

0206 Fuel System

1 General Information.....	193
2 Diagnosis and Testing.....	197
3 Fuel Tank.....	200
4 Fuel Pump Assembly	205
5 Fuel Filter.....	210
6 Injection Unit.....	212

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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1 General Information

1.1 Overview.....	193
1.2 Product specifications.....	194
1.3 The fuel sytem assembly drawing.....	195
1.4 The connection layout of the fuel system pipeline.....	196

1.1 Overview

- The fuel sytem is used to provide fuel smoothly from the fuel tank to the engine at a certain amount of pressure.
- When the ignition is turned on, the engine control module activates the fuel pump relay to work for several seconds. Then the fuel pump starts to work and builds up a starting oil pressure for the fuel system. When receiving the anti-theft control module signal and the crankshaft position sensor signal, the engine control module will keep the fuel pump relay working.
- The fuel system consists of the following components:
 - a. Fuel tank
 - b. Fuel pump assembly
 - c. Fuel filter
 - d. Fuel rail
 - e. Injector
 - f. Fuel pipes

02

Warning

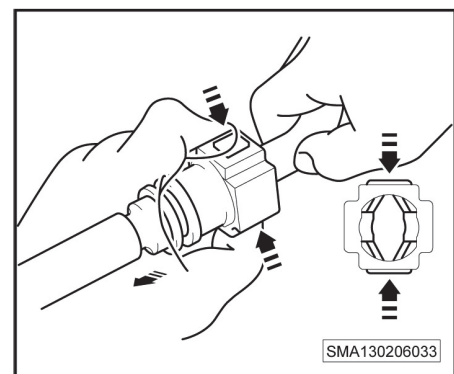
- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

Notes

When removing the fuel pipe connector, first press the projecting part of the fuel pipe connector with force in the (-arrow-) direction, and then pull out the fuel pipe connector.

Make sure that you have heard a "click" in the installation process. Then pull the fuel hose and its connector with force to make sure it is fixed.

Start the engine to make sure that there is no fuel leakage in the fuel connector after installation.



1.2 Product specifications**Torque specifications**

Component	Torque (N•m)
Fixing bolt of the fuel rail	9±1
Fixing bolt of the fuel tank fixing strap	30±3
Fixing nut of the filling guide	7±1
Fixing bolt of the filling pipe	10±1

Fuel system pressure

Condition	Value (Kpa)
Idle speed (800±50 r/min)	>350
Engine speed (2500 r/min)	>350

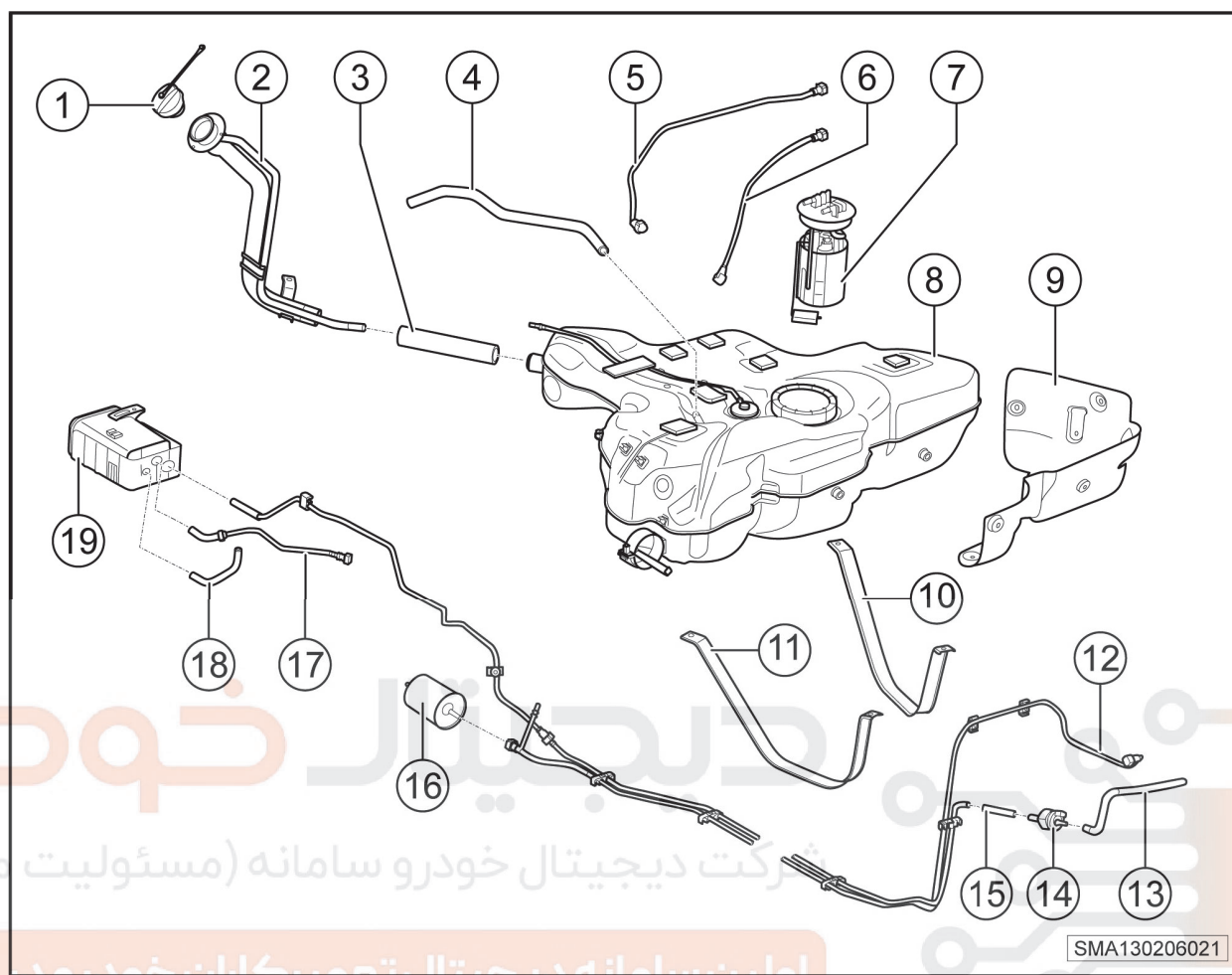
Fuel pump motor

Item	Ohm (Ω)
Resistance	0.5

Injector

Item	Value
Standard resistance	12±0.4 Ω
Normal operating voltage	12.5 V

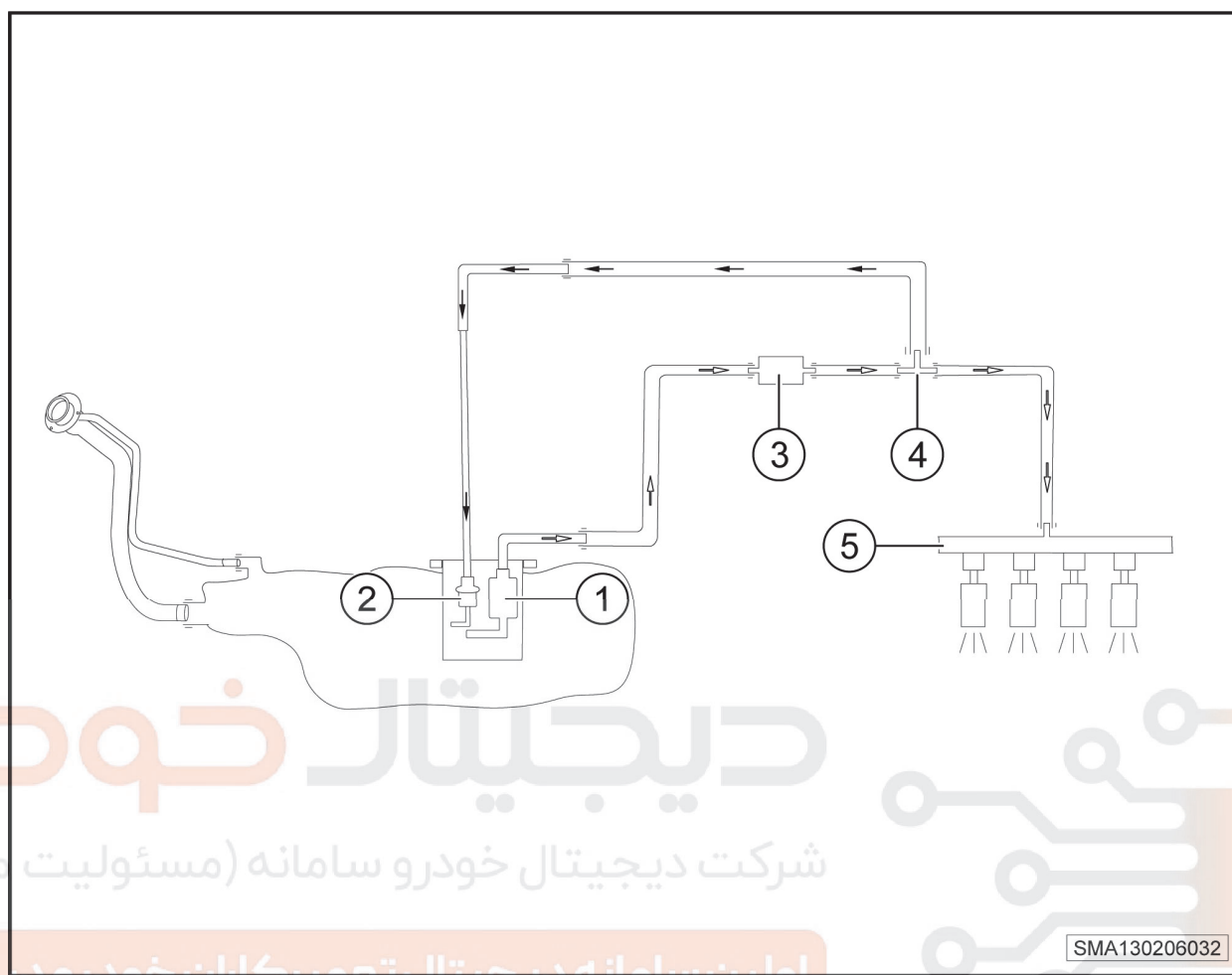
1.3 The fuel sytem assembly drawing



02

1. Fuel filler cap	2. Fuel filler pipe assembly
3. Hose	4. Fuel vapor hose
5. Fuel pump return pipe	6. Fuel pump outlet pipe
7. Fuel pump assembly	8. Fuel tank
9. Fuel tank heat shield	10. Fuel tank fixing strap
11. Fuel tank fixing strap	12. Oil feed pipe
13. Hose	14. Activated carbon canister solenoid valve
15. Hose	16. Fuel filter
17. Hose	18. Activated carbon canister intake pipe
19. Activated carbon canister assembly	

1.4 The connection layout of the fuel system pipeline



When the engine works properly, the fuel pump (-1-) pumps fuel from the fuel tank to filter through the fuel filter (-3-) and then reaches the T pipe (-4-). Then part of the fuel goes to the fuel rail (-5-) to supply fuel to the injector, and part flows directly to the fuel pump pressure regulating valve (-2-). When the fuel system pressure is high, the pressure jacks up the diaphragm spring inside the regulating valve, and then the valve opens and fuel lets out from the regulating valve. When the pressure reaches a normal level, the regulating valve shuts off and then fuel stops letting out. Consequently, the system pressure is stable.

2 Diagnosis and Testing

2.1 Testing the fuel system pressure.....	197
2.2 Fuel system fault list.....	199

⚠ Warning

- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

2.1 Testing the fuel system pressure

02

Maintenance tools and common equipment



Preconditions

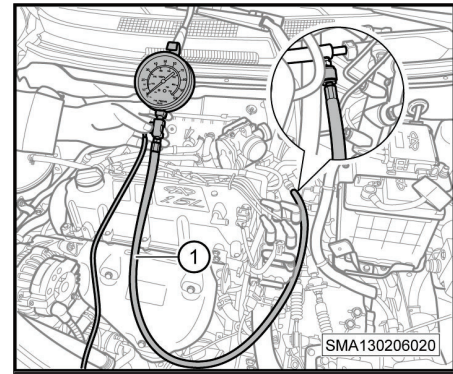
1. The battery voltage should be at least about 11.5 V.
2. The fuel should be at least 25% of the fuel tank volume.
3. The fuel filter mileage should be within 5,000 Km.
4. The fuel system pipe should abstain from leakage.

Testing

1. Switch off all electrical equipment and the ignition switch, and disconnect the fuel pump relay.

02 - Engine Mechanism

2. As shown in the figure, disconnect the oil feed hose connector and connect the fuel system pressure tester (-1-) between the oil feed hose and the fuel rail.



3. Start the engine, run it at idle speed and read the pressure tester value.

- The standard pressure at idle speed should be over 350 Kpa.
- If the measured pressure value is lower than 350 Kpa, please check the fuel filter for blockage. Replace the fuel filter if necessary.
- If the measured pressure value is lower than 350 Kpa and the fuel filter functions properly, please check the fuel pump and replace it if necessary.
- If the measured pressure value is too high, it may be caused by the injector blockage or fuel pump pressure regulating valve fault. Check the injector and the pressure regulating valve, replace them if necessary.

4. Switch off the engine and read the pressure tester value minutes later.

- The standard dwell pressure of the fuel system should be 24 Kpa.
- If the measured pressure value is lower than 24 Kpa, please check the fuel system pipe for leakage. If there is leakage, repair the pipe.
- If the measured pressure value is lower than 24 Kpa and the fuel system pipe does not leak, replace it with a new fuel pump and test again. If the measured pressure value becomes normal after the replacement, it indicates a fuel pump failure. Please replace the fuel pump. If the measured pressure value is still under 24 Kpa, please check the injector and replace it in case of failure.

2.2 Fuel system fault list

Fuel system fault diagnosis list

Symptoms	Possible causes	Maintenance recommendations
Normal starter operation, engine start failure	Anti-theft system failure	Eliminate the failure with the diagnostic tester
	Fuel pump failure	Check the fuel pump, replace it if necessary
	Fuel pump relay failure	Check the fuel pump relay, replace it if necessary
	Fuel system pipe leakage	Repair or replace the leaky pipe
	Fuel filter blockage	Replace the fuel filter, clean the fuel tank and replace the fuel
	Fuel pump filter blockage	Replace the fuel and fuel pump, and clean the fuel tank
	Complete failure of the fuel pump pressure regulating valve	Replace the fuel pump
	Massive blockage in the injector	Clean or replace the injector
Extended time for engine start	Injector leakage	Clean or replace the injector
	Failure of the fuel pump internal check valve	Replace the fuel pump
	Fuel pump pressure regulating valve failure	Replace the fuel pump
	Fuel system pipe leakage	Repair or replace the leaky pipe
Frequent blockage in the injector	Poor fuel quality	Replace the fuel and clean the fuel tank
	Excessive impurities in the fuel tank	Replace the fuel and clean the fuel tank
	Dirty fuel filter	Replace the fuel and fuel filter, and clean the fuel tank

Fuel pump failure elimination

Symptoms	Possible causes	Maintenance recommendations
Loud operating noise	Low oil level for a long time or fuel pump damage	Replace the fuel pump, and keep the fuel level at over 25%
Powerless running		
Extended operation for fuel pump		

Injector failure elimination

Symptoms	Possible causes	Maintenance recommendations
Injector leakage	The injector blockage caused by excessive impurities in the fuel	Clean the fuel system, clean or replace the injector
Poor atomization of the injector	Excessive impurities in the fuel or injector failure	Replace the fuel and the injector
Injection hole blockage	Excessive impurities in the fuel	Clean the injector
Non-operation of the injector	Short circuit in the injector coil	Replace the injector

3 Fuel Tank

3.1 Removing and installing the fuel tank.....	200
3.2 Fuel tank accessory instructions.....	204

⚠ Warning

- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

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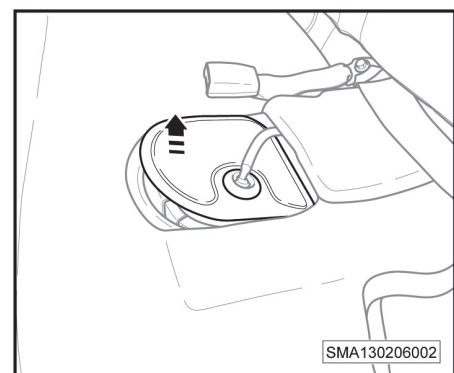
3.1 Removing and installing the fuel tank

Maintenance tools and common equipment

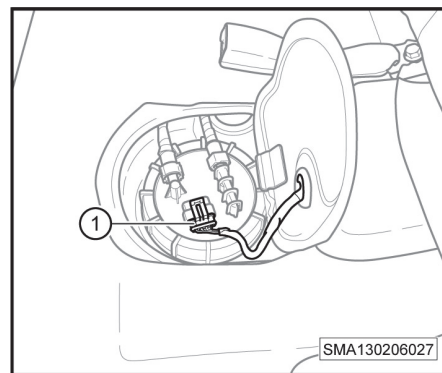


Removal

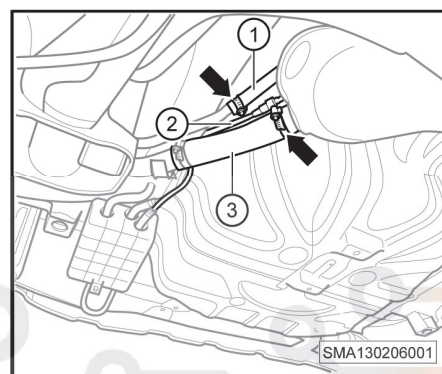
1. Switch off all electrical equipment and the ignition switch, and disconnect the fuel pump relay.
2. Start the engine and wait until its natural flameout.
3. Disconnect the battery negative terminal.
4. Lift the rear seat and pry off the cover with a screwdriver in the (-arrow-) direction.



5. Disconnect the fuel pump connector (-1-).



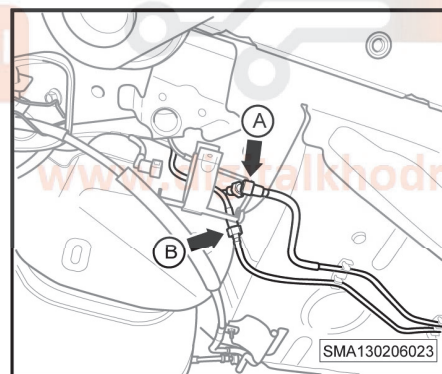
6. Place a collection vessel under the fuel filler hose.
7. Press the lock pin of the pipe connector (-2-) and pull out the fuel vapor hose. Loosen the clamps (-arrow-) and pull out the hoses (-1-) and (-3-).
8. Unscrew the fixing nuts of the stabilizer bar link (-arrow-).



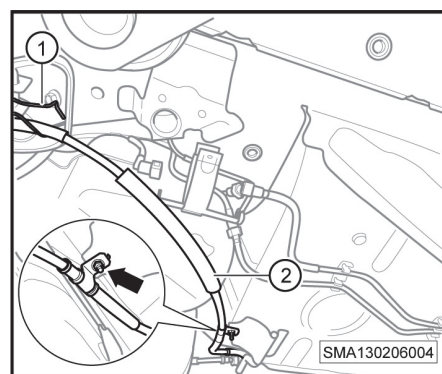
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9. Remove the fuel filter => refer to page 211

10. Press the lock pins of the pipe connectors (-arrow A-) and (-arrow B-), and pull out the fuel filter return pipe and the fuel vapor hose.

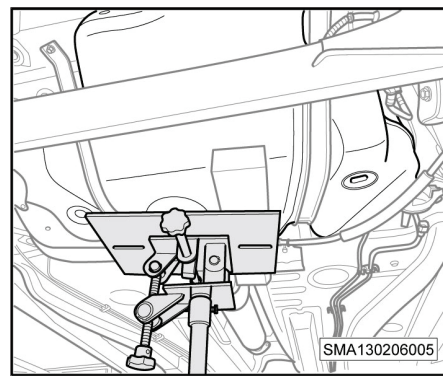


11. Unscrew the fixing bolt (-arrow-), disengage the holder (-1-) and move away the parking brake cable (-2-).

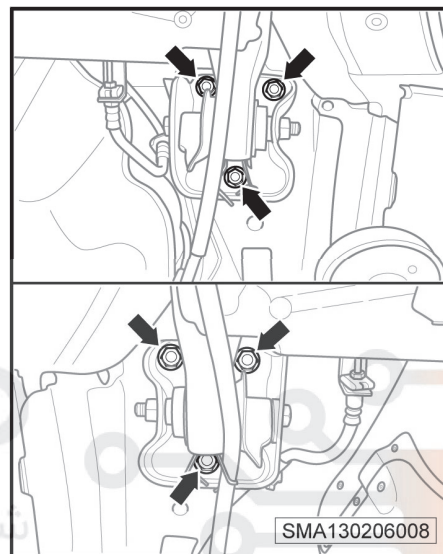


02 - Engine Mechanism

12. As shown in the figure, use a hydraulic jack to prop the fuel tank. A proper spacer block is used at the fuel tank support point so as to avoid fuel tank damage.

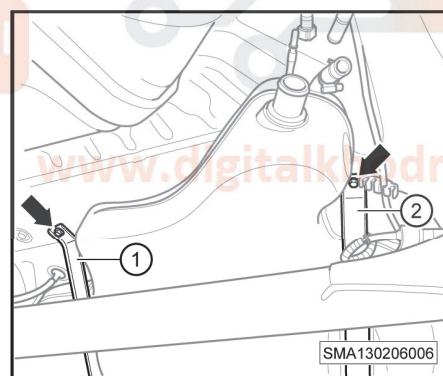


13. Unscrew the fixing bolts of the rear suspension (-arrow-) and lower the rear suspension slowly to a proper position.



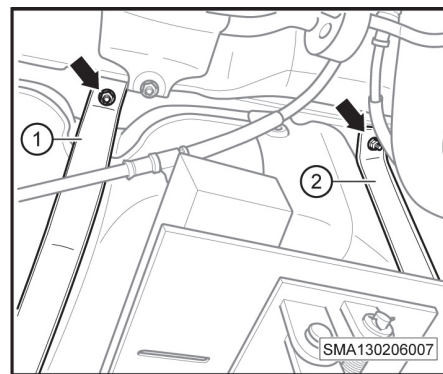
14. Unscrew the fixing bolts (-arrow-) and disengage the fixing straps (-1-) and (-2-).

- Tightening torque of the fixing strap fixing bolt: $22 \pm 2 \text{ N}\cdot\text{m}$



15. Unscrew the fixing bolts (-arrow-) and remove the fixing straps (-1-) and (-2-). Lower the jack slowly to remove the fuel tank.

- Tightening torque of the fixing strap fixing bolt: $22 \pm 2 \text{ N}\cdot\text{m}$



Installation

Installation shall follow the reverse sequence of the removal procedure. Please pay attention to the following notes:

1. The fuel pipe and the ventilation pipe of the fuel tank must be restored to their original position. Otherwise, the friction caused by the body vibrations will damage the fuel pipe and subsequently leads to fuel leakage.
2. Check whether the pipe is firmly connected after installation of the fuel tank.
3. Be sure to keep enough space between the fuel pipe and the exhaust pipe heat shield.
4. Check the toe-in and camber of the rear wheel, and adjust it if necessary.

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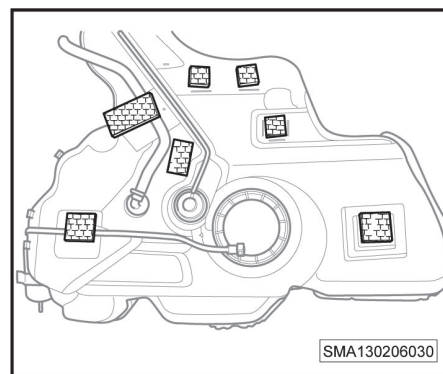
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3.2 Fuel tank accessory instructions

Installation position of the fuel tank spacer blocks

As shown in the figure, be sure to properly install the spacer blocks. Improper installation can lead to friction between the fuel tank and the body shell, which will damage the fuel tank or the fuel pipes.

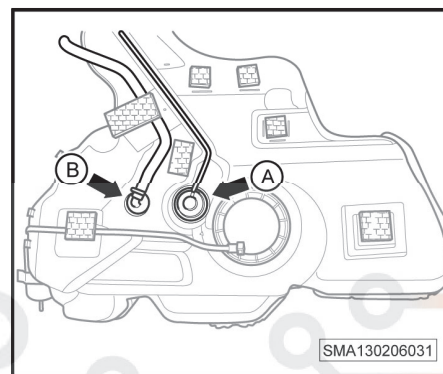


Fuel steam valve and vent pipe

02

The function of the fuel steam valve (-arrow A-): When fuel in the fuel tank produces oil vapor, the vapor is then absorbed from the fuel steam valve to the activated carbon canister. When the fuel tank is fully filled, fuel buoyancy will help jack up the fuel steam valve to prevent fuel being absorbed from the fuel steam valve to the activated carbon canister.

The function of the vent pipe (-arrow B-): When filled into the fuel tank via the filler, the fuel squeezes air out of the fuel tank.



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4 Fuel Pump Assembly

4.1 Overview.....	205
4.2 Removing and installing the fuel pump assembly.....	206
4.3 Testing the fuel pump.....	208

4.1 Overview

1. The fuel pump is used to absorb the fuel from the tank and then deliver pressurized fuel to the oil feed pipe, which then works with the fuel pump pressure regulating valve to stabilize the fuel pressure.
2. When the ignition is turned on, the engine control module activates the fuel pump relay to work for several seconds. Then the fuel pump starts to work and builds up a starting oil pressure for the fuel system. When receiving the anti-theft control module signal and the crankshaft position sensor signal, the engine control module will keep the fuel pump relay working.
3. The fuel pump consists of the following components:
 - a. Fuel pump motor
 - b. Fuel filter screen
 - c. Oil level sensor
 - d. Fuel pump pressure regulating valve
 - e. Fuel pipes

02

⚠ Warning

- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

👁 Caution

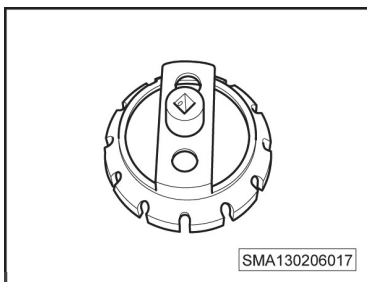
- Only use parts approved by Chery Automobile Co., Ltd. to replace the fuel pump assembly.
- As the fuel pump assembly radiates through fuel, low fuel level in the fuel tank will directly shorten the service life of the fuel pump.
- Be sure to keep the fuel pump assembly and the working area clean when replacing the fuel pump assembly; otherwise, the fuel pump screen will be blocked.

4.2 Removing and installing the fuel pump assembly

Caution

- Protective gloves must be worn in removing the fuel pump assembly.
- Be sure not to damage the harness and the fuel hose, nor to bend the float arm of the level sensor when removing the fuel pump assembly.

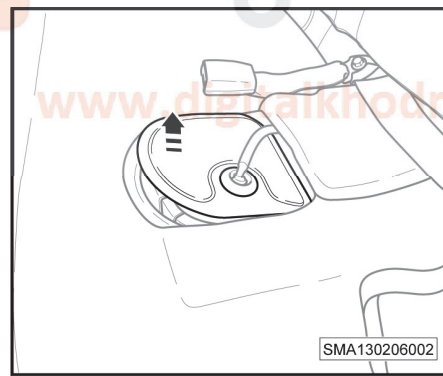
Maintenance tools and common equipment



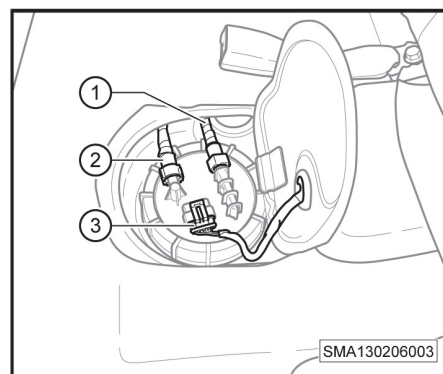
Fuel pump cover remover

Removal

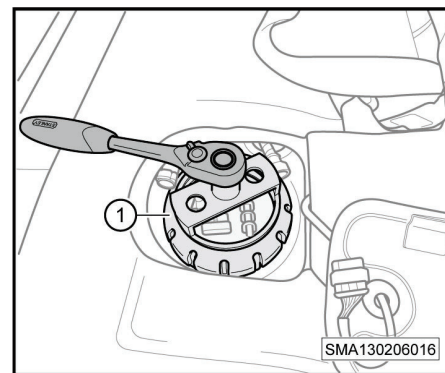
1. Switch off all electrical equipment and the ignition switch, and disconnect the fuel pump relay.
2. Start the engine and wait until its natural flameout.
3. Disconnect the battery negative terminal.
4. Lift the rear seat and pry off the cover with a screwdriver in the (-arrow-) direction.



5. Disconnect the fuel pump connector (-3-), press the lock pins of the pipe connectors (-1-) and (-2-) and pull out the oil return hose and oil outlet hose.



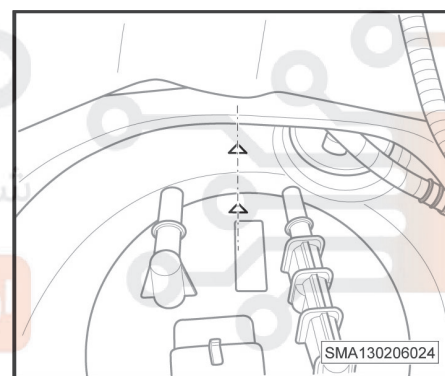
6. As shown in the figure, unscrew the fixing cover with the special tool (-1-) and remove the fuel pump assembly and the fuel pump seal ring.



Installation

Installation shall follow the reverse sequence of the removal procedure. Please pay attention to the following notes:

1. Check if the fuel pump package is complete before installing a new fuel pump.
2. Keep an eye on the installation position of the fuel pump. As shown in the figure, the mark ARROW on the fuel pump housing and that on the fuel tank must point toward the same direction before installing the fuel pump.



3. After installation, turn on the ignition switch repeatedly (without starting the engine) to build up a pressure for the fuel system. Also check the fuel pump connector for leakage.
4. Start the engine, check the fuel pump inlet and outlet pipe for leakage.

4.3 Testing the fuel pump

⚠ Warning

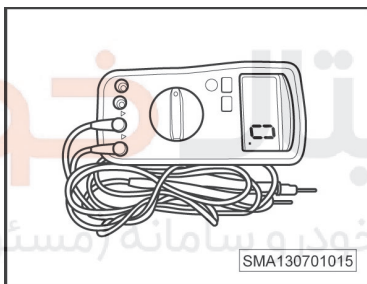
- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

👁 Caution

- The fuel pump must be removed from the fuel tank when checking the fuel pump.
- The current on time must not exceed 10 seconds to avoid coil burning when testing the fuel pump.

02

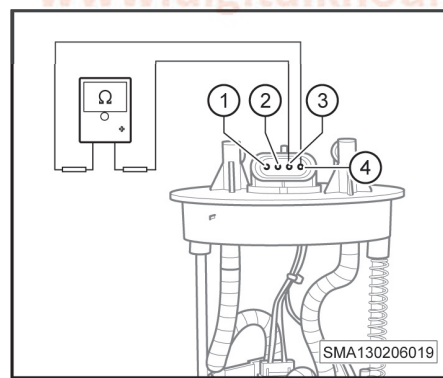
Maintenance tools and common equipment



Digital multimeter

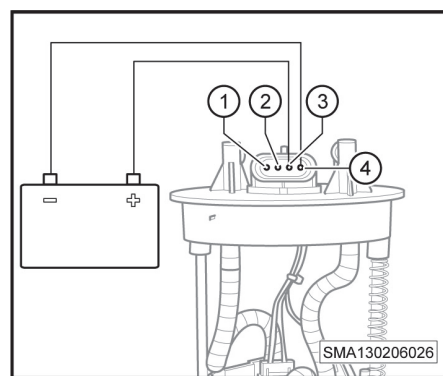
Testing the fuel pump resistance

1. Connect the digital multimeter with fuel pump pins (-3-) and (-4-) respectively to test the fuel pump resistance. The resistance under normal temperature 20°C is about 0.5 Ω . Replace the fuel pump if the resistance is too high.



Testing the fuel pump motor running state

1. Use a jumper to connect the fuel pump connector (-3-) with the battery positive terminal, and connect the fuel pump connector (-4-) with the battery negative terminal to check if the fuel pump runs properly. Replace the fuel pump in case of any abnormal conditions. The starting voltage of the fuel pump motor is 8 V and the maximum voltage is 16 V.



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5 Fuel Filter

5.1 Overview.....	210
5.2 Removing and installing the fuel filter.....	211

5.1 Overview

- The fuel filter is used to filter impurities in the fuel to avoid blockage in the fuel system (especially in the injector). Additionally, it will reduce mechanical wear and keep the engine running properly.

⚠ Warning

- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

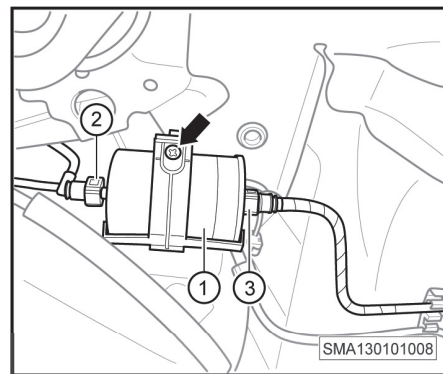
i Note

- Frequent injector blockage or poor atomization after replacement of the fuel filter are mostly caused by improper installation direction of the fuel filter.

5.2 Removing and installing the fuel filter

Removal

1. Switch off all electrical equipment and the ignition switch, and disconnect the fuel pump relay.
2. Start the engine and wait until its natural flameout.
3. Place a collection vessel under the fuel filter.
4. Unscrew the fixing screw (-arrow-), press the lock pins of pipe connectors (-2-) and (-3-), and pull out the oil inlet and outlet pipes.
5. Remove the fuel filter (-1-) from the bracket.



02

Installation

Installation shall follow the reverse sequence of the removal procedure. Please pay attention to the following notes:

1. Check the filter package for completeness.
2. During installation, the ARROW direction on the fuel filter housing must point to the vehicle's driving direction.
3. When starting the engine, please turn on the ignition switch repeatedly to build up a starting oil pressure for the fuel system. And meanwhile check the fuel filter connector for leakage.
4. Start the engine and check the fuel filter for leakage.

6 Injection Unit

6.1 Overview.....	212
6.2 Removing and installing the injector.....	213
6.3 Testing the injector.....	215

6.1 Overview

- The injection unit is used to inject a certain amount of fuel into the intake manifold at a proper time according to the command of the engine control module, and produce flammable gas mixture with the air inside.
- The injector is a precision part of considerably high machining accuracy, which requires a large range of dynamic flow, sound clog-free and anti-contamination performance, and good atomization.
- The engine control module controls the power-on and power-off of the injector. The engine control module outputs control current to the injector in the form of electric pulse. When the electric pulse rises from zero, the injector will open because of power-on. When the electric pulse drops to zero, the injector will close because of power-off. The duration from electric pulse rise to drop is defined as pulse width. The shorter the pulse width output by the engine control module, the shorter the injection duration and the smaller rate of injection; and vice versa.
- The injection unit, installed on the intake manifold, consists of four injectors and one common fuel rail.

⚠ Warning

- When operating the fuel system, please keep the fire sources and open flames away from the working area, which should be equipped with extinguishers.
- Before operating the fuel system, please touch the vehicle body to discharge the static electricity; otherwise, it will cause fire and even explosion.
- When operating the fuel system, please keep good ventilation in the working area.
- Before removing and installing the fuel pipes, depressurize the fuel system.

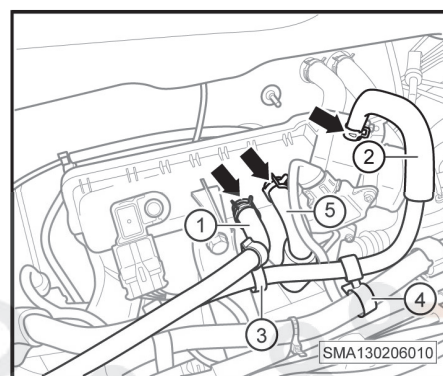
6.2 Removing and installing the injector

Removal

1. Switch off all electrical equipment and the ignition switch, and disconnect the fuel pump relay.
2. Start the engine, wait until its natural flameout, and pull out the key.
3. Disconnect the battery negative terminal.
4. Remove the air filter assembly . => refer to page 34

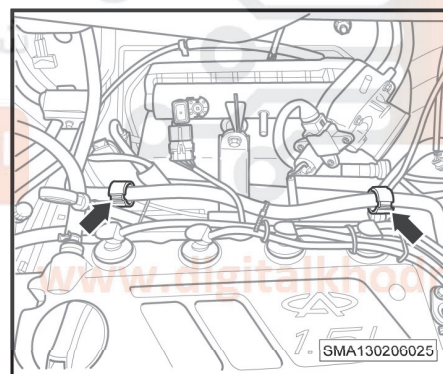
The following steps 5 to 6 are applied to vehicles equipped with mechanical throttles

5. Loosen the clamps (-arrow-), pull out the hoses (-1-), (-2-) and (-5-) and disengage the hose clips (-3-) and (-4-).



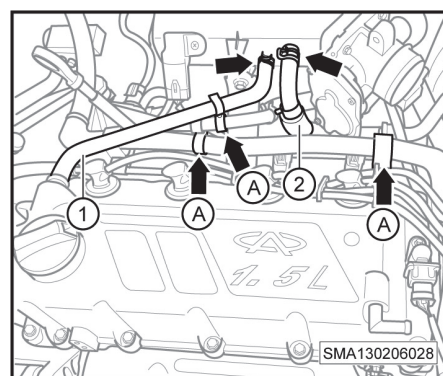
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6. Release the harness from the fixing clips (-arrow-).



The following steps 7 and 8 are applied to vehicles equipped with electronic throttles

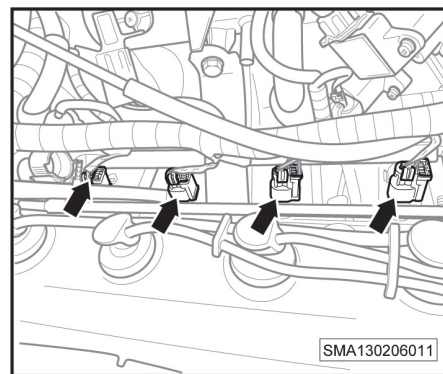
7. Release the clips (-arrow A-) and the clamps (-arrow-), and pull out the hoses (-1-) and (-2-).



8. Remove the electric throttle .=> refer to page 240

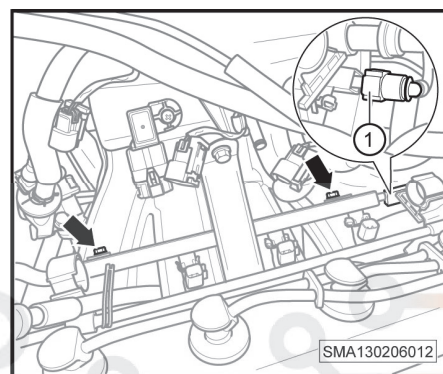
The following steps 9 to 11 are applied to all vehicles

9. Disconnect the fuel injector connectors (-arrow-).

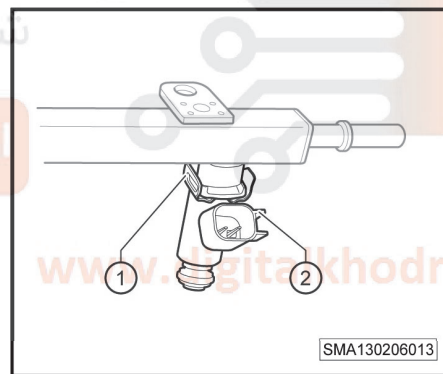


10. Press the lock pin of the pipe connector (-1-) and pull out the oil feed hose connector. Then unscrew the fixing bolts of the fuel rail (-arrow-) and pull out the injector together with the fuel rail. Seal the installation hole with a glabrous cloth to fend off foreign materials.

- Tightening torque of the fixing bolt of the fuel rail: $9 \pm 1 \text{ N} \cdot \text{m}$



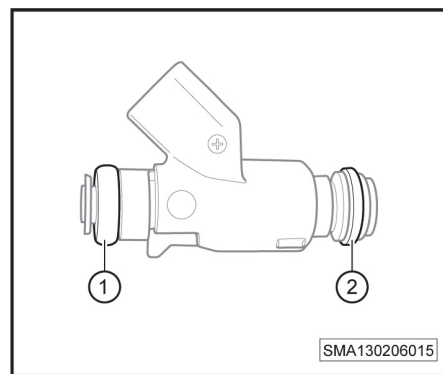
11. Loosen the holder (-1-) and pull out the injector (-2-).



Installation

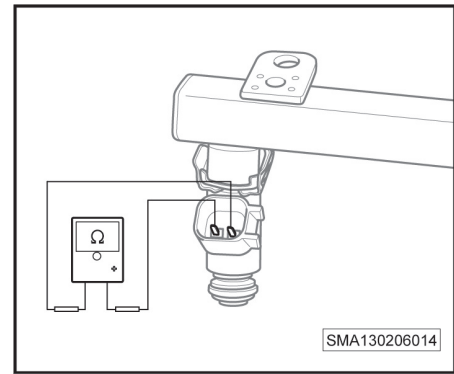
Installation shall follow the reverse sequence of the removal procedure. Please pay attention to the following notes:

1. Replace the seal rings (-1-) and (-2-).
2. Apply a little lubricant on the injector O-ring to prevent the O-ring from being damaged in installing the injector.
3. Be sure to properly install the fuel rail and the injector. The injector connector must point to the vehicle's driving direction.



6.3 Testing the injector

1. Switch off all electrical equipment and the ignition switch, and pull out the key.
2. Disconnect the battery negative terminal.
3. Disconnect the fuel injector connectors.
4. Use a multimeter to measure the resistance between the two injector pins. The standard resistance under normal temperature 20°C is $12 \pm 0.4 \Omega$.



02

دیجیتال خودرو

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