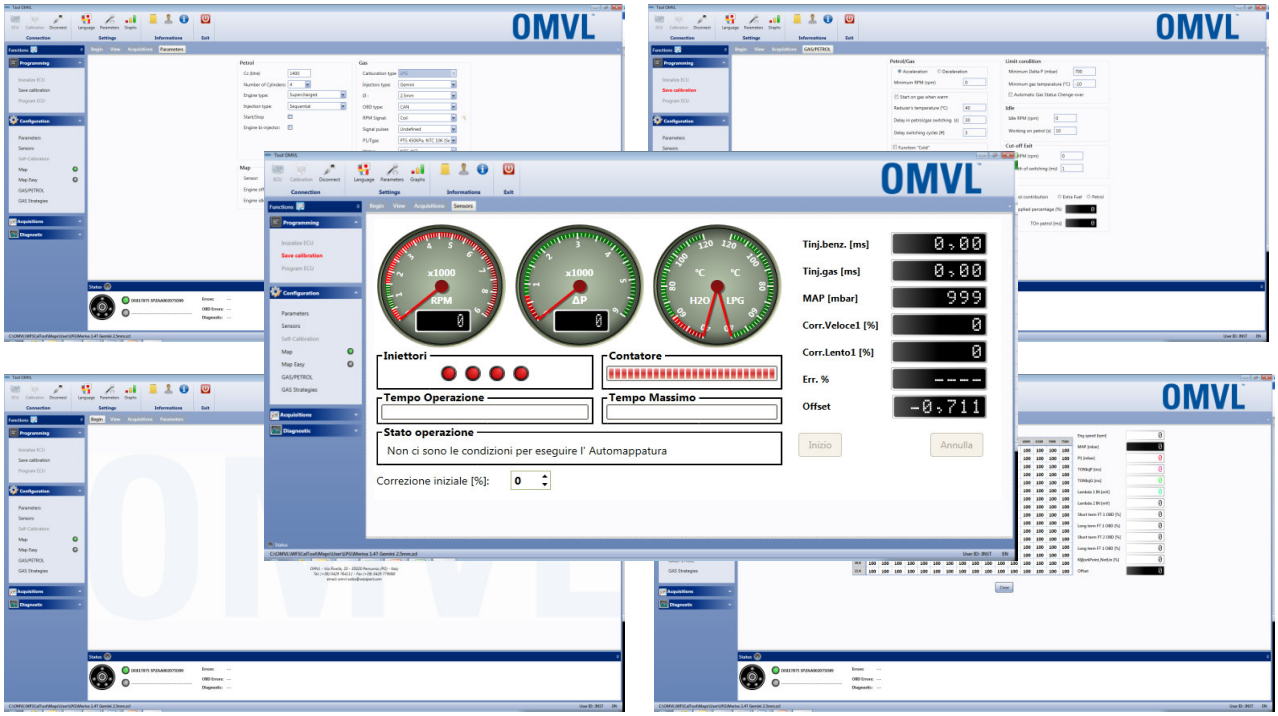
Instructions Manual for Calibration Software of OMVL DREAM ON Injection System



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0	22/12/2017	First release	Ufficio Tecnico MTM	

FOREWORD

This manual is not intended as exhaustive in regards to the calibration and management of the DREAM ON system; this activity requires the support of specific equipment as well as the presence of specialized personnel.

Its goal therefore is to give guidelines in regards to the management and calibration activity of the DREAM ON injection system.

In this regard, OMVL declines any responsibility for system malfunctioning attributable to it being tampered with by personnel that is unauthorized to carry out such operations, and is therefore susceptible to the non-continuation of the warranty.

It is understood that, OMVL reserves the right to every further amendment of the software following any new application techniques, therefore, the same does not guarantee any future malfunctioning due to the manual not being updated.

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Sommario

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1. Introduction

The new software is characterised by a **totally innovative approach** and strongly aimed at the management of gas, as fuel for the most recent spark-ignition engines.
The main innovation resides in the engine control software inside the control units that, thanks to the new management algorithms, allows for the optimisation of the gaseous fuel dosing in a simple and innovative way, allowing the installer to easily obtain the best results. In order to guarantee the greatest integration with the petrol engine control system and to satisfy the OBD requisites, the DREAM ON software is equipped with advanced diagnostics of the gas system enabling communication with the original OBD system of the vehicle. The calibration Software has changed in both appearance and functionality, but also trying to help out installers as much as possible. The calibration software can be accessed without necessarily being directly connected to the control unit. To connect to the control unit instead, it will be necessary to have the pc and the control unit properly connected by means of an interface cable and a usb-serial adapter (if the PC is not equipped with a Serial port) that can be purchased from any retailer. Furthermore, the control unit must be connected to the +12V battery (Red wire) and to the ground wire (Black wire).

2. Minimum computer requisites

Operating system: - Windows XP Service Pack 3, VISTA, Windows 7, Windows 8, Windows 10 Windows or successive versions.
Memory (ram) : - At least 128 Mbyte.
Hard disk: - At least 1 Gbyte of free space at the moment of installation.
Video resolution: - 1024 x 768 or greater.

3. Software installation

The package installation and update OMVL Calibration Tool can be downloaded from the special section of the reserved area of the website www.OMVL.it.
During installation, you will be asked in which directory you choose to install the program; we recommend not changing the pre-set directory.
Once installation is completed, the icon of the program will be automatically created on the desktop.

3.1. Installing USB Communication Cable Driver

Suitable driver should be installed for using USB communication cable.
You can find Drivers both on OMVL Calibration Tool installation CD-ROM and entering the www.OMVL.it reserved area.

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4. Main Menu

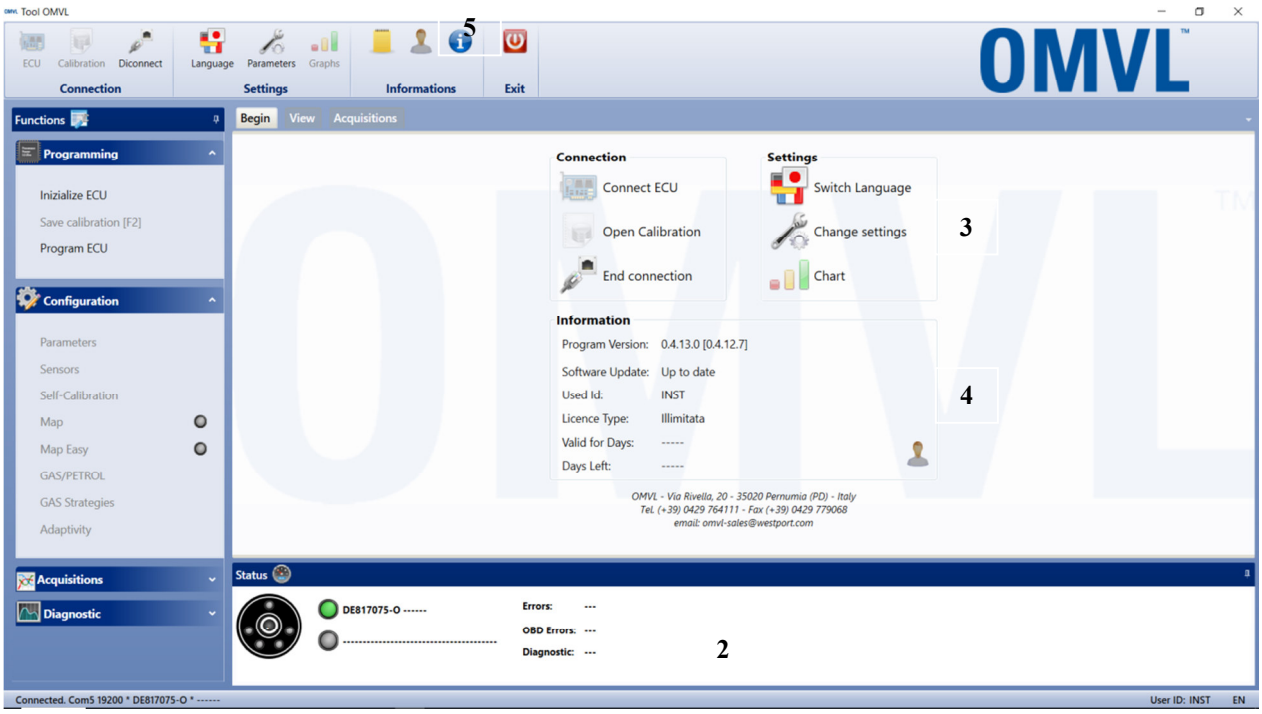

Fig. 2-1

The program start window will appear as shown in fig. 2-1. All information will be displayed on a single screen making navigating simple and intuitive.
The software version installed on the PC can also be read at the centre, without the user having to perform any special operation.
The lower part of the page shows the following information, Figure 2-2:

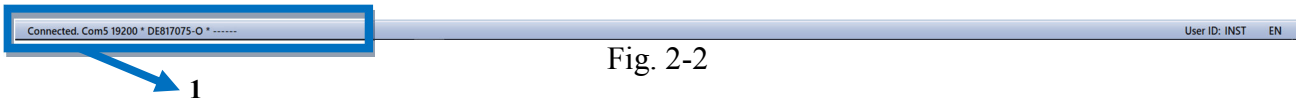

Fig. 2-2

1) It indicates whether the control unit is connected or not to the calibration software.
When the program is opened it will automatically try to connect to the control unit. If the program does not connect, an error page will open.
At this point check:

- The connection of the serial interface,
- That the control unit is connected to the battery and to the ground wire,
- If the ignition has been switched off for more than an hour, in order to connect you will need to enter the key in the panel for a few seconds, or start the vehicle.
- The control unit version.

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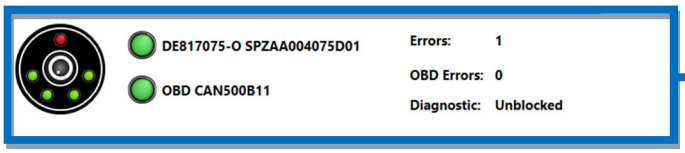
2) Gas ECU status:



- Change-over switch status
- Presence of errors in the gas ECU
- OBD connection type
- Presence of errors in the petrol ECU.
- The Software version of the control unit.

3) The central part shows the following information Figure 2-3:

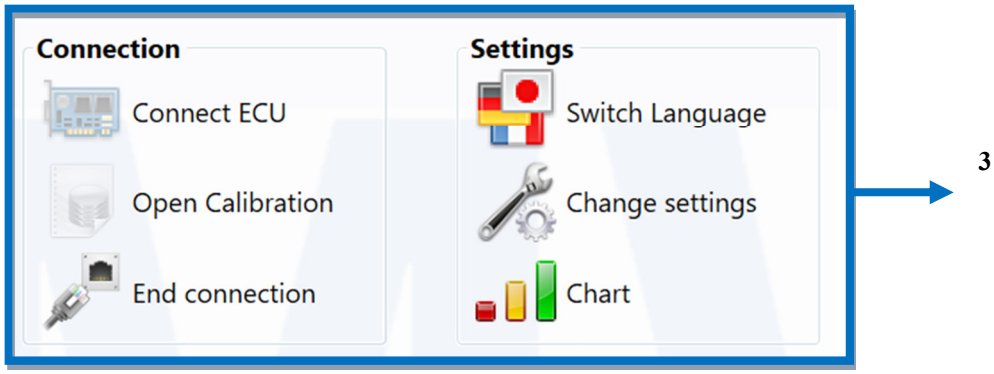
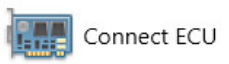
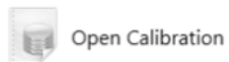


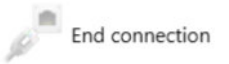
Fig.2-3



Activate the connection between PC and ECU.

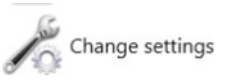


Accesses a calibration previously saved on pc and navigates the software in the off-line mode.

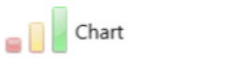


Closes the connection between PC and ECU.

From the drop-down menu allows to choose the language of the software.



Set the communication parameters of the PC ports.



Displays the charts saved on the PC.

4) It is possible to draw all the information relating to the management and calibration software from this form.

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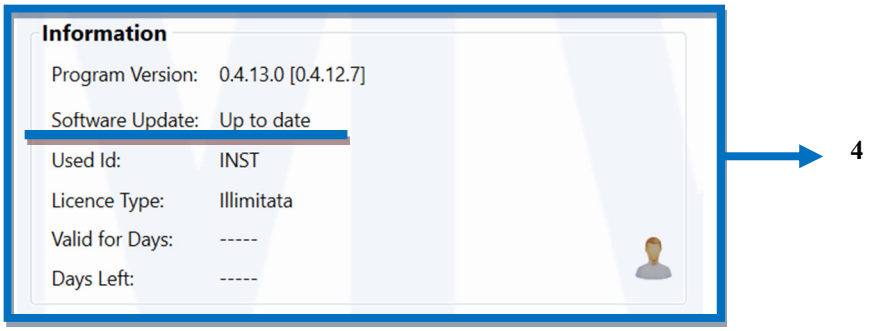
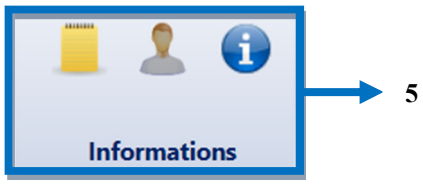
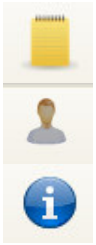
Live Update
This application automatically search for new and official software updates. Your PC must be connected to the internet.



Program version	Version of software currently installed on PC
Software update	Shows if currently installed software version is up to date, and checks if LiveUpdate has a newer version available to download. Requires Internet connection
User ID	User ID linked to the installed software license. The software is distributed with *INST* user-ID
License type	Type of license installed. The software is distributed with Installer *Unlimited* license.
Valid for days	In case of special time-limited software licenses, this shows the validity period
Days left	In case of special time-limited software licenses, this shows days left before expiration

5) The superior part shows the following "information" we find:





DREAM ON installation instructions.

Live Care to make connection with a remote support with technical Zavoli (you need internet connection).

Information relating to the management and calibration software.

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5. Programming

The programming procedure of the DREAM ON software is based on 2 different types of files:
1. File .S19
2. File .ZCL.

Files with the S19 extension contain the algorithms and strategies used by the systems equipped with the DREAM ON Software. Each time the control unit is newly programmed, it is advisable to update the S19 software with the latest version present on the PC (obviously the PC must also be updated). This allows you to have available all the functionalities and strategies that have been implemented up to that moment.
The files with .ZCL extension contain the characteristic data of the vehicle and of its mapping. For example, they contain type of system, type of engine (aspirated or supercharged), mapping parameters, calibration parameters of all the signals coming from the acquired sensors, commutation parameters, any parameters for the GAS strategies, etc.

5.1. Control Unit Programming

If the control unit needs to be programmed, select the *Inizialize control unit* key from the main screen. Two different programming modes are available:

- Control unit inizialize
- Control unit program

5.2. Control Unit inizialize

Control unit inizialize is carried out when wanting to install a new vehicle for which the Configuration is not available. In such a case, proceed with the Configuration of the characteristic parameters and, subsequently, with the actual self-mapping. The control unit inizialize procedure consists of a first step, which involves the selecting of the fuel type with which the vehicle was equipped, and then selecting either LPG or Methane, fig. 3-1.

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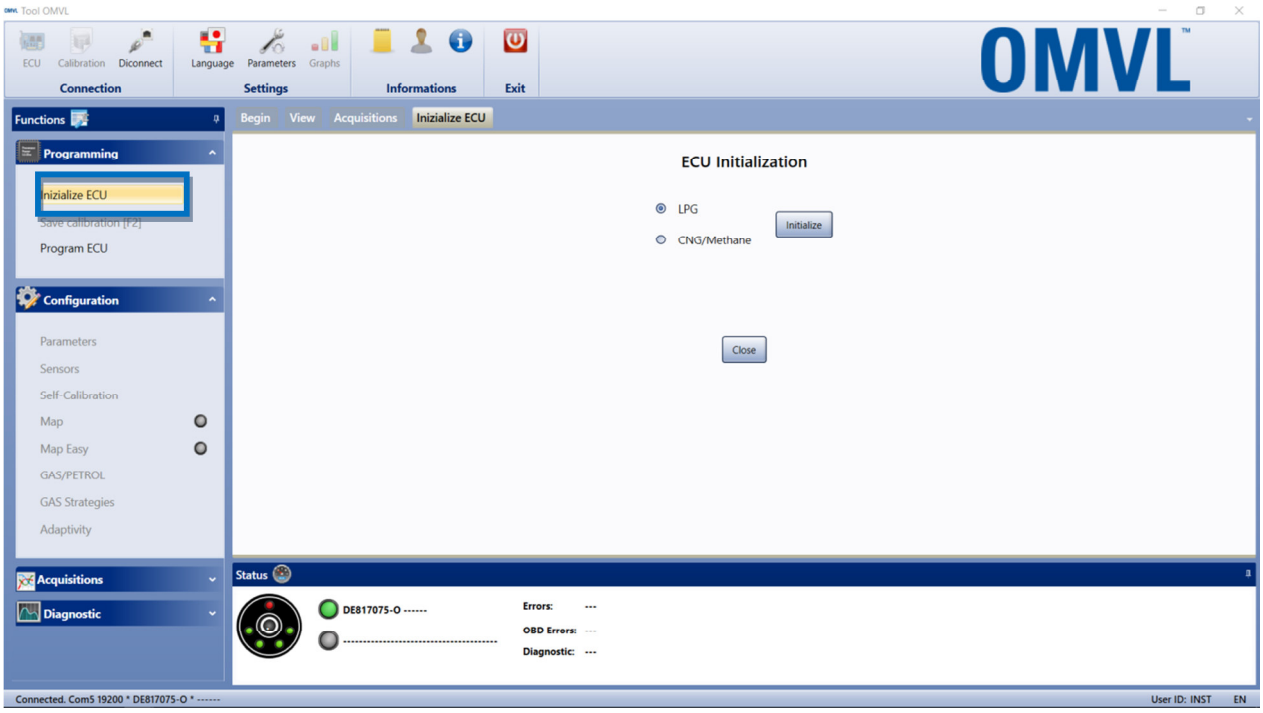

Fig.3-1

After having selected the box corresponding to the fuel type, LPG or Methane, simply press the *initialise* key. The software and a standard mapping will be automatically sent to the control unit, which will allow for the calibration of the vehicle. Once programming is completed, you will move to the next step.

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Fig. 3-2 lists the main steps for the proper inizialize and configuration of the control unit.

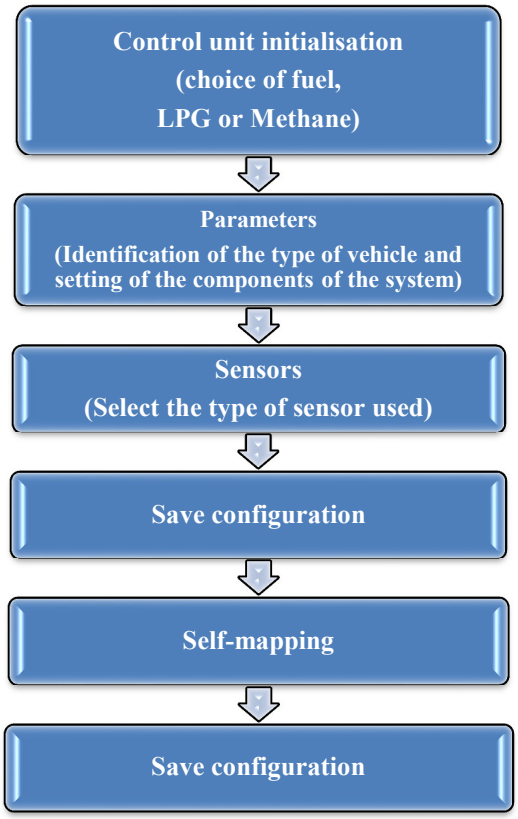

Fig.3-2

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5.3. Parameters

It is the second step of the procedure; it is used to specify further information on the type of system installed and of the vehicle. (see fig. 3-3).

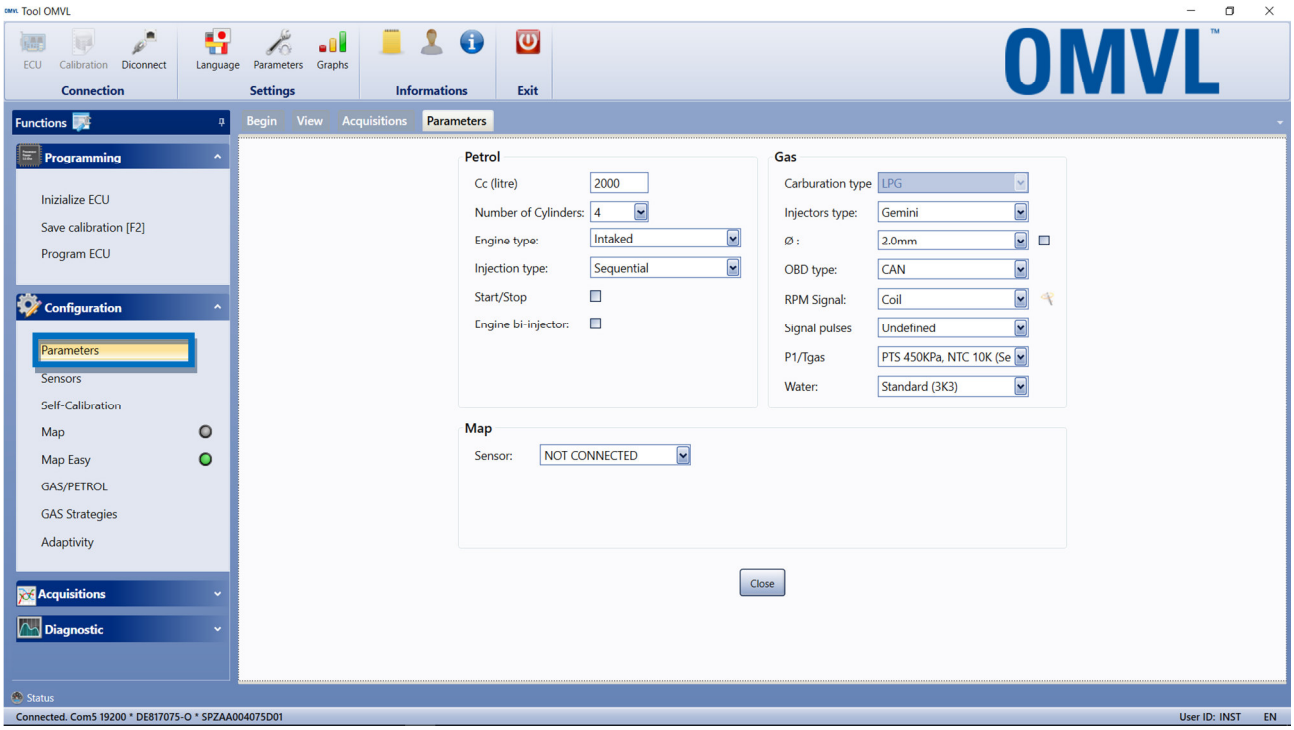

Fig.3-3

In particular, it indicates whether the system is *Aspirated* or *Supercharged* (turbo).
Some of the parameters are pre-set and are the same for all the DREAM ON systems on the market; usually it is not necessary to modify them, others vary from vehicle to vehicle and therefore are to be set by the installer. The following describes the standard parameters (DREAM ON) and those that differ depending on the system installed.

STANDARD DREAM ON PARAMETERS DESCRIBE THE CHARACTERISTICS OF THE INSTALLATION:

Petrol

- **Engine displacement**: indicate the total engine displacement in cubic centimetres (e.g. 1400 for a 1.4 litre engine).

NB. To confirm the value entered press the "Enter" key.

- **Number of Cylinders**: you must indicate the number of cylinders of the engine, which also the corresponds to the number of gas injectors installed and the number of petrol injectors connected.
- **Engine Type**: indicate whether it is a aspirated or a turbo engine.
- **Injection Type**: choose between sequential or semi-sequential type injection.
- **START/STOP**: indicate whether the vehicle is equipped with the Start/Stop device.
- **Bi-injection engines**: Selecting this function for 4 cylinder engines that have 8 petrol injectors. (for example, Nissan Juke/Nissan Qashqai).

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GAS

- **Injector Type**: indicate the type of gas injector installed, choosing from the list of those available. Remember that the choice of injectors **depends on the vehicle's power: see sizing table.**
- **OBD type:** *(Only for DREAM ON systems)*: used to specify whether the system is connected with the vehicle diagnosis connector and whether the K line (1 wire connected) or the CAN BUS (two wires connected) line has been used. It is possible to determine the type of communication, and therefore which types of connections to perform, by connecting an OBD tester to the vehicle connector. As soon as the tester performs the communication, it will give its type with a number from 1 to 9. The connections and selection must comply with the indications in the following table.

Communication type on OBD tester	**Communication type set on DREAM ON interface**	**Wires to connect**
From type 1 to type 3	K-LINE	White on pin 7 OBD connector
Type 4 or type 5	Not available	-
From type 6 to type 9	CAN BUS	Yellow on pin 6 and yellow/black on pin 14 OBD connector

- **Rmp signal**: Allows the control unit to detect the revs signal via the BROWN wire.

  - *Not Connected:* Select only if you are connecting map Standard and OEM.

  - *Coil:* Selecting the system calculates the number of motor revs from the coil. Set "Pulse Signals" as always "Undefined".

  - *RMP signal or crankshaft sensor:* Selecting, the system prepares the reading of the Motor Revs from the source such as: Phonic Wheel, Timing Sensor and rev counter exit. Set the "Pulse Signals" as the number of pulses from the timing sensor or the number of phonic wheel slots.

  Selecting and by selecting the “magic wand”  icon near the selection window "signal pulses" the gas ECU automatically recognize the type of signal generated by sensor on which the Brow wire is connected. To enable the automatic recognition, the vehicle engine must turned on and idling on petrol.

  - *Acqu. Coil:* Selecting, the system prepares the reading of the Motor Revs directly acquiring the signal from the coil. Setting from "Pulse Signals" the number of pulses of the coil. Also in this case it is possible to use the “magic wand”, to automatically set the number of pulses of the coil.

- **P1-Tgas**: indicate the type of sensor used for gas pressure and temperature. The program automatically proposes the sensor that is generally used for the pre-chosen application.
- **Water**: View the type of sensor used. In the DREAM ON systems equipped with the OBD Communication function this information can be collected from the car's diagnosis.

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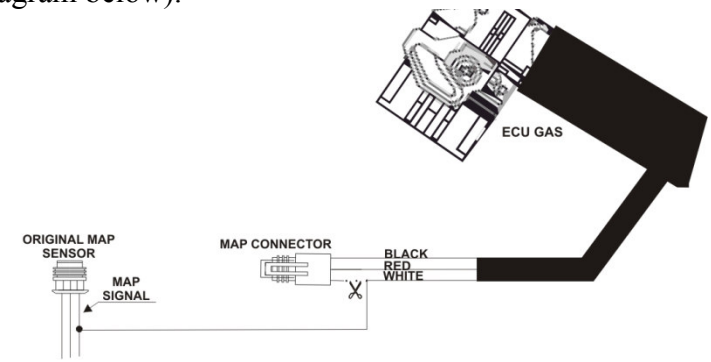
MAP

- **Not connected:** Selecting, the MAP sensor is used only during the self-calibration phase. The value of the map is calculated (recommended choice).
- **MAP Sensor DE802060:** Selecting, the OMVL MAP sensor is left mounted on the vehicle.
- **OEM:** Selecting, the White wire needs to be connected to the original MAP signal of the vehicle, (see the diagram below).



For the correct connection, you will have a variable signal from ± 0- 5 V.

5.4. Sensors

It is the Third step of the procedure; it is used to specify additional information about the type of sensor installed and to enable the reading of the lambda probe. (see fig. 3-4).

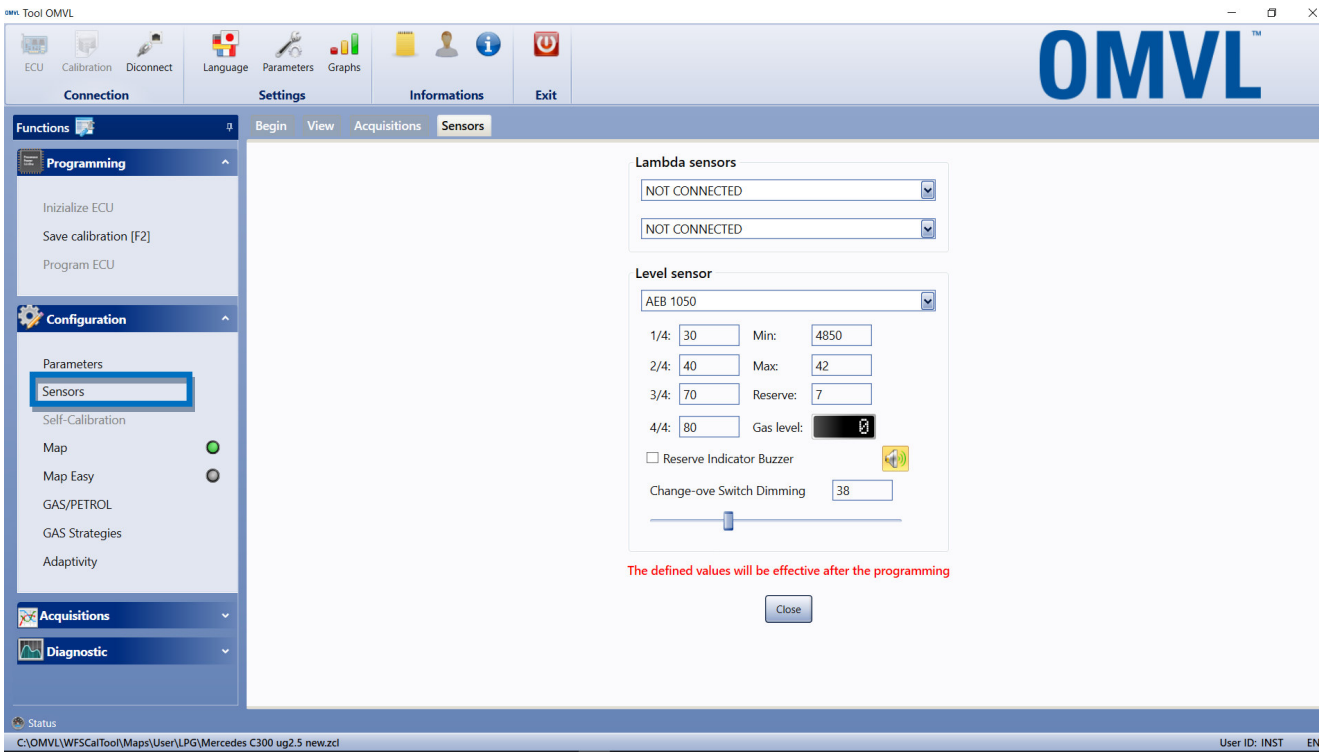


Fig.3-4

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Lambda sensors

By selecting the type of gas Probe the Gas ECU allows the reading of the lambda probe signal. Before selecting the type of Lambda Probe, it is necessary to check its operation.
If you want to read the value of the probe, connect the lambda probe to the PURPLE wire without interrupting the original connection.

- **Standard:** select with probe in voltage 0-1 Volt; 0-5 Volt; 0,8-1,6Volt.
- **Standard inverted:** select with probe in voltage 5-0 Volt.
- **UEGO** do not select and do not connect any wires when there are UEGO probes
- **Not connected:** select if no wire is connected to the lambda probe.
- **Standard emu.:** select in the event you want to perform an emulation of the lambda probe. Connection the PURPLE wire in to original signal lambda probe.

Level sensor

This section is about calibrating the signal coming from the tank level sensor, so as to correctly display the level on the LED of the change-over switch.

LPG

- **0-90 Ohm:** set if the gas control unit is connected to a sensor with 0-90 output signal (standard MTM sensor); for the connection refer to the assembly diagram of the gas control unit.
- **AEB 1050:** set if the gas control unit is connected to an AEB1050 sensor; for the connection refer to the assembly diagram of the gas control unit.
- **Sensata HP:** set if the gas control unit is connected to a Sensata sensor; for the connection refer to the assembly diagram of the gas control unit.
- **Custom 2 wires :** Set this option if a resistive LPG sensor is connected to a LINEAR variable signal (lower value (Ohm) with empty level and higher value (Ohm) with full level).

CNG

- **0-90 Ohm 18CE00010070:** set if the gas control unit is connected to a sensor with 0-90 output signal (standard sensor)
- **Sensata 55PP31-01 260bar**: set for EVO HP reducer equipped with Sensata sensor. Requires a specific connector (sold separately)
- **Bosch 0261A04913 260bar:** set for Emer C300 reducer equipped with Bosch sensor. Requires a specific connector (sold separately)
- **Custom 3 wires:** Set this option if a resistive CNG sensor is connected and it need a pull-up, like AEB 860 sensor. Requires to insert a 120 ohm resistor in series to the signal wire. (Sold separately)
- **Custom 2 wires:** Set this option if a resistive CNG sensor is connected to a LINEAR variable signal (lower value (Ohm) with empty level and higher value (Ohm) with full level).

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To correctly signal the gas level, it is very important to perform the electrical connection as per the gas control diagram.

By selecting the sensor installed, standard values are automatically set which, in most cases, correspond to the proper calibration of the sensors. It is also possible to perform the calibration of the level:

1/4, 2/4, 3/4, 4/4: you can manually fine-tune the threshold percentages of each level of gage display.
Min: acquire the minum reading of level sensor with empty tank. Level thresholds are automatically re-scaled
Max: acquire the maximum reading of level sensor with full tank. Level thresholds are automatically re-scaled
Reserve: set up the threshold percentage to activate reserve indication on gage display of change-over switch.

Gas level customization procedure: it is necessary to position the vehicle with the tank emptied and to detect the sensor level signal under these conditions and pressing the *Empty tank detection* key; the recorded value appears in the box next to the key. After filling up with gas, it is sufficient to press the *Full tank detection* key, the recorded value appears in the box next to the key.

Reserve Indicator Buzzer

Select "Reserve Indicator Buzzer ". As the system detects a reserve electrical signal, the change-over switch generates a double bleeping sound.

This button, close to the Reserve Indicator Buzzer checkbox, is used to enable / disable totally the switch buzzer.

If enabled the button becomes  .

Change-Over Switch Dimming

This regulates the intensity of the change-over switch lights.

5.5. Self-Calibration

Before starting self-calibration procedure for the DREAM ON system, the connection to the MAP sensor will be requested.
Self-calibration consists in acquiring the values of the various parameters when idling on petrol and in their processing on the basis of the supplied data (engine displacement, number of cylinders, injection type, etc.). It will then be implemented without the intervention of the installer. As soon as

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self-calibration starts, the key shown in fig. 3-5 will be enabled and will request to press *Begin* when the idling conditions with petrol have been reached.

Fig.3-5

Note the various gauges that indicate the progress of the self-calibration and other values.
During this phase, note the 4 red or green circles and the text box (Err%) that contains the error percentage that still needs to be corrected. The circles (one for each cylinder) are initially red, indicating that all the cylinders are petrol fuelled. Subsequently, partial change-over to gas is had of certain cylinders with subsequent change backs between gas and petrol, until reaching full gas functioning at the end of the procedure. During the entire procedure, the error box shows the gap between current situation and the optimal one. When the percentage error is below 5% (positive or negative), the box is green indicating a situation where one can proceed, otherwise it is red making it necessary to wait before changing-over other cylinders. At the end of the procedure, a message will signal that it has properly come to a conclusion.

Please note: at the end of the self calibration procedure it is important that the off-set value is negative, otherwise repeat the procedure and check for any problems in the installation.

In the event the gas ECU does not complete the self-calibration procedure it is possible to interrupt the procedure at any moment and, saving the configuration file, the gas ECU acquires the last off-set value available. In this way the fine tuning of the carburation in the map menu can continue.

Initial correction: Indicates the initial leaning or enrichment with which the self-calibration procedure starts. In LPG configuration the default value is 0, while with methane the default value is -20. Varying this value in negative values you increase leaning, increasing it, it diminishes.
We recommend varying this value only in exceptional cases on specific vehicles.

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5.6. Save Configuration

You will be able to conclude the procedure by saving the changes and adding the configuration to the archive, see fig. 3-6.

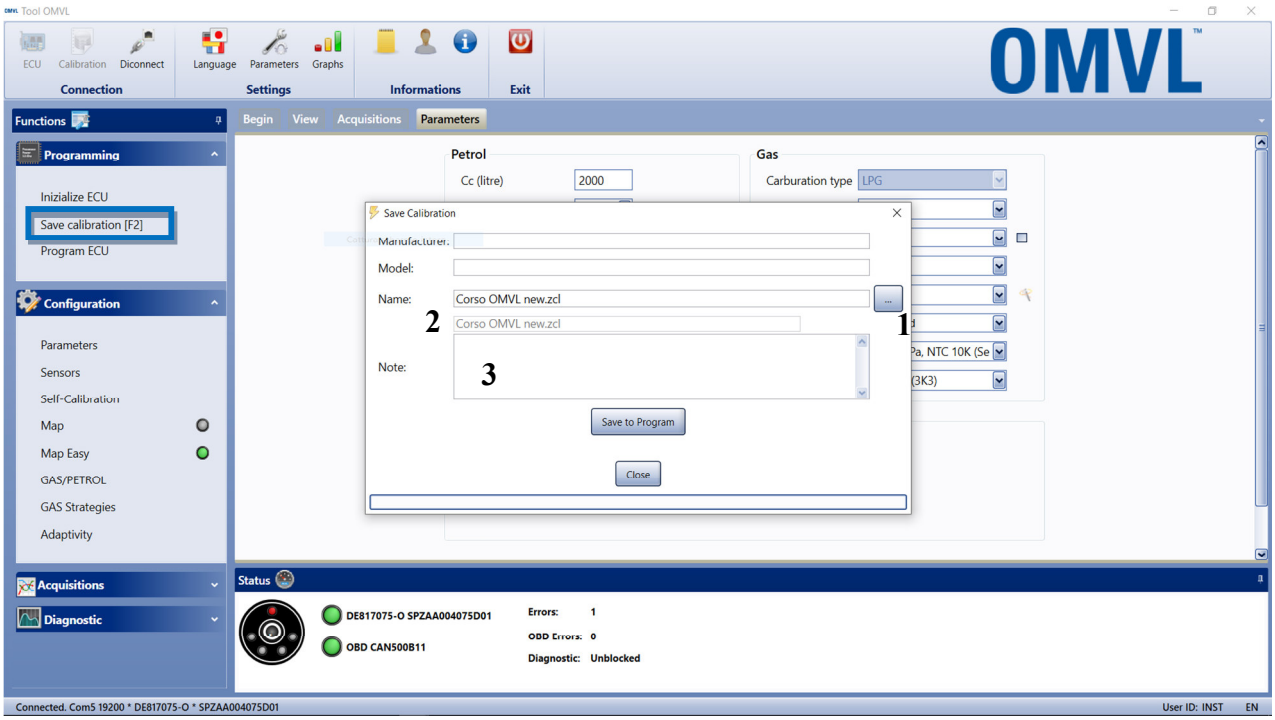

Fig. 3-6

(F2) short-cut button to save the calibration file.

1 Press the inset with the points to recover the configuration in the log and overwrite the file. Automatic recognition of last saved file/calibration. After the first save you no longer have to look for the same calibration file to overwrite any further change, the system automatically select this file for you. All you have to do is to press "save" to overwrite the last saved calibration.
2 The name of the configuration saved in the control unit appears in the string in grey.
3 In the inset note, during save useful information can be shown on the installation carried out, that will be written in the control unit and that can be consulted in any moment in the "information control unit" menu.

5.7. Program Ecu

Selecting the ***Program Ecu*** *From Archive* key accesses the screen for the programming of the OMVL control unit from the archive, see fig. 3-7, i.e. by using already available files (for example those of vehicles already developed in the past).

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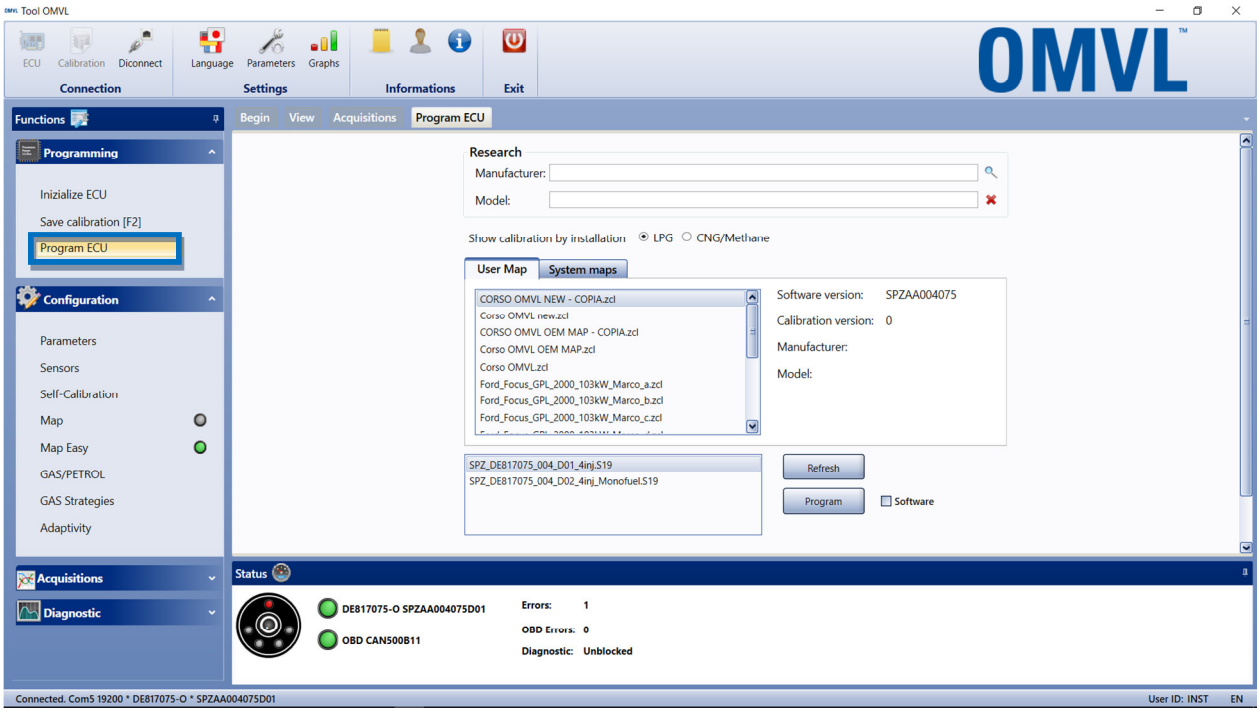

Fig.3-7

The programming will take place if the key contact is engaged, with the motor still or while running on petrol. If the vehicle is running on gas. the system will automatically perform the change-over to petrol before proceeding with the programming. To program, select from the archive the file to be downloaded depending on the type of system, brand, model and petrol of the vehicle. If the vehicle is distributed by OMVL, the files are located in the **System maps** folder, if the vehicle has been developed by the installer, the files are located in the **User maps** folder.
Once the control unit initials of the vehicle that you intend to program have been selected, select the files to download. The selection of the .ZCL file to download is carried out by pressing on the chosen file twice. If you want to program the configuration including the software, select the software (file .S19) to download. To transfer this file to the control unit, you must checkmark the box next to the word *Software*. You can change the software chosen by selecting another file shown in the programming window. Select the software to download by pressing on one of the software listed. You should do perform these operations only if recommended by OMVL technicians or by competent personnel.
The checkmark shows the files that will be downloaded simultaneously when proceeding with the programming of the control unit, i.e. by pressing the *Program* key. It will not be possible to download only S19, without the .ZCL file.

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6. MAP

This section allows having a numerical view of the multiplication coefficients used by the control unit in the calculation of the GAS injection time.
The table displays on the Y-axis the petrol injection times, while on the X-axis we find the number of RPMs, (fig. 4-1).

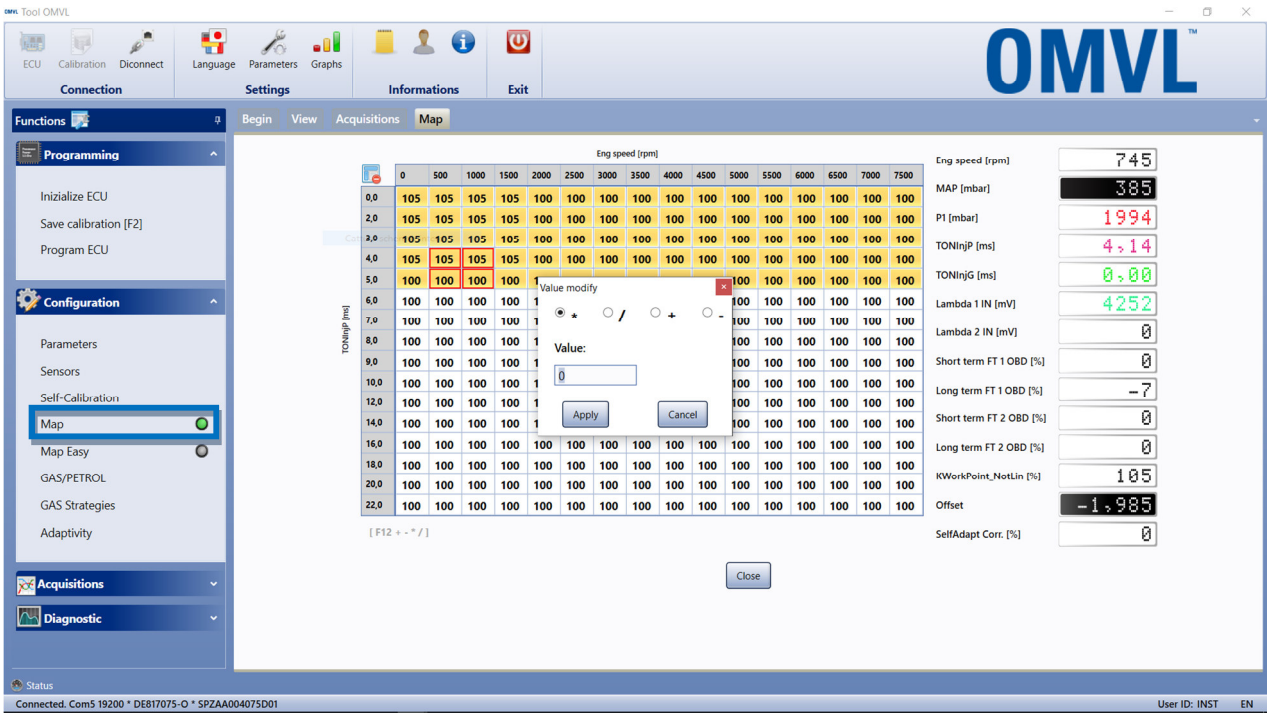

Fig.4-1

The red-coloured selection displayed on the map identifies the RPMs and the petrol injection times at which the the engine is running.
Increasing the value of the calculation coefficients (Off set) in the map, while maintaining the PETROL injection time constant, will increase the GAS injection time, while decreasing this value the exact opposite will take place, i.e. the system will be leaner.
In order to perform a proper carburetion control, it is possible to read the lambda correctors on the program by connecting the wires to the OBD diagnostic connector of the vehicle. This function is active only with the DREAM ON EVO OBD gas control units;
To change the values, select one or more check boxes on the map and press the "Enter" key; enter the value to be attributed to the cell and confirm the value with the “Enter” key.
Or pressing "F12", value changes can occur in a linear manner through the table, "modify value" as seen in figure 4-1.

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6.1. Test using the Integrators/Calibrators

If the value of the calibrators/integrators shifts more than 3-4 units compared to the normal PETROL operation during GAS operation (e.g. the calibrator moves from 8% to 11-12%), correct the value in the map keeping in mind that:

- If the integrators/calibrators shift toward positive values, this usually means that the petrol control unit detects a weak carburetion, so in the box you are checking the K value should be increased until the integrators/ calibrators return to the values detected with PETROL.

- If the integrators/calibrators shift toward negative values, this usually means that the petrol control unit detects a rich carburetion, so in the box you are checking the K value should be decreased until the integrators/ calibrators return to the values detected with PETROL.

To check that the K values entered are correct, perform a few PETROL/GAS changes at a constant speed while checking that the calibrators/integrators are operating in a similar way with both PETROL and GAS.
To perform a correct mapping, you have to road-test the vehicle keeping in mind that it will not be possible to perform the procedure described above in some map areas because the engine will not abide staying in the same map area during the PETROL/GAS changes as it is in a transient state (acceleration or deceleration).

6.2. Test using the Petrol injection time

If the value of the PETROL injection time during GAS operation shifts compared to normal PETROL operation (e.g. 0.5/1 ms longer or shorter), correct the carburetion remembering that:

- If the PETROL injection time increases, this means that the petrol control unit is detecting a weak carburetion, so in the box you are checking the K value should be increased until the PETROL injection time returns to the values detected with PETROL.

- If the PETROL injection time decreases, this means that the petrol control unit is detecting a rich carburetion, so in the box you are checking the K value should be decreased until the PETROL injection time returns to the values detected with PETROL.

To check that the K values entered are correct, perform a few PETROL/GAS changes at constant speed while checking that the PETROL injection time is working during GAS operation as it works during PETROL operation.
To perform a correct mapping, you have to road-test the vehicle keeping in mind that it will not be possible to perform the procedure described above in some map areas because the engine will not abide staying in the same map area during the PETROL/GAS changes as it is in a transient state (acceleration or deceleration).

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7. Map Easy

In this section the program allows you to carry out a correction of the map automatically, figure 5-1.

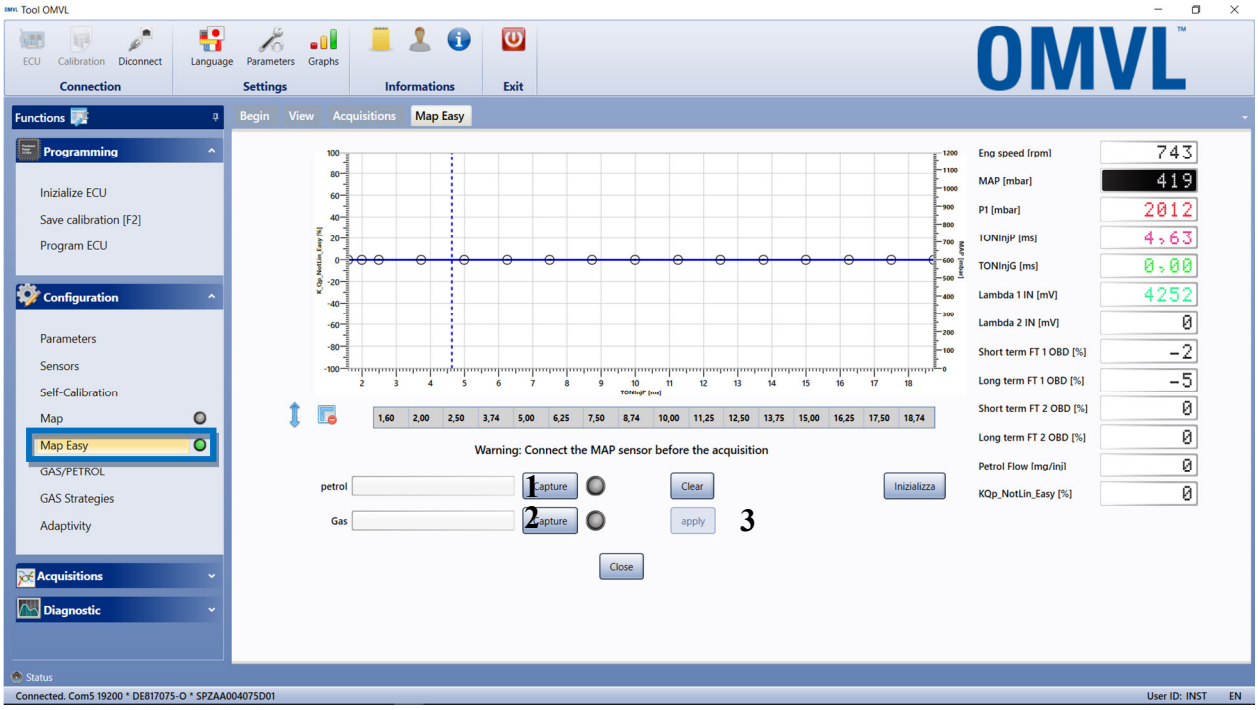

Fig.5-1

The curve is made of 16 points that represents the correction % over base gas injection, computed from self-calibration. The points are sweeped based on petrol injection time, regardless of engine speed; the vertical dotted line shows the current working point.
You can adjust the curve by moving around the points: click the arrows at bottom left of the curve, to move the points vertically (change correction %) or shift them horizontally (change petrol injection time reference). The higher the dot, the longer the gas injection time, and the richer the mixture.
At any time you can reset the curve to a flat line with the **Initialize** button.

Capture petrol & gas

You can automatically fine-tune the curve, by capturing parameters of petrol injection, while driving the car on the road on petrol first, and then on gas.
The correction occurs acquiring in different driving conditions (MAP, T.on petrol/Gas, Motor revs). At the end of the acquisition, the system automatically carries out an automatic correction of the carburation.

NB: the acquisitions must be made with the MAP sensor connected on the vehicle. (OMVL o OEM).

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Procedure

1. Press **Capture** button for petrol: red dots will populate the screen, representing petrol injection times acquired at different MAP values.
2. Drive normally, slowly sweeping all possible loads, speeds and transmission gears. Do not push the engine into wide-open throttle, or it could switch into open-loop and the capture process would pause.
3. The red bar shows % of completion on petrol; you can stop at any time, but the closer to 100%, the better
4. Press now **Capture** button for gas: green dots will appear, showing petrol injection times acquired while on gas at different MAP values
5. The green bar shows % of completion on gas; you can stop at any time, but the closer to 100%, the better
6. When you are satisfied and you stop capturing, the software will automatically compute the differences between red and green dots, and propose an optimized curve (dotted curve on screen)
7. You can accept the proposed curve by clicking the **Apply** button.
8. Otherwise, you can click Clear, delete all the dots and start over again.

Once completed, remember to **Save the calibration** to ECU and hard-drive.

NB: The circles at the side of the **Capture** buttons indicate, if red, that the scoring points are still insufficient and if green that the scoring points are sufficient and you can go to the next step.

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Fig.5-2

ATTENTION: The two Maps cannot be used simultaneously, changes that are made in one, are not taken into consideration by the other.

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8. Gas/Petrol

By selecting *GAS/PETROL* on the main screen, you can access a series of sections on settings and parameters of the vehicle. (fig.6-1)

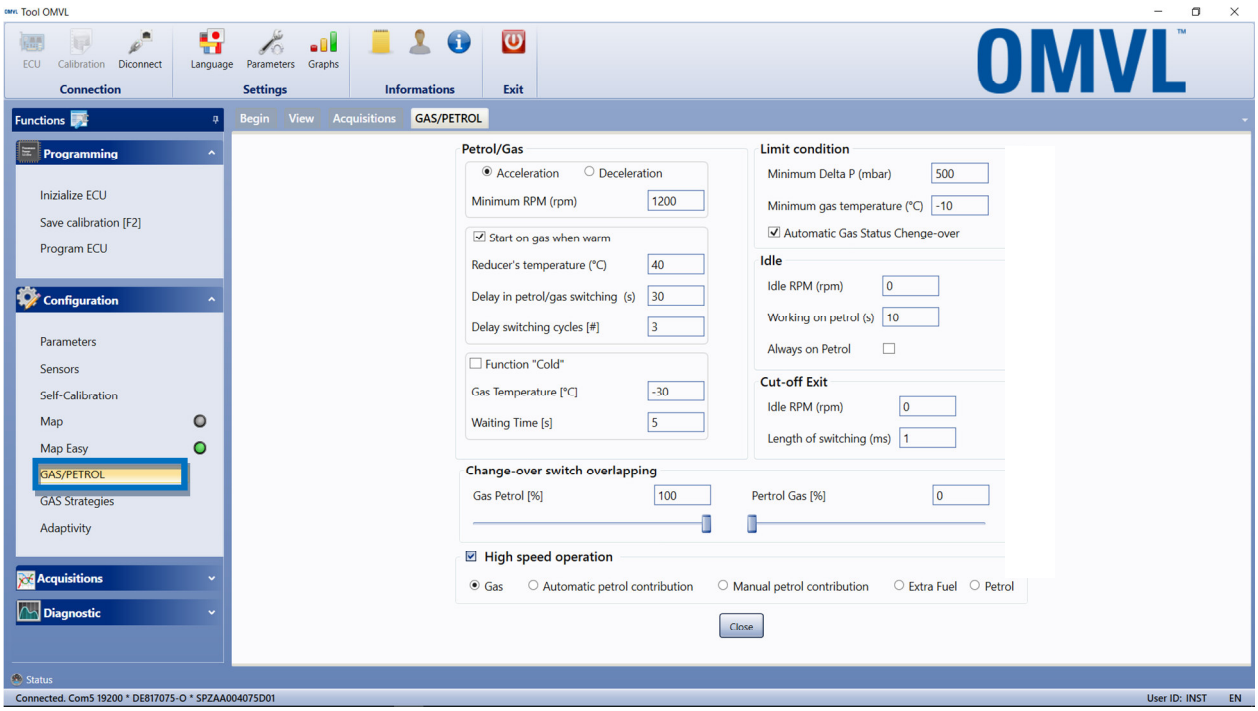

Fig.6-1

The following describes the ECU parameters;

8.1. Petrol/Gas

Acceleration: The vehicle changes-over when the RPMs are above the minimum RPM parameter settable from the interface. If set to 0, the system change-over even at idle, if set to something other than 0, the system must exceed this threshold to change-over.

Deceleration: The vehicle changes-over only when the MAP is below the maximum MAP [mbar] parameter threshold that can be set from the interface. The default value is 2000 and indicates that the system can start the change-over under any operating conditions. If an appropriate value is set, e.g. 300 mBar, the vehicle will change-over only when the MAP drops below this threshold, which normally takes place during release.

Start on gas when warm: If the strategy is enabled when the two thresholds for regulator Temperature and Petrol/Gas Change-Over Delay are validated, the vehicle will start-up directly on GAS.

Reducer's temperature: Engine water temperature threshold read by the sensor placed on the gearbox to enable gas switching.

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Delay in petrol/gas switching: Waiting time to wait for gas switching from engine starting.

Delay Switching Cycles: With the value of 3 injections, with the example of a 4 cylinder vehicle, after change-over of the first injector, 3 injections will take place in which 3 cylinders will still be fuelled with petrol and only one with gas, after which for 3 injections, 2 cylinders will be fuelled by gas and 2 on petrol, after another 3 injections there will be 3 gas fuelled cylinders and 1 petrol fuelled one, and after 3 more injections, even the last gas injector will be activated.

Function Cold
Selecting "Function Cold", in extremely cold weather conditions, when the changeover reducer's temperature is reached and the gas temperature is higher than that set in the *Gas Temperature [° C]*, the system will try to switch to gas by checking if the gas temperature rises above the threshold set in the *Minimum Gas Temperature [° C]* within a preset time set in the Waiting Time [s] parameter. If this does not happen the gas system re-changeover to petrol , then try after again gas switching.

Gas temperature: Gas temperature threshold to recognize the intervention of the Function Cold strategy

Waiting Time: Time when the system must check the gas temperature rise during the Function Cold strategy.

8.2. Limit Conditions

Minimum DeltaP: corresponds to the DeltaP value (difference between the gas pressure in the rail and the MAP) below which, the vehicle will definitively change-over to petrol due to lack of gas.

Minimum Gas Temperature: If gas temperature drops below the set value (-10°C default value), the system changes-over to petrol permanently, in order to prevent malfunctions due to temperatures that are too low.

Automatic Gas Status Change-over: Select the "Automatic Gas Status Change-over" checkbox. When the car run out of gas, and the systems has changed over to petrol:

- **LPG;** If the system detects a gas level increment of approximately 20%, it automatically sets the change-over switch to gas mode.
- **CNG;** When the car ignition key is turned to ON position, the system automatically sets the change-over switch to gas mode.

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8.3. Idle

Idle RPM: (RPM threshold gas-petrol change-over): when the RPMs are below the value entered in this box, the strategy activates and the vehicle changes-over to petrol. The default value is 0: this value effectively disables the strategy.

Working on Petrol: (Maximum stay time on petrol):after this time, the strategy ends its effect and the vehicle changes back to gas, regardless of the RPMs. The default value is 10 seconds.
The strategy allows to solve any problems present during the return to idle. The strategy allows a change-over to petrol for a instants during the return to idle, with a negligible petrol consumption, but avoids the engine switch-off or the excessive lowering of the RPMs.

Always on petrol: The flag, to activate an unlimited idol on petrol.

NB: These allow to solve any problems that may arise when returning to idle. The strategy allows change-over to petrol for a few moments following a cut-off, with a negligible petrol consumption, but avoiding the engine switch-off or an excessive lowering of the RPMs.

8.4. Cut-Off Exit

Idle RPM: (RPM threshold max change-over)*:* when the RPMs are below the value entered in this box, the strategy activates and the vehicle switches to petrol. The default value is 0: this value effectively disables the strategy.

Length of Switching: (*No. petrol injections):* determines the maximum duration of the strategy. After the number of injections/ms indicated in this box (counted on the first injector), the system changes back to gas.

NB: These strategies are used to resolve any problems during RPM lowering following a cut-off (momentary shut-down of the injectors in situations of deceleration). It may be necessary to use this strategy, for example, to prevent engine shut-downs which occur as a result of sudden clutch pressure leading to a rapid decrease in RPMs.
The strategy allows change-over to petrol for a few moments following a cut-off, with a negligible petrol consumption, but avoiding the engine switch-off or an excessive lowering of the RPMs.

8.5. Change-over switch overlapping

This function allows to modify the parameters related to the fuels overlapping during the change-over process (Gas to Petrol and Petrol to Gas).
Supplying gas while running on petrol is useful to anticipate the gas pipelines filing, especially between the gas injectors rail and the intake manifold. This is especially true when using pipes exceeding the normal length.

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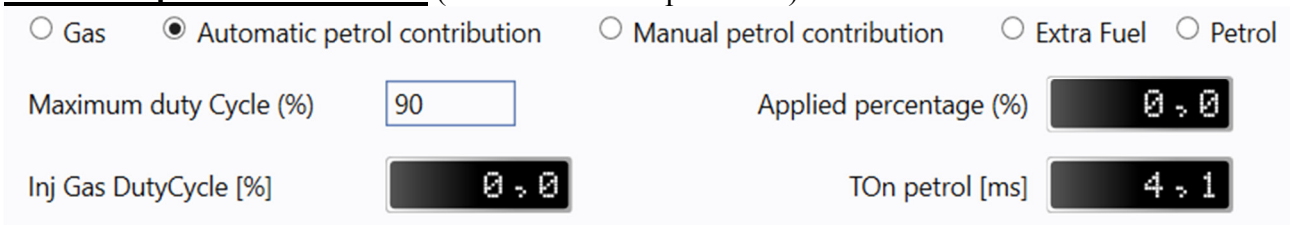
Gas to Petrol (%): During the "Gas to Petrol" change-over process, the last gas injection is calculated accordingly to the parameters you input in the "Gas to Petrol (%)" overlapping section. You can decide to enrich or lean the gas flow by modifying the last injection, before the change-over to petrol.
You can decide the percentage of the last gas injection during the change-over process. This is set to 100% by default, meaning a full gas injection. If you chose "0", it means NO last gas injection before change-over. To lean the gas flow you must reduce the value in %.

Petrol to Gas (%): During the "Gas to Petrol" change-over process, the last gas injection is calculated accordingly to the parameters you input in the "Gas to Petrol (%)" overlapping section.
During the last petrol injection before the change-over to gas, you can set the system to supply a percentage of its corresponding gas injection. If you set to 100%, during the last petrol injection the system reaches the 100% (total) of the corresponding gas injection. The system is set to 0 by default, which means supplying the 0% of the corresponding gas injection, meaning supply NO additional gas injection in conjunction with the petrol one.

8.6. High Speed Operation

Gas: The system works entirely on LPG.

Automatic petrol contribution: (Lack of Gas compensation)



Above a Duty Cycle Gas threshold, that can be calibrated through the Interface, you can inject a percentage of petrol that meets the demand of the engine. This strategy can be used to solve the problem of changing-over to petrol due to having reached the max D.C. Inj set at 100%.
Once the strategy is enabled, up to the set value (default at 90%) of the Duty Cycle GAS. the system will feed the engine only with LPG. Instead, when the system should open the GAS injector above the set value, the remaining amount will be provided by opening the petrol injector up to the ***100% limit*** set in the calibration file. The two fuels supplied together however represent a stoichiometric calibration.
Example: If the calculated Gas flow to supply the engine to satisfy the user's demand, should involve a Duty Cycle GAS equal to 98%, 90% of the flow will be supplied with LPG and 8% will be supplied with Petrol. When the calculation of the total Duty Cycle, LPG + Petrol, reaches 100%, the vehicle will change-over to petrol.

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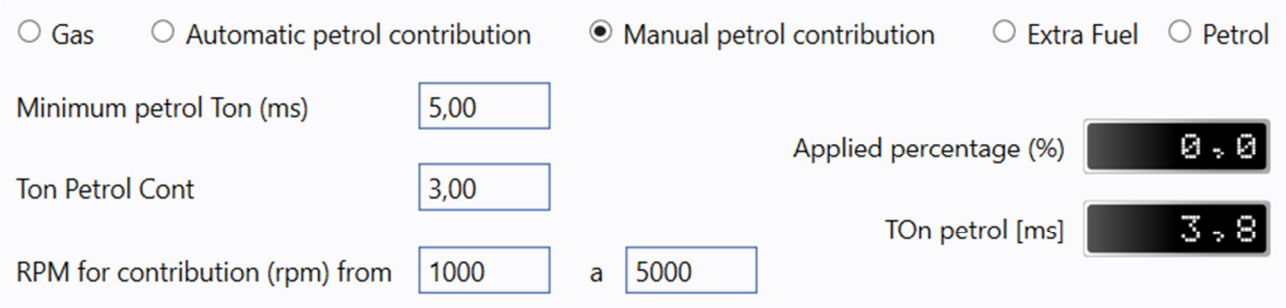
Manual petrol contribution:



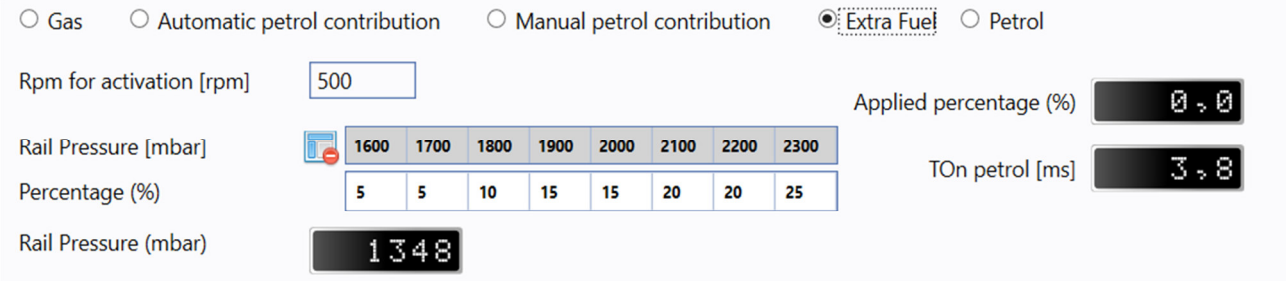
The strategy allows for the addition of petrol during gas funtioning. This strategy, if enabled, maintains the functioning and the duration of the valve seats especially on vehicles known for this kind of problem. Function parameters that can be set by the operator:

- ✓ ***Minimum petrol ton:*** Minimum petrol injection time beyond which the system starts feeding an amount of petrol equal to the Petrol Contribution Ton parameter.

- ✓ ***Petrol Ton Contribution:*** Petrol injection time intended to be supplied to the engine.
  RPMs for contribution from ... to..: RPM range within which, if the minimum petrol Ton parameter is exceeded, the system will start to inject petrol.

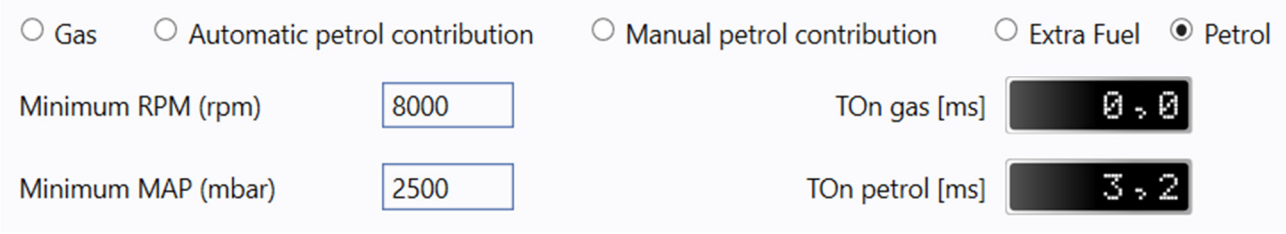
- ✓ ***Strategy operation:*** in operating conditions between the two thresholds of engine RPMs, if the petrol injection time exceeds the threshold set in the minimum petrol Ton parameter, an amount of petrol corresponding to the Petrol Contribution will be provided; the remaining petrol injection Time will be used to calculate the amount of gas to be injected.

Extra Fuel:



This strategy allows you to inject a % of petrol in correspondence with a specific injectors rail pressure. It is also possible to select at which RPM the strategy activates.

Petrol:



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Strategy that allows, above certain RPM and MAP thresholds, the temporary change-over to petrol. This solution can be used to avoid problems due to the lack of fuel supply at high RPMs. The change-over parameters can be modified by the installer.
The changing-over back to petrol will not be indicated on the switch that will remain in GAS condition with the two-coloured green LED. The system automatically manages a changing-over back to GAS when dropping below the change-over parameters.

9. GAS Strategies

By selecting *GAS Strategies,* from the main screen you can access a series of strategies dedicated to the setting and modification of parameters. (fig.7-1)

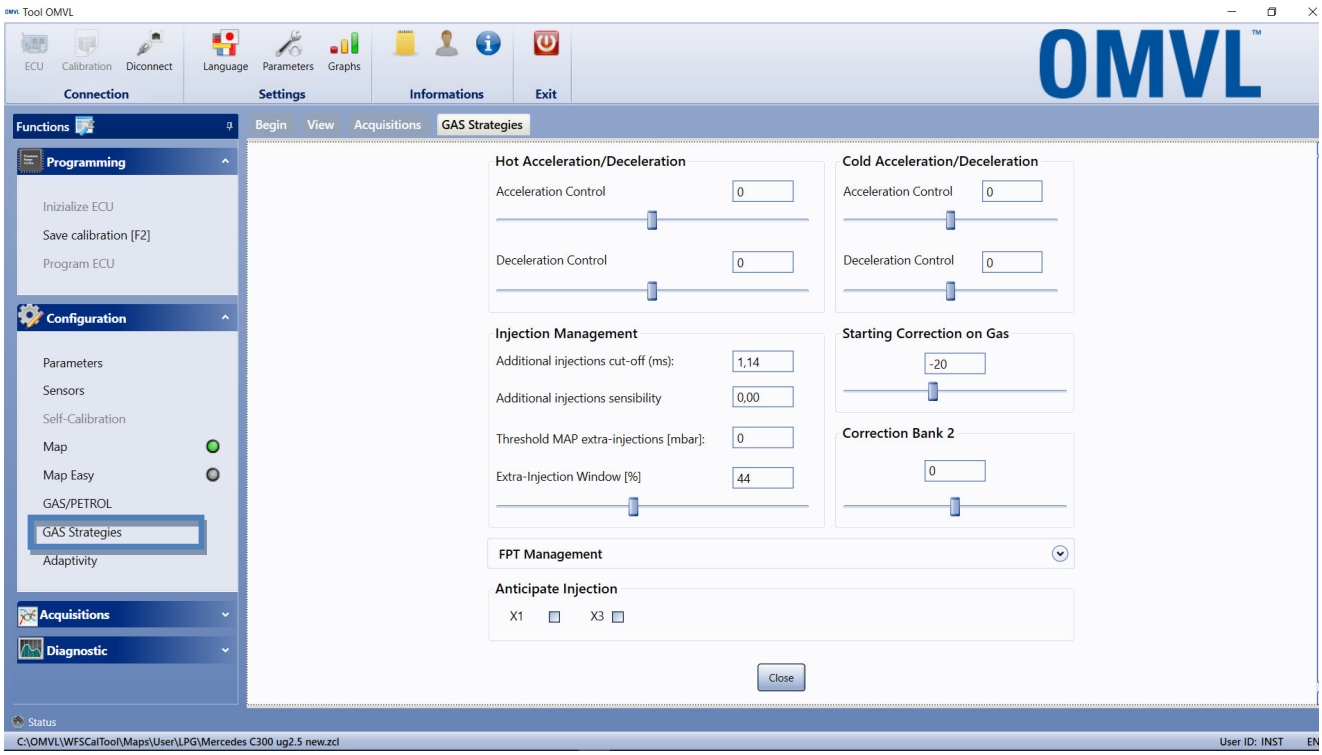

Fig.7-1

9.1. Hot Acceleration/Deceleration

This transient strategy compensates variations introduced by the petrol injection in a simple way, by setting with a cursor the leaning or enrichment that is desired. When the system use this strategy the title becomes red.

Acceleration Control: The leaning and enrichment take place in conditions of acceleration, in the situation of this car hot. The value set corresponds to the percentage change of the calibration.

Deceleration Control: The leaning and enrichment take place in conditions of deceleration, in the situation of this car hot. The value set corresponds to the percentage change of the calibration.

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9.2. Cold Acceleration/Deceleration

This transient strategy compensates variations introduced by the petrol injection in a simple way, by setting with a cursor the leaning or enrichment that is desired. When the system use this strategy the title becomes red.

Acceleration Control: Leaning and enrichment take place in conditions of acceleration, cold vehicle. The value set corresponds to the percentage change of the calibration.

Deceleration Control: Leaning and enrichment take place in conditions of deceleration, cold vehicle. The value set corresponds to the percentage change of the calibration.

9.3. Injection management

Additional injections cut-off : Petrol Ton threshold under which the petrol Cut-Off is detected and the injection will not be repeated and fed with Gas.

Additional injections sensibility: If set greater than the Extra injections cut-off parameter, all fuel injections that have a value between these two parameters will be added to the main injection.

MAP threshold extra injected: The Map value can be set, from which the software carries out a complete cut of the extra injections.

Extra-Injection window [%]: it allows to calibrate the sensibility through which the extra-injections are separated from the normal injections.
By increasing its value, the probability the system recognises the injections as extra-injections increases, causing the strategy to intervene as consequence.

9.4. FPT Management

Management strategy return to idle to overcome shutdown problems. The strategy is hidden if not enabled.

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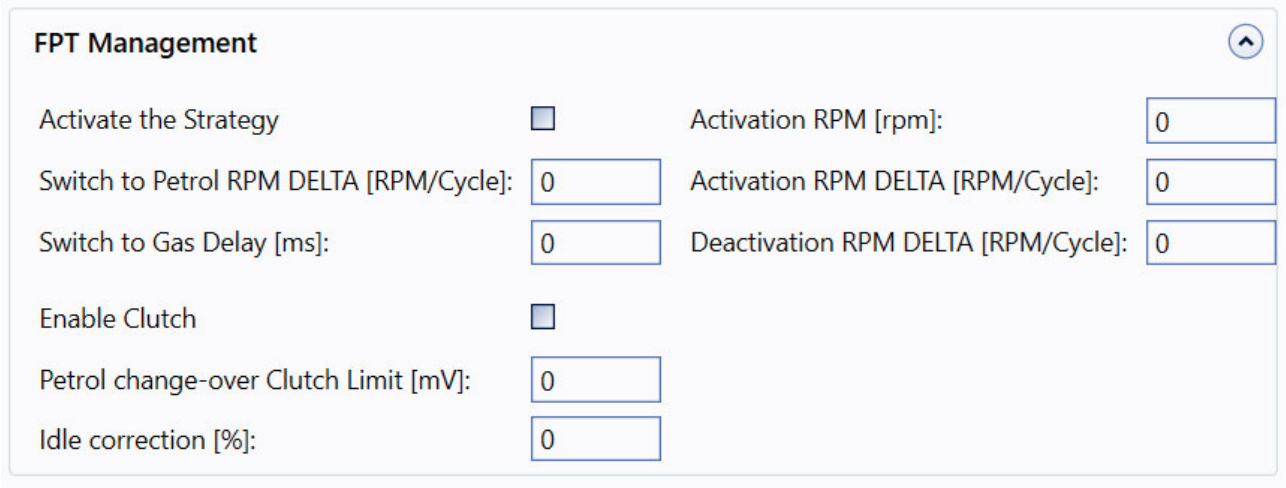

Activate the Strategy: "Flag" the check-box to activate the strategy.

Activation RPM: (RPM limit for switch over): when the RPM value is below the selected limit, the strategy turns on and the vehicle switches over to petrol.

Switch to Petrol RPM-Delta RPM/Cycle: (RPM cycle limit): when the number of rpm contained in a Engine Cycle fall below the indicated limit, the strategy turns on and the vehicle switches over to petrol.

Activation RPM-Delta RPM/Cycle: (RPM cycle limit): if the RPM raise above the selected limit, the strategy turns on and the vehicle switches over to petrol.

Switch to gas delay ms: (Maximum time on petrol): when the selected time has passed, the strategy ends its effect and the vehicle switch over to gas.

Deactivation RPM-Delta RPM/Cycle: (Rpm-per-Cycle difference): if the rpm raise above the selected value, the system switch to gas during one engine cycle, without waiting for the Timeout (Switch to gas delay in ms).

Enable Clutch: If enabled, a petrol re-changeover is activated every time the clutch is pressed to return to idle. The enabling is controlled by a clutch signal crossing threshold (Petrol Return Clutch Threshold [mV]).

Petrol change-over Clutch Limit [mV]: Clutch signal crossing threshold to enable the strategy and re-changeover the vehicle to petrol.

Idle Correction [%]: In parallel to the changeover it is possible to decide to carry out a correction to the gas calibration every time the clutch is pressed.

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9.5. Anticipate Injection

Anticipate injection: The system, in order to anticipate the sequence, does not provide the Gas injector with its command, but that of the previous injector in the ignition order.

Example:
Generally, the ignition order for the 4 cylinder is the following: ***1 – 3 – 4 – 2***
The Anticipated injection strategy will use this new ignition order: ***3 – 4 – 2 – 1***
Therefore, via SW, the command of the Gas 1 Injector will go to the Gas 3 injector.
A a result, the command of the Gas 3 Injector will go to injector 4; the command of Gas 4 will go to injector 2 and the Command of Gas 2 will go to injector 1;
This strategy, if enabled, anticipates the gas injection compared to the normal petrol injection timing. Anticipated injection can be used to solve problems of drivability due to engine timing changes, opening of the ducts of the variable fuel manifolds.

The system allows you to anticipate the injection in two different ways:

X1: Advance standard injection. An injection is anticipated in the ignition order sequence. The previous injector command is then used in the switch-on order.
X3: Advance three injections in the ignition order sequence. The injector control is then used three times earlier in the switch-on order.

9.6. Starting Correction on Gas

Starting Correction on Gas: This type of thinning is active only in the start condition of the car**.** The value set corresponds to the percentage change of the calibration.

9.7. Correction Bank 2

Correction Bank 2: Only for DREAM ON 6/8 cylinder ECU. With this cursor you have the opportunity to implement a change to the map to be provided to the second bank in the case where the two banks have different carburations.

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10.Adaptivity

Available only for DREAM ON OBD ECU, it improves the performance and efficiency of the vehicle while running on gas over time. The new strategy, in fact, allows the gas ECU to auto-adaptate itself through an automatic process, thus solving all the carburation problems associated with engine aging and the variation in fuel characteristics.
By selecting *Adaptivity,* in fact the new strategy allows the gas ECU to self-adapt through an automatic process, this way resolving all carburation problems related to the aging of the engine and to the variation of the fuel characteristics. (fig.8-1)

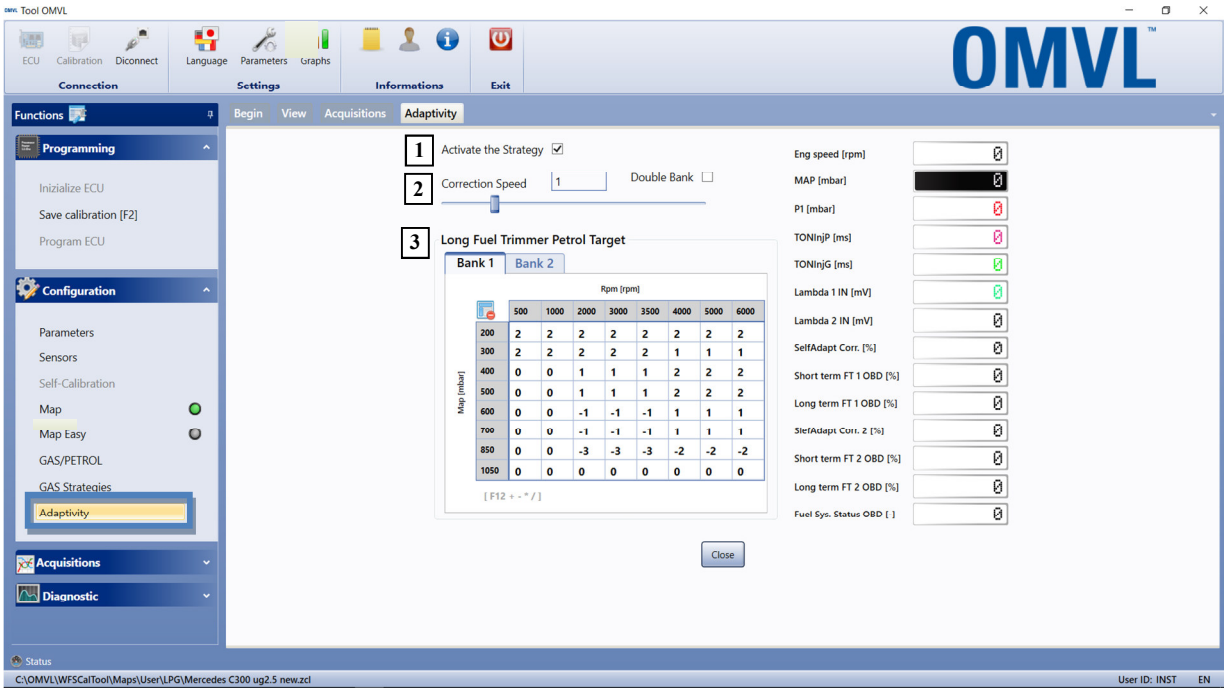

Fig.8-1

1. ***Active the Strategy:*** Flag the box to enable the strategy.

2. ***Correctoin speed (%):*** Allows to vary the correction speed of the fast gas corrector variation step.

3. ***Long Fuel Trimmer Petrol Target:*** Through this chart is possible to change the slow corrector work %. It must be used only with vehicles with a slow carburation corrector not equal to 0. The gas ECU will generate an automatic correction, until the chart value is reached.

Double Bank: Available only on 6/8 cylinder units. It is possible to decide whether to keep the same correction target table for both banks or, by putting the "flag" on *Double Bank*, use two different tables, one per bank. When activated, you will also be able to use the second table dedicated to the bank 2.

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To activate this function, you must connect the OBD cables in the vehicle original diagnosis socket.

11. Acquisitions

11.1. View Graph

This page displays all the signals managed by the control unit, Figure 9-1.

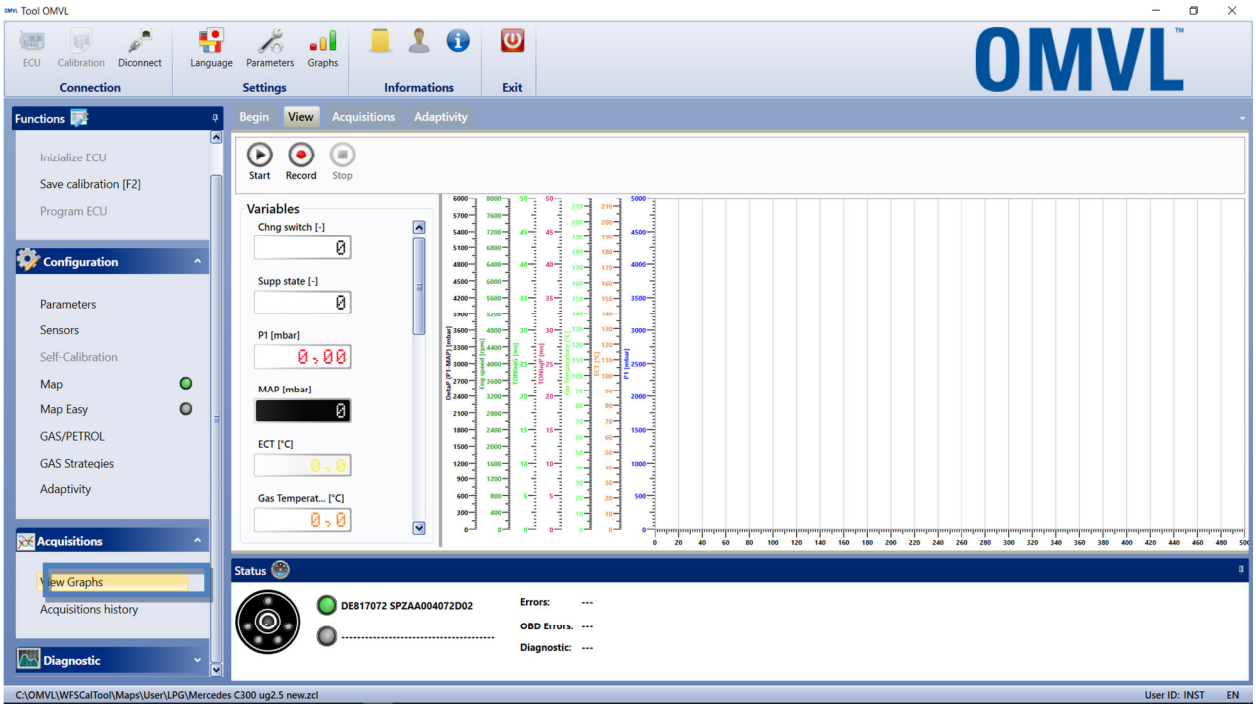

Fig.9-1

To display the parameters, simply click on the “START” key; at this point, both the numerical values and the graphical representation can be read.

By pressing the "REGISTER" key, the data acquisition will start and will end only by clicking on the "STOP" key.

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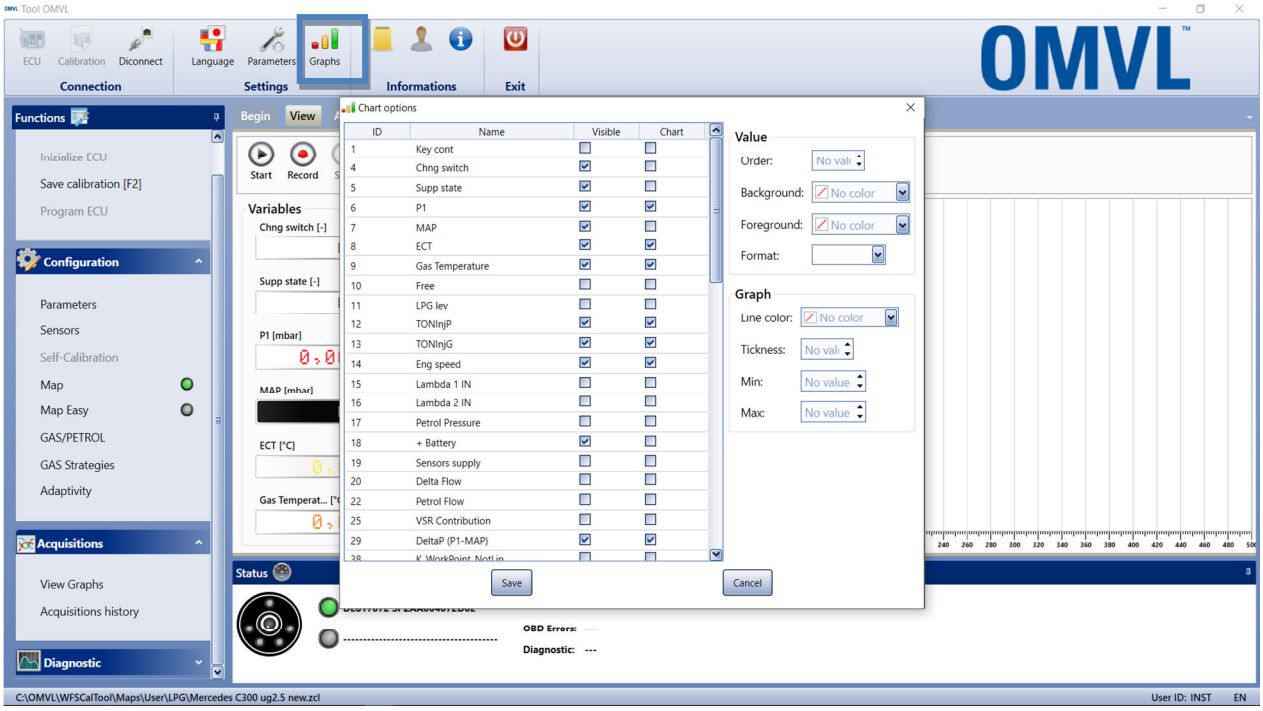

Fig.9-2

Clicking on the chart key, accesses the "chart settings" window, where changes on the display of the various parameters can be made.

11.2. Acquisitions History

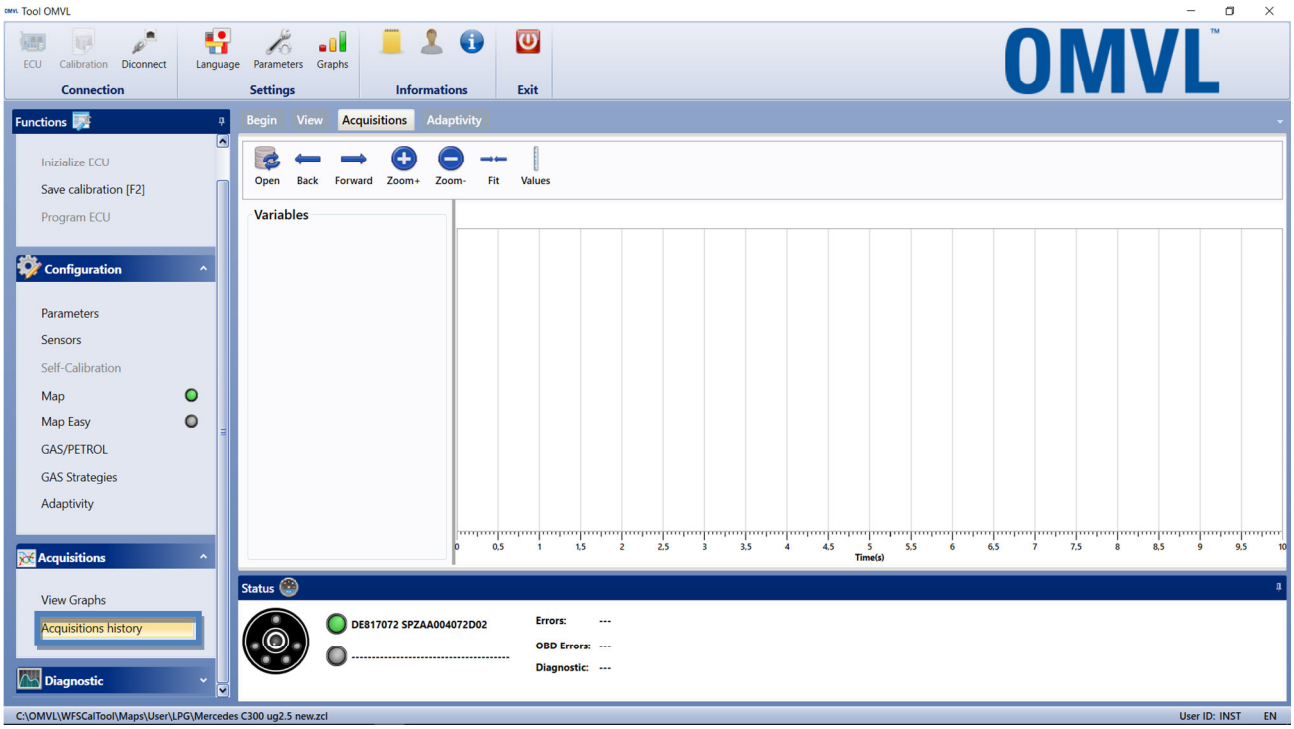

Fig.10-1

Fig 7-2

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From the "Acquisitions Log", the acquisitions that were previously saved can be displayed, in figure 10-1.

With the "back" and "forward" keys, scrolling of the values in the graph, with the "values" key a bar graph will be displayed that can be moved in the different parts of the graph.

12.Diagnostics

12.1. System

On this page, you can access the injectors test and the system's operation time, Figure 11.1-1.

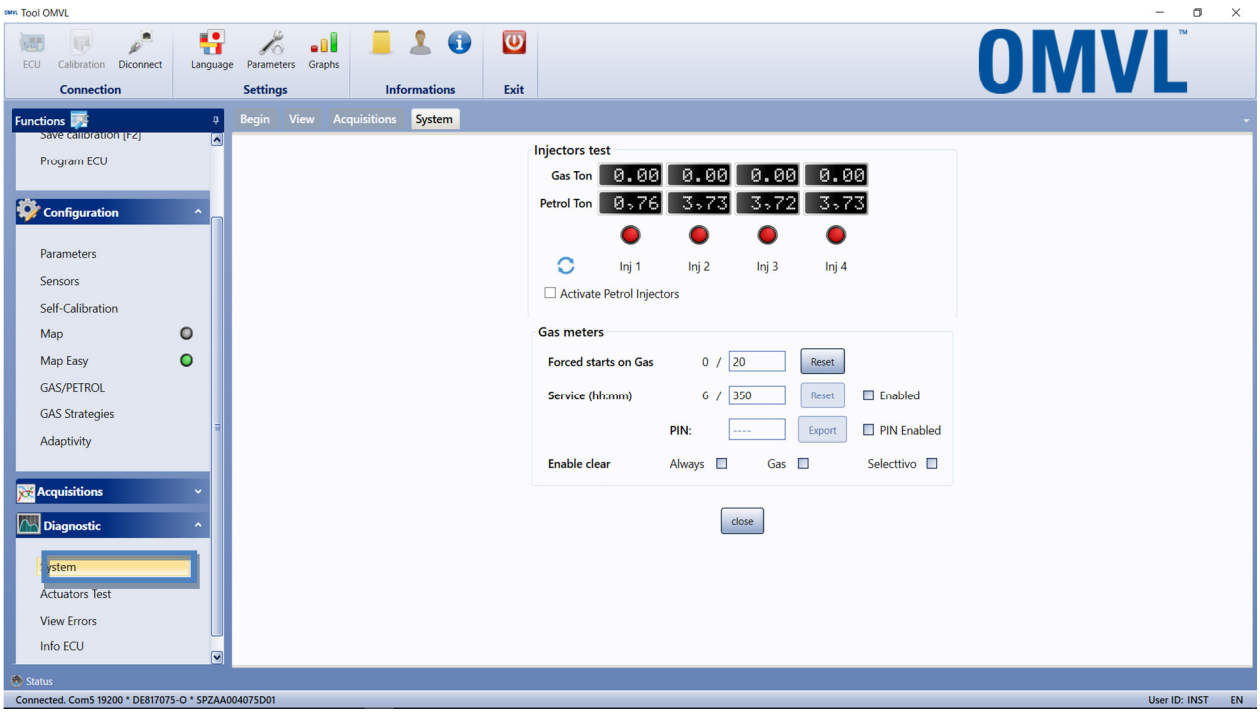

Fig.11.1-1

Injectors Test

You can electrically exclude one or more GAS injectors, thus enabling the corresponding PETROL injector. This function becomes quite useful, for example, when diagnosing the malfunctioning of one or more GAS injectors.

Activate Petrol Injectors Select “Activate Petrol Injectors”. This option allows to activate one or more petrol injectors even if the interface cable is not connected.

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Gas Meters

In this section you can enable some service strategy for the customer.

Forced starts on GAS: The system allows a limited number of motor start-ups directly to gas equal to the one set in calibration.
To carry out the emergency forced start-up, follow the procedure below;

1- Position the changeover switch in the Petrol position,
2- Start the key contact,
3- Keep the changeover switch key pressed,
4- Wait 4 seconds
5- At the sound of the buzzer release the changeover switch and start engine.

NB: For correct operation of the Forced Start-Up procedure, the 12 volt positive signal under the key must be timed.

Service: By enabling this option, you can enter a service expiration so as to make the customer aware of the periodic maintenance of the gas system.
When the threshold is reached in hours, the system will alert the customer by activating the buzzer every time the vehicle is started. The system can still run gas even after reaching the service. The operating time can be reset by pressing the *Reset* button.

PIN
Enabling this function with a pin code the control unit can be blocked from any access if one does not have the code. Enabling the service to total the hours set, the vehicle will not change over to gas again until the counters are reset.
If the "pin" option is selected , before the complete deactivation of the Gas system, anticipate the Service alarm / reminder up to 20 hours . All switch lights flash and double bleep sound is produced.

NB: NOT FORGET THE PIN! If not remember the pin set, it is possible to use the *Export* button and send an encrypted file with the code inside to OMVL dealer who can decrypt the code through a specific tool.

Enable clear: Deletion of all types of DTC errors in the petrol ECU.
The function "ENABLE CLEAR" has different methods of application:
"ALWAYS", which reset the petrol ECU independently from which fuel the engine is running on (Petrol or Gas).
“GAS " , which reset the petrol ECU only if the engine runs on GAS.
“Selectable” which reset only errors related to the carburation and malfunction of the lambda sensors..

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12.2. Actuators Test

In this page you can make some parts of the actuators test, Figure 11.2-1.

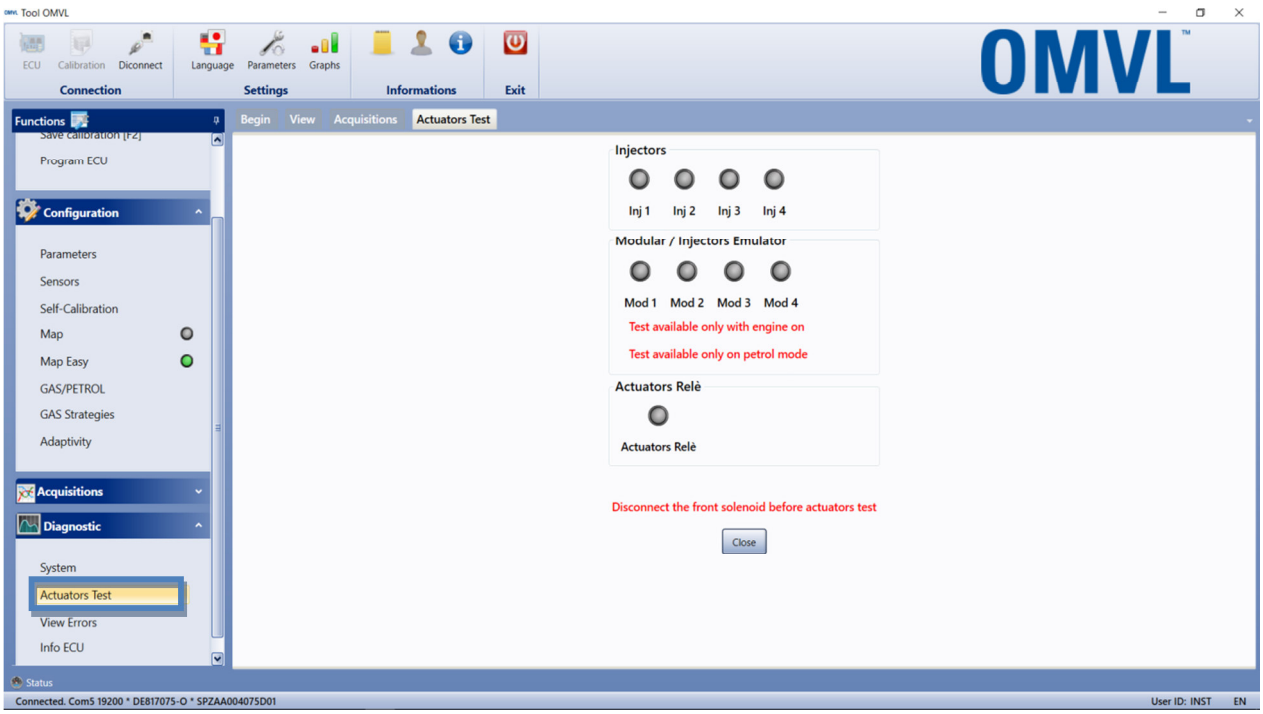

Fig.11.2-1

Note: Disconnect the front soleinoid valve before actuators test

Injectors: while engine is off, ignition voltage is on but gas shut-off solenoid valves are disconnected, you can test each gas injector, one by one. Select which injector to test, and hear it clicking.
Note: gas shut off solenoid valve should be disconnected, otherwise gas could leak into manifold

Modular/Injectors Emulator: with engine idling on petrol, you can enable a channel of petrol injector emulator integrated into ECU, one by one. When active, it cuts-off the corresponding petrol injector, therefore the engine will rev with only 3 cylinders.

Actuators Relè: with engine off and ignition voltage on, this tests the main load relay integrated into ECU. When on, both gas shut off solenoid valves should open and therefore you should hear their click.

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12.3. View Errors

This page shows all the parameters that the control unit monitors through diagnosis, Figure 11.3-1.

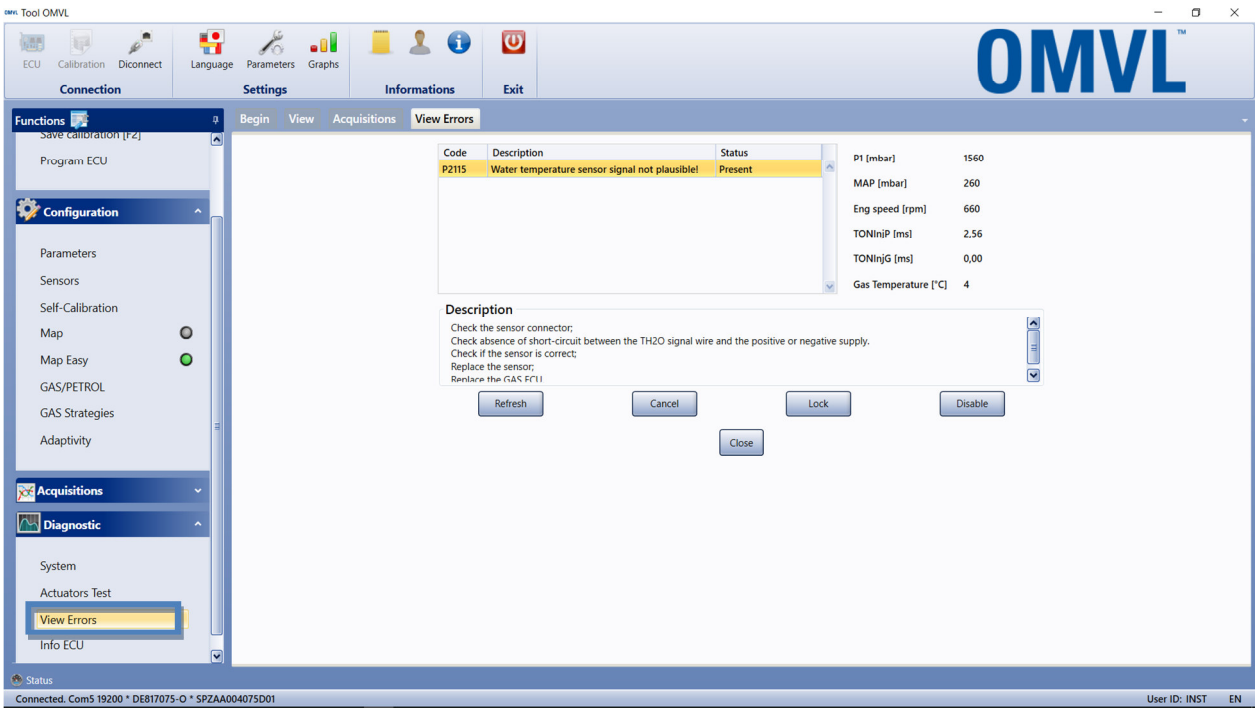

Fig.11.3-1

When the GAS control unit detects an error in the diagnosis of the parameter read, it will implement the action corresponding to the error detected.

Diagnosis	Action
Gas Injectors	**Passage to Petrol**
Petrol injector connection	**Passage to Petrol**
Tank solenoid valve	**Passage to Petrol**
Solenoid valve regulator	**Passage to Petrol**
Gas pressure sensors	**Passage to Petrol**
Map Sensor	**Passage to Petrol**
Gas temperature sensor	**Passage to Petrol**
Water temperature sensor	**Passage to Petrol**
Presence of the Change-Over Switch	**None**

The detected diagnostic errors can be deleted from the memory of the control unit simply by pressing the "*Delete*" key.

In the case of an anomaly, the control unit will be able to signal this to the user through the flashing of the petrol/gas LED or with a series of three repeated beeps.

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If a serious fault is detected, or that is potentially dangerous for the driver or damaging for the vehicle, the on-board diagnostics will undertake corrective RECOVERY measures, such as the exclusion of the faulty sensor and functioning only with the remaining sensors, or SAFETY actions, for example the automatic switching to petrol functioning.

12.4. Info Ecu

This page displays the information relating to the control unit, Fig. 11.4-1.

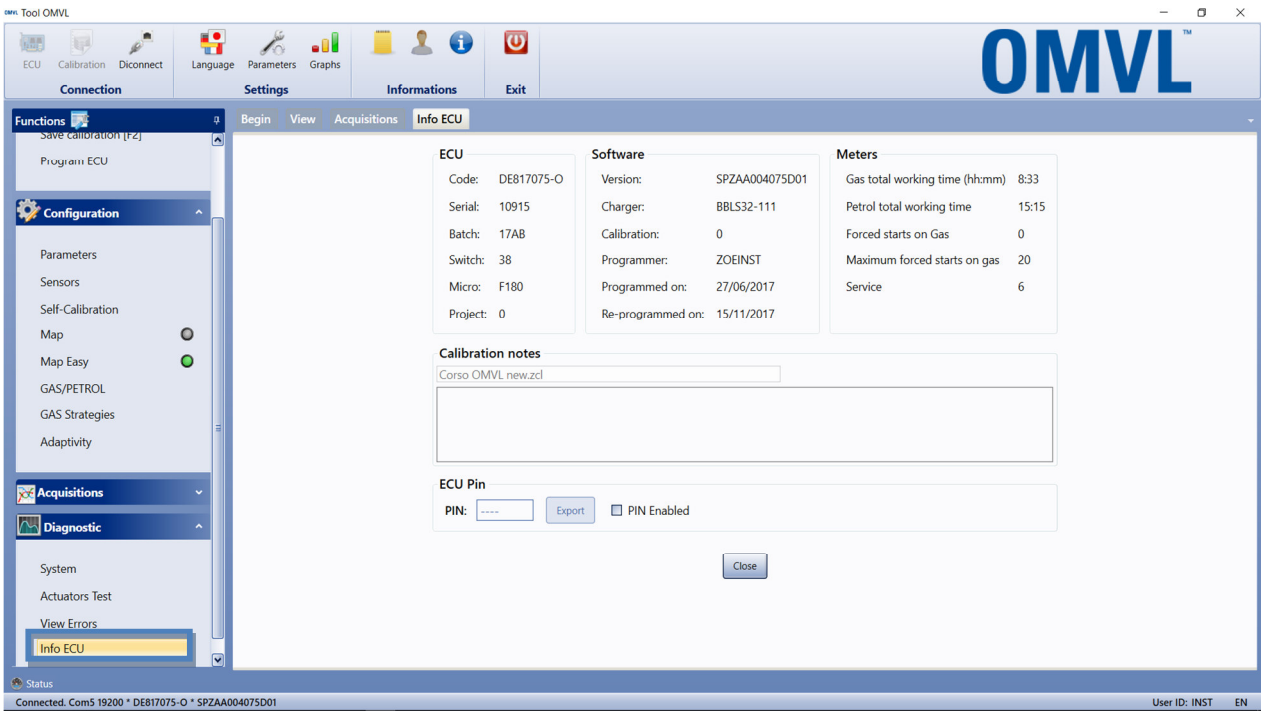

Fig.11.4-1

ECU

This section lists all the information referring to the control unit.

Code: Represents the product code identifying that particular type of control unit.
Serial: Indicated the product serial number.
Batch: It identifies the production lot of the control unit that consists of a code from which you can be aware of the year and the week in which the unit was manufactured.
Switch: Indicates the change-over switch version that is at that moment connected to the system.
Micro: It indicates the type of processor installed inside the control unit.
Project: This indicates the project number to which the control unit refers to.

Software

This section provides all the information relating to the software.

Version: Indicates the real and proper software running on the control unit. It consists of 5 letters + 3 numbers + 3 numbers. The first 5 letters indicate the particular type of software, the following 3 numbers indicate the actual software version (the higher the number, the more recent and improved the program will be), whereas the last 3 numbers indicate the hardware version.

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Charger: Indicates the version of the loader currently present in the control unit memory (the loader is that part of the software that allows for the changing of the control unit program. It is used only upon ignition and for programming). The last four digits indicate the version. The greater the version number, the more recent and improved will be the loader.
Calibration: Indicates the calibration version currently present in the control unit.
Programmer: Indicates the user who programmed the control unit.
Programmed on: Indicates the date in which the control unit was programmed the first time by the installer. After the first programming, this date will not change throughout the life span of the control unit, while also indicating when it was used for the first time.
Re-programmed on: Indicates the date in which the control unit was last programmed by the installer. Practically speaking it is the date of the final and actual programming for that vehicle.

Meters
This section provides information relating to the various counters.

Gas total working time (hh:mm): Indicates the total gas functioning time of the system, memorised in the control unit memory in days, hours and minutes. It is not possible to reset counter using the PC interface.
Petrol total working time (hh:mm): Indicates the total petrol functioning time of the system, memorised in the control unit memory in days, hours and minutes. It is not possible to reset counter using the PC.
Forced starts on Gas: The DREAM ON system allows a limited number of engine start-ups directly with gas. This functionality is to be intended as an emergency operation enabling start-up in case of no petrol or of malfunctioning of certain parts of the original petrol system (pump, injectors, petrol circuit).
To start the engine on gas, introduce the key contact, keep the change-over button pressed, wait for the double beep from the buzzer (about 4 seconds) and start the engine within 4 seconds.
Maximum forced starts on gas: Indicates the maximum number of forced start-ups allowed.
Service: Service hours counter.

Calibration Notes
In this section the name of the configuration saved in the gas ECU and any notes written when the file was being saved are shown.

ECU Pin
This section is used to enter the pin and unlock the control unit to export the pin.

PIN: To unlock the control unit, enter the correct pin code, uncheck the box and save the configuration. Once the saving phase is finished the control unit will be unlocked.

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13.Standard Error Codes DREAM ON

Error Code	Description
P0006	Rear Fuel Cut-Off Solenoid Valve Control Circuit Low
P0007	Rear Fuel Cut-Off Solenoid Valve Control Circuit High
P01A5	Alternative fuel rail pressure circuit low voltage
P01A6	Alternative fuel rail pressure circuit high voltage
P01B5	Alternative fuel rail temperature, circuit performance
P01B6	Alternative fuel rail temperature circuit low voltage
P01B7	Alternative fuel rail temperature high voltage
P0611	Microcontroller Error
P1230	Overcurrent actuators error
P1248	Internal relè actuators error
P15AE	System voltage low voltage
P15AF	System voltage high voltage
P16B4	Sensors supply voltage low
P16B5	High voltage sensor power supply
P2115	Water temperature sensor signal not plausible
P2146	Alternative fuel actuators supply voltage
P22DA	Cylinder 1 alternative fuel injector circuit low
P22DB	Cylinder 1 alternative fuel injector circuit high
P22DE	Cylinder 2 alternative fuel injector circuit low
P22DF	Cylinder 2 alternative fuel injector circuit high
P22E2	Cylinder 3 alternative fuel injector circuit low
P22E3	Cylinder 3 alternative fuel injector circuit high
P22E6	Cylinder 4 alternative fuel injector circuit low
P22E7	Cylinder 4 alternative fuel injector circuit high
P22EA	Cylinder 5 alternative fuel injector circuit low
P22EB	Cylinder 5 alternative fuel injector circuit high
P22EE	Cylinder 6 alternative fuel injector circuit low
P22EF	Cylinder 6 alternative fuel injector circuit high
P22F2	Cylinder 7 alternative fuel injector circuit low
P22F3	Cylinder 7 alternative fuel injector circuit high
P22F6	Cylinder 8 alternative fuel injector circuit low
P22F7	Cylinder 8 alternative fuel injector circuit high
P2666	High Pressure cut-off solenoid valve in front, control circuit low
P2667	High Pressure cut-off solenoid valve in front, control circuit high

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14.DREAM ON Program Error Codes

Error Code	Cause
0	No error
1	Generic error
2	Framework.Net 4.0 Extended not installed
3	SQL Server Compact 4.0 not installed
4	The language set for the application is not valid (it does not exist in the DB, or it exists but the resource file is missing)
5	License File error
6	Error in the chart settings File
100	Error in the Database Opening
101	Error in the retrieval of the SQL command
102	Error in the retrieval of the SQL parameter
103	Error in the retrieval of the languages
104	Error in the retrieval of the skin info (id_group and group code)
105	Error in the retrieval in the enabling of user functions
106	Error in the retrieval of the list of the variables based on the skin and language
107	Error in the retrieval of the info relating to the ecu and software (ECU and ECU_DERIVATIVES and SOFTWARE and Enabling of Functions - GetEcuDetails)
108	ECU not present in the DB (GetEcuDetails)
109	ECU sw not present in the DB (GetEcuDetails)
200	Error in the inizialize of the communication library (oEcuLib.InitLibrary)
201	Error in the opening of the connection (oEcuLib.OpenConnection)
202	The request for info to the library returned FALSE
203	The control unit returned a negative reply to the request
205	The data that has returned from the control unit is not in the correct format (DATA_KO)
206	Error in the procedure management of the info (OnGetEcuInfo)
207	There is no feature to read the Flag in RAM or failure in the read request (SharedRamwithPC)
300	The Ecu has an ID that is not complete, and the user is not enabled to connect to Ecu with an incomplete ID
301	The Ecu was programmed by a toll of a group different from the user's license
302	Ecu not associated to the SKIN group
303	File A2L does not exist
304	Error in the loading of the A2L file
305	Error in the reading of the calibration from the ECU

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