

Prins

A WESTPORT COMPANY



installation manual Engine Kit part 2/2



MANUFACTURER	Hyundai
TYPE	Tucson (TL)
ENGINE DISPLACEMENT	1591
NUMBER OF VALVES	16
ENGINE CODE / NUMBER	G4FJ 1.6 Turbo-GDI 130kW / G4FD 1.6 GDI 97kW
VEHICLE CATEGORIES	M
TRANSMISSION	G4FJ-AT / G4FD-MT
VERSION	AFC-2.1
PETROL ECU MANUFACTURER / CODE	Bosch MED 17.9.8
HIGH PRESSURE PETROL PUMP	Bosch 261520378 type5
HIGH PRESSURE PETROL INJECTOR	Bosch
MODEL YEAR:	6-2015
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000017 / DLM-LPG 10
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	349/070095/A / 349/070117/A
MANUAL NUMBER	076/0910600
DATE	4-11-2015
	Version 8-12-2014 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 / servicing** 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 the 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 debris has 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 gas 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 see owner's 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 the system (with warranty card) on the Prins warranty portal within 14 days after installation.

Required equipment / tools / materials for installing a complete system

- Complete workshop toolbox (wrenches, screwdrivers, cutters, pliers, ratchet, sockets)
- Car lift
- Portable computer
- 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 (Ø20, 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

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 analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

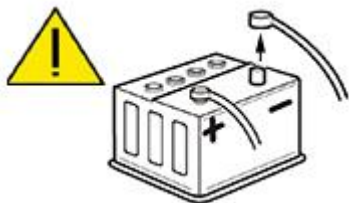
Tightening moments

	Nm	Spanner mm
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
Boost pump clamp	7	10
High pressure petrol fuel line	24-35	17

EXPLANATION OF SYMBOLS :

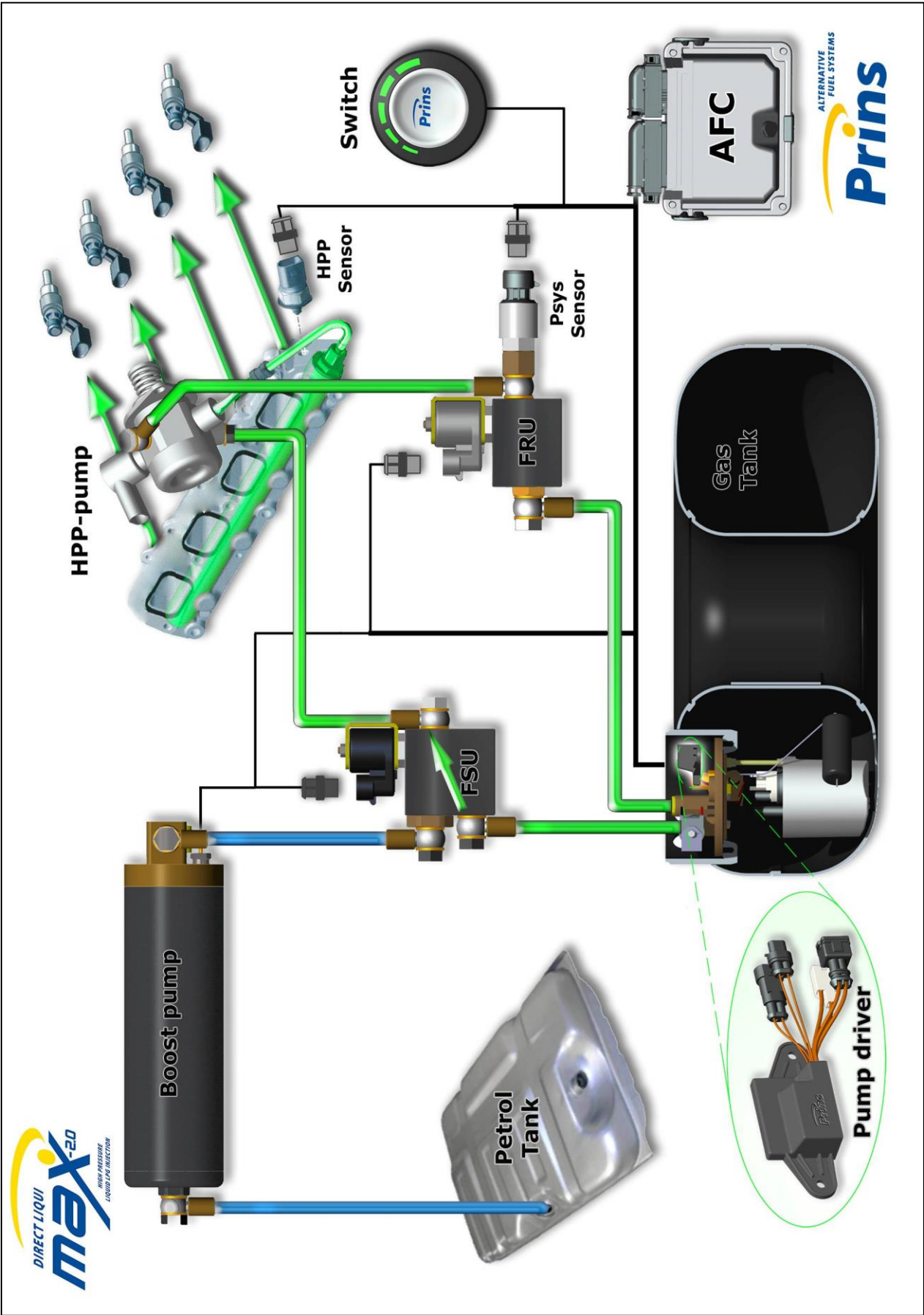


= IMPORTANT, CAUTION

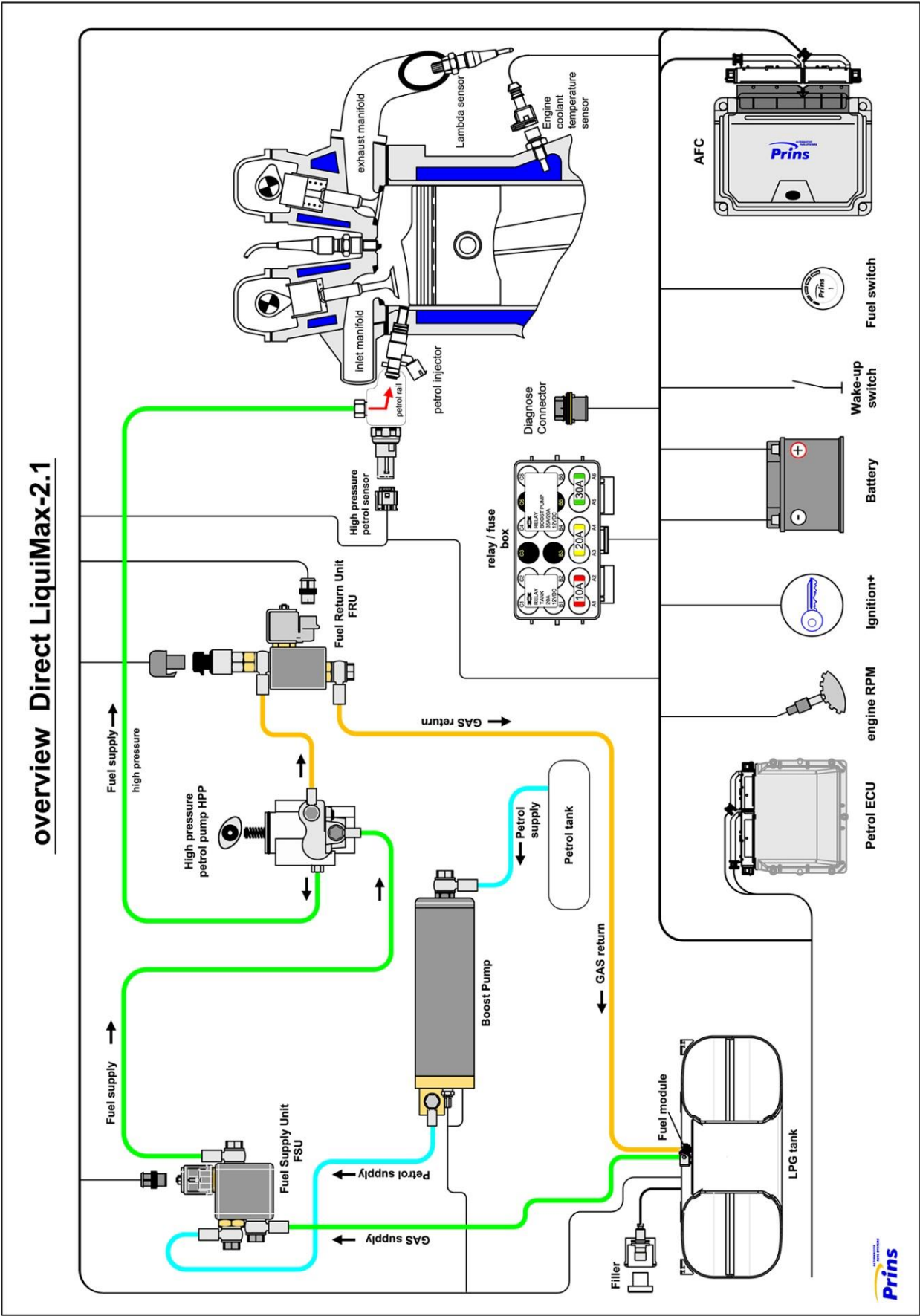


= WEAR SAFETY GOGGLES

Direct LiquiMax-2.0, AFC-2.1



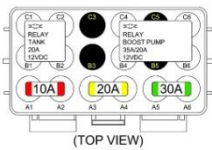
Direct LiquiMax-2.0 diagram, AFC-2.1



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 AFC: E4-67R-010098 E4-10R-030507	Fuel lines series XD : E4-67R-010247 XD3 E4-67R-010247 XD4

DLM component location overview

HPP pump 		Petrol ECU
FSU 		AFC 
FRU 		Fuse / relay box 
Boost pump 		

	R115 approval sticker : Right side centre door post
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Prepare



Remove battery, air filter box.

Removal of the Bosch High Pressure Petrol Pump

REMOVAL-

WARNING-

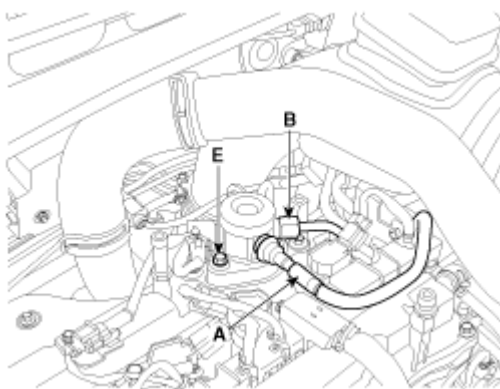
In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, there may be injury caused by leakage of the high pressure fuel.

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.



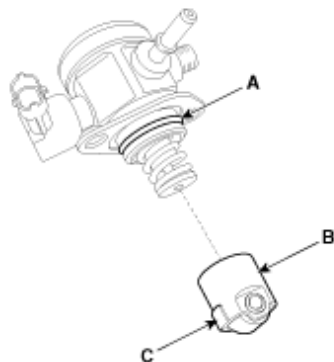
CAREFULLY store the removed petrol pump. Make sure no pollution can come into the pump.

Installation of the Bosch High Pressure Petrol 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 petrol pump installation bolt: 12.8 ~ 14.7 N.m

Petrol 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.

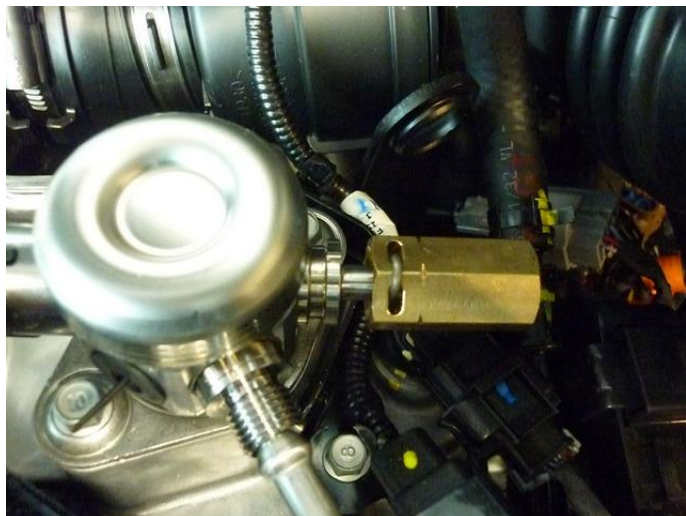
High pressure petrol pipe installation nut: 26.5 ~ 32.4 N.m

Installation is reverse of removal.

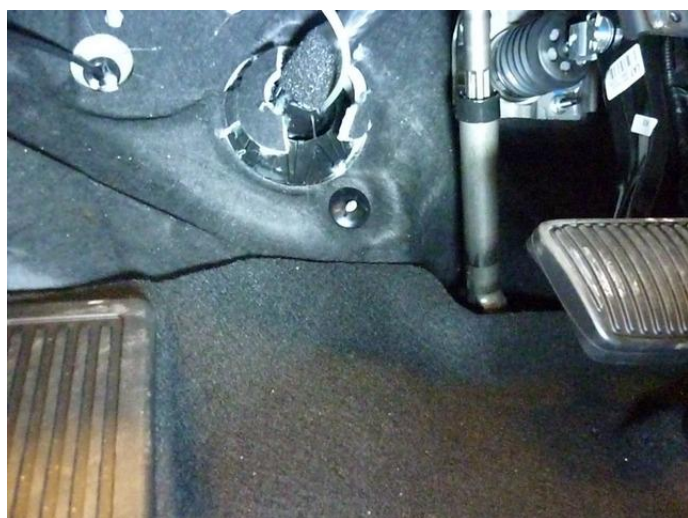
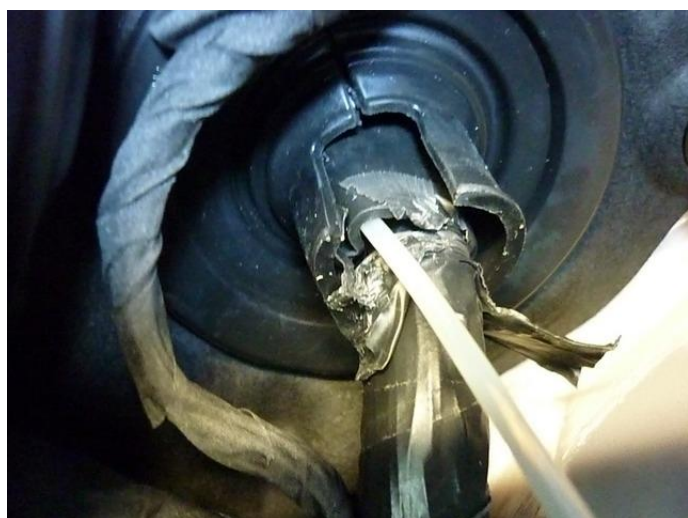
High pressure petrol pump installation



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

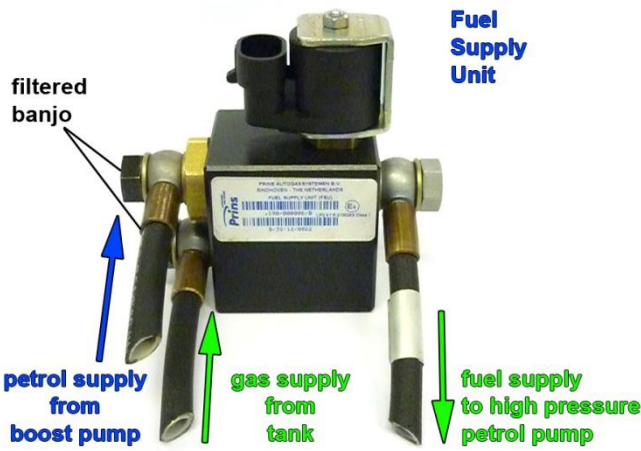


Prepare grommet for wiring

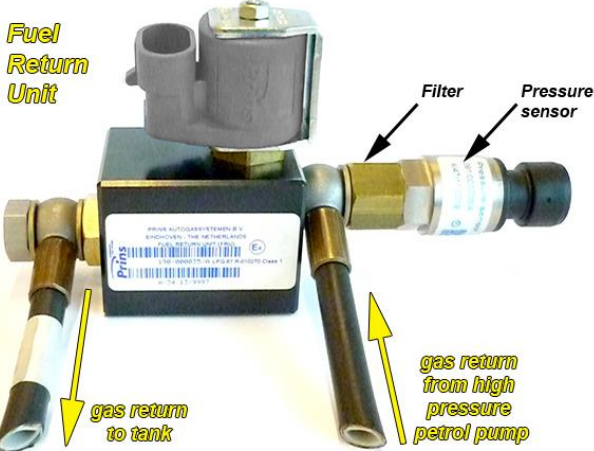


**Wiring inside: Switch + CAN.
Wake-up not used, insulate !**

Fuel Supply Unit / Fuel Return Unit



Black filtered banjo will only be used on inlet connections !



Filter inside sensor banjo

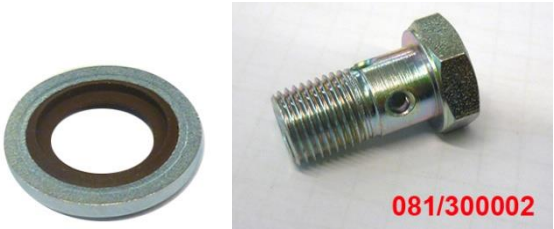


LPG / petrol fuel lines

	Hose	from	to	Length (cm)
1	XD-4 quick Ø8	Adapter original petrol hose	Petrol boost pump	85
2	XD-3	Fuel supply unit	High pressure petrol pump	65
3	XD-3	Petrol boost pump	Fuel supply unit	40
4	XD-3	Fuel return unit	High pressure petrol pump	65



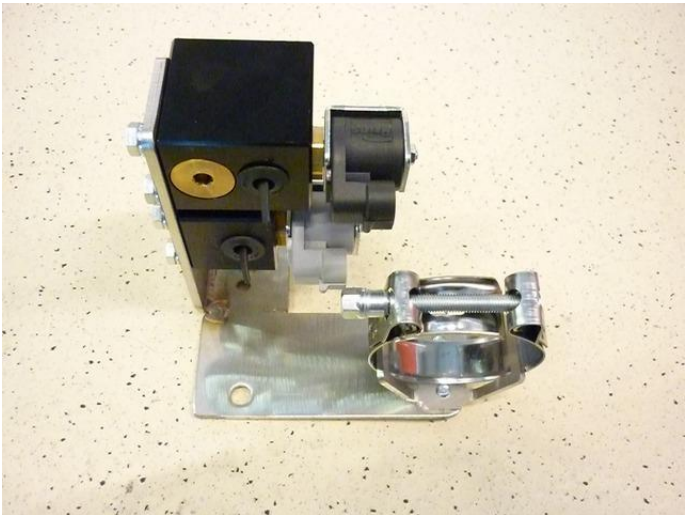
Install the fuel line using two bonded seal washers and banjo bolt :



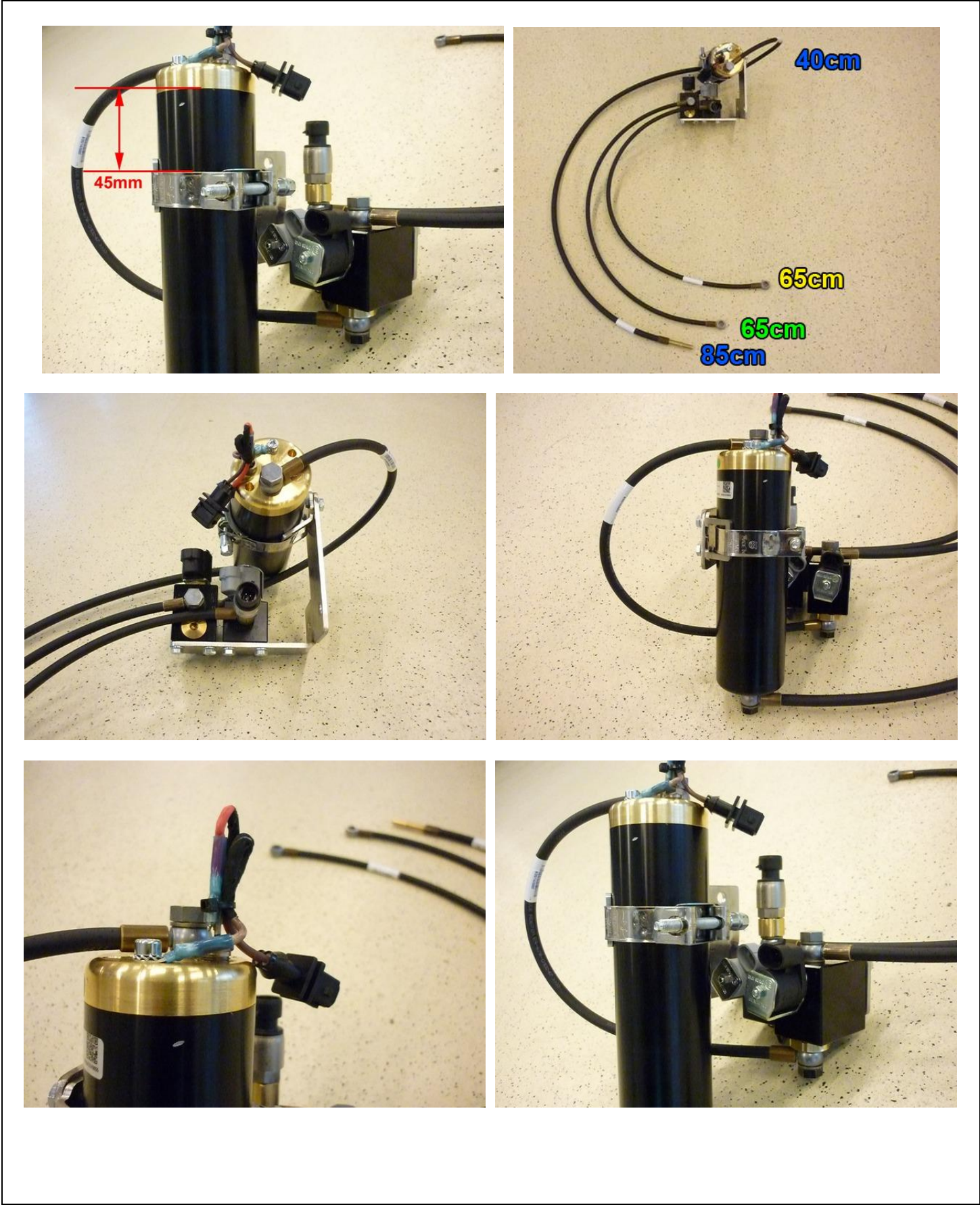
Filtered banjo: (FSU supply inlets / boost pump inlet / HPP pump inlet : black filtered banjo)



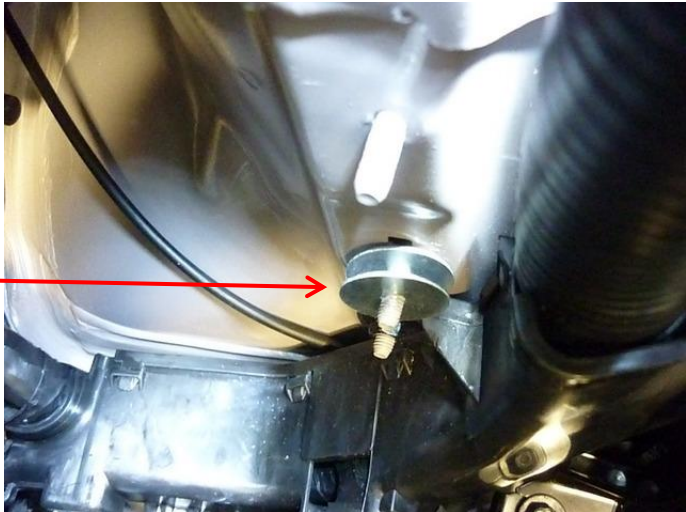
Boost pump assy



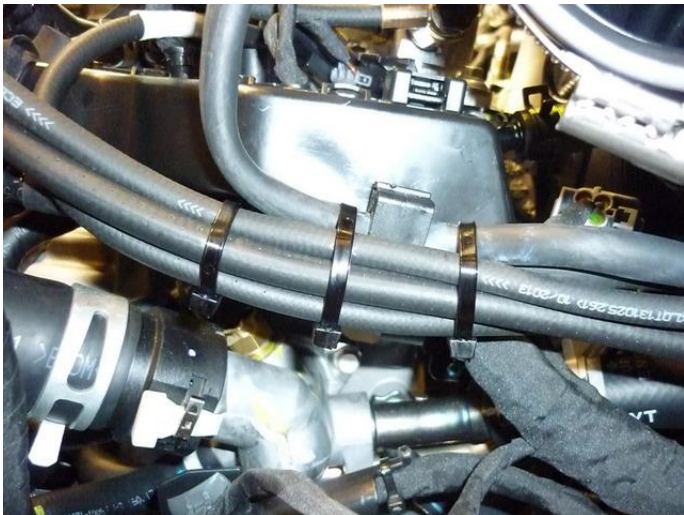
Boost pump assy



Mounting the assembly 1.6t G4FJ



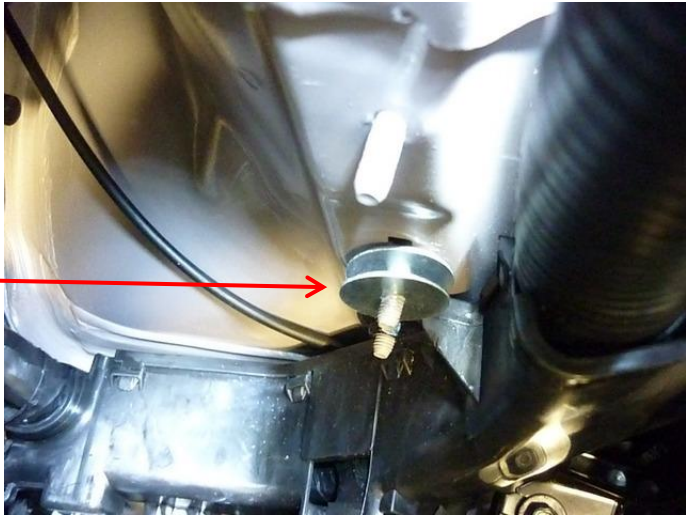
2x washer



Connection of the fuel hoses to fuel pump 1.6t G4FJ



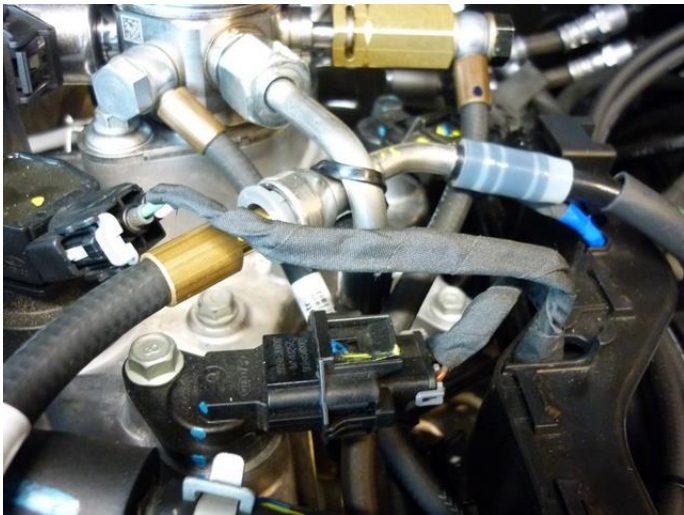
Mounting the assembly 1.6 G4FD



2x washer

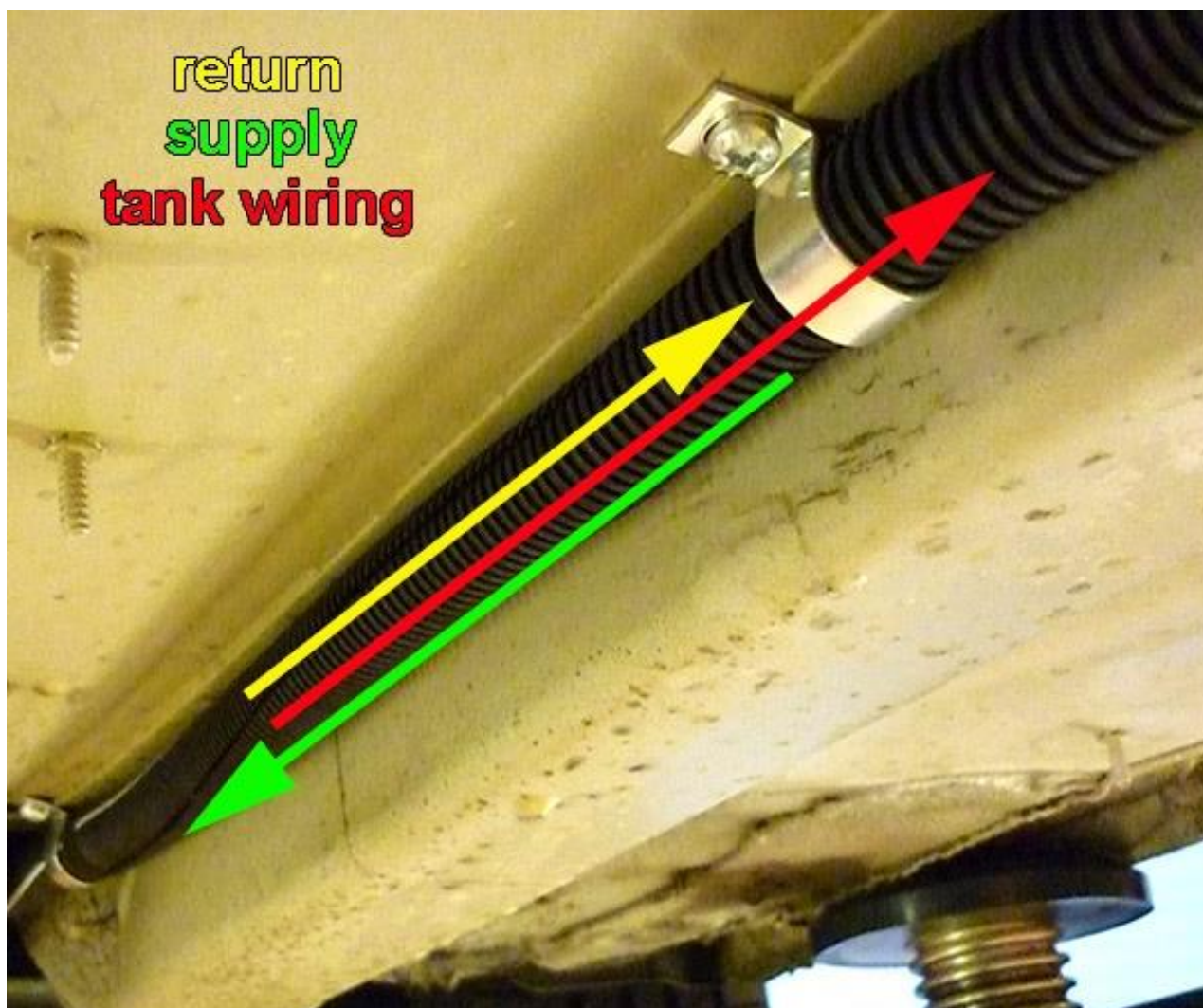


Connection of the fuel hoses to fuel pump 1.6 G4FD



Supply hose – Return hose – Tank wiring

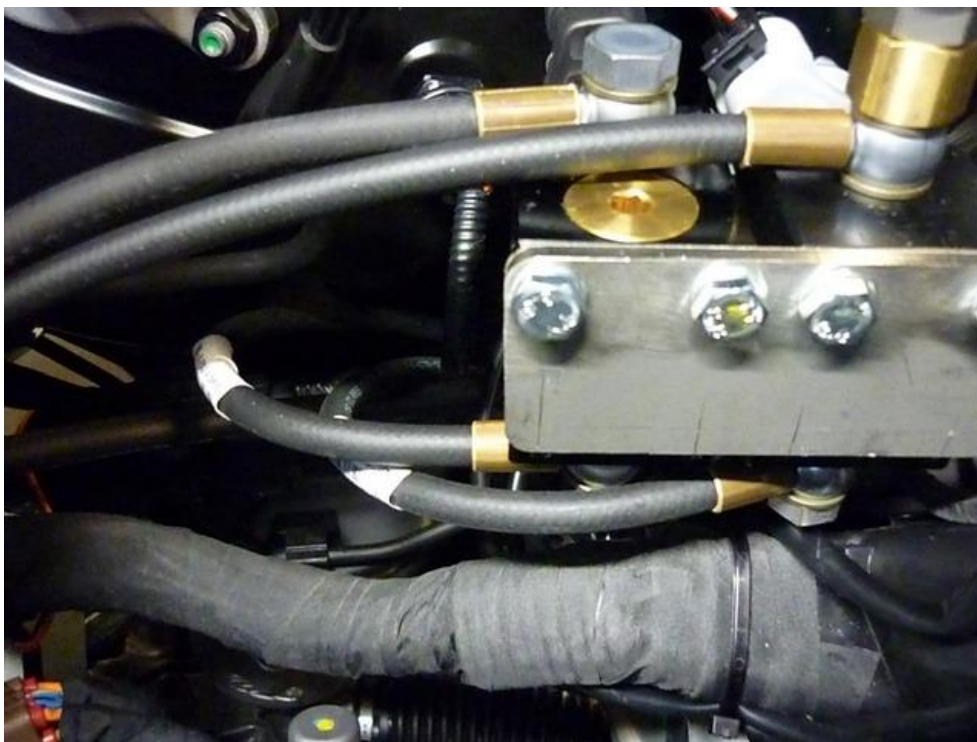
Protect the supply- and return hose together with tank-wiring using the Ø16 split tube. Mount the “hose assembly “ with clamps, with a maximum distance of 40cm.



Demo photo

Hose routing

See tank fitting instruction.



Mounting the AFC-2.1



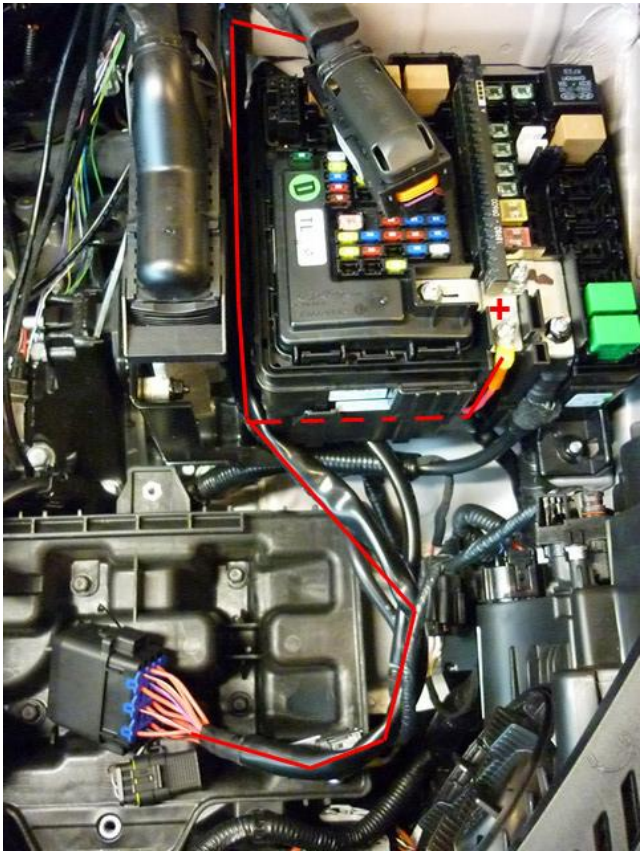
Mounting the AFC-2.1



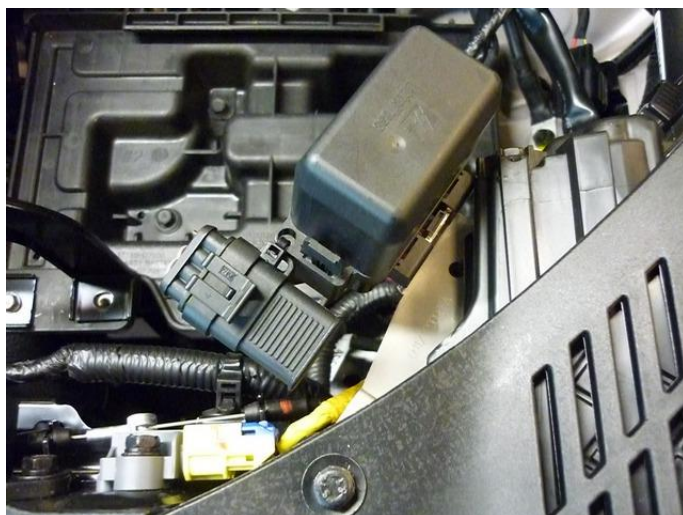
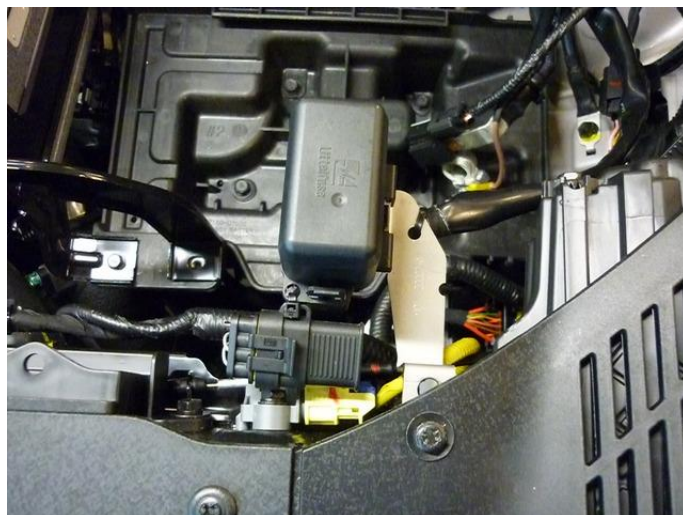
Wiring Assembly / Switch, CAN, wake-up wire40

Wire 40, wake-up = not used on this car, insulate.

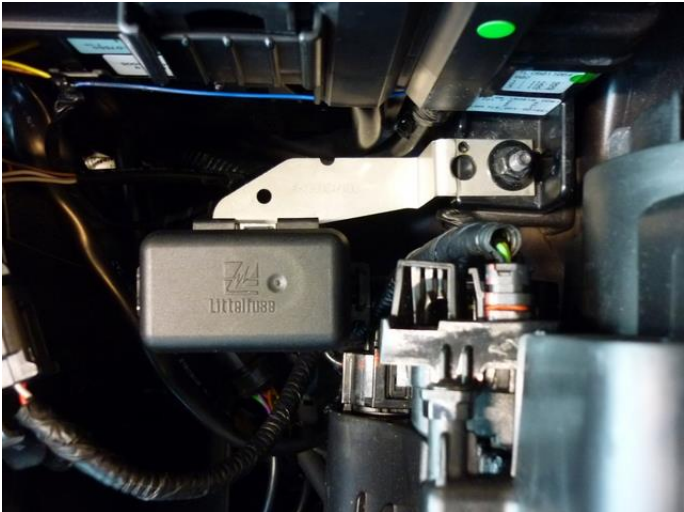
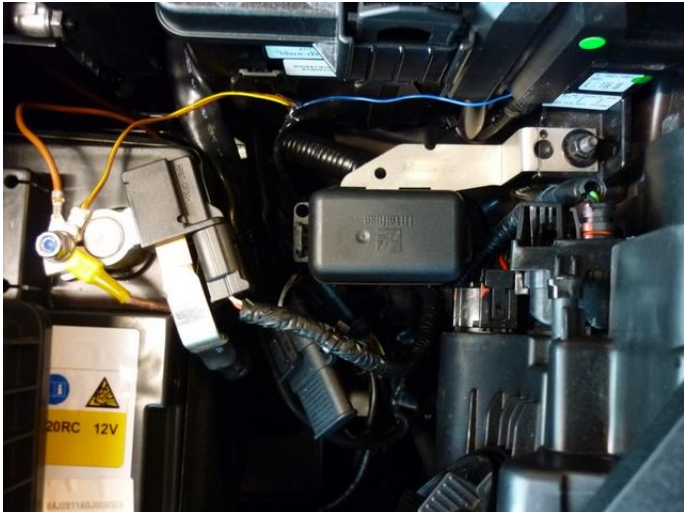
Wiring routing 12V / ground



Mounting the fuse / relay box 1.6t G4FJ



Mounting the fuse / relay box 1.6 G4FD





Mount the switch, drill Ø8,3mm.

Mounting the fuel selection switch



or



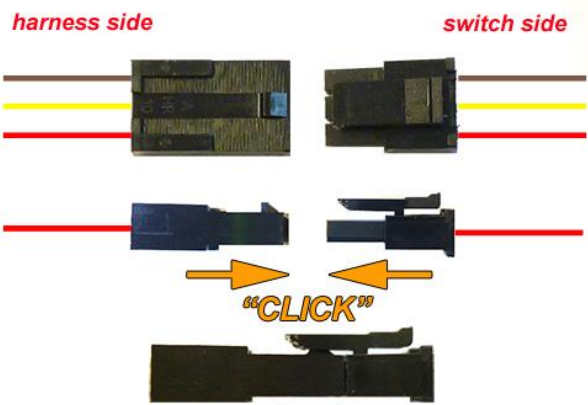
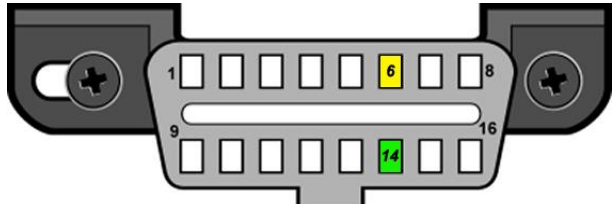
MT:



Electrical connections

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

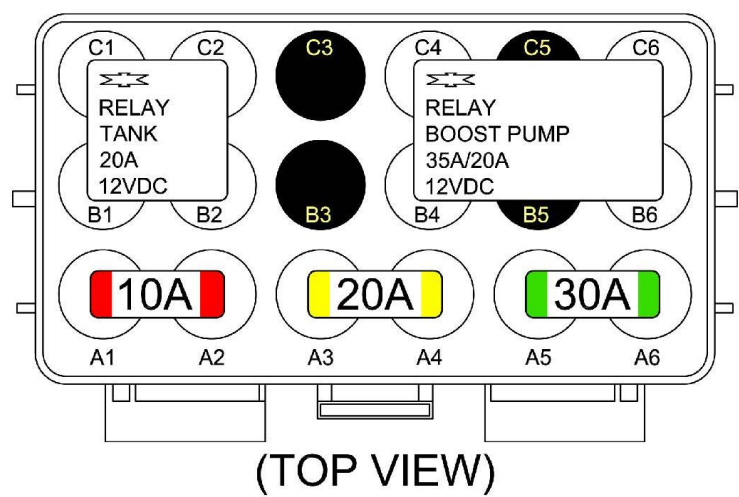
Driver room

Wire number / code		Wire colour	Connection
3-pole micro connector			
66	Ground fuel switch	Brown-black	Connect the 3-pole connector to the Prins fuel selection switch.
3	+12V fuel switch	Red-white	
49	LIN fuel switch	Yellow	
			
51	CAN-High	Yellow	EOBD connector pin 6 green
70	CAN-Low	Green	EOBD connector pin 14 orange
			

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	Brown	Connect to the '-' of the battery (-31) ; use a ring terminal. Battery ground terminal
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. Do not place the fuses before having completed the installation of the lpg system. Wire location : Fuse box.

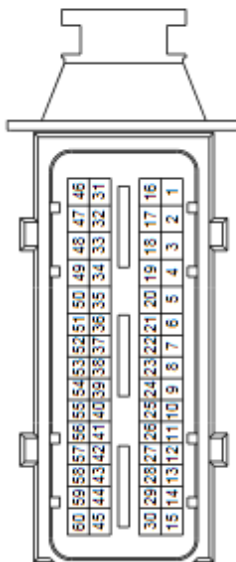


Electrical connections

SD313-35

Engine Control System (G4FJ : GAMMA 1.6L T-GDI) (1)

ECM Terminal Information

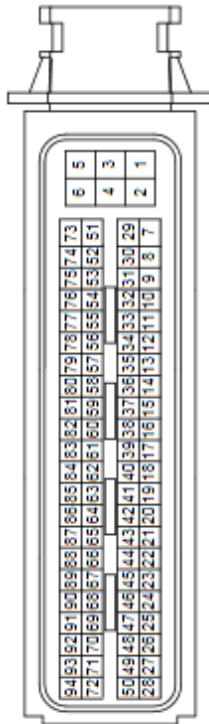


C500-A

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	W	Injector #3 Control (+)	31	W	Ignition Coil #3 Control
2	G	Injector #4 Control (+)	32	R	Ignition Coil #1 Control
3	R	Injector #2 Control (-)	33	R	Injector #1 Control (-)
4	Br	EWGA Motor (+)	34	L	FPCV (+)
5	L	Oxygen Sensor (Up) Heater	35	O	ETC Motor (-)
6	-	-	36	-	-
7	-	-	37	W	Knock Sensor Signal
8	-	-	38	G	Knock Sensor Ground
9	B	EWGA Sensor Ground	39	-	-
10	-	-	40	G/B	Brake Light Switch
11	-	-	41	-	-
12	-	-	42	-	-
13	-	-	43	-	-
14	B	Cooling Fan (High) Relay Control	44	-	-
15	L	Oil Control Valve Exhaust	45	L	Oil Control Valve Intake
16	L	Injector #2 Control (+)	46	W	Ignition Coil #4 Control
17	W	Injector #1 Control (+)	47	R	Ignition Coil #2 Control
18	L	Injector #3 Control (-)	48	L	Injector #4 Control (-)
19	G	EWGA Motor (-)	49	W	FPCV (-)
20	P	Oxygen Sensor (DOWN) Heater	50	R	ETC Motor (+)
21	-	-	51	-	-
22	-	-	52	L	EWGA Sensor Signal
23	W	ECTS Signal	53	L/B	Brake Test Switch
24	B	ECTS Ground	54	-	-
25	-	-	55	W	Clutch Switch
26	-	-	56	P/B	Defroster (Active High)
27	G	FIPump Relay Control (W/O IMMO. & W/O Smart Key)	57	L	Alternator (COM)
28	-	-	58	W	Engine RPM Output
29	-	-	59	B	Cooling Fan (Low) Relay Control
30	-	-	60	-	-

C500-K

PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION	PIN	COLOR	DESCRIPTION
1	B	Ground	33	-	-	65	G/B	CMPS (Exhaust) Signal
2	B	Ground	34	-	-	66	-	-
3	B	Ground	35	Br	TPS Ground	67	O	CKPS Ground
4	R	Engine Control Relay 'ON' Input	36	B/O	TPS 2 Signal	68	-	-
5	P	Memory Power	37	-	-	69	-	-
6	P	Memory Power	38	Br	Vacuum Sensor Signal	70	B	RCV Control
7	R	Engine Control Relay 'ON' Input	39	Br	TPS Supply	71	-	-
8	P	Oxygen Sensor (DOWN) Ground	40	B/B	APS 1 Supply	72	B/O	PCSV Control
9	B/O	APS 1 Signal	41	Gr	MAP Supply	73	-	-
10	Y/O	APS 2 Ground	42	Br	5V Supply	74	Gr	Oxygen Sensor (UP) Nemst
11	-	-	43	-	-	75	R	Oxygen Sensor (UP) Trim
12	-	-	44	-	-	76	L	RPS Ground
13	B	Vacuum Sensor Ground	45	G	APT Signal	77	G	APT Ground
14	Gr	TPS 1 Signal	46	P	Vehicle Speed Input	78	B	MAP Sensor Ground
15	-	-	47	Gr	Start Relay (High) Control	79	Br	IAT Signal
16	-	-	48	-	-	80	Gr	MAP Sensor Signal
17	B/O	Fuel Tank Level Sender	49	-	-	81	-	-
18	G	APS 2 Supply	50	-	-	82	-	-
19	R	CKPS/EWGA/Vacuum 5V	51	-	-	83	L	IMMO. Data Line
20	W	APT/RPS/BPS Supply	52	P	Oxygen Sensor (UP) Mutual Ground	84	W	CCP-CAN (High)
21	L	ISG Switch	53	G	Oxygen Sensor (UP) Pumping Current	85	G	C-CAN (High)
22	-	-	54	-	-	86	L/O	CMPS (Intake) Ground
23	Y	Neutral Switch	55	G/O	BPS Sensor Signal	87	B/O	CMPS (Intake) Signal
24	W	Alternator (PWM)	56	-	-	88	-	-
25	-	-	57	Br	BPS Sensor Ground	89	L	CKPS Signal
26	-	-	58	O	RPS Signal	90	G	FIPump Relay Control (With IMMO. or Smart Key)
27	O	ISG IND.	59	-	-	-	-	-
28	-	-	60	R, R/B, P	Starting Signal	91	-	-
29	B/O	ON/START Input	61	W	LIN Communication Bus	92	-	-
30	Gr	Oxygen Sensor (DOWN) Signal	62	Br	CCP-CAN (Low)	93	W	Engine Control Relay Control
31	L	APS 2 Signal	63	O	C-CAN (Low)	94	O	Start Relay (Low) Control
32	G/B	APS 1 Ground	64	Br	CMPS (Exhaust) Ground	-	-	-



Electrical connections

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

Pin-outs are leading in case of wire colour change

Wire number / code	Wire colour	Connection
36 & 25 RPS Signal		High pressure petrol sensor signal interruption Wire colour : Green Wire location : Petrol ecu C500-K pin 58
36 AD6	Blue-brown	Sensor side High pressure petrol sensor
25 DAC1	Green-white	Petrol ecu side High pressure petrol sensor
18 AD1 MAP Signal	Blue-white	Wire colour : Green-white or grey Wire location : Petrol ecu C500-K pin 80
8 RPM CMPS	Purple-white	For measuring the engine speed signal. Wire colour : White or grey-black Wire location : petrol ecu C500-K pin 65
7 + IGNITION On/Start	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 : Orange-black Wire location : petrol ecu C500-K pin 29
63 Ground Shift RPS Ground	Blue-orange	High pressure petrol sensor ground Wire colour : Blue Wire location : Petrol ecu C500-K pin 76
61 DI4 RPS Supply	Yellow-blue	High pressure petrol sensor 5Volt Wire colour : White Wire location : Petrol ecu C500-K pin 20
40 Wake-up	Grey-red	High pressure petrol sensor 5Volt supply / car wake-up Wire location : <u>insulate, not used, engine side and driver room side</u>
15 & 10 ECTS		For measuring / interruption the engine coolant temperature signal. Wire colour : Yellow Wire location : Petrol ecu C500-A pin 23 (Small connector)
15 T-ect	Grey	Sensor side T-ect sensor
10 DAC 2	Green	Petrol ecu side T-ect sensor

Electrical connections

Check and measure the wiring in case of changes in the cars wiring colours.

Insulate not used wires, in case of universal wiring loom

Wire number / code		Wire colour	Connection
22	LSS 1	Purple-white	
23	LSS 2	Purple-green	
42	Digital out pull up 2	Red-purple	
58	+12V switched	Red-white	
60	DI 3	Yellow-pink	
61	DI 4	Yellow-blue	
20	AD 3	Blue-pink	
19	AD 4	Blue	
21	AD 9	Blue-purple	
74	DAC 3	Green-pink	
40	Wake-up	Grey-red	Engine side and driver room side : insulate

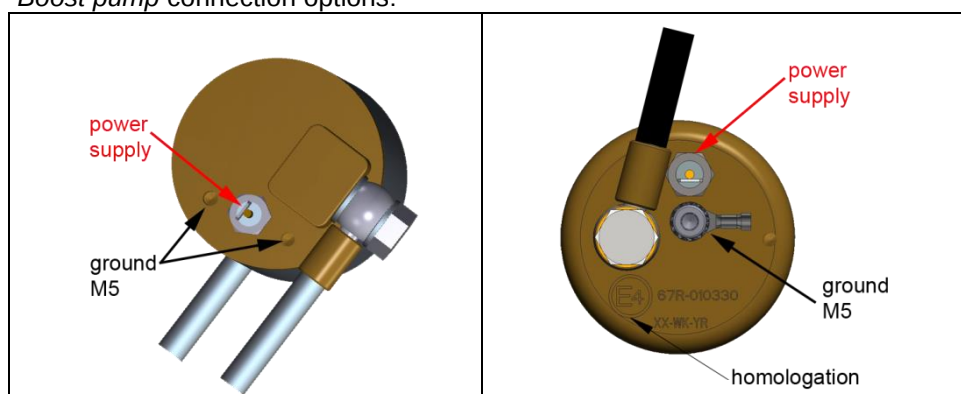
Electrical connections

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>		
35 Ground Psys pin A 9 +5V sensor pin B 16 Psys pin C	Brown Red-blue 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
<i>2-pole connector FSU, black</i>		
24 + Lock-off FSU 31 C Ground	Yellow-green Brown-black	Connect the 2-pole connector to the lock-off valve of the Fuel Supply Unit
<i>2-pole connector FRU, grey</i>		
43 + Lock-off FRU 34 C Ground	Red-white Brown-black	Connect the 2-pole connector to the lock-off valve of the Fuel Return Unit
<i>4-pole diagnose connector</i>		
46 Service TxD 65 Service RxD 68 C Ground	Grey Grey Brown-black	Diagnose connector for service / diagnosis Connector pin 1 Connector pin 2 Connector pin 4
<i>Boost pump relay</i>		
2 + relay boost pump 26 Ground BP relay +12V fused BATT +12V Boost pump	Red-white Purple-blue Red 2.5mm2 Red 2.5mm2	Pin 86 of the boost pump relay C4 Pin 85 of the boost pump relay B6 Pin 30 of the boost pump relay C6-A5 Pin 87 of the boost pump relay B4
<i>Wiring tank pump driver relay</i>		
57 + driver relay 73 LSS 4 tank relay +12V BATT fused +12V driver	Red-white Purple-blue Red 2.5mm2 Red 2.5mm2	Pin 86 of the driver relay C1 Pin 85 of the driver relay B2 Pin 30 of the driver relay C2-A4 Pin 87 of the driver relay B1

Boost pump connection options:

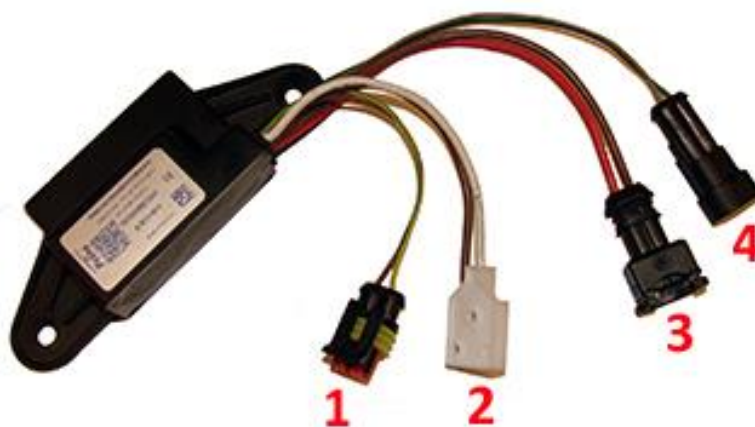


Electrical connections

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



Prins safety stickers



LPG TANK



Checklist after installation

1. Install the system fuses.
Turn on ignition.
Connect the Prins Diagnostic Tool and run the Prins diagnostic 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 gas leak detector device or a fluid detection like soap. Also check for petrol leakage.
Check all made connections and XD-hose crimps for petrol / LPG 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.