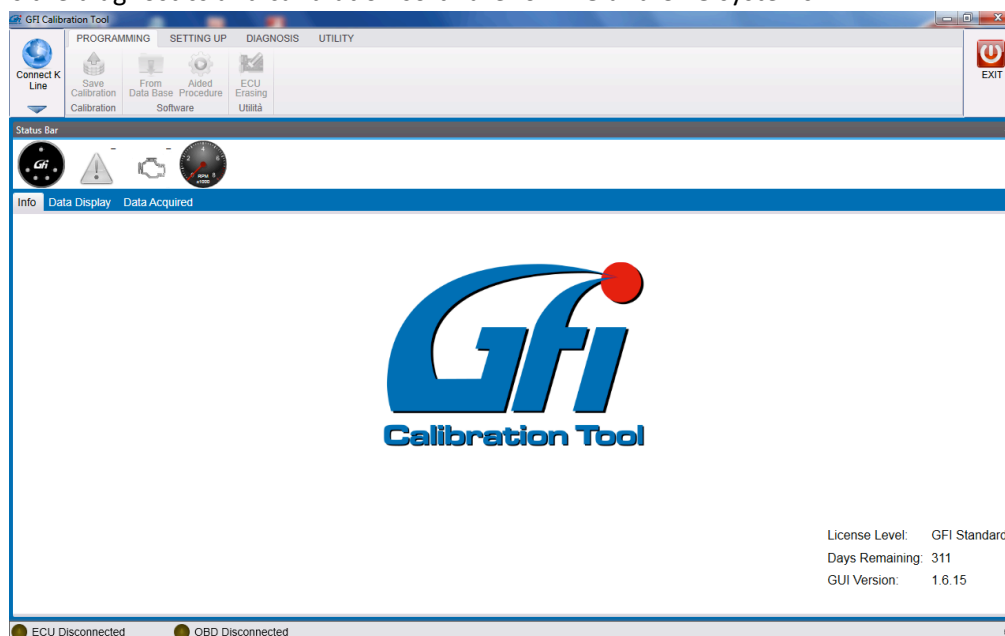


***QUICK START GUIDE***  
***TO***  
***CALIBRATION TOOL***



# Introduction

CALIBRATION TOOL is the diagnostics and calibration software for LPG and CNG systems.



The CALIBRATION TOOL software can be used on the following ECUs:

- EZ-GO
- EZ-JET
- EZ-SDI Direct Injection
- EZ-LGI Direct Injection

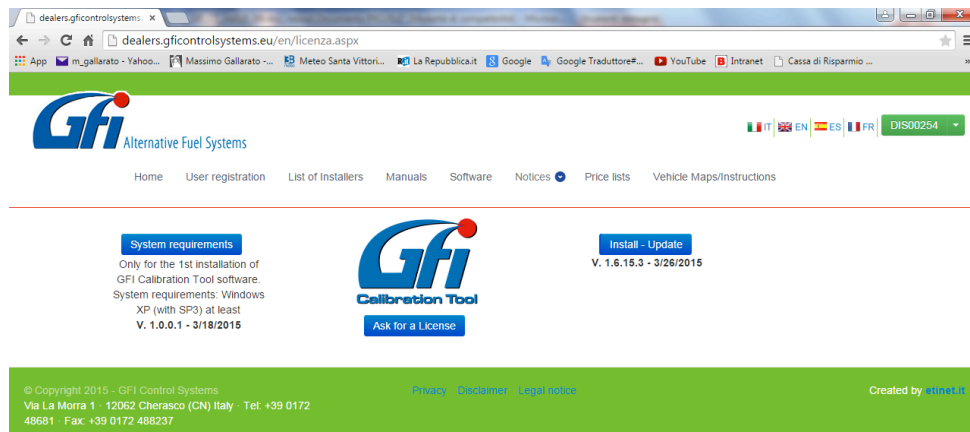
**!ATTENTION!:** The software change its structure according to the kind of ECU connected, only showing sections dedicated to that specific system and license.

## Installing/Updating CALIBRATION TOOL

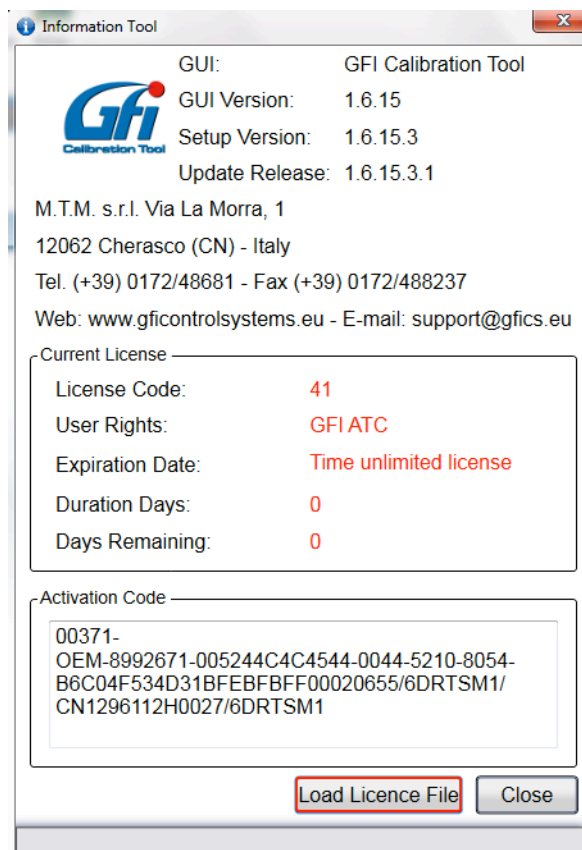
The CALIBRATION TOOL installation and update package can be downloaded from the [www.gficontrolsystems.eu](http://www.gficontrolsystems.eu) reserved area.

Proceed as follows:

1. Enter the RESERVED AREA > SOFTWARE MAPS INSTRUCTIONS VEHICLES>CALIBRATION TOOL section of [www.gficontrolsystems.eu](http://www.gficontrolsystems.eu)



2. During the first installation only, download the file *System Requirements* and execute.
3. Download the Installation/Update file and execute.
4. Starting the Calibration Tool for the first time, an *Application Information* window appears showing the computer "Activation code".



## License management

A license should be required by the user in order to upload it on software and use CALIBRATION TOOL.

Every license is for exclusive use of the computer where CALIBRATION TOOL has been installed. No other computer can use it.

The license includes all software graphic and function authorizations.

# License requirement

CALIBRATION TOOL license can be required at the suitable section of [www.gficontrolsystems.eu](http://www.gficontrolsystems.eu) reserved area.

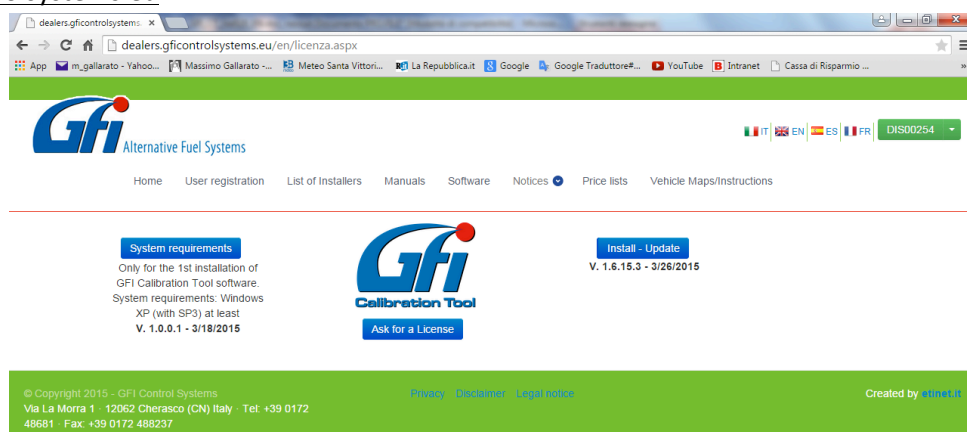
Please follow this procedure:

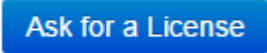
1. Open CALIBRATION TOOL and enter the section *UTILITY>Application Information*.
2. Copy activation code from the box below.

Activation Code

00371-  
OEM-8992671-005244C4C4544-0044-5210-8054-  
B6C04F534D31BFEBFBFF00020655/6DRTSM1/  
CN1296112H0027/6DRTSM1

1. Enter the RESERVED AREA at the section SOFTWARE MAPS INSTRUCTIONS VEHICLES>CALIBRATION TOOL of [www.gficontrolsystems.eu](http://www.gficontrolsystems.eu).



2. Click on the central button .
3. Paste activation code where required and click on *Request License*

## Ask for a license

Type the activation code of GFI software and click:

**Ask for a license**

### NOTES:

During every programming, GFI Calibration Tool will record the user code into the GFI ECU

4. File.lic will be automatically downloaded on your PC.

# License upload

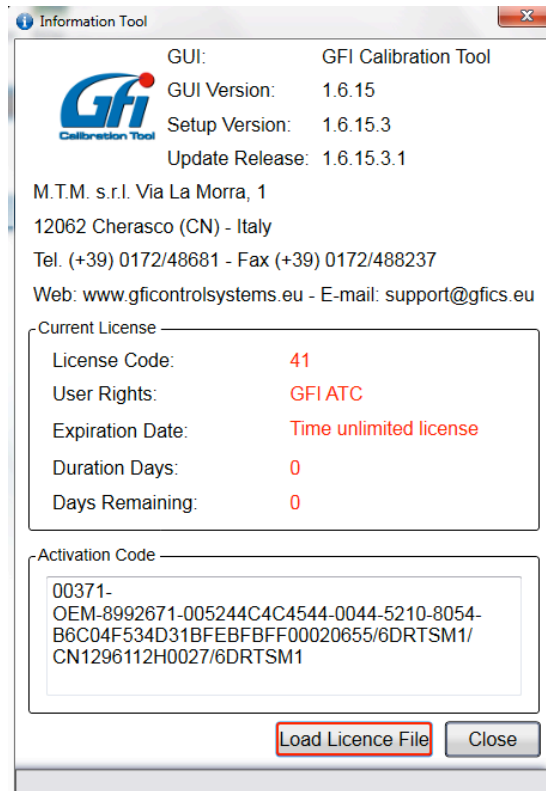
License previously required should be uploaded to CALIBRATION TOOL to start.



Double click on CALIBRATION TOOL icon on desktop to start the application.



Select *Utility > Application Information* from the main menu to enter the windows shown below

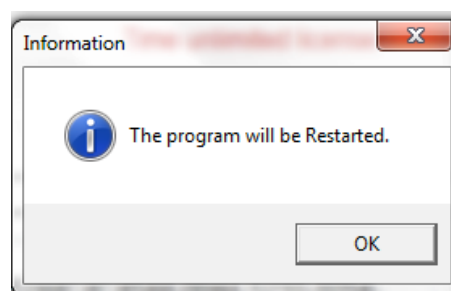


**Load Licence File**

Click on **License File Upload** and select the file required.

Press OK. The system records it allowing user to access all functions and strategies enabled by the license.

A restart confirmation message appears.



Now the software is ready to use.

Once you connected communication cable to the gas ECU diagnostic connector and PC USB port, click on button *Connect K Line* top left to activate communication with ECU.

The system automatically detects the right communication port. This operation is only carried out at the first connection; then the system records the communication port used.

***!WARNING!: if you change communication cable position, the system will automatically search the new one.***

When communication with ECU is ok, the button top left turns red.

Bottom of the screen, the status bar informs that ECU and OBD communication are connected.



## Using **CALIBRATION TOOL**

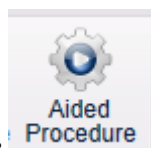
### PROGRAMMING

#### Aided procedure

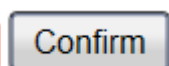
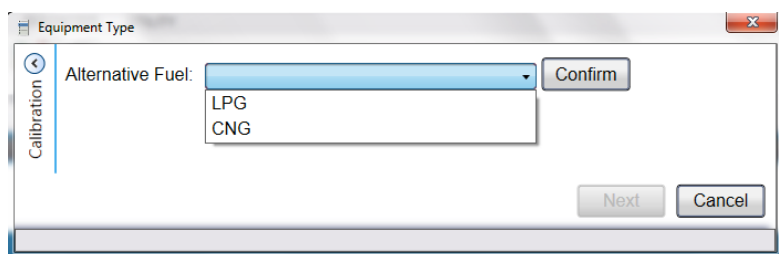
The aided programming procedure is used when you want to install a new vehicle of which the map is not available. Specific features are so set up before carrying out the real self-mapping. The number of steps of aided procedure depends on selections made.

Installer is guided step by step through the whole procedure by some messages.

The buttons *NEXT* and *PREVIOUS* at the bottom of the window allow to go backwards and forwards of one or more steps.



From the main menu select *Programming > Aided Procedure* to start the aided programming.



Click on *Confirm* and a new window appears, called *Type of equipment*, which should be filled in with system features.

#### Type of equipment

It specifies more information about the system installed and vehicle.

Here below the list of standard and specific parameters for the different kind of systems that should be indicated in the form. Calibration Tool will show only parameters concerning the kind of ECU connected and system:

- **Alternative fuel:** LPG or CNG
- **Suction system:** aspirated or supercharged engine
- **Injection:** sequential or semi-sequential injection
- **Nr. of Cylinders:** number of cylinders of the engine, which is also the number of gas injectors installed and petrol ones connected.
- **CC:** cubic capacity of the engine (e.g. 1400 for a 1,4 l).
- **Kind of injector:** type of gas injector installed, amongst the available of the pull-down menu.
- **P1-Tgas Sensor:** type of sensor used for gas pressure and temperature.
  - PTS 4.5 bar (Brown Conn.)



- Rail P + Rail T



+



- PTS 2.5 bar (Black Conn.)



- **MAP Sensor:** type of MAP sensor used. It can be modified if you are using the original MAP (**OEM**). In this case the procedure will automatically ask for sensor setting, requiring the acquisition at idle and with engine off. In case of systems with **EZ-Software** ECU, a further option **MAP Disconnected** will appear giving the possibility to connect GFI MAP only during the Self-mapping procedure. For these systems, RPM must be connected and calibrated.
- **ECT Sensor:** type of sensor used. In case of systems having the OBD communication function, this information can be taken from the vehicle diagnostics.
- **Changeover switch:** type of switch to use.

- **Lambda Oxy Sensor 1:** Lambda Oxy Sensor cables connected or not. In case of Standard setting, the software shows the Sensor signal with no calibration.
- **Air Flow Meter:** for a more precise setting, select the presence or not of an air flow meter into the original petrol system of the vehicle, generally situated on the intake manifold and easy-to-see. Choose “**PRESENT**”, “**NOT PRESENT**” or, in case of doubt, “**UNDEFINED**”.
- **Type of OBD communication.** (Only for system with EZ-Software 4-, 5-, 6-, 8-cylinder ECUs). It specifies if the system is connected to the vehicle diagnostic socket and if K-line (1 cable connected) or CAN BUS (2 cables connected) has been used.
- **Petrol pressure:** (Only for system with EZ-Software 4-, 5-, 6-, 8-cylinder ECUs). Necessary to manage Petrol Pressure, reading and/or emulating the petrol pressure from the original sensor situated on rail.
- **Pump signal:** (Only for system with EZ-Software 4-, 5-, 6-, 8-cylinder ECUs). Necessary to manage Petrol Pressure. Set **Connected** when it is necessary to read the control signal of petrol pump situated into the tank.
- **RPM Signal:** it specifies if vehicle RPM signal has been connected to the system, or if RPM is read by petrol injectors or coil. Generally it is not necessary to connect this signal, so the software automatically propose the option “**Disconnected**”. In case of systems where MAP sensor is not connected, RPM should be connected and set up.
- **Crankshaft configuration:** (EZ-Software CNG) type of timing advance processor used, Aries or Acrux, according to the kind of crankshaft on vehicle.

Crankshaft acknowledgement procedure

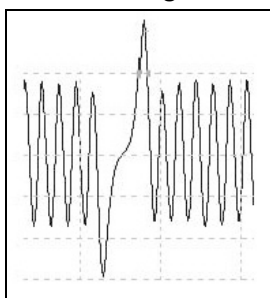
There are two kind of Crankshaft:

- a) Inductive sensor
- b) Hall Effect sensor

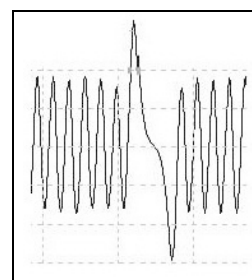
#### **Inductive Sensor:**

It has two cables on connector (Positive and Negative signal). Oscilloscope diagram could appear as follows:

Positive signal



Negative signal



In this case use the Aries timing advance processor configuration.

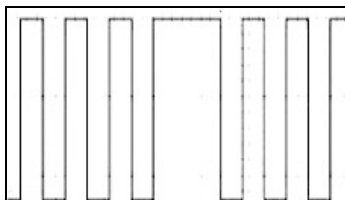
After realizing connections, Pink - Pink/Black on Positive and Light Blue – Light Blue/Black on Negative (see Equipment Manual for connections), set **VR High Voltage** in CRANKSHAFT CONFIGURATION.

**VR Low Voltage** configuration is only used for specific applications.

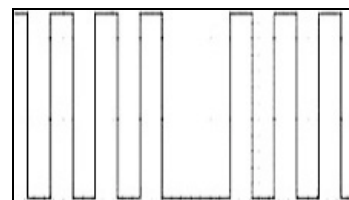
#### **Hall Effect Sensor:**

It has three cables on connector (Positive, Negative and Signal). Electric signal read by the oscilloscope could appear as follows:

Positive signal



Negative signal



In these cases use the Acrux timing advance processor configuration.

After realizing connections with Pink - Pink/Black on signal (see Equipment Manual for connections), set **HALL** in CRANKSHAFT CONFIGURATION.

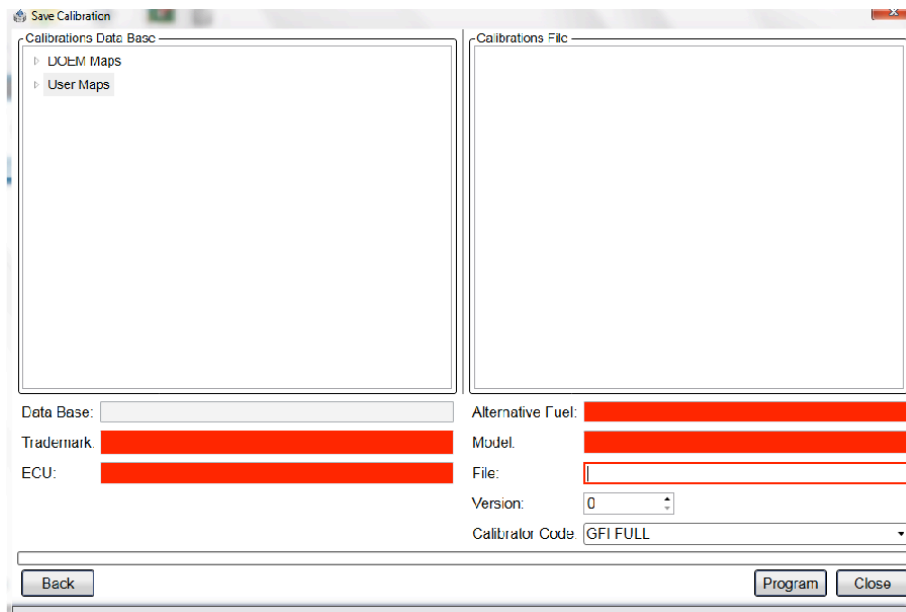
In CRANKSHAFT CONFIGURATION there still appear the **Only RPM** configuration, identifying the reading connection of RPM of the Grey cable only, in case the timing advance processor is not necessary.



Next

After setting up configurations, press *Next* to continue.

The system asks for the destination file to save configuration just made. Fill in the form below in detail typing *Trademark*, *Model*, *Gas ECU*, *File*.



**Note:** you can choose whatever name for your file. We suggest to use a name that clearly identifies the vehicle installed (e.g. number plate).

Program

Press on *Programming* to save calibrations on PC and download them on ECU.

Close

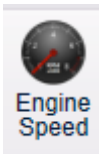
By pressing on *Close* all calibrations made would be lost.

Now starts the real Self-mapping procedure.

**Note:** If you set up as **Connected** some signals that can be taken from the original ones, such as MAP – RPM – Petrol pressure while filling in the Type of Equipment section, an adjustment procedure will be required before starting Self-mapping.

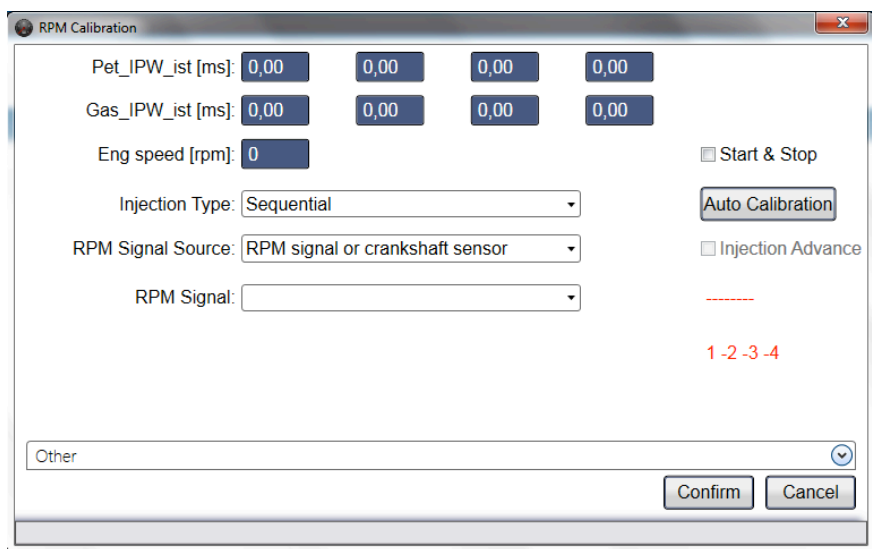
## RPM

RPM signal can be enabled or disabled according to the configuration of the system installed.



Click on *Setting up* > from main menu to enter the RPM sensor setting section.

RPM signal must be enabled for systems having **EZ-Software**, for which standard configuration foresees the MAP signal connection only during self-mapping.



**Pet\_IPW\_ist [ms]:** all real petrol injection times read by original injectors are shown, without any strategy reading filter.

**Gas\_IPW\_ist [ms]:** gas injection times the system is using to control gas injectors are shown. Only visible during gas mode.

**Injection type:** vehicle injection, Sequential or Semi-sequential.

**RPM signal source:** selects the source from which the system will take RPM signal. Choices are:

- ***“Not Connected”***

RPM signal is not connected and calculated by petrol injection times. It is enough to choose SEQUENTIAL or SEMI-SEQUENTIAL, checking that RPM reading is correct.

- ***“RPM signal or crankshaft sensor”***

RPM signal is read by RPM counter or crankshaft. After suitably connecting grey cable, calibration procedure is necessary.

- ***“Coil”***

RPM signal is taken from vehicle coil signal. It is enough to choose SEQUENTIAL or SEMI-SEQUENTIAL, checking that RPM reading is correct, just as in case of *Not connected* choice.

**RPM signal:** identifies the type of signal recognized by the automatic calibration procedure. If system cannot recognise it, **Manual Setting** will be indicated.

**Aries RPM inlet type:** (EZ-Software CNG) Internal timing advance processor used.

- ***Only RPM***

Only grey cable connection for RPM reading. No connection for timing advance processor:

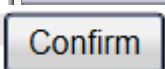
- ***High Voltage Inductive***
- ***HALL***
- ***Low Voltage Inductive***

**Software Aries:** (EZ-Software CNG) Timing advance management software. After the RPM automatic setting, the system will only show software dedicated to the typology recognised.

### Automatic calibration procedure

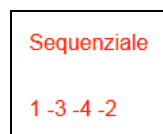
**Auto Calibration**

Press on *Automatic Calibration* ; the system requires the engine on at petrol idle and automatically proceeds with recognising the right kind of signal.



If RPM is correct, press **Confirm** confirm and go on.

Please note the red text to the right side of the window.



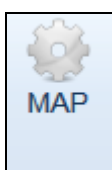
If RPM signal is well connected, the system automatically detect injection sequence and kind – sequential or semi-sequential – on the basis of RPM signal and petrol injectors.

If information does not correspond to the installer's one, he should check installation, especially the petrol injectors connection and the RPM signal, or software setting.

After that, you can exit the page and save changes by clicking on *Save Calibration* if needed.

## MAP

If a OEM MAP sensor is selected in Type of Equipment (connect MAP sensor of the original system), a sensor calibration is necessary.



Click on *Setting up > MAP* of main menu to enter the original MAP sensor calibration section.

Procedure is easy:

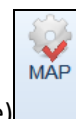
1. Start the engine in petrol mode and wait for steady condition, then enter the idle MAP *Physical Value [mbar]* into the respective case (it could be read by a OBD tester); press *Acquire* into the top idle engine box.

**!ATTENTION!:** Before acquiring the electric value, confirm the physical one manually entered by clicking *ENTER*.

2. With engine off and dashboard on, enter the MAP Physical Value with engine off (it could be read by a OBD tester); press *Acquire* into the bottom engine off box.

**!ATTENTION!:** Before acquiring the electric value, confirm the physical one manually entered by clicking *ENTER*.

If the OBD communication connection and enabling is possible, the system gives the possibility to set MAP on the basis of OBD reading.



When a change made in RPM calibration is confirmed, a red tick appears on the icon (see picture) meaning that user modified that section.

Download change into the Gas ECU through *Save Calibration* in order to enable it.

## Self-mapping

Systems based on EZ-SOFTWARE software work with suitable maps included into the ECU which allow translating petrol injectors signals in gas injectors controls, different from vehicle to vehicle. **Self-mapping** wants to get maps through some simple acquisitions (made on site) of vehicle working conditions to “map”, just after the installation.

**Note:** GFI MAP sensor connection is required before starting Self-mapping as well as the disconnection is required at the end of procedure if decided to not use the MAP sensor.

RPM Calibration

Pet\_IPW\_ist [ms]: 0,00 0,00 0,00 0,00

Gas\_IPW\_ist [ms]: 0,00 0,00 0,00 0,00

Eng speed [rpm]: 0

Injection Type: Sequential

RPM Signal Source: RPM signal or crankshaft sensor

RPM Signal: Crankshaft sensor 60-2

Start & Stop

Auto Calibration

Other

Back Next Cancel

1 -2 -3 -4

Right working conditions and self-mapping procedure parameters are indicated on the left.

Parametri

Stato: 1

Stato Alim.: 1

Tempo dall'accensione:

Temperatura Acqua [°C]: 55,5

Temperatura Gas [°C]: 31,1

Delta P=P1-MAP[mbar]: 844,0

Posizione Commutatore: BENZINA

Errore Perc. [%]:

Parametri Configurazione

Press *Modify calibration* to start procedure.

Starting self-mapping, the window below appears, asking for pressing OK when petrol idle steady conditions are reached.

Auto Mappatura

Giri motore [rpm]: 706

MAP [mbar]: 275

TONinjB [ms]: 2,4

TONinjG [ms]: 0,0

Parametri

Stato: 1

Stato Alim.: 1

Tempo dall'accensione:

Temperatura Acqua [°C]: 94,0

Temperatura Gas [°C]: 58,9

Delta P=P1-MAP[mbar]: 2507,0

Posizione Commutatore: BENZINA

Errore Perc. [%]:

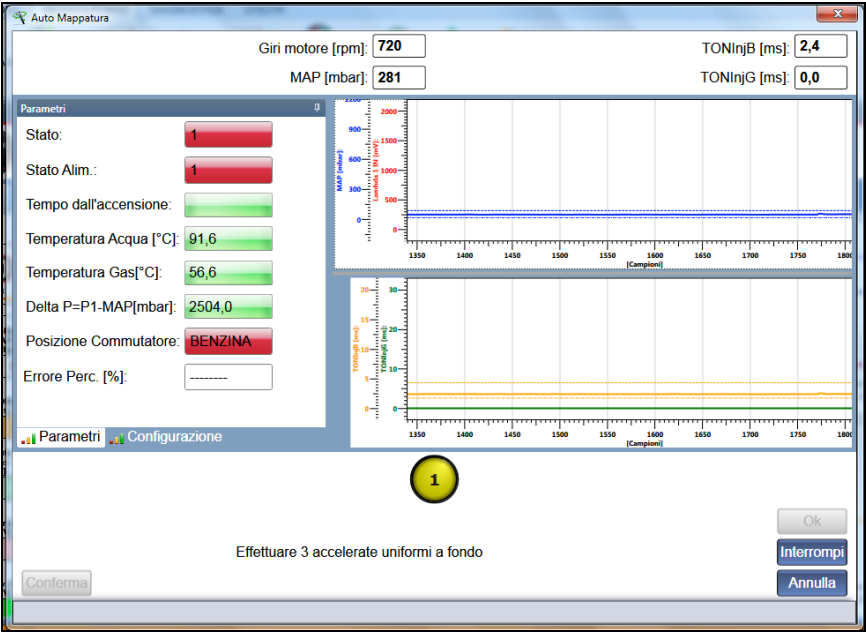
Conferma

Posizionarsi al minimo senza carichi e premere Ok

Ok Interrompi Annulla

Then the system asks for remaining at idle and make three deep accelerations up to 5000 RPM.

Accelerator should be pressed rapidly until the end, not reaching more than 5000 RPM and avoiding the constructor RPM limitation intervention.

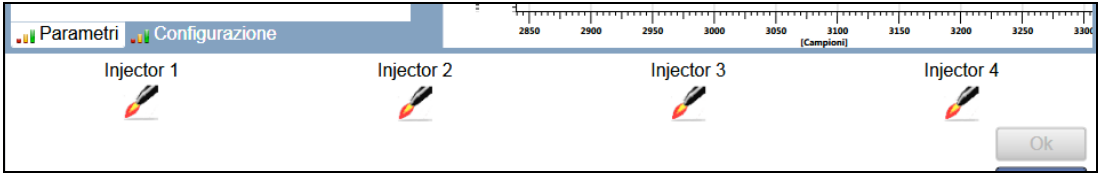


The yellow circle in the middle bottom shows the number of acceleration to do. In this picture the system asks for the first tip-in.

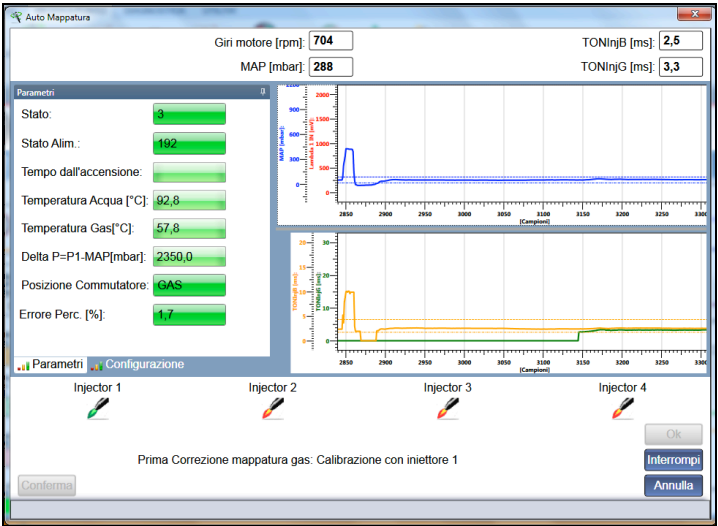
**Note:** We suggest to make the accelerations as uniform as possible.

After the third tip-in, installer fundamentally ended his work. All further self-mapping and aided procedure calibrations are automatic and only need to press OK to confirm the end of procedure.

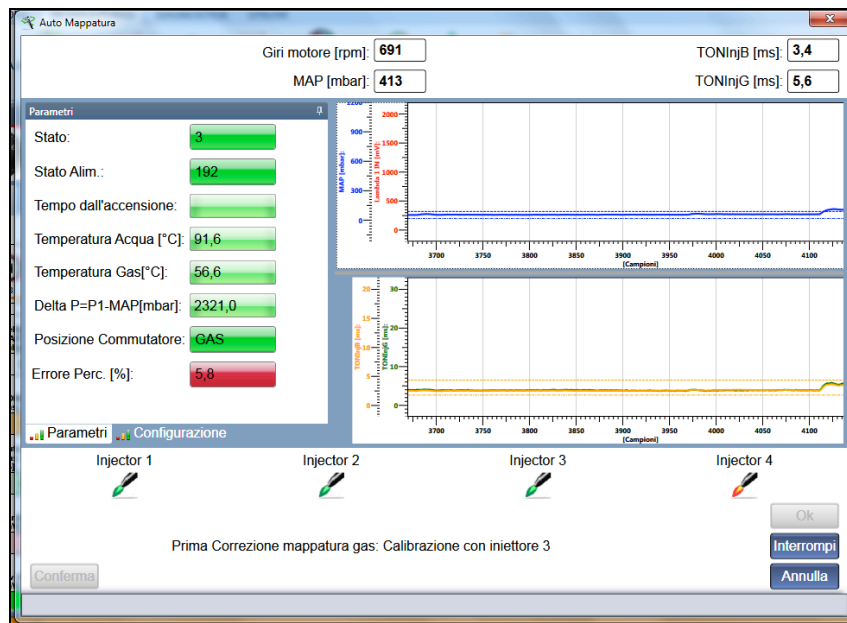
Automatic calibration has the aim to get the best idle centring.  
During this step, 4 injectors, red or green, appear bottom of the page.



Injectors are red (one for each cylinder), indicating that all cylinders are in petrol mode.  
Partial gas changeover will occur for some cylinders with further changeovers between gas and petrol, up to reach the end of procedure with gas mode for all cylinders.

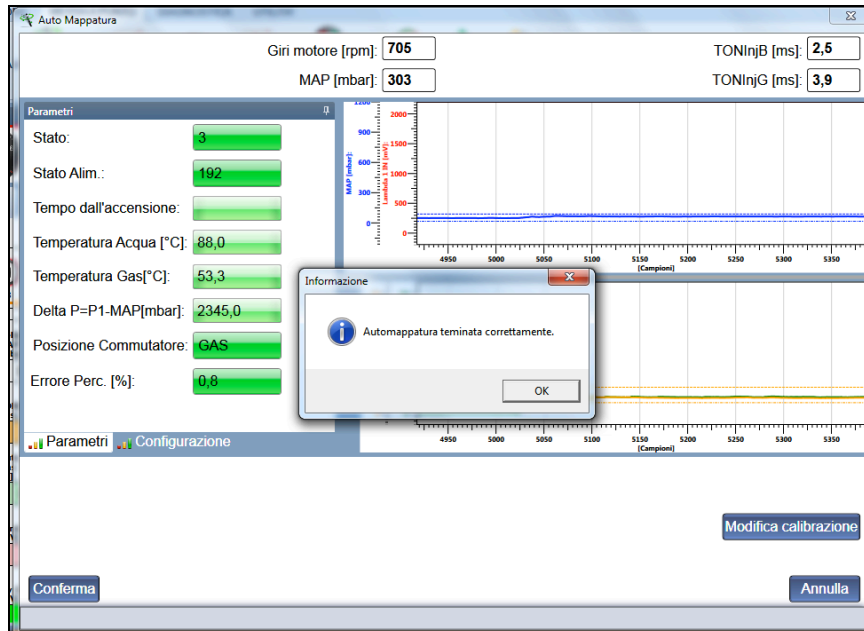


During the whole procedure, the Perc. Error [%] box show the gap between the current and the optimal condition.



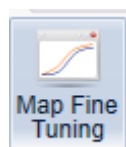
If percentage error is lower (both positive and negative) than  $\pm 5\%$ , box is green, meaning that the situation is ok to proceed, or it is red, meaning that you should wait before changing over other cylinders.

At the end of procedure a message will notice the successfully end.



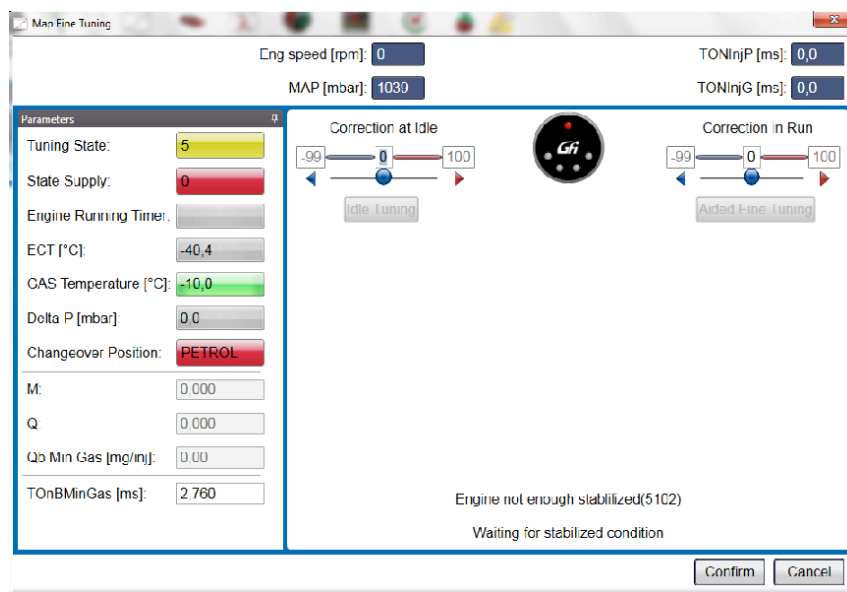
Press *Confirm* to leave the page and save changes with the *Save Calibration* key if necessary.

## Map fine tuning



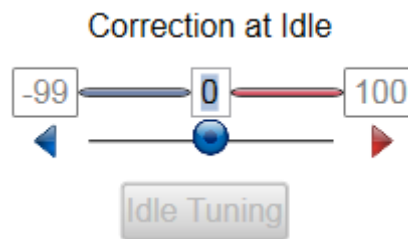
Click on *Setting up > Map fine tuning* from main menu to enter the section of gas calibration check and manual modification.

In this section you can modify any ECU map and refine a self-mapping just made.

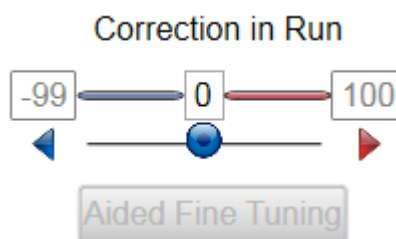


Map fine tuning can be made manually by acting on two “cursors”.

The first is *IDLE*



while the second *RUNNING*.



**IDLE:** acting on this cursor you enrich or lean in the idle area. Move cursor to the right to get a percentage increasing of gas flow at idle (numbers greater than 0). Move cursor to the left to get a percentage decreasing of gas flow at idle (numbers lesser than 0).

Act on this adjustment for a better centring of idle map.

**RUNNING:** acting on this cursor you enrich or lean point with engine medium and high loads. Move cursor to the right to get a percentage increasing of gas flow at idle (numbers greater than 0). Move cursor to the left to get a percentage decreasing of gas flow at idle (numbers lesser than 0).

Act on this adjustment for improving engine medium and high loads carburation.

### Map correction procedure

Map control procedure is very easy: you just have to check that TonP is the same during petrol mode and then gas mode. If TonP after the passage to gas is higher, gas carburation should be enriched up to reach the same value of the petrol mode. On the contrary, if TonP after the passage to gas is lower, gas carburation should be leaned up to reach the same value. In no way a calibration affects vehicle behaviour during the other condition.



After a self-mapping a drive test is suggested to check the right vehicle running in medium-high loads conditions, **in Closed Loop**, also verifying the Lambda Oxy Sensor working and the petrol ECU self-adapting parameters, which are visible on this page if connection with vehicle diagnostic socket has been made and OBD information are available. Any possible carburation anomaly in this case can be solved by acting on “*RUNNING*” cursor.

**Automatic idle fine tuning**

The automatic idle fine tuning can be carried out by simply clicking on *Idle fine tuning*. The window below appears.

Correzione al Minimo

-99

0

100

Correzione in Marcia

-99

0

100

Correzione Iniziale [%]:

-100

0

400

Errore Massimo [%]:

2

2

20

Velocità Correzione [%]:

-100

0

100

Errore Perc. [%]:

Injector 1

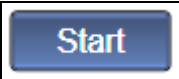
Injector 2

Injector 3

Injector 4

Start

Chiudi



Press *START* , to start procedure.

The system waits for petrol steady conditions.

Correzione al Minimo

-99

0

100

Correzione in Marcia

-99

0

100

Correzione Iniziale [%]:

-100

0

400

Errore Massimo [%]:

2

2

20

Velocità Correzione [%]:

-100

0

100

Errore Perc. [%]:

Injector 1

Injector 2

Injector 3

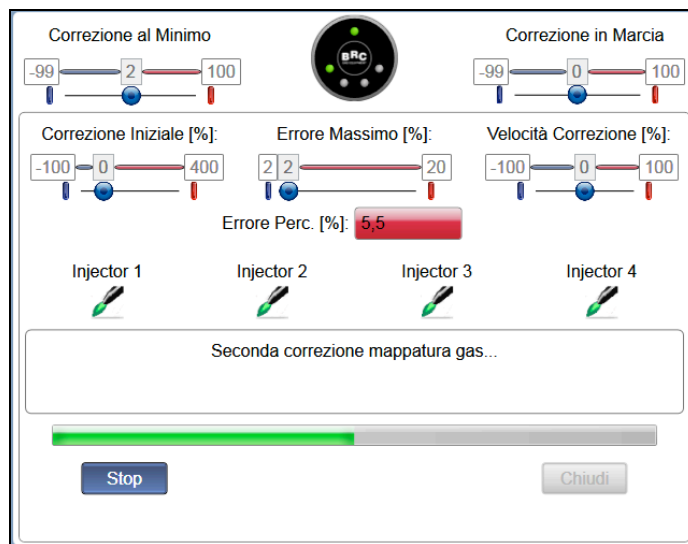
Injector 4

Attendere, calibrazione automatica in corso...

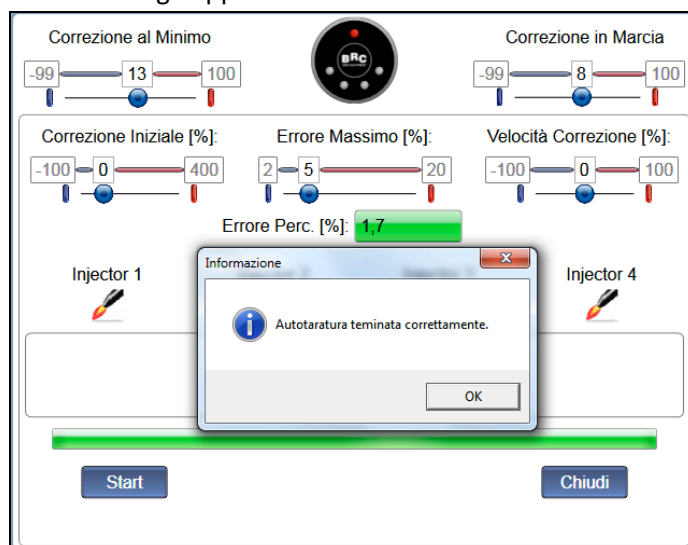
Stop

Chiudi

Then it automatically changes over to gas and centres the idle



At the end of procedure a confirmation message appears

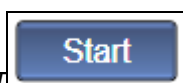


**! ATTENTION!:** MAP sensor connection is required to use this procedure with systems having EZ-Software ECU.

### Assisted fine tuning in running

Map can be automatically refined in RUNNING condition too.

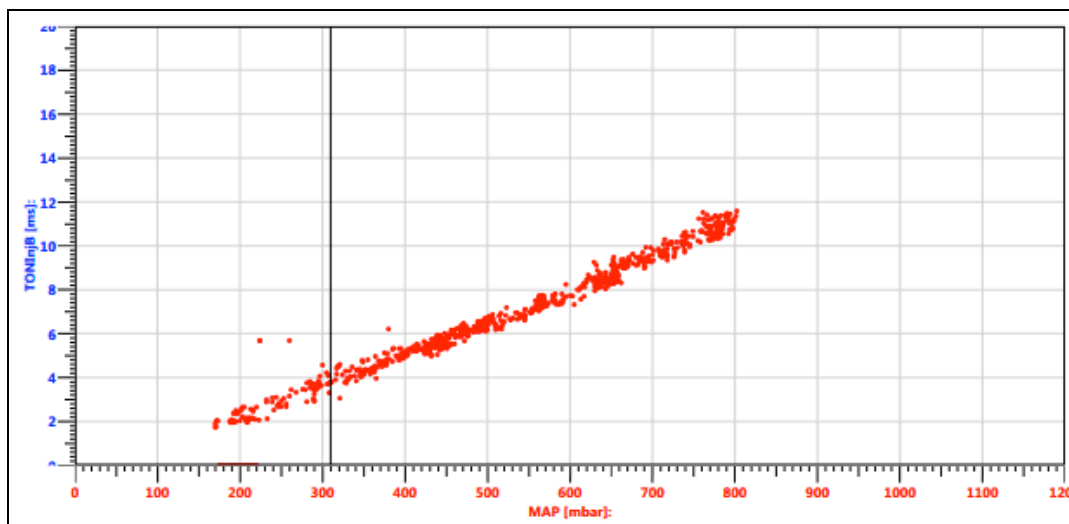
Press *Assisted Fine Tuning*; a graph appears in the middle of the Map Fine tuning window.



Press **START**, the system starts to acquire TonP (injection times) of **petrol injectors** showing them on graph in correspondence to the acquisition MAP value.

Dots are red during petrol mode (injection times of petrol injectors during petrol mode) and green during gas mode (injection times of petrol injectors during gas mode).

After a drive test both in petrol and gas mode, the graph appears as follows:



Please remember that it is possible to change over from petrol to gas and vice-versa by pressing the switch, clicking the icon on software or the F5 key on keyboard.

The petrol point acquisition is firstly suggested, trying to explore all MAPs.

It is not necessary a unique progressive acceleration to acquire dots: acquisition can be made in different times, even stopping it through the central button, become STOP in the meanwhile.

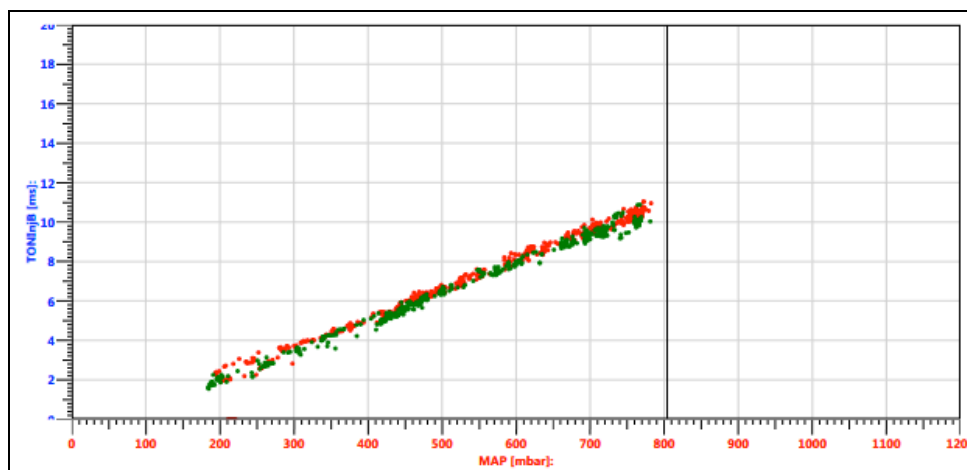
Just try to avoid too high or too low RPM in the same graph: better is to keep them between 2500 and 3500 RPM, acting on pedal and gear if necessary.

Open Loop conditions obtained with pedal totally pressed are not significant for this kind of setting up and should not be taken into consideration.

Anyway, a possible acquisition is not a problem because it is easily observable in the graph.

Change over to gas and acquire dots as made before for petrol mode.

a similar graph appears:



Stop

Now press *STOP* and park the vehicle in a safe area.

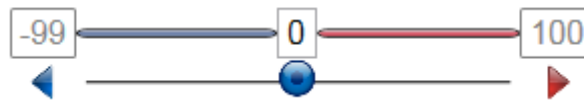
Map correction occurs with vehicle stopped and no need of any other people, except for the driver.

Aim of correction is the red and green dots superposition, in order to have the same petrol injection time both in petrol and gas mode.

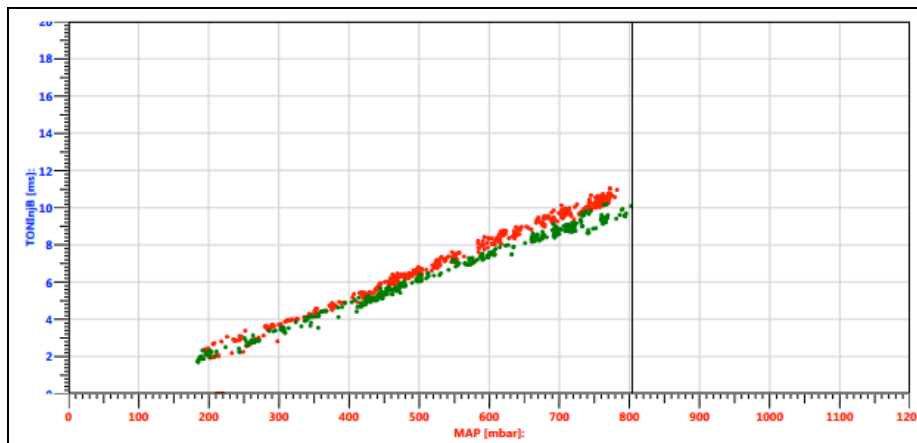
If they are not superposed, map is not centred and should be corrected by acting on RUNNING cursor.

Let's try to put RUNNING cursor at +10%.

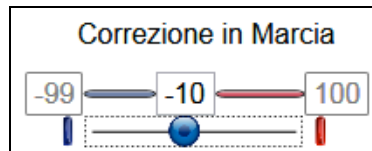
## Correction in Run



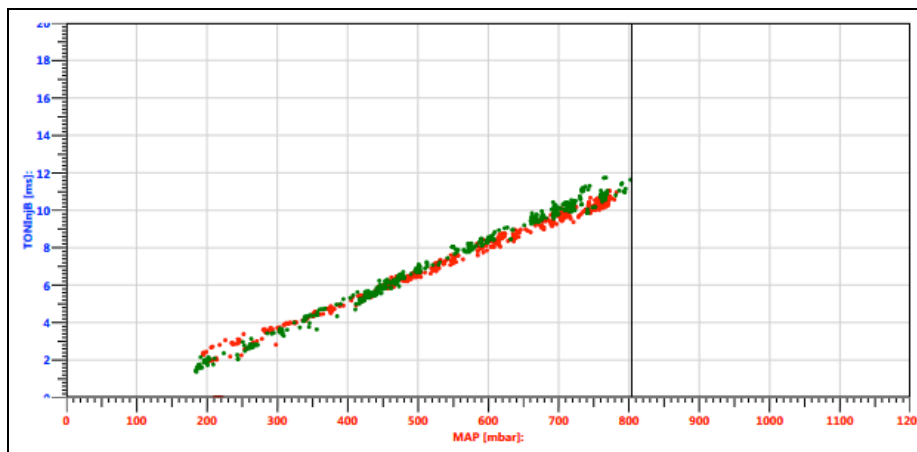
Graph changes as follows,



The system modifies gas carburation and green dots acquired in gas mode move down.  
Now let's try to put RUNNING cursor at -10%.

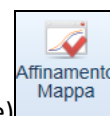
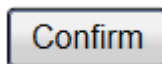


Graph changes as follows,



The system modifies gas carburation and green dots acquired in gas mode move up.

When right correction is found, press *Confirm*.

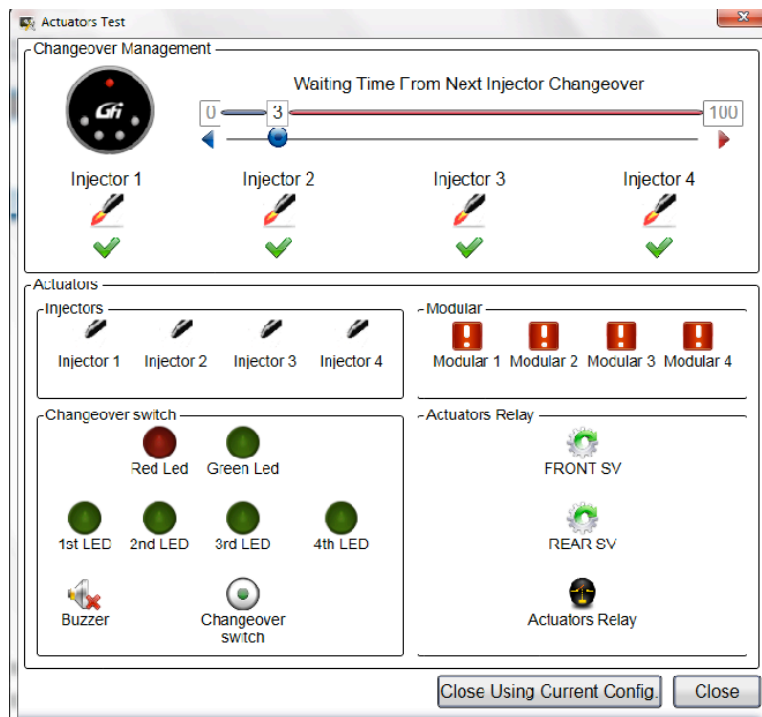


When a change made in gas calibration is confirmed, a red tick appears on the icon (see picture) meaning that user modified that section.

Download change into the Gas ECU through *Save Calibration* in order to enable it.

## Actuators test

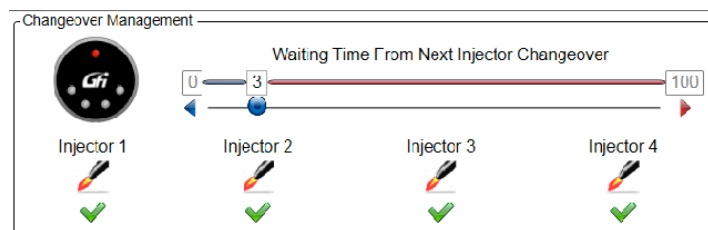
Calibration Tool shows a different version of Actuators test according to the type of gas system.



Click on " *ACTUATORS TEST*" from Diagnostics to enter the page dedicated to system actuators check, where you can verify:

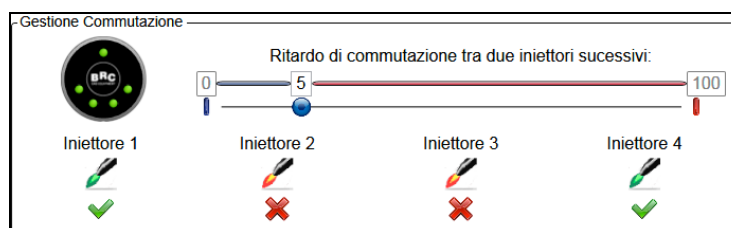
- Injectors connection right sequence
- Gas injectors good working
- Petrol injection cut-off good working
- Actuators relay good working
- Two solenoid valves good working
- Gas level display LEDs good working
- Changeover switch buzzer good working
- Changeover switch good working

### Changeover management



The system reads from ECU the number of injectors connected (4 in the example) and the injection delay between cylinders changeover (5 in the example).

You can decide to suddenly supply any cylinder with petrol by remove tick on corresponding injector, even if switch stays in gas mode and show the green LED on; in case of a 4-cyl vehicle, you can make engine work with one cylinder in gas mode and three in petrol mode, or two-two, or one-three, or even all four cylinders in petrol mode. Please note that in this latter case, vehicle runs in petrol mode but switch LED is green (solenoid valves open or open at changeover), being deceptive for user.



Move the *Waiting Time From Next Injector Changeover* cursor to the right to increase the changeover delay between two consecutive injectors, so that any wrong connection creates a longer and easy-to-detect engine failure allowing an easier and quicker diagnostics.

Change is temporary, injectors return to default setting when you leave the actuators test section.

Click on *Close keeping configuration* to apply the change just made on vehicle.

**Injectors**

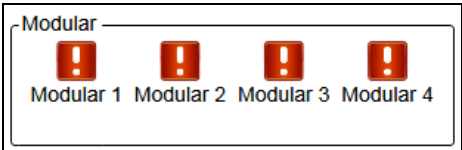


LPG injector can be controlled with engine off.

Select the box corresponding to the gas injector wished; it opens and closes many times. The sound emitted confirms its good working.

Test can only be carried out with engine off and dashboard on.

**Modular**



Petrol injector cut-off can be tested.

In petrol mode, select the box corresponding to the petrol injector wished; it is cut-off and emulated from gas ECU.

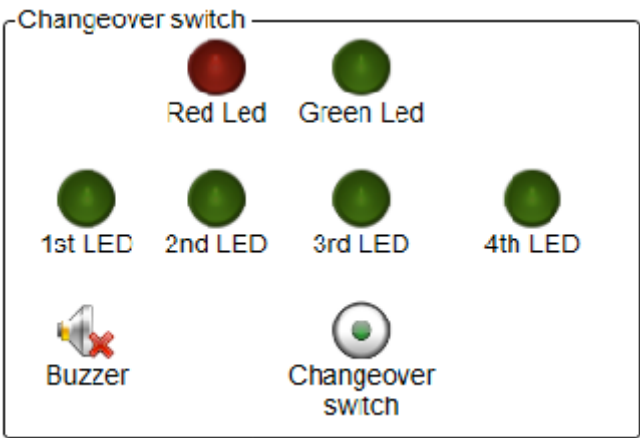
Injection cut-off does not run properly if engine starts to work wrongly.

Test can only be carried out with engine on in petrol mode.


**CHANGEOVER SWITCH**


Changeover switch bicolour LED, all LPG level indicator LEDs and Buzzer can be tested.


Click on one of the LEDs icons, for instance *LED 1 or red LED*, or on Buzzer icon




Consecutive lightning flashes of changeover switch LEDs or consecutive beeps of buzzer confirm their good working.


Testing the red LED, respective icon turns  **Red Led** . Check the bicolour LED right working directly on changeover switch.


Testing the green LED, respective icon turns  **Green Led** . Check the bicolour LED right working directly on changeover switch.

Testing the level LEDs, such as the LED 1, respective icon turns  **1st LED** . Check the LED 1 right working directly on changeover switch.

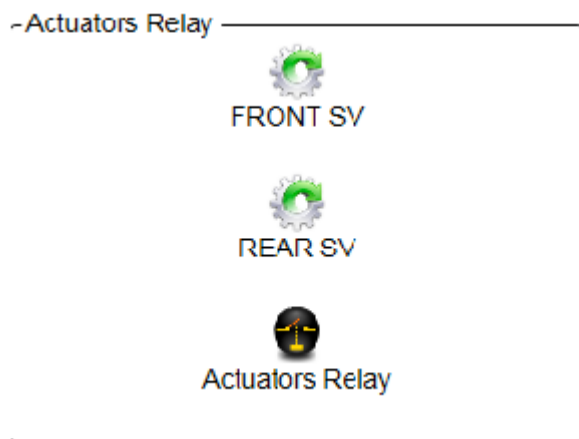
Testing the Buzzer, respective icon turns  **Buzzer** . Check the Buzzer right working.

Testing the changeover switch, a writing identifying the switch position appears next to the icon:

If changeover switch is in LPG mode, the icon turns  **Changeover switch**

If changeover switch is in petrol mode, the icon turns  **Changeover switch**

## RELAY



Actuators Relay, Front and Rear Solenoid Valves can be tested.

Select the Actuators Relay icon, it opens and closes many times. The sound emitted confirms its good working.

Select one of the solenoid valve icons, it opens and closes many times. The sound emitted confirms its good working.