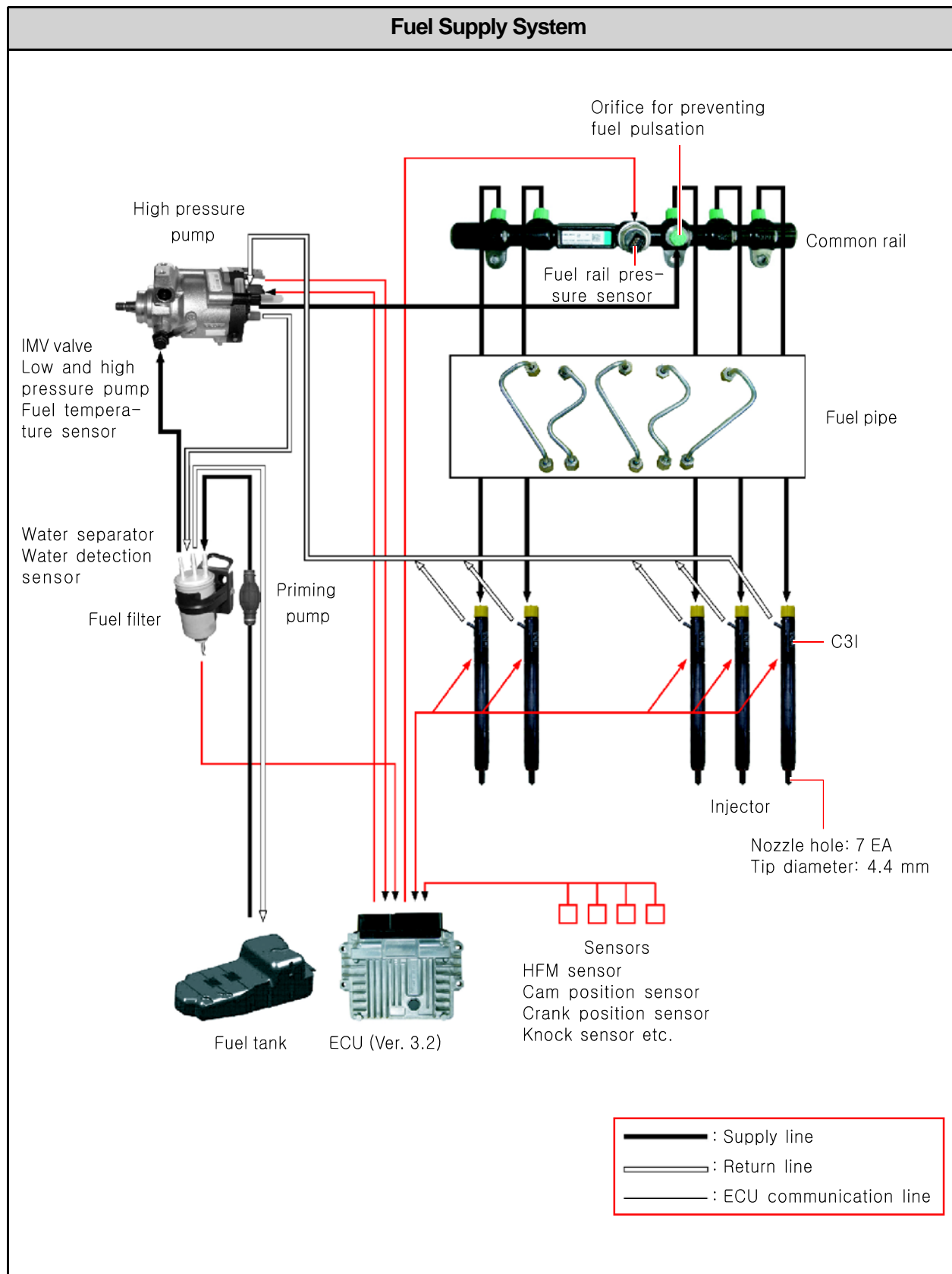


► Fuel Flow of D27DTP (Power Up) Engine



- ENGINE GENERAL
- ENGINE ASSEMBLY
- ENGINE FUEL**
- ENGINE INTAKE
- ENGINE EXHAUST
- CDPF (EURO IV)
- ENGINE LUBRICATION
- ENGINE COOLING
- ENGINE ELECTRICAL
- ENGINE CONTROL
- CRUISE CONTROL

Modification basis	
Application basis	
Affected VIN	

ENGINE INTAKE SYSTEM

2321-01

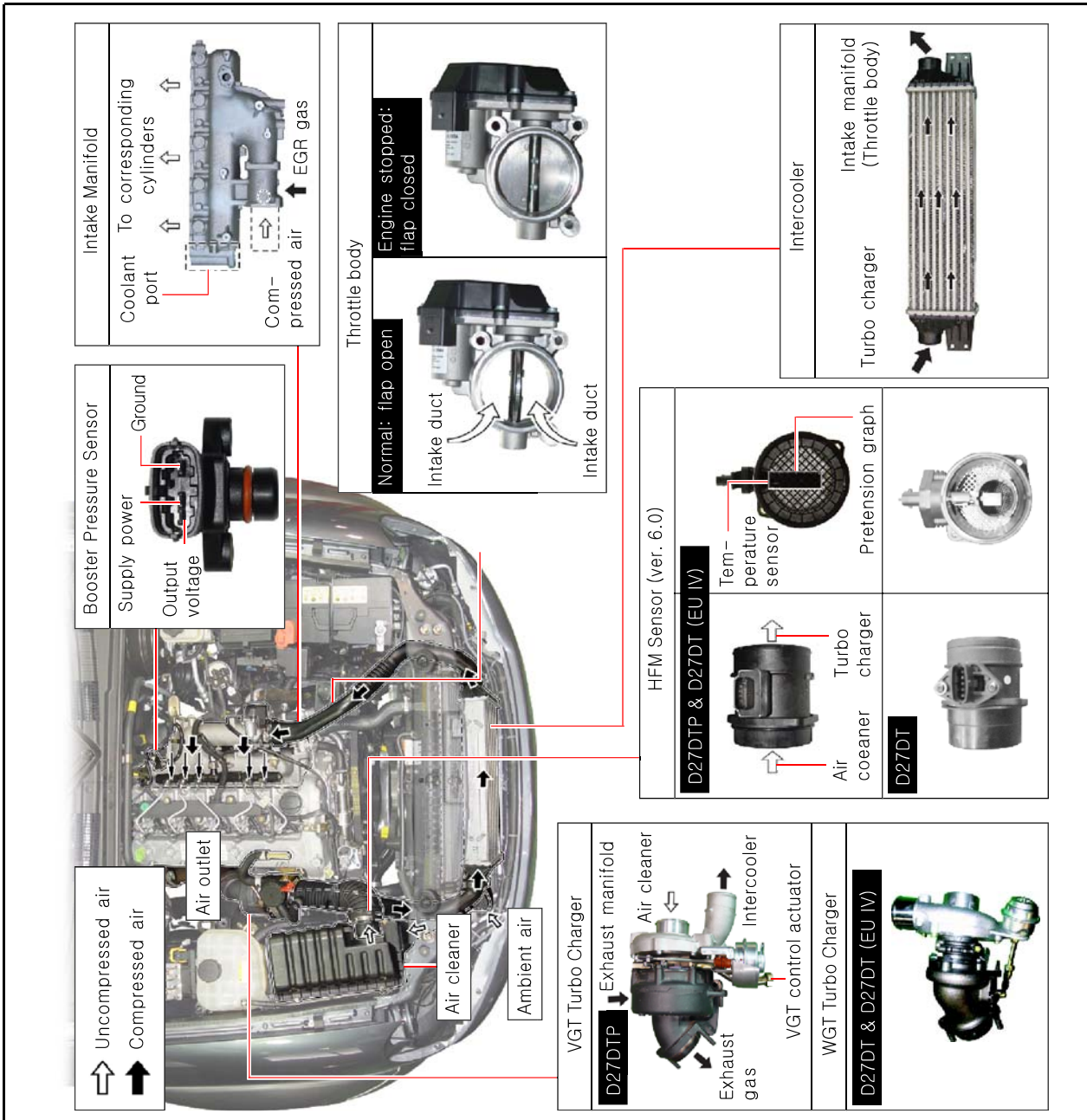
- ENGINE GENERAL
- ENGINE ASSEMBLY
- ENGINE FUEL
- ENGINE INTAKE**
- ENGINE EXHAUST
- CDPF (EURO IV)
- ENGINE LUBRICANT
- ENGINE COOLING
- ENGINE ELECTRICAL
- ENGINE CONTROL
- CRUISE CONTROL

OVERVIEW AND OPERATION PROCESS

1. INTAKE SYSTEM LAYOUT

The intake system for the D27DTP (POWERUP) engine is equipped with the throttle body that has a flap to block the air coming to the engine when the engine is switched off. Therefore, the structure of the intake manifold has been changed.

Also, the improved HFM sensor (from HFM5.0 to HFM6.0) has been installed to control the intake air precisely so that the NOx in the exhaust gas can be decreased.



Modification basis	
Application basis	
Affected VIN	

ENGINE EXHAUST SYSTEM

1792-01

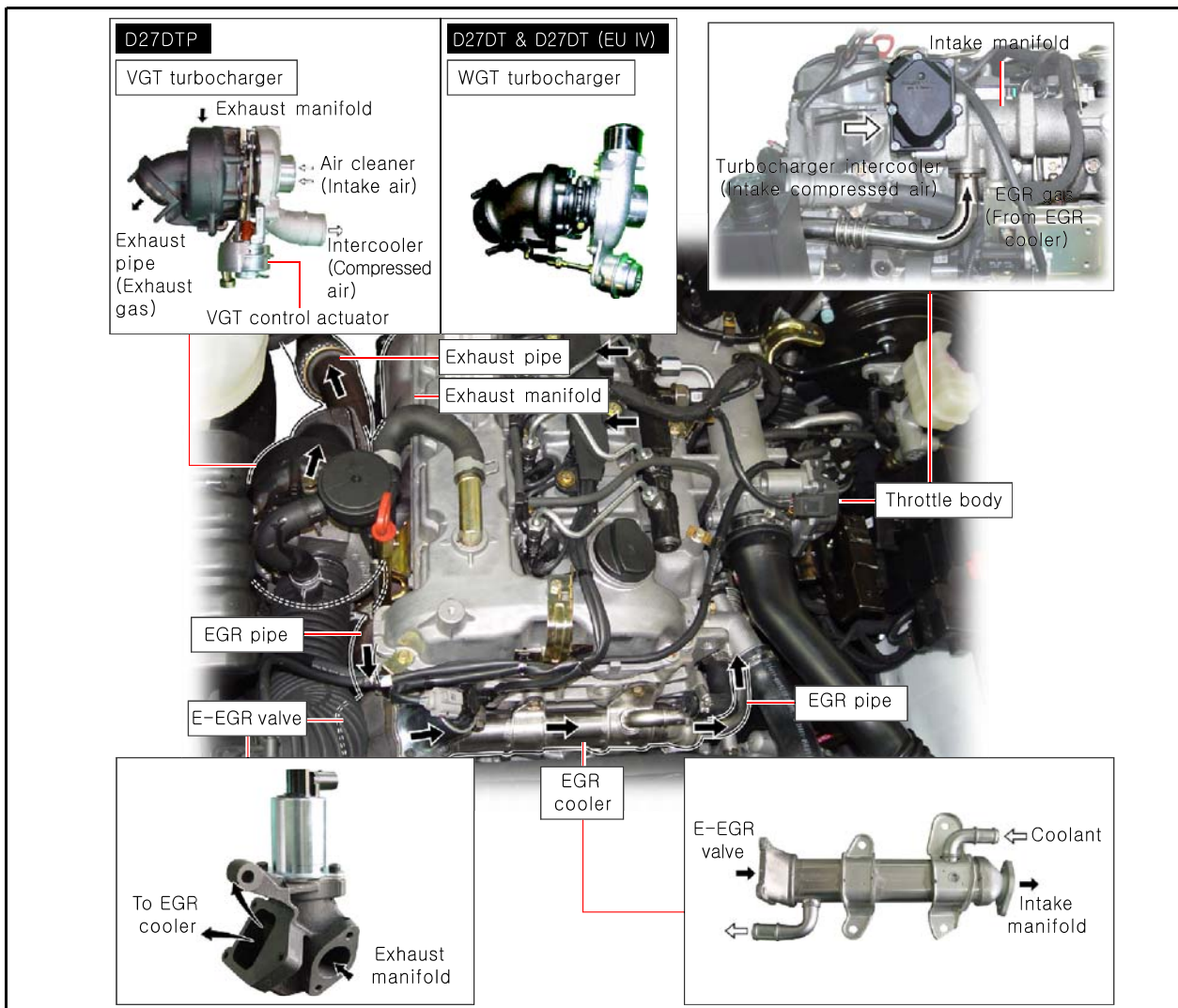
OVERVIEW AND OPERATION PROCESS

1. COMPONENTS

The components of the exhaust system for the D27DTP (POWER UP) engine have been changed as follows:

1. E-EGR valve: Controlling the EGR valve electrically and sends the valve location signal to ECU (vacuum modulator control has been deleted)
2. EGR cooler: Decreasing EGR gas (NOx) efficiently by cooling the EGR gas and let it flow to the intake pipe
3. VGT turbocharger: Increase in capacity and performance compared to D27DTP & D20DT engine

The EGR system has been changed to control NOx more efficiently and the VGT turbo charger has been changed to increase the engine power. For more details, refer to the next description. The exhaust system for D27DTP (POWER UP) engine is as follows:



Modification basis	
Application basis	
Affected VIN	

CDPF(EURO IV)

2412-02

GENERAL INFORMATION

1. OVERVIEW FOR CDPF (EURO IV)

1) General Description

The CDPF (Catalyst & Diesel Particulate Filter) was installed to the Rexton II D27DTP engine previously. However, it is now installed to the all 2009 DI engine models, except the Actyon Sports. The DI engine types installed to Rexton are D27DTP, D27DT and D20DT, and their CDPF, related sensor and operation logic are the same.

This section describes the CDPF system (based on Euro IV) which is installed to the Rexton II D27DTP engine (older model).

2) Compatibility of CDPF System by Vehicle Model

Rexton II: Same CDPF system for D27DTP and D27DT engines (including its components)

Kyron & Actyon: Same CDPF system for D27DT and D20DT engines (including its components)



NOTE

- The CDPF assemblies installed to the Euro IV D27DTP Rexton II and 2009 Rexton II are different in their mounting layout, but their front/rear exhaust temperature sensors and differential pressure sensors are same.

3) System Met with Euro IV Regulations

- E-EGR valve
- EGR cooler
- Engine ECU (Ver. 3.2)
- HFM sensor
- C3I injector
- Electronic throttle valve (body)
- Other engine mounting components

For details about the modified components and system related to the Euro IV regulations, refer to the 2008 Rodius engine service manual.

Modification basis	
Application basis	
Affected VIN	

2. CDPF(EURO IV) SYSTEM

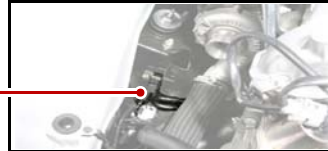
The CDPF system is only installed to the D27DT engine, and the major changes comparing to the previous D27DT engine is as follows:

CDPF (Catalyst & Diesel Particulate Filter) and sensors

Differential pressure sensor (ΔP sensor)

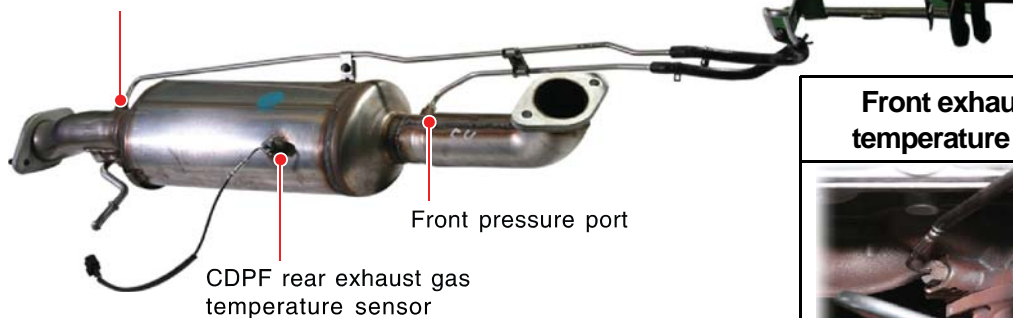


Under air cleaner in right side of engine compartment



As the soot is filtered in the CDPF, the pressure between the front side and the rear side of the filter is different from each other. If the amount of soot is over 28 g, the soot is burnt in the CDPF. The combustion is determined depending on the pressure difference, temperature of exhaust gas and EGR ratio. According to these, the soot filtered by post injection of injector is burnt at 600°C.

Rear pressure port



Front pressure port

CDPF rear exhaust gas temperature sensor

Front exhaust gas temperature sensor



CDPF Exhaust Gas Temperature Sensor



The two temperature sensors inside the CDPF are installed in exhaust manifold (front exhaust gas temperature sensor) and in DOC (rear exhaust gas temperature sensor), and perform the following functions.

Front Exhaust Gas Temperature Sensor:

Measures the exhaust gas temperature of the exhaust manifold. As it is installed in front of the VGT turbocharger, it also monitors the exhaust gas temperature coming to the turbocharger. If the temperature of the exhaust gas flowing to the turbocharger is higher than the specification, the engine lowers the exhaust gas temperature.

Rear Exhaust Gas Temperature Sensor:

Measures the increased exhaust gas temperature after the oxidation process of DOC. If the temperature is below 600°C, the post injection amount is increased to increase the temperature.

Modification basis	
Application basis	
Affected VIN	

Throttle Body

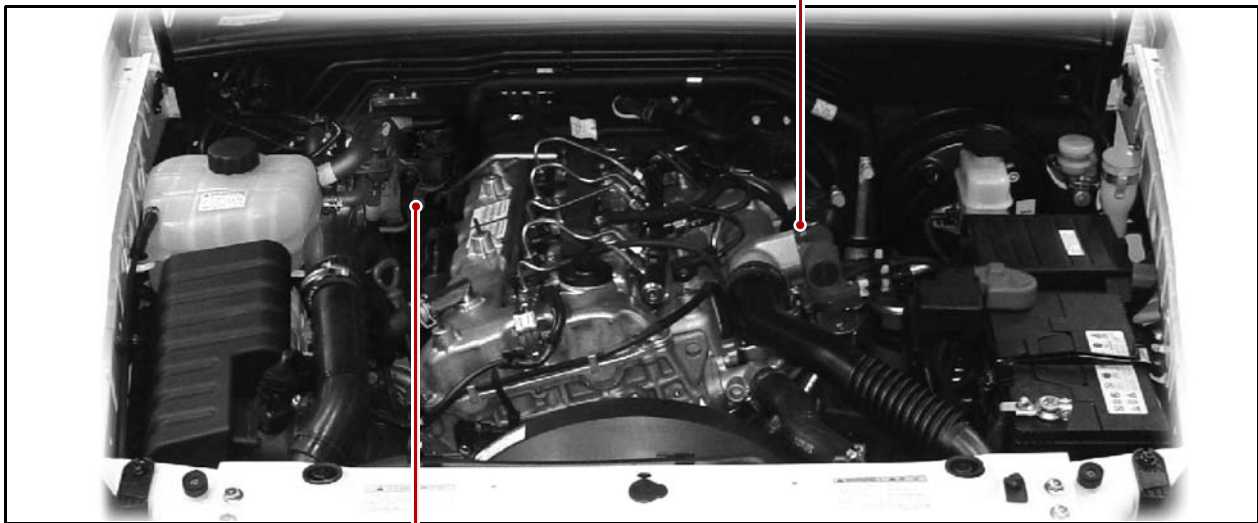
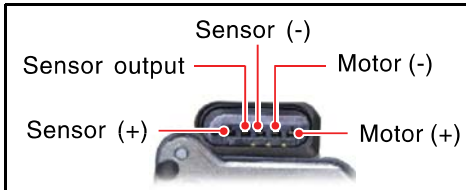


CDPF system controls the amount of intake air by controlling the electronic throttle body. The electronic throttle body has the following main functions.

CDPF control- added a function that increases the exhaust gas temperature by closing the throttle valve flap to minimize the intake air amount by the fuel injection amount during the CDPF regeneration range with the low engine load range.

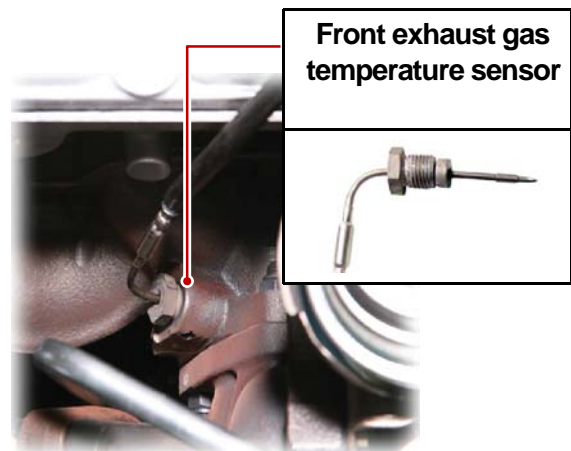
ON/OFF control - prevents the engine from turning off with vibration and noise by closing the throttle body flap to block the intake air when the engine is stopped.

Duty control- controls the valve inside the throttle body to burn more EGR gas in the EGR valve operating range.



VGT Turbocharger and Front Exhaust Gas Temperature Sensor

Turbocharger may become weaker if high temperature exhaust gas passes through the turbocharger for DPF regeneration process. The front exhaust gas temperature sensor monitors the temperature of the exhaust gas that flows into the turbocharger. If the temperature of the exhaust gas that passes through the exhaust manifold is higher than the specification, the ECU decreases the fuel injection amount and increases the EGR gas intake amount to decrease the exhaust gas temperature.



Modification basis	
Application basis	
Affected VIN	

OVERVIEW AND OPERATION PROCESS

1. OVERVIEW



As the solution for environmental regulations and PM (Particulate Material) of diesel engine, the low emission vehicle is getting popular. This vehicle is equipped with an extra filter to collect the soot and burn it again so that the amount of PM in the exhaust gas passed through the DOC (Diesel Oxidation Catalyst) is reduced. The CDPF (Catalyst & Diesel Particulate Filter) is an integrated filter including DOC (Diesel Oxidation Catalyst) and DPF (Diesel Particulate Filter).

► Comparison of throttle body functions based on exhaust emission regulation

Regulated parts are carbon monoxide (CO), nitrogen oxide (NOx), particulate matter (PM) and soot in the exhaust emission, and the particulars of the regulations are prescribed in the following table.

Engine	Control method	Function
D27DTP + CDPF D27DT + CDPF D20DT + CDPF	ECU's electric signal (Duty and On/Off control) + Throttle flap control during CDPF operation	ON/OFF control - prevents the engine from turning off with vibration and noise by closing the throttle body flap to block the intake air when the engine is stopped Duty control - controls the valve inside the throttle body to burn more EGR gas in the EGR valve operating range. CDPF control - added a function that increases the exhaust gas temperature by closing the throttle valve flap to minimize the intake air amount by the fuel injection amount during the CDPF regeneration range with the low engine load range.
D27DT engine (EU IV)	ECU's electric signal (Duty and On/Off control)	ON/OFF control - prevents the engine from turning off with vibration and noise by closing the throttle body flap to block the intake air when the engine is stopped Duty control - controls the valve inside the throttle body to burn more EGR gas in the EGR valve operating range.

Modification basis	
Application basis	
Affected VIN	

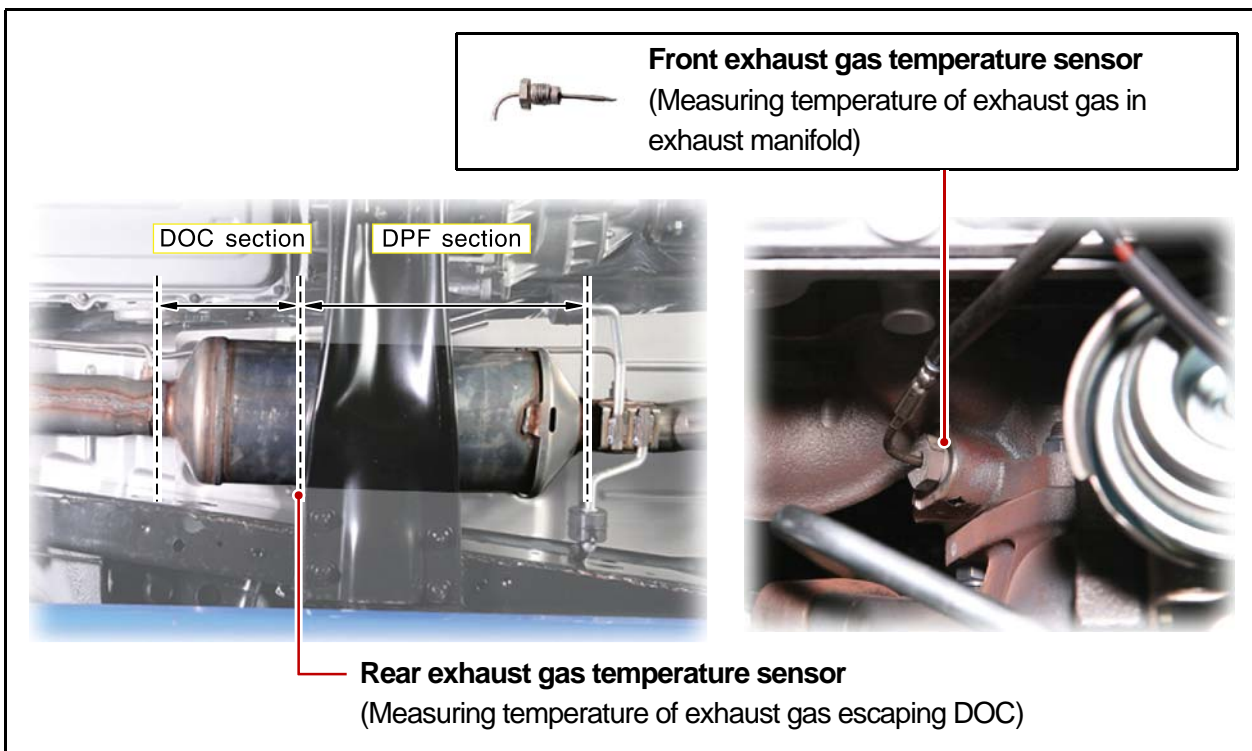
2. CDPF (EURO IV) SYSTEM CONTROL

1) Combustion Temperature and Procedures

As the soot is filtered in the CDPF, it is burnt and removed, and the CDPF is returned to the initial state to collect the soot. Therefore, the burning procedures in the CDPF can be called as regeneration.

The CDPF assembly is integrated with DOC (at front side) and DPF (at rear side).

The DPF burns the soot with high-temperature exhaust gas (over 600°C). The rear exhaust gas temperature sensor monitors the temperature of DPF section. If this temperature is below the regeneration temperature, the ECU increases the post injection period to increase the fuel injection amount, and consequently to increase the exhaust gas temperature.



NOTE

- Normally, when the vehicle is driven for 600 ~ 1,200 km, the enough amount of soot to be burnt is filtered and accumulated in the CDPF. The ECU increase the amount of post injection to increase the temperature of exhaust gas up to 600°C so that the soot is burnt. The soot is burnt for 15 ~ 20 minutes.

Modification basis	
Application basis	
Affected VIN	

2) System composition for Soot Combustion

When the engine is running in low load range, the temperature of exhaust gas is decreased as the amount of fuel supplied is decreased. To burn the soot filtered in the CDPF, the control system should be installed to check the operating range and increase the temperature of exhaust gas by controlling the amount of fuel supplied and intake air.

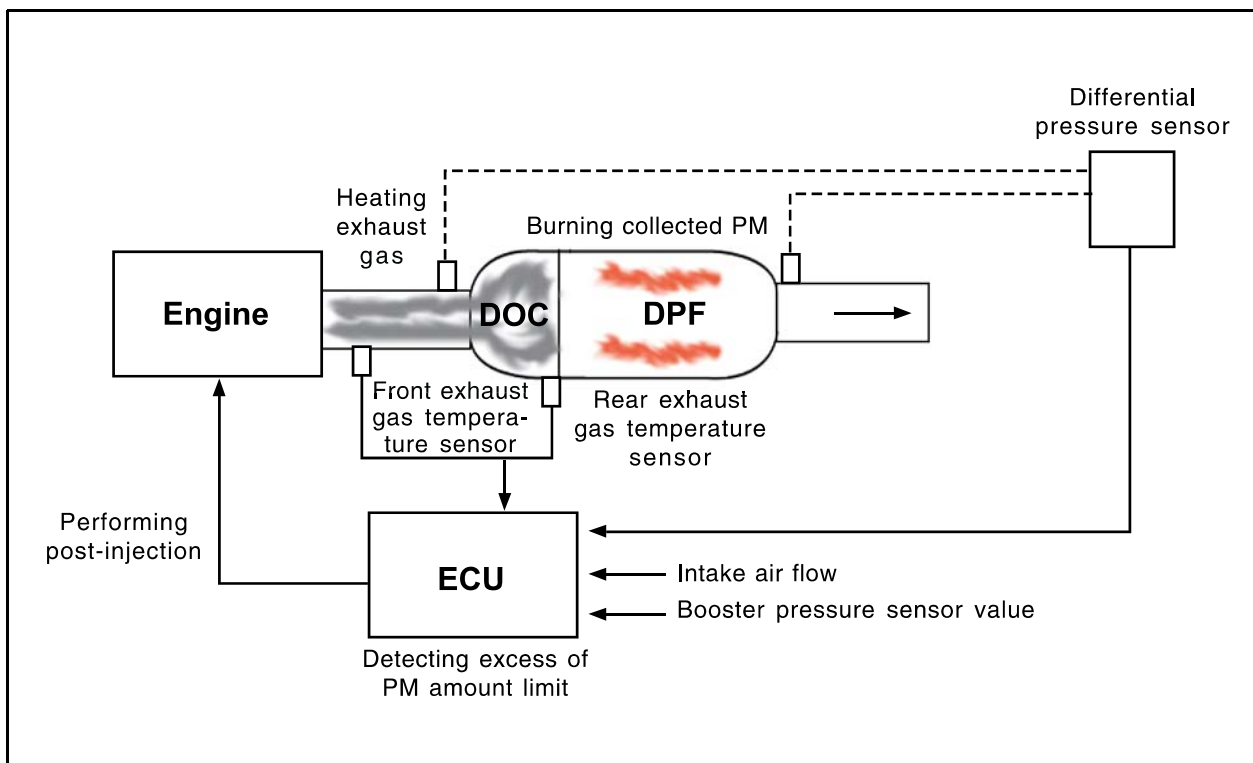
Two temperature sensors and one differential pressure sensor monitor the CDPF's operating range. According to these sensors' information, the throttle flap decreases the intake air entered to the throttle body. Also, the fuel injection pattern is added to increase the temperature of exhaust gas for soot combustion.

There are three fuel injection patterns (pilot injection, pre-injection and main injection). As the CDPF is installed, the post injection pattern is added.

3) Post Injection and Air Mass Control

When the differential pressure sensor detects the pressure difference between the front and the rear side of CDPF, the sensor sends signal indicating the soot is accumulated and the post injection is performed to raise the temperature of exhaust gas. The amount of fuel injected is determined according to the temperature of exhaust gas detected by the rear temperature sensor. If the temperature is below 600°C, the amount of fuel injected is increased to raise the temperature. If the temperature is over 600°C, the amount of fuel injected is decreased or not controlled.

When the engine is running in low load range, the amount of post injection and the amount of intake air are controlled. It is to raise the temperature by increasing the amount of fuel while decreasing the amount of intake air.



Modification basis	
Application basis	
Affected VIN	