ALTERNATIVE FUEL SYSTEMS

Prins

installation manual Engine Kit part 2/2

MANUFACTURER		Ford
TYPE		* Fiesta VII JA8
ENGINE DISPLACEMENT		999
ENGINE CODE / NUMBER - OUTPUT		M1JE - 92 kW
TYPE		**** + ***** Transit Courier**
ENGINE DISPLACEMENT		**999**
ENGINE CODE / NUMBER - OUTPUT		****SFCA-D - 74 kW / **SFJA-D – 74kW / *SFCF - 100kW**
TYPE		*** B-Max (JK8)
ENGINE DISPLACEMENT		999
ENGINE CODE / NUMBER - OUTPUT		***SFJA / SFJB / SFJC / SFJD - 74kW
TYPE		**** Fiesta**
ENGINE DISPLACEMENT		**999**
ENGINE CODE / NUMBER - OUTPUT		****SFJA / SFJB / SFJC / SFJD - 74kW**
VEHICLE CATEGORIES		M
TRANSMISSION		MT / AT
AFC VERSION		**AFC-2.1**
PETROL ECU MANUFACTURER / CODE		Bosch FoMoCo xxxx-12A650-xx / xxxx-12B684-xxx
HIGH PRESSURE PETROL PUMP		Bosch 0261520094 / 0261520095 / 0261520671
HIGH PRESSURE PETROL INJECTOR		FoMoCo Bosch Motronic 0261S09317
MODEL YEAR:		2013-
SYSTEM APPROVAL NUMBER (R115)	***(not all engine codes!)***	E4-115R-000009 / DLM-LPG 02
LOCATION R115 SYSTEM STICKER		right side, centre door post
ENGINE SET NUMBER		* 347/070110001/A // ** 347/070310001/A // ***347/070310021/A**
ENGINE SET NUMBER		*** 347/070510001/A // ****347/070110011/A**
MANUAL NUMBER		076/0706500
DATE		4-9-2018
		Version 1-1-2016 D

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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 Gen3 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.
- When working on the car, beware of moving and rotating parts in the engine compartment (even when the engine is not running !!).
- 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 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 debris has been removed (especially when mounting an 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

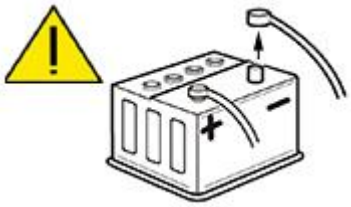
- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

Tightening moments

	Nm	Spanner mm
M 5 x 0,8	6.5	8
M 6 x 1,0	11.3	10
M 8 x 1,25	27.3	13
M 10 x 1,5	54	15-16-17
Banjo bolt	10	14
Supply line connection tank	15	13
Fuel module Allen bolts tank	20	7
Filler hose connection tank	50	22
Boost pump M6 mounting bolts	10	10
FMU M6 mounting bolts	10	10
High pressure petrol fuel line	24-35	17
Quick release	20	19

EXPLANATION OF SYMBOLS :

= IMPORTANT, CAUTION

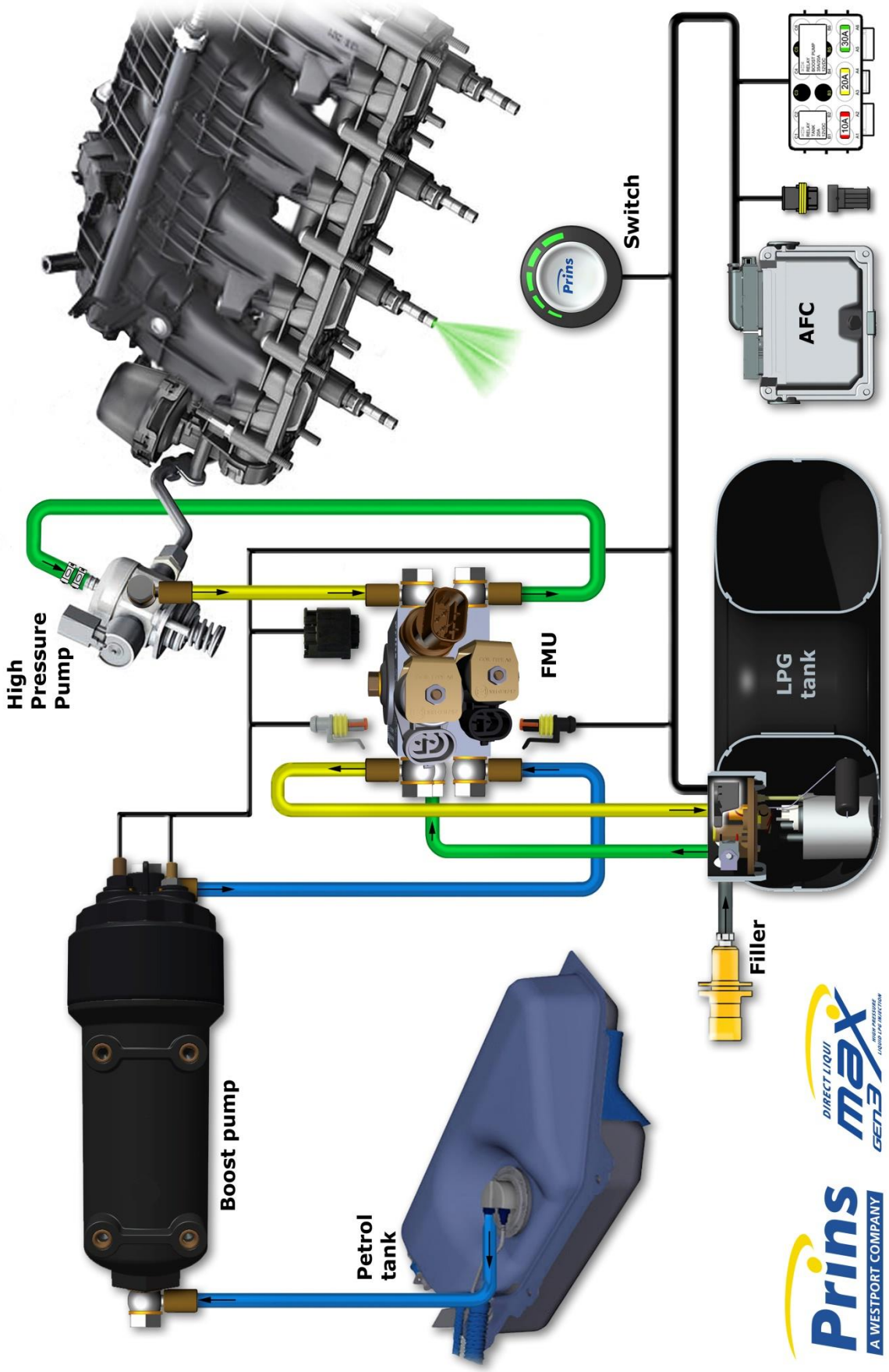


= WEAR SAFETY GOGGLES

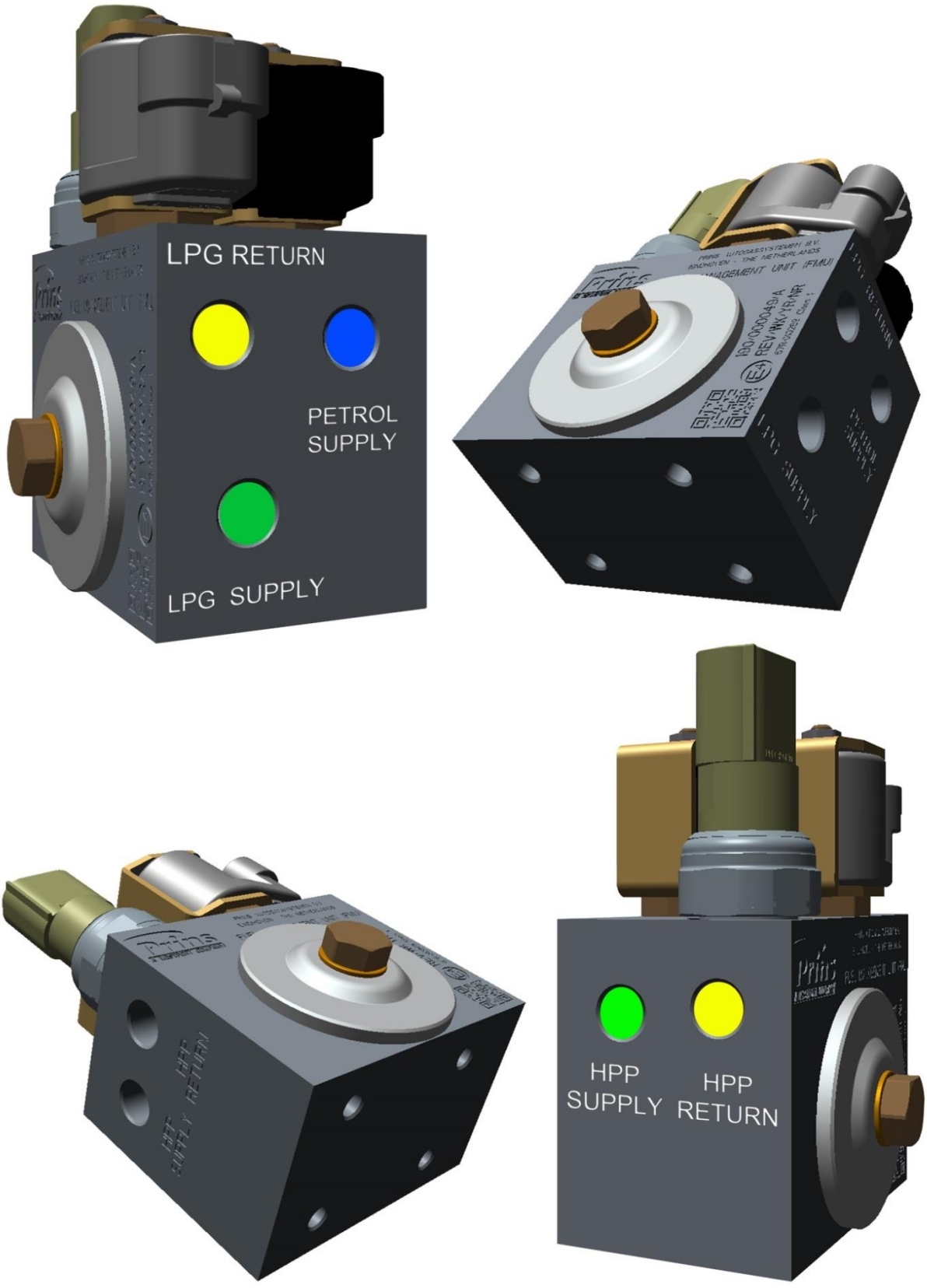
Direct LiquiMax parts / approval numbers

	
Fuel Management Unit : E4-67R-010269	Boost pump
	
Prins AFC: E4-67R-010098 E4-10R-030507	High Pressure Pump : E4-67R-010266 High Pressure Rail : E4-67R-010267 High Pressure Injectors : E4-67R-010309
	
	Fuel lines XD-series : E4-67R-010247

Overview DLM Direct Injection



Fuel Management Unit connections



Fuel Management Unit

Boost pump

DLM component location overview

HPP pump

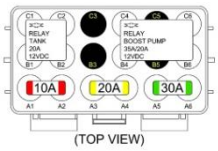
Petrol ECU

FMU

AFC

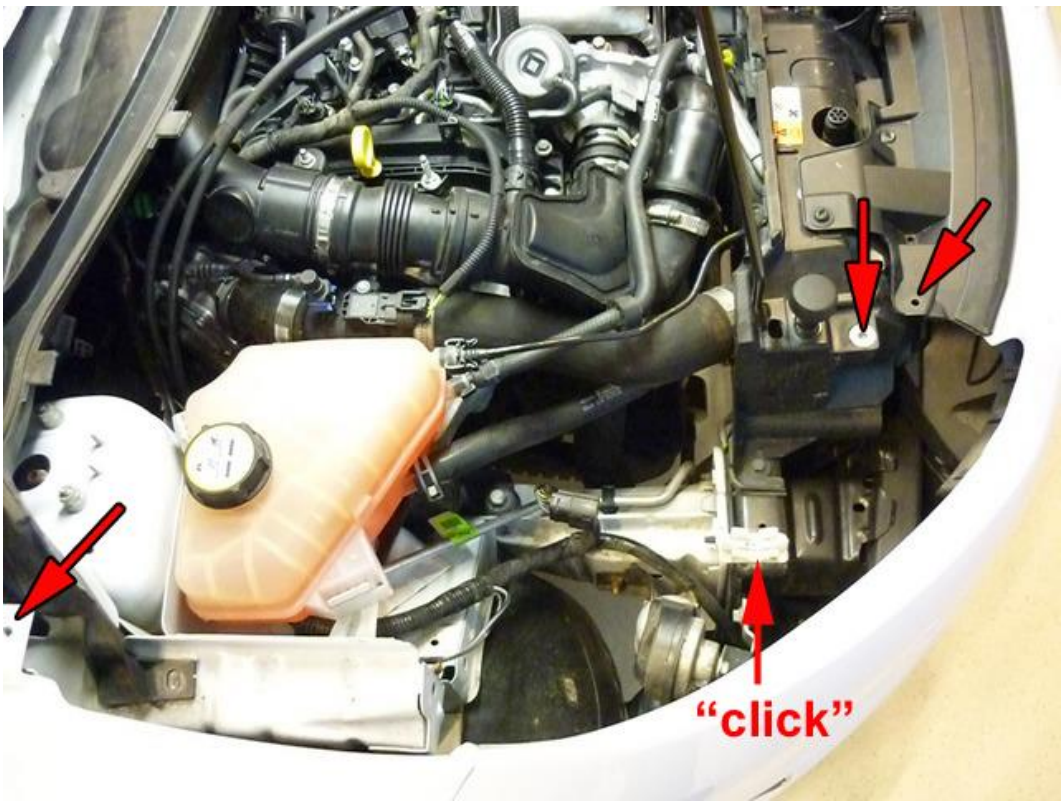
Boost pump

Fuse / relay box



i.a.R115 approval sticker :
Right side centre door post

Prepare



Remove head lights

Remove wipers, cowl panel and fire wall panel (4 screws)

Prepare

Removed fire wall panel

Removed air filter box and inlet pipe (turbo -> air box)

Remove battery






Removal of the Bosch High Pressure Petrol Pump

-REMOVAL-

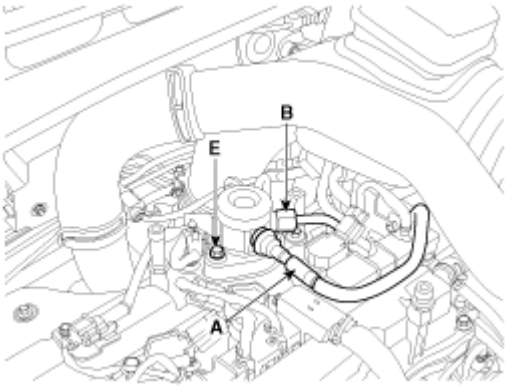
-WARNING-

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.
- Ware 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.



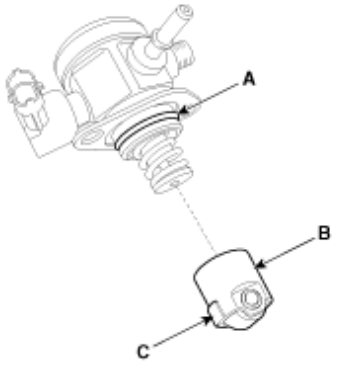
CAREFULLY store the removed petrol pump. Make sure no pollution can come into the pump.

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.



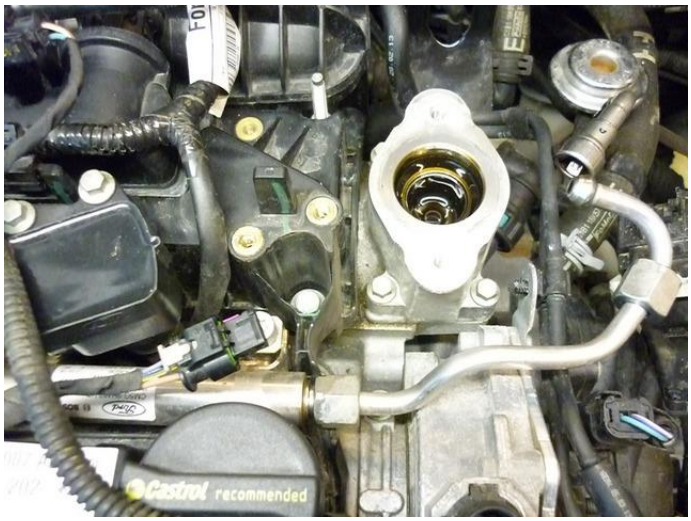
Installation bolts:
When tightening the installation bolts of the high pressure fuel pump, tighten and turn the bolts in small step (0.5 turns) after tightening them with hand-screwed torque.
High pressure petrol pump installation bolt: 12.8 ~ 14.7 N.m

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

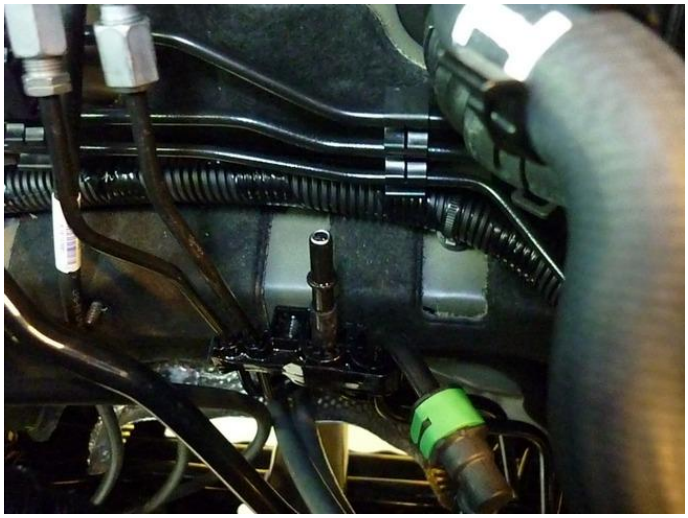
Installation is reverse of removal.

High pressure petrol pump installation (except SFCF)

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



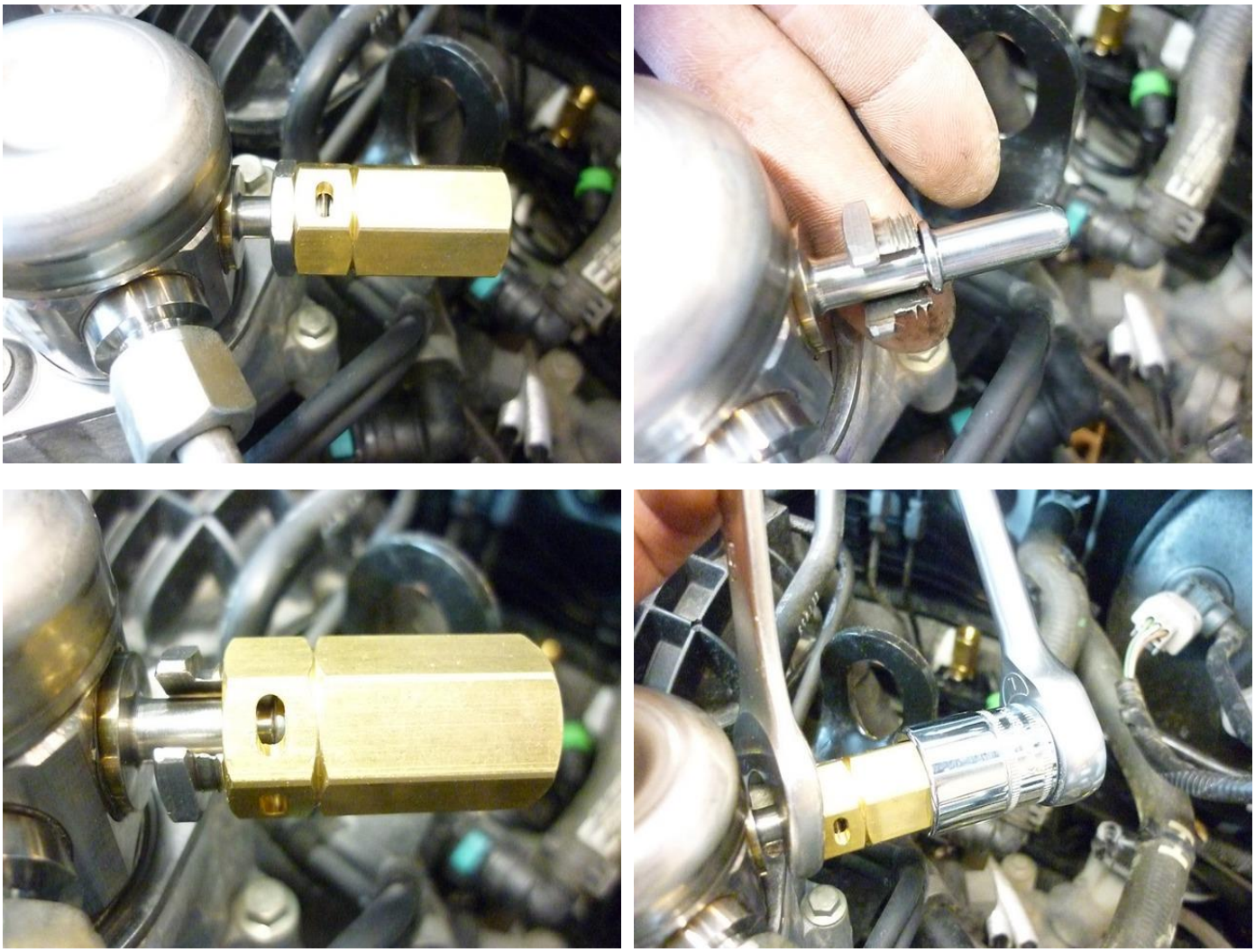
Remove petrol line.



Push plastic casing down for quick-release

20 Nm torque

Installation Quick release

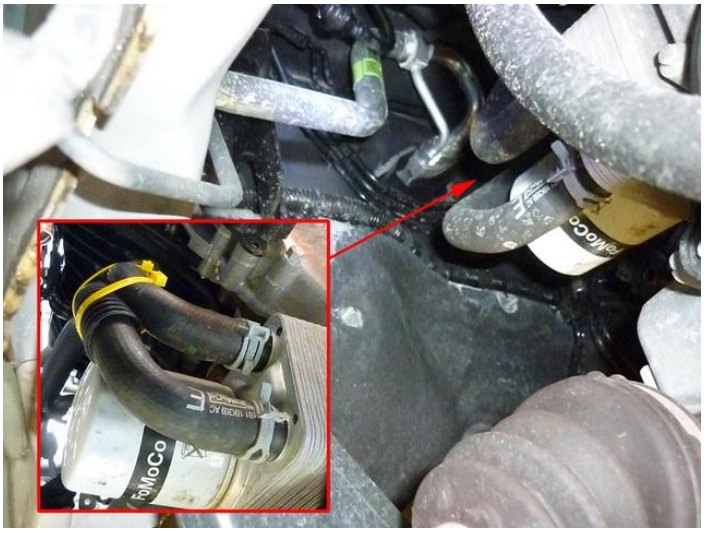


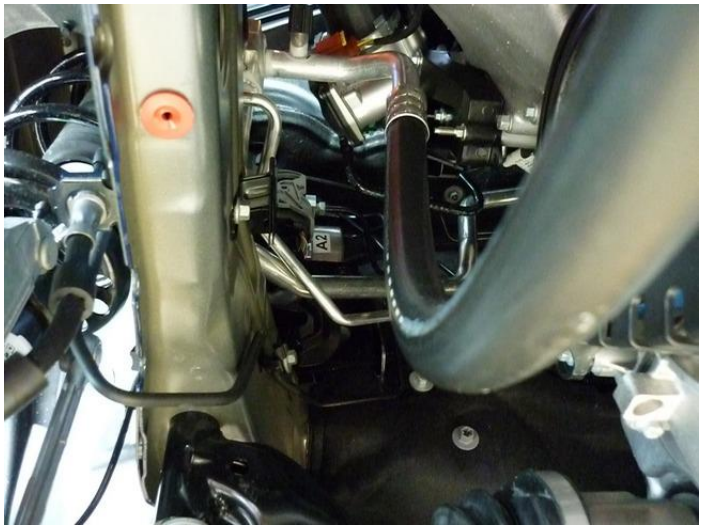
20 Nm torque (no locking-clip needed/supplied) **(not on SFCF engine)**

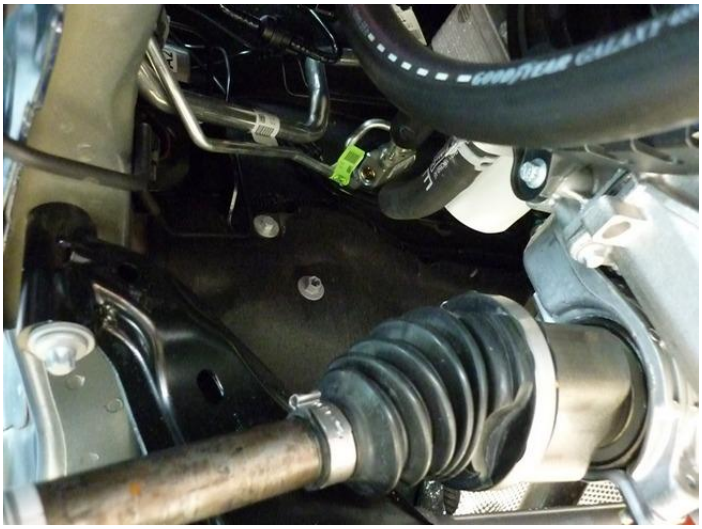
Boost pump / FMU assembly

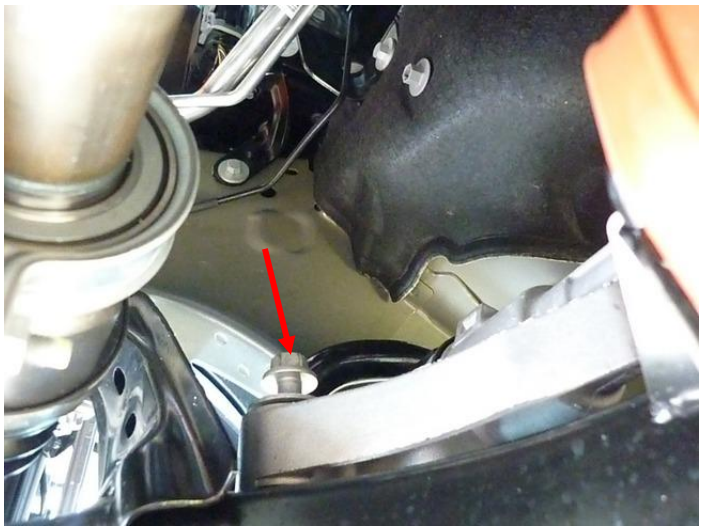
					SFCF
2	XD **3**	Boost pump out	FMU petrol supply	20	20
3	XD **3**	FMU HPP supply	High pressure pump	110	115 ball nose
4	XD **3**	High pressure pump	FMU HPP return	110	115

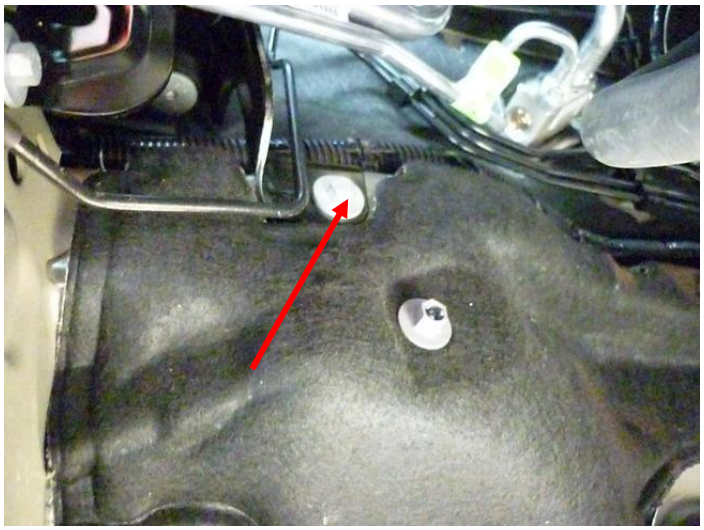
Mounting the FMU / Boost pump





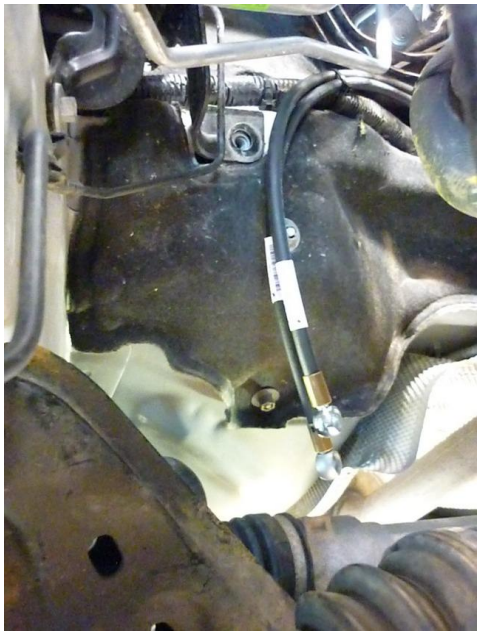


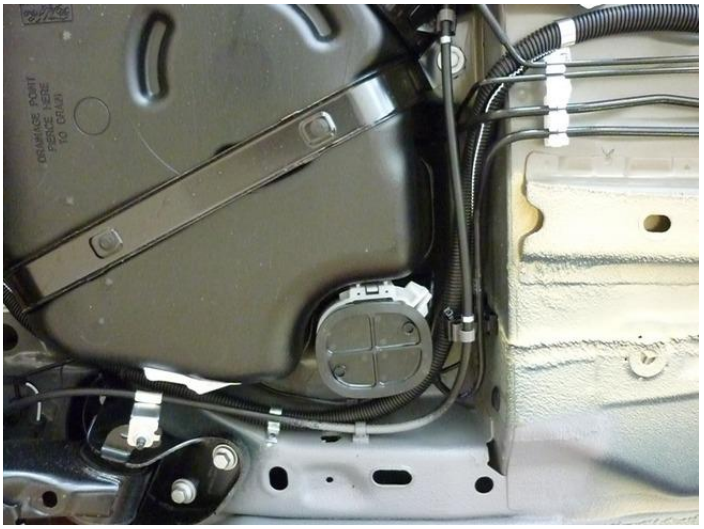




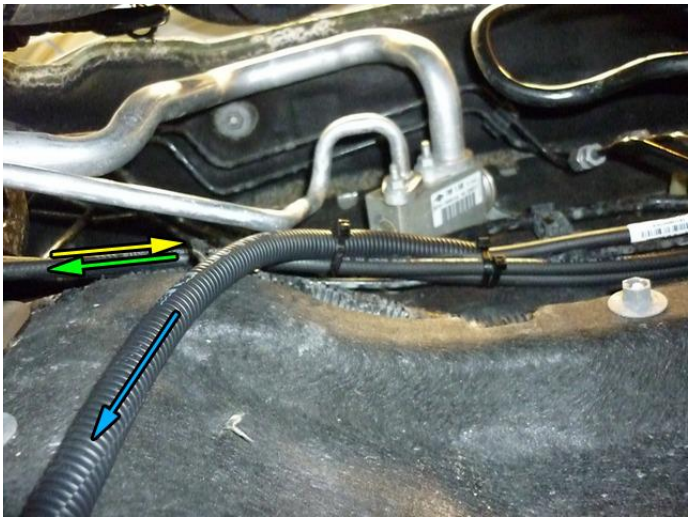
Remove bolts for bracket installation.

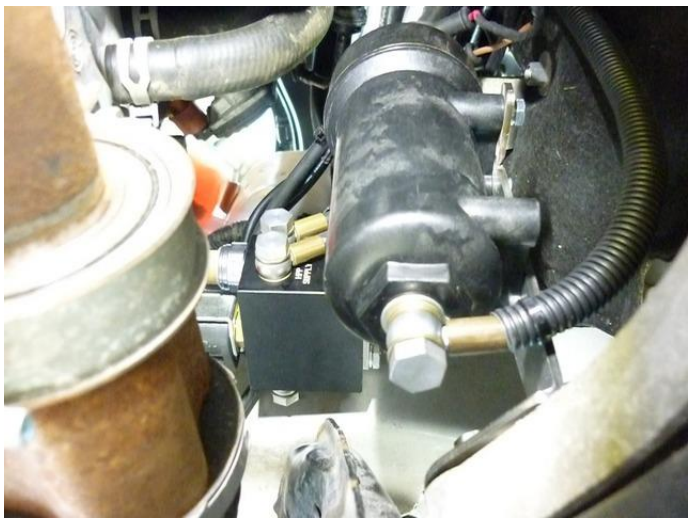
Hose routing





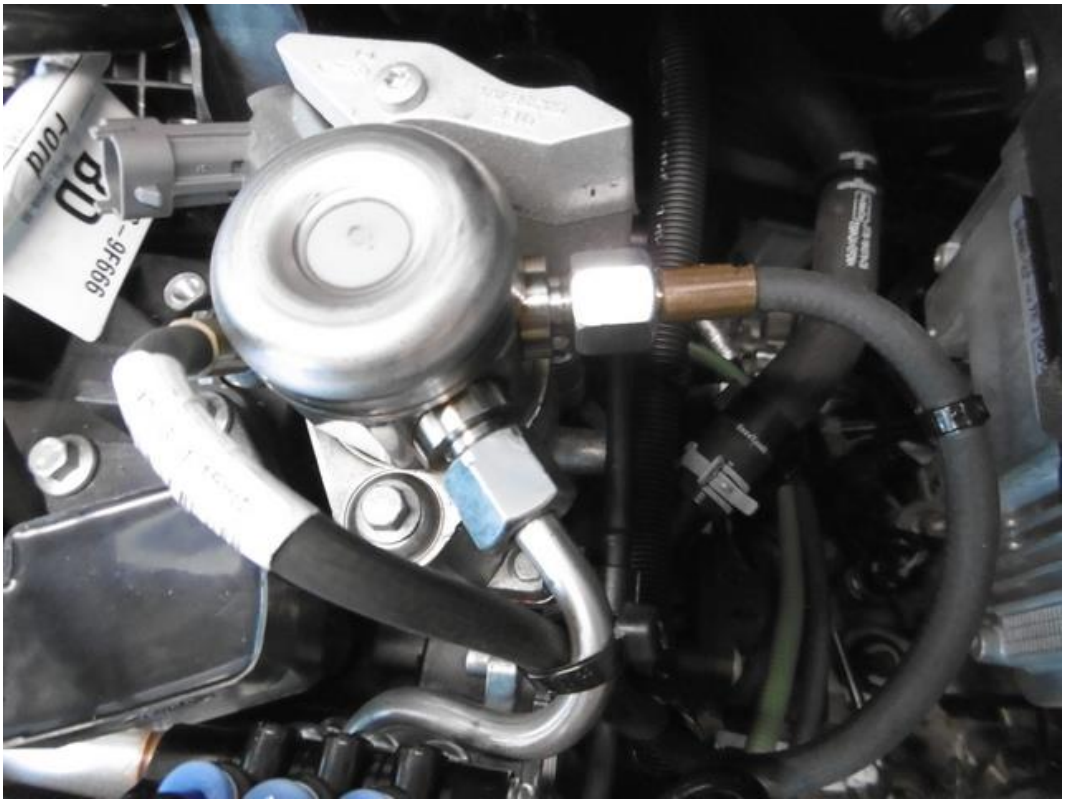
Mounting the FMU / Boost pump





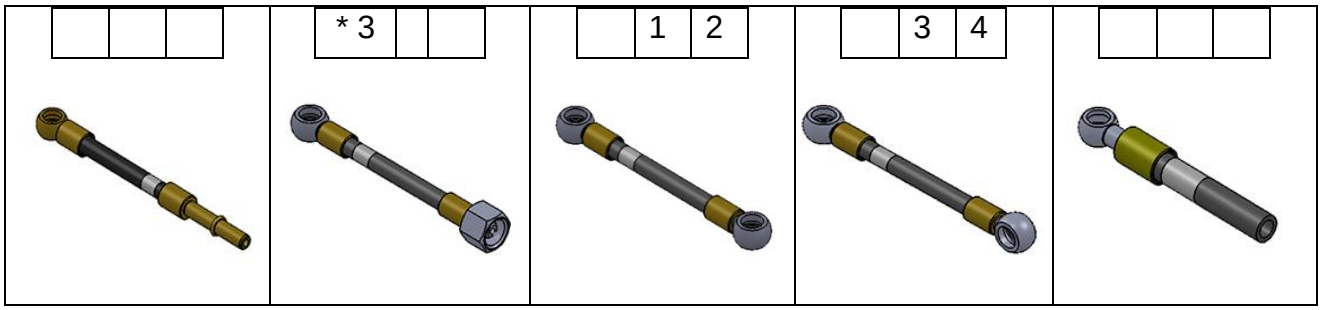
Connection of the fuel hose to HPP pump

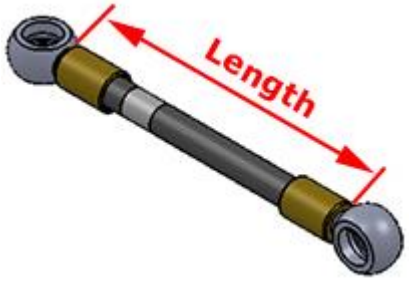
Connection of the fuel hose to HPP pump SFCF



LPG / petrol fuel lines

Hose		from	to	Length (cm)
1	XD **3**	Adapter original petrol hose	Boost pump in	60
2	XD **3**	Boost pump out	FMU petrol supply	20
3	XD **3**	FMU HPP supply	High pressure pump	110 / SFCF 115 ball nose *
4	XD **3**	High pressure pump	FMU HPP return	110 / SFCF 115
5	XD fuel supply line	FMU LPG supply	Tank	450
6	XD fuel return line	FMU LPG return	Tank	450

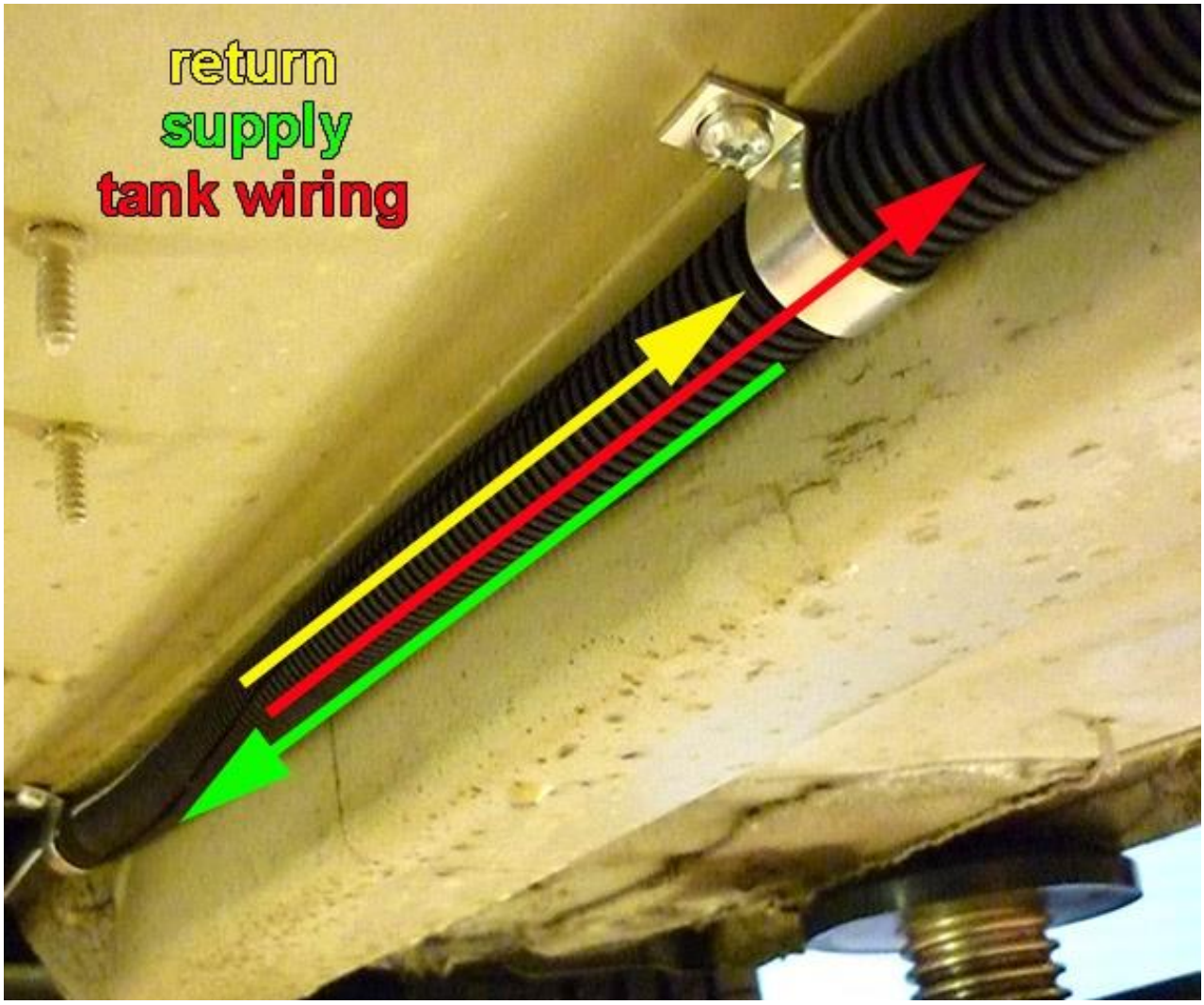




Install the fuel line using two bonded seal washers and banjo bolt :

Supply hose – Return hose – Tank wiring

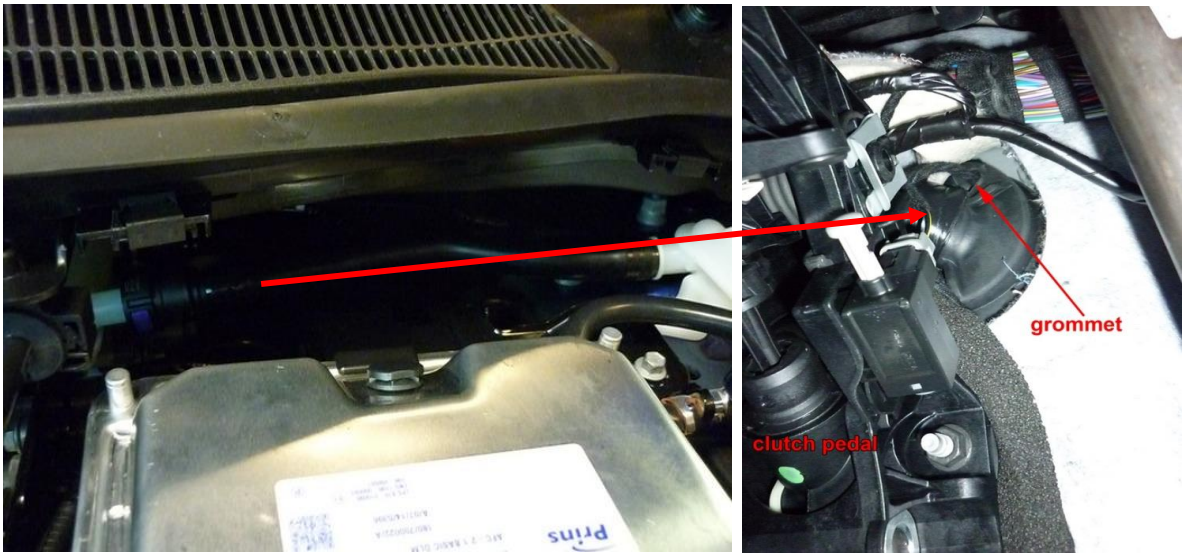
Protect the supply- and return hose together with tank-wiring using the Ø16mm split tube.
Mount the “hose assembly“ with clamps, with a maximum distance of 40cm.



Demo photo

Wiring Switch

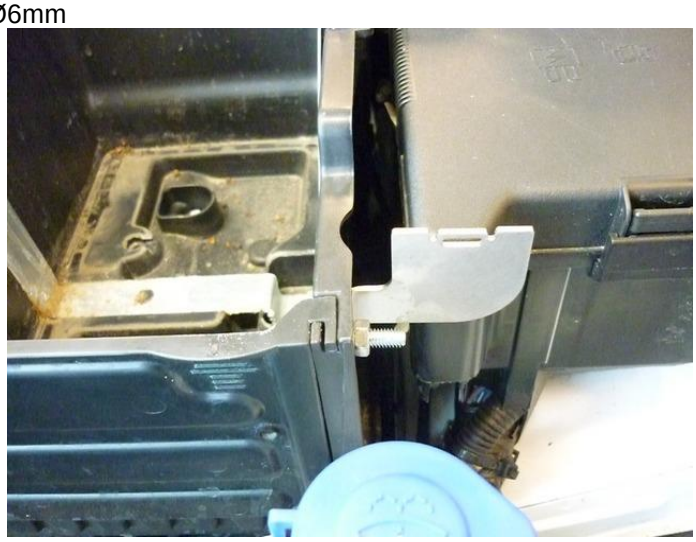
Prepare for switch wiring

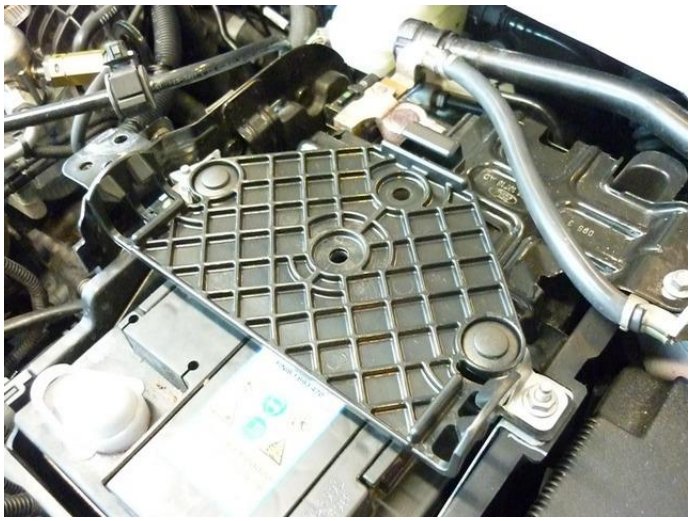


Grommet for switch and Can wiring

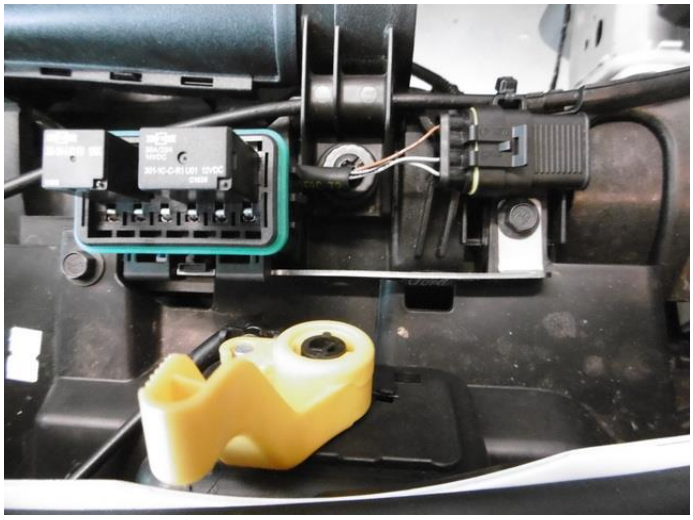
AFC / Relay box ->2018

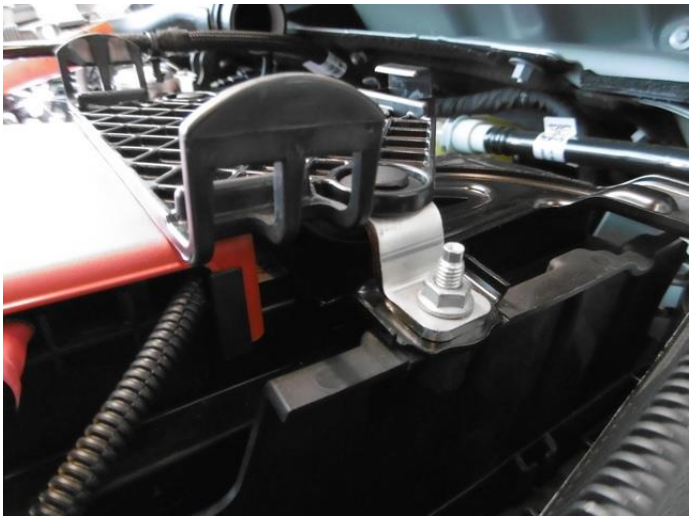
Drill Ø6mm





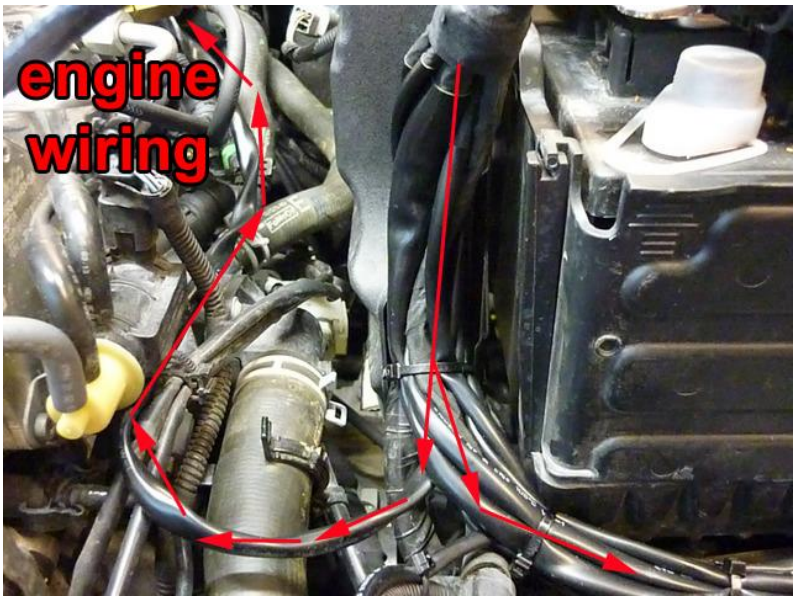
AFC / Relay box Courier SFCF



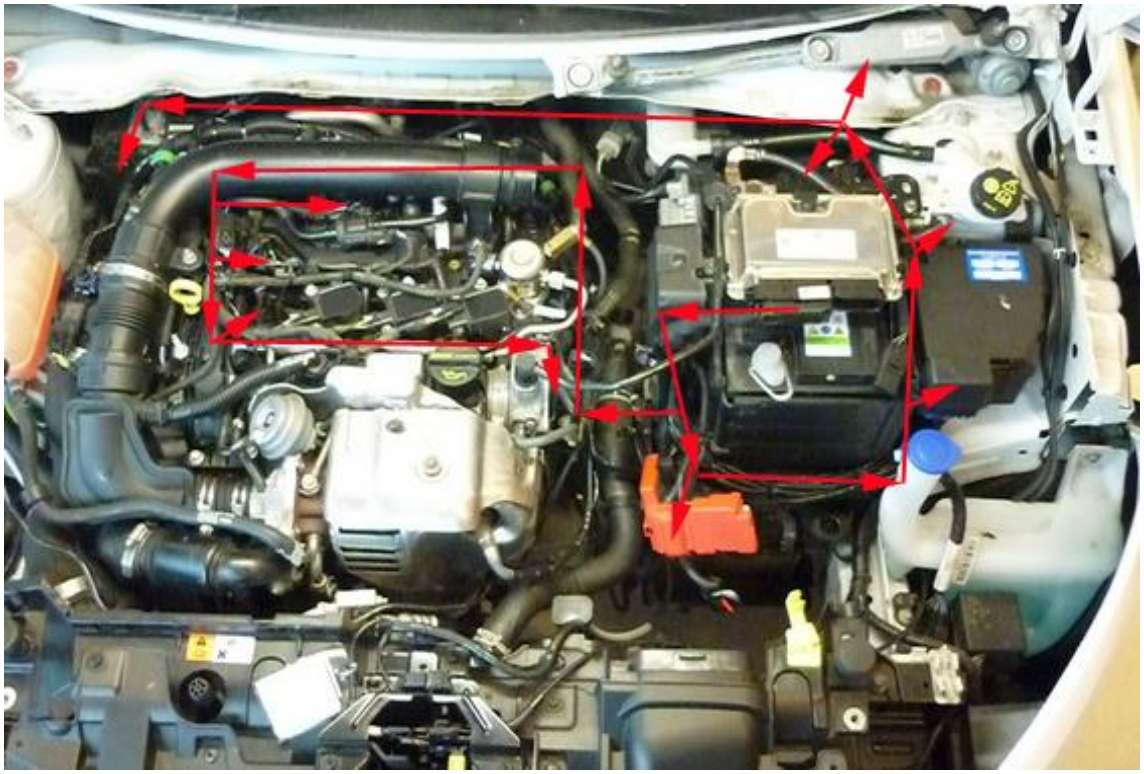


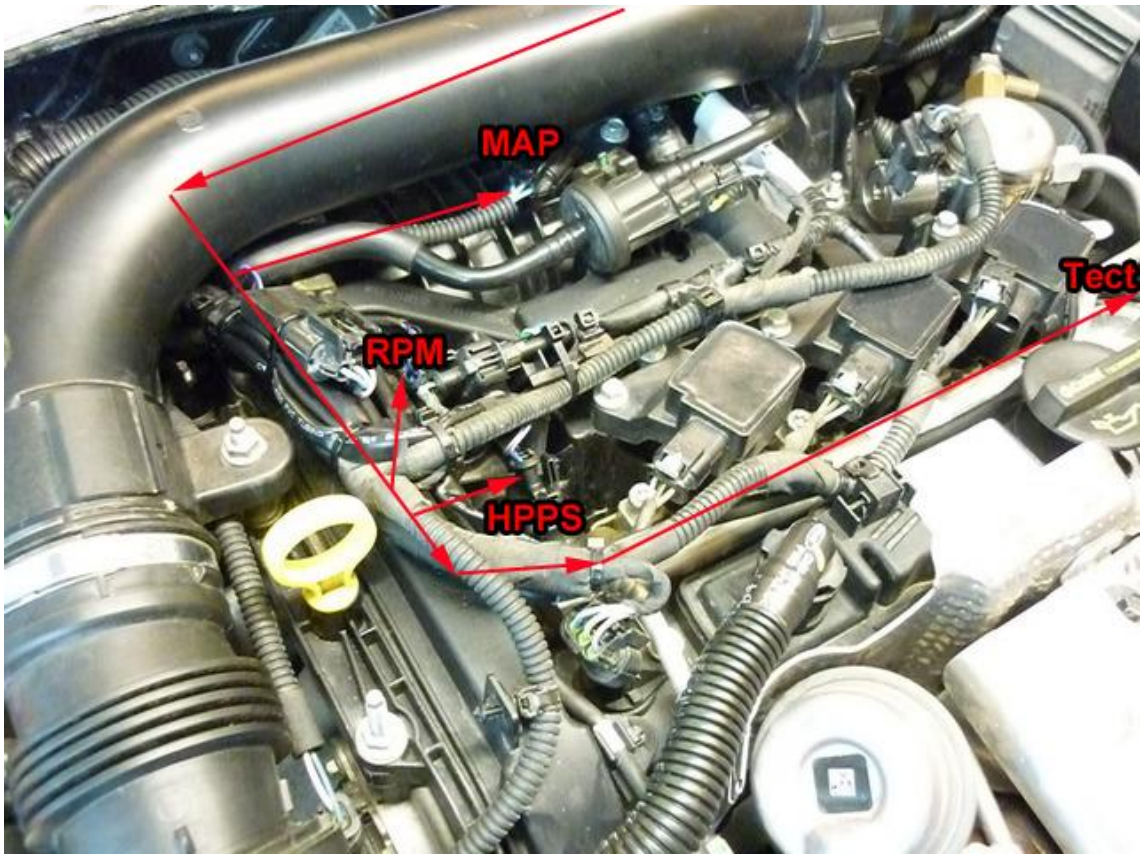
Remove/cut upstanding rib

Wiring



Wiring





Electrical connections (Plug&Play wiring loom) MAP

When having a 4-pole MAP connector instead of 3-pole:
Cut off the 4-pole male and female connector, insulate ALL wires instead the Blue-white, 18AD1,
Connect this wire to the original 3-pole MAP connector, MAP signal wire, pin 1 (Solder)
Connect this wire to the original 4-pole MAP connector, MAP signal wire, pin 4 (Solder)

Or solder to petrol ecu connector:

			Analog in (sensor side) MAP sensor in. Wire colour : blue-green Wire location : ECU connector B, pin 35 Wire sensor : pin 1 (3-pole connector) Wire sensor : pin 4 (4-pole connector)
18 AD 1		Blue-white	

Electrical connections (Plug&Play wiring loom) RPM, CAM sensor

Or solder to petrol ecu connector:

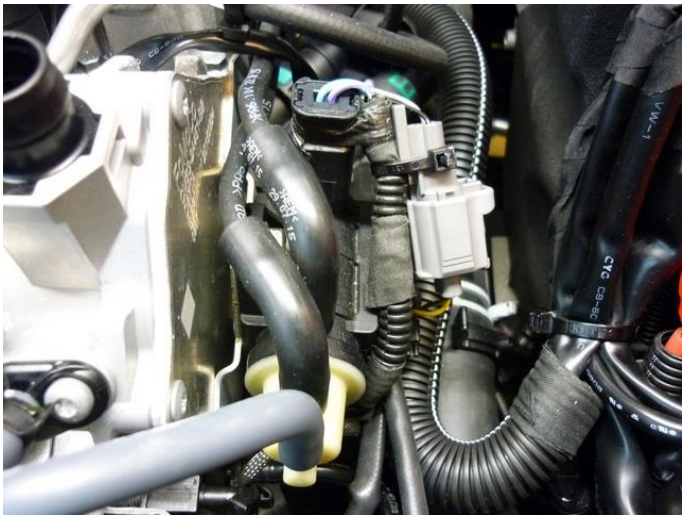
			For measuring the engine speed signal. Wire colour : white-green Wire location : ECU connector B, pin 36
8 RPM		Purple-white	

Electrical connections (Plug&Play wiring loom) High petrol pressure sensor

Or solder to petrol ecu connector:

36 & 25			*High pressure petrol sensor signal interruption.* Wire colour :blue-brown Wire location : ECU connector B, pin 38
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side

Electrical connections (Plug&Play wiring loom) T-ECT

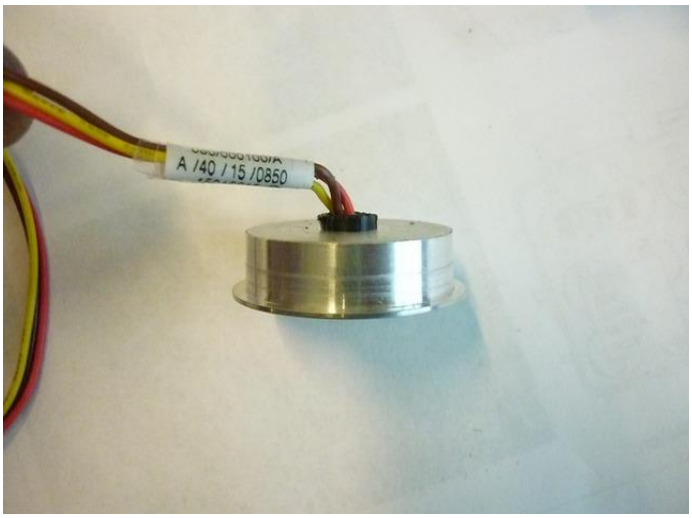


Or solder to petrol ecu connector:

			For measuring the engine coolant temperature. Wire colour : yellow Wire location : ECU connector B, pin 23
19 T-ect		Grey	

Switch with cup Fiesta

Switch with cup Fiesta

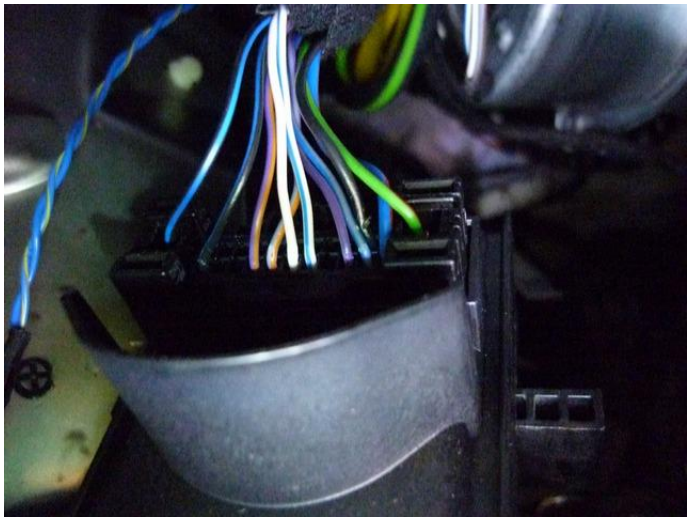


Switch without cup Fiesta

Switch without cup Fiesta

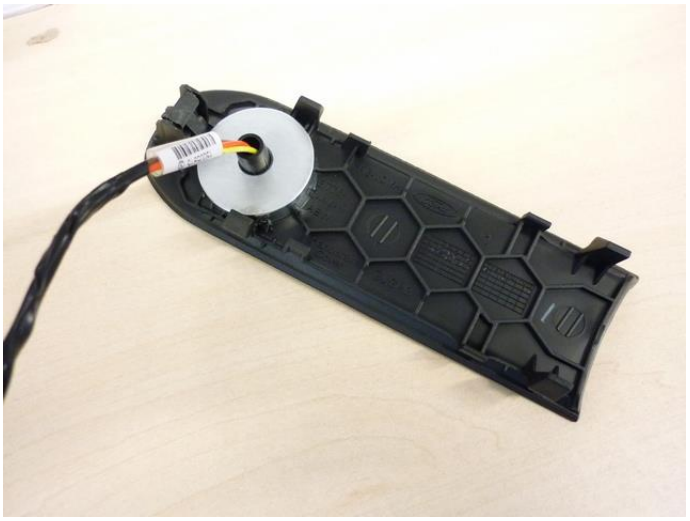
Remove clamp and carefully drill up the 8.2 switch hole -> Ø29mm (conical)
Lock switch shell with hot glue/plastic gun.

Switch B-Max



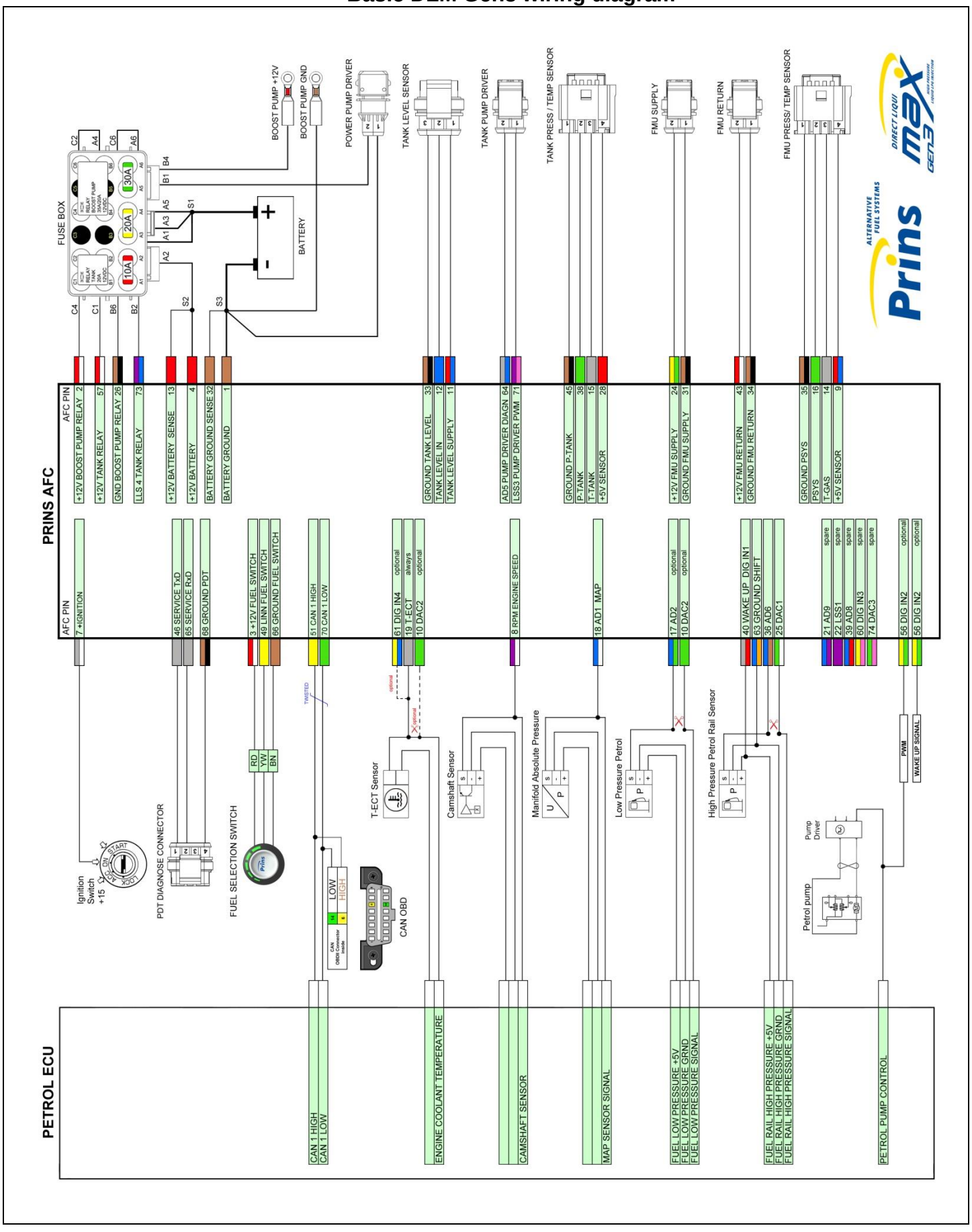
Backside eobd connector (2 torx screws)

Switch Courier



Main Connector

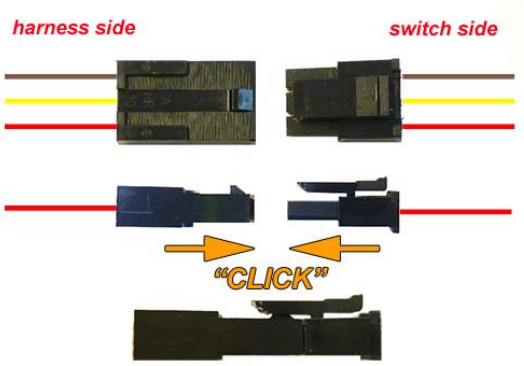
Basic DLM Gen3 wiring diagram

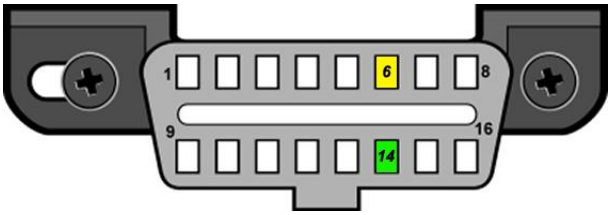


Electrical connections

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

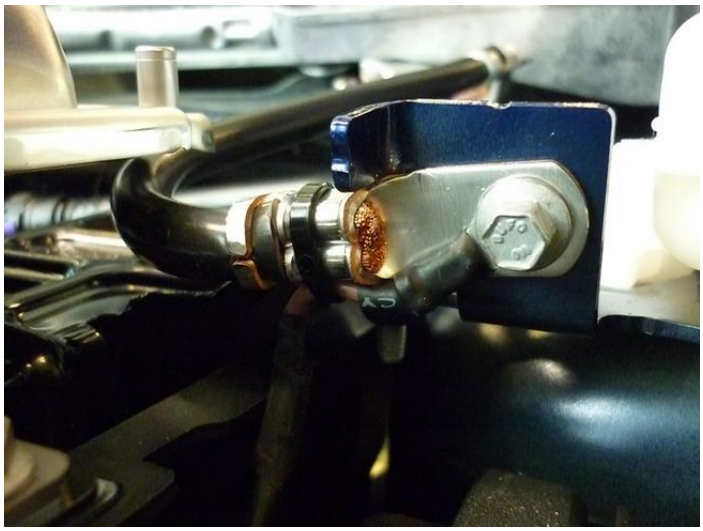
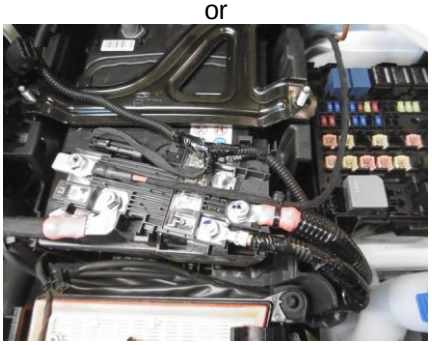
Driver room

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 white-blue
70	CAN-Low	Green	EOBD connector pin 14 white
			 

Electrical connections

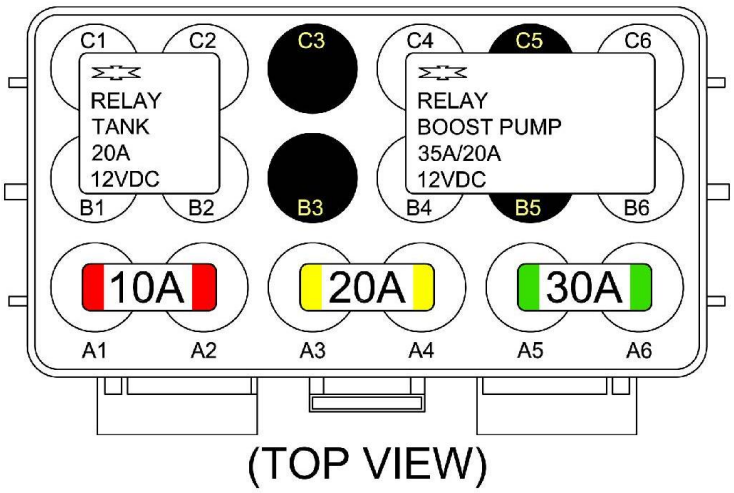
Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

1-32 MAIN GND ecu MAIN GROUND SENSE	Brown	Connect to the '–' of the battery (-31) ; use a ring terminal. 
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 and lock-nut. **Do not place the fuses** before having completed the installation of the lpg system.  or 

Electrical connections (Solder)

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

			Do not place the fuses in the holder before having completed the installation of the LPG system. *High pressure petrol sensor supply / car wake-up 5V* Wire colour : blue-white Wire location : ECU connector B, pin 7
7 +IGNITION		Grey-white	

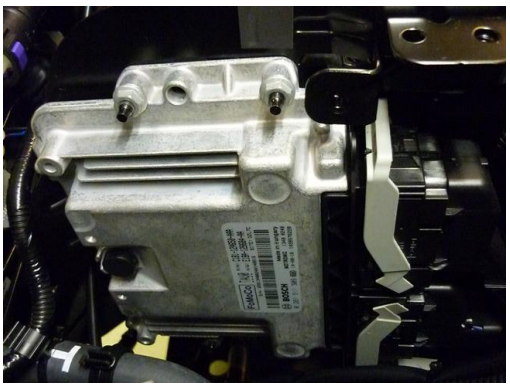


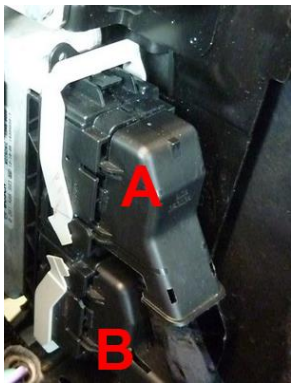
(TOP VIEW)

Electrical connections (Solder)

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

Wire text	*clr*	*Wire colour*	*Connection*
36 & 25			*High pressure petrol sensor signal interruption.* Wire colour :blue-brown Wire location : ECU connector B, pin 38
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
			High pressure petrol sensor ground. Wire colour :grey-white Wire location : ECU connector B, pin 22
63 Ground Shift		Blue-orange	
			For measuring the engine speed signal. Wire colour : white-green Wire location : ECU connector B, pin 36
8 RPM		Purple-white	
			Analog in (sensor side) MAP sensor in. Wire colour : blue-green Wire location : ECU connector B, pin 35
18 AD 1		Blue-white	
			For measuring the engine coolant temperature. Wire colour : yellow Wire location : ECU connector B, pin 23
19 T-ect		Grey	





Electrical connections

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

Insulate not used wires.

Wire text	*clr*	*Wire colour*	*Connection*
21 AD 9		Blue-purple	
22 LSS 1		Purple	
39 AD 8		Blue-red	
60 DIG IN3		Yellow-pink	
61 DIG IN4		Yellow-blue	
74 DAC 3		Green-pink	
40 Wake-up		Grey-red	
56 DIG IN2		Yellow-green	

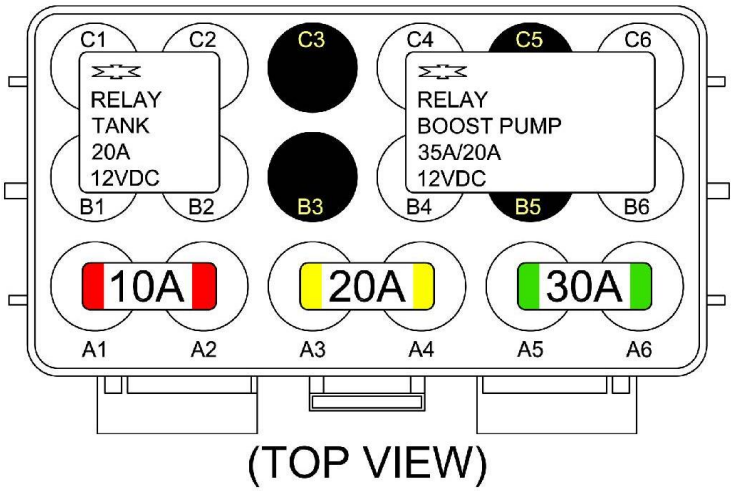
17 & 10			
17 AD 2		Blue-green	
10 DAC 2		Green	

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***
4-pole FMU P/T sensor 1. 35 Ground P-Sys 2. 16 P-Sys 3. 14 T-Sys 4. 9 +5V sensor	 Brown-black Green Grey Red-blue	Connect the 4-pole connector to the P/T sensor.
2-pole black connector FMU 24 +12V FMU supply 31 Ground FMU supply	 Yellow-green Brown-black	Connect the 2-pole connector to the black lock-off valve of the Fuel Management Unit
2-pole grey connector FMU 43 +12V FMU return 34 Ground FMU return	 Red-white Brown-black	Connect the 2-pole connector to the grey lock-off valve of the Fuel Management Unit
4-pole diagnose connector 46 Service TxD 65 Service RxD 68 Ground PDT	 Grey Grey Brown-black	*Diagnose connector for service / diagnosis.* Connector pin 1 Connector pin 2 Connector pin 4
Boost pump relay 2 +12V boost pump relay 26 Ground BP relay +12V fused BATT +12V Boost pump	 Red-white Purple-blue Red Red	 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
Wiring tank pump driver relay 57 +12V tank relay 73 LSS 4 tank relay +12V BATT fused +12V driver	 Red-white Purple-blue Red Red	 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



(TOP VIEW)

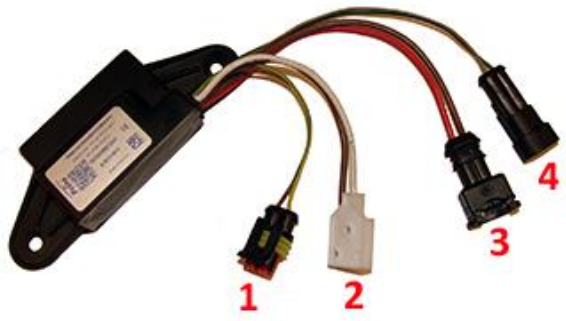
Electrical connections

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 1. 33 Ground tank level 2. 12 Tank level in 3. 11 + tank level supply	Brown-white Blue Red-blue	Connect the 3-pole connector to the tank level sensor.
4-pole Tank P/T sensor 1. 45 Ground P-Tank 2. 38 P-Tank 3. 15 T-Tank 4. 28 +5V sensor	Brown-black Green Grey Red	Connect the 4-pole connector to the P/T sensor.
2-pole Steering Diagnose connector 1. Ground pump driver 2. +12V pump driver	Brown Red	Connect the 2-pole connector to the driver, connector 3.
2-pole Steering Diagnose connector 1. 71 LSS3 Pump driver PWM 2. 64 Pump driver diagnose	Purple-pink Blue-grey	Connect the 2-pole connector to the driver, connector 4.

Pump Driver			
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 Brown	From tank pump driver From tank pump driver	
3. *2-pole connector driver*	Brown Red	From main ground From tank pump relay	Ground pump driver +12V pump driver
4. *2-pole connector driver*	Green Grey	From AFC pin 71 From AFC pin 64	LSS3 Pump driver PWM Pump driver diagnose



Prins safety stickers

Apply the sticker on an eye catching location.

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 ECU 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.

ALTERNATIVE FUEL SYSTEMS
Prins