

ALTERNATIVE
FUEL SYSTEMS

Prins

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



Installation manual Dedicated PART 2/2

MANUFACTURER	CHEVROLET
TYPE	CAMARO
ENGINE DISPLACEMENT	3600
NUMBER OF VALVES	24V
ENGINE CODE / NUMBER	LLT
VEHICLE CATEGORIES	M
TRANSMISSION	MT
VERSION	Direct LiquiMax-2.0
PETROL ECU MANUFACTURER / CODE	BOSCH Motronic 0261.S06.080
HIGH PRESSURE PETROL PUMP	Bosch HDP-5-PE 0261.520.(036)/(114)/(115)
HIGH PRESSURE PETROL INJECTOR	Bosch HDEV-5-1 0261.500.(028)/(056)/(049)/(022)
MODEL YEAR:	2011
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000012 / DLM-LPG 05
LOCATION SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	333/070004/A
MANUAL NUMBER	076/3301200
DATE	2013-1-18

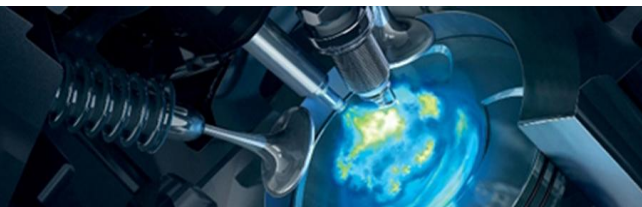


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FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE : INSTALLATION MANUAL GENERAL PART 1 / 2



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 :



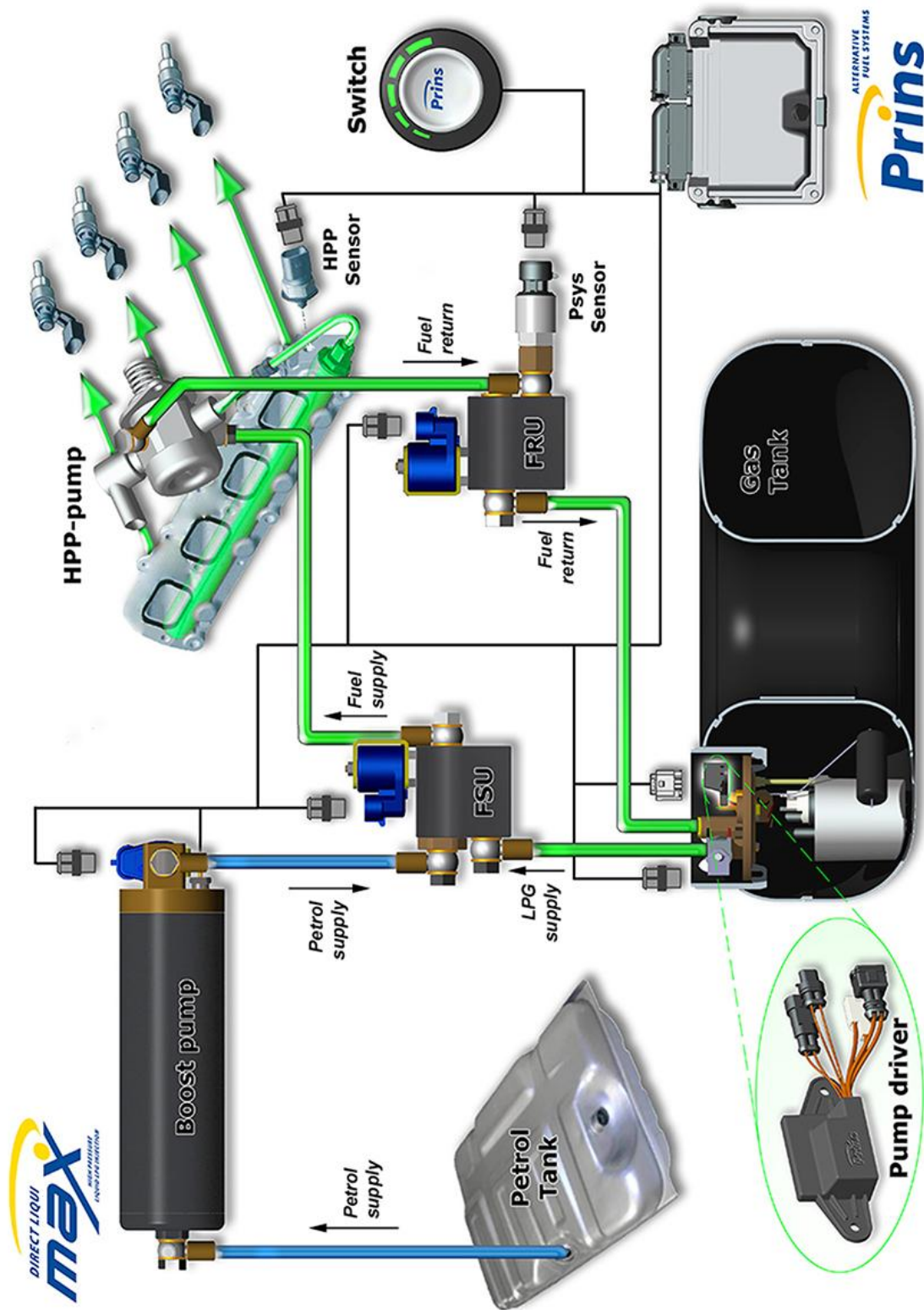
= IMPORTANT, CAUTION



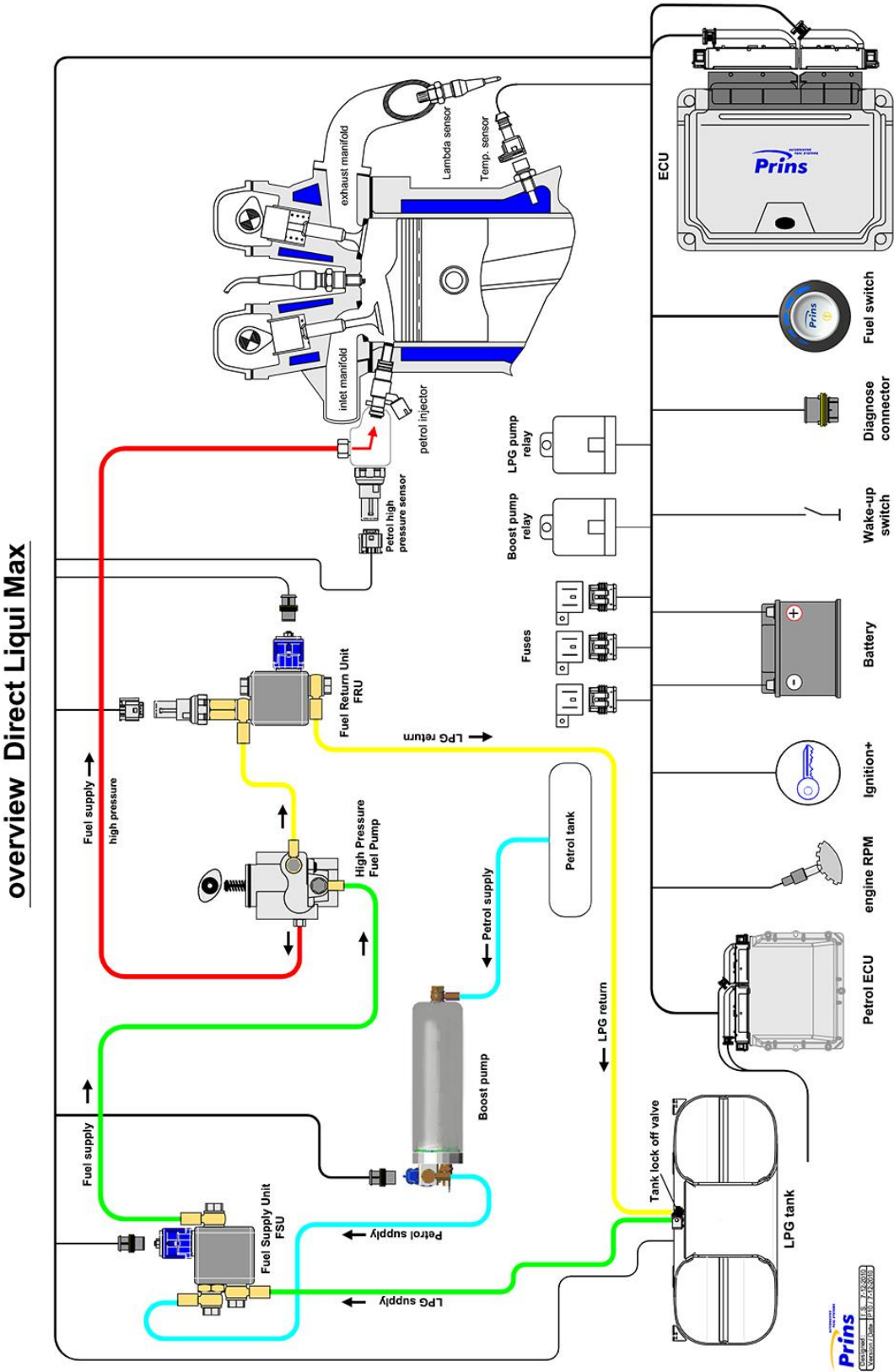
= WEAR SAFETY GOGGLES



Direct LiquiMax



Overview Direct LiquiMax

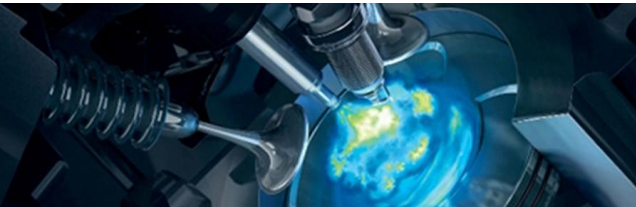
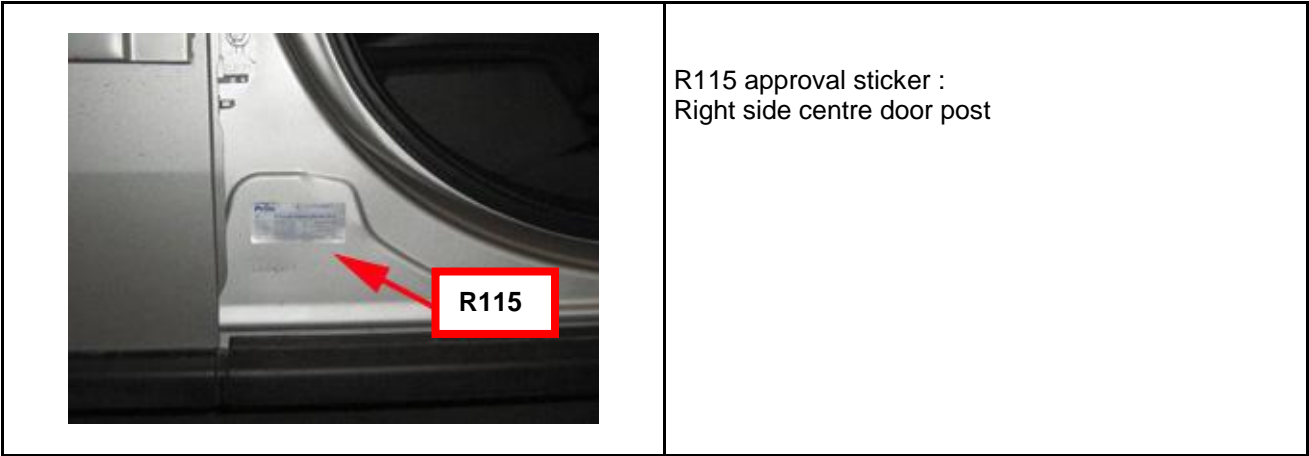
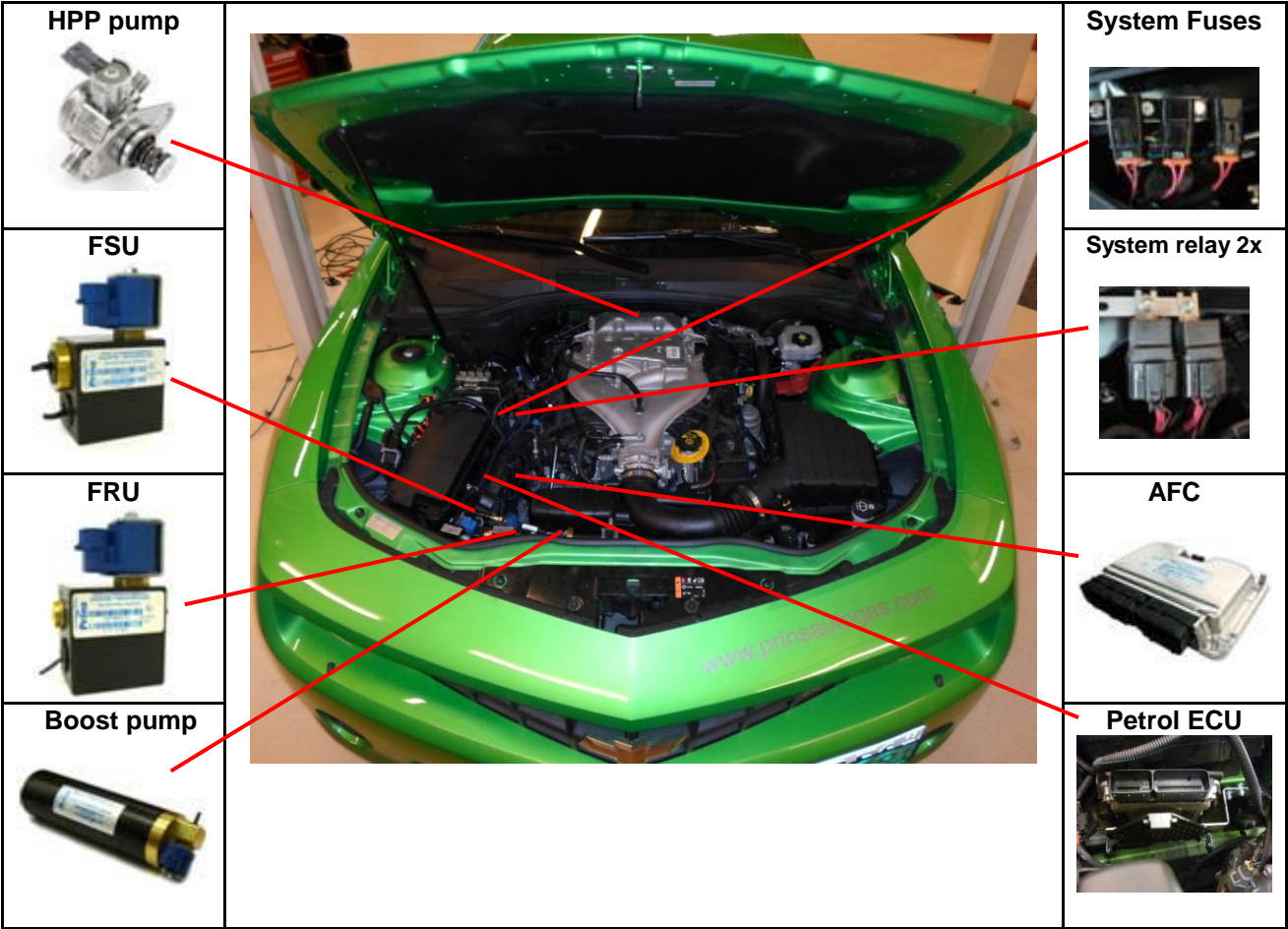


Direct LiquiMax parts / approval numbers

 <p>1st generation</p>  <p>2nd generation</p>	 <p>1st generation</p>  <p>2nd generation</p>
<p>Fuel Supply Unit : E4-67R-010269</p>	<p>Fuel Return Unit : E4-67R-010270 Pressure Sensor : E4-67R-010051</p>
	
<p>Boost pump</p>	<p>High Pressure Pump : E4-67R-010266 High Pressure Rail : E4-67R-010267 High Pressure Injectors : E4-67R-010309</p>
	 <p>XD-3 LPG</p>  <p>XD-4 LPG</p>
<p>Prins ECU : E4-67R-010098 E4-10R-030507</p>	<p>Fuel lines series XD : E4-67R-010247 XD3 E4-67R-010247 XD4</p>



DLM component location overview



Removal of the Bosch High Pressure Pump

-REMOVAL-

-WARNING-

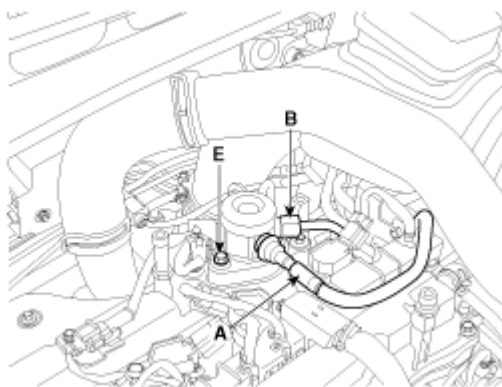
In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, there may be injury caused by leakage of the high pressure fuel.

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.

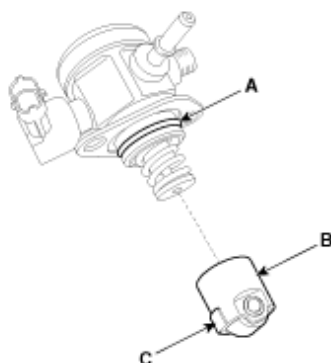


Installation of the Bosch High Pressure Pump

-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 petrol pressure pump installation



Replace the high pressure pump for the adapted high pressure pump.

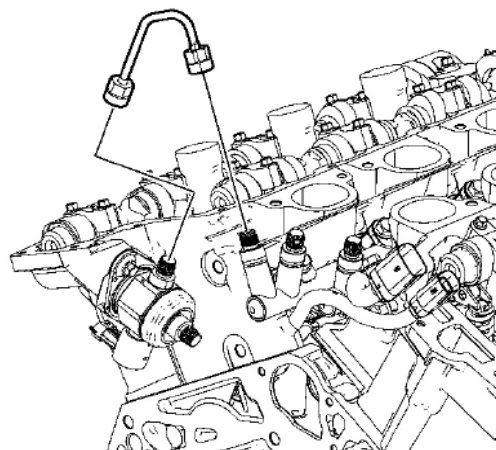
(Follow the workshop manual of the car)

Remove wiper arm, cover, wiper motor.

Remove the upper inlet part with throttle body. **Make sure nothing can fall into the intake ducts.**



Petrol high pressure pump.



Replace the high pressure pump for the adapted version.

Roller tappet :



Careful : roller tappet can fall out the pump housing !
See chapter : Installation of the Bosch High Pressure Pump !



High petrol pressure pump return

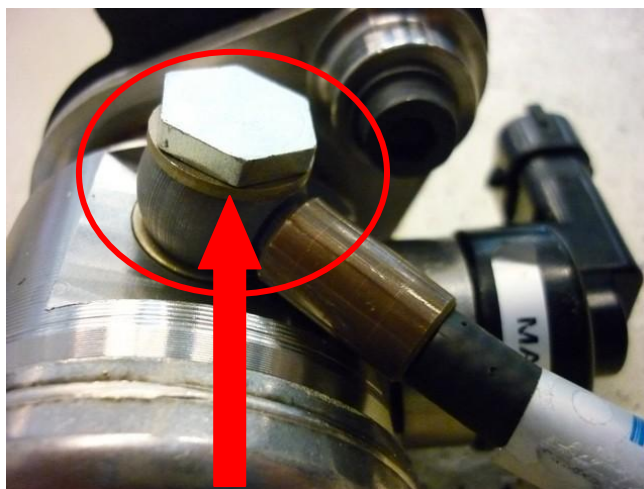
Replace the high pressure pump for the adapted high pressure pump.
(Follow the workshop manual of the car)



Check Roller Tappet before installation HPP pump



Not used anymore

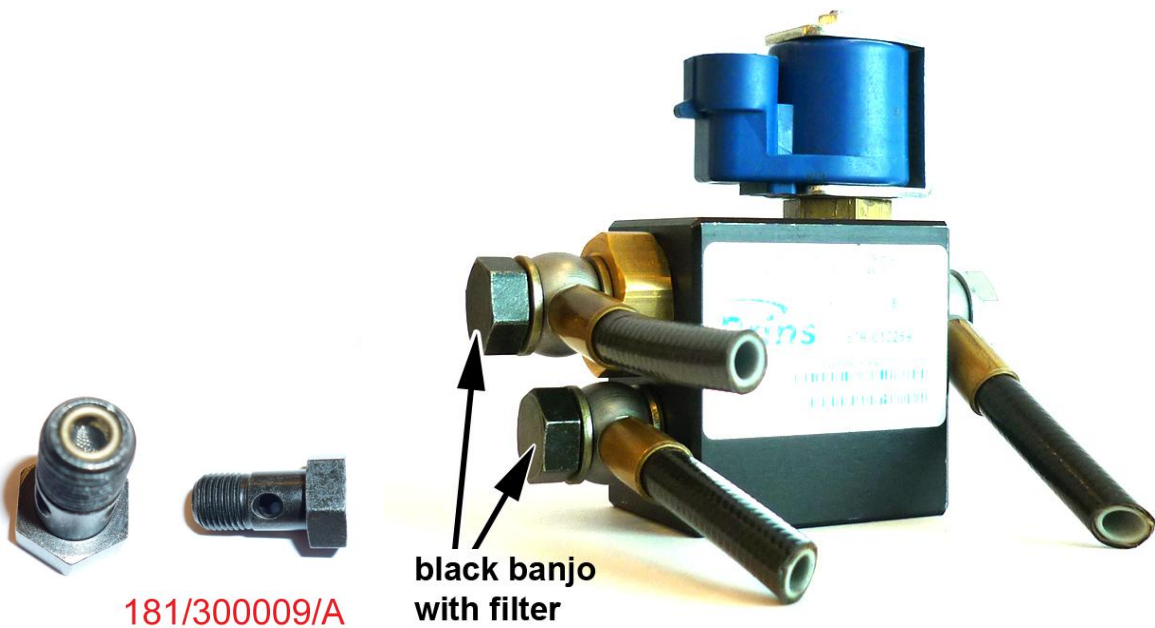
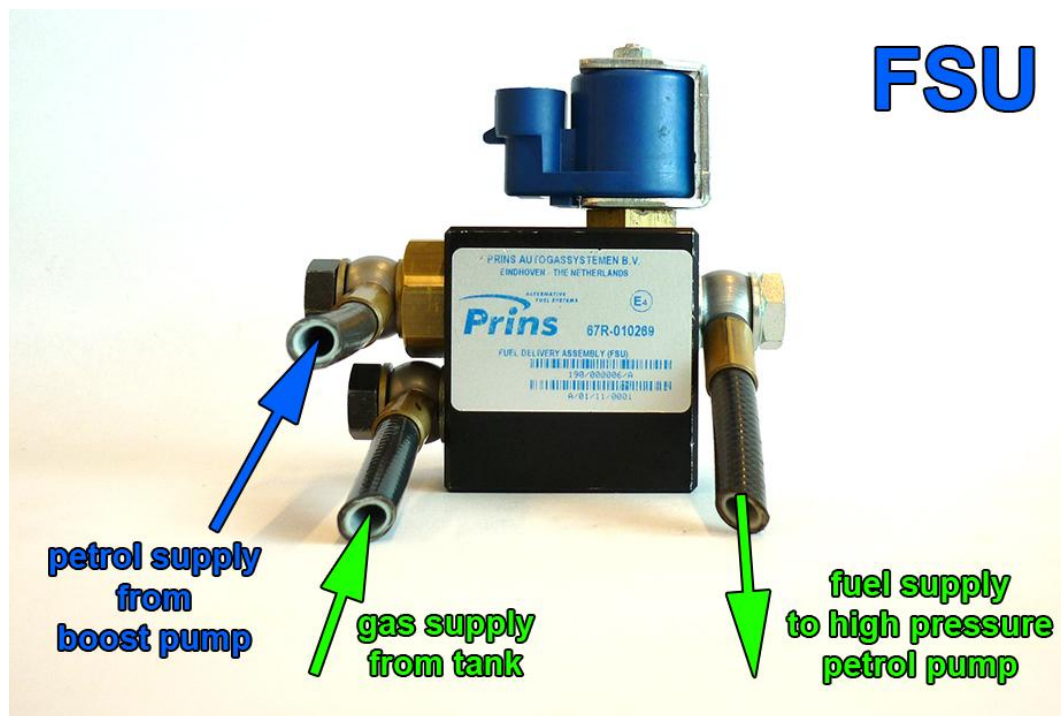


Short head banjo bolt (special).

Install / tighten both hoses (see page 4) as shown. After pump installation, tightening is no longer possible!



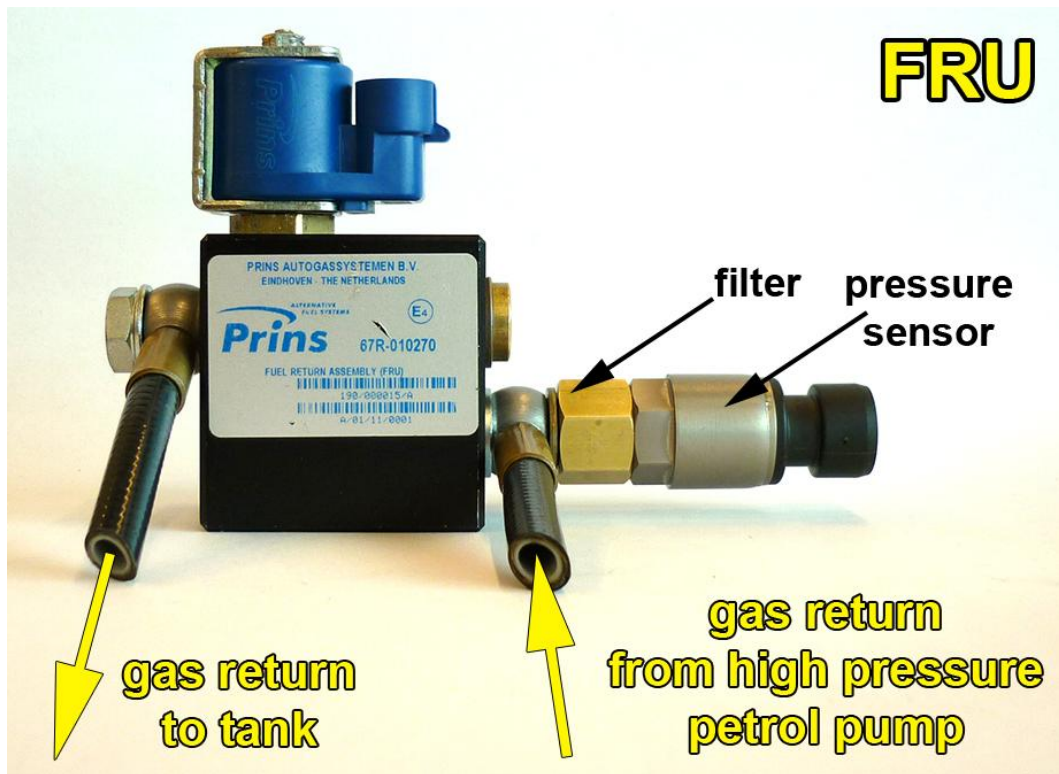
Fuel Supply Unit



Black filtered banjo will only be used on inlet connections !



Fuel Return Unit



Mounting the Fuel Supply and Fuel Return Unit



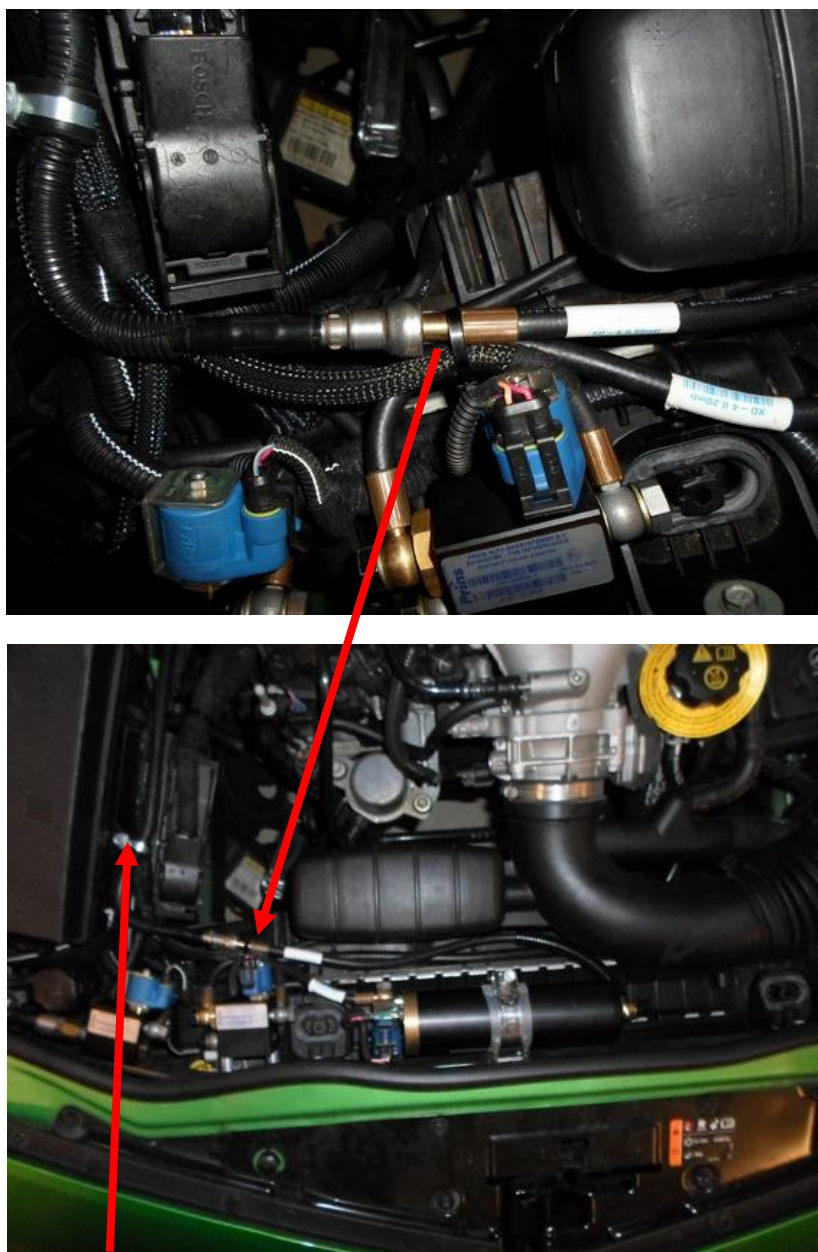
Mounting points fuel bracket



Boost pump



Connection of the fuel hose to the boost pump.



Mounting point original petrol fuel line with a clip Ø15mm original mounting point.



MAP sensor



Drill hole Ø5mm and cut thread M6x1. Install the inlet coupling with a locking compound.




Remove the original bolt and use a new longer M6x1 bolt, washer & spring washer for mounting the MAP sensor.
Install a Ø5mm LPG hose between MAP sensor and inlet coupling.

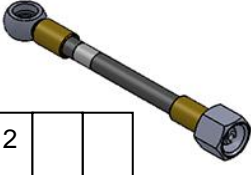


LPG / petrol fuel lines


Hose		from	to	Length (cm)
1	XD-4	Adapter original petrol hose	Petrol boost pump	65 cm
2	XD-3	Fuel supply unit	High pressure petrol pump	130 cm
3	XD-3	Petrol boost pump	Fuel supply unit	20 cm
4	XD-3	Fuel return unit	High pressure petrol pump	125 cm
5	XD-	Fuel return unit	High pressure petrol rail	n.a.




1



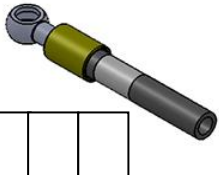
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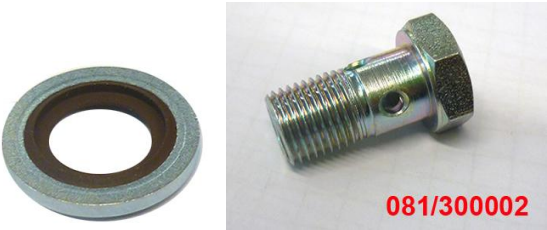


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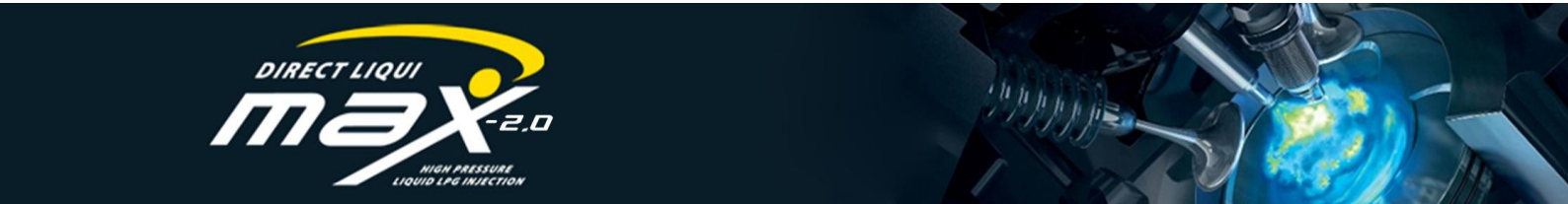




Install the fuel line using two bonded seal washers and (filtered) banjo bolt for each banjo side:



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



Routing fuel line



Mount on the original fuel line the extension line that goes to the boost pump



The supply and return line high pressure pump.

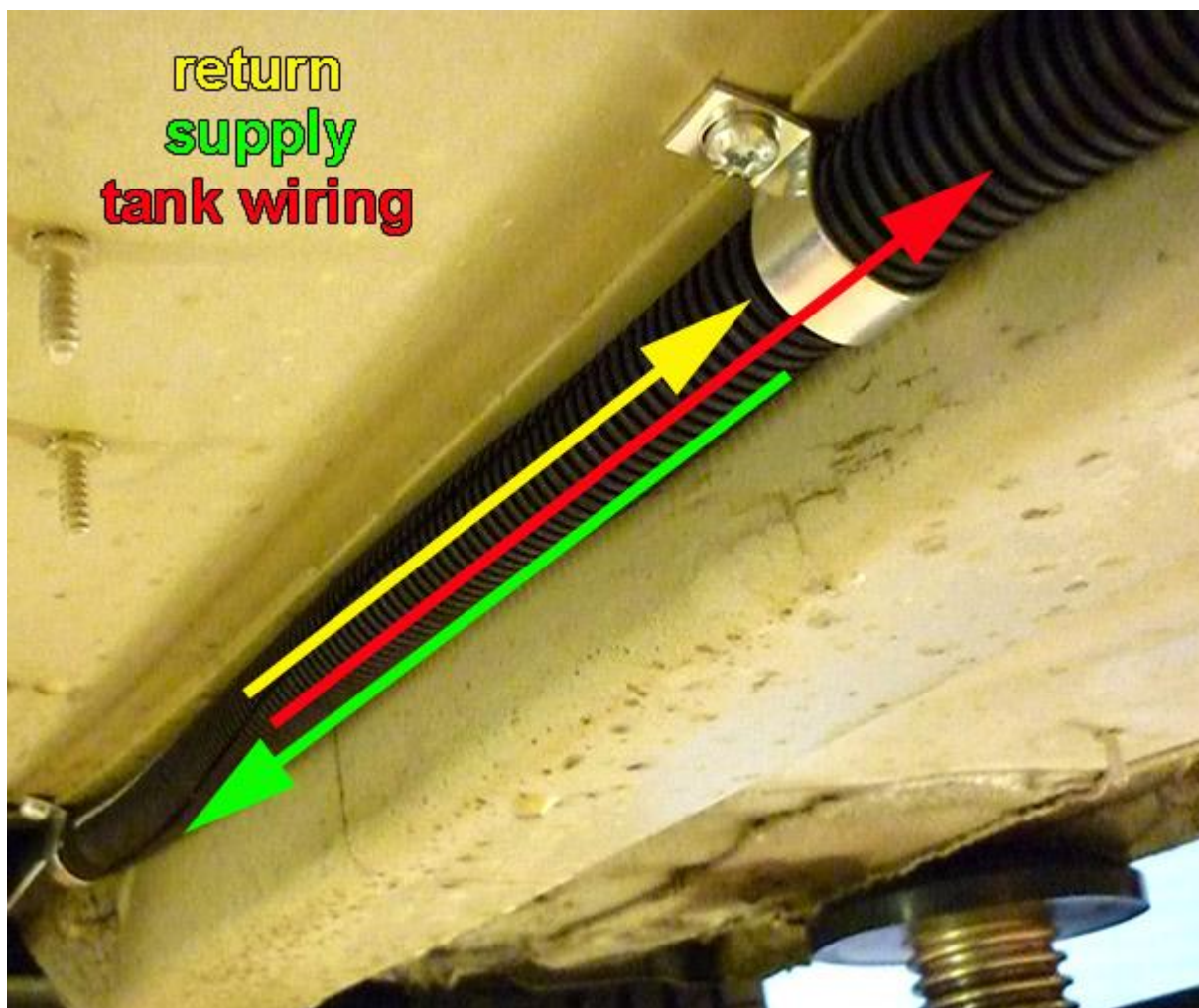


Mount the fuel line with wiring to the chassis and replace the fuel line behind the heat shield to the trunk.

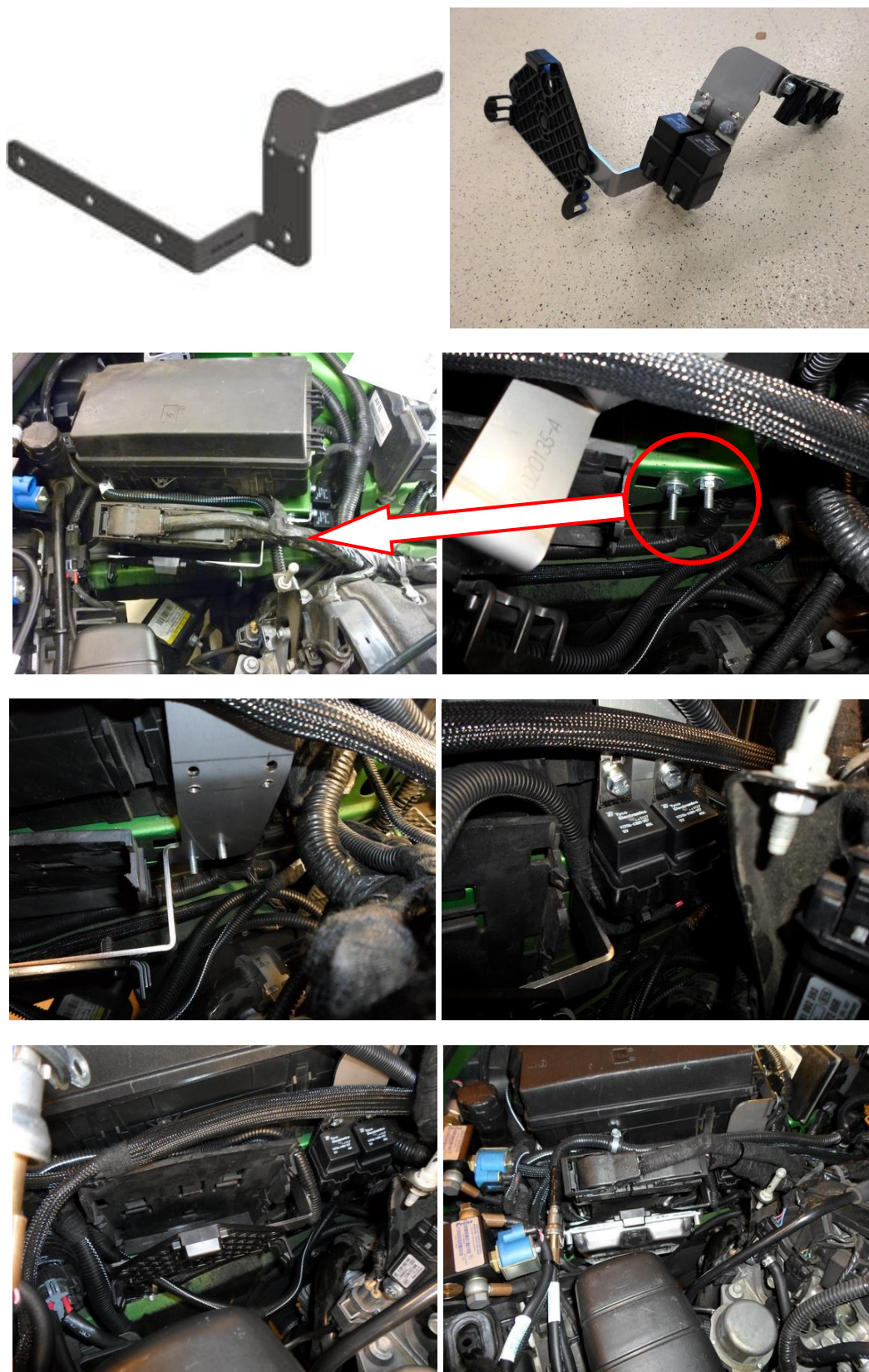


Supply hose – Return hose – Tank wiring

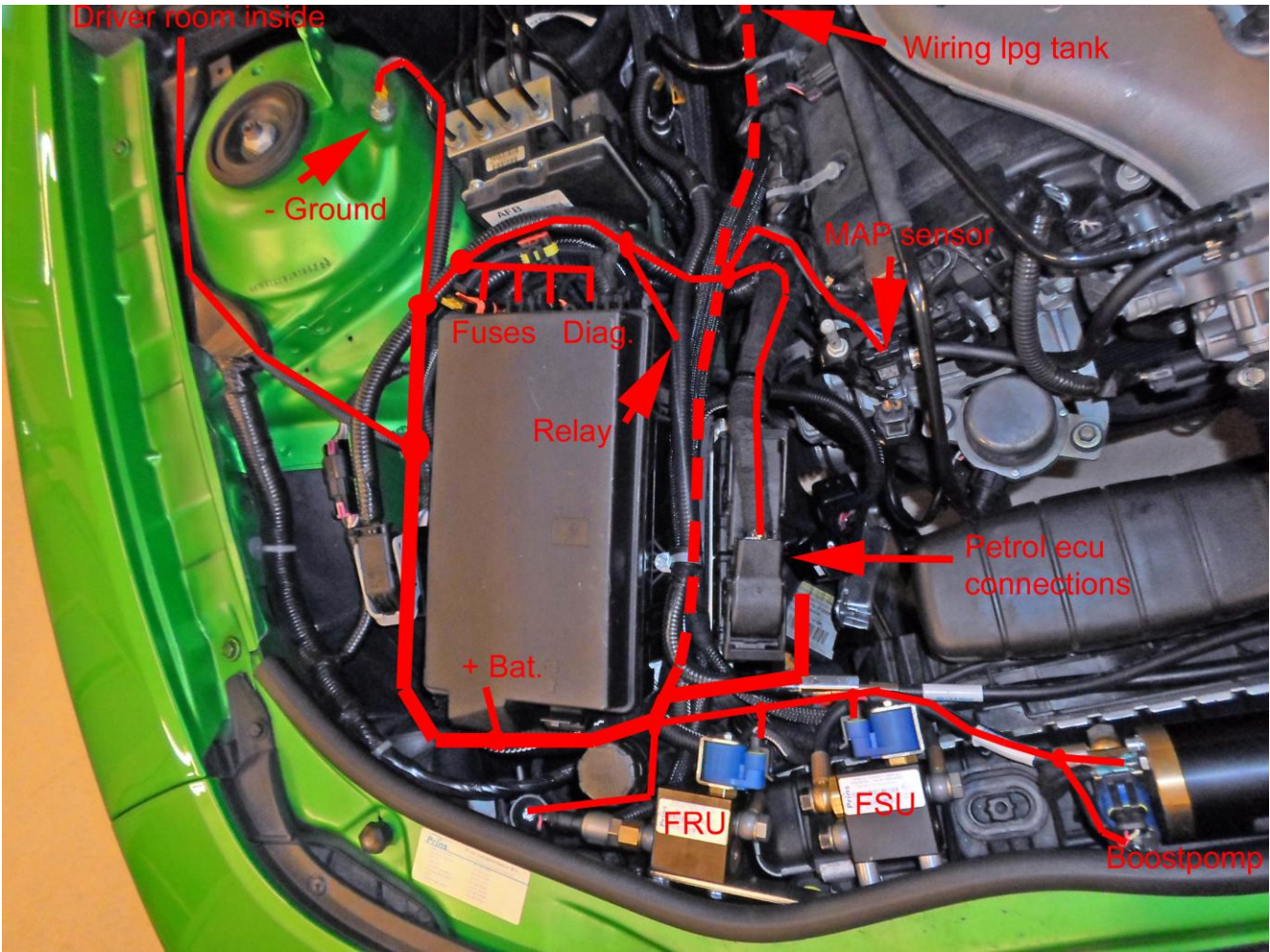
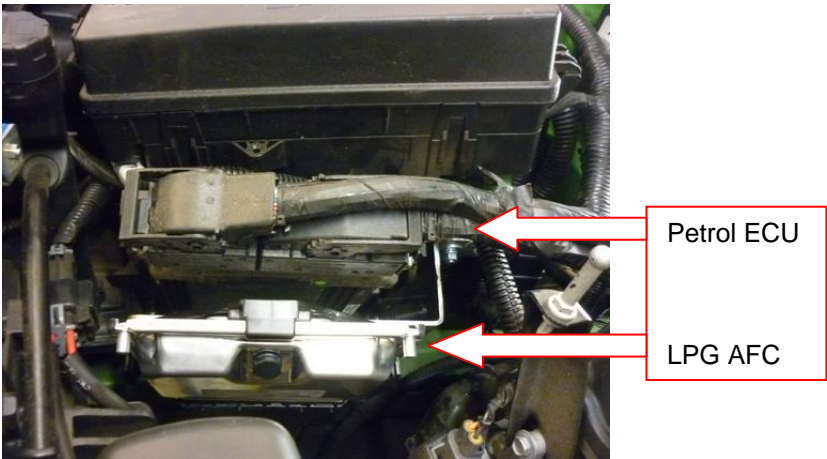
Protect the supply- and return hose together with tank-wiring using the Ø16 split tube.
Mount the “hose assembly” with clamps, with a maximum distance of 40cm.



Mounting the AFC with fuses and relays



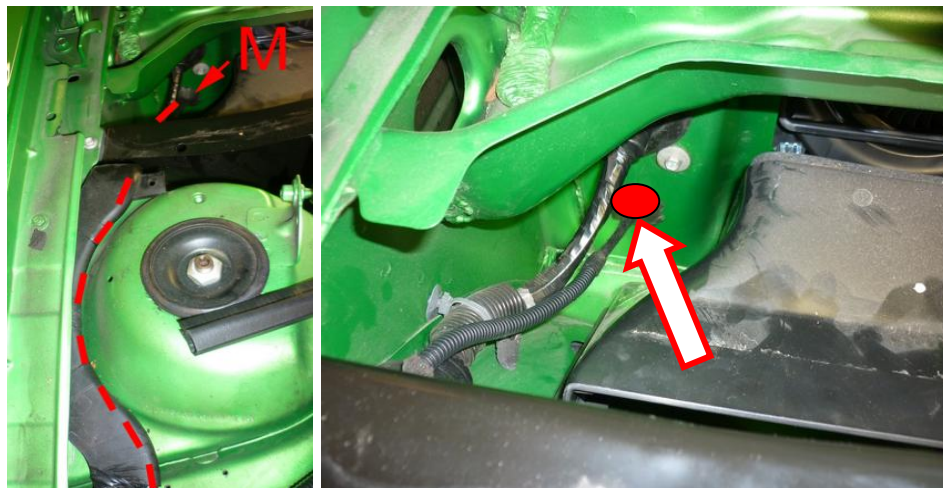
Wiring AFC / Routing wiring



Mounting the fuel selection switch



Wiring inside : Switch, Wake-up, CAN, Pump driver petrol wiring.



Grommet wiring inside.



Electrical connections

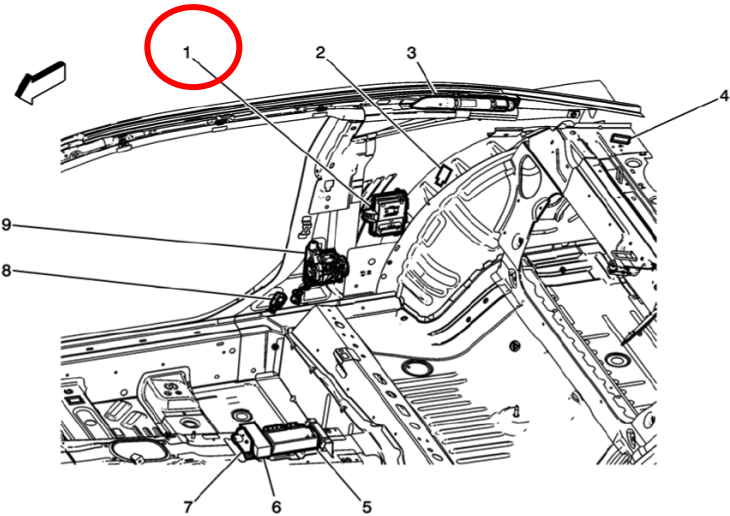
Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

Driver room **Inside**

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
121	Wake-up	Red-grey	Wire colour : Wire location : EOBD can sig.

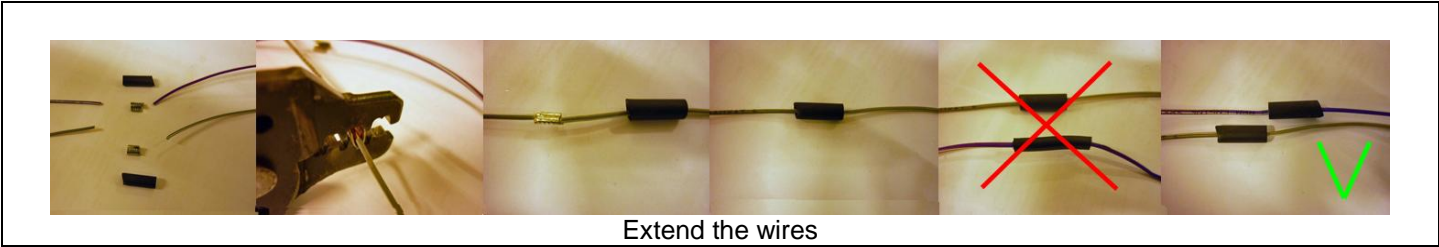
Driver room **Inside** (petrol pump driver)

17	Analog 2	Blue-black Green-black	Low pressure sensor petrol interruption Sensor side. ECU side. Wire colour :Purple Wire location : on left wheel arch in the trunk. Module Pin 10
10	Simulation 2		
Extend wires (see picture)			
115	Digital input 4	Yellow-red	Petrol fuel pump driver (PWM in) Fuel pump flow control module. Wire colour :Tan Wire location : on left wheel arch in the trunk. Module Pin 13 dikke draad
Extend wires (see picture)			

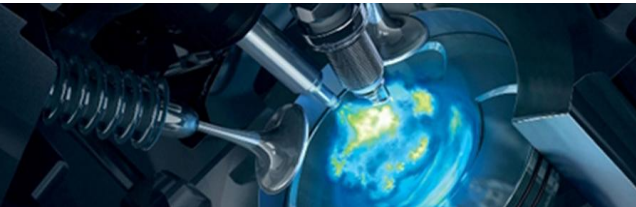


- (1) K27 Fuel Pump Control Module
- (2) R6 Data Link Resistor
- (3) F105R Roof Rail Air Bag - Right
- (4) R14R Rear Window Defogger Noise Filter - Right
- (5) K36 Inflatable Restraint Sensing and Diagnostic Module
- (6) T11 Multimedia Player Interface Module
- (7) B119 Multi-axis Acceleration Sensor
- (8) B63R Side Impact Sensor - Right
- (9) F112P Seat Belt Retractor Pretensioner - Passenger

Fig. 12: Right Side Of Passenger Compartment

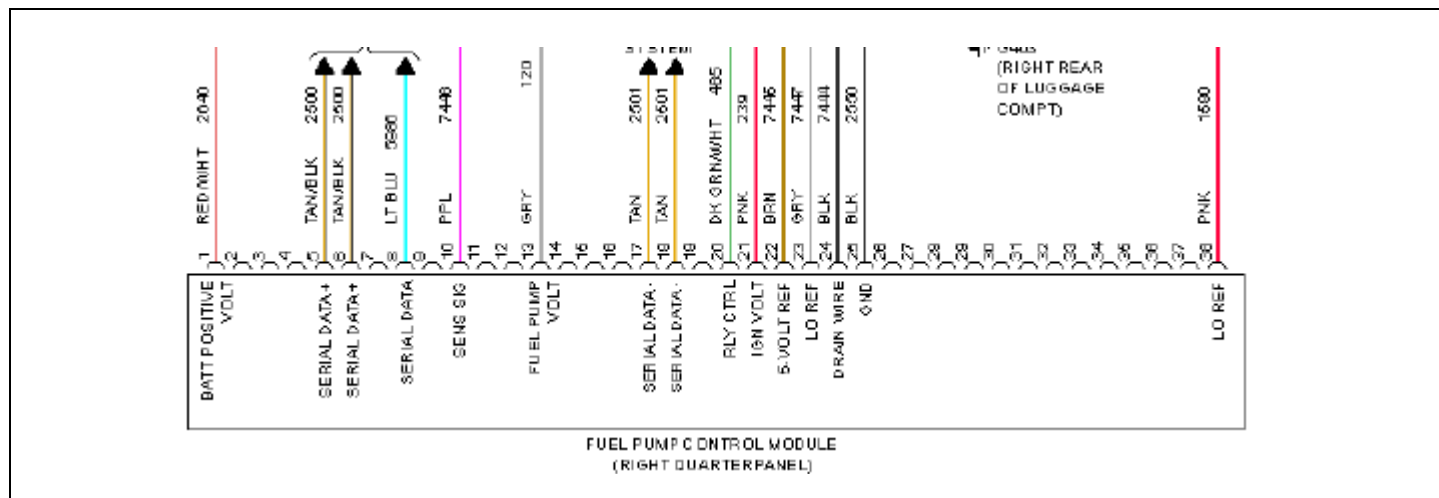


Extend the wires





Electrical connections

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



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 MAIN GND ecu MAIN GROUND SENSE MAIN GND pump driver MAIN GND boost pump	brown	Connect to the '-' of the battery (- 31) ; use a ring terminal. Wire colour :Brown Wire location : Right suspension strut	
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 terminal. Do not place the fuse in the holder before having completed the installation of the LPG system. Wire location :Fuse box	



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
18 Analog 1 25 Simulation 1	Blue-red Green-grey	High pressure petrol sensor signal interruption Sensor side. ECU side. Wire colour :Yellow Wire location : Petrol ECU under the left headlight insert ECU connector X1, black connector, pin 36
19 Analog 4	Blue-white	High pressure petrol sensor ground Wire colour :Tan Wire location : Petrol ecu X1, black connector, pin 42
117 Digital input 3	Yellow-black	High pressure petrol sensor 5Volt supply Wire colour :Grey Wire location : Petrol ecu X1, black connector, pin 38
119 Digital input 2 23 Digital Simulation	Yellow-grey Green-red	Digital Airflow 1 sensor interruption Wire colour :Yellow sensor side Wire colour :Yellow ecu side Wire location : Petrol ecu X2, black connector, pin 13
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 : Yellow Wire location :Petrol ECU under the left headlight insert ECU connector X2, black connector, pin 54



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
27 +5V sensor 37 C ground 20 Analog 3 MAP	Red Brown Blue	For measuring the inlet manifold pressure (MAP). Connect the 3-pole connector to the Prins MAP sensor. Sensor location: Right side behind the throttle body
8 RPM	Purple-white	For measuring the engine speed signal. Wire colour :Yellow Wire location :Petrol ecu X1, black connector, pin 35
15 T-ect	Grey	For measuring the engine coolant temperature. Wire colour : Yellow Wire location : Petrol ECU under the left headlight insert ECU connector X1, black connector, pin 82

6 Lambda1 WB	Orange	insulate
42 Lambda2 WB 10KΩ	Orange-white	insulate
113 Digital input 6	Yellow-purple	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>		
106 + Lock-off Boost Pump	Red	Connect the 2-pole connector to the lock-off valve of the Boost Pump.
98 Ground lock-off	White-yellow	
<i>2-pole connector FSU</i>		
108 + Lock-off FSU	Red	Connect the 2-pole connector to the lock-off valve of the Fuel Supply Unit
100 Ground lock off	Pink-yellow	
<i>2-pole connector FRU</i>		
90 + Lock-off FRU	Red	Connect the 2-pole connector to the lock-off valve of the Fuel Return Unit
82 Ground lock off	Blue-yellow	
<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

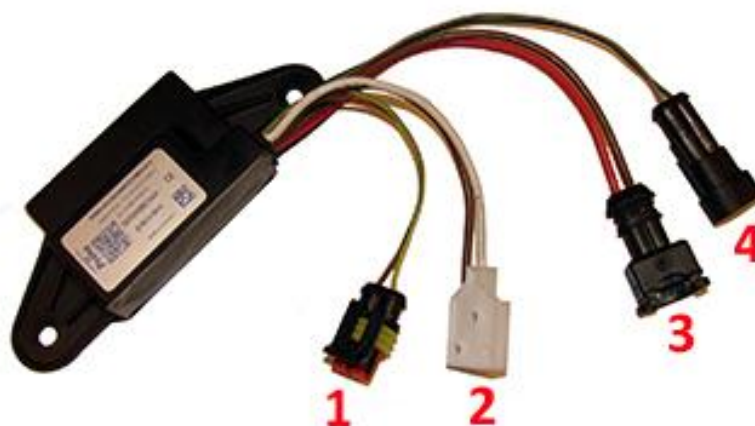


Electrical connections

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. Connector pin 1 Connector pin 2 Connector pin 3
1. 2-pole connector tank lock-off	Green-yellow Brown	Pump driver to lock-off power Pump driver to lock-off ground
2. 3-pole fusite	Red Brown -	1. Pump power 2. Pump ground 3. not used
3. 2-pole connector tank pump	Red 2.5mm ² Brown 2.5mm ²	Pump driver power Pump driver ground
4. 2-pole connector	Grey Green	Pump driver diagnose Pump driver control



Wiring tank relay 2 + tank relay 26 Ground tank relay +12V BATT fused +12V pump driver	Red Green-yellow Red 2.5mm ² Red 2.5mm ²	Pin 86 of the tank relay Pin 85 of the tank relay Pin 30 of the tank relay Pin 87 of the tank relay
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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.

