

# VERSUS Software ver.3,01 - manual

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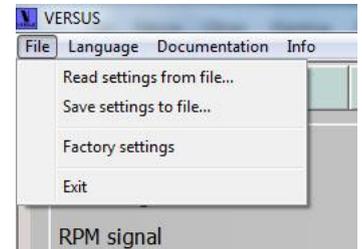
## 1). Basic instructions of use.

The program is delivered in a zipped file and does not require any installation. It is recommended only to copy the program file to your computer's desktop. However you also have the option to copy the entire folder containing all files ("firmware", "mfc", "msvcp", "doc" and others) on the CD to your hard drive and to create a shortcut to the application. You cannot copy ONLY the file with the "VERSUS" icon from the CD folder to your computer. This kind of installation can cause a software miss-function. Application in V3.xx version is compatible with ECU in 2.xx version.

### Software's top bar menu:

1. **"File"**. There is the possibility to save software settings (tune) to a file after the calibration of the vehicle has been completed, or later read (upload) of settings from an already saved file (tune). There is also the function to restore the ECU's factory parameters (after confirming the choice). "Exit" will close the software. **WARNING:** After restoring the ECU back to factory parameters, either re-calibration or re-loading your settings from a file will be required.
2. **"Language"**. This will change the software's language. Please make sure your computer has the selected language already installed in Windows operating system.
3. **"Documentation"**. A kind of software shortcut forwarding the user directly to the technical documentation already stored in the "Doc" file folder inside the software file. There is a possibility to copy any file to the "Doc" folder.
4. **"Info"**. After choosing "Info...", the version of the software the installer is using will be exposed.

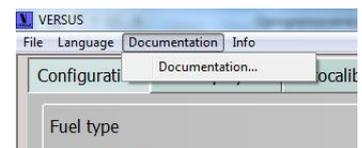
Picture no.1a: File



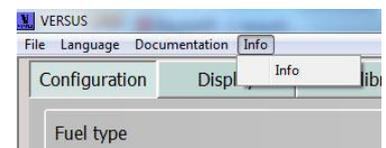
Picture no. 1b: Language



Picture no. 1c: Documentation



Picture no. 1d: Info



Picture no 1e: VERSUS Software start page

If the program is opened and is not connected with the ECU, the "no connection" window will appear with two options: "no connection mode" and "demo mode". In the "no connection mode" all readings (in all bookmarks) will equal zero and there will be a "no connection" message in the left bottom corner. The program will keep searching for a connection with the ECU and once connection is made readings (your vehicles parameters) will appear.



## 2). Connection between the computer and the VERSUS ECU.

It is always recommended to use an original VERSUS interface cable to connect the computer with the VERSUS ECU. If a non-original interface cable used there is the possibility for no connection or the connection with the controller may be sporadic.

The VERSUS original interface cable is always supplied with the CD. On the CD there is:

- The driver for the USB Interface cable must be installed before the first use of this interface cable. Please study a separate manual located on the CD which explains this process in detail.
- The most up-to-date software with its technical documentation.



Picture no 2a: VERSUS ECU USB interface cable

The software automatically searches for active serial ports and makes a connection if possible. If there is a connection problem (if there is the “no connection” error and software shows the “Demo” button) it may mean that the Interface driver has not been installed properly or that the Interface is faulty.

## 3). VERSUS ECU software top menu and its bookmarks.

After the software opens, the main menu with bookmarks' selection appears (picture no. 3a).

At the top there are the following buttons:

- **“Configuration”** – basic settings of the VERSUS ECU.

- **“Display”** – visualization of some basic parameters.

- **“Auto-calibration”** – Auto-calibration of the engine on idle.

- **“Mapping”** – calibration in driving conditions.

- **“Corrections”** – corrections configured by the software with the possibility of their manual modification.

- **“Map”** – advanced manual modification of time injections' corrections.

- **“Sensor”** – selection of the gas level sensor's type; its configuration and readings are shown in real time (the Switch readings are delayed).

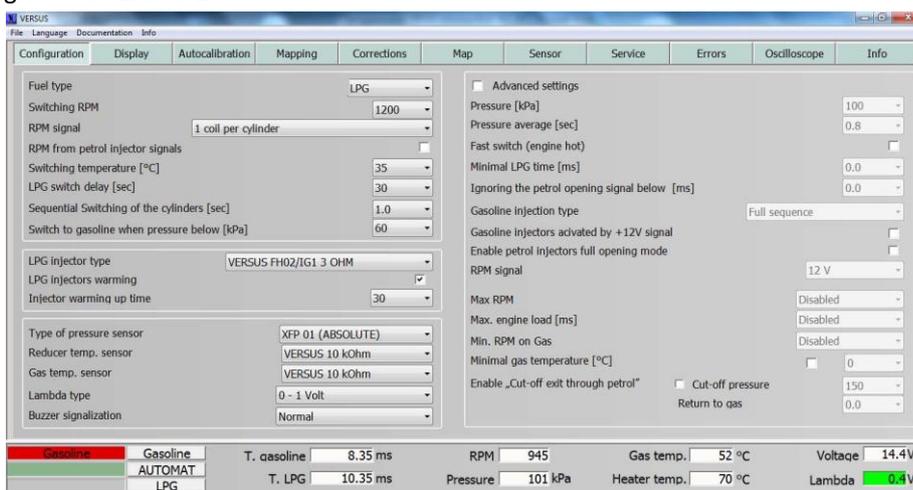
- **“Service”** – advanced workshop tools.

- **“Errors”** – codes stored in the VERSUS ECU (in case of OBD ECU – OBD errors will be shown as well).

- **“Oscilloscope”** – the tool used for recording real-time parameters' for further analysis purposes.

- **“Info”** – contains the data: VERSUS ECU version (firmware version), number of cylinders, production date, unique ECU's serial number, drive time counters, installation data, next inspection reminder function, firmware update.

Picture no 3a: main menu



**Note 1:** Any change to the VERSUS ECU calibration parameters (apart from GAS level sensor where “write to device” button needs to be clicked) is saved to the VERSUS ECU memory instantly after changes are made by the installer.

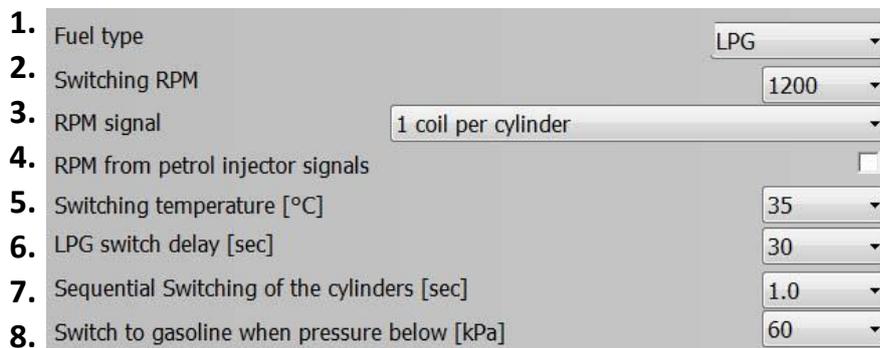
**Note 2:** When pressing **“restore default settings”** the VERSUS ECU will revert back to the factory settings (all calibration settings like: corrections, maps and other calibration settings will be deleted from the VERSUS ECU memory). In that case the ECU will switch back to GASOLINE mode and will require the calibration process to be started again.

#### 4). "CONFIGURATION" bookmark – basic settings

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

Picture no 4a: configuration bookmark

1) **Fuel Type.** There are two options: LPG and CNG. The choice of this parameter determines the strategy used by the ECU. This strategy works resulting from the differences in the physicochemical properties between LPG and CNG. It is mandatory to select the correct fuel type in accordance to the KIT installed on the vehicle. The selection of gas type also changes all the relative phrases in the software that switches them between "LPG" or "CNG" depending on the fuel type selected in this section. Later in this manual the name "LPG/CNG" or "GAS" will be used to describe the GAS (CNG/LPG) fuel injected to the engine.



1.	Fuel type	LPG
2.	Switching RPM	1200
3.	RPM signal	1 coil per cylinder
4.	RPM from petrol injector signals	<input type="checkbox"/>
5.	Switching temperature [°C]	35
6.	LPG switch delay [sec]	30
7.	Sequential Switching of the cylinders [sec]	1.0
8.	Switch to gasoline when pressure below [kPa]	60

2) **Switching RPM.** Determined by the Ignition system. This option provides the RPM value at which an engine switches from gasoline to the alternative fuel supply (assuming the reducer's temperature (coolant temp) and switch delay parameters have already been met). Recommended level is between 1100-1500 RPM. This value is only used for initial switching. Vehicle will still run on the alternative fuel below this RPM after initial switch.

3) **RPM Signal.** Determined by the ignition system in the vehicle. Choose the one that consistently reads the same value as your tachometer inside vehicle. Alternatively, change the threshold of this input (described in point no. 25 - see below). There is a possibility to set up this parameter experimentally (to observe RPM at the bottom of the screen until real RPM of the engine are the same as RPM displayed in the software).

4) **RPM signals from Petrol injectors.** Selecting this option allows to use RPM signal coming from petrol injectors as nominal one. After selecting this option the controller will no longer use the brown wire signal. When this option is selected, the RPM signal divider is set to automatically recognize the correct RPM value (the RPM signal window shows "From Petrol Injectors" with optimal divider value recognized by the ECU), which depends on the gasoline injectors' work type. It may be necessary to select correct "RPM signal" (point no 3) value to have correct reading of RPM value. When this option is selected, the software shows 0 RPM in case of injector cut-off conditions (no Gasoline injection time signals); however this is normal and is not a malfunction in engine operation. Note: this function cannot be used in engines where no vacuum is provided inside the inlet manifold (BMW Valvetronic system and some of Peugeot models).

5) **Switching temperature.** The value of the minimal temperature at which the controller can automatically switch to the alternative fuel supply. After reaching it, the controller is waiting for the fulfillment of other parameters, such as: the switch RPM and the switch delay. Recommended minimum temperature for LPG is 35°C. Lower temperature will cause faulty installation operation and can cause damage to the engine or the catalytic converter. The temperature for CNG may be lower because decompressing CNG does not absorb large amounts of heat. Recommended value is 30-35°C.

6) **Switch delay.** This is the time between the start of the engine and the moment when the controller switches to the alternative fuel supply if all other conditions are met, such as: the switching temperature and the switching RPM. The switch delay can be increased by the injectors warming up time when the warming option is active (see description in point 10).

7) **Sequential switching of the cylinders.** This is the time between successive cylinders switching from gasoline to the alternative fuel supply. Switching cylinder by cylinder makes transition from gasoline to the alternative fuel unnoticeable. These values can be changed freely from 0.0, which means that all cylinders are switched at once, to the value of 5.1 s. This time is the delay time between switching next cylinder. Switching is done synchronously, so if one cylinder's injection is in progress the controller waits for its successful end and then switches to the alternative fuel.

8) **Switching to Gasoline when pressure below.** It is the pressure at which the controller returns to the gasoline supply in case of LPG/CNG depletion. The value of this parameter is automatically recorded as about 60% of the reducer operating pressure (stored in the controller as the operating pressure). If the pressure drops while driving due to the engine high demand for fuel (e.g. acute acceleration), but the tank is filled over half, the controller will switch to the

AUTO mode (gasoline) for a moment and after reaching the switch delay parameter it automatically returns to the CNG/LPG supply. In this case, the controller also waits for a higher RPM to switch than the set value. In the case a pressure drop is recorded and the level of CNG/LPG in the tank is below half, the controller will return to the gasoline supply with the empty CNG/LPG tank signal illuminated (the LED lights running up and down). If the controller registers a growth of the fuel level above half (fuelling), it will automatically be switched into the AUTO mode.

Picture no 4b: configuration bookmark

9) **LPG/CNG Injectors.** This is the check box of mounted injector type. Depending on the type of injector used the controller applies the appropriate

9.	LPG injector type	VERSUS FH02/IG1 3 OHM
10.	LPG injectors warming	<input checked="" type="checkbox"/>
11.	Injector warming up time	30

strategy of the injector control. Special attention should be paid to the resistance of the used injector because incorrect settings can cause damage to the controller or a short circuit / overload of the vehicle's electrical system. The list of supported injectors can be easily extended by changing the software in the controller-firmware. If using original VERSUS injectors (highly recommended) this value will be preset for you to the VERSUS FH02 option (shown above).

10) **LPG/CNG injectors warming.** Running this function prepares the injectors to switch to the CNG/LPG supply through the power of short pulses that are on the border of the injector actuation. This function is especially useful when the ambient temperature fluctuates around freezing; the combination of moisture and contaminants contained in the CNG/LPG can cause a noticeable jerk during the first switch after a prolonged time sitting in the cold. Switching this function "in advance" will not cause any fluctuations. This function is always activated when the reducer's temperature is lower than 50°C. The activity of this function increases the time to switch the length of the warm-up time value.

11) **Injector warming up time.** The value specifies how long the injectors are warming up (in seconds). Warm-up time is added to the time delay (for reducer's temperature below 50 ° C).

Picture no 4c: configuration bookmark

12) **Type of pressure sensor.** There is possibility to select between two types of sensors: XFP01-absolute and MPX01-standard. Installing and selecting the sensor MPX01 effects the calibration while driving needed; it should be accompanied by the dedicated

12.	Type of pressure sensor	XFP 01 (ABSOLUTE)
13.	Reducer temp. sensor	VERSUS 10 kOhm
14.	Gas temp. sensor	VERSUS 10 kOhm
15.	Lambda type	0 - 1 Volt
16.	Buzzer signalization	Normal

adapter with the second sensor conveyed only for vacuum. The use of sensor XFP01 releases of the need for additional sensors to calibrate. If VERSUS KIT is purchased then value is preset at the correct XPF 01 Sensor option.

Picture no 4d: MPX01 pressure sensor



Picture no 4e: XFP01 Absolute pressure sensor



13) **Reducer Temp. Sensor:** Depending on the sensor used, you can choose from a list of sensor types that have been used in installation and been calibrated with the VERSUS ECU. Incorrect choice of the sensor creates distortion in the temperature readings and, consequently, can lead to improper operation of the CNG/LPG injection system and even cause damage to the engine. Note: original VERSUS sensor resistance value is 10 kOhm and is preset (as shown above).

14) **Gas Temperature sensor:** There is the possibility to select another sensor type other than the VERSUS temperature sensor. Please note: original VERSUS sensor resistance value is 10 ,5kOhm and is preset (as shown above).

15) **Lambda type.** Connecting lambda system is not necessary to operate the system. The connection of violet and violet – white wires is responsible only for visualization of lambda sensor indication in the software ("Display" bookmark). If there are multiple lambda (oxygen) sensors on the vehicle, the ones before catalytic converter should be connected too for correct installation. In case there is wideband lambda sensor (or two) existing in the car the connection of these wires to such a lambda sensor is forbidden (Ex. air/fuel ratio sensors on some Toyota vehicles).

Picture no 4f: Buzzer signalization

16) **Buzzer signalization.** Normal or extended mode can be selected. Normal indication means that the beep signal is generated only in case of fuel switching



from CNG/LPG to gasoline. This situation occurs most often in a depletion of the CNG/LPG (empty tank) or a drop in the regulator's output pressure (heavy load/ high demand).

Extended indication (not recommended in normal cases) means that the beep signals to any situation of fuel switching such as: switching from CNG/LPG to gasoline - a single beep, and switching from CNG/LPG to gasoline - double beep. Also other strategies such as: maximum RPM, maximum engine load, minimum RPM, minimum temperature of the CNG/LPG, service "cut-off exit through petrol" will be signaled by sound.

**Regardless of the chosen type of alarm:**

- If maintenance service (inspection time) had been activated and has now expired it will be indicated with a triple beep signal before switching to the alternative fuel.
- If the "leakage test" function is activated by the customer while starting the engine and its test result is negative - there will be four (4) beep signals generated by the buzzer.

**5). "CONFIGURATION" bookmark – Advanced settings:**

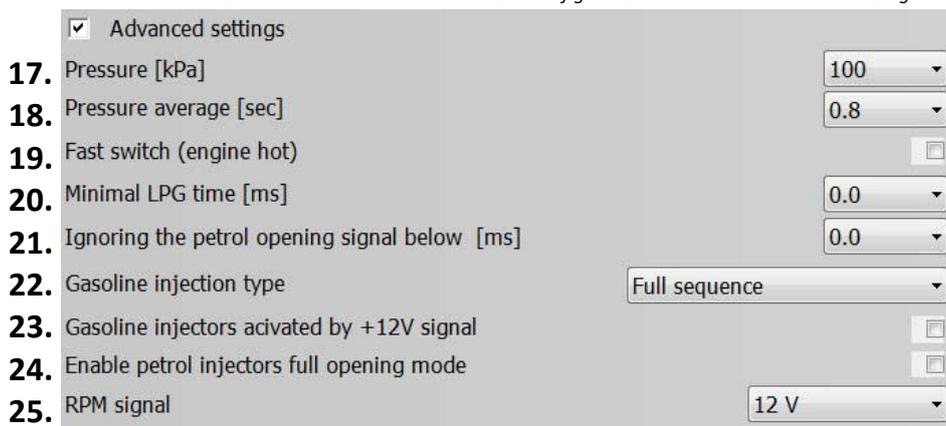
Access to the advanced settings is possible after selecting it; all functions are now available.

**17) "Reducer's pressure".**

This is the reducer's working pressure that has been stored in the controller automatically during auto-calibration on the idle as nominal one.

This is the most important information for the controller to properly determine the injection time (in the event of a pressure drop the system opens the CNG/LPG injectors for a longer period of time to keep the amount of CNG/LPG at a proper level; in case of pressure rise the ECU will shorten injection time). If the reducer's pressure has been changed manually by the installer (pressure adjustment screw of the reducer) the system will need to be auto-calibrated again. This value is automatically set during auto-calibration.

Picture no 5a: configuration bookmark – advanced settings



**18) Pressure average.** This is the period of time in which the pressure value in the low pressure line falls below the "switch pressure to gasoline below" value and will result with a return to the gasoline.

**Note:** If the value of this parameter is set up at the level of 0.8 sec and the value of "Switch to gasoline when the pressure below" is set at the value of 60 kPa, it means that:

- When the pressure of the regulator (reducer) output falls below 60 kPa and this fall will be shorter than 0.8 sec – the engine will still work on the alternative fuel.
- When the pressure of the reducer output falls below 60kPa and this fall is longer than 0.8 sec – the engine will switch to gasoline.

**19) Fast switch (hot engine).** Selecting this option will allow that if the temperature of the engine (reducer temp) after start-up is at least 50°C there will not be any delay and the controller will almost immediately switch to the alternative fuel. (Not normally recommended). This option is useful in the case of Hybrid cars with VERSUS ECU system installed.

**20) Minimal LPG/CNG Injection Time.** Entering a value will cause the controller to not send a pulse feed to the LPG/CNG injector if the pulse is lower than the entered value. Using this function eliminates the emerging problems (jerky, hesitation, stuttering) during engine braking without the cut-off when the gas injection times oscillate around the dead time of gas injectors. Example: If this value is set up at a level of 3.0 ms, the CNG/LPG injectors will not open with a lower than 3 ms time though petrol injection impulses.

**21) Ignoring the petrol opening signal below.** This function is used to eliminate the effects common for extra injections in some vehicles. These are short injection pulses of less than about 1.5ms occurring before the actual injection pulse that cause improper operation of the CNG/LPG fuel. Choosing this option means that the VERSUS ECU will not recognize petrol injection cycles shorter than the value of ms set up by the installer in this section.

**22) Gasoline Injection type.** Depending on the vehicles engine type, you can choose from the existing options: "Full sequence", "half sequence" (injectors' pair are activated with one impulse) or "non - sequence" (all gasoline injectors

are activated with one impulse at the same time). When “half sequence” option is selected the controller measures CNG/LPG injection times on the first and second channel by controlling the CNG/LPG injectors in pairs: 1+3 and 2+4. For the selected option “non-sequence” measurement is performed only on the first channel (the others have identical injection time) the CNG/LPG injectors’ control is the same as for gasoline. Type of control can be identified when the gasoline injectors are connected to CNG/LPG injection controller (ECU). Full sequence has the same amount of wires connecting each single injector with a power stage in the engine’s control unit. No matter what kind of injection, we recommend to always cut up all the gasoline injectors like for the full sequence. Not following this recommendation may provide to damage the VERSUS ECU and the engine.

**23) Gasoline Injectors activated by +12V signal.** Some vehicles have "reversed" injector control which means they are activated by the power pulse at 12 V. Most vehicles on the market are activated by the ground (GND) through the OEM ECU. If yours are read by the positive 12 volt, select this option to be able to correctly read the gasoline injection times.

**24) Enable petrol injectors full opening mode.** Continuous injection occurs sporadically at high revolution speeds (RPMs) in very volumetric efficient engines, especially turbocharged engines. Selecting this option will cause the ECU to switch back to gasoline in case a detection of this phenomenon occurs.

**25) RPM signal.** Depending on the location where the brown wire is connected will determine its sensitivity. If the revolutions (RPMs) are not being displaying correctly, you must change the sensitivity to 5V. Some ignition coils have an integrated power stage which causes the signal to be very weak and is not detected by the controller. If the signal is not visible then the controller will use the gasoline injector signals (exception: Valvetronic system).

**26) Max. RPM.** The revolution value

(RPM) above which the controller will switch to gasoline. The default setting is off. This function is disabled if "maximum load" is activated. For example, if set at 6000 RPMs then beyond this value the engine will be operated on gasoline until the RPMs fall below this value. During this function operating, the change-over switch will not signal a switch to gasoline.

Picture no 5b: configuration bookmark – advanced settings

<b>26.</b> Max RPM	<input type="checkbox"/>	Disabled
<b>27.</b> Max. engine load [ms]	<input type="checkbox"/>	Disabled
<b>28.</b> Min. RPM on Gas	<input type="checkbox"/>	Disabled
<b>29.</b> Minimal gas temperature [°C]	<input type="checkbox"/>	0
<b>30.</b> Enable „Cut-off exit through petrol”	<input type="checkbox"/>	Cut-off pressure
		Return to gas
		150
		0.0

**27) Max. engine load.** This is the value of the gasoline injection time beyond which the engine returns to operate on gasoline. This feature is designed especially for turbocharged engines where you cannot provide a sufficient AIR/FUEL mixture at maximum engine load on the alternative fuel. In this case momentary return to gasoline without signaling on the change-over switch can be obtained. The default setting is off. Injection time can be varied from 5 to 30 ms. This option is superior to “Max RPM” which means that when it is selected “Max RPM” will be automatically deactivated.

**28) Min. RPM on Gas.** Below the applied value of RPM the VERSUS ECU will switch to the gasoline supply without indicating on the change-over switch. Possible values are from 600 to 2000 RPM.

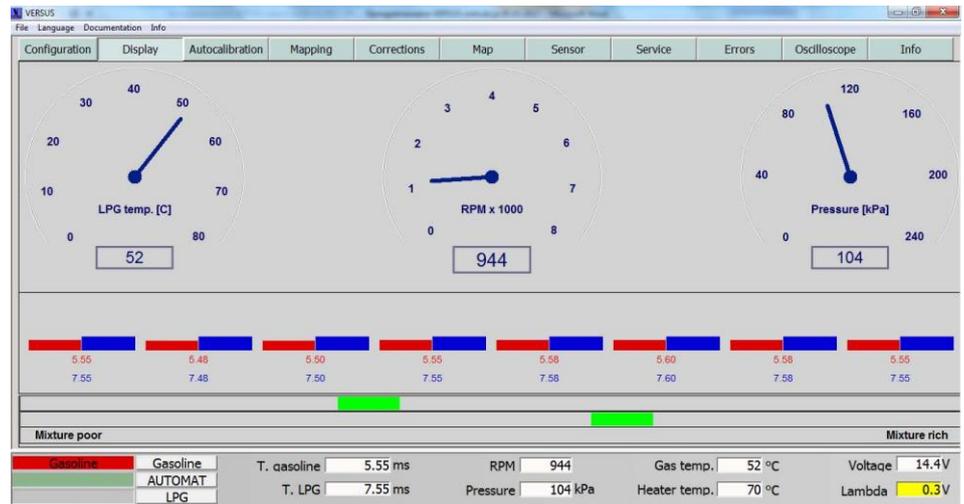
**29) Min. gas temperature.** Enabling this function starts the procedure responsible for the cyclic switching from CNG/LPG to gasoline until the adjusted gas (CNG/LPG) temperature is reached. This is indicated by the change-over switch as a return to AUTO mode for about 1min and then switching to the alternative fuel. This function works in a cyclic manner in order to heat the CNG/LPG flowing through the reducer so this gas could warm up the injectors, allowing them to work correctly. The temperature can be modified from 0 to 20 ° C. This option is useful especially when using LPG fuel.

**30) Enable “Cut-off exit through petrol”:** Feature eliminates the engine fades while exiting the engine braking phase in the situation of a significant increase in CNG/LPG pressure in the low pressure line. The controller checks the pressure during cut-off and if it exceeds adjusted value then for the time defined in the next frame the system will turn to the gasoline supply. After this allotted time the controller will return back to the CNG/LPG supply. This strategy is especially useful in turbocharged engines where the pressure excesses after the cut-off may be particularly large. Values of the parameters shall be chosen carefully so that when exiting the cut-off phase no stumbles are present.

## 6). "Display" bookmark

In the "display" bookmark all important information for the CNG/LPG ECU performance parameters are visible in the graphical form. Regardless of the selected tab, these parameters are always visible in abbreviated form in the bottom bar of the software. The bottom left corner shows the current fuel being used, eventual errors in memory and quick-choice ECU work mode: gasoline, auto, LPG or CNG. The quick-choice button is always superior to the change-over switch and all other ECU strategies. This means that it allows the user to switch the system to the alternative fuel even if the RPM or reducer's temperature is not proper – which should be kept in consideration when using this to switch.

Picture no 6a: "Display" bookmark



The parameters that are exposed are:

- GAS temperature (52 °C on picture no 6a)
- Revolutions/RPM (944 RPM on picture no 6a)
- Reducer Pressure (in low pressure line) (104 kPa on picture no 6a)
- Injection times for all injectors (Gasoline – red stripes, CNG/LPG – Blue stripes)
- If violet wires are connected to Lambda (O2) sensors, there is the possibility to observe both signals

At the bottom of the screen following parameters can be observed:

- "T. Gasoline" (Gasoline Injection times) and "T. LPG/CNG" (LPG/CNG Injection time)
- "RPM" and "Pressure" (the same as on graphical visualization above)
- "Gas Temp." (Sensor usually installed on CNG/LPG Injector Rail) "Heater temp" (sensor attached to the reducer body)
- "Voltage" coming to the VERSUS ECU and "Lambda" O2 (oxygen) sensor indication

**Note:** bottom display parameters are exposed and visible in the software regardless of the bookmark opened.

In the left bottom corner in the software actual fuel supplied to the engine is displayed ("Gasoline" – shining with red background or "LPG/CNG" shining with blue background). The fuel type can be switched in the software. In case the engine works with Gasoline and "LPG/CNG" button is clicked - it changes to LPG/CNG supply immediately. There is also an option of automatic switching between Gasoline and CNG/LPG ("**AUTO**" button). In that case the VERSUS ECU will switch from GASOLINE to LPG/CNG automatically in case switching parameters are obtained (adjusted RPM, temperature, others).

**Note:** Before closing the software it is recommended to press "AUTO". If "GASOLINE" button is pressed and then the software is closed, the engine will work with GASOLINE mode only without the Automatic switching option available. In such a case the user would have the possibility to switch to LPG/CNG by only manually by pressing the switch installed in the driver's cabin.

## Continuous injection display.

Picture no.6b:continuous injection display

Continuous injection means that the gas injectors are continuously open (there is a lack of closing the injector phase). Injection pulse is

LPG	Gasoline	T. gasoline	11.28 ms	RPM	955
	AUTOMAT	T. LPG	13.28 ms	Pressure	83 kPa
	LPG				

so long that the next pulse is applied to the former resulting in a continuous opening of the injector. This situation may occur especially in high performance engines (big power of small capacity). The continuous injection can be dangerous for the engine and in extreme cases can lead to serious damage. The cause of this phenomenon is the necessity to generate a CNG/LPG injection pulse longer than gasoline due to the physical capabilities of the CNG/LPG injectors. Another factor affecting the continuous injection is large pressure drops in the reducer caused by heavy loads. Such phenomenon can be eliminated by: increasing reducer pressure, increasing injection nozzle size or by correctly setting "Max. engine load" so the message about "Continuous injection" will not appear. The system will switch to gasoline for a moment when the engine load is too high.

## 7). "Auto-calibration" bookmark.

In this bookmark all important ECU's work and regulation parameters on idle are visible. After earlier configuration of read parameters, the auto-calibration procedure is totally automatic.

To start the auto-calibration procedure, the below conditions should be fulfilled:

- The engine temperature must be at least 60°C
- There must not be any errors in the ECU's memory (MIL light is not lit)
- Lambda sensor works properly on gasoline.
- The ignition system is in good condition (spark plugs, high voltage wires, coils)
- During auto-calibration, the engine load should not be changed, i.e.: turn the steering wheel (power steering), we also recommend to turn off air conditioning and keep the vehicle in park.

Before clicking "Auto-calibration" it is recommended to switch the engine to CNG/LPG manually when the RPMs are high in order to fill the reducer and CNG/LPG Injectors with GAS (after installing SGI VERSUS system there is no GAS inside REDUCER, GAS lines, or GAS injectors so this fuel needs to be transmitted from the Tank). This can be done with pressing "LPG/CNG" button. After few seconds of on CNG/LPG, the system should be turned back on to gasoline before starting auto-calibration. For V-engines or the ones which stop during the auto-calibration, there is the possibility to choose the "Calibration per 1 cylinder" option. Thanks to this function, the engine will not stop even if it is detuned (improper calibration nozzles size).

In order to start the auto-calibration procedure it is essential to click the "Auto-calibration" button (see picture no 7b). Calibration should be done at idle.

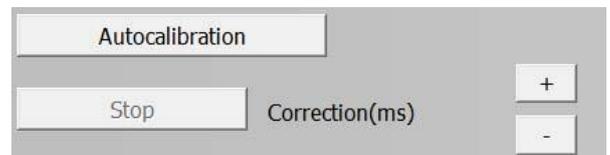
During the first calibration of the new controller when "Auto-calibration" button is clicked, the program requires to enter basic data such as "mounting service name" (8 letters), "LPG/CNG Injectors size" and the "engine capacity". This data is stored in nonvolatile memory of the controller. This data can be seen later in the "Info" bookmark.

After clicking OK another window will occur: "Set stable RPM". The calibration progress bar will be seen (see picture no 7d) and the controller will automatically switch between gasoline and LPG/CNG.

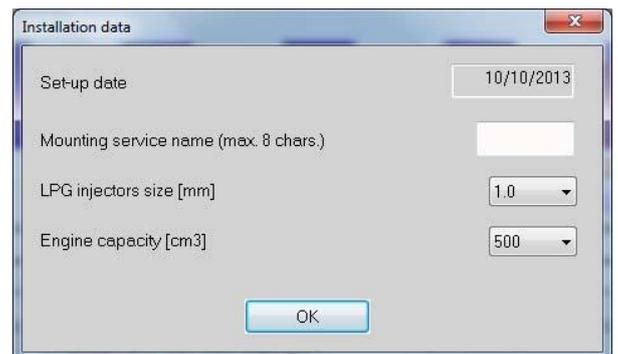
Picture no.7a: "Auto-calibration" bookmark



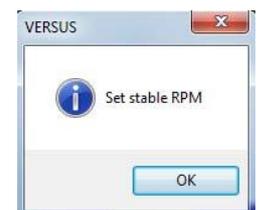
Picture no.7b: "Auto-calibration" button



Picture no. 7c: Installation data section



Picture no.7d: Set stable RPM



Picture no. 7e: Calibration progress bar



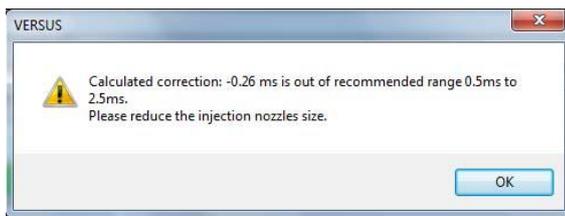
**Note:** During auto-calibration the value of “correction” is determined automatically. The recommended value of the correction should be between 0.5 and 2.5. If the calculated value exceeds this recommended value a message is prompted in favor of the incorrect size of injector nozzles. Calibration can be interrupted or continued to the end but be aware that the wrong value of the correction can cause problems with maintaining proper Air/Fuel mixture and incorrect operation of the engine while on CNG/LPG. Consequently, it can lead to illumination of the "check engine" light and / or cause problems with engine operation on gasoline.

**Note:** Any messages during Auto-calibration should be treated as recommendation, not like an error.

Possible scenarios:

- When CNG/LPG injector nozzle size is too big (calculated “correction” is too small – picture no 7f), then during auto calibration appears a message telling of the necessity of reducing injectors’ nozzle size or decreasing GAS reducer pressure.
- When chosen CNG/LPG injector nozzle size is too small, then appears a message telling of the necessity of increasing injectors’ nozzle size or increasing GAS Reducer pressure (manual regulation on reducer’s body as on the picture no 7g).
- When the engine turns off during the first calibration it is essential to investigate whether the size of calibration nozzle is not too small to keep the engine running correctly. In case the size is significantly too small it is necessary to increase that before auto-calibration process is performed to obtain the most optimal results from auto-calibration. The way of choosing the correct calibration nozzles is described in the VERSUS Installation manual.
- For the “V” engines and those which flame out during the first switching to the alternative fuel during the calibration – function “Calibration per one cylinder” can be activated. This function calibrates each cylinder individually (auto-calibration without this function activates all injectors at once) which makes possible to finish the calibration even with the significantly incorrect nozzle size. Additionally, for the “V” type engines, the ECU will choose different corrections for each side of the engine.
- In case any of the parameters ( reducer’s pressure or the size of the calibration nozzle) has been modified, it is necessary to start the calibration process again from the beginning.

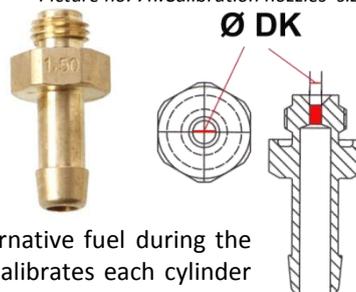
Picture no. 7f: Message during auto-calibration



Picture no. 7g: Reducer’s pressure regulation

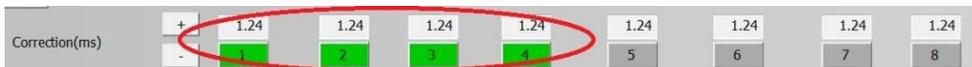


Picture no. 7h: Calibration nozzles’ sizes



There is a possibility of setting up to two different values of “Correction”. This option can be useful if the value of the fuel trim of one side of the engine differs significantly from the other side of the engine.

Picture no. 7i: Two different corrections’ values



**Practical note:** Usually if the car does not have an EOBD socket that means there is not two independent systems for the composition of the mixture. If, however, has the EOBD socket and four lambda sensors, it should be checked with the OBD tester and possibly view the differences between the two systems manually.

Manual modification can be performed in selected cylinders and is possible after turning off the green fields of the correction values for the cylinders that you do not want to change. Change occurs by clicking on a "+" and "-" .

After auto-calibration at idle, a calibration drive may be done using the “Mapping” bookmark.

## 8). "Mapping" bookmark.

Mapping during normal driving conditions is to appoint and compensate for the difference between gasoline injection times on gasoline work and gasoline injection times when the engine works on the alternative fuel. Maps cannot be created for the engines with Valvetronic systems because vacuum is essential to do it.

**Note:** Auto-calibration of mixture regulation on idle is very important and always is the first step of calibration.

Mapping during the drive can be performed in three (3) ways:

- 1) **"Manual":** Mapping based on the points recorded in the controller's memory automatically. It is a default method of mapping available in every VERSUS controller. Created maps are being kept in the non-volatile memory of the ECU. Manual mapping means that calculating the corrections by the ECU starts after clicking the "Calculate correction" button. Maps are always registered by the ECU as long as the reducer's temperature reaches the adjusted "Switching temperature". The ECU does not collect at idle. Connection with the PC is not essential to collect the maps.
- 2) **"Automatic-VERSUS SCS":** Maps are being collected and counted by the VERSUS ECU controller fully automatically (new calibration method is available in VERSUS software from the version v. 2.17 and VERSUS ECU firmware from the version v. 2.12). Mapping is being performed only once and should be activated after auto-calibration on idle. Automatic-VERSUS SCS is available in all "V" OBD group and "MV4 pro" versions of the controllers, but is not available in MV4 and MINI version.
- 3) **Mapping "with interval":** this method is based on a fully automatic, periodic collection of maps and calculating the corrections automatically. The cycles can be selected between 1000, 2000, 5000, 10000, 20000, 50000 km.

**Note:** in case the MPX01 pressure sensor is being used during the installation, it is necessary to connect additional vacuum sensor for the mapping to proceed correctly.

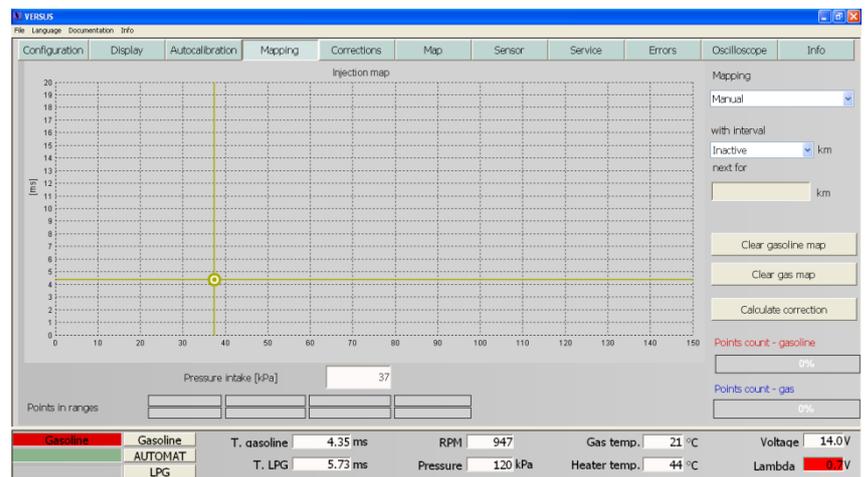
### 8.1). Manual mapping.

Default enabled calibration during driving is using the map which is being recorded in the controller's memory. This means that the map can be collected without connection to the computer.

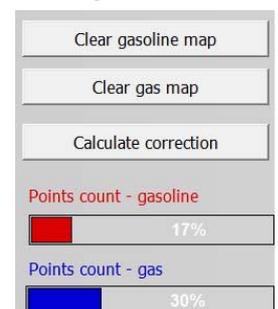
#### Procedure and its steps:

Picture no. 8a: Clear map with no calibration points collected

- a) **Cleaning maps:** After completion of auto-calibration on idle and before driving, both maps recorded by the controller must be deleted by clicking the "Clear gasoline map"(picture no 8a - "1"). and "Clear gas map" buttons (picture no 8a - "2"). After that there will be no calibration points (picture no 8a - "3").
- b) **Close the software and start the calibration drive with GASOLINE for 10-15 miles.** At this stage the controller will collect the calibration map points during driving automatically and store them in its internal non-volatile memory.
- c) **After 10-15 miles of Gasoline calibration drive, press the change-over switch button and start similar drive on CNG/LPG.**



Picture no. 8b: Percentage of gained points during auto-calibration



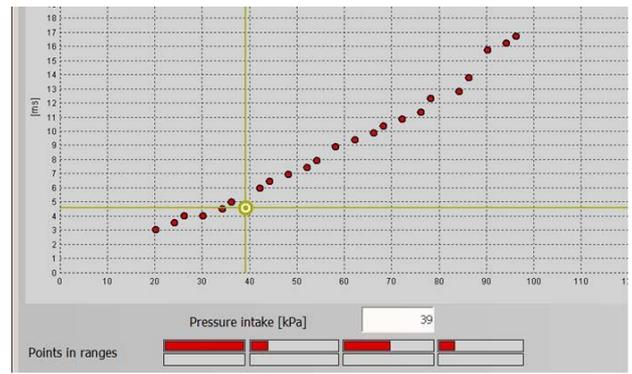
**Note:** It is not necessary to drive with the PC connected to the VERSUS ECU to collect the mapping points, however the software indications can be useful to estimate in which areas there is not enough calibration points collected. It significantly helps to reduce the time of calibration drive.

In case the computer is connected to VERSUS ECU the progress of points counting in % will be seen in the software (picture no. 8b).

Also if your computer is connected to the software “points in ranges” can be observed by the installer.

“Points in ranges” logic:

- “1.” – calibration points collected in about 40% during low engine load (low pressure intake value (VAC))
- “2.” – calibration points collected in about 40% during medium-low engine load (pressure intake values usually in the range of 35-55 kPa)
- “3.” – calibration points collected in about 20% during medium-high engine load
- “4.” – calibration points collected in about 20% during high engine load (usually pressure intake over 75 kPa)



Picture no. 8c: Points in ranges

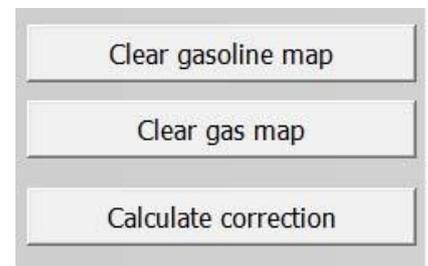
The VERSUS ECU recognizes the ranges automatically and those ranges differ between different types of engines.

Red stripes show quantity of calibration points collected when the engine is supplied with GASOLINE, while the blue stripes below the red ones show the quantity of calibration points collected when the engine is supplied with CNG/LPG.

- d) When the calibration drive is finished: the calculation of the corrections will need to be provided by the installer by clicking the “Calculate correction” button

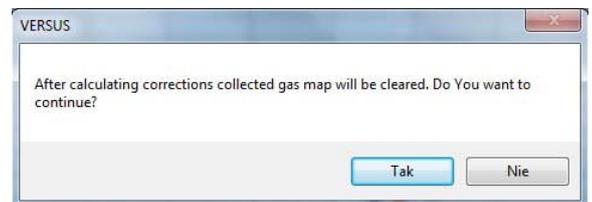
Picture no.8d: „Calculate correction” button

**Note:** During the half-automatic calibration method it is necessary to press “calculate correction” button directly after the calibration drive is finished. If it is not pressed – no corrections will be stored in the VERSUS ECU memory and it may result in the illumination of the “check-engine” light.



- e) Click "Calculate correction". With this step the software will show the announcement that already collected gas (CNG/LPG) map will be cleared from the VERSUS ECU memory. This map after corrections is now incorrect and should be deleted.

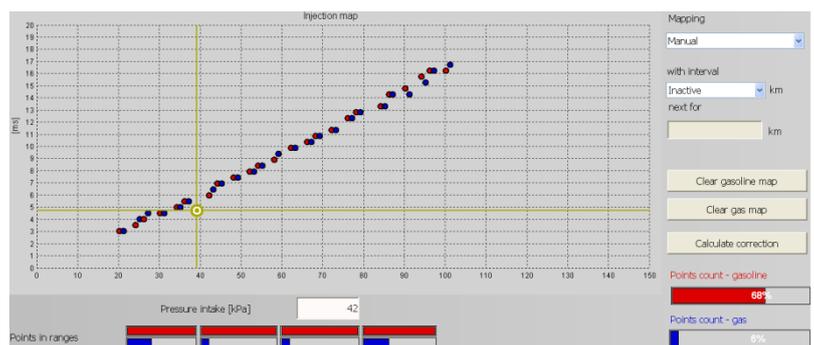
Picture 8e: The window with the information about erasing of corrections



**Practical note:**

- When “calculate correction” is completed, another GAS (CNG/LPG) map should cover the GASOLINE map almost perfectly (red calibration points should be very close to blue calibration points). In case the red calibration points are far away from blue ones that usually means that the “calculate correction” button should be pushed again.

Picture no. 8f: Blue points almost cover red ones

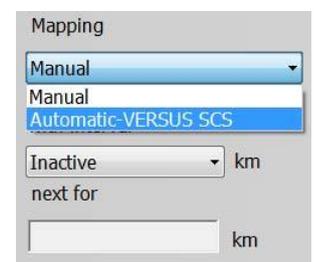


**8.2). “Automatic-VERSUS SCS” mapping.**

Activating “Automatic-VERSUS SCS” :

Picture 8g: Automatic mapping choice Versus SCS

- a) Complete the auto-calibration at idle.
- b) Choose “Automatic-VERSUS SCS” (picture no. 8g )
- c) Close the software and start driving normally.



The VERSUS ECU will start collecting calibration map points automatically; this will be signaled by the blinking of the upper LED on the change-over switch during the calibration. At this time, the VERSUS ECU will supply only gasoline to the engine. The LEDs on the change-over switch will indicate how many calibration points have been collected in VERSUS ECU memory.

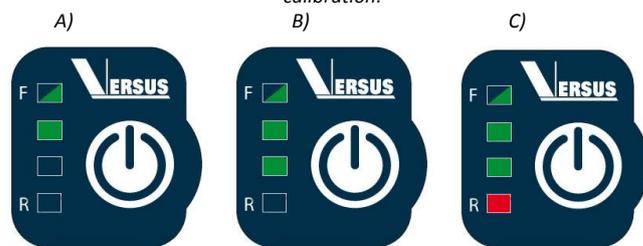
The signalization for "MV4 pro" change-over switch is as follows:

- when 25% or more of the calibration points is gathered - the second diode will be lit (image 8h "A")
- when 50% or more of the calibration points is gathered - two middle diodes will be lit (8h image "B")
- when 50% or more of the calibration points is gathered - the bottom three diodes will be lit (picture 8h "C")
- Finally, when 100% of the calibration points from the gasoline injectors are collected by the ECU, the engine will automatically switch to CNG/LPG, then the whole calibration procedure (now on CNG/LPG) starts from the beginning and is the same as the calibration on gasoline.

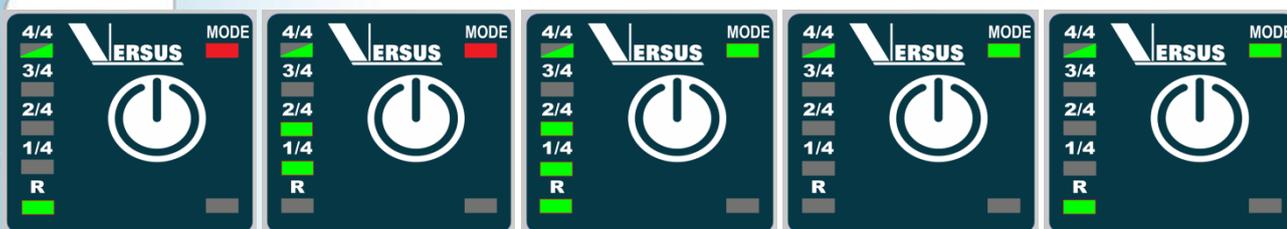
The signalization for the "MV4 pro" (OBD) change-over switch is more accurate and shows the range in which the engine load is still missing points. Thanks to this signalization the calibration drive may be shorter. Start-up of "Versus SCS" is indicated by the flashing of the upper LED diode. Every LED diode, below the flashing green one, corresponds to the one of the "points in range" visible in the software (the picture no. 8c).

The signalization's examples are shown below.

Picture 8h: „MV4 pro“ change-over switch display during the calibration:



Picture no. 8i: The signalization's example of SCS performance in ECU V OBD



Mapping on gasoline, collected range of the lowest engine load

Mapping on gasoline, collected range of the middle engine load, without the lowest and highest load

Mapping on CNG/LPG, without the highest load range

The beginning of the mapping on CNG/LPG, all ranges empty

Mapping on CNG/LPG, collected range of the lowest engine load

When all CNG/LPG calibration points are gathered and recorded in the VERSUS ECU memory, there will be four (4) long sound beeps from the buzzer. This means that the VERSUS ECU has finished the auto-calibration process and has switched to normal performance in "AUTO" mode. Now all options that were pre-set before are active, so the change-over switch will show the level of CNG/LPG in the tank instead of the calibration process.

#### Practical advice:

- Calibration while driving on gasoline takes about 15 km/20min. During this time, the drive should be as smooth as possible (without rapid changes in the position of the gas pedal) at different engine loads, avoiding driving the gas pedal "to the floor".
- It is recommended not to press the change-over button while driving during the time of auto - calibration. If it is pressed, the VERSUS ECU will switch to gasoline. To return the system to the automatic mapping, it will be necessary to restart the engine.

### 8.3). Mapping with interval.

It can be activated when the manual mapping is finished and the corrections have been calculated. After selected interval additional mapping will be done to eliminate parameter changes of the system elements such as the injectors or reducer.

#### Procedure and steps:

After manual mapping is finished or during the installation inspection, the value of the "with interval" parameter can be selected from 1000km to 50000 km. In the window below it is shown how many km there is left to the next automatic mapping.

## 9). "Corrections" bookmark

In the "Corrections" bookmark are the values corrected automatically by the ECU from the injections times. In the sub-tabs there are CNG/LPG temperature corrections and CNG/LPG pressure correction. Using these two last corrections is not essential for proper system operation. CNG/LPG temperature and pressure corrections are dedicated to advanced installers only. The red dot, which moves on the graph represents the gasoline injection time and the accurate percentage of CNG/LPG correction. In ECU version 3.xx corrections have higher resolutions (points are arranged at 0.5 ms) and there is the possibility to erase them or later amending additional ones on the graph. At the graph's active places, correction values can be modified or erased and are visible as pomegranate dot. The graph navigations are done using the arrows, erasing points with 'delete' button and creating the prior erased point with the 'enter' button. If there is the need to move the entire graph up/down, it can be done by the key combination 'ctrl' + up/down arrow. Additionally, the corrections' values are expanded to +/- 50 % (2.xx version had +/- 25 %).

Please notice that the linear graph should be rather plain, without sudden 'jumps' (picture no. 9b).

After the corrections have been calibrated, the installation operation should be checked as well as the engine's performance during regular driving. It is also recommended to check if higher engine load value is causing the AIR/FUEL mixture to be getting too lean. This could cause serious engine damage (ie. burnt valves, valve seats and/or the damage of catalytic converter).

The system is ready for regular performance after: the calibration on idle, creating the map while driving, possible level sensors' configuration and setting the next inspection date.

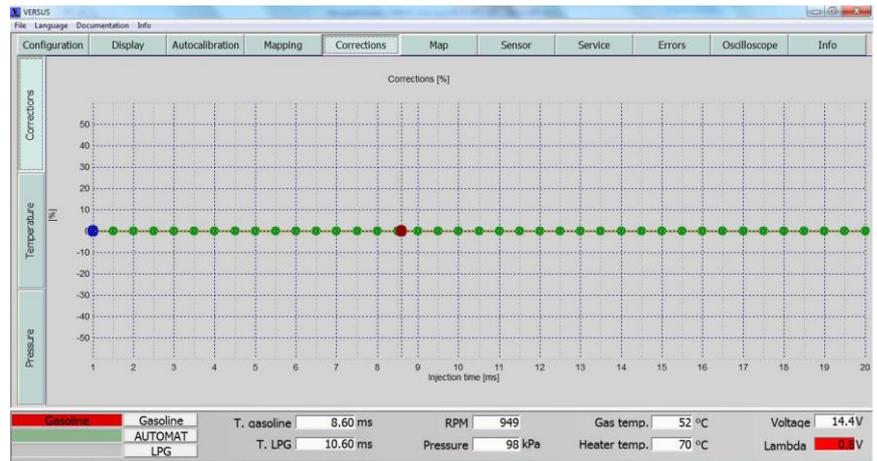
The settings can be saved and stored on the computer's hard disk. To do so, click 'File', 'Save settings to file'. Before communication cut-off with the ECU, make sure the "AUTO" button was pushed. Only then the application can be closed and the diagnostic cable disconnected. The system is now ready for regular performance.

## 10). "Map" bookmark.

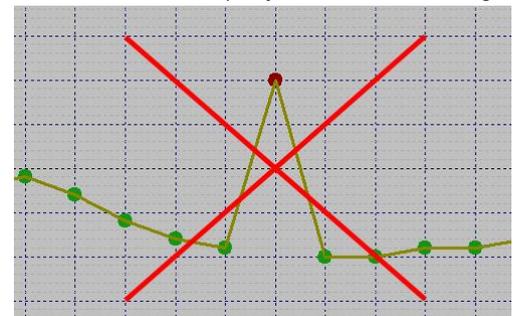
For EOBD version of ECU, all regulations and maps' modifications should be done with switched off EOBD system's corrections.

On the map, there is the possibility to modify current CNG/LPG injection time in RPM function (horizontal axis) and gasoline injection time (vertical axis). The bookmark may be very useful during precise regulation, i.e.: with wideband controller sensor (picture no. 10a – "A") or at least hand OBD scanner (picture no. 10a – "B"), which shows the corrections' values (STFT – Short Time Fuel Trim). For the VERSUS ECU "V" OBD corrections' values are visible in the application. This bookmark's possibilities are very wide, but difficult to amend. It is dedicated for advanced installers.

Picture no. 9a: "Corrections" bookmark



Picture no. 9b: Example of Incorrect manual settings

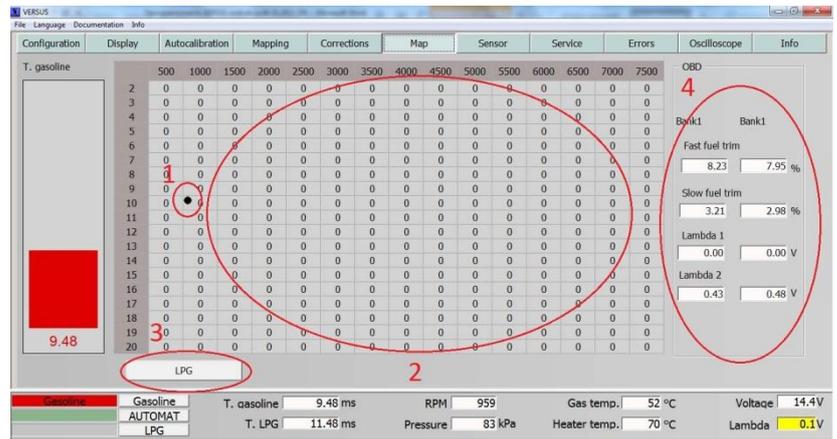


Picture no. 10 a: Hand testers:  
A) Wideband controller sensor B) OBD scanner



**The bookmark presents:**

- 1) Black dot (picture 10b – “1”) presents the current gasoline injection time. The dot refers to the gasoline injection time.
- 2) RPM (the horizontal axis)/Gasoline injection time (vertical axis) - customizable fields (picture 10b – “2”).
- 3) “LPG/CNG” button is useful to switch fuels. Possible options are “LPG/CNG” or “Gasoline” (picture 10b – „3”).
- 4) Only in VERSUS ECU “EOBD” version. Corrections display (picture 10b – “4”).



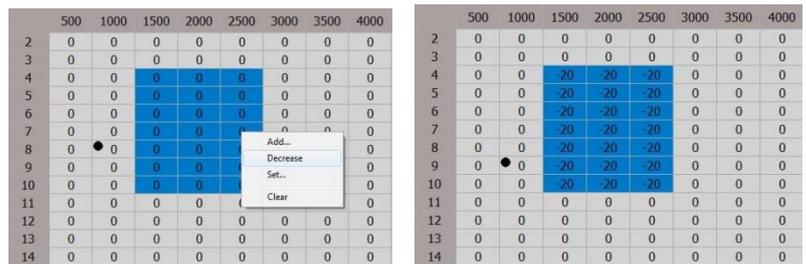
The map can be used for single cell modification or the selected field (left mouse's button has to be pushed and held to make the selection). Modification is expressed as a percentage and possible in the range +/-50%.

The main idea of this modification is to amend changes and later observation of STFT and LTFT corrections. When the vehicle runs on CNG/LPG, these values should be as close to the gasoline corrections as possible.

**Practical example:**

- When the engine runs on CNG/LPG and:
- STFT (short term fuel trim) is in the range of 10-15 ms and 3000-4000 RPMs at -25%. This means that too much gas is being delivered to the engine in this area. In this case, it is recommended to select the field and make the correction. Modification options show after right clicking on the mouse.
- After pushing “Add”/”Decrease”/”Set” there will be the next window with the possibility to add the value (picture no. 10d).

Picture no. 10c: MAP bookmark – corrections' modifications window

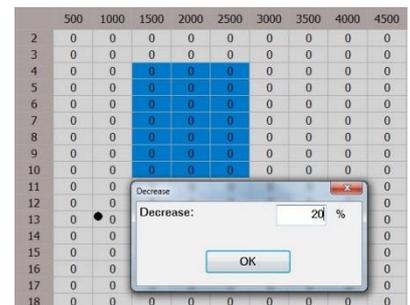


**Practical advice:**

- When the accurate corrections are modified, the OBD tester should display the mixture at values near 0%.
- The final aim of these corrections is to make both short term fuel trims and long term fuel trims be as close to 0 as possible when the engine runs on CNG/LPG.

The default step after selecting “Add”/”Decrease”/”Set” equals 5%. However, there is the possibility to amend to a different value. During amending the modifications you may be required to switch the system from gasoline to CNG/LPG; which can be done by the switching button (picture 10b – “3”). Any modifications in corrections, amended to the controller, are immediately implemented. It should be remembered to avoid immediate and large value's changes.

Picture no. 10d: Correction's value window



**11). 'Sensor' bookmark**

This bookmark is used for the calibration of the CNG/LPG tank level sensor; which is installed on the tank's multivalve (LPG) or in the high pressure line (CNG).

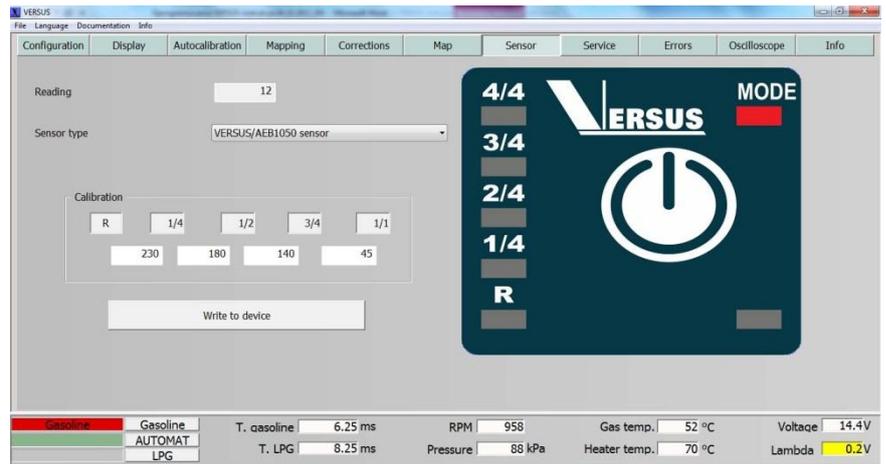
The default values are set under the particular sensor's name. There are different sensor types: resistance and voltage. To choose a different sensor then the present one, it should be chosen from the list and confirmed by clicking 'Write to device' button.

**Note:** If you do not click the 'Write to device' button after choosing the sensor type the new settings will not be saved to the VERSUS ECU.

Other sensors can be added manually.

A) Selection window

B) Program Change-over switch display



Picture no. 11b: CNG VERSUS VR-C 01 sensor    Picture no. 8c: VERSUS/AEB1050 sensor

There are two sensor types delivered with the VERSUS KIT:

- a) VERSUS/AEB1050 sensor (LPG KITS)
- b) CNG VERSUS VR-C 01 sensor (CNG KITS)



The "reading" shows a value between 0 and 255 corresponding to the current state of the alternative fuel. Reading is done without any delay. The CNG/LPG level shown on the change-over switch is delayed (averaged) according to the algorithm.

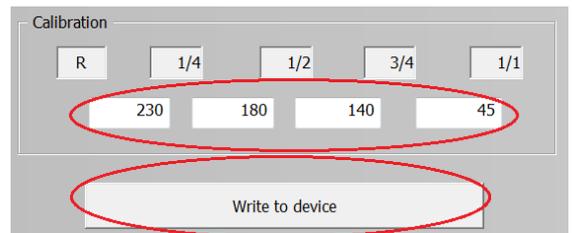
Picture no. 11d: Manual parameters' adjusting fields and 'Write to device'

There are four white fields for manual modifications of CNG/ LPG level sensor. These values can be changed after ensuring that they are in the ascending or descending series. Changes will only be saved by pressing the 'Write to device' button.

**Note:**

- If you do not press the 'Write to device' button after sensor options have been chosen, the new settings will not be saved to the VERSUS ECU.

- After any change is made to the sensor type calibration values, it will automatically change to "Other – high resistance".

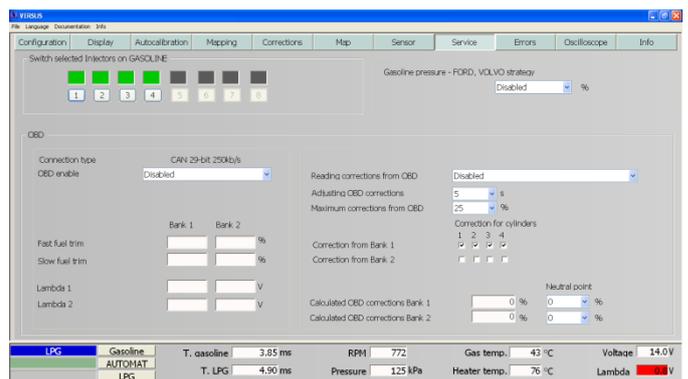


**12). Service.**

This bookmark contains :

- a) Option of switching individual cylinders to gasoline during the CNG/LPG performance.
- b) "Gasoline pressure –Volvo, Ford strategy" for vehicles with the fuel pressure sensor on the OEM fuel rail.
- c) OBD parameters (if the particular ECU is connected to OBD).

Picture no. 12a: "Service" bookmark



### 12.1). Switching individual cylinder to gasoline supply.

This bookmark contains tools to choose the CNG/LPG injector which should be deactivated and the gasoline injector will be activated in its place. When the vehicle injector cylinder is running on CNG/LPG the square will be green, if that cylinder is on gasoline the square will be grey. It allows to identify the faulty gas injector or check the proper order connection of gas injectors.

Picture no. 12b:Example – second injector works on gasoline



### 12.2). “Gasoline pressure –Volvo, Ford strategy”

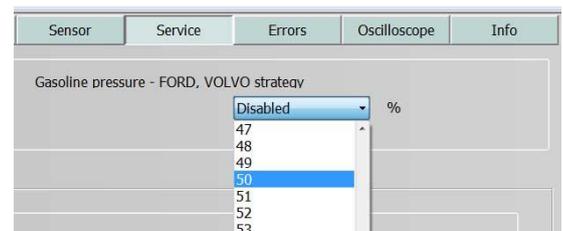
This option is dedicated to vehicles with the gasoline fuel pressure sensor on the gasoline fuel rail. While the vehicle is running on CNG/LPG the gasoline fuel pressure will be reading higher than normal at the given engine load due to the fact you are driving on CNG/LPG and not gasoline. To eliminate this state there is the possibility to choose one value from the list that will allow you to change the pressure in the OEM gasoline rail. This value is determined by the gasoline consumption of the engine.

Every few second the VERSUS ECU will switch one cylinder from CNG/LPG to gasoline (this is visible in the ‘Service’ bookmark)

#### Practical advice:

- A value of 100% means that there will always be one cylinder running on gasoline. The active cylinder will rotate every few seconds.
- 20% means that there is one cylinder which works on gasoline for 20% of time. It means that 20 of 100 cycles will be on gasoline and 80 on CNG/LPG on one cylinder. This function does not always guarantee full efficiency. It is forbidden to start this option before finishing the ECU calibration process.

Picture no.12c: Ford,Volvo strategy



### 12.3). “OBD” Section.

The controller’s wiring should be done in accordance to the wiring diagram depending on the type of communication in the particular vehicle (OBD or CAN etc). Detailed information is given in the system installation manual. It should be taken under consideration that the ECU version with EOBD is not compatible with an ECU without this option. To avoid any mistakes, the plug pins have been reversed from the factory.

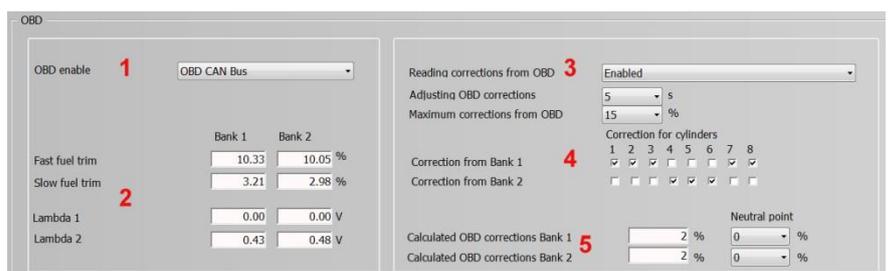
The harness for the ECU with EOBD is different than the one dedicated to the ECU without EOBD. However the wires are in the same color scheme in both harnesses; EOBD harness has an additional four wires next to the change-over switch wire.

The controller’s calibration should be done in the identical way as the traditional “V” controller and after the calibration during the drive EOBD corrections should be switched on. This way the controller’s calibration is recommended, because only EOBD corrections may not be sufficient.

Picture no. 12d: OBD options

#### 1) Activating reading corrections from OBD:

This is used to start OBD; this can also be visible in ‘Map’ bookmark and can be registered on the oscilloscope. There is also the additional window for ‘Errors codes’. If the connection fails, this means that there is the error in electrical connections to OBD plug. It is recommended to make this connection at the very finish of the system installation.



2) **Fast fuel trim and slow fuel trim and Lambda sensors' reading.** Depending on the engine's type there can be visible one or two banks. Once the OBD connection is complete, the short time fuel trim of the mixture, long time fuel trim correction, lambda (O2) sensor's signals (upstream and downstream) will all be visible. Especially for "V" type engines where each bank has parameters responsible for each side. In this case it is important to know cylinder numbers (CNG/LPG injector numbers) of the VERSUS ECU supply for the particular bank.

3) **Reading the OBD corrections:** If the connection with OBD is active, this option activates the OBD corrections. The VERSUS ECU implements from now the corrections in CNG/LPG injection time; this means the short time fuel trim and long time fuel trim stay the same as on gasoline. This avoid problems connected with "Check engine" light and problems related with engine's efficiency lost. As long as signals are from the OBD, the moment time delay can be set with "Adjusting OBD corrections" – the default value is set at 5s (picture no. 12 e – "3"). This time can be changed, but it should be remembered that too quick corrections can correct to quickly taking away engine "flow" (normal).

4) **Corrections for cylinders:** this allows selecting which controller's cylinders will be corrected by which bank. If the vehicle has one bank, there is no reason to change anything. If the vehicle has two banks, there is a need to allocate appropriate cylinders to the appropriate EOB bank. Usually the right side of the engine, as seen from the passenger cabin, is assigned to BANK1 (it is strongly recommended to check this fact with the vehicle's service documentation), so if the channels 1,2,3 are on the side as shown in the picture no. 12d - "4" ( " Correction of Bank 1" section ) . Thus, cylinders 4,5,6 are from BANK2 (picture no. 12d - "4" " Correction of Bank 2").

**Note :** If there are two banks , please check which cylinders are located in which bank. Incorrect banks and cylinders may provide problems with the engine, "check engine" light or even problems starting the engine cold. After such error, it may be necessary to restore the factory settings in controller and to adjust the procedures for controller accordingly.

5) **"Calculated OBD corrections Bank 1/Bank 2":** It is the currently calculated correction of injection time. This value is for reference only.

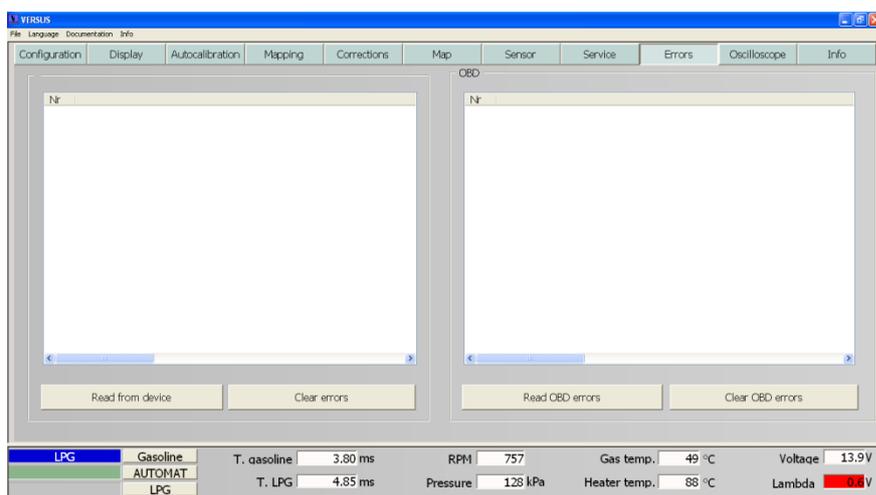
**The neutral point:** the value of long term fuel trim in the mixture, which the controller will seek to. If the engine before conversion run only on gasoline and the value of long term fuel trim significantly differenced from zero (with no errors), the value should be rewritten here. The value of the long term fuel trim is important during the cold-starting of the engine, especially in cold climates.

### 13). "Errors' bookmark

After clicking the "Read from device" button the controller will display errors recorded in the VERSUS ECU controller memory. Errors can be removed by clicking the "Clear errors" button; the VERSUS ECU will then switch the engine to the gasoline fuel supply and remove any errors from its memory.

**Note:** In the VERSUS ECU with the EOB connection, there is an additional "OBD" window where the errors from the engines ECU are displayed. This feature is available when the VERSUS ECU establishes connection with the ECU of the engine. In certain car models erasing OBD errors is possible only when the engine is tuned off. In such case it is important to connect to the VERSUS ECU so it could work while the engine is turned off (red/black wire connection – key after ignition).

Picture 13a: Error windows. On the left side ECU VERUS window, on the right side engine's ECU window.



If the controller has registered significant errors, they will be displayed on the bottom bar located between type of fuels (picture no 13b). If the software was started as "DEMO", there will always be the ERROR communicate displayed.

Picture no. 13b: Registered error signalization

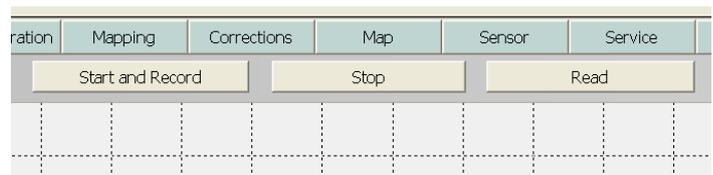


## 14). "Oscilloscope" bookmark

### Buttons for oscilloscope navigation :

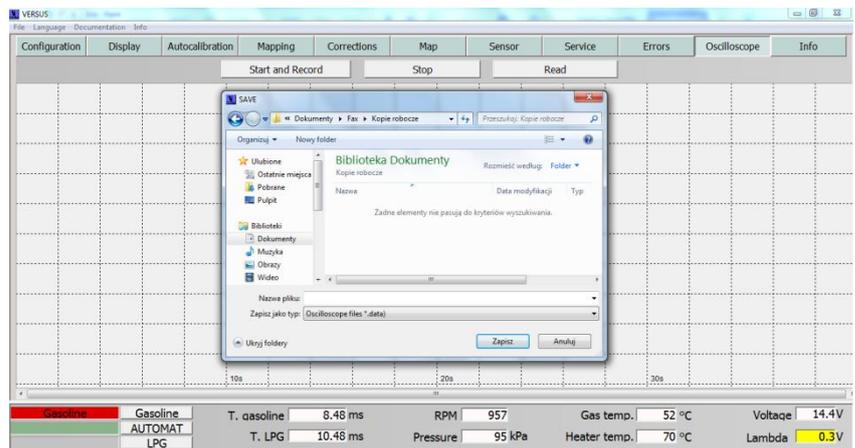
- 1) "Start and record" – saving the observed parameters to a file
- 2) "Stop" – finish of saving the observed parameters to file by the VERSUS ECU software.
- 3) "Read" – reading of parameters already saved to file

Picture no 14a: Oscilloscope 's menu



Picture no 14b: Starting of data saving

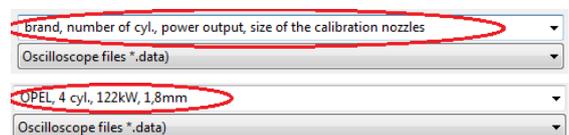
To start data saving by the oscilloscope the "Start and record" button should be pushed. The application will show the window where you should be chose the place on your hard drive for data to be saved. Give the file a unique name. (Picture no. 14b).



### Practical advice:

If the oscilloscope's record is created with the aim of sending it via e-mail to another person to verify it, it is recommended to provide the following information in the file name: model, number of cylinders, power output (HP), the size of the calibration nozzles and other relevant information. If there is no data enclosed, the analysis is more difficult.

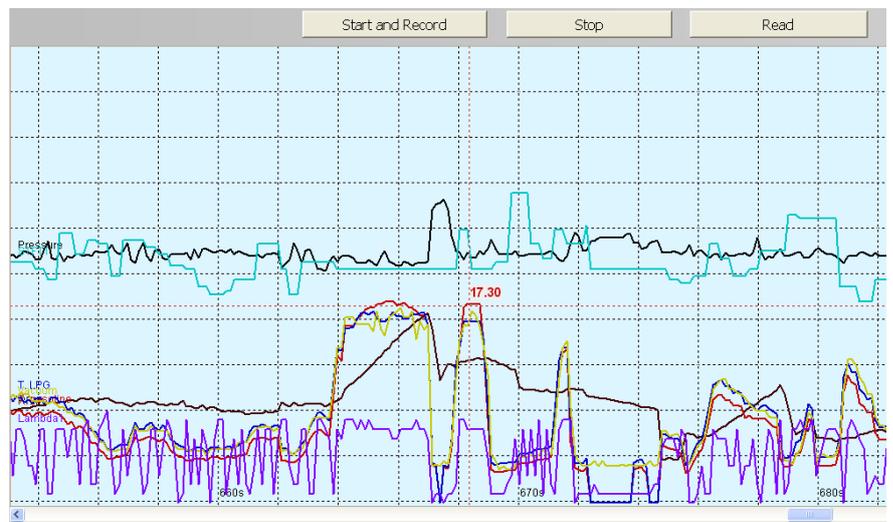
Picture no 14c: Oscilloscope's data saving –recommended file's name



Picture no 14d: Parameters displayed on the oscilloscope

The oscilloscope displays the parameters as shown in diagram to the right (14d):

- 1) the line description is on the left side of the display name of the parameter
- 2) during the process of information registration, descriptions on the right side indicate the parameter's value
- 3) During the file browsing, putting the cursor anywhere in the window to on the chart shows the exact parameter's value (in the picture it is shown, in 290th second, the gasoline injection time)
- 4) type of fuel is visible as a chart background: petrol - white, CNG/LPG - blue



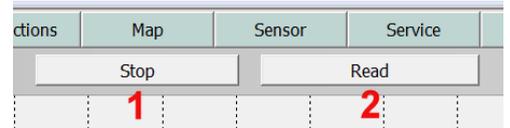
Picture no 14e: Chose of parameters visible in the oscilloscope

To modify the parameters displayed, Right-click on the screen, then select / deselect viewing parameters. The file always records all parameters.



Picture no.14f: "Stop" / "Read" buttons

To stop data recording it is necessary to press the "Stop" button (picture no. 14f - "1"). All data recorded up to that moment will be saved to the file. To read the recorded data, press the "Read" (picture no. 14f - "2") button.

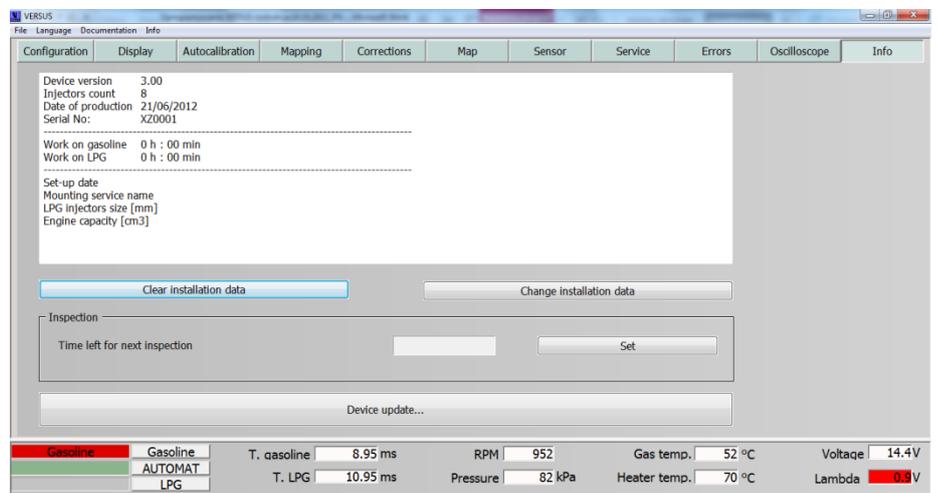


### 15). "Info" bookmark.

The bookmark contains data about the VERSUS ECU such as:

- ECU software (firmware) version
- The number of injectors
- Date of ECU production (programmable on the production line)
- Unique serial number of the controller (for warranty)
- Working time on gasoline
- Working time on CNG/LPG
- ECU installation date
- Name of the installer's workshop
- Size of injector calibration nozzles
- Engine capacity

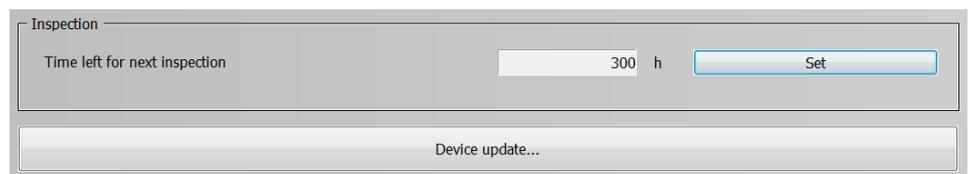
Picture no. 15a: „Info" bookmark



Picture no. 15b: "Service tools" editable parameters

This bookmark also contains editable parameters (Picture no. 15b), such as:

- 1) "Clear installation data"
- 2) "Change Installation Data"
- 3) " Device Update "
- 4) "Time left for next inspection"



### "Clear installation data ".

This option is password protected. It is used to modify the warranty and installation data.

Option dedicated only to authorized distributors who have authorization to change data in the controller that is used to count the warranty period from the date of installation.

### "Change Installation Data"

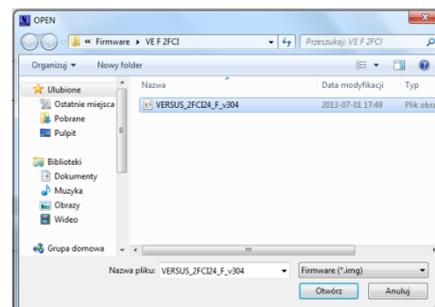
Option dedicated to installers who want to modify the installation data, such as:

- Name of the workshop, where the conversion took place
- Calibration nozzles size
- Engine's capacity

**Practical advice:** If you save the settings to the file, the data is stored there. If the file is going to be sent to technical support, it is one of the main sources of information needed.

## " Device Update "

This option is essential to re-program the controller to a different version of the software (firmware). When the "ECU Update" is clicked, the following window appears where different versions of firmware can be selected (as shown in the picture no. 15c). Then by selecting the correct firmware file, the reprogramming process of the controller's flash memory will begin. All configurations performed in previous versions operate in the regular way and do not require a restart. The controller upgrade should be performed on only a running engine (this way you ensure that the power supply will not get cut-off from the controller at the time of update.)



Picture no. 15c: ECU Update file

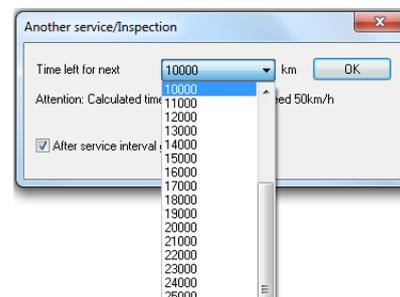
**Note:** During uploading of the new software the +12 V (red - black wire) should be provided on continuous basis. If there is an interruption in power supply to the controller during the software loading it is recommended not to disconnect the controller with the USB interface cable, just restore the power supply and continue the upgrade process.

## "Time left for next inspection"

This parameter is default inactive.

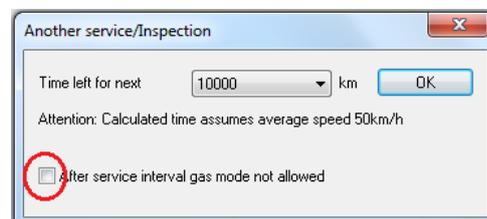
In the "Another service/Inspection" window, there is the information about the time remaining to the next inspection (if one had been set). To enable this function, press the "Set" button, then display the "further review."

Picture no.15e: "Another service/Inspection window"



Picture no.15d: After service interval gas mode not allowed

There is the possibility to stop the controller's operation on CNG/LPG after this time. The time exceeded signal beeps after starting the engine and before switching to CNG/LPG, there is the triple beep. When the next inspection time has been exceeded the controller will only work on gasoline and the user is unable to drive on LPG/CNG.

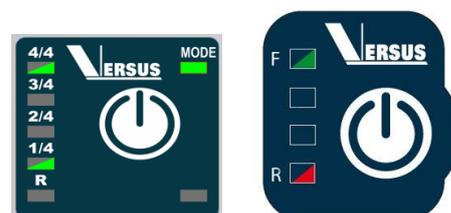


## 16). Other software/firmware options.

### 16.1). Leak detection procedure – steps:

1. The engine should be turned on and running on gasoline ("AUTO" mode with the blinking diodes or gasoline supply with all diodes inactive).
2. Press and hold on the button on the change-over switch for about 10 seconds.
3. After this time a single beep signal can be heard and the switch will start to indicate the testing process with two extreme diodes blinking (see picture 16a).
4. Release the button and wait for the test end.

Picture no. 16a: leak detection procedure



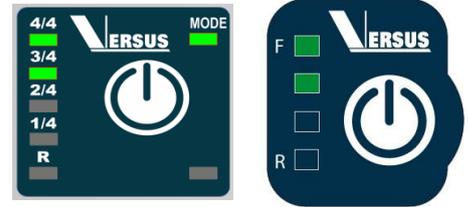
### Possible scenarios:

#### a) Test positive – no leakage:

If there is no drop of the pressure during the next 15 seconds (there is no leak), the controller completes the procedure that is confirmed with:

- Two top diodes shining for 3 seconds and
- One beep signal can be heard

After this time the controller switches the mode to "AUTO" mode.



b) **Test negative** – leakage detected:

If within 15 seconds, the controller registers a pressure decrease of more than 15kPa the controller completes the procedure that is confirmed with:

- Two bottom diodes shining for 3 seconds and
- Triple beep signal can be heard

After this time the controller switches the mode to “Gasoline” mode.

**Notes:**

- If the tank is empty the leakage test will not be performed correctly and the result will be negative. Please make sure that the tank is at least ¼ filled.
- Please note that this procedure can only check for leakage of the output section of the regulator; low pressure CNG/LPG hose with filter, injection rail and Pressure sensor/Map-Sensor. Other leaks and high pressure line leaks are not detected.
- The efficiency of the procedure also depends strongly on the type of regulator (solenoid valve must be attached close to the regulator). In case the solenoid valve is located away from the regulator and there is a pipe full of CNG/LPG between the devices, the potential pressure falls of the evaporated CNG/LPG pressure will be compensated by CNG/LPG coming from the in-between high pressure line. In such special cases (gas solenoid away from the regulator), medium and small leaks are not being detected.
- It is unacceptable to check the leaks just by using the above procedure. Leak test always must include all pressure connections with the use of an appropriate leak tester.

**16.2). Documentation access.**

During the program use without connection or in “Demo” mode, there is a possibility to open the folder with specification (wiring schemes etc.) by clicking on “Documentation” in top bar menu. A new window will be opened with the content of the folder. Any files can be pasted/copied to “Doc” folder of the software.

For more advanced technical explanations please visit our website: [www.versusgasusa.com](http://www.versusgasusa.com)

**Thanks for studying the manual to the end!**

