ALTERNATIVE FUEL SYSTEMS

Prins

HYUNDAI KIA MOTORS

Installation manual

PART 2/2

We strongly advice ValveCare-DI on this engine

MANUFACTURER	Hyundai / Kia
MODEL	(based on Ceed 2020)
ENGINE DISPLACEMENT	1353 cc
NUMBER OF VALVES	16
ENGINE CODE / NUMBER - OUTPUT	G4LD - 103kW
FIRING ORDER	1-3-4-2
VEHICLE CATEGORIES	M1
TRANSMISSION	MT
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	KN9 - 52cc
TYPE INJECTION MODULE	Gen2 type 4
PETROL ECU MANUFACTURER / CODE	Kefico CPEGD 2.20.3
MODEL YEAR:	2020
SYSTEM APPROVAL NUMBER (R115)	E4-#115R-000031 / VSI-LPG 45
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	349/121003/A
MANUAL NUMBER	076/2892400
DATE	2020-03-18

TABLE OF CONTENTS

FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE : INSTALLATION MANUAL GENERAL PART 1 / 2

Manual updates / revision

Rev. nr	Rev. Date	Subject update
-	2020-03-18	Release

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.
- Always download the “general manual 1/2 “ from our website for basic instructions and diagrams.
- Always disconnect the battery when installing the LPG system. Make sure the ignition key is outside the car. Be aware of central door locking, radio / telephone memory code, alarm system.
- Do not place the main fuse into the fuse holder before having completed the installation of the VSI system.
- The VSI computer has to be activated by means of the diagnosis software.
- In the unlikely event the VSI computer fails, it will automatically switch over to petrol.
  Never disconnect the VSI computer connector, unless you have removed the main fuse.
- When installing the VSI 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 the 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.
- Remove any internal burrs after having shortened the LPG pipe.
  (This guarantees the maximum flow through the pipe without pollution.)
- If holes have to be drilled (wear safety glasses) for installing brackets, etc., the drilled holes must always be treated with an anti-corrosion agent, after the chips have been removed (especially when mounting an exterior filler into body work).
- After having completed the installation, check the whole system for gas leakage; use a gas leak detection device. Also check for any leak of engine coolant, petrol and air.
- Fitting and maintenance is only allowed by Prins Autogassystemen selected LPG engineers.
- Failure to follow the instructions in this manual can result in a poor or non-working LPG-installation or a dangerous situation.
- For maintenance instructions and filter registration see owner’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.

Please fill in the warranty portal completely within 14 days after installation.
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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 diagnostic tool
- 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

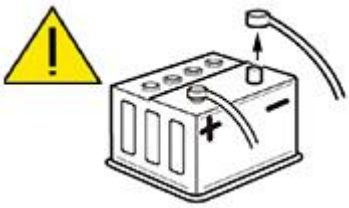
- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

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

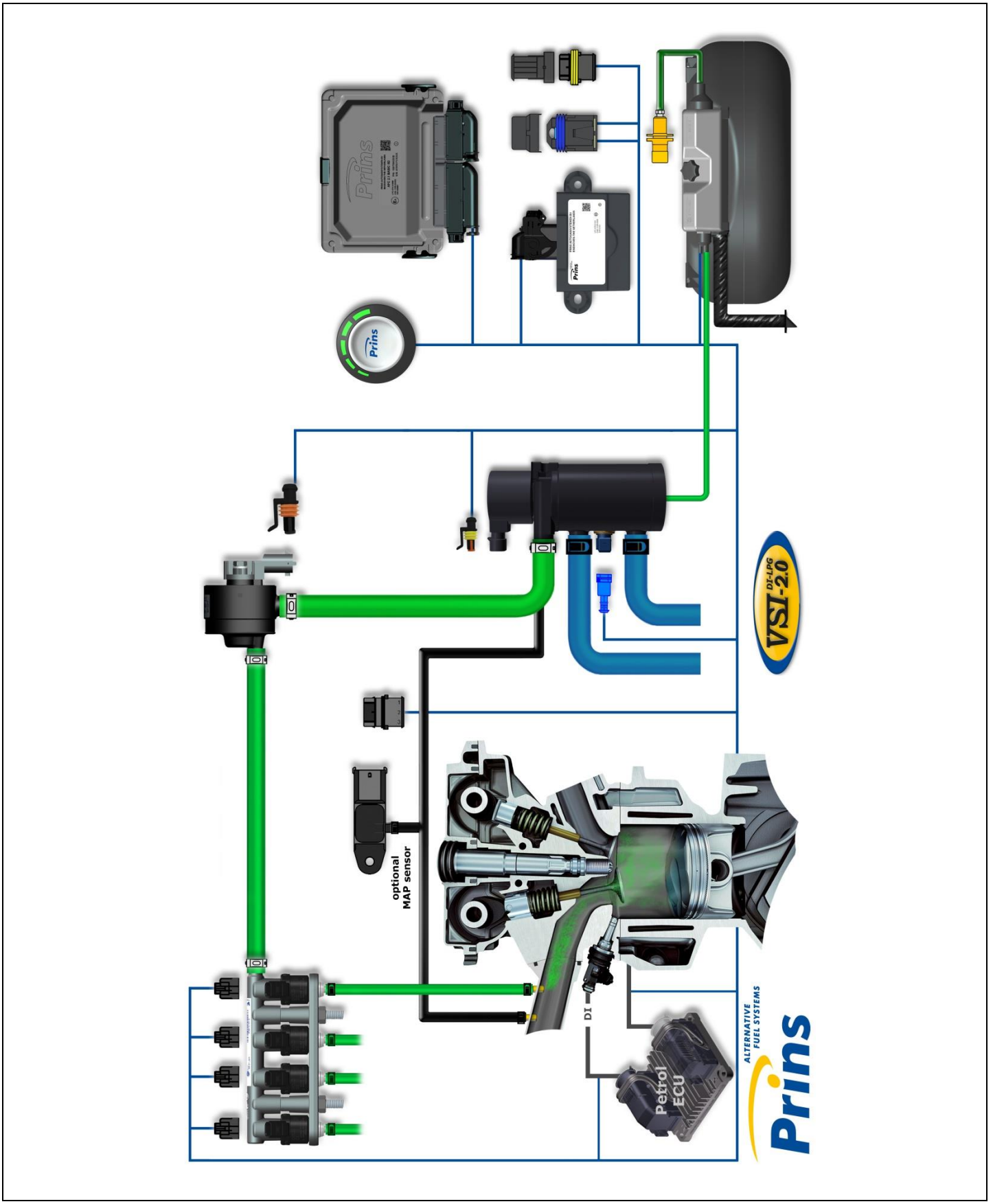
EXPLANATION OF SYMBOLS :

= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

Base diagram



VSI approval numbers

	
Reducer eVP-500 : E4-67R-010358	Injector rail Prins : LPG E4-67R-010093 CNG E4-110R-000021
	
Filter unit Prins : LPG E4-67R-010096 CNG E4-110R-000028	Injector Keihin KN9 : LPG E4-67R-010310 CNG E4-110R-000295
	
Prins AFC : E4-67R-010098 E4-10R-030507	Tubithor : LPG E13-67R-010145 CNG E13-110R-000017 Rubia : LPG E4-67R-010068 CNG E4-110R-000003 WinLas : LPG E37-67R-010140 CNG E37-110R-000012

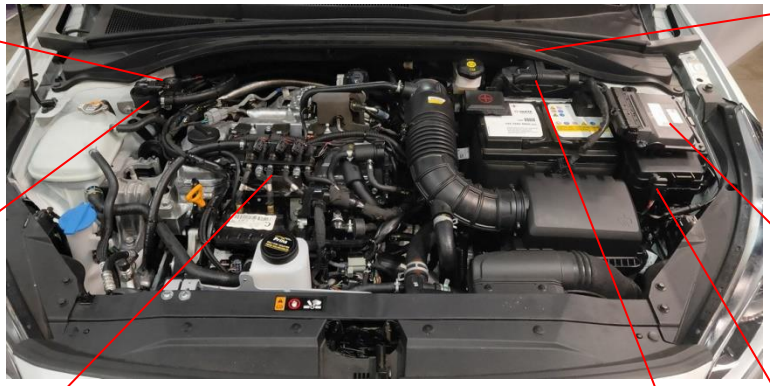
VSI component location overview

(example Kia Ceed 2020)

eVP-500

Filter

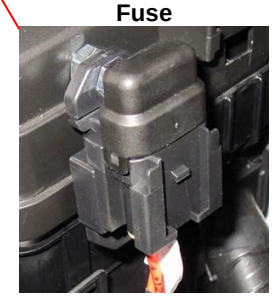
Rail



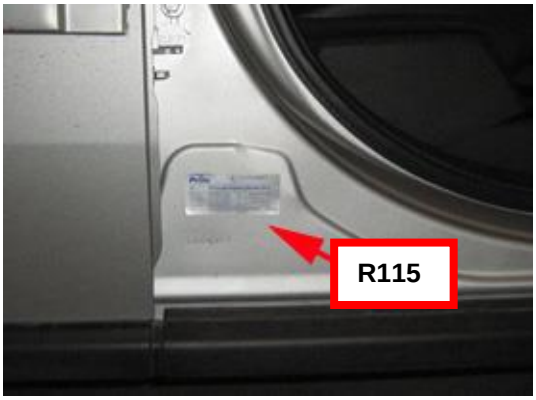
IM

AFC

Fuse



Petrol ECU



R115 approval sticker :
Right side centre door post

Location Examples
(based on Kia Ceed 2020)

eVP-500 & filter

Injection Module

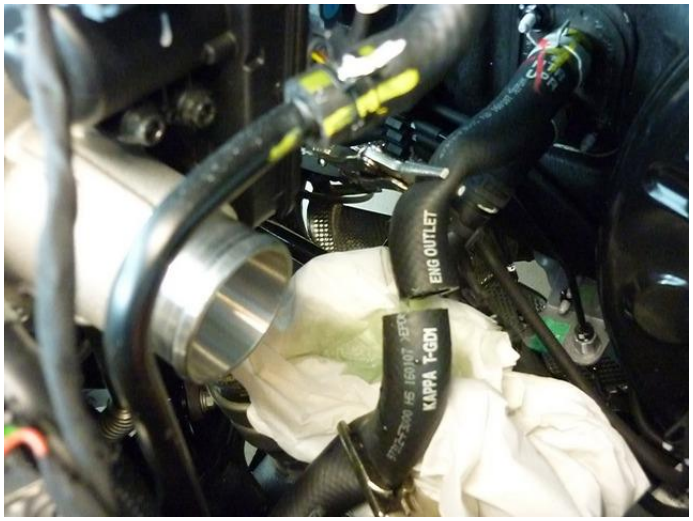
AFC

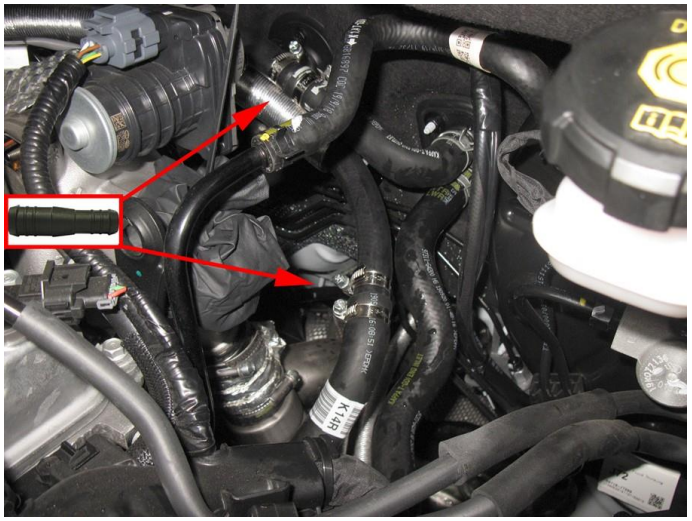
Fuse & diagnostic connector

ValveCare-DI (if mounted)

Water connections

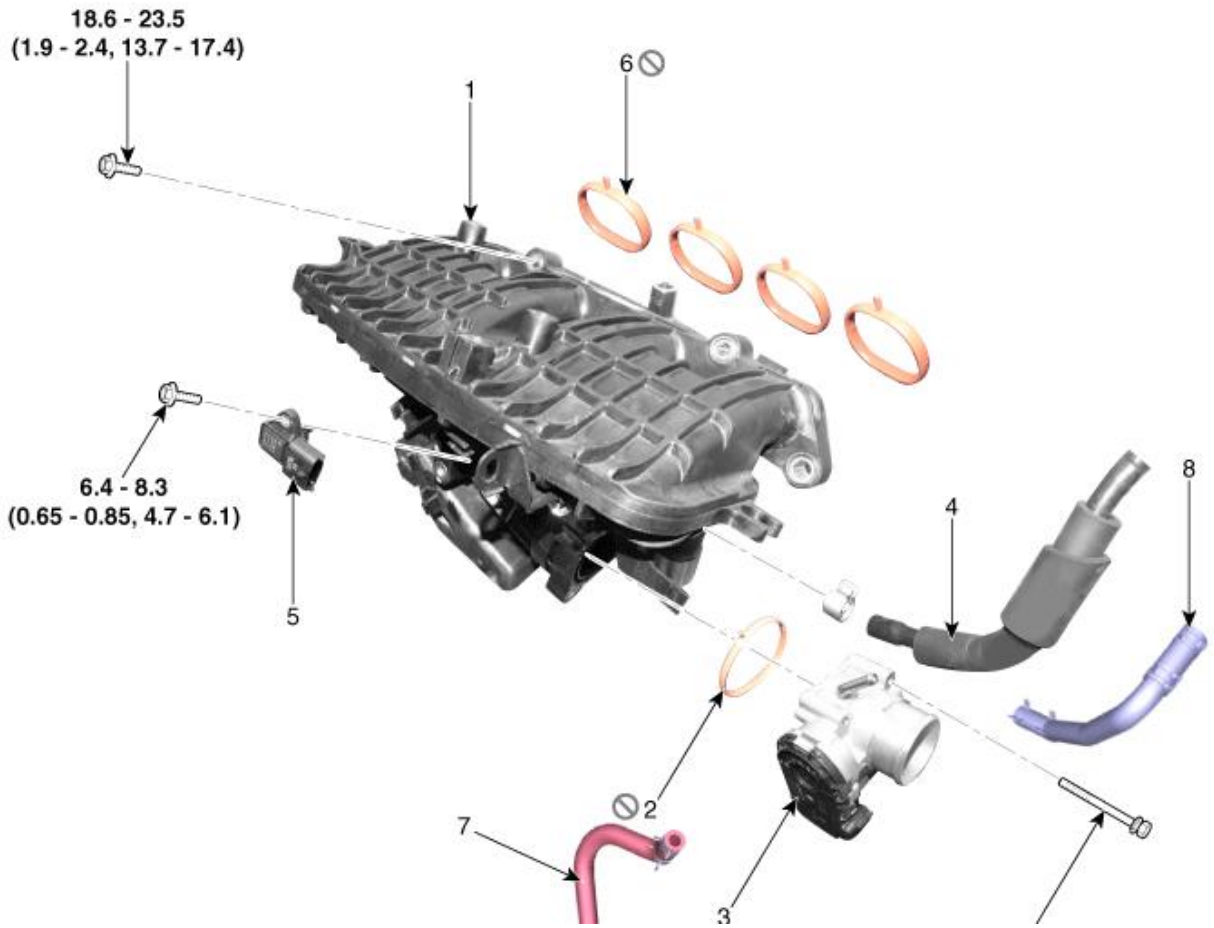
(based on Kia Ceed 2020)





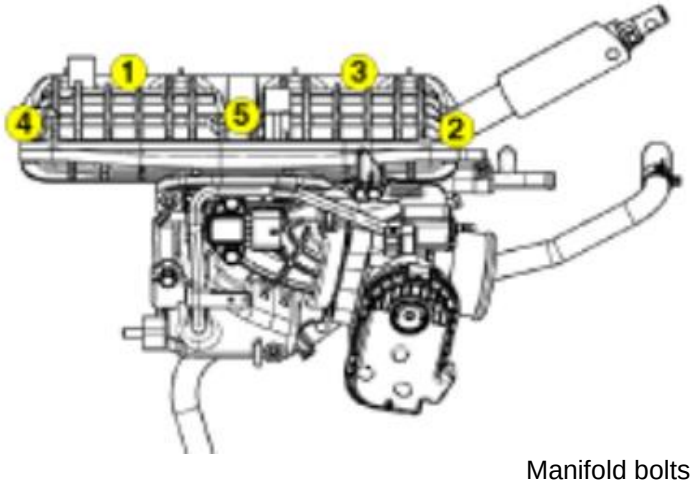
Cut and rotate the top heater hose if necessary. Use 2 couplers Ø16x20mm.

Inlet manifold



Remove the inlet manifold

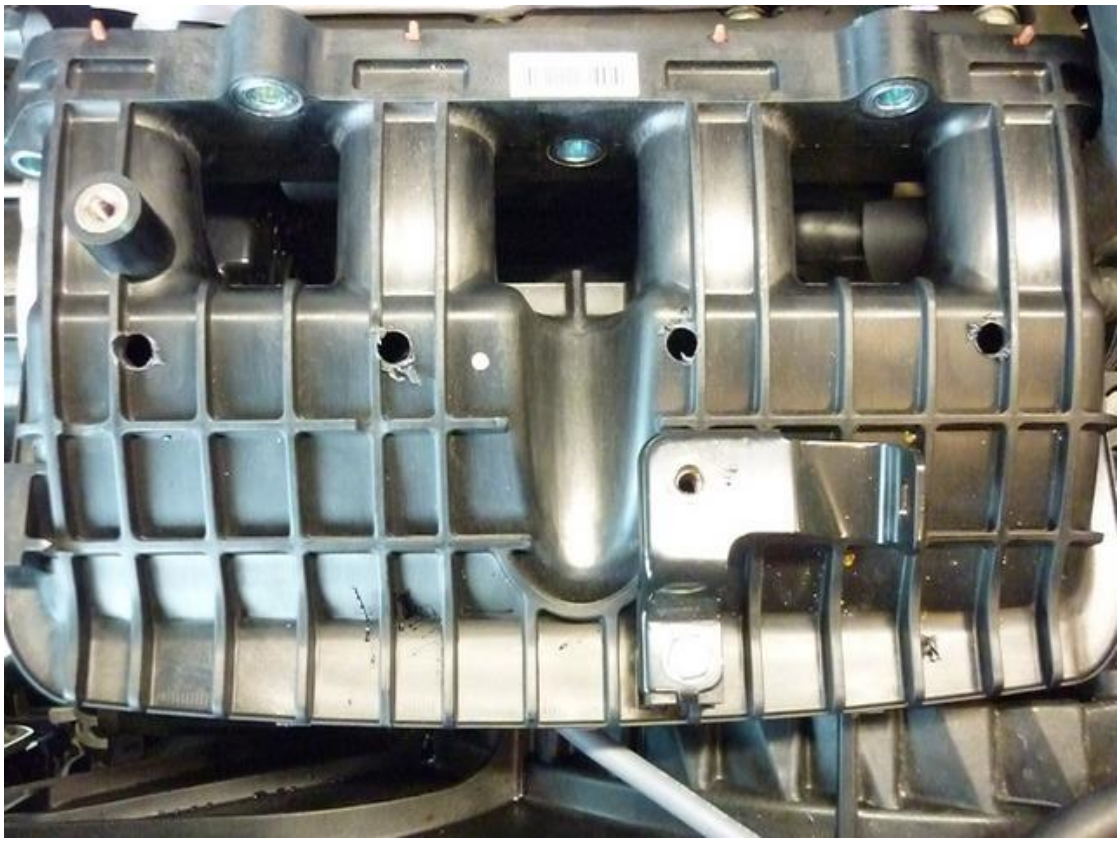
Wiring

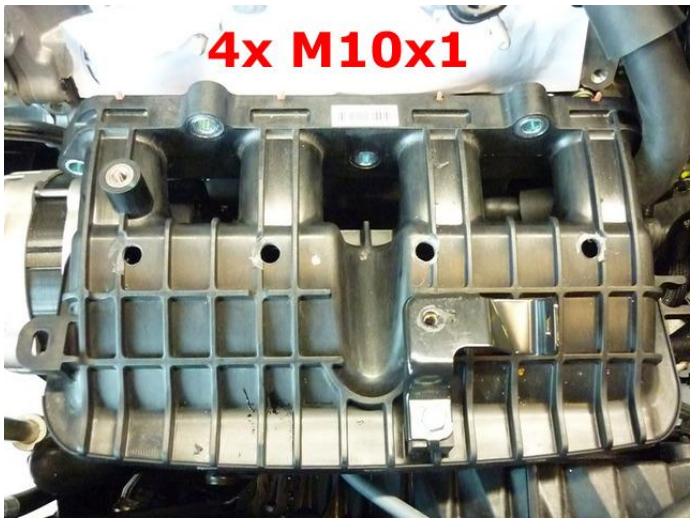


Manifold bolts

Mounting the inlet manifold couplings

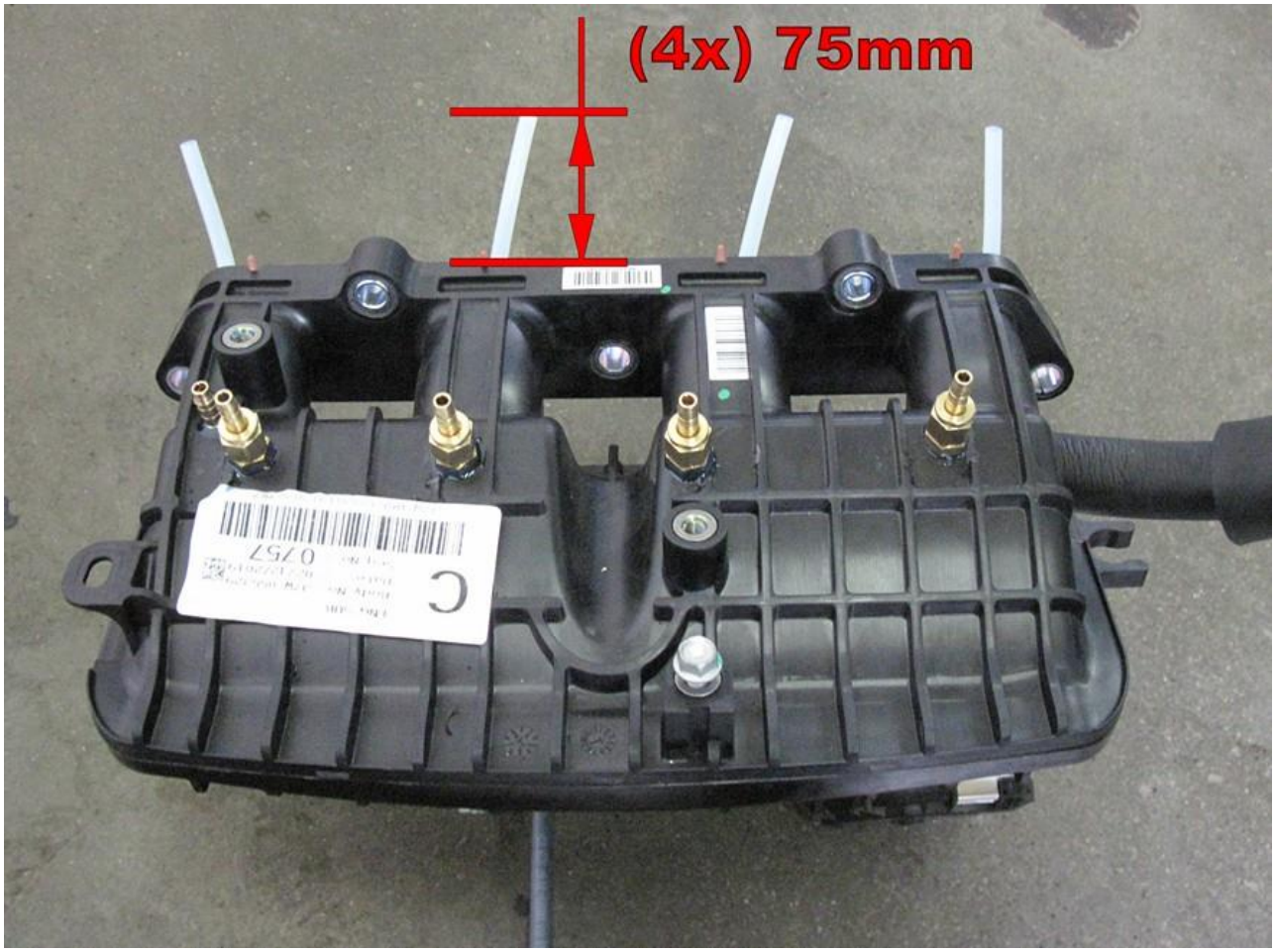
Drill **4** holes of **8.5mm** in the inlet manifold. Cut **M10x1** thread in these holes.
Place the VSI couplings with a locking compound in the inlet manifold.
Watch out that the locking compound doesn't come inside the VSI couplings.



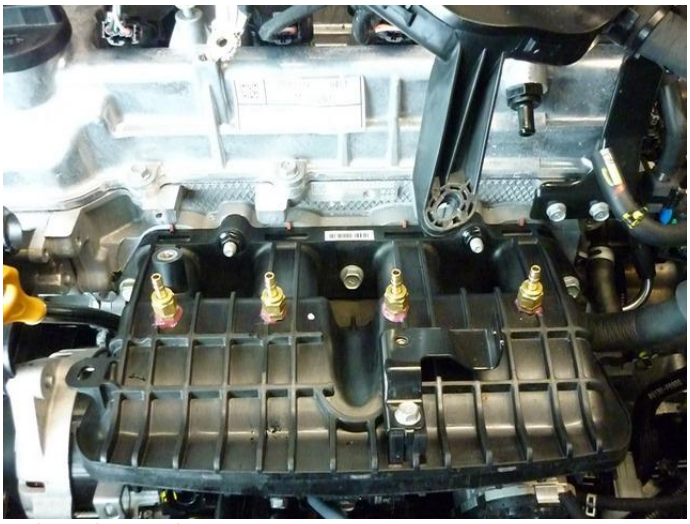


Drill 4mm holes into the manifold as shown.
Clear area around drilled holes, mill or Dremel.
Drill up to 8.5mm and cut M10x1.
Place the couplings with a locking compound in the inlet manifold.
Watch out that the locking compound doesn't come inside the VSI couplings.

Mounting the inlet manifold hoses

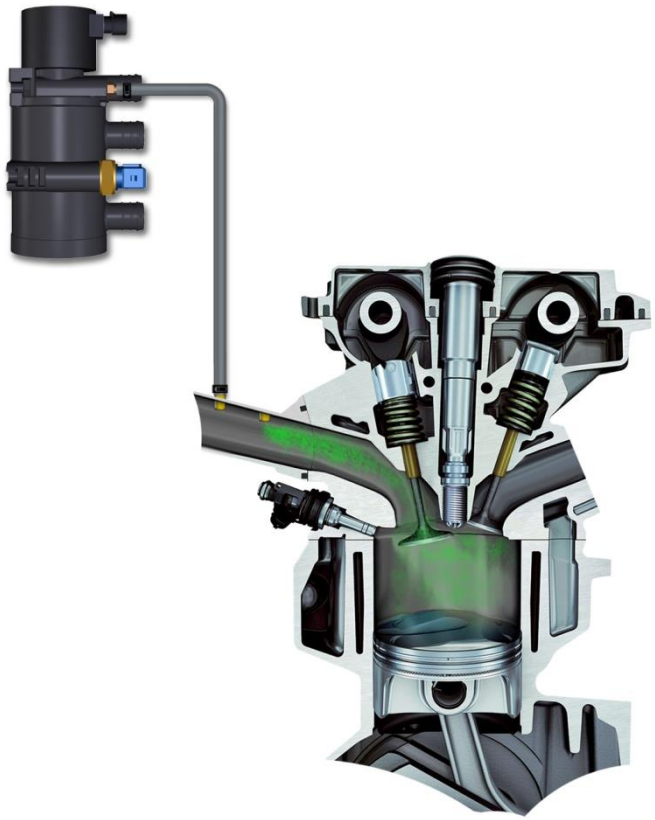


Mount the inlet manifold couplings with a locking compound.
Mount the hoses to the couplings and be sure that the hoses have a maximum length of 75mm out of the manifold.

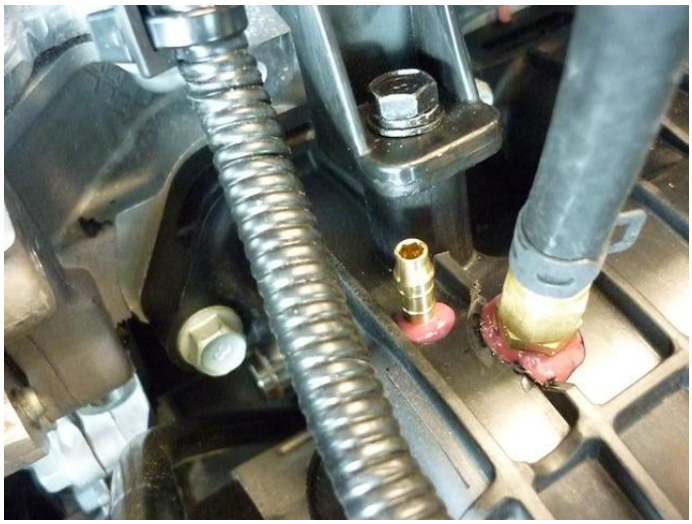


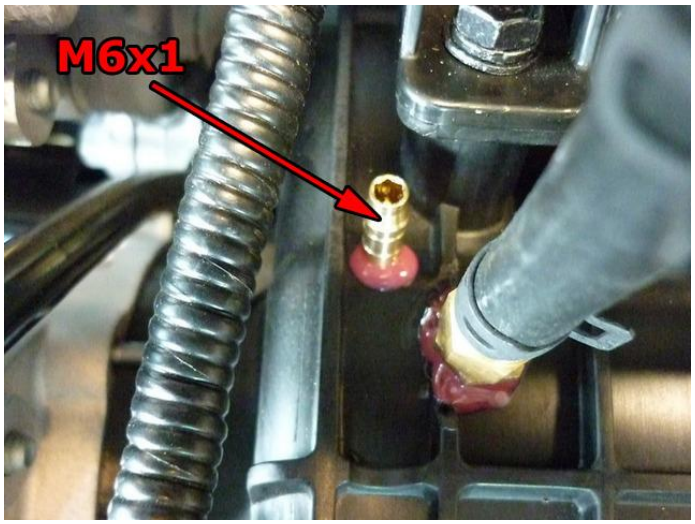
Mount the manifold back to the engine.

Overpressure connection

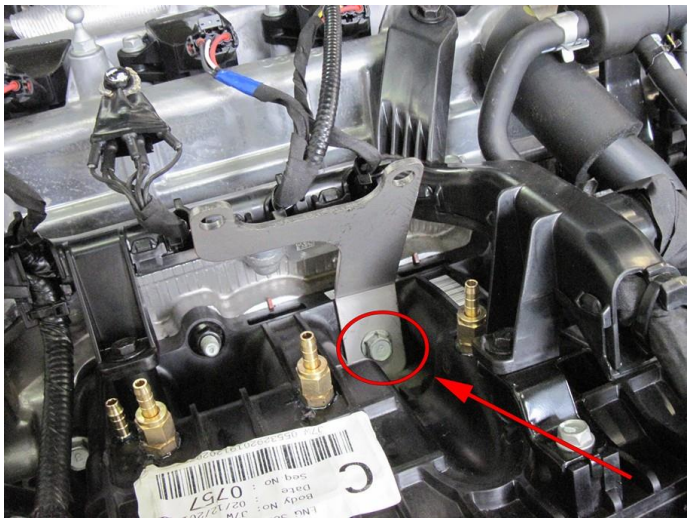


Remove the inlet manifold.
Drill **1** hole of **5mm** in the inlet manifold. Cut **M6x1** thread in this hole.
Place the VSI couplings with a locking compound in the inlet manifold.
Watch out that the locking compound doesn't come inside the VSI couplings.

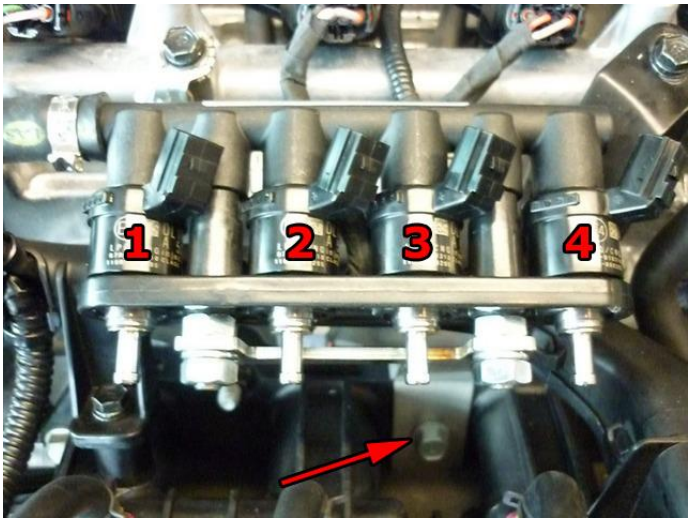




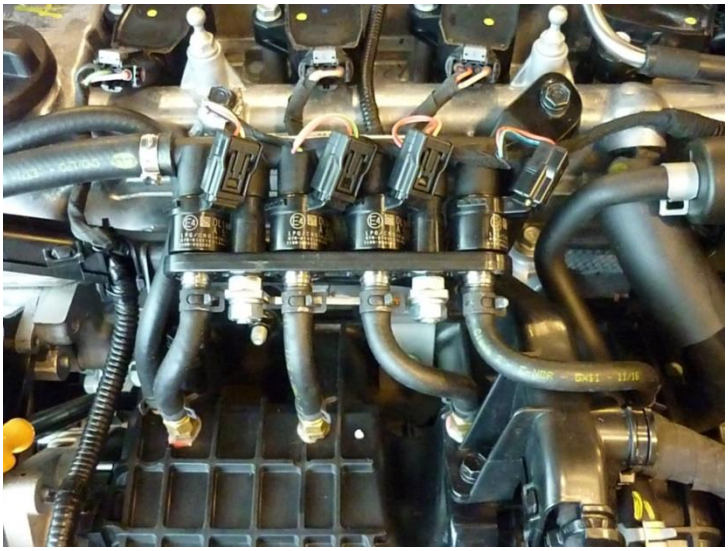
Mounting the VSI injector rail



Flatten the wires from the grounding point on the valve cover. Mount the bracket to the bolt dfrom the inlet manifold.



Connect the hoses from the rail to the manifold couplings.

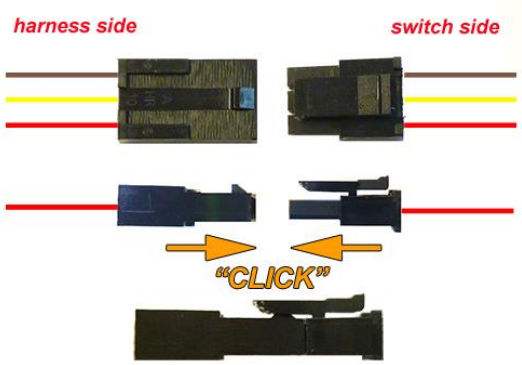


Wires Driver Room

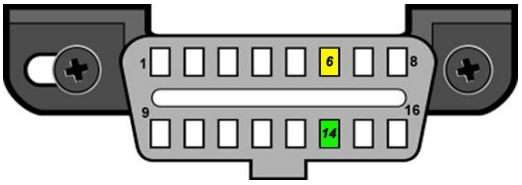
Before mounting the petrol ECU back to the vehicle, be sure the following wires are INSIDE:

17 AD 2	Blue-green	For/to the Petrol Low Fuel Pressure Sensor
10 DAC 2	Green	For/to the Petrol Low Fuel Pressure Sensor

3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	Brown-black Red-white Yellow	*Connect to switch.* Connect the 3-pole connector to the Prins fuel selection switch



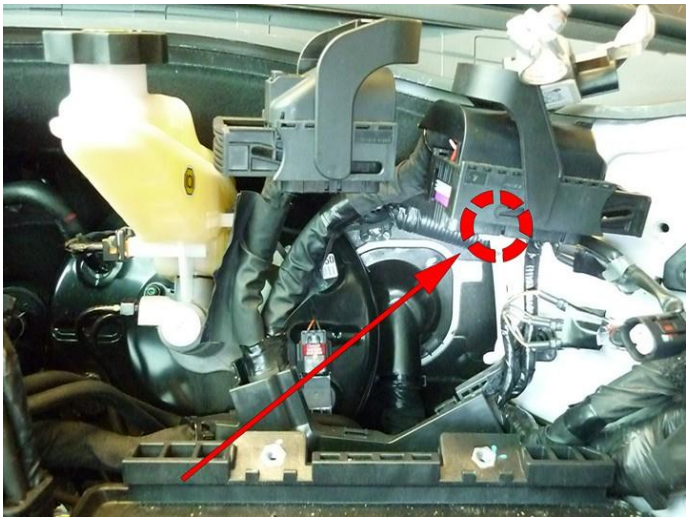
51 CAN1 High 70 CAN1 Low	Yellow Green	*Connect to EOBD diagnose connector* ***OR*** *to* Petrol ECU Pin : 6 Pin : 14



Grommet / Mounting the fuel selection switch – Driver Room

(based on Kia Ceed 2020)

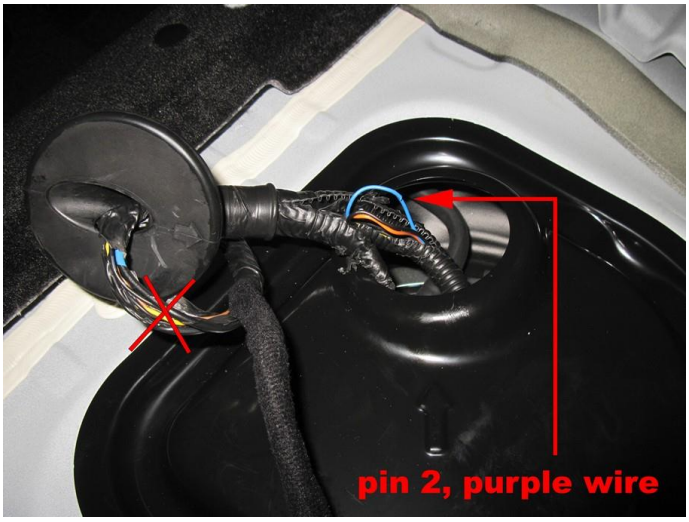
When mounting the switch, only push on its sides.
Pushing the switch hard in the centre may result in damage to the switch.

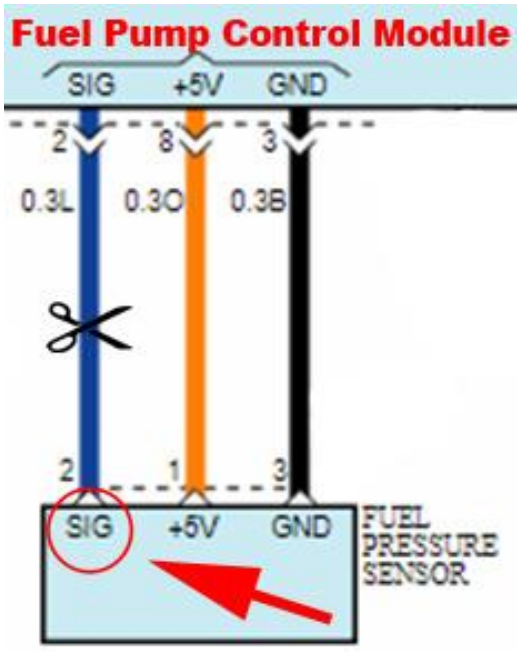


Mount the switch (with the cup) next to the steering wheel.

Electrical connections - Driver Room

17 & 10 **Extend with supplied wire(s)**				*Low Pressure Petrol Sensor Signal interruption.* *UNDER THE BACK SEAT, INSIDE THE VEHICLE* Wire colour: **Purple** Wire location: **under** cover **back seat**, pin **2**
17 AD 2		Blue-green		Sensor side
10 DAC 2		Green		Pump Driver side



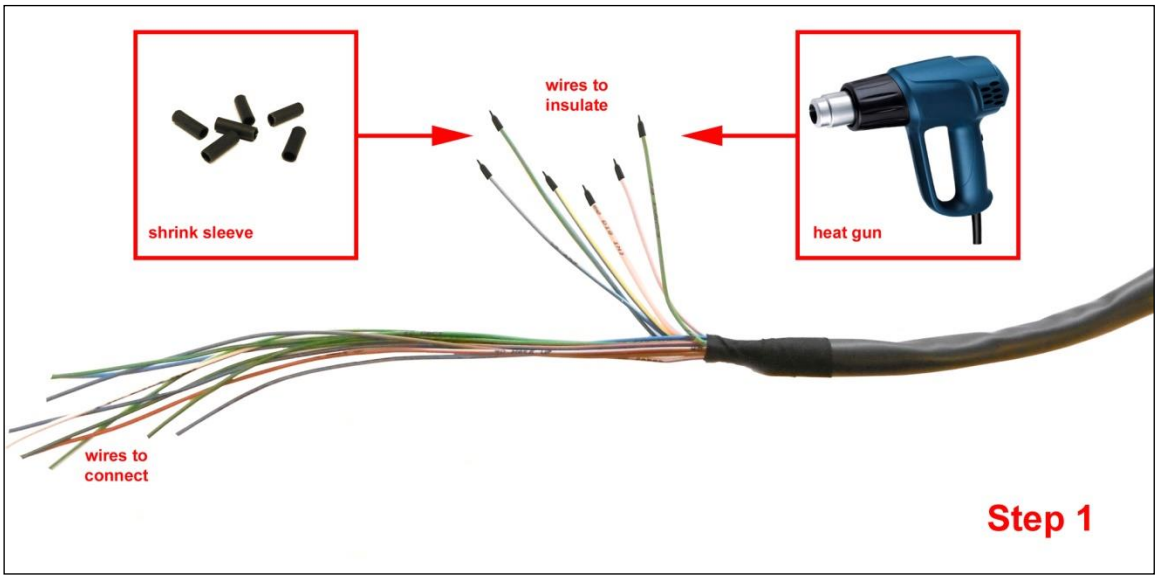


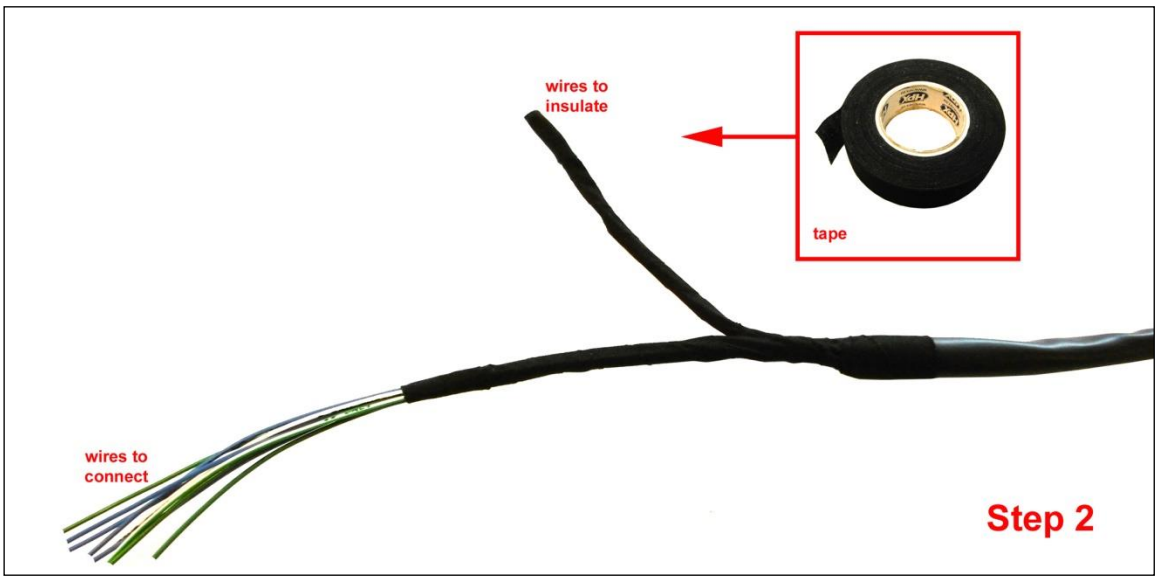
Connect wires 17 & 10 to the low pressure petrol sensor signal on the petrol tank.

Electrical connections – Insulate

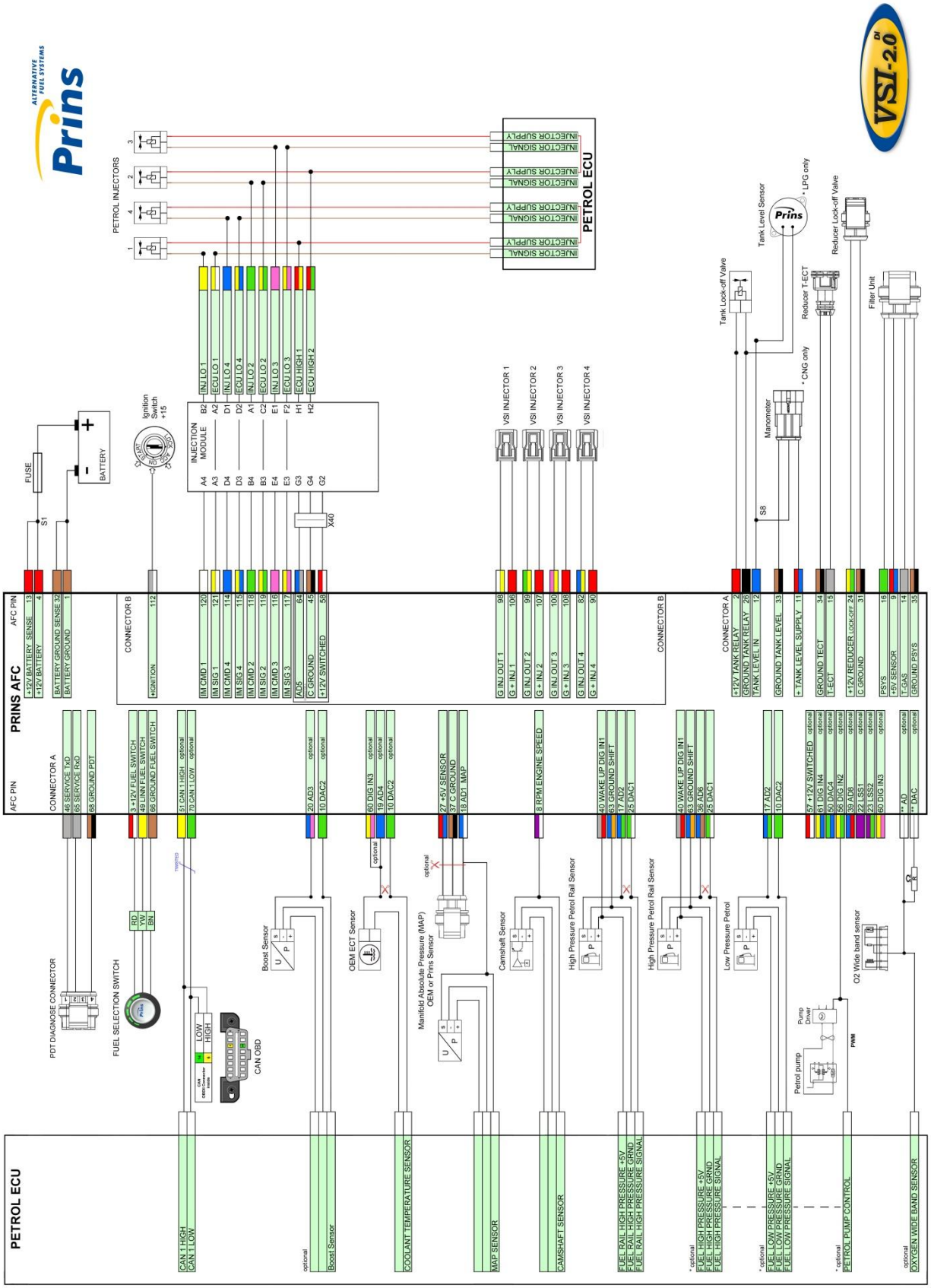
19	AD4			Blue	***Insulate***
20	AD3			Blue-pink	***Insulate***
22	LSS1			Purple	***Insulate***
23	LSS2			Purple-green	***Insulate***
38	AD7			Blue-light Blue	***Insulate***
39	AD8			Blue-red	***Insulate***
43	+12 Valve 2			Red-white	***Insulate***
50	DAC4			Green-blue	***Insulate***
56	DI2			Yellow-green	***Insulate***
60	DIG IN3			Yellow-pink	***Insulate***
61	DIG IN4			Yellow-blue	***Insulate***
62	C Ground			Brown-black	***Insulate***
74	DAC3			Green-pink	***Insulate***
Insulate additional loose wires					

Electrical connections – How to insulate not used wires





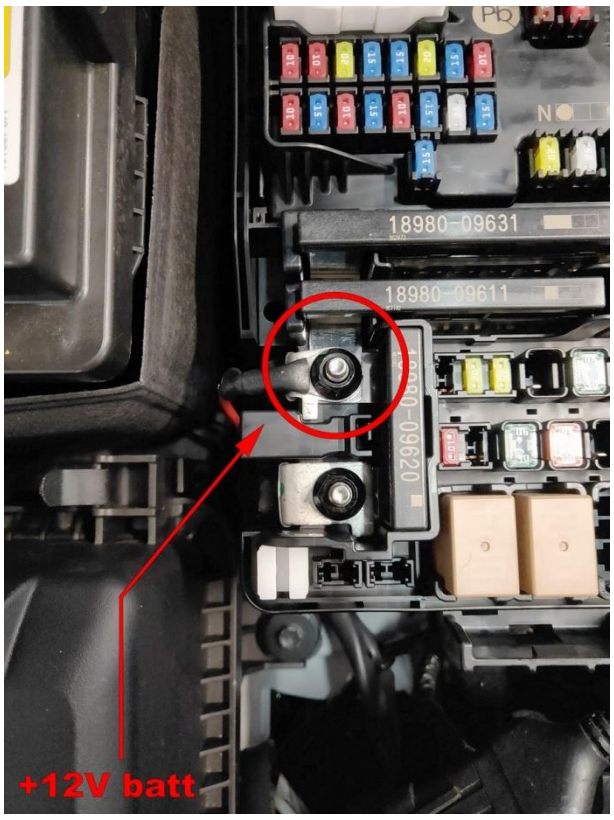
Basic Wiring diagram



Electrical connections

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

Do not place the fuse in the holder before having completed the installation of the LPG system.

Wire number / code	Wire colour	Connection
32 Ground sense 1 Ground battery	Brown Brown	*Connect to the '–' of the battery; use a ring terminal* Wire location : next to fuse box, original batt-ground 
4 +12V Battery	Red	*Use a ring terminal, connect to the +12V battery in the fuse box.* 

Electrical connections

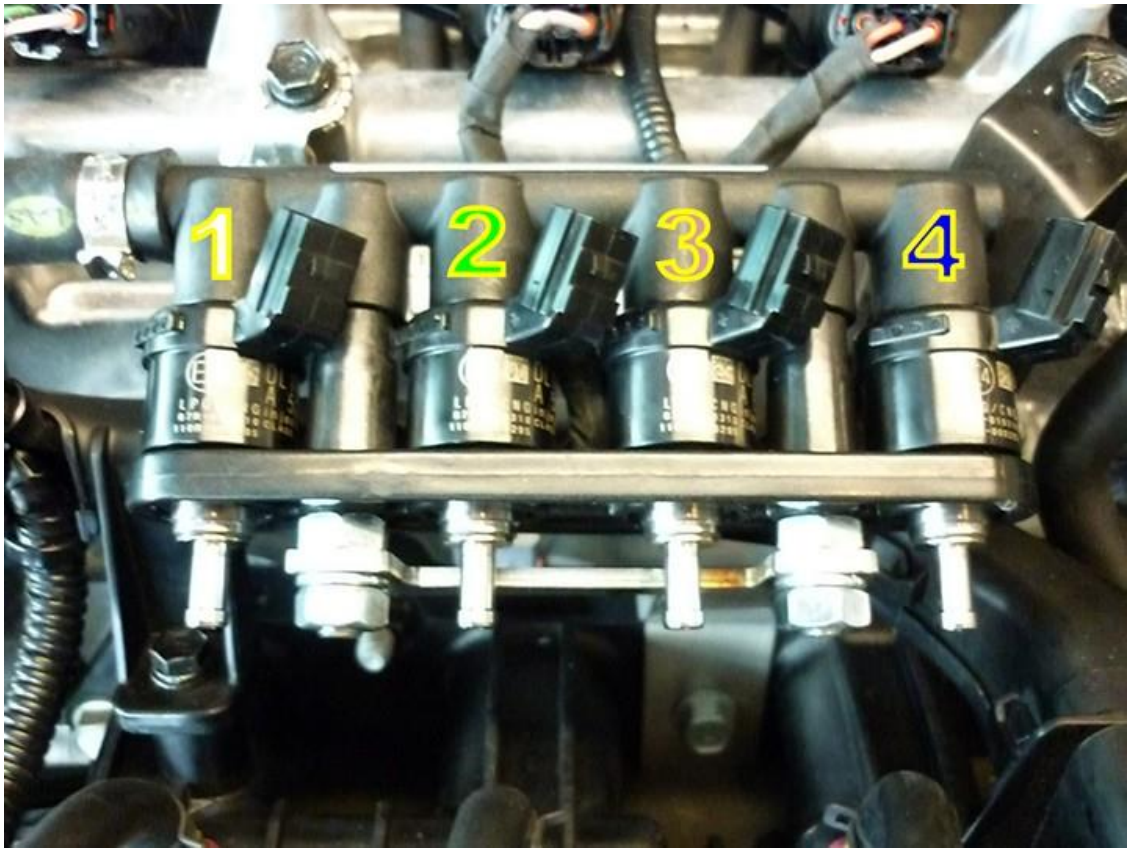
Check and measure the wiring in case of changes in the cars wiring colours.

98 98 G INJ OUT **1**	**White-yellow**	Connector VSI-injector to cylinder **1**. Timing belt/chain side
106 106 G + INJ 1	**red**	

99 99 G INJ OUT **2**	**Green-yellow**	Connector VSI-injector to cylinder **2**.
107 107 G + INJ 2	**red**	

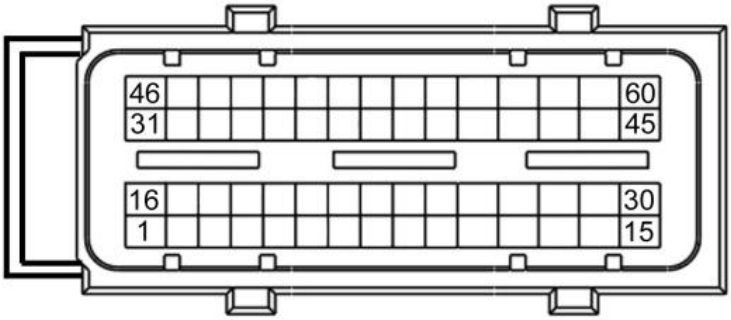
100 100 G INJ OUT **3**	**Pink-yellow**	Connector VSI-injector to cylinder **3**.
108 108 G + INJ 3	**red**	

82 82 G INJ OUT **4**	**Blue-yellow**	Connector VSI-injector to cylinder **4**.
90 90 G + INJ 4	**red**	

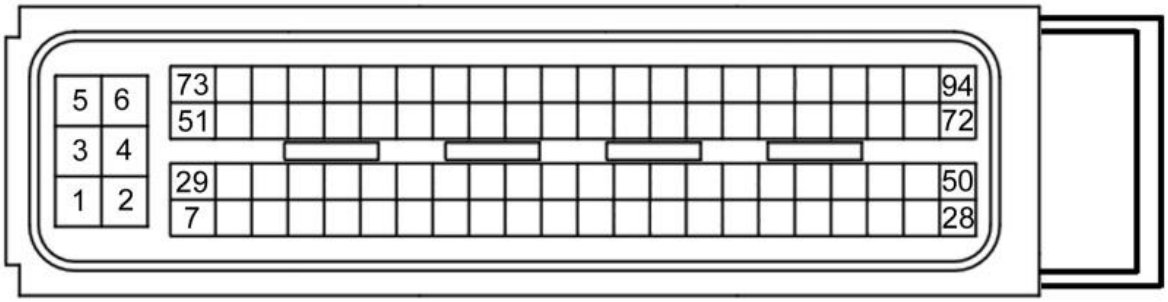


Petrol ECU overview

60P wiring view / top view



94P wiring view / top view



Electrical connections

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

⚠ For measuring the petrol injectors :

Interrupt each petrol injector control wire (injector min)
Each VSI wire has a petrol injector / cylinder number printed on the wire, connect this wire to the corresponding petrol injector / cylinder.
Connect the **bicoloured** VSI measuring wire to the **ecu side** (wire code: ecu-lo).
Connect the **corresponding full coloured** VSI wire to the **petrol injector side** (wire code: inj-lo).
See diagrams: Installation manual general part 1 / 2.

Attention:
Each bicoloured measuring wire corresponds to a specific LPG injector and petrol injector / cylinder number.
Do not interchange the wires.

Petrol injector **cyl. 1**			
INJ LO 1		White	Injector side
ECU LO 1		**White-yellow**	ECU side
IM pos. B2 / A2			Colour: **Black** Location: petrol ecu **P60 / pin 34**

Petrol injector **cyl. 4**			
INJ LO 4		Blue	Injector side
ECU LO 4		**Blue-yellow**	ECU side
IM pos. D1 / D2			Colour: **Blue-lila** Location: petrol ecu **P60 / pin 49**

(cyl. 1-4)			
ECU HIGH **A**		**Red-white**	Injector side
IM pos. H1			Colour: **White** Location: petrol ecu **P60 / pin 47**

Petrol injector **cyl. 2**			
INJ LO 2		Green	Injector side
ECU LO 2		**Green-yellow**	ECU side
IM pos. A1 / C2			Colour: **Red** Location: petrol ecu **P60 / pin 20**

Petrol injector **cyl. 3**			
INJ LO 3		Pink	Injector side
ECU LO 3		**Pink-yellow**	ECU side
IM pos. E1 / F2			Colour: **Black** Location: petrol ecu **P60 / pin 5**

(cyl. 2-3)			
ECU HIGH **B**		**Red-green**	Injector side
IM pos. H2			Colour: **White** Location: petrol ecu **P60 / pin 32**

Electrical connections

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

			High pressure petrol sensor ground. Wire colour: **Black** Wire location: petrol ecu **P94 / pin 36**
63 Ground Shift		Blue-orange	

3-pole connector		Cut-off connector	*For measuring the inlet manifold pressure (MAP).*
27 +5V Sensor		Red-blue	insulate
37 C ground		Brown-black	insulate
18 AD1		Blue-white	Wire colour: **Yellow** Wire location: petrol ecu **P94 / pin 57**

36 & 25			*High pressure petrol sensor signal interruption.* Wire colour: **Green** Wire location: petrol ecu **P94 / pin 78**
36 AD 6		Blue-brown	Sensor side
25 DAC 1		Green-white	Petrol ecu side

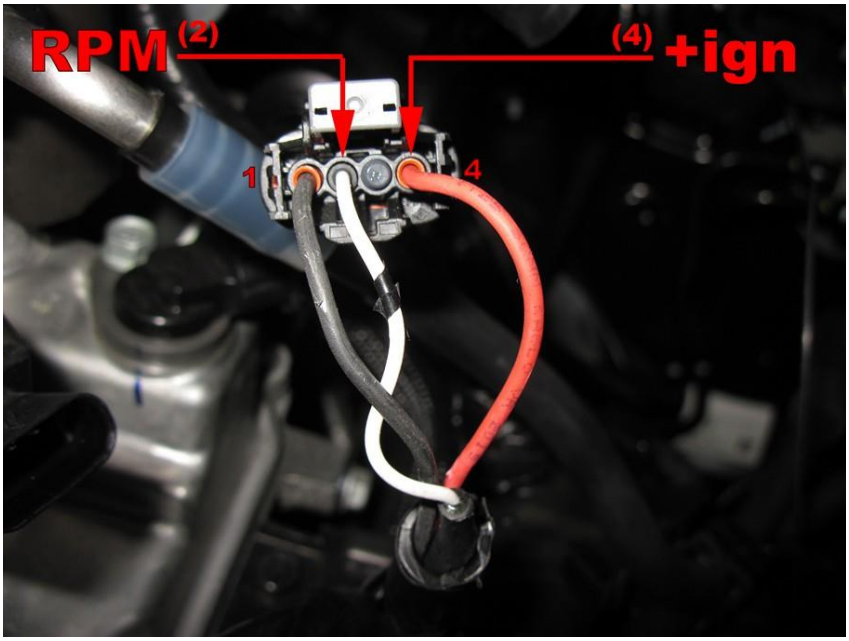
			High pressure petrol sensor supply 5V Wire colour: **Red-orange** Wire location: petrol ecu **P94 / pin 87**
40 Wake-up		Grey-red	

Electrical connections

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

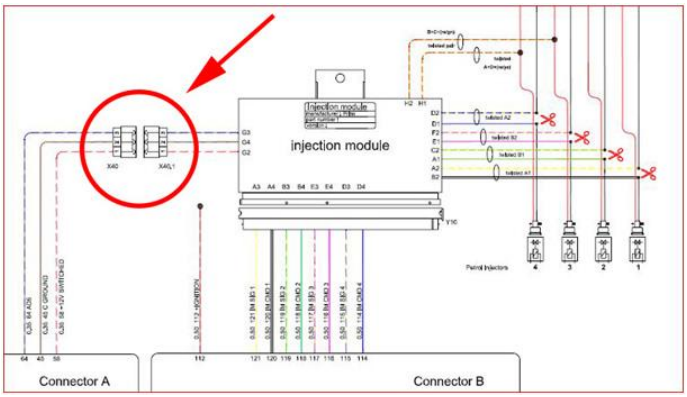
			For measuring the engine speed signal. Wire colour: **White** Wire location: Ignition Coil Cylinder 4, **Pin 2**
8 RPM		Purple-white	

112			*Connect to +ignition / contact+ (+15).* *Do not place the fuses in the holder before having completed the installation of the LPG system.* Wire colour: **Red** Wire location: Ignition Coil Cylinder 4, **Pin 4**
112 +Ignition		Red-grey	



Electrical connections

Connectors in wiring loom

2-pole blue connector 15 T-ECT 34 Ground T-ECT	 Grey Brown-black	*For measuring the engine coolant temperature (Tect).* Connect the connector to the reducer temperature sensor.
4-pole connector 35 Ground Psys 14 T-Gas 9 +5 Volt sensor 16 Psys	 Brown-black Grey Red-blue Green	*For measuring gas pressure and temperature.* Connect the connector to the filter unit sensor.
2-pole connector 24 +12V reducer lock-off 31 C Ground	 Yellow-green Brown-black	Connect the connector to the reducer lock-off valve or eVP-500.
4-pole connector 46 Service TxD 65 Service RxD 68 Ground PDT	 Grey Grey Brown-black	Diagnose connector.
Tank wiring loom 2 +12V Tank relay 12 Tank level IN 26 Ground tank relay	 red blue black	 Connect to the tank lock-off. Connect the tank level gauge. Connect to the tank lock-off.
Wiring loom link 45 C ground 58 +12V switched 64 AD5	 Brown–black Red–white Blue-grey	Connection from AFC connector A to connector B. 

Optional:

3-pole connector 11 + manometer 12 tank level in 33 ground manometer	 red blue brown	***Cut off connector and insulate wires***

Checklist after installation

1. Connect the Prins Diagnostic Tool and run the VSI diagnostic program.
   Install the VSI fuse, turn the ignition key in the accessory position.
   When working on the car, beware of moving and rotating parts in the engine compartment.

2. When commissioning the LPG system, you must activate the AFC with the diagnostic software.
   When the AFC has not been activated, the switch will keep blinking.
   To activate the AFC, select function *activate ECM* in the diagnostic software.

3. Check whether the program in the AFC matches with the car (dedicated engine set):
   Refer the car description in the diagnostic software (Basic → Identification) and compare these with the set number.

4. The system will switch over to LPG as soon as the temperature of the coolant becomes higher than parameter 70 - Switch over ECT.

5. Check all components and connections for any gas leakage (use a LPG leak detector device or a fluid detection like soap). Caution for moving and rotating parts in the engine compartment!

6. Let the engine run warm on petrol >80°C.
   Check if the reducer heats up.
   Check the engine signals, petrol injection time, RPM, ECT, lambda, MAP signal and petrol pressure signal.
   Let the engine run idle on LPG.
   Adjust the reducer pressure.
   Refer to *Basic → System* in the diagnostic software for the idle level value set.
   Adjust the reducer pressure in such a way that the pressure measured (P-sys) equals the idle level value.
   Turn the socket-head screw at the front of the reducer to adjust the pressure.
   An error code will be generated whenever the pressure variation is too high.

7. Use the diagnostic software to check again all input and output signals.

8. Check the system for error codes and solve these, if required.
   Check the petrol ECM for EOBD error codes.
   Place the protection connector on the VSI communication connector.

9. Take a test drive and check the drivability on LPG and petrol.