



Installation manual

PART 2/2

MANUFACTURER	GM
TYPE	*
ENGINE DISPLACEMENT	3564cc
NUMBER OF VALVES	24
ENGINE CODE / NUMBER - OUTPUT	LFY 228kW – LGX 231kW
FIRING ORDER	1-2-3-4-5-6
VEHICLE CATEGORIES	M
TRANSMISSION	AT
VERSION	AFC-2.1 DI
TYPE VSI INJECTOR	KN9 - 73cc
TYPE INJECTION MODULE	Gen2 Type 2
PETROL ECU MANUFACTURER / CODE	LFY: AC Delco / Continental (no number available)
PETROL ECU MANUFACTURER / CODE	LGX: AC Delco / Continental 12679179 (E82)
MODEL YEAR:	LFY 2018-2019 / LGX 2015-2017
SYSTEM APPROVAL NUMBER (R115)	E4-#115R-000028 / VSI-LPG 48
LOCATION R115 SYSTEM STICKER	right side, centre door post
ENGINE SET NUMBER	338/121008/A
MANUAL NUMBER	076/3302700-1
DATE	2019-10-10

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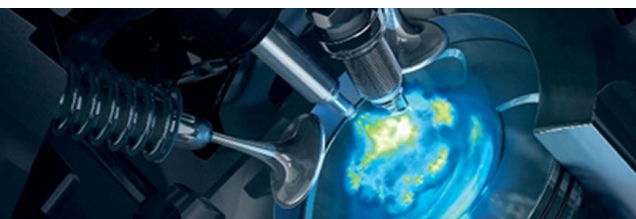


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FOR EXPLANATION AND CIRCUIT DIAGRAMS SEE : INSTALLATION MANUAL GENERAL PART 1 / 2



Manual updates / revision

Rev. nr	Rev. Date	Subject update
-	2019-07-25	First release
1	2019-10-10	



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 AFC 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 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.



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)



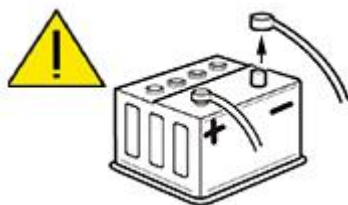
Tightening moments

	Nm	Spanner mm
M4 x 0,7	3.3	7
M5 x 0,8	6.5	8
M6 x 1,0	11.3	10
M7 x 1,0	14.5	11
M8 x 1	24.5	13
M8 x 1,25	27.3	13
M10 x 1	52	15-16-17
M10 x 1,5	54	15-16-17

EXPLANATION OF SYMBOLS :

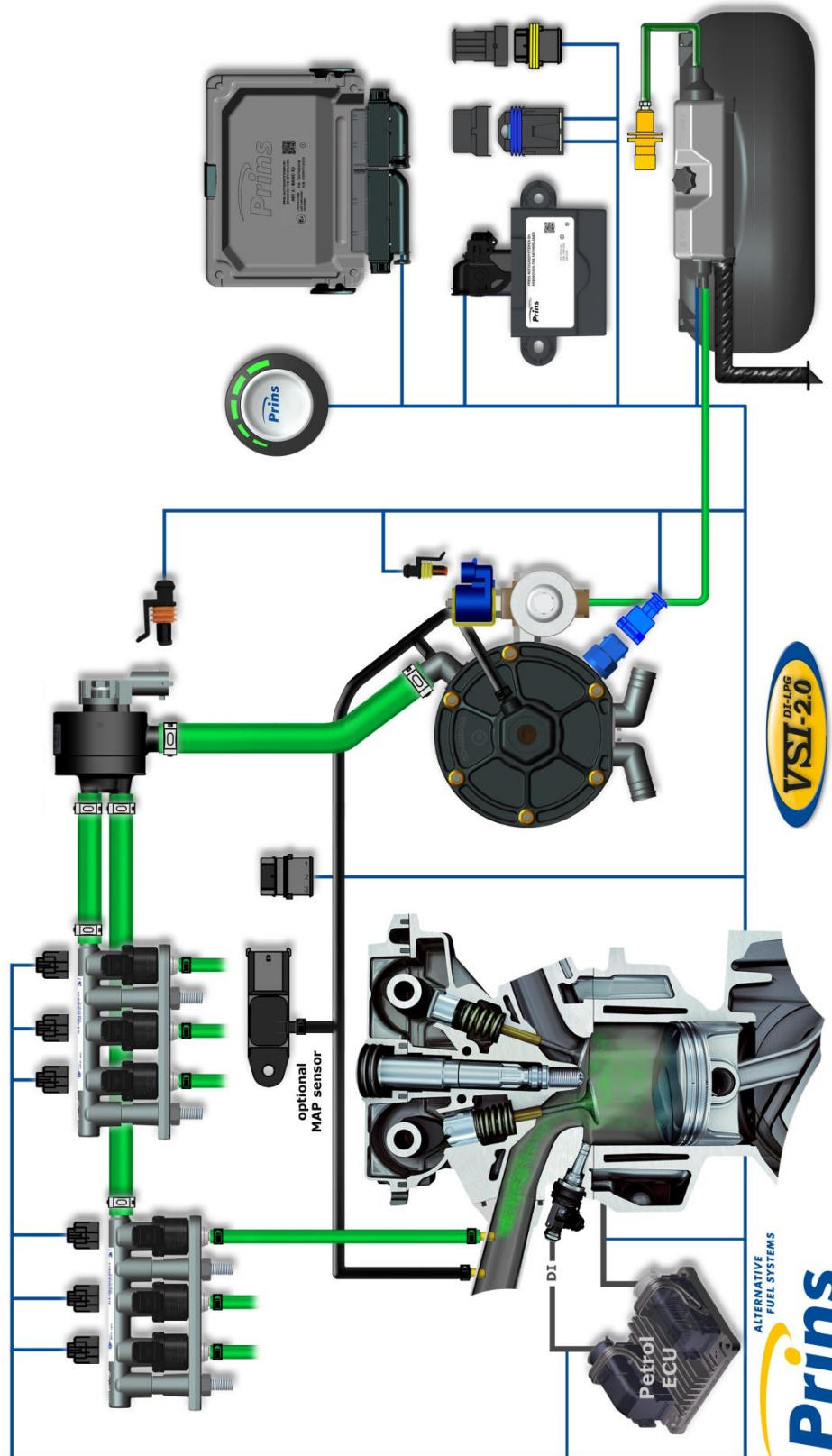


= IMPORTANT, CAUTION



= WEAR SAFETY GOGGLES

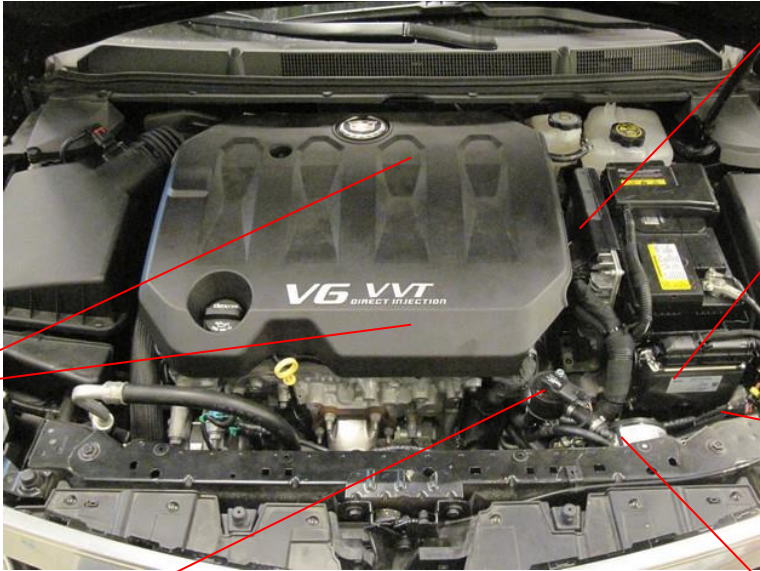
Basic System Overview



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

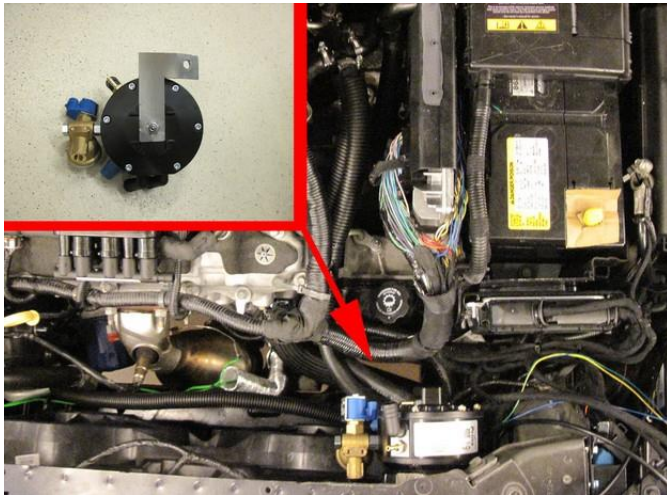
VSI component location overview
(Example Cadillac XTS)

		Petrol ECU 
		AFC 
Rails (2x) 		Fuse 
Filter 		Reducer 

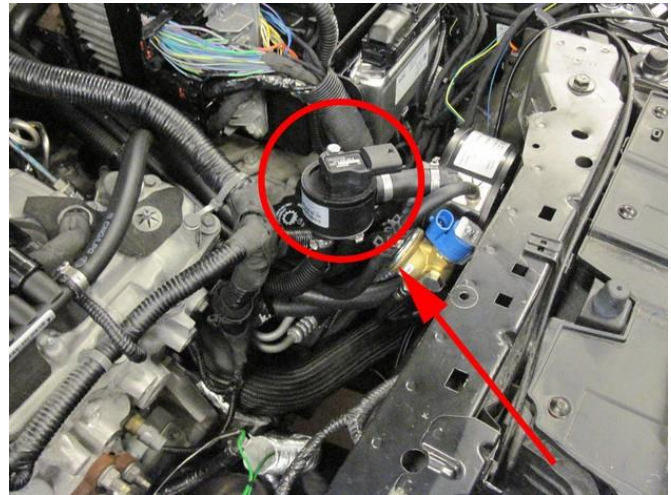
	R115 approval sticker : Right side centre door post
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Examples mounting the Prins parts

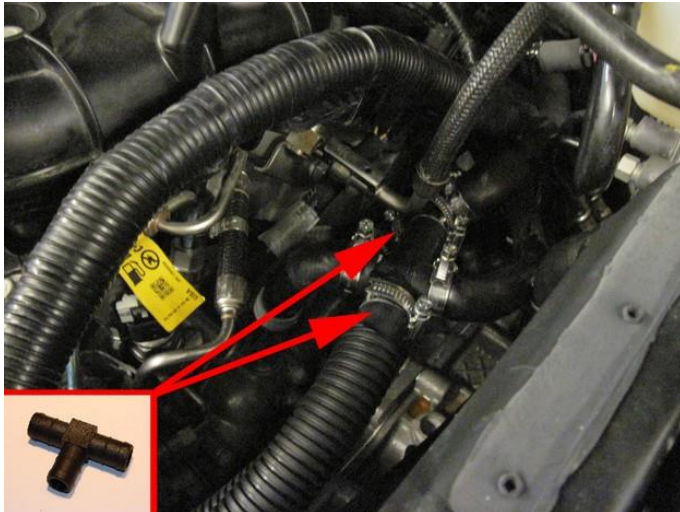
(Based on Cadillac XTS)



Reducer



Filter directly to the reducer



Coolant connection: 2 T-pieces (1x 20x16x20mm, 1x 16x16x16mm)



AFC, next to the battery



Injection Module & fuse

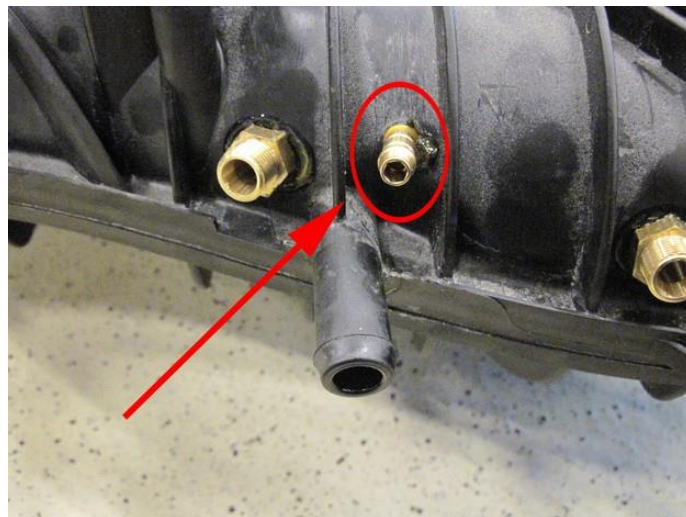
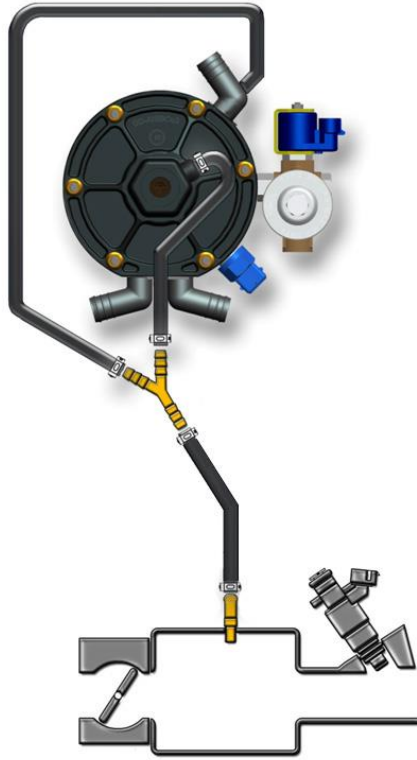
Overpressure / MAP connection

Remove the inlet manifold.

Drill **1x** hole of **5mm** in the inlet manifold. Cut M6x1 thread in this hole.

Place the VSI coupling with a lock compound in the inlet manifold.

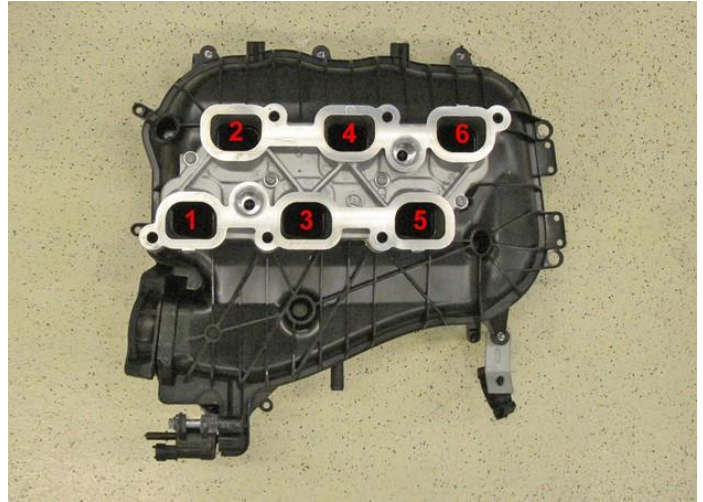
Watch out that the lock compound doesn't come inside the VSI coupling and place the inlet manifold back on the engine



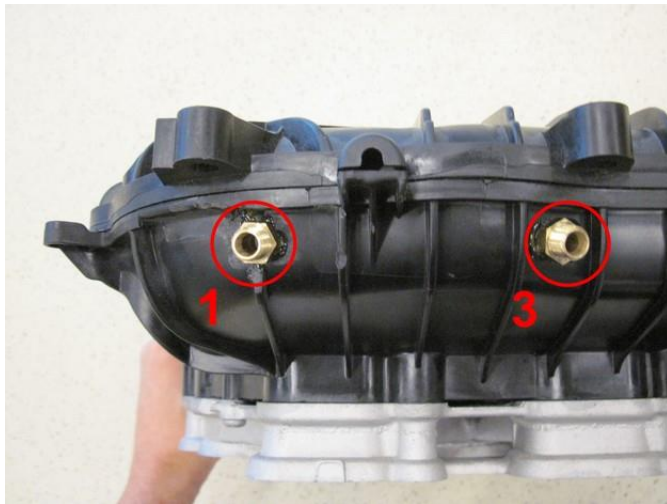
Mounting the inlet manifold couplings 1

(This manifold is the older LFX manifold, the base principle is the same. LFX & LGX pictures are welcome!)

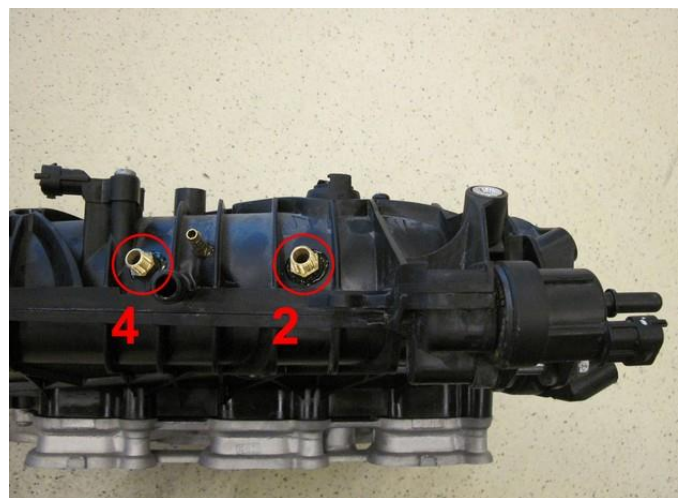
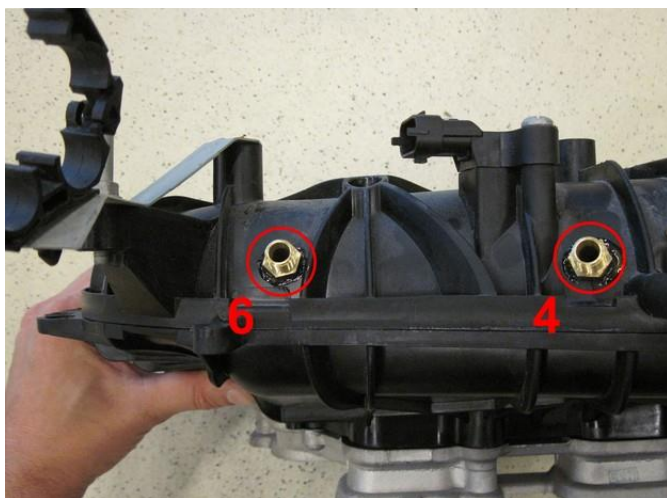
Drill 6 holes of 8.5mm in the inlet manifold. Cut M10x1 thread in these holes.



Remove the inlet manifold.

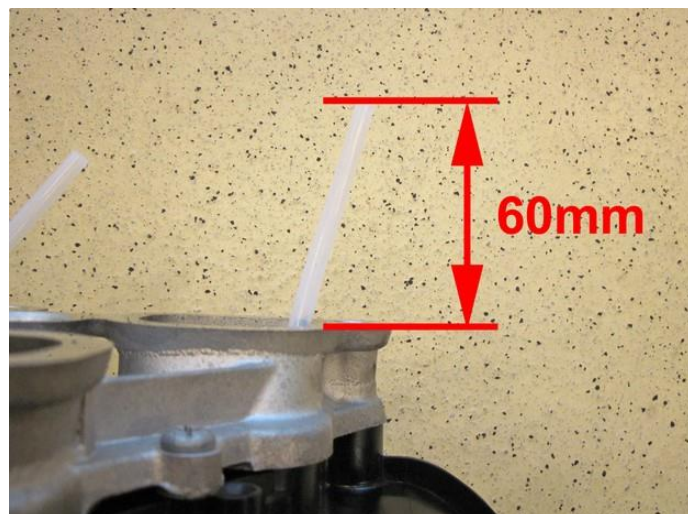


Mount the couplings with a locking compound in the inlet manifold.



Mount the couplings with a locking compound in the inlet manifold.

Mounting the inlet manifold couplings 2

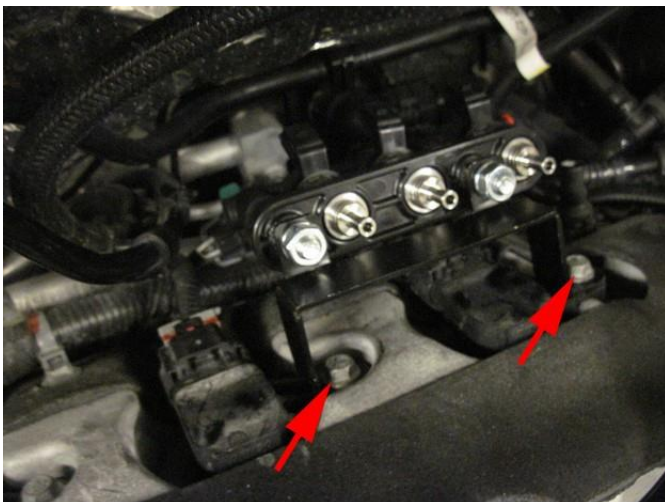
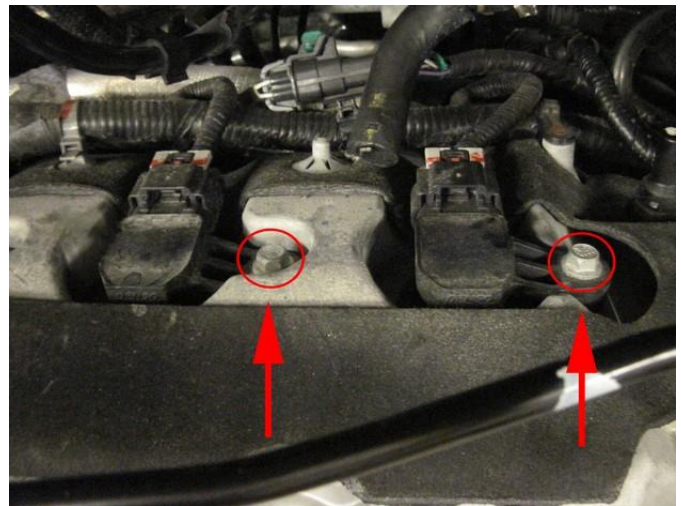
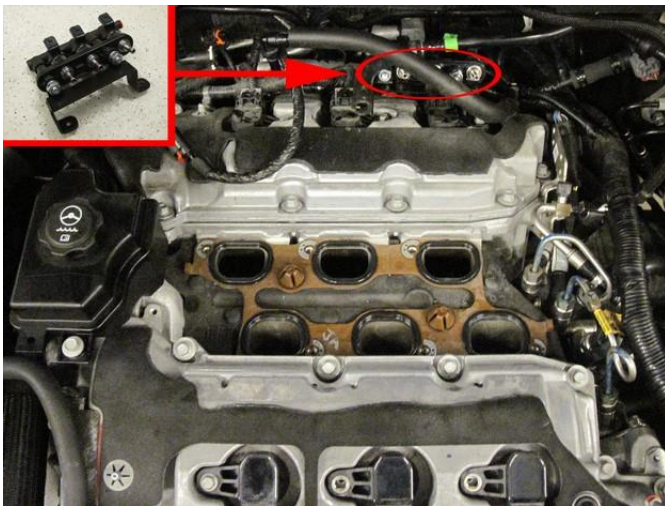


Mount the hoses to the inlet manifold couplings. Cut on length.

Mounting the (back) VSI injector rail

(based on Cadillac XTS, LFY & LGX pictures are welcome)

For easy mounting, mount the back rail before mounting the inlet manifold.



Mount the 5mm LPG hoses from the rail to the injector rail.

Mounting the (front) VSI injector rail

(based on Cadillac XTS, LFY & LGX pictures are welcome)



Mount the 5mm LPG hoses from the rail to the injector rail.

LPG hoses

Hose (Ø in mm)	From component	To component	Hose length (cm) +/-
5	VSI injector 1	Inlet manifold coupling cyl.1	23
5	VSI injector 2	Inlet manifold coupling cyl.2	17
5	VSI injector 3	Inlet manifold coupling cyl.3	13
5	VSI injector 4	Inlet manifold coupling cyl.4	10
5	VSI injector 5	Inlet manifold coupling cyl.5	10
5	VSI injector 6	Inlet manifold coupling cyl.6	11
6	VSI injector 1	Nylon hose cyl.1	33
6	VSI injector 2	Nylon hose cyl.2	33
6	VSI injector 3	Nylon hose cyl.3	33
6	VSI injector 4	Nylon hose cyl.4	33
6	VSI injector 5	Nylon hose cyl.5	33
6	VSI injector 6	Nylon hose cyl.6	33

General info.

In Case of a *Keihin* filter : only use two **M6x10mm** bolts with spring washers.

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.



Mounting the fuel selection switch

(examples off various vehicles, pictures others are welcome)



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



Example Cadillac CTS

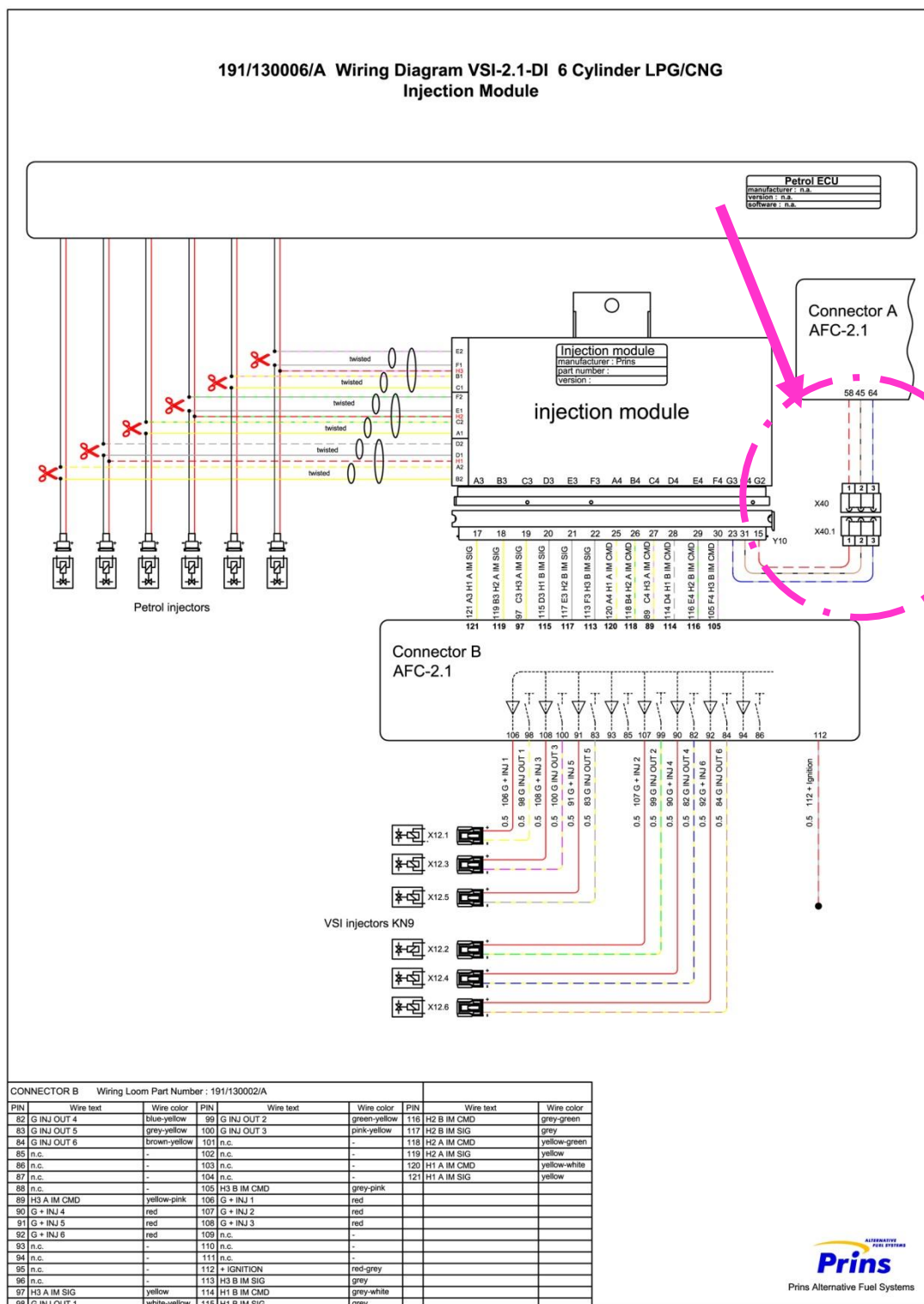


Example Camaro

Electrical connections

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

Connector Injection Module

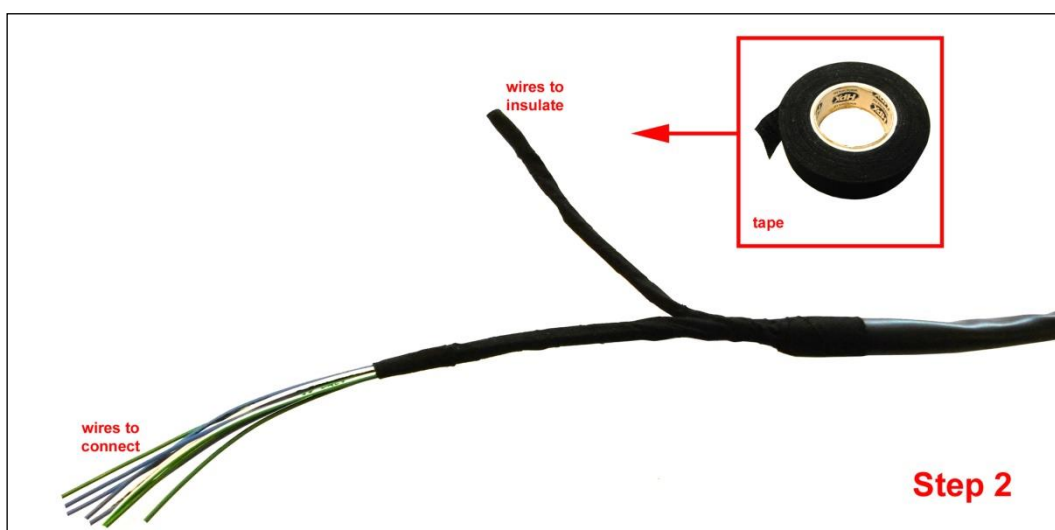
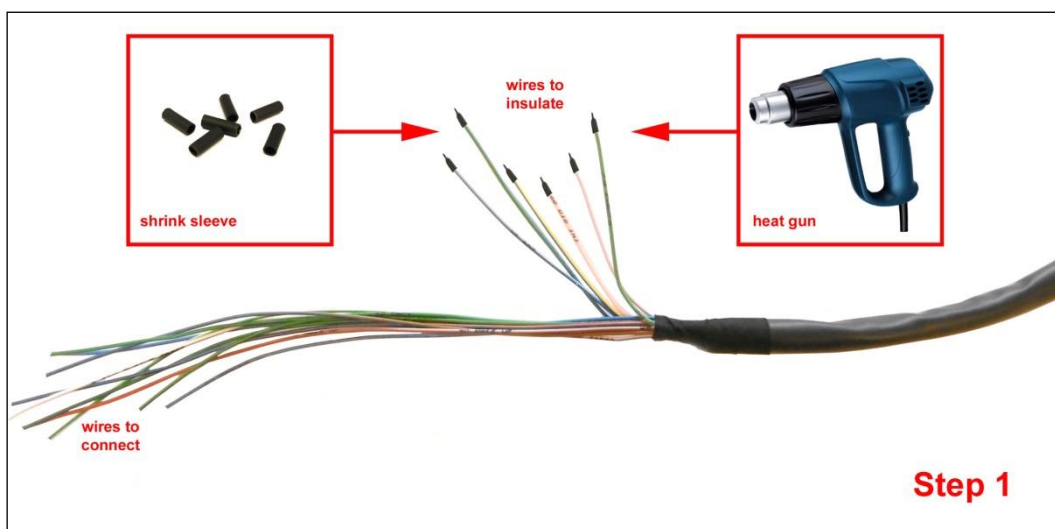


Electrical connections – Insulate

22	LSS1		Purple	
23	LSS2		Purple-green	
25	DAC 1		Green-white	
38	AD7		Blue-light blue	
39	AD8		Blue-red	
43	+12 Valve 2		Red-white	
50	DAC4		Green-blue	
61	DIG IN4		Yellow-blue	
62	C Ground		Brown-black	
74	DAC3		Green-pink	

Insulate additional loose wires

How to insulate



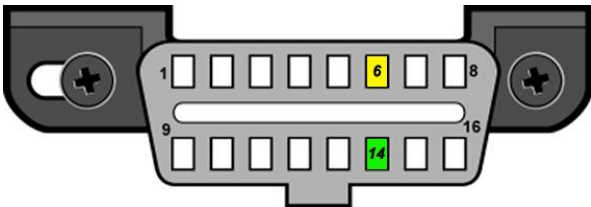
Electrical Connections (**remarks**)

Before mounting the wiring to the AFC and/or the vehicle, mount the 2 extra wiring modules to pin 29 and pin 71 from the AFC connector and extend wire 56 DI2 with the supplied wiring and split tube. Be aware of the location of the Petrol Fuel Pump Driver Module Location (see next pages). Also remove the MAP connector and add the wiring from the MAP connector to the rest of the wiring connected to the ECU.

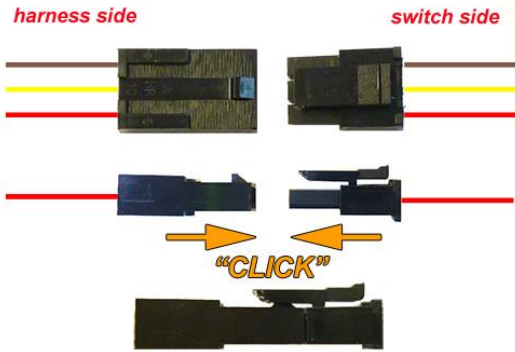
Electrical connections - Driver room

Driver room

				Connect to EOBD diagnose connector.
51	CAN1 High		Yellow	Pin : 6
70	CAN1 Low		Green	Pin : 14



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

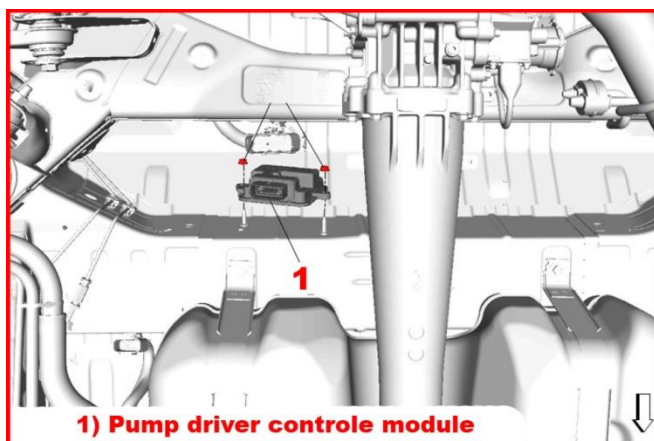
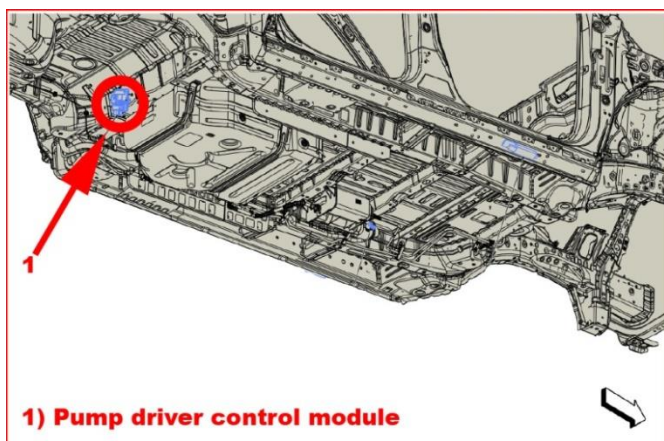
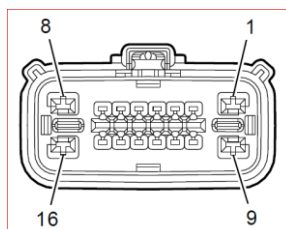


Electrical connections - Petrol Fuel Pump Driver

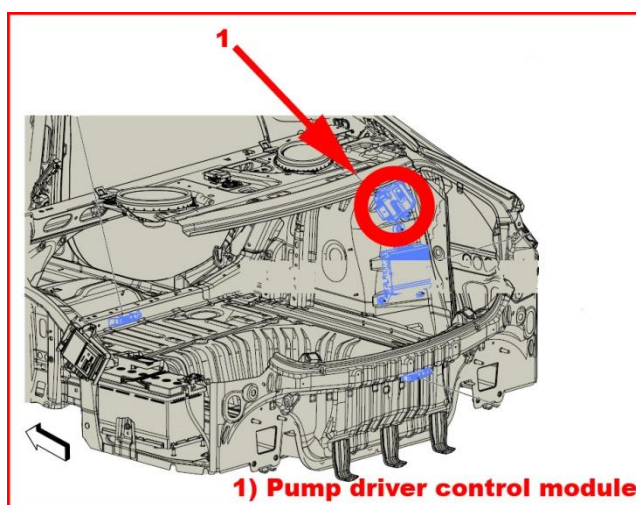
Check and measure the wiring in case of changes in the cars wiring colours.

Extend wire56 from the VSI wiring loom. Depending on the vehicle, lead wire56 to the driver room OR mount underneath the vehicle.

			Petrol fuel pump driver (PWM in). Wire colour: Thick Grey Wire location: Fuel pump flow control module on right wheel arch, trunk. Module Pin 8
56	DI2		Yellow-green

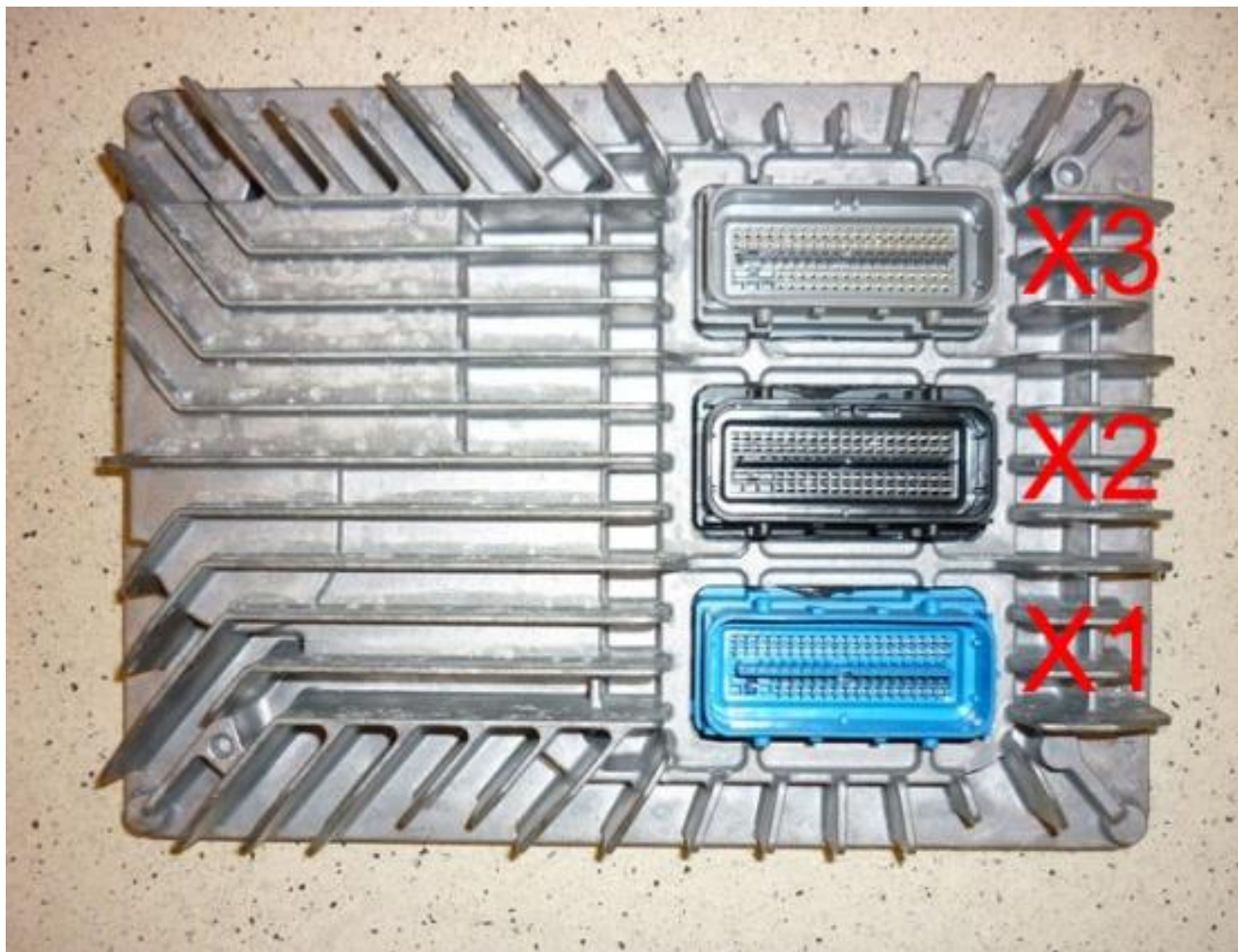


Chevrolet Traverse, located under the vehicle.



Buick Lacrosse, located in the trunk.

Petrol ECU connectors



Electrical connections

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

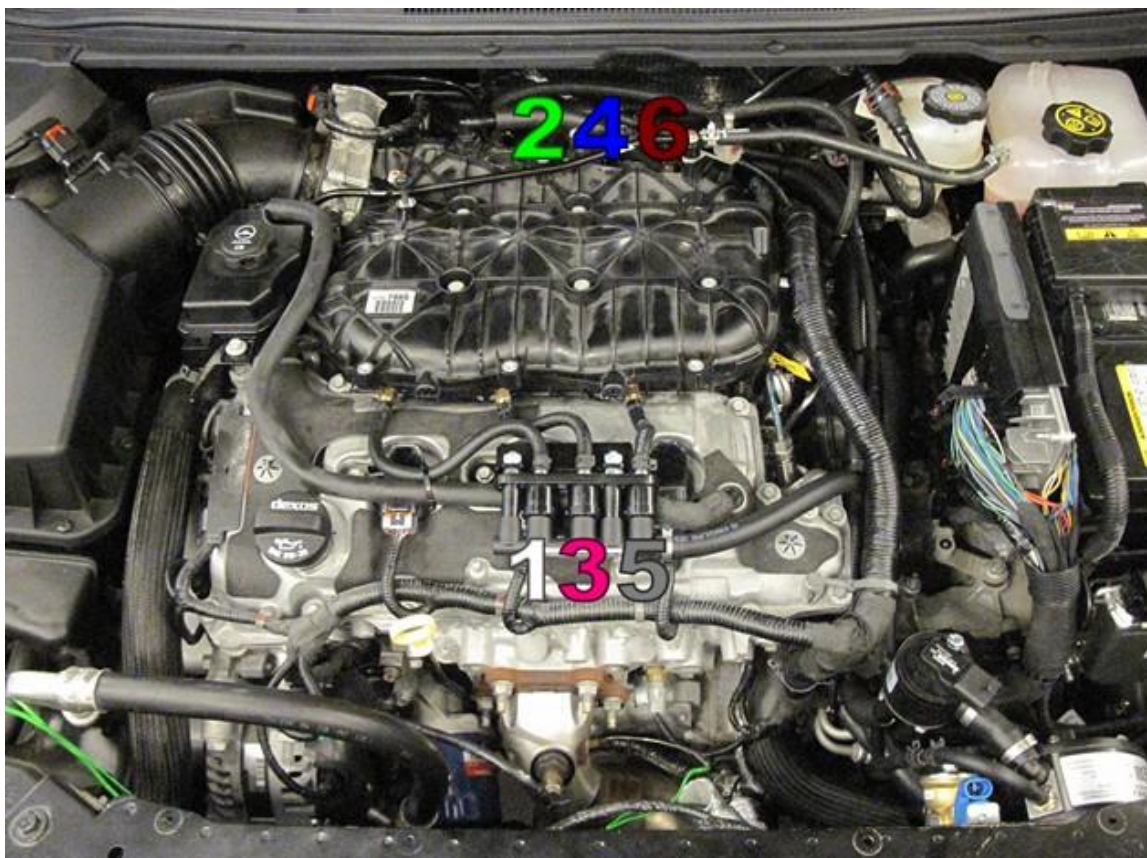
Do not place the fuse in the holder before having completed the installation of the LPG system.

32	Ground sense		Brown	Connect to the '-' of the battery; use a ring terminal or solder: Wire colour: Wire location: Directly to the battery ground clamp/wire
1	Ground battery			
4	+12V Battery		Red	Connect to the '+' of the battery; use a ring terminal or solder: Wire colour: Wire location: Directly to the +12V battery clamp/wire

Electrical connections

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

Wire number / code	Wire colour	Connection
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	
83 83 G INJ OUT 5	 Grey-yellow	Connector VSI-injector to cylinder 5.
91 91 G + INJ 5	 red	
84 83 G INJ OUT 6	 Brown-yellow	Connector VSI-injector to cylinder 6.
92 91 G + INJ 6	 red	

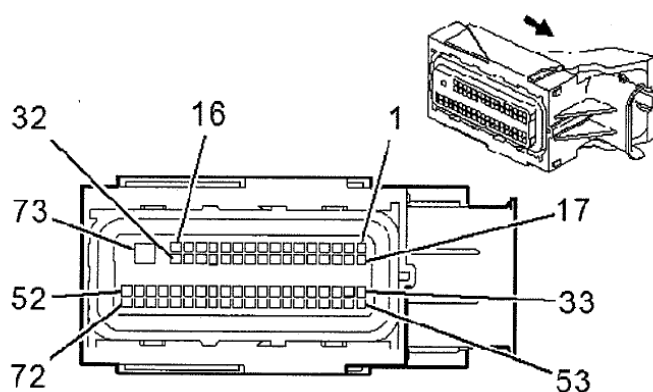


Electrical connections X3 *GREY* connector

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

 Join the injector supply connections of the petrol injector groups					
					
Join +inj. 1 and +inj. 4		Grey Connector X3 - pin 69 with pin 70 (Brown-white & blue-white)			
Join +inj. 3 and +inj. 6		Grey Connector X3 - pin 72 with pin 71 (Green-grey & purple-grey)			
Join +inj. 2 and +inj. 5		Grey Connector X3 - pin 68 with pin 67 (Blue-grey & green-white)			

Connect AFC wiring, ECU_High_1, 2, 3 (H1, H2, H3) to the just joint wires					
					
Petrol inj. High 1 H1 (ECU_HIGH_1)		Red-White	Colour: Brown-white Location: Petrol ECU, grey connector X3, inj. 1 - pin 69		
Petrol inj. High 2 H2 (ECU_HIGH_2)		Red-Green	Colour: Green-grey Location: Petrol ECU, grey connector X3, inj. 3 - pin 72		
Petrol inj. High 3 H3 (ECU_HIGH_3)		Red-Pink	Colour: Blue-grey Location: Petrol ECU, grey connector X3, inj. 2 - pin 68		



Electrical connections X3 *GREY* connector

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
------------------------	----------------------------	--------------------------------

H1 (INJ LO A)		yellow	Injector side
H1 (ECU LO A)		Yellow-white	ECU side
Petrol injector cyl. 1 IM pos. B2 / A2			Colour : Brown Location : Petrol ECU, X3, pin 49
H1 (INJ LO B)		grey	Injector side
H1 (ECU LO B)		Grey-white	ECU side
Petrol injector cyl. 4 IM pos. D1 / D2			Colour : Grey-blue Location : Petrol ECU, X3, pin 50
H1 (ECU HIGH 1)		Red-white	Colour : Brown-white
+ Petrol injector (cil 1 & 4) / IM pos. H1			Location : Petrol ECU, X3, pin 69

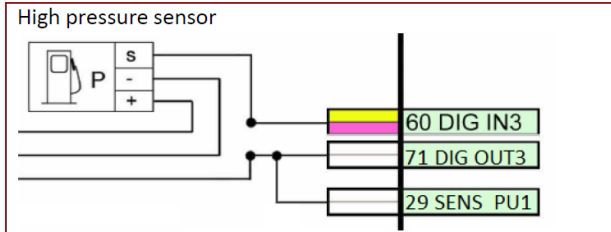
H2 (INJ LO A)		yellow	Injector side
H2 (ECU LO A)		Yellow-green	ECU side
Petrol injector cyl. 3 IM pos. A1 / C2			Colour : Green Location : Petrol ECU, X3, pin 52
H2 (INJ LO B)		grey	Injector side
H2 (ECU LO B)		Grey-green	ECU side
Petrol injector cyl. 6 IM pos. E1 / F2			Colour : Green-violet Location : Petrol ECU, X3, pin 51
H2 (ECU HIGH 2)		Red-green	Colour : Green-grey
+ Petrol injector (cil 3 & 6) / IM pos. H2			Location : Petrol ECU, X3, pin 72

H3 (INJ LO A)		yellow	Injector side
H3 (ECU LO A)		Yellow-pink	ECU side
Petrol injector cyl. 2 IM pos. C1 / B1			Colour : Blue Location : Petrol ECU, X3, pin 48
H3 (INJ LO B)		grey	Injector side
H3 (ECU LO B)		Grey-pink	ECU side
Petrol injector cyl. 5 IM pos. F1 / E2			Colour : White-green Location : Petrol ECU, X3, pin 47
H3 (ECU HIGH 3)		Red-pink	Colour : Blue-grey
+ Petrol injector (cil 2 & 5) / IM pos. H3			Location : Petrol ECU, X3, pin 68



Electrical connections X3 *GREY* connector

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

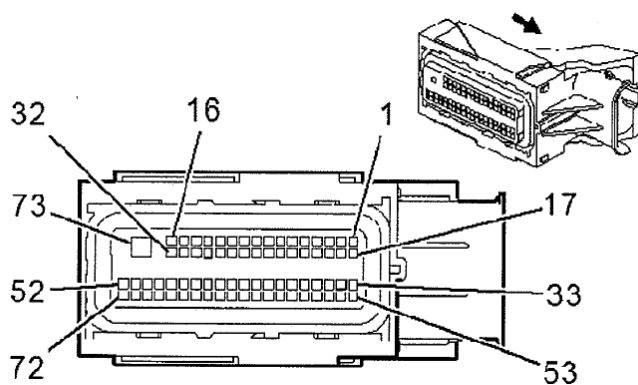
60, 71 & 29				Fuel rail pressure sensor signal interruption. Wire colour: Blue-white Wire location: Petrol ECU, X3 , pin 60 Add wiring module for pin 29 & pin 71
60	DIG IN3		Yellow-pink	Sensor side
71	Wiring module		White	ECU side
29	Wiring module		White	Connect wire 29 to wire 71 , see picture below
				High pressure sensor 
				<i>High pressure petrol sensor ground.</i> Wire colour: Black- green Wire location: Petrol ECU, X3 , pin 41
63	Ground Shift		Blue-orange	
				<i>High pressure petrol sensor supply 5V.</i> Wire colour: Brown-red Wire location: Petrol ECU, X3 , pin 40
40	Wake-up		Grey-red	
17 & 10				Fuel line pressure sensor signal interruption. Wire colour: Blue-white Wire location: Petrol ECU, X3 , pin 59
17	AD2		Blue-green	Sensor side
10	DAC2		Green	ECU side
				<i>For measuring the engine speed signal.</i> Wire colour: Yellow-purple Wire location : Petrol ECU, X3 , pin 56
8	RPM		Purple-white	

Electrical connections X2 *BLACK* connector
Check and measure the wiring in case of changes in the cars wiring colours.

3-pole connector 27 +5V Sensor 37 C ground 18 AD1		Red-blue Brown-black Blue-white	For measuring the inlet manifold pressure (MAP). Insulate → Cut-off connector Insulate → Cut-off connector Wire colour: Green-white Wire location: Petrol ECU, X2, pin 67
18	AD 1		Blue-white

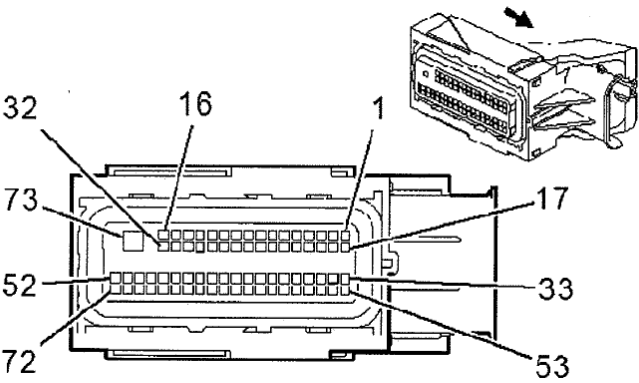
			Make a connection to Lambda sensor bank 2 Wire colour: Purple-white Wire location: Petrol ECU, X2, pin 56
19	AD4		Blue

			Make a connection to Lambda sensor bank 1 Wire colour: Purple-grey Wire location: Petrol ECU, X2, pin 55
20	AD3		Blue-pink



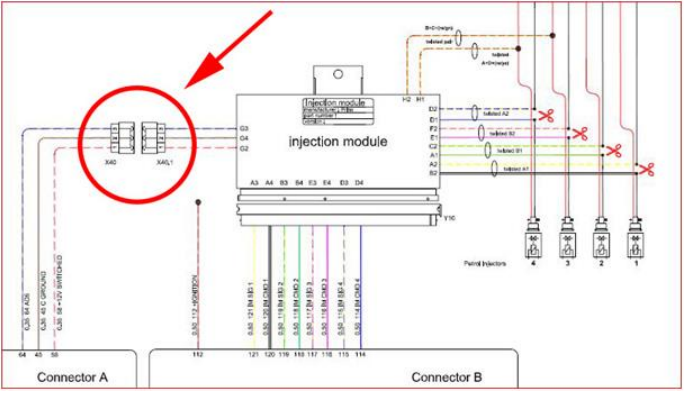
Electrical connections X1 *BLUE* connector
Check and measure the wiring in case of changes in the cars wiring colours.

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: Purple- blue Wire location: Petrol ECU, X1, pin 49
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 gas 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	Cut off connector and insulate wires
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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 evaporator 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 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 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.

