ALTERNATIVE FUEL SYSTEMS

Prins

Installation manual
Dedicated
PART 2/2

DIRECT LIQUI max-2.0 HIGH PRESSURE LIQUID LPG INJECTION

MANUFACTURER	Range Rover
TYPE	Evoque
ENGINE DISPLACEMENT	1999cc
NUMBER OF VALVES	16V
ENGINE CODE / NUMBER	204PT
VEHICLE CATEGORIES	M
TRANSMISSION	AT
VERSION	Direct LiquiMax-2.1
PETROL ECU MANUFACTURER / CODE	Bosch 0 261 S06 504 / Bosch 0 261 S10 410
HIGH PRESSURE PETROL POMP	Bosch 0 261 520 - 100/101 / 151/152
HIGH PRESSURE PETROL INJECTOR	Bosch 0 261 500 147
MODEL YEAR:	2012 →
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000009 / DLM-LPG 02
LOCATION SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	352/070001/A
MANUAL NUMBER	076/1201500
DATE	2016-12-13

Version 2012-11-02 D

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FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE : INSTALLATION MANUAL GENERAL PART 1 / 2

General instructions

- The installation of the system shall be done in accordance with the installation manual provided by Prins Autogassystemen.
- This manual is based on Dutch regulations, always install the system in accordance to the local regulations.
- For an optimal functioning of the Direct LiquiMax-2.0 system, maintain a clean and organized work environment during installation and maintenance to prevent pollution of the LPG components.
- Always download the “general manual 1/2 “ from our website for basic instructions and diagrams.
- Always disconnect the battery when installing the LPG system. Make sure the ignition key is outside the car.

  Be aware of central door locking, radio / telephone memory code, alarm system.
- Wear safety goggles when working on petrol filled system / connections (pressurized petrol)
- Do not place the main fuse into the fuse holder before having completed the installation of the system.
- The AFC has to be activated by means of the Prins diagnosis software.
- Never disconnect the AFC connector, unless you have removed the main fuse.
- When installing the wiring harness, ensure that it does not run near any of the ignition components.

  Solder and insulate all electrical connections.
  The wires in the loom are provided with numbers and text. The text on the wire explains the function of the wire.
  The wire harness is not model specific, therefore is it may be necessary to adjust the length of the wires.
  Ensure maximum care is taken when connecting wiring.
  Make professional joints using solder and shrink sleeve. Do not stretch the wiring harness.
- No component of the LPG-system shall be located within 100 mm of the exhaust or similar heat source, unless such components are adequately shielded against heat.
- If holes have to be drilled (wear safety glasses) for installing brackets, etc., the drilled holes must always be treated with an anti-corrosion agent, after the chips have been removed (especially when mounting a exterior filler into body work).
- After having completed the installation, check the whole system for LPG leakage; use a LPG leak detection device. Also check for leak of engine coolant, petrol and air.
- Fitting and maintenance is only allowed by Prins Autogassystemen selected LPG engineers.
- Failure to follow the instructions in this manual can result in a poor or non-working LPG installation or a dangerous situation.
- For maintenance instructions and filter registration see owner manual.
- Prins Autogassystemen is not responsible for any damages to people or objects as a result of changes to Prins products.
- Check our website regularly for diagrams, certificates, updates, info-bulletins and product information.

Register (warranty card) the system on the Prins warranty portal .

Required equipment / tools / materials for installing a complete system

- Complete workshop toolbox (wrenches, screwdrivers, cutters, pliers, ratchet, sockets)
- Car lift
- Portable computer : operating on Windows 98,W2000 or XP.
  Internal memory : 16 Mb or more
  Memory HD space : 5MB
  Screen : 256 colours, advise colours 16 bits or more
  Com port : 1 free COM port 1 or COM port 2 with a 9 or 25 pins connector
- Vehicle fuel system scan tool or OBD scan tool Prins (part nr. 099/99928)
- Exhaust gas analyser
- Multimeter
- Oscilloscope
- Prins diagnostic software
- Prins serial interface
- Torque wrench (5-50Nm)
- Torque wrench (200-250Nm)
- Portable light
- Assortment drill bits 4 to 12 mm
- Assortment cutters (ø 20, 30, 50, 70 mm)
- Portable drill or pneumatic drill
- Thread cutting device (male M6x1, M8x1, M10x1)
- Air gun
- Vacuum cleaner
- Safety goggles
- Hot air gun
- Soldering iron, soldering tin
- Wire-stripping pliers
- Adhesive tape
- Adhesive sealant
- Thread locking compound
- Anti-corrosion agent / black body coating
- Gas leak detection device or foam leak spray
- Shrink sleeves

Vehicle check

- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyzer)
- Check the condition of the ignition system (spark plugs, cables, coil)

Tightening moments

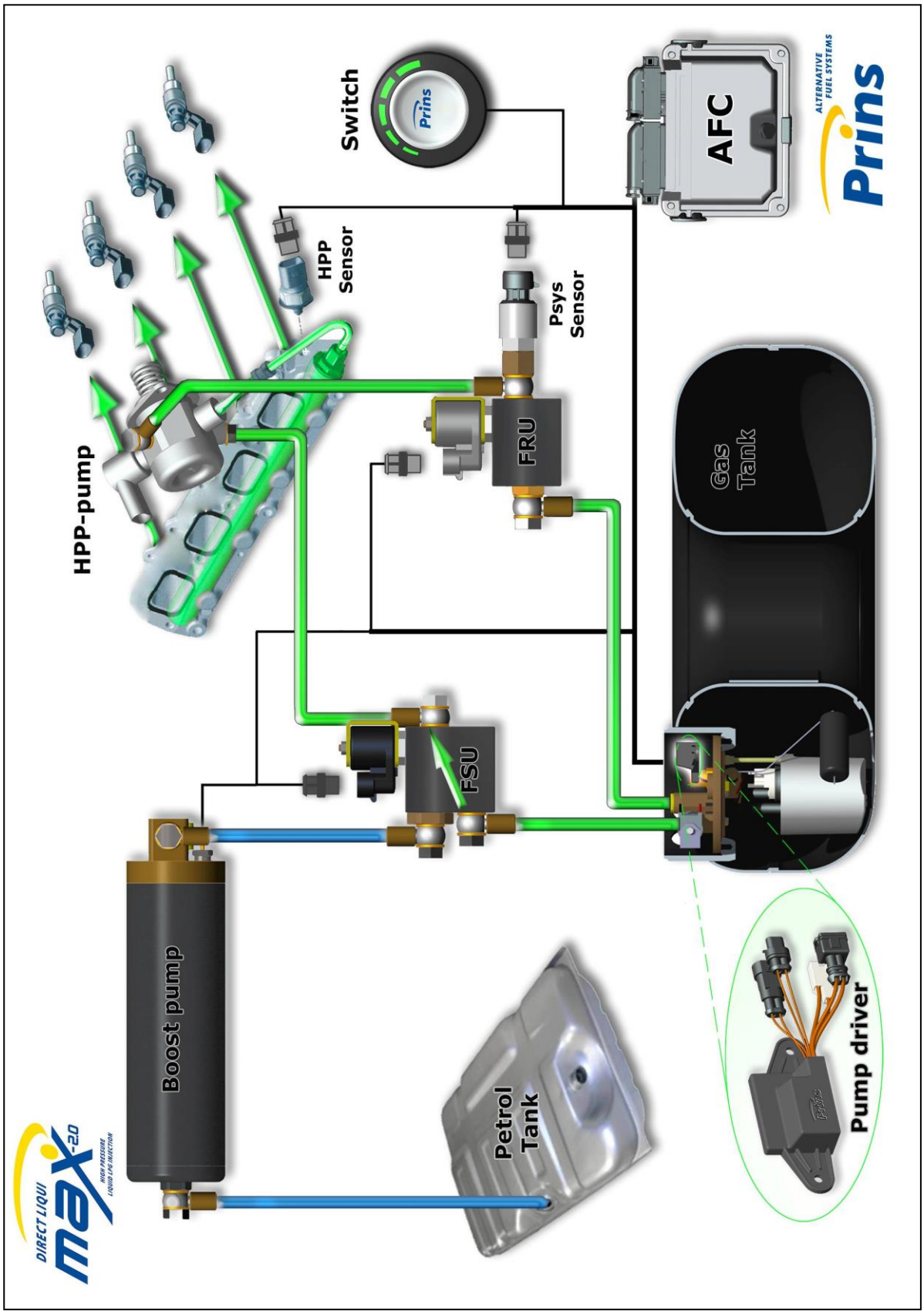
		Nm	SW
M 4 x 0,7		3.3	7
M 5 x 0,8		6.5	8
M 6 x 1,0		11.3	10
M 7 x 1,0		14.5	11
M 8 x 1		24.5	13
M 8 x 1,25		27.3	13
M 10 x 1		52	15-16-17
M 10 x 1,5		54	15-16-17
(filtered)Banjo bolt		10	14
Supply line connection		15	13
Fuel module Allen bolts		20	7
Filler hose connection		50	22

EXPLANATION OF SYMBOLS :

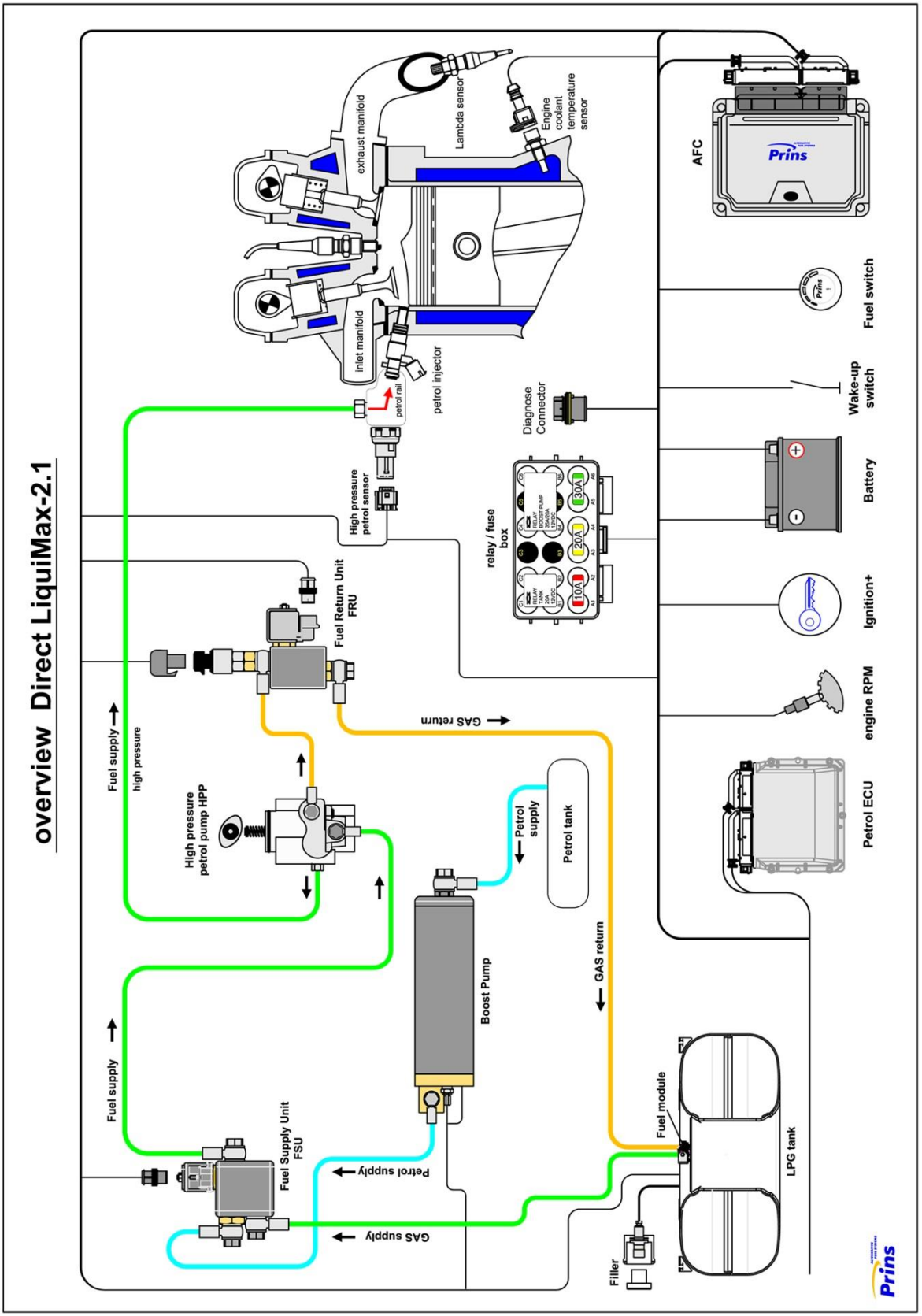
= IMPORTANT, CAUTION

= WEAR SAFETY GOGGLES

Direct LiquiMax-2.1



Overview Direct LiquiMax 2.1



Direct LiquiMax parts / approval numbers

<table>
<tr>
<td> 
1st generation
 
2nd generation</td>
<td> 
1st generation
 
2nd generation</td>
</tr>
<tr>
<td>Fuel Supply Unit : E4-67R-010269</td>
<td>Fuel Return Unit : E4-67R-010270
Pressure Sensor : E4-67R-010051</td>
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<tr>
<td>  </td>
<td>  </td>
</tr>
<tr>
<td>Boost pump</td>
<td>High Pressure Pump : E4-67R-010266
High Pressure Rail : E4-67R-010267
High Pressure Injectors : E4-67R-010309</td>
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<tr>
<td>Prins AFC: E4-67R-010098
E4-10R-030507</td>
<td>Fuel lines series XD : E4-67R-010247 XD3
E4-67R-010247 XD4</td>
</tr>
</table>

DLM-2.1 component location overview

Petrol ECU

Fuses & Relays

AFC

FSU

HP Petrol pump

Boost pump

FRU

R115 approval sticker :
Right side centre door post

Removal of the Bosch High Pressure Pump

-REMOVAL-

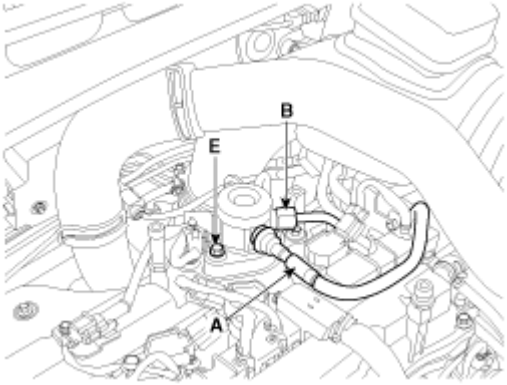
-WARNING-

In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, there may be injury caused by leakage of the high pressure fuel.
Don't do any repair work right after engine stops (HOT engine).

- Turn the ignition switch OFF and disconnect the battery negative (-) cable.
- Ware safety goggles.
- Disconnect the fuel pressure regulator valve connector
- Disconnect the High Pressure fuel feed pipe (B)
- Remove the Low Pressure fuel pipe / hose (A).
- Remove the installation bolts (E), and then remove the high pressure fuel pump from the cylinder head assembly.

  CAUTION:

  Unscrew in turn the two bolts in small steps (0.5 turns). In case of fully unscrewing one of the two bolts with the other bolt installed, the housing surface of the cylinder head may break because of tension of the pump spring.



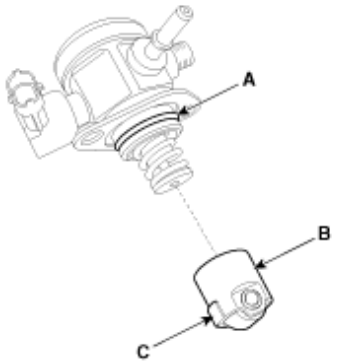
CAREFULLY store the removed petrol pump. Make sure no pollution can come into the pump.

Installation of the Bosch High Pressure Pump

-INSTALLATION-

Before installing the high pressure fuel pump, position the roller tappet (**B**&**C**) in the lowest position by rotating the crankshaft. Otherwise the installation bolts may be broken because of tension of the pump spring.

Apply engine oil to the O-ring (**A**) of the high pressure fuel pump, the roller tappet (**B**), and the protrusion (**C**). (roller tappet, only if removed from cylinder head)
Also apply engine oil to the groove on the location where the protrusion (**C**) is installed.



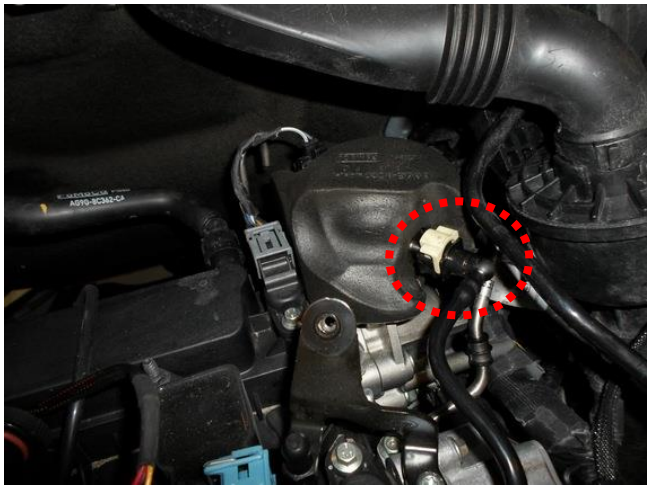
Installation bolts:
When tightening the installation bolts of the high pressure fuel pump, tighten and turn the bolts in small step (0.5 turns) after tightening them with hand-screwed torque.
High pressure fuel pump installation bolt: 12.8 ~ 14.7 N.m

Fuel pipe:
First hand-tighten the nut(s) fully until they are not fastened any more in order to have them inserted in place and then completely tighten to the specified torque using a torque wrench.
If not tightening the bolts or nuts in a straight line with the mating bolt holes or fittings, it may cause a fuel leak due to broken threads.
High pressure fuel pipe installation nut: 26.5 ~ 32.4 N.m

Installation is reverse of removal.

High pressure pump installation

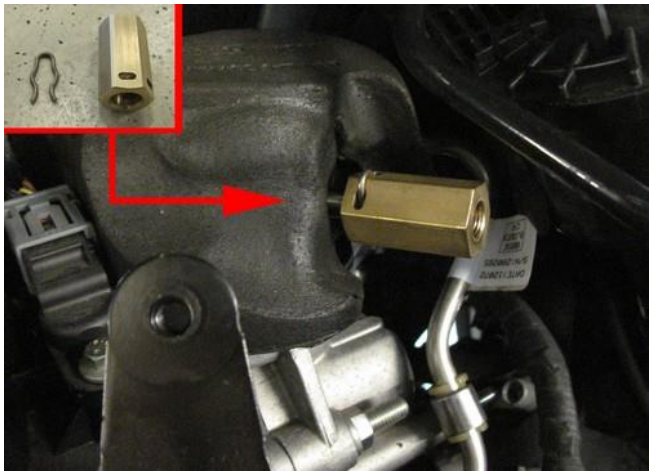
Replace the high pressure pump for the adapted high pressure pump.
(Follow the workshop manual of the car)




Remove the quick release of the fuel supply line to the high pressure pump and turn the fuel supply line 180 degrees with the quick release to the front.

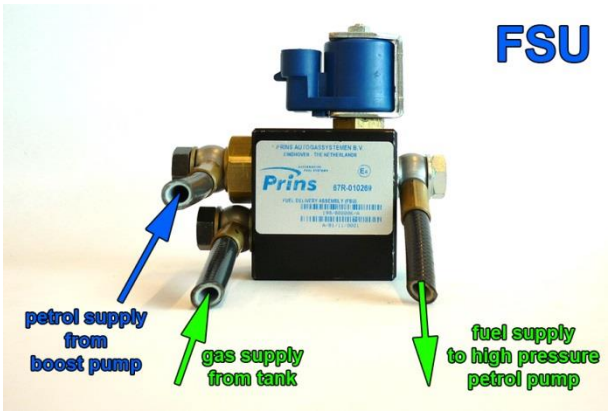
“Old” high pressure pump.

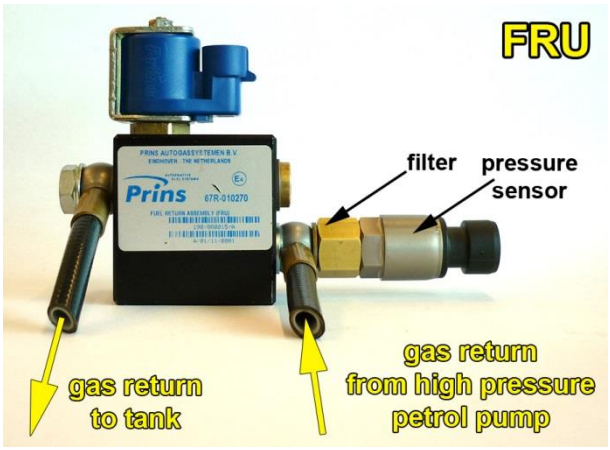
“New” high pressure pump with return.

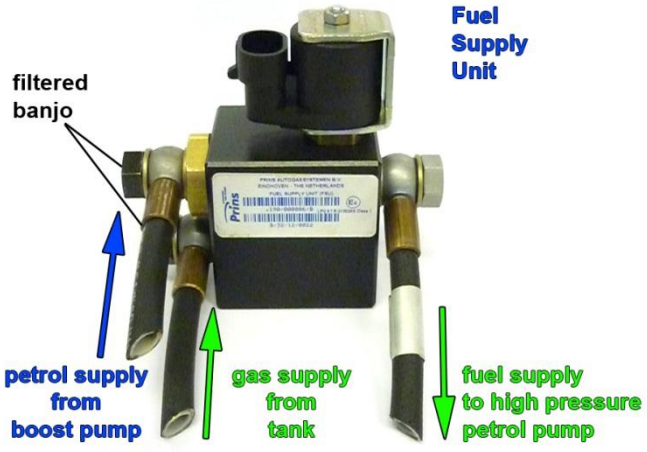



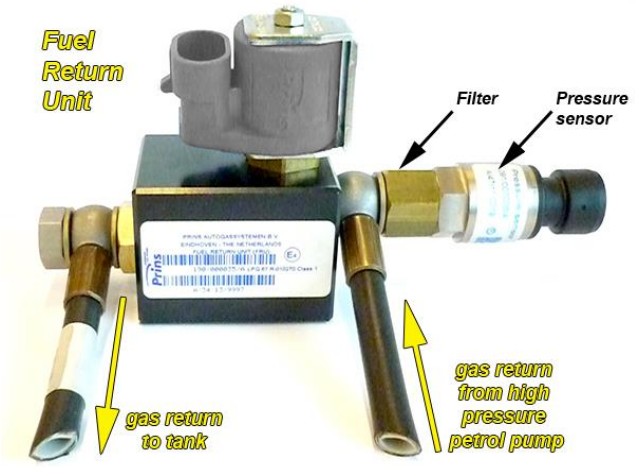
Mount “new” high pressure pump. Mount quick release to high pressure pump inlet.

Fuel Supply Unit / Fuel Return Unit







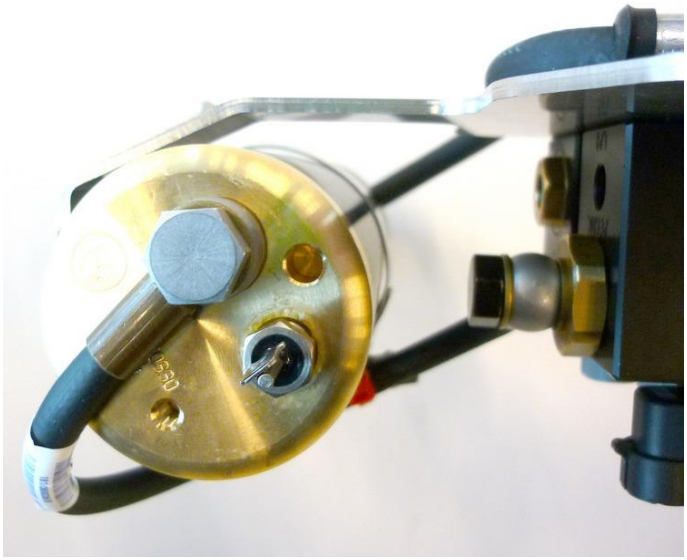
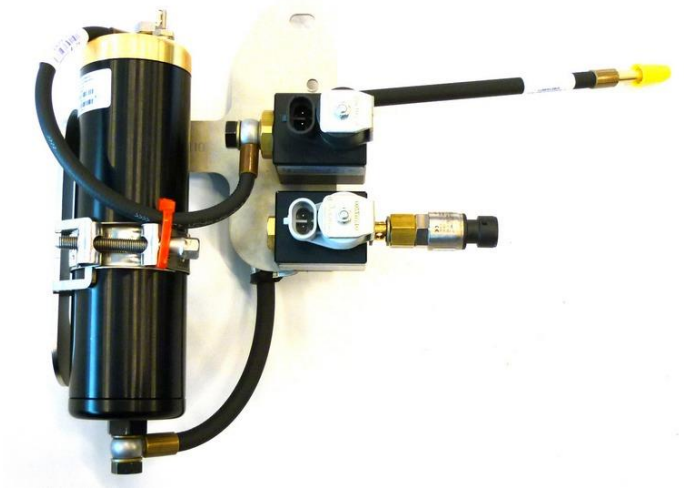


Black filtered banjo will only be used on inlet connections !

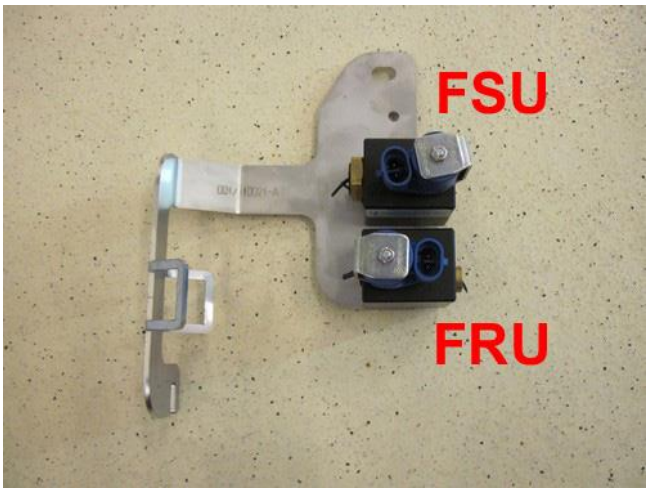
Filter inside sensor banjo

*** installation boost pump without valve ***

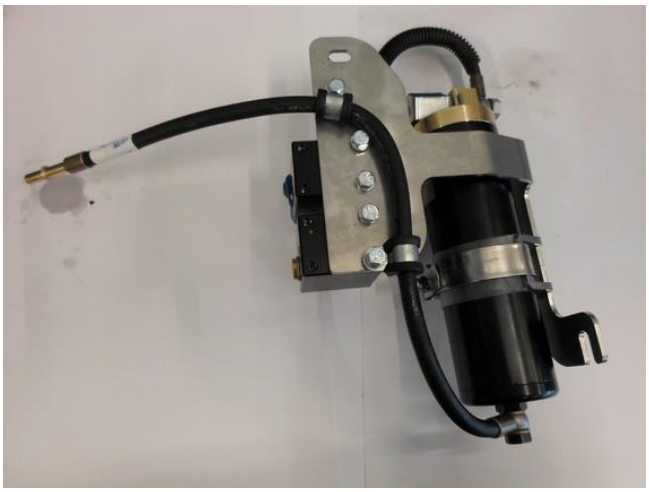



Mounting the Fuel Supply Unit (FSU), Fuel Return unit (FRU) and Boost pump 1



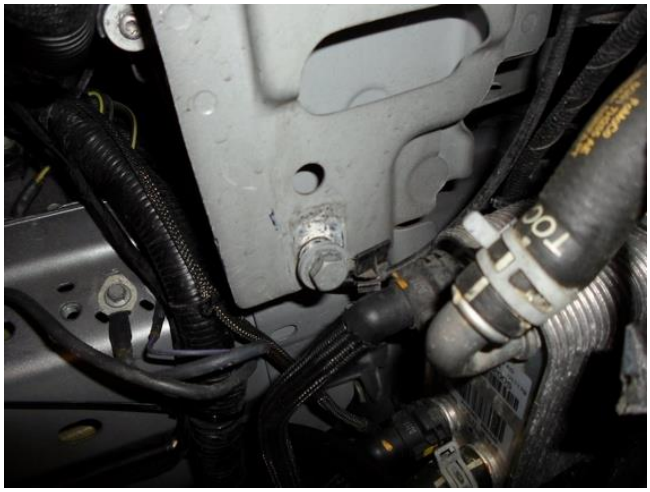
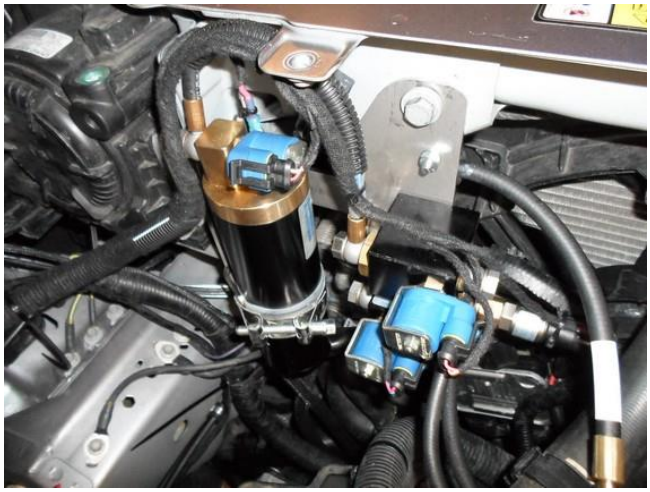
Mount the FSU & FRU onto the bracket. Mount the boost pump with clamp and rubber onto the bracket.



Mount supply hose with quick connection to boost pump with clamps.
Mount hose from boost pump to FSU. Mount protection around hose.

Mounting the Fuel Supply Unit (FSU), Fuel Return unit (FRU) and Boost pump 2

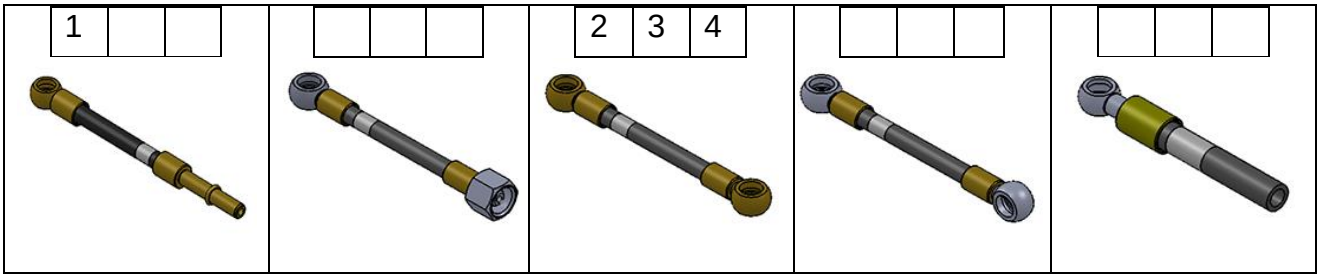

Remove reinforcement rod next to the left head light.

Screw the lower bolt back in for easy mounting and mount the bracket with FSU, FRU & boost pump.

Lpg / petrol fuel lines

Hose		from	to	Length (cm)
1	XD-4	Adapter original petrol hose	Petrol boost pump	45cm
2	XD-3	Fuel supply unit	High pressure petrol pump	55cm
3	XD-3	Petrol boost pump	Fuel supply unit	20cm
4	XD-3	High pressure petrol pump	Fuel return unit	50cm



Install the fuel line using two bonded seal washers and banjo bolt :

<u>Filtered banjo:</u> (FSU supply inlets / boost pump inlet : black filtered banjo) :

181/300009/A

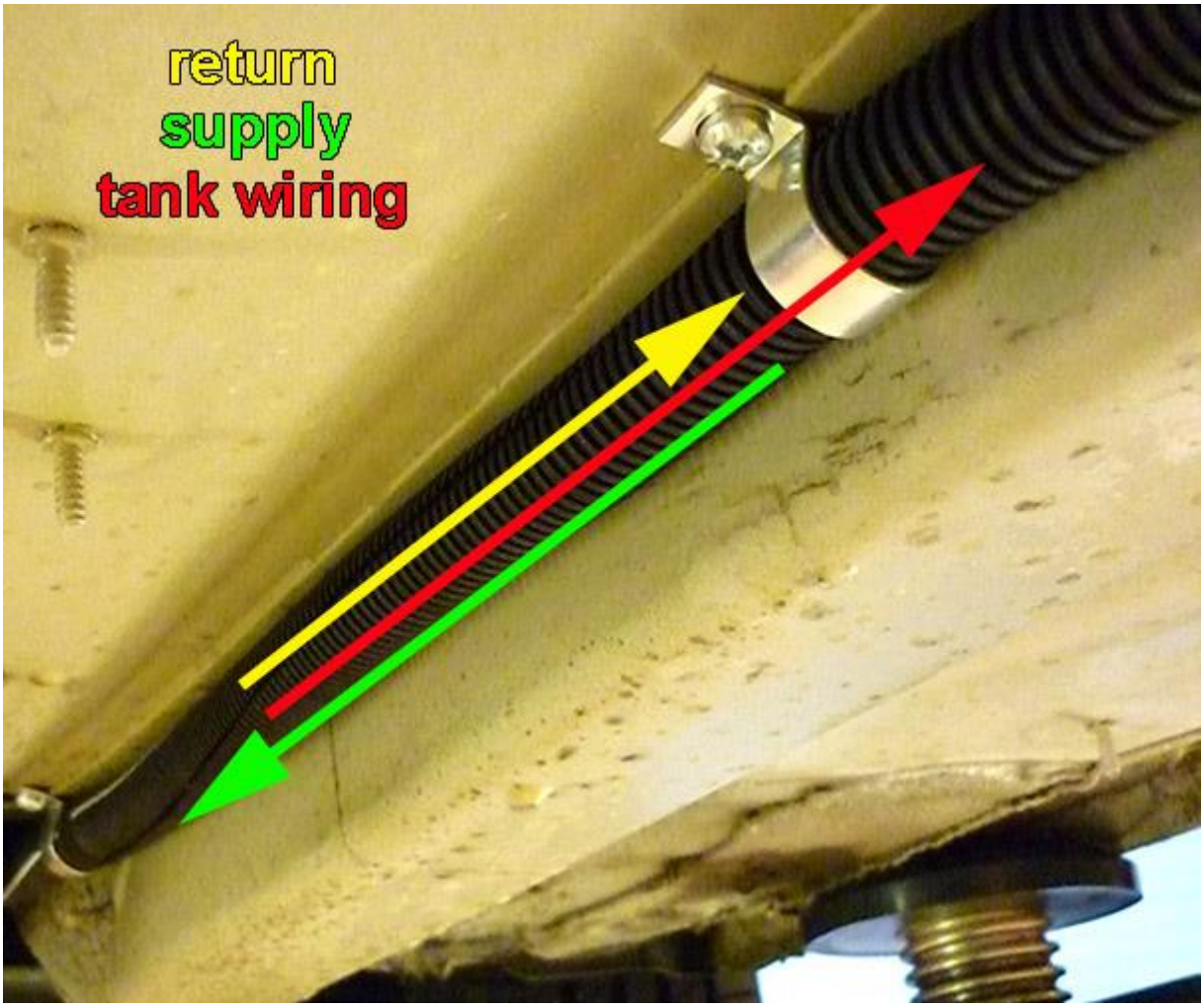
Hose routing


Connect petrol hose to boost pump with the quick connector. Connect hoses from/to FSU & FRU.


Mount hoses to high pressure pump. Fixate hoses with clamp on original bolt.
Adapt high pressure pump cover to fit around the fuel hoses.

Supply hose – Return hose – Tank wiring

Protect the supply- and return hose together with tank-wiring using the Ø16mm split tube.
Mount the “hose assembly “ with clamps, with a maximum distance of 40cm.



Remove left front wheel and plastic inner wheel arch. One screw is behind the plastic front fender.

Hose / wiring routing to tank 1

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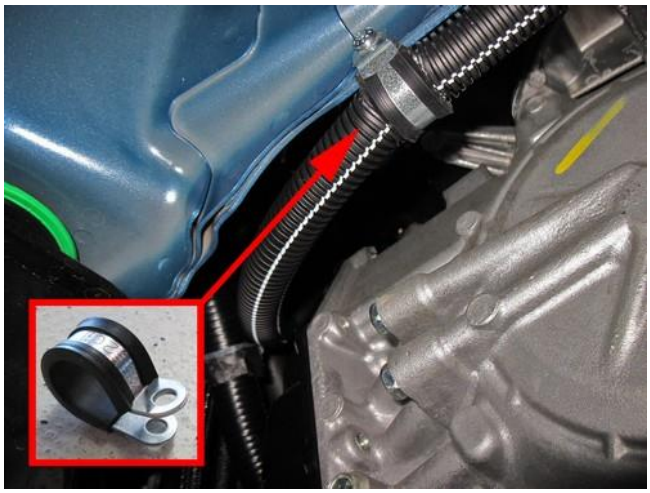
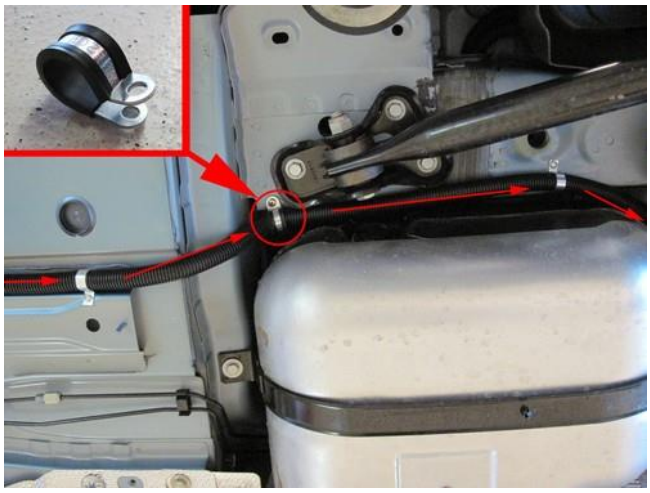
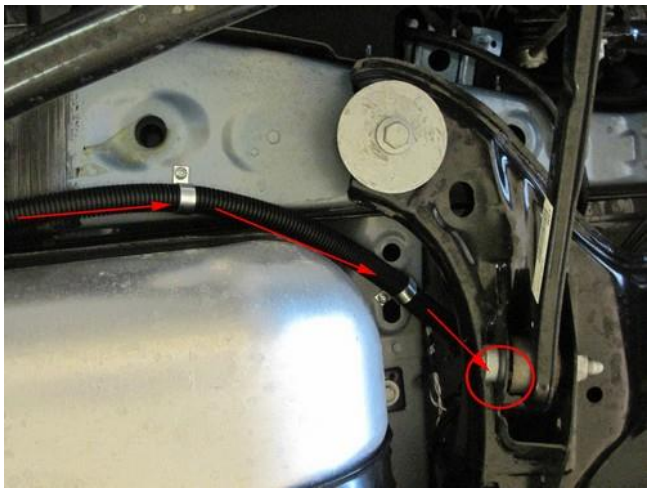
Mount protection around hoses (easiest from below vehicle). Be sure to fixate the wiring with the hoses too.

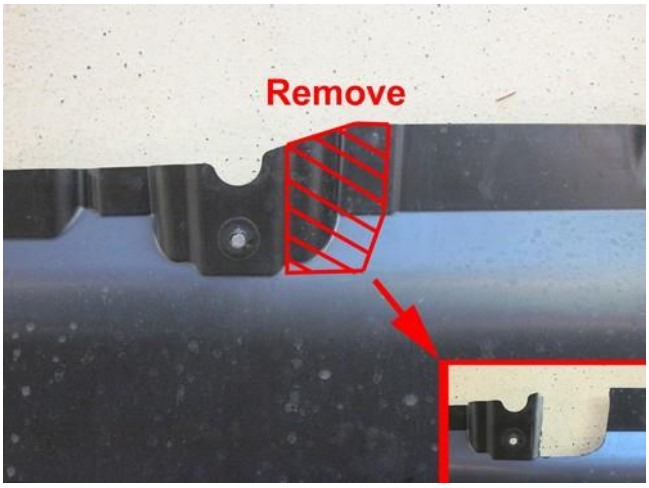


Hose / wiring routing to tank 2


Remove cover to fixate fuel lines to vehicle.

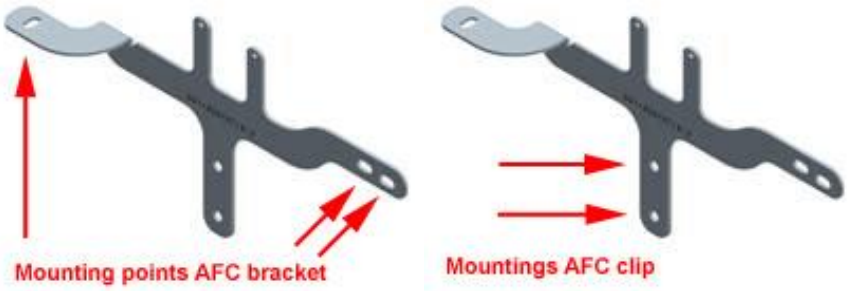



Stab through bleeder.



Adapt cover to fit around fuel lines.

Mounting the AFC

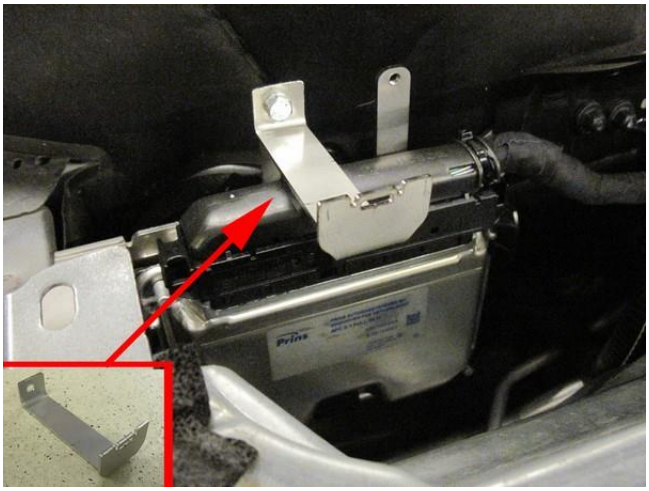



Mount AFC to bracket. Hold in place and mark hole for drilling.


Drill hole Ø7mm and treat anti-rust. Mount bracket with AFC to vehicle.

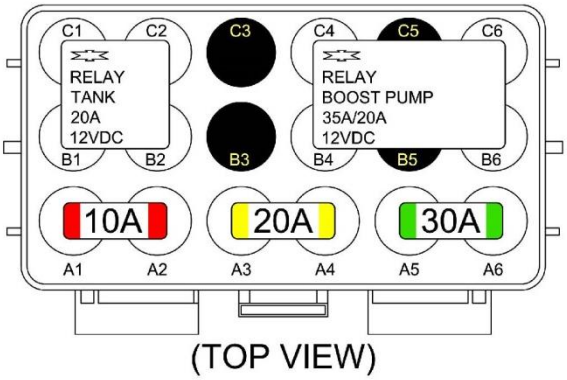
See page 25 before installing wiring loom !!!

Fuse-relay box / Wiring routing / Grommet

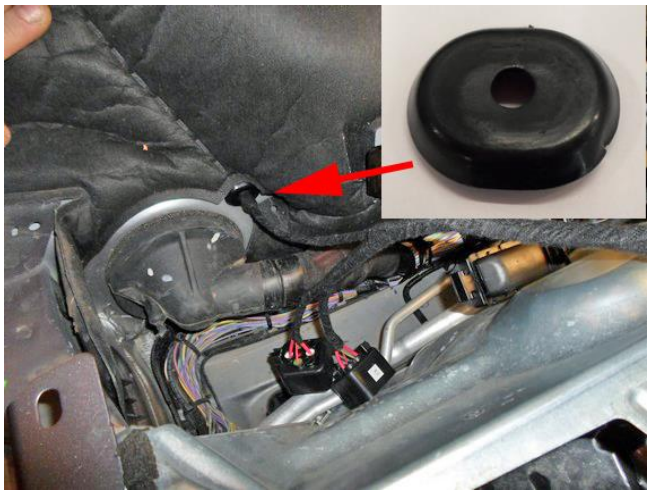


Mount fuse-relay bracket to AFC bracket. Mount fuse-relay box to bracket.

Fuse-relay box with plastic cover.



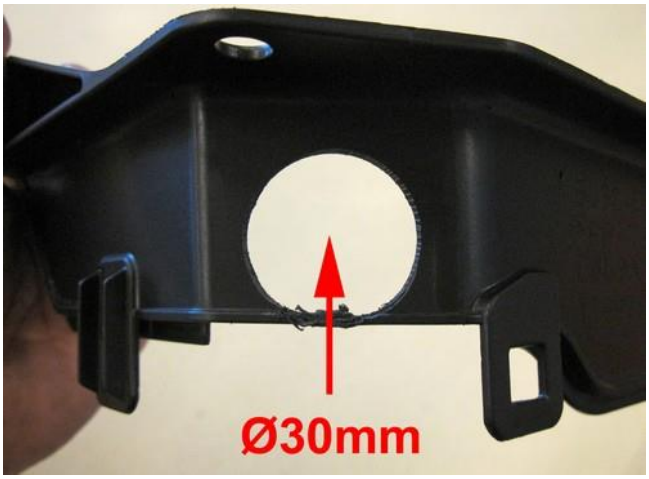
Fuse & relay location.

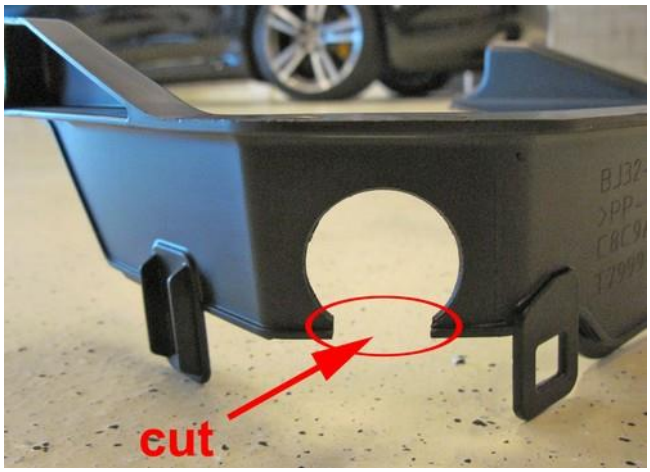


Wiring grommet to the passenger room behind AFC bracket.

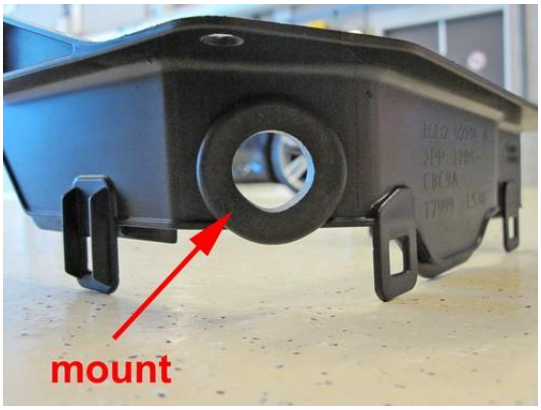
Wiring routing.

Wiring grommet engine room

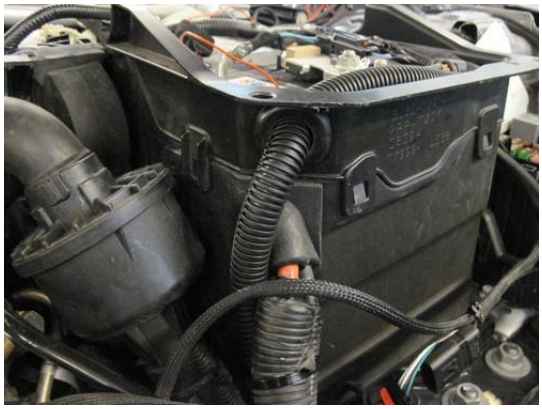




Drill hole Ø30mm as low as possible. Cut out the plastic underneath the hole.

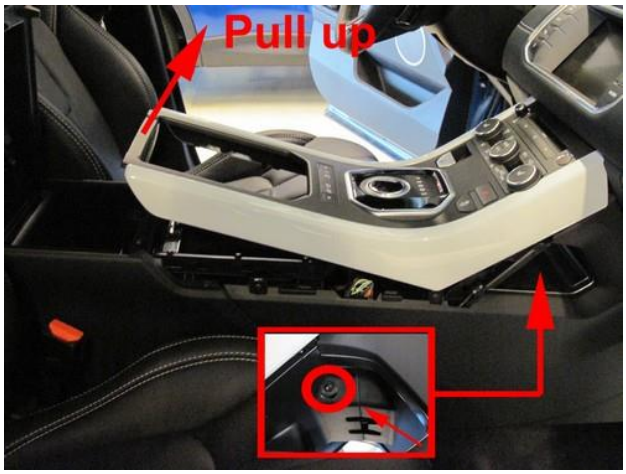


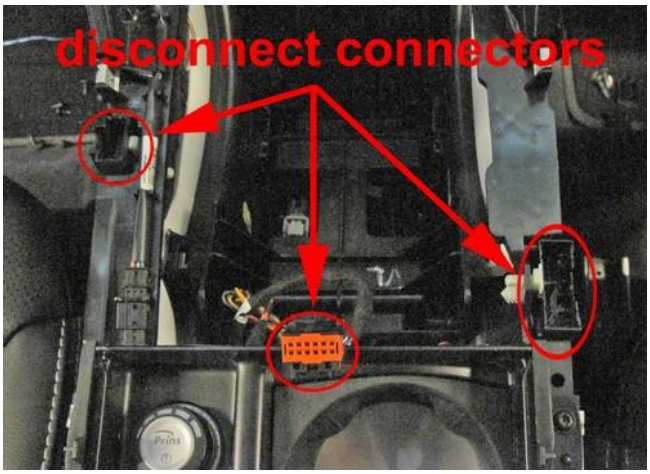
Mount rubber grommet. Stab wiring through grommet.



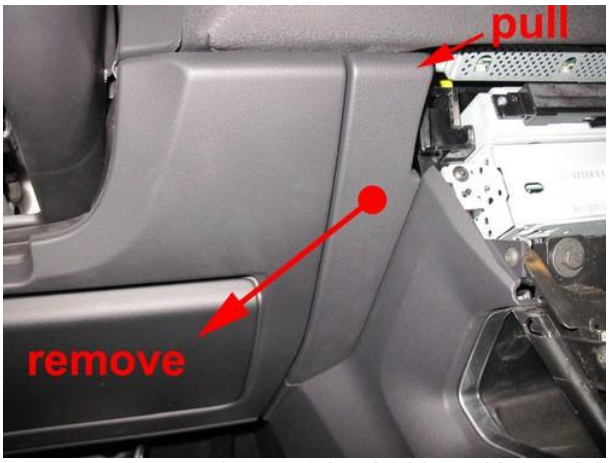
Mount plastic cap back to battery housing.

Mounting the fuel selection switch / CAN connection 1

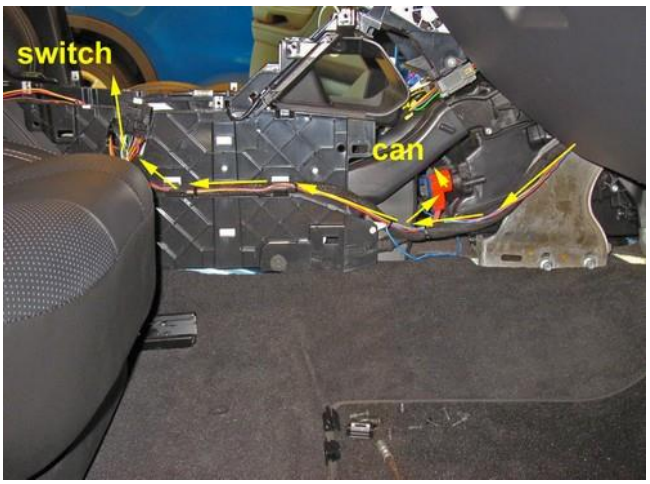


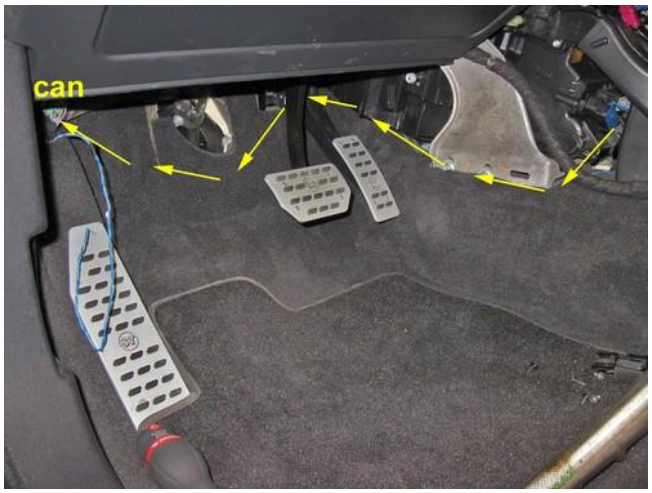


Remove centre top console, when removing disconnect the connectors when pulling up.



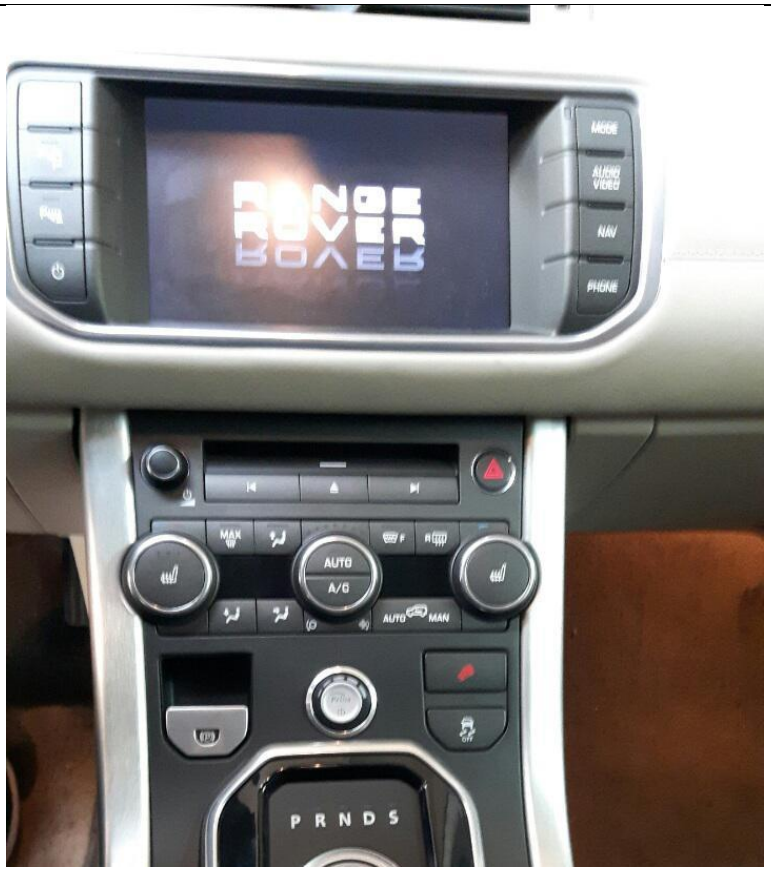
Remove pieces of the dashboard left & right. Remove left & right caps from center console.





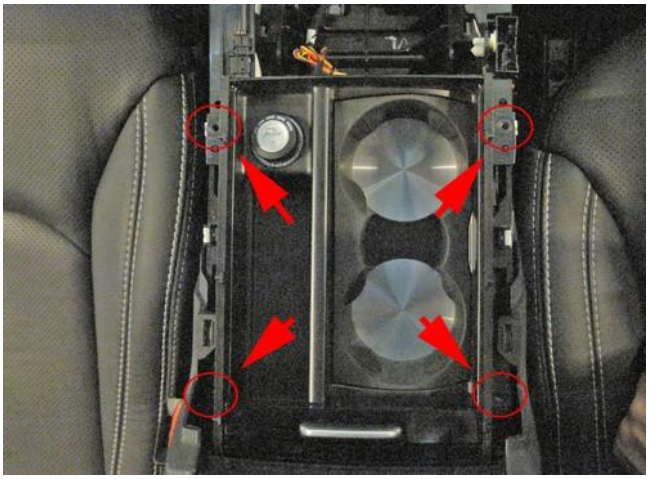
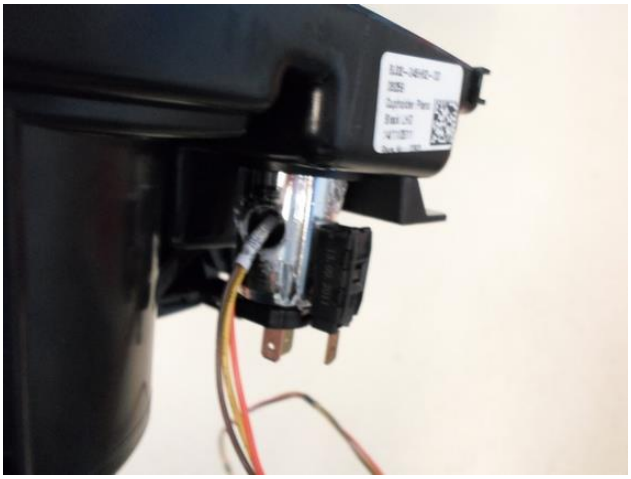
Wiring routing inside passenger room.

Fuel selection switch positions



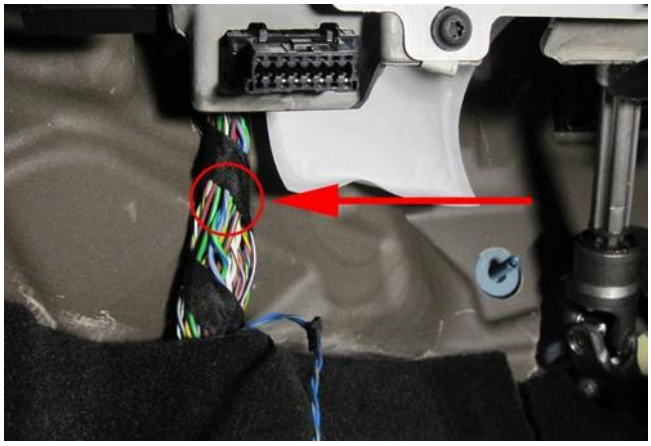
or

Mounting the fuel selection switch / CAN connection 2

Remove cup holder. Drill hole Ø8mm in cigarette lighter for wiring transit.


Mount switch to “adapter” and mount switch in cigarette lighter.

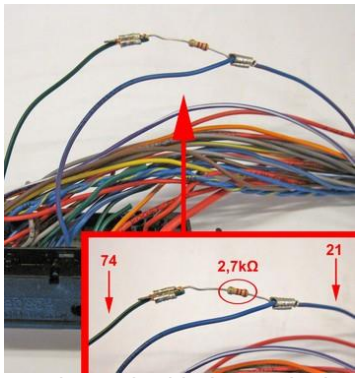
Mount back center console. Connect CAN wiring at the back of the OBD connector in the OBD connector wiring loom.

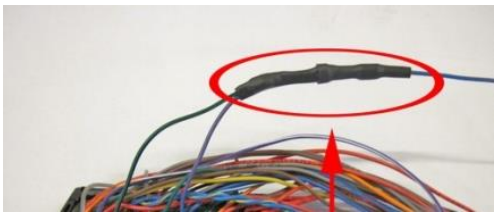
Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.

Install resistor in wiring loom before mounting wiring loom to AFC !

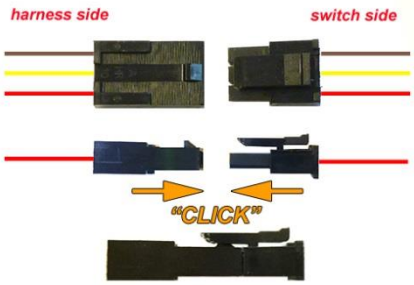
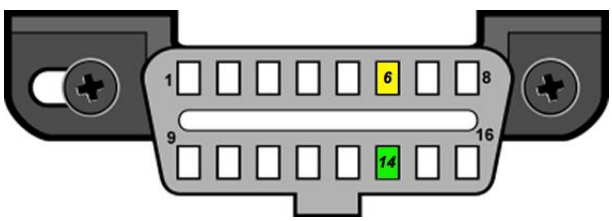
Wire number / code	Wire colour	Connection
21 AD9 Blue-purple 74 DAC3 Green-pink	Blue-purple	*Wideband lambda probe connection* Wire colour : **Brown-yellow** Wire location : Petrol ECU *pin A64* Connect wire 74 (DAC3) with the 2,7 kOhm resistor to wire 21 (AD9). Use heat shrink for protection. When connected like pictures, connect wire 21 to petrol ECU.





Connect wire 74 (DAC3) with the 2,7 kOhm resistor to wire 21 (AD9). Use heat shrink for protection.

Driver room

Wire number / code	Wire colour	Connection
3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	 Brown Red Yellow	Connect the 3-pole connector to the Prins fuel selection switch.
		
51 CAN-High	Yellow	EOBD connector pin 6
70 CAN-Low	Green	EOBD connector pin 14
		

Electrical connections

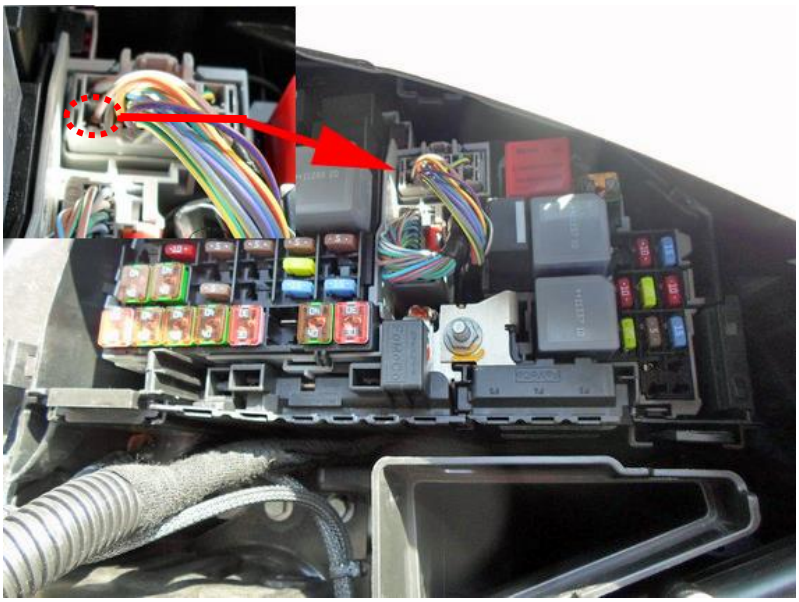
Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

Battery

1-32 MAIN GND ecu MAIN GROUND SENSE	Brown	Connect to the '–' of the battery (-31) ; use a ring terminal. *Wire location* : **- Battery**
4 - 13 +12V BATT fused +12V BATT boost pump +12V BATT pump driver	Red	Connect to the '+' of the battery (+30); use a ring terminal. Do not place the fuse in the holder before having completed the installation of the lpg system. *Wire location* : **+ Battery**

Fuse box engine room

7 +12V IGNITION	Grey-white	Make a connection to ignition + / contact + (+15). Do not place the fuse in the holder before having completed the installation of the lpg system. *Wire colour :* **Brown-white 14p/8** *Wire location :* Fuse box engine room, **grey 14 pole connector, pin 8**



Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

Petrol ecu

Wire number / code	***Wire colour***	***Connection***
36 AD6 25 DAC1	Blue-brown Green-white	*High pressure petrol sensor signal interruption* Sensor side. ECU side. *Wire colour :* **Blue-brown** *Wire location :* Petrol ecu Pin **A9**
63 Ground Shift	Blue-orange	*Sensor ground* *Wire colour:* **Blue-grey** *Wire location :* Petrol ecu Pin **A31**
17 AD2 10 DAC2	Blue-green Green	*Low pressure petrol sensor interruption* *Sensor side* *ECU side* *Wire colour :* **Purple-brown** *Wire location :* Petrol ecu Pin **A7**
40 Wake-up	Red-grey	*Sensor 5Volt supply* ***Petrol ECU 0 261 S06 504*** *Wire colour :* **Grey** *Wire location :* Petrol ecu Pin **A23** ***Petrol ECU 0 261 S10 410*** *Wire colour :* **Light-blue** *Wire location :* Petrol ecu Pin **A19**
56 DI2	Yellow-green	*Petrol fuel pump driver (PWM in)* *Wire colour :* **Yellow-orange** *Wire location :* Petrol ecu Pin **B45 (!! B-connector)**
60 DI3	Yellow-pink	*Airflow* *Wire colour :* **Light blue-brown** *Wire location :* Petrol ecu Pin **A55**
18 AD1	Blue-white	*For measuring the inlet manifold pressure from the engine MAP sensor.* *Wire colour :* **Green-brown** *Wire location :*Petrol ecu pin **A83**
8 RPM	Purple-white	*For measuring the engine speed signal.* *Wire colour :* **Brown-blue** *Wire location :* Petrol ecu pin **A80**
15 T-ect	Grey	*For measuring the engine coolant temperature.* *Wire colour :* **Yellow** *Wire location :* Petrol ecu pin **A12**

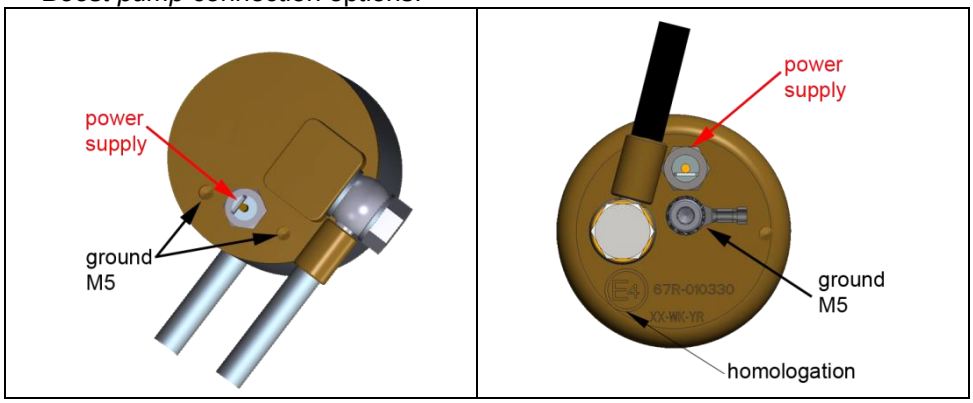
Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires

Engine room

Wire number / code	Wire colour	Connection
3-pole connector		Connect the 3-pole connector to the Psys sensor positioned into the Fuel Return Unit.
35 C Ground pin A	Brown-black	Sensor wire pin A
9 +5V sensor pin B	Red-blue	Sensor wire pin B
16 Psys pin C	Green	Sensor wire pin C
2-pole connector FSU		
24 +12V Lock-off FSU	Yellow-green	Connect the 2-pole connector to the lock-off valve
31 C ground	Brown-black	of the Fuel Supply Unit
2-pole connector FRU		
43 +12V Lock-off FRU	Red-white	Connect the 2-pole connector to the lock-off valve
34 C ground	Brown-black	of the Fuel Return Unit
4-pole diagnose connector		Diagnose connector for service / diagnosis
46 RS232 TXD	Grey	Connector pin 1
65 RS232 RXD	Grey	Connector pin 2
68 Ground PDT	Brown-black	Connector pin 4
Boost pump relay		
2 +12V boost pump relay	Red-white	Pin 86 of the boost pump relay
26 GND boost pump relay	Brown-black	Pin 85 of the boost pump relay
+12V fused BATT	Red	Pin 30 of the boost pump relay
+12V Boost pump	Red	Pin 87 of the boost pump relay
Wiring tank pump driver relay		
57 +12V tank relay	Red-white	Pin 86 of the driver relay
73 LSS4 tank relay	Purple-blue	Pin 85 of the driver relay
+12V BATT fused	Red 2.5mm2	Pin 30 of the driver relay
+12V driver	Red 2.5mm2	Pin 87 of the driver relay

Boost pump connection options:



Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

Lpg tank housing

Wire number / code	***Wire colour***	***Connection***
3-pole tank level connector 33 Ground tank level 12 Tank level in 11 Tank level supply	 Brown-black Blue Red-blue	Connect the 3-pole connector to the tank level sensor.
2-pole driver connector 71 LSS 3 PWM driver 64 AD 5 driver diagnose	 Purple-pink Blue-grey	Connect the 2-pole connector to the pump driver (4).
1. *2-pole connector tank lock-off*	Green-yellow Brown	From tank pump driver From tank pump driver
2. *3-pole connector tank pump*	Red 2.5mm^2 Brown 2.5mm^2	From tank pump driver From tank pump driver
3. *2-pole connector power driver*	Red 2.5mm^2 Brown 2.5mm^2	From tank pump relay 87 From main ground
4. *2-pole connector driver*	Green Grey	From AFC pin 71 pwm From AFC pin 64 diagnose

Checklist after installation

1. Install the system fuses.
   Turn on ignition.
   Connect the Prins interface wire and run the Prins diagnosis program.
   When working on the car, beware of moving and rotating parts in the engine compartment
   (even when the engine is not running !!).

2. When commissioning the LPG system, you must activate the AFC with the diagnosis software.

3. Check whether the program in the AFC matches with the car (dedicated engine set):
   See “Identification” in the diagnosis program.

4. Check all components and connections for any LPG leakage, use a LPG leak detector device or
   a fluid detection like soap. Also check for petrol leakage. Make sure the solenoid valves are in open position.
   No evidence of leakage is permitted.
   Caution for moving and rotating parts in the engine compartment !

5. Use the diagnosis software to check again all input and output signals.

6. Check the system for error codes and solve these, if required.
   Check the petrol MMS for EOBD error codes.
   Place the protection connector back on the diagnose connector.

7. Make a test drive and check the cars drivability on LPG and petrol.