
ENGINE

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8.1 EMISSION CONTROL SYSTEM

1 Warning and Precaution

1.1 Warning

Be sure to observe the following instructions before repairing, to prevent property damage, personal injury or even death:

- (1) Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.
- (2) Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

1.2 Precaution

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

- (1) Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts has been applied with grease and grease must be applied on mounting threads during assembling.
- (2) Unneeded activated charcoal canister assembly should be handled by the specialized department according to local laws and regulations. Never discard it at will.
- (3) If the oxygen sensor falls, never pick it up to install and it needs to return to factory for testing.

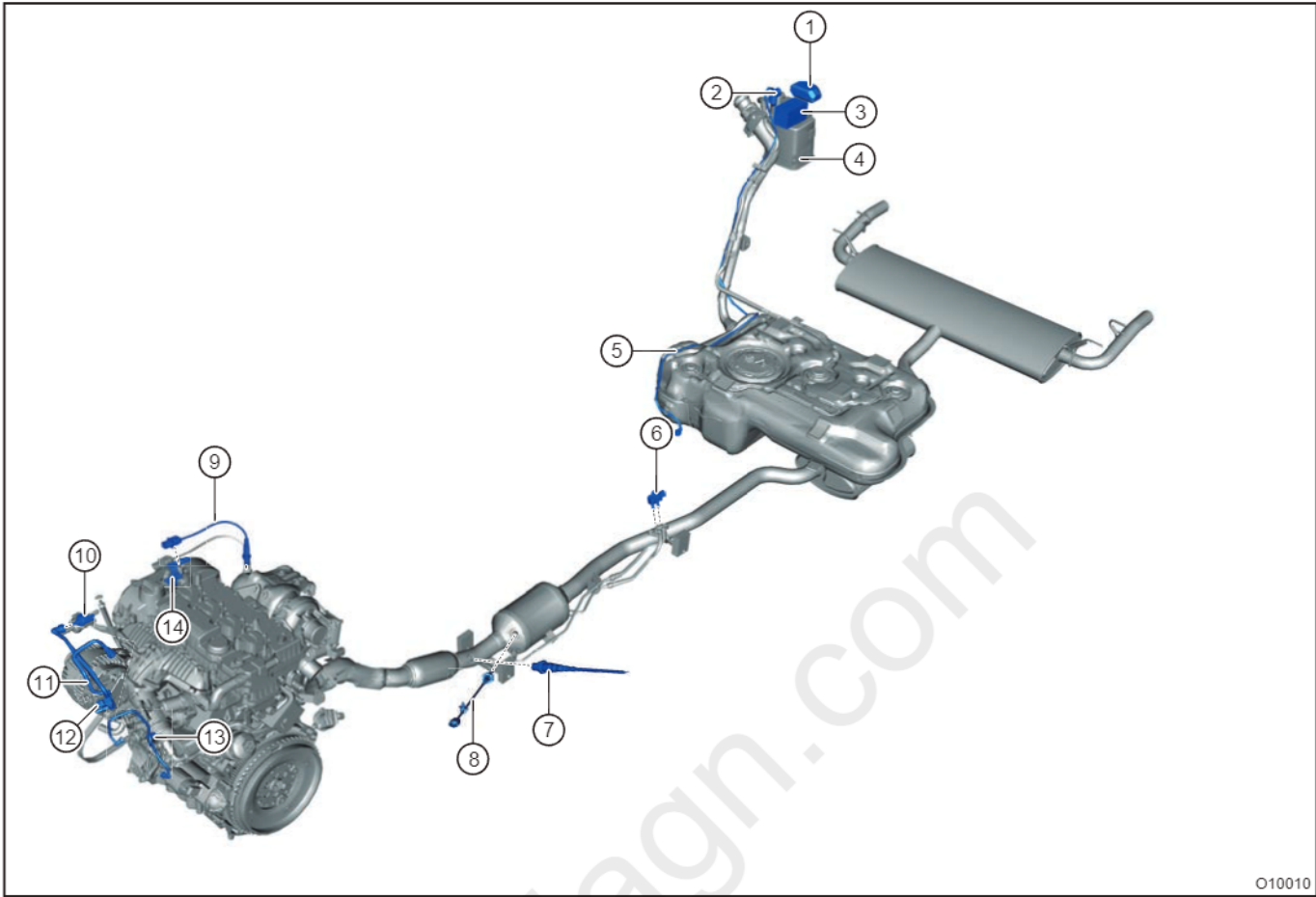
2 System Overview

2.1 System Description

Emission control system includes: Fuel vapor recovery/leakage diagnosis system, exhaust emission conversion system, Gasoline Particulate Filter (GPF) system and crankcase forced ventilation system.

- (1) The function of fuel vapor recovery/leakage diagnosis system: Fuel vapor (HC) is recovered and inhaled into engine cylinder for combustion, which can reduce emission and improve fuel economy. According to National VI regulation, fuel vapor recovery system adds leakage diagnosis function, the generated fuel vapor is not allowed to leak into atmosphere in the process of recovery, desorption and refilling etc. The system judge whether it leaks according to leakage diagnosis test. Once leakage occurs, the system will turn on malfunction light to warn and avoid polluting environment.
- (2) The function of exhaust emission conversion system: Through front and rear oxygen sensors determine whether oxygen is excess (namely oxygen content) in exhaust gas after engine combustion, convert oxygen content into voltage signal and transmit to alternator computer, then engine can realize closed-loop control which aims at excess air coefficient. Make sure three-way catalytic converter can convert harmful gases such as CO, HC and NOX from exhaust gas into harmless carbon dioxide, water and nitrogen by oxidation and reduction. Avoid polluting environment.
- (3) The function of Gasoline Particulate Filter (GPF) system: According to National VI regulation, GPF is added in order to avoid the emission of gasoline particulates, which can reduce the particulates leaked into the air and avoid polluting environment.
- (4) The function of crankcase forced ventilation system: The air in cylinder leaks into crankshaft space during normal engine operation. The leaked air contains unburned fuel and all exhaust air contents, which will cause the deterioration of lubricant and increase of crankshaft pressure and temperature. In order to avoid this, the gas leaked into crankshaft is inhaled into cylinder for combustion and recover HC, which reduces the air pollution.

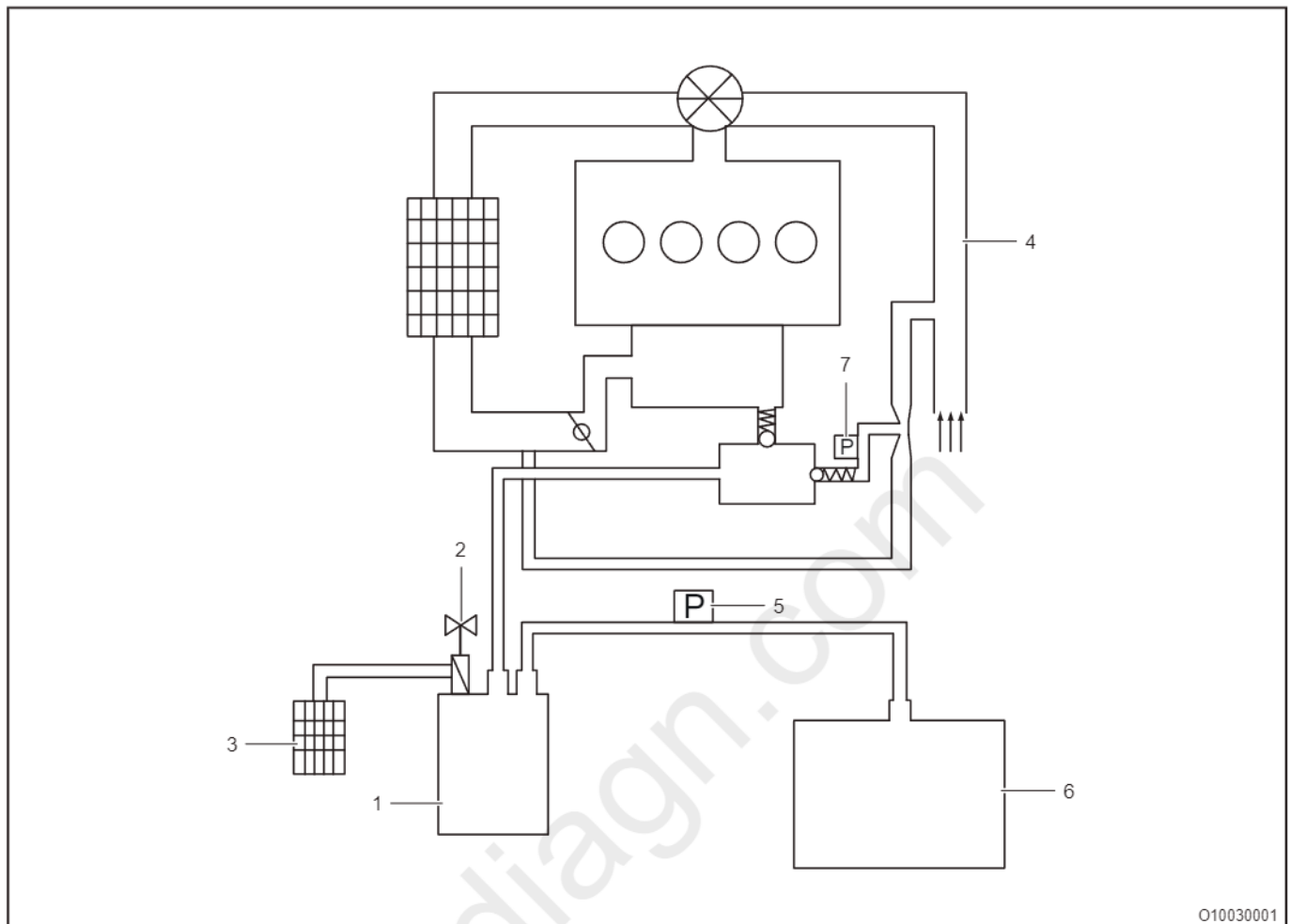
2.2 System Components Diagram



1	Charcoal Canister Breather Pipe	8	Exhaust Temperature Sensor
2	Charcoal Canister Cut-off Valve	9	Upstream Oxygen Sensor
3	Dust Filter	10	Charcoal Canister Solenoid Valve
4	Activated Charcoal Canister Assembly	11	Charcoal Canister Outlet Pipe Assembly
5	Charcoal Canister Desorption Pipe	12	Charcoal Canister Desorption Pressure Sensor
6	Pressure Difference Sensor	13	Charcoal Canister Outlet Pipe II Assembly
7	Downstream Oxygen Sensor	14	Upstream Oxygen Sensor Bracket

2.3 System Schematic Diagram

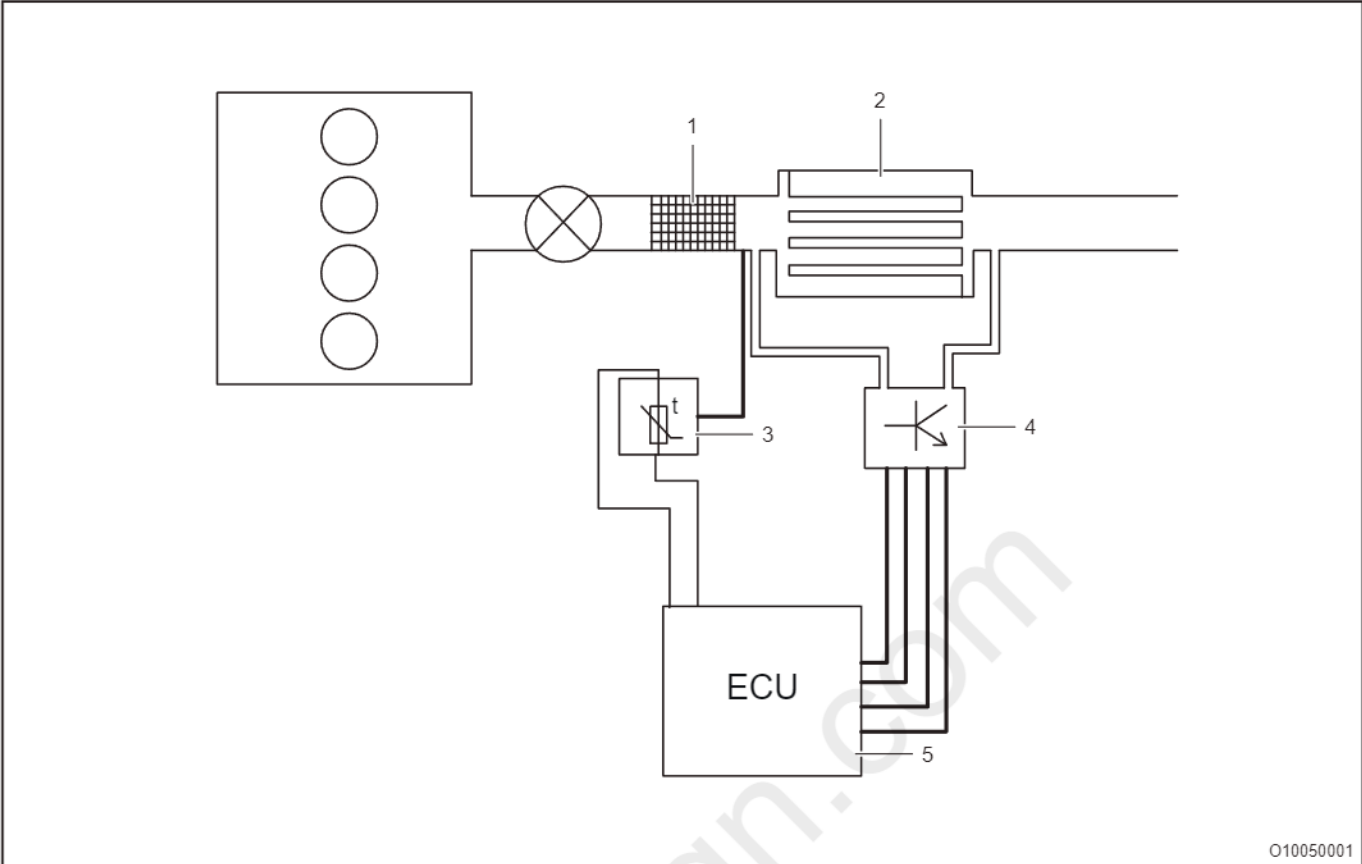
■ Fuel Vapor Recovery/Leakage Diagnosis System



1	Activated Charcoal Canister Assembly	5	Fuel Tank Pressure Sensor
2	Activated Charcoal Canister Cut-off Valve	6	Fuel Tank Assembly
3	Dust Filter	7	Charcoal Canister Desorption Pressure Sensor
4	Intake Hose Assembly		

Two desorption pipelines are equipped in fuel vapor recovery system. One desorption pipeline is connected to intake manifold through charcoal canister solenoid valve, which is low load desorption pipeline. Another desorption pipeline is connected to intake hose through charcoal canister solenoid valve pipeline (venturi tube), which is high load desorption pipeline. Principle of fuel vapor leakage diagnosis: After closing the charcoal canister ventilation valve, pump the fuel tank into a certain negative pressure through the intake manifold vacuum degree. If the negative pressure cannot be established, it is considered that there is a large leakage, i.e. a coarse leakage. Then close the charcoal canister solenoid valve, and form a closed space between charcoal canister solenoid valve rear pipe and fuel tank. When there are holes and no holes, the attenuation gradient of vacuum degree in this closed space is different, so it can be judged whether there is leakage.

Gasoline Particulate Filter (GPF) System



1	Precatalytic Converter Assembly	4	Pressure Difference Sensor
2	Gasoline Particulate Filter	5	Engine Control Unit
3	Exhaust Temperature Sensor		

GPF is a ceramic filter installed in gasoline engine emission system, which can capture gasoline particulates before they enter the atmosphere. Although GPF can capture the gasoline particulates in exhaust gas effectively, with the increase of captured gasoline particulates, exhaust back pressure will increase, which will effect the vehicle power and economy. When particulates in GPF are accumulated to a certain extent, particulates in GPF will be oxidized and burned by adjusting engine operation condition (such as fuel cut-off, delayed ignition angle), ECU controls the regeneration of GPF and remove particulates in GPF, and finally realize positive cycle of “capture-regeneration-capture” .

2.4 System Components Description

Charcoal Canister Desorption Pressure Sensor

As a varistor type, the sensor mainly detects whether the pressure (negative pressure) in high load desorption pipeline meets charcoal canister desorption requirement. Thereby complete high load desorption.

Fuel Tank Pressure Sensor

As a varistor type, the sensor mainly detects the pressure change in fuel tank, then judges whether the absorbed fuel vapor in charcoal canister is saturated and whether there is leakage in fuel vapor system.

Charcoal Canister Solenoid Valve Outlet Pipe (Venturi Tube)

Venturi effect is adopted in the venturi tube. The principle of venturi tube is to change the air flow from coarse to fine, so as to speed up the air flow rate and form a "vacuum area" at the rear side of venturi tube outlet; this vacuum area will produce certain adsorption to the outside, thereby complete high load desorption.

■ Pressure Difference Sensor (If Equipped)

The sensor is a dual-mode differential pressure sensor, and the output dual-mode signals are digital signals, which mainly detects pressure difference between the two ends of GPF, so as to indirectly judge the amount of captured particulates. Realize the “regeneration” condition.

■ Exhaust Temperature Sensor (If Equipped)

The sensor is a positive temperature coefficient thermistor (PTC) whose resistance value becomes larger as the temperature increases and becomes smaller as the temperature decreases. It mainly detects GPF inlet temperature and make sure GPF can regenerate safely.

■ Charcoal Canister Solenoid Valve

Charcoal canister solenoid valve consists of solenoid coil, armature, valve body and other parts, and it is controlled by ECU by means of duty ratio control.

■ Activated Charcoal Canister Assembly

The inside of charcoal canister is filled with active carbon with strong adsorption. The excess fuel vapor in fuel tank is no longer discharged into the atmosphere, but introduced into the charcoal canister by hose. The active carbon absorbs the fuel vapor. When it meets engine desorption conditions, the charcoal canister solenoid valve is opened, and the absorbed fuel vapor is poured into the intake manifold for combustion, so as to achieve the purpose of fuel saving and environmental protection.

■ Activated Charcoal Canister Cut-off Valve

As a normal open valve, when power is on and when fuel vapor leakage diagnosis is performed, it performs closing action which cuts off the vent of charcoal canister to the atmosphere.

■ Upstream Oxygen Sensor

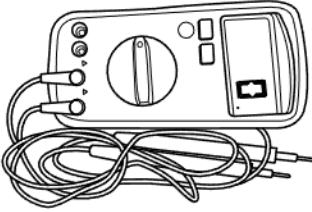
The upstream oxygen sensor is a ceramic body and is integrated with a micro pump for oxygen ion transportation. The pump supplies enough oxygen to the electrode on the exhaust gas contact side to keep the voltage on both sides constant, about 450 mV. The electronic controller converts the power consumption of pump into excess air coefficient. The output current is almost linearly related to λ , and $\lambda = 0.65 \sim \infty$, so it is also called a linear oxygen sensor. It can not only determine whether λ is greater than 1 or less than 1. Moreover, the specific value of λ can be measured in the lean and rich regions, so that the excess air coefficient in a larger range (i.e. broadband) can be measured, and continuous control of $\lambda < 1$ to $\lambda > 1$ can be realized.

■ Downstream Oxygen Sensor

The sensing element of downstream oxygen sensor is a ceramic flat body with pores. The outer side of ceramic is surrounded by engine exhaust, and the inner side is open to atmosphere. The sensing ceramic body wall is a kind of solid electrolyte, which has a heating electrode inside. The work of oxygen sensor is realized by converting the difference of oxygen ion concentration inside and outside the sensing ceramic body into voltage signal. When the temperature of sensing ceramic body reaches 350 °C, it has the characteristic of solid electrolyte. Because of its special material, oxygen ions can freely pass through the ceramic body. It is precisely by taking advantage of this characteristic, it converts the concentration difference into the potential difference, thus forming the electrical signal output. If the mixed gas is rich, the concentration difference of oxygen ions inside and outside of ceramics body is higher, potential difference is higher, a large amount of oxygen ions move from inside to outside, and the output voltage is higher (- approximately 800 mV - 1000 mV); If the gas mixture is lean, the concentration difference of oxygen ions inside and outside of ceramics body is lower, potential difference is lower, only a few oxygen ions move from inside to outside, and the output voltage is lower (approximately 100 mV). Signal voltage changes suddenly when near the theoretical equivalent air-fuel ratio ($\lambda = 1$).

3 Special Tool And Equipment

3.1 General Tool

Tool Name	Tool Drawing
Digital Multimeter	 S00002

4 Fasteners Torque List

4.1 Torque Specifications

Description	Torque (N·m)
Charcoal Canister Desorption Pressure Sensor	7 ± 1
Upstream Oxygen Sensor	45 ± 5
Downstream Oxygen Sensor	45 ± 5

5 DIAGNOSIS & TESTING

5.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Emission Control System

Symptom	Possible Cause
Fuel tank flat	Charcoal canister closed valve (damaged)
	Activated charcoal canister (blocked)
	Activated charcoal canister filter (blocked)
Lean mixture	Intake pressure sensor
	Oxygen sensor invalid
	Low fuel pressure in electric fuel pump
	Fuel injector blocked
Rich mixture	Fuel injector leakage
	Air filter blocked
	Oxygen sensor invalid
Lack of power	Oxygen sensor invalid
	Air flow meter malfunction

Symptom	Possible Cause
	Fuel pressure too low
	Cylinder compression pressure drop

6 Removal & Installation

6.1 Charcoal Canister Solenoid Valve

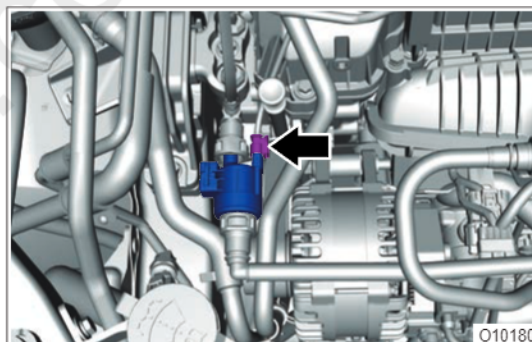
■ Removal

⚠ Warning

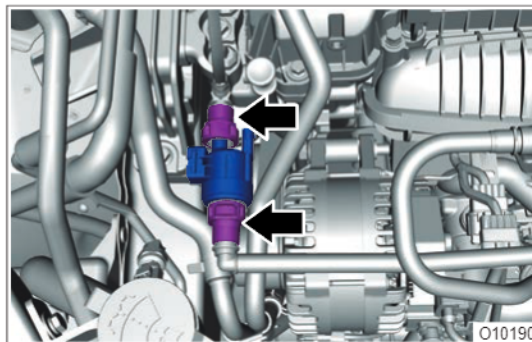
- **Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve.**
- **Appropriate force should be applied, when removing charcoal canister solenoid valve. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.
- (3) Remove the negative battery cable.

- (4) Disconnect the charcoal canister solenoid valve connector.



- (5) Disconnect charcoal canister solenoid valve inlet pipe and charcoal canister solenoid valve outlet pipe assembly.



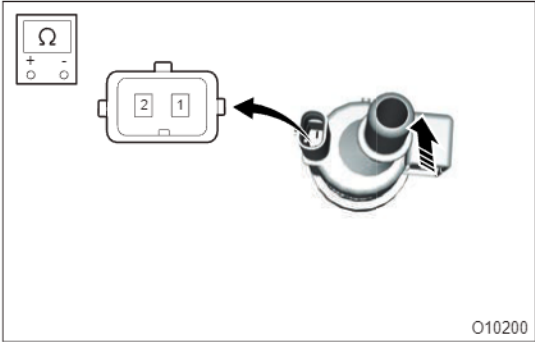
- (6) Remove the charcoal canister solenoid valve assembly.

■ Inspection

- (1) Measure the resistance of charcoal canister solenoid valve with a digital multimeter.

Measurement Temperature	Specification (Ω)
20 °C	16 ± 2

- Hint:**
If resistance is not as specified, replace the charcoal canister solenoid valve assembly.
- (2) Connect the positive battery to charcoal canister solenoid valve No. 1 pin and connect the negative battery to charcoal canister solenoid valve No. 2 pin. Check if the charcoal canister solenoid valve opens. After it opened, bleed air to direction of charcoal canister solenoid valve (arrow), and air flows easily.



■ Installation

- (1) Install charcoal canister solenoid valve, and connect charcoal canister solenoid valve inlet pipe and charcoal canister solenoid valve outlet pipe to both ends of charcoal canister solenoid valve.
- (2) Connect the charcoal canister solenoid valve connector.
- (3) Install the engine compartment trim cover assembly.

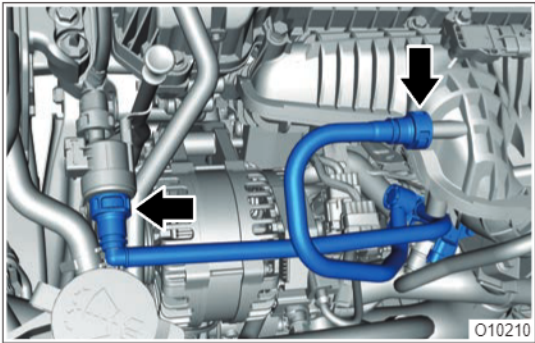
6.2 Charcoal Canister Solenoid Valve Outlet Pipe Assembly

■ Removal

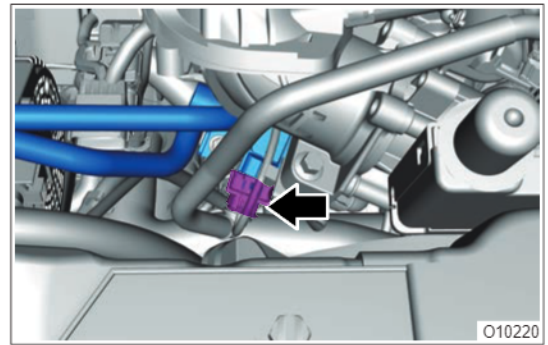
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve outlet pipe assembly.
- Appropriate force should be applied, when removing charcoal canister solenoid valve outlet pipe assembly. Be careful not to operate roughly.

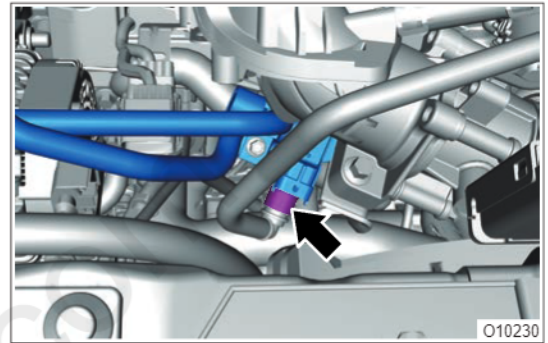
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the connection between charcoal canister solenoid valve outlet pipe assembly and charcoal canister solenoid valve.
- (5) Disconnect the connection between charcoal canister solenoid valve outlet pipe assembly and intake manifold assembly.



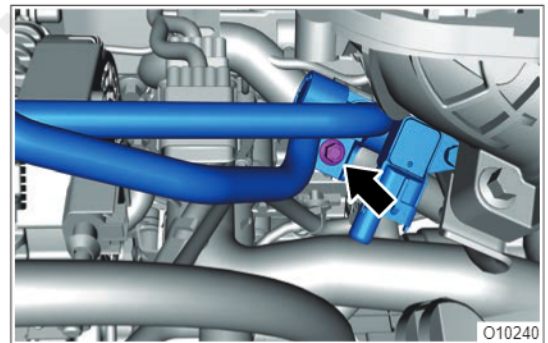
- (6) Disconnect the charcoal canister desorption pressure sensor connector.



- (7) Disconnect the charcoal canister solenoid valve outlet pipe II assembly.



- (8) Remove 1 fixing bolt and charcoal canister solenoid valve outlet pipe assembly.



- (9) Remove 1 fixing bolt from charcoal canister desorption pressure sensor, separate charcoal canister desorption pressure sensor from charcoal canister solenoid valve outlet pipe assembly.



■ Installation

- (1) Install charcoal canister desorption pressure sensor and fix 1 bolt.

Torque: 8 + 3 N·m

- (2) Install 1 fixing bolt to charcoal canister solenoid valve outlet pipe assembly.

Torque: 7 ± 1 N·m

- (3) Connect charcoal canister solenoid valve outlet pipe II assembly.
- (4) Connect the charcoal canister desorption pressure sensor connector.
- (5) Install the connection between charcoal canister solenoid valve outlet pipe assembly and intake manifold assembly.
- (6) Install the connection between charcoal canister solenoid valve outlet pipe assembly and charcoal canister solenoid valve.
- (7) Install the engine trim cover.
- (8) Install the engine compartment trim cover assembly.

6.3 Charcoal Canister Solenoid Valve Outlet Pipe II Assembly

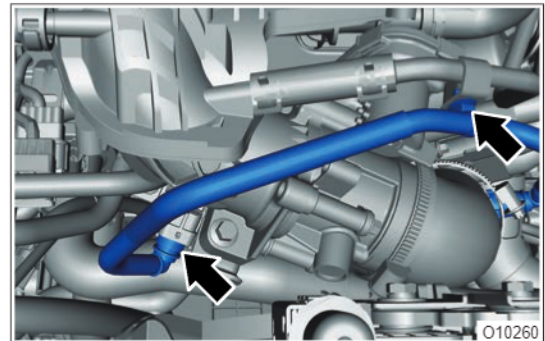
■ Removal

⚠ Caution

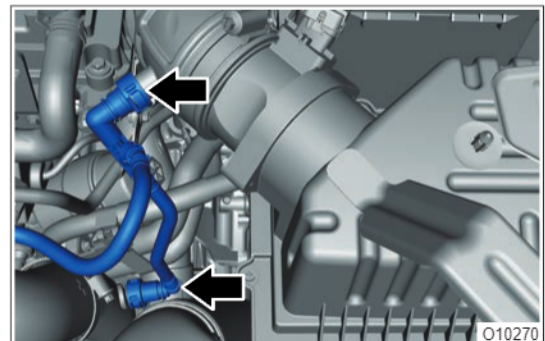
- **Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve outlet pipe II assembly.**
- **Appropriate force should be applied, when removing charcoal canister solenoid valve outlet pipe II assembly. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.

- (3) Disconnect the connection between charcoal canister solenoid valve outlet pipe II assembly and charcoal canister solenoid valve outlet pipe assembly.
- (4) Disconnect 1 fixing clip from charcoal canister solenoid valve outlet pipe II assembly.



- (5) Disconnect the connection between charcoal canister solenoid valve outlet pipe II assembly and intercooler outlet pipe assembly II.
- (6) Disconnect the connection between charcoal canister solenoid valve outlet pipe II assembly and intake hose assembly.



- (7) Remove charcoal canister solenoid valve outlet pipe II assembly.

■ Installation

- (1) Install charcoal canister solenoid valve outlet pipe II assembly.
- (2) Install the connection between charcoal canister solenoid valve outlet pipe II assembly and intake hose assembly.
- (3) Install the connection between charcoal canister solenoid valve outlet pipe II assembly and intercooler outlet pipe assembly II.
- (4) Install 1 fixing clip to charcoal canister solenoid valve outlet pipe II assembly.
- (5) Install the connection between charcoal canister solenoid valve outlet pipe II assembly and charcoal canister solenoid valve outlet pipe assembly.
- (6) Install the engine compartment trim cover assembly.

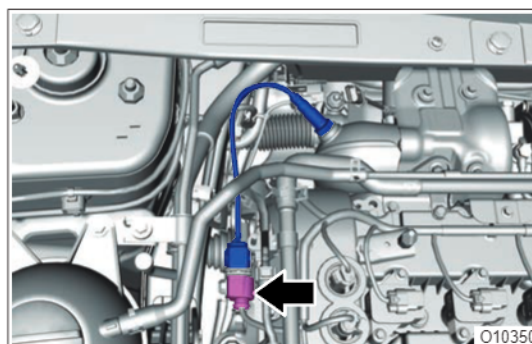
6.4 Upstream Oxygen Sensor

■ Removal

⚠ Warning

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Appropriate force should be applied when removing upstream oxygen sensor. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched when removing upstream oxygen sensor.

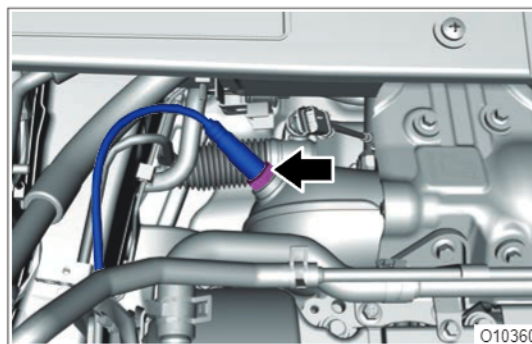
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.
- (3) Disconnect the negative battery cable.
- (4) Remove the engine trim cover.
- (5) Take off and disconnect upstream oxygen sensor connector from bracket.



- (6) Remove the upstream oxygen sensor from front part of precatalytic converter assembly.

Hint:

Remove it with special oxygen sensor socket.

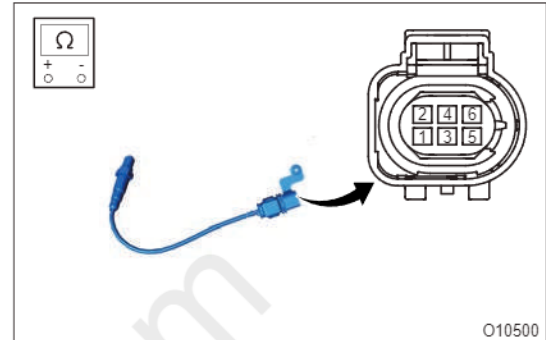


■ Inspection

- (1) Measure the resistance of upstream oxygen sensor with a digital multimeter.

Multimeter Connection	Terminal Definition
Terminal 1	Controlled by oxygen pump
Terminal 2	(Reference ground) Analog ground
Terminal 3	Heater power supply
Terminal 4	Heater control
Terminal 5	Correction resistance
Terminal 6	Reference signal

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	Normal Temperature	4 - 5 Ω
Terminal 1 - Terminal 5	Normal Temperature	114 Ω



Hint:

If result is not as specified, replace the upstream oxygen sensor.

■ Installation

⚠ Caution

- The specified grease must be used. Use of other grease will lead to oxygen sensor poisoning. The new sensor has been applied with grease and the grease must be applied to the mounting threads when reassembling.

Material No.: 5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

- If oxygen sensor falls, never install it directly.

- (1) Install upstream oxygen sensor with special oxygen sensor socket.

Torque: 45 ± 5 N·m

- (2) Install the upstream oxygen sensor connector.
- (3) Install the engine compartment trim cover assembly.

6.5 Downstream Oxygen Sensor

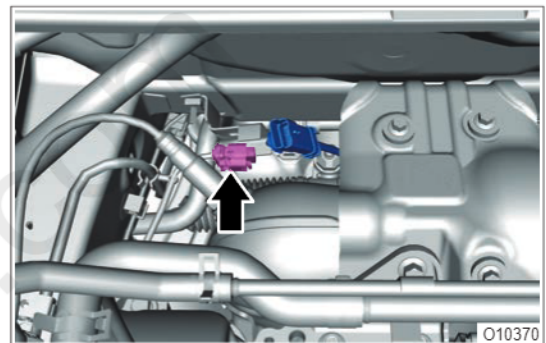
■ Removal

⚠ Warning

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Appropriate force should be applied when removing downstream oxygen sensor. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched when removing downstream oxygen sensor.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Raise the vehicle to a proper position.

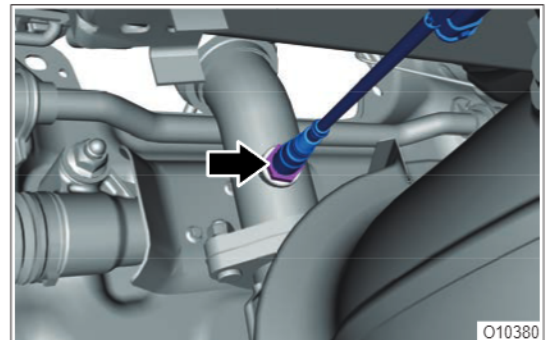
- (4) Disconnect the downstream oxygen sensor connector.



- (5) Remove the downstream oxygen sensor.

Hint:

Remove it with special oxygen sensor socket.

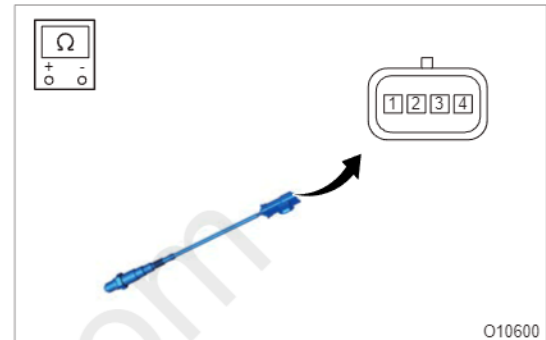


■ Inspection

- (1) Measure the resistance of upstream oxygen sensor with a digital multimeter.

Multimeter Connection	Terminal Definition
Terminal 1	Ground
Terminal 2	Signal
Terminal 3	Heat control
Terminal 4	Heater power supply

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	Normal Temperature	5 - 22 Ω
Terminal 1 - Terminal 2	Always	No continuity
Terminal 1 - Terminal 4		
Terminal 2 - Terminal 3		
Terminal 2 - Terminal 4		



Hint:

If result is not as specified, replace the downstream oxygen sensor.

■ Installation

⚠ Caution

- The specified grease must be used. Use of other grease will lead to oxygen sensor poisoning. The new sensor has been applied with grease and the grease must be applied to the mounting threads when reassembling.

Material No.: 5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

- If oxygen sensor falls, never install it directly.

- (1) Install downstream oxygen sensor with special oxygen sensor socket.

Torque: 45 ± 5 N·m

- (2) Install the downstream oxygen sensor connector.

6.6 Activated Charcoal Canister Assembly

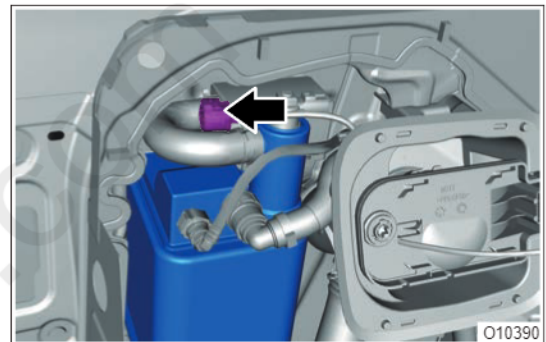
■ Removal

⚠ Warning

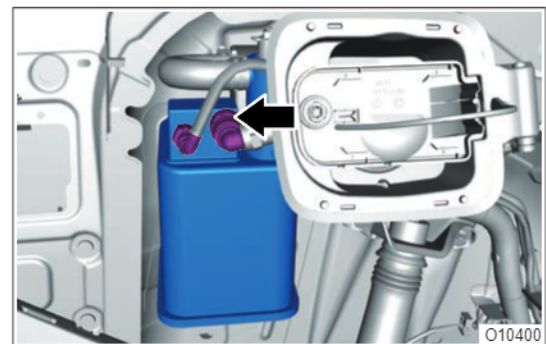
- **Be sure to wear necessary safety equipment to prevent accidents when removing activated charcoal canister assembly.**
- **Appropriate force should be applied when removing activated charcoal canister assembly. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Remove the engine compartment trim cover assembly.
- (3) Disconnect the negative battery cable.
- (4) Remove the rear right wheel.
- (5) Remove the rear right wheel house protector assembly.

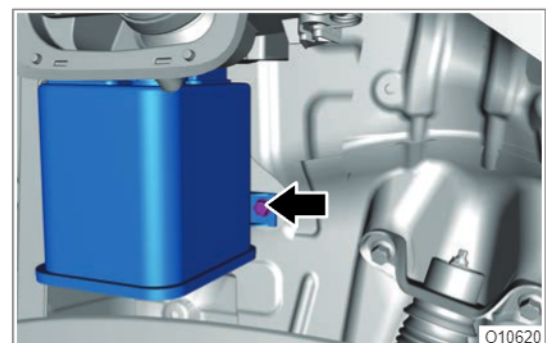
- (6) Disconnect the activated charcoal canister cut-off valve connector.



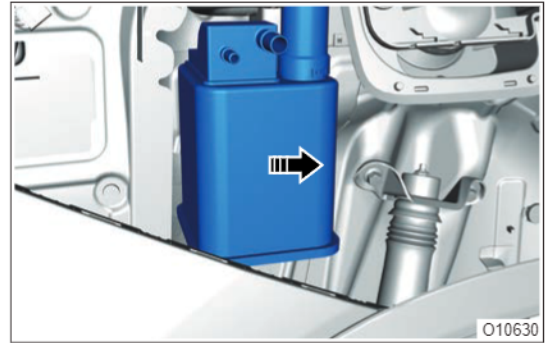
- (7) Disconnect the charcoal canister desorption pipeline and fuel breather pipe from activated charcoal canister.



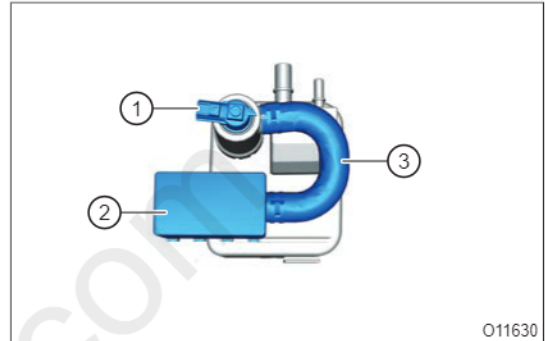
- (8) Remove 1 fixing bolt from activated charcoal canister assembly.



- (9) Remove the activated charcoal canister assembly in direction of arrow.



- (10) Remove charcoal canister cut-off valve (1), dust filter (2) and charcoal canister breather pipe (3) from activated charcoal canister assembly.



■ Inspection

- (1) Make sure solenoid valve can move freely and it is not stuck.

■ Installation

- (1) Install charcoal canister cut-off valve, dust filter and charcoal canister breather pipe to activated charcoal canister assembly.
- (2) Install activated charcoal canister assembly to body and tighten 1 fixing bolt.

Torque: $19 \pm 3 \text{ N}\cdot\text{m}$

- (3) Connect charcoal canister desorption pipe to activated charcoal canister assembly.
- (4) Connect fuel tank breather pipe to activated charcoal canister assembly.
- (5) Connect the activated charcoal canister cut-off valve connector.
- (6) Install rear right wheel house protector assembly.
- (7) Install the rear right wheel.
- (8) Install the engine compartment trim cover assembly.

6.7 Dust Filter

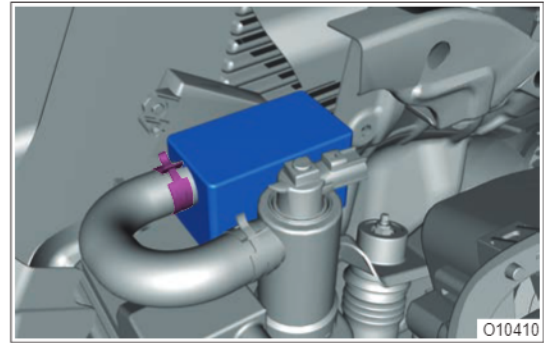
■ Removal

⚠ Warning

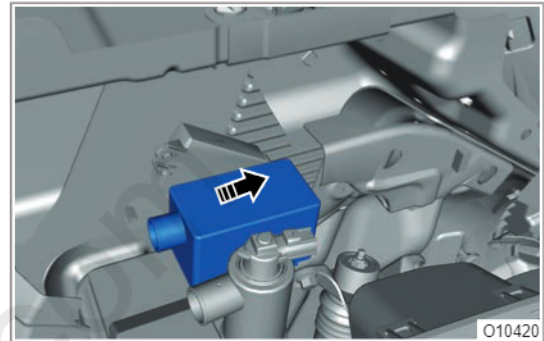
- **Be sure to wear necessary safety equipment to prevent accidents when removing dust filter.**
- **Appropriate force should be applied when removing dust filter. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear right wheel.
- (4) Remove the rear right wheel house protector.

- (5) Loosen elastic clamp, and disconnect connection of activated charcoal canister breather pipe and dust filter.



- (6) Remove dust filter in direction of arrow.



■ Inspection

- (1) Check dust filter for blockage, damage.

■ Installation

- (1) Install dust filter to activated charcoal canister assembly.
- (2) Connect activated charcoal canister breather pipe to dust filter.
- (3) Install rear right wheel house protector.
- (4) Install the rear right wheel.

6.8 Activated Charcoal Canister Breather Pipe Assembly

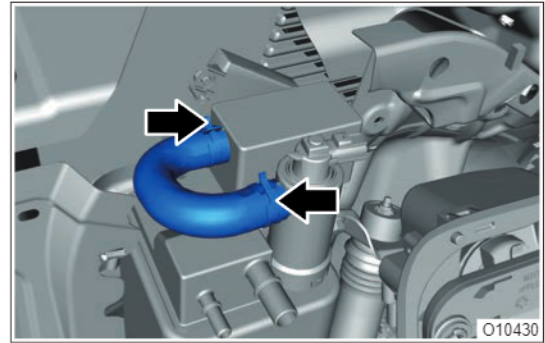
■ Removal

Warning

- Be sure to wear necessary safety equipment to prevent accidents when removing activated charcoal canister breather pipe assembly.
- Appropriate force should be applied when removing activated charcoal canister breather pipe assembly. Be careful not to operate roughly.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear right wheel.
- (4) Remove the rear right wheel house protector.

- (5) Loosen elastic clamp, and disconnect connection of activated charcoal canister breather pipe and activated charcoal canister cut-off valve.
- (6) Loosen elastic clamp, and disconnect connection of activated charcoal canister breather pipe and dust filter.



- (7) Remove activated charcoal canister breather pipe assembly.

■ Inspection

- (1) Check activated charcoal canister breather pipe for blockage, damage.

■ Installation

- (1) Connect activated charcoal canister breather pipe to activated charcoal canister cut-off valve and install elastic clamp.
- (2) Connect activated charcoal canister breather pipe to dust filter and install elastic clamp.
- (3) Install rear right wheel house protector.
- (4) Install the rear right wheel.

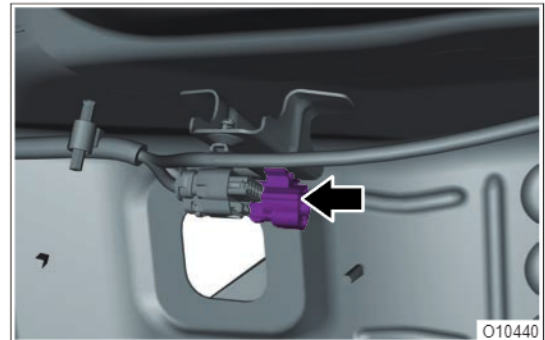
6.9 Exhaust Temperature Sensor (If Equipped)

■ Removal

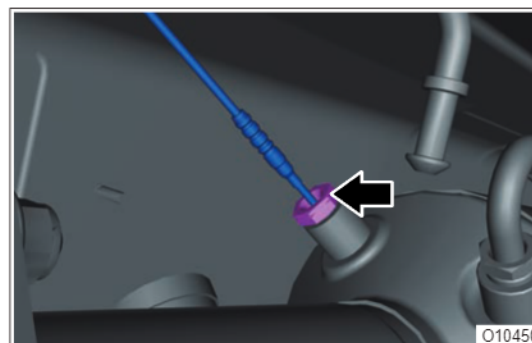
⚠ Warning

- Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.
- Appropriate force should be applied when removing exhaust temperature sensor. Be careful not to operate roughly.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Raise the vehicle to a proper position.
- (4) Disconnect the exhaust temperature sensor connector.



- (5) Remove exhaust temperature sensor from the front end of GPF.



■ Cleaning

- (1) Heating the front end of sensor, measure resistance with multimeter ohm band. The resistance should change in accordance with temperature.
- (2) Turn digital multimeter to ohm band, connect two probes to two terminals (no polarity) respectively, the normal resistance should be 200 ~ 230 Ω at normal temperature (0 ~ 40 $^{\circ}\text{C}$). If the resistance is abnormal (out of range), the performance is invalid. Abnormal conditions usually include open (- resistance is ∞) or short (resistance is 0).

Temperature ($^{\circ}\text{C}$)	Resistance (Ω)
-40	170.68
0	201.50
10	209.15
50	239.49
100	276.90
150	313.72
200	349.96
250	385.61
300	420.68
350	455.16
400	489.06
450	522.37
500	555.10
550	587.24
600	618.80
650	649.77
700	680.16
750	709.96
800	739.18
850	767.81
900	795.86

■ Installation

- (1) Install the exhaust temperature sensor.

Torque: $35 \pm 5 \text{ N}\cdot\text{m}$

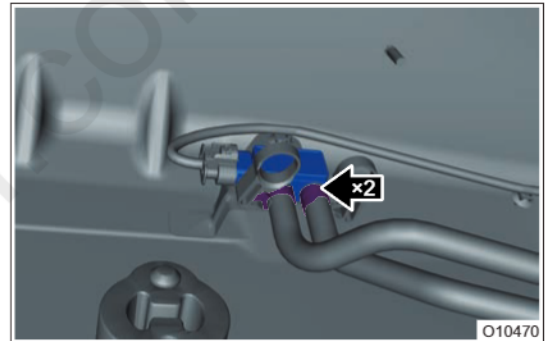
- (2) Connect the exhaust temperature sensor connector.

6.10 Pressure Difference Sensor (If Equipped)**■ Removal****⚠ Warning**

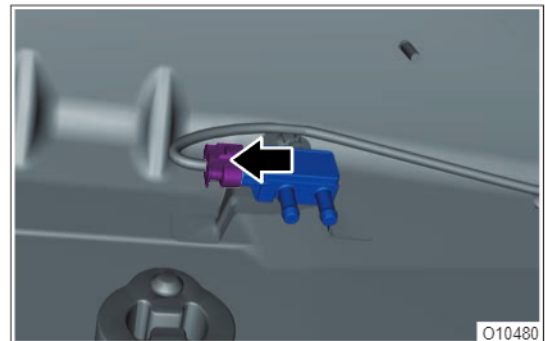
- **Be sure to wear necessary safety equipment to prevent accidents, when removing pressure difference sensor.**
- **Appropriate force should be applied when removing pressure difference sensor. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Raise the vehicle to a proper position.

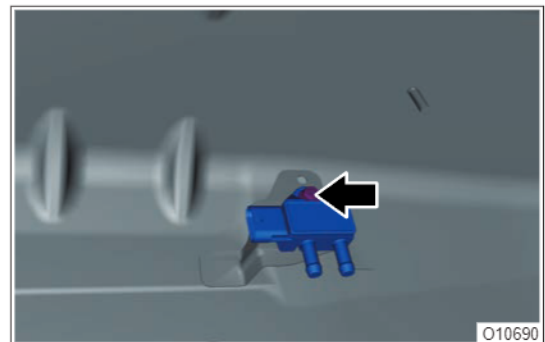
- (4) Loosen 2 elastic clamps and disconnect the connection between hose and pressure difference sensor.



- (5) Disconnect the pressure difference sensor connector.



- (6) Remove 1 fixing bolt from pressure difference sensor.



- (7) Remove the pressure difference sensor assembly carefully.

■ Inspection

- (1) Turn digital multimeter to ohm band, ground the black probe 3#, connect red probe to pins 1# and 2# respectively. It is normal that resistance is greater than 2.5 MΩ.
- (2) Connect pin 4# VDD of sensor to 5V power supply, pin 3# GND to ground, and connect output pins 1# and 2# through SENT signal collector (oscilloscope). At normal temperature ($30 \pm 10^\circ$) and normal pressure (101 kpa $\pm$ 5 kpa), the output value in decimal number 1184 ~ 1423 is normal.

Hint:

SENT is the abbreviation of Single Edge Nibble Transmission. As a point-to-point and one-way transmission scheme launched by Society of Automotive Engineers (SAE), it is used to transmit HD sensor data between vehicle sensor and electronic control unit (ECU). Sensor data is transmitted through a series of pulse sequence between two falling periods. SENT provides a reference calibration pulse at the beginning of signal and provides a check bit at the end. The length of message varies with half bit value. As a new interface standard of vehicle sensor, compared with analog output and PWM output, SENT (SAE J2716) has a good EMC performance with low cost which saves wire harness and pin connector, and it can transmit DTC, so that sensor system has an excellent malfunction diagnosis ability.

■ Installation

- (1) Install 1 fixing bolt to pressure difference sensor.
Torque: 9 ± 1.5 N·m
- (2) Connect the differential difference sensor connector.
- (3) Connect hose to pressure difference sensor and install elastic clamp.

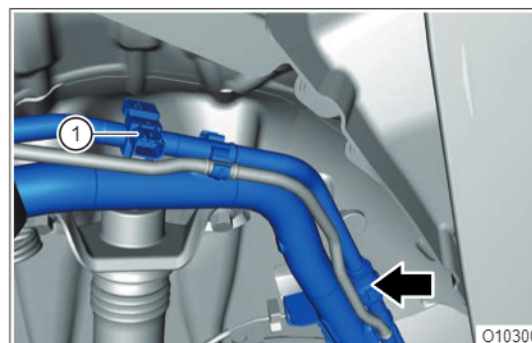
6.11 Fuel Tank Pressure Sensor

■ Removal

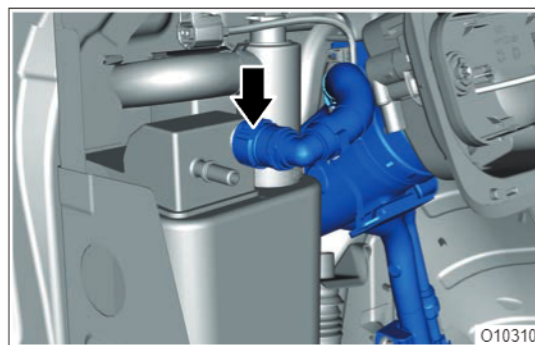
⚠ Warning

- Be sure to wear necessary safety equipment to prevent accidents, when removing fuel tank pressure sensor.
- Appropriate force should be applied when removing fuel tank pressure sensor. Be careful not to operate roughly.

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear right wheel.
- (4) Remove the rear right wheel house protector.
- (5) Disconnect the fuel tank pressure sensor connector (1).
- (6) Disconnect the pipeline.



- (7) Disconnect the activated charcoal canister assembly.



- (8) Remove fuel tank pressure sensor.

■ Installation

⚠ Caution

- Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.
- When pipe is connected using quick connector, pay attention to the fitting size and direction of the connector. During assembly, install the male connector into place along the axis direction of quick connector until it is bounced into mechanically and a "click" sound is heard. In order to check if the installation is in good condition, pull it forcibly in reverse direction.

- (1) Connect each pipeline in place.
- (2) Connect the fuel tank pressure sensor connector.
- (3) Install rear right wheel house protector.
- (4) Install the rear right wheel.