

ALTERNATIVE
FUEL SYSTEMS

Prins



installation manual Engine Kit part 2/2

MANUFACTURER	Ford
TYPE	Focus
ENGINE DISPLACEMENT	999 cc
NUMBER OF VALVES	12
ENGINE CODE / NUMBER - OUTPUT	B7DA - 92 kW
VEHICLE CATEGORIES	M1
TRANSMISSION	MT
AFC VERSION / SYSTEM	AFC-2.1 / DLM Gen3
PETROL ECU MANUFACTURER / CODE	Bosch FoMoCo JX6A-12B650-BJA / JX6A-12B684-KA
HIGH PRESSURE PETROL PUMP	H6BG-9D376-AA
HIGH PRESSURE PETROL INJECTOR	FoMoCo
MODEL YEAR:	9-2018-
SYSTEM APPROVAL NUMBER (R115)	E*-115R-0000** / DLM-LPG **
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	347/070210021/A
MANUAL NUMBER	076/0708300
DATE	16-1-2019

Version 30-6-2016 D



TABLE OF CONTENTS

General instructions	2
Required equipment / tools / materials for installing a complete system	3
Vehicle check	3
Tightening moments.....	4
Direct LiquiMax parts / approval numbers.....	4
Overview DLM Direct Injection.....	6
Fuel Management Unit connections.....	7
Fuel Management Unit.....	8
Boost pump	9
DLM component location overview	10
Preparation.....	11
Removal of the High Pressure Petrol Pump	12
Installation of the High Pressure Petrol Pump	13
Remove / replace High pressure pump H6BG-9D376-AA.....	14
High pressure petrol pump Supply.....	15
Boost pump / Unit assembly.....	16
Boost pump / Unit installation.....	17
LPG / petrol fuel lines.....	18
Connection of the fuel hose to the boost pump	19
High pressure petrol pump LPG return	20
High pressure petrol pump LPG return / supply.....	21
Mounting the AFC	22
Mounting the fuse / relay box	23
Hose routing	24
Wiring routing	25
Mounting the fuel selection switch	26
Connector location PWM and Low pressure INSIDE.....	27
EOBD connection.....	28
Wiring inside PWM.....	29
Wiring inside Low Pressure Sensor	30
Wiring inside WAKE UP	31
Basic DLM Gen3 wiring diagram.....	32
Main Connector	33
Wiring HPPRS.....	34
Wiring RPM	35
Wiring T-ect.....	36
Wiring MAP	37
Wiring Battery plus & ground	38
Electrical connections.....	39
Electrical connections.....	40
Prins safety stickers	41
Checklist after installation	42

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 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 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 no. 099/99928)
- Exhaust gas analyzer
- Multimeter
- Oscilloscope
- Prins diagnostic software
- Prins Diagnostic Tool
- Torque wrench (5-50Nm)
- Torque wrench (200-250Nm)
- Portable light
- Assortment drill bits Ø4 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 analyzer)
- Check the condition of the ignition system (spark plugs, cables, coil)

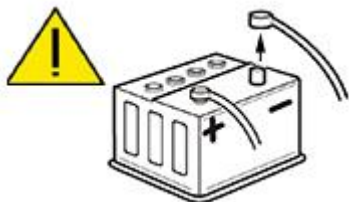
Tightening moments

	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

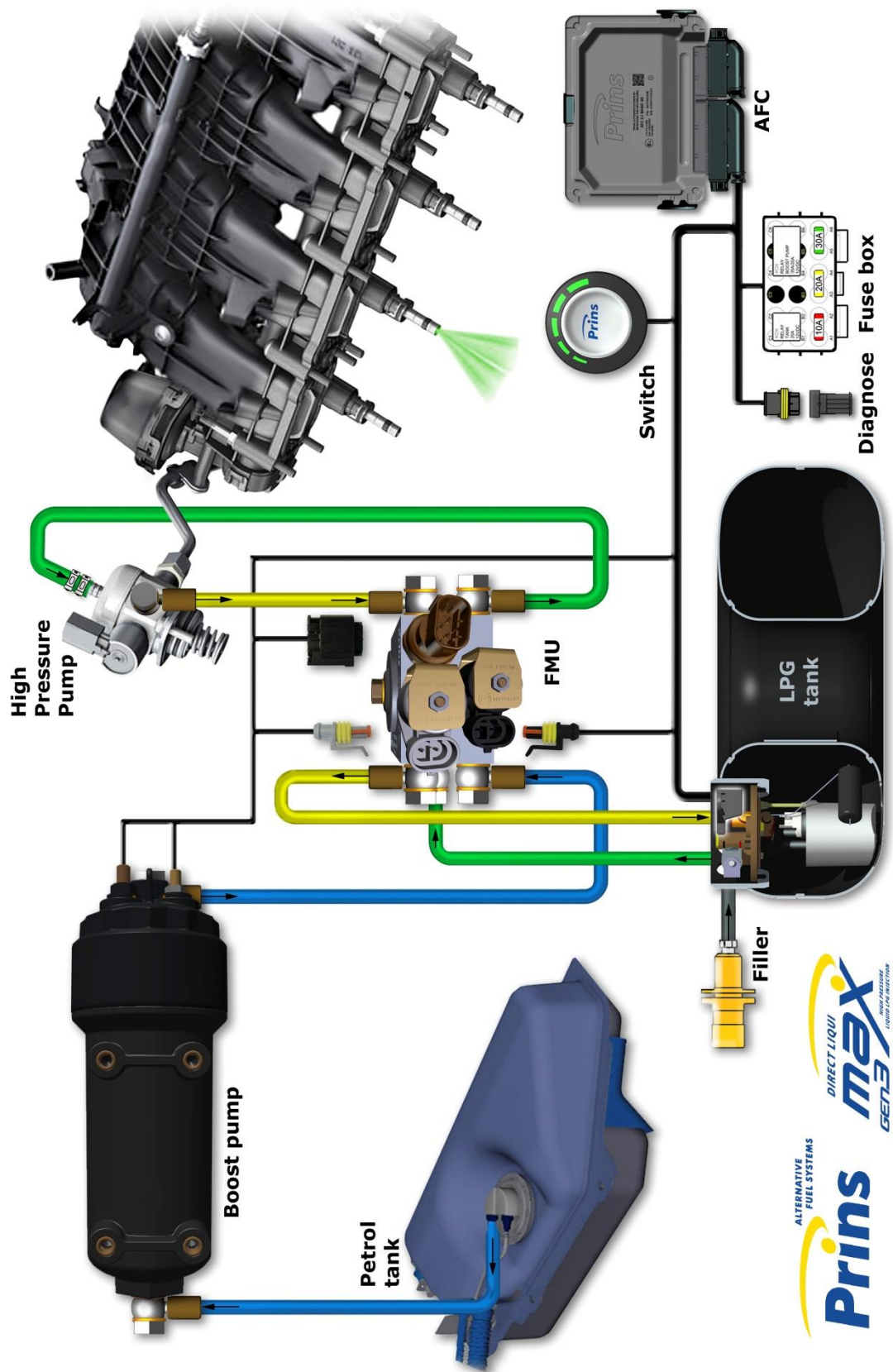


= WEAR SAFETY GOGGLES

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




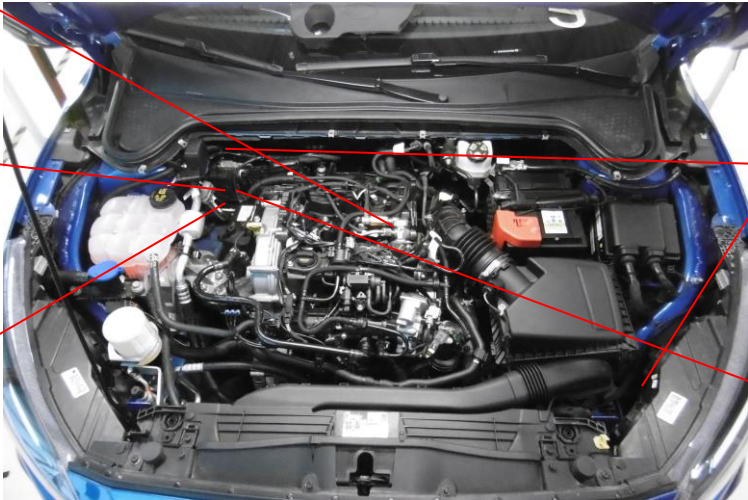



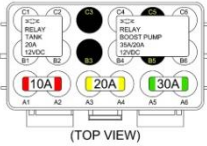
Fuel Management Unit



Boost pump



DLM component location overview

<p>HPP pump</p> 		<p>Petrol ECU</p>
<p>FMU</p> 		<p>AFC</p> 
<p>Boost pump</p> 		<p>Fuse / relay box</p> 

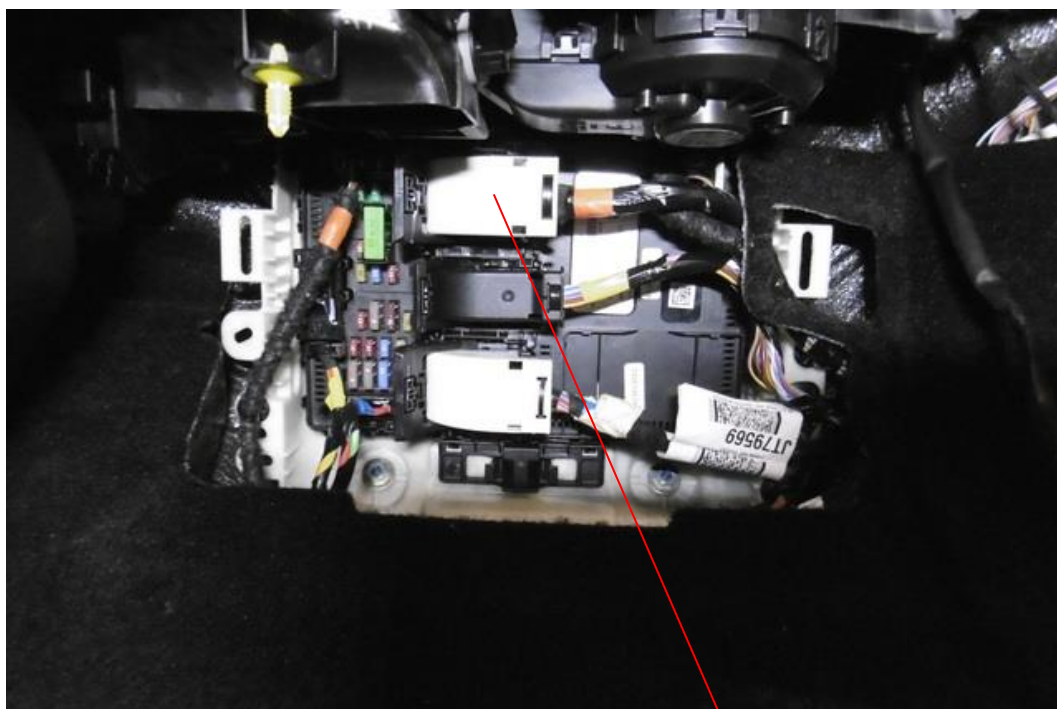
	<p>If applicable, R115 approval sticker : Right side centre door post</p>
---	---

Preparation

Remove glove box



Grommet



BCM (wake-up connection)

Removal of the High Pressure Petrol Pump

REMOVAL-

WARNING-

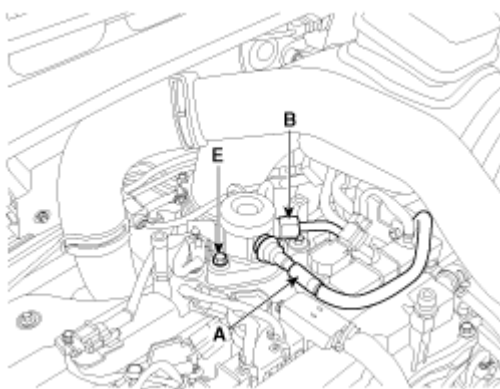
In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, there may be injury caused by leakage of the high pressure fuel.

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.



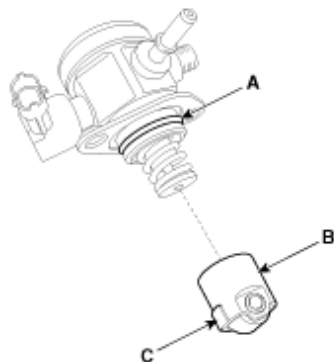
CAREFULLY store the removed petrol pump. Make sure no pollution can come into the pump.

Installation of the 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 Nm.

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 pump installation nut: 26.5 ~ 32.4 Nm.

Installation is reverse of removal.

Remove / replace High pressure pump H6BG-9D376-AA



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

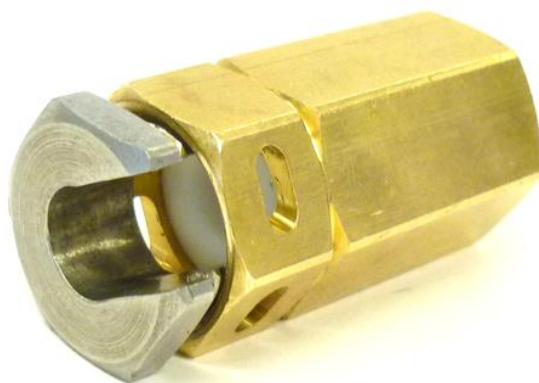


original



with return

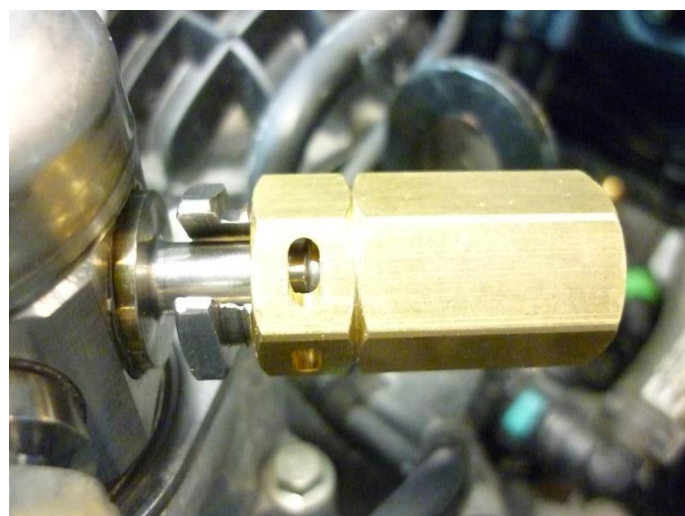
High pressure petrol pump Supply



No locking clip needed.

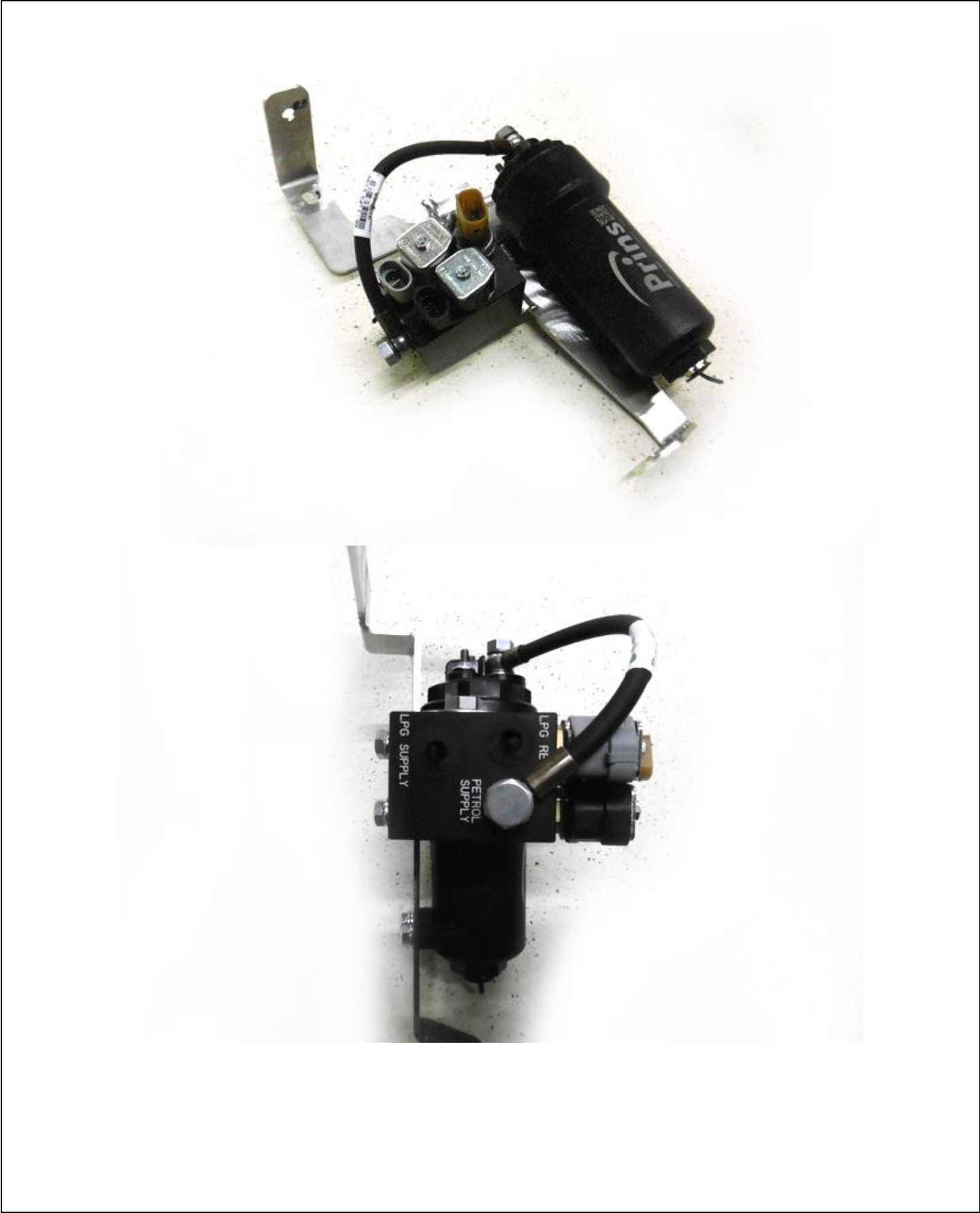


(example)

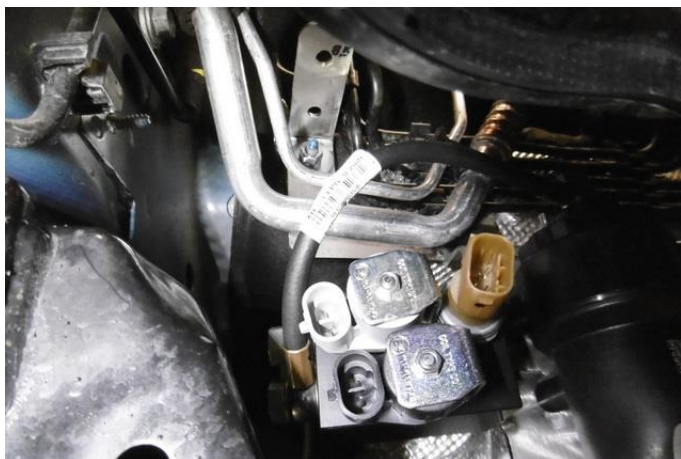


20Nm

Boost pump / Unit assembly

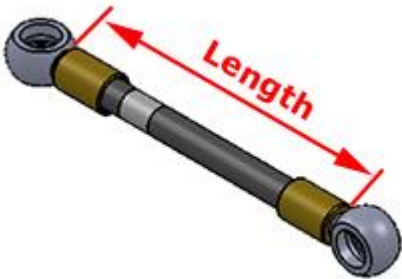
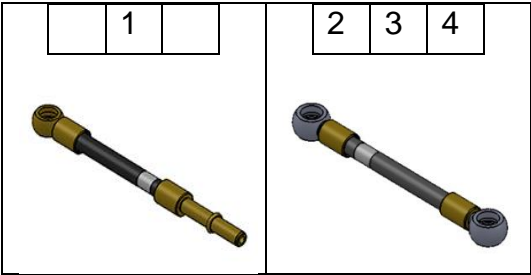


Boost pump / Unit installation



LPG / petrol fuel lines

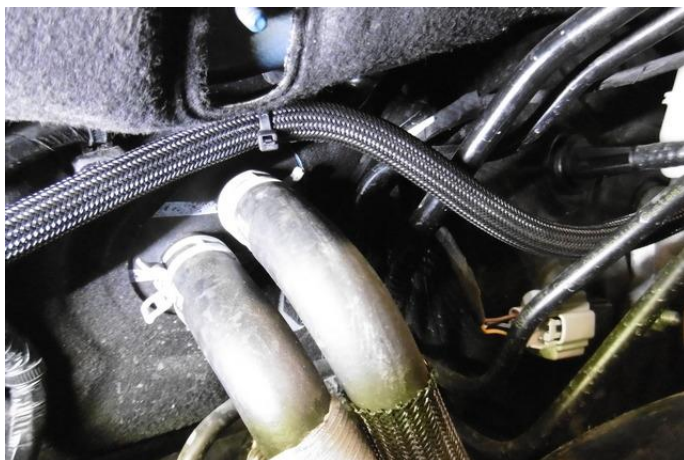
	Hose	from	to	Length (cm)
1	XD4	Adapter original petrol hose	Boost pump in	45
2	XD3	Boost pump out	FMU petrol supply	20
3	XD3	FMU HPP supply	High pressure pump	85
4	XD3	High pressure pump	FMU HPP return	85
5	XD fuel supply line	FMU LPG supply	Tank	450
6	XD fuel return line	FMU LPG return	Tank	450



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



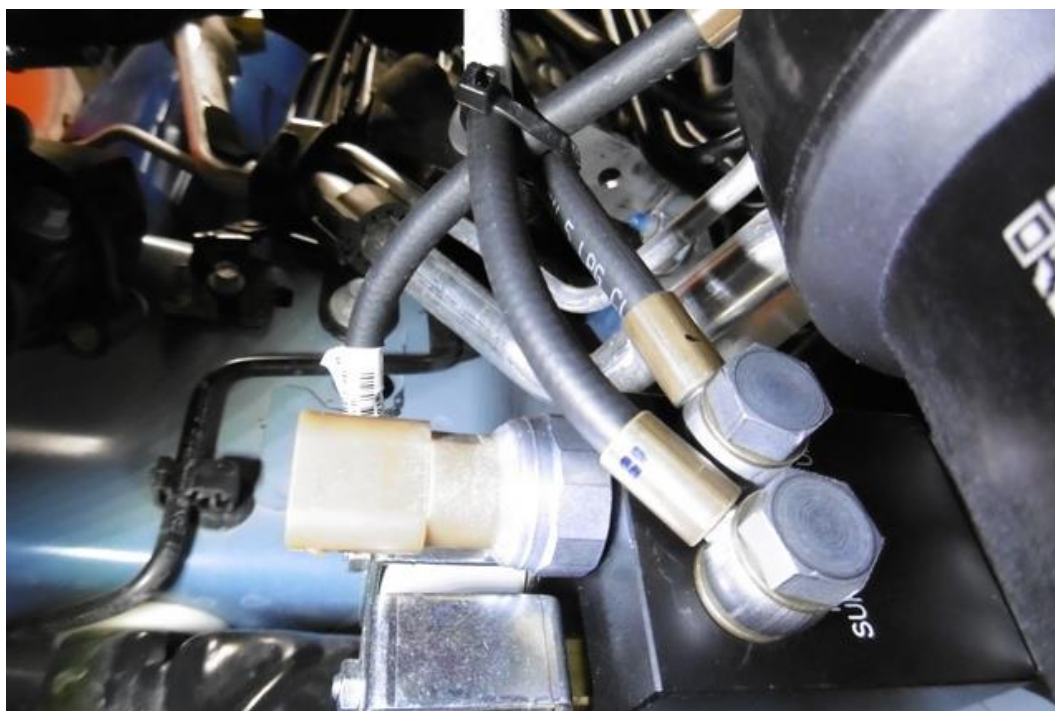
Connection of the fuel hose to the boost pump



High pressure petrol pump LPG return



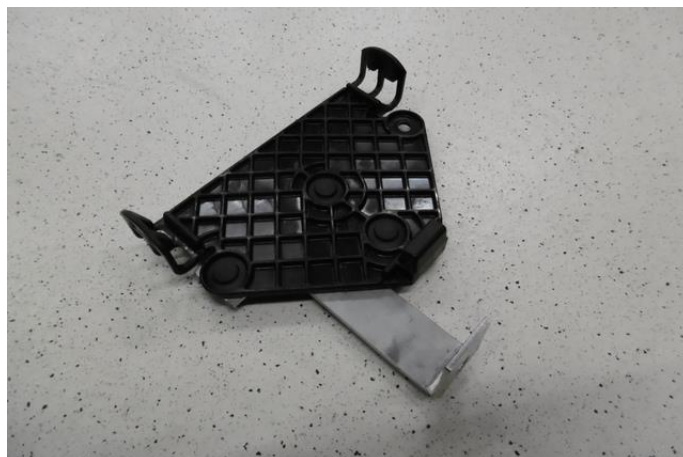
Remove ignition coil for easy installation of the return



High pressure petrol pump LPG return / supply



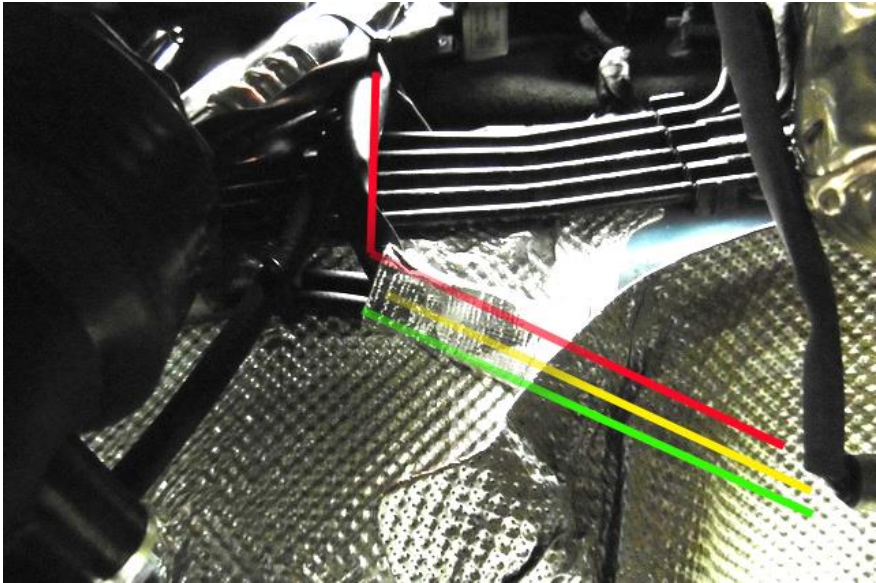
Mounting the AFC



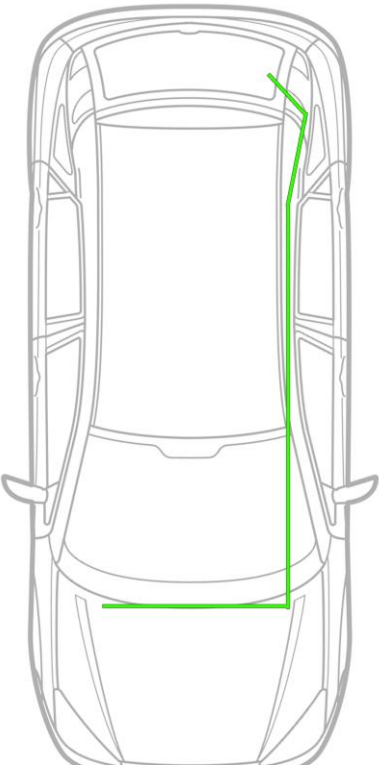
Mounting the fuse / relay box



Hose routing

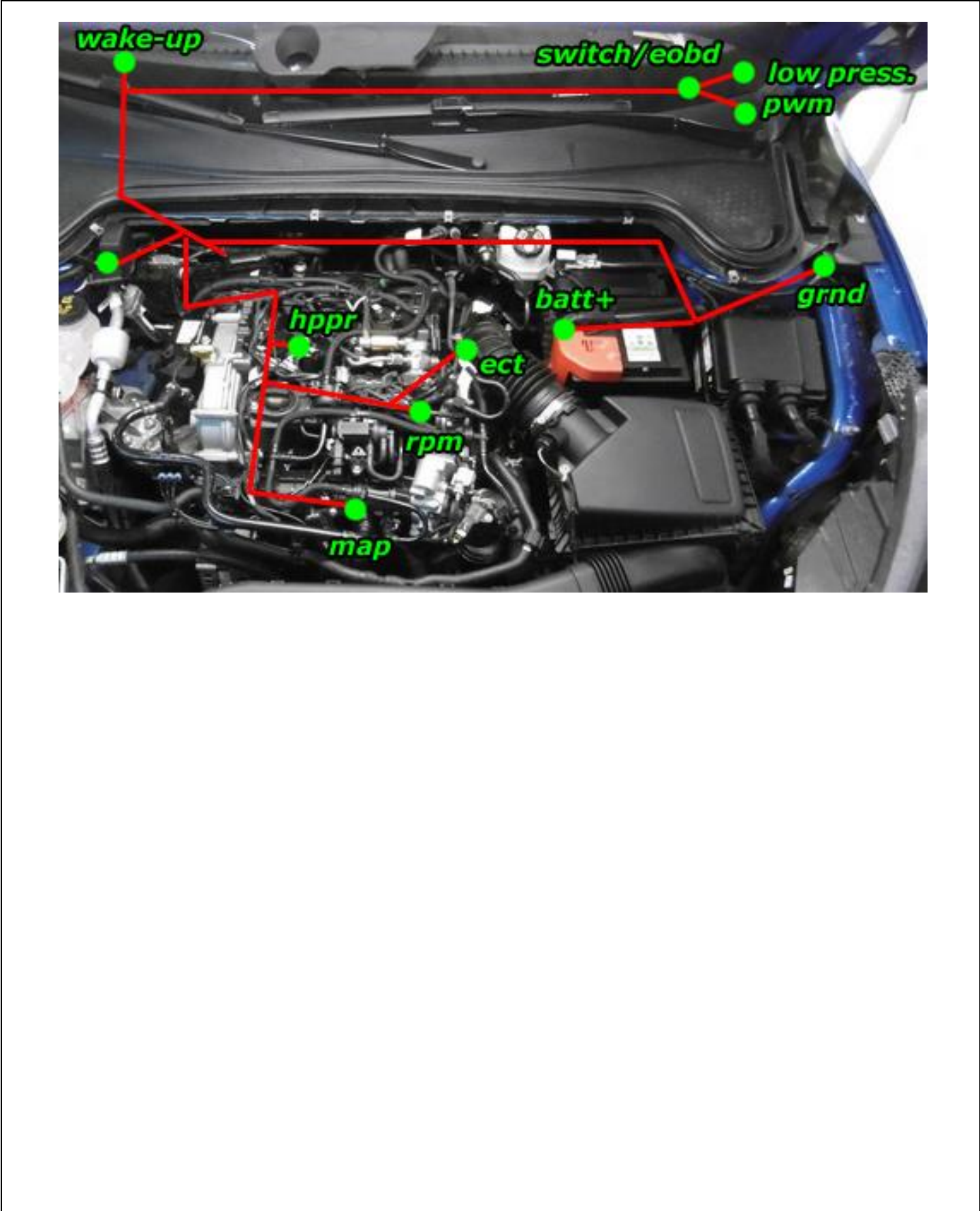


Use heat reflecting foil sticker (wrap fuel lines and wiring)



Fuel lines/tank wiring

Wiring routing



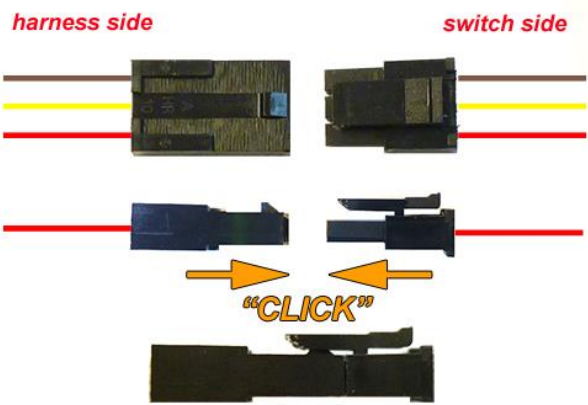
Mounting the fuel selection switch



mount the switch.

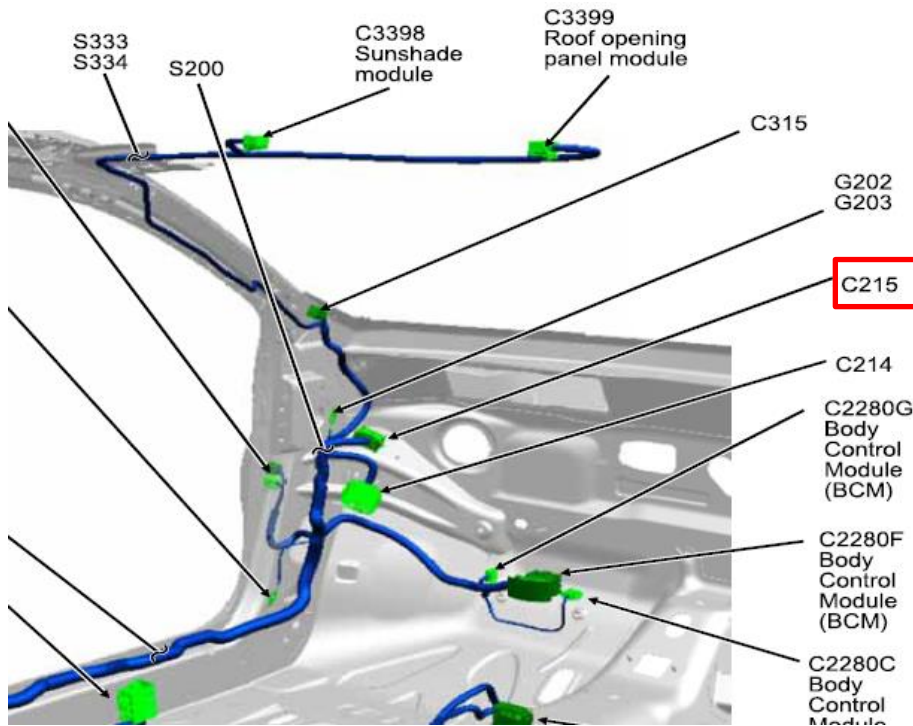
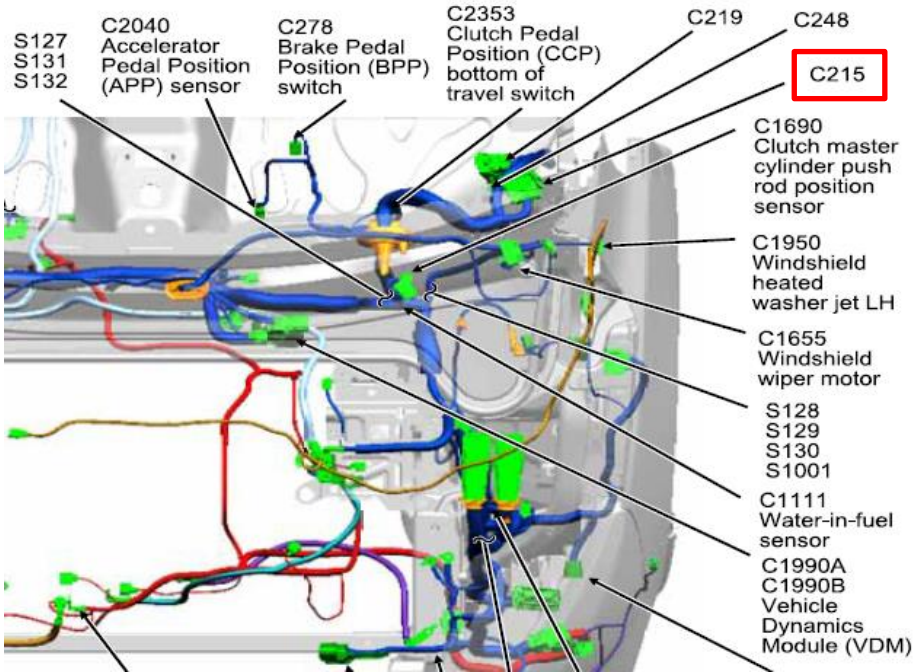


Driver room

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	
		<div><div>harness side</div><div>switch side</div></div>

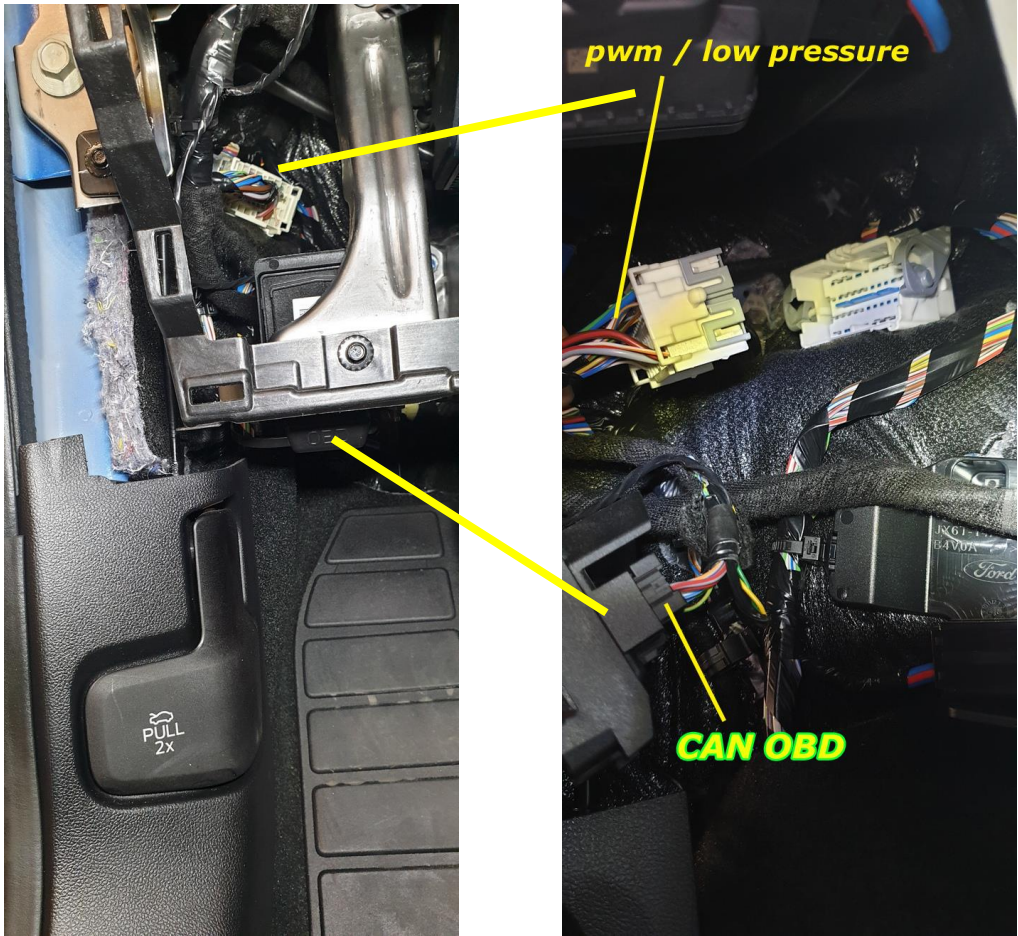
Connector location PWM and Low pressure INSIDE



Connector C215

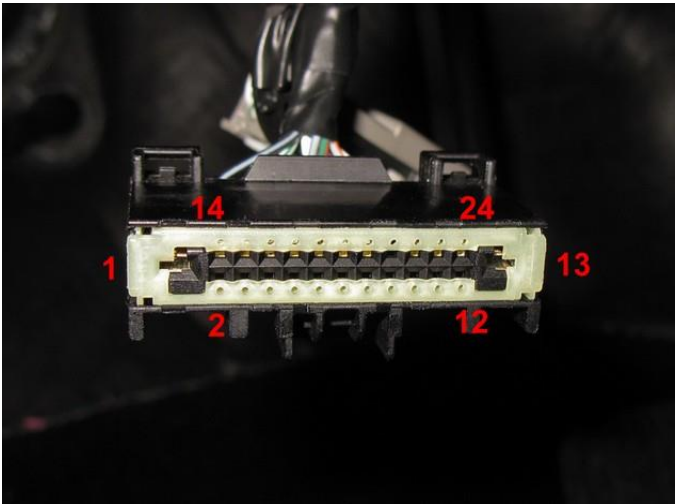


Left front

EOBD connection




51	CAN-High		Yellow	EOBD connector Pin 20 blue-white
70	CAN-Low		Green	EOBD connector Pin 19 white

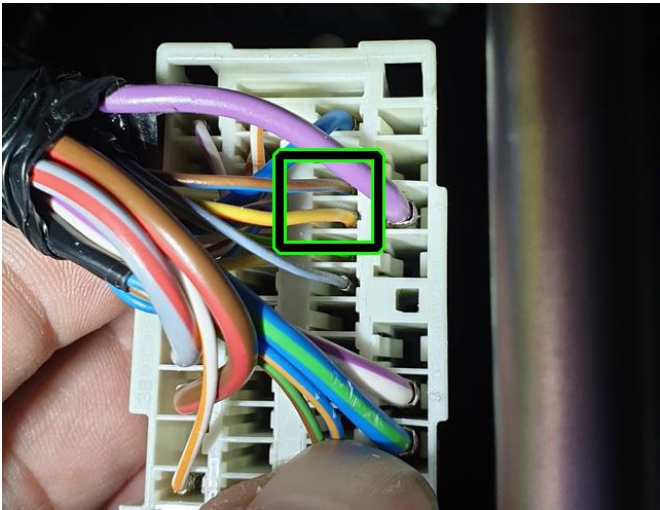
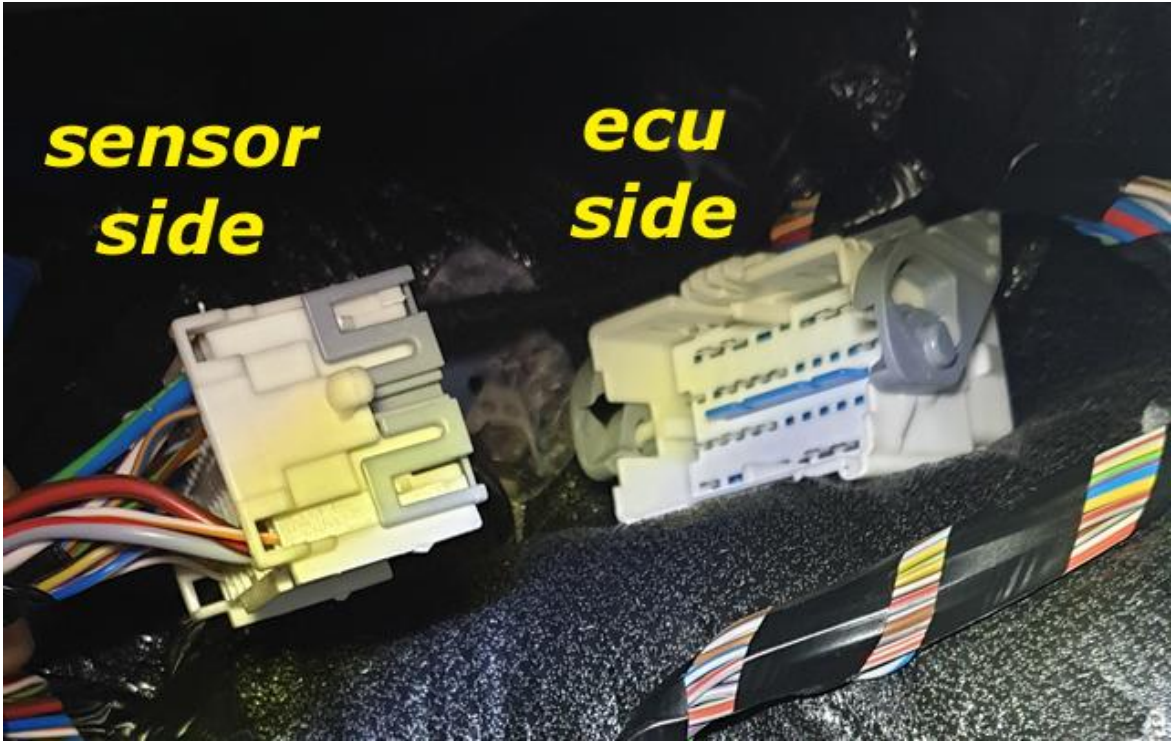


Wiring inside PWM



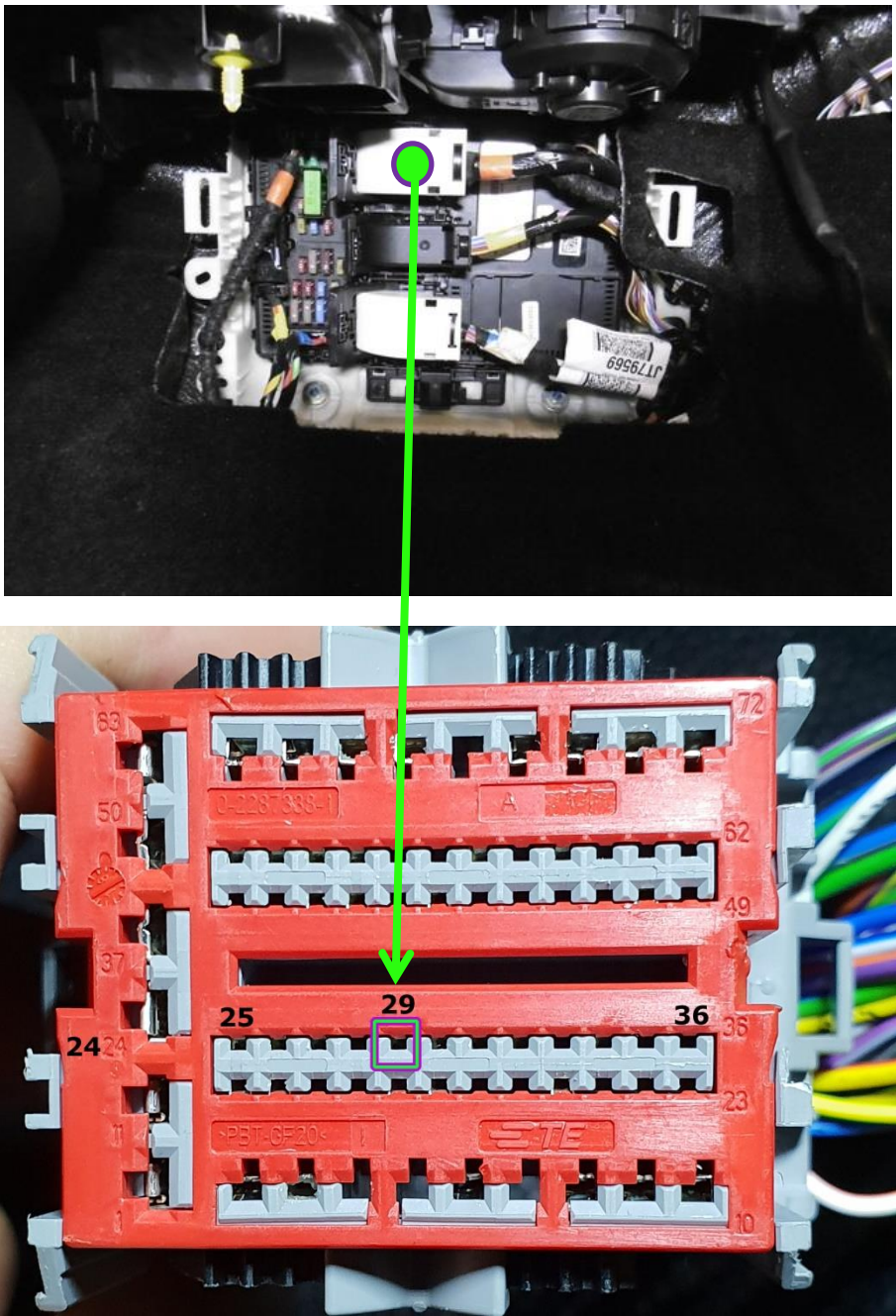
			Digital Input 2, OEM petrol pump driver, PWM IN. Wire colour : yellow-orange, pin 12
56	DIG IN2		Yellow-green


Wiring inside Low Pressure Sensor



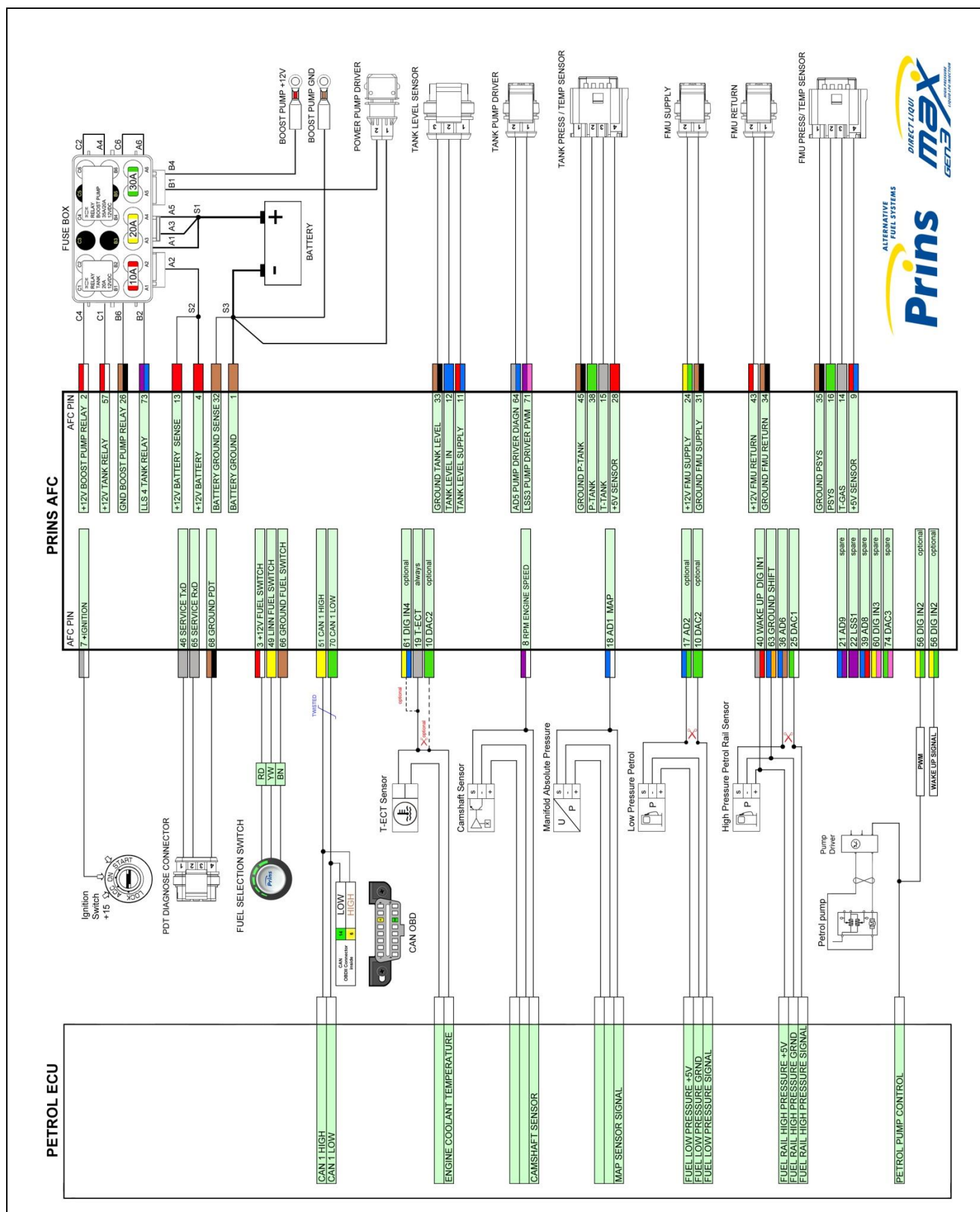
17 & 10			Low pressure petrol sensor signal interruption. Wire colour : brown-blue, pin 11
17 AD 2	<div><div></div><div></div></div>	Blue-green	Sensor side
10 DAC 2	<div><div></div><div></div></div>	Green	Petrol ecu side

Wiring inside WAKE UP

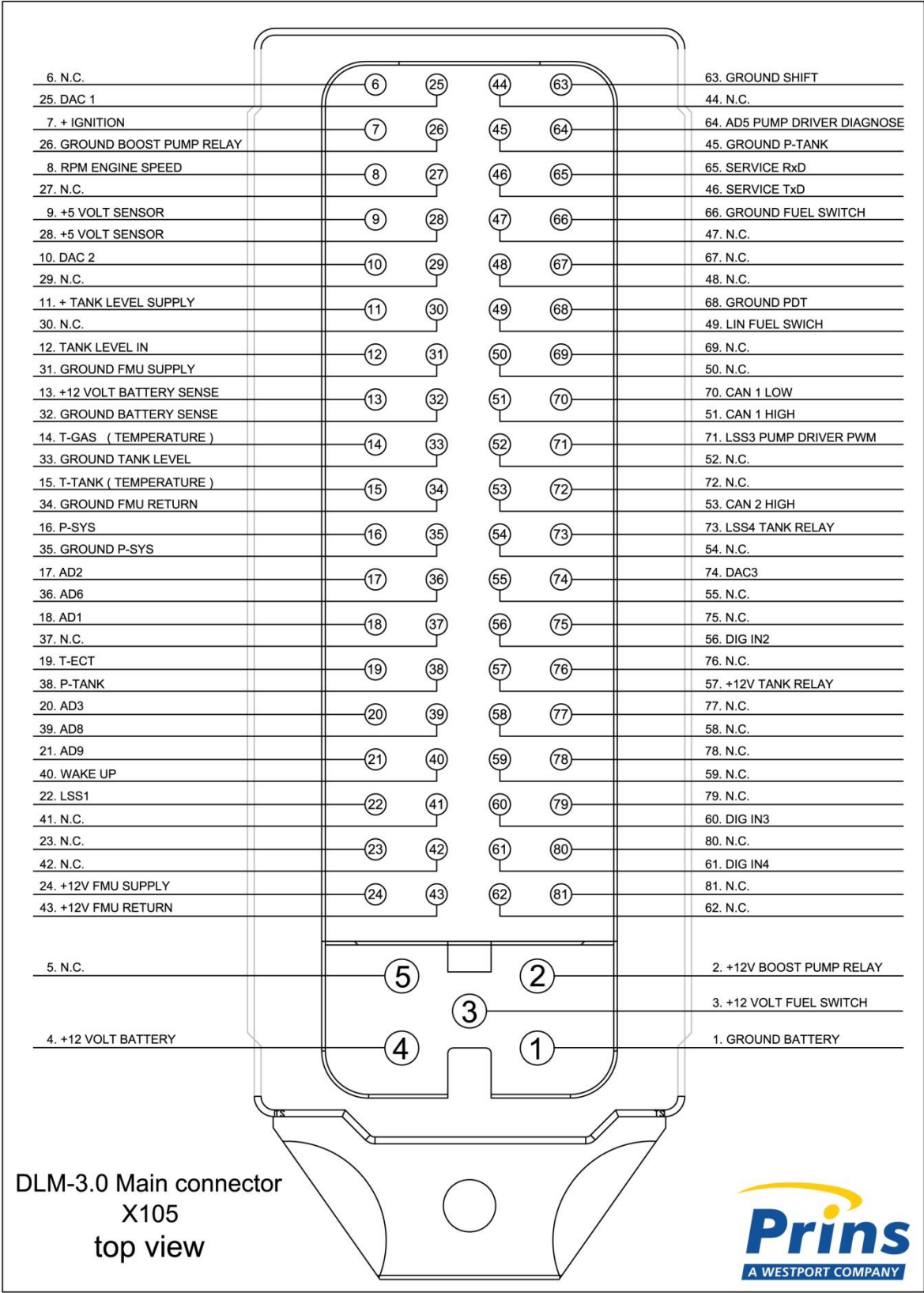


			car wake-up
40	Wake-up		Wire colour : green-purple, pin 29

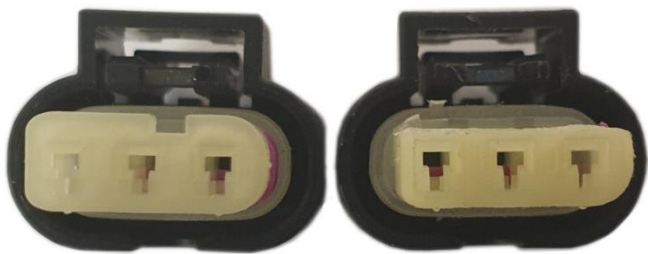
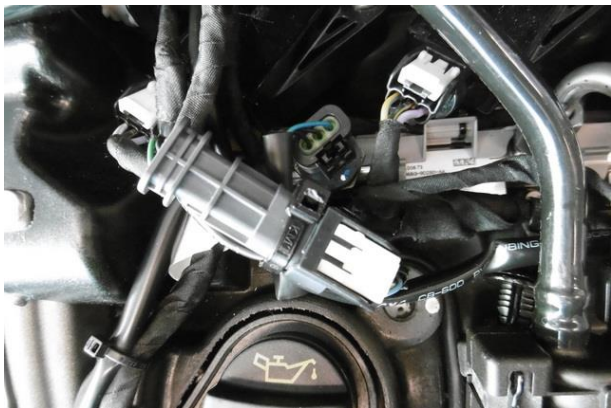
Basic DLM Gen3 wiring diagram







Main Connector



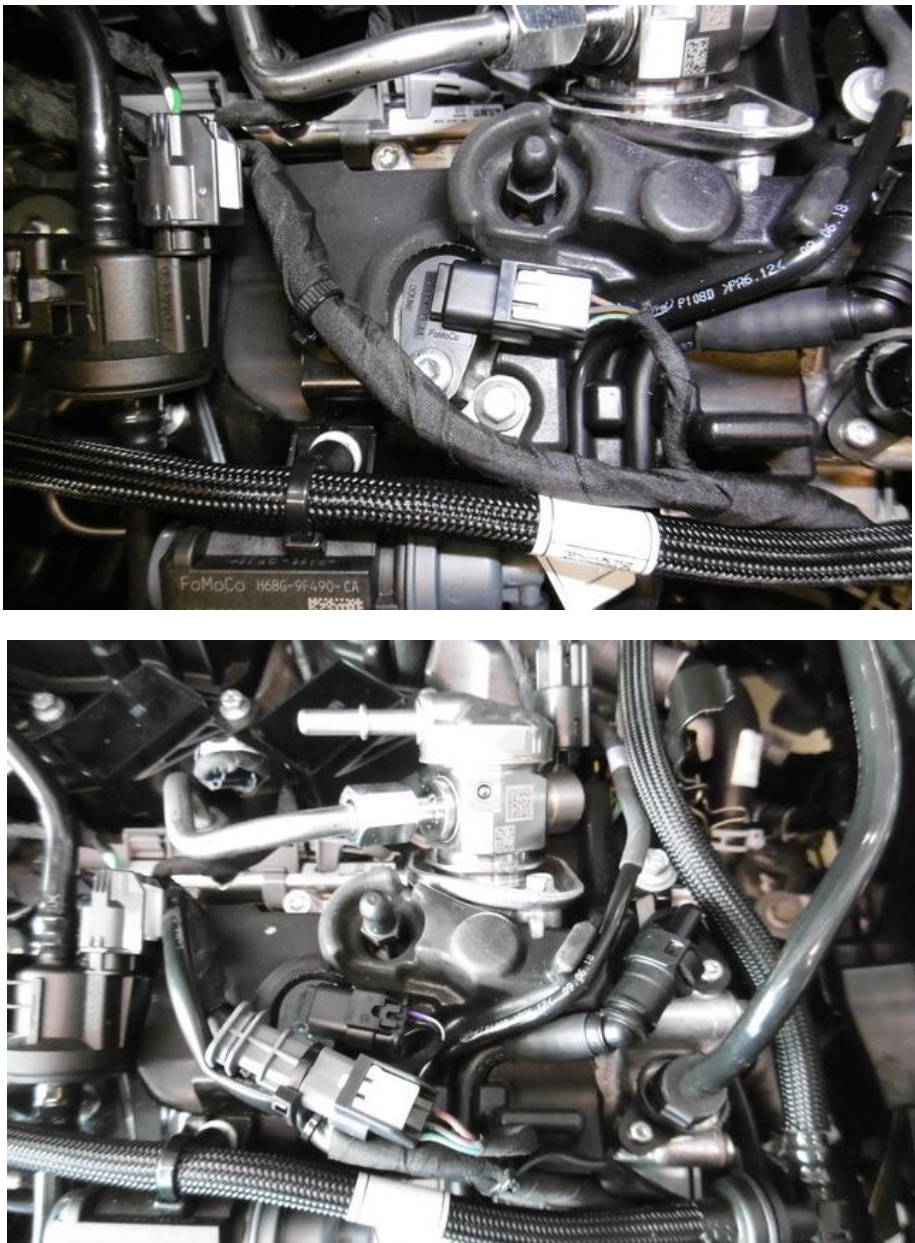
Wiring HPPRS



Remove/cut the keying away inside and outside the HPPRS connectors

36 & 25			High pressure petrol sensor signal interruption. Wire colour : blue-brown, pin 1
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
			High pressure petrol sensor ground. Wire colour : green-white, pin 2
63 Ground Shift		Blue-orange	
7			Connect to sensor supply. Do not place the fuses in the holder before having completed the installation of the LPG system. Wire colour : blue-white, pin 3
7 +IGNITION		Grey-white	

Wiring RPM



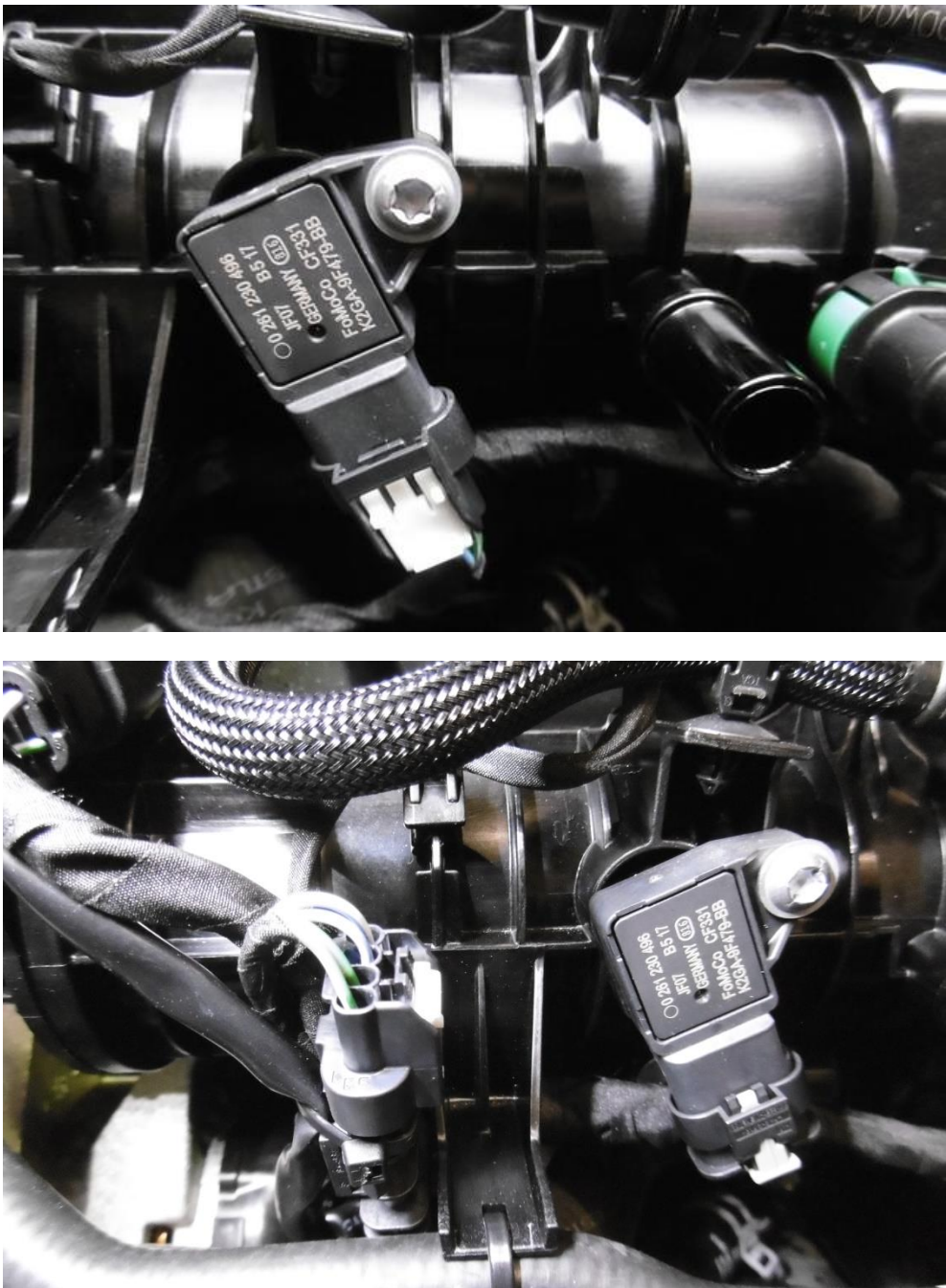
			For measuring the engine speed signal. Wire colour : brown, pin 3
8	RPM	Purple-white	


Wiring T-ect



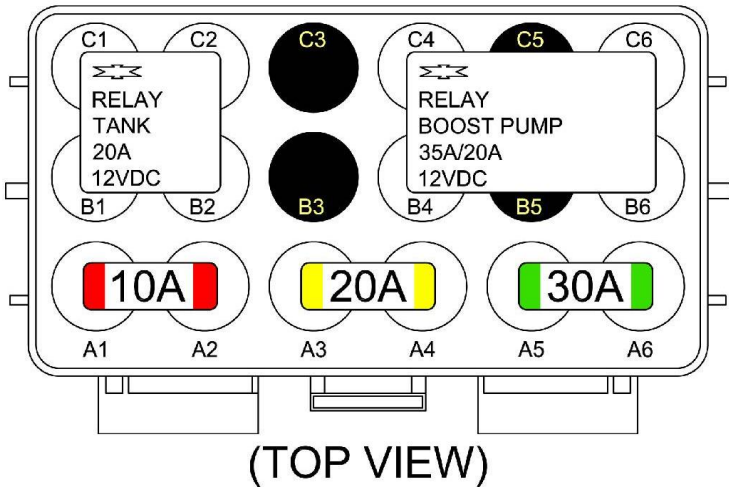
			For measuring the engine coolant temperature. Wire colour : yellow, pin 1
19	T-ect	Grey	

Wiring MAP



			Analog in (sensor side) MAP sensor in.
18	AD 1		Blue-white
			Wire colour : white-blue, pin 1

Wiring Battery plus & ground



Wire text	clr	Wire colour	Connection
1			Connect to the '-' of the battery (-31); use a ring terminal
1 BATTERY GROUND		Brown	
4			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.
4 +12V BATTERY		Red	

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	<i>Diagnose connector for service / diagnosis.</i> 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 Brown-black 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

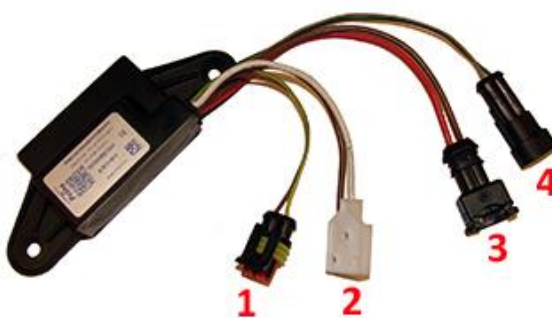
Electrical connections

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.

