

SWB6859EV01G

Vehicle Maintenance Manual

Functional group: 17



SUNWIN Bus Sales Department

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Foreword

This manual is formulated in accordance with the rules of the *Implementation Management Measures for the Disclosure of Automotive Maintenance Technology Information*.

This manual is prepared by Shanghai Sunwin Bus Corporation.

The authorship and interpretation rights of this manual belong to Shanghai Sunwin Bus Corporation. Please contact us for correction if users find discrepancies between the content of the maintenance manual and the actual condition of the vehicle.

For your personal and property safety, please read this manual carefully before starting work and strictly follow the instructions in this manual.

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I. Safety Precautions

1. High voltage electrical warning

1.1 The vehicle provides safety warning information such as "Danger" and "Warning" signs. Before maintenance operations or carrying out maintenance steps, relevant prompts and prescribed operation safety requirements shall be strictly followed;

"Danger" indicates that failure to follow the prescribed procedures will result in serious injury or death;

"Warning" indicates a direct danger, which may lead to serious personal injury if the prescribed operating procedures are not followed;

1.2 Any high-voltage wire is wrapped in orange red insulated threaded pipes with warning signs on the joints.

1.3 A current exceeding 10mA is a dangerous current, and the person who is electrocuted will have difficulty getting rid of the charged object. The current can damage the body's muscle function and nervous system. When an electric current passes through the chest, it can cause the chest muscles to malfunction, affecting breathing and ultimately leading to suffocation.

1.4 If an electric shock accident occurs and the person is unable to escape the current alone, the power supply must be disconnected before moving the person, because the person is also live before the power supply is disconnected. Regardless of whether the electric shock injury is severe or not, seek medical attention promptly and report the accident.

1.5 If the injured person's heart or breathing stops, immediate cardiopulmonary resuscitation shall be performed and 120 shall be dialed.

2. Safety protection requirements

2.1 Personal safety protection requirements

2.1.1 Maintenance personnel must wear necessary safety protective equipment, such as insulating gloves (both high-voltage electrical gloves and battery electrolyte acid-base gloves shall be prepared), insulating rubber shoes, insulating rubber pads, and protective glasses. Their voltage resistance level must be greater than 1.5 times the maximum voltage to be measured, and the personnel must not wear metal jewelry.

2.1.2 Before use, insulating gloves must be checked for any damage, holes, or cracks, and shall

be intact and undamaged; Protective equipment such as insulating rubber shoes shall not have water during operation, and the inner and outer surfaces shall be clean and dry to ensure safety.

2.1.3 When repairing the high-voltage electrical system of vehicles, a safety guardian must be appointed, whose is responsible for supervising the entire maintenance process.

2.1.4 It is strictly prohibited for untrained personnel to carry out high-voltage maintenance, and all dangerous operations with a sense of luck are prohibited to avoid safety accidents.

2.1.5 When repairing power battery packs with electrolyte leakage, protective glasses shall be worn to prevent electrolyte from splashing into the eyes.

2.1.6 Do not touch the live parts inside the high-voltage wire harness connectors with your fingers to avoid electric shock.

3. Safety maintenance operation specifications

3.1 Before repairing the high-voltage electrical system of the vehicle, please adopt safety isolation measures (such as using warning barriers or dividing dedicated maintenance positions for isolation), and set up high-voltage warning signs to alert relevant personnel and avoid safety accidents.

3.2 When repairing the high-voltage system, the ignition switch must be in the OFF position (the vehicle is not in a charging state), and the emergency maintenance switch must be pressed (if equipped, or unplug the positive and negative bus of the power battery). After the emergency maintenance switch is pressed, it is supervised by the safety guardian to ensure that during the entire maintenance process, it is strictly prohibited for anyone to turn it on in violation of regulations in the situation that power is not allowed.

3.3 After disconnecting the emergency maintenance switch for 5 minutes, before repairing the high-voltage system, a multimeter shall be used to measure the entire vehicle's high-voltage circuit to ensure that there is no electricity. After disconnecting the device and preventing reconnection, electrical components such as capacitors and cables may still carry charges and shall be discharged using appropriate devices.

3.4 During the maintenance process, corresponding warning signs shall be posted in prominent areas of the vehicle.

3.5 After the maintenance work is completed, before powering on the vehicle, pay attention to

confirming whether there are still personnel performing high-voltage maintenance operations to avoid danger; And with the confirmation of safety by the safety guardian, the maintenance personnel shall restore the high-voltage power supply.

3.6 Any connection involving high-voltage component connectors must be restored to the normal state before disconnection!

4. Site requirements, equipment, and facilities

4.1 The workplace shall be clearly defined and labeled. Adequate working space, access routes, and lighting shall be provided for all parts of the electrical equipment used to carry out any work activities on or near it. If necessary, the safe access to the workplace shall be clearly marked.

4.2 Appropriate preventive measures shall be taken to prevent harm to personnel from other hazards in the workplace and work activities, such as machinery or pressure systems, or falling objects.

4.3 Items and/or combustible materials that obstruct entry and exit shall not be placed near or within the access and escape routes of electrical switch gear and control equipment, nor shall they be placed in areas where personnel need to operate these equipment.

4.4 Combustible materials stored near electrical devices shall be kept away from all ignition sources.

4.5 If the work location cannot be marked and/or clearly determined, inappropriate work areas shall be marked.

4.6 Install a grounding pole for a dedicated maintenance station for new energy vehicles at the high-voltage electrical station for vehicle maintenance.

4.7 Install safety isolation measures at the high-voltage electrical stations for vehicle maintenance (such as using warning barriers or dividing dedicated maintenance positions for isolation), and set up high-voltage warning signs to alert relevant personnel and avoid safety accidents.

5. Maintenance identification

5.1 Warning signs for the maintenance area of new energy vehicles shall be hung prominently on the vehicle body or fence.

5.2 Warning signs for power outage maintenance of new energy vehicles shall be hung at the obvious disconnection point of the power battery.

Table of Hazard Identification Symbols

Hazard symbol	Hazard classification	Symbol description
	Attention	Pay attention to safety
	Warning	Be careful of electric shock
	Warning	Pay attention to high temperatures
	Warning	Flammable materials
	Warning	Explosive or flammable gas atmosphere
	Warning	Caution! Mechanical injury
	Warning	Be careful of high temperature burns
	Attention	Protective conductor terminal (grounding)
	Prompt	Gas mask must be worn
	Prohibition	No burning

II. Chassis Maintenance Manual

Chapter I Brake Maintenance Manual

I. Component Introduction

1. Component functions

The rotating components in the friction pair of a disc brake are metal discs that work on the end face, known as disk brakes. The friction element clamps the disk brake from both sides to produce braking.

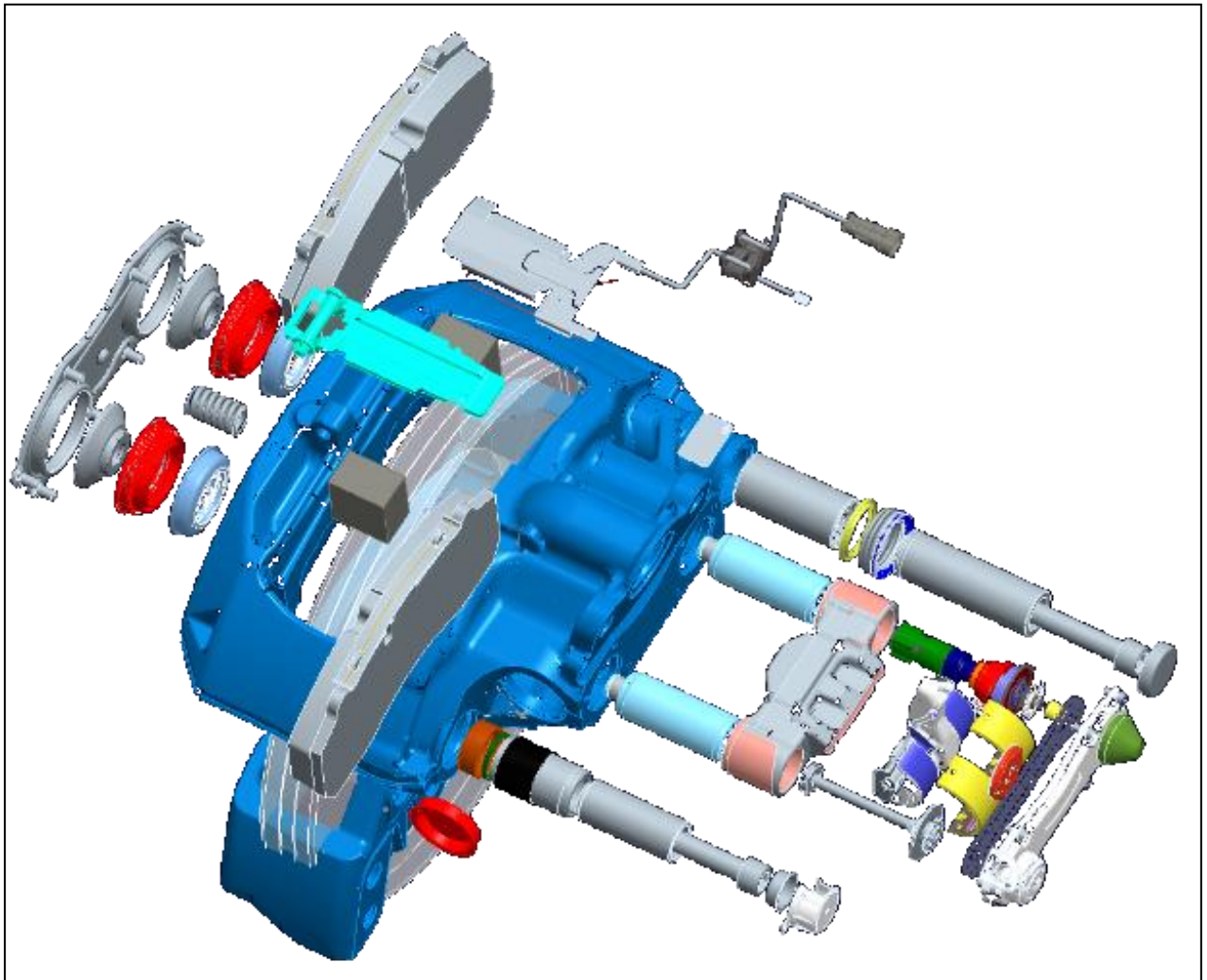
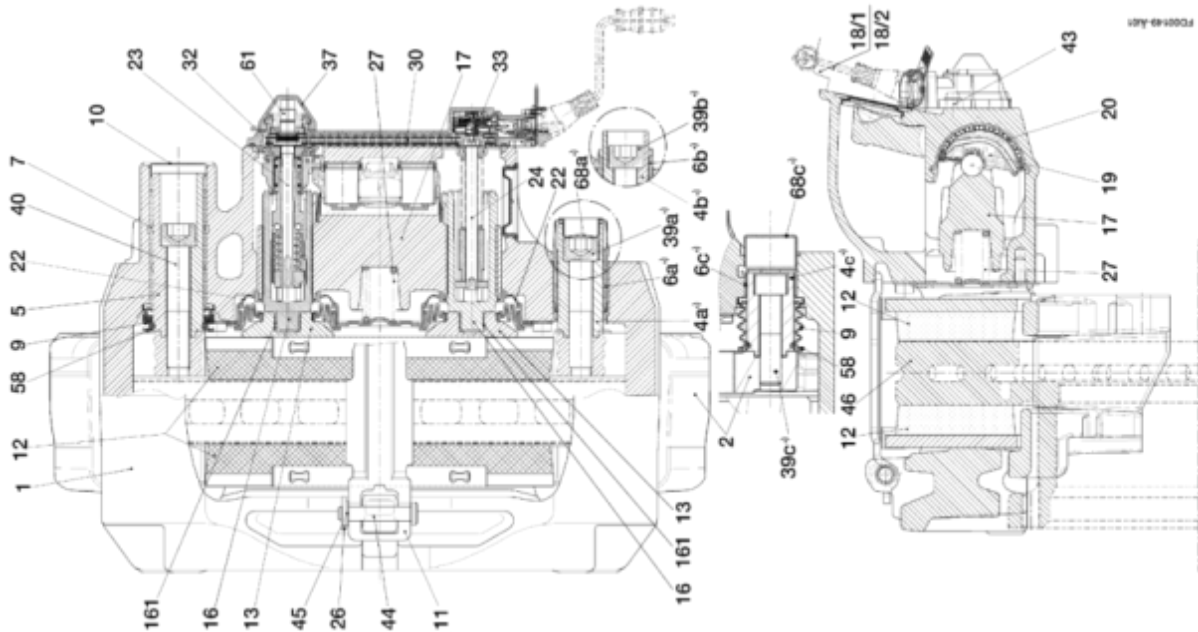


Fig. Disc Brake

2. Component structure

The disc brake mainly consists of floating caliper, brake shoe, disk brake, and brake cylinder. The component structure is shown in the following figure:



1 Caliper body	2 Bracket	4a*) Guide pin
4b*) Guide pin	4c*) Guide pin	5 Guide pin
6a*) Rubber bellow	6b*) Rubber bellow	6c*) Guide sleeve (DU)
7 Brass bushing	9 Inner protective cap	10 Steel cap
11 Brake pad baffle	12 Brake pad (assembly)	13 Thrust disc assembly with sleeve
16 Threaded pipe	17 Connecting bridge	18/1 Spring brake chamber
18/2 Diaphragm brake chamber	19 Lever	20 Eccentric bearing
22 Inner seal cartridge	23 Regulator	24 Rotating device
26 Spring locking pin	27 Pull back spring	30 Chain
32 Sprocket	33 Wear sensor	37 Regulator cap
39a*) Hexagon socket head cap screw	39b*) Hexagon socket head cap screw	39c*) Hexagon socket head cap screw
40 Hexagon socket head cap screw	43 Bolt	44 Brake pad baffle pin
45 Washer	46 Disk brake	58 Ring
61 Torque protector	68a*) Cover	68c*) Steel cap
161 Thrust disc bushing		

Fig. Structure of Disc Brake

3. Component principle

3.1 Braking process

When braking, the push rod (18/1 or 18/2) of the brake chamber pushes the lever (19), and the thrust is transmitted to the connecting bridge (17) through the eccentric bearing (20), which is divided into two parts. Through the threaded pipes (16) on both sides, the thrust disc with sleeve (13) is pushed, and finally the inner brake pad (12) is pushed towards the direction of the disc brake.

As the gap between the brake pad and disc brake decreases, the floating caliper moves in the opposite direction of the inner brake pad movement, transmitting braking force to the outer brake pad (12). In this way, the brake pads on both sides form a clamping force on the rotating disk brake, which generates braking force on the wheels and causes the car to brake.

3.2 Release of braking

After the air pressure in the brake chamber is released, two pull back springs (27) push the connecting part (17) and lever (19) back to the initial position, ensuring the rotational clearance between the brake pads and disk brakes on both sides.

3.3 Adjustment of brake clearance

To ensure that the rotational clearance between the brake pads and disk brakes remains unchanged, the disc brakes are equipped with an automatic adjustment mechanism with minimal wear and tear. Due to the mechanical connection between the regulator (23) and the lever (19), the regulator will operate every time the brake is applied. With the wear of the brake pad, the rotational clearance between the brake pad and the disk brake increases. During the braking process, the regulator(23) and the rotating device (24) rotate relatively, so that the forward distance of the threaded pipe (16) is equal to the wear amount that must be compensated. The total clearance (sum of clearances on both sides of the disk brake) shall be between 0.6-1.1mm. A too small clearance may cause overheating of the frictional parts.

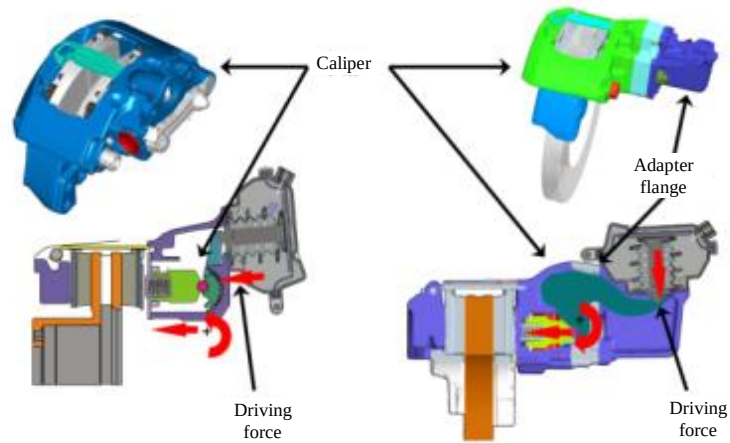


Fig. Working Principle of Brake

II. Special Tools

SN6/SN7/NA7 brake tool kit K001288

ZB9031-2 portable diagnostic tester

It is used to detect vehicles employing Knorr Bremse's disc brakes equipped with continuous potentiometer type wear indicators.

By connecting this diagnostic tester to the 13-pin socket (DIN72570) on the vehicle, the wear of each brake can be measured. The vehicle manufacturer connects this socket to each sensor.

This detector can be used for the following tests:

- a) Quickly and concisely check for wear and tear
- b) Check the operation of the potentiometer
- c) Check up to six brakes simultaneously without removing the wheels



Fig. Brake Repair Kit

1. Lubricating grease

Part number	Color	Weight
II14525	White	5 grams
II32868	White	500 grams

2. Torque requirements

Part number		Torque	Wrench size (mm)
39a; 39b; 39c; 40	Brake caliper bolts (2) M16 × 1.5 (hexagon socket head cap screw)	180Nm+90°	14 (External hexagonal wrench)
18/1; 18/2	Diaphragm brake chamber/spring brake chamber from other brake chamber manufacturers	Follow the requirements of the brake chamber manufacturer	—

III. Maintenance Data

A=Disc thickness: new disc 45mm, 37mm after wear, replacement must be carried out

C=Total thickness of brake pad (new pad) 30mm

D=Bottom plate 9mm

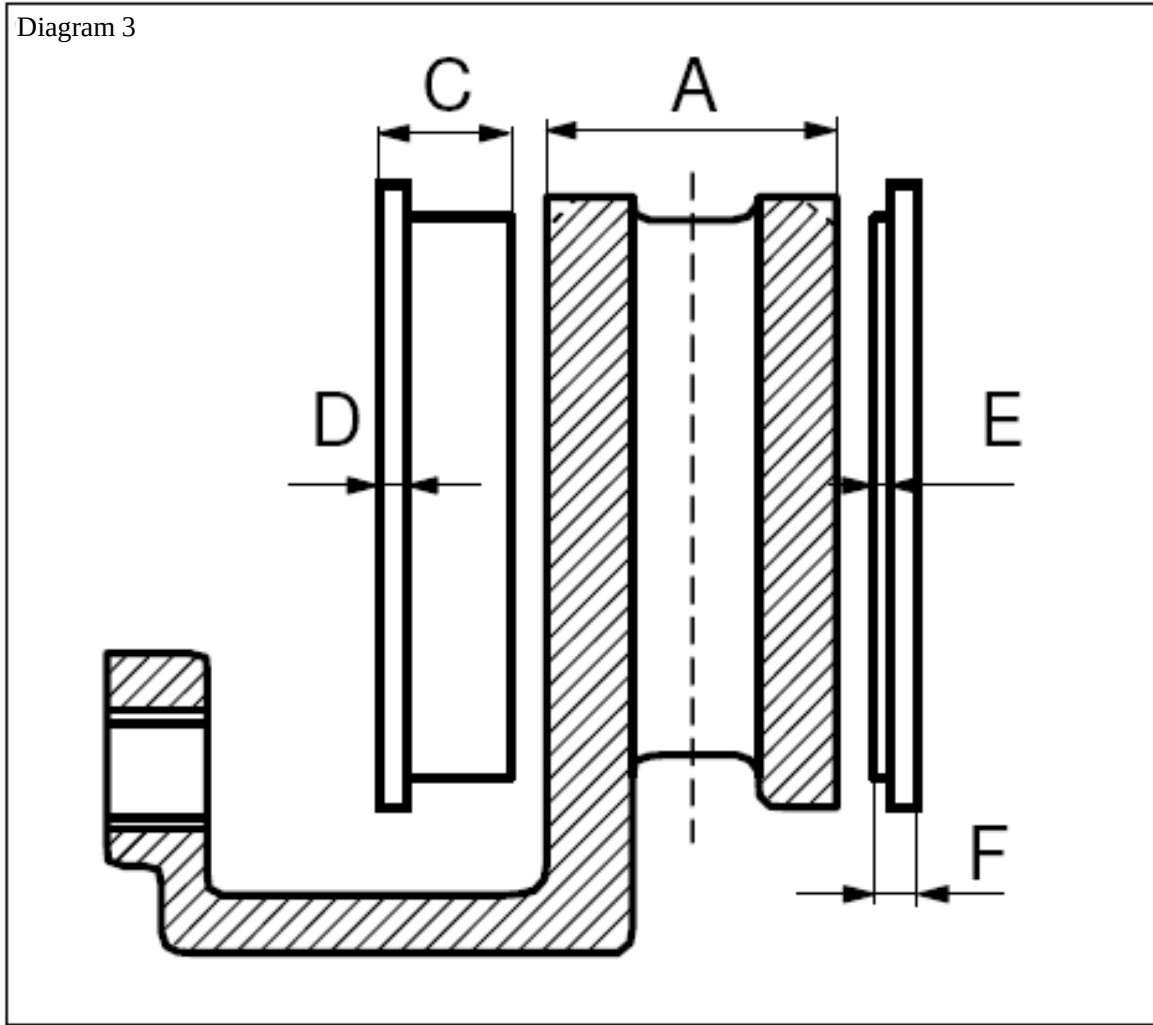
E=Minimum thickness of friction material 2mm

F=Minimum allowable value of the total thickness of friction material and bottom plate 11mm, and the brake pad must be replaced.

If dimension $A \leq 39\text{mm}$, the brake pad and disk brake need to be refurbished.

When the disc thickness is less than 37mm, it must be replaced.

Diagram 3



IV. Circuit Diagram

None

V. Fault Diagnosis

The brake faults and troubleshooting measures are shown in the table below:

Faults	Cause of fault	Troubleshooting method
Braking noise and vibration	Cracks or grooves on the disk brake	Replace or repair the disk brake
	The runout of the disk brake does not meet the requirements	Replace or repair the disk brake
	Permanent deformation of the friction block pressure spring	Replace the friction block pressure spring
	The friction block cannot slide freely on the bracket	Clean the bracket
	Fail in using the friction blocks specified by Ningbo Heli Company	Replace with the friction block of Ningbo Heli Company

Brake deviation	One side of the friction block is worn out	Replace friction block
	Abnormal clearance between friction block and disk brake	Perform clearance adjustment and functional inspection
	Inconsistent air pressure on both sides	Refer to the vehicle user manual
	The vent plug of the air chamber has not been removed	Remove the vent plug of the air chamber
	Fail in using the friction blocks specified by Ningbo Heli Company	Replace with the friction block of Ningbo Heli Company
	Adjustment function failure	Check the adjustment function
Brake drag	Compressed air present in the air chamber	Refer to the vehicle user manual
	Parking brake not released	Release the parking brake
	Abnormal clearance between friction block and disk brake	Perform clearance adjustment and functional inspection
	The friction block cannot slide freely on the bracket	Clean the bracket
	Abnormal sliding function of the caliper body	Replace the guide pin or bushing
	Abnormal clearance of wheel hub bearings	Refer to the vehicle user manual
	The vent plug of the air chamber has not been removed	Remove the vent plug of the air chamber
	Fail in using the friction blocks specified by Ningbo Heli Company	Replace with the friction block of Ningbo Heli Company
No braking or weak braking	Friction block is worn out	Replace friction block
	Excessive clearance between friction block and disk brake	Perform gap adjustment and automatic adjustment function check
	Abnormal wear of the disk brake	Replace or repair the disk brake
	Abnormal air pressure	Refer to the vehicle user manual
	The vent plug of the air chamber has not been removed	Remove the vent plug of the air chamber
	Fail in using the friction blocks specified by Ningbo Heli Company	Replace with the friction block of Ningbo Heli Company
	Adjustment function failure	Check the adjustment function
Brake smoke	Brake clearance too small	Perform initial clearance adjustment
	Half shaft oil seal is damaged	Replace the half shaft oil seal
	Excessive oil in the axle housing	Adjust the oil level height of the axle housing
	Fail in using the friction blocks specified by Ningbo Heli Company	Replace with the friction block of Ningbo Heli Company
	Abnormal high temperature	Check the brake return function and

	generated by brake dragging	sliding performance
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VI. Method of disassembly and assembly

6.1 Replacement of brake pad

6.1.1 Disassembly of brake pad

Remove the wheels (please follow the vehicle manufacturer's instructions).

Attention:

We strongly recommend checking the regulator mechanism for proper operation before disassembling the brake pads.

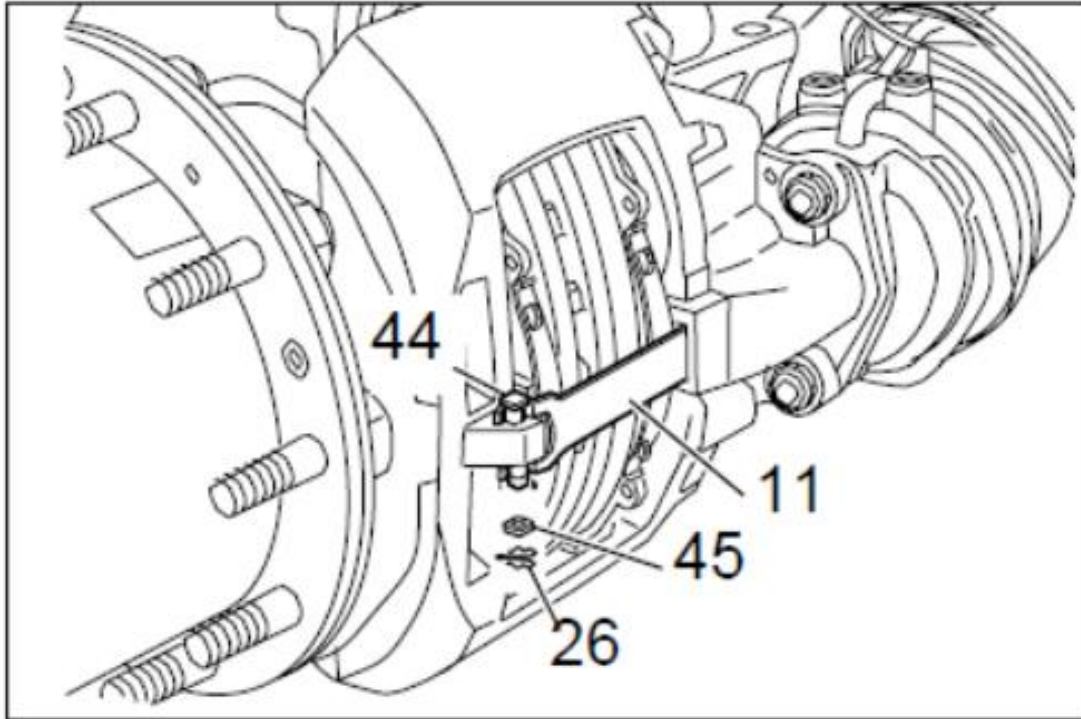
Remove the locking pin (26) and gasket (45), press the brake pad baffle (11) and pull out the pin (44).

If necessary, remove the wear indicator placed inside the brake pad.

If the baffle (11) is corroded or damaged, it should be replaced. Remove the regulator cap (37) by pulling the lug, being careful not to lose the torque protector (61).

It is not allowed to use a screwdriver or similar tool to remove the regulator cap, as doing so may damage the seal.

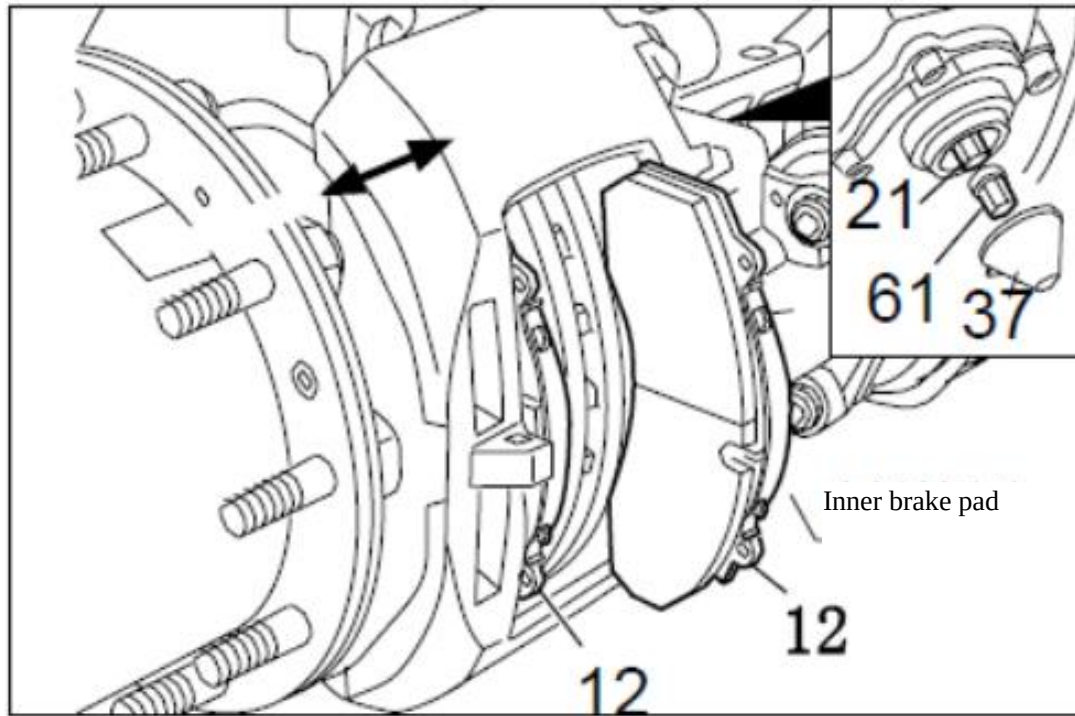
Rotate the torque protector (61) counterclockwise to fully retract the thrust disc assembly with sleeve (13).



Attention:

Never turn the regulator (23) without the torque protector (61) installed properly. If the shearing moment borne by the torque protector is too large and the protector is intentionally damaged, replace it with a new (unused) protector and try again. If it still fails, the brake caliper must be replaced because there is an internal fault in the brake caliper.

Do not use an open-ended wrench as it may damage the regulator.



6.1.2 Installation of brake pad

The brake pad must be replaced on an axle basis and **cannot** be replaced individually. Brake pads approved by the vehicle manufacturer, axle manufacturer, and disc brake manufacturer must be used. Failure to comply with the above terms will terminate the warranty of Knorr Bremse Company, as well as the vehicle manufacturer's warranty and affect the vehicle's operating license.

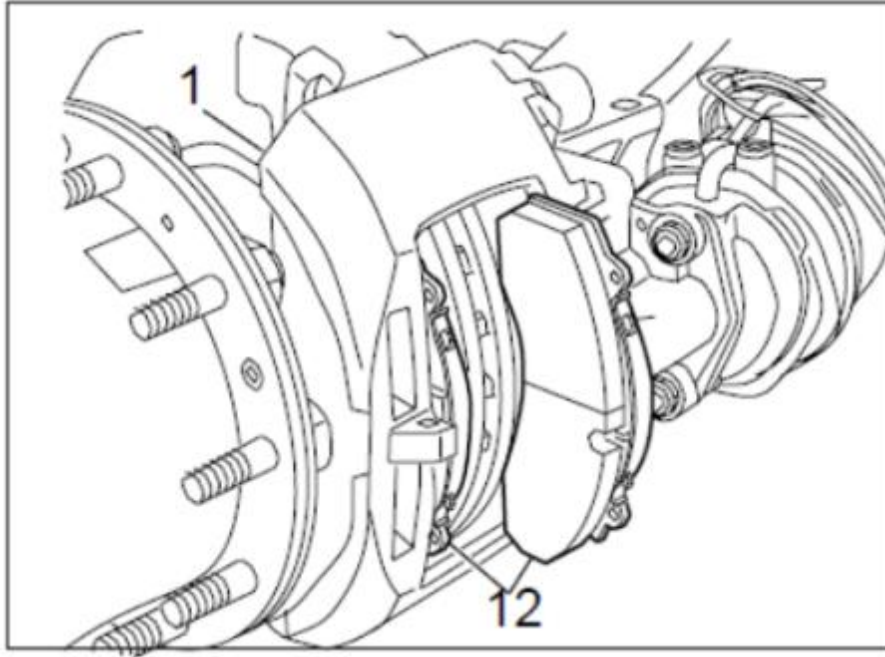
Attention:

Before installing the brake pads, rotate the torque protector (61) counterclockwise to fully retract the thrust disc assembly with sleeve (13).

Never turn the regulator (23) without the torque protector (61) installed properly. If the shearing moment borne by the torque protector is too large and the protector is intentionally damaged, replace it with a new (unused) protector and try again. If it still fails, the brake caliper must be replaced because there is an internal fault in the brake caliper.

Do not use an open-ended wrench as it may damage the regulator.

Clean the support seat of the brake pads.



After installing the brake pad baffle (11) into the baffle groove, press down on the baffle to install the brake pad baffle pin (44).

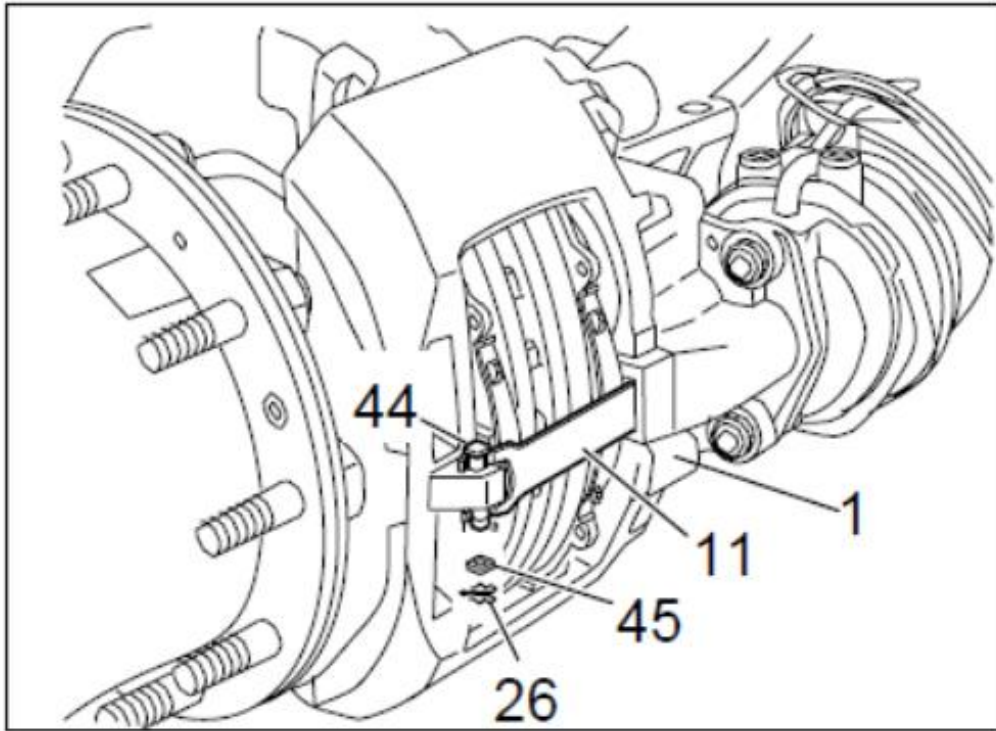
Install the gasket (45) and locking pin (26) onto the baffle pin (44) (only new parts can be used).

Recommend installing the baffle pin (44) in a downward direction (see diagram).

Reinstall the wheels according to the vehicle manufacturer's instructions.

Only use new and white grease (part number II14525 or II32868)

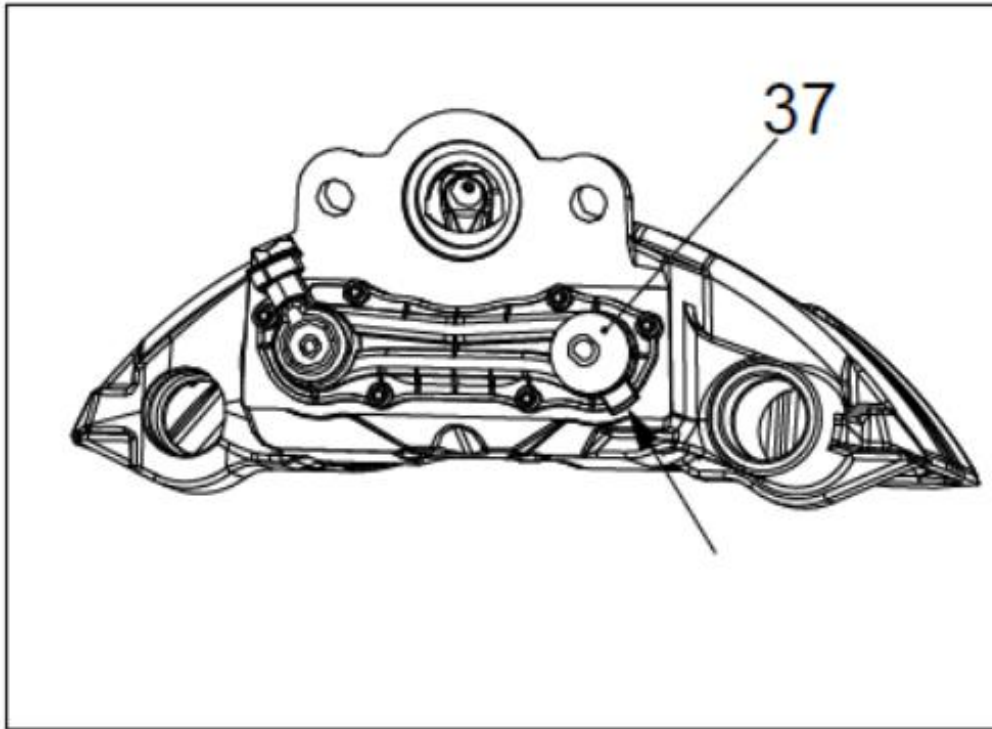
Slightly lubricate the regulator cap (37) on the contact surface.



Attention:

The lug of the regulator cap (37) shall be installed at the position indicated by the arrow in the side diagram. This will help with disassembly during the next maintenance and repair.

After any maintenance and warranty work is completed: please check the braking performance and the operation of the braking system on the drum tester, and check the function and effectiveness. Please remember that during the breaking-in period period, there will be a decrease in performance of the brake pads and/or disk brakes.

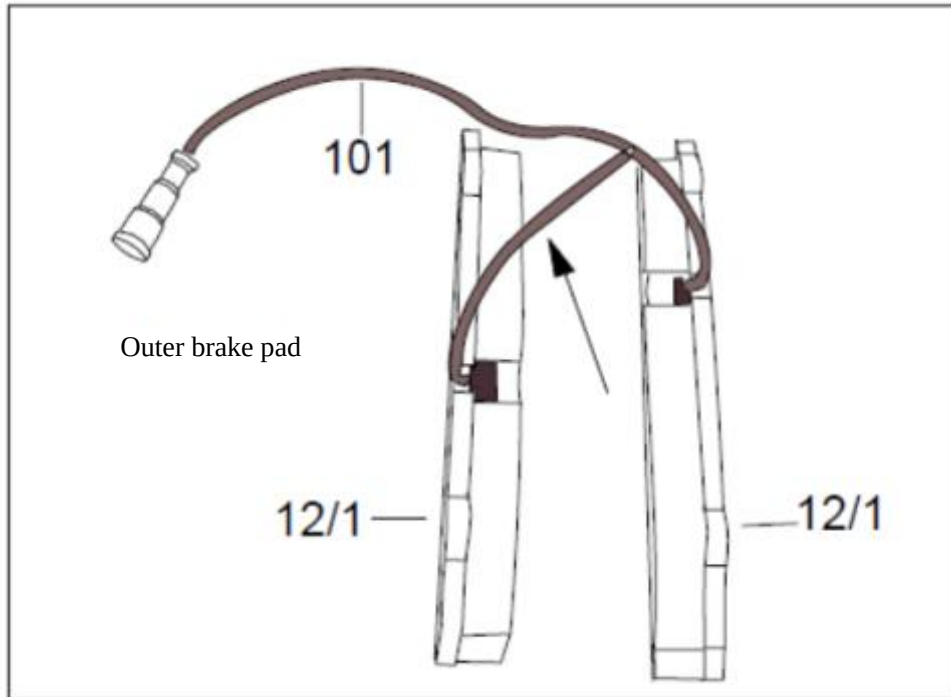


6.1.3 Installation of wear indicator (cable type placed inside brake pad)

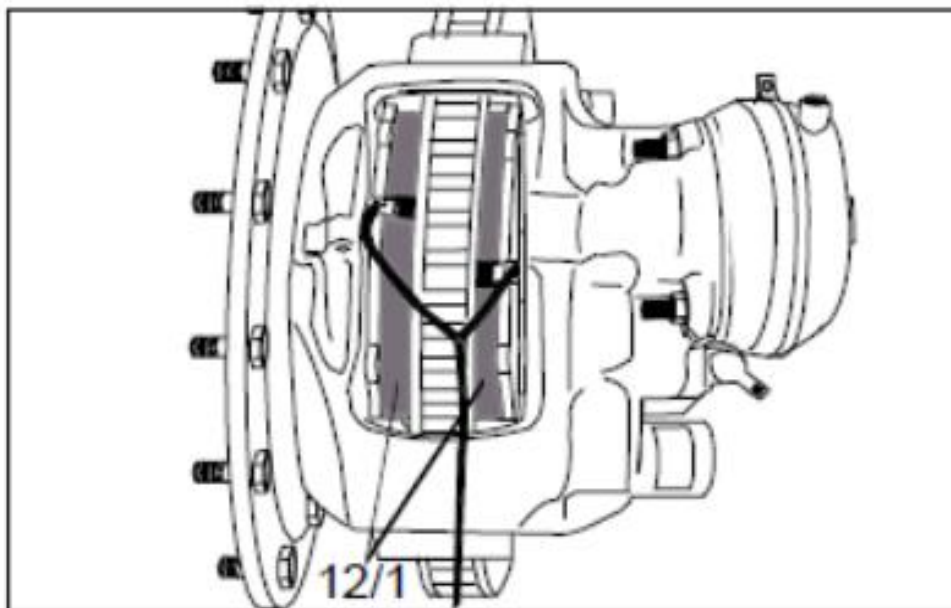
Remove the brake pad (12)

Insert the wear indicator cable (101) into the groove of the brake pad, and the wear indicator shall be inserted into the hole of the brake pad friction material.

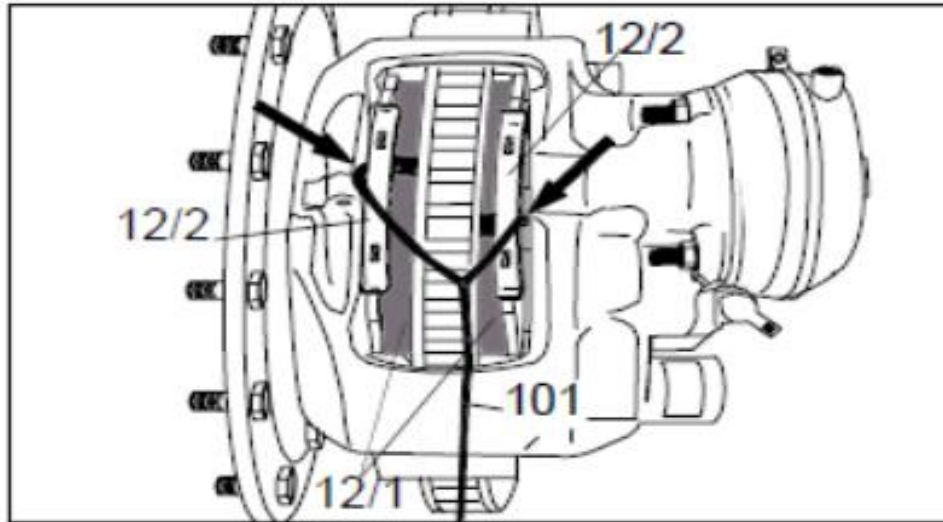
The cable (arrow) on the longer side of the wear indicator (101) must be installed on the outer brake pad (12/1).



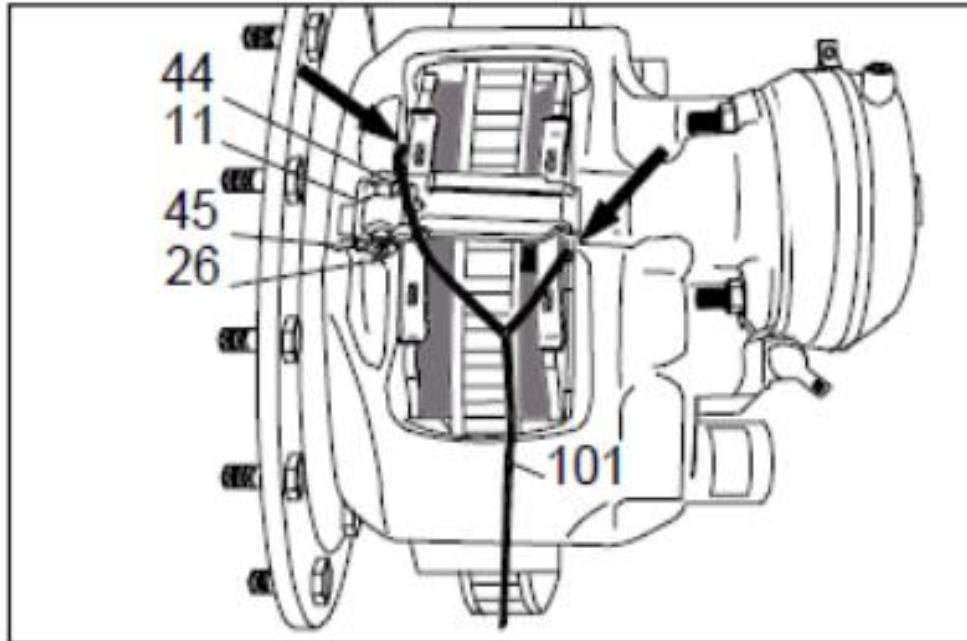
Place the brake pad (12/1) on the support seat of the brake pad.



Install the brake pad retaining spring (12/2) onto the brake pad (12/1), paying attention to the correct installation of the wear indicator cable (101) (refer to the arrow).

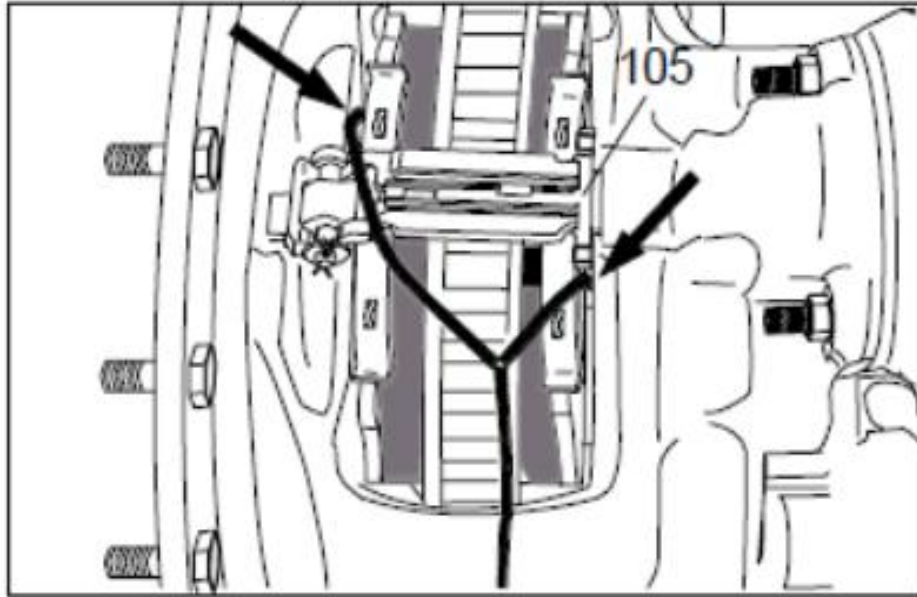


Install the brake pad baffle (11), baffle pin (44), washer (45), and spring locking pin (26). Pay attention to the correct installation of the wear indicator cable (101) (refer to the arrow).



6.1.3.1 Cable guide (105)

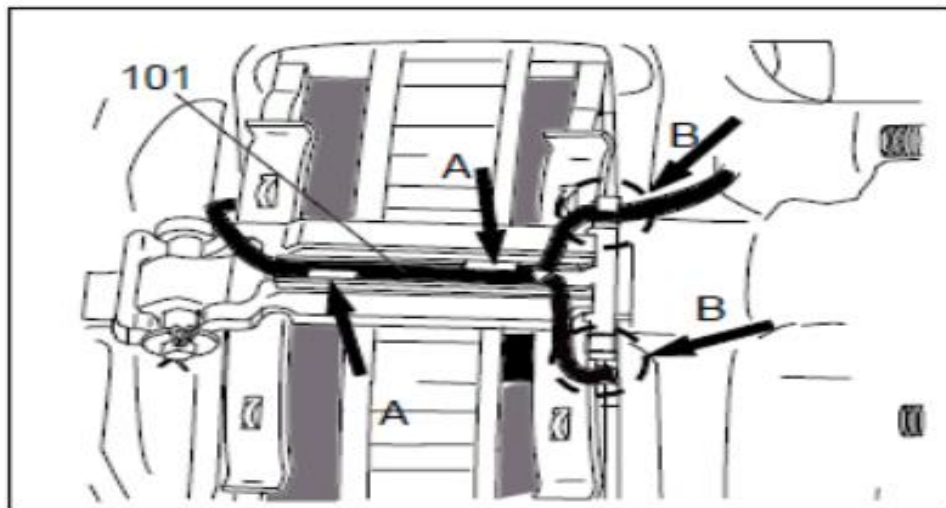
Install cable guide (105) onto brake pad baffle (11). On the right side, the cable guide (105) is gently pressed into the appropriate position in the brake pad baffle (11).



Press the wear indicator cable (101) into the groove of the cable guide (105) position (refer to arrow A).

According to the different vehicle models, install the wear indicator cable leading to the vehicle power supply in one of the two grooves of the cable guide (refer to arrow B).

The shorter side of the wear indicator cable (101) does not need to be firmly located in the groove of the cable guide (105).



6.1.3.2 Cable guide (105a)

Install the wear indicator cable (101) in the center of the brake pad baffle (11).

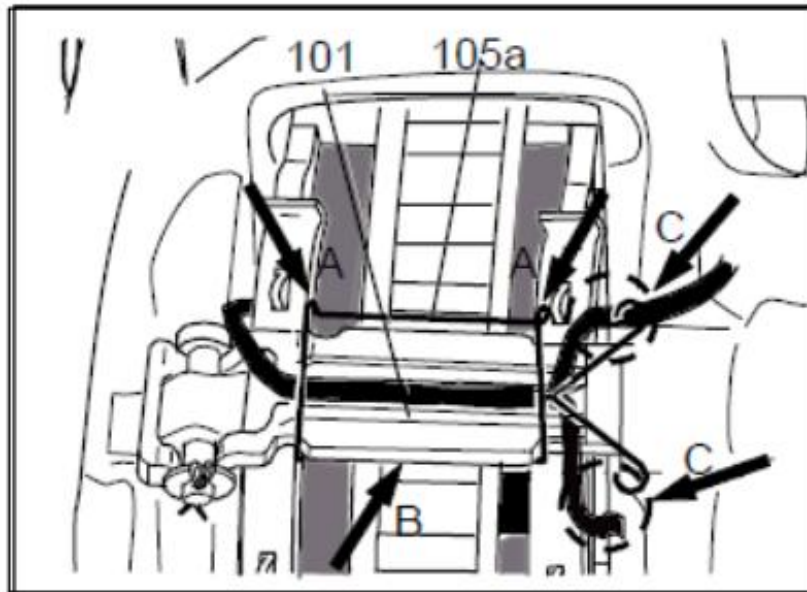
Insert the cable guide (105a) into one side of the brake pad baffle (11) (refer to arrow B).

Gently press the other side of the brake pad baffle (11) (refer to arrow A). Press the cable

guide (105) into the appropriate position.

According to the different vehicle models, install the wear indicator cable leading to the vehicle power supply in one of the two grooves of the ring cable guide (refer to arrow B).

The shorter side of the wear indicator cable (101) does not need to be firmly located in the groove of the ring cable guide (105a). (Refer to arrow C).

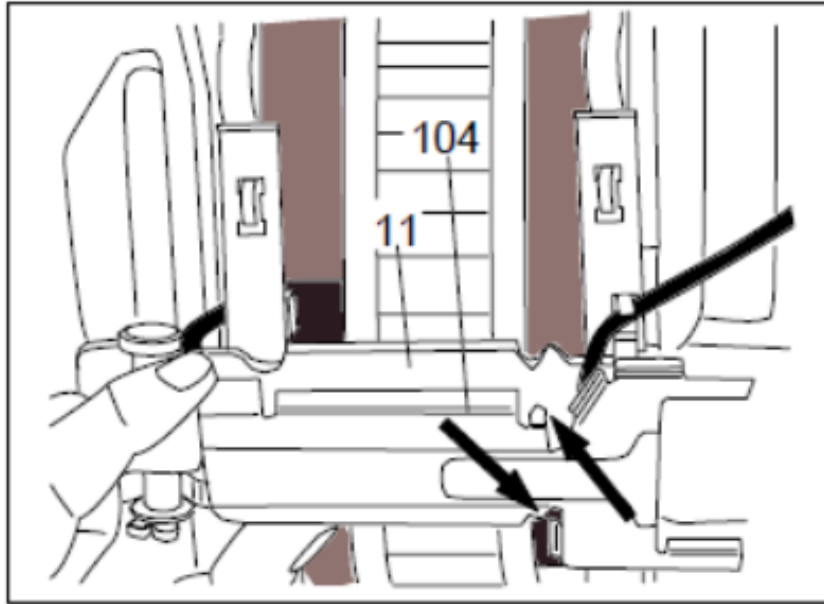


6.1.3.3 Cable protection board (104)

Install the cable protection board (104) onto one side of the brake pad baffle (11).

Pay attention to the correct position of the cable protection board positioning bolts (refer to the arrow).

Press the cable protection board (104) radially with your hands and force to enter the appropriate position.



6.2 Replacement of thrust disc assembly with sleeve (13) and inner seal cartridge (22)

6.2.1 Disassembly of thrust disc assembly with sleeve (13)

Attention:

The disassembly of the thrust disc assembly with sleeve (13) can be done either when the brake caliper is installed on the vehicle or after the brake caliper is removed from the vehicle.

Rotate the regulator (61) clockwise until the sleeve is exposed (maximum distance 30mm).

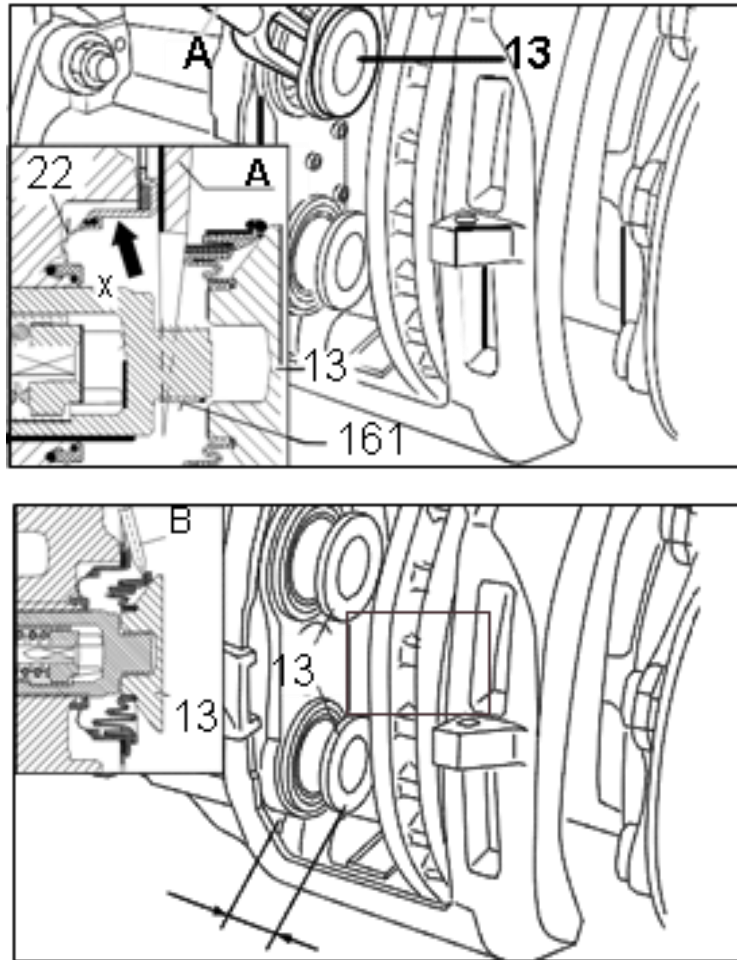
Use a screwdriver or similar tool to remove the sleeve (as shown in side view B).

When removing the thrust disc with sleeve (13) from the threaded pipe (16) using a wedge fork A (part number II32202), press the wedge fork between the thrust disc and the threaded pipe.

Remove the old thrust disc bushing (161). Check the surface of the inner sealing seat (arrow X).

If the inner sealing seat (X) is damaged, a new brake caliper must be replaced.

When replacing the thrust disc with sleeve (13), the inner seal cartridge (22) must also be replaced.



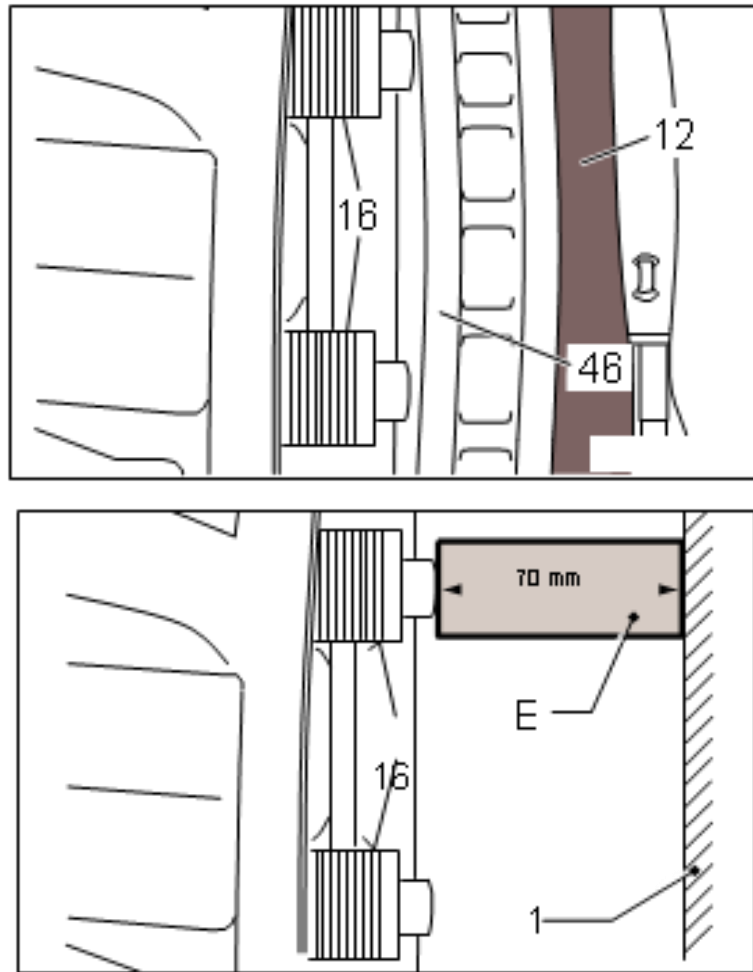
6.2.2 Inspection of threaded pipe (16)

Install a new brake pad (12) on the outside to avoid exceeding the stroke of the threaded pipe.

Do not completely unscrew the threaded pipe from the connecting bridge, as it will cause the synchronization function to fail and the brake caliper must be replaced.

If the brake caliper is not installed on the axle, a stopper E (length=70mm) shall be placed at the brake caliper (1) when unscrewing the threaded pipe (16) (see side view), and the thread shall be checked for corrosion or damage during the unscrewing process.

If there is water intrusion or erosion, the brake caliper must be replaced.



6.2.3 Replacement of inner seal cartridge (22)

Rotate the torque protector (61) counterclockwise to fully turn the threaded pipe (16) back.

Clean the surrounding area of the inner seal cartridge (22).

Use a screwdriver or similar tool to remove the inner seal cartridge (22) (as shown in side view A).

The inner seal cartridge (22) on the brake caliper must not be damaged on the mounting seat surface (X), otherwise the brake caliper must be replaced (refer to the arrow in the bottom diagram)

Clean the surface of the sealing seat (X).

Turn the torque protector (61) clockwise to unscrew the threaded pipe (maximum 30mm) and check the thread.

Use lubricating grease (part number: II4525 or II32868) to lubricate the thread and rotate it into the brake caliper until it stops.

Install the inner seal cartridge (22) onto the threaded pipe (16) separately.

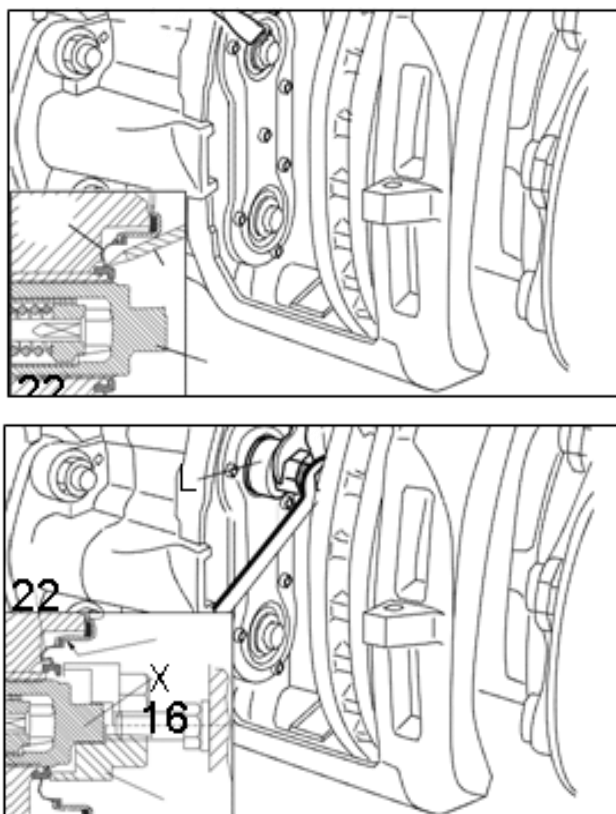
When the brake caliper is installed on the axle:

Remove the thrust disc bushing (161).

Place the short support rod tool (L) (part number Z004361) in the position shown.

The tool (L) is guided by the optical axis of the threaded pipe (16).

Use a wrench to rotate tool T3 and fully press in the inner seal cartridge (22).



Check the correct installation of the inner seal cartridge (22), rotate the torque protector (61) clockwise to unscrew the threaded pipe (16) by 4 or 5 threads.

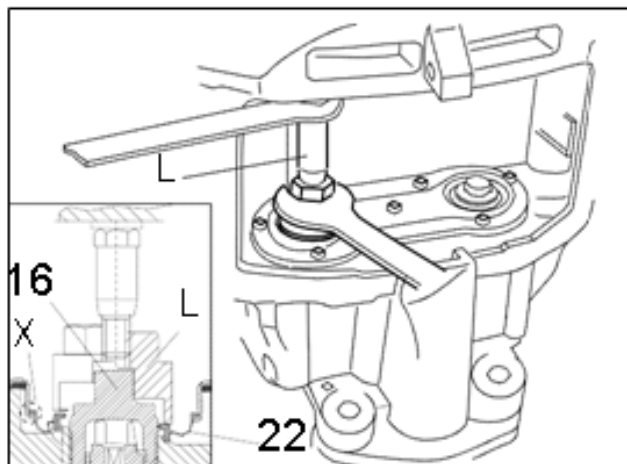
The inner seal cartridge (22) shall not rotate.

When the brake caliper is not installed on the axle:

The installation sequence of the inner seal cartridge (22) is exactly the same as that when the brake caliper is installed on the axle.

When pressing in the inner seal cartridge (22), use long support rod tools (T3+T4) (part number Z004361).

Check the correct installation of the inner seal cartridge (22), rotate the torque protector (61) clockwise to unscrew the threaded pipe (16) by 4 or 5 threads.



6.2.4 Assembly of thrust disc assembly with sleeve (13)

When the brake caliper is installed on the axle:

The threaded pipe (16) must be fully screwed back.

Clean each sealing seat of the brake caliper thrust disc with sleeve (13), ensuring that it is clean and free of grease.

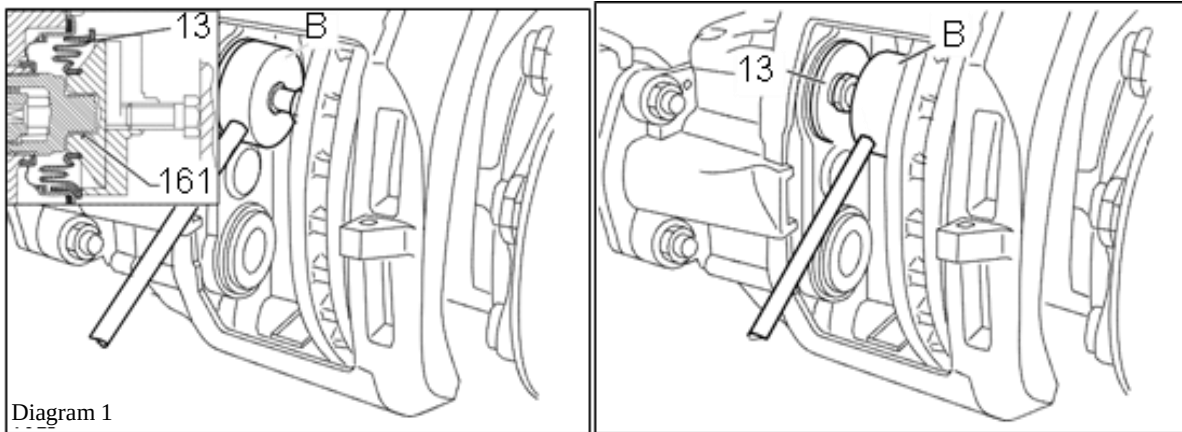
Install the new thrust disc bushing (161) onto the optical axis of the threaded pipe (16).

Place the thrust disc with sleeve (13) at the thrust disc hole of the threaded pipe (16).

Place the short support rod (T3) and the pressing tool combination (B) (part number Z004190) in the center position and press in the sleeve.

Reverse the pressing tool B and short support rod (T3) combination and press in the thrust disc.

After assembling the thrust disc with sleeve (13), the thrust disc must be able to rotate freely left and right.



When the brake caliper is not installed on the axle:

The threaded pipe (16) must be fully screwed back.

Clean each sealing seat of the brake caliper thrust disc with sleeve (13), ensuring that it is clean and free of grease.

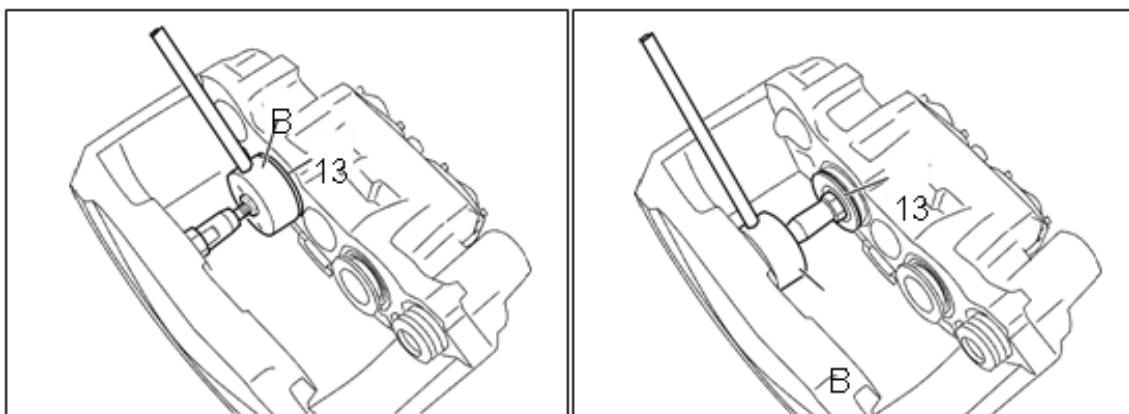
Install the new thrust disc bushing (161) onto the optical axis of the threaded pipe (16).

Place the thrust disc with sleeve (13) at the thrust disc hole of the threaded pipe (16).

Place the long support rod (T3+T4) and the pressing tool combination (B) (part number Z004190) in the center position and press in the sleeve.

Reverse the pressing tool B and the long support rod (T3+T4) combination and press in the thrust disc (refer to the diagram).

After assembling the thrust disc with sleeve (13), the thrust disc must be able to rotate freely left and right.



6.3 Replacement of brake caliper body

6.3.1 Disassembly of brake caliper on bracket

Remove the brake pad (12).

Remove the brake chamber.

If there is a cable for a wear indicator or a cable for a potentiometer type wear indicator installed, please remove it.

Removal of steel cap (10): Use a suitable tool (such as a screwdriver) to insert it into the steel cap (10).

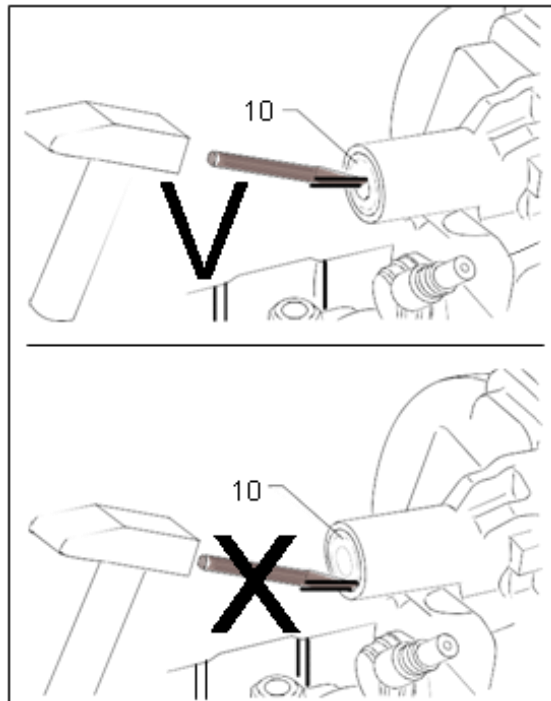
When inserting, the steel cap may move inward by about 10 millimeters.

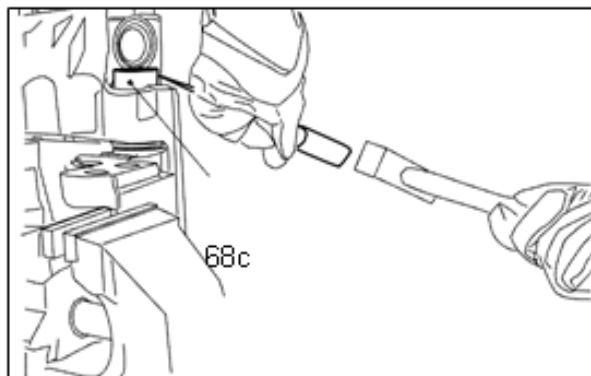
Remove the steel cap (10).

Removal of steel cap (68c): The protruding steel cap (68c) must be removed using a screwdriver or similar tool, as shown in the figure.

Do not remove the steel cap (68c) in the direction of the brake caliper, as this may cause damage to the brake caliper or caliper body parts.

Check the internal area of the guide pin hole on the side of the removed steel cap (68c), and also check whether the internal area of the guide pin bushing is corroded and dirty. If there is rust, the brake caliper body must be replaced.

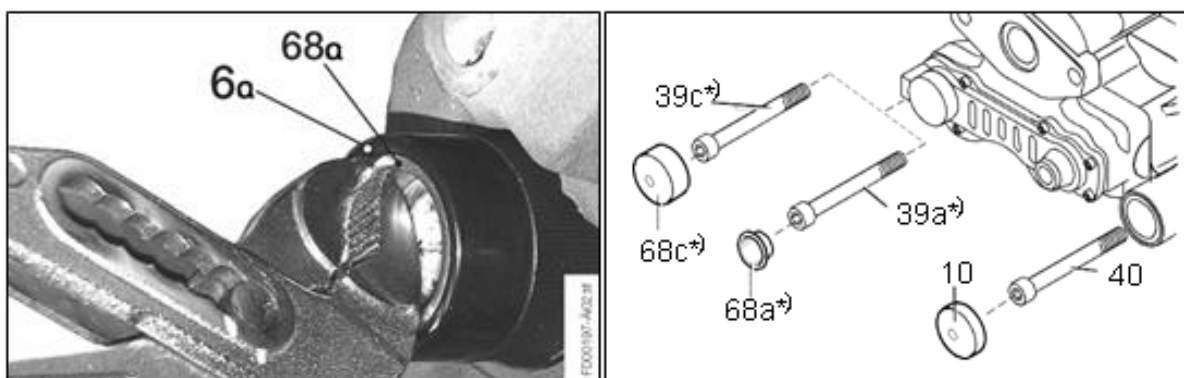




Removal of cover (68a): For brake calipers with rubber bellows (6a), use appropriate tools to pull the cover (68a) out of the guide pin (4) (refer to attached figure).

Remove the brake caliper from the bracket: Before removing the brake caliper bolts (39 and 40), make sure that the brake caliper (1) does not move or fall due to removing the bolts, otherwise it may cause damage or injury to people.

Remove the brake bolts (39) and (40) and discard them.



6.3.2 Installation of brake calipers (bracket fixed to axle)

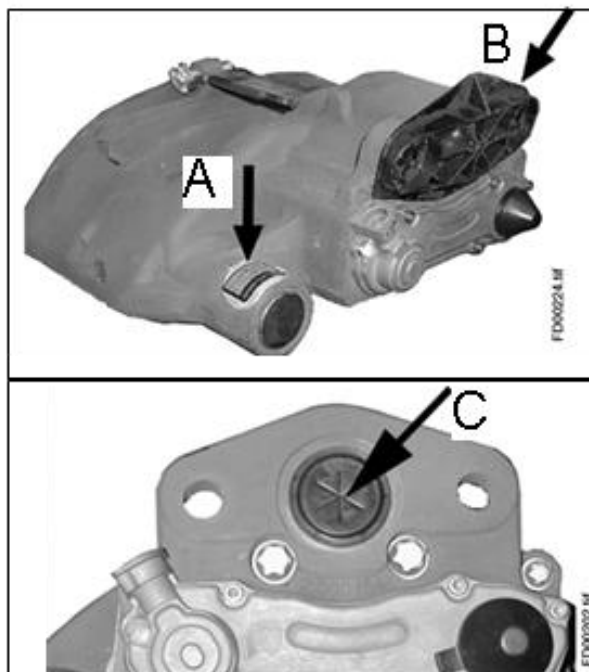
Carefully check the part number on the label (refer to arrow A in the diagram) to ensure that the correct brake caliper is being used.

Remove the plastic cover or tape at the contact point between the caliper body and the brake chamber (refer to arrow B in the diagram). In addition, the brake caliper used for maintenance has a permeable diaphragm that shall be left in place (refer to arrow C in the diagram).

Attention:

The brake caliper used for maintenance includes seals and guide pins, but does not include brake pads.

If the brake caliper used for maintenance is equipped with a potentiometer type wear indicator, a matching connector must be used at its connection (refer to the vehicle manufacturer's recommendation).



The guide pins (4 and 5) and brake caliper bolts (39 and 40) are high stress parts that must be replaced as long as the brake caliper (1) is removed from the bracket (2).

Install the brake caliper onto the bracket.

Tighten the new brake caliper bolts (39 and 40) to 180 N.m, then tighten by 90 ° (only new parts can be used).

The threads and threaded holes must be clean and dry (without lubricating grease or residual pre coated adhesive).

Check if the brake caliper slides freely along the guide pin.

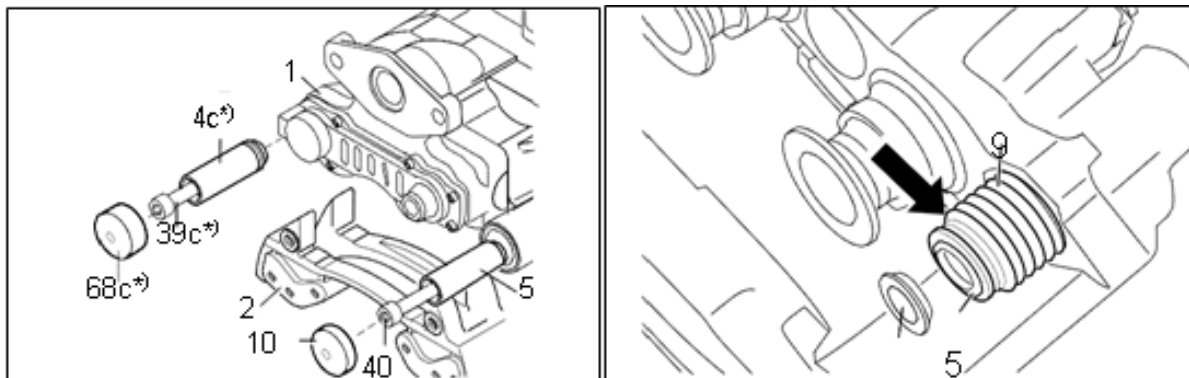
Check the position of the inner protective cap (9) and snap ring (58) on the guide pin (5).

According to the changes in the brake caliper, the position of the inner protective cap (9) and snap ring (58) on the guide pin (4) also needs to be checked for some caliper bodies.

Install the brake pad.

Check the function of the regulator.

Install the brake chamber.



6.3.3 Installation of steel caps (10) and (68c)

The brake caliper guide hole and steel caps (10) and (68c) must be clean and free of grease.

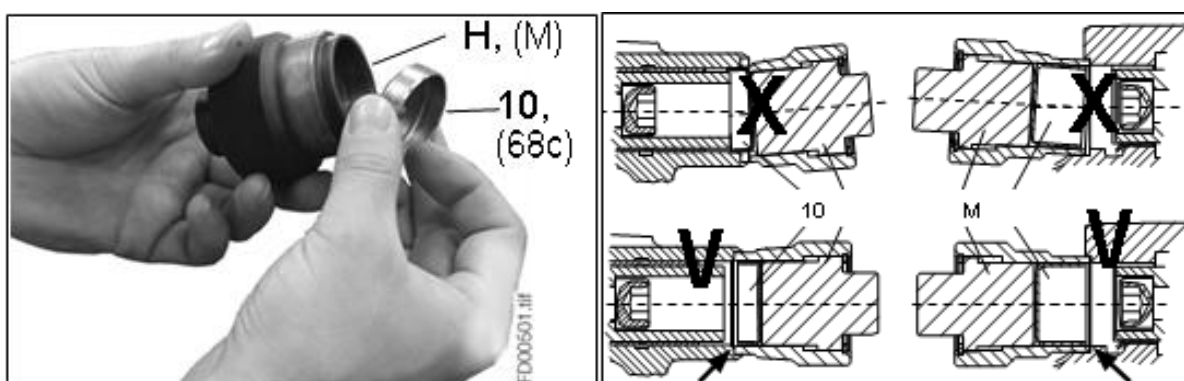
Thoroughly clean the new steel caps (10) and (68c), while inspecting their flat surfaces and inner cavities (as shown by the arrow in the diagram below) for cleanliness and no damage.

Clean the inside of the pressing tool (H) or (M) and place the steel cap (10) or (68c) in it.

Place the pressing tool (H) or (M), including the steel cap (10) or (68c), into the flat position of the brake caliper hole. The alignment of the tool is achieved through the diameter of the flat area.

Attention:

When assembling the steel caps (10) and (68c), the tools shall not tilt (refer to the diagram).



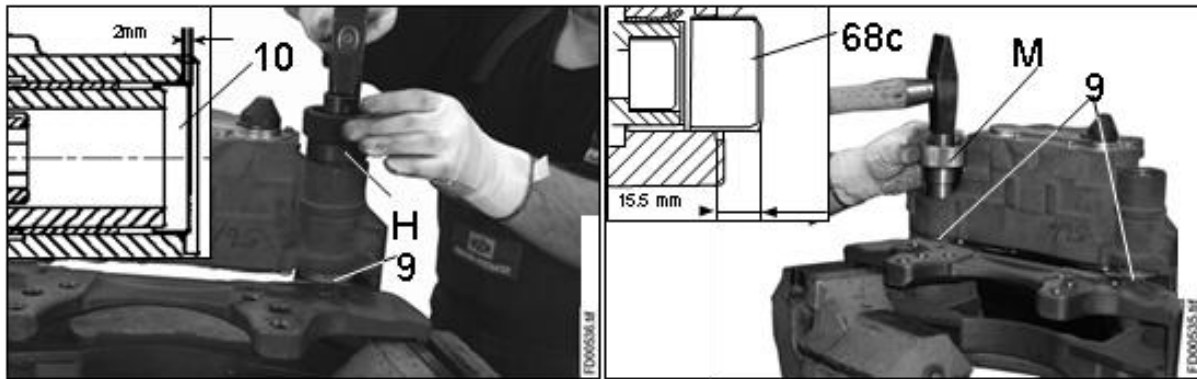
The inner protective cap (9) must be in a compressed state (as shown in the attached figure). Otherwise, the free sliding of the brake caliper will be restricted.

Press the center of the pressing tool (H) or (M) with your hand until it stops. Align the center of the inserted steel cap with a hammer and strike it into place.

Notes:

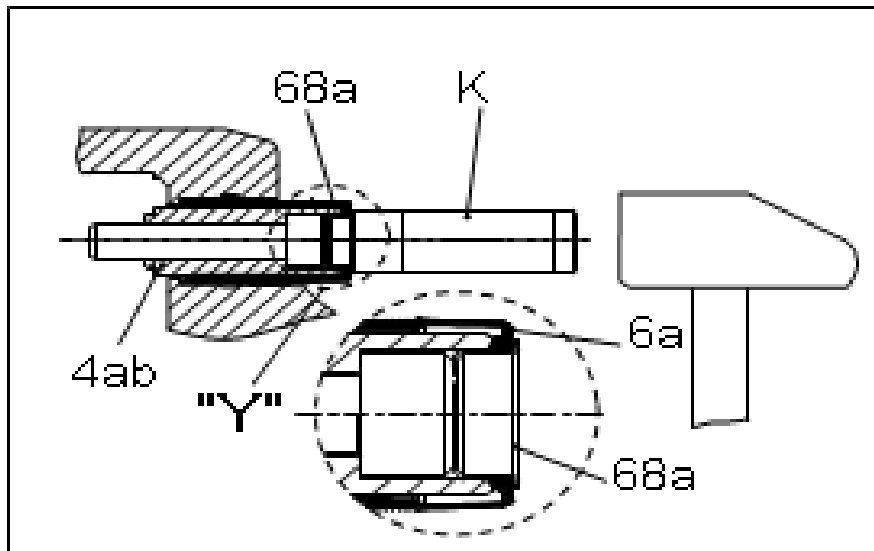
After installing the new steel cap (10), ensure that the surface of the steel cap is 2 millimeters higher than the step surface of the brake caliper.

After installing the new steel cap (68c), ensure that the surface of the steel cap is 15.5 millimeters higher than the step surface of the brake caliper.



6.3.4 Installation of cover (68a)

Use special tool K (part number Z003934) and a hammer to install the cover (68a). Press the cover (68a) into the guide pin (4) until it is firmly fixed. The sealing is achieved by the edge of the rubber bellow (6a) compressed between the guide pin (4) and the cover (68a) (refer to view "Y").



6.4 Replacement of inner protective cap (9)

For the convenience of differentiation, the various parts in the maintenance tools are

referenced according to their identification numbers. Install the inner protective cap (9) using the pull-in tool (C) (part number Z004357).

Remove the brake caliper.

Remove the ring (58).

Pull out the guide pin (5).

Use a screwdriver or similar tool to remove the inner protective cap (9).

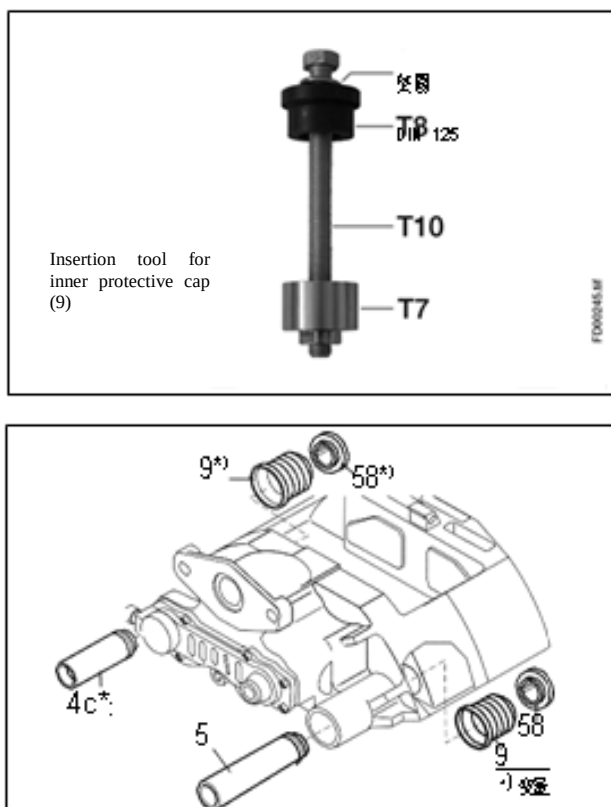
Notes:

Other models of calipers may have both guide pins sealed with inner protective caps.

Remove the ring (58).

Pull out the guide pin (4c).

Use a screwdriver or similar tool to remove the inner protective cap (9).



The contact surface of the inner protective cap on the guide pin (5) or (4) must be clean and not lubricated. Check for corrosion (refer to arrow A in the attached diagram).

Check the brass bushing (7). If the installed guide bushing (6c) is corroded, dirty, or damaged, it needs to be replaced.

Place the new inner protective cap (9) into the sleeve of tool C (part number Z004357).

Refer to arrow B in the attached diagram.

Note that the corrugated folding part of the inner protective cap (9) needs to be placed inside the tool.

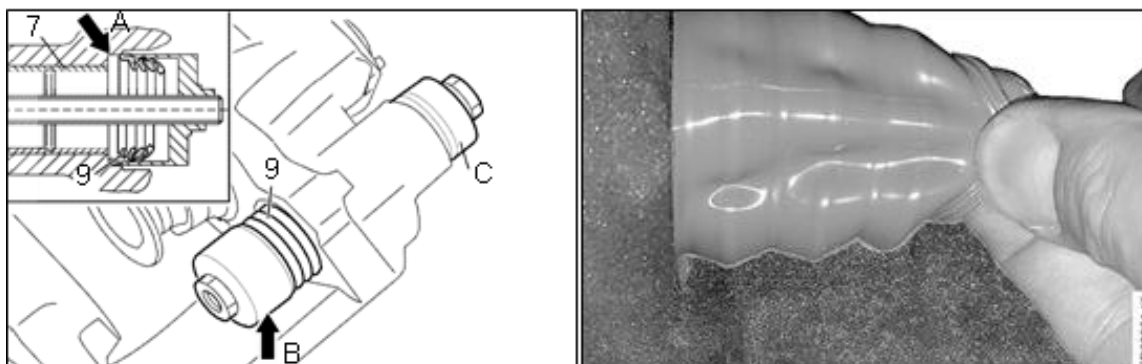
Place the sleeve of tool C and the inner protective cap (9) together at the brake caliper hole and pull them in by hand.

The maximum torque pulled in is 8 N.m.

Attention:

Please pay attention to the correct position of the inner protective cap (9).

Perform a pull check (refer to attached image).



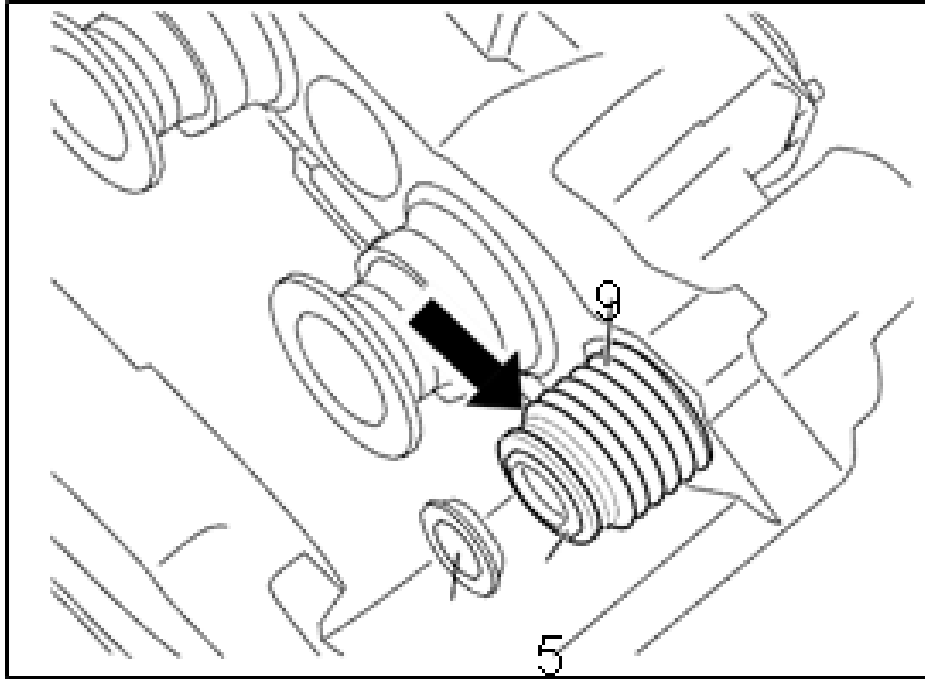
Use white grease (part number II14525 or II32868) to lubricate the brass bushing (7), and if a guide sleeve (6c) is installed, also lubricate it.

Install the guide pin (5) and install the guide pin (4c) as needed.

The lip edge at the end of the inner protective cap must fit the groove of the guide pin (5); If installed on both sides, the lip edge shall also fit with the groove of the guide pin (4c) (as indicated by the arrow).

Push the ring (58) and position it at the fitting of the lip edge at the end of the inner protective cap (9) and the groove of the guide pin (5) or the installed guide pin (4c).

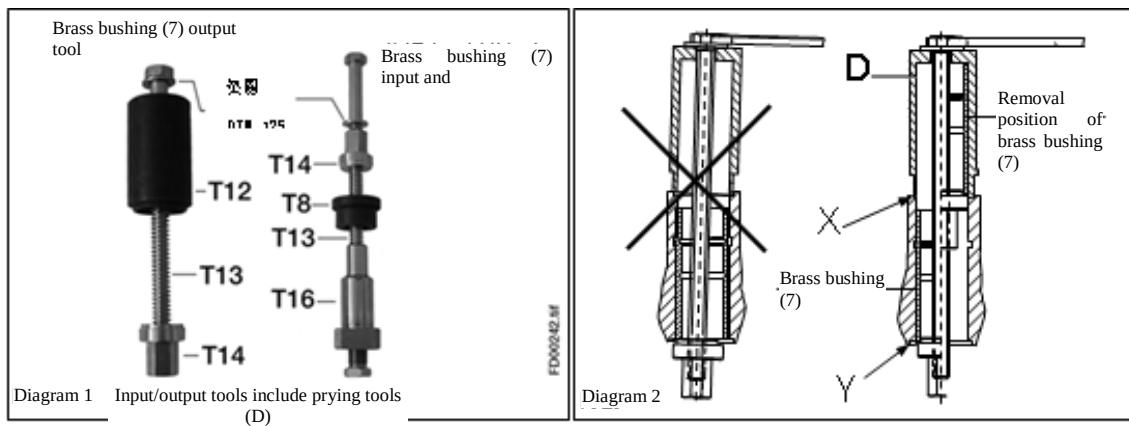
Install the brake caliper.



6.5 Replacement of guide pin bushing

6.5.1 Replacement of brass bushing (7)

Remove the guide pin (5) and inner protective cap (9). Clean the surfaces (X) and (Y), and the brass bushing (7) (refer to diagram 2).



6.5.2 Disassembly of brass bushing (7)

Place the combination tool (D) to pull out the brass bushing (refer to diagram 2).

Attention:

Ensure that the brass nut (T14) is guided by the brass bushing (7). The support tool (12) must be placed on a flat surface (X).

Pull out the brass bushing (7) using a screw (T13) (refer to diagram 2).

6.5.3 Installation of brass bushing (7)

Rotate the brass nut (T14) on the screw (T13) until it stops.

Place the new brass bushing (7) on the groove pressing tool (T16) and insert it into the hole of the brake caliper (refer to diagram 3a).

Rotate the screw (T13) by hand until it stops.

Attention:

Pay attention to the groove pressing tool (T16) (refer to diagram 3a), which shall be able to move freely.

The tool (T8) must be placed flat on the surface (X) of the brake caliper (see diagram 3a).

Pull the brass bushing (7) in with the brass nut (T14) until it stops (see diagram 3b).

To prevent radial displacement of the brass bushing (7), a groove must be pressed on the brass bushing (see diagram 3c).

For this, the hexagonal bolt of the groove pressing tool (T16) must be rotated upwards until it stops.

Turn the hexagonal bolt of the groove pressing tool (T16) back by approximately 20mm.

Loosen the brass nut (T14) and rotate the groove pressing tool (T16) by approximately 60°.

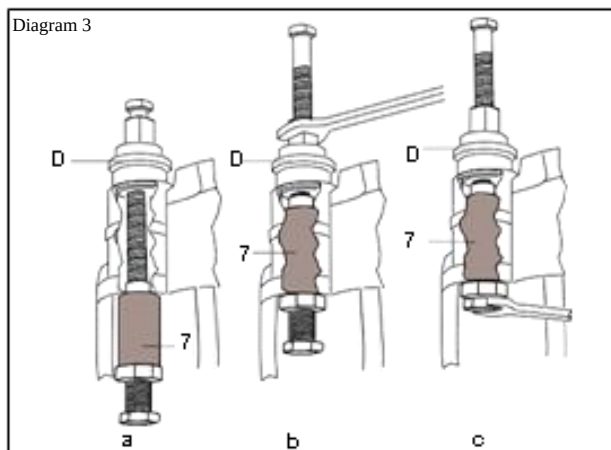
Repeat the process of pressing grooves.

In this way, the new brass bushing is pressed into the groove by the brake caliper.

Before removing tool (D), the hexagonal bolt of the groove pressing tool (T16) should be turned to the starting position.

Check the contact surface of the brass bushing (7) and remove all burrs.

Use white grease (part number II14525 or II32868) to lubricate the brass bushing (7).



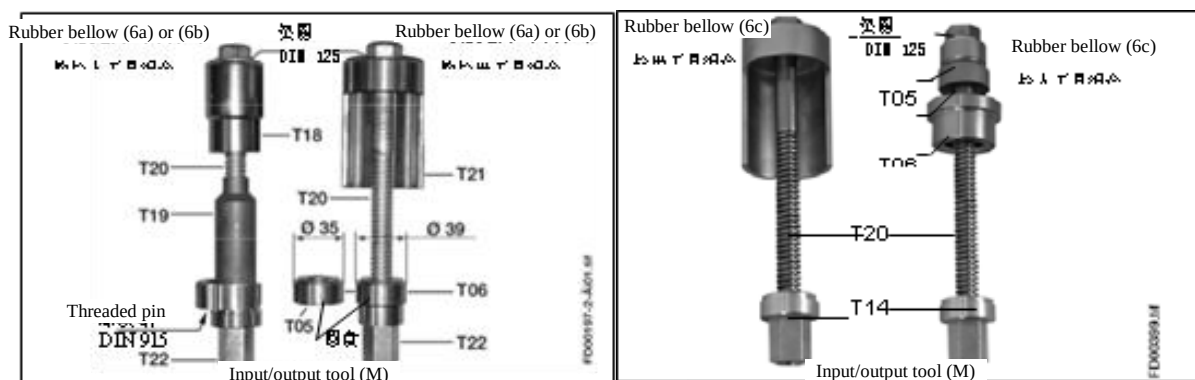
6.5.4 Replacement of rubber bellow (6a or 6b) and guide sleeve (6c)

Install the rubber bellow (6a or 6b) using tool (H) (part number Z004198), as shown in the attached diagram.

Attention:

Do not use the $\varnothing 35$ disc nut T5 for the SN series brake calipers.

Install the guide sleeve (6c) using tool (N) (part number: K005986).



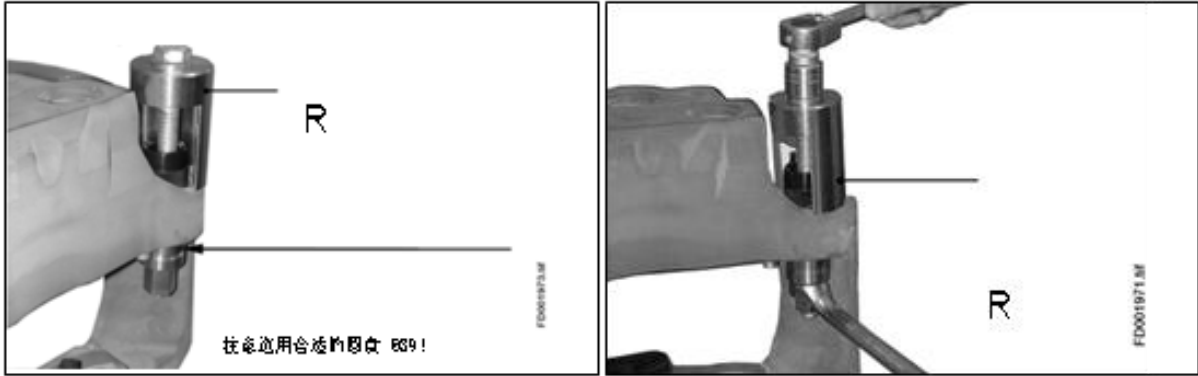
6.5.5 Disassembly of rubber bellow (6a or 6b)

Remove the guide pin (4a or 4b).

Clean the surrounding area of the rubber bellow on the brake caliper. Select the disc nut T6 of $\varnothing 39$.

Place the tool (R) (part number Z004198) in the position shown in the side view and rotate the nut (T22) by hand.

Lock the nut (T22) with an eye wrench and tighten the long screw (T20) with a suitable socket or eye wrench to remove the rubber bellow.



6.5.6 Removal of the guide sleeve (6c)

Remove the guide pin (4c).

To separate the locating lug from the guide sleeve (6c), a screwdriver or similar tool narrower than the lug can be used.

Place the screwdriver as close as possible to the bottom of the locating lug (as indicated by the arrow in the diagram).

Then use a screwdriver and hammer to separate the locating lug from the guide sleeve (6c).

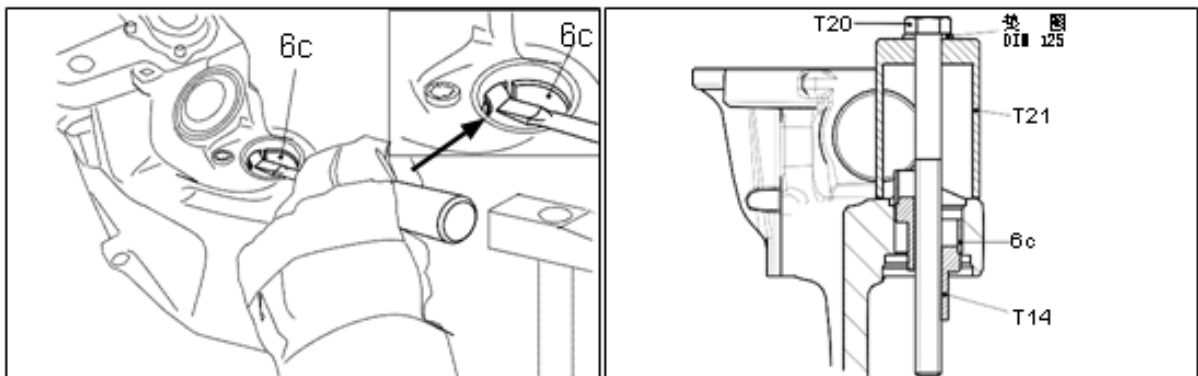
Clean the area where the guide sleeve (6c) is installed on the brake caliper and the area around the brake pads.

Attention:

The groove of the brake caliper may be on the left or right side of the brake caliper inner hole. Place the tool (N) as shown in the diagram.

Tighten the nut (T14) by hands.

Lock the nut (T14) with an eye wrench and tighten the long screw (T20) with a suitable socket or wrench to remove the guide sleeve (6c).



6.5.7 Installation of rubber bellow (6a or 6b)

Check for corrosion in the inner hole and clean it.

Ensure that the threaded pins in tool (R) are not tightened so that there are no protruding parts on the contact surface.

Press the rubber bellow (6a or 6b) into tool (R).

Place the rubber bellow (6a or 6b) and tool (R) in the position shown in the side view. Gently rotate the nut (T22) by hand.

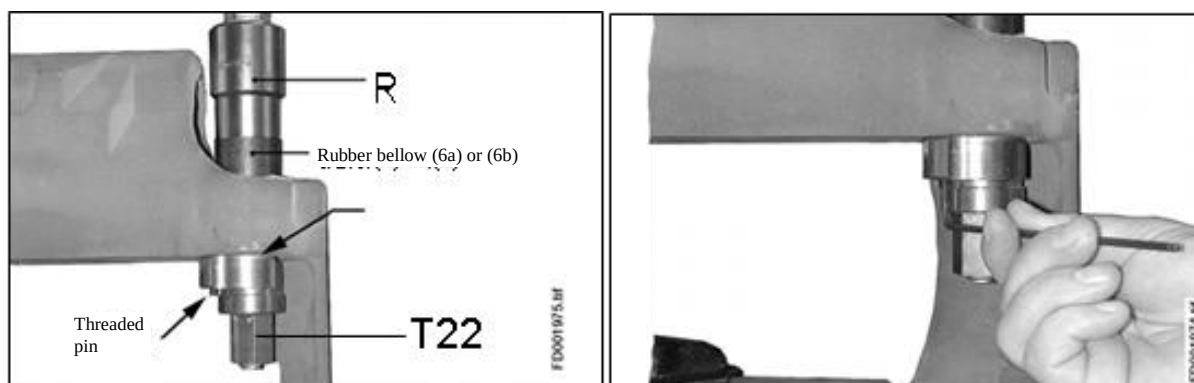
Attention:

When pulling in, do not tilt the rubber bellow (6a or 6b).

Use a torque wrench to pull the rubber bellow (6a or 6b) in until it stops.

Remove the tool.

If the torque is less than 8 N.m or greater than 45 N.m, the brake caliper must be replaced.



6.5.8 Installation of guide sleeve (6c)

Check for corrosion in the inner hole and clean it. If necessary, spray rust inhibitor.

Place the guide pin (6c) in the position shown in the diagram.

Before pressing in the guide sleeve (6c), the locating lug of the guide sleeve must be in such a position that when the guide sleeve (6c) reaches the final position, the locating lug must be stuck in the groove of the brake caliper.

Attention:

The groove of the brake caliper may be on the left or right side of the brake caliper inner hole.

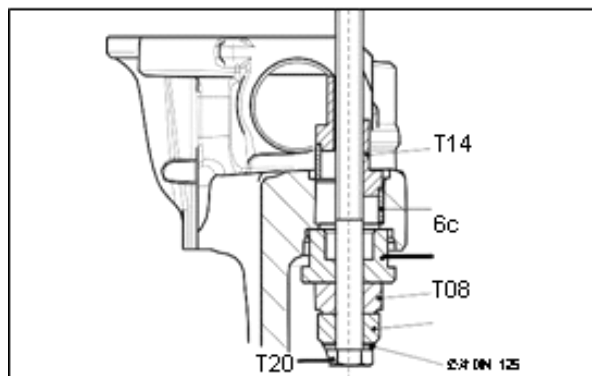
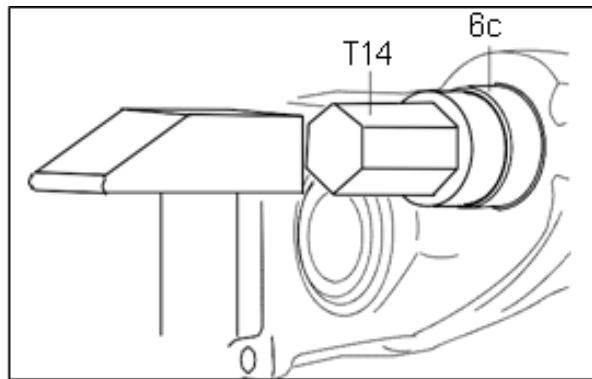
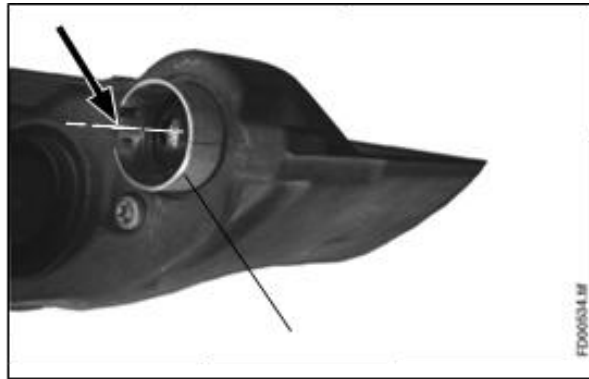
Press in the guide sleeve (6c) through the nut (T14) and hammer, ensuring that the position

of the locating lug is in line with the groove on the brake caliper body.

Insert the tool (N) and place it in the appropriate position.

Tighten the long screw (T20) by hand.

Lock the nut (T14) with an eye wrench and tighten the long screw (T20) with a suitable socket or other suitable tool until it is fully tightened.



Remove the tool (N).

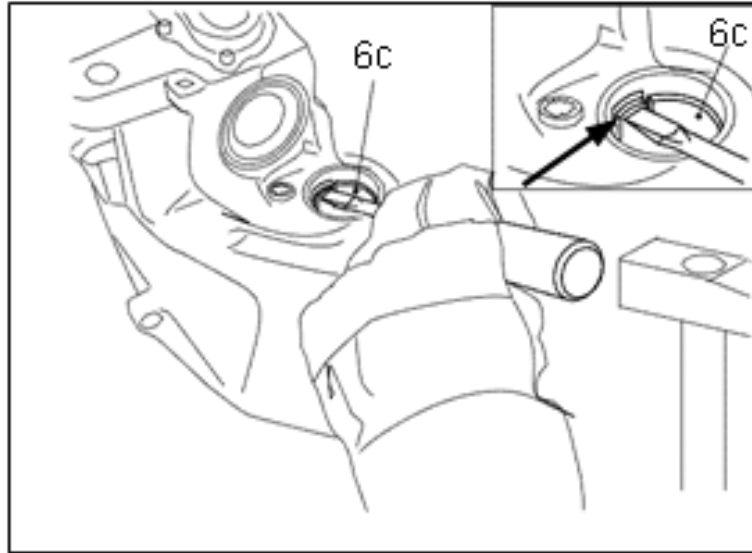
To press in the locating lug on the guide pin, a screwdriver or similar tool narrower than the lug can be used. Place the screwdriver as far as possible on the upper part of the lug. Knock the lug into the groove of the brake caliper.

Now the guide sleeve (6c) should be fixed and cannot be rotated or moved axially

anymore.

Use white grease (part number II14525 or II32868) to lubricate the inside of the guide sleeve (6c).

Install the guide pin (4c).



6.6 Replacement of bracket

If necessary, remove the brake caliper.

Loosen the bolts and remove the bracket (2) from the axle (if necessary, remove it together with the brake caliper).

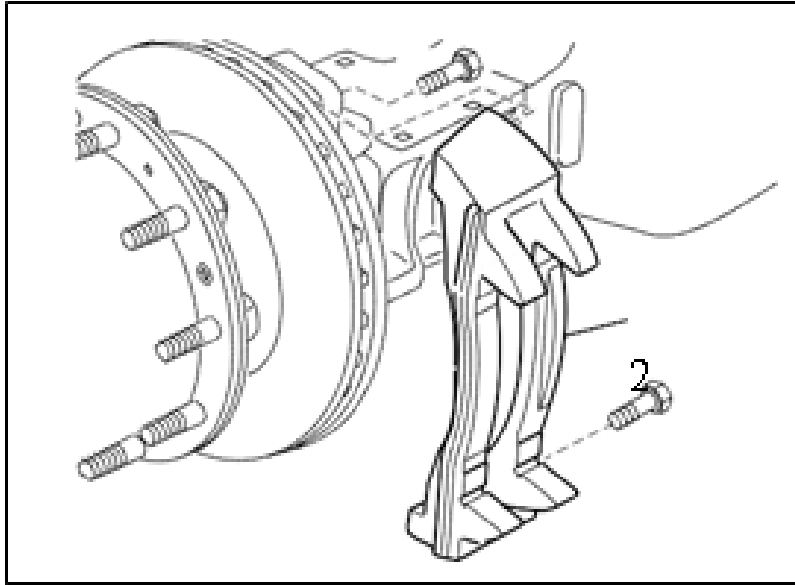
Attention:

Do not fix any lifting equipment onto the brake pad baffle (11) as this will damage the brake caliper.

Clean the contact surface on the axle.

Follow the technical specification of the vehicle manufacturer and install the new bracket (2) with the new bolts provided by the vehicle manufacturer (the installation bolts are not spare parts from Knorr Bremse).

If necessary, you can also install the brake caliper first.



6.7 Replacement of brake chamber

6.7.1 Disassembly of brake chamber

Release the air pipe on the brake chamber (18/2). **Attention:** The air pressure pipeline must be free of pressure.

Remove the brake chamber (18/2).

6.7.2 Installation of brake chamber

Attention:

The new brake chamber (18/2) is equipped with drain hole plugs (see arrow A).

Remove the lowest hole plug, and other drain holes should be plugged. Refer to the recommendations of the vehicle manufacturer.

The sealing surface and flange surface (see arrow C in the diagram) must:

- be free from dust and corrosion
- be free from from damage
- be smooth. Be careful not to let dust enter the brake caliper body.

Before installing the new brake chamber, lubricate the ball seat (19) and sealing surface of the push rod with white grease (part number II14525 or II32868).

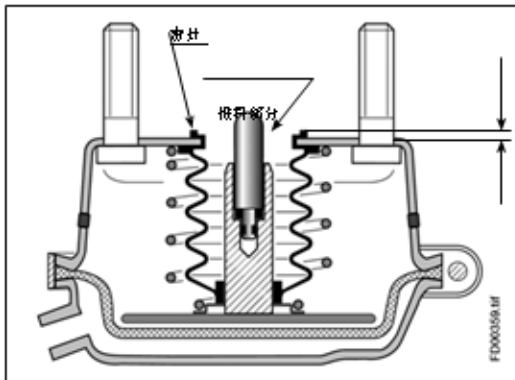
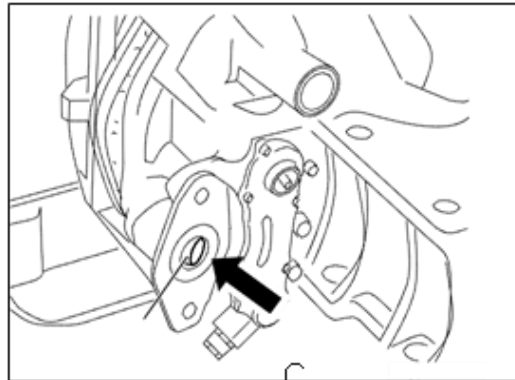
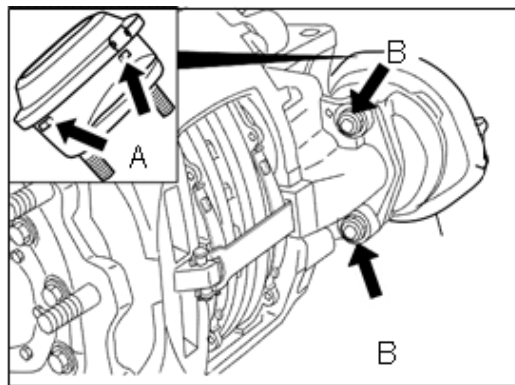
The sealing and push rod head area (see diagram) must be clean and free of lubricating grease.

Note: If the thickness of the sealing protrusion of the new brake chamber is less than 3 millimeters, the brake chamber must be replaced (see attached diagram).

Install the brake chamber with a new nut.

To avoid tilting of the brake chamber during the connection process, the new nut needs to be gradually and symmetrically tightened using a suitable tool, and then tightened according to the technical specification of the brake chamber manufacturer.

Connect the air pipes and check for any air leaks. Ensure that the pipeline is not twisted and avoid wear.



6.7.3 Disassembly of spring brake chamber

Before releasing the spring brake, please block the wheels with a stopper to ensure that the

vehicle will not detach.

Release the parking brake.

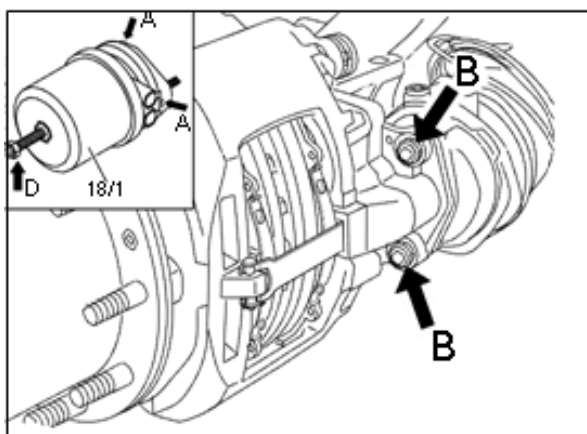
Screw out the release bolt (see arrow D) to the release position with a maximum torque of 35 N.m (refer to the vehicle manufacturer's recommendation).

Apply the parking brake.

Release the air pipe on the spring brake chamber (18/1). **Attention:** The air pressure pipeline must be free of pressure.

Loosen the installation nut of the spring brake chamber (see arrow B), and the nut cannot be used again.

Remove the spring brake chamber (18/1).



6.7.4 Installation of spring brake chamber

Attention:

The new spring brake chamber (18/1) is equipped with drain hole plugs (see arrow A). Remove the lowest hole plug (as shown when installing the spring brake chamber), and other drain holes should be plugged. Refer to the recommendations of the vehicle manufacturer.

The sealing surface and flange surface (see arrow C in the diagram) must:

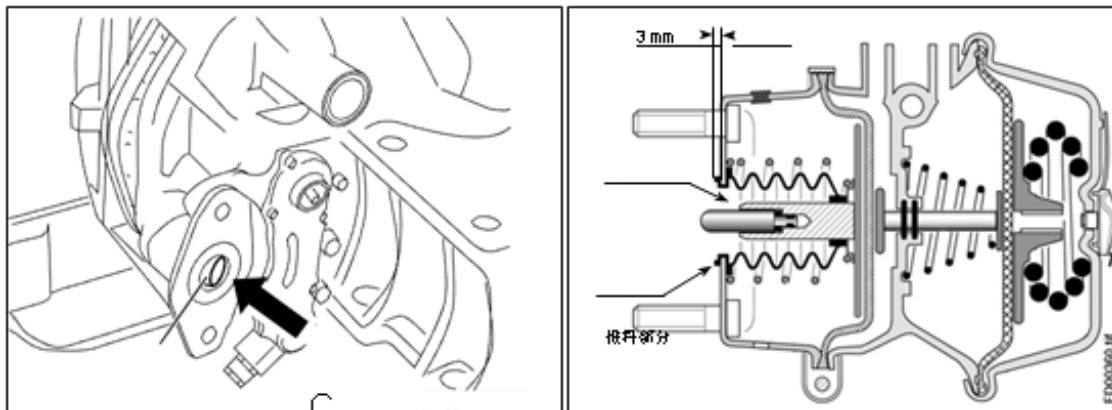
- be free from dust and corrosion
- be free from from damage
- be smooth. Be careful not to let dust enter the brake caliper body.

Before installing the new spring brake chamber, lubricate the ball seat (19) and sealing surface of the push rod with white grease (part number II14525 or II32868).

The sealing and push rod head area (see diagram) must be clean and free of lubricating

grease.

Note that if the thickness of the sealing protrusion of the new spring brake chamber is less than 3 millimeters, the spring brake chamber must be replaced (see attached diagram).



Install the spring brake chamber with a new nut.

To avoid tilting of the spring brake chamber during the connection process, the new nut needs to be gradually and symmetrically tightened using a suitable tool, and then tightened according to the technical specification of the spring brake chamber manufacturer.

Connect the air pipes and ensure that they are reinstalled on the correct interface. Ensure that the pipeline is not twisted and avoid wear.

Release the parking brake.

Screw back the release bolt of the spring brake chamber, with a maximum torque of 70 N.m. Connect the air pipes and check for any air leaks.

VII. Component Maintenance Cycle

Content	Configuration	Interval	Quantity	Nature of work
Brake pad	Sunwin accessory	15,000 Km / 3 Months	/	Inspection
		Indicator light alarm/shoe wear limit equal to 2mm	8P	Replacement
Disk brake	Sunwin accessory	15,000 Km / 3 Months	/	Inspection
		Wear limit/crack failure/disk brake wear limit equal to 37mm	4P	Replacement
Brake caliper regulator sealing	Sunwin	Every time the brake pads are	4P	Inspection

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cap	accessory	replaced		
Brake caliper horizontal sliding	/	Every time the brake pads are replaced	/	Inspection
Thrust disc and thrust disc sleeve	/	Every time the brake pads are replaced	/	Inspection
Brake caliper sliding pin clearance	/	Every time the brake pads are replaced	/	Inspection (the total rotational clearance and the sum of the clearances on both sides should be between 0.5 and 1.0 millimeters)
Brake caliper sliding pin sealing cover	Sunwin accessory	Every time the brake pads are replaced	8P+8P	Inspection
Brake caliper sliding pin sealing ring	Sunwin accessory	Every time the brake pads are replaced	8P+8P	Inspection
Brake caliper screw sealing ring	Sunwin accessory	Every time the brake pads are replaced	8P	Inspection
Brake caliper self-adjusting mechanism	/	60,000 Km / 12 Months	/	Inspection

Chapter II Front Axle Maintenance Manual

I. Component Introduction

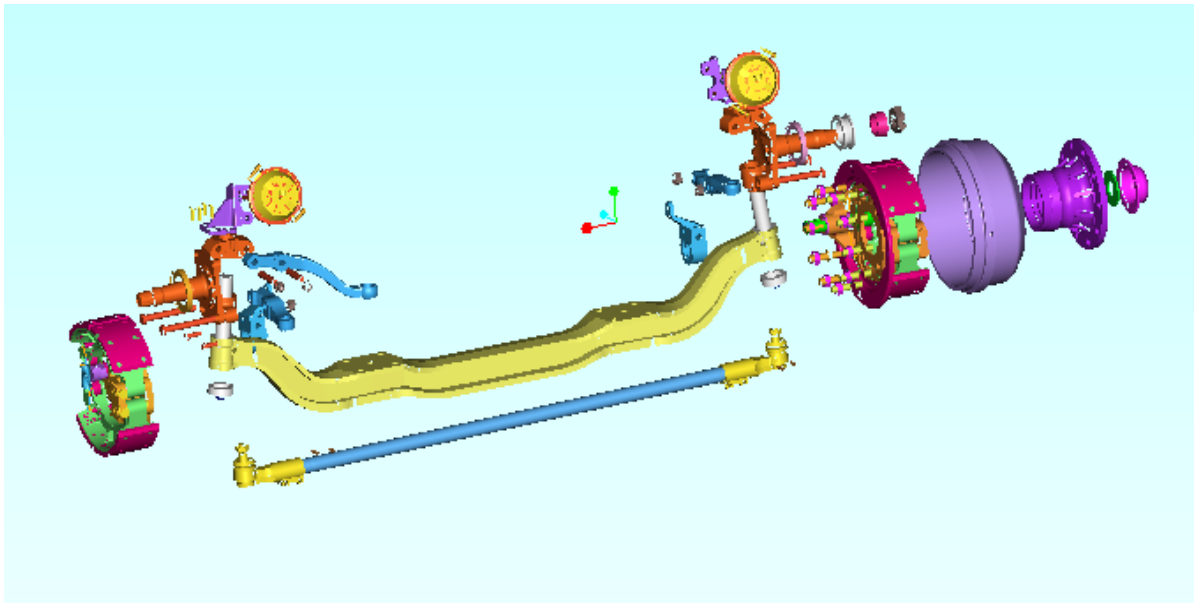
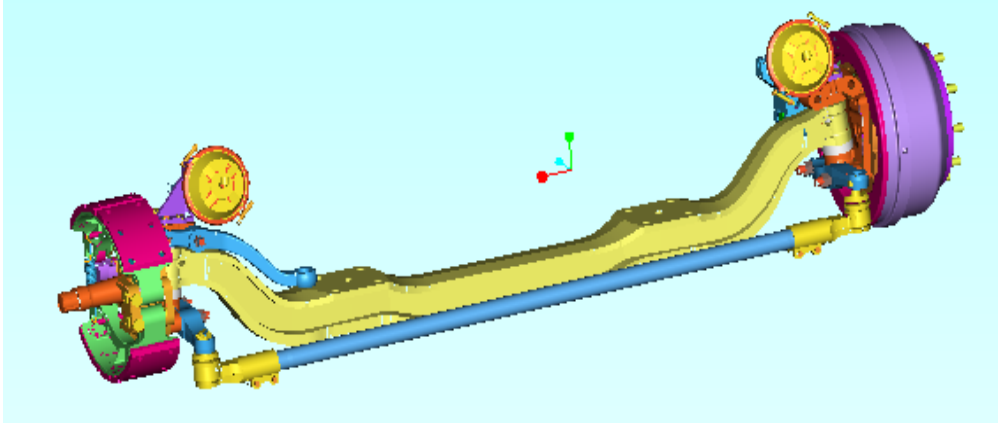
1. Component functions

The axle is an important component of the chassis driving system of a car. If the engine is compared to the heart of a car, then the axles are the two legs of the car. The axle is connected to the frame (or unitary construction body) through suspension, and car wheels are installed at both ends. Its function is to transmit the forces and moments in all directions between the frame (or unitary construction body) and the wheels. It has a significant impact on the power, stability, and load-bearing capacity of automobiles. As a driving axle, the rear axle not only plays a load-bearing role but also plays a driving, deceleration, and differential role.

2. Component parameters

Item	Model
	3000005-NB05C
Rated axle load	5500 kg
Distance between wheel rim mounting surfaces	2345 mm
Front wheel camber angle	0.5°
Front wheel toe-in	1-3 mm
Maximum steering angle	Inner wheel 42°; Outer wheel 32°
Brake specification	19.5"
Number and distribution circle of tire bolts	8-M20×1.5/Φ275
Air chamber specification	20"
King	Φ 42 mm

3. Component structure



4. Component principle

- 1) The engine torque transmitted by the universal transmission device is transmitted to the driving wheels through the main reduction tire, differential, half axle, etc., achieving a reduction in speed and an increase in torque;
- 2) Change the direction of torque transmission through the bevel gear pair of the final drive;
- 3) Achieve the differential speed on both sides of the wheels through the differential, to ensure that the inner and outer wheels steer at different speeds.

II. Special Tools

Table 3-1 Special Tools

S/N	Tool type	S/N	Tool type
1	Torque wrench 200~1000 N.m	6	Feeler gauge 0.02~0.5mm
2	Caliper 0~150mm	7	Torque wrench 75~500Nm
3	Torque wrench 0-300Nm	8	Multimeter
4	Micrometer 25~50 mm	9	Inner diameter gauge 25~50 mm
5	Spring scale 100 N		

III. Maintenance Data

1. The torque table for fasteners is as follows:

Fastener	Tightening torque (N.m)
Locking pin nut of the king	40~60
Knuckle limit bolt locking nut	80~100
Drag link arm fixing bolt	550~680
Knuckle arm fixing bolt	550~645
Ball stud fixing nut	180~250
Tie rod clamping sleeve fastening nut	78~115
Upper and lower end cover nuts	30~40
Brake connecting bolt M20 × 1.5	540~600
Front adjusting nut (maintenance-free oil lubrication)	400~450 (no retreat)
Front adjusting nut (ordinary grease lubrication)	200 (tighten and retreat)
Front adjusting nut (maintenance-free grease lubrication)	700~800 (no retreat)
Wheel nut M20	280~350

2. Braking system

Inspection item		Cycle	Judgment criteria	
			16/17.5 inches	19.5/22.5 inches
Brake pad (wear limit)	Minimum lining thickness	3 months	2mm	2mm
	Maximum uneven wear		1mm	1mm
Disk brake	Minimum thickness		28mm	37mm
	Maximum wear thickness on each side		3mm	4mm
	Maximum radial runout		0.4mm	0.5mm

	Maximum thickness difference		0.08mm	0.1mm
	Maximum surface crack		< 75% disk brake width	
	Maximum groove depth		0.5mm	
Gap between sliding pin and shaft sleeve	Maximum clearance (diameter)		1mm	
Dust cover	Falling off, breaking, aging		None	None
Caliper body sliding function	Maximum sliding resistance		80N	100N
Gap self adjustment function			Yes	Yes

IV. Circuit Diagram

None

V. Fault Diagnosis

Faults	Cause analysis	Troubleshooting method
Stuck wheel hub bearings	Excessively pre-tightened wheel hub bearings	Adjust the pre-tightening force
	Lack of lubrication in bearings or use of incorrect lubricating oil	Strengthen lubricating grease or replace lubricating grease
	Bearing dirtied with dust	Clean or strengthen lubrication
Heavy steering wheel operation	Poor wheel alignment adjustment (excessive rear tilt)	Check and adjust the alignment
	The gap between the king and the bushing is too large	Check and adjust the gap
	Reverse installation of thrust bearing	Correct the assembly
	Lack of lubrication in front axle components	Add grease
	Ball head connection too tight or too loose	Check and lubricate the ball joint pins
	Low tire pressure	Supplement to the specified pressure
	Excessive tire wear	Replace the tire
Steering wheel shimmy	Wear of front wheel bearings	Replace the bearings
	Excessive wear on the king and bushing	Correct or replace faulty components
	Steering knuckle is deformed	Replace the steering knuckle
	Inappropriate wheel alignment	Check or adjust the wheel alignment
Steering wheel running towards either side	Incorrect adjustment of front wheel alignment	Check and adjust the wheel alignment
	Front axle bending	Correct or replace the front axle
	Harsh braking	Please read the braking item
	Loose front wheel hub bearing nut	Tighten it to the specified torque

Faults	Cause analysis	Troubleshooting method
Uneven or premature tire wear	Incorrect front wheel alignment	Check and adjust front wheel positioning
	Worn or damaged wheel hub bearings, loose bearing nuts	Replace the bearings or tighten nuts according to regulations
	Ball stud, king, and bushing are too loose or too tight	Correct, if necessary, replace faulty components
Braking noise or vibration	Does the curved spring of the brake pad produce permanent deformation	If permanent deformation occurs, replace the brake pad curved spring
	Can the brake pads slide freely on the bracket	Remove the brake pad pressing plate and brake pad assembly, clean the brake pad pressing plate, brake pad assembly, and bracket
	Does the maximum runout of the disk brake meet the requirements	If it does not meet the requirements, replace the disk brake or correct it
	Is there any crack or groove on the disk brake	If it does not meet the requirements, replace the disk brake
	Is the disc brake and its components fixed on the axle according to the specified requirements	Check all fasteners to ensure they are securely fastened
No braking or insufficient braking torque	Is the friction material of the brake pad assembly polished	If the total thickness is $\leq 12\text{mm}$, the brake pads must be replaced
	Is the gap between the brake pads and disk brakes normal	Normal gap is $0.7\sim 1.2\text{mm}$. If it does not meet the requirements, check the working condition of the self-adjusting mechanism
	Is the disk brake in good condition	Check and replace the disk brake if it does not meet the requirements
	Is the air pressure in the brake chamber $\geq 0.6\text{MPa}$ (measure the air pressure of the chamber with an air pressure gauge)	Implement remedial measures according to the requirements of the vehicle manufacturer
	Is the drain plug of the brake chamber removed	Remove the drain plug from the brake chamber

VI. Method of disassembly and assembly

1. Disassembly and assembly of axle assembly in vehicle condition

1.1 Preparation before disassembly

Attention: Before disassembling the air pipe, the residual air in the air pipe should be drained.

When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

- a) Use flat nose pliers to cut off the ABS sensor connection cable ties, wear alarm cable ties, differential lock sensor connection cable ties tied to the axle, and disconnect the wiring harness plug from the vehicle.
- b) Disconnect the air pipe from the two air pipe joints in the brake chamber.



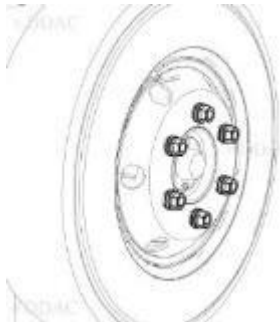
- c) Remove the drag link arm.

1.2 Dismantling wheels

Attention: Before disassembling the air pipe, the residual air in the air pipe should be drained.

When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

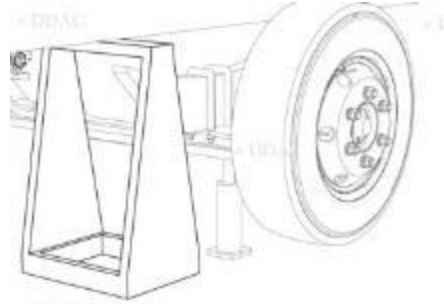
- a) Loosen the wheel nuts



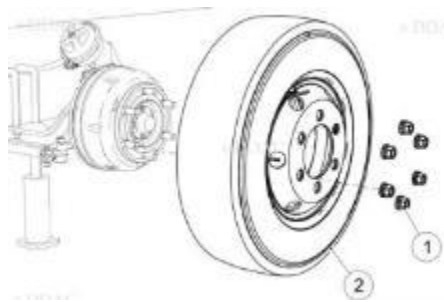
- b) Lift the vehicle under the steel plate spring so that the wheels are just off the ground.



- c) Place a safety bracket of suitable height under the frame to support the vehicle.



- d) Remove the wheel nuts and pull out the left and right wheel assemblies

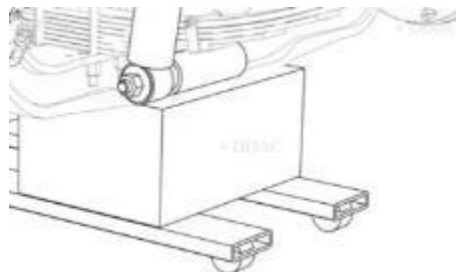


1.3 Remove the front axle assembly

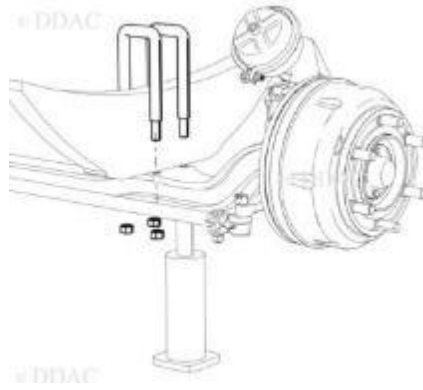
Attention: When disassembling, be careful to avoid collision with the tie rod.

- a) Place the translation trolley under the front axle I-beam.

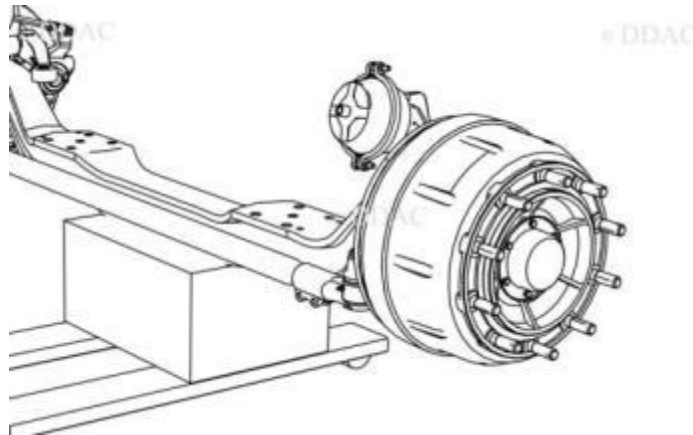
Detach the lower end of the shock absorber from the front spring.



- b) Remove the clamping U-bolt and nut of the front axle steel plate spring.



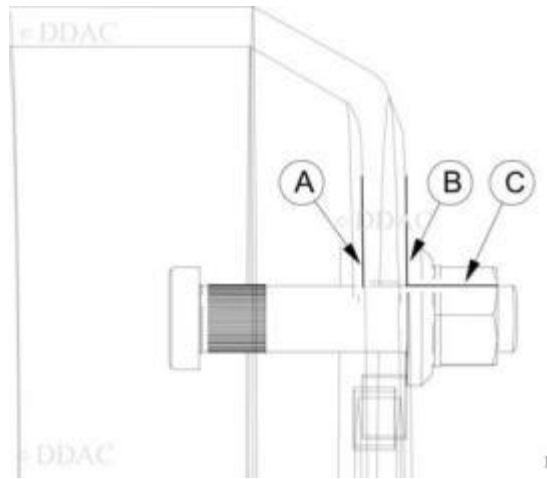
- c) Slowly release the jack to place the front axle assembly on the trolley.
Pull out the front axle assembly.



1.4 Preparation before installing the axle assembly onto the vehicle

- Check and confirm that the front axle assembly is in good condition.
- Clean the installation areas (A, B, C) of the wheel bolts, wheel nut threads, hub, rim, and wheel nuts.

If paint is applied to the installation area (nut mounting surface A on the wheel and contact surface B of rim and hub), thoroughly remove the paint and rust.

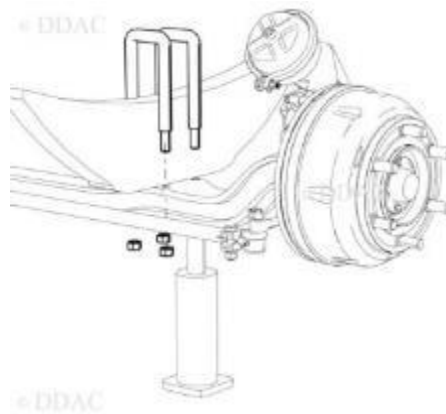


1.5 Installing the front axle assembly

- a) Pull the front axle assembly to the installation position below the frame.

The bracket should be placed in a reliable position.

Lift the axle with a jack and thread the left and right U-bolts.



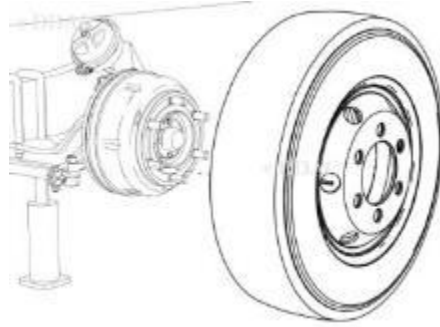
1.6 Installing wheels

Attention:

The wheels are very heavy, be careful not to harm people during installation.

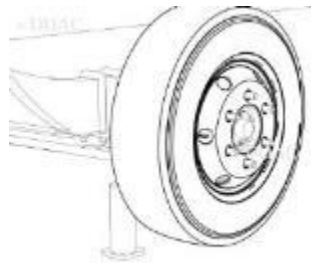
Prevent wheel rim from damaging wheel bolt threads.

- a) Align the wheel tire bolt holes with the wheel hub wheel bolt holes.



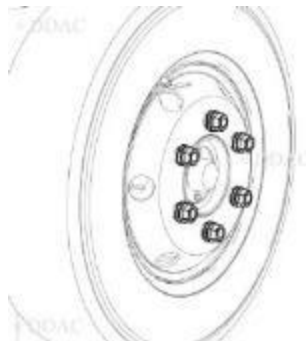
b) Push the wheels into place.

Apply two drops of gear oil to the threaded part of the wheel nut and wipe off any excess oil with a clean cloth.

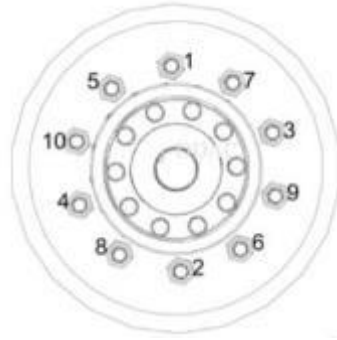


c) Install the wheel nuts.

- First, pre tighten three nuts and confirm that the center of the bolt is aligned with the center of the wheel bolt hole. The tightening torque is approximately 100 N.m.



- Tighten the nuts in stages according to the sequence shown in the diagram, and finally tighten the nuts as required



Attention:

After reinstalling the wheels, the wheel nuts must be checked and tightened again after the vehicle runs for 50~100km.

1.7 Final steps

- a) Take out the jack.
- b) Install the air pipe according to the disassembly label.
- c) Connect the ABS and wear alarm wire to the vehicle harness.

2. Disassembly and assembly of wheel hub system

2.1 Preparation before disassembly

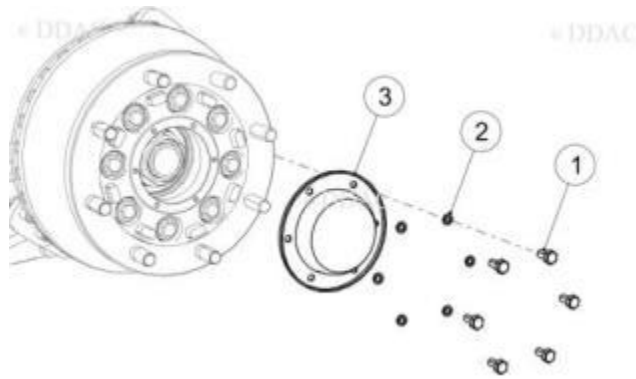
For wheel disassembly, refer to the steps for axle assembly system.

2.2 Removing adjusting nut

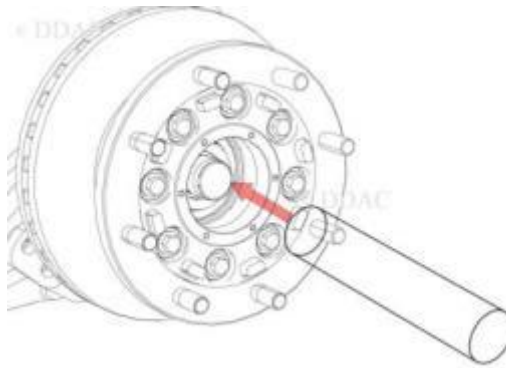
Attention: Do not damage the shaft tube thread when removing the nut.

If it is a rivet locking nut structure, the rivet part should be flattened above the outer diameter of the shaft tube thread before disassembly.

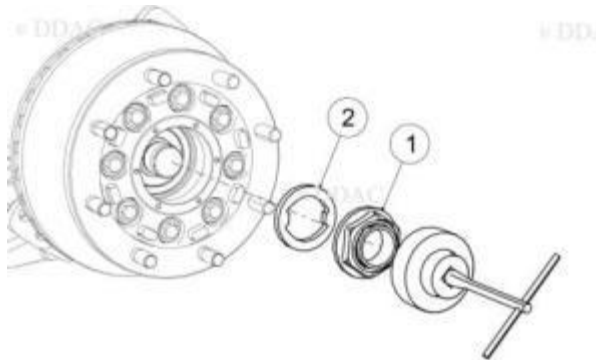
- a) Remove the hub end cover installation bolts and remove the hub cover.



- b) Flatten the rivet part of the shaft head locking nut.



- c) Use a socket tool to remove the adjusting nut and remove the wear reducing gasket.



2.3 Removing the hub disk brake assembly

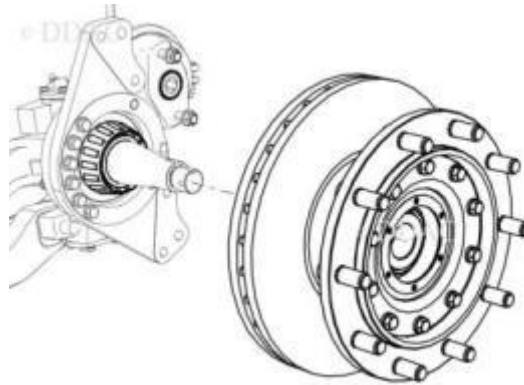
Rotate the wheel hub and gently tap on it to remove the wheel hub assembly along the hub shaft tube assembly.

Attention:

Do not damage the shaft tube threads when disassembling the wheel hub (drum (disk) brake) assembly.

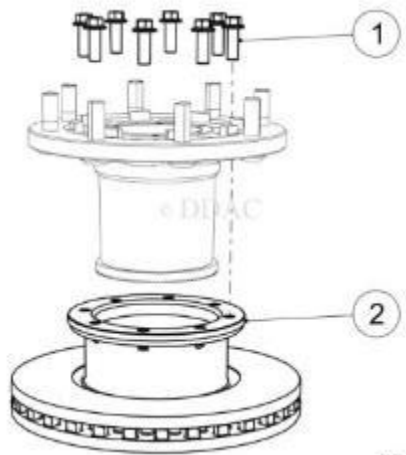
The wheel hub assembly is very heavy and requires two people or a lifting machine

to remove it.



2.4 Dismounting the hub disk brake assembly

- a) Remove the hub disk brake connecting bolts and remove the disk brake.

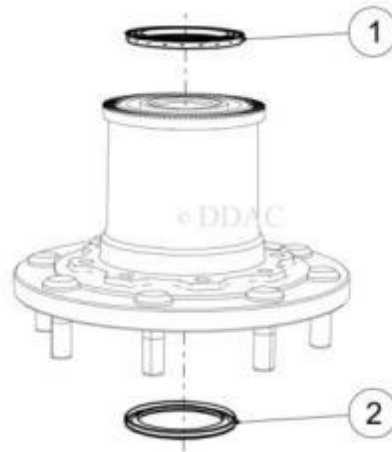


- b) Remove the hub oil seal

Place the outer end of the wheel hub downwards and remove the inner and outer oil seals.

Attention: Do not damage the mounting surface when removing the oil seal.

Dispose of the disassembled oil seal properly, regardless of whether it is damaged in appearance, and do not use it again.



c) Remove the middle snap ring



d) Take out the inner ring assembly and sealing ring of the inner bearing.



e) Remove the ABS gear ring

Remove the installation bolts between the gear ring and the disk brake, and remove the ABS gear ring



f) Remove the outer ring of the bearing

Place the tool in the small diameter hub disassembly groove of the outer ring of the hub bearing.

Strike the end of the tool with a copper rod to exit the outer ring of the bearing

Warning:

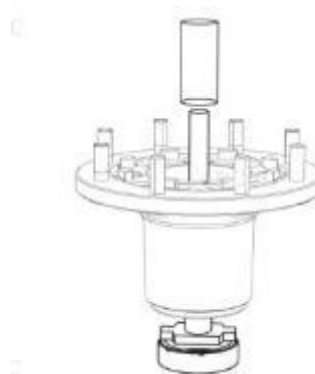
If using a press for disassembly, follow all warnings and precautions required by the stamping machine manufacturer to avoid damage to components and personal injury.

When using manual tapping to disassemble the outer ring, be careful not to rebound and injure people.

Attention:

To perform this step, it is necessary to confirm that the hub bearings need to be replaced with new bearings.

Avoid damaging the outer ring hole of the hub bearing and the bearing installation steps.



2.5 Dismantling wheel bolts

Warning:

Comply with all warnings and precautions required by the stamping machine manufacturer to avoid damage to components and personal injury.

Do not knock on the wheel hub when installing the bolt by knocking to avoid damage to the wheel hub.

Attention:

Replace all wheel bolts that have been damaged, deformed in thread, broken, bent, or corroded, and also replace the adjacent bolts on both sides of the damaged bolts. If two or more bolts are damaged, all bolts should be removed and replaced simultaneously.

- a) Place the wheel hub flat on the ground or on the press bracket, with the bolt flange facing downwards, so that the support point is close to the bolt to be removed.
- b) Use a copper rod to strike threaded head of the bolt that needs to be replaced, or press the bolt out and remove the bolt that needs to be replaced.



2.6 Preparation before Installation

Warning:

It is strictly prohibited to use gasoline to clean parts.

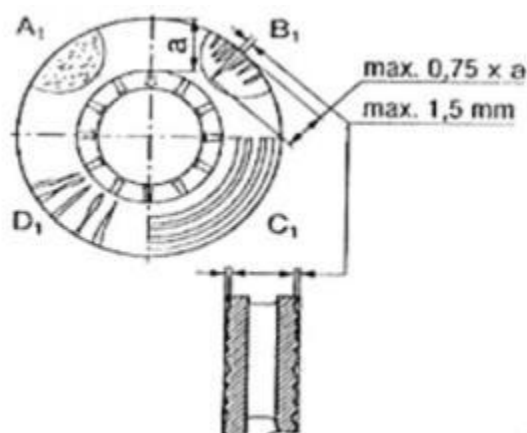
If you choose to continue using existing bearings, these bearings must be inspected according to the manufacturer's recommended principles.

When it is determined that the inner or outer ring of the bearing is damaged, both the inner and outer bearings must be replaced as a complete set, and the bearing spacer must also be replaced.

- a) Clean the inner cavity of the wheel hub. If the outer ring of the bearing has been

removed, check the bearing seat hole of the wheel hub to confirm whether the outer ring of the bearing is rotating. If it rotates, replace the wheel hub.

- b) Clean the inner ring assembly of the bearing (if the bearing is disassembled).
- c) Clean the oil and debris on the ABS gear ring.
- d) Check the disk brake



A1=Small cracks extend on the surface, which is allowed;

B1=Radial extension of cracks less than 1.5 mm in length and width, which is allowed;

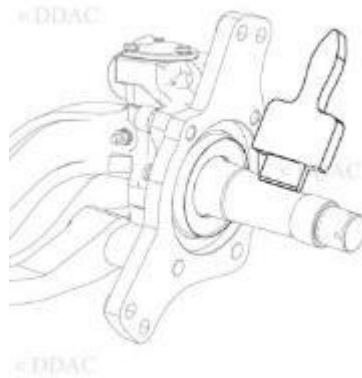
C1=Circular groove with a depth of less than 1.5 mm, which is allowed;

D1=Flake cracks are not allowed and the disk brake must be replaced;

The total thickness 19.5/22.5 of the disk brake is not less than 37 mm and 16/17.5 not less than 28 mm.

- e) Allow the parts to dry thoroughly, and any remaining solution must be wiped clean.
- f) After cleaning the parts, inspect the inner and outer rings of the bearings for any damage or defects.
- g) Apply lubricating grease (FAG special grease) to the inner and outer bearing inner ring assemblies, filling the space between the rollers and the cage with lubricating grease.
- h) Preparation work for shaft head
 - Clean the shaft head, remove all rust and other impurities, and the oil seal seat ring also needs to be cleaned.

- If necessary, cleaning agents can be used.
- If necessary, gauze can be used to remove stains and rust on the oil seal seat ring.
- Apply a thin layer of gear oil GL-5/85W-90 to the mounting surface of the inner and outer bearing positions of the shaft tube and the thread surface of the shaft head, as well as the thread surface of the locking nut and the end face of the locking washer. If there is any dripping, wipe off the excess lubricating oil.



2.7 Installing the wheel bolts

Drive or press the new bolt into the hub bolt hole until the bolt is fully installed and the flange surface is fitted with the hub end face.



2.8 Installing the hub disk brake assembly

- a) Install the outer ring of the bearing

Warning:

If using a press, all warnings and precautions required by the manufacturer of the pressure must be followed to avoid damage to components and personal injury.

Attention:

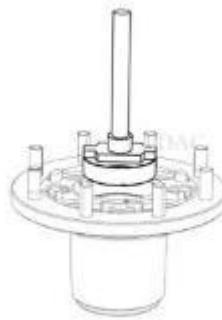
The outer ring of the bearing should be pressed into place in one step, and a 0.02mm feeler gauge should be used to check the gap between the outer ring of the bearing and the installation step surface of the wheel hub. There should be no gap.

Take measures to avoid damaging the bearing outer ring hole and bearing mounting shoulder of the wheel hub

- The end face of the wheel hub should be facing downwards, with the outer ring of the bearing facing outward. Place it into the wheel hub, with a press-fitting pressure not less than 60 KN and not more than 100 KN to ensure that the outer ring end face of the bearing is tightly fitted with the shoulder end face of the wheel hub bearing without any clearance.



- Flip the wheel hub and press fit the outer ring of the bearing on the other side.



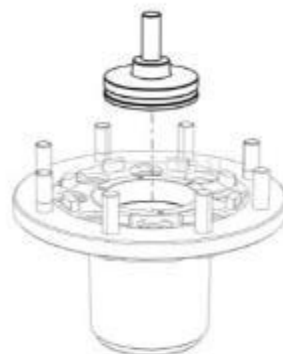
- b) Install the inner and outer bearing inner rings into the wheel hub equipped with the outer rings, and place the clamp spring into the inner bearing inner ring assembly hole to clamp the two bearing inner rings.



- c) Use a special tool to press the inner oil seal into the horizontally placed hub (with a pressure not exceeding 10 KN), and ensure that the end face of the inner oil seal is in contact with the hub end face.



- d) Use a special tool to press the outer oil seal into the horizontally placed hub (with a pressure not exceeding 10 KN), and ensure that the end face of the outer oil seal is in contact with the hub end face.



Attention:

- The oil seal should have its plane facing outward.

- In the absence of specialized tools, a flat plate and a small wooden hammer can be used to assist in installing the oil seal. When installing the oil seal, it must be flat on top and flat on bottom. It is not allowed to directly hit the end face of the oil seal for installation or install it at an angle.
 - Check and ensure that the oil seal is not warped, deformed, or damaged.
- e) After lightly applying DDAC-A grease to the O-ring, install it into the inner ring groove of the bearing in the hub, wipe off excess grease, and prevent grease from overflowing the assembly surface.



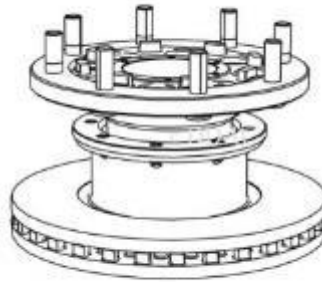
- f) Install the ABS gear ring

Fit the ABS gear ring to the mounting surface of the disk brake, align the mounting bolt holes, and install the mounting bolts.

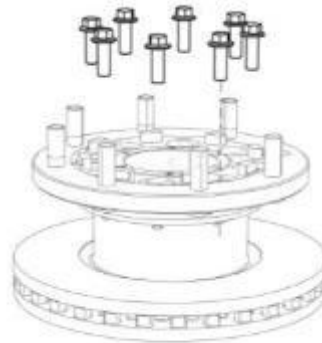


2.9 Installing the hub disk brake assembly

- a) Place the large plane of the disk brake facing downwards, and ensure that the wheel hub mounting surface is fitted with the disk brake mounting surface.



- b) Install the heavy-duty spring washer onto the installation bolt, first pre tighten the installation bolts in sequence, and then symmetrically tighten the installation bolts in sequence.



2.10 Installing the hub disk brake assembly

Attention:

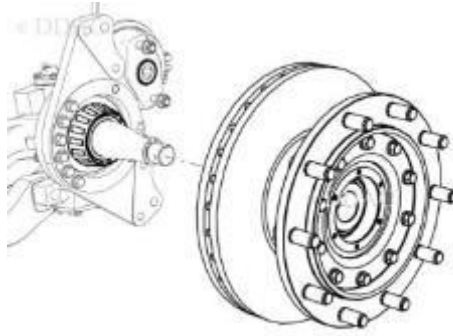
Do not cause the hub oil seal to collide, and do not pull or push back and forth during assembly.

Push the ABS sensor towards the wheel hub until it is in place.

Prevent the O-ring from falling off in this process, and if it falls off, it should be reset in a timely manner.

The wheel hub assembly is heavy and requires 2 people or lifting equipment for installation

- a) Install the guide sleeve, lift the hub assembly horizontally, align it with the center of the guide sleeve, and push the hub assembly in until it touches the end face of the shaft tube. Then remove the guide sleeve.

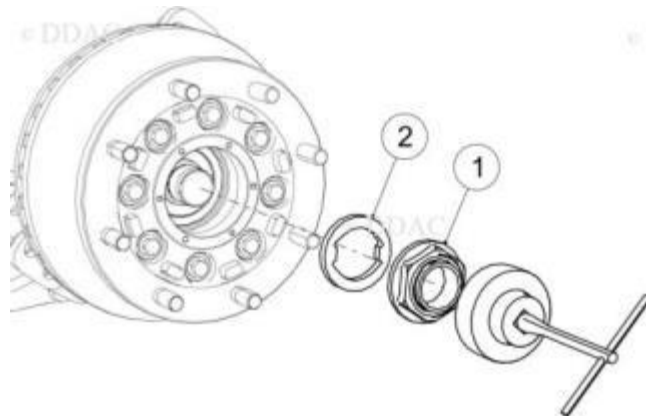


2.11 Installing the adjusting nuts

Warning:

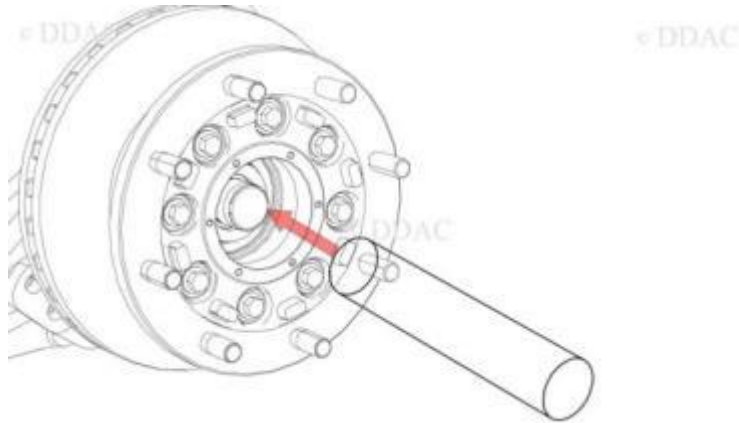
When assembling the adjusting nut, only tighten it and do not retreat. Failure to assemble according to specifications may result in early failure of the wheel end.

- a) Install the wear reducing gasket, screw the adjusting nut into the knuckle thread, ensuring that the hub unit rotates the hub disk brake assembly at a constant speed of 30 r/min in both directions, and tighten the adjusting nut with a torque of 700~800 N.m until the torque is reached.

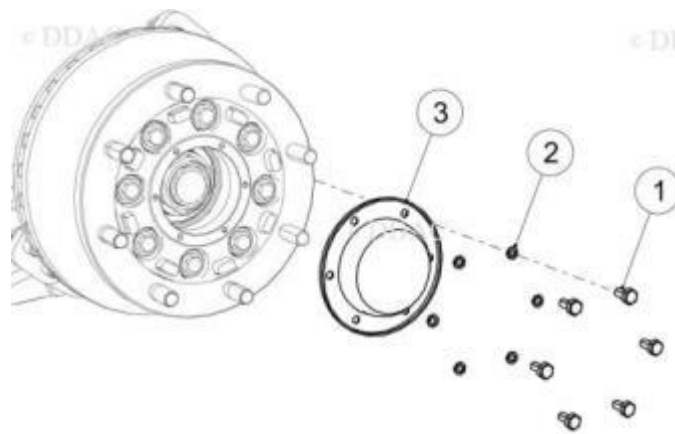


- b) Punch and rivet nut skirt to the shaft head groove.

Attention: There should be no cracks on the edge of the riveted skirt, and the riveted part should be embedded in the groove after riveting.



- c) Install the hub end cover and apply sealant to the screw holes on the end cover surface in a circumferential direction. The width of the sealant should not be less than 3mm and the sealant should be continuous without interruption. The tightening torque is 16~21 N.m.



2.12 Final steps

- Check the gap between the ABS sensor and the ABS gear ring, which should not exceed 0.7 mm
- Refer to the steps for axle assembly and install the wheels.

3. Disassembly and assembly of disc brake assembly

3.1 Preparation before disassembly

The disassembly and maintenance of the disc brake assembly does not require the disassembly of the wheel hub system.

For wheel disassembly steps, refer to: Axle assembly system

3.2 Disassembling the disc brake assembly

Warning:

The brake caliper assembly is very heavy and requires 2 people or a lifting machine for disassembly and assembly.

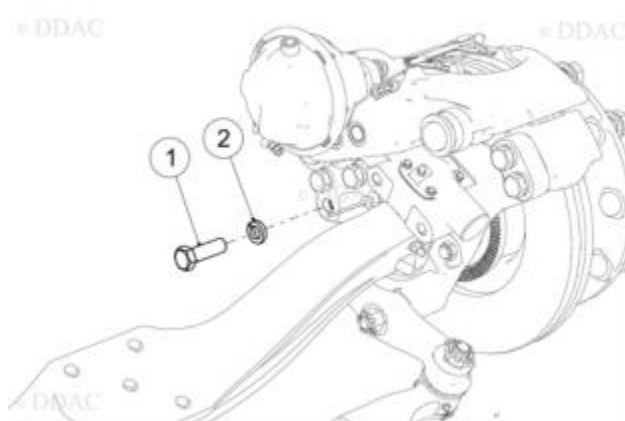
Attention:

Before disassembling the air pipe, the residual air in the air pipe should be drained.

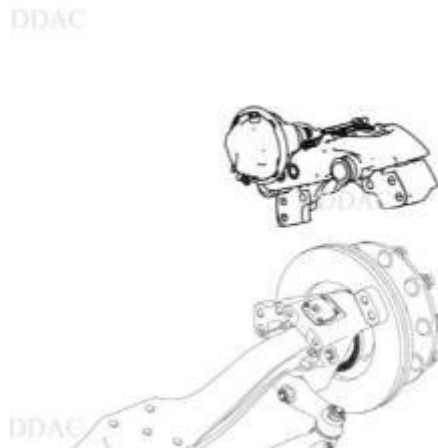
When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

- a) Disconnect the wiring harness connecting the wear alarm wire to the entire vehicle, and cut the wear alarm wire cable tie.
- b) Pull up the handbrake and remove the air pipe in the air chamber.
- c) Remove the brake mounting bolts (2) and washers (1).

Attention: The bolts may be very tight and not easy to disassemble. Choose a suitable socket tool and a torque rod.



- d) Remove the brake assembly.



3.3 Preparation before Installation

- a) Check and remove oil stains and other rust inhibitors on the surface of the disk brake before installation.
- b) Confirm that the brake is in good condition.
- c) Place clamping pads between the friction blocks to prevent them from falling off during assembly.

3.4 Installing the disk brake assembly

Warning:

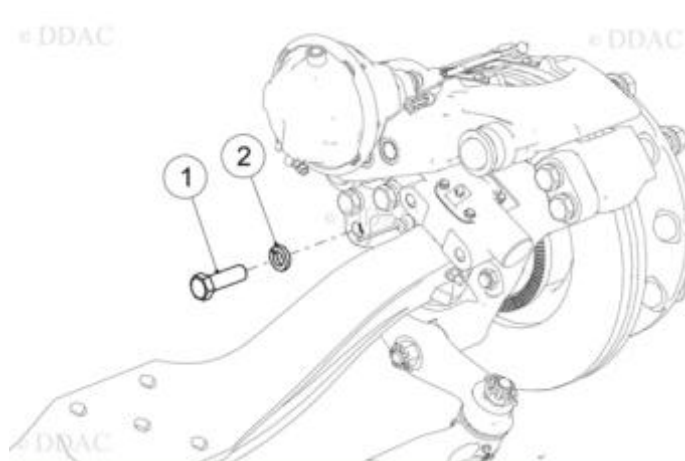
The brake caliper assembly is very heavy and requires 2 people or a lifting machine for disassembly and assembly.

Attention:

The brake mounting bolts should be new.

The original bolts must be inspected for any elongation or thread damage.

- a) Clamp the brake caliper assembly onto the disk brake and remove the clamping pads.
- b) For the position of the caliper, align the bolt holes with the flange screw holes of the axle housing. Install the gasket (2) and tighten the installation bolt (1) by hand by about 2-3 turns, then tighten it symmetrically in sequence. Please refer to the important fastener tightening torque table for tightening torque.



- c) Install the brake air circuit

Connect the air pipe to the air pipe connector in the air chamber.

Note: Install the air pipe according to the disassembly label

- d) Connect the wear alarm wire to the vehicle connector and tie the wear alarm wire in place with a cable tie.

3.5 Adjustment of brake clearance

The adjustment of brake clearance is a necessary step after repairing the braking system.

Attention:

Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- a) Check the gap between the brake caliper and disk brake. If the gap is less than 1.2mm, first increase the gap to 1.5mm or more.
- Remove the sealing cap.
 - Rotate the adjustment shaft counterclockwise by 180 ° with the wrench, and hear a "click" sound (increasing the gap).
 - Check clearance.
- b) Without removing the adjustment wrench, while ensuring that the braking pressure of the vehicle meets the requirements ($\geq 0.6\text{MPa}$), apply 20 brakes in place, maintain the pressure for more than 5 seconds, and maintain the braking frequency of once every 2-3 seconds. The brake clearance can be adjusted to the normal range by hand.
- c) Observe that the wrench should turn clockwise at a smaller angle.
- d) If the wrench cannot rotate, or only rotates during the first brake application, or rotates forward and then backward during each brake application, it indicates that the automatic adjustment mechanism has failed and the brake caliper must be replaced.

3.6 Refer to the steps for axle assembly system and install the wheels.

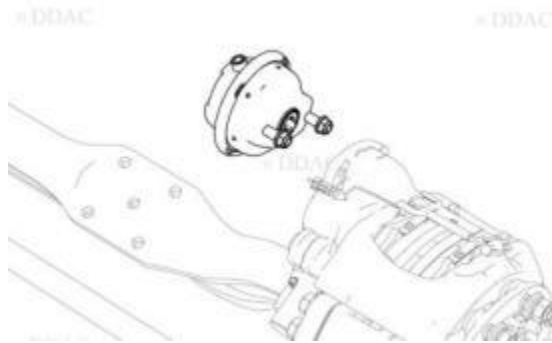
4. Disassembly and assembly of air chamber assembly

4.1 Removing the air chamber assembly

Attention:

Before disassembling the air pipe, the residual air in the air pipe should be drained. When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

- a) Pull up the handbrake, remove the air pipe from the air chamber, and remove the air chamber mounting nut.
- b) Remove the air chamber assembly



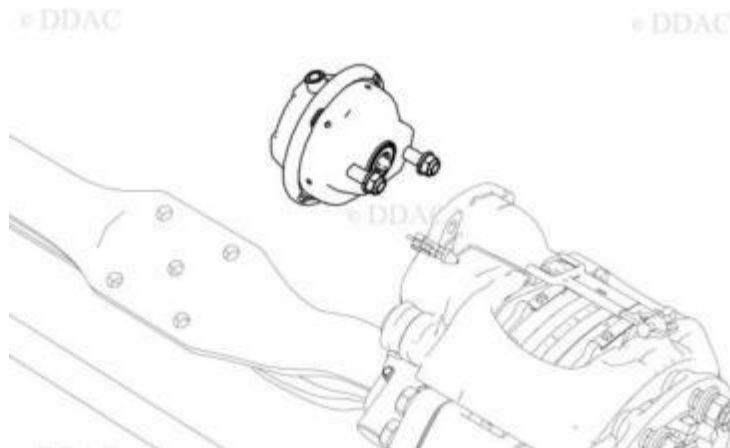
4.2 Preparation before Installation

- a) Is the mating surface between the brake caliper and the air chamber clean.
- b) Check if there is lubricating grease at the ball groove of the brake lever.
- c) Confirm that the original or designated brake chamber is selected.

Attention: Air chambers that have been used for more than two years should have their seals and pistons checked and replaced proactively.

4.3 Installing the air chamber assembly

- a) Place the air chamber in the installation position and lock the brake chamber with a nut, with an installation torque of 180~210 N.m.



- b) Connect the air pipe of the brake chamber.

Note: Install the air pipe according to the disassembly label.

- c) Remove the blockage below the brake chamber.

Lower blockage can be removed at 1-2 places.

4.4 Checking the brake clearance

The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake pad, check the clearance with a feeler gauge to ensure that the clearance is between 0.6 and 1.2 mm.

If the clearance is less than 0.6 mm, readjust the clearance.

5. Disassembly and assembly of brake pad and wear alarm

5.1 Preparation before disassembly

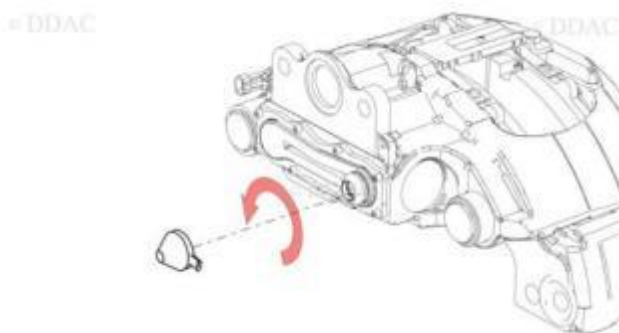
- a) For wheel disassembly steps, refer to: Axle assembly system.
- b) Release the handbrake.

5.2 Disassembly steps

Attention:

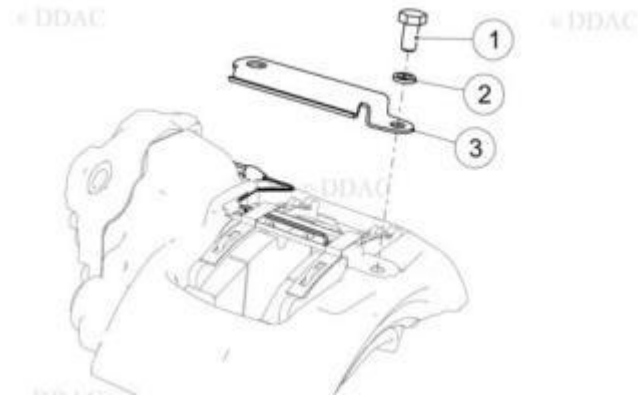
Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- a) Remove the sealing cap and use a wrench to rotate the adjustment shaft counterclockwise, creating a gap between the brake pad and the disk brake and being completely loose.



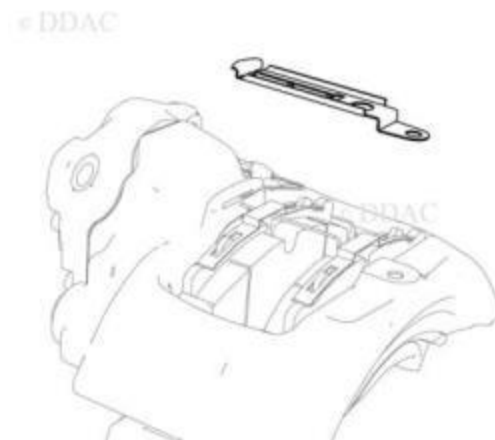
- b) Remove the sensor cover and unplug the socket of the sensor harness.

Note: There are various forms of sensor cover structure.



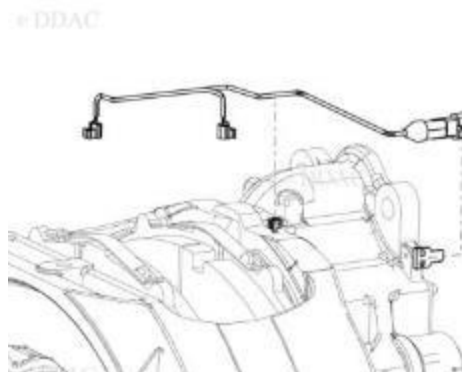
- c) Remove the upper support bracket of the caliper

Note: The caliper bracket can be fixed by bolts or pins.



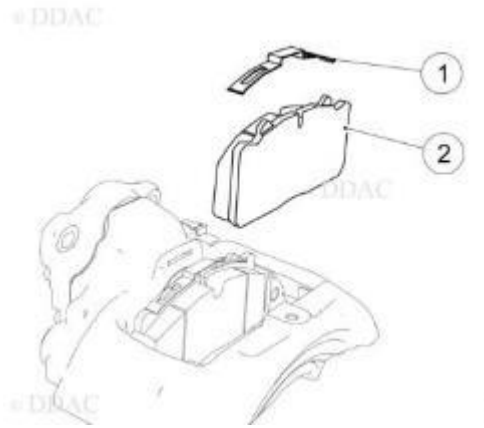
- d) Unplug the wear indicator plug and connect it to the power cord of the vehicle.

Use a screwdriver to remove the wear indicator plug from the brake pad, cut the wire harness tie, and remove the wear indicator.



- e) Remove the pressure spring (1) from the brake pad and take out the brake pad (2).

Note: There may also be a combination structure of friction plate and pressure spring.



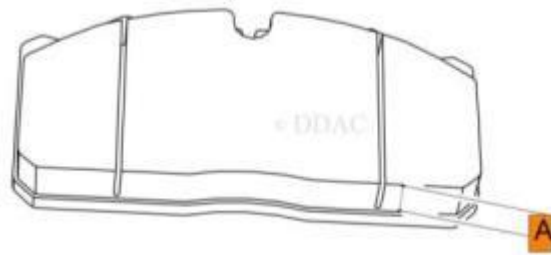
5.3 Preparation before Installation

Attention: The left and right friction blocks must be replaced simultaneously.

a) Measure the thickness of the brake pad

Measure and check the thickness of the brake pad friction material, with a minimum thickness of no less than 2 mm.

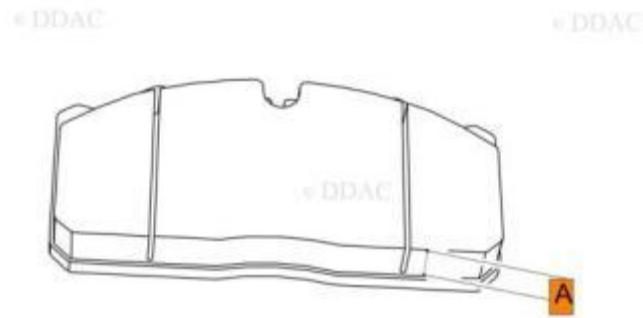
Note: Based on actual usage conditions, if the friction material has been ground to the minimum thickness or may have been ground to the minimum thickness before the next inspection, a new brake pad assembly must be replaced in advance.



b) Measure and check if the wear of the brake pad friction material is even

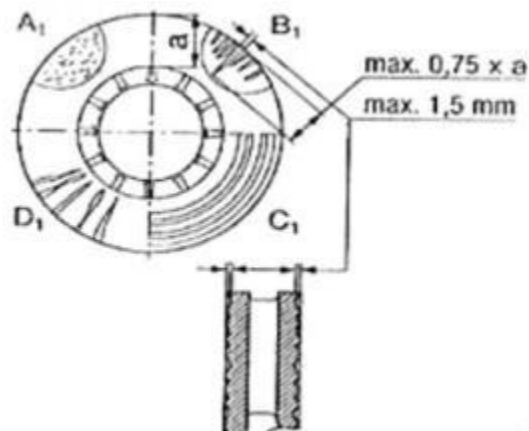
Measure and check whether the friction material of the brake pad is worn evenly. Measure at 4 points. If the wear is extremely uneven, or the surface is severely chipped, the brake pad needs to be replaced.

Note: If the thickness difference between the inner and outer friction blocks exceeds 5mm, the inner and outer plates should be transposed and installed.



c) Check the disk brake

- Check if there are cracks or scratches on the disk brake due to wear and tear



A1=Small cracks extend on the surface, which is allowed.

B1=Radial extension of cracks less than 1.5 mm in length and width, which is allowed.

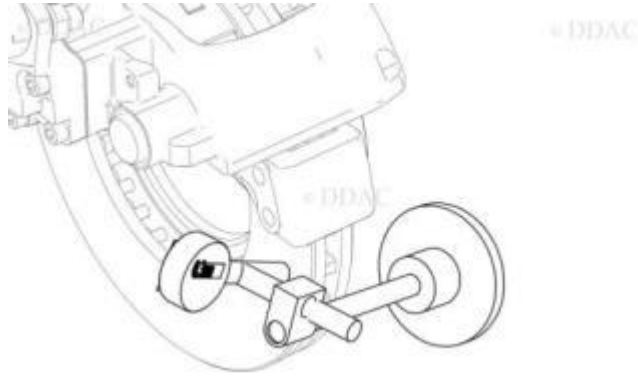
C1=Circular groove with a depth of less than 1.5 mm, which is allowed.

D1=Through cracks are not allowed and disk brake must be replaced.

The total thickness 19.5/22.5 of the disk brake is not less than 37 mm and 16/17.5 not less than 28 mm.

- Check the runout of the disk brake

Use the measuring head of a dial gauge with a magnetic seat to contact the two friction surfaces of the disk brake, and rotate the disk brake one circle to measure its runout. The maximum runout should not exceed 0.5 mm (after minus the axial runout of the wheel hub).



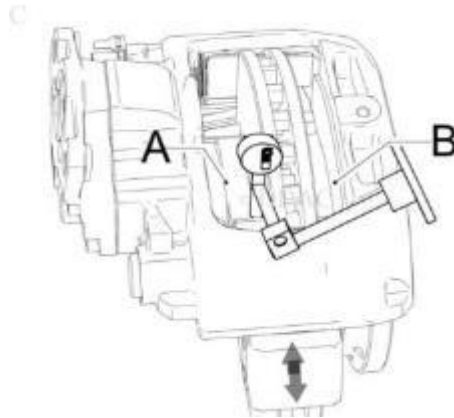
d) Check the sliding function of the brake caliper

The maximum sliding resistance of the brake caliper is 100 N. If the sliding resistance exceeds 100 N, check if there is any dust, debris, etc. that hinders the sliding of the brake caliper. Check if the sliding pin seal is damaged, causing rust on the sliding pin and affecting the sliding of the brake caliper.



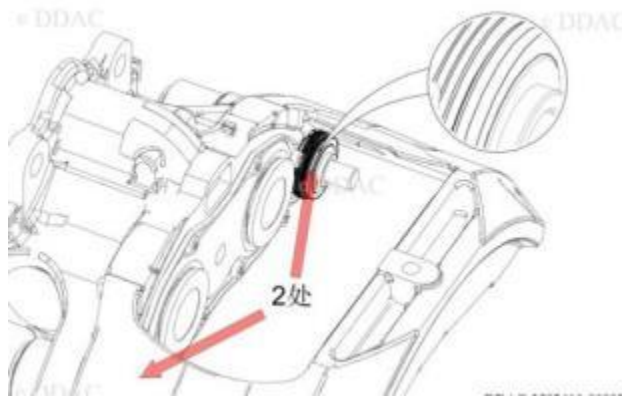
e) Check the clearance of the sliding pin

The position A in the diagram is for checking the clearance of the outer sliding pin, and the position B is for checking the clearance of the inner sliding pin. During the inspection, the dial gauge should be placed at the 0 point on the scale. Lift and lower the brake caliper using a lever at positions A and B. The maximum clearance of the two positions should not exceed 1.0 mm. If the clearance exceeds 1.0 mm, the sliding pin must be replaced.



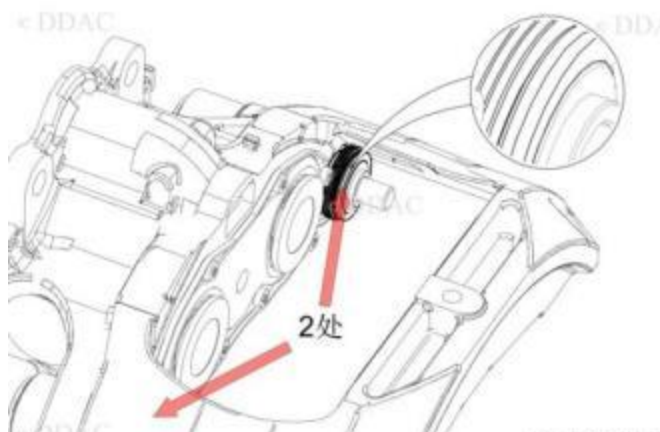
f) Check the sliding pin sealing ring

Push the main and auxiliary calipers to slide, check the sealing ring of the sliding pin, and replace it in a timely manner if there are cracks or damage.



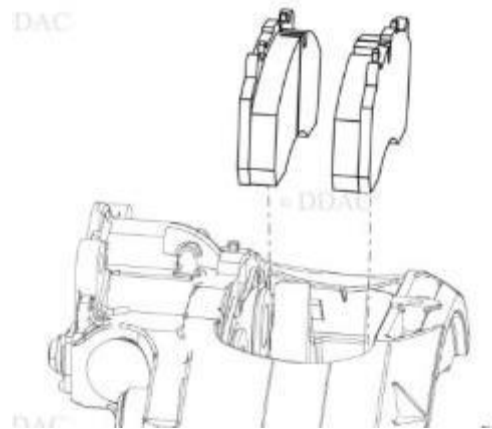
g) Check and adjust the screw seal cartridge

Rotate the adjustment shaft clockwise with a wrench to fully expose the screw sealing ring, so that the push plate is pushed out 20 mm from the initial position. Check the screw sealing ring. If there are cracks or other damages that affect the sealing, it must be replaced.

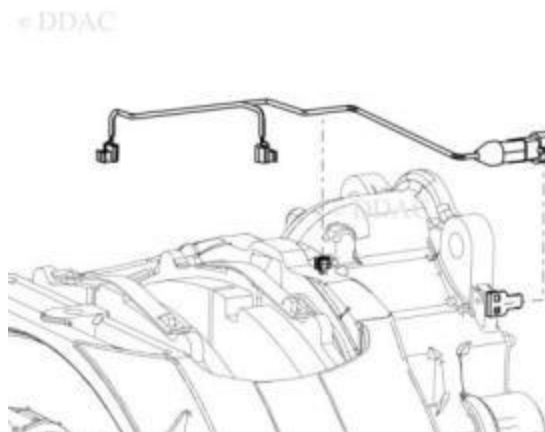


5.4 Installation steps

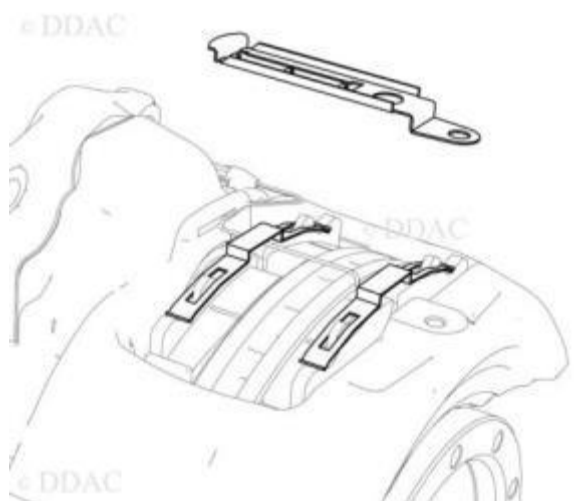
- a) Place the inner and outer brake pads into the brake caliper.



- b) Install a wear indicator on the brake pad, organize the wiring harness, and fix the wiring harness according to the disassembly position.



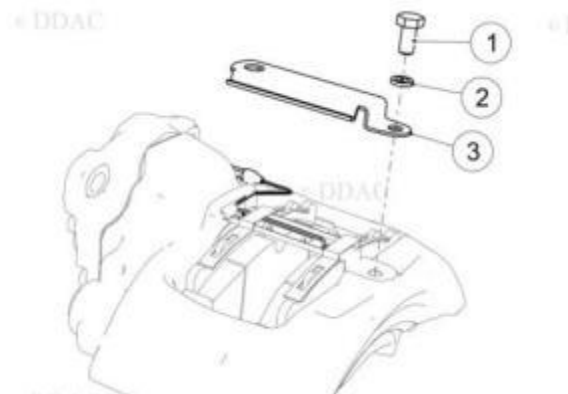
- c) Install the inner and outer brake pad pressure springs and install the bracket.



- d) Install the wear alarm wire cover, install and organize the internal and external

wear alarm wire harnesses, and cover the cover plate.

Note: The wear alarm cover varies depending on the brake product.



- e) Connect the wear alarm wire to the vehicle connector and tie the wear alarm wire in place with a cable tie.

5.5 Adjustment of brake clearance

Attention:

The adjustment of brake clearance is a necessary step after repairing the braking system.

Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- a) Check the gap between the brake caliper and the disk brake. The normal gap is 0.6~1.2 mm. If it is less than 0.6mm, it needs to be manually adjusted.
- Remove the sealing cap.
 - Rotate the adjustment shaft counterclockwise by 180 ° with the wrench, and hear a "click" sound (increasing the gap).
 - Check clearance.
- b) Without removing the adjustment wrench, while ensuring that the braking pressure of the vehicle meets the requirements ($\geq 0.6\text{MPa}$), apply 20 brakes in place, maintain the pressure for more than 5 seconds, and maintain the braking frequency of once every 2-3 seconds. The brake clearance can be adjusted to the normal range by hand.
- c) Observe that the wrench should turn clockwise at a smaller angle.

- d) If the wrench cannot rotate, or only rotates during the first brake application, or rotates forward and then backward during each brake application, it indicates that the automatic adjustment mechanism has failed and the brake caliper must be replaced.

5.6 Refer to the steps for axle assembly system and install the wheels.

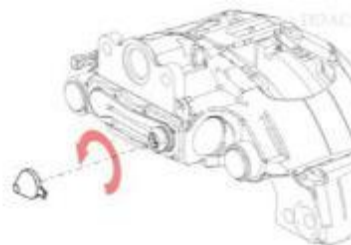
6. Disassembly and assembly of screw protective sleeve

6.1 Preparation before disassembly

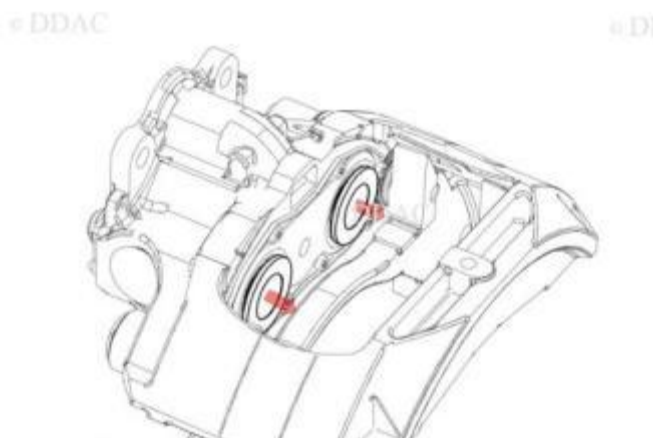
- a) Follow the disassembly steps for the air chamber assembly to disassemble the air chamber.
- b) Remove the brake pads according to the disassembly steps for the brake pads and wear alarm indicator.

6.2 Disassembly steps

- a) Remove the sealing cap and use a wrench to clockwise rotate the adjustment shaft until the push plate extends 35~40 mm and stops rotating.



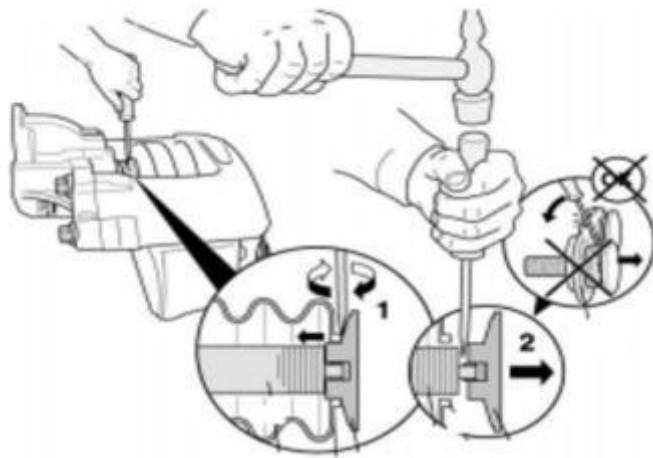
- b) Pull the coil spring protective sleeve backwards with force.



- c) Use a screwdriver to separate the protective sleeve and push plate.

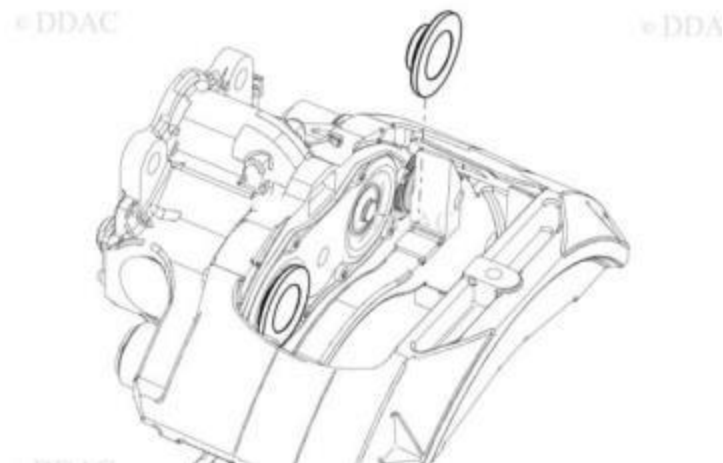
Attention: During the disassembly process, avoid damaging the adjustment

screw and push plate.

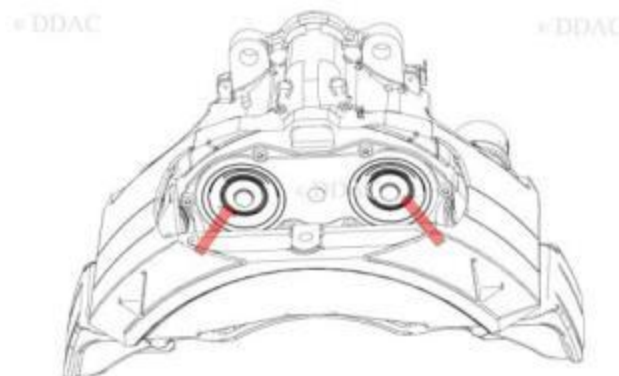


- d) Rotate the adjustment shaft counterclockwise until the adjustment screw fully returns, and remove the protective sleeve from the end cover.

Attention: During the disassembly process, avoid damaging the sealing mating surface.

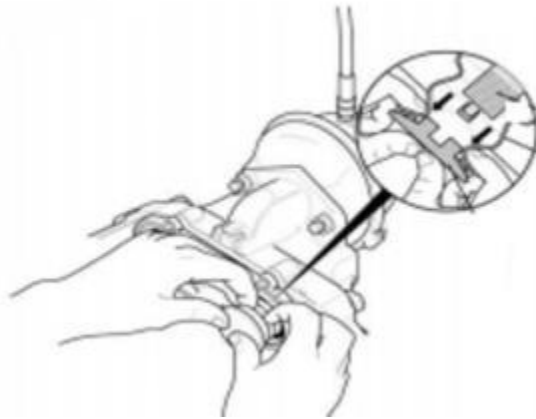


6.3 Preparation before Installation



- a) Check if the installation surface of the protective sleeve on the end cover and the installation surface of the push plate are intact and not damaged.
- b) Check if the contact surface between the push plate and the adjustment screw is intact and free of damage.
- c) Check if there is rust, damage, and indentation on the adjustment mechanism at the other end of the adjustment screw. If there is rust or damage, replace it with a new one.

6.4 Installation steps



- a) Apply special lubricating grease to the threads of the adjustment screw.
- b) Install the protective sleeve on the end cover and press it into the installation groove.
- c) Fix the protective sleeve onto the adjustment screw using a new clamp spring.
- d) Press the protective sleeve onto the push plate with your fingers, and then install the push plate onto the adjustment screw.

6.5 Final steps

- a) Install the brake pad according to the steps for the brake pads and wear alarm.
- b) Install the brake chamber according to the steps for the chamber assembly.
- c) Check and adjust the brake clearance.

The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake pad, check the clearance with a feeler gauge to ensure that the clearance is between 0.6 and 1.2 mm. If the clearance is less than 0.6 mm, follow the brake clearance adjustment method, rotate counterclockwise to enlarge the clearance, and then readjust the clearance.

- d) Install the adjustment screw sealing cap.

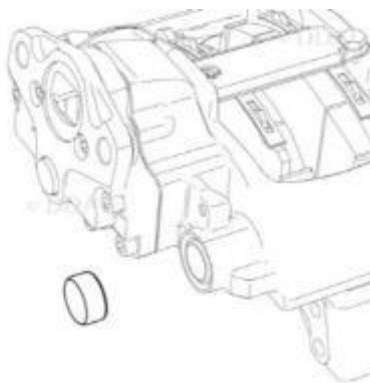
7. Disassembly and assembly of sliding pin and sliding pin bushing

7.1 Preparation before disassembly

- a) Follow the disassembly steps for the disc brake assembly and remove the brake assembly.
- b) Follow the disassembly steps for the air chamber assembly to remove it.

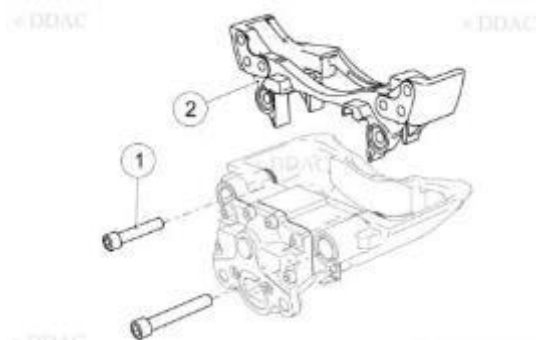
7.2 Disassembly steps

- a) Remove the sliding pin sealing cover



- b) Remove the sliding pin fixing bolt (1), push the sliding pin back with force, and remove the bracket (2).

Attention: Do not damage the sealing surface of the sliding pin.

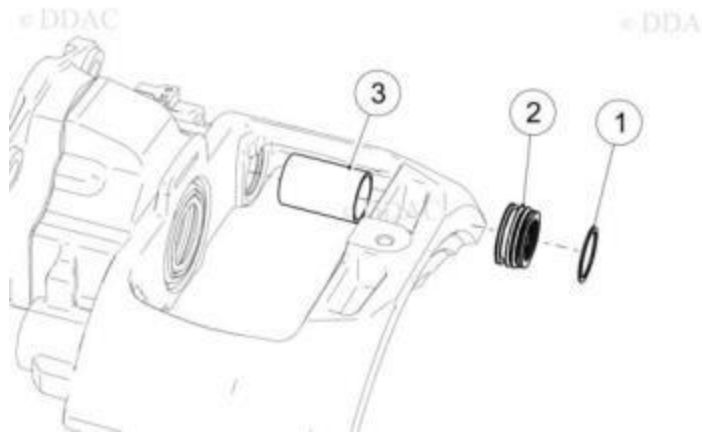


- c) Remove the rubber protective sleeve (2) and sliding pin bushing (3).

Attention:

Do not damage the rubber protective sleeve. If it is damaged, it must be replaced with a new protective sleeve.

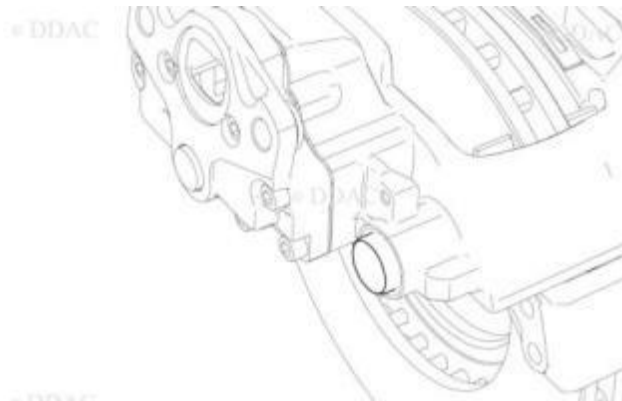
Check the inner hole of the guide pin. If there is obvious wear on the bushing, replace it. If there is obvious wear on the guide pin, replace it simultaneously.



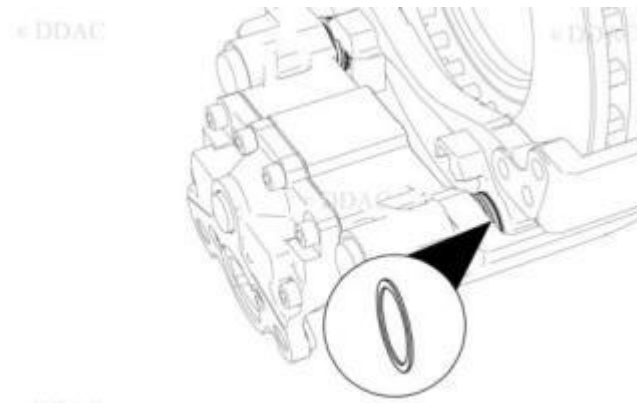
7.3 Preparation before Installation

- a) Check the sealing cover of the brake caliper sliding pin. If it is loose or lost, replace or install it in a timely manner.

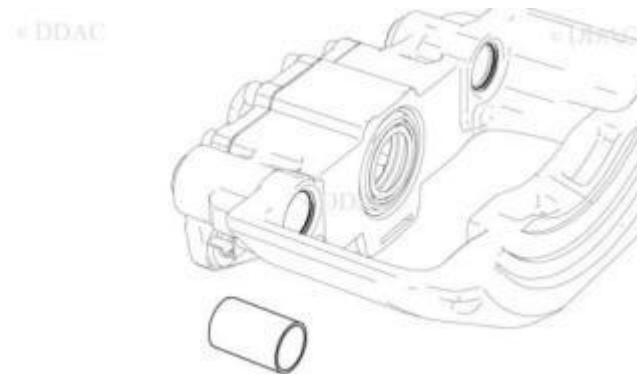
Note: The sealing cover is disposable. Once the guide pin is opened, please replace the sealing cover with a new one simultaneously.



- b) Push the main and auxiliary calipers to slide, check the sealing ring of the sliding pin, and replace it in a timely manner if there are cracks or damage.



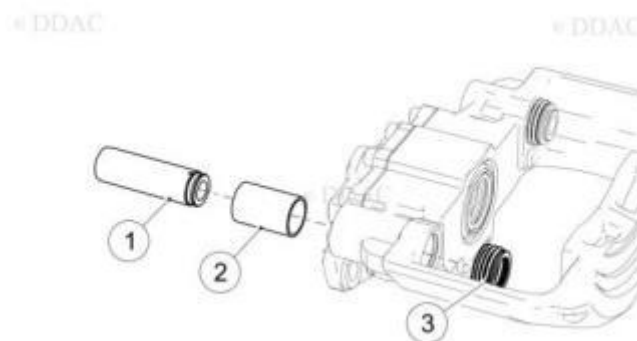
- c) Check and clean the contact surface between the brake caliper, sliding pin bushing, and rubber sleeve to ensure that there are no foreign objects or damage.



- d) Clean the contact surfaces between the brake pad and the fixed base plate, as well as brake caliper and push plate.

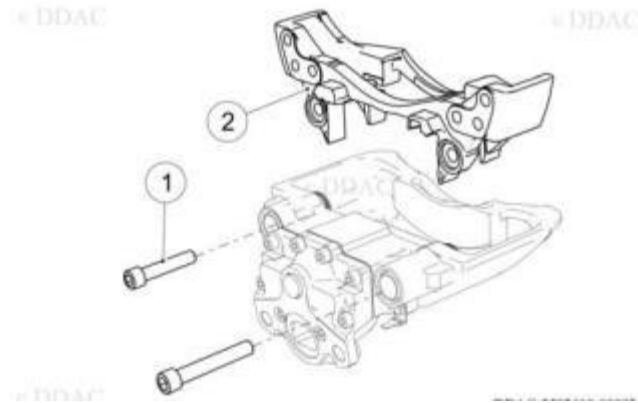
7.4 Installation steps

- a) Install the sliding pin (1) on the bracket, and install the sliding pin bushing (2) and rubber sleeve (3) on the guide pin hole of the caliper body.



- b) Push out the sliding pin outward, place the bracket (2) at the installation

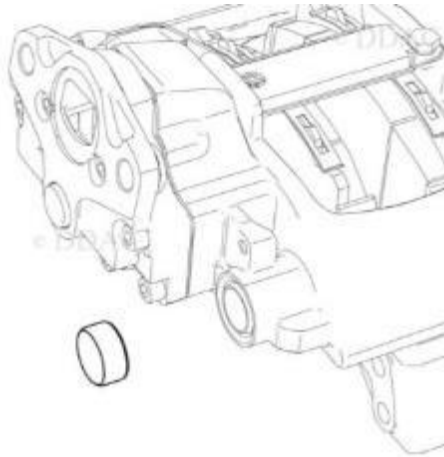
position on the brake caliper, then push in the sliding pin and install the bolt (1) with a torque of 280~320 N.m, locking the sliding pin.



- c) As for the installation of the sliding pin sealing cover, carefully tap the sealing cover, and install it on the sliding pin of the brake caliper.

The sealing cover must be in full contact with the bottom of the brake caliper.

Some structures do not have cap limit holes, and caps generally need to be pressed in place using toolings to ensure the depth of the cap pressing.



7.5 Final steps

- Install the brake chamber according to the steps for the chamber assembly.
- Follow the steps for the disc brake assembly and install the brake assembly.
- Install the brake pads and wear alarm according to the steps for the brake pads and wear alarm.
- The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake pad, check the

clearance with a feeler gauge to ensure that the clearance is between 0.6 and 1.2 mm. If the clearance is less than 0.6 mm, readjust the clearance according to the brake clearance adjustment method.

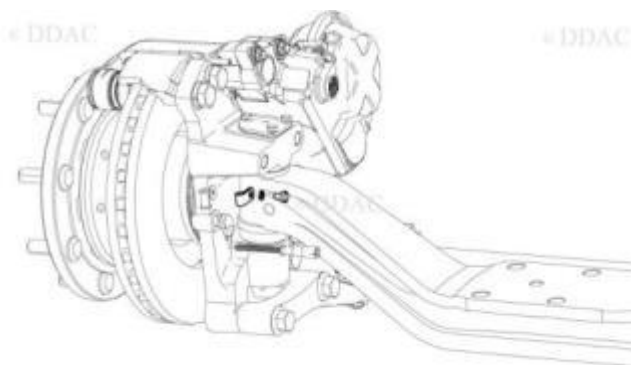
8. Disassembly and assembly of ABS sensor and ABS bracket

8.1 Preparation before disassembly

- Check and confirm if ABS installation and disassembly require wheel disassembly.
- The ABS sensor or bracket malfunction has be confirmed before disassembly.
- Vehicle power outage.

8.2 Removing the ABS sensor

- a) Use flat nose pliers to cut off the cable ties that bind the ABS harness, leaving the harness in an unbound state.
- b) Remove the plug connector connecting the ABS harness to the vehicle harness.
- c) Release the ABS harness clip on the axle housing.



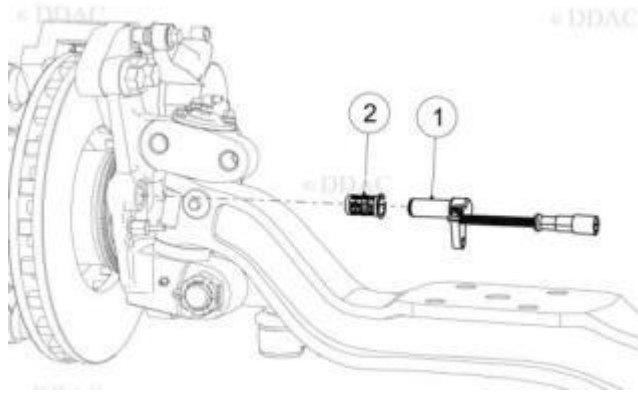
- d) Keep the ABS harness in a completely unsecured state.

Attention:

Properly store the buckle to prevent loss.

Properly place the ABS wiring harness to prevent breakage.

- e) Pull out the ABS sensor assembly and ABS bushing from the rear.



8.3 Preparation before Installation

- a) Clean and inspect the elastic bushing.

Check the inner hole of the bracket with a caliper and check for any out of roundness, rusting, or larger than 18.11mm in size. Replace the bracket with a new one.

Attention:

The elastic bushing needs to be replaced due to rust or permanent elastic deformation.

- b) Check the ABS sensor

ABS sensors can only be installed after passing the inspection.

- Check the appearance of the ABS sensor, and there should be no obvious scratches or dents on the head.
- Measure the resistance of the sensor using the resistance range of a multimeter, and the resistance should be between 1350 and 1650 Ω .
- The wiring harness must not be damaged.

- c) Clean the ABS gear ring

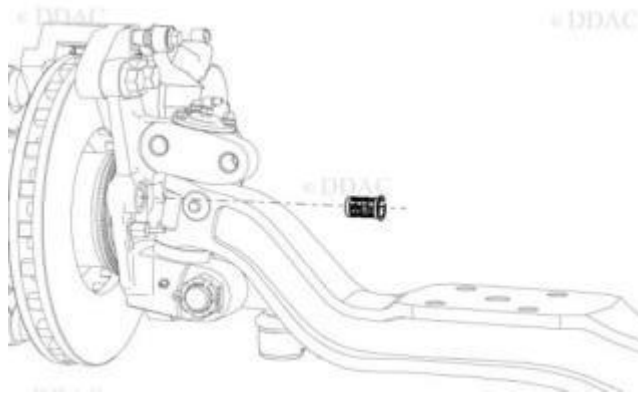
Clean the ABS gear ring with a brush.

Check for foreign objects in the gap of the ABS gear ring.

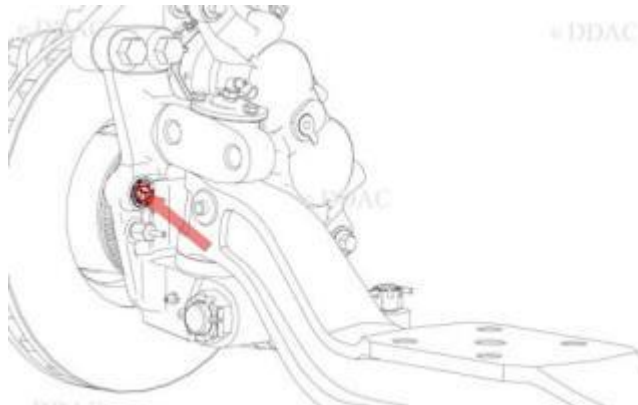
8.4 Installing the elastic bushing

The inner edge of the elastic bushing is on the inside

- a) Install the elastic bushing from the inner side of the mounting hole on the bottom plate until it is blocked by the edge.

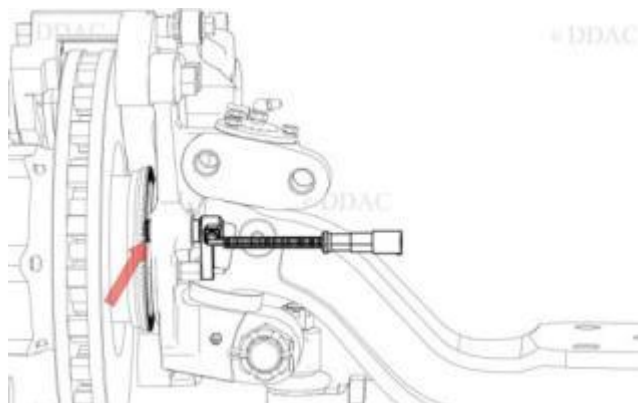


- b) Apply lubricating grease evenly in the inner hole of the elastic bushing



8.5 Installing the ABS sensor

- a) Insert the sensor into the elastic bushing hole until it is directly against the ABS gear ring.



- b) When the vehicle is in motion, the end runout of the gear ring and the clearance between the wheel bearings will automatically push the sensor away, creating a gap of less than 0.7mm between the sensor and the gear ring. But when assembling the wheel hub and drum brake assembly, the gear ring will push the sensor to a certain position. If the sensor is pushed too far, exceeding the maximum gap, it must be removed and reinstalled. The maximum gap between

the gear ring and the sensor shall not exceed 1.2mm.

c) ABS signal detection confirmation

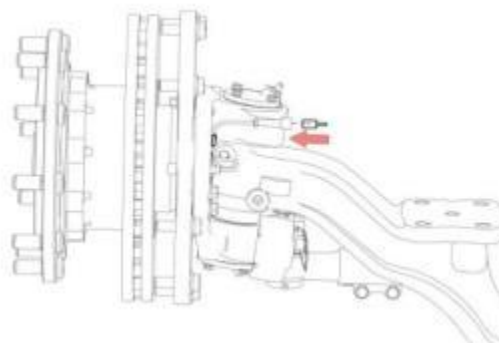
Unplug the ABS sensor assembly and insert the ABS signal measuring instrument quick connector into the ABS sensor assembly. If there is no ABS signal measuring instrument, connect the multimeter needle to the ABS plug. Turn the multimeter to the AC voltage range and rotate the wheel end. If the needle is swinging, it indicates that the ABS sensor is normal.

8.6 Fixing the wiring harness

Plug in the connector of the vehicle and place the ABS wiring harness in place.

Attention:

The ABS wiring harness must not have any swinging phenomenon when fixed on the vehicle

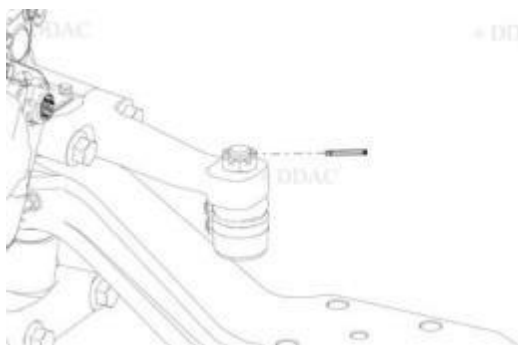


8.7 If disassembling the wheels, refer to: Axle assembly system

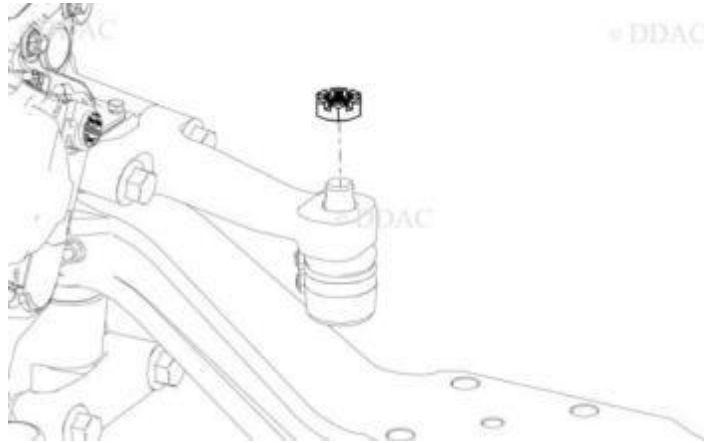
9. Disassembly and assembly of drag link arm

9.1 Remove the connection between the drag link and the drag link arm

- a) Use sharp-nose pliers to straighten and bend the split pin and pull it out.



- b) Remove the slotted link nut.

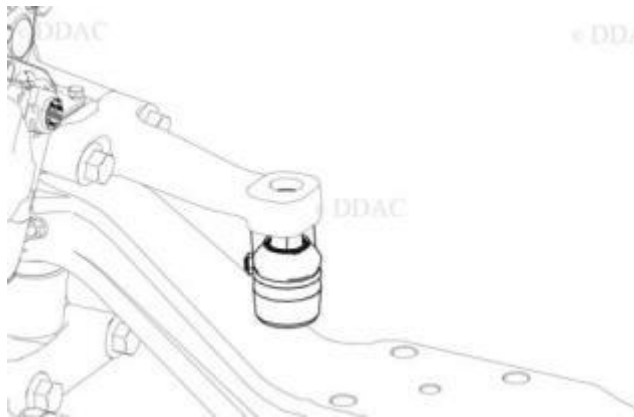


- c) Knock the drag link ball stud upwards and disengage the drag link arm.

Attention:

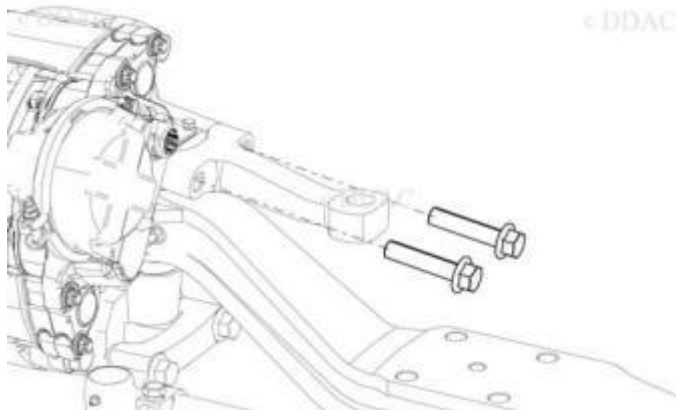
Do not damage the thread of the ball stud during the process of striking it.

Use a puller if necessary.



9.2 Removing the drag link arm

Remove the bolt and take out the drag link arm.



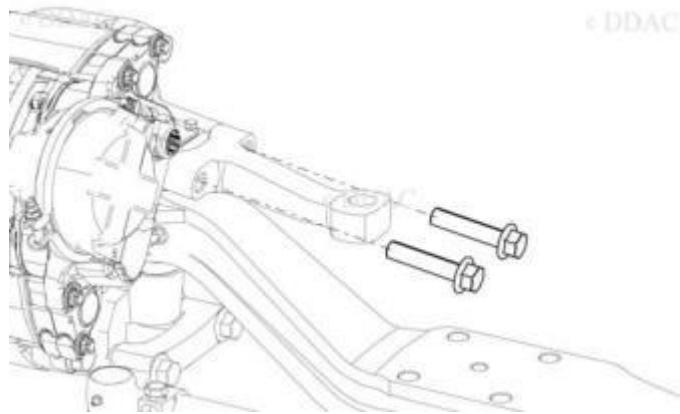
9.3 Preparation before Installation

- a) Clean the installation conical surface of the drag link arm on the knuckle.
- b) Check if the threads of the installation bolts are damaged and replace them if there are any defects.
- c) Check and confirm that there are no cracking defects on the drag link arm.

9.4 Installing the drag link arm

Install the drag link arm onto the knuckle and tighten the bolts with a torque of 550~680 N.m.

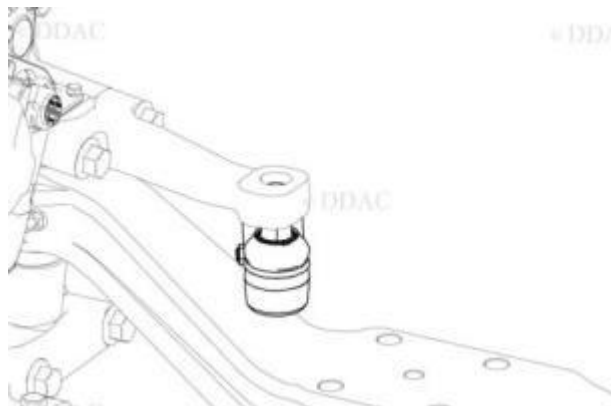
Attention: When slotting the locking pin hole, only allow the nut to rotate and align in the direction of torque increase.



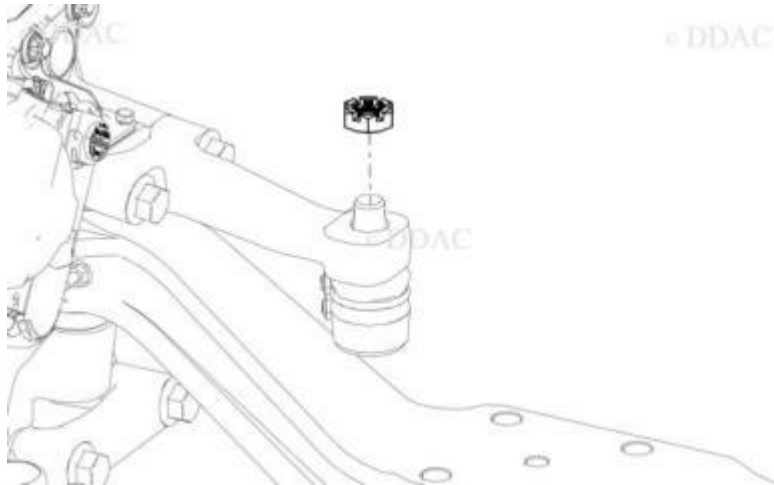
9.5 Installing the ball stud connecting the drag link and the drag link arm

Attention: When slotting the locking pin hole, only allow the nut to rotate and align in the direction of torque increase

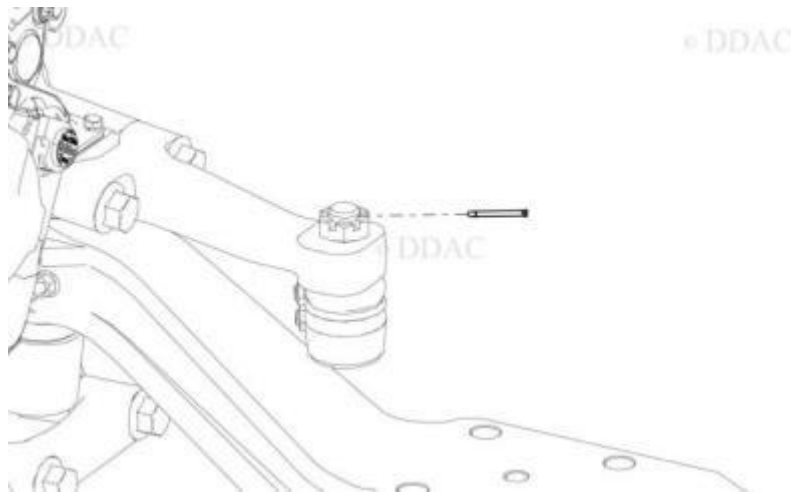
- a) Insert the drag link ball stud into the connecting cone hole of the drag link arm.



- b) Screw on the slotted nut and tighten it, with the center of the slot corresponding to the center of the bolt split pin hole.



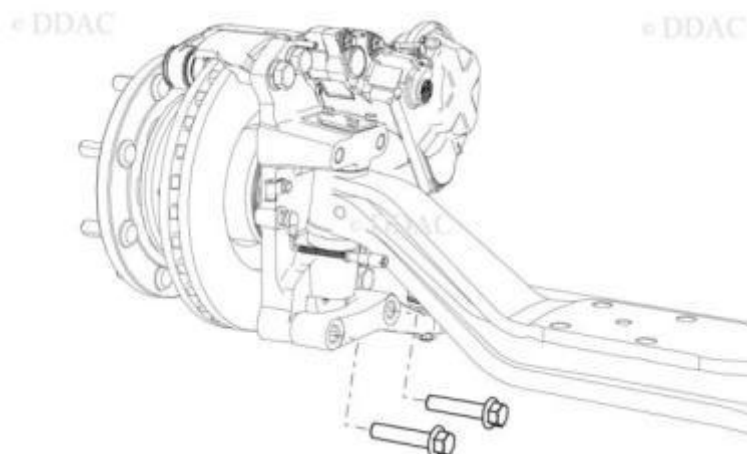
c) Insert the split pin and bend it 90 degrees.



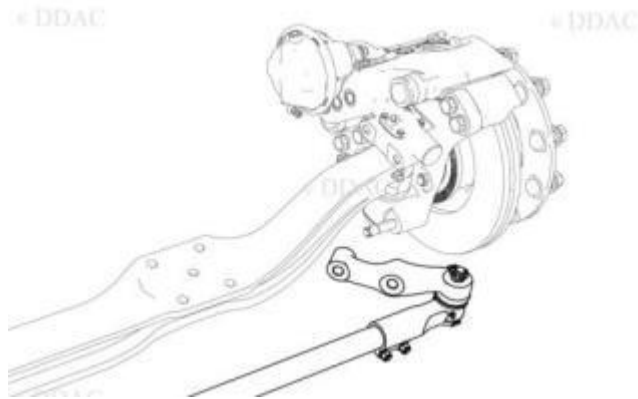
10. Disassembly and assembly of the tie rod assembly and steering knuckle arm

The tie rod assembly can be removed together with the steering knuckle arm or separately.

10.1 Removing the bolt



10.2 Removing the steering knuckle arm and tie rod assembly.



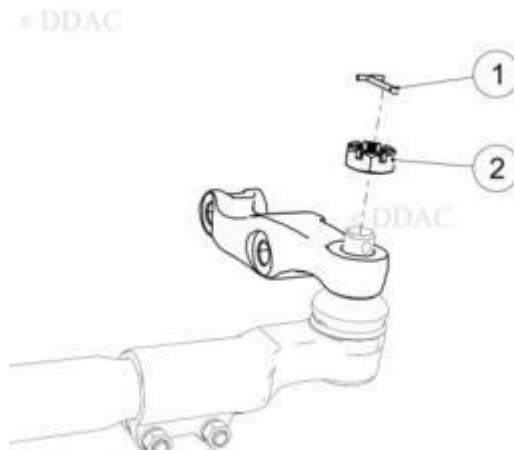
10.3 Disassembling the tie rod and steering knuckle arm assembly.

Attention:

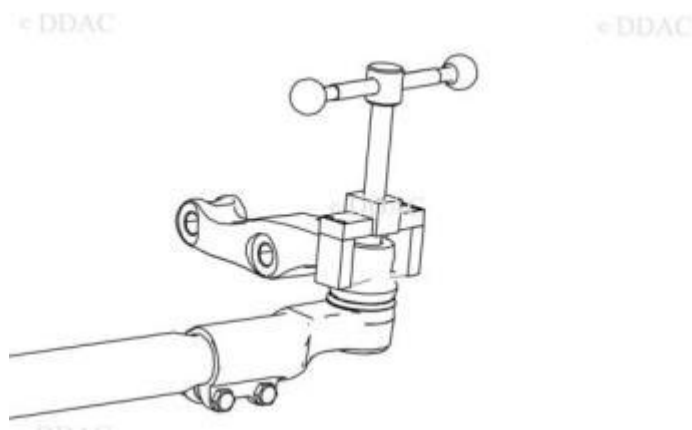
If there are no faults in the tie rod and knuckle, they will not be disassembled.

Remove the brake baseplate before performing this step.

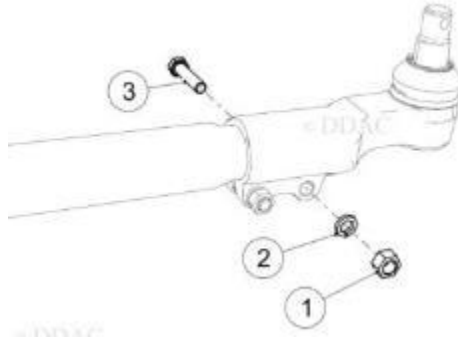
- a) Remove the split pin (1) and the castle nut (2).



- b) Use a puller to separate the steering knuckle arm from the tie rod.

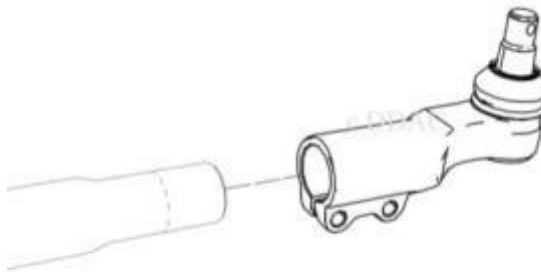


- c) Remove the tie rod clamp nut (1), washer (2), and bolt (3).



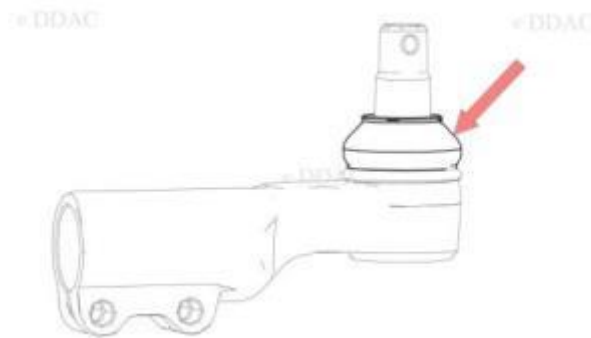
- d) Remove the tie rod joint assembly from the tie rod.

Attention: The right end of the tie rod is a right thread, and the left end is a left thread

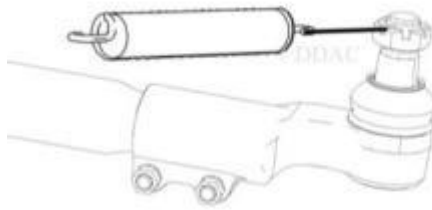


10.4 Preparation before Installation

- a) Visually inspect the joint assembly dust cover for cracks and replace it promptly if there is any cracks.



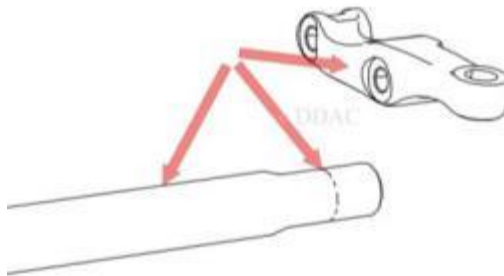
- b) Check and confirm the swing resistance of the tie rod ball head, which shall be greater than 50 N.



- c) Check and confirm that the tie rod has no bending or deformation.

Check if the threads of the installation bolts are damaged and replace them if there are any defects.

Check and confirm that there are no cracking defects on the steering knuckle arm.



- d) In order to align the groove of the nut with the hole of the bolt, tighten the castle nut first. If the groove is not aligned with the hole, slowly tighten the nut (do not loosen the nut by reverse turning) until it can pass through the split pin.

10.5 Install the tie rod assembly onto the steering knuckle arm.

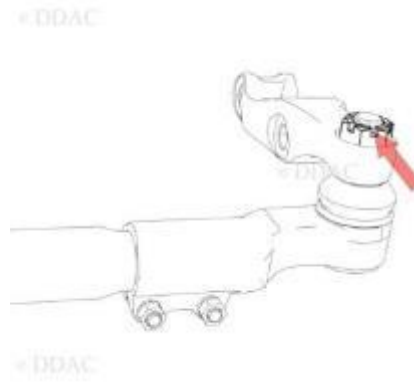
- a) Insert the ball stud of the tie rod arm into the connecting cone hole of the steering knuckle arm.



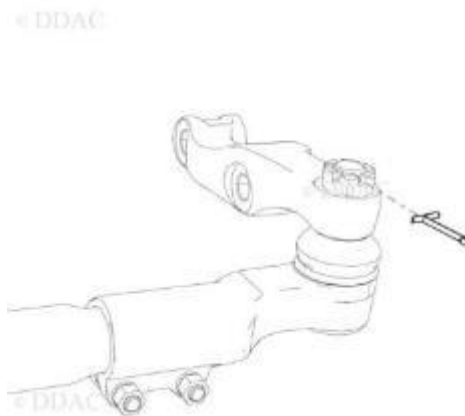
- b) After pre tightening the slotted nut, the ball stud should be struck to ensure a

good fit on the conical surface, and then tighten to the specified torque, with a tightening torque of 180~250N. m.

Note: The center of the slot should correspond to the center of the bolt split pin hole.

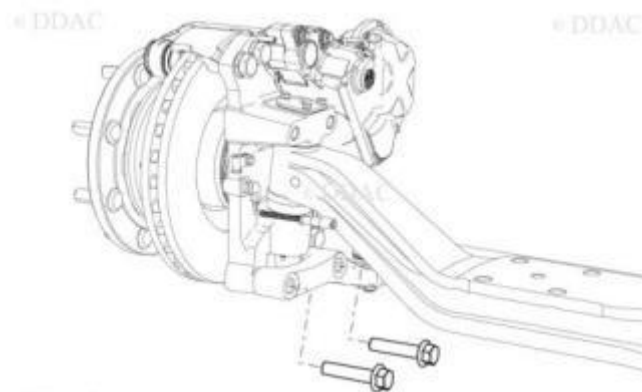


c) Insert the split pin and bend it 90 degrees.



10.6 Install the tie rod and steering knuckle arm assembly onto the knuckle

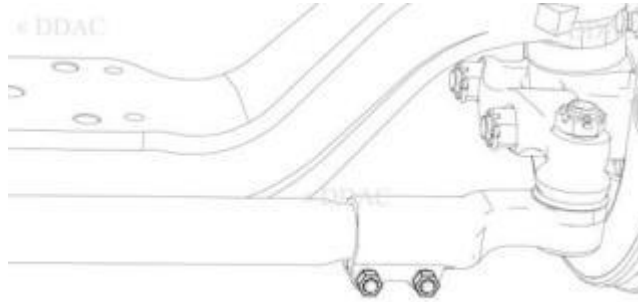
Install the tie rod and steering knuckle arm assembly onto the knuckle, and tighten the bolts with a torque of 550~645 N.m.



10.7 Readjusting the toe-in and tightening the slotted nut

Attention: Confirm that the vehicle is parked on a level ground before inspection

- a) Use a jack to lift the front axle and support it with a bracket to ensure that the tire is off the ground. Draw an arrow at the center of the tire tread, and draw a centerline on the tread of each tire.
- b) Fix the steering wheel in the straight ahead position of the vehicle. In front of the front wheel, place the toe-in measuring tool parallel to the front axle (pointing towards the left and right front wheels respectively).
It is recommended to use a four-wheel aligner. If there is no four-wheel aligner, use a tape measure.
- c) Place the pointer cap of the toe-in measuring tool at the height of the axis of the steering shaft head.
- d) Align the pointer with the centerline of the left and right tires respectively, and record the reading of the measuring tool. Assume the reading of the measuring tool is "A".
- e) Using the same method as above, move the measuring tool behind the front axle, align the pointer with the centerline of the left and right tires, and record the reading of the measuring tool. Assume the reading of the measuring tool is "B".
- f) Subtract A from B to obtain the accurate toe-in value C.
- g) If the measured toe-in value does not match the technical parameters, loosen the tie rod joint clamping bolt and transmission tie rod until the correct toe-in value is obtained.
- h) After toe-in adjustment, adjust the left and right joint clamps to the same direction, and ensure that there is no interference between the tie rod joint and the ball stud when the left and right inner wheels rotate at the maximum angle. Then tighten the clamp nuts with a tightening torque of 78~115 N.m.



11. Disassembly and assembly of knuckle and king

11.1 Preparation before disassembly

Warning: Two people are required to operate when knocking out the king to prevent the knuckle from falling and injuring people when the spindle leaves the front axle hole.

- a) For the disassembly of the axle assembly, refer to: Front axle body.
- b) For the disassembly of the wheel hub and drum brake assembly, refer to: Wheel hub system.
- c) For the disassembly of brake assembly, refer to: Braking system.
- d) For the disassembly of steering knuckle arm, refer to: Tie rod and steering knuckle arm.
- e) For the disassembly of drag link arm, refer to: Drag link arm.

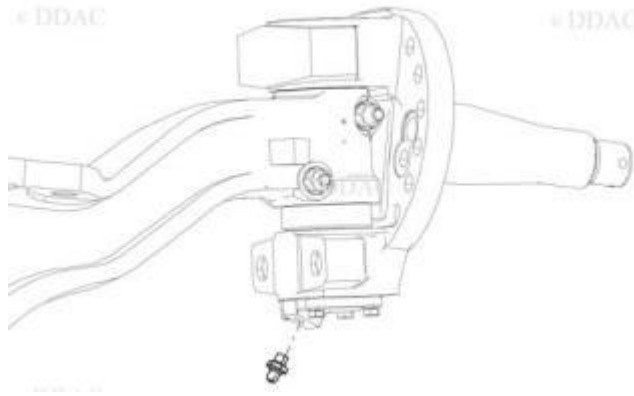
11.2 Removing the dust cover

Remove the bolt (1), washer (2), and upper dust cover (3).

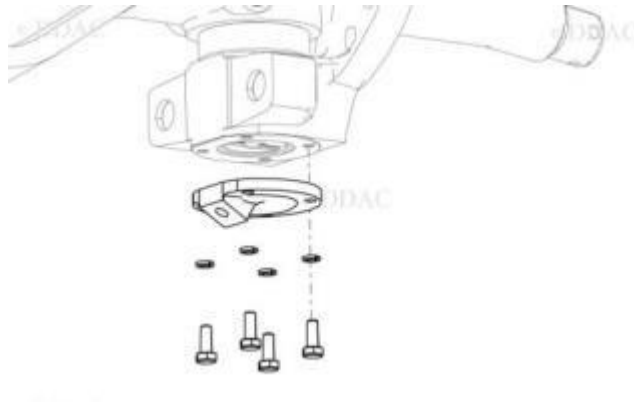


11.3 Removing the dust hood

- a) Remove the oil nozzle.

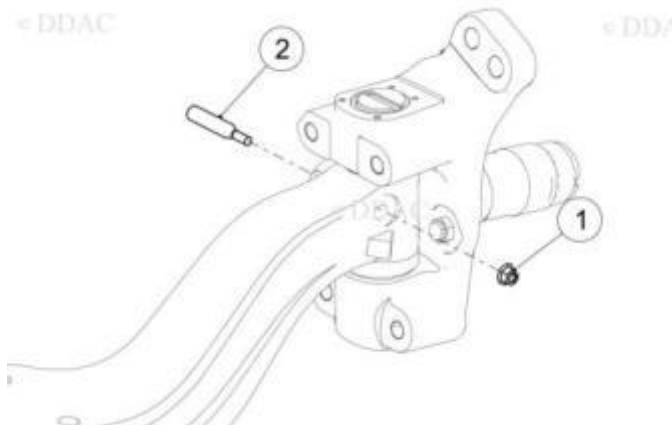


b) Remove the bolt (1), washer (2), and lower dust cover (3).



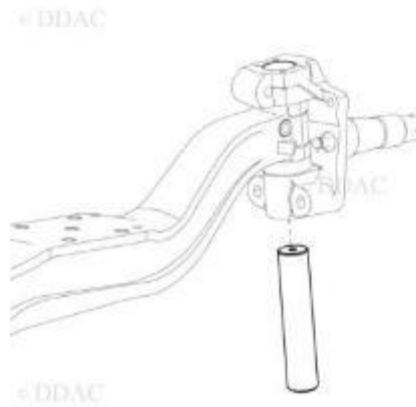
11.4 Removing the wedge locking pin

Loosen the locking pin nut (1) and drive out the wedge pin (2) from the inside out.



11.5 Removing the king

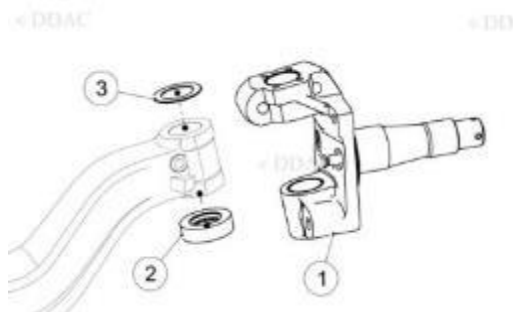
Use a copper hammer and rod to drive out the king from top to bottom.



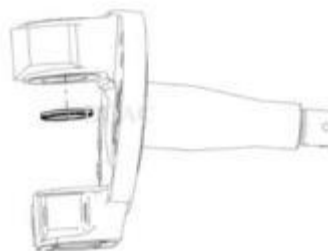
11.6 Removing the knuckle assembly

Attention: When removing the knuckle assembly, prevent the lower thrust bearing and upper adjustment shim from falling off.

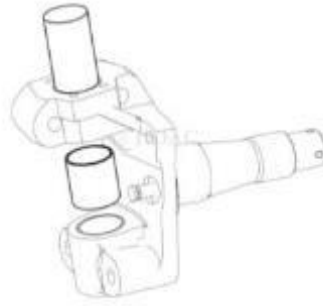
- a) Remove the knuckle assembly (1), the lower axial thrust tapered roller bearing (2), and the upper adjustment shim (3).



- b) Pry out the oil seal.



- c) Press out the bushing on the knuckle.

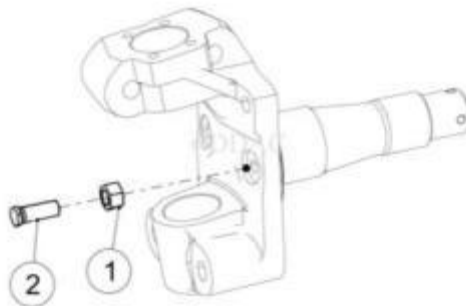


- d) Press out the needle-roller bearing under the knuckle.



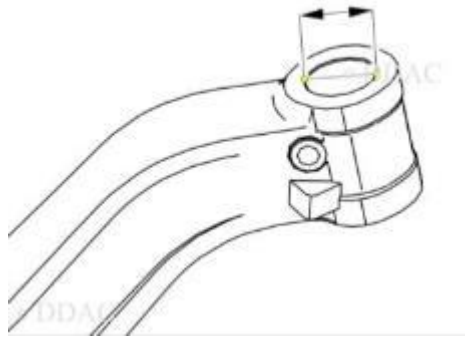
- e) Take the limit nut (2) and bolt (1).

Note: Remove when replacing the knuckle or limit bolt.

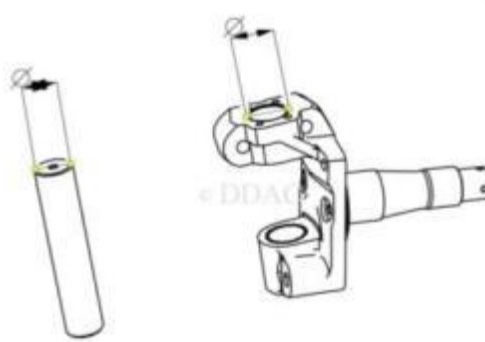


11.7 Preparation before Installation

- a) Clean the installation hole of the front axle king. Measure the inner diameter of several kingpin holes on a plane perpendicular to the axis. If the kingpin hole is larger than $\phi 42.2$ mm, or the kingpin hole is out of roundness, it should be repaired and an enlarged king should be used.

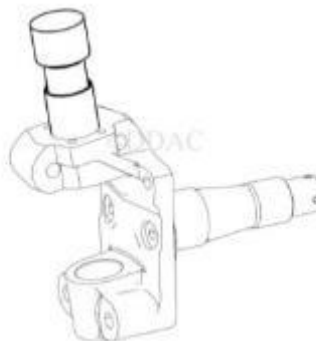


- b) Clean the inner hole of the steering knuckle bushing and the king, measure the outer diameter of the king and inner diameter of the bushing at several different points, and calculate the average difference between the inner and outer diameters. When the difference (gap) is greater than the wear limit of 0.2 mm, replace the king or bushing.



11.8 Installing the king bushing

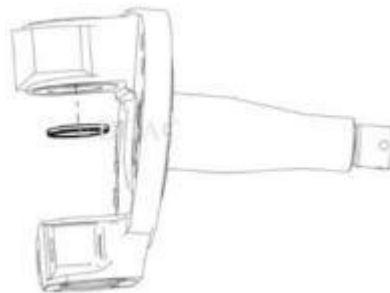
- a) Use a special tool to press in the upper bushing.



- b) Press in the lower needle-roller bearing with a special tool



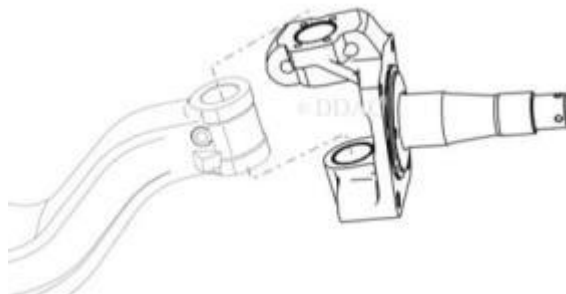
- c) Press to fit the oil seal with a special tool



11.9 Installing the knuckle

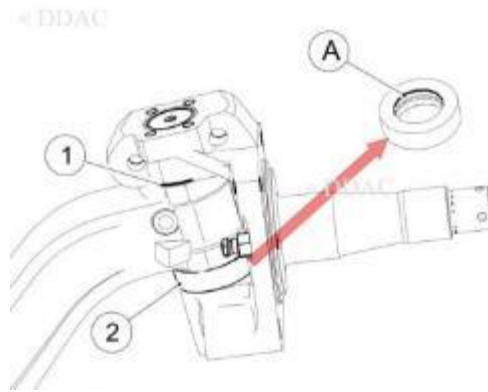
Apply lubricating grease evenly to the inner hole of the steering knuckle bushing.

- a) Align the steering knuckle bushing hole with the front axle end kingpin hole.



- b) Place a pre-selected adjustment shim (1) on the mating surface between the knuckle and the upper part of the front axle, remember the thickness of the shim, and place a new axial thrust tapered roller bearing (2) at the lower part.

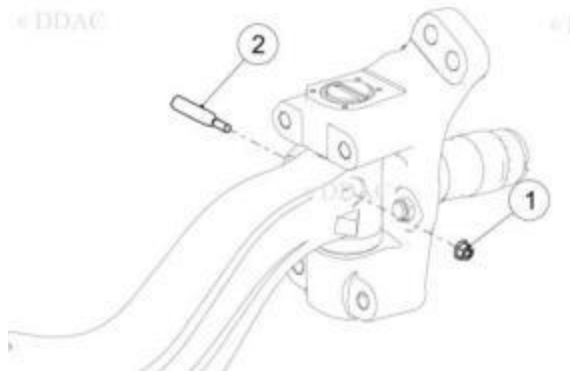
Note: The thrust bearing should have the O-ring sealing end facing upwards.



- c) Insert the king into the hole on the knuckle from top to bottom, and align the groove on the king with the locking pin hole on the front axle.



- d) Thread the wedge locking pin bolt (2) from front to back through the locking pin hole, and tighten the nut (1) with a torque of 40~60 N.m.



- e) Measure the gap between the lower thrust bearing of the knuckle and the front axle using a feeler gauge, with a requirement that the gap should not exceed 0.1 mm. If the gap is greater than 0.1 mm, select the upper adjustment shim again and reassemble according to the above steps before measuring.

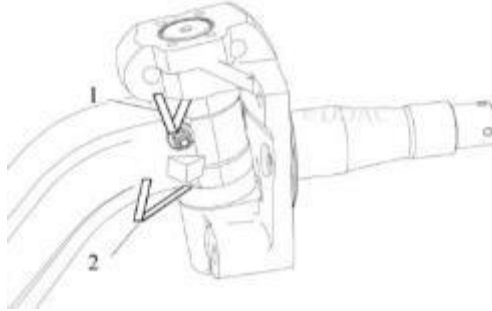
Attention:

Do not use a hammer to strike the shim.

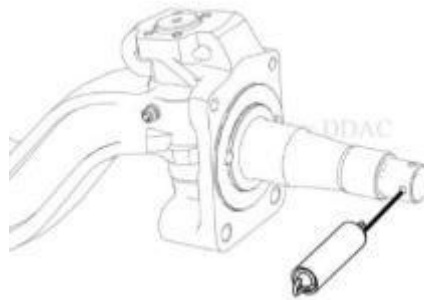
Only one adjustment shim can be used for adjustment.

When the wheels are on the ground, measure the gap ①, with a maximum gap of 0.1 mm.

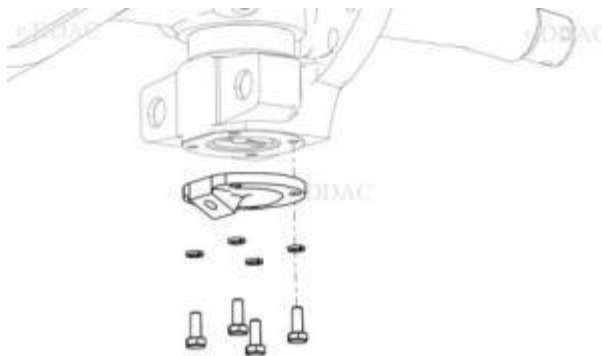
When the axle is supported, measure the gap ②.



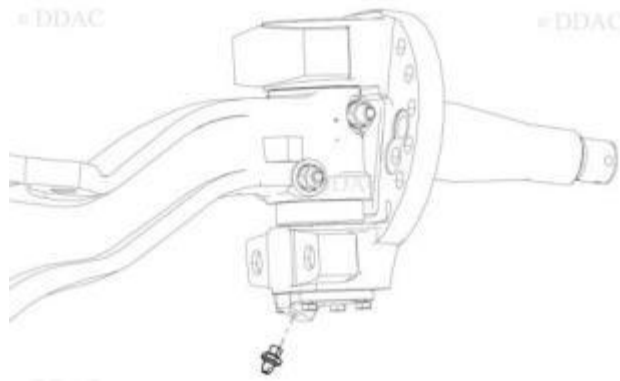
- f) At the knuckle head, use a spring scale to detect the starting force of the knuckle, and the starting force is required to be less than 10 N.



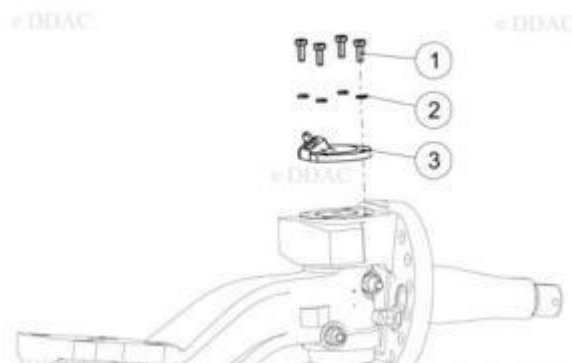
- g) Install the lower end cover (3), gasket (2), and bolt (1) with a tightening torque of 30~40 N.m.



- h) Install the upper oil nozzle.



- i) Install the upper end cover (3), gasket (2), and bolt (1) with a tightening torque of 30~40 N.m.



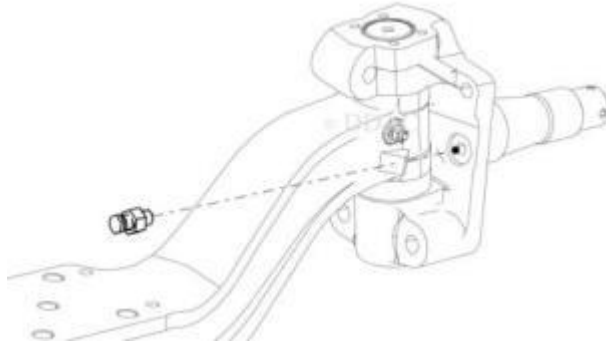
11.10 Final steps

- Install the hub disk brake assembly.
- Install the brake assembly.
- Install the drag link arm according to the installation steps.
- Install the steering knuckle arm according to the disassembly steps.
- Install the tie rod assembly according to the installation steps.
- Install the wheels according to installation steps.
- Follow the steps for toe-in adjustment when assembling the tie rod to adjust the toe-in until it is qualified.

11.11 Adjusting the maximum wheel rotating angle

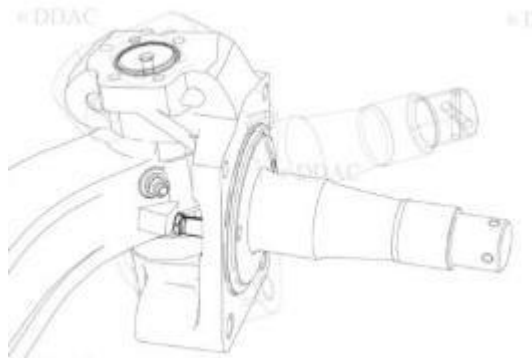
After adjusting the front wheel position, adjust the maximum rotating angle of the front wheel

- Install the locking nut, and install the limit bolt onto the knuckle, tightening it as deeply as possible.

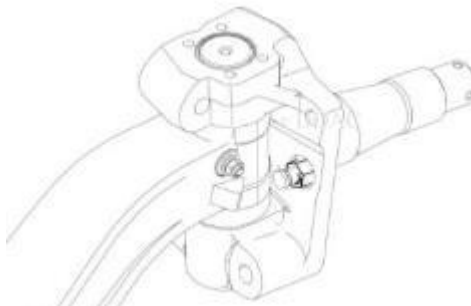


- b) Place the contact center of the left and right tires on the front axle at the center of the turntable of the angle measuring instrument (ensuring that the front wheels are in a straight ahead position).

Adjust the turntable scale to zero, turn the steering wheel to the right extreme position, and adjust the right wheel (inner wheel) angle to the specified range, which is achieved by adjusting the limit screw on the knuckle. When the head of the limit bolt is exactly against the front axle limit protrusion, ensure that the rotating angle is in the specified range.



- c) Tighten the knuckle limit nut with a tightening torque of 80~100 N.m.



- d) Turn the steering wheel to the left extreme position and adjust the left wheel (inner wheel) angle to the specified range. Use the same method.

12. Pre installing the lower thrust rod

- 1) Align the installation hole of the thrust rod with the lower hole of the front axle, install the fixing bolt, and pay attention to the direction of the fixing bolt.
- 2) The fixing bolts do not require a fixed force and can be tightened using an air gun and a 27mm socket.



Fig. Location of Thrust Rod Installation Holes

1-Thrust rod gasket 2-Thrust rod hexagonal bolt

- 3) Fig. 7-2, adjust the length of the thrust rod to 440mm.



Fig. Position for Adjusting the Length of Thrust Rod

1-Thrust rod 2-Adjust the length of the thrust rod to 440mm

13. Pre installing the upper thrust rod

- 1) Align the installation holes of the thrust rod with the holes of the air spring support, install the fixing bolt, and pay attention to the direction of the fixing bolt.
- 2) The fixing bolts do not require a fixed force and can be tightened using an air gun and a 27mm socket.



Fig. Location of Thrust Rod Installation Holes

1-Thrust rod gasket 2-Thrust rod hexagonal bolt

- 3) Adjust the length of the upper thrust rod to 455mm;



Fig. Position for Adjusting the Length of Thrust Rod

1-Thrust rod 2-Adjust the length of the thrust rod to 455mm

14. Pre installing the ball pin suspension rod assembly

- 1) Thread the installation bolt of the ball pin suspension rod assembly through the hole of the air spring support, tighten the slotted nut, and use an air gun and socket to slot it



Fig. Location of Installation Holes for Ball Pin Suspension Rod

1-Ball pin suspension rod assembly

- 2) Thread the split pin through the installation bolt of the ball pin suspension assembly, and fold one of them outward to the position shown in the figure.

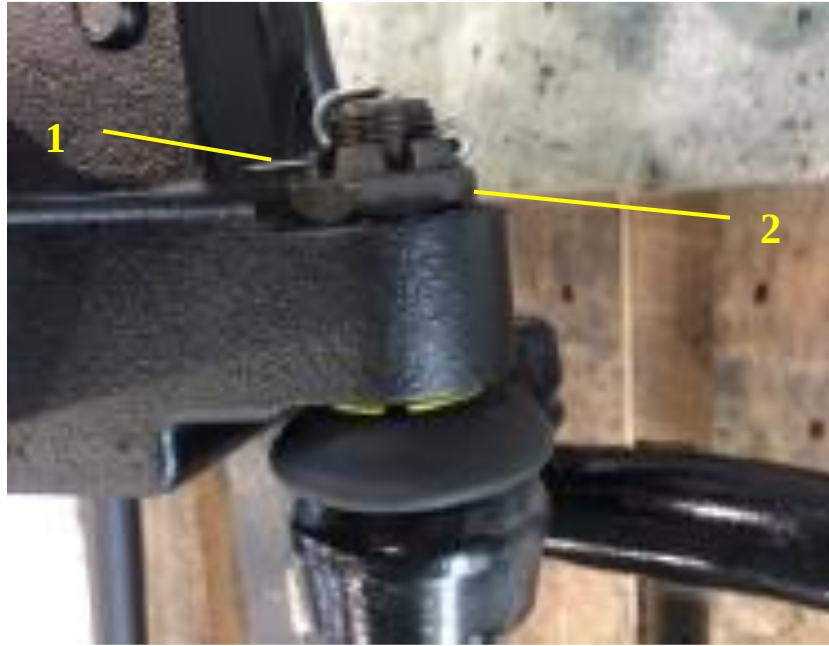


Fig. Installation Position for Ball Pin Suspension Rod

1-Split pin 5 × 60 2-Slotted nut

15. Pre installing the altitude valve hanging plate

- 1) Align the mounting holes of the altitude valve hanging plate with the axle mounting holes for installation. Attention: There should be no impurities inside the screwed hole.
- 2) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen;



Fig. Installation Position of Altitude Valve Hanging Plate

1-Hexagon bolt M8 × 16 standard spring washer 8 2-Altitude valve hanging plate

16. Installing the stabilizer bar

- 1) Move the stabilizer bar to the position where the frame is to be installed, and place the stabilizer bar bushing on the stabilizer bar.
- 2) Install the stabilizer bar clamping plate so that the inner side of the stabilizer bar clamping plate is tightly against the outer side of the stabilizer bar bushing.
- 3) Adjust the stabilizer bar clamping plate so that the installation holes on the stabilizer bar clamping plate align with the installation holes on the frame, adjust the stabilizer bar to be symmetrical left and right, and insert the bolts.
- 4) Use pneumatic tools to pre tighten the bolts.



Fig. Installation Position of Stabilizer Bar

17. Connecting the upper thrust rod to the frame

- 1) Loosen the pre installed thrust rod bolts to ensure a certain floating clearance.
- 2) Install by pairing the sliding trolley with the frame, aligning the bolt holes of the thrust rod with the position of the frame.
- 3) Before using the fixing bolts, apply Loctite 243 sealant to the threads of the fixing bolts.
- 4) Use pneumatic tools and a 30mm socket to tighten the bolts. Use a torque setting tool to tighten the bolts to the specified torque ($T=410 \pm 40 \text{ N} \cdot \text{m}$), and mark with a white marker pen.
- 5) The fixed force between the upper thrust rod and the axle end is $T=440 \text{ N} \cdot \text{m}$.



Fig. Connecting the Thrust Rod to the Frame

1-Standard spring washer 20 2- Hexagon bolt M20 × 70

18. Connecting the lower thrust rod to the frame

- 1) Loosen the pre installed thrust rod bolts to ensure a certain floating clearance.
- 2) Install by pairing the sliding trolley with the frame, aligning the bolt holes of the thrust rod with the position of the frame.
- 3) Before using the fixing bolts, apply Loctite 243 sealant to the threads of the fixing bolts.
- 4) Use pneumatic tools and a 30mm socket to tighten the bolts, and use a torque setting tool to tighten the bolts to the specified torque ($530 \pm 60 \text{ N} \cdot \text{m}$). Mark with a white marker pen.
- 5) The fixed force between the lower thrust rod and the axle end is $T=440\text{N} \cdot \text{m}$.



Fig. Connecting the Thrust Rod to the Frame

1-Type I hexagon nut M20 2-Standard spring washer 20 3- Hexagon bolt M20 × 150

19. Installing the air spring

- 1) Connect the airbag to the frame and front suspension airbag support, and install the airbag in the existing holes.
- 2) During installation, pay attention to lifting the girder until the air spring can be inserted.
- 3) Use pneumatic tools and a 27mm socket to tighten the bolts, and use a torque setting tool to tighten the bolts to the specified torque ($T=80 \text{ N.m}$). Mark with a white marker pen.



Fig. Air Spring Assembly

1-Air spring assembly



Fig. Position of Hexagon Thin Nut

2-Hexagon thin nut M18 × 1.5

20. Installation of shock absorber

- 1) The upper end of the shock absorber is connected to the girder, and the lower end is connected to the rear axle. Pay attention to the position of the shock absorber gasket
- 2) Use pneumatic tools to tighten the bolts, use a torque setting tool to tighten the bolts to the specified torque ($T=85 \pm 15 \text{ N} \cdot \text{m}$), and mark with a white marker pen



Fig. Installation Position of Shock Absorber

1-Shock absorber

21. Connecting the stabilizer bar to the ball pin suspension rod assembly

- 1) Thread the installation bolts of the ball pin suspension rod assembly through the installation holes of the stabilizer bar, tighten the slotted nuts, and use an air gun and socket to tighten the installation bolts.
- 2) Thread the split pin through the installation bolt of the ball pin suspension assembly, and fold one of them outward to the position shown in the figure.
- 3) Use pneumatic tools and a 24mm socket to tighten the connecting bolts between the stabilizer bar clamping plate and the frame. Use a torque setting tool to tighten the bolts to the specified torque ($T=220 \pm 35 \text{ N} \cdot \text{m}$) and mark with a white marker pen.

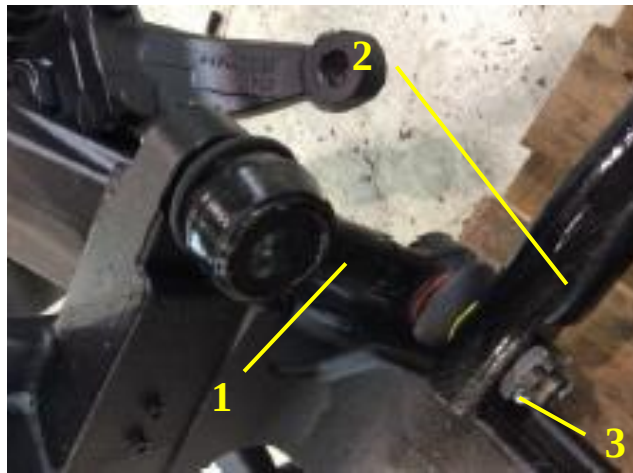


Fig. Installation Position of Stabilizer Bar and Ball Pin Suspension Rod Assembly

1-Ball pin suspension rod assembly 2-Stabilizer bar 3-Split pin 5 × 60

22. Installing the altitude valve adjustment rod assembly

- 1) Thread the installation bolt of the altitude valve adjustment rod assembly through the altitude valve hanging plate and tighten the nut.
- 2) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen.
- 3) Adjust the length of the height sensor arm and altitude valve adjustment rod assembly (III) to the length shown in the figure.

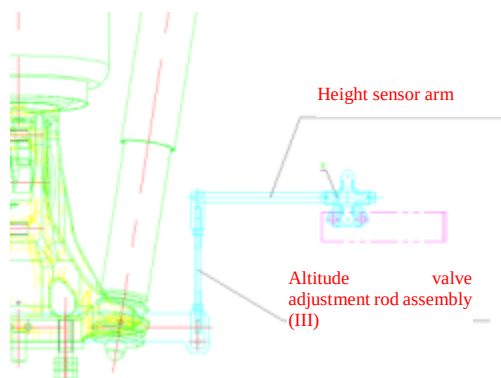


Fig. Installation Position of Altitude Valve Adjustment Rod Assembly (III) and Height Sensor Arm

VII. Component Maintenance Cycle and Methods

1. Daily maintenance

S/N	Maintenance item	Technical requirements	Maintenance cycle	Note
1	Check the wheel bolts and nuts	No missing or looseness	Before departure and after service	
2	Check the wheel end	No oil leakage	Before departure and after service	
3	Braking system self check	No AB and wear indicator wire fault prompts on the vehicle instrument panel	Before departure	
4	Check and test the service braking	The service braking function is normal	Before departure and during driving	
5	Turn the steering wheel to check the steering	Flexible, no jamming, no abnormal noise	Before departure	
6	Observe if there is any abnormal high temperature at the wheel end	The temperature on the wheel end surface shall not exceed 100 °C	After service	See Note ①

Note ①:

If the temperature exceeds 100 °C during operation for 2-3 consecutive days, further inspection at the service station is required. In some special circumstances, such as continuous braking for long-distance downhill driving, frequent braking for long-term urban operation, parking after long-distance operation, etc., if the temperature exceeds 100 °C in a short period of time (less than 5 hours), it does not affect the service life of the wheel end assembly.

2. Level I maintenance

S/N	Maintenance item	Technical requirements	Recommended cycle
1	Check the brake chamber and braking pipeline	No leakage, firmly fixed	10,000 km/1 month
2	Check ABS, wear indicator wire harness, corrugated sleeve, and wires	The wiring harness is neat and firmly fixed, the corrugated sleeve is not aged or damaged, and the wires are not exposed	10,000 km/1 month

3	Checking the brake clearance	The brake clearance meets the requirements	10,000 km/1 month
4	Check the tightness of the connecting bolts and nuts for brake chamber, chamber bracket, adjustment arm, brake, disk brake, and brake baseplate	The connecting bolts and nuts are complete and free of looseness	10,000 km/1 month
5	Check and confirm the wheel nuts	Torque qualified	10,000 km/1 month
6	Check and confirm the locking of the tie rod, ball stud, and king, as well as knuckle limit bolts and nuts	The connecting bolts and nuts are not loose	10,000 km/1 month
7	Check the drag link arm, left and right steering knuckle arms, and installation bolts and nuts	No cracks, no loosening of bolts and nuts	10,000 km/1 month
8	Check if the joint dust hood is damaged	No damage	10,000 km/1 month
9	Check the tie rod assembly	No bending deformation	10,000 km/1 month
10	Apply grease to the top and bottom grease nozzles of the king	Refer to the lubricating grease filling location and requirements	Refer to the lubricating grease filling location and requirements
11	Apply grease to the grease nozzle of the drag link and tie rod ball joint	Refer to the lubricating grease filling location and requirements	Refer to the lubricating grease filling location and requirements
12	Apply grease to the brake baseplate grease nozzle	Refer to the lubricating grease filling location and requirements	Refer to the lubricating grease filling location and requirements
13	Apply grease to the adjustment arm grease nozzle	Refer to the lubricating grease filling location and requirements	Refer to the lubricating grease filling location and requirements

Thread tightening torque inspection method:

Method I:

Tightening method: Tighten the thread pair in the direction of tightening, applying force steadily and gradually increasing the torque, avoiding impact.

Method II:

Marking method: Mark the relative position of the tightened thread pair, loosen by 1/2 turn and tighten again to the marked position. At this point, the torque value of the inspection tool is the inspection torque. When re tightening, the force should be steady, gradually increasing

the torque, avoiding impact, and the alignment deviation of the marks should not exceed $\pm 10^\circ$.

Torque inspection of coated bolts:

When checking the torque of fasteners coated with thread locking adhesive, do not twist the fasteners to prevent damaging the function of the locking adhesive. It is generally recommended to use the tightening method to tighten to the lower limit of 0.9 times the assembly torque. During this process, if the fastener does not rotate relative to the connected part, it is judged that the inspection torque is qualified; If the fastener rotates relative to the connected part, it is judged that the inspection torque is unqualified. The bolt should be unscrewed and cleaned of impurities such as residual glue, then the bolt should be re coated and tightened according to the specified torque.

Torque inspection of taper screw thread:

Tighten it again with its maximum assembly torque, and it is considered qualified when the relative rotating angle of the thread pair does not exceed 1/6 turn; Taper screw threads with sealing requirements are only judged as qualified when the torque inspection is qualified and the sealing requirements are met.

3. Level II maintenance

S/N	Maintenance item	Technical requirements	Recommended cycle	Note
1	Check the wheel hub bearings	No lag or abnormal noise during rotation	60,000 km or 6 months	
2	Check if there is any abnormal noise at the wheel end	Wheel end rotation without abnormal noise	120,000 km or 12 months	See Note ①
3	Check the axial clearance of the wheel hub bearing	Axial clearance meets regulations	120,000 km or 12 months	See Note ②
4	Check the wheel hub body	No crack damage	60,000 km or 6 months	
5	Check the thickness of brake friction plate and disk brake	The thickness does not reach the wear limit	60,000 km or 6 months	
6	Check the appearance of disk brake and friction plate	The friction working surface of the disk brake and friction	60,000 km or 6 months	

		plate shall be free of oil stains, cracks, loss of roundness, grooves, etc.		
7	Check the brake seal	No cracks or damage	60,000 km or 6 months	
8	Check the brake caliper slip resistance	Meet requirements	60,000 km or 6 months	
9	Check the tightness of the brake caliper	Firmly installed	60,000 km or 6 months	
10	Check the brake clearance adjustment mechanism of the brake	Work normally	60,000 km or 6 months	
11	Check the gear ring and sensor, and clean the gear ring and sensor	No damage or foreign objects	60,000 km or 6 months	
12	Replace the joint dust hood	Intact, without damage	60,000 km or 6 months	
13	Replace the ordinary wheel end lubricating grease	Refer to the chapter about wheel hub system	Refer to the lubrication grease filling cycle	

Note ①:

Noise test:

Support the axle and manually rotate the tire, requiring different speeds for both forward and reverse rotation:

- 1) The rotation is not smooth and there is obvious noise. It indicates that the bearing is damaged and needs to be replaced. Please refer to the hub system for the replacement of the bearing.
- 2) The noise increases as the tire rotates. It indicates that the bearing is worn out and needs to be replaced. Please refer to the hub system for the replacement of the bearing.
- 3) Grinding noise is generally generated by the friction of relative moving parts such as the axle wheel end, and does not affect the application of bearings.

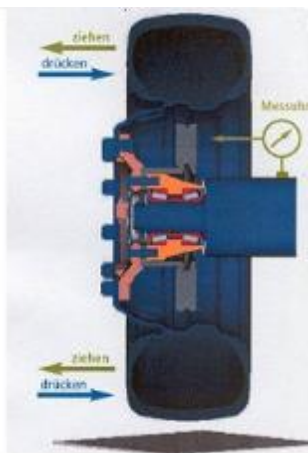
Note ②:

Axial clearance test:

Fix the magnetic base dial gauge to the axle housing (or a relatively fixed position), with the pointer cap resting on the disk brake surface (or a clean and smooth machining surface at the wheel end), adjust the gauge to zero position, and measure the axial clearance of the wheel

hub bearing by reciprocating the wheel end. (For ease of operation, the wheel can be removed during this inspection)

- 1) When the axial clearance is less than 0.2mm, no additional operation is required.
- 2) When the axial clearance exceeds 0.2mm, please prioritize confirming the status of the wheel hub locking nut. If it is intact, it can be removed and re tightened according to the specified torque. Check again according to the above method. If the axial clearance still exceeds 0.2mm, the bearing needs to be replaced. For the replacement of the bearing, please refer to the wheel hub system.



4. Lubricating grease replacement cycle and requirements

1) Lubricating grease filling location and requirements

Filling location	Grease filling requirements	Diagram
1. King upper grease nozzle	Fill until a small amount of grease overflows from the front axle fist surface	
2. Adjustment arm grease nozzle (drum brake)	Fill until the grease overflows at the nozzle	
3. King lower grease nozzle	Fill until a small amount of grease overflows from the front axle fist surface	
4. Tie rod ball joint grease nozzle (non maintenance-free configuration)	Fill until oil spills from one side of the leather cuff	
5. Bottom plate	Overflow at the	

camshaft grease nozzle (drum brake)	grease nozzle	
6. Wheel hub grease change	Refer to the chapter of wheel hub system (only for grease lubricated wheel ends)	Refer to the chapter of wheel hub system (only for grease lubricated wheel ends)

Note: Among them, 2 and 5 are only applicable to drum type S-cam brakes

2) Lubricating grease filling cycle

Corresponding vehicle usage	Regular grease lubricated wheel end replacement cycle		Grease filling cycle for king, tie rod ball joint, bottom plate or camshaft bracket (air chamber bracket), adjustment arm	
	Lubricating grease	Replacement cycle	Lubricating grease	Replacement cycle
Highway passenger transportation and tourism	DDAC-B	60,000 km/6 months	DDAC-B	20,000 km/2 months
Urban public transportation	DDAC-B	60,000 km/6 months	DDAC-B	20,000 km/2 months
School buses, commuters, and shuttle buses	DDAC-B	60,000 km/6 months	DDAC-B	20,000 km/2 months

Note:

1. The maintenance-free grease lubricated wheel end does not require active and regular replacement of lubricating grease.
2. The king adopts a needle roller structure, and the grease filling cycle can be increased to 120,000 km/12 months.

3) Recommended lubricating grease products

DDAC number	Name
DDAC-A	General lithium base grease for automobile
DDAC-B	Extreme pressure compound lithium base grease
DDAC-C	High temperature and

	long-life grease
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Chapter III Rear Axle Maintenance Manual

I. Component Introduction

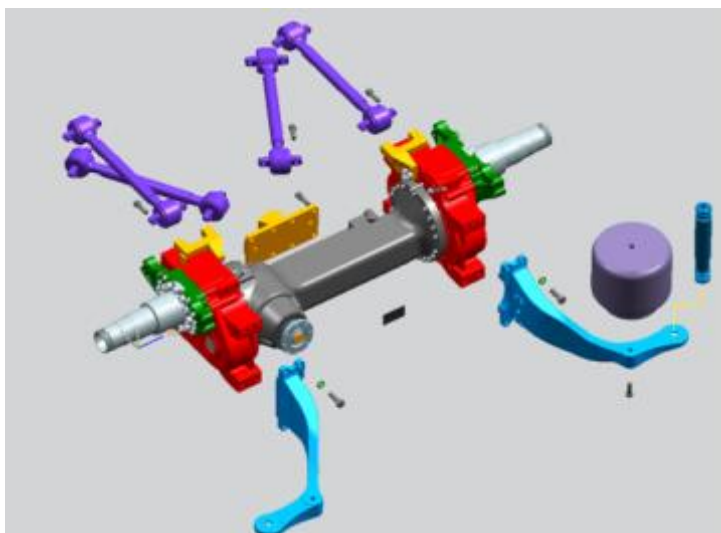
1. Component functions

The axle is an important component of the chassis driving system of a car. If the engine is compared to the heart of a car, then the axles are the two legs of the car. The axle is connected to the frame (or unitary construction body) through suspension, and car wheels are installed at both ends. Its function is to transmit the forces and moments in all directions between the frame (or unitary construction body) and the wheels. It has a significant impact on the power, stability, and load-bearing capacity of automobiles. As a driving axle, the rear axle not only plays a load-bearing role but also plays a driving, deceleration, and differential role.

2. Component parameters

Item \ Model	2400005-FQ0YA
Rated load	9500 Kg
Track	1818 mm
Airbag center distance	990 mm
Maximum output torque of the final drive	24000 N.m
Final drive speed ratio	6.14
Final drive gear oil filling amount	8.5 L
Brake specification	19.5"
Applicable tires	70R19.5

3. Component structure



4. Component principle

- 1) The engine torque transmitted by the universal transmission device is transmitted to the driving wheels through the main reduction tire, differential, half axle, etc., achieving a reduction in speed and an increase in torque;
- 2) Change the direction of torque transmission through the bevel gear pair of the final drive;
- 3) Achieve the differential speed on both sides of the wheels through the differential, to ensure that the inner and outer wheels steer at different speeds.

II. Special Tools

S/N	Tool type	S/N	Tool type
1	Torque wrench 200~1000 N.m	6	Feeler gauge 0.02~0.5mm
2	Caliper 0~150mm	7	Torque wrench 75~500Nm
3	Torque wrench 0~300Nm	8	Multimeter
4	Spring scale 0~200 N	9	Torque wrench 0~150Nm
5	Adjusting nut socket 590V3-531	10	Dial gauge and gauge stand

III. Maintenance Data

1. Maintenance torque

Fastener	Tightening torque (N.m)
Main cone locking nut	1000~1500
Bearing seat connecting bolt	240~280
Differential shell connecting bolt	140~180

Driven bevel gear connecting bolt	615~685
Differential bearing cover stud	220~280
Differential bearing cover nut	500~550
Stop plate bolt of adjusting nut	15±3
Connecting bolts between reducer and axle housing	250~300
Half shaft mounting bolt	230~260
Oil filling plug	130~150
Oil drain plug	130~150
Connecting bolts between brake baseplate and disc brake	390~440
Connecting bolts between brake baseplate and axle housing	250~300
Tightening torque of wheel hub bearing adjusting nut (maintenance-free grease lubrication)	1000~1100 (no retreat)
Tightening torque of wheel hub bearing adjusting nut (maintenance-free oil lubrication)	400~450 (no retreat)
Tightening torque of wheel hub bearing adjusting nut (ordinary grease lubrication)	500~550 (tighten and retreat)
Wheel nut M20	420~490

2. Brake system inspection and judgment standards

Inspection item		Cycle	Judgment criteria	
			16/17.5 inches	19.5/22.5 inches
Brake pads (Wear limit)	Minimum lining thickness	3 months	2mm	2mm
	Maximum uneven wear		1mm	1mm
Disk brake	Minimum thickness		28mm	37mm
	Maximum wear thickness on each side		3mm	4mm
	Maximum radial runout		0.4mm	0.5mm
	Maximum thickness difference		0.08mm	0.1mm
	Maximum surface crack		< 75% disk brake width	
	Maximum groove depth		0.5mm	
Gap between sliding pin and shaft sleeve	Maximum clearance (diameter)		1mm	

Dust cover	Falling off, breaking, aging		None	None
Caliper body sliding function	Maximum sliding resistance		80N	100N
Gap self adjustment function			Yes	Yes

IV. Circuit Diagram

None

V. Fault Diagnosis

Faults	Cause analysis	Troubleshooting method
Abnormal transmission sound	Driving/driven gear collision	Replace the driving/driven gear or reducer assembly
	Wear and abrasion on the tooth surface of the driving/driven gear	Replace the driving/driven gear or reducer assembly
	Gear oil unqualified	Replace with qualified oil products
	Excessive clearance between differential gears	Replace the adjustment shim and adjust the gap to the qualified range
	Excessive backlash between the teeth of the driving/driven gear	Adjust the backlash in circular tooth to the qualified range
	The pre-tightening force of the driving gear bearing is too small	Adjust the pre-tightening force to the qualified range
	Wear or damage to the half shaft gears, planetary gears, thrust washers, pin shafts, etc.	Replace faulty parts
	Insufficient gear oil filling amount	Add enough gear oil
	Damaged or worn inner bearings of the final drive	Replace damaged bearings
	Influence of drive shaft include angle	Adjust the include angle of the drive shaft to a reasonable range
Lubricating oil leakage	Wear or damage to the main cone oil seal	Replace the main cone oil seal
	The fastening bolts on the joint surface between the reducer and the axle housing are loose (torque attenuation) or the sealant is damaged	Tighten the bolts to the specified torque and reapply sealant
	Loose oil drain plug or damaged gasket	Tighten the screw plug to the specified torque or replace the gasket
	Deformation of axle housing due to overloading	Correct or replace the axle housing
	Vent plug blocked or damaged	Clean or replace the vent plug

Wheel end oil leakage	Loose half shaft fastening bolts	Tighten the bolts to the specified torque
	Sealant damage and failure, oil seal failure	Apply sealant again and replace the oil seal inside the wheel hub
Braking noise or vibration	Does the curved spring of the brake pad produce permanent deformation	If permanent deformation occurs, replace the brake pad curved spring
	Can the brake pads slide freely on the bracket	Remove the brake pad pressing plate and brake pad assembly, clean the brake pad pressing plate, brake pad assembly, and bracket
	Does the maximum runout of the disk brake meet the requirements	If it does not meet the requirements, replace the disk brake or correct it
	Is there any crack or groove on the disk brake	If it does not meet the requirements, replace the disk brake
	Is the disc brake and its components fixed on the axle according to the specified requirements	Check all fasteners to ensure they are securely fastened
No braking or insufficient braking torque	Is the friction material of the brake pad assembly polished	If the total thickness is $\leq 12\text{mm}$, the brake pads must be replaced
	Is the gap between the brake pads and disk brakes normal	Normal gap is $0.7\sim 1.2\text{mm}$. If it does not meet the requirements, check the working condition of the self-adjusting mechanism
	Is the disk brake in good condition	Check and replace the disk brake if it does not meet the requirements
	Is the air pressure in the brake chamber $\geq 0.6\text{MPa}$ (measure the air pressure of the chamber with an air pressure gauge)	Implement remedial measures according to the requirements of the vehicle manufacturer
	Is the drain plug of the brake chamber removed	Remove the drain plug from the brake chamber

VI. Method of Disassembly and Assembly

1. Disassembly and assembly of axle assembly in vehicle condition

1.1 Preparation before disassembly

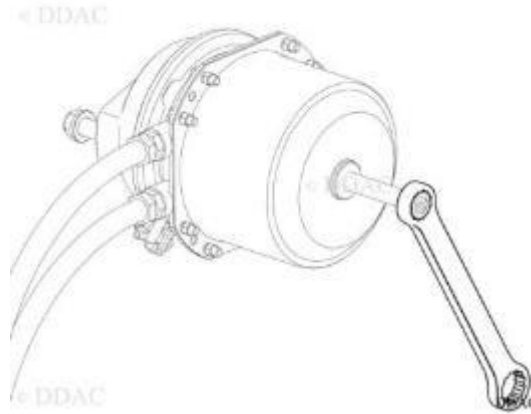
Attention:

Before disassembling the air pipe, the residual air in the air pipe should be drained.

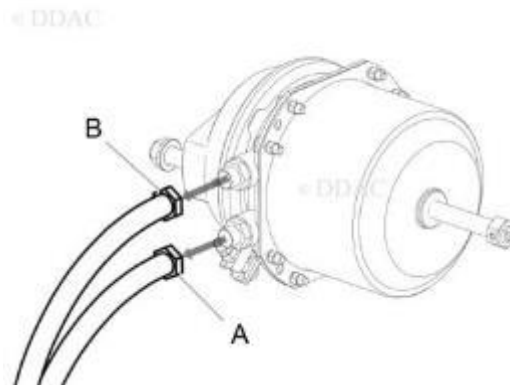
When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

- a) For the draining of lubricating oil from the axle assembly, refer to: Gear oil draining.

- b) Use flat nose pliers to cut off the ABS sensor connection cable ties, wear alarm cable ties, differential lock sensor connection cable ties tied to the axle, and disconnect the wiring harness plug from the vehicle.
- c) Completely unscrew the bolt (1) on the spring brake chamber without parking brake.



- d) Pull the handbrake, disconnect the air pipe from the brake chamber at the air pipe joint (A, B), and label the air pipe properly.



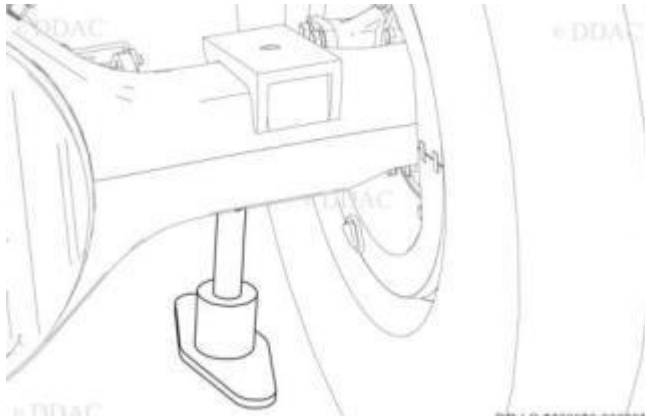
- e) Disconnect the air pipe from the differential lock at the air pipe joint.

1.2 Dismantling wheels

Attention:

Do not damage the wheel bolts when assembling the wheels.

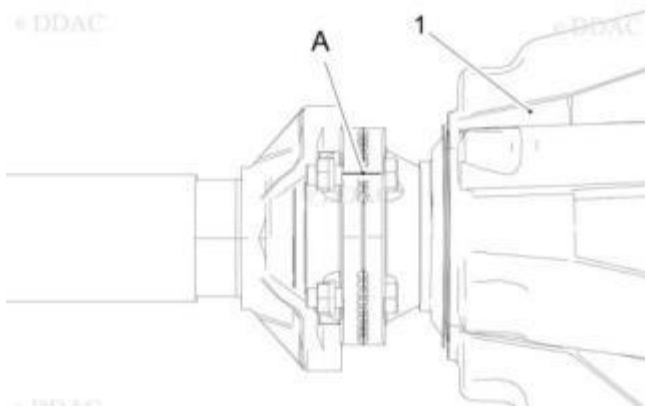
The wheels and hubs are aligned through matching end lips, and do not use force to move or twist them during disassembly and installation.



- a) Loosen the wheel nuts.
- b) Lift the vehicle under the lower thrust rod seat of the rear axle, so that the rear axle wheels are just off the ground, and install a safety bracket of appropriate height.
- c) Remove the wheel nuts and pull out the left and right wheel assemblies.

1.3 Dismantling the drive shaft

Disconnect the final drive flange and the drive shaft, and use tools such as a paint pen to carve matching marks on the empty spline of the drive shaft. Then, carve matching marks on the matching flange and separate the drive shaft from the final drive.



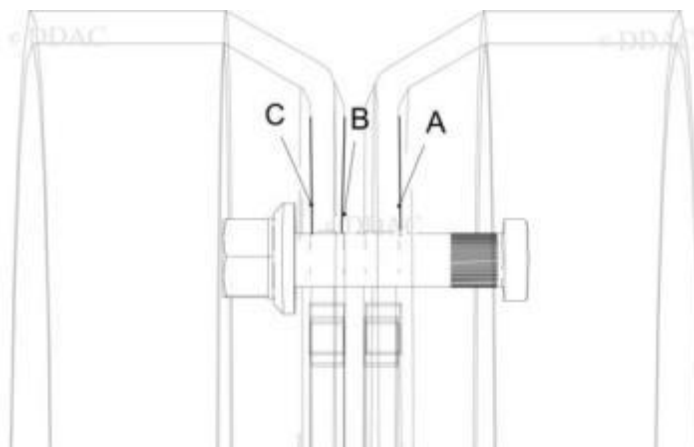
Warning:

The drive shaft is very heavy, so it is important to prevent injury when disconnecting it

1.4 Remove the U-bolt of the steel plate spring.

- 1.5 Place a translation trolley directly below the axle assembly.
- 1.6 Turn on the jack, place the axle smoothly on the translation trolley, and pull out the axle assembly.
- 1.7 Preparation before installation on the vehicle

Before installing the tire, carefully clean the hub bolts, wheel nut threads, hub and spoke, inner and outer wheels, and the contact area between the wheel and wheel nuts (A, B, C).



Note:

If the user has applied paint to the installation area (A, B), thoroughly remove the paint and rust.

When installing the spare tire, if the installation area (A, B) has already been coated with anti rust paint, thoroughly remove the paint from the installation area.

1.8 Installation steps

- a) Pull the rear axle assembly into place and install the steel plate spring into the steel plate spring guide seat of the rear axle assembly.
- b) Install steel plate spring connecting U-bolts.
- c) Install the left and right ABS sensor connection wires.
- d) Install the rear axle spring brake chamber connection pipeline.

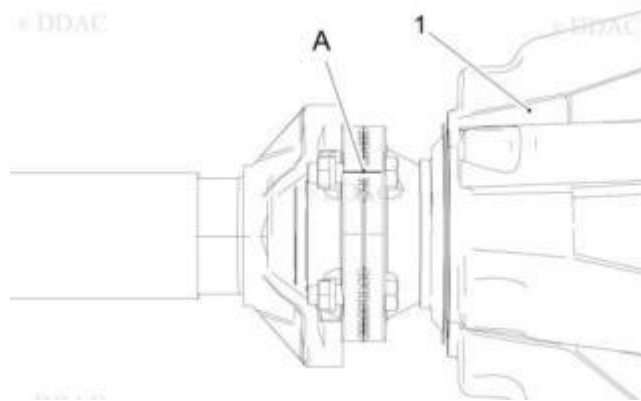
Attention:

Before disassembling the air pipe, the residual air in the air pipe should be

drained.

When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

- e) Connect the drive shaft and the final drive assembly flange according to the markings.



1-Final drive A-Matching mark

- f) Install the rear axle mudguard assembly and various connecting accessories of the frame.
- g) Install the inner wheels.

Fix the tire assembly so that the hub bolt is in the center of the wheel bolt hole, and ensure that the inner wheel is in the center of the bolt hole.

Attention:

When installing the tire assembly, be careful not to damage the threads of the wheel hub bolts.

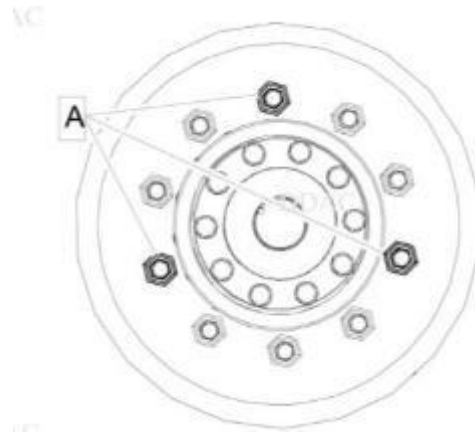
- h) Install the outer wheels.

Attention:

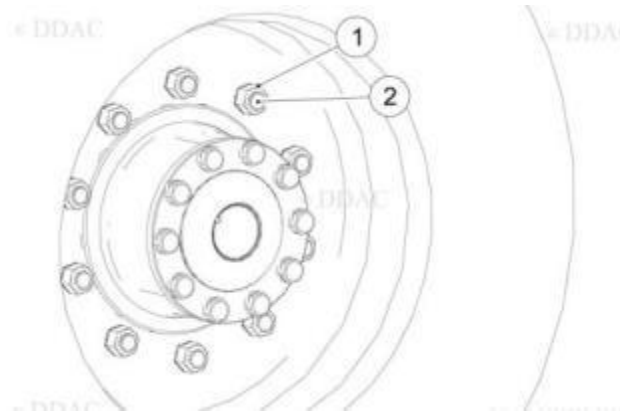
After reinstalling the wheels, recheck and re tighten the wheel nuts when driving around 50~100 kilometers.

Apply two drops of gear oil to the threaded part of the wheel nut and wipe off any excess oil with a clean cloth.

- Place the wheel assembly so that the hub bolt contacts the center of the wheel hole at 3 points (A). Slightly tighten the nut and ensure that the wheel is at the center of the bolt hole.

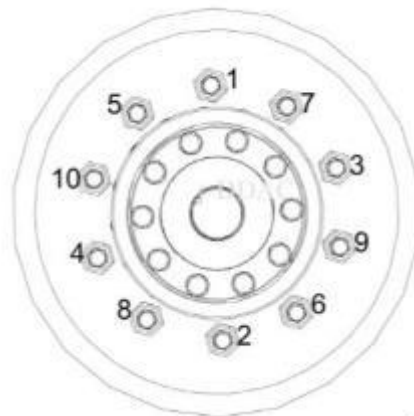


- Slightly tighten the wheel nuts (1) until they come into contact with the wheel (torque: approximately 100 N.m), and tighten the nuts (1) with the specified torque in the order shown in the figure.



1- Nut 2- Bolt

- Tighten the wheel nuts with the specified torque in several times, in the order shown in the figure, and finally tighten them with the specified torque.



- Return the spring brake chamber bolt to its original position and remove

the front and rear triangular wooden blocks of the front wheel

- i) Remove the safety bracket and slowly lower the jack.

1.9 Final steps

- a) Check and add lubricating oil, refer to lubricating oil filling.
- b) Site cleaning.

2. Disassembly and assembly of half shaft

3.1 Preparation before disassembly

For lubricating oil discharge, refer to: lubricating oil draining.

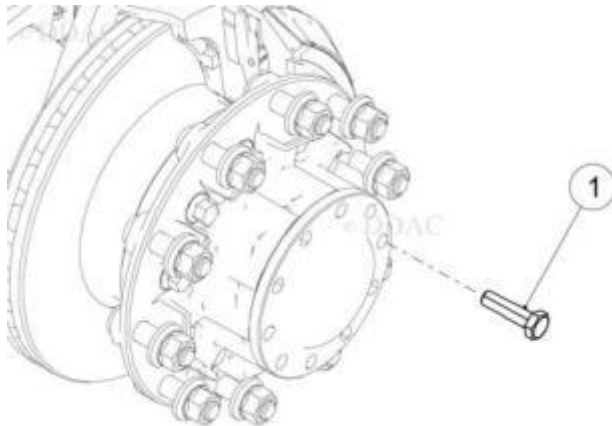
3.2 Dismantling the half shaft

Attention:

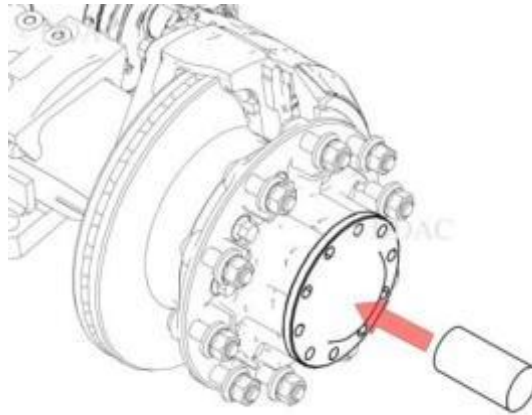
When disassembling the half shaft, be careful not to damage the threads of the half shaft bolts.

After disassembling the half shaft, it should be properly stored to avoid damage and collision with the half shaft splines.

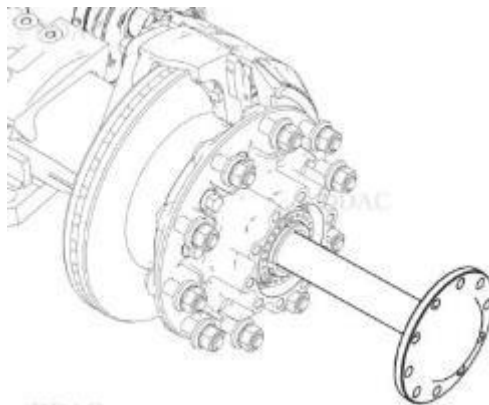
- a) Remove the half shaft bolts.



- b) Gently tap the outer round end surface of the half shaft flange to disengage the half shaft from the wheel hub.



c) Extract the half shaft.



3.3 Preparation before Installation

Attention

Do not scratch the installation surface when cleaning residual glue.

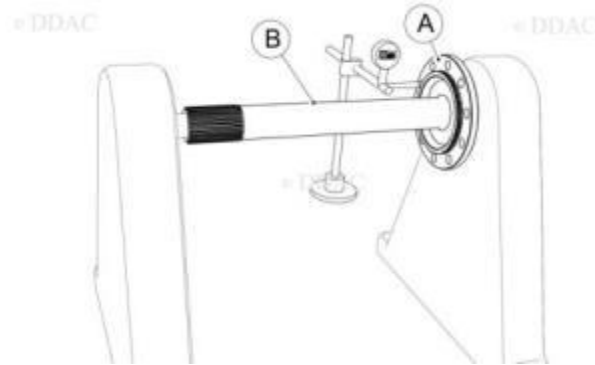
Do not dispose of residual glue casually as it may cause environmental pollution.

- a) Thoroughly clean the sealant on the joint surface between the half shaft and the wheel hub, remove the grease and clean the joint surface, and then thoroughly remove oil, water, and other dirt.
- b) Clean the half shaft bolt holes and any remaining adhesive on the bolts.
- c) Check the half shaft bolts for any peeling of threads and bending deformation of the bolts.
- d) Check if the runout of the half shaft is qualified.
 - Inspection of the deformation of the half axle rod
Key point: Measure the circumferential runout at the midpoint of the half axis rod (at point A in the diagram)
Repair standard: less than 2.5 mm, repair limit: 3.5 mm

- Inspection of the deformation of the half axle flange end face

Key point: Measure the runout of the Min diameter at the outer edge of the half axle flange end (at point B in the diagram)

Repair standard: less than 0.5 mm, repair limit: 0.8 mm

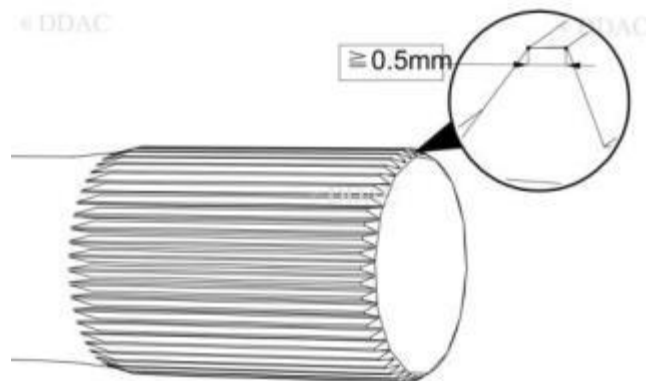


e) Check the half axle spline

- Check if the spline area is twisted or deformed.
- Check if there is any crushing deformation at the spline area

Attention:

Measure the top width of the spline teeth, not less than 0.5mm, and replace it if it is less than 0.5mm.



3.4 Install the half axle

Attention:

During the assembly of the half axle, do not push forcefully or strike vigorously to prevent damage to the half axle gear spline.

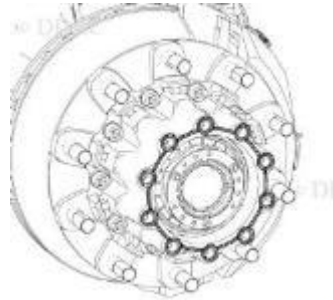
When assembling the half axle, do not contact the half axle spline with the oil seal lip to prevent damage to the half axle oil seal lip.

- a) Apply sealing adhesive on the surface between the half axle flange and the

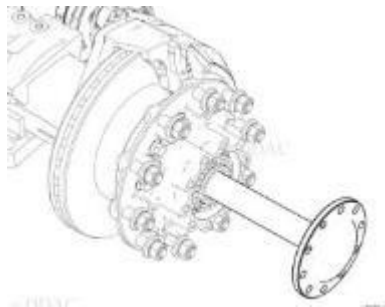
wheel hub, with a width of no less than 3 mm and without interruption.

Note:

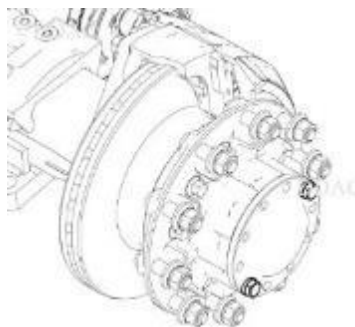
After applying the sealing adhesive, assembly should be completed within 2-20 minutes, and lubricating oil should be added after the sealing adhesive has hardened (about 2 hours).



- b) Carefully insert the half axle into the hole of the axle housing shaft tube, shake the half axle to fit its head into the spline of the half shaft gear, and rotate the hub before the half axle fits the hub, aligning the half axle hole with the hub screwed hole.



- c) Push the half axle into place, screw the bolts into the screwed holes, symmetrically pre-tighten them, and then tighten all the bolts symmetrically with a torque of 230~260 N.m.



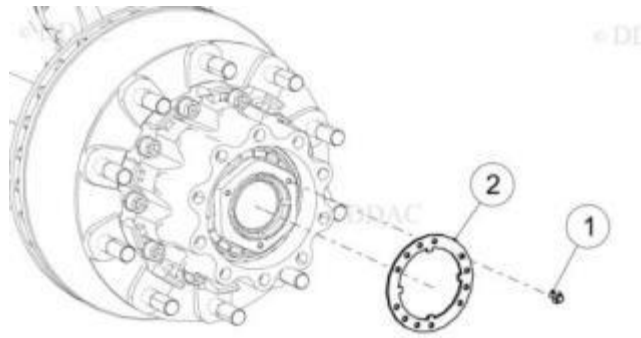
3. Disassembly and assembly of wheel hub system

4.1 Preparation before disassembly

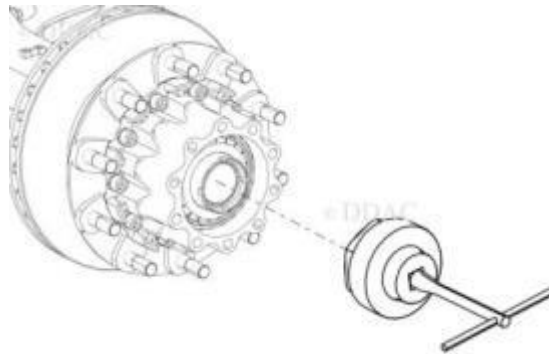
- a) For wheel disassembly, refer to: Axle assembly system.
- b) For half axle disassembly, refer to: Half axle system.

4.2 Removing adjusting nut

- a) Remove three lock bolts (1) and lock washers (2).

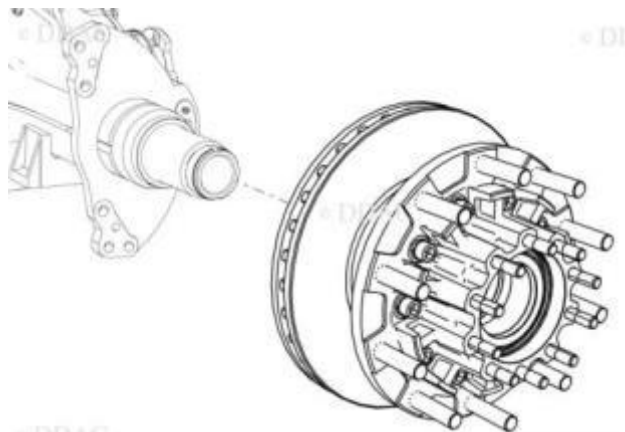


- b) Use special tool (590V3-753) to remove the adjustable nut.



4.3 Removing the hub disk brake assembly

Rotate the wheel hub and gently tap on it to remove the hub disk brake assembly along the hub shaft tube assembly.



Warning:

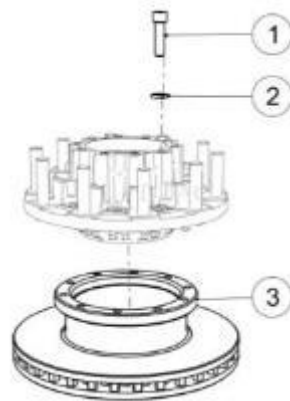
The wheel hub assembly is very heavy and requires two people or a lifting machine to remove it.

Attention:

Do not damage the knuckle threads when removing the wheel hub assembly.

4.4 Dismounting the hub disk brake assembly

- a) Remove the wheel hub disk brake fastening bolt (1) and washer (2), and remove the disk brake (3).



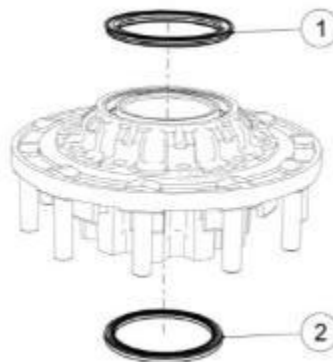
- b) Remove the hub oil seal

Place the outer end of the wheel hub downwards and remove the inner and outer oil seals.

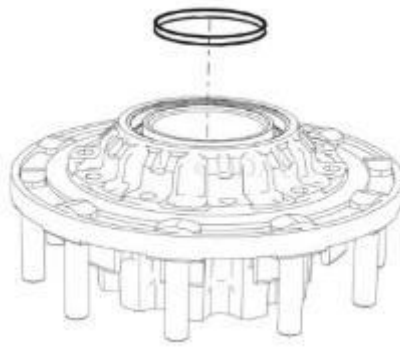
Attention:

Do not damage the installation surface when disassembling the oil seal.

Dispose of the disassembled oil seal properly, regardless of whether it is damaged in appearance, and do not use it again.



- c) Remove the middle snap ring



d) Remove the inner ring assembly of the bearing



e) Remove the middle sealing ring of the inner bearing.



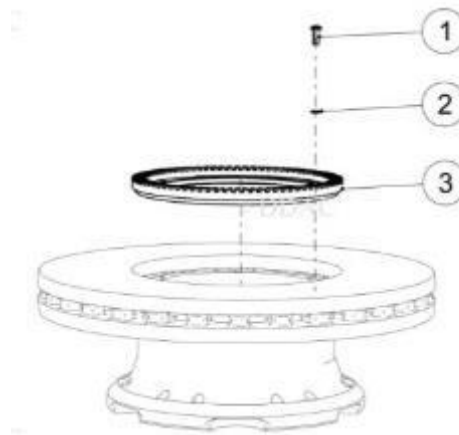
f) Remove the ABS gear ring

Remove the installation bolts between the gear ring and the disk brake, and remove the ABS gear ring

Attention:

To perform this step, it is necessary to confirm that the wheel hub or ABS gear ring needs to be replaced. Do not damage the wheel hub when removing the

ABS gear ring. If the installation part of the ABS gear ring on the wheel hub is damaged, the hub needs to be replaced.



g) Remove the outer ring of the bearing

Warning:

If using a press for disassembly, follow all warnings and precautions required by the stamping machine manufacturer to avoid damage to components and personal injury.

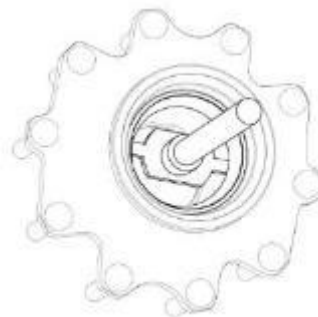
When using manual tapping to disassemble the outer ring, be careful not to rebound and injure people.

Attention:

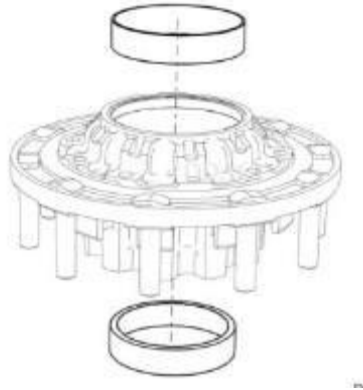
To perform this step, it is necessary to confirm that the hub bearings need to be replaced with new bearings.

Avoid damaging the outer ring hole of the hub bearing and the bearing installation steps

- Place the tool into the small diameter surface of the outer ring of the wheel hub bearing in the disassembly groove of the wheel hub



- Strike the end of the tool with a copper rod to remove the outer ring of the bearing.



4.5 Dismantling wheel bolts

Warning:

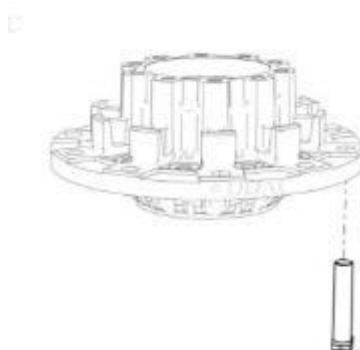
Comply with all warnings and precautions required by the stamping machine manufacturer to avoid damage to components and personal injury.

Do not knock on the wheel hub when installing the bolt by knocking to avoid damage to the wheel hub.

Attention:

Replace all wheel bolts that have been damaged, deformed in thread, broken, bent, or corroded, and also replace the adjacent bolts on both sides of the damaged bolts. If two or more bolts are damaged, all bolts should be removed and replaced simultaneously.

- a) Place the wheel hub flat on the ground or on the press bracket, with the bolt flange facing downwards, so that the support point is close to the bolt to be removed.
- b) Use a copper rod to strike threaded head of the bolt that needs to be replaced, or press the bolt out and remove the bolt that needs to be replaced.



4.6 Preparation before Installation

Warning:

It is strictly prohibited to use gasoline to clean parts.

If you choose to continue using existing bearings, these bearings must be inspected according to the manufacturer's recommended principles.

When it is determined that the inner or outer ring of the bearing is damaged, both the inner and outer bearings must be replaced as a complete set, and the bearing spacer must also be replaced.

- a) Clean the inner cavity of the wheel hub. If the outer ring of the bearing has been removed, check the bearing seat hole of the wheel hub to confirm whether the outer ring of the bearing is rotating. If it rotates, replace the wheel hub.
- b) Clean the inner ring assembly of the bearing.
- c) Clean the oil and debris on the ABS gear ring.
- d) Check the disk brake

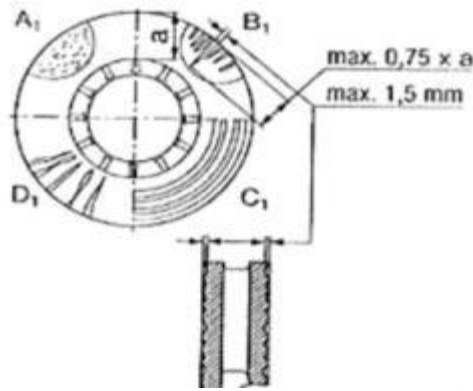
A1=Small cracks extend on the surface, which is allowed.

B1=Radial extension of cracks less than 1.5 mm in length and width, which is allowed.

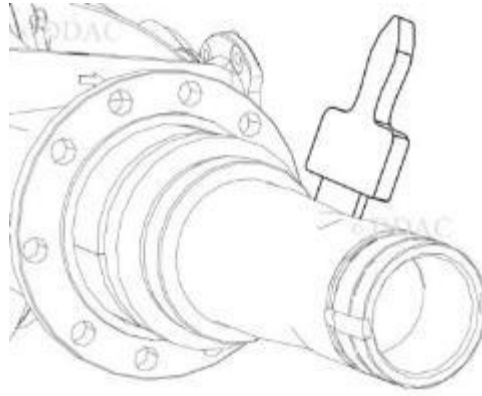
C1=Circular groove with a depth of less than 1.5 mm, which is allowed.

D1=Flake cracks are not allowed and the disk brake must be replaced.

The total thickness 19.5/22.5 of the disk brake is not less than 37 mm and 16/17.5 not less than 28 mm.

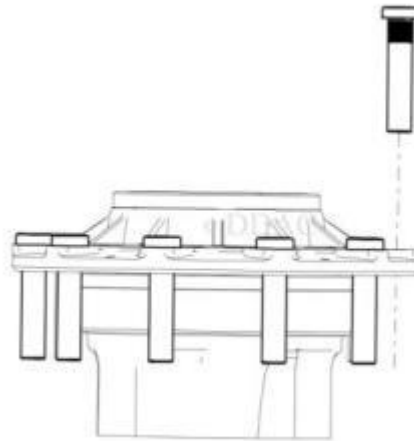


- e) Allow the parts to dry thoroughly, and any remaining solution must be wiped clean.
- f) After cleaning the parts, inspect the inner and outer rings of the bearing for damage and defects.
- g) Apply lubricating grease (FAG special grease) to the inner and outer bearing inner ring assemblies, filling the space between the rollers and the cage with lubricating grease.
- h) Preparation work for shaft tube
 - Clean the shaft head, remove all rust and other impurities, and the oil seal seat ring also needs to be cleaned.
 - If necessary, cleaning agents can be used.
 - If necessary, gauze can be used to remove stains and rust on the oil seal seat ring.
 - Apply a thin layer of gear oil GL-5/85W-90 to the mounting surface of the inner and outer bearing positions of the shaft tube and the thread surface of the shaft head, as well as the thread surface of the lock nut and the end face of the lock washer. If there is any dripping, wipe off the excess lubricating oil.



4.7 Install the wheel bolts

Drive or press the new bolt into the hub bolt hole until the bolt is fully installed and the flange surface is fitted with the hub end face.



4.8 Install the wheel hub assembly

a) Install the outer ring of the bearing

- The end face of the wheel hub should be facing downwards, with the outer ring of the bearing facing outward. Place it into the wheel hub, with a press-fitting pressure not less than 60 KN and not more than 100 KN to ensure that the outer ring end face of the bearing is tightly fitted with the shoulder end face of the wheel hub bearing without any clearance.

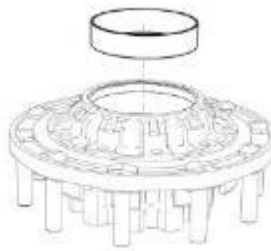
Warning:

If using a press, all warnings and precautions required by the manufacturer of the pressure must be followed to avoid damage to components and personal injury.

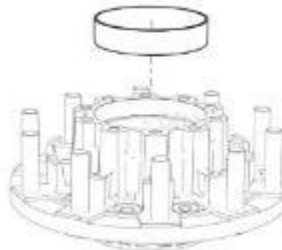
Attention:

The outer ring of the bearing should be pressed into place in one step, and a 0.02mm feeler gauge should be used to check the gap between the outer ring of the bearing and the installation step surface of the wheel hub. There should be no gap.

Take measures to avoid damaging the bearing outer ring hole and bearing installation shoulder of the hub.



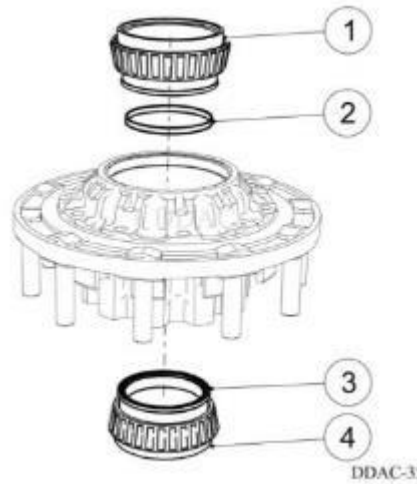
- Flip the wheel hub and press fit the outer ring of the bearing on the other side.



- b) Install the middle sealing ring into the inner ring of the outer bearing and ensure that the middle sealing ring does not tilt after installation.



- c) Install the inner and outer bearing inner rings into the wheel hub equipped with the outer rings, and place the clamp spring into the inner bearing inner ring assembly hole to clamp the two bearing inner rings.



- d) Use a special tool to press the inner oil seal into the horizontally placed hub (with a pressure not exceeding 10 KN), and ensure that the end face of the inner oil seal is in contact with the hub end face.

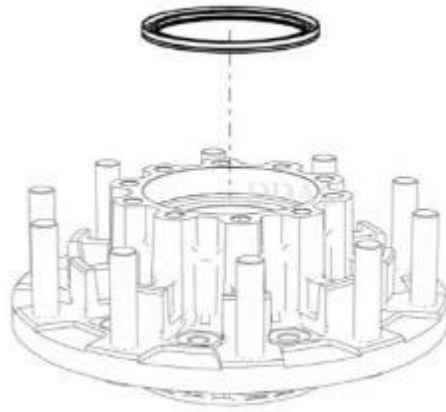


- e) Use a special tool to press the inner oil seal into the horizontally placed hub (pressure not exceeding 10 KN), and the outer oil seal end face should be in contact with the hub end face.

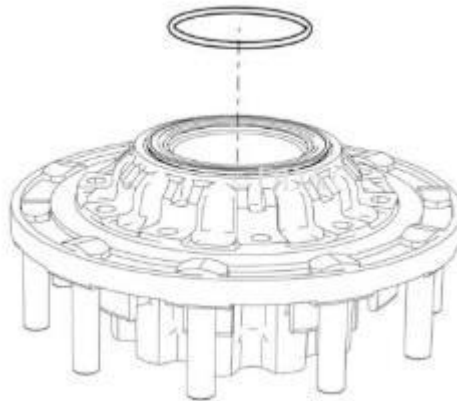
Note:

The direction of the outer oil seal, with the plane facing the bearing

- In the absence of specialized tools, a flat plate and a small wooden hammer can be used to assist in installing the oil seal. When installing the oil seal, it must be flat on top and flat on bottom. It is not allowed to directly hit the end face of the oil seal for installation or install it at an angle.
- Check and ensure that the oil seal is not warped, deformed, or damaged

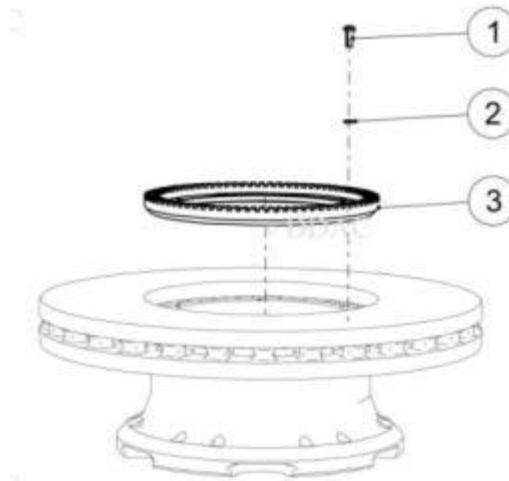


- f) After lightly applying DDAC-A grease to the O-ring, install it into the inner ring groove of the bearing in the hub, wipe off excess grease, and prevent grease from overflowing the assembly surface.



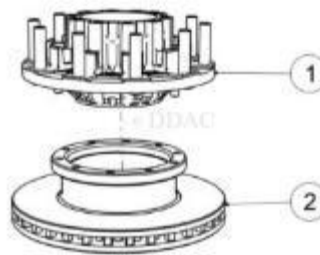
- g) Install the ABS gear ring

Fit the ABS gear ring to the mounting surface of the disk brake, align the mounting bolt holes, and install the mounting bolts.

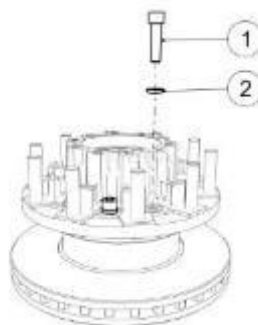


4.9 Install the disk brake

- a) Align the threaded hole of the disk brake with the connecting thread between the hub (1) and the disk brake, and install the disk brake (2).



- b) Install the washer (2) and tighten the wheel hub disk brake fastening bolt (1).



4.10 Installing the hub disk brake assembly

Install the guide sleeve, lift the hub assembly horizontally, align it with the center of the guide sleeve, and push the hub assembly in until it touches the end face of the shaft tube. Then remove the guide sleeve.

Warning:

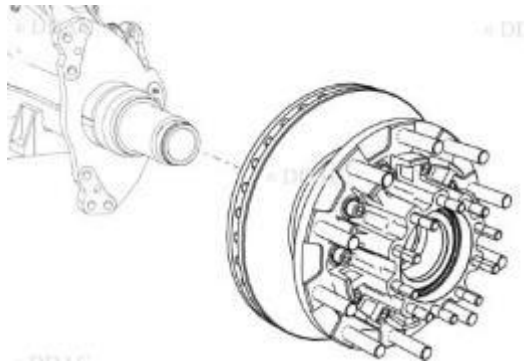
The hub assembly is heavy and requires 2 people or lifting equipment for installation.

Attention:

Do not cause the hub oil seal to collide, and do not pull or push back and forth during assembly.

Push the ABS sensor towards the wheel hub until it is in place.

Prevent the O-ring from falling off in this process, and if it falls off, it should be reset in a timely manner.

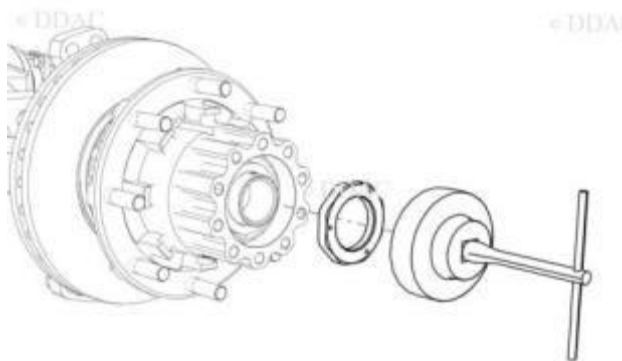


4.11 Installing the adjusting nuts

Warning:

When assembling the adjusting nut, only tighten it and do not retreat. Failure to assemble according to specifications may result in early failure of the wheel end.

- a) Screw the adjustment nut into the shaft pipe thread, ensuring that the hub unit rotates the hub disk brake assembly at a constant speed of 30 r/min in both directions, and tighten the adjustment nut with a torque of 1000-1100 N.m until the torque is reached.

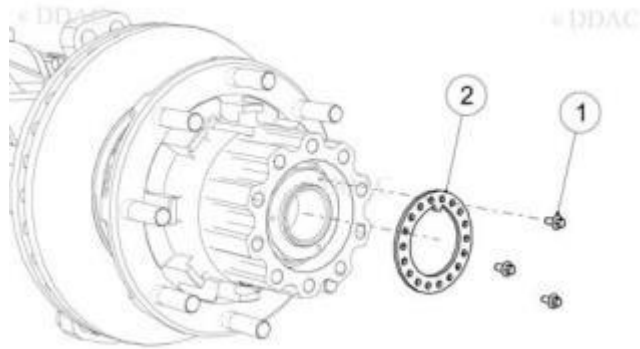


- b) At the lower torque limit, the locking plate screw hole can be aligned. If it

cannot be aligned, the locking plate can be flipped over and aligned again. If it still cannot be aligned with the screw hole, continue to tighten the locking nut (2) and install the fastening screw (1) with a tightening torque of 7-11 N.m.

Note:

During the process of aligning the screw holes, the locking nut can only move forward and not backward.



4.12 Final steps

- a) Check the gap between the ABS sensor and the ABS gear ring, which should not exceed 0.7 mm.
- b) Refer to the half axle system steps and install the half axle.
- c) Refer to the steps for axle assembly system and install the wheels.

4. Disassembly and assembly of disc brake assembly

4.1 Preparation before disassembly

For wheel disassembly steps, refer to: Axle assembly system.

Note:

The disassembly and maintenance of the disc brake assembly does not require the disassembly of the wheel hub system.

4.2 Disassembling the disc brake assembly

- a) Disconnect the wiring harness connecting the wear alarm wire to the entire vehicle, and cut the wear alarm wire cable tie.

Warning:

The brake caliper assembly is very heavy and requires 2 people or a lifting machine for disassembly and assembly.

Attention:

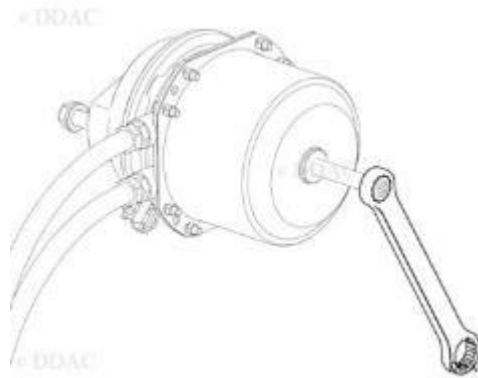
Before disassembling the air pipe, the residual air in the air pipe should be drained.

When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

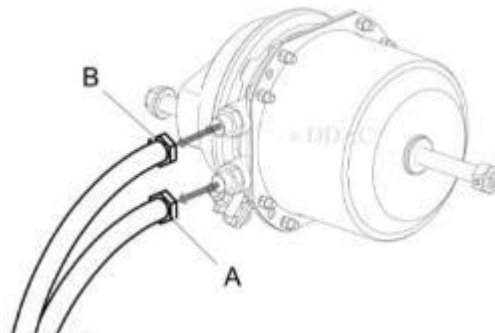
- b) Release the handbrake and fully unscrew the brake chamber screw.

Note:

Do not use an air gun to avoid damaging the air chamber.



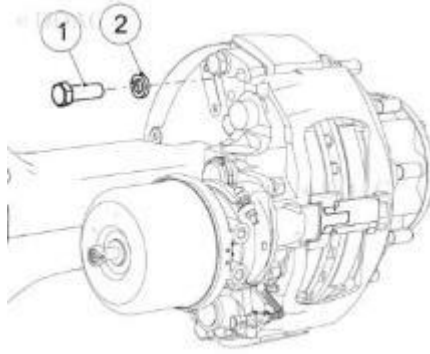
- c) Pull up the handbrake and remove the air pipe in the air chamber.



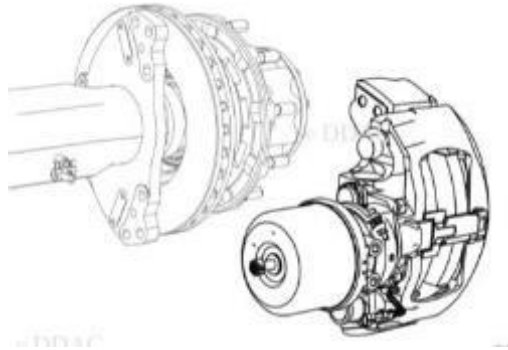
- d) Remove the brake mounting bolts (2) and washers (1).

Note:

The bolt may be very tight and not easy to disassemble, so choose a suitable socket tool and force bar.



- e) Remove the brake assembly.



4.3 Preparation before Installation

- Check and remove oil stains and other rust inhibitors on the surface of the disk brake before installation.
- Confirm that the brake is in good condition.
- Place clamping pads between the friction blocks to prevent them from falling off during assembly.

4.4 Installation steps

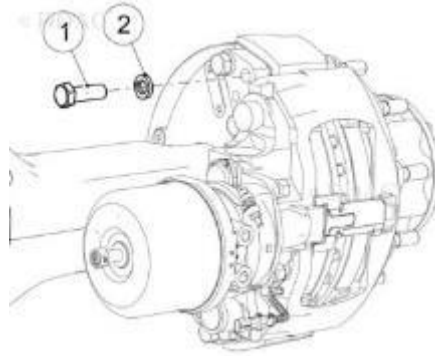
Warning:

The brake caliper assembly is very heavy and requires 2 people or a lifting machine for disassembly and assembly.

- Clamp the brake caliper assembly onto the disk brake and remove the clamping pads.
- Installing the disk brake assembly

For the position of the caliper, align the bolt holes with the flange screw holes of the axle housing. Install the gasket (2) and tighten the installation bolt (1) by

hand by about 2-3 turns, then tighten it symmetrically in sequence. Please refer to the important fastener tightening torque table for tightening torque.



Note:

The brake mounting bolts should be new.

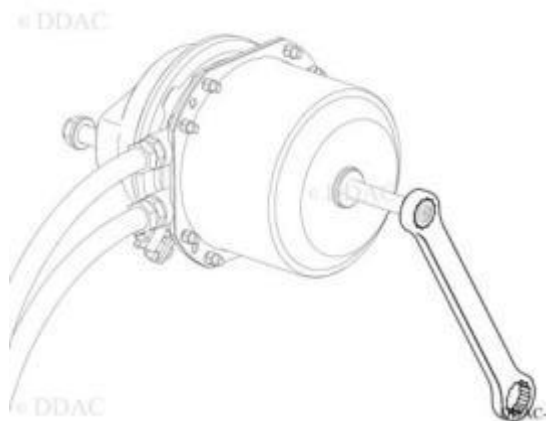
The original bolts must be inspected for any elongation or thread damage.

c) Install the brake air circuit

Note:

Install the air pipe according to the disassembly label.

- Connect the air pipe to the air pipe connector in the air chamber.
- Release the handbrake and screw in all the limit screws.



d) Connect the wear alarm wire to the vehicle connector and tie the wear alarm wire in place with a cable tie.

4.5 Adjustment of brake clearance

The adjustment of brake clearance is a necessary step after repairing the braking

system.

Attention:

Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- a) Check the gap between the brake caliper and disk brake. If the gap is less than 1.2mm, first increase the gap to 1.5mm or more.
 - Remove the sealing cap.
 - Rotate the adjustment shaft counterclockwise by 180 ° with a wrench until you hear a clicking sound (increasing clearance).
 - Check the gap
- b) Adjust the wrench without removing it. While ensuring that the braking pressure of the entire vehicle is consistent ($\geq 0.6\text{MPa}$), apply 20 brakes in place, maintain the pressure for more than 5 seconds, and maintain the braking frequency at 2-3 seconds per time. The braking gap can be automatically adjusted to the normal range.
- c) Observe that the wrench should turn clockwise at a smaller angle.
- d) If the wrench cannot rotate, or only rotates during the first brake application, or rotates forward and then backward during each brake application, it indicates that the automatic adjustment mechanism has failed and the brake caliper must be replaced.

4.6 Refer to the steps for axle assembly system and install the wheels.

5. Disassembly and assembly of air chamber assembly

5.1 Preparation before disassembly

- a) Manually screw in or out the release screw with a wrench;
- b) When screwing in the release screw, the torque should not exceed 70N.M until the nut contacts the rear sealing;
- c) When screwing out the release screw, the parking chamber must be ventilated (above 600KPa) until it is completely screwed out, with a torque not exceeding

45N M.

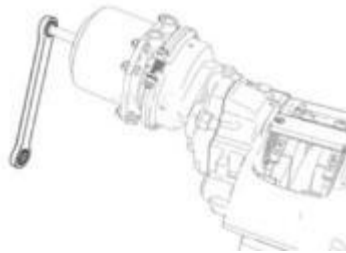
5.2 Removing the air chamber assembly

Attention:

Before disassembling the air pipe, the residual air in the air pipe should be drained.

When removing the air pipe, make a mark that corresponds to the position of the air chamber interface.

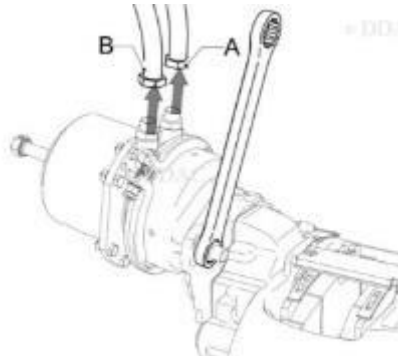
- a) Release the handbrake and fully unscrew the brake chamber screw.



- b) Pull up the handbrake, remove the air duct A/B from the air chamber, and remove the air chamber mounting nut.

Note:

Nuts may not be easy to disassemble, so choose a suitable socket tool.



- c) Remove the air chamber assembly.



5.3 Preparation before Installation

- a) Is the mating surface between the brake caliper and the air chamber clean.
- b) Check if there is lubricating grease at the ball groove of the brake lever.
- c) Confirm that the original or designated brake chamber is selected.

Note:

For air chamber that has been used for more than two years, seals and pistons should be actively inspected and replaced.

5.4 Installing the air chamber assembly

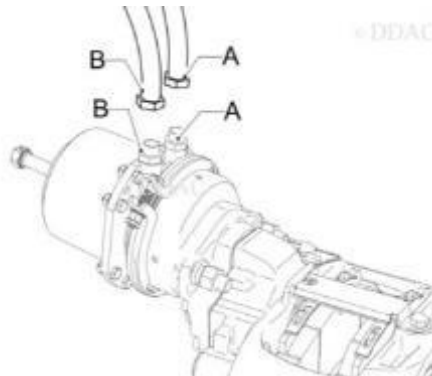
- a) Place the air chamber in the installation position and lock the brake chamber with a nut, with an installation torque of 250-280 N.m.



- b) Connect the air pipe to the brake chamber

Note:

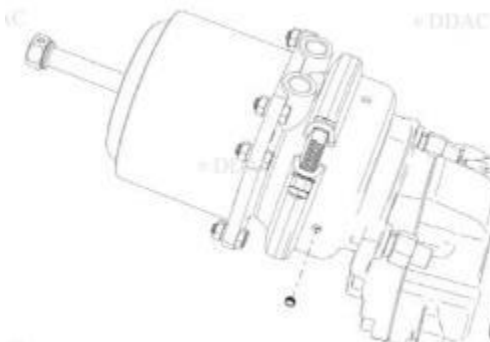
Install the air pipe according to the disassembly label.



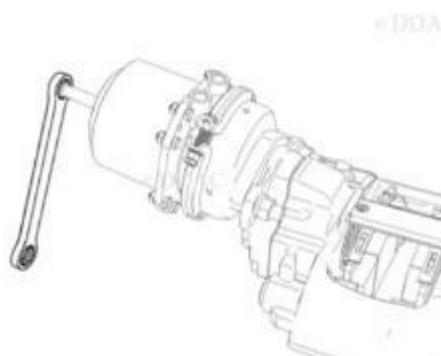
- c) Remove the blockage below the brake chamber.

Note:

Lower blockage can be removed at 1-2 places.



- d) Pull up the handbrake and fully screw in the air chamber limit screw.



5.5 Checking the brake clearance

The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake block, check the gap with a feeler gauge to ensure that the gap is between 0.6 and 1.2 mm. If the gap is less than 0.6 mm, readjust the gap.

6. Disassembly and assembly of brake pad and wear alarm

6.1 Preparation before disassembly

- For wheel disassembly steps, refer to: Axle assembly system.
- Release the handbrake.

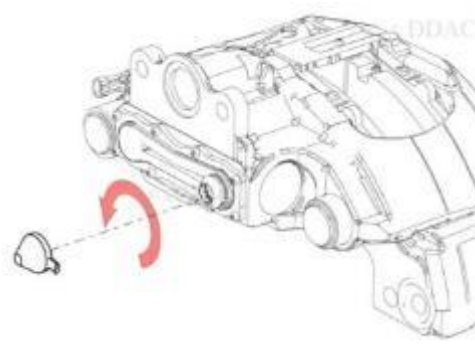
6.2 Disassembly steps

Attention:

Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- Remove the sealing cap and use a wrench to rotate the adjustment shaft

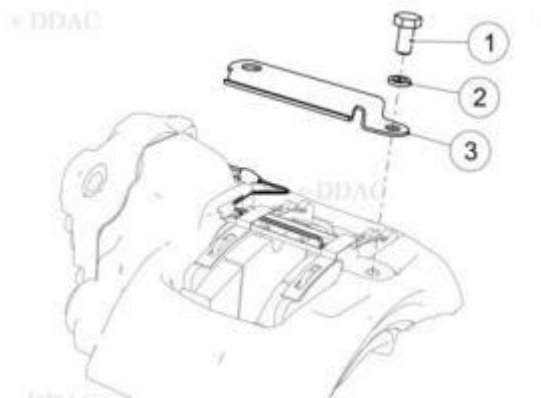
counterclockwise, creating a gap between the brake pad and the disk brake and being completely loose.



- b) Remove the sensor cover and unplug the socket of the sensor harness.

Note:

There are various structural forms of sensor cover structures.



- c) Remove the support bracket on the caliper.

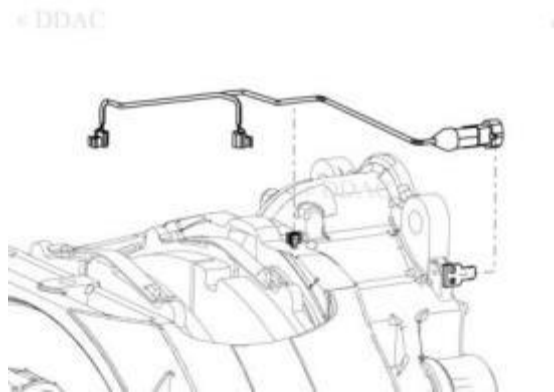
Note:

The caliper bracket can be fixed by bolts or pins.



- d) Unplug the wear indicator plug and connect it to the power cord of the entire vehicle. Use a screwdriver to remove the wear indicator plug from the brake

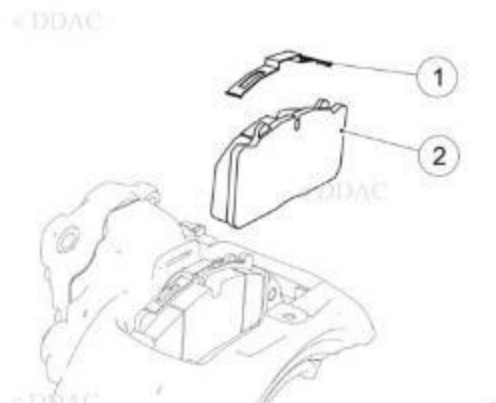
block, cut the wire harness tie, and remove the wear indicator.



- e) Remove the pressure spring (1) from the brake pad and take out the brake pad (2).

Note:

There will also be a combination structure of friction plates and compression springs.



6.3 Preparation before Installation

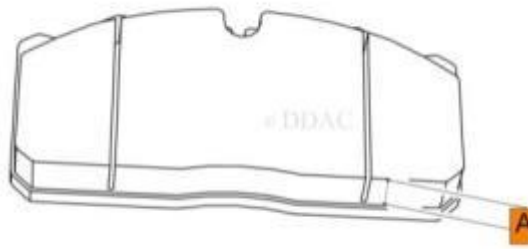
The left and right friction blocks must be replaced simultaneously.

- a) Measure the thickness of the brake pad

Measure and check the thickness of the brake pad friction material, with a minimum thickness of no less than 2 mm.

Attention:

According to actual usage conditions, if the friction material has been ground to the minimum thickness or may be ground to the minimum thickness before the next inspection, a new brake pad assembly must be replaced in advance.

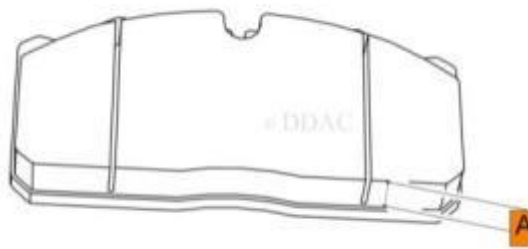


- b) Measure and check if the wear of the brake pad friction material is even

Measure and check whether the friction material of the brake block is worn evenly. Measure at 4 points. If the wear is uneven, out of tolerance, or the surface is severely chipped, the brake block needs to be replaced.

Note:

If the thickness difference between the inner and outer friction blocks exceeds 5mm, the inner and outer plates should be replaced and installed.



- c) Check the disk brake

- Check if there are cracks or scratches on the disk brake.

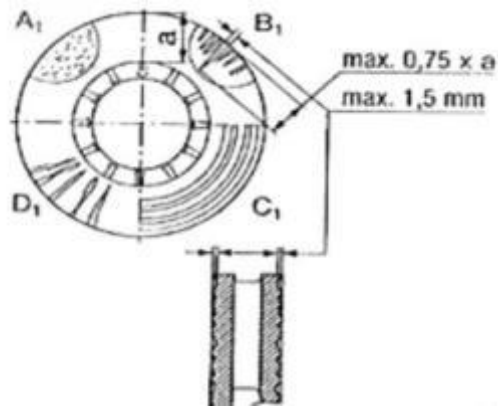
A1=Small cracks extend on the surface, which is allowed.

B1=Radial extension of cracks less than 1.5 mm in length and width, which is allowed.

C1=Circular groove with a depth of less than 1.5 mm, which is allowed.

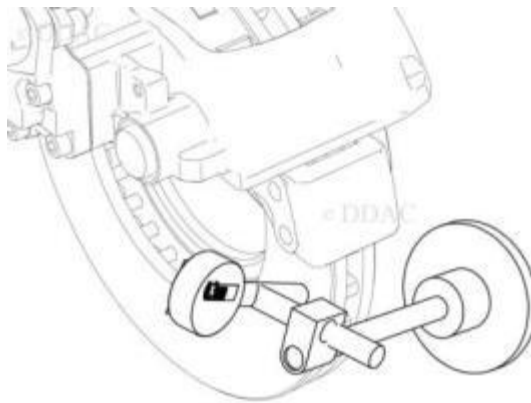
D1=Through cracks are not allowed and the disk brake must be replaced.

The total thickness of the disk brake shall not be less than 37 mm for 19.5/22.5 inches and 28 mm for 16/17.5 inches.



- Check the runout of the disk brake.

Use a dial indicator measuring head with a magnetic seat to contact the two friction surfaces of the disk brake, and rotate the disk brake once to measure its runout. The maximum runout should not exceed 0.5 mm (minus the axial runout of the wheel hub).



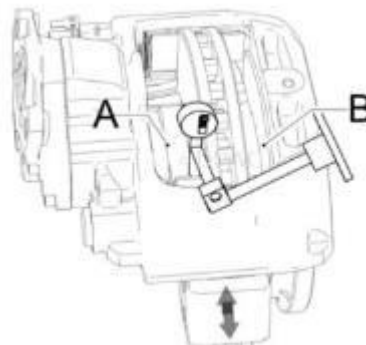
- d) Check the sliding function of the brake caliper

The maximum sliding resistance of the brake caliper is 100 N. If the sliding resistance exceeds 100 N, check if there is any dust, debris, etc. that hinders the sliding of the brake caliper. Check if the sliding pin seal is damaged, causing rust on the sliding pin and affecting the sliding of the brake caliper.



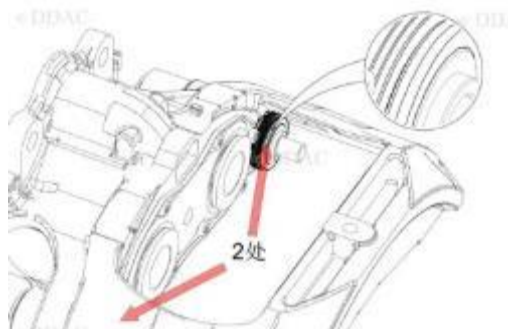
e) Check the clearance of the sliding pin

The position A in the diagram is for checking the clearance of the outer sliding pin, and the position B is for checking the clearance of the inner sliding pin. During the inspection, the dial indicator should be placed at the 0 point on the scale. The brake caliper should be lifted and lowered using a lever at positions A and B. The maximum clearance between the two positions should not exceed 1.0 mm. If the clearance exceeds 1.0 mm, the sliding pin must be replaced.



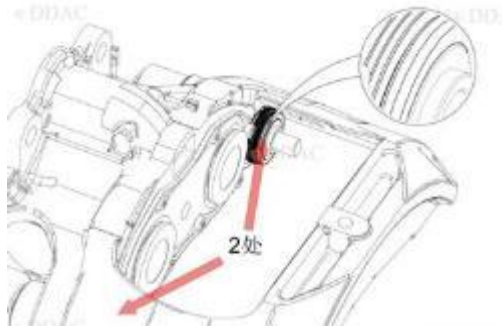
f) Check the sliding pin sealing ring

Push the main and auxiliary calipers to slide, check the sealing ring of the sliding pin, and replace it in a timely manner if there are cracks or damage.



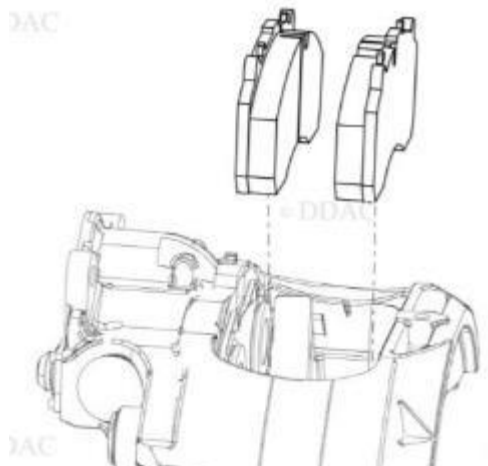
- g) Check and adjust the screw seal cartridge

Rotate the adjustment shaft clockwise with a wrench until the screw seal ring is completely exposed, pushing the push plate out by 20mm from the initial position. Check the screw seal ring. If there are cracks or other damages that affect the seal, they must be replaced.

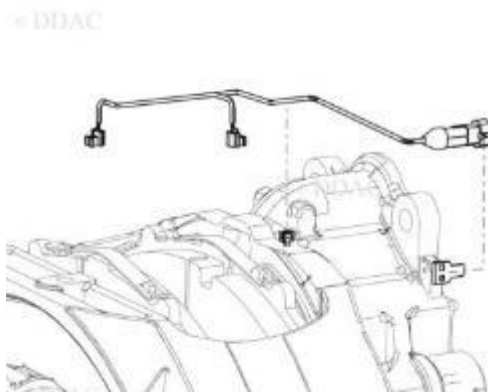


6.4 Installation steps

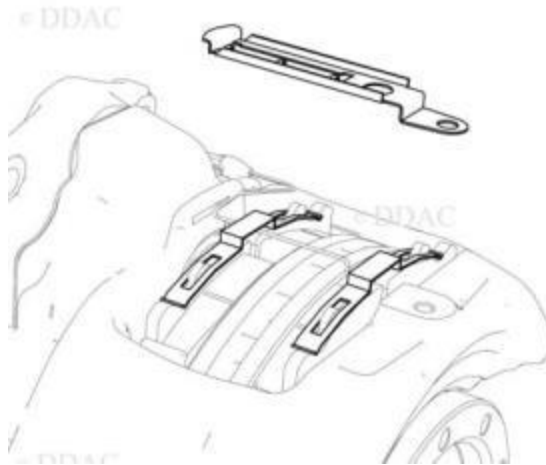
- a) Place the inner and outer brake pads into the brake caliper.



- b) Install a wear indicator on the brake block, organize the wiring harness, and fix the wiring harness according to the disassembly position.



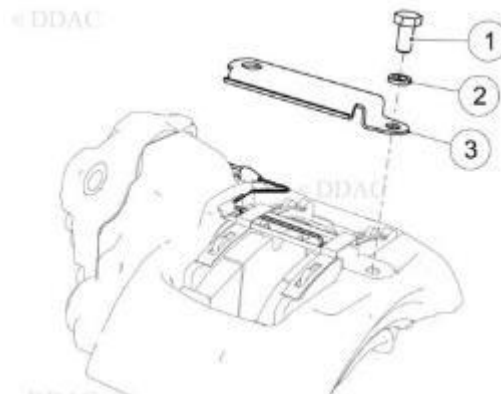
- c) Install the inner and outer brake pad pressure springs and install the bracket.



- d) Install the wear alarm wire cover, install and organize the internal and external wear alarm wire harnesses, and cover the cover plate.

Note:

The wear alarm cover varies depending on the brake product.



- e) Connect the wear alarm wire to the vehicle connector and tie the wear alarm wire in place with a cable tie.

6.5 Adjustment of brake clearance

The adjustment of brake clearance is a necessary step after repairing the braking system.

Attention:

Do not use pneumatic wrenches or other similar tools to rotate the adjusting bolts to prevent damage to the self-adjusting mechanism.

- a) Check the gap between the brake caliper and the disk brake. The normal gap is 0.6~1.2 mm. If it is less than 0.6mm, it needs to be manually adjusted.

- Remove the sealing cap.
 - Rotate the adjustment shaft counterclockwise by 180 ° with a wrench until you hear a "click" sound (increasing clearance).
 - Check clearance.
- b) Without removing the adjustment wrench, while ensuring that the braking pressure of the entire vehicle meets the requirements (≥ 0.6 MPa), apply 20 brakes in place, maintain the pressure for more than 5 seconds, and maintain the braking frequency at 2-3 seconds per time. The braking gap can be automatically adjusted to the normal range.
- c) Observe that the wrench should turn clockwise at a smaller angle.
- d) If the wrench cannot be turned, or only rotates during the first brake application, or rotates forward and then backward during each brake application, it indicates that the automatic adjustment mechanism has failed and the brake caliper must be replaced.

6.6 Refer to the steps for axle assembly system and install the wheels.

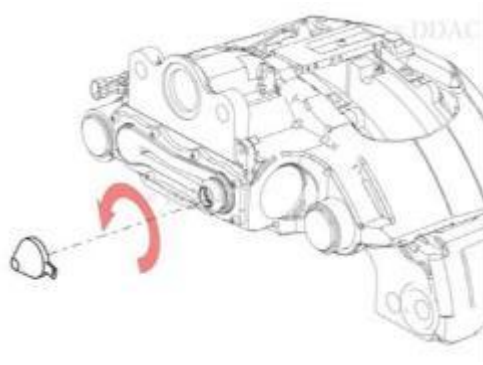
7. Disassembly and assembly of screw protection sleeve

7.1 Preparation before disassembly

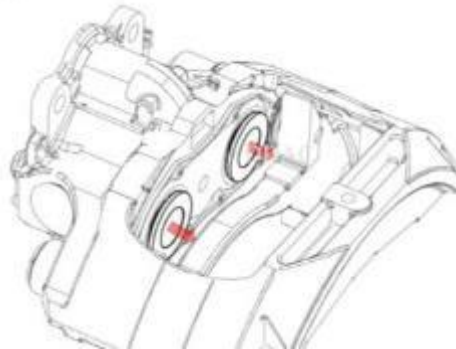
- a) Follow the disassembly steps for the air chamber assembly to disassemble the air chamber.
- b) Remove the brake pads according to the disassembly steps for the brake pads and wear alarm indicator.

7.2 Disassembly steps

- a) Remove the sealing cap and use a wrench to rotate the adjustment shaft clockwise until the push plate extends 35-40 mm and stops rotating.



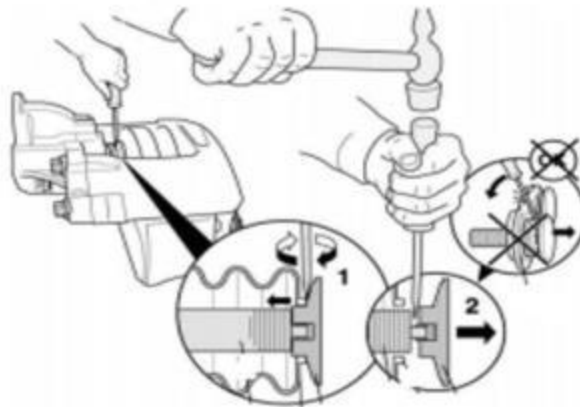
- b) Pull the coil spring protective sleeve backwards with force.



- c) Use a screwdriver to separate the protective sleeve and push plate.

Attention:

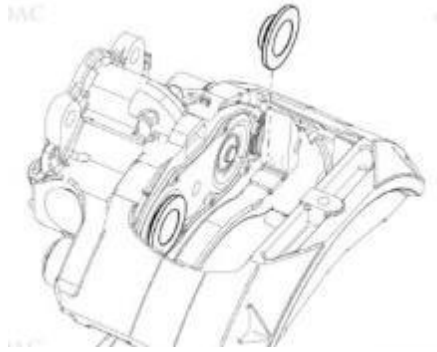
During the disassembly process, avoid damaging the adjustment screw and push plate.



- d) Rotate the adjustment shaft counterclockwise until the adjustment screw fully returns, and remove the protective sleeve from the end cover.

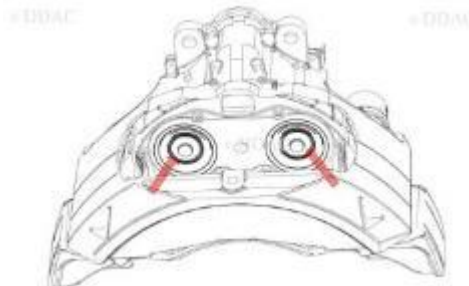
Attention:

During the disassembly process, it is important to avoid damaging the sealing mating surface.



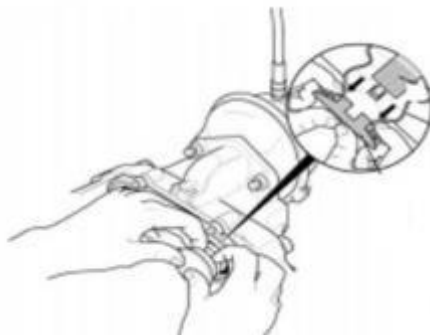
7.3 Preparation before Installation

- a) Check if the installation surface of the protective sleeve on the end cover and the installation surface on the push plate are intact and not damaged.
- b) Check if the contact surface between the push plate and the adjustment screw is intact and free of damage.
- c) Check if there is rust, damage, and indentation on the adjustment mechanism at the other end of the adjustment screw. If there is rust or damage, replace it with a new one.



7.4 Installation steps

- a) Apply special lubricating grease to the threads of the adjustment screw.
- b) Install the protective sleeve on the end cover and press it into the installation groove.
- c) Fix the protective sleeve onto the adjustment screw using a new clamp spring.
- d) Press the protective sleeve onto the push plate with your fingers, and then install the push plate onto the adjustment screw.



7.5 Final steps

- a) Install the brake pad according to the steps for the brake pads and wear alarm.
- b) Install the brake chamber according to the steps for the chamber assembly.
- c) Check and adjust the brake clearance.

The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake block, check the gap with a feeler gauge to ensure it is between 0.6 and 1.2 mm. If the gap is less than 0.6 mm, follow the brake gap adjustment method, rotate counterclockwise, enlarge the gap, and then readjust the gap.

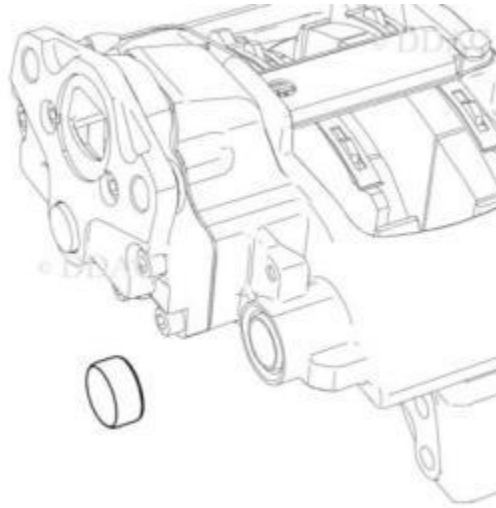
8. Disassembly and assembly of sliding pin and sliding pin bushing

8.1 Preparation before disassembly

- a) Follow the disassembly steps for the disc brake assembly and remove the brake assembly.
- b) Follow the disassembly steps for the air chamber assembly to remove it.

8.2 Disassembly steps

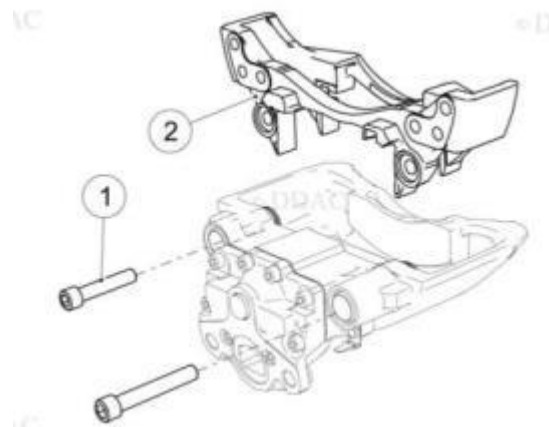
- a) Remove the sliding pin seal cover.



- b) Remove the sliding pin fixing bolt (1), push the sliding pin back with force, and remove the bracket (2).

Attention:

Do not damage the sealing surface of the sliding pin

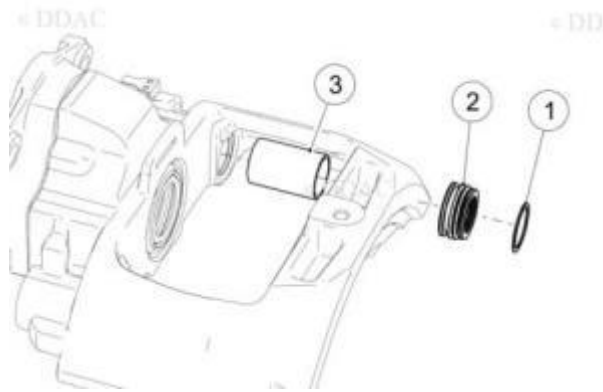


- c) Remove the rubber protective sleeve (2) and sliding pin bushing (3).

Attention:

Do not damage the rubber protective sleeve. If it is damaged, it must be replaced with a new protective sleeve.

Check the inner hole of the guide pin. If there is obvious wear on the bushing, replace it. If there is obvious wear on the guide pin, replace it simultaneously.

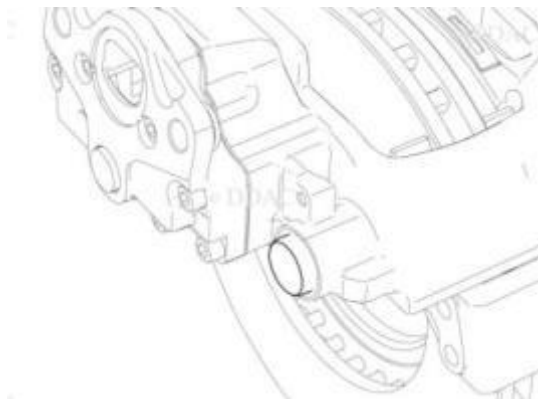


8.3 Preparation before Installation

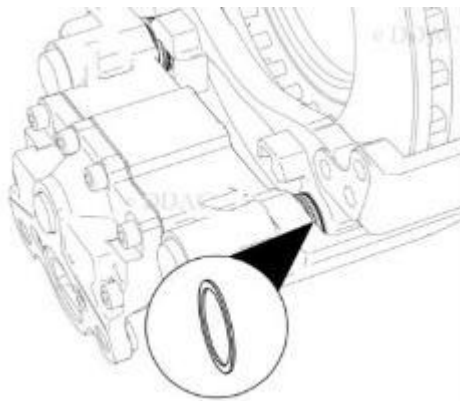
- a) Check the sealing cover of the brake caliper sliding pin. If it is loose or lost, replace or install it in a timely manner.

Note:

The sealing cover is disposable. Once the guide pin is opened, please replace it with a new one simultaneously.

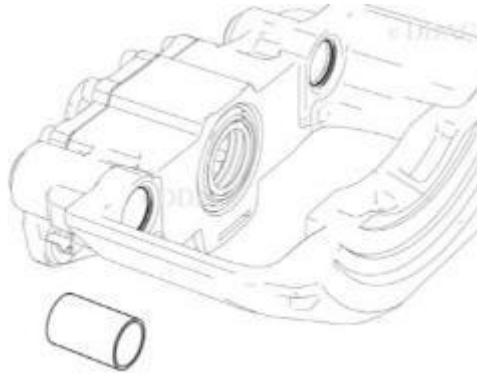


- b) Push the main and auxiliary calipers to slide, check the sealing ring of the sliding pin, and replace it in a timely manner if there are cracks or damage.



- c) Check and clean the contact surface between the brake caliper and the sliding pin bushing and rubber sleeve, and ensure that there are no foreign objects or

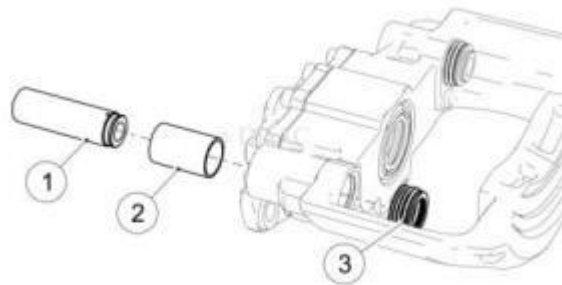
damage.



- d) Clean the contact surfaces between the brake pad and the fixed base plate, as well as brake caliper and push plate.

8.4 Installation steps

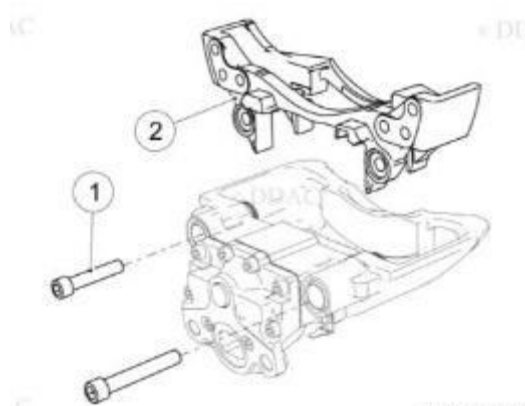
- a) Install the sliding pin (1) on the bracket, and install the sliding pin bushing (2) and rubber sleeve (3) on the guide pin hole of the caliper body.



- b) Push out the sliding pin outward, place the bracket (2) at the installation position on the brake caliper, then push in the sliding pin and install the bolt (1) with a torque of 280~320 N.m, locking the sliding pin.

Note:

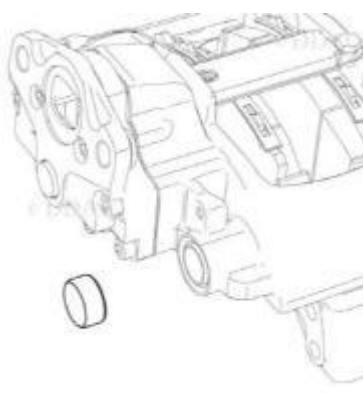
Apply a layer of lubricating grease to the inner hole of the bushing on the surface of the sliding pin.



- c) As for the installation of the sliding pin sealing cover, carefully tap the sealing cover, and install it on the sliding pin of the brake caliper.

Note:

The sealing cover must be in full contact with the bottom of the brake caliper. Some structures do not have cap limit holes, and caps generally need to be pressed in place using toolings to ensure the depth of the cap pressing.



8.5 Final steps

- Install the brake chamber according to the steps for the chamber assembly.
- Follow the steps for the disc brake assembly and install the brake assembly.
- Install the brake pads and wear alarm according to the steps for the brake pads and wear alarm.
- Adjust the brake clearance.

The inspection and adjustment of brake clearance is a necessary step after repairing the braking system.

Pull or push the brake caliper to contact one side of the brake pad, check the clearance with a feeler gauge to ensure that the clearance is between 0.6 and

1.2 mm. If the clearance is less than 0.6 mm, readjust the clearance according to the brake clearance adjustment method.

9. Disassembly and assembly of ABS sensor and ABS bracket

9.1 Preparation before disassembly

Check and confirm if ABS installation and disassembly require wheel disassembly.

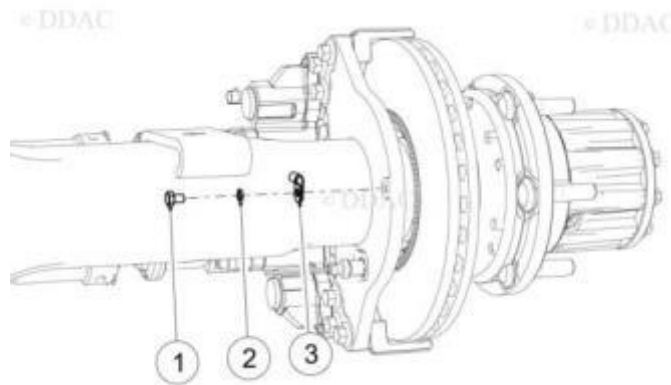
Note:

The ABS sensor or bracket malfunction has be confirmed before disassembly.

Vehicle power outage.

9.2 Removing the ABS sensor

- a) Use flat nose pliers to cut off the cable ties that bind the ABS harness, leaving the harness in an unbound state.
- b) Unplug the plug connector connecting the ABS harness to the vehicle harness
- c) Release the ABS harness clip on the axle housing.



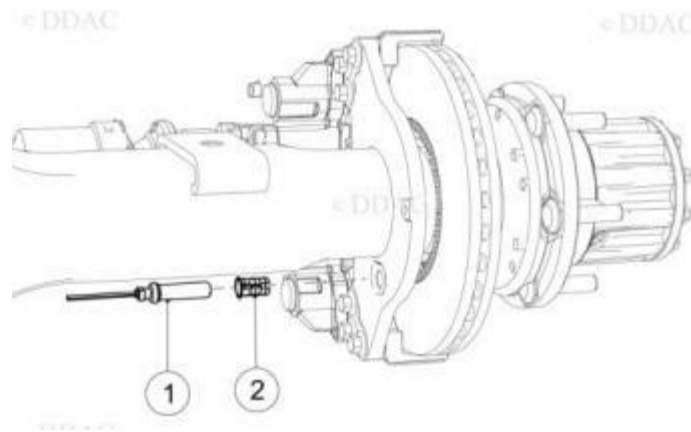
- d) Keep the ABS harness in a completely unsecured state.

Note:

Properly store the buckle to prevent loss.

Properly place the ABS wiring harness to prevent breakage

- e) Pull out the ABS sensor assembly and ABS bushing from the rear.



9.3 Preparation before Installation

a) Clean and inspect the elastic bushing.

Check the inner hole of the bracket with a caliper and check for any out of roundness. If it exceeds the limit of use, replace it.

Attention:

The elastic bushing needs to be replaced due to rust or permanent elastic deformation.

The ABS bracket inner hole is rusted or the inner hole size is larger than 18.11mm, and a new bracket needs to be replaced.

b) Check ABS sensor

Attention:

ABS sensors can only be installed after passing the inspection.

- Check the appearance of the ABS sensor, and there should be no obvious scratches or dents on the head.
- Measure the resistance of the sensor using the resistance range of a multimeter, and the resistance should be between 1350 and 1650 Ω .
- The wiring harness must not be damaged.

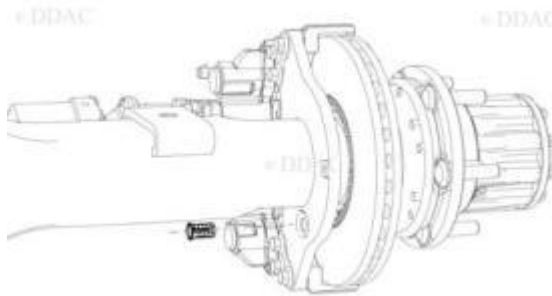
c) Clean the ABS gear ring

- Clean the ABS gear ring with a brush.
- Check for foreign objects in the gap of the ABS gear ring.

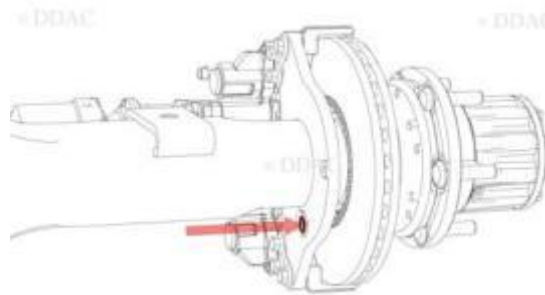
9.4 Installing the elastic bushing

The inner edge of the elastic lining is on the inside.

- a) Install the elastic bushing from the inner side of the mounting hole on the bottom plate until it is blocked by the edge.

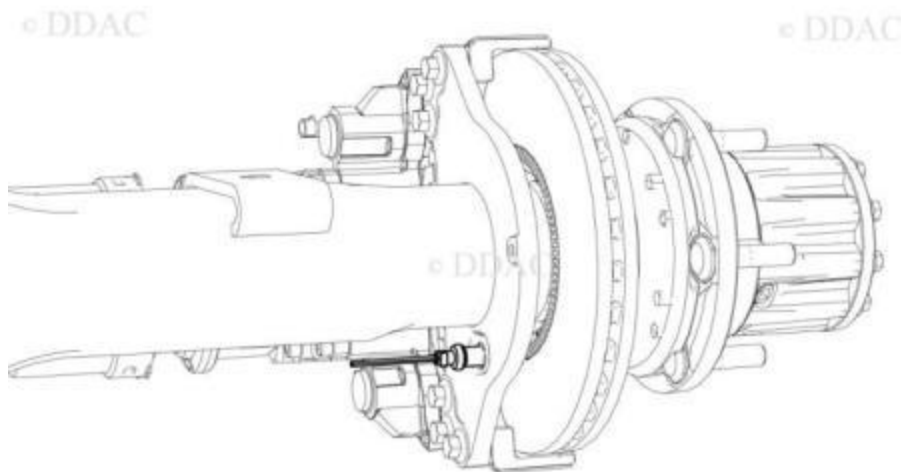


- b) Apply lubricating grease evenly in the inner hole of the elastic bushing



9.5 Installing the ABS sensor

- a) Thread the sensor through the brake baseplate hole.
- b) Insert the sensor into the elastic bushing hole until it presses against the ABS gear ring.



- c) When the vehicle is in motion, the end runout of the gear ring and the clearance between the wheel bearings will automatically push the sensor away, creating a gap of less than 0.7mm between the sensor and the gear ring. But when

assembling the wheel hub and brake drum assembly, the gear ring will push the sensor to a certain position. If the sensor is pushed too far, exceeding the maximum clearance, it must be removed and reinstalled. The maximum gap between the gear ring and the sensor shall not exceed 1.2mm.

d) ABS signal detection confirmation

Unplug the ABS sensor assembly and insert the ABS signal measuring instrument quick connector into the ABS sensor assembly. If there is no ABS signal measuring instrument, connect the multimeter needle to the ABS plug. Turn the multimeter to the AC voltage range and rotate the wheel end. If the needle is swinging, it indicates that the ABS sensor is normal.

9.6 Fixing the wiring harness

Plug in the connector of the vehicle and place the ABS wiring harness in place.

Attention:

The ABS wiring harness must not have any swinging phenomenon when fixed on the entire vehicle.

9.7 If disassembling the wheels, refer to the axle assembly system.

10. Disassembly and assembly of the main final drive

10.1 Preparation before disassembly

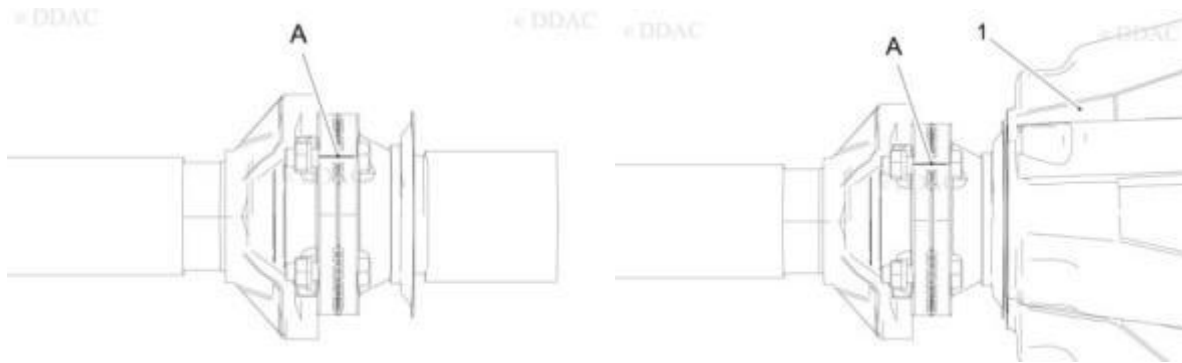
- a) Refer to the steps for draining the lubricating oil of the reducer: draining the lubricating oil.
- b) Disassemble the half axle system, refer to steps of half axle system.
- c) Remove the transmission-middle axle drive shaft and the middle axle rear axle drive shaft.

Attention:

Before disassembly, if the mark on the original drive shaft is damaged, it is necessary to make a matching mark on the flange again.

When disassembling the transmission shaft assembly, it should be removed

from the rear to the front (rear axle → transmission).



A - Matching mark 1- Rear axle main reduction

10.2 Dismantling the main reducer system

Attention:

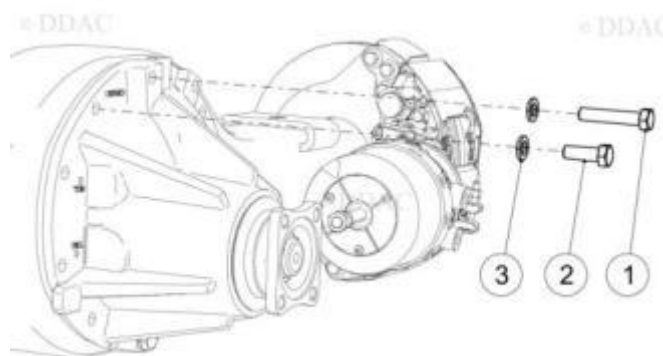
When disassembling the reducer, be careful not to damage the fitting surface between the reducer and the axle housing. If the fitting surface is damaged, it may cause oil leakage.

After removing the reducer assembly, two magnets can be seen in the inner cavity of the axle housing. Please take them out and clean them thoroughly before putting them back in their original positions.

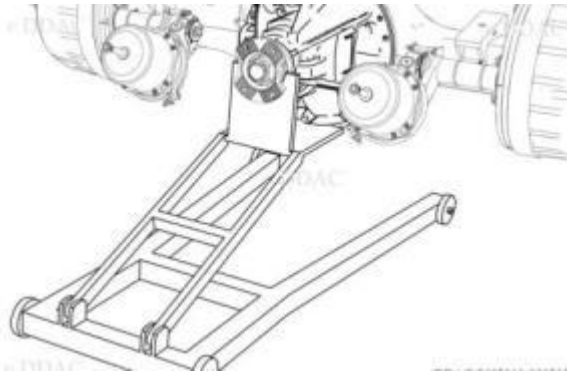
Lock the wheel differential lock before disassembling the main reducer assembly.

The main reducer assembly is very heavy and requires a lifting machine to remove it.

- a) Remove the bolts connecting the reducer assembly and the axle housing.

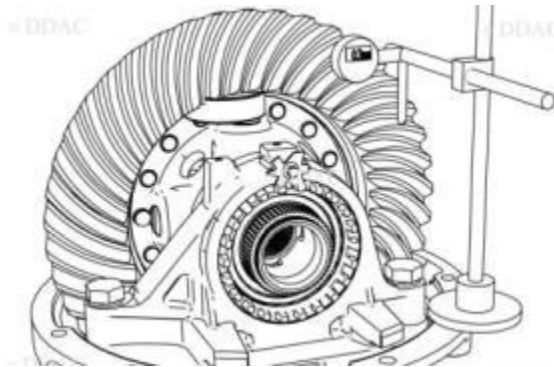


- b) Lift the main reducer assembly out of the axle housing using a horizontal sled.

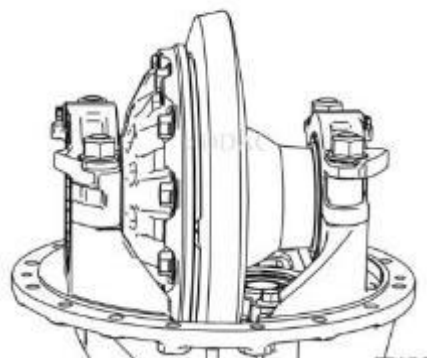


- c) Check the backlash between the drive and driven bevel gears.

During testing, the dial indicator measuring head should be perpendicular to the big end curved surface of the large wheel. Detect 1 to 2 teeth in each of the three directions roughly equidistant around the circumference of the passive bevel gear.



- d) Place the main reducer assembly on the disassembly table.



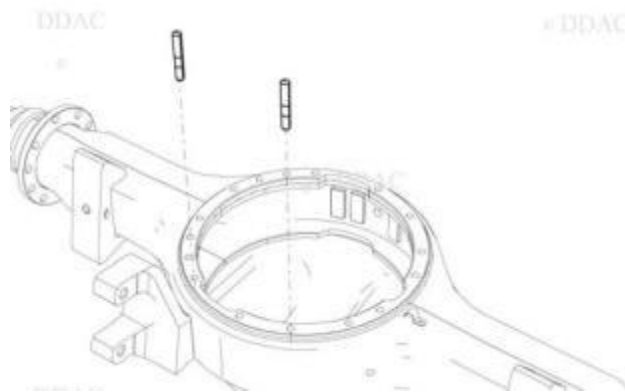
10.3 Preparation before Installation

- Clean the residual adhesive at the joint surface between the axle housing and the main reducer assembly, and clean the remaining sealing washers at each joint surface.
- Preparation work for axle housing

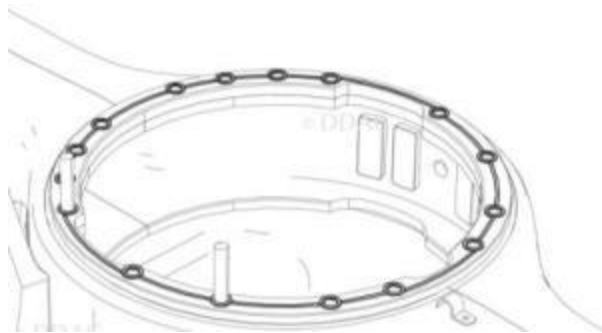
- Remove residual adhesive from the flange surface of the axle housing.
- Remove any attachments (dust, dirt, moisture, etc.) from the flange surface.
- If necessary, cleaning agents can be used.

10.4 Install the rear axle main reducer system

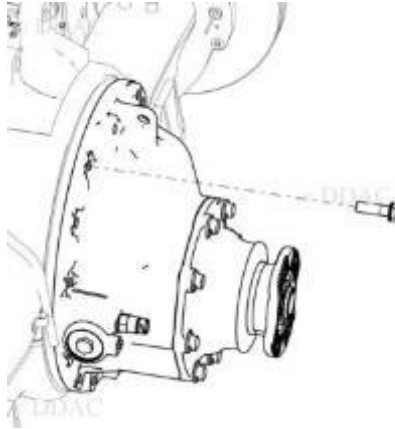
- a) Screw the adhesive ends of the double headed bolts into the axle housing separately.



- b) Apply two circles of oil resistant silicone sealing adhesive inside and outside the bolt holes on the flange surface of the axle housing, with a tape width of no less than 3mm. The application of tape should be continuous and uninterrupted.



- c) Lift the reducer with a horizontal sled and keep the flange surface level to smoothly assemble the reducer assembly in place. Install the corresponding bolts and tighten them with a torque of 220-250 N.m.



10.5 Final steps

- a) Install the drive shaft and align it with the matching marks, then tighten the flange.
- b) To install the half axle system, refer to the steps of half axle system.
- c) Refer to the steps for adding lubricating oil to the reducer: Adding lubricating oil.

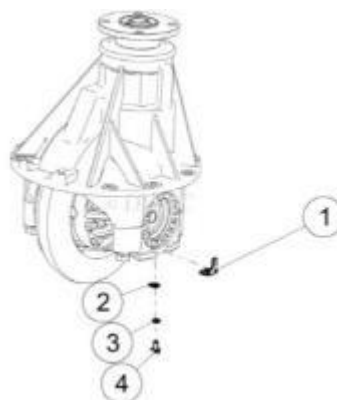
11. Inter-wheel differential assembly

11.1 Preparation before disassembly

Follow the steps of the final drive system to disassemble the final drive assembly.

11.2 Dismantling the inter-wheel differential

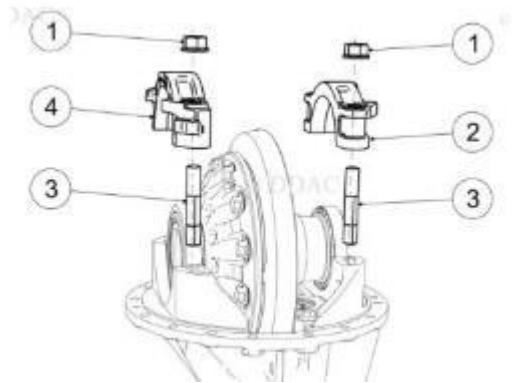
- a) Remove the fastening bolts (4), washers (2, 3), and locking nuts (1) at both ends of the differential assembly.



- b) Loosen the bearing cover bolt (3) using the bearing cover bolt socket, and remove the adjusting nut (2) using the differential adjustment wrench (1).



- c) Mark the left and right bearing covers separately, remove the nut (1) and bearing cover (2).

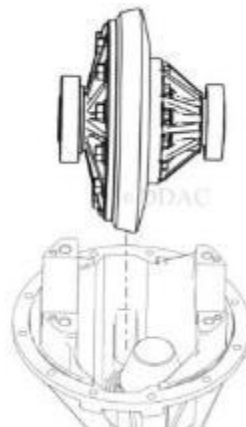


- d) Use a lifting tool to remove the differential from the reducer housing.

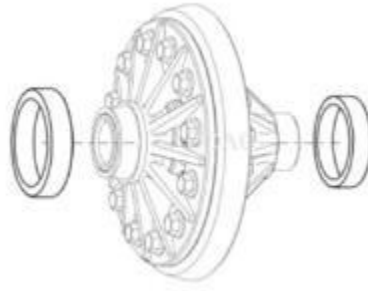
Attention:

The differential is very heavy and requires a lifting machine for assembly.

Pay attention to the scattered right bearing cover and outer ring of the right bearing.



- e) Remove the outer ring of the bearing.

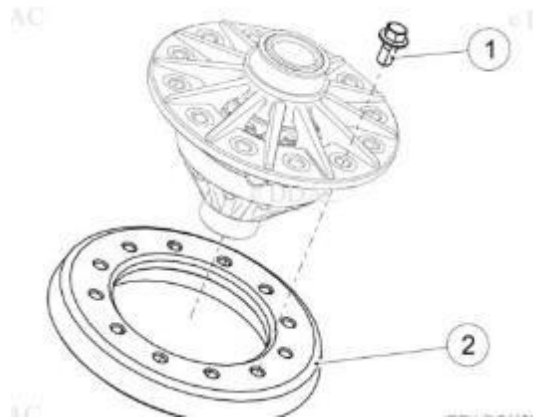


11.3 Disassemble the inter-wheel differential assembly

- a) Remove the connecting bolt (1) of the driven bevel gear and remove the passive gear (2) from the right housing.

Note:

Make pairing marks on the left and right housings before disassembling them.



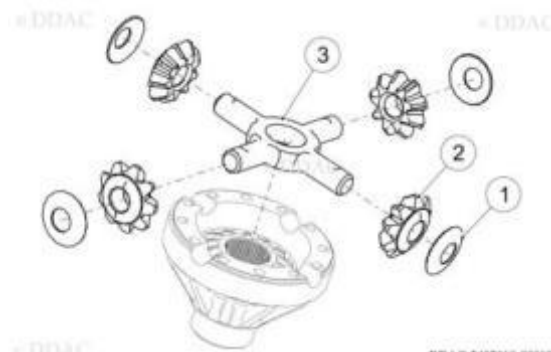
- b) Place the differential downwards, remove the differential connecting bolts, and separate the left and right housings of the differential.



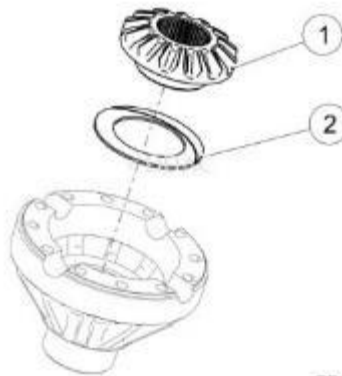
- c) Take out the half axle gear support gasket (1) and the left shell half axle gear (2).



- d) Remove the cross shaft (3) with epicyclic gear (2) and supporting gasket (1) from the right differential housing.



- e) Take out the right half axle gear (1) and gasket (2).



- f) Use the differential left/right bearing inner ring puller to remove the bearing inner ring from the left and right differential housing respectively.

Warning:

If using a press for disassembly, follow all warnings and precautions required by the stamping machine manufacturer to avoid damage to components and personal injury.

When using manual tapping to disassemble the outer ring, be careful not to

rebound and injure people.



11.4 Preparation before Installation

Warning:

It is strictly prohibited to use gasoline to clean parts.

If you choose to continue using existing bearings, these bearings must be inspected according to the manufacturer's recommended principles.

When it is determined that the inner or outer ring of the bearing is damaged, both the inner and outer bearings must be replaced as a complete set, and the bearing spacer must also be replaced.

- a) Clean the disassembled parts with clean solvent.
- b) Allow the parts to dry thoroughly, and any remaining solution must be wiped clean.
- c) Check the parts for scratches, cracks, damage, etc.
- d) Check if there is any running ring on the outer ring of the bearing. If there is running ring, please replace the inner and outer bearings in pairs immediately.
- e) Check for cracks in the drive and driven bevel gears, differential housing, bearings, etc.

Note:

The drive and driven bevel gears need to be replaced in pairs.

The final drive housing and differential bearing cover need to be replaced in pairs.

- f) Before installing the inter-wheel differential assembly, it is necessary to install the drive bevel gear in advance. Please refer to the steps of drive bevel gear

assembly.

11.5 Assemble the inter-wheel differential assembly

Warning:

If using a press, all warnings and precautions required by the manufacturer of the pressure must be followed to avoid damage to components and personal injury.

Attention:

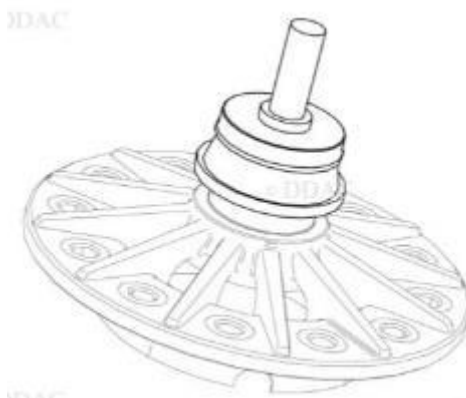
When pressing the inner ring of the bearing, it is not allowed to come into contact with the rolling element and supporter.

- a) Apply a layer of lubricating oil evenly to the inner rings of the left and right bearings, and use the differential left and right bearing sleeves to press the inner rings of the left and right differential bearings onto the shaft diameter of the left and right differential housings.

Note:

If the bearing preheating method is used, the preheating temperature should not exceed 100°C and the insulation time should not be less than 2 minutes.

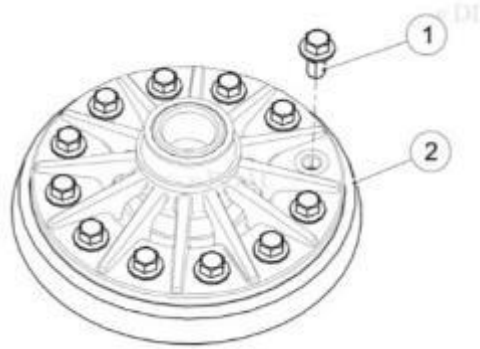
The inner ring of the bearing should be pressed into place in one step, and a 0.02mm feeler gauge should be used to check that there is no gap between the large end face of the inner ring of the bearing and the installation surface of the drive bevel gear.



- b) Install the passive wheel (2) onto the left differential housing and tighten it with bolt (1) to a torque of 615-685 N.m.

Attention:

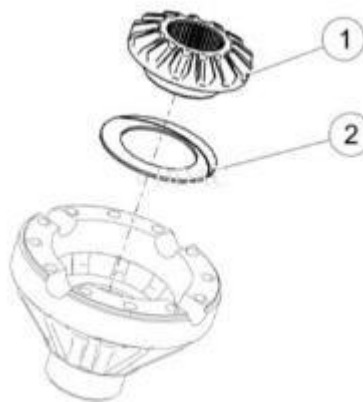
Before reassembling the bolt, apply thread locking adhesive to the circumference of the thread head, with no less than 10 threads.



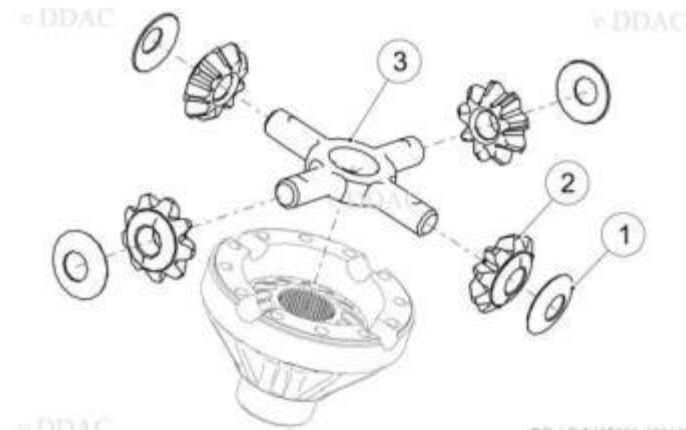
- c) Apply lubricating oil evenly to the support gasket (1) and the half axle gear (2), and then place them in the left differential housing in sequence.

Note:

The supporting gasket should be completely attached to the right differential housing, and the half axle gear should be completely attached to the supporting gasket.



- d) Apply lubricating grease evenly to the two sets of supporting washers (1) and epicyclic gears (2), then place them on the cross shaft (3) and place them on the left differential housing.



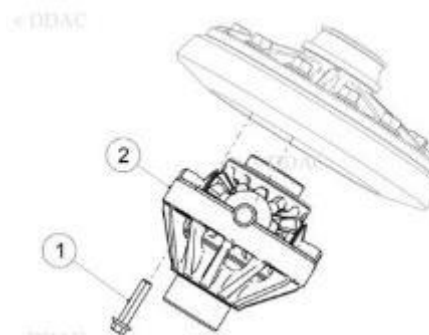
- e) Apply lubricating oil on the tooth surface of the half axle gear, place the half axle gear (2) and half axle gear gasket (1) onto the assembled epicyclic gear.



- f) Install the left differential housing and tighten the bolts to a torque of 140~180 N.m.

Attention:

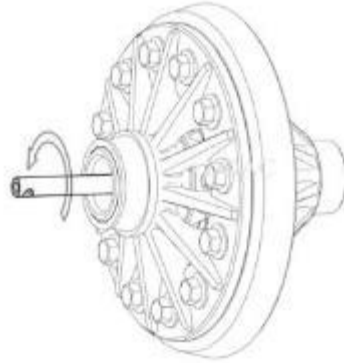
Apply thread locking adhesive to the circumferential direction of the threaded head before bolt reassembly, with no less than 10 threads



11.6 Install the inter-wheel differential assembly

- a) After assembly, ensure that the backlash between the differential gear teeth is 0.20-0.35mm (or the axial clearance of the half axle gear is 0.25-0.45mm), and

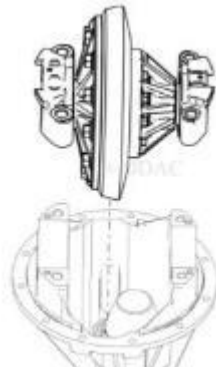
use a shaft with splines to rotate the half axle gear to ensure light rotation without obvious jamming. If there is any abnormality, it needs to be disassembled and reassembled.



- b) Fit the outer rings of the left and right differential bearings with the outer rings of the differential assembly bearings, and lift them as a whole onto the final drive housing.

Attention:

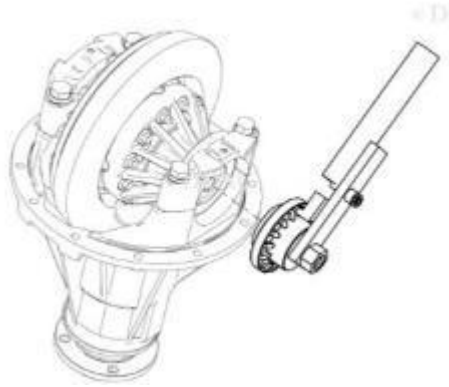
The differential is very heavy and requires a lifting machine for assembly.



- c) Use a differential adjustment wrench to install the left and right differential adjustment nuts onto the reducer housing.

Note:

When tightening the adjusting nut, try to align the tooth groove with the position where the stop plate is installed on the bearing cover as much as possible

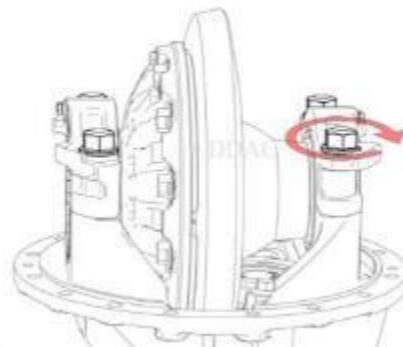


- d) Install the bolts and pre-tighten the bearing cover mounting nuts with a torque of 300-400N. m.

Attention:

Ensure that the bearing cover is installed in place. If the assembly end face of the bearing cover does not fit the outer ring of the bearing, the bearing cover should be removed and the left and right nuts of the differential should be readjusted.

Before reassembling the bolt, apply thread locking adhesive to the circumference of the thread head, with no less than 10 threads.



- e) Adjust the tooth side clearance and bearing pre-tightening
- Tighten the right adjustment nut, then rotate the passive bevel gear. If the clearance between the teeth of the active and passive gears is small, tighten the left adjustment nut, until the torque of rotating the differential assembly is within the range of 7-11N.m. (Excluding the pre-tightening load of the active bevel gear bearing), the uniform rotational torque should meet 3.3~5.0N. m (for reference only, no measurement required).

- Adjust the left and right adjustment nuts and adjust the tooth side clearance.

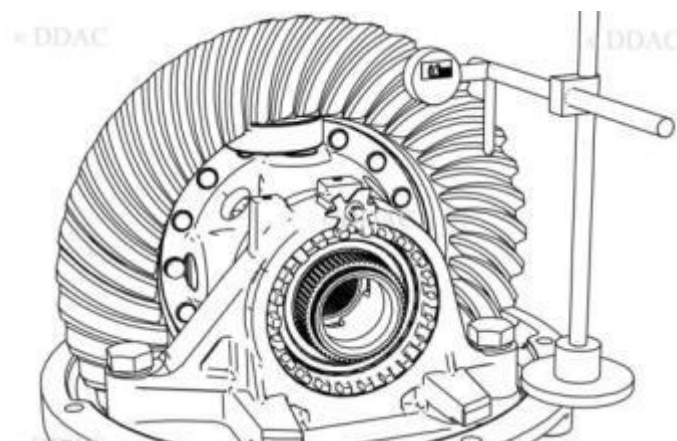
The tooth side clearance is 0.23~0.40mm.

Note:

The adjustment nut on one side must be tightened to the same value as the adjustment nut on the other side, to ensure that the pre-tightening load of the already adjusted differential bearing remains unchanged, and to ensure that the stop groove position of the adjustment nut is appropriate.

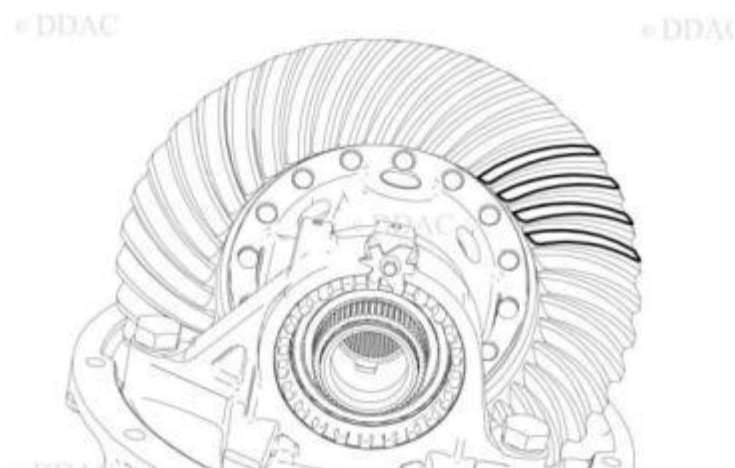
During testing, the dial indicator measuring head should be perpendicular to the big end curved surface of the large wheel.

When detecting the backlash between the drive and driven bevel gears, 1 to 2 teeth are detected in three directions roughly evenly distributed around the circumference of the driven bevel gear.



11.7 Drive and driven bevel gear imprint and clearance adjustment

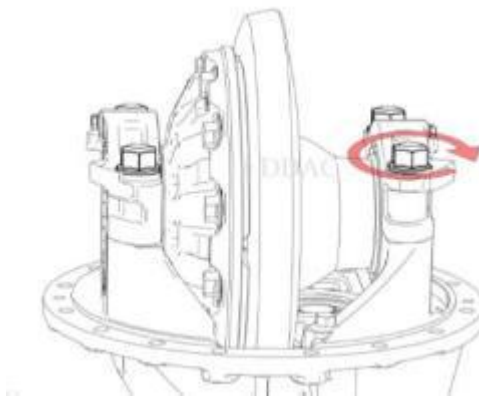
- a) Adjust the contact imprint between the drive and driven bevel gears
 - Apply a layer of red lead powder on 3-4 driven gear teeth, then drive (lightly loaded) the drive bevel gear and check the contact marks on the tooth surface of the driven bevel gear.



- After adjustment, tighten the bearing cover nut with a torque of 500~550N.m.

Note:

Before tightening the bearing cover bolts, check if the bearing cover is installed properly. If the assembly end face of the bearing cover does not fit the bearing support end face, remove the bearing cover and readjust the position of the differential left and right adjustment nuts.

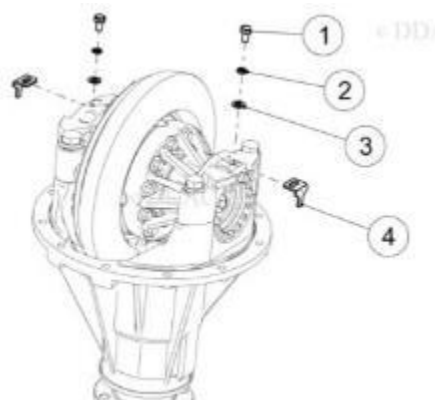


b) Method for adjusting imprint standards

Contact area diagram	Illustration of contact area (front face)	Adjustment method for driven wheel	Method of adjusting the drive wheel
	Normal contact area (the contact area is located at the middle and upper ends of the tooth surface)	No need for adjustment	No need for adjustment
	The contact area is too large or partially beyond the large end	Loosen the right differential adjustment nut Tighten the left differential adjustment nut	If the contact area exceeds the tooth top, reduce the thickness of the main cone bearing seat gasket at the same time

	The contact area is too small or partially beyond the small end	Loosen the left differential adjustment nut Tighten the right differential adjustment nut	If there is a tooth tip in the contact area, reduce the thickness of the main cone bearing seat gasket at the same time
	The contact area deviates from the root of the tooth or has partially emerged from the root of the tooth	—	Increase the thickness of the adjusting gasket for the main cone bearing seat
	The contact area deviates from the top of the teeth or partially exceeds the top of the teeth	—	Reduce the thickness of the adjusting gasket for the main cone bearing seat

- c) Install the adjusting nut stopper (4), clip the stopper gasket into the groove of the adjusting nut, and tighten the stopper mounting bolt (1) with a torque of 12-18 N.m.



11.8 Final steps

- Assemble the final drive assembly, refer to the final drive assembly.
- Assemble the drive shaft, refer to the axle assembly system.

12. Disassembly and assembly of the drive bevel gear assembly

12.1 Preparation before disassembly

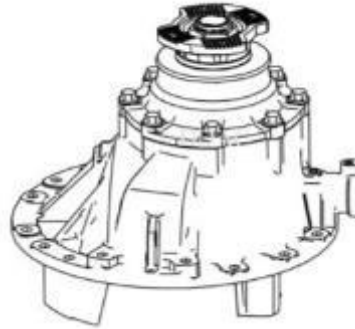
Confirm the fault, do not replace the active bevel gear shaft pair and do not disassemble the reducer assembly.

12.2 Remove the drive bevel gear assembly

Attention:

Due to the high height of the rear axle reducer housing, in order to prevent damage to the drive bevel gear after it falls off the rear axle reducer housing, timber sleepers must be placed as required.

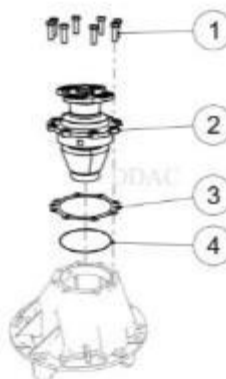
- a) Flip over the final drive housing.



- b) Remove the bearing seat mounting bolt (1) and pull out the drive bevel gear assembly (2).

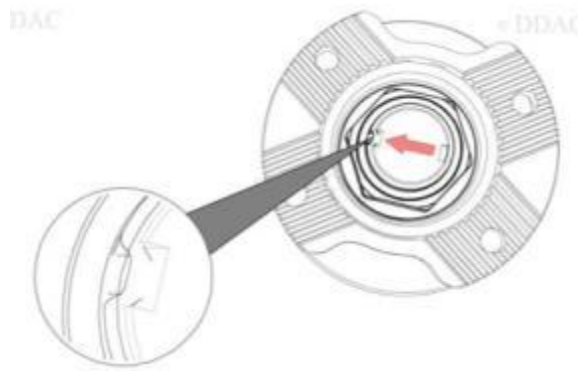
Note:

At the same time, remove the adjusting gasket (3) and place it properly, and remove the O-ring (4) for inspection.

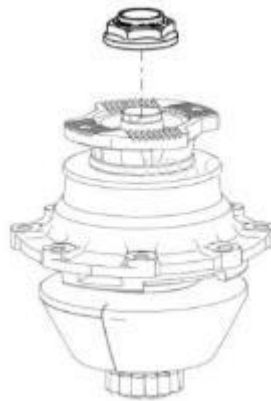


12.3 Disassemble the drive bevel gear assembly

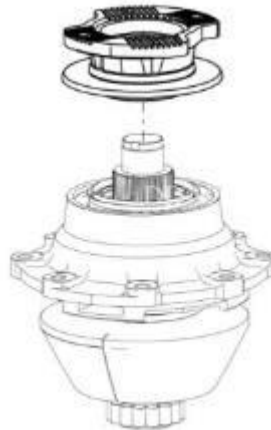
- a) Flatten the nut skirt edge and rivet the part.



- b) Use a tool to remove the nut.



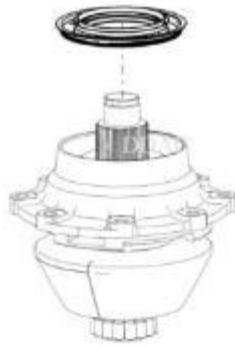
- c) Remove the input end flange assembly.



- d) Use a flat shovel or flat screw to pry out the input end oil seal assembly.

Attention:

After removing the oil seal, it must be replaced with a new one.



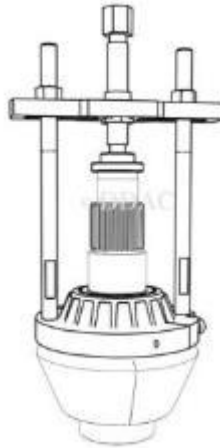
- e) Use a pressure head to press out the inner ring assembly and bush of the main cone with the main cone rear bearing.



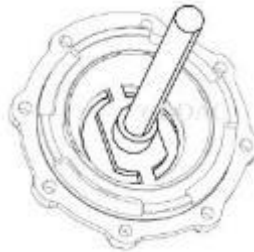
- f) Take out the inner ring of the main cone front bearing from the bearing seat.



- g) Use a rear axle main cone rear bearing inner ring puller to remove the main cone rear bearing inner ring from the main cone.



- h) Use the outer ring pressure plate of the front cone bearing and the outer ring pressure plate of the rear axle main cone rear bearing to remove the outer rings of the front and rear cone bearings from the bearing seat.



- i) Drive out the outer ring of the guide bearing from the reducer housing.



12.4 Preparation before Installation

Warning:

It is strictly prohibited to use gasoline to clean parts.

- Clean the disassembled parts with clean solvent.
- Allow the parts to dry thoroughly, and any remaining solution must be wiped clean.

Warning:

If you choose to continue using existing bearings, these bearings must be

inspected according to the manufacturer's recommended principles.

When it is determined that the inner or outer ring of the bearing is damaged, both the inner and outer bearings must be replaced as a complete set, and the bearing spacer must also be replaced.

- c) Check the parts for scratches, cracks, damage, etc.
- d) Check if there is any running ring on the outer ring of the bearing. If there is running ring, please replace the inner and outer bearings in pairs immediately.
- e) Check for cracks in the drive and driven bevel gears, differential housing, bearings, etc.

Note:

The drive and driven bevel gears need to be replaced in pairs.

The final drive housing and differential bearing cover need to be replaced in pairs.

- f) We have calculated and pre-selected the adjustment gasket and adjustment bush, and prepared the corresponding spare parts.
- g) Replace the sealing.

12.5 Install the drive bevel gear assembly

Warning:

If using a press, all warnings and precautions required by the manufacturer of the pressure must be followed to avoid damage to components and personal injury.

- a) Fix the bearing seat on the installation platform.
- b) Apply a layer of lubricating oil evenly to the outer rings of the front and rear bearings.



- c) Use the main cone rear bearing outer ring sleeve to press the rear bearing outer ring into the rear bearing hole of the bearing seat.

Attention:

The outer ring of the bearing should be pressed into place in one step, and a 0.02mm feeler gauge should be used to check the gap between the outer ring of the bearing and the mounting surface of the bearing seat.

When pressing the outer ring of the bearing, contact with the raceway is not allowed.

Take measures to avoid damaging the bearing outer ring hole and bearing installation shoulder.



- d) Change the direction and use the outer ring sleeve of the front bearing of the rear axle main cone to press the outer ring of the front bearing into the front bearing hole of the main cone bearing seat.

Note:

The outer ring of the bearing should be pressed into place in one step, and a 0.02mm feeler gauge should be used to check the gap between the outer ring of the bearing and the mounting surface of the bearing seat.

When pressing the outer ring of the bearing, contact with the raceway is not allowed.

Take measures to avoid damaging the bearing outer ring hole and bearing installation shoulder.



- e) Apply a layer of lubricating oil evenly to the inner ring of the rear bearing, and use the sleeve of the inner ring of the rear bearing of the main bevel gear to press the inner ring of the rear bearing of the drive bevel gear onto the journal of the driving bevel gear.

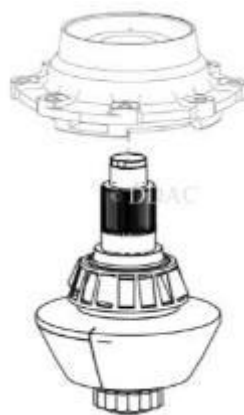
Note:

The inner ring of the bearing should be pressed into place in one step. Use a 0.02mm feeler gauge to check that there is no gap between the large end face of the inner ring of the rear bearing and the installation of the drive bevel gear.

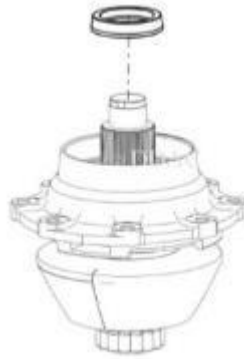
When pressing the inner ring of the bearing, it is not allowed to come into contact with the rolling element and supporter.



- f) Insert the main cone under the bearing seat equipped with the outer ring of the bearing.



- g) Apply a layer of lubricating oil to the busher and install it onto the main cone.



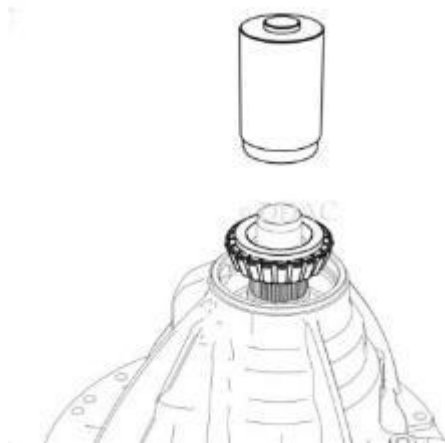
- h) Slowly press in the inner ring of the main cone front bearing using the sleeve of the inner ring of the main cone front bearing.

Note:

After adjusting the busher fitting, it is necessary to choose the appropriate adjusting busher based on the starting torque of the main cone assembly.

Ensure that the pressing is in place and there is no gap in the limit contact area.

When pressing the inner ring of the bearing, it is not allowed to come into contact with the rolling element and supporter.

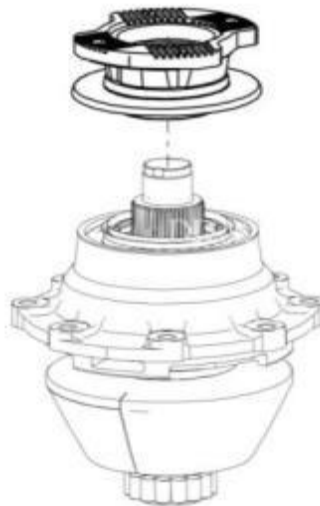


- i) Press the inner ring assembly of the main cone guide bearing.



j) Install the flange assembly

Manually adjust the flange to align it with the main cone spline teeth, and press it into place after keeping the flange end face horizontal.



k) Installing oil seal

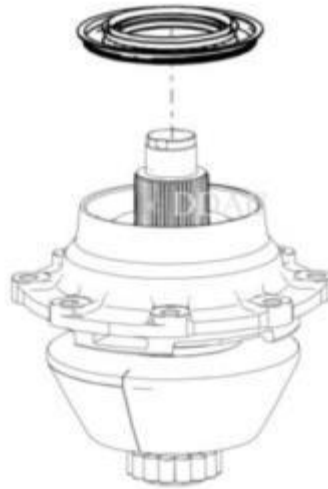
Attention:

It is strictly prohibited to directly hit the oil seal end face and install it askew.

After assembly, check if the oil seal spring has come off. If it does, replace it with a new oil seal and reassemble it.

- Before assembly, apply a layer of lithium grease to the oil seal blade.
- After aligning the oil seal, use the rear axle main shaft oil seal sleeve to press it onto the oil seal position of the round shell cover, and use a copper hammer to tap and install it in place.

- Check and ensure that the oil seal is not warped, and that the inner end face of the oil seal can rotate freely with the inner bearing.



l) Installing guide bearings

Press the outer ring of the guide bearing onto the installation position of the reducer housing.



m) Install the main cone nut

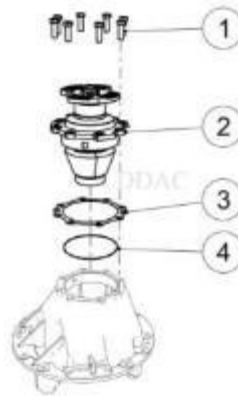
- Apply sealing adhesive to the joint surface between the spline and the flange.



- Tighten the nut with a tightening torque of 1000-1500 N.m, fix the bearing seat, hook one end of the spring scale onto the screw hole of the flange, and measure the pre-tightening force distance at this time. The torque is required to be 1.9-4.4 N.m.



- n) Place the selected adjustment gasket on the installation surface of the reducer housing, align the screw holes, install the outer circle of the main cone bearing seat onto the reducer housing, tighten the bearing seat installation bolts, with a tightening torque of 240~280 N.m.



12.6 To install the inter-wheel differential assembly, refer to the inter-wheel differential assembly.

13. Disassembly and assembly of the vent plug assembly

13.1 Preparation before disassembly

Clean the area around the ventilation plug hose of the axle housing.

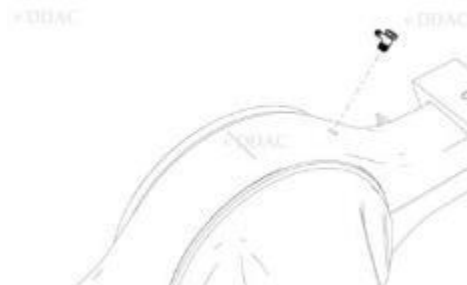
13.2 Remove the ventilation hose

Pinch the clamp (2) and pull off the hose (1) from the hose connector.



13.3 Remove the ventilation plug body

Use an 18 mm open-ended wrench to remove the hose connector.



13.4 Preparation before installation

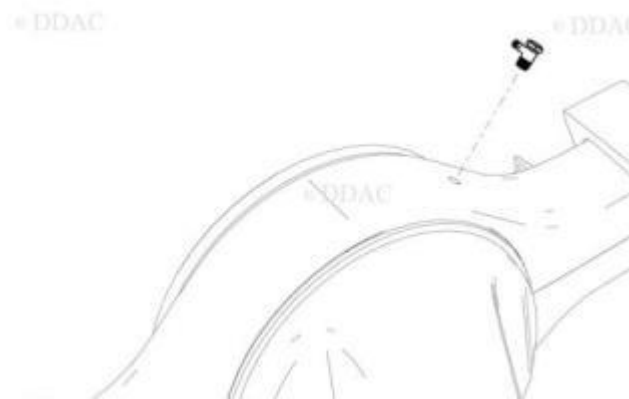
Note:

The ventilation hose is long and can be cleared with compressed air of 0.1Mpa.

- a) Clean the hose and check for cracks and aging.
- b) Check the dredging and ventilation plug body.
- c) Check if there is any oil leakage at the connection between the ventilation plug body and the axle housing.
- d) Clean the residual adhesive on the threads of the ventilation plug body and reapply the thread adhesive.

13.5 Installation steps

- a) Install the ventilation plug body into the axle housing with a torque of 30-50N.m.



- b) Insert the hose (1) onto the connector and install the clamp (2).

Note:

The outlet direction of the hose is facing towards the rear of the vehicle.



13.6 Clean the area around the ventilation plug.

14. Pre-install the cantilever

- 1) Lift the axle body and accessories from the box using a crane and place them on the workbench.
- 2) Thoroughly remove the grease and protective paper from the cantilever installation surface and the axle housing installation surface.
- 3) All bolts must be manually screwed to the bottom of the thread before being removed and cleaned.
- 4) Align the installation holes on the cantilever with the installation holes on the axle housing, and manually screw the cantilever bolts in 5 to 6 threads.
- 5) Use pneumatic tools to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark them with a white marking pen.



Diagram of cantilever installation position

1-Cantilever gasket 2-Cantilever bolt 3-Cantilever

15. Pre-install the rear lateral stabilizer bar mounting bracket

- 1) Install the positioning pin of the rear stabilizer bar bracket into the positioning hole

of the cantilever.

- 2) Fit the positioning hole of the rear lateral stabilizer bar mounting bracket with the positioning pin of the rear stabilizer bar bracket.
- 3) Align the installation holes of the rear lateral stabilizer bar mounting bracket with the installation holes of the cantilever, and screw in the bolts.
- 4) Use pneumatic tools to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark them with a white marking pen.



Fig. Installation position diagram of the rear lateral stabilizer bar mounting bracket plate

1- Hexagon bolt $M16 \times 1.5 \times 50$ standard spring washer 16 2-Rear lateral stabilizer bar mounting bracket

3-Hexagon screw $M16 \times 60$ standard spring washer 16

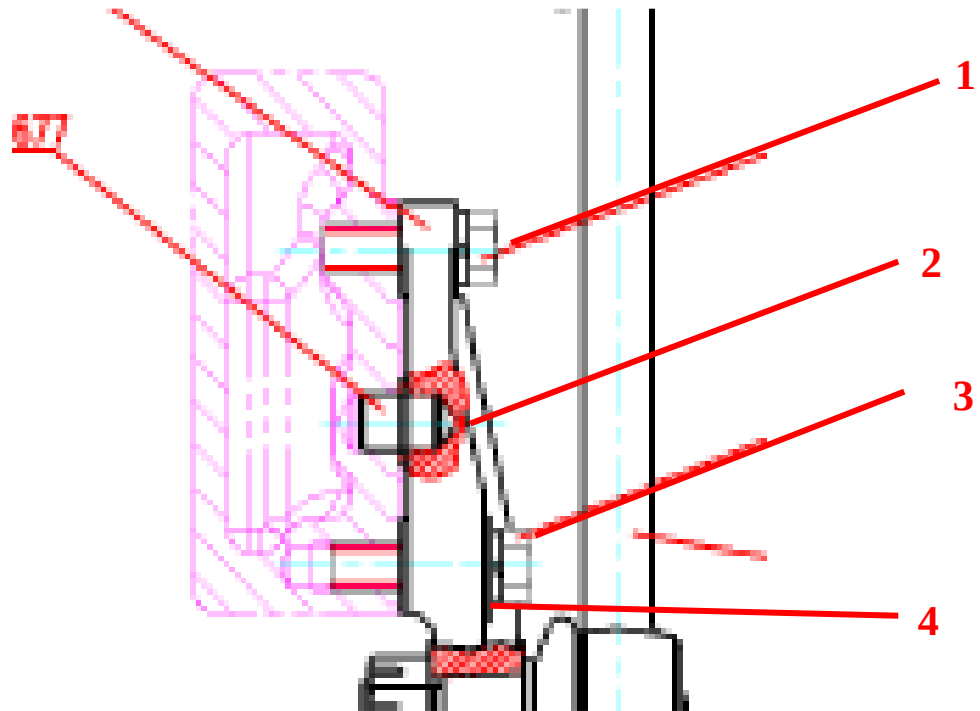


Fig. Installation position diagram of the rear lateral stabilizer bar mounting bracket plate

- 1-Hexagon bolt $M16 \times 1.5 \times 50$ standard spring washer 16 2-Rear stabilizer bar bracket locating pin
3-Hexagon screw $M16 \times 60$ standard spring washer 16 4-Rear lateral stabilizer bar mounting bracket

16. Pre-install the stabilizer bar sling stay

- 1) Pay attention to whether the part number of the stabilizer bar sling stay matches the drawing;
- 2) Thread the installation bolts of the stabilizer bar sling stay through the installation holes of the rear lateral stabilizer bar mounting bracket, tighten the slotted nuts, and use an air gun and socket.
- 3) Thread the split pin through the installation bolt of the stabilizer bar sling stay, and fold one of them outward to the position shown in the picture.



Fig. Position diagram of the stabilizer bar sling stay

1-Stabilizer bar sling stay



Fig. Installation position diagram of stabilizer bar sling stay

1-Rear stabilizer bar bracket positioning pin 2-Split pin 5×60

17. Pre-tighten the upper trailing arm

- 1) Pay attention to whether the part number of the stabilizer bar sling stay matches the drawing.
- 2) Align the installation holes of the upper trailing arm with the installation holes of the axle, install the fixing bolts, and pay attention to the direction of the fixing bolts.
- 3) The fixing bolts do not require a fixed force and can be tightened with an air gun

(using a 27mm socket).



Fig. Position diagram of upper trailing arm

1-Thrust rod bolt 2-Upper trailing arm

18. Pre-install the lower V-shaped thrust rod

- 1) Note that the part number of the thrust rod matches the drawing.
- 2) Align the installation hole of the lower V-shaped thrust rod with the installation hole of the axle, install the fixing bolt, and pay attention to the direction of the fixing bolt.
- 3) The fixing bolts do not require a fixed force and can be tightened with an air gun (using a 27mm socket).



Fig. Position diagram of lower V-shaped thrust rod

1-Lower V-shaped thrust rod 2-Thrust rod bolt

19. Placing the rear suspension

- 1) After the pre-installation of the rear axle is completed, the rear suspension needs to be placed on the shovel board for transportation.



Fig. The rear suspension is placed on the shovel plate

20. Installing the stabilizer bar

- 1) Move the rear lateral stabilizer bar to the desired installation position on the frame and place the front stabilizer bar bushing over the rear stabilizer bar.
- 2) Install the front stabilizer bar clamp so that the inner side of the front lateral stabilizer bar bushing is tightly against the outer side of the front lateral stabilizer bar bushing.
- 3) Adjust the stabilizer bar clamp plate to align the installation hole on the stabilizer bar clamp plate with the installation hole on the frame, and adjust stabilizer bar to make the left and right parts symmetry. Insert the bolts.
- 4) Use the pneumatic pre-tightening bolts without the need for fixed force.



Fig. Installation Position of Stabilizer Bar

1-Stabilizer bar bushing 2-Stabilizer bar clamp plate



Fig. Installation Position of Stabilizer Bar

1-Standard spring washer 16 2-Hexagon bolt M16×1.5×70

21. Install the upper longitudinal thrust rod

- 1) Loosen the pre installed thrust rod bolts to ensure a certain floating clearance.
- 2) By pairing the process lifting trolley with the frame for installation, align the bolt holes of the thrust rod with the position of the frame for installation.
- 3) Before using the fixing bolts, apply Loctite 243 sealant to the threads of the fixing bolts.
- 4) Use a pneumatic tool (using a 27mm socket) to tighten the bolts, use a torque setting tool to tighten the bolts to the specified torque, and mark them with a white marking pen.
- 5) The fixed force between the upper thrust rod and the axle end is $T=440 \text{ N}\cdot\text{m}$.



Fig. Installation position diagram of upper longitudinal thrust rod

1-Hexagon bolt M18×30

22. Install the lower V-shaped thrust rod

- 1) Loosen the pre installed thrust rod bolts to ensure a certain floating clearance.
- 2) Install by pairing the sliding trolley with the frame, aligning the bolt holes of the thrust rod with the position of the frame.
- 3) Before using the fixing bolts, apply Loctite 243 sealant to the threads of the fixing bolts.
- 4) Use a pneumatic tool (using a 27mm socket) to tighten the bolts, use a torque setting tool to tighten the bolts to the specified torque, and mark them with a white marking pen.
- 5) The fixed force between the lower V-shaped thrust rod and the axle end is $T=440 \text{ N}\cdot\text{m}$.



Fig. 7-12 Installation position diagram of lower V-shaped thrust rod

1-Hexagon bolt M18×130



Fig. 7-13 Installation position diagram of lower V-shaped thrust rod

1-Hexagon bolt M18×130 2-I-type hexagon nut M18

23. Install the height valve rod connection bracket

- 1) Align the installation hole of the height valve rod connecting bracket with the axle installation hole, and ensure that there are no impurities in the threaded hole.
- 2) Use pneumatic tools to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark them with a white marking pen.



Fig. Installation position diagram of the height valve pull rod connection bracket

1-Hexagon bolt M8×16 standard spring washer 8 2-Height valve rod connection bracket

24. Installing the altitude valve adjustment rod assembly

- 1) The height valve adjustment rod assembly is installed on the height sensor arm.
- 2) The installation nut comes with the height valve adjustment rod assembly. Tighten the nut to the specified torque, and mark it with a white marker pen.
- 3) Adjust the height valve adjustment rod to the appropriate length.

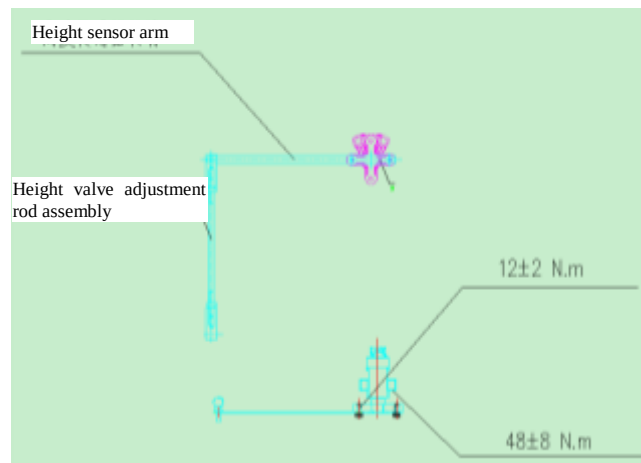


Fig. Installation position diagram of height valve adjustment rod assembly

25. Installing the air spring

- 1) Connect the airbag to the frame and the rear axle suspension airbag support, and install the airbag in the existing holes.
- 2) During installation, pay attention to lifting the girder until the air spring can be inserted.

- 3) Use a pneumatic tool (using a 27mm socket) to tighten the bolts, use a torque setting tool to tighten the bolts to the specified torque, and mark them with a white marking pen.



Fig. Installation position diagram of air spring

1-Hexagon thin nut M18×1.5



Fig. Installation position diagram of air spring

1-Air spring

26. Installation of shock absorber

- 1) The upper end of the shock absorber is connected to the main beam, and the lower

end is connected to the rear axle. Pay attention to the position of the shock absorber gasket.

- 2) Use pneumatic tools to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark them with a white marking pen.



Fig. Installation Position of Shock Absorber

1-Nuts coming with the shock absorber 2-Shock absorber assembly

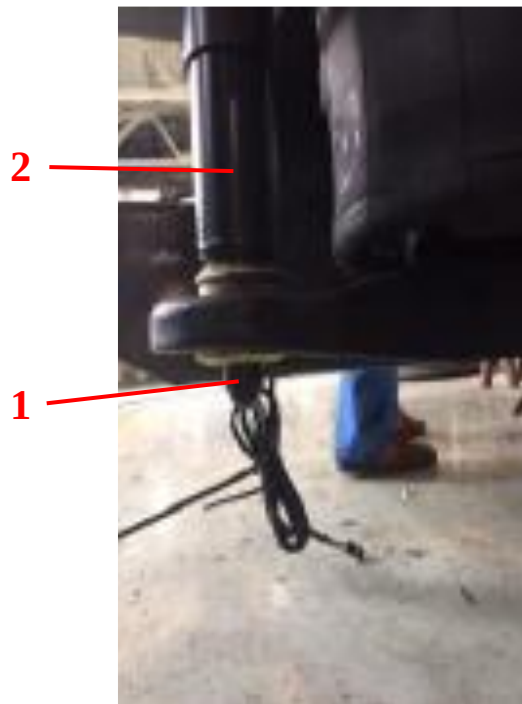


Fig. Installation Position of Shock Absorber

1-Nuts coming with the shock absorber 2-Shock absorber assembly

27. Install the ventilation pipe

- 1) The installation of the ventilation pipe must not interfere with the rear axle.
- 2) The ventilation pipe must not interfere with the moving parts.
- 3) One end of the ventilation pipe is connected to the rear axle, and the other end is inserted into the frame.
- 4) The ventilation pipe is installed on the upper right towing bar of the rear axle.



Fig. Installation position diagram of ventilation pipe

1-Insert into the rear axle 2- $\Phi 8 \times 1$ nylon tube

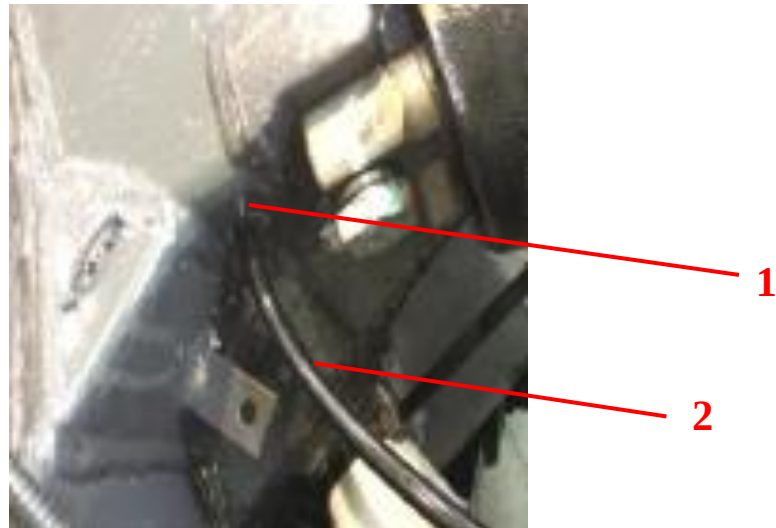


Fig. Installation Position of Shock Absorber

1-Insert into the frame 2- $\Phi 8 \times 1$ nylon tube

28. Connect the lateral stabilizer bar to the stabilizer bar sling stay

- 1) Thread the installation bolts of the stabilizer bar sling stay through the rear lateral

stabilizer bar installation hole, tighten the slotted nut, and use an air gun and sleeve to tighten the slotted nut.

- 2) Thread the split pin through the installation bolt of the rear lateral stabilizer bar, and fold one of them outward to the position shown in the figure.

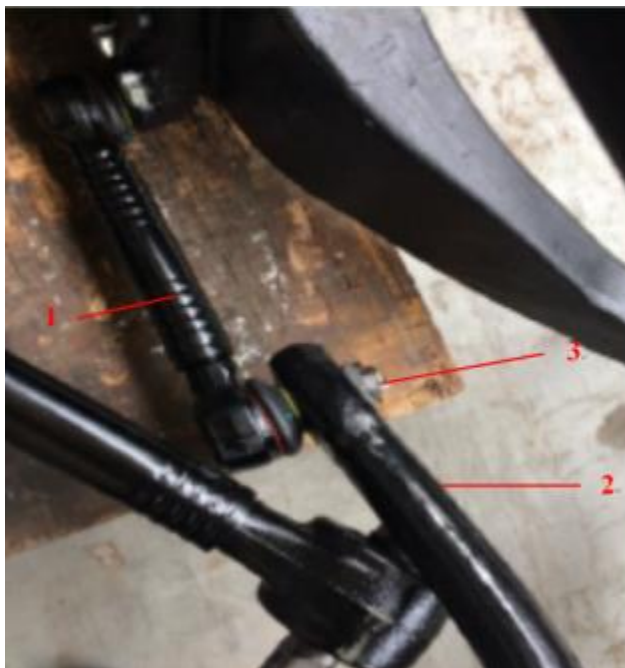


Fig. Installation position diagram of lateral stabilizer bar and the stabilizer bar sling stay

1-Stabilizer bar sling stay 2-Stabilizer bar 3-Split pin 5×60

VII. Component Maintenance Cycle and Methods

1. Daily maintenance

S/N	Maintenance item	Technical requirements	Maintenance cycle	Note
1	Braking system self check	There is no ABS or grinding line fault prompt on the vehicle instrument.	Before departure During driving	
2	Check and test the service braking	The service braking function of the high-speed train is normal	Before departure During moving of the vehicle	
3	Check the wheel bolts and nuts	No missing or looseness	Before departure	

			After service	
4	Check for any oil leakage points on the axle	There is no oil leakage on the joint surface between the half axle and the wheel end, the inner side of the wheel end, the axle housing body, the joint surface between the reducer and the axle housing, the oil filling/draining plug, the main cone, and the bearing seat	Before departure After service	
5	Observe if there is any abnormal high temperature at the wheel end	The surface temperature of the wheel end shall not exceed 100°C	After service	See Note ①

Note ①:

If the temperature exceeds 100 °C during operation for 2-3 consecutive days, further inspection at the service station is required. In some special circumstances, such as continuous braking for long-distance downhill driving, frequent braking for long-term urban operation, parking after long-distance operation, etc., if the temperature exceeds 100 °C in a short period of time (less than 5 hours), it does not affect the service life of the wheel end assembly.

2. Level I maintenance

S/N	Maintenance item	Technical requirements	Recommended cycle	Note
1	Check the brake chamber and braking pipeline	No leakage, firmly fixed	10,000 km/1 month	
2	Check the ventilation plug	No blockage, no missing	10,000 km/1 month	
3	Check ABS, wear indicator wire harness, corrugated sleeve, and wires	The wiring harness is neat and firmly fixed, the corrugated sleeve is not aged or damaged, and the wires are not exposed	10,000 km/1 month	
4	Checking the brake clearance	The brake clearance meets the requirements	10,000 km/1 month	
5	Check the tightening of the half axle bolts and nuts	Torque qualified	10,000 km/1 month	
6	Check and confirm the wheel nuts	Torque qualified	10,000 km/1 month	
7	Check the tightness of the connecting bolts and nuts for brake chamber, chamber bracket, adjustment arm, brake, disk brake, and brake baseplate	The connecting bolts and nuts are complete and free of looseness	10,000 km/1 month	

Thread tightening torque inspection method:

Method I:

Tightening method: Tighten the thread pair in the direction of tightening, applying force steadily and gradually increasing the torque, avoiding impact.

Method II:

Marking method: Mark the relative position of the tightened thread pair, loosen by 1/2 turn and tighten again to the marked position. At this point, the torque value of the inspection tool is the inspection torque. When re tightening, the force should be steady, gradually increasing the torque, avoiding impact, and the alignment deviation of the marks should not exceed $\pm 10^\circ$.

Torque inspection of coated bolts:

When checking the torque of fasteners coated with thread locking adhesive, do not twist the fasteners to prevent damaging the function of the locking adhesive. It is generally recommended to use the tightening method to tighten to the lower limit of 0.9 times the assembly torque. During this process, if the fastener does not rotate relative to the connected part, it is judged that the inspection torque is qualified; If the fastener rotates relative to the connected part, it is judged that the inspection torque is unqualified. The bolt should be unscrewed and cleaned of impurities such as residual glue, then the bolt should be re coated and tightened according to the specified torque.

Torque inspection of taper screw thread:

Tighten it again with its maximum assembly torque, and it is considered qualified when the relative rotating angle of the thread pair does not exceed 1/6 turn; Taper screw threads with sealing requirements are only judged as qualified when the torque inspection is qualified and the sealing requirements are met.

3. Level II maintenance

S/N	Maintenance item	Technical requirements	Recommended cycle	Note
1	Check the oil level of the axle assembly	The oil level of the axle assembly meets the requirements	60,000 km or 6 months	

S/N	Maintenance item	Technical requirements	Recommended cycle	Note
2	Check the tightness of the wheel hub bearings	Flexible rotation without looseness	60,000 km or 6 months	
3	Check if there is any abnormal noise at the wheel end	Wheel end rotation without abnormal noise	120,000 km or 12 months	See Note ①
4	Check the axial clearance of the wheel hub bearing	Axial clearance meets regulations	120,000 km or 12 months	See Note ②
5	Check the wheel hub body	No crack damage	60,000 km or 6 months	
6	Check the thickness of brake friction plate and disk brake	The thickness does not reach the wear limit	60,000 km or 6 months	Only used for disc brake axles
7	Check the tightness of the brake caliper	Firmly installed	60,000 km or 6 months	Only used for disc brake axles
8	Check the brake caliper slip resistance	Meet requirements	60,000 km or 6 months	Only used for disc brake axles
9	Check the appearance of disk brake and friction plate	The friction working surface of the disk brake and friction plate shall be free of oil stains, cracks, loss of roundness, grooves, etc.	60,000 km or 6 months	Only used for disc brake axles
10	Check the brake seal	No cracks or damage	60,000 km or 6 months	
11	Check the brake clearance adjustment mechanism of the brake	Work normally	60,000 km or 6 months	
12	Check the gear ring and sensor, and clean the gear ring and sensor	No damage or foreign objects	60,000 km or 6 months	
13	Replace the lubricating oil of the axle assembly	Refer to the filling method	Refer to the lubricating oil filling cycle	
14	Replace the ordinary wheel end lubricating grease	Refer to the chapter about wheel hub system	Refer to the chapter on axle maintenance grease filling cycle	Simultaneously replace the hub oil seal and half axle oil seal

Note ①:

Noise test:

Support the axle and manually rotate the tire, requiring different speeds for both forward and reverse rotation:

1) The rotation is not smooth and there is obvious noise. It indicates that the bearing is damaged and needs to be replaced. Please refer to the hub system for the replacement of the bearing.

2) The noise increases as the tire rotates. It indicates that the bearing is worn out and needs to be replaced. Please refer to the hub system for the replacement of the bearing.

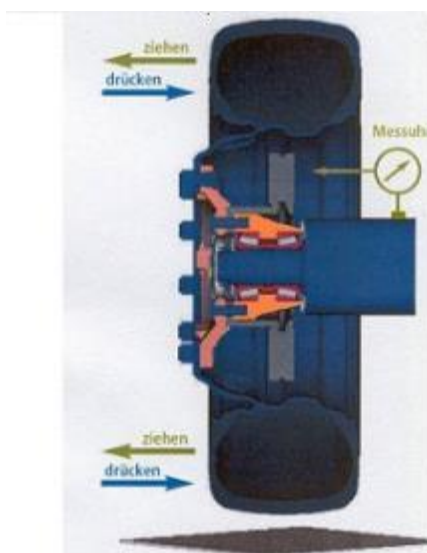
3) Grinding noise is generally generated by the friction of relative moving parts such as the axle wheel end, and does not affect the application of bearings.

Note ②:

Axial clearance test:

Fix the magnetic base dial gauge to the axle housing (or a relatively fixed position), with the pointer cap resting on the disk brake surface (or a clean and smooth machining surface at the wheel end), adjust the gauge to zero position, and measure the axial clearance of the wheel hub bearing by reciprocating the wheel end. (For ease of operation, the wheel can be removed during this inspection)

- 1) When the axial clearance is less than 0.2mm, no additional operation is required.
- 2) When the axial clearance exceeds 0.2mm, please prioritize confirming the status of the wheel hub locking nut. If it is intact, it can be removed and re tightened according to the specified torque. Check again according to the above method. If the axial clearance still exceeds 0.2mm, the bearing needs to be replaced. For the replacement of the bearing, please refer to the wheel hub system.



4. Lubricating grease replacement cycle and requirements

1) Lubricating grease filling location and requirements

Filling location	Grease filling requirements	Diagram
1. Air chamber	Until grease overflows	

bracket grease nozzle	from the end face of the bushing	
2. Bottom plate camshaft grease nozzle	Until grease overflows from the end face of the bushing	
3. Adjusting arm grease nozzle	Add until a small amount of grease overflows from the grease nozzle	
4. Camshaft bracket camshaft grease nozzle	Add until a small amount of grease overflows from the bushing	
5. Wheel hub grease change	Refer to the chapter of wheel hub system (only for grease lubricated wheel ends)	Refer to the chapter of wheel hub system (only for grease lubricated wheel ends)

Note:

1. Among them, 1, 2, 3, and 4 are only for the drum S-cam brakes.

2) Lubricating grease filling cycle

Corresponding vehicle usage	Regular grease lubricated wheel end replacement cycle		Bottom plate or camshaft bracket (air chamber bracket), adjusting arm grease filling cycle	
	Lubricating grease	Replacement cycle	Lubricating grease	Replacement cycle
Highway passenger transportation and tourism	DDAC-B	60,000 kilometers/6 months	DDAC-B	20,000 kilometers/2 months
Urban public transportation	DDAC-B	60,000 kilometers/6 months	DDAC-B	20,000 kilometers/2 months
School buses, commuters, and shuttle buses	DDAC-B	60,000 kilometers/6 months	DDAC-B	20,000 kilometers/2 months

Note:

- The maintenance-free grease lubrication wheel end does not require active and regular replacement of lubricating grease.
- The grease grade at the wheel end is lower than DDAC-B, and the replacement cycle is halved.

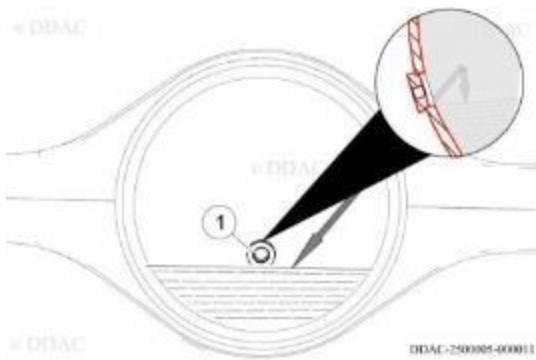
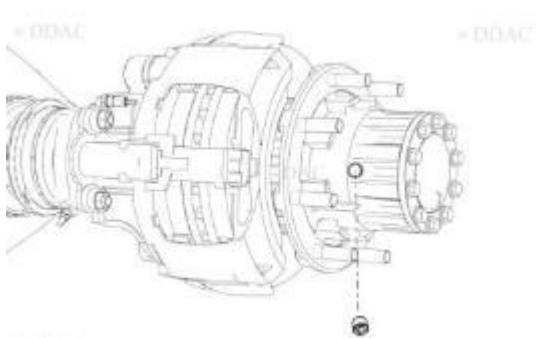
3. Other grease areas can be lubricated with DDAC-A grade grease, with the same filling cycle.

3) Recommended lubricating grease products

DDAC number	Name
DDAC-A	General lithium base grease for automobile
DDAC-B	Extreme pressure compound lithium base grease
DDAC-C	High temperature and long-life grease

5. Lubricating oil replacement cycle and requirements

1) Lubricating oil filling location and requirements

Filling location	Filling requirements	Diagram
Axle assembly oil filling hole (1)	Refer to "Adding Lubricating Oil"	
Wheel hub end cover oil filling hole	Refer to the chapter on adding lubricating oil (only for oil lubricated wheel ends)	

2) Lubricating oil filling cycle

Refueling area	Applicable vehicle models	Name	Oil grade	First maintenance oil change cycle (whichever comes first)	Regular maintenance and oil change interval (whichever comes first)	Note
Main reducer	Urban transit bus (Note: ①)	Heavy-load gear oil	API GL-5 (Select lubricating oil with different viscosity and temperature resistance according to seasonal, regional, environmental temperature and other factors (Note ②))	5,000 kilometers/3 months	60,000 kilometers/6 months	
	Tourist bus, intercity bus			5,000 kilometers/3 months	60,000 kilometers/6 months	
	School buses, commuters, and shuttle buses			5,000 kilometers/6 months	60,000 kilometers/12 months	
	Urban transit bus (Note: ①)	High-performance gear oil	GL-5+ (Select lubricating oils with different viscosities and temperature resistance according to seasonal, regional, environmental temperature and other factors) (Note ②))	5,000 kilometers/3 months or free of first maintenance oil change (note ④)	100,000 kilometers/12 months	
	Tourist buses, intercity buses, etc.			5,000 kilometers/3 months or free of first maintenance oil change (note ④)	100,000 kilometers/12 months	
	All passenger vehicles	Long range gear oil	SAE J2360 (Select lubricating oil with different viscosity and temperature resistance according to the seasonal, regional, environmental temperature and other factors (Note ③))	5,000 kilometers/3 months or free of first maintenance oil change (note ④)	Over 100,000 kilometers/12 months	
		Ultra long life gear oil	SAE J2360 (Select lubricating oil with different	First maintenance-free oil change (note ④)	300,000 kilometers/36 months	

			viscosity and temperature resistance according to the seasonal, regional, environmental temperature and other factors (Note ③)			
Wheel hub	Heavy-load gear oil		API GL-5 or replace the same type of oil for the rear axle assembly		100,000 kilometers/12 months or change the oil with the rear axle and check the wheel end at the same time	Only for maintenance-free oil lubrication
			API GL-5 or replace the same type of oil for the rear axle assembly		50,000 kilometers/6 months or change oil with the rear axle, and inspect the wheel end at the same time	Only for ordinary oil lubrication

Note ①:

For other unspecified vehicle models, please refer to city buses

Note ②:

Tropical region ($\geq 40^{\circ}\text{C}$): 85W/140

Normal temperature area ($-15^{\circ}\text{C}\sim 40^{\circ}\text{C}$): 85W/90

($-30^{\circ}\text{C}\sim 40^{\circ}\text{C}$): 80W/90

Extremely cold regions ($< -30^{\circ}\text{C}$): 75W/90

Note ③:

It means to meet the SAE J2360 level standard, with priority given to the recommended oil products. If the sales area of the vehicle is overseas, recommended oil products cannot be selected. Please choose the recommended oil products based on the location of the vehicle, or

choose lubricating oil certified by DANA Global Oil Company. All oil products must meet the technical indexes of long-life gear oil.

Note ④:

The first maintenance-free oil change axle refers to some axle types confirmed by the customer through a technical agreement with DDAC.

3) Recommendation for lubricating oil products

Name	Quality level
Heavy-load gear oil	GL-5
High-performance gear oil	GL-5+
Long range gear oil	SAE J2360

Notes: The performance index of the oil must meet the technical requirements for lubricating oil used in the axle.

Chapter IV Steering System Maintenance Manual

I. Component Introduction

1. Component functions

The power steering system is a device that uses the power of the engine to assist the driver in steering control. It converts the energy of the engine into hydraulic, electrical, or pneumatic energy, and then converts hydraulic, electrical, or pneumatic energy into mechanical energy to act on the steering wheel to assist the driver in steering, so it should be called a power assisted steering system. It was initially applied to vehicles primarily to reduce the steering force exerted by drivers on the steering wheel. So far, pneumatic power steering has been phased out, and the most widely use is hydraulic power steering.

EPS stands for Electric Power Steering in English, which means that the electric power steering system is directly provided with steering assistance by the electric power steering machine, eliminating the necessary power steering oil pump, hose, hydraulic oil, conveyor belt, and pulley installed on the engine for the hydraulic power steering system. This not only saves energy but also protects the environment. In addition, it also has the characteristics of simple adjustment, flexible assembly, and being able to provide steering assistance in various situations. It is precisely with these advantages that the electric power steering system, as a new steering technology, will challenge the well-known hydraulic steering system with a history of over 50 years.

According to the different installation positions of the power assist motor, the EPS system can be divided into three types: steering shaft power assist, gear power assist, and rack power assist. The electric motor of the steering shaft assisted EPS is fixed on one side of the steering shaft and connected to the steering shaft through a retarding mechanism, directly driving the steering shaft power steering. The electric motor and retarding mechanism of the gear assisted EPS are connected to the small gear, directly driving the gear power steering. The electric motor and retarding mechanism of the rack assisted EPS directly drive the rack

to provide power.

When the driver controls the steering wheel for steering, the torque sensor detects the direction and torque of the steering wheel, and sends the voltage signal to the electronic control unit. The electronic control unit sends instructions to the electric motor controller based on the torque voltage signal, rotation direction, and vehicle speed signal detected by the torque sensor, causing the electric motor to output steering assistance torque of corresponding size and direction, thereby generating auxiliary power. When the vehicle does not turn, the electronic control unit does not send instructions to the electric motor controller, and the electric motor does not work.

2. Component parameters

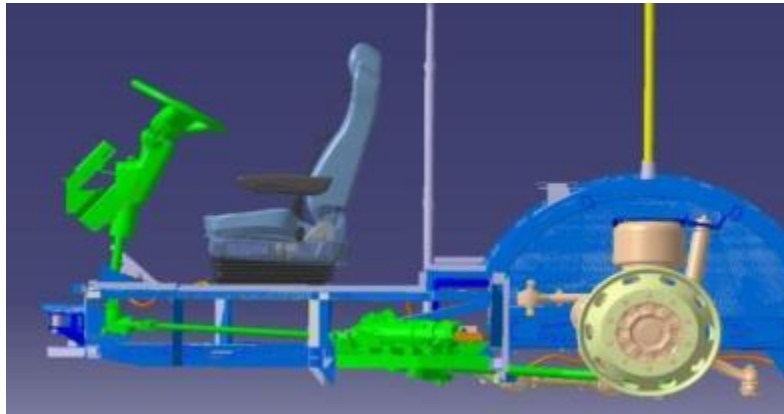
Electric power steering pump assembly		
Part number	C00407083	
Model	ZYB-1917R/2159WA-3K	
Displacement (ml/r)	12	
Volume efficiency (%)	$\geq 80\%$	
Control flow (L/min)	1500 r/min, unloaded	17 ± 1.5
	1500 r/min, 16.2MPa	≥ 14
Maximum pressure (MPa)	19 ± 0.3	
Oil inlet	M27×1.5-6H depth 16mm	
Oil outlet	M18×1.5-6H depth 14mm	
Rotation direction (viewed from the end of the shaft)	Clockwise (right-handed rotation)	

High voltage module motor parameters (400~700VDC)	
Model	EHPS-43XAZHGT01-010
Motor type	Permanent magnet synchronous
Range of revolving speed (r/min)	600~1800
Rated speed (r/min)	1500
Induced voltage at rated speed (VAC)	196

Rated frequency (Hz)	100
Maximum output power (kw)	7.5
Number of motor poles	8 poles (4 pairs of poles)
Working system	S2~3min
Rated voltage (VAC)	353
Rated phase current (A)	8
Peak phase current (A)	20
Line-to-line resistance (Ω , at 20°C)	2.02
Rated power (kw)	3
D-axis inductance (mH)	11.73
Q-axis inductance (mH)	23.46
Rated torque (N.m)	19.1
Peak torque (N.m)	48
Rated efficiency (%)	$\geq 92\%$
Insulation level	H-level
Protection level	IP67
Cooling method	Natural cooling
Working ambient temperature	-40°C~+85°C

Low-voltage module motor parameters (24VDC)	
Motor type	Permanent magnet synchronous
Rated speed (r/min)	1200
Induced voltage at rated speed (VAC)	10
Rated frequency (Hz)	80
Peak power (KW)	2
Number of motor poles	8 poles (4 pairs of poles)
Working system	S2~3min
Peak phase current (A)	120
Line-to-line resistance (Ω , at 20°C)	26.6
D-axis inductance (mH)	0.048
Q-axis inductance (mH)	0.107
Peak torque (N.m)	13
Working ambient temperature	-40°C~+85°C

3. Component structure



4. Component principle

The basic principle of EPS is that the torque sensor is connected to the steering shaft (small gear shaft). When the steering shaft rotates, the torque sensor begins to work, converting the relative rotational angular displacement generated by the input and output shafts under the action of the torsion bar into an electrical signal to the ECU. The ECU determines the direction of rotation of the motor and the magnitude of the assist current based on the signals from the speed sensor and torque sensor, thereby completing real-time control of the power steering. Therefore, it can easily provide different assistance effects for the electric motor at different speeds, ensuring that the vehicle is lightweight and flexible when turning at low speeds and stable and reliable when turning at high speeds.

The electric power steering system has developed on the basis of traditional mechanical steering systems. It uses the power generated by the electric motor to assist the driver in steering operations. The system mainly consists of three parts: signal sensing device (including torque sensor, angle sensor, and speed sensor), steering power mechanism (motor, clutch, deceleration transmission mechanism), and electronic control device. The electric motor only operates when assistance is needed. When the driver controls the steering wheel, the torque angle sensor generates a corresponding voltage signal based on the input torque and steering angle. The vehicle speed sensor detects the vehicle speed signal, and the control unit gives instructions to control the operation of the electric motor based on the voltage and vehicle speed signals, thereby generating the required steering assistance.

II. Special Tools

S/N	Tool type
1	Pneumatic gun
2	13mm socket
3	18mm socket
4	24mm socket
5	24 N.m torque wrench
6	85 N.m torque wrench
7	290 N.m torque wrench
8	520 N.m torque wrench
9	700 N.m torque wrench

III. Maintenance Data

Explanation of tightening torque for steering gear connecting bolts:

Model	Item	Tightening torque (N.m)
8095 type	Install connecting bolts	$520 \pm 10 \%$
	Vertical arm lock nut	$700 \pm 10 \%$
	Steering limit bolt	12(+3)

IV. Circuit Diagram

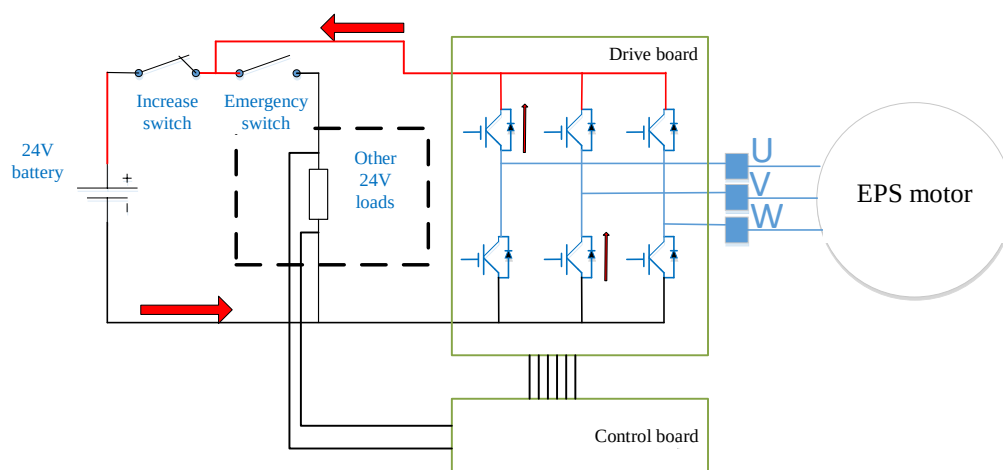


Fig. Schematic diagram of Topology

V. Fault Diagnosis

Table 6-1 Fault Diagnosis Analysis

Fault type	Causes	Troubleshooting method
The pump	Oil viscosity is high	Replace the recommended brand of oil

does not suction oil or the suction is insufficient	The oil level in the tank is too low	Refuel to the specified oil level
	Motor rotates reversely	Check wiring and correct steering
The pressure does not meet the requirements	The steady flow valve is stuck in the fully open state, causing internal flow leakage and insufficient pressure	Disassemble the valve, clean the valve core and valve hole, and remove any dirt
	Stable flow valve wear and increased clearance	Replace the corresponding wear parts
	Pressure regulating valve leakage, causing insufficient pressure	Clean the pressure valve seat and valve core
	Damping hole blocked	Clean and remove the dirt
	Bent and pressed bypass flow path, and the pressure cannot be increased	Check if the oil circuit is bent and pressed and if the pressure oil flows out of the actuator bypass
Noise	The filter element is blocked and the oil suction is not smooth	Check if the filter element is blocked. If it is, repair or replace the filter element
	Gas enters the hydraulic oil inlet system	Check if there is any air leakage in the oil inlet connection, and repair it if there is any
	The inlet and outlet oil pipes are too thin and too long, and there are too many bends	Bold and shorten oil pipes, reduce bends
	The motor fan blades are loose or attached with foreign objects	Re-fix the fan blades or remove the foreign objects from the fan blades
	Loose screws on the motor fan protector	Use a cross head screwdriver to secure the screws again

1. Technical parameters:

- 1) Connect the grounding wire of the frequency converter to the grounding wire of the steering pump motor.
- 2) Personnel are not allowed to touch the steering pump during operation.
- 3) When installing the steering pump, it is important to ensure that there is no continuity between the steering pump head, motor, and mounting bracket, otherwise the steering pump cannot achieve double insulation.
- 4) Newly installed products require hydraulic oil replacement every 5000 kilometers, and the oil tank and pipeline system should be cleaned to remove dirt and debris. When changing

oil, the oil tank, oil filter, and pipeline should be carefully cleaned, and all fixing screws should be checked.

- 5) When bubbles appear in the oil tank, please shake it left and right to shorten the time for bubbles to be discharged.
- 6) The hydraulic oil should be replaced every 20,000 kilometers of driving, and the pipelines should be cleaned to keep the system clean.
- 7) The oil tank must be sealed well and dirt is not allowed to seep in. Regularly inspect the oil tank and replace the filter element.
- 8) Be careful not to leave the steering wheel in the extreme position for more than 10 seconds, otherwise the temperature of the steering pump will rise sharply, which can easily cause damage to the pump.
- 9) Regularly check the oil level in the oil tank and replace the filter element (with a filtration accuracy of 25 μ m).
- 10) When the steering pump makes abnormal noises, check whether the oil level in the oil tank is too low, whether the filter screen is blocked, and whether the oil pipe joints are loose.
- 11) The oil flow rate in the inlet pipe is generally between 0.5 and 14.5m/s, and the flow rate in the outlet pipe is generally 5m/s. The recommended choices are as follows:

Steering pump flow rate	The minimum diameter of the oil inlet pipeline	The minimum diameter of the oil outlet pipeline
8L/min	$\Phi 10.6$	$\Phi 6.6$
11.5L/min	$\Phi 12.8$	$\Phi 7.8$
13L/min	$\Phi 13.6$	$\Phi 8.3$
15L/min	$\Phi 14.6$	$\Phi 8.9$
16L/min	$\Phi 15$	$\Phi 9.2$
20L/min	$\Phi 16$	$\Phi 10.3$

VI. Method of Disassembly and Assembly

1. Install the electric hydraulic power motor oil pump assembly

- 1) Install the electric hydraulic power motor oil pump assembly according to the installation position dimensions on the drawing, and tighten it with 4 sets of M12 bolt sets. The bolt torque is 85 ± 15 N, and mark it with a marking pen after

tightening.

- 2) According to the installation position dimensions on the drawing, install the straight reducer joint body on the oil outlet of the motor oil pump, and seal it with a combination sealing gasket 18. Connect a sleeve type combination right angle pipe joint G14 to the straight reducer joint body.
- 3) According to the installation position dimensions on the drawing, connect the bamboo joint of the oil pump return pipe to the oil pump with a hollow bolt and seal it with a sealing gasket.
- 4) Check whether each joint is pre- tightened in place and whether the installation position meets the drawing requirements.

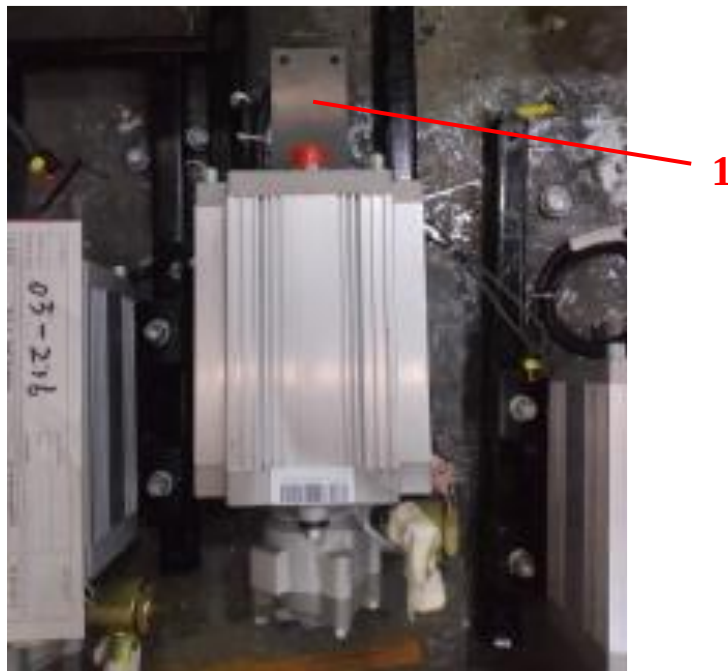


Fig. Electric hydraulic power assisted motor oil pump assembly

1. Installation during bracket pre-installation

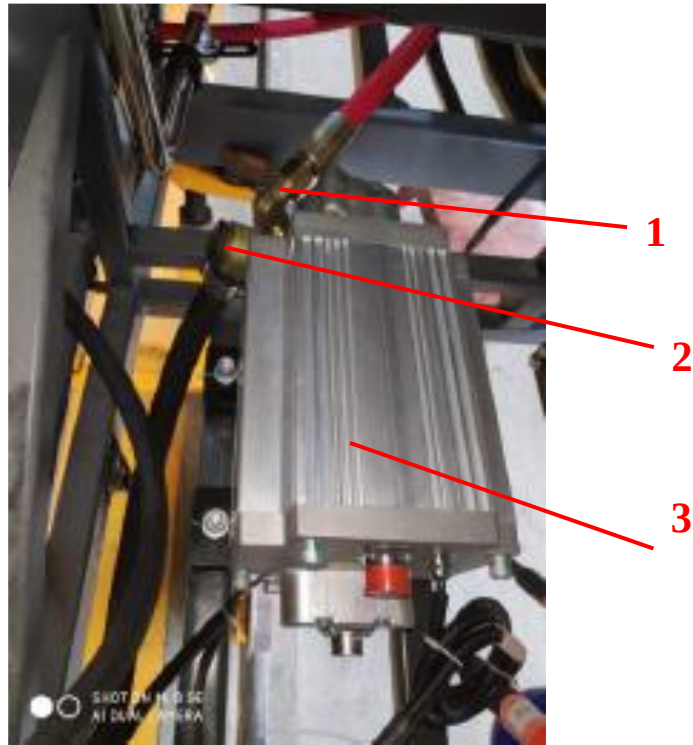


Fig. Electric hydraulic power assisted motor oil pump assembly

1. The interface between the high-pressure oil pipe and the oil pump is connected by a straight reducing joint body
2. The oil pipe at the inlet is connected to a bamboo joint ring joint, a hollow bolt (oil pump inlet), a combination sealing gasket 27, and a motor port (return port)
3. For installation of power steering pump, the mounting bracket and the main beam should be fixed with hexagonal head bolts $M12 \times 30$

2. Install the power steering oil tank assembly

- 1) Install the power steering oil tank assembly according to the installation position dimensions on the drawing. Fix the oil tank onto the oil tank bracket with 4 sets of M8 bolts, with a torque of $24 \pm 4 \text{ N.m}$.
- 2) Check whether each joint is pre- tightened in place and whether the installation position meets the drawing requirements.

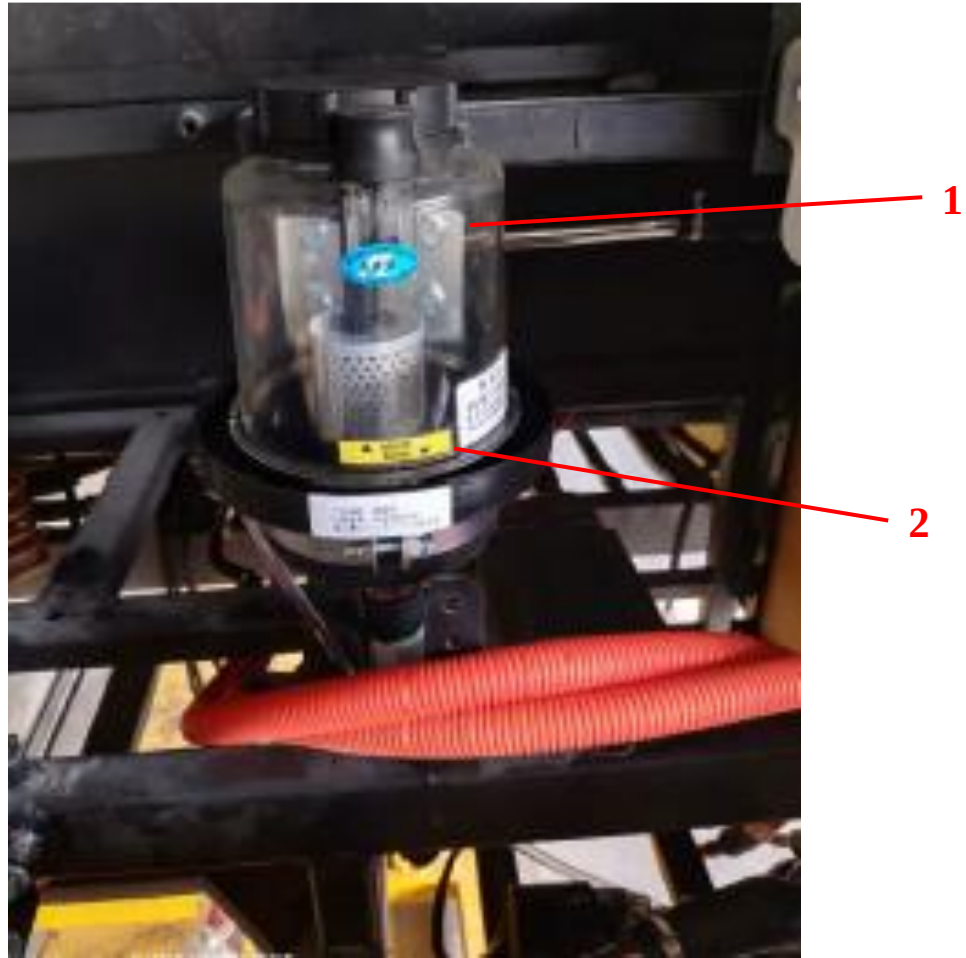


Fig. Power steering oil tank assembly

1-Install the power steering oil tank and fix it to the oil tank bracket with a hexagon bolt M8×25 (hexagon bolt M8×25)

2-The scale mark of the oil tank faces outward, as shown in the figure

3. Install the oil pump inlet and outlet pipes

- 1) According to the power steering pipeline drawing, install the oil pump inlet pipe in place. Connect one end of the pipe to the oil pot, lock the connection part with a pipe clamp, and connect the other end to a bamboo joint and the oil pump inlet.
- 2) According to the power steering pipeline drawing, install the oil pump outlet pipe in place. One end of the oil pipe is connected to the oil pot, and the connection is locked with a pipe clamp. The other end is connected to the combination oil pipe, and the middle part is connected with a sleeve type straight pipe joint.
- 3) The oil inlet pipe and oil pump outlet pipe are fixed with clamps at the bracket as

shown in the figure to prevent shaking.

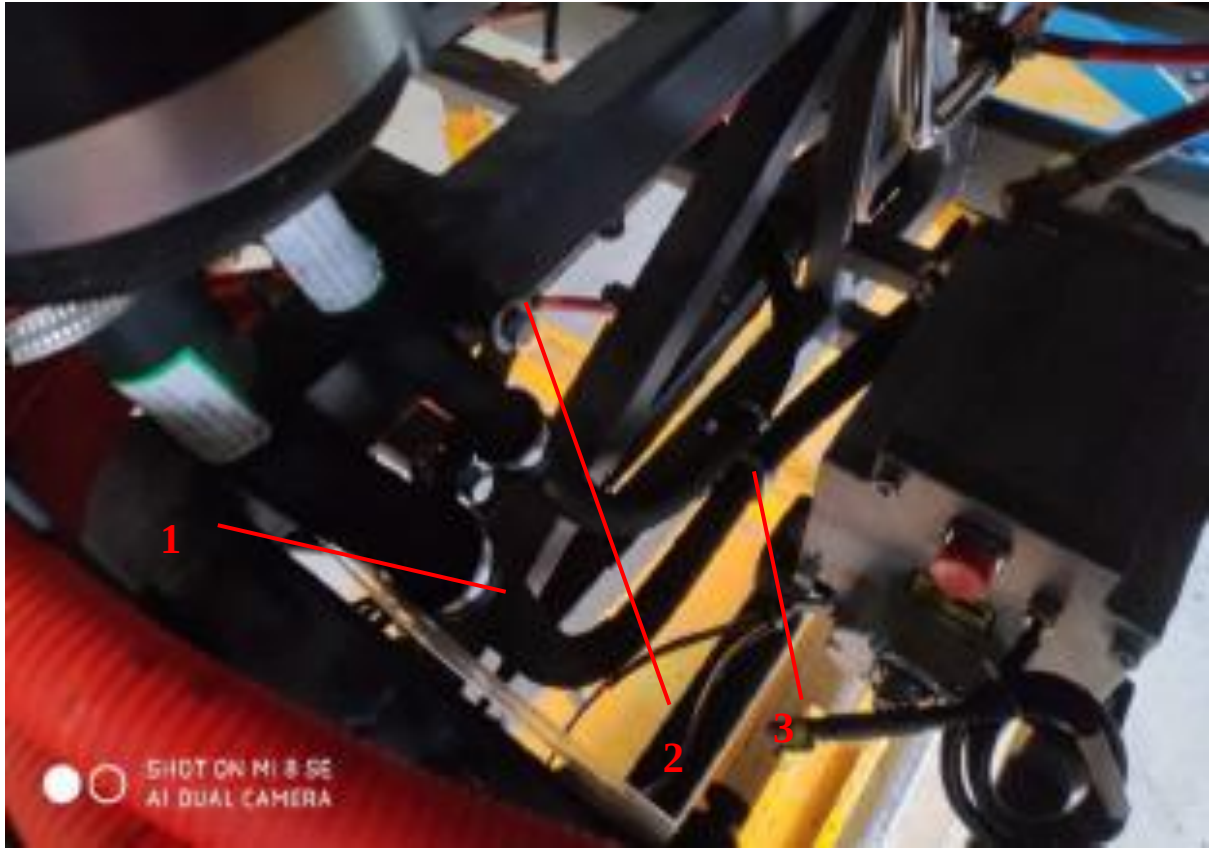


Fig. Oil pump inlet and outlet pipes

1. Lock the connection between the oil pump inlet pipe and the joint with a pipe clamp.
2. Install a three-eye flat bracket here to fix the oil pipe
3. Use pipe clamps to lock the connection between the oil pump outlet hose and the joint

4. Install oil and gas pipes, high and low pressure lines

- 1) Fix the high and low pressure oil pipes in the direction shown in the drawing, along the fixing groove on the far right side of the frame, and fix them with D-shaped pipe clamps at the protrusion
- 2) Place padding and leather wrapping on the oil pipe at the contact point with the frame
- 3) When the oil pipe, gas pipe, and high and low pressure lines pass through the same hole, they need to be wrapped in leather and tied tightly to avoid contact
- 4) Check whether each joint is pre- tightened in place and whether the installation position meets the drawing requirements.



Fig. The fixed direction of the oil pipe at the rear of the frame

1. The direction of the power steering oil pipe at the rear of the frame should be fixed with D-shaped pipe clamps every 400mm or less

5. Connect the steering gear assembly and steering gear bracket

- 1) Align the installation holes of the steering gear assembly with the installation holes on the steering gear bracket, paying attention to the installation direction of the steering gear assembly.
- 2) After applying Loctite 243 thread locking agent to the steering gear bolts, connect the steering bracket and steering gear assembly.
- 3) Use pneumatic tools and sleeves to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque $T=520 \pm 52$ N.m, and mark with a white marking pen.

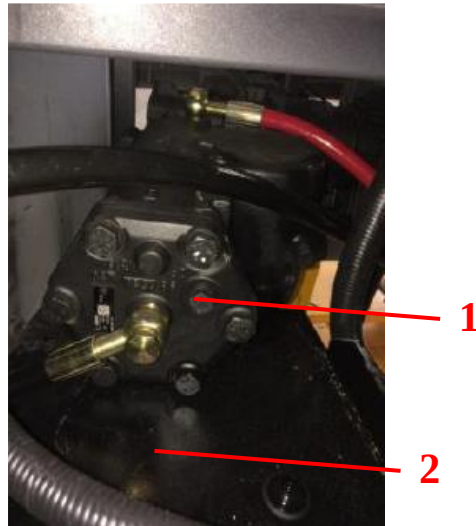


Fig. Installation position diagram of power steering gear

1. Power steering gear 2. Steering gear bracket

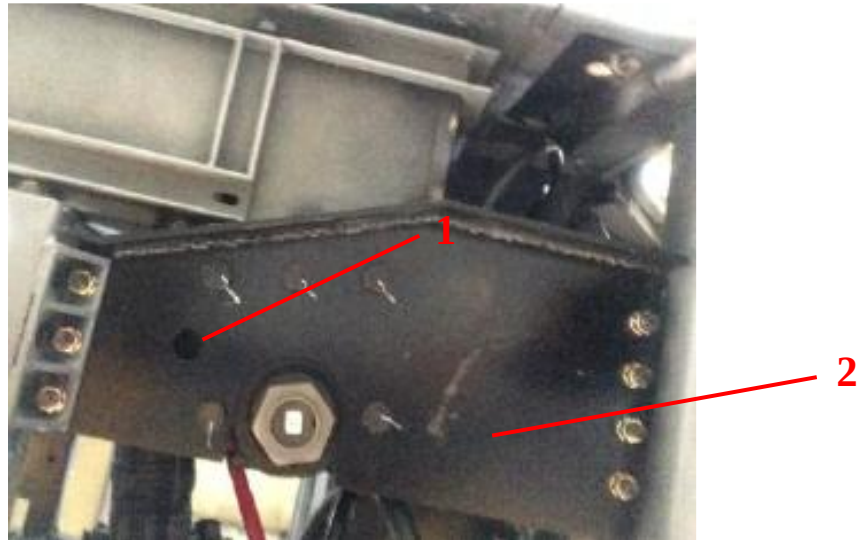


Fig. Diagram of the installation position of the steering machine

1. Steering gear bolt 2. Steering gear bracket

6. Connect the steering gear bracket to the frame

- 1) Place the steering gear bracket with the installed steering gear assembly on the process lifting trolley.
- 2) Use a process trolley to lift the steering gear bracket and align the mounting holes of the steering gear bracket with the mounting holes on the frame.
- 3) The bolt passes through the installation hole from top to bottom.
- 4) Use pneumatic tools and sleeves to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque ($T=290 \pm 45 \text{ N.m}$), and mark with a white

marking pen.

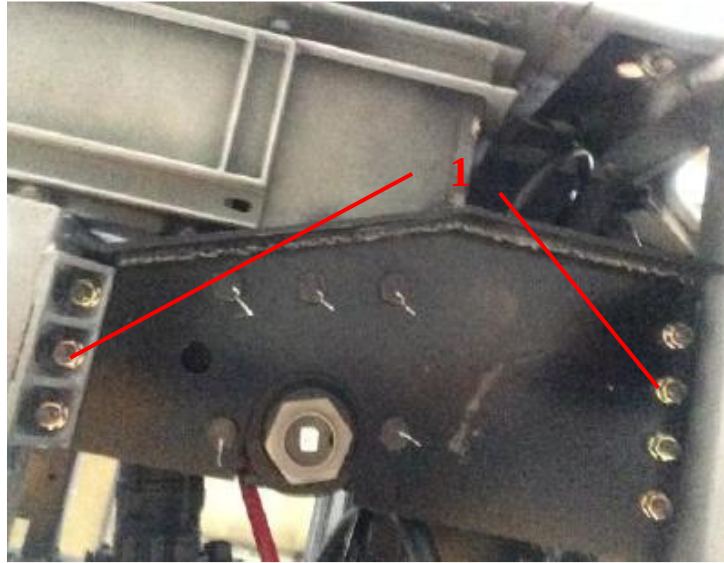


Fig. Installation position diagram of steering gear bracket

1-Hexagon bolt M16×1.5×45 Schbiler hexagon flange locknut M16×1.5

7. Install the steering rocker arm

- 1) Before installation, it is necessary to install a spline positioning tooling at the input shaft of the steering gear.
- 2) The installation of the steering wheel rocker arm should correspond to the engraved line on the output shaft of the steering gear, and the fixing nut should be tightened.
- 3) Use pneumatic tools to tighten the bolts, and use a torque setting tool to tighten the bolts to the specified torque ($T=700 \pm 70\text{N.m}$), marking with a white marker pen.
- 4) Tighten the bolts to the specified torque and secure the steering rocker arm with a chisel.
- 5) After installation, do not remove the spline positioning tooling until the straight rod is installed.



Fig. Installation Position of Steering Rocker Arm

1. After setting the force, use a chisel to secure the vertical arm.
2. Steering rocker arm

8. Install the angle drive

- 1) Align the installation holes of the angle drive with the installation holes on the frame, pay attention to the installation direction of the angle drive, and let the bolts pass through the installation holes from top to bottom.
- 2) Use pneumatic tools to tighten the bolts, and use a torque setting tool to tighten the bolts to the specified torque ($T=85\pm15$ N.m), marking with a white marking pen.
- 3) Connect the steering transmission shaft assembly to the angle transmission and steering gear assembly, paying attention to the front and rear positions.
- 4) Ensure that the steering gear is correctly aligned and the scale on the input shaft dust cover is aligned with the scale on the housing when the vehicle is driving straight.



Fig. Installation position diagram of angle transmission

1-Hexagon bolt M12×45 nut M12 standard spring washer 12 2-Steering rocker arm



Fig. Steering transmission shaft assembly

1-Steering transmission shaft assembly



Fig. Steering gear assembly

1-Ensure that the steering gear is correctly aligned when the vehicle is driving straight

9. Install the steering column system assembly

- 1) Align the installation holes of the steering column system assembly with the installation holes on the driver's console.
- 2) Thread the bolt through the installation hole from the inside out and tighten the nut.
- 3) Use pneumatic tools to tighten the bolts, and use a torque setting tool to tighten the bolts to the specified torque ($T=24\pm4\text{N.m}$), marking with a white marker pen.

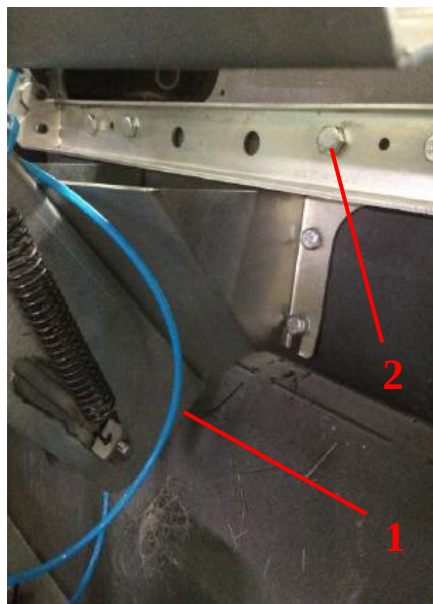


Fig. Steering Column System Assembly

1-Steering column system assembly 2-I-type hexagon nut M8 standard spring washer 8 flat washer 8

10. Install the straight rod assembly

- 1) Before installation, adjust the length of the straight rod to the design theoretical size.
- 2) One end of the straight rod is connected to the steering gear rocker arm, and the other end is connected to the front axle.
- 3) If the cotter pin cannot pass through the flowering nut, the nut needs to be tightened until the cotter pin passes through. The cotter pin needs to be opened at both ends to provide safety.
- 4) The tightening torque of the straight rod lock bolt M12×1.5 is 85 ± 15 N.m, and the opening of the clamp is aligned with the opening of the straight rod.
- 5) The locking torque of the straight rod ball joint nut is 280 ± 30 N.m.

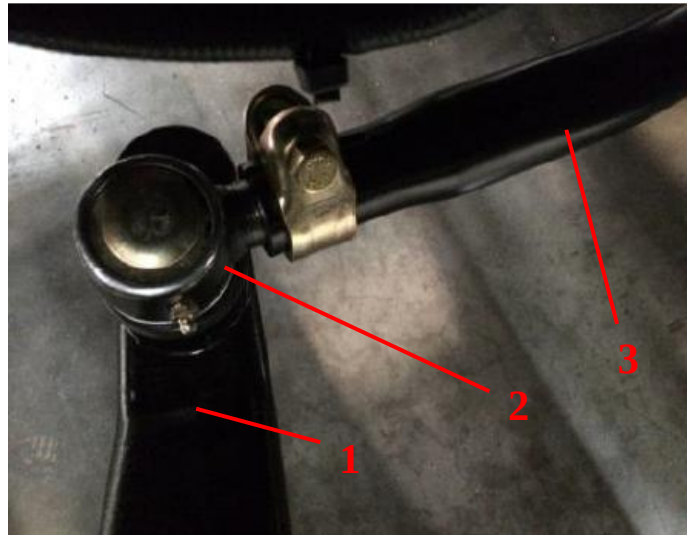


Fig. Connection between the straight rod assembly and the steering gear rocker arm

1. Steering gear rocker arm 2. Connection between straight rod assembly and steering gear rocker arm 3.

Straight rod assembly



Fig. Connecting the straight rod assembly to the front axle

1-Connect the straight rod assembly to the front axle

VII. Component Maintenance Cycle

Configuration	Content	Configuration	Interval	Quantity	Nature of work
Bosch integrated power steering gear 8095	Power steering filter element	Sunwin accessory	First maintenance 5,000 Km/1 Month	1P	Replacement
			60,000 Km / 12 Months	1P	
Steering drag link	Ball lubrication	2# Lithium based grease	First maintenance 5,000 Km/1 Month	/	Addition
			7,500 Km / 1.5 Months	/	
Quanxing precision hydraulic steering power pump	Appearance	/	7,500 Km / 1.5 Months	/	Cleaning
	Oil inlet and outlet pipelines	/	7,500 Km / 1.5 Months	/	Check/tightening
	Steering power oil filtration	/	First maintenance 5,000 Km/1 Month	1P	Replacement
			60,000 Km / 12 Months	1P	Replacement
	Fixed bracket	/	7,500 Km / 1.5 Months	/	Check/tightening
	High and low voltage wiring harnesses and	/	7,500 Km / 1.5 Months	/	Check/tightening

	connectors				
	Power steering fluid	ATF220	150,000 Km / 36 Months	5L	Replacement
			When repairing the steering gear only	5L	Replacement
	Insulation resistance value of steering motor	/	60,000 Km / 12 Months	/	Detection

Chapter V Drive Shaft Maintenance Manual

I. Component Introduction

1. Component functions

The drive shaft is a high-speed, less supported rotating body, so its dynamic balance is crucial. Generally, the drive shaft undergoes a dynamic balance test before leaving the factory and has been adjusted on the balance machine. For a front engine rear wheel drive, it transmits the rotation of the transmission to the shaft of the main reducer, which can be several joints, and the joints can be connected by a universal joint.

2. Component structure

The structure of the drive shaft components is shown in the following figure

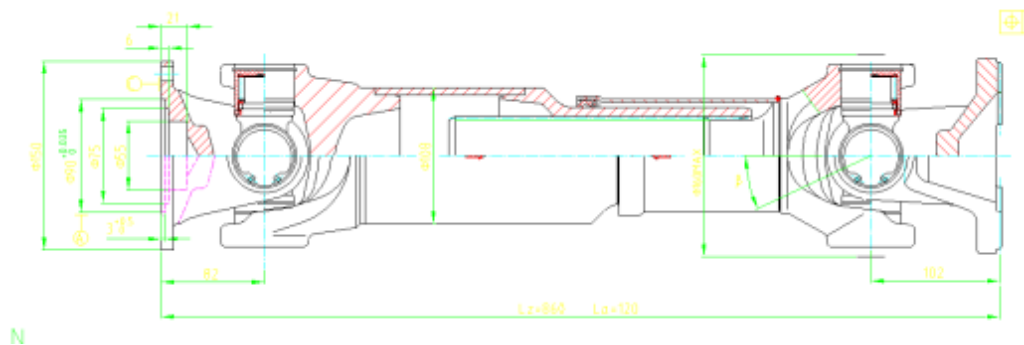


Fig. Structure of drive shaft components

3. Component principle

The drive shaft is an important component in the vehicle transmission system that transmits power. Its function, together with the gearbox and drive axle, is to transfer the power of the drive motor to the wheels, causing the vehicle to generate driving force.

II. Special Tools

S/N	Tool Name	S/N	Tool Name
1	18mm socket	3	120 N.m torque wrench

2	18mm socket	4	120 N.m torque wrench
---	-------------	---	-----------------------

III. Maintenance Data

1. The model and torque of the drive shaft bolts are shown in the table below

Table: Model and torque of drive shaft bolts

Part Name	Quantity	Torque (N.m)
Hexagon bolt M12×35 (motor end)	4	120 ± 20
DTFLOCK hexagon flange locking nut M12 (drive axle end)	8	110 ± 20
Standard spring washer 12 (motor end)	4	

IV. Circuit Diagram

None

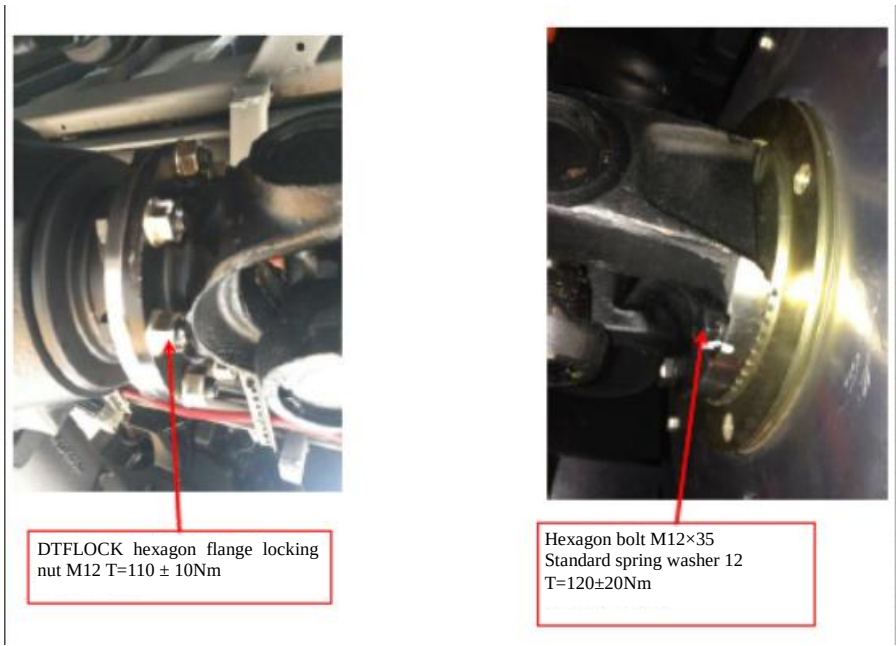
V. Fault Diagnosis

1. The description and troubleshooting methods of the faults are shown in the table below

S/N	Faults	Troubleshooting method
1	Damaged universal joint of drive shaft	Replace the drive shaft

VI. Method of Disassembly and Assembly

1. One end of the drive shaft is connected to the rear axle and the other end is connected to the motor.
2. Before connecting the bolts, use 243 thread locking agent at the threads.
3. Tighten the bolts in a symmetrical cross pattern to the specified torque and mark with a white paint pen.



VII. Component Maintenance Cycle and Methods

1. The maintenance cycle is shown in the table below

Table Maintenance Cycle

S/N	Maintenance cycle	Grease model
1	Level I maintenance	2# Lithium base grease

2. Maintenance methods

Use a grease gun to inject 2# lithium base grease into the oil inlet (indicated by the arrow in the diagram) until oil stains seep out from the bearing.



Fig. Location of oil injection port

Chapter VI ATS Water Cooling System Maintenance Manual

I. Component Introduction

1. Component functions

1) Functions of the ATS cooling system

The ATS motor cooling system mainly consists of three parts. The main function of the electronic control system is to monitor the motor temperature in real time and control the cooling fan. The radiator assembly, including the electronic cooling fan and water tank, mainly dissipates heat from the coolant flowing through the electric motor control system. The main function of the water pump assembly is to provide coolant circulation for the cooling system.

2) Technical parameters of ATS cooling system

Table Technical Parameters

Radiator	Outer frame size	671mm×448mm×98mm
	Core size	279mm×499.8mm×52mm
	Core positive area	0.14m ²
	Total heat dispersing area	8.6m ²
	Radiating pipe specifications	1.8×14×168
	Heat dissipation belt specifications	7×3.5×57
Fan	Model	VA113-BBL506PN-94A
	Maximum speed	4100 rpm /min
	Rated voltage	24V
	Rated current	21A
Water pump	Rated voltage	DC24V
	Operating voltage range	18-32V
	Rated power	180W
	Rated operating conditions	The pump head is 12m, the flow rate is ≥ 2000L/h, and the current is ≤ 8A
	Maximum head	≥15m
	Service ambient temperature	-40~100℃
	Service life	≥20000h
	Protection level	IP67

2. Component structure

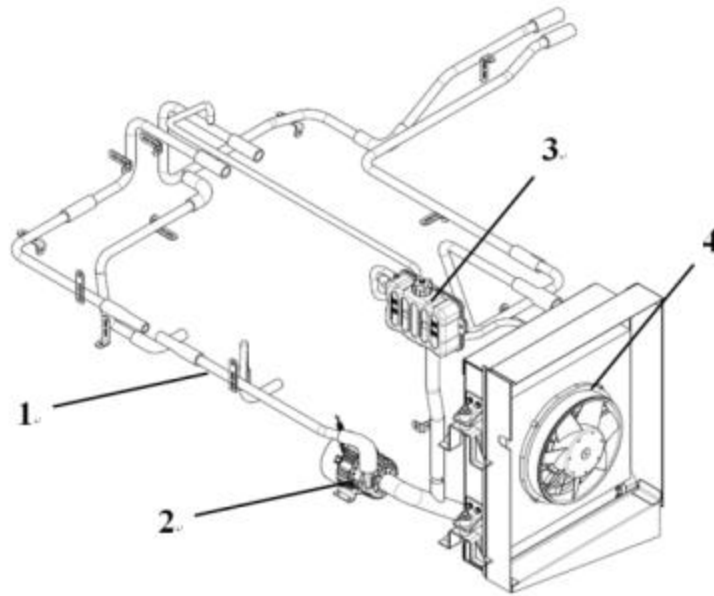


Fig. ATS Cooling System

1. Cooling water pipe 2. Water pump 3. Expansion water tank 4. Radiator fan

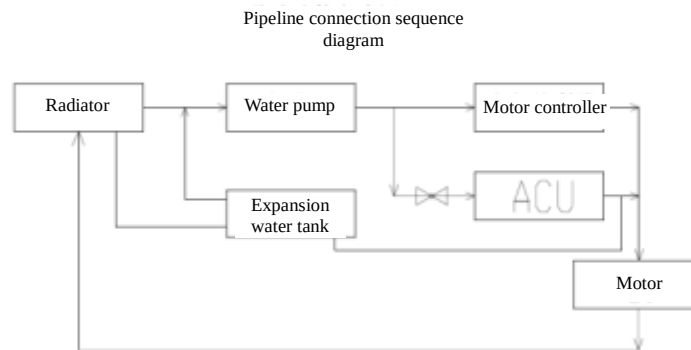


Fig. Diagram of Pipeline Connection

3. Component principle

When the vehicle starts, the temperature sensor of the ATS cooling system will automatically detect the water circulation temperature of the motor and transmit it in real-time to the electronic cooling fan controller. After the water inlet temperature of the radiator in the water tank reaches the set value, the electronic cooling fan starts, accelerates, decelerates, stops running, etc., to achieve circulating heat dissipation of the

motor coolant until the water inlet temperature reaches the optimal operating temperature requirement of the motor. During this period, the temperature sensor will monitor the motor temperature in real time, and the controller will intelligently adjust the fan's step-less speed based on the water circulation temperature, achieving intelligent constant temperature control of the motor and on-demand heat dissipation, thereby achieving precise control of the motor's water and gas temperature.

II. Special Tools

Table Special Tools

S/N	Tool type
1	Pneumatic gun
2	10 mm socket
3	10 N.m torque wrench
4	13 mm socket
5	24 N.m torque wrench
6	16 mm socket
7	48 N.m torque wrench

III. Maintenance Data

1. Tightening torque for fixing bolts and nuts

Table Key Torque

S/N	Name	Model	Tightening torque
1	Water pump bracket nut	M6-ZN.D	10±1.5 N.m
2	Hexagon bolt	M8×20	24±4 N.m
3	Hexagon bolt	M8×35	24±4 N.m
4	Hexagon bolt	M10×120	48±8 N.m

IV. Circuit Diagram

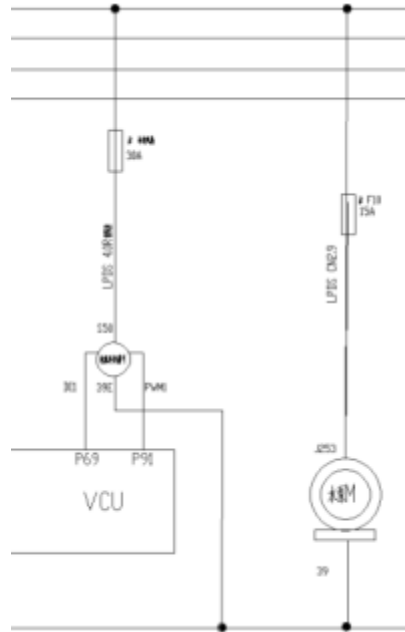


Fig. Electrical schematic diagram of motor cooling

V. Fault Diagnosis

1. Description of fault symptoms;
2. Fault diagnosis process;
3. Methods for fault diagnosis and troubleshooting;
4. Technical parameters, including data parameters and their meanings, reasonable ranges of data parameter values;
5. Electronic control system fault codes and definitions.

VI. Method of Disassembly and Assembly

1. Cooling system installation

- 1) After lifting the radiator to the appropriate installation position, align the installation holes of the radiator mounting bracket with the installation holes of the frame, and pay attention to the direction of the radiator placement;



Fig. Fan installation position

- 2) The bolt passes through the rubber pad and installation hole from top to bottom, and the rubber soft pad can be compressed with self-locking nuts. The compression amount of the rubber pad is 10%. Adjust the radiator to a horizontal and vertical state, and tighten all bolts.
- 3) Align the installation holes of the cooling water pump bracket with the installation holes on the frame, pay attention to the installation direction of the shock absorber gasket, and tighten the nuts.



Fig. Installation and fixing position of water pump

- 4) Use pneumatic tools and sleeves to tighten the bolts, use torque setting tools to

tighten the bolts to the specified torque ($T=10 \pm 1.5 \text{ N.m}$), and mark with a white marking pen.

- 5) Take the water pump inlet hose and connect the two ends of the water pump inlet hose to the cooling water pump and radiator respectively. Pay attention to the installation direction of the water pump inlet hose.



Fig. Water pump inlet hose



Fig. Radiator end hose

- 6) Adjust the installation position of the water pump inlet hose and use pneumatic tools and sleeves to tighten the pipe clamp.
- 7) Align the installation holes of the pipeline bracket with the installation holes of the protrusion on the frame, use pneumatic tools and sleeves to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marking pen.
- 8) Take a reducer rubber elbow to connect the cooling water pump and cooling water pipe, and use a D-shaped pipe fixing clamp to fix the cooling water pipe on the pipe bracket. Do not tighten the bolts and pipe clamps.
- 9) Connect the rubber transition pipe to the ball valve and two cooling water pipes, and use D-shaped pipe clamps to fix the cooling water pipes on the pipe bracket and frame. Do not tighten the bolts and pipe clamps.
- 10) After adjusting the installation position of the cooling water pipe and ball valve, use pneumatic tools and sleeves to tighten the pipe clamp and bolts, use torque setting tools to tighten the bolts to the specified torque, and use a white marking pen to

mark them.



Fig. Reducing Rubber Elbow

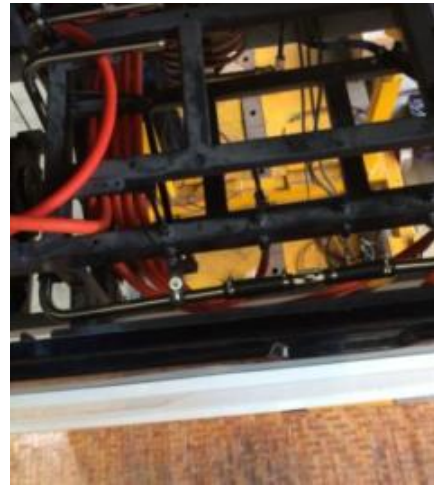


Fig. Rubber Transition Pipe

- 11) Align the installation holes of the expansion tank with the installation holes on the frame.



Fig. Installation position of water tank

- 12) The bolt passes through the installation hole from the back to the front, and is tightened using pneumatic tools and sleeves. The bolt is tightened to the specified torque using a torque setting tool and marked with a white marker pen.
- 13) Take one end of the $\Phi 25$ rubber pipe I and connect it to the expansion water tank, and connect the other end to the transition joint. Do not tighten the pipe clamp.
- 14) Connect one end of the transition joint to the water pump inlet hose without tightening the pipe clamp.
- 15) After adjusting the position of the hose, use pneumatic tools and sleeves to tighten all the clamps.

16) Install the sealing strip and wind shield.

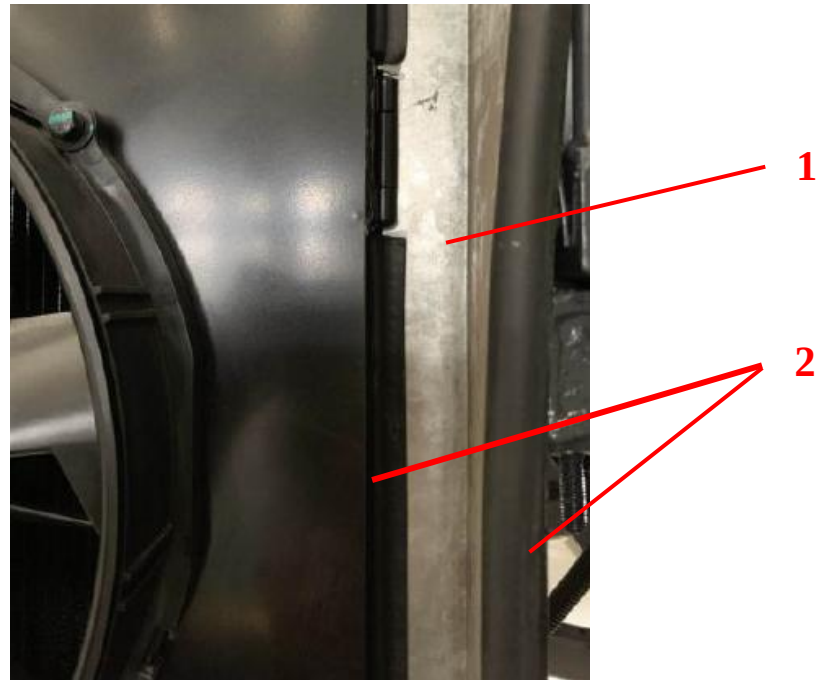


Fig. Installation of sealing strip baffle plate

1 Wind shield 2 Sealing strip

17) Correctly install the wind shield in place, use electric tools to drill holes, and use cross recessed raised countersunk (oval) head screw to fix the wind shield to the frame.

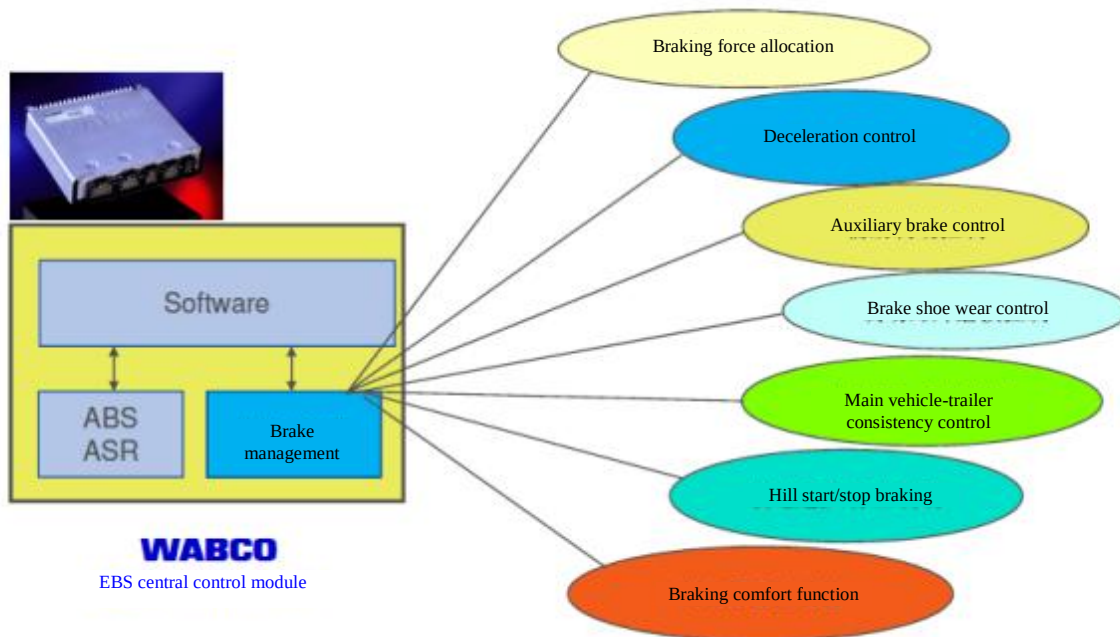
VII. Component Maintenance Cycle

Content	Configuration	Interval	Quantity	Assignment configuration
Exterior of radiator	/	7,500 Km / 1.5 Months	/	Clean
Interior of radiator	/	120,000 Km / 24 Months	/	Clean
Leakage of cooling system pipelines	/	7,500 Km / 1.5 Months	/	Check/tighten
Coolant	-15°C coolant	7,500 Km / 1.5 Months	/	Check/add
		120,000 Km / 24 Months	12L	Replacement

Chapter VII EBS Maintenance Manual

I. Component Introduction

1. Component functions



1) Introduction to ABS functions:

ABS is designed to prevent drivers from experiencing wheel lock up due to excessive braking force during driving, especially on slippery roads. To maintain the vehicle's steering performance and stability, the braking deceleration is increased, and the braking distance is shortened.

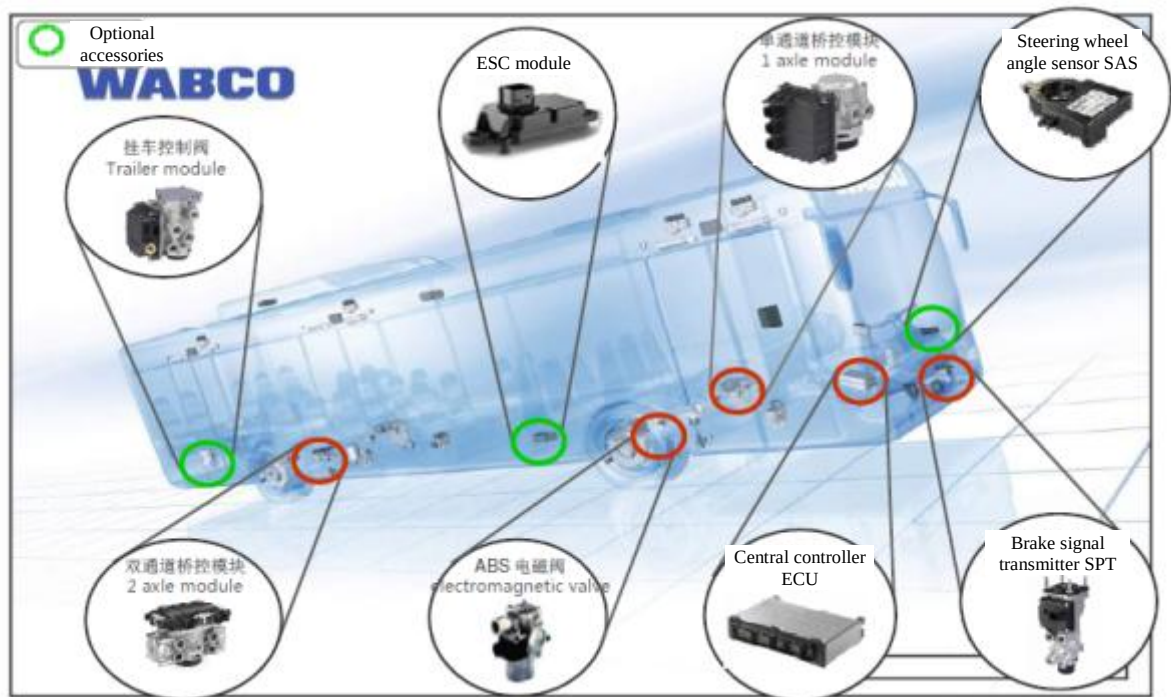
Function: Boosting, reducing, and maintaining pressure

2) ASR Function Introduction:

The ASR function is used to improve the driving wheel slip phenomenon caused by excessive driving force during the starting process of the vehicle, especially on wet and slippery roads, to avoid instability caused by driving wheel slip.

Function: Engine torque limit (motor torque limit), differential braking

2. Component structure



1) Main features of EBS central controller:

- Control and monitor the entire EBS system
- Provide all control functions, such as ABS/ATC, stability control, etc.
- System diagnosis
- Provide interfaces and power supply for various components, such as BST, TCV, AAMM, AABBS solenoid valves, etc.
- Provide CAN communication interface (SAE J1939, ISO 11992)
- Using HDSCS connector MCP1.5, 2.8mm
- Working temperature: $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$, storage temperature of 100°C , not exceeding 2 hours
- Operating voltage: 16V-32V (16-20V limited ABS function)
- Software Architecture of WABCO CESAR Platform



2) Main characteristics of brake signal transmitter:

- Dual gas circuit, one electrical circuit
- Two displacement sensors and interlock switches
- Using HDSCS connectors
- 4 x M8 mounting bolts, 24 N.m, 61mm spacing
- Pipeline interface thread pipeline interface thread

M16×1.5, max34 N.m, suitable for VOSS 232

- Working pressure 12.5 bar, maximum 15 bar
- Integrated pressure drop function, resulting in a backup pressure ratio of 1:1.5 between the two circuits
- Working temperature -40°C ~ +80°C, storage temperature of 110 °C for no more than 1 hour
- Working voltage 9~32 volts
- The protection level after installing the connector is IP6K9K
- Two variants: straight stepping and hanging



3) Main features of the front axle module:

- Single channel control of braking pressure for one axle
- Integrated backup valve
- Collecting wheel speed sensor signals
- Collect friction plate wear signals
- Circuit interface: 1 set of power supply (positive and negative power supply), 1 set of CAN wires (CAN high, CAN low), 2 sets of wheel speed sensors, 2 sets of wheel speed



sensors, 22 sets of wear sensors, wear sensors

- Can be applied to front and rear axles or lifting axles, etc.
- Pipeline interface thread M16/M22, max 34/53N.m, suitable for VOSS 232
- Working pressure of 10~12.5 bar, maximum 15 bar
- Using HDSCS connectors with MCP 1.5 and 2.8 mm
- Installation thread M12 x 1.5, part weight 1.8kg
- Working voltage 14.5~32V
- Working temperature -40°C ~ +80°C, storage temperature of 100°C for no more

than 2 hours

- The protection level after installing the connector is IP6K9K

4) Main features of the rear axle module:

- It can independently control two circuits of air pressure (including ABS control),

and can control the braking pressure of up to two axles

- Integrated backup valve
- Collecting wheel speed sensor signals
- Collect friction plate wear signals
- Circuit interface: 1 set of power supply

(positive and negative), 1 set of CAN lines (CAN high, CAN low), 2 sets of wheel speed sensors, speed sensors, 22 sets of wear sensors, with axle selection function

Used to drive the axle with an additional axle (optional)

- Pipeline interface thread M16/M22, max

34/53 N.m, suitable for VOSS 232

- Working pressure of 10~12.5 bar, maximum 15 bar
- Using HDSCS connectors with MCP 1.5 and 2.8 mm
- Installation thread M12x1.5, part weight 3.5kg
- Working voltage 14.5~32V
- Working temperature -40°C ~ +80°C, storage temperature of 110°C, not

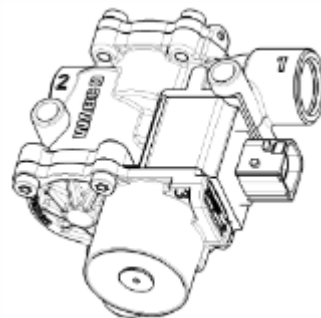
exceeding 1 hour



- The protection level after installing the connector is IP6K9K

5) Main characteristics of ABS solenoid valve:

- Using HDSCS connectors
- 2x Φ 8.5 installation holes
- Pipeline interface thread M22 $\times$ 1.5, max 53 N.m, suitable for VOSS 232 (NG12)



- Maximum working pressure of 11 bar, maximum support of 13 bar, working temperature of $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$, storage temperature of 120°C for no more than 1 hour

- Working voltage 17.5~28 volts ($-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$); 16~30 volts ($23 \pm 5^{\circ}\text{C}$)
- The protection level after installing the connector is IP6K9K

6) Main characteristics of the ESC control module:

- Yaw velocity acquisition
- Lateral acceleration acquisition
- Communication via EBS internal CAN bus
- Using HDSCS connectors
- The installation holes are suitable for M10 bolts
- Working temperature $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$, storage temperature of 100°C for no more than 2 hours
- Working voltage 8~32 volts
- The protection level after installing the connector is IP6K9K
- Installed near the center of gravity of the vehicle; Or deviate from the center of gravity position by a certain distance, which can be automatically corrected by the system through parameter settings (for passenger cars)



7) Main characteristics of angle sensors:

- Measure the steering wheel angle
- Starting from 0°, counterclockwise

direction is positive

- Communication with EBS system or vehicle bus (automatic detection connection method)
- MQS 6-hole connector
- 33 M44 bolts connection fixing bolt connections fixing
- Working temperature -40°C ~ +85°C, storage temperature of 100°C for no more than 2 hours
- Working voltage 8~32 volts
- The protection level after installing the connector is IP50 (installed inside the driver's cab)
- Install and fix on the steering column according to the drawing requirements
- After installation, the 0 position of the vehicle needs to be calibrated through the CAN bus

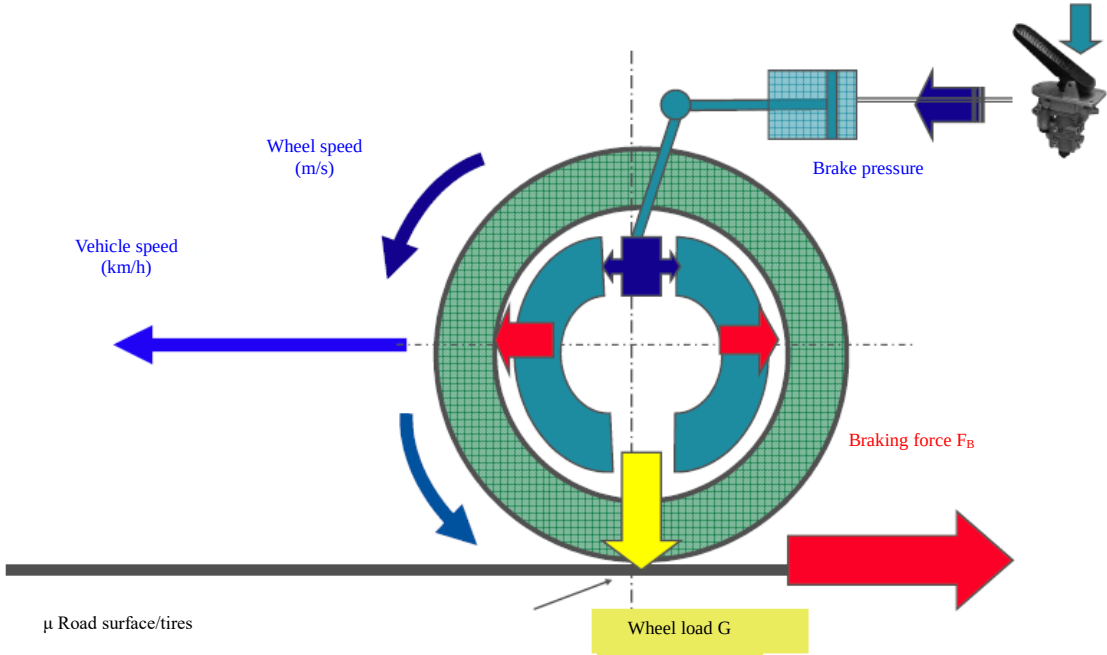


3. Component principle

The electronic control braking system (EBS) for automobiles is based on ABS, replacing traditional mechanical transmission with electronic control to control the braking system, in order to achieve good braking effect and increase the safety of vehicle braking. When a vehicle brakes, the braking force of the wheels is related to the ground adhesion coefficient. When the wheels are in a semi sliding and semi rolling state, the ground adhesion coefficient can reach its maximum, that is, the braking force can reach a larger value, and the lateral stability is also good at this time. When the wheels are completely locked without rolling, the ground adhesion decreases and the lateral stability is zero. Extremely prone to sideslip and tailspin, which can easily cause accidents. The ABS anti-lock braking system is designed to keep the wheels in a state that is about to lock up but

not completely locked when braking a vehicle. It can ensure that the vehicle achieves maximum adhesion while maintaining corresponding lateral stability, and it completely solves the problem of insufficient braking force when the wheels are not locked or completely locked in conventional systems, causing the vehicle to lose lateral stability. When the vehicle brakes, the ABS system continuously detects the rotation of the wheels.

When the wheels are about to lock up, the ABS system sends a signal to the pressure regulator to control the braking force of the brake, causing the braking force to stop increasing. At this time, a small amount of brake fluid in the brake returns to reduce pressure, then increases pressure, and the braking force increases. This can achieve the best braking effect for several consecutive times, which can reach 10-20 times per second. The EBS system has added various sensors compared to the ABS system, including three-dimensional force sensors, brake friction plate wear sensors, etc. When braking, the brake pedal position signal is transmitted to the electronic control unit, and at the same time, each force sensor transmits the load, ground adhesion, and brake pressure signals to the electronic control unit. The electronic control unit automatically adjusts the brake pressure, forming a closed-loop control. The system replaces mechanical transmission with electronic control to reduce the lag of mechanical transmission in the braking system, shorten the braking distance, and minimize friction plate wear at low intensity; When at moderate strength, use ABS to achieve the optimal utilization rate of road adhesion coefficient; At high intensity, apply maximum braking pressure to achieve optimal control of braking force. The friction and wear sensor can monitor the friction situation of each brake pad, control the pressure distribution of each brake, and extend its service life. The EBS system can be centrally and uniformly controlled by a single electronic control unit along with other electronic control systems. Implement various control functions with different requirements.



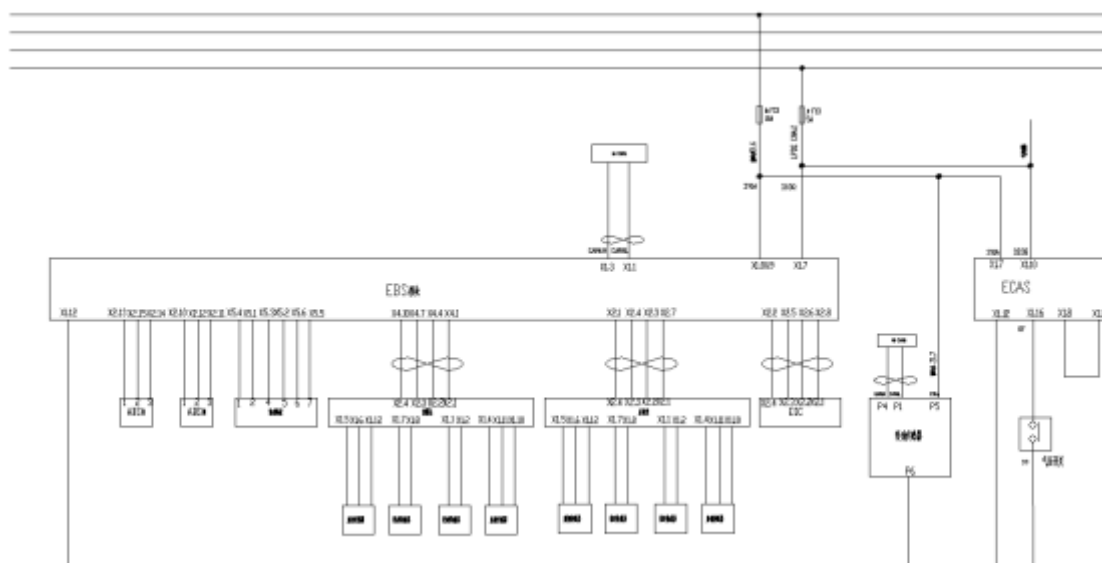
II. Special Tools

S/N	Tool type
1	24 ± 4 N.m torque wrench
2	90 ± 15 N.m torque wrench

III. Maintenance Data

None

IV. Circuit Diagram



V. Fault Diagnosis

1. Electronic control system fault codes and definitions.

1) EBS central controller pin definition:

X1 plug (446 135 25X 0 ECU)		
1	CAN-L	CAN-L data cable to vehicle bus
2	ASRAUS/WLVERSCH	ATC off light/brake lining wear warning light
3	CAN-N	CAN-H data cable to vehicle bus
4	HSA	Hill start switch
5	LAX/LAIR	Lift shaft switch/low pressure switch
6	ATC	ATC off-road button
7	KL_15	Vehicle terminal pin 15 (ignition power supply)
8	KL_30A	Permanent power supply from batteries
9	KL_30B	Permanent power supply from batteries
10	WL2	Yellow warning light
11	HSB	Entering the station for parking
12	GND	Vehicle ground wire
13		Not used
14	BRK_LGHT	Brake light relay output
15	-	Plug drop detection
16	ASRL	ATC lights
17	DBR	Engine control
18	WL1	Red warning light

X2 plug (446 135 25X 0 ECU)		
1	AA_CAN-L	CAN-L data cable used for the drive axle

		module
2	ESP_CAN-L	CAN-L data cable used for ESC module
3	AA_UB	Power-drive axle module
4	AA_CAN-H	CAN-H data cable used for the drive axle module
5	ESP_CAN-H	CAN-L data cable used for ESC module
6	ESP_UB	Power supply-ESC module
7	AA_GND	Ground wire for drive axle module
8	ESP_GND	ESC module ground wire
9	EBI	EBI switch input
10	AV_VLI	Left front axle ABS output valve
11	EV_VLI	Left front axle ABS input valve
12	ABS_GND_VLI	Ground wire of left front axle ABS valve
13	AV_VRE	Right front axle ABS output valve
14	EV_VRE	Right front axle ABS input valve
15	ABS_GND_VRE	Ground wire of right front axle ABS valve

X3 plug (446 135 25X 0 ECU)		
1	TCV_AV	High-side switch drives the trailer control valve (output)
2	TCV_EV	High-side switch drives the trailer control valve (input)
3	TCV_LOW	Low-side switch drives the trailer control valve
4	TCV_BUV	High-side switch drives the trailer control valve (BUV)
5	ASR_GND	Ground wire of ATC cut-off valve
6	ASR_ZA	ATC cut-off valve
7	TCV_DSENS_U	Trailer control valve pressure sensor power supply
8	TCV_DSENS	Pressure signal of trailer control valve
9	TCV_DSENS_GND	Ground wire of trailer control valve pressure sensor

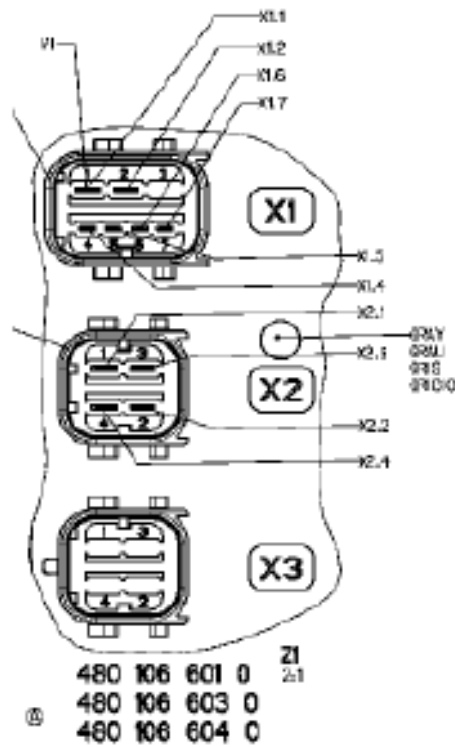
X4 plug (446 135 25X 0 ECU)		
1	VA_CAN-L	CAN-L data cable used for front axle module
2	SAS_CAN-L	CAN-L data cable used for steering angle sensor
3	AS_CAN-L	CAN-L data cable - main trailer interface
4	VA_CAN-H	CAN-H data cable used for front axle

		module
5	SAS_CAN-H	CAN-H data cable is used for the steering angle sensor
6	VA_CAN-H	CAN-H data cable - main trailer interface
7	VA_UB	Front axle module power supply
8		Not used
9	SAS_GND	Ground wire of steering angle sensor
10	VA_GND	Ground wire of front axle module
11		Not used
12	SAS_UB	Steering angle sensor power supply

X5 plug (446 135 25X 0 ECU)		
1	BWG_UB	BST power supply
2	BWG1	BST sensor signal 1
3	BS1	BST brake switch signal 1
4	BWG_GND	BST ground wire
5	BWG2	BST sensor signal 2
6	BS2	BST brake switch signal 2

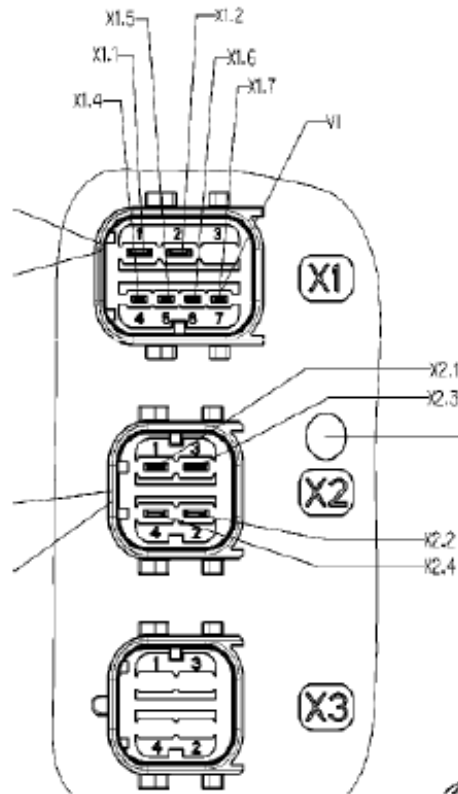
2) Front axle module AM 1M pin definition

Pipeline interface		Function
Left side	Right side	
11	12	Air pressure input connection port
4		Air pressure backup connection port
21	22	Air pressure output connection port
3		Exhaust port
X1.1		Wheel speed sensor input
X1.2		Wheel speed sensor output
X1.3		Not used
X1.4		Left sensor high signal
X1.5		Left sensor low signal
X1.6		Right sensor high signal
X1.7		Right sensor low signal
X2.1		Ground wire
X2.2		Power supply
X2.3		CAN-H
X2.4		CAN-L
X3.1		Ground wire
X3.2		Power supply
X3.3		CAN-H
X3.4		CAN-L



3) Rear axle module pin definition

Pipeline interface		Function
Left side	Right side	
11	12	Air pressure input connection port
4		Air pressure backup connection port
21	22	Air pressure output connection port
31	32	Exhaust port
X1.1		Wheel speed sensor input
X1.2		Wheel speed sensor output
X1.3		Not used
X1.4		Left sensor high signal
X1.5		Left sensor low signal
X1.6		Right sensor high signal
X1.7		Right sensor low signal
X2.1		Ground wire
X2.2		Power supply
X2.3		CAN-H
X2.4		CAN-L
X3.1		Ground wire
X3.2		Power supply
X3.3		CAN-H
X3.4		CAN-L



VI. Method of Disassembly and Assembly

6.1 Pre-install foot brake valve

- 1) According to the installation position of the air brake pipeline valve in the drawing, pre-install the foot brake valve, and install it at all four ports of the brake valve.

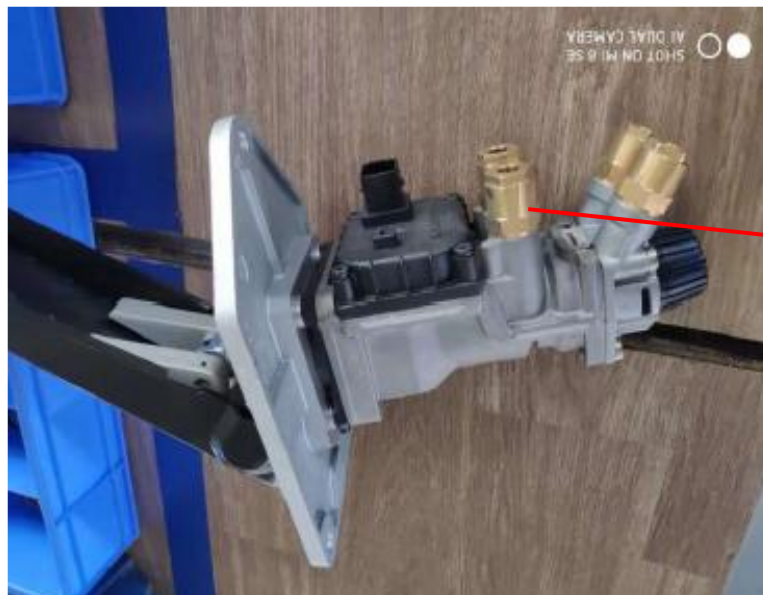


Fig. Pre-install foot brake valve

1- Transition joint (NG8 M16 × 1.5)

6.2 Pre-install ABS valve

- 1) Pre-install ABS valve, with one transition joint (NG12 M22 × 1.5) installed at each inlet and outlet of the valve.
- 2) The air inlet is connected to the right angle connector body (NG12/NW9), and the air outlet is connected to the straight connector body (NG12/NW9).



Fig. Pre-install ABS valve

1- Front ABS valve

6.3 Pre-install EBS valve, EBS front module

- 1) Pre-install EBS valve, connect a transition joint (NG12 M22 × 1.5) to port 11, 12, 21, and 22 of the EBS front module, and connect a transition joint (NG8 M16 × 1.5) to port 4.
- 2) Fig. 7-4 shows a transition joint (NG12 M22 × 1.5) connected to ports 11, 12, 21, 21, and 22 of the EBS rear module, and a transition joint (NG8 M16 × 1.5) connected to port 4.



Fig. EBS Axle Control Front Module



Fig. EBS Axle Control Rear Module

6.4 Install foot brake valve

- 1) Install the foot brake valve according to the installation position of the air brake pipeline valve in the drawing, and fix it with 3 sets of M8 bolt sets, with a torque of $24 \pm 4\text{N.m}$.



Fig. Install foot brake valve

1. Brake valve, all four ports are equipped with transition joints and right angle quick insertion pipe connections

6.5 Install ABS valve

- 1) According to the installation position of the air brake pipeline valve in the drawing,

fix the left and right ABS valves with 2 sets of M8 bolt sets.



Fig. EBS Axle Control Front Module



Fig. EBS Axle Control Rear Module

1. Installation position of front left ABS valve 2. Air outlet
1. Installation position of front right ABS valve 2. Air inlet

6.6 Install EBS front module

- 1) Fix the EBS front module with 2 sets of M12 bolts according to the installation position of the pneumatic brake pipeline valve in the drawing.



Fig. EBS front axle module

1-EBS front axle module installation position

6.7 Install EBS rear module

- 1) Fix the EBS rear module with 2 sets of M12 bolts according to the installation position of the pneumatic brake pipeline valve in the drawing.

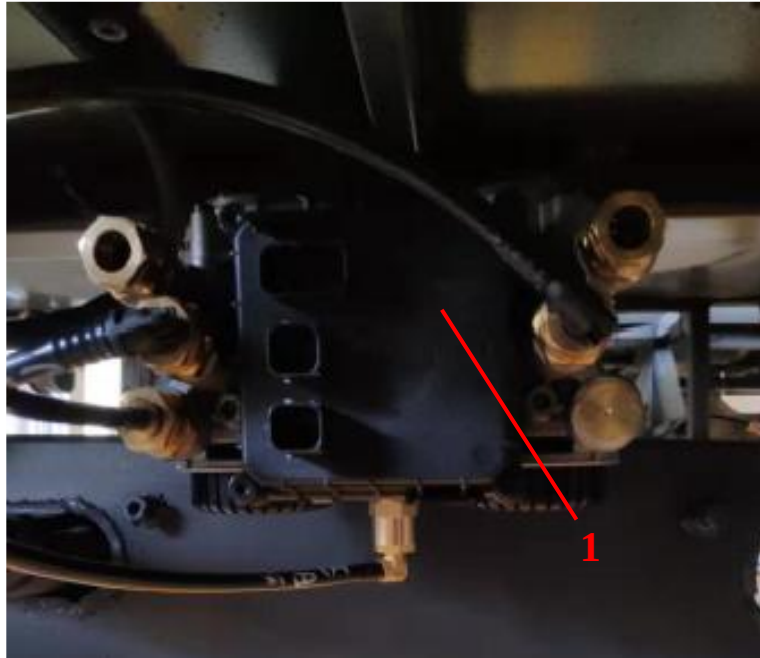


Fig. EBS rear axle module

1-Installation position of EBS rear axle module

6.8 Install steering angle sensor

- 1) Fix the steering angle sensor with a bolt set according to the installation position of the pneumatic brake pipeline valve in the drawing.

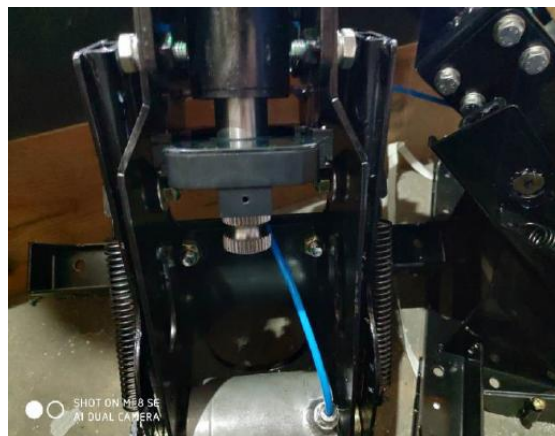


Fig. Steering angle sensor

6.9 Install ESC module

- 1) Fix the ESC module with 2 sets of M8 bolts according to the installation position of the pneumatic brake pipeline valve in the drawing.

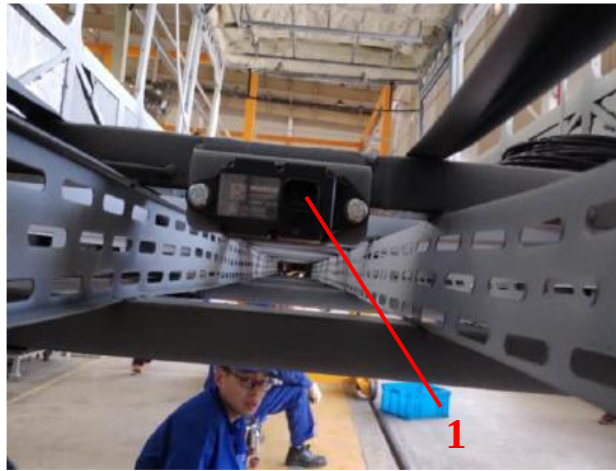


Fig. ESC Module

1-ESC module installation location

VII. Component Maintenance Cycle

Content	Configuration	Interval	Quantity	Nature of work
Air dryer	Sunwin accessory	7,500 Km / 1.5 Months	/	Inspection (Reservoir water accumulation)
		60,000 Km / 12 Months	1P	Replacement (recommended before the rainy season)
Gas cylinder water drainage	/	1 week	6P	Water drainage

Chapter VIII Tire Maintenance Manual

I. Component Introduction

1. Component functions

Tires are circular elastic rubber products assembled on various vehicles or machinery for ground rolling.

2. Component structure

The tire is mainly composed of the crown, shoulder, sidewall, and toe opening. The tire structure is shown in the following figure

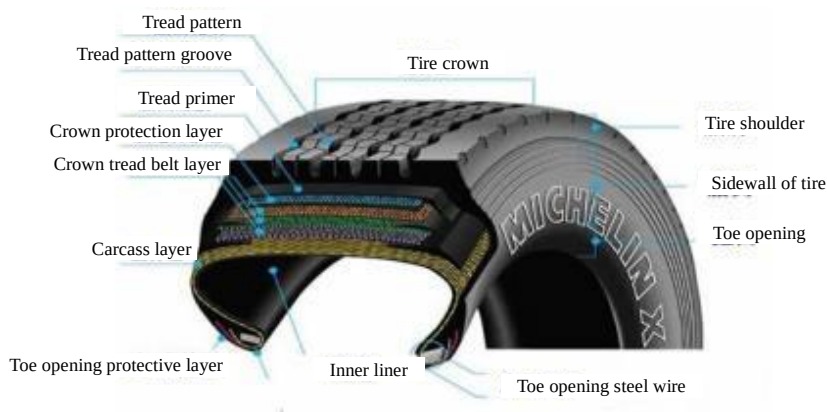


Fig. Tire Structure

3. Component parameters

Wheel model	7.5×19.5
Tire model	265/70 R19.5 tubeless tire
Front axle tire pressure	750 kPa to 950 kPa (single tire)
Rear axle tire pressure	750 kPa to 950 kPa (double tires)

II. Special Tools

S/N	Tire disassembly tool
1	Pneumatic gun engine (34mm socket)
2	Fixed torque wrench (torque greater than 700 N.m)

III. Maintenance Data

1. When using tires, the inflation pressure is 775 kPa.
2. Tire nut model: M20 x 1.5.

3. Tires with a groove depth of less than 1.6mm should be discontinued and replaced promptly. (Take Bridgestone tires as an example here)

IV. Circuit Diagram

None

V. Fault Diagnosis

None

VI. Method of Disassembly and Assembly

1. Park the vehicle on flat ground, use a process lift trolley to lift the tires to the axle, align the bolts, and tighten the nuts, as shown in the following figure.



Fig. Tire Installation

2. Use a **650 N.m** torque tool to pre-tighten the nuts in the order shown in the installation diagram (**330 N.m**).
3. After pre-tightening the nuts one turn, apply torque to the five sets of nuts again and tighten them to the specified torque (420-490 N.m) using a torque setting tool.
4. Use a white marker to mark the nuts that have been tightened to the specified torque.



Fig. Tightening sequence of tire nuts

Remark: The installation method for the front and rear wheels is consistent.

VII. Component Maintenance Methods

1. Check the tightening torque of the wheel nuts every time:
2. Pre-delivery inspection: Tighten all wheel nuts to the correct torque.
3. After installing the wheels: After driving a small distance (about 200 km), check the tightness of the wheel nuts
4. Every 6 months: Check all wheel nuts (whether or not the wheels have been removed).
5. Tires with a groove depth of less than 1.6mm should be discontinued and replaced promptly. (Take Bridgestone tires as an example here).
6. The tire rotation reference is shown in the following figure

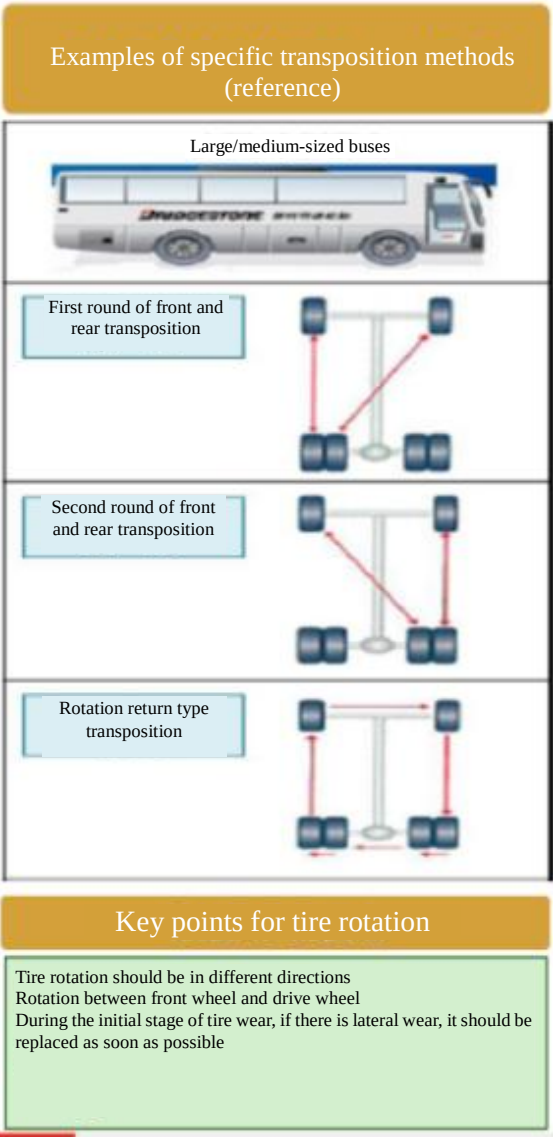


Fig. Tire Rotation (Take Bridgestone tires as an example)

Chapter IX Air Compressor Maintenance Manual

I. Component Introduction

1. Component functions

Electric air pump host: mainly used for compressing and conveying air. Electric air pumps are divided into oil and oil-free types based on whether there is oil in the compressed air. The oil-free electric air pump can extend the sealing life of the gas system of new energy buses.

Motor: The motor converts electrical energy into mechanical energy and drives the main engine of the electric air pump to operate or stop through belt transmission.

Exhaust shut-off valve: It is a one-way valve, and its correct installation can effectively prevent compressed air from flowing back to the main engine of the electric air pump.

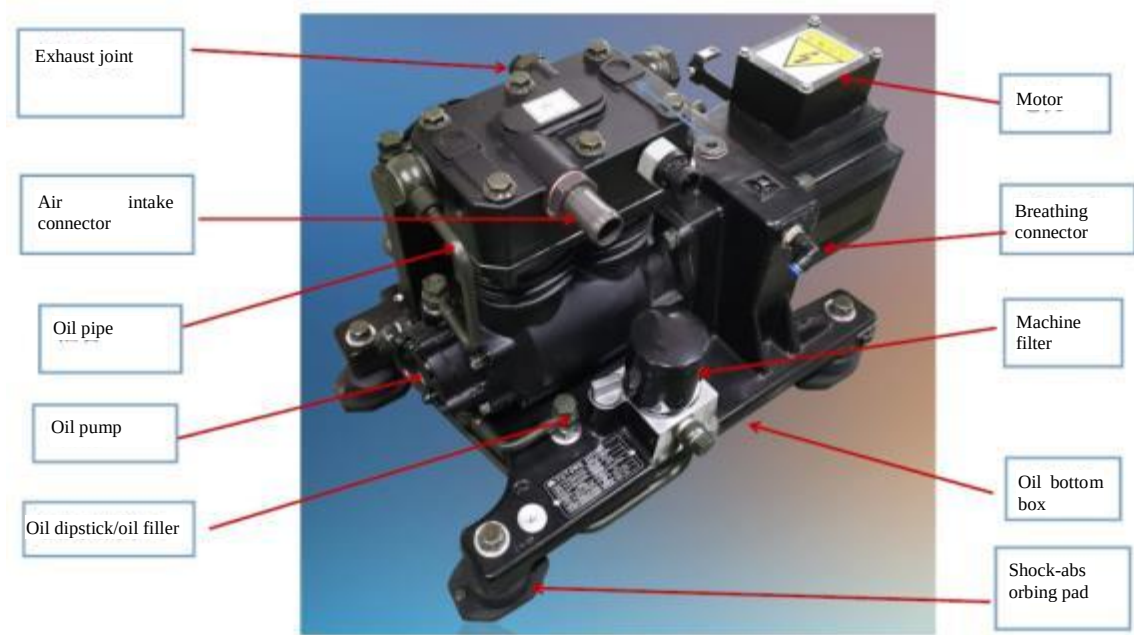
Radiator: Heat exchange occurs between the external atmosphere and the compressed air inside the radiator, reducing the temperature of the compressed air and removing some moisture.

First-level air filter: It filters out impurities that enter the air of the main engine of the electric air pump.

Safety valve: In case of over-pressure operation of the electric air pump, it performs pressure relief and discharge to avoid damage to the motor due to over-current operation.

Shock absorber: It reduces the vibration of the electric air pump and prevents the transmission of vibration from new energy buses to the electric air pump as much as possible.

2. Component structure



3. Component principle

Working principle of air compressor:

When the motor drives the crankshaft of the piston compressor to rotate, the piston undergoes reciprocating motion through the transmission of the connecting rod, and the working volume composed of the cylinder inner wall, cylinder head, and piston top surface undergoes periodic changes. When the piston of the piston compressor starts to move at the top of the crankcase, the working volume inside the crankcase gradually increases. At this time, gas moves along the intake pipe, pushes open the intake valve, and enters the crankcase until the working volume reaches its maximum, and the intake valve closes; When the piston of a piston compressor moves in the opposite direction, the working volume inside the crankcase decreases and the gas pressure increases. When the pressure in the cylinder reaches and is slightly higher than the exhaust pressure, the exhaust valve opens and the gas is discharged from the cylinder until the piston moves to its limit position, and the exhaust valve closes. When the piston of the piston compressor moves in reverse again, the above process repeats. In short, the crankshaft of a piston compressor rotates once, and the piston reciprocates once. The process of intake, compression, and exhaust in the crankcase is carried out successively, completing a work cycle

The working principle of the air compressor is shown in the following figure:

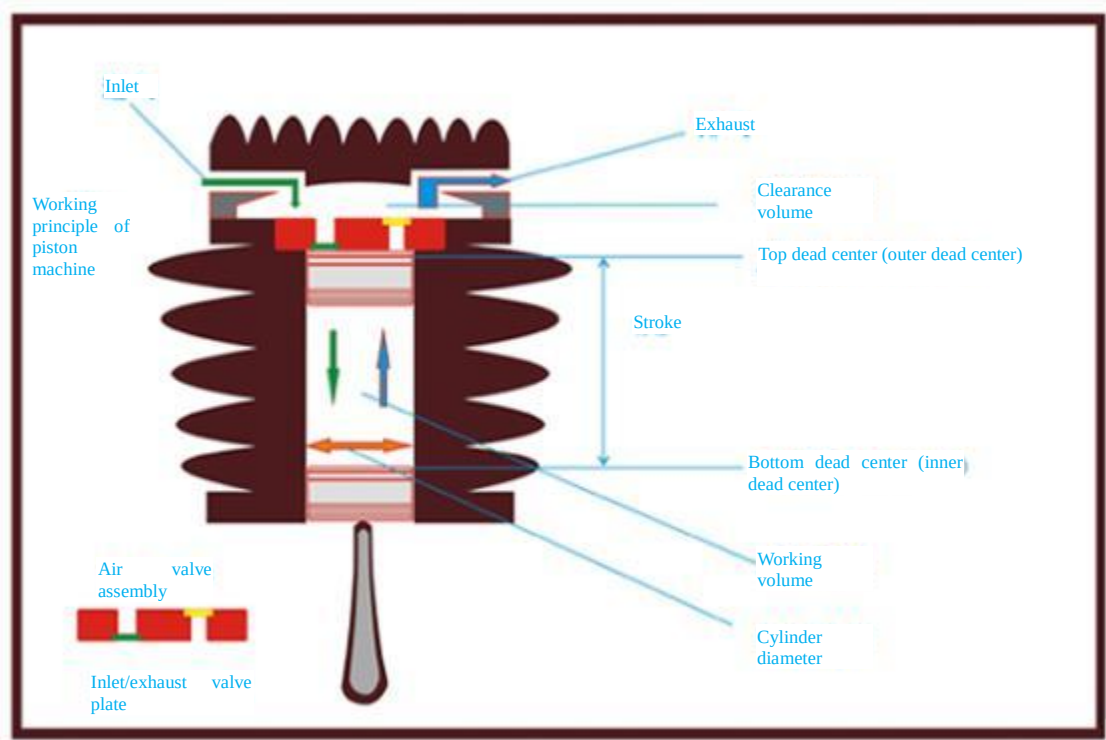


Fig. Working principle of air compressor

Control principle of air compressor system:

The start stop of the air compressor is directly controlled by the inverter, and the start stop signal of the inverter is provided by the vehicle control signal.

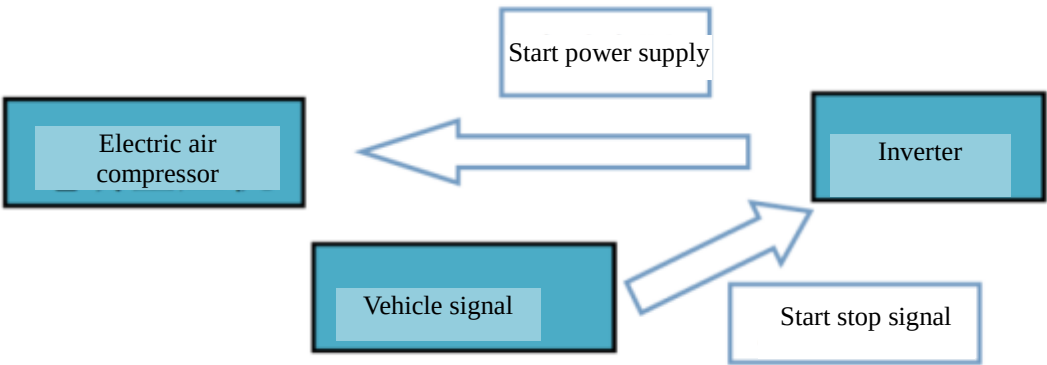


Fig. Control principle of air compressor system

II. Special Tools

None

III. Maintenance Data

The key parameters for air compressor maintenance are shown in the table below

Table Key parameters of air compressor

Product name	Piston air compressor
Rated exhaust pressure	1.0 Mpa
Starting pressure	0.7 Mpa
Exhaust volume	250 L/min
Exhaust temperature	<180 °C
Unit weight	48±3 kg
Noise level	72dB
Cooling method	Air-cooled
Allowed working environment temperature	-40~65 °C
Air intake	Φ25
Air outlet connection Specifications and dimensions	M30×2 (external thread)
External dimensions	579×355×373

IV. Circuit Diagram

None

V. Fault Diagnosis

The fault diagnosis table is shown in the following table:

Fault	Cause	Solution
The air compressor is difficult to start	1. Electrical fault 2. Incorrect frequency converter parameters	1. Electrical personnel conduct maintenance 2. Contact the frequency converter manufacturer
There is abnormal noise during the operation of the air compressor	1. Incorrect frequency converter parameters 2. Loose bolt connections 3. Insufficient oil	1. Contact the frequency converter manufacturer 2. Tighten the connection points 3. Oiling
Low exhaust pressure	1. Air filter blockage	1. Replace the air filter

	2. Muffler blockage 3. Pipeline leakage 4. The demand for compressed air is greater than the gas production of the air compressor	2. Replace the muffler 3. Check and eliminate 4. Contact the supplier to resolve the issue
The air compressor keeps running	1. Damaged dryer 2. The air pressure of the dryer is set too high 3. Vehicle system error	1. Contact the dryer manufacturer 2. Contact the dryer manufacturer 3. Contact suppliers
Oil leakage on the surface of the air compressor	Loose connection tighteners	Check, repair or replace

VI. Method of Disassembly and Assembly

1. Air filter disassembly and assembly method

- Fix the air filter bracket and the main beam with hexagonal bolts M8×30
- Fix the air filter and bracket with hexagonal bolts M6×20



Fig. Air filter disassembly diagram

2. Installation of air compressor body

- The fixing bolt of the air compressor is a fastener that comes with the air compressor from the factory

- b) High temperature hose, connecting air compressor and air pressure tank, with a clamp type end right angle pipe joint G22/M26×1.5 (B80001125) connected to the upper and lower parts of the air pressure tank, with the direction angle of the joint separated by 180 °

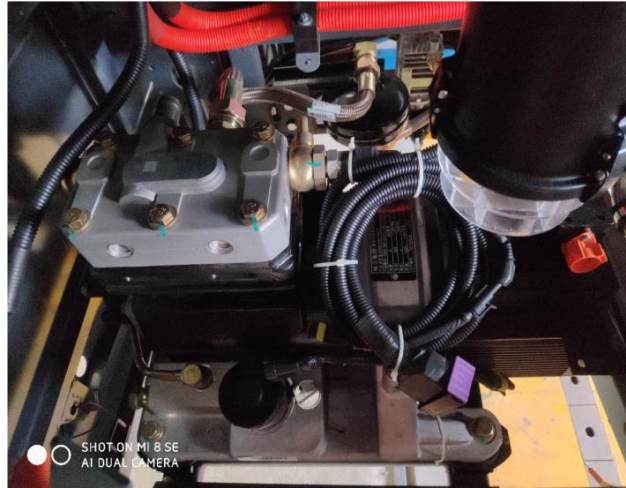


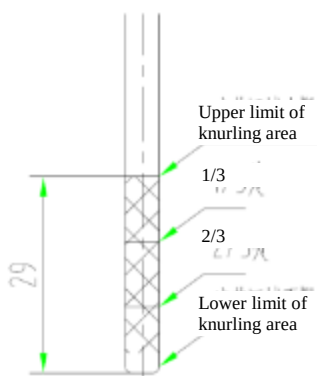
Fig. Disassembly and assembly of the air compressor body

VII. Component Repair and Maintenance

1. Check the oil level

a) Check the oil mirror: When the air compressor is running, observe the oil level from the oil mirror. The oil should be at 1/3 to 2/3 of the oil mirror port; (There are oil mirrors and drain ports on the oil pan of the air compressor)

b) Check the oil level through the dipstick (the knurling area on the dipstick is the oil level area)



1. When the oil level is located at 1/3 to 2/3 of the oil dipstick knurled area, it is a reasonable position;
2. When the oil level is at the upper limit of the knurled area to 1/3, it indicates that there is too much oil, but it does not affect the normal operation of the air compressor;
3. When the oil level is between 2/3 of the knurled area and the lower limit of the knurled area, it indicates that there is too little oil, but it does not affect the normal operation of the air compressor. At this time, oil should be added;
4. When the oil level is below the lower limit of the knurled area, it must be refueled;

2. Oiling:

a) Check the oil level by observing the oil mirror/dipstick. If there is not enough oil, add oil in a timely manner.

b) When oiling, it is necessary to unscrew the dipstick and then start oiling towards the dipstick hole. When oiling, it should be slowly poured in to avoid spillage.

c) When the oil is added to the specified position, tighten the oil dipstick; If oil splashes on the machine, it should be cleaned thoroughly.

d) After adding oil, turn on the power and check if the operation is normal.

3. Clean or replace the muffler filter element

a) Use a tool to loosen the clamp on the air pipe and remove the intake hose;

b) Use a wrench to remove the nuts and washers on the muffler end cover;

c) Remove the end cover and filter element, clean the outside of the filter element with low-pressure air, and blow air downwards along the edge of the filter element from the end cover; During the cleaning process, do not use hands or other tools to squeeze the filter paper;



d) If the filter element is not damaged and not very dirty, wait for the filter element to be cleaned before reinstalling it in its original state; If the filter element is too dirty to clean, or if the filter element is damaged, it needs to be replaced and reinstalled in its original state.

The steps for disassembling and installing the filter element are as follows:

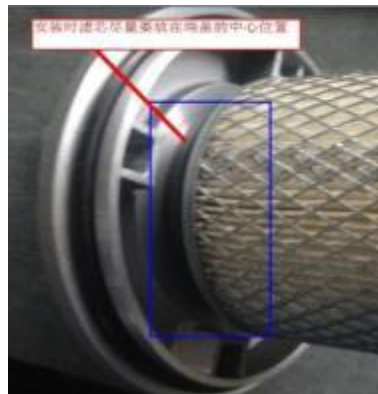
- 1) After removing the filter element assembly, use a wrench to unscrew the locking nut, and sequentially remove the locking nut M16x1.5, flat washer, and pressure ring, as shown in the following figure:



- 2) Remove the filter element from the pull rod and note that the filter element is equipped with springs and flat washers on the pull rod, as shown in the following figure:



- 3) Install the new filter element, spring, flat washer, nut, and pressure ring in sequence. When tightening the locking nut, it is necessary to ensure that the position of the filter element is in the center position of the end cover, and the sealing ring is tightly attached to the end cover to ensure sealing. The M16x1.5 nut should not be tightened too tightly (the nut should be roughly screwed into 3-4 teeth) to avoid damaging and deforming the filter element, as shown in the following figure:



- 4) After installing the filter element, install the filter element assembly back into the

silencer, and then tighten the M8 nut and flat gasket to make the end cover and housing tightly adhere and seal, as shown in the following figure:



4. Replace the engine oil

a) Before changing the oil, please make sure that the oil being changed is the required model of oil;

Note: Deteriorated oil can damage the air compressor, and when changing the oil, it is necessary to ensure that the power supply of the air compressor is cut off, in the shutdown state, and the internal pressure of the compressor is zero.

b) Prepare a container and disassembly tools for oil, unscrew the oil plug, and drain the oil from the tank.

c) Unscrew the original oil filter, clean it thoroughly, and replace it with a new one.

d) Tighten each screw plug, clean the oil and dust on the machine, and then add oil to the correct level through the oil filling port according to the previous oiling specifications;

5. Check/adjust connectors, tighteners, pipelines, and joints

a) Regular inspection of the exposed connection parts on the air compressor is required to prevent oil leakage caused by loose tighteners;

b) The connectors (pressure switches) on the air compressor should be regularly checked for looseness, and the power cord on the motor should be regularly checked for looseness and damage. If necessary, corresponding measures should be taken to handle or even replace them;

c) At the breathing tube, during long-term use, due to the presence of trace amounts of oil and gas in the exhaust gas, the accumulation of this oil and gas over a long period of time can give people the illusion of spraying oil into the air compressor; And if there are too many surface stains on the breathing tube, it will affect the discharge of exhaust gas inside the air compressor, leading to excessive negative pressure inside the air compressor; Therefore, it is necessary to regularly clean and inspect the mouth of the breathing tube;

6. Motor

- a) Do not touch the surface of the motor with your hands during the operation of the air compressor;
- b) Regularly clean the surface dust of the motor to prevent poor heat dissipation caused by dust coverage or other factors;
- c) The motor and the entire air compressor need to be grounded to prevent electric leakage accidents;
- d) During the operation of the motor, it is necessary to ensure that the direction of motor operation is consistent with the marked direction.

7. Fault repair

- a) The holder of the air compressor shall bear the maintenance responsibility for the air compressor, and all damaged parts caused by wear, collision, etc. must be replaced in a timely manner;
- b) Qualified and trained personnel are required for inspection, operation, and maintenance;
- c) When troubleshooting, please make sure to cut off the power supply and drain the internal pressure before proceeding; If users are unable to analyze and troubleshoot faults, please contact our company.
- d) When troubleshooting the air compressor, it is necessary to ensure that the intake and exhaust pipelines of the air compressor are unobstructed, and then confirm that the relevant connectors on the electric air compressor are in good contact (power cord, pressure sensor harness) before conducting the troubleshooting;
- e) When the air compressor fails to start and run, please make sure that the vehicle signal is transmitted first, then ensure that the ACU (power supply is transmitted to the air compressor), and then ensure that there is oil in the oil pan of the air compressor. Finally, troubleshoot other components.
- f) The maintenance cycle and items are shown in the table below

Table Air compressor maintenance items and cycles

S/N	Maintenance	Maintenance	Operating	Maintenance mileage and interval (whichever comes first)
-----	-------------	-------------	-----------	--

	items	requirements	instructions	12×1000km (Regular maintenance)	Running in period (First maintenance) 25×1000km	Every 50×1000km
				Every 3 months	Every 6 months	Every 12 months
1	Clean/replace the air filter element	Keep clean and unobstructed (if the filter element is found to be too dirty to clean, it should be replaced immediately)	Open the buckle around the air filter, remove the dust box and take out the filter element. Use an air gun to clean the dust, then reinstall it in its original state;	Inspection	Cleaning/replacement	Replacement
2	Clean/replace the muffler filter element	Keep clean and unobstructed (if the filter element is found to be too dirty to clean, it should be replaced immediately)	Tighten the bolts on the end cover, take out the muffler end cover along with the filter element, clean the dust with it an air gun, and reinstall it in its original state after cleaning	Inspection	Cleaning/replacement	Replacement
3	Check the low-voltage wiring harness and connectors	The low-voltage wiring harness is not damaged, and the connectors are not loose	Visually inspect the status of the low-pressure wiring harness of the air compressor. If there is any damage, it needs to be replaced in a timely manner; And	Inspection	Inspection	Inspection

			each wire harness connector should have no looseness;			
4	Check/replace shock pads	There are no cracks on the surface of the shock pad	Visually inspect the damage of the shock pad, and if there is any cracking, replace it immediately	Inspection	Inspection	Inspection/replacement
5	Inspect/clean the surface of the entire machine	The surface of the entire machine is free of dust and mud accumulation, and the surface is clean	Use an air gun to clean the surface of dust and mud	Inspection/cleaning	Inspection/cleaning	Inspection/cleaning
6	Check/replace safety valve	The safety valve is not open	Check if the safety valve is open/if there is obvious airflow at the safety valve port. If there is, replace it immediately	Inspection	Inspection	Inspection/replacement
7	Check/replace the fan	Fan running normally	Check the running status of the fan, and if it is damaged, replace it immediately	Inspection	Inspection	Inspection
8	Replace the machine filter	Normal filtration of machine filter	Dismantle the original machine filter, reinstall the new machine filter as it is,	Inspection	Replacement	Replacement

			and clean the oil stains that leak around the installation position of the machine filter			
9	Oil Change	The oil is clean and free of impurities	Please refer to "4. Changing oil" for details	Inspection	Replacement	Replacement
10	Clean the breathing tube	Breathing tube ventilation is unobstructed	Clean the stains on the breathing tube mouth to prevent blockage of the breathing tube mouth	Inspection/cleaning	Inspection/cleaning	Inspection/cleaning
11	Fixed bolts between the air compressor and the vehicle mounting bracket	The locking is normal and there is no looseness	Check if the fixing bolts are loose, and if so, tighten them	Inspection	Inspection	Inspection

Note: If the usage environment is harsh, the maintenance frequency needs to be increased.

III. Electrical maintenance manual

Chapter I Vehicle lighting maintenance manual

I. Component Introduction

1. Component functions

(I) Headlight

The combination headlamps are located at the front of the vehicle and mainly serve as lighting and signaling. The light emitted by the headlamps can illuminate the road conditions in front of the vehicle, allowing the driver to drive safely in the dark. The combined headlamps are LED energy-saving lights, which can be divided into (1) low beam, (2) high beam, (3) F. turn lamp, (4) front position lamp (also known as clearance lamp, indicating the presence of the vehicle), and front fog lamp according to their functions.

(II) Combination tail lamps

The combination tail lamps are located at the rear of the vehicle and mainly serve as lighting and signaling. Rear lights generally consist of (3) rear position lamps, (5) backup lamps, (1) stop lamps, (2) rear fog lamps, (4) rear turning lights, and reflectors.

(III) Turn signal light

A lamp used to indicate left or right turns to other road users. The regulation requires amber color.

(IV) License lamp

License lamps are mainly used to illuminate license plates, allowing people to distinguish vehicle license plates in the dark.

2. Component structure

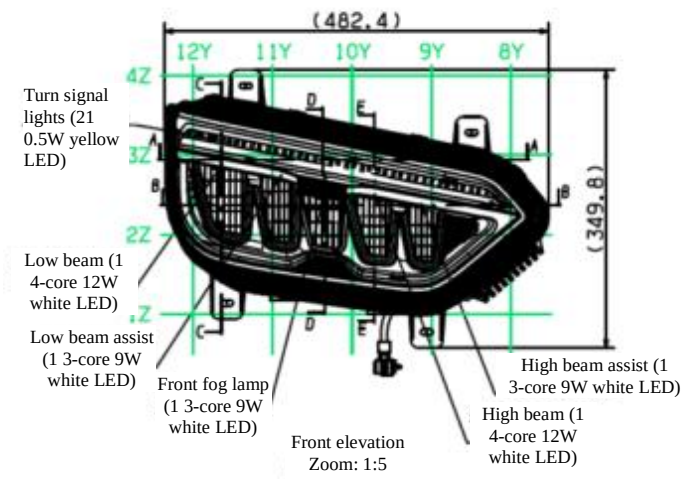


Fig. Front combination lamp structure

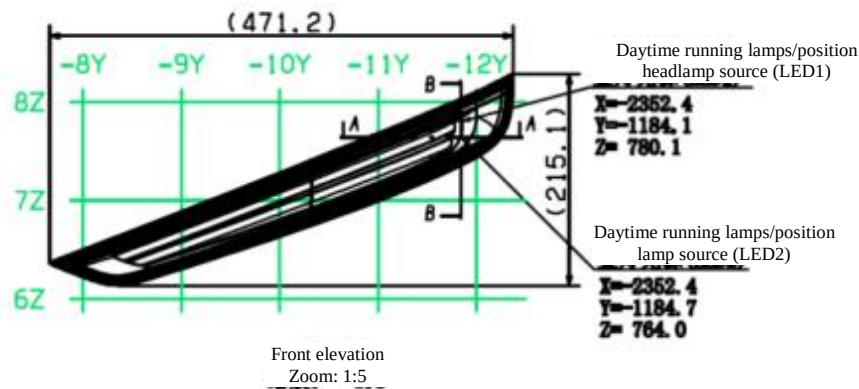


Fig. Structure of daytime running lamps

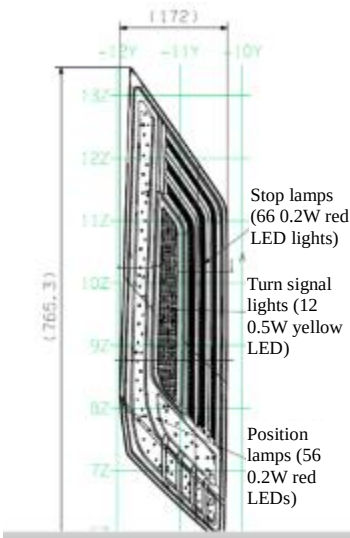


Fig. Rear combination lamp structure

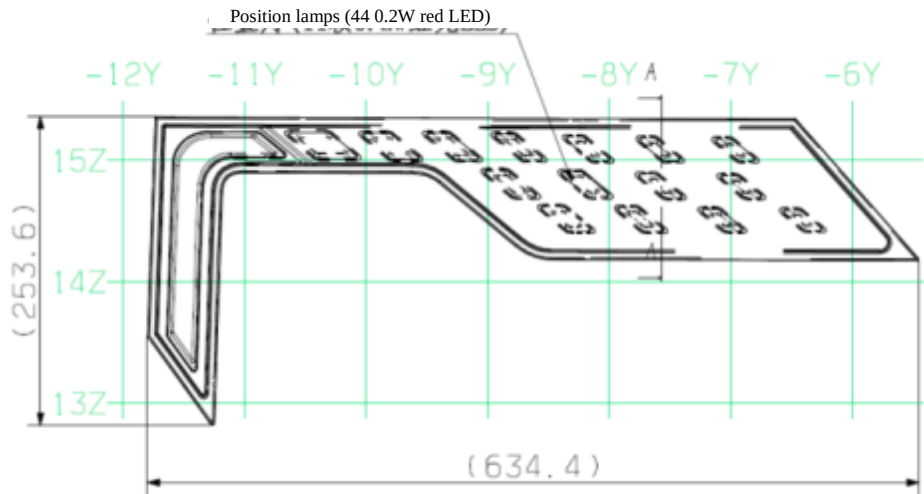


Fig. C-type tail light structure

3. Component principle

None

II. Special Tools

S/N	Tool Name	Quantity
1	Multimeter	1
2	Test lamp	1

III. Maintenance Data

- 1. Rated voltage 24V, working voltage range: 18V~32V.
- 2. The working temperature range is -40 °C~70 °C.

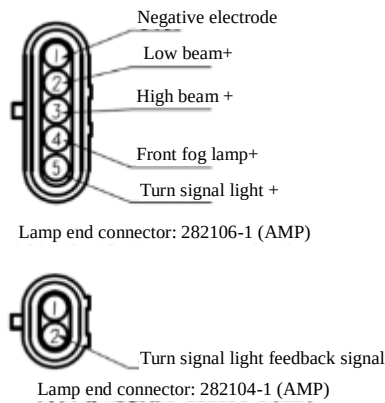
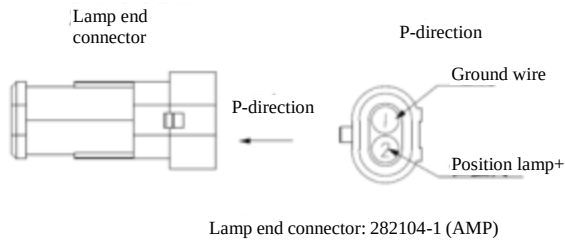
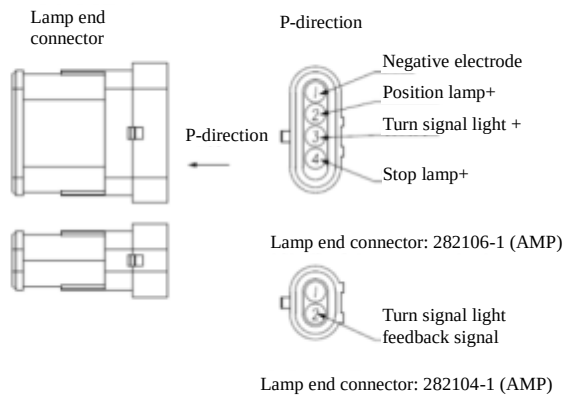
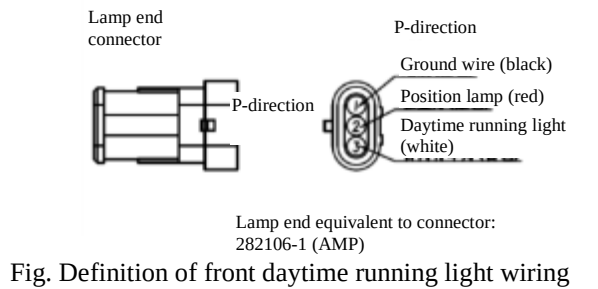


Fig. Definition of headlamp wiring



IV. Circuit Diagram

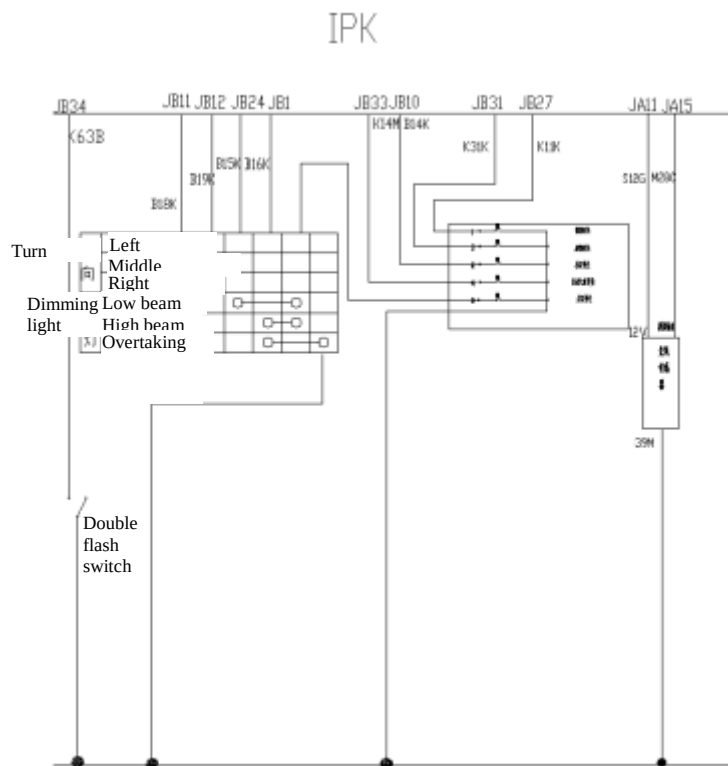


Fig. Schematic diagram of light switch

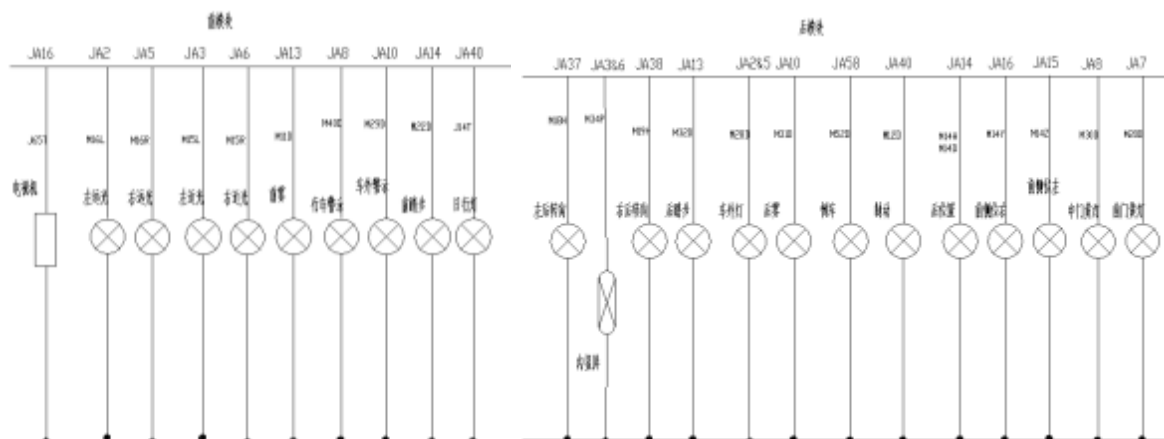


Fig. Schematic diagram of the lights

V. Fault Diagnosis

S/N	Faults	Cause analysis	Troubleshooting method
1	Front left and right headlamps of the vehicle not working	Car light switch malfunction/instrument module malfunction	Replace switches or modules
2	Front left and right turn signals of the vehicle not working	Steering column turn signal switch malfunction/module malfunction	Replace switches or modules
3	Rear stop lamps of the vehicle not working	Brake pedal malfunction inside the compartment/instrument module	Replace the brake pedal or module

		malfunction	
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VI. Method of Disassembly and Assembly

1. Disassembly and assembly of front combination lamp

Step 1: Open the vehicle's front flip panel

Arrangement 2: Gradually remove the 4 fixing bolts of the vehicle lights

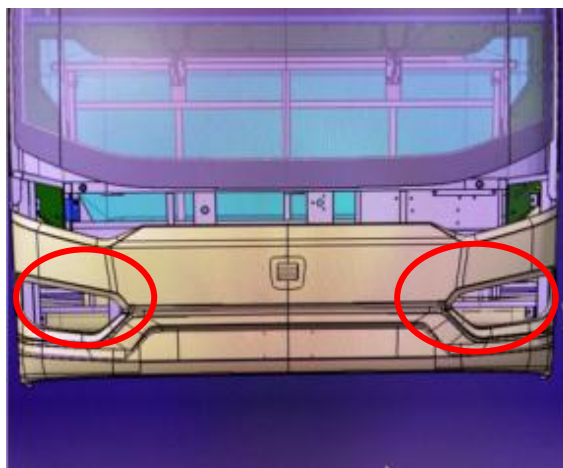


Diagram of the installation position of the front headlamps of the vehicle

The installation hole position of the front headlamp body can be adjusted in the Y direction:

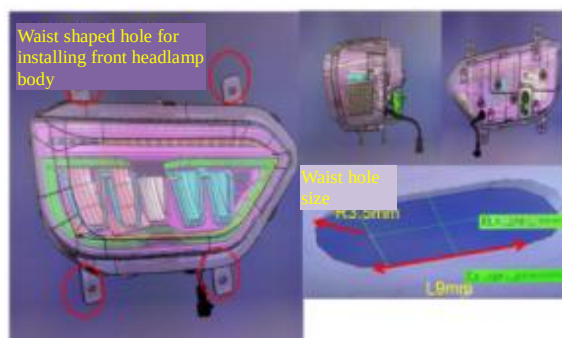


Fig. Vehicle front headlamp mounting bracket

2. Disassembly and assembly of rear combination lamp

Step 1: Open the vehicle's rear flip panel

Arrangement 2: Gradually remove the fixing bolts of the lights



VII. Component Maintenance Cycle and Methods

None

Chapter II Speaker Maintenance Manual

I. Component Introduction

1. Component functions

(1) Internal speaker function

The internal speaker, also known as the "speaker", is a commonly used electro-acoustic transducer. The main function of the "internal speaker" is to transmit arrival information or planned arrival information to passengers.

(2) External speaker function

The external speaker, also known as the "speaker", is a very commonly used electro-acoustic transducer. The main function of the "external speaker" is to remind road vehicles to maintain distance and remind road personnel to pay attention to safety.

2. Component structure

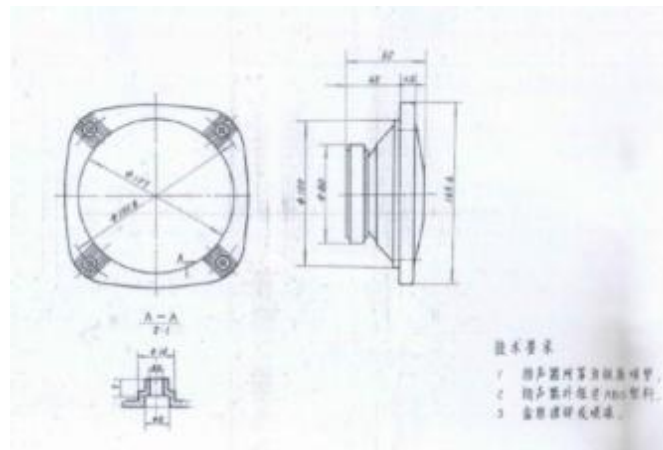


Fig. Speaker structure

3. Component principle

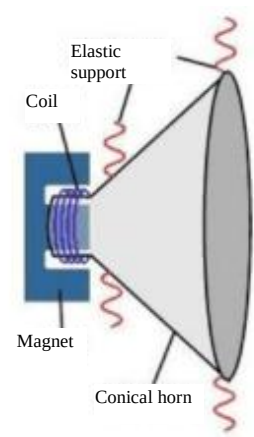


Fig. Speaker principle

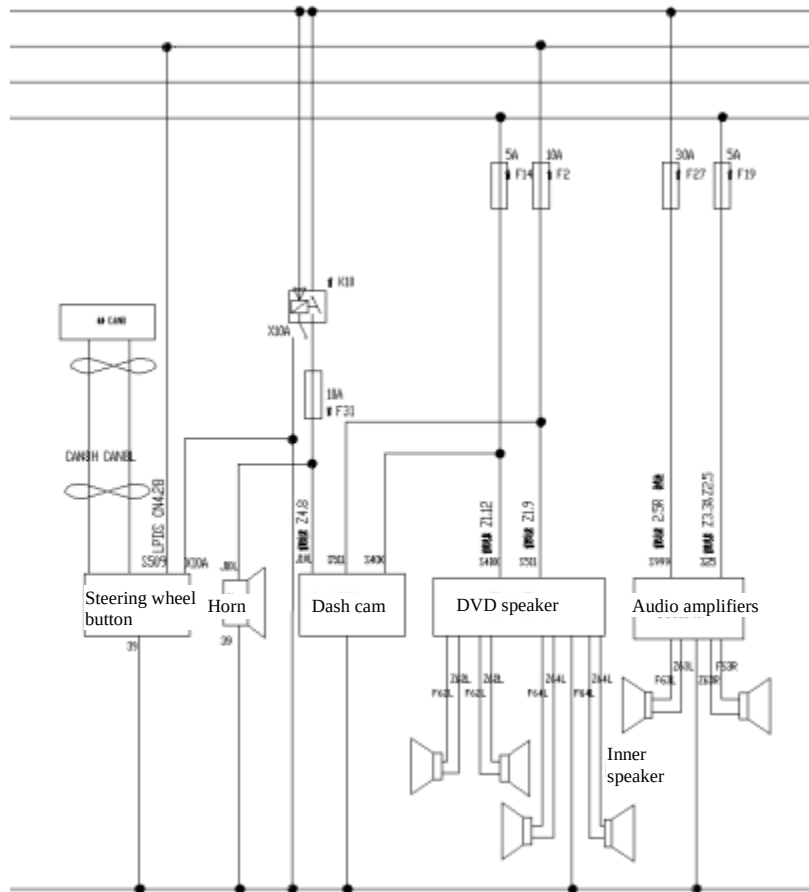
II. Special Tools

S/N	Tool Name	Quantity
1	Multimeter	1
2	Test lamp	1

III. Maintenance Data

None

IV. Circuit Diagram



V. Fault Diagnosis

S/N	Faults	Cause of fault	Measures
1	All internal speakers not working	Possible audio converter malfunction	Replace the audio converter
2	Single inner speaker not working	Speaker malfunction or poor wiring harness contact	Repair wiring harness or replace speaker
3	External speaker not working	Horn wire malfunction/horn relay malfunction/fuse blown	Handle according to the fault symptoms

VI. Method of Disassembly and Assembly

1. External speaker disassembly and assembly (1 piece)

Step 1: Open the front flap of the vehicle.

Step 2: Remove the M6×25 hexagonal bolt that fixes the horn. See the figure below



Fig. External speaker disassembly

2. Internal speaker disassembly and assembly (4 air ducts inside the compartment)

Step 1: Open the air duct cover inside the vehicle compartment.

Step 2: Remove four ST4.2×20 cross pan head self-tapping screws. See the figure below



Fig. Internal speaker disassembly

VII. Component Maintenance Cycle and Methods

None

Chapter III Combination Instrument Maintenance Manual

I. Component Introduction

1. Component functions

The vehicle instrument interface of this vehicle is simple and powerful, compatible with the usage requirements of traditional cars, hybrid cars, pure electric cars, and fuel cell buses and other new energy vehicles. It meets the electromagnetic compatibility (EMC) requirements of new energy vehicle standards, has 12.3-inch TFT display technology, and is equipped with a body control module. The instrument panel can display various traditional vehicle interior information, including vehicle speed, mileage, various interior voltage, current, air pressure, etc. It can also display information related to new energy vehicles, including power batteries, motors, etc. It can also display various fault indicator signals. At the same time, in conjunction with various body control modules, it can reflect various information on the body and chassis to the instrument panel to provide maintenance operation guidance.

2. Component structure

This instrument consists of three parts, namely the combination instrument, the front module of the instrument, and the rear module of the instrument.

The structure of the combination instrument is shown in the following figure.

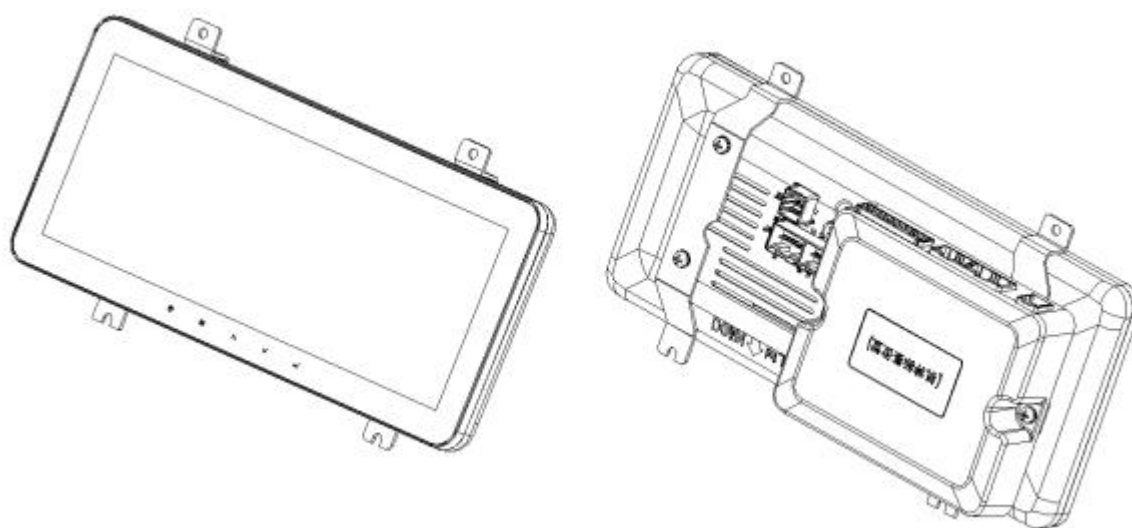


Fig. Combination instrument structure

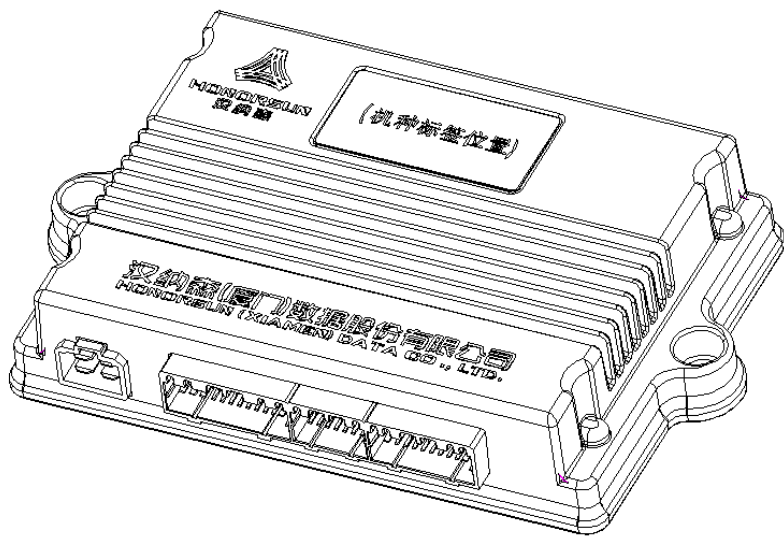


Fig. Instrument module

II. Special Tools

PCAN is used to detect the communication status and data analysis between instruments and modules.

III. Maintenance Data

1. The definition of instrument interface is shown in the table below:

Table Instrument interface definition

Sleeve	Type	Interface characteristics	Definition	Annotation	Wire number	Logical description
JA1		Video 1			7301	
JA2		Video 2			2060	
JA3		Instrument power supply-	Instrument power supply-	Grounding	3029	
JA4		Instrument power supply-	Instrument power supply-	Grounding	3029	
JA5	Diagnostic power supply	12V power output	12V power output	12V power output	MCL	
JA6	Diagnostic power	12V power output	12V power output	12V power output	TCL	

Sleeve	Type	Interface characteristics	Definition	Annotation	Wire number	Logical description
	supply					
JA7	Diagnostic power supply	12V power output	12V power output	12V power output	MCH	
JA8	Diagnostic power supply	12V power output	12V power output	12V power output	TCH	
JA9		Instrument power supply-	Instrument power supply-	Grounding	P1	
JA10		Instrument power supply-	Instrument power supply-	Grounding	P	
JA11		Video 3				
JA12		Video 4			3100	
JA13		External CAN shield wire	CAN matrix CAN1	External CAN shield wire		
JA14		Core board CAN line shield wire		Core board CAN line shield wire	2140	
JA15	Default valid	External CAN end-of-line resistor selection pin	Matchable	120 ohmic resistance selection pin	7617	
JA16		Core board CAN low		Core board CAN low	2612	
JA17		External CAN low	CAN matrix CAN1	External CAN low	2096	
JA18		Core exterior CAN high		Core exterior CAN high	9301	
JA19		External CAN high	CAN matrix CAN1	External CAN high		
JA20		Instrument power supply-	Power supply-	Grounding	1863	
JA21		RS485_B				
JA22	Switch	Positively or negatively controlled, with weak driving current	ON gear switch	High level input	1864	With wake-up function, entering the main interface
JA23		RS485_A			6903	
JA24		AMP_WAKE			2728	
JA25		RS232_TX			2007	
JA26		5W_SPK+			2008	
JA27		RS232_RX			2097	

Sleeve	Type	Interface characteristics	Definition	Annotation	Wire number	Logical description
JA28					2098	
JB1		Instrument power supply-	Power supply-	Grounding	3532	
JB2	Diagnostic power supply	Instrument power supply+	Power supply+	Power supply+	3100	
JB3	Switch	Positively or negatively controlled, with weak driving current	ACC gear switch	High level input	5115	With wake-up function, displaying logo
JB4		Internal CAN high	CAN high inside the instrument panel	Internal CAN high	5113	
JB5	Switch	Positively or negatively controlled, with weak driving current	External charging signal	High level input	2565	With wake-up function, entering the main interface
JB6		Internal CAN low	CAN low in the instrument panel	Internal CAN low		
JB7	Default valid	Internal CAN end-of-line resistor selection pin	Internal CAN end-of-line resistor selection pin		2088	
JB8		Internal CAN shield wire		Internal CAN shield wire	2089	

2. The definition of domain control module is shown in the table below:

Table Definition of domain control module

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
JB1	Positively or negatively controlled, with weak driving current	High beam headlight switch	Low level input	Icon	Switch
JB2	CAN2 end-of-line	Multi-function	CAN2		

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
	resistor selection pin	steering wheel and TPMS	end-of-line resistor selection pin		
JB3	Positively or negatively controlled, with weak driving current	Rear door unlocking switch	Low level input		Switch
JB4	Only negatively controlled, with an upward pull of 120mA driving current	TV switch	Low level input		Switch
JB5	Positively or negatively controlled, with weak driving current	Hill starting	Low level input	CAN sending	Switch
JB6	Positively or negatively controlled, with weak driving current	Rear door locking switch	Low level input		Switch
JB7	Positively or negatively controlled, with weak driving current	Ventilation fan switch	Low level input		Switch
JB8	Positively or negatively controlled, with weak driving current	Driver seat belt switch	Low level input	Icon, hovering normally, grounding alarm, indicator lit up when the vehicle is not under high voltage, indicator flashing and buzzing when the vehicle is under high voltage	Switch
JB9	Positively or negatively controlled, with weak driving current	Internal display screen switch	Low level input		Switch
JB10	Positively or negatively controlled, with weak driving current	Position lamp switch	Low level input	Instrument backlight	Switch

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
JB11	Positively or negatively controlled, with weak driving current	Left turn signal light switch	Low level input	Icon	Switch
JB12	Positively or negatively controlled, with weak driving current	Right turn signal light switch	Low level input	Icon	Switch
JB13	Only positively controlled	Emergency stop switch input	High level input	Wake up function, automatically turn on double flashing; Front and rear courtesy lamps; When the vehicle speed is less than 1, open the door (highly effective), enter the main interface, light up the double flashing and emergency stop icon	Switch
JB14	Only positively controlled		High level input		Switch
JB15	Positively or negatively controlled, with weak driving current	ECAS up switch	Low level input	Icon, CAN sending	Switch
JB16	Only positively controlled	PTC heating signal	High level input	CAN transmission	Switch
JB18	Only negatively controlled, with an upward pull of 120mA driving current	ASR switch	Low level input		Switch
JB19	Positively or negatively controlled, with weak driving current	ECAS descent switch	Low level input	Icon, CAN sending	Switch
JB20	Only negatively controlled, with an upward pull of 50mA driving current	External warning light switch	Low level input		Switch

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
JB22	Only negatively controlled, driving current 10ma	Wheelchair elevator area seat belt switch	Low level input	Icon, hovering normally, grounding alarm, indicator lit up when the vehicle is not under high voltage, indicator flashing and buzzing when the vehicle is under high voltage	Switch
JB23	Positively or negatively controlled, with weak driving current	ECAS ecas kneeling switch	Low level input	Icon, CAN sending	Switch
JB24	Only negatively controlled, driving current 10ma	Low beam switch	Low level input	Icon	Switch
JB25	Positively or negatively controlled, with weak driving current	ECAS reset switch	Low level input	Icon, CAN sending	Switch
JB27	Positively or negatively controlled, with weak driving current	Front foglight switch	Low level input	Icon, self-locking switch	Switch
JB29	Positively or negatively controlled, with weak driving current	Front door unlocking switch	Low level input	With wake-up function, only opening the door with the screen not up	Switch
JB31	Positively or negatively controlled, with weak driving current	Rear fog lamp switch	Low level input	Icon, self-locking switch	Switch
JB32	Positively or negatively controlled, with weak driving current	Front door locking switch	Low level input	With wake-up function, only closing the door with the screen not up	Switch
JB33	Positively or negatively controlled, with weak driving current	Automatic headlamp switch	Low level input		Switch

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
JB34	Positively or negatively controlled, with weak driving current	Emergency alarm switch	Low level input	Grounding alarm, icon, click sound, entering the main interface, lighting up dual flashing icon	Switch
JB35	Positively or negatively controlled, with weak driving current	Washer switch	Low level input		Switch
JB36	Positively or negatively controlled, with weak driving current	Automatic headlamp switch	Low level input		Switch
JB37	Positively or negatively controlled, with weak driving current	Wiper intermittent switch	Low level input		Switch
JB38	Positively or negatively controlled, with weak driving current	Wiper low speed switch	Low level input		Switch
JB39	Positively or negatively controlled, with weak driving current	Wiper high-speed switch	Low level input		Switch
JB40	Instrument power supply-	Instrument power supply-	Grounding		Diagnostic power supply
JC1	Instrument power supply-	Instrument power supply-	Grounding		Diagnostic power supply
JC2	Power output	Power output	Power output docking instrument		Diagnostic power supply
JC4	CAN1 (internal can) high	CAN1 (internal can) high	CANH inside the instrument panel	CANH inside the instrument panel	
JC6	CAN1 (internal can) low	CAN1 (internal can) low	CANL inside the instrument	CANL inside the instrument panel	

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
			panel		
JC8	CAN1 (internal can) shield wire	CAN1 shield wire	Instrument internal wire shield wire	CAN shielding inside the instrument panel	
JA1	Power supply+	Power supply+	Power supply+24V		Diagnostic power supply
JA2	Power supply+	Power supply+	Power supply+24V		Diagnostic power supply
JA4	Instrument power supply-	Instrument power supply-	Grounding		
JA6	Instrument power supply-	Instrument power supply-	Grounding		
JA8	CAN3 shield wire	CAN matrix CAN2	CAN3 shield wire		
JA11	12V power output	Light sensor power supply	When capturing pulses, it should also be turned on		Load
JA14	CAN2 high	Multi-function steering wheel and TPMS	Can2 high		
JA15	Analog input (0-5v) coefficient: 103, Pull-up resistance: 0, pull-down resistance: 10000	Light sensor	Offset: -20; Bit value: 1; Measurement value: 27,51,102,208, 382,560; Corresponding values: 150,120,90,60, 30,0; Minimum open circuit AD value: 245; Filter level: 1;	>3V signal valid	Sensor

Sleeve	Interface characteristics	Definition	Annotation	Logical confirmation	Type
			Diagnostic type: default valid;		
JA16	CAN2 low	Multi-function steering wheel and TPMS	Can2 low		
JA18	Only positively controlled	Battery charging switch	High level input	Wakeable	Switch
JA21	CAN3 low	CAN matrix CAN2	External can3 low		
JA23	CAN3 high	CAN matrix CAN2	External can3 low		

3. The wiring definition of the instrument front control drive module is shown in the table below:

Table Definition of wiring for instrument front control drive module

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
JA1	Load	Power output (maximum output current 11A)	Low speed wiper	High level output, $\leq 11A$	Key switch ACC valid $\cap$ (wiper low speed switch ON; wiper intermittent switch ON and the interval time up; washer switch ON, wiping back and forth 3 times; wiper high speed switch OFF and wiper reset signal OFF; wiper low speed on) switch

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
					OFF and the wiper reset signal OFF
JA2	Load	Power output (maximum output current 9A)	High beam	High level output, $\leq 9A$	High beam switch ON $\cap$ Key switch ACC valid
JA3	Load	Power output (maximum output current 9A)	Low beam	High level output, $\leq 9A$	(Low beam switch ON $\cap$ position lamp switch ON $\cap$ key switch ACC valid) $\cup$ (automatic headlamp sensor sensing no light $\cap$ automatic headlamp switch ON
JA4	Parallel with JA1		Parallel with JA1		
JA7	Load	Power output (maximum output current 9A)	High speed wipers	High level output, $\leq 13A$	Wiper high-speed switch ON $\cap$ key switch ACC valid
JA8	Load	Power output (maximum output current 5A)	Install yellow LED warning lights in the front of the car	High level output, $\leq 5A$	Vehicle speed greater than 1km/h
JA9	Parallel with JA7		Parallel with JA7		
JA10	Load	Power output (maximum output current 5A)	External warning lights	High level output, $\leq 5A$	External warning light switch
JA13	Load	Power output (maximum output current 5A)	Front fog lamps	High level output, $\leq 5A$	[Position lamp switch ON $\cup$ (automatic headlamp sensor sensing no light $\cap$ automatic headlamp switch ON] $\cap$ Front fog lamp switch ON $\cap$ Key switch ACC valid

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
JA14	Load	Power output (maximum output current 5A)	Front courtesy lamp	High level output, $\leq 5A$	([Position lamp switch ON $\cup$ (automatic headlamp sensor sensing no light $\cap$ automatic headlamp switch ON)] $\cap$ Front door limit switch ON $\cap$ Key switch ACC valid) $\cup$ Emergency stop switch input ON
JA15	Load	Power output (maximum output current 5A)	Electric air conditioning control power supply	High level output, $\leq 5A$	CAN message of electric air conditioner $\cap$ high-voltage ready valid
JA16	Load	Power output (maximum output current 5A)	Television set	High level output, $\leq 5A$	TV switch ON $\cap$ Key switch ACC on valid
JA17	Switch	Positively or negatively controlled, with weak driving current	Wiper reset switch	Low level input	
JA18	Switch	Positively or negatively controlled, with weak driving current		Low level input	
JA19	Switch	Positively or negatively controlled, with weak driving current		Low level input	
JA20	Switch	Positively or negatively controlled, with weak driving current		Low level input	
JA21	Switch	Only positively controlled, with an upward pull of 10mA driving	Front door limit switch signal	High level input	Associated icon, sending message

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
		current			
JA31	Sensor	Analog input (0-5v) coefficient: 103, Pull-up resistance: 0, pull-down resistance: 10000	Front air pressure sensor	Offset: 0; Bit value: 0.01; Measurement value: 0.50,1.50,2.00,2.50,3.00,3.50; Corresponding value: 0,0.40,0.60,0.80,1.00,1.20; Minimum open circuit AD value: 10; Filter level: 1;	
JA32	Sensor	Analog input (0-5v) coefficient: 103, Pull-up resistance: 0, pull-down resistance: 10000	Moisture pressure sensor	Offset: 0; Bit value: 0.01; Measurement value: 0.50,1.50,2.00,2.50,3.00,3.50; Corresponding value: 0,0.40,0.60,0.80,1.00,1.20; Minimum open circuit AD value: 10; Filter level: 1;	
JA40	Load	Power output (maximum output current 2.5A)	Daily running lights	High level output, $\leq 2.5A$	High-voltage ready valid $\cap$ [(position lamp switch OFF $\cap$ automatic headlight switch OFF) $\cup$ (automatic headlamp sensor sensing light $\cap$ automatic headlamp switch ON)]
JA43	Switch	Positively or negatively controlled, with weak driving current			
JA44	Switch	Positively or negatively controlled, with weak driving current			
JA45	Switch	Positively or negatively controlled, with	Hand brake switch signal	Low level input	Icon

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
		weak driving current			
JA46	Switch	Positively or negatively controlled, with weak driving current	Door pump emergency valve alarm switch	Low level input	Icon, grounding alarm, normal hovering
JA47	Switch	Only negatively controlled, with an upward pull of 10mA driving current	Door bell for people with disabilities getting off the car	Low level input	Yellow icon display, buzzing
JA49	Load	Power output (maximum output current 2.5A)	Left front/side turn signal light	High level output, $\leq 2.5A$	(Left turn switch ON $\cap$ key switch ACC valid) $\cup$ Emergency stop switch input ON $\cup$ Red light switch ON [Output frequency 1.5Hz]
JA50	Load	Power output (maximum output current 2.5A)	Right front/side turn signal light	High level output, $\leq 2.5A$	(Right turn switch ON $\cup$ Key switch ACC valid) $\rightarrow$ Emergency stop switch input ON $\cup$ Hazard signal switch ON [Output frequency 1.5Hz]
JA51	Load	Power output (maximum output current 2.5A)	Washer motor	High level output, $\leq 2.5A$	Washer switch ON $\cap$ key switch ACC valid
JA52	Load	Power output (maximum output current 2.5A)	Battery charging condition	High level output, $\leq 2.5A$	Output conditions: Any wake-up signal $\cap$ Odd battery charging switch is on (valid) $\cap$ Rear door is closed OFF (valid) (continuous output for 30 minutes and then stop) Closing conditions: 1) If the battery charging switch is in an even position during

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
					the output process, the output will stop; 2)If the high-voltage ready signal is active or the rear door is opened during the output process, the output will stop;
JA53		Module identification	Grounding	Address 1	Module identification
JA54		Module identification	Grounding	Address 2	Module identification
JA58	Load	Power output (maximum output current 2A)	Front position lamp	High level output, $\leq 2A$	[Position lamp switch ON $\cup$ (automatic headlamp sensor sensing no light $\cap$ automatic headlamp switch ON)] $\cap$ key switch ACC valid
JA59	Load	Power output (maximum output current 2A)	Low speed buzzer	High level output, $\leq 2A$	High-voltage Ready valid $\cap$ (1km/h < Speed < 20km/h) $\cap$ Gear D message valid
JA61		Internal CAN shield wire (internally grounded)	Internal CAN shield wire	CAN-SHLD (shield)	
JA62		Internal CAN low	Internal CAN low	CANL	
JA63		Internal CAN high	Internal CAN high	CANH	
JB1		Power supply-	Power supply-	Grounding	
JB2		Power supply-	Power supply-	Grounding	
JB3		Power supply+24V	Power supply+	Constant power supply+	
JB4		Power supply+24V	Power supply+	Constant power supply+	

4. The definition of the instrument rear control drive module is shown in the table

below:

Table Definition of instrument rear control drive module

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
JA1	Load	Power output (maximum output current 9A)	Ventilator	High level output, $\leq 9A$	Ventilator switch ON $\cap$ Key switch ACC valid
JA2	Load	Power output (maximum output current 9A)	Exterior light	High level output, $\leq 9A$	Daily running lights or position lamps
JA3	Load	Power output (maximum output current 9A)	Internal display screen	High level output, $\leq 9A$	Internal display screen ON $\cap$ Key switch ACC valid
JA7	Load	Power output (maximum output current 9A)	Front door yellow light	High level output, $\leq 9A$	When any wake-up signal $\cap$ front door switch ON is active, there will be a delayed flashing output for 2 seconds. The blinking frequency will be 0.5 seconds on and 0.5 seconds off, accompanied by a beeping sound alert.
JA8	Load	Power output (maximum output current 5A)	Rear door yellow light	High level output, $\leq 5A$	When any wake-up signal $\cap$ rear door switch ON is active, there will be a delayed flashing output for 2 seconds. The blinking frequency will be 0.5 seconds on and 0.5 seconds off, accompanied by a beeping sound alert.
JA10	Load	Power output (maximum output current 5A)	Rear fog lamps	High level output, $\leq 5A$	Key ON $\cap$ [Position lamp switch ON $\cup$ (Automatic headlamp sensor

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
					sensing no light $\cap$ Automatic headlamp switch ON] $\cap$ [Front fog lamp switch ON $\cup$ Low beam switch ON $\cup$ High beam switch ON] $\cap$ Rear fog lamp switch effective
JA13	Load	Power output (maximum output current 5A)	Rear courtesy lamp	High level output, $\leq 5A$	([Position lamp switch ON $\cup$ (Automatic headlamp sensor sensing no light $\cap$ Automatic headlamp switch ON)] $\cap$ Rear door limit switch ON $\cap$ Key switch ACC valid) $\cup$ Emergency stop switch input ON
JA14	Load	Power output (maximum output current 5A)	Rear position lamp output	High level output, $\leq 5A$	Position lamp switch ON $\cup$ Key switch ACC is effective
JA15	Load	Power output (maximum output current 5A)			
JA16	Load	Power output (maximum output current 5A)			
JA17	Switch	Positively or negatively controlled, with weak driving current		Low level input	
JA18	Switch	Positively or negatively controlled, with	Get off doorbell	Low level input	Icon, buzzer, door unlocking logic

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
		weak driving current			
JA19	Switch	Positively or negatively controlled, with weak driving current	Cooling water level alarm switch	Low level input	Normal grounding, hovering alarm, associated icon
JA20	Switch	Positively or negatively controlled, with weak driving current	Rear compartment door unlocking signal	Low level input	Icon, CAN sending
JA21	Switch	Only positively controlled, with an upward pull of 10mA driving current	Rear door limit switch signal	High level input	Associated icon, sending message (rear door for this vehicle)
JA22	Switch	Only positively controlled, with an upward pull of 10mA driving current		High level input	
JA23	Switch	Positively or negatively controlled, with weak driving current		High level input	
JA24	Switch	Positively or negatively controlled, with weak driving current		Low level input	
JA29	Sensor	Analog input (0-2000 ohms) coefficient: 40, Pull-up resistor: 1000, pull-down resistor: 0	Water temperature sensor inlet water	Offset: -20; Bit value: 1; Measurement value: 10,256,827,1750,3611,14000; Display value: 140,110,70,50,30,0; Minimum open circuit AD value: 245; Filter level: 1; Diagnostic type: default valid;	

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
JA30	Sensor	Analog input (0-2000 ohms) coefficient: 40, Pull-up resistor: 1000, pull-down resistor: 0	Water temperature sensor outlet water	Offset: -20; Bit value: 1; Measurement value: 10,256,827,1750,3611,14000; Corresponding value: 140,110,70,50,30,0; Minimum open circuit AD value: 245; Filter level: 1; Diagnostic type: default valid;	
JA31	Sensor	Analog input (0-5v) coefficient: 103, Pull-up resistance: 0, pull-down resistance: 10000	Rear air pressure sensor	Offset: 0; Bit value: 0.01; Measurement value: 0.50,1.50,2.00,2.50,3.00,3.50; Corresponding value: 0,0.40,0.60,0.80,1.00,1.20; Minimum open circuit AD value: 10; Filter level: 1;	
JA37	Load	Power output (maximum output current 2.5A)	Left rear (top) turn signal light	High level output, $\leq 2.5A$	(Left turn switch ON $\cap$ key switch ACC valid) $\cup$ Emergency stop switch input ON $\cup$ Red light switch ON [Output frequency 1.5Hz]
JA38	Load	Power output (maximum output current 2.5A)	Right rear (top) turn signal light	High level output, $\leq 2.5A$	(Right turn switch ON $\cup$ Key switch ACC valid) $\rightarrow$ Emergency stop switch input ON $\cup$ Hazard signal switch ON [Output frequency 1.5Hz]
JA39	Load	Power output (maximum output current 2.5A)	Blowback solenoid valve	High level output, $\leq 2.5A$	1. After any one of the front, rear, and wet tanks has a pressure greater than 1.05Mpa, delay for 1 second and continue to output

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
					for 20 seconds before stopping; 2. When the air pump is enabled to output, it outputs 2 seconds every 30 seconds.
JA40	Load	Power output (maximum output current 2.5A)	Rear roof brake lamp	High level output, $\leq 2.5A$	[(ESC brake effective and handbrake ineffective) $\cup$ Brake signal valid] $\cap$ Key switch ON valid
JA43	Switch	Positively or negatively controlled, with weak driving current			
JA44	Switch	Positively or negatively controlled, with weak driving current			
JA47	Switch	Only negatively controlled, with an upward pull of 10mA driving current	Door bell for people with disabilities getting off the car	Low level input	Yellow icon display, buzzing
JA49	Load	Power output (maximum output current 2.5A)	Front door unlock solenoid valve	High level output, $\leq 2.5A$	Any wake-up signal $\cap$ (front door unlock signal ON $\cup$ emergency stop switch input ON) $\cap$ Vehicle speed $< 1\text{km/h}$ [OFF $\rightarrow$ ON, output for at least 1 second]
JA50	Load	Power output (maximum output current 2.5A)	Front door lock solenoid valve	High level output, $\leq 2.5A$	Any wake-up signal $\cap$ front door lock signal ON Note: If the rear

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
					door unlock signal is detected within 1 second, the rear door lock signal will not be detected
JA51	Load	Power output (maximum output current 2.5A)	Rear door unlocking solenoid valve	High level output, $\leq 2.5A$	Any wake-up signal (rear door unlock signal ON $\rightarrow$ emergency stop switch input ON)} Vehicle speed $<1\text{km/h}$ [OFF $\rightarrow$ ON, output for at least 1 second]
JA52	Load	Power output (maximum output current 2.5A)	Rear door locking solenoid valve	High level output, $\leq 2.5A$	Any wake-up signal $\cap$ rear door locking signal ON Note: If the rear door unlock signal is detected within 1 second, the rear door lock signal will not be detected
JA53		Module identification	Power supply	Address 1	Module identification
JA54		Module identification	Grounding	Address 2	Module identification
JA58	Load	Power output (maximum output current 2A)	Backup lamp (horn)	High level output, $\leq 2A$	Reverse signal valid $\cap$ key switch ON valid
JA59	Load	Power output (maximum output current 2A)	Air compressor inflation enabling signal	High level output, $\leq 2A$	(High-voltage ready, effective for any pressure in the front, back, and wet tanks $<0.7\text{Mpa}$) Output until any pressure is greater than 1.05Mpa , delay for 10s, and stop first
JA60	Default valid	When a end-of-line resistor is required	Internal CAN high	120 ohmic resistance selection pin	Internal CAN high connection 120 ohm

Sleeve	Type	Interface characteristics	Definition	Annotation	Logical description
		for this module, connect the pin in parallel with JA63. When no end-of-line resistor is required for this module, the pin will be suspended.	CANH-120		resistor
JA61		Internal CAN shield wire (internally grounded)	Internal CAN shield wire	CAN-SHLD (shield)	
JA62		Internal CAN low	Internal CAN low	CANL	
JA63		Internal CAN high	Internal CAN high	CANH	
JB1		Power supply-	Power supply-	Grounding	
JB2		Power supply-	Power supply-	Grounding	
JB3		Power supply+24V	Power supply+	Constant power supply+	
JB4		Power supply+24V	Power supply+	Constant power supply+	

IV. Circuit Diagram

The working principle of the instrument is shown in the following figure.

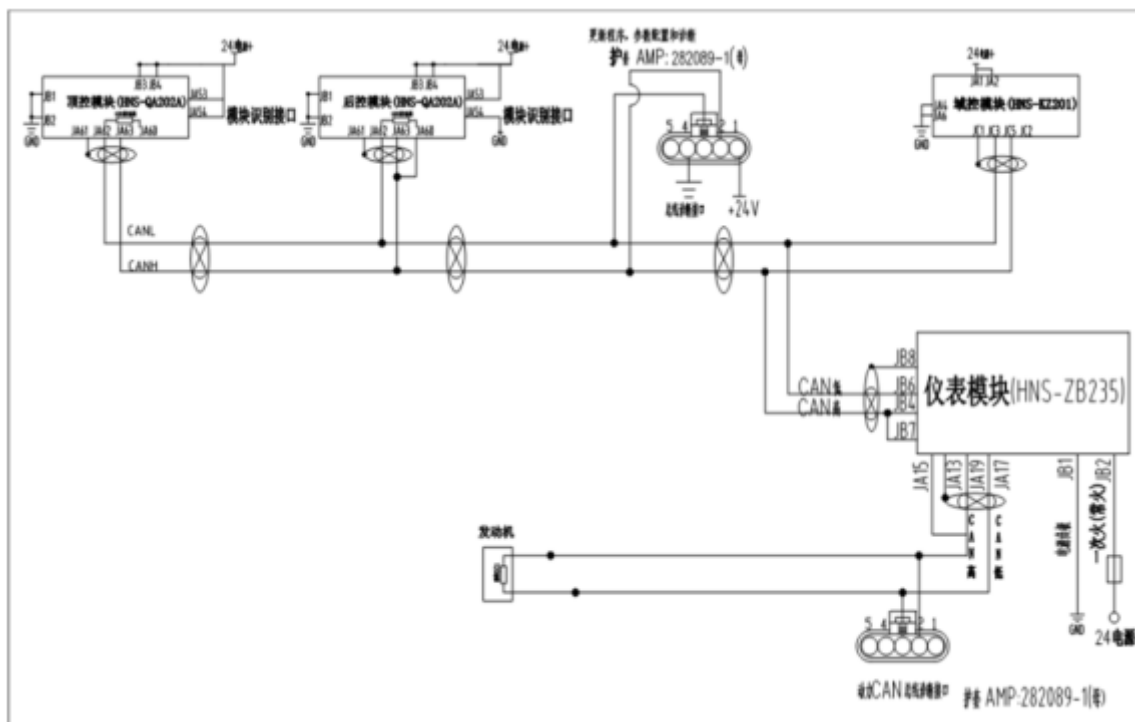


Fig. Instrument working principle

V. Fault Diagnosis

The names and signal sources of instrument faults are shown in the table below:

Code	Name	Alarm icon	Signal source
1	DC/DC not working indication		Hard wire;
2	ASR indication		ASR flashing light Used to read ABS faults
3	High voltage battery fault indication		Power system CAN message
4	High voltage battery cut-off indication		Power system CAN message
5	Serious motor malfunction indication		Serious motor malfunction
6	Insulation fault indication		Insulation fault

Code	Name	Alarm icon	Signal source
7	Overheating fault indication of the power system		Propulsion system overheating fault (Motor temperature greater than 95 °C or motor winding temperature greater than 135 °C)
8	Emergency stop fault indication		Emergency stop fault
9	Severe power system malfunction indication		Power system CAN message
10	Minor fault indication of power system		Minor faults in the power system
11	Low voltage distribution box over temperature indication		Low voltage distribution box over temperature
12	ACU fault indication		ACU malfunction
13	Tire pressure warning indicator		Tire pressure warning
14	Brake shoe wear indicator		Brake shoe wear
15	Fire alarm indication		Fire alarm
16	Emergency valve alarm indication		Emergency valve alarm
17	ATS fault indication		ATS malfunction
18	AutoHold system fault indication		AutoHold system malfunction
19	Communication fault indication		CAN malfunction
20	High voltage interlock indication		High-voltage interlocking signal

Code	Name	Alarm icon	Signal source
21	Oil pump DC/AC fault indication		Oil pump malfunction
22	Air pump DC/AC fault indication		Air compressor failure
23	ECAS over-limit indication		ECAS over-limit
24	ECAS fault indication		ECAS malfunction
25	ECAS ecas kneeling indication		ECAS ecas kneeling
26	Seat belt unfastened alarm indication		Seat belt unfastened signal
27	Cooling liquid level alarm indication		Liquid level sensor
28	Air pressure alarm indication		Air pressure 1 alarm; Air pressure 2 alarm;
29	Defrosting high temperature alarm indication		Defrosting high temperature signal
30	EBS indication		EBS yellow indication
31	EBS indication		EBS red indication
32	ESC indication		ESC indication
33	Station parking indication		Station parking indication signal
34	Hill starting assist indication		Hill indication assist signal
35	Hill starting assist indication		Hill indication assist signal
36	LCA prewarning (left)		Yellow icon flashing
			Red icon flashing

Code	Name	Alarm icon	Signal source
37	LCA warning (right)		Yellow icon flashing
			Red icon flashing
38	Emergency braking system activation		Yellow icon
39	Throttle misstep function enabled		Misstep function signal
40	Wading alarm		Wading alarm switch
41	IES function enabled		IES_C_ON signal

VI. Method of Disassembly and Assembly

Omitted

VII. Component Maintenance Cycle

The combination instrument and modules are inspected every 6 months and cleaned.

Maintenance level	Interval period	Nature of work
Level II maintenance	30,000 Km / 6 Months	Cleaning/inspection

Chapter IV Drive System Maintenance Manual

I. Component Introduction

1. Component functions

The drive control system is the heart of electric vehicles, and its task is to efficiently convert the energy of the power battery into the kinetic energy of the wheels under the control of the driver, driving the vehicle forward.

The drive control system mainly consists of a motor and a motor controller. The energy flow between the motor and the battery is regulated by the controller, and the motor and the wheel are connected together through a mechanical transmission device.

1) Functions of the motor controller

The function of the motor controller is to convert the electrical energy stored in the power battery into the electrical energy required to drive the motor based on instructions such as gear, throttle, and brake, in order to control the starting operation, forward and backward speed, climbing force, and other driving states of the electric vehicle, or to assist the electric vehicle in braking and store some braking energy in the power battery. It is one of the key components of electric vehicles.

Table Technical parameters of motor controller

Model	KTZ62X41SD09
Cooling method	Water circulation cooling
Input voltage	624 V
Maximum operating current	410 A
External dimensions	460×244×109mm
Ambient temperature	-40°C ~ 85°C
Protection level	IP67

2) Function of the motor

The actuator of the driving motor power system is the carrier for converting electrical energy into mechanical energy. It plays a role in driving or stopping the vehicle during driving, and in braking and energy recovery during the vehicle braking process.

Table Technical parameters of the drive motor

Model	TZ365XSD09
Drive motor type	Permanent magnet synchronous motor
Cooling method	Water circulation cooling
Rated voltage	419 V
Rated power	120 KW
Maximum power	190 KW
Rated torque	1273 N·m
Maximum torque	2000 N·m
Maximum speed	9000 r/min

2. Component structure



Fig. Outline of motor controller

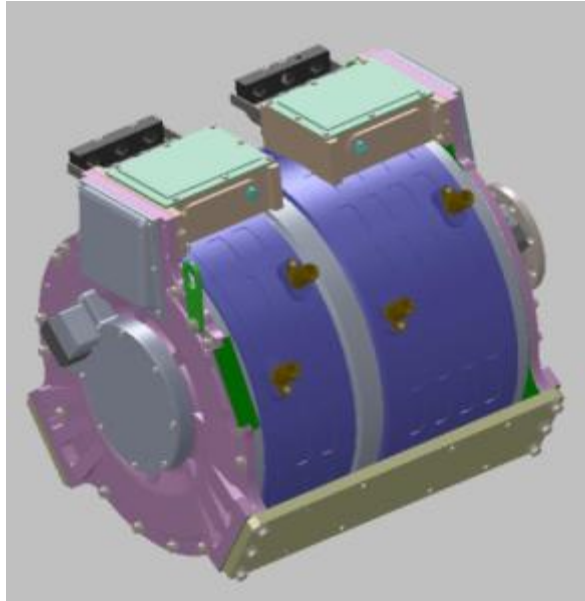


Fig. Motor outline

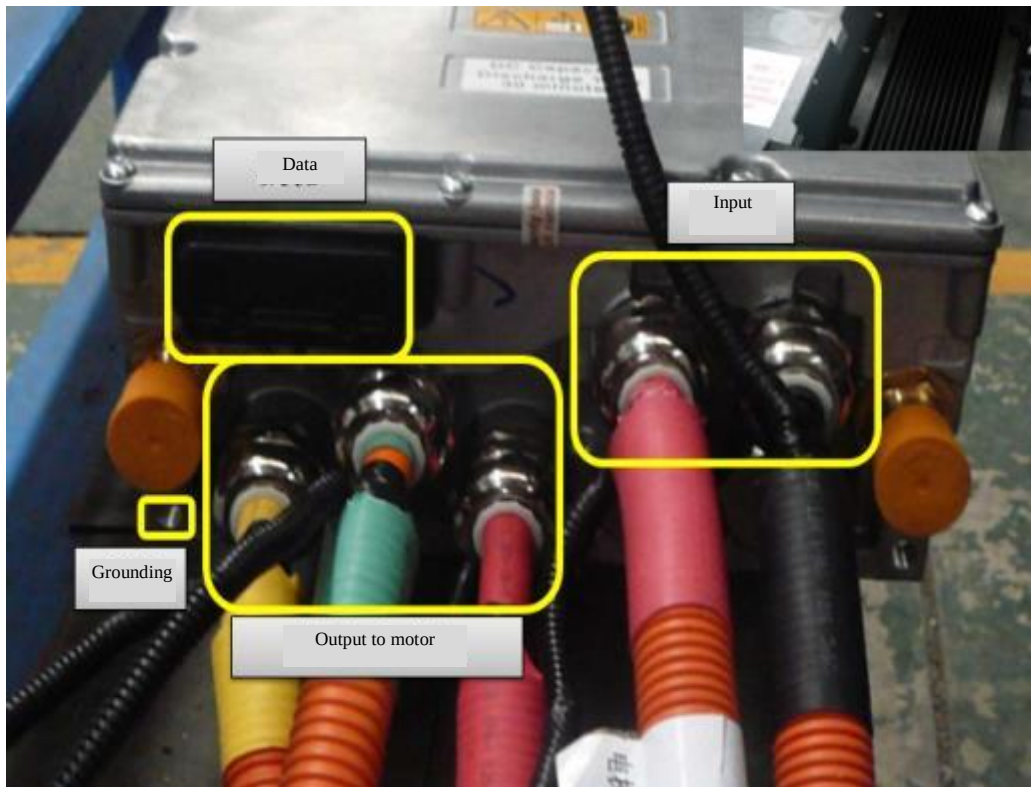


Fig. Position of the controller high voltage cable outlet

3. Component principle

The motor controller is an integrated circuit that controls the motor to operate according to the set direction, speed, angle, and response time through active operation.

The drive motor and motor controller are connected through three-phase high-voltage lines and low-voltage signal harnesses. The motor system is connected to the entire vehicle through

positive and negative high-voltage lines and low-voltage wiring harnesses, and communicates with the entire vehicle through CAN bus.

II. Special Tools

S/N	Tool type
1	Multimeter
2	Clamp-on ammeter
3	AC500V megger
4	Insulation detector
5	Insulation tool set

III. Maintenance Data

1. The overall layout of the motor and controller cables and connectors is shown in the following figure:

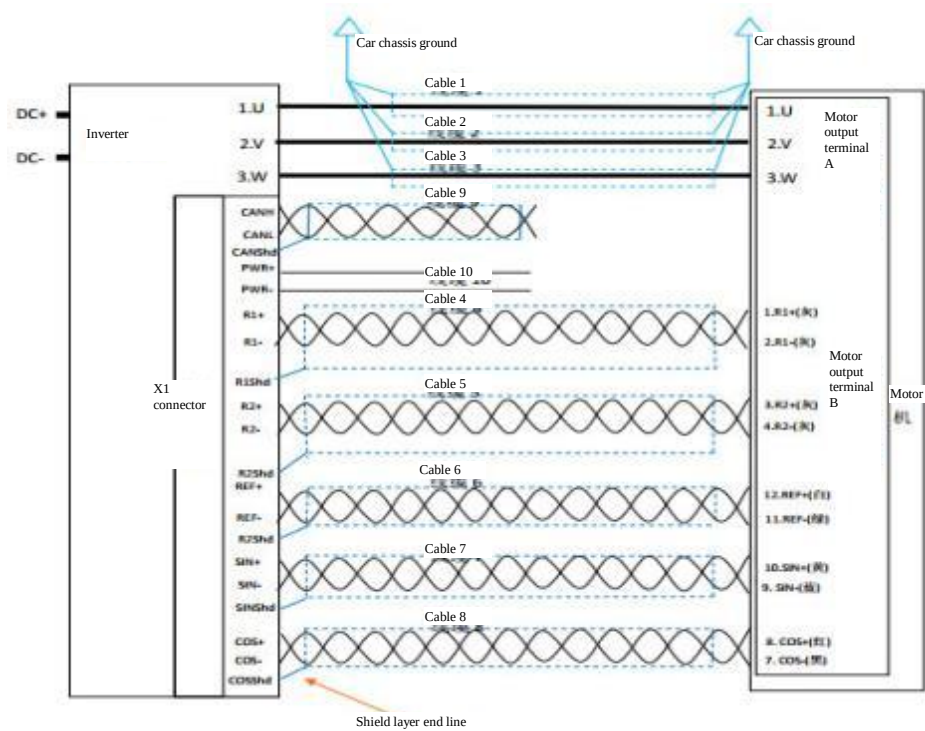


Fig. Motor and controller cable arrangement

- a) Cables 1, 2, and 3 are power cables for the three-phase winding of the motor, with each cable voltage $V = \pm$ battery voltage and current $I = \pm$ maximum phase current of the motor;
- b) Cables 4 and 5 are temperature measurement resistance signal wires (unshielded);

- c) Cables 6, 7, and 8 are rotary signal lines, shielded twisted pair differential signal lines, twisted pair differential voltage $V_{pp}=20V$, and $I=0.1A$ for each wire;
- d) Cable 9 is a CAN communication high-speed signal line, shielded twisted pair differential signal line, twisted pair differential voltage $V_{pp}=5V$, with weak current in each wire;
- e) Cable 10 is the +12/24V power supply line and return line, with a current of 1.5A@24V, 3A@12V .
- f) The output wires of pins 5 and 6 at the motor end are rotary shield wires, connected to the bundle shielding layer, and connected to the controller housing at the controller end.
- g) Each shield wire can be connected together, including CANShd, R1Shd, R2Shd, SINShd, COSShd, REFShd, and GND with pins 5 and 6 at the motor end

2. Cable and signal arrangement for motor outlet culvert

Connector name	Pin No.	Signal name	Line color	Note
Motor outlet culvert A	1	U(A, L1)	US Black/CN Yellow	
	2	V(B, L2)	US Red/CN Green	
	3	W(C, L3)	US Blue/CN Red	
Motor outlet culvert B Public end (for motor) model: deutsch DTM04-12PA-L012 Mother end (for wiring harness) model: Deutsch DTM06-12SA	1	R1+	Gray	NTC temperature sensor 1
	2	R1-	Gray	
	3	R2+	Gray	NTC temperature sensor 2
	4	R2-	Gray	
	5	GND	Bundle shielding layer shielding	For shielding Rotating transformer shielding
	6	GND	Bundle shielding layer Shielding	
	7	COS-	Black	Resolver COS Cosine
	8	COS+	Red	
	9	SIN-	Blue	Resolver SIN Sine
	10	SIN+	Yellow	
	11	REF-	Green	Resolver REF excitation
	12	REF+	White	

3. Controller inlet and outlet connector (X1) cable and signal arrangement



Table Instructions for using the X1 pin of the control board connector

Pin No.	Signal name	Signal description	Line color	Note
1	PWR+	Power input	Red	+12V or+24V power input (nominal 9V-32V, <u>1.5A @+24V</u> , 3A@12V)
2	IGN ON+	Enable signal input	Red	
3	HVIL_IN			
4	HVIL_OUT			
5	PS_PWR_GND			
6	PS_PWR			
7	PS_DI_AP	Resolver REF+	White	Positive signal of resolver excitation
8	PS_DI_BP	Resolver SIN-	Blue	Resolver sine negative signal
9	PS_DI_NP	Resolver COS-	Black	Resolver cosine negative signal
10	R2+	Temperature sensor R2+	Gray	Temperature sensor 2 positive signal
11	PS_AI_C1			
12	PS_AI_C2			
13	PWR-	Power supply ground	Black	Low voltage power input ground
14	CANA_H	CAN bus communication line A	White	CAN communication CAN high signal (twisted pair shield wire)
15	CANA_L		Blue	CAN communication CAN low signal (twisted pair shield wire)
16	CANB_H	CAN bus communication line B	White	
17	CANB_L		Blue	
18	MP_DO_C1			
19	REF-	Resolver REF-	Green	Negative signal of resolver excitation
20	SIN+	Resolver SIN+	Yellow	Resolver sine positive signal
21	COS+	Resolver COS+	Red	Resolver cosine sine signal
22	R2-	Temperature sensor R2-	Gray	Temperature sensor 2 negative signal
23	R1+	Temperature sensor R1+	Gray	Temperature sensor 1 positive signal
24	R1-	Temperature sensor R1-	Gray	Temperature sensor 1 negative signal
25	RS232_RX			

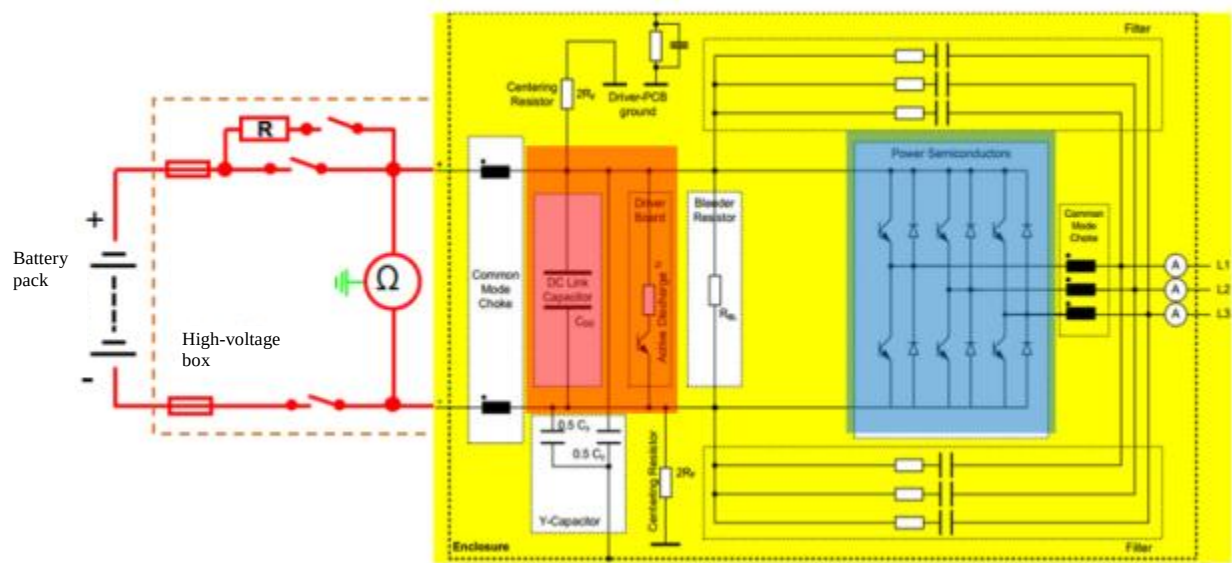
26	CANA_TERM	Connect CANA_1	Blue	There is a 120 Ω end-of-line resistor inside the controller, but this pin needs to be connected to X1:15 to be effective.
27	RS232_TX			
28	CANB_TERM			
29	MP_AI_C2P			
30	MP_AI_C2N			
31	MP_DI_C1			
32	MP_DI_C2			
33	MP_DI_GND			
34	MP_DO_C2			
35	ENCLOSURE			Connect the controller housing, and the shield wire can be grounded through this pin.

4. Basic data of the controller

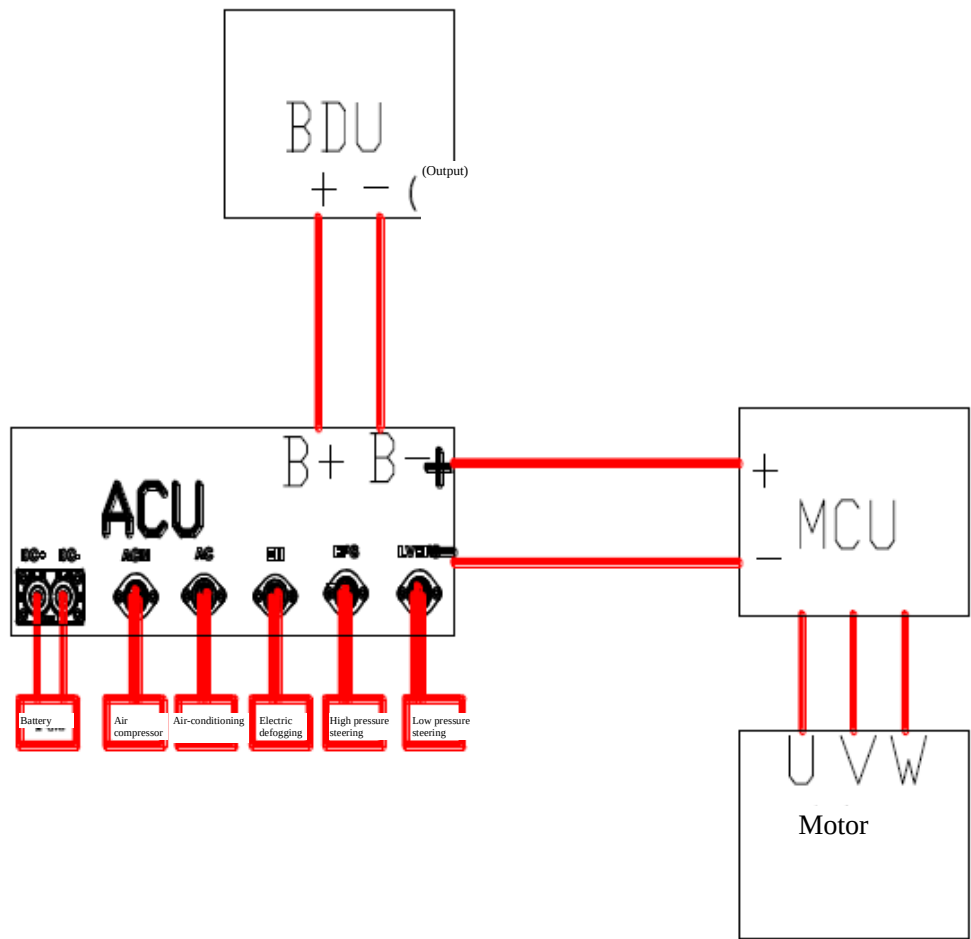
Unit	Symbol	Item	Minimum value	Typical value	Maximum value	Unit
	CDC	DC bus capacitance	0.9	1	1.25	mF
	Cy	EMI capacitance; DC to housing		0.66		μ F
	RF	DC+to housing, DC - to housing intermediate resistance		6		M Ω
Passive discharge unit	td	Discharge time to VCC<60V			5	s
	Rdis	PTC discharge resistance (25 $^{\circ}$ C)		350		Ω
Power parameters	VS	Power supply	8		32	V
	ISO	Controller not working leakage current			0.5	mA
	IS	When VS=12V		2900	3900	mA
		When VS=24V		1500	2000	mA

Recommended pre-charge resistance value of 100-200 ohms

IV. Circuit Diagram



Controller high-voltage power supply circuit diagram



Motor controller and drive motor wiring diagram

V. Fault Diagnosis and Detection

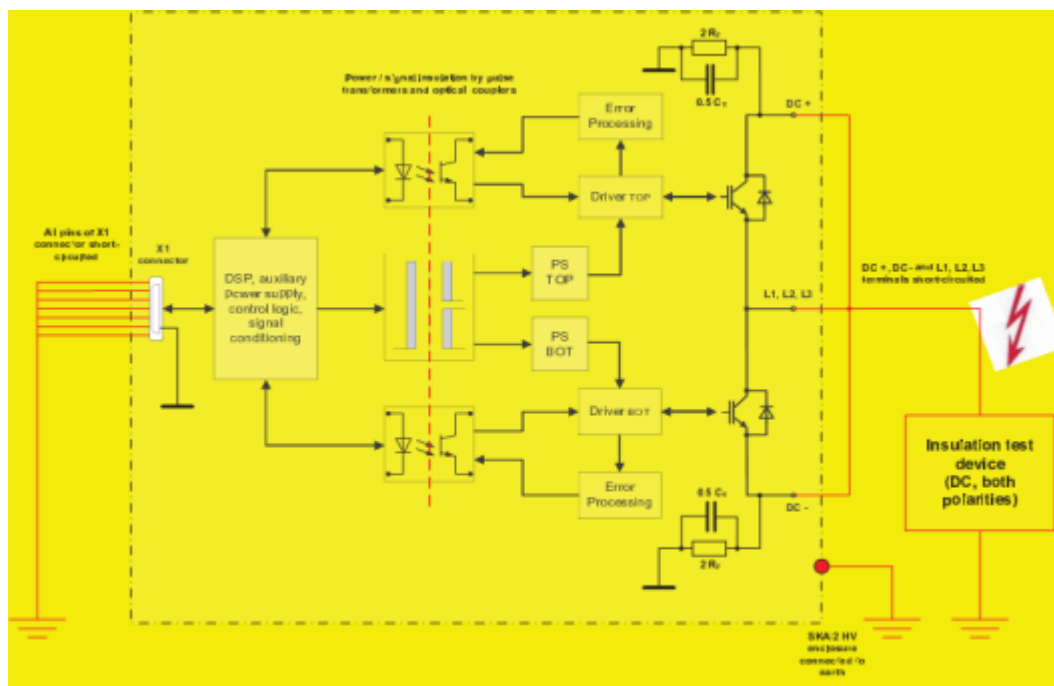
1. Common fault diagnosis of electric systems

S/N	Fault mode	Cause analysis	Troubleshooting method
1	Overvoltage of the motor bus	1. If the DC side voltage of the motor exceeds the fault threshold, and the motor is still in the generating state when the battery voltage approaches the threshold, 2. If the battery contact is suddenly disconnected, and the motor is just in the braking recuperation state, the energy can quickly fill the capacitor inside the motor, causing 3. When running at high speed, if the controller suddenly starts the protection state, turns off the pulse, and enters the uncontrollable	1. In vehicle control, when it is close to the limit of motor overvoltage, the motor recuperation braking shall be limited. 1. Jingjin strongly recommends that customers do not interrupt the DC relay during operation in any motor fault mode, ensuring that the DC relay does not suddenly Find the causes for fault protection
2	Overcurrent of motor phase current	1. When overcurrent occurs during high-speed running, it may be the angle error of the resolver signal. 2. If there is any problem of the insulation of the high voltage power system to the ground, it will lead to motor jitter and out of control, and thus lead to overcurrent. 3. Loose wiring harness, water ingress, mud ingress, etc. of the rotary transformer cause signal errors 4. At very low speed, an instruction of small torque is for overcurrent. The possible cause is that the three-phase line of the motor is short-circuited to the ground.	1. Detect the resolver angle of the motor surface, read the storage angle in the controller with a diagnosis tool to ensure that there 1. Check the insulation value of the DC terminal to ground, which should be around 6MΩ normally. If it is lower than 6MΩ, it is suspected to be an insulation problem. 2. Besides, it is necessary to detect 1. Check the resolver line on the motor side, and ensure that there is no contamination and no water enters it. 2. Measure the resistance value of the motor resolver on the side of the motor controller connectors, 1. Connect the three-phase line of the motor, check the insulation value of the motor to the ground, and it should be about 6MΩ. Disconnect the three-phase wire of the motor, check the insulation of the motor to the ground, and it
3	The motor speed is excessively	1. The actual speed of motor exceeds the set threshold.	Limit the motor speed

S/N	Fault mode	Cause analysis	Troubleshooting method
4	The motor winding is overheated	1. The motor cooling water circuit is blocked, the pipeline installation is incorrect, there is lack of water, or the cooling pump is damaged. 2. The motor runs for a excessively long time with overload and causes over-temperature of the motor. 3. The temperature sensor of the motor is short circuited or water enters the sensor. Since the temperature sensor will display high temperature when the resistance value is low, if it is confirmed that the motor	1. Check the motor cooling system 2. The temperature curve of the motor and controller can be read through the upper computer. In static state, the controller temperature is close to the water temperature. If the controller 1. Make analysis according to the monitoring data. 1. In the motor cooling state, check the resistance value of the motor temperature sensor from the controller end. Under normal circumstances, it should be over 1k ohms, and the room temperature of 22°C corresponds
5	Inverter over-temperature	1. Usually the temperature of the inverter is the water temperature when it is not working, and the difference between the inverter temperature and the water temperature when the inverter is working should be within 30°C.	1. Check the water pump, liquid level and the cooling fan. 2. Jingjin Electric suggests that once the vehicle starts working, the water circuit should maintain circulation. If the inverter temperature exceeds 45 °C, the
6	CAN communication fault	The motor does not receive signal from the vehicle controller within the specified time.	1. Check the vehicle wiring harness and read the CAN bus fault frame ratio through the bus recording instrument. 2. Check if the connector is loose and if the three-phase wire between the motor and controller
7	Hardware malfunction	Hardware damage is usually manifested like this: once the power-on function is enabled, hardware fault will be reported.	Check the insulation of the controller three-phase to the ground, the inter-phase insulation and the diode characteristics.
8	Motor bus under-voltage	1. When the DC side voltage of the motor is lower than the threshold, the vehicle controller gives the enable command. 2. The relay on the DC side of the motor is disconnected.	1. Record the data to ensure that the DC side voltage is higher than the threshold when the pulse is turned on. 2. Check the voltage on the DC side. If there is a sudden change,

S/N	Fault mode	Cause analysis	Troubleshooting method
9	Locked-rotor alarm	When the motor speed is less than 100rpm, if the water temperature is higher than about 55 degrees, the inverter begins to operate with limited power, and the locked-rotor alarm will be made in this situation.	1. Check whether the motor is stuck, if so, please find out the cause or replace the motor with a new one of the same model. 2. Check whether there is mistake in the operation. If the hand brake is not released, stop on the

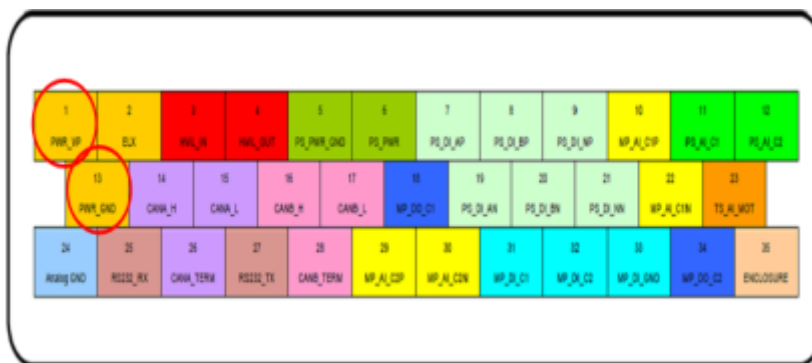
2. Insulation detection of motor controller:



Insulation detection circuit diagram

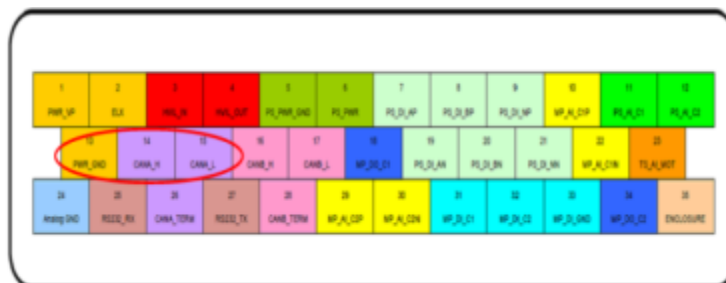
3. Auxiliary power input impedance: (hardware detection)

Measure the impedance between PWR_VP (1) and PWR_GND (13) using the resistance range of a multimeter, and the normal value is at the MΩ level



4. CAN transceiver detection: (hardware detection)

Use a multimeter to measure the impedance between CAN-H (14), CAN_L (15), and PWR_GND (13). The normal value should be at the MΩ level



5. IGBT detection (hardware detection)

There are two common methods to use a multimeter to determine whether an IGBT module is malfunctioning: one is to use a diode range test. The second is to use a resistance range for testing.

The following content is based on the use of Fluke multimeters:

First, measure the on state voltage of the diode using a diode gauge.

When measuring the upper half of the bridge, connect the red meter to the AC terminal (L3 \ L2 \ L1) and the black meter to +HV;

When measuring the lower half of the bridge, connect the red meter to HV and the black meter to AC terminal (L3 \ L2 \ L1).

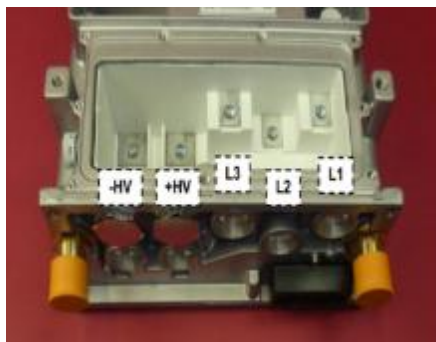
At room temperature, it should be around 0.25-0.50V, indicating that the IGBT module still has junction characteristics. If 0V or OL is displayed, it indicates that the IGBT module has failed.

Under the premise of displaying 0.3V, measure the impedance of IGBT and Diode in parallel using a resistance range. When measuring the upper half bridge, connect the red meter to +HV and the black meter to the AC terminal;

When measuring the lower half of the bridge, connect the red meter to the AC terminal and the black meter to the DC -.

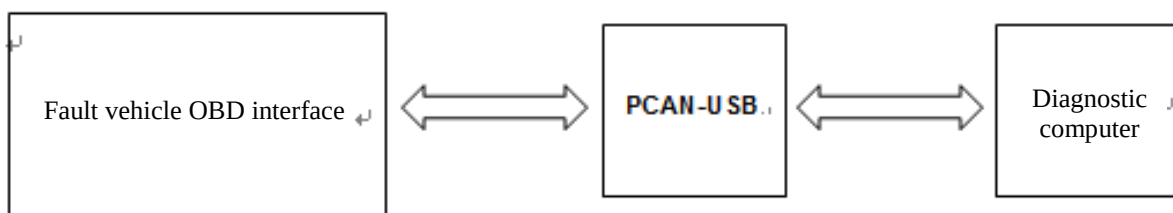
If the display is below tens of kiloohms, it indicates that the IGBT has been damaged. If the display is above hundreds of kiloohms or megaohms, the IGBT module may be normal (due to not applying high voltage, it is still impossible to determine whether it

has failed)



6. Fault code detection method

The fault diagnosis connection method is shown in the following figure



Fault diagnosis link diagram

7. Fault codes

DTC (Dec)	Fault Name	Fault level	Fault name
5132	MCUoverload_Fault	Secondary fault	Motor bus overcurrent fault
5133	DCOverVOLSoft_Fault1	Level 1 fault	Motor bus overvoltage fault
5122	DCOverVOLSoft_Fault2	Secondary fault	Motor bus overvoltage fault
5134	DCOverVOLSoft_Fault3	Level 3 fault	Motor bus overvoltage fault
5140	DCVOLRATESoft_Fault3	Level 3 fault	Motor bus voltage fault
5135	DCOverVOLHard_Fault3	Level 3 fault	Motor bus overvoltage fault
5136	DCunderVOL_Fault1	Level 1 fault	Motor bus undervoltage fault
5123	DCunderVOL_Fault2	Secondary fault	Motor bus undervoltage fault
5137	RDC_Fault	Level 3 fault	Motor resolver fault
5138	IGBT_Fault	Level 3 fault	Motor IGBT malfunction

5127	MotorOvertempFault1	Level 1 fault	Motor over-temperature fault
5139	MotorOvertempFault2	Secondary fault	Motor over-temperature fault
5126	MotorOvertempFault3	Level 3 fault	Motor over-temperature fault
5129	McuOvertempFault1	Level 1 fault	Motor controller over-temperature fault
5128	McuOvertempFault2	Secondary fault	Motor controller over-temperature fault
5141	McuOvertempFault3	Level 3 fault	Motor controller over-temperature fault
5125	MotorOverspeedFault1	Level 1 fault	Motor overspeed failure
5142	MotorOverspeedminusFault1	Level 1 fault	Motor reverse overspeed fault
5124	MotorOverspeedFault2	Secondary fault	Motor overspeed failure
5143	MotorOverspeedFault3	Level 3 fault	Motor overspeed failure
5131	Motoroverload_Fault2	Secondary fault	Motor overcurrent fault
5144	Motoroverload_Fault3	Level 3 fault	Motor overcurrent fault
5145	Motoroverload_Fault33	Level 3 fault	Motor overcurrent fault
5146	CAN_COMM_Fault	Level 3 fault	Motor CAN communication fault
5147	DC_CurrentsensorFault3	Level 3 fault	Motor current sensor malfunction
5148	DC_CurrentsensorFault33	Level 3 fault	Motor current sensor malfunction
5149	U_PHASECurrentsensorFault	Level 3 fault	Motor current sensor malfunction
5150	W_PHASECurrentsensorFault	Level 3 fault	Motor current sensor malfunction
5151	TempSensorFault	Level 3 fault	Motor temperature sensor fault
5152	Activ_DischargeFault	Level 1 fault	Motor discharge fault
5153	DC_SoftoverVOL_fault	Level 3 fault	Motor low-voltage fault
5154	LockRotorFault	Secondary fault	Motor stalling

VI. Method of Disassembly and Assembly

When repairing the high-voltage part, first cut off the low-voltage power supply, and then cut off the high-voltage power supply. Wait for more than 5 minutes (filter capacitor) or discharge before proceeding, and do not operate with power on. Ensure that the controller and relay are in a non-working and disconnected state.

1. Comparison table of installation hole specifications and tightening torque for motor controller:

Installation hole specifications	Screwed hole depth	Thread grade	Tightening torque	Tightening torque range
M6	22mm	8.8	10Nm	9-11Nm
M8	19mm	8.8	14Nm	13-15Nm
	20mm			
	22mm			

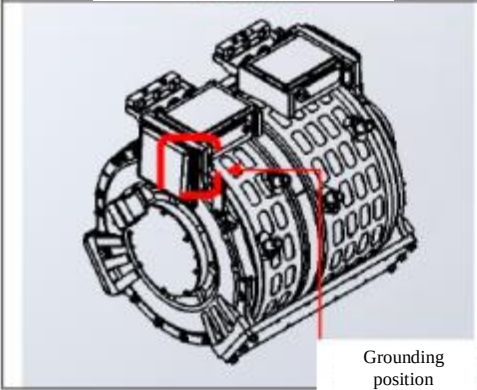
Please use electric tools to tighten the screws;

Do not use pneumatic tools to tighten screws, as uncontrollable torque from pneumatic tools can cause damage to the controller.

2. The installation specifications and tightening torque of the motor are as follows:

Item	Unit	Numerical value
Hole thread	-	M12-6H
Tightening torque	Nm	90
Thread grade	-	10.9
Quantity	-	16

3. Motor grounding wire connection specifications

Location of grounding point		Specification of screwed hole for grounding point		
		Item	Unit	Numerical value
		Thread	-	M8-6H
		Thread length	mm	16
		Tightening torque	Nm	25
		Thread grade	Grade	10.9
		Quantity	Pcs.	1

4. Specification and terminal requirements for motor three-phase wire fastening bolts

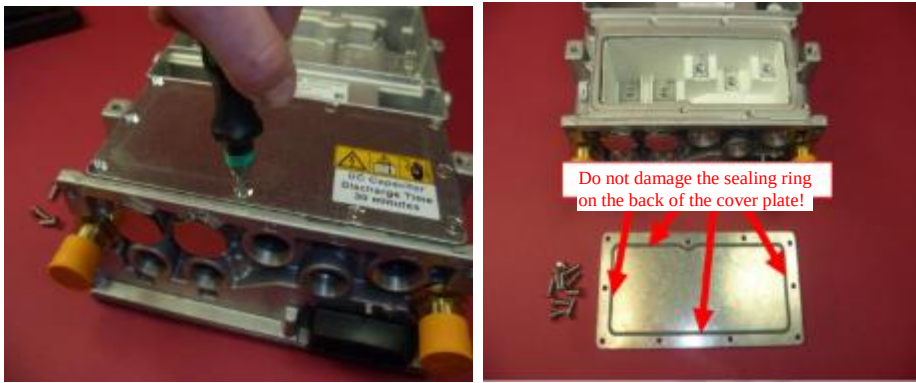
Wiring terminals	Width 21mm Max
Number of wiring terminals	6
Wiring screw	M10×20, grade 10.9
Number of wiring screws	6
Tightening torque	25Nm
Standard spring washer	Φ 10mm
Standard number of spring pads	6
Flat washer	Φ 10mm
Number of flat washers	6

When assembling the wiring harness, it should be ensured that the grid head is tightened. The model of the gland head is M3221BR-EMC-S, and the gland head is forced to cap

The tightening torque is 13-18Nm, and the cable outer diameter range for the gland is 14.5-21.5mm.

5. Motor controller power cable installation

- 1) Remove the fixing bolts of the cover plate and be careful not to damage the sealing ring on the back of the cover plate



2) Insert the power cable and adjust it to the appropriate position



3) Install fixing bolts and tighten them according to torque requirements

Installation hole specifications	Screwed hole depth	Thread grade	Tightening torque	Tightening torque range
M6	22mm	8.8	10Nm	9-11Nm
M8	19mm	8.8	14Nm	13-15Nm
	20mm			
	22mm			

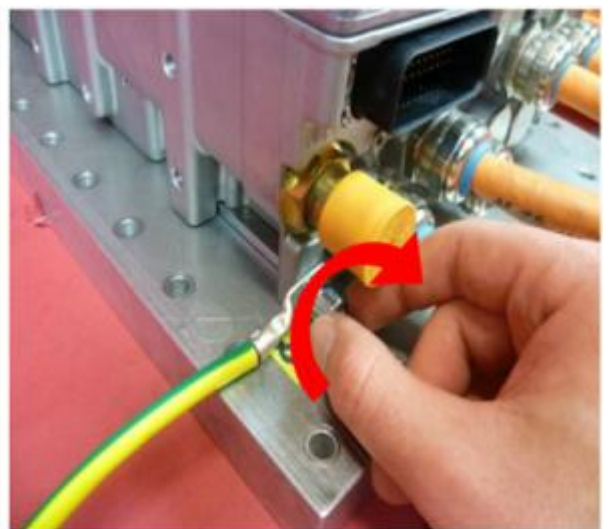
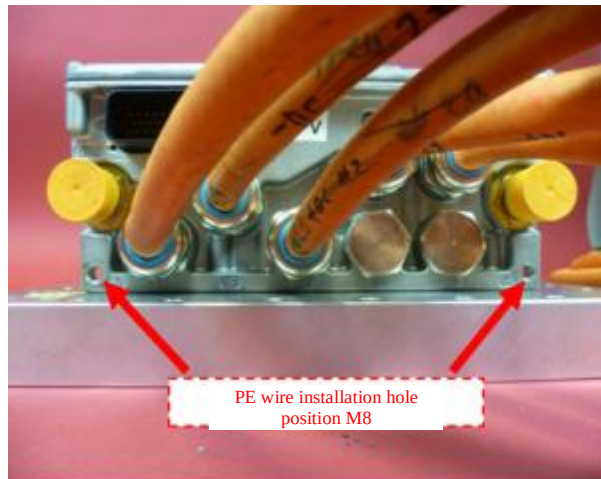


4) Complete the installation of all power cables



6. Installation of controller grounding wire

- 1) Install the grounding wire at the hole indicated in the diagram. The torque requirement is 25Nm.



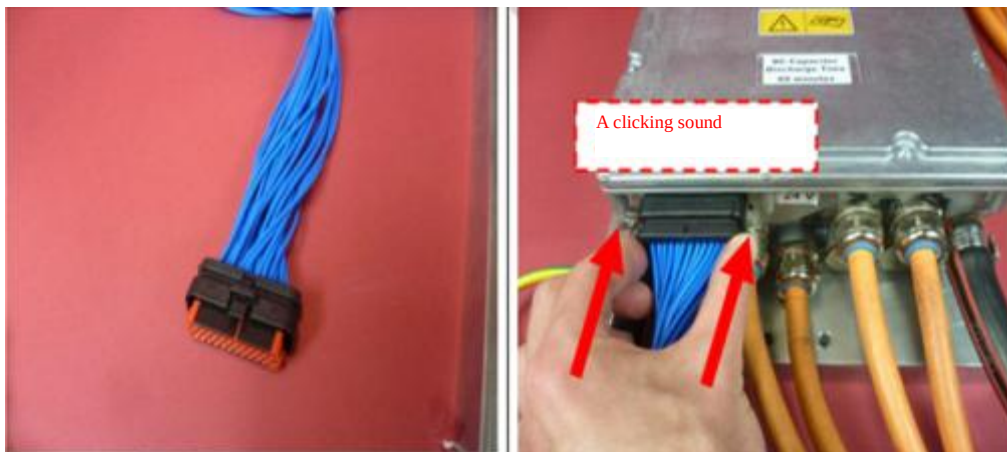
- 2) Measure the impedance between the controller housing and the exposed part of the vehicle chassis.

Attention: Do not measure the position of the screw cap



7. Installation of controller signal terminal X1

Connect the signal terminal interface to the controller X1 interface, ensuring that the interface is locked properly.



8. Installation of motor power cables

- 1) Install the M25-18 waterproof joint base on the screwed hole of the junction box



- 2) Place the shielding spring plate into the waterproof joint base



- 3) Insert the wiring terminals into the wiring screws on the wiring board and tighten the waterproof joint cover with a wrench



- 4) Use a multimeter to measure the conductivity between the shielding layer and the

motor housing display



9. Pre-install the motor left and right brackets

- 1) Take the left bracket of the motor, align the installation hole of the left bracket with the installation hole of the motor, and pay attention to the installation direction of the left bracket of the motor;
- 2) Before connecting the left bracket of the motor to the motor, the bolts must be coated with Loctite 243 thread locking agent;
- 3) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen;
- 4) Take the right bracket of the motor, align the installation hole of the right bracket with the installation hole of the motor, and pay attention to the installation direction of the right bracket of the motor;
- 5) Before connecting the right bracket of the motor to the motor, the bolt must be coated with Loctite 243 thread locking agent;
- 6) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen;

10. Embed bolts

Thread the bolts connecting the left bracket to the frame from the outside to the inside through the installation holes;

11. Lift the motor

Using an electric lifting car to lift the motor to the left and right brackets can be installed in conjunction with the frame normally;

12. Install the left and right brackets

- 1) Align the installation hole of the left bracket with the installation hole of the frame, paying attention to the installation direction of the left bracket;
- 2) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen;
- 3) Align the installation hole of the right bracket with the installation hole of the frame, paying attention to the installation direction of the right bracket;
- 4) Use pneumatic tools and socket to tighten the bolts, use torque setting tools to tighten the bolts to the specified torque, and mark with a white marker pen;

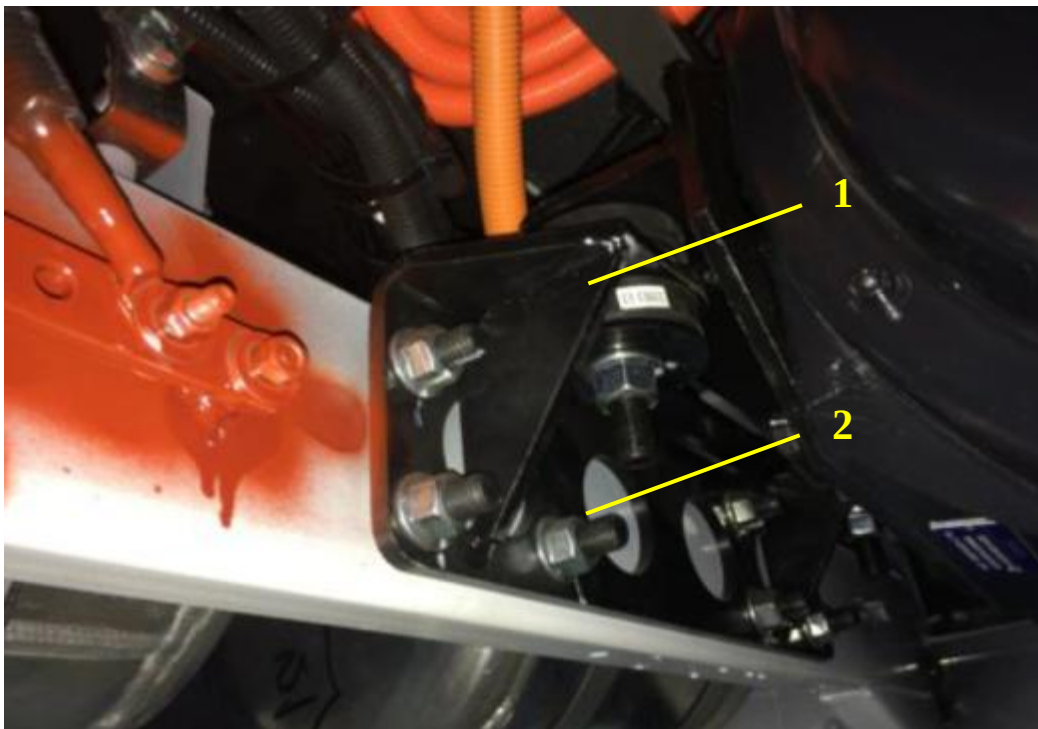


Fig. Installation of left bracket for motor

1. Left bracket 2. Hexagonal head bolt, hexagonal flange locking nut

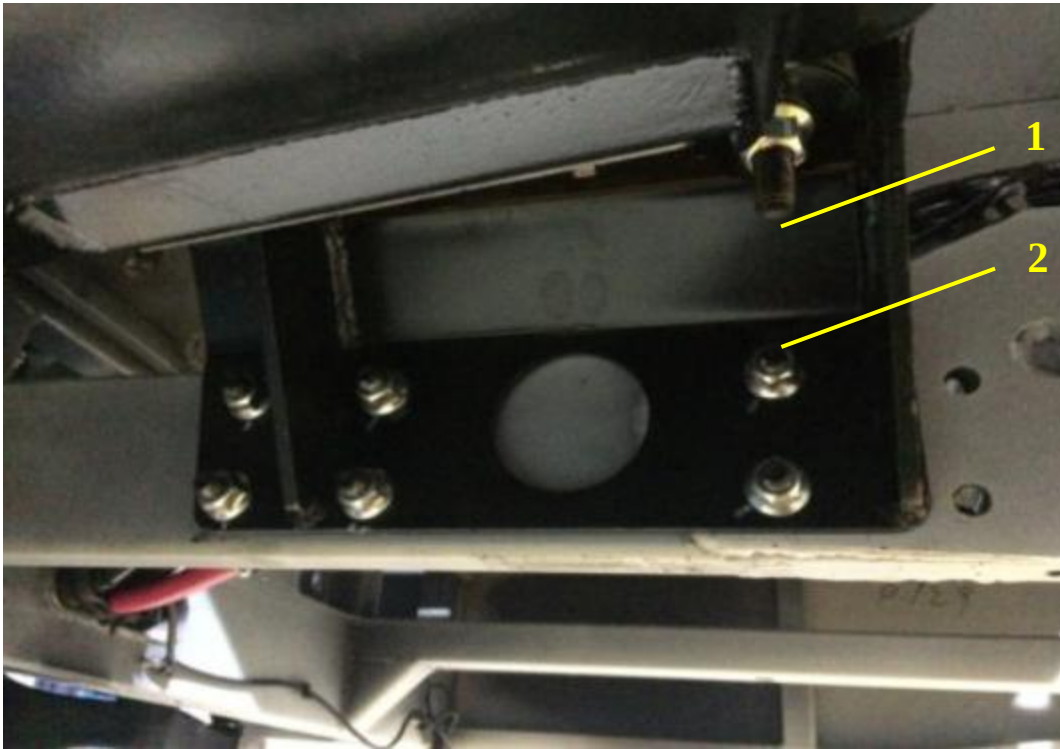


Fig. Installation of the right bracket of the motor

1. Right bracket 2. Hexagonal head bolt, hexagonal flange locking nut

13. Install the motor assembly

- 1) Use an electric lifting vehicle to lower the motor to a height where elastic washers can be installed;
- 2) When installing the elastic washer, pay attention to the installation direction of the elastic washer, and the bolt should pass through the installation hole from top to bottom;
- 3) Before installation, the elastic pad needs to be coated with rubber lubricating grease (P80) or soap solution on the rubber surface for easy assembly;
- 4) Use pneumatic tools to tighten the bolts and adjust the height of the elastic washer to the height shown in the figure;

14. Installation of cooling water pipes

- 1) Connect the motor and cooling water pipe with a $\Phi 25 \times 100$ rubber hose;
- 2) Connect the other end of the cooling water pipe to a $\Phi 25$ rubber bend pipe;

- 3) After adjusting the position of the cooling water pipe and the $\Phi 25$ rubber bend pipe, use pneumatic tools and sockets to tighten the pipe clamp;

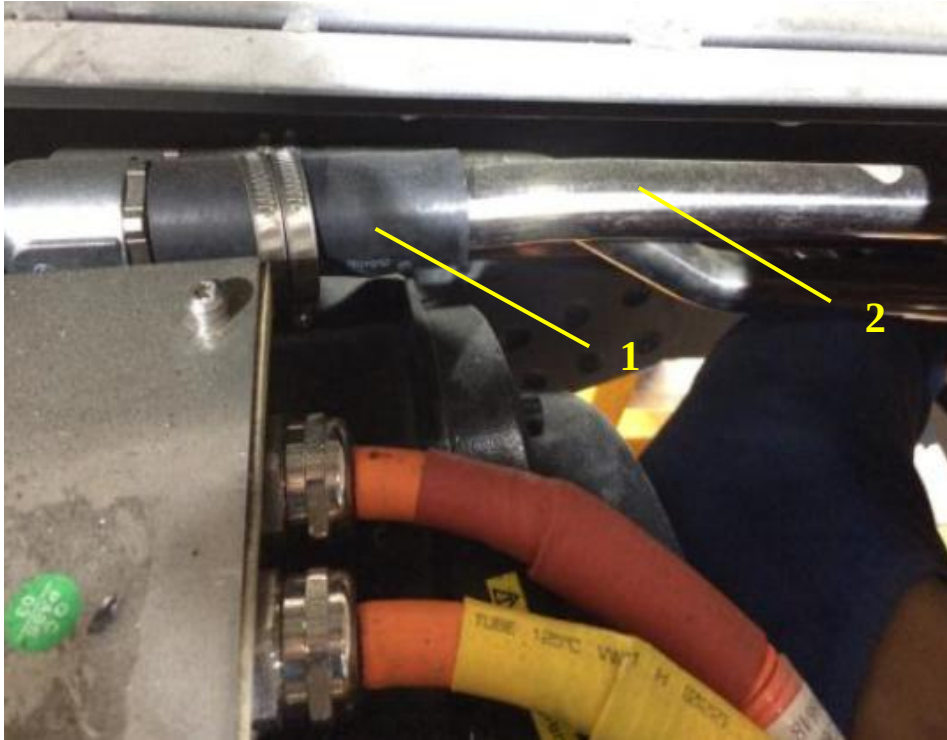
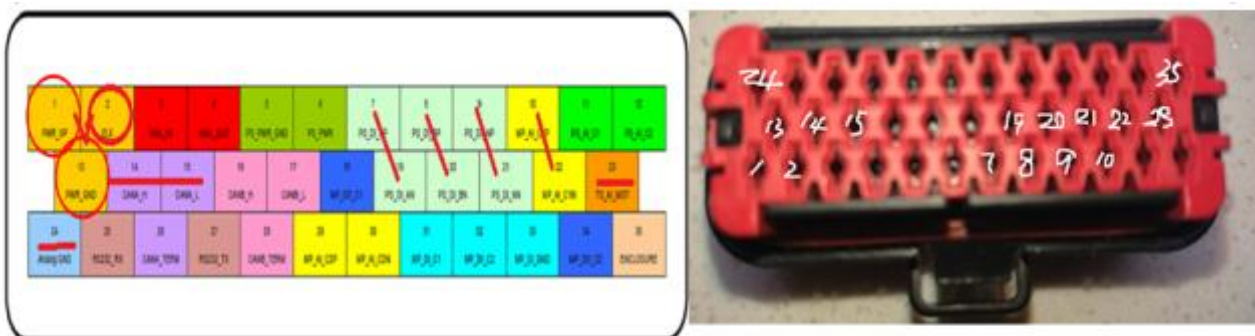


Fig. Motor cooling water pipe

1. Rubber hose 2. Cooling water pipe

15. Check the resolver value at the motor controller terminal (35 pins)



Definition of low-voltage connector pins (controller end)				
Pin No.	Line color	Signal name	Resistance	Note
23, 24	Gray	R1+	30k Ω (room temperature)	NTC temperature sensor 1
	Gray	R1-		
10, 22	Gray	R2+	30k Ω (room temperature)	NTC temperature sensor 2
	Gray	R2-		
9, 21	Black	COS-	About 26 Ω	Resolver cosine
	Red	COS+		
8, 20	Blue	SIN-	About 31 Ω	Resolver sine
	Yellow	SIN+		
7/19	Green	REF-	About 9.5 Ω	Resolver excitation
	White	REF+		

VII. Repair and Maintenance

1. Daily maintenance

Maintenance item	Operation content	Technical requirements
Motor and controller	Clean the motor and controller	There shall be no dust, water stains, or obvious rust on the surface of the motor and controller.
	Grounding insulation test for the motor controller housing	Use a multimeter to check the resistance between the motor controller housing and the vehicle body, which should be less than 0.01 Ω under normal circumstances. If the resistance is significantly too high (such as 1 Ω or more), it is necessary to check the grounding connection of the controller and re ground it.
	Inspection of cooling system	1. Check whether the anti-freezing liquid in the radiator is full. Add anti-freezing liquid if it is insufficient. 2. Check the pipeline for aging, deformation, and leakage.
	Check the following items after the key is turned to the ON position	1. The instrument monitoring motor system and weak current control power supply display are normal; 2. The temperature of the motor and controller is

		normal; 3. The feedback voltage and current of the motor should be zero, and the speed should be zero;
	Inspection of driving monitoring	1. Whether there is an abnormal mechanical sound when the motor is running. 2. The motor system fault information that occurs during the driving process shall be recorded. (Instrument display)

2. Level I maintenance: (5000-7500 kilometers, 1 month, whichever comes first)

S/N	Maintenance item	Check the content of maintenance tasks	Technical requirements
	All routine maintenance items		Maintenance requirements
1	Controller	1. Check the wiring of UVW terminal (if any) and grounding of the shield layer (external shielding). 2. Check the three-phase input wire of the motor and the junction box. 3. Check whether the low-voltage connectors are well fixed. 4. Check the grounding wire of the motor controller. 5. Check the condition of the cooling water pipe joints	1. The UVW terminal wiring is firm and not loose; The grounding resistance of the motor controller housing is less than 0.01Ω . 2. The insulation layer of the input cable is undamaged, and the cover plate of the three-phase junction box is tightly sealed and intact. 3. The low-voltage plug-in interface is undamaged, and the wiring harness is securely and effectively fixed. 4. The grounding wire meets the technical requirements and is firmly fixed.

2	Motor	1. Check the wiring of UVW terminals and the grounding of the shielding layer. 2. Check the three-phase input lines and junction box of the motor. 3. Check the dust on the surface of the motor. 4. Check if the low-voltage plug-in is fixed properly. 5. Check the operation of the motor. 6. Use a megohmmeter to test the wire resistance between motor AB, AC, and BC. 7. Measure the insulation resistance value with a megohmmeter 8. Check the tightness of the flange plate at the output shaft end of the motor, ensure that the oil seal of the output shaft is well sealed, and there is no foreign object entanglement	1. The UVW terminal wiring is firm and not loose; The grounding resistance of the motor casing is less than 0.01Ω. 2. The insulation layer of the input cable is undamaged, and the cover plate of the three-phase junction box is tightly sealed and intact. 3. The surface of the motor should be free of dust, kept dry and clean, and there should be no foreign objects in the grooves of the reinforcing ribs. 4. The low-voltage plug-in interface is undamaged, and the wiring harness is securely and effectively fixed. 5. Test drive and no abnormal noise from the motor. 6. The three resistance values
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3. Level II maintenance: (15000 kilometers, 6 months, whichever comes first)

S/N	Maintenance item	Inspection and maintenance content	Technical requirements
	All the items of level I maintenance.		Maintenance requirements
1	Controller	1. Check and tighten the fixing screws of the U, V, and W wiring terminals (if any). 2. Remove the dust on the controller junction box and the oxide layer on the wiring	1. The UVW terminal wiring is firm and free of looseness. 2. Remove the dust and clean the surface of the wiring terminals. 3. The insulation resistance value of the motor controller is $6M\Omega$.
2	Motor	1. Check and tighten the fixing screws of the U, V, and W wiring terminals. 2. Remove the dust on the controller junction box and the	1. The UVW terminal wiring is firm and free of looseness. 2. Remove the dust and clean the surface of the wiring terminals. 3. The insulation resistance value of the

Chapter V ACU Controller Maintenance Manual

I. Component Introduction

1. Component functions

The high-voltage auxiliary controller is used to achieve energy distribution, energy conversion, energy inversion, and management functions from the power battery to different high-voltage equipment, including manual maintenance switch (MSD), DC/DC, DC/AC, high-voltage fuse, high-voltage relay (main contactor and pre-charging contact), DC busbar, 24V auxiliary power backup scheme, etc. This product should have functions such as DC input protection, output protection, and over temperature protection. The cooling method of this controller is water cooling.

2. Component structure

ACU is a water-cooled structure that uses CAN communication, with one high-voltage input and seven outputs. The input and output are shown in the following figure.

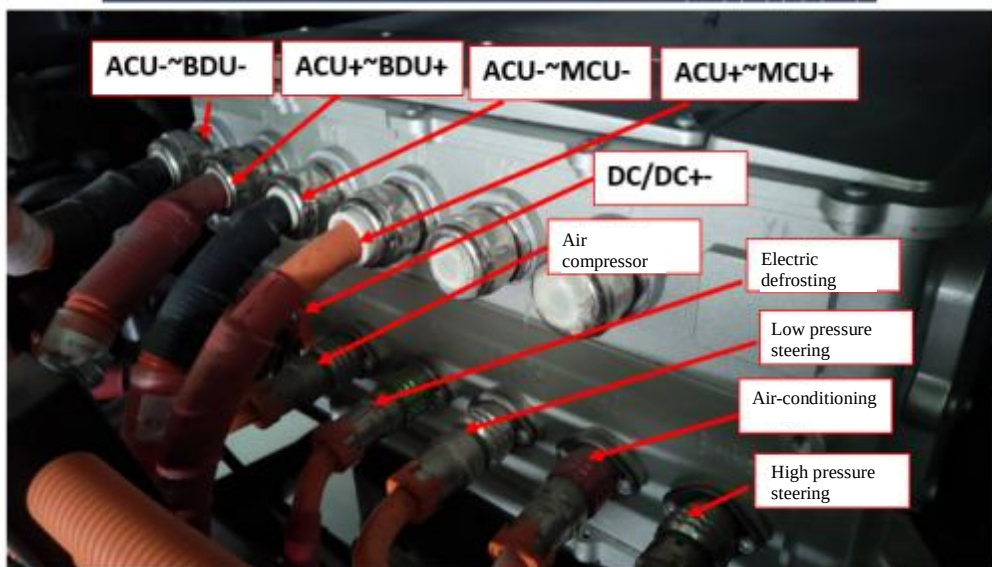


Fig. ACU outline

3. Component principle

ACU communicates with the vehicle VCU through CAN, closes and closes high-voltage contactors according to the different needs of operators. At the same time, to ensure the safety of maintenance personnel, an MSD is installed externally on ACU. When

repairing ACU, the MSD must be disassembled before operation can proceed. The principle of ACU and external high voltage is shown in Fig. 1, and the basic internal principle of ACU is shown in Fig. 2.

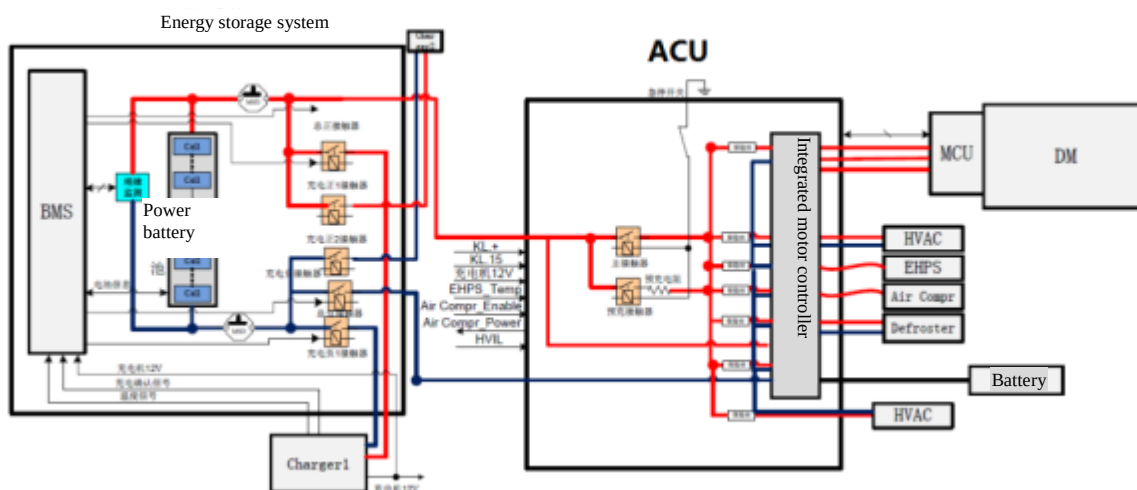


Fig. ACU external connection high voltage diagram

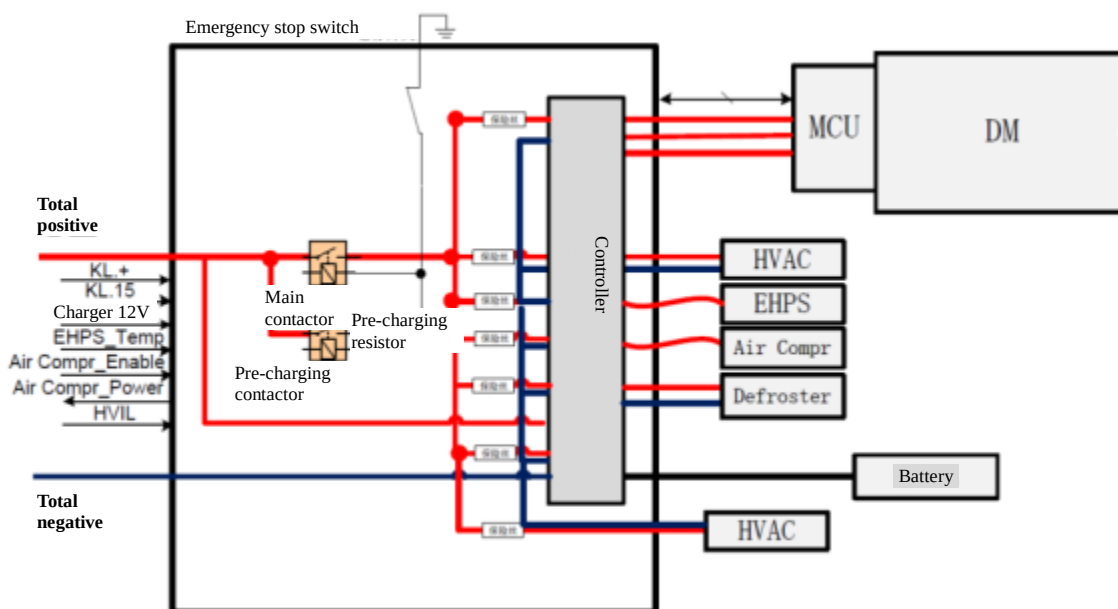


Fig. ACU internal working principle diagram

II. Special Tools

Kvaser USBCAN II serves as a specialized tool for ACU debugging and diagnosis.

III. Maintenance Data

The ACU working status detection data is shown in the table below:

Pin number	Wire number	I/O	Electrical characteristics	Notes
PIN1	EN-QB	EN-QB	Input	High level effective, $\geq 16V$
PIN2	ON	ON	Input	High level effective, $\geq 16V$
PIN3	A+	A+(New)	Input (12V)	High level effective, $\geq 9V$
PIN4	39	39	Input	
PIN5	39	39	Input	
PIN6	KL.1	KL.1	Input	
PIN7	KL.1	KL.1	Input	
PIN8	QB-ECU2(+24V 1A)	Reserved	Output	
PIN9	QB-ECU-GND2(-24V 1A)	Reserved	Output	
PIN10	GND-5V(-5V 1A)	Reserved	Output	
PIN11	+5V(+5V 1A)	Reserved	Output	
PIN12	+5V(+5V 1A)	Reserved	Output	
PIN13	TEMP-A2	Reserved	A2 temperature resistance input	
PIN14	TEMP-A1 (ground)	TEMP-A1 (ground)	A1 temperature resistance input (ground)	
PIN15	HVIL2	Reserved	Output	
PIN16	39	39	Input	
PIN17				
PIN18	KL.1	KL.1	Input	
PIN19	QB-ECU(+24V 1A)	QB-ECU	Output	
PIN20	QB-ECU-GND(-24V 1A)	QB-ECU-GND	Output	
PIN21	GND_MID (emergency switch ground)	Reserved	Output	
PIN22	GND-5V(-5V 1A)	Reserved	Output	
PIN23	OIL (oil pressure detection)	Reserved	Input	
PIN24	TEMP-A2 (ground)	Reserved	A2 temperature resistance input (ground)	
PIN25	TEMP-A1	TEMP-A1	A1 temperature resistance input	
PIN26	HVIL1	HVIL1	Input	High level effective,

Pin number	Wire number	I/O	Electrical characteristics	Notes
				$\geq 16V$
PIN27	EMER1	EMER1	Input	
PIN28				
PIN29	GND1 (casing)	GND1	Input	
PIN30	GND2 (casing)	GND2	Input	
PIN31	GND3 (casing)	Reserved	Input	
PIN32	GND2L	GND2L	Input	
PIN33	CAN2H	CAN2H	Input	
PIN34	CAN1L	CAN1L	Input	
PIN35	CAN1H	CAN1H	Input	

IV. Circuit Diagram

The electrical schematic diagram of ACU is shown in the following figure

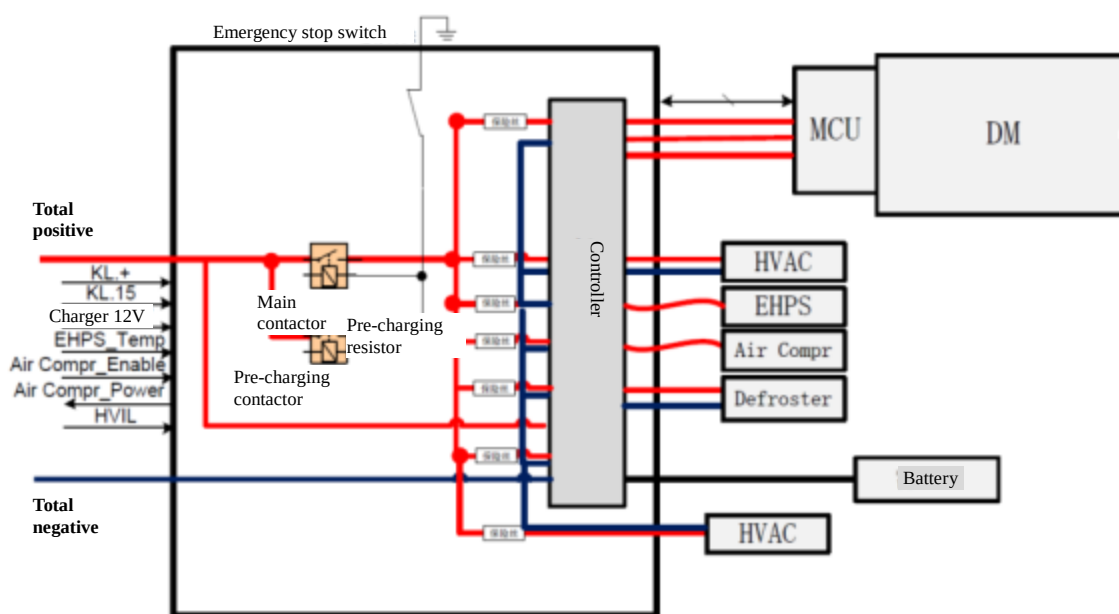


Fig. Electrical schematic diagram of ACU

V. Fault Diagnosis

1. Fault symptoms and troubleshooting methods

After an ACU fault occurs, the instrument panel will display the ACU fault symbol. By entering the instrument panel submenu, you can read the ACU fault code, determine the specific fault based on the fault code, and then use Kvaser USBCAN II and professional diagnostic software

to diagnose the specific cause of the fault.



Fig. Instrument ACU fault display icon

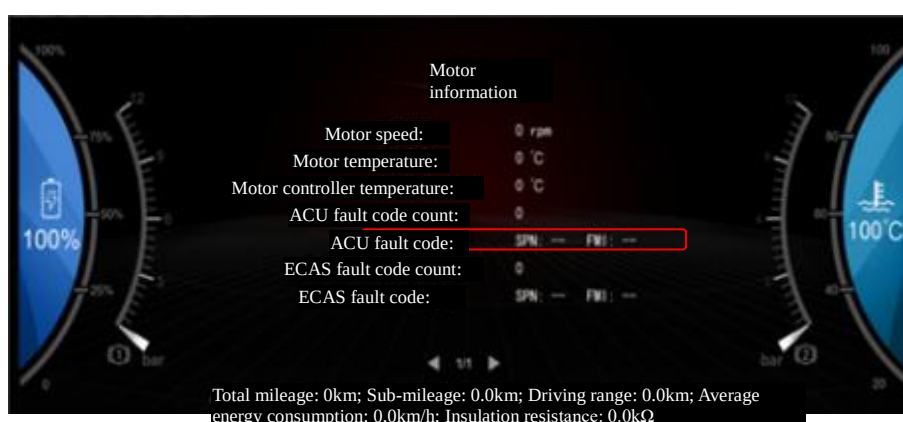


Fig. ACU fault code viewing area

2. The definition of fault codes is shown in the table below

Table Fault code definition

ACU	P1042	1042	4162	ACU minor fault
	P1043	1043	4163	ACU power reduction fault
	P1044	1044	4164	ACU major fault
	P1111	1111	4369	Minor fault of electric steering pump
	P1039	1039	4153	Electric steering pump power reduction fault
	P1112	1112	4370	Major fault of electric steering pump
	P1113	1113	4371	Minor fault of electric air compressor
	P1040	1040	4160	Electric air compressor power reduction fault
	P1114	1114	4372	Major fault of electric air compressor
	P110F	110F	4367	DCDC minor fault
	P1041	1041	4161	DCDC power reduction fault
	P1110	1110	4368	DCDC serious fault

VI. Method of Disassembly and Assembly

1. Fix ACU~BDU -, ACU+~BDU+, ACU~MCU- and ACU+~MCU+ with M8 bolts (with

flat washer and spring washer); torque requirement: 25N.M; lock tightly and make a torque mark with a white oil paint pen

2. Use a torque wrench to tighten the tail gland, with a tightening torque of 20 N.m, and make a torque mark
3. After assembly, check the sealing ring of the upper junction box cover. Cover the box cover, tighten the bolts with a torque requirement of 7N.m, and make a torque mark
4. Insert the DC-DC, air compressor, electric defrosting, low-voltage steering, air conditioning, high-voltage steering, and high-voltage cables into the corresponding interfaces, lock the clips (the clips expose the green ring). Pay attention to aligning the positioning point for insertion and removal, and do not twist or bend the cable after inserting it into the interface, which may cause the pin to break.
5. Install the ACU grounding wire using a hex head bolt M8×30, a flat washer 8, and a standard spring washer 8. The torque requirement is 15 N.m, and a torque mark should be made.

VII. Component Maintenance Cycle and Methods

The maintenance cycle and methods of ACU are shown in the table below:

Table ACU maintenance cycle and methods

93 auxiliary power system	Appearance	7500 Km/1.5 months	Clean
	Sealing of high-voltage wire junction box	7500 Km/1.5 months	Inspection
	High voltage wiring harness and connectors - external	7500 Km/1.5 months	Check/tighten
	Low voltage plug-in	7500 Km/1.5 months	Check/tighten
	Housing - body ground wire	7500 Km/1.5 months	Check/tighten
	Cooling liquid pipeline and interface	7500 Km/1.5 months	Check/tighten
	Fixed bracket	30000 Km/6 months	Check/tighten
	Insulation resistance value of auxiliary controller	60000 Km/12 months	Detection
	High voltage connector bolt - internal	60000 Km/12 months	Fastening

Chapter VI Maintenance Manual for High Pressure Defroster

I. Component Introduction

1. Component functions

This defroster has two functions: defogging and defrosting. The first and second gears only have defogging function (which blows fresh air), while the third and fourth gears have defrosting function. When turned on, the PTC will work.

2. Component structure

The defroster consists of two parts: a PTC heater and a speed control switch installed on the driver's cab, as shown in the following diagram.

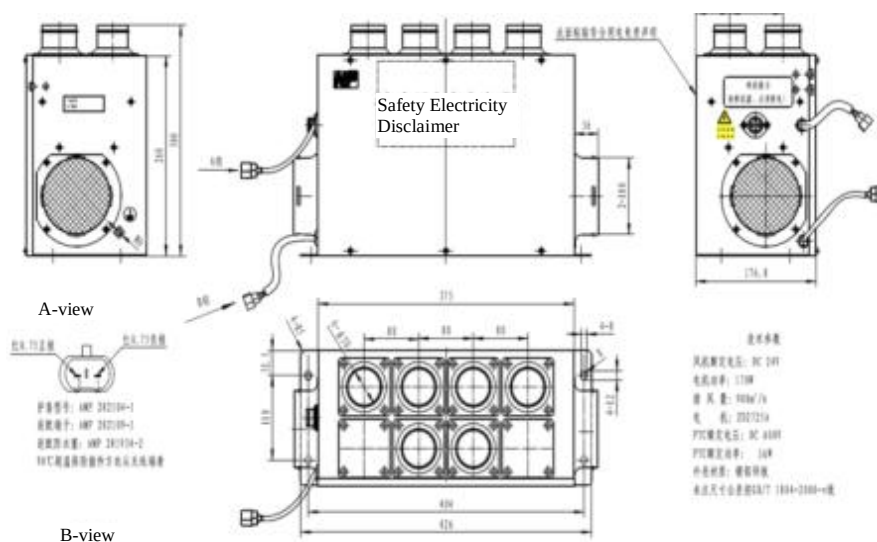


Fig. Defroster structure diagram

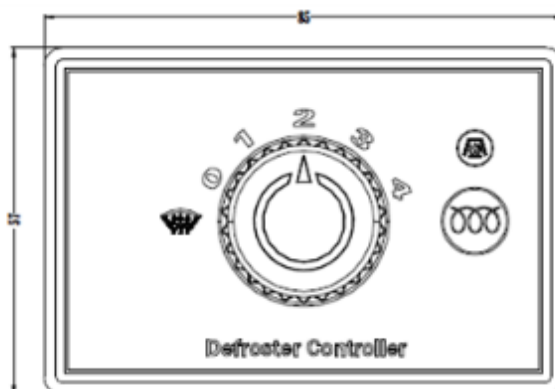


Fig. Defroster speed control switch

3. Component principle

After the defroster starts working, the internal high-pressure PTC starts heating, and then the

heated air is blown to the front windshield through a fan.

II. Special Tools

None

III. Maintenance Data

The working parameters of the defroster are shown in the table below:

Table Defroster operating parameters

Basic parameters	PTC rated voltage	DC 600V
	PTC rated power	3 KW
	PTC withstand voltage range	300V-750V
	Rated voltage of fan	DC 24V
	Machine input power	170 W
	Exhaust air volume	900 m ³ /h
	Fan	ZD2725 A
	IP rating of high-voltage connectors	IP67
	Whole machine IP level	IP56
	Defroster over-temperature protection value	98 °C

IV. Circuit Diagram

The working principle of the defroster is shown in the following figure:

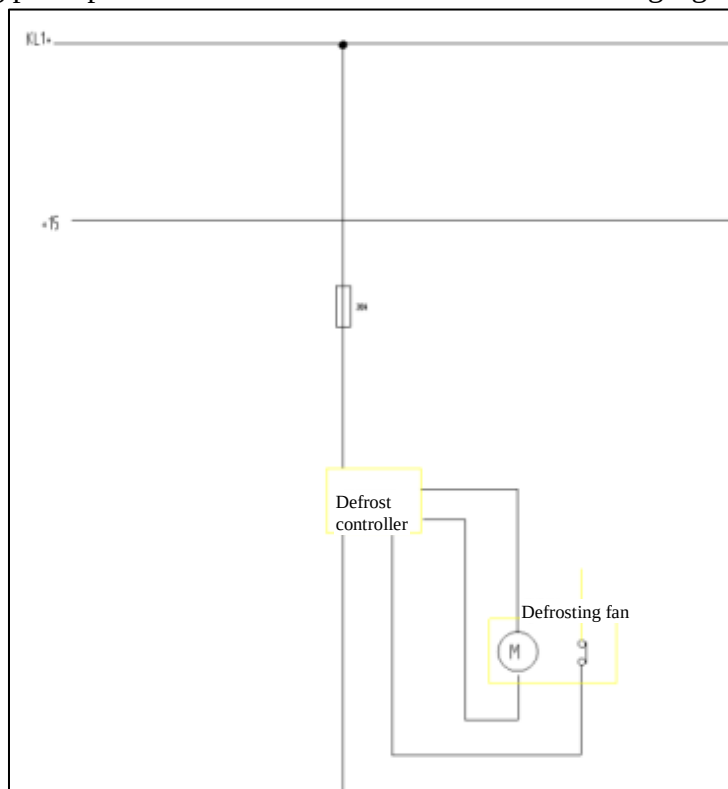


Fig. Electrical control principle of defroster

V. Fault Diagnosis

1. The fault diagnosis and troubleshooting methods are shown in the table below

Diagnosis and troubleshooting methods for defroster faults

Faults	Cause	Troubleshooting method
The fan does not work after startup	Fan plug-in not connected, virtual connection	Connect the plug-in properly
	Turbine stuck	Remove and repair
	Fuse broken	Replace the fuse
	Motor damage	Replace the motor
	Speed control switch damaged	Replace the speed control switch
PTC not working after startup	Pver-temperature safety plug-in not connected or not connected properly	Connect the plug-in properly
	High voltage plug-in not connected, virtual connection	Connect the plug-in properly
	Overtemperature protection and temperature control fuse damaged	Replace PTC or complete machine (determined based on product model)
	PTC heating element damaged	Replace PTC or complete machine (determined based on product model)
	Speed control switch faulty	Replace the speed control switch
	Relay voltage too low (with relay model)	Ensure that the relay voltage is within the normal range
Small exhaust volume of the fan	The positive and negative poles of the power supply are reversed	Correct wiring
	The intake filter screen is sticky with soil or has too much water	Clean the intake air filter screen
	Air duct rupture	Replace the air duct
Fan noise	Damaged motor bearings	Replace the motor
	Blade sweeping chamber	Adjust the clearance of the wind turbine
Insulation fault	Internal water accumulation in the defroster	Remove the intake filter and drain the water
	High voltage component fault of defroster	Replace the corresponding faulty parts after insulation resistance testing

2. PTC fault detection items

Insulation testing tool: Insulation resistance tester (FLUKE1508)

The test shall be carried out as follow:

- Adjust the voltage measured by the insulation resistance tester to the 1000V level;
- Press the "Compare" key to adjust the display to 1MΩ;
- Press the "Lock" button, then press the "Test" button;
- Measure the insulation resistance value between the high-voltage plug-in terminal and the housing;
- Measure the insulation resistance value between the high-voltage plug-in terminal and the low-voltage circuit terminal.
- Some products have high-voltage relays inside, and during measurement, two high-voltage

terminals need to be measured separately from the casing and low-voltage circuit.

VI. Method of Disassembly and Assembly

The defroster is installed on the front of the vehicle. After opening the door cover, ordinary tools can be used to disassemble and repair the defroster. The installation position is shown in the following figure:

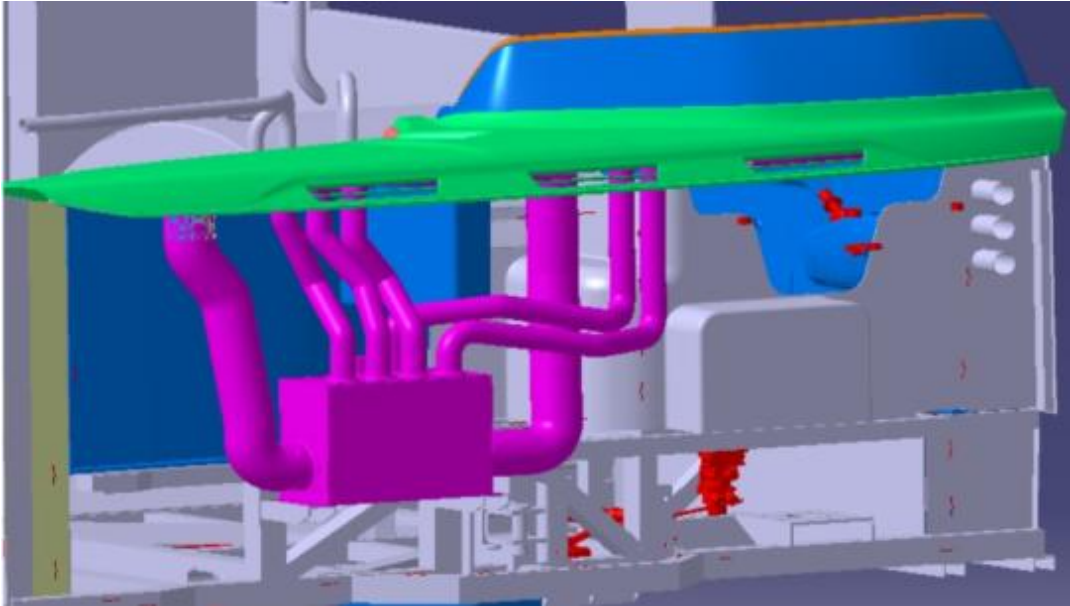


Fig. Installation position of defroster

VII. Component Maintenance Cycle and Methods

Table Defroster maintenance schedule

Content	Interval	Nature of work
Body damage inspection	15000 Km/3 months	Cleaning
Air inlet and heating pipeline	15000 Km/3 months	Inspection
High voltage wiring harness and connectors - external	15000 Km/3 months	Inspection

Chapter VII Wiper Maintenance Manual

I. Component Introduction

1. Component functions

Windshield wipers, also known as wipers, water wipers, wipers, or windshield wipers, consist of an electric motor, reducer, four link mechanism, wiper arm spindle, wiper blade assembly, etc. They are devices used to brush and remove raindrops and dust attached to the vehicle's windshield, in order to improve driver visibility and increase driving safety.

2. Component structure

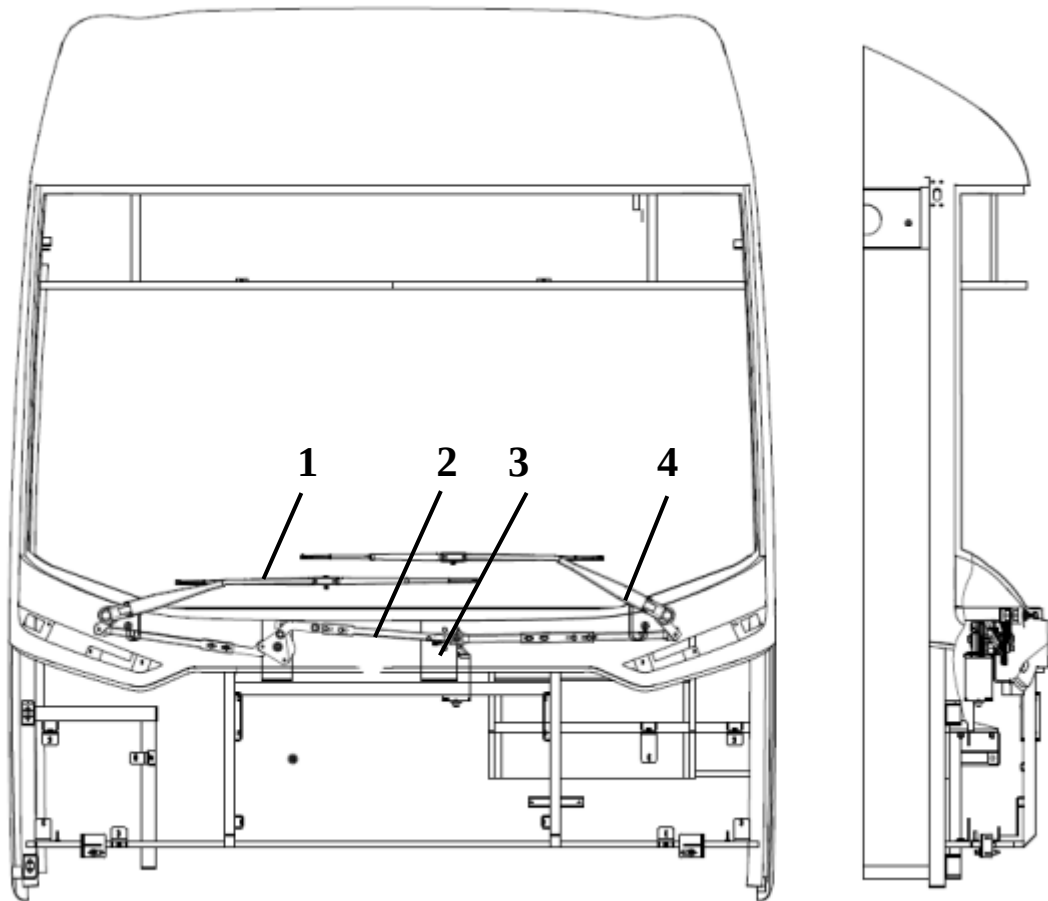


Fig. Diagram of wiper system

1. Scraper blade 2. Linkage mechanism 3. Wiper motor 4. wiper arm

3. Component principle

The power source for the wiper blades comes from an electric motor, which serves

as the core of the entire wiper system. The wiper motor is generally installed on the front windshield and integrated with the mechanical part of the worm gear. The function of a worm gear mechanism is to reduce speed and increase torque. Its output shaft drives a four-bar linkage mechanism, which changes continuous rotational motion into left and right swinging motion through the four-bar linkage mechanism.

The intermittent time of the wiper is controlled by an intermittent relay, which uses the return switch contact of the motor and the charging and discharging function of the relay resistor capacitor to make the wiper sweep according to a certain cycle. The wiper blade rubber is the tool that directly clears rainwater and dirt from the glass surface. Only when the tip of the blade is in a certain angle with the glass can the required function be realized.

II. Special Tools

Table Special Tools

S/N	Tool type
1	Sleeve
2	Torque wrench

III. Maintenance Data

The tightening torque of fixed bolts and nuts is shown in the table below:

Table Key Torque

S/N	Name	Model	Tightening torque
1	Hexagon nut	M12	40 N.m

IV. Circuit Diagram

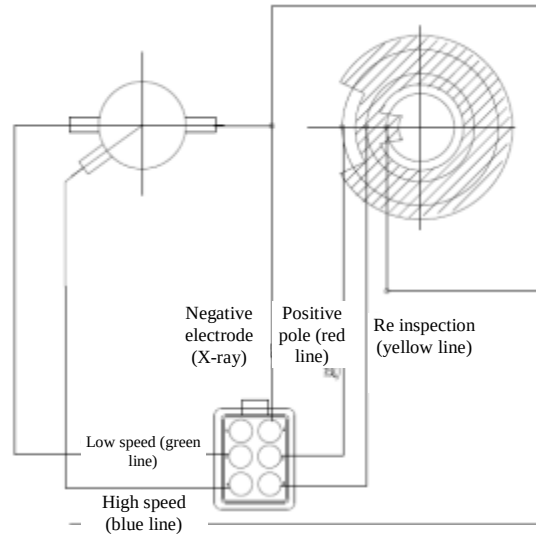


Fig. Schematic diagram of motor positive pole control

V. Fault Diagnosis

The fault diagnosis table is as follows:

Table 6-1 Fault Diagnosis Analysis

Faults	Cause of fault	Troubleshooting
Wipers not working with switch on	Wiper motor malfunction	Replace wiper motor
	Wiper switch malfunction	Replace the wiper switch
	The fuse is blown	Replace the fuse
The wipers are not clean and make abnormal noises	After long-term use, the blade will age	Replacing wiper blades
	Loose wiper mechanism	Tighten all components and adjust the wiper arm

VI. Method of Disassembly and Assembly

1. Installation of wiper linkage mechanism

- 1) The wiper linkage mechanism (with motor) needs to be installed before the defroster is installed. First, align the wiper motor assembly with the positioning hole on the front bracket and lock it with bolts.

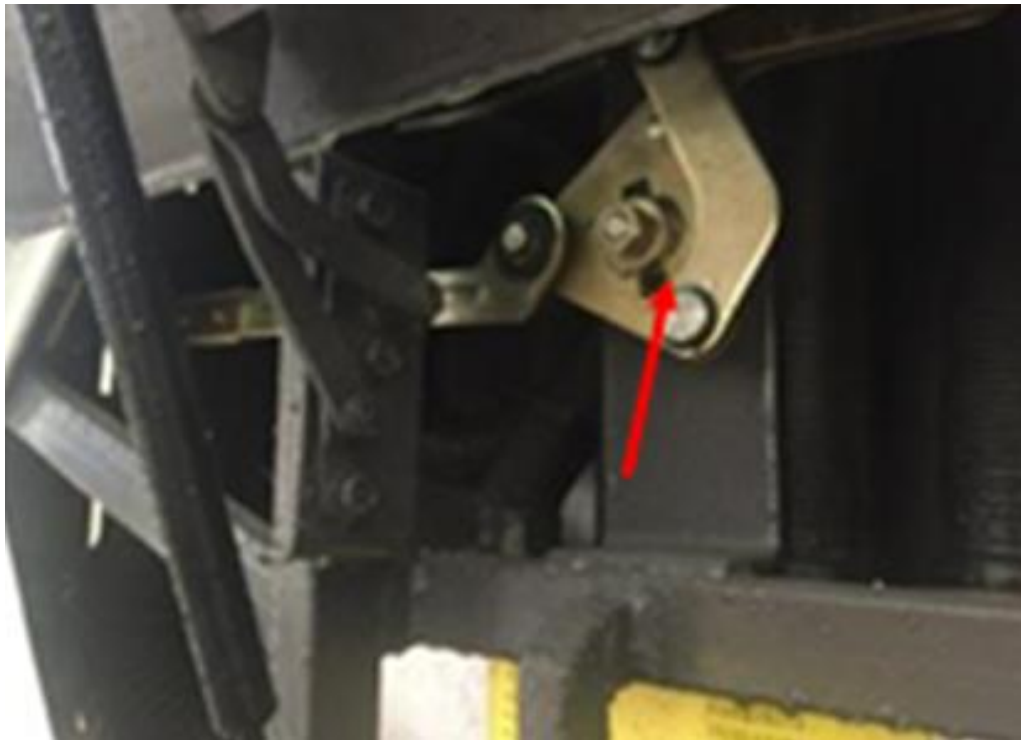


Fig. Motor positioning installation

- 2) The crankshaft is parallel to the main connecting rod, and the motor shaft is installed to the left. Tighten the fixing bolts.



Fig. Crank installation Fig. Motor shaft

- 3) Install the main and auxiliary rocker arms, adjust the inner nut of the shaft, so that the outer nut of the shaft is locked and the thread is exposed by about 8 threads.
- 4) By adjusting the length of the auxiliary rod and transition rod, the angle of the front passenger wiper blade can be adjusted within the tolerance range. The angle between the control arm and the horizontal line must be greater than 30° but less

than 45°.

2. Installation of washer

- 1) Install the washer connector with the interface facing downwards.



Fig. Washer Interface

- 2) Install the washer bracket, secure it with M5×20 bolts and nuts, and secure the washer to the bracket.
- 3) Connect the washer pipe and fix the water pipe to the front wall with a tie, with a spacing of about 300mm. The water pipe must not interfere with the connecting rod mechanism, and a tie must be added to fix the three-way joint.

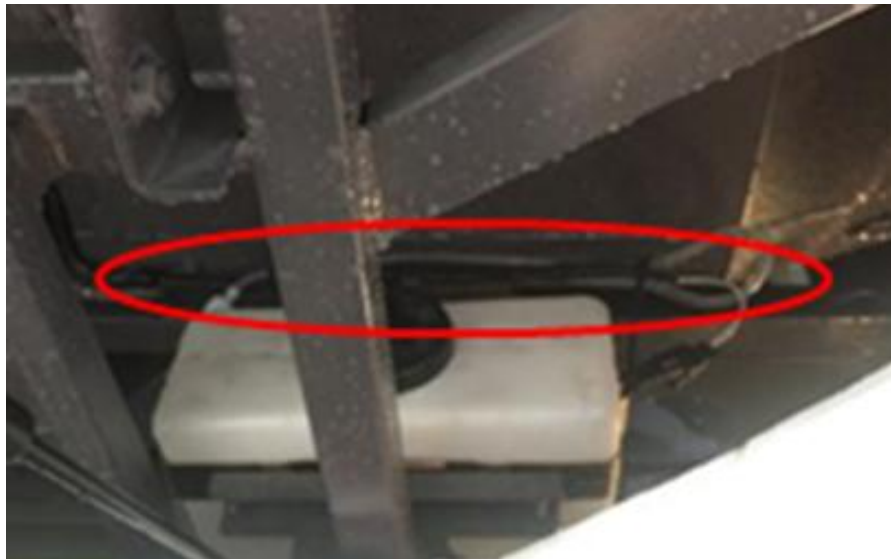


Fig. Fixed installation of water pipes

3. Installation of wiper blades

- 1) Remove the nut and snap ring from the wiper shaft, open the decorative cover at the rear of the wiper blade, and thread it onto the wiper shaft. After installation, the wiper blade should be kept level and fixed with an M12 nut and snap ring using a torque wrench.
- 2) When connecting the washer pipeline, wrap the pipeline around the shaft, cut off the excess part, and close the rear decorative cover.

VII. Component Maintenance Cycle and Methods

None

Chapter VIII Power Battery Maintenance Manual

I. Component Introduction

1. Component functions

The power battery system is used as an energy source for pure electric buses to meet the high-voltage energy needs of the vehicle. It is one of the main components of a vehicle.

This system consists of 8 standard G01 battery packs, with 4 boxes of batteries connected in series and then connected in parallel with another group of the same 4 boxes, forming two branches, as shown in the following figure.

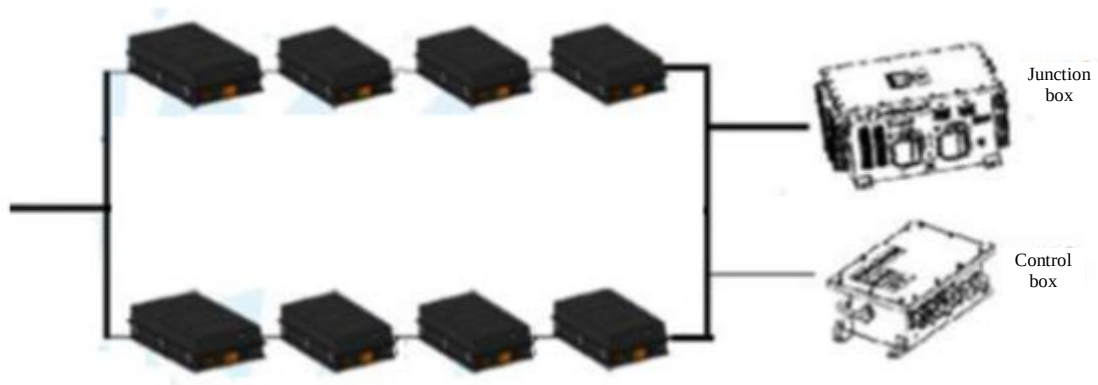


Fig. Composition and structure of power battery

The standard G01 battery pack consists of 39 228Ah battery cells, 1 CSC, 1 MSD box, several high-voltage connection harnesses, several low-voltage connection harnesses, several high-voltage connectors, several low-voltage connectors, and installation and fixing devices

The junction box consists of 1 main negative relay, 2 DC charging positive relays, 2 DC charging negative relays, 2 MSDs, 2 current sensors, 1 heating positive relay, 1 heating negative relay, 1 HVB, 1 DCDC, several high and low voltage connectors, several high voltage connectors, and low-voltage wiring harnesses.

The control box consists of 1 BMU, 1 RDB, several low-voltage connectors, and several low-voltage wiring harnesses.

2. Component structure

The battery system consists of three main components: a battery pack, a junction box, and a control box. The power battery is installed on the top of the vehicle, while the junction box and control box are installed in the rear compartment of the vehicle.

Junction box dimensions, L: 520mm, W: 492mm, H: 324mm

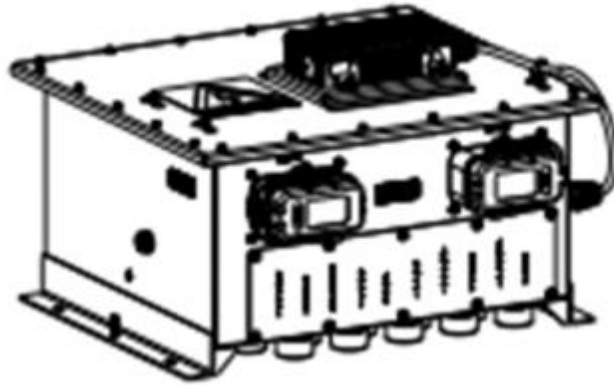


Fig. Outline of the junction box

Power battery pack dimensions: L: 950mm, W: 630mm

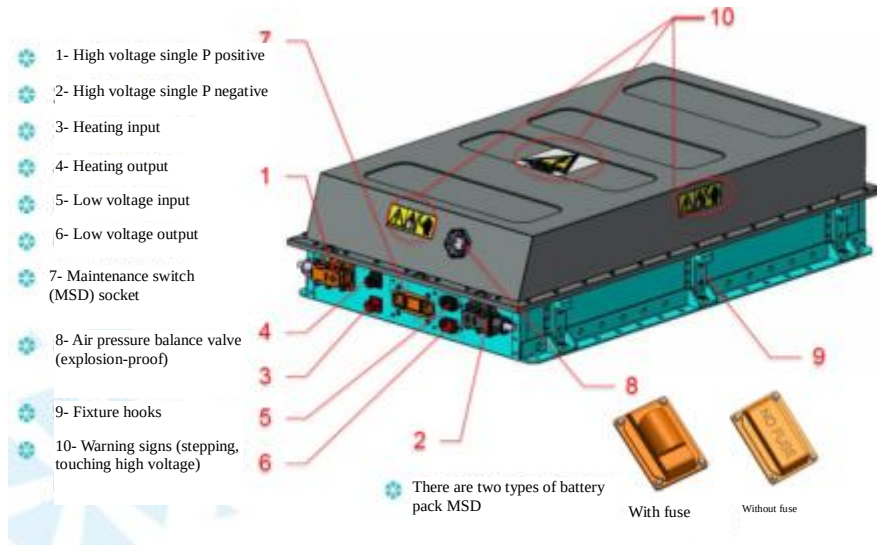


Fig. Power battery pack structure

Control box dimensions, L: 388mm, W: 260.4mm, H: 99.8mm

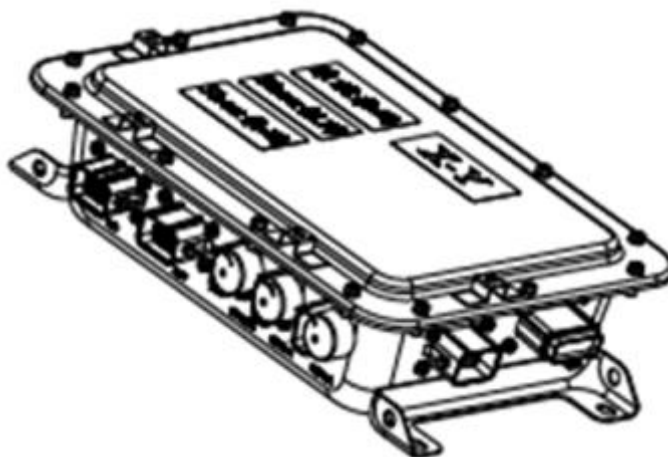


Fig. Control box appearance

3. Component principle

1. The main series circuit of the battery pack must be equipped with a fast fuse to ensure that the main circuit can be disconnected in case of a short circuit in the power system. The MSD of electrical boxes 2 and 5 is equipped with a fuse, with a fuse of 750V/630A.

- 1) BMS requires constant power supply.
- 2) In driving mode, the BMS is awakened by a high level provided by the vehicle's ignition switch in the ON position.
- 3) In the charging state, the BMS is awakened by an A+signal, which is valid at a high level.
- 4) In charging or self-wake-up mode, the BMS is powered by the battery system's built-in DCDC. In driving mode, it is provided by the vehicle's lead acid.

2. The electrical schematic diagram of the system is as follows:

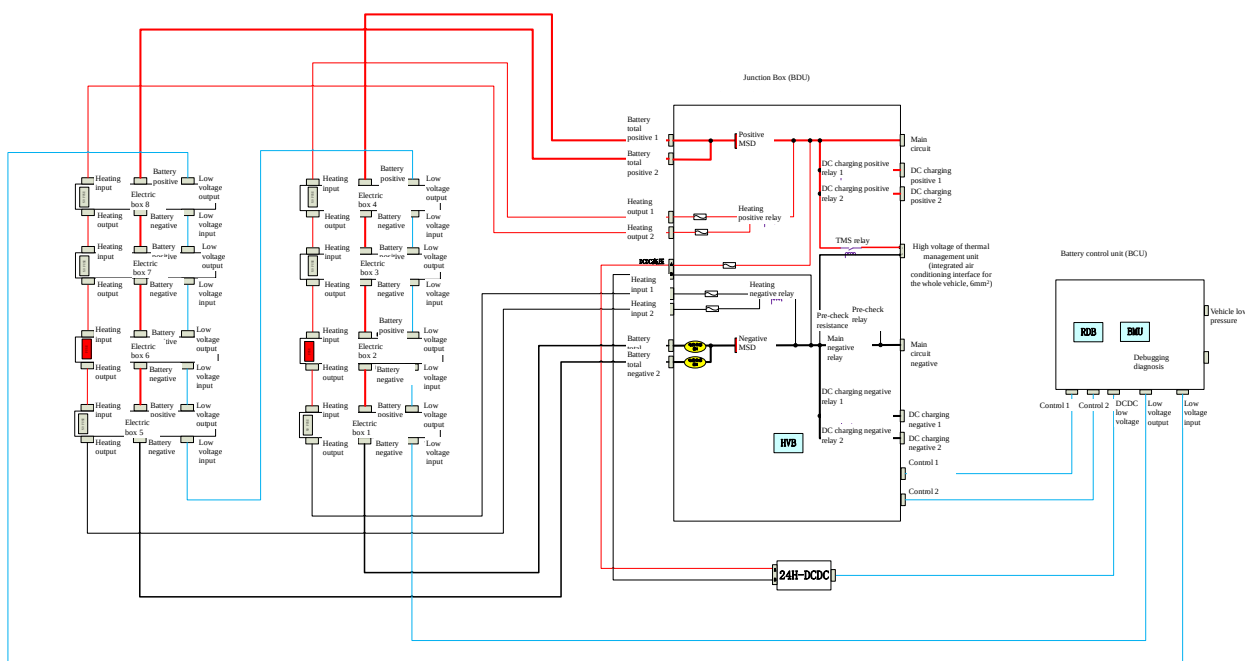


Fig. Principle of power battery system

II. Special Tools

Table 3-1 Special Tools

S/N	Tool type
1	Sleeve
2	Torque wrench
3	Multimeter
4	Insulation detector

III. Maintenance Data

The nominal voltage of the power battery is 502.32V, with a total of 2 parallel 156 series and a total energy of 229.057kW.h. Other data can be found in the table below:

Table 1 Key maintenance data

S/N	Item name	Technical parameter	Note
1	Battery type	LFP battery	
2	Temperature of storage environment	-40~+55℃	
3	Working ambient temperature	System: -35 ℃~65 ℃ Battery charging: 0-65 ℃ Battery discharge: -35~565 ℃	The power system is equipped with a heating scheme, and charging is not allowed when the battery's temperature is below 0 ℃
4	Work environment relative humidity	≤85%	
5	Rated capacity (Ah)	456	0.5C, 100%DOD, 25℃
6	Nominal voltage (V)	502.32	
7	Operating voltage range (v)	390~569.4	Single cell 2.8V~3.65V
8	Specific energy (Wh/Kg)	>155Wh/Kg	0.5C, 100%DOD, 25℃
9	Thermal management method	Heating: heating film Cooling: integrated water cooling	
10	Battery grouping scheme	A total of 2 parallel 156 strings, with 8	

		L228G01 boxes for dual branches L228G01 box: 1 parallel 39 strings	
11	Rated storage energy (kWh)	229.057	0.5C, 100%DOD, 25°C
12	End-of-life available energy (kWh)	160.339	0.5C, 100%DOD, 25°C
13	Cell cycle life	3000cls	1C/1C, 100%DOD, 25°C
14	Calendar lifespan of battery cells	8 years	25°C, 50%SOC
15	Rated charging current	250A	50%~95% SOC, 25 °C~50 °C, single cell voltage $\leq 3.7V$, only supporting single gun charging
16	Peak charging current	400A, 30s	0%~95% SOC, 25 °C~50 °C, single cell voltage $\leq 3.65V$
17	Rated discharging current	250A	30%~100% SOC, 25 °C~50 °C, single cell voltage $\geq 2.8V$
18	Peak discharge current	400A, 30s	30%~100% SOC, 25 °C~50 °C, single cell voltage $\geq 2.8V$
19	Self-discharge rate/month	$<3.5\%$	25 °C, SOC 50%, new battery stored for 3 months
20	Insulation requirements	$\geq 8M\Omega$	Refer to GB/T 18384.3-2015 for testing, and BMS insulation testing is prohibited during testing
21	Vibration requirements	The electrical box meets the requirements of GBT31467.3-20157.1.1 The junction box and control box meet the requirements of GBT31467.3-20157.1.2	
22	IP protection grade	Battery box IP67, junction box IP67, control box IP67, wire harness connector IP67	
23	Cell consistency	Capacity consistency $\leq 7\%$	New battery, 50% SOC, 25 °C
24	Total weight of electrical box (Kg)	1456	The estimated weight of the electrical box is not used as an acceptance standard
25	Total number of system temperature probes	48	

Table 2 Key maintenance data

Fault number	Fault list	Fault level (higher and more severe)	Vehicle fault level (higher and more severe)	Troubleshooting measures	Judgment criteria	Cancellation conditions
1	Single cell overvoltage alarm	1	1	The maximum allowable charging (feedback) power can be set to 50% of the current allowable value	U _{max} > 3.8V	U _{max} < 3.65V
		2	2	The maximum allowable charging (feedback) power can be set to 0	U _{max} > 3.85V	U _{max} < 3.65V
		3		The maximum allowable charging (feedback) power can be set to 0, requesting parking	U _{max} > 3.9V	U _{max} < 3.7V
2	Single cell undervoltage alarm	1	1	The maximum allowable discharging power can be set to 50% of the current allowable value	U _{min} < 2.8V (room temperature) U _{min} < 2.5V (low temperature)	U _{min} > 3.1V (room temperature) U _{min} > 2.8V (low temperature)
		2	2	The maximum discharging power can be set to 0	U _{min} < 2.5V (room temperature) U _{min} < 2.3V (low temperature)	U _{min} > 2.8V (room temperature) U _{min} > 2.5V (low temperature)
		3		The maximum discharging power can be set to 0, requesting parking	U _{min} < 2.4V (room temperature) U _{min} < 2.2V (low temperature)	U _{min} > 2.5V (room temperature) U _{min} > 2.4V (low temperature)
3	Low temperature alarm of battery cells	1	1	Alarm only, no restrictions	T _{min} < -25°C	T _{min} > -20°C
		2	1	Alarm only, no restrictions	T _{min} < -30°C	T _{min} > -25°C
		3		Alarm only, no restrictions	T _{min} < -35°C	T _{min} > -30°C
4	Cell high temperature alarm	1	1	The maximum allowable charging and discharging power can be set to 50% of the current allowable value	T _{max} > 55°C	T _{max} < 53°C

Fault number	Fault list	Fault level (higher and more severe)	Vehicle fault level (higher and more severe)	Troubleshooting measures	Judgment criteria	Cancellation conditions
		2	2	The maximum allowable charging and discharging power can be set to 0	Tmax > 60°C	Tmax < 58°C
		3		The maximum charging and discharging power can be set to 0, requesting parking	Tmax > 64°C	Tmax < 62°C
5	Excessive single cell voltage difference (driving) alarm	1	1	Alarm only, no restrictions	$\Delta V > 0.3V$	$\Delta V < 0.25V$
		2	1	Alarm only, no restrictions	$\Delta V > 0.4V$	$\Delta V < 0.35V$
		3	1	Alarm only, no restrictions	$\Delta V > 0.5V$	$\Delta V < 0.45V$
6	Low battery SOC alarm	1	1	The maximum allowable discharging power can be set to 50% of the current allowable value	SOC < 15%	SOC > 18%
		2	1	The maximum allowable discharging power can be set to 50% of the current allowable value	SOC < 10%	SOC > 13%
		3	1	The maximum allowable discharging power can be set to 50% of the current allowable value	SOC < 8%	SOC > 12%
7	Total voltage overvoltage alarm	1	1	Alarm only, no restrictions	$V_{bat} > 3.7V * N$, where N is the number of battery strings	$V_{bat} < 3.7V * N - 5$
		2	1	Alarm only, no restrictions	$V_{bat} > 3.75V * N$	$V_{bat} < 3.75V * N - 5$
		3	1	Alarm only, no restrictions	$V_{bat} > 3.8V * N$	$V_{bat} < 3.8V * N - 5$
8	Total voltage undervoltage	1	1	Alarm only, no restrictions	$V_{bat} < 2.85V * N$ (room temperature)	$V_{bat} > 2.85V * N + 5$ (room

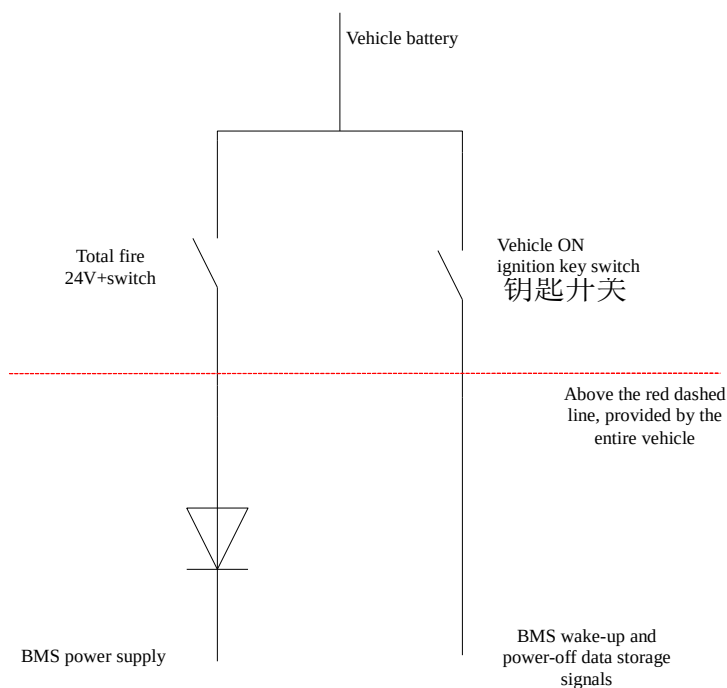
Fault number	Fault list	Fault level (higher and more severe)	Vehicle fault level (higher and more severe)	Troubleshooting measures	Judgment criteria	Cancellation conditions
	alarm				Vbat<2.6V * N (low temperature)	temperature) Vbat > 2.6V * N+5 (low temperature)
		2	1	Alarm only, no restrictions	Vbat<2.6V * N (room temperature) Vbat<2.3V * N (low temperature)	Vbat > 2.6V * N+5 (room temperature) Vbat > 2.3V * N+5 (low temperature)
		3	1	Alarm only, no restrictions	Vbat<2.3V * N (room temperature) Vbat<2.1V * N (low temperature)	Vbat > 2.3V * N+5 (room temperature) Vbat > 2.1V * N+5 (low temperature)
9	Branch pressure differential alarm (present when there are multiple branches)	1	1	The maximum allowable charging and discharging power can be set to 50% of the current allowable value	$\Delta V > 0.04 * N$	$\Delta V > 0.04 * N - 2$
		2	2	The maximum allowable charging and discharging power can be set to 0	$\Delta V > 0.045 * N$	$\Delta V > 0.045 * N - 2$
		3		The maximum charging and discharging power can be set to 0, requesting parking	$\Delta V > 0.05 * N$	$\Delta V > 0.05 * N - 2$
10	Branch circuit break fault alarm (exists when there are multiple branches) alarm	3	2	The maximum charging and discharging power can be set to 0, requesting parking	When the cumulative change in the capacity of a certain branch exceeds 6Ah, judge the open circuit situation of other branches: If there is a cumulative capacity change of less than 1Ah in other branches, it is judged that the branch with a capacity change of less than 1Ah is open circuit;	If there is a cumulative capacity change of $\geq 3Ah$ in other branches, it is determined that the branch with a capacity change of $\geq 3Ah$ is not open circuit;

Fault number	Fault list	Fault level (higher and more severe)	Vehicle fault level (higher and more severe)	Troubleshooting measures	Judgment criteria	Cancellation conditions
11	Alarm for excessive temperature difference	1	1	The maximum allowable charging and discharging power can be set to 50% of the current allowable value	$\Delta T > 20^{\circ}\text{C}$	$\Delta T < 18^{\circ}\text{C}$
		2	2	The maximum allowable charging and discharging power can be set to 0	$\Delta T > 25^{\circ}\text{C}$	$\Delta T < 23^{\circ}\text{C}$
		3		The maximum charging and discharging power can be set to 0, requesting parking	$\Delta T > 30^{\circ}\text{C}$	$\Delta T < 28^{\circ}\text{C}$
12	Discharging current exceeding limit alarm	1	1	The maximum allowable discharging power can be set to 50% of the current allowable value	$> I * 105\%$	$< I * 100\%$
		2	1	The maximum allowable discharging power can be set to 50% of the current allowable value	$> I * 120\%$	$< I * 105\%$
		3	1	The maximum allowable discharging power can be set to 50% of the current allowable value	$> I * 125\%$	$< I * 105\%$
13	Recharging current exceeding limit alarm	1	1	The maximum allowable charging power can be set to 50% of the current allowable value	$> I * 105\%$	$< I * 100\%$
		2	2	The maximum allowable charging power can be set to 0	$> I * 120\%$	$< I * 105\%$
		3		The maximum charging and discharging power	$> I * 125\%$	$< I * 105\%$

Fault number	Fault list	Fault level (higher and more severe)	Vehicle fault level (higher and more severe)	Troubleshooting measures	Judgment criteria	Cancellation conditions
				can be set to 0, requesting parking		
14	Charging current exceeding limit alarm	3	2	The maximum allowable charging power limit can be 0, requesting to stop charging	$I > I_{*120\%}$	$I < I_{*105\%}$
15	Alarm for low insulation during driving	1	1	The maximum allowable charging and discharging power can be set to 50% of the current allowable value	$R < 600\Omega/V$	$R \geq 1100\Omega/V$
		2			$R < 500\Omega/V$	$R \geq 1000\Omega/V$
		3	2	Allow maximum discharge power to be set to 0 and requesting parking	$R < 400\Omega/V$	$R \geq 900\Omega/V$
16	Charging insulation low alarm	3	2	Stop charging	$R < 100\Omega/V$	$R \geq 100\Omega/V$

IV. Circuit Diagram

The schematic diagram of BMS power supply and triggering is as follows:



V. Fault Diagnosis

1. Fault phenomenon description, the higher the fault level, the more severe it becomes

Table Fault description

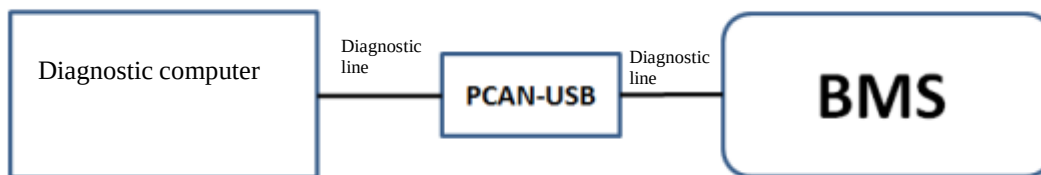
Fault number	Fault list	Fault level	Vehicle fault level	Troubleshooting measures	Judgment criteria	Cancellation conditions
1	Main positive contactor fault alarm	3	2	No charging allowed, requesting limping while driving	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
2	Main and negative contactor fault alarm	3	2	No charging allowed, requesting limping while driving	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
3	DC charging positive contactor fault alarm	3	2	No charging allowed, requesting limping while driving	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
4	DC charging negative contactor fault	3	2	No charging allowed, requesting	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0

Fault number	Fault list	Fault level	Vehicle fault level	Troubleshooting measures	Judgment criteria	Cancellation conditions
	alarm			limping while driving		
5	Heating positive contactor fault alarm	1	1	Report fault, prohibit heating	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
6	Heating negative contactor fault alarm	1	1	Report fault, prohibit heating	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
7	Thermal management system fault (only applicable to systems with thermal management) alarm	1	1	Report fault, prohibit starting the thermal management system	Heating film open circuit fault The inlet temperature of the water cooling system is too high The inlet temperature of the water cooling system is too low Thermal management unit fault	Heating film open circuit fault requires after-sales confirmation; Power on again in other situations
8	Thermal management unit contactor fault alarm (only applicable to water cooling system)	1	1	Report fault, prohibit starting thermal management unit	Contact coil chip detection fault location 1	Contact Coil chip detection fault position 0
9	Vehicle power supply 24V abnormal alarm	3	2	Can allow the maximum charging and discharging power to be set to 0, requesting parking, and request to stop charging during charging.	Power supply<18V Power supply>32V	Power supply meets the requirements 19~31V
10	BMS internal communication	3	2	Charging prohibited,	CCAN SCAN message	Received a frame of

Fault number	Fault list	Fault level	Vehicle fault level	Troubleshooting measures	Judgment criteria	Cancellation conditions
	fault alarm (CCAN, SCAN)			requesting limp power while driving	loss	message
11	High voltage interlock fault alarm	3	2	Parking: charging prohibited, driving prohibited: maximum charging and discharging power allowed to be set to 0, requesting parking	High voltage interlock disconnected	High voltage interlock recovery
12	Driving SOC too high fault	3	2	Prohibit recharge	BEV: SOC exceeding 100% is considered a fault	BEV: SOC $\leq$ 100% Cancel fault
13	SOC jump fault alarm	3	2	Alarm only, no restrictions	SOC jump detection fault location 1	SOC jump detection fault position 0
14	Rechargeable energy storage system mismatch fault alarm	3	2	Alarm only, no restrictions	System mismatch detection fault location 1	System mismatch detection fault location 0
15	Charging dock overtemperature alarm	1	1	Charging power is reduced by 50%	Alarm threshold: Charging gun temperature $>100\text{ }^{\circ}\text{C}$	Cancellation threshold: Charging gun temperature $\leq 90\text{ }^{\circ}\text{C}$
		2	2	Reduce charging power to 0 and stop charging	Alarm threshold: Charging gun temperature $>110\text{ }^{\circ}\text{C}$	Cancellation threshold: Charging gun temperature $\leq 100\text{ }^{\circ}\text{C}$
16	External communication loss	2	2	Requesting limp while driving	External CAN communication fault duration: 10S	Communication recovery, no interruption within 2 seconds,

Fault number	Fault list	Fault level	Vehicle fault level	Troubleshooting measures	Judgment criteria	Cancellation conditions
						duration: 0 seconds
17	BMS hardware fault alarm (reserved)	3	2	No charging allowed, requesting limping while driving	\	\
18	BMS extreme fault self-protection (non charging)	4	2	If the maximum charging and discharging power is allowed to be set to 0 and a request is made to disconnect the high voltage, and there is no response within 35 seconds of the vehicle, the BMS will actively disconnect the main circuit contactor	① Extreme overvoltage: Maximum voltage of a single cell>4.1V ② Extreme undervoltage: Minimum voltage of a single cell<2.3V (room temperature)/2.1V (at low temperature) ③ Extreme overtemperature: The maximum temperature of a single cell is>65 °C	\
19	Fire warning	4	2	If the maximum charging and discharging power is allowed to be set to 0 and a request is made to disconnect the high voltage, and there is no response within 35 seconds of the vehicle, the BMS will actively disconnect the main circuit contactor	The maximum temperature of a single unit is $\geq 75\text{ }^{\circ}\text{C}$	No backlash

2. Fault diagnosis process;



3. Electronic control system fault codes and definitions.

Table 1 Fault codes of vehicle power battery

BMS	P110B	110B	4363	Battery management system shutdown fault
	P110C	110C	4364	Zero power fault of battery management system
	P110D	110D	4365	Battery management system power reduction fault
	P110E	110E	4366	Minor malfunction of battery management system
	P0AA6	0AA6	2726	Minor insulation fault
	P0AA7	0AA7	2727	Serious insulation fault
	P0A0A	0A0A	2570	HV interlocking fault

Table 2 Power battery fault codes

SPN	FMI	Fault level	Fault light	Fault description
524287	31	2	Yellow	Slight battery overcurrent
510976	16	2	Yellow	Total voltage high
510976	18	2	Yellow	Total voltage low
510976	0	2	Red	Total voltage extremely high (severe)
510976	1	2	Red	Total voltage extremely low (severe)
510976	2	2	Yellow	Total voltage data incorrect
510977	16	2	Yellow	Total current high
510977	0	1	Red	Total current extremely high (severe)
510977	2	2	Yellow	Total current data incorrect
510978	16	2	Yellow	SOC high
510978	18	2	Yellow	SOC low
510978	0	2	Red	SOC extremely high (severe)
510978	1	2	Yellow	SOC extremely low (severe)
510978	2	2	Yellow	SOC data incorrect
510979	5	2	Red	Main relay not closed fault
510979	6	2	Red	Main relay not disconnected fault
510980	7	2	Red	Pre-charge relay not closed fault

SPN	FMI	Fault level	Fault light	Fault description
510980	8	2	Yellow	Pre-charge relay not disconnected fault
510981	9	2	Red	Charging relay not closed fault
510981	10	2	Red	Charging relay not disconnected fault
510982	2	2	Red	Charging fault
510983	17	2	Yellow	Low insulation resistance fault
510983	1	1	Red	Very low insulation resistance fault (severe)
510985	2	2	Red	Battery interlock fault
510986	15	2	Yellow	Voltage balancing fault
510986	16	2	Red	Voltage balancing fault (severe)
510987	15	2	Yellow	Temperature balance fault
510987	16	2	Red	Temperature balance fault (severe)
510988	19	2	Yellow	CAN communication fault
510989	12	2	Red	BMS controller malfunction (24V power supply malfunction)
510990	15	2	Yellow	Single cell overvoltage
510990	16	2	Red	Single cell overvoltage (severe)
510990	0	2	Red	Single cell overvoltage (most severe)
510990	17	2	Yellow	Single cell undervoltage
510990	18	2	Red	Single unit undervoltage (severe)
510990	1	2	Red	Single unit undervoltage (most severe)
510991	15	2	Yellow	Single cell overheating
510991	16	1	Red	Single cell overheating (severe)
510991	17	2	Yellow	Single cell undertemperature
510991	18	2	Red	Single cell undertemperature (severe)
511200	15	2	Yellow	Single cell 1 voltage sensor value high
511499	15	2	Yellow	Single cell 300 voltage sensor has high values
511200	17	2	Yellow	Single cell 1 voltage sensor value low
511499	17	2	Yellow	Single cell 300 voltage sensor value low
511200	0	2	Red	Single cell 1 voltage sensor with extremely high values (severe)
511499	0	2	Red	Single cell 300 voltage sensor with extremely high values (severe)
511200	2	2	Yellow	Single cell 1 voltage sensor value incorrect
511200	5	2	Red	Single cell 1 voltage sensor open circuit
511499	5	2	Red	Single cell 300 voltage sensor open circuit
511200	6	2	Red	Single cell 1 voltage sensor short circuit
511500	15	2	Yellow	Temperature sensor value high at temperature measurement point 1

SPN	FMI	Fault level	Fault light	Fault description
511799	15	2	Yellow	Temperature sensor value high at temperature measurement point 300
511500	17	2	Yellow	Temperature sensor value low at temperature measurement point 1
511799	17	2	Yellow	Temperature sensor value low at temperature measurement point 300
511500	0	2	Red	Temperature sensor value extremely high (severe) at temperature measurement point 1
511799	1	2	Red	Temperature sensor value extremely low (severe) at temperature measurement point 300
511500	2	2	Red	Temperature sensor value incorrect at temperature measurement point 1
511799	2	2	Red	Temperature sensor value incorrect at temperature measurement point 300
511500	5	2	Red	Temperature sensor open circuit at temperature measurement point 1
511799	5	2	Red	Temperature sensor open circuit at measuring point 300
511500	6	2	Red	Short circuit of temperature sensor at temperature measurement point 1
511799	6	2	Red	Short circuit of temperature sensor at measuring point 300

VI. Method of Disassembly and Assembly

The method introduced here is for external disassembly and assembly of power batteries. Internal disassembly and assembly of power batteries are carried out at the factory and not on site.

Step 1: Open the roof power battery protective cover



Fig. Roof battery pack outer cover

Step 2: Disassemble the battery pack you need to repair

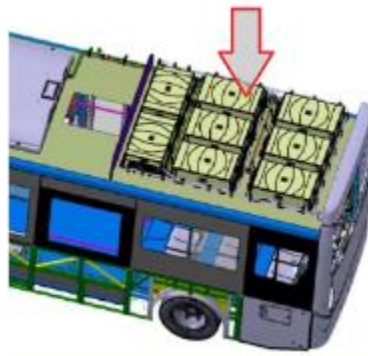


Fig. Power battery placement position

Step 3: Disassemble and assemble the power battery pack shown in the figure

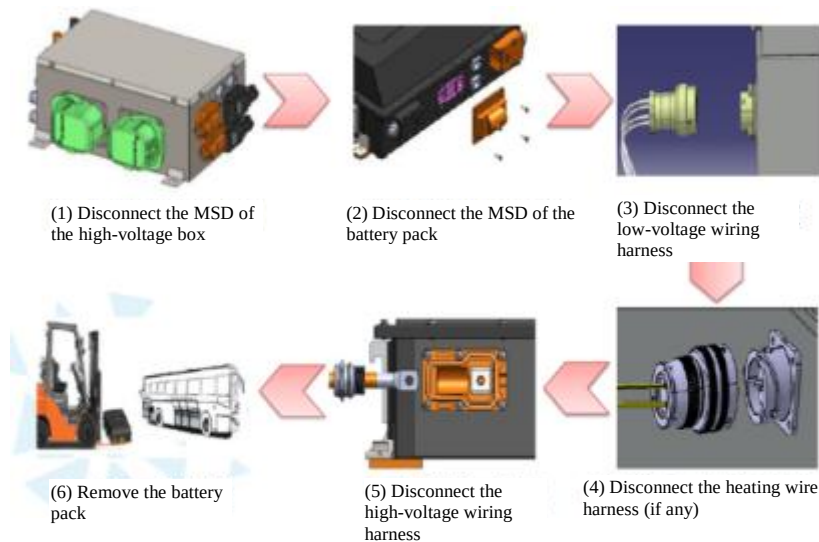


Fig. Steps for disassembling the power battery pack

Step 4: Disassemble and assemble the bolts of the power battery pack as shown in the figure.

(1) Adjust the position of the battery pack so that the welding nuts on the battery pack align with the installation holes on the vehicle;

(2) Fix the battery pack with M12 long bolts, spring washers, and large flat washers, and

pre-tighten them;

(3) Lock the bolts with a locking torque of **190N·m**. Priority should be given to locking bolts 2 and 5, and then diagonal locking should be used to sequentially lock bolts 1, 3, 4, and 6.

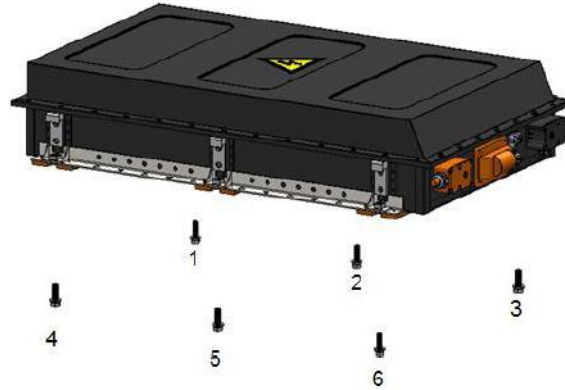
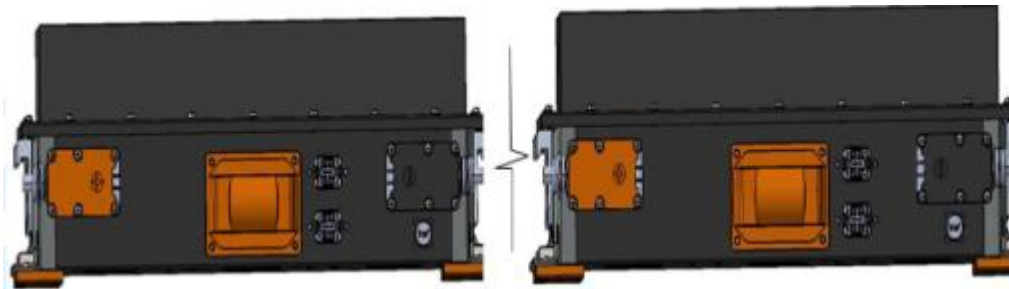


Fig. Dismantling of the power battery pack

Step 5: Disassemble and assemble the high-voltage wiring harness of the power battery pack as shown in the figure.

When installing connectors, it is necessary to ensure that the wiring harness label corresponds to the box label.



Check whether the installation base of the high-voltage connector and the surface of the high-voltage wire connection terminal are clean and free of oil stains, black spots, etc., to ensure that no metal or other powder falls into the connector.

Insert the high-voltage wire into the high-voltage connector in the direction of the arrow in the diagram. The direction of the high-voltage wire outlet must not be perpendicular to the opening of the connector as shown by the arrow in the diagram.

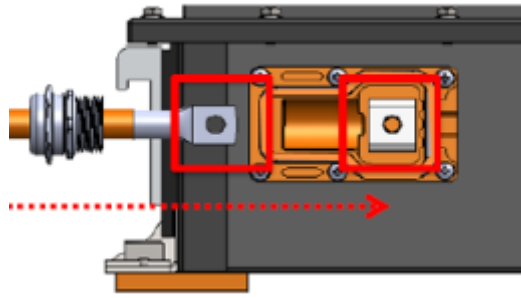


Fig. Disassembly and assembly of wiring

The installation of high-voltage terminals and non high-voltage connectors should be pre tightened with M8×16 combination bolts (with flat washers and spring washers), and then tightened again. The final tightening torque requirement is $25\text{N} \cdot \text{m}$ for locking.

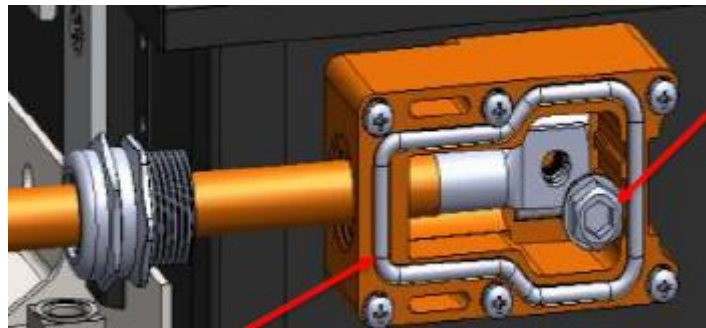


Fig. High-voltage line bolt disassembly torque

The installation of the sealing ring of the high-voltage connector must be ensured to be installed in the corresponding connector slot. The upper cover component should be installed on the base and locked with M4×12 combination cross head screws. The torque requirement is: (A) $2\text{N} \cdot \text{m}$; (B) $1.2 \pm 0.2\text{N} \cdot \text{m}$.

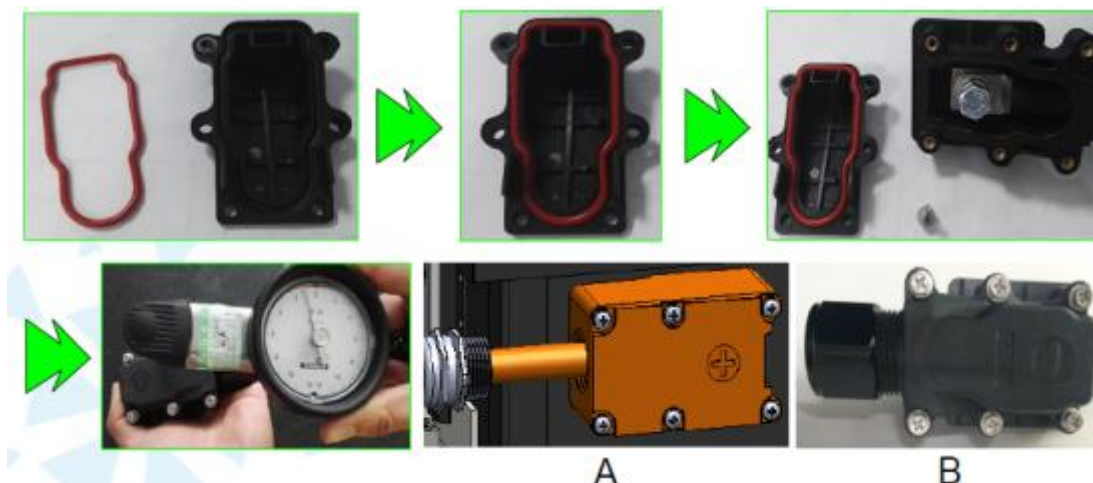


Fig. Requirements for disassembling and assembling wiring ports

Gland installation, tightening force requirement: (A) $(4-4.4)\text{N} \cdot \text{m}$; (B) Reference $(8-10)\text{N} \cdot \text{m}$; And tighten the gland head until only one turn of the thread is left.

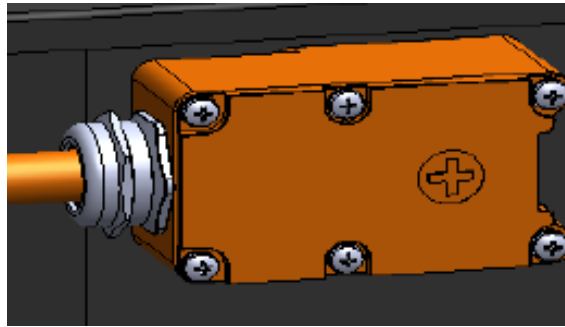


Fig. Gland fastening

Step 6: Disassemble and assemble low-voltage wiring harness in power battery pack

When installing connectors, it is necessary to ensure that the wiring harness labels do not correspond to the box connector labels.

Check if the low-voltage connector is clean and free of oil stains, and ensure that no metal or other powder falls into the connector.

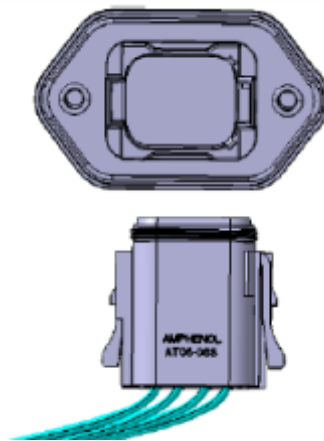


Fig. Socket and plug

Before inserting, confirm the positioning slot position of the low-voltage connector.

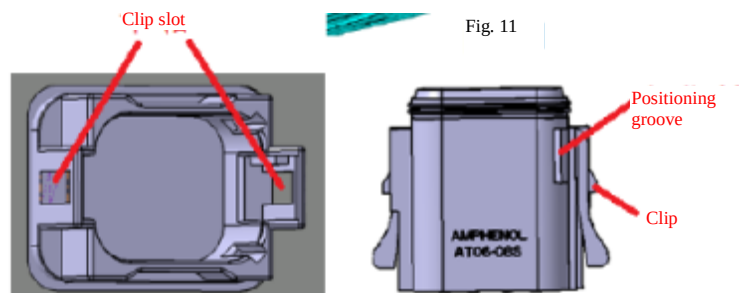
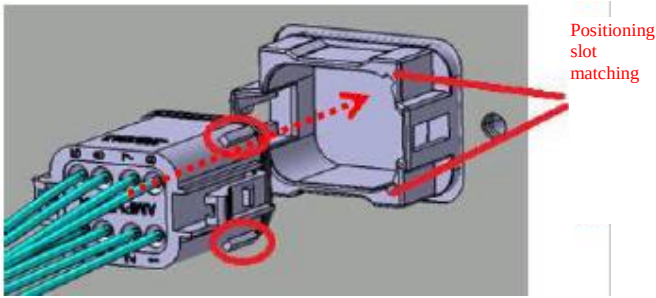


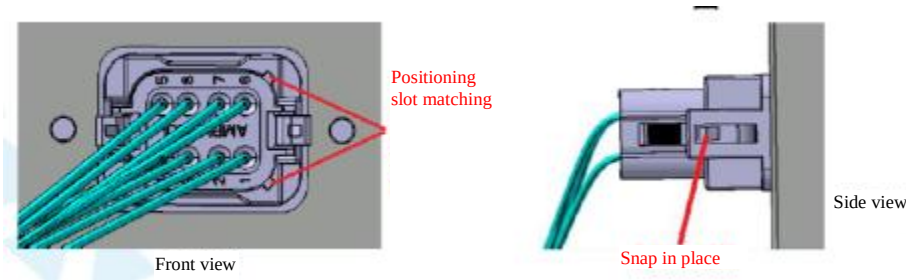
Fig. Clip slot positioning slot

As shown by the arrow direction in the diagram: the plug end does not match the positioning slot position of the socket end, and the plug is inserted.



After insertion, a "click" sound is heard, indicating that the buckle of the plug is already in place.

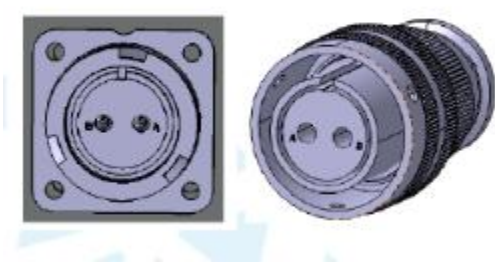
After the insertion is completed, it is shown in the picture.



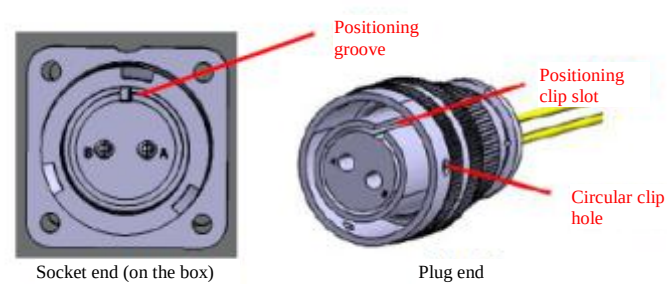
Step 7: Installation method for low-voltage wire harness with round head

When installing connectors, it is necessary to ensure that the wiring harness labels do not correspond one-to-one with the box connector labels.

Check if the low-voltage connector is clean and free of oil stains, and ensure that no metal or other powder falls into the connector.

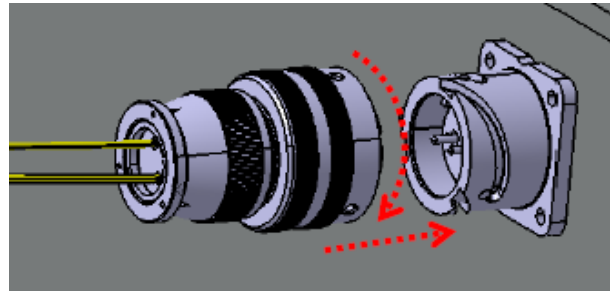


Before inserting, confirm the positioning slot position of the heating connector.

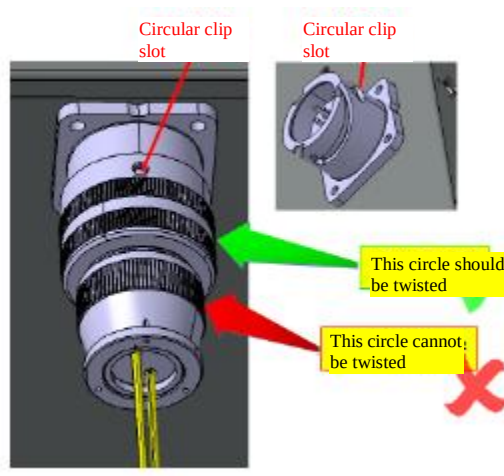


As indicated by the arrow direction: the positioning slot of the plug end does not match the

socket end. Insert the plug and rotate it to the right.



Until a "click" sound is heard, the plug cannot rotate to the right anymore, indicating that the card hole of the plug is no longer stuck in the slot of the socket.



Step 8: Disassembly and assembly of battery pack maintenance switch

Pre-tighten with 4 M5×16 hexagonal flange bolts, and then proceed with the final tightening.

The required torque for the final tightening is 4 N · m.

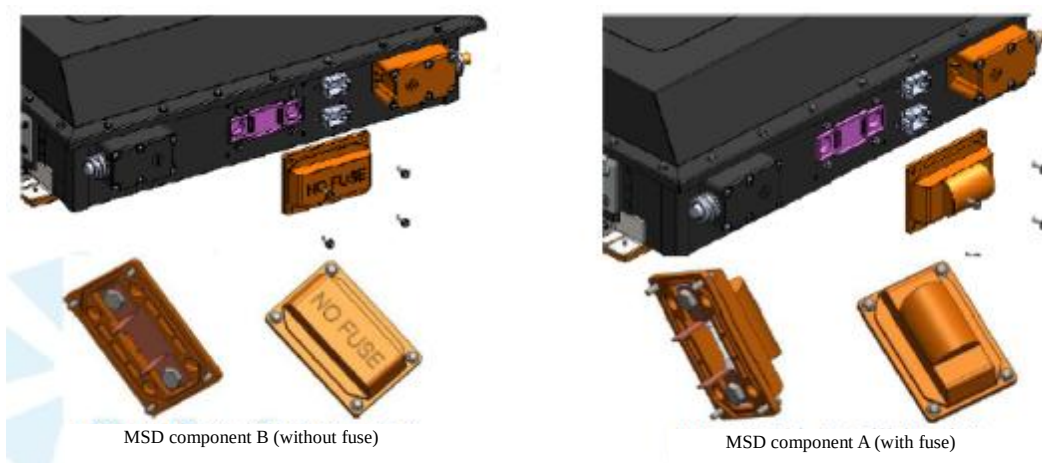


Fig. Manual maintenance switch installation torque

VII. Component Maintenance Cycle and Methods

1. Usage and storage temperature

- 1) Battery working environment temperature: -30 °C~50 °C
- 2) Battery storage environment temperature: -40 °C~55 °C

2. SOC and charging

- 1) When the SOC value is between 50% and 100%, it is best to drive. When it is below 30%, it is not recommended to drive. It should be recharged to 50% to 100% before driving.
- 2) Normal operating vehicles should strive to be fully charged once a day, and it is not allowed to pull out the gun until the charging is completed.

3. Long periods of inactivity and routine maintenance

- 1) When there is a maintenance alarm on the vehicle instrument panel, do not leave the vehicle for a long time (more than two weeks). Before the first use, it is necessary to perform a "routine maintenance" as soon as possible.
- 2) It is recommended that the SOC value range before long-term storage should be between 50% and 80%, and a full charge should be conducted every two months.
- 3) The vehicle needs to undergo a regular battery check every 1-2 months of operation.

4. Daily inspection

- 1) Check for any collision, deformation, or damage on the outside of the battery compartment. If so, open the compartment and check if the battery pack is intact.
- 2) Check for foreign objects blocking the external ventilation louvers of the vehicle. Clean up any foreign objects in a timely manner.
- 3) Check for stains, water stains, unknown liquids, etc.
 - 1)
 - 2)
 - 3)
- 4) Check if the MSD is loose, overheated, and if the fixing screws are loose.
- 5) Check if the battery pack balance valve is functioning properly.

- 6) Check if the battery pack is deformed or damaged.
- 7) Check whether the wiring harness joint is loose.
- 8) Check whether the high-voltage cable is aged or damaged.
- 9) Check if there is any odor in the battery pack and prevent any liquid leakage.
- 10) Check if the fixing screws of the battery pack are loose.
- 11) Check for any looseness or heating in the MSD.
- 12) Check if the terminals of the high-voltage box are loose or overheated.
- 13) Check if the high-voltage box is deformed.
- 14) Check for aging or damage to the high-voltage wiring harness.
- 15) Check if the fixing screws are loose.

5. Maintenance operation process

- 1) Control the battery level to a static parking position between 25% and 40% SOC.
- 2) Turn off the power of the entire vehicle and power it on again. Turn the key to the on position and turn off all electrical appliances such as the air conditioner and radio.
- 3) Maintain this state for 12-15 hours before powering off the entire vehicle. After maintenance is completed, a full charge is required.

IV. Body Repair Manual

Chapter I Driver's Seat Maintenance Manual

I. Component Introduction

1. Component parameters

Table Driver's seat parameters

Model	SJ12
Backrest adjustment angle (front)	$25^{\circ} \pm 5^{\circ}$
Backrest adjustment angle (rear)	$35^{\circ} \pm 5^{\circ}$
Front and rear travel	90mm
Height adjustment	$60 \pm 5\text{mm}$
Suspension stroke	$70 \pm 5\text{mm}$
Burning speed	$\leq 50\text{mm/min}$
Seat belt	Three point rebound type
Adjustment direction	Six directions
Fabric material	Artificial leather

2. Component structure



Fig. Driver's seat

3. Component principle

The main control for air pressure rise and fall is the airbag on the chair. The airbag inside the chair is filled with a certain amount of gas when the human body sits on the chair. When gas is compressed under pressure, the height of the chair will decrease, and conversely, it will rise.

II. Special Tools

Table Special Tools

S/N	Tool type
1	Sleeve
2	Drill bit
3	Pneumatic gun
4	Torque wrench

III. Maintenance Data

None

IV. Circuit Diagram

None

V. Fault Diagnosis

None

VI. Method of Disassembly and Assembly

Installation steps for driver's seat:

- 1) Place the driver's seat in the driving area.
- 2) Align the center of the seat with the center of the steering wheel, with a distance of 400mm between the front mounting hole and the brake pedal.
- 3) Mark the installation hole of the seat bracket with a black pen and move the seat away.
- 4) Drill holes at the marked area using a $\varnothing 6.7$ drill bit and blow off the drilling chips, then tap M8.
- 5) Move back to the seat and secure it with the matching M8 bolts and spring washers listed in the list.



Fig. Installation position of driver's seat

VII. Component Maintenance Cycle and Methods

None

Chapter II Vehicle Glass Maintenance Manual

I. Component Introduction

1. Component Introduction

The vehicle windows are arranged as follows:



Fig. Left side window glass

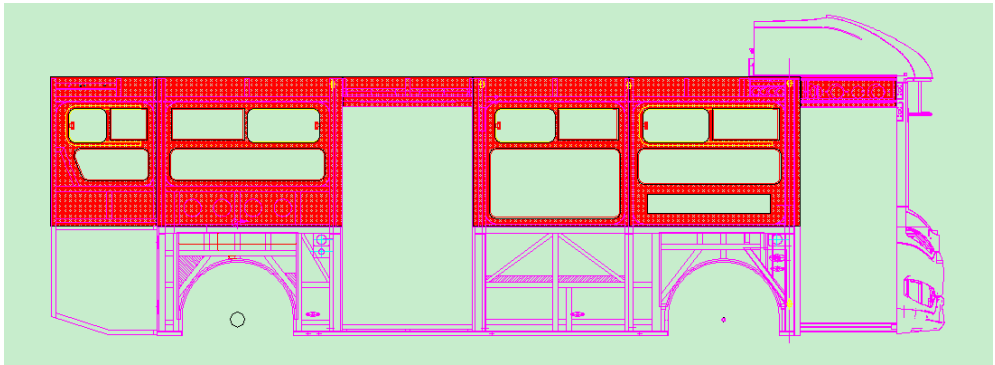


Fig. Right side window glass

II. Special Tools

Table Special Tools

S/N	Tool type
1	Primer brush head
2	Glue gun
3	Scraper

III. Maintenance Data

None

IV. Circuit Diagram

None

V. Fault Diagnosis

None

VI. Method of Disassembly and Assembly

1. Pre-treatment and cleaning

- 1) Drill a $\Phi 3.4$ fixing hole at the bottom edge of the window frame.
- 2) Stick protective tape around the apparent surface of the side window frame.
- 3) Cut insulation cotton according to the grid size and fill it into the grid.
- 4) All surfaces of objects bonded with adhesive should be cleaned in the same direction with a clean and dry sweatshirt cloth dipped in a specialized matching cleaning agent or activator, and any excess cleaning agent or activator should be immediately wiped off in the same direction with a dry and clean cloth. The adhesive surface must be clean and must not be missed. The drying time of the cleaning agent or activator is ≥ 5 minutes.

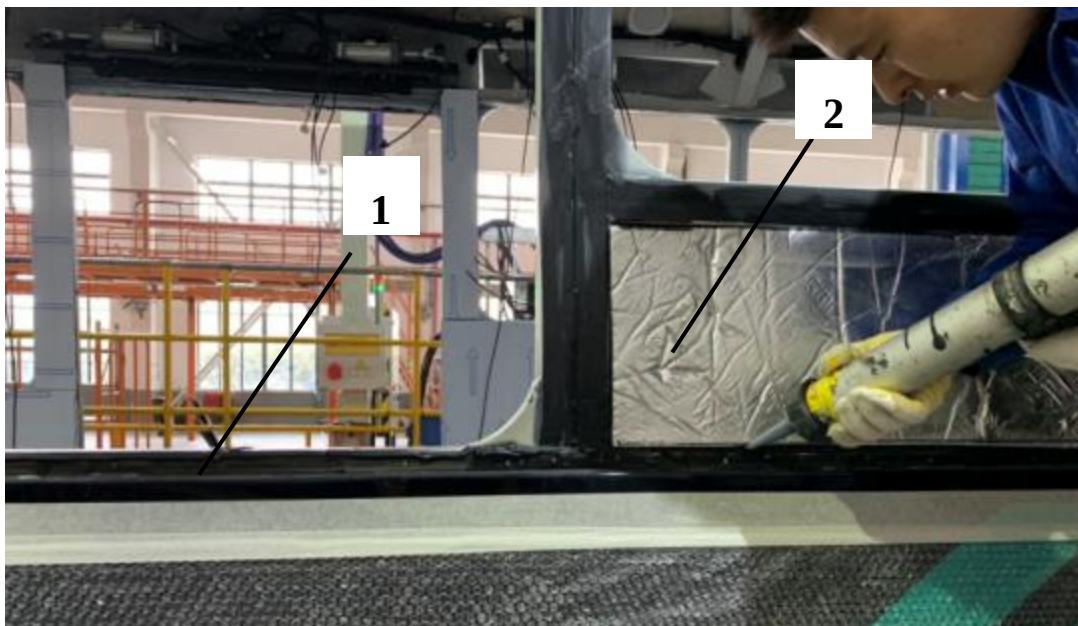


Fig. Tape and insulation cotton

1. Adhesive tape 2. Insulation cotton

2. Primer brushing and gap gluing

- 1) Pour the primer into other clean and dry containers, and use a shading pen or paint brush to dip the primer thinly and evenly on the bonding surface of the window frame and glass, as well as the surrounding end faces of the glass. No omission, exposure, or sagging is allowed. When applying primer, it is necessary to check whether there is any primer dripping on the paint surface. If there is, it should be promptly removed with a cloth dipped in cleaning agent.
- 2) The drying time of the primer is ≥ 10 minutes, and the applied primer should be bonded within 8 hours.
- 3) When the construction environment temperature is $\leq 5^{\circ}\text{C}$, the adhesive and sealant for packaging single pieces must be heated to $30 \pm 5^{\circ}\text{C}$, and used within 1 hour after heating and removal. If using a rubber pump device, it needs to have a heating function and a temperature of $30 \pm 5^{\circ}\text{C}$.
- 4) Apply continuous sealant around the window frames on both sides, in the joint gaps, and in the welding gaps between the vehicle body skin and frame. Then use a special tool to scrape a circle along the adhesive surface to embed the sealant into the gaps.
- 5) Fix the pre prepared clean rubber block with 502 glue, with a thickness of 8mm on the lower edge and 5mm on the bonding surface.



Fig. Injecting glue into the gaps

3. Injecting adhesive and bonding side windows

- 1) When injecting adhesive, the adhesive strip applied to the bonding surface must be uniform and continuous in a Δ shape. The rubber nozzle has a V-shaped opening. The width of the adhesive strip is $b=10 \pm 2\text{mm}$, and the height of the adhesive strip is $h=12 \pm 3\text{mm}$.
- 2) Bonding the side window (driver's side), the prefilled adhesive strip should be glued to the glass within 6 minutes, and the adhesive strip should be glued one by one. For composite windows, aluminum alloy windows should be bonded first, and then glass should be bonded. Lift the aluminum alloy window or glass by hand or suction cup, align it with the bonding position, slowly bond, adjust the peripheral gap to $7\text{mm} \pm 1\text{mm}$, and ensure that the gap between the two windows is in the center of the frame.
- 3) When installing aluminum alloy windows, use C-shaped fixtures to fix them, and also adjust the gap between the inner decoration to be $\geq 8\text{mm}$. On the side without a door, bond from front to back until there are still 3 pieces of glass left, and then bond from back to front. On the side with a door, first bond the glass on both sides, and then bond the glass in the middle. Use rubber pads to ensure an 8mm gap between the glass and the front and rear edges of the window frame, and a uniform

gap between the glass and the glass.

- 4) After bonding the glass, use small wooden blocks and ST4.2×35 screws to fix the glass at the pre drilled fixing holes. When punching pressing plate holes after glass bonding, a rubber block of $\geq 8\text{mm}$ should be placed in front of the air gun to prevent damage to the glass. Press the pressing plate according to the requirements, and adjust the flatness between the glass, aluminum alloy window, and outer skin during the pressing process, with a step difference of $\leq 1\text{mm}$; If there are uneven areas in certain areas, adjustments can be made by adding pressing plates or using rubber blocks. The pressing plates should be firmly fixed. After fixing the pressing plate, the C-shaped clip can be removed.

4. Sealing of inner and apparent surfaces (before removing the pressing plate)

- 1) The inner surface should be sealed directly after the glass is bonded, and the gap between the glass and the skeleton should be filled with adhesive. The adhesive surface should be scraped flat, excess adhesive should be removed, protective tape should be peeled off, and cleaned thoroughly.
- 2) The apparent surface is sealed with protective tape. Glass and aluminum alloy window frames are pasted along the edges, and yellow paper tape is applied to the painted edges on the sides and bottom. The edges of the skin can be adjusted appropriately based on the width of the gaps and the level of the edges. The surface bonded to the sealant should be cleaned and coated with primer as required. When injecting sealant, the nozzle should be deep into the gap, and the gun should not move too fast to fill the seam with glue. Scrape it flat in time to remove excess glue, tear off the protective tape, and clean it thoroughly. Any defects (such as flipping) that may affect the quality of the rear seal on the front adhesive surface should be repaired before sealing the gap twice or three times, and before sealing the rear seal.



Sealing of the apparent surface of the image

5. Sealing of inner and apparent surfaces (after removing the pressing plate)

- 1) Environmental temperature above 25 °C for 16 hours, 15-25 °C for 24 hours, 5-15 °C for 36 hours of curing; Cure below 5 °C for 48 hours (usually wait for 12 hours after the inner packaging is installed) and remove the pressing plate. The waiting time is affected by the ambient temperature and extends as the temperature decreases, so it is particularly important to pay attention in winter.
- 2) Remove the pressing plate, remove the rubber pad, and check if there is any excess glue in the gap. If there is, it should be removed. Sealing parts, longitudinal and lower edges of side windows, front wall and body joints, small seams on the upper and left and right skin of the passenger door. Protective tape is applied along the edges of glass and aluminum alloy window frames, and yellow paper tape is applied to the painted edges on the sides and bottom. The edges of the skin can be adjusted appropriately based on the width of the gaps and the level of the edges. The surface bonded to the sealant should be cleaned and coated with primer as required. When injecting sealant, the nozzle should penetrate deep into the gap, and the gun should not move too fast to fill the gap with glue. Timely scrape it flat (vertically, scrape the concave surface between glass and aluminum alloy windows, and scrape the flat surface of other parts) to remove excess glue, tear off the protective tape, and clean it thoroughly.

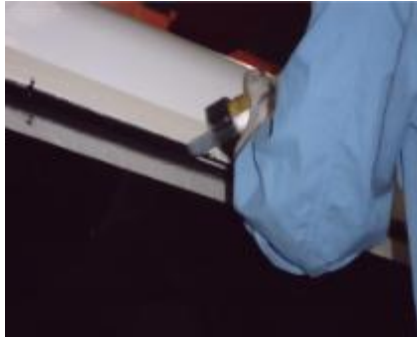


Fig. Gluing



Fig. Frictioning

VII. Component Maintenance Cycle and Methods

None

Chapter III Vehicle Rearview Mirror Maintenance Manual

I. Component Introduction

1. Component functions

The rearview mirror is located on the left and right sides of the car's head, as well as the front of the car's interior. The rearview mirror reflects the situation behind, on the side, and below the car, allowing the driver to indirectly see these positions clearly. It serves as the "second eye" and expands the driver's field of vision.

2. Component structure

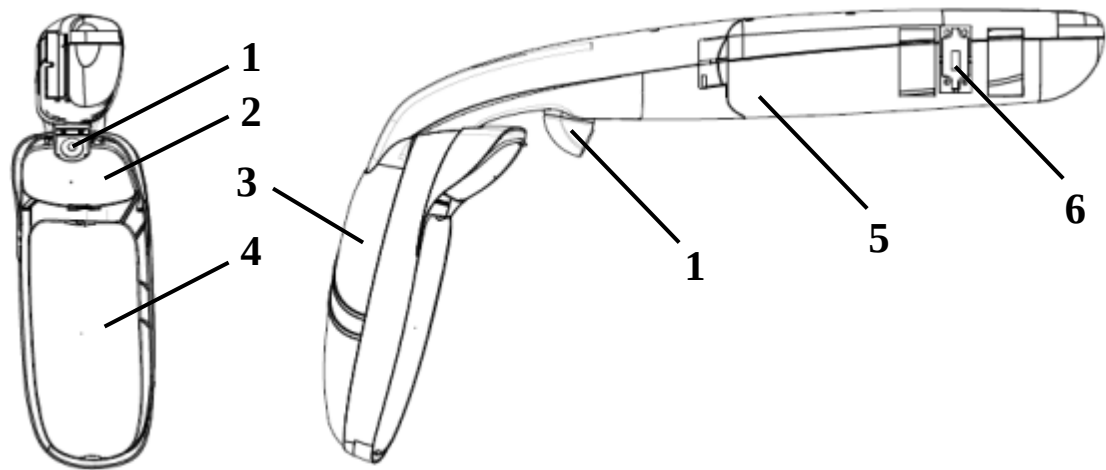


Fig. Schematic diagram of (right) rearview mirror

1- Camera 2- Downview mirror 3- Rear view lens housing 4- Rear view mirror 5- Mirror arm housing 6- Base/connecting seat

3. Component principle

None

II. Special Tools

Table Special Tools

S/N	Tool type
1	Sleeve
2	Torque wrench

3	Rubber hammer
---	---------------

III. Maintenance Data

The tightening torque for fixing bolts and nuts is as follows:

Table Key Torque

S/N	Name	Model	Tightening torque
1	Hexagon socket bolt	M10	75 N.m
2	Base fixing bolts		95 N.m

IV. Circuit Diagram

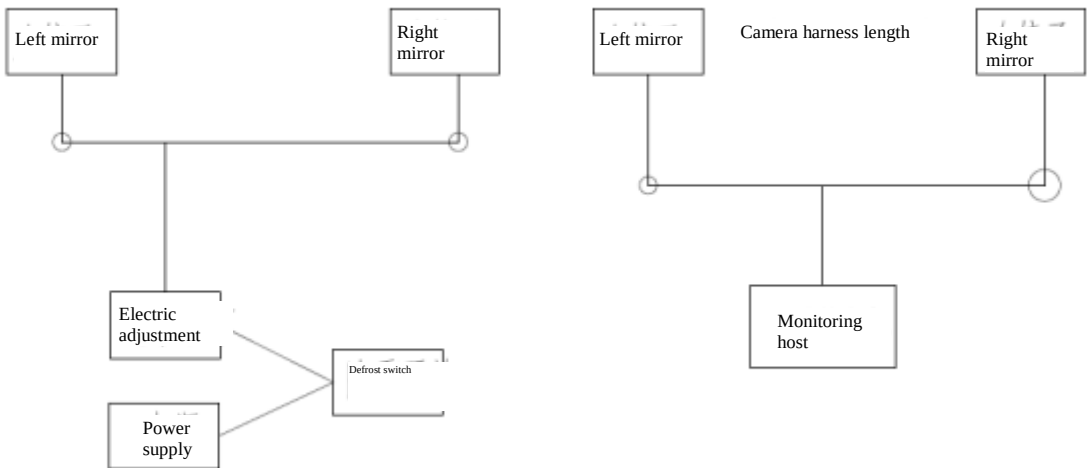


Fig. Rearview mirror circuit diagram

V. Fault Diagnosis

1. Fault diagnosis table

Table Fault diagnosis analysis

Faults	Cause of fault	Troubleshooting
Lens cannot be adjusted	Motor malfunction	1) Replace the lens adjustment motor

	The motor has no power supply	2) Check whether the power supply is normal 3) Check if the adjustment switch is ineffective 4) Check the power fuse of the rearview mirror
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VI. Method of Disassembly and Assembly

1. Installation of outside rearview mirror

- 1) Drill 4 positioning holes on the base, match them with the appropriate drill bit, and tap them with an M10 thread. Inject clear silicone into the bolt holes (using a $\Phi 6$ mm nozzle) to prevent water leakage.
- 2) Fix the base firmly with M10 internal hexagonal bolts and spring washers, and tighten the four bolts.
- 3) After setting the force, draw a white line as a mark. The base should be connected to the inner hexagon screw in a straight line, and any excess glue should be wiped off and cleaned thoroughly.



Fig. Rearview mirror positioning thread tapping



Fig. Preliminary fixation of

base

- 4) Insert the base rubber decorative cover onto the base, and pull out the front inner rearview mirror wiring harness from the threading hole to connect with the

connector on the rearview mirror.

- 5) Insert the outside rearview mirror into the base groove as much as possible, and tighten the upper fastening screws.



Fig. Installation of left rearview mirror



Fig. Installation of right

rearview mirror

- 6) Adjust the mirror angle, clean the residue around the base of the rearview mirror, check if the base is firmly fixed and vertical, and ensure that the outside rearview mirror is not loose.
- 7) Finally, insert the connected connector into the rubber sleeve to prevent water from entering.

VII. Component Maintenance Cycle and Methods

None

Chapter IV Vehicle Passenger Door Maintenance Manual

I. Component Introduction

1. Component functions

1) Functions of the passenger door

The door provides a passage for the driver and passengers to enter and exit the vehicle, and isolates external interference, to some extent reducing side impacts and protecting passengers. The quality of the door is mainly reflected in its anti-collision performance, sealing performance, and convenience of opening and closing.

2) Technical parameters of the passenger door assembly

Technical parameters of the passenger door assembly

Model	Electric and pneumatic inner swing door assembly
Working voltage	24V
Working air pressure	0.4-0.8 Mpa
Working temperature	-5°C ~ 60°C
Mechanism driving force	1100N (0.6Mpa)
Durability	500,000 times

2. Component structure

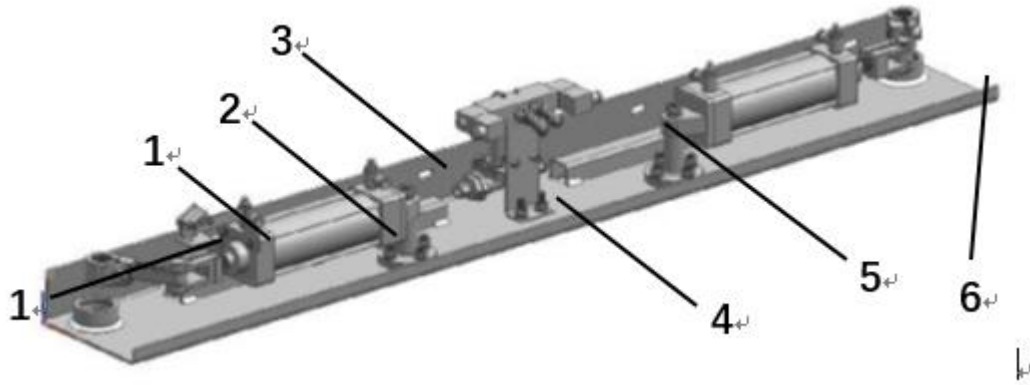


Fig. Schematic diagram of door support plate

- 1- Micro switch and bracket 2- Cylinder 3- Speed regulating valve 4- Buffer valve 5- Solenoid valve 6- Spline arm

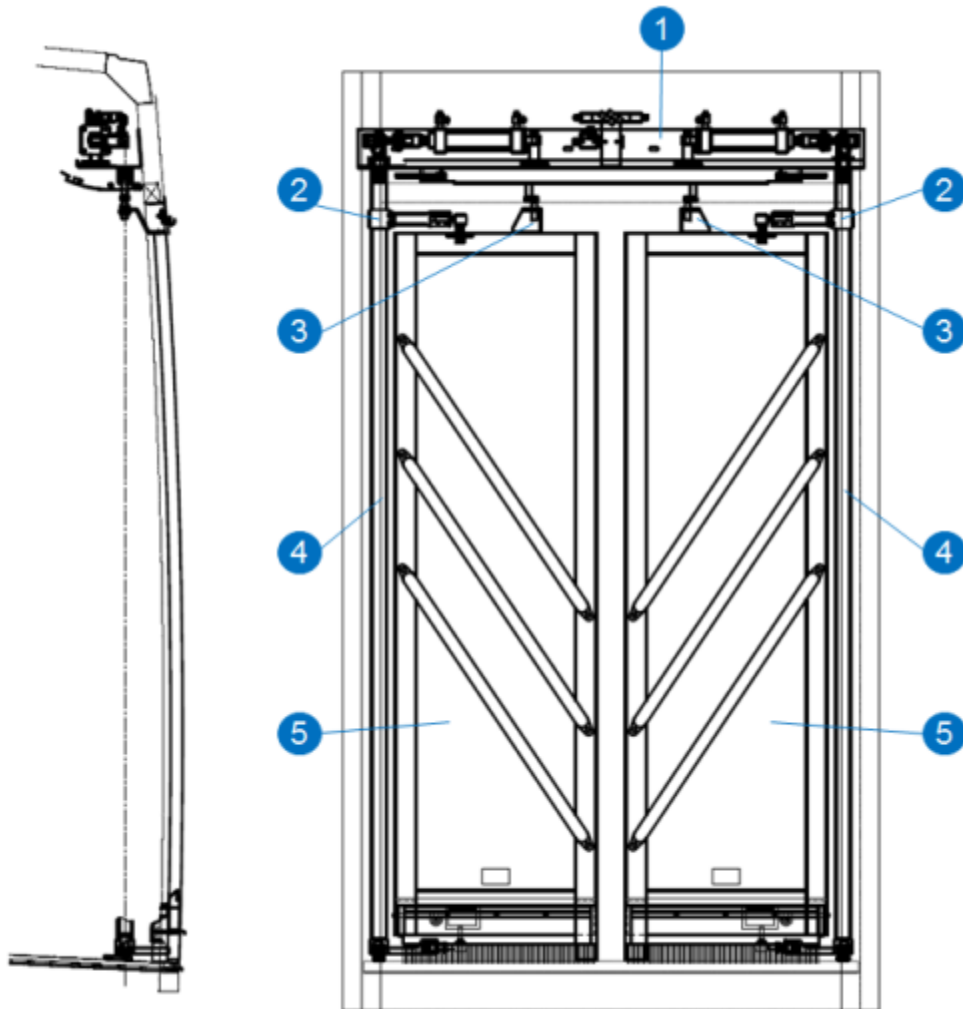


Fig. Front passenger door assembly

1. Transmission mechanism 2. Upper control arm assembly 3. Sliding block mechanism assembly 4.

Rotary column assembly 5. Door body subassembly

3. Component principle

Under normal conditions, the emergency valve is closed, and compressed air is supplied from the air source through the emergency valve to the solenoid valve. When one end of the bidirectional switch is turned on, the solenoid valve coil is energized, and compressed air is inflated to one side of the cylinder through the solenoid valve. The remaining air on the other side of the cylinder is discharged through the exhaust port of the solenoid valve, and the compressed air pushes the piston to move, opening the passenger door; When the other end of the bidirectional switch is turned on, the solenoid valve coil is energized, and compressed air is charged to the other side of the cylinder through the solenoid valve. The residual air on one side of the corresponding cylinder is discharged through the exhaust port of the solenoid valve, and the compressed air pushes the piston to move, closing the passenger door. When there is a malfunction in the electrical and pneumatic circuits, open the emergency valve, and the compressed air in the cylinder can be discharged through the exhaust port of the solenoid valve and the exhaust port of the emergency valve, which can achieve manual opening and closing of the door.

II. Special Tools

Table Special Tools

S/N	Tool type
1	φ 8.5mm air drill
2	Sleeve
3	Torque wrench

III. Maintenance Data

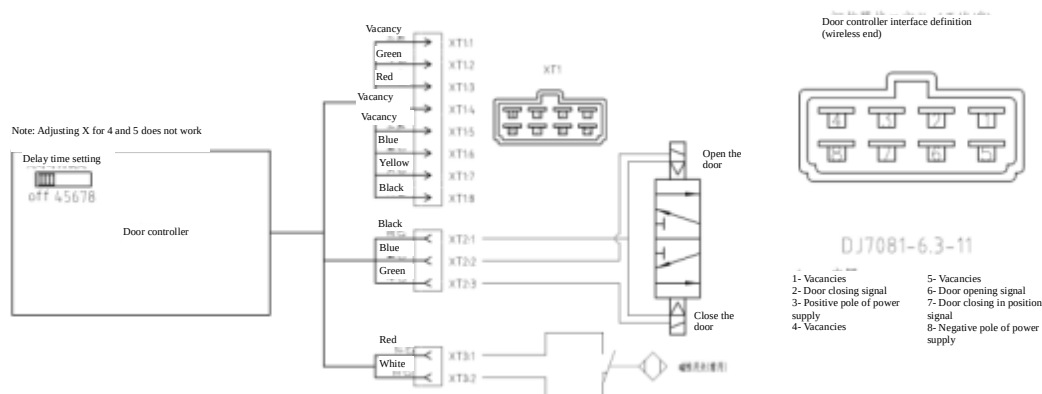
The tightening torque for fixing bolts and nuts is as follows:

Table Key Torque

S/N	Name	Model	Tightening torque
1	Hexagon bolt	M8×30	24 N.m

2	Hexagon bolt	M10	60 N.m
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IV. Circuit Diagram



V. Fault Diagnosis

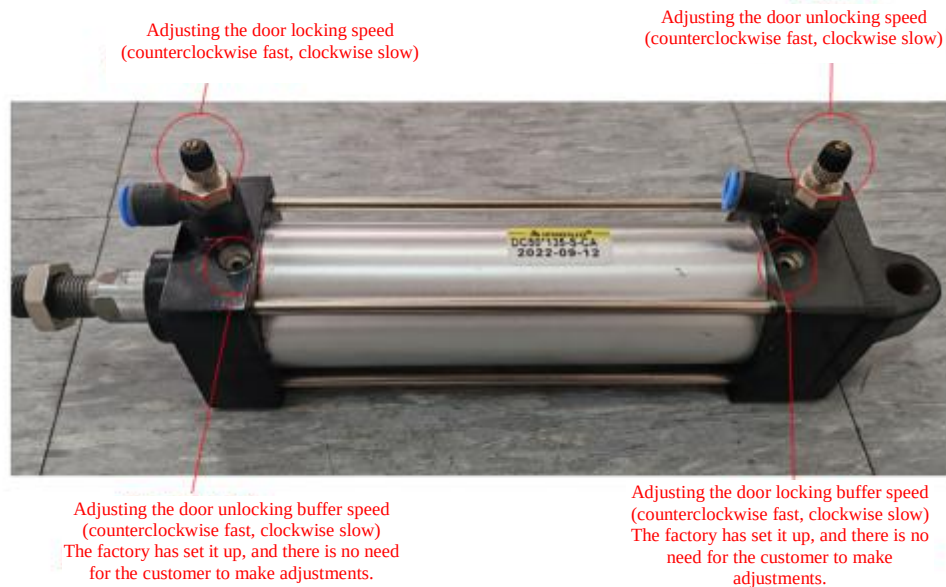
1. The fault diagnosis table is as follows:

Table Fault diagnosis analysis

Fault phenomenon	Troubleshooting
The speed of opening and closing the door is too fast	Readjust the adjusting screws for opening and closing the door to ensure a moderate opening and closing speed, and tighten the screws
Opening and closing doors without buffering	Adjust the buffer adjustment screws for opening and closing doors;
The opening and closing speed is very slow	The gas source pressure fails to reach 0.6~0.8Mpa; If there is an air leakage phenomenon in the door pump mechanism assembly, it should be checked step by step, and the faulty parts causing the leakage should be replaced.
When the door is closed, the door lights do not turn off	Magnetic switch not connected
The fit between the middle rubber strip of the door or the fit between the edge rubber strip and the door frame is not tight	Loosen the screws, adjust the upper and lower swivel arms connected to the pillar, pull the door to make the rubber strip fit tightly, and tighten the screws;
	Adjust the eccentric shaft of the guide wheel to ensure a tight fit of the rubber strip.
	The tightening nut on the cylinder piston rod is loose, adjust and tighten it again
The passenger door cannot be opened or closed	Door pump solenoid valve malfunction: replace the door pump solenoid valve
	Door pump solenoid valve has no power supply:

	check if the power supply is normal; Check if the door switch is ineffective; Check the power fuse of the passenger door
There is a strange noise when the passenger door is opened	Loose passenger door mechanism: Adjust and tighten the passenger door mechanism, add butter

2. Passenger door unlocking and locking speed/buffer adjustment method



VI. Method of Disassembly and Assembly

1. Side door airway

- 1) Insert a lead wire (using a waste air pipe or wire harness) into the inner frame hole of the front wheel cover maintenance hole, and lead it out from the opening of the right front wheel side frame. Wrap the lead wire with the small light wire harness (turn signal, side light, and front courtesy lamp wire harness) and fix it. Then pull the lead wire to thread the wire harness from the lower hole to the middle hole.
- 2) Door pump pipeline installation: Lay the following air pipes according to the direction of the passenger door air pipeline connection diagram.
 - a) Chassis air duct reservation to instrument panel passenger door switch (needs to be newly installed)
 - b) Passenger door switch to front door external emergency switch (to be newly installed)
 - c) Front door exterior emergency switch to middle door exterior emergency switch (to

- be newly installed)
- d) Connect the emergency switch outside the middle door to the emergency switch above the front middle door via a three-way connection (new installation required)
 - 3) When laying the air pipe, attention should be paid that the air pipe at the front door and middle door pillars should be threaded through the pipe holes of the front door rear pillar and middle door front pillar, and the pipeline should not be bent. Rubber rings should be placed in the pipe holes of the front and rear pillars to prevent air pipe wear.
 - 4) After laying, the pipeline needs to be organized and fixed with zip ties.
 - a) The two air pipes from the front door pillar to the dashboard need to pass through the chassis frame threading port and pass through the circular hole on the left side sealing plate of the driver's cab.
 - b) Insert the hand brake valve air pipe back and forth, and install 2 passenger air pipes, including the steering gear air pipe and airbag seat air pipe, through the 2 holes on the left sealing plate of the driver's cab from bottom to top. Install a rubber protective ring inside the pipe hole.
 - c) Finally, tidy up the air ducts under the front of the vehicle and secure them in place with zip ties.
 - 5) After the installation of the inner duct and top cover wiring harness is completed, lay the right top wiring harness from the front passenger door to the middle passenger door. Reserve an appropriate length in front of the front door and rear pillar, and fix it to the top cover wiring harness (low-voltage wiring harness) with zip ties at a spacing of about 300mm.

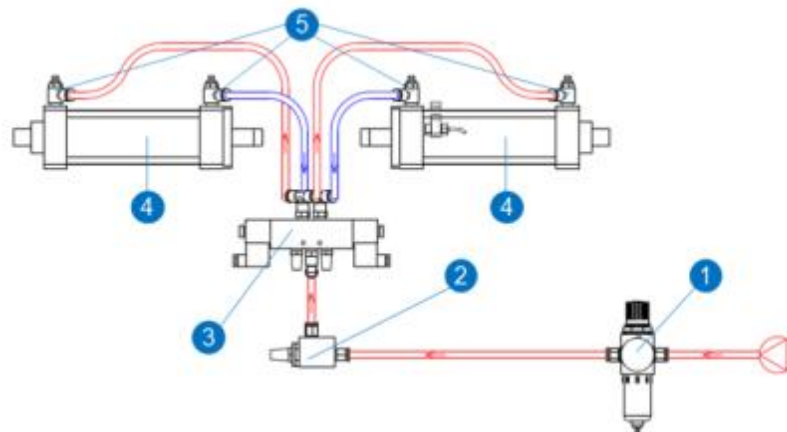


Fig. Front and rear passenger door air circuit diagram

1. Filter pressure reducing valve assembly
2. Quick exhaust valve assembly
3. Two position five way solenoid valve assembly
4. Cylinder
5. One-way throttle valve

2. Door support plate installation

- 1) Use an 8mm tapping gun to tap the back thread on the bracket plate of the door support plate.
- 2) Mark the centerline of the door frame and the center of the door support plate with a tape measure.
- 3) When installing, the center line of the door frame and the center line of the door support plate should coincide and be fixed with hexagonal bolts M8×30, spring washers, and flat washers. The support plate should not be skewed and tightened with screws.

3. Door shaft installation

- 1) First, use your fingers to move the radial self-lubricating bearing inside the lower end of the rotary column to the installation position.



Fig. Installation position of radial self-lubricating bearing

- 2) The spline part on the rotary column is diagonally inserted into the radial self-lubricating bearing hole of the door support plate assembly and rises into place before moving into the car.



Fig. Rotary column spline

- 3) Insert the column base plate assembly into the radial self-lubricating bearing located at the lower end of the rotary column.
- 4) Adjust the rotary column to be perpendicular to the transmission mechanism and parallel to the door frame, ensuring that the center distance of the column is consistent up and down, with a center distance of 140mm from the outer end of the passenger door.



Fig. Adjusting the position of the rotary column

- 5) apply Φ 8.5mm air drill, drill holes on the step according to the hole of the column bottom plate component, and insert matching bolts (cross groove countersunk head screws M8×60). Add M8 flat washers, spring washers, and nuts to the lower end face of the step for fastening.
- 6) After installation, remove the rust and insert the support ring into the shaft.

4. Static installation and debugging of the passenger door

- 1) After installing the slider mechanism, manually rotate the door leaf without any obstruction. Check if the door panel is vertical when opened, and adjust it through the

waist hole of the slider mechanism if it is not vertical. Observe whether there is a gap between the two door leaves. If there is a gap, it can be adjusted by tightening the crankshaft.



Fig. Gap between the two doors Fig. Crankshaft roller assembly and fastening nut

- 2) If it is found that the passenger door does not fit the door frame, it can be adjusted by rotating the upper control arm.
- 3) If it is found that the passenger door panel inside the vehicle is not vertical and there is a gap between the passenger doors, it can be adjusted through the upper and lower control arms.



Adjusting the left and right upper control arms

- 4) If the height of the two doors of the beam is found to be inconsistent, adjustments can be made through the threaded angular joint bearings on the lower control arm and the polished rod angular joint bearings on the upper control arm assembly. The gap between the door step and the lower edge of the door panel should not exceed 5 millimeters. It is strictly prohibited to forcibly adjust the upper control arm without adjusting the threaded angular joint bearings on the lower control arm. After adjustment, please tighten all the bolts here.



Fig. 1- Tightening bolts 2- Adjusting position

5. Spline arm installation

When the door is closed, pull out the cylinder on the door support plate assembly by 10mm and install the spline arm, as shown in the figure. The installation of the spline arm after pulling out the cylinder 10mm is to eliminate the mechanism gap during the closing state and prevent the door from loosening during the closing state. Insert the pin shaft and connect it to the cylinder fork. After adjusting the passenger door in place, insert the split pin and tighten it. Tighten the matching bolts on the spline rocker arm.

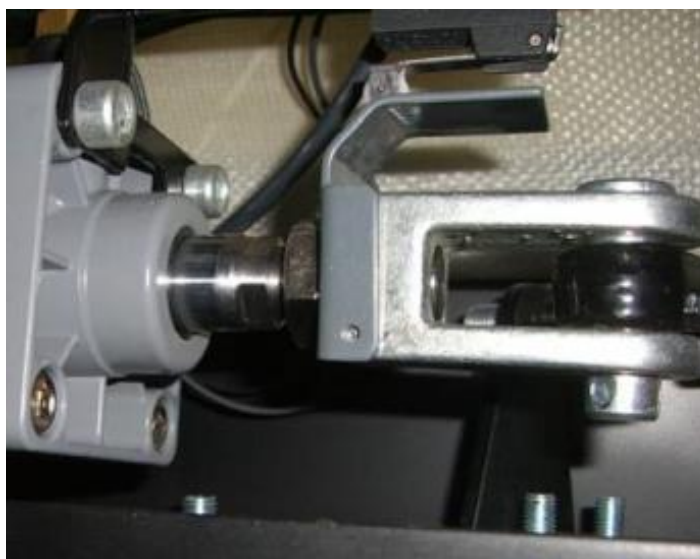


Fig. Pull out the cylinder by 10mm

6. Fixed force and dynamic inspection

- 1) After installation and adjustment, tighten all bolts and draw a white line on the bolt head as shown in the figure.
- 2) Connect the power and air supply for trial operation. The opening and closing action time is 3-5 seconds.
- 3) The apparent surface of the door panel and door frame are in the same plane and ensure that the curvature matches.
- 4) Special ratchet force tools should be used to check for compliance with specified values for parts with force requirements.
- 5) Adjust the rotary column to be perpendicular to the transmission mechanism and parallel to the door frame.



Fig. Mark for bolt tightening

7. Installation of door frame and rain cover

- 1) Rain cover installation
 - a) Attach the configured rain cover tightly to the upper edge of the door frame, mark the installation position, and keep the center consistent with the center of the door frame.
 - b) Use a glue gun to apply glue around the inside of the rain cover, about 10mm away from the edge (the glue nozzle should have an opening with a diameter of 8mm). The injected adhesive strip should be uniform and continuous.
 - c) Attach the rain cover to the door frame and drill holes in the prefabricated holes on the splash board $\Phi 3.6\text{mm}$. Tighten the rain cover plate with ST4.2 $\times$ 25 cross recessed round head black screws.

- d) Apply adhesive (black silicone adhesive 222) to the left, right, and upper ends of the rainproof cover to seal (with a circular nozzle) to prevent water leakage.
 - e) Finally, clean the remaining adhesive around the rain cover.
- 2) Install door frame decoration
- a) Apply adhesive to the corner between the door frame decoration and the side frame frame.
 - b) Drill holes on door frame profiles $\Phi 3.6$. Drill holes from top to bottom with a distance of 50 and a spacing of 350 between the ends.
 - c) Use black self tapping round head 4x25 screws to fix from top to bottom, ensuring that the rubber of the door is flush with the lower end of the door unlocking.

VII. Component Maintenance Cycle and Methods

Content	Interval	Nature of work
Appearance	7500 Km/1.5 months	Cleaning/inspection
Door shaft floor, base, and tumbler fixing bolts	15,000 Km/3 months	Check/tightening
Upper bracket fixing bolt	15,000 Km/3 months	Check/tightening
Roller bracket fixing bolt	15,000 Km/3 months	Check/tightening
Gas pipeline and joints	15,000 Km/3 months	Check/tightening
Emergency valve at the passenger door	15,000 Km/3 months	Inspection

Chapter V Vehicle Painting and Spraying

I. Component Introduction

None

II. Special Tools

Table 3-1 Special Tools

S/N	Tool type
1	Spray gun
2	Scraper
3	Shovel blade
4	Polishing machine

III. Maintenance Data

None

IV. Paint Pattern



Fig. Painting scheme

V. Fault Diagnosis

None

VI. Method of Disassembly and Assembly

1. Primer

- 1) Use a polishing machine to stick P150# sandpaper to polish the repair area, and manually supplement the edges. During polishing, touch the surface with your hands from time to time to feel the flatness of the defect area. Clean the defective area with 2230 days of water after polishing.
- 2) Before formal spraying, check whether each shielding area is damaged. If so, add shielding and use masking tape to cover the surface of the side box door rubber strip. Remove the iron wire that fixes the box door, wipe the entire vehicle's painted surface clean with a sticky cloth, and wipe in order from top to bottom and from inside out.
- 3) The paint spraying personnel collect the pre-mixed primer from the paint mixing room, and use it for 2 hours after mixing. Filter with a paper filter before spraying. Air pressure: 0.3~0.5MPa. Construction environment temperature: $25 \pm 2^{\circ}\text{C}$, humidity: 65±5% RH
- 4) After manual spraying is completed, the box door is re-fixed with iron wire to ensure firmness and reliability.
- 5) After spraying, check for any missed spraying. If any, manual spraying is required. After the spraying is completed, clean the spray gun with 2230 days of water. Pour the washing gun with 2230 days of water and waste paint into the corresponding waste bins, and hand them over to the paint mixing room for unified storage and treatment.



Fig. 7-1 Front cowl primer spraying



Fig. 7-2 Wheelhouse primer spraying

- spraying
- 6) Send the vehicle body with the primer sprayed on it into the drying room. Once the vehicle is fully inside the drying room, close the drying room door. The transport personnel should switch the indicator light at the entrance of the drying chamber to red, and record the start time of the baking process on the accompanying vehicle log sheet.
 - 7) 825P high solid epoxy primer curing window, EP300 water-based epoxy primer curing window; According to the actual temperature curve of the oven, the display screen of the oven is set to a temperature of 95 °C, and the oven is dried for 75 minutes.

2. Atomic ash

- 1) When scraping atomic ash, the thickness should not exceed 5mm, and multiple repeated scrapings can be carried out. The putty scraping area should not exceed the polishing area, and a certain drying time should be left after each layer of scraping is completed.
- 2) Use P150# sandpaper to lightly polish the surface of the primer on the entire vehicle, blow it clean with compressed air or wipe off the floating dust on the surface of the vehicle with a cloth. Mask the adhesive surface of the side window frame glass with

primer using masking tape and seal it completely.

- 3) After opening the bucket, the atomic ash inside the bucket must be stirred evenly up and down before use to avoid excessive viscosity of the atomic ash at the bottom of the bucket. Mix atomic ash and curing agent at a weight ratio of 100:2. After adding the curing agent, it must be thoroughly and repeatedly mixed and used evenly. The effective use time of the prepared atomic ash is 10-15 minutes, and each time should be adjusted according to the scraping area. Single adjustment should not be too much.



Fig. Mixing atomic ash

- 4) Scrape and apply putty to the defective areas on the surface of the vehicle, including the front and rear fiberglass and inner lining, the inner side of the front and rear windshields, the side door frames, the rear flip door frames, the passenger door frames and safety door frames without decorative shielding, all welding seams of the entire vehicle, the vehicle floor sealing plate, the side sealing plate of the step box, the side sealing plate of the aisle, the side sealing plate of the front and rear wheel covers, and the welding seams and pits on the surface until the surface is flat, the edges are clear, the arc transition is natural, and there is no excess putty or burrs on the seams.
- 5) The rubber hinge part of the bus body is covered with adhesive tape on the surface of the hinge. After scraping, the putty at the joint between the hinge and the body

skin is promptly opened with a shovel. The width of the opening is required to be 3-5mm, and the gap is uniform and straight.



Fig. Putty opening seam

- 6) When scraping putty, the total thickness should not exceed 5mm. Multiple repeated scraping can be carried out. After each layer of scraping is completed, it needs to be cured before proceeding to the next layer of scraping. The scraping and coating area should be flat and smooth, with smooth and round curves and rounded corners that match the curvature of the vehicle body. The two ends of the groove at the joint between the front and rear walls and the side walls are straight and smooth, without excess putty. The process holes and corners are free of excess putty and thoroughly cleaned.
- 7) After the entire vehicle is scraped and coated, clean the scraper and putty tray with 2230 days of water, clean the vehicle body and construction site, and receive the putty waste and waste bin in the designated garbage bin. After use, send the water to the paint mixing room for storage and treatment according to regulations.
- 8) Send the vehicle body that has been scraped and coated with atomic ash into the drying room. After the vehicle has fully entered the drying room, close the drying room door. Atomic ash baking conditions: effective metal surface temperature 60°C x 20 minutes; The set temperature of the drying room is 95 °C, and the drying process is carried out for 30 minutes.
- 9) Check if the atomic ash is completely dry and has good adhesion with the primer. Paste P150 # sandpaper onto the pneumatic polishing machine, polish the entire vehicle's putty in the direction of the vehicle body, scrape and apply putty inside the vehicle for polishing, and use manual and machine grinding cross operation to

polish the edges, frames, stops, edges, and other parts of the front and rear walls and their inner tanks, various box doors, safety doors, and other components.



Fig. Putty polishing

- 10) Use 240 # sandpaper to paste on the pneumatic polishing machine and polish the entire vehicle's putty layer in the direction of the vehicle body. While grinding, cross touch the surface with your hands to check if the polishing surface is flat, smooth, and round. Mark the defects and thoroughly remove the sandpaper marks on the putty surface. The entire vehicle's skin putty should be polished from the roof to the skirt edge.
- 11) Use a shovel to remove any excess putty burrs on the corners of the side window frames and front and rear windshield frames, as well as any excess putty in the joints between the exterior skin of the vehicle door and the exterior skin of the front and rear bumpers, and polish them with sandpaper. After polishing, the surface should be smooth and even.
- 12) After the entire vehicle is polished, use compressed air to blow away the dust inside the compartment, and then use compressed air and a cloth to blow and wipe the floating dust on the surface of the entire vehicle from top to bottom. All dust on the interior surfaces of all boxes, door frames, and side doors, as well as at all seams and skin joints, must be thoroughly cleaned with compressed air and a brown brush. The blowing of dust should be thorough, without leaving any dead corners, and there should be no floating dust on the inner and apparent surfaces.

3. Intermediate coat

- 1) Wipe the sprayed surface of the entire vehicle clean with a sticky dust cloth, and wipe in order from top to bottom and from inside out.
- 2) The paint spraying personnel collect the premixed intermediate paint from the paint mixing room, and use it for 1 hour after mixing. Filter with a paper funnel before spraying. Air pressure: 0.2~0.4MPa. Construction environment: Temperature: 25 ± 2 °C; Humidity: $65 \pm 5\%$ RH
- 3) After the body painting is completed, check for any leakage of spray. If any, manual spraying is required. After the spraying is completed, clean the spray gun with 2230 days of water. Pour the washing gun with 2230 days of water and waste paint into the corresponding waste bins, and hand them over to the paint mixing room for unified storage.
- 4) Send the painted vehicle body into the drying room and close the drying room door once the vehicle has fully entered the drying room.
- 5) 1340C high solid intermediate coating curing window, PUR300 water-based intermediate coating curing window; According to the temperature curve of the drying room, set the temperature of the drying room to 95 °C and dry for 60 minutes.
- 6) After baking, check if the paint film is completely dry, and the adhesion of the intermediate paint is $\leq$ Level 1; Paint film hardness: H; Paint film thickness: 50-60um.
- 7) Polish with P320# sandpaper, and use P400# sandpaper to polish the metallic paint model until the paint film on the entire vehicle is smooth and delicate. The curved surfaces and rounded corners of the front and rear walls, roof, and other components of the vehicle are polished with sand discs and soft pads to prevent the intermediate paint from being worn through.



Fig. Sandpaper polishing

- 8) Search from top to bottom, from front to back, and fill the surface of the entire vehicle, as well as all components, box doors, door frames, front and rear inner lining surfaces with sand holes, sand marks, pinholes, fish holes, and other defects with filler. Filling must be complete and thorough, without omission. After scraping and coating, dry naturally for 20-30 minutes before polishing. Pure color paint models are polished with P400 # sandpaper, while metal color paint models are polished with P600 # sandpaper.



Fig. Filling the surface of the entire vehicle

- 9) After the entire vehicle is polished, use compressed air to blow away the dust inside the compartment, and then use compressed air and a cloth to wipe and blow the floating dust on the surface of the entire vehicle from top to bottom. All dust on the

interior surfaces of all boxes, door frames, and side doors, as well as at all seams and skin joints, must be thoroughly cleaned with compressed air and a brown brush. The blowing of dust should be thorough, without leaving any dead corners, and there should be no floating dust on the inner and apparent surfaces.

4. Topcoat

- 1) Check if each shielding area is damaged, and if so, provide additional shielding. Check whether the door is securely fixed. If not, fix it with a wire. Cover the rubber surface of the side box door with masking tape.
- 2) Wipe the sprayed surface of the entire vehicle clean with a sticky dust cloth, and wipe in order from top to bottom and from inside out.
- 3) The spray paint personnel collect the prepared varnish from the paint mixing room, and use it for 2 hours after mixing. Filter with a paper funnel before spraying. Air pressure: 0.25-0.4MPa. Construction environment: Temperature: 25 ± 2 °C; Humidity: $65 \pm 5\%$ RH
- 4) After the body painting is completed, check for any leakage of spray. If any, manual spraying is required. After the spraying is completed, clean the spray gun with 2230 days of water. Pour the washing gun with 2230 days of water and waste paint into the corresponding waste bins, and hand them over to the paint mixing room for unified storage and treatment.
- 5) Send the vehicle body that has been sprayed with topcoat and varnish into the drying room. After the vehicle has fully entered the drying room, close the drying room door.
- 6) High solid topcoat curing window, high solid varnish curing window; According to the temperature curve of the drying room, set the temperature of the drying room to 95 °C and dry for 60 minutes.
- 7) After baking, check if the paint film is completely dry, and the adhesion of the topcoat is $\leq$ Level 1; Glossiness: $\geq 95\%$; Paint film thickness: Solid color paint $\geq 100\mu\text{m}$, metallic paint $\geq 120\mu\text{m}$.

5. Body pattern

- 1) According to the requirements for the size and position of the marked pattern on the drawing, accurately mark the outline of the template on the vehicle body with a pencil, and use 3M straight or curved tape to protect the pattern outline along the marked pattern contour line. If there is no template, stick the engraved instant sticker onto the vehicle body, remove excess parts, and reveal the outline of the pattern.



Fig. Pattern contour line

- 2) Use masking paper and masking tape to protect areas of the vehicle that do not require painted stripes, ensuring strong, reliable, and thorough protection.



Fig. Protecting other areas of the vehicle

- 3) Use a pneumatic polishing machine to paste P400 # sandpaper to evenly polish the area of the vehicle to be painted with color strips. For smaller line areas, use vegetable cloth or sandpaper for manual polishing. It is required to polish evenly to make the painted surface rough and dull, without damaging the masking tape or instant adhesive.
- 4) After polishing, clean the floating ash in the polishing area with compressed air and a cloth.
- 5) Place the used sample on the corresponding sample rack, and put the used sandpaper, tape, and other garbage into the trash bin to keep the workplace clean and tidy.
- 6) For complex patterns that require multiple sprays, they should be masked twice according to the above process requirements.
- 7) Check if each shielding area is damaged, and if so, provide additional shielding. Wipe the sprayed surface of the entire vehicle clean with a sticky dust cloth, and wipe in order from top to bottom and from inside out.
- 8) The spray paint personnel receive the prepared color strip paint and box paint from the paint mixing room. Filter with a filter before spraying, adjust the air pressure and paint output of the spray gun. Air pressure: 0.35-0.5MPa. Construction environment: Temperature: 25 ± 2 °C; Humidity: $65 \pm 5\%$ RH.
- 9) Apply a uniform coat of water-based chassis blue-gray paint on the inner surfaces of various enclosures (excluding painted surfaces and aluminum plates in the battery compartment), inner surfaces of the enclosure doors, and their door frames. Apply a uniform coat of water-based matte ice gray paint on the inner side of the safety door, the surface of its door frame, the inner surface of the rear window, and the inner surface of the front pillar. Apply a uniform coat of water-based chassis blue-gray paint on the inner surface of the galvanized skin below the floor. It is required to apply 2-3 coats with a film thickness of 30-40um. The paint surface should be full, without exposing the bottom, without particles, damage, or sagging.



Fig. Painting the box door



Fig. Painting the inner surface of the skin

- 10) After the box is sprayed, spray 2-3 coats of water-based color stripe paint according to the drawing requirements. After spraying, dry naturally for 15-20 minutes.



Fig. Spraying water-based color stripe paint

- 11) After the body painting is completed, check for any leakage of spray. If necessary, manual respraying is required. After spraying is completed, use a cloth dipped in 2230 days of water to wipe off any scattered paint on the exterior surface of the vehicle. Clean the spray gun with 2230 days of water, pour the 2230 days of water and waste paint into the corresponding waste bins, and hand them over to the paint mixing room for unified storage and disposal.

- 12) Send the painted vehicle body into the drying room and close the drying room door.
- 13) Baking conditions for water-based color strip paint: according to the temperature curve of the drying room, set the temperature of the drying room to 95 °C, and bake and dry for 60 minutes; Natural temperature ≥ 30 °C and relative humidity $\leq 80\%$, natural drying for more than 24 hours.
- 14) After baking, check if the paint film is completely dry, and the adhesion of the color strip paint is $\leq$ Level 1; Glossiness: Solid paint $\geq 90\%$, metallic paint $\geq 95\%$.

VII. Component Maintenance Cycle and Methods

None

Chapter VI Vehicle Sheet Metal

I. Component Introduction

1. Component functions

The body skin is a thin sheet covering the apparent surface of the bus body frame, which has functions such as protection and decoration. Usually, the production of the skin is done in blocks and installed on the body frame. According to different parts, the skin can be divided into sections: left and right side skin, and top cover skin.

2. Component structure

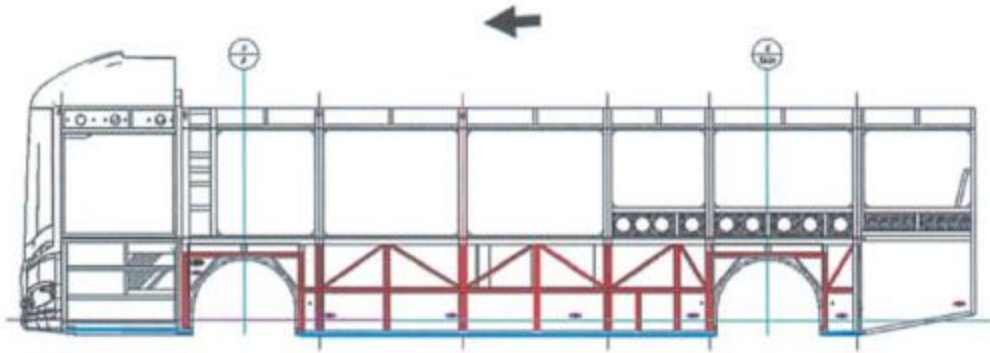


Fig. Left side skin

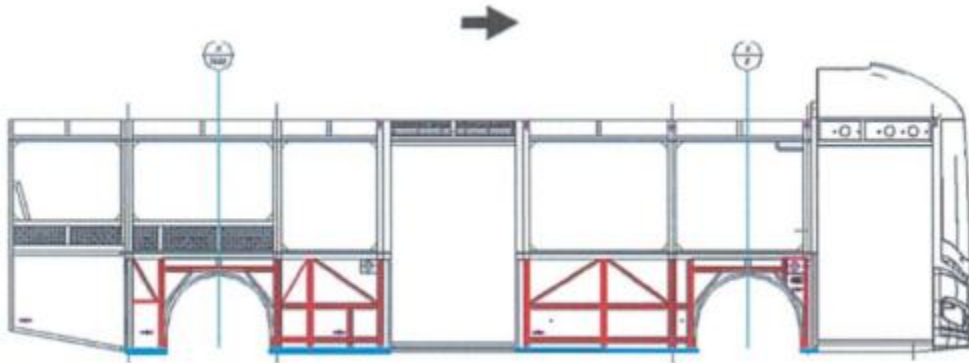


Fig. Right side skin

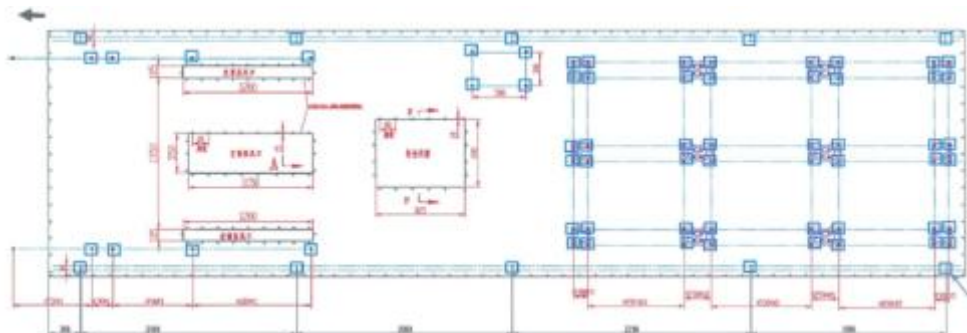


Fig. Top cover skin

II. Special Tools

Table Special Tools

S/N	Tool type
1	Utility knife
2	3M tape measure
3	F-type fixture
4	Electric scissors
5	Gun drill
6	Vibration riveting gun
7	Handmade scissors
8	Scratching pin
9	Skin stretching machine
10	Welding machine

III. Maintenance Data

The list of auxiliary materials is as follows:

Table Key auxiliary materials

S/N	Name
1	Thermal insulation cotton
2	Flame retardant adhesive materials

IV. Circuit Diagram

None

V. Fault Diagnosis

None

VI. Method of Disassembly and Assembly

1. Left side skin installation

- 1) Below the window beam and above the surface of the floor joist, any inner sealing

board (non foaming position) needs to be filled with flame-retardant sponge. Prepare flame-retardant sponge on-site according to the size, and insert the sponge into the skeleton gap.

- 2) Apply sealant at the middle of the side pillar, crossbeam, and wheel cover, and do not apply at the front and rear pillars, box door frame pillars. Before applying sealant, the corresponding cleaning agent and primer should be wiped off.
- 3) Stick self-adhesive sponge strips on the diagonal beams of the side pillars.



Fig. Preparation before installation

- 4) After all the preparation work is completed, lift the stress skin onto the side frame, adjust the front and rear, high and low positions of the skin. The front and rear positions are based on the front edge of the front column, and the height position is based on the upper edge of the window beam.
- 5) Use an F-shaped fixture to clamp the skin onto the window sill, ensuring that the skin is flat in the front and back directions. Weld the rear end of the skin to the rear pillar of the side panel and plug weld it, with intermittent welding at the folded edge. When welding, braces should be used to make the skin tightly adhere to the skeleton.
- 6) Insert the front end skin into the clamping groove of the stretching machine, move the trolley, hang the chain, and start the clamping device to clamp the skin.
- 7) Use a dedicated square tube and F-shaped fixture to slightly clamp the skin and side wall framework between the front door frame of the water tank door (1 piece), the front and rear ends of the front and rear bridge (4 pieces), and the front end of the fuel tank cap and the rear bridge (1 piece).
- 8) Start the stretching device and prestretch the skin until it is flat. Mark the starting point of stretching on the skin and skeleton at the front pillar, stretching the skin by

approximately 7/10000.

- 9) When spot welding the folded edge on the skin and the window stop, the spacing should be 40mm, and the welding points should be in the same straight line. Plug welding should not be applied at pressure welding points. Intermittent welding is carried out between the lower edge of the skin and the skirt edge, with a weld seam of 30mm and a spacing of 100mm.
- 10) Cut the skin along the skeleton at the rear of the side panel, remove excess parts, and keep the rolled edges below the skin. Bend the folded edge upwards along the skeleton, connect it with the original skin, and perform spot welding.
- 11) Loosen and remove the clamp, and cut off any excess skin. Clamp the skin and frame at the front pillar using a special shaped square tube, apply plug welding between the skin and frame, and polish the weld seam.

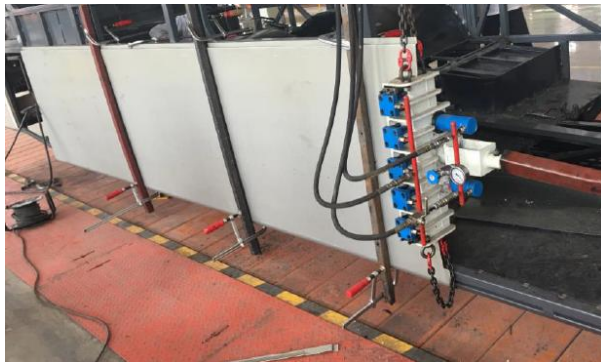


Fig. Skin stretching

- 12) During the production of the side wheel rim, drill $\Phi 5$ holes from the bottom edge of the skin to a height of 170mm, 350mm, and 500mm at the outer side of the wheel rim, and drill one $\Phi 5$ hole at the highest point. Then weld plugs onto the 7 holes. While welding the plugs, support them with a wooden block.
- 13) Cut an appropriately sized notch in the skin at the wheel rim area. Use a scribe needle to mark the edge line of the wheel rim and leave a margin for folding. Cut along the marked line with electric scissors. Finally, use a folding tool to fold the wheel cover. Weld the wheel rim skeleton to the skin by intermittent welding. The welding seam should be 15mm long with a spacing of 100mm between each weld. Also, perform intermittent welding on the edge of the wheel rim and the skin after folding.

- 14) Finally, polish the welds and ensure that the skin is not damaged. If there is wear, it should be repaired by welding.



Fig. Wheel skin installation

- 15) When opening the side light holes, follow the drawing to mark the positions of the light holes and the frames of the light holes. Use a ruler to locate the center points of the holes. Use a $\Phi 30$ auger drill to drill the $\Phi 30$ light holes and a $\Phi 18$ auger drill to drill the $\Phi 18$ holes. For the remaining opening holes, follow the skeleton for the appropriate placement.

2. Right side skin installation

Refer to the installation of the left side skin

3. Installation of top cover skin

- 1) Firstly, fix one end of the skin in the X-direction with a pop rivet, and fix it from the middle to both sides with pop rivets. The center of the pop rivet is 20mm from the edge of the skin, and the distance between the rivet and the rivet center is 60mm. The distance between the two outermost rivets can be appropriately reduced. Rivets need to be dipped in sealant before use, and the diameter of the rivet hole is 5.1mm. The other end of the skin is placed in the clamping groove of the stretching machine, clamped and stretched.
- 2) Clamp the skin and top cover frame with bandages to ensure that the frame fits the skin (the number of bandages depends on the fit, usually 5-6). After stretching, keep the stretching machine stationary and rivet the other end of X onto the top cover using the same method. A welding position of 5mm should be reserved on the front

and rear end faces of the skin and top cover skeleton. Use an air gun to rivet the length direction on both sides, starting from the fixed end.

- 3) The distance between the rivet and the rivet center is 80mm, and the distance between the rivet center and the edge of the skin is 10mm. After riveting, the rivet should be perpendicular to the surface of the plate, without any deviation, and the rivet head should be intact without any unevenness.
- 4) Use pneumatic scissors to cut off the part of the skin that grows out of the skeleton and polish it flat.
- 5) When opening the air conditioning vent frame, drill 2 $\Phi 30$ holes along each of the four corners. Draw 4 straight lines. Use electric scissors to cut along the lines through the holes. After cutting, use a grinder to smooth the air conditioning vent. Align the mouth frame with the position of the mouth frame and fix it firmly with pop rivets.
- 6) Use the same method to open the safety sunroof and air conditioning return vent. The distance between the center of the rivet and the mouth frame is 15mm, and the distance between the rivet and the center of the rivet is 80mm.



Fig. Sunroof window frame

- 7) Start by drilling a hole from the top cover skeleton through-hole, passing through the skin to determine the opening position. Then, use a drill bit to separately create $\Phi 9$ and $\Phi 13$ through-holes. Follow the drawing to weld 8-M12 $\times$ 120 bolts, 24-M8 $\times$ 30 bolts, and 72-M12 $\times$ 40 bolts. Ensure that the welding is done evenly around the perimeter.

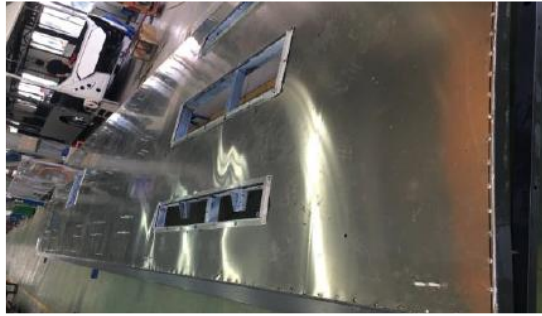


Fig. Air conditioning return air outlet

- 8) Paste a 40mm decorative paper adhesive tape outside the adhesive area of the air conditioning vent frame. Clean the adhesive area with a cleaner and let it dry for at least five minutes. Apply a special primer within that area and let it dry for at least ten minutes. Apply sealant using a specialized scraper. Once completed, remove the adhesive tape paper.
- 9) Apply a circle of sealant around the root of the embedded bolts on the top cover, place the brackets on the bolts separately, press them tightly, and fix them with screws. Completely cover the area around the bolts and brackets with sealant to ensure sealing performance.

7. Component maintenance cycle and maintenance methods

None

V. Vehicle Four-wheel Alignment

Front axle positioning parameters:

Toe-in	Camber angle (°)	Inner inclination angle (°)	Caster angle (°)	Angle of inner and outer wheels (°)
1~3mm	0.5	9	3.5	42/32

VI. Vehicle Electrical Maintenance Diagram

Appendix (Electrical Diagram):

Appendix (Electrical Wiring Diagram):