Installation manual
PART 2/2

MANUFACTURER	GM (based on Chevrolet)
TYPE	(based on S10)
ENGINE DISPLACEMENT	2457cc
NUMBER OF VALVES	16
ENGINE CODE / NUMBER - OUTPUT	LCV - 147 kW
FIRING ORDER	1-3-4-2
VEHICLE CATEGORIES	M
TRANSMISSION	MT
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	KN9 – 73cc
TYPE INJECTION MODULE	TYPE 1
PETROL ECU MANUFACTURER / CODE	Delphi 12669908-12670037
MODEL YEAR:	2017-
SYSTEM APPROVAL NUMBER (R115)	N.A.
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	338/031001/A
MANUAL NUMBER	076/3302100
DATE	2018-10-17

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

General instructions

- The installation of the system shall be done in accordance with the installation manual provided by Prins Autogassystemen.
- This manual is based on Dutch regulations; always install the system in accordance to the local regulations.
- 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 and 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 100mm 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 the 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 no. 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 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 analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

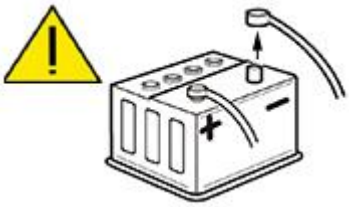
Tightening moments

		Nm	Spanner mm
M5 x 0,8		6.5	8
M6 x 1,0		11.3	10
M8 x 1,25		27.3	13
M10 x 1		52	15-16-17
M10 x 1,5		54	15-16-17

LPG manifold nipple		1	3.5 Allen
Reducer nut - bracket		10	13
Lock-off nut		15	16
Fuel line nut – lock-off		20	13
Fuel line tank – lock-off		20	16
Filling hose connections		50	22

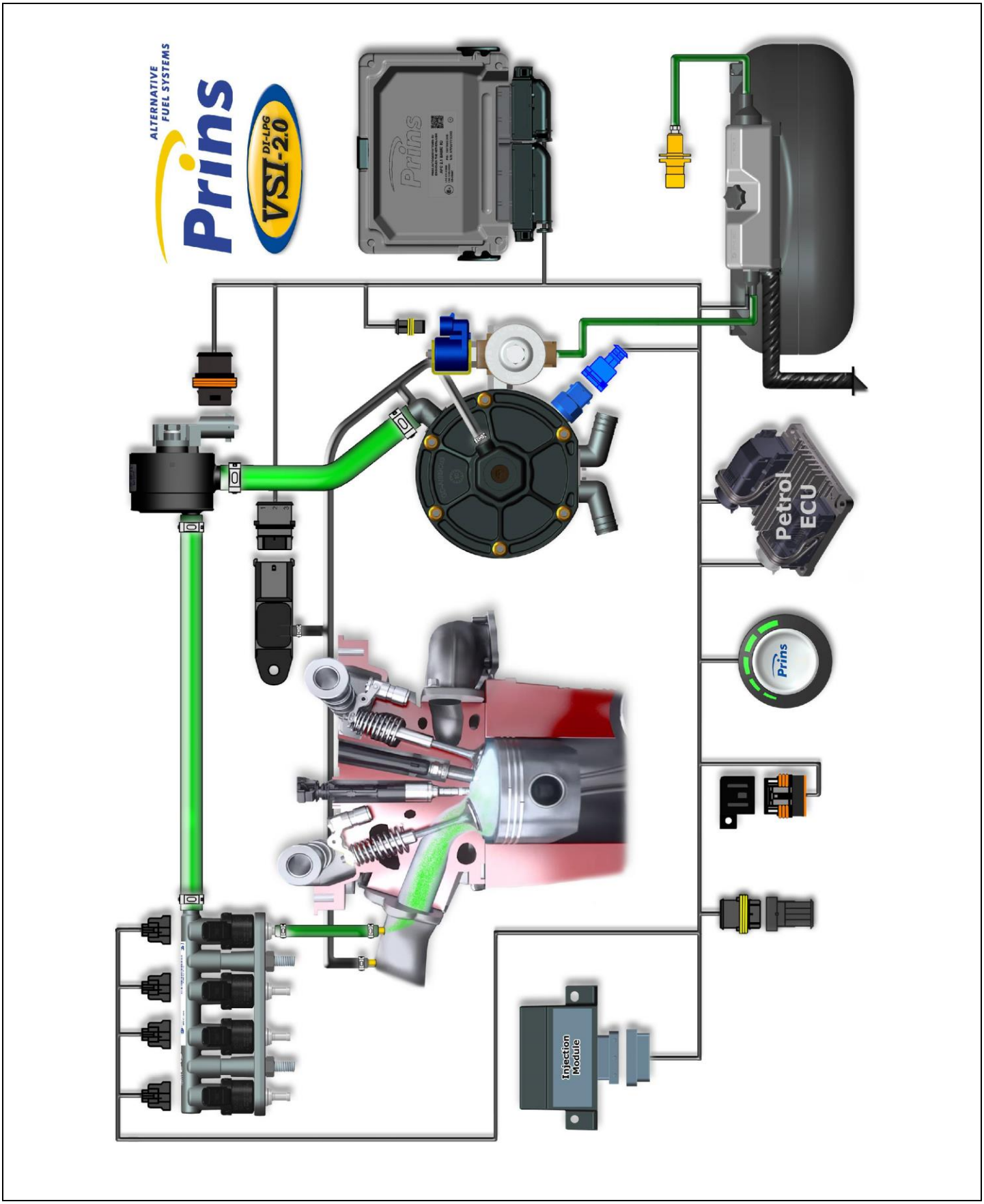
EXPLANATION OF SYMBOLS:

= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

Base diagram



VSI approval numbers

Reducer VSI LPG Prins : E4-67R-010054
Lock-off valve OMB : E8-67R-014327
Lock-off valve Valtek : E4-67R-010041

Injector rail Prins : LPG E4-67R-010093
CNG E4-110R-000021

Filter unit T1 / T2 Prins : LPG E4-67R-010096
CNG E4-110R-000028
Filter unit Keihin: LPG E4-67R-010177
CNG E4-110R-000091

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
Thunderflex LPG E24-67R-010018
CNG E24-110R-000040

VSI component location overview (example Chevrolet S10)

Reducer

Filter

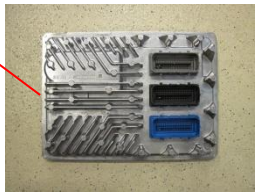
Rail(s)

AFC

Fuse

IM

Petrol ECU



R115 approval sticker (if applicable):
Right side centre door post

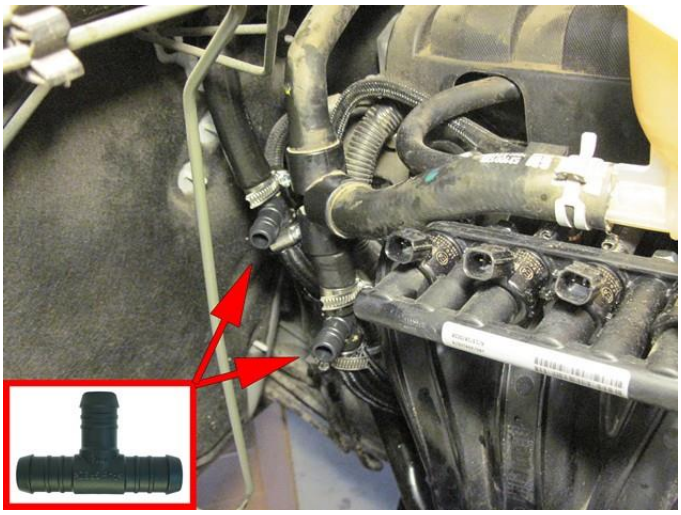
Examples
(based on Chevrolet S10)

Reducer & filter

Fuse

AFC

IM

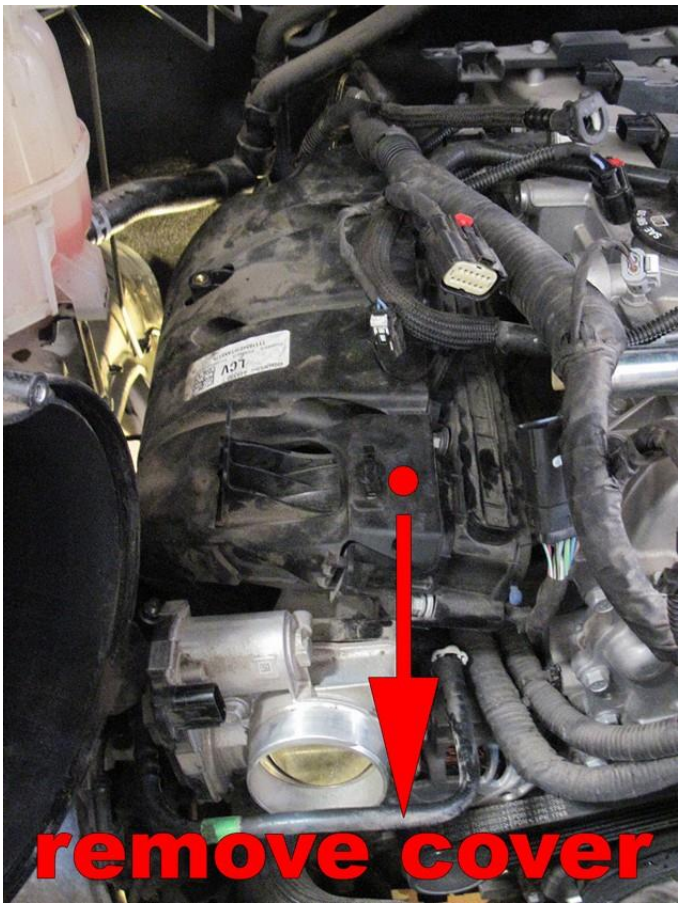


Water connections

11mm LPG hose routing

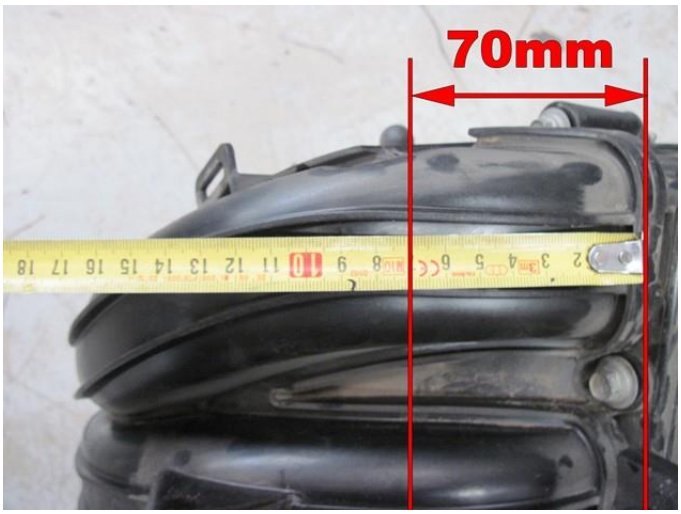
Mounting the inlet manifold couplings

Remove the inlet manifold.
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.



Remove cover, this will not be used again.

Remove manifold.



Mark & drill holes Ø8,5mm and cut thread M10x1.

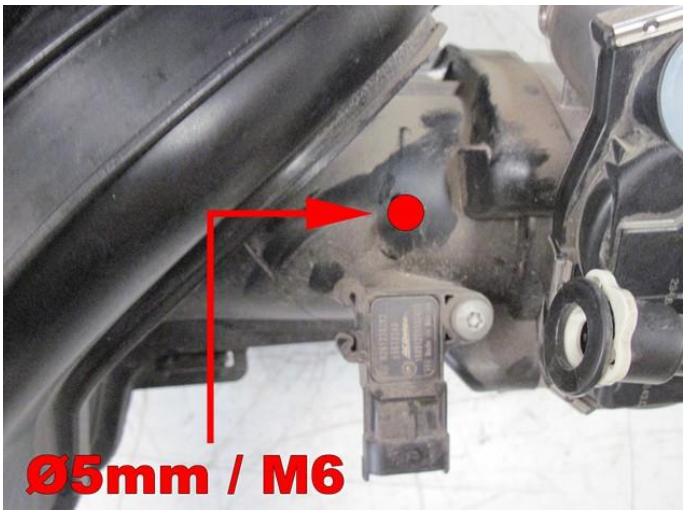
Mounting the inlet manifold couplings / hoses

Mark & drill holes Ø8,5mm and cut treat M10x1. Mount the hoses to the couplings.

Mount the hoses to the couplings. Length of the hoses towards the engine (manifold): 90mm.

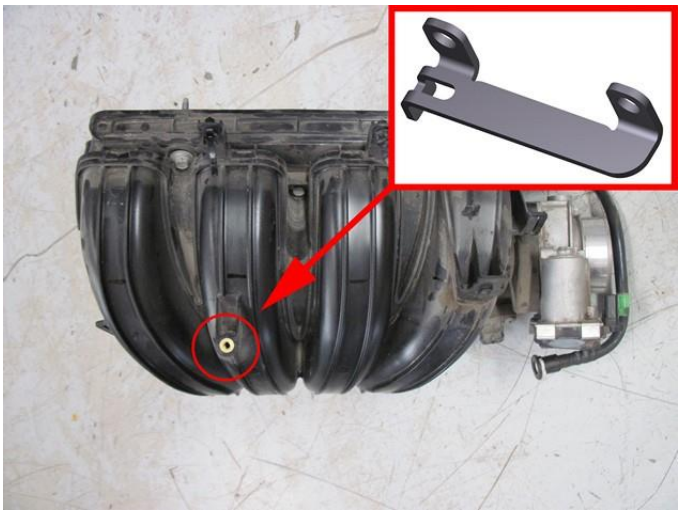
Mounting the MAP inlet manifold coupling

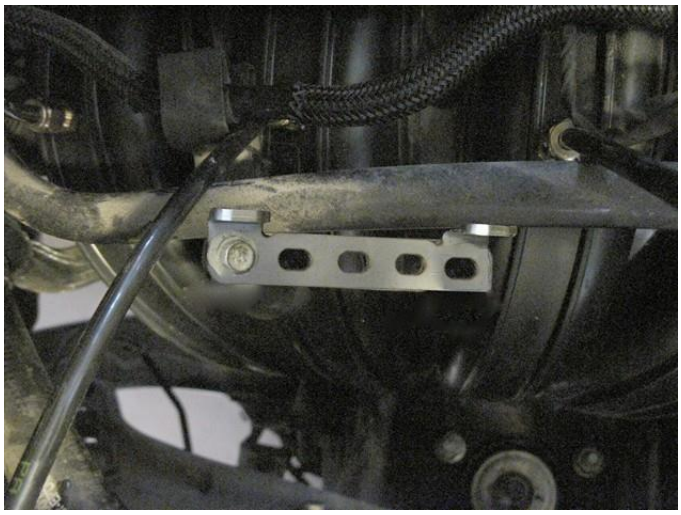
Remove the inlet manifold.
Drill **1** hole of **5mm** in the inlet manifold. Cut **M6x1** thread in this hole.
Place the VSI coupling with a locking compound in the inlet manifold.



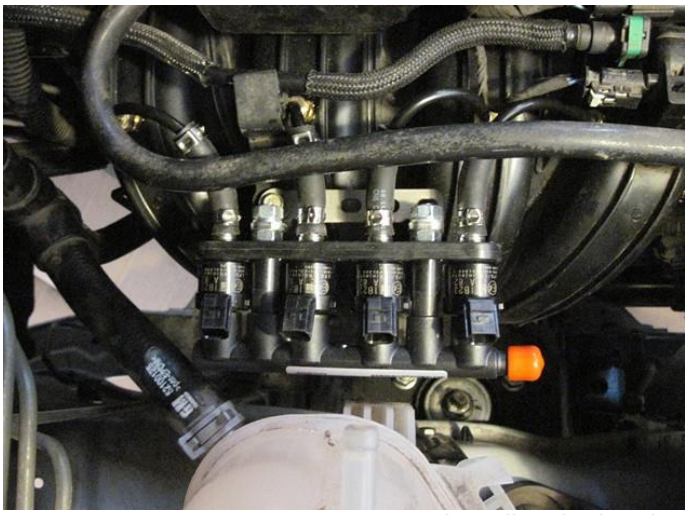
Drill hole Ø5mm and cut thread M6x1. Mount the MAP coupling with a locking compound.

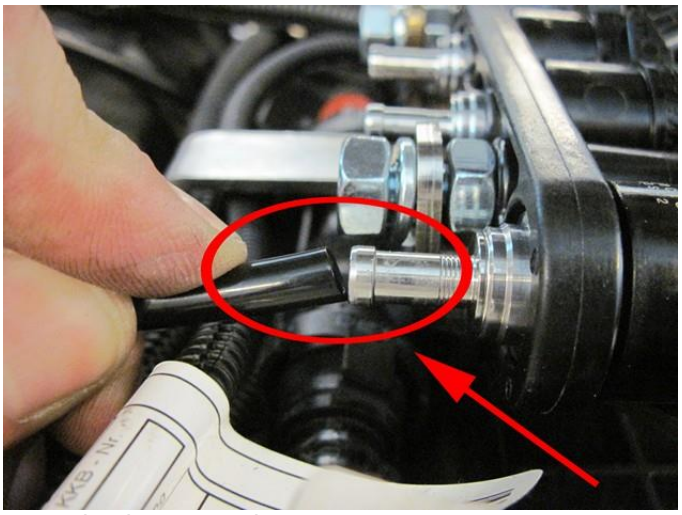
Mounting the Injector rail



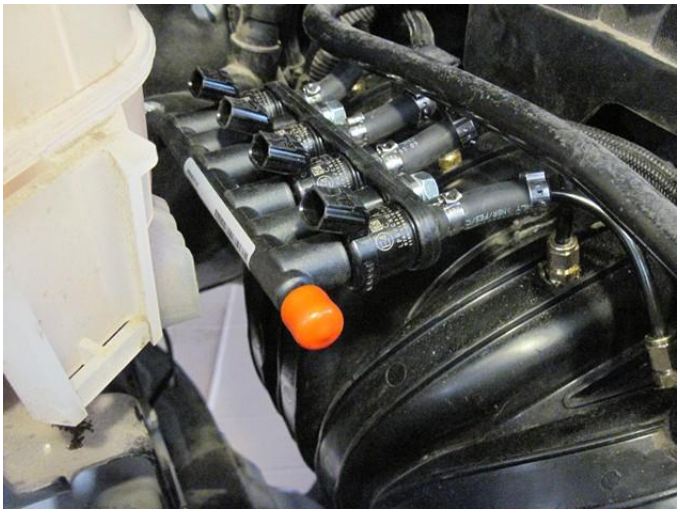


Mount the bracket to the original mounting point in the inlet manifold.





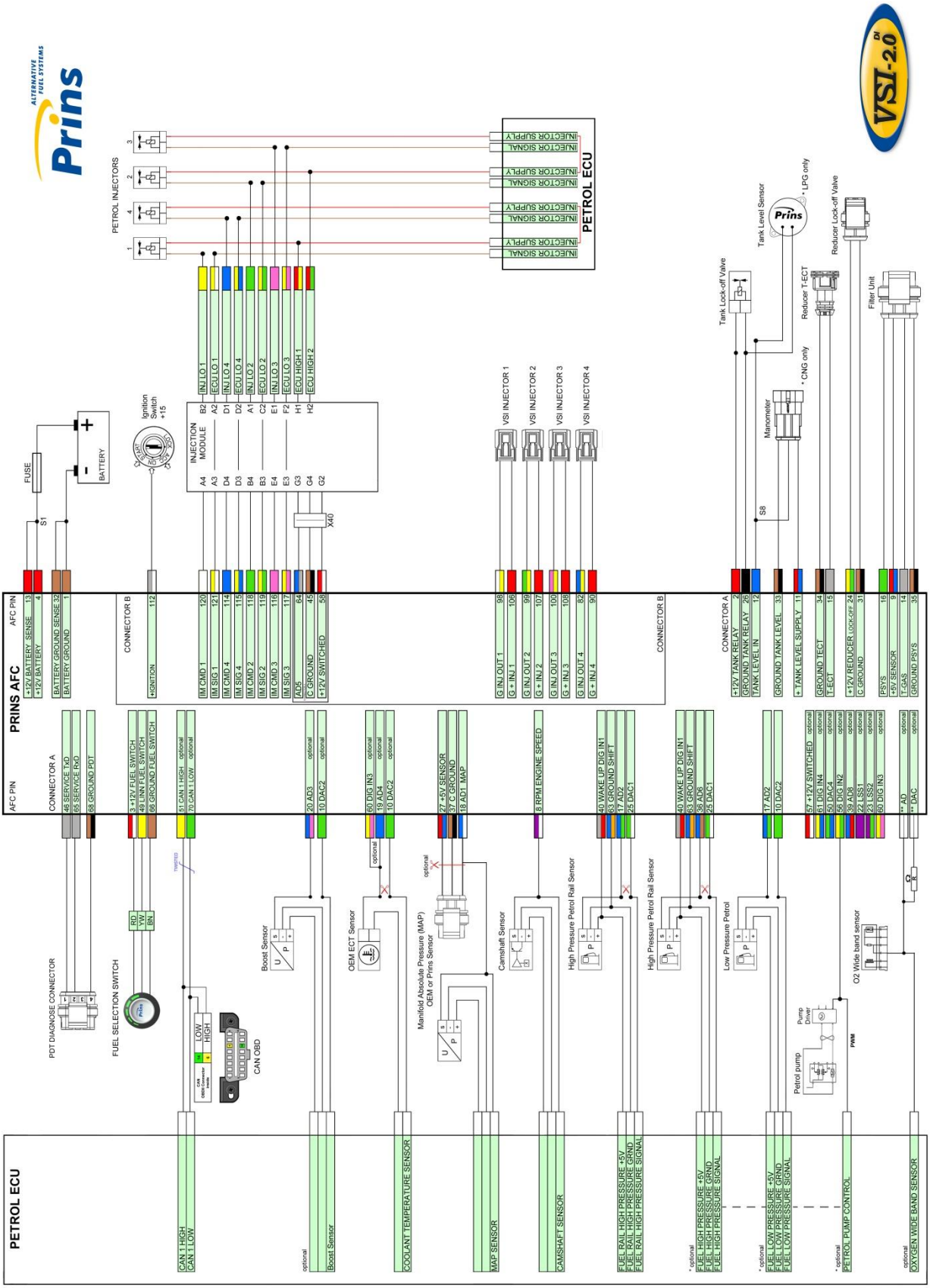
Mount the rail to the bracket. Cut nylon hoses as shown.



Mount the nylon hoses with the 6mm/50mm LPG hoses to the rail.

Please observe that there is no damage or fouling to the hoses.

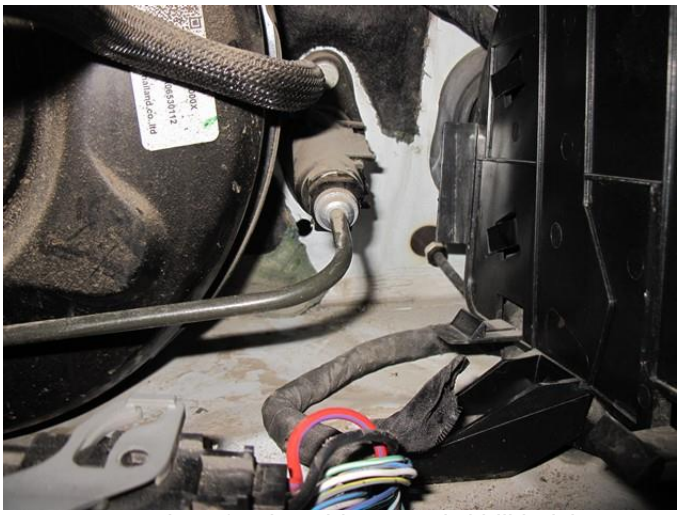
Basic Wiring Diagram



Mounting the fuel selection switch / CAN

(example Chevrolet S10)

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

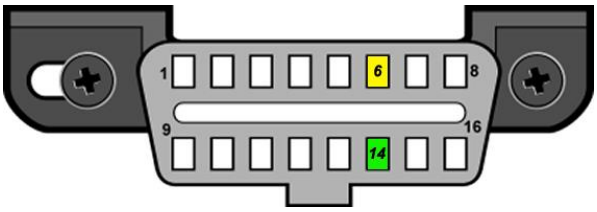
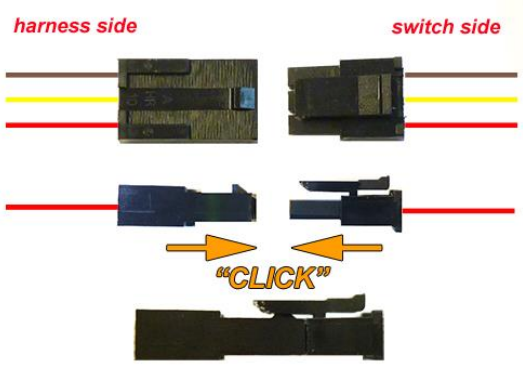


Best place for the wiring transit (drill hole).

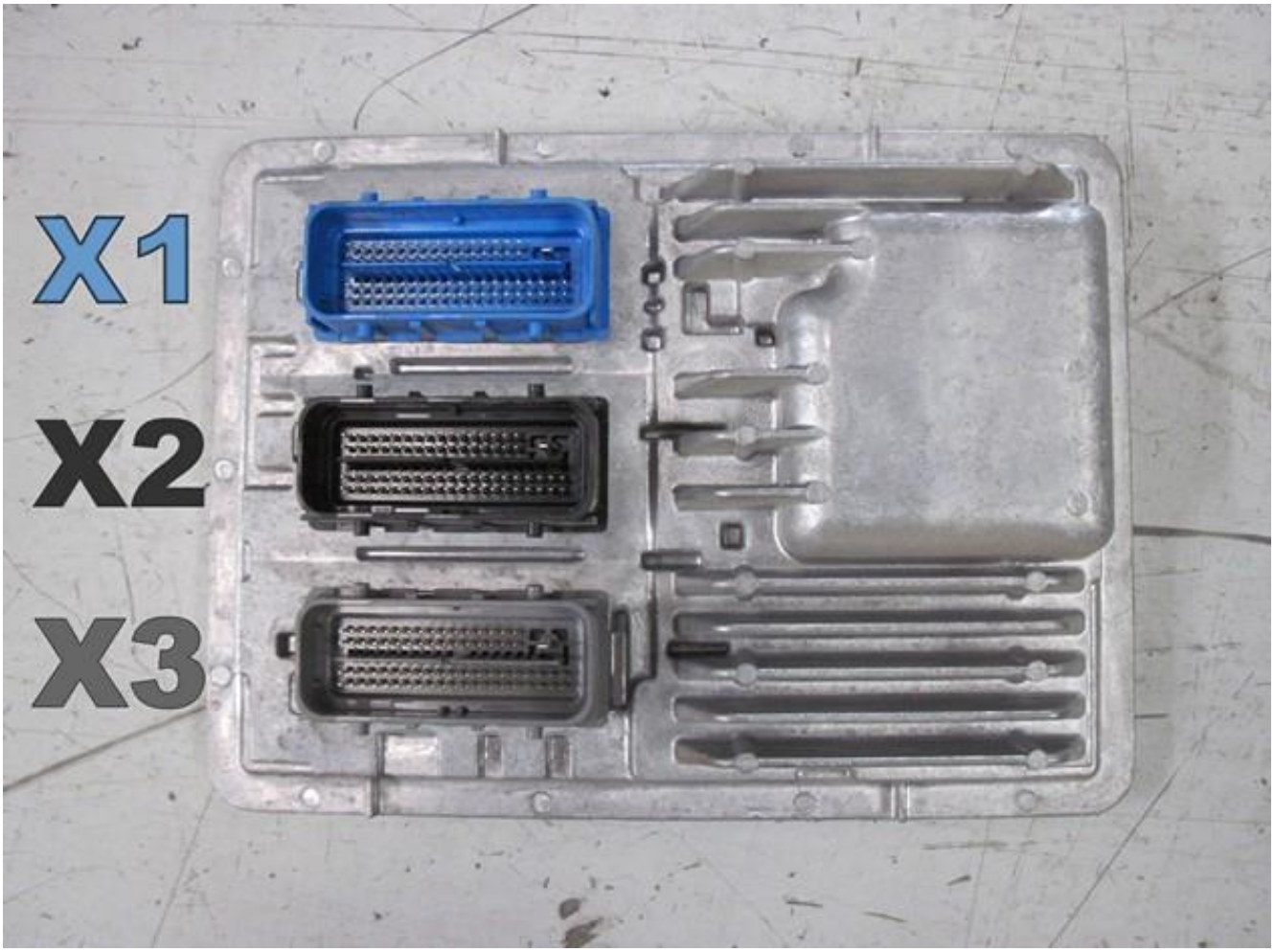
To mount the switch, drill a hole Ø8,3mm and mount the switch. Location for the CAN/OBD connection.

Electrical connections

Driver room

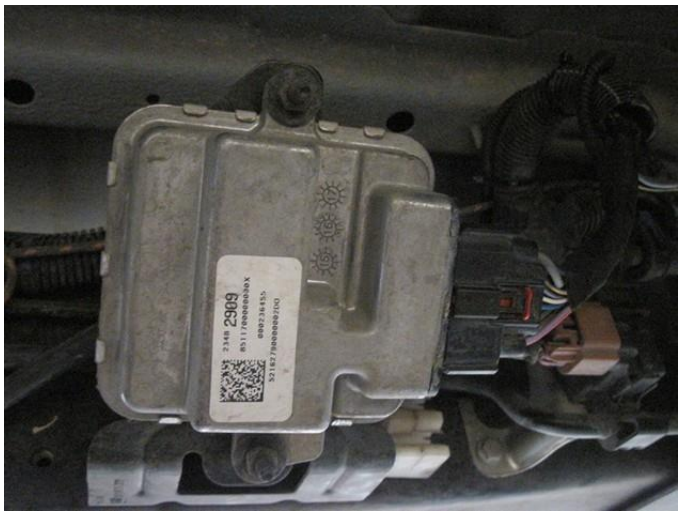
51 CAN1 High 70 CAN1 Low	Yellow Green	*Connect to EOBD diagnose connector.* Pin : 6 Pin : 14
		
3-pole micro connector 66 Ground fuel switch 3 +12V fuel switch 49 LIN fuel switch	Brown-black Red-white Yellow	*Connect to switch.* Connect the 3-pole connector to the Prins fuel selection switch
		

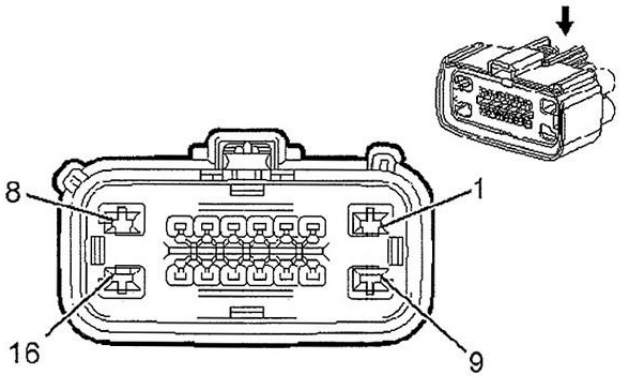
Petrol ECU



PWM wiring fuel pump module

(Example Chevrolet S10)



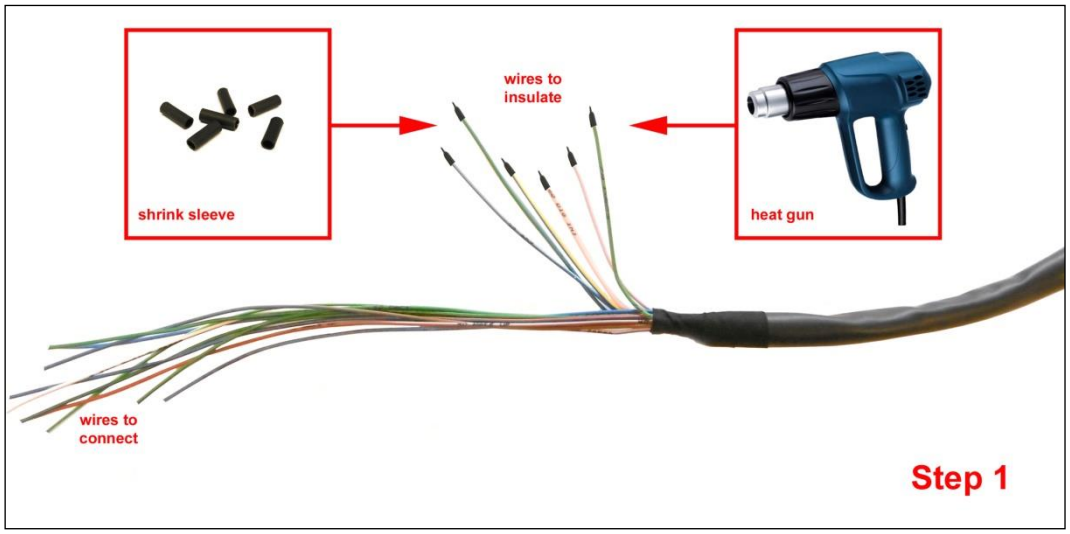


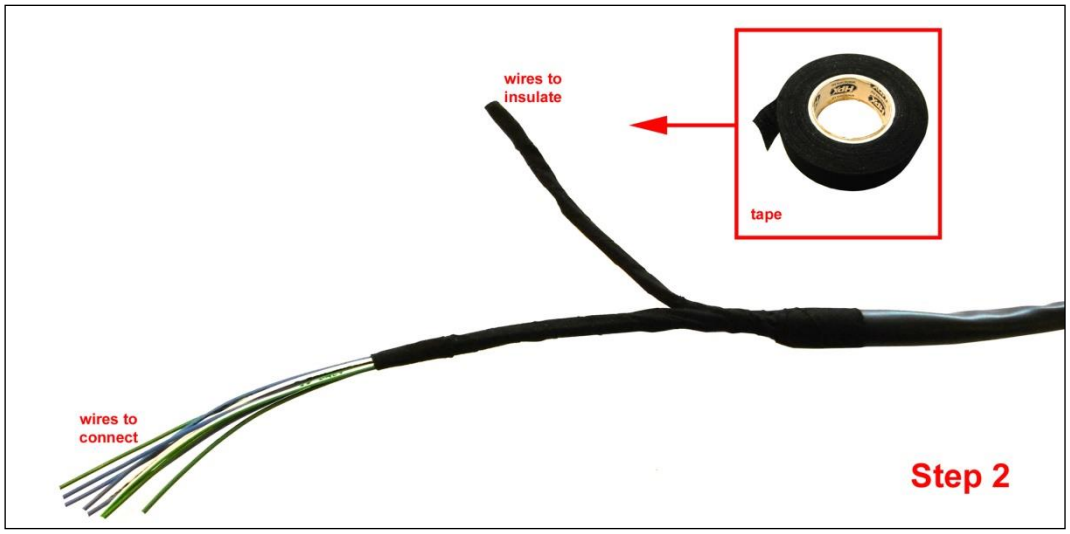
Locate the Fuel Pump Module. At the Chevrolet S10 this is located half-way under the vehicle.

			Wire colour : **Grey** (thick) Wire location : **Fuel Control Module**, pin **8** Extend the 56 DI2 wire with the supplied yellow-green wire, mount protection sleeve on the wire and connect to the Fuel Control Module pin 8 (grey).
56 DI2 **extend!**		Yellow-green	

Electrical connections – Insulate

19	AD4	Blue	***Insulate***
22	LSS1	Purple	***Insulate***
23	LSS2	Purple-green	***Insulate***
25	DAC1	Green-white	***Insulate***
36	AD6	Blue-brown	***Insulate***
38	AD7	Blue-light Blue	***Insulate***
39	AD8	Blue-red	***Insulate***
43	+12 Valve 2	Red-white	***Insulate***
50	DAC4	Green-blue	***Insulate***
61	DIG IN4	Yellow-blue	***Insulate***
62	C Ground	Brown-black	***Insulate***
74	DAC3	Green-pink	***Insulate***
Insulate all extra wires that are not connected			

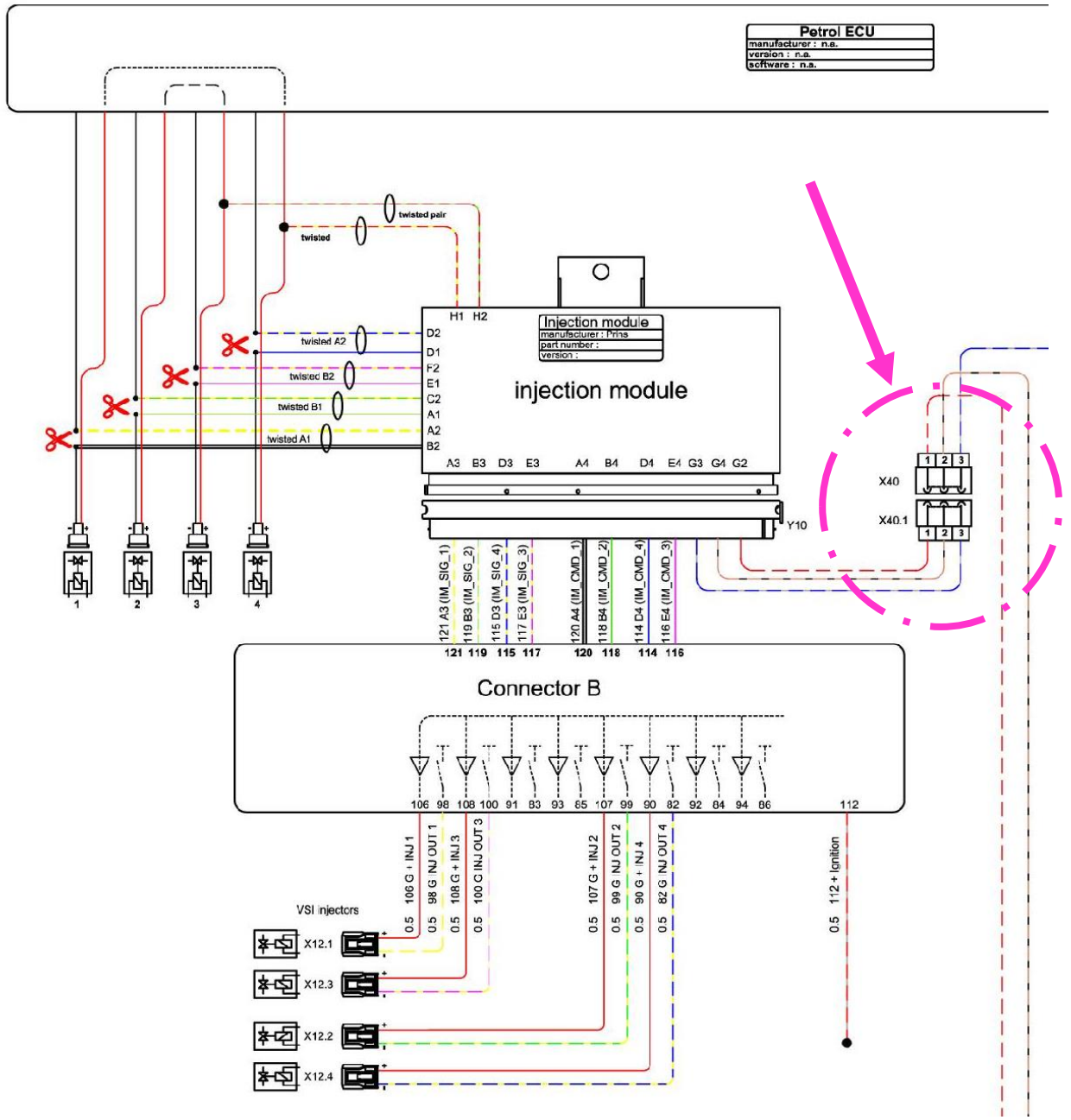




Electrical connections

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

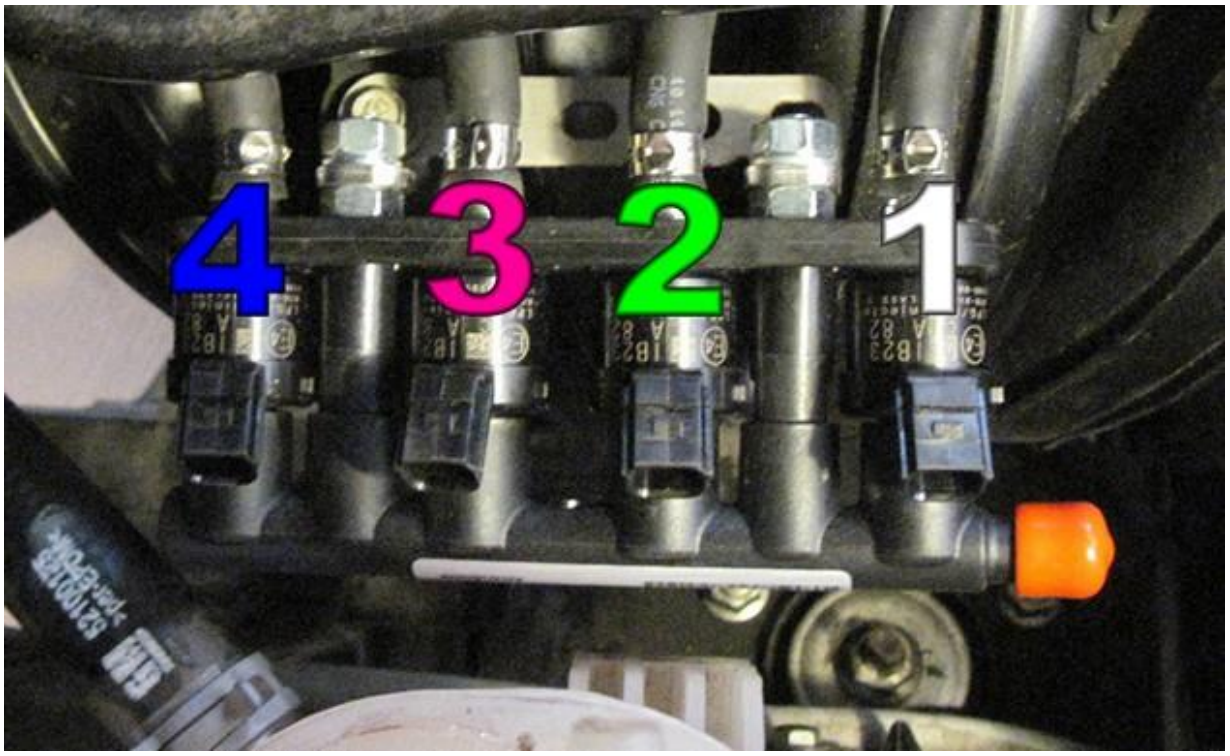
Connector Injection Module



Electrical connections

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

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 : **Battery ground**
4 +12V Battery	Red	*Do not place the fuse in the holder before having completed the installation of the LPG system. use a ring terminal* Wire location : **Battery +**
98 98 G INJ OUT **1** 106 106 G + INJ 1	**White-yellow** red	Connector VSI-injector to cylinder **1**. Timing belt side
99 99 G INJ OUT **2** 107 107 G + INJ 2	**Green-yellow** red	Connector VSI-injector to cylinder **2**.
100 100 G INJ OUT **3** 108 108 G + INJ 3	**Pink-yellow** red	Connector VSI-injector to cylinder **3**.
82 82 G INJ OUT **4** 90 90 G + INJ 4	**Blue-yellow** red	Connector VSI-injector to cylinder **4**.



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)
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 : **Brown** Location : petrol ecu **X2** (black) pin **51**

Petrol injector **cyl. 4**			
INJ LO 4		Blue	Injector side
ECU LO 4		**Blue-yellow**	ECU side
IM pos. D1 / D2			Colour : **Grey-blue** Location : petrol ecu **X2** (black) pin **49**

(cyl. 1-4)			
ECU HIGH **A**		**Red-yellow**	Injector side
IM pos. H1			Colour : **Brown-white** & **Blue-white** Location : petrol ecu **X2** (black) pin **71** & **69** **Twist and solder** **both injector highs wires & High-A** 

Petrol injector **cyl. 2**			
INJ LO 2		Green	Injector side
ECU LO 2		**Green-yellow**	ECU side
IM pos. A1 / C2			Colour : **Blue** Location : petrol ecu **X2** (black) pin **48**

Petrol injector **cyl. 3**			
INJ LO 3		Pink	Injector side
ECU LO 3		**Pink-yellow**	ECU side
IM pos. E1 / F2			Colour : **Green** Location : petrol ecu **X2** (black) pin **50**

(cyl. 2-3)			
ECU HIGH **B**		**Red-green**	Injector side
IM pos. H2			Colour : **Blue-grey** & **Green-grey** Location : petrol ecu **X2** (black) pin **68** & **70** **Twist and solder** **both injector highs wires & High-B** 

Electrical connections

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

Petrol ECU connector X1 (blue):

112			*Connect to +ignition / contact+ (+15).* Wire colour : P**urple-blue** Wire location : **X1**, blue connector, pin **51**
112 + Ignition		Red-grey	

Petrol ECU connector X2 (black):

			For measuring the engine speed signal. Wire colour : **Yellow-purple** Wire location : **X2**, black connector, pin **39**
8 RPM		Purple-white	

17 & 10			*Low pressure sensor interruption.* Wire colour : **Blue-white** Wire location : **X2**, black connector, pin **20**
17 AD 2		Blue-green	Sensor side.
10 DAC 2		Green	ECU side.

			Oxygen sensor. Wire colour : **Purple-grey** Wire location : **X2**, blue connector, pin **53**
20 AD3		Blue–pink	

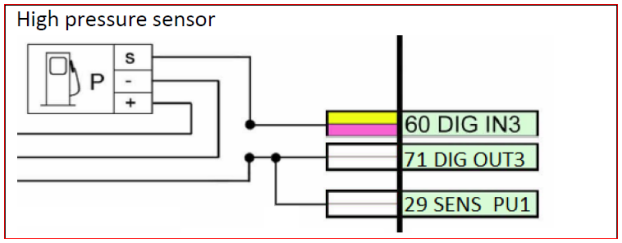
Electrical connections

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

Petrol ECU connector X3 (grey):

3-pole connector 27 +5V Sensor 37 C ground 18 AD1		Cut off connector Red-blue Brown-black Blue-white	*For measuring the inlet manifold pressure (MAP).* insulate insulate Wire colour : **Yellow-white or Green-white** Wire location : **X3**, grey connector, pin **40**
18 AD 1		Blue-white	

			High pressure petrol sensor supply 5V Wire colour : **Brown-red** Wire location : **X3**, black connector, pin **6**
40 Wake-up		Grey-red	

60, 71 & 29			*Fuel rail pressure sensor signal interruption* Wire colour : **Blue-white** Wire location : **X3**, grey connector, pin **21** ***Add wiring module for pin 29 & pin 71***
60 DIG IN3		Yellow-pink	Sensor side
71 **Wiring module**		**White**	ECU side
29 **Wiring module**		**White**	Connect wire **29** to wire **71**, see picture below
			

			High pressure petrol sensor ground. Wire colour : **Black-green** Wire location : **X3**, grey connector, pin **22**
63 Ground Shift		Blue-orange	

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.
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 VSI computer with the diagnostic software. When the VSI computer has not been activated, the switch will keep blinking.
   To activate the VSI computer, select function activate ECM in the diagnostic software.

3. Check whether the program in the VSI computer 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 evaporator heats up.
   Check the engine signals, petrol injection time, RPM, ECT, lambda, MAP signal, petrol pressure signal.
   Let the engine run idle on LPG.
   Adjust the evaporator pressure. Refer to Basic → System in the diagnostic software for the idle level value set.
   Adjust the evaporator 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 evaporator to adjust the pressure.
   An error code will be generated whenever the pressure variation is to 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.

ALTERNATIVE FUEL SYSTEMS
Prins