

Injection System

**Description of the injection system
calibration software
COMPLETE ADVANCED VERSION**



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INTRODUCTION

Minimum computer requirements for software installation

Operating system	-	Windows XP or later versions
Memory (RAM)	-	At least 16 Mbyte
Hard drive	-	At least 20 Mbyte free at time of installation
Display resolution	-	800 x 600 or greater

Internet Explorer 5.5 or higher must also be installed.

Software installation

To install the calibration software, put the CD-ROM in the computer drive and wait for the guided installation window to open.

If the installation program does not start, select "Start" in the "Taskbar". Choose "Run" and enter: "D:\setup.exe" (where D stands for the CD-ROM drive).

During installation you will be asked in which directory you want to install the program. We recommend you do not change the pre-set directory. **The configuration, acquisition files and the firmware will be saved in the folder "User\Documents\Multipointinj".**

The program icon will be created on the desktop when installation is complete.

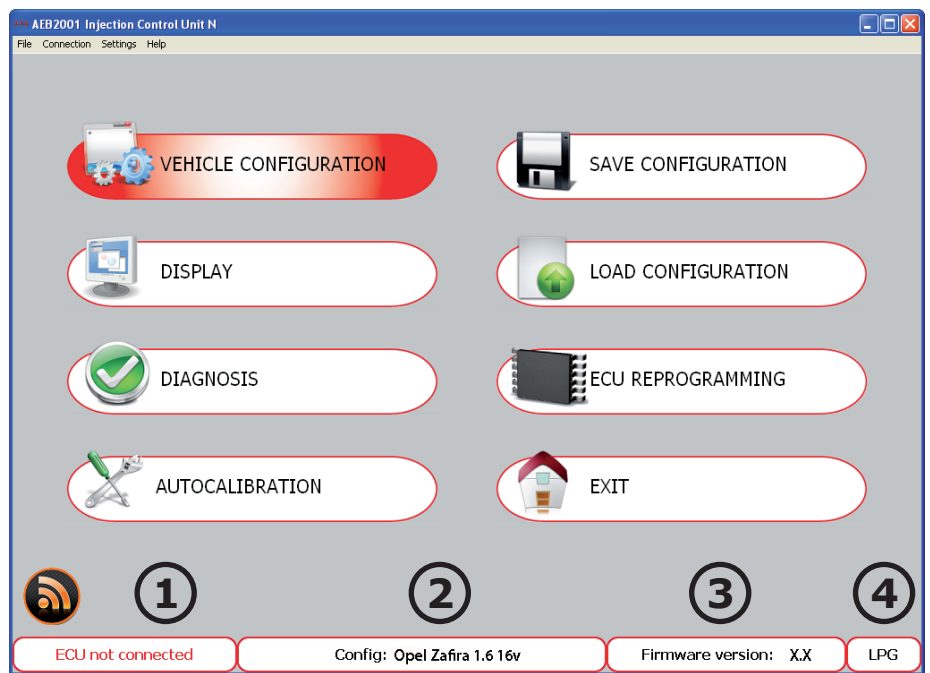
Introduction

The calibration software can be opened without having to be connected directly to the control unit. To connect to the control unit it is necessary that the PC and the ECU are duly connected through a **specific** interface cable or a wireless interface (Items to be ordered separately, not included in the kit and available for purchase at any Emer distributor).

The control unit must also be connected to the +12 volt battery (red – black wire) and to the ground (black wire).

MAIN MENU

All calibration software sub-menus listed below with their separate descriptions can be accessed from this menu:



File Menu: For exiting the calibration software.

Connection Menu: For connecting/disconnecting the gas control unit from the calibration software.

Settings Menu: For selecting the calibration software language based on the country where used.

Help Menu: Allows to know which version of the software is in use, the expiry date of the hardware key and contains the instruction booklets for both the calibration and the wireless connection setting software.

The following information is shown at the bottom of the page:

① Indicates whether the control unit is connected or disconnected to the calibration software.

If you connect through a wireless interface, the  symbol will appear on the bottom left side of the screen. Clicking on the symbol you can access the wireless setting parameters.

It is important to remember that all the settings made on the disconnected control unit will be lost when it is connected, unless they are previously saved in a configuration file.

When the program is opened automatically, it will try to connect to the control unit.

If the program does not connect, an error window will open. At this point check:

- the serial interface connection,
- that the control unit is connected to the battery and ground,
- if the sub key has been disconnected for more than an hour, to connect it will be necessary to connect the panel for a few seconds and check that the switch turns on at the same time, or start the vehicle.

To attempt connection again, open the "Connection" window and select "Connect".

② Is the name of the configuration in the control unit (max. 28 characters displayed). To upload a pre-existing configuration in the control unit, it must be connected to the configuration software (see chapter "**Load configuration**").

③ Is the firmware version of the control unit connected; to update it, go to the submenu "REPROGRAM CONTROL UNIT" and select the desired firmware from those proposed.



Note: This operation is possible only if INTERNET EXPLORER 5.5 or higher is installed.

④ Indicates whether the configuration currently loaded in the control unit uses the operation parameters for natural gas or for LPG; to select the fuel type, go to the submenu "VEHICLE CONFIGURATION".

VEHICLE CONFIGURATION

This menu consists of 8 pages in which it is possible to set the parameters that manage the behaviour of the gas control unit. Pressing ESC on the PC keyboard, you quit the configuration menu.

In the part underneath all of the pages, a display summarising the current values of the general system operation signals is provided.

- ① Whether the vehicle is petrol  or gas  powered is displayed in this box
CUT-OFF also might appear when the system is in the cut-off condition.
- ② The following are displayed in this box:
REVOLUTIONS: the engine revolutions read in real time by the gas control unit.
T.GAS: gas temperature detected by the temperature sensor positioned on the gas injection rail.
T.RED: gas reduction gear temperature detected by the temperature sensor positioned on the gas reduction gear.
- ③ The gas (Tinj.gas) and petrol (Tinj.benz) times are displayed in this box. If 2 banks are selected (see paragraph "**Lambda**"), the gas and petrol times regarding the second bank will also be displayed
- ④ The following are displayed in this box:
GAS PRESS: this is the pressure difference between the gas in the gas injectors and that in the intake manifolds read by the pressure gauge supplied in the kit.
MAP: If an AEB025 pressure sensor has been installed, it identifies the intake pressure in the manifolds.
AEB025 SENSOR: indicates the type of pressure gauge the software selects (see paragraph "**Sensors**").
- ⑤ The following are displayed in this box:
 - > The voltage of the **lambda** probe read by the purple wire (if connected); it is also necessary to set the type of probe connected (front/back) in "F2 Lambda". If the latter is not set, no value will be displayed (n.d.).
 - > The voltage of the **lambda2a** probe read by the purple/black wire (if connected); it is also necessary to set the type of probe connected (front/back) in "F2 Lambda". If the latter is not set, no value will be displayed (n.d.).
 - > The OBD plug status (connected/disconnected).

CHANGE-OVER

Change-over

N.B. all parameters highlighted in **YELLOW** are changed with the panel disconnected and the switch off. Moreover, to keep system operation in good condition, do not leave the petrol tank completely empty and do not disconnect the petrol pump.

FUEL TYPE

This selection serves to initialise the control unit with the typical parameters set ahead of time for correct operation with the type of fuel used.

Select:

LPG: for LPG-powered vehicles.

NATURAL GAS: for NATURAL GAS-powered vehicles.

When LPG or NATURAL GAS is selected, also the directory where the configuration files are saved changes (see "**Load configuration**").

INJ.

This function lets you select the GAS injection activation strategy with reference to the type of system:

SEQUENTIAL (RECOMMENDED OPTION): the GAS injector is activated next to every PETROL injection. In case the gas injection time is lower than necessary, the control unit will AUTOMATICALLY supply petrol to avoid carburetion "gaps".

NOTE: this "petrol supply" is not signalled by the switch which keeps showing a regular Gas functioning.

SEQUENTIAL MJ: in case the gas injection time is lower than necessary, the control unit will AUTOMATICALLY switch back to petrol. The event is signalled by the switch.

FULL GROUP: the GAS injector is activated next to every 2 PETROL injections

INJECTORS

This window is used to select the type of GAS injectors that are supplied with the conversion kit. When a previously saved configuration is loaded, this window indicates the type of injectors that are used in the configuration.

If the GAS injectors installed on the vehicle do not correspond to the type shown in the window, then you will need to load a configuration that uses the correct type of injector. If the installed injectors do not correspond to the type that have been selected on the software, then the injectors will be piloted with incorrect parameters and may cause malfunctions during gas operation.

TYPE OF REVOLUTION SIGNAL

It sets up the control unit for reading the rev signal through the BROWN² wire:

STANDARD: select this option when the BROWN² wire is connected to one of these signals:

- rev counter wire with **0 ÷ 12 V square wave signal**;
- negative coil.

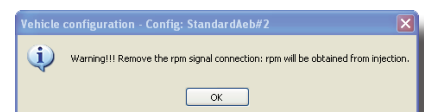
WEAK SIGNAL: select this option when the BROWN² wire is connected to one of these signals:

- rev counter wire with **0 ÷ 5 V square wave signal**;
- static ignition control with **0 ÷ 5 V square wave signal**;

These signals can be identified only by using an oscilloscope.

This function can be disabled unflagging the box (☑) next to "REV signal type".

Disabling the function, the warning window shown on the left appears as a reminder to removing the rev connection. As a consequence the signal is detected by the injection ECU.



CHANGE-OVER

REDUCTION GEAR

This window allows to modify the activity pressure of the reduction gear.

IGNITION TYPE

The control unit uses this parameter for correctly calculating the engine speed, which varies based on the type of ignition on which the BROWN² wire is connected. Set:

MONO COIL: for vehicles with one coil per cylinder if the BROWN² wire is connected to the negative terminal of one of the coils;

DOUBLE COIL: for vehicles with one coil every 2 cylinders if the BROWN² wire is connected to the negative terminal of one of the coils;

REV COUNTER: for vehicles with one coil and mechanical distributor if the BROWN² wire is connected to the negative terminal of this coil, or in all vehicles where the BROWN² wire is connected to the rev counter signal wire.

REV COUNTER 2: set this option when the engine's speed is not read correctly on a **6 or 8-cylinder** vehicle with the BROWN² wire connected to the rev counter.

NUMBER OF CYLINDERS

This parameter serves to tell the control unit how many cylinders the vehicle has and therefore how many gas injectors it has to control:

set **3 CYLINDERS** or **4 CYLINDERS**, depending on the number of cylinders the vehicle has.

If a control unit for 5-6-8 cylinders is used, these options will also be displayed in the selection window: select **5 CYLINDERS**, **6 CYLINDERS** or **8 CYLINDERS**, depending on the number of cylinders the vehicle has.

NOTE²: Meaning the Brown wire of the gas control unit wiring harness

☐ Valvetronik / Start & Stop

☐ MultiAir

VALVETRONIK/START & STOP

This function allows to enable a particular strategy in cars equipped with this device.
These vehicles cut-off also on ignition.

WARNING !!!!!

IF THIS FUNCTION IS ENABLED IT IS COMPULSORY TO CONNECT THE KEY SWITCH WIRE (WHITE AND RED WIRE) TO THE PETROL PUMP WIRE OR TO THE INERTIAL SWITCH.

IN CASE OF CRASH OR CASUAL CUT OFF OF THE ENGINE, THIS FUNCTION ALLOWS THE SOLENOID VALVES TO CLOSE, OTHERWISE THEY COULD BLOCK OPENED.

MULTIAIR

This function allows to enable a particular strategy in cars equipped with MULTIAIR technology.

In these cars, under certain conditions, the accelerator throttle works slightly differently from normal; for example it works on idle and opens at a certain run speed and motor load.

This effect does not allow a correct engine mapping as carburetion gaps may happen that jeopardize the smooth driving while working on gas.

Enabling the multiair function, the system uses a different compensation for the gas injection pressure. This function can be used also on cars equipped with VALVETRONIC device or on systems with dynamic variation of the engine intake geometry.

WARNING !!!!!

WHILE THIS FUNCTION IS ACTIVATED IT IS NECESSARY TO PAY ATTENTION TO THE CHOICE OF THE INJECTION NOZZLE WHOSE DIAMETER VARIES DEPENDING ON THE CAR MODEL.

ON IDLE, THE MAPPING VALUES WILL BE LOW WHILE THEY WILL GROW STEADILY WITH THE ENGINE REVVING UP. AS A CONSEQUENCE THE DRIVEABILITY BENEFITS FROM THE MAPPING RESULTS FAR MORE LINEAR.

Type of change-over

In acceleration

Revs. threshold for change-over

1600 rpm

Overlapping time

0 s

TYPE OF CHANGE OVER

The mode of switching over from PETROL to GAS can be selected.

ACCELERATION

PETROL switches over to GAS during acceleration when the vehicle exceeds the number of revolutions set in "REV THRESHOLD FOR SWITCH OVER".

DECELERATION

In this case PETROL may switch over to GAS following either one of these two conditions:

- when the rpm exceeds the reference set in "REV THRESHOLD FOR SWITCH OVER" and then drops below this reference.
- when a Cut-Off condition occurs with the rpm higher than the reference set in "REV THRESHOLD FOR SWITCH OVER".

REV THRESHOLD FOR CHANGE OVER

Identifies the rpm at which you want the petrol-gas switch over to take place..

OVERLAPPING TIME

It indicates the time during which there is an overlap between PETROL and GAS in order to prevent possible carburetion gaps when switching over from one type of fuel to the other.

Note. It is recommended to leave the pre-set value (ZERO).

CHANGE-OVER

☐ Start on gas with hot engine

Reducer temperature for change-over

30 °C

Change-over from petrol-gas delay

30 s

☒ Switching to petrol for low gas temperature

0 °C

DIRECT GAS START UP.

Enabling this function the vehicle starts directly on GAS, ignoring the settings chosen for "Reducer temperature for Change over" and " Change over from petrol to gas delay".

REDUCER TEMPERATURE FOR CHANGE OVER

It indicates the temperature the reduction gear has to reach so that switching to gas is allowed.

The control unit WILL NOT SWITCH TO GAS beneath this temperature.

It is recommended to set a temperature between 20°C and 45°C since:

- setting a lower temperature could trigger the fuel change over if the reducer has not warmed up enough for a correct Gas output.
- setting a higher temperature would postpone too long the change over to Gas.

CHANGE OVER FROM PETROL-GAS DELAY

It indicates the minimum time from engine ignition for switching over from PETROL to GAS.

We recommend you set a time no less than 20 seconds in order to ensure correct system operation.

SWITCHING TO PETROL FOR LOW GAS TEMPERATURE.

It sets the temperature value that inputs the switch from CNG to petrol.



RESET ECU

All control unit configuration parameters are reset and put back in the original configuration when this button is pressed. We recommend that this button be pressed if you are unsure you have correctly set all control unit parameters and you want to start with the original configuration of the parameters

NOTE² Meaning the Brown wire of the gas control unit wiring harness.

Note

LAMBDA

Lambda

Number of banks

2

Fuel trim bank 2

0

NUMBER OF BANKS

This selection serves to set the number of banks in which the engine is divided into.

FUEL TRIM BANK 2

When the number of banks is set at two, this item appears. Its purpose is to be able to modify (enrich or weaken) the GAS carburetion concerning the second bank in vehicles equipped with two front lambda probes if the two banks are working slightly off-balance.

In particular, in the case of 4-cylinder vehicles, carburetion of the GAS B and C injectors is unbalanced with respect to carburetion of the GAS A and D injectors when this parameter is changed.

In the case of 6 or 8-cylinder vehicles, carburetion of the GAS injectors connected by the wiring harness identified by the **RED STRAP** is instead unbalanced with respect to that of the other GAS injectors.

Type of pre-catalytic oxygen sensor

0 - 1 Volt

Oxygen Sensor 1 (purple wire)

Pre

Oxygen Sensor 2 (purple/black wire)

Post

TYPE OF PRE-CATALYTIC OXYGEN SENSOR

When this parameter is set correctly, the control unit is able to detect operation of the lambda probe. Before you select the type of Lambda Probe, check its operation with a digital multimeter.

With probes having 0-1 Volt, 0-5 Volt, 5-0 Volt, 0.8-1.6 Volt voltage, follow these instructions if you want to read only its value:

Connect the PURPLE wire to the lambda probe without interrupting the original connection (therefore leave the GREY wire disconnected).

If you instead want to check the emissions, follow these instructions:

Interrupt the original connection and connect the PURPLE wire to the sensor and the GREY wire to the PETROL control unit.

0 ÷ 1 V - Select this option is the voltage fluctuates between these voltage values on the signal wire:

- about 0 ÷ 0.2 V with lean mixture;
- about 0.8 ÷ 1 V with rich mixture.

0 ÷ 5 V - Select this option is the voltage fluctuates between these voltage values on the signal wire:

- about 0 ÷ 0.2 V with lean mixture;
- about 4.8 ÷ 5 V with rich mixture.

5 ÷ 0 V - Select this option is the voltage fluctuates between these voltage values on the signal wire:

- about 4.8 ÷ 5 V with lean mixture;
- about 0 ÷ 0.2 V with rich mixture.

LAMBDA

0.8 ÷ 1.6 V - Select this option is the voltage fluctuates between these voltage values on the signal wire:

- about 0.7 ÷ 0.8 V with lean mixture;
- about 1.4 ÷ 1.6 V with rich mixture.

UEGO - Select this option if the lambda probe is the linear type and if required to change the emission values (using the GREY wire only).

2.5 ÷ 3.5 V - Select this option is the voltage fluctuates between these voltage values on the signal wire:

- about 2.4 ÷ 2.5 V with lean mixture;
- about 3.4 ÷ 3.5 V with rich mixture.

PLEASE NOTE: If a 2001PC ECU is connected to the software, no UEGO and 2,5/ 3,5 V probes will appear on screen.

OXYGEN SENSOR 1 (PURPLE WIRE)

It allows to check the values of a front lambda sensor and eventually to emulate a rear lambda probe (in case diagnostic issues like "Catalytic malfunctioning" should manifest).

NOT CONNECTED: the lambda probe value is not displayed (n.d.) and no type of emulation is activated.

FRONT: While working on GAS, the front lambda reference value is shown on the lower-right side of the monitor (**if you decide to select this option, connect the PURPLE wire only**).

REAR: While working on GAS, the rear lambda reference value is shown on the lower-right side of the monitor and an emulation control unit is activated.

This action is particularly advisable for solving catalyser inefficiency problems with the warning light being consequently turned on by the PETROL control unit (see **EMISSIONS** menu).

NOTE: Selecting this option you need to connect the GREY wire to the PETROL control unit and the PURPLE wire to the lambda sensor.

OXYGEN SENSOR 2 (PURPLE/BLACK WIRE)

It allows to check the values of a front lambda sensor and eventually emulate a rear lambda probe (in case diagnostic issues like "Catalytic malfunctioning" should manifest).

NOT CONNECTED: the lambda probe value is not displayed (n.d.) and no type of emulation is activated.

FRONT: While working on GAS, the front lambda reference value is shown on the lower-right side of the monitor (**if you decide to select this option, connect the PURPLE/BLACK wire only**).

REAR: While working on GAS, the rear lambda reference value is shown on the lower-right side of the monitor and an emulation is activated from the control unit.

This action is particularly advisable for solving catalyser inefficiency problems with the warning light being consequently turned on by the PETROL control unit.

NOTE: Selecting this option you need to connect the GREY/BLACK wire to the PETROL control unit and the PURPLE/BLACK wire to the lambda sensor.

SENSORS

Sensors

Type of map sensor

AEB025

Type of GAS level sensor

Not standard

Level refs. not as standard

Reserve 56

1/4 115

2/4 162

3/4 216

Livello

0

Press to confirm

Accept

TYPE OF MAP SENSOR

It tells the GAS control unit what type of MAP sensor is being used (AEB 025 – AEB 013).

TYPE OF GAS LEVEL SENSOR

It tells the gas control unit what type of level sensor was used:

AEB - set AEB if a sensor with an AEB standard output signal sensor (e.g. AEB1050) is connected. Refer to the assembly drawing of the gas control unit for connection.

0 - 90 ohm - set 0 – 90 ohm if a sensor with output signal sensor ranging between 0 and 90 ohm (e.g. AEB1090) is connected. Refer to the assembly drawing of the gas control unit for connection.

NOT STANDARD - Set this option if an LPG or NATURAL GAS resistive sensor with a variable STRAIGHT signal (lower (Ohm) value with higher vacuum level and value (Ohm) with full level) is connected.

NOT STANDARD INVERTED - Set this option if an LPG or NATURAL GAS resistive sensor with a variable REVERSED signal (higher (Ohm) value with lower vacuum level and value (Ohm) with full level) is connected.

LEVEL REFS. NOT STANDARD - This option appears only if NON STANDARD or REVERSED NON STANDARD is set in the "TYPE OF GAS LEVEL SENSOR" box.

Set the reference values necessary for setting the level sensor as follows:

- manually move the sensor indicator starting from the full level and note the value indicated in "Level" for each reference (RESERVE, 1/4, 2/4, 3/4).
- enter the values noted in the corresponding boxes.
- press the ACCEPT button.

We can then see the following changes on the switch:

RESERVE = LEVEL value when the red reserve LED turns on and the 1/4 LED turns off.

1/4 REFERENCE = LEVEL value when the 2/4 LED turns off.

2/4 REFERENCE = LEVEL value when the 3/4 LED turns off.

3/4 REFERENCE = LEVEL value when the 4/4 LED turns off.

SENSORS

☐ Tank solenoid valve with dedicated wire

☒ Gas electrovalves opened in advance

☒ Automatic change back to petrol

Low pressure time for change back

0 s

TANK SOLENOID VALVE WITH DEDICATED WIRE

Enables diagnosis of the GAS solenoid valve of the tank.

If there is no sheath with BLUE-WHITE and BLACK wires on the GAS control unit cable (wires expressly dedicated to powering the rear multivalve) or they are not connected, do not enable this control; otherwise, the GAS control unit might save errors.

GAS ELECTROVALVES OPENED IN ADVANCE

The Gas control unit usually enables the GAS solenoid valves about 1 second before switching from PETROL to GAS in order to allow the pipes filling.

If the time span is not enough to prevent the vehicle from shutting down while switching from one fuel to the other, it is possible to enable this function so that the gas solenoid valves are opened (and stay open until the switch-over is completed) at least 5 seconds before switching over to GAS allowing a major filling of the pipes.

If this function is enabled, a warning message will appear reminding the user not to switch off the PETROL pump.

ATTENTION: If this function is enabled, a warning message reminds you to not interrupt the PETROL pump because it would cause the vehicle to shut down.

ATTENTION: If you use a timing advance processor, this will start to advance when the vehicle is still running on petrol, causing it to malfunction during the "fill gas pipes more" phase. For this reason we recommend setting the processor with 9° advance at the most.

AUTOMATIC CHANGE BACK TO PETROL

The switch-over from GAS (whether it is LPG or NATURAL GAS) to PETROL is automatic when the pressure drops below the minimum operating pressure.

Note. It is recommended to keep the function enabled to prevent system malfunctions.

LOW PRESSURE TIME FOR CHANGE BACK

It indicates the delay in going back to PETROL in the case of operation at minimum operating pressure.

Note. It is recommended to leave the parameter at ZERO, which is the default value.

Map

☒ Map profile

T.inj - RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
2,00	132	132	132	132	132	132	133	134	134	134	134	134
2,50	134	134	134	134	134	134	135	136	136	136	136	136
3,00	146	146	146	146	146	146	147	148	148	148	148	148
3,50	155	155	155	155	155	155	156	157	157	157	157	157
4,50	159	159	159	160	160	160	160	160	160	160	160	160
6,00	156	156	157	158	158	158	158	159	159	159	159	159
8,00	151	151	152	153	153	153	154	155	155	155	155	155
10,00	139	139	139	139	139	139	140	142	142	142	142	142
12,00	130	130	130	130	130	130	131	132	132	132	132	132
14,00	126	126	126	126	126	126	127	128	128	128	128	128
16,00	126	126	126	126	126	126	127	128	128	128	128	128
18,00	124	124	124	124	124	124	125	126	126	126	126	126

This menu provides a numerical display of the multiplication coefficients called K the control unit uses in calculating the GAS injection time.

The table displays the petrol injection times on the Y axis, while we find the engine rpm on the X axis. The red dot displayed on the map identifies the rpm references and petrol injection time in which the engine is running.

Moreover, if the vehicle OBDII plug is connected, the display shows the carburetion parameters during GAS running (Slow and Fast Correctors). The values are expressed in positive or negative percentage.

Enabling the **"MAP profile"** function, the user has a quick view of the map progressing; the higher values are identified by a stronger marking.

☒ Map profile

T.inj - RPM	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
2,00	132	132	132	132	132	132	133	134	134	134	134	134
2,50	134	134							136	136	136	136
3,00	146	146							148	148	148	148
3,50	155	155							157	157	157	157
4,50	159	159							160	160	160	160
6,00	156	156							159	159	159	159
8,00	151	151							155	155	155	155
10,00	139	139							142	142	142	142
12,00	130	130							132	132	132	132
14,00	126	126	126	126	126	126	127	128	128	128	128	128
16,00	126	126	126	126	126	126	127	128	128	128	128	128
18,00	124	124	124	124	124	124	125	126	126	126	126	126

To change the K values, select one or more map boxes and press enter; a window with the following modification modes will appear:

ABSOLUTE - the value corresponding to the one entered can be exactly placed in the map.

LINEAR - adds or subtracts (if a number with negative sign is entered) the entered value to or from the one already in the box or boxes selected.

PERCENTAGE - adds or subtracts the entered value to or from the one in the box or boxes selected in percentage.

MAP

REVS. columns (rpm)	Time lines (ms)
1 500	1 2
2 1000	2 2,5
3 1500	3 3
4 2000	4 3,5
5 2500	5 4,5
6 3000	6 6
7 3500	7 8
8 4000	8 10
9 4500	9 12
10 5000	10 14
11 5500	11 16
12 6000	12 18

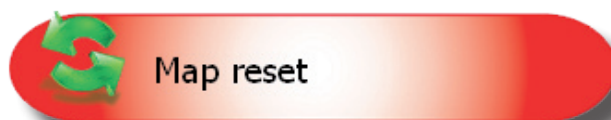


The references regarding the engine revolutions and the PETROL injection time can be modified with this function.

To change the references, set the new values and then press OK.



Clicking on this button it is possible to switch from GAS to PETROL directly from the PC. When this function is selected, the switch in the passenger compartment is temporarily deactivated.



This function allows to reset the map to default values.

CARBURATION TESTING

CARBURETION TESTING PROCEDURE:

Once the self-calibration procedure is completed, it is recommended to test the carburetion and make the necessary changes as described below.

NOTE: Before making any changes, check that the vehicle is running correctly on petrol as the Gas delivery system is based on the Petrol delivery system.

- Start the petrol-powered vehicle and wait for the engine to reach the operating temperature;
- Move into the area of the map where you want to test carburetion and keep the accelerator position steady;

Slow trim	n.a. %
Fast trim	n.a. %

If the vehicle is equipped with an OBDII diagnostic system, it is necessary to check the value of integrators/calibrators under the map.

In the same way, if the vehicle does not have an OBDII diagnostic system, it is necessary to check the petrol injection time **(in OBDII equipped vehicles it is advisable to check the calibration using the integrators/calibrators parameters instead of the petrol injection time);**

Tinj.gas	0,00 ms
Tinj.benz	0,00 ms

- Click on the  button to switch to GAS being careful to keep the acceleration steady.

- Check the value of the integrators/calibrators or of the PETROL injection time;

TEST USING THE INTEGRATORS/CALIBRATORS:

If the value of the calibrators/integrators shifts more than 3-4 units compared to normal PETROL operation during GAS operation (e.g. the calibrator moves from 8% to 11-12%), correct the value in the map while bearing 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 manner with both PETROL and GAS.

To perform a correct mapping, you have to road-test the vehicle while bearing 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).

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 while bearing 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).

Gas/petrol

☒ Sequential fuel changeover

☐ Anticipate the injection sequence

Incompatible with petrol strategy when running on gas

SEQUENTIAL FUEL CHANGE OVER

GAS is switched over to gradually one cylinder at a time when this function is enabled (recommended default option).

The switch over is usually smoother when this function is used.

If this function is not enabled, the PETROL injectors are all disconnected at the same time and switching over to GAS is immediate.

This function is automatically disabled when the engine is started in emergency mode through the switch.

ANTICIPATE THE INJECTION SEQUENCE

This is a guided procedure which allows automatic acquisition of the original injection sequence and enables a phase shift in advance of the gas injection. The entity of the phase shift also depends on the **"Number of cylinder banks"** control on page [Lambda](#).

This advance can improve vehicle function especially if the gas injectors are distant from the intake manifold.

This function is to be used only if it is really necessary since it disables the GRADUAL PETROL-GAS switch over feature, with the switch over occurring instantaneously.

Operation at minimum

☐ Gas

☒ Return to petrol

☐ Petrol

RPM for identifying minimum

1100 rpm

WARNING: This function could cause the OBDII calibrators to drift when activated on vehicles with a V-multi-cylinder engine. The anticipated injection sequence may cause the inversion of some cylinders on the two cylinder banks, each one controlled by a pre-cat probe.

OPERATION AT MINIMUM

GAS - the vehicle always runs with GAS when at idle speed when this function is enabled (recommended default option).

RETURNING TO PETROL - while returning to idle speed, for a few seconds the vehicle switches to petrol and then returns to gas, in some cases preventing the vehicle from switching off during this phase.

Only use this function if absolutely necessary.

The value **"Revolutions to identify idle speed"** determines the number of revolutions below which this strategy is enabled.

PETROL - when running at idle speed, below the value of set revolutions, the vehicle always runs on petrol. Gas function is restored when the number of revolutions exceeds the set value.

This function can only be used if running on gas at idle speed is practically impossible, unstable and causes the vehicle to switch off frequently.

The fact that the system is running on petrol is not indicated on the switch (which stays on gas), but by reading the gas injection time on the computer (which becomes nil).

In this phase, the switch continues to signal gas function and the gas solenoid valves stay enabled.

If there is an advance variable valve timing mechanism, if the supply remains active during this phase, ensure the idle speed advance does not disturb the system.

GAS/PETROL

Operation at high RPM

☐ Gas

☒ Petrol addition

☐ Petrol



RPM for petrol addition

from

4500 rpm

to

9000 rpm

Petrol inj. time for petrol addition

15 ms

Amount of petrol addition

2 ms

OPERATION AT HIGH RPM

GAS - the vehicle normally runs on GAS when this function is enabled, even at high engine speed and load (recommended default option).

PETROL ADDITION – by enabling this function, there is the possibility to deliver an additional contribution of PETROL to the normal GAS injection. You can therefore set:

- RPM window inside of which PETROL contribution goes into effect.
- The PETROL contribution injection time, i.e. the read PETROL injection time reference, over which the PETROL contribution is delivered.

ATTENTION: The petrol contribution will be enabled only if both conditions are met.

- The petrol contribution value, i.e. the injector opening time of the PETROL delivered as a contribution.



The graphic status indicator on the far right side of the "Running at high engine speed" box will be **YELLOW** to signal temporary operation with PETROL contribution.

PETROL – temporary high engine speed and load operation with PETROL will commence when this function is enabled, and will last until the accelerator is released. Both the number of revolutions and the injection time after which the GAS control unit will switch over to PETROL can be set.

ATTENTION: Switching over from one type of fuel to the other will occur only if both conditions are met.

This function will be particularly recommended for all vehicles equipped with a very delicate catalyser subject to overheating while running on GAS.

Another application where this system proves to be extremely useful regards highly powerful engines (usually turbo), where in order to be able to power the high-load engine we are forced to use large GAS injectors with consequent instability at low loads.

The fact that the system is running on petrol is not indicated on the switch (which stays on gas), but by reading the gas injection time on the computer (which becomes nil).

In this phase, the switch continues to signal gas function and the gas solenoid valves stay enabled.

If there is an advance variable valve timing mechanism, if the supply remains active during this phase, ensure the idle speed advance does not disturb the system.



The graphic status indicator on the far right side of the "Running at high engine speed" box will be **RED** to signal temporary operation of the vehicle with PETROL.

MODIFY CARBURATION

Modify carb.

OBD connection type

Auto

☒ Adaptivity

Type of PETROL trimmers

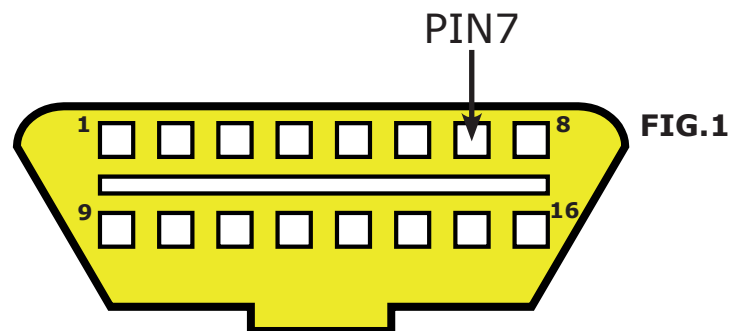
☒ standard

lean carburation with positive trimmers

☐ inverted

lean carburation with negative trimmers

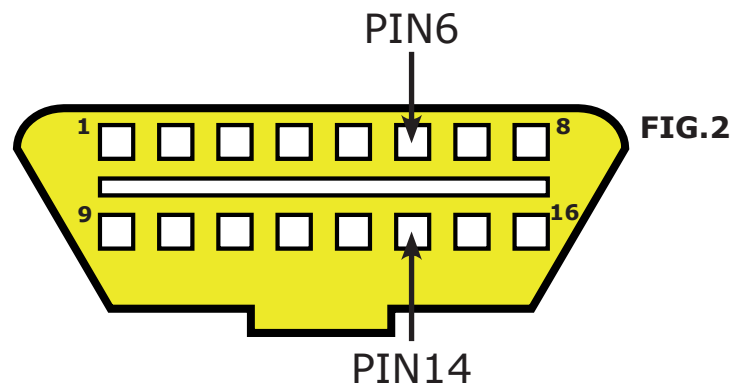
TYPE OF CONNECTION	CONNECTION DETAILS
Connection type 1	ISO 9141-2
Connection type 2	KWP-2000 Fast Init
Connection type 3	KWP-2000 Slow Init



Connect the GREEN wire to the signal found on PIN 7 of the OBD connector.

ATTENTION: The YELLOW-GREEN and YELLOW-GREY wires must be isolated and not connected.

TYPE OF CONNECTION	CONNECTION DETAILS
Connection type 6	CAN Standard 250 Kbps
Connection type 7	CAN Extended 250 Kbps
Connection type 8	CAN Standard 500 Kbps
Connection type 9	CAN Extended 500 Kbps



Connect the YELLOW-GREEN wire to the signal found on PIN 6 and the wire YELLOW-GREY to PIN 14 of the OBD connector.

ATTENTION: The GREEN wire must be isolated and not connected

MODIFY CARBURATION

OBDII CONNECTION TYPE

This menu allows to choose the OBDII connection type among a list of possible connections. Setting the default connection (AUTO), the software automatically tries to connect to the vehicle testing all the available OBDII types of connection till it targets the suitable one.

ADAPTIVITY

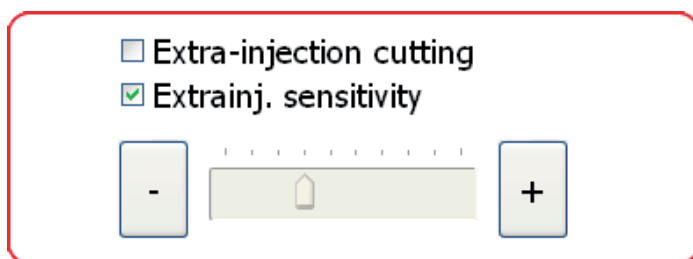
This function allows the OBDII connection in those vehicle equipped with BOSCH electronics (no Marelli). It makes it possible to adapt the GAS calibration according to the behaviour on petrol only in closed loop conditions.

TYPE OF PETROL CALIBRETERS

It allows to select the type of petrol trimmer in use in the vehicle choosing among right or inverted.

RIGHT: choose this petrol trimmer if the vehicle carburetion tends to weaken at the positive increase of calibration values.

INVERTED: choose this petrol trimmer if the vehicle carburetion tends to weaken at the negative increase of calibration values.



CUT EXTRA INJECTIONS

Selecting this function all the settings chosen for the EXTRA INJECTION sensitiveness will be ignored

EXTRA INJECTION SENSITIVENESS

EXTRA INJECTIONS are very short injections made in addition to the normal injection, and are given during petrol operation, usually during

accelerations, to slightly enrich the carburetion, thus improving engine performance.

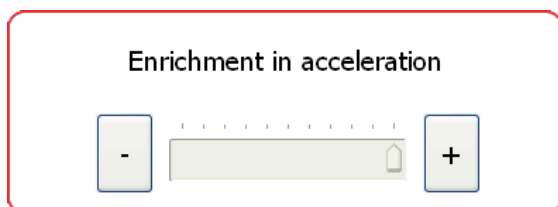
The extra injections can be recognised by looking at the progress of the RED dot in the map, or the petrol injection time that will switch from normal injection time (e.g. 8ms) to a much shorter time (e.g. 0.8ms), to then immediately go back to the previous one.

If we control the extra injections like a normal injection during gas operation, we may enrich the carburetion too much, with the risk that the engine runs too fast serrating (this happens above all in natural gas systems, whereas the problem is usually less noticeable in LPG systems).

By enabling the "EXTRA INJECTION SENSITIVITY" check at the side, the parameters of the GAS extra injections can be changed, increasing or decreasing the GAS injectors opening time during the extra injection.

By moving the slider towards the plus sign, we increase the gas extra injection time, whereas we decrease it by moving the slider towards the minus sign.

If the check is not enabled, the extra injection will not be considered as such, and the GAS control unit will control the impulse like a normal fuel injection.



ENRICHMENT IN ACCELERATION

In some models of vehicles, the PETROL injection time almost instantaneously changes from a MEDIUM-LOW level to a high value (e.g. 15-16 ms) when accelerating suddenly. This can cause malfunctioning when GAS is used since the carburetion would be greatly enriched. To get round this problem, use the "Enrichment in acceleration" slider in the following way:

- By moving towards the plus sign, the control unit will follow the PETROL injection time changes faster and faster.
- By moving towards the minus sign, this change will be increasingly narrower and filtered.

The background of the slider lights up BLUE when the "Enrichment in acceleration" strategy goes into operation.

Weakening on Mazda™



WEAKENING ON MAZDAS

On some MAZDA models we see a change from a sequential injection strategy to a half-group with opening of the PETROL injectors in pairs during PETROL operation in acceleration.

This condition is easily to recognise by watching the course of the RED dot in the map or the PETROL injection time in acceleration.

When switching from one injection strategy to the other, the injection time normally displayed almost halves (e.g. from about 8ms goes to 4ms). The display will show a constant variation of the injection time that in some models could be steady till the vehicle reaches a given number of rpm. In the end, the value will return to the initial PETROL injection time.

This working condition may cause malfunctioning during GAS operation since when injection changes from a sequential type of strategy to a half-group (low injection time), GAS carburetion tends to become highly enriched, causing erratic behaviour.

Therefore, in order to get round this problem all you have to do is enter a value adequate for resisting this tendency in "Leaning on MAZDAS".

Note: We suggest to try low values while testing the vehicle on the road, increasing them till the problem is solved.

EMISSIONS

MAP - RPM

(bar - RPM)

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
0,400	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51
0,600	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51
0,800	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51
1,000	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51

High emulation level

Pre	Post
0,8 V	0,7 V

Low emulation level

0,1 V	0,1 V
-------	-------

Initial emulation delay

150 s

Note: emulation is disable with initial emulation delay equal to zero

Lambda post.

n.d. V

In this menu you can set and modify the parameters necessary for controlling emissions. Adjustment possibilities differ, depending on whether you want to emulate the probes installed in front or in back of the catalyser or catalysers.

- In the case you want to activate emulation on a front lambda probe (see "LAMBDA" menu), it is possible to change the emissions map and the high and low emulation levels of the probe. These latter values can be modified under the column "Front".

- In the case you want to activate emulation on a rear lambda probe (see F2 LAMBDA menu), it is possible to change the high and low emulation levels of the probe (under the column "Rear").

Note: The default parameters have been tested by our personnel, and changing them is usually not recommended.

ADJUSTMENTS

Reducer temperature corrections (°C)

20	25	30	35	40	50	60	70	Over	(°C)
-6	-5	-4	-3	-2	-1	0	0	0	(±100%)

Gas temperature corrections (°C)

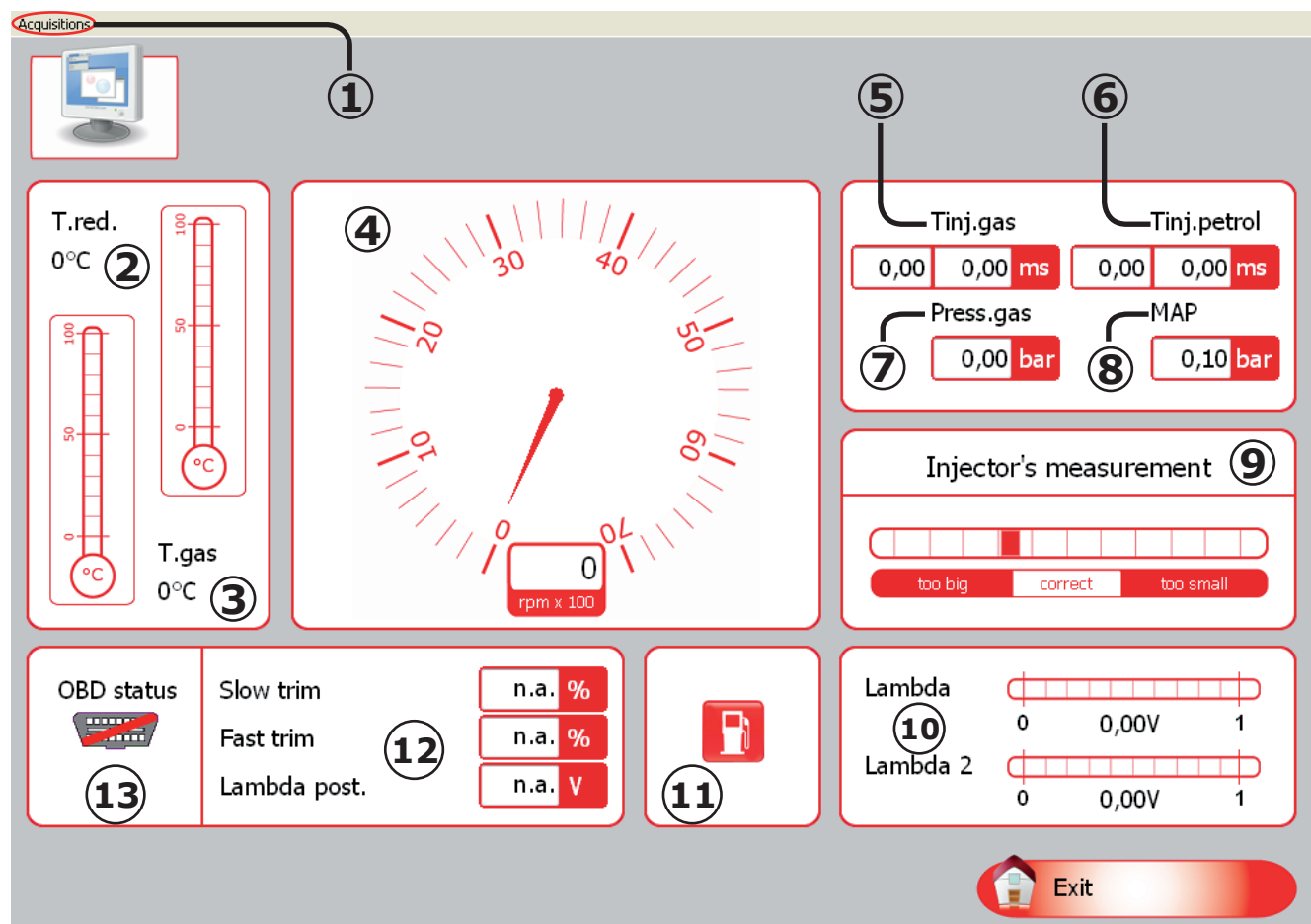
0	10	20	30	40	50	60	70	Over	(°C)
-12	-9	-6	-3	0	2	4	6	8	(±100%)

In this menu you can set percentage corrections on the GAS injection time obtained according to the temperatures of the reduction gear and of the GAS.

Note: The default parameters have been tested by our personnel, and changing them is usually not recommended.

DISPLAY

All the signals managed by the control unit are displayed on this page.



1) Acquisitions: For storing the GAS control unit operation parameters in a file that can be displayed via a chart.

- Start/Stop saving: For starting/stopping the data saving operation.
- Display chart: For viewing the trend of the saved data in a chart (see chapter "**Display chart**").
- Send by e-mail: For sending the file in which the data are save by e-mail.

Note: This option is available only for Outlook.

2) It displays the temperature of the GAS reduction gear (expressed in °C);

3) It displays the gas temperature (expressed in °C);

4) It displays the number of engine revolutions in real time (rpm);

5) It displays the Gas injection time in real time (ms);

6) It displays the PETROL injection time in real time (ms);

7) It is the pressure difference between the gas in the gas injectors and that in the intake manifolds read by the pressure gauge supplied in the kit (expressed in Bar);

8) It displays the pressure in the intake manifolds (expressed in Bar);

9) It provides information useful for correctly sizing the nozzles installed on the GAS injectors.

10) It is the voltage of the lambda probe(s).

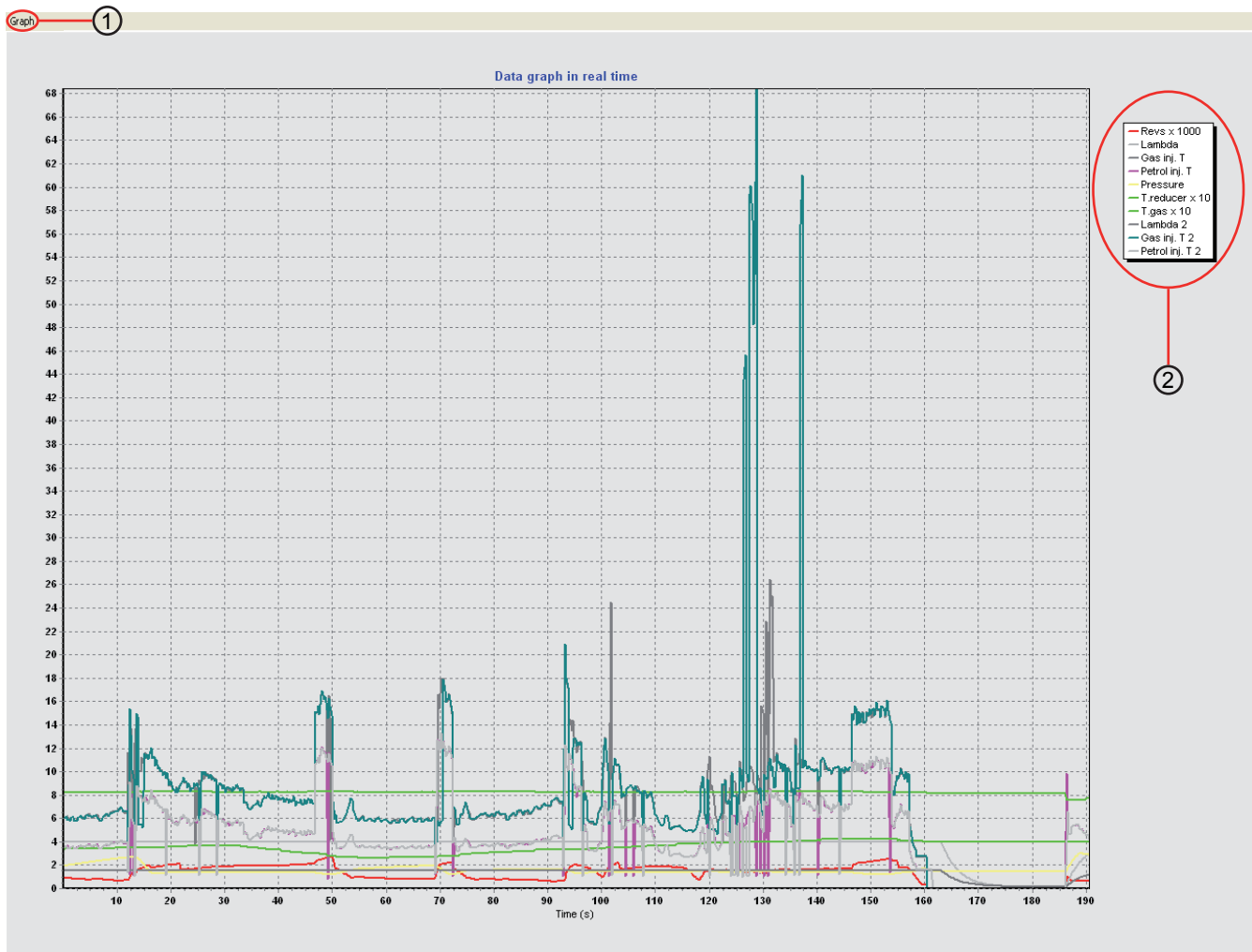
If the wires of the lambda probe(s) are not connected, there will be no display;

11) Indica se la vettura sta funzionando a GAS o a BENZINA;

12) It indicates the parameters displayed by the OBDII plug

13) It indicates the OBDII plug status (connected/disconnected)

DISPLAY CHART



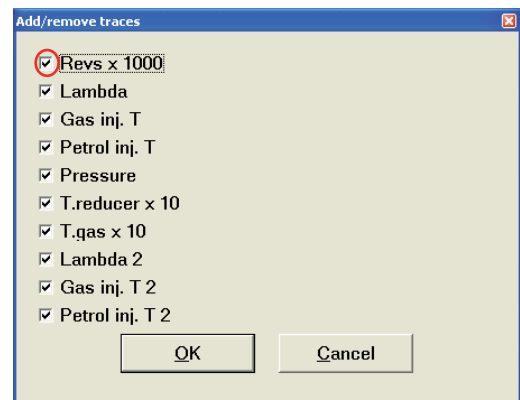
One of the acquisitions previously made and saved can be graphically displayed (see figure) by selecting "Display chart" (see chapter **"Vehicle configuration"**).

By moving from left to right with the left mouse button pressed, you can enlarge the selected area; similarly, by moving from right to left you will cancel this operation and return to the original display.

You can move within the chart by keeping the right mouse button pressed.

1) You can select the following items in the "Chart" menu:

- Trace management: It lets you choose all the parameters (traces) you plan to display on the chart.
- Print: It lets you print the displayed chart.
- Cancel zoom: It lets you bring the chart back to default display (100%).
- Exit: It lets you exit the "Chart" menu.



2) Chart key: Indicates the colours assigned to the various signals displayed. Only the traces selected in "Trace management" in the "Chart" menu are displayed (see point 1).

NOTE: The "T inj.gas 2" and "T inj.benz.2" traces refer to "GAS injection Time" and "PETROL injection Time" of the second bank, respectively.

DIAGNOSIS

If present, one or more errors detected by the GAS control unit are displayed on this page.

There is an example of a display of some of these errors in the figure below.

WARNING

Connecting a 2001PC control unit, the function highlighted in yellow will not be available.

The screenshot shows a vehicle diagnosis interface. At the top left is a green checkmark icon. Below it is a 'Reset errors' button with a circular arrow icon. To the right is a 'Diagnosis' window with a 'State' column. It lists four errors: 'Gas injectors', 'Petrol injector connection', 'Tank solenoid valve', and 'Reduction gear solenoid valve', all with a state of 'Error'. Below the 'Reset errors' button is an 'Operating times' section with two rows: 'G' (Gas) and a fuel pump icon (Petrol), each with a time display '0:00 h:mm'. At the bottom left is an 'Enable diagnosis' button with a checkmark icon. To the right of the 'Operating times' section are two diagnostic windows. The 'Petrol injectors signal diagnosis' window has columns for 'OK', 'X', and 'T.INJ.' with rows A, B, C, and D, each showing '0,00'. The 'Gas injectors cut out' window has columns for 'ON', 'OFF', and 'T.INJ.' with rows A, B, C, and D, each showing '0,00'. At the bottom right is an 'Exit' button with a house icon. A legend at the bottom of the petrol diagnosis window states: 'OK - Injector signal properly read', 'X - Injector signal not read'.

When the GAS control unit detects a diagnosis error on the parameter read, it will perform the action corresponding to the error detected. The possible diagnoses of the PETROL control unit are:

Diagnosis

Action

Gas injectors
Tank solenoid valve
Reduction gear solenoid valve
Gas pressure sensor
Map sensor
Gas temperature sensor
Water temperature sensor
Switch present

Change to Petrol
Change to Petrol
Change to Petrol
Change to Petrol
Change to Petrol
Change to Petrol
Change to Petrol
None

The diagnostics performed on the reading of the petrol injection time is graphically represented in the box "Petrol injector signal diagnosis".

That the signal has been correctly read is indicated with "OK", and the presence of a reading error corresponding to injector A, B, C or D is indicated with the symbol "X", respectively.

NOTE: In the case of 5/6/8-cylinder vehicles, the PETROL injectors and corresponding GAS injectors marked in red refer to the second bank

One or more GAS injectors can be cut out electrically in the "Gas injectors cut-out" box by pressing the "Off" button, in this way enabling the corresponding PETROL injector.

This operation is particularly useful, for example, for diagnosing the malfunctioning of one or more GAS injectors.

The diagnostic errors detected can be deleted from the control unit memory simply by pressing the lower right-hand button "Zero-set diagnosis errors".

By enabling or disabling the check in the "Enable diagnosis" box, display of the diagnostic errors will be activated or deactivated.

The error detected will be signalled to the driver by the yellow LED coming on and remaining steady, and by the slow blinking of the green LED on the switch. Moreover, the buzzer inside the switch will be enabled to simplify identification of the alarm status.

To deactivate the audible alarm, just press the switch button to change the car from Gas set-up to the Petrol position.

NOTE: Switching over to petrol is envisaged for some errors. In this case, the GAS control unit will automatically switch over when the error is detected.

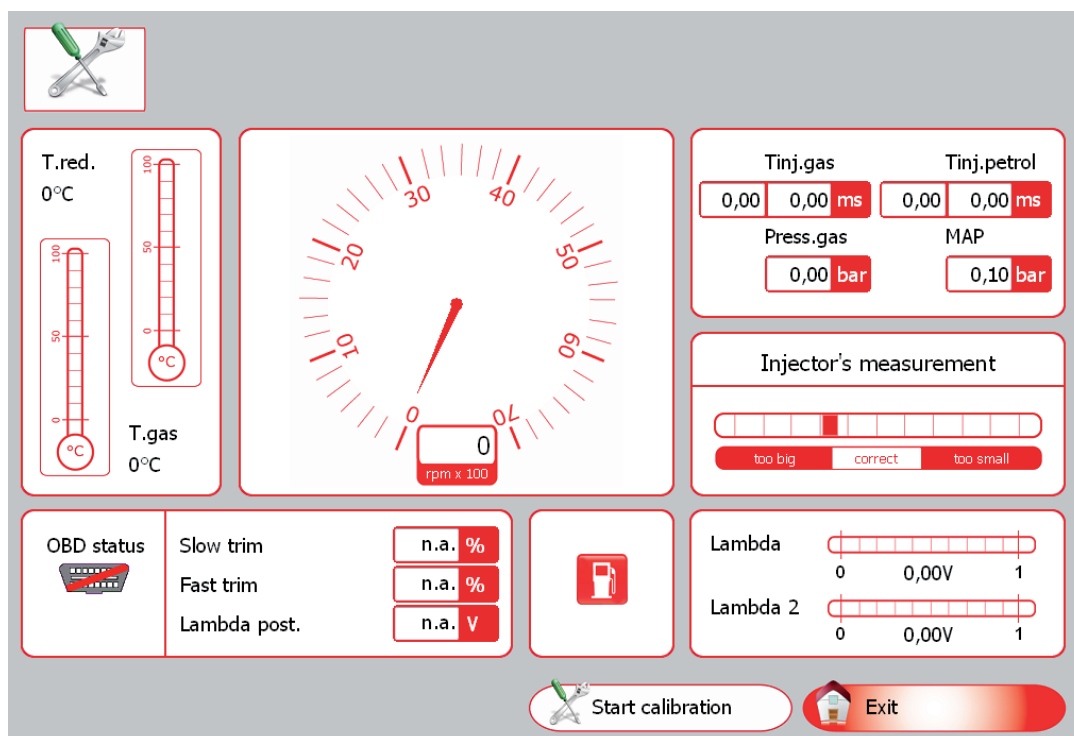
To return to GAS operation, it is necessary to shut down and re-start the vehicle.

Counters (hh:mm) register the vehicle's time of operation (shown in hours and minutes) during GAS () and PETROL () operation, is found in the "Function Time" option.

AUTOCALIBRATION

In this section it is possible to automatically calibrate the GAS control unit so as to get car carburetion that on the average is correct during GAS operation.

Before you start the self-calibration procedure, you have to check that the vehicle is in good operating condition with petrol as the Gas fuel delivery system is based on the Petrol system.




Follow these instructions for self-calibration:

1) Start the vehicle running on Petrol and check that the following parameters are correct:

- **PETROL injection time**
- **Number of rpm**
- **GAS temperature**
- **Reduction gear temperature**

2) Wait for the engine to reach the operating temperature.

3) Start the self-calibration procedure by pressing the **Avvia calibrazione** ( **Start calibration**) key and follow the instructions displayed on the monitor.

Once the number of engine rpm specified on the monitor is reached, the control unit will perform several switch overs from petrol to gas. It is important that the accelerator be kept steady in this situation, even if the revolutions shift, without trying to bring the number of rpm back to the value taken on during PETROL operation.

After SELF-CALIBRATION is completed, try the vehicle running on gas to verify it operates correctly, and if necessary, correct the calibration using the map (see paragraph "**Modify carburation**") as previously illustrated.

SAVE/LOAD CONFIGURATION

Save Configuration

It is possible to save all calibration parameters set in the **"Vehicle configuration"** menu in a file in this submenu.

This file can later be used for configuring other control units installed on vehicles of the same model and with the same type of fuel, NATURAL GAS or LPG.

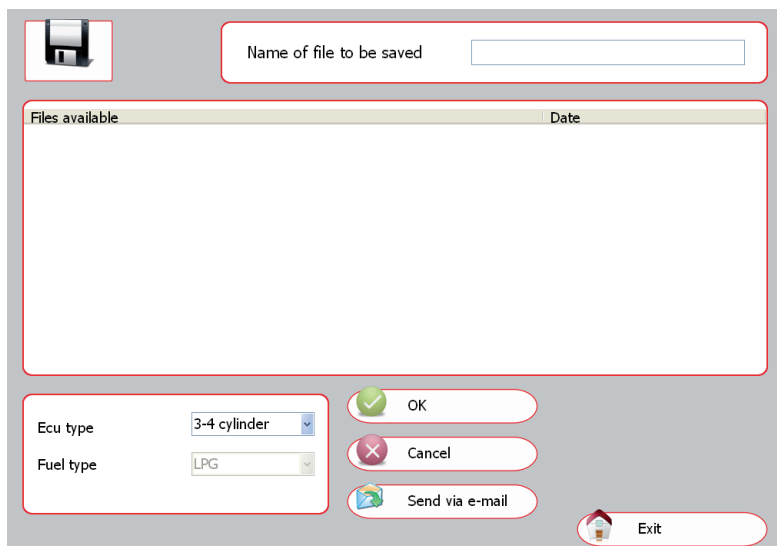
Note: The "Control unit type" and "Fuel type" menus (in the lower part of the window) appear **only if the control unit is not connected to the PC**.

The "Fuel type" parameter cannot be modified because it depends on what is set in the "Vehicle configuration" menu (see paragraph **"Change-over"**).

If the control unit **is connected** to the computer, this information is saved automatically.

To save, specify the "Name of the file to save" and click on OK.

By selecting a configuration in the list of those available, you can also sent the file by e-mail. It will be automatically attached to the message.



Load Configuration

It is possible to upload a pre-existing configuration into the control unit from this submenu.

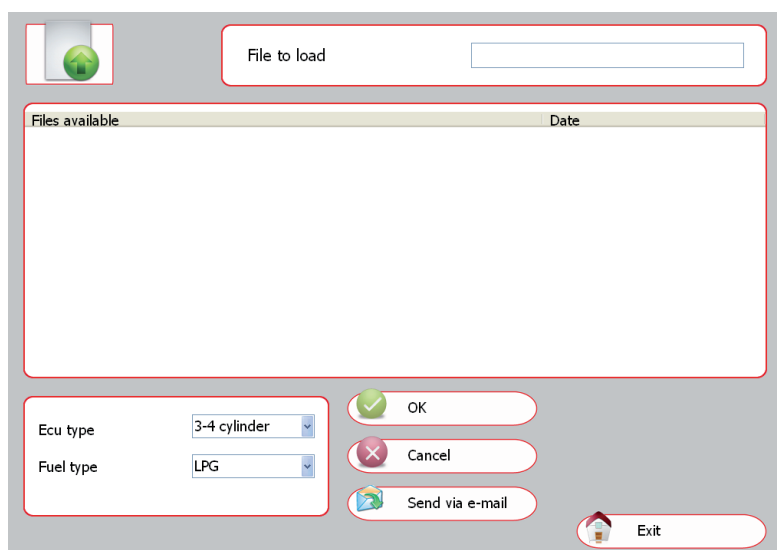
The configuration files are in two separate directories: one for LPG configurations and the other for NATURAL GAS configurations.

Before uploading a configuration it is necessary to go to **"VEHICLE CONFIGURATION"** (see paragraph **"Change-over"**) and select natural gas or LPG in "Fuel type", based on the configuration you want to upload.

The "Control unit type" and "Fuel type" menus (in the lower part of the window) appear **only if the control unit is not connected to the PC**.

If the control unit **is connected** to the computer, only the configurations available for automatically recognised control unit are proposed in the list.

Select the file you want to upload and click on OK.



ECU REPROGRAMMING

From this submenu it is possible to update the FIRMWARE (the management program in the control unit) of the gas control unit after updates.

The latest firmware version available when the CD-ROM is created is always included in the calibration software installation CD-ROM, whereas any subsequent versions can be sent by e-mail or on any other removable support.

WARNING



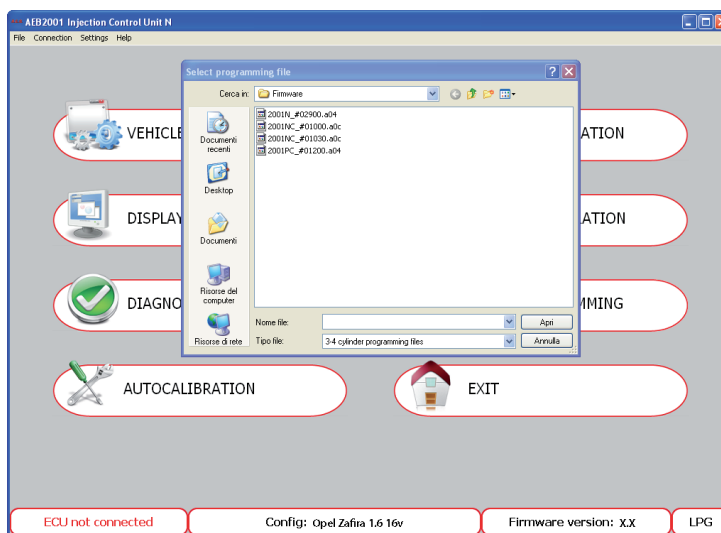
WARNING

The correct path for saving the programme file (firmware) is the following:

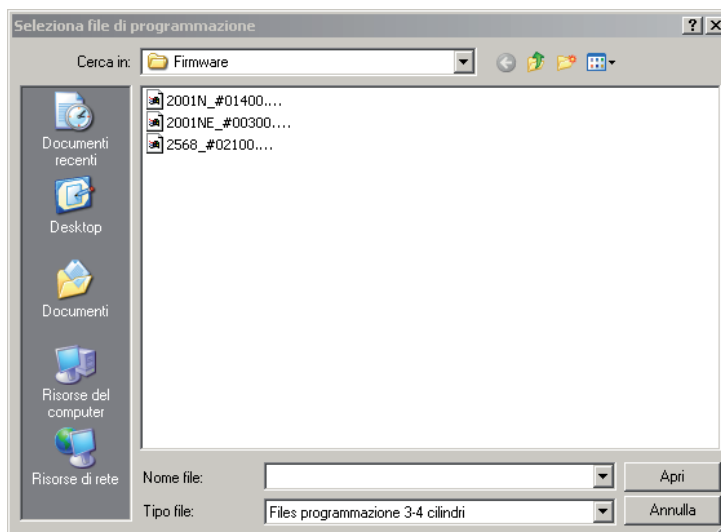
C:\DOCUMENTS AND SETTINGS**PERSONAL ACCOUNT**\DOCUMENTS\MULTIPOINTINJ\FIRMWARE where "**PERSONAL ACCOUNT**" is usually the "USERNAME" or the PC-ID.

IT IS THEREFORE NECESSARY TO FOLLOW THE SAME PATH TO SAVE POTENTIAL UPDATES AND NEW FIRMWARE. IT IS ADVISABLE TO KEEP A COPY OF THE OBSOLETE FIRMWARE IN THE PATH IN ORDER TO KEEP A FILE-HISTORY IN THE SAME FOLDER.

To update the FIRMWARE, select "REPROGRAM CONTROL UNIT". The window "Select program file" will be displayed. Select the update file and click on open. If there is more than one file, select the one with the highest number (most recent version).



NOTE: To avoid losing the configuration of the control unit, make sure that the control unit is connected to the computer before updating. Whether or not the control unit is connected is indicated on the bottom left-hand side of the main menu screen.



IMPORTANT: to run the reprogramming, it is necessary that Internet Explorer 5.5 or higher be installed on the PC.