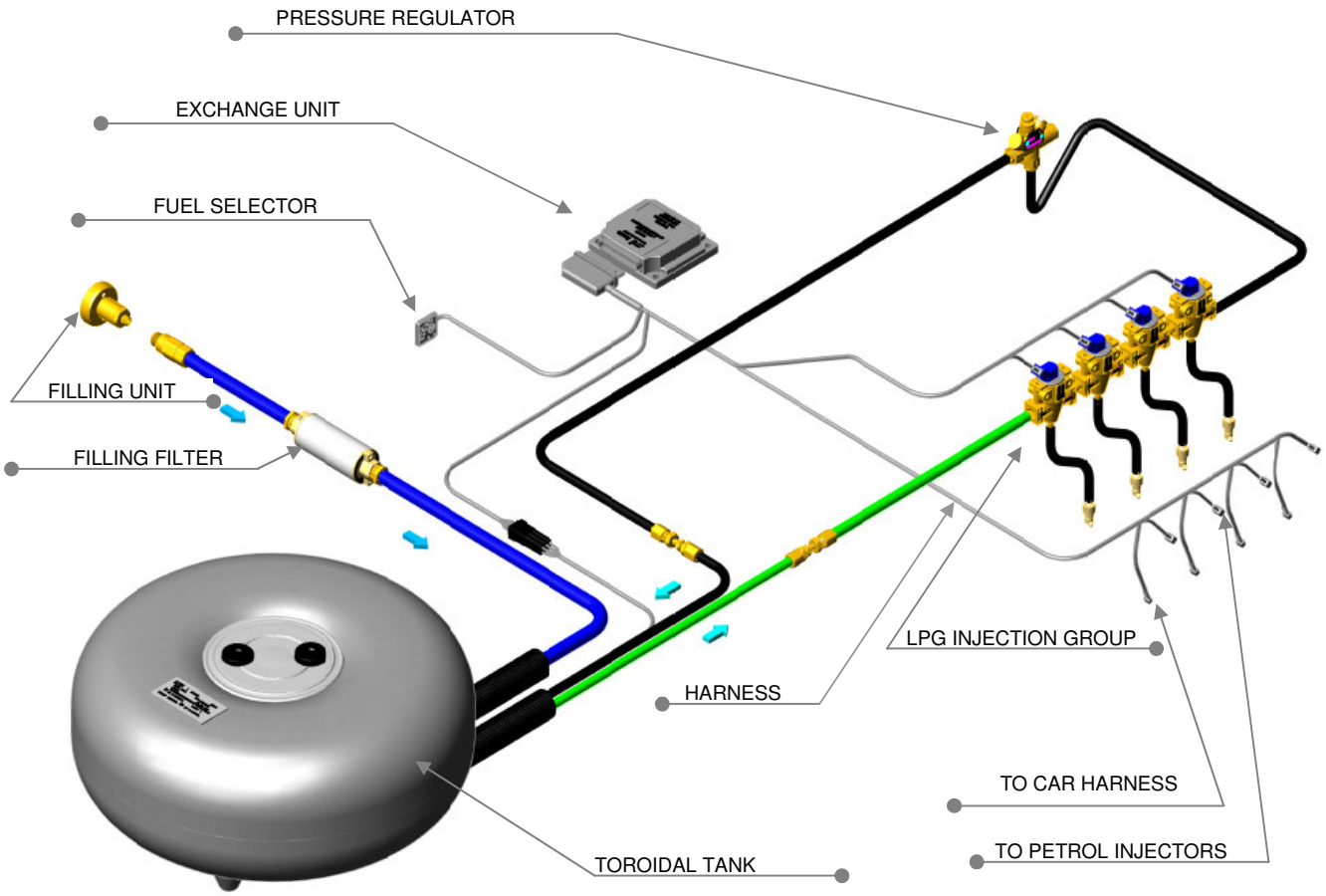
ICOM JTG® SYSTEM GENERAL SCHEME



1. LPG LIQUID INJECTION GROUP

1.1 Electro injector

The electro injectors must be apply to the collector of aspiration in a next position to the heading in line with the other mechanical organs climbed on the collector of aspiration.

The electro injectors will owe the one to be connected with the other so that to form a *rail* of feeding for the circuit of the LPG.

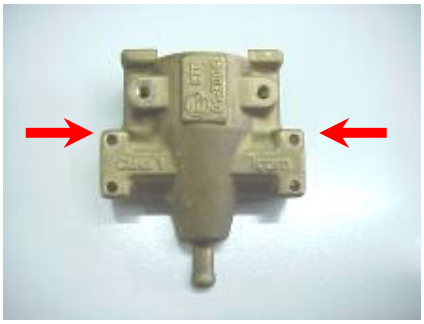
The connection between them is made with some special injectors holder constituted by a body in brass opportunely worked for containing the electro injector, to allow the assemblage of the links of connection and to be able to have fixed on the collector of aspiration.

The number of the electro injectors has to correspond to the number of the cylinders of the motor.

1.2 Injector holder

The injectors holder can be of two different typologies:

⇒ Type ***I 02-D***



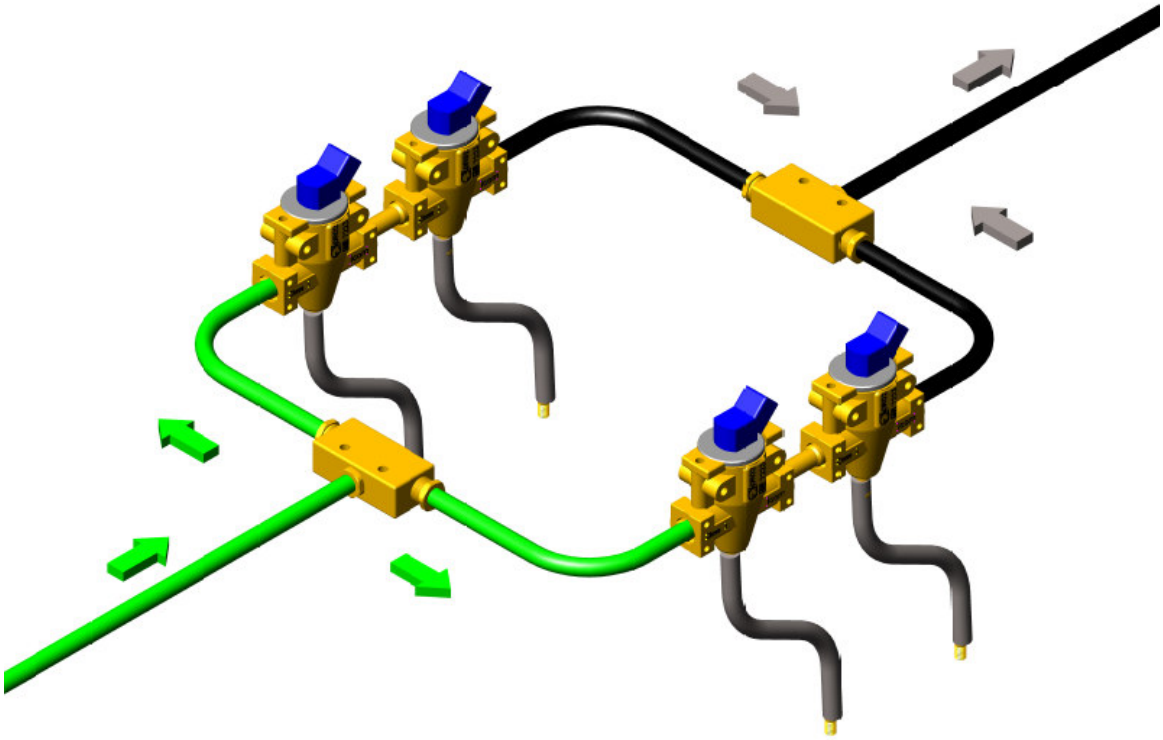
This typology allows the connection of the links in horizontal sense (transversal), perpendicular to the axle of the injector as holder pointed out by the arrows in the photo

The connection among the injectors holder type ***I 02-D*** can be performed with the flexible pipe 3/16" or, in alternative, with astute rigid links of various lengths as those in the following photos.

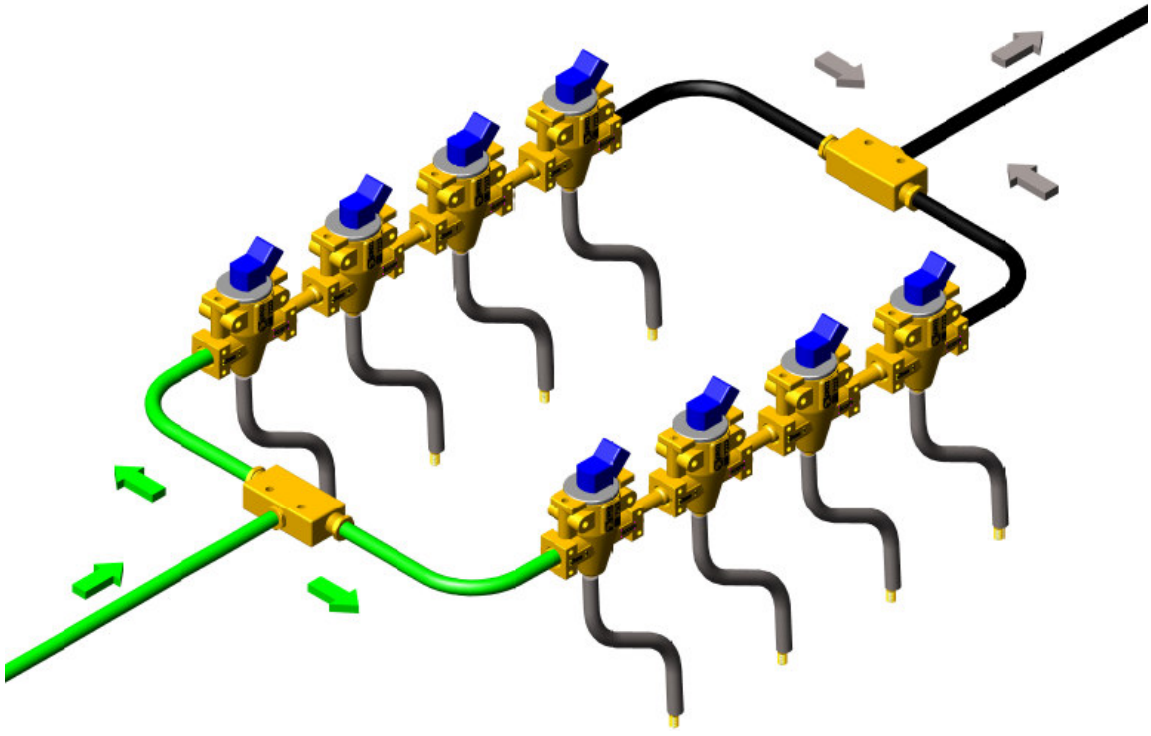
⇒ Type ***I 02-V***

This typology allows the connection of the links in sense tilted to V as pointed out by the arrows, with the flexible pipe from 3/16."

3 way connection – scheme:



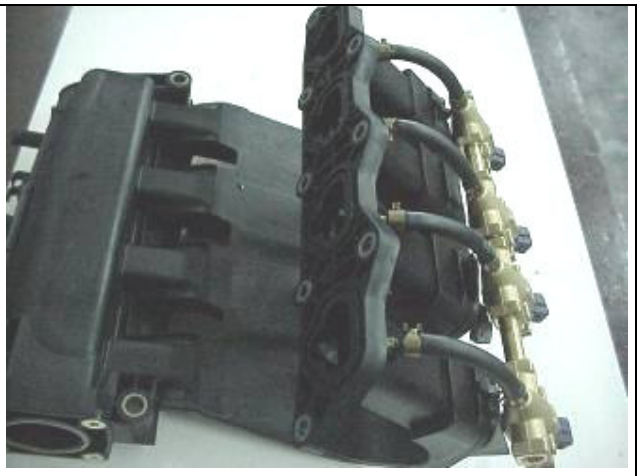
Scheme n°1 – injectors positioning for 4 cylinder boxer engine



Scheme n°2 – injectors positioning for V 6,8, 10 and 12 cylinder engine

Examples of application of the injectors group:

Peugeot 206



Renault Modus

Toyota Yaris

Chevrolet Thaoe

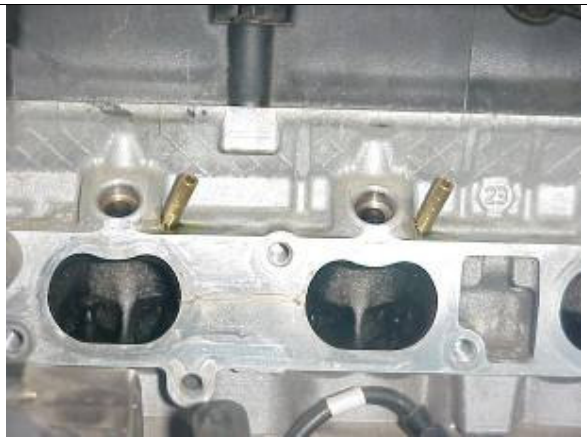
Porche Cheyenne S

Nissan Almera

Audi A3

Daewoo Matiz

Fiat Bravo



Ford Focus

Opel Astra

Honda Civic

1.3 Inlet manifold perforation and usable nozzles

a) Let's perforate the inlet manifold making attention to orientate Lpg flow (Lpg nozzle) in the same direction of petrol flow injected by the petrol injectors. Lpg flow have to not go in contact whit inlet manifold.

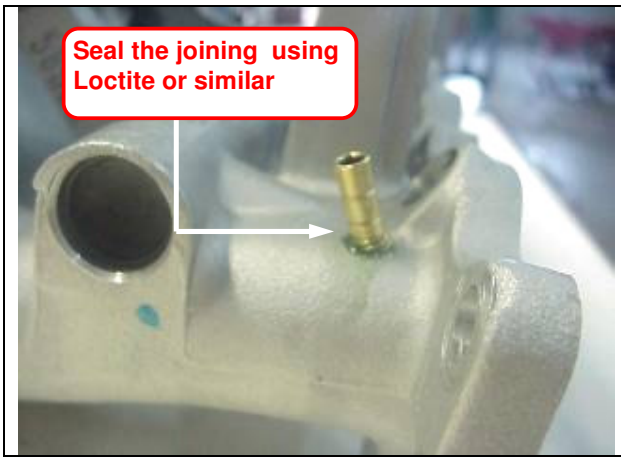
b) Let's insert the proper nozzle as per the application:

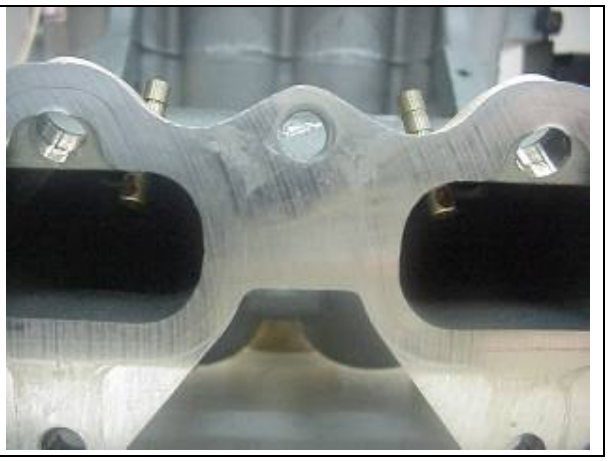
⇒ **straight nozzle**

The straight nozzle in the picture have to be oriented in the same direction of petrol flow

⇒ **angular nozzle**

The angular nozzle in the picture give possibility to orientate the LPG flow in the same direction of petrol flow but using a drilling axe on the in. manifold different to the LPG flow direction.



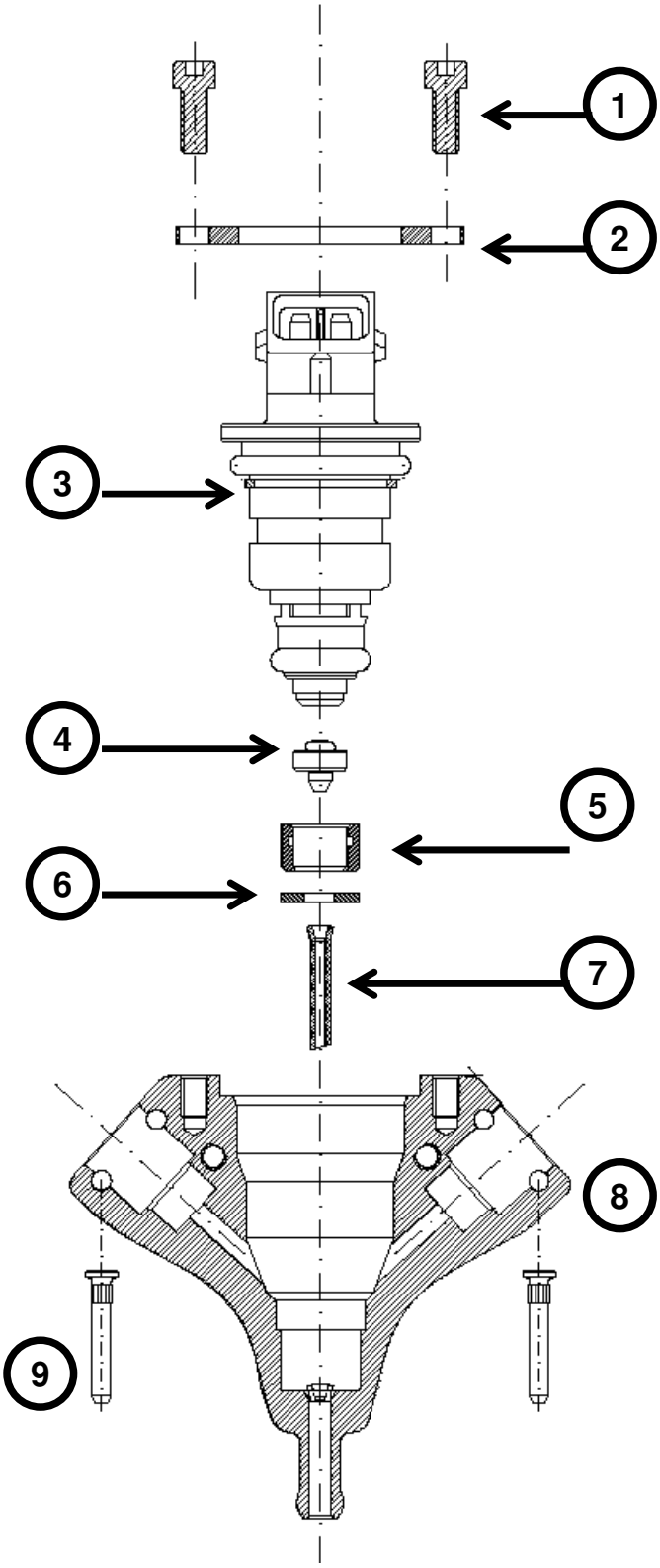


ATTENTION:

- ⇨ In case of **PLASTIC INLET MANIFOLD**, leave the Rilsan plastic hose exit from nozzle about 15 mm.
- ⇨ In case of **ALLUMINIUM INLET MANIFOLD**, leave the Rilsan plastic hose exit from the straight nozzle about 2 mm. and 5mm from the angular nozzle.

2mm

1.4 Assemblage of calibrator and injector in the injector holder



1. *Injector fixing screw*
2. *Injector fixing plate*
3. *Injector*
4. *calibrator*
5. *Calibrator holder ring*
6. *gasket*
7. *Rilsan's pipe*
8. *Injector holder*
9. *Fixing pin for flexible hose*

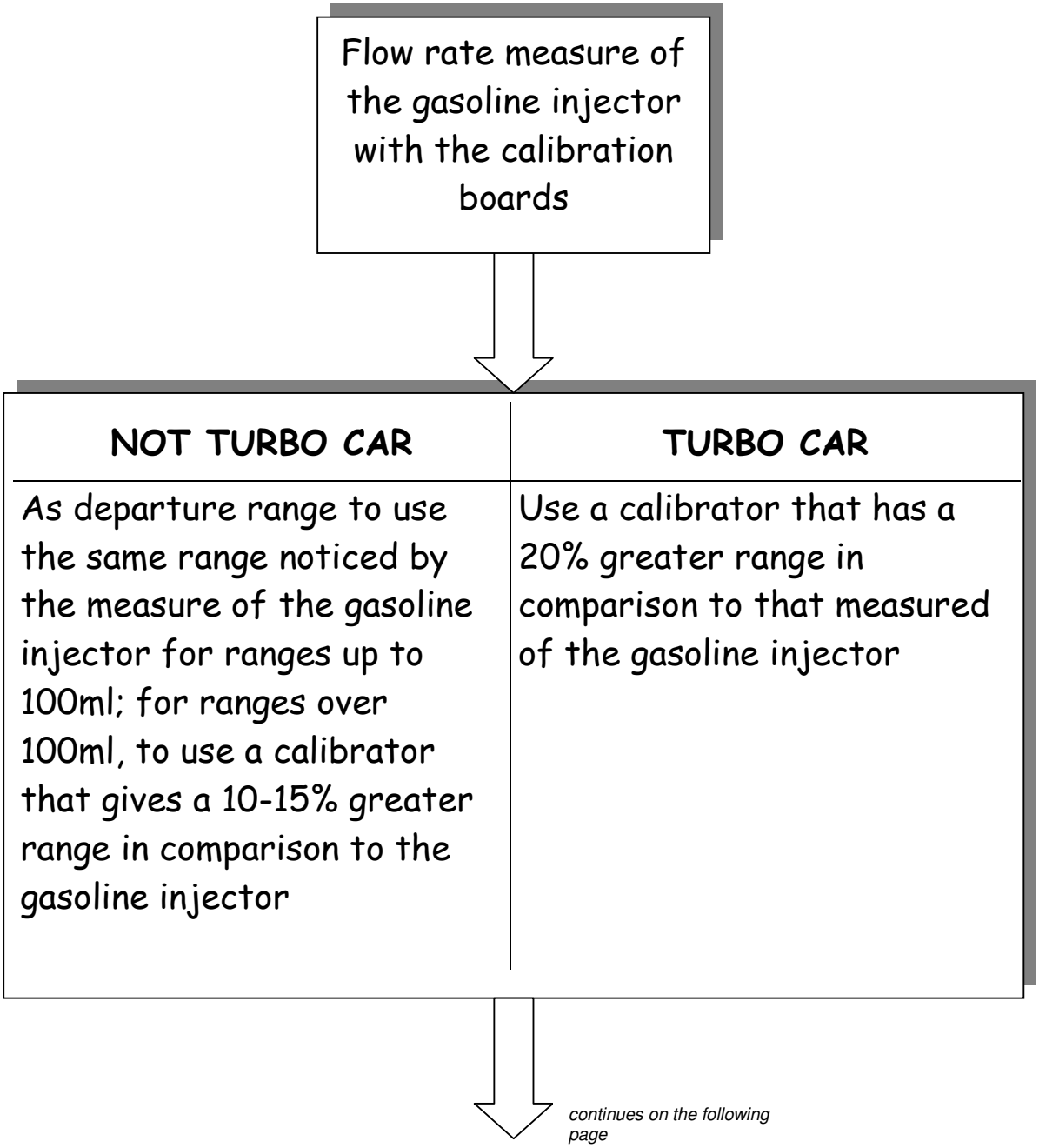
- Insert the Risaln's pipe (7) in the injector holder
- Insert the gasket (6)
- Insert the calibrator (4) in the calibrator holder ring (5) and, use the special rubber band (you see photo) or a pliers for seiger rings, to insert all in the injector holder (8)
- Lubricate all the or-ring and to climb on the injector (3) on the injector holder (8) rotating it during the assemblage so that not to damage the or-ring
- Mount the plate (2) and fix it with the screws (1) with power of fixing equal to 15*Nm*

Rubber band for calibrator's extraction

1.5 Choice of the calibrator

With the purpose to effect a correct calibration, before installing the LPG system and to choose the calibrator, check the real values of the long and short term probes of the car in the gasoline formality, why the ICU of the car keeps in mind of the factors of deterioration of the car. This verification is necessary for the consideration of the fact that the system has to be installed on cars with strategies of management and different kilometers covered.

For the choice of the calibrator follow the phases described in the following scheme:



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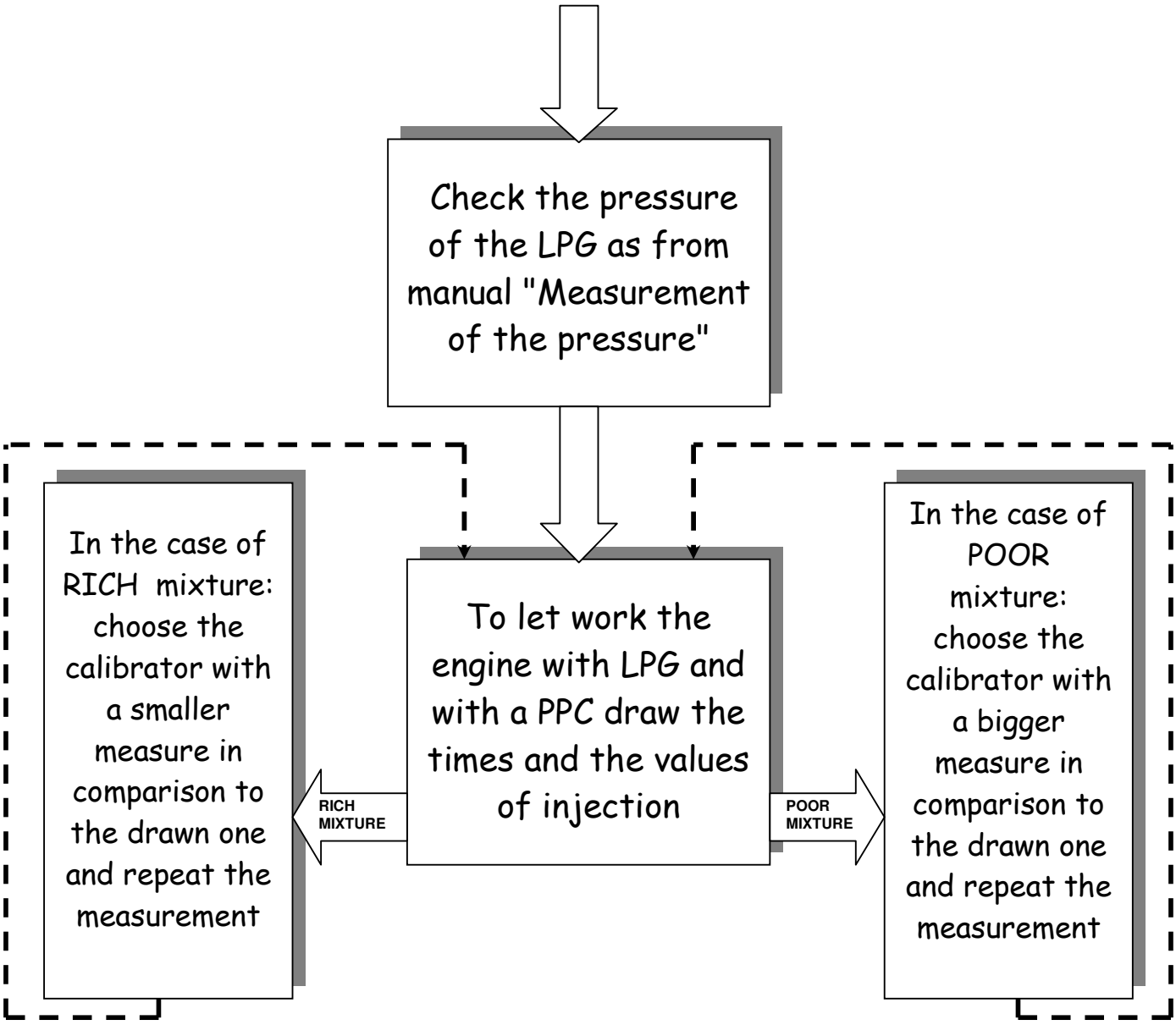


During the measurement of the injection times you have to consider also the **pressure of the LPG into the tank**:

● for pressures between 7,5 and 9 bar the injection times have to be the same of the one as when the car runs with gasoline;

● for pressures higher than 9 bar the injection times have to be indicatively 5% less ;

● for pressures less than 7,5 bar the injection times have to be indicatively 5% higher;

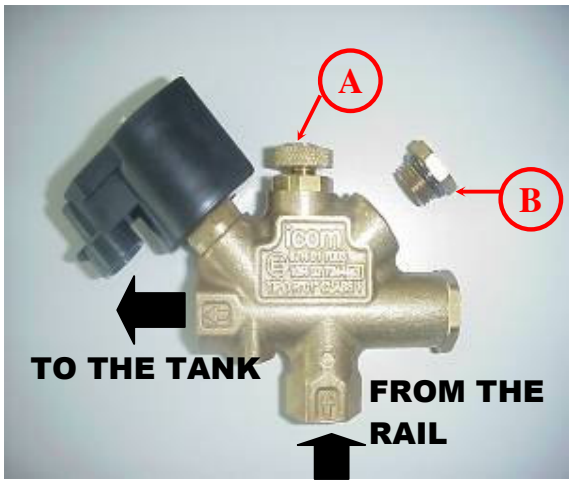
ATTENTION: ***first LPG calibration have to be done 2 – 3% less than petrol injection parameter because of the air contained into the LPG tank:***
Ex.: in case of petrol injection timing about 3 ms, Lpg injection timing have to be approx 3.1 ms.

2. Pressure Regulator

The pressure regulator **R01** have to be installed on the return hose which connect the LPG injector rail whit the Lpg tank.
The regulator is necessary to have a constant ΔP into the LPG housing for maintaining Lpg in liquid phase into the LPG injectors rail.

2.1 Pressure measuring

1. Be sure that manual faucet A is closed
2. Unscrew the bolt B on the top of the regulator
3. Screw in the manometer extremity on the regulator.
4. Open the manual faucet A.
5. Crank on the engine, let engine run in "switching" condition, crank off the engine and check pressure value a first time.
6. Crank on the engine and check pressure value a second time after JTG system switched on LPG.



For a proper functioning of the system is necessary to have a delta pressure measured whit engine running on Lpg and engine not running about ***3 bar*** (2.5 min – 3.5 max) :

3. ICU

The electronic control unity of exchange **UCE01** must be installed **away from heat sources and sheltered from water.**

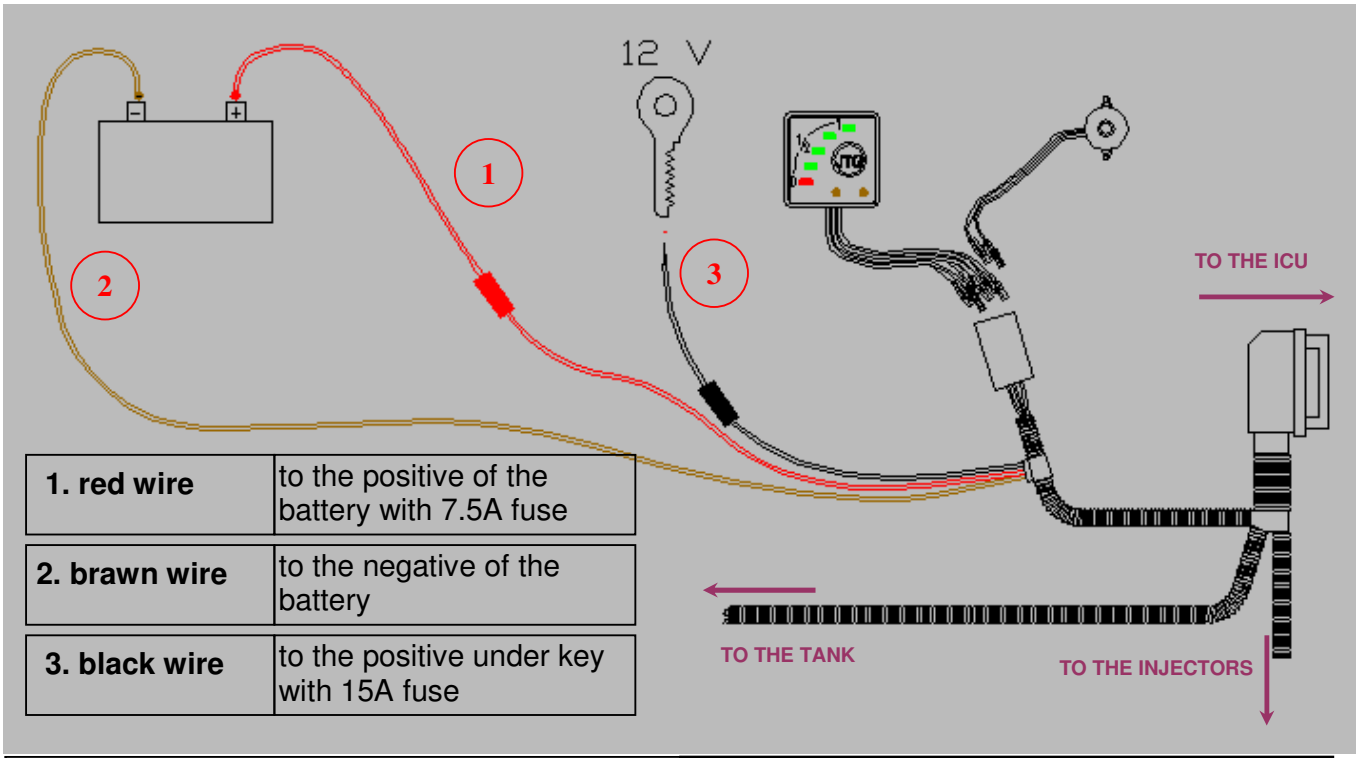
In the following photos are shown two examples of application on BMW 520 and Audi A3.

4. COMMUTATION SWITCH

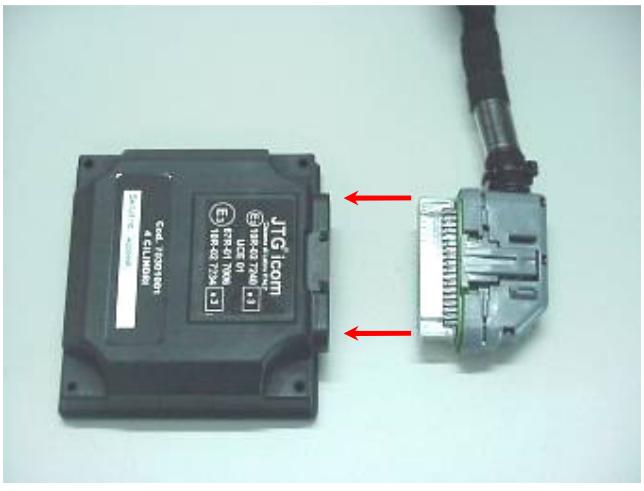
The commutation switch **ILC01** of the ***JTG*** is of redoubts dimensions and therefore easy to position it on the cockpit of the car.
In the following photos are shown two examples of application on Lexus RX300 and Alpha 147.

5. HARNESS

A single and simple harness connects all the components of the system.
The connections between the harness and the various components happen in rapid and simple way since all the various terminals of the wiring are provided of connectors type auto and conforming to the normative and European directives, besides the simplicity of insertion, they also guarantee extreme safety in every single connection.

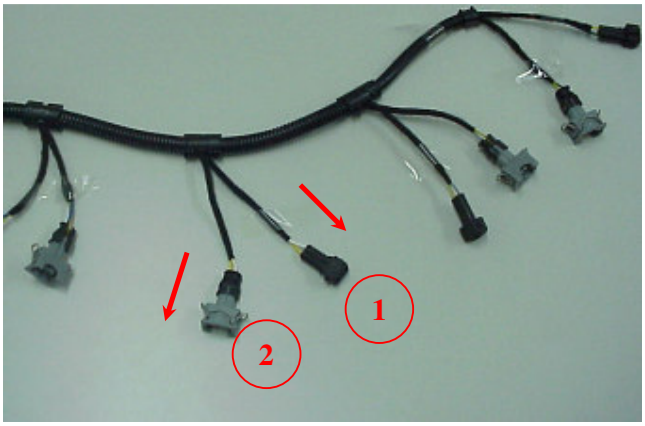


1. red wire	to the positive of the battery with 7.5A fuse
2. brawn wire	to the negative of the battery
3. black wire	to the positive under key with 15A fuse



Insert the 36 pin connector on the ICU JTG® ICOM

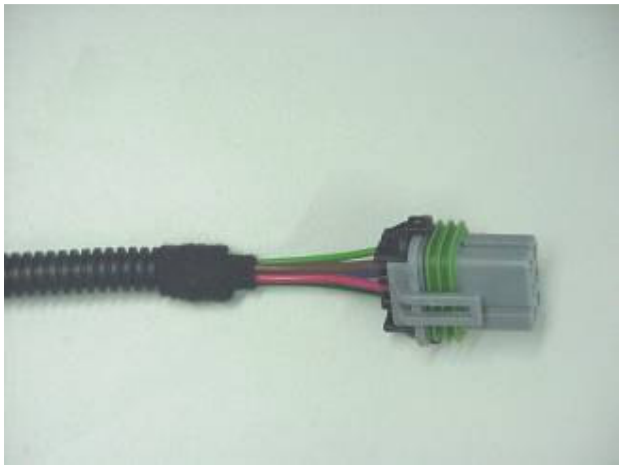
Green connectors to insert on the LPG injectors



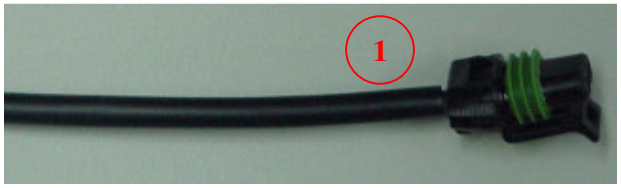
Connections to be effected on the system of the car: black connector (1) to the wiring car; gray connector (2) to the gasoline injector

IMPORTANT:
1. during the connections verify to maintain the same order of the connections of the injectors gasoline / LPG
2. verify that polarity is correct, otherwise to insert the special one **"polarity inverter"**

WARNING:
in the case of 5 cylinders car you have to use the 6 cylinders harness watching out for leave the first connector (pointed out by the arrow in photo) not connected

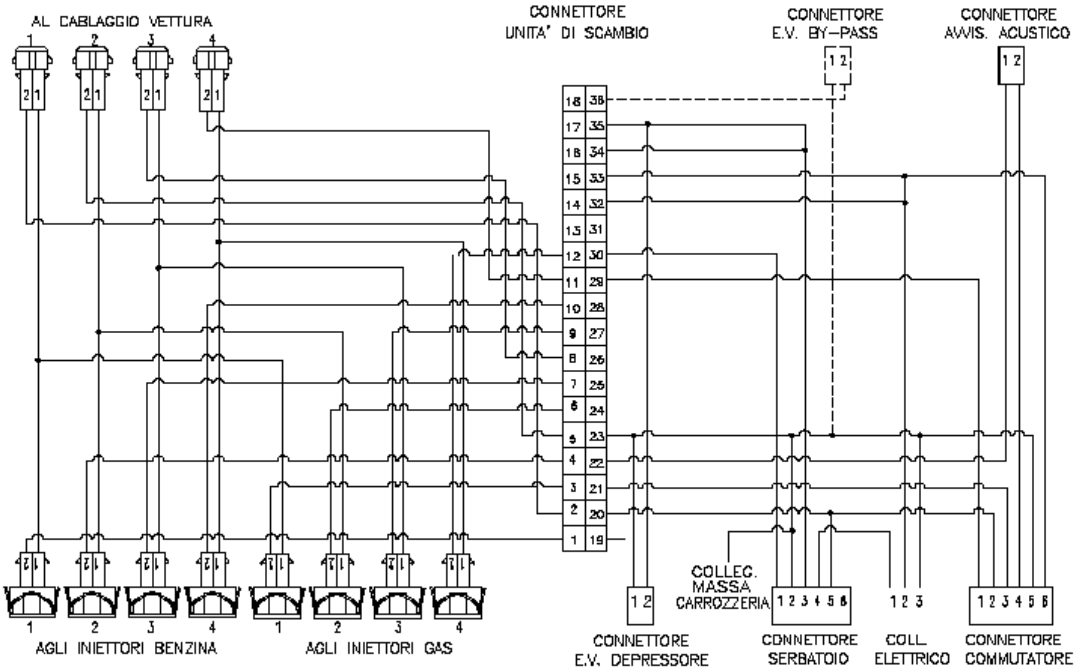


To connect to the connector coming from the tank



In the version **without by-pass**, connect the connector **1** to the electro valve depressor

In the version **with by-pass** connect the connector **1** to the electro valve depressor; the connector **2** to the electro valve of the by-pass of the pressure regulator



CONNETTORE UNITA' DI SCAMBIO				
Pos.	Cont.	Funzione Pin	Colore	mm2
1	IN	PIN PER INIETTORE BENZINA N°1	VIOLA/BIANCO	0.5
2	OUT	PIN DRIVER INIETTORE N°1 ECU BENZINA	VIOLA	0.5
3	IN	PIN PER INIETTORE GPL N°1	VIOLA/NERO	0.5
4	IN	PIN PER INIETTORE BENZINA N°2	ARANCIO/BIANCO	0.5
5	OUT	PIN DRIVER INIETTORE N°2 ECU BENZINA	BIANCO	0.5
6	IN	PIN PER INIETTORE GPL N°2	ARANCIO/NERO	0.5
7	IN	PIN PER INIETTORE BENZINA N°3	GRIGIO/BIANCO	0.5
8	OUT	PIN DRIVER INIETTORE N°3 ECU BENZINA	GRIGIO/BIANCO	0.5
9	IN	PIN PER INIETTORE GPL N°3	GRIGIO/NERO	0.5
10	IN	PIN PER INIETTORE BENZINA N°4	MARRONE/BIANCO	0.5
11	OUT	PIN DRIVER INIETTORE N°4 ECU BENZINA	MARRONE	0.5
12	IN	PIN PER INIETTORE GPL N°4	MARRONE/NERO	0.5
13				
14				
15				
16				
17				
18				
19	IN	PIN INPUT SEGNALE VELOCITA' MOTORE	BIANCO/NERO	0.5
20	IN	PIN INPUT SEGNALE LIVELLO	VERDE	0.5
21	OUT	PIN USCITA SPIA DIAGNOSTICA	ARANCIO	0.5
22	OUT	PIN UNSCITA AVVISATORE ACUSTICO	ROSA	0.5
23	END	PIN MASSA DALL'UNITA' DI CONTROLLO UCE01	MARRONE	0.75
24				
25				
26				
27				
28				
29	IN	PIN INPUT SCELTA CARBURANTE	GIALLO	0.5
30	IN	PIN PER SEGNALE PRESSONE SULLA MANDATA	VERDE/NERO	0.5
31				
32	IN	PIN PER ALIM. UNITA' DI CONTROLLO UCE01	NERO	0.75
33	IN	PIN PER ALIM. UNITA' DI CONTROLLO UCE01	NERO	0.75
34	OUT	PIN PER ALIM. POMPA GPL E VALV. DI MANDATA	BLU	0.75
35	OUT	PIN PER ALIM. POMPA GPL E VALV. DI MANDATA	BLU	0.75
36	OUT	ELETTROVALVOLA DI BY-PASS		

CONNETTORE COMMUTATORE				
Pos.	Cont.	Funzione Pin	Colore	mm2
1	IN	PIN INPUT SCELTA CARBURANTE	GIALLO	0.5
2	IN	PIN INPUT SEGNALE DI LIVELLO	VERDE	0.5
3	OUT	PIN USCITA SPIA DIAGNOSTICA	ARANCIO	0.5
4	OUT	PIN MASSA CONNET. AVVISATORE ACUSTICO	NERO/MARRONE	0.5
5	END	PIN MASSA DELL'UNITA' DI CONTROLLO UCE01	MARRONE	0.75
6	IN	PIN PER ALIM. UNITA' DI CONTROLLO UCE01	NERO	0.75

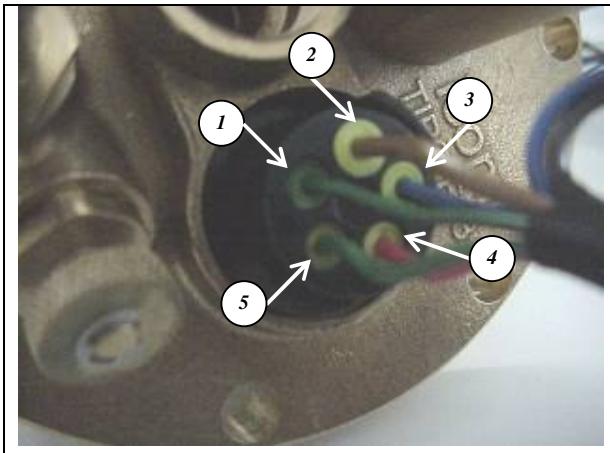
CONNETTORE SERBATOIO				
Pos.	Cont.	Funzione Pin	Colore	mm2
1	IN	PIN SEGNALE PRESS. SULLA LINEA DI MANDATA	VERDE/NERO	0.5
2	END	PIN MASSA CONNETTORE SERBATOIO	MARRONE	0.75
3	OUT	PIN PER ALIM. CONNETTORE SERBATOIO	BLU/NERO	0.75
4	IN	PIN INPUT 12V BATTERIA	ROSSO	1
5	IN	PIN INPUT SEGNALE LIVELLO	VERDE	0.5
6				

CONNETTORE E.V. DEPRESSORE				
Pos.	Cont.	Funzione Pin	Colore	mm2
1	IN	PIN POSITIVO	MARRONE	0.75
2	OUT	PIN NEGATIVO	BLU	0.75

CONNETTORE AVVISATORE ACUSTICO				
Pos.	Cont.	Funzione Pin	Colore	mm2
1	OUT	PIN USCITA AVVISATORE ACUSTICO	ROSA	O.5
2	IN	PIN MASSA CONNET. AVVISATORE ACUSTICO	NERO/MARRONE	0.5

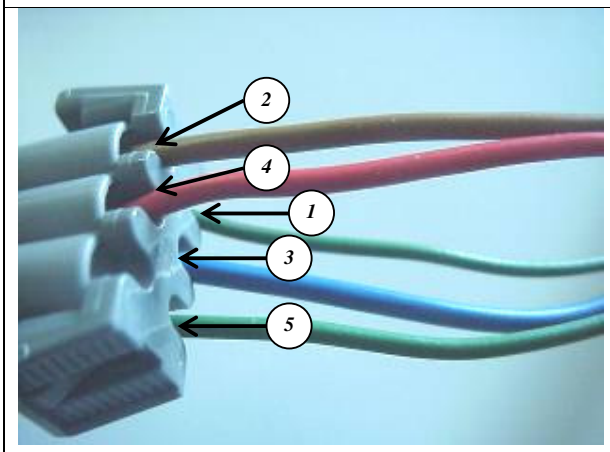
COLLEGAMENTO ELETTRICO				
Pos.	Cont.	Funzione Pin	Colore	mm2
1		POSITIVO 12V BATTERIA	ROSSO	0.5
2		COLLEGAMENTO SOTTOQUADRO	NERO	2.5
3		MASSA BATTERIA	MARRONE	2.5

CONNETTORE E.V. BY PASS				
Pos.	Cont.	Funzione Pin	Colore	mm2
1		PIN ALIMENTAZIONE CONNETTORE E.V. BY-PASS	BLU	0.75
2		PIN MASSA DELL'E.V. DEPRESSORE	MARRONE	0.75



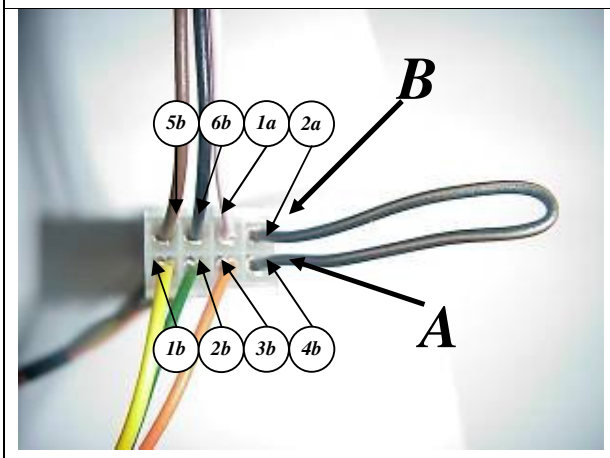
Electrical connector on the flange (out side)

TANK CONNECTOR				
Pos.	Cont.	Funzione Pin	Colour	mm2
1	IN	PIN SEGNALE PRESS. SULLA LINEA DI MANDATA	GREEN/BLACK	0.5
2	END	PIN MASSA CONNETTORE SERBATOIO	BROWN	0.75
3	OUT	PIN PER ALIM. CONNETTORE SERBATOIO	BLUE/BLACK	0.75
4	IN	PIN INPUT 12V BATTERIA	RED	1
5	IN	PIN INPUT SEGNALE LIVELLO	GREEN	0.5



Electrical connector between front harness and rear harness (tank)

ELECTRICAL CONNECTOR BETWEEN FRONT HARNESS AND REAR HARNESS				
Pos.	Cont.	Funzione Pin	Colour	mm2
1	IN	PIN SEGNALE PRESS. SULLA LINEA DI MANDATA	GREEN/BLACK	0.5
2	END	PIN MASSA CONNETTORE SERBATOIO	BROWN	0.75
3	OUT	PIN PER ALIM. CONNETTORE SERBATOIO	BLUE/BLACK	0.75
4	IN	PIN INPUT 12V BATTERIA	RED	1
5	IN	PIN INPUT SEGNALE LIVELLO	GREEN	0.5



Commutation switch and buzzer connector

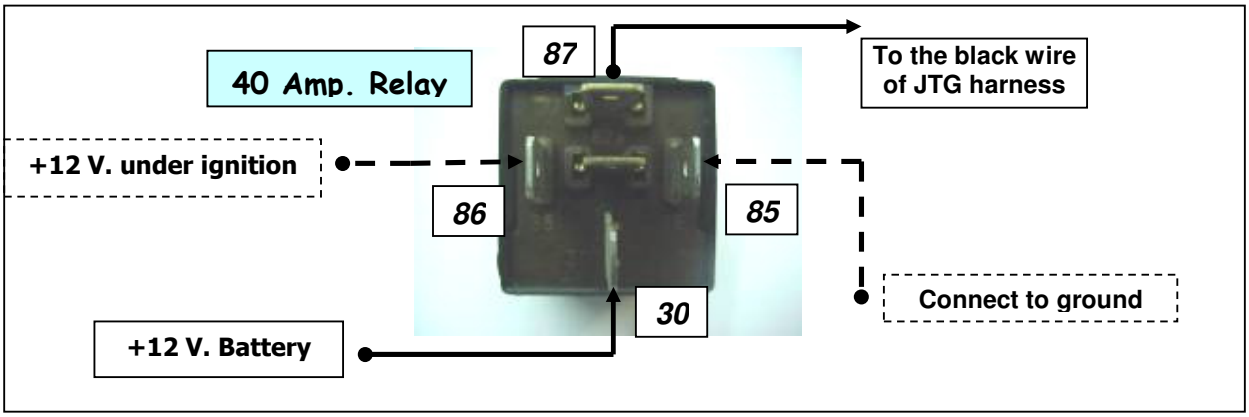
BUZZER CONNECTOR				
Pos.	Cont.	Funzione Pin	Colour	mm2
1a	OUT	PIN USCITA AVVISATORE ACUSTICO	PINK	O.5
2a	IN	PIN MASSA CONNET. AVVISATORE ACUSTICO	BLACK/BROWN	0.5

COMMUTATION SWITCH CONNECTOR				
Pos.	Cont.	Funzione Pin	Colour	mm2
1b	IN	PIN INPUT SCELTA CARBURANTE	YELLOW	0.5
2b	IN	PIN INPUT SEGNALE DI LIVELLO	GREEN	0.5
3b	OUT	PIN USCITA SPIA DIAGNOSTICA	ORANGE	0.5
4b	OUT	PIN MASSA CONNET. AVVISATORE ACUSTICO	BLACK/BROWN	0.5
5b	END	PIN MASSA DELL'UNITA' DI CONTROLLO UCE01	BROWN	0.75
6b	IN	PIN PER ALIM. UNITA' DI CONTROLLO UCE01	BLACK	0.75

Let's connect the switch respecting wires colours

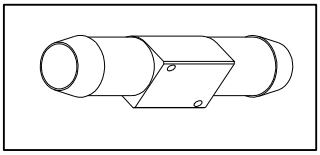
⇨ ***"Under ignition" connection***

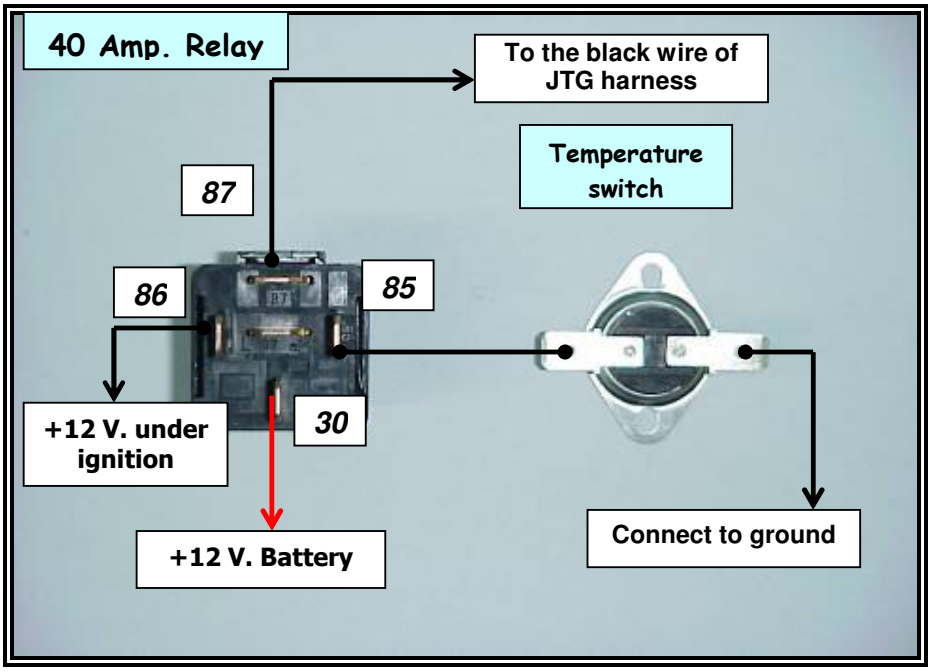
Connect under ignition wire (black wire) of JTG system using a relay to guaranty a correct power supply coming from the battery.
To make proper connection let's considerate following scheme.



⇨ ***Temperature switch connection*** – "**OPTIONAL**"

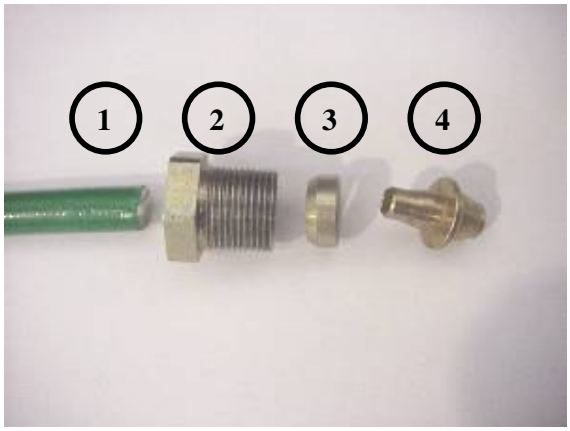
Temperature switch will allow to the JTG system to switch on LPG only when engine temperature arrive to the same value of temperature switch setting (40° C) .
The switch contact is normally open and will close when engine temperature arrive to 40°C. Once the contact close the ICU will start to count 55 sec for switching to Lpg.
The contact will back open once the engine temperature decrees until 30°C.
Temperature switch have to be fixed on one of the water hose for cabin heating using the brass nipple showed into the side picture.





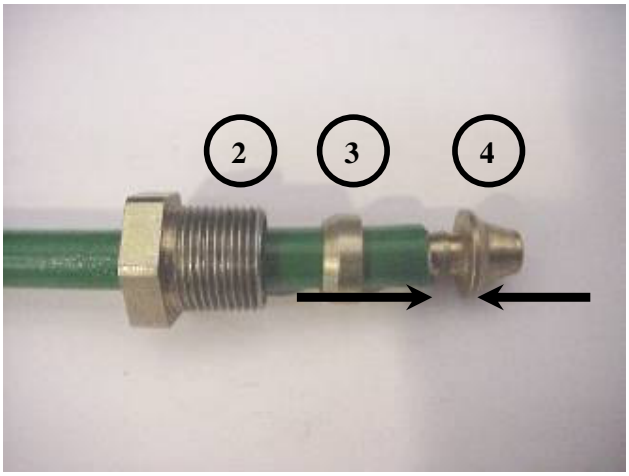
7. HOSES AND CONNECTORS

The connection between the different hoses could be don with the connectors that you can the assemblage.



In the photo are shone the different components of the connection :

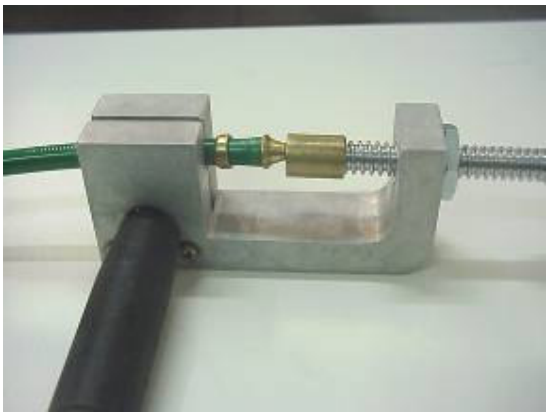
1. flexible hose
2. connector
3. fixing ring
4. conical connector



- cut the flexible hose (1) at the desired length, being careful to do a clean and precise cut
- insert in the sequential: the connector (2), the fixing ring (3), the conical connector (4)

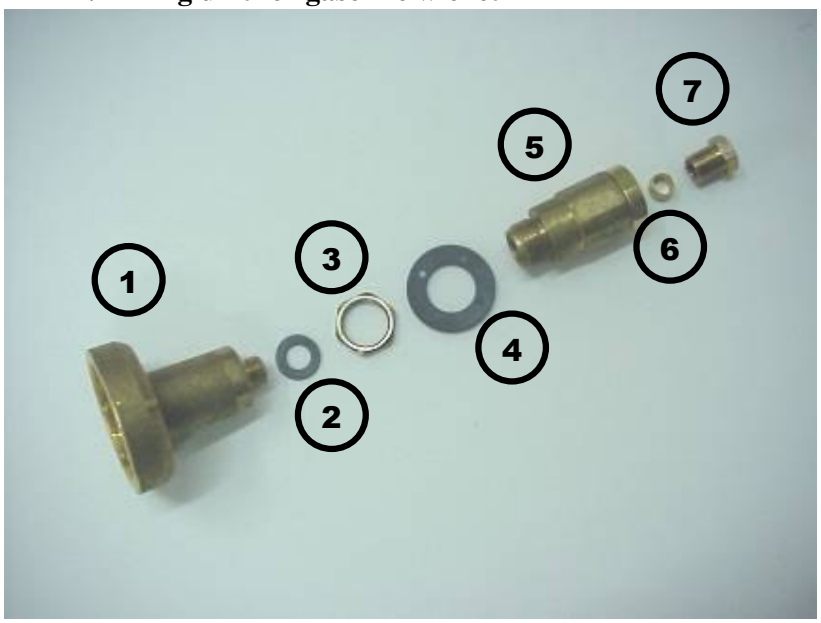
- bring the conical connector (4) in contact with the cut extremity of the flexible hose, as shown in the photo, before to clamp the prima shut the junction through the ring (3)

- through the special pliers of clamping shown in photo, bring the fixing ring in contact with the conical connector on the extremity in the sequence shown by the following photos



8. FILLING UNITS

⇒ **filling unit for gasoline wicket**



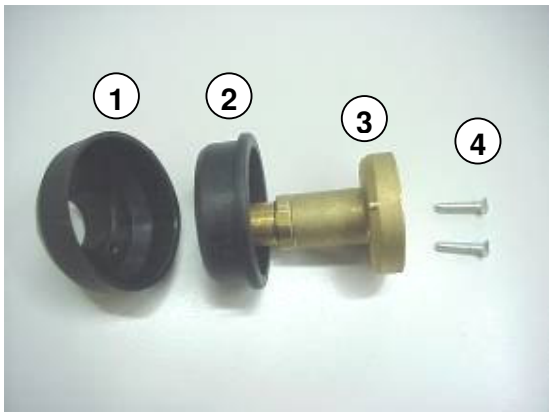
Components of the filling unit kit:

1. filling unit
2. holding gasket between filling unit and connector mounted on the car
3. M18x1 nut for the fixing of the connector on the car
4. washer
5. connector for filling unit
6. conical connector for Ø8 cooper pipe
7. connector for the fixing of theØ8 cooper pipe

Correct sequence for the assemblage of the filling unit on the car:

- *DRIL THE PART OF THE CAR BODY IN THE INSIDE OF THE GASOLINE WICKET FOR THE INSERTION OF FILLING UNIT KIT*
- *ASSEMBLA THE EXTREMITY OF THE FILLING PIPE ON THE CONNECTOR (5) THROUGH THE CONICAL CONNECTOR (6) AND THE CONNECTOR (7)*
- *MOUNT THE CONNECTOR (5) ON THE CAR BODY*
- *INSERIT THE ESTATE WASHER (4) ON THE PART FILLETED CONNECTOR*
- *SCREW THE NUT (3) ON THE CONNECTOR (5)*
- *SCREW AND FASTEN THE FILLING UNIT ON THE CONNECTOR WHEN YOU FILLING UP THE TANK*

⇒ **filling unit for bumper**



Description of the components of the filling unit for bumper:

1 e ***2*** → plastic ring nuts
3 → filling unit
4 → screws for the fixing of the filling unit on the plastic ring nut

In the photo is shone where the car bumper has to be when the plastic nut will fix on it

Fix the filling unit with the screws and close it with the protection cup

In the case in which is not possible or however not convenient the application of the filling unit on the bumper of the car, for the fixing can be used a bracket as in photo, also included in the kit

8.1 Filtering system on the filling hose

During filling operation LPG will be filtered from pollutions by the filter showed into the picture. The filter have to be installed on the filling hose and it will protect from pollution LPG pump and all the component contained into the LPG tank.

Filter installation scheme:

1 The filter have to be installed on the filling hose between filling unit and tank.

2. Arrow on the filter indicate the way of installation:
from the filling unit → to the tank

3. To fix hoses on the filter let's use connections contained into the filter kit.

9. POSITIONING OF THE TANK

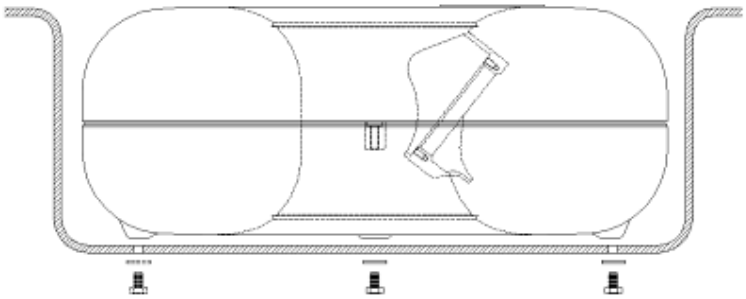
⇒ **Toroidal F86 I.I. JTG tank**

Both the typologies of tanks foreseen for the JTG system have supports welded on the tank. Such supports allow the technician to mount the tank in a rapid and safety way guaranteeing a strong anchorage directly on the bottom of the car.

The toroidal and cylindrical tank contains in there inside the pump, therefore they have to be mounted that the pump will be comes on the correct position to favor the suction lift of the LPG during the accelerations with the vehicle in movement.

For the toroidal tank, fix the tank with the identification plate positioned transversal in comparison to the car, so that the pump comes to be revolt to the back of the car.

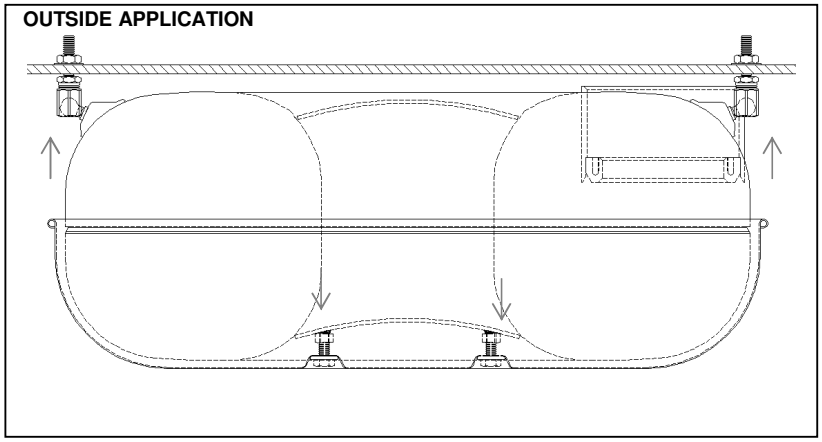
For the correct assemblage of the tank on the car, position the tank in the point in which it must be fixed. Underline the exact positioning of the foots and drill the ground of the car. At this point bring to coincide the holes effected with the foots of the tank and to stare with the screws

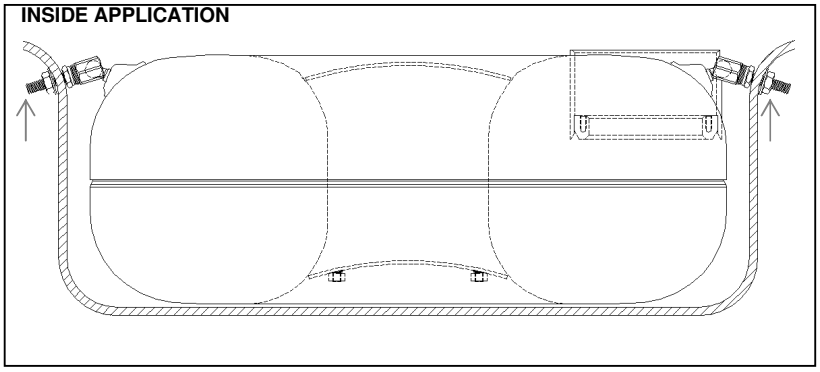


Position the foot in correspondence of the holes and to fix the tank on the car through the 3 screws

⇒ **Toroidal F86 GS JTG tank**

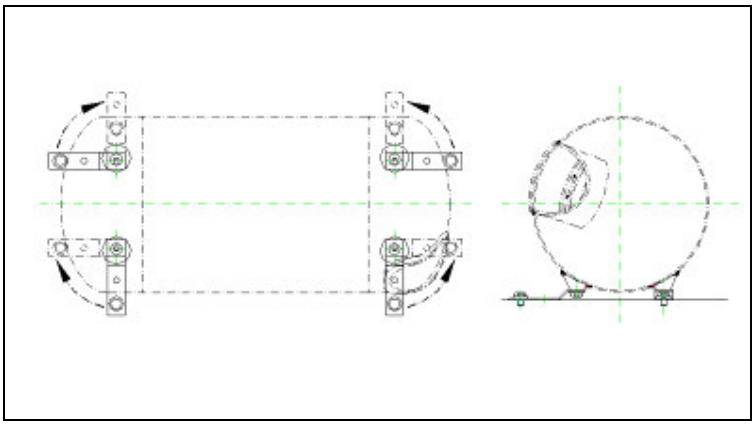
In the case of GS toroidal tank, the fixing of the tank has to happen through the 3 directional connecting shown by the arrows in figure, that are mounted on the side of the inside surface of the spare wheel place.





⇒ **Cylindrical JTG tank**

For the cylindrical tank, it will be enough to mount the tank on the special foot. In the case of assemblage with bands, to maintain the ring nut tilted of 20°



10. Purging system for Lpg tanks

In case of ordinary and not ordinary maintenance on a tank, it will be necessary to remove the Lpg from the tank in safety conditions for the installers.

It will be possible (to remove Lpg from the tank in safety condition) by using the tools showed into the following pictures. The first one give possibility to stock Lpg into the tank fixed above the pump so that at the end of maintenance Lpg can be replace into the tank.

The second one have the same possibility of the first one but it have non tank to stock Lpg. In that case installer have to stock Lpg into another Lpg tank.

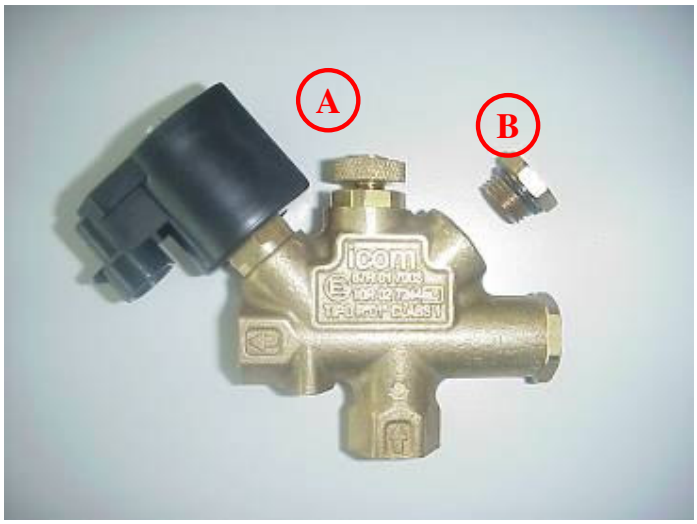
1. Purging system whit tank

2. Purging system without tank

11. CHECK TO DO AFTER INSTALLATION

11.1 Pressure check

When installation is finish, let's measure Lpg pressure(P) (whit engine stop) and Lpg exercise pressure (Pe). The differential (ΔP) between those two pressure (Pe-P) have to be 3 bar ± 0.5bar (from 2.5 to 3.5 bar).



1. Be sure that faucet **A** is close.
2. Remove bolt **B** present on the top of pressure regulator.
3. Apply, in state of bolt B, the manometer to check LPG pressure.
4. Open faucet **A**

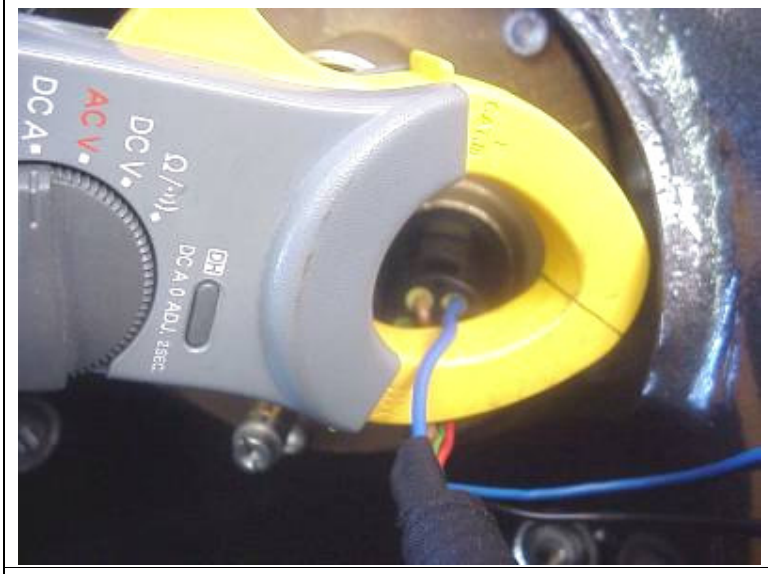
5. Crank on the engine, let's engine run during "switching operation" (55 sec.), crank off the engine than measure LPG pressure (P).
6. Crank on the engine and, measure the exercise pressure (Pe) only after switching operation complete (whit engine running on LPG).

Differential pressure (Pe-P) have to be comprised between 2.5 and 3.5 bar

11.2 Pump power supply check

An excessive current measured on the pump power supply circuit will be a “signal” of a bad functioning of the JTG System .

It will be very important to measure power supply for the pump/system as per the instruction above.



On the pump

Apply multi-meter on the power supply wire (blue/black) for the pump in correspondence of the external tank connector as show in the picture than make measurement.
Maximum acceptable value is ***6.5A***

Max. power supply on the pump wire: 6.5 A

On the system

Power check should be effectuated also on the front part of the JIG system in correspondence of the main fuse. Remove the fuse from the seat and apply the multi-meter as per the picture.
Than make measurement.
Maximum acceptable value is ***8.0 A*** (because of ***+1A*** due to the solenoid power supply and **+0.5 A** due to the ICU) ***+ nA*** (due to other solenoid if they are present)

Max. power supply on the system: 8.0 A

11.3 Fuel injection timing check

During measuring of fuel injection timing let's take in consideration Lpg pressure into the system:

- ⇨ For pressure between 7,5 e 9 bar LPG injection timing have to be the same of petrol injection timing;
- ⇨ For pressure > 9 LPG injection timing have to be approx 5% less than petrol injection timing (ex.: petrol 3.0ms – LPG 2.85ms);
- ⇨ For pressure < 7,5 bar LPG injection timing have to be approx 5% more than petrol (ex.: petrol 3.0ms – LPG 3.15ms).

ATTENTION: **during first calibration the installer have to take in consideration that into the LPG tank there is air, than is necessary to start whit a calibration about 2-3% lower compared to values measured whit engine running on petrol.**
Ex.: if petrol injection timing is 3ms, LPG injection timing have to be approx 3.1 ms.

To measure fuel injection timing is necessary to connect the instruments to the injector signal as show into the picture, than wait that engine switch from petrol to Lpg, wait few seconds for stabilization than start to measure LPG injection timing.

If possible, let's check fuel trimming by a scan tool connected whit OBDII system on the car.
LPG trimming have to remain into a range of ±5% compared to petrol trimming.