ALTERNATIVE FUEL SYSTEMS

Prins

installation manual
Engine Kit
part 2/2

MANUFACTURER	KIA
TYPE	(PRO) CEED (GT)
ENGINE DISPLACEMENT	1591
NUMBER OF VALVES	16
ENGINE CODE / NUMBER - OUTPUT	G4FJ / G4FD
VEHICLE CATEGORIES	M
TRANSMISSION	MT / AT
AFC VERSION	**AFC-2.1**
PETROL ECU MANUFACTURER / CODE	Bosch MED 17.9.8
HIGH PRESSURE PETROL PUMP	BOSCH-HDP-5-PE / 0261520.(081)/(082) TYPE 5
HIGH PRESSURE PETROL INJECTOR	BOSCH-HDEV-5-1 / 0261500.(100)/(101)
MODEL YEAR:	2013-2017
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000017 / DLM-LPG 10
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	CEED G4FD 349/075316001/A
ENGINE SET NUMBER	PRO CEED G4FD 349/075316021/A
ENGINE SET NUMBER	CEED GT G4FJ 349/075316011/A
ENGINE SET NUMBER	PRO CEED GT G4FJ 349/075316031/A
MANUAL NUMBER	076/2891400
DATE	04-12-2017
	Version 30-6-2016 D

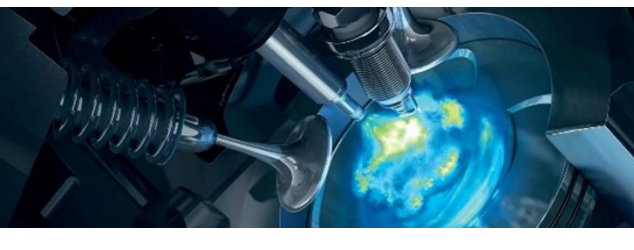


TABLE OF CONTENTS

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 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

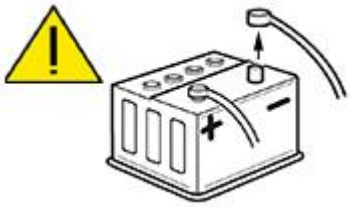
- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

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

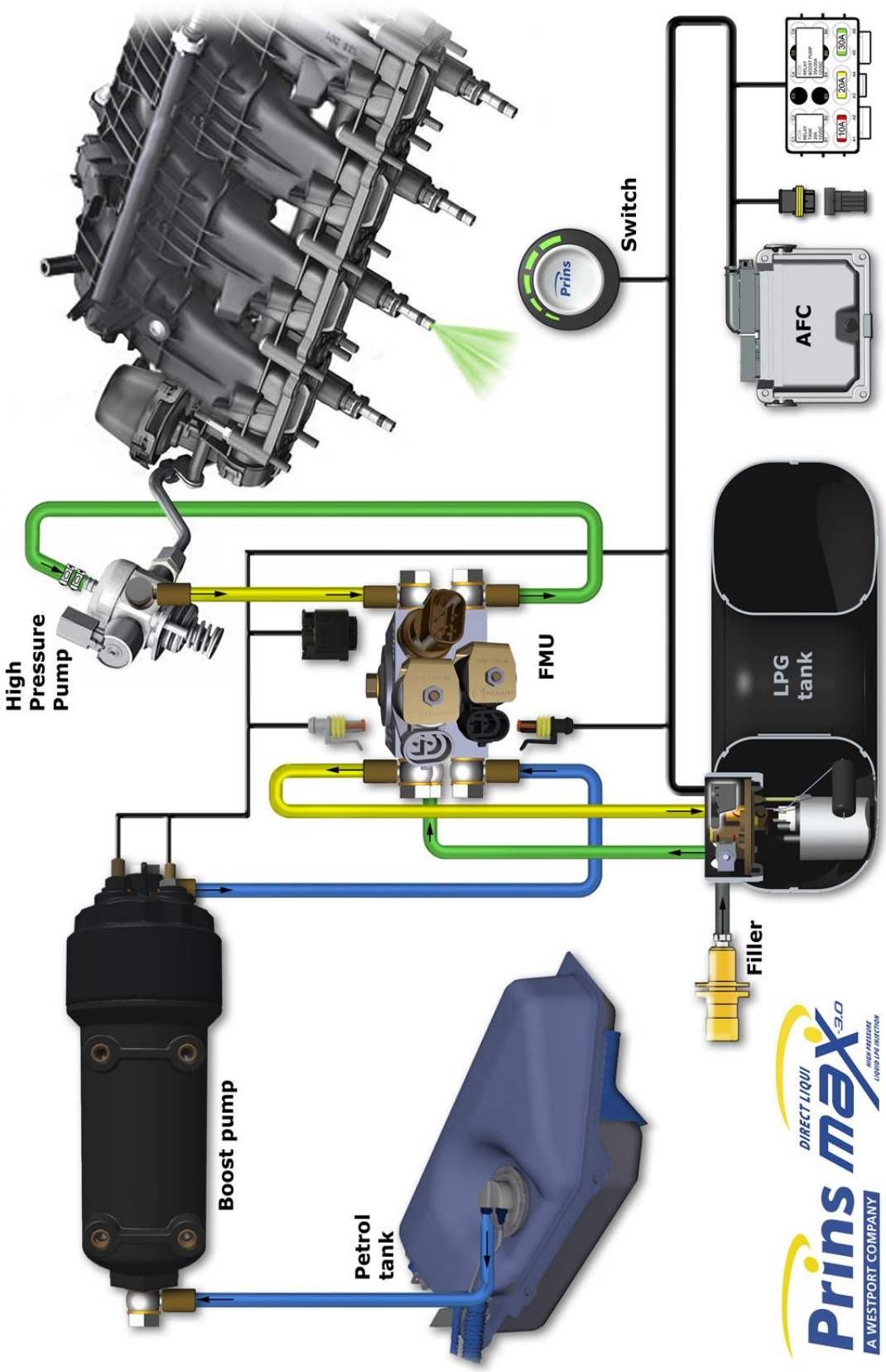


= WEAR SAFETY GOGGLES

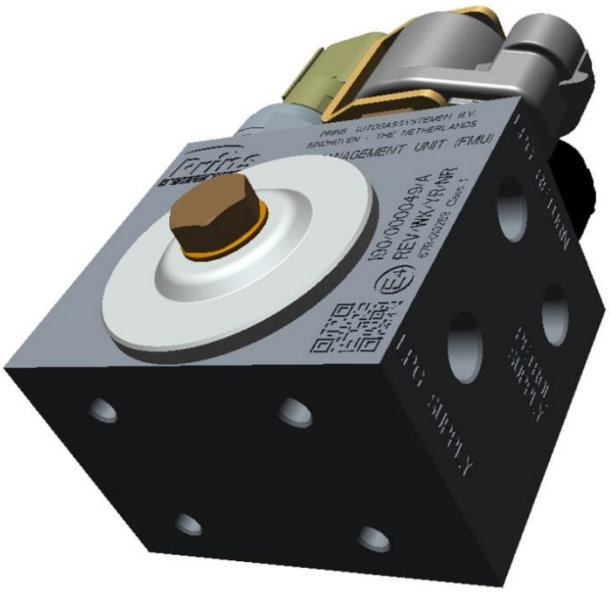
Direct LiquiMax parts / approval numbers

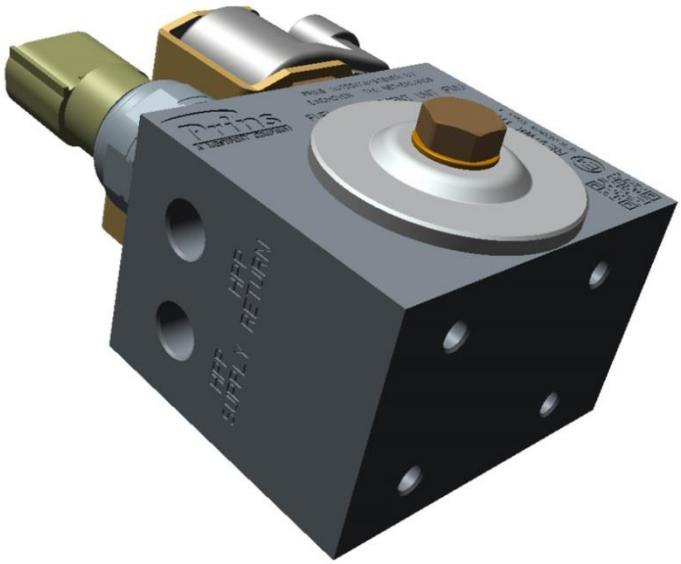
	
Fuel Management Unit : E4-67R-010269	Boost pump
	
Prins AFC: E4-67R-010098 E4-10R-030507	High Pressure Pump : E4-67R-010266 High Pressure Rail : E4-67R-010267 High Pressure Injectors : E4-67R-010309
	
	Fuel lines XD-series : E4-67R-010247

Overview DLM Direct Injection



Fuel Management Unit connections





Fuel Management Unit

Boost pump

DLM component location overview

HPP pump

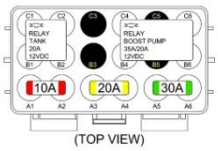
FMU

Boost pump

Petrol ECU

AFC

Fuse / relay box



R115 approval sticker :
Right side centre door post

Removal of the Bosch High Pressure Petrol Pump

-REMOVAL-

-WARNING-

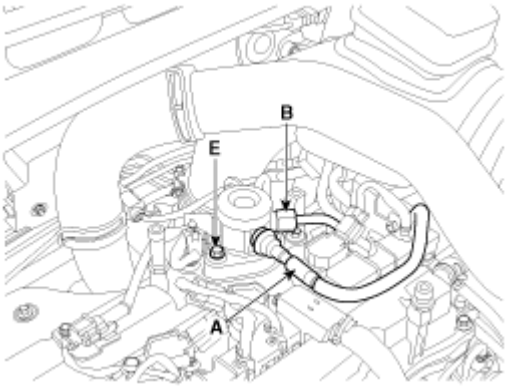
In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, there may be injury caused by leakage of the high pressure fuel.

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.



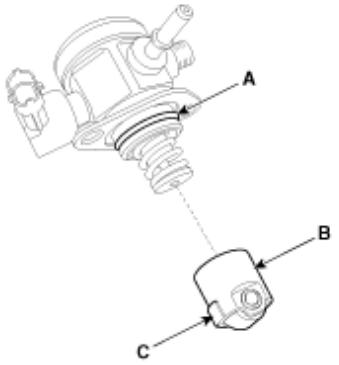
CAREFULLY store the removed petrol pump. Make sure no pollution can come into the pump.

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.



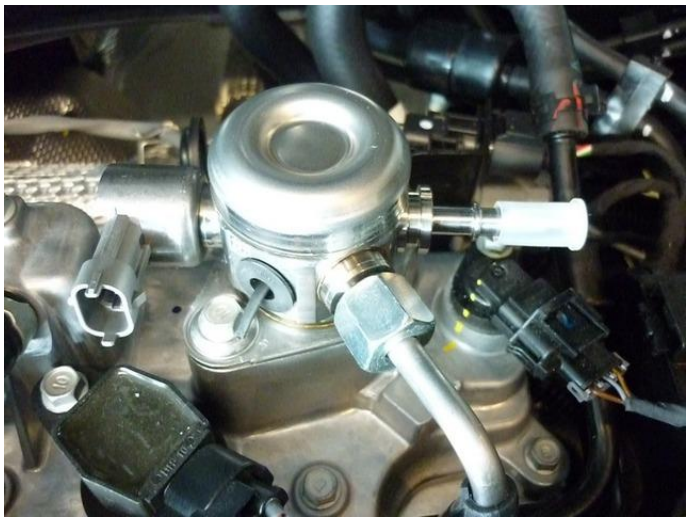
Installation bolts:
When tightening the installation bolts of the high pressure fuel pump, tighten and turn the bolts in small step (0.5 turns) after tightening them with hand-screwed torque.
High pressure petrol pump installation bolt: 12.8 ~ 14.7 N.m

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

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

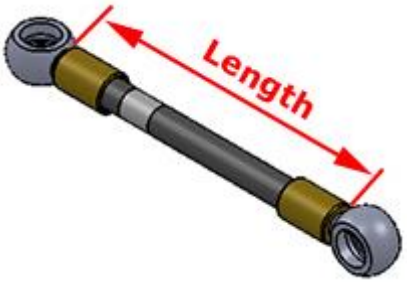


Tighten 20Nm

LPG / petrol fuel lines

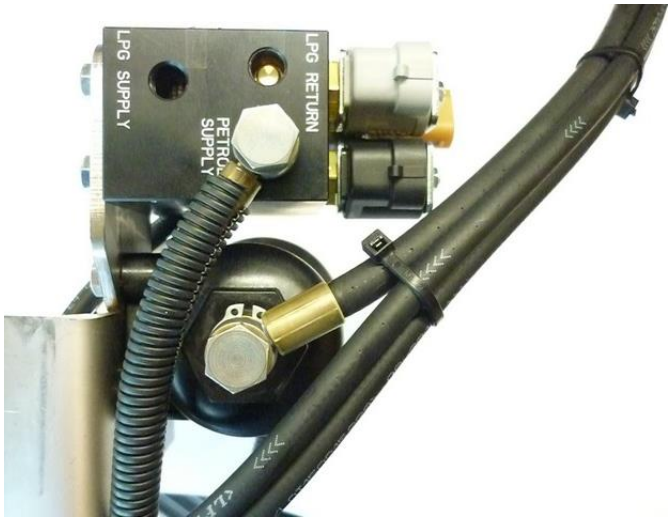
Hose		from	to	Length (cm)
1	XD **4**	Adapter original petrol hose	Boost pump in	70
2	XD **3**	Boost pump out	FMU petrol supply	40
3	XD **3**	FMU HPP supply	High pressure pump	110
4	XD **3**	High pressure pump	FMU HPP return	110

1		2 3 4		
				



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

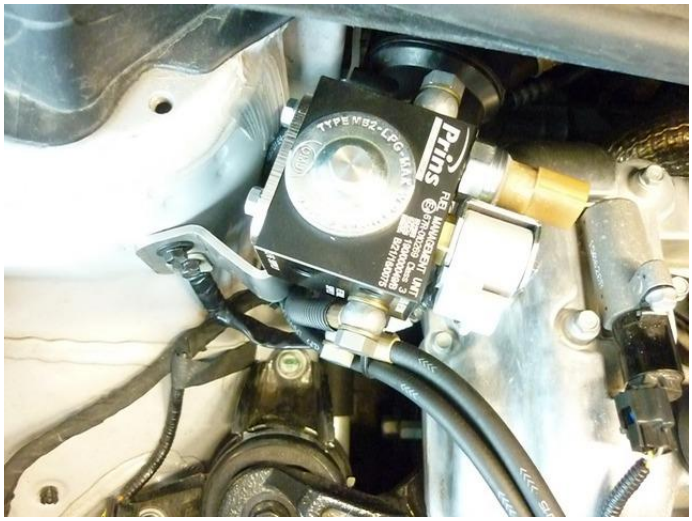
Mounting the FMU / Boost pump



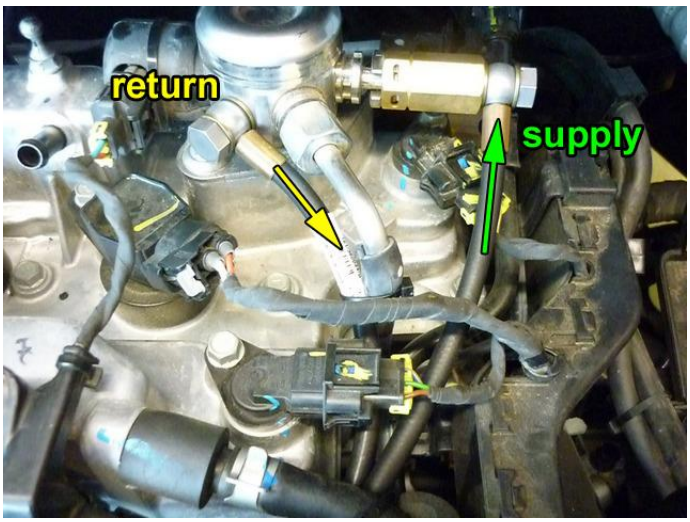
Mounting the FMU / Boost pump

Remove / replace horn

Mounting the FMU / Boost pump

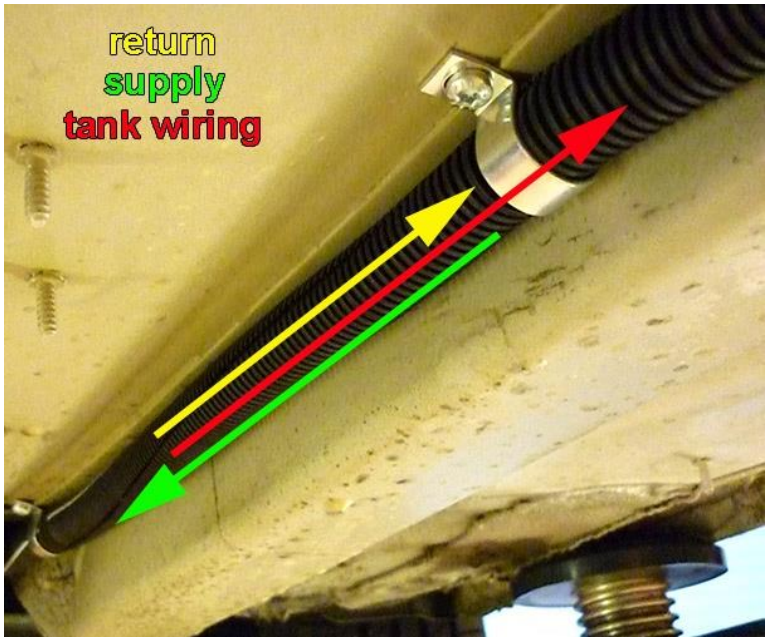


Connections



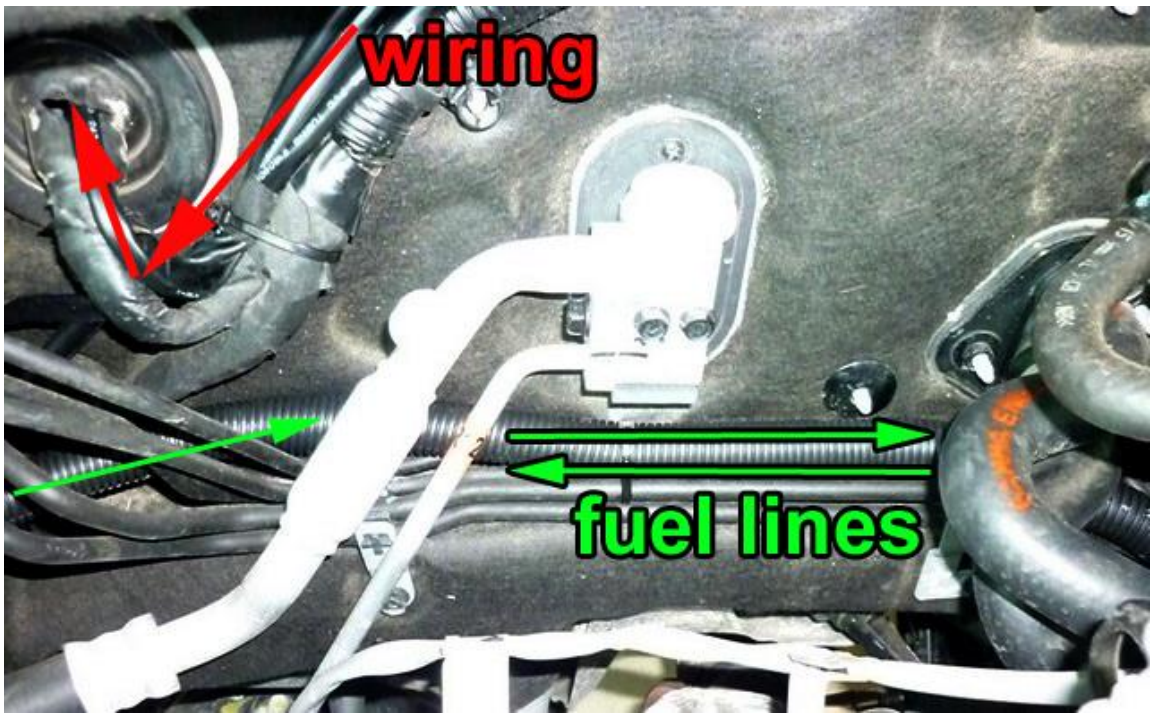
Supply hose – Return hose – Tank wiring

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.

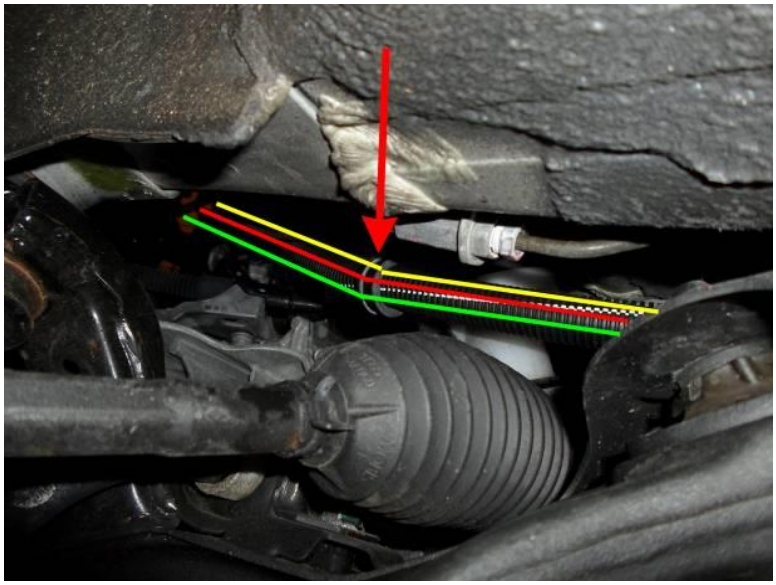


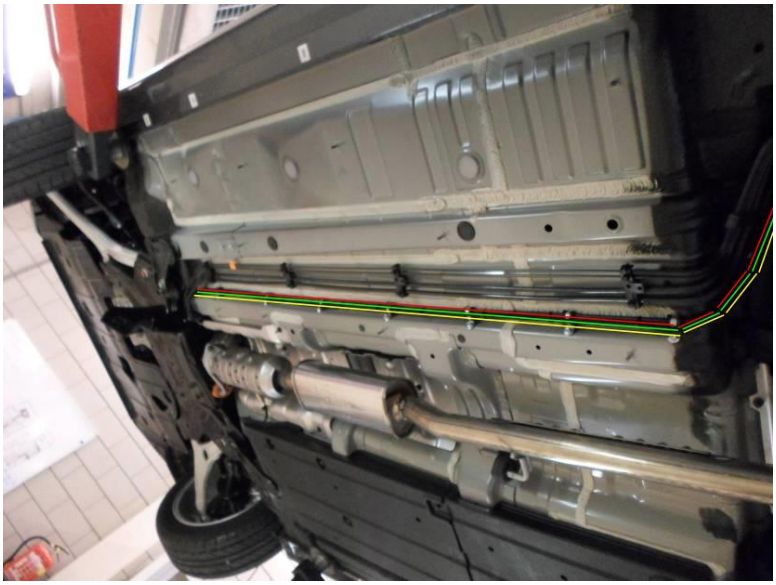
Demo photo

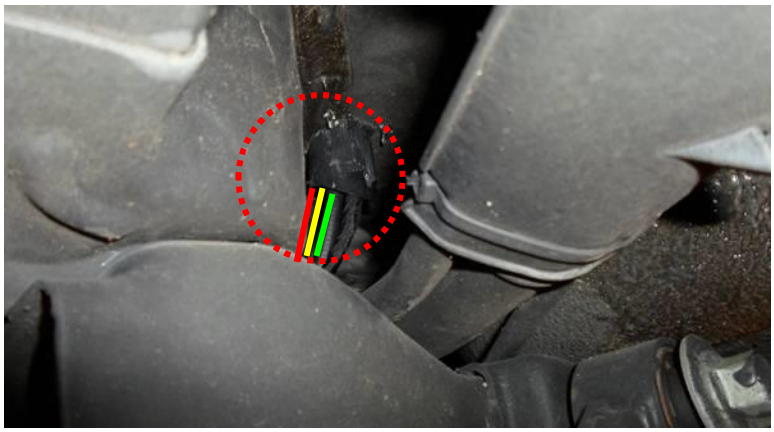
Switch/CAN AND 56 DI wiring



Hose routing



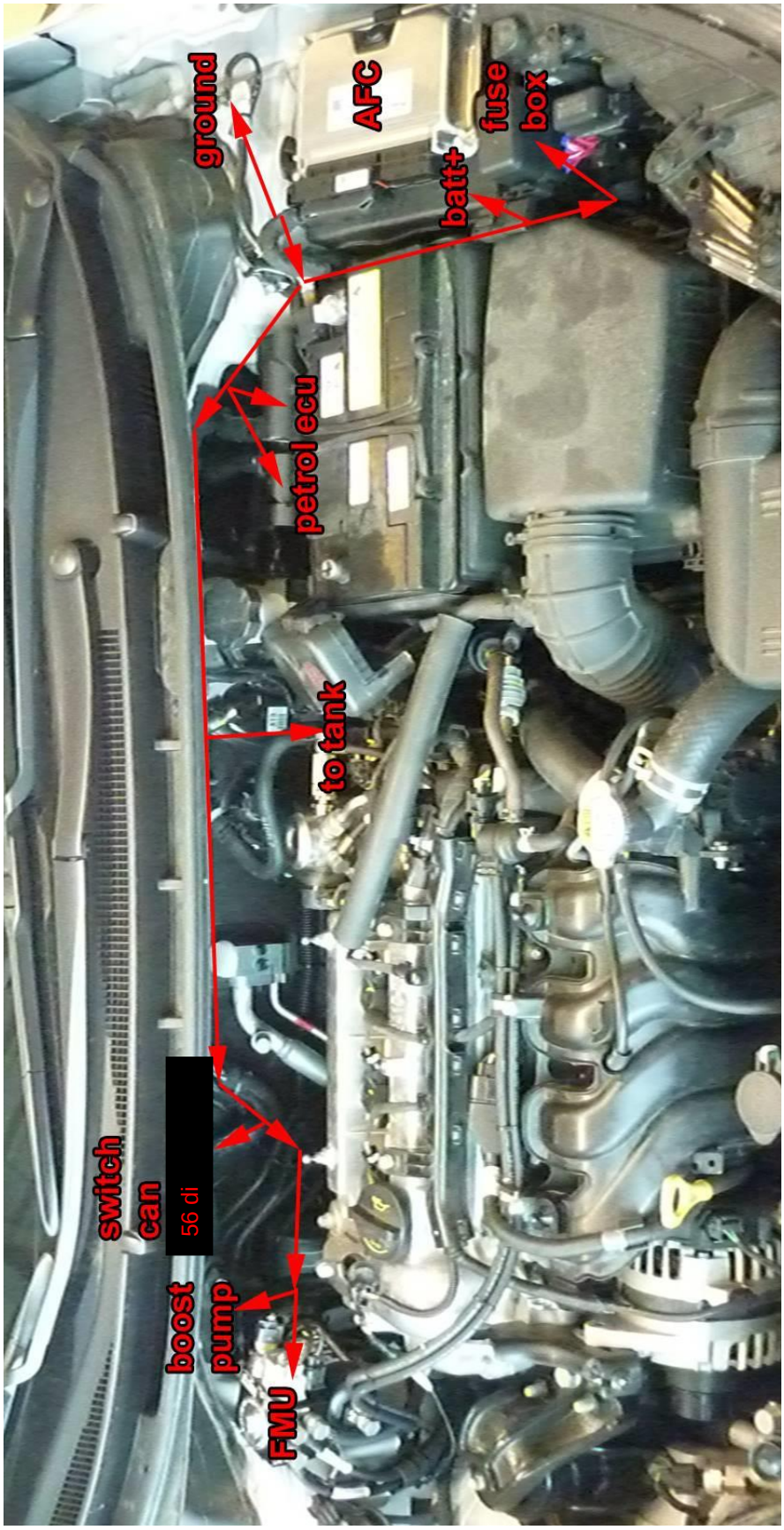




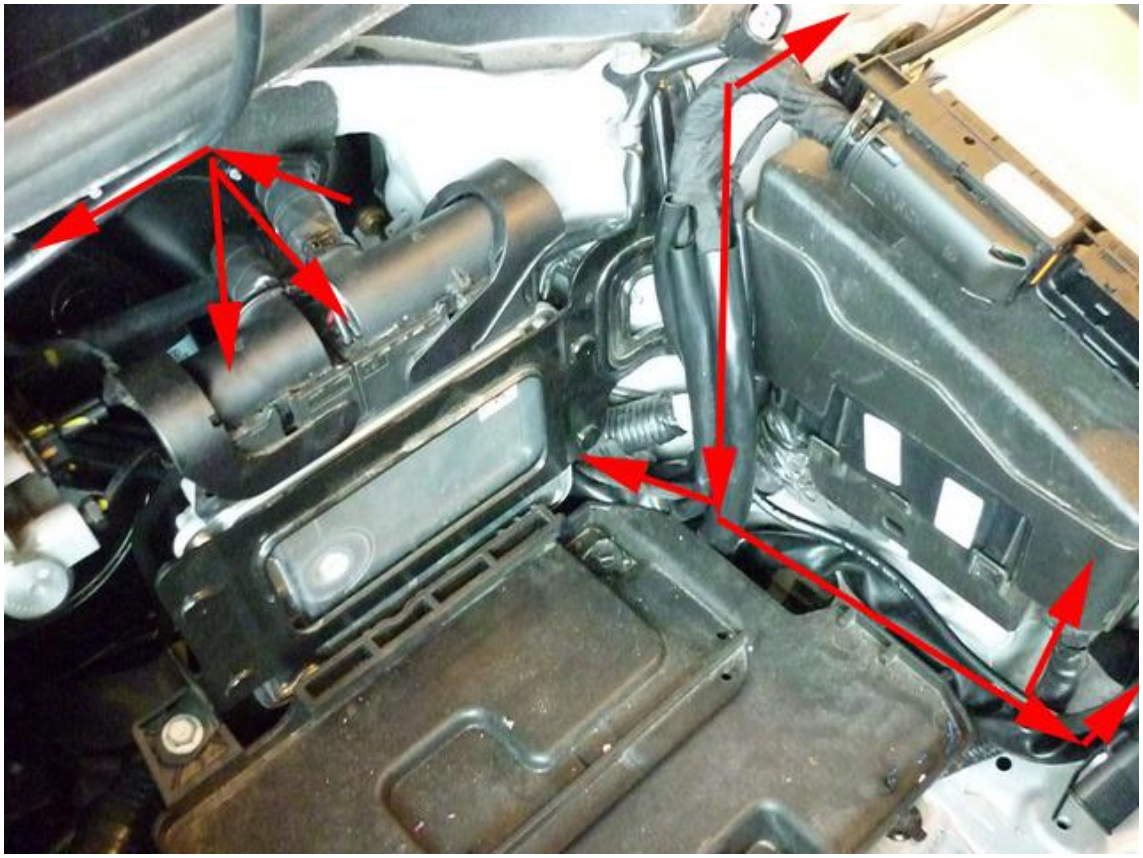
Mounting the AFC-2.1

Drill 3x Ø8mm
Use sealant

Wiring routing



Wiring routing



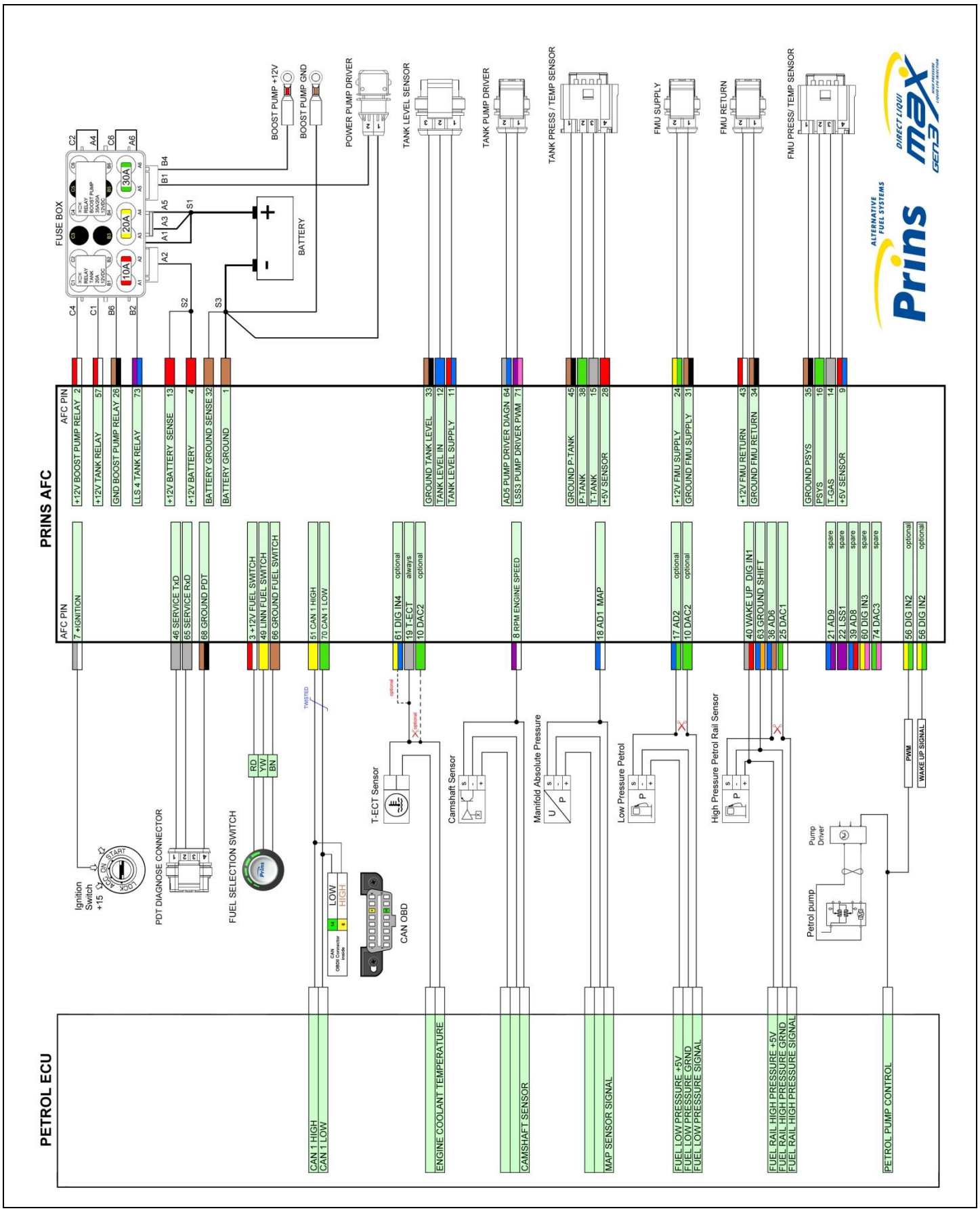
INSIDE : Switch/CAN wiring + 56DIG IN yellow-green

Mounting the fuse / relay box

Mounting the fuel selection switch

Drill Ø8.3mm, mount the switch.

Basic DLM Gen3 wiring diagram

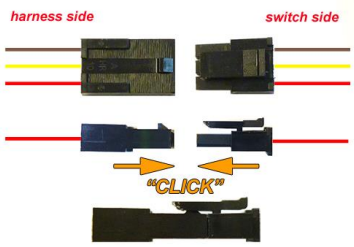


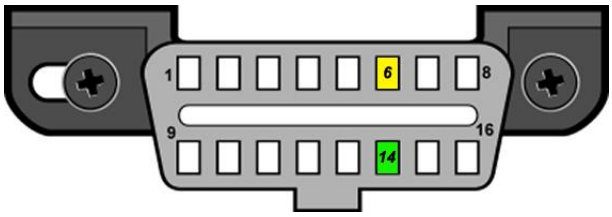
Main Connector

Electrical connections inside, Model ⟶2015

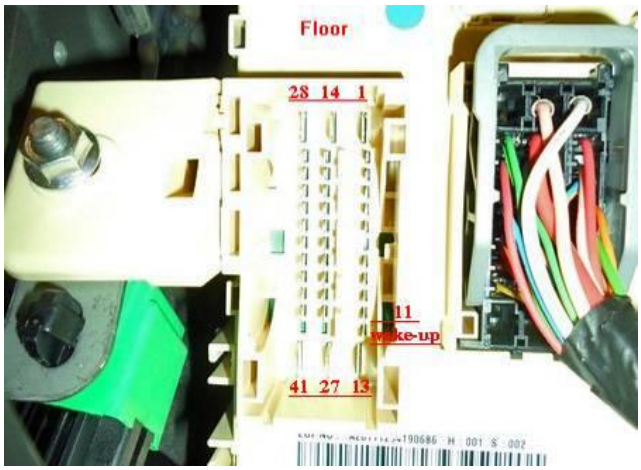
Check and measure the wiring in case of changes in the cars wiring colours.
Insulate not used wires.

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
70 CAN-LOW		Green	EOBD connector pin 14
			

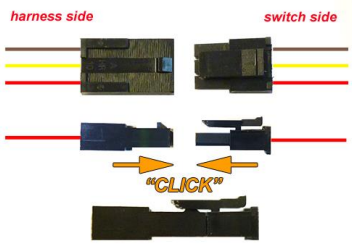
56 DIG IN2		Yellow-green	Connect to drive door switch to wake up
ONLY MODEL ⟶2015			Wire colour : **Red/orange** Wire location :Driver side fuse box **black connector Pin 11**

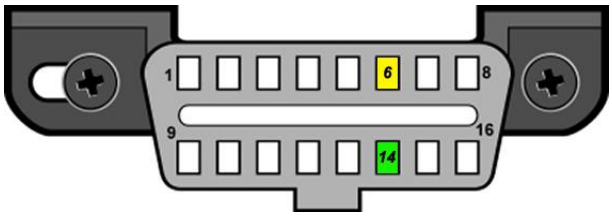


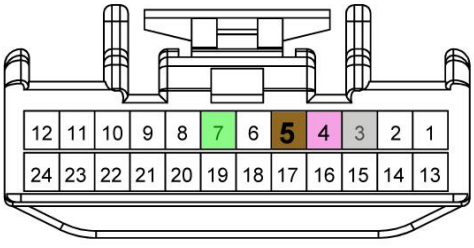
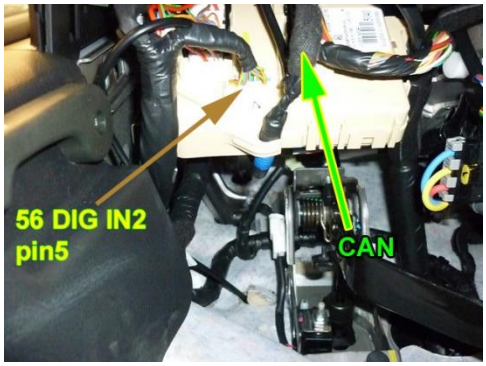
Electrical connections inside, Model 2016⟶

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.
		

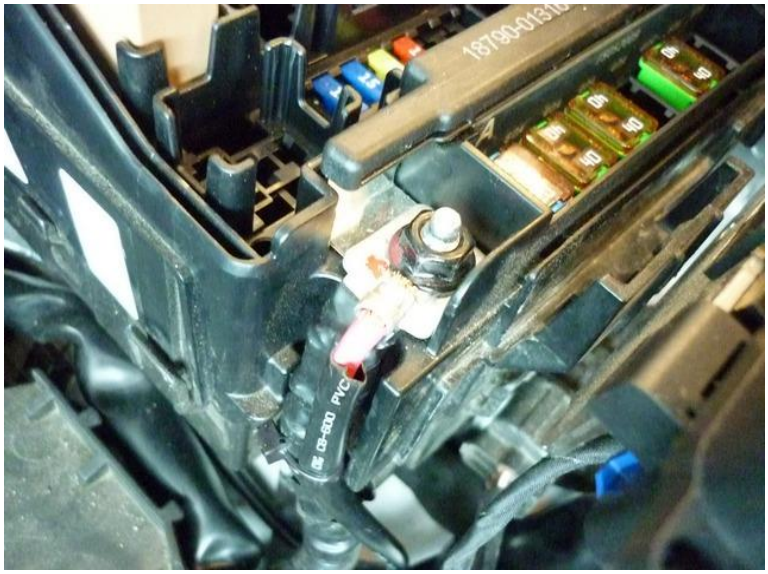
51 CAN-HIGH		Yellow	EOBD connector pin 6
70 CAN-LOW		Green	EOBD connector pin 14
			

56 DIG IN2		Yellow-green	Connect to drive door switch to wake up
ONLY MODEL 2016⟶			Wire colour : **brown, pin 5**. Wire location : 24-pole connector, smart junction block, behind obd.
			

Electrical connections power and ground

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

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

Electrical connections petrol ecu Manual transmission →2015

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

Wire text	*clr*	*Wire clr*	*Connection*
RPS signal			*High pressure petrol sensor signal interruption* Wire colour : **orange** Wire location :Petrol ecu **C100-K pin 58**
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
RPS ground			*High pressure petrol sensor ground* Wire colour : **pink** Wire location :Petrol ecu **C100-K pin 76**
63 Ground Shift		Blue-orange	
CMPS			*For measuring the engine speed signal.* Wire colour : **white-black** Wire location : petrol ecu **C100-K pin 65**
8 RPM		Purple-white	
MAP			Wire colour : **white-black** Wire location :Petrol eco **C100-K pin 80**
18 AD 1		Blue-white	
On-Start			*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 : **pink** Wire location : petrol ecu **C100-K pin 29**
7 +IGNITION		Grey-white	
			High pressure petrol sensor 5V Wire colour : **pink** Wire location :Petrol eco **C100-K pin 20**
40 Wake-up		Grey-red	
T-ect		**G4FD**	*Engine coolant temperature interruption.* Wire colour : **orange** Wire location : Petrol ecu **C100-A pin 23 (Small connector**
19 T-ect		Grey	
Engine coolant Temperature 		**G4FJ**	*Engine coolant temperature interruption.* Wire colour : **orange** Wire location : Petrol ecu **C500-A pin 23 (Small connector)**
61 DIG IN4		Yellow-blue	Sensor side *T-ect sensor (61&19)*
19 T-ect		Grey	Sensor side *T-ect sensor (19&61)*
10 DAC 2		Green	Petrol ecu side *T-ect sensor*

Electrical connections petrol ecu Manual transmission 2016⟶

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

Wire text	*clr*	*Wire clr*	*Connection*
RPS signal			*High pressure petrol sensor signal interruption* Wire colour : **orange** Wire location :Petrol ecu **C100-K pin 58**
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
RPS ground			*High pressure petrol sensor ground* Wire colour : **pink** Wire location :Petrol ecu **C100-K pin 76**
63 Ground Shift		Blue-orange	
CMPS			*For measuring the engine speed signal*. Wire colour : **white-black** Wire location : petrol ecu **C100-K pin 65**
8 RPM		Purple-white	
MAP			Wire colour : **white-black** Wire location :Petrol eco **C100-K pin 80**
18 AD 1		Blue-white	
On-Start			*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 : **pink** Wire location : petrol ecu **C100-K pin 29**
7 +IGNITION		Grey-white	
			High pressure petrol sensor 5V Wire colour : **pink** Wire location :Petrol eco **C100-K pin 20**
40 Wake-up		Grey-red	
Engine coolant Temperature ⚠		**G4FD** & **G4FJ**	*Engine coolant temperature interruption.* Wire colour : **Yellow or white** Wire location : Petrol ecu **C500-A pin 23 (Small connector)**
61 DIG IN4		Yellow-blue	Sensor side *T-ect sensor (61&19)*
19 T-ect		Grey	Sensor side *T-ect sensor (19&61)*
10 DAC 2		Green	Petrol ecu side *T-ect sensor*

Electrical connections Automatic transmission →2015

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

Wire text	*clr*	*Wire colour*	*Connection*
RPS ground			*High pressure petrol sensor ground.* Wire colour : **Green** or **Black** Wire location : **Petrol ECU, T91, *pin 10***
63 Ground Shift		Blue-orange	
RPS supply			*High pressure petrol sensor supply 5V* Wire colour : **Blue** or **Green-black** Wire location : **Petrol ECU, T91, pin 15**
40 Wake-up		Grey-red	
MAP			*Analog in (sensor side) MAP sensor in.* Wire colour :**Pink** Wire location : **Petrol ECU, T91, pin 26**
18 AD 1		Blue-white	
RPS signal			*High pressure petrol sensor signal interruption.* Wire colour : **White** or **Orange** or **Blue-black** Wire location : **Petrol ECU, T91, *pin 27***
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
CMPS			*For measuring the engine speed signal.* Wire colour : **Green** or **Blue-black** Wire location : **Petrol ECU, T91, pin 47**
8 RPM		Purple-white	
On-Start			*Connect to +ignition / contact+ (+15).* *Do not place the fuses in the holder before having completed the installation of the LPG system.* Wire colour : **Pink** or **Green** Wire location : **Petrol ECU, T91, pin 68**
7 +IGNITION		Grey-white	
Engine coolant Temperature		**G4FD**	*For measuring the engine coolant temperature.* Wire colour : **Yellow** or **Pink** Wire location : **Petrol ECU, T105 !!, *pin 82***
19 T-ect		Grey	Sensor side *T-ect sensor*
Engine coolant Temperature ⚠		**G4FJ**	*For measuring the engine coolant temperature.* Wire colour : **Yellow** or **Pink** Wire location : **Petrol ECU, T105 !!, *pin 82***
61 DIG IN4		Yellow-blue	Sensor side *T-ect sensor (61&19)*
19 T-ect		Grey	Sensor side *T-ect sensor (19&61)*
10 DAC 2		Green	Petrol ecu side *T-ect sensor*

Electrical connections Automatic transmission 2016⟶

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

Wire text	*clr*	*Wire colour*	*Connection*
RPS ground			*High pressure petrol sensor ground.* Wire colour : **Green** or **Black** Wire location : **Petrol ECU, T91, *pin 10***
63 Ground Shift		Blue-orange	
RPS supply			*High pressure petrol sensor supply 5V* Wire colour : **Blue** or **Green-black** Wire location : **Petrol ECU, T91, pin 15**
40 Wake-up		Grey-red	
MAP			*Analog in (sensor side) MAP sensor in.* Wire colour :**Pink** Wire location : **Petrol ECU, T91, pin 26**
18 AD 1		Blue-white	
RPS signal			*High pressure petrol sensor signal interruption.* Wire colour : **White** or **Orange** or **Blue-black** Wire location : **Petrol ECU, T91, *pin 27***
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side
CMPS			*For measuring the engine speed signal.* Wire colour : **Green** or **Blue-black** Wire location : **Petrol ECU, T91, pin 47**
8 RPM		Purple-white	
On-Start			*Connect to +ignition / contact+ (+15).* *Do not place the fuses in the holder before having completed the installation of the LPG system.* Wire colour : **Pink** or **Green** Wire location : **Petrol ECU, T91, pin 68**
7 +IGNITION		Grey-white	

Engine coolant Temperature 		**G4FD** & **G4FJ**	*For measuring the engine coolant temperature.* Wire colour : **Yellow** or **Pink** Wire location : **Petrol ECU, T105 !!, *pin 82***	
61 DIG IN4		Yellow-blue	Sensor side	*T-ect sensor (61&19)*
19 T-ect		Grey	Sensor side	*T-ect sensor (19&61)*
10 DAC 2		Green	Petrol ecu side	*T-ect sensor*

Electrical connections not used

Insulate not used wires, when using an universal wiring harness.

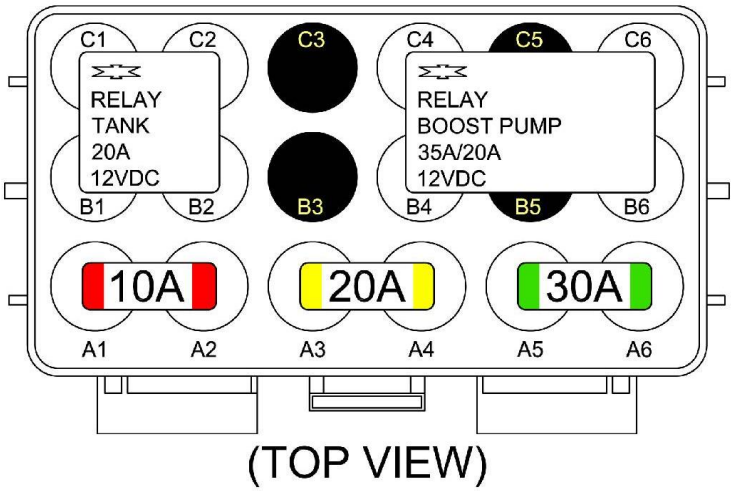
Wire text	*clr*	*Wire clr*	*Connection*
21 AD 9		Blue-purple	
22 LSS 1		Purple	
39 AD 8		Blue-red	
60 DIG IN3		Yellow-pink	
74 DAC 3		Green-pink	
17 AD 2		Blue-green	

Electrical connections connectors

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 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



(TOP VIEW)

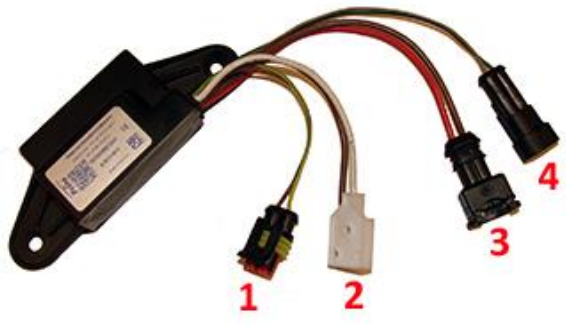
Electrical connections tank housing

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



Safety sticker

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.