

1 - High pressure fuel pump

1.1 - Role.

The high pressure fuel pump receives "low pressure" fuel from the booster pump.

Role of the high pressure fuel pump (BOSCH CP1 type with 3 pistons) :

- To supply high pressure fuel.
- To supply the diesel injectors through the high pressure common injection rail.

The high pressure fuel pump is driven by the timing belt (drive ratio 0,5).

1.2 - Description.

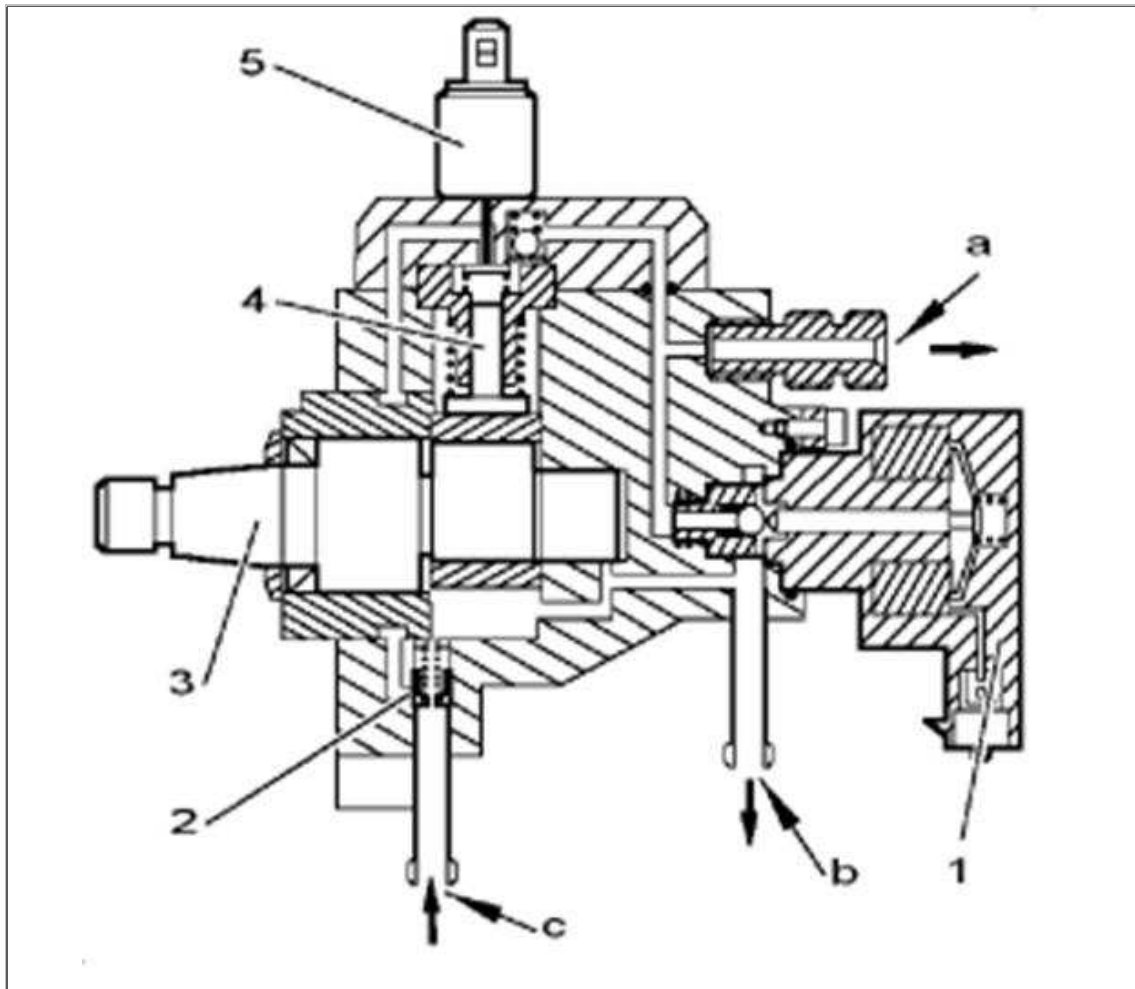


Fig : B1HP118C

A:high pressure fuel outlet (to the common injection rail).

B:return to fuel tank.

C:fuel inlet (booster pump).

(1) fuel high pressure regulator.

(2) lubricating valve.

(3) eccentric pump shaft.

(4) high pressure piston.

(5) deactivator of the 3rd piston of the high pressure fuel pump.

The high pressure fuel varies between 200 and 1350 bar.

NOTE : The high pressure fuel is controlled by the high pressure fuel regulator.

Components mounted on the high pressure fuel pump :

- (1) Fuel high pressure regulator.
- (5) Deactivator of the 3rd piston of the high pressure fuel pump.

NOTE : The high pressure pump is not a distributing pump and does not need setting.

Maximum absorbed power:3,5kW.

1.3 - Lubricating valve.

The lubricating valve lubricates the high pressure fuel pump in case the booster pressure is too low.

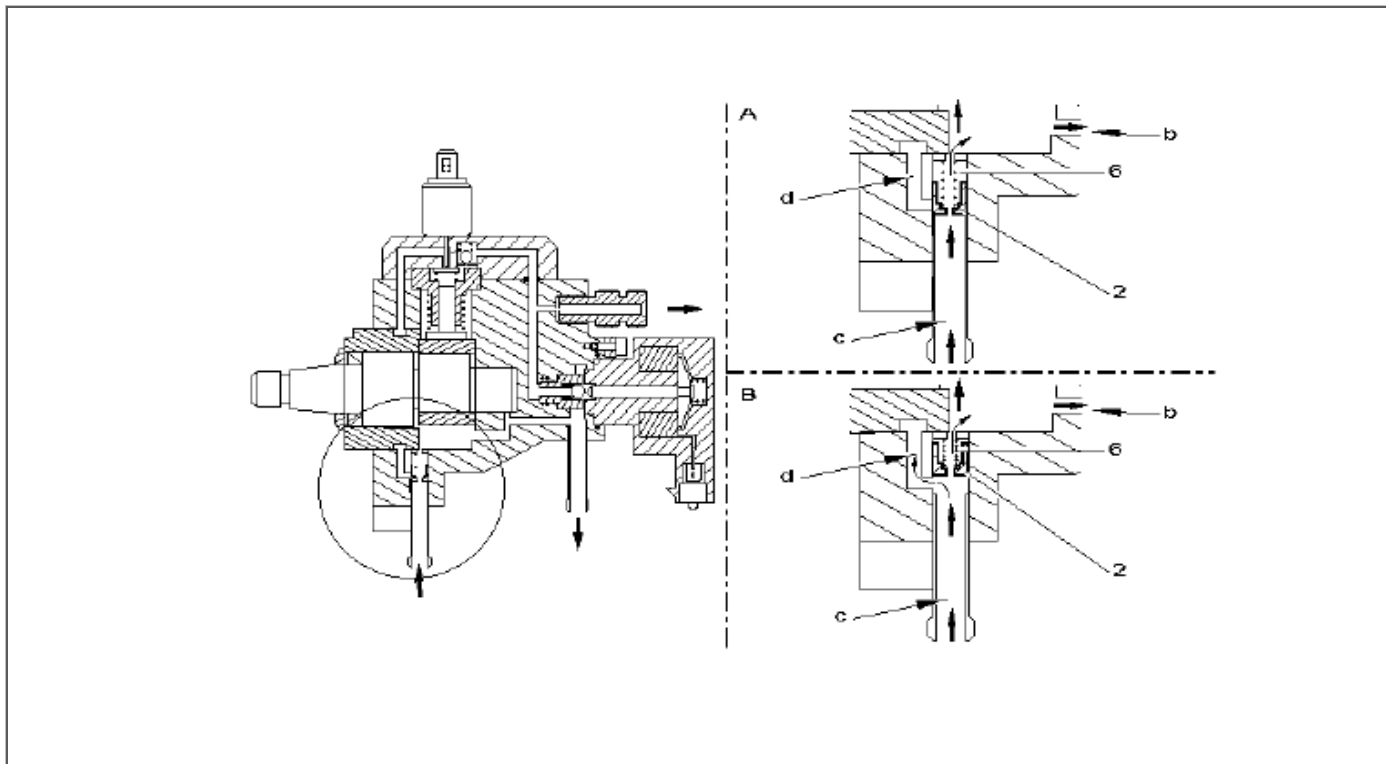


Fig : B1HP119D

Difference between the booster pressure and the pressure in the fuel tank return circuit :

- A:Pressure less than 0,8 bar.
- B:Pressure more than 0,8 bar.

B:return to fuel tank.

C:fuel inlet (booster pump).

D:to high pressure stage.

(2) lubricating valve.

(6) return spring.

The fuel enters the pump through inlet "c" and passes through the lubrication valve (2) (booster pump).

A :Pressure less than 0,8 bar :

- The fuel pressure is not sufficient to push back the valve (2).
- The fuel passes through the valve (restrictor hole).
- The fuel lubricates and cools the high pressure pump.

B :Pressure more than 0,8 bar :

- The fuel pushes back the valve (2).
- The fuel used for lubricating passes through the valve through its restriction.
- The fuel is distributed to the high pressure stage "d" of the high pressure pump.

1.4 - Creating the high pressure.

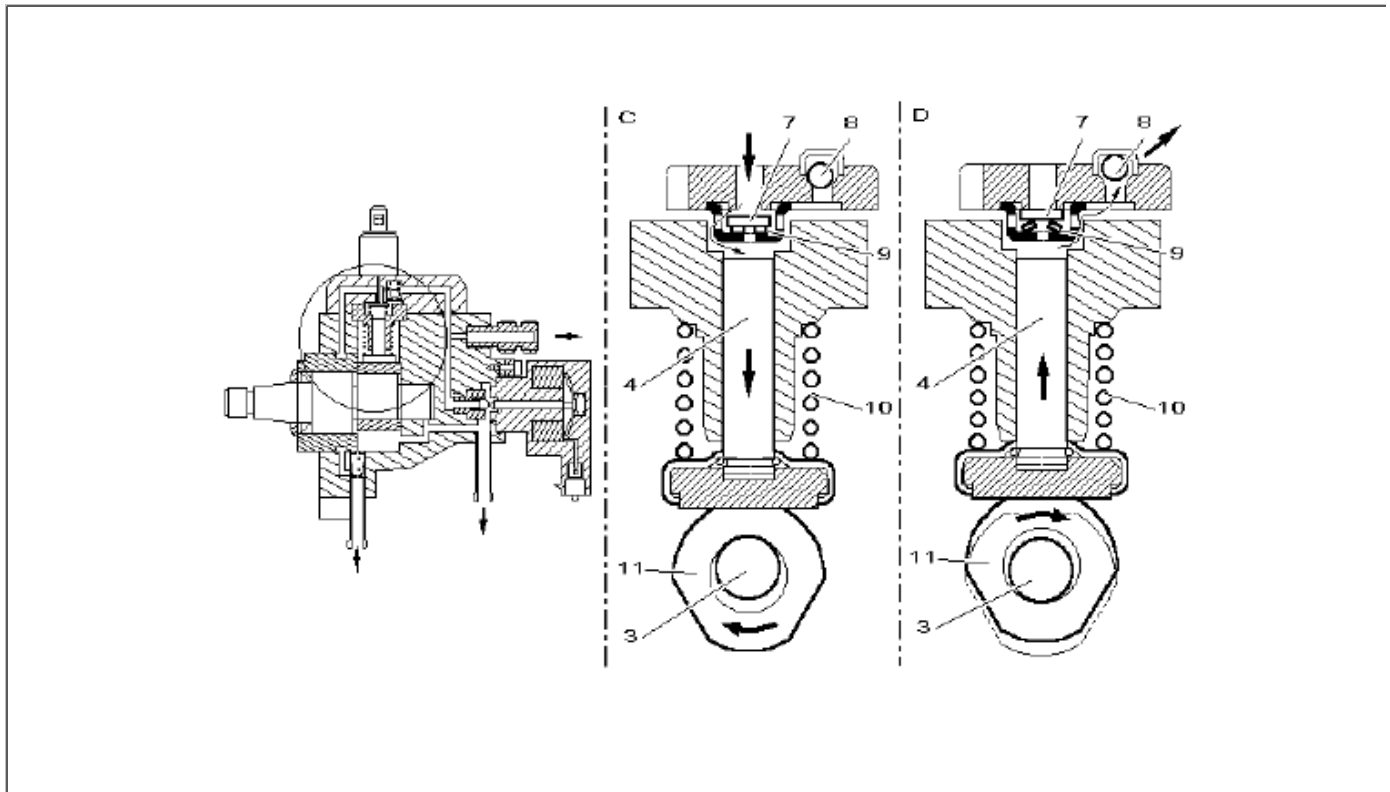


Fig : B1HP11AD

C:suction phase.

D:delivery phase.

(3) eccentric pump shaft.

(4) high pressure piston.

(7) fuel suction valve.

(8) delivery ball valve.

(9) suction valve return spring.

(10) high pressure piston return spring.

(11) drive cam.

The shaft of the high pressure fuel pump contains a cam.

The injection pistons are supplied with fuel by the low pressure circuit inside the high pressure pump.

The fuel is drawn in by the piston during the suction phase.

(4) high pressure piston.

(5) deactivator of the 3rd piston of the high pressure fuel pump.

(7) fuel suction valve.

(8) delivery ball valve.

(9) suction valve return spring.

(12) push rod.

Components of the deactivator of the 3rd piston of the high pressure fuel pump :

- An electromagnet.
- A push rod which moves under the action of the magnetic field created by the electromagnet.

When the 3rd piston deactivator is not energised :

- The fuel suction valve (7) is held against its seat by the spring (9).
- The cylinder is closed.
- The action of the pump shaft cam leads to a pressure being created.
- The fuel pressure lifts the delivery valve (8).
- The fuel is directed towards the high pressure outlet of the pump.

When the 3rd piston deactivator is energised :

- The push rod (12) raises the suction valve (7) from its seat.
- The cylinder is open:No pressure is created.
- The fuel is directed towards the low pressure part of the high pressure pump.

2.3 - Electrical features.

Control:injection ECU.

Type:"all or nothing" control through earth.

When the 3rd piston deactivator is energised:the pump operates on 2 pistons.

When the 3rd piston deactivator is not energised:the pump operates on 3 pistons.

3 - Fuel high pressure regulator (1322)(1322)

3.1 - Role.

The high pressure fuel regulator regulates the pressure of the fuel at the outlet of the high pressure fuel pump.

3.2 - Description.

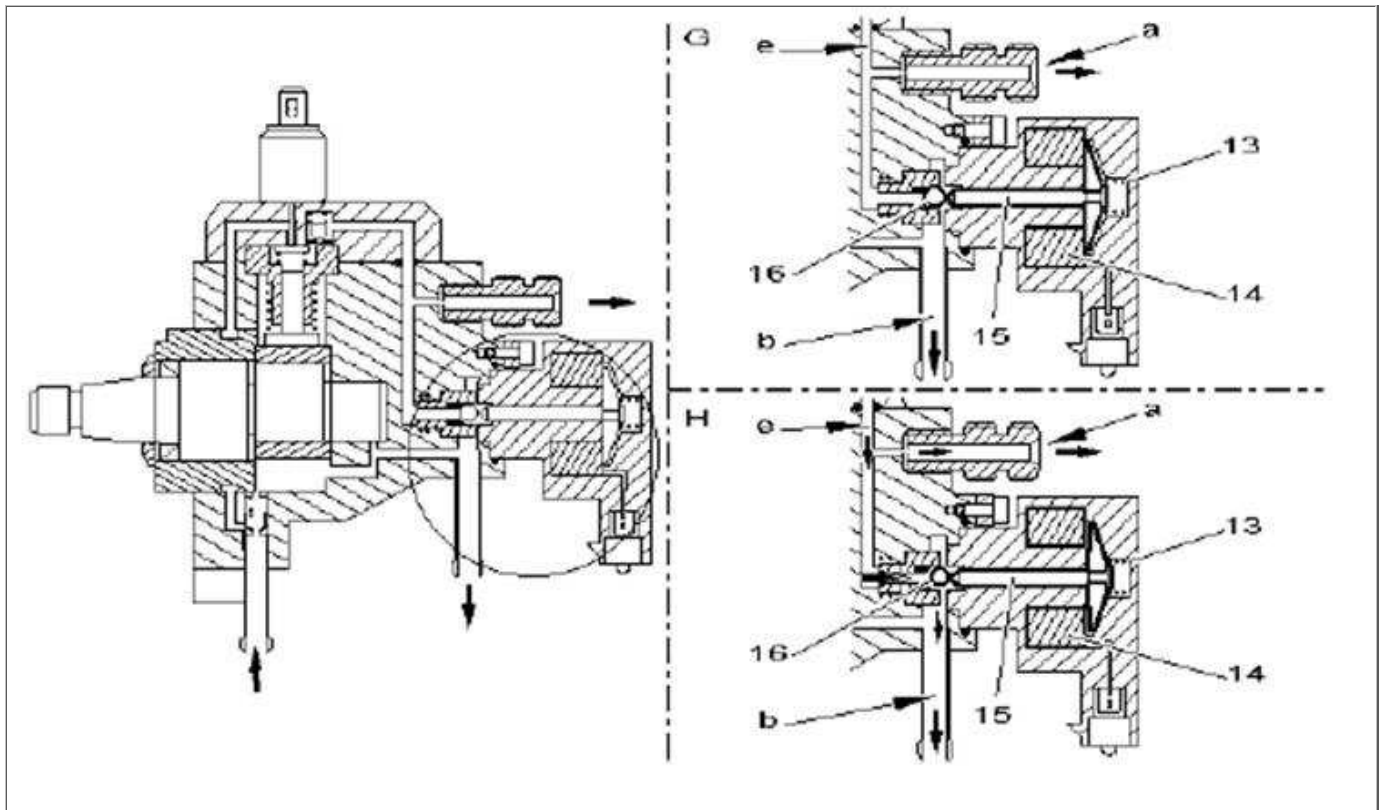


Fig : B1HP11CD

G:high pressure regulator not energised.

H:high pressure regulator energised.

A:high pressure fuel outlet (to the common injection rail).

B:return to fuel tank.

E:high pressure fuel circuit.

(13) spring.

(14) electric coil.

(15) magnetic core.

(16) ball.

The fuel high pressure is regulated by modifying the rating of the high pressure fuel regulator.

The high pressure fuel regulator consists of 2 pressure control circuits :

- The electrical circuit which acts directly on the high pressure which controls the electromagnet of the high pressure fuel regulator (injection ECU).
- The mechanical circuit which provides a minimum pressure and dampens pulses.

3.3 - Mechanical operation.

The high pressure fuel circuit is subject to pressure variations.

The fuel high pressure increases when a pump piston delivers.

The fuel high pressure decreases when a diesel injector is opened.

The movement of the ball dampens pressure variations.

3.4 - Electrical operation.

When the high pressure fuel regulator is not energised :

- The fuel high pressure opposes the mechanical action of the spring (13).
- The regulator opens for a high pressure which is greater than the spring pressure (ø 100 bar).
- The fuel released by the high pressure regulator returns to tank through the outlet "b".

NOTE : Engine off for 30 seconds, there is no residual pressure in the high pressure fuel circuit.

Pressure rise control phases :

- The injection ECU supplies the high pressure fuel regulator with an OCR current.
- The coil of the high pressure fuel regulator drives the magnetic core (magnetic force).
- The force applied to the ball is the sum of the spring force (13) and the magnetic force of the core.
- The cut-out value of the high pressure regulator increases.

Pressure reduction control phases :

- The injection ECU reduces the OCR supplied to the coil of the high pressure fuel regulator.
- The coil of the high pressure fuel regulator drives the magnetic core (magnetic force).
- The force applied to the ball reduces.
- The cut-off valve of the high pressure regulator decreases.

NOTE : OCR : Open Cycle Ratio.

3.5 - Electrical features.

When the high pressure fuel regulator is not energised:the pressure is limited to ø 100 bar.

Control:injection ECU (earth).

Variable voltage control (OCR) :

- Maximum voltage (maximum OCR)=Maximum pressure.
- Minimum voltage (minimum OCR)=Minimum pressure.