



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



Installation manual Dedicated PART 2/2

MANUFACTURER	Ford
TYPE	Mondeo
ENGINE DISPLACEMENT	1596
NUMBER OF VALVES	16
ENGINE CODE / NUMBER	JTBB
VEHICLE CATEGORIES	M1
TRANSMISSION	MT
VERSION	Direct LiquiMax-2.0
PETROL ECU MANUFACTURER / CODE	Bosch MED
HIGH PRESSURE PETROL PUMP	Bosch HDP-5-PE BM5G 0261.520.140
HIGH PRESSURE PETROL INJECTOR	Bosch HDEV-5-1
MODEL YEAR:	2011
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000009 / DLM-LPG 02
LOCATION SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	347/070007/A
MANUAL NUMBER	076/0704100
DATE	2014-04-03



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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 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
- Engine coolant

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 :



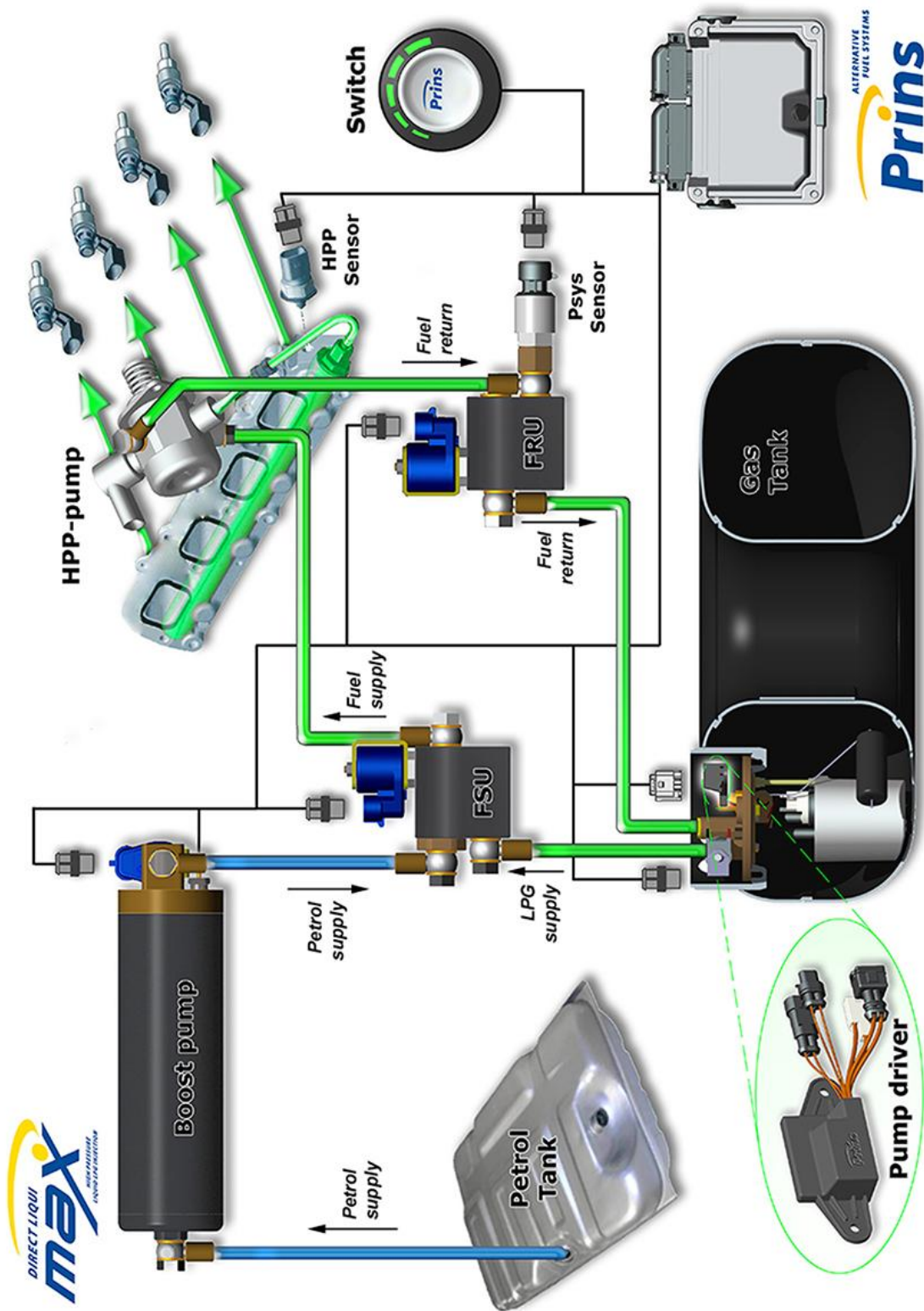
= IMPORTANT,
CAUTION



= WEAR SAFETY GOGGLES

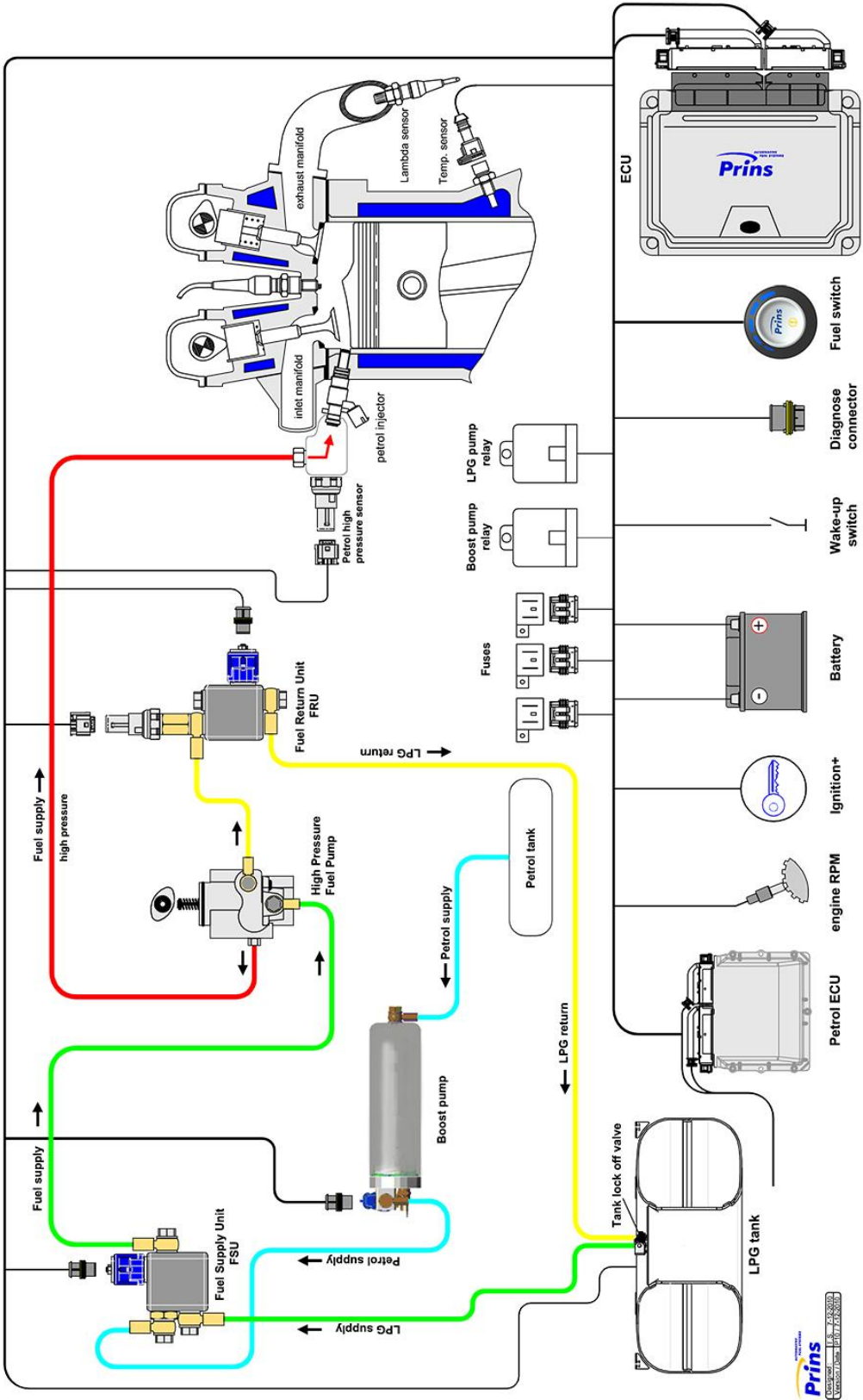


Direct LiquiMax



Overview Direct LiquiMax

overview Direct Liqui Max

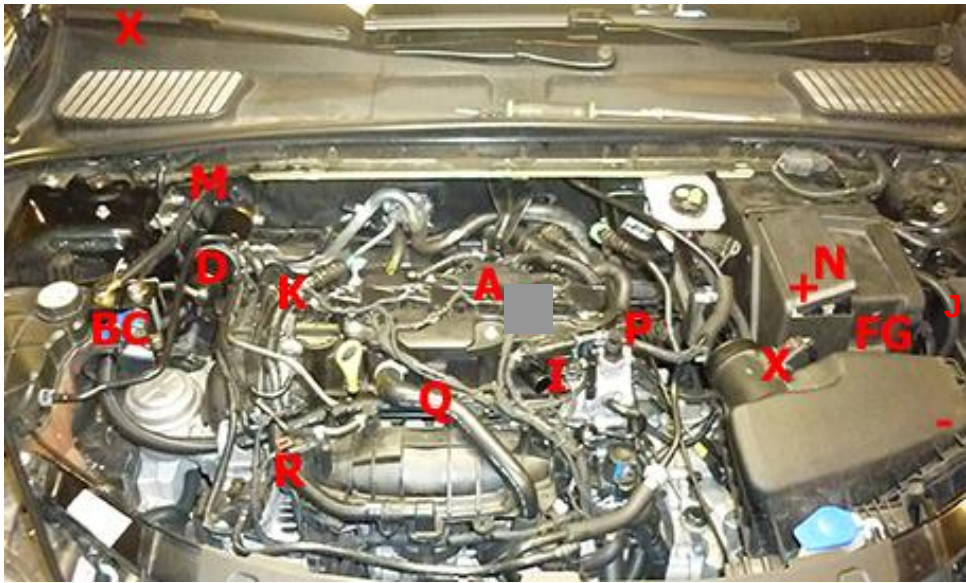


Direct LiquiMax parts / approval numbers

 1st generation  2nd generation	 1st generation  2nd generation
Fuel Supply Unit : E4-67R-010269	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
	 XD-3 LPG  XD-4 LPG
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 petrol sensor 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 : Wake-Up
K : High pressure petrol sensor signal	X : Digital input



L:
R115 approval sticker :
Right side centre door post



Removal of the Bosch High Pressure Pump

-REMOVAL-

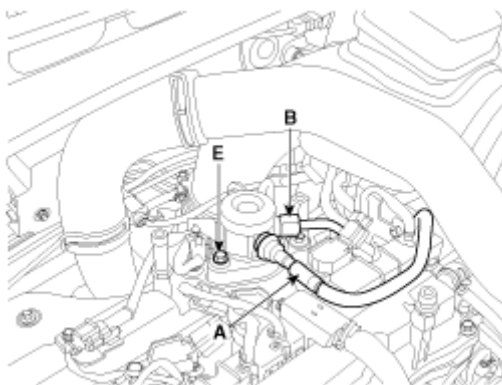
-WARNING-

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.
- Wear 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.

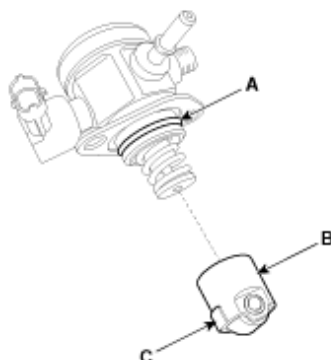


Installation of the Bosch High Pressure Pump

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.



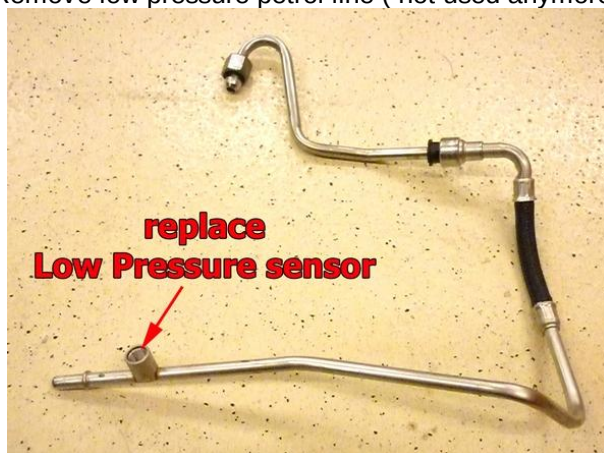
High pressure pump installation



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



Remove low pressure petrol line (not used anymore)



See chapter : Connection of the fuel hose to the boost pump.



Install a new (shorter) M6x25 bolt.



Boost pump



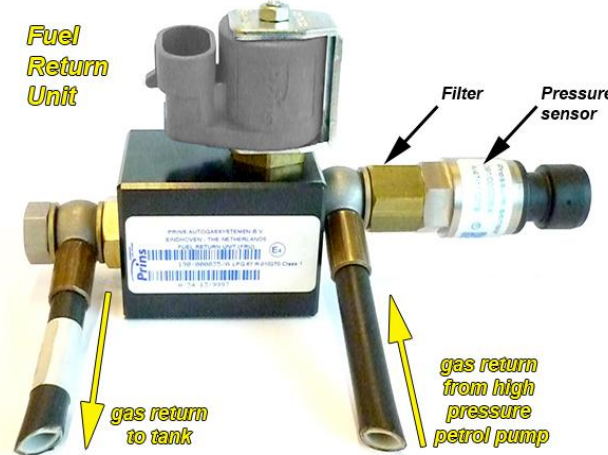
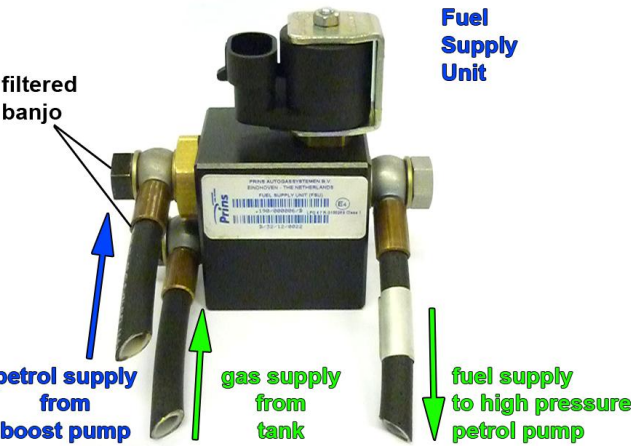
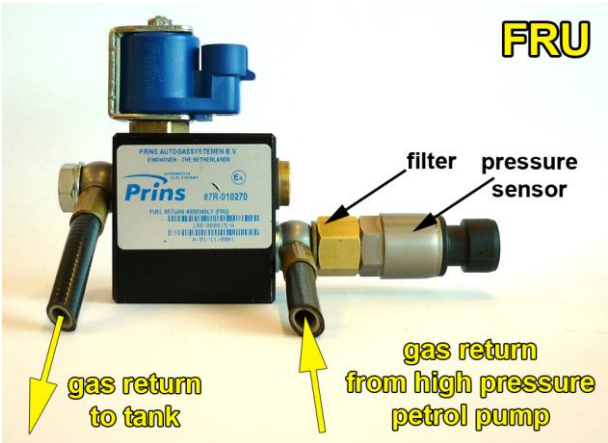
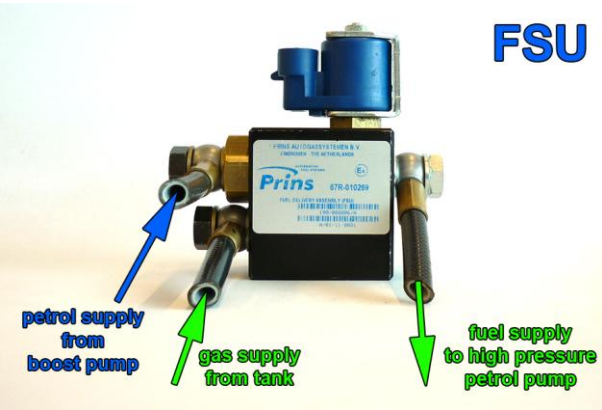
2 bolts M6x13 for boostpump bracket onto main bracket



Split-tube Ø9mm protection petrol fuel line



Fuel Supply Unit / Fuel Return Unit

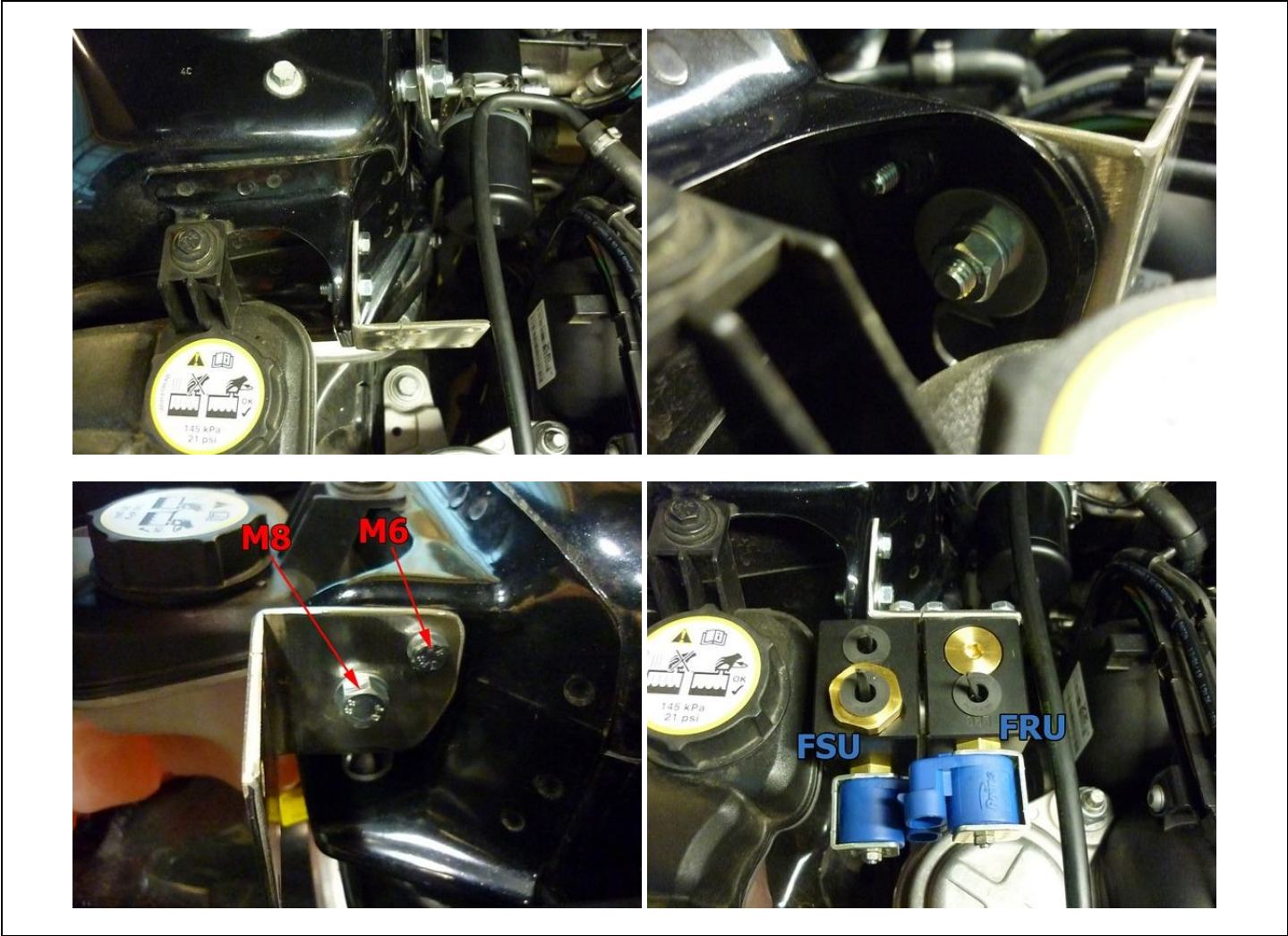


Black filtered banjo will only be used on inlet connections !

Filter inside sensor banjo



Mounting the Fuel Units



High pressure pump return / supply

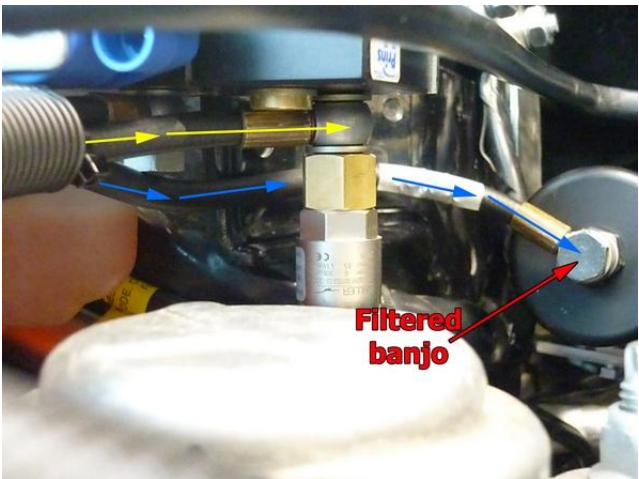
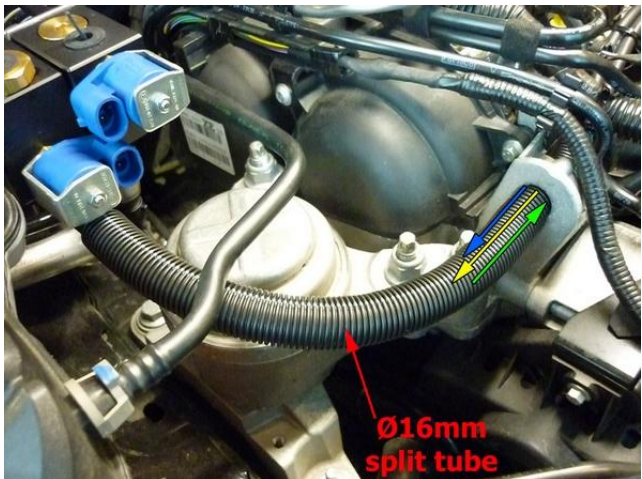
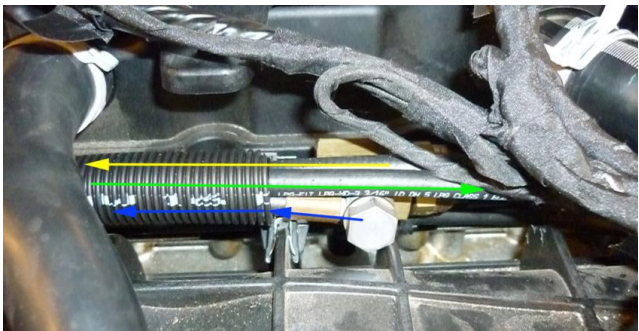
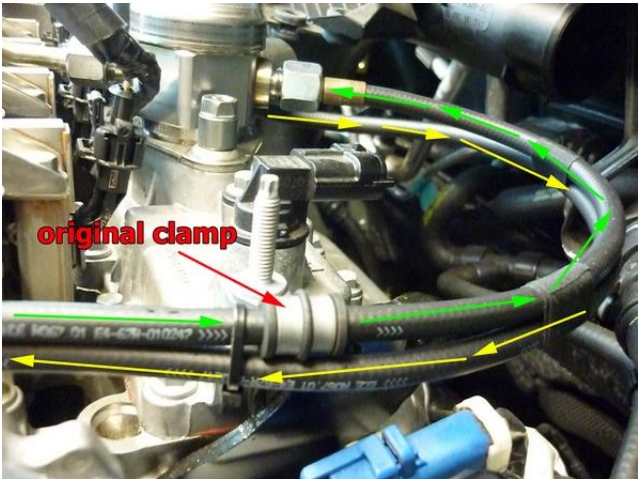
Replace the high pressure pump for the adapted high pressure pump.
(Follow the workshop manual of the car)



Adapt cover. Remove bolt (cut away)

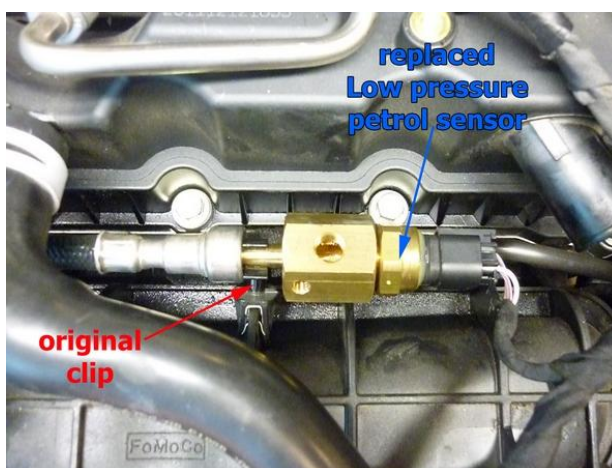
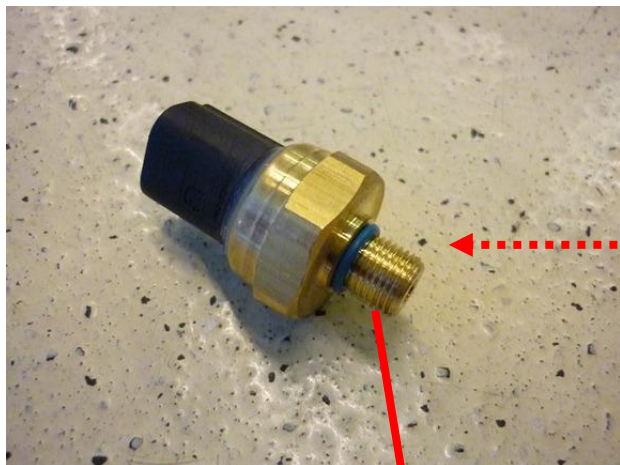


High pressure pump return / supply



Connection of the petrol fuel hose to the boost pump.

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

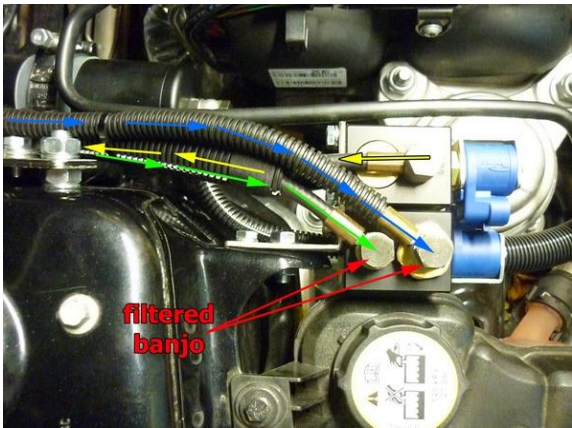


Connection of the petrol fuel hose to the boost pump.

Blue : petrol



Filter banjo bolt



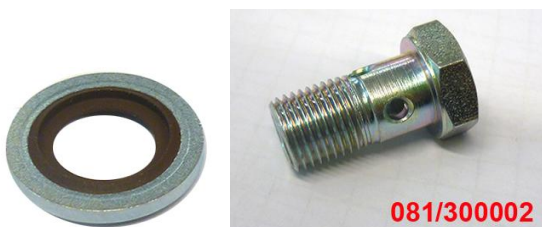
Lpg / petrol fuel lines

Hose	from	to	Length (cm)
1 XD-3	Adapter original petrol hose	Petrol boost pump	90cm
2 XD-3	Fuel supply unit	High pressure petrol pump	115cm
3 XD-3	Petrol boost pump	Fuel supply unit	25cm
4 XD-3	Fuel return unit	High pressure petrol pump	125cm

	2 		1 3 4 	
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Install the fuel line using two bonded seal washers and banjo bolt :



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

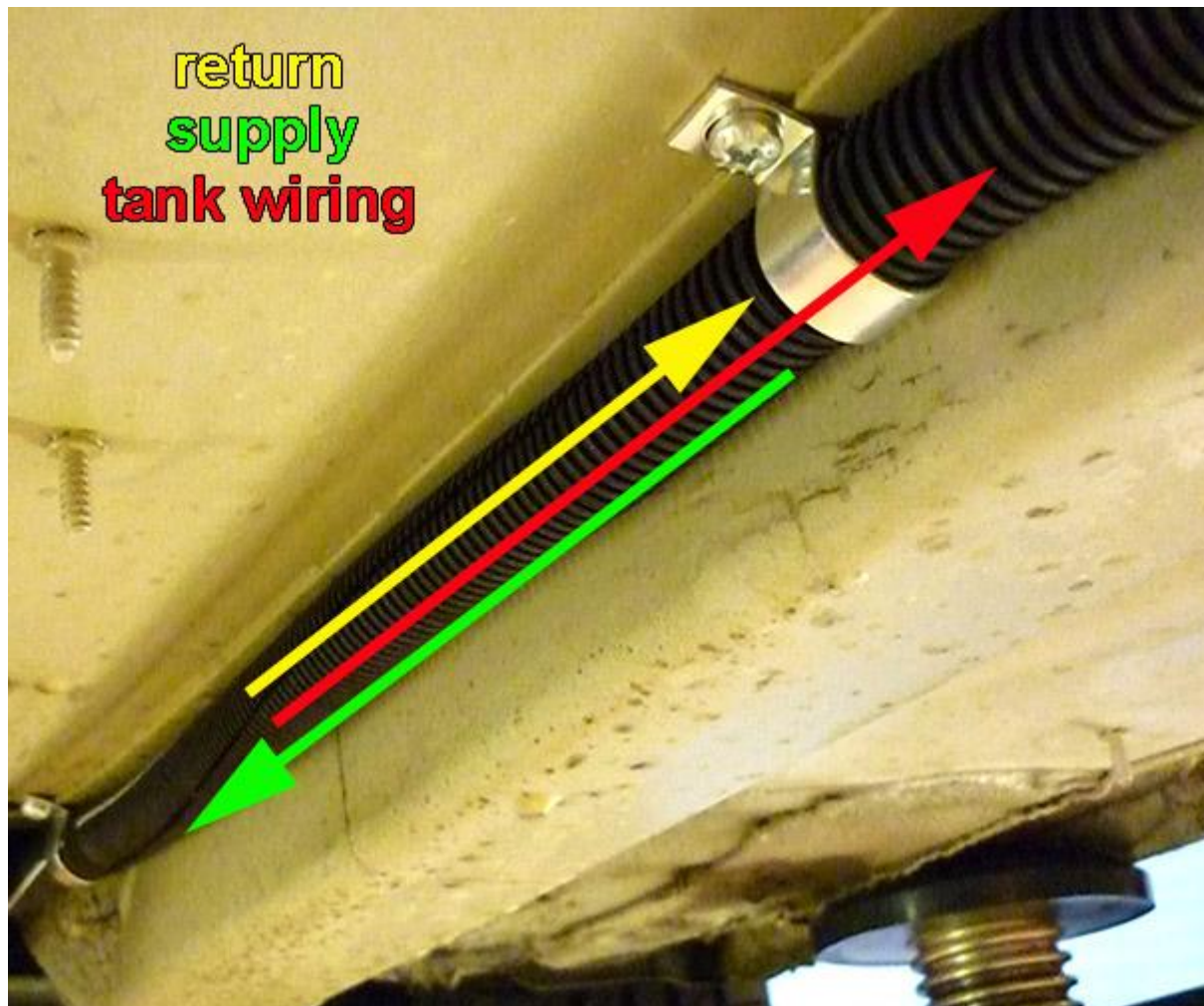


181/300009/A



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.



Mounting the AFC / relay location

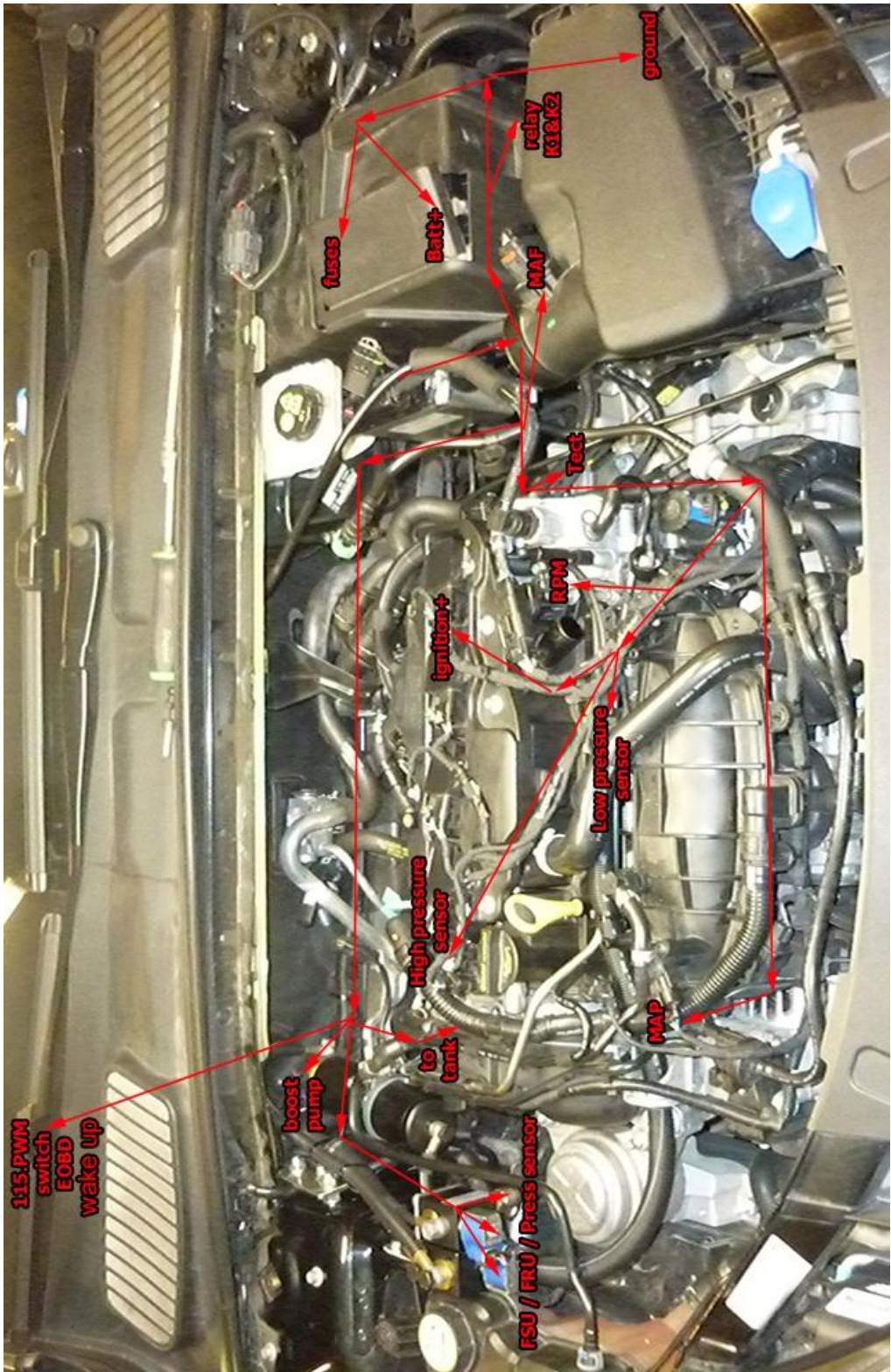
Remove battery box



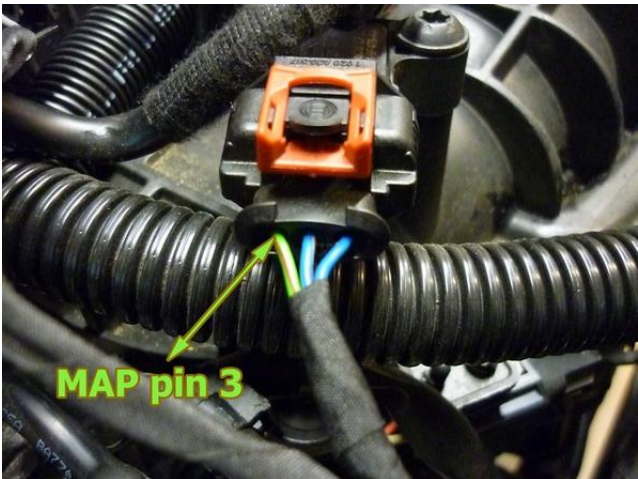
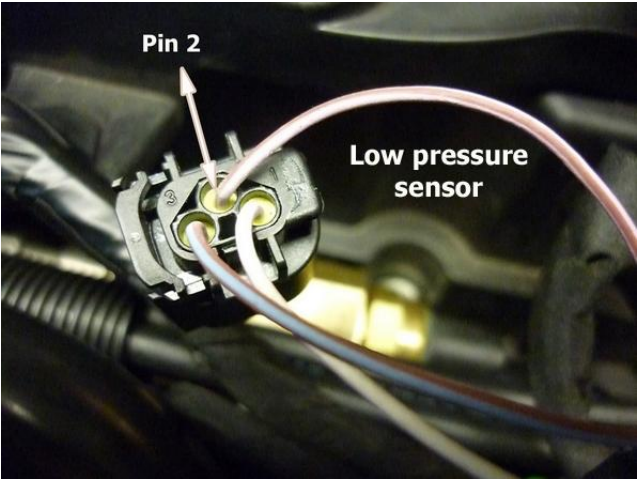
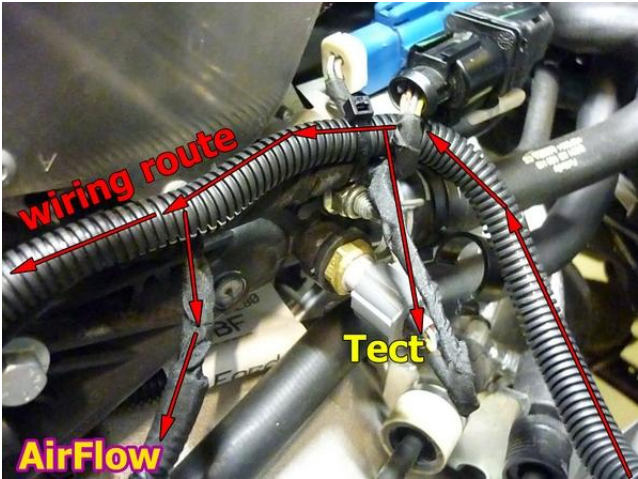
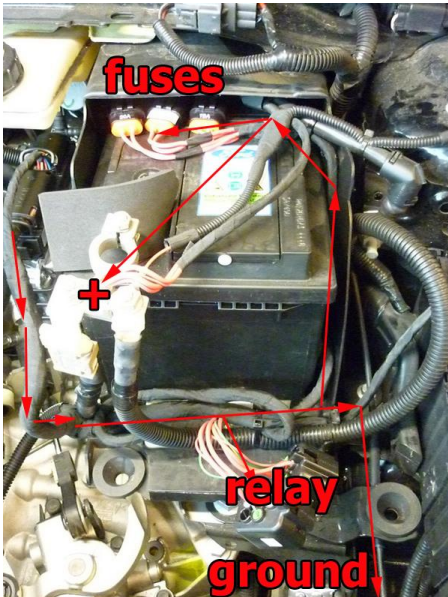
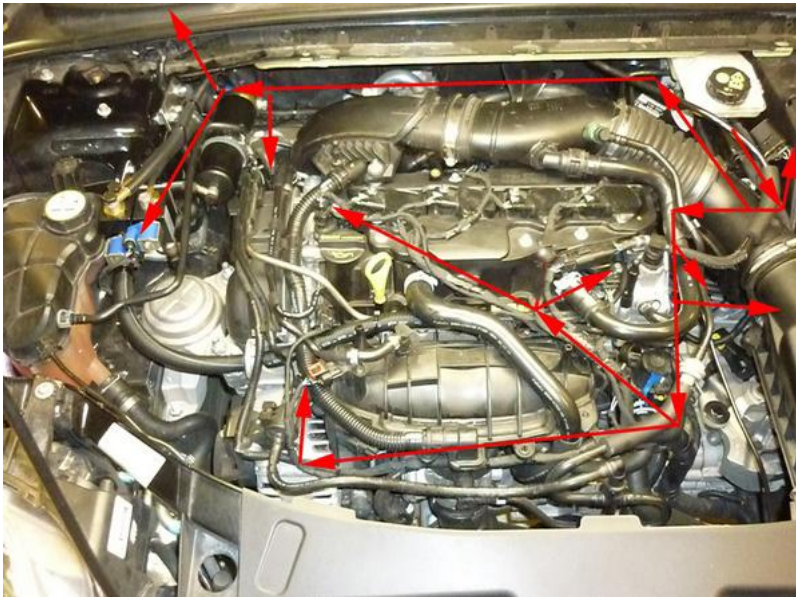
Bolt on the bracket with M6x20 and spring washers



Wiring AFC



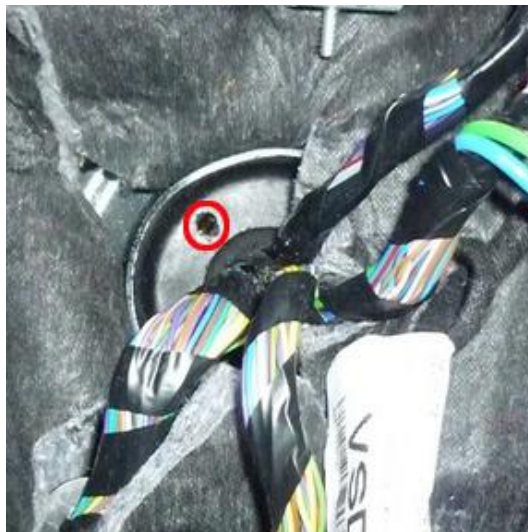
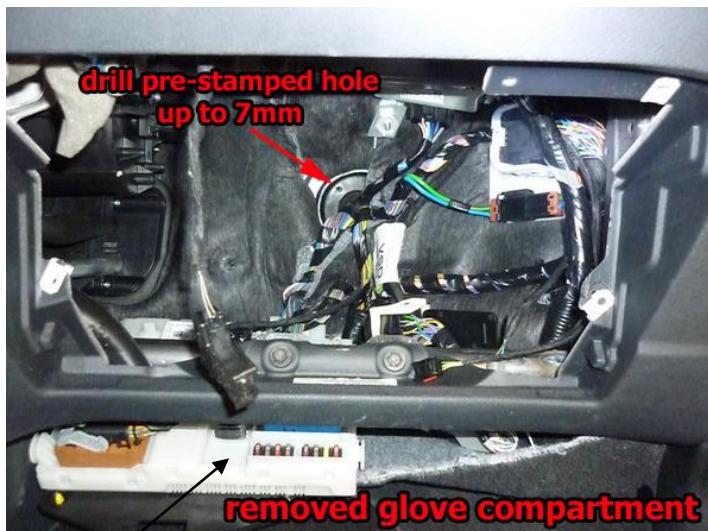
Wiring AFC



Wiring inside



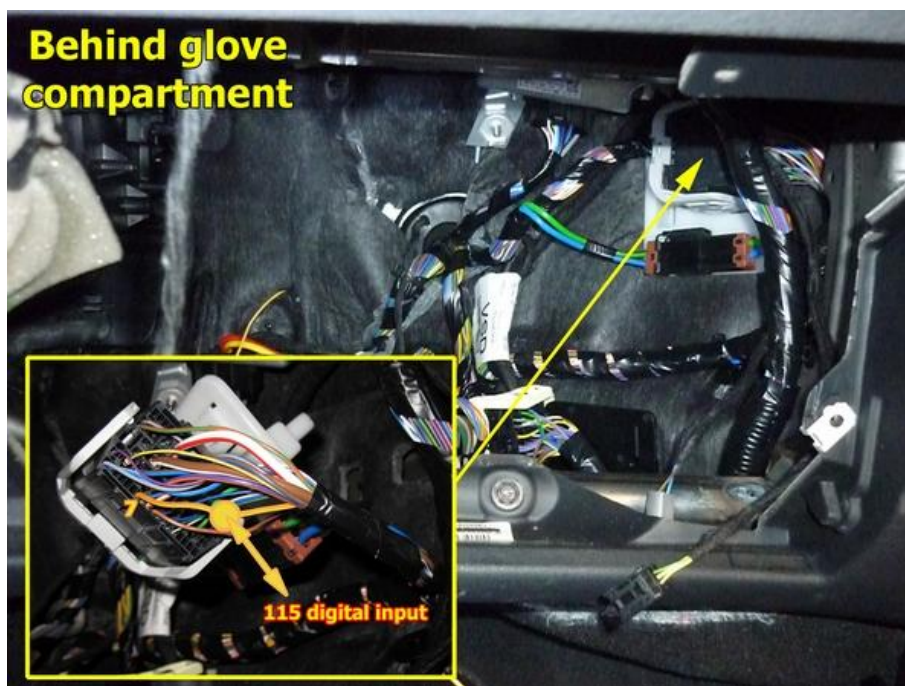
Switch / CAN / 115 Digital input 4 / 121 wake-up (see page 26 / 28)



BCM



PWM petrol tank connection

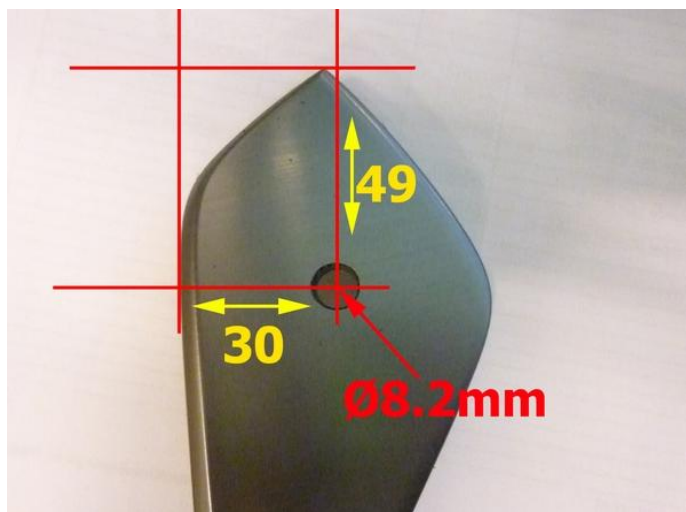


Pin 7, PWM wire



Mounting the fuel selection switch

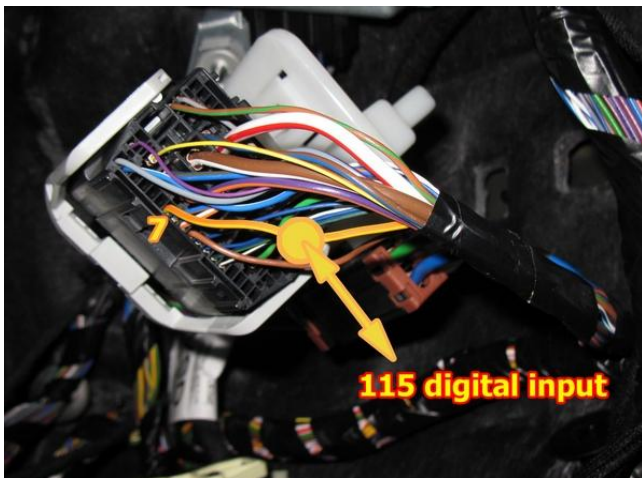
 Mount the switch.



Electrical connections

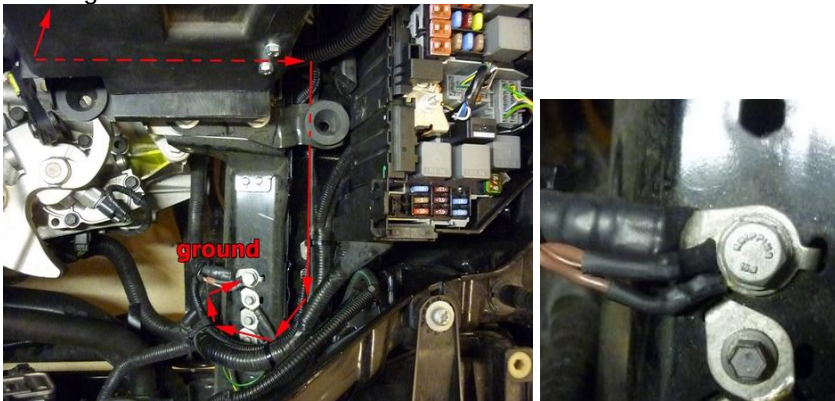
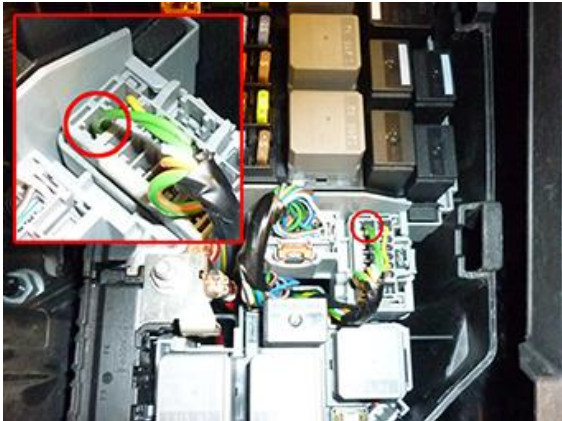
Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

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	Blue-yellow	EOBD connector pin 6,
70 CAN-Low	Blue	EOBD connector pin 14
115 Digital input 4	Yellow-red	Petrol fuel pump driver (PWM in) Wire colour :yellow-orange, pin 7 Wire location :see chapter: PWM petrol tank connection 
121 Digital input	Red-grey	Wake up Wire colour :blue-grey Wire location : under glove compartment, blue connector. 

Electrical connections

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

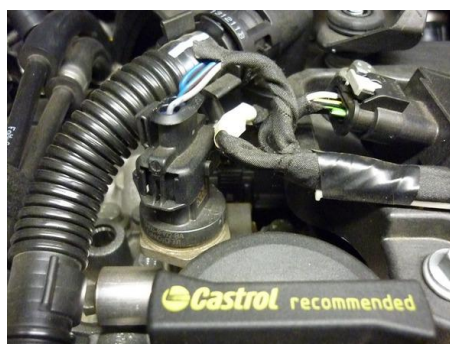
1-32 MAIN GND ecu MAIN GROUND SENSE MAIN GND pump driver MAIN GND boost pump	Brown	Connect to the '-' of the battery (-31) ; use ring terminals. 
4 – 13 – 44 +12V BATT sense +12V BATT fused +12V BATT boost pump +12V BATT pump driver	Red	Connect to the '+' of the battery (+30) ; use a ring terminals. Do not place the fuse in the holder before having completed the installation of the lpg system. 
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 : double green wires Wire location : fuse box 



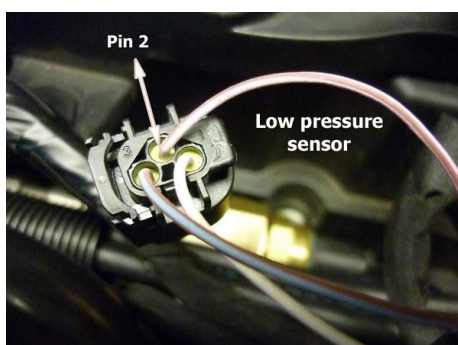
Electrical connections

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 25 Simulation 1	Blue-red Green-grey	High pressure petrol sensor signal interruption Sensor side. ECU side. Wire colour :blue-brown, pin 2 Wire location :right side rail
19 Analog 4	Blue-white	High pressure petrol sensor ground Wire colour :green-purple, pin 1 Wire location :right side rail
117 Digital input 3	Yellow-black	High pressure petrol sensor 5Volt supply Wire colour : grey, pin 3 Wire location : 3-pole connector, petrol pressure sensor. right side rail



17 Analog 2 10 Simulation 2	Blue-black Green-black	Low pressure petrol sensor petrol interruption Sensor side. ECU side. Wire colour :Pink-brown, pin 2 Wire location : Low petrol pressure line In Prins adaptor.
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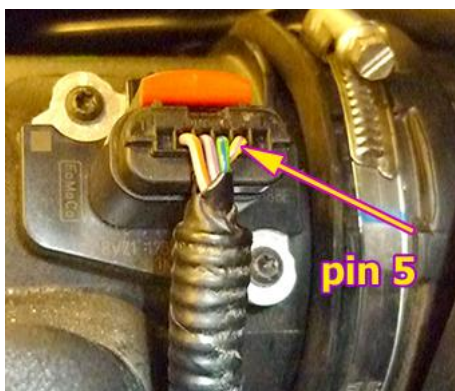
Electrical connections

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

15	T-ect	Grey	<i>For measuring the engine coolant temperature.</i> Wire colour : yellow Wire location : coolant sensor, left side cylinder head.
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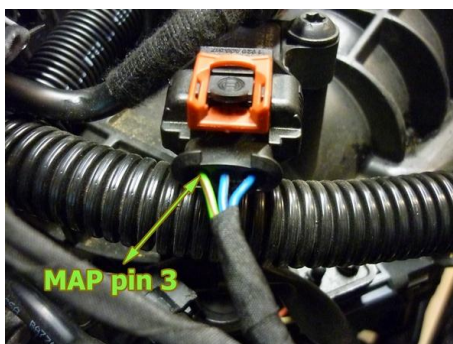
119 23	Digital input 2 Digital Simulation	Yellow-grey Green-red	<i>Digital Airflow MAF signal interruption</i> Sensor side. ECU side. Wire colour :yellow-purple, pin 5 Wire location : Air filter box, MAF, airflow sensor.
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Electrical connections

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

27	+5V sensor	Red	<i>For measuring the inlet manifold pressure.</i>
37	C ground	Brown	
20	Analog 3 MAP*	Blue	
* cut off connector: <u>Only</u> use blue signal wire 20		Red Brown Blue	insulate insulate Wire colour : yellow, pin 3 Wire location : intake manifold, MAP sensor



8	RPM	Purple-white	<i>For measuring the engine speed signal.</i> Wire colour :brown-blue Wire location : cam sensor, left side engine, pin 2
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97	Digital input 5	Yellow-orange	Insulate
113	Digital input 6	Yellow-purple	Insulate
6	Lambda1 WB	Orange	Insulate
42	Lambda2 WB 10KΩ	Orange-white	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
<i>3-pole connector</i>		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.
<i>2-pole connector Boost Pump</i>	Red	Connect the 2-pole connector to the lock-off valve of the Boost Pump.
106 + Lock-off Boost Pump	White-yellow	
98 Ground lock-off		
<i>2-pole connector FSU</i>	Red	Connect the 2-pole connector to the lock-off valve of the Fuel Supply Unit
108 + Lock-off FSU	Pink-yellow	
100 Ground lock off		
<i>2-pole connector FRU</i>	Red	Connect the 2-pole connector to the lock-off valve of the Fuel Return Unit
90 + Lock-off FRU	Blue-yellow	
82 Ground lock off		
<i>4-pole diagnose connector</i>		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
<i>Boost pump relay</i>		
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
<i>Wiring tank pump driver relay</i>		
2 + driver relay	Red	Pin 86 of the driver relay
26 Ground driver relay	Green-yellow	Pin 85 of the driver relay
+12V BATT fused	Red 2.5mm ²	Pin 30 of the driver relay
+12V driver	Red 2.5mm ²	Pin 87 of the driver relay

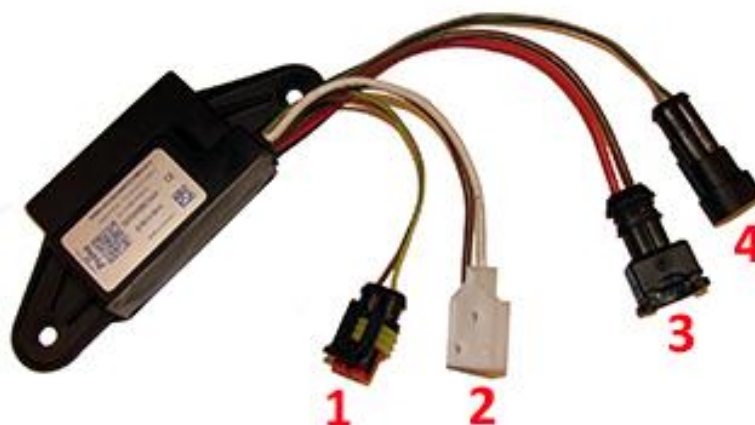


Electrical connections

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 40 Ground tank gauge 12 Tank level in 11 + tank level supply	Brown Blue Red	Connect the 3-pole connector to the tank level sensor.
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 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 22 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.

