ALTERNATIVE FUEL SYSTEMS

Prins

Quality, innovation and customer care, it's in our nature


# Installation manual
# Dedicated
## PART 2/2

| | |
|---|---|
| MAKE OF AUTOMOBILE: | Skoda |
| TYPE: | SuperB |
| PISTON DISPLACEMENT: | 1800 TSI |
| NUMBER OF VALVES: | 16 |
| ENGINE NUMBER: | CDAA |
| VEHICLE CATEGORIES | M |
| TRANSMISSION | MT |
| VERSION ( LPG ) | Direct LiquiMax-2.0 |
| INJECTION SYSTEM: | Bosch MED 17.5 |
| HIGH PRESSURE PETROL POMP | Bosch HDP-5-PE 0261.520.(055)/(056) /(069)/(070)/(089)/(090)/(132)/(133) |
| HIGH PRESSURE PETROL INJECTOR | Bosch HDEV-5-1 0261.500.(057)/(58)/(74)(75) |
| MODEL YEAR: | 2009 |
| SYSTEM APPROVAL NUMBER ( R115 ) | E4-115R-000010 / DLM-LPG 03 |
| LOCATION SYSTEM STICKER | right side, centre door post |
| ENGINE SET NUMBER | 364/070003/A |
| MANUAL NUMBER | 076/3600900 |
| DATE | 2014-04-03 |



Version 2012-05-21 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 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.

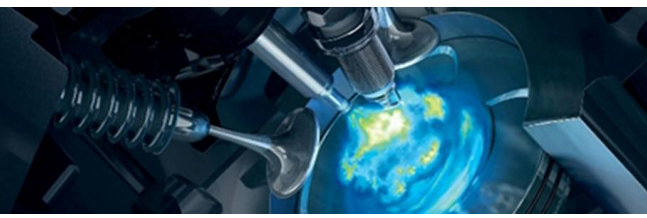
Register ( warranty card ) the system on the Prins warranty portal .

## 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 ( 10Nm )
- 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 )
- Socket 46mm
- 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

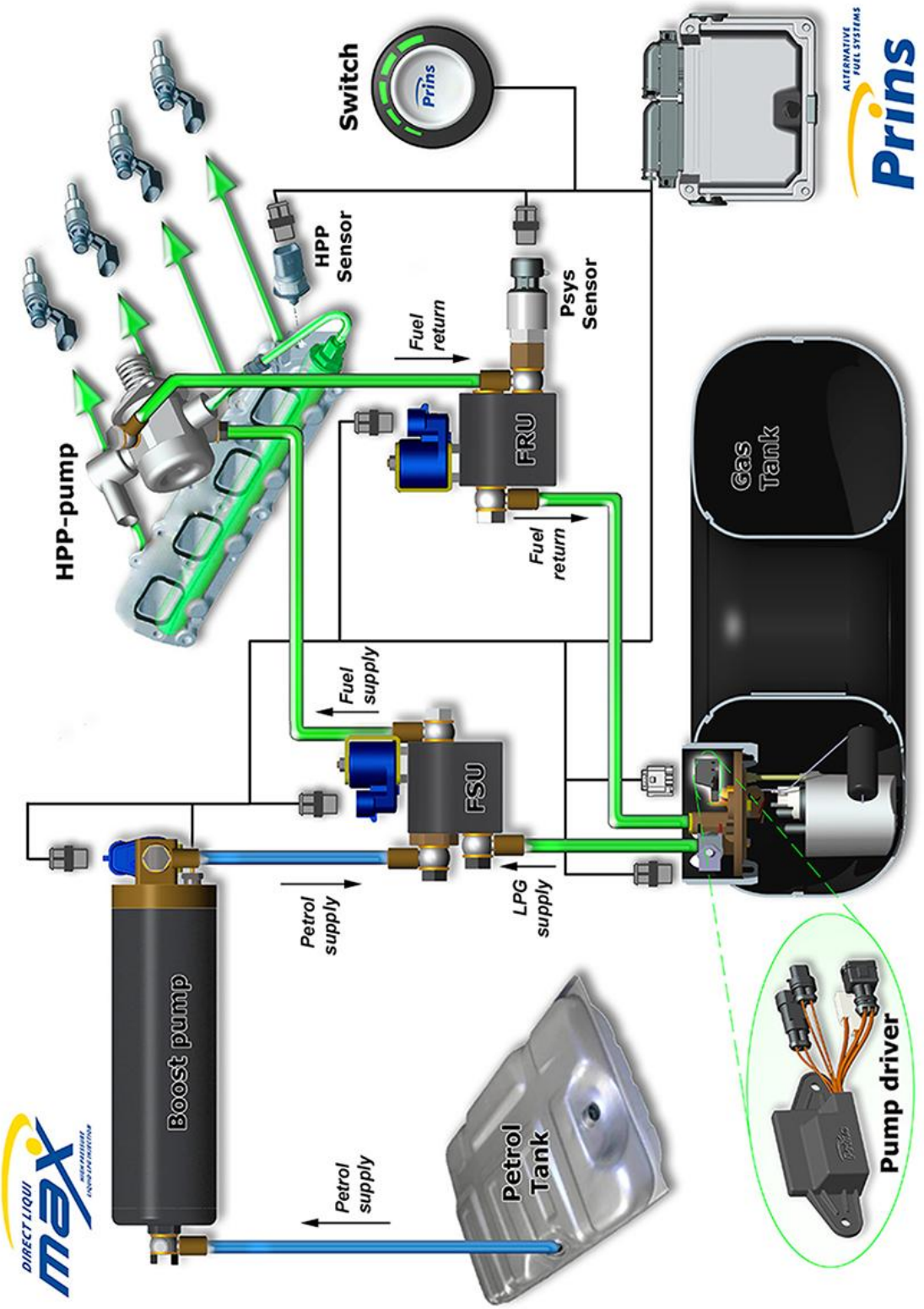
| | | Nm | SW |
|---|---|---|---|
| M 4 x 0,7 | | 3.3 | 7 |
| M 5 x 0,8 | | 6.5 | 8 |
| M 6 x 1,0 | | 11.3 | 10 |
| M 7 x 1,0 | | 14.5 | 11 |
| M 8 x 1 | | 24.5 | 13 |
| M 8 x 1,25 | | 27.3 | 13 |
| M 10 x 1 | | 52 | 15-16-17 |
| M 10 x 1,5 | | 54 | 15-16-17 |
| | | | |
| ( filtered )Banjo bolt | | 10 | 14 |
| Supply line connection | | 15 | 13 |
| Fuel module Allen bolts | | 20 | 7 |
| Filler hose connection | | 50 | 22 |
| HPP cover Hitachi | | 220 | 46 |

EXPLANATION OF SYMBOLS :

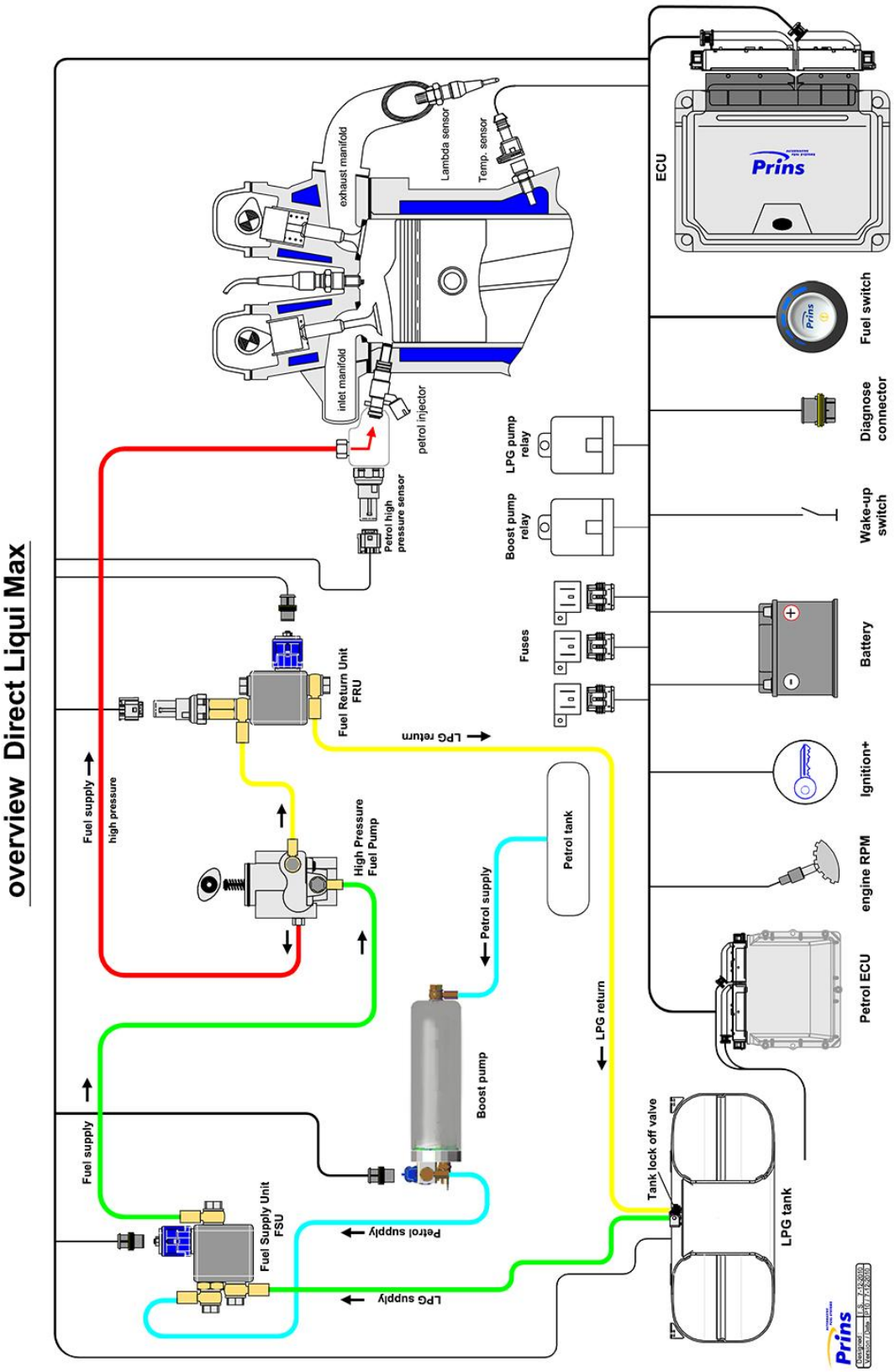
= IMPORTANT, CAUTION

= WEAR SAFETY GOGGLES

# Direct LiquiMax



# Overview Direct LiquiMax



# Direct LiquiMax parts / approval numbers


1st generation


2nd generation

Fuel Supply Unit : E4-67R-010269


1st generation

2nd generation

Fuel Return Unit : E4-67R-010270
Pressure Sensor : E4-67R-010051


Boost pump

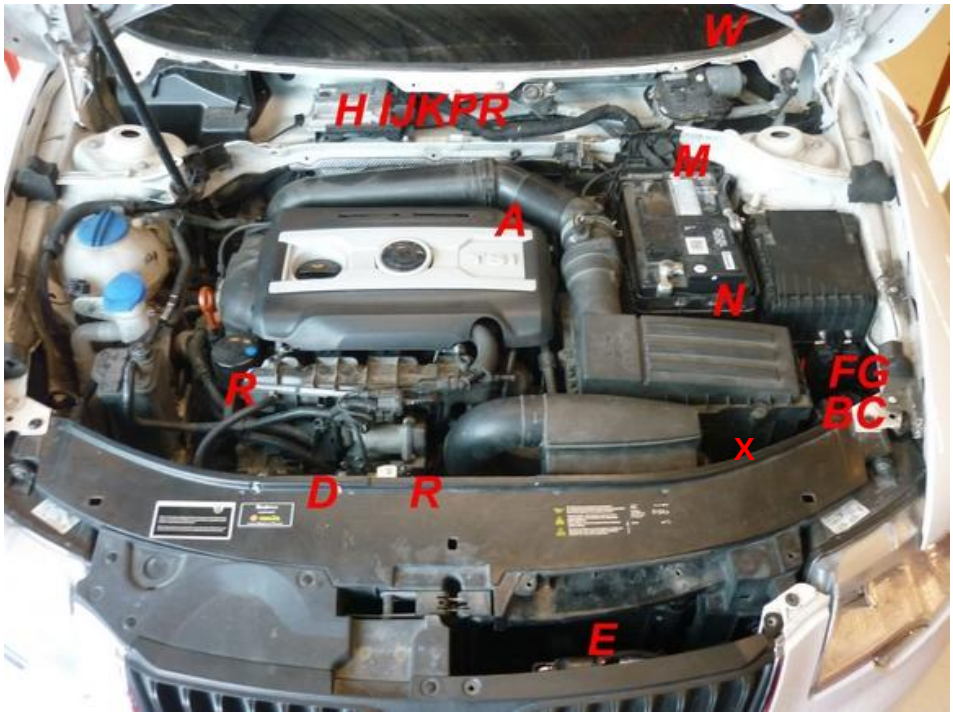
High Pressure Pump : E4-67R-010266
High Pressure Rail : E4-67R-010267
High Pressure Injectors : E4-67R-010309

Prins ECU : E4-67R-010098
E4-10R-030507



Fuel lines series XD : E4-67R-010247 XD3
E4-67R-010247 XD4

## Mounting and connection points




| | |
|---|---|
| A : High pressure petrol pump | L : R115 Approval sticker |
| B : Fuel Supply Unit : FSU | M : Grommet |
| C : Fuel Return Unit : FRU | N : Gas system fuses |
| D : Boost pump | P : T-ect |
| E : AFC | Q : Low pressure signal |
| F : Boost pump relay | R : MAP, Analog 3 |
| G : Tank relay | S : Analog 2 |
| H : Petrol ECU | T : Analog 4 |
| I : Engine speed signal RPM | V : Digital input 3 |
| J : “+” ignition | W : EOBD |
| K : High pressure signal Analog 1 | X : WAKE-UP |


L:
R115 approval sticker :
Right side centre door post

# Removal of the Bosch High Pressure Pump

**-REMOVAL-**

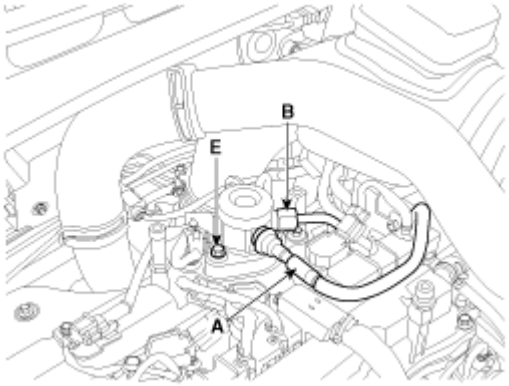
-WARNING-

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.



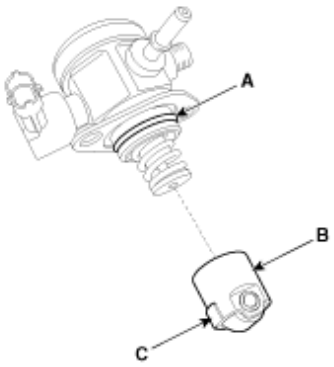

**CAREFULLY** store the removed petrol pump. Make sure no pollution can come into the pump.

# 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.



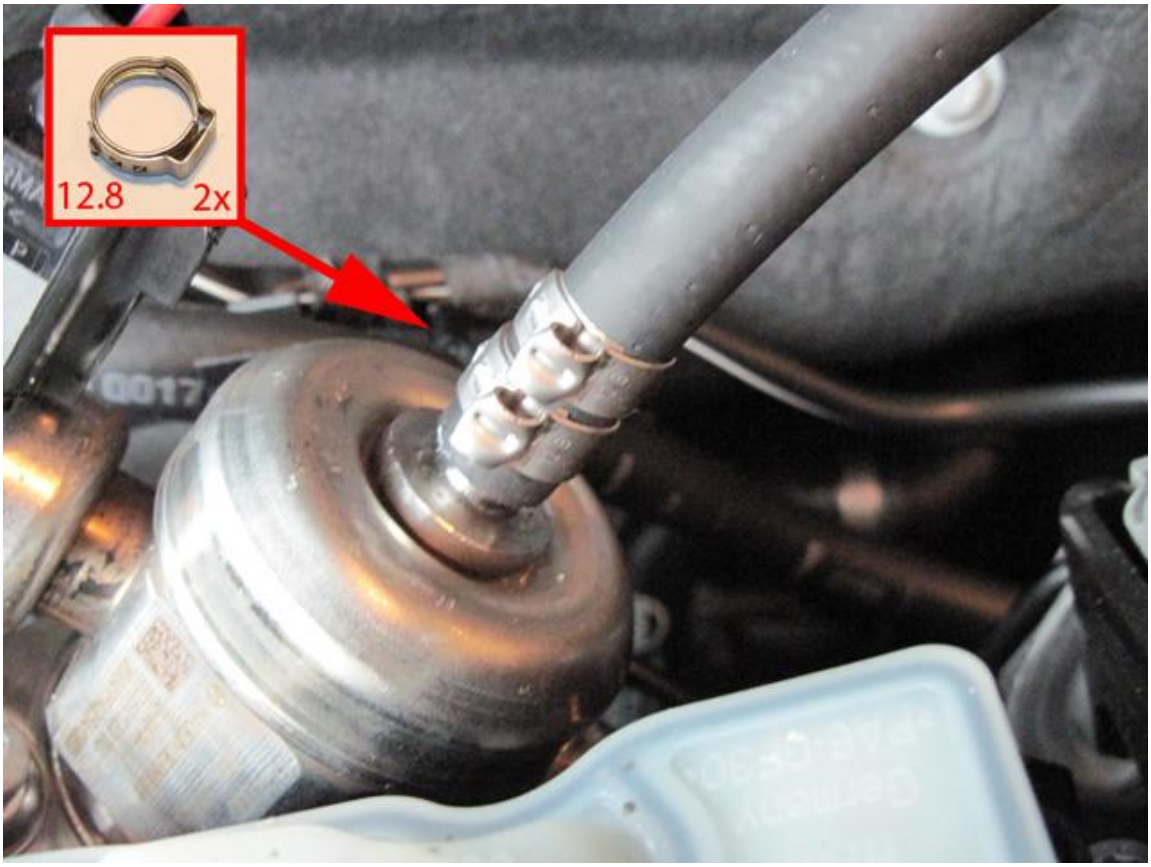

Installation bolts:
When tightening the installation bolts of the high pressure fuel pump, tighten and turn the bolts in small step ( 0.5 turns ) after tightening them with hand-screwed torque.
**High pressure fuel pump installation bolt:** 12.8 ~ 14.7 N.m

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.

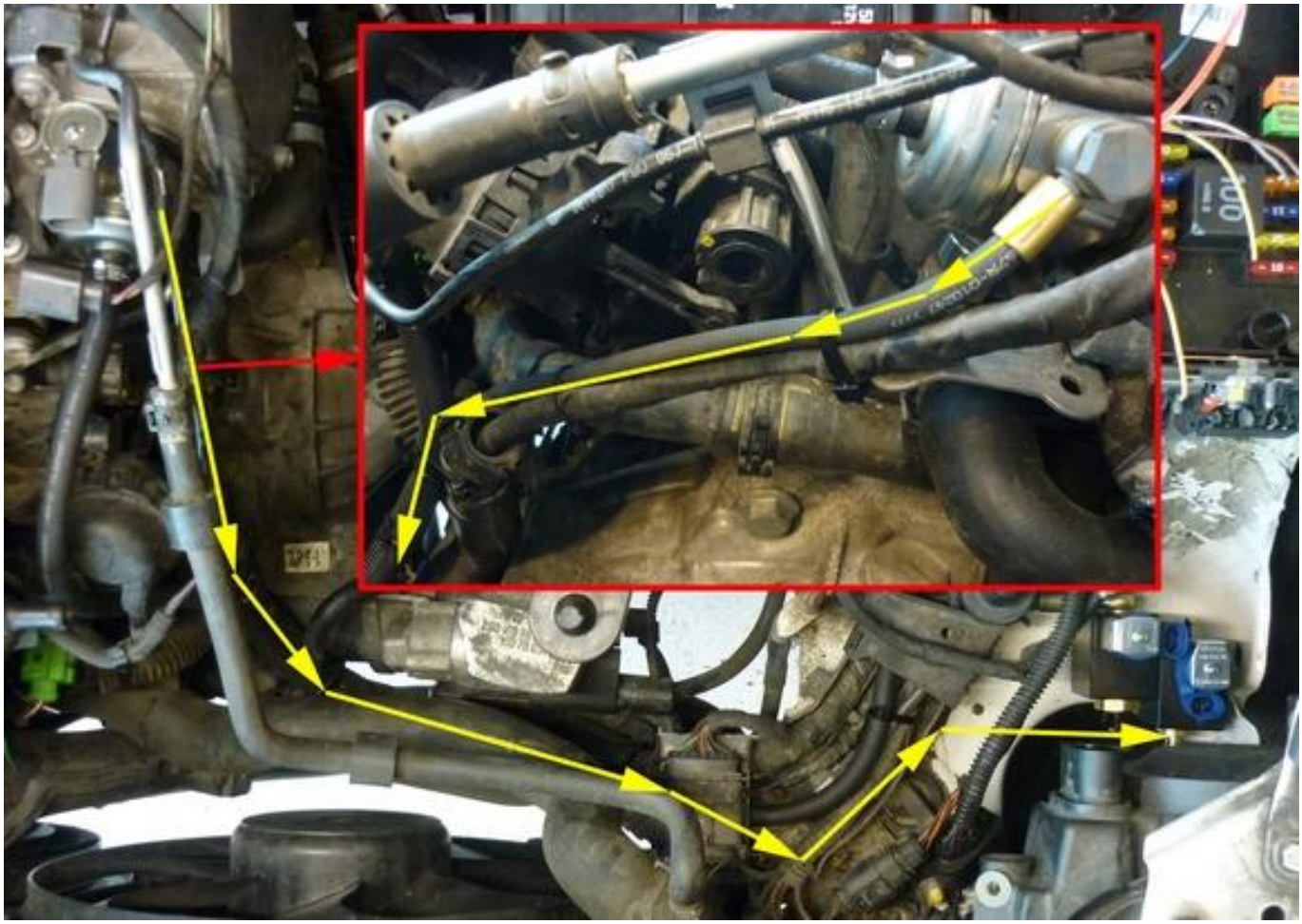
# High pressure pump installation

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



## High pressure pump return

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

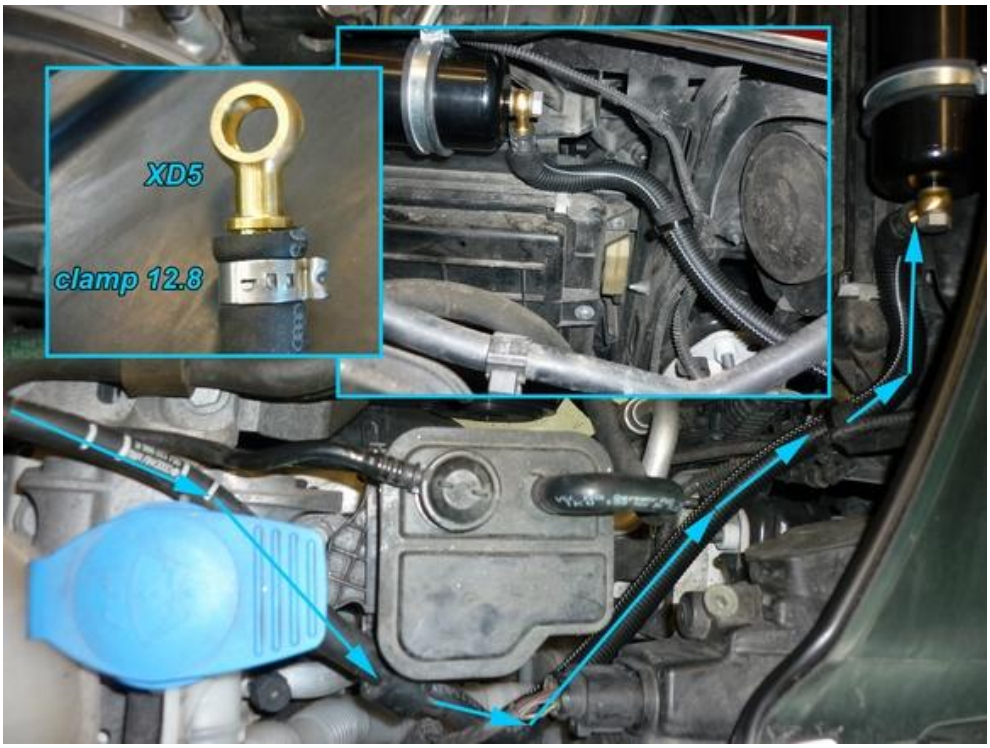


## Boost pump



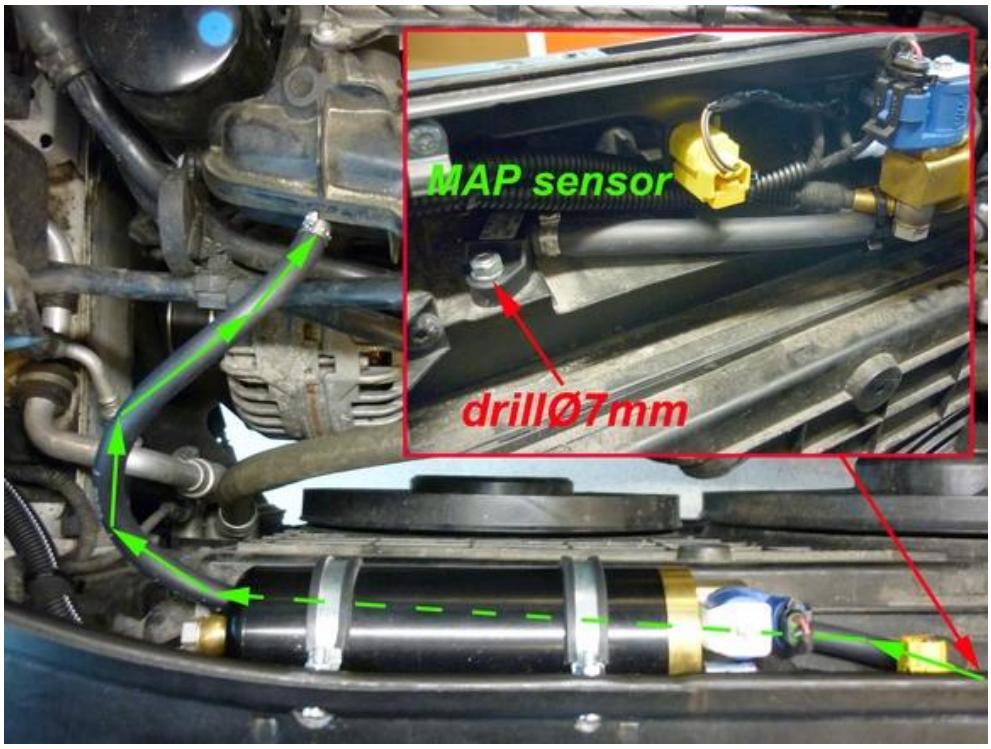
## Connection of  the fuel hose to the boost pump.

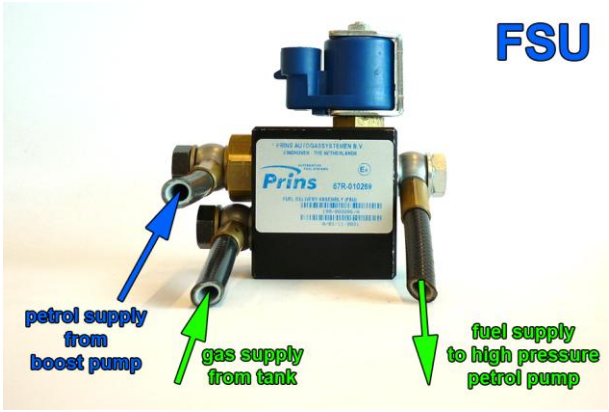
Connect the fuel hoses with an adapter to the boost pump.

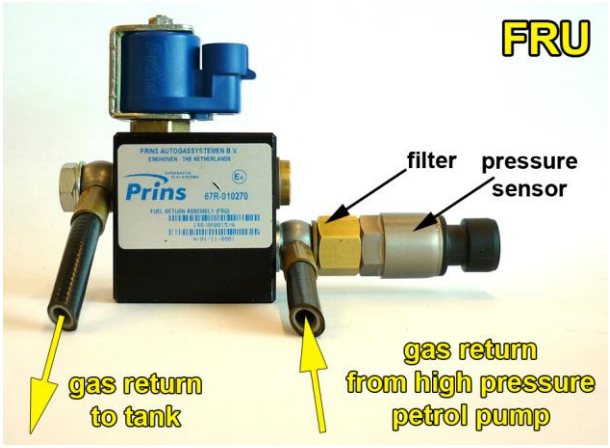


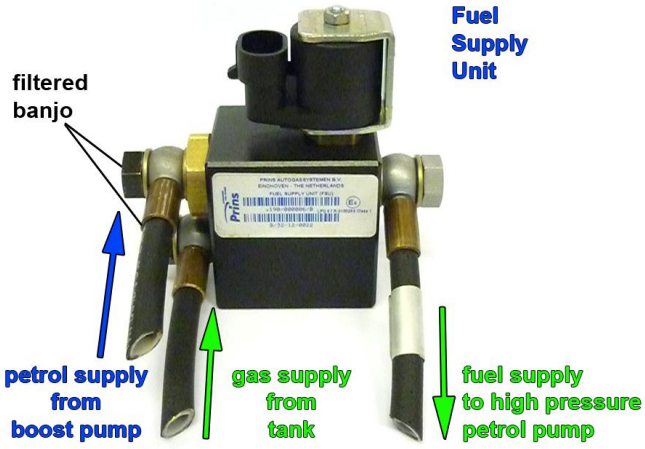

Filtered banjo

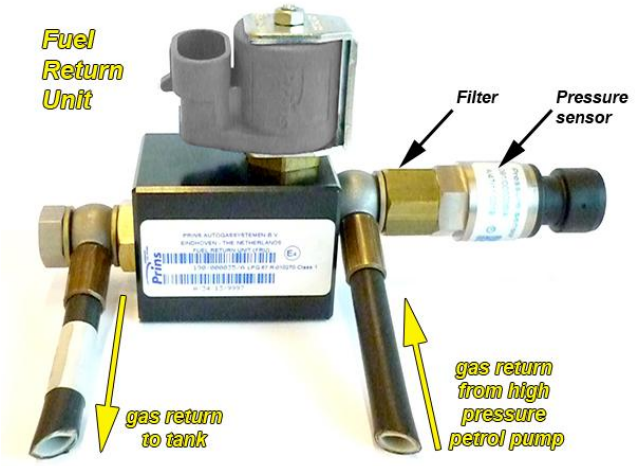
# Prins MAP sensor



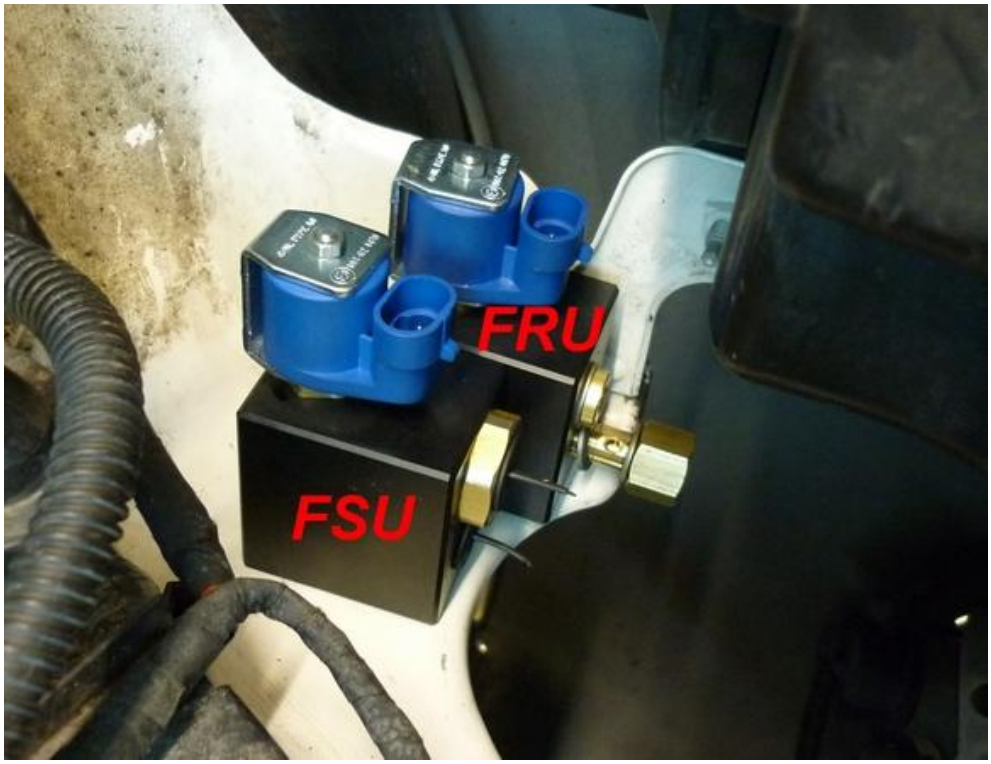




**Black filtered banjo will only be used on inlet connections !**

**Filter inside sensor banjo**

# Mounting the Fuel Supply Unit

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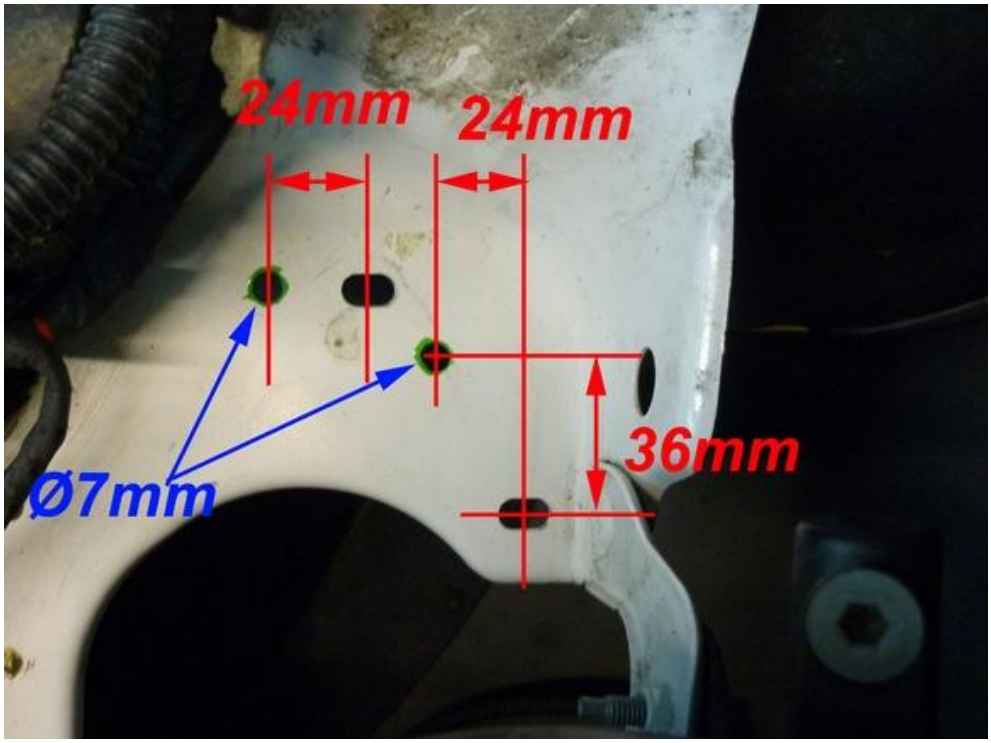
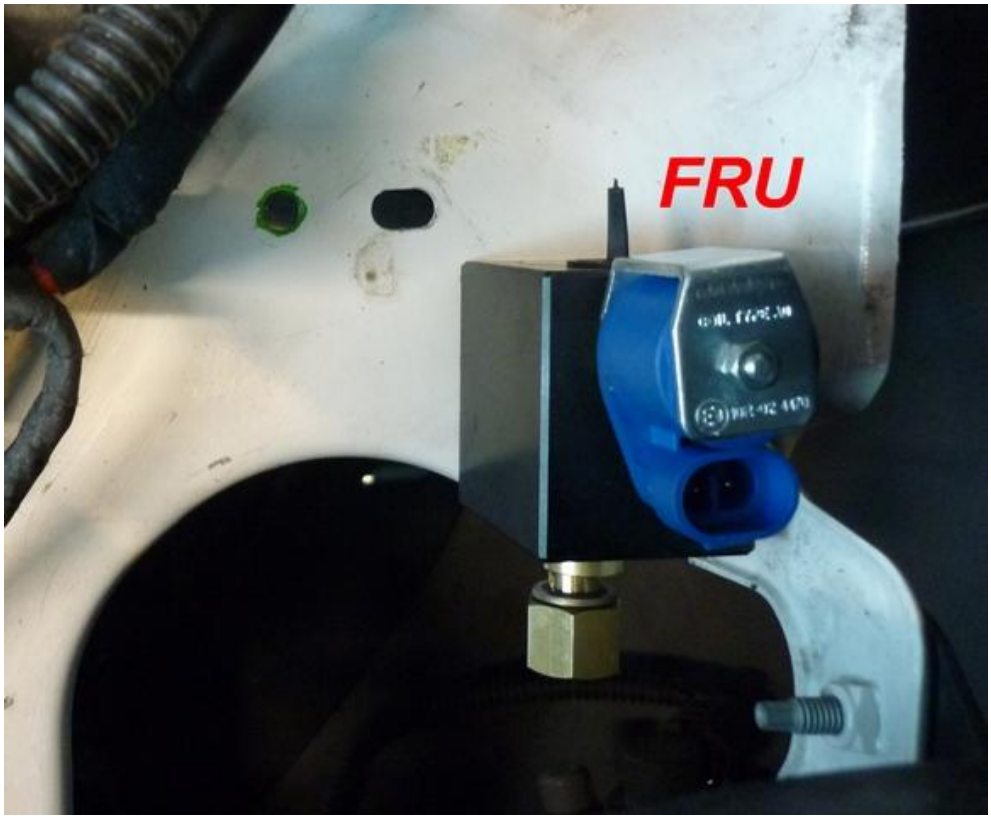
# Mounting the Fuel Return Unit



# LPG / petrol fuel lines

| Hose | from | to | Length ( cm ) |
|---|---|---|---|
| | Adapter original petrol hose | Petrol boost pump | n.a. |
| XD-5 | Fuel supply unit | High pressure petrol pump | 100 |
| XD-3 | Petrol boost pump | Fuel supply unit | 100 |
| XD-3 | Fuel return unit | High pressure petrol pump | 100 |
| | Fuel return unit | High pressure petrol rail | n.a. |

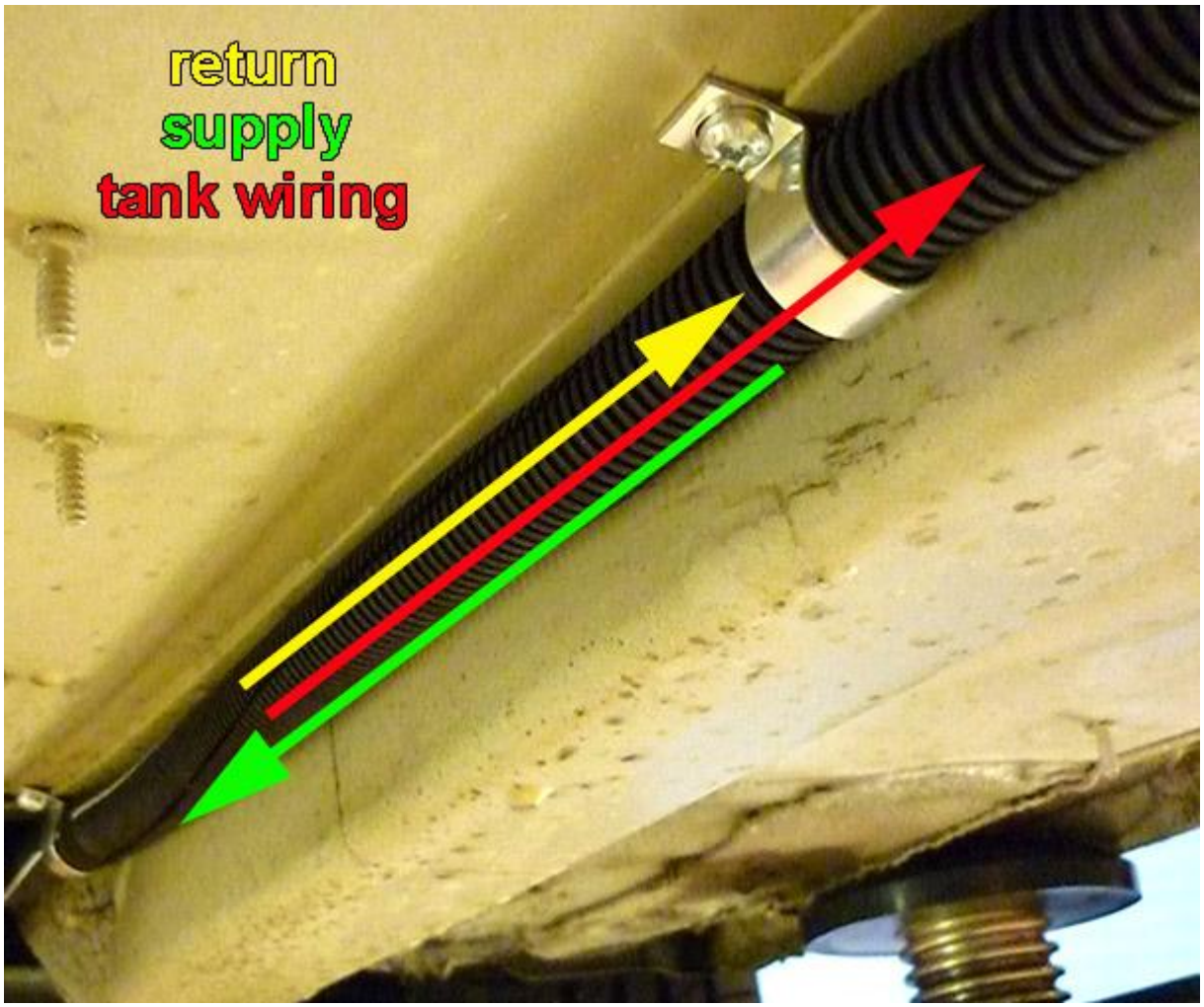

Install the fuel line using two bonded seal washers and banjo bolt :


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

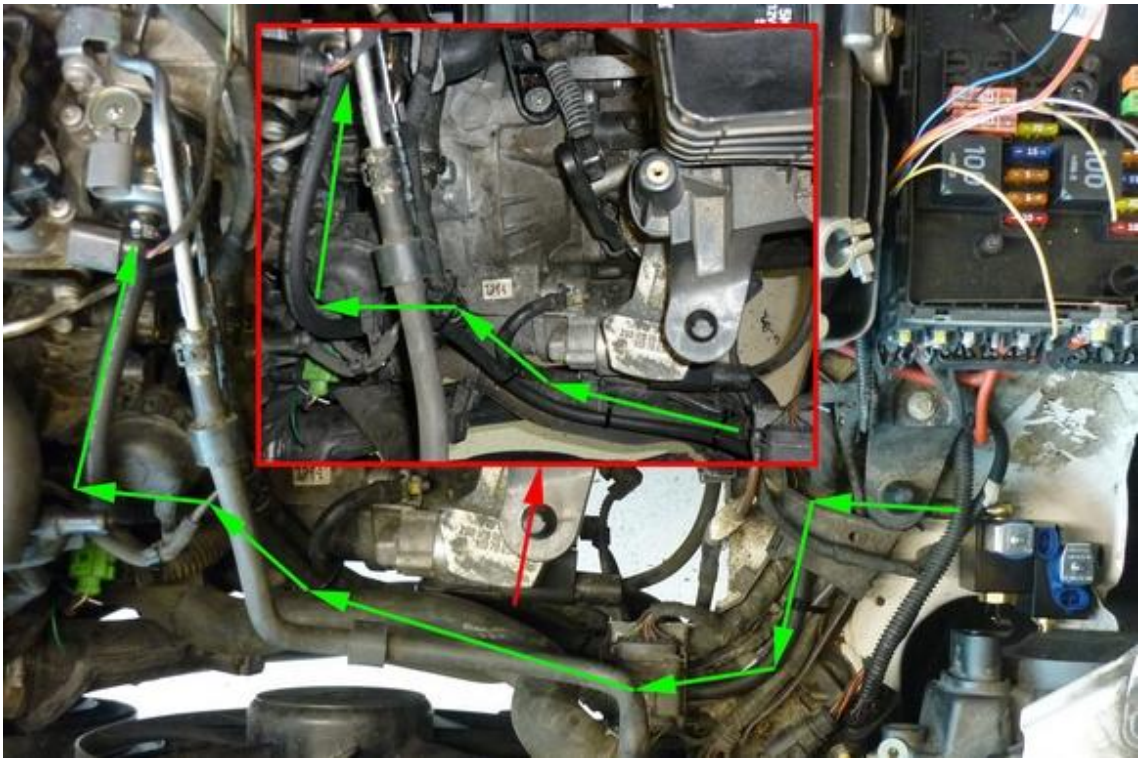
181/300009/A

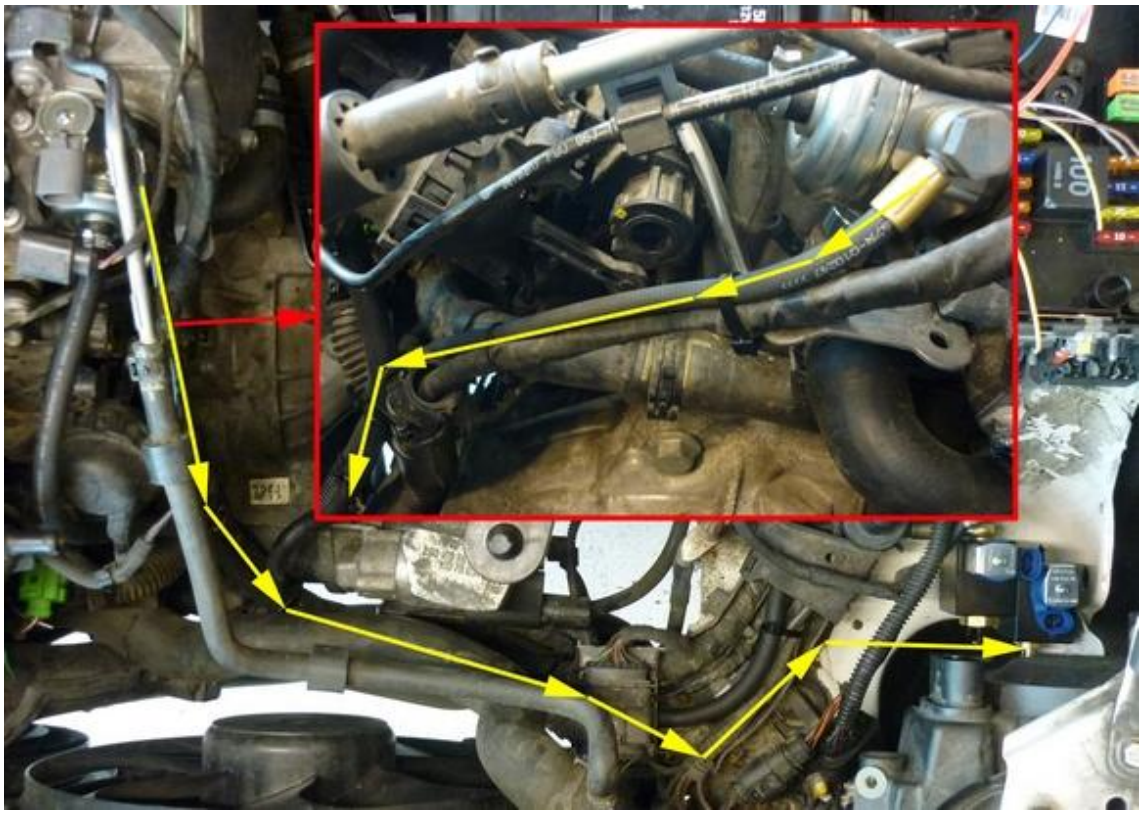
## Supply hose – Return hose – Tank wiring

Protect the supply- and return hose together with tank-wiring using the Ø16 split tube.
Mount the “hose assembly “ with clamps, with a maximum distance of 40cm.

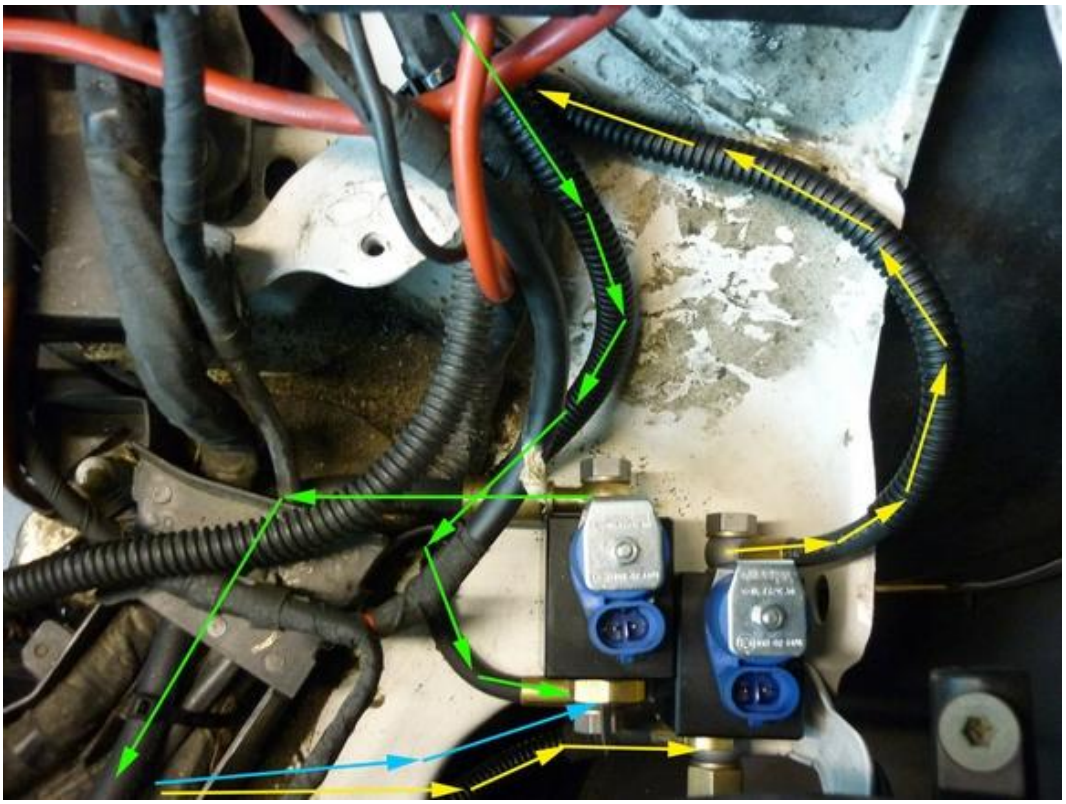


## Hose routing

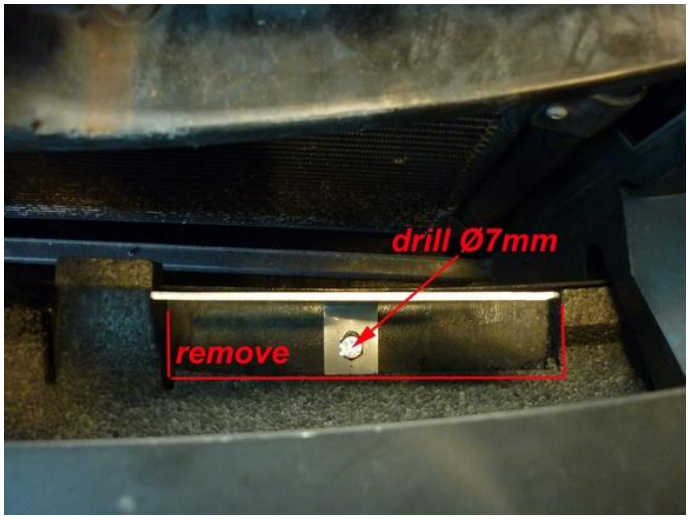




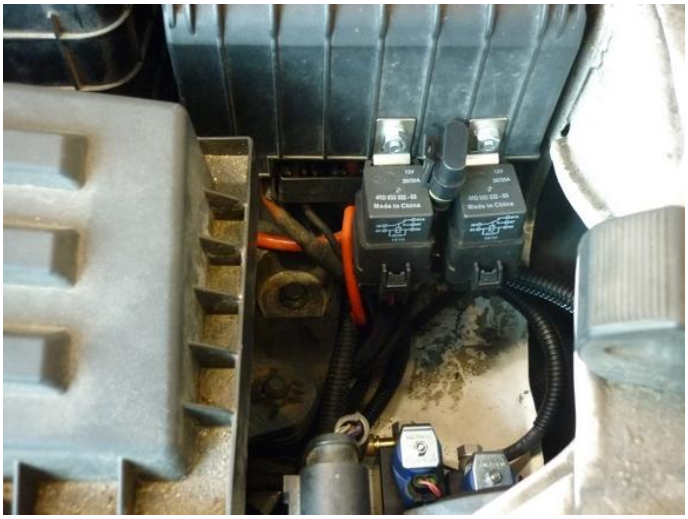
## Hose routing



# Mounting the AFC




# Wiring AFC / relay location



## Wiring routing

## Mounting the fuel selection switch

Mount the switch.

**Push through grommet : switch + can**

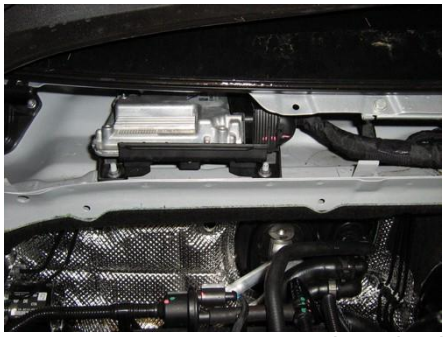
Grommet behind battery

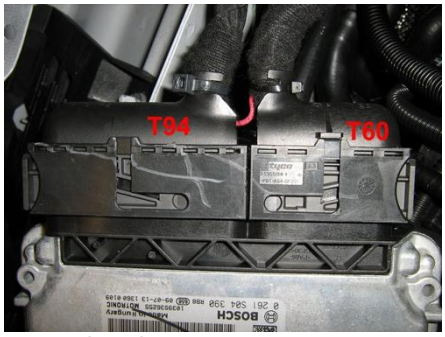
# Electrical connections

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

| *Wire number / code* | *Wire colour* | *Connection* |
|---|---|---|
| 1-32<br>MAIN GND ecu<br>MAIN GROUND SENSE<br>MAIN GND pump driver<br>MAIN GND boost pump | brown | Connect to the '–' of the battery ( -31 ) ;<br>use a ring terminal.<br>Wire location :behind fuse box.<br>Original ground point left side suspension strut. |

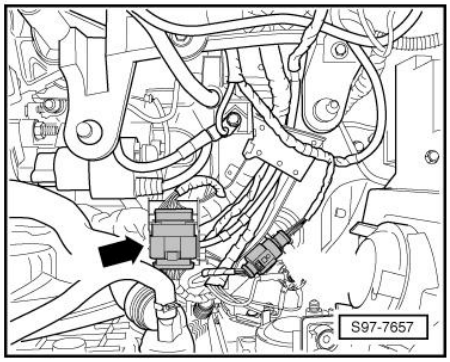
| | | |
|---|---|---|
| 4 – 13 – 44<br>+12V BATT sense<br>+12V BATT fused<br>+12V BATT boost pump<br>+12V BATT pump driver | red | Connect to the '+' of the battery ( +30 );<br>use a ring terminal.<br>Do not place the fuse in the<br>holder before having completed<br>the installation of the LPG system.<br>Wire location :  |






Petrol ecu in plenum chamber

| | | |
|---|---|---|
| 7 +12V IGNITION | grey - white | Make a connection to ignition + / contact + ( +15 ).<br>Do not place the fuse in the holder before having completed the installation of the LPG system.<br>Wire colour : blue-black<br>Wire location : ecu connector **T94** pin 87 |

| | | | |
|---|---|---|---|
| 121 | Wake-up | Red-grey | Wire colour : thin Black<br>Wire location :left side, under air filter box, 14-pole oval connector, pin 2<br>( always thin black )<br>  |

# Electrical connections

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

| ***Wire number / code*** | ***Wire colour*** | ***Connection*** |
|---|---|---|
| 18 Analog 1<br>25 Simulation 1 | Blue-red<br>Green-grey | *High pressure petrol sensor interruption*<br>Sensor side.<br>ECU side.<br>Wire colour : blue<br>Wire location : ecu connector T60 pin 40 |
| 19 Analog 4 | Blue-white | *High pressure petrol sensor ground*<br>Wire colour : brown<br>Wire location : ecu connector T60 pin 13 |
| 117 Digital input 3 | Yellow-black | *High pressure petrol sensor 5Volt*<br>Wire colour : grey-white<br>Wire location : ecu connector T60 pin 29 |

| | | |
|---|---|---|
| 115 Digital input 4 | Yellow-red | *MAF sensor*<br>Wire colour :grey-white<br>Wire location : ecu connector **T94** pin 23 |

| | | |
|---|---|---|
| 27 +5V sensor<br>37 C ground<br>20 Analog 3 MAP | Red<br>Brown<br>Blue | For measuring the inlet manifold pressure (MAP).<br>Connect the 3-pole connector to the Prins MAP sensor.<br>Sensor location: mount next to boost pump |
| 8 RPM | Purple-white | For measuring the engine speed signal.<br>Wire colour : green<br>Wire location : ecu connector T60 pin 53 |
| 15 T-ect | Grey | For measuring the engine coolant temperature.<br>Wire colour : yellow<br>Wire location : ecu connector T60 pin 57 |

| | | | |
|---|---|---|---|
| 10 | Simulation 2 | Green-black | Not used, insulate. |
| 17 | Analog 2 | Blue-black | Not used, insulate. |
| 23 | Digital Simulation | Green-red | Not used, insulate. |
| 119 | Digital input 2 | Yellow-grey | Not used, insulate. |
| 6 | Lambda1 WB | Orange | Not used, insulate. |
| 42 | Lambda2 WB 10KΩ | Orange-white | Not used, insulate. |

# 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 | Sensor wire pin A |
| 9 +5V sensor pin B | Red | Sensor wire pin B |
| 16 Psys pin C | Green | Sensor wire pin C |
| 14 T-LPG | Grey | Not used, insulate. |
| *2-pole connector Boost Pump* | | |
| 106 + Lock-off Boost Pump | Red | Connect the 2-pole connector to the lock-off valve |
| 98 Ground lock-off | White-yellow | of the Boost Pump. |
| *2-pole connector FSU* | | |
| 108 + Lock-off FSU | Red | Connect the 2-pole connector to the lock-off valve |
| 100 Ground lock off | Pink-yellow | of the Fuel Supply Unit |
| *2-pole connector FRU* | | |
| 90 + Lock-off FRU | Red | Connect the 2-pole connector to the lock-off valve |
| 82 Ground lock off | Blue-yellow | of the Fuel Return Unit |
| *4-pole diagnose connector* | | Diagnose connector for service / diagnosis |
| 46 Service TxD | Grey | Connector pin 1 |
| 65 Service RxD | Grey | Connector pin 2 |
| 68 C ground | Brown | Connector pin 4 |
| *Boost pump relay* | | |
| 107 + relay boost pump | Red | Pin 86 of the boost pump relay |
| 99 GND relay boost pump | Green-yellow | 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 |

**Driver room**

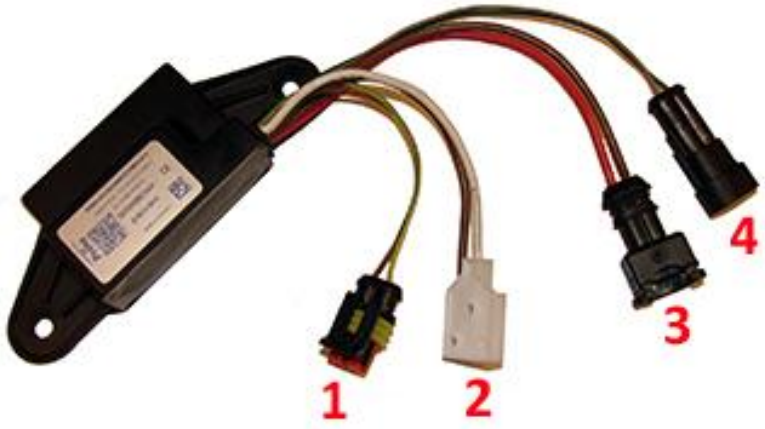
| | | |
|---|---|---|
| *3-pole micro connector* | | |
| 66 Ground fuel switch | Brown | Connect the 3-pole connector to the Prins fuel selection switch. |
| 3 +12V fuel switch | Red | |
| 49 LIN fuel switch | yellow | |
| 51 CAN-High | Blue-yellow | EOBD connector pin 6 |
| 70 CAN-Low | Blue | EOBD connector pin 14 |

# 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*<br>*40 Ground tank gauge*<br>*12 Tank level in*<br>*11 + tank level supply* | <br>Brown<br>Blue<br>Red | Connect the 3-pole connector to the tank level sensor.<br>Connector pin 1<br>Connector pin 2<br>Connector pin 3 |
| **1.** *2-pole connector tank lock-off* | Green-yellow<br>Brown | Pump driver to lock-off power<br>Pump driver to lock-off ground |
| **2.** *3-pole fusite* | Red<br>Brown<br>- | 1. Pump power<br>2. Pump ground<br>3. not used |
| **3.** *2-pole connector tank pump* | Red 2.5mm$^2$<br>Brown 2.5mm$^2$ | Pump driver power<br>Pump driver ground |
| **4.** *2-pole connector* | Grey<br>Green | Pump driver diagnose<br>Pump driver control |




| | | |
|---|---|---|
| *Wiring tank relay*<br>2 + tank relay<br>26 Ground tank relay<br>+12V BATT fused<br>+12V pump driver | <br>Red<br>Green-yellow<br>Red 2.5mm$^2$<br>Red 2.5mm$^2$ | <br>Pin 86 of the tank relay<br>Pin 85 of the tank relay<br>Pin 30 of the tank relay<br>Pin 87 of the tank relay |

# 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.