cooling system

explain

The engine cooling system is a closed forced circulation system. It mainly includes the following components:

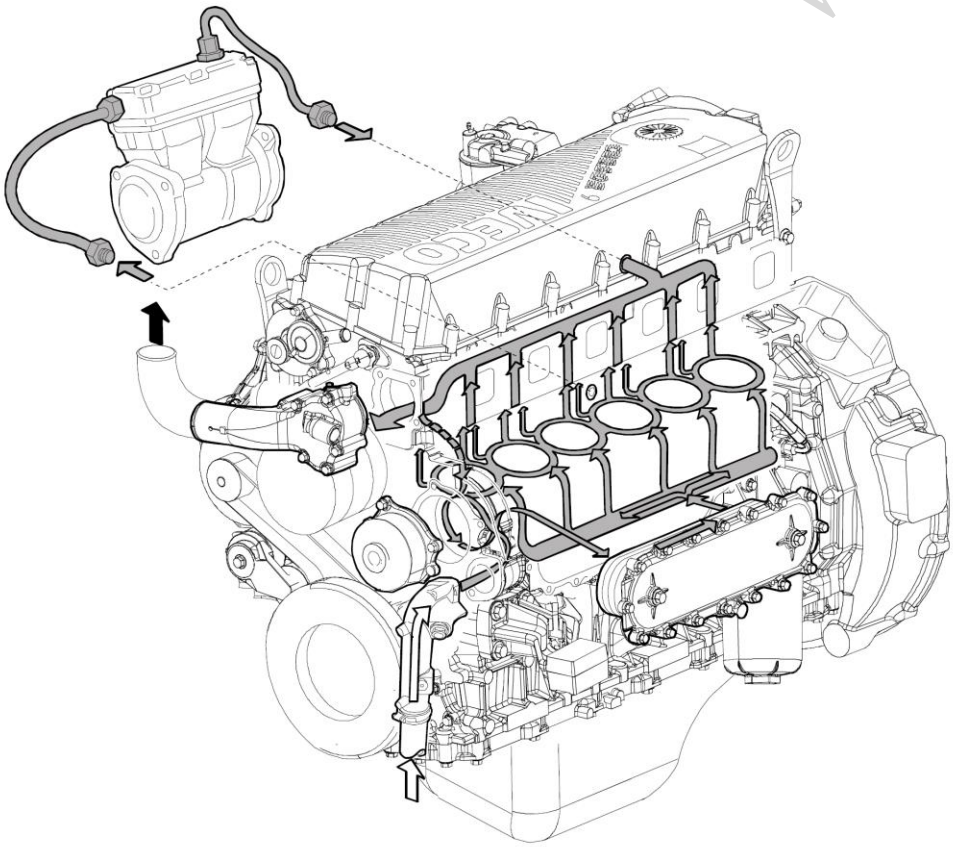
- D Expansion tank (self-provided);
- D The radiator is use for reducing that temperature of the cool liquid; D A water pump, the centrifugal system of which is incorporated into the cylinder seat; D Fan, self-provided;
- D Two-way thermostat, used to control the circulation of coolant.

operate

The water pump is driven by the crankshaft through the poly-V belt, which transports the coolant to the cylinder block, especially to the cylinder head (in large quantities). When the coolant reaches and exceeds the set temperature, the thermostat opens. Coolant flows out of the thermostat, then flows into the radiator and is cooled by the fan.

The pressure change (due to temperature change) in the system is controlled by the expansion tank.

Figur



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Water flowing out of the thermostat

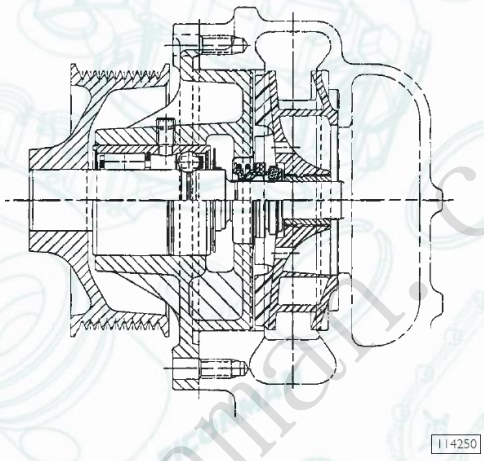
Water circulating in the engine

Water flows out of the thermostat.

Water circulates in

water pump

Figure 22



Cross section of water pump

The water pump includes: rotor, shaft and bearing, T-shaped gasket and drive pulley with dust cover.

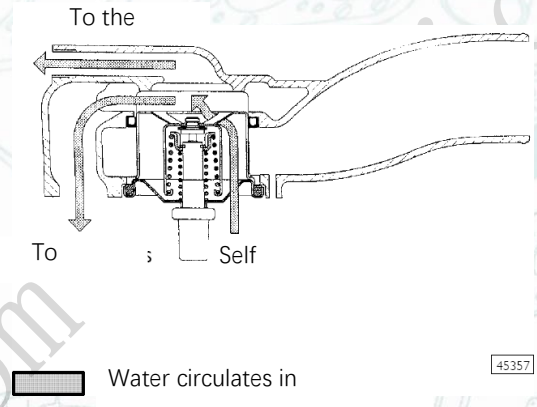
Note: Check the pump body for cracks and water leakage. If yes, replace it.

The whole water pump assembly.

thermostat

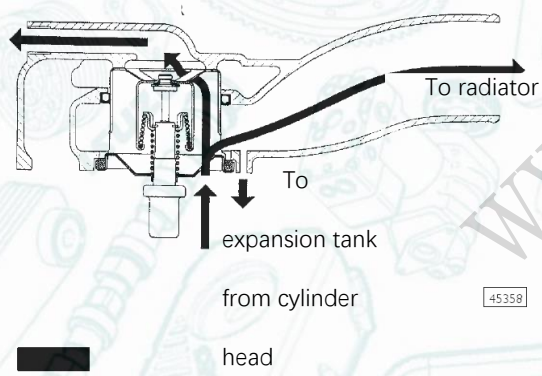
Thermostat working view

Figure 23



Water circulates in

Figure 24

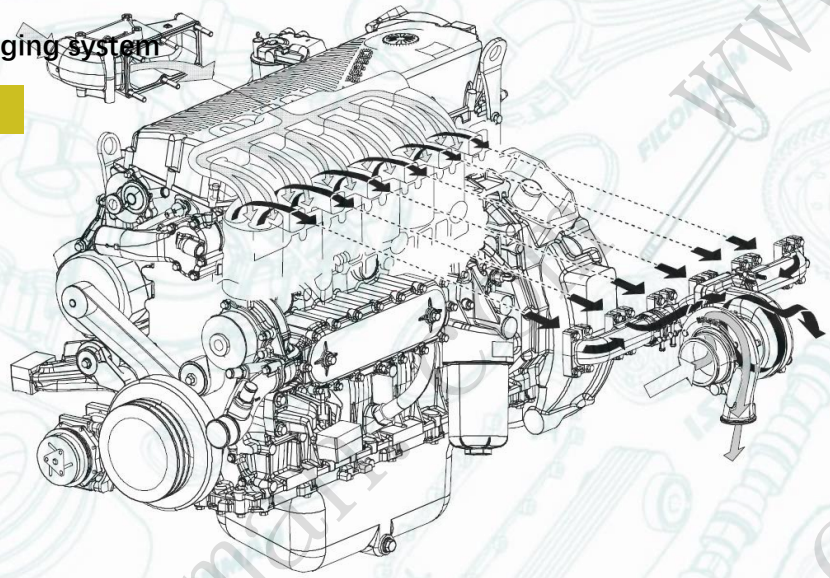


Water flows out of the thermostat.

Check whether the thermostat works properly. If in doubt, replace it. Initial opening temperature: 84c 2c. At the temperature of 94c 2c, the minimum full-open stroke is 15mm.

Turbocharging system

Figure 25



vent
Compressed air
(hot) intake
Inhale compressed air

125716

The turbocharging system includes:

- Air filter
- exhaust gas turbocharger
- charge air cooler

explain

Turbocharger is composed of the following main components: turbine, pressure regulating valve (used to regulate the intake boost pressure), intermediate and compressor.

When the engine is working, the exhaust gas is discharged through the turbine and drives the turbine to rotate.

The compressor rotor connected with the turbine through the rotating shaft rotates with the turbine to suck and compress the air filtered by the air cleaner.

Then, after being cooled by the intercooler, the compressed air enters the cylinder through the intake manifold.

The turbocharger is equipped with a pressure regulating valve, which is located at the exhaust gas inlet of the turbine. The pressure regulating valve is connected with the compressor by a vacuum tube and a controller.

The function of the pressure regulating valve is: when the inlet boost pressure on the compressor reaches the specified pressure value, the pressure regulating valve will open and part of the waste gas will be directly discharged to the exhaust.

Tube.

The turbocharger and bearing are cooled and lubricated by engine oil.

variable turbine geometry

(Applicable to engine F2CE0681A* ...)

Working principle

Variable turbine geometry (VGT) includes a centrifugal compressor and a turbine, and is equipped with a movable device.

The device can adjust the rotating speed by changing the area where the exhaust gas passes through the turbine. When the exhaust gas passes through a narrow passage, the gas can flow faster, so the turbine rotates faster. In this way, even if the engine is idling, the gas speed and turbine speed can be increased.

The device is driven by pneumatic actuators.

The actuator is directly controlled by ECU through solenoid valve.

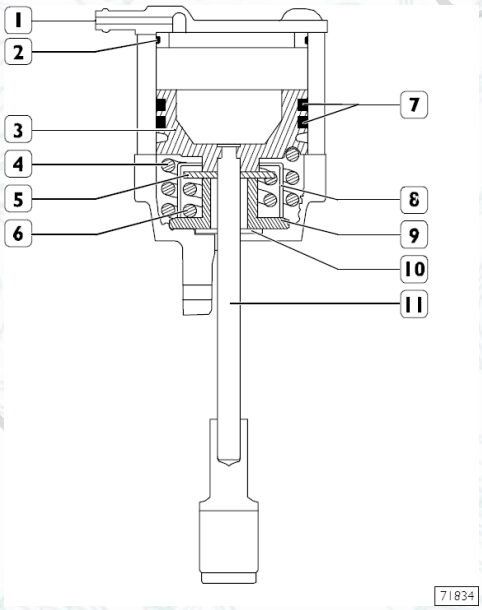
The device is completely closed at idle speed. When the engine is running at high speed

When rotating, the electronic control system drives the device and increases the area where the gas passes through the turbine, so that the incoming gas does not accelerate when flowing.

There is a cavity in the intermediate for the coolant to flow.

Actuator

Figure 26

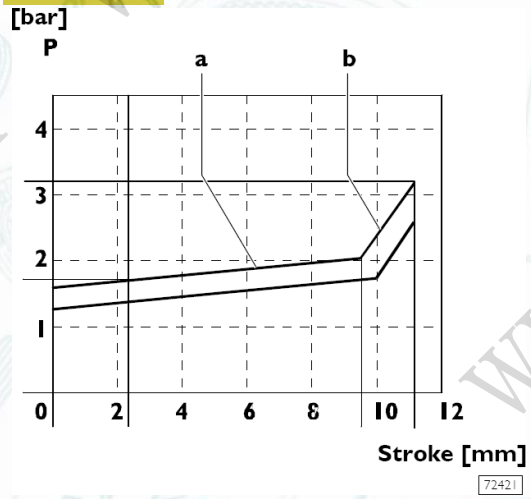


1. Air inlet 2. Gasket 3. Piston 4. Outer spring

5. Internal spring control panel 6. Internal spring 7.O-ring

8. Spring disc 9. Stop 10. Dust seal 11. Control lever

Figure 27



a Slope characterized by external spring action (4, Figure 25).

b Slope characterized by the action of the outer spring (4, Figure 25) and the inner spring (6, Figure 25).

Working principle (see Figure 25)

The movement of the actuator piston is controlled by compressed gas entering from the air inlet (1) at the top of the actuator.

Adjusting the air pressure will change the motion of the piston and the transmission rod of the turbine. As the piston moves, it further compresses the outer spring (4) until the piston base reaches the control panel (5) for controlling the inner spring (6).

Further increasing the pressure, the piston interferes with the stopper (10) through the control panel (5).

The ratio between piston stroke and pressure can be changed with two springs. about

85% of the rod stroke is driven by external spring and 15% by internal spring.

VGT electromagnetic control valve

The numerical control proportional solenoid valve is located on the cylinder body.

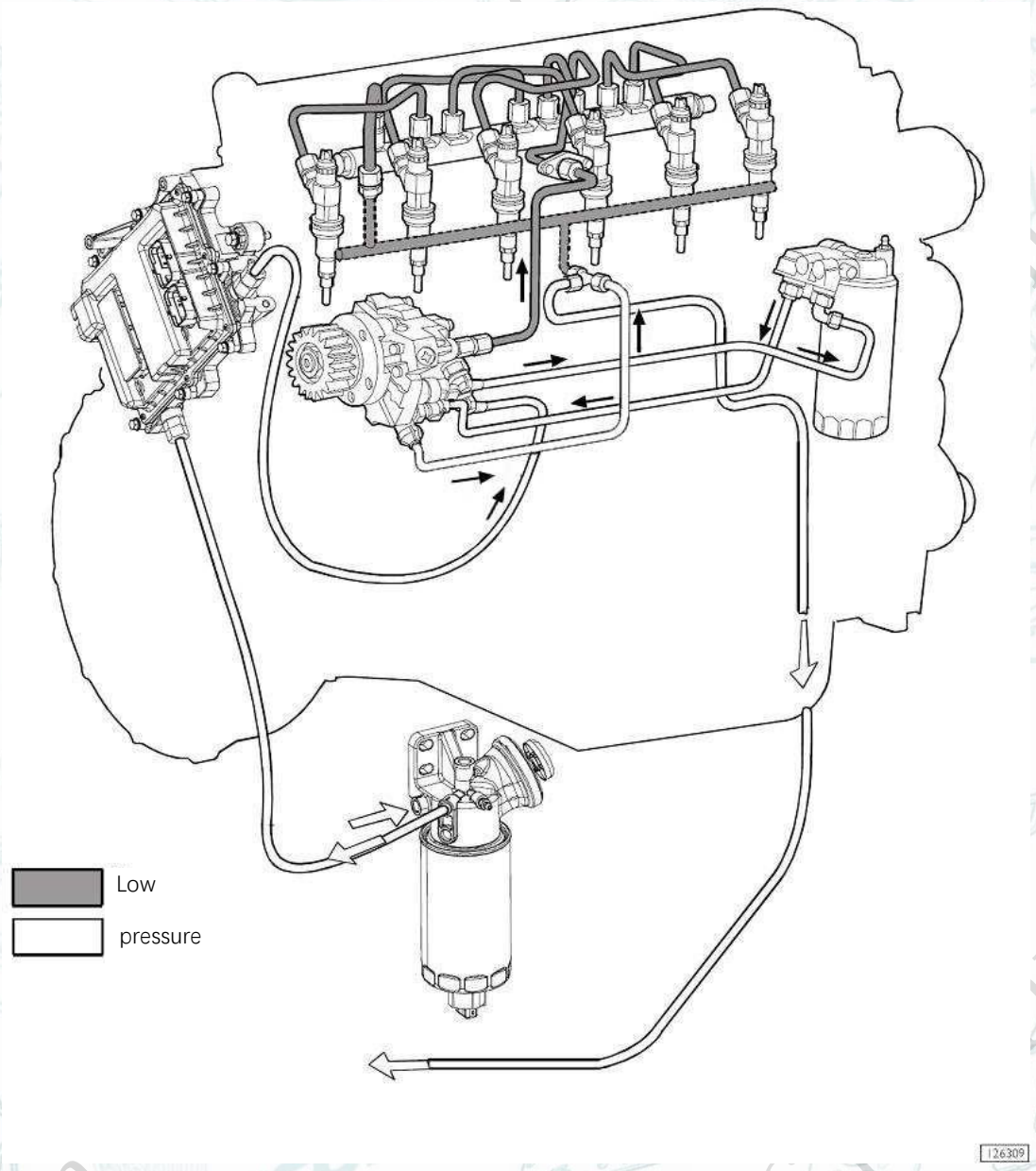
The electronic control module controls the solenoid valve through the PWM signal, controls the supply pressure of the actuator, changes the position of the electronic control module, changes the cross section through which the exhaust gas flows to the impeller blade, and thus changes the exhaust gas flow speed.

The resistance of the coil is about 20-30.

oil supply system

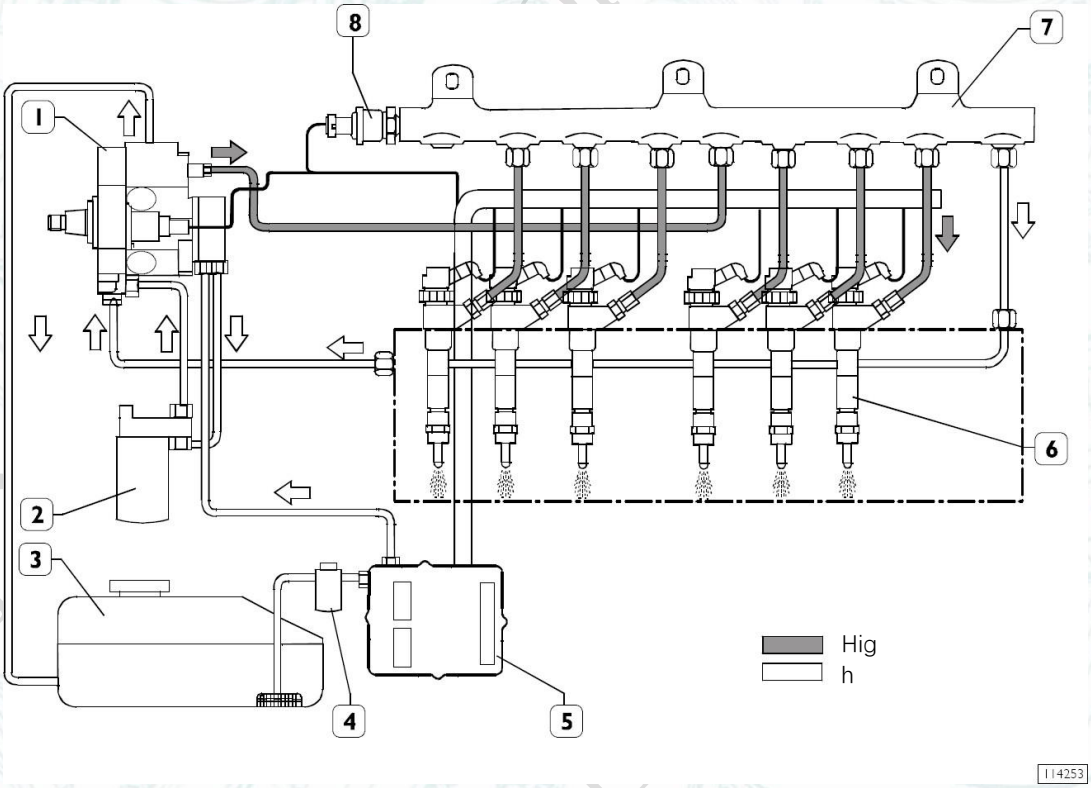
The common rail oil supply system is equipped with a special pump. The pump can keep the fuel gathered in the common rail at a constant high pressure under any injection condition and state. Therefore, the fuel at the inlet of the electronic injector is always at the injection pressure (calculated by the ECU of the engine control device). The solenoid valve of the fuel injector is controlled by ECU.

figure 1



Fuel supply map

Figure 2



1. High-pressure pump 2. Fuel filter 3. Fuel tank 4. Fuel prefilter 5. ECU 6. Electronic fuel injector

7. Common rail 8. Common rail pressure sensor

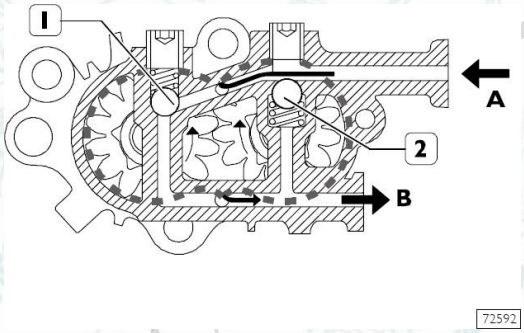
After installing the high-pressure pipeline, the oil level should be checked frequently within the first 20 hours of operation (the oil level should not rise).

Mechanical oil supply pump

The oil supply pump is installed at the rear side of the high-pressure oil pump and used to deliver fuel to the high-pressure oil pump. The oil supply pump is controlled by the high-pressure oil pump shaft.

Normal operating conditions

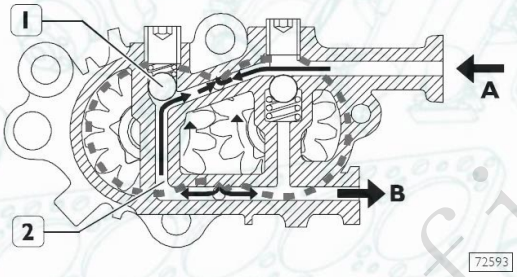
Figure 3



A fuel from the tank b fuel 1-2 bypass valve to the filter (in closed position)

Outlet overpressure condition

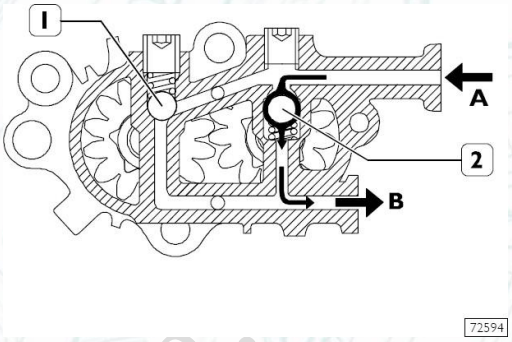
Figure 4



When the pressure at B is too high, the bypass valve (1) opens. So that a and b are communicated through the pipeline (2).

Manual oil supply condition

Figure 5



When the hand oil pump is operated to supply oil to the fuel system, the bypass valve (2) is opened. this

When the engine is turned off, the bypass valve (1) is kept in the closed position, and the bypass valve

(2) Open under the action of pressure at A Fuel flows out from B.

Note: The mechanical oil supply pump shall not be replaced separately, so the pump shall not be removed from high pressure.

Remove from the pump.

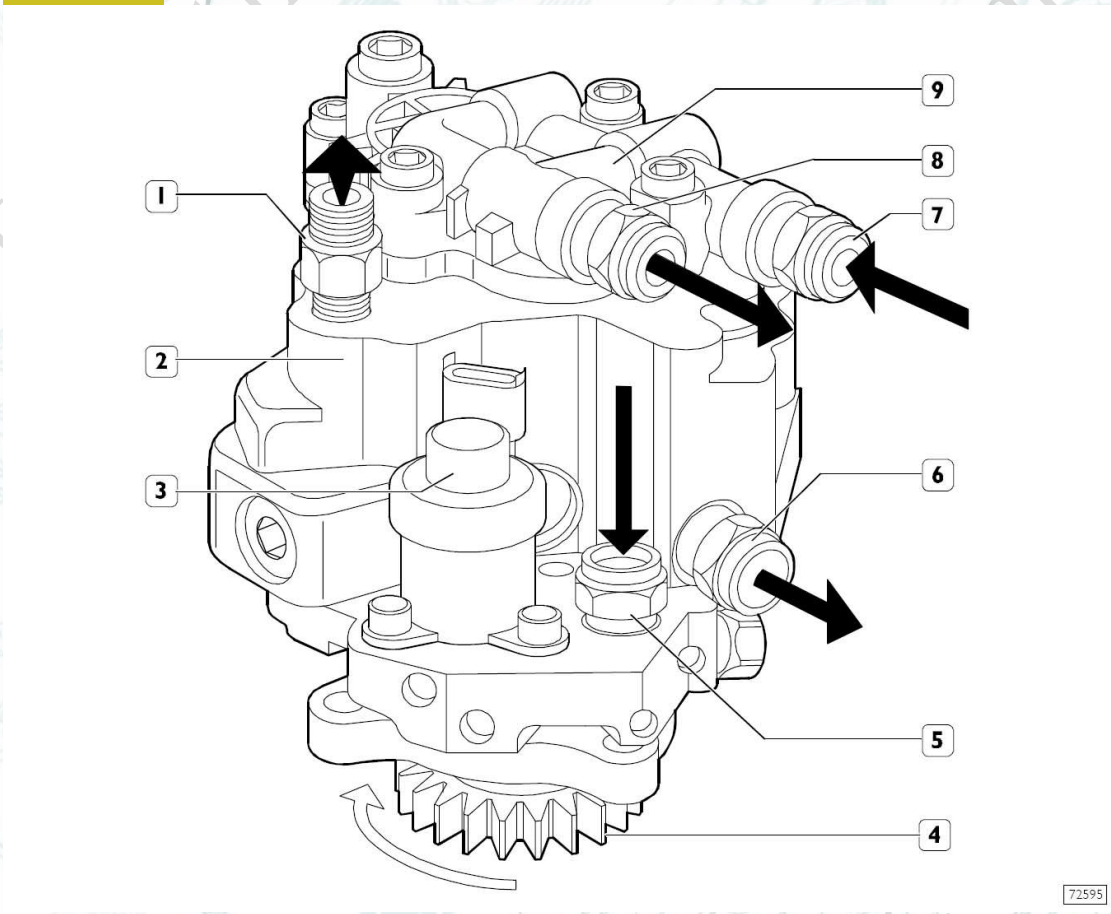
CP3 high pressure oil pump

The high-pressure oil pump is equipped with three radial plungers, which are controlled by the gear of the high-pressure oil pump without any setting. The mechanical oil supply pump is installed at the rear side of the high-pressure pump and controlled by the high-pressure pump shaft.

The following work must be carried out on the oil supply pump/high pressure oil pump assembly:

- Replace the high-pressure oil pump gear;
- Replace the voltage regulator.

Fig



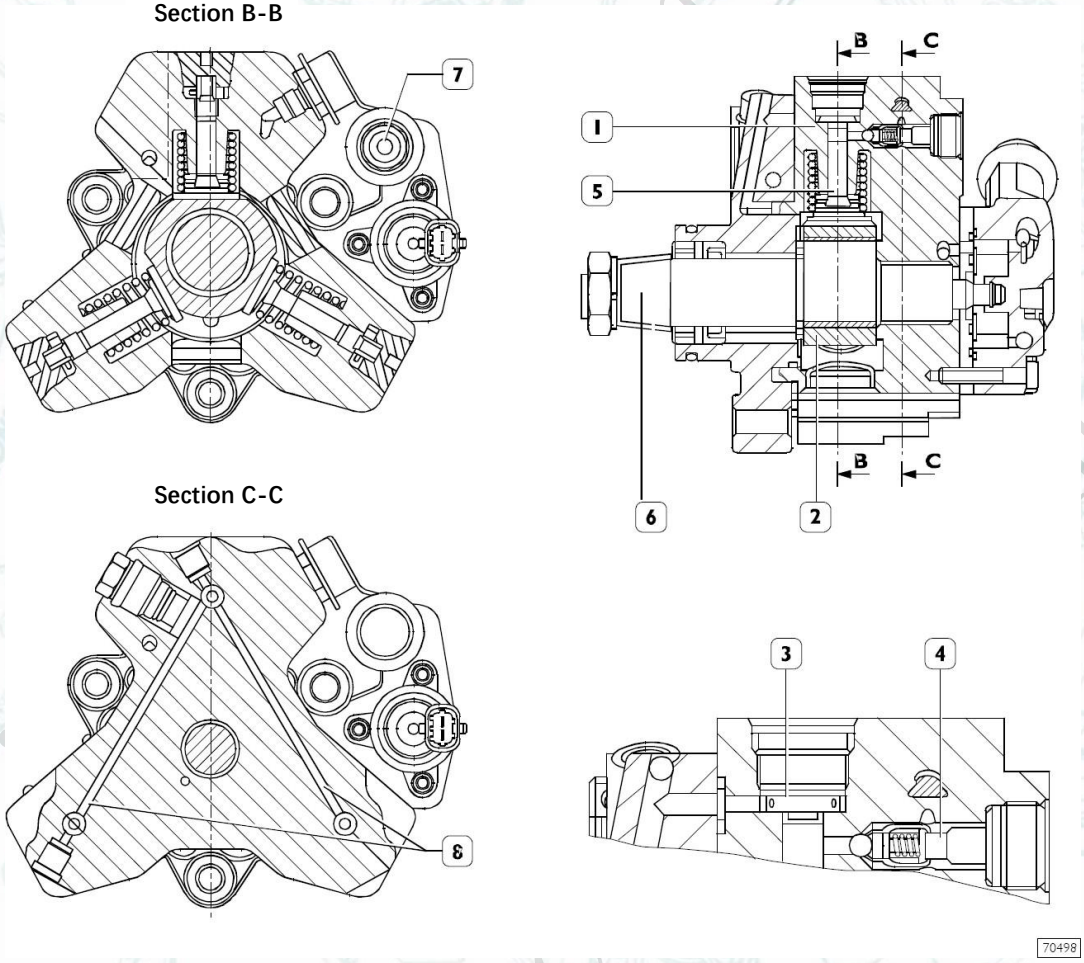
1. Oil outlet connector (to common rail) 2. High pressure oil pump 3. Regulator 4. High pressure oil pump gear 5. Oil inlet connector (self-filter) 6. Oil outlet connector (to oil return pipe) 7.

Oil inlet connector (from ECU base) 8. Oil outlet connector (to filter)

9. Mechanical oil supply pump

High pressure oil pump-internal structure

Figure 7



1. High pressure chamber 2. Trilobal cam 3. Oil inlet valve 4. Spherical oil outlet valve 5. Piston 6. Pump shaft 7. Low pressure fuel inlet.

8. Oil supply pipeline

Each high-pressure chamber device includes:

- The piston (5) is driven by a trilobal cam (2) floating on the pump shaft (6). The cam (2) is suspended on the misplaced parts of the pump shaft (6). When the pump shaft rotates, the cam does not rotate with it, but rotates along a larger radius, thus driving three pump parts alternately.
- Oil inlet valve (3).
- Spherical oil outlet valve (4).