Installation manual
Dedicated
PART 2/2

MANUFACTURER	Mazda
TYPE	CX-5 2WD
ENGINE DISPLACEMENT	2000cc
NUMBER OF VALVES	16v
ENGINE CODE / NUMBER	PE-VPS (Skyactiv-G)
VEHICLE CATEGORIES	M
TRANSMISSION	AT / MT(6)
VERSION	Direct LiquiMax-2.1
PETROL ECU MANUFACTURER / CODE	Mitubishi PE1T / PE03
HIGH PRESSURE PETROL POMP	Denso 295100-0294 (Mazda PE01 20 3FO)
HIGH PRESSURE PETROL INJECTOR	x
MODEL YEAR:	2012
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000011 / DLM-LPG 04
LOCATION SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	353/070007/A
MANUAL NUMBER	076/1307400
DATE	2015-06-22

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
- 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

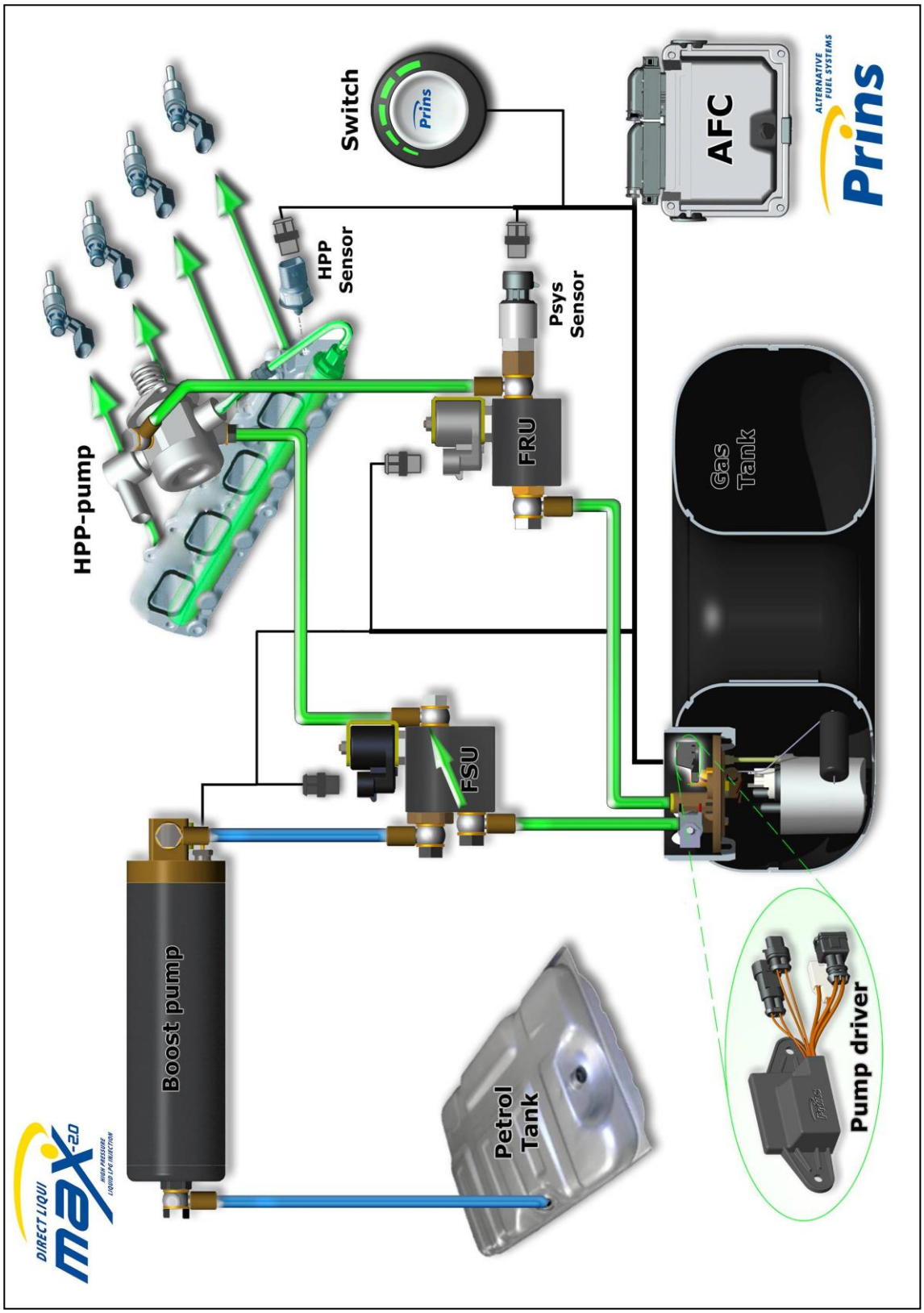
		Nm	SW
M 4 x 0,7		3.3	7
M 5 x 0,8		6.5	8
M 6 x 1,0		11.3	10
M 7 x 1,0		14.5	11
M 8 x 1		24.5	13
M 8 x 1,25		27.3	13
M 10 x 1		52	15-16-17
M 10 x 1,5		54	15-16-17
(filtered)Banjo bolt		10	14
Supply line connection		15	13
Fuel module Allen bolts		20	7
Filler hose connection		50	22

EXPLANATION OF SYMBOLS :

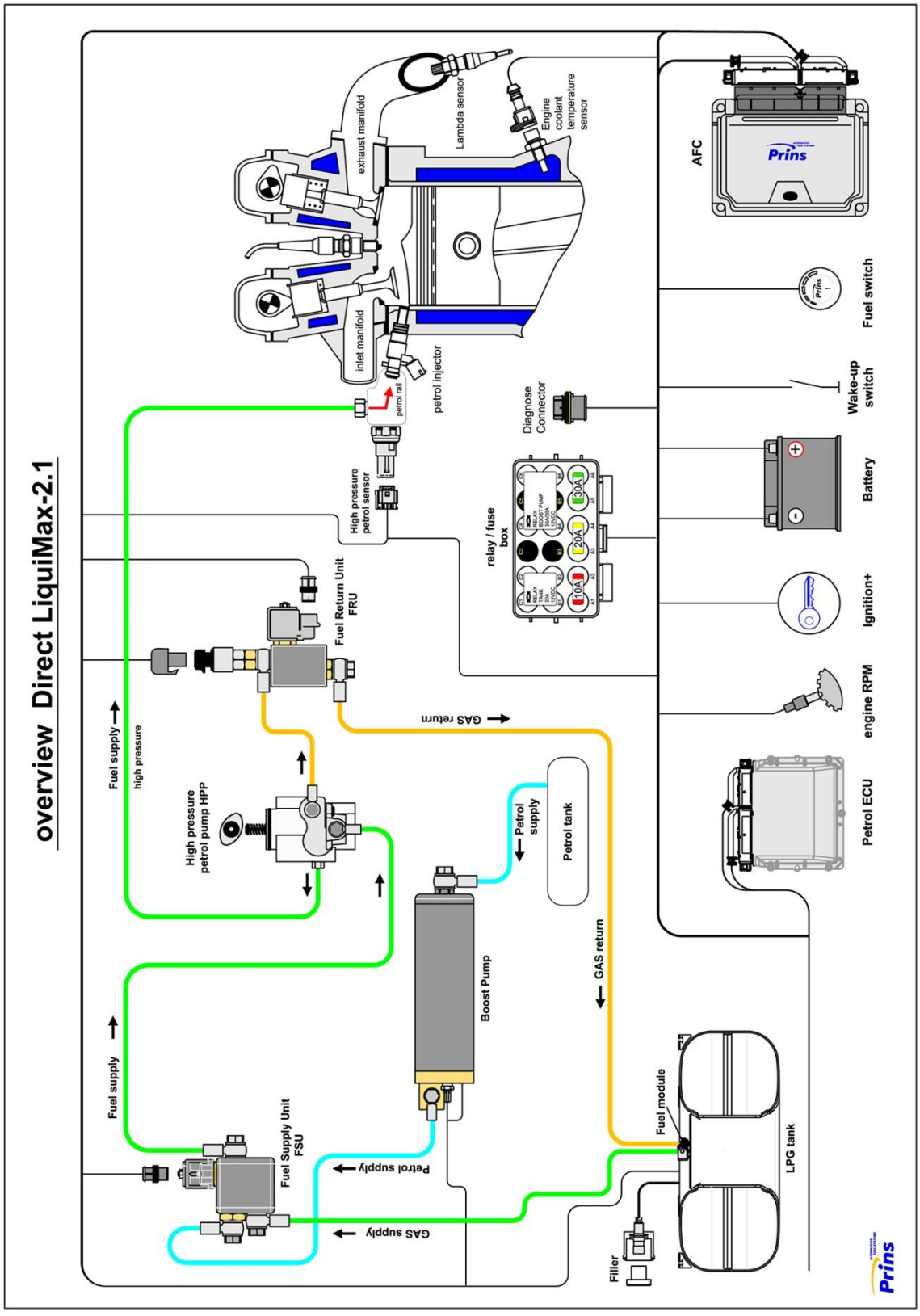
= IMPORTANT, CAUTION

= WEAR SAFETY GOGGLES

Direct LiquiMax-2.1



Direct LiquiMax-2.1diagram



Direct LiquiMax parts / approval numbers

<table>
<tr>
<td> 
1st generation
 
2nd generation</td>
<td> 
1st generation
 
2nd generation</td>
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<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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<td>  </td>
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<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>
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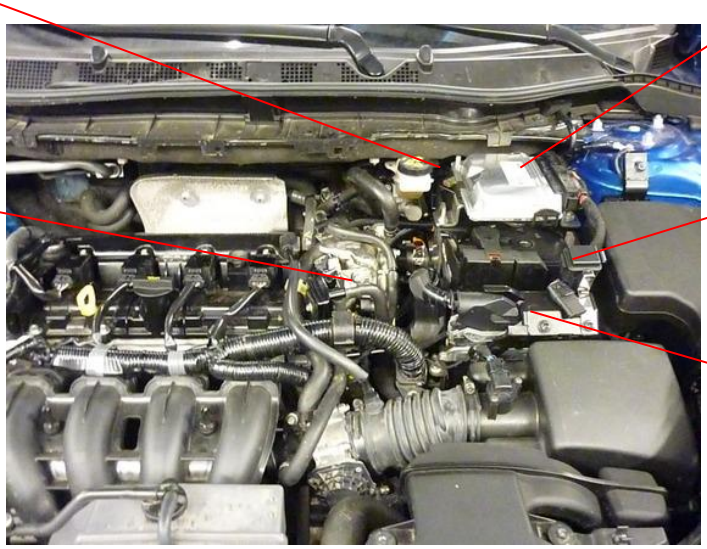
DLM-2.0 component location overview

DLM unit

HPP pump



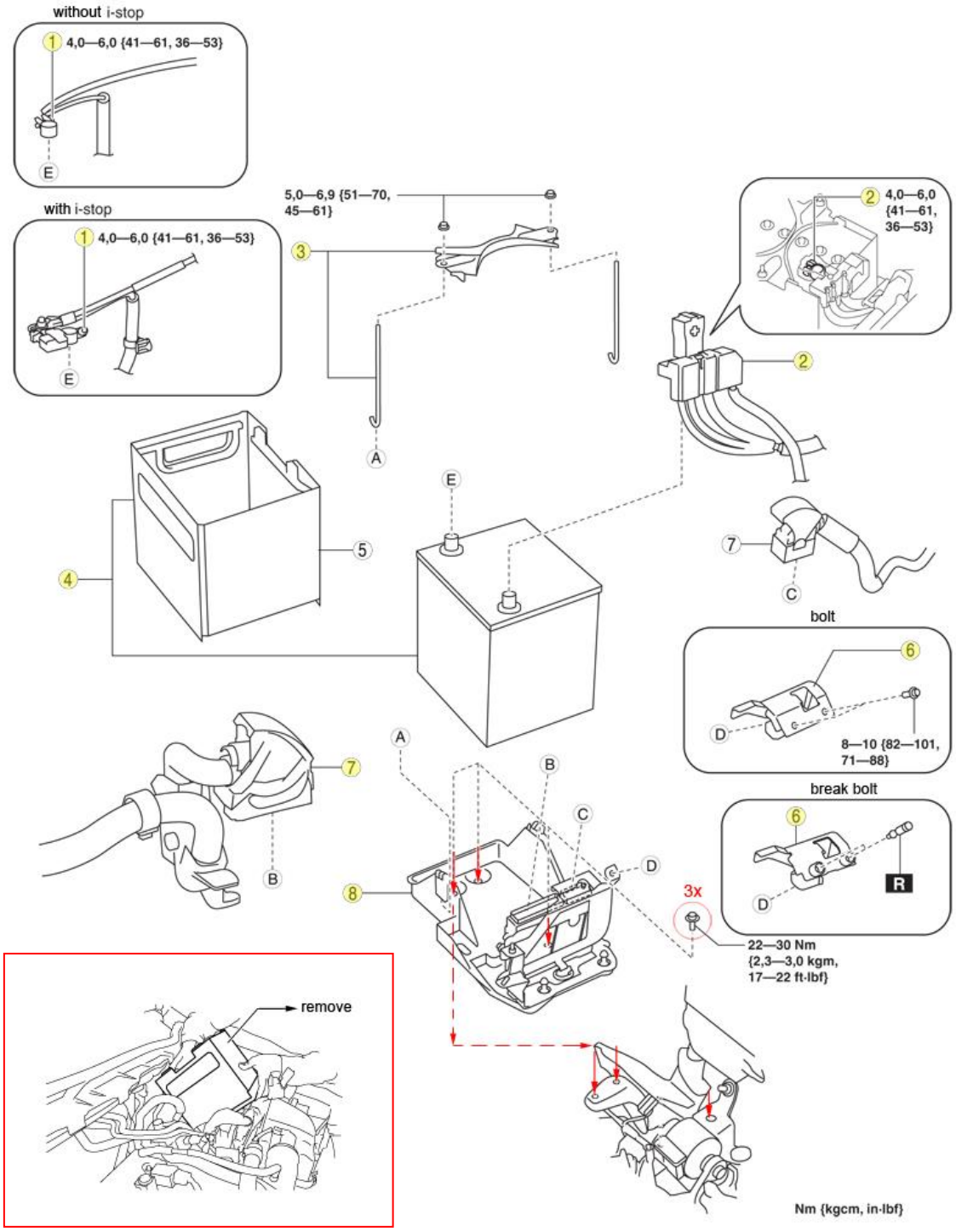
AFC

Fuse box

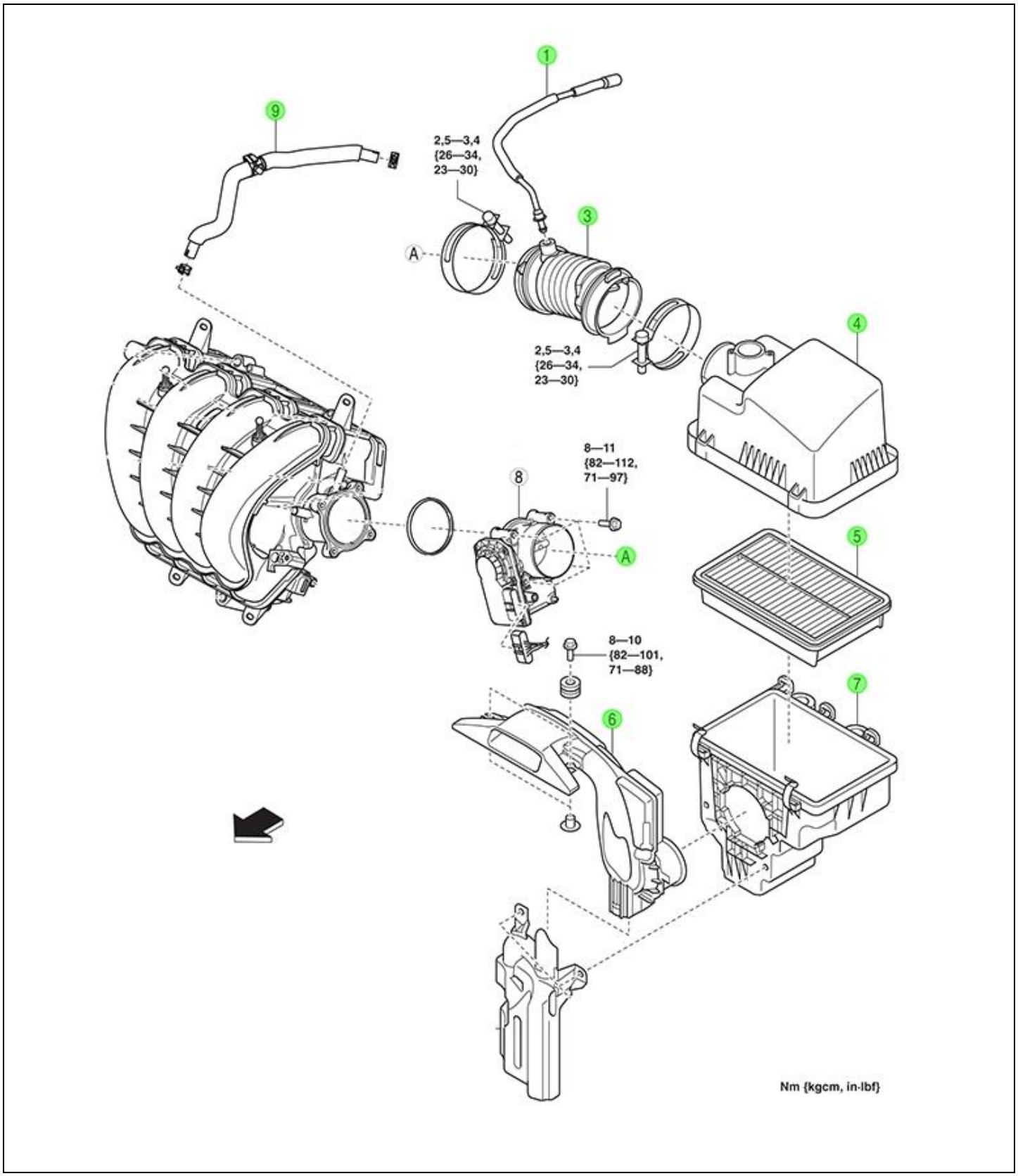
Petrol ecu

R115 approval sticker :
Right side centre door post

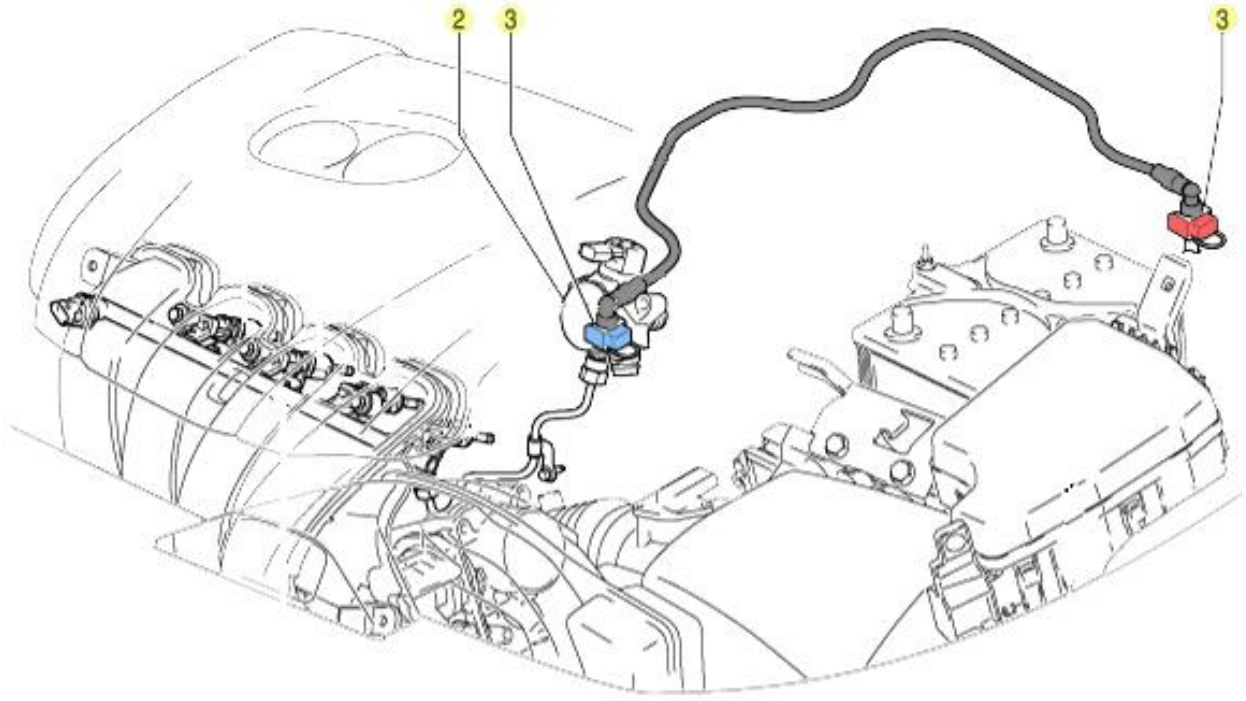
Remove battery



Overview Filter removal

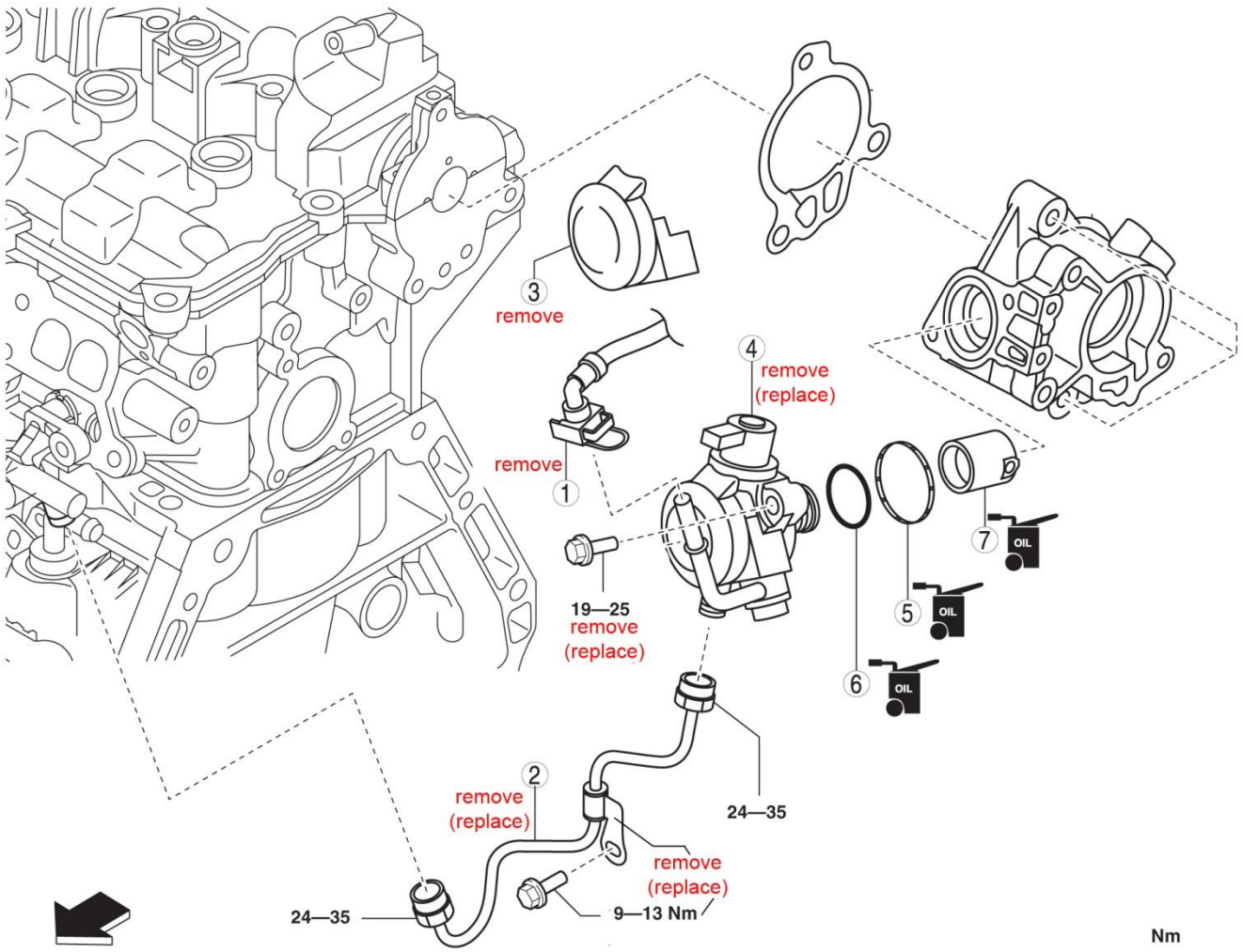


Petrol hose removal



Remove complete petrol hose, not used anymore.

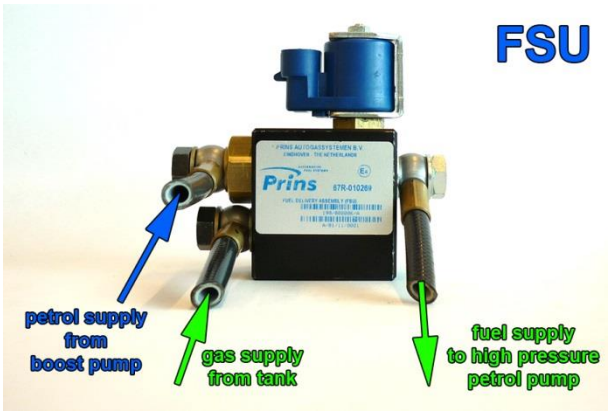
Overview pump removal

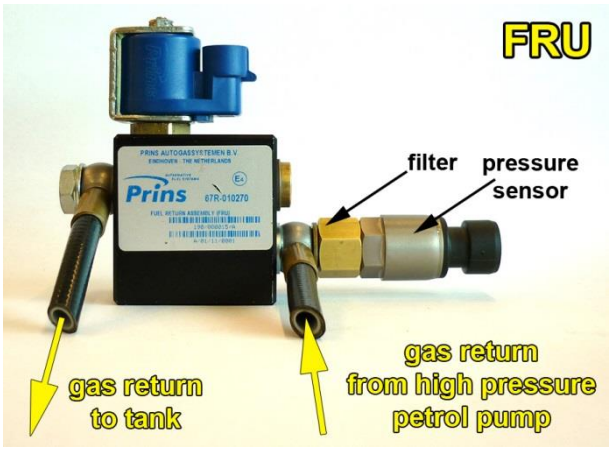


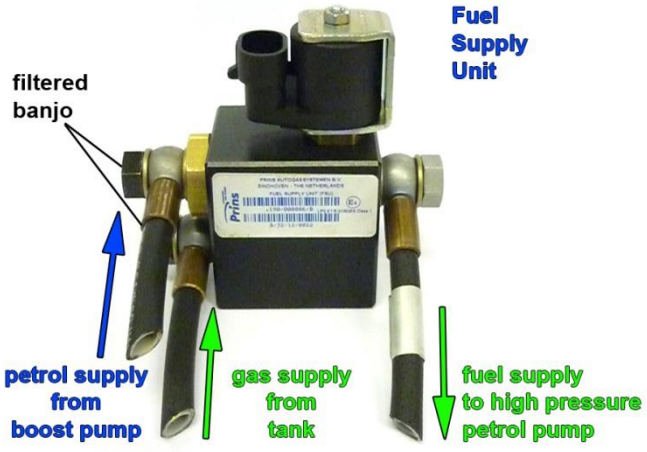
Remove/replace fuel line, reuse clamp.

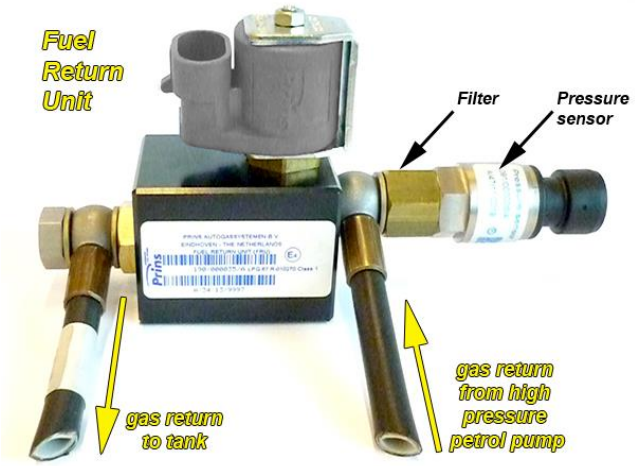
Remove high pressure petrol pump, not used anymore.

Fuel Supply Unit / Fuel Return Unit







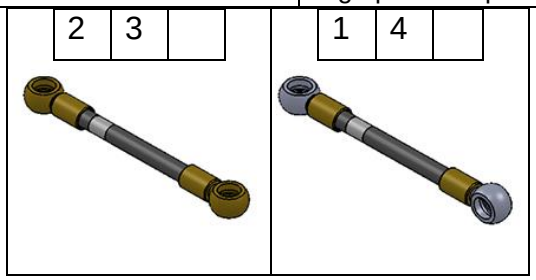


Black filtered banjo will only be used on inlet connections !

Filter inside sensor banjo

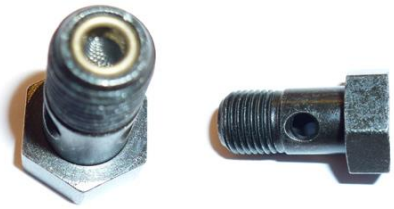
Lpg / petrol fuel lines

Hose		from	to	Length (cm)
1	XD-3	Adapter quick connection	Petrol boost pump	30
2	XD-3	Fuel supply unit	High pressure petrol pump	80
3	XD-3	Petrol boost pump	Fuel supply unit	13
4	XD-3	Fuel return unit	High pressure petrol pump	110



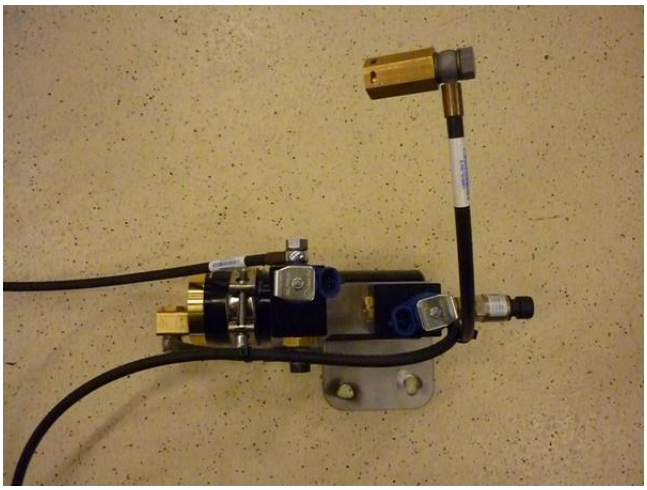
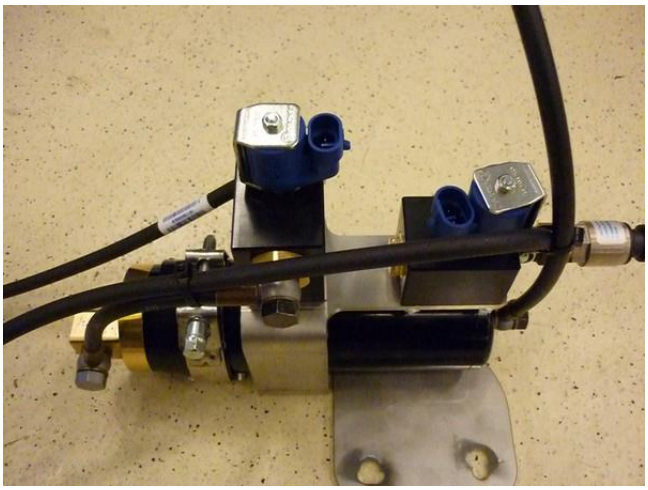
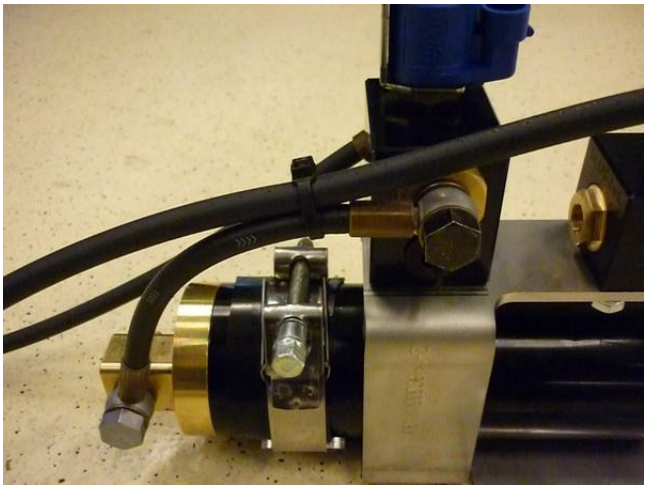
Install the fuel line using two bonded seal washers and banjo bolt :

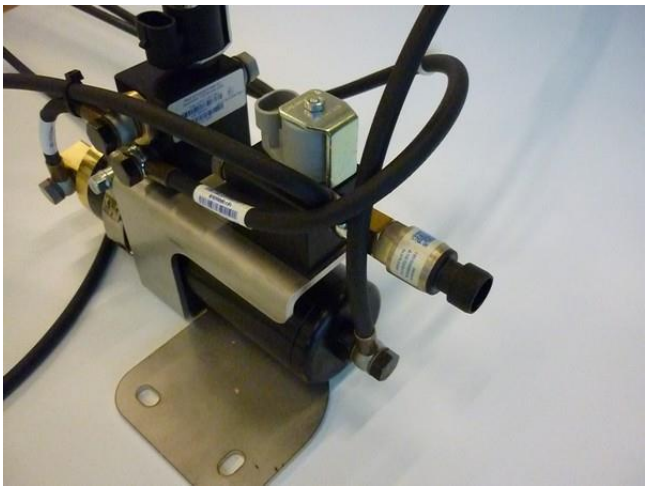
<u>Filtered banjo:</u> (FSU supply inlets / boost pump inlet : black filtered banjo) :



181/300009/A

Preassemble system unit bracket

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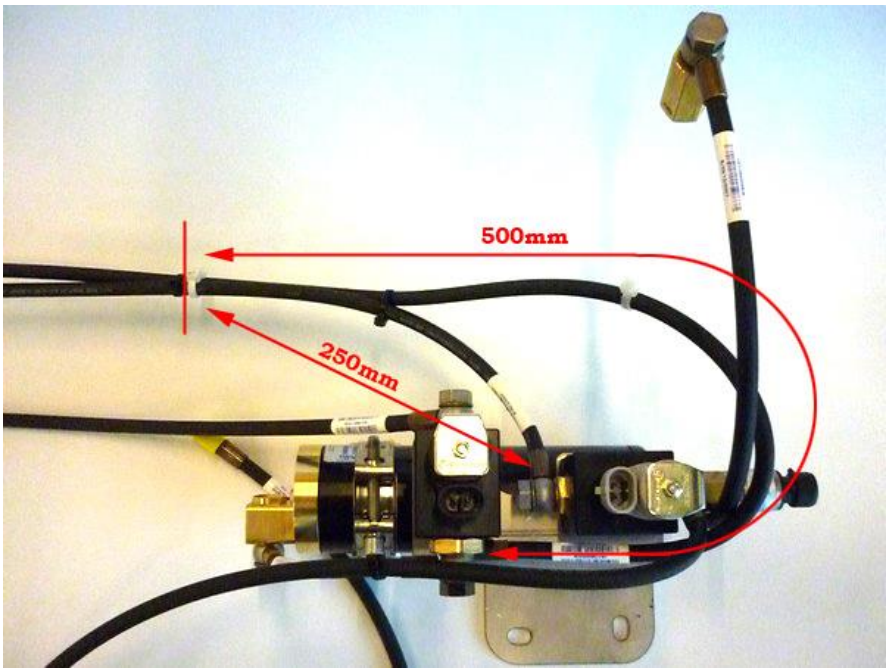
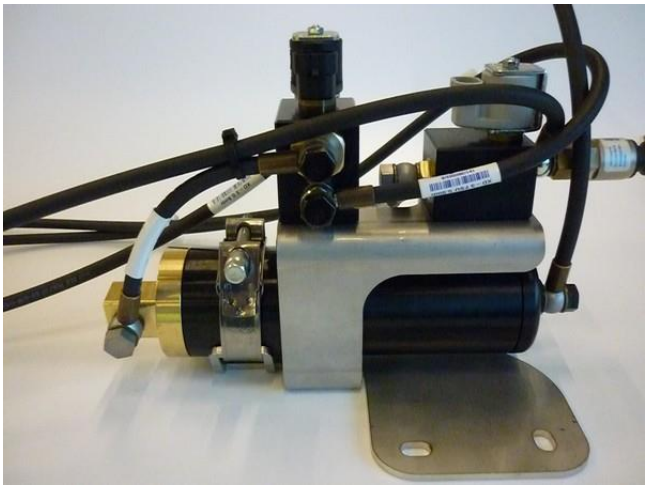
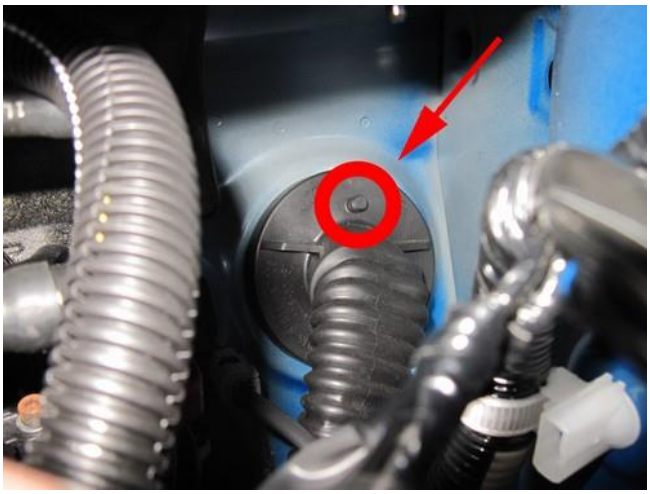
Preassemble system unit bracket with tank hoses (optional)





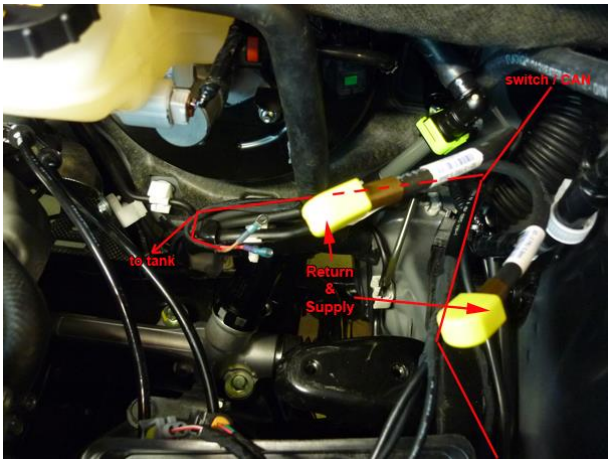
Installation preparation

Grommet for putting through the Switch and CAN wiring (prepare before unit installation)

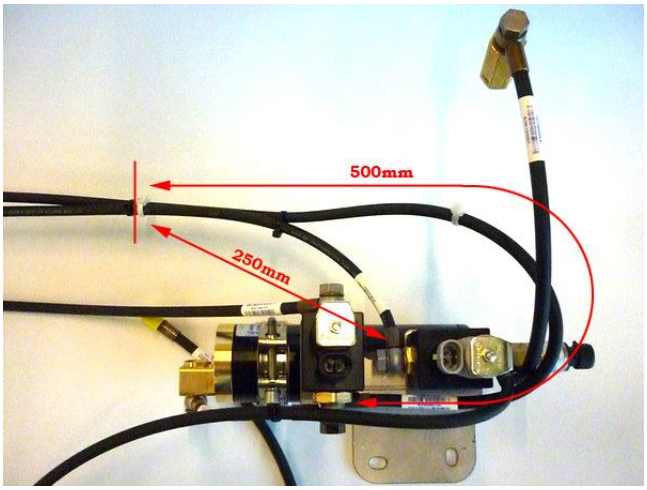

Replace white cable clamp, wiring loom moves to front

Install wiring loom and hoses



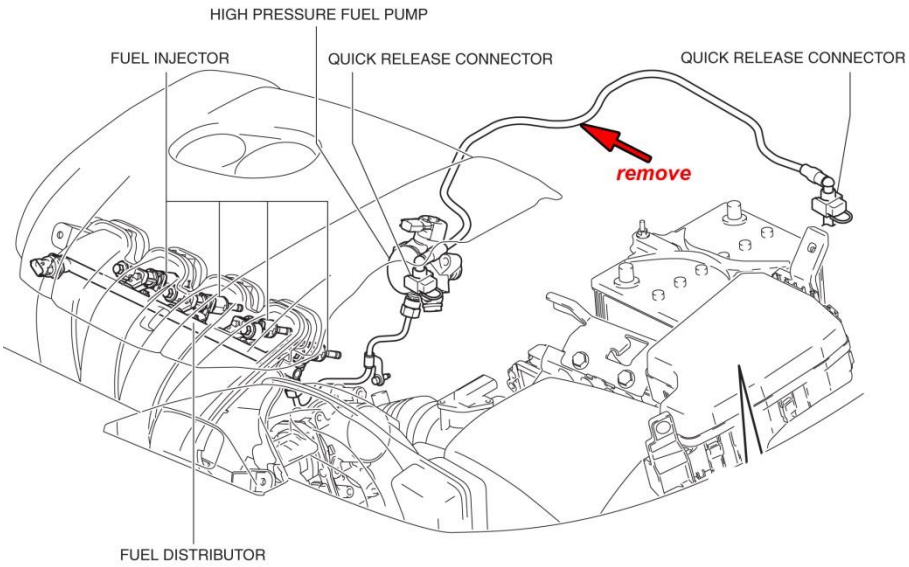
Install wiring harness / supply/return hose, before installing the unit

Or unit and hoses at ones.
Hoses will follow the original petrol fuel line !



Connection of the fuel hose to the boost pump.

Remove the original petrol supply line.



See next page

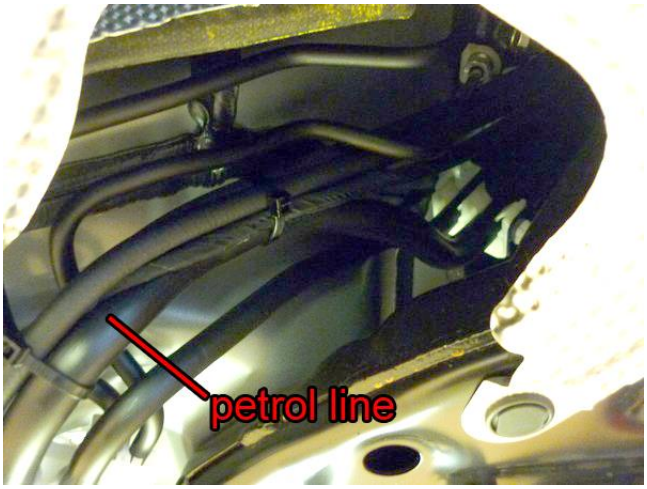
Install the unit

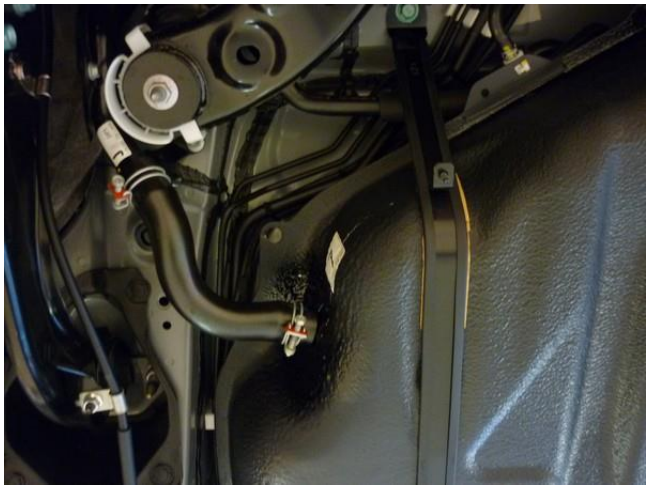
Connect the petrol supply quick connector (**install lock spring** !) to the fuel pipe.

Connect the tank supply and return hose to FSU an d FRU

Insert the unit bracket under battery plate and bolt back on the plate

Hose routing





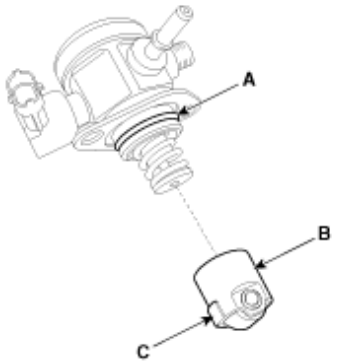
DLM Lines with tie-rap -> only to petrol line !
DLM Lines with clamps and screws -> chassis beam / floor.

Installation of the Bosch High Pressure Pump

-INSTALLATION-

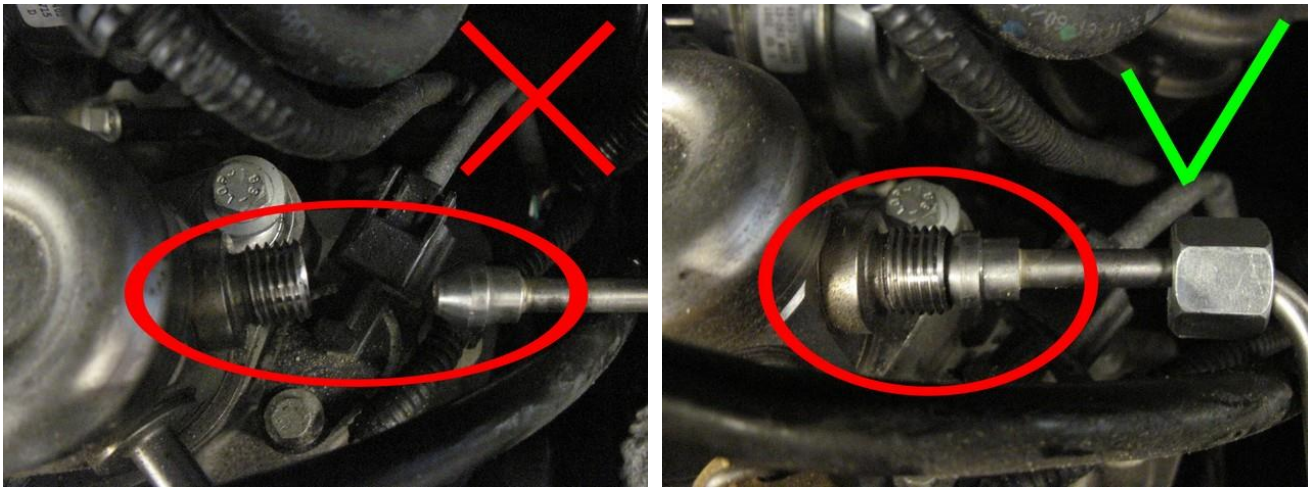
Before installing the high pressure fuel pump, position the roller tappet (**B**&**C**) in the lowest position by rotating the crankshaft. Otherwise the installation bolts may be broken because of tension of the pump spring.

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



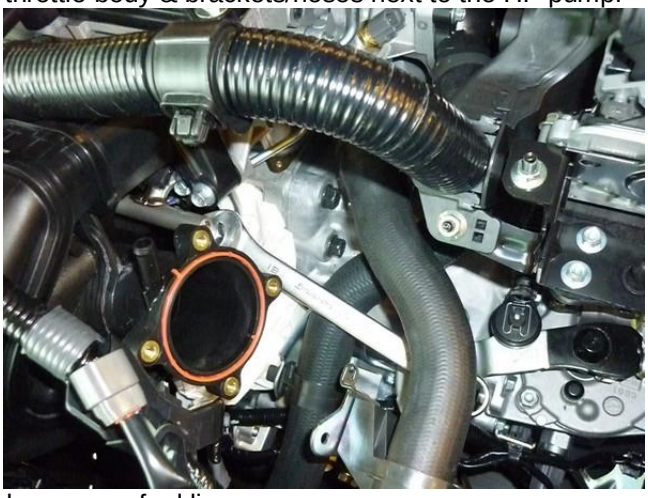
Mount the new fuel line free of tension. If the fuel line does not fit correctly, adapt the fuel line.

Installation is reverse of removal.

High pressure pump installation

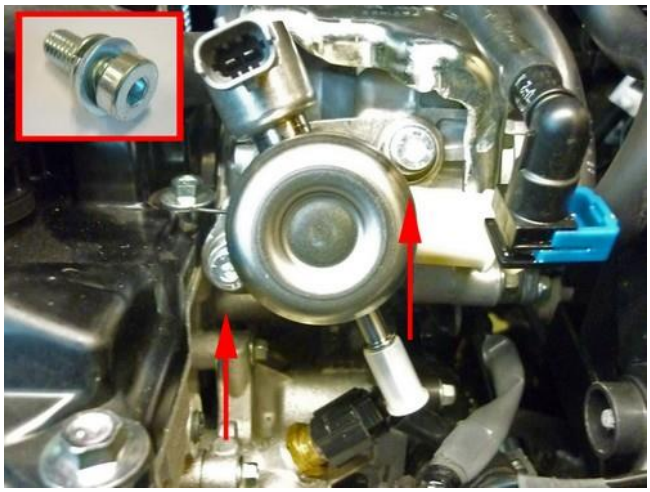
Replace the high pressure pump for the adapted high pressure pump.
(Follow the workshop manual of the car)


Remove hose from air filter to throttle body. Remove throttle body & brackets/hoses next to the HP pump.

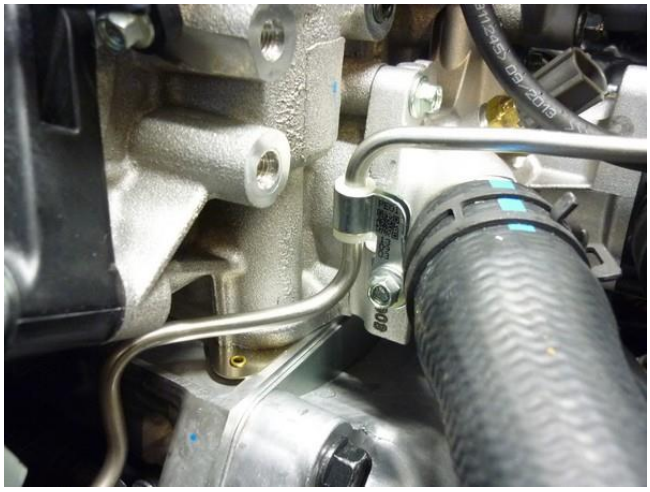



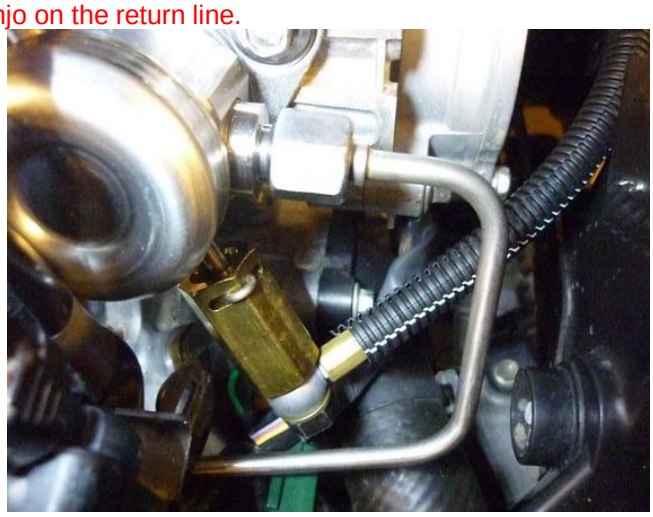
Remove original high pressure fuel line

High pressure pump installation 2

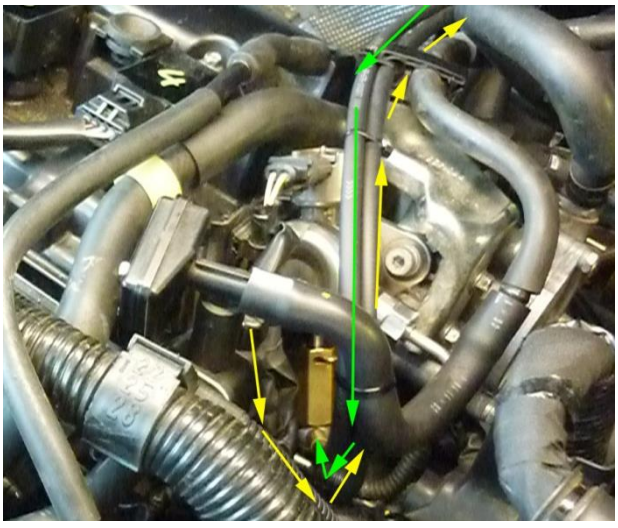


Mount the supplied HP pump with the new Allen bolts & (spring) washers with 25Nm.
After mounting pump, tighten return hose banjo 10Nm, hose facing down.
Use the flat head banjo on the return line.





Installation of the new high pressure petrol line, with clamp.
Mount the new fuel line free of tension. If the fuel line does not fit correctly, adapt the fuel line.

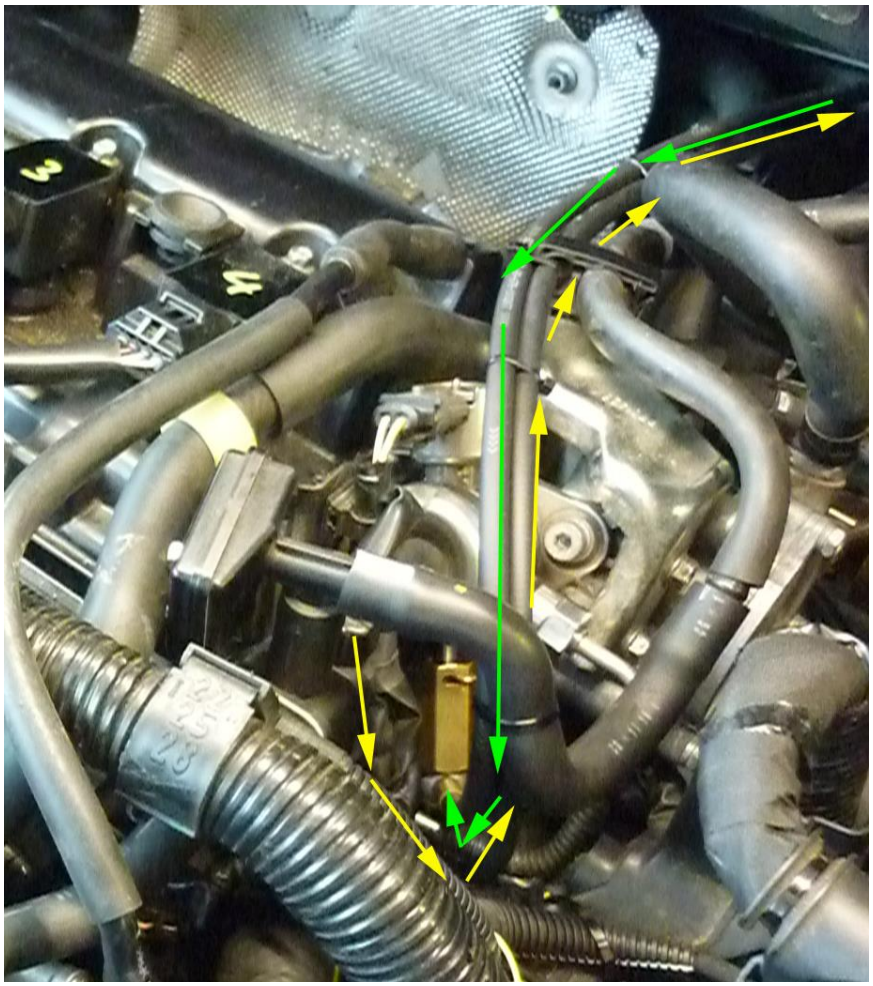


Pump hose routing



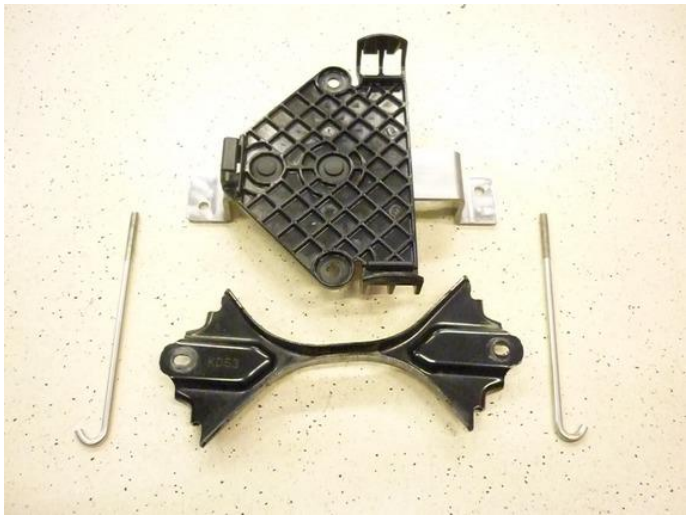

Re-connect with the new plug-play connector

Hose routing



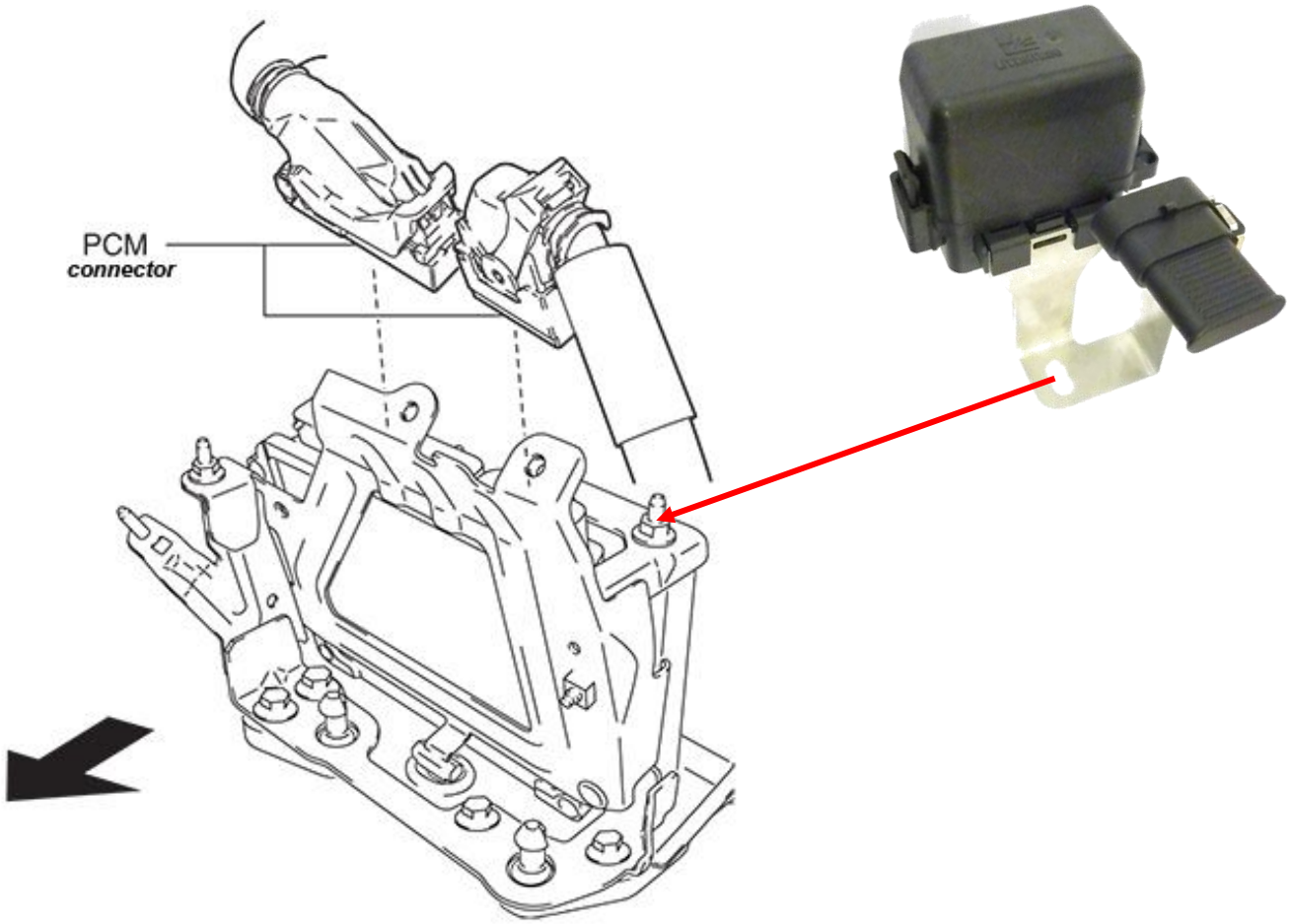
One hose into original clip (there where the original petrol hose was located), supply next to return secured with straps.

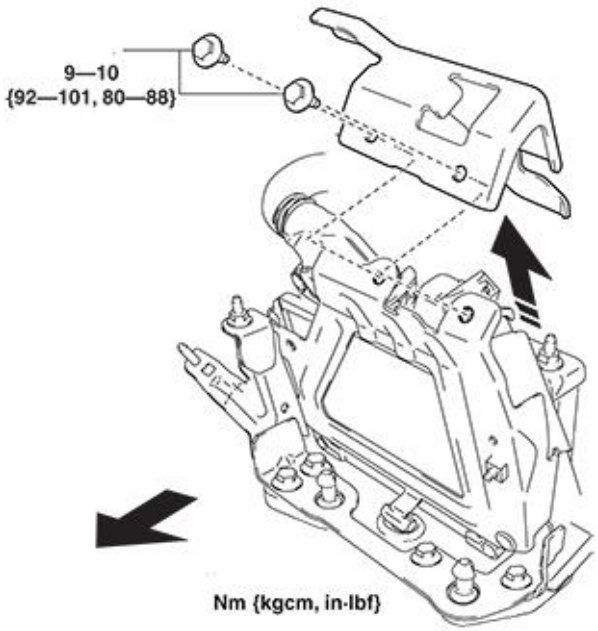
Mounting the AFC

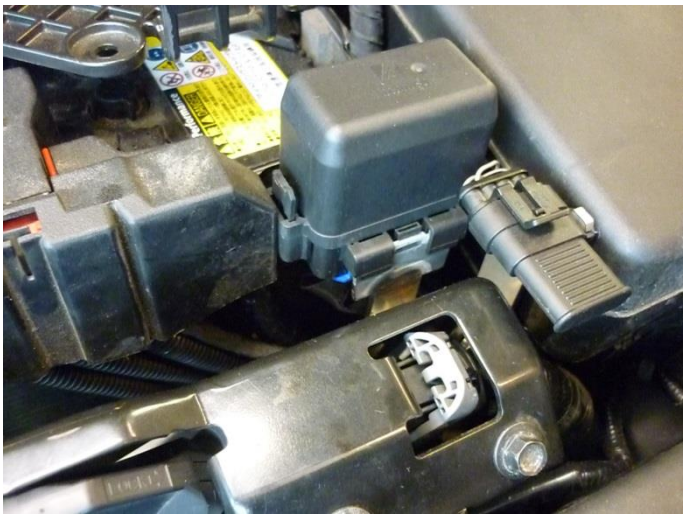


Connect battery ground only when completely finished the installation !

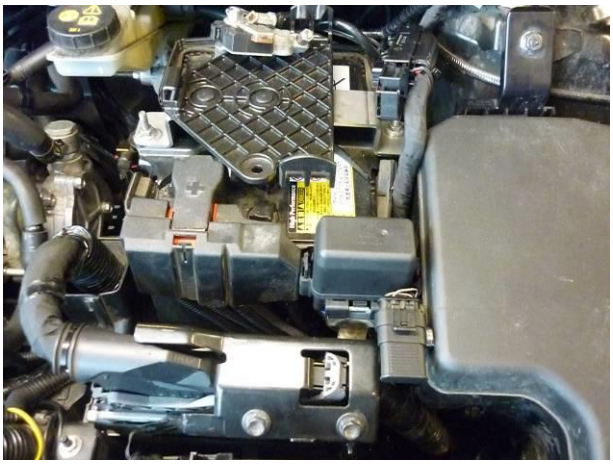
Fuse / relay box location

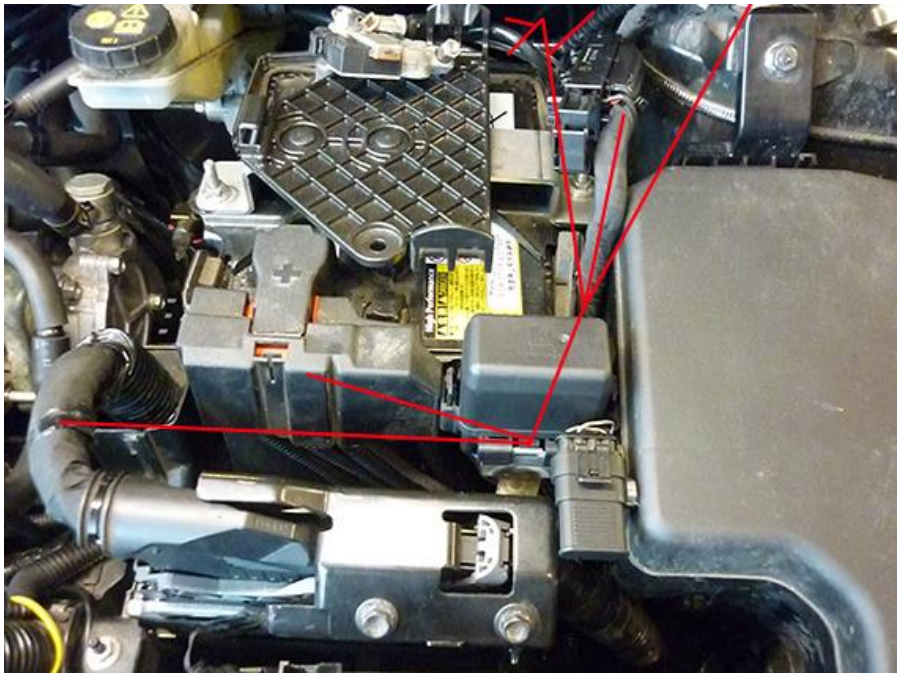






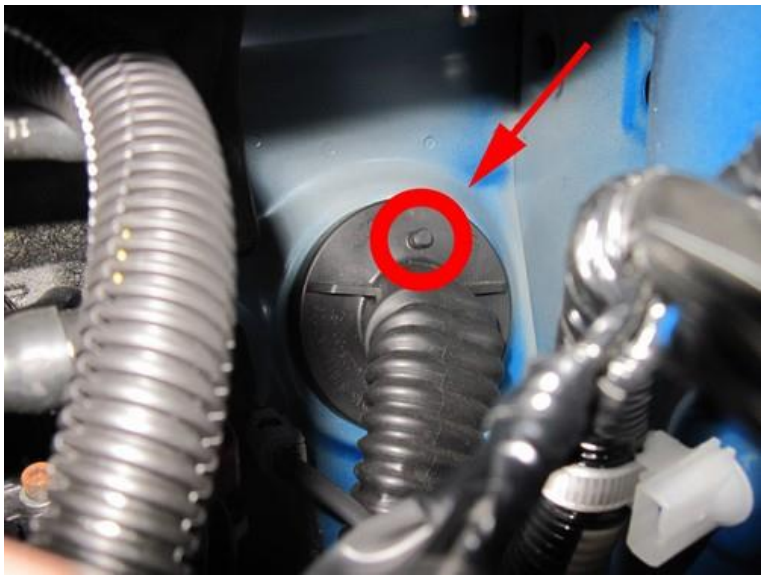
Wiring routing





Mounting the fuel selection switch

Mount the switch.

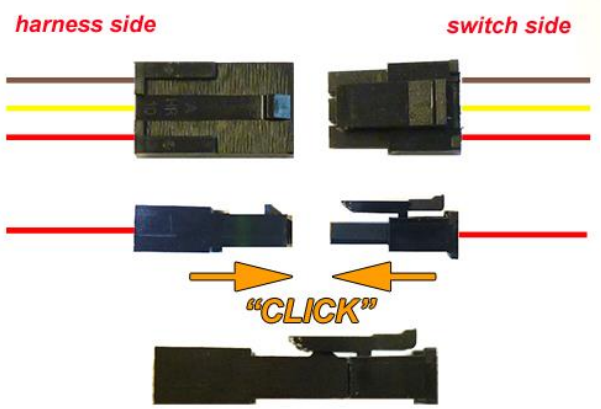


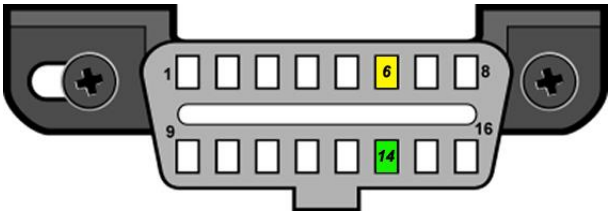
Drill Ø8.3mm

Electrical connections

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

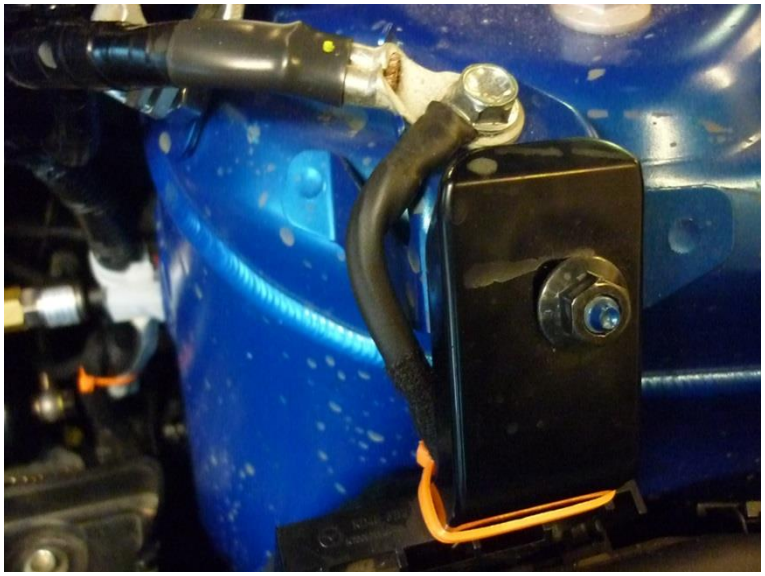
Driver room

Wire number / code	**Wire colour**	**Connection**
3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	 Brown-black Red-white Yellow	Connect the 3-pole connector to the Prins fuel selection switch.
		

51	CAN-High	Yellow	EOBD connector pin 6, pink
70	CAN-Low	Green	EOBD connector pin 14, brown
			

Electrical connections

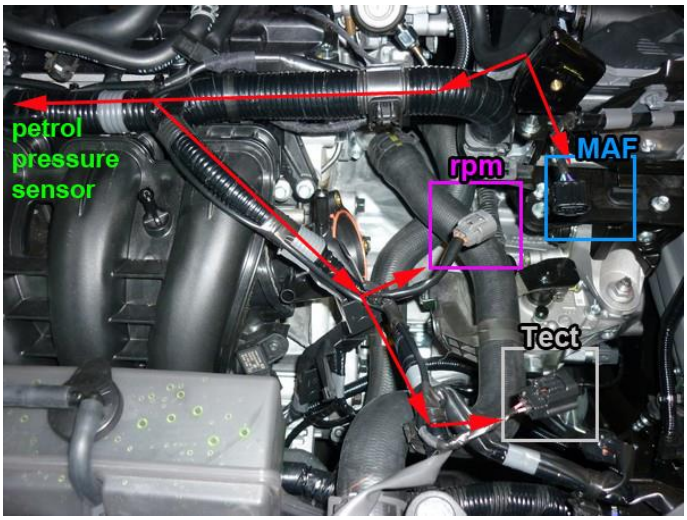
1-32 MAIN GND ecu MAIN GROUND SENSE	Brown	Connect to the '–' of the battery (-31) ; use a ring terminal Ø6mm. Wire location : left suspension strut, original ground.



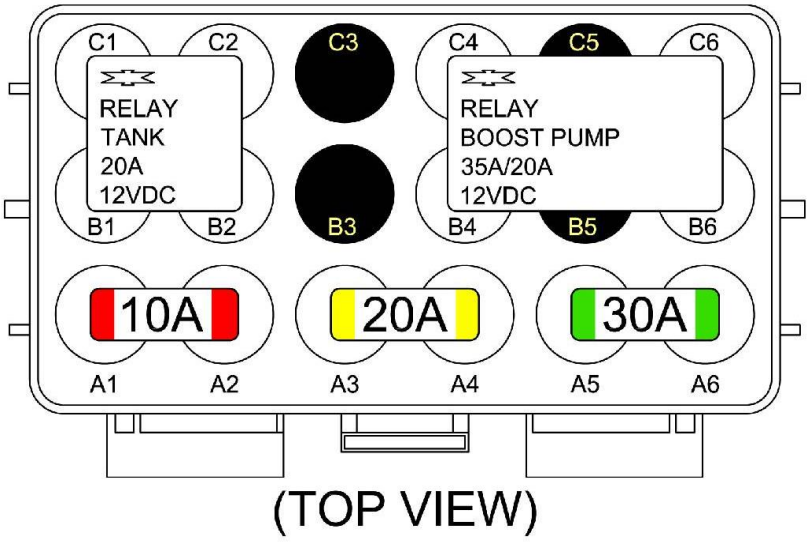
4 – 13 +12V BATT sense +12V BATT fused +12V BATT boost pump +12V BATT pump driver	Red	Connect to the '+' of the battery (+30); use a ring terminal Ø6mm. Do not place the fuse in the holder before having completed the installation of the lpg system.

Electrical connections (solder)

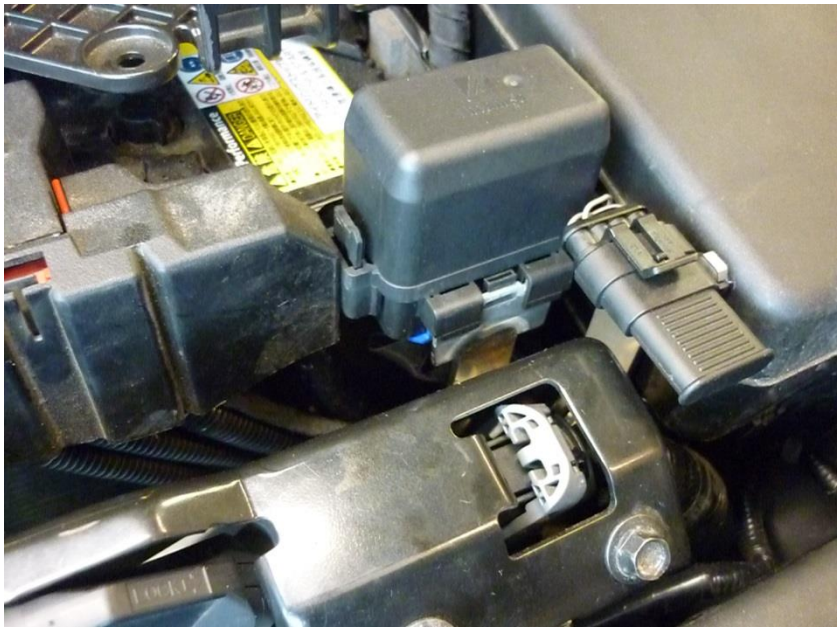
Wire number / code	Wire colour	Connection
8 RPM engine speed	Purple-white	For measuring the engine speed signal. Wire colour :green Wire location : 3-pole grey connector, pin 1 
15 Tect	Grey	For measuring the engine coolant temperature. Wire colour : Tan Wire location : 2-pole connector, pin 1 
		High pressure petrol sensor signal interruption 3-pole connector high pressure petrol sensor Wire colour : Green, 3-pole connector, pin 2 Wire location : petrol rail
25 DAC 1	Green-white	Petrol ecu side,
36 AD 6	Blue-brown	Sensor side,
63 Ground Shift	Blue-orange	High pressure petrol sensor ground shift 3-pole connector high pressure petrol sensor Wire colour : Tan, 3-pole connector, pin 1 Wire location : petrol rail
7 +12V IGNITION	Grey-white	3-pole connector high pressure petrol sensor Wire colour : Pink, 3-pole connector, pin 3 Wire location : petrol rail
21 AD9	Blue-brown	For measuring the Air Flow signal MAF . Wire colour : Black or brown Wire location : 5-pole connector, pos 3. 



Fuse Box



(TOP VIEW)



Electrical connections

Engine room

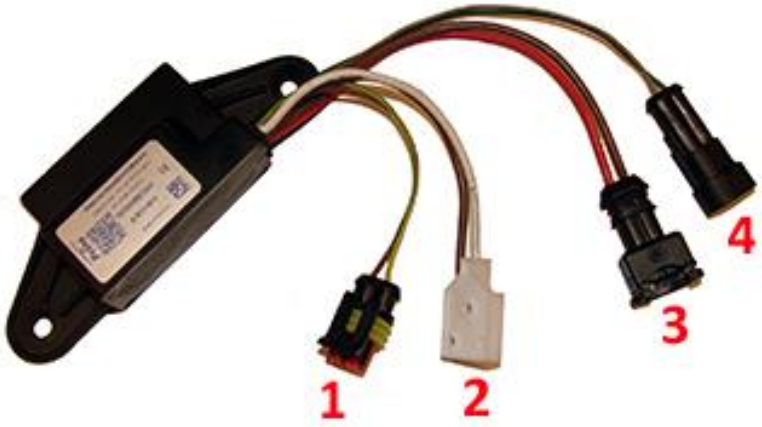
Wire number / code	Wire colour	Connection
3-pole connector		Connect the 3-pole connector to the Psys sensor positioned into the Fuel Return Unit.
35 Ground Psys pin A	Brown	Sensor wire pin A
9 +5V sensor pin B	Red-blue	Sensor wire pin B
16 Psys pin C	Green	Sensor wire pin C
2-pole connector FSU, black		
24 + 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, grey		
43 + 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 Service TxD	Grey	Connector pin 1
65 Service RxD	Grey	Connector pin 2
68 C Ground	Brown-black	Connector pin 4
Boost pump relay		
2 + relay boost pump	Red-white	Pin 86 of the boost pump relay C4
26 Ground BP relay	Purple-blue	Pin 85 of the boost pump relay B6
+12V fused BATT	Red 2.5mm2	Pin 30 of the boost pump relay C6-A5
+12V Boost pump	Red 2.5mm2	Pin 87 of the boost pump relay B4
Wiring tank pump driver relay		
57 + driver relay	Red-white	Pin 86 of the driver relay C1
73 LSS 4 tank relay	Purple-blue	Pin 85 of the driver relay B2
+12V BATT fused	Red 2.5mm2	Pin 30 of the driver relay C2-A4
+12V driver	Red 2.5mm2	Pin 87 of the driver relay B1

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 gauge 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.