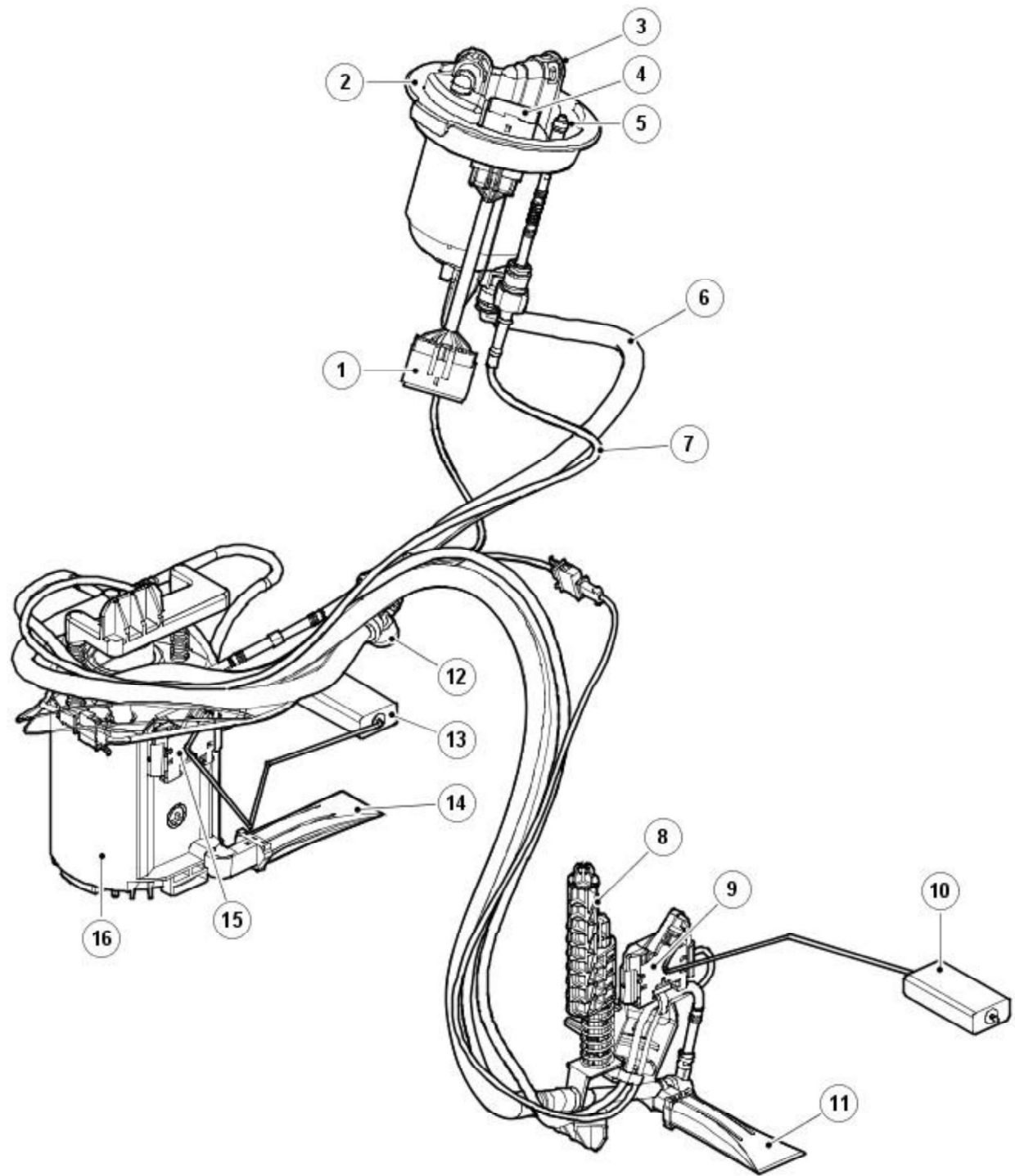


FUEL DELIVERY MODULE



E60117

Item	Part Number	Description
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1	-	Electrical connector
2	-	Top flange assembly
3	-	Pressure outlet to fuel rail
4	-	Harness connector
5	-	Outlet for FFBH pump (if fitted)
6	-	Pressure feed pipe to filter
7	-	Fuel outlet pipe to FFBH pump connection
8	-	Remote jet pump assembly
9	-	LH fuel level sensor
10	-	Level sensor float
11	-	Inlet filter
12	-	One way valve
13	-	Level sensor flat
14	-	Inlet filter
15	-	RH fuel level sensor
16	-	Fuel pump

The fuel delivery module is a new design for 2006MY vehicles. The module is located inside the fuel tank and comprises three main components; a fuel pump, a remote jet pump and a top flange assembly.

Fuel Pump

The fuel pump is a dual stage electric pump which is located in the bottom of the fuel tank, on the right hand side. The fuel pump delivers fuel at a maximum pressure of 5.5 bar (80 lbf/in²) to the filter bowl in the top flange.

The pump has a spring loaded top plate which secures the pump by compression in its location in the front right hand side of the fuel tank. The electric pump is located in a plastic swirl pot which collects fuel from the base of the fuel tank via a filter.

The fuel level sensor the right hand side of the tank is attached to the outside of the swirl pot.

The fuel pump is a serviceable component. Access to the pump is by removal of the top flange.

Remote Jet Pump

The remote jet pump is located in the front left hand side of the fuel tank. The jet pump has a spring loaded frame which secures the pump by compression in the fuel tank.

The jet pump is connected by 2 pipes to the fuel pump. One small diameter pipe supplies pressurized fuel from the fuel pump to the jet pump. The jet pump is also connected to the fuel pump swirl pot by a larger diameter pipe. The pressurized fuel from the small pipe enters the larger pipe and the fuel flow causes a vacuum which draws fuel from the bottom of the tank via a filter. This fuel, collected from the left hand side of the fuel tank, in addition to the pressurized fuel from the fuel pump is delivered back to the fuel pump swirl pot in the right hand side of the tank.

The fuel level sensor for the left hand side of the fuel tank is attached to the remote jet pump frame.

The remote jet pump is a serviceable component. Access to the jet pump is by removal of the flange cover on the top left hand side of the fuel tank.

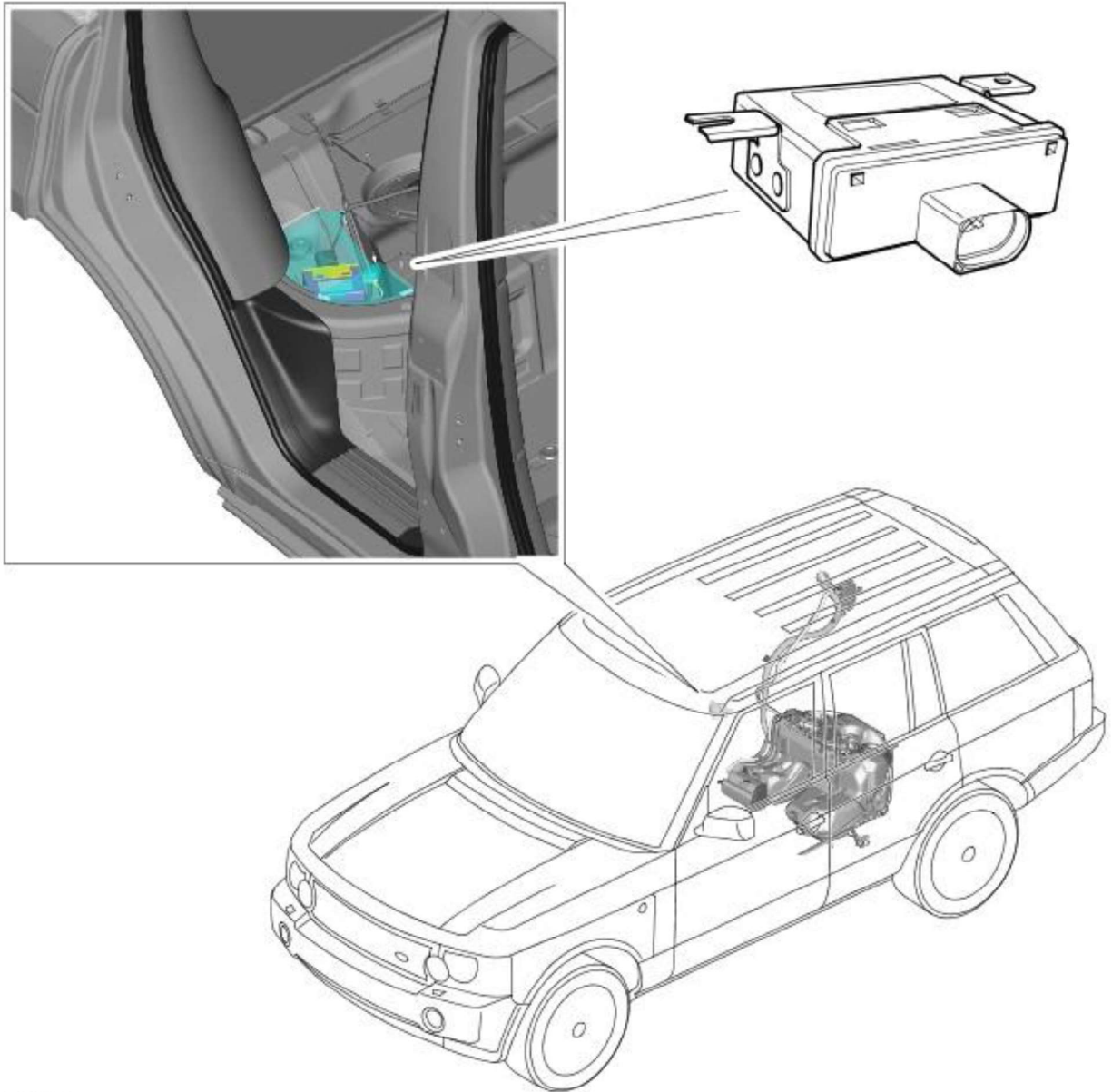
Top Flange Assembly

The top flange is located on the top right hand side of the fuel tank. The flange assembly is sealed in the tank with a with a sealing ring. A locking ring secures the flange assembly in the tank and requires a special tool for removal.

The outer surface of the flange has 2 outlets with quick-fit connections. One connection is the pressure outlet to the fuel rail, the second outlet is the fuel supply to the Fuel Fired Booster Heater (FFBH) pump, if fitted. For additional information, refer to: [Auxiliary Heater](#) (412-02B Auxiliary Heating, Description and Operation). An electrical connector is located adjacent to the pipe connections and provides the electrical interface to the fuel pump and the level sensors.

On the underside of the flange, inside the tank, is a moulded housing which contains the fuel filter. Fuel from the fuel pump enters the base of the housing and passes through the filter before exiting the tank to the fuel rail or the FFBH pump, if fitted. An electrical connection on the base of the filter housing provides a ground for the filter.

FUEL PUMP DRIVER MODULE (FPDM)



E60118

The fuel pump operation is regulated by a FPDM which is controlled by the engine management system. The FPDM regulates the flow and pressure supplied by controlling the operation of the fuel pump using a Pulse Width Modulation (PWM) output. Refer to Electronic Engine Controls for operation details. For additional information, refer to: Electronic Engine Controls (303-14A, Description and Operation).

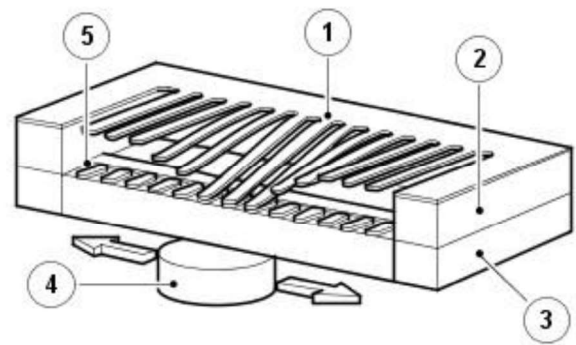
FUEL LEVEL SENSORS

Two fuel level sensors are used in the fuel tank to measure the amount of remaining fuel in the left and right hand sides of the fuel tank. The left hand sensor is attached to the frame of the jet pump and the left hand level sensor is attached to the fuel pump swirl pot. The sensors are connected to the vehicle wiring harness via a connector on the outer face of the top flange assembly.

The sensors are a MAGnetic Passive Position Sensor (MAPPS) which provides a variable resistance to ground for the output from the fuel gage. The sensor is sealed from the fuel preventing contamination of the contacts, increasing reliability. The front and rear fuel level sensors are connected to the external electrical connector on the flange via the connectors on the underside of the fuel pump module flange.

The sensor comprises a series of 51 film resistors mounted in an arc on a ceramic surface. The resistors are wired in series with individual contacts. A soft magnetic foil with 51 flexible contacts is mounted a small distance above the film resistors. A magnet, located below the ceramic surface, is attached to the sender unit float arm. As the float arm moves, the magnet follows the same arc as the film resistors. The magnet pulls the flexible contacts onto the opposite film resistor contacts forming an electrical circuit.

Sensor Operating Principle



E44504

Item	Part Number	Description
1	-	Magnetic foil
2	-	Spacer
3	-	Ceramic surface
4	-	Magnet
5	-	Resistance film

The film resistors are arranged in a linear arc with resistance ranging from 51.2 to 992.11 Ohms. The electrical output signal is output proportional to the amount of fuel in each side of the tank and the position of the float arms. The measured resistance is processed by the instrument cluster to implement an anti-slosh function. This monitors the signal and updates the fuel gage pointer position at regular intervals, preventing constant pointer movement caused by fuel movement in the tank due to cornering or braking.

A warning lamp is incorporated in the instrument cluster and illuminates when the fuel level is at or below 10 liters (2.64 US gallons).

The fuel level sender signals are converted into a CAN message by the instrument cluster as a direct interpretation of the fuel tank contents in liters. The ECM uses the CAN message to store additional OBD P Codes for misfire detection when the fuel level is below a predetermined capacity.

Left Hand Fuel Level Sensor Resistance/Fuel Gage Read out Table

• NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.

Sender Unit Resistance, Ohms	Nominal Gage Reading
51	Empty
84	Low fuel level illumination (12.5L)
375	Half full

Sender Unit Resistance, Ohms	Nominal Gage Reading
911	Full

Right Hand Fuel Level Sensor Resistance/Fuel Gage Read out Table

- NOTE: These figures are with the vehicle on level ground. Sensor readings will differ with varying vehicle inclinations.

Sender Unit Resistance, Ohms	Nominal Gage Reading
86	Empty
160	Low fuel level illumination (12.5L)
441	Half full
944	Full

FUEL FILLER PIPE AND TANK BREATHER ASSEMBLY

Fuel Filler Pipe Assembly- ROW (Non NAS)