



UNI-K

- **Fuel System**

UNI-KRM2C/1/1

3.1.6 Intake system Specifications

Torque specification

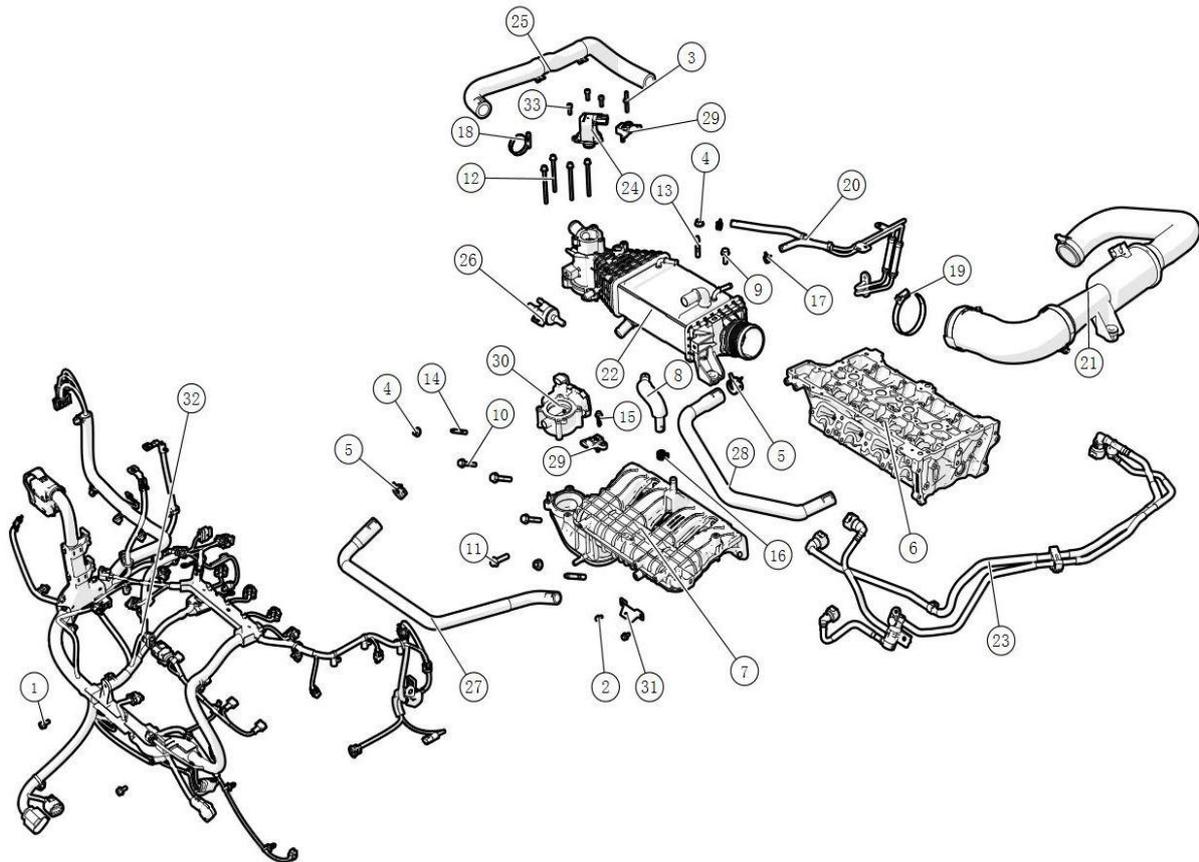
Name	Nm	lb-ft	lb-in
Intake manifold mounting nut and bolt	23±2	17	-
Throttle body connecting bolt	10±1	-	89
Air filter upper cover connecting screws	10±1	-	89
Air filter assembly mounting bolt(Bulge welding nut, plastic + insert nut)	10±1	-	89
Air filter assembly mounting bolt(Plastic piece + piece nut)	10±1	-	89
Water-cooled intercooler assembly mounting stud	10±1	-	89
Water-cooled intercooler assembly mounting nut/bolt	23±2	17	-
Intake manifold temperature and pressure sensor	8±0.5	-	71
Water-cooled intercooler temperature and pressure sensor	10±1	-	89

Description and operation

System overview

The ambient air enters the air filter, is filtered by the air filter element, pressurized by the supercharger, enters the water-cooled intercooler through the intercooler inlet trachea assembly, and then enters the throttle body and intake manifold and enters the cylinder. Crankcase vent pipe is connected to the intake manifold, through which the exhaust gas from the crankcase enters the cylinder with fresh air.

Exploded view



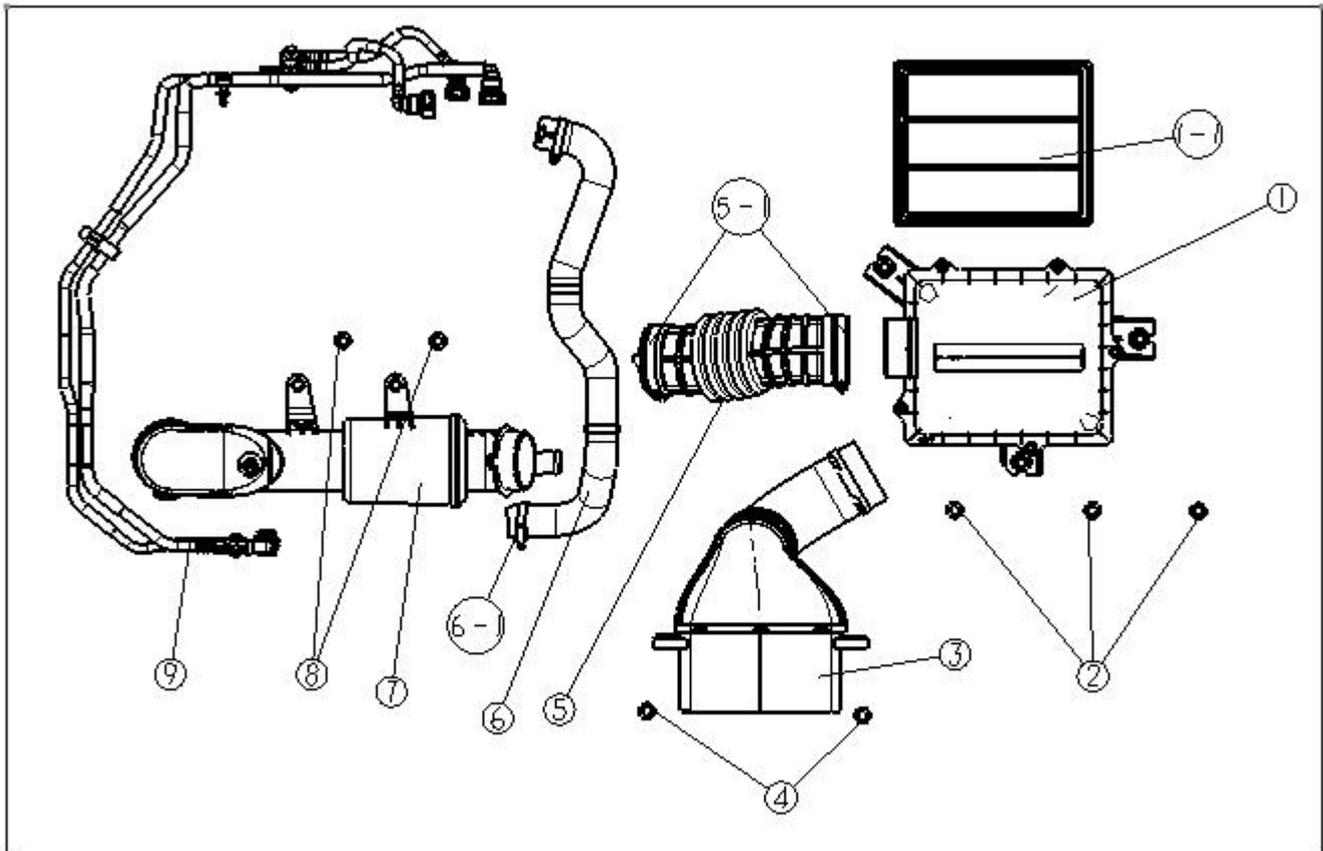
Project	Description	Project	Description
1	Temperature and pressure sensor	19	Bolt
2	Bolt	20	Intake manifold assembly
3	Intake manifold bracket	21	Canister control valve
4	Canister tee valve bracket	22	Water-cooled intercooler assembly
5	Bolt	23	Hoop
6	Electronic throttle valve	24	Intercooler inlet trachea assembly
7	Bolt	25	Intake relief valve hose
8	Tapping screw	26	Cylinder head
9	Hoop	27	Hoop
10	Water cooler inlet pipe	28	Pressure regulating valve vent hose
11	Bolt	29	Intake relief valve
12	Hoop	30	Canister control valve outlet trachea assembly
13	Hoop	31	Engine harness assembly

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Intake system

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14	Bolt	32	Bolt
15	Bolt	33	Bolt
16	Nut	34	Water inlet and outlet pipe assembly of supercharger
17	Water cooler water outlet pipe	35	Hoop
18	Stud		



Project	Description	Project	Description
1	Air filter assembly	6	Intake relief valve hose
1-1	Air filter element assembly	6-1	Hoop
2	Bolt	7	Air filter outlet connecting pipe assy. II
3	Air filter inlet trachea assy.	8	Bolt
4	Bolt	9	Canister control valve outlet trachea assembly
5	Air filter outlet connecting pipe assy. I		
5-1	Hoop		

General inspection

General equipment

Vacuum gauge

⚠ Warning: The temperature of the engine components in operation is very high. Pay attention to the high temperature of the engine when assembling and disassembling all parts. Otherwise, serious scald may be caused.

Intake system vacuum check

1. Turn the ignition switch to "LOCK" position when the engine stops.
2. Disconnect the charcoal canister blowdown solenoid vacuum hose on the intake manifold.
3. Connect the appropriate vacuum hose to the charcoal canister blowdown solenoid valve position plug, connect the tee to the disconnected vacuum hose and the test vacuum hose on the connection, and connect the vacuum gauge test hose respectively.
4. Start the engine and measure the intake system vacuum at idle speed.
Standard value of vacuum: >60kPa
5. Remove the vacuum gauge and restore the vacuum pipe connection.

Daily maintenance of air filter element

Daily maintenance of air filter element shall be carried out in strict accordance with the daily

maintenance interval in the Instructions for Use. For detailed maintenance steps, see "Air filter element" in dismantling and installation.

Fault symptom diagnosis and test

General equipment

Vacuum gauge

Inspection and confirmation

1. Confirm the customer's problem.
2. Visually inspect the table for signs of mechanical or electrical damage.

Visual Check List

Mechanical part
<ul style="list-style-type: none"> • Air filter assembly • Air filter inlet trachea-way • Air filter outlet trachea-way • Water-cooled intercooler • Electronic throttle body • Intake manifold

3. If the observed or raised problem is obvious and the cause has been found, the cause must be corrected before proceeding to the next step.
4. If the visual inspection is passed, confirm the fault and refer to the fault symptom table.

Fault symptom table

If the fault occurs but no DTCs are stored in the ECM and the cause of the fault cannot be confirmed in the basic inspection, the fault diagnosis and rule out shall be performed according to the sequence listed in the following table.

Symptoms	Possible causes	Measures
Intake leakage	<ul style="list-style-type: none"> • Air filter • Intake manifold • Electronic throttle body • Water-cooled intercooler • Canister control valve outlet trachea assembly • Canister control valve assembly • Component connection 	Replace corresponding parts
Intake block	<ul style="list-style-type: none"> • Air filter element 	<ul style="list-style-type: none"> • Check the air filter, and replace the air filter element if necessary.
	<ul style="list-style-type: none"> • foreign matter entering trachea 	<ul style="list-style-type: none"> • Disassemble the air filter cover, check whether there is foreign matter in the air filter and into trachea, and remove foreign matter.

Intake leakage diagnosis process

Test conditions	Details/Results/Measures
1. Check whether there is air leakage	
	<p>A. Start the engine.</p> <p>B. Listen for air leakage. Is there any hissing air leak?</p> <p>? Yes</p> <p>Check the leakage point and repair the leakage component.</p> <p>? No</p> <p>Go to step 2.</p>
2. Inspect all pipelines connected with intake manifold.	
	<p>A. Check whether crankcase ventilation pipeline and fuel tank evaporative emission pipeline are aged or not sealed tightly.</p> <p>Are the pipelines normal?</p> <p>? Yes</p> <p>Go to Step 3</p> <p>? No</p> <p>Repair the relevant lines.</p>
3. Check the vacuum of intake system	
	<p>A. Perform intake system vacuum check procedure.</p> <p>Vacuum standard: Does >60kPa have normal vacuum?</p> <p>? Yes</p> <p>The system is normal.</p> <p>? No</p> <p>Go to Step 4.</p>
4. Inspect intake manifold or electronic throttle body or water-cooled intercooler.	
	<p>A. Check the tightness of intake manifold or electronic throttle body or water-cooled intercooler.</p> <p>Is the intake manifold or throttle body or water-cooled intercooler leaking?</p> <p>? Yes</p> <p>Repair the intake manifold or electronic throttle body or water-cooled intercooler seal.</p> <p>? No</p> <p>Check engine valve mechanism.</p> <p>Reference: 3.1.3 Mechanical system</p>

Removal and installation

Water-cooled intercooler, throttle body and intake manifold

Removal

1. Disconnect negative battery wire.
2. Remove canister control valve assembly, canister control valve outlet trachea assembly, intake relief valve hose, intercooler inlet trachea assembly, water-cooled intercooler inlet pipe, water-cooled intercooler outlet pipe, supercharger inlet and outlet pipe assembly and engine harness assembly wiring box.
3. Remove the temperature and pressure sensor assembly on the water-cooled intercooler.
4. Remove ECRV valve assembly on water-cooled intercooler.
5. As shown in the above figure, remove the bolts fixing the water-cooled intercooler, electronic throttle body and intake manifold flange side, remove the bolts and nuts of the water-cooled intercooler integration bracket, and remove the water-cooled intercooler assembly.
6. Remove electronic throttle body assembly.
7. Remove intake manifold bracket.
8. Remove boost pressure and temperature sensor assembly of intake manifold.
9. Remove intake manifold assembly.

Installation

Install in reverse order of removal and observe the following points.

1. Before installation, confirm that the water-cooled intercooler interior, intake manifold interior, throttle body assembly and intake manifold assembly are clean and free of foreign matter.
2. Install the temperature and pressure sensor assembly on the intake manifold to the torque specified in Table A.
3. Tighten the connecting bolts and nuts between intake manifold and cylinder head and cylinder block, and connecting bolts and nuts between intake manifold and electronic throttle valve and water-cooled intercooler according to the torque specified in Table A.
4. Check to make sure that all removed parts

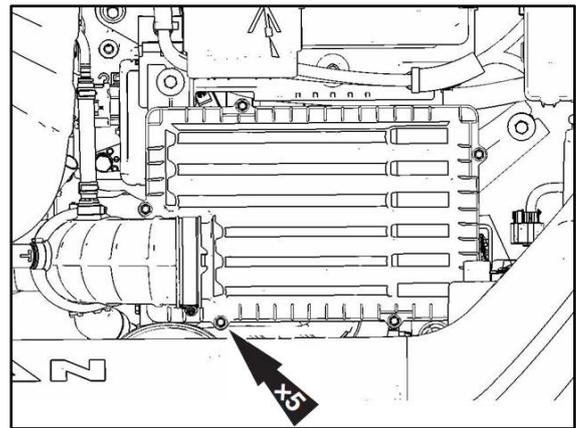
have been installed back in place and that the required parts that have not been installed have been installed.

5. Start the engine, check whether the engine idle speed is normal after heating, and determine whether the intake system leaks.

Air filter element

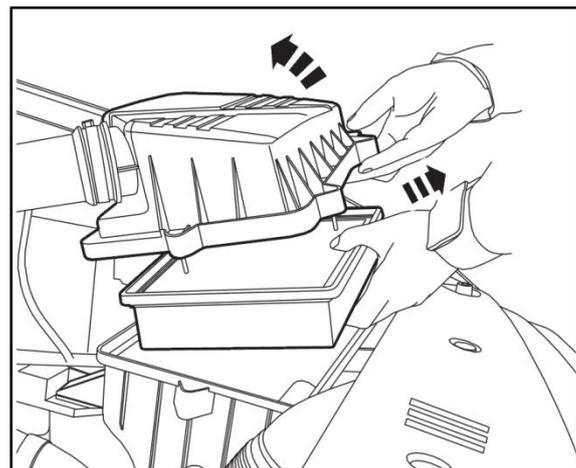
Removal

1. Loosen the screws securing the air cleaner upper cover.



2. Lift the upper cover of the air filter to clean the air.

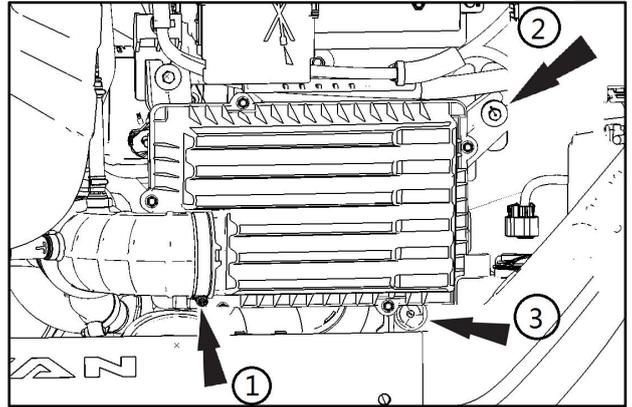
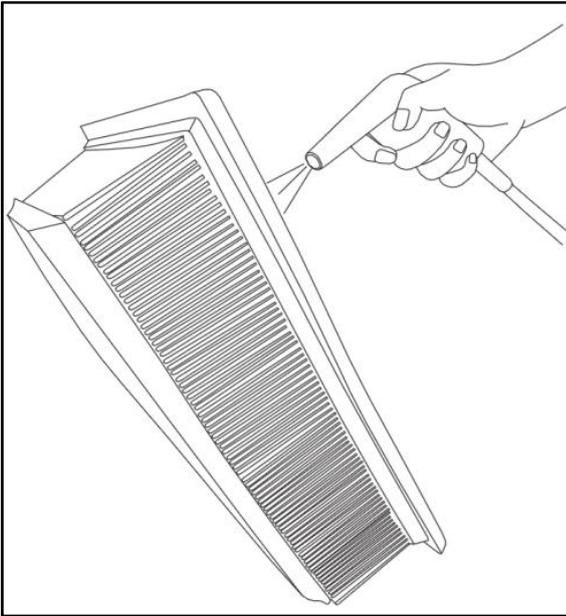
Remove the filter element from the housing.



3. Inspect the air filter element for dirt.

4. Clean the filter element with compressed air when required.

Blow off the dirt on the side. If it is too dirty, replace the filter element.



Installation

Install in the reverse order of removal, noting the following:

1. Before installation, confirm that the air filter upper cover and filter element are clean and free of foreign matter.
2. Confirm the filter element is installed in place in the air cleaner housing.
3. Tighten screws to the torque specified in Table A.

Air filter assembly

Removal

1. Loosen clamp securing air cleaner out of trachea way.
2. Remove the 2 retaining bolts that secure the air cleaner assembly.
3. Pull off the rubber gasket that secures the air cleaner assembly.
4. Take out the air cleaner assembly.

Installation

Install in the reverse order of removal, noting the following:

1. Before installation, confirm that the air filter assembly, inlet trachea-way and output pipeline are clean and free of foreign matter.
2. Confirm that the air filter assembly, trachea-way inlet and output pipelines are installed in place.
3. Tighten the air filter assembly retaining bolts and air filter output pipe clamp according to the torque specified in Table A.

3.1.7 Exhaust system Specifications

Torque specification

Name	Nm	lb-ft	lb-in
Turbocharger mounting stud	15	11	-
Supercharger mounting nut	40	30	-
Turbocharger oil inlet pipe retaining bolt	34	25	-
Turbocharger oil return pipe retaining bolt	10	-	89
Water inlet and return pipe retaining bolt of supercharger	10	-	89
Supercharger heat shield retaining bolts	23	17	-
Supercharger and three-way catalytic converter connecting stud and nut	25	18	-
Three-way catalytic converter reinforcement bracket retaining bolt	23	17	-
Three-way catalytic converter retaining bolt	65	48	-
Three-way catalytic converter heat shield retaining bolt	10	-	89
Oxygen sensor assembly	50	37	-
Muffler inlet pipe assembly and three-way catalytic converter connecting nut	50	37	-
Connecting nut between muffler assembly and muffler inlet pipe assembly	50	37	-

Description and operation

System overview

Three-way catalyst poisoning

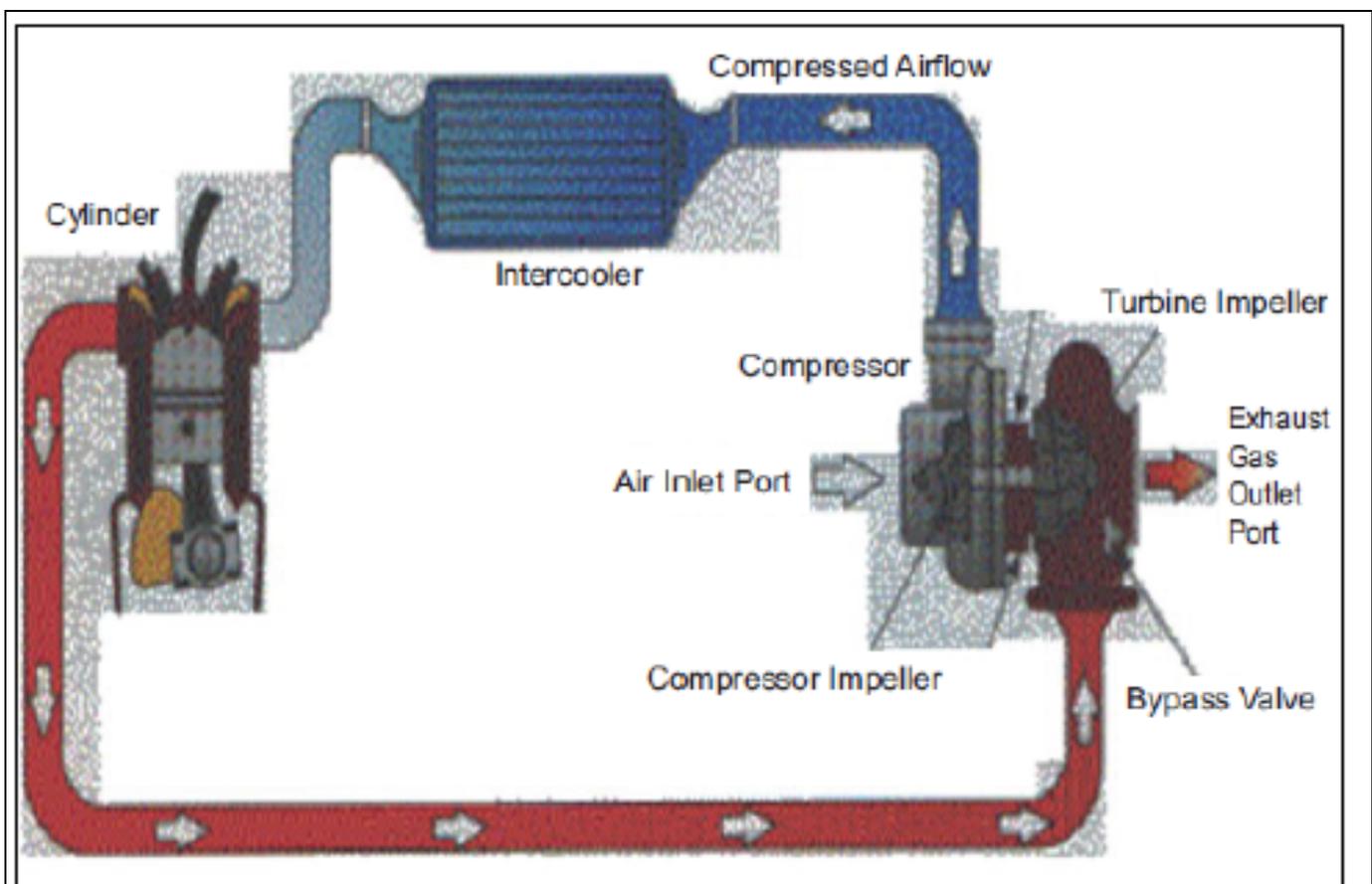
If the fuel contains more than 5 mg/L lead, the catalyst will be severely poisoned. Therefore, it is prohibited to use leaded gasoline for vehicles equipped with three-way catalytic converter.

If the oil consumption is too high, zinc and phosphorus in the oil can cause catalyst poisoning. The discharge of H₂S from the three-way catalytic converter is most noticeable. The gas smells like rotten eggs. Replace the fuel of other brands to solve the problem. To reduce H₂S emissions, ensure that CO emissions at idle speed meet standards and the engine exhaust system works properly.

⚠ Warning: If the temperature exceeds 900 °C, the catalyst carrier will melt. In order to prevent the occurrence of such faults, the causes of the faults shall be described and repaired in detail.

Due to excessive back pressure, catalyst melting is often accompanied by power drop.

Supercharger principle



The exhaust gas from the engine exhaust manifold drives the turbocharger turbine to rotate, and the turbine drives the pressure impeller coaxial with it to rotate. The impeller compresses the fresh air by centrifugal force, thus increasing the density of air entering the intake manifold of the engine, so that the engine can burn more fuel and then generate more power.

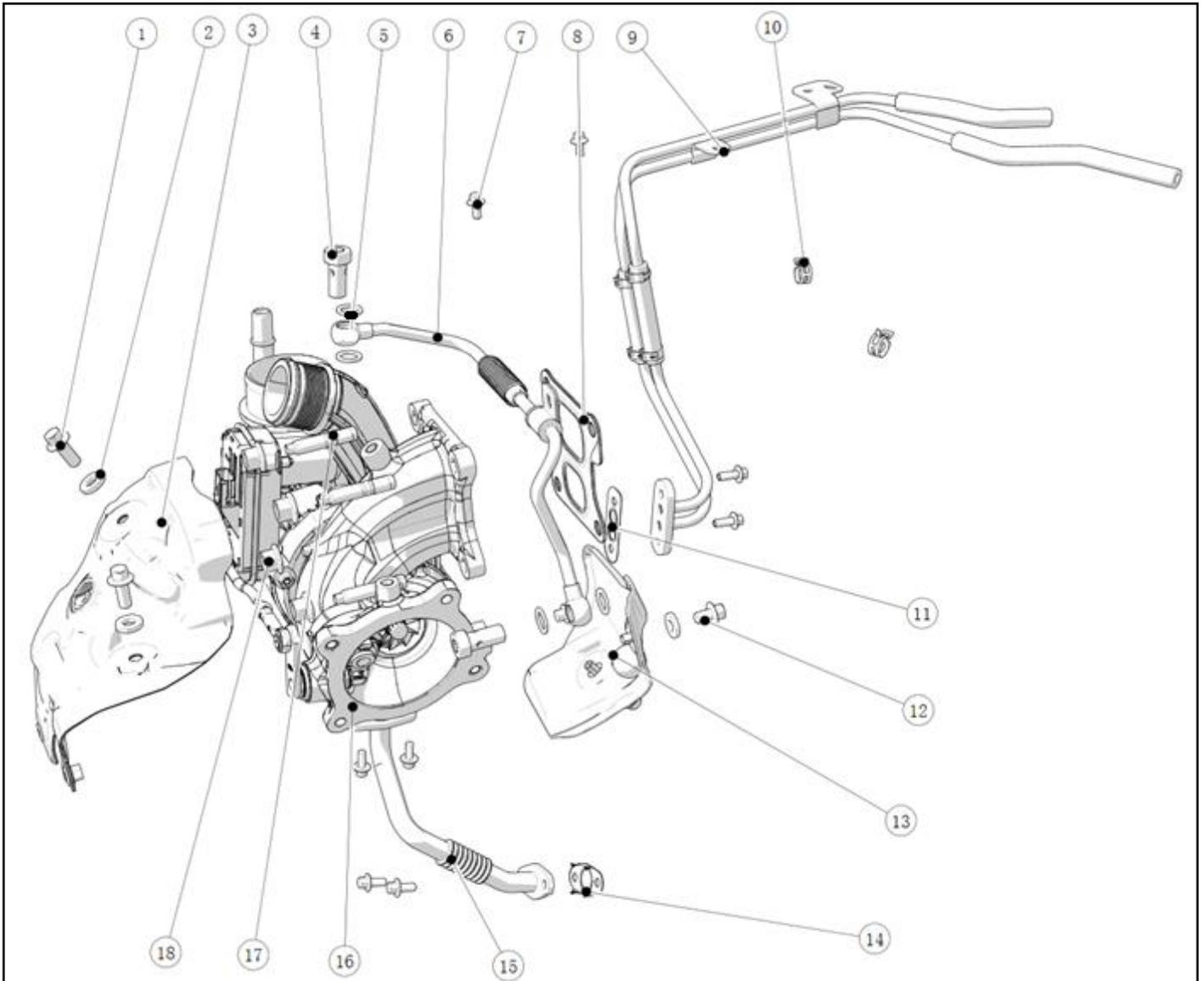
Component description

Three-way catalytic converter

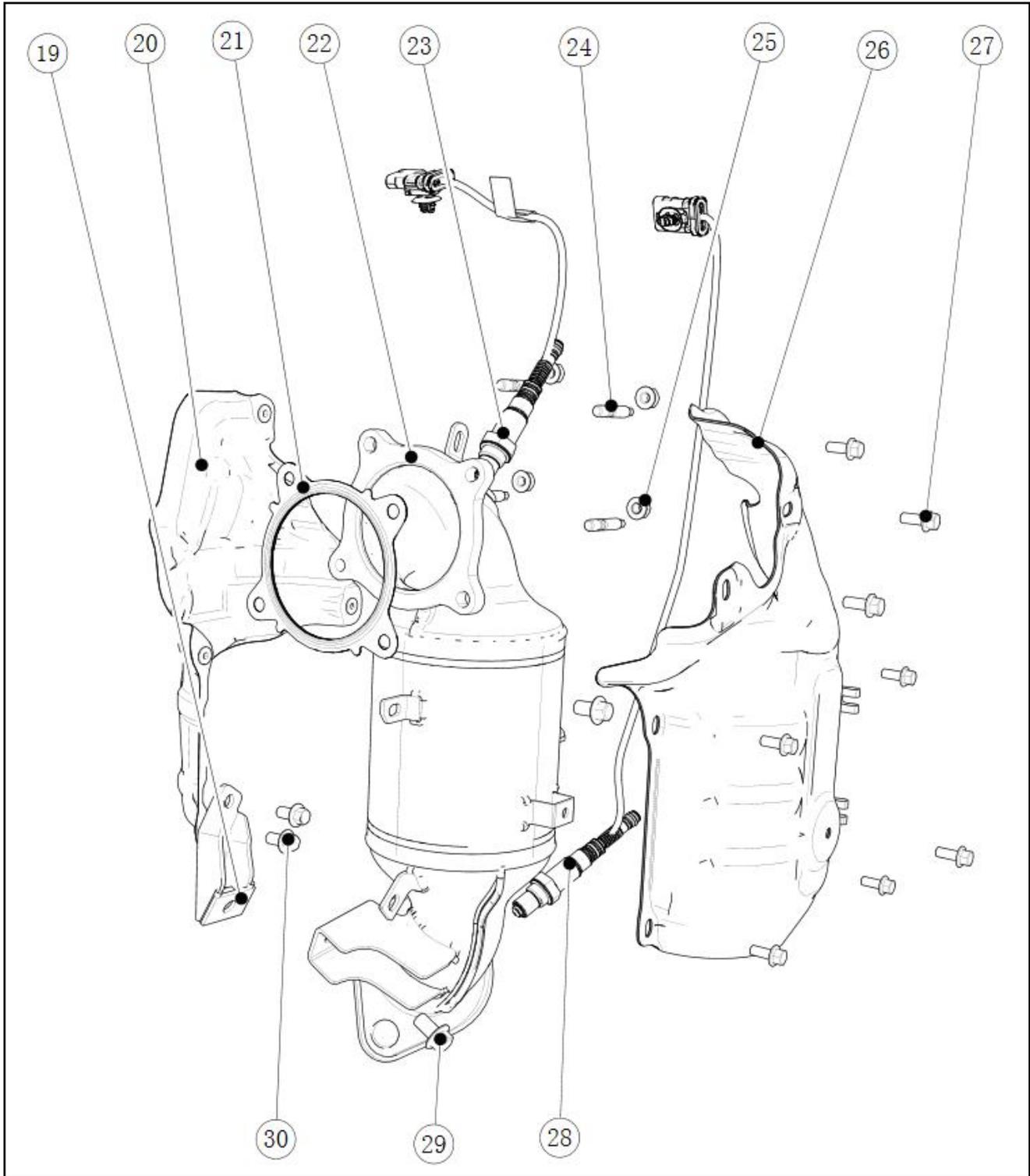
The three-way catalytic converter is similar in shape to a small muffler. Because of its high operating temperature, the body around the three-way catalytic converter is protected by a heat shield. Three-way catalytic converter controls three emissions: HC, CO and NOx.

Exploded view

Supercharger assy.



Three-way catalytic converter assy.

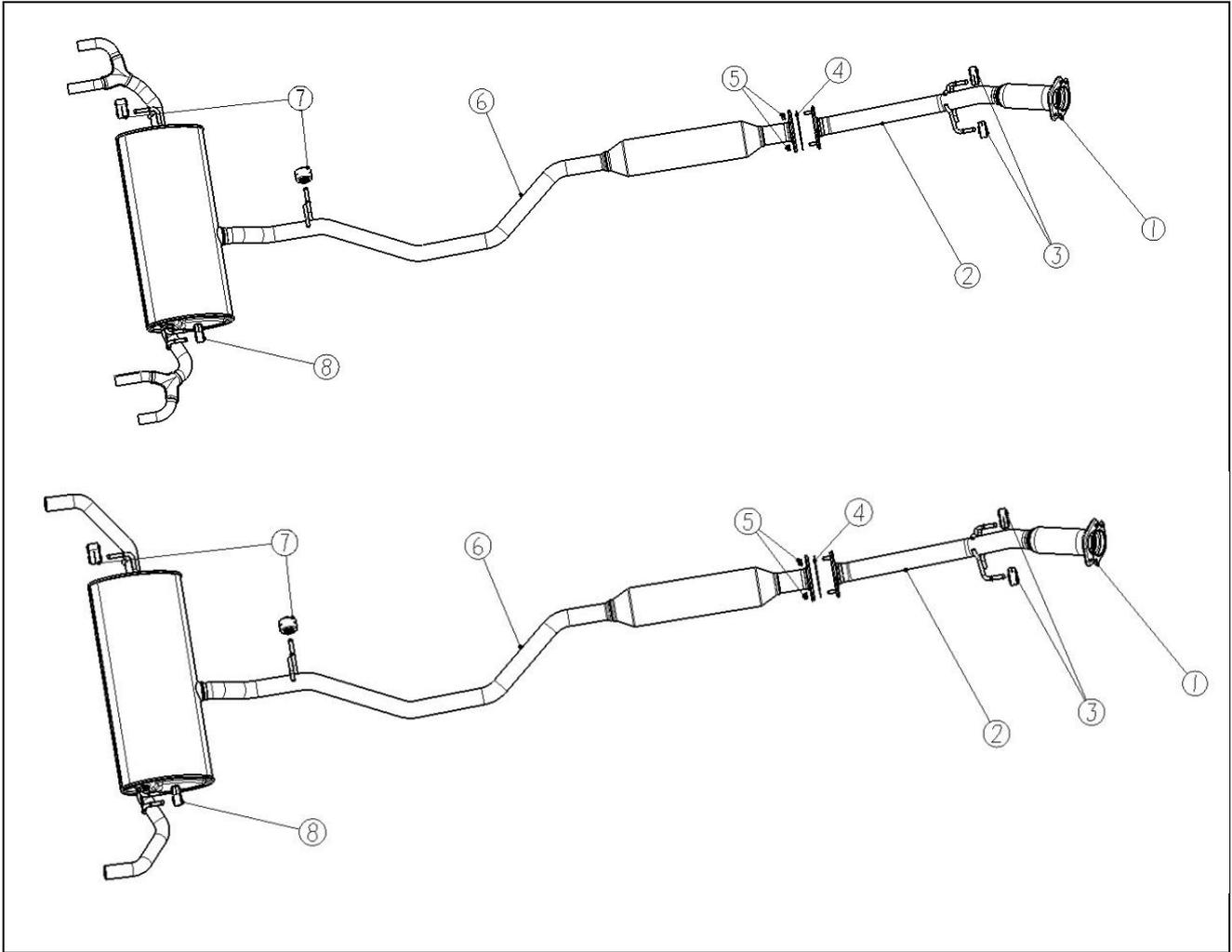


Project	Description	Project	Description
1	Bolt	16	Supercharger assy.
2	Nut	17	Supercharger and cylinder head connecting stud
3	Supercharger upper cover assembly	18	Supercharger and cylinder head connecting nut

3.1.7 -5**Exhaust system****3.1.7 -5**

4	Hollow bolt	19	Three-way catalytic converter bracket assembly
5	Gasket	20	Three-way catalytic converter lower cover assembly
6	Supercharger oil inlet pipe assy.	21	Three-way catalytic converter and supercharger gasket assembly
7	Bolt	22	Three-way catalytic converter assy.
8	Supercharger and cylinder head gasket assembly	23	Front oxygen sensor assembly
9	Supercharger water inlet and return pipe assy.	24	Three-way catalytic converter and supercharger connecting stud
10	Clamp	25	Three-way catalytic converter and supercharger connecting nut
11	Water inlet and return pipe gasket assy.	26	Three-way catalytic converter upper cover assembly
12	Bolt	27	Bolt
13	Booster lower cover assembly	28	Rear oxygen sensor assembly
14	Supercharger oil return pipe gasket assy.	29	Bolt
15	Supercharger oil return pipe assy.	30	Bolt

Muffler with accessory assembly



Project	Description	Project	Description
1	Gasket	5	Exhaust system nut
2	Muffler inlet pipe assy.	6	Muffler assembly
3	Lifting lug	7	Lifting lug
4	Gasket	8	Lifting lug

General inspection

Daily inspection



Note: The engine must be cooled down before inspection. During inspection, the engine cannot be started to avoid personal injury.

1. Check the tightness and tightness of the connecting pipeline between the air filter and the supercharger, the supercharger and the engine trachea, and the three-way catalytic converter. The connection should not be loose, the pipeline is broken, and the air filter filter element is not installed in place.
2. Check whether the turbocharger oil inlet and return pipes are damaged or blocked, and whether the connecting bolts at the joints are loose. The oil return pipe shall be free of excessive pipe bending, aging, oil sludge blockage, etc.
3. Check the oil quality and change the oil and oil filter regularly.
4. Check the air filter and clean or replace the filter element regularly.
5. Check whether the engine crankcase ventilation system is smooth, whether the engine waste trachea (i.e. crankcase through trachea) is blocked and broken, and whether the crankcase pressure is normal.

Troubleshooting method of supercharger related engine:

Fault symptom								Complete engine related fault diagnosis table	
I	B	E	B	S	S	S	T		
n	l	x	l	u	u	u	r		
s	a	c	s	p	p	p	b		
u	c	e	s	r	r	r	o		
o	c	s	s	c	c	c	c		
o	k	s	m	h	h	h	h		
o	s	s	o	a	a	a	a		
o	m	i	k	r	r	r	r		
o	i	o	e	g	g	g	g		
o	k	v	r	e	e	e	e		
o	e	e	r	r	r	r	r		
o	c	c	r	g	g	g	g		
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				•				Turbine rear trachea-way	Re-tighten fasteners or replace gaskets as
		•	•			•	•	Engine crankcase oil is too full	Refer to this manual 3.1.3-4 Check the engine oil level and drain the excess oil.
		•	•			•	•	Engine crankcase ventilation system is not smooth	Remove debris from blocked lines or replace damaged parts as appropriate
		•	•			•	•	Turbocharger return oil pipeline is not smooth	Remove debris from blocked lines or replace damaged parts as appropriate
•	•	•	•			•	•	Abnormal wear of engine piston ring causes channeling	Refer to this manual 3.1.2-19 Replace the engine piston ring.
•	•	•	•	•	•	•	•	Supercharger damage	Replace supercharger

1. Please troubleshoot the engine fault according to the above table. If it is confirmed that the supercharger is faulty, replace the supercharger.
2. The supercharger is a precision component that needs to be repaired and tested by a professional. The replaced faulty supercharger shall not be dismantled by itself to avoid affecting the analysis of its failure causes. It is only necessary to record the supercharger nameplate information and fault phenomenon, and return the fault supercharger to the factory for detection and treatment.

Fault symptom diagnosis and test

Fault symptom table

If the fault occurs but no DTCs are stored in the ECM and the cause of the fault cannot be confirmed in the basic inspection, the fault diagnosis and rule out shall be performed according to the sequence listed in the following table.

Symptoms	Possible causes	Measures
Exhaust system blocked	<ul style="list-style-type: none"> • Three-way catalytic converter • Muffler • Exhaust system component connection 	<p>Reference: 3.1.7 Exhaust System Exhaust System Plugging Diagnostic Procedure</p>
Exhaust system leakage	<ul style="list-style-type: none"> • Exhaust system component misalignment or wrong installation 	<ul style="list-style-type: none"> • Position and tighten exhaust system components to the specified torque • Make sure that the three-way catalytic converter bracket is in the correct position and is not loose.
	<ul style="list-style-type: none"> • Seal or gasket leakage • Supercharger and cylinder head • Supercharger and three-way catalytic converter assembly • Three-way catalytic converter assembly and front muffler assembly • Front muffler assembly and rear muffler assembly 	<ul style="list-style-type: none"> • Replace leaking seals or gaskets.
	<ul style="list-style-type: none"> • Irregular joint surface at flange joint 	<ul style="list-style-type: none"> • If necessary, repair or replace the relevant components.
	<ul style="list-style-type: none"> • Cracking or disconnection of exhaust system components 	<ul style="list-style-type: none"> • Replace cracked or disconnected exhaust system parts.
	<ul style="list-style-type: none"> • Leakage at welded connection of exhaust system components 	<ul style="list-style-type: none"> • Replace leaking components.

Exhaust system blockage diagnosis process

Test conditions	Details/Results/Measures
1. Visual inspection of turbocharger vortex inlet	<p>A. Inspect whether there is foreign matter at the inlet of the turbocharger vortex end.</p> <p>Is there any foreign matter at the inlet of the turbocharger vortex?</p> <p>? Yes</p> <p>Remove foreign objects.</p> <p>? No</p> <p>Go to step 2.</p>
2. Check three-way catalytic converter	<p>A. Remove the three-way catalyst.</p> <p>B. Check three-way catalyst.</p> <p>Is the three-way catalytic converter normal?</p> <p>? Yes</p> <p>Go to Step 3.</p> <p>? No</p> <p>Replace the three-way catalyst.</p>
3. Check muffler	<p>A. Remove muffler.</p> <p>B. Check muffler.</p> <p>Is the muffler normal?</p> <p>? Yes</p> <p>Check the connection position of exhaust system components and test whether the system works normally.</p> <p>? No</p> <p>Replace the muffler.</p>

Removal and installation

Supercharger, three-way catalytic converter

Removal

1. Disengage negative wire from the battery.
2. Disconnect the upstream oxygen sensor connecting wire.
3. Remove the three-way catalytic converter and muffler connecting nuts.
4. Remove upper and lower cover assemblies of three-way catalytic converter.
5. Remove the connecting nuts of three-way catalytic converter and supercharger.
6. Remove three-way catalytic converter bracket bolts.
7. Remove upstream oxygen sensor connector.
8. Remove three-way catalytic converter assembly.
9. Remove the supercharger water inlet and outlet pipe assembly, supercharger oil inlet pipe and oil return pipe assembly.
10. Remove the booster lower cover assembly.
11. Remove the supercharger assembly.



Note: When removing the supercharger assembly, pay attention to the correct state of the protective actuator rod. The supercharger lubricating oil and cooling oil must be clean and do not enter into impurities. When removing the turbocharger oil return pipe assembly, it is not allowed to leak oil to the exhaust gas.

Installation

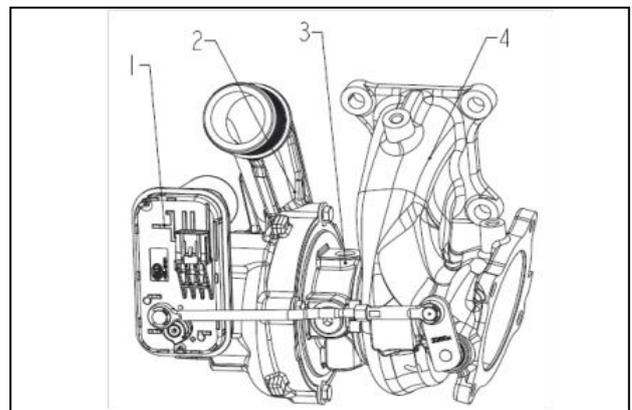
1. Connect the cylinder head and supercharger, replace the supercharger upper cover with gasket assembly between supercharger and cylinder head, and check the second torque; Install the booster lower cover assembly.
2. Install water inlet and outlet pipe assembly, oil inlet pipe assembly and oil return pipe assembly of supercharger.
3. Install the three-way catalytic converter assembly, replace with a new three-way catalytic converter gasket, tighten the fasteners according to the specified torque, and check the second torque.
4. Install the three-way catalytic converter and cylinder block connecting bolts.

5. Install upper and lower cover assemblies of three-way catalytic converter.
6. Install three-way catalytic converter and muffler connection.
7. Connect the upstream oxygen sensor connector and connect the connector securely.
8. Connect negative battery wire.
9. Check whether the exhaust system leaks air and oil.

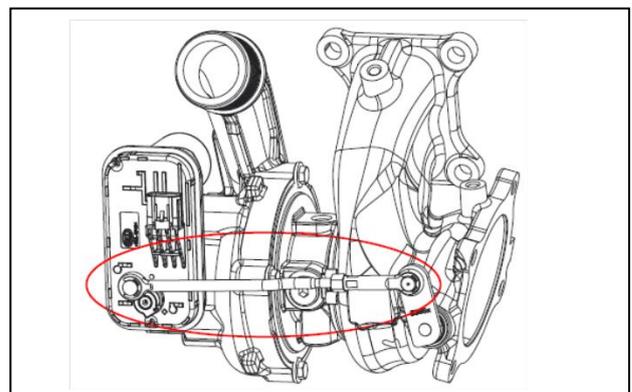


Note: When installing the exhaust manifold with supercharger assembly, pay attention to whether the supercharger oil inlet pipe and oil return pipe are correctly installed to prevent oil leakage.

Supercharger related precautions



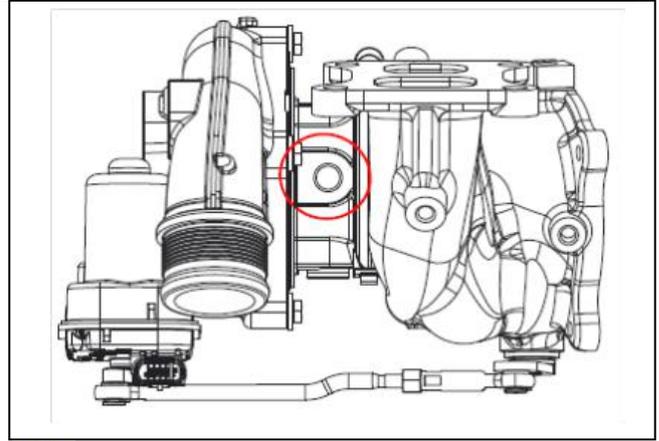
Warning: The entire supercharger consists of turbine 4, compressor 2, intermediate 3 and actuator assembly 1, etc. Non-supercharger professional manufacturer cannot disassemble any part of supercharger assembly. (The figure above shows the status of the minimum disassembly unit that can be disassembled)



Warning: Do not use the red ring inner actuator push rod as a handle to move the supercharger

assembly, and pay attention to avoid impact or heavy pressure on the inner area of the ring to avoid affecting the sensitivity and reliability of the bypass valve actuator.

⚠ Warning: The voltage calibration of the bypass valve actuator assembly is completed on the special equipment of the supercharger manufacturer. Do not adjust the inner nut in the above figure.



⚠ Note: It is necessary to prevent the mounting surface from scratching during the repair, assembly and placement of the supercharger, and prevent foreign matter from falling into the open interfaces. Especially, the above oil inlet area should be kept clean.

3.1.8 Fuel system Specifications

Component specification

Name	Specifications
Fuel injector resistance	At room temperature, $1.83 \Omega \pm 5\%$; 1. At other temperatures, the resistance value will exceed the deviation; 2. The accuracy requirement of multimeter is 0.01Ω .
Fuel pump and bracket assembly rated fuel supply pressure	500kpa
Fuel pump assembly fuel flow	13.5 V voltage, 500kPa, not less than 140 L/h
Fuel tank assembly	70L

Torque specification

Name	Nm	lb-ft	lb-in
Fuel manifold assembly mounting bolt	32 ± 2	24	
Fuel tank fixing belt assembly and body mounting bolts	63 ± 5		
Fuel tank filling hose assembly connecting hoop	5 ± 1		
Mounting bolts of fuel transfer pump flange and fuel tank assembly	135 ~ 406(Main angle and auxiliary torque)		
Canister control valve outlet trachea assembly and retaining bracket bolts	5 ± 1		
Canister assembly and lower body bolt	23 ± 3		
Filler pipe assembly and filler box(Hexagon bolt spring washer and plain washer assembly)	9 ± 3		
Filler pipe assembly and body side wall nut	9 ± 3		

Description and operation

System overview

Fuel system includes fuel tank filler cap assembly, fuel filler pipe assembly, fuel tank assembly, fuel pump and bracket assembly, fuel supply pipeline and connecting parts for storage, delivery and cleaning of fuel. Fuel supply pipeline includes fuel supply connecting pipe assembly and fuel tank filling hose assembly to connect fuel pump and engine fuel rail for fuel delivery. The connecting part includes pipe clamp and fixing bracket to fix the fuel supply pipe to the vehicle body. The fuel pipeline is arranged side by side with trachea fuel

steaming lines, and the common connecting parts are used.

Direct fuel injection system(GDI)

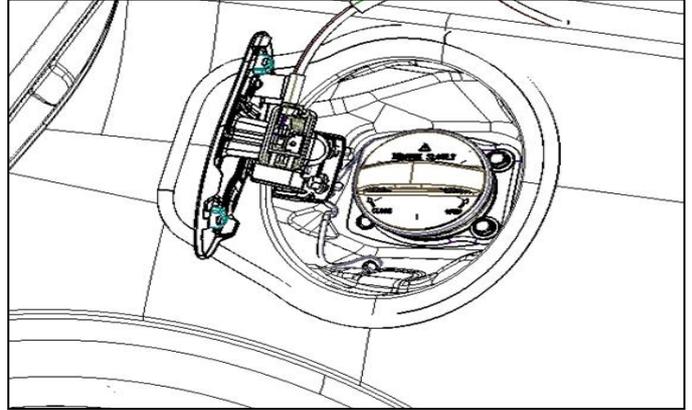
1. Direct injection system uses porous fuel injectors to directly inject high-pressure fuel into the combustion chamber, and the atomized fuel injected from the porous fuel is conducive to vaporization, and the air temperature in the combustion chamber will decrease accordingly. Therefore, explosion-proof performance, higher compression ratio and engine output power can be obtained.
2. There is no time lag from the start of fuel injection to the fuel injection into the

combustion chamber, so high response performance can be achieved.

Exploded view

Fuel tank filler cap assembly

Cooperate with the oil filler pipe to ensure the system tightness. The lifting rope is installed on the fuel tank door rotary arm to prevent the port cover from being lost during oil filling.



Filler pipe assy.

Install on the left side of the body through bolts. Connect the fuel tank through a rubber hose for fuel filling.



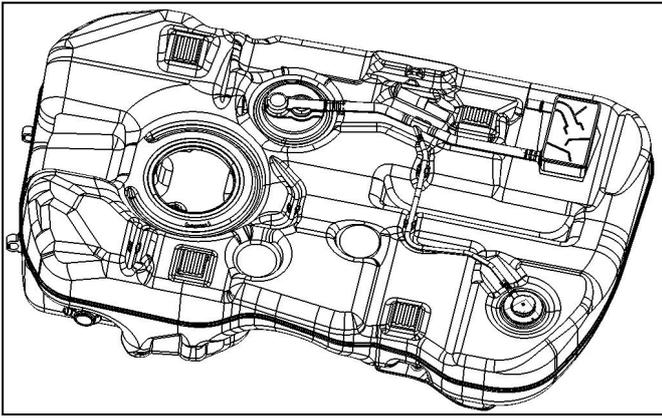
Fuel tank assembly

Fuel tank Gasoline, with rubber shock pad, rollover valve, filling check valve and heat shield on the fuel tank. Install at the rear of the body with 2 retaining strips.

3.1.8 -3

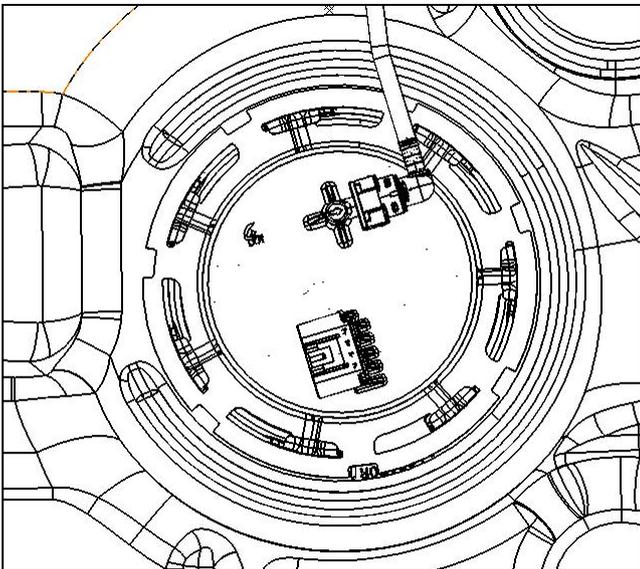
fuel system

3.1.8-3



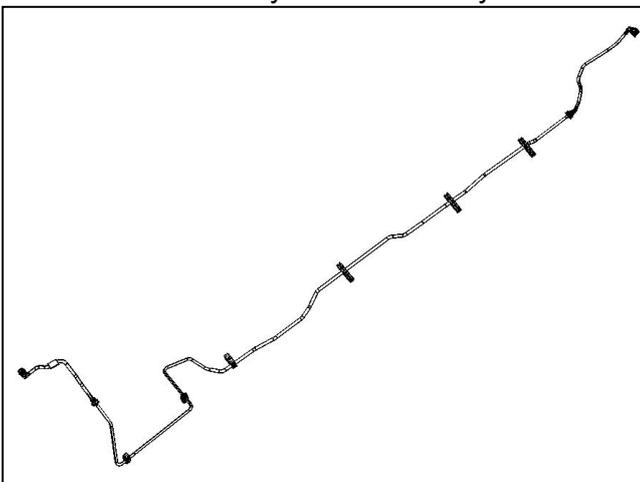
Fuel pump and bracket assembly

Pump gasoline out of the fuel tank and send it to the fuel rail through pipeline. The fuel pump is installed in the fuel tank, fixed by flange and sealed by oil-resistant rubber sealing ring.



Fuel supply pipeline and connecting piece

Fixed to the body for fuel delivery.



Structure and principle

(1) Function

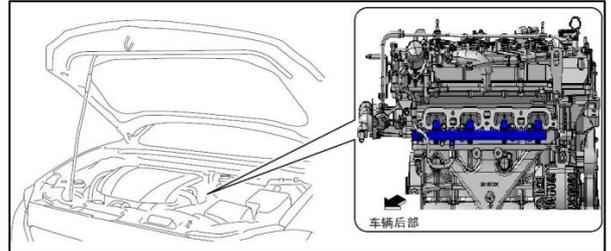
The fuel header distributes the fuel delivered by the high-pressure fuel pump to each fuel injector, improves the atomization effect of the fuel by perforated injection, mixes the atomized mixture with the air and achieves the best mixture of oil and gas for combustion. In this case, the combustion efficiency is improved by reducing the temperature in the combustion chamber and reducing the air density.

The fuel injector injects the fuel directly into the cylinder according to the ECU signal.

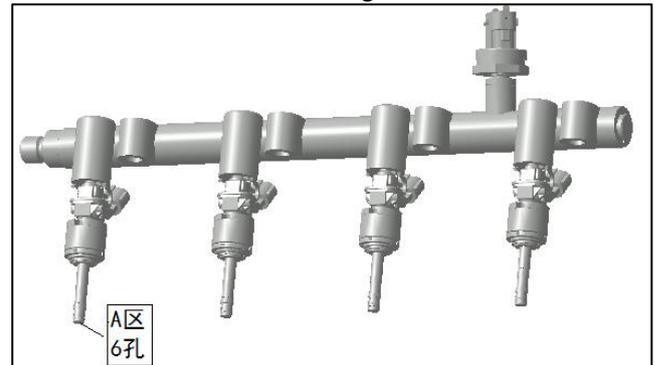
The fuel injector has six fuel injection holes in area A as shown in the figure.

(2) Structure

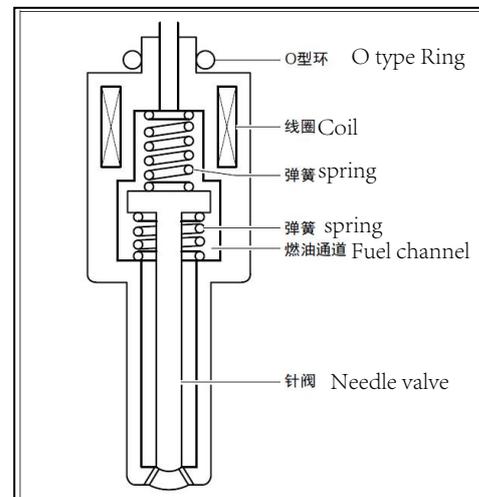
Install fuel header assembly on cylinder head



The fuel manifold assembly is integrated with the fuel pressure sensor and fuel injector by the fuel manifold. The fuel injector has 6 fuel injection holes in area A as shown in the figure.

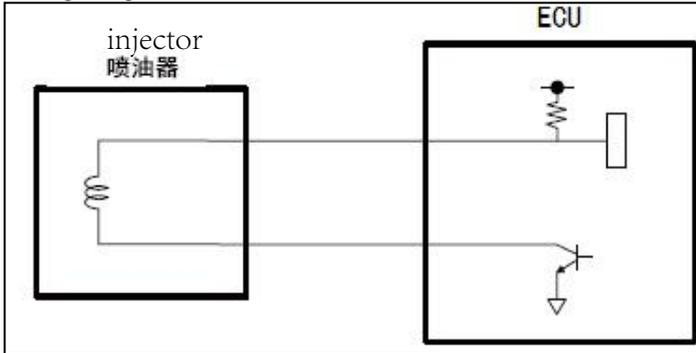


Injector includes needle valve, spring, coil, O-ring, etc.



Working principle

The valve controls the coil energizing time according to ECU signal to realize fuel injection. Fuel injection time is determined by coil energizing time. Injection time can be adjusted by intermittently energizing the coil.



Before injection(Without fuel injection)

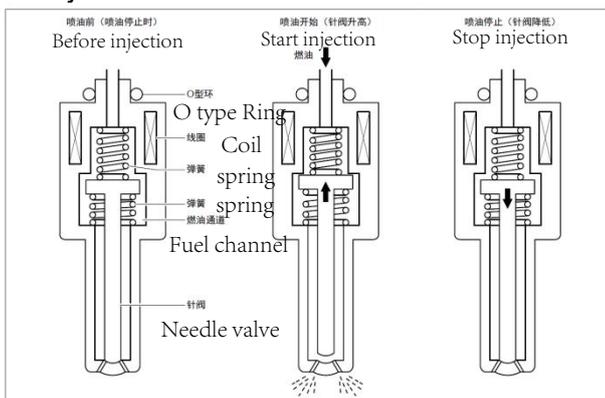
When the coil is not energized, the high-pressure fuel injection passage sent by the fuel header, the needle valve is pressurized, and fuel injection is not performed.

Fuel injection start(Needle valve open)

Send a signal from ECU to generate excitation current in the coil to open the needle valve and start fuel injection.

Fuel injection stop(Needle valve closed)

When stopping energizing the coil, the pressure in the oil passage increases, and the needle valve is pressed to close under the action of spring to stop fuel injection.



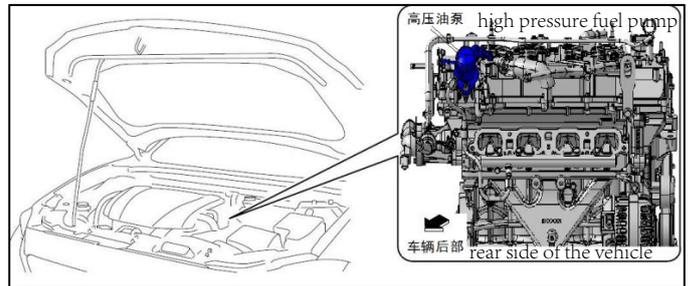
High-pressure oil pump

(1) Function

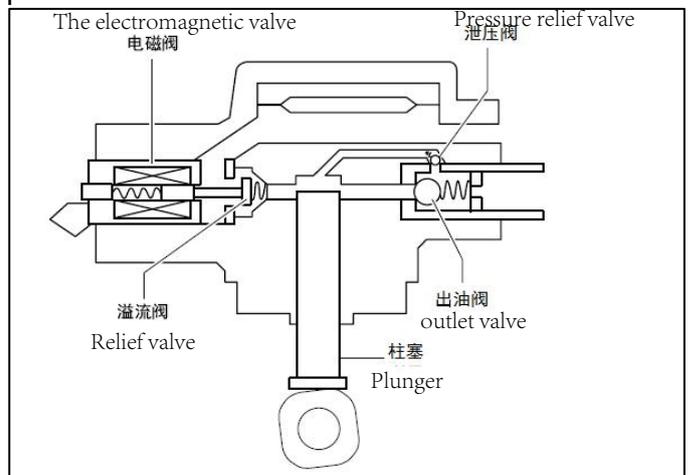
The high-pressure fuel pump is connected to the engine ECU control circuit and system power supply through the engine harness, and controls the opening and closing of solenoid valve according to ECU signal to provide fuel of required pressure.

(2) Structure

The 2.0T power high-pressure oil pump is located below the intake camshaft at the rear end of the engine.



High-pressure oil pump is composed of solenoid valve, overflow valve, plunger, oil outlet valve and pressure relief valve.

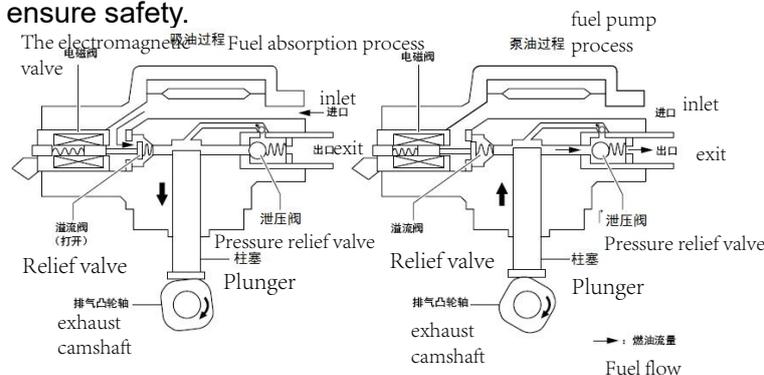


(3) Working principle

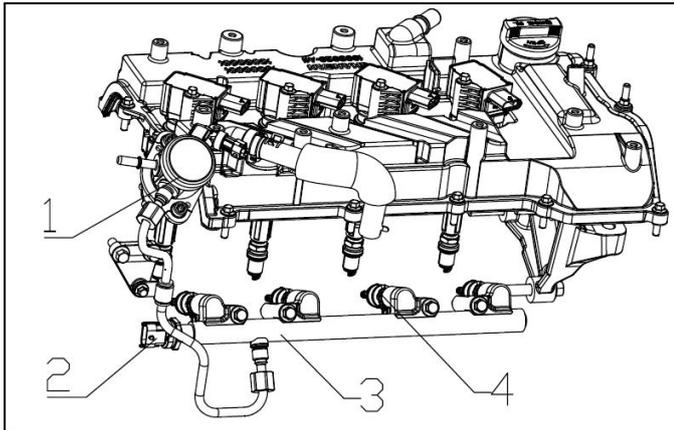
The piston is driven up and down by the cam at the rear end of the exhaust camshaft to segment and pump the fuel out.

Control the high-pressure oil pump solenoid valve to open or close according to the control signal from ECU.

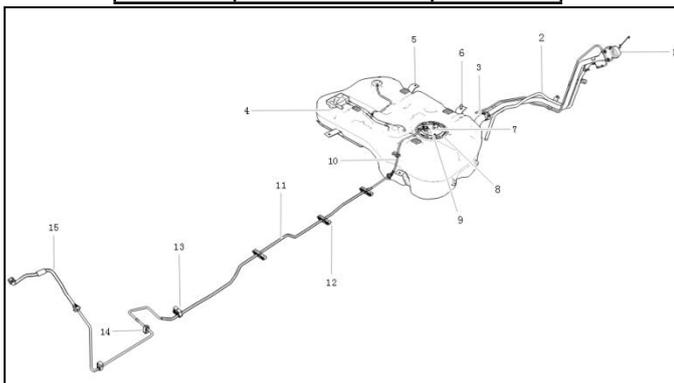
If the solenoid valve fails and the fuel pressure exceeds the set value, the relief valve opens to ensure safety.



Exploded view



Serial number	Component name	Quantity
1	High-pressure fuel pump assembly	1
2	Fuel pressure sensor	1
3	Fuel manifold	1
4	Fuel injector	4



Serial number	Component name	Quantity
1	Fuel tank filler cap assembly	1
2	Filler pipe assy.	1
3	Fuel tank filling hose	1
4	Fuel tank assembly	1
5	Fuel tank fixing belt assembly(Left)	1
6	Fuel tank fixing belt assembly(Right)	1
7	Fuel pump flange	1
8	Fuel pump and bracket assembly	1

9	Fuel pump sealing ring	1
10	Oil supply connecting pipe assy. I	1
11	Oil supply connecting pipe assy. II	1
12	Fuel pipe clamp assembly	3
13	Fuel pipe clamp assy. I	1
14	Fuel pipe clamp component I	2
15	Oil supply connecting pipe assy. III	1

General inspection

General equipment

Diagnostic scanner
Fuel pressure gauge

Special equipment

Smoke leakage tester

⚠ Warning: Fuel or fuel evaporative gas is highly flammable to avoid fire.

Disaster or explosion hazard, please keep away from the fire source, and do not allow the operator to execute this

Use the mobile phone during the procedure. Do not drain fuel using an open container

Drain or store fuel, prepare one nearby before performing this procedure

Dry chemical fire extinguisher.

Fuel Evaporation System Leak Test

1. Perform fuel evaporation system leakage test according to relevant requirements of smoke leakage test equipment instructions.

Fuel system pressure relief

1. Set the shift gear to neutral gear, and set the parking gear to tension parking state.
2. Open the engine cover and unplug the fuel pump fuse.
3. Press the ignition switch, start the engine, and run it until the engine stops.
4. Without pressing the ignition switch, insert the

fuel pump fuse and close the engine cover.

Fuel system pressure test

1. Perform pressure relief operation on the fuel system.
2. Open the engine cover, disconnect the negative battery cable and connect the fuel pressure gauge to the fuel line.

Warning: Package 1 around fuel pressure gauge and fuel distribution pipe joint

Block cleaning cloth, which can absorb fuel leakage when connecting fuel pressure gauge.

Oil to reduce the risk of fire and injury. When the test is completed, it will be cleared

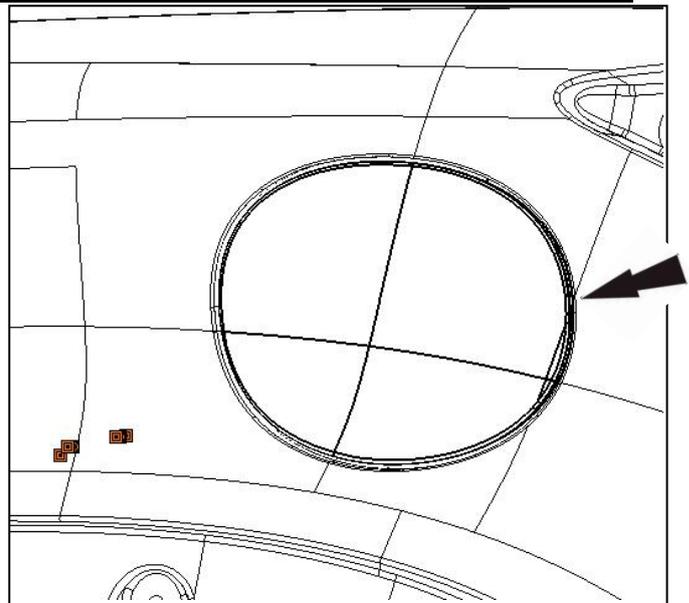
Place the cleaning cloth in the specified container. Clean the oil pipe connection before removing the oil pipe.

Head.

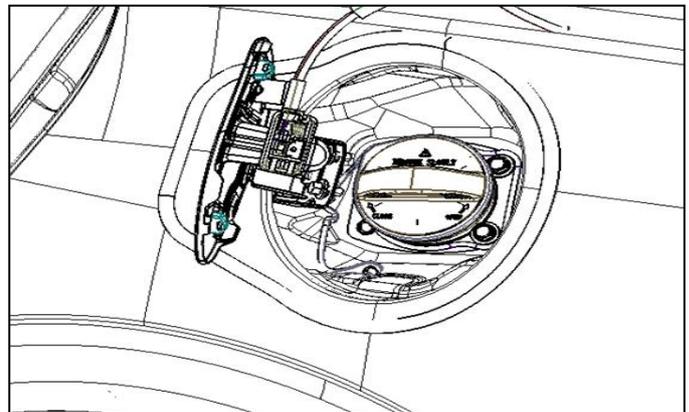
3. Connect the battery negative cable,
4. Idle pressure test: Start the engine and let the vehicle run at idle speed for 1 minute, and record the fuel pressure value of fuel pressure gauge within 5 minutes.
5. High speed pressure test: Press the accelerator, control the engine speed to stabilize at 4000 ~ 5000 rpm, and record the fuel pressure value of fuel pressure gauge in 30 s.
6. Pressure maintenance test: The vehicle is flameout, and record the fuel pressure value of the fuel pressure gauge at 20 min after flameout.
7. Perform the fuel system pressure relief operation, disconnect the battery negative cable, remove the fuel pressure gauge, restore the fuel line, connect the battery negative cable, and close the engine cover.

Fuel tank relief

1. Without pressing the ignition switch, close all doors and windows, unlock the vehicle, press the right edge area of the fuel filler cover, and slightly open the fuel filler cover;



2. Slowly loosen the fuel tank filler cap;



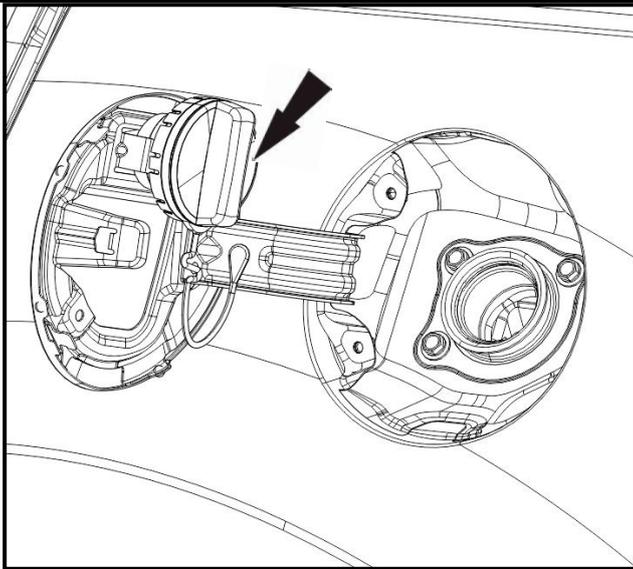
3. Hearing "Sue" sound stops;

Fuel filling

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

1. Fuel tank pressure relief, refer to fuel tank pressure relief operation procedure;
2. Fully unscrew the fuel tank filler cap from the fuel filler pipe port; Put the filler cap on the fuel tank door bracket for clamping;



3. When filling fuel, extend the fuel gun as far as possible to the depth of the fuel filler. Otherwise, fuel may spill and spill the fuel tank. Spilled and spilled fuel may cause fire, burn personnel. Do not attempt to continue refueling after the 4. automatic refueling gun is closed automatically. Otherwise, fuel may spill over the fuel tank and other parts may fail.
5. After filling, close the filler cap clockwise.

Fuel system drain

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

1. fuel system pressure relief, refer to fuel system pressure relief operation procedure;
2. Lifting the vehicle;
3. Discharge fuel in fuel pipe; Place a container under the oil pipe joint at the floor, and then disconnect the connection between the oil tank oil return pipe assembly and the oil supply connecting pipe assembly; Connect the fuel tank return pipe assembly to the container with hose.
4. Put down the lift.
5. Unplug the fuel pump relay, take a section of iron wire or copper wire to connect the fuel pump relay, make the fuel pump start to work, pump out the fuel

in the fuel tank, and start to drain the fuel. Observe the fuel flow at the outlet of the hose. When the flow is significantly reduced and the fuel contains air, stop discharging the fuel.

Fuel pump and bracket assembly inspection

1. Perform the fuel pump and bracket assembly removal process;
2. Check the appearance of fuel pump and bracket assembly for obvious damage, mechanical damage or rust. If yes, replace the fuel pump and bracket assembly;
3. Inspect whether all electrode plug pins of fuel pump and assembly are bent or corroded; if yes, replace fuel pump and bracket assembly;

Filler cap and filler pipe inspection

1. After unscrewing the fuel filler cap, check whether the fuel filler accessory has obvious oil dirt and whether the sealing gasket of the fuel filler cap is damaged. If yes, replace the fuel filler pipe and the fuel filler cap;
2. Inspect the fuel filler cap housing and lifting rope for damage. If so, replace the filler cap.

Fuel tank check

1. Check whether the torque of mounting nut of fuel tank fixing belt is loose; if not, tighten as specified;
2. Check the fuel tank for oil leakage, and if yes, replace the fuel tank assembly.

Fuel supply pipeline and connecting piece

1. Check whether the fuel supply pipeline joint is assembled normally; if not, re-assemble;
2. Check whether the fuel supply pipe and connecting parts are damaged, and replace the damaged parts if so.

High-pressure oil pump resistance check

1. Disconnect the high-pressure oil pump connector without pressing the ignition switch;
2. Measure resistance between terminals of high-pressure oil pump;

3. Connect the high-pressure oil pump connector.
Note: The accuracy requirement of multimeter is 0.01Ω; At other temperatures, the resistance value may exceed the deviation of ±5%. Pay attention to distinguish the deviation caused by the product itself and temperature.

Fault symptom diagnosis and test - high voltage system

Fuel manifold assembly

General equipment

High precision multimeter

Inspection and confirmation

- 1、 Confirm vehicle problem
- 2、 Visually inspect for visible signs of mechanical or electrical damage.

Appearance check list

- Harness
- Fuel manifold assembly
- Control unit(ECU)

3. If the observed or raised problem is obvious and the cause has been determined, correct the cause before proceeding to the next step.
4. If the visual inspection is passed, confirm the fault and refer to the fault symptom table.

Fault symptom table

If the fault occurs but no DTCs are stored in the ECUs and the cause of the fault cannot be determined in the basic inspection, the fault diagnosis and rule out shall be carried out according to the sequence listed in the following table. (There are many possible reasons for the following fault symptoms. Only when the fuel system needs to be inspected are necessary.)

Symptoms	Possible causes	Measures
Engine jitter/ Insufficient	Harness ECU	Refer to the following diagnostic procedure

engine power	Fuel manifold assembly	
--------------	------------------------	--

Diagnostic process

Test conditions	Details/Results/Measures
1. Check engine fault code	A. Press the ignition switch once. B. Connect diagnostic scanner C. Diagnostic engine control system Is there a fault code? - Yes, refer to fault code table for corresponding inspection. - No, go to Step 2
2. Check fuel injector harness	A. Check whether the harness and fuel injector are connected reliably. - Reliability, next step - Unreliable, fastening B. Check whether the fuel injector harness is connected with ECM reliably. - Reliability, next step - Unreliable, fastening C. Inspect the fuel injector harness for open circuit. - Open circuit, replace - Normal, next step D. If all the above three steps are normal, go to step 3.
3. Check fuel injector	Reference Fuel Header Assembly (Injector Resistance) Test - If the resistance is not qualified, replace the fuel injector. - Resistance is qualified, go to step 4
4. Check other directions	Check other directions such as ECU

High-pressure oil pump

General equipment

Multimeter

Fault information

Troubleshooting process

Inspection and confirmation

1. Confirm vehicle problem
2. Visually inspect for obvious mechanical or electrical damage.

Appearance check list

- Oil circuit
- Harness
- High-pressure oil pump
- Control unit(ECU)

3. If the observed or raised problem is obvious and the cause has been determined, correct the cause before proceeding to the next step.
4. If the visual inspection is passed, confirm the fault and refer to the fault symptom table.

Fault symptom table

When the following fault codes are read, perform troubleshooting according to the following procedure:

Fault information	Troubleshooting process
Flow control valve positive or negative control circuit open	<ol style="list-style-type: none"> 1. Check whether the connection between harness connector and high-pressure oil pump end/harness connector and ECU end is loose. <ul style="list-style-type: none"> - Loose, check the connectors, and replace the harness corresponding to the damaged connector if there is damage; If there is no damage, insert and remove again to ensure fastening. - Not loose, go to Step 2 2. High-pressure oil pump harness ON/OFF <ul style="list-style-type: none"> - Conduction, go to step 3 - If it is not connected, replace the high-pressure oil pump harness. 3. Check high-pressure oil pump resistance; <ul style="list-style-type: none"> - The resistance is normal, go to

Positive and negative control circuits of flow control valve are mutually short

step 4;
 - Replace high-pressure oil pump with infinite resistance.
 4. Check ECU and harness.

1. Check whether the high-pressure fuel pump harness is interconnected.
 - Yes, replace the harness;
 - No, go to step 2.
2. Measure high-pressure oil pump resistance with high-precision multimeter;
 - The resistance is low, go to step 3;
 - The resistance is normal, go to step 4
3. ABA verification: Switch the high-pressure fuel pump of the faulty vehicle to the normal vehicle, and check whether the same fault mode occurs.
 - Yes, replace the high-pressure oil pump;
 - No, install the high-pressure oil pump back to the original vehicle. If it does not work normally, go to step 4; If working normally, check harness connection to ensure reliability;
4. Check other directions

If the fault code is not read, but the fault caused by high fuel pump fault is suspected, troubleshoot according to the following procedure:

Symptoms	Possible causes	Measures
Gasoline smell	High-pressure oil pump Low pressure oil pipe	Refer to the following diagnostic procedure 1

3.1.8 -10

fuel system

3.1.8-10

	High-pressure oil pump oil outlet pipe	
Other	High-pressure oil pump Low pressure oil circuit Harness ECU	Refer to the following diagnostic procedure 2

	- The resistance is normal, go to step 4
4. ABA verification	Change the high-pressure fuel pump of the faulty vehicle to the normal vehicle, and check whether the same fault occurs. - Yes, replace high-pressure oil pump - No, reinstall the high-pressure oil pump again, if the fault occurs again, go to step 5; If the fault is eliminated, check the harness connection to ensure reliability;
5. Continue to check ECU	Check whether ECU function is abnormal.

Diagnostic process 1

Test conditions	Details/Results/Measures
1. Check the connection positions of high-pressure oil pump inlet and outlet.	Check whether there is leakage at the inlet/outlet port of high oil pump. - Yes, check the sealing position of the connecting part and replace the damaged parts; - No, go to Step 2
2. Check other directions	Fuel header assembly interface and low-pressure fuel circuit connections, etc.

Diagnostic process 2

Test conditions	Details/Results/Measures
1. Check harness connection	Check whether the wiring harness is connected to the high-pressure oil pump and whether the wiring harness is connected to the ECU reliably. - Yes, next step - No, tighten
2. Check harness	Check harness for open circuit - Yes, replace wire harness - No, go to Step 3
3. Check high-pressure oil pump	Measure high-pressure oil pump resistance; - Replace high pressure oil with infinite resistance;

Fault symptom diagnosis and test

General equipment

Diagnostic scanner

Multimeter

Special equipment

Smoke leakage tester

Inspection and confirmation

- Confirm the customer's problem.
- Visually inspect for visible signs of mechanical or electrical damage.

Appearance check list

Mechanical part	Electrical part
Fuel line damage	
Quick coupling damage	
Fuel leakage	
Fuel tank filler cap is damaged.	Fuel pump circuit
Fuel tank filler pipe damaged	Fuel pump relay
Fuel filter installation error	Fuel pump and bracket assembly
Fuel filter damage	
Fuel tank damage	

- If the observed or raised problem is obvious and the cause has been found, the cause must be corrected before proceeding to the next step.
- If the problem cannot be found obviously, confirm the fault and refer to the symptom table.

Fault symptom table

Symptoms	Measures
Fuel taste heavy	Fuel smell re-diagnosis process
Large/small fuel evaporation	Large/small diagnostic flow of fuel evaporation system
No pump oil	Diagnosis process without oil pump
Difficult to start	Start difficult diagnostic process
Acceleration weakness	Accelerate weak diagnosis process
Inaccurate oil level indication	No diagnostic flow for oil level indication

Fuel smell re-diagnosis process

 **Warning:** The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

 **Note:** Disconnecting/connecting the quick-release connector without cleaning may damage the fuel line and the quick-release connector. Before disconnecting, be sure to clean the joint of quick release connector and ensure that there is no foreign matter.

Test conditions	Details/Results/Measures
1. General inspection	<p>A. Visually inspect all parts and connections of the fuel system for fuel leakage.</p> <p>B. Check that the O-ring seal does not fit into the lip of the filler pipe assembly after the filler cap is normally assembled.</p> <p>Check whether it is normal?</p> <p>? Yes Go to step 2.</p> <p>? No Repair the faulty position.</p>
2. Check fuel pressure	<p>A. Perform the fuel system pressure test.</p> <p>Is the fuel pressure too high?</p> <p>? Yes Repair the blocked fuel pipeline, and replace the fuel pump and bracket assembly.</p> <p>? No Go to Step 3.</p>
3. Check canister solenoid valve seal and canister	

	<p>A. Inspect the line to the canister solenoid valve for leaks.</p> <p>B. Check the canister for leaks.</p> <p>Check whether it is normal?</p> <p>? Yes</p> <p>Repair the leaking area, repair or replace the canister.</p>
--	--

Diagnostic process of large/small leakage of fuel evaporation system

 **Warning:** The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

 **Note:** Disconnecting/connecting the quick-release connector without cleaning may damage the fuel line and the quick-release connector. Before disconnecting, be sure to clean the joint of quick release connector and ensure that there is no foreign matter.

Test conditions	Details/Results/Measures
1. General inspection	
	<p>A. Visually inspect whether there is obvious leakage at all parts of fuel system pipeline and whether there is loose at all parts of pipeline connection.</p> <p>? Yes</p> <p>Repair or replace the faulty parts.</p> <p>? No</p> <p>Go to step 2.</p>
2. Smoke leakage diagnostic scanner	
	<p>A. Perform a smoke leakage diagnostic test.</p> <p>Refer to Fuel System Evaporation Leak Test</p> <p>Are fuel system components leaking?</p> <p>? Yes</p> <p>Repair damaged fuel system components.</p>

Diagnosis process without oil pump(Low pressure fuel supply system)

 **Warning:** The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

Test conditions	Details/Results/Measures
1. General inspection	
	<p>A. Perform fuel system pressure test, and check whether the fuel pressure value of idle speed pressure test is within (350 ~ 420) kPa.</p>

	<p>? Yes rule out Fuel system fault.</p> <p>? No Go to step 2.</p>
Inspection of 2. circuit, signal, pipeline, etc.	
	<p>A. Check fuel pump relay, fuel pump fuse, harness, ECU control signal and pipeline filter.</p> <p>Check whether the fuel pump relay is faulty? Is the fuel pump fuse blown? Is the harness in poor contact? Is ECU control signal (fuel pump relay) faulty? Is the oil supply pipe and joint leaking or blocked?</p> <p>? Yes Repair or replace the corresponding faulty parts.</p> <p>? No Go to Step 3.</p>
3. Inspection of fuel pump and bracket assembly	
	<p>A. Execute fuel pump and bracket assembly removal process</p> <p>Use a multimeter to test the internal resistance of the fuel pump motor for zero or infinity (i.e. short circuit or open circuit status).</p> <p>? Yes Replace fuel pump and bracket assembly.</p>

Start difficult diagnostic process(Low pressure fuel supply system)

 **Warning:** The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

Test conditions	Details/Results/Measures
1. General inspection	
	<p>A. Perform the fuel system pressure test, and check whether the pressure value of the pressure test is not less than 250kPa.</p> <p>? Yes rule out Fuel system fault.</p> <p>? No Go to step 2.</p>
2. Pipeline inspection	

	<p>A. Inspect the oil supply pipeline.</p> <p>Check whether there is leakage at the oil supply pipe and connector.</p> <p>? Yes</p> <p>Repair or replace the corresponding faulty parts.</p> <p>? No</p> <p>Go to Step 3.</p>
3. Interchange inspection	
	<p>A. After replacing the fuel pump and bracket assembly for the test, perform the fuel system pressure test (3.1.7), and check whether the fuel pressure for the pressure test is not less than 250kPa.</p> <p>? Yes</p> <p>Replace fuel pump and bracket assembly.</p>

Accelerate weak diagnosis process(Low pressure fuel supply system)

 **Warning:** The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

Test conditions	Details/Results/Measures
1. General inspection	
	<p>A. Perform fuel system pressure test, and check whether the fuel pressure of high speed pressure test is not less than 320kPa.</p> <p>? Yes</p> <p>rule out Fuel system fault.</p> <p>? No</p> <p>Go to step 2.</p>
2. Pipeline inspection	
	<p>A. Inspect the oil supply pipeline.</p> <p>Check whether there is leakage at the oil supply pipe and connector.</p> <p>? Yes</p> <p>Repair or replace the corresponding faulty parts.</p> <p>? No</p> <p>Go to Step 3.</p>
3. Interchange inspection	
	<p>A. After replacing the fuel pump and bracket assembly for the test, perform the fuel system pressure test (3.1.7), and check whether the fuel pressure for the pressure test is not less than 320kPa.</p> <p>? Yes</p>

	Replace the original fuel pump and bracket assembly.
--	--

No diagnostic flow for oil level indication(Fuel quantity sensor related, integrated on fuel pump and bracket assembly)

⚠ Warning: The following troubleshooting flow chart contains the diagnostic and maintenance procedures for the fuel system. Before servicing the fuel system, read the following warning: Fuel vapor is dangerous. It can easily catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

Test conditions	Details/Results/Measures
1. General inspection	
	<p>A. Perform the fuel pump and bracket assembly removal process.</p> <p>Visually check whether the floater rod is obviously bent or deformed, whether the oil floater can rotate freely, and whether the oil floater can float normally in gasoline.</p> <p>? No Replace the original fuel pump and bracket assembly.</p> <p>? Yes Perform step 2.</p>
2. Clean impurity/colloid	
	<p>A. Use alcohol or gasoline to clean the impurities/colloids accumulated on the surface of the oil quantity sensor resistance plate, re-load the vehicle, and check whether the fault is eliminated.</p> <p>? Yes Repair completed.</p> <p>? No Go to Step 3.</p>
3. Oil quantity signal detection	
	<p>A. Connect the oil sensor signal wire with a multimeter (ohmic gear), swing the floater rod slowly from the lowest point to the highest point, test whether the maximum and minimum resistance values of the oil sensor meet the component specification process, whether the resistance value changes slowly and uniformly from large to small during the swing process, and whether there is no open circuit phenomenon.</p> <p>? Yes rule out Fuel sensor problem.</p> <p>? No Go to Step 3.</p>

3.1.8 -17

fuel system

3.1.8-17

	Replace the original fuel pump and bracket assembly.
--	--

Removal and installation

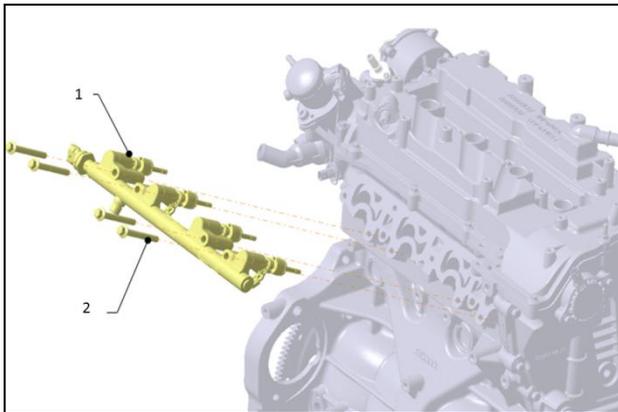
Special tool

Guo VI fuel pump removal tool

Universal tool

T-sleeve

Fuel manifold assembly



Project	Description
1	Fuel manifold assembly
2	Bolt

Removal

- 1、 Remove relevant parts around;
- 2、 Remove fuel pressure sensor harness connector and fuel injector connector;
- 3、 Release the fuel system pressure;
 - a) In case of long-time shutdown for maintenance, the engine shutdown time must be more than 8h before removing the high-pressure oil pump oil outlet pipe;
 - b) In case of temporary shutdown inspection, disconnect the high-pressure fuel pump plug and run at idle speed for about 10 s before removing the fuel pipe of fuel header assembly;
- 4、 Remove the high-pressure oil pump oil outlet pipe;

 **Note: Wear protective glasses**

 **Note: There may be residual fuel injection, which shall be collected and processed**

centrally.

- 5、 Remove the bolts fixing the fuel manifold;
- 6、 Remove the fuel header assembly. Generally, the fuel header is easy to separate from the fuel injector when removing the assembly, which requires two steps.

- a) Remove the fuel manifold: Pull out the fuel manifold along the injector axis; When pulling out, the force acts on the metal part of the fuel manifold to avoid bending the fuel injector.

Remove the fuel injector; First remove the fuel injector compression ring from the fuel injector, and use a sliding hammer tool to remove the fuel injector from the cylinder head.

Assembly

 **Note: Before installation, inspect the parts and replace them if they are defective or contaminated.**

 **Note: Once the parts are dropped and scrapped directly, it is forbidden to use them again.**

1. Before installation, confirm the fuel inlet, fuel injector and its mounting hole are clean. Do not apply grease or lubricant on the fuel injector end, Teflon sealing ring and mounting hole.
2. Put the fuel manifold assembly into the cylinder head along the axis of the fuel injector mounting hole, and install the bolts;
 - (1) During manual assembly (no press-fit equipment, no tightening equipment):
 - a) Pre-tighten bolt flange and oil rail bracket block by hand;
 - b) Tighten the bolts step by step in the sequence from both sides to the middle, repeat until the oil rail mounting surface fully fits the cylinder head support surface, and tighten the bolts crosswise from both sides to the middle according to the specified torque.

(2) During automatic assembly (with press-fitting equipment and tightening equipment):

a) Along the direction of the injector axis, the pressure head acts on the top of the fuel passage seat (the pressure head allows the press-fitting position to be directly above the injector seat), applies the specified press-fitting force within the specified force range, and tightens the bolts according to the specified torque after the bolts are fitted (the tightening procedure recommends step by step).

Fitting method of fuel manifold and mounting base:

Pre-tighten bolts from both sides to the middle in sequence when there is no pressing tool.

3. Inspect fuel leakage after fuel header assembly is installed.

(a) Confirm the fuel header assembly has been installed firmly.

(b) Confirm that there is no fuel leakage around the fuel header assembly. Check

After repairing or reinstalling the fuel header assembly, please confirm that there is no fuel leakage at the fuel header assembly after starting. After confirming that there is no problem, the vehicle can be delivered to the user.

 **Warning:** The engine temperature in operation is very high, so do not repair the engine just flameout to avoid burns. When the system is cooled, it can be repaired.

 **Warning:** This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

 **Warning:** Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

High-pressure oil pump

Precautions before maintenance

 **Warning:** Fuel vapor is dangerous and easy to catch fire, leading to serious injury and damage. Always keep fuel away from sparks and flames.

 **Warning:** If the fuel line is cut off, high-pressure fuel may be sprayed. Because of the following hazards during fuel injection, always perform the "Fuel line safety procedure" to prevent fuel from splashing.

- If fuel comes into contact with skin and eyes, it may cause irritation.

- If fuel ignites and causes fire, it may cause serious personal injury and injury, and damage components and equipment.

 **Warning:** People with static electricity may cause fire or even explosion, leading to major accidents such as death or serious injury. Before working on the fuel system, touch the body to release static electricity.

Attention

 **Warning:** If foreign matter enters the fuel passage, it may cause fuel supply/injection related parts damage. When removing/installing fuel supply/injection-related components, be sure not to allow foreign matter to enter the fuel passage.

Removal

1. Complete "Precautions before repair."
2. Disconnect battery negative wire
3. Removing engine cover
4. Disconnect the high-pressure oil pump solenoid valve end connector.
5. Remove low-pressure oil pipe.
6. Release fuel system pressure;
 - a) In case of long-time shutdown for maintenance, the engine shutdown time must be more than 8h before removing the high-pressure oil pump oil outlet pipe;

b) In case of temporary shutdown inspection, disconnect the high-pressure oil pump solenoid valve connector and run at idle speed for about 10 s before removing the high-pressure oil pump oil outlet pipe;

7. Remove the high-pressure oil pump oil outlet pipe.



Note: Wear protective glasses



Note: There may be residual fuel injection, which shall be collected and processed centrally.

8. Remove the high-pressure oil pump bolts, loosen each mounting bolt alternately, one turn each time until the plunger spring is completely released. After removing the bolts, take out the high-pressure oil pump from the mounting base along the axis of the plunger to avoid the high-pressure oil pump swing.

Installation



Note: Before installation, inspect the parts and replace them if there are defects.



Note: Once the parts are dropped and scrapped directly, it is forbidden to use them again.

1. Before installation, confirm that the mounting seat hole, inner surface of high-pressure oil pump tappet and high-pressure oil pump are clean and free of foreign matter, the high-pressure oil pump sealing ring is in good condition, and the installation sealing area is free of sharp corners and burrs.

2. Rotate the crankshaft so that the cam base circular surface of the high-pressure oil pump faces the mounting hole of the high-pressure oil pump, lubricate the tappet of the high-pressure oil pump with engine oil, install the tappet into the mounting seat of the high-pressure oil pump (the roller faces the camshaft), and the tappet locating boss of the

high-pressure oil pump should be matched with the locating groove of the high-pressure oil pump base assembly.

3. Apply lubricating oil on the high-pressure oil pump O-ring, install the high-pressure oil pump into the high-pressure oil pump mounting seat, and then put the bolt into the high-pressure oil pump bolt mounting hole.

(1) With presser + with tightener: Press the top cover of high-pressure oil pump with pressure head, apply the specified force along the axis of high-pressure oil pump in the specified force range, and tighten the bolts synchronously after fitting to the specified torque (the tightening procedure is recommended to be performed step by step);

(2) With pressure press + without tightening machine: Press the top cover of high-pressure oil pump with pressure head, apply the specified force along the axis of high-pressure oil pump in the specified force range, and then tighten the two bolts with small step distance (1 turn) in turn and re-tighten to the specified torque by hand;

(3) No compactor + no tightening machine: Alternately take two bolts one by one by hand to fit the flange, and then tighten the two bolts in turn at a small step (1 turn) + re-tighten to the specified torque by hand;

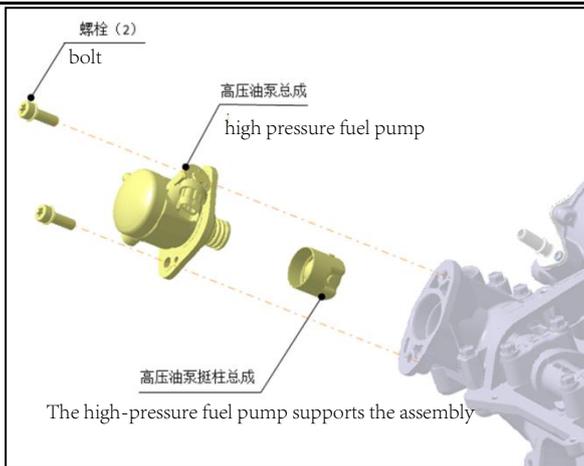
4. Connect connector, low-pressure oil pipe and high-pressure oil pump oil outlet pipe.

5. Check fuel leakage after installation of high-pressure fuel pump

(a) Confirm that the high-pressure oil pump has been installed firmly;

(b) Confirm that there is no fuel leakage around the high-pressure fuel pump;

Installation diagram:



Warning: The engine temperature in operation is very high, so do not repair the engine just flameout to avoid burns. When the system is cooled, it can be repaired.

Warning: During the shutdown, the fuel system pressure is very high, and there may be residual fuel injection, which is harmful to personal safety. Please pay attention to releasing the pressure.

Nylon pipe quick-change joint

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

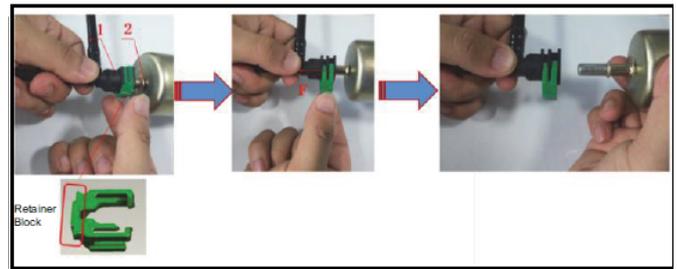
Warning: Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

Removal

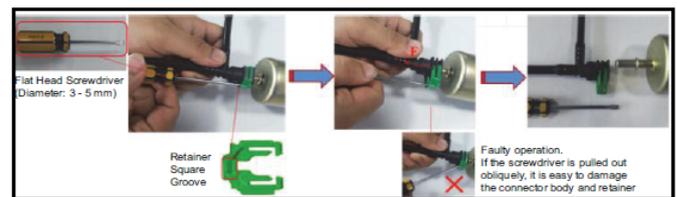
Pull-tab type misfit-proof joint:

Method 1 (manual). Step A: Pinch the nylon pipe assembly with the left hand near the quick-connect end, and pinch the lock block with the thumb and index finger of the right hand respectively (see the figure below); Step B: Put the two clamping blocks of the lock by the right hand and pull them out slightly to open the lock in the figure (see the figure below); Step C: Hold the connector pipe assembly with left hand and apply proper force F outwards to separate the male plug from the quick

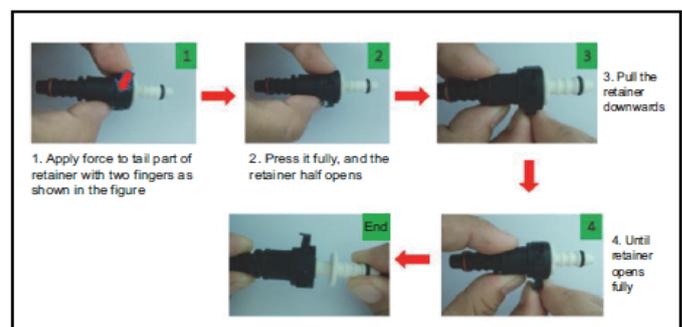
connector (see figure below).



Method 2 (with tool). Step A: Prepare a flat screwdriver (diameter 3~5 mm); Step B: Put the connector pipeline assembly with the left hand close to the quick connector end, pick up the prepared screwdriver with the right hand, insert the flat end of the screwdriver into the square groove of the locker along the horizontal direction (see the figure below), pull out the locker slightly outwards along the horizontal direction of the connector, and the locker is open at this moment; Step C: Hold the connector pipe assembly in the left hand and apply proper force F outwards to separate the male plug from the quick connector (see figure below).

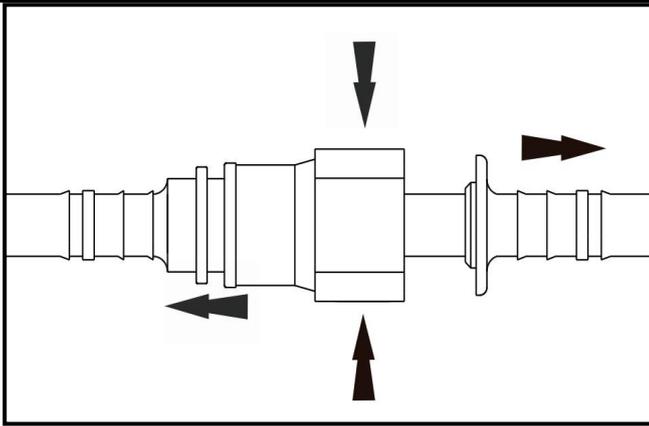


Push-button misfit-proof joint:



Push-button connector:

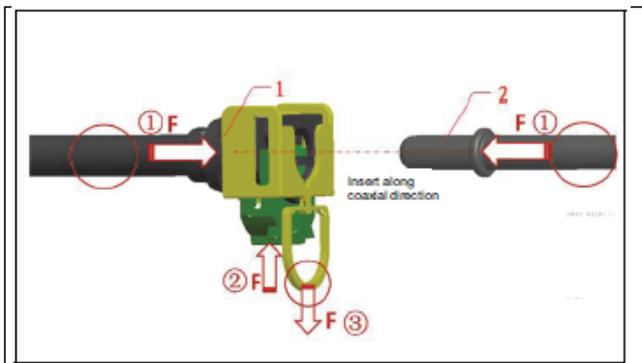
Pinch the female joint locating clip, release it, and pull out the connected pipeline in the opposite direction of the coaxial direction;



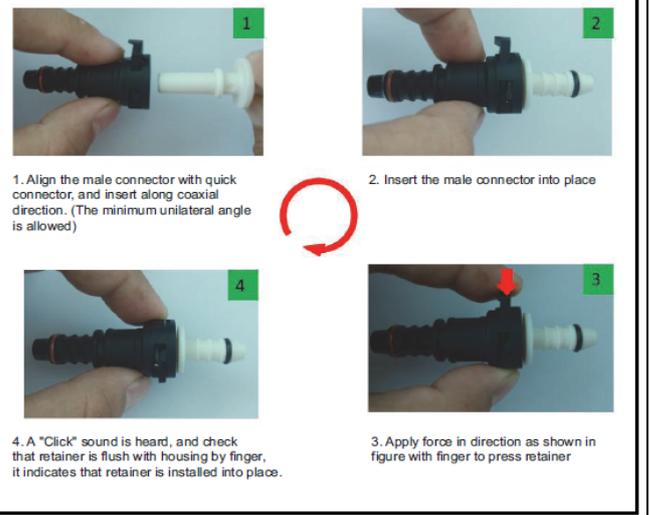
Installation

Pull-tab type misfit-proof joint:

1. Clean the surface of male plug; It is recommended to lubricate the circumferential surface of male plug with 40# lubricating oil under conditions.
2. Hold two pipelines, and insert the male connector into the female connector hole with proper force along the coaxial direction as shown in the figure (avoid oil leakage caused by damage to the sealing ring in the female connector due to improper tilting assembly, and the tilt shall be $<5^\circ$);
3. After completing step 2 above, gently push up the locker in the figure, and the locker will move forward along the guide rail until it cannot be pushed;
4. Pull the pipe with proper force for 2~3 times after completing the above three steps to ensure that the joint and the counterpart are firmly installed. Complete the fitting.

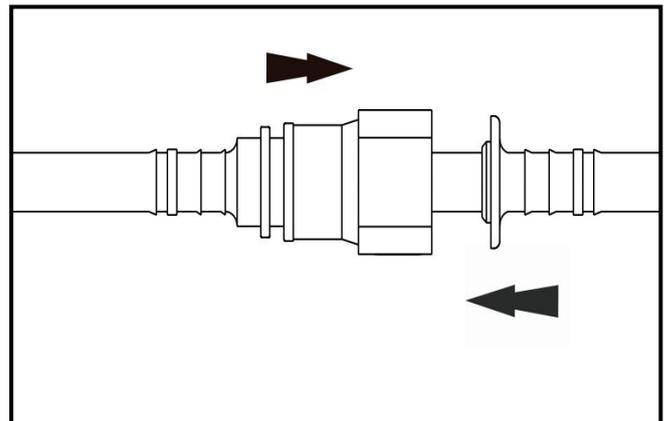


Push-button misfit-proof joint:



Push-button connector:

1. The male connector shall be inserted along the coaxial direction of the quick connector to avoid damage to the inner sealing ring of the female connector due to improper tilting assembly.
2. When inserting, you can hear a click, and pull back the end face of the quick connector by hand.



Fuel tank filler cap assembly

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Always shut down the engine when working on fuel components. Do not use open flames of any kind. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

Removal

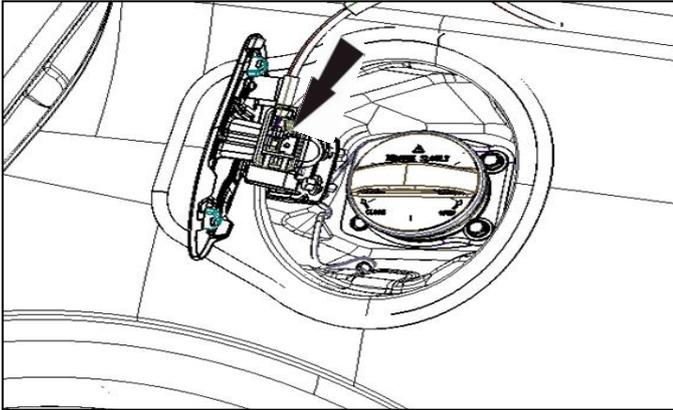
1. Fuel tank pressure relief, refer to fuel tank pressure relief operation procedure;
2. Fully unscrew the fuel tank filler cap from the fuel

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fuel system

3.1.8-23

filler pipe port; And remove the port cover fixing rope from the fuel tank door rotary arm;



Installation

The installation process is the reverse of the removal process.

Filler pipe assy.

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

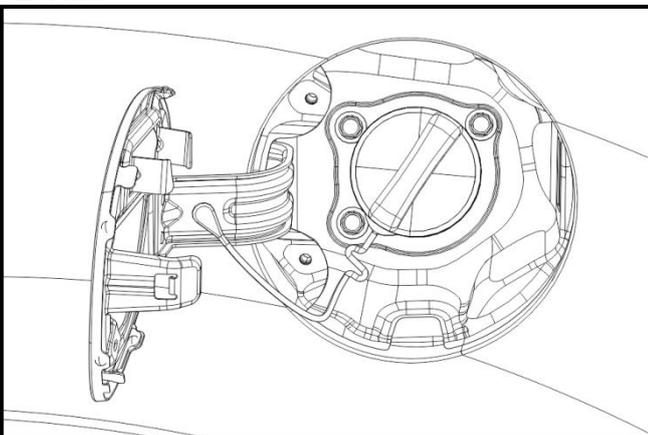
Removal

1. Remove the fuel filler box. Refer to the fuel tank filler box assembly removal process for details;

2. Remove the bolts at the filler port;

Torque:

$9\pm 3\text{N.m}$



3. Lifting the vehicle;

4. Remove rear left wheel and rear wheel cover liner assembly (left);

5. Remove the connection between fuel tank trachea assembly and canister atmospheric connecting pipe assembly I; Fuel tank filling hose assembly and fuel tank connection; Connection of recirculation and refueling pipe; Connection of oil filler pipe assembly and rear hub bag inner plate assembly (left);

Fuel tank filler hose assembly connection Worm drive clamp Tightening torque: $5\pm 1\text{N.m}$ (17 ftlb.)

Tightening torque of bolts at the connection between filler pipe assembly and rear floor side beam front section assembly (left): $9\pm 3\text{N.m}$



Fuel tank assembly

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Do not use any form of open flame and do not start the engine when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

Removal

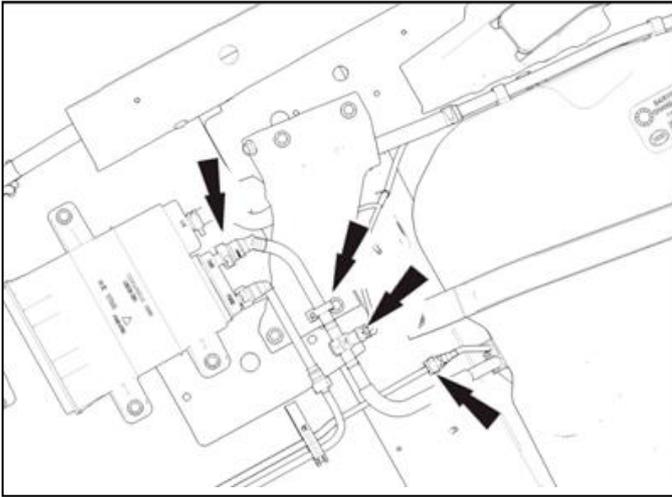
1. Lift the vehicle;

2. Fuel drain, see fuel drain process of fuel system for details;

Disconnect the fuel supply connecting pipe

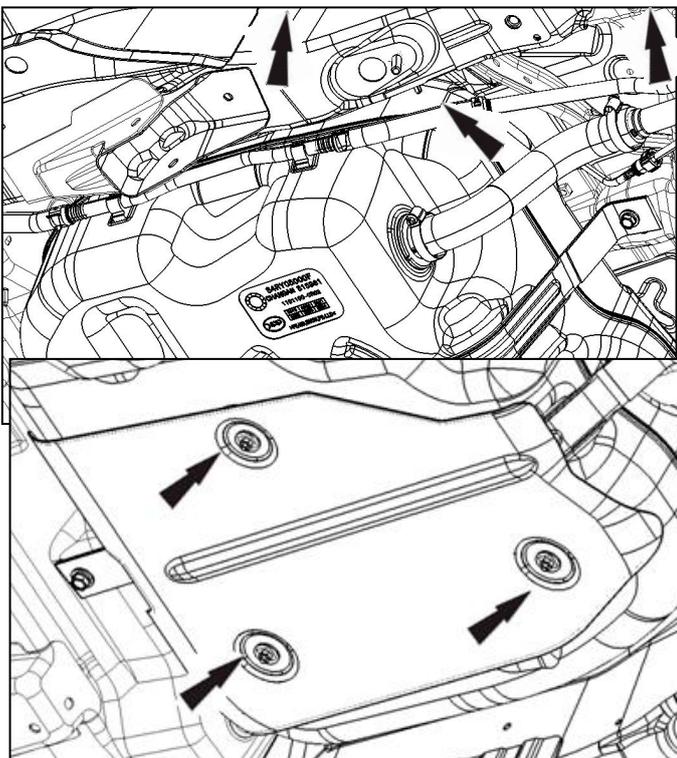
assembly I from the lower floor fuel pipe, and refer to the nylon pipe quick-change joint removal procedure for joint removal;

3. Disconnect the fuel tank pressure sensor harness connector;
4. Open the fuel pipe clamp I, disconnect the canister adsorption connecting pipe assembly from the canister assembly connector, and refer to the nylon pipe quick-change connector removal procedure for joint removal;



5. For 4WD model, dismantle 4WD rear suspension, drive shaft and torque manager; for dismantling, refer to corresponding dismantling process;
6. Dismantle the connection between fuel tank recirculation pipe and fuel tank pipe; dismantle the connection between fuel tank fuel hose and fuel tank assembly; detach canister atmospheric connecting pipe assembly I from the pipe clamp on the side of fuel tank;

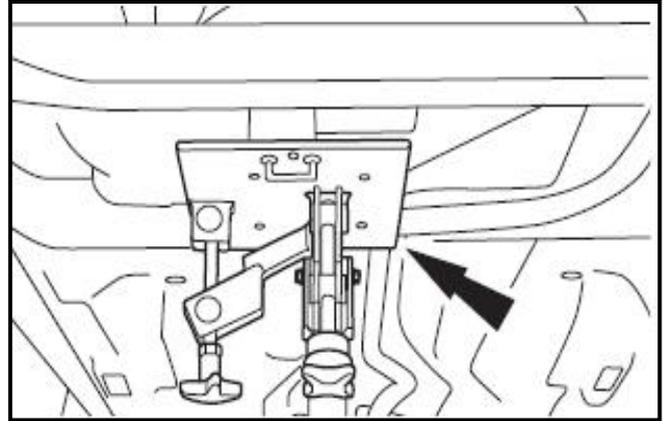
Torque of worm clamp between oil filling hose



and fuel tank $5\pm 1\text{Nm}$;

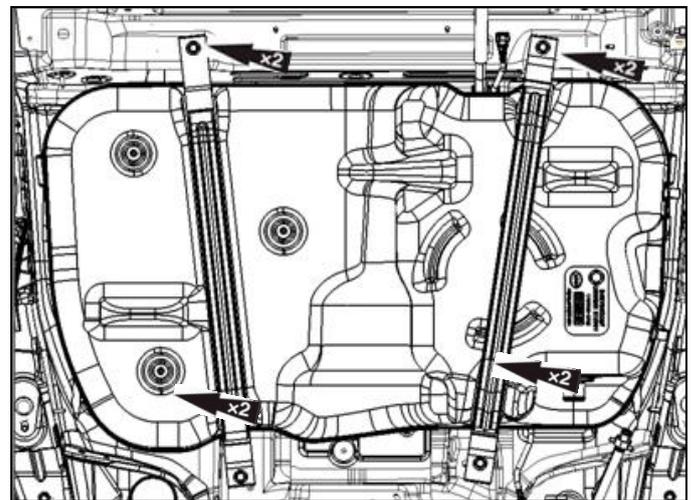
7. Remove connecting nut between fuel tank guard plate assembly II and fuel tank assembly, torque 5 ± 1 ;
8. Counter the fuel tank with a flat jack

Warning: Support the bottom of the fuel tank with a suitable material to prevent damage;



9. Remove the mounting bolts of fuel tank fixing belt assembly; Loosen the strap;

Torque: $63\pm 5\text{N.m}$



10. Slowly lower the flat panel jack and disconnect the fuel pump harness plug, and remove the fuel tank sub-assembly;

Warning: When removing the fuel tank, make sure not to apply excessive tension on the fuel pipe and harness.

Installation

The installation process is the reverse of the removal process.

Fuel pump and bracket assembly

Removal

Warning: This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

Warning: Do not use any form of open flame when working on fuel components. Highly flammable mixture produced during operation

May be ignited. Improper operation may cause personal injury

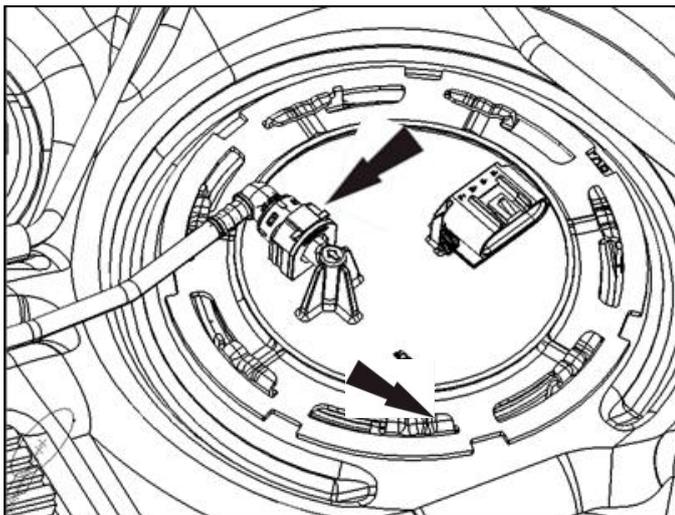
So.

Warning: Before removing or replacing the fuel pump and bracket assembly, disconnect the battery negative.

Warning: When inspecting or replacing the fuel pump and bracket assembly, it is prohibited to smoke or close to the fire source.

Warning: The fuel pump and bracket assembly can only be removed after the fuel pressure in the fuel pipeline system is removed.

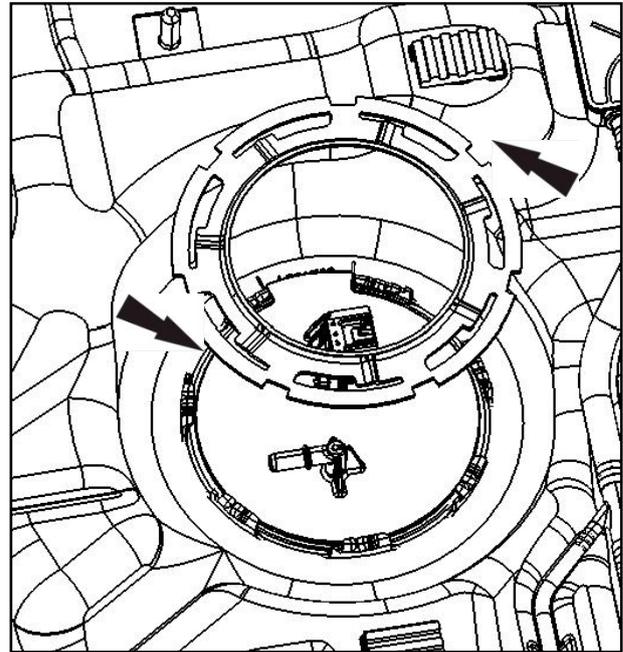
1. Refer to the fuel tank assembly removal procedure to remove the fuel tank first.
2. Remove the connection between fuel supply connecting pipe assembly I and fuel pump outlet, and refer to the nylon pipe quick-change joint removal procedure for joint removal;



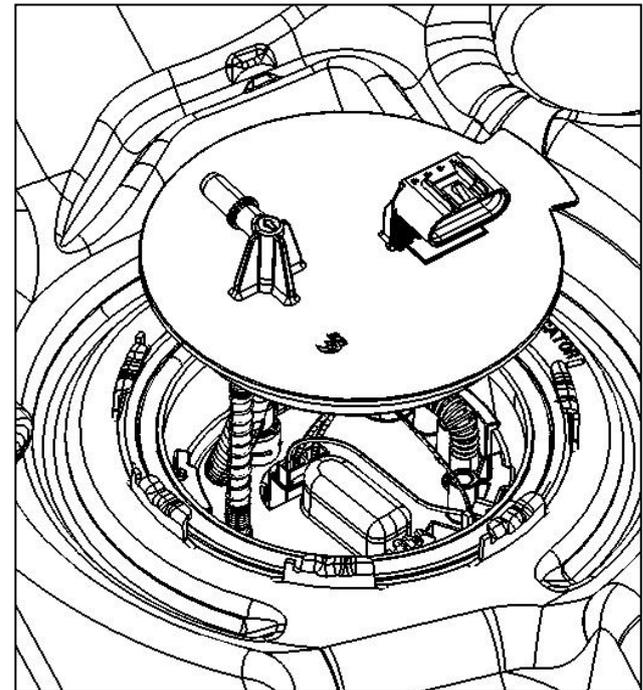
3. Use the special dismantling tool of the fuel pump of the country VI to dismantle the fuel pump

flange in the counterclockwise direction;

Torque: 135 ~ 406 N.m



4. Take out fuel pump and bracket assembly;



Note: Do not damage the liquid level sensor assembly during fuel pump removal, otherwise it will cause oil level indication fault.

Installation

Note: Used and damaged sealing rings cannot be used again.

Note: Do not damage the level sensor assembly during installation.

 **Note:** After installing the fuel pipe, ensure that there is no leakage.

1. Other installation process is opposite to removal process.

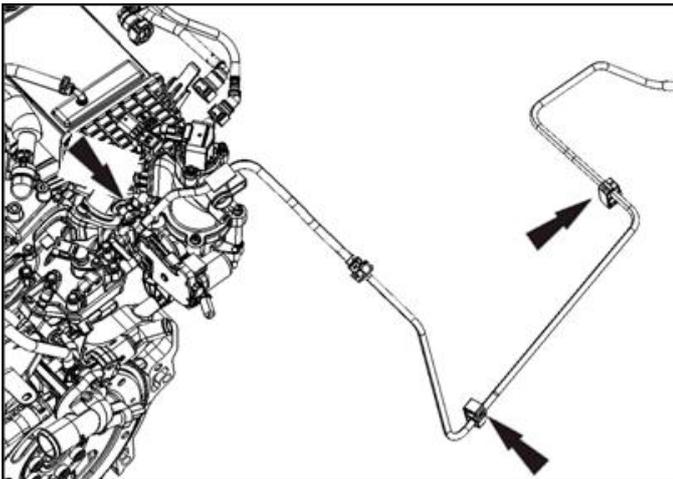
Fuel supply pipeline and connecting piece

 **Warning:** This process contains fuel handling. Pay attention to whether there is fuel spill at any time and pay attention to precautions for fuel treatment, otherwise personal injury may be caused.

 **Warning:** Do not use any form of open flame when working on fuel components. High flammability mixture generated during operation may be ignited. Improper operation may cause personal injury.

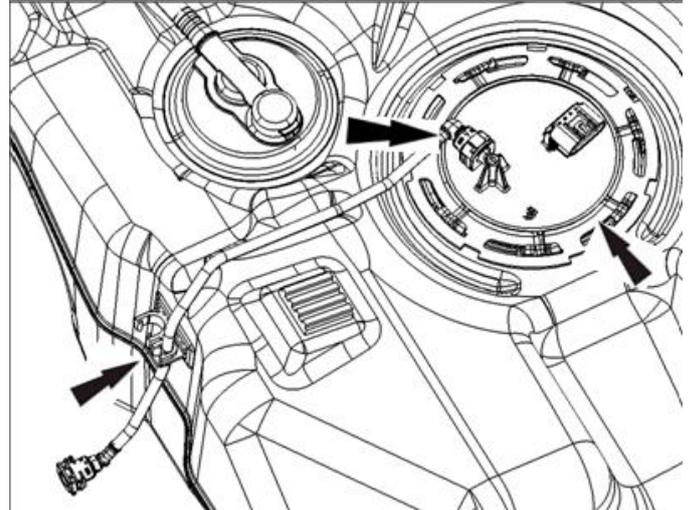
Removal

1. fuel system pressure relief, refer to fuel system pressure relief operation procedure;
2. Drain fuel, see the fuel drain flow of fuel system for details;
3. In the engine compartment, dismantle the connection between the fuel supply connecting pipe assembly and the engine oil rail joint, refer to the nylon pipe quick-change joint dismantling procedure for joint dismantling, and dismantle the engine compartment cross beam and front wall panel fuel pipe clamp assembly;

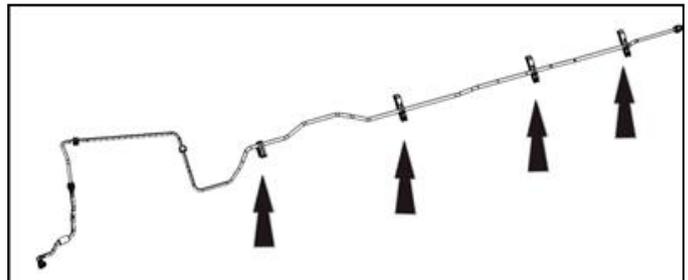


4. Remove the fuel tank assembly, see the fuel tank assembly removal process for details;

5. Remove the connection between fuel supply connecting pipe assembly I and fuel pump inlet and outlet, and refer to the nylon pipe quick-change joint removal procedure for joint removal; Remove the connection between pipeline and fuel tank welded pipe clamp;



6. Remove the lower floor fuel pipe clamp.



Installation

Installation process is reverse to removal process

3.1.9 Ignition system Specifications

Component specification

Name	Specifications
Spark plug model	HU00A70P
Spark plug part number	3707010-A04
Spark plug clearance	0.6~ 0.7 mm
Ignition coil model	DX000A0A
Ignition coil part number	3705010-NE01

General specifications

Application	Specifications
Ignition type	Independent ignition of each cylinder
Ignition sequence	1 - 3 - 4 - 2

Torque specification

Name	Nm	lb-ft	lb-in
Spark plug	2.0 Model 27.5±2.5	16.5	-
Ignition coil retaining bolt	10±1	-	89

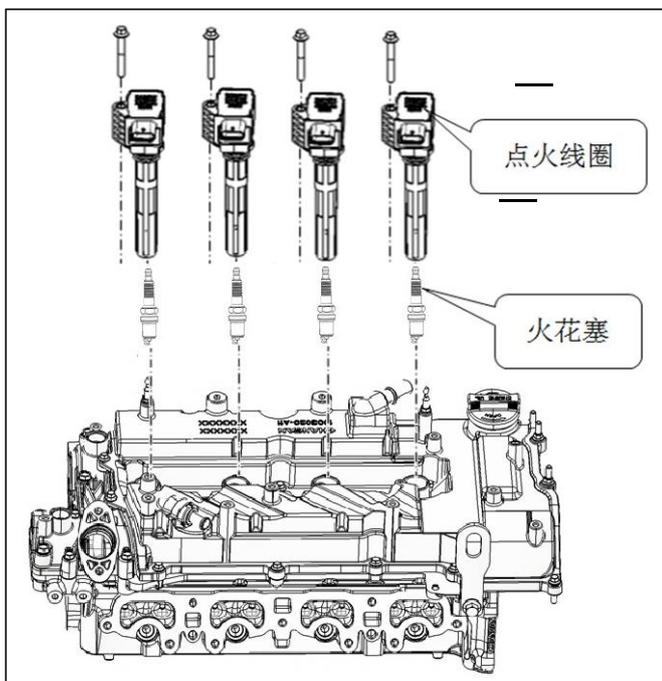
Description and operation

System overview

The ignition system is a device used in gasoline engines to ignite the in-cylinder mixture. According to the ignition signal sent by the ECU, the ignition coil provides sufficient high voltage to the spark plug according to the cylinder ignition sequence at any engine speed and load, so as to generate spark between the spark plug electrodes and ignite the compressed mixture in the cylinder.

The ignition coil generates the high voltage required to ignite the mixture through electromagnetic induction, and transmits the generated high voltage to the spark plug. Spark is generated between the spark plug electrodes to ignite the in-cylinder compression mixture.

Installation position: The ignition coil is located on the upper part of the spark plug and directly connected to the spark plug.



Serial number	Component name	Quantity
1	Ignition coil	4
2	Spark plug	4
3	Bolt	4

General inspection

Ignition spark test

Warning: Direct use of high voltage line to test fire trip may cause personal injury and module damage. Do not directly use high voltage line to perform ignition spark test.

Warning: The engine temperature in operation is very high, so pay attention to scald when operating on the engine just flameout.

1. For "neutral gear" of transmission shift lever, apply parking brake reliably.
2. Disconnect the fuel injector plug without pressing the ignition switch.

Warning: Continuous opening of fuel injector may cause fire.

3. Remove ignition coils, remove spark plugs.
4. Connect the ignition coil and spark plug, and ground the spark plug at a reliable grounding point of the engine.
5. Start the engine and observe the spark status of the spark plug.
6. The engine stops and the ignition switch is not pressed.
7. Install spark plug and ignition coil;



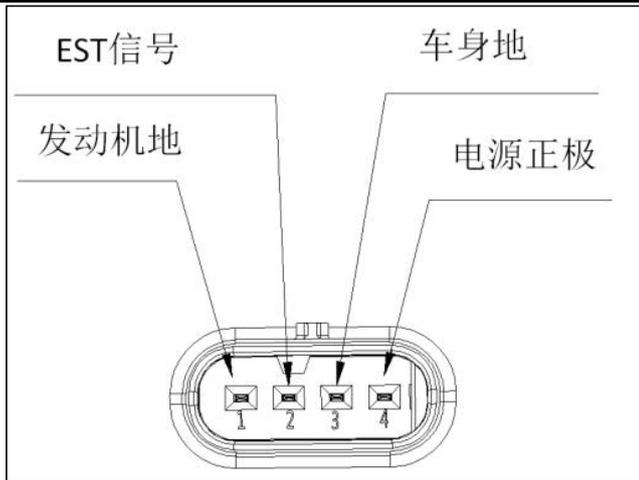
Note: It is unlikely that all four ignition coils will not work properly. To avoid replacing the normal ignition coil, perform the above procedure, identify the faulty ignition coil and replace it.

Check of ignition coil

1. Ask the customer about the fault condition of the vehicle.
2. Read the vehicle DTC and confirm the cylinder with "misfire" fault.
3. Interchange the ignition coil of the cylinder with "misfire" fault with the ignition coil of the normal cylinder, and then run the vehicle under the faulty condition.

If the misfire fault code changes to the original normal working cylinder following the ignition coil, please replace the ignition coil.

The definition of 4. ignition coil pin is as shown in the following figure.

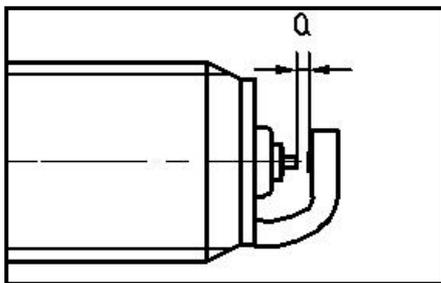


 **Note:**

- It is unlikely that all 4 ignition coils will not work properly. To avoid replacing the normal ignition coil, perform the above procedure, identify the faulty ignition coil and replace it.
- This type of coil has internal ignition module, and Howe meter cannot directly measure the primary resistance of ignition coil.

Spark plug inspection

1. Technical specifications: Model and part number are consistent with vehicle configuration.
2. Spark plug electrode initial gap "a": 0.6~0.7 mm.



3. Carbon deposit: If carbon is adsorbed on the spark plug, after the engine is warmed up, it can idle at 2000 rpm~2500 rpm without load for 5 min.

 **Note:**

- Carbon may be adsorbed on the electrode or ceramic body of the spark plug during vehicle delivery to the 4S store or during winter repetitive short drive. If the spark plug electrode or ceramic volume carbon is large (black), which causes such faults as unstable idling speed or difficult starting, carbon shall be burned out by performing engine idling without load.
- When no load idling is performed, pull up the parking brake and depress the foot brake to move the shift lever to neutral gear (MT) or shift the shift lever to P gear (AT) to prevent accidents and serious injuries.

4. If any of the following faults occur, replace the spark plug.

- Damage of ceramic body
- Electrode fracture

5. Interchangeability check

Note: Perform visual inspection of spark plugs without abnormality.

- 1) Interchange the spark plug of the cylinder with misfire fault with the spark plug of the normal cylinder, and then run the vehicle under the faulty condition.

If the misfire fault code changes to the original normal working cylinder following the spark plug, please replace the spark plug.

Fault symptom diagnosis and test

Fault symptom table

If the fault occurs but no DTCs are stored in the ECUs and the cause of the fault cannot be confirmed in the basic inspection, the fault diagnosis and rule out shall be performed according to the sequence listed in the following table.

Fault symptom		Reason	Handling method
Engine cannot be started	Engine does not start or is difficult to start; Or the engine stops suddenly during running and does not catch fire when restarting.	1. Battery power loss	Troubleshooting battery faults
		2. Battery pole wiring is loose or poor contact	Check whether the wiring is secure
		3. Ignition coil harness plug falls off.	Check whether the wiring is secure, reassemble or replace
		4. Ignition coil harness connector is loose.	Replace or reassemble
		5. Spark plug does not trip	Perform the "Ignition Spark Test" and if it does not trip, perform the Ignition Coil Assembly Check and Spark Plug Check or Replace.
		6. Other engine problems	Check engine
Individual cylinder does not work	When the engine is running at various speeds, row trachea can hear gun sound and row trachea has black smoke.	1. Ignition coil harness connector is loose.	Replace or reassemble
		2. Spark plug does not trip	Perform the "Ignition Spark Test" and if it does not trip, perform the Ignition Coil Assembly Check and Spark Plug Check or Replace.
		3. Other engine problems	Check engine
Insufficient engine power	Engine is difficult to start, and acceleration and climbing are weak during driving.	1. Individual cylinder does not work	Refer to previous fault diagnosis.
		2. Ignition coil leakage	Replacement
		3. Ignition coil harness connector is loose.	Replace or reassemble
		4. The spark plug has serious carbon deposit.	Replacement

Ignition system fault diagnosis process

Serial number	Operation	Yes	No
1	Is the engine ignition system fault diagnosis flow checked	Go to Step 2	Enter fault diagnosis process
2	Record the operating conditions and user description of the vehicle in case of problems.	Go to Step 3	Enter fault diagnosis process
3	Read the fault code through the diagnostic scanner, check whether there is "misfire" fault display, and confirm which cylinder is faulty.	Go to Step 4	Enter fault diagnosis process
4	After the fault is cleared, restart, whether there is still "misfire" fault display	Go to Step 5	Enter fault diagnosis process
5	Check whether the connection of ignition coil harness connector is reliable and whether the harness is on/off.	Go to Step 6	Reconnect
6	Check the coils one by one to see if the results meet the requirements.	Go to Step 7	Replacing ignition coil in question
7	Check the spark plugs one by one, and the inspection results meet the requirements.	Good ignition system	Replace the faulty spark plug.

**Note:**

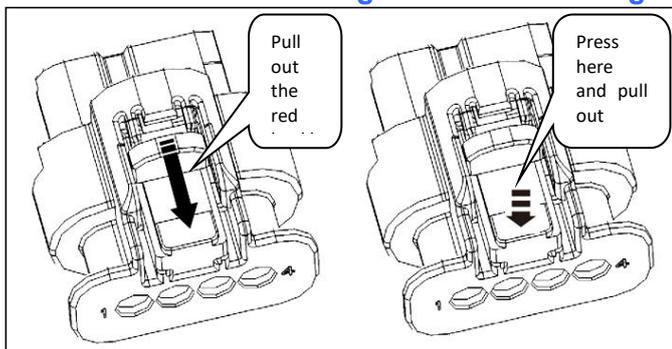
The "misfire" fault displayed in the diagnostic scanner is not all caused by the ignition system. Engine misfire diagnosis is a comprehensive evaluation result, which may be related to software data or hardware.

Removal and installation**Ignition coil**

1. Remove engine cylinder head cover.
2. Disconnect the connector between the ignition coil and the harness.
3. Remove the ignition coil retaining bolts, and remove the ignition coil.
4. Install in reverse order of removal.



Note: When removing the connector of ignition coil and harness, please follow the figure below.

**Spark plug**

Note: If a non-conforming spark plug is installed, the engine performance will be degraded. When replacing, install only the spark plugs that meet the vehicle configuration requirements.

1. Remove engine cylinder head cover.



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