HPI 07

High Performance Injection system

LPG
CNG

EN	INSTALLATION MANUAL

INDEX

CHAPTER 1: FUNCTIONING PRINCIPLES OF EMMEGAS SEQUENTIAL HPI07

1.1 GENERAL DESCRIPTION

The Emmegas HPI07 is based on the latest generation of sequential injection technology for Petrol / Lpg or Cng conversion of the vehicles and the functioning is based on the same principles used by the gasoline ECU of the vehicle

The amount of required fuel is adjusted for each cylinder, independently and moment-to-moment: the principle through which the ECU of gas determines the effective times of injection in the gas injectors is based on the acquisition, during the running with gas, of the petrol injection times; this means that the control of the engine is based on the petrol control unit while the gas control unit simply converts the petrol signals into gas signals. This precise, synchronized injection strategy optimizes performance, consumption, provides a stable response and eliminates the risk of backfiring

The HPI07 includes the latest technology, is easy to install and will not interfere with the OE settings of the vehicle. Available in version for 3-4, 5-6-8, cylinders, the HPI07 is based on a simple and user-friendly installation software with easy steps for configuration and diagnostics. The intelligent auto-calibration function shows working parameters for gasoline under different conditions, mapping for the highest efficiency in either Lpg – Cng.

The calculation of the gas injection times is based on a series of parameters, besides the times of injection of gasoline, monitored by the Emmegas ECU07, such as:

gas pressure / gas temperature / water temperature / rpm / battery tension

Particularly, with the objective of maintaining a perfect coherence with the petrol system, the ECU07 Emmegas carries out the injection of the gas in the same cylinder where is registered the corresponding petrol injection time.

During the maintenance of the vehicle, it is possible to monitor the functioning of the gas parameters and to check the diagnostic connecting a computer with the EMMEGAS ECU-07 by the relevant USB interface.
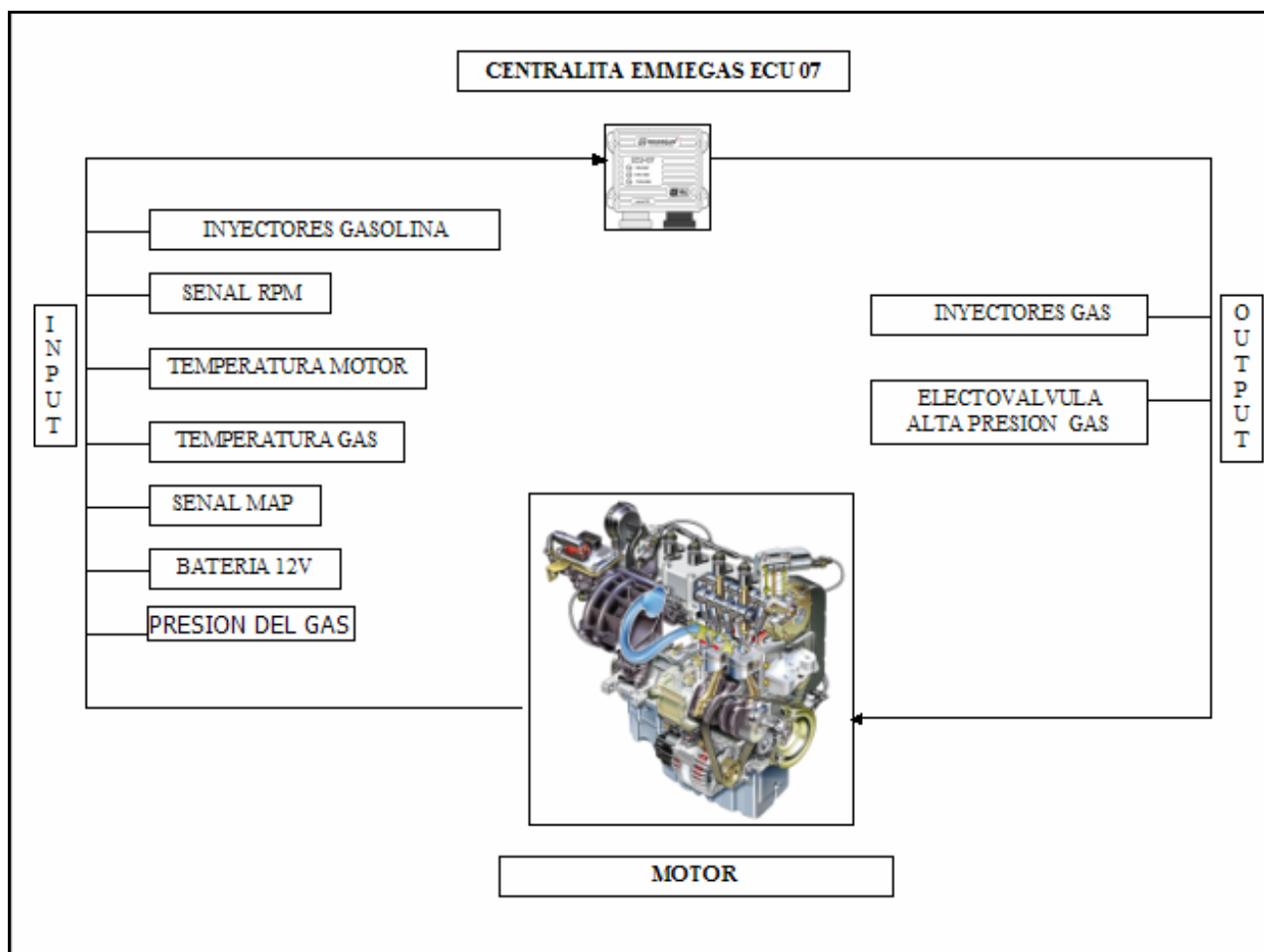

Fig.1: HPI07 Functioning Diagram

1.2 INPUT SIGNALS:

- Petrol injection time
The system uses the petrol injection times as main parameters for the calculation of the amount of Gas that should be injected into the engine: the Emmegas ECU07 converts the petrol injection times into gas injection times.

- RPM
The RPM signal is one of the two basic parameters necessary to calculate the gas injection times. It is also used to control if the engine is on or off. The RPM signal is detected through a cable connected to the ignition coil of the vehicle.

- Engine Temperature
The temperature of the cooling liquid is necessary in order:
- to control the petrol – gas switch
- to correct the gas injection times

- Gas Temperature
The temperature of the gas is necessary in order to correct the gas injection time; this correction is also essential to compensate for the variations of density during the running of the engine on the basis of outside temperature variations.

- Gas Pressure
When the gas pressure increases, the density also increases so, it is necessary to have compensation into the gas injection time on the basis of the pressure variations.
The signal of the gas pressure is also used in order to determine when to switch from gas to petrol when the gas tank is empty or in case the pipes are obstructed.

- MAP
The MAP signal is necessary in order to continuously compensate the gas flow on the basis of the gas pressure into the rail and vacuum into the engine

- Battery 12v
This 12V signal is necessary for the electric power of the system

1.3 OUTPUT SIGNALS

- Gas injection times
The Emmegas ECU07 generates the gas injection times on the basis of the petrol injection time in order to determine the correct amount of gas to be injected in to the engine.

- Cut-Off Gas valve
The gas control unit controls the Cut-Off valve present before the pressure regulator.

By the switch / indicator the driver visualizes the following information:
- the type of fuel that is used during the running;
- the quantity of Gas available in the tank;
- the eventual check engine need in case of malfunctioning of the gas system

All the functions are accessible through a personal computer connected to the ECU07 with its relevant interface, so that it will be possible to program the ECU07 and to diagnose eventual functioning   errors.
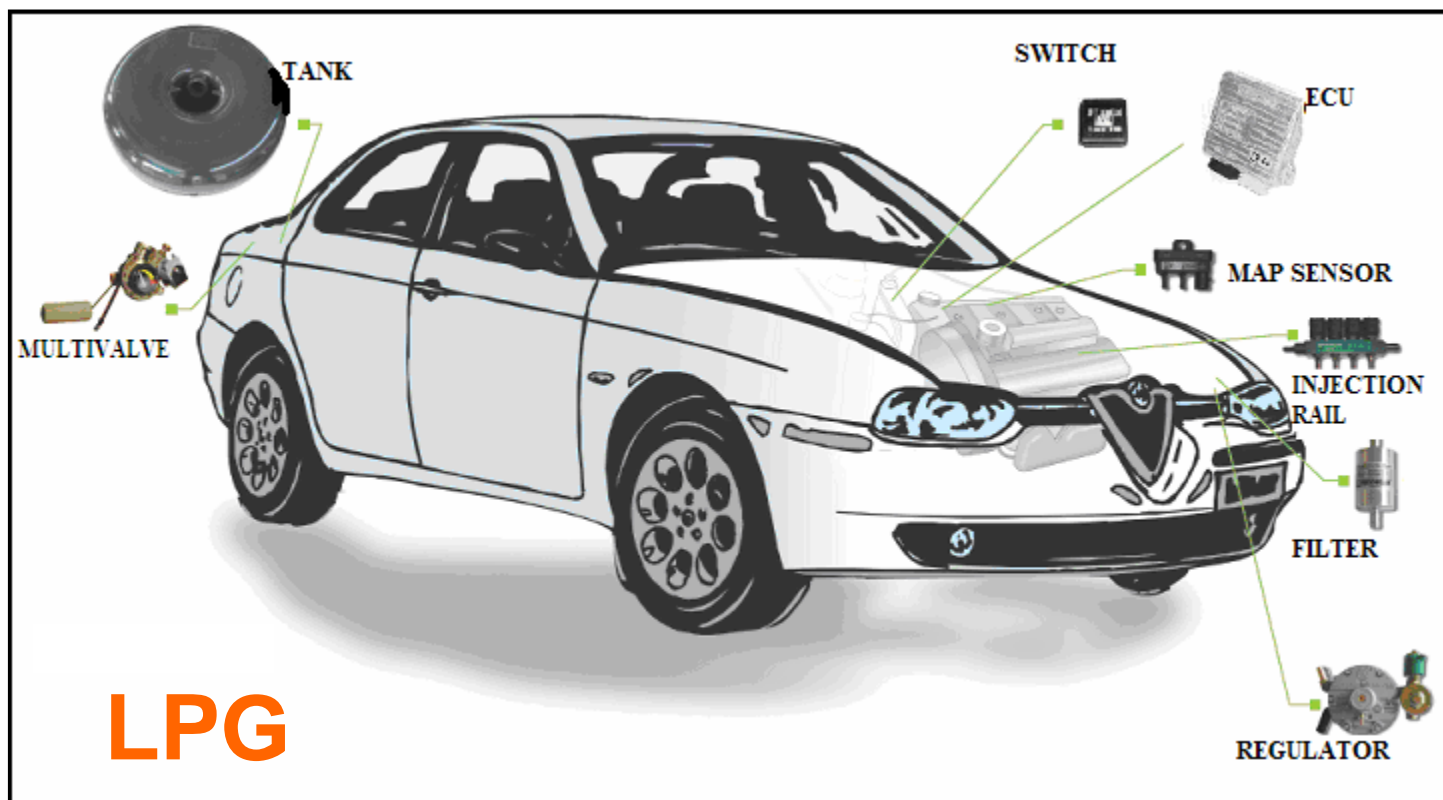
1.4: THE COMPONENTS OF THE SYSTEM
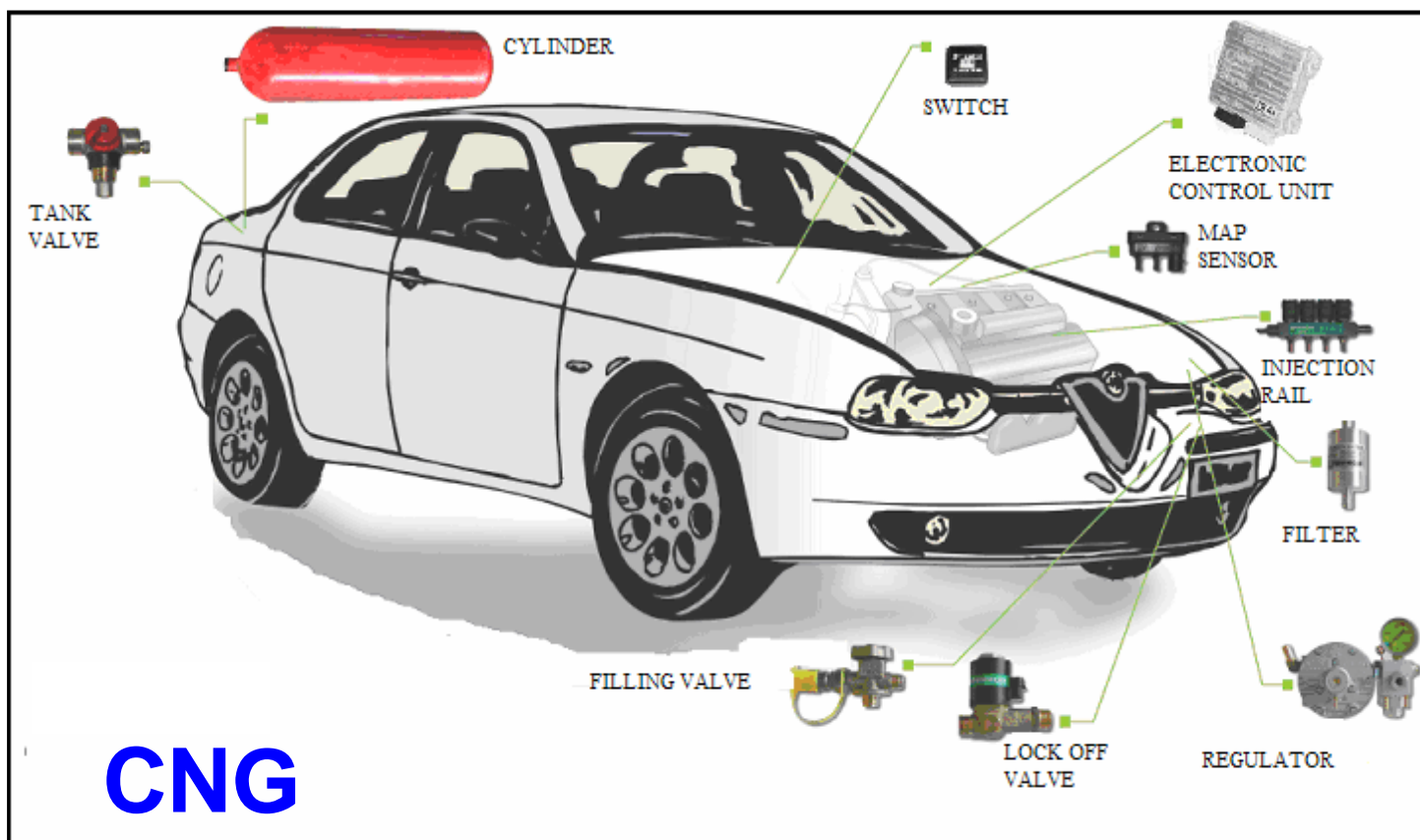

Fig.2: HPI07 Lpg components

Fig. 3: HPI07 Cng components

CHAPTER 2: INSTALLATION

2.1 TOOLS AND EQUIPMENT REQUIRED FOR THE CONVERSION

- Set of allen keys

- Set of screwdrivers

- Milling machine, diameter 30 mm

- Tap wrench & taps

- Meter

- Work bench with bench vice

- Digital Multimeter

- Air compressor

- Hydraulic pump, gauge and accessories for the hydraulic test of the gas pipes

- Exhaust Gas Analyzer

- Personal computer

- Wire stripper

- Lift

- Electric welder

- Gas detector, as alternative you can use a commercial fluid for the detection of leakages (WITHOUT ammonia, corrosive or chemical agents)

- Oscilloscope

- Electric drill with a series of drills from 4 to 10 mm

- OBD scan tool (Emmegas code 117214)

- Various workshop materials (grease, radiator liquid, Adhesive tape, Sealer for threads)

2.2 TECHNICAL KNOWLEDGE OF THE INSTALLER
The installer should have attended an Emmegas technical training in order to have full knowledge of the installation, calibration and diagnostic of the system

2.3 BEFORE PROCEEDING WITH THE INSTALLATION
Confirmation of correct operation of the following parts of the vehicle is required:
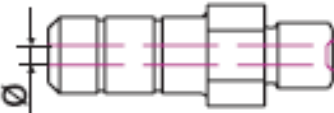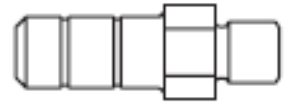
- Air filter

- Spark plugs, Cables, Coil (by the oscilloscope)

- Valves and Exhaust system

- The catalytic converter and lambda sensor should be under operational conditions

- Full diagnosis of the vehicle

If necessary, proceed with the replacement of the faulty components and start the installation only when all the above parts are in good conditions

2.3.1 PROCEDURE FOR THE CALCULATION OF THE CORRECT NOZZLE DIAMETER

The first step of fundamental importance in order to avoid troubles in the phase of autocalibration and during the functioning of the vehicle is to choose the correct dimeter of nozzles of the conversion kit; it is important to follow the procedure hereunder:

1) DIVIDE the <u>displacement</u> of the engine by the number of cylinders: this is the unitary cylinder displacement to which corresponds a determined diameter of the nozzles
(example: 1.600 cc : 4 cylinders = 400 cc -->> Ǿ 2,25 mm)

2) DIVIDE the <u>power</u> of the engine by the number of cylinders: this is the unitary cylinder power to which corresponds a determined diameter of the nozzles
(example: 120 hp : 4 cylinders = 30 hp -->> Ǿ 2,25 mm

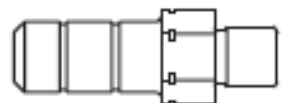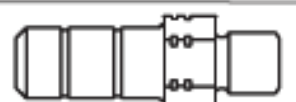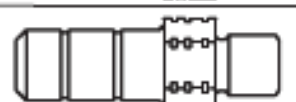3) If BOTH the results (unitary displacement and power) correspond to the <u>same line</u>, the corresponding nozzle must be used

4) if both the results correspond to the same diameter but the values are very NEAR TO THE SUPERIOR LIMITS, it is necessary to use the following nozzle <u>with bigger diameter</u>

5) if the results DO NOT CORRESPOND to the same line, it is always necessary to choose the <u>bigger diameter</u> resulting from displacement or power calculations

NOZZLES Ø / VEHICLE DISPLACEMENT & POWER correspondence table
TABELLA di corrispondenza Ø UGELLI / CILINDRATA E POTENZA VEICOLO

Ø		Engine displacement divided by the number of cylinders / Cilindrata di viso per il N°dei cilindri cm^3		Power divided by the number of cyliders / Dividere la Potenza per il N°dei cilindri CV/Hp	
1,8 mm		0	350	10	20
2,25 mm		>350	500	>20	32
2,5 mm		>500	650	>32	39
2,7 mm		>650	800	>39	46
3,5 mm		>800		>46	

The total displacement and the total Power must be divided dy the number of the cylinders.
A > if the two results belong to the same line, use the corresponding nozzle;
B > if further to the item A, the two results are on the upper boundary, use the bigger hole diameter of the next line;
C > if the two results belong to different lines, use the nozzle with the bigger hole diameter.
Note > the conversion Factors "kW<=>CV" are: 1kW=1,36CV ; 1CV=0,735kW

2.4 INSTALLATION OF THE COMPONENTS

- Install all the components into the engine compartment on the basis of the below indicated 4 (Fig. 4), 6 (Fig. 5) or 8 (Fig. 6) cylinder **diagrams** and relevant instructions

- **Fix the components directly to the body** of the vehicle or, indirectly, by means of the fixing accessories present in the kit

- Set the components **far from the ventilation system** of the vehicle

- **Do not install the components at a distance less than <u>20 cm</u> from the exhaust system** of the engine. If it is not possible, it will be necessary to interpose a <u>metal protection</u> or equivalent material, with a thickness not less than 1 mm.; anyway, the component has to be positioned at a distance of at least **10 cm** from the exhaust system.

- Be sure of **not creating elbows or narrow curves** in the connection of pipes and hoses

Fig. 4: 4 cylinder Installation Diagram

HPI - HIGH PERFORMANCE INJECTION SYSTEM
Schema Installazione / Installation Diagram

4 CYL
LPG / CNG

LPG

CNG

* Stessa lunghezza
* Same length

Fig. 5: 6 cylinder Installation Diagram

HPI - HIGH PERFORMANCE INJECTION SYSTEM
Schema installazione / Installation Diagram

6 CYL
LPG / CNG

CNG

LPG

⚠ * Stessa lunghezza
  * Same length

Fig. 6: 8 cylinder Installation Diagram

HPI - HIGH PERFORMANCE INJECTION SYSTEM
Schema Installazione / Installation Diagram

8 CYL
LPG / CNG

CNG

LPG

⚠ * Stessa lunghezza
  * Same length

2.4.1 PRESSURE REGULATOR: ML04-XJ Lpg or NGV04-XJ Cng

For the installation of the pressure regulator, refer to the follwoing instructions:
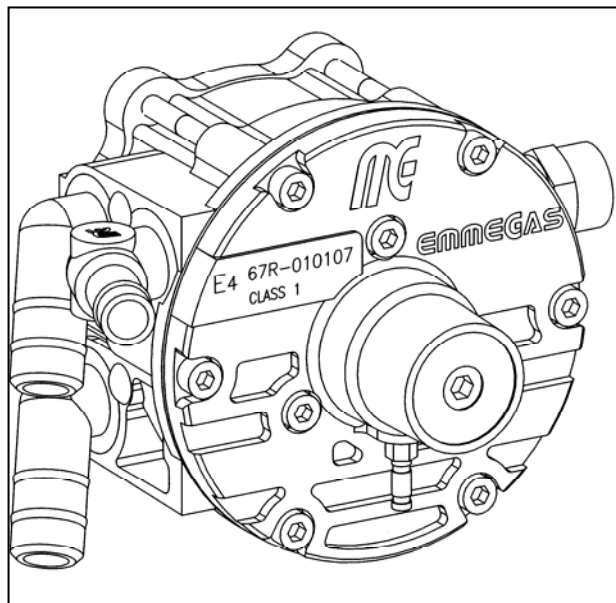
Fig.7: Lpg Pressure Regulator ML04-XJ
(w/o in-built valve version)
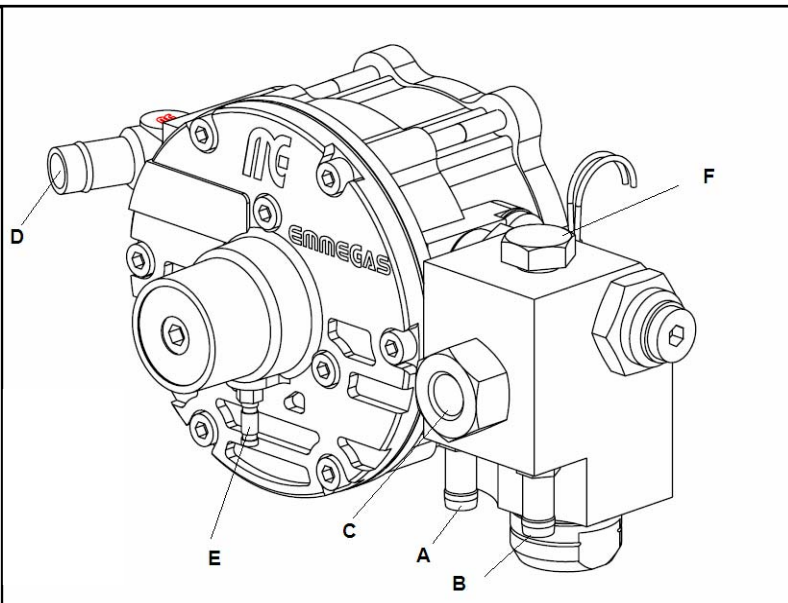
Fig.8: Cng Pressure Regulator NGV04-XJ

- Install the regulator in a position which allows easy **maintenance**

- Fix the regulator to the **body** of the vehicle (not to the engine, not to other components fixed to the engine) and in a **vertical** position, if possible (nose pointing up)

- It is also advisable to position the regulator **below the radiator level**

- **Clean carefully the gas pipes and tank** before the installation, in order to avoid the storage of dirt inside the regulator.

- Place the **water hoses** and fix them by the relevant fastener present in the kit; the other end of the water hose should be connected in parallel with the heating system of the vehicle, by the 'T' connectors; it is important not to form elbows neither narrow curves in those connections

- Connect the **gas pipe** into the relevant gas inlet, using its nipple and bicone present in the kit

- Connect the **gas hose** into the relevant gas outlet, fixing the same by the fastener present in the kit

- Connect the **compensation hose** (ø 4mm) to the compensation connection

- Only for the Cng installation, screw the **Manometer** in its seat by the relevant washer

- If necessary, adjust the pressure on the basis of the following parameters:

| **Lpg Pressure Regulator ML04-XJ**
between 1,1 ÷ 1,2 Bar | **Cng Pressure Regulator NGV04-XJ**
between 1,8 ÷ 1,9 Bar |

and consider the following intervals as correct tolerance pressure range:

| **Lpg between 0,6 ÷ 1,4 Bar** | **Cng between 1,2 ÷ 2,4 Bar** |

To **increase the pressure, turn clockwise** the register on the front cover of the regulator

To **decrease the pressure, turn anti-clockwise** the above mentioned register

2.4.2 LPG SV-06 CUT-OFF VALVE

The SV-06 Lpg Cut-Off valve is:

- <u>incorporated</u> to the ML04-XJ regulator version 4 cylinders, but it is

- <u>separated</u> (and it has to be installed separately) in the 6 and 8 cylinder versions of the regulator.

In the second case, to install the valve, the following indications should be observed:

- Install the valve **before** the reducer, in a position which allows easy maintenance

- Fix the valve to the **body of the vehicle** by its bracket; never fix it to the engine or to some components fixed to the same

- Pay attention to the **gas flow**, as indicated by the arrow printed on the valve

Fig.9: Lpg SV-06 Cut-Off Valve

2.4.3 CNG APUS HIGH PRESSURE VALVE

To install the Cng Apus High Pressure valve, refer to the following instructions:

- Install the valve **between the reducer and the filling valve**, in such a way that the maintenance will be facilitated.

- Fix the valve to the **body of the vehicle** by its bracket; never fix it to the engine or to some components fixed to the same

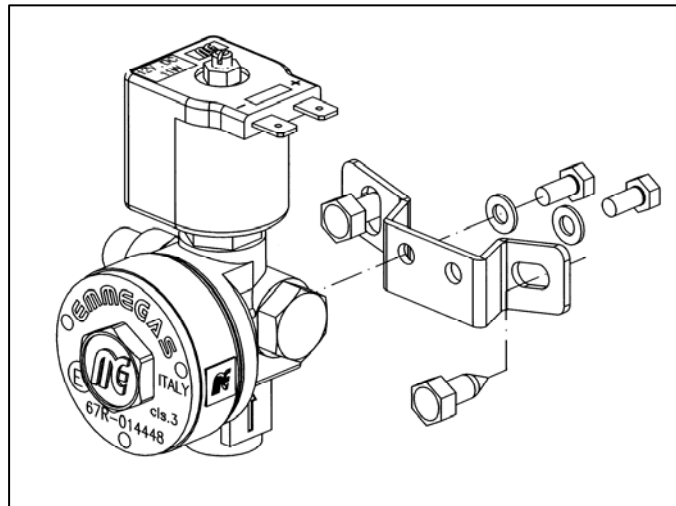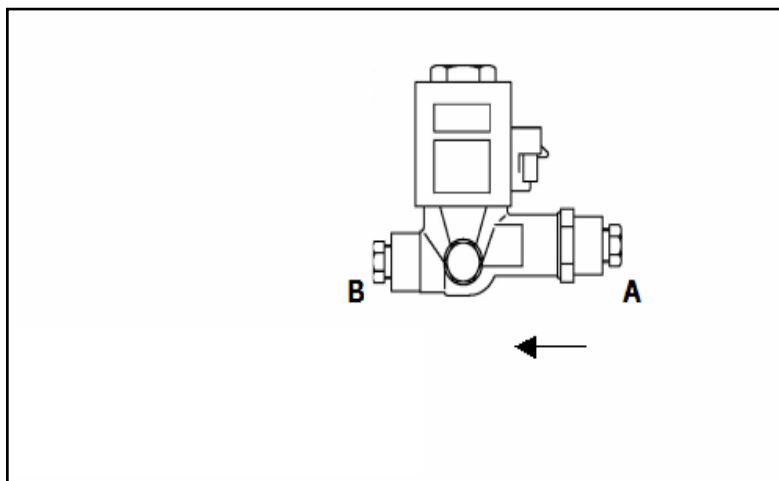- Pay attention to the **gas flow**, as indicated by the arrow printed on the valve

Fig.10: Cng Apus High Pressure Valve

2.4.4 JMU INJECTION RAIL & NOZZLES

The JMU Injection rail is available in 2 / 3 / 4 cylinder versions; for the installation it is necessary to follow the hereunder instructions:
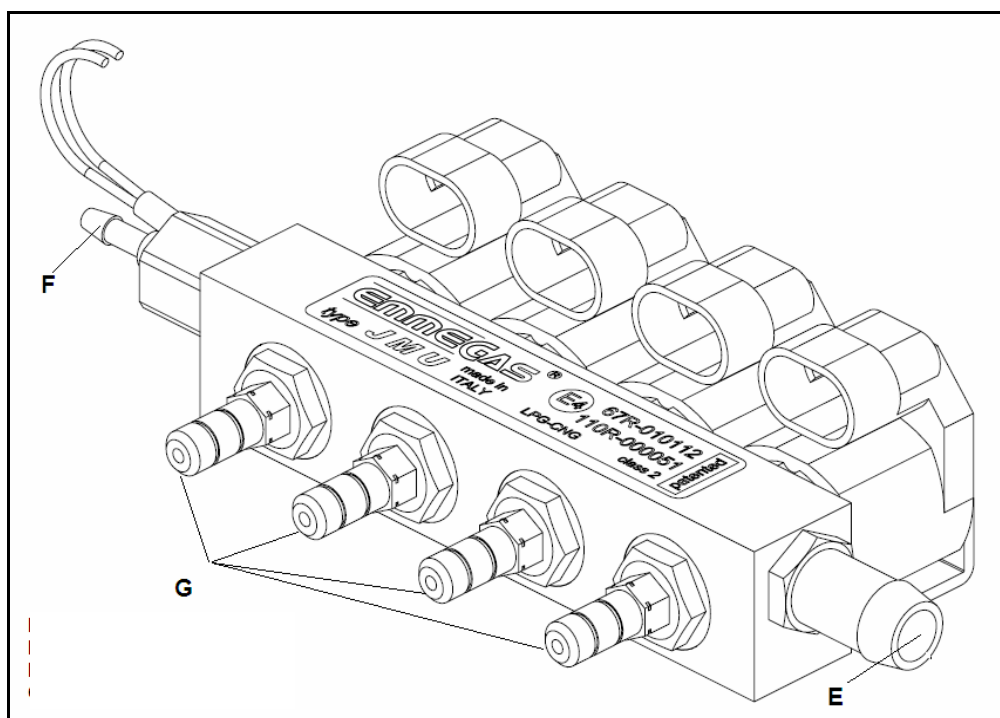
Fig.11: JMU injection Rail

- Position the rail **as close as possible to the intake manifold** of the vehicle, so that the connection hoses (ø internal 6 mm) will be the shortest possible and they can be easily connected to the nozzles without making elbows.

- Install the rail by its brackets and, if possible, in **vertical position** (never put the coils upside-down)

- From the inlet gas side (position 'E') must be connected the **hose coming from the the filter** (ø internal 12 mm); in the opposite side, where there is the pressure sensor (position 'F') it is necessary to connect the **compensation hose** (ø 4 mm) to the Map Sensor (see Fig.11)

- Into the output side of the Rail (position 'G') it is necessary to connect the hoses (internal ø 6 mm) up to the nozzles into the intake manifold: **the distance of each hose must be less than 25 cm** and all 4, 6 or 8 hoses have to be of the **same lenght**

- The injection raíl and the nozzles should be perfectly **fixed** and **connected** by their relevant fasteners

- Install the **nozzles** into the intake manifold **as near as possible to the petrol injectors** and with the **same inclination** as represented hereunder (not at 90°):

Fig.12: nozzles positioning

2.4.5 FILTER FIL-05

For the installation of the filter, follow the hereunder instructions:

- Position:
  o as **close** as possible to the **rail** (no more than <u>25 cm distance</u>) and at the same time
  o not **too far** from the **regulator** (no more than <u>70 cm distance</u>)

- **Do not position the gas hoses too close to the hot parts** of the engine, so that the gas will not be heated

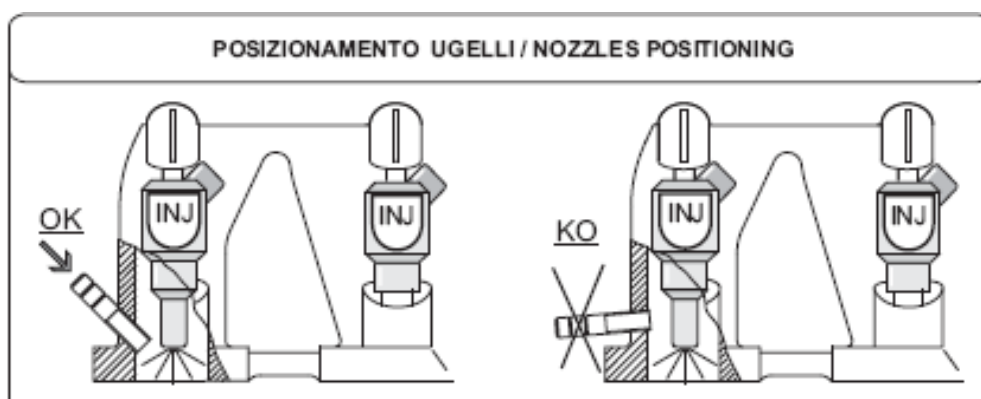- Install the gas hoses as represented on page 8/9: the hose ø 12 mm **from the reducer** in the entrance of the filter (pos. **'A'**) and the tube ø 12 mm **to the raíl** in the exit of the filter (pos. **'B'**)

- Inside the filter there is a **paper cartridge** which has to be periodically **replaced** (see User Manual)
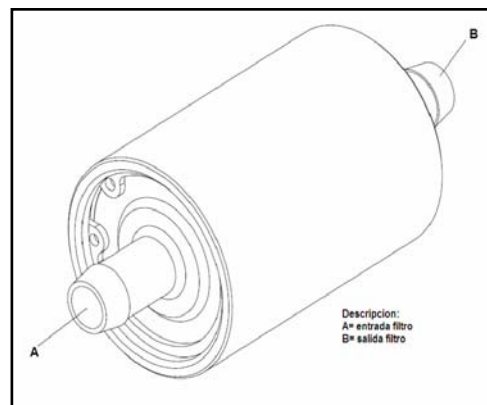
Fig.13: Filter Fil-05

2.4.6 ECU07 CONTROL UNIT
For the installation of the Control Unit, follow the hereunder instructions:

Fig.14: Emmegas ECU07 Control Unit
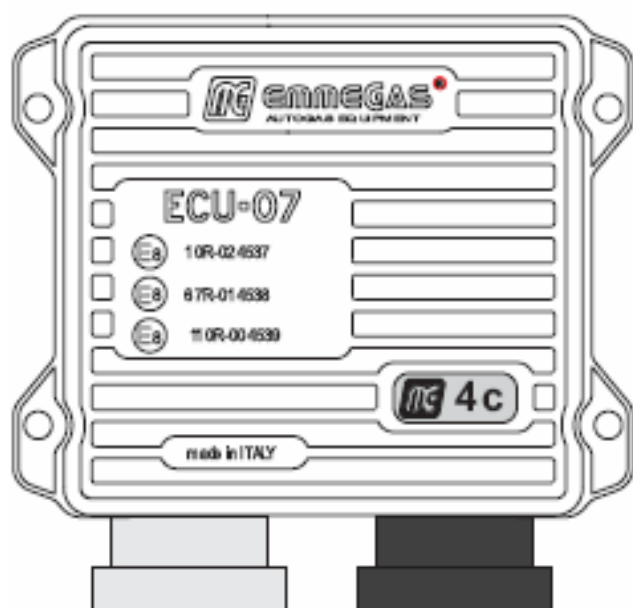
- The ECU07 can be positioned into the **engine compartment** or into the **passenger compartment**

- If installed into the engine compartment, it must be fixed in **vertical position** and as **far as possible from sources of heat**, as, for example, the exhaust of the vehicle, the radiator, etc. and protected from **water infiltrations**

- Position the ECU07 in such a way that it will be easy to operate on the **connectors**

- Insert the connectors inside their lodgments on the ECU07 (grey with grey and black with black) and with their levers totally extracted; once inserted, **lock the connectors** by pressing the levers

2.4.7 MAP SENSOR
For the Map Sensor installation, follow the hereunder instructions:

- Fix the Map Sensor to the **body of the vehicle** (not to the engine or components fixed to the engine) and in an **position higher than the regulator**

- To connect the **entrance P** (position B) directly to the pressure sensor **output of the rail**

- To connect the **entrance V** (position A), to the **compensation connector of the reducer** and to the **vacuum of the intake manifold** (see diagrams page 8 and 9)

Fig.15: Map Sensor

2.4.8 ELECTRIC CONNECTIONS

All the necessary electric connections have to be done with the two different looms of the ECU07 control unit; in the following pages are presented the diagrams for the 4, 6 and 8 cylinder vehicles.

Fig.16: General Electric Diagram (black connector)

WIRE COLOURS CORRESPONDENCE TABLE / TABELLA CORRISPONDENZA COLORE FILI

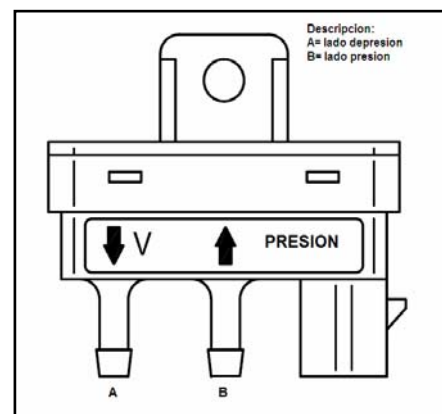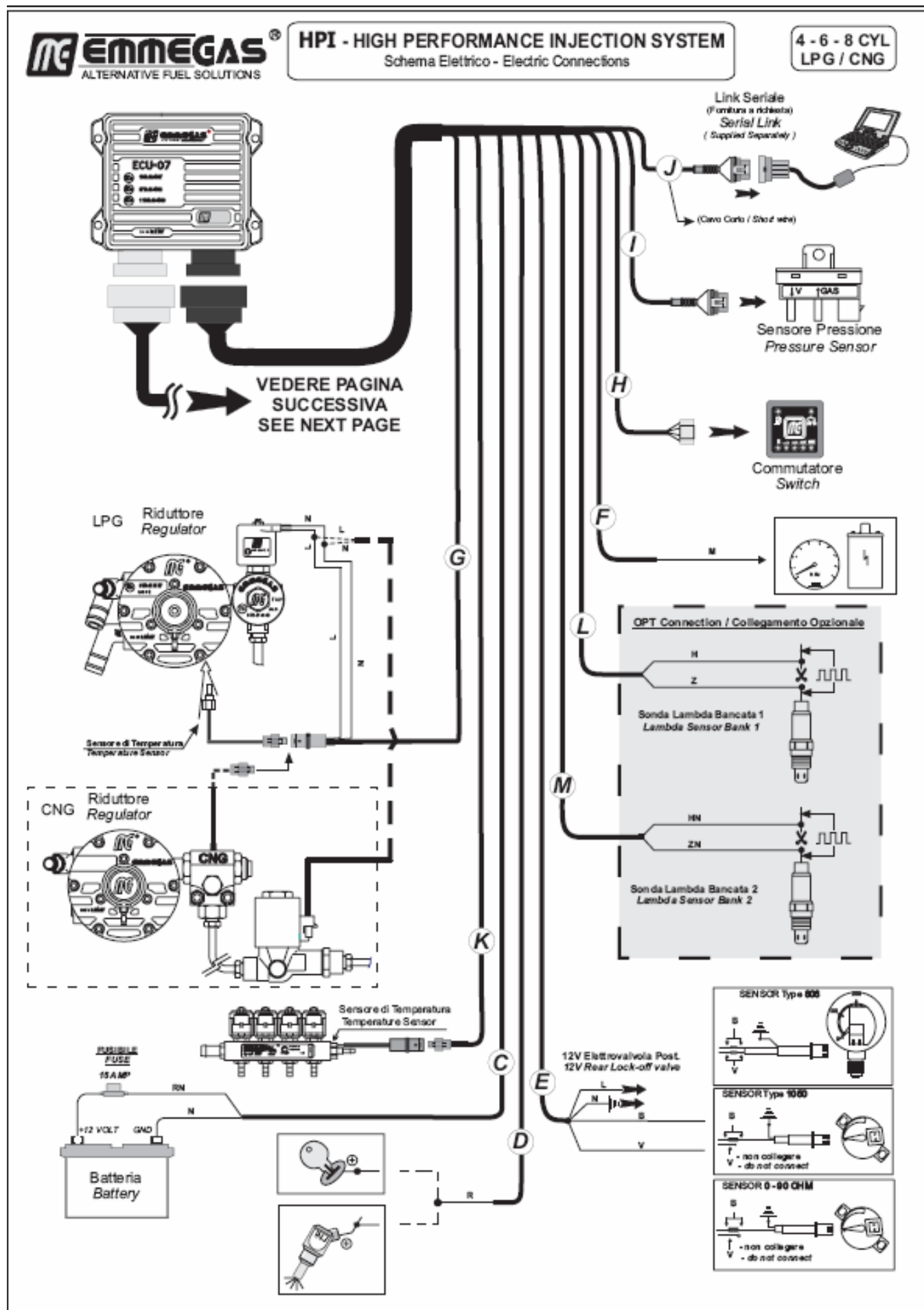|	I	GB	ES	TR	PL	D	F
A	Azzurro	---	--	--	--	---	--
B	Bianco	White	Blanco	Bexaz	Biala	Weiß	Blanc
C	Arancio	Orange	Naranja	Turuncu	Pomarańczowa	Orange	Orange
G	Giallo	Yellow	Amarillo	Sari	Żółta	Geld	Jaune
H	Grigio	Grey	Gris	Gri	Szara	Grau	Gris
I	Blu	Blue	Azul	Mavi	Niebieska	Blau	Bleu
M	Marrone	Brown	Marrón	Kahverengi	Brazowa	Braun	Marron
N	Nero	Black	Negro	Siyah	Czama	Schwarz	Noir
R	Rosso	Red	Rojo	Kirmizi	Czerwona	Rot	Rouge
S	Rosa	Pink	Rosa	Pembe	Różowa	Rosa	Rose
V	Verde	Green	Verde	Yesil	Zielona	Grün	Vert
Z	Viola	Violet	Violeta	Mor	Fioletowa	Violett	Violet
RN	Rosso - Nero	Red - Black	Rojo - Negro	Pembe-Sinai	Czerwona-Czama	Rot - Schwarz	Rouge - Noir
VN	Verde - Nero	Green - Black	Verde - Negro	Yesil-Siyah	Zielona-Czama	Grün - Schwarz	Vert - Noir
MN	Marrone - Nero	Brown - Black	Marrón-Negro	Kahverengi-Siyah	Brazowa-Czama	Braun - Schwarz	Marron - Noir
SN	Rosa - Nero	Pink - Black	Rosa - Negro	Pembe-Siyah	Różowa-Czama	Rosa - Schvarz	Rose - Noir
HN	Grigio - Nero	Grey - Black	Gris - Negro	Gri-Siyah	Szara-Czama	Grau - Schwarz	Gris - Noir
GN	Giallo - Nero	Yellow - Black	Amarillo - Negro	Sari-Siyah	Żółta-Czama	Gelb - Schwarz	Jaune - Noir
ZN	Viola - Nero	Violet - Black	Violeta - Negro	Mor-Siyah	Fioletowa-Czama	Violett - Schvarz	Violet - Noir

HPI - HIGH PERFORMANCE INJECTION SYSTEM
Schema Elettrico - Electric Connections

4 CYL

VEDERE PAGINA PRECEDENTE
SEE PREVIOUS PAGE

ECU-07

⚠ Vedi tabella corrispondenza colore fili pag. succ.
See wire colours correspondence table next page

A ALLA CENTRALINA BENZINA
TO PETROL E.F.I. UNIT

INIETTORI BENZINA
PETROL INJECTORS

B INIETTORI GAS
GAS INJECTORS

Al collettore d'aspirazione
To the intake manifold

⚠ Cilindro "1" Benzina = Cilindro "1" Gas
Cylinder "1" Petrol = Cylinder "1" Gas
etc ....

Fig.17: 4 cylinder Electric Diagram (gray connector)

Fig.18: 6 cylinder Electric Diagram (gray connector)

Fig.19: 8 cylinder Electric Diagram (gray connector)

2.5 CHECKS
Once the installation has been finished, the proper operation has to be checked on both petrol and gas, to check if the petrol correctors work properly and according to the set parameters.

2.5.1 CHECK IN PHASE OF ACCEPTANCE OF THE VEHICLE
" Check the ignition system:
  - correct resistance of the **high tension cables**
  - check if there are any signs of **current discharge** in the ceramic insulator of the spark plugs and if the electrodes are wornout
  - Check the **coils**
" Check the **air filter** (if it is very dirty, replace it)
" Correct operation of the **vehicle on petrol**.
" Diagnostic control of the **car pilot lights** (on the dashboard, all the pilot lights have to be off)
" By the "scan tool" check the **diagnostic** of the vehicle and particularly the fast and the slow **petrol correctors** (within +10% and -10%).

2.5.2 CHECK IN PHASE OF INSTALLATION OF THE KIT
" Check the **positioning of the mechanical components** of the kit to avoid they get in contact with the moving elements of the engine.
" Check the heating **water circuit of the reducer**: the level of the cooling liquid has always to be below the highest point (to avoid air bubbles).
" Check the installation of the **electrical components** is protected from any possible water infiltrations and is far from ant heating sources (do not position the control unit close to the exhaust manifold of the engine).
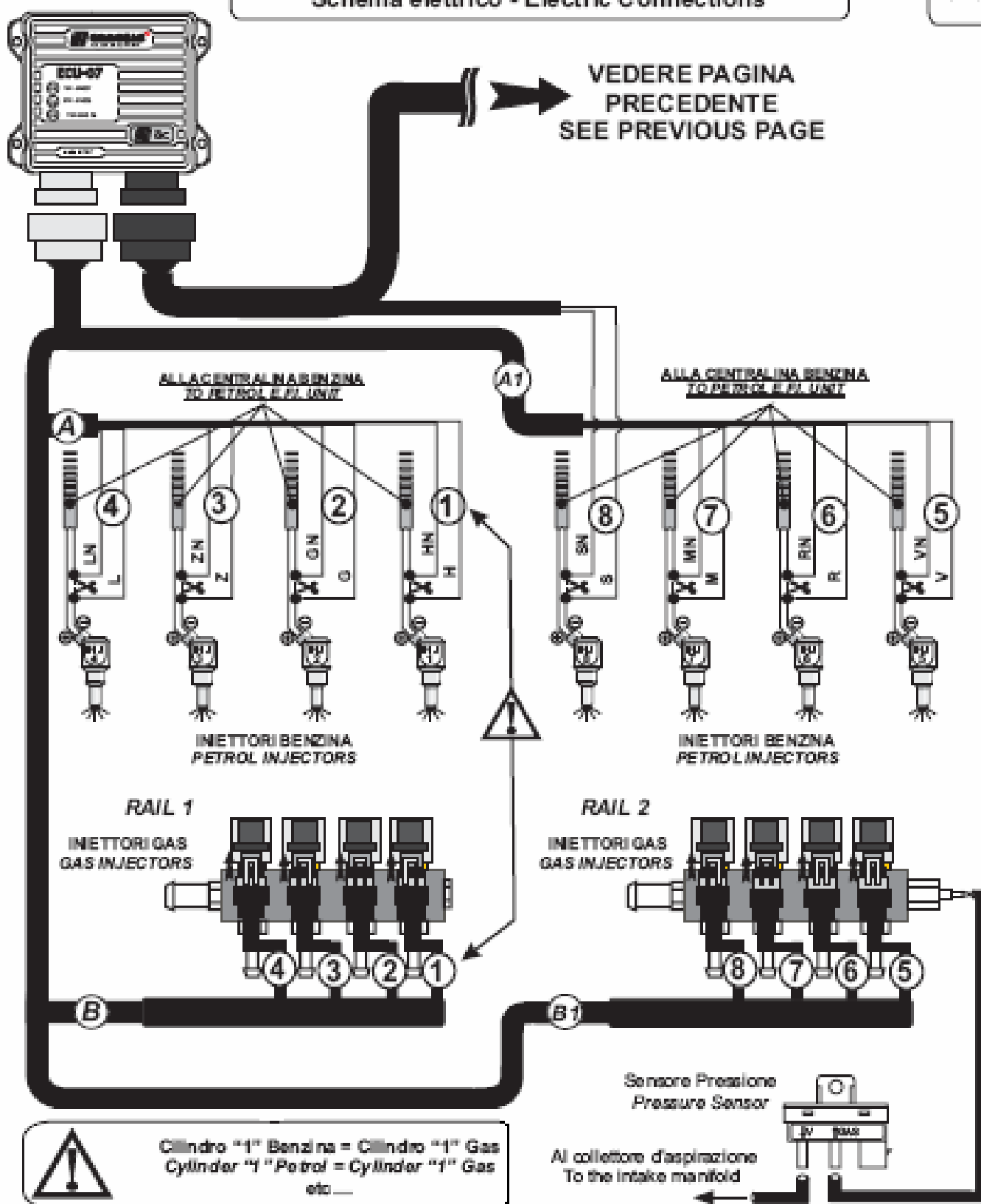" Check the **electrical connections are completely insulated** and they cannot become sources of false contacts or short circuits; check that all the connections have been carried out by a tin welding.
" To place the **nozzles**, drill and tap the manifold into the point which is **closest to the intake valves and to the petrol injectors**
" After having installed the injector nozzles into the intake manifold (plastic/aluminum), check carefully that there aren't any **shavings or residuals** inside them.

2.5.3 FINAL CHECK AT THE END OF THE CONVERSION OF THE VEHICLE
" Check the **temperature of the reducer**, just to be sure there is a good flow of hot water after the engine has been running (and only after the thermostat has opened).
" Check the **electrical connections** are not sources of short circuits or contacts which can cause damage to the wire.
" Check the **high and the low pressure gas** conduits of the installed system do not have any leakages (check the connections and the bands by a Gas Analyzer).
" Verify the **water circuit** of the regulator is watertight.
" Carry out an accurate air purging of the **cooling circuit** of the engine.
" Check the resistance of the **intake manifold**, verifying that no suction nor any disconnections of the vacuum pipes have occured.

2.5.4 CHECK AT THE END OF THE CALIBRATION
" At idle, check the **gas operation** of the engine: it is necessary there aren't any vacuum, thrust nor exhaust..
" Check the **exhaust emissions** by the gas analyzer (CO and HC)
" Check the **Gas calibration map** doesn't affect the parameters of the carburetion on petrol (refer to page no. 13 of the HPI07 programming Manual)

CHAPTER 3: TROUBLE SHOOTING

3.1 INSTALLATION

MALFUNCTIONING	REASON	SOLUTION
Connection not possible with the ECU07	The USB interface is not connected to the ECU07 or to the Laptop	Connect the interface
	The RED or <u>BLACK</u> wires of the ECU07 are not connected to the power or the fuse is out of order	Connect the wires and / or replace the fuse
	The interface 'drivers' have not been downloaded into the laptop	Download and install the 'drivers' by the CD or from the web site www.emmegas.net
	The interface does not communicate with the ECU07	The interface could be damaged, replace it
	ECU07 damaged	Replace the ECU07
During the auto-tuning the following message is visualized: "**Impossible to continue, check installation"**	Diameter of the rail nozzles too big or too small	Install the nozzles of adeguate diameter, to be calculated on the basis of table present on page 7

3.2 PETROL/GAS SWITCH

The functioning of the engine with gas is possible if the hereunder conditions are satisfied:

- achievement of **RPM minimum limit** for the change, page "Configuration", window "<u>Switch at (RPM)</u>" of HPI07 software
- achievement of **Water Temperature minimum limit** for the change, page "Configuration", window "<u>Temperauture (°C)</u>" of HPI07 software
- overcoming of "**Forced petrol time (s)**" into page "Configuration"

MALFUNCTIONING	REASON	SOLUTION
The vehicle **does not switch to gas**	Wrong Cut-injector connections	Check the cut-injector connections.
	The ECU07 diagnostic found some mistakes	Check the eventual signalizations into the 'ERROR' page, solve the trouble and cancel the error
	RPM limit for the change too high	Check the value programmed and decrease the same
	The ECU07 does not receive any RPM signal	Check the connection of brown wire; in case, install a RPM amplifier
	The gas injectors do not open	Replace the rail
After the switch to gas, the **engine turns off**	The tank or regulator cut-off valves do not open	Check the electric connection or replace the cut off valves
	The "Injector Delay" value into Configuration page is too low	Increase the value
After the switch to gas, the **engine switch again to petrol**	Pressure of regulator too low	Dirty Filter
		Adjust pressure of regulator
		Replace Map Sensor

3.3 IDLE OPERATION

MALFUNCTIONING	REASON	SOLUTION
Unstable Idle, RPM increase and decrease	Too different values into the Map	Conform the values of Map into the Idle operation area
At idle and with the air conditioning turned on, the **carburation is lean**	Too low values into the Gas Map	At idle and with the air cond. turned on , increase the values of the Map until the correct carburation is achieved
At idle, the **engine turns off**	Pressure of the regulator too high	At idle, adjust pressure at values indicated on page 10
	Rail damaged	Replace the rail
	Rail replaced but then no new auto-tuning	Proceed with new auto-tuning
At idle, **RPM** is too **high** or too **low**	Air infiltration from vacuum circuit	Check the compensation hoses and connections

3.4 RETURN TO IDLE

MALFUNCTIONING	REASON	SOLUTION
Engine turns off in acceleration after running without accelerations	The carburation is too rich	Decrease the values of the Map into the return-to-idle area
Engine turns off when **RPM decrease** from high values	Too big diameter of nozzles	Replace the nozzle with adequate diameter
Unstable engine functioning	Too big distance between rail and nozzles into the intake manifold, wrong position of nozzles	Check the installation, position again the Rail on the basis of instructions of page 12, in case, position again the nozzles into the intake manifold in a position closer to the valves

3.5 OUT-OF-IDLE RPM THROUGH SLOW ACCELERATION

MALFUNCTIONING	REASON	SOLUTION
Irregular engine functioning; **Gas injection time** is around **3m**s	Lean Carburation; The Rail is functioning into a Map area with no correct values	Increase the values of the Map
The engine **switch to Petrol**, the switch buzzer and flashes	Low pressure of gas in the tank, low quantity of gas in the tank	Fill the tank
	Pressure of regulator too low	adjust pressure at values indicated on page 10

3.6   ACCELERATION AT MEDIUM/HIGH RPM

MALFUNCTIONING	REASON	SOLUTION
Delay between the push of accelerator pedal and consequent acceleration of the vehicle	Carburation Map not correct	Adjust the carburation, proceed with a new auto-tuning
	Too big distance between rail and nozzles into the intake manifold, wrong position of nozzles	Check the installation, position again of the Rail on the basis of instructions of page 12, in case, position again the nozzles into the intake manifold in a closer position to the valves
	Response of the engine not adeguate during the gas functioning	Only for CNG application, check if is available a suitable Timing Advance Processor

3.7   FULL LOAD & LOW RPM

MALFUNCTIONING	REASON	SOLUTION
At low RPM, **the engine runs irregularly**, with jerking.	Extra injections from petrol ECU.	Into "Configuration" page, adjust the 'Sensibility' value
	Only for CNG application and if installed, the Timing Advance Processor is programmed with too advance degrees	Decrease the advance degrees of Timing Advance Processor.

3.8   POWER FUNCTIONING OF THE ENGINE

MALFUNCTIONING	REASON	SOLUTION
The vehicle **looses power**, the carburation is lean	Values of the Map into power area are too low	Increase the values of the Map into the power area and test the vehicle on the road
	Too high gas pressure from the regulator	Repair / Replace the regulator
After a determined period of functioning at full power, the engine **switches to petrol**	Too low gas pressure of the regulator	Proceed with following checks: - gas filter, - pressure of regulator - gas level into the tank - possible elbow or narrow curves into the low and high pipes and hoses
Fuel consumption out of usual values	Some areas of the Map are too rich	Decrease the values of the Map into the area of interest

3.9 VARIOUS

MALFUNCTIONING	REASON	SOLUTION
Switch not illuminated	The fuse of red/black wire is burnt	Replace the fuse with another of same capacity
	Wire of the switch is damaged	Repair the wire
	The Switch is damaged	Replace the Switch
The vehicle **runs in a irregular way**, sometimes the engine turn off and driving is not proper in all conditions	One gas injector (or more) is not working properly	Check the rail and, if necessary, repair it or replace it
		Replace the ECU07
	Wrong electric connection between Cut-Injector wire and corresponenting Gas Injector wire (1 with 1, 2 with 2, etc)	Check the electric connection and the correspondance
At all RPM level, the **carburation is too rich** and there is no way to adjust it	The rail is damaged	Replace the Rail
	Too high gas pressure from the regulator	Adjust the pressure (see page 10) and, if not possible, replace the regulator

3.10: ERRORS DIAGNOSTIC

The errors visualization of HPI07 sequential ECU is organized as follows:

- **Error List:** shows the list of all the errors, pointing out if they are current errors or memorized (occurred during a previous running with gas)

#	Device name	Present	Stored
Err 00	INJ_1	---	---
Err 01	INJ_2	---	---
Err 02	INJ_3	---	---
Err 03	INJ_4	---	---
Err 04	INJ_5	---	---
Err 05	INJ_6	---	---
Err 06	INJ_7	---	---
Err 07	INJ_8	---	---
Err 08	MAP SENSOR	---	---
Err 09	MAP1 SENSOR	---	---
Err 10	TEMP_VAPOR	---	---

Emmegas ECU07 - 1.03.48 - 21/04/2008
Tabs: Monitor, Configuration, Petrol parameters, Compensations, Lambda / Auto Tuning, Map Tuning, Errors, Overview

Erase Errors | Show Freeze Frame

Emmegas ECU07 - 1.03.00 - 24/07/2007
Tabs: Monitor, Configuration, Compensations, Lambda / Auto Tuning, Map Tuning, Errors, Overview

Signal name	Value
Gas inj time	0,00 (ms)
Petrol inj time	2,67 (ms)
Time between 2 injections Petrol	137,17 (ms)
Correction time	0,00 (ms)
Rpm period	870 (rpm)
Absolut colletctor pressure	1,12 (bar)
Collector - Reducer pressure	0,68 (bar)
Lambda sensor voltage	1,12 (V)
Lambda 2 sensor voltage	0,93 (V)
Level gas visualized on switching	3,74 (V)
Level gas read	3,73 (V)
Reducer temperature	-62 (°C)
Injectors gas temperature	46 (°C)
Hardware temperature	0 (°C)

☑ Enable acoustic signal | Erase Errors | Back to Error Page

- **Show Freeze Frame**: the ECU07 pass to the Freeze Frame modality showed aside;
In the Freeze Frame modality is presented the list showing the status of the vehicle during the last error (instead of the list of errors)