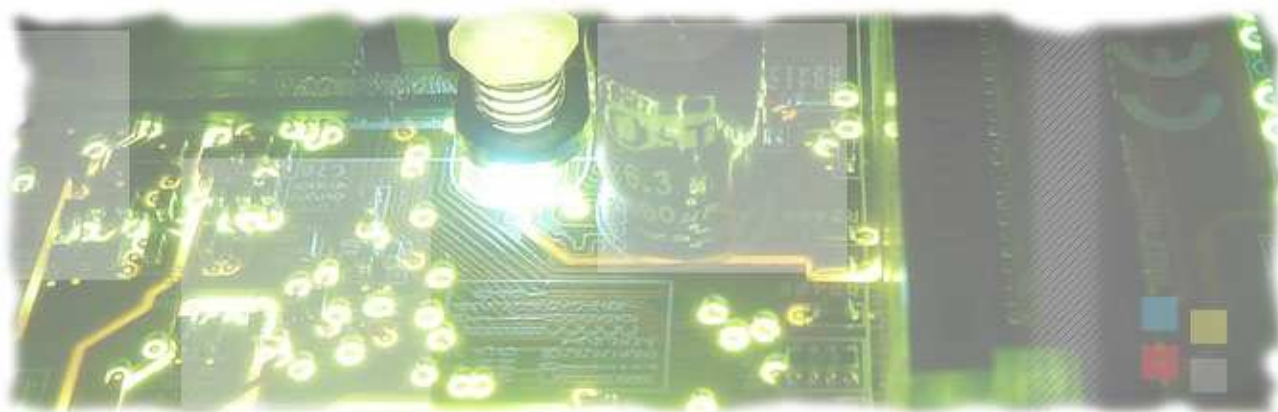




by



MANUAL

Instruction Of CONFIGURATION

And CALIBRATION



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INTRODUCTION

Congratulations of a good chose!. We are glad to present our product - **SGI ECU controller VERSUS**. It was designed for vehicles equipped with advanced OBD2 diagnostics; however, it may also be installed in older models of vehicles.

SGI ECU VERSUS

Gas injection controller is the **IV generation device** fulfilling rigorous standards regarding fuel dosage and performance quality. Constructors' team has worked out control algorithms of LPG injectors based on control signals of gasoline fuel injectors where real- time corrections are calculated for every injector separately. Thanks to it is needless to prepare the map of LPG injectors (as it was in older constructions of controllers) and to use OBD emulators.

A great advantage of the controller VERSUS is the possibility of mapping of LPG injectors' expenses towards gasoline fuel injectors during calibration drive, which simplifies and shortens the time of device installation in a car and respectively raises the quality of control and reduces fuel consumption. It increases versatility of the controller- assembling and calibration processes are irrespective of type and brand of a car as well as of used mechanical components (reducers, injectors). It is possible for assemblers, who are accustomed to older generations of devices to calibrate controller in a traditional way by manual modifying the composition of mixture.

Advantages of ECU VERSUS:

- Supply of the LPG-AIR mixture to the cylinders in the optimal phase of the engine cycle - corresponding with the cycle used by the injection of gasoline
- Simplicity in service, configuration and diagnostics of the system
- Compatibility with EOBD
- The system can be adapted to fit engines with Sequential, Half-sequential and non sequential Injection system.
- The system can be fitted to Turbo-charged engines
- Properly calibrated system allows to get the same driving dynamic on LPG as on Gasoline
- Sophisticated software. "Creating map" allows precise calibration of the engine supplying with LPG
- Diagnostic/assistance tools in the software
- Environment friendly - complies with exhaust emission standards EURO 2, EURO 3, EURO 4
- Full time "**Technical Assistance**" **Service** on the website
- Clear, simple, user friendly interface allowing for time efficient service.
- Fully automatic operation including automated switching from LPG to petrol when the LPG tank is empty
- Eliminates Backfire and possible consequential damage of intake manifolds, air filters and housing or flow meters
- Availability for 3, 4,5,6,8 – cylinder Engines.

INITIAL TIPS/RECOMMENDATIONS:

- Every installation should be made by **Qualified personnel**. Before starting installation it is strongly recommended to read this Manual carefully and follow the instructions.
- Before switching ECU VERSUS wires it is strongly recommended to **disconnect minus of battery**
- Switching on the wiring/harness should be performed when the ECU VERSUS controller is disconnected and started with switching on the mass.
- All connections made if not plug and play have to be **properly connected, soldered** and than the connections are to be properly isolated
- All signals should be picked up as close as possible to the gas computer.
- Try to **avoid putting Versus controller harness wire next to high voltage/** tension wires and ignition coil
- Before the assembling definitely **check the condition of the spark plugs, HT wires, coils, and Lambda sensor(s)**. Their poor condition may cause some problems with the gas controller working. Problems with the system's working that occurred after a period of a proper functioning (e.g. month, six months) are usually caused by the wear of elements of the ignition system (spark plugs, HT wires, coils)
- ECU VERSUS Controller should be assembled in place where it is **protected from water**
- The controller should be assembled as far as possible from the sources of high temperature such as cylinder head and exhaust manifold. **Guaranteed temperature range of Versus controller work is from -40 to + 95 °C**. If the maximum temperature is exceeded, the controller may switch to petrol in emergency.
- One of the most important while SGI VERSUS installation is **Setting up LPG Injector RAIL**. General Rules are as follows:
 - a) The shortest rubber hoses between Injection RAIL and inlet manifold the better
 - b) The hoses has to be the same length.
 - c) The closest to the inlet valves/Gasoline injectors fitting of LPG inlet manifold nozzles the better.
- **LPG Injectors inlet manifold nozzles are to be installed VERY carefully**. After their installation (drilling) make sure Inlet Manifold is clean from any filings inside. It is strongly recommended to remove the inlet manifold and after drilling the nozzles holes to clean up the manifold inside walls.
- Recommended differential pressure applied on the reducer comes to approx. **100-120kPa**
- Before first switching to gas, the engine should be warmed up on petrol so that the LPG reducer's heater shows higher temperature than 40 °C.
- It is recommended to calibrate ECU VERSUS controller in every single car separately. After turning on the engine on petrol, software configuration should be engaged to Versus controller, which should be pre – configured ("Configuration" bookmark)
- With every change of a reducer pressure or injectors' nozzles, Auto-calibration should be performed again
- **The latest version of software, diagrams, manuals** are available on the website www.versuslpg.com or www.versuslpg.eu. Technical assistance system is available at www.forum.versuslpg.com. Before starting a new topic READ THIS MANUAL and Existing TOPICS carefully!

ECU VERSUS

Before installation it is strongly recommended to read carefully tips given above!

ECU VERSUS can be installed:

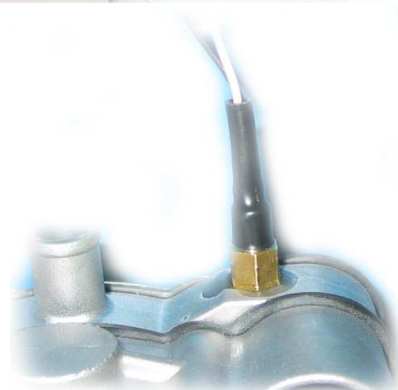
- In 3,4 cylinders engines – 4-cyl ECU VERSUS Version
- In 3,4,5,6 cylinders engines – 6-cyl ECU VERSUS Version
- In 3,4,5,6,8 cylinders engines – 8-cyl ECU VERSUS version

It is recommended to install ECU VERSUS with the plugs downwards, in places that protects the ECU from High temperature sources and water.

REDUCER

ECU VERSUS works properly with different kind of Reducers. The role of the reducer is to evaporate LPG from Liquid phase to gaseous phase by using heat from cooling system. The reducer measures sub-pressure in Inlet manifold and supply LPG Injection RAIL with LPG.

- It is recommended to fit Reducer with pressure regulation. (Basically, the regulation from 0,6 to 1,8 Bar). **Recommended pressure is between 1 – 1,2 Bar**.
- Reducer can be installed in accordance to drive axis or opposite, but must be stabile fitted.
- It is not allowed to install water cooling pipes to the reducer in serial to cooling system (It may limit the flow of the engine coolant). It is recommended to fit the reducer below the highest level of coolant.
- There is a temperature sensor that is to be connected to reducer's body. Wiring connection – "color to color". The sensor measures the temperature of the reducer. It is essential to use original temperature sensor that is a part of ECU VERSUS (others can indicate false temperature)
- In case of high capacity engines it is essential to use gas inlet supply (from a tank) 8 mm diameter copper pipe (service line).
- Other recommended hoses diameters:
 - a) Water cooling hose – d. 16 mm.
 - b) Gas inlet pipes – copper pipes 6 mm, 8 mm.
 - c) Gas outlet pipe – 12-14 mm
- It is essential to connect sub-pressure from the reducer's nozzle to ECU VERSUS sub-pressure system according to the diagram "MAPSENSOR CONNECTION SCHEME" (description in "SENSORS" at next pages).



LPG INJECTORS NOZZLES SELECTION

LPG injectors' nozzles selection should be preliminarily made according to the following table. **It is absolutely essential to choose adequate type of LPG Injectors nozzle type.**

Engine Capacity in litre	Diameters of LPG injectors' nozzles in mm
below 1.4	1.3 to 1.4
1.4	1.4 to 1.6
1.6	1.6 to 1.8
1.8	1.8 to 2.0
2.0	2.0 to 2.5
2.5	2.5 to 3.0
3.0	from 3.0

Nozzle sizes given in the table are for 100kPa reducer pressure.

Notice: if 3.0 nozzles are too small for a high capacity engine, it is possible to increase reducer's pressure. If 1.3 nozzles are too big for a low capacity engine, it is recommended to reduce reducer's pressure.

If the size of the nozzles is too small there is a possibility to drill nozzles to make their inner diameter bigger however it is recommended to change their type to bigger ones.



If the size of the nozzles is too big (especially in case of low capacity engines) there is a possibility to solder the nozzle and then to drill to prepare adequate diameter)



In case of semi-sequential or non-sequential engines it is recommended to use smaller diameter nozzles.

Inlet manifold LPG nozzles.

While installing it is essential to follow the rules:

- **Absolutely essential** - The holes of LPG inlet nozzles are to be drilled the closest to cylinder head. It is essential to keep the same distance for every separate nozzle.
- The direction of the nozzles should be to the cylinder/inlet valve.



- Every separate nozzle should be installed in the same way.
- Their installation should be done in a careful way, in order not to allow any filings to get inside the manifold.
- In some cases it is essential to remove Inlet manifold to install the nozzles properly.



- Holes should be drilled with 5 mm diameter drill, than to be taped with M6.



- LPG Inlet manifold nozzles have to be installed in stable way to protect their accidental unscrewing.
- LPG Inlet manifold nozzles' inside diameter is 5 mm.
- It is forbidden to drill accidental holes in inlet manifold. Before drilling make sure the drilling place was properly chosen.

LPG INJECTION RAIL

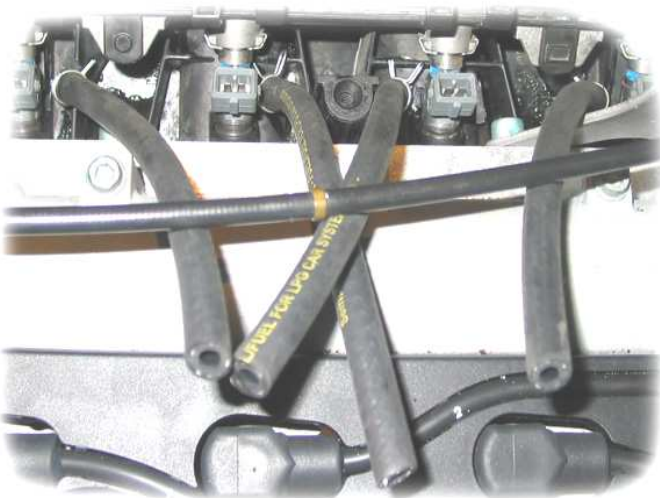
ECU VERSUS operates properly with several kinds of LPG Injectors (different Brands, impedance).

It is essential to chose the type of installed LPG injectors in the software.

- In case of 4-cyl engine you are to use 1x4 set LPG Injection RAIL. Other possibility - 2x2 set Injection RAIL or 4x1 set LPG Injector.
- In case of 6-cyl engine - 2x3 set LPG injection RAIL. Other possibility 3x2 or 6x1.
- 8-cyl engine – 2x4, 4x2, 8x1.
- In case of 4-cyl set LPG injectors RAIL and 6-cyl engine only 3 first sections works.

LPG Injection RAIL – LPG Inlet manifold Nozzles hoses:

- **Essential** - The shortest rubber hoses between LPG Injection RAIL – LPG Inlet manifold Nozzles the better!.
- **Essential** - The hoses has to be the same length!.



SGI VERSUS FILTER

Installed between Reducer LPG Supply Hose and LPG Injection RAIL. While installing it is essential to observe flow direction (mark on Filter body with the direction to LPG Injection RAIL).

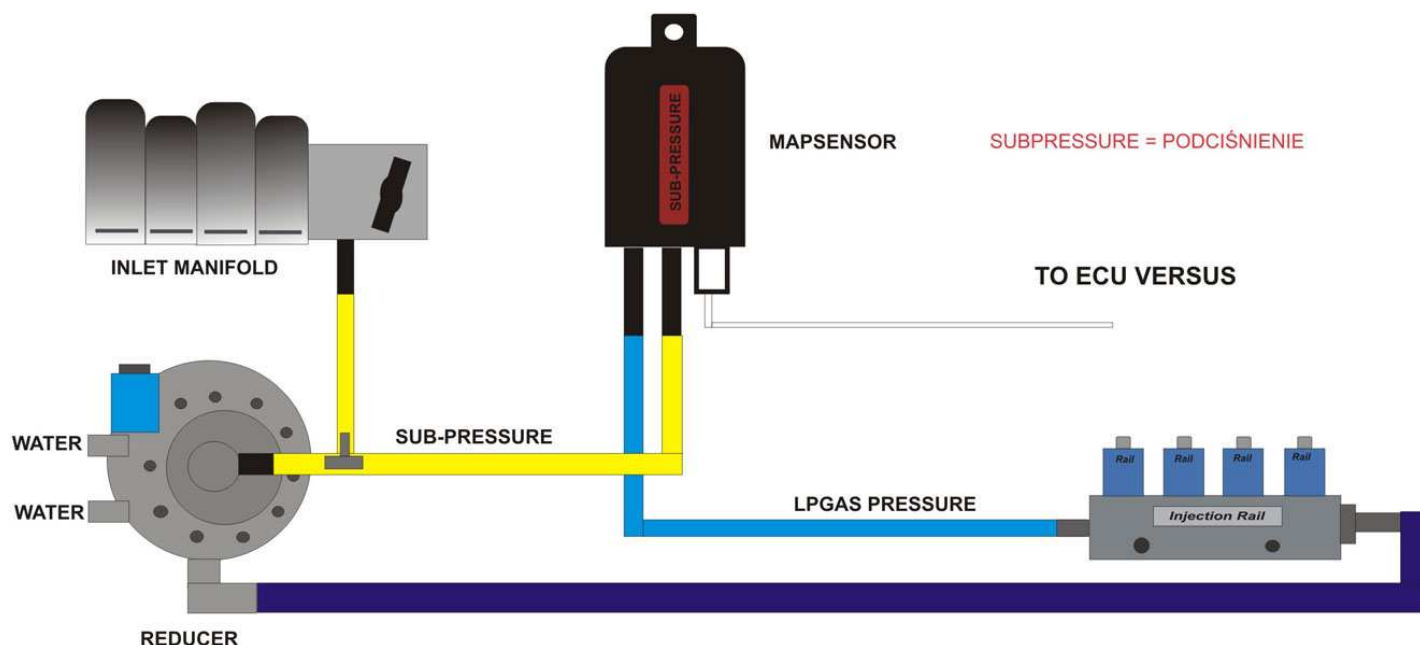


SENSORS (Sub-pressure, Temperature sensors)

a) Sub-pressure sensor.

Sub-pressure sensor should be connected according to the scheme:

MAPSENSOR CONNECTION SCHEME



Description:

- Sub-pressure/VACUUM/Podciśnienie is to be fitted by T-Fitting to:

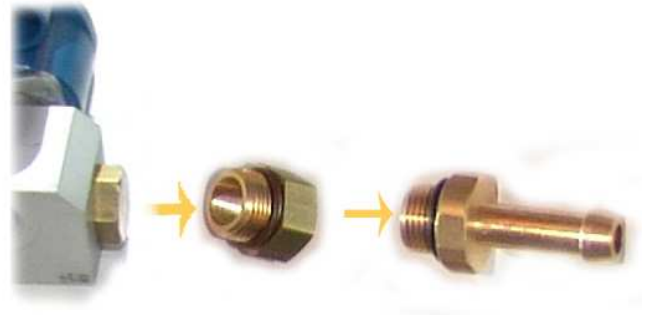
- Reducer's nozzle
- Inlet manifold nozzle
- Marked nozzle of ECU
VERSUS map-sensor (Red or
white label – always market)



- Important - Inlet manifold nozzle is to be fitted the closest to the throttle.**



- Pressure is to be connected to:
 - a) unmarked nozzle of ECU VERSUS map-sensor
 - b) LPG Injection RAIL Outlet (as on the picture beside)
- Map-sensor PLUG is to be connected to ECU VERSUS PLUG

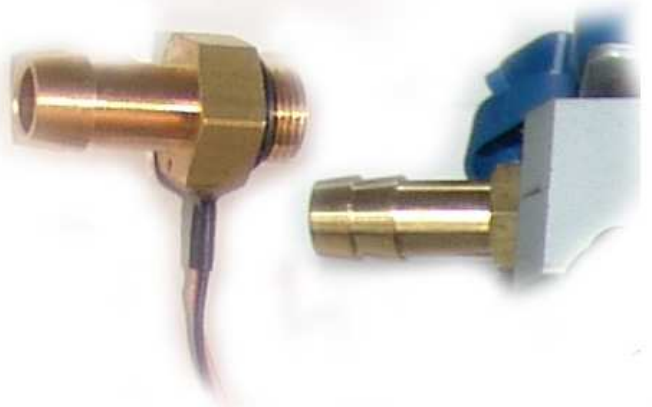


b) Temperature sensors.

First one is to be connected to reducer's body (Described above – "REDUCER").

The second one is to be fitted to LPG Injection RAIL:

- Unscrew original nozzle fitted to LPG Injection RAIL inlet.
- Fit LPG inlet nozzle integrated with Temperature sensor (a part of ECU VERSUS KIT) to the inlet of LPG Injection RAIL.
- Temperature sensor wiring connection – "color to color"

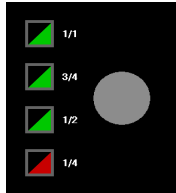
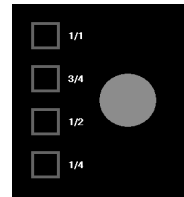


SWITCH

- The Versus controller signals its runtime mode by the console and the buzzer (horn) assembled in the cabin.
- After the button "G" is pushed diodes start to flash (blink). It means that the system is ready to change petrol supply from GASOLINE to LPG.
- Wires connection – "color to color"
- Pink wire from (ECU VERSUS Harness) is to be connected to horn signal (buzzer).
- Black wire from Buzzer is to be additionally connected to black color wire from the Switch and ECU VERSUS.
- After buzzer installation put the label off from the buzzer.



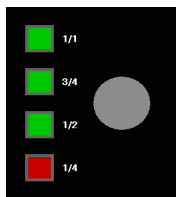
Petrol runtime is signaled by switching off the diodes on the console.



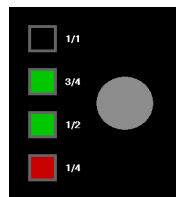
Automatic mode is signaled by flicking of diodes on the console.

LPG runtime is signaled by one or more shining diodes and also displays LPG level in the tank.

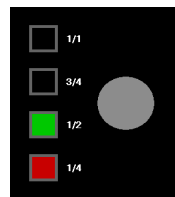
Full tank- all diodes shine



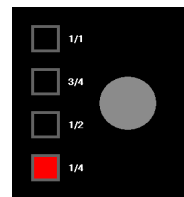
$\frac{3}{4}$ of the tank



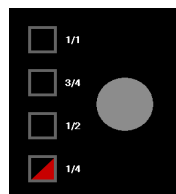
$\frac{1}{2}$ of the tank



$\frac{1}{4}$ of the tank



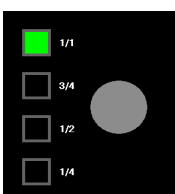
Reserve (the red diodes shine)



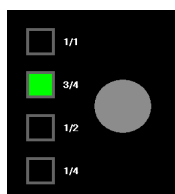
Notice: The indication described above are to be taken approximately.

Switching to petrol after emptying the LPG tank is signaled by the single buzzer signal or by the shining one by one diodes on the console.

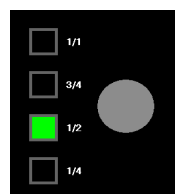
1



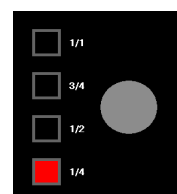
2



3



4



LPG FUEL LEVEL GAUGE

- Is to be fitted to Multivalve.
- There is a possibility to turn the indicator left or right in order to achieve adequate LPG Level indication on the Switch (If LPG Tank is full all diodes should shine).
- White color wire from ECU VERSUS is to be connected to LPG Fuel level gauge (usually also white one).



WIRING/HARNESS and PLUGS

Is to be done according to the Schemes, that are available on the website **www.versuslpg.com** or given on CD attached to VERSUS ECU Interface.

Some explanations:

- 1) LPG FUEL LEVEL Gauge wiring connection is to be done as follows:
 - a) White color wire – signal
 - b) Bronze color wire – to be fitted to the Ground.
 - c) Green color wire is to be fitted to +12 V after ignition. It is not recommended to fit this cable to +12 V LPG Solenoid.

ECU VERSUS CALIBRATION.

First Overview:

The screenshot shows the 'Settings - VERSUS' application window. It has a menu bar with 'File', 'Language', and 'Info'. Below the menu bar is a tabbed interface with the following tabs: 'Configuration', 'Display', 'Autosetup', 'Create Map', 'Corrections', 'LPG level sensor', 'Error Codes', 'Service Tools', 'Device Info', and 'Default Settings'. The 'Configuration' tab is active, showing various settings for switching between gasoline and LPG. Settings include: Switching RPM (1200), RPM signal (1 coil per cylinder), Switching temperature [°C] (35), LPG switch delay [sec] (30), Pressure [kPa] (100), Switch to gasoline when pressure below [kPa] (60), Pressure average [sec] (0.8), LPG injector type (VALTEK 3 OHM), LPG injectors warming (checked), Minimal LPG time [ms] (0.0), Lambda type (0-1 Volt), Gasoline injection type (Full sequence), Gasoline injectors activated by +12V signal (unchecked), Buzzer signalling (Normal), and Enable LPG injectors current overload control (checked). At the bottom, there is a status bar with a fuel mode selector (Gasoline, AUTO, LPG) and real-time readings: T. gasoline (3.18 ms), RPM (944), Lambda (0.4 V), T. LPG (5.18 ms), Pressure (96 kPa), and Heater temp. (70 °C).

Configuration	Display	Autosetup	Create Map	Corrections	LPG level sensor	Error Codes	Service Tools	Device Info	Default Settings
Switching RPM				1200					
RPM signal				1 coil per cylinder					
Switching temperature [°C]				35					
LPG switch delay [sec]				30					
Pressure [kPa]				100					
Switch to gasoline when pressure below [kPa]				60					
Pressure average [sec]				0.8					
LPG injector type				VALTEK 3 OHM					
LPG injectors warming				☒					
Minimal LPG time [ms]				0.0					
Lambda type				0-1 Volt					
Gasoline injection type				Full sequence					
Gasoline injectors activated by +12V signal				☐					
Buzzer signalling				Normal					
Enable LPG injectors current overload control				☒					

Fuel Mode	T. gasoline	T. LPG	RPM	Pressure	Lambda	Heater temp.
GASOLINE	3.18 ms	5.18 ms	944	96 kPa	0.4 V	70 °C
Gasoline						
AUTO						
LPG						

After starting-up of application there appears main menu with bookmarks' selection. At the top there are buttons as follows:

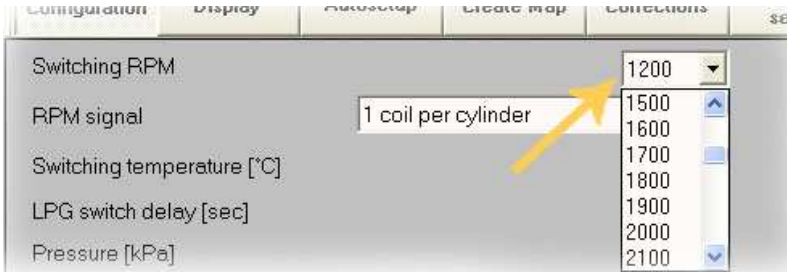
- Configuration – basic settings of ECU VERSUS
- Display – visualization of some basic parameters
- AUTOS SETUP – Auto-calibration of the engine on idle
- Create map – calibration while driving
- Corrections – manual modification
- LPG Level sensor
- Error codes
- Service tools – the possibility of switching off one cylinder fuel supply (useful in case of 6-8- cyl. engines)
- Device info and default settings.

On **"File"** top left corner of the screen there is a possibility of "Reading settings from file" or "Saving settings to file" (useful if you are about to convert the same kind of car with the same engine).

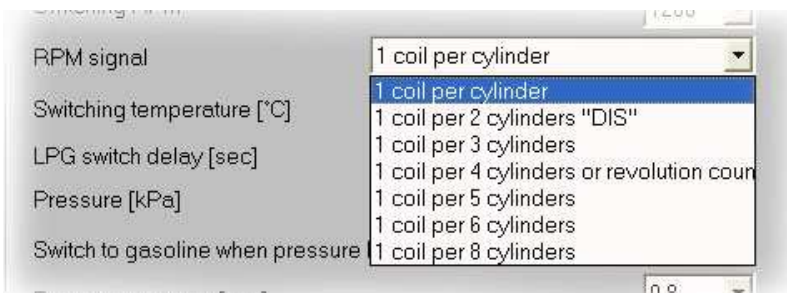
CONFIGURATION

The first step after assembling is to set the basic parameters of the controller, which are in the 'Configuration' button. From the top the parameters are as follows:

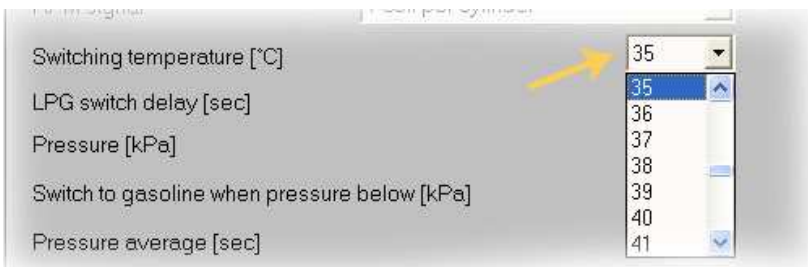
- 1) **Switching RPM.** The level of engine's RPM. After it is more than established the engine turns on LPG. The range of setting is between 500 – 5000 RPM. Recommended level is between 1200-2000 RPM.



- 2) **RPM Signal** source from ignition coil. There is a possibility to choose as beside. You can choose this parameter experimentally (it is essential to observe RPM at the bottom of the screen till the moment when real RPM of the engine are the same as RPM displayed in the software).

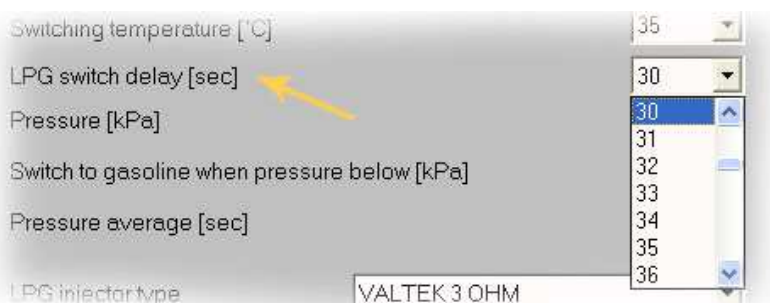


- 3) **Switching temperature.** If the temperature of reducer's body (temperature sensor switched to the reducer) will be higher than established at this stage the engine could turn to LPG. In warm climate countries it is recommended to establish this parameter in the region of 25 °C. In cold climate countries recommended value is in the



region of 35 °C.

- 4) **LPG Switch delay.** In warm climate countries recommended value is in the region of 5-10 sec.. In case of cold climate countries recommended value is between 20-30 sec. LPG switch delay is strictly connected with 'LPG Injectors warming' (described below).



- 5) Below "LPG switch delay" you can find "**Pressure [kPa]**". It is differential pressure is kept by the controller at a minimal load (low RPM). This parameter is automatically set by the software during Auto-calibration. There is no need to change that value at this stage of ECU VERSUS configuration. **Recommended controller pressure- 100kPa.**

6) Switching to Gasoline when pressure below [kPa]. - Pressure of the petrol (gasoline) switch - pressure at which it is impossible to drive on gas and causes the return to 'Petrol' mode.

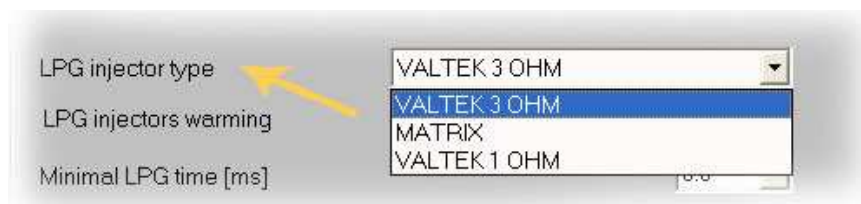


This parameter is set during Auto-calibration at 60% of the controller pressure. If needed, lower pressure can be applied, especially in case of toroidal outside head

tanks. It is not recommended to use this parameter below 30kPa. If LPG pressure falls below established the engine turns to Gasoline automatically (it will be signaled by horn signal installed inside driver's cabin.).

7) Pressure average. There is no need to change this parameter at this stage. It is automatically set by the software during Auto-calibration. This parameter describes the delay of reaction for falling pressure. When this parameter is higher than the factory one, switching to petrol at momentary and short falls of the controller pressure can be eliminated.

8) LPG Injector Type. At this stage you are to choose a proper type of the injector used while assembling, as the control is different for different types of injectors. When the injectors are not assembled, leave the



factory parameters. You can chose between VALTEK/**RAIL** 3OHM, MATRIX, VALTEK/**RAIL** 1 OHM.

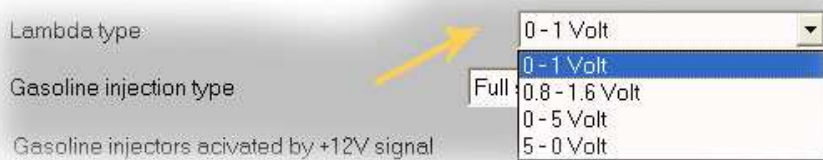
9) LPG Injectors warming - switching on this option causes the preliminary preparation of LPG injectors to work in automatic mode (before switching to LPG). It



is recommended to tick this option in cold climate countries. This enables smoother switching from petrol to gas, especially at low ambient temperature. When you establish "LPG switch delay" (point 4th) e.g. on 15 sec. the engine will be supplied with Gasoline for 15 sec. even if RPM (point 1st) and reducer temperature (point 3rd) is over established in the software before. LPG injectors will work for 15 sec. but they will not supply LPG.

10) Minimal LPG Time [ms]. This parameter enables to eliminate problems when cut-off conditions appear, when the time of LPG injection is similar to the time of opening already assembled injectors LPG. In most cars you are not to change this parameter from 0,0. When you press gas pedal and than put it off it is essential to observe **"T. Gasoline"** (at the bottom of the screen). Provided by the value while putting gas pedal off falls to 0,0 there is no need to change this parameter. If it falls to the value of 0,3 ms– you have to change "Minimal LPG time" to 0,3 ms.

- 11) Lambda type.** Basically there is no need to connect a wire from ECU VERSUS harness (violet color). It is useful only for visualization and has no influence on engine working (if you connect violet wire to Lambda sensor signal wire you can observe LPG/AIR mixture on the screen in "Display" and "Auto-setup").



- 12)** Below you can find "**Gasoline injection type**". - if LPG injection is assembled in a car, which has half-sequential or non sequential petrol injection, this information should be given to the controller. When the selected option is different to the sequential one, the work of 'Versus' controller is as follows:

- Non sequence - controller reads signal of the petrol injector 1 and according to it controls all LPG injectors
- Half sequence - controller reads signal of petrol injectors 1 and 2 and according to them controls LPG injectors as follows: 1 with odd and 2 with even.

For cars with complete sequence, options with half and non sequence should not be selected.

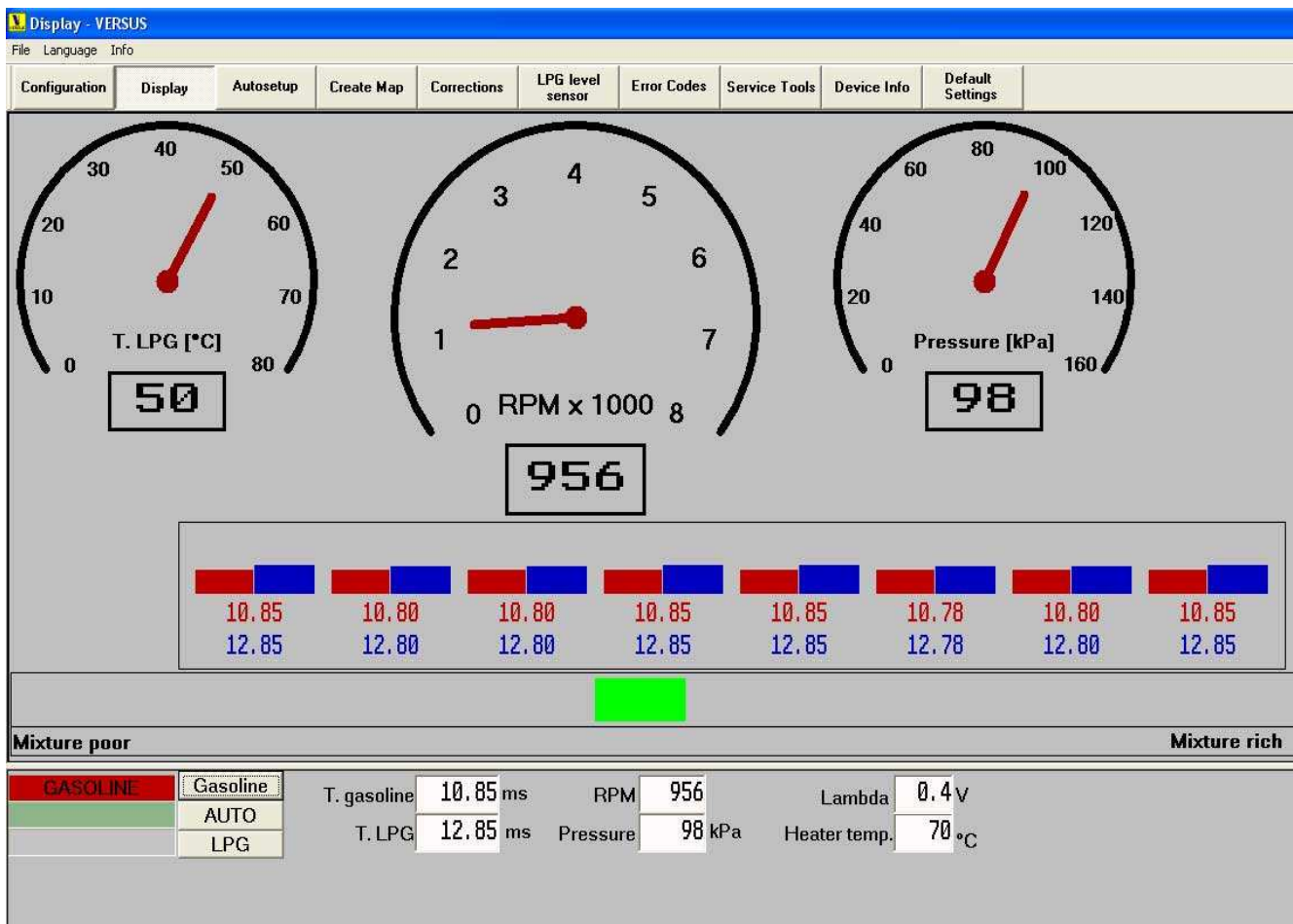
- 13) Gasoline injectors activated by +12V signal** – this option enables to chose non standard petrol injection control at which the injector's opening is possible by adding +12V. By standards petrol injectors are activated by adding mass. If the display of "T. Gasoline" (below on the screen) is unreal or even abstract (above 40 ms or 0 ms) tick this option.



- 14) Enable LPG Injectors current overload control** – it is to be ticked in warm climate countries if 1 Ohm LPG Injection RAIL was used.

DISPLAY

First Overview:



After selecting a bookmark '**Display**' the software shows the parameters of an engine work, recorded by a controller. The parameters that you can observe are as follows:

- Vaporised phase LPG temperature (50 °C on print-screen above)
- Engine speed/RPM (956 RPM)
- Reducer Pressure (98 kPa on print-screen above)
- Time of injection for all injectors (Gasoline – red shining, LPG – Blue one)
- Provided by violet wire is connected to Lambda sensor signal there is possibility to observe LPG/AIR mixture composition (poor/rich) – 0.4 V on the print-screen above.

Than at the bottom of the screen you can observe some more parameters:

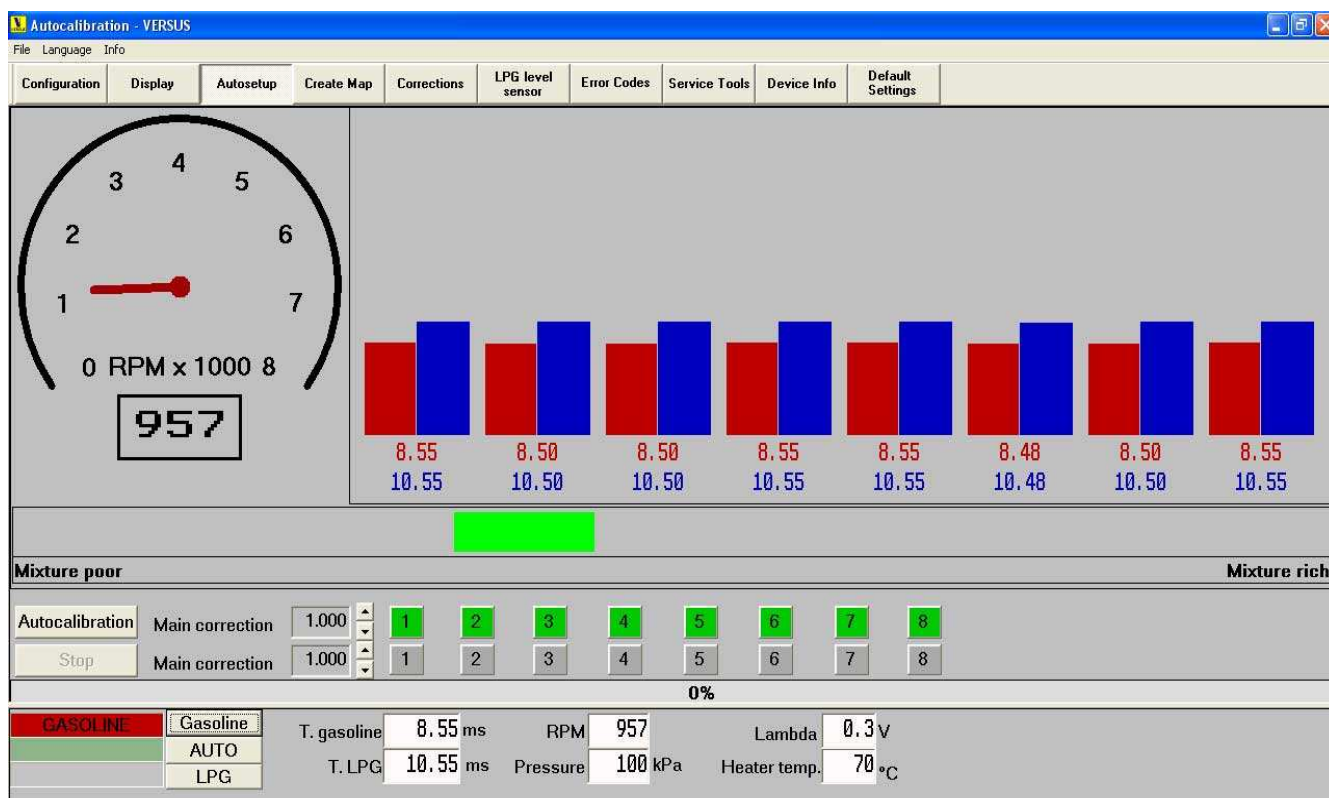
- "T. Gasoline" and "T. LPG" below (ms)
- RPM and pressure (the same as on visualization above)
- Lambda value (V)
- Reducer temperature (Heater temperature).

On the left bottom side of the screen you can see red shining "**GASOLINE**". It means that the engine works on Gasoline at the time. You can manually switch the engine to LPG by pressing "**LPG**" button below. Than the engine will be supplied with LPG. There is an option of automatic switching between Gasoline and LPG ("**AUTO**" tab) after fulfilling certain conditions (Temperature, RPM).

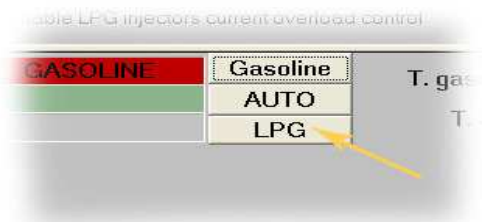
Display options can be useful when you are not close to the computer but need to observe the parameters of engine working.

AUTOSETUP

First overview:

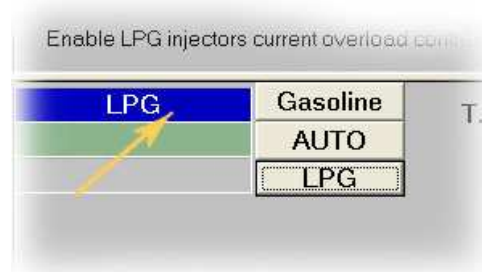


Before clicking "**Autocalibration**" it is recommended to switch the engine to LPG manually in order to fill reducer and Injection RAIL with LPG.



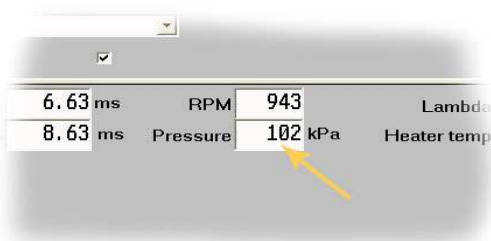
Click on "**LPG**" Button

Before clicking on "LPG" button "GASOLINE" is shining (red color - the engine works on Gasoline). After pressing "LPG" button the engine starts to work on LPG (Blue LPG starts to shine, as below).



After pressing LPG the engine will turn off (no LPG in Reducer, LPG hoses, Injection RAIL).

Notice: Before first switching to gas, the engine should be warmed up on petrol so that the LPG reducer's temperature sensor (switched to reducer's body) shows temperature higher than 40 °C.



Switch the engine once again to LPG and observe the pressure on the screen. If the pressure is in the region of 100 kPa you can go to "Autocalibration".

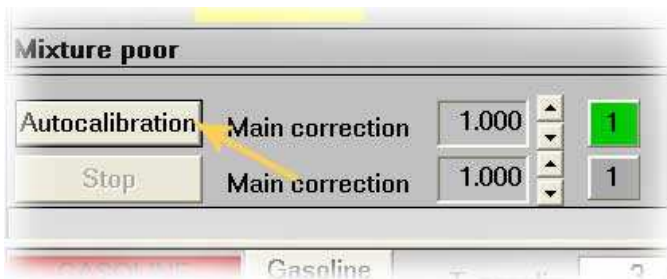
After starting **Autocalibration** the program will be switching the controller from GASOLINE to LPG and adjusting the injector step by step.

It is recommended to carry out Autocalibration on low RPM. When the car turns off while performing Autocalibration, the preliminary Autocalibration can be done on higher and stable RPM speed but than switched again to lower speed.

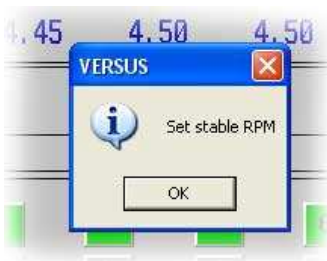
First switching to LPG should be made on higher and stable speed/rev approx. 2000/ 3000 rev/min. **After switching, it should be checked whether the reducer is set to recommended pressure that is from 100kPa to 120kPa.**

After switching to LPG slowly increase speed/RPM to neutral gear. If the engine turns off or is unstable while increasing the speed, it means that factory corrections of Versus controller are too small or too big to keep the engine on neutral gear. In this case keep the engine on higher and stable rev/speed. Afterwards, the preliminary auto calibration should be performed on higher speed/rev: 2500- 3000 rev/min.

While starting AUTOCALIBRATION main corrections should be at the level of 1,000 ms. If you change the value e.g. to 4,000 the engine will turn off while Autocalibration.

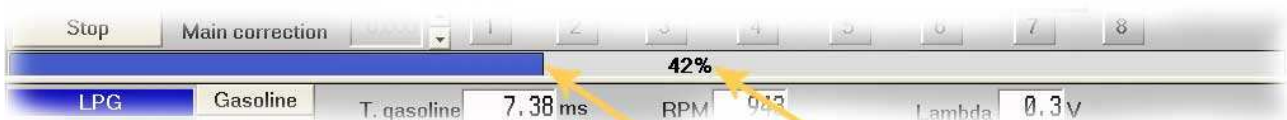


There appears the panel where you write down data of assembling service, capacity of the engine, and LPG Injectors **nozzles** size [mm] (useful while future servicing when LPG injectors hidden and the access to them is difficult). The panel opens only with the first start of auto calibration.

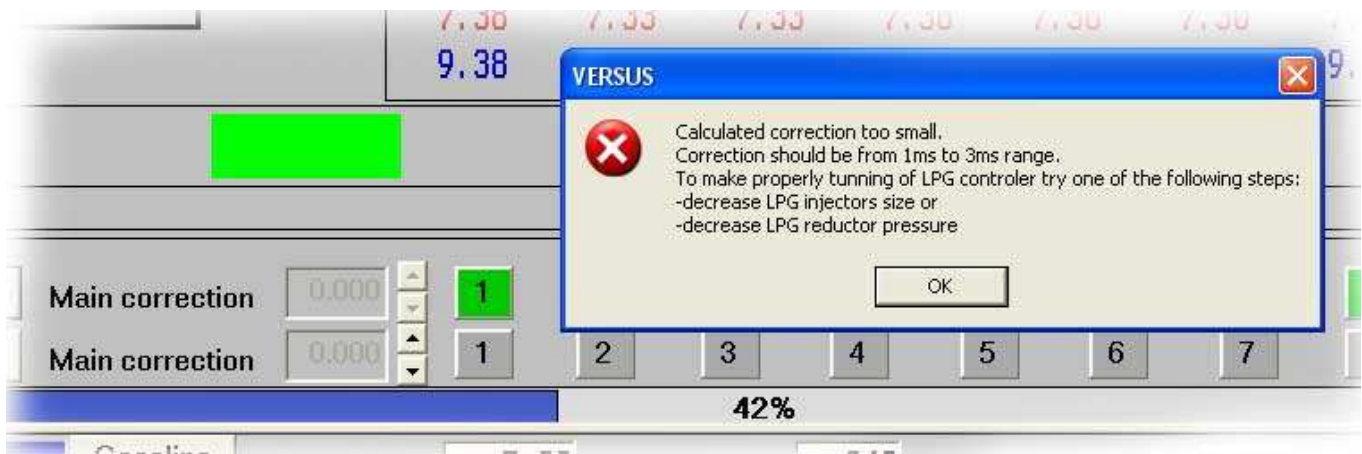


After the notice 'Set stable RPM' appears, click '**OK**' and the AUTOCALIBRATION will automatically start. Than the engine will be automatically switched between Gasoline and LPG. You can observe that on the left bottom side of the screen.

You can observe the stage of AUTOCALIBRATION on the strip (blue one) ore in percentage (42 % on the picture below).



When the corrections counted during auto calibration procedure are far from the correct range, the user is informed about it by the application.



Generally the value of "Main Correction" after AUTOCALIBRATION and while AUTOCALIBRATION should be between 1 ms – 3 ms. Main correction means how more "ms" LPG Injectors are opened in comparison to Gasoline injectors opening time. Basically LPG is a fuel different from Gasoline – therefore the time of LPG Injectors opening (ms) should generally be higher.

There are two situations possible:

- *When chosen LPG injectors nozzle size were too big* (calculated "main corrections" are too small – as above), then during auto calibration appears an announcement telling of the necessity of reducing injectors' nozzle size or decreasing LPG reducer pressure.
- *When chosen LPG injectors nozzle size were too small*, then appears an announcement telling of the necessity of increasing injectors' nozzle size or increasing LPG Reducer pressure (manual regulation on reducer's body).

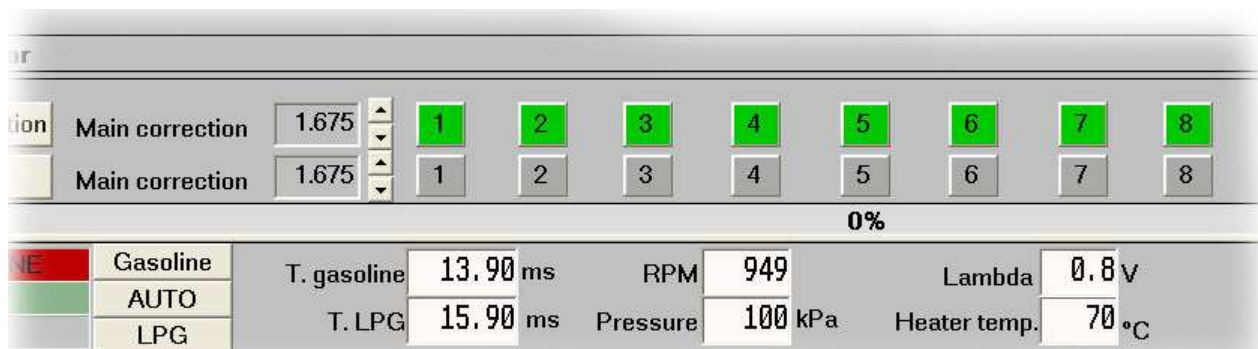


If you change any of the parameter (LPG injectors Nozzles' size, Reducer's pressure) there is a necessity to make AUTOCALIBRATION again. If the engine turns off while AUTOCALIBRATION while main correction are 1,000 ms you can increase the value to e.g. 2.000 ms.

Next, press **"AUTOCALIBRATION"** when the car is on idle.

In the region of 50 % stage of AUTOCALIBRATION first "main correction" change should be visible (If you initially establish 1,000 ms it could be e.g. 1.250 ms). It should be between 1.000 ms – 3.000 ms. If it is in that range it means that the size of LPG injectors nozzles as well as Reducer's pressure are correct.

Two different "Main corrections".



There are two different corrections, useful especially in case of two head engines.

E.g. if one side of the engine works better (pressure on the cylinders is better) there is a possibility to press "5", "6", "7", "8" buttons and change the value of second main correction. Other words; you are to observe in the software screen the difference between Gasoline injection time and LPG Injectors time. Than if the difference for the cylinders 1-4 is different than for the cylinders 5-8 you can change first or second correction to make proper correction for the second side of the engine. It is to be done manually.

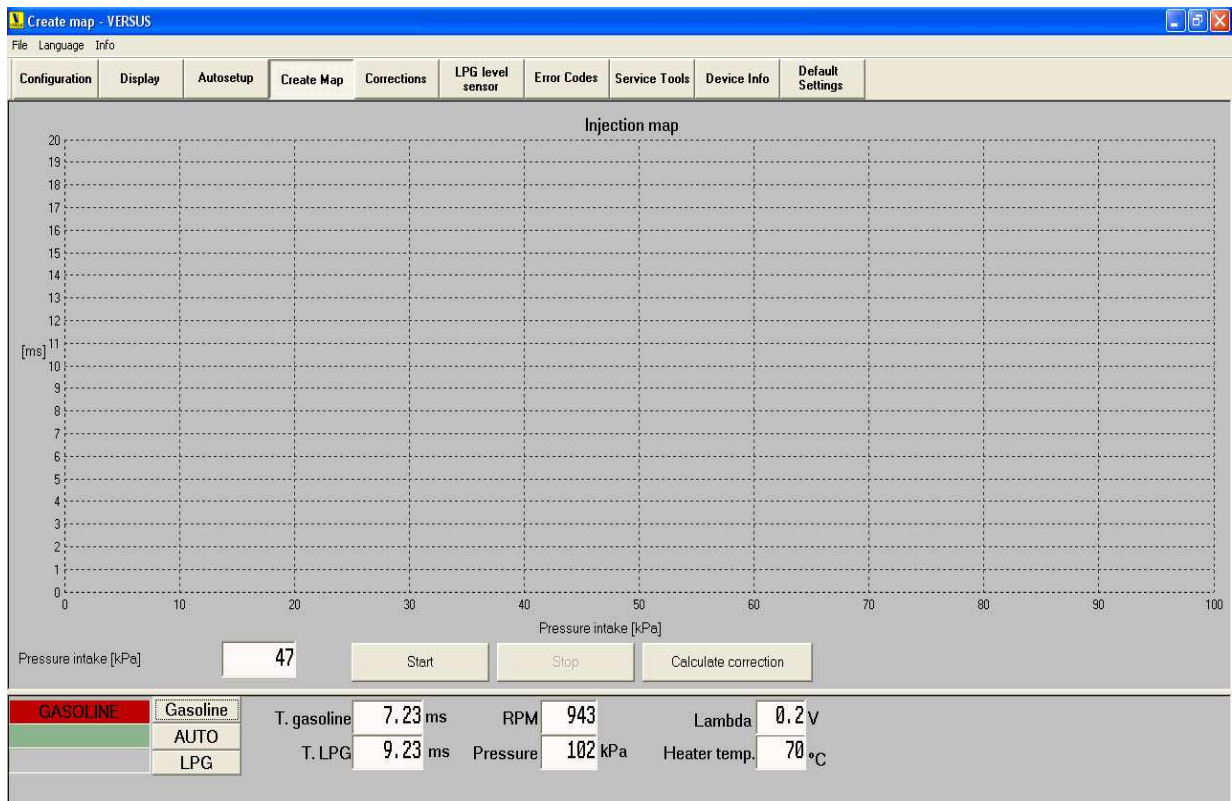
If everything is correct the system does not display any Error Codes. And the engine switch from Gasoline to LPG with no shaking. The engine will switch to LPG with no shaking provided by:

- The sizes of LPG injectors' nozzle size are correct
- Reducer pressure is correct
- Main correction are between 1,000 ms – 3,000 ms
-

Notice: AUTOCALIBRATION does not guarantee a proper running of the engine supplied with LPG in whole range of engine's loading. It is strongly recommended to go to **"Create map"** and to make Calibration while driving, especially in EURO 4 norm cars.

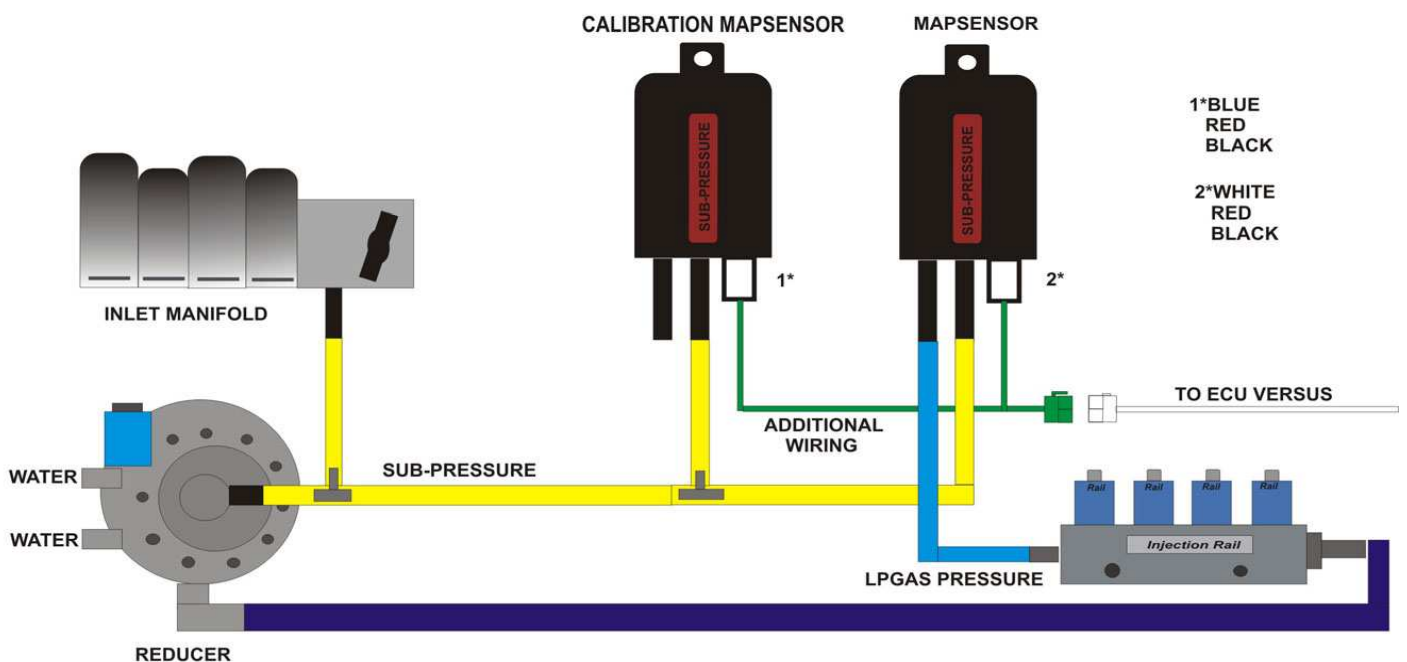
CREATE MAP

First overview:



In order to "Create map" you have to switch additional Calibration map-sensor according to following scheme:

CALIBRATION MAPSENSOR CONNECTION SCHEME



- Calibration map-sensor is to be connected only to **"Subpressure" / "Vacuum" / "Podciśnienie"**.
- Plug with Blue, Red and Black wires is to be connected to Calibration Map-sensor.
- Plug with White, Red and Black wires is to be connected to ECU VERSUS map-sensor.
- If Calibration map-sensor is properly connected 'Pressure Intake' is shown in the software

Calibration procedure while driving (CREATE MAP) is as follows:

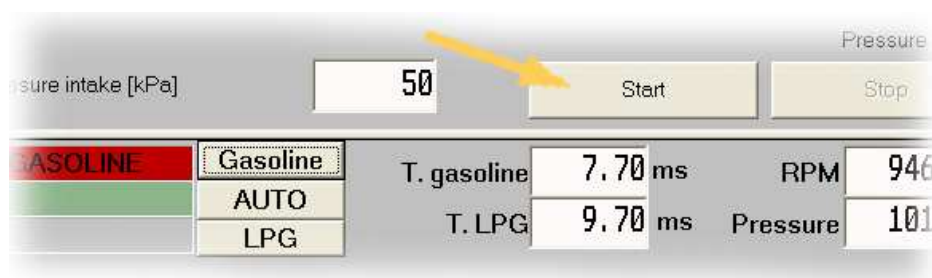
- a) Connection of Calibration Map-sensor (described above).

- b) Switch the engine to GASOLINE

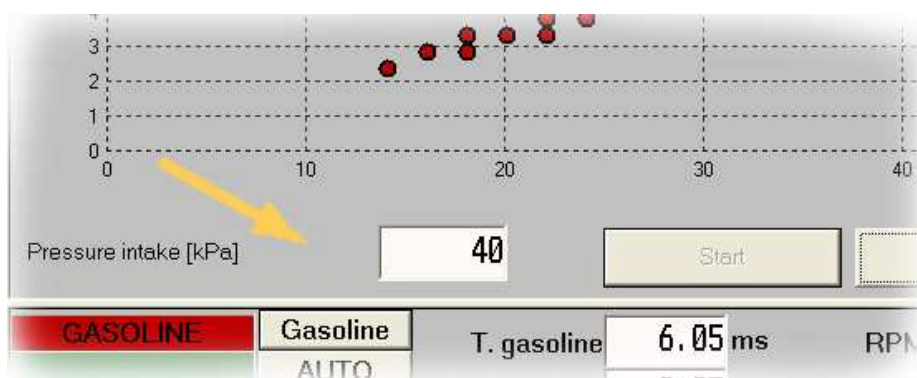


- c) Turn the lights, clima on.

- d) Press "START"

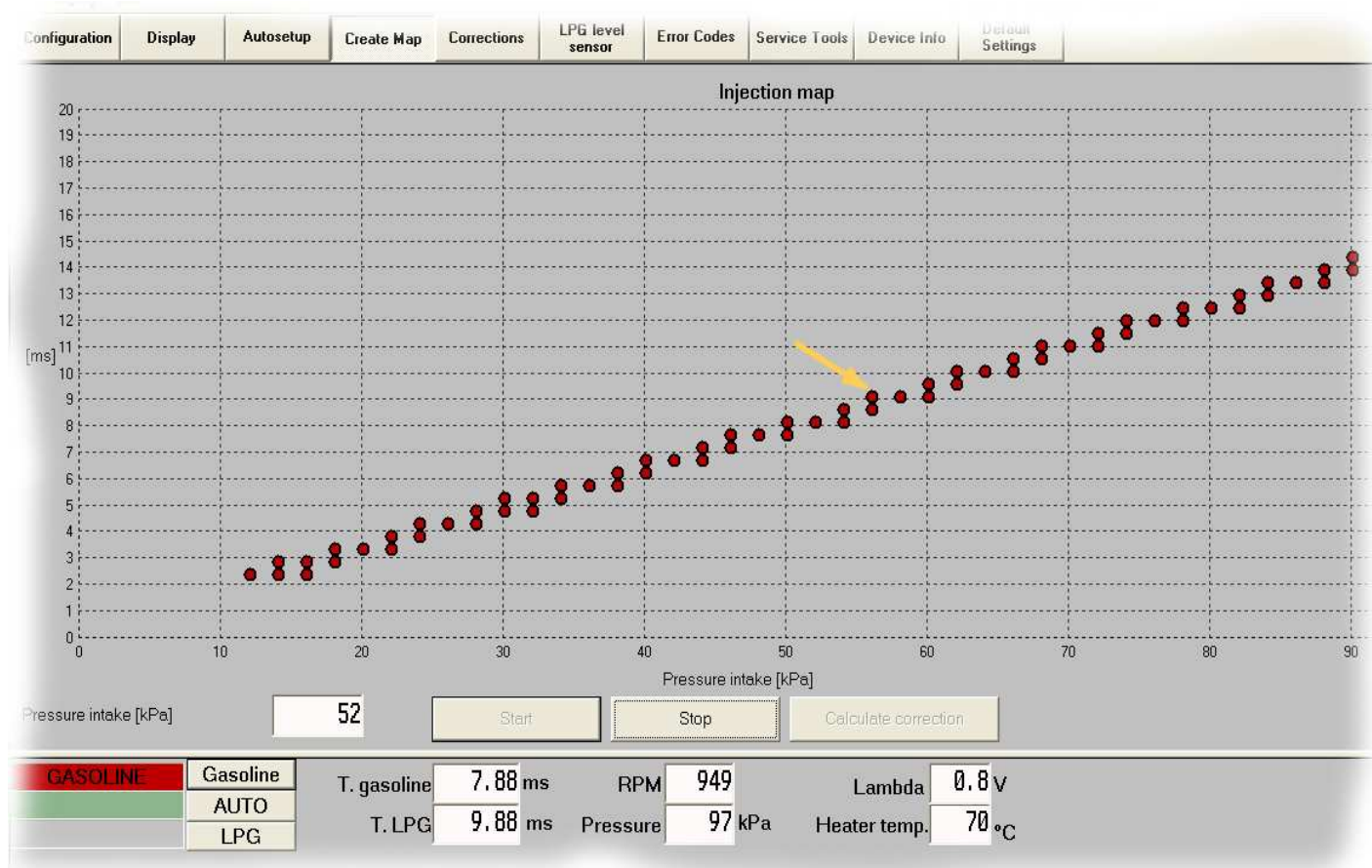


- e) After that you are to start test road drive on Gasoline. It is recommended to drive on Gasoline for about 5-10 min, than the same for LPG. You are about to observe pressure intake value (picture beside). Test drive should be done on the basis of different values of "pressure intake". Other words – you should drive with the value in the region 40 [kPa] for about 5 sec. (as first gasoline points appear – red ones). The same drive should be made for other values of pressure intake. On each gear/pressure intake value some GASOLINE points have to be collected (1st gear – 4000/5000 RPM, 5th gear – 40/60 km/h etc.).



It is essential to collect almost several gasoline points for each range of engine loading (low, medium, high), for different values of "Pressure intake"!

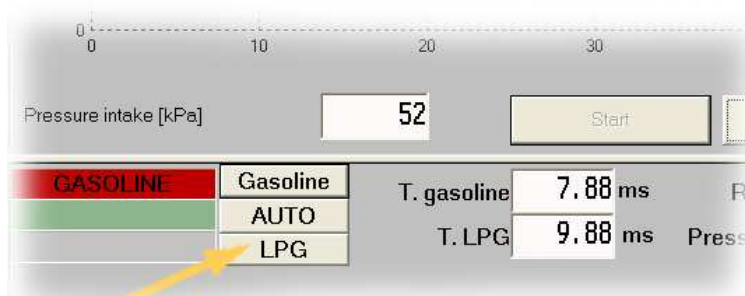
If test drive on Gasoline is properly done the map should be as follows (sample print-screen):



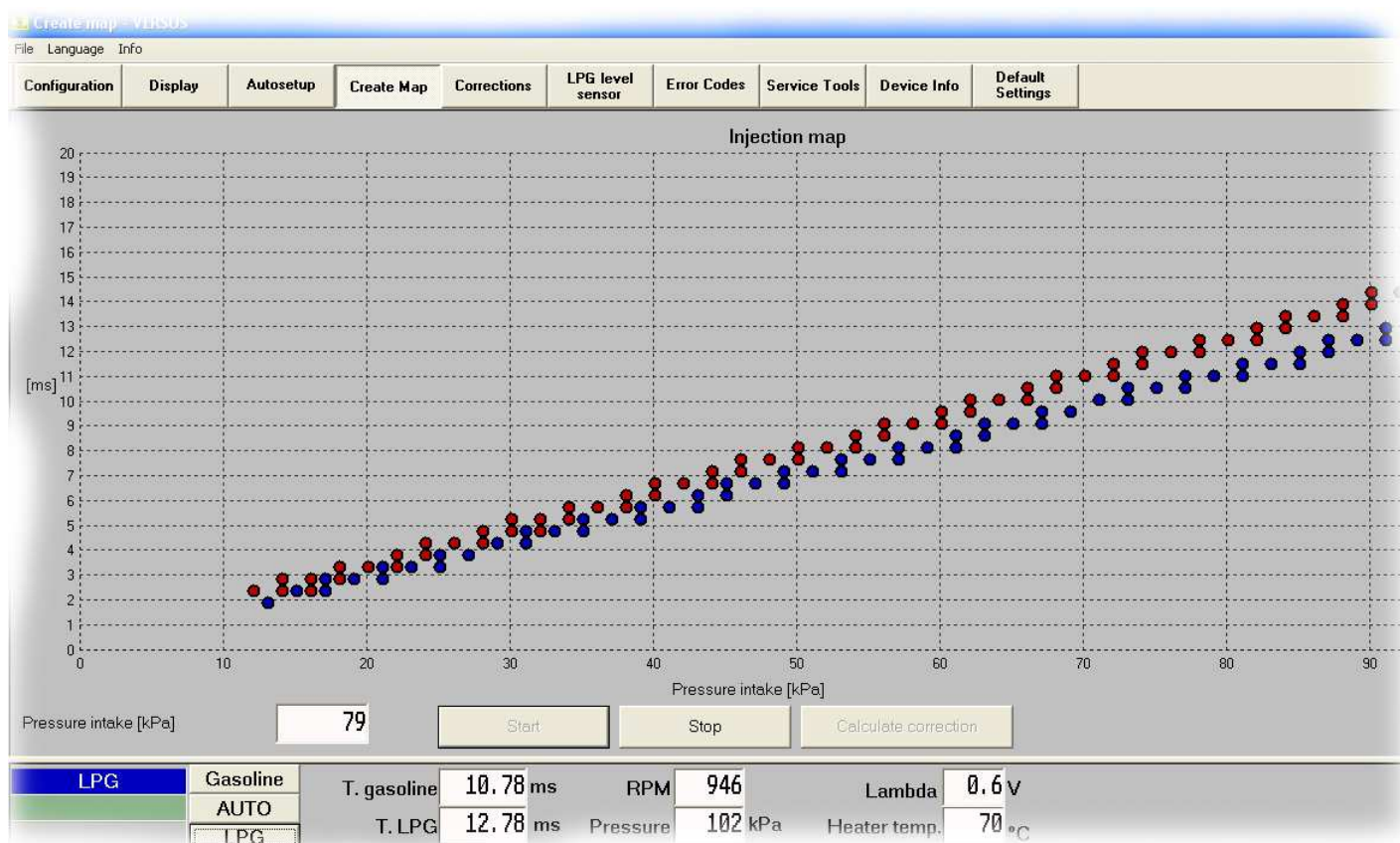
- Vertical axis shows different values of injectors opening, horizontal axis shows different values of Pressure intake (sub-pressure in inlet manifold).
- Sub pressure below 40kPa means low load of the engine, above 90kPa means full load.
- On the picture above you can observe, that for the value of "pressure intake" in the region of 55-56 [kPa] the time of Gasoline injectors opening is about 9 ms (marked gasoline point).
- Red points create GASOLINE map (picture above) while blue ones create LPG map (picture below).
- **The most number of different GASOLINE/LPG points the better.**

If you managed to collect adequate number of Gasoline points you can go to next step.

- f) Start the same test drive on LPG. Press "LPG" button and do similar LPG test drive. It should be done according to the rules described above (different values of "pressure intake", the most number of LPG map points the better). You can switch the engine to LPG while driving.

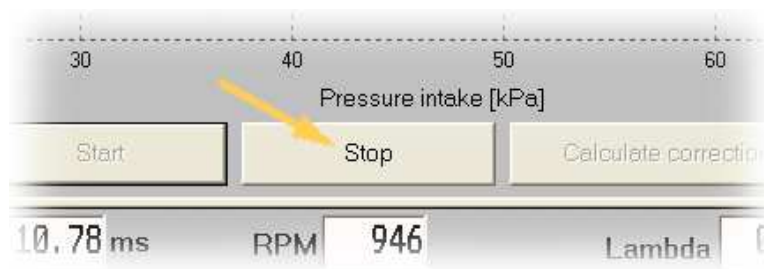


g) If Gasoline test drive is properly done the map should be as follows (sample):

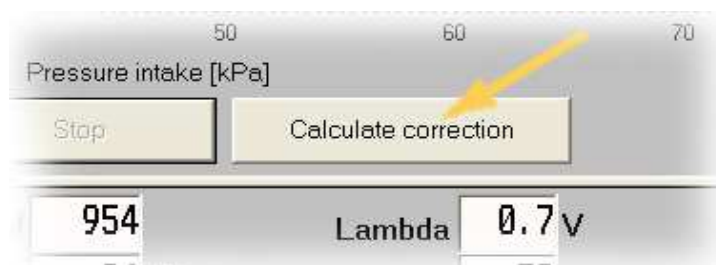


It is optimal to collect the most number of GASOLINE and then LPG point in whole range of "Pressure intake" (from 15-20 to 90-100 [kPa]). The controller while such drive measure the value of GASOLIN/LPG injectors time opening for different values of sub-pressure. If collecting GASOLINE/LPG points is finished you can go to next step.

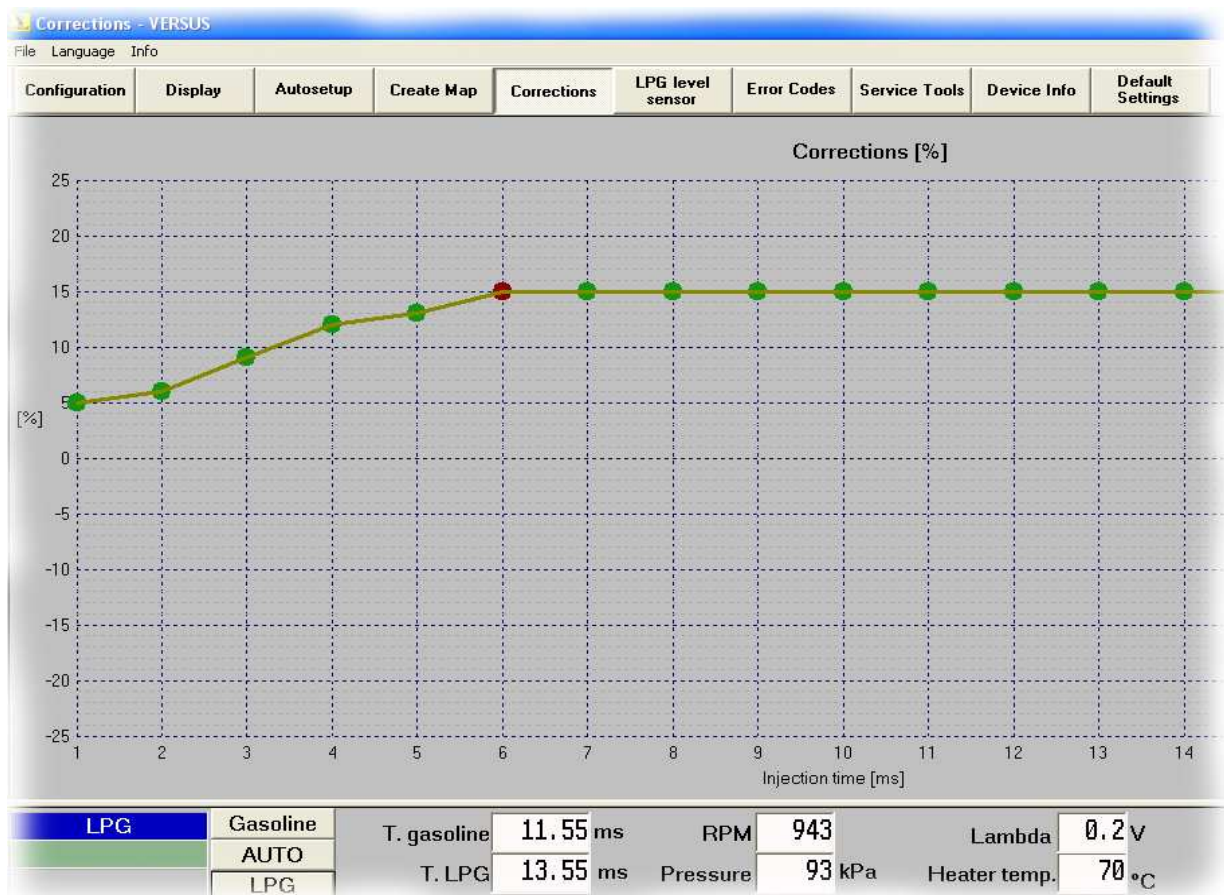
h) Press **"Stop"** button.



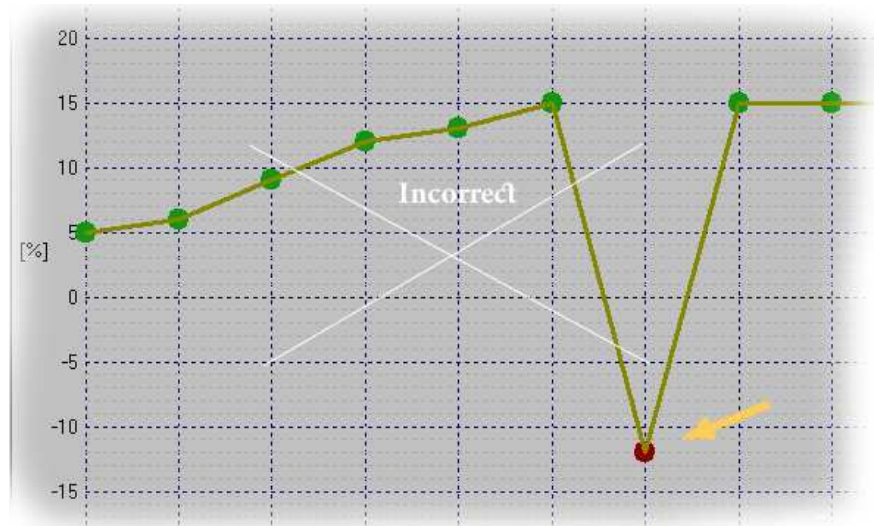
i) Than press **"Calculate corrections"**.



j) The controller automatically calculates correction and switches us to next bookmark – **"Corrections"**. In this case the corrections are as follows (sample picture):

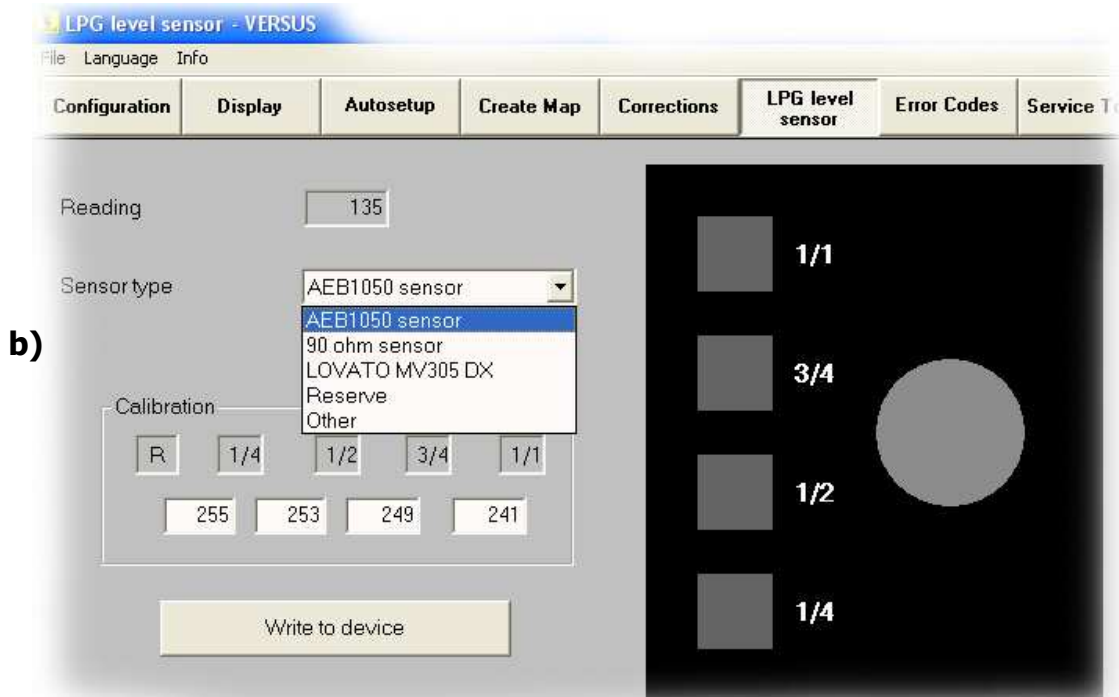


- The sample graph above shows controller automatic calculation of LPG injectors time opening (how many ms they will be opened in comparison with Gasoline injectors).
- E.g. for the injection time of 1 [ms] corrections were increased from 0% to about 5 %)
- For the injection time of 6 [ms] counted corrections are at the level of 15 %.
- Corrections counted while "creating map" can be manually modified (manual corrections of +/- 25% for certain time of petrol injections). Graph modification is made by a mouse or keys ←, ↑, →, ↓.
- E.g. if the engine works unstable while the value of gasoline injection time of 5 [ms] you can manually increase the value of correction for defined Injection time.
- Manual modification, if done, should be slight. Rapid increase in that correction could cause unstable work of the engine.



OTHER BOOKMARKS OF VERSUS SOFTWARE

a) **LPG level Sensor.** At this stage you have to chose the type of LPG Level Sensor Used while installation.



The application has predefined settings for definite sensors:

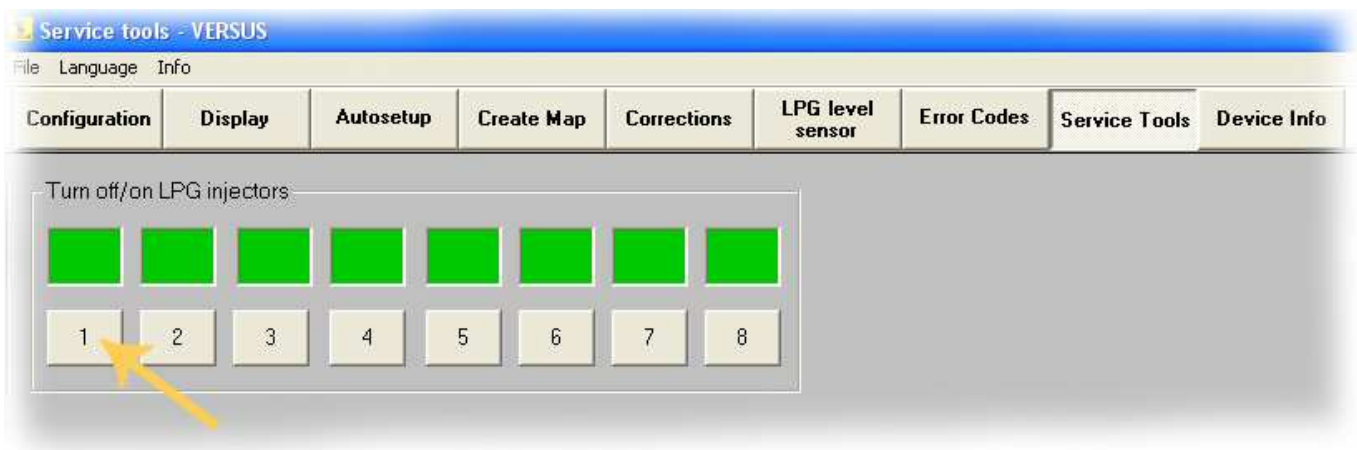
- AEB 1050 and compatible
- 90 OHM sensor
- LOVATO MV305 DX
- Reserve
- Other

The rest of sensors can be calibrated manually. It should be done according to the current indication displayed by the sensor (on the scale 0-255). Serve it 4 edit boxes that determine the range of indications for a definite sensor condition, $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$, full.

b) Next Bookmark – “**Error Codes**”. In order to check if any Error exist – press “Read from device”. If any error appear it is essential to verify given indication. Than press “Clear Errors”. The controller will automatically switch the engine to Gasoline.

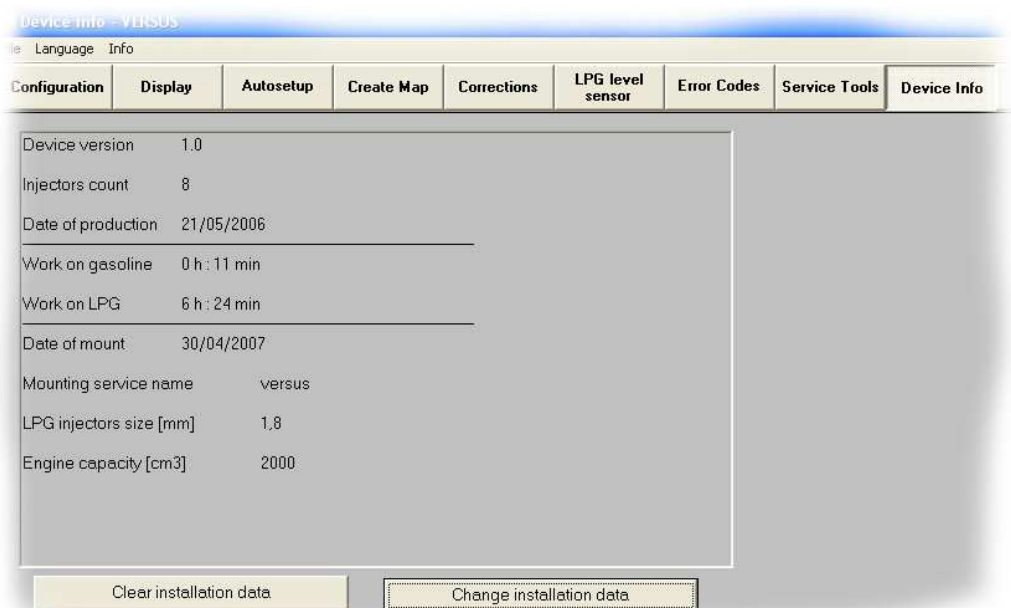


c) **"Service Tools"** bookmark.



At this stage you can switch different cylinder petrol supply off. It is useful especially in case of 5-8-cyl. cars. If the engine work unstable and you predict that one of the cylinder does not work properly you can switch the cylinder off to check if it works correctly by pressing numbers buttons (1-8). In case of 8-cyl cars it is hard to find out which one does not work correctly.

d) **"Device info"**. This bookmark includes ECU VERSUS info as well as other parameters useful while SGI VERSUS servicing (Size of LPG injectors' nozzles, Engine Capacity etc.).



e) **"Default settings"**. If you press that button such communicate appear. You can restore Default settings (Tak – YES, Nie – NO).



Finally, you can observe engine parameters in "**Display**" Bookmark. If everything is correct you are about to:

- 1) Close VERSUS Software
- 2) Turn off the engine
- 3) Take additional Calibration Map-sensor off.
- 4) Give the car to the customer back.