Installation manual

PART 2/2

MANUFACTURER	VAG
ENGINE DISPLACEMENT / POWER	1390cc
NUMBER OF VALVES	16
ENGINE CODE / NUMBER	CAVA-G - 103-136kW / **CTHA-G - 110-136kW** / *CKMA – 118kW*
FIRING ORDER	1-3-4-2
VEHICLE CATEGORIES	M
TRANSMISSION	MT & AT/DSG
VERSION	AFC-2.1 DI-LPG
TYPE VSI INJECTOR	KN9 - 63cc
INJECTION MODULE	Gen2 Type 1
PETROL ECU MANUFACTURER / CODE	Bosch MED 17.5.5
MODEL YEAR:	2011-
SYSTEM APPROVAL NUMBER (R115)	E4-#115R-000020 / VSI-LPG 31
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	366/121007/A // **366/121018/A** // *366/121029/A*
MANUAL	076/2618400-1
DATE	2019-06-04

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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, 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 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.
- 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 a 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 leak of engine coolant, petrol and air.

  ATTENTION: please check, after activation of the AFC and switching the system to LPG, if DTC’s are stored in the Prins diagnostic software. If DTC’s are stored, please contact our After Sales department for a software update in relation to the CAN-BUS compatibility. aftersales@prinsautogas.com
- 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 gas installation or a dangerous situation.
- For maintenance instructions and filter registration see owner 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 8 days after installation.

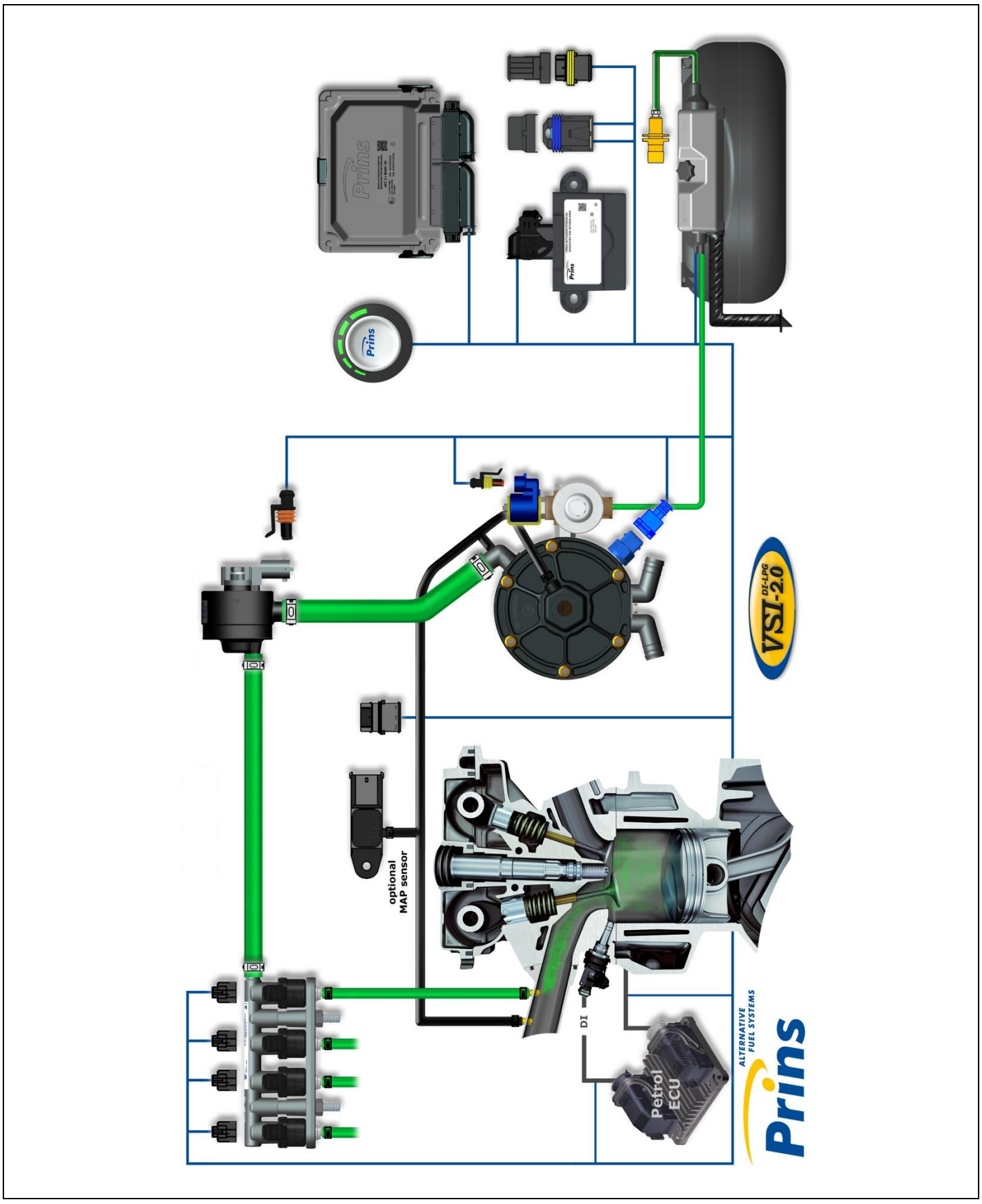
Required equipment / tools / materials for installing a complete system

- 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 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)

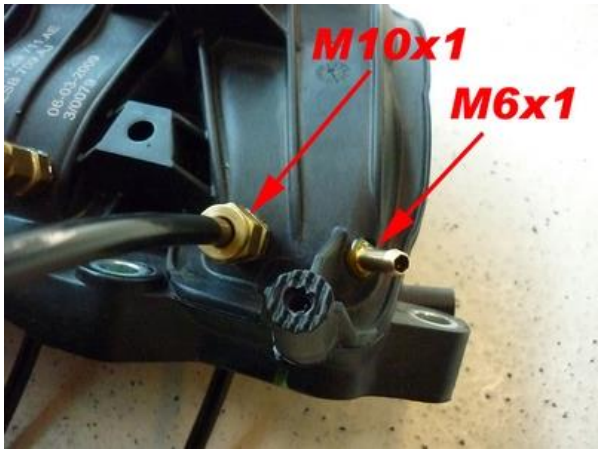
Base diagram



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	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

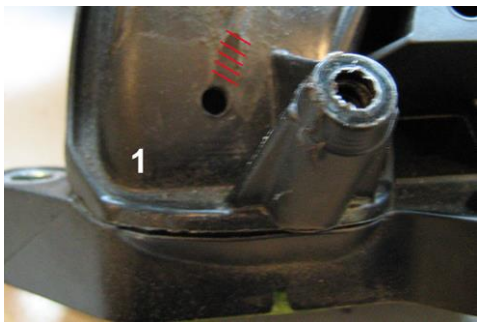
Overpressure / MAP connection

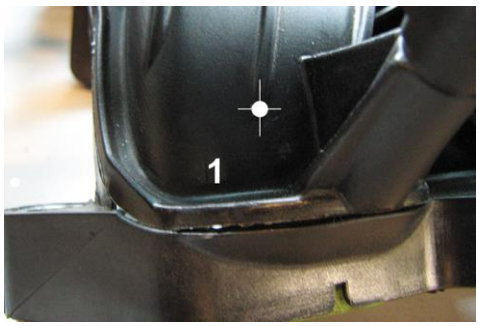


MAP connection

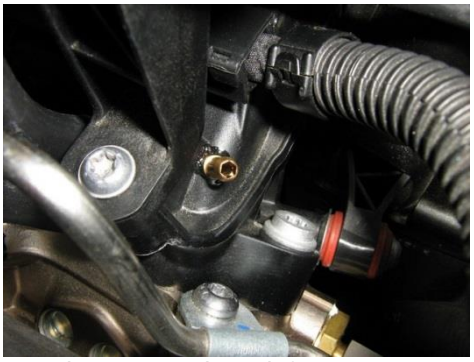
Mounting the inlet manifold couplings 1

Remove the inlet manifold. Smoothen the area before drilling hole cylinder 1.
Drill **4** holes of **Ø5mm** and drill up to **9mm** in the inlet manifold. Cut **M10x1** thread in these holes.
Place the VSI couplings with a lock compound in the inlet manifold.
Also drill the hole for the overpressure / MAP coupling, see picture, **Ø5mm** drill, cut **M6x1** thread.





Cilinder 1

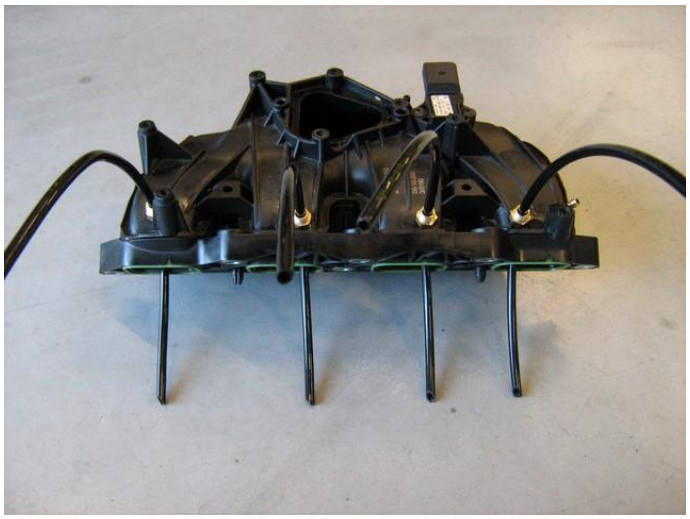


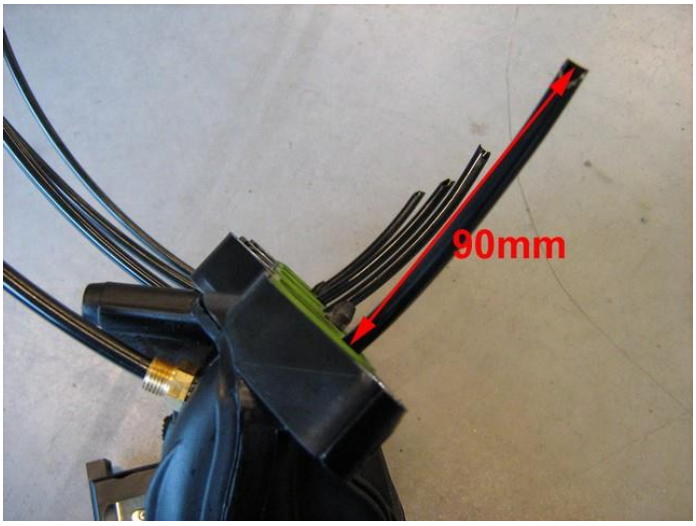
Drill a hole of **Ø5mm**, and cut **M6x1** thread, for overpressure / **MAP** connection.

Mounting the inlet manifold couplings 2

Install the hoses (4x45cm) before mounting the inlet manifold.
Cut the hoses on length later.

Cilinder 1





Mounting the VSI injector rail

Mount the injector rail bracket with the two original torx bolts on top of the manifold.
Cut the nylon hoses on length: inlet nylon against outlet VSI injector
Connect the nylon hoses to the rail with **Ø6 mm** LPG hose (4 x 6 cm).
Adapt the cover for hose clearance.

LPG hoses

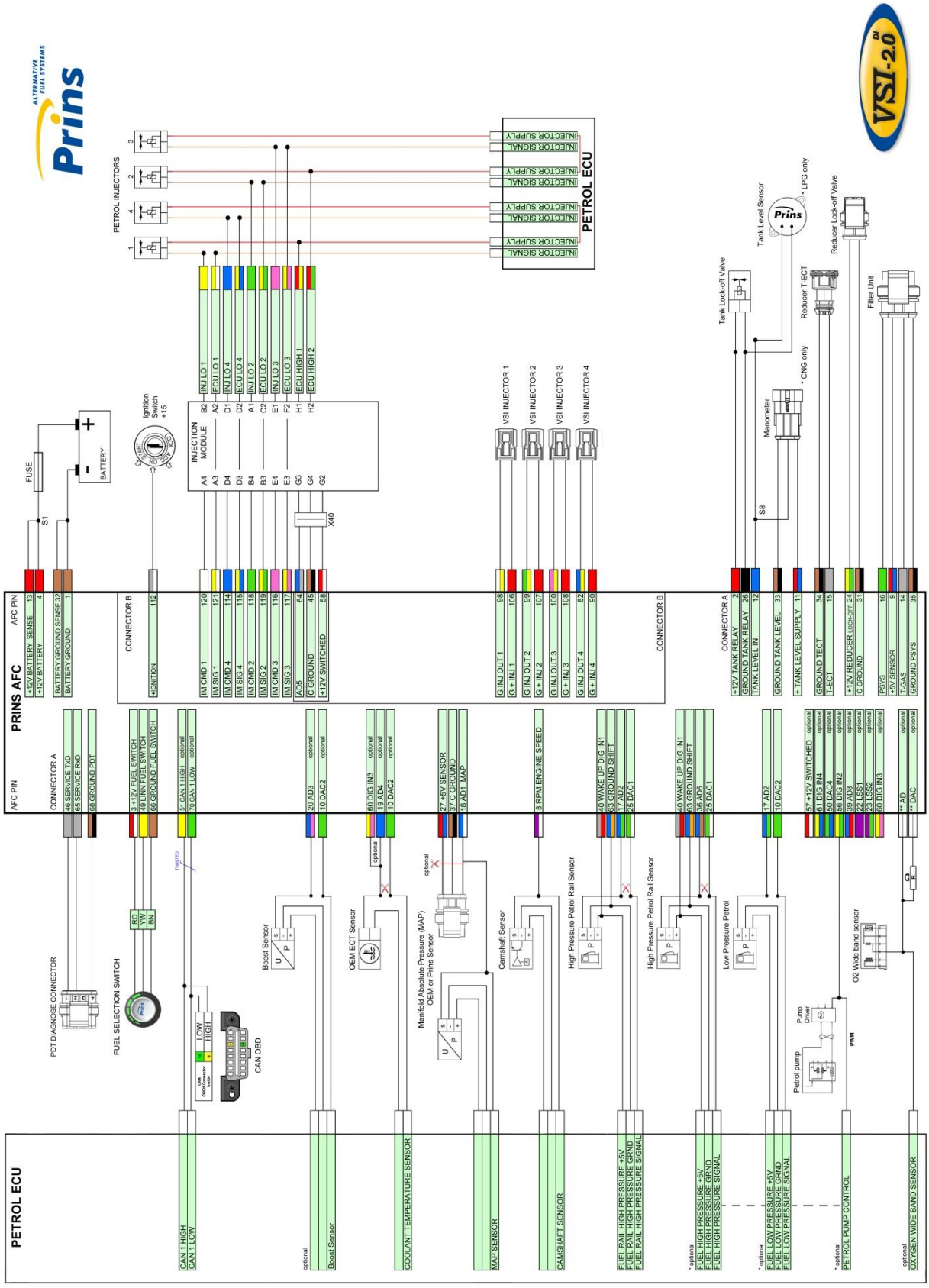
Hose (Ø..mm)	*From component*	*To component*	*Hose length (cm)*
6	VSI injector 1	Nylon hose cyl.1	6
6	VSI injector 2	Nylon hose cyl.2	6
6	VSI injector 3	Nylon hose cyl.3	6
6	VSI injector 4	Nylon hose cyl.4	6

General info.

Cut the LPG hoses on length.
Cut the nylon hoses on length, make sure that the inlet of the nylon hose faces the injector outlet.

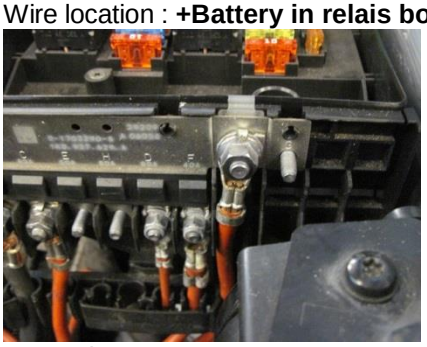
Please observe that there is no damage or fouling to the hoses.

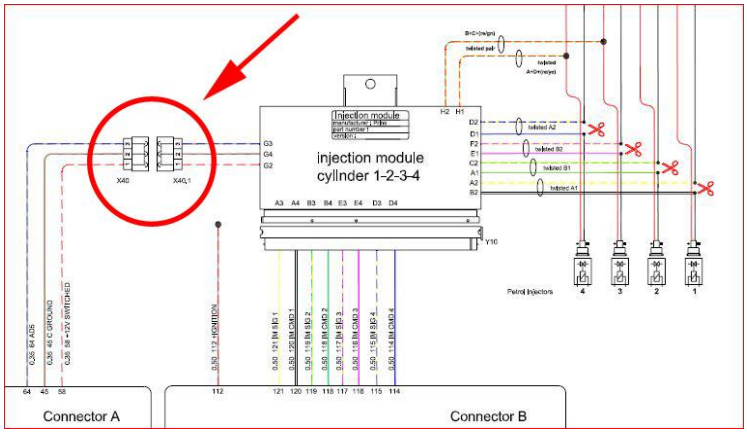
Wiring Diagram



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 or solder: Wire colour : **Black** Wire location : **- Ground battery on left suspension strut**  *Example*
4 +12V Battery	Red	Do not place the fuse in the holder before having completed the installation of the LPG system. Wire colour : **Red** Wire location : **+Battery in relais box left side engine room**  *Example*
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

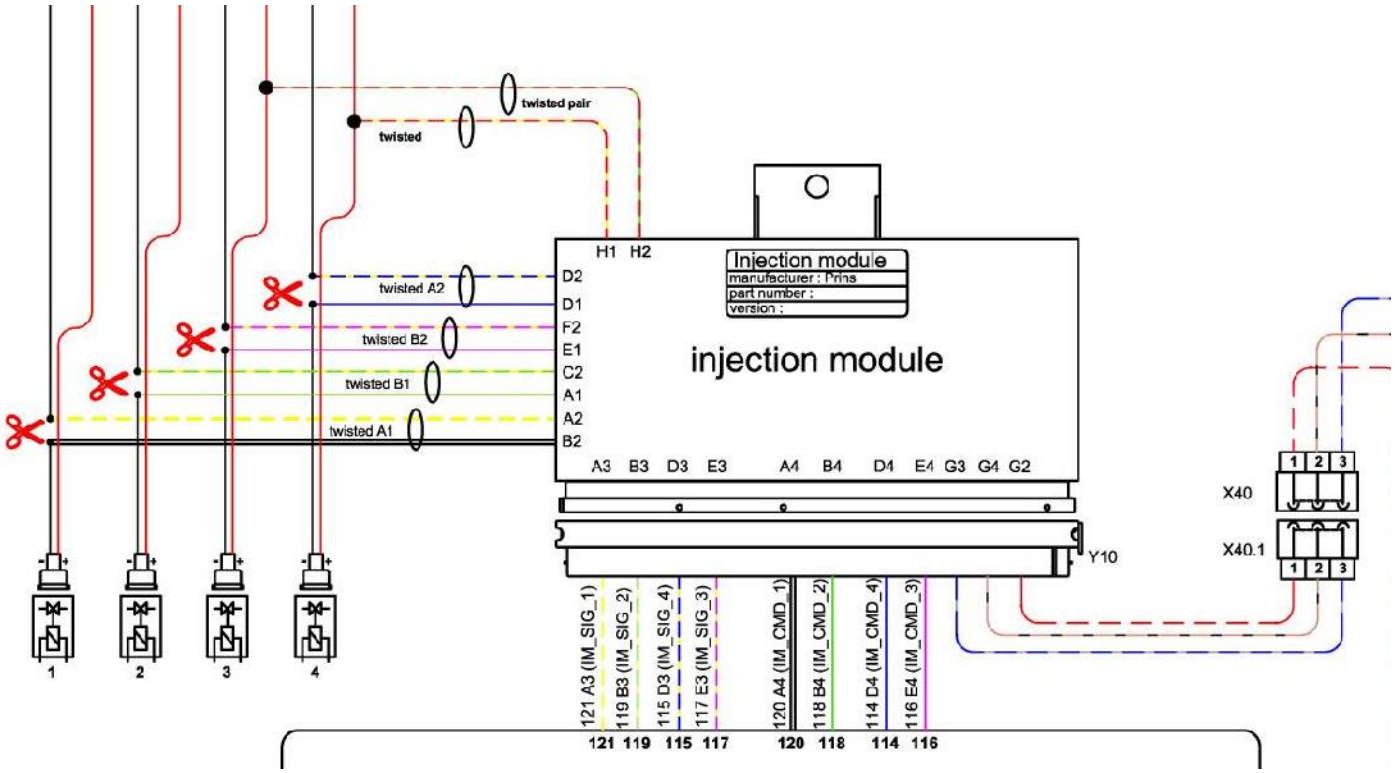
Check and measure the wiring in case of changes in the cars wiring colours.

⚠ For measuring the petrol injectors :

Interrupt each petrol injector control wire (injector min)
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.

VSI measure wire nr. :	Full coloured / Bicoloured Module position	Interrupt petrol injector wire
VSI wire inj / ecu **1** *Petrol injector cyl. 1*	white / white-yellow B2 / A2	Colour : **Brown - black** Location : Petrol ECU, **T60,** pin **33**
VSI wire inj / ecu **2** *Petrol injector cyl. 2*	green / green-yellow A1 / C2	Colour : **Brown - white** Location : Petrol ECU, T**60**, pin **49**
VSI wire inj / ecu **3** *Petrol injector cyl. 3*	pink / pink-yellow E1 / F2	Colour : **Brown - purple** Location : Petrol ECU, **T60**, pin **34**
VSI wire inj / ecu **4** *Petrol injector cyl. 4*	blue / blue-yellow D1 / D2	Colour : **Brown - grey** Location : Petrol ECU, **T60**, pin **48**
Module wire pos. H1 ECU HIGH A (cil. 1-4)	red-yellow H1	Colour : **Red – black** Location : Petrol ECU, **T60**, pin **31**
Module wire pos. H2 ECU HIGH B (cil. 2-3)	red-green H2	Colour : **Red - white** Location : Petrol ECU, **T60**, pin **32**



Electrical connections

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

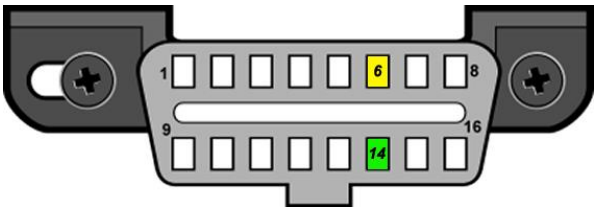
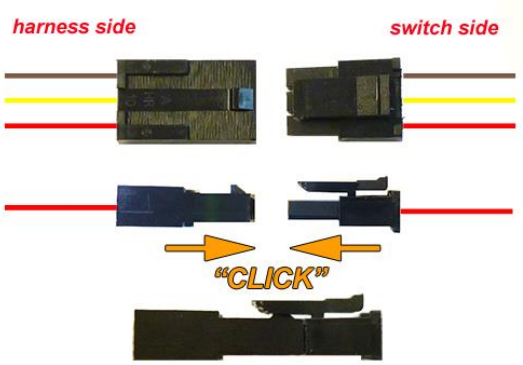
Wire number / code	Wire colour	Connection
27 +5V Sensor 37 C ground 18 AD1	Red–blue (not used) Brown-black (not used) Blue-white	*For measuring the inlet manifold pressure (MAP).* ***Cut-off connector & insulated not used wires*** Wire colour : **Yellow-blue** Wire location : Petrol ECU, connector **T60**, pin **55**
17 AD2 25 DAC1	Blue–green Green-white	*High pressure petrol sensor signal interruption.* Sensor side. ECU side. Wire colour : **Grey-blue** Wire location : Petrol ECU, connector **T60**, pin **40**
63 Ground shift	Blue–orange	*Make a connection to ground high pressure petrol sensor.* Wire colour : **Brown-blue** Wire location : Petrol ECU, connector **T60**, pin **13**
8 RPM engine speed	Purple-white	*For measuring the engine speed.* Wire colour : **white-brown** Wire location : Petrol ECU, connector **T60**, pin **36**
40 Wake-up	Grey-red	*High pressure petrol sensor 5Volt supply / car wake-up.* Wire colour : **red-blue** Wire location : Petrol ECU, connector **T60**, pin **29**
112 + Ignition	Red-grey	*Make a connection to ignition + / contact +.* Do not place the fuse in the holder before having completed the installation of the LPG system. Wire colour : **Grey** *or* **Grey-black** *or* **Black-white** Wire location : Petrol ECU, connector **T94**, pin **87**

Insulate not used wires:

10	DAC2	Green	Insulate
19	AD4	Blue	Insulate
20	AD3	Blue-pink	Insulate
36	AD6	Blue-brown	Insulate
38	AD7	Blue-light blue	Insulate
39	AD8	Bleu-red	Insulate
50	DAC4	Green-blue	Insulate
56	DI2	Yellow-green	Insulate
60	DI3	Yellow-pink	Insulate
61	DI4	Yellow-blue	Insulate
74	DAC3	Green-pink	Insulate
Insulate additional not used wires.			

Electrical connections inside

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 the 3-pole connector to the Prins fuel selection switch
		

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.

ATTENTION: please check, after activation of the AFC and switching the system to LPG, if DTC's are stored in the Prins diagnostic software.
If DTC's are stored, please contact our After Sales department for a software update in relation to the CAN-BUS compatibility. aftersales@prinsautogas.com