Installation manual

PART 2/2

MANUFACTURER	VAG
TYPE	Based on Audi Q7 (4LB)
ENGINE DISPLACEMENT	4163cc
NUMBER OF VALVES	32
ENGINE CODE / NUMBER	BAR
FIRING ORDER	1-5-4-8-6-3-7-2
VEHICLE CATEGORIES	M
TRANSMISSION	AT
VERSION	AFC-2.1 DI
TYPE VSI INJECTOR	KN9 - 82cc
TYPE INJECTION MODULE	Gen2 Type 1
PETROL ECU MANUFACTURER / CODE	Bosch MED 9.1.1
MODEL YEAR:	2006 - 2010
SYSTEM APPROVAL NUMBER (R115)	E4-115R-000020 / VSI-LPG 31
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	366/121015/A
MANUAL NUMBER	076/2620400
DATE	2020-07-02

Revision: -

TABLE OF CONTENTS

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

Manual updates / revision

Rev. nr	Rev. Date	Subject update
-	2020-07-02	Releasing this semi-dedicated manual (Injection module changed from Gen2 type 2 to Gen2 type 1 compared to former full dedicated set 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 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.
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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 (ø 20, 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

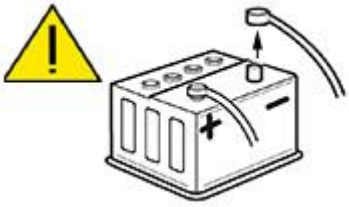
- Check the vehicle drivability on petrol
- Check the fuel system for error codes (scan tool)
- Check if the catalytic converter is in good condition (exhaust gas analyser)
- Check the condition of the ignition system (spark plugs, cables, coil)

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

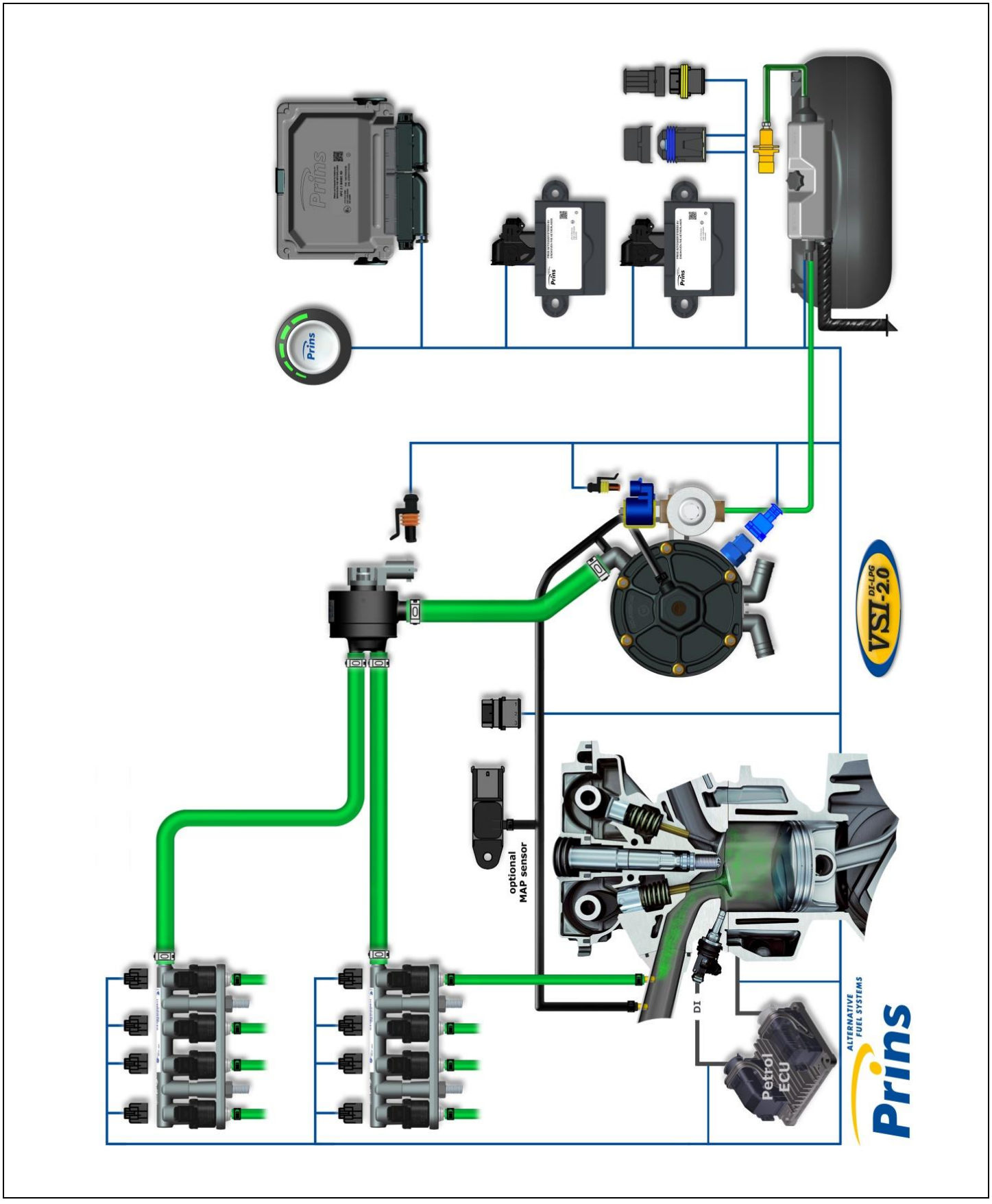
EXPLANATION OF SYMBOLS :

= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

Base diagram



VSI approval numbers

	
Reducer 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	ubithor : 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

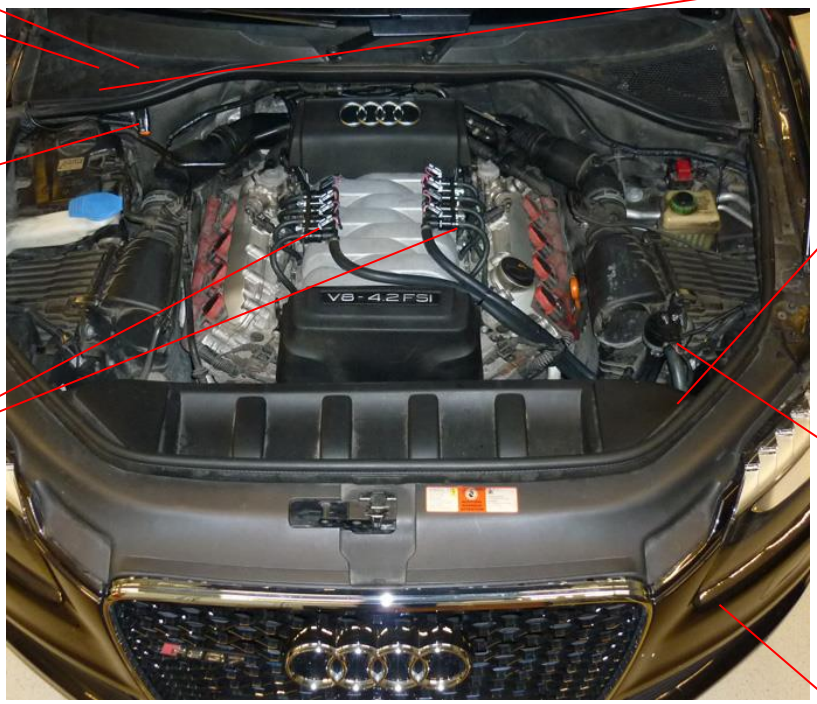
VSI component location overview

(example Q7)

AFC / IM

Fuse

Rail(s)



Petrol ECU

MAP sensor

Filter

Reducer

Examples mounting Prins parts

Filter replacement must be recorded in the service book supplied

Reducer

Filter

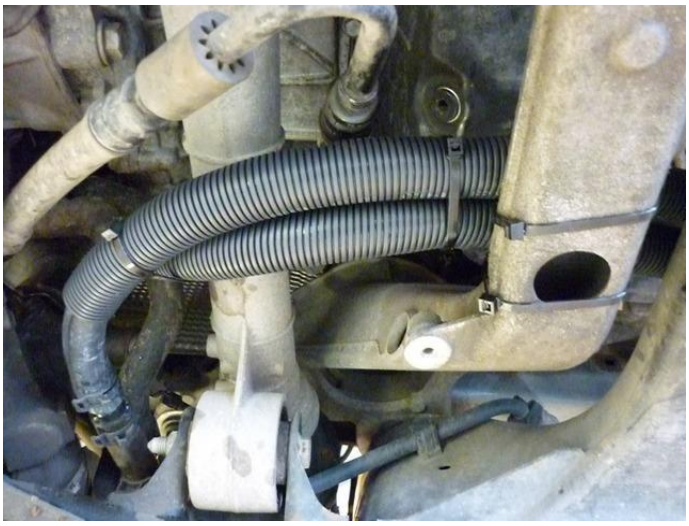
Injection Modules

Velcro tape on the AFC & petrol ECU, AFC on the petrol ECU

Water connections

Audi Q7:






Overpressure / MAP connection

Removing the inlet manifold

WARNING

The fuel system operates at extremely high pressure. This can cause injury.

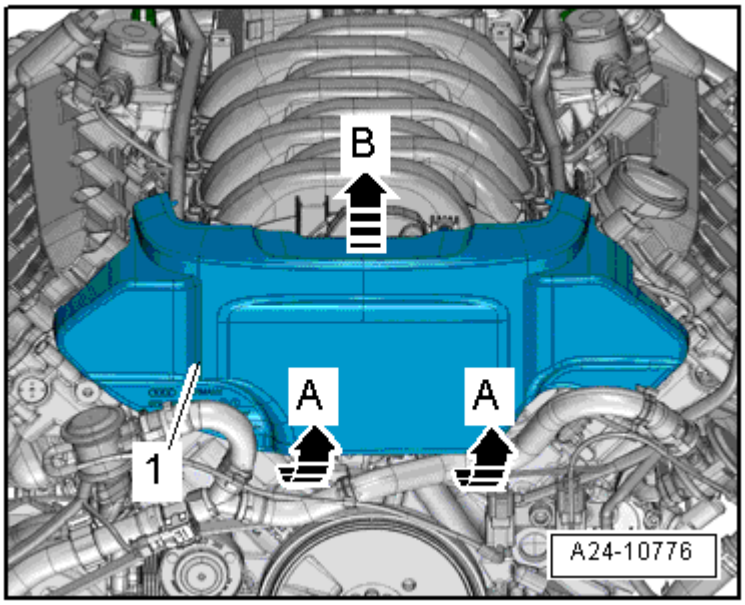
- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.
- Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.

Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

-Remove engine cover panel.

-Remove front cover.

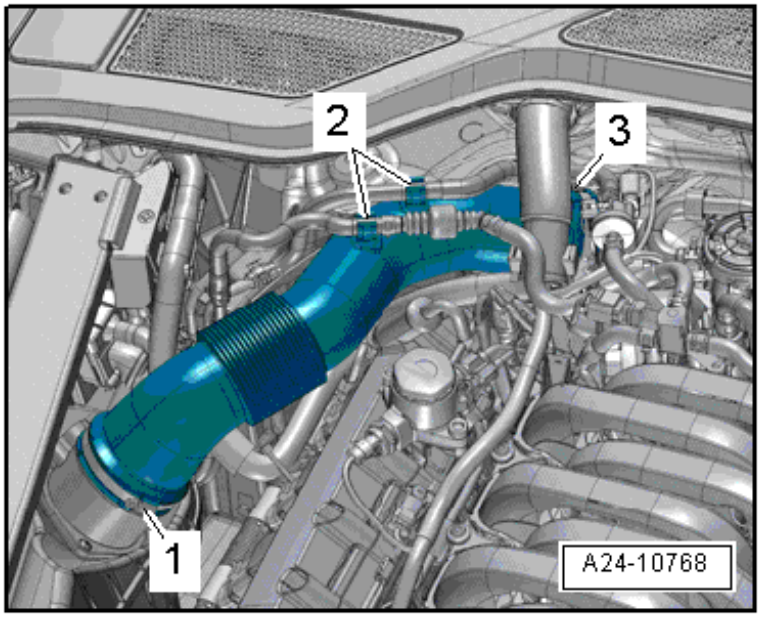


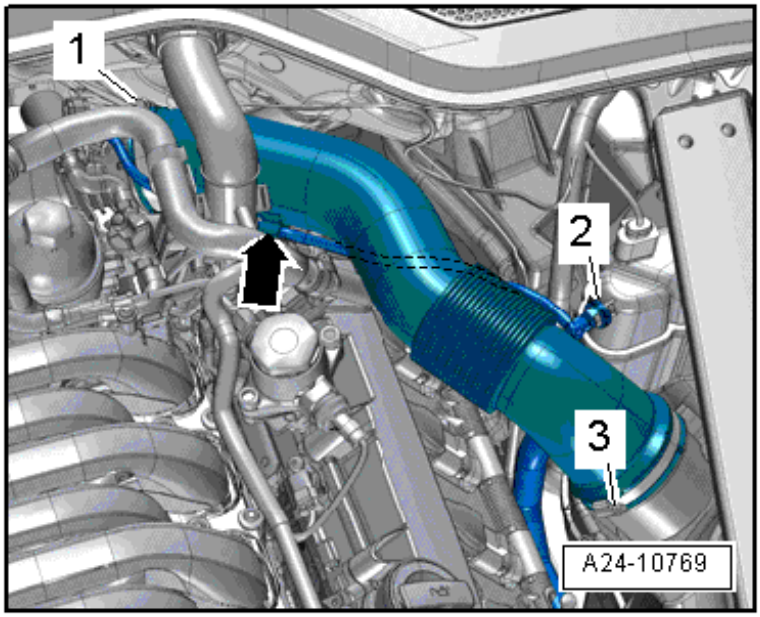
Removing the inlet manifold

– Loosen hose clips -1 and 2- and remove air pipe (right-side).

– Loosen hose clips -1 and 2- and remove air pipe (left-side).

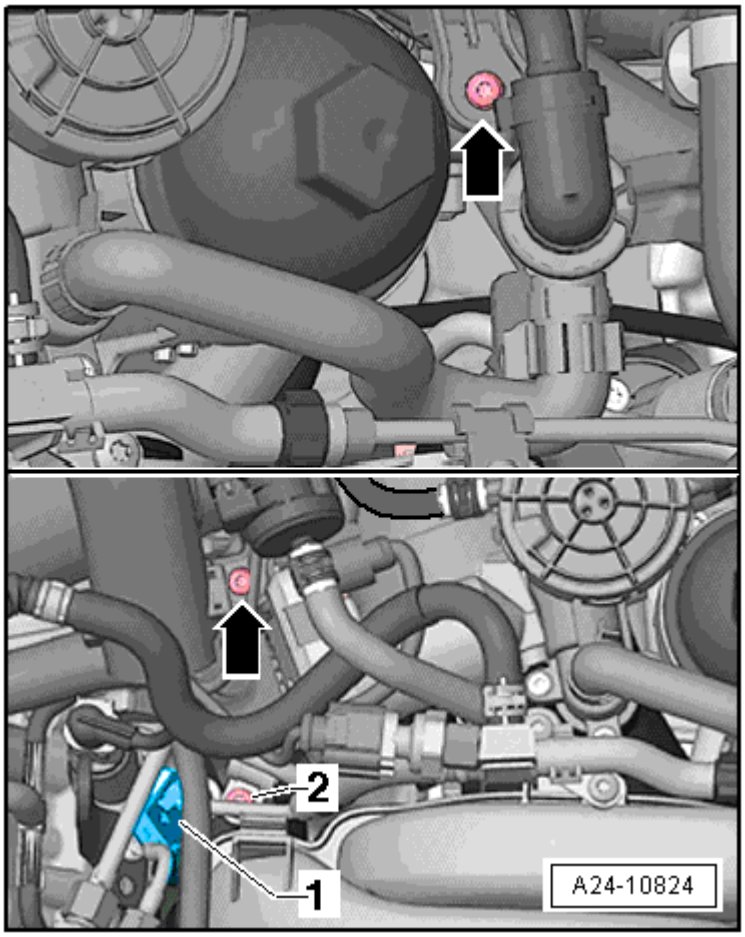
– Disconnect vacuum lines - arrows- from air pipe.



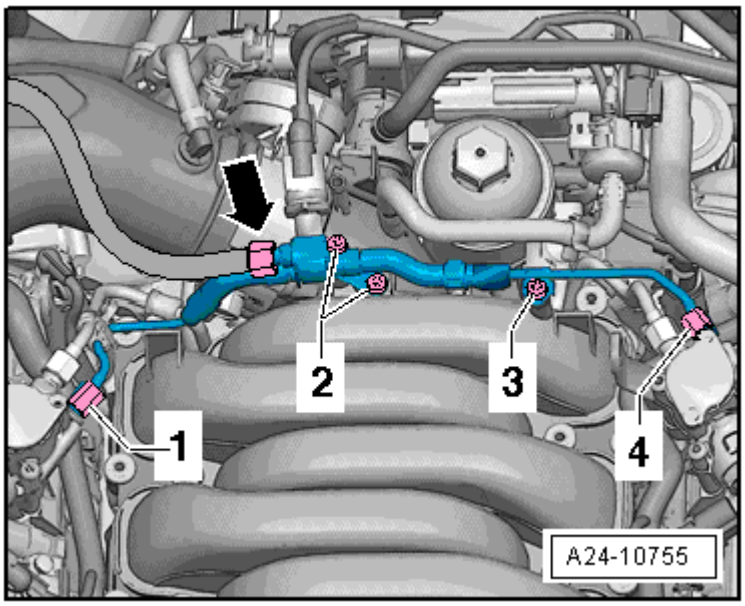


Removing the inlet manifold

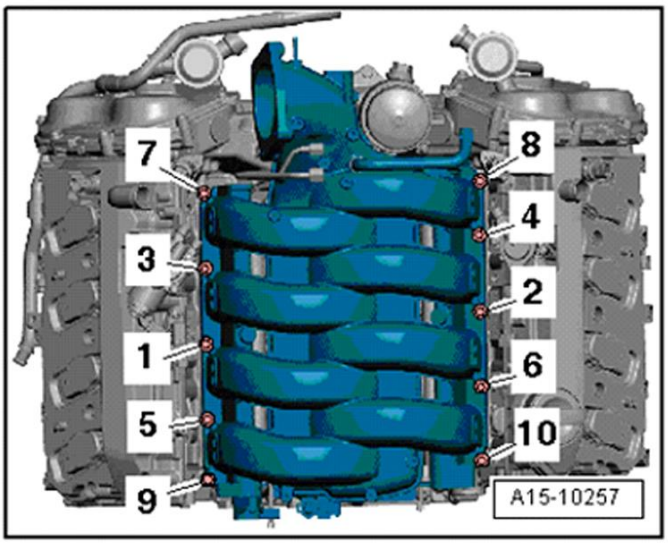
– Remove both bolts -arrows- from intake connecting pipe.
– Remove both retaining clips on fuel lines -1 and 2-.
– Press intake connecting pipe off throttle valve module -J338- to the rear.

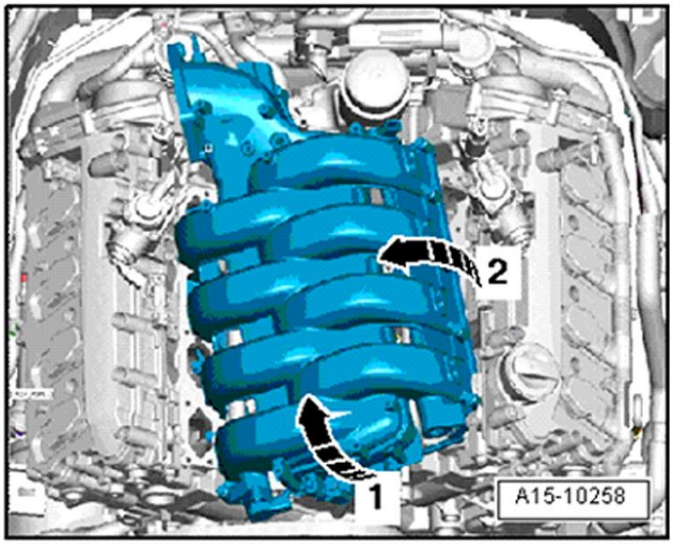


– Disconnect fuel lines -1 and 4- at high-pressure pumps.
– Remove bolts -2 and 3-.



Removing the inlet manifold

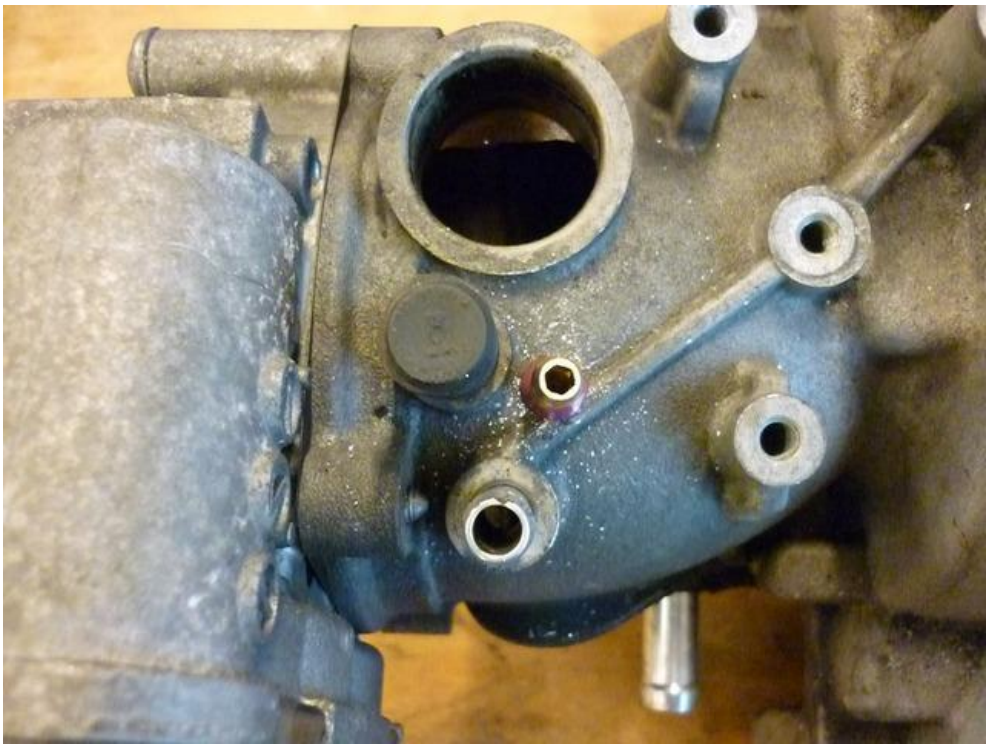




If needed inform your local VAG dealer, new gasket : (2x) 079.133.074B gasket

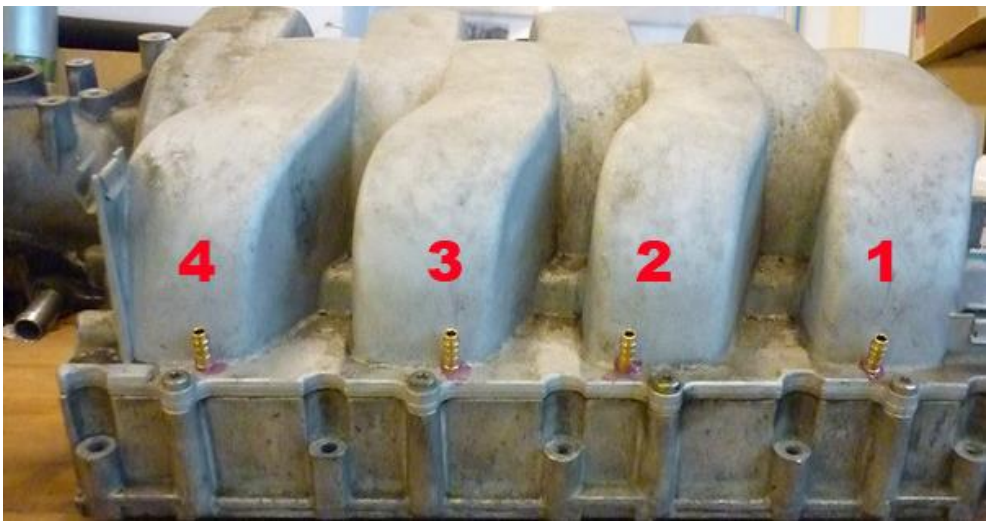
Mounting the inlet manifold couplings

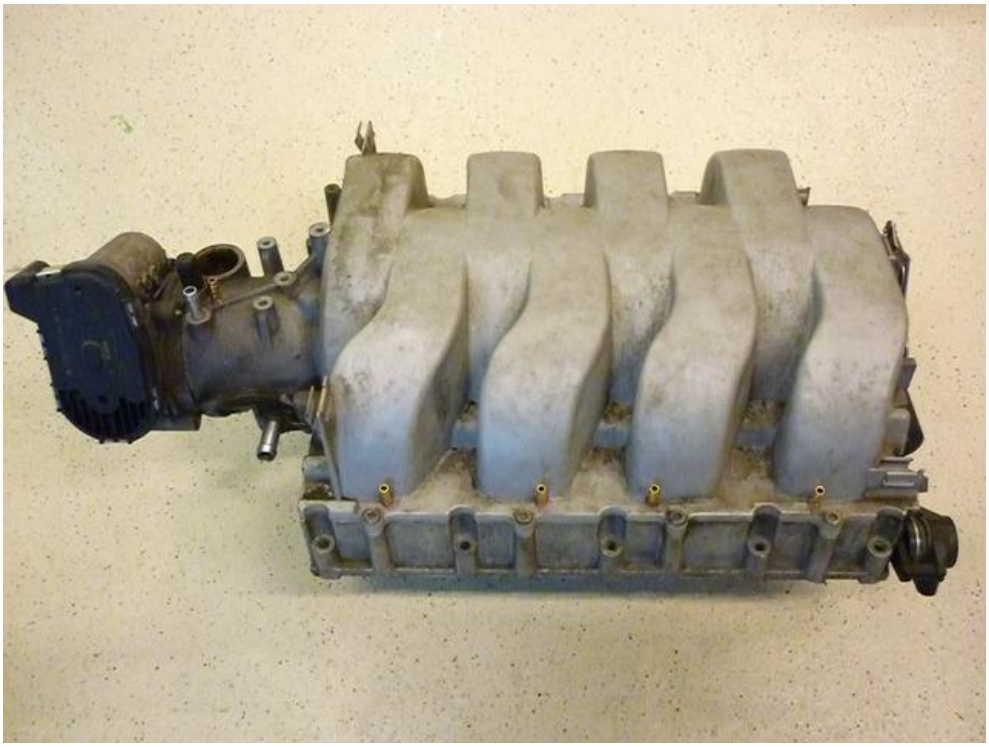
Remove the inlet manifold.
Drill **1** hole of **5mm** in the inlet manifold for MAP. Cut **M6x1** thread.
Place the VSI coupling with a lock compound in the inlet manifold.



Mounting the inlet manifold couplings 1-2-3-4

Remove the inlet manifold.
Drill **4** holes of **5mm** in the inlet manifold. Cut **M6x1** thread.
Place the VSI couplings with a lock compound in the inlet manifold.

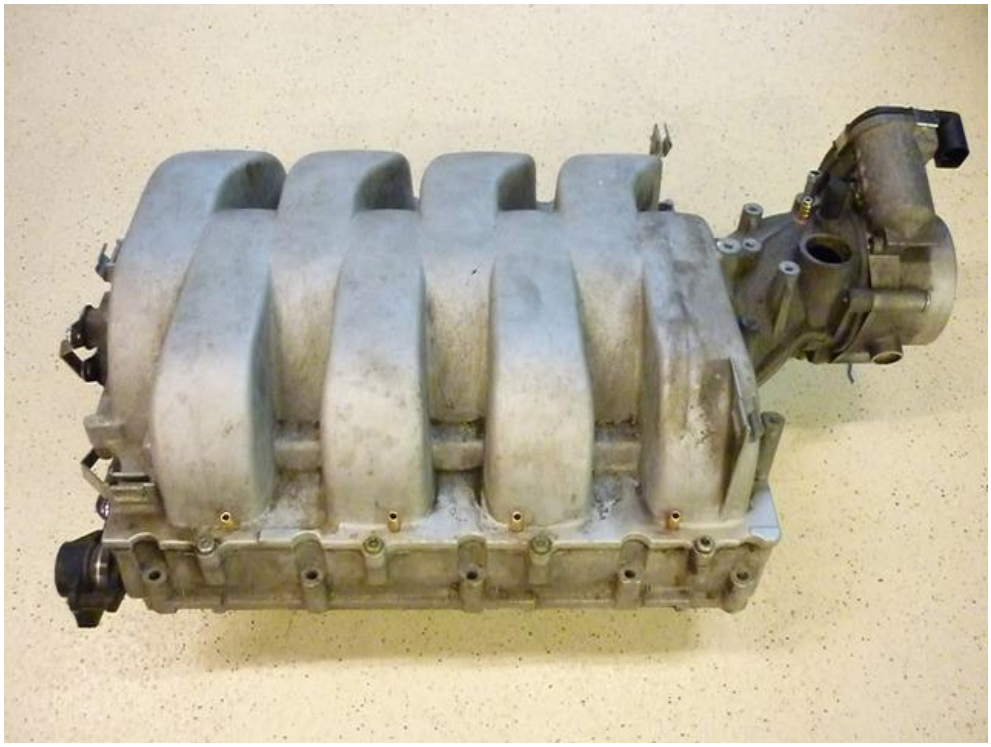




Check the two engine-manifold gaskets before reinstalling the manifold.
If needed inform your local VAG dealer, new gasket : 2x 079.133.074B

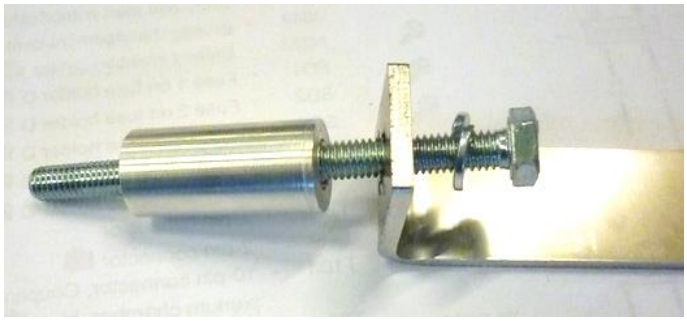
Mounting the inlet manifold couplings 5-6-7-8

Remove the inlet manifold.
Drill **4** holes of **5mm** in the inlet manifold. Cut **M6x1** thread.
Place the VSI couplings with a lock compound in the inlet manifold.



Check the two engine-manifold gaskets before reinstalling the manifold.
If needed inform your local VAG dealer, new gasket : 2x 079.133.074B

Mounting the VSI injector rail brackets



Same on other side

Mounting the VSI injector rail

Rotate injectors

Mounting the VSI injector rail

LPG hoses

(based on Audi Q7)

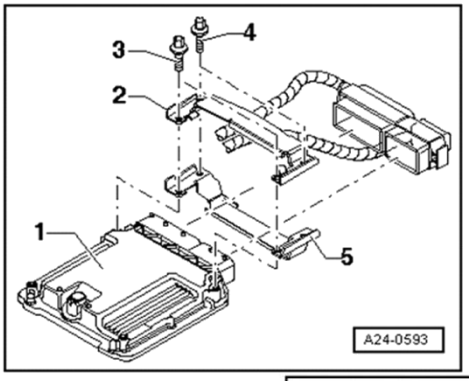
Hose (Ø..mm)	*From component*	*To component*	*Hose length (cm)*
16	Reducer	Prins filter unit	100
11	Prins filter unit	VSI injector rail	86
11	Prins filter unit	VSI injector rail	70
5	Reducer overpressure	T-piece	5
5	Reducer MAP connection	T-piece	15
5	T-piece	T-piece	25
5	T-piece	MAP sensor	6
5	T-piece	Inlet manifold coupling (vacuum)	120
5	VSI injector 1	Inlet manifold coupling cyl.1	18
5	VSI injector 2	Inlet manifold coupling cyl.2	15
5	VSI injector 3	Inlet manifold coupling cyl.3	15
5	VSI injector 4	Inlet manifold coupling cyl.4	18
5	VSI injector 5	Inlet manifold coupling cyl.5	18
5	VSI injector 6	Inlet manifold coupling cyl.6	15
5	VSI injector 7	Inlet manifold coupling cyl.7	15
5	VSI injector 8	Inlet manifold coupling cyl.8	18

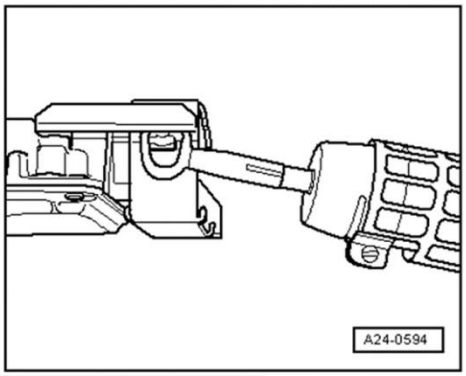
General info.

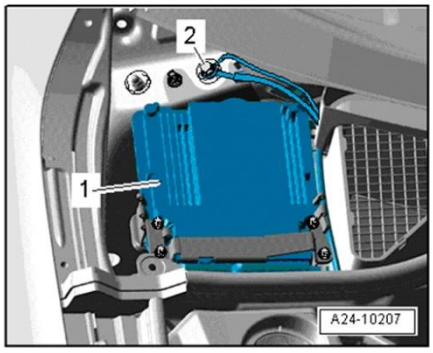
Cut the LPG hoses on length.

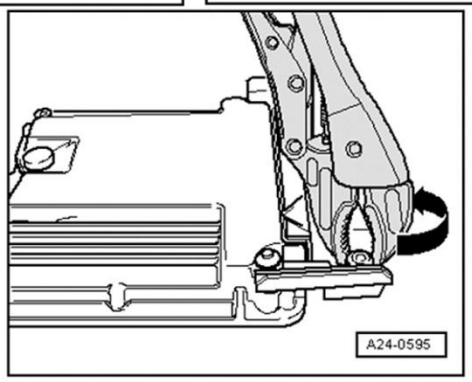
Please observe that there is no damage or fouling to the hoses.

Petrol ECU
(Audi Q7)









Heat up the bolts (nr 3 & 4) for 25 seconds with a heat gun, use pliers to loosen the bolts.
Remove connector guard, not used anymore.

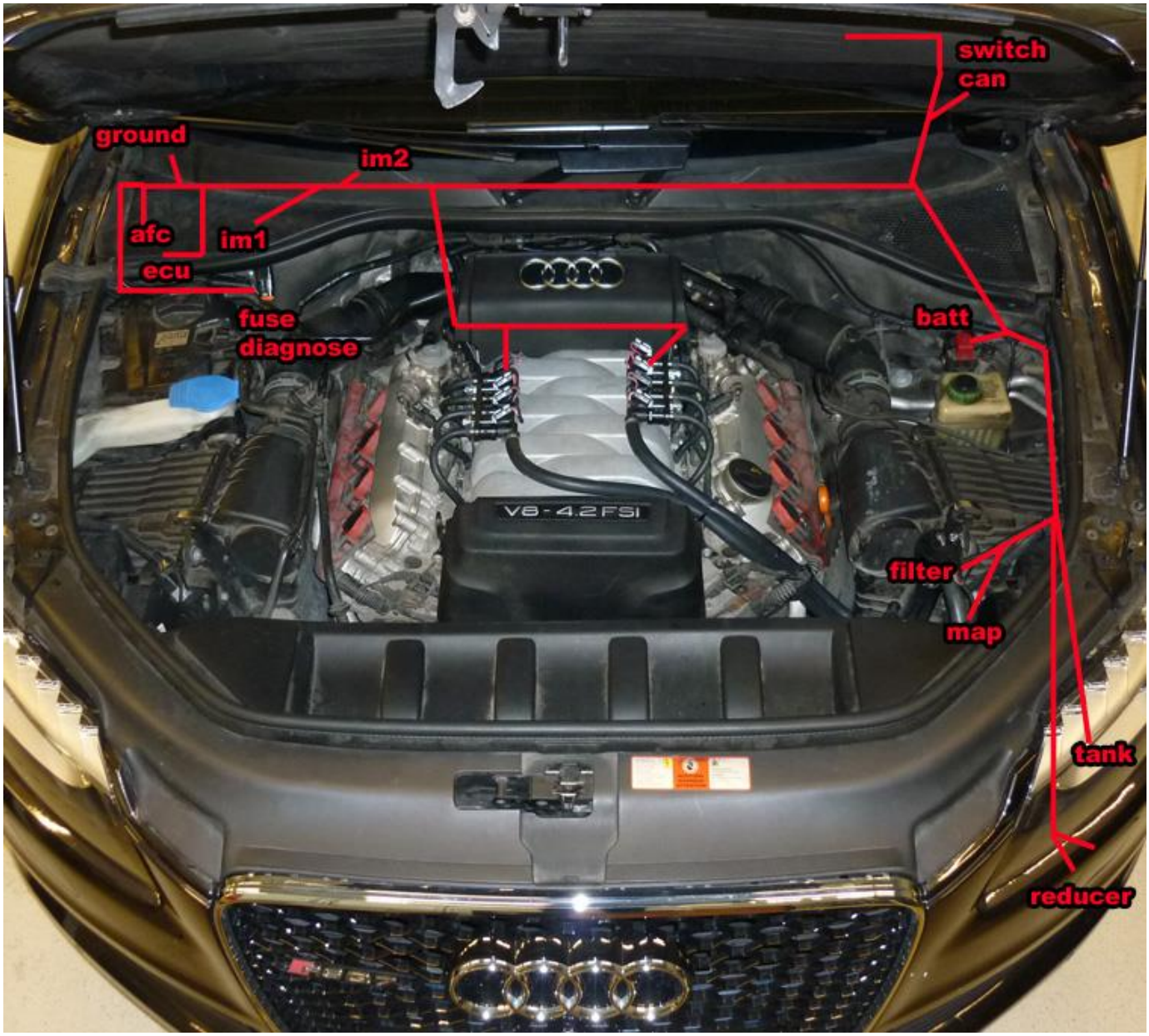
Petrol ECU

Remove parts (ecu bracket, water gutter, air inlet)

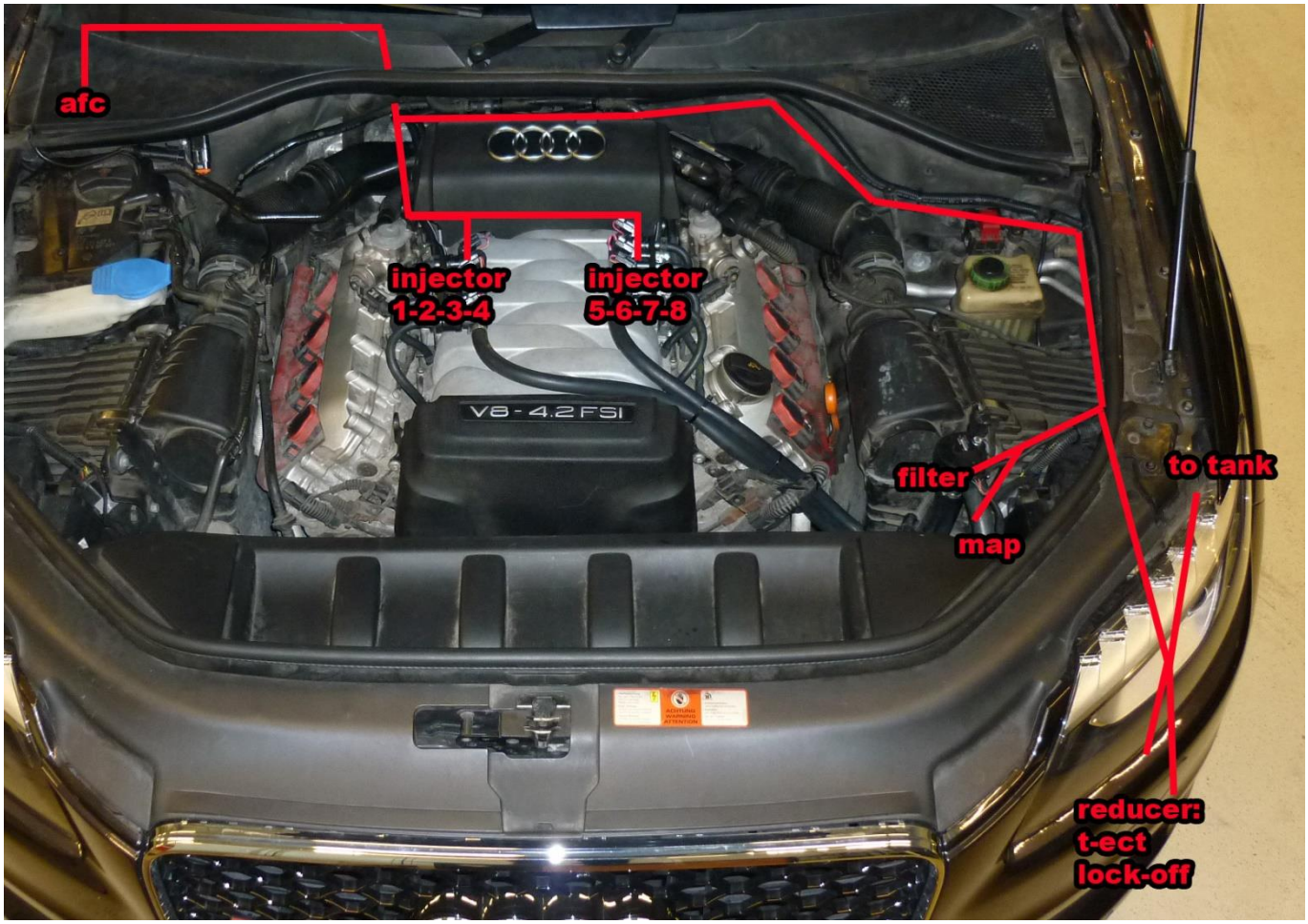
Fresh air inlet (2 nuts and 2 clamps inside)

Removed: water gutter, air inlet,

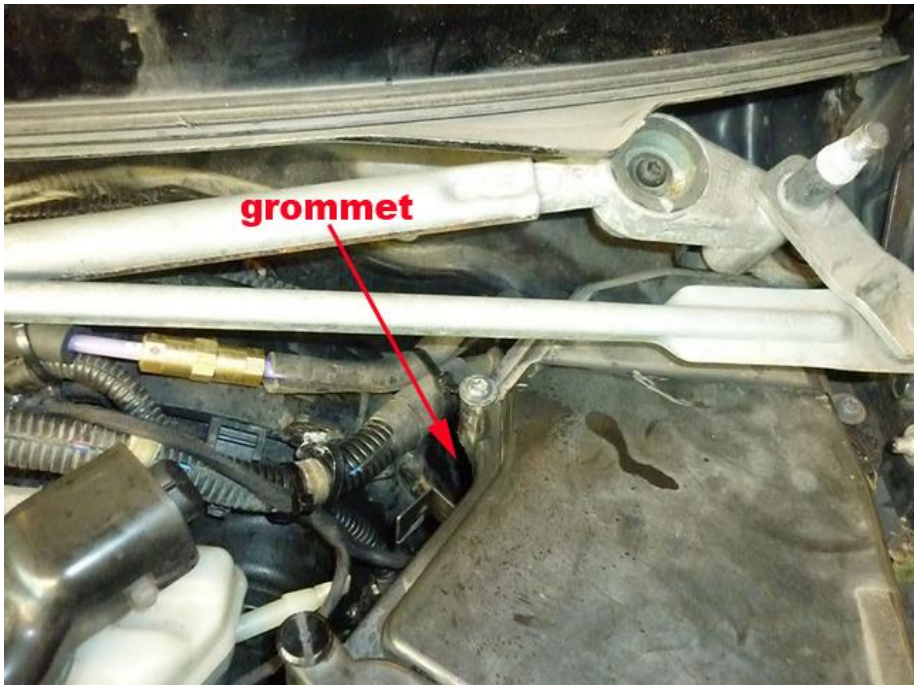
Wiring routing
(Example Audi Q7)

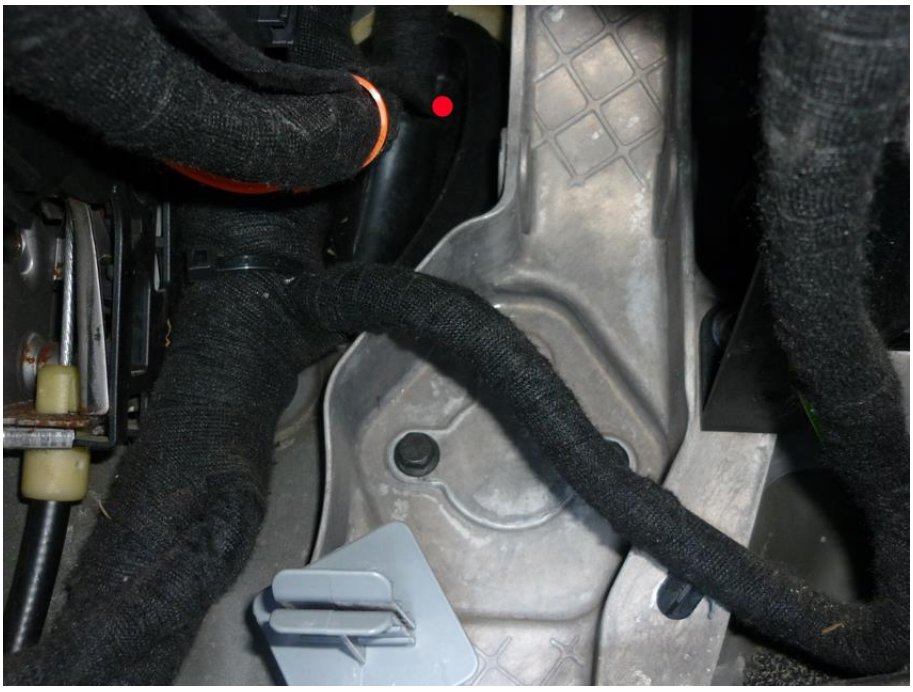


Wiring routing
(Example Audi Q7)



Wiring inside
(Example Audi Q7)

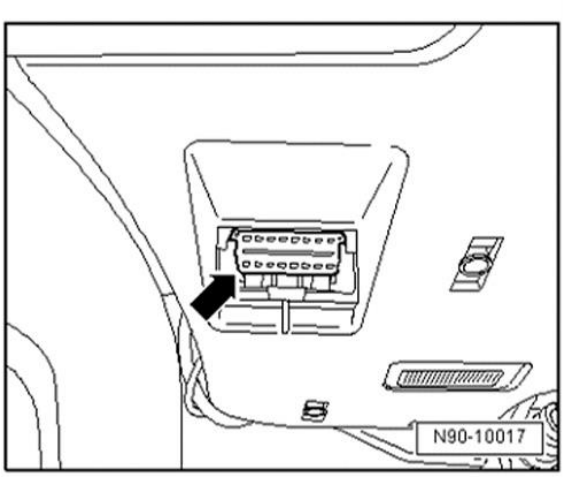




Switch & OBD

Audi Q7:

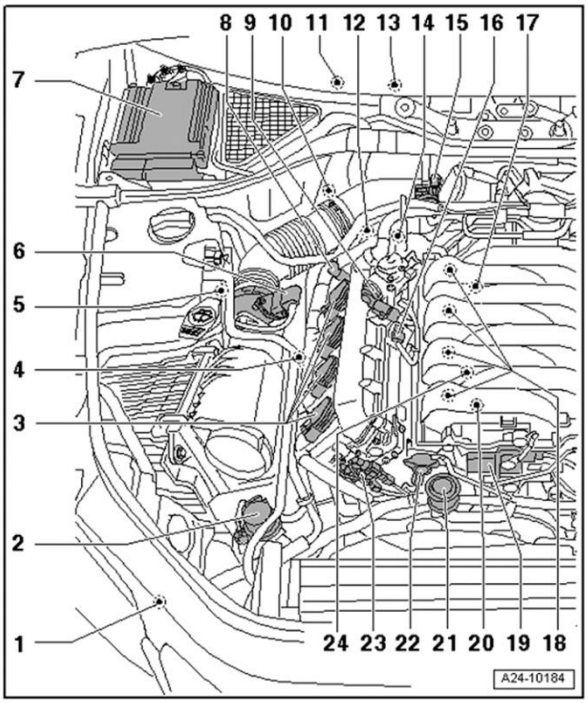
Drill Ø8.3mm



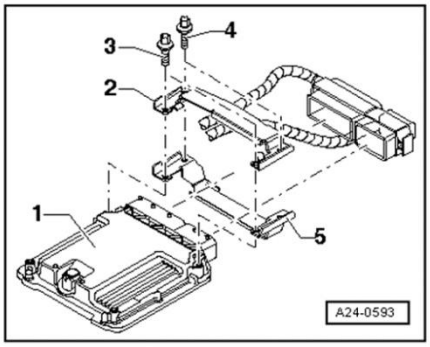
EOBD location

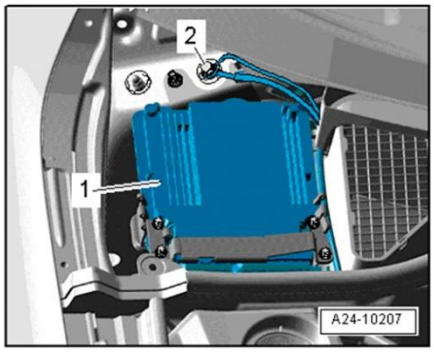
Petrol Ecu Location

(Example Audi Q7)

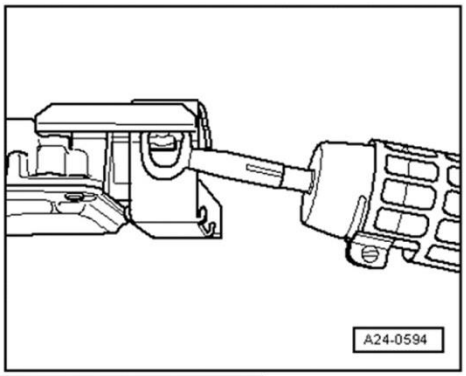


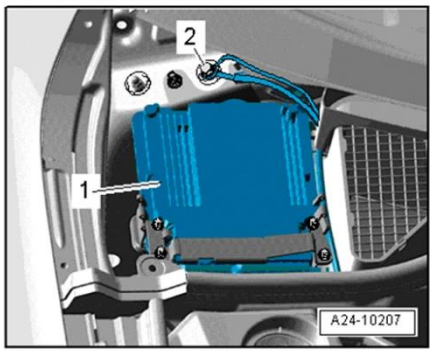
7 = Petrol ECU

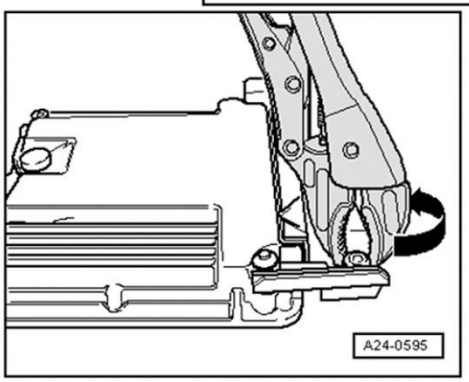




1 = ECU 2 = Ground



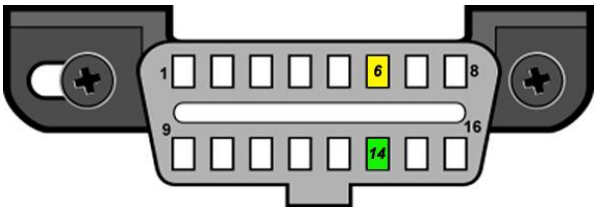


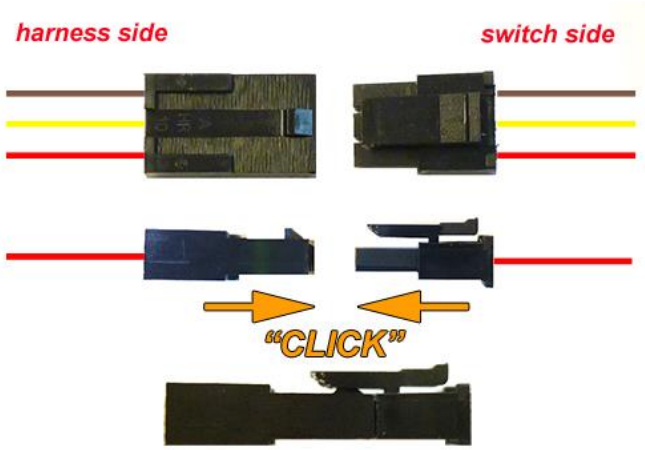


Heat up the bolts for 25 seconds with a heat gun, use pliers to loosen the bolts.
Remove connector guard, not used anymore.

Electrical connections INSIDE

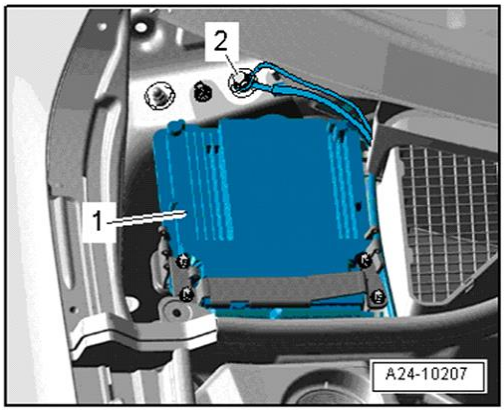
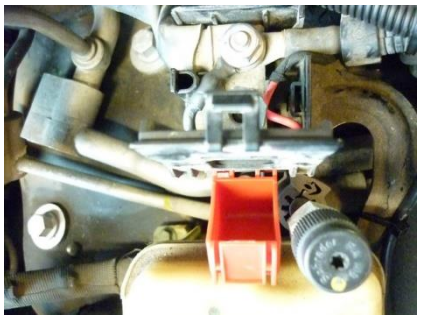
Driver room

		Connect to EOBD diagnose connector
51 CAN1 High	Yellow	Pin : 6
70 CAN1 Low	Green	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

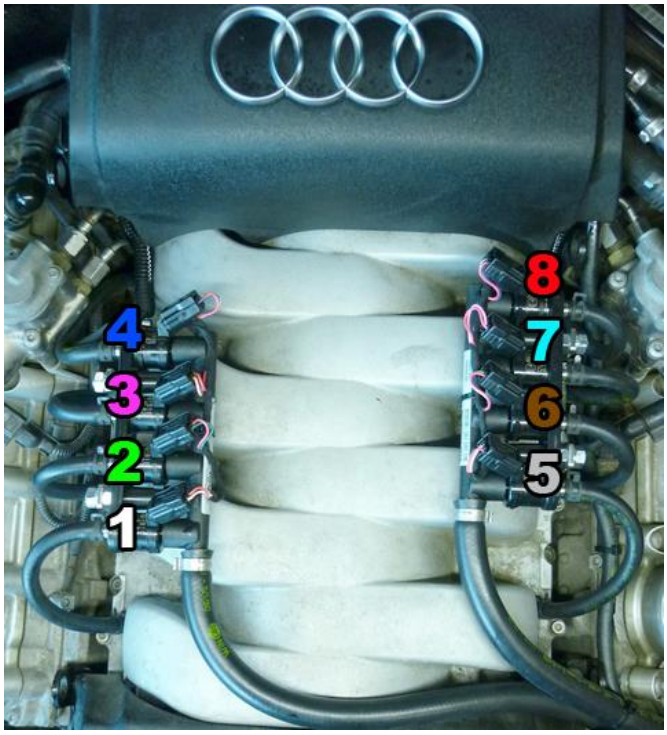
Check and measure the wiring in case of changes in the cars wiring colours.

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: Use a ring terminal (ground nr 2) 
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.  

Electrical connections

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

Wire number / code	Wire colour	Connection
Right side (passenger side)		
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**.
Left side (driver side)		
83 83 G INJ OUT **5** 91 91 G + INJ 5	**Grey - yellow** red	Connector VSI-injector to cylinder **5**.
84 83 G INJ OUT **6** 92 91 G + INJ 6	**Brown - yellow** red	Connector VSI-injector to cylinder **6.**
85 85 G INJ OUT **7** 93 93 G + INJ 7	**Light Blue - yellow** red	Connector VSI-injector to cylinder **7.**
86 86 G INJ OUT **8** 94 94 G + INJ 8	**Red - yellow** red	Connector VSI-injector to cylinder **8.**



Not used wires

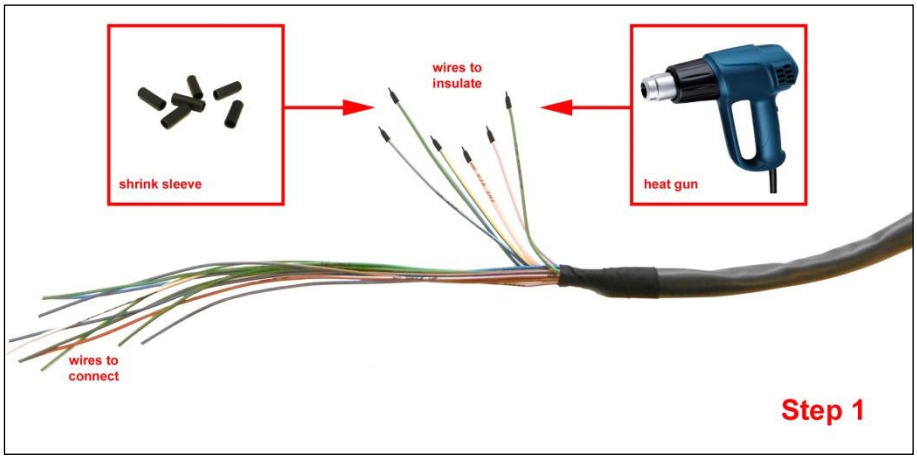
Insulate

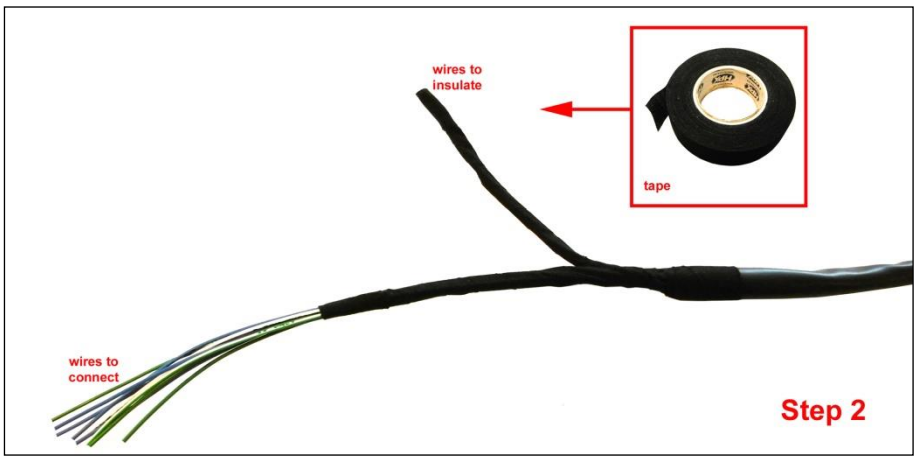
19	AD4	Blue	***Insulate***
22	LSS1	Purple	***Insulate***
23	LSS2	Purple-green	***Insulate***
36	AD6	Blue-brown	***Insulate***
38	AD7	Blue-lightblue	***Insulate***
39	AD8	Blue-red	***Insulate***
50	DAC4	Green-blue	***Insulate***
60	DI3	Yellow-pink	***Insulate***
61	DI4	Yellow-blue	***Insulate***
74	DAC3	Green-pink	***Insulate***

Optional:

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

Electrical connections – How to insulate not used wires



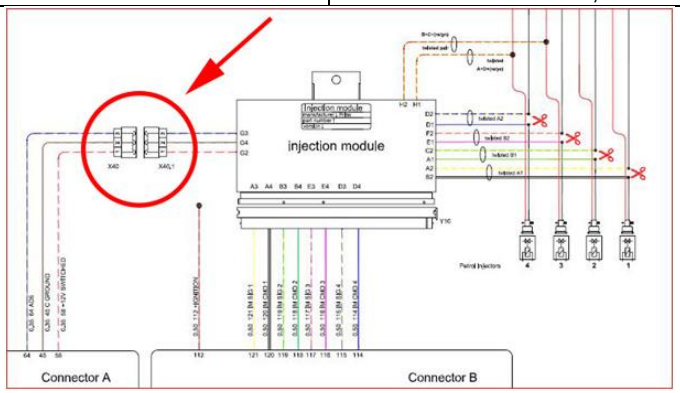


Electrical connections

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**	**Interrupt petrol injector wire** **Petrol ECU connector T60:**
H1 (INJ LO A) / H1 (ECU LO A) Petrol injector cyl.	Yellow / yellow-white	Colour : Brown-black Location : Petrol ECU, T60 / **2**
H1 (INJ LO B) / H1 (ECU LO B) Petrol injector cyl.	Grey / grey-white	Colour : Brown-yellow Location : Petrol ECU, T60 / **16**
H1 (ECU HIGH 1) + Petrol injector (cil **1 & 6**)	Red-white H1	Colour : Brown-red Location : Petrol ECU, T60 / **33**
H2 (INJ LO A) / H2 (ECU LO A) Petrol injector cyl.	Yellow / yellow-green	Colour : Brown-yellow Location : Petrol ECU, T60 / **4**
H2 (INJ LO B) / H2 (ECU LO B) Petrol injector cyl.	Grey / grey-green	Colour : Brown-white Location : Petrol ECU, T60 / **19**
H2 (ECU HIGH 2) + Petrol injector (cil **2 & 8**)	Red-green H2	Colour : Red-yellow Location : Petrol ECU, T60 / **48**
H3 (INJ LO A) / H3 (ECU LO A) Petrol injector cyl.	Yellow / yellow-pink	Colour : Brown-green Location : Petrol ECU, T60 / **18**
H3 (INJ LO B) / H3 (ECU LO B) Petrol injector cyl.	Grey / grey-pink	Colour : Brown-violet Location : Petrol ECU, T60 / **3**
H3 (ECU HIGH 3) + Petrol injector (cil **3 & 5**)	Red-pink H3	Colour : Red-green Location : Petrol ECU, T60 / **32**
H4 (INJ LO A) / H4 (ECU LO A) Petrol injector cyl.	Yellow / yellow-blue	Colour : Brown-blue Location : Petrol ECU, T60 / **17**
H4 (INJ LO B) / H4 (ECU LO B) Petrol injector cyl.	Grey / grey-blue	Colour : Brown-white Location : Petrol ECU, T60 / **1**
H4 (ECU HIGH 4) + Petrol injector (cil **4 & 7**)	Red-blue H4	Colour : Red-blue Location : Petrol ECU, T60 / **47**



Electrical connections

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

Pin Outs are Leading !

27 +5V Sensor 37 C ground 18 AD1	Red-blue Brown-black Blue-white	For measuring the inlet manifold pressure (MAP). Connect to the Prins MAP sensor.

Petrol ECU connector T60:

8 RPM engine speed	Purple-white	For measuring the engine speed.(CAM) Wire colour : green Wire location : T60 / 44

17 & 25		High petrol pressure sensor signal Interruption Wire colour : Blue Wire location : T60 / 25
17 AD2	Blue-green	Sensor side
25 DAC1	Green-white	ECU side

40 Wake-up	Grey-red	High pressure petrol sensor 5Volt supply Wire colour : Blue-red Wire location : T60 / 26

63 Ground shift	Blue-orange	High petrol pressure sensor signal ground Wire colour : Brown (ground splice) Wire location : T60 / 14

Petrol ECU connector T94:

56 DI2	Yellow-green	Petrol Pump PWM Wire colour : yellow-grey Wire location : T94 / 70

20 & 10		Low petrol pressure sensor signal Interruption Wire colour : Brown Wire location : T94 / 35
20 AD3	Blue-pink	Sensor side
10 DAC2	Green	ECU side

112 Ignition+	Red-grey	Ignition +15 Wire colour : Blue-black Wire location : T94 / 87

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

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.