



Installation manual

PART 2/2

MANUFACTURER	BMW (based on F10 520i)
ENGINE DISPLACEMENT	N20B16 -1598cc / N20B20 – 1998cc
NUMBER OF VALVES	16v
ENGINE CODE / NUMBER - OUTPUT	N20B16A - 105kW & 125kW
ENGINE CODE / NUMBER - OUTPUT	N20B20A - 115kW → 180kW / N20B20B - 135kW
FIRING ORDER	1-3-4-2
VEHICLE CATEGORIES	M
TRANSMISSION	AT
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	N20B16 - KN9 63cc / N20B20 - KN9 73cc
TYPE INJECTION MODULE	Gen2 Type 1
PETROL ECU MANUFACTURER / CODE N20B16A	Bosch 0.261.S10.553 (658) & 0.216.S10.549 (658)
PETROL ECU MANUFACTURER / CODE N20B20A // N20B20B	Bosch 0.261.S11.653 // 0.261.S08.709
MODEL YEAR:	2012 - 2016
SYSTEM APPROVAL NUMBER (R115)	(not all engines!) E4-115R-000045 / VSI-LPG 51
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	N20B16 - 343/121002/A / N20B20 - 343/121004/A
ENGINE SET NUMBER eVP	N20B20 - 343/121005/A
MANUAL NUMBER	076/0301900-2
DATE	2019-09-16

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Revision: 2



TABLE OF CONTENTS

Manual updates / revision	2
General instructions	3
Required equipment / tools / materials for installing a complete system	4
Vehicle check	4
Tightening moments	5
Basic System Overview	5
VSI approval numbers	7
VSI component location overview.....	9
Engine coolant connection	10
Overpressure / MAP connection	11
Mounting the inlet manifold couplings.....	12
Mounting the VSI injector rail	13
Basic Wiring Diagram	14
Electrical connections	15
Electrical connections – Insulate.....	16
Electrical connections	17
Petrol ECM connector overview.....	17
Electrical connections	18
Electrical connections	19
Electrical connections	20
Electrical connections	21
Electrical connections	22
Checklist after installation	23

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



Manual updates / revision

Rev. nr	Rev. Date	Subject update
1	2019-02-13	Started with revision list
2	2019-09-16	Updated with N20B20B engine



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 AFC fails, it will automatically switch over to petrol. Never disconnect the AFC 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.

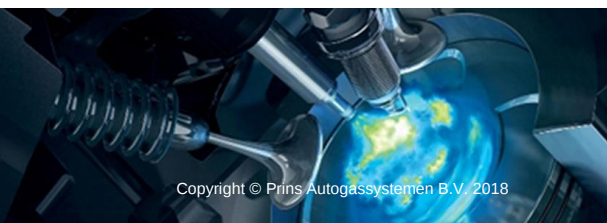


Required equipment / tools / materials for installing a complete system

- 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

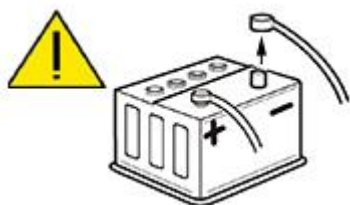
	Nm	Spanner mm
M5 x 0,8	6.5	8
M6 x 1,0	11.3	10
M8 x 1,25	27.3	13
M10 x 1	52	15-16-17
M10 x 1,5	54	15-16-17

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:

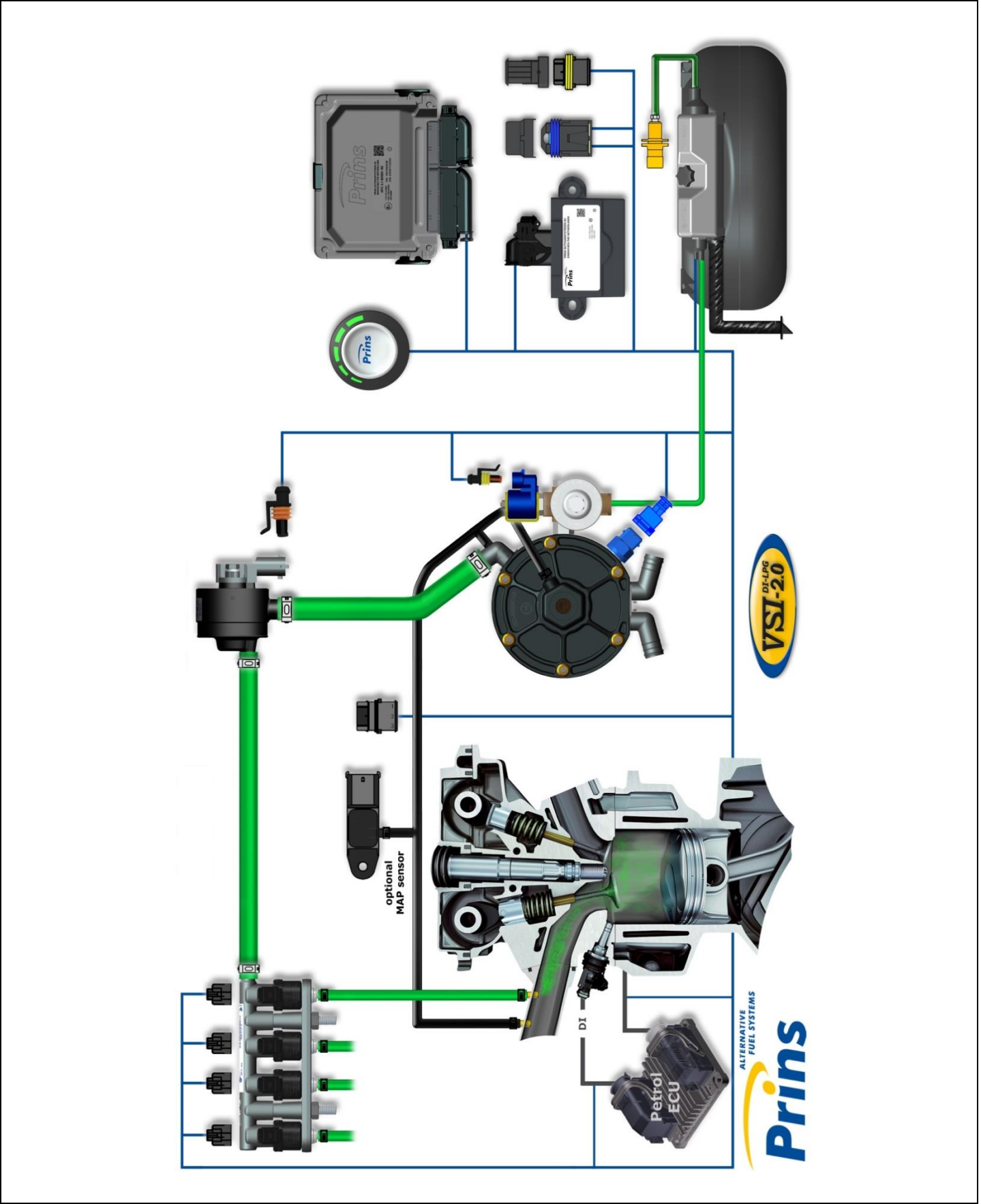


= IMPORTANT, CAUTION

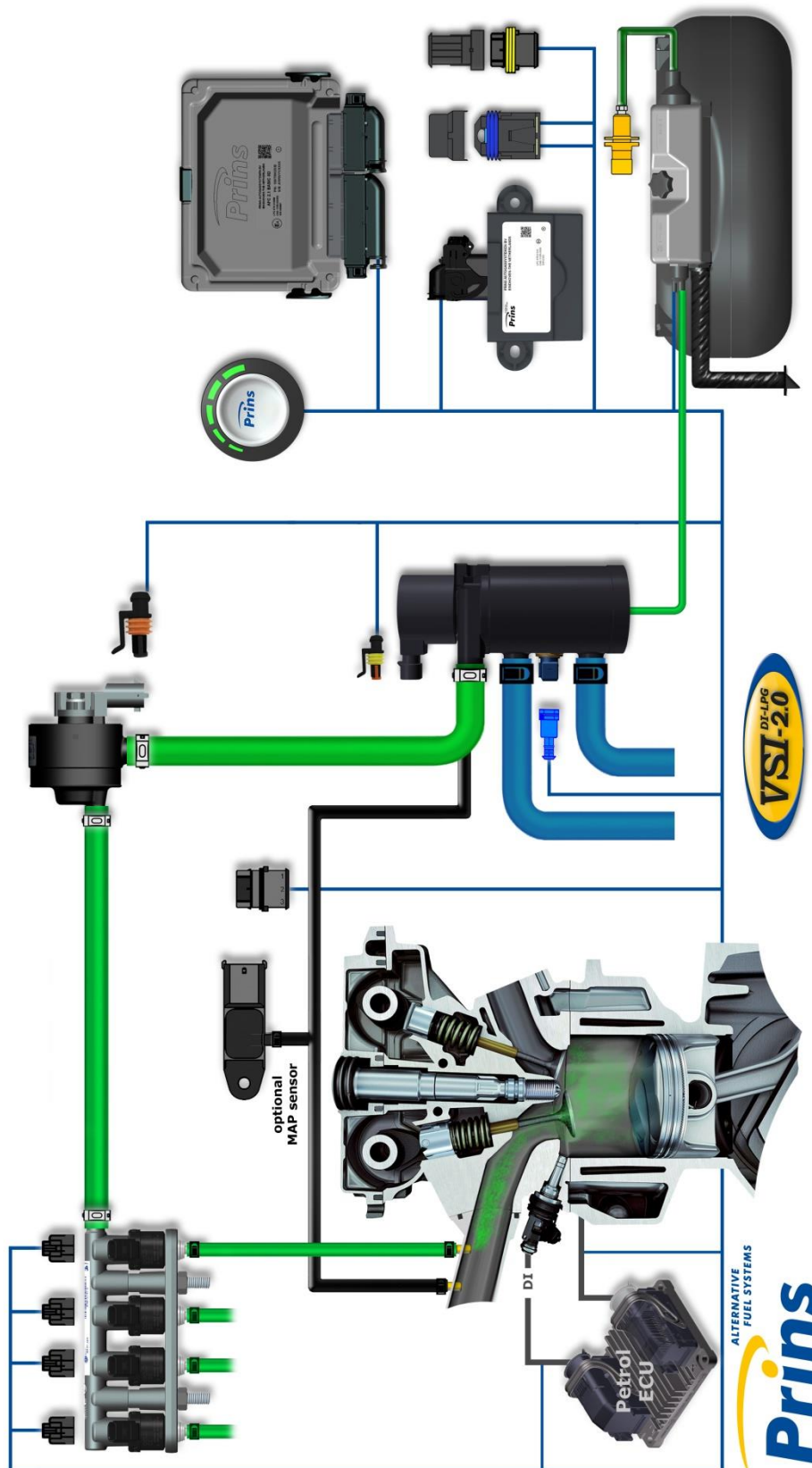


= WEAR SAFETY GOGGLES

Basic System Overview



Basic System Overview eVP



VSI approval numbers

	
Reducer VSI LPG Prins : E4-67R-010054 Reducer eVP-500 : E4-67R-010358 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 KN8 : LPG E4-67R-010092 CNG E4-110R-000020 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

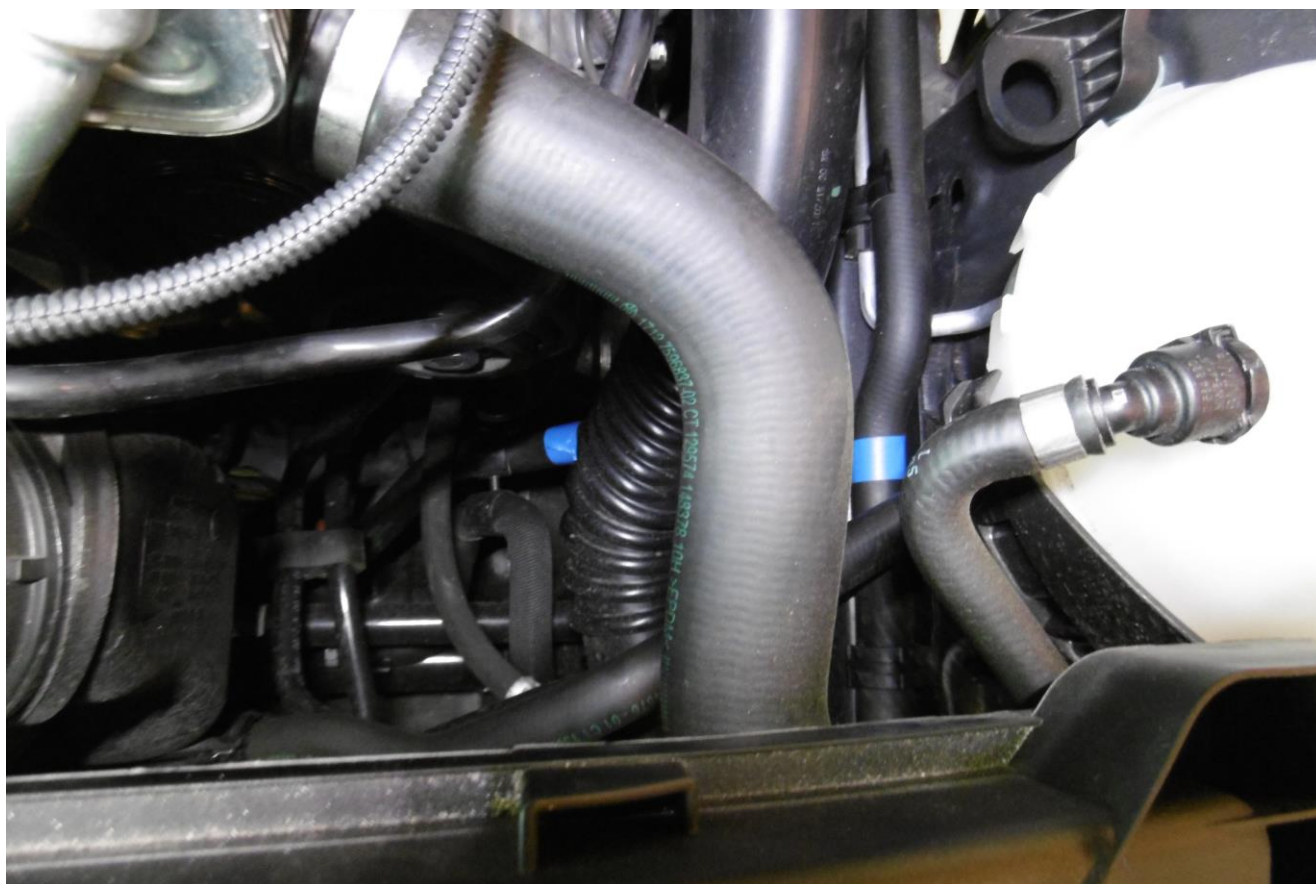
VSI component location overview

Based on BMW F10 520i

		AFC 
Petrol ECU 		Injection module 
Rail(s) 		Fuse box 
Reducer 		Filter 

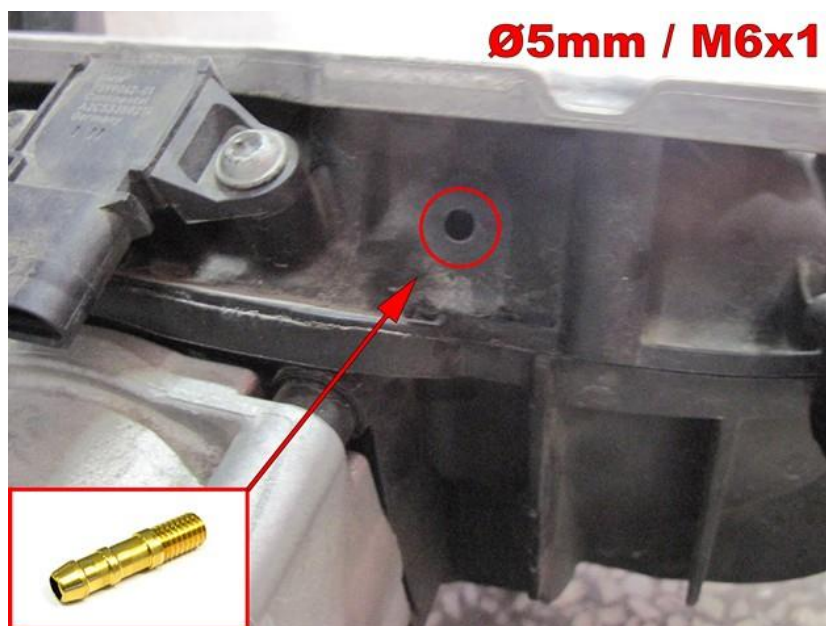
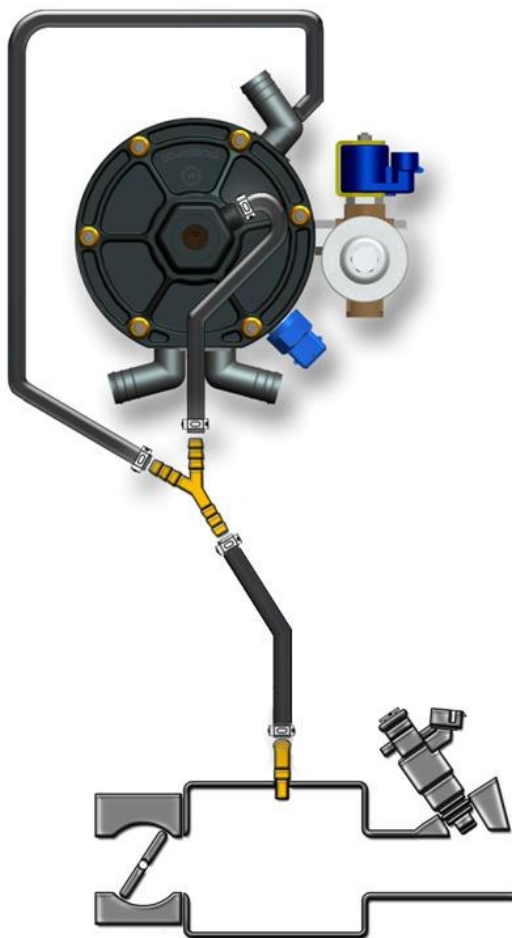
	If applicable, R115 approval sticker : Right side centre door post
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Engine coolant connection



See blue markers, 2x T-piece 16x16x16

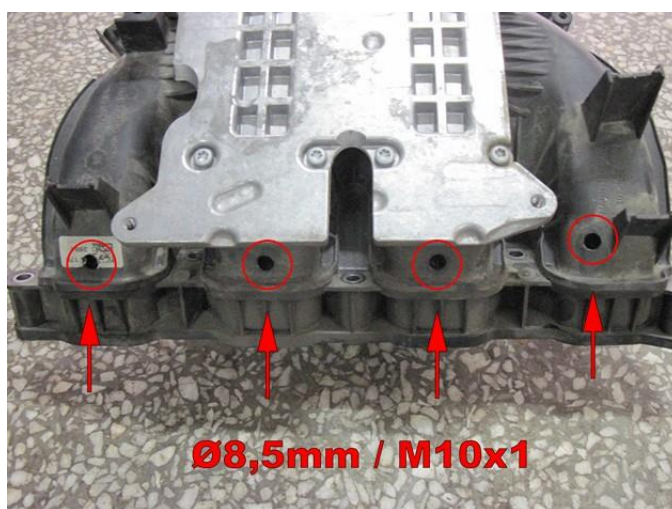
Overpressure / MAP connection



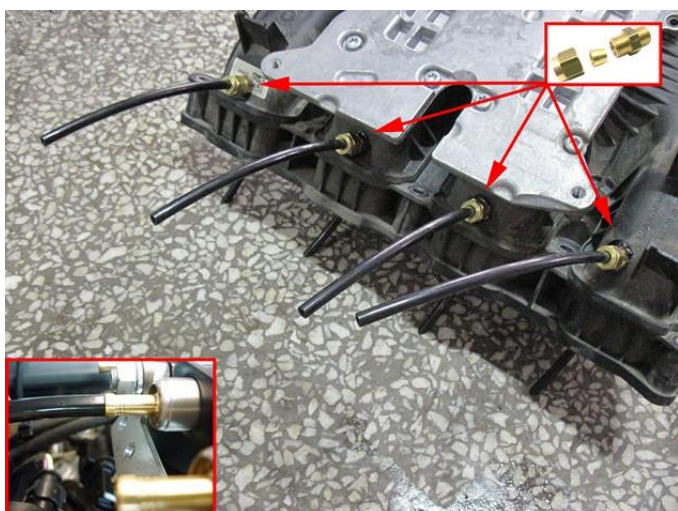
Remove manifold, drill hole Ø5mm and cut thread M6x1. Mount the coupling with a locking compound.

Mounting the inlet manifold couplings

Remove the inlet manifold. Drill 4x holes of **8,5mm** in the inlet manifold.
Cut **M10x1** thread in these holes. Place the VSI couplings with a lock compound in the inlet manifold.
Watch out that the lock compound doesn't come inside the VSI couplings.
Place the inlet manifold back on the engine.



Drill holes Ø8,5mm and cut thread M10x1.



Mount the couplings and hoses, be sure the hose is long enough to reach the VSI-injector.
Inside the manifold, cut-off the hoses with a length of 45mm. Mount the manifold back to the engine.



Beware of the hoses when mounting the manifold back to the engine.

Mounting the VSI injector rail



Mount the bracket to the screw from the petrol ECM. Mount the injector rail to the bracket.

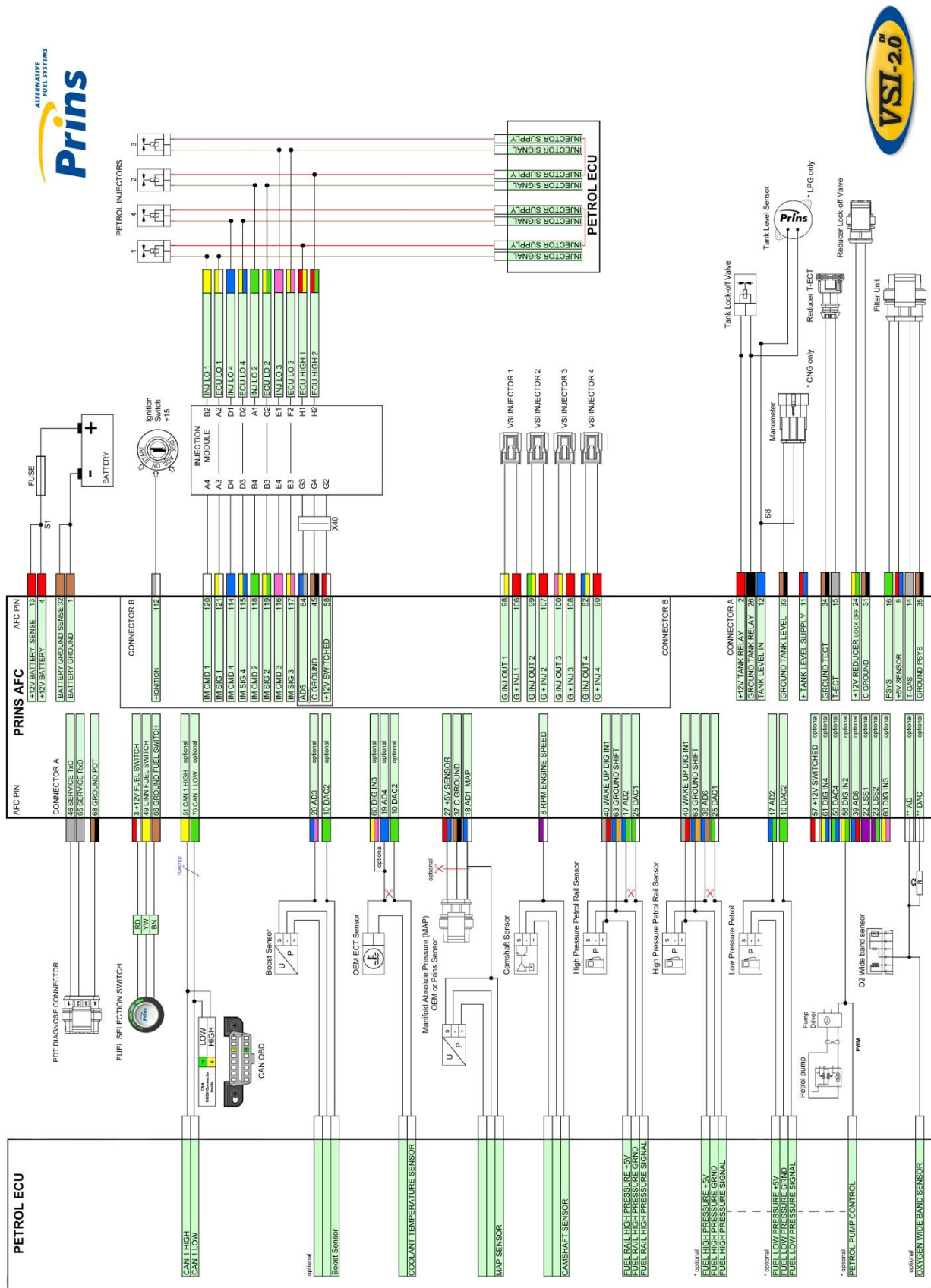


Connect the nylon hoses with 50mm 6mm LPG hose to the injectors.



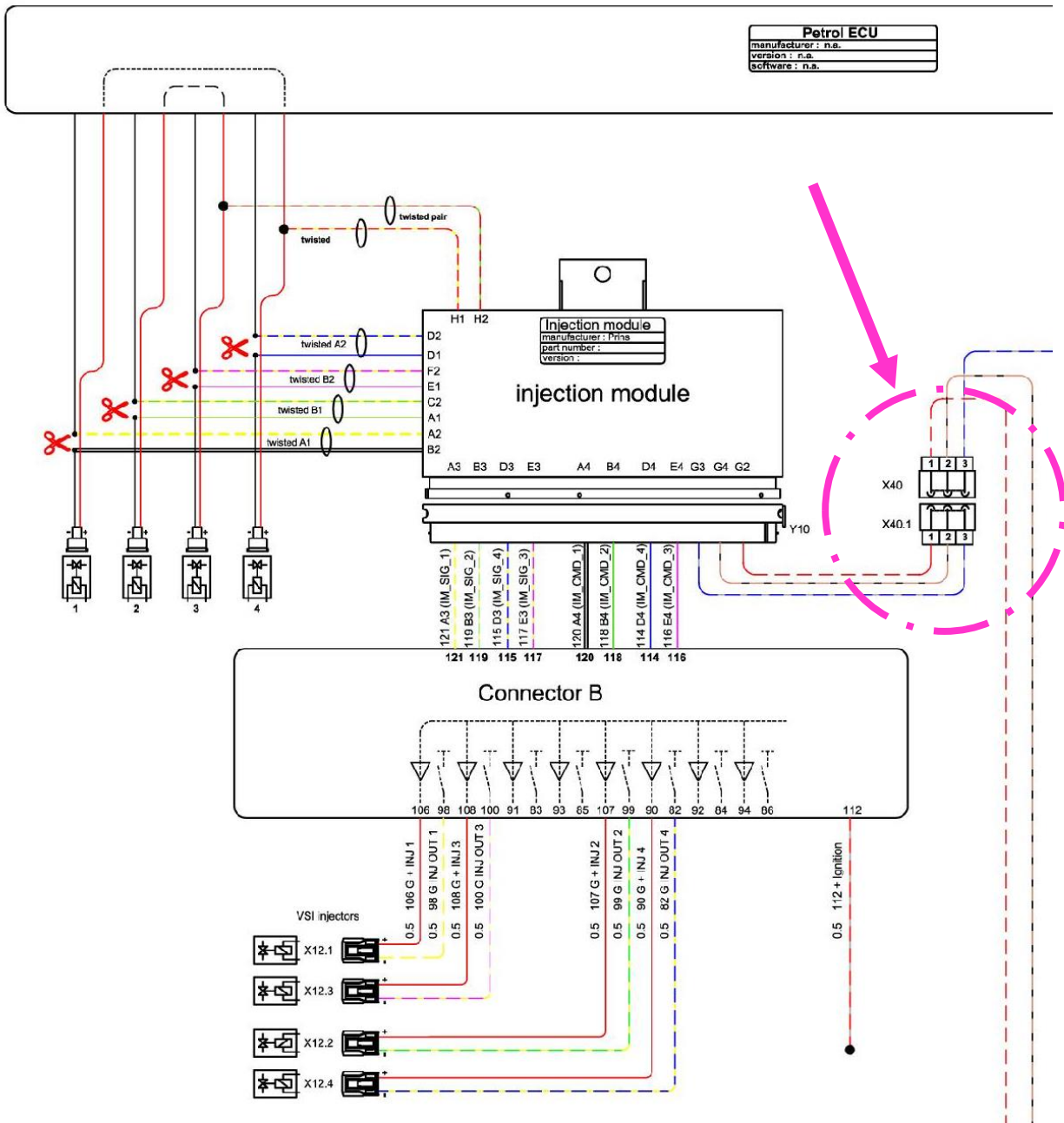
Connect the nylon hoses with 50mm 6mm LPG hose to the injectors.

Basic Wiring Diagram



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

Connector Injection Module



Electrical connections – Insulate

19	AD4			Blue	<i>Insulate</i>
22	LSS1			Purple	<i>Insulate</i>
23	LSS2			Purple-green	<i>Insulate</i>
36	AD 6			Blue-brown	<i>Insulate</i>
38	AD7			Blue-light Blue	<i>Insulate</i>
39	AD8			Blue-red	<i>Insulate</i>
43	+12 Valve 2			Red-white	<i>Insulate</i>
50	DAC4			Green-blue	<i>Insulate</i>
56	DI2			Yellow-green	<i>Insulate</i>
60	DIG IN3			Yellow-pink	<i>Insulate</i>
61	DIG IN4			Yellow-blue	<i>Insulate</i>
62	C Ground			Brown-black	<i>Insulate</i>
74	DAC3			Green-pink	<i>Insulate</i>
<i>Insulate all extra not used wires.</i>					



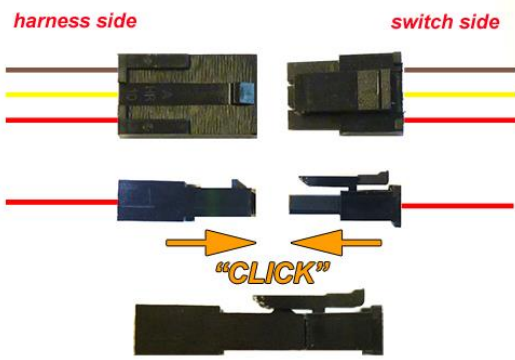
Electrical connections

Driver room

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

harness side

switch side



"CLICK"

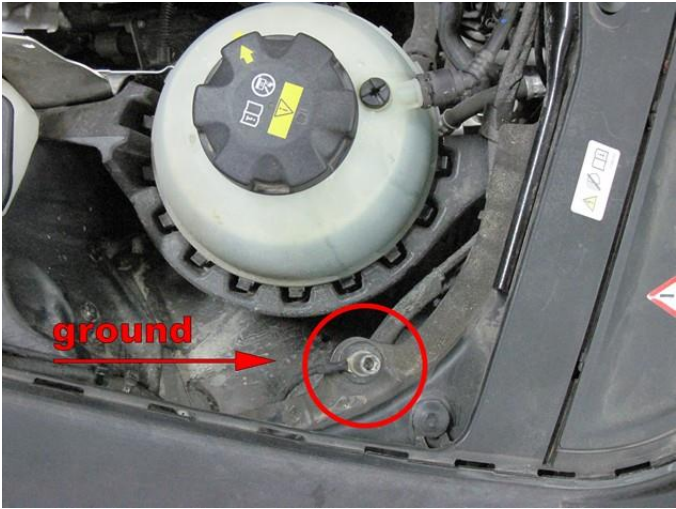
Petrol ECM connector overview



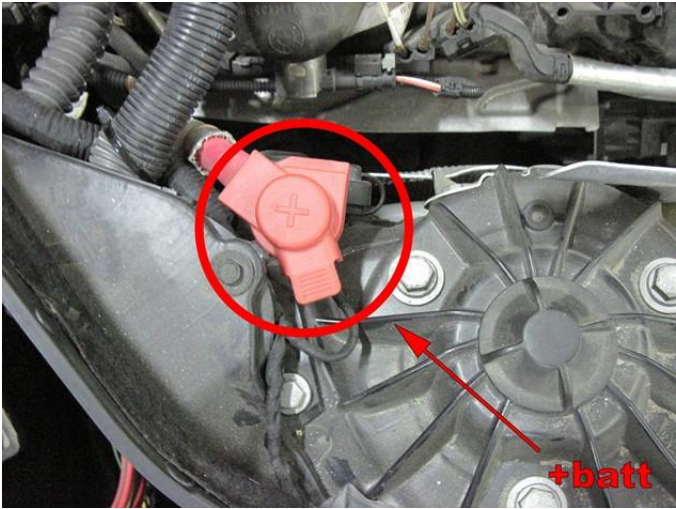
Electrical connections

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

32	Ground sense1 Ground battery		Brown	Connect to the '-' of the battery; use a ring terminal or solder: Wire colour: Black Wire location: On ground point in engine room.
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4	+12V Battery		Red	Connect to the '+' of the battery; use a ring terminal or solder: Wire colour: Red Wire location: On +Batt point at suspension strut.
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Do not place the fuse in the holder before having completed the installation of the LPG system.

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	



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: White-green Location: Petrol ECU, connector 6 , pin 8
Petrol injector cyl. 4			
INJ LO 4		Blue	Injector side
ECU LO 4		Blue-yellow	ECU side
(IM pos. D1 / D2)			Colour: White-red Location: Petrol ECU, connector 6 , pin 24
(cyl. 1-4)			
ECU HIGH A		Red-yellow	Injector side
(IM pos. H1)			Colour: White Location: Petrol ECU, connector 6 , pin 9
Petrol injector cyl. 2			
INJ LO 2		Green	Injector side
ECU LO 2		Green-yellow	ECU side
(IM pos. A1 / C2)			Colour: White-red Location: Petrol ECU, connector 6 , pin 23
Petrol injector cyl. 3			
INJ LO 3		Pink	Injector side
ECU LO 3		Pink-yellow	ECU side
(IM pos. E1 / F2)			Colour: White-green Location: Petrol ECU, connector 6 , pin 22
(cyl. 2-3)			
ECU HIGH B		Red-green	Injector side
(IM pos. H2)			Colour: White Location: Petrol ECU, connector 6 , pin 12



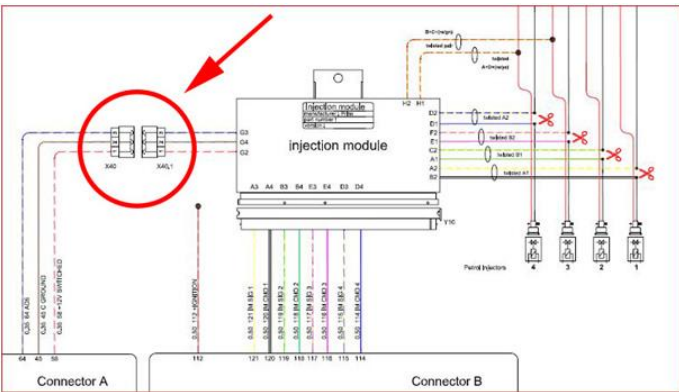
Electrical connections

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

			CAN 1 High. Wire colour: Blue-red Wire location: Petrol ECU connector 1 pin 28
51	CAN1 High		Yellow
			CAN 1 Low. Wire colour: Red Wire location: Petrol ECU connector 1 pin 13
70	CAN1 Low		Green
3-pole connector 27 +5V Sensor 37 C ground 18 AD1 Cut off connector			For measuring the inlet manifold pressure (MAP). Cut off & insulate Cut off & insulate Wire colour: Blue Wire location: Petrol ECU connector 2 pin 11
18	AD 1		Blue-white
			High pressure petrol sensor signal interruption. Wire colour: Yellow-white Wire location: Petrol ECU connector 2 pin 53
17 & 25			
17	AD 2		Blue-green
25	DAC 1		Green-white
			High pressure petrol sensor ground. Wire colour: Black-green Wire location: Petrol ECU connector 2 pin 38
63	Ground Shift		Blue-orange
			High pressure petrol sensor supply 5V Wire colour: Blue-grey Wire location: Petrol ECU connector 2 pin 3
40	Wake-up		Grey-red
			For measuring the engine speed signal. Wire colour: Yellow Wire location: Petrol ECU connector 3 pin 16
8	RPM		Purple-white
			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: Petrol ECU connector 5 pin 6
112	+ Ignition		Red-grey

Electrical connections

Connectors in wiring loom

2-pole blue connector 15 T-ECT 34 Ground T-ECT	Grey Brown-black	<i>For measuring the engine coolant temperature (Tect).</i> 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	<i>For measuring gas pressure and temperature.</i> 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	<i>Cut off connector and insulate wires</i>
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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.

