

When the eccentric cam produces a downward stroke, the process is reversed.

The VCV is located on the high-pressure fuel pump. The valve regulates the fuel supply (and hence the quantity of fuel) from the transfer pump to the high-pressure fuel pump elements, depending on the fuel pressure in the rail. This makes it possible to match the delivery of the high-pressure fuel pump to the requirements of the engine from the low-pressure side. The quantity of fuel flowing back to the main fuel supply line is kept to a minimum. In addition, this adjustment reduces the power consumption of the high-pressure fuel pump, improving the efficiency of the engine.

For additional information, refer to: [Electronic Engine Controls](#) (303-14 Electronic Engine Controls - 2.4L Duratorq-TDCi HPCR (103kW/140PS) - Puma, Description and Operation).

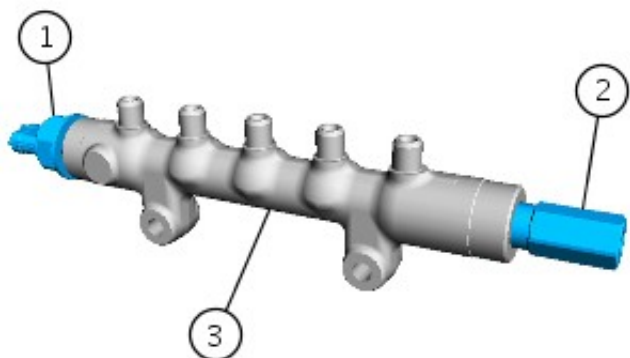
After replacing the high-pressure pump and/or the ECM, the VCV must be calibrated with the aid of approved Land Rover diagnostic equipment.

The fuel temperature sensor is also located on the high-pressure fuel pump. The ECM monitors the fuel temperature constantly so it can respond correctly to changes in fuel density in relation to fuel temperature.

For additional information, refer to: [Electronic Engine Controls](#) (303-14 Electronic Engine Controls - 2.4L Duratorq-TDCi HPCR (103kW/140PS) - Puma, Description and Operation).

If the fuel temperature sensor is disconnected the engine will operate at reduced power and a DTC will be triggered.

## Fuel Rail



E69911

Item	Part Number	Description
1	-	Fuel pressure sensor
2	-	Pressure limiting valve
3	-	Fuel rail

The fuel rail performs the following functions:

- Stores fuel under high pressure
- Minimizes pressure fluctuations

Pressure fluctuations are induced in the high-pressure fuel system by operating movements in the high-pressure chambers of the fuel pump and the opening and closing of the solenoid valves on the fuel injectors. Consequently, the fuel rail is designed in such a way that it has sufficient volume to minimize pressure fluctuations, but low enough volume to be able to build up the fuel pressure required for a quick start in the shortest time possible.

The fuel supplied by the high-pressure pump passes through a high-pressure line to the high-pressure accumulator. The fuel is then sent to the individual fuel injectors via the 4 injector tubes, which are all the same length. When fuel is taken from the fuel rail for an injection process, the pressure in the fuel rail is kept almost constant.

The pressure limiting valve opens at a fuel pressure of approximately 2000 bar. It serves as a safety device in the case of malfunctions in the high-pressure system, preventing damage due to excessive pressure. The valve operates as a disposable unit and must be replaced after a single trigger, as the valve can no longer be guaranteed leak-free. Triggering of the pressure limiting valve is detected by the ECM, whereupon a corresponding Diagnostic Trouble Code (DTC) is set and the Malfunction Indicator Lamp (MIL) is actuated.

The fuel rail pressure sensor is located in the end of the fuel rail. The sensor measures the pressure of the fuel in the fuel rail. This input is then used by the ECM to control the amount of fuel delivered to the fuel rail.

For additional information, refer to: [Electronic Engine Controls](#) (303-14 Electronic Engine Controls - 2.4L Duratorq-TDCi HPCR (103kW/140PS) - Puma, Description and Operation).

If the pressure sensor is disconnected the engine will operate at reduced power and a DTC will be triggered. The sensor is not serviceable, and will come as part of a new rail with the limiting valve.

## Fuel Injectors