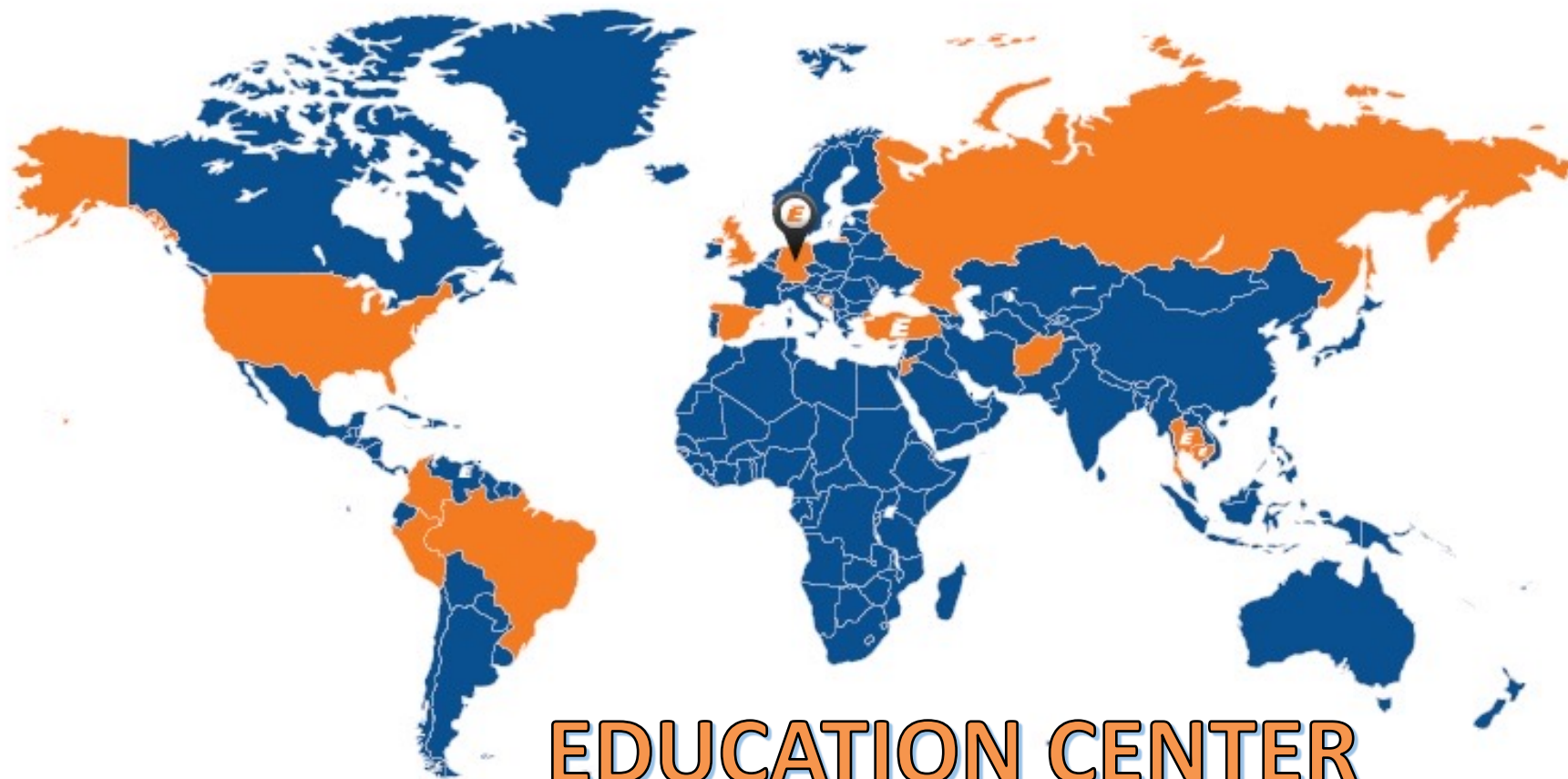


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Armin Čutuna

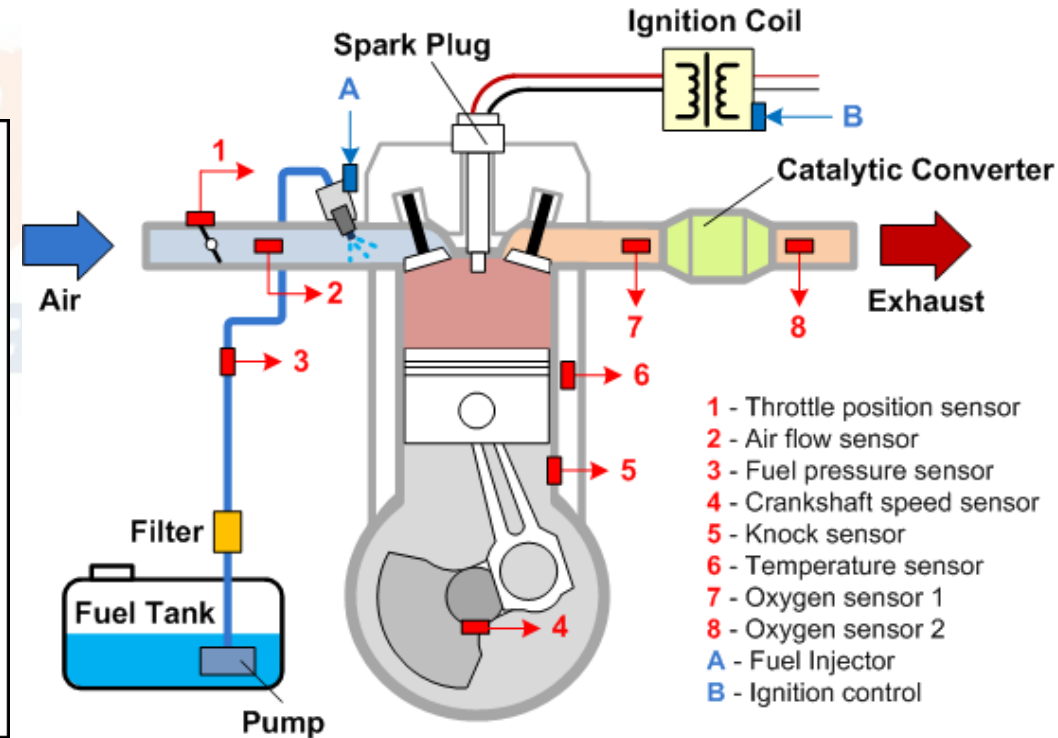
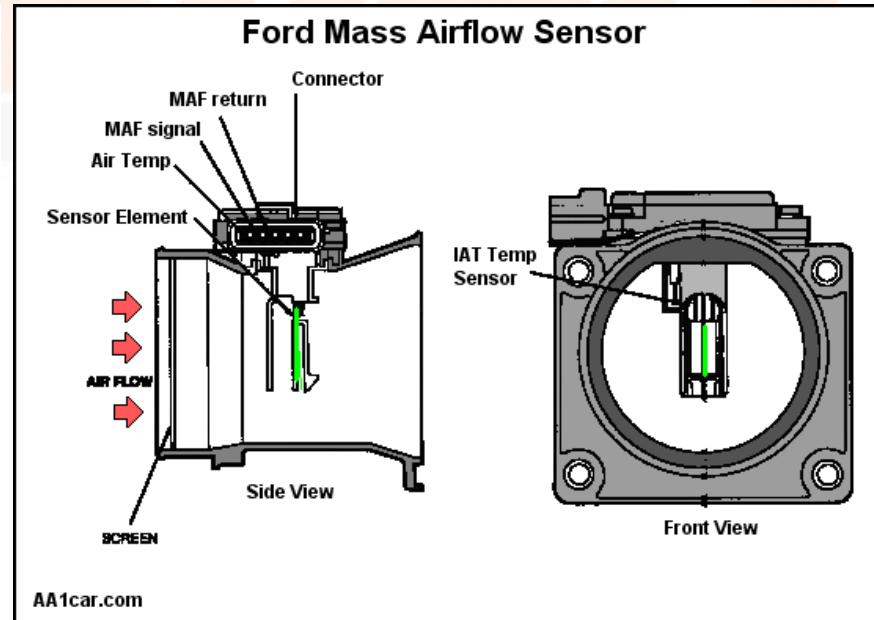
Basics of installation

Content

- Engines, engine types and injection types
 - Searching signals
- Where to place the reducer and how to connect to water?
 - How to drill the intake manifold and where?
 - Components of the Kit and what is their use?
 - Wiring?
 - Best place for the ECU?

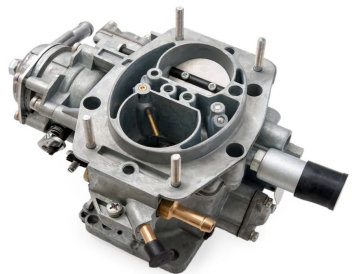
Engines, sensors, function

- How engines work?
- What is the idle air to fuel mixture (AFR)?
- Sensors on the engine and their function?
- Timing of an engine and 4 stroke process?

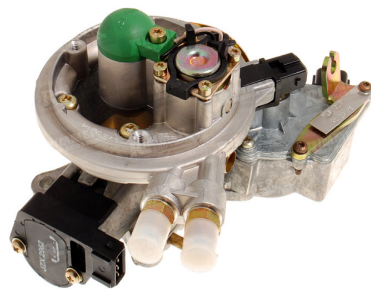


Types of engines

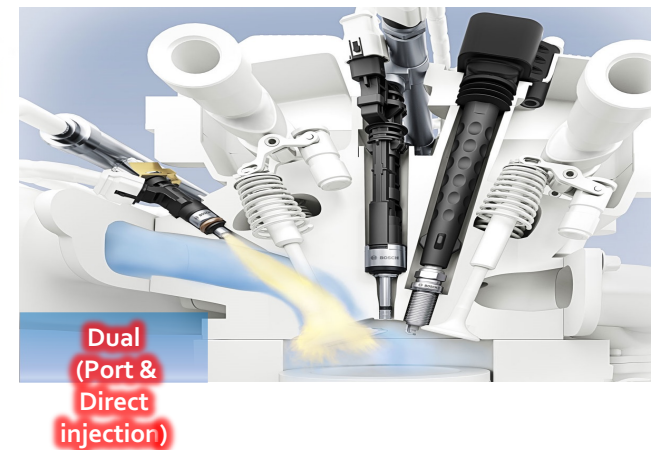
- We have different types of engines not on all of them LPG can be installed.
 - Carburetor engines
 - Mono-injection or mono-point or single- point
 - MPI (Multipoint injection) or Port fuel injection
 - Direct injection (**on inquiry**)
 - Dual Port and direct (**can not be installed**)
- Most common are the MPI engines and there we also have few types
 - Full group (1991 - 1994)
 - Semi-sequent (1994 - 1998)
 - Full sequent (1998 - till now)



Carburetor



Mono-injection

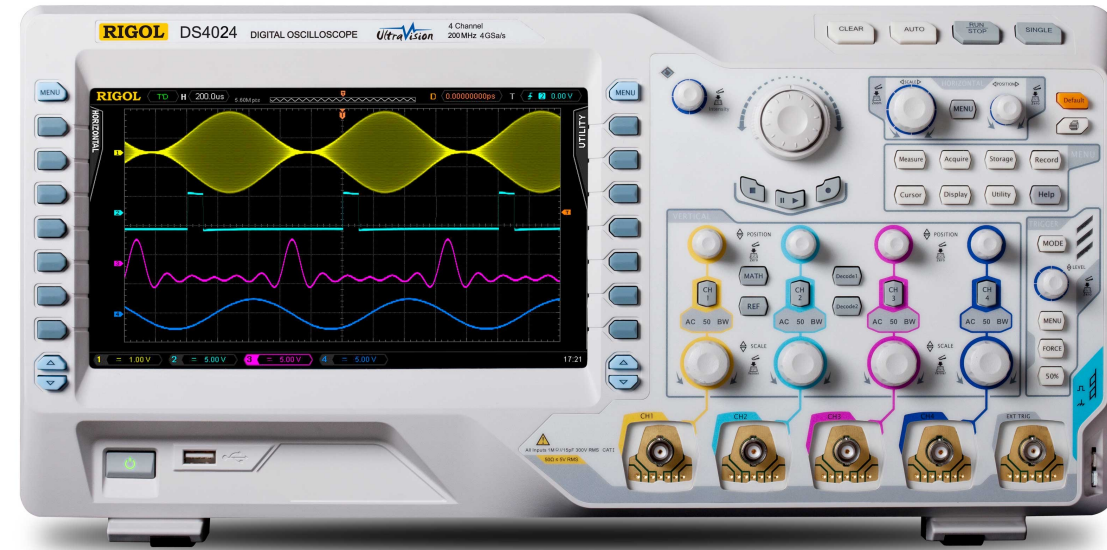


mergia
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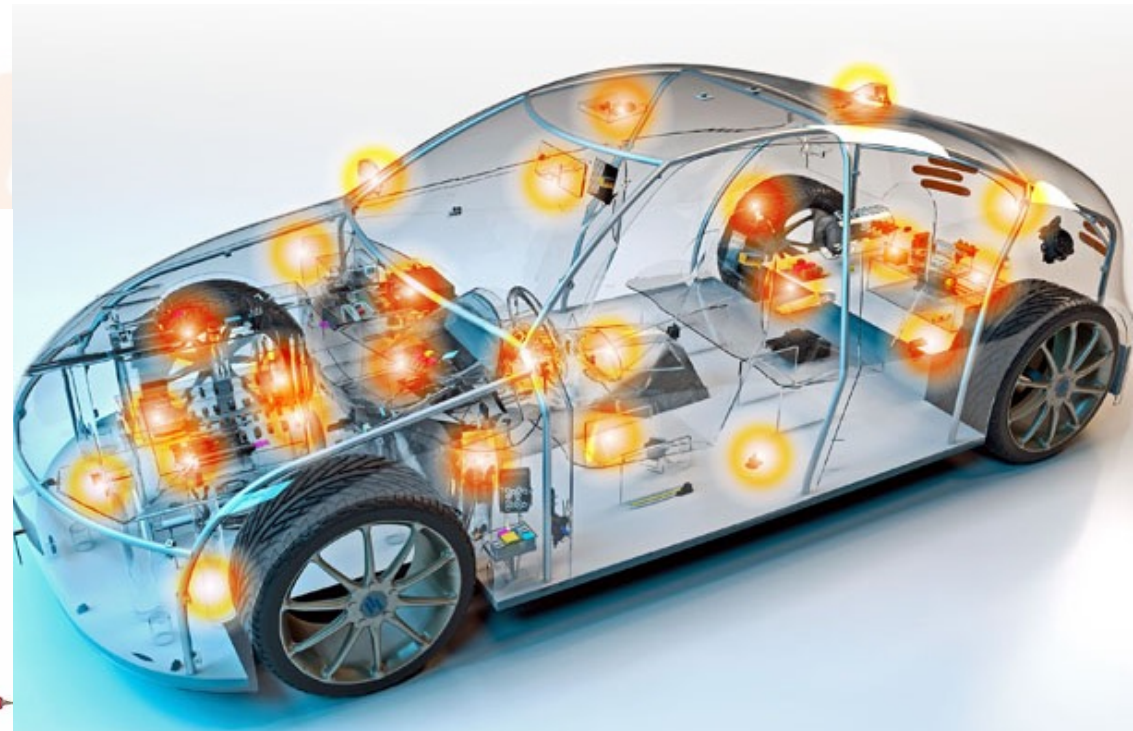
Searching signals

Key signals that we have to find:

- RPM
- Ignition key - ON
- Injector signals

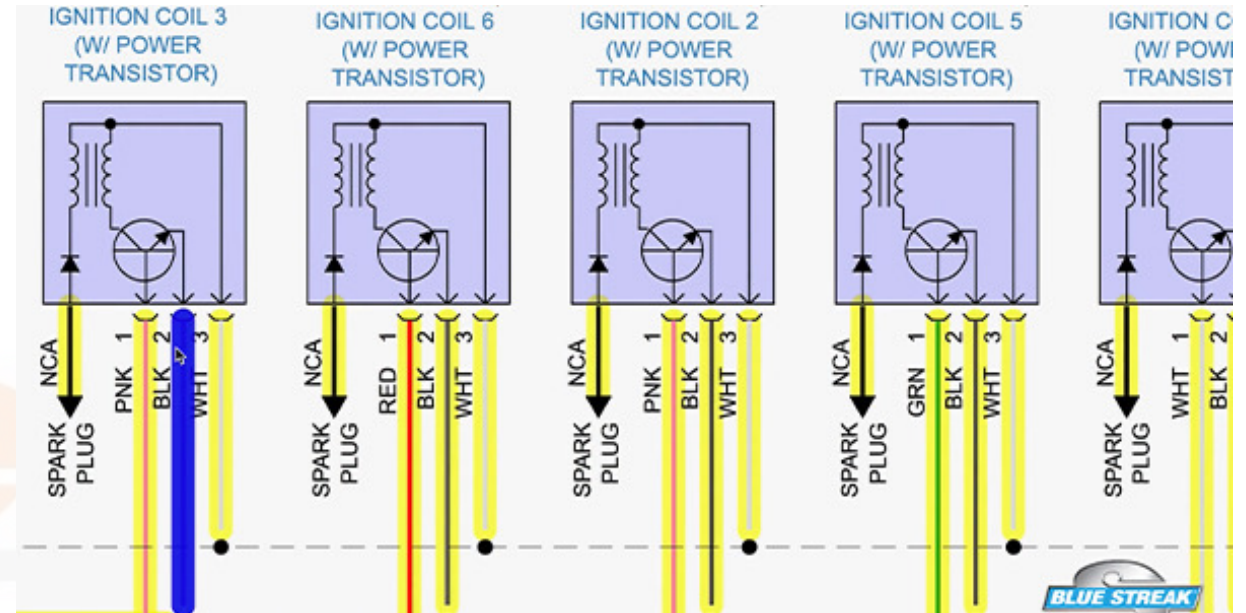


Enera



RPM signal

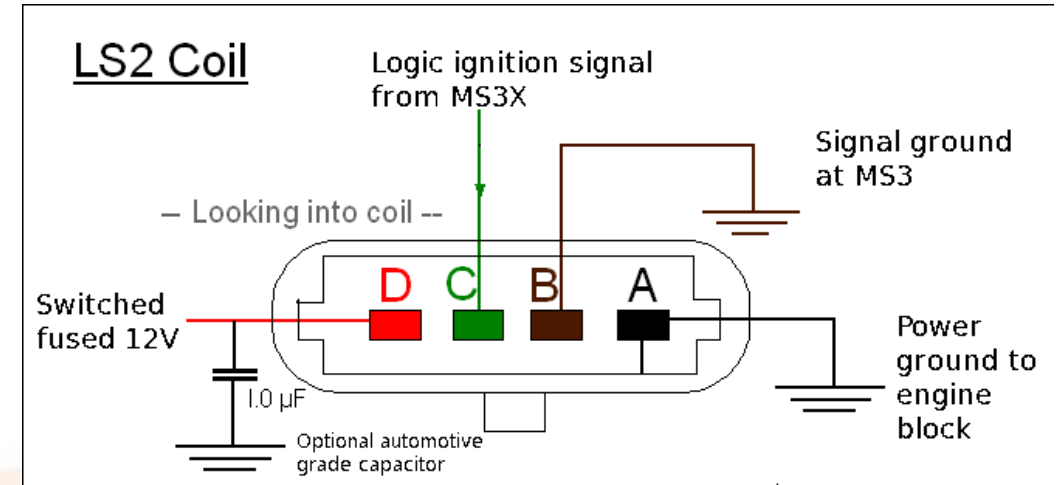
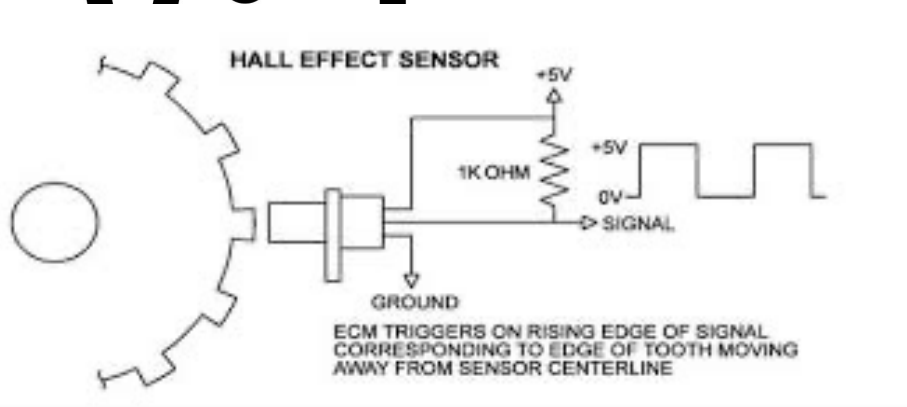
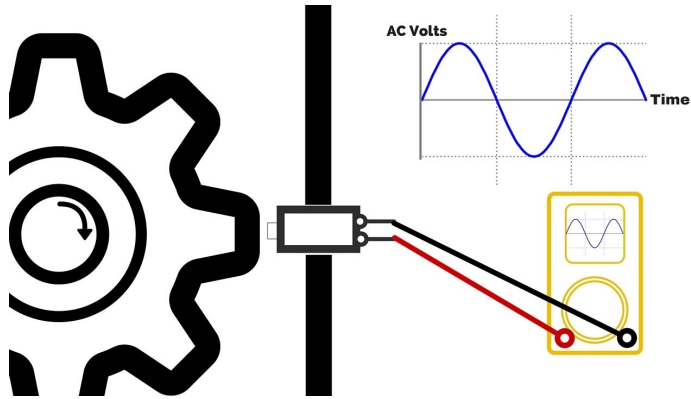
RPM (Revs per Minute) so this means how many times will the engine spin per min. The signal for this RPM is coming from the ECU where the ECU is getting data of good timing of the engine from Crankshaft and Camshaft sensor. If this signal is not available the engine will not start and will not deliver power to the injectors. Consequently the injectors will not open the fuel pump relay will not have power and the car will just crank but not start. RPM signal usually is marked in a different color. And the wire is thinner than the other wires.



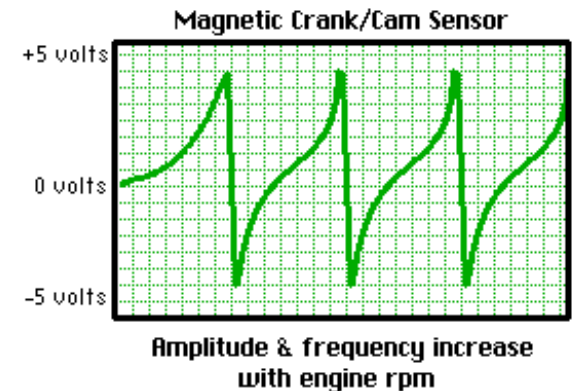
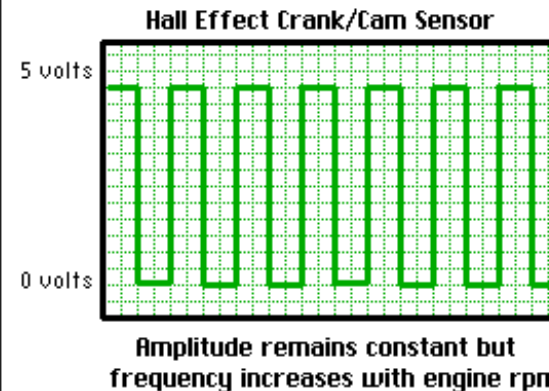
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RPM signal

- Rpm signal can be found on 3 places
 1. Ignition coil
 2. Camshaft/Crankshaft sensor
 3. OBD connector

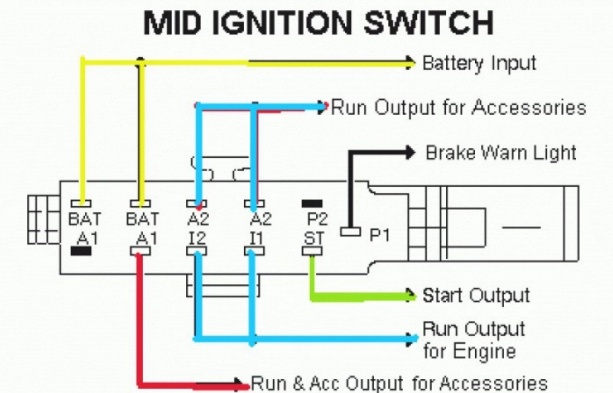
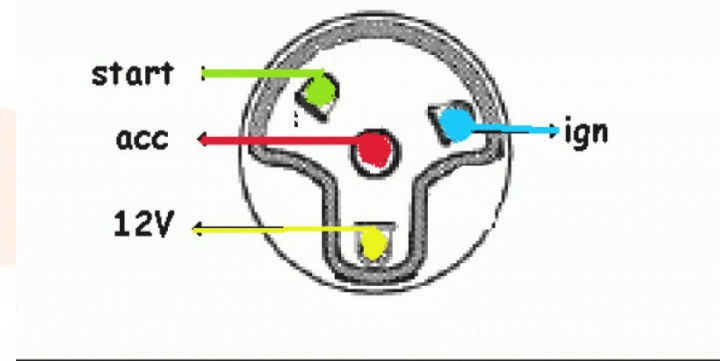


CRANKSHAFT / CAMSHAFT POSITION SENSOR WAVEFORMS



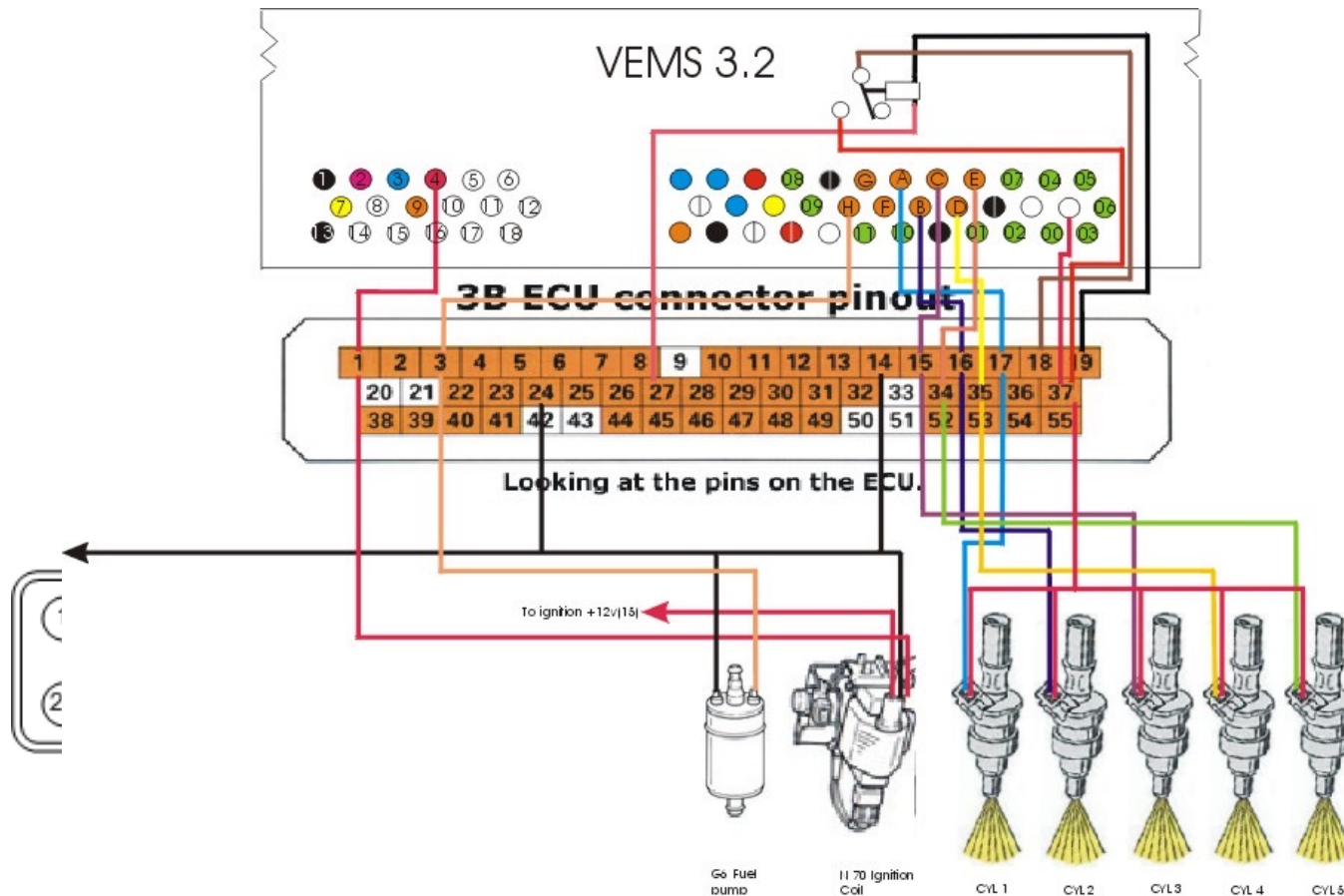
Ignition key signal

- The ignition key signal must be a 12 volt signal. When we turn the key on the first step then the ACC is ON and we have 12v signal. This is the signal for the LPG ECU to activate.
- We can also find the signal on other places but we need to check if we star the car will the signal be there after starting (It have to be there, if its not then this is not a good signal) and we have to check will it disappear when turning off the engine. Some of this signals disappear after 10sec. This delay is acceptable.
- The 12v signal can also be found on the Injectors , Coils, near the fuse box.
- Usually it is connected to the injector signal or coils



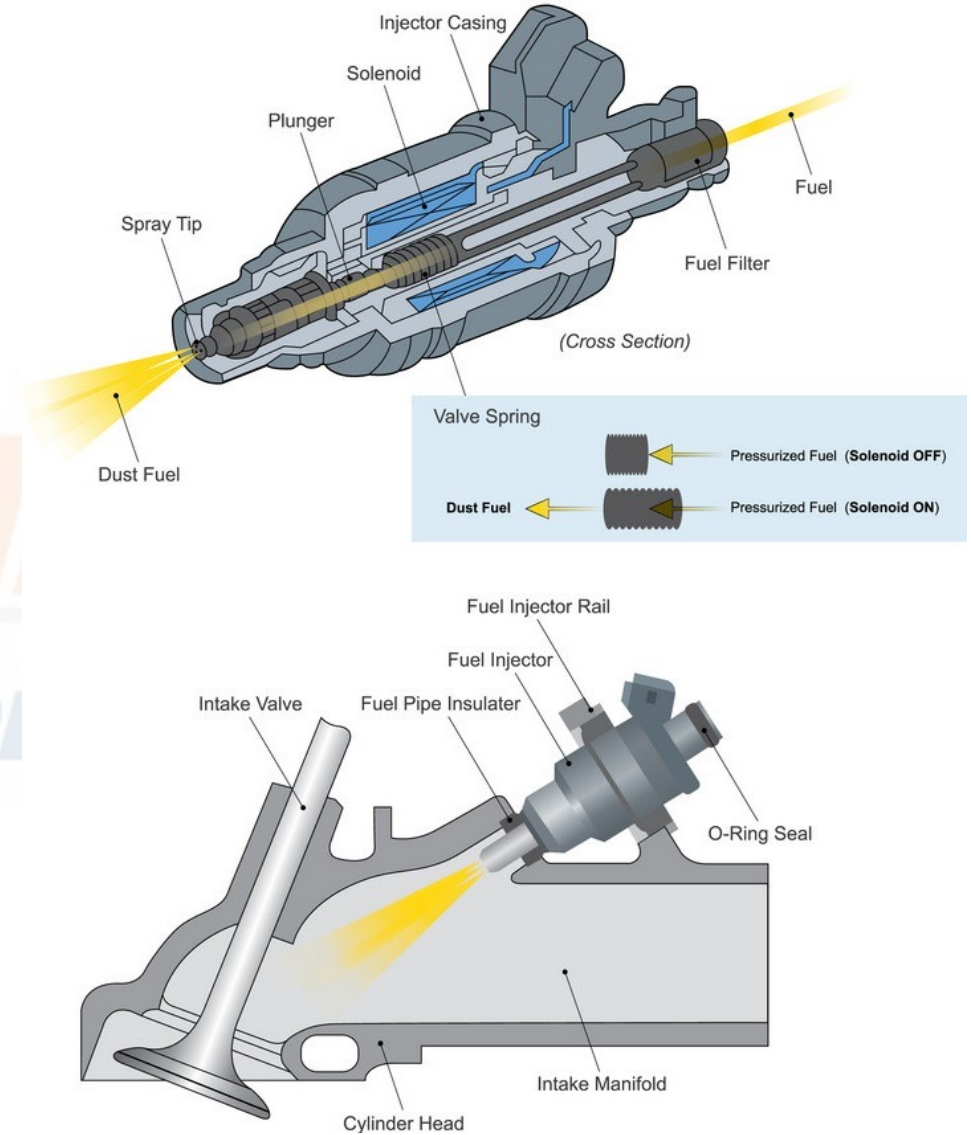
INJECTION signals

- Recognizing what system we have on the car
- Searching signals! What we need? How to recognize!!!
- Connection on LPG system



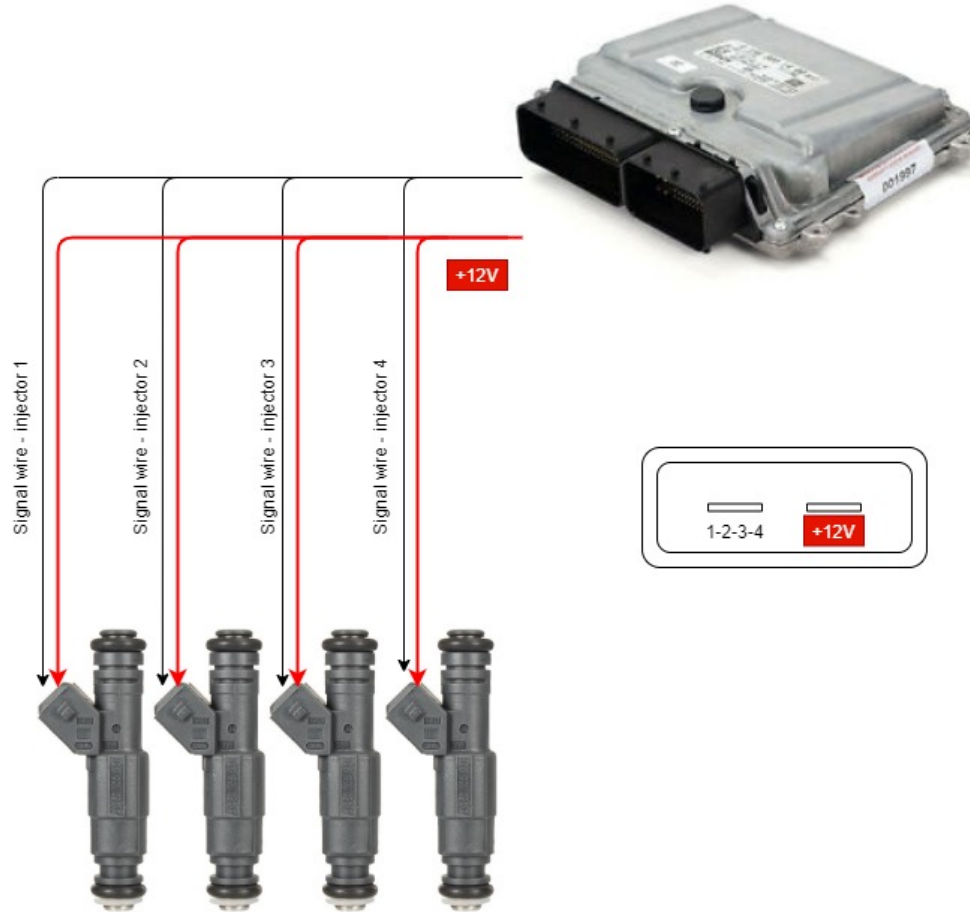
Fuel Injector

Fuel Injector Assembly



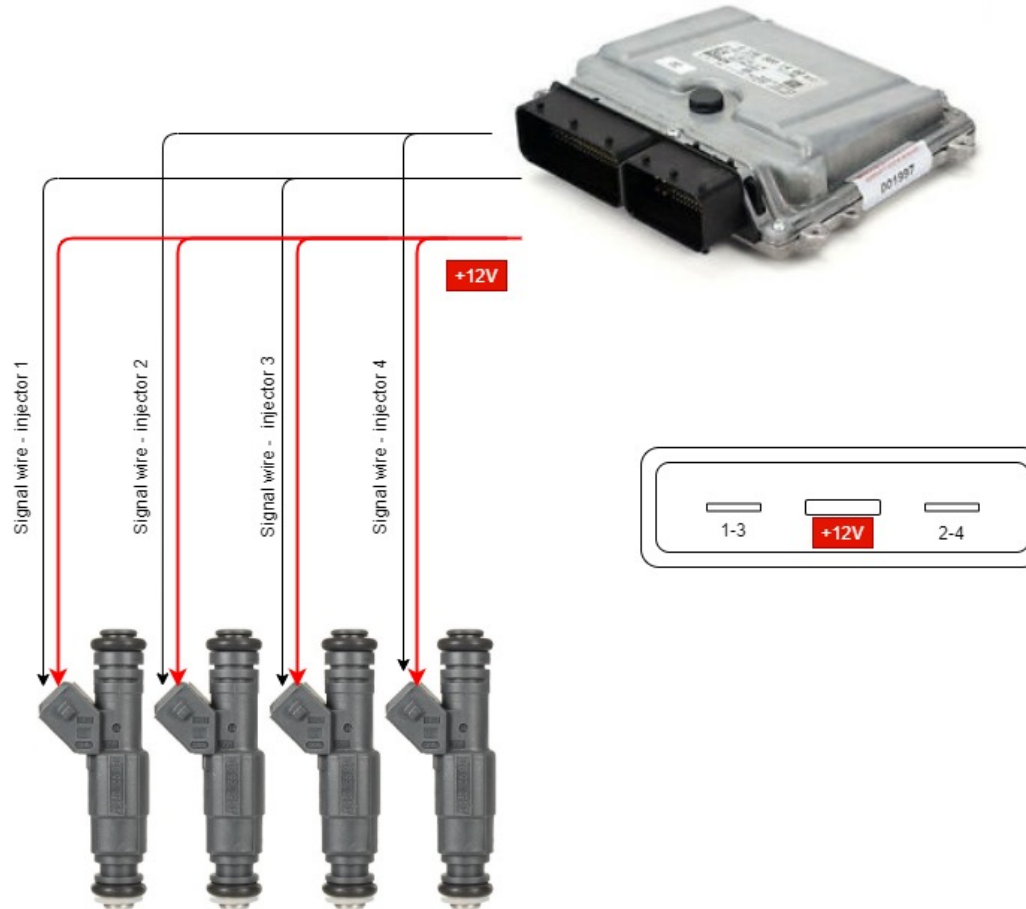
Multi point injection
Full group

Injector signals



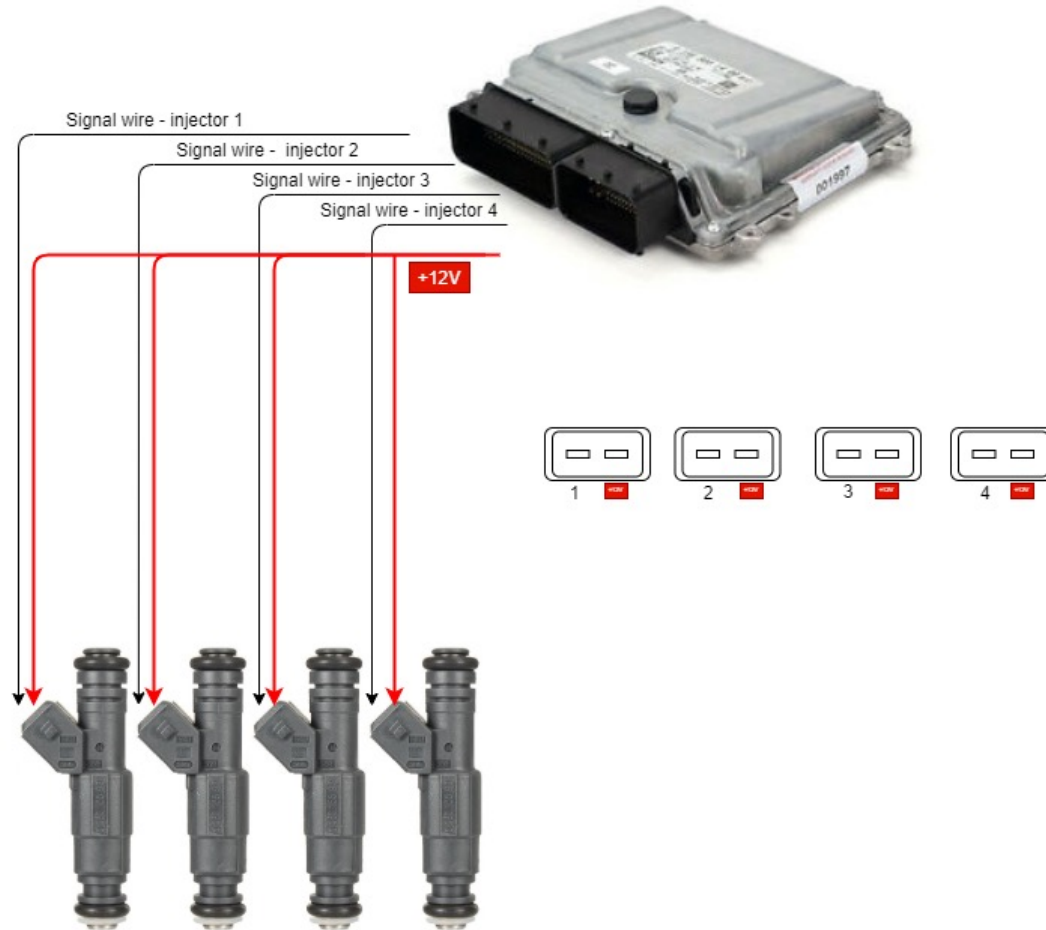
Multi point injection
Semi-sequent

Injector signals



**Multi point injection
Full sequential**

Injector signals



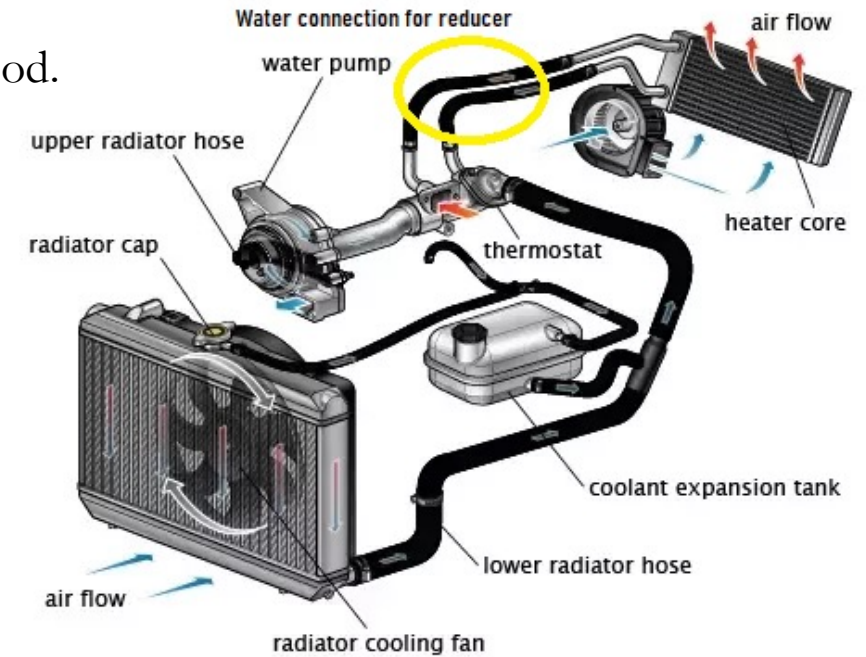
This is the most common wiring that you will find on all cars from 1999 till now except Di engines and Piezo injectors.

Reducer place and connection to water

The reducer is placed under the minimum level of the coolant container. To ensure now air pockets inside the coolant system. The water connections are usually have to be connected to the cabin radiator that can be reached from the engine bay. We are using the T connections 19x19x16 mm for water to connect to reducer.

The water pump and thermostat have to be in a good condition to ensure properly work of the reducer.

If the thermostat is not good or the circulation of the water is not good we will have problems to keep the reducer hot. This will cause that the lpg is not working good.



Reducer place and connection to water

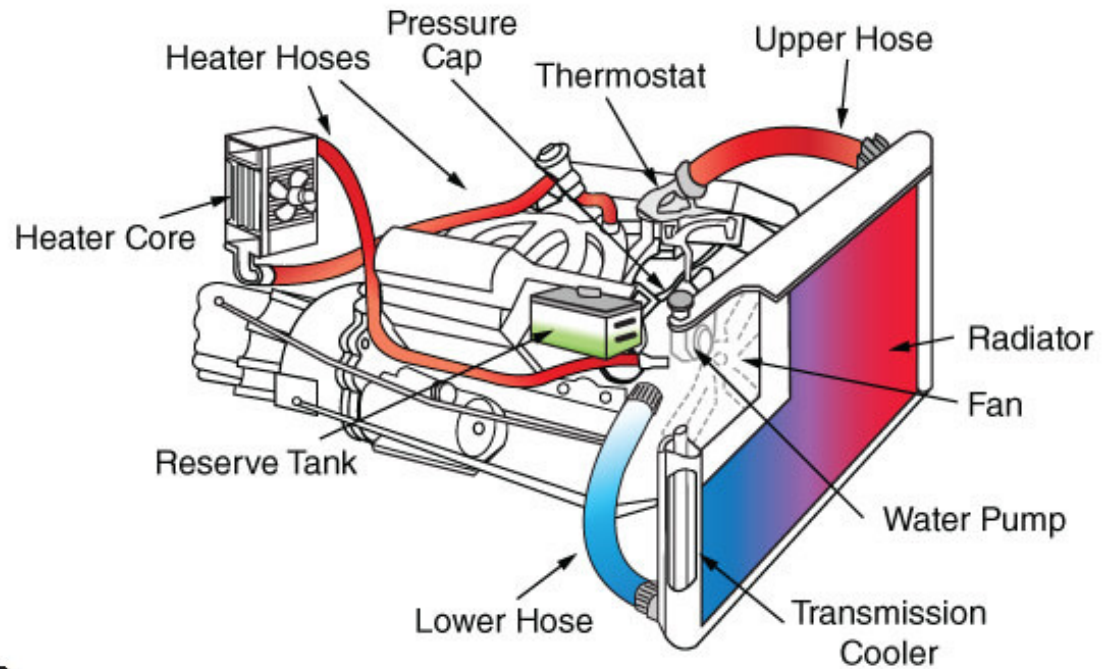
Two types of water connection

1. Serial
2. Parallel

SERIAL CONNECTION



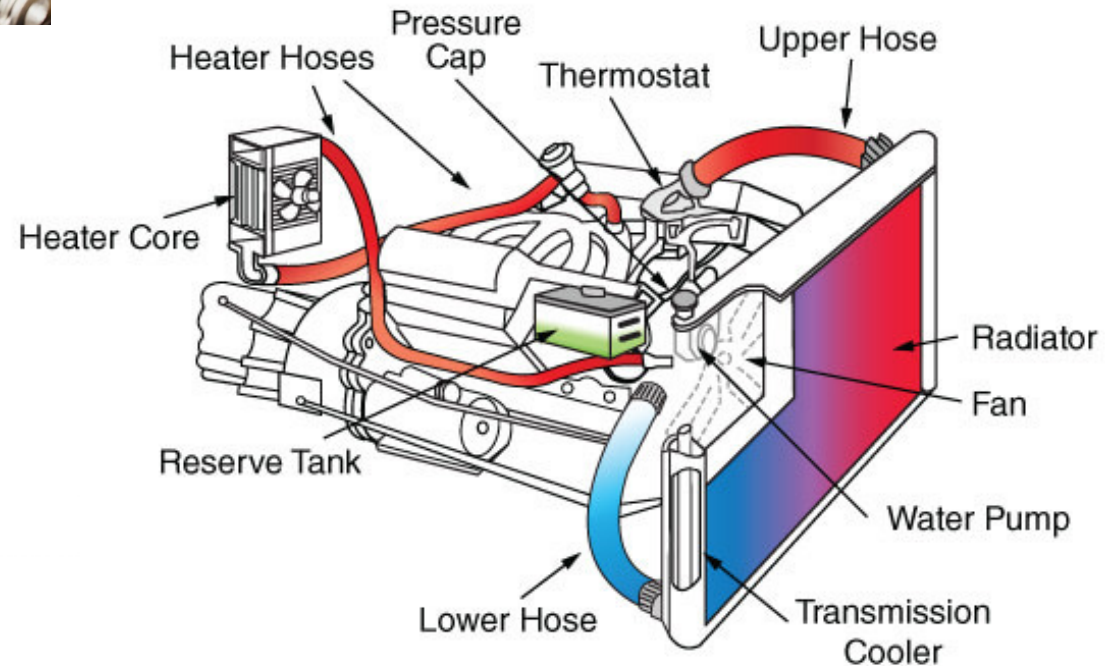
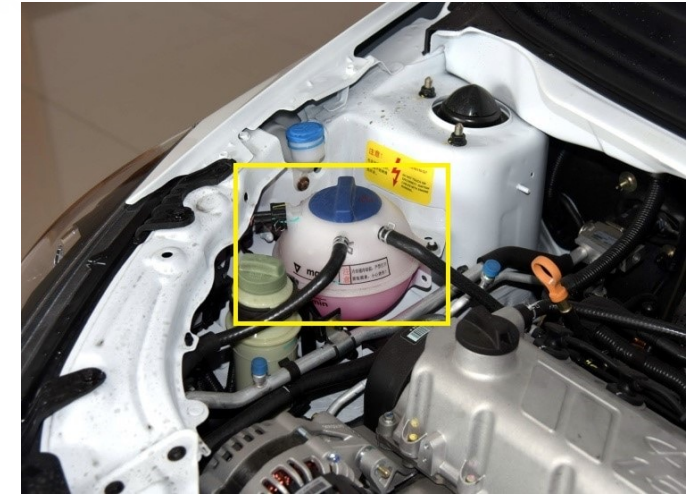
PARALLEL CONNECTION



Reducer place and connection to water



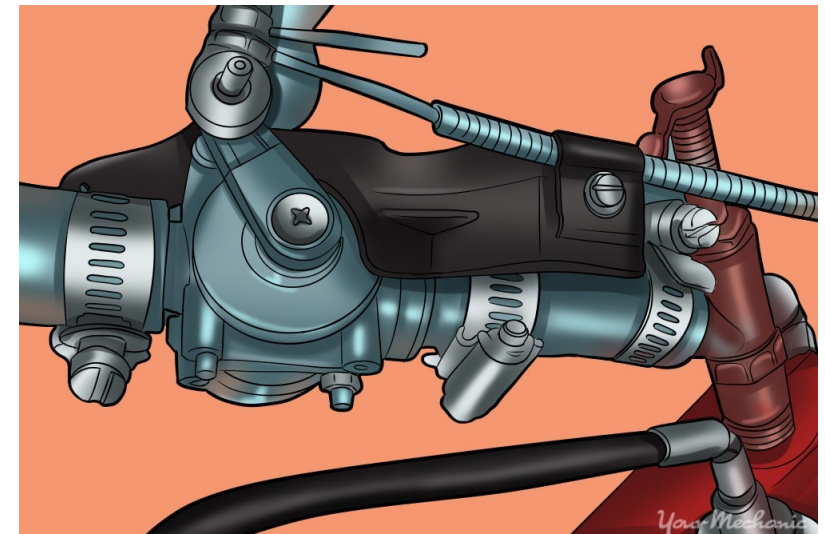
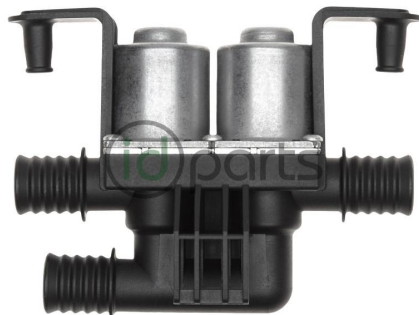
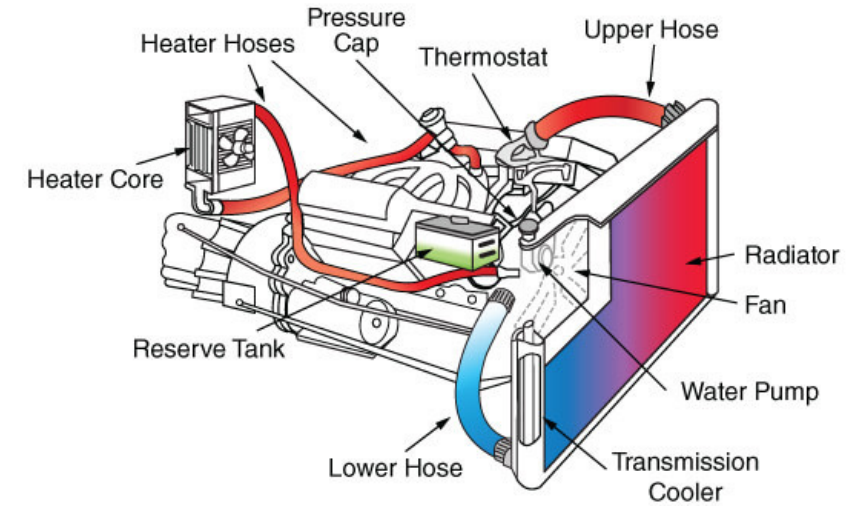
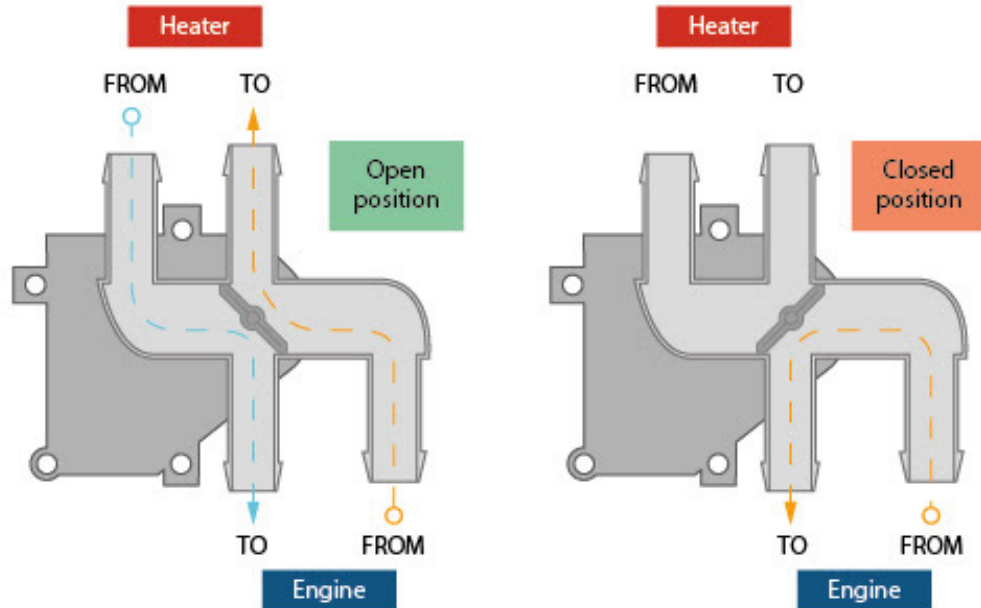
Pay attention to vent the system good!!!
To prevent air gaps inside the cooling system



Lpg reduce should be not
mounted higher then the
minimum of the coolant tank!

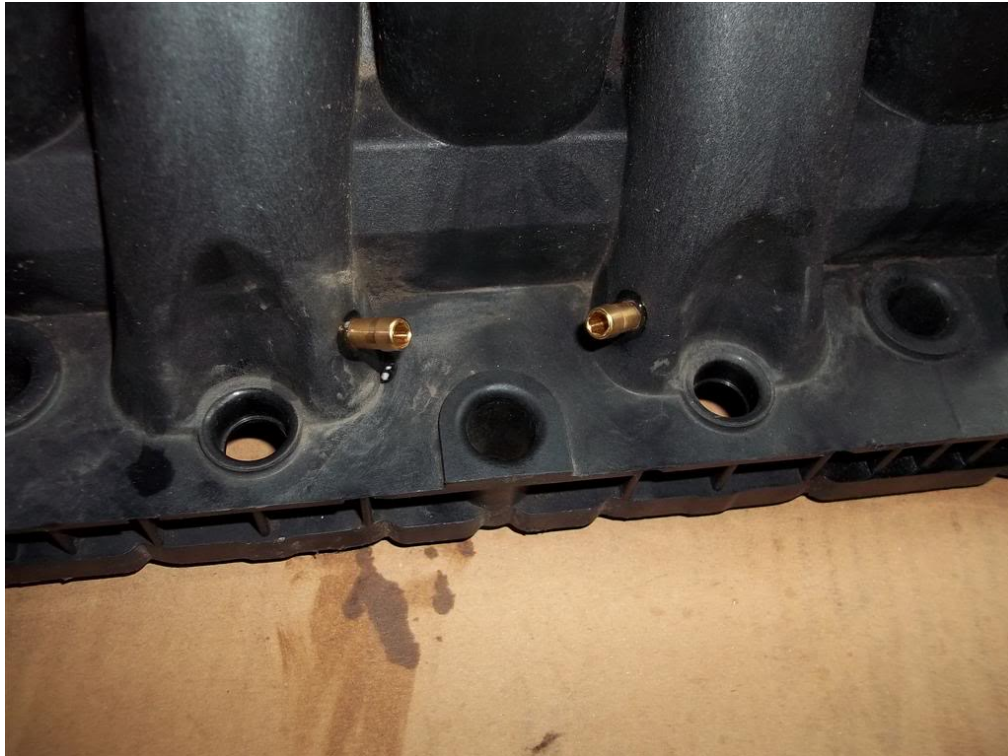
Reducer place and connection to water

Pay attention!!! Heater Valve!!! If the car have one!!



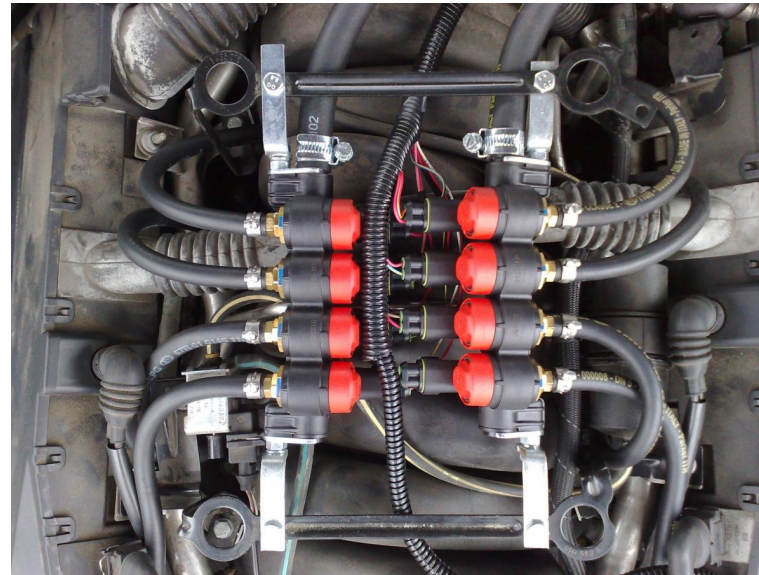
Intake manifold

The best point to drill the intake nozzles are near to the petrol injector. All nozzles have to have the same level so that the hoses coming out are all the same length. By drilling the nozzles ensure there are no flaps inside the intake.



Intake manifold

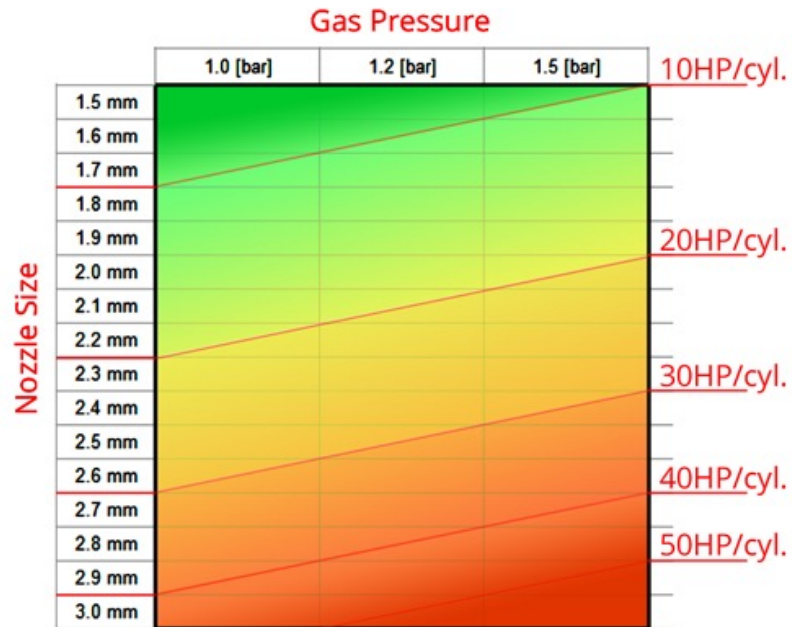
- Types of LPG injectors
- Length of hoses to the intake nozzles
- Size of the injector nozzles



Intake manifold

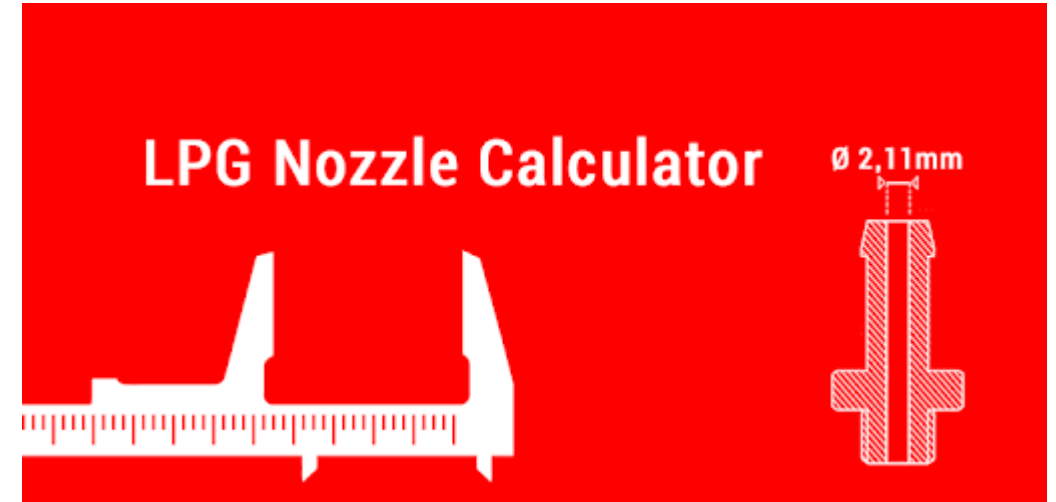
**LPG
TRADE**

VALTEK Injectors Nozzle Chart



1. Determine Engine Horse Power per Cylinder
2. Check Gas Pressure on the Injectors Rail
3. Use chart to find proper Nozzle Size Diameter

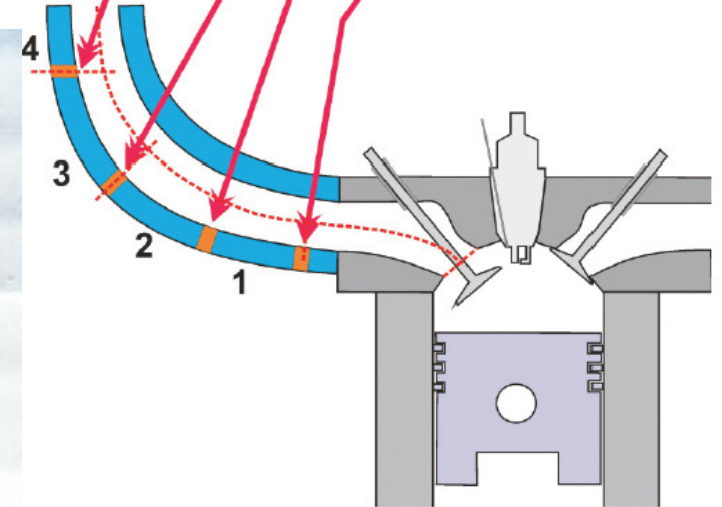
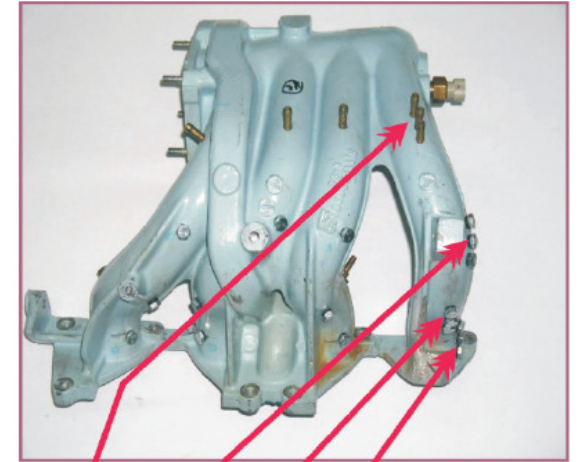
Autogas Systems Wholesale



Size of the nozzle [mm]		AC W01 [kW / KM]		AC W01 BFC [kW / KM]	
		LPG: 1,0 bar CNG: 1,6 bar	LPG: 1,2 bar CNG: 1,8 bar	LPG: 1,0 bar CNG: 1,6 bar	LPG: 1,2 bar CNG: 1,8 bar
LPG	CNG	Power per cylinder approx [kW / KM]	Power per cylinder approx [kW / KM]	Power per cylinder approx [kW / KM]	Power per cylinder approx [kW / KM]
1,5	1,7	10,0 / 13,6	13,0/17,5	-	-
1,6	1,8	12,0 / 16,3	15,0/20,4	-	-
1,8	2,0	15,5 / 21,8	18,0/24,8	-	-
2,0	2,2	18,0 / 24,8	20,5/27,0	-	-
2,2	2,4	20,0 / 26,5	23,2/31,2	-	-
2,4	2,6	22,0 / 29,2	25,0/34,0	24,0 / 32,6	26,0 / 35,5
2,6	2,8	24,1/ 32,8	27,9/37,8	25,5/ 34,6	28,0 / 38,8
2,8	3,0	29,2 / 39,7	33,8/45,8	30,0 / 40,8	33,8 / 45,8
3,0	3,1	-	-	34,1/ 46,3	37,9 / 51,5
3,2	3,2	-	-	38,8 / 52,7	42,5 / 57,8

Intake manifold - Vacuum

The vacuum nozzle should be drilled near the Throttle body behind it or on the collector yellow marked. Usually a good vacuum is between 0.25 to 0.35 on idle without load on the engine of A/C



Components of the KIT

Front LPG kit:

1. Reducer
2. Injectors
3. Water temp. sensor
4. ECU+wiring
5. Map sensor
6. Filter
7. Switch
8. Nozzles
9. PVC T-connection 5x5x5
10. Pressure connection 12x5 with o ring
11. LPG Hose 12mm
12. Water Hose 16mm
13. Vacuum hose 5mm
14. Set of clamps



Wiring

Now that we know how to search the signals.
The wiring will be easy for us.

Injector wiring

RPM

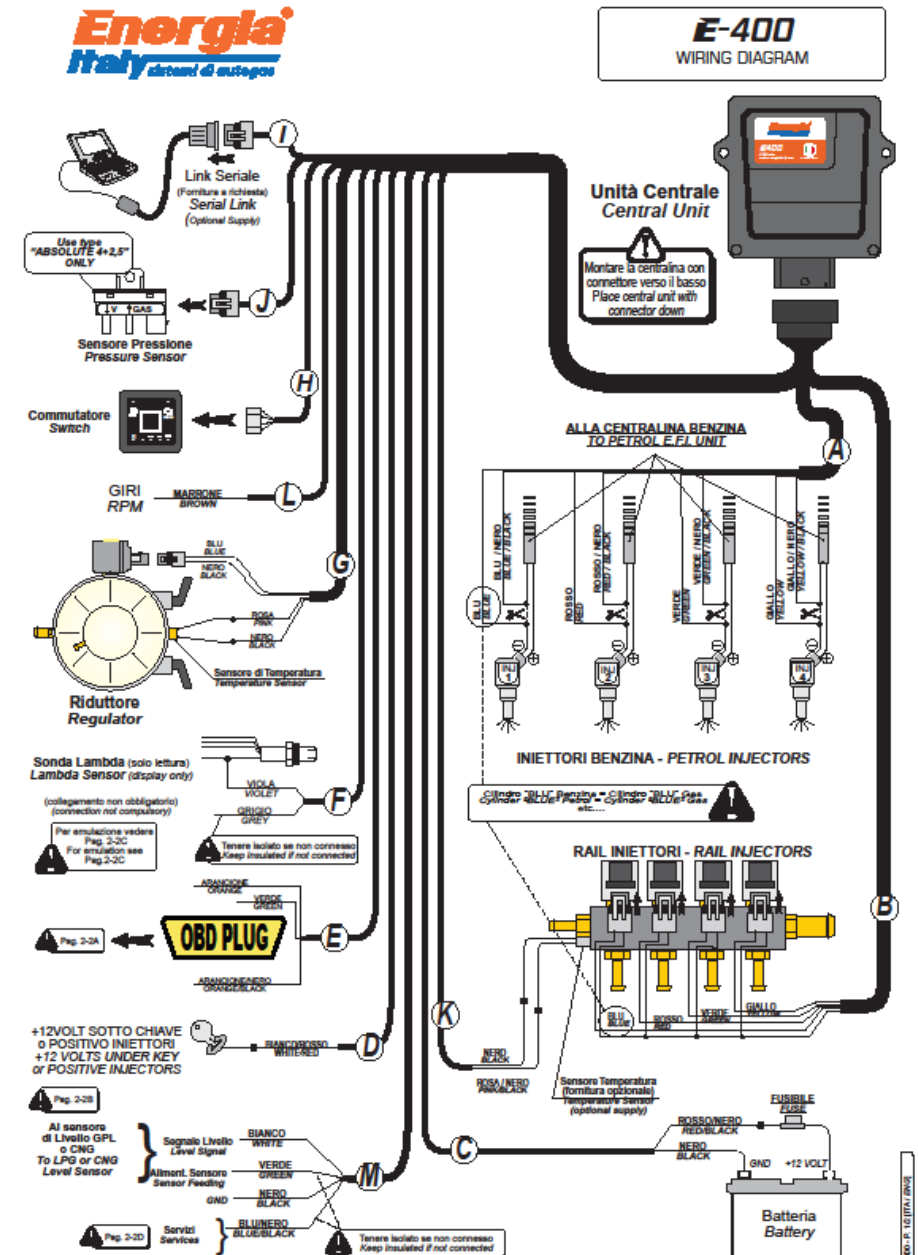
Ignition key

Level sensor

Coil wiring

Obd wiring

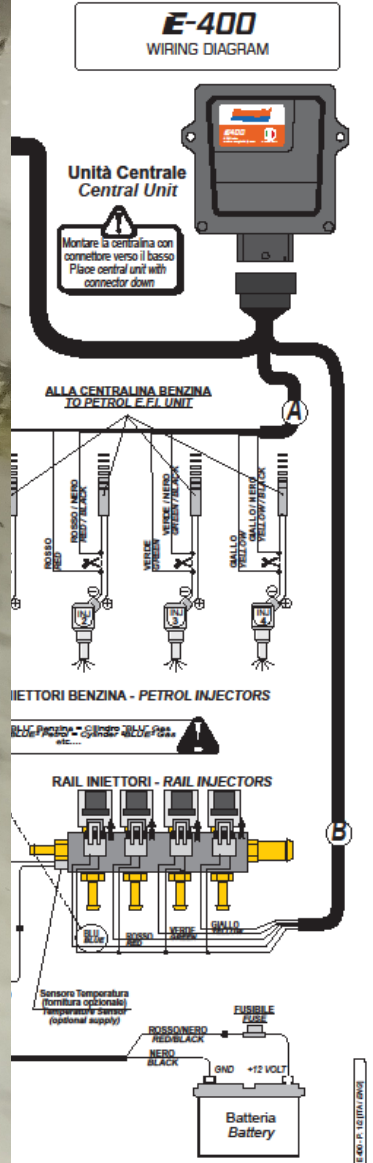
Temp. sensor wiring



ECU
have
to be

Pay a

Do not
The c
Wirin
dama
pipes



Questions please?