

**USING
CALIBRATION TOOL
- SOFTWARE MANUAL -**



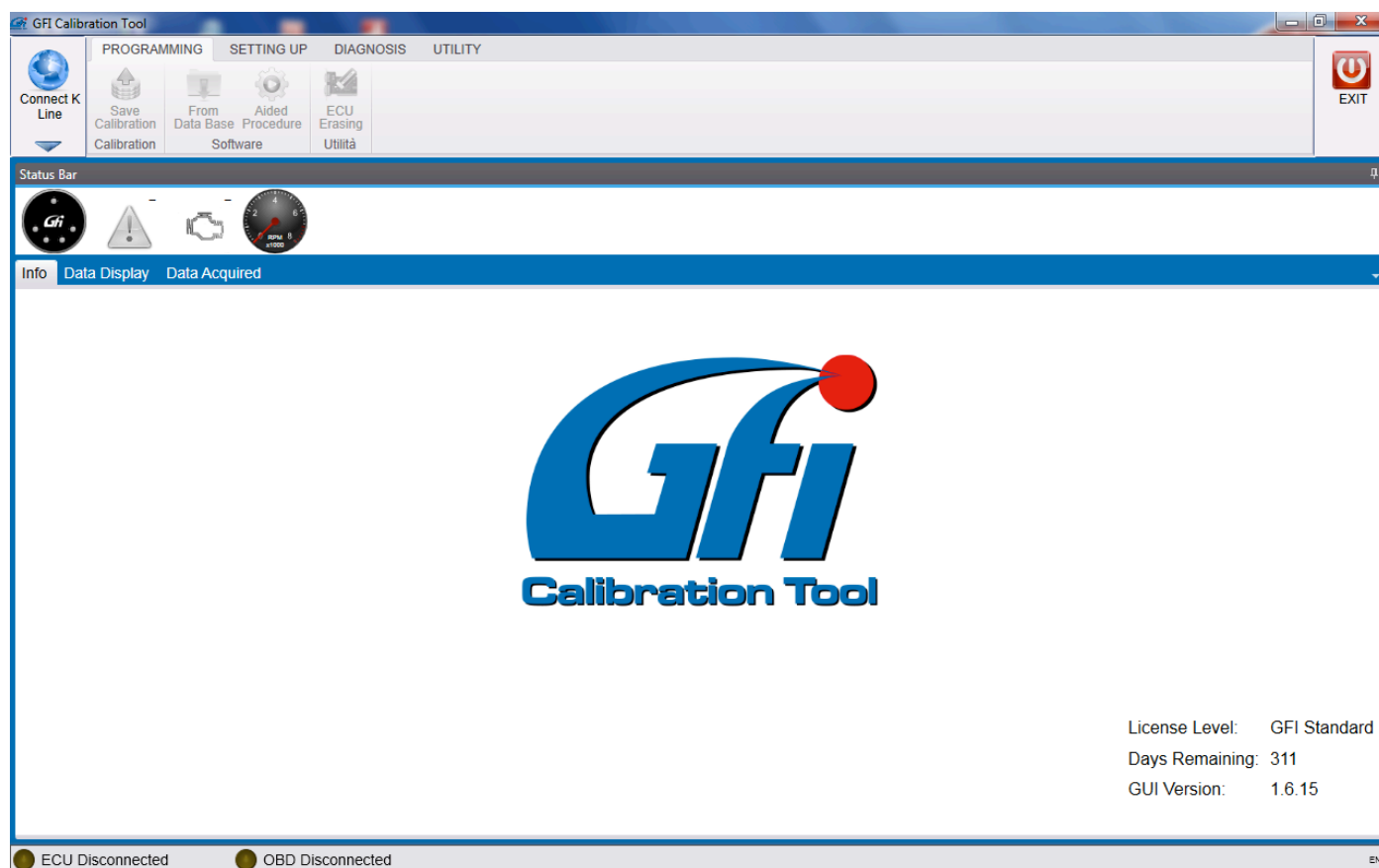
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1 Introduction

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

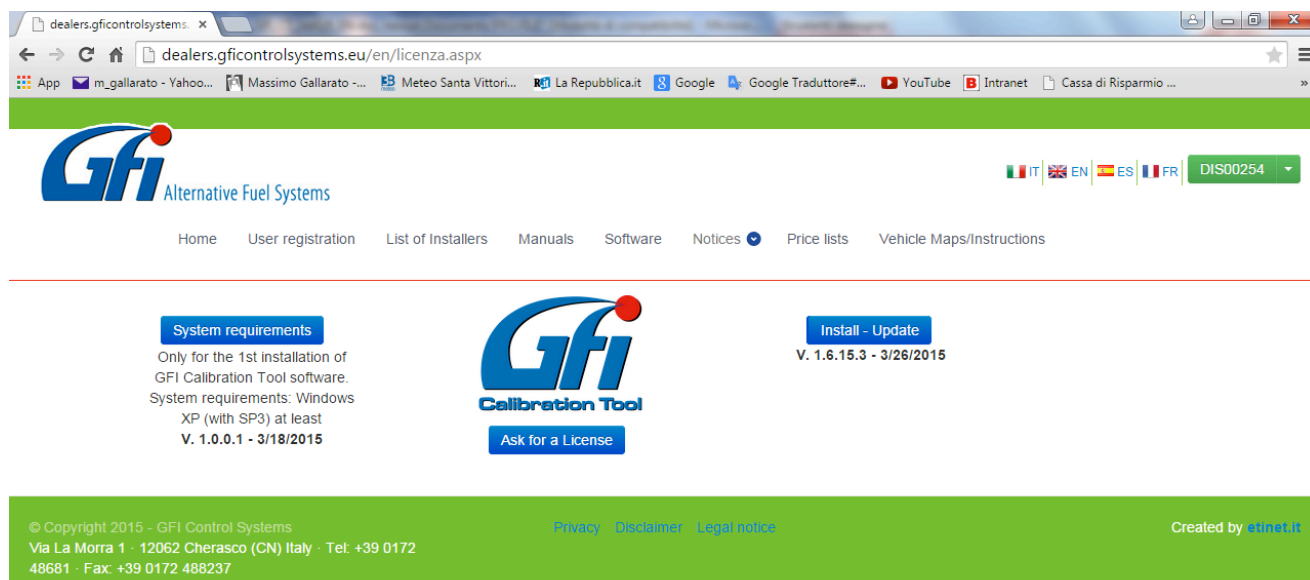
!ATTENTION!: The software change its structure according to the kind of ECU connected, only showing sections dedicated to that specific system and license.

2 Installing/Updating CALIBRATION TOOL

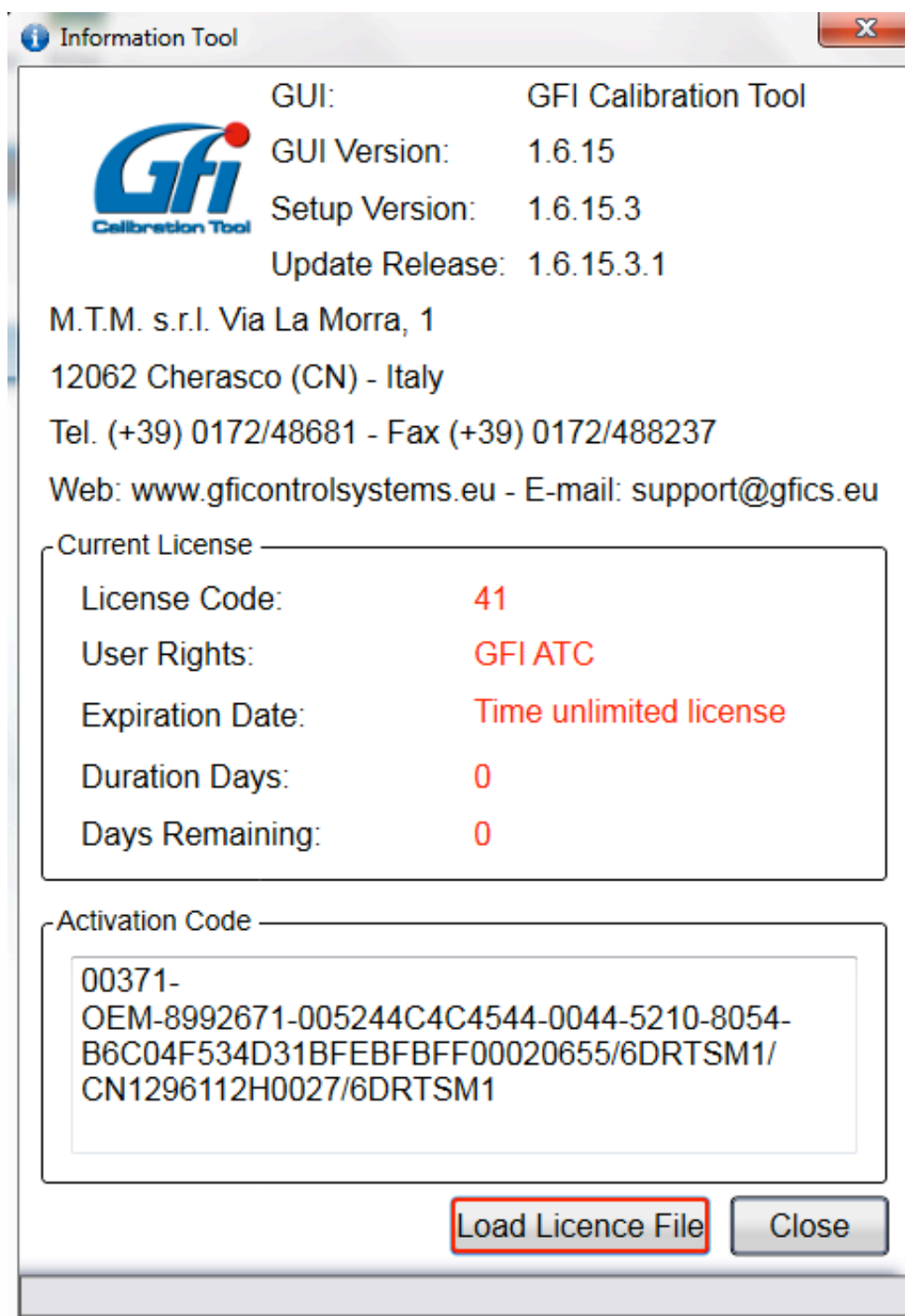
The CALIBRATION TOOL installation and update package can be downloaded from the www.gficontrolsystems.eu reserved area.

Proceed as follows:

1. Enter the RESERVED AREA > SOFTWARE MAPS INSTRUCTIONS VEHICLES>CALIBRATION TOOL section of 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" (use described later).



3 Installing USB communication cable driver

Suitable driver should be installed for using USB communication cable.

You can find Drivers entering the www.gficontrolsystems.eu reserved area at the section *Software Maps and Instructions\Driver & Utility\PC-USB Connection cable*.

4 License management

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

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

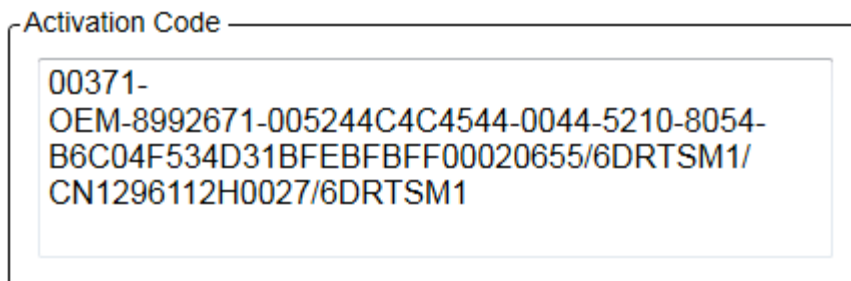
The license includes all software graphic and function authorizations.

4.1 License requirement

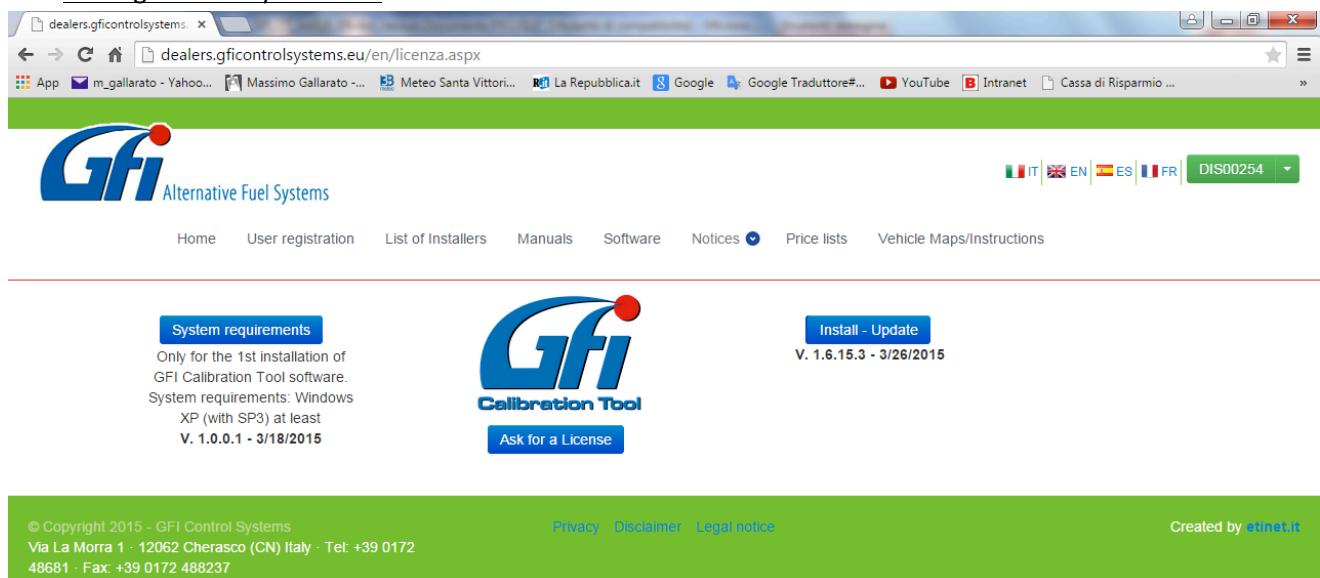
CALIBRATION TOOL license can be required at the suitable section of www.gficontrolsystems.eu reserved area.

Please follow this procedure:

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



3. Enter the RESERVED AREA at the section SOFTWARE MAPS INSTRUCTIONS VEHICLES>CALIBRATION TOOL of www.gficontrolsystems.eu.



4. Click on the central button

Ask for a License

5. Paste activation code where required and click on *Ask for a license*

Ask for a license

Type the activation code of GFI software and click:

Ask for a license

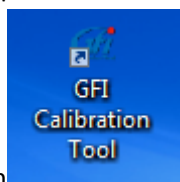
NOTES:

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

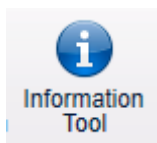
6. File.lic will be automatically downloaded on your PC.

4.2 License upload

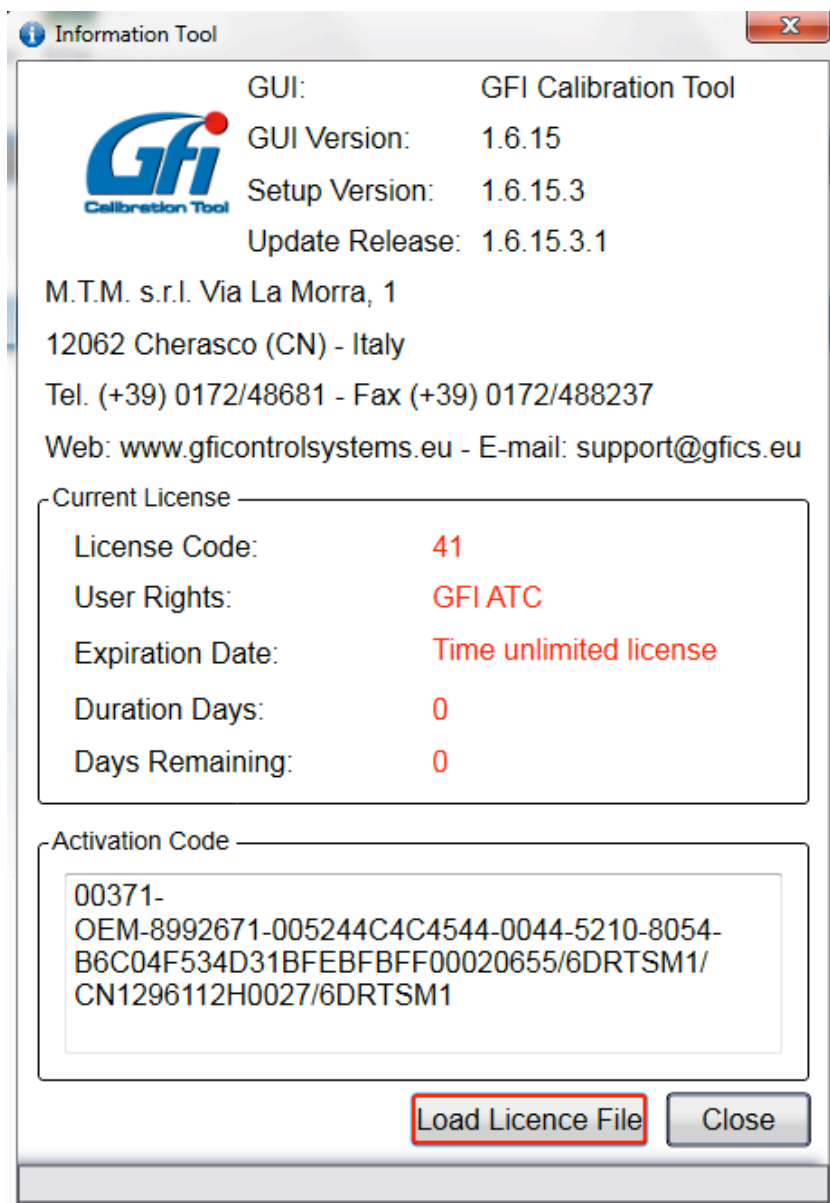
License previously required should be uploaded to CALIBRATION TOOL to start.



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



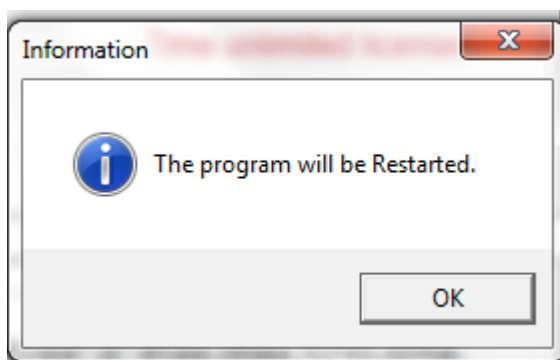
Load Licence File

Click on License File Upload and select the file required.

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.

5 The CALIBRATION TOOL software

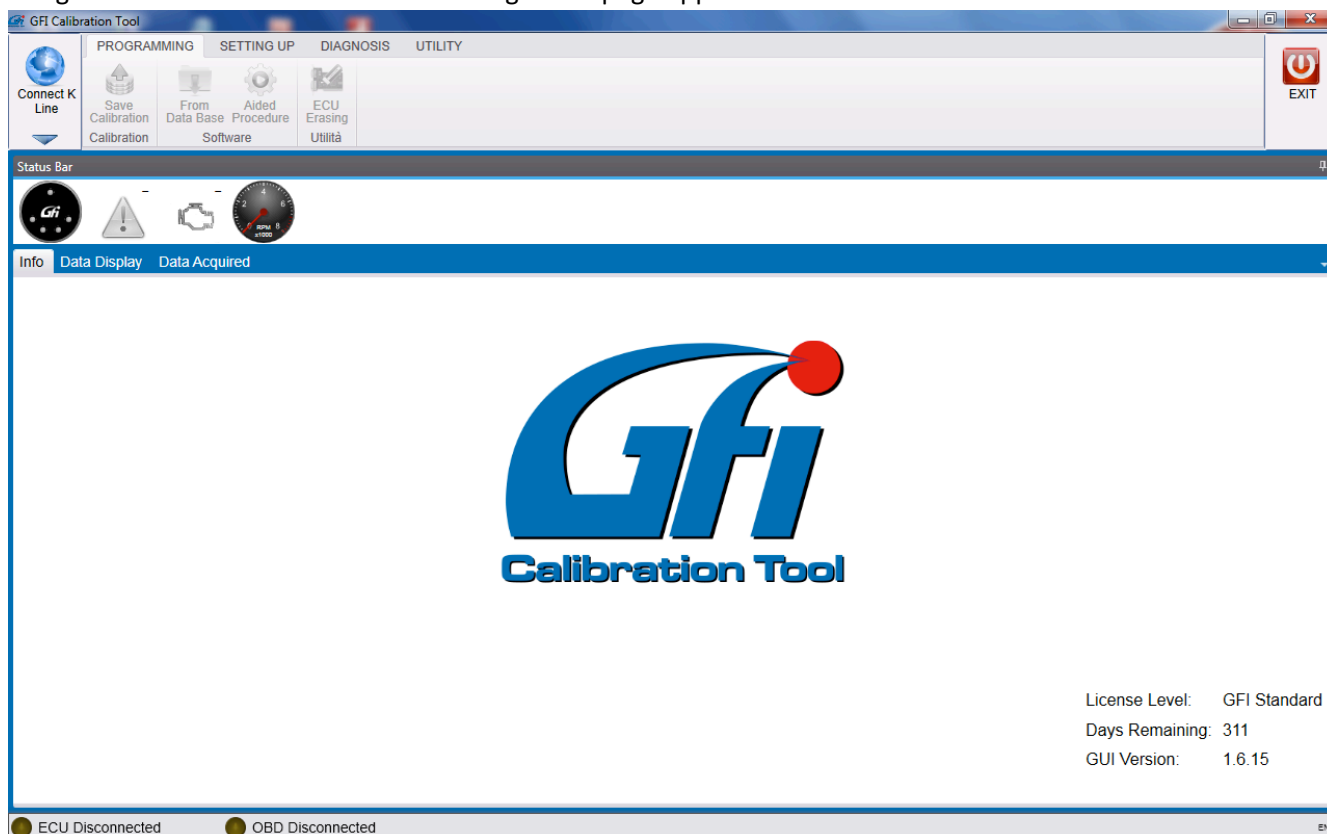
Once the installation ended successfully, you can start the CALIBRATION TOOL, by double clicking on CALIBRATION



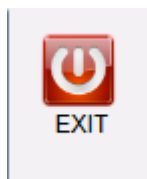
TOOL icon on desktop.

5.1 Calibration Tool structure

Starting the CALIBRATION TOOL the following home page appears.



The *Exit* button top right allows to leave the CALIBRATION TOOL.



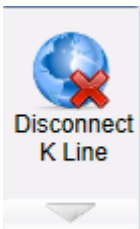
Once you connected communication cable to the gas ECU diagnostic connector and PC USB port, click on button *Connect K Line* top left to activate communication with ECU.



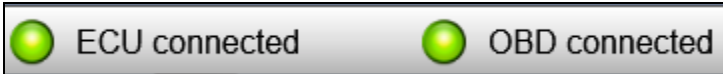
The system automatically detects the right communication port. This operation is only carried out at the first connection; then the system records the communication port used.

!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.

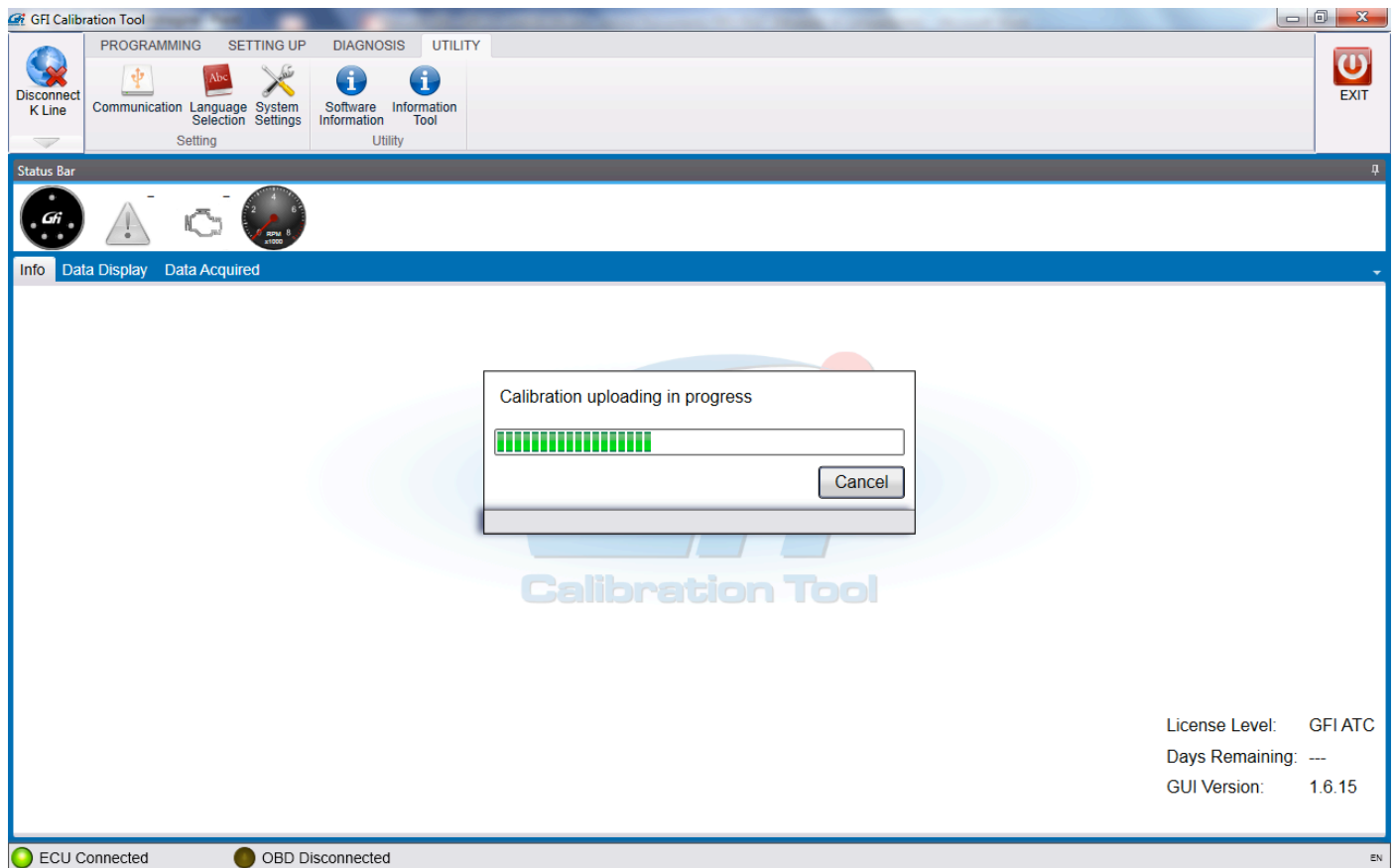


In this picture you can see both ECU and OBD communication right connection.

If OBD communication fails, the respective symbol is off.

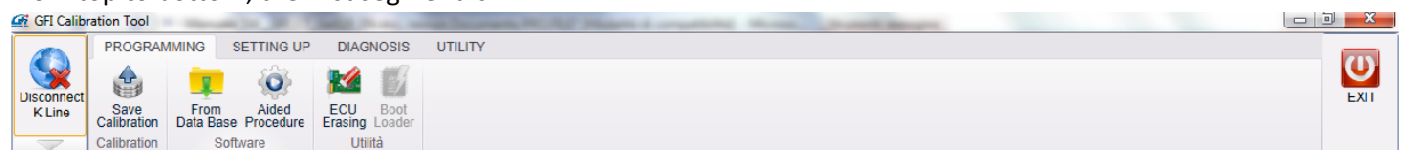
If light is blinking, the system is searching for OBD communication.

Once the communication is enabled, CALIBRATION TOOL window appears as follows:



CALIBRATION TOOL can be divided into three main segments.

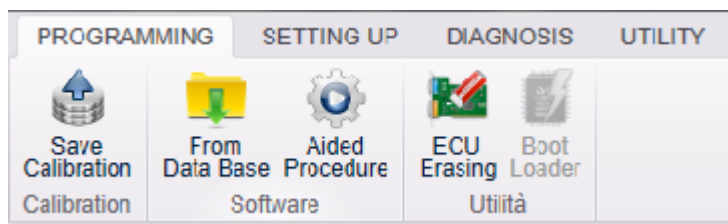
From top to bottom, the first segment is:



Besides the two buttons seen before (communication and exit), there are 4 main sections.

Each section has further subsections to carry out dedicated procedures, briefly described here below, but examined in depth in the next chapters.

PROGRAMMING



From database: in this section you can program ECU through files previously archived or provided by BRC.

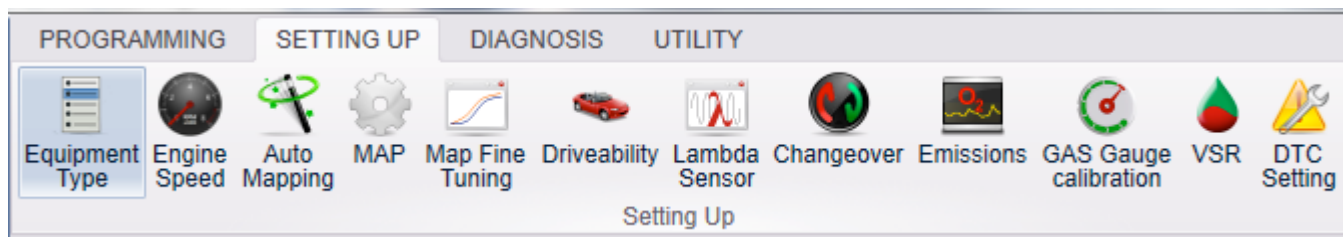
Aided Procedure: in this section you can program ECU realizing a new customized calibration.

Save Calibration: in this section you can file the ECU map into the PC database and download the calibration previously modified by the user.

Erase ECU: in this section you can erase the ECU programming and software. **!ATTENTION!:** only carry out this procedure under supervision of GFI technicians.

Boot Loader: in this section you can update the gas ECU loader. Only carry out this procedure under supervision of GFI technicians.

SETTING UP



Equipment Type: in this section you can enter or modify any system feature, such as engine, cylinders, injectors sensors, etc...

Engine Speed: in this section you can enable and adjust RPM.

Auto mapping: in this section you can create a new gas map.

MAP: in this section you can set up OEM MAP input.

Map fine tuning: in this section you can modify/refine gas calibration.

OBD settings: in this section you can manage communication with OBD system.

Driveability: this section gathers all strategies necessary to improve vehicle driveability.

Lambda Sensor: in this section you can set up Lambda Oxygen Sensor.

Changeover: in this section you can modify Petrol-Gas and Gas-Petrol commutation strategies.

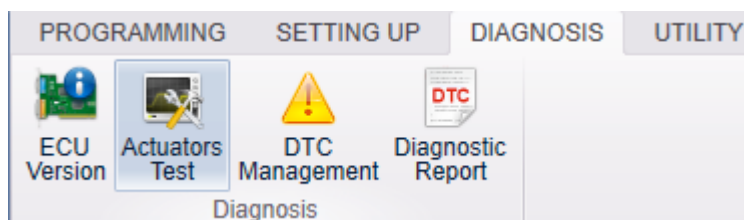
Gas Gauge calibration: in this section you can customise gas level display on changeover switch

VSR: in this section you can enable and manage the petrol contribution strategy in order to preserve valves right operation.

Petrol pressure: in this section you can set up petrol pressure sensor input.

DTC Setting: in this section you can Enable/Disable and adjust gas diagnostics errors management.

DIAGNOSTICS



ECU Version: in this section there is all information recorded into the ECU.

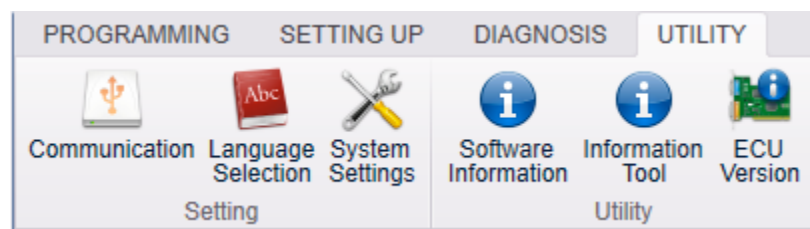
Actuators Test: in this section you can test gas system actuators good working.

Errors Management: in this section you can consult gas system diagnostics.

Diagnostics Report: in this section you can save a text file with a summary report of gas system diagnostics errors.

Disable OBD: in this section you can temporarily disable OBD communication between gas and petrol ECUs.

UTILITY



Communication: in this section you can change communication parameters between TOOL and ECU.

!ATTENTION! We suggest to not modify default parameters if not suggested by GFI After-Sales Service .

Choose Language: in this section you can choose which language to use.

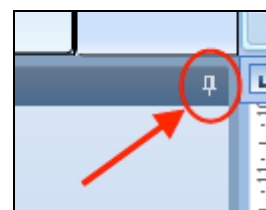
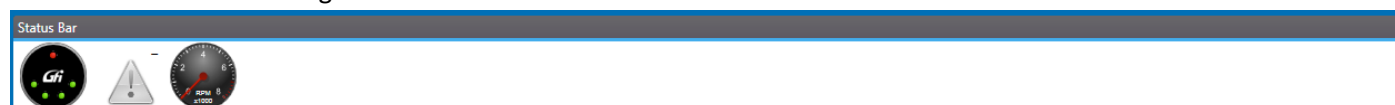
Software Information: in this section you can see all software of Calibration Tool database

Application Information: in this section there is all information concerning CALIBRATION TOOL.

ECU Version: in this section there is all information recorded by the ECU.

STATUS BAR

The second and middle segment of the window is the Status Bar

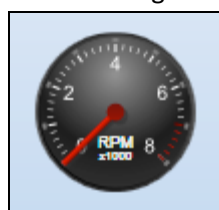


The Status Bar can be temporarily removed by clicking on symbol shown in this picture.

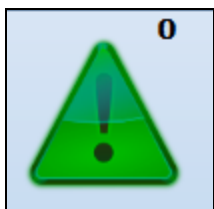
The Status Bar includes:



Virtual changeover switch, that allows to change over directly from PC.



RPM indicator.



Indication of possible errors recorded in gas diagnostics and Petrol ECU memory.

The colour of this symbol changes accordingly to the diagnostics configuration:

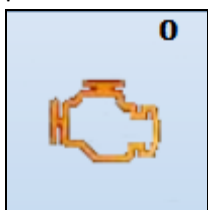
Grey: Diagnostics disabled

Green: Diagnostics enabled with no errors found.

Yellow: Diagnostics temporarily blocked.

Red: Diagnostics enabled with errors in ECU. The number of errors detected appears top right.

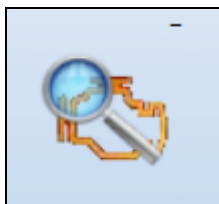
You can enter the errors management section by clicking on the icon, in order to directly check recording and possible solutions.



OBD communication indication and errors recorded in petrol ECU memory.

If communication with vehicle OBD system is present, this icon turns yellow and the number of errors recorded in petrol ECU is shown.


If system is not able to communicate with vehicle OBD, this icon appears as follows.





In the third and last segment of the window, information about application and connected ECU is shown.



Bottom right of the screen, there is the application information:

License Level: 

Days Remaining: 


GUI Version: 


License level: it indicates the kind of license used for the application.


Days Remaining: Licenses can have an expiration date; after this deadline they cannot be used anymore. At the expiration, a new license can be required following the procedure described in the paragraph “License requirement”.


GUI Version: it indicates CALIBRATION TOOL interface version

Bottom left, there is the information about connected ECU

ECU Code: 

Software Version: 

Current Calibr.Vers. (FXD): 

Original Calibr.Vers. (FXD): 

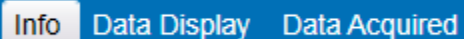
ECU Code: it indicates the code and shows a little description of ECU.

Software Version: it indicates the version of current ECU software.

Current Calibr. Vers. (FXD): it indicates the version of current ECU calibration. Versions 0 are the ones created/modified by the user. Versions validated and provided by GFI have a value different from 0.

Original Calibr. Vers. (FXD): it indicates the starting version of OEM calibration, if modified by the user.

Clicking top of this segment



you can navigate from the Info main window to the Data Visualisation one, where you can check graphs and numbers of system variables. You can also reach the Acquired Data window, where you can create graphs from acquisitions previously done.

5.2 Using CALIBRATION TOOL

The CALIBRATION TOOL on a gas system gives installer the possibility to use the following functions:

1. PROGRAMMING

- Programming from Database
- Aided Procedure
- Saving Calibration
- Erase ECU
- Boot Loader

2. SETTING UP

- System
- RPM
- Self-mapping

- MAP
- Map fine tuning
- OBD settings
- Driveability
- Lambda Oxy Sensor
- Changeover
- Level Calibration
- VSR
- Petrol pressure
- Errors Calibration

3. DIAGNOSTICS

- ECU Version
- Actuators Test
- Errors Management
- Diagnostics Report
- Disable OBD

4. UTILITY

- Communication
- Choose Language
- Software Information
- Application Information
- ECU Version

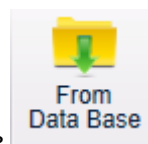
5. DATA VISUALISATION

- Graph Creation/Management

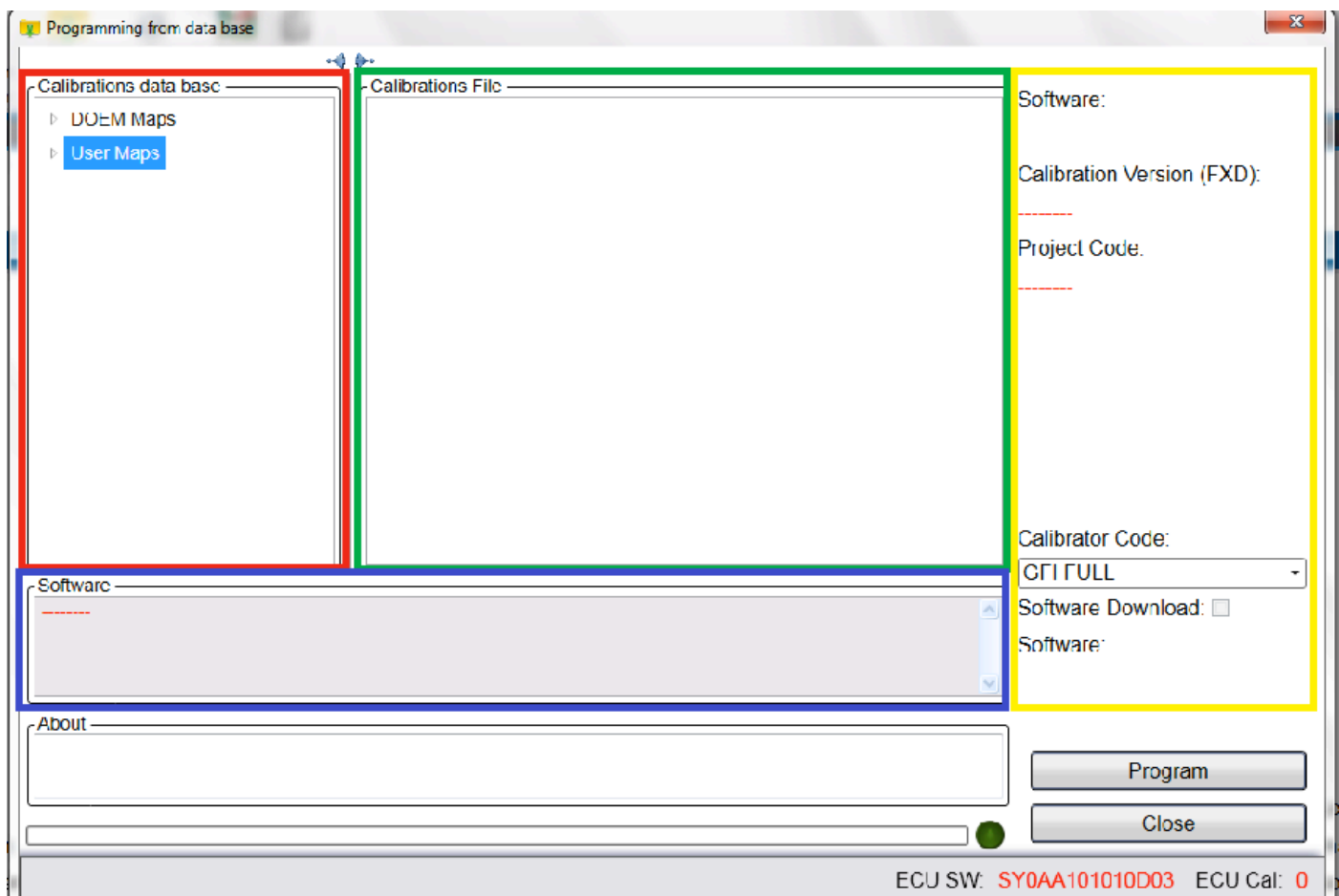
6. OFF-LINE

5.2.1 PROGRAMMING

5.2.1.1 Programming from Database



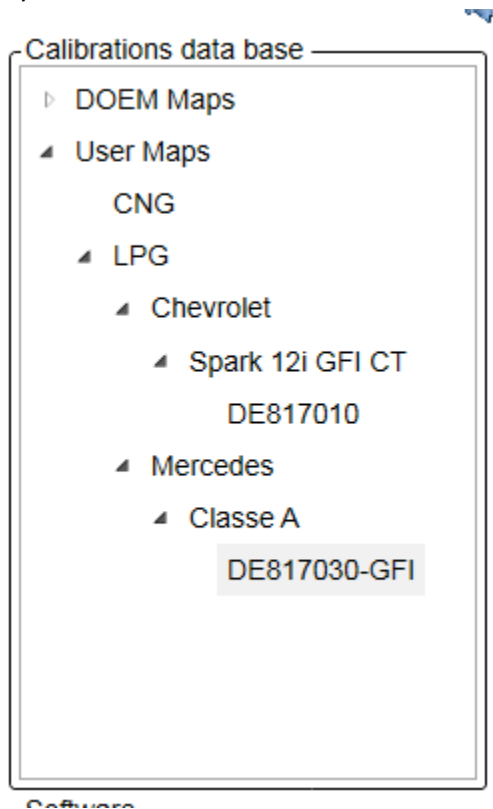
From the main menu, select *Programming > From Database* to enter the page for programming ECU from database, that's to say from files already available (such as already developed vehicles).



As you can see, Programming from Database section has been divided into four main boxes.

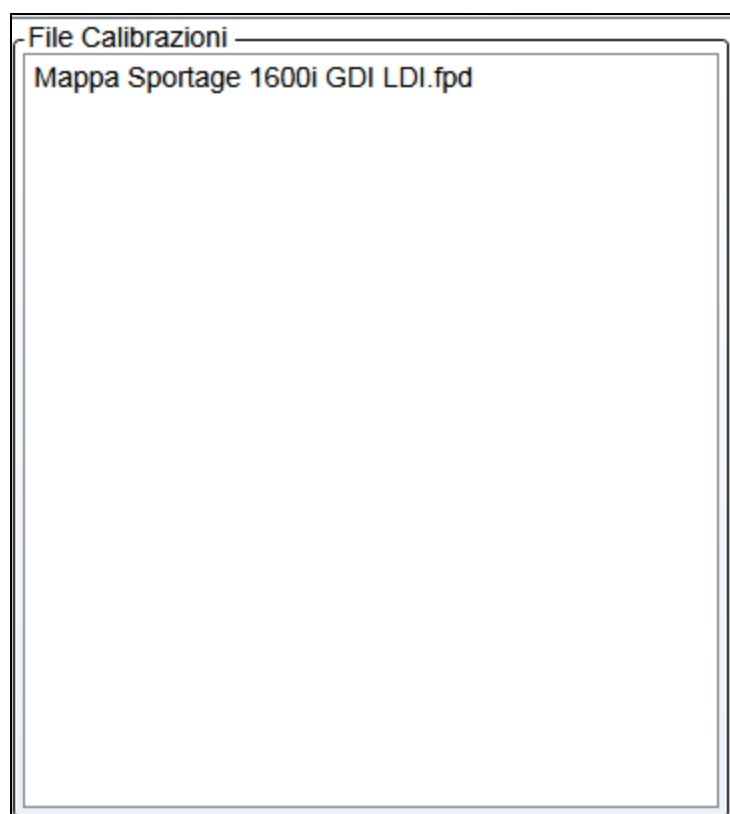
Calibration Database (red box)

Select a calibration file from CALIBRATION TOOL database to carry out programming. There are two main families into the database: OEM maps, dedicated to calibrations validated and provided by GFI, and User Maps, dedicated to calibrations saved and/or developed by the user. Every family has been further divided accordingly to the kind of system, trademark, model and ECU.

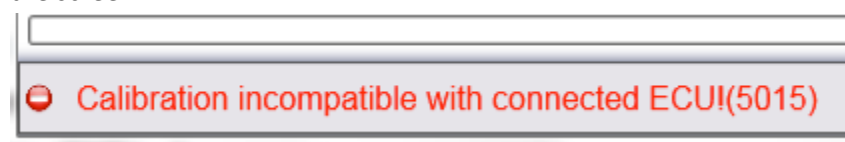


Calibration Files (green box)

Once the wished calibration position selected, all calibrations available from database for download in ECU appear in this box. The installer should select the calibration file to be programmed in gas ECU.



If a calibration file is not compatible with the ECU connected, the following warning message appears bottom left of the screen.



Software (blue box)

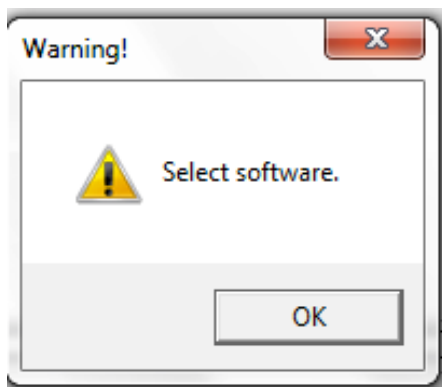
This box shows software available into the database for the ECU connected.

Select software to download with calibration if necessary.

Choose software to download by selecting one of the listed ones.



If software is not available, or if software is available but not compatible with the calibration wished, a warning message appears. Select the updated software.



Summary (Yellow box)

Programming from Database right box shows a programming procedure summary.

Software:	SY0AA100010
Vers. File Calibrazione (FXD):	0
Codice Progetto:	0
Scarica Software:	<input checked="" type="checkbox"/>
Software:	SY0AA100010D03

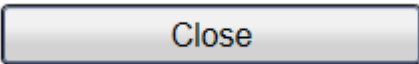
It supplies information about: the software coupled with calibration you wish to download.

The version of the map you wish to download; the version of calibration currently present on ECU. Moreover, it supplies the parameters of software to download, such as programming tick and name of the software.

Once you selected calibration and possible ECU software, you can proceed with programming ECU by clicking on

button *Programming* 

The *Close* button allows to leave the page without downloading any calibration

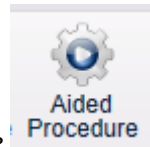


5.2.1.2 Aided procedure

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.

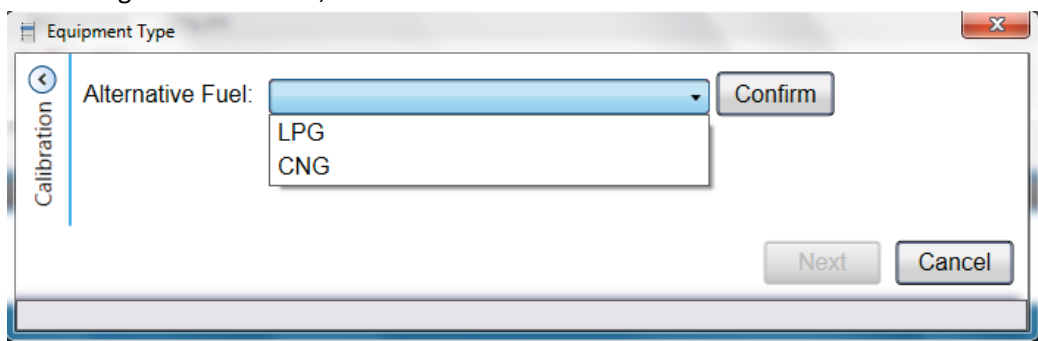
Installer is guided step by step through the whole procedure by some messages.

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.

A window appears asking the kind of fuel, LPG or CNG.



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

5.2.1.2.1 Type of equipment

It specifies more information about the system installed and vehicle.

Equipment Type

Alternative Fuel: LPG [Modify]

Intake System: Intaked

Injection Type: Sequential

Number of Cylinders: []

Displacement: 0

Injector Type: []

P1 TGAS Sensor: []

MAP Sensor: []

Coolant Sensor: []

Changeover Type: []

Lambda Sensor 1: []

Mass Air Flow Meter: []

RPM Signal: []

Calibration

Characteristics of injectors

Next Cancel

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 5,6,8 Cyl and EZ-Software 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 5,6,8 Cyl and EZ-Software 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 5,6,8 Cyl and EZ-Software 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

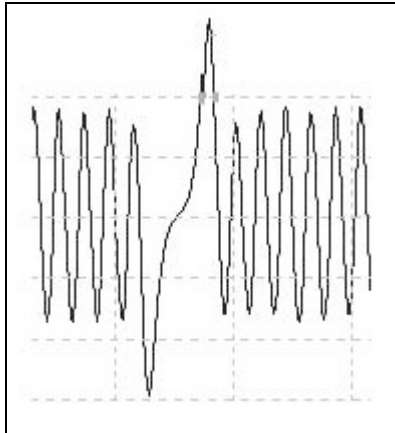
There are two kind of Crankshaft:

- Inductive sensor
- Hall Effect sensor

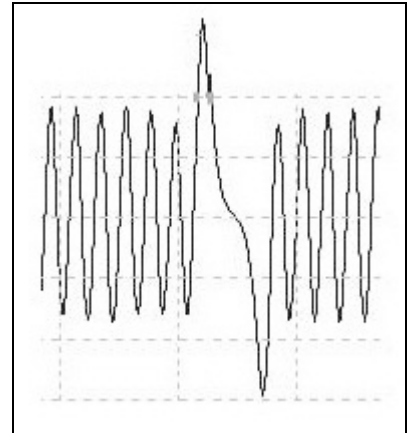
Inductive Sensor:

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.

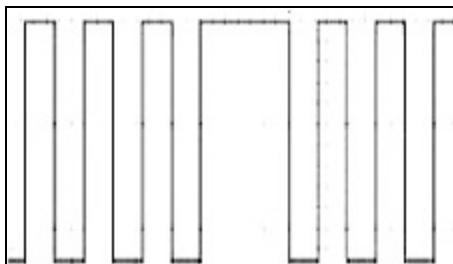
After realizing connections, Pink - Pink/Black on Positive and Light Blue – Light Blue/Black on Negative (see Equipment Manual for connections), set **VR High Voltage** in CRANKSHAFT CONFIGURATION.

VR Low Voltage configuration is only used for specific applications.

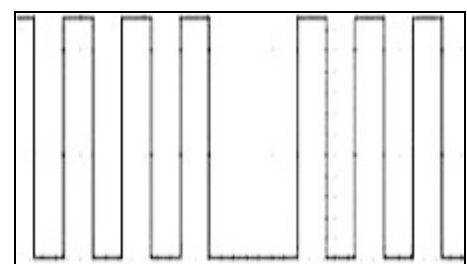
Hall Effect Sensor:

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*.

Save Calibration

Calibrations Data Base

- ▷ DOEM Maps
- ▷ User Maps

Data Base:

Trademark:

ECU:

Calibrations File

Alternative Fuel:

Model:

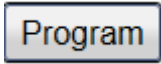
File:

Version:

Calibrator Code:

Back Program Close

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).

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

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.

5.2.1.2.2 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 Auto Calibration

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

File save

GFI Calibration Tool

PROGRAMMING SETTING UP DIAGNOSIS UTILITY

Disconnect K Line Save Calibration Calibration

Status Bar

Info Data Display

ECU Code: Software Version: Current Calibr. Version: Original Calibr. Version: (FXD):

ECU Connected OBD Disconnected

Save Calibration

Calibrations Data Base

- DOEM Maps
- User Maps
 - CNG
 - LPG
 - Chevrolet
 - Spark 12i GFI CT
 - DE817010
 - Mercedes
 - Classe A
 - DE817030-GFI

Data Base: User Maps

Trademark: Mercedes

ECU: DE817030-GFI

Alternative Fuel: LPG

Model: Classe A

File: Classe A Test05

Version: 0

Calibrator Code: GFI FULL

Calibrations File

- Classe A Test01.fpd
- Classe A Test02.fpd
- Classe A Test03.fpd
- Classe A Test04.fpd
- Classe A Test05.fpd

Back Program Close

Level: GFI ATC

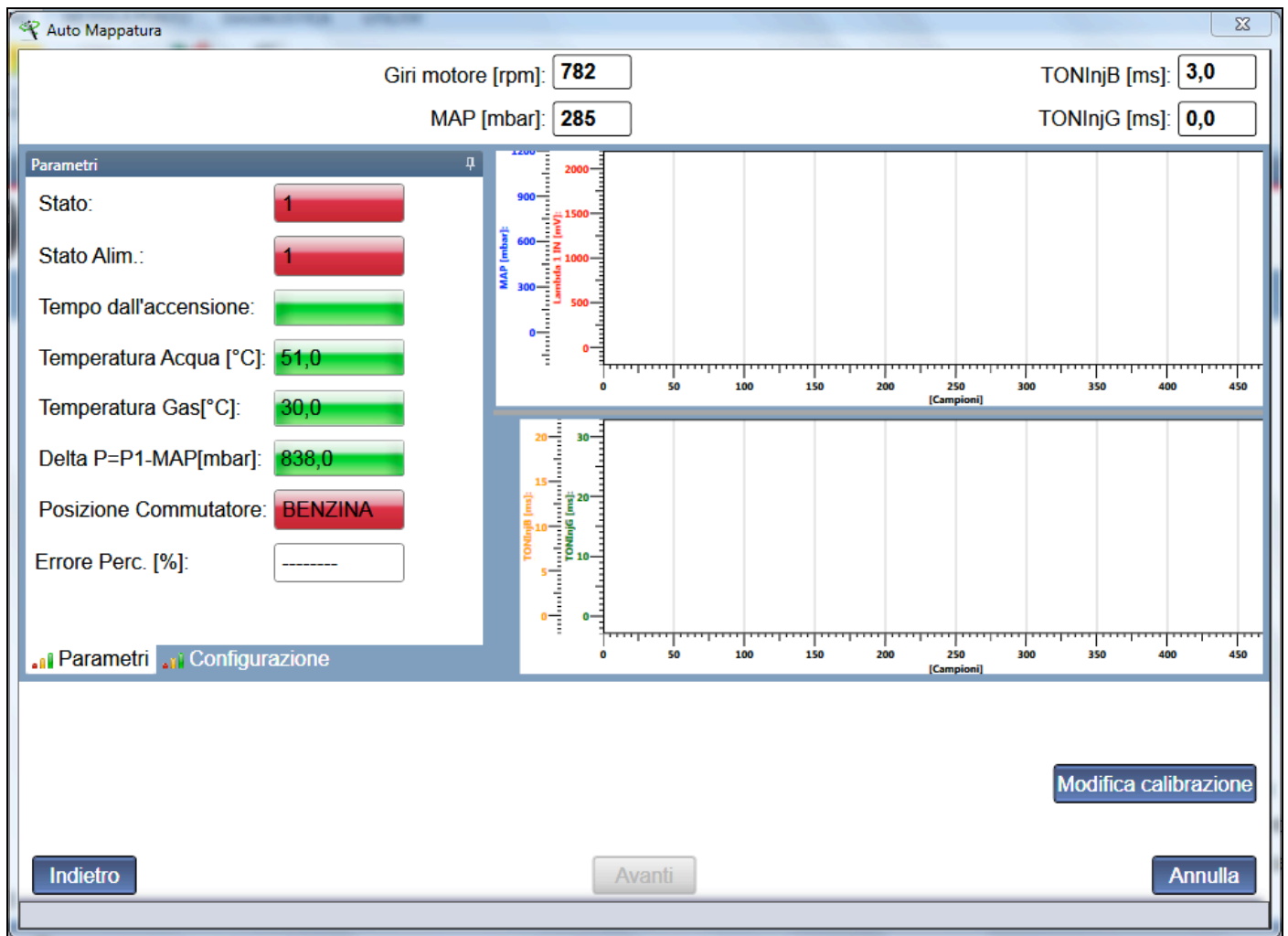
Training: ---

Version: 1.6.15

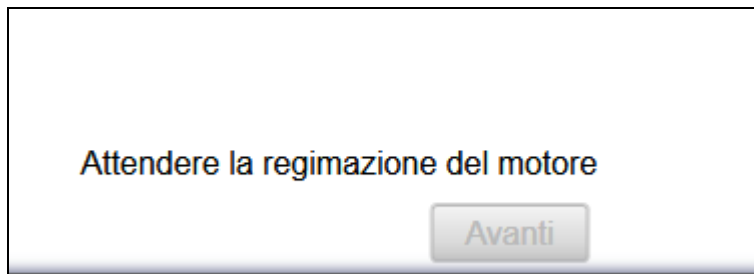
Save the file and click to

Program

to continue.



If system is not ready for self-mapping, waiting for right starting time and ECT temperature, the message below will appear:



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

Self-mapping set up can be modified by clicking on Configuration and entering a new box.

Configurazione

Errore Massimo[%]:

2 5 20

Correzione Iniziale[%]:

-100 5 400

Velocità Correzione[%]:

-100 0 100

MAP Max[mbar]:

TOn Max[msec]:

M:

Q:

Parametri Configurazione

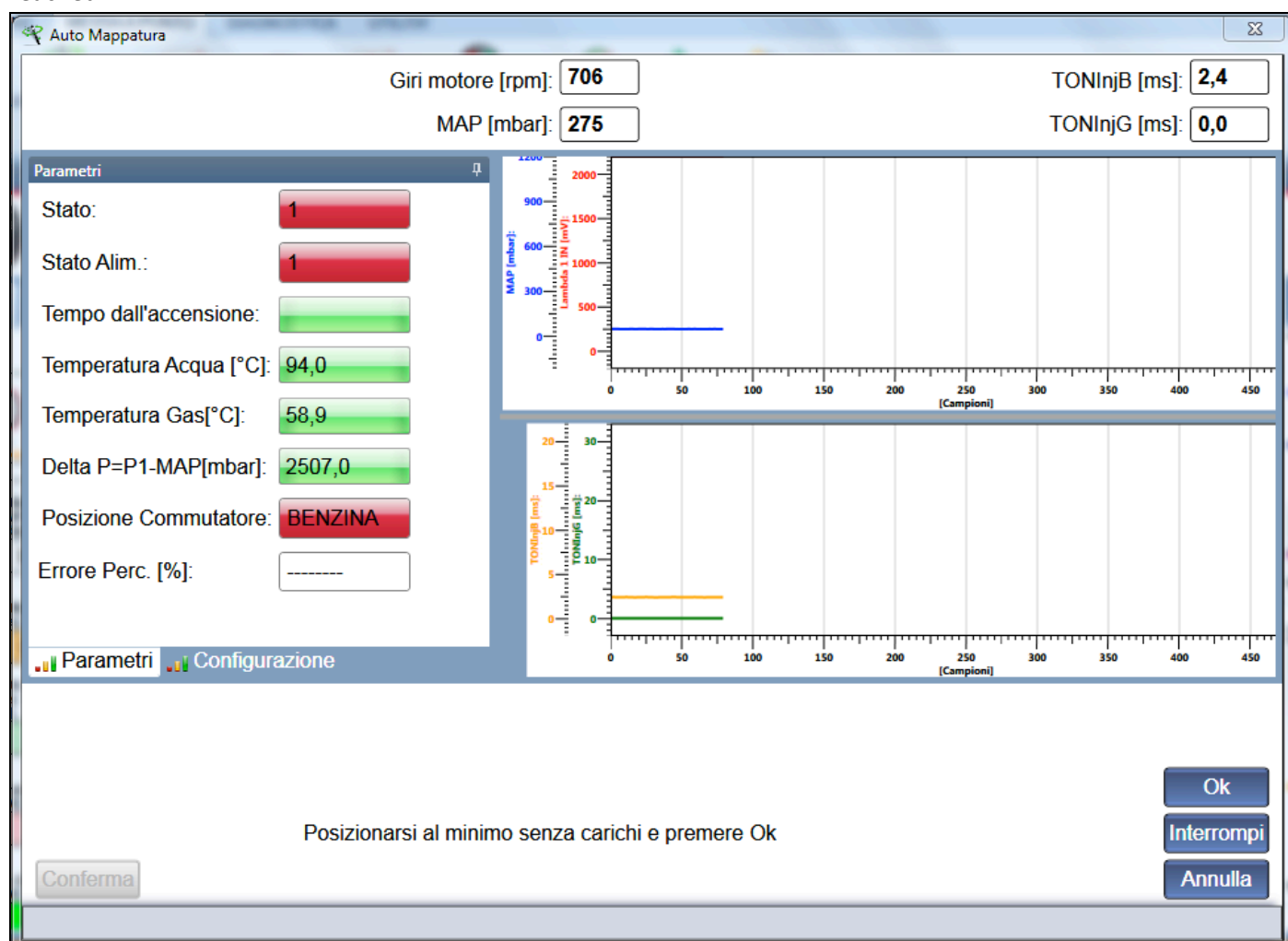
Max error [%]: the maximum error allowed for gas map centring can be modified. If calibration error is bigger than $\pm 5\%$ compared with petrol condition, the system goes on with the change. If it remains within the set up value, the system stores the change and can continue with self-mapping.

First correction [%]: If, during self-mapping, vehicle turns off before passing all cylinder to gas mode, the procedure can be repeated making the PC enrich or lean of any percentage. First correction only has its effect during a few starting moments after the first gas cylinder changeover. Then, automatic corrections will prevail.

Correction speed [%]: calibration correction has a default speed. You can speed or slow it through this cursor. Generally, when Perc.Error [%] is too high, you can try to speed it in order to accelerate centring so that vehicle self-adapting parameters do not move. In case of Perc.Error [%] low values, you can reset correction speed. On the contrary, in case of Lambda Oxy Sensor slow fluctuations, making gas system correction hard-to-do, we suggest to modify Correction Speed towards negative values, slowing correction until reaching Perc. Error [%] low values. Now correction speed can be reset.

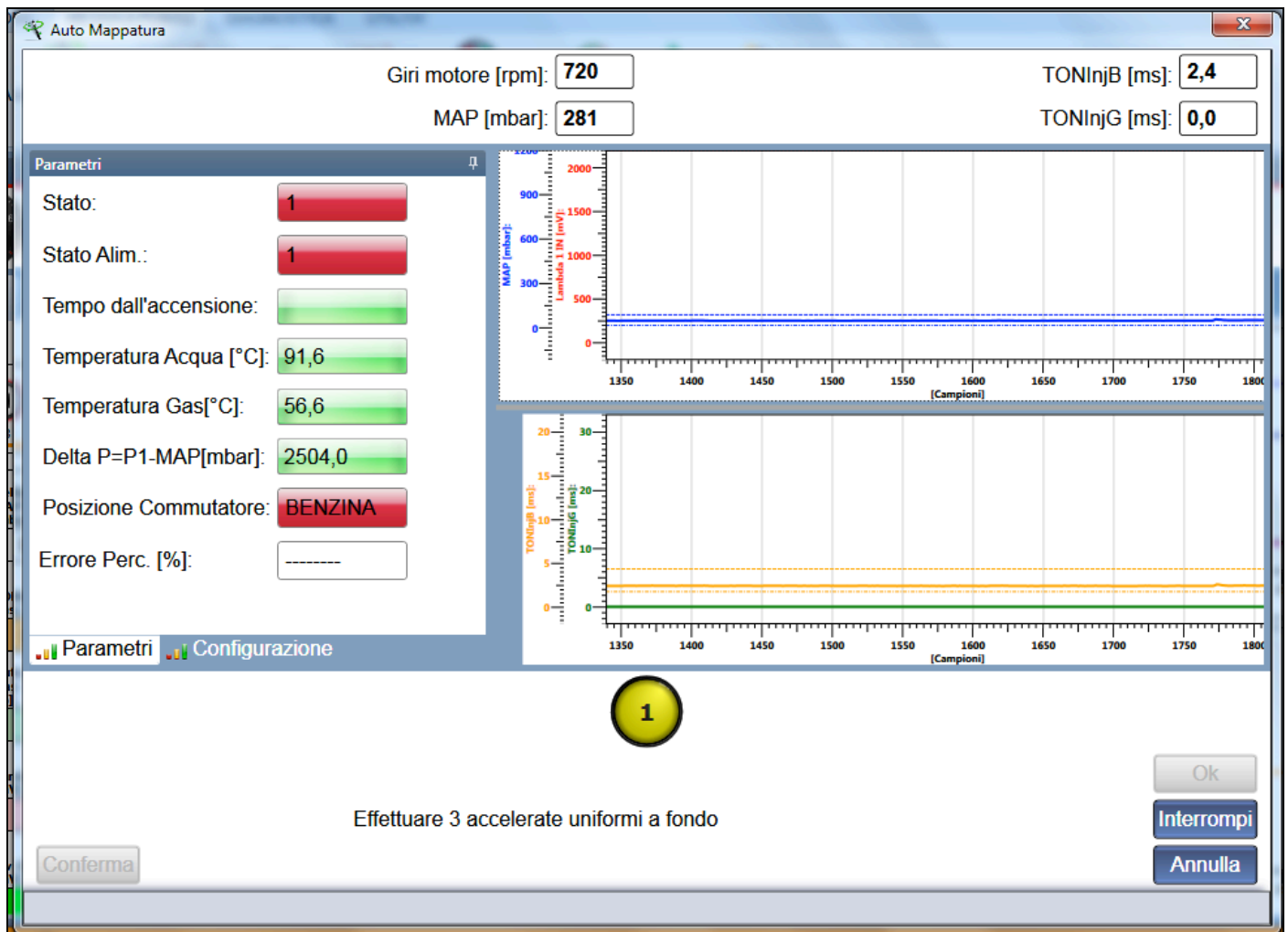
Press **Modify calibration** to start procedure.

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



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.



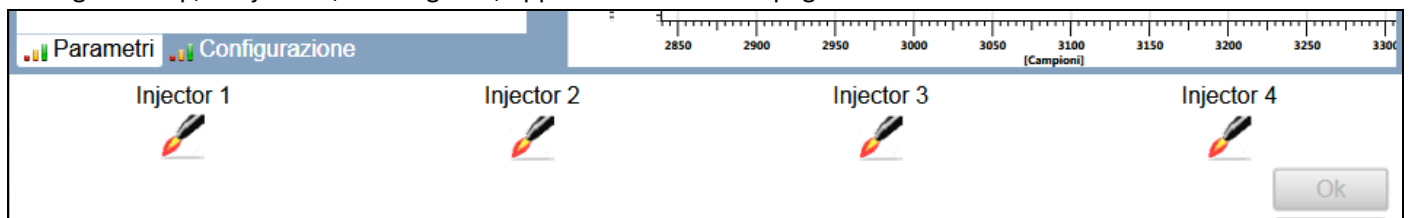
The yellow circle in the middle bottom shows the number of acceleration to do. In this picture the system asks for the first tip-in.

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.

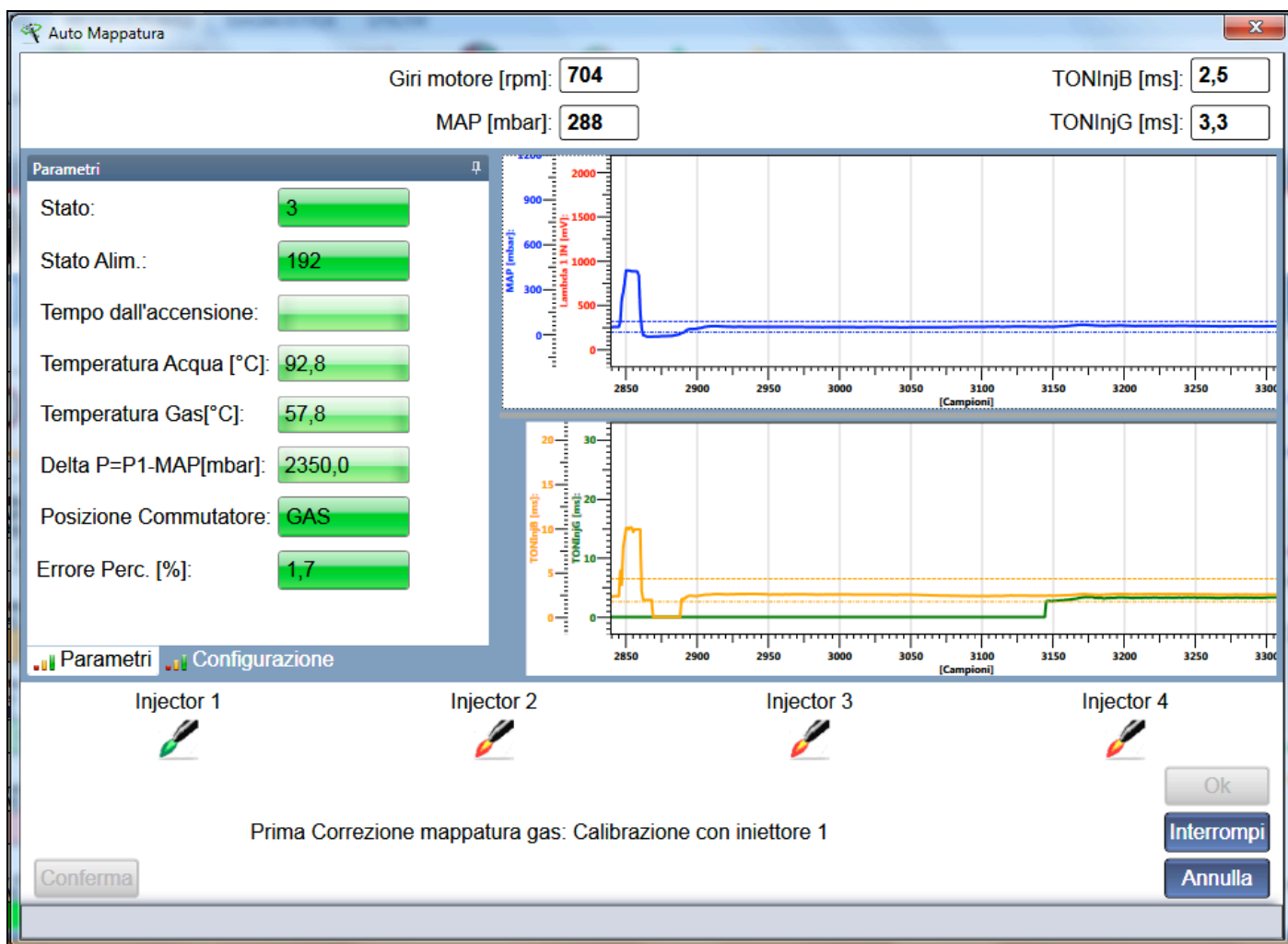
Automatic calibration has the aim to get the best idle centring.

During this step, 4 injectors, red or green, appear bottom of the page.

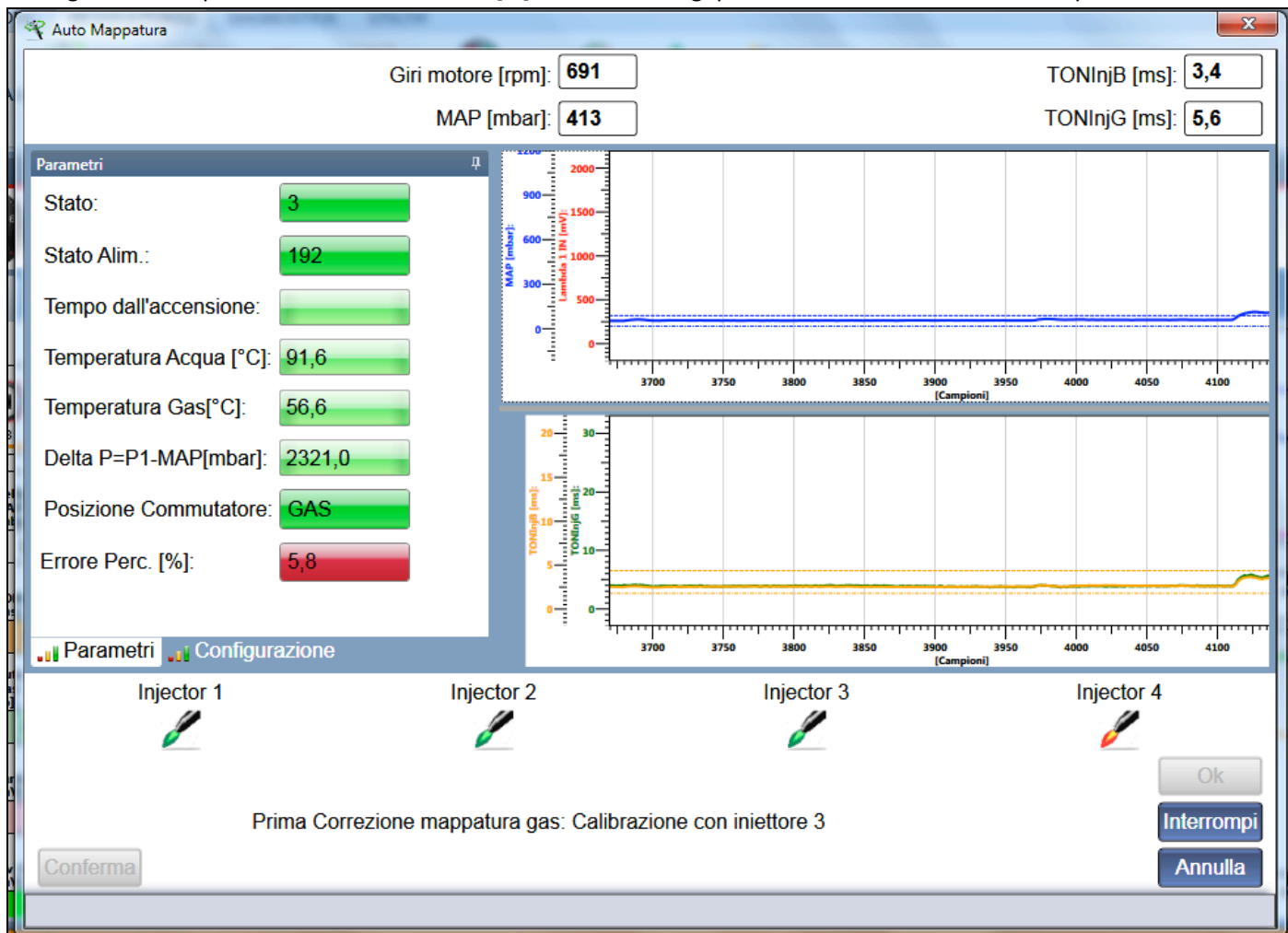


Injectors are red (one for each cylinder), indicating that all cylinders are in petrol mode.

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.

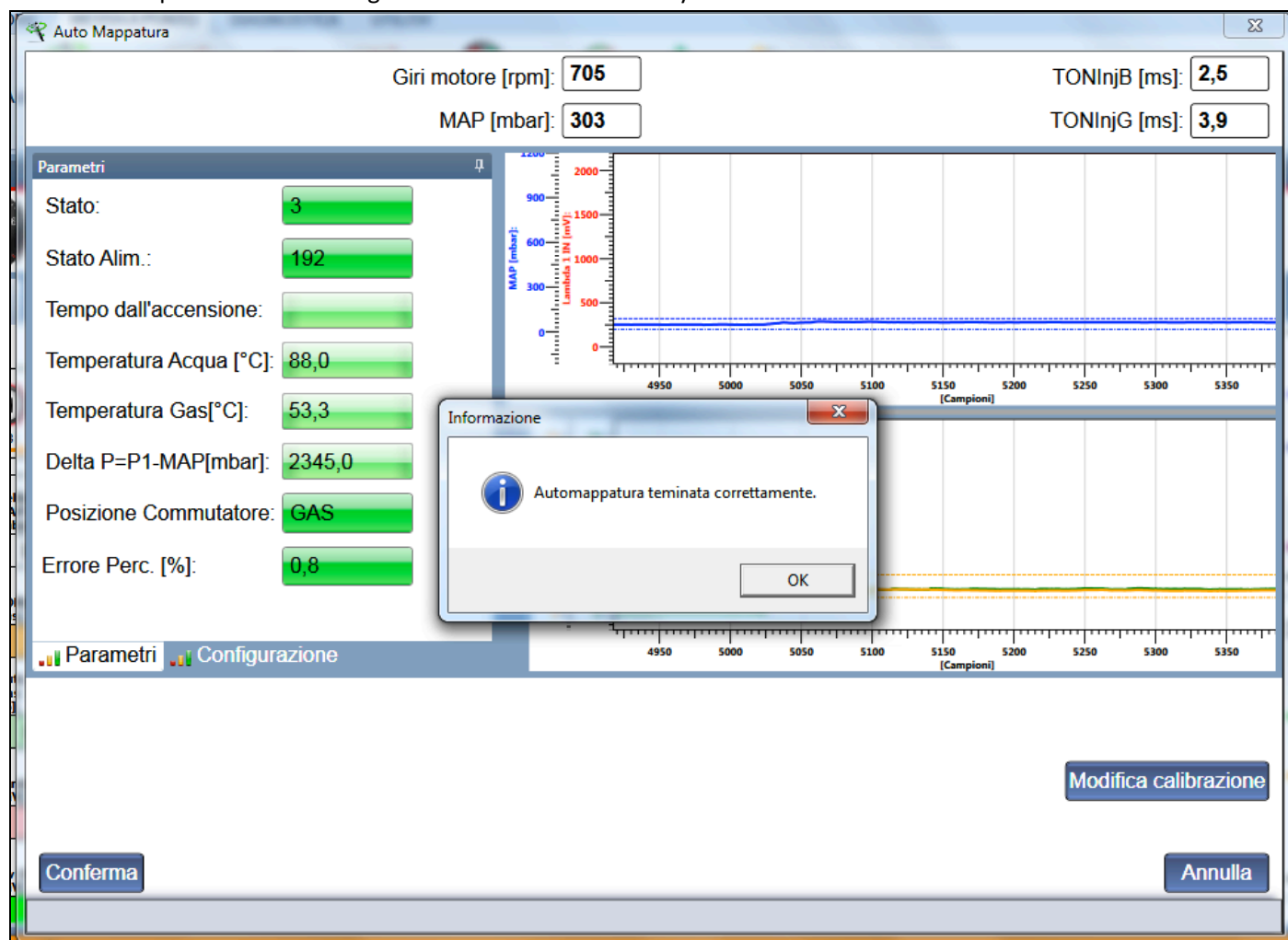


During the whole procedure, the Perc. Error [%] box show the gap between the current and the optimal condition.



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.

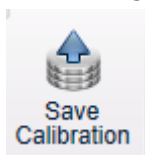
At the end of procedure a message will notice the successfully end.



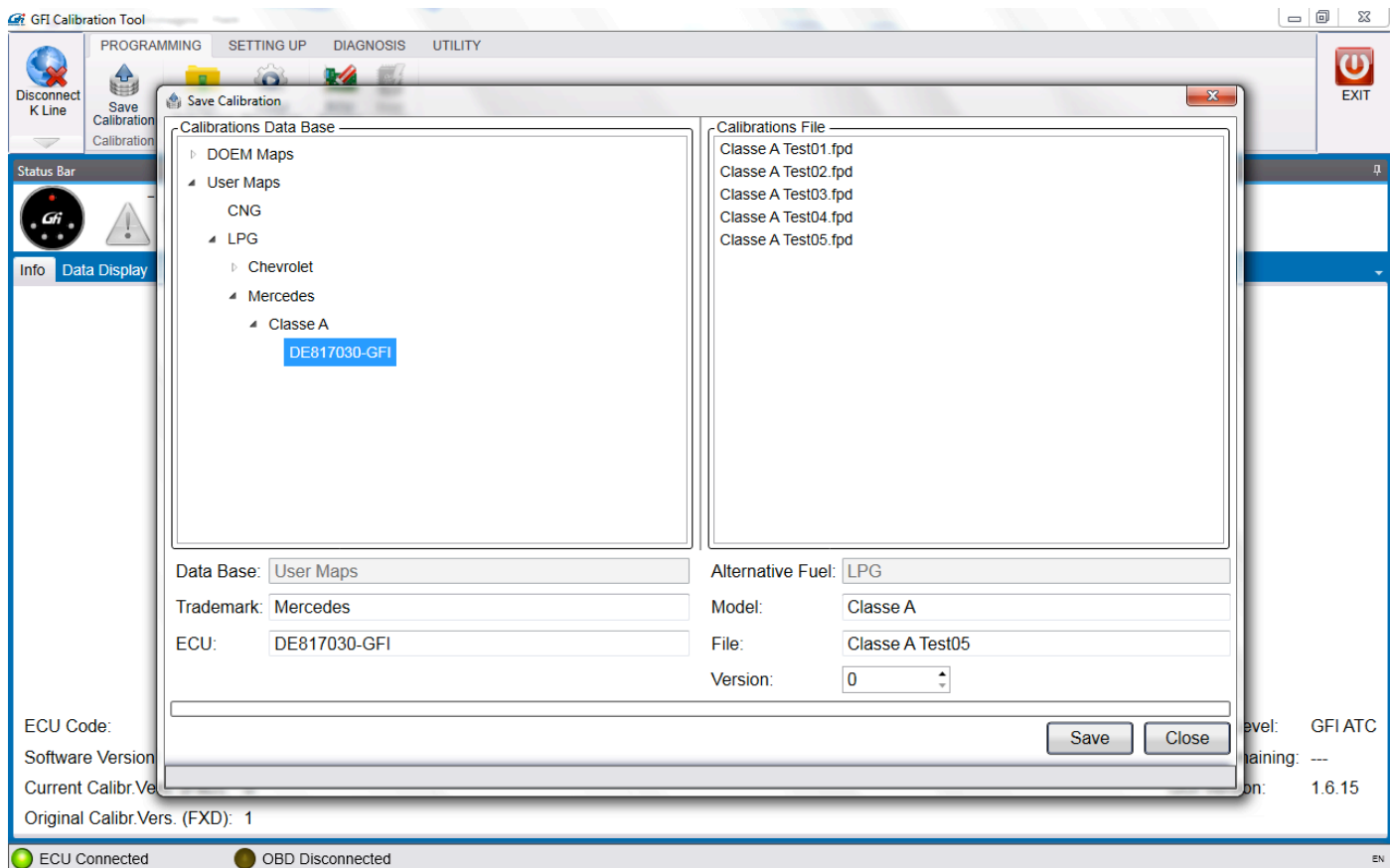
Press *Confirm* to leave the page and save changes with the *Save Calibration* key if necessary.

5.2.1.3 Saving Calibration

This tool allows installer to save ECU current calibration into the PC database. Carrying out this procedure before making diagnostics/modifications on vehicles lacking in calibrations is suggested.



Click on *Programming > Save Calibration* from main menu; a saving window appears to be filled in with kind of fuel, Trademark, Model and ECU of vehicle about which you wish to save calibration.



After typing the name of calibration file

Archivio:	Mappe Utente	Alimentazione:	LPG
Marca:	KIA	Modello:	Sportage 1600i 16V 99 kW GDI E5
ECU Gas:	MPI	File:	UPLOAD CALIBRAZIONE

Save

press **Save**.

Maps saved will always be filed into User's Maps.

Close

If calibration file saving is not required, press **Close** to come back to the main window.

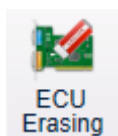
5.2.1.4 Erase ECU

ECU erasure is an emergency procedure; use just if ECU programming is not possible anymore.

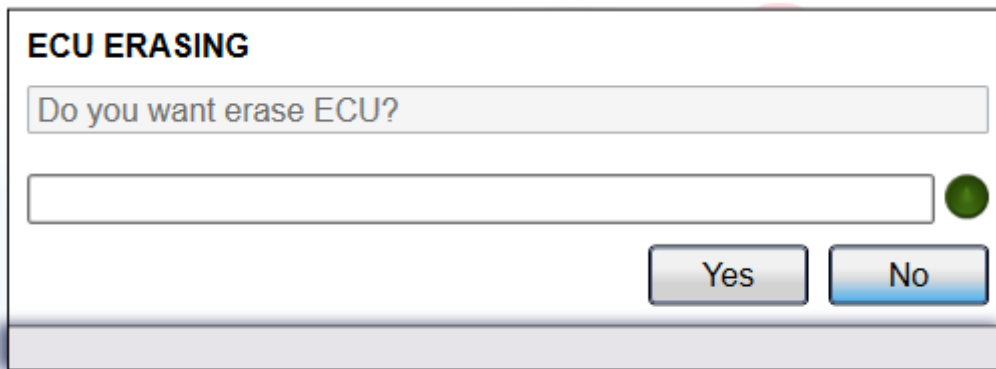
This procedure initializes ECU at default setting and removes definitely all calibrations and software previously made.

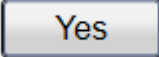
!ATTENTION! all information present on ECU will be lost using this procedure.

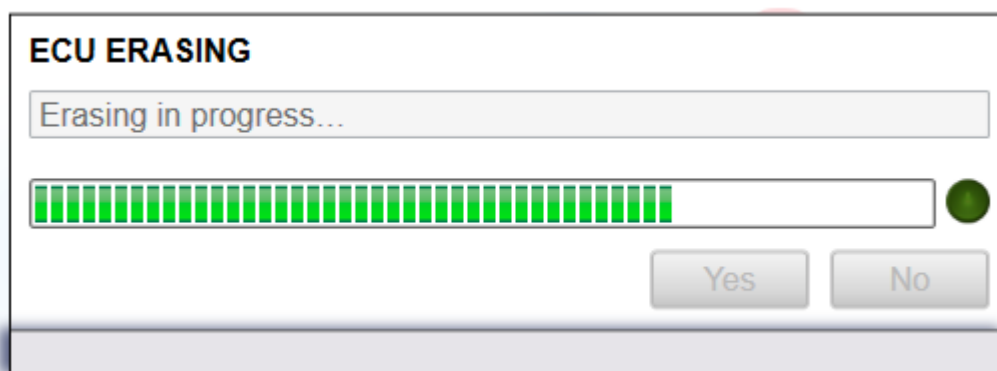
In case of doubt, better is to save ECU data on your PC through **PROGRAMMING > SAVE CALIBRATION**.



Select **Programming > ECU Erase** from the main menu to start the ECU erasure procedure.



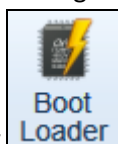
Press YES  to start procedure.

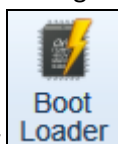


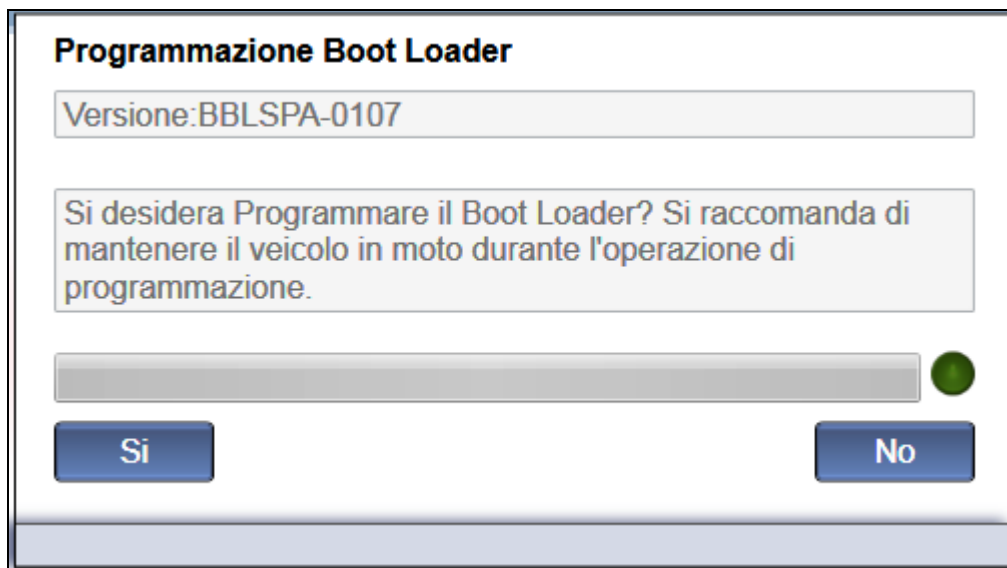
Press NO  to leave procedure.

5.2.1.5 Boot Loader

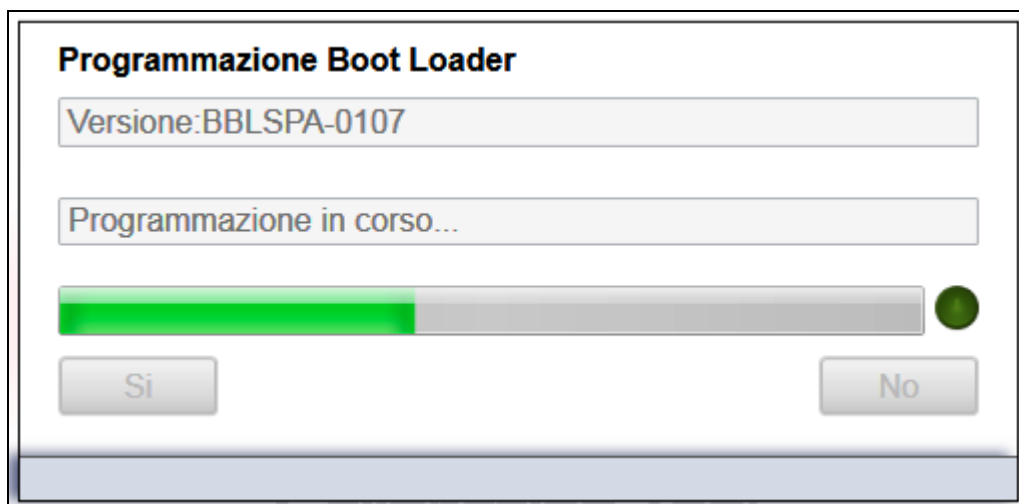
It could be necessary to update Boot Loader on ECU. In case of need, the system automatically informs the user during ECU programming.



Press *Boot Loader*  to update it.



The box above will appear.
Press YES to start procedure.



Press NO to end procedure.

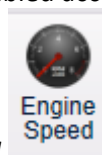
5.2.2 SETTING UP

Setting up functions, already described in the previous chapter, are:

- Type of equipment (Ch. 5.2.1.2.1)
- Self-mapping (Ch. 5.2.1.2.2)

5.2.2.1 RPM

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



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

RPM signal must be enabled for systems having a EZ-SoftwareECU, 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-SoftwareCNG) 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-SoftwareCNG) Timing advance management software. After the RPM automatic setting, the system will only show software dedicated to the typology recognised.

5.2.2.1.1 Automatic calibration procedure

Auto Calibration

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

Confirm

If RPM is correct, push **Confirm** and go on.

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

Sequenziale

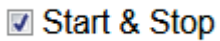
1 -3 -4 -2

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.

5.2.2.1.2 “Start & Stop” strategy



This strategy is dedicated to the vehicles equipped with Start & Stop function.

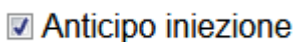
The peculiarity of this petrol system is to reduce pollution and fuel consumption when vehicle is stopped by switching off the engine.

GFI systems should wait for changing over until reaching changeover parameters at every starting, consuming so too much petrol.

By enabling this strategy, on the contrary, the system manages the engine Start&Stop starting just like a gas forced one, avoiding increasing the number allowed of that kind of startings.

!ATTENTION!: this strategy requires RPM connected in crankshaft or RPM counter modality!

5.2.2.1.3 “Advanced injection” strategy



This strategy allows the gas injection advance with respect to the regular petrol injection timing and it only works for 4-cyl engine.

It can be useful in case of problems of driveability caused by engine timing changes or manifold ducts opening.

The system does not give the gas injector its own control input, but rather the previous injector one with respect to the starting order, to advance the sequence.

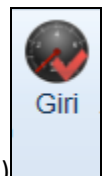
E.g.:

Generally, the 4-cylinder engines starting order is: **1 – 3 – 4 – 2**

The Advanced injection strategy uses instead this order: **3 – 4 – 2 – 1**

So, the software sends Gas Injector 1 control to the Gas injector 3.

Gas injector 3 control goes to the injector 4; Gas injector 4 control goes to the injector 2 and Gas injector 2 control goes to the injector 1.



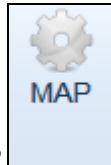
When a change made in RPM sensor calibration is confirmed, a red tick appears on the icon (see picture), meaning that user modified that section.

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

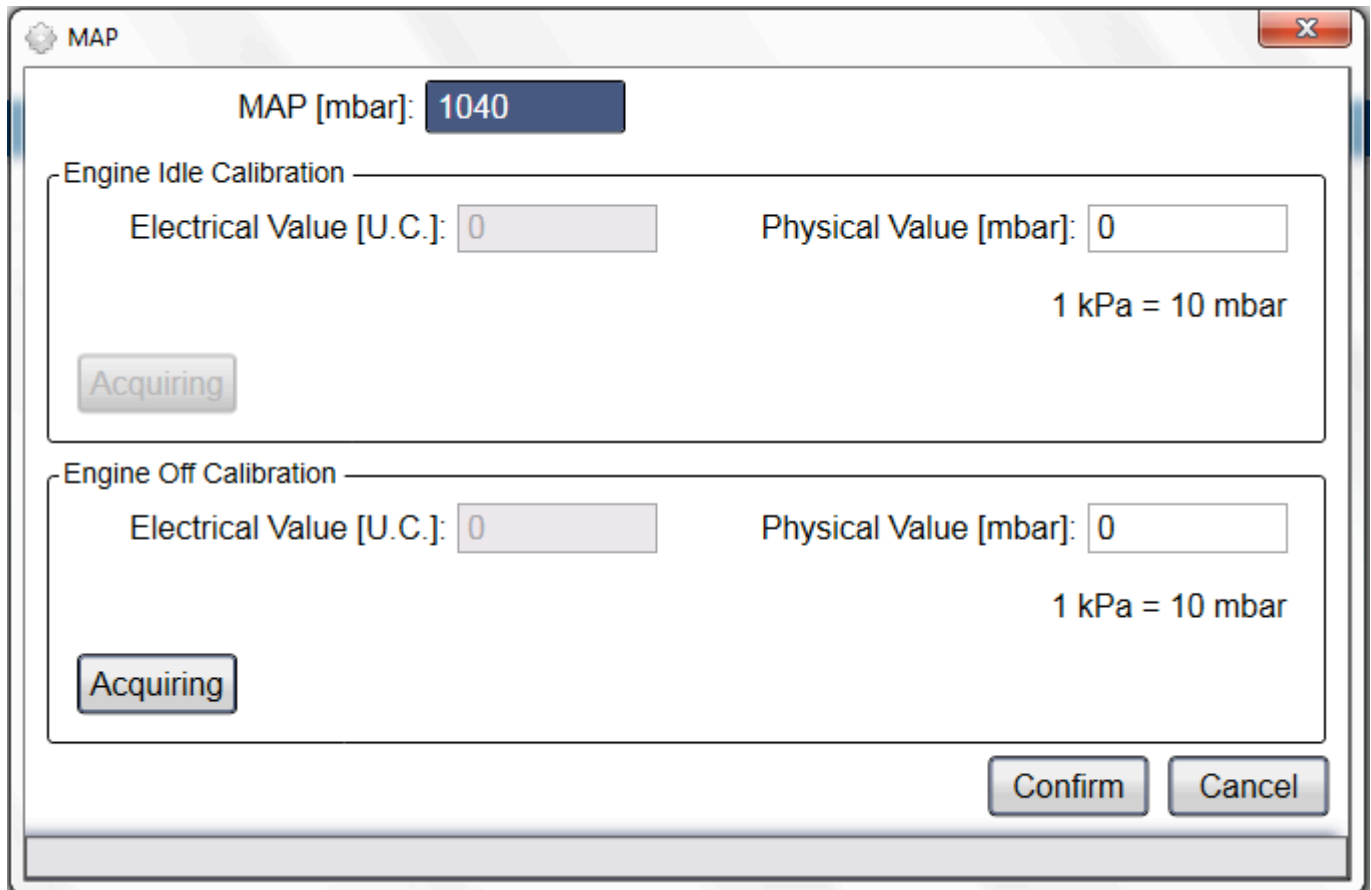
!ATTENTION!: This function is only available for ECUs of systems up to 4 cylinders

5.2.2.2 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.



The image shows a software window titled "MAP" with a gear icon and a close button. Inside the window, there are two main sections for calibration. The top section is "Engine Idle Calibration" and the bottom is "Engine Off Calibration". Each section contains two input fields: "Electrical Value [U.C.]" and "Physical Value [mbar]". In the "Engine Idle Calibration" section, the "MAP [mbar]" value is set to 1040, and both input fields are set to 0. In the "Engine Off Calibration" section, both input fields are also set to 0. Below each set of input fields is an "Acquiring" button. To the right of the input fields, the text "1 kPa = 10 mbar" is displayed. At the bottom right of the window are "Confirm" and "Cancel" buttons.

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*.



The image shows a software window titled "Taratura a motore al minimo". It contains two input fields: "Valore Elettrico [U.C.]" with the value 77 and "Valore Fisico [mbar]" with the value 350. Below the input fields is a button labeled "Acquisisci". To the right of the input fields, the text "mbar=kPa*10" is displayed.

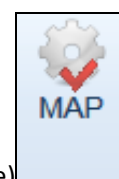
2. With engine off and dashboard on, enter the MAP Physical Value with engine off (it could be read by a OBD tester); press *Acquire* into the bottom engine off box.
! ATTENTION!: Before acquiring the electric value, confirm the physical one manually entered by clicking *ENTER*.

Engine Off Calibration

Electrical Value [U.C.]: Physical Value [mbar]:

1 kPa = 10 mbar

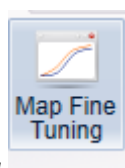
If the OBD communication connection and enabling is possible, the system gives the possibility to set MAP on the basis of OBD reading.



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

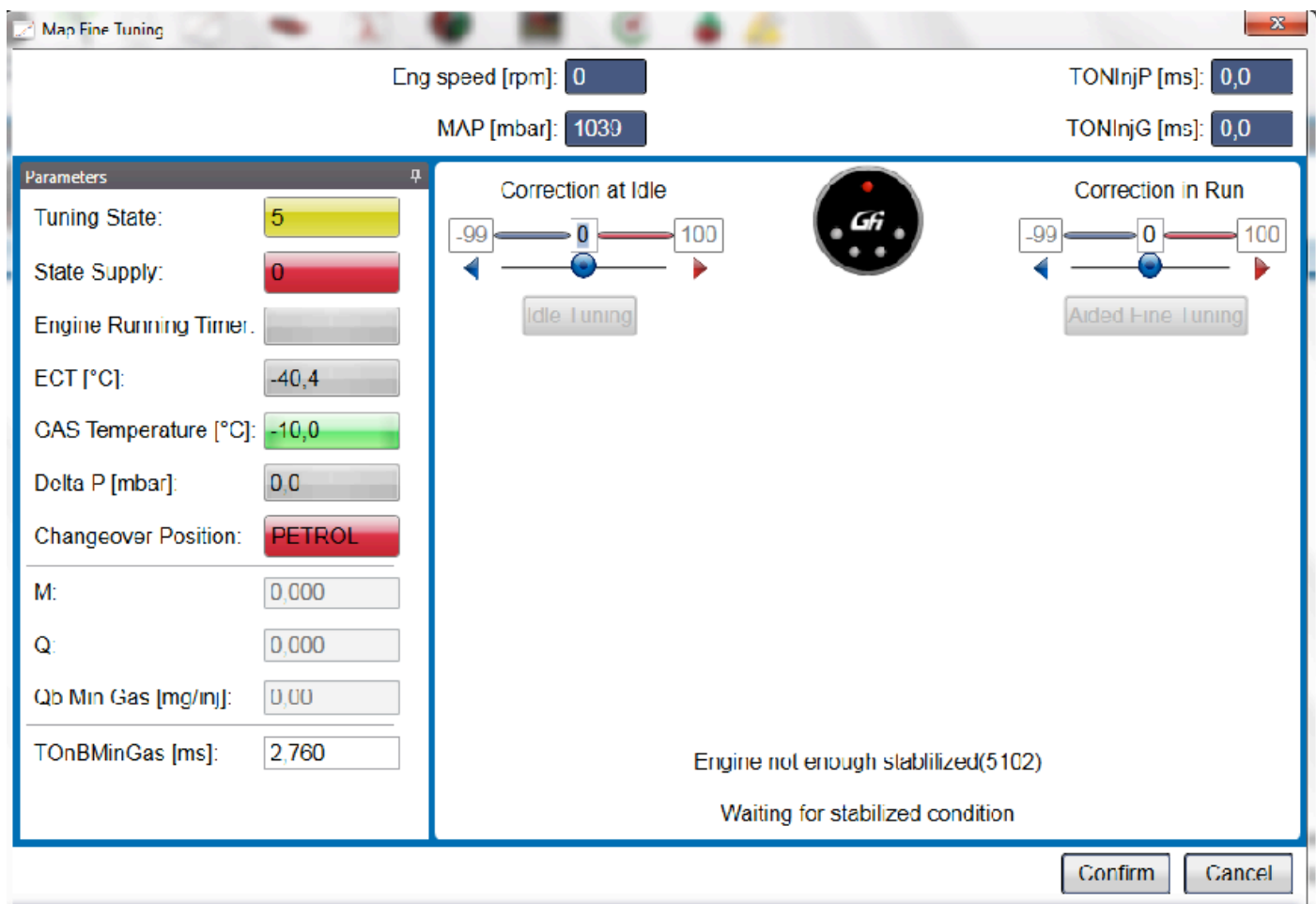
Download change into the Gas ECU through *Save Calibration* in order to enable it.

5.2.2.3 Map fine tuning



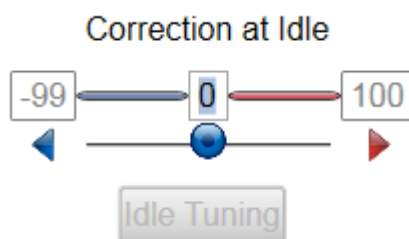
Click on *Setting up > Map fine tuning* from main menu to enter the section of gas calibration check and manual modification.

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

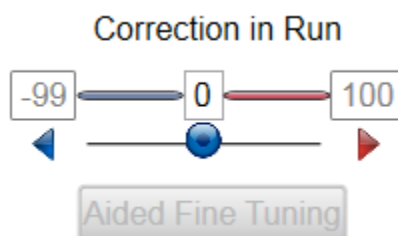


Map fine tuning can be made manually by acting on two “cursors”.

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.

5.2.2.3.1 Automatic idle fine tuning

The automatic idle fine tuning can be carried out by simply clicking on *Idle fine tuning*

Correction at Idle

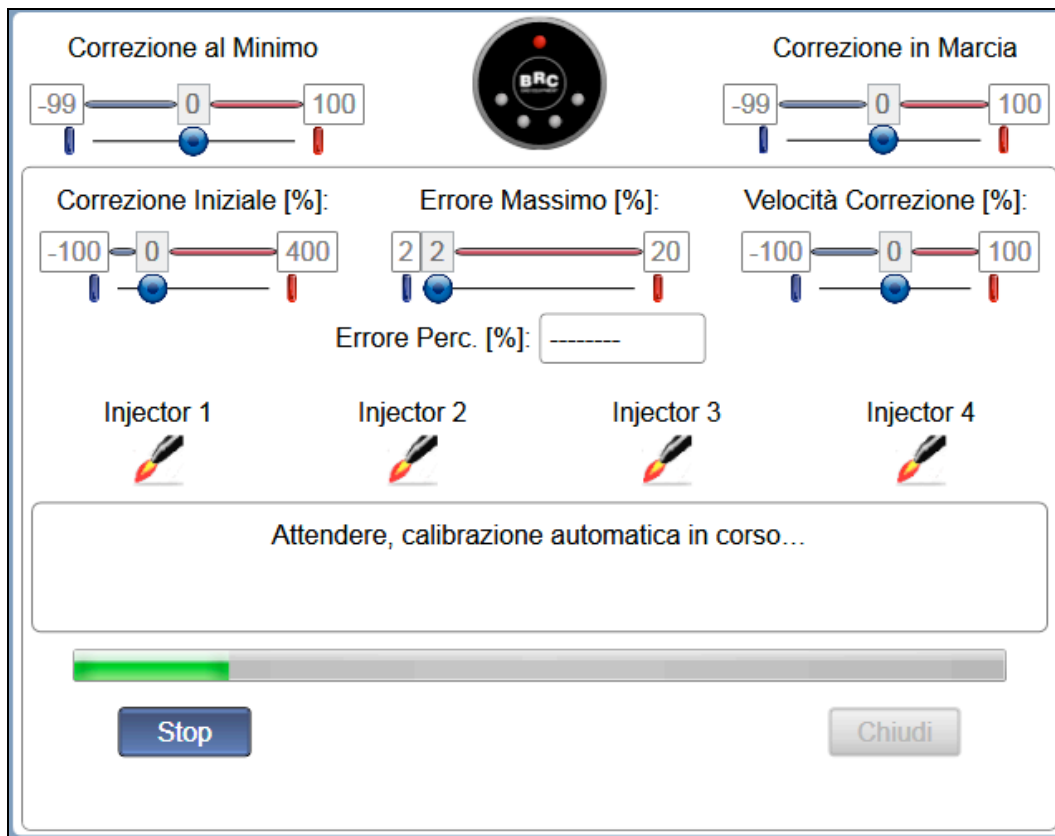


The window below appears.

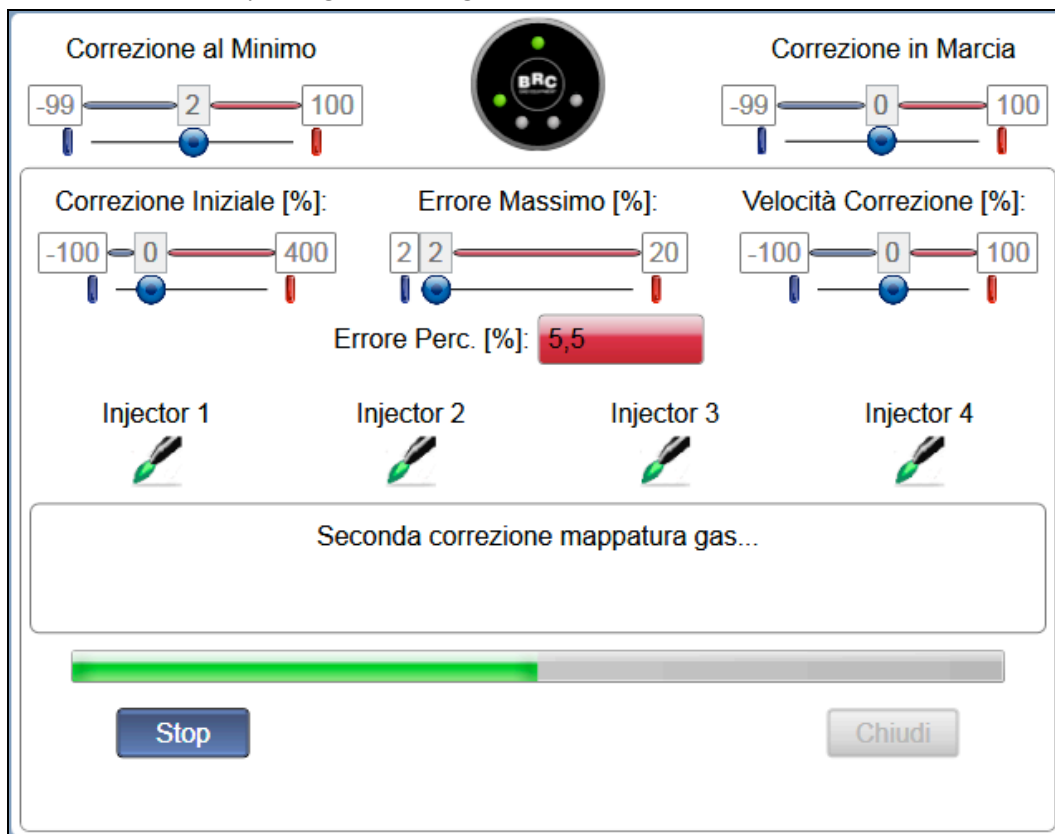
Start

Press **START** to start procedure.

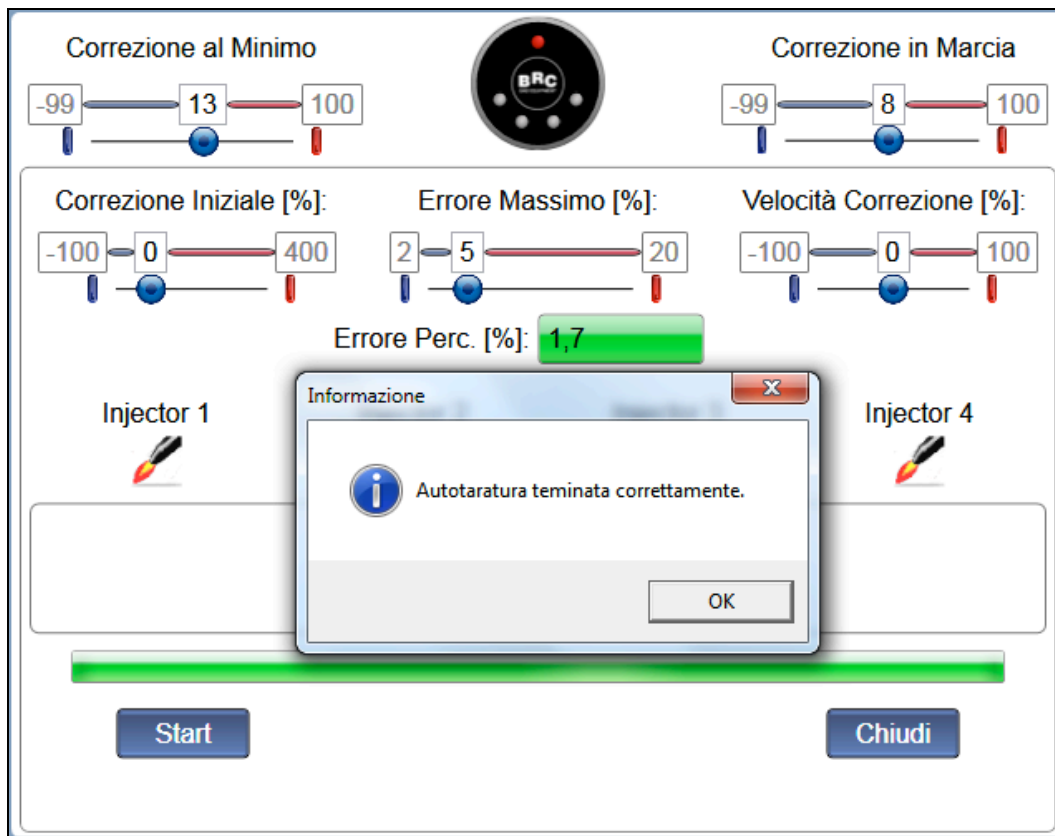
The system waits for petrol steady conditions.



Then it automatically changes over to gas and centres the idle.



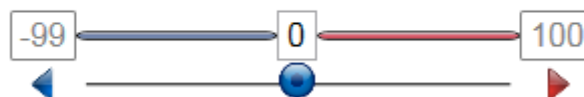
At the end of procedure a confirmation message appears.



5.2.2.3.2 Assisted fine tuning in running

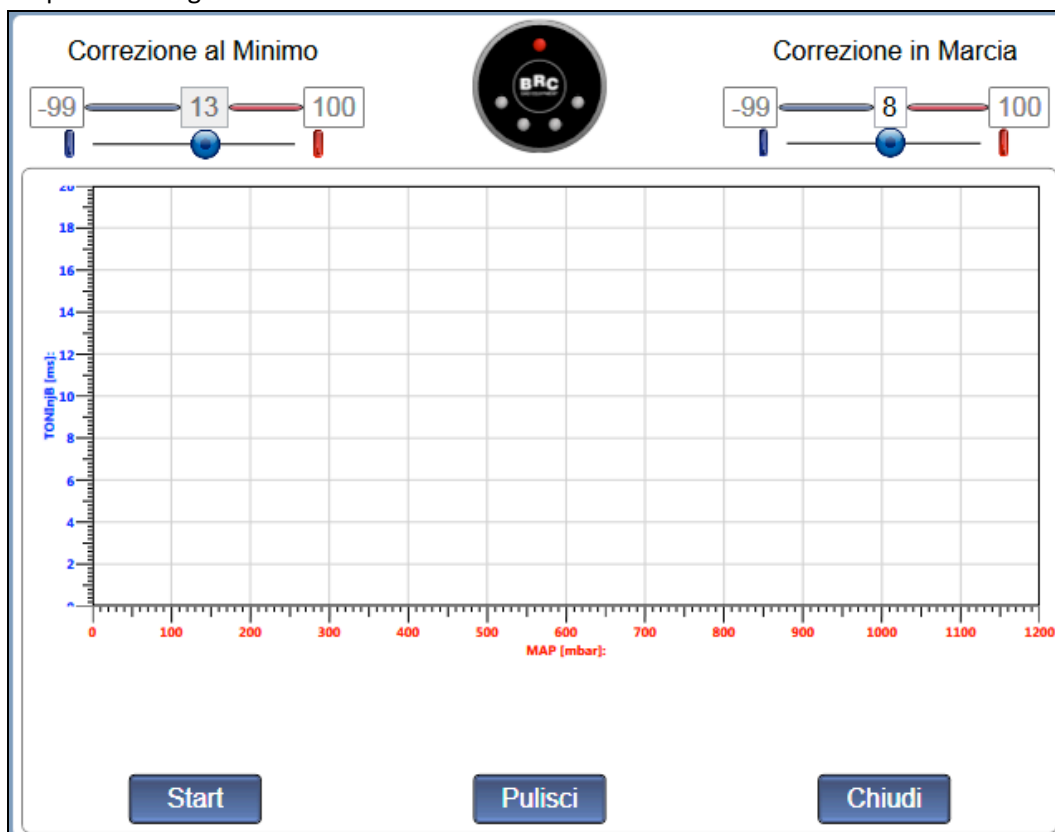
Map can be automatically refined in RUNNING condition too.

Correction in Run



Press *Assisted Fine Tuning*
Map Fine tuning window.

; a graph appears in the middle of the

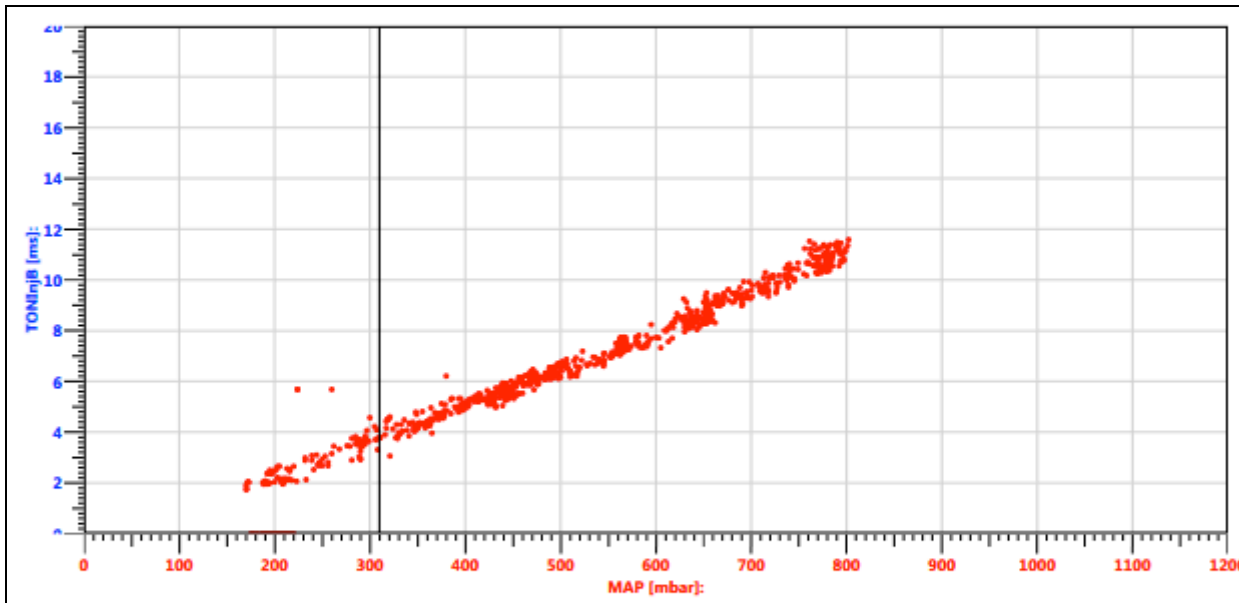


Start

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.

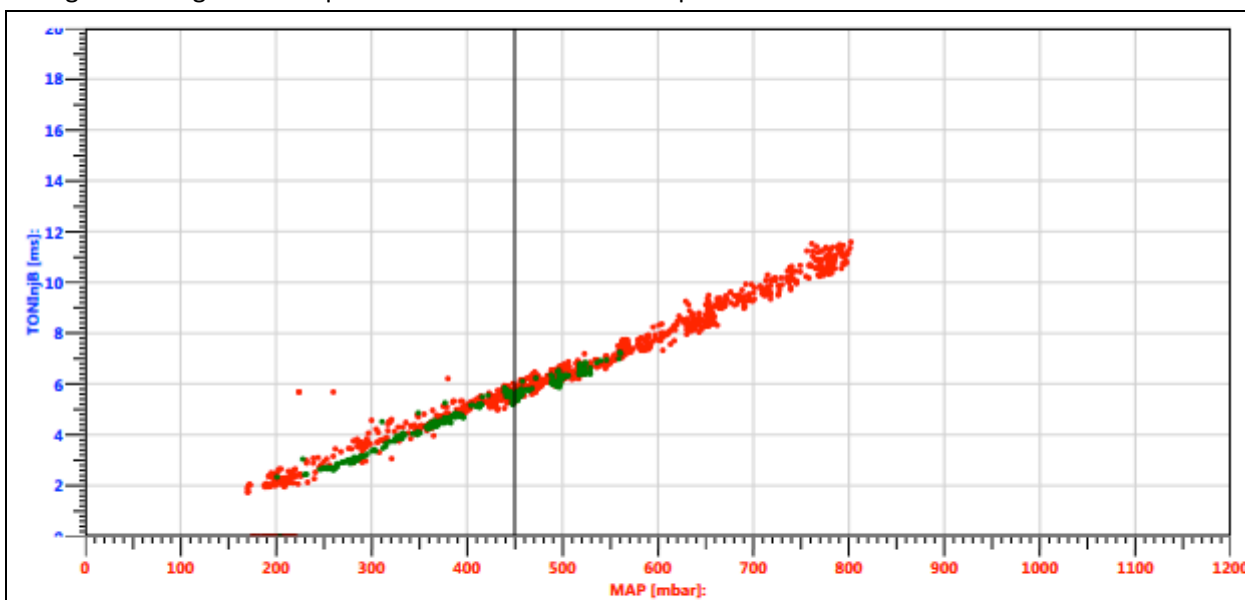
It is not necessary a unique progressive acceleration to acquire dots: acquisition can be made in different times, even stopping it through the central button, become STOP in the meanwhile.

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.

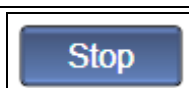
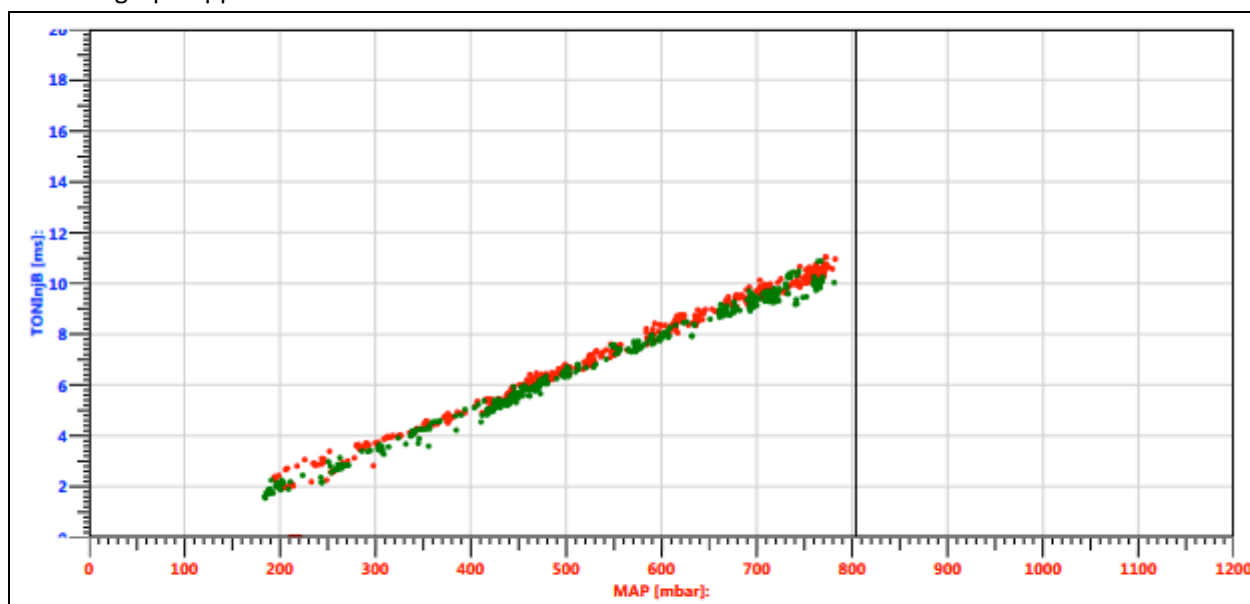
Open Loop conditions obtained with pedal totally pressed are not significant for this kind of setting up and should not be taken into consideration.

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:



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

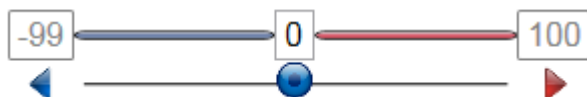
Map correction occurs with vehicle stopped and no need of any other people, except for the driver.

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.

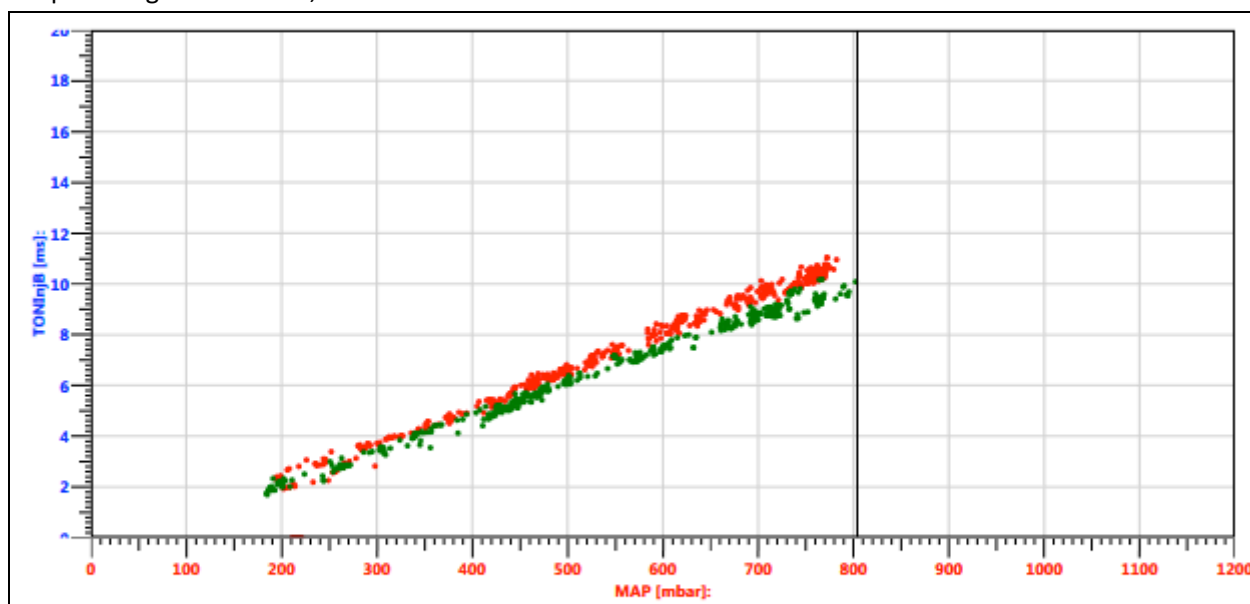
If they are not superposed, map is not centred and should be corrected by acting on RUNNING cursor.

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

Correction in Run

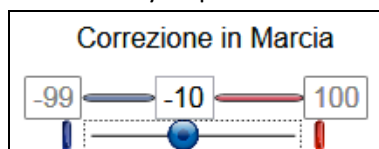


Graph changes as follows,

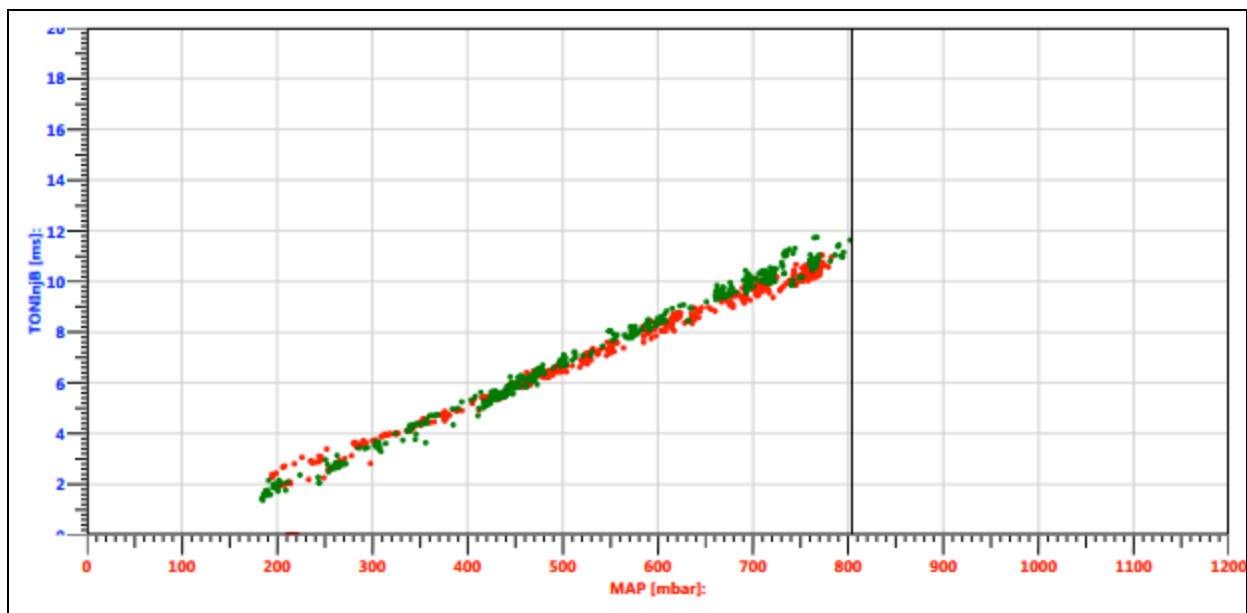


The system modifies gas carburation and green dots acquired in gas mode move down.

Now let's try to put RUNNING cursor at -10%.



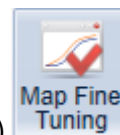
Graph changes as follows,



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

When right correction is found, press *Confirm*

Confirm

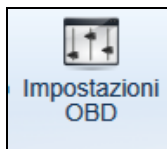


When a change made in gas calibration is confirmed, a red tick appears on the icon (see picture) meaning that user modified that section.

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

5.2.2.4 OBD settings

If vehicle is equipped with On Board Diagnostic communication ("OBD") petrol ECU information can be acquired to make setting up easier for the installer and be useful for ECU strategies to obtain a fine and repeatable working.



Click on *Setting up > OBD configuration* to enter the section where communication between OBD communication and vehicle original ECU can be enabled.

Configurazione OBD

Impostazioni OBD

Comunicazione Impostata: Non collegato

Comunicazione Trovata: Non collegato

Abilita\Disabilita	Codice	Descrizione

Conferma

Memory6

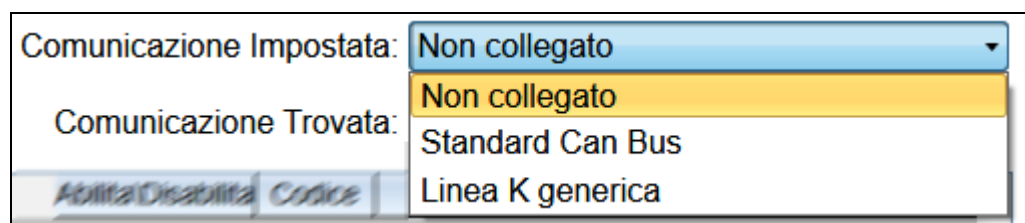
☒ Disattiva

☐ Attiva Sempre

☐ Attiva a Gas

Annulla

You can choose the kind of communication:



Comunicazione Impostata: **Non collegato**

Comunicazione Trovata: **Non collegato**

Standard Can Bus

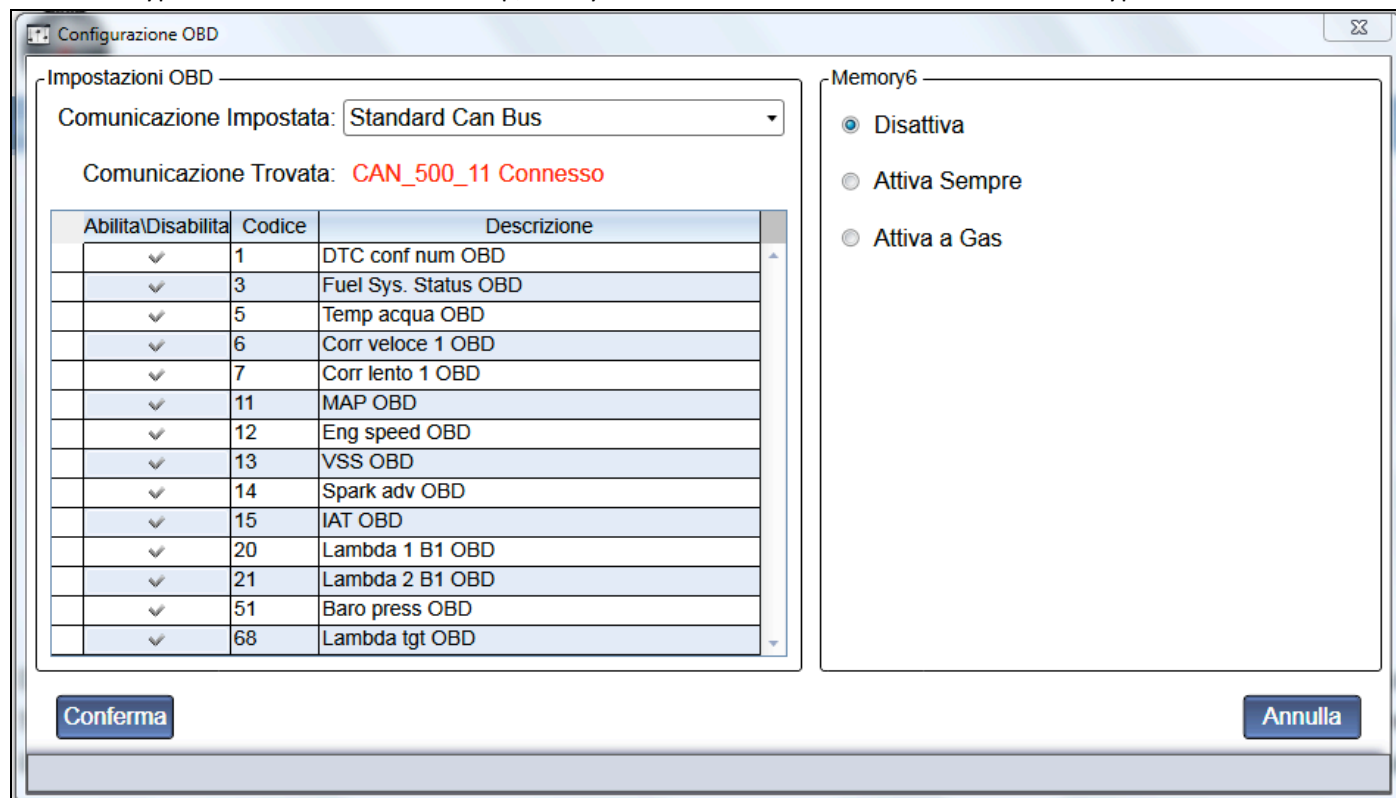
Linea K generica

Abilita/Disabilita Codice

You must choose the right type of communication and connect cables properly to the vehicle OBD socket.

This can be detected using a OBD tester.

When the type of communication is set up, the system searches connection and shows the type if found.



Configurazione OBD

Impostazioni OBD

Comunicazione Impostata: Standard Can Bus

Comunicazione Trovata: **CAN_500_11 Connesso**

Abilita/Disabilita	Codice	Descrizione
✓	1	DTC conf num OBD
✓	3	Fuel Sys. Status OBD
✓	5	Temp acqua OBD
✓	6	Corr veloce 1 OBD
✓	7	Corr lento 1 OBD
✓	11	MAP OBD
✓	12	Eng speed OBD
✓	13	VSS OBD
✓	14	Spark adv OBD
✓	15	IAT OBD
✓	20	Lambda 1 B1 OBD
✓	21	Lambda 2 B1 OBD
✓	51	Baro press OBD
✓	68	Lambda tgt OBD

Memory6

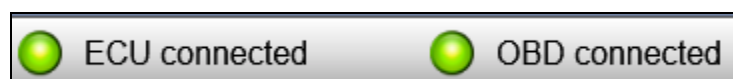
☒ Disattiva

☐ Attiva Sempre

☐ Attiva a Gas

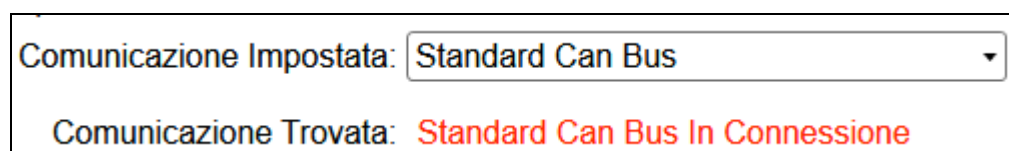
Conferma Annulla

Petrol ECU communication is also indicated bottom of Calibration Tool window



ECU connected **OBD connected**

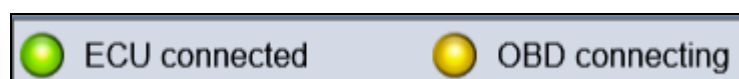
If the system cannot find connection with petrol ECU or the type of connection is wrong, the message of search appears: *Connecting Standard Can Bus*:



Comunicazione Impostata: Standard Can Bus

Comunicazione Trovata: **Standard Can Bus In Connessione**

and bottom of Calibration Tool window you can see



ECU connected **OBD connecting**

When gas system starts communication, the list of all parameters required by the gas ECU to the petrol one appears in the box below the type of communication. All of these parameters can be seen in Data Visualisation section.

Abilita\Disabilita	Codice	Descrizione
✓	1	DTC conf num OBD
✓	3	Fuel Sys. Status OBD
✓	5	Temp acqua OBD
✓	6	Corr veloce 1 OBD
✓	7	Corr lento 1 OBD
✓	11	MAP OBD
✓	12	Eng speed OBD
✓	13	VSS OBD
✓	14	Spark adv OBD
✓	15	IAT OBD
✓	20	Lambda 1 B1 OBD
✓	21	Lambda 2 B1 OBD
✓	51	Baro press OBD
✓	68	Lambda tgt OBD

Memory function can be enabled to the right of the window; it allows erasing any possible error recorded in the petrol ECU.

Memory6

☒ Disattiva
☐ Attiva Sempre
☐ Attiva a Gas

As you can imagine petrol errors can be erased in gas mode only (Enable on Gas mode) or in both petrol and gas mode (Always enable).

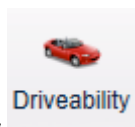
!ATTENTION!: By choosing *Always Enable*, EOBD diagnostics can not notice properly possible errors to the customer anymore.



When a change made in OBD setting 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.

5.2.2.5 Driveability



Click on *Setting up > Driveability* from main menu to enter the gas systems setting up section.

Some setting up parameters can be modified to get a better driveability during rich Open Loop condition (generally with pedal completely pressed), sudden tip-in or tip-out or deceleration to idle.

5.2.2.5.1 Deceleration to idle

This is the *Deceleration to idle* section.

Driveability

Eng speed [rpm]: 0 MAP [mbar]: 1037 TONInjP [ms]: 0,0 TONInjC [ms]: 0,0

Deceleration at Idle Cold Strategy Transient Open Loop Enleanment

Changeover to Petrol at Idle —

RPM Threshold Changeover GAS - Petrol [rpm]: 0

RPM Threshold Changeover Petrol - GAS [rpm]: 0

Maximum Time to Stay in Petrol [s]: 10,0

Strategy State: Disabled

Changeover to Petrol in Cut-Off —

Maximum RPM Threshold Changeover [rpm]: 0

Number of Injections of Petrol: 1

Strategy State: Disabled

Enleanment Decel. at Idle —

Correction Decel. to Idle [%]:

-90 0 90

Others

Injector:

Parameters

Delta Flow [%]: 0 IAT [°C]: 25

DeltaP (P1 MAP) [mbar]: 0,0 Gas Duty Cycle [%]: 0,0

ECT [°C]: -40,4 PDaro [mbar]: 1040

Parameters Graphs

Confirm Cancel

There are three different strategies:

- **Changeover to Petrol at Idle**
- **Changeover to Petrol in Cut-Off**
- **Enleanment Decel. At Idle**

Let's describe them in detail.

Changeover to Petrol at Idle

Changeover to Petrol at Idle —

RPM Threshold Changeover GAS - Petrol [rpm]: 900

RPM Threshold Changeover Petrol - GAS [rpm]: 1200

Maximum Time to Stay in Petrol [s]: 10,0

This strategy can solve problems arising during deceleration to Idle if not yet eliminated in other ways.

It allows to change over to petrol for a few instants during deceleration to Idle using a unperceivable quantity of petrol, in order to avoid engine from switching off or RPM from decreasing too much.

You can act on the following parameters:

- **RPM Threshold Changeover GAS - Petrol [rpm]:** strategy starts when RPM are lower than this value; vehicle changes over to petrol.
- **RPM Threshold Changeover Petrol - GAS [rpm]:** strategy immediately stops when RPM are higher than this value; vehicle changes over to gas again, irrespective of the time spent.
- **Maximum Time to Stay in Petrol [s]:** after this period of time strategy ends its effect and vehicle changes over to gas again, irrespective of RPM.

In the example, the strategy foresees the passage to petrol under 900 RPM, the return to gas mode over 1200 RPM or after 10 seconds.

NOTE: the current state of strategy is indicated by the injectors icons

Injector: 

and the box "Strategy State".

Stato Strategia: Attiva

!ATTENTION!: strategy needs RPM properly connected and adjusted!

Changeover to Petrol in Cut-Off

Changeover to Petrol in Cut-Off

Maximum RPM Threshold Changeover [rpm]:	3000
Number of Injections of Petrol:	8

This strategy can solve problems arising during RPM decreasing after a Cut-off (temporarily injectors turning off during deceleration) if not yet eliminated in other ways. It can be used to avoid engine from switching off due to sudden clutch pedal pressure and relative RPM sudden decreasing.

It allows to change over to petrol for a few instants after a cut-off using a unperceivable quantity of petrol, in order to avoid engine from switching off or RPM from decreasing too much.

You can act on the following parameters:

- **Maximum RPM Threshold Changeover [rpm]:** strategy starts when RPM are lower than this value; vehicle changes over to petrol.
- **Number of Injections of Petrol:** it defines the max duration of strategy. After the number of injections indicated, calculated on the first injector, vehicle changes over to gas again.

In the example, the strategy foresees the passage to petrol in Cut-off under 3000 RPM and for nr. 8 injections before returning to gas mode.

NOTE: the current state of strategy is indicated by the injectors icons

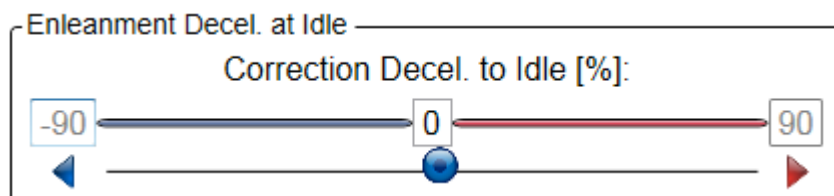
Iniettori: 

and the box "Strategy State".

Stato Strategia: Attiva

! ATTENTION!: strategy needs RPM properly connected and adjusted!

Deceleration to idle Correction



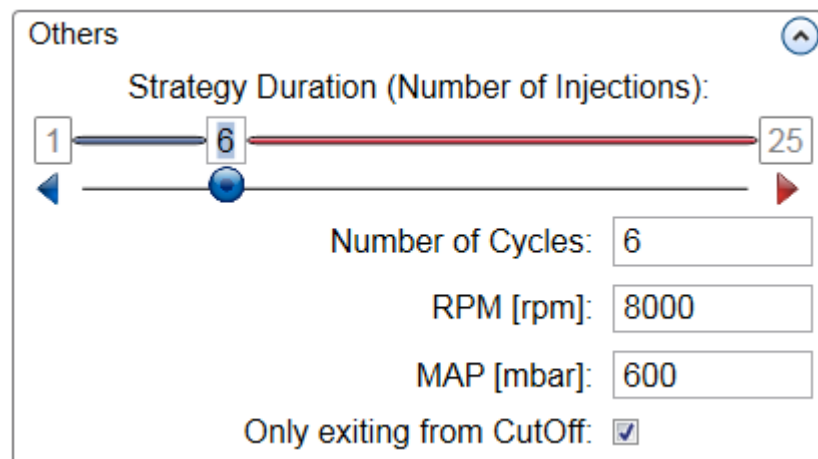
It allows set up a leaning or enrichment immediately applied leaving the Cut-off condition.

Generally a little leaning can improve RPM decreasing after a Cut-off, avoiding engine from switching off and RPM from decreasing too much.

Strategy acts just as in case of tip-in, but generally needing fewer leanings.

A default value is automatically applied after the assisted procedure.

If needed, press Next to change some parameters; this operation is generally not necessary.



Let's see in detail:

- **Strategy Duration (Number of Injections):** it allows having a more or less extended effect of the deceleration to idle correction. Default value is nr. 6 injections.
- **Number of Cycles:** you can specify for how many engine cycles (calculated on the first cylinder) the strategy should be enabled.
- **RPM [rpm]:** strategy is enabled when RPM are lower than this value. With the high value of the example (8000 rpm) strategy is enabled after every cut-off.
- **MAP [mbar]:** strategy is enabled when MAP is lower than this value, just as for RPM. With the high value of the example (600 mbar) you can be sure that strategy is enabled after every cut-off.

5.2.2.5.2 Tip-in

The tip-in strategy allows to improve the vehicle driveability by the enrichment or the leaning of the mixture in the tip-in, that's to say when there are quick changes of engine working parameters, as MAP and rpm, usually due to quick tip-in or tip-out made by the driver.

The reason of bad driveability actually depends on petrol calibrations that adopt strategies that increase very much the injection times after abrupt tip-in and usually decrease them after abrupt tip-out.

Petrol strategies are not always suitable for the gas mode working, especially for CNG, because the gas doesn't support very well excessive enrichments, and because diffusion and mix of the gaseous fuel injected near the intake valves, happens in a different way from the liquid one.

Tip-in strategy allows compensating easily the changes made by petrol injection, setting the leaning or enrichment wished through a cursor.

Driveability

Eng speed [rpm]: 0 MAP [mbar]: 1036 TONInjP [ms]: 0.0 TONInjG [ms]: 0.0

Deceleration at Idle Cold Strategy **Transient** Open Loop Enleanment

Transient:

Tip-IN Correction [%]: 90 — 25 — 90

Tip IN Duration (Number of Injections): 1 — 10 — 25

Max RPM for Strategy [rpm]: 8000

Tip OUT Correction [%]: 90 — 15 — 90

Tip OUT Duration (Number of Injections): 1 — 10 — 25

Other:

Extra-Injection Window [%]: 0 — 31 — 75

GAS Injection Delay [ms]: 0 — 0.0 — 5

TONMinCutOff [ms]: 1.0 MAP Threshold TONMinCutOff [mbar]: 2000

TONMaxExtrInj [ms]: 0.0 MAP Threshold TONMaxExtrInj [mbar]: 200

Parameters

Delta Flow [%]: 0 IAT [°C]: 25

DeltaP (P1-MAP) [mbar]: 0.0 Gas Duty Cycle [%]: 0.0

ECT [°C]: 40.4 PBaro [mbar]: 1040

Parameters Graphs

Confirm Cancel

Obviously tip-in and tip-out can also be corrected in other ways to get the wished driveability effect in both conditions.

Cursor positive values always indicate enrichments, while negative ones mean leanings.

At the end of aided procedure, strategy is automatically enabled with default values, that generally give a good driveability.

Strategy can be disabled by bringing tip-in and tip-out corrections to zero.

Delta Flow [%] parameter shows the real strategy condition.

You can also modify other parameters, even if generally it is unnecessary.

Let's see in detail:

- **Tip-IN Duration [Number of Injections]:** it allows having a more or less extended strategy effect after abrupt tip-in.
- **Tip-OUT Duration [Number of Injections]:** it allows having a more or less extended strategy effect after abrupt tip-out.
- **Max RPM for strategy [rpm]:** strategy stops leaning or enrichment if RPM indicated are surpassed.
- **Extra-Injection Window [%]:** allows to calibrate distinction sensibility between the extra-injections and the normal ones. The higher the value, the higher the probability that systems detects extra-injections and strategy acts consequently.
- **GAS Injection Delay [ms]:** allows delaying the gas injection with respect to the petrol one. Useful especially if gas injectors injection times is often lower than the petrol injectors ones.
- **TOnMinCutOff [ms]:** it identifies the minimum petrol injection to detect Cut-off. All Ton petrol values under this value are considered 0.
- **TOnMaxExtraInj [ms]:** Ton petrol value needed to detect which extra-injections should be added to the main injection. All Ton petrol values under this value are added to the main injection.
- **MAP Threshold TOnminCutOff [mbar]:** Max MAP threshold under which the TOnMinCutOff strategy acts.
- **MAP Threshold TOnMaxExtraInj [mbar]:** Min MAP threshold over which the TOnMaxExtraInj strategy acts.

5.2.2.5.3 Cold strategy

Cold strategies allow setting up specific values of tip-in leaning or enrichment in case of low temperatures.

Usually, tip-in should be more leaned in case of cold.

Calibration software enters default values with leanings higher than the tip-in ones in warm condition. If installer changes the warm default values (Tip-in) without changing the cold ones, these latter changes consequently so that a constant difference is assured.

If installer manually enters a cold correction value different from the default one, it does not change anymore.

This page is very similar to the tip-in one, showing the same cursors mentioned above.

Driveability

Eng speed [rpm]: 0 MAP [mbar]: 1036 TONinjP [ms]: 0,0 TONinjG [ms]: 0,0

Deceleration at Idle Cold Strategy **Transient** Open Loop Enleanment

Tip-IN Correction [%]: -90 -25 90

Tip-OUT Correction [%]: -90 0 90

Low Temperature Threshold [°C]: 40 High Temperature Threshold [°C]: 80

Strategy State: **Enabled** Enable Cold Corrections: ☒

Parameters

Delta Flow [%]: 0 IAT [°C]: 25

DeltaP (P1-MAP) [mbar]: 0,0 Gas Duty Cycle [%]: 0,0

ECT [°C]: 10,1 PBaro [mbar]: 1010

Parameters Graphs

Confirm Cancel

Moreover, there are two numerical boxes that can be set up:

Low Temperature Threshold [C°]: under this ECT, tip-in and tip-out corrections are the ones indicated in this page and not in the tip-in one.

High Temperature Threshold [C°]: over this ECT, tip-in and tip-out corrections of this page are ignored in favour of the tip-in page ones.

Please remember that in case of temperatures included between these two thresholds, correction values used by the system are the intermediated ones of this page and the tip-in one.

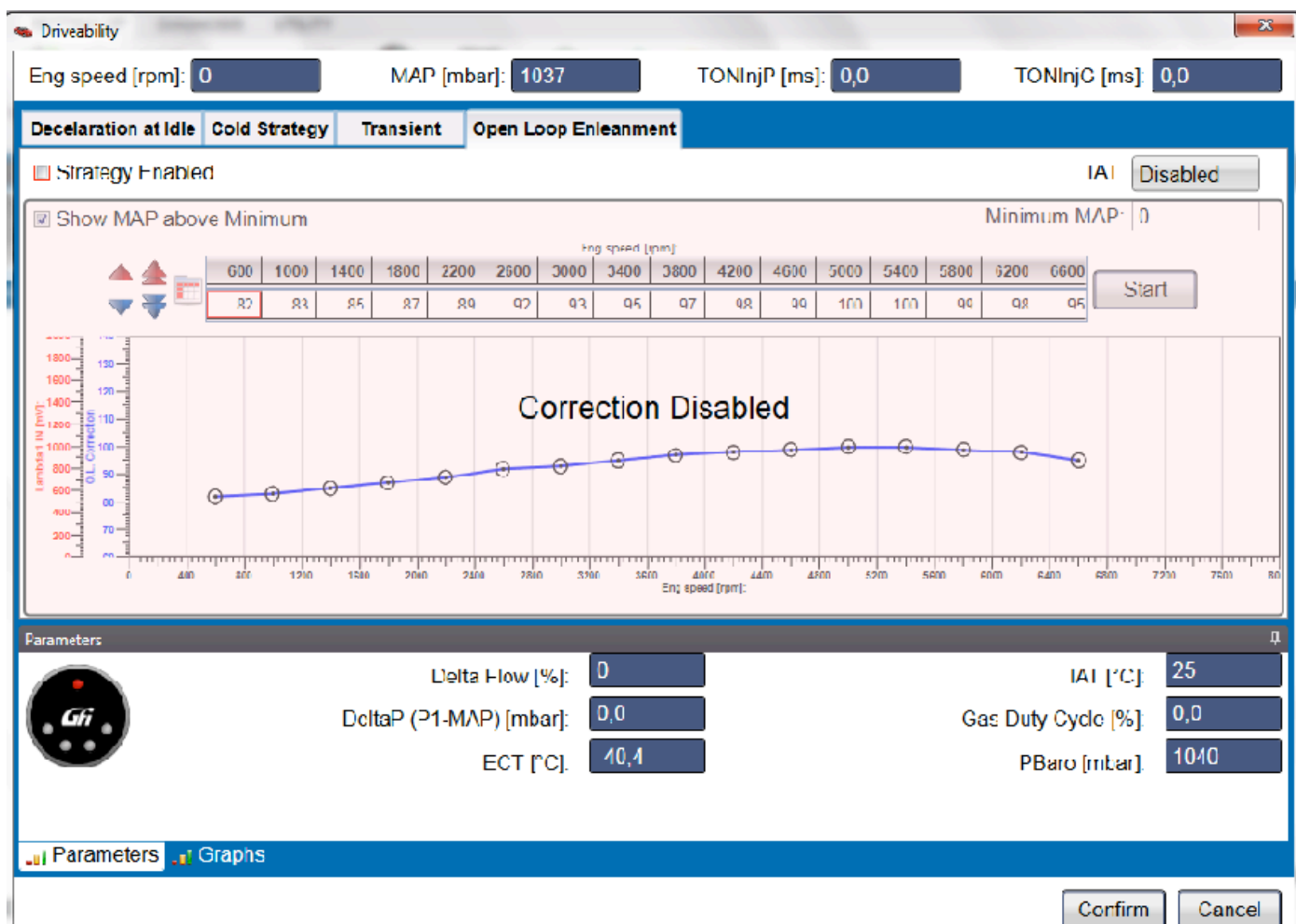
Parameters section shows the current ECT.

Delta Flow [%] parameter shows the real tip-in condition.

5.2.2.5.4 Leaning in Open Loop

This strategy is useful to limit enrichment made by petrol ECU in Open Loop condition. This enrichment made on gas mode could cause malfunctioning such as jerks in CNG mode and high consumptions in LPG mode.

The installer can modify carburation limitation.



Entering the section, the page appears as above. Strategy is disabled by default.

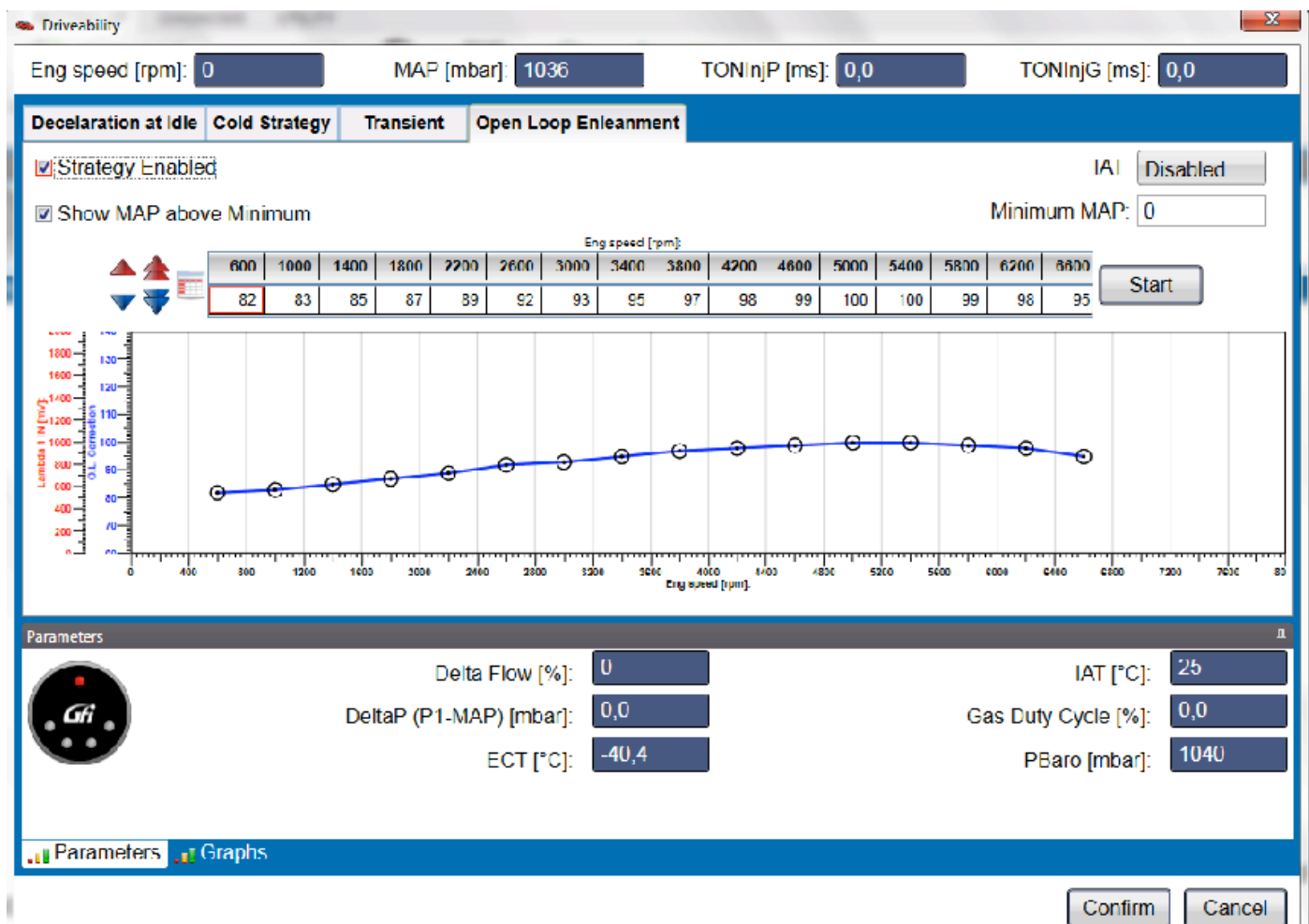
The first step for strategy calibration is to select the little box top left called **"Strategy enabled"**.

In these conditions, strategy limits gas quantity to supply according to its calculations and default values, so that its effect should already be visible in full load condition (accelerator completely pressed).

ATTENTION: After enabling strategy, check that in regular idle gas mode gas quantity is not limited too much, verifying that Lambda Oxy Sensor has not low values or that OBD adapting parameters stay centred. On the contrary, MIL light could turn on in a few seconds.

In this case, change over to petrol and repeat the aided procedure being careful to enter the right engine cc, gas injector type and other parameters.

Now the page appears as follows.



Let's analyse the window:

☒ Abilita Soglia MAP Visualizzazione

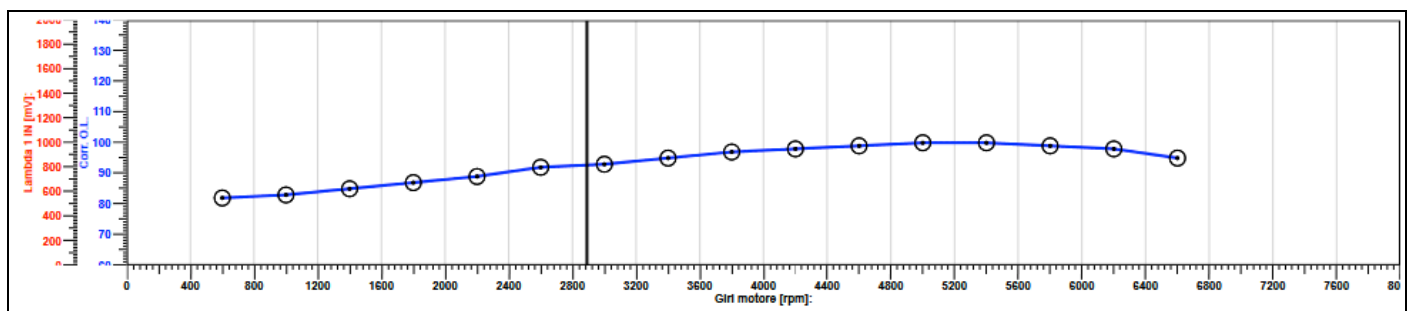
Map Minimo: 0

MAP intervention on strategy can be enabled through the *Min Map* parameter. Ticking the box, the strategy only intervenes with MAP values higher than this threshold. It is disabled by default, meaning that strategy intervenes in all working conditions if required.

The graph below (middle of the window) shows enrichment limitation trend according to RPM, with a blue curve (graph Corr. O.L.) connected the 16 blue circled dots.



This line is just like a max threshold of carburation for the engine. The system does not allow any enrichment bigger than this.




A table is present top of the graph indicating RPM and dots correction steps of threshold line. Every case corresponds to a dot.

Eng speed [rpm]:															
600	1000	1400	1800	2200	2600	3000	3400	3800	4200	4600	5000	5400	5800	6200	6600
82	83	85	87	89	92	93	95	97	98	99	100	100	99	98	95

Start

Strategy working parameters are shown bottom of the page.

Parameters



Delta Flow [%]:
DeltaP (P1-MAP) [mbar]:
ECT [°C]:

IAT [°C]:
Gas Duty Cycle [%]:
PBaro [mbar]:

Parameters Graphs

Delta flow [%] is the most important parameter, indicating the real strategy leaning.

Leaning in O.L strategy calibration

!ATTENTION!: MAP sensor connected as GFI or OEM is required to use this strategy with systems having EZ-SoftwareECUs.

As said before, the strategy enabled works immediately; if the enrichment required by petrol ECU in Open Loop is higher than the one calculated by the gas system, it will not be allowed and carburation will be limited and leaned.

Now a **drive test** is required to check settings just made.

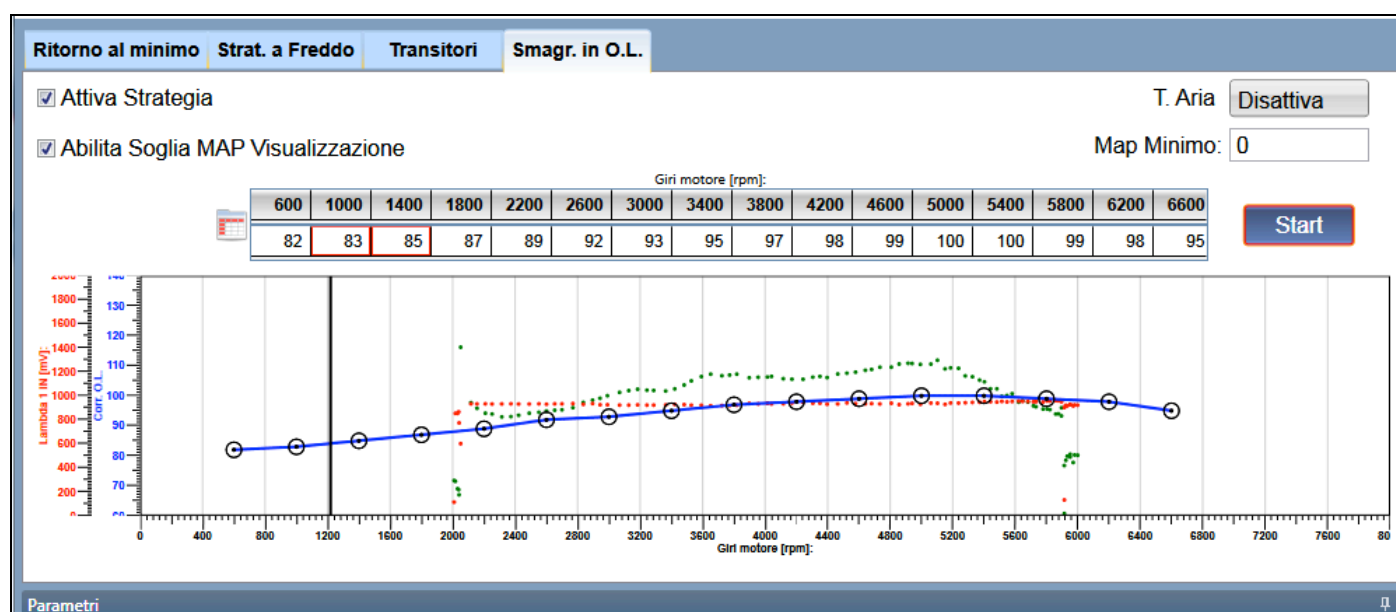
1. Run in gas mode in second or third gear at low speed, roughly 800 or 900 RPM, do not press accelerator pedal too much.

Start

2. Press Start to begin the acquisition.
3. Then make a deep tip-in until reaching high loads, next to the engine over-revs (e.g.: 6500 RPM).

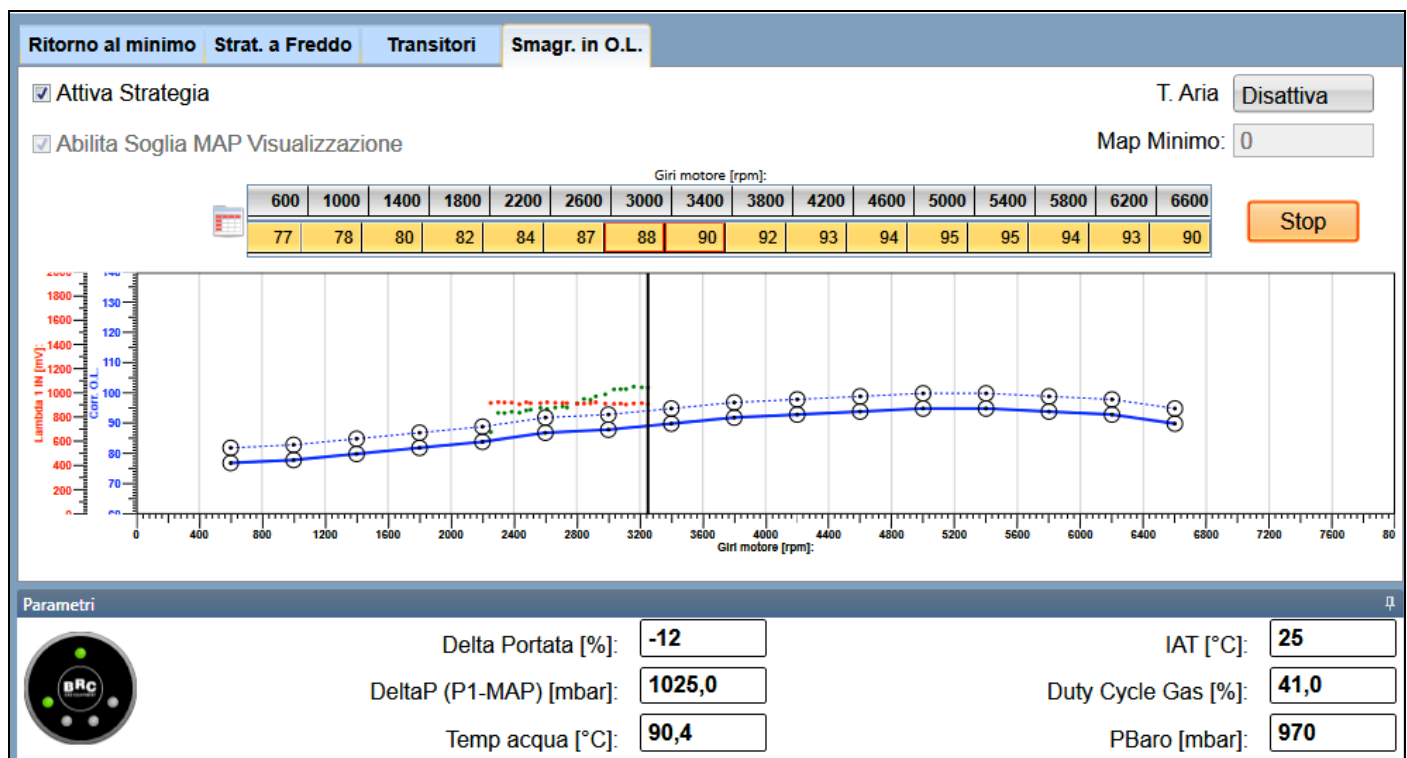
Stop

4. Loosen accelerator and press Stop.
5. Pull up the vehicle as soon as possible.
6. The central graph shows the result, where big red and little green dots appear.



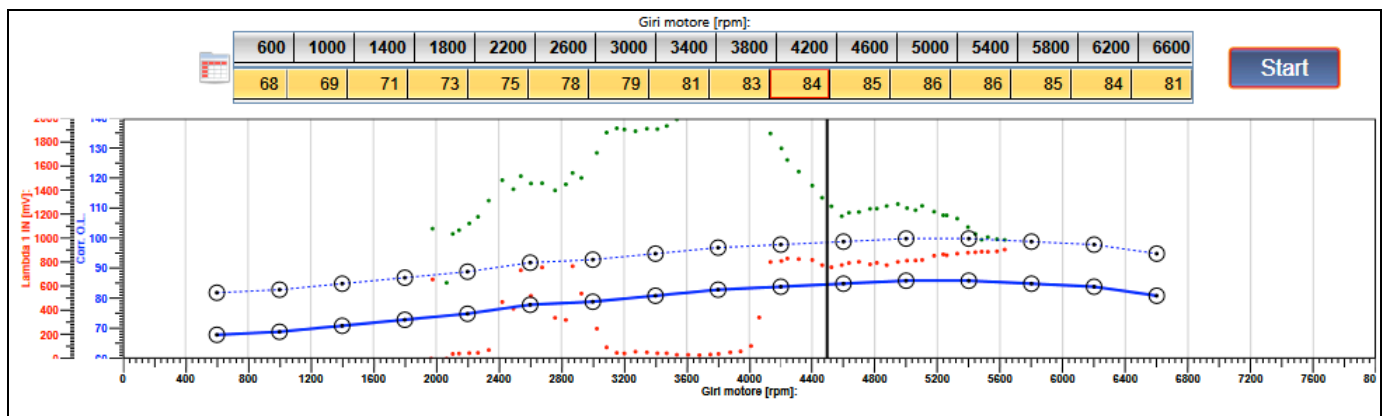
- **BLUE line** is the gas carburation limitation.
- **Black vertical line** is RPM.
- **Red dots** represent the Lambda Oxy Sensor values acquired during the RPM increasing.
As you can see, in all conditions, sensor remained high, showing that the enrichment limitation has produced a richer mixture than the stoichiometric one.
Strategy is not calibrated for limiting fuel quantity too much.
You have to decide if a leaning is necessary or not.
!ATTENTION!: Leaning in Open Loop strategy works even in case of Lambda sensor disconnection. If not connected, check trend through a OBD tester.
- **Green dots** represent fuel quantity required by the petrol ECU.
 - If green dots are above the blue graph, strategy leans bringing fuel quantity to the blue dots level instead of the green ones.
 - If green dots are under the blue graph, leaning does not occur and gas quantity is the one required by petrol ECU.

Limit values are indicated by **Delta Flow [%]** parameter that shows the leaning percentage applied in a specific condition.



In the example, at about 3200 rpm, a 12% leaning (**Delta Portata [%]: -12**) occurs and sensor stays rich.

Leaning in Open Loop can be increased or decreased by acting on limit line. The important is that Lambda Oxy Sensor in Open Loop condition always is rich in correspondence with limit line.



As per this picture, leaning between 2800 and 4000 rpm is too high, as red dots (Lambda signal) is low. It means that leaning is excessive and line should be modified.

Note: check Lambda signal directly on graph (red dots) if possible; otherwise, use an OBD tester.

Modification can be made by selecting the box corresponding to the dot to move or directly moving the dot itself on line

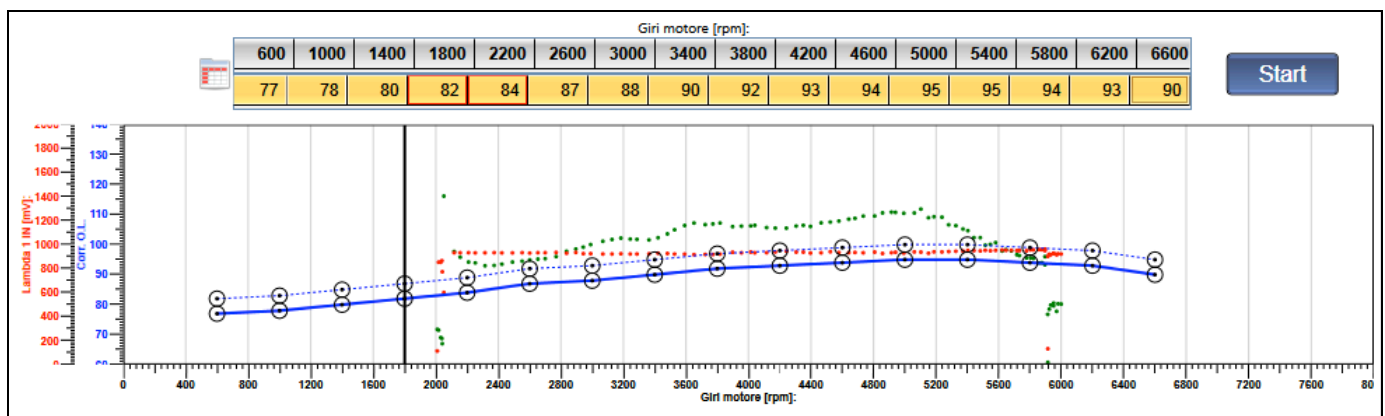
Moving the box

Select the boxes corresponding to the part of line you wish to modify, then use your keyboard:

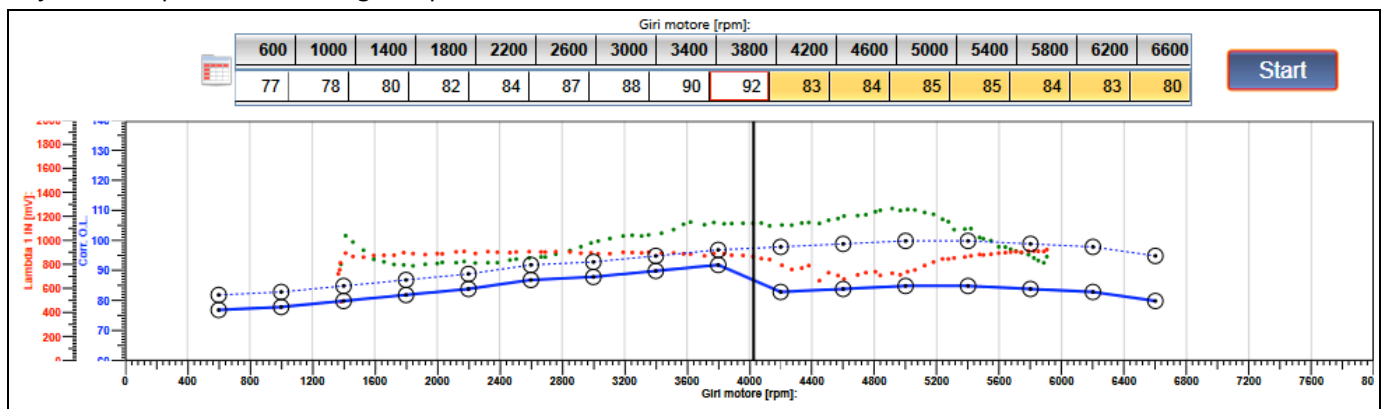
“+” or “↑” to move the dot up, reducing leaning in that specific condition.

“-” or “↓” to move the dot down, increasing leaning in the condition required.

You can select the whole blue line,

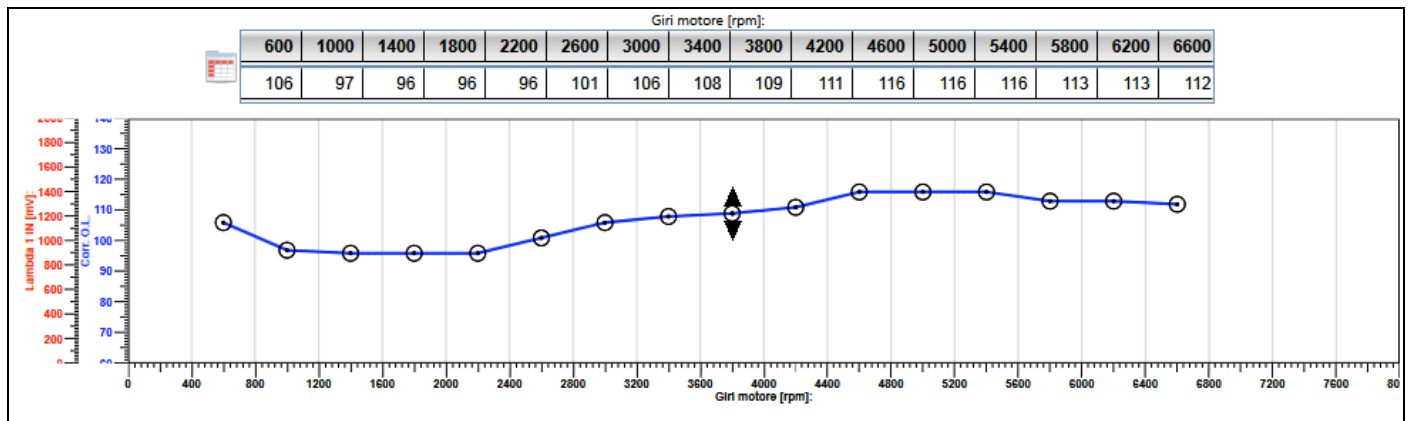


or just some parts of it, through respective boxes.

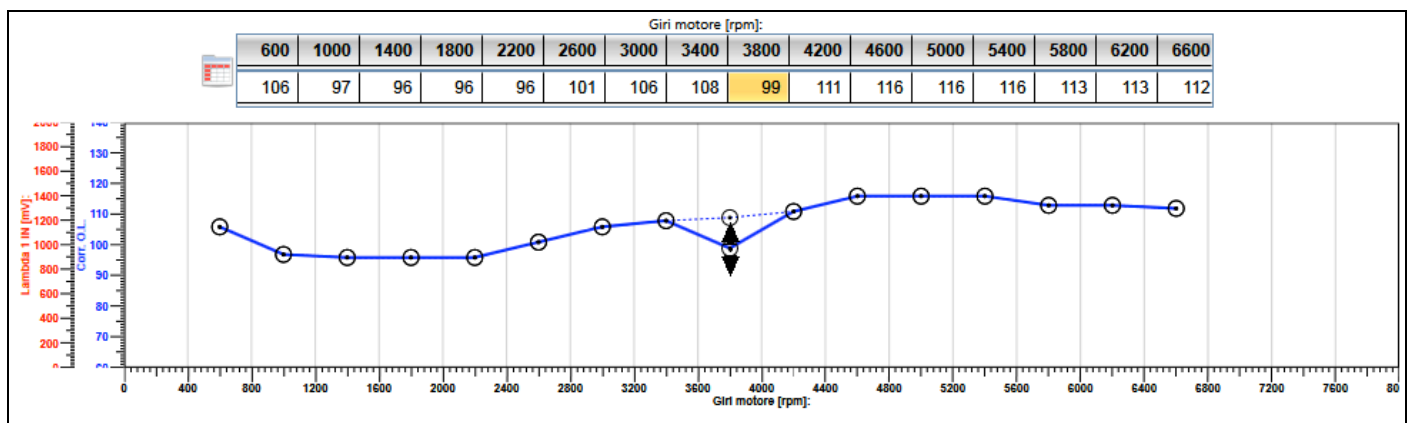


Moving the dot

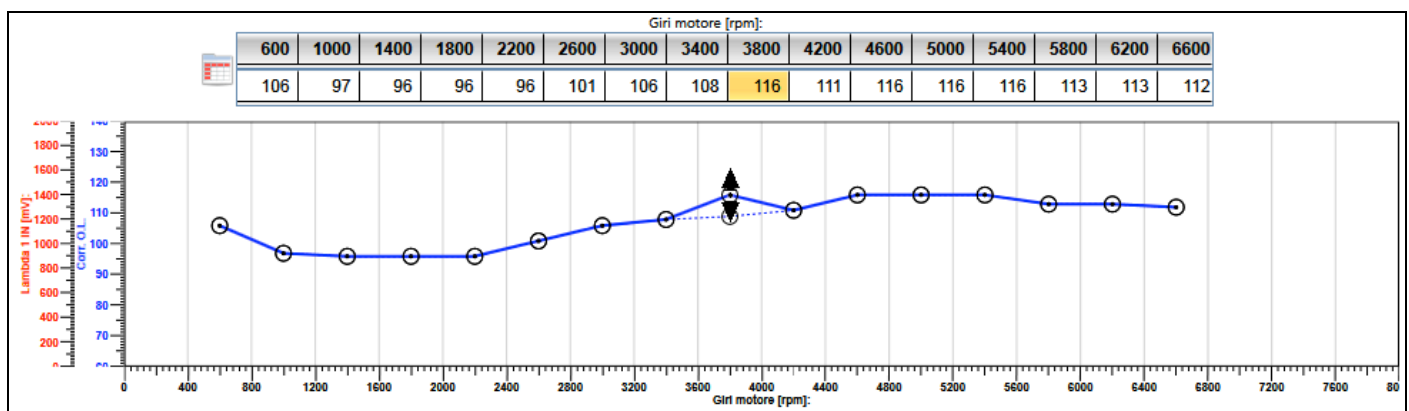
Left-click on dot with mouse, keep pressed and drag dot up and down. The numbers in the boxes change consequently.



Modification



Move the dot down to increase strategy leaning.



Move the dot up to decrease strategy leaning.

Download this change into the Gas ECU through *Save Calibration* in order to make it definitive.

5.2.2.5.5 Timing Advance Control

This is the timing advance control page.

Guidabilità

Giri motore [rpm]: 744 MAP [mbar]: 375 TONInjB [ms]: 2,9 TONInjG [ms]: 4,3


Ritorno al minimo Strat. a Freddo Transitori Smagr. in O.L. **Contr. Anticipi**

Variatore Esterno

Giri Minimi per attivazione [rpm]: 1500 Stato Variatore Anticipi: Disattiva

MAP Minimo per attivazione [mbar]: 450

Parametri

 Delta Portata [%]: 0 IAT [°C]: 25

DeltaP (P1-MAP) [mbar]: 42,0 Duty Cycle Gas [%]: 0,0

Temp acqua [°C]: 32,2 PBaro [mbar]: 993

Parametri Grafici

Conferma Annulla

For EZ-Software 4-, 5-, 6-, 8-cylinder this page allows interacting with possible external timing advance processor installed, programming its intervention according to RPM and MAP. Setting min RPM and MAP values for activation, processor starts to work over these values and control light turns from red to green. In the example, the processor will start to work at a MAP value higher than 450 mBar and RPM higher than 1550 rpm.

Processor activation box indicates ENABLED.

Stato Variatore Anticipi: **Attiva**

With EZ-SoftwareAries/Acrux and Scorpio, the page described above also shows the possibility to manage internal timing advance processor of gas ECU.

Guidabilità

Giri motore [rpm]: MAP [mbar]: TONInjB [ms]: TONInjG [ms]:

Ritorno al minimo | **Strat. a Freddo** | **Transitori** | **Smagr. in O.L.** | **Contr. Anticipi**

Variatore Esterno

Giri Minimi per attivazione [rpm]: Stato Variatore Anticipi:

MAP Minimo per attivazione [mbar]:

Variatore Interno

☒ Attiva Variatore


☒ Matrice Estesa

Anticipo Attuato [deg]:

☐ Tempo di Accensione Preservato

		Giri motore [rpm]:															
		600	1000	1400	1800	2200	2600	3000	3400	3800	4200	4600	5000	5400	5800	6200	6600
MAP [mbar]:	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	550	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	950	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Parametri

 Delta Portata [%]: IAT [°C]:

DeltaP (P1-MAP) [mbar]: Duty Cycle Gas [%]:

Temp acqua [°C]: PBaro [mbar]:

Parametri | Grafici

First step to manage timing advance table is to select the box top left called **"Spark Advancer enabled"**.

Once enabled, a table MAP/RPM opens where we can indicate advance parameter we want in that working condition.

It is easy to insert this value. Left-click inside the box, erase value with space bar and insert the new one confirming it by clicking on ENTER.

!ATTENTION!: We suggest to insert a value between 0 and 15 and unit fraction. A bigger value can cause engine knocking, MIL light on and even serious damages to the engine.

Variatore Interno

☒ Attiva Variatore

☒ Matrice Estesa

Anticipo Attuato [deg]:

☐ Tempo di Accensione Preservato


		Giri motore [rpm]:															
		600	1000	1400	1800	2200	2600	3000	3400	3800	4200	4600	5000	5400	5800	6200	6600
MAP [mbar]:	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	250	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	400	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	550	5	5	7	7	7	7	7	7	7	7	7	7	7	7	5	5
	700	5	5	7	7	7	7	7	7	7	7	7	7	7	7	5	5
	850	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5
	900	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5
	950	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5

Engine working condition is identified with some red boxes inside the table.

Top right, into the section INTERNAL PROCESSOR, there's the box **"Timing Advance Actuated [deg]"** where system indicates the real value of advance applied.

Table can be customized. You can modify RPM and MAP steps identifying table boxes.



Click on  to start modification, top left of the diagram.

Variatore Interno

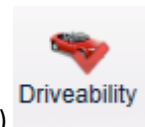
☒ Attiva Variatore
 ☒ Matrice Estesa

Anticipo Attuato [deg]:

☐ Tempo di Accensione Preservato

		Giri motore [rpm]:															
		600	1000	1400	1800	2200	2600	3000	3400	3800	4200	4600	5000	5400	5800	6200	6600
MAP [mbar]:	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	250	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	400	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	550	5	5	7	7	7	7	7	7	7	7	7	7	7	7	5	5
	700	5	5	7	7	7	7	7	7	7	7	7	7	7	7	5	5
	850	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5
	900	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5
	950	5	5	7	7	9	9	9	9	9	9	9	9	7	7	5	5

Click on the box you want to modify, erase the old value using space bar and enter the new one; confirm by clicking on ENTER.



When a change made in driveability 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.

5.2.2.6 Lambda Oxy Sensor



Click on *Setting up* > *Lambda Oxy Sensor* from main menu to enter the Sensor activation and setting section, where you can find upper, lower and middle parameters.

Lambda Sensor

Eng speed [rpm]: 0 Lambda 1 IN [mV]: 86

☐ Enable Lambda Sensor

☒ Direct Lambda Sensor ☒ HEGO Sensor ☒ Lambda Sensor Non-emulated
☐ Reverse Lambda Sensor ☐ UEGO Sensor ☐ Lambda Sensor Emulated

Rich Threshold Lambda Sensor [mV]: 550 Maximum Emulation Value [mV]: 900
Lean Threshold Lambda Sensor [mV]: 450 Minimum Emulation Value [mV]: 100

Disable Lambda Sensor

Legend:

- Lambda 1 IN [mV]:
- Max Value
- Min Value
- Rich sensor signal threshold
- Lean sensor signal threshold

Check system requirements.

Change Settings

Confirm Cancel

Click on activation box top left to see the Lambda sensor signal on Calibration Tool, after connecting the right cable on harness.

Lambda Sensor

Eng speed [rpm]: 0 Lambda 1 IN [mV]: 87

Lambda 1

☒ Enable Lambda Sensor

☒ Direct Lambda Sensor
 ☒ HEGO Sensor
 ☒ Lambda Sensor Non-emulated
☐ Reverse Lambda Sensor
 ☐ UEGO Sensor
 ☐ Lambda Sensor Emulated

Rich Threshold Lambda Sensor [mV]: 550 Maximum Emulation Value [mV]: 900

Lean Threshold Lambda Sensor [mV]: 450 Minimum Emulation Value [mV]: 100

Legend:
 - Lambda 1 IN [mV]: (Red line)
 - Max Value (Orange line)
 - Min Value (Blue line)
 - Rich sensor signal threshold (Green line)
 - Lean sensor signal threshold (Pink line)

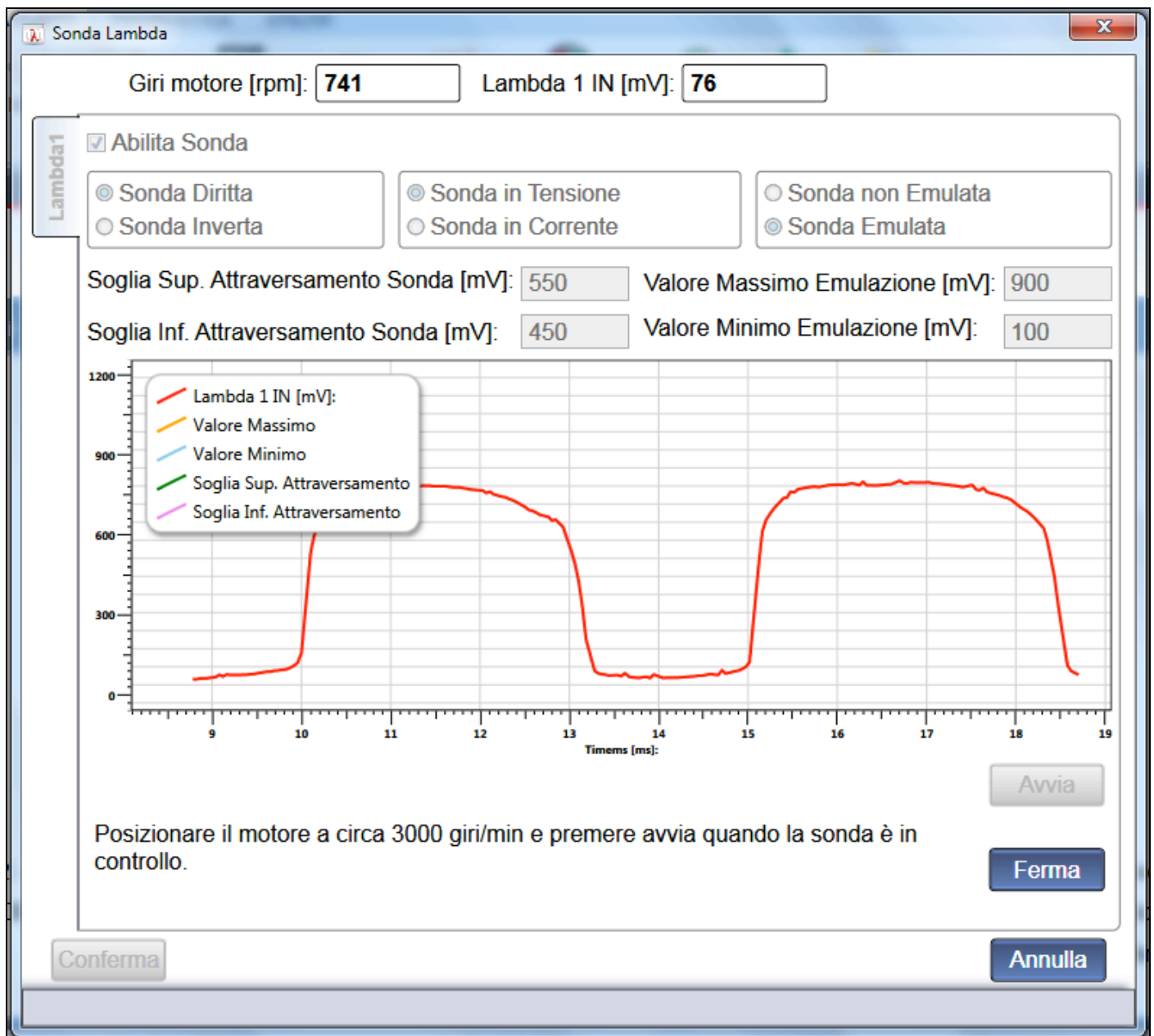
Time (ms)

Change Settings

Check system requirements.

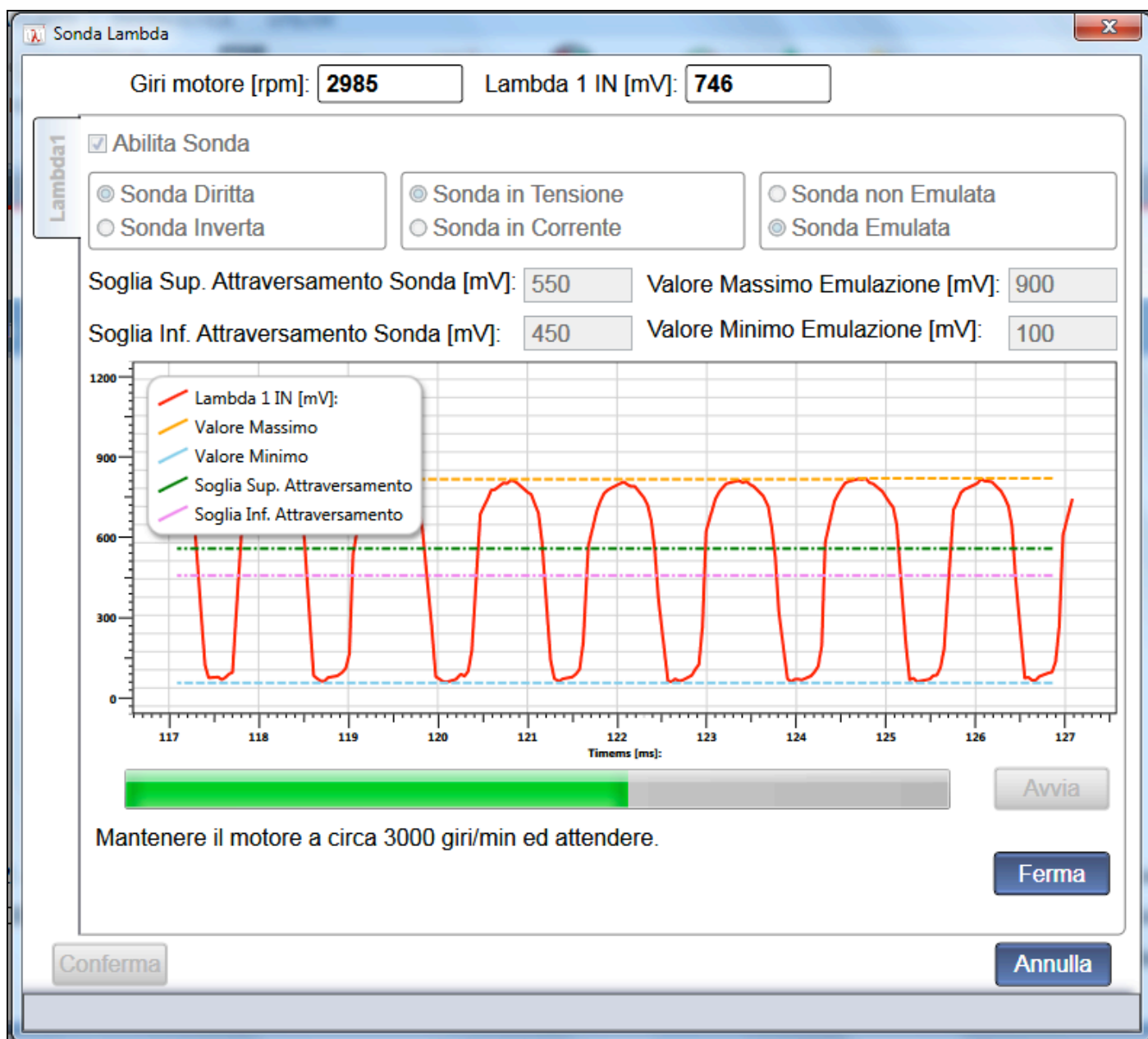
Confirm Cancel

If Lambda Oxy Sensor needs to be emulated, signal should be set up. Start procedure by clicking on Modify.



Avvia

Now the system requires about 3000 RPM condition. Press Start when the RPM threshold required is reached.



Starting from now, gas system automatically acquires Lambda signal setting parameters, always at 3000 rpm, necessary to properly rebuild the emulated signal.
A confirmation message appears at the end of calibration.



When a change made in Lambda Oxy Sensor setting 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.

5.2.2.7 Changeover

This page allows to modify parameters for the changeover from petrol to gas and vice-versa, gas end detection and petrol contribution.



Click on *Setting up > Changeover* from main menu to enter relative section.

5.2.2.7.1 Changeover parameters

Changeover Calibrations	Final Re-changeover to GAS	Overlap	Petrol Assistance
Cold Engine			
Changeover at Temperature greater than[°C]: 40			
Changeover Delay at Start [s]: 60			
Hot Engine			
Changeover at Temperature greater than[°C]: 50			
Changeover Delay at Start [s]: 5			
Pulses per Injector for Changeover: 3			
Changeover Petrol-GAS			
Maximum MAP for Changeover [mbar]: 2000			
Minimum RPM for Changeover: 0			
Maximum RPM for Changeover: 8000			
Rail Filling Time [s]: 2,0			

Two changeover conditions are taken into consideration:

- Cold engine
- Warm engine

The first one calibrates the petrol/gas changeover when a vehicle starts from cold condition, i.e. after a long stop without engine starting.

Cold Engine
Changeover at Temperature greater than[°C]: 40
Changeover Delay at Start [s]: 60

Changeover happens when ECT reaches the temperature set up in “**Changeover at Temperature greater than [°C]**”, as long as a period of time equal to or bigger than “**Changeover Delay at Start [s]**” is passed.

The second one calibrates the changeover when a vehicle is already warm, i.e. when you start it after a not too long stop.

Hot Engine

Changeover at Temperature greater than[°C]: 50

Changeover Delay at Start [s]: 5

When ECT reaches the value set up in “**Changeover at Temperature greater than [°C]**”, changeover occurs as long as a period of time greater or equal to engine “**Changeover Delay at Start [s]**” is passed.

Reference temperature is the ECT one, read by sensor of pressure reducer or by OBD reading.

Pulses per Injector for Changeover: 3

The “**Pulses per Injector for Changeover**” parameter allows to set up the speed with which the sequential changeover from petrol to gas happens, and vice-versa (GFI patent). You can so define how many injections each gas injector has to do before the next one starts to change over.

E.g. With a value of 3 injections on a 4-cyl vehicle, after the first injection changeover, 3 injections will occur with 3 cylinders supplied with petrol and only one with gas; for further 3 injections, 2 cylinders will be supplied with gas and 2 with petrol; after 3 injections more, 3 will be supplied with gas and only 1 with petrol; finally, after 3 injections more, the last gas injectors will be enabled too.

Petrol – Gas changeover

Changeover Petrol-GAS

Maximum MAP for Changeover [mbar]: 2000

Minimum RPM for Changeover: 0

Maximum RPM for Changeover: 8000

Rail Filling Time [s]: 2,0

Parameters that you can set up in “**Petrol-Gas changeover**” section allow managing the regular changeover from gas to petrol. They are:

- **Maximum MAP for Changeover [mbar]:** it is the absolute pressure value in the intake manifold, over which gas changeover is impeded. With a value “2000”, as in the example, changeover is only allowed for MAP values lower than 2000 mbar (next to always).
- **Minimum RPM for Changeover:** it corresponds to the rpm value under which the gas changeover is impeded. With a value “0”, as in the example, changeover is allowed wit any RPM value.
- **Maximum RPM for Changeover:** it corresponds to the rpm value above which the gas changeover is impeded. With a value “8000”, as in the example, changeover is only allowed for RPM values lower than 8000 RPM (next to always).
- **Rail Filling Time [s]:** it is the time getting by during changeover from the gas solenoid valves opening to the first injector changeover starting. This time it is necessary to bring the system under pressure before changing over. With a value “2”, as in the example, changeover starts 2 seconds after the solenoid valves opening.

5.2.2.7.2 Petrol re-changeover for end of gas

Changeover

Changeover Calibrations Final Re-changeover to GAS Overlap Petrol Assistance

Delta P Minimum [mbar]: 800

Duty Cycle Injector Max for Re-Changeover [%]: 110

GAS Temperature for Re-Changeover to Petrol [°C]: 0

Waiting Time for Re-Changeover to Petrol [s]: 0,4

Maximum RPM for Definitive Re-Changeover: 8000

Maximum MAP for Definitive Re-Changeover [mbar]: 2500

Maximum GAS Flow for Changeover [%]: 70

Waiting Time for Re-Changeover to GAS [s]: 10

Petrol Consumption Alert [l]: 0,5

Red LED after Petrol Alert: ☒

Red LED Always: ☐

Confirm Cancel

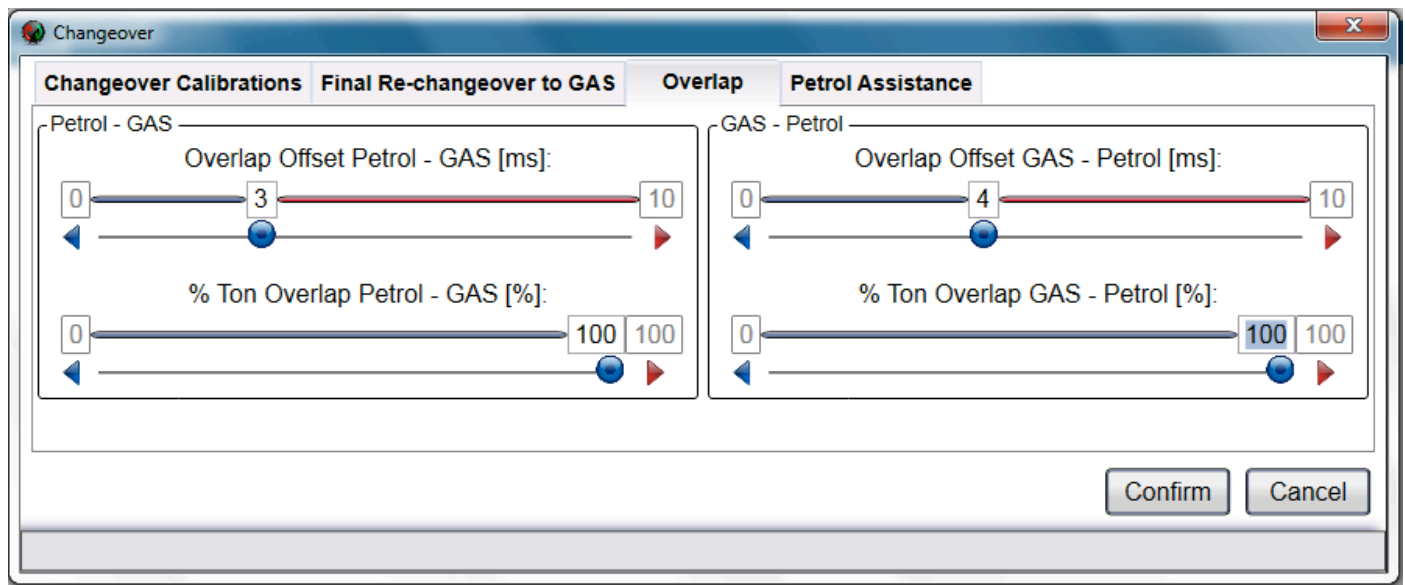
Parameters that you can set up in “**Petrol re-changeover for end of gas**” section allow managing the changeover from gas to petrol, due to gas pressure lack, gas injectors inability to supply enough fuel (excessive duty cycle) or gas temperature too low.

They are:

- **Delta P Minimum [mbar]:** it corresponds to the DeltaP value (difference between rail gas pressure and MAP) under which the system changes over to petrol again. In the example, a DeltaP lower than 800 mbar causes the re-changeover to petrol for end of gas.
- **D.C. Inj Max for Re-Changeover [%]:** it corresponds to the gas injectors duty cycle threshold over which the re-changeover occurs for maximum gas injectors duty cycle reached.
- **GAS Temperature for Re-Changeover to Petrol [°C]:** if gas temperature lowers under this value (0°C in the example), system changes over to petrol again, in order to avoid failures due to too low temperatures.
- **Waiting Time for Re-Changeover to Petrol [s]:** it shows the time elapsing between recognizing a possible cause of re-changeover to petrol and the real re-changeover. So the passage can not occur immediately, even in case of right conditions for petrol changeover, if this parameter is different from zero.
- **Maximum RPM for Definitive Re-Changeover:** if re-changeover to petrol happens with a rpm value lower than this threshold, it is considered as definitive and the system doesn't try gas supply again and immediately informs the user by means of a buzzer.
- **Maximum MAP for Definitive Re-Changeover [mbar]:** if re-changeover to petrol happens with a MAP value lower than this threshold, it is considered as definitive and the system doesn't try gas supply again and immediately informs the user by means of a buzzer.
- **Maximum GAS Flow for Changeover [%]:** the system retries to change over to gas, after a not definitive re-changeover to petrol, only when gas flow decreases under the percentage set up in this parameter, with respect to the petrol re-changeover conditions.
- **Waiting Time for Re-Changeover to GAS [s]:** when system is ready to return to the gas regular mode, even if a short passage to petrol was necessary, it waits this further time before changing over again.
- **Petrol Consumption Alert [l]:** this threshold detects the consumption of 0,5 l petrol after a not definitive re-changeover to petrol for end of gas, according to settings. In this case, the acoustic indicator buzzes to inform the user of current petrol consumption despite the gas mode selected on changeover switch.
- **Red LED after 0,5 l:** by enabling this parameter, bicolour LED turns red when the total amount of petrol consumed for many different not definitive re-changeovers reaches 0,5 l.

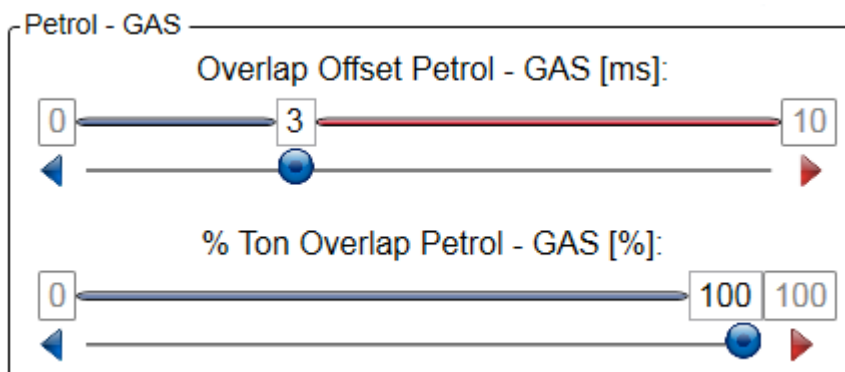
- **Red LED Always:** by enabling this strategy, bicolour LED turns red every time the vehicle changes over to petrol again.

5.2.2.7.3 Superposition



Fuels superposition parameters of *Petrol - Gas* and *Gas - Petrol* changeovers can be modified through this section.

Petrol – Gas



During PETROL-GAS changeover, a gas injection is added to the last petrol one, calculated on the basis of parameters set up in Petrol-Gas superposition, *Overlap Offset Petrol - GAS + % Ton Overlap Petrol - GAS*. This is useful to advance pipe filling between gas rail and intake manifold, especially in case of long pipes.

Overlap Offset Petrol - GAS [ms]:

The duration of gas injection added can be decided through this parameter. In the example, a 3 ms gas injection is added to the last petrol one. Default setting is 0 ms, meaning that no gas injection is given concurrently to the petrol one.

% Ton Overlap Petrol - GAS [%]:

A percentage gas injection, compared with the petrol one, can be added to the last petrol injection before changing over to petrol. In the example, a 100 % (full) gas injection is added to the last petrol one. Default setting is 0, meaning that a 0% gas injection is supplied, so no injection is given concurrently to the petrol one.

Gas - Petrol

GAS - Petrol

Overlap Offset GAS - Petrol [ms]:

0 4 10

% Ton Overlap GAS - Petrol [%]:

0 100 100

During GAS- PETROL changeover, the last gas injection is calculated on the basis of parameters set up in Gas-Petrol superposition, *Overlap Offset GAS - Petrol + % Ton Overlap GAS - Petrol*. Gas flow can be enriched or leant by modifying the last injection before changing over to petrol.

Overlap Offset GAS - Petrol [ms]:

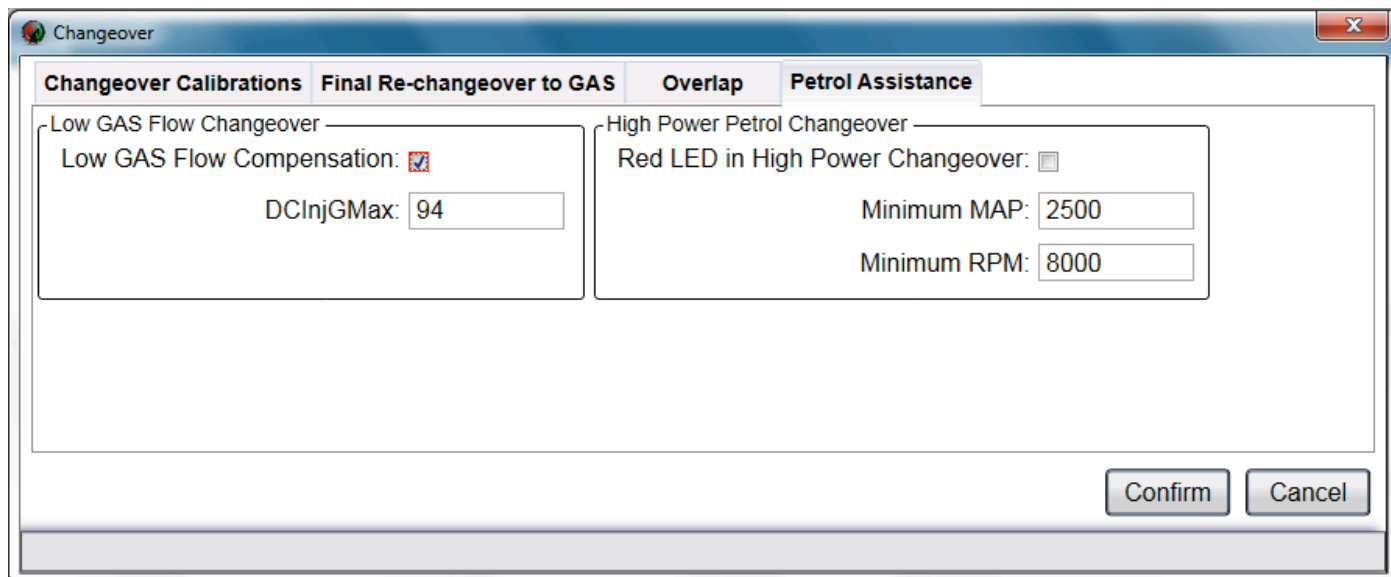
The duration of last gas injection before petrol changeover can be set up to max 10 ms. Default setting is 0 ms, meaning that the original gas injection is given.

% Ton Overlap GAS - Petrol [%]:

The percentage of last gas injection to give during changeover can be decided through this parameter. Default setting is 100%, meaning to give the full original gas injection. 0 % means that no last gas injection before changeover is given before changing over. Decrease the % value in order to obtain leaning.

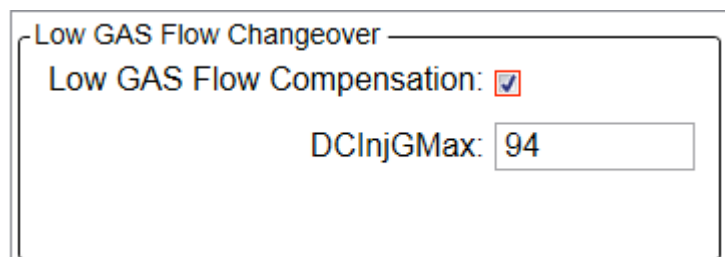
5.2.2.7.4 Petrol contribution

Petrol contributions can be managed in case the engine supply shows any problems with standard calibration.



The screenshot shows a window titled "Changeover" with four tabs: "Changeover Calibrations", "Final Re-changeover to GAS", "Overlap", and "Petrol Assistance". The "Petrol Assistance" tab is selected. It contains two main sections. The left section, titled "Low GAS Flow Changeover", has a checkbox for "Low GAS Flow Compensation" which is checked, and a text input field for "DCInjGMax" with the value "94". The right section, titled "High Power Petrol Changeover", has a checkbox for "Red LED in High Power Changeover" which is unchecked, and two text input fields: "Minimum MAP" with the value "2500" and "Minimum RPM" with the value "8000". At the bottom right of the window are "Confirm" and "Cancel" buttons.

Low GAS Flow Changeover



This is a close-up of the "Low GAS Flow Changeover" section. It shows the checkbox for "Low GAS Flow Compensation" is checked, and the "DCInjGMax" text input field contains the value "94".

Strategy based on VSR operation (Valve Seat Recession).

A petrol percentage can be injected over a Gas Duty Cycle threshold, previously set up through interface, in order to meet engine requirements.

This is useful to avoid petrol re-changeovers due to *Duty Cycle Injector Max for Re-Changeover [%]* attainment, especially if small-sized injectors had to be used during installation.

By enabling the strategy, the system only supplies LPG until the DCInjMax value is reached.

Over that value, the system opens the petrol injector instead of the gas one to supply the remaining part, up to the *Duty Cycle Injector Max for Re-Changeover* value. This limit identifies the definitive petrol re-changeover. The two fuels supplied together are anyway a stoichiometric calibration.

In the example, Gas flow to be supplied to the engine needs a Duty Cycle GAS 98%; the system supplies 94% LPG and 4% Petrol. When total Duty Cycle reaches 100% (*Duty Cycle Injector Max for Re-Changeover*), the vehicle returns to petrol mode.

High Power Petrol Changeover

High Power Petrol Changeover

Red LED in High Power Changeover: ☒

Minimum MAP:

Minimum RPM:

This strategy allows to temporarily change over to petrol over specific RPM and MAP thresholds. This is useful to avoid problems due to failed supply at high RPM or petrol 100% Duty Cycle detection.

The installer can modify changeover parameters.

Changeover switch does not show this petrol re-changeover, bicolour LED stays green (gas mode).

The system automatically returns to GAS when values decrease under changeover parameters.

In the example, vehicle changes over to petrol over 900 mbar MAP and 5000 RPM.



When a change made in changeover strategies 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.

5.2.2.8 Level calibration



Click on *Setting up > Level calibration* from main menu to enter the LPG level sensor setting section, where the signal coming from gas level sensor can be calibrated in order to obtain the right fuel level indication on changeover switch.

Calibration Tool shows features of sensors available according to the kind of system.

GAS Level Gauge Settings

Level Gauge: 0-90 Ohm

Time [ms]: 0 100 %

Full Tank [LPG: mV CNG: bar]: 1071 85 %

Acquisition

LPG lev [mV]: 0

Empty Tank [LPG: mV CNG: bar]: 39 0 %

Acquisition

Delta Lev. Refresh [%]: 20

Default Values Update Confirm Cancel

Overfilled Tank

4th LED

3rd LED

2nd LED

1st LED

Reserve

1071 LPG: mV CNG: bar

804 LPG: mV CNG: bar

585 LPG: mV CNG: bar

355 LPG: mV CNG: bar

124 LPG: mV CNG: bar

Let's explore the Level Calibration section.

Top of the window, a pull-down menu proposes all sensors used by GFI systems. Choose the suitable sensor according to the tank installed.

EZ-LGI System

Sensore Livello

LDI H230

LDI H270

LPG System

Sensore Livello

0-90 Ohm

0-90 Ohm

CNG System

Sensore Livello

Ottico HP

0-90 Ohm

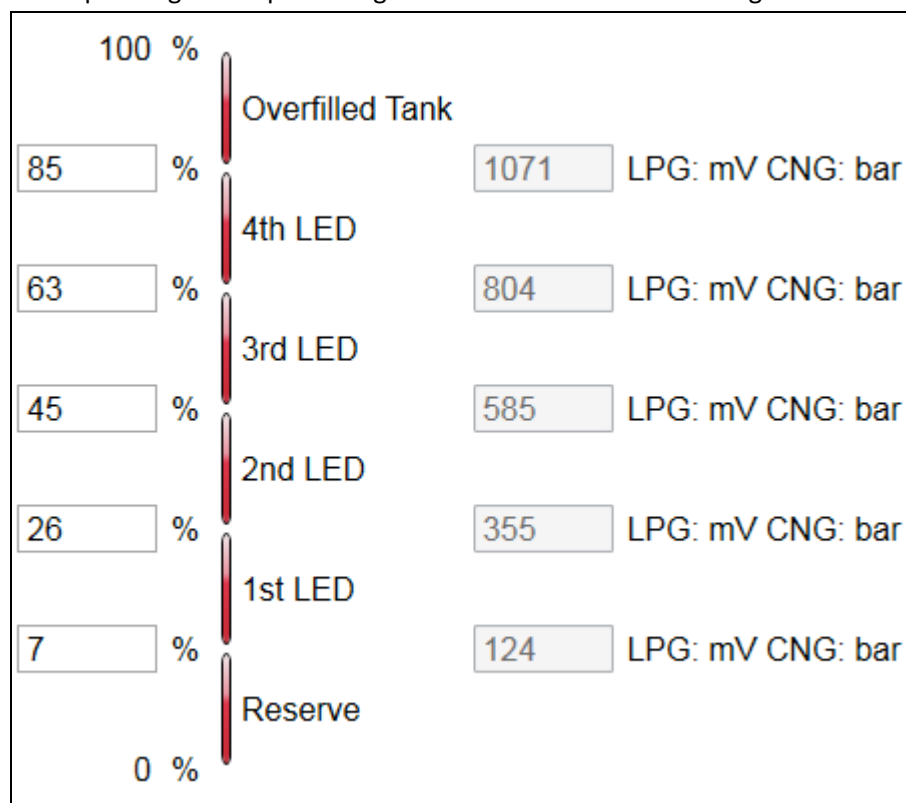
Tempo [ms]:

Sensata HP

Ottico HP

After selecting the kind of sensor, a new division of changeover switch level setting scale appears.

The picture shows an example of percentage division of level setting. *mV* values for LPG and *bar* values for CNG corresponding to the percentage values are indicated to the right.



The system gets level input from sensor and compares it with the ECU current setting. All 4 LEDs are on when tank is 80% full, with a 5% margin. Consuming gas, the fourth LED turns off when tank is 63% full while the other 3 LEDs are on, and so on until reaching the 7% condition, when reserve fuel starts to be reported through the first LED blinking light.

!ATTENTION!: If sensor detects a value higher than 85%, the system reports the Overfilling condition through the 4 LEDs simultaneous blinking light.

The installer can modify these percentages customizing the setting scale and obtaining a different LED display division. Press ENTER to confirm and enable changes.

Next to the setting scale there are two buttons

Full Tank [LPG: mV CNG: bar]:

By clicking on this button, the system fills in the Full tank box with the value acquired through sensor reading.

! ATTENTION!: press the button when LPG/CNG tank is full.

Empty Tank [LPG: mV CNG: bar]:

By clicking on this button, the system fills in the Empty tank box with the value acquired through sensor reading.

! ATTENTION!: press the button when LPG/CNG tank is empty.

In the middle of the window there is

LPG lev [mV]:

It shows the electrical value the system is receiving from tank level sensor. You can compare it with setting division mV values in order to understand how many switch LEDs should be on.

Delta Lev. Refresh [%]:

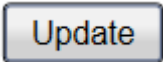
Percentages indicate the turning off thresholds of changeover switch LED, depending on fuel level decreasing.

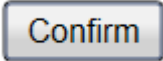
Ascending LEDs turning on only happens when hysteresis percentage level, indicated by the Delta Lev. Refresh[%] parameter, is passed, with respect to LEDs turning off intermediate steps.

This check is necessary to avoid instability in displaying two consecutives conditions.

E.g. if a level value lower than 45% turns off the third LED, a higher signal is needed to turn it on, corresponding to 45% + hysteresis value (20%).

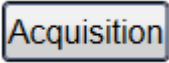
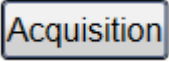
The button *Default values*  restores setting default values of every sensor selected.

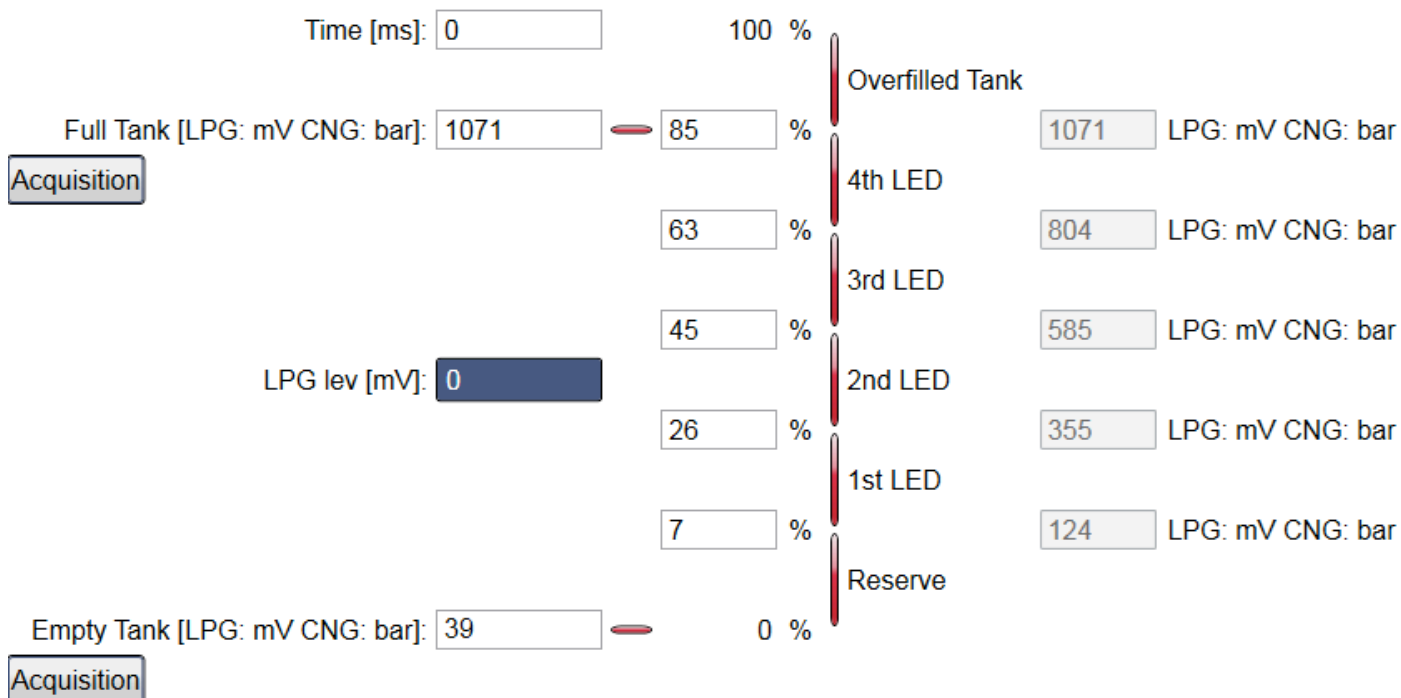
The button *Update*  refreshes the real tank fuel level displayed by changeover switch LEDs, eluding automatic update time.

The button *Confirmation*  confirms level calibration modifications. Save them on ECU through Save Calibration.

Use

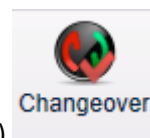
As said before, you can change setting through the Level Calibration if LPG level indication is not correct or if you need to customise it.

Procedure is easy: with empty tank, acquire the level sensor signal by clicking on *Acquire* ; read value appears into the respective box (see picture below). After gas refuelling, just click on *Acquire* , read value appears into the respective box.



The software will automatically calculate again every setting range with new MIN and MAX values, according to the percentage values.

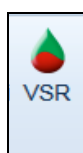
Once the calibration ended and checked, you can proceed by clicking on *Confirm*.



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

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

5.2.2.9 VSR



Click on *Setting up* > VSR from main menu to enter the VSR strategy section.

“VSR” (*Valve Seat Recession*) strategy allows giving a petrol contribution during vehicle gas mode.

If enabled, it allows protecting the life of valves seats, especially on vehicles suffering from this problem.

!ATTENTION!: *The introduction of VSR strategy does not assure the feasibility of all vehicles.*

The list of inadvisable vehicles, periodically updated and sent to workshops, is absolutely still valid and has priority on all feasibility confirmation or strategy.

Working condition (RPM, MAP) and petrol percentage to be injected can be calibrated through Interface at VSR section of main menu.

VSR


VSR MODE

VSR **Extended VSR Table**

VSR Enabled: ☐

MAP Min for VSR [mbar]: 0 RPM Min for VSR [rpm]: 0

VSR Contribution [%]: 0 RPM Max for VSR [rpm]: 0

Minimum Petrol TOn Available: 1,000 Qb VSR: 50,8 

Gas_IPW_ist [ms]: 0 0..20 Gas Duty Cycle [%]: 0,0

Pet_IPW_ist [ms]: 0,00 Petrol Duty Cycle [%]: 0,0

TbVSRReal [ms]: 0,00 DeltaQbTxVSR [%]: 0

Low GAS Flow Compensation

Compensation Enable: ☒ DCInjG Max: 94

Confirm Cancel

In this page you can enable strategy and change parameters. It also shows petrol contribution values.

Working parameters

-VSR MODE

VSR **Extended VSR Table**

VSR Enabled: ☒

MAP Min for VSR [mbar]: 500 RPM Min for VSR [rpm]: 1500

VSR Contribution [%]: 20 RPM Max for VSR [rpm]: 6000

MAP Min for VSR [mbar]: strategy intervenes above this MAP value.


RPM Min for VSR [rpm]: strategy intervenes above this RMP value.

RPM Max for VSR [rpm]: strategy intervenes under this RMP value.

VSR correction [%]: petrol percentage we want to inject. This percentage is deducted from the gas flow normally supplied to the engine and the correspondent petrol quantity is given.

In the example VSR strategy will intervene only above a 500 mbar MAP in a range of RPM included between 1500 and 6000 rpm, with a 20% petrol contribution.

Intervention Values

Minimun Petrol TOn Available:	<input type="text" value="1,000"/>	Qb VSR:	<input type="text" value="50,8"/>	
Gas_IPW_ist [ms]:	<input type="text" value="0,00"/>	Gas Duty Cycle [%]:	<input type="text" value="0,0"/>	
Pet_IPW_ist [ms]:	<input type="text" value="0,00"/>	Petrol Duty Cycle [%]:	<input type="text" value="0,0"/>	
TbVSRReal [ms]:	<input type="text" value="0,00"/>	DeltaQbTxVSR [%]:	<input type="text" value="0"/>	

Minimun Petrol TOn Available: Minimum Petrol Injection Time that injector can supply.

T.Inj.gas Ist. [ms]: Gas injection time after deduction of the petrol percentage required.

T.Inj.petrol Ist. [ms]: Petrol Injection Time.

TbVSRReal [ms]: Injection Time corresponding to the petrol percentage to be supplied to the engine.

Qb VSR [%]: Average petrol percentage supplied with VSR strategy from the last reset.

Duty Cycle Gas and Duty Cycle Petrol [%]: Gas and Petrol Duty Cycle in working condition.

DeltaQbTxVSR [%]: VSR real intervention percentage. This value results from many automatic software verifications concerning the real possibility to supply VSR quantity desired. Wished value can be different to the real one.



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

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

5.2.2.10 Petrol pressure

In EZ systems you can set up the petrol pressure sensor for a right gas carburetion.

As for MAP OEM sensor, it consists in match physical values, petrol pressure in this case, with electrical values read by GFI.



Click on *Setting up > Petrol pressure* from main menu to enter the petrol pressure input calibration section.

Pressione Benzina

Input

Press Benzina [mbar]:

Bassa Pressione Rail —

Valore Elettrico [U.C.]: Press rail ass da OBD [mbar]:

1 kPa = 10 mbar

Acquisisci

Alta Pressione Rail —

Valore Elettrico [U.C.]: Press rail ass da OBD [mbar]:

1 kPa = 10 mbar

Acquisisci

Indietro **Avanti** **Annulla**

Procedure is easy and intuitive:

- 1) Start engine in petrol mode and wait for steady condition; insert petrol pressure physical value read by OBD tester at idle into the *Press rail abs from OBD [mbar]* box. Click on ACQUIRE inside the top box ENGINE AT IDLE. **!ATTENTION!** confirm the physical value inserted by hand by clicking on ENTER before acquiring the electrical one.

Bassa Pressione Rail —

Valore Elettrico [U.C.]: Press rail ass da OBD [mbar]:

1 kPa = 10 mbar

Acquisisci

- 2) Acquisition of max pressure. Setting procedure changes accordingly to the type of system installed.

Alta Pressione Rail —

Valore Elettrico [U.C.]: Press rail ass da OBD [mbar]:

1 kPa = 10 mbar

Acquisisci

- a) EZ-Software 4-, 5-, 6-, 8-cyl systems.

Remove key contact with engine at steady condition. Wait for some minutes and check with an OBD tester that inside rail pressure increases up to values higher than the idle condition ones. Insert in *Press rail abs from OBD [mbar]* the petrol pressure physical value read by OBD tester and click on *Acquire* inside the bottom box Engine off.

! ATTENTION!: confirm the physical value inserted by hand by clicking on ENTER before acquiring the electrical one.

b) EZ-SDI system.

Set the petrol pressure sensor at 100 bar by typing 100000 in the *Press rail abs from OBD [mbar]* box. Drive with PC and EOBD tester connected. When fuel pressure on tester is 10000 KPa click on *Acquire* into the second box. Insert physical value read by OBD during acquisition. The system matches 100 bar physical value to this electrical one.

Note: If you can not set pressure at exactly 100 bar, 90 or 80 bar is ok too; the important is that electrical value acquired corresponds to the physical one indicated in *Press rail abs from OBD [mbar]* and correctly read by the EOBD tester.

! ATTENTION!: confirm the physical value inserted by hand by clicking on ENTER before acquiring the electrical one.

If system allows the OBD communication connection and enabling, petrol pressure sensor can be set up through the values read by OBD.

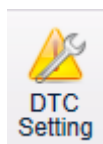
When a change made in Petrol pressure section is confirmed, a red tick appears on the icon (see picture)



meaning that user has modified that section.

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

5.2.2.11 ERRORS CALIBRATION



Click on *Setting up > Errors Calibration* from main menu to enter the errors management enabling and modification section, where you can enable and make changes to gas system diagnostics.

DTC Setting

DTC	DTC Description	Enabled	Changeover to Gasoline	Buzzer indication	Led Blinking
P0106	MAP Sensor not plausible!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P0107	MAP Sensor low signal voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P0108	MAP Sensor high signal voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01A0	Gas level signal low!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01A1	Gas level signal high!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01A4	Alternative fuel rail pressure performance!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01A5	Alternative fuel rail pressure circuit low voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01A6	Alternative fuel rail pressure circuit high voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01B5	Alternative fuel rail temperature, circuit performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01B6	Alternative fuel rail temperature circuit low voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P01B7	Alternative fuel rail temperature high voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P0611	Microcontroller performance!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P0619	Flash checksum error!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P0641	Sensors supply voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P1115	Sensore TH2O	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P1378	GAS ECU, low voltage supply!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P1379	GAS ECU, high voltage supply!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P1726	rpm or crancck shaft signal!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P2146	Alternative fuel actuators supply voltage!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

DTC Calibration

N1: 20	Min Threshold: 60	<table border="1"> <thead> <tr> <th>Extra Parameters</th> <th>Physical Value</th> <th>Unit</th> </tr> </thead> <tbody> <tr><td colspan="3" style="height: 100px;"></td></tr> </tbody> </table>	Extra Parameters	Physical Value	Unit			
Extra Parameters	Physical Value		Unit					
Q1: 11	Max Threshold: 1300							
N2: 20	Min Raw Unit: 95							
Q2: 11	Max Raw Unit: 9830							

Errors Management of Diagnostics menu shows the error indication.

Default Calibration

Click on *Default Values* for the automatic enabling; in this case, all default errors of the system installed are enabled.

On the contrary, to customise gas diagnostics, click on the box corresponding to the error wished in the column "Enable".

If error is recorded, the effect on vehicle can be checked on the last three columns.

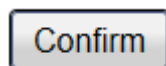
Changeover to Gasoline	Buzzer indication	Led Blinking
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Changeover to Gasoline: if box is ticked, the vehicle automatically returns to petrol mode when error is recorded.

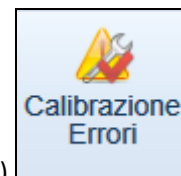
Buzzer Indication: if box is ticked, buzzer starts to play to inform user when error is recorded.

Led Blinking: if box is ticked, switch bicolour LED starts to blink to inform user when error is recorded.

!ATTENTION!: installer can not modify the effect on vehicle.



Confirm by clicking on . A red tick appears on the icon (see picture) meaning that user has modified that section.



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

5.2.3 DIAGNOSTICS

5.2.3.1 ECU Version



Click on *DIAGNOSTICS > ECU Version*, or *UTILITY > ECU Version* from main menu to enter the page below,

The screenshot shows a window titled "ECU Version" with a close button in the top right corner. The window contains two columns of data. The left column lists various identifiers and versions, while the right column lists programming dates, programmer names, micro version, and running times. Some values are marked with red 'X' icons, indicating errors or warnings.

ECU Code: DE817010 AM Standard	
No. of Cylinders:	4
Project Number:	0
Serial Number:	20109/5-P
Batch:	10CI
Loader Vers.:	BBLY10-0107
Software Ver.:	SY0AA101010D03
Current Calibr.Vers.:	0
Original Calibr.Vers.:	1
Changeover Switch Vers.:	---
First Programming Date:	24/04/2015
Last Programming Date:	27/04/2015
First Programmer:	BRC38
Last Programmer:	GFI41
Micro Version:	C1C1
Petrol Mode Running Time [hh:mm]:	2:01
Gas Mode Running Time [hh:mm]:	1:39
Nr. of Gas Forced Crank:	0 / 5
Qb VSR [%]:	50,8

Close

showing parameters concerning ECU, software, calibration and programming.

ECU Code

It is the code identifying that specific ECU version. In the example is "DE817010", which identifies the ECU version EZ-Software. This code could become DE817010-2, in the future, where the main code (DE817010) identifies the product, while the number after the score identifies the ECU hardware revision.

A short description appears next to the code. In the example, *AM STANDARD* means that DE817010 is a EZ-Software AM **Standard** one.

No. of Cylinders

It is the maximum number of cylinders the ECU can manage.

Project Number

It is the number that GFI couples with every vehicle developed and validated in-house. If installer creates a new map modifying a GFI previous one, the original vehicle number does not change.

Serial Number & Batch

Manufacturing data of ECU installed. The serial number (consecutive) is different for each ECU produced by GFI assembly lines and properly tested.

Batch number can give information about the year and week of ECU manufacturing. For instance, "10DA" means that ECU has been manufactured in 2010 (first number), week 41 (D=4 and A=1).

Loader Ver.

It shows the version of loader currently present on ECU memory (loader is the part of software allowing to change ECU programming. It is only necessary for starting and programming). It is an alphanumerical sequence such as: "**BBL Y10-0107**". The last three numbers represent the version (107 in the example). The higher the number, the more recent and improved the loader.

Software Ver.

It indicates the software running on ECU. It has 5 letters + 3 numbers + 3 numbers + 3 letters. The first 5 letters state the kind of software (SY0AA), the 3 numbers state the software real version (100 - the higher the number, the more recent and improved the program), the following 3 numbers state the hardware version dedicated (010 - means that it is for DE817010 ECU, that's to say the EZ-Software 4-cyl one), the last 3 letters state the software final version (D04 - it is possible to have many final software for the version indicated by the first 3 numbers).

Current Calibr.Vers. (FxD):

It shows the version of ECU calibrations (file .FxD). It is at least 1 for GFI maps; every time GFI releases a new calibration, this number increases.

It is always 0 in case of maps realized/modified by the installer.

Original Calibr.Vers.(FxD)

It is the starting version of a GFI validated calibration from which the version "0" currently present in ECU has been created. With a GFI validated calibration, Current and Original calibration versions are the same. When user modifies GFI calibration, the current one becomes "0" while the original one keeps the starting version.

Changeover Switch Ver.:

It shows the version of changeover switch connected to that system.

Changeover switch has a microprocessor able to communicate with ECU. Changing the switch, this information could change.

It is not possible to reprogram changeover switch to increase the version.

Date of First Programming

This is the date of first ECU programming made by the installer. It does not change anymore, always showing when it has been used for the first time. In the example, ECU has been programmed for the first time on October 14th 2010

Date of Last Programming

This is the date of last ECU programming made by the installer. It is the final and current programming of that vehicle. Every time a modification is made involving programming, this date is updated.

First Programmer

It is the code of the programmer who modified ECU calibration before the last one.

Last Programmer

It is the code of the last programmer who modified ECU calibration.

Petrol Mode Working Time (hh:mm)

It shows the petrol total working time of the system, recorded by ECU memory, in hours and minutes. Counter can not be reset through PC.

Gas Mode Working Time (hh:mm)


It shows the LPG total working time of the system, recorded by ECU memory, in hours and minutes. Counter can not be reset through interface on PC.

Nr. of Gas Forced Crank:

EZ-Software system allows to start engine directly in gas mode for certain times.

This is an emergency procedure and should only be used in case of lack of petrol or original petrol system components failure (such as pump, injectors, petrol circuit).

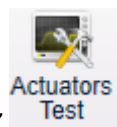
To start engine in gas mode, insert key contact, keep changeover switch pressed for about 6 seconds, wait for double-beep acoustic indicator and start engine by 4 seconds. The system allows max 5 gas forced cranks, then the

counter should be reset with  button to make the function available once again.

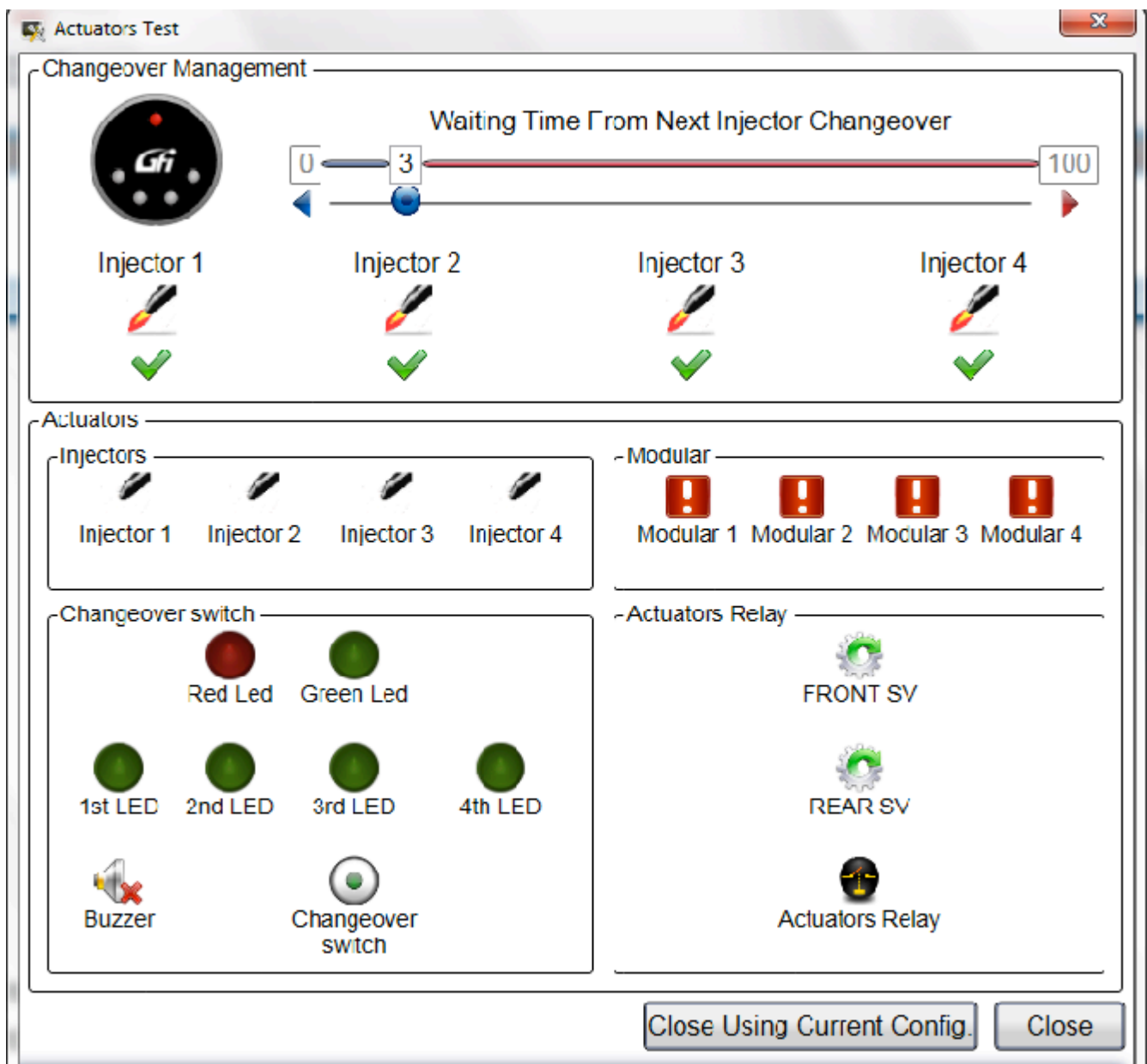
5.2.3.2 Actuators test

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

5.2.3.2.1 EZ Systems



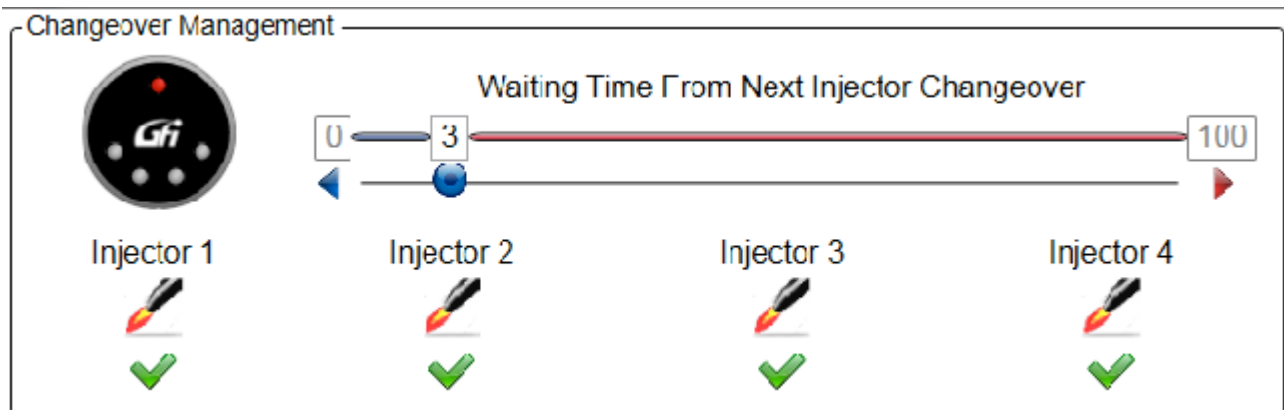
Click on " *ACTUATORS TEST* " from Diagnostics to enter the page dedicated to system actuators check



where you can verify:

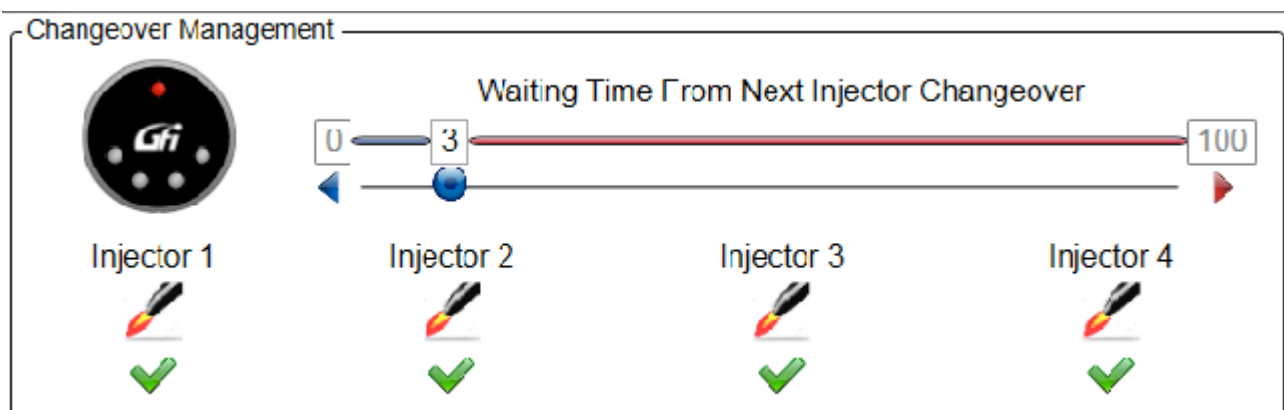
- Injectors connection right sequence
- Gas injectors good working
- Petrol injection cut-off good working
- Actuators relay good working
- Two solenoid valves good working
- Gas level display LEDs good working
- Changeover switch buzzer good working
- Changeover switch good working

Changeover management



The system reads from ECU the number of injectors connected (4 in the example) and the injection delay between cylinders changeover (3 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.

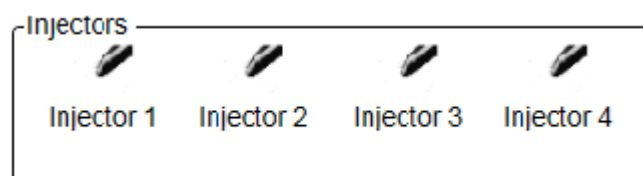


Move the *Waiting Time From Next Injector Changeover* cursor to the right to increase the changeover delay between two consecutive injectors, so that any wrong connection creates a longer and easy-to-detect engine failure allowing an easier and quicker diagnostics.

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

Click on *Close keeping configuration* [Close Using Current Config.](#) to apply the change just made on vehicle.

Injectors

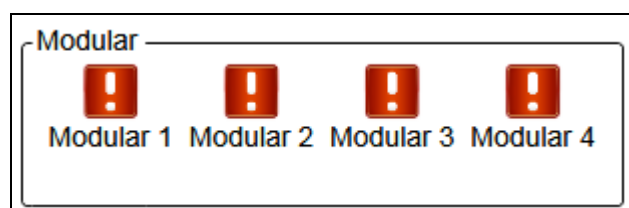


LPG injector can be controlled with engine off.

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.

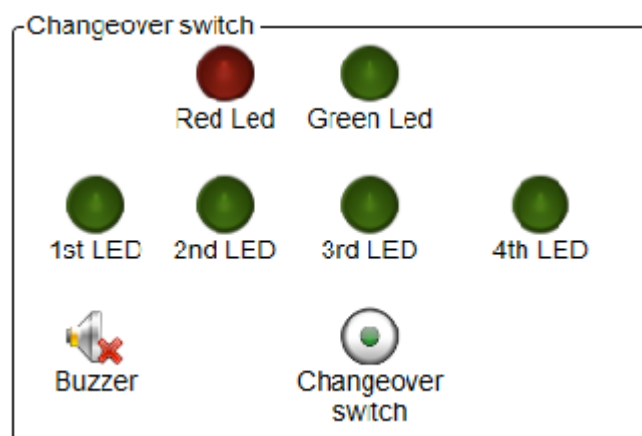
Injection cut-off does not run properly if engine starts to work wrongly.

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 _____



If changeover switch is in petrol mode, the icon turns _____

RELAY

-Actuators Relay _____



FRONT SV



REAR SV



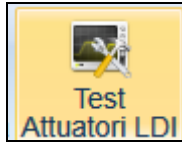
Actuators Relay

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

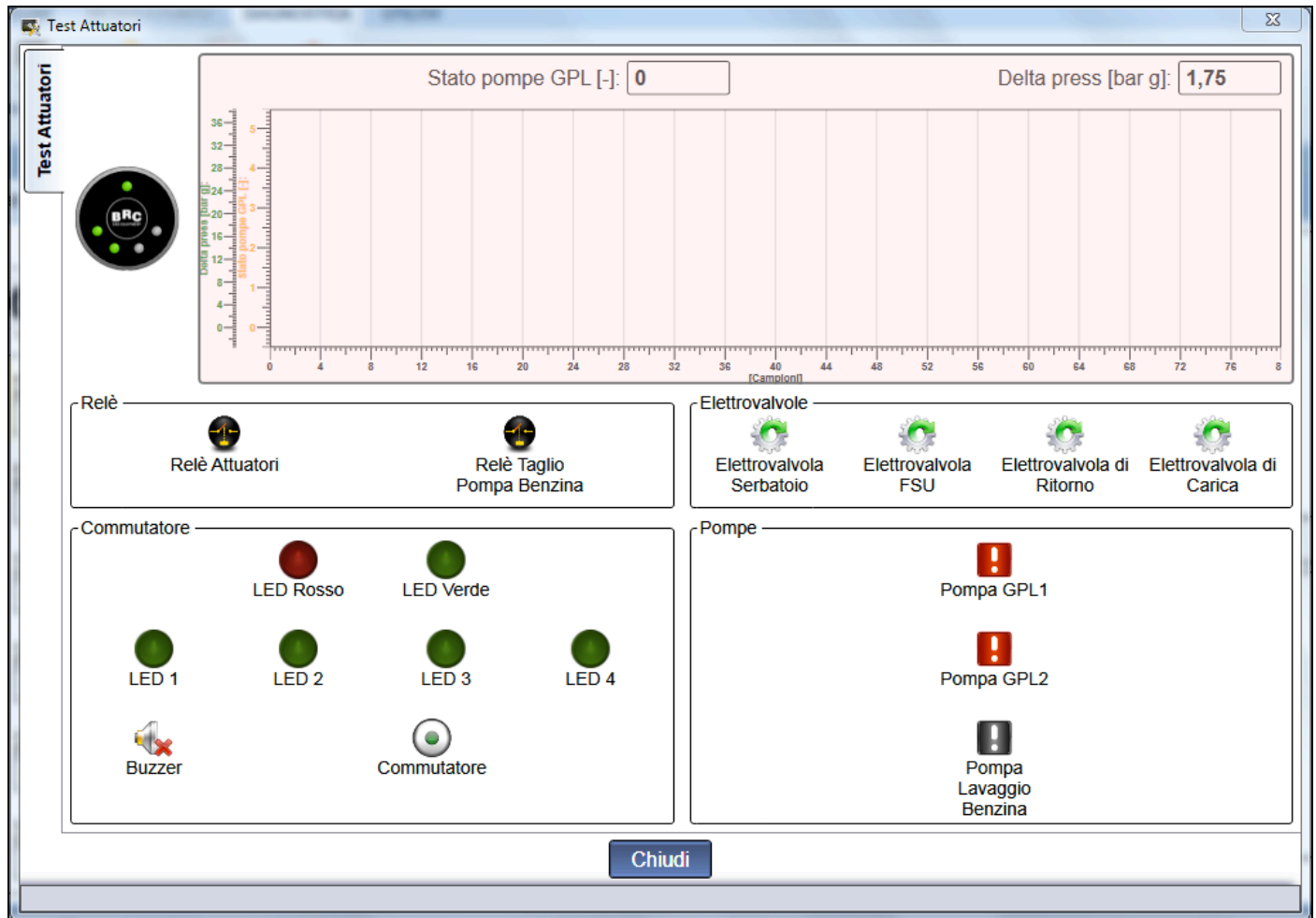
Select the Actuators Relay icon, it opens and closes many times. The sound emitted confirms its good working.

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

5.2.3.2.2 EZ-LGI System



Click on DIAGNOSTICS > EZ-LGI Actuators Test [Test Attuatori LDI](#) from main menu to enter the page dedicated to system actuators check.



where you can verify:

- System relays good working
 - Actuators relay
 - Petrol pump cut-off relay
- Solenoid valve good working
 - Tank solenoid valve
 - FSU solenoid valve
 - Return solenoid valve
 - Filling solenoid valve
- Gas level display LEDs good working
- Changeover switch buzzer good working
- Changeover switch good working
- LPG pumps and relative relay good working
- Petrol flush pump and relative relay good working

The page is divided into an upper section dedicated to check LPG pump and Petrol flush pump good working inspection, where you can also see the virtual changeover switch useful to change fuel mode from PC, and a lower section collecting all test buttons. Click on the wished button to start/stop the test corresponding to the device you want to check.

Actuators Relay (Sound inspection)

Select *Actuators Relay* icon



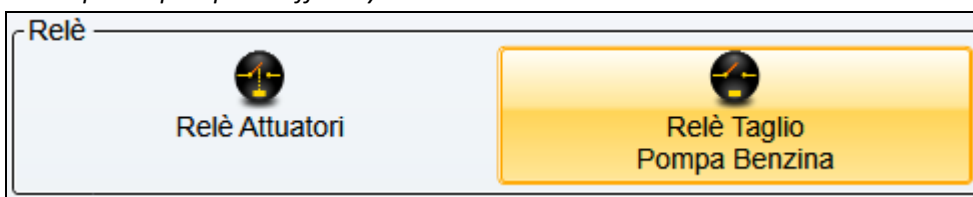
actuators relay opens and closes many times, while the icon turns as follows:



The sound emitted confirms its good working.

Petrol pump cut-off relay (Sound inspection)

Select *petrol pump cut-off relay* icon



the relay controlling the petrol pump cut-off opens and closes many times, while the icon turns as follows:



The sound emitted confirms its good working.

Tank solenoid valve (Sound inspection)



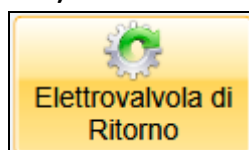
Select the *Tank solenoid valve* icon; the solenoid valve situated on EZ-LGI flange opens and closes many times. The sound emitted confirms its good working.

FSU solenoid valve (Sound inspection)



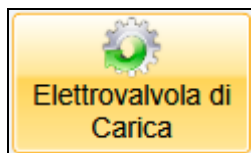
Select the *FSU solenoid valve* icon; the solenoid valve situated on FSU device opens and closes many times. The sound emitted confirms its good working.

Return solenoid valve (Sound inspection)



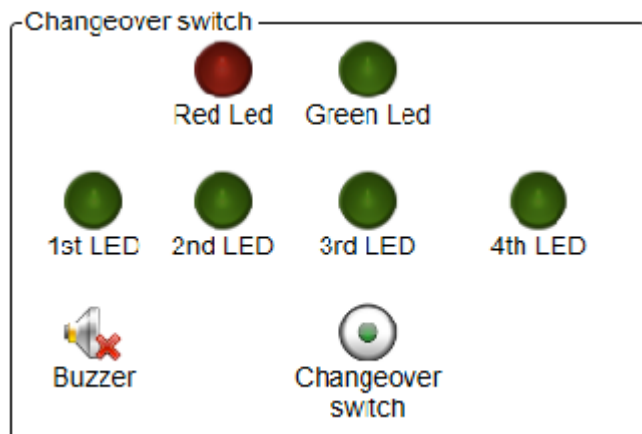
Select the *Return solenoid valve* icon; the solenoid valve situated on FSU device opens and closes many times. The sound emitted confirms its good working.

Filling solenoid valve (Sound inspection)



Select the *Filling solenoid valve* icon; the solenoid valve situated on EZ-LGI flange opens and closes many times. The sound emitted confirms its good working.

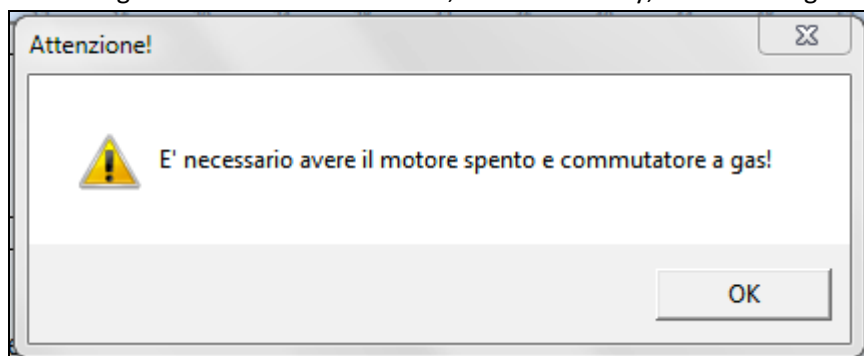
Changeover switch



Changeover switch bicolour LED, all LPG level indicator LEDs and Buzzer can be tested by clicking on one of the LEDs icons, for instance *LED 4 or red LED*, or on Buzzer icon; consecutive lightning flashes of changeover switch LEDs or consecutive beeps of buzzer confirm their good working.

LPG Pumps 1 and 2

The good working of the two LPG pumps integrated on tank LPG flange can be verified with dashboard on, engine off and changeover switch on LPG mode; on the contrary, the following warning message appears

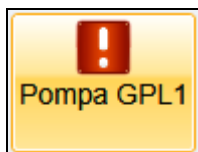


Check the good working through a sound inspection of pump activation; you can also check the following variables in the upper graph of Actuators Test window:

LPG Pump state [-] : it shows test working condition. Orange line

Delta press (bar) : difference between FSU sensor pressure and LPG tank inside one. Green line

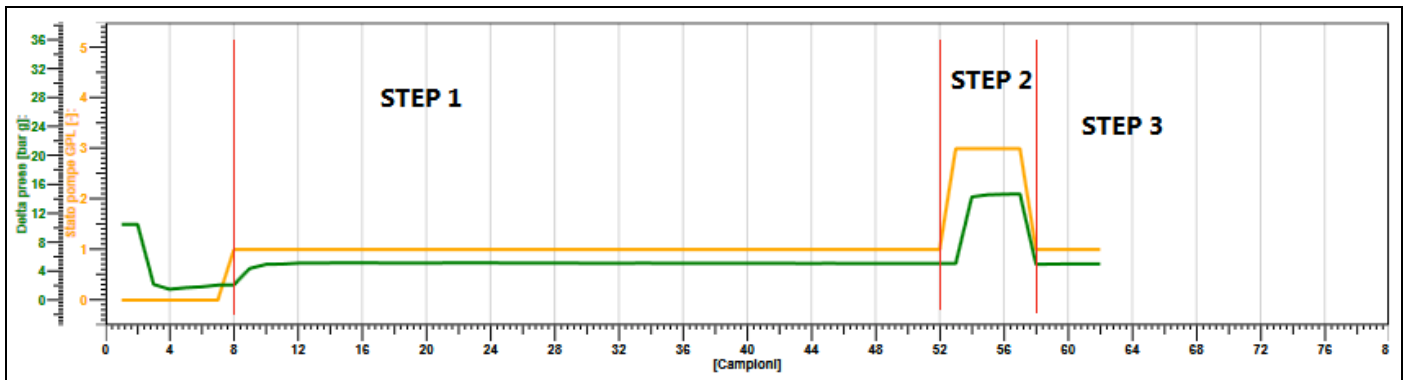
LPG pump 1 test



Start test by clicking on *LPG pump 1* button

After a short time, LPG pump 1 is activated with open *FSU and Return Solenoid Valves* and relative *Delta press (bar)* variable increase up to $\approx 5\text{bar}$. Then, *Return Solenoid Valve* closes while the *FSU one* stays open. When closing it, a further *Delta press (bar)* $> 15\text{ bar}$ increase should occur. Finally, *Return Solenoid Valve* opens again and relative *Delta press (bar)* decreases $\approx 5\text{bar}$.

The graph shows every activation phase through a change of condition, *LPG Pump state [-]*.



Test phases

Phase 1: *LPG Pump state [-] = 1*

FSU Solenoid Valve open.

Return Solenoid Valve open.

LPG pump 1 activation. Delta press (bar) value should be steady at ≈5bar.

Phase 2: *LPG Pump state [-] = 3*

FSU Solenoid Valve open.

Return Solenoid Valve closing.

With LPG pump 1 still activated, Delta press (bar) value should further increase, > 15 bar.

Phase 3: *LPG Pump state [-] = 1*

FSU Solenoid Valve open.

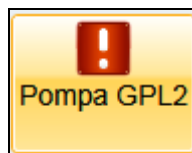
Return Solenoid Valve opening.

Delta press (bar) pressure should come back to the starting value of Phase 1, ≈5bar.

Test result:

LPG pump 1 works properly if during test the *Delta press (bar)* pressure trend is the one described above.

LPG pump 2 test



Start test by clicking on *LPG pump 2* button.

While testing the LPG pump 2, the LPG pump 1 is activated too.

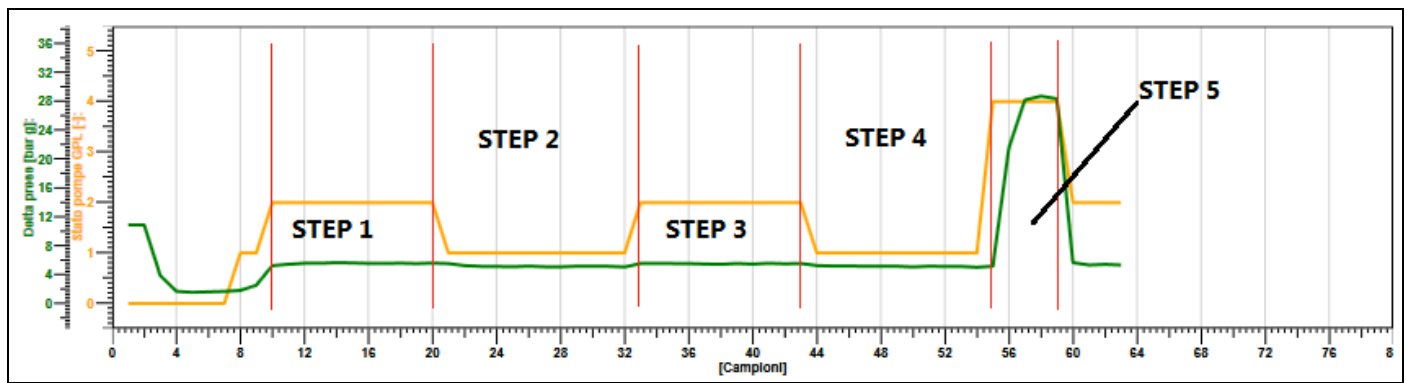
With open *FSU and Return Solenoid Valves*, LPG pump 1 and LPG pump 2 are activated at the same time, while *Delta press (bar)* variable increases up to ≈5bar.

Then LPG pump 2 turns off and on again many times. While turning off LPG pump 2, the *Delta press (bar)* pressure slightly decreases; on the contrary, while reactivating LPG pump 2 the *Delta press (bar)* pressure slightly increases.

Now, during the LPG pumps 1 and 2 working, *Return Solenoid Valve* closes while the *FSU one* stays open. When closing it, a further *Delta press (bar)* > 25 bar increase should occur.

Finally, *Return Solenoid Valve* opens again and relative *Delta press (bar)* variable decreases up to ≈5bar.

The graph shows every activation phase through a change of condition, *LPG Pump state [-]*.



Test phases

Phase 1-3: *LPG Pump state [-] = 2*

FSU Solenoid Valve open.

Return Solenoid Valve open.

LPG pump 1 and LPG pump 2 simultaneous activation. *Delta press (bar)* value should increase.

Phase 2-4: *LPG Pump state [-] = 1*

FSU Solenoid Valve open.

Return Solenoid Valve open.

LPG pump 2 closing with LPG pump 1 still working. *Delta press (bar)* value should slightly decrease.

Phase 5: *LPG Pump state [-] = 4*

FSU Solenoid Valve open.

Return Solenoid Valve closing.

Together with LPG pump 1 and LPG pump 2 activation, *Delta press (bar)* value should further increase, > 25bar.

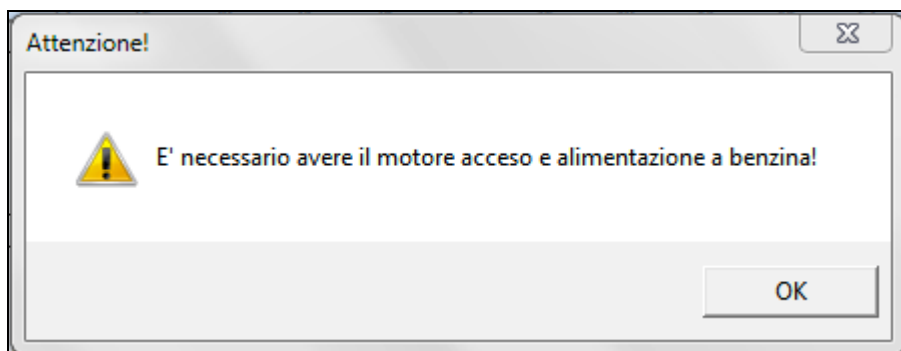
Finally, while opening the Return Solenoid Valve, *Delta press (bar)* value comes back to the starting value of Phases 1-3, ≈5bar.

Test result:

LPG pump 2 works properly if during test the *Delta press (bar)* pressure trend is the one described above.

Petrol flush pump

The good working of LPG petrol flush pump situated on tank petrol flange can be verified with engine on and changeover switch on petrol mode; on the contrary, the following warning message appears



Check the good working through a sound inspection of pump activation; you can also check the following variables in the upper graph of Actuators Test window:

Petrol Flush Pump [-] : it shows pump activation. 0 when Off, 1 when On.

FSU press (bar): pressure read by the FSU pressure sensor.

Petrol flush pump test



Start test by clicking on *Petrol flush pump* button

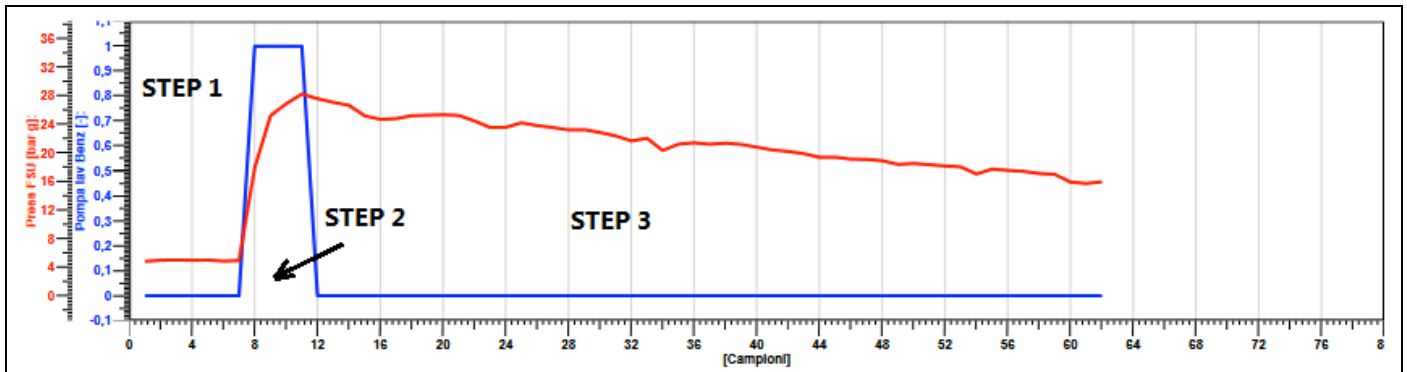
Being in petrol mode, *FSU* and *Return Solenoid Valves* keep closed.

After a short time, Petrol flush pump is activated. At the same time, a *FSU press (bar)* > 25 bar increase occurs inside the FSU.

Now the Petrol flush pump turns off. *FSU press (bar)* value should slowly decrease as engine is consuming fuel.

The Pump activation-turning off cycle is repeated twice during test.

The graph shows every activation phase through a change of condition, *Petrol Flush Pump [-]*.



Test phases

Phase 1: *Petrol Flush Pump [-]*=0

FSU Solenoid Valve closed.

Return Solenoid Valve closed.

Regular vehicle petrol mode, *FSU press (bar)* ≥ 4 bar.

Phase 2: *Petrol Flush Pump [-]*=1

FSU Solenoid Valve closed.

Return Solenoid Valve closed.

Petrol flush pump activation. *FSU press (bar)* value should increase, > 25 bar.

Phase 3: *Petrol Flush Pump [-]*=0

FSU Solenoid Valve closed.

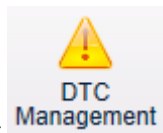
Return Solenoid Valve closed.

Petrol flush pump closing. *FSU press (bar)* value should decrease.

Test result:

Petrol flush pump works properly if during test the *FSU press (bar)* pressure trend is the one described above.

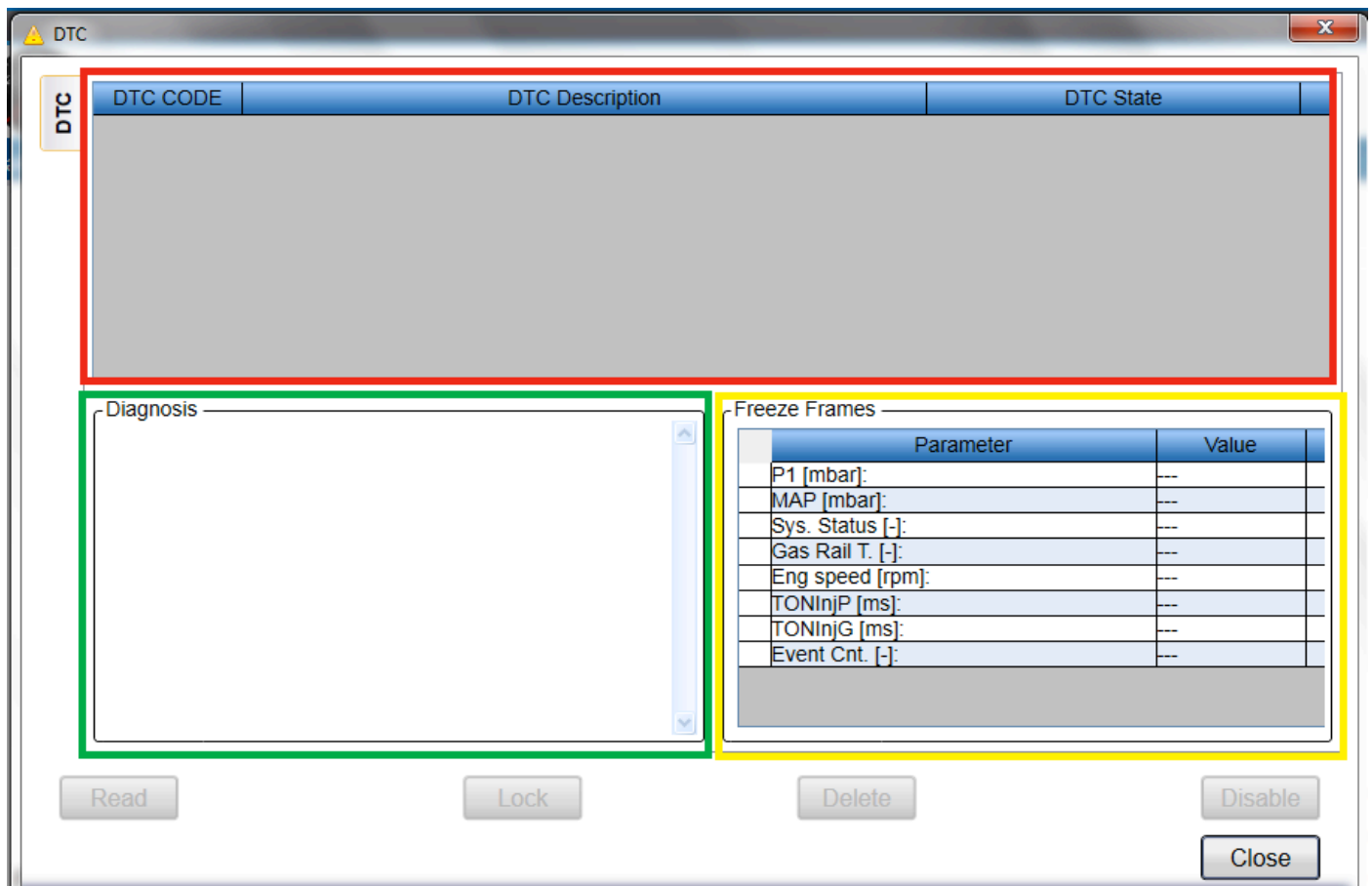
5.2.3.3 Errors management



Click on *UTILITY>Errors Management*

from main menu to enter the page dedicated to gas system

diagnostics.



The page is divided into three boxes.

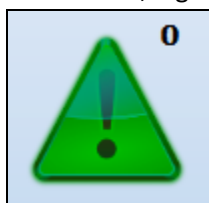
Errors box (Red): if diagnostics was enabled in Setting up menu/Errors calibration, it shows the list of errors detected by LPG diagnostics, reporting the error code, the device involved, the kind of problem and the error status, which could be:

- Recorded: error detected in the past, no more present.
- Present: error currently present during diagnostics.

Diagnostics box (Green): it shows the list of causes of a possible error recording.

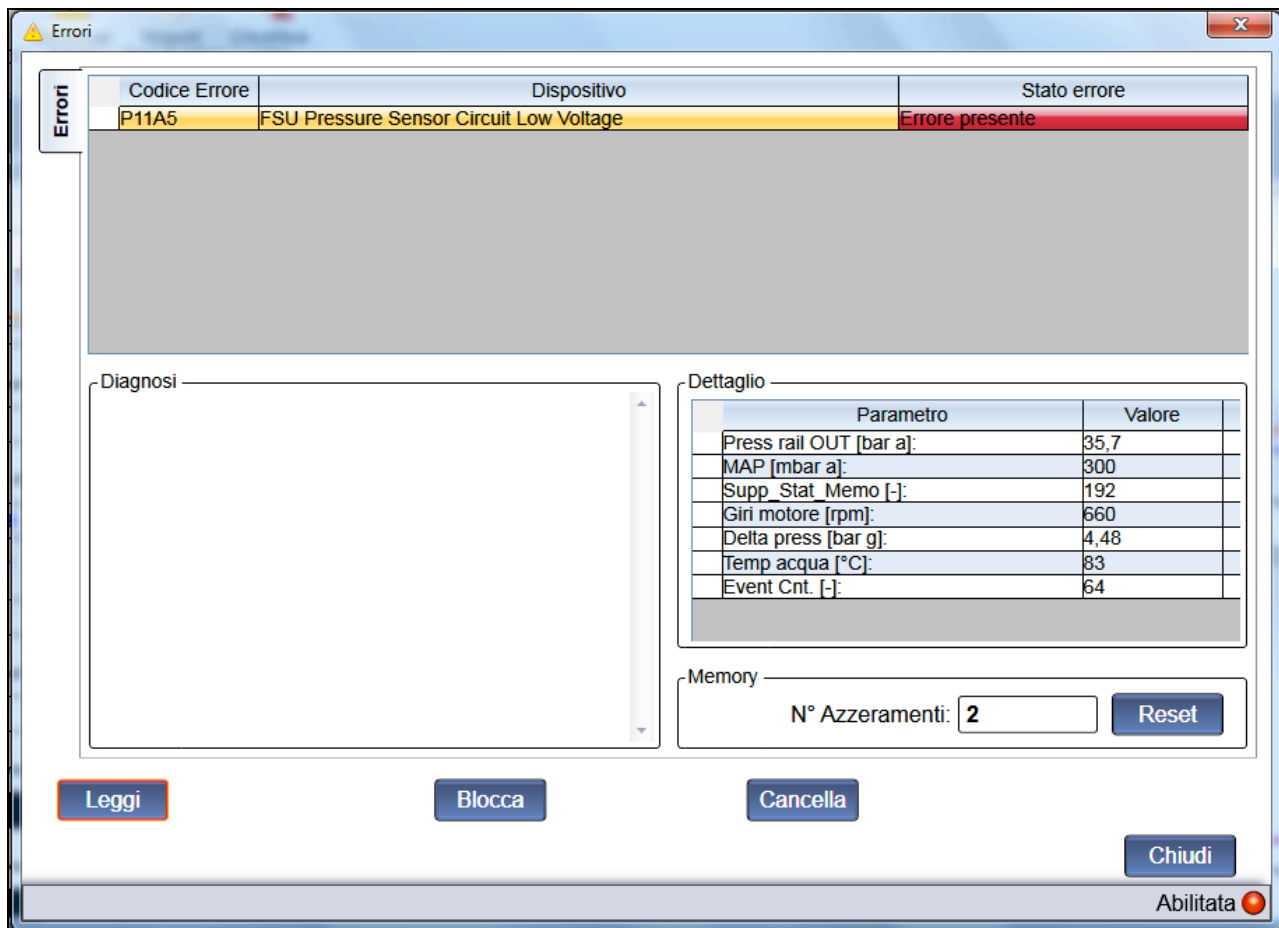
Detail box (Yellow): it shows all physical and electrical information about gas system at the moment of failure recording.

If there are no errors recorded, a green circle appears bottom right of Errors Diagnostic section

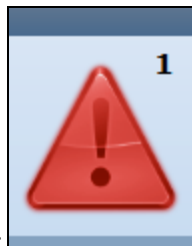


and the green icon appears on Status Bar.

Example of error present in gas memory:

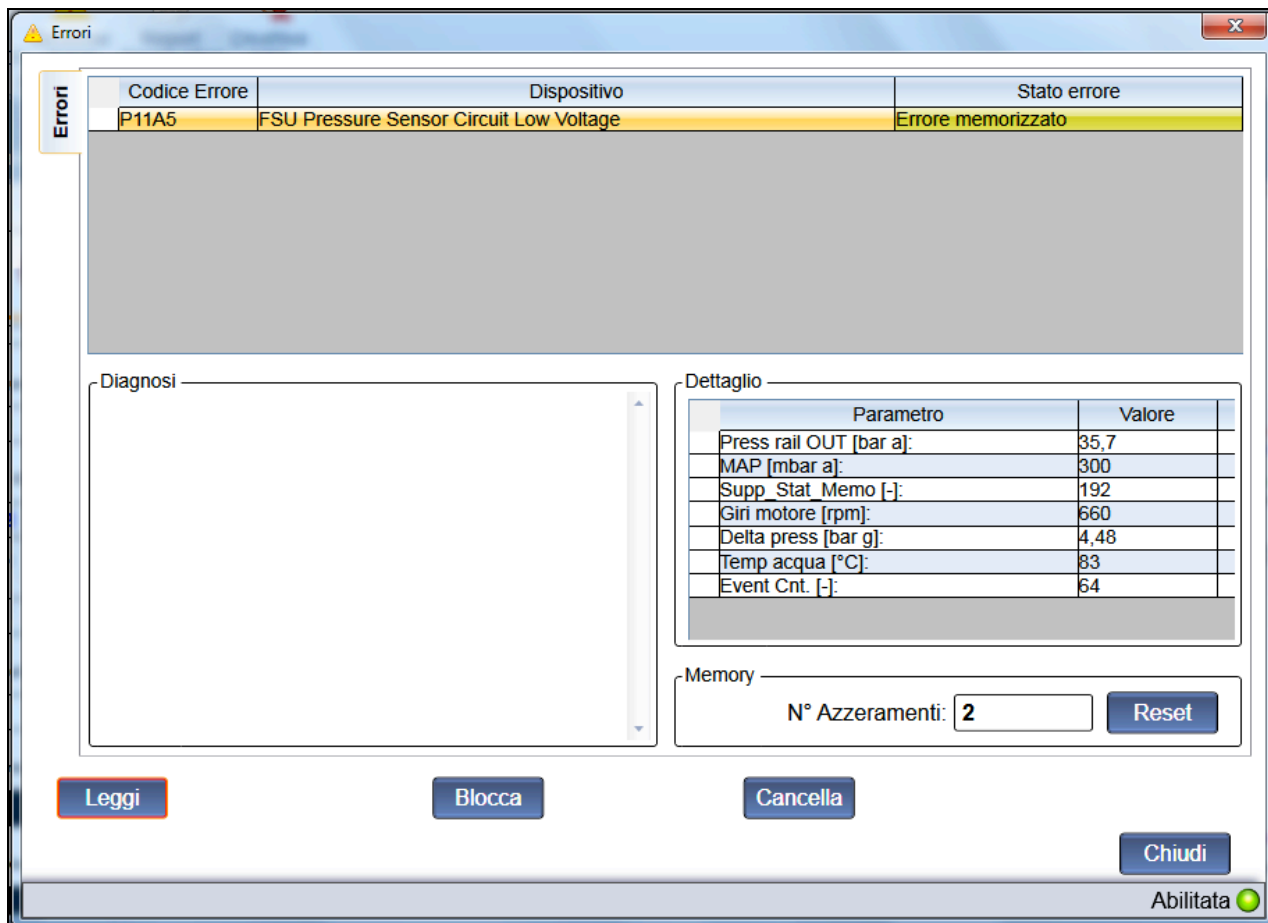


If an error is present in gas ECU memory, a red circle appears bottom right of Errors Diagnostics section



while the icon on Status Bar turns red showing the number of errors.


As said before, if an error has been previously found but it is not present when you consult the ECU, it becomes Recorded:



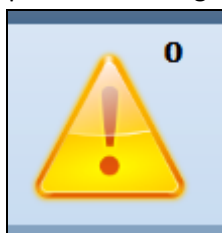
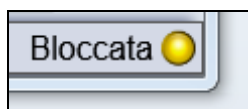
Through the *Read* button you can consult gas ECU memory and ask for displaying errors found, which will be listed in the upper box.



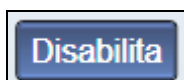
Through the *Lock* button you can stop LPG diagnostics. By clicking on it, diagnostics is not able to

detect possible LPG system electrical errors anymore, and button turns into *Unlock* . Press it again to reactivate LPG diagnostics.

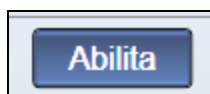
When LPG diagnostics is locked, a yellow circle appears bottom right of Errors Diagnostics section



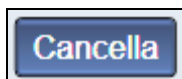
while the icon on Status Bar turns yellow.



The *Disable* button disables LPG diagnostics. By clicking on it, button turns into *Enable*

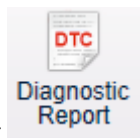


. Press it to enable gas diagnostics. Download the change in ECU through programming, in order to make it effective.



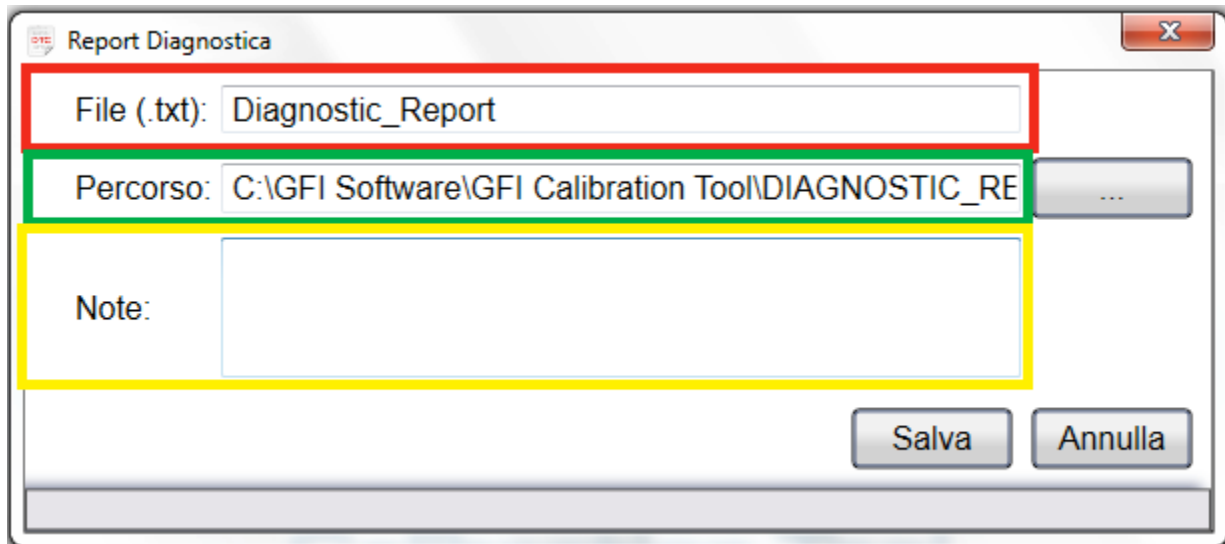
The *Delete* button erases errors present and/or recorded into ECU.

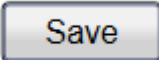
5.2.3.4 Diagnostics Report

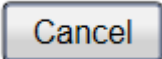


Click on *UTILITY> Diagnostics Report* from main menu to create a text file reporting all information about gas system errors.

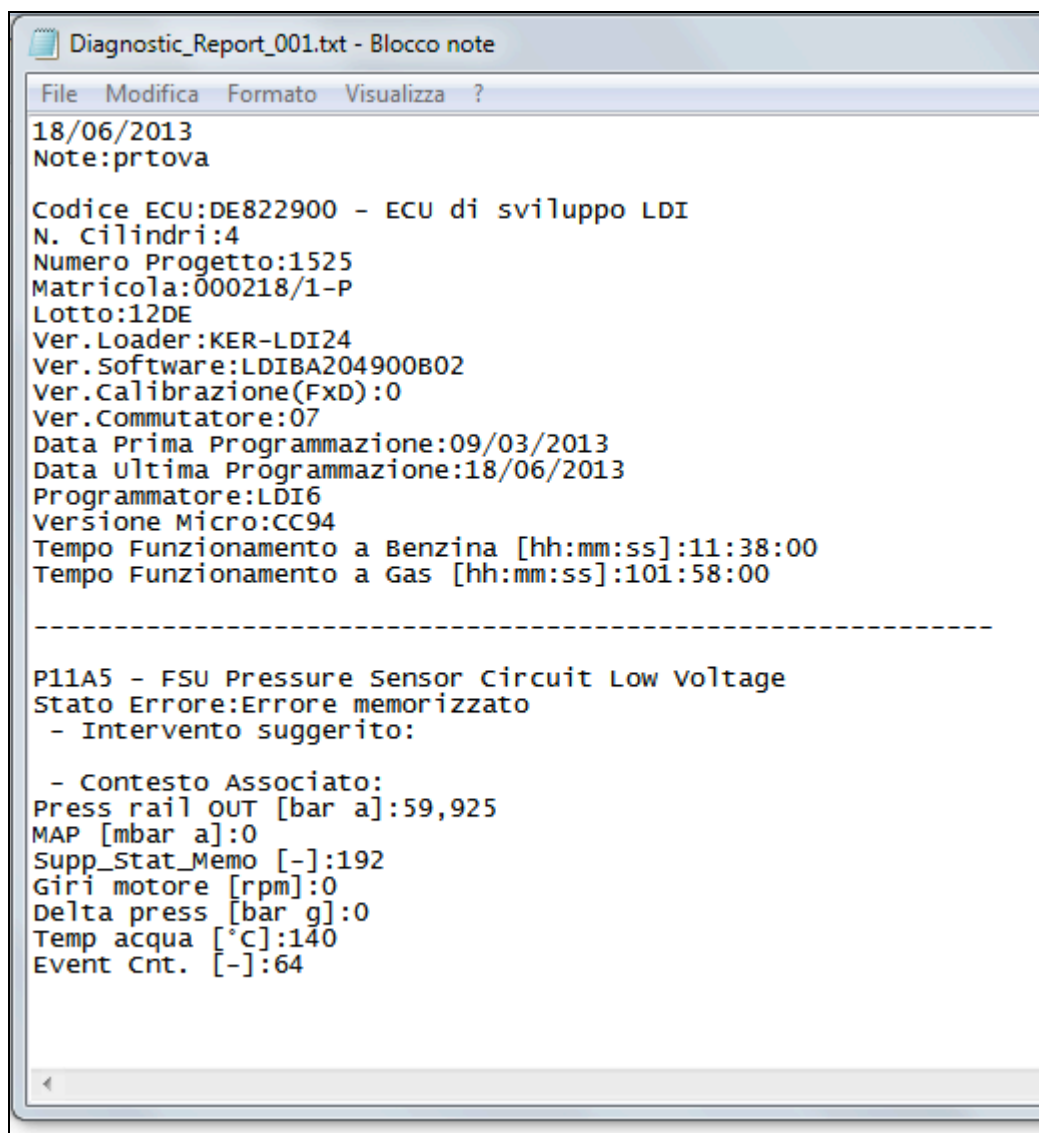
A message window opens, where name (red box) and path (green box) should be indicated. Moreover, a Notes field (yellow box) is suitable to contain an additional description.



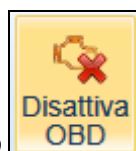
After filling all fields, press .

or press  to exit without creating any report.

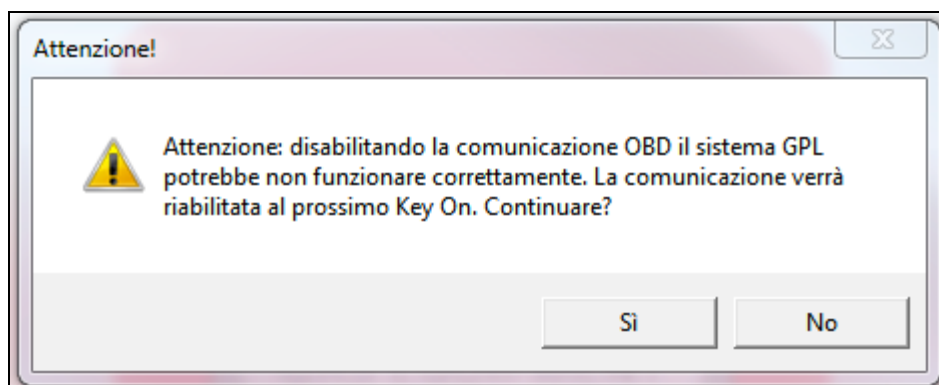
See below an example of report recorded:

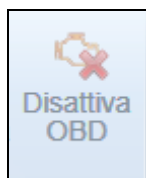


5.2.3.5 Disable OBD

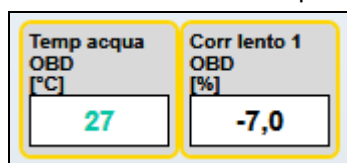


By clicking on *Diagnostics>Disable OBD* from main menu, OBD communication between gas ECU and vehicle diagnostics is temporarily disabled. If pressed, a message appears to notify that OBD communication will be enabled again at the next Key On.





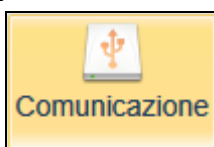
The icon on main menu turns disabled and all parameters read through OBD in data visualisation



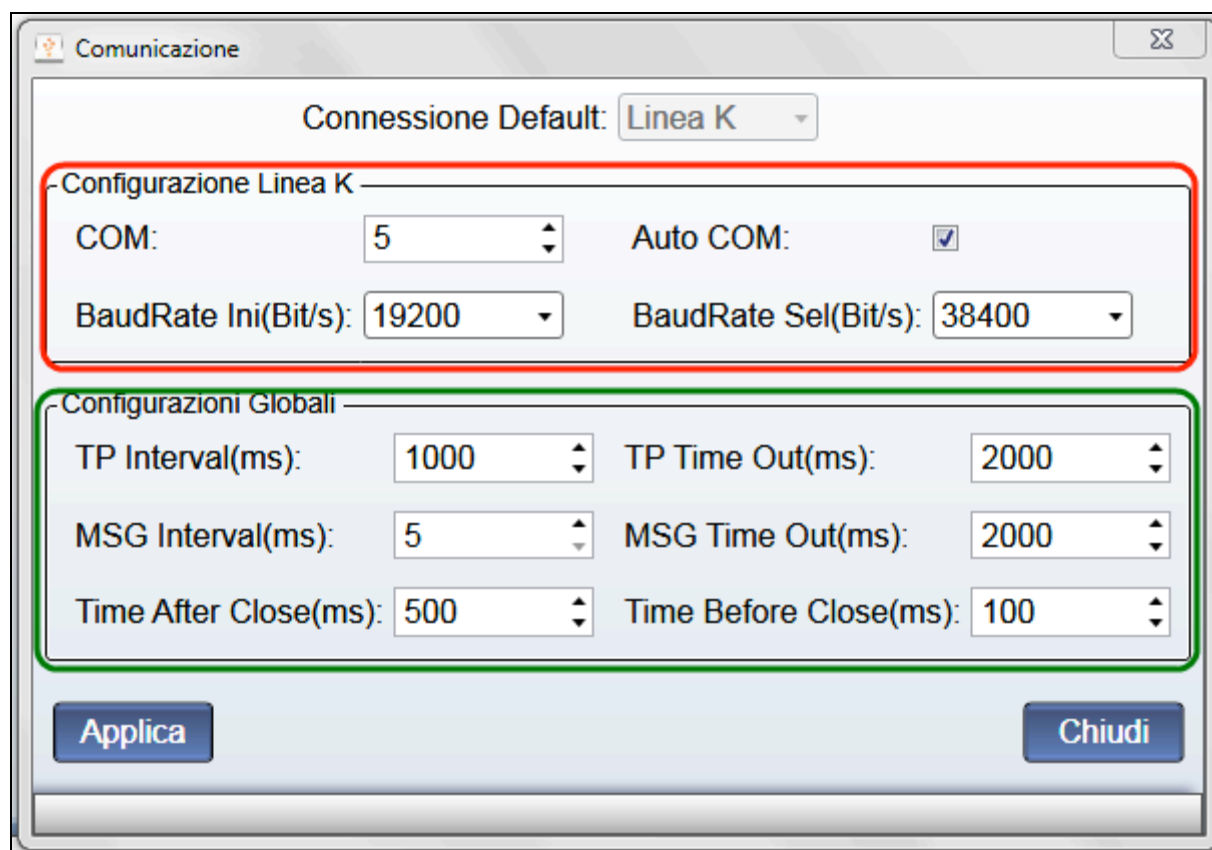
assume the following fixed values

5.2.4 UTILITY

5.2.4.1 Communication



Click on *UTILITY>Communication* from main menu to enter the setting page of PC-ECU communication.



As said before, the system automatically searches for the communication port used for ECU connection. This only happens at the first connection, then the system memorizes the port used.

!ATTENTION!: changing communication cable position means a system new search for the right port.

Configurations have been divided into two main parts.

K Line configuration (Red box)

This box includes PC communication setting, such as:



: it shows the identification number of communication port used for PC-gas ECU connection. The system automatically searches for and memorizes it.

Auto COM: ☒

: when enabled, the system automatically searches for communication port. When disabled, communication port can be set manually.

BaudRate Ini(Bit/s): 19200 ▾

: It is a standard parameter necessary to start communication with gas ECU. If modified, it can cause communication problems.

! ATTENTION!: Do not modify

BaudRate Sel(Bit/s): 38400 ▾

: this case allows to modify transmission speed. Default setting is the maximum speed (38400 baud), the always-suggested one (except in case of problems) in order to have the shortest ECU programming time.

Global configuration (Green Box)

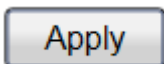
This box gathers all communication setting.

! ATTENTION!: Do not modify.

5.2.4.2 Choose Language

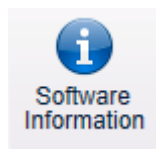


Click on *UTILITY>Choose Language* from main menu to enter the page where to choose the language of all messages and text information. Language can be changed at any time selecting the wished one directly into the current page.



Once the language selected, press .

5.2.4.3 Software Information



Click on *UTILITY> Software Information* from main menu to enter the page showing all GFI CALIBRATION TOOL available software.

Check	Software Code	File	ECU Code	Notes
	SDIEA016060D01	SDI_DE816060_EA_016_D01.S19	DE816060	New strategy KMS/ACQ for KMS modules data acquisition (data visualization)
	SDIDA013050D07	SDI_DE816050_DA_013_D07.S19	DE816050	
	SDISA013060D09	SDI_DE816060_SA_013_D09.S19	DE816060	
	SDISA012060D16	SDI_DE816060_SA_012_D16.S19	DE816060	Delivered for Volvo V40 1.6i EcoBoost
	SDISA013060D07	SDI_DE816060_SA_013_D07.S19	DE816060	
	SDISA014050D01	SDI_DE816050_SA_014_D01.S19	DE816050	New X-tipin and X-tipout for high rpm and map
	SDISA013050D07	SDI_DE816050_SA_013_D07.S19	DE816050	
	S32AA100030D21	S32_DE817030_AA_100_D21.S19	DE817030	
	S32AA100030D20	S32_DE817030_AA_100_D20.S19	DE817030	
	S32AA100030D19	S32_DE817030_AA_100_D19.S19	DE817030	
	S32AA100030D17	S32_DE817030_AA_100_D17.S19	DE817030	Bug fix in changeover switch communication
	S32AA100030D16	S32_DE817030_AA_100_D16.S19	DE817030	Bug fix for 3 cylinders
	S32AA100030D15	S32_DE817030_AA_100_D15.S19	DE817030	Pull-up configuration run line
	LDIBA219000D08	LDI_DE822000_BA_219_D08.S19	DE822000	1- Resettled flag EOLTST Stop From Tools at start of each 2
	SY0AA101010D03	Y10_DE817010_AA_101_D03.S19	DE817010	Forced Gasoline mode in Rpm calibration
	SY0AA101011D03	Y10_DE817011_AA_101_D03.S19	DE817011	Forced Gasoline mode in Rpm calibration
	SY0AA100010D04	Y10_DE817010_AA_100_D04.S19	DE817010	Level sensor calibration capability
	SY0AA100010D03	Y10_DE817010_AA_100_D03.S19	DE817010	
	SY0AA100011D04	Y10_DE817011_AA_100_D04.S19	DE817011	Level sensor calibration capability
	SDIBA011060D08	SDI_DE816060_BA_011_D08.S19	DE816060	VSR on two injectors
	SY0AA100010D02	Y10_DE817010_AA_100_D02.S19	DE817010	
	SY0AA100011D03	Y10_DE817011_AA_100_D03.S19	DE817011	
	LDIBA221000D03	LDI_DE822000_BA_221_D03.S19	DE822000	Bug fix on strategy RFLSTP
	LDIBA222000D01	LDI_DE822000_BA_222_D01.S19	DE822000	Added flag (FlagStrategyLedAndBuzzer.BuzzerOnLedChange) of led level indicator (only decreasing)
	SY0AA100010D01	Y10_DE817010_AA_100_D01.S19	DE817010	Delivered with Lambda emulation software

Top of the page you can enter a dedicated ECU code into the search box

ECU Code:

Search

and press

in order to filter the list and find software available for that specific ECU.

Codice ECU: <input type="text" value="DE822900"/>		<input type="button" value="Cerca"/>	
Verifica	Codice Software	File	Codice Centralina
	LDIBA200900B02	LDI_DE822900_200_B02_4inj_HYU.S19	DE822900
	LDIAA200900B02	LDI_DE822900_200_B02_4inj_STD.S19	DE822900
	LDIBA202900B01	LDI_DE822900_202_B01_4inj_HYU.S19	DE822900
	LDIAA202900B01	LDI_DE822900_202_B01_4inj_STD.S19	DE822900
	LDIBA200900B04	LDI_DE822900_200_B04_4inj_HYU.S19	DE822900
	LDIAA203900B05	LDI_DE822900_203_B05_4inj_STD.S19	DE822900
	LDIBA203900B05	LDI_DE822900_203_B05_4inj_HYU.S19	DE822900
	LDIBA203900B06	LDI_DE822900_203_B06_4inj_HYU.S19	DE822900
	LDIAA203900B06	LDI_DE822900_203_B06_4inj_STD.S19	DE822900
	LDIAA203900B07	LDI_DE822900_203_B07_4inj_STD.S19	DE822900
	LDIBA203900B07	LDI_DE822900_203_B07_4inj_HYU.S19	DE822900
	LDIBA203900B08	LDI_DE822900_203_B08_4inj_HYU.S19	DE822900
	LDIAA203900B08	LDI_DE822900_203_B08_4inj_STD.S19	DE822900
	LDIAA203900B09	LDI_DE822900_203_B09_4inj_STD.S19	DE822900
	LDIBA203900B09	LDI_DE822900_203_B09_4inj_HYU.S19	DE822900

The example shows the list of software available for DE822900 ECU.

Every row includes the software internal code, its name and the code of suitable ECU.

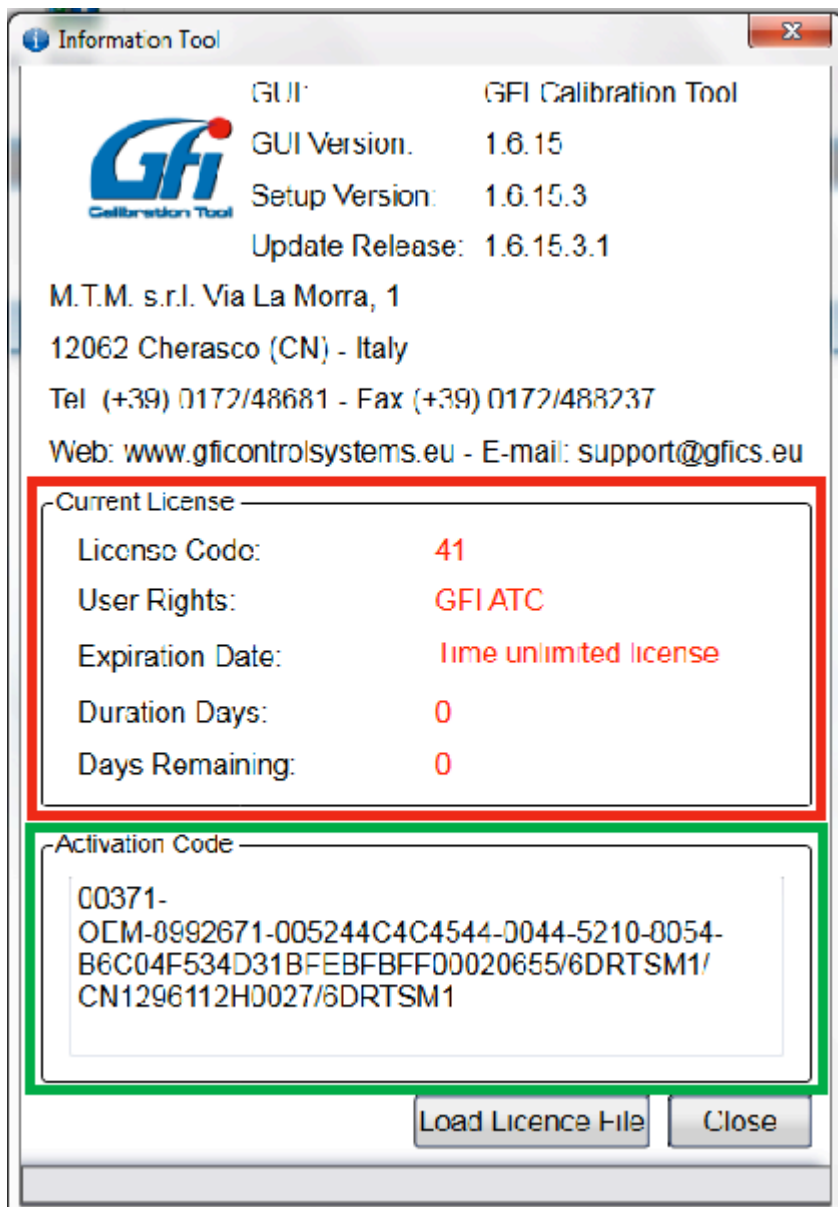
Verifica	Codice Software	File	Codice Centralina
	SPNBA012000D23	LDI_DE822000_01.3_B16_C_HYU.S19	DE822000

Click on to check information accuracy. A tick will appear if ok, or an error message on the contrary.

5.2.4.4 Application Information



Click on *UTILITY> Application Information* to enter a page showing application information about version and license.



As said before, you can upload here license file necessary to use GFI CALIBRATION TOOL.

The red box “Active License Information” shows license features.

Licence Code

It indicates the numerical code identifying the license used by GFI CALIBRATION TOOL.

User Rights

It indicates the kind of license installed. GFI Calibration tool modifies its structure according to the license typology.

Expiration Dtae

It indicates the possible license expiration date. Some licenses used or sent by GFI can expiry, impeding the further use and the GFI CALIBRATION TOOL right working.

Duration Days: 0

Days Remaining: 0

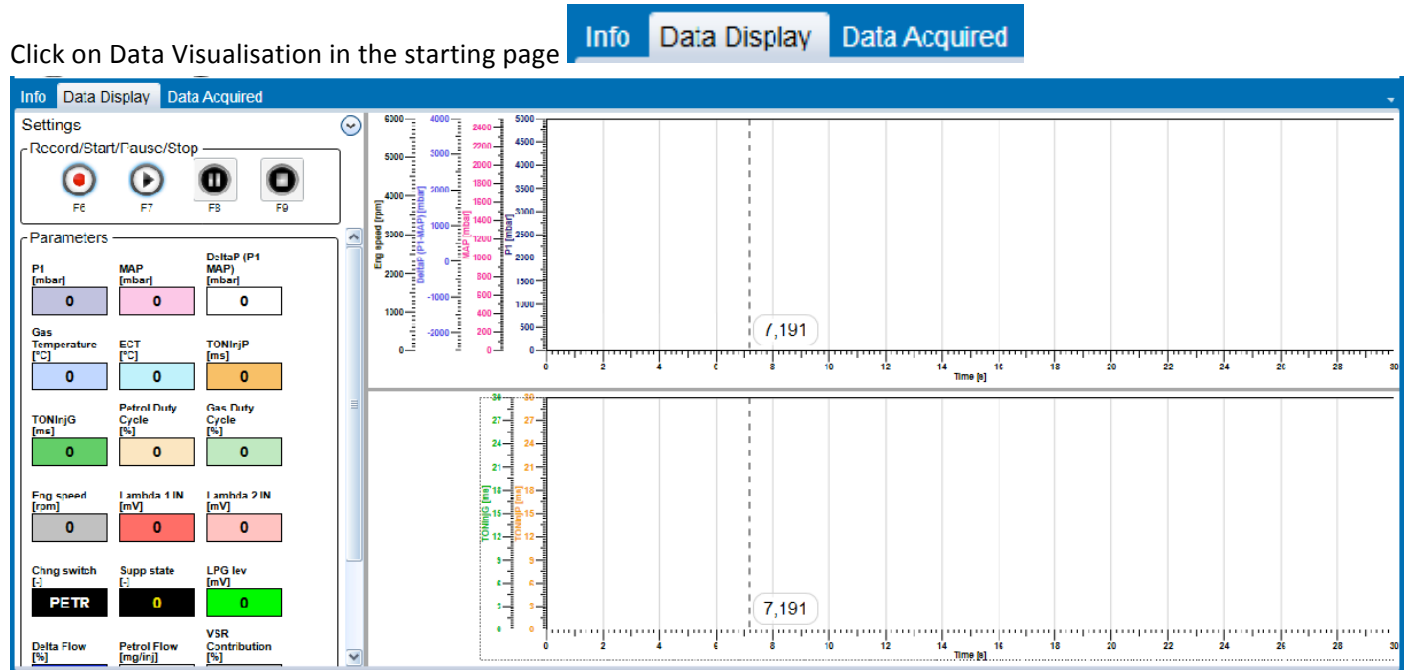
In case of expiration date, the two parameters above show the real license lifetime and how many days are left.

The green box “Activation Code” shows identification code of PC where GFI CALIBRATION TOOL is installed. As already said, this code is necessary for License requirement.

5.2.5 DATA VISUALISATION

5.2.5.1 Graph Visualisation/Creation

Main news is the acquisition/data visualisation speed and the installer’s possibility to customise profile by changing colours and variables to display.



This section has been divided into two parts, the right one is dedicated to visualisation graphs and the left one is dedicated to numerical visualisation of system variables, profiles management and data acquisition.

Top left of the window there is a hidden menu called **Settings**

Click on the right to open the following menu

The 'Settings' menu is shown with the following options:

- Profile:** Standard Profile (dropdown menu)
- Graph Time Interval:** 30 seconds (dropdown menu)
- Sampling Time:** ---- (dropdown menu)

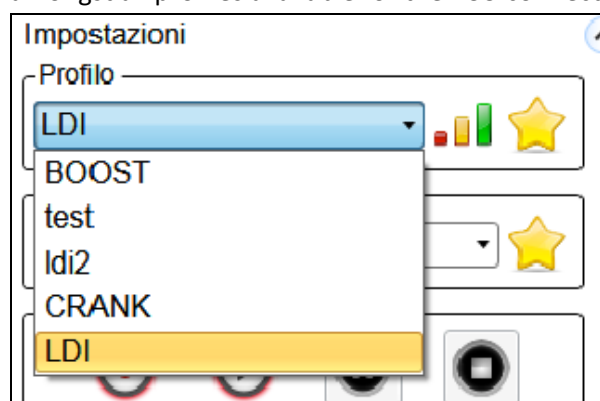
where profile and graph time interval can be chosen.

The 'Profile' dropdown menu is shown with the following options:

- Profile:** Standard Profile (dropdown menu)

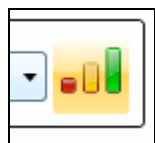
The profile is the totality of graphic and numerical visualisation configurations that system should use in this page. The system proposes a default profile, but the installer can modify and create multiple customised profiles.

The system automatically uses the standard profile of system connected, but you can choose from a pull-down menu amongst all profiles available for the ECU connected.




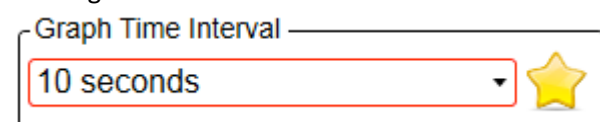
After selecting a profile, the respective numerical and graphic variables enabled are displayed.

Click on Profiles Configuration button, to the right of the pull-down menu,

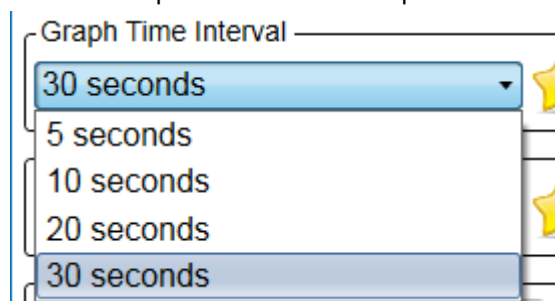


to enter the section dedicated to real profile customisation. The installer can not modify the standard profile.


Click on  to set the profile selected as the Default one; the Calibration Tool will use this profile at every starting.



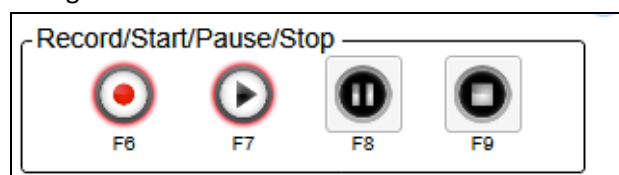
Click on the pull-down menu Graph Time Interval to choose the most suitable time range for visualisation graphs.



The shorter the interval, the faster the variables graph trend. On the contrary, the longer the interval, the slower the variables graph trend.

Click on  to set the time range selected as the Default one; the Calibration Tool will use this range at every starting.

Going down the left side of the Data Visualisation window, the data recording and display buttons are available.



Entering the Data Visualisation window, graphs and numerical boxes are empty. Press the Start button - Data

requirement starting -  or **F7** key to start data visualisation.



Numerical and graphic variables of profile selected are displayed. Variables to be displayed can be modified through the Profile Configuration suitable section.






In this section, the installer can decide which variables should be numerically and which ones should be graphically displayed, at most 5 total graphs.



During Data Visualisation, the GFI Calibration Tool bottom status bar turns Orange:



Data Visualisation can be paused by clicking on  or **F8** key and restarted by clicking on  or stopped


by clicking on  or **F9** key.

Click on Start button , after a Pause , to resume visualisation with no loss of previous data. Click

on Start button  after a Stop  on the contrary, to reset graphs and start a new visualisation.

By clicking on Pause button  the GFI Calibration Tool bottom status bar turns blue:



Click on *Record button – Data Acquisition Starting*  or **F6** key to create a file of data displayed. Now the system records all numerical and graphic variables while they are displayed.


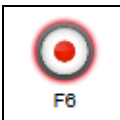
Data Acquisition can be launched from Data Visualisation condition, that's to say after clicking on *Start* button



After clicking on *Record button – Data Acquisition Starting* , during visualisation, the system starts to create an acquisition file including the pre-recording values too.

During data recording, the GFI Calibration Tool bottom status bar turns pink:



In this case too, recording can be paused by clicking on  and restarted by clicking on , or stopped

by clicking on

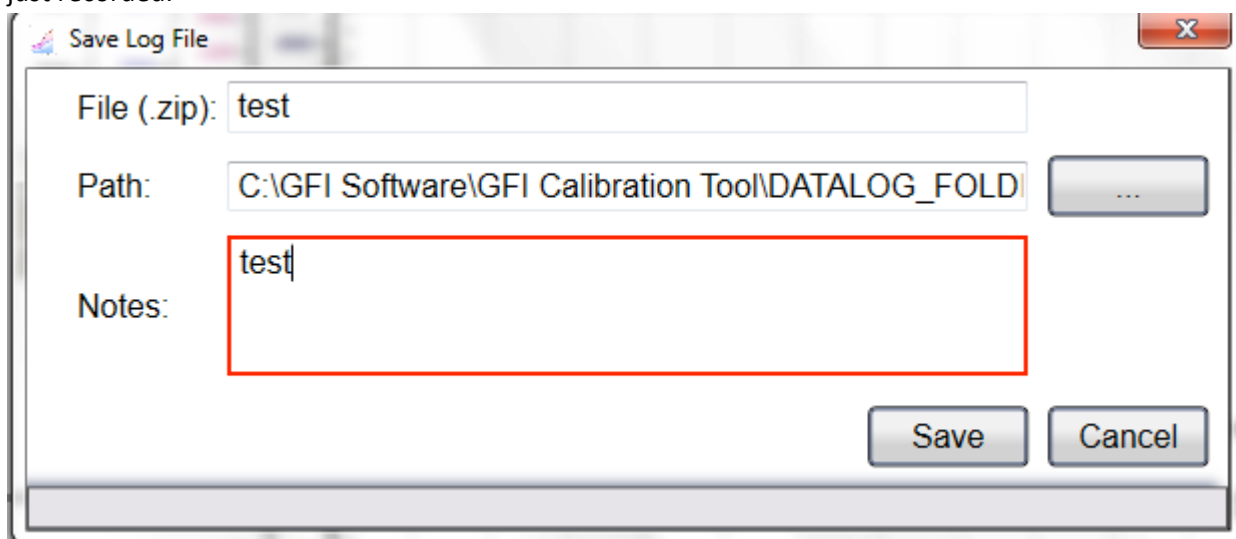


By clicking on Pause button  the GFI Calibration Tool bottom status bar turns blue:



Help: Click on F12 button on keyboard to insert some reference points useful for tracking specific points of acquisition quickly during control.

Once data acquisition ended, a saving window appears allowing the installer to name a new file where save the data just recorded.



The system automatically proposes the name previously used upgrading the version code at the end.

File (.zip): test

Some notes concerning the file can also be added into the suitable box before saving.

Notes:

test

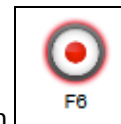
To close the window without ending the operation, click on Cancel.

The last section shows all numerical values of variables enabled for the profile selected.

Parameters				
P1 [mbar]	MAP [mbar]	DeltaP (P1- MAP) [mbar]	Gas Temperature [°C]	ECT [°C]
500	1036	0	-10	-40
TONinjP [ms]	TONinjG [ms]	Petrol Duty Cycle [%]	Gas Duty Cycle [%]	Eng speed [rpm]
0	0	0	0	0
Lambda 1 IN [mV]	Lambda 2 IN [mV]	Chng switch [-]	Supp state [-]	LPG lev [mV]
165	0	PETR	0	0
Delta Flow [%]	Petrol Flow [mg/inj]	VSR Contribution [%]	Petrol Pressure [mbar]	+ Battery [mV]
0	0	0	1828	12671
Sensors supply [mV]				
5039				

Help: The following shortcut keys have been introduced for Data Visualisation window, in order to simplify and make it easier:

F5: it allows to change over (LPG-Petrol and Petrol-LPG) through PC.



F6: it allows to start data recording. It has the same function of Record button



F7: it allows to start Data visualisation. It has the same function of Start button



F8: it allows to pause data recording or visualisation. It has the same function of Pause button



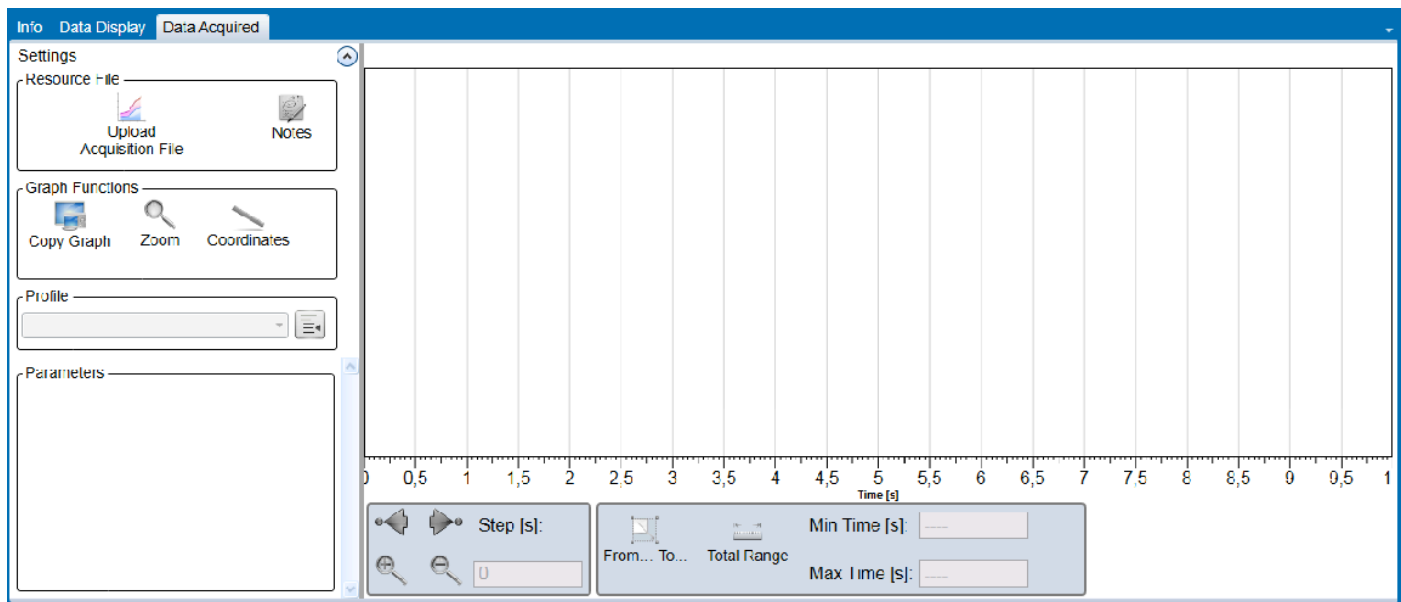
F9: it allows to stop data recording or visualisation. It has the same function of Stop button

F12: it allows to insert some reference points useful for tracking specific points of acquisition quickly during control.

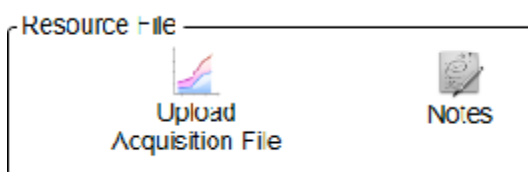
5.2.5.2 Graph management

The installer can check acquisition files directly through interface. A graph can be created even Off-Line, that's to say disconnected from gas ECU.

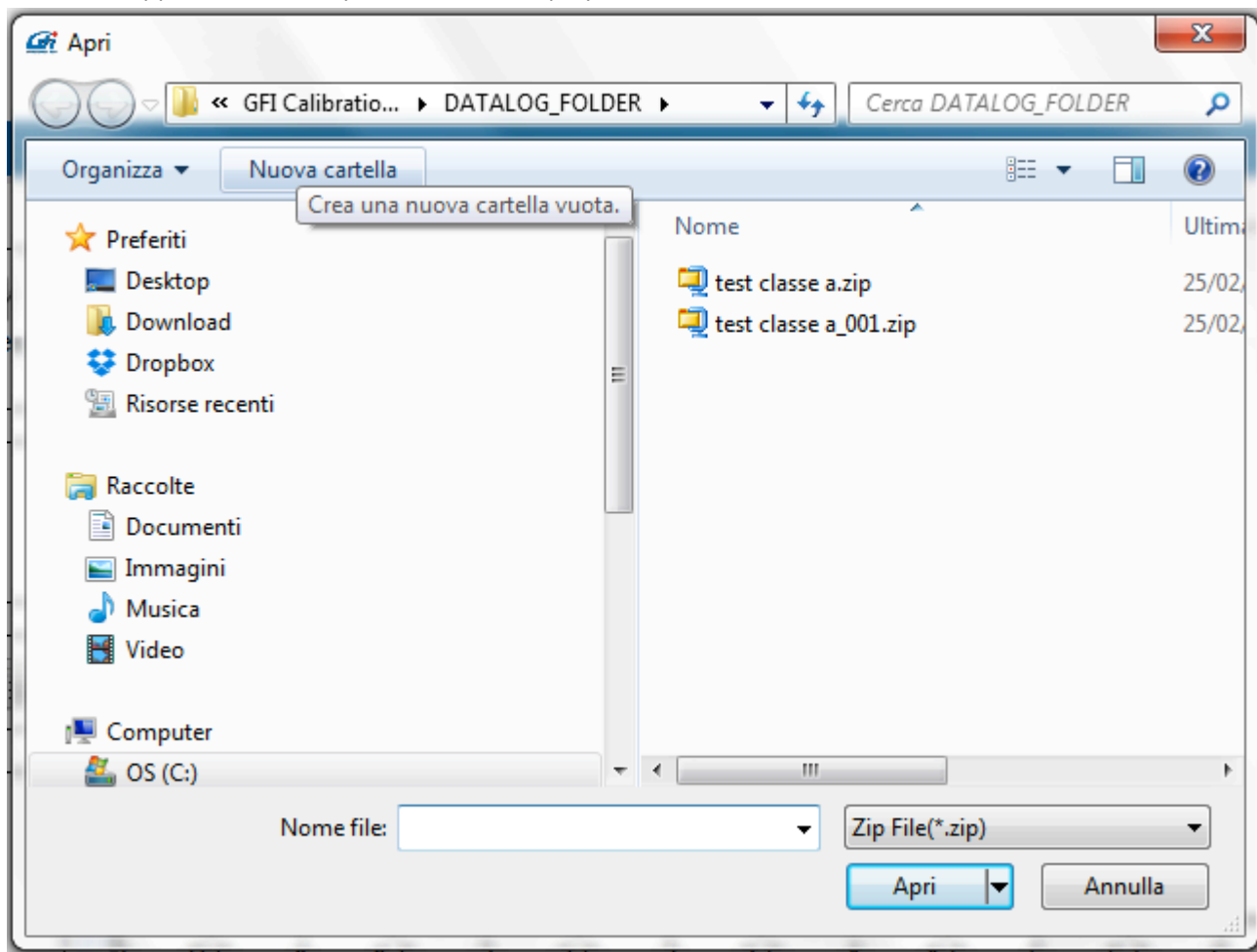
Entering the Data Acquired section,



you can recall acquisition files previously saved by clicking on Loading Acquisition File into the Resource File box.

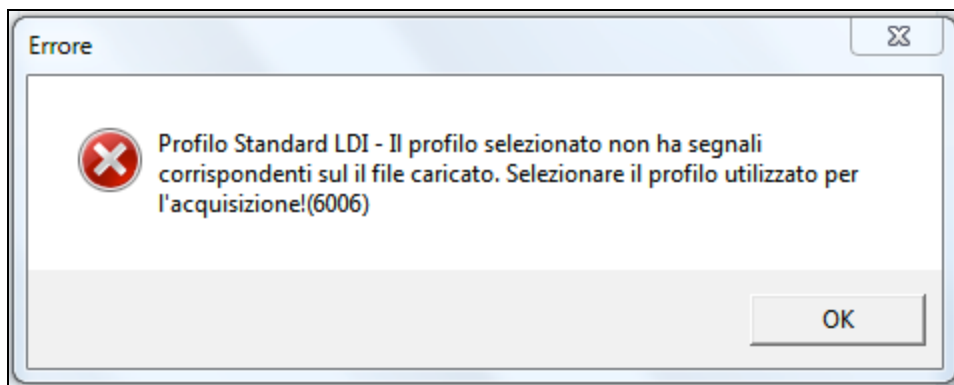


A window appears where acquisition file to display should be selected.



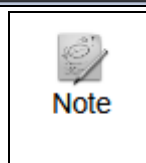
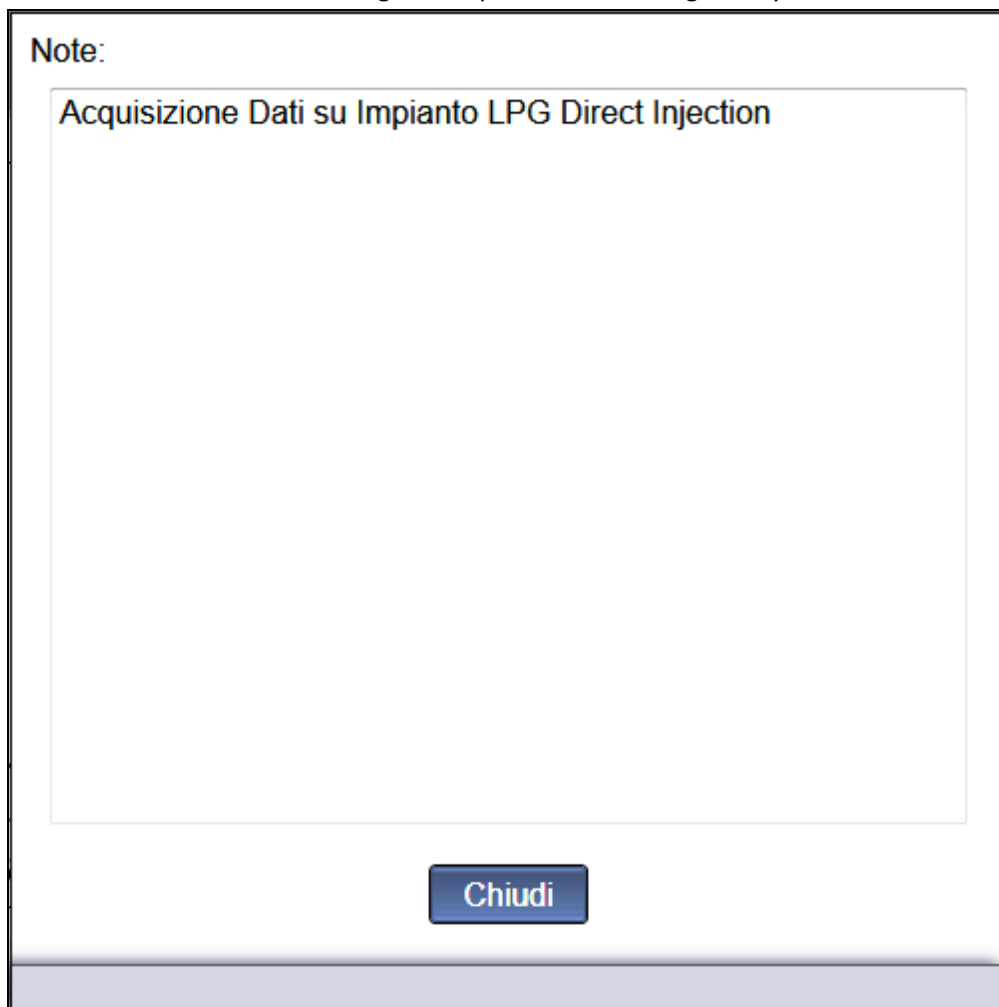
After selecting it, press Open.

If acquisition file has a profile different from the standard one and some variables acquired are not shown, the system is not able to open the graph and the following error message appears:



Click on OK then select the profile used for the acquisition.

If a note was added during the acquisition file saving, the system shows it while opening the graph.



Click on Note to read it again

By clicking Close in the right graph, all variables saved into the file and enabled in the profile selected are displayed. All standard profile variables are displayed by default, but a different profile can be chosen.

Profilo

LDI

BOOST

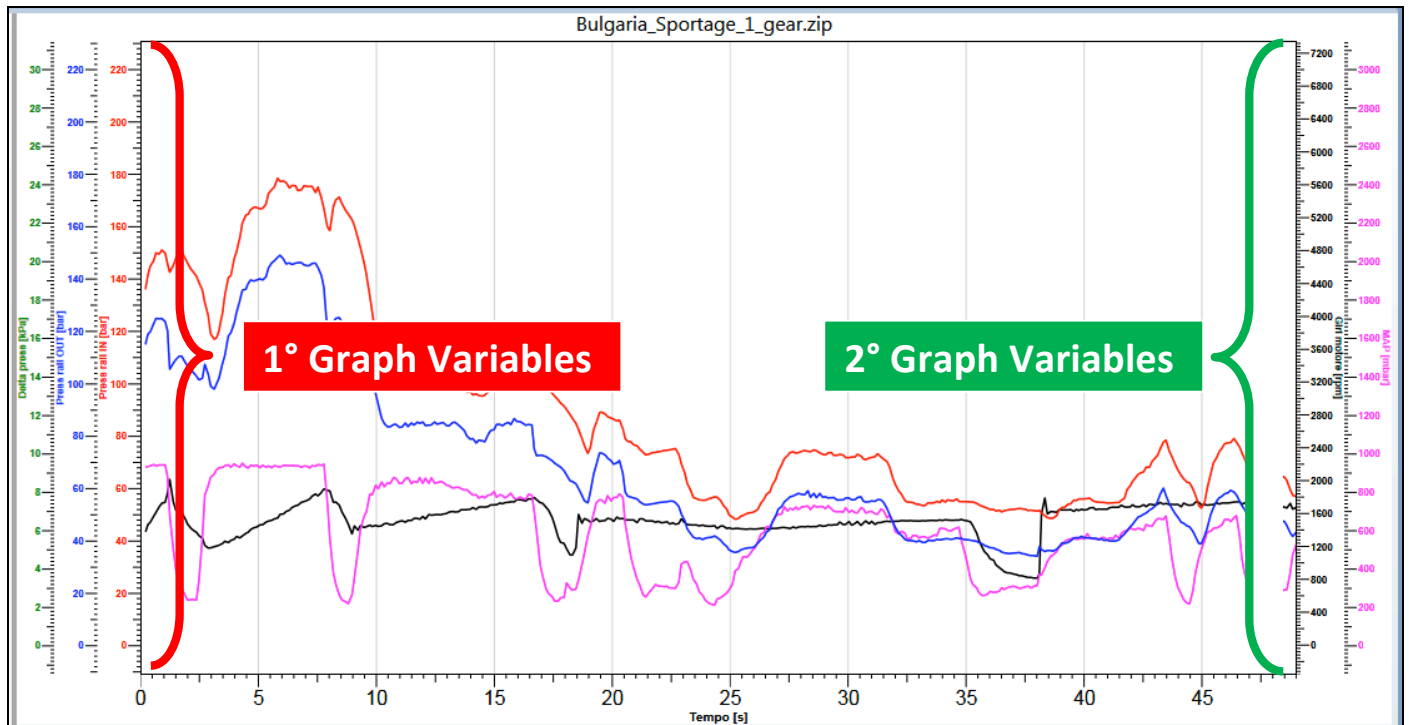
test

Idi2

CRANK

LDI

The left ordinate concerns top graph variables, while the right ordinate concerns the bottom graph ones.



All standard profile variables are displayed by default, but a different profile can be chosen.

Profilo

LDI

BOOST

test

Idi2

CRANK

LDI

Numerical parameters only show variables displayed by the graph.

Parametri

Giri motore [rpm]

0

MAP [mbar a]

0

Press rail IN [bar a]

0,0

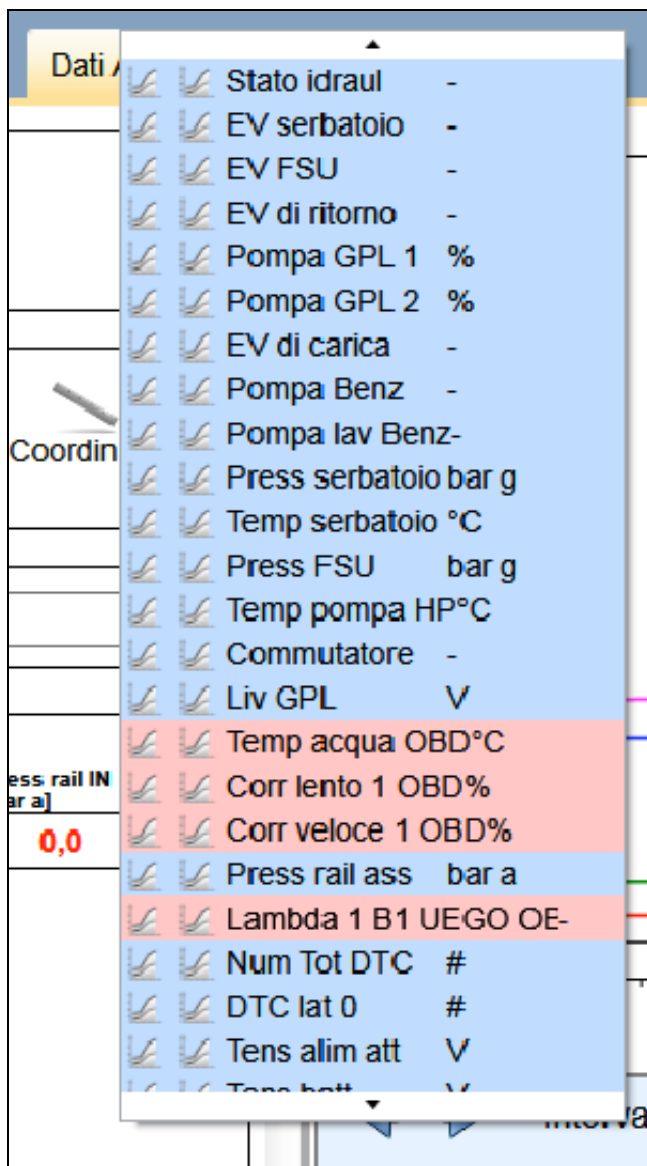
Press rail OUT [bar a]

0,0

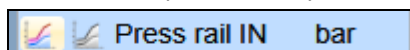
Delta press [bar g]

0,00

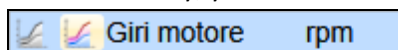
If you want to change graph and numerical variables, just right click inside the “Parameters” box to open the list of parameters available for graph visualisation.



Next to each parameter, you can enable the left axis visualisation by clicking on the left graph icon

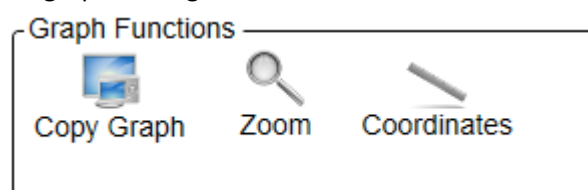


On the contrary, you can enable the right axis visualisation by clicking on the right graph icon



The system can display max 5 parameters per axis.

Bottom of the screen, some graph management tools are available to better analyse the graph itself.



The Graph Functions box

includes:



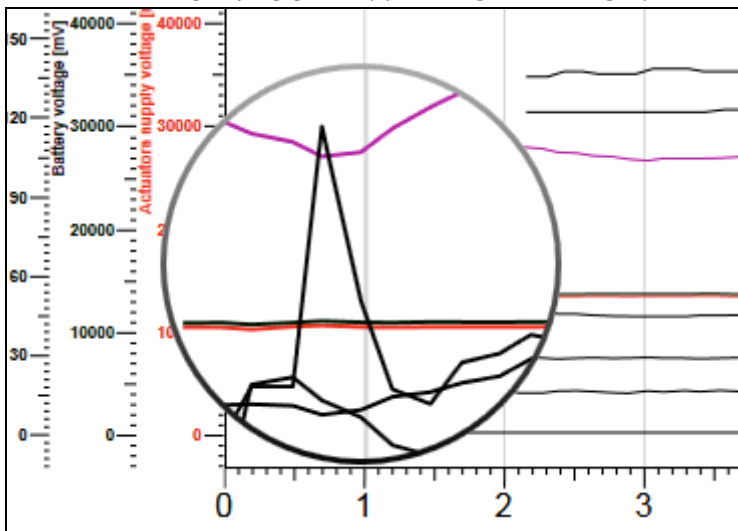
Copy Graph

you can copy an image of the graph and paste it into any graphic software.



Zoom

a magnifying glass appears right on the graph

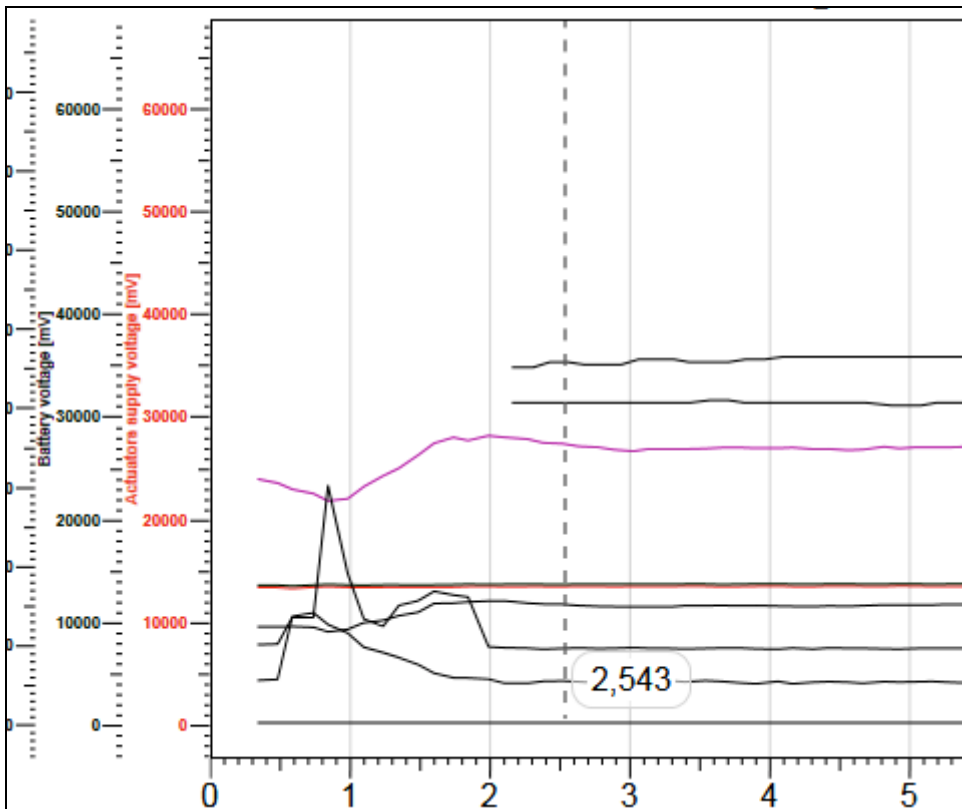


to allow zooming in on the graph.



Coordinates

a vertical dotted line appears on the graph.



This line identifies a specific moment of the acquisition, from which to display the value of all variables into the numerical boxes. Moving the line, the system will display variables values of the specific moment corresponding to the new position.

The tools “Zoom” and “Coordinates” can be used at the same time.

Under the graph, there are two zoom tools acting on time axis.

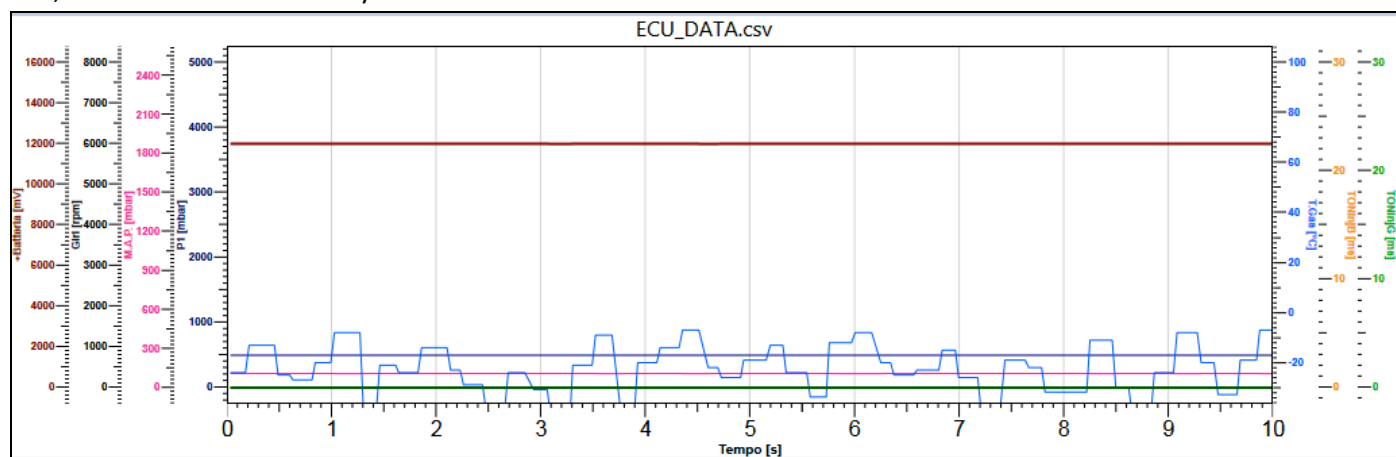
Step [s]:

From... To... Total Range

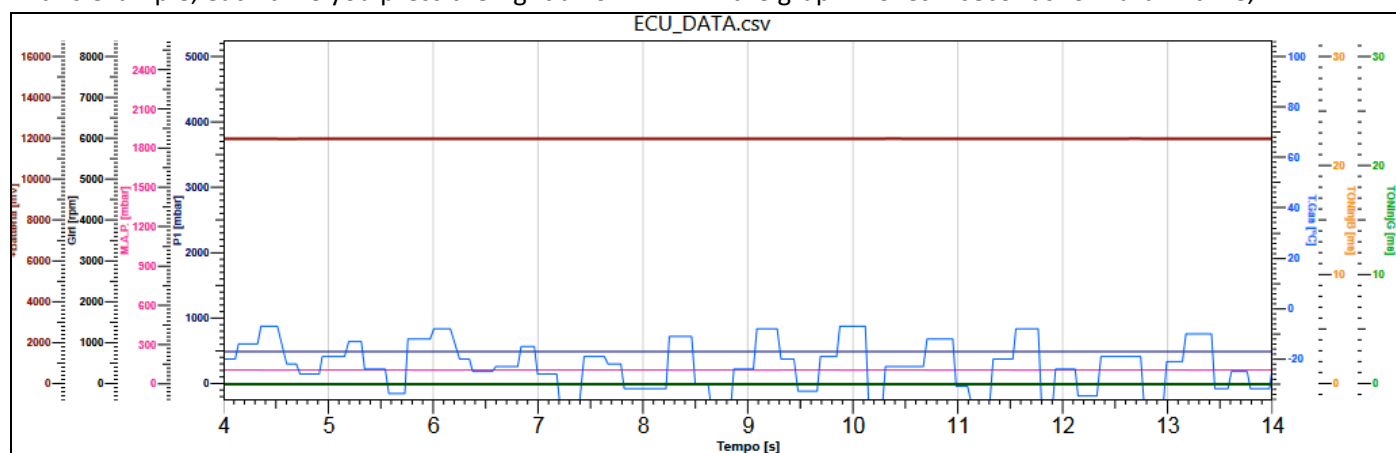
Min Time [s]:

Max Time [s]:

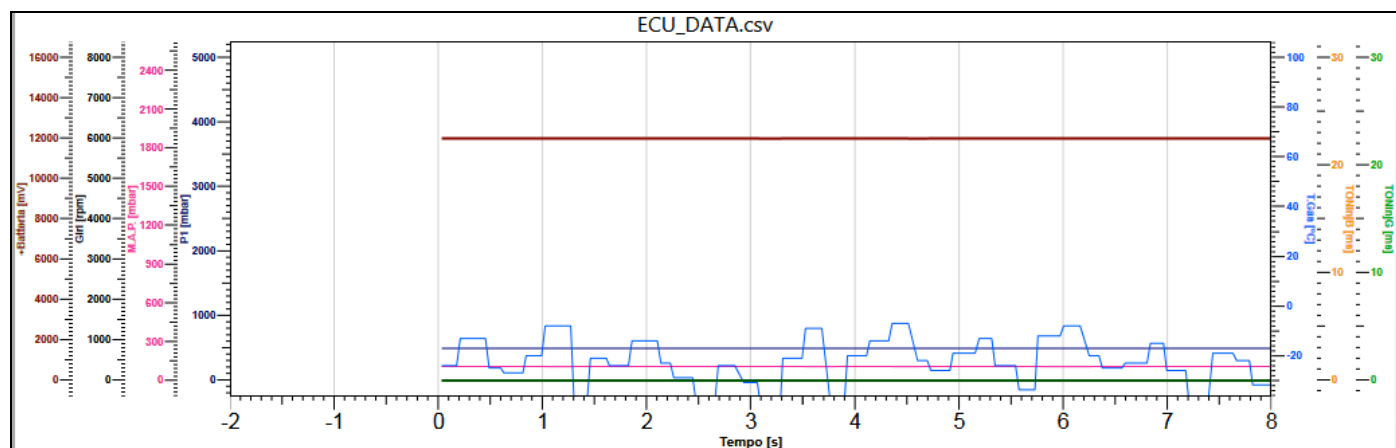
The left one allows to move forward in time the variables graph, with the specific lapse of time indicated into the box, which can be modified by the installer.



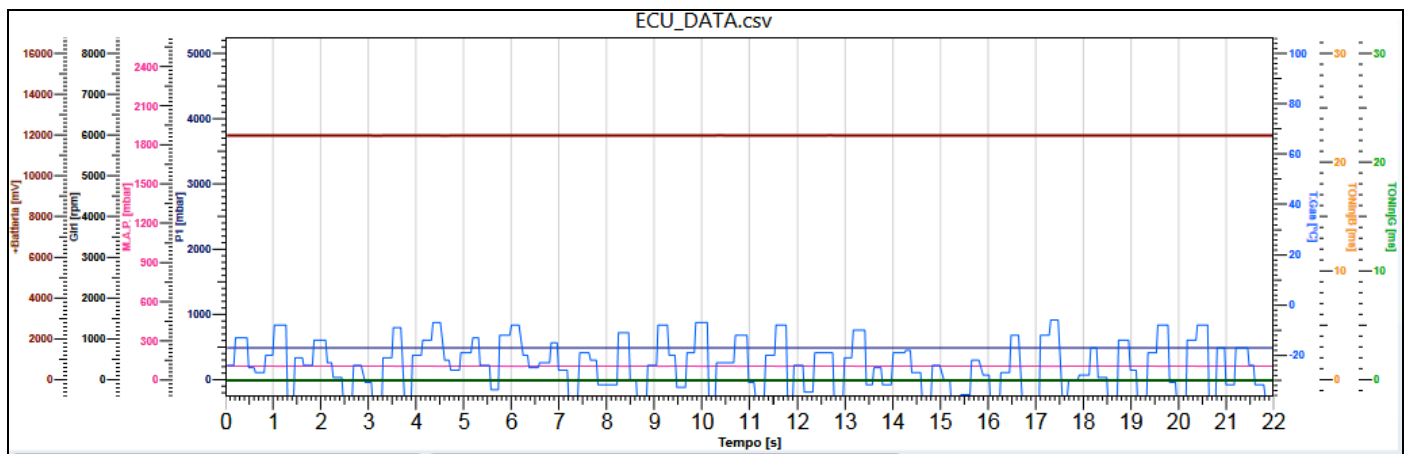
In this example, each time you press the right arrow the graph moves 2 seconds forward in time,



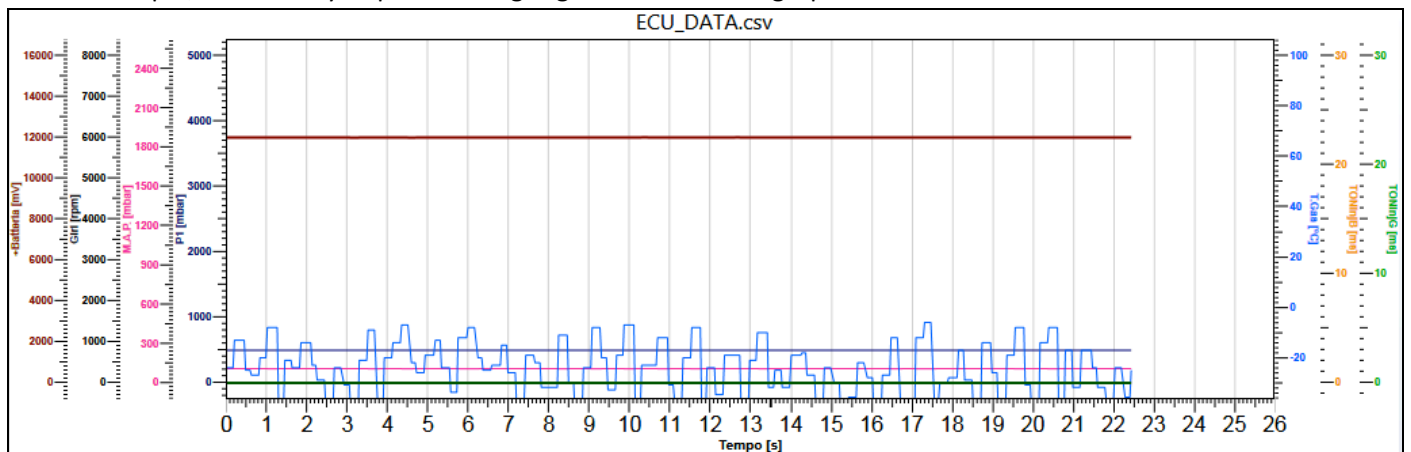
while each time you press the left arrow the graph moves 2 seconds backward in time.



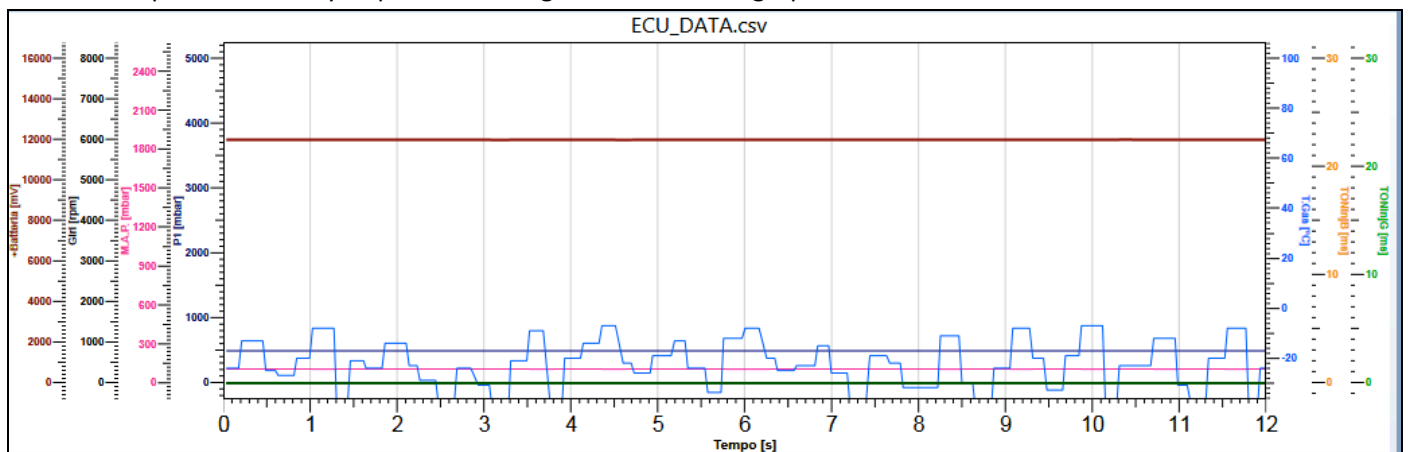
You can zoom in or out the graph through the two magnifying glasses.





In this example, each time you press the right glass the graph zooms 2 seconds out.



In this example, each time you press the left glass the graph zooms 2 seconds in.



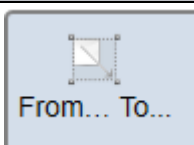
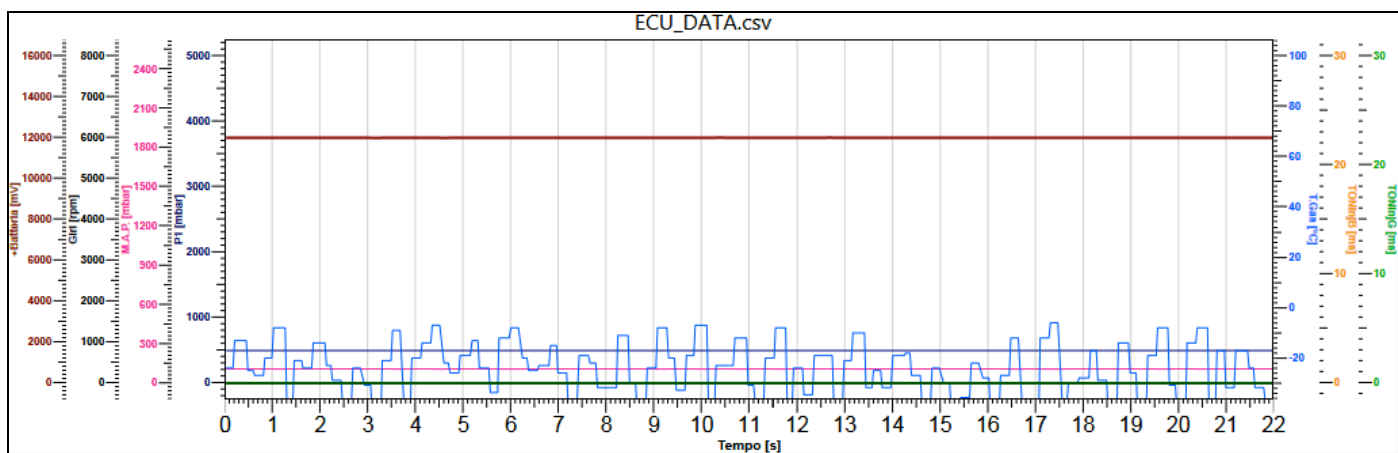
From... To...

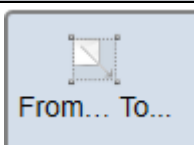
Total Range

Min Time [s]:

Max Time [s]:

The second one allows to change time axis minimum and maximum value.



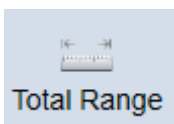
Press  , after typing new parameters into the Time min(s) and Time Max(s) boxes as shown in picture

Min Time [s]:

Max Time [s]:

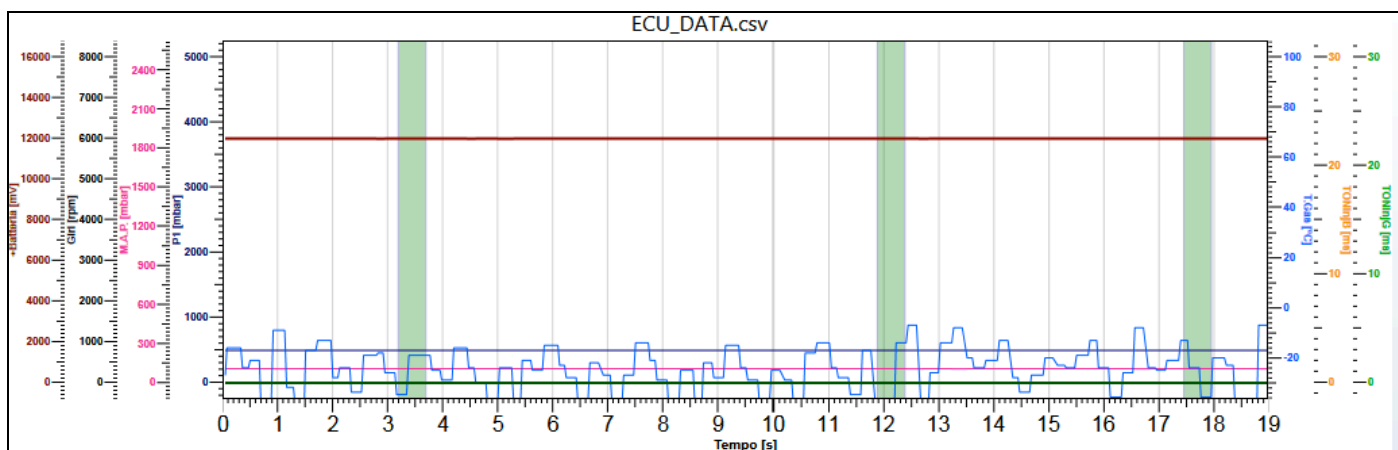
the graph will be centred within the new range.

Next to the time boxes, the red numbers represent the min and max value of acquisition.



Press  to zoom the graph until acquisition extreme values.

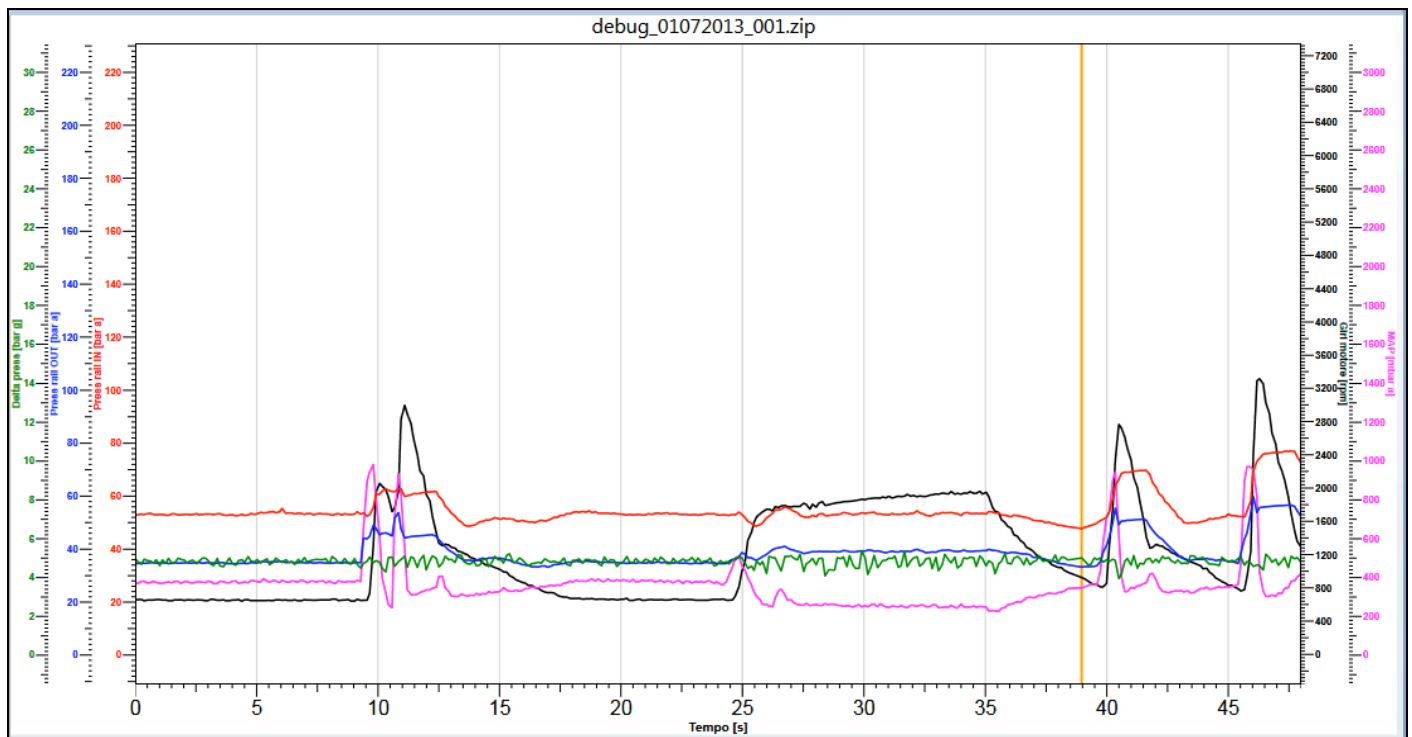
Help: If during acquisition you clicked on F12, the points corresponding to the insertion of reference points will be now highlighted in green.



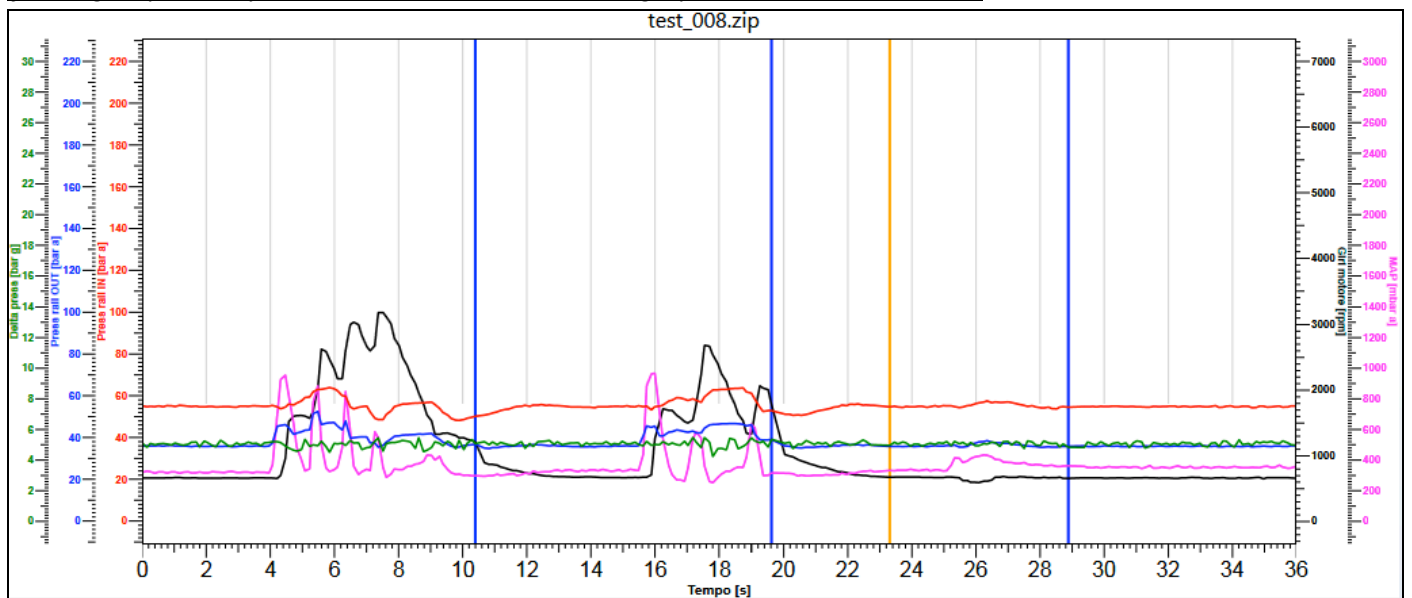
If you click REC during data visualisation, a vertical orange line appears on the graph, identifying the recording starting point.



If acquisition file has been created by clicking Rec from simple data visualisation, the graph will show an orange mark. As you can see in picture, the system also stored parameters displayed before recording.



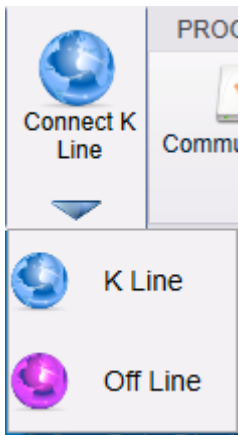
If during acquisition you clicked on Pause button, the graph will show a blue mark.



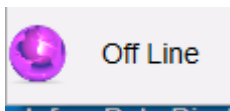
5.2.6 OFFLINE

A calibration can be opened, checked and modified even offline, that's to say with gas ECU disconnected from PC.

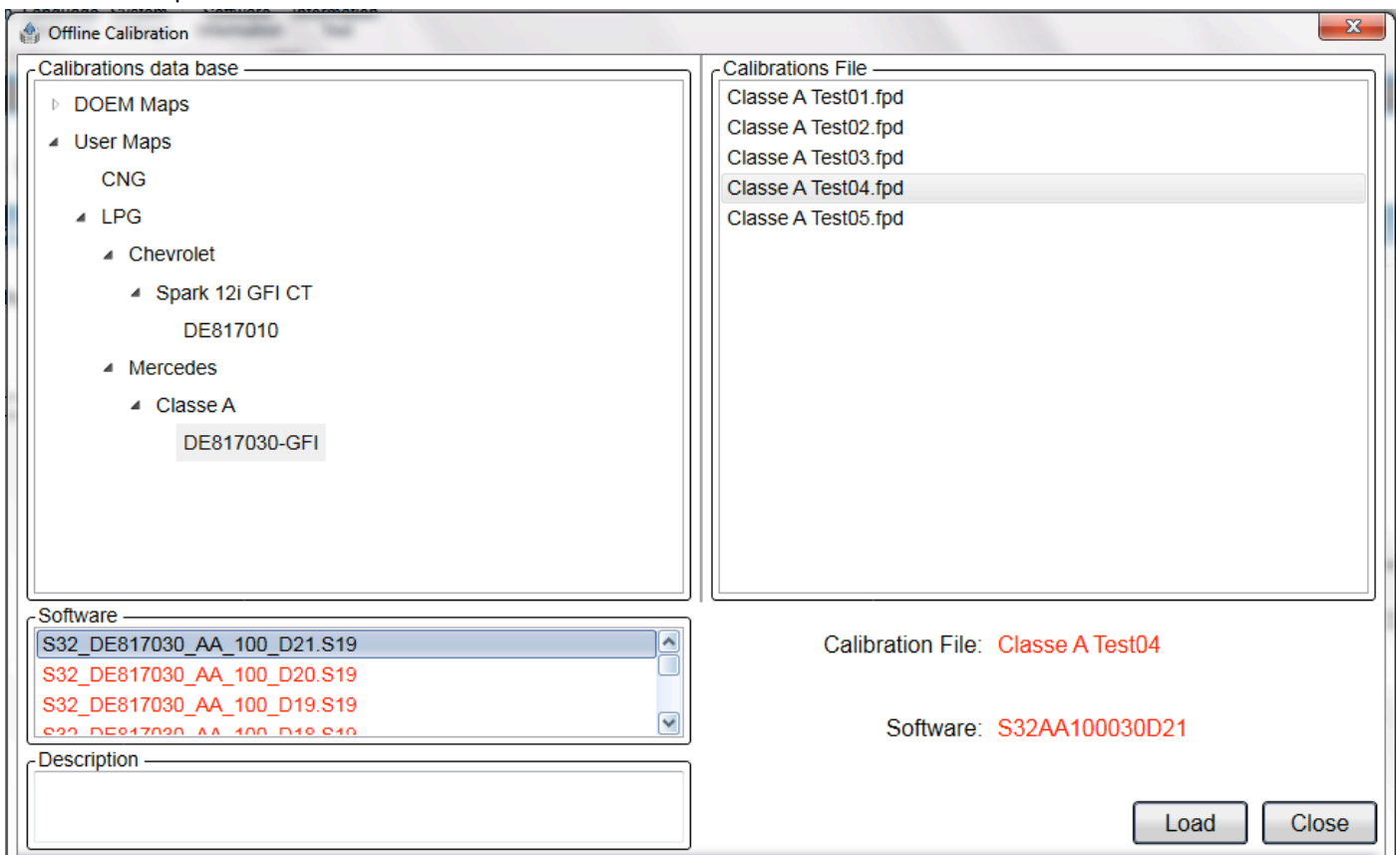
Click on  under the  communication button; the menu below appears:



Select *Offline* to enable it. Communication button turns *Open Offline*



Click on it to open the calibration wished for the Offline mode.



Procedure is the same of the Programming from Database one.

Select the path of calibration wished in Calibration Database box.

Choose the calibration wished amongst the Calibrations Files proposed.

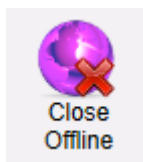
Select the suitable software for that calibration amongst the ones suggested in Software box.

In case of doubt, choose the most recent software. In the example, choose D04 (final part of file name identifies the temporary version).

Press *Upload* .

Now you can browse Calibration Tool sections just as if PC was connected to the vehicle.

Enter the Save Calibration section of Programming menu to create the new calibration coming from changes just made.



Click top left on *Close Offline* to come back to the Online mode.