ALTERNATIVE FUEL SYSTEMS

Prins

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

Installation manual
Dedicated
PART 2/2

MANUFACTURER	Mazda
TYPE	6
ENGINE DISPLACEMENT	2000
NUMBER OF VALVES	16
ENGINE CODE / NUMBER	LF-VD (MZR disi)
VEHICLE CATEGORIES	M
TRANSMISSION	Mt
VERSION	Direct LiquiMax-2.0
PETROL ECU MANUFACTURER / CODE	Mitsubishi LFDC 18881
HIGH PRESSURE PETROL POMP	Hitachi Gen-1
HIGH PRESSURE PETROL INJECTOR	x
MODEL YEAR:	2011
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000011 / DLM-LPG 04
LOCATION SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	353/070001/A

NUMBER :	076/1307000
DATE :	2012-11-06
VERSION NR :	2012-05-21 D

TABLE OF CONTENTS

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.

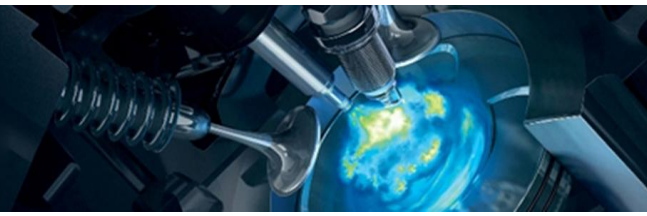
Register (warranty card) the system on the Prins warranty portal .

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
- 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

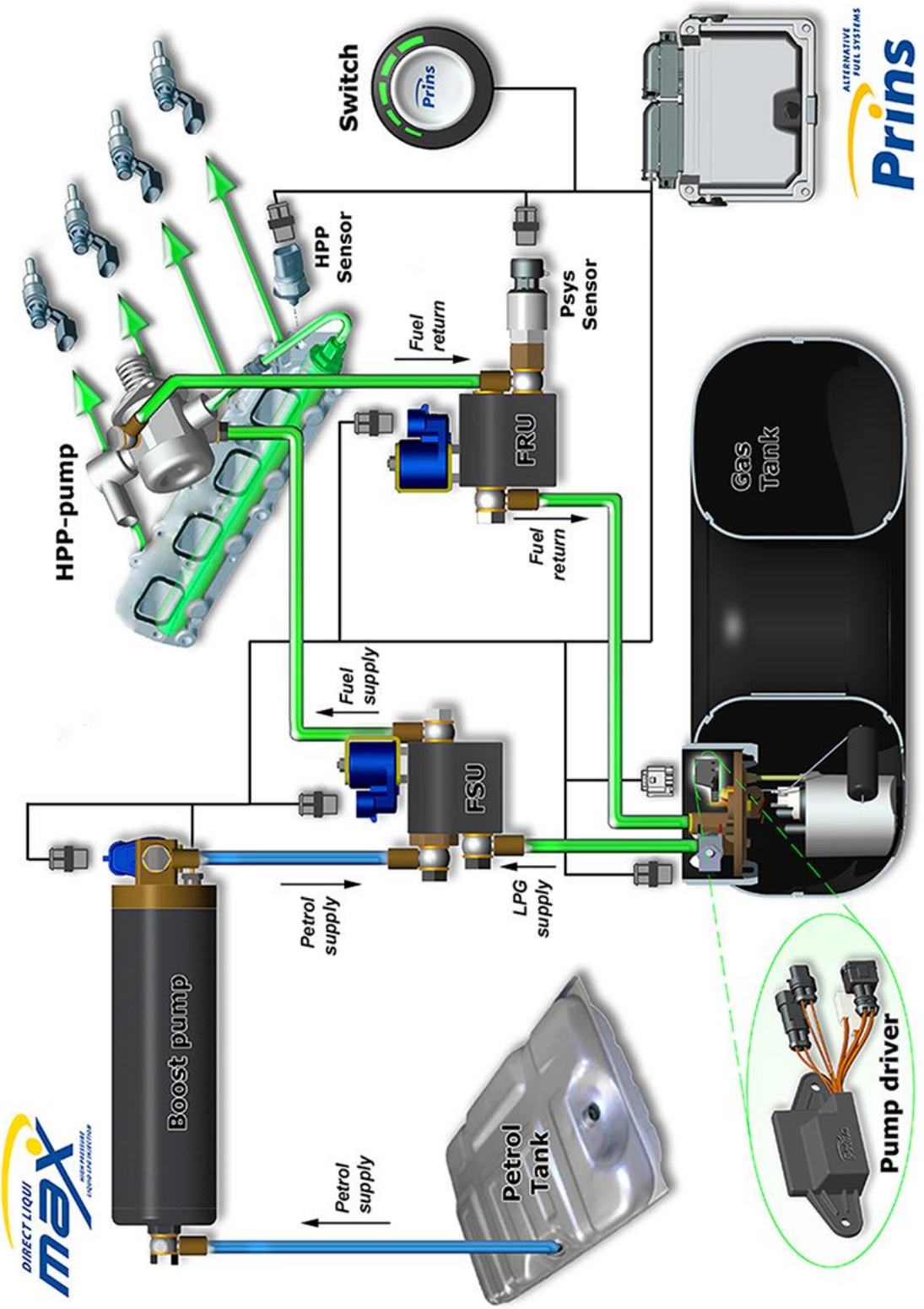
		Nm	SW
M 4 x 0,7		3,3	7
M 5 x 0,8		6,5	8
M 6 x 1,0		11,3	10
M 7 x 1,0		14,5	11
M 8 x 1		24,5	13
M 8 x 1,25		27,3	13
M 10 x 1		52	15-16-17
M 10 x 1,5		54	15-16-17
(filtered)Banjo bolt		10	14
Supply line connection		15	13
Fuel module Allen bolts		20	7
Filler hose connection		50	22

EXPLANATION OF SYMBOLS :

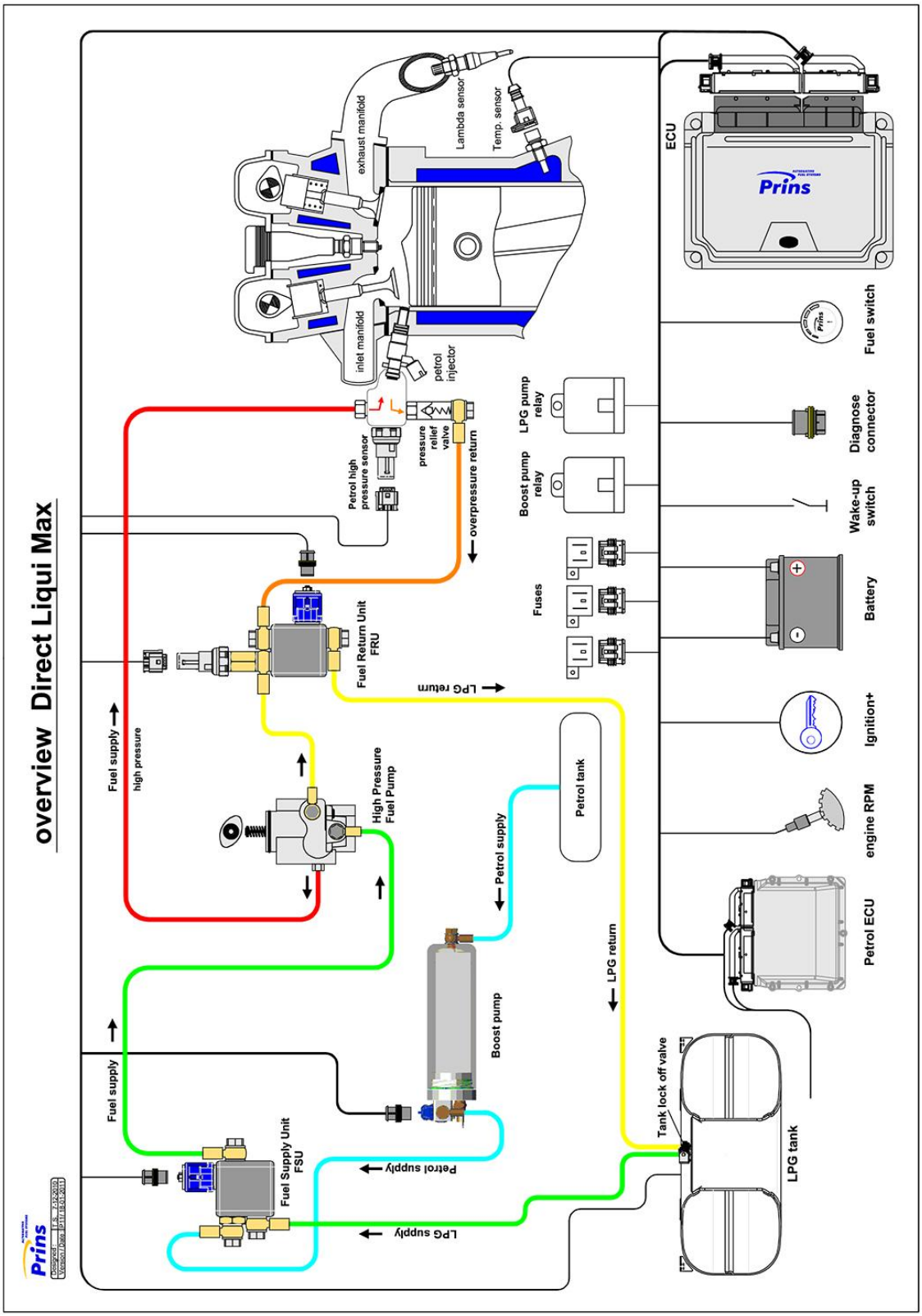
= IMPORTANT, CAUTION

= WEAR SAFETY GOGGLES

Direct LiquiMax



Overview Direct LiquiMax



Direct LiquiMax parts / approval numbers

	
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
	 
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

High pressure pump installation

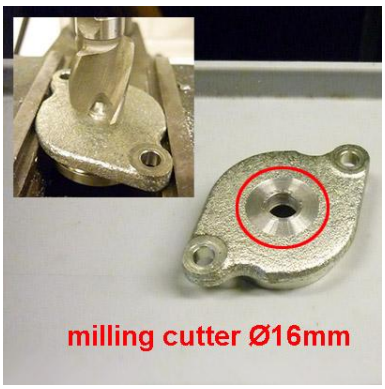
Replace the high pressure pump for the adapted high pressure pump.
(Follow the workshop manual of the car)

Remove original inlet and install the special inlet with a o-ring

Use the original bolts or M5x16

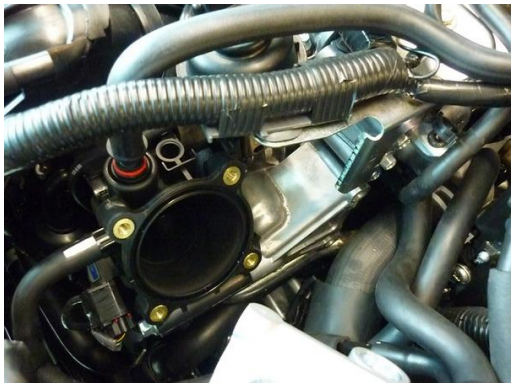
High pressure pump return

Remove the high pressure pump, careful : petrol !!
(Follow the workshop manual of the car) Carefully remove cover and adapt as shown:

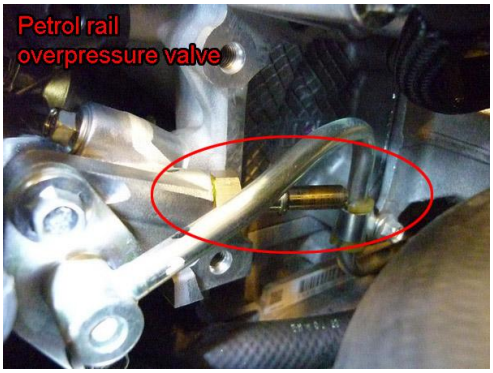


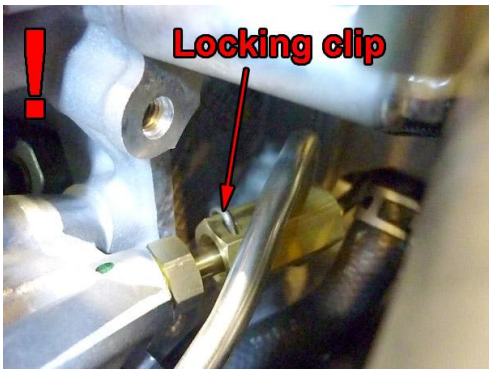
Replace adapted cover

Petrol rail overpressure return



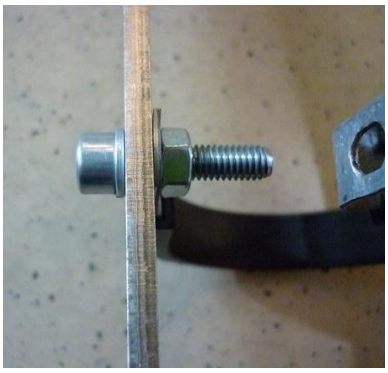
Remove rail-cover





Connect the banjo-banjo flex hose from quick connection to the FRU (remove Allan bolt next to pressure sensor)

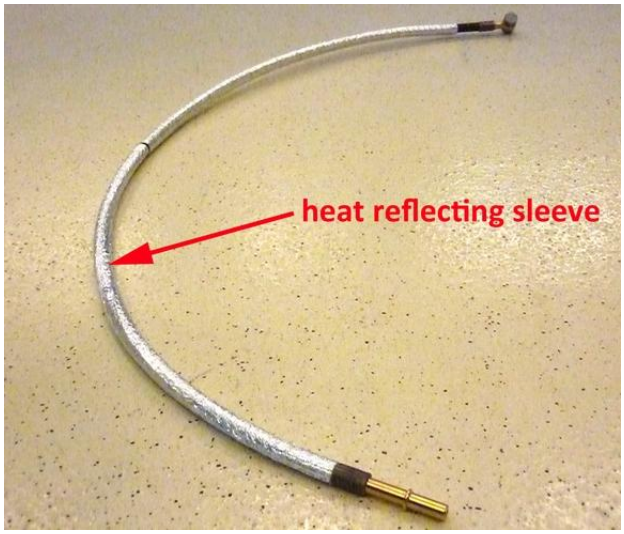
Preparation boost pump location



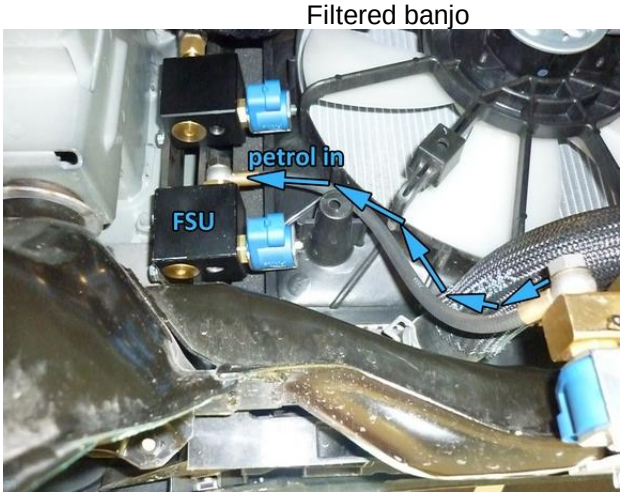
Connection of the fuel hose to the boost pump.

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

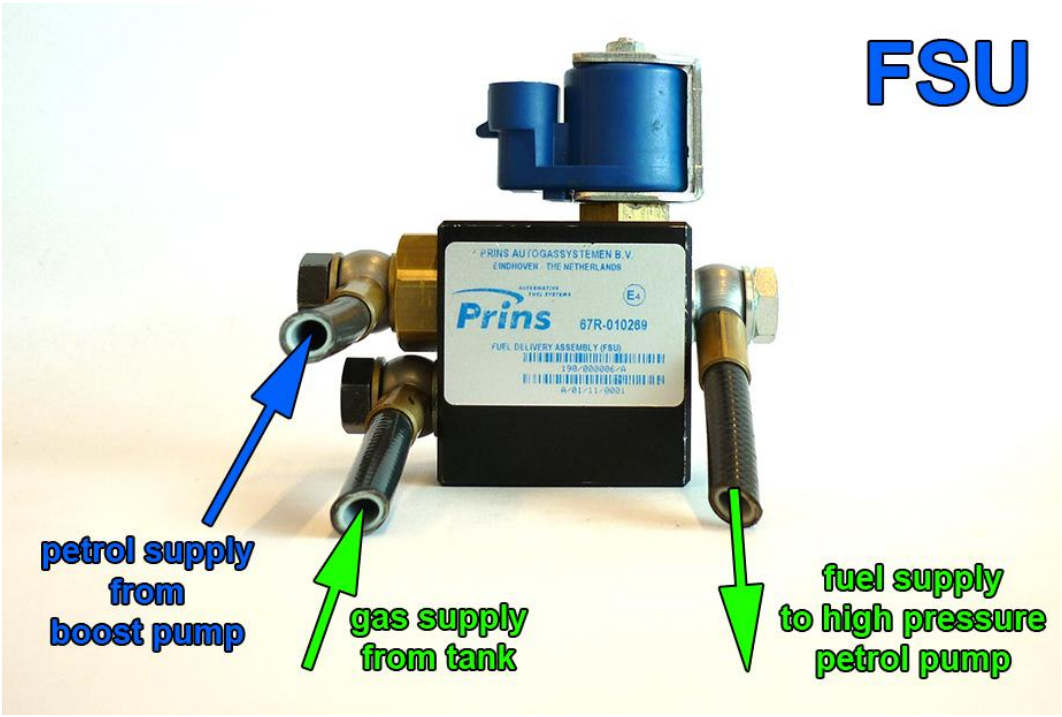
Put heat reflecting sleeves over the flex hoses



Filtered banjo



Fuel Supply Unit



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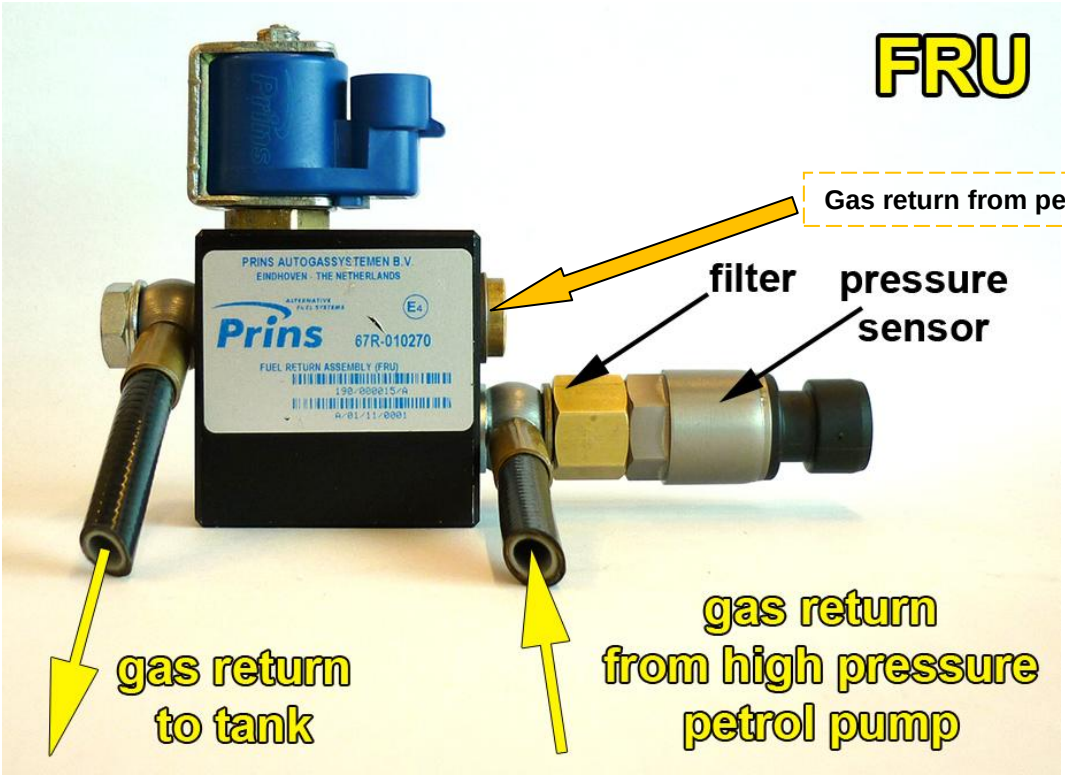
Black filtered banjo will only be used on inlet connections !

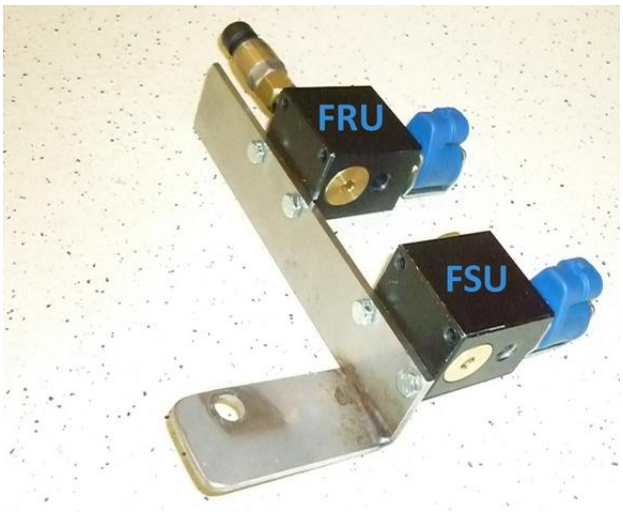
Fuel Return Unit

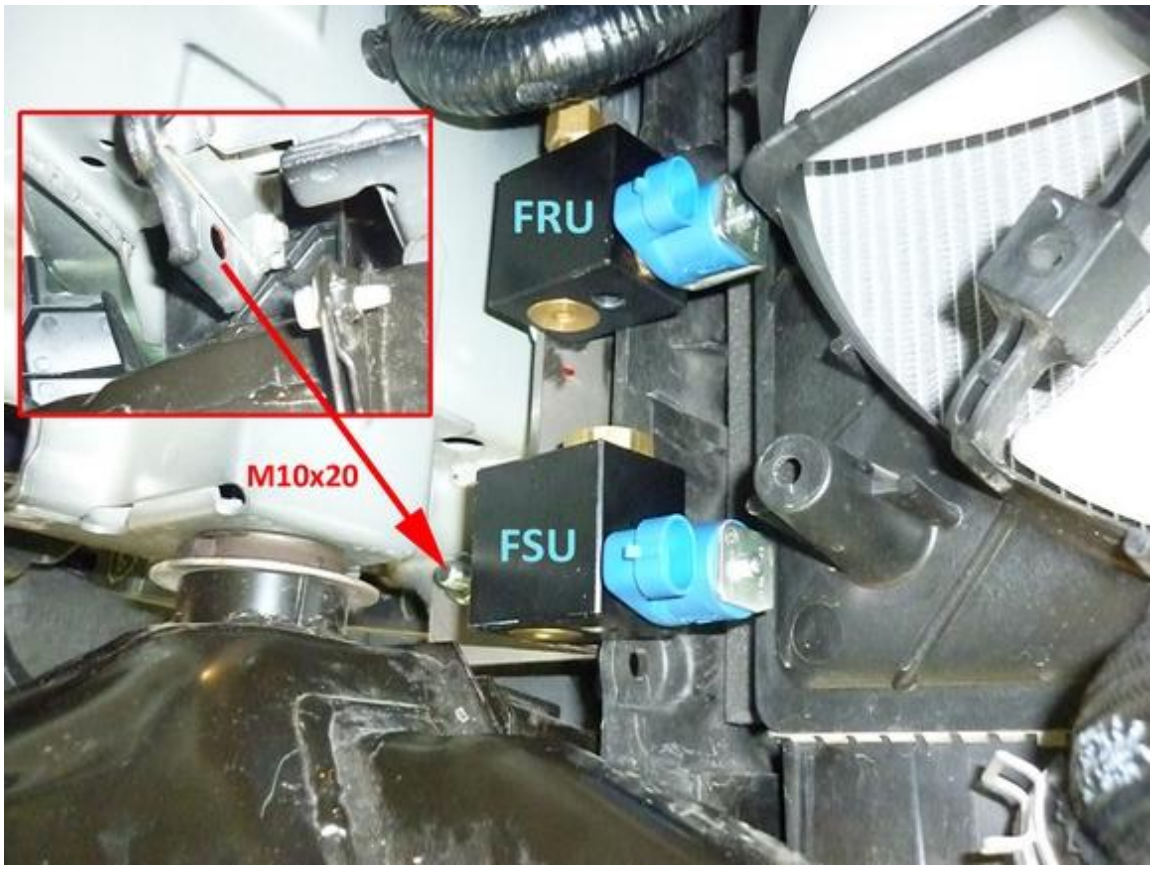


Filter inside sensor banjo

Mounting the Fuel Unit Bracket

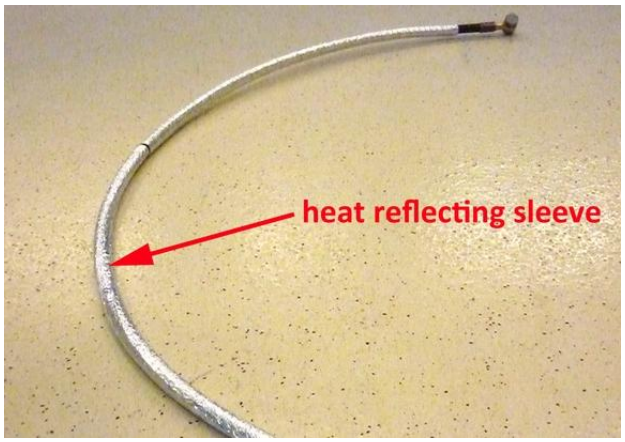
Install the units onto the bracket with four M6x13 bolts and spring washer





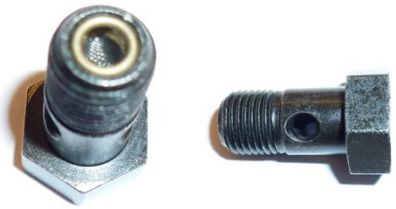
Lpg / petrol fuel lines

Hose	from	to	Length (cm)
XD-4	Adapter original petrol hose	Petrol boost pump	95 with heat sleeve
XD-3	Fuel supply unit	High pressure petrol pump	90 with heat sleeve
XD-3	Petrol boost pump	Fuel supply unit	25
XD-3	Fuel return unit	High pressure petrol pump	110 with heat sleeve
XD-3	Fuel return unit	High pressure petrol rail	60



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) :



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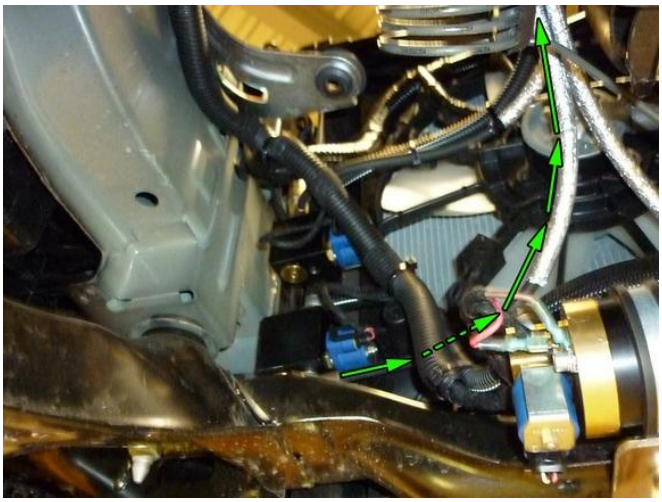
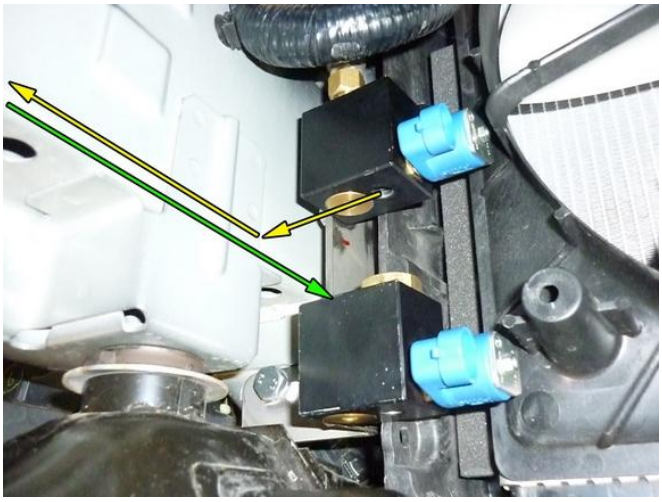
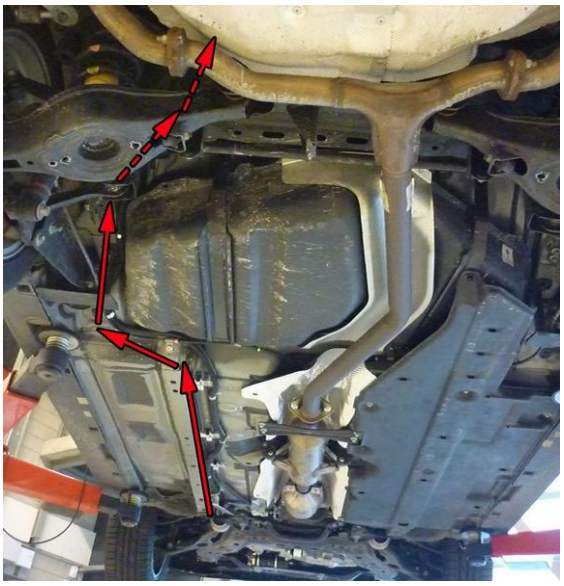
Hose routing

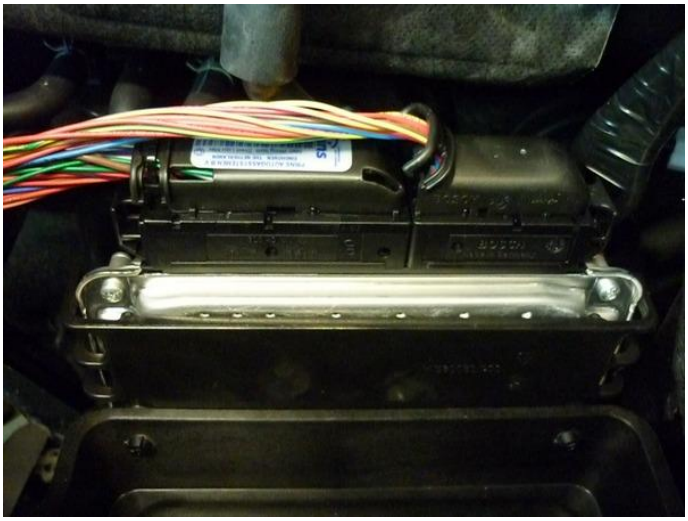




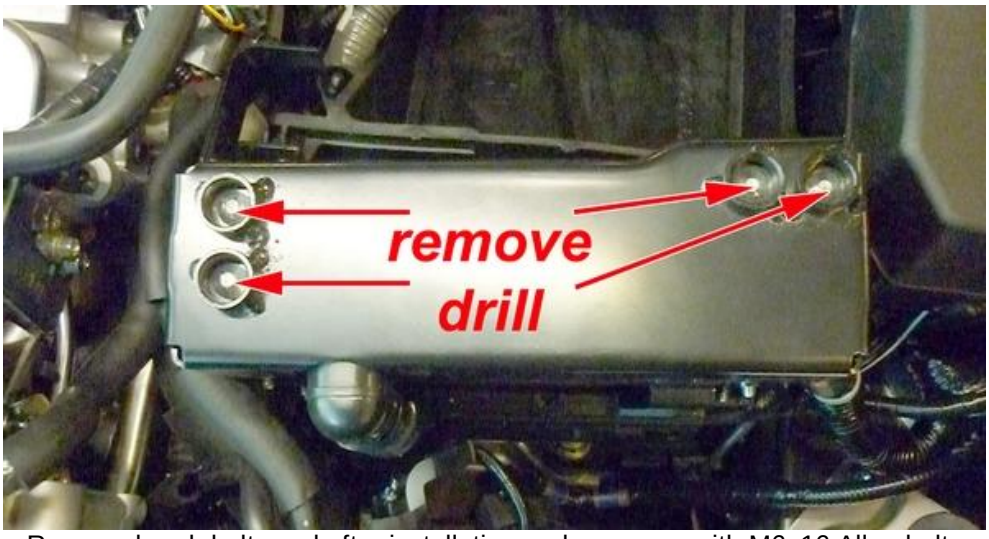


Mounting the AFC

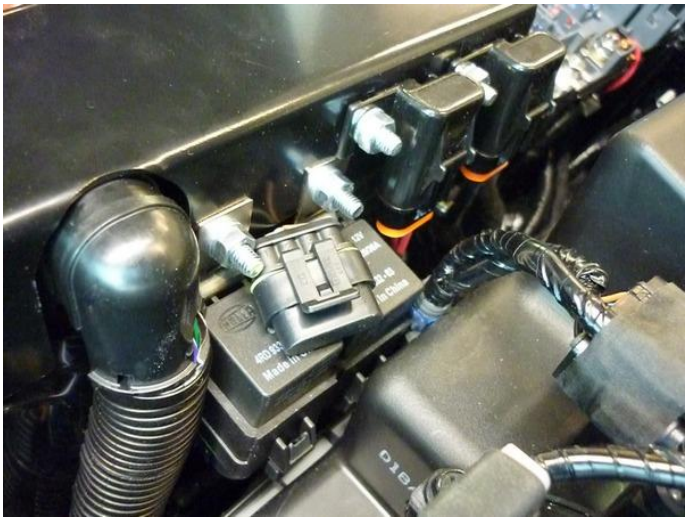
Remove battery and battery plate. Position ecu clip and drill 2 holes of Ø8.5mm.
Secure the clip with the two plastic push-clips.

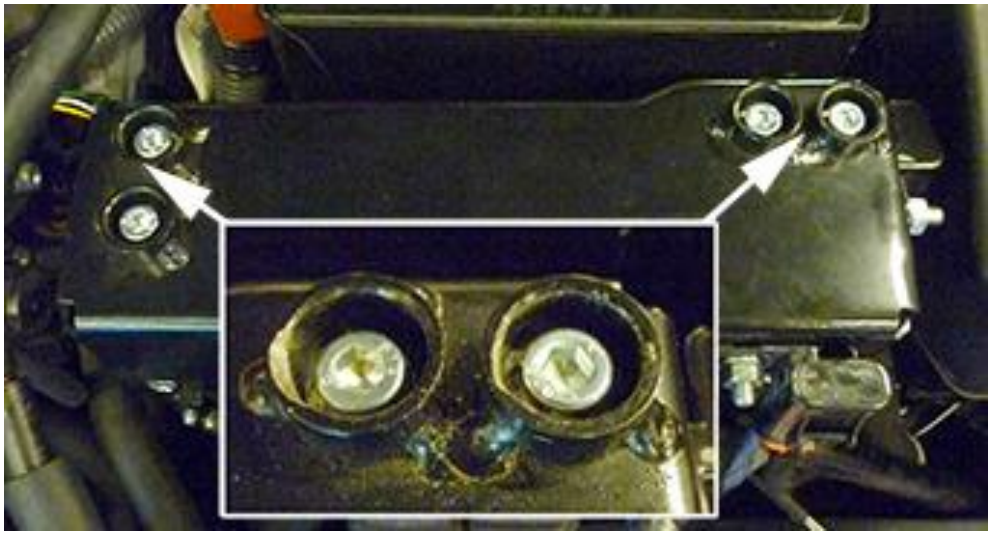


Wiring AFC / relay location



Remove break-bolts and after installation replace cover with M6x16 Allen bolts





Wiring routing

Mounting the fuel selection switch

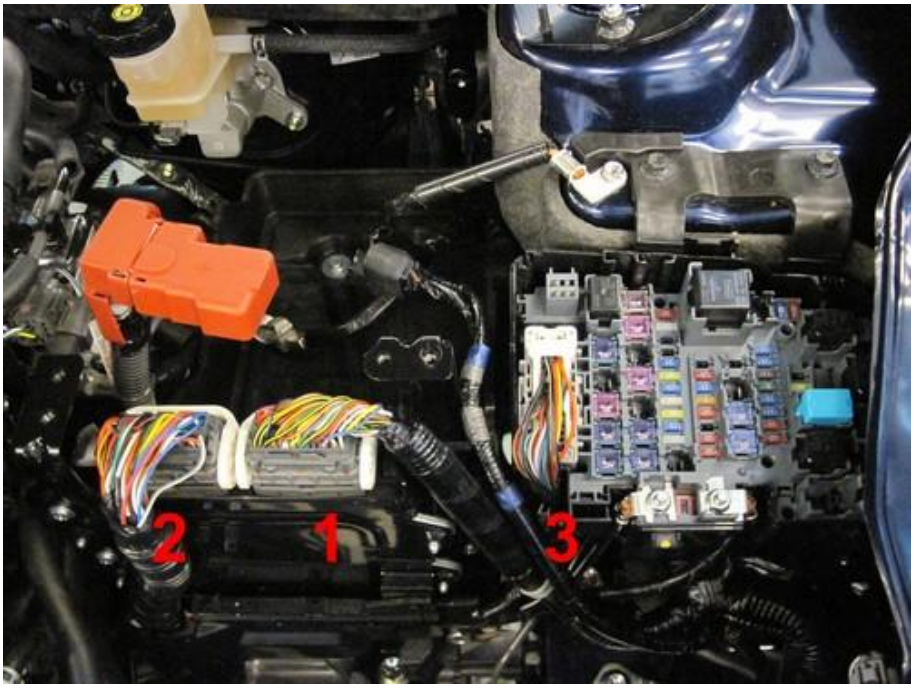
Mount the switch.

Wiring inside : switch wiring / CAN wiring / 120 wake-up switch

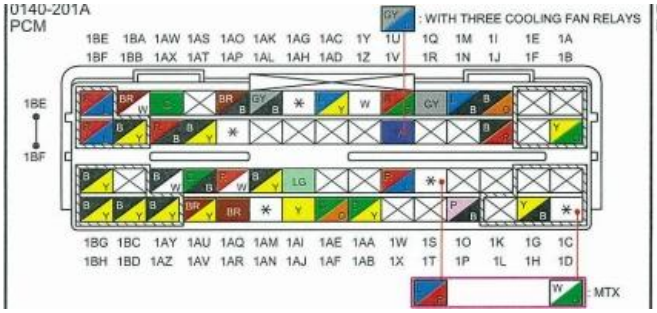
Original grommet

Drill Ø8,2 mm for the switch

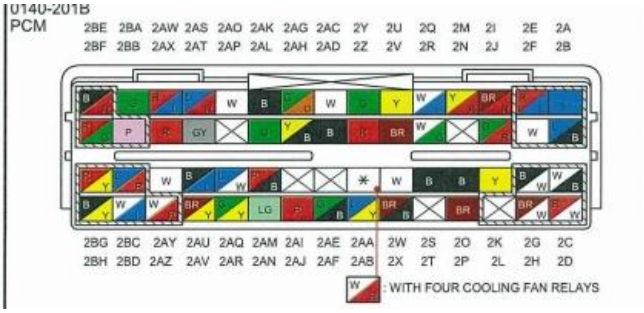
Petrol computer pin out and location



1: Connector 1
2: Connector 2
3: fuse box



Connector 1

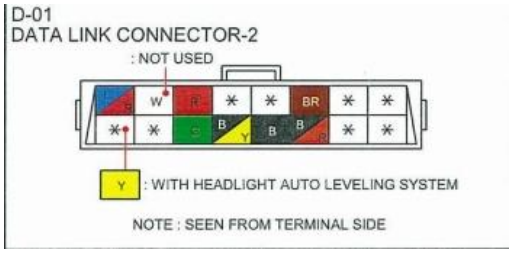
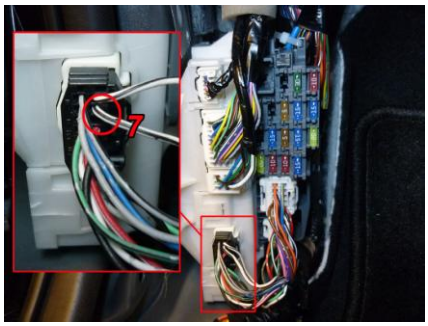


Connector 2

Electrical connections inside

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

Driver room

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 brown (clamp connection, not solder)
70	CAN-Low	Blue	EOBD connector pin 14 black-red (clamp connection, not solder)
			 
121	Wake-up	Red-grey	Wire colour : **white-black** Wire location : **left side fuse box, pin 7** (clamp connection, not solder)   

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 location : original ground point, Left suspension. 
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 
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 : **black-white** Wire location : **ECU Connector 1, pin 1AY**

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 : **White-green** Wire location : **ECU Connector 2, pin 2R**
117 Digital input 3	Yellow-black	*High pressure petrol sensor 5Volt supply* Wire colour : **Yellow** Wire location : **ECU Connector 2, pin 2K**
19 Analog 4	Blue-white	*High pressure petrol sensor ground* Wire colour : **Brown** Wire location : **ECU Connector 2, pin 2P**

17 Analog 2	Blue-black	*Airflow* Wire colour : **grey-black** Wire location : **ECU Connector 1, pin 1AK**

23	Digital Simulation	Green-red	insulate
10	Simulation 2	Green-black	Insulate
115	Digital input 4	Yellow-red	insulate
119	Digital input 2	Yellow-grey	insulate
6	Lambda1 WB	Orange	insulate
42	Lambda2 WB 10KΩ	Orange-white	insulate
97	Digital input 5	Yellow-orange	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.

Wire number / code	Wire colour	Connection
27 +5V sensor 37 C ground 20 Analog 3 MAP* or: * When original sensor is used: cut off connector: Only use blue signal wire 20	Red Brown Blue or: Red:insulate Brown:insulate Blue	For measuring the inlet manifold pressure (MAP). Connect the 3-pole connector to the Prins MAP sensor. Sensor location: or: For measuring the inlet manifold pressure from the engine MAP sensor. Wire colour: **Green-orange** Wire location: **Connector 2, pin 2AG**
8 RPM	Purple-white	For measuring the engine speed signal. Wire colour : **Black** Wire location : **2S**
15 T-ect	Grey	For measuring the engine coolant temperature. Wire colour : **yellow-black** Wire location : **Connector 2, pin 2AH**

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 35 C Ground pin A 9 +5V sensor pin B 16 Psys pin C	 Brown Red Green	Connect the 3-pole connector to the Psys sensor positioned into the Fuel Return Unit. Sensor wire pin A Sensor wire pin B Sensor wire pin C
14 T-LPG	Grey	Not used, insulate.
2-pole connector Boost Pump 106 + Lock-off Boost Pump 98 Ground lock-off	Red White-yellow	Connect the 2-pole connector to the lock-off valve of the Boost Pump.
2-pole connector FSU 108 + Lock-off FSU 100 Ground lock off	Red Pink-yellow	Connect the 2-pole connector to the lock-off valve of the Fuel Supply Unit
2-pole connector FRU 90 + Lock-off FRU 82 Ground lock off	Red Blue-yellow	Connect the 2-pole connector to the lock-off valve of the Fuel Return Unit
4-pole diagnose connector 46 Service TxD 65 Service RxD 68 C ground	 Grey Grey Brown	Diagnose connector for service / diagnosis Connector pin 1 Connector pin 2 Connector pin 4
Boost pump relay 107 + relay boost pump 99 GND relay boost pump +12V fused BATT +12V Boost pump	 Red Green-yellow Red Red	 Pin 86 of the boost pump relay Pin 85 of the boost pump relay Pin 30 of the boost pump relay 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

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.