Program and configuration manual for

sequential gas injection system NEVO, NEVO PLUS, NEVO PRO

NEVO

Sequential Gas Injection System

Software version: 4.0.5.0

Full compatibility with gas controller 4.0F

ver. 3.4.2 16-05-2013

Table of contents

1 Introduction

Software for NEVO system configuration is free and need no license key to be downloaded, installed or run.

If USB interface will be used to communicate PC with the system, the newest drivers (delivered with the software or other) should be also installed.

After installation and launching, the program should automatically connect to the controllers through COM or USB interfaces. After that it is possible to check basic parameters and configure installation.

2 Compatibility, new functions

The NEVO controllers are compatible with the software in version 4.0.x.x, where x.x stands for the release version. The most recent version of software is available on www.kme.eu. It is recommended to check availability of newest versions and to use them.

Program for communication with NEVO controller allows to communicate and is compatible with all controllers of 4.0 family. Connection with earlier controllers is not possible.

Notice: It is not possible to update firmware of any earlier controllers to version 4.0.

Program in version 4.0.3.0 will have its full functionality only with controllers with 4.0D or above firmware. In other case some functions of the program will become inactive. Differences between drivers NEVO, NEVO-PLUS and NEVO-PRO are presented in the table below:

	NEVO	NEVO-PLUS	NEVO-PRO
Standard NEVO functions	✓	✓	✓
Maximal number of cylinders	4	8	8
Additional analogue inputs*	✗	✓	✓
Controllable output**	✗	✓	✓
Integrated OBD	✗	✗	✓
Cooperation with Adapter OBD v2	✓	✓	✗

*) – 4 analogue inputs with ability to connect to lambda voltage probes, PPO (Valvetronic), reducer/gas temperature sensor.
**) – Output for example used to control relays; maximum 50 mA.

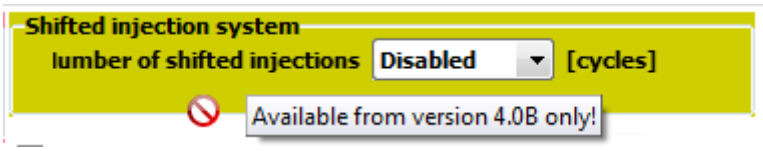


Fig. 2.1 Inactive mouse cursor.

List of changes:

Since version **4.0.5.0** (full compatibility with **4.0F** controller and Adapter OBDv2 **2.0B**):

- Added option Start&Stop (cars with Start&Stop system)
- Improved Auto-Verification process and added sounds when driving in the right conditions for this process
- Language improvements

Since version **4.0.4.0** (full compatibility with **4.0Er3** controller and Adapter OBDv2 **2.0B**):

- Improved legibility of the program, especially the sidebar readings (increased font, changed the colors, added coloring analog inputs)
- Added choice of program view (Standard, PLUS, PRO) in Off-line mode (demo)
- Added long descriptions of options
- Auto-Save option moved to menu
- Improved manual model changes in Auto-Save mode
- Improved "Maximum gas injection time" option
- Improved procedure for determining the model after Auto-Setup
- Added "Lock MOSA" option
- Added new options on "Driver's panel configuration":
    - "Schema of displaying" for gas level
    - "Switch automatically to silent malfunction mode"
    - "Signaling switching to gas"
- Added Hana (1,3ohms) and Hana (1,9ohms) gas injectors
- Added hide the settings panel on the Map (F10)
- Added error "Gas pressure too high"
- Improved recording of last time of error occurrence
- Improved schemas (recommendations for mounting of components, additional descriptions of connections, connecting of KME PW)

Since version **4.0.3.2** (full compatibility with **4.0Dr6** controller and Adapter OBDv2 **2.0B**):

- Added option "Hot start" (it is recommended to connect RPM wire)
- Improved Emergency start on gas mechanism
- Improved communication with Control panel
- Language improvements

Since version **4.0.3.1** (full compatibility with **4.0Dr2** controller and Adapter OBDv2 **2.0B**):

- Added new USB interface drivers for Prolific (1.6.0 2012-4-26).
- Added USB interface drivers for FTDI OPTIC (CDM20824 2012-4-26).
- Added automatic calibration for gas level sensor (check the manual).
- Improved strategies with automatic return to gas (long cut-off) - **40Dr2**.
- Languages corrections.
- MOSA mechanism (Map On-board System Adaptation) = Map Adaptation.
- OSA mechanism (OBD System Adaptation) = OBD Adaptation.
- Added user (driver) manual.

Since version **4.0.3.0** (full compatibility with **4.0D** controller and Adapter OBDv2 **2.0B**):

- Added camshaft sensor as RPM source.
- Added petrol times signals filter.
- Added pictures for all types of gas injectors.
- Added Master mode.
- Added Matrix HS gas injectors.
- Added option: Maximum gas injection time.
- Added option for displaying multiplier graph on model.
- Extended RPM range for collecting map points (from 1000rpm).
- Extended freeze frame parameters with gas and reducer temperature, and engine load.
- Added scaling for model graph.
- Extended status bar information and added action for updating old Gas ECU firmware.
- Extended gas temperature correction to -30 Celsius degrees.
- Added support for Adapter OBD v2 in standalone mode (OBD scanner).
- Improved OBD module support (from 4.0C r5).
- Added reading of pressure parameters on OBD tab.
- OBD parameters control on Recorder.
- Added German language.

Since version **4.0.2.1** (full compatibility with **4.0C** controller and Adapter OBDv2 **2.0A**):

- Added Czech language
- Added support for drivers **NEVO-PLUS** and **NEVO-PRO**
- Added support for **Adapter OBD v2**
- Increased Recorder functionality.

- Added reducer temperature correction.
- Extended FUNC bar indicating the activated features.
- Added In/Out tab.
- Added OBD tab.

Since version **4.0.1.3** (full compatibility with **4.0B** controller):

- Added Lithuanian and Italian language.
- Improved Auto-save mode.
- Extended information about the connected devices.
- Improved the recorder.
- Added colouring tables of corrections.

Since version **4.0.1.2** (full compatibility with **4.0B** controller):

- Improved support for the 0-90ohm gas level sensor
- Optimized start-up and scaling program
- Added support for verifying after Autosetup
- Improved the Auto-save mode
- Introduced the manual model changes mode in Auto-save mode
- Added status of the device: GAS, PETROL, WAITING, OFF.
- Improved Recorder

Since version **4.0.1.0** (full compatibility with **4.0B** controller):

- Added gas injectors test.
- Added change list In Workshop info.
- Added inspections info.
- Added Turbo and Mazda options In Auto Setup window.
- Added Idle model calibration.
- Added Corrections map.
- Added stripe indicating activity of chosen functions.
- Added upgrade to the Recorder (the ability to load and watch previously recorded waveforms).
- Added colour changing of red values which are beyond range for appropriate work.
- Refreshed the look of the program.

3 Program Interface

3.1 Starting view

After launching the program the starting window appears on screen (**Fig. 3.1**). After installation and launching, the program should automatically connect to the controllers through COM or USB interfaces.

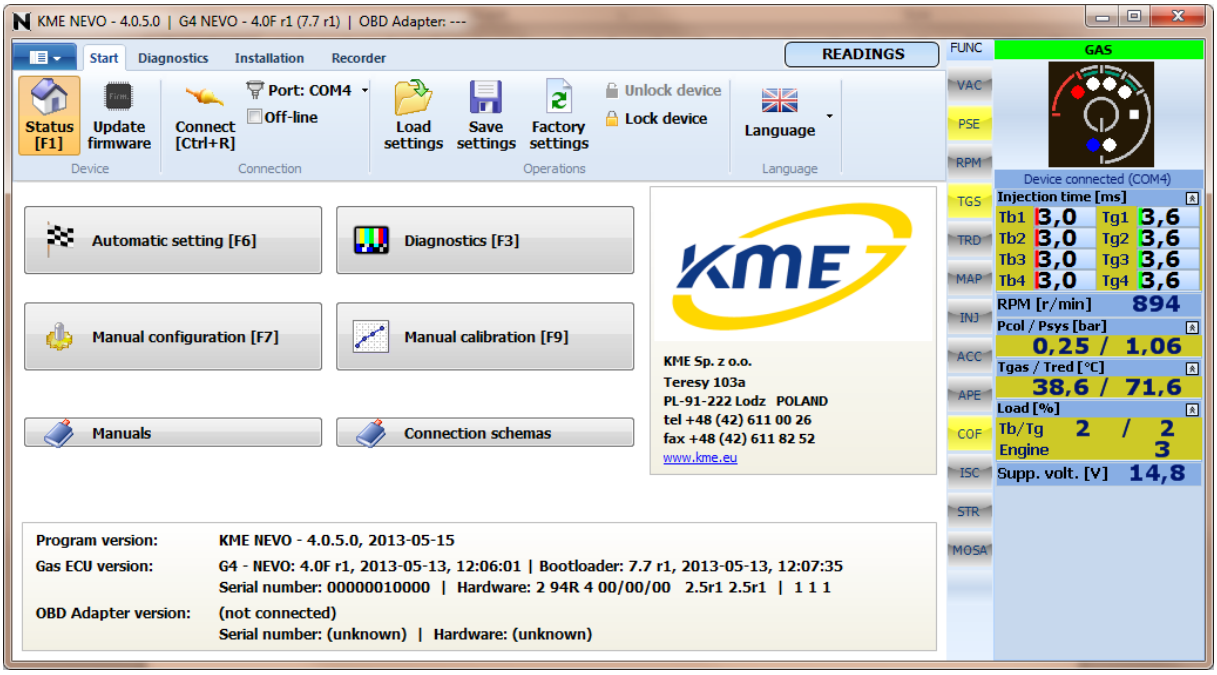


Fig. 3.1 Starting view.

Components of main window:

- Tabs – (Start, Diagnostics…) – allow switching between different functions.
- Ribbon – field under the tabs containing functions and windows; different on each tab.
- Function window – located under the Ribbon.
- Readings stripe – located in the right side of main window. It contains current reading of the main parameters (Fig. **3.2**). Values coloured in red are inappropriate for proper work of gas injection system. Vaporizer temp. is olive between the temperature of switch-over to gas and 50˚C. It is blue when over 50˚C, because then all of the functions and procedures work properly. Pressure is always red when running on petrol. Yellow highlighting of the Gas injection time indicates active injector correction for specific injector. Readings bar is divided into parts. Part of an OBD can

be seen only when the OBD adapter or driver NEVO-PRO is connected. In/Out part can be seen by only when NEVO-PLUS or NEVO-PRO is connected.

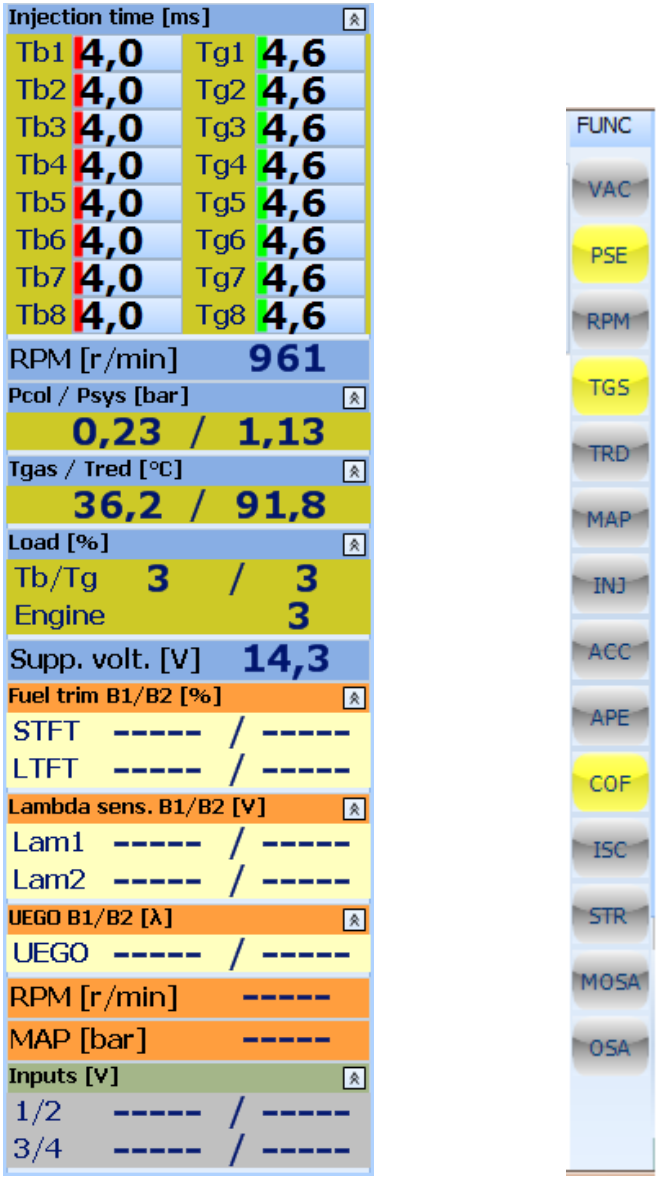


Fig. 3.2 Readings stripe and stripe indicating activity of chosen functions.

- „FUNC" stripe, indicating activity of chosen functions.

FUNC description:

- VAC – vacuum correction
- PSE – gas pressure correction
- RPM – RPM correction

- TGS – gas temperature correction
- TRD – reducer temperature correction
- MAP – corrections map
- INJ – injectors corrections
- ACC – acceleration corrections
- APE – adding petrol
- COF – cut-off mechanism
- ISC – injection system change correction
- STR – switch to petrol with
- MOSA – map adaptation (MOSA - Map On-board System Adaptation)
- OSA – OBD adaptation (OSA - OBD System Adaptation)

Functions highlighted in yellow are activated.

- State of the gas ECU bar – indicates current state of the gas ECU (Fig. **3.3**).
- Virtual panel – work like a real control panel: clicking on the panel image using left mouse button switches from petrol to gas and from petrol to gas, coloured diodes indicate the gas level. (Fig. **3.3**).
- Program state bar – indicates the state of the program (device connected, working off-line[1], updating firmware) (Fig. **3.3**).

Whole right side of main window (readings stripe, virtual panel, state bar) is visible and accessible on every tab.

If gas controller registers any errors the yellow flashing triangle appears next to the virtual panel (Fig. **3.3**). Left-clicking on it opens Diagnostic errors window in Diagnostics tab. A similar triangle will appear in the case of a trouble code for OBD.

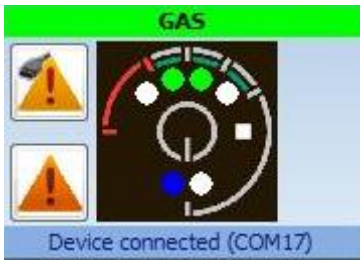


Fig. 3.3 Virtual panel with state bar and triangle informing about errors.

[1] Off-line mode - working without communication with the gas controller.

3.2 Menu button

Button located next to Start tab. It opens menu which contains functions from Start tab and ribbon. These functions are described in the next chapter.

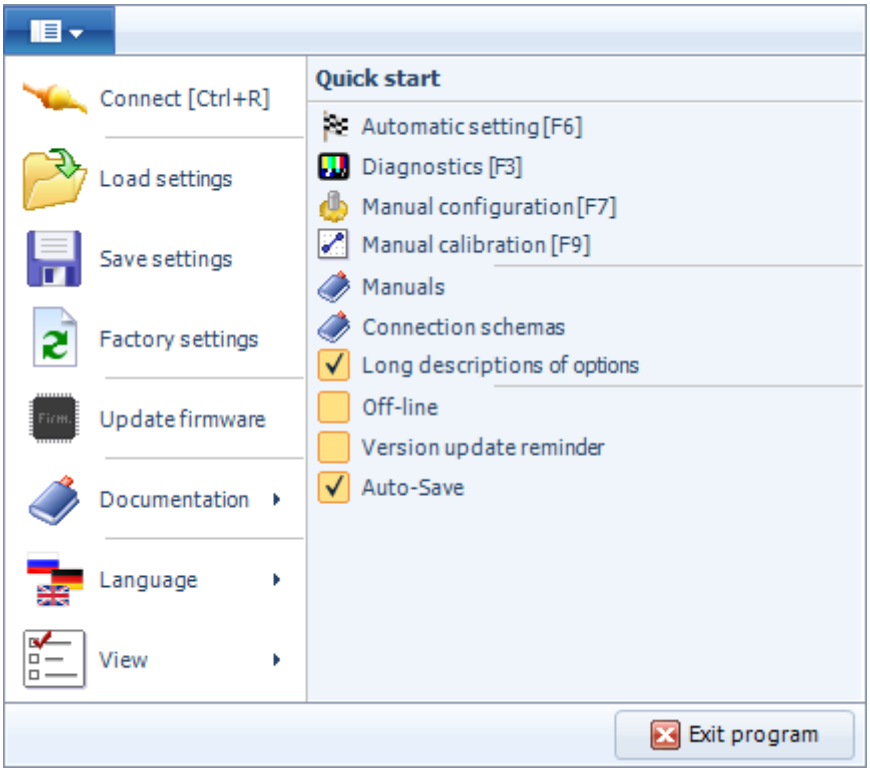


Fig. 3.4 Main menu.

- ***"Version update reminder"*** - unchecking will cause the window that indicates the existing newer version of the software not to pop-up, but only changes the color of state bar panel at a virtual driver (purple color, the word "old version").
- ***AutoSave*** – allows to automatically save changes in settings and adjustments without the need of using “Write” button.

3.3 Start tab

Start tab ribbon elements are split in a few groups:

- Device
  - ***Status*** (F1) – shown after starting the program, indicates current driver, OBD adapter and program status: firmware, hardware and software version, serial numbers; it has four button (Fig. **3.1** Starting view.)

        - Automatic settings – moves to Installation → Auto Setup.
        - Diagnostics moves to Diagnostics → Installation tests.
        - Manual configuration – moves to Installation → Basic.
        - Manual calibration – moves to Installation → Model.
        - Manual – opens user's manual folder.
        - Connection schemas – opens file with installation schemas.
    - ***Update firmware*** (Ctrl + F1) – opens window with gas ECU firmware update.
- Connection
    - ***Auto connect*** (Ctrl+R) – allows to search COM port to which controller is connected and establish communication.
    - ***Port: COMx*** – selection of COM port.
    - ***Off-line*** (Ctrl+E) - enabling/disabling Off-line mode (working without communication with the gas controller)

- Operations
    - ***Load settings*** (Ctrl+O) - allows to load configuration that has been saved earlier.
    - ***Save settings*** (Ctrl+S) - allows to save controller's current configuration to a file on a PC.
    - ***Factory settings*** (Ctrl+D) - enables to return to factory settings of controller. After that configuration is lost.
    - ***Lock/Unlock*** - allows to set password preventing from changes in configuration. Password may contain digits only, its length is 4. After locking the device, no changes in its configuration are possible. Only readings are possible to be red. Unlocking require typing the password or returning to factory settings.

- Program
    - ***Language*** – select from available program languages.

3.3.1 Firmware update

Actualization changes the firmware in connected NEVO driver or Adapter OBD v2 and saves default configuration in it. Therefore, it's recommended to save previous configuration (only if it is needed) in file before updating the controller. Actualization window is shown on Fig. **3.5**. Current firmware version and available updates are visible in two frames.

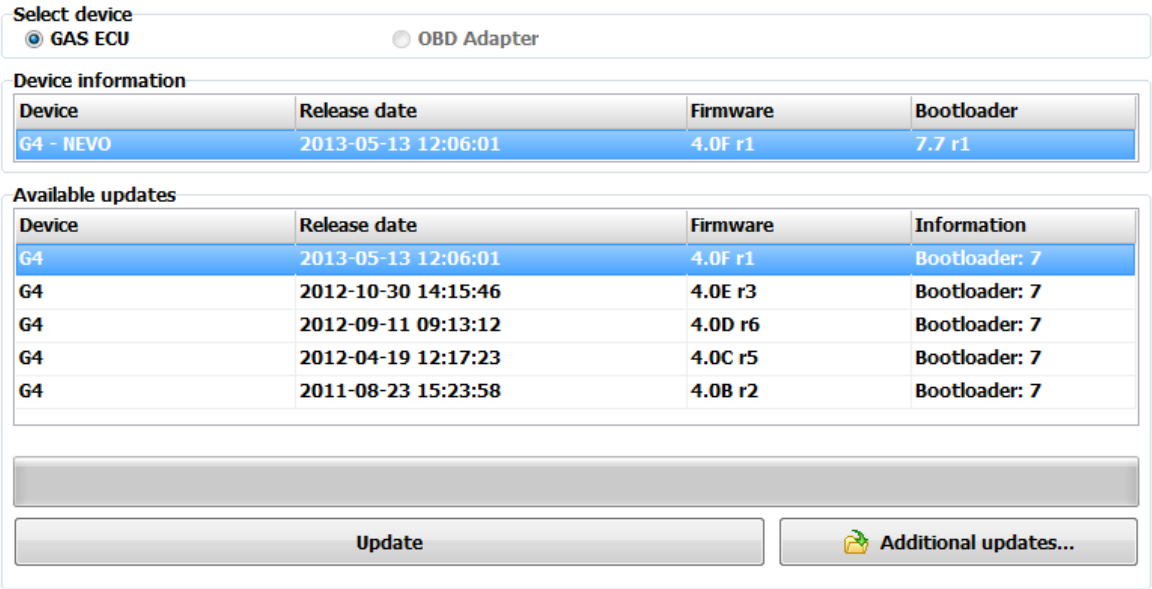


Fig. 3.5 Firmware update window.

Procedure of updating is as follows:

- If desired update file is not on the list of available updates press “Additional updates...” button and choose file from your PC. It will be added to the list.
- Choose update file and press “Update” button. First the window with question about saving current settings to a file will appear. After saving or choosing not to save the update confirmation window will appear (Fig. **3.7**). To start actualization process press “Yes”.

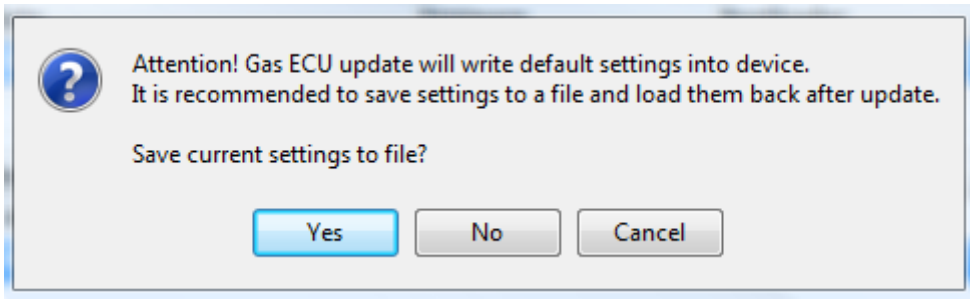


Fig. 3.6 Window with question about saving current settings to file before updating.

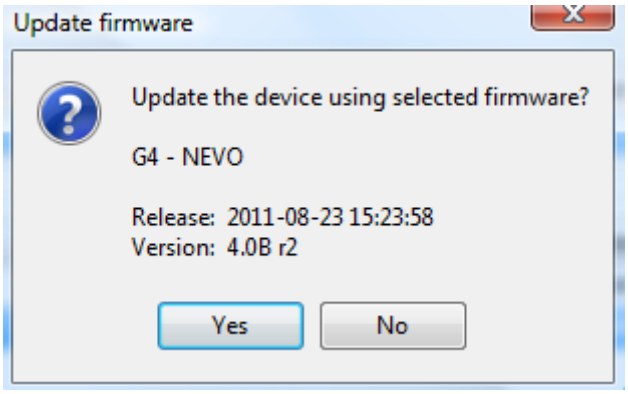


Fig. 3.7 Staring update confirmation window.

- During actualization process progress the progress bar is shown (Fig. **3.8**)and diodes in drivers panel flash sequentially. Also the status bar indicates execution of actualization process (Fig. **3.9**).

Fig. 3.8 Actualization progress bar.

Fig. 3.9 Information about running actualization.

- In case of fault in communication during actualization, (Fig. **3.10**, press „OK”) press “Auto connect”

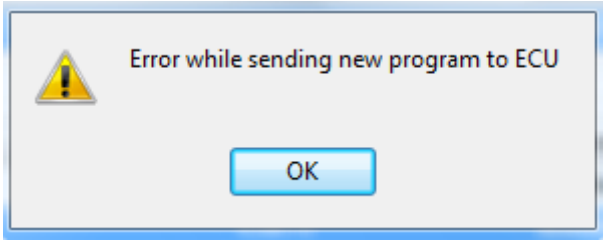


Fig. 3.10 Information about communication failure.

Window shown on Fig. **3.11** appears after retrieving lost connection. Press "Ok" to restart actualization process.

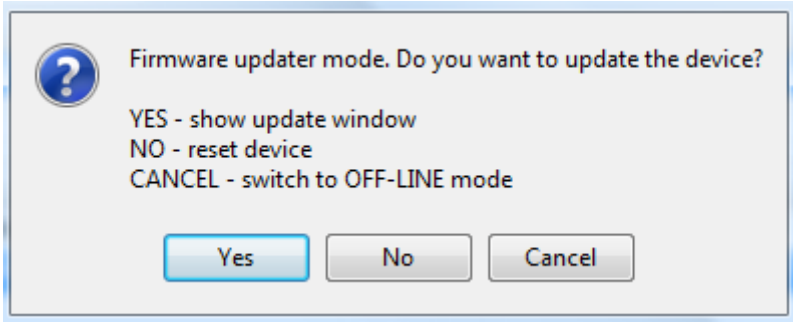


Fig. 3.11 Window shown after communication failure during the actualization process.

- After finishing update, the program informs user about it.

The OBD adapter software update is analogous to NEVO driver software update.

3.4 Diagnostics tab

Diagnostics tab contains functions that allow checking correctness of installation of sequential gas injecting system and its components. It also has functions that register errors and help to diagnose them. Diagnostics tab ribbon elements are split in a few groups:

- Settings
  - ***Write*** (Ctrl+K) – press this button to write current setting to gas ECU. If there are any unsaved changes made by user the button is highlighted as shown on

Fig. **3.12**. After pressing "Write" button the warranty invalidation warning window will appear (Fig. **3.13**).

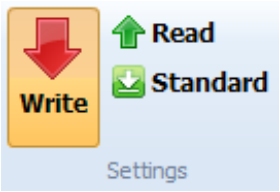


Fig. 3.12 Highlighted "Write" button.

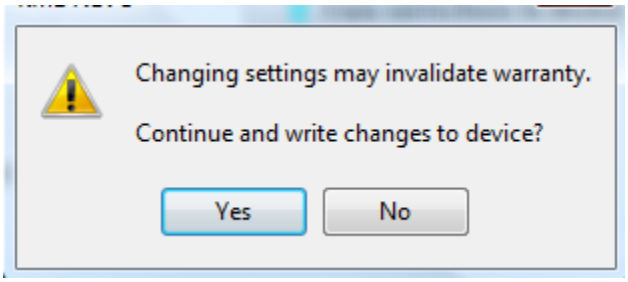


Fig. 3.13 Warranty invalidation warning window.

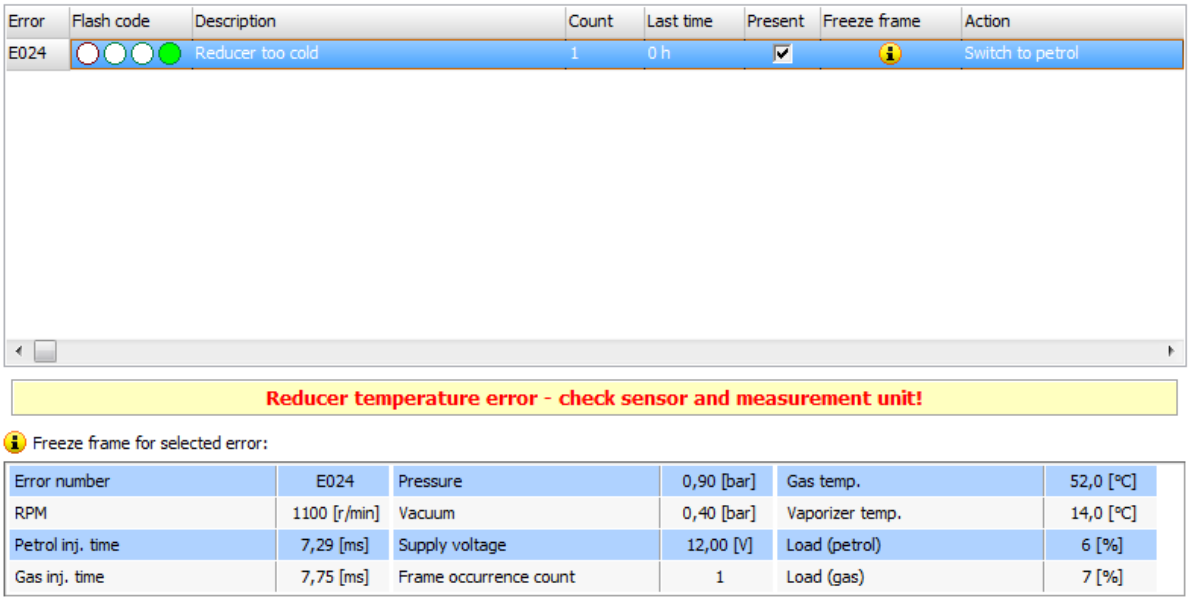
- ***Read*** (Ctrl+J) – used to read setting from gas ECU.
- ***Standard*** (Ctrl+L) – pushing this button overwrites current configuration in program by default settings. The "Write" button must be used for these changes to take effect.
- ***AutoSave*** – allows to automatically save changes in settings and adjustments without the need of using "Write" button.

- Errors
  - ***Diagnostic errors*** (F2) – gas ECU has self-diagnostic system allowing to detect and register errors occurred during work and determine conditions of their occurrence. Each error has its individual flash code displayed on control panel using one red and three green diodes. In the window errors are displayed with their:
    - flash code,
    - description,
    - count,
    - last time,
    - present,
    - freeze frame,
    - action.

After highlighting error its freeze frame shows in the bottom of the window. Freeze frame contains frozen parameters at which the error occurred (Fig. **3.14**). In the case of error E017, E018 and E024 additional reducer temperature error message will be displayed in the error codes window. When one of these errors occurs check the temperature sensor and the measurement module PS-CCT4-D.

Errors codes list:

Code	Description	Red	Green	Green	Green
E001-E008	Petrol injector no signal cyl 1..8.	●	●	○	○
E009-E016	Gas injector malfunction cyl 1..8.	●	○	●	○
E017	Tred sensor short.	○	●	●	○
E018	Tred sensor open.	●	●	●	○
E019	Tgas sensor short.	○	●	○	●
E020	Tgas sensor open.	●	●	○	●
E021	Valve short.	○	○	●	●
E022	Valve open.	●	○	●	●
E023	Low gas pressure.	●	○	○	○
E024	Reducer too cold.	○	○	○	●
E025	Petrol injectors merged.	○	●	○	○
E026	Gas injectors merged.	○	○	●	○
E027	Gas temperature too high.	N/A			
E028	Control panel malfunction.	N/A			
E029	Sensor unit malfunction.	N/A			
E030	High ECU temperature.	N/A			
E031	Low ECU voltage.	N/A			
E032	Gas pressure too high.	N/A			



Error	Flash code	Description	Count	Last time	Present	Freeze frame	Action
E024		Reducer too cold	1	0 h	☑		Switch to petrol

Reducer temperature error - check sensor and measurement unit!

Freeze frame for selected error:

Error number	E024	Pressure	0,90 [bar]	Gas temp.	52,0 [°C]
RPM	1100 [r/min]	Vacuum	0,40 [bar]	Vaporizer temp.	14,0 [°C]
Petrol inj. time	7,29 [ms]	Supply voltage	12,00 [V]	Load (petrol)	6 [%]
Gas inj. time	7,75 [ms]	Frame occurrence count	1	Load (gas)	7 [%]

Fig. 3.14 Table of error with freeze frame at the bottom.

- ***Clear errors*** – clears all errors registered gas ECU.
- ***Read errors*** – reads registered errors from gas ECU.
- ***Action settings*** – opens new window in which actions for all errors can be determined.

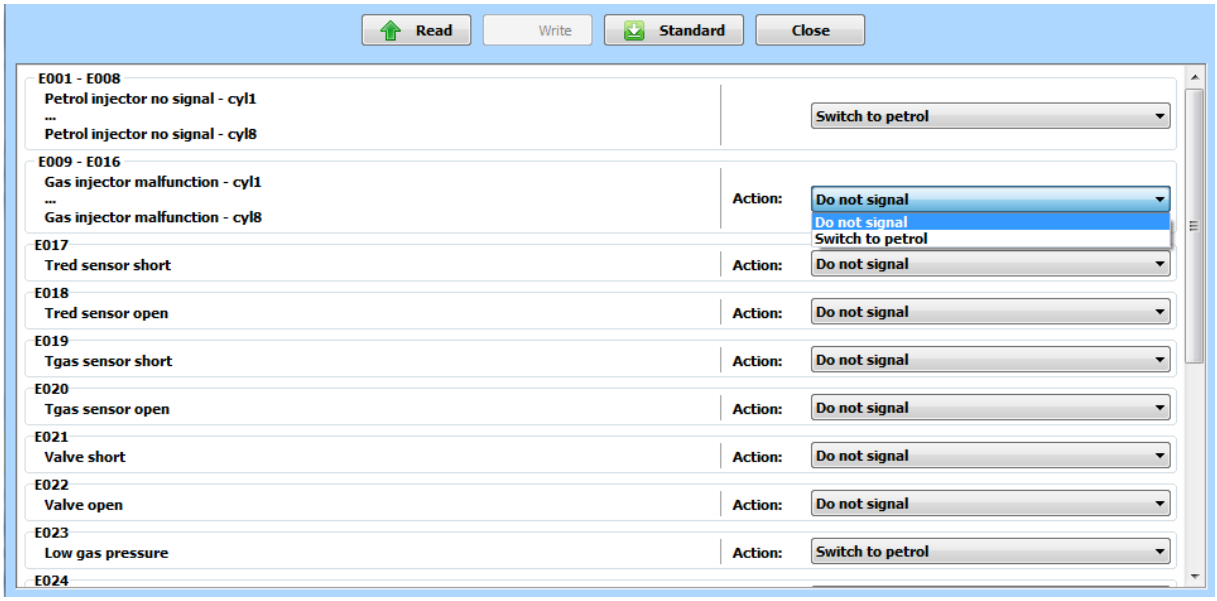


Fig. 3.15 Action settings window.

- Tests
  - ***Installation tests*** (F3) – contain channels/cylinders tests, valve test, information about gas ECU maximum working temperature , number of emergency starts and ECU resets (**Fig. 3.16**).

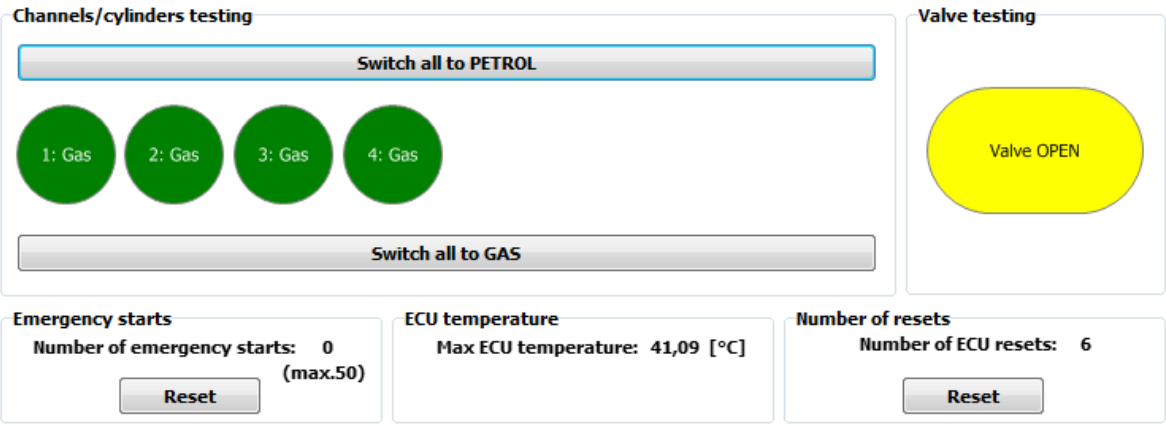


Fig. 3.16 Installation tests window.

  - ***Injectors test*** (F4) - enables to detect differences of effectiveness of used gas injectors without necessity of removing them from the system. In case of incorrectness it allows to determine the corrections that have to be put into operation to restore proper, even work of the gas injection system.

- Workshop
  - ***Workshop info*** (F5) – information for workshops (change list, computer code, gas ECU working time) (Fig. **3.17**).

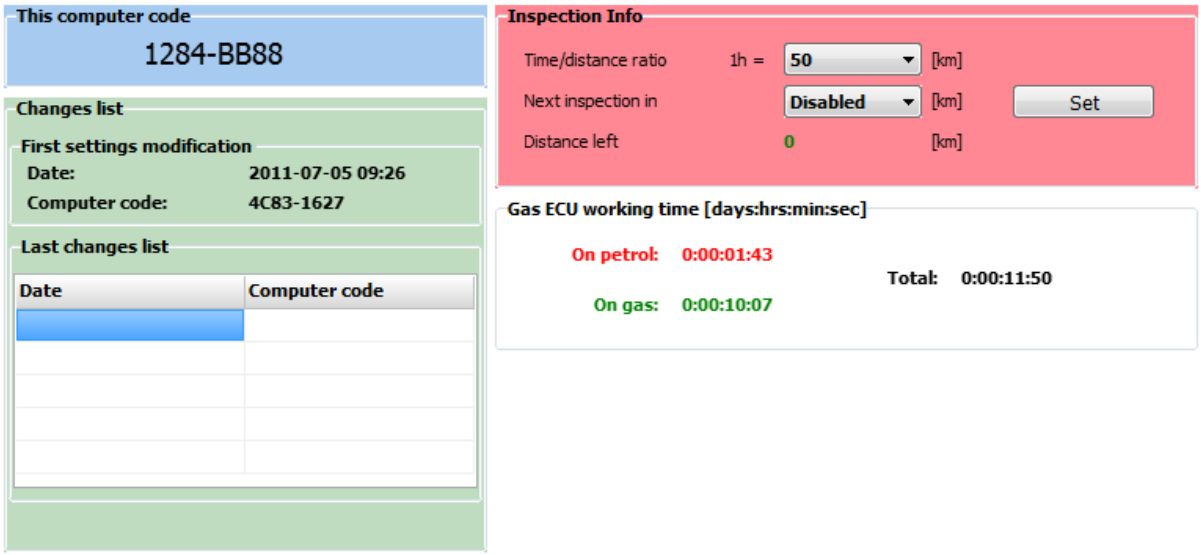


Fig. 3.17 Workshop information.

It is possible to set approximate distance after which the controller will go to the inspection reminding mode. In this purpose, the Time/distance ratio has to be set (e.g. 70 kmph) and the distance between inspections. In the inspection reminding mode, each time engine starts, the controller signalize the necessity of inspection by ten long buzzer sounds.

3.4.1 Channels/cylinders testing

This function enables to check the order of channel connections, detect faulty cylinders. It also allows to check the correctness of valves operation.

Channels/Cylinders testing can be done in the following way:

1. Switch the gas system to work on gas
2. Press button “Switch all to petrol”
3. Starting from the first cylinder switch consecutive channels to gas. If the engine does not work evenly, the channel being presently checked is not working correctly (faulty cutting the petrol injector wire, faulty connection of gas injectors, or fault of gas injector operation may occur)
4. Repeat procedure to each cylinder.

3.4.2 Internal temperature of gas ECU

Current gas ECU internal temperature is shown at readings stripe. In Diagnostics tab the highest internal temperature of the controller can be checked. It allows to estimate conditions in which the controller works.

3.4.3 Number of emergency starts on gas

The controller has a procedure of emergency starting on gas.

Procedure is as follows (reducer temp. must be > 0˚C):

1. Turn the ignition on
2. Switch system to petrol
3. Turn the ignition off
4. Turn the ignition on
5. Press and hold button on the Control panel for about 10 seconds. State diode is blinking and buzzer is beeping. After that time the gas ECU opens the valves and the state diode on Control panel is constantly on (buzzer stops beeping).
6. Start the engine.

Maximum number of emergency starts is 50. Button “Reset” enables to set number of emergency starts back to 0.

3.4.4 Injectors test

Before doing the test the engine has to be well wormed up. It is also crucial, that gas injectors has to be installed in the proper order. It is also important, that during the whole test, the engine has to have equal load. Changing load: for example switching the air conditioning during the test may falsify the test's results.

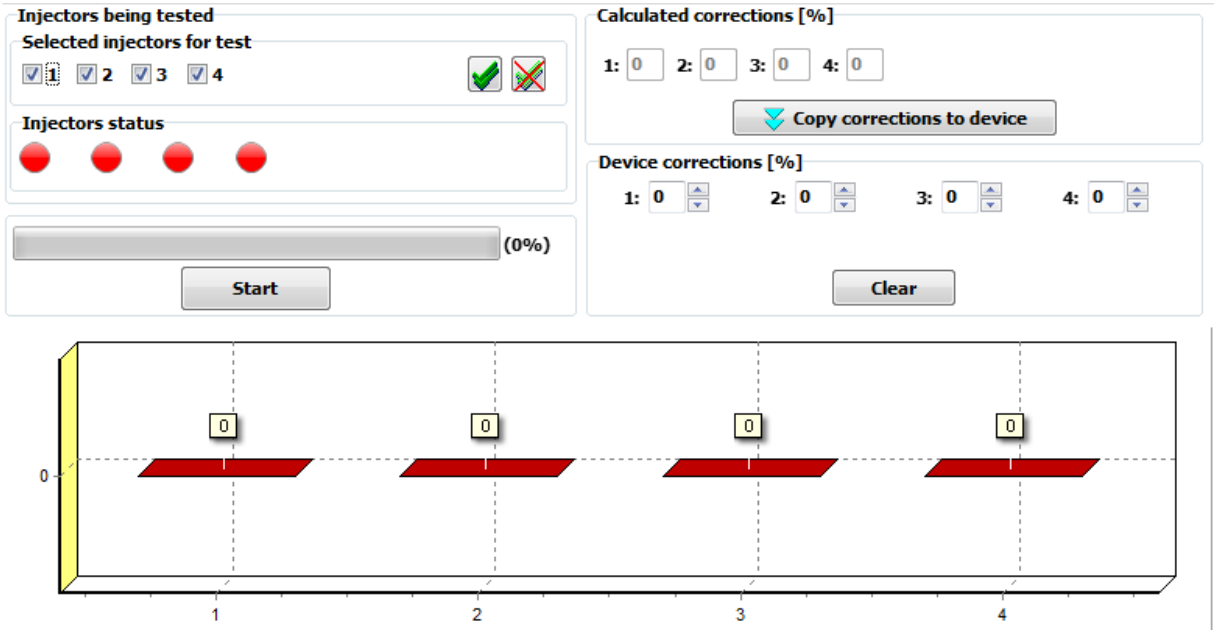


Fig. 3.18 Injectors test window.

Procedure of gas injectors testing:

1. Check, if all injectors have been properly installed in the correct order.
2. Start the engine.
3. Leave car at idle for about 5 minutes to stabilize the conditions (gas temperature, reducer temperature).
4. Open the window of the gas injectors test, choose cylinders to be tested (during the first test choose all cylinders), press Start.
5. Wait for the test to finish. During the test progress bar is visible.
6. After the test the results and corrections are shown. The result can be only used to compare effectiveness of injectors in one gas system.
7. Correction may be copied by clicking ***Copy corrections to device*** and then saved by clicking ***Write.***

3.5 Installation

The Installation tab contains functions responsible for configuring and calibrating gas injection system. Installation tab ribbon elements are split in a few groups:

- Configuration
  - ***Auto Setup*** (F6) – shows Auto setup window.
  - ***Basic*** (F7) – shows basic configuration options.

- ***Advanced*** (F8) – shows advanced configuration options.
- Calibration
  - ***Model*** (F9) – shows editable model chart. Model is gas injection time in function of petrol injection time for no corrections.
  - ***Map*** (F10) – shows .the window with petrol and gas maps.
  - ***Corrections*** (F11) – shows available corrections for the Model.
  - ***Clear PETROL map*** – deletes all petrol map points. Doesn't require usage of "Write" button.
  - ***Clear GAS map*** – deletes all gas map points. Doesn't require usage of "Write" button.
  - ***Set model*** – function that automatically calculates and sets model. New point will be shown on the Model chart and collected GAS map points will be deleted. Function doesn't require usage of "Write" button.

3.5.1 Auto Setup

Before you start Auto Setup, set the basic parameters required: the type of alternative fuel and gas injectors. You can choose which functions will be performed by Options:

- **AutoConfig** – sets the basic configuration parameters required for the proper functioning of the system (number of cylinders, a source of RPM, type of injection system). Procedure can be executed when reducer temperature reaches 50°C.
- **Autocalibration** - sets the parameters of the gas installation controller on the basis of the engine behaviour at idle and prepares the car to the road test. Procedure can be executed when reducer temperature reaches 50°C:
  - **Offset** – depends on the type of gas injectors,
  - **Switch all cylinders at the same time** – perform calibration on all cylinders simultaneously.

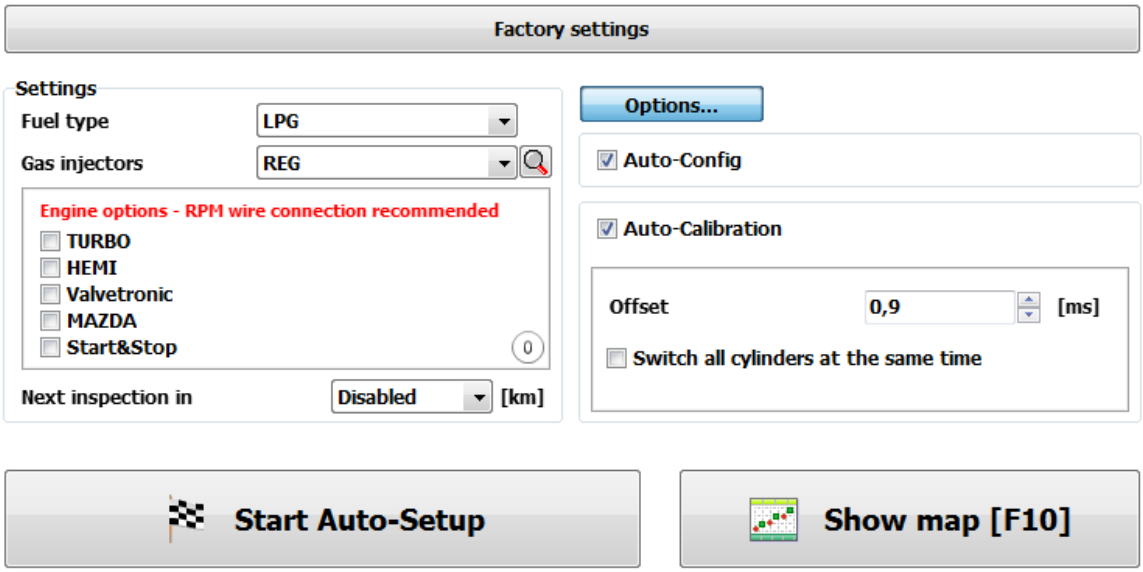


Fig. 3.19 Auto Setup window.

During the Auto Setup the progress window is shown.

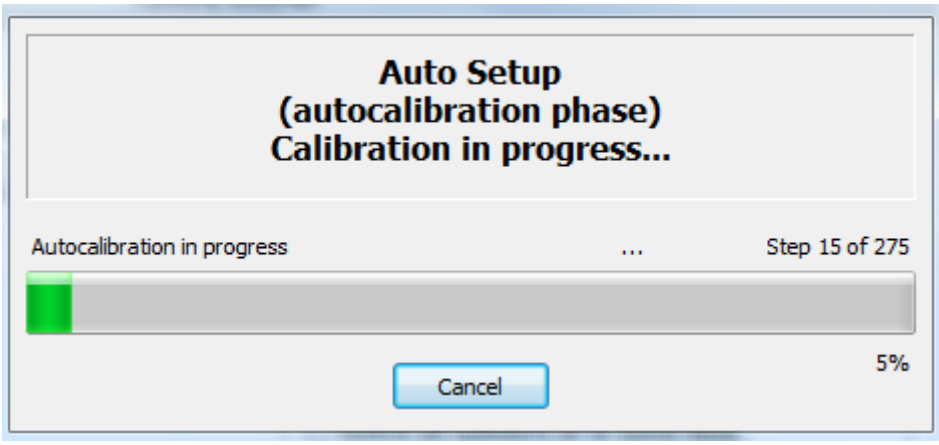


Fig. 3.20 Auto Setup progress window.

User will be informed after successful finishing the Auto Setup.

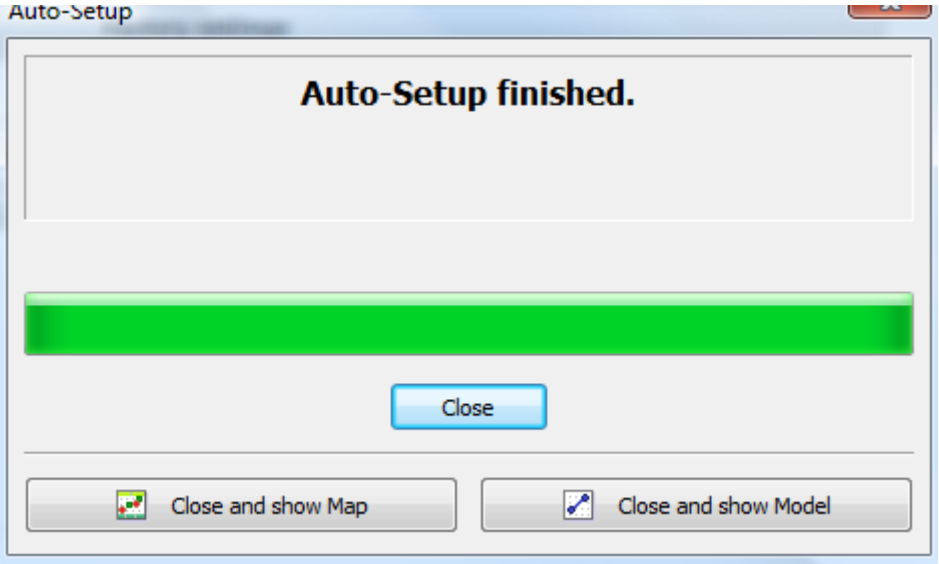


Fig. 3.21 Window with information about finishing Auto Setup.

After finishing the Autocalibration one of the messages can be shown:

- **nozzles too big** – diameter is too big in some cases. The gas controller may not be able to correct gas amount in a whole range of load. Change nozzles to smaller ones.
- **nozzles too small** – diameter is too small in some cases. The gas controller may not be able to correct gas amount in a whole range of load. Change nozzles to bigger ones. Too big nozzles, and – consequently – high tilts dangerous to the engine, because of the lack of possibility of controlling the mixture during the high load.

When Auto-Setup is successful, a message will appear in Model and Map window (Fig. **3.22**). It indicates that verification process is running. To complete the verification mode, follow the instructions provided in the message.

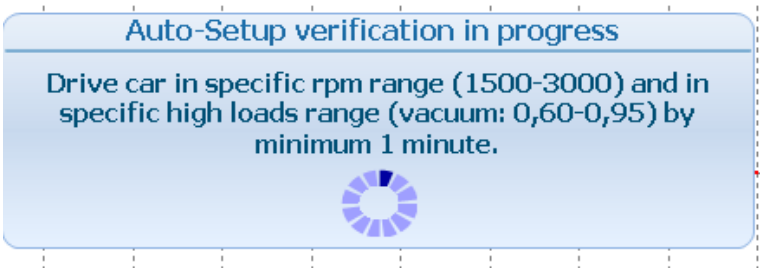


Fig. 3.22 Message indicating the ongoing process of Auto-Setup verification.

3.5.2 Basic configuration

The most important and necessary options are gathered in Basic configuration window. Each group of options has different background colour (Fig. **3.23**).

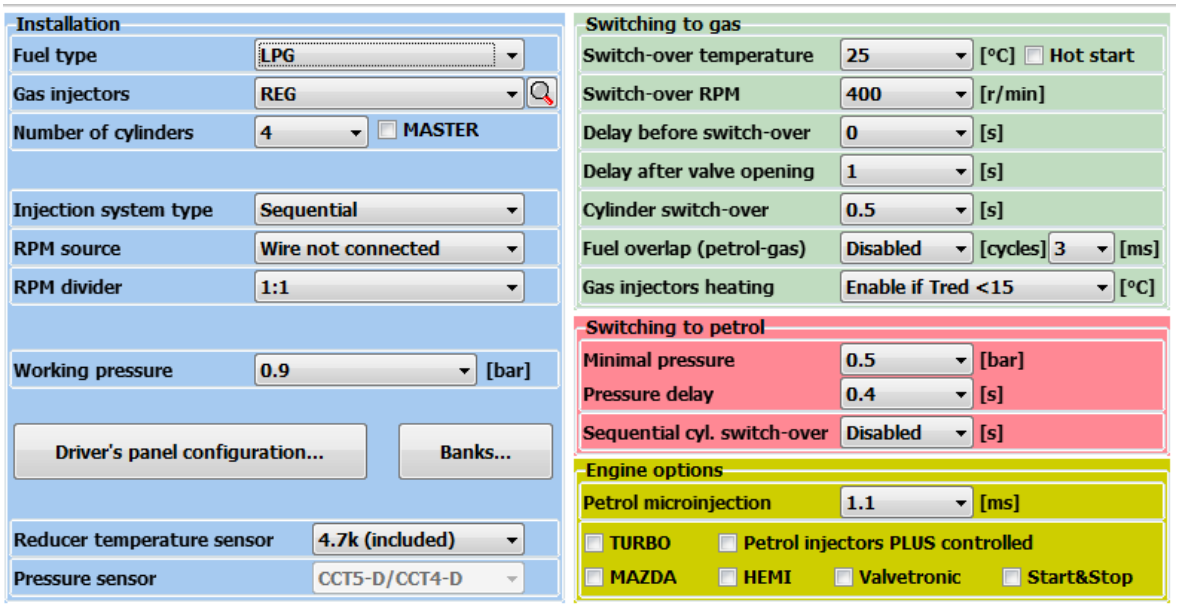


Fig. 3.23 Basic configuration window.

Description of available options:

- Installation:
  - ***Fuel type*** – determine the type of alternative fuel (LPG or CNG).
  - ***Gas injectors*** – enter installed injectors type. It is very important to choose appropriate gas injectors type. The wrong choice may cause serious problems with gas installation and Autocalibration process. The button with the magnifying glass opens a new window containing the currently selected injectors photo (Fig. **3.24**).

Fig. 3.24 Window with gas injectors picture.

- ***Number of cylinders*** – enter amount of cylinders.
- ***Injection system type*** – choose the car's injection system type.
- ***RPM source*** – enter what is the source of the RPM signal. If RPM wire is not connected petrol injectors are the only source possible. Since the ECU version 4.0D it is also available to choose signal of the camshaft sensor. In this case, type in the current engine speed read from tachometer and press the button which will determine the divider circuit with automatic tuning of the camshaft position sensor.

Wire not connected – enable this option, when the RPM wire is not connected.

IMPORTANT! When the program does not read any RPM value if this option is enabled, the RPM wire needs to be connected.

- ***Ignition system*** – choose the ignition system type. RPM value shown next to ignition system type allows to verify the choice. If the type is correct, shown RPM value should be the same as shown on the car tachometer.
- ***Working pressure*** – value of pressure for which the corrections are 0%.
- ***Reducer temperature sensor*** – choose the type of reducer temperature sensor.
- ***Pressure sensor*** – choose the type of pressure sensor (at the moment only PS-CCT4-D is available).

- Switching to gas:
  - ***Switch-over temperature*** – reducer temperature, that has to be reached before switching to gas.
  - ***Switch-over RPM*** – the value of RPM that has to be reached before the controller can switch to gas.
  - ***Delay before switch-over*** – minimum time from starting the engine to switching to gas.
  - ***Delay after valve opening*** – time from gas valve opening to switching to gas.
  - ***Cylinder switch-over*** – is the period between switching on the consecutive gas injectors during switching from petrol to gas. Long period smoothes switching. The value of 0 causes all cylinders to switch on gas at one moment.
  - ***Fuel overlap (petrol-gas)*** – this option enables overlapping of gas and petrol during first few cycles during switching. This function is useful if there is a long distance between an inlet manifold and injectors. If so, an amount of air may gather in hoses during driving on petrol, and it is necessary to remove it and replace it with gas before switching to gas. It is done by turning the gas and petrol injectors on in the same time (overlapping). This may soften the switching process, but count of the overlapped cycles and time of each gas pulse needs to be chosen experimentally: exact values depend on pipes length and injectors. Time needs to be high enough to remove the air from pipes, but low enough not to inject too much gas and petrol at the same time. It is not advised to use more than one pulse.
  - ***Gas injectors heating*** – efficiency of gas injectors is lower in low temperatures. This option enables heating the gas injectors before switching to gas. This option gives more stable switching when gas injectors are dirty and cold.

- Switching to petrol:
  - **Minimal pressure / Pressure delay** – set pressure and time value after which the controller switches engine back to petrol due to the low level of gas in the tank. In cars with automatic gearbox or when strong jerk can be felt during this switching time has to be reduced by 0,1s, and when this gives no result – pressure has to be raised (e. g. to 0.8 bar)
  - **Sequential cyl. switch-over** – is the period between switching on the consecutive petrol injectors during switching from gas to petrol. Long period smoother switching. The value of 0 causes all cylinders to switch on petrol at one moment.

- Engine options:
  - ***Petrol microinjection*** – enable this option if engine is microinjection-type. Engines of that type apart from a main injections in a single cycle, have also very short injections, called microinjections. If this option is not set and the engine has microinjections, petrol injection time it not stable and have small and big values by turns. In that case small values means microinjections time. It is advised to set the microinjection time longer than values visible in Readings window.
  - ***Petrol injectors PLUS controlled*** – enable this option if petrol injectors are controlled by positive voltage signal. To this type of injectors, external emulators are required.
  - ***MASTER*** – this option is used in cars with more than 8 cylinders. In this case it is required to use two controllers and a special Master-Slave interface. One of controllers has to be then in MASTER mode.
  - ***TURBO*** – option used with Turbo engines.
  - ***HEMI*** – enable this option if engine is HEMI-type. Engines of this type turn cylinders off at idle to reduce fuel consumption and emission.
  - ***Valvetronic*** – option used with Valvetronic engines.
  - ***MAZDA*** – option for engines changing the type of fuel injection system from sequential into semi-sequential or fullgroup, which often takes place in the Mazda cars.
  - ***Start&Stop*** – enable this option if car is Start&Stop-type. Cars of this type turn off engine at idle to reduce fuel consumption and emission.

3.5.2.1 Driver's panel configuration

"Driver's panel configuration…" *button* opens configuration window shown on Fig. **3.25**.

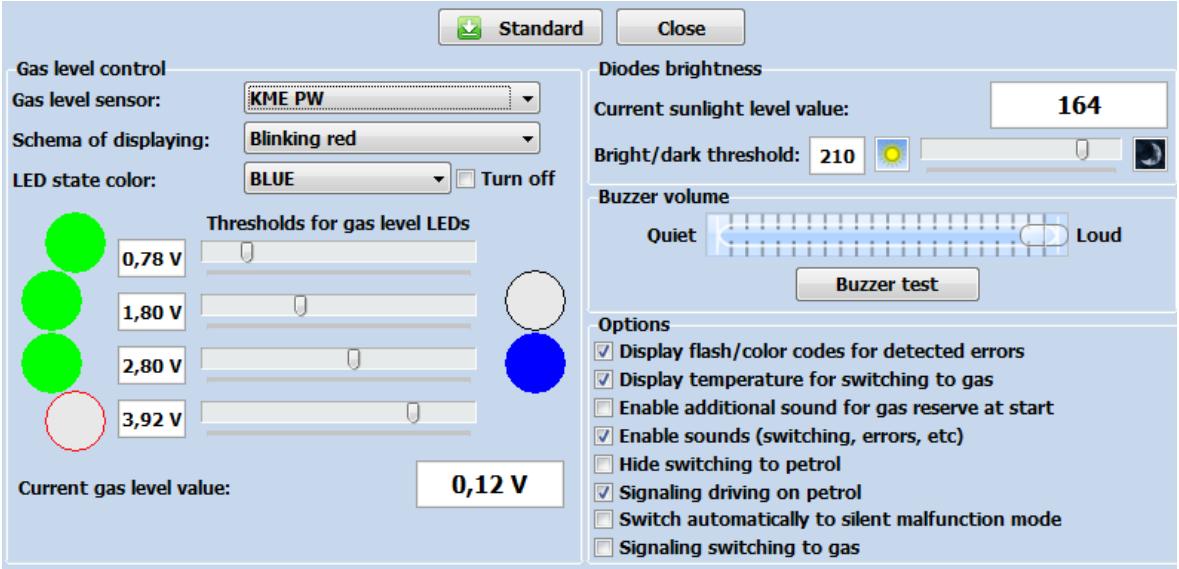


Fig. 3.25 Driver's panel configuration window.

Configuration window includes buttons known from the main window: Read, Write, Standard as well as many options:

- *Gas level sensor* – enter type of mounted gas level sensor.
- *LED state colour/Turn off* – choose which diode (red/blue/none) will indicate working on gas.
- *Thresholds for gas level LEDs* – sets threshold for each LED.
- *Bright/dark threshold* – Driver's panel LEDs have two levels of gloving – bright and dark. You can choose level of sunlight that makes LEDs to glow darker. Moving slider far right causes LEDs to always glow brighter.
- *Buzzer volume* – by using slider you can choose buzzer's volume level.
- *Display flash/colour codes for detected errors* – enabling this option causes that errors flash codes are displayed on the driver's panel.
- *Display temperature for switching to gas* – when system waits for switching to gas together with increasing temperature of reducer the amount of gloving LEDs increases. Four gloving lead indicate that switching temperature has been reached.
- *Enable additional sound for gas reserve at start* – after reaching reserve while working on gas system will generate sound informing about low gas level.
- *Enable sounds* – when this option is disabled the buzzer is inactive.

- *Hide switching to petrol* – when this option is active the driver's panel does not signalize switching to petrol with automatic return to gas.
- *Signaling driving on petrol* – when system starts in "petrol mode" and is not going to switch to gas, controller generates three short sounds.
- *Switch automatically to silent malfunction mode* - when this option is enabled, the buzzer beeping stops automatically after 5 seconds after the error occurred.
- *Signaling switching to gas* - when this option is enabled, then before the first gas injection buzzer beep sounds.

3.5.2.2 Automatic gas level indicator calibration (from 4.0D version)

This process allows you to automatically configure the full range of gas level indication on the panel driver. Prior to calibration, it is necessary to select the right type of gas level sensor. Automatic calibration should be performed during the refueling of empty gas tank.

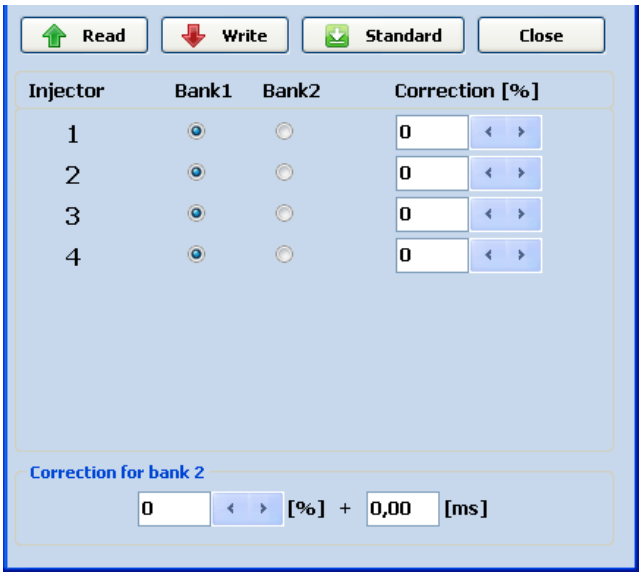
The whole procedure is as follows:

1. Switch system to petrol.
2. Turn the ignition on.
3. Turn the ignition off.
4. Press the button on the control panel, and hold for about 15 seconds. After about 10 seconds the ECU switches the valves and indicates working on gas (the same situation as in the case of emergency start on gas). After about 5 seconds after the gas valve opening (the button is still pressed) panel will indicate the calibration mode of the gas level indicator – gas level LEDs flash alternately.

5. Turn the ignition off.
6. Fuel the gas tank.
7. Turn the ignition on.
8. Wait until the panel stops indicating the calibration mode.
9. Calibration finished.

3.5.2.3 Banks configuration

"Banks…" button enables to use additional correction for the chosen cylinders. This option is used for equalization of work of two banks in two-banks engines. (V6 and V8).



To determine which cylinder belongs to which bank, turn the system to work on gas. Then, check any cylinder (e.g. first) as belonging to the second bank and set any correction for 2nd bank (e.g. +3ms). Then check which bank's STFT correction is changing. If STFT of first bank changed, then the chosen cylinder belongs to the first bank. If the second bank's STFT correction changed, the chosen cylinder belongs to the second bank. Every cylinder should be checked in this way.

3.5.3 Advanced configuration

The Advanced configuration window contains the more complex options and strategies.

Fig. 3.26 Advanced configuration window.

There are white circles, with “0” digit inside, located next to some of advanced options (Fig. 3.21a). White circle with “0” means, that this specific option is inactive at the moment even if its enabled. When circle turns red and the digit inside it is “1”, the enabled option becomes active (Fig 3.12b). This functionality allows to easier and quicker determine the impact of the changes made in the gas ECU configuration.

Fig. 3.27 a) inactive function indicator; b) active function indicator

Description of options:

- Correction for acceleration – correction, that is active during acceleration.
  - ***Percent*** – correction value.
  - ***Aggressiveness*** – far left position: detection of practically every acceleration, far right position: detection of only a very dynamic and rapid acceleration.
- Add petrol for high RPM – adding petrol to gas.

- ***RPM > [...] to [...]*** – range of RPM, in which the mechanism is active.
- ***Petrol injection time >*** – petrol injection time beyond which the addition of petrol starts.
- ***Added petrol value*** – added petrol injection time.

- Cut-off
  - ***Pressure letting off*** – enable controlling enlarging pressure during cut-off state. This ensures proper work when cut-off passes. Pressure value, at which mechanism starts has to be chosen.
  - ***Injection enrichment [...] for RPM < [...]*** - enrichment option may be used when the engine does not work properly (or stops) on gas after the end of a cut-off state. When this option is switched on, during cut-off gas injectors will get opened for a given time if the RPM is less than given value. Option recommended for Renault's cars.
- ***Correction for injection system change*** – in some engines (often in Mazda's cars) dynamic changes of injection system type occure. Injection system type may be changed from sequential to full-group or semi sequential. In some cases during that dynamic change inaccuracies in mixture composition may occur, and consequently, engine does not work properly. To avoid that, a new mechanism of corrections during changes of injection type may be used. If this option is active, the gas injection during detected change of injection type will be corrected by a given percentage.
- ***Semi sequential gas injectors control – ONLY FOR CARS WITHOUT OBD*** – option useful for fullgroup engines. It changes gas injectors control from fullgroup to semi-sequential (in this way you can use bigger nozzles size). This option cannot be used if engine has OBD.
- ***Minimum gas injection time*** – parameter determines the minimal time of driving gas injector. Gas injection times will not be shorter than value of the parameter given here, even, if it would result from model and corrections.
- ***Shifted injection system*** – gas injection time and injection moment are calculated from petrol injection from other cylinder in which ignition occurs selected number of cycles before. This option helps in cars which are shaking during acceleration (for example Totyota Avensis).
- ***Petrol times signals filter*** – used in cars, in which the interference is affecting the reading of petrol injection times.

Advanced configuration window also include strategies. These are the functions that cause switching system to petrol with automatic return to gas. Switching to petrol prevent the engine from working in inaccurate conditions. "Automatic return to gas" means that if

the conditions that enforce switching to petrol subside, it will automatically return to work on the gas. Strategies are available after selecting "Activate strategies" (Fig. **3.28**)

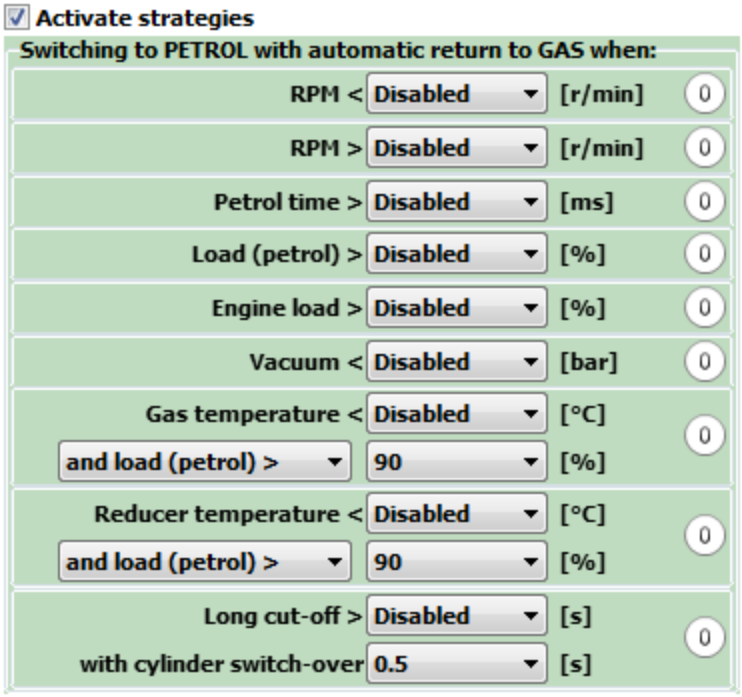


Fig. 3.28 Strategies in Advanced configuration.

- Switch to petrol with automatic return to GAS when::
  - ***RPM <*** – set the minimal RPM value at which the gas controller may work on gas. This option is to be used only in the last resort, when car do not work properly on gas at idle and no other methods give effect.
  - ***RPM >*** – set the maximal RPM value at which the gas controller may work on gas.
  - ***Petrol time >*** - petrol injection time beyond which system will switch to petrol.
  - ***Load (petrol) >*** – set the maximal load (petrol) percentage value at which the gas controller may work on gas. **Notice:** petrol time load percentage is taken under consideration here (look at the percentage indicator Readings page). This option is to be used in the last resort in case of nor proper work under big loads. Before using it, always try to match size of nozzles to get parameter Mult of 0% (see Model)
  - ***Engine load >*** – set the threshold load (see the sidebar readings) beyond which the system switches to petrol.

- ***Vacuum <*** - vacuum below which system switches to petrol. Helpful option for cars which go out when approaching the intersection.
- ***Gas temperature < and load (petrol/engine) >*** - set the minimal gas temperature at which controller may work on gas on high load. This function prevents engine from using not vaporized gas during long and big loads. This option is recommended for engines with power 300 PH and above.
- ***Reducer temp. < and load (petrol/engine) >*** - set the minimal reducer temperature at which controller may work on gas on high load. This option is recommended for engines with power 300 PH and above.
- ***Cut-off longer than ...[sec] with cylinder switch-over...[sec]*** – the purpose of this function is to avoid possible problems with returning from cut-off. If the option is enabled, during long cut-off (length can be set by first parameter), the system will be temporarily switched to petrol. The second parameter (time of switching a single emulator on) tells how fast will consecutive cylinders be switched back on gas.

3.5.4 Model

Model window (Fig. **3.29**) allows you to manually tune the gas system. The model is a feature that converts petrol injection times (Tb) for gas injection times (Tg). On the graph the model is represented by blue points and the segments connecting them. Above each point is a number indicating the Tg of a given point in ms. It is possible to insert up to 15 points of the model, which gives a great freedom of modelling (the optimal number of points of the model is approximately 8).Model graph also contains multiplier which is helpful in manual calibration. It can be turned off. Instantaneous operating point of the system is represented by a yellow diamond shaped point.

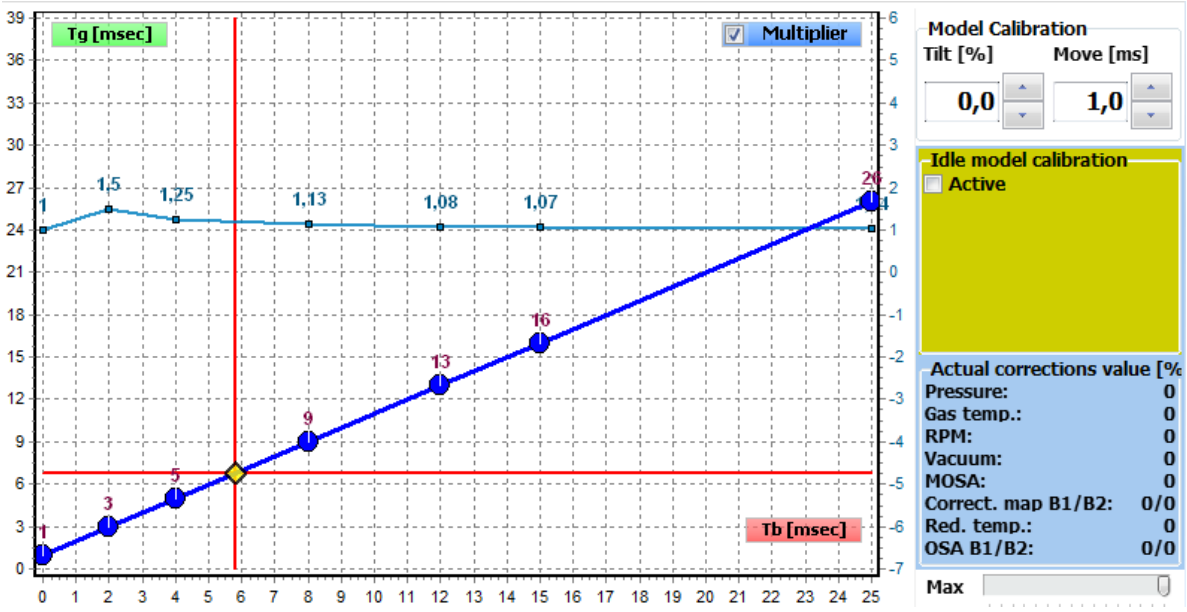


Fig. 3.29 Model window.

In Auto-Save mode any modification made to the model must be manually saved. After making any manual changes in the model, a message appears on outdated gas map and its automatic erasure after saving the changed settings (Fig. **3.30**).

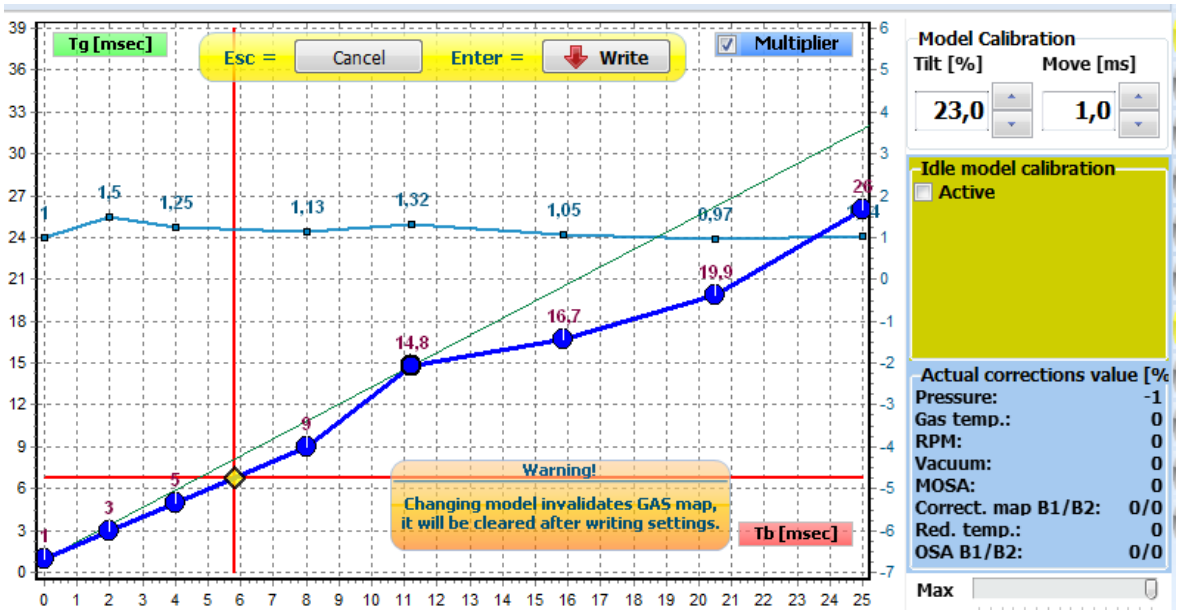


Fig. 3.30 Model window In Auto-Save mode.

Functions on Installation → Model tab:

- Click on the point to set focus on it.
- When the focus is set on the point, it is bolder and is blinking.

- Changing model points can be done with keyboard in one of the following ways:
    - Click on the point to set focus on it.
    - When the focus is set on the point, it is bolder and is blinking.
    - The position of the focused point can be changed with arrow keys.
    - To focus next or previous point Ctrl + arrow keys can be used.
    - To delete selected point Del key can be pressed.
    - To add a new point between focused and the next point, Ins key can be used.
    - To save changes in model, Enter key can be used.
    - To cancel changes – Esc key can be used.
    - Space key allows you to quickly switch between petrol and gas.

- Changing model points can be done with mouse in one of the following ways:
    - Clicking on the model with right mouse button adds point to model.
    - Clicking on a point and dragging it changes the point coordinates. Note : you cannot change points order in this way.
    - Pressing Ctrl and clicking any point deletes the point.

- Model calibration:

The model can be modified using the mouse or using the parameters in the panel model:

- ***Tilt*** – parameter enables to change Tg value of all model points by a given percentage. It changes the ratio of slope (gradient) of the model curve.

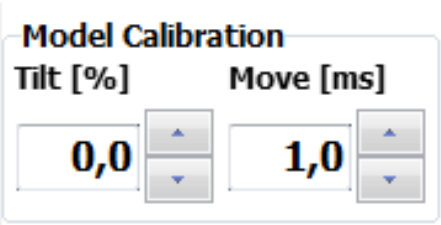


Fig. 3.31 Model calibration buttons.

Recommended tilt for groups of engine types:

Engine type	Recommended tilt
Sequential turbo	-5 – 5 %
Sequential	0 – 15%
Semi sequential	10 – 25%
Full group	15 – 30%

If on high RPM (e. g. 6000RPM) petrol injections are merged (injection times reach 20ms) nozzles need to be changed to bigger ones, and thanks to that tilt parameter can be lower and this should prevent from merging injection times.

Move - parameter enables to change Tg value of all the model points by a given value in milliseconds. Offset depends on reaction times of gas injectors.

- **Idle model calibration** - enables using additional model for the idle work. This model is represented by points P1 and P2 (**Fig. 3.32**). Thanks to that, idle work can be richer or leaner than it would be with normal model. P1 and P2 coordinates are calculated during autocalibration, but may be also set manually.

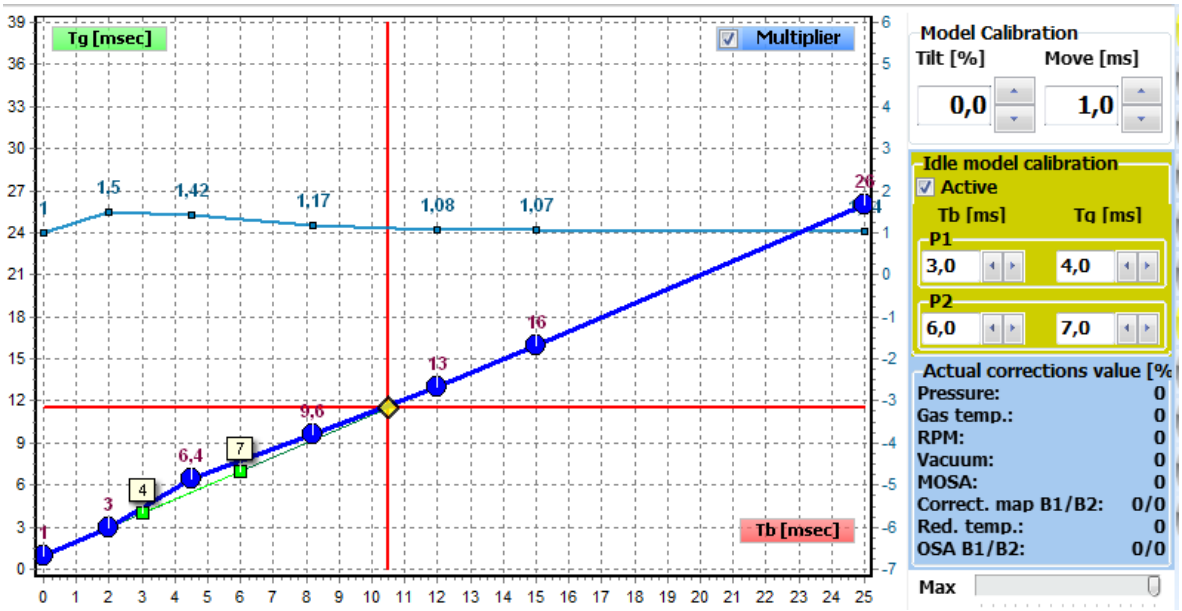


Fig. 3.32 Idle model on Model chart.

In the model window there is a frame from the current values of the corrections are shown and regularly updated in real time (Fig. **3.33**):

Actual corrections value [%]	
Pressure:	0
Gas temp.:	0
RPM:	0
Vacuum:	0
MOSA:	0
Correct. map B1/B2:	0/0
Red. temp.:	0
OSA B1/B2:	0/0

Fig. 3.33 Current correction frame.

On the Model graph there is also petrol template and calculated model. First one is indicated by red dots (Fig. **3.34**) while the second one by orange squares (Fig. **3.35**). Number of petrol template and calculated model points depend on collected map points.

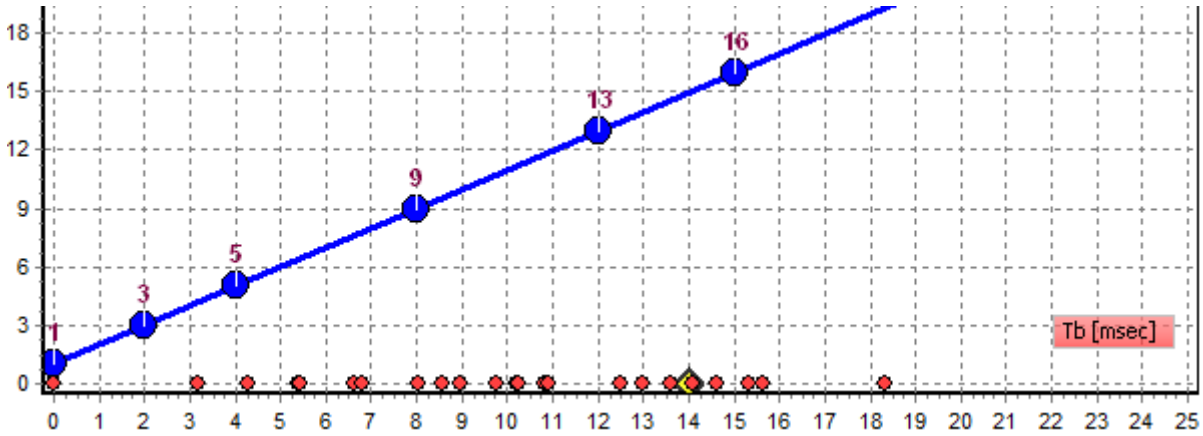


Fig. 3.34 Petrol template on the Model chart.

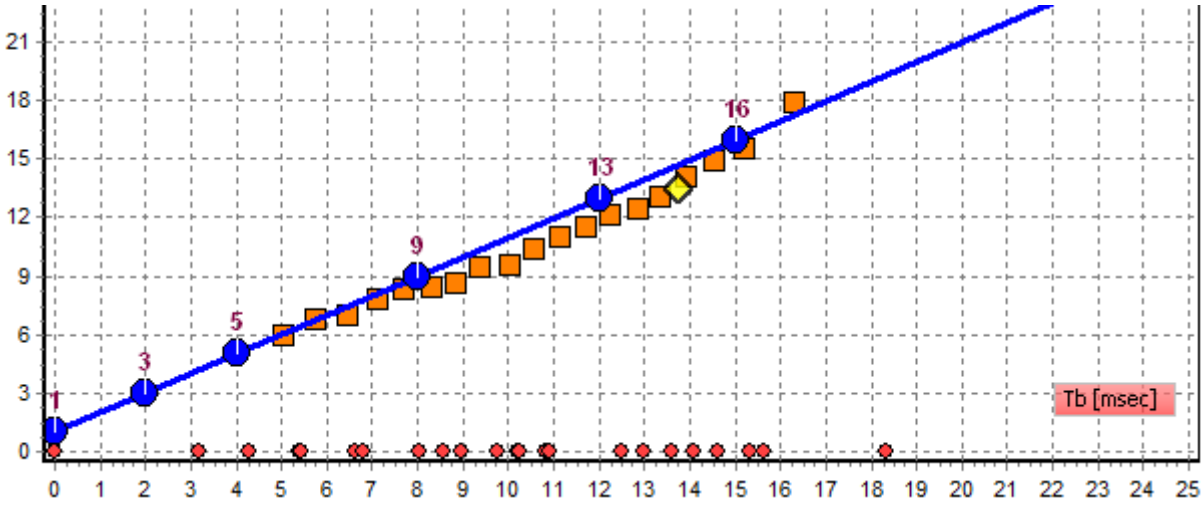


Fig. 3.35 Petrol template and calculated model points on Model chart.

With petrol template and calculated model points you can use the Set model function, which automatically moves the model to the suggested location. The exact process of calibrating the gas system, the collection of maps and setting the model is described in Chapter 3.5.7.

3.5.5 Map

During the road test controller collects points of the petrol and gas map. Points are collected only when reducer temperature is higher than 40°C, when the RPM is in a specific, chosen range. If the RPM is appropriate (RPM is in the chosen range) collected working points are saved in the controller and shown on the chart. Petrol map points are drown in red, while gas map point in green (**Fig. 3.36**).

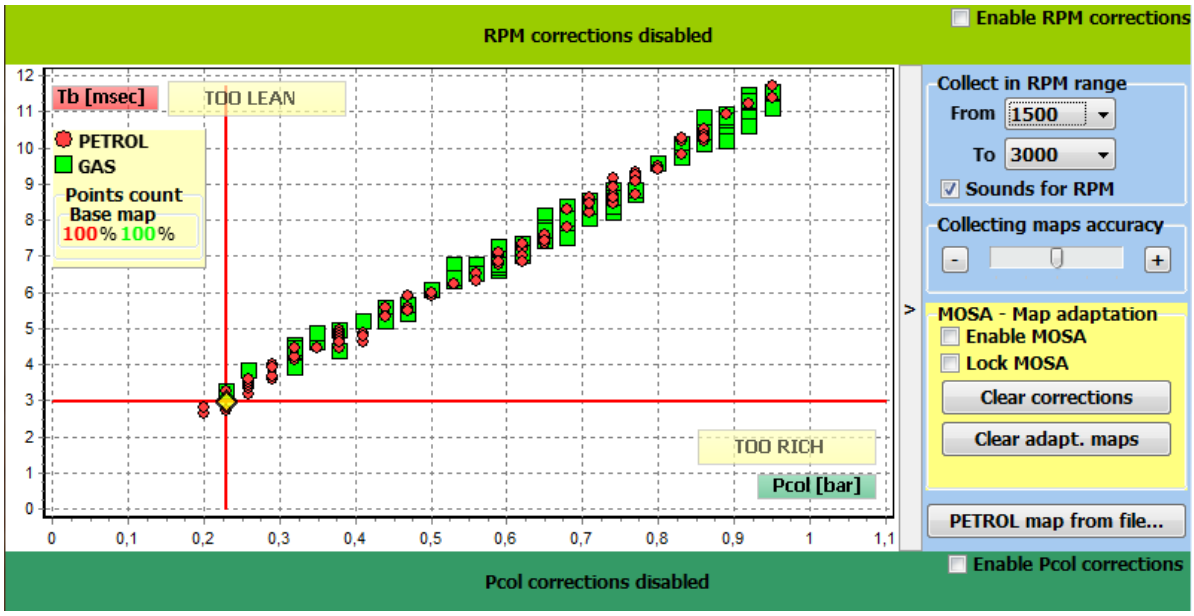


Fig. 3.36 Map window in Installation tab.

Description of options in Installation → Map:

- ***Collect In RPM range from* [...] to [...]** – choose range of RPM within which points are collected.
    - ***Sounds for RPM*** – activates the software sound signal (if the PC has a speaker) indicating that the engine is in the correct RPM range and reducer temp. > 40°C.
- ***Collecting maps accuracy*** – you can change the algorithm of collecting the map points. The more accurate setting the slower the map is being collected and vice versa. Collect more detailed maps for more precise calibration.
- ***MOSA - Map adaptation*** – MOSA (Map On-board System Adaptation) is an option that enables the automatic adjustment to changing engine's working conditions, as, for example, driving on low quality gas.

Turning MOSA on should be preceded by road test, because it is crucial, that the model should allow to drive in the whole range of load.

The adaptation mechanism operates during driving on gas and modifies model according to read gas injection times. Model modified by MOSA may not differ from the original model more than 20% and that is why adaptation may not be the only mechanism calibrating the controller. After turning on the adaption, frame that contains number of collected points is increased by points by points collected for the purpose of adaptation in different RPM ranges (**Fig. 3.37**).

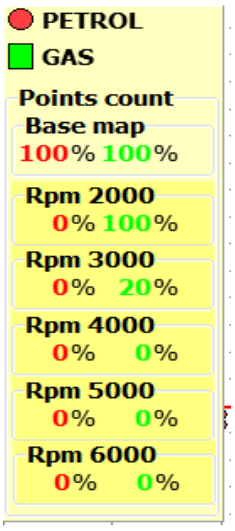


Fig. 3.37 Frame with additional ranges of RPM.

- ***Lock MOSA*** – lock update MOSA corrections table.
- ***Clear corrections*** – erases all the information gathered so far by the adaptation.
- ***Clear adapt. maps*** – erases maps gathered by adaptation.

- ***Read PETROL map from file*** – enables to read maps from the file on the PC hard drive.
- ***Clear PETROL map*** – erases petrol map from controller.
- ***Clear GAS map*** – erases gas map from controller.

In Map window you can also enable the RPM and vacuum (Pcol) linear corrections. After enabling the two tables will appear at the top and bottom of the Map chart (**Fig. 3.38**).

RPM [r/min]	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	☑ Enable RPM corrections
Correct [%]	0	0	0	0	0	0	1	2	3	4	5	8	10	11	12	13	14	15	

Pcol [bar]	0,2	0,3	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,1	☑ Enable Pcol corrections
Correct [%]	0	0	0	0	0	0	0	0	0	0	

Fig. 3.38 RPM (top) and Pcol corrections table (bottom).

3.5.6 Corrections

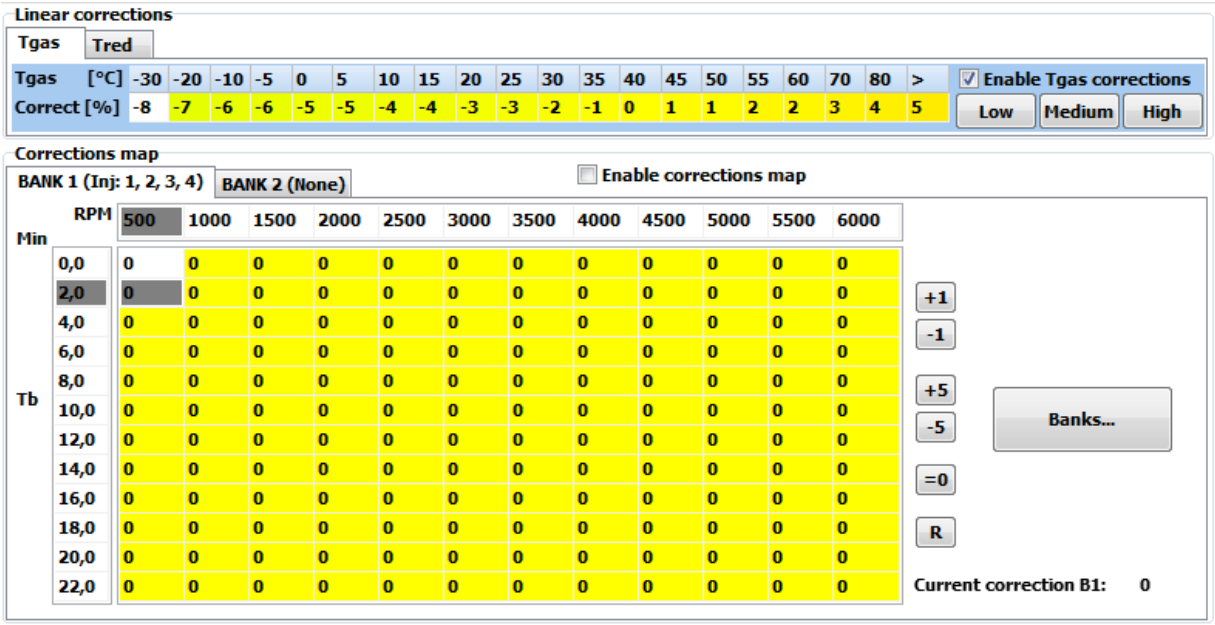


Fig. 3.39 Tgas correction table and Corrections map.

- ***Tgas correction*** - enables to add correction from gas temperature. It is recommended to use standard corrections. Verification of corrections may be done when engine is cool (T vaporizer < 20°C) by comparing petrol times on petrol and petrol time on gas. Such a correction has to be chosen, so that the difference between those times would be the smaller.
- ***Tred correction*** – enables to add correction from vaporizer temperature.
- ***Corrections map*** - by corrections map it is possible to set a more advanced corrections on RPM and petrol injection time (Tb). If linear corrections on RPM are not enough to regulate the system (e.g. if in some high RPMs corrections should be different for high load and different for low load) then it is possible to set RPM corrections depending on petrol injection times by corrections map. Notice: it is possible to set different corrections map on each bank. It is necessary then to select injectors belonging to second bank.

To activate correction map, select ***Enable corrections map*** option. To set corrections on correction map, select some area of the map by mouse and press one of the buttons on the right side of the map (+1, -1, +5, -5, =0). The value of the correction in the selected area will be changed by a value corresponding with the pressed button. Notice: corrections on the map should be as smooth as possible. Resultant correction for the current working point

is changing linearly with changes of RPMs and injection times and is visible below the correction map.

3.5.7 Road test

The road test procedure:

1. Choose RPM range to collect points in. Doing test in one RPM range is absolutely sufficient. It is recommended to choose a RPM range that will be most frequently used during further car usage.

NOTICE: Both petrol and gas map has to be collected in one RPM range. For example, if 1500 – 3000 RPM range was chosen, both petrol and gas map has to be collected in specified range. After changing RPM range maps should be cleared and collected again. When servicing it is recommended to collect new petrol map if the old one was collected earlier than a month ago because of changes of external conditions.

After changing RPM range save the changes.

2. Clear petrol and gas map.
3. Switch the controller to work on petrol.
4. Collect petrol.

   Drive on petrol; try to keep rounds per minute in the chosen range:

Example for RPM range: 2250-2750 RPM

	Parameters	Time
PETROL	2nd gear, 2250-2750 RPM	~ 1-2 min
PETROL	3rd gear, 2250-2750 RPM	~ 1-2 min
PETROL	4th 5th gear, 2250-2750 RPM	~ 1-2 min

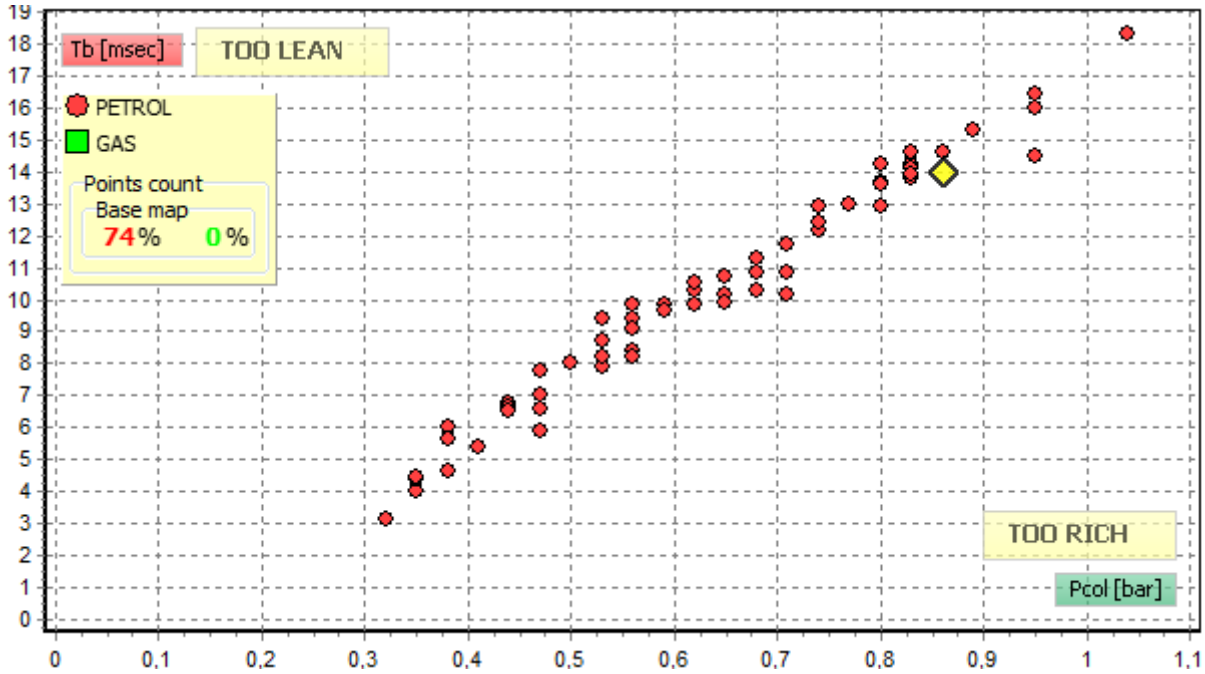


Fig. 3.40 Collected petrol map.

Time of collecting may be adjusted, take under consideration that there should be about five points collected during drive on each gear. Points should be spaced equally in the whole range of load. Collected petrol map may look like on Fig. **3.40**.

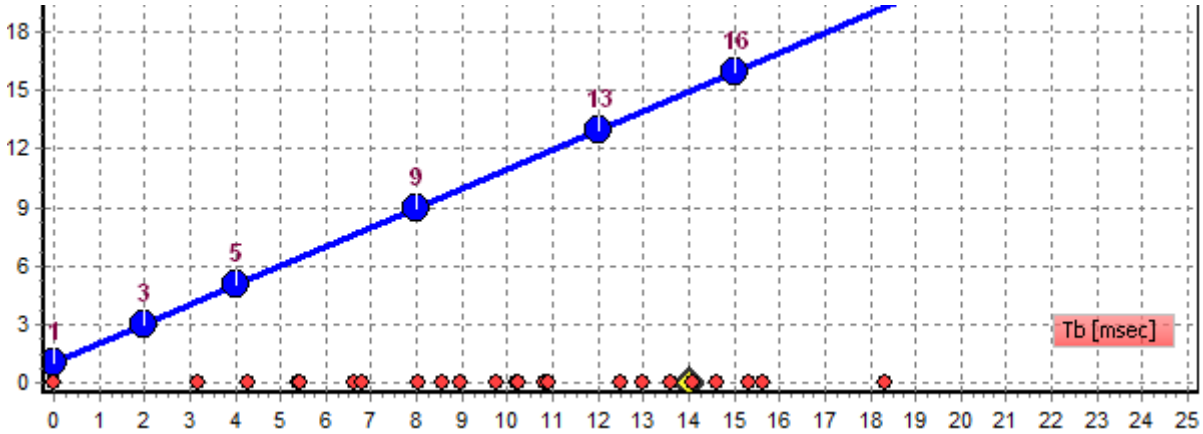


Fig. 3.41 Petrol template based on collected petrol map.

5. Switch the controller to work on gas.

6. Collect gas map.

Drive on gas; try to keep rounds per minute in a chosen range.

Example for RPM range: 2250-2750 RPM:

	Parameters	Time
GAS	2nd gear, 2250-2750 RPM	~ 1-2 min
GAS	3rd gear, 2250-2750 RPM	~ 1-2 min
GAS	4th or 5th gear, 2250-2750 RPM	~ 1-2 min

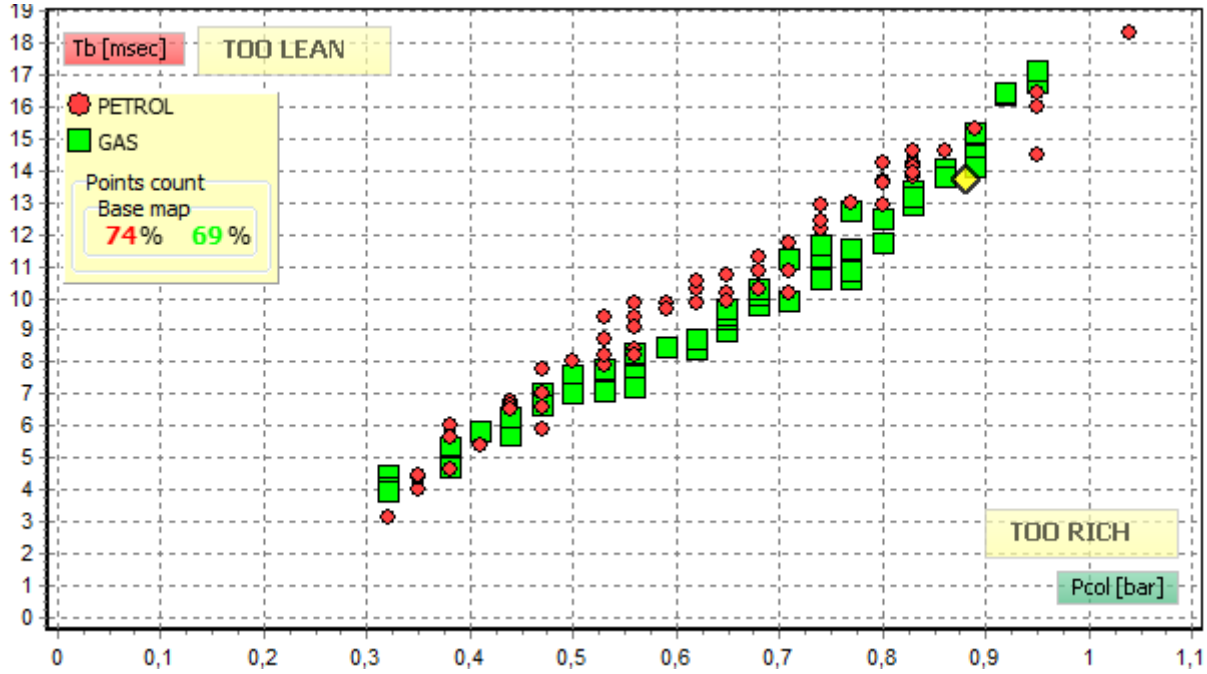


Fig. 3.42 Collected petrol and gas map.

Gas map after collecting may look like on Fig. **3.42**. Calculated model based on petrol and gas map is shown on Fig. **3.43**.

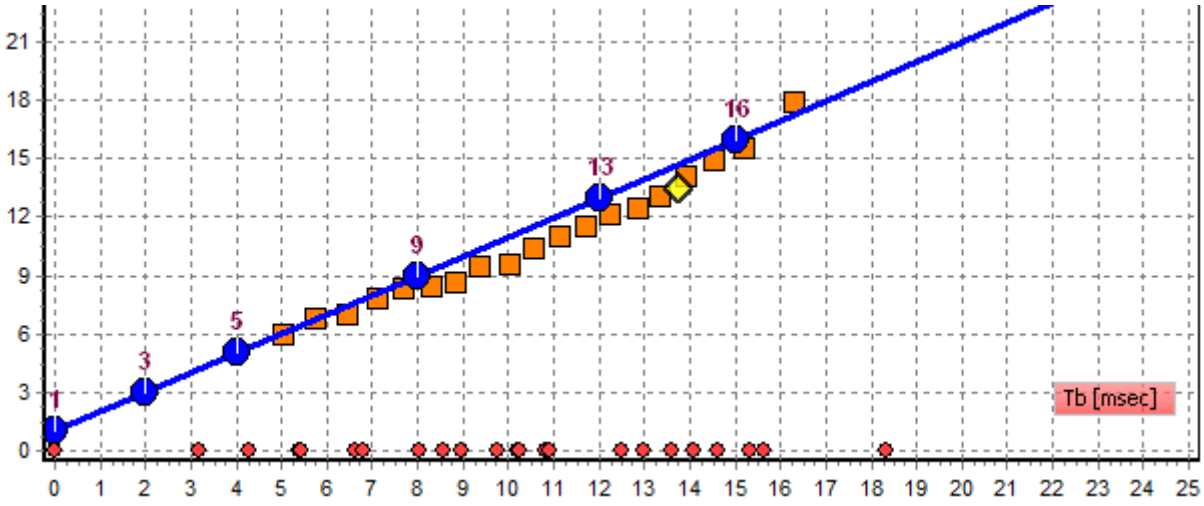


Fig. 3.43 Petrol template and calculated model points on Model chart.

7. If used gas injectors were used for the first time during autocalibration, their characteristics may change drastically during first drive on gas. Therefore first autocalibration may not give correct results. It is recommended to check if idle model is still correct after first drive on petrol by comparing petrol time at idle on gas and petrol time at idle on petrol (figures 3.40, 3.41).

Tb1	4,38	Tg1	6,52
Tb2	4,38	Tg2	6,52
Tb3	4,39	Tg3	6,53
Tb4	4,39	Tg4	6,53

Fig. 3.44 Petrol and gas times while running o gas.

Tb1	4,37	Tg1	0,00
Tb2	4,37	Tg2	0,00
Tb3	4,37	Tg3	0,00
Tb4	4,37	Tg4	0,00

Fig. 3.45 Petrol times while running on petrol.

If those time are drastically different (difference bigger than 0,2 ms) autocalibration or idle model should be set again by moving P1 and P2 points In that situation, gas map may be needed to be collected again.

8. After collecting petrol and gas maps click „Set model" button. Program will ask for confirmation of setting model and deleting gas map. (Fig. **3.46**).

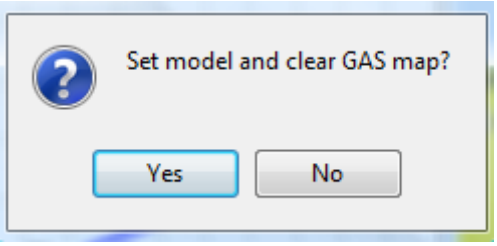


Fig. 3.46 A window confirming setting the model and deletion of the gas map.

If you click YES, the points of the map will automatically be converted to the model. The program will move the model points to cover orange settings points. At the same time gas map will be deleted so as the old calculation points. New model will be automatically written to the gas ECU.

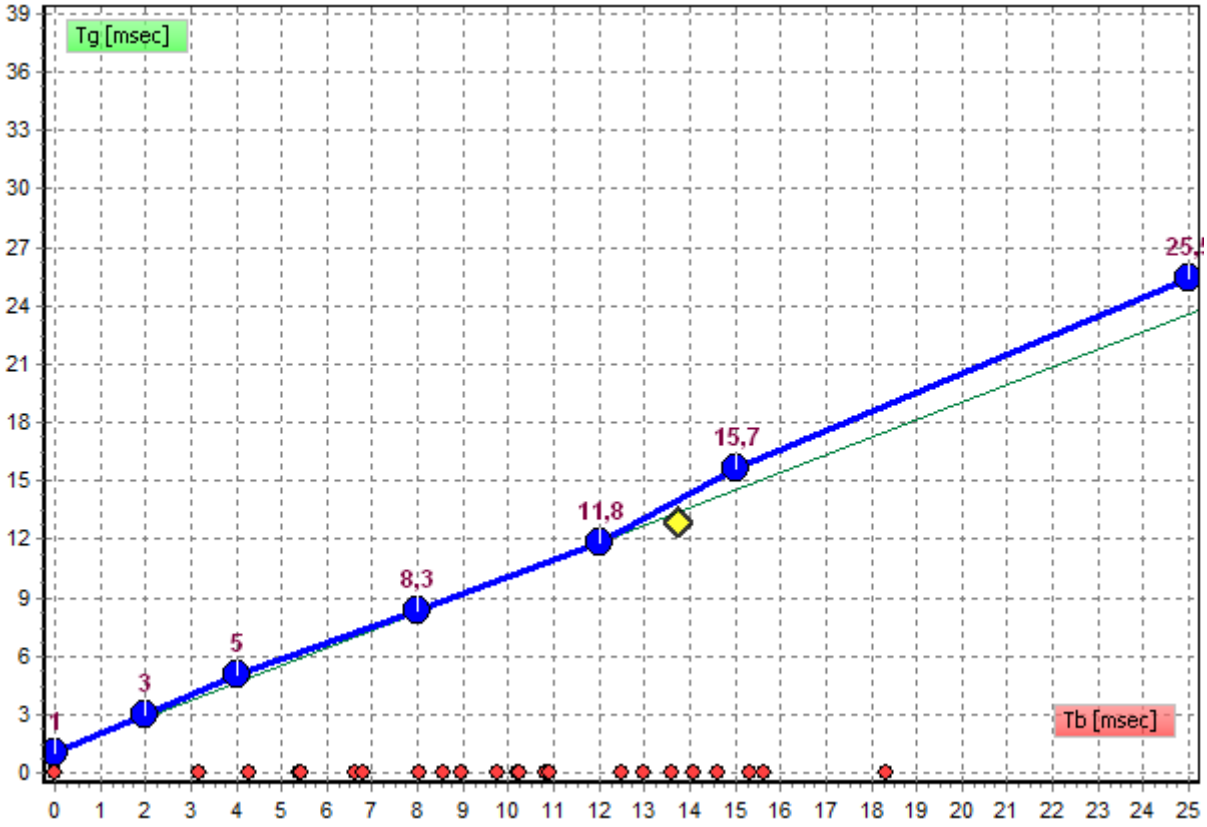


Fig. 3.47 Model changed with Set model function.

9. Then, if needed, the model can be also changed by mouse, keyboard keys or by changing tilt and move parameters. After changing the model, when it fully fit the yellow calculation points, press “Write”.

10. Procedure should be repeated until petrol and gas maps covers completely (like on Fig. **3.48**).

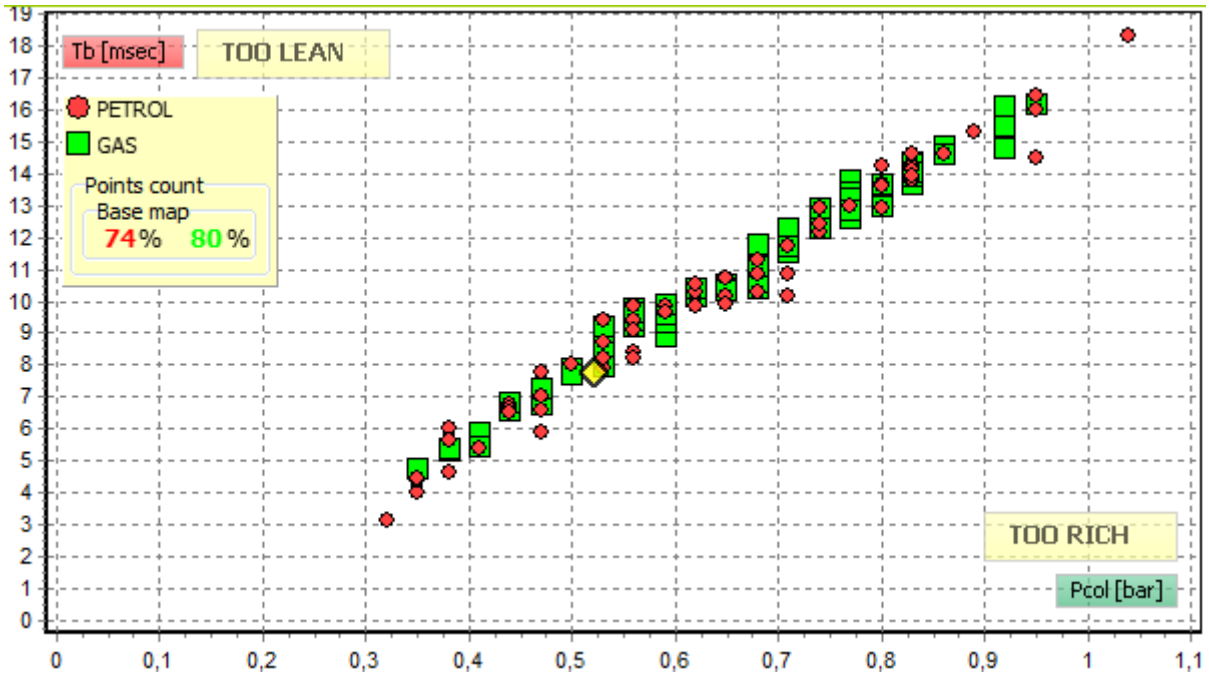


Fig. 3.48 Gas map covering petrol map.

3.6 Recorder

This function allows you to register gas system performance in time. Parameter values are presented in numerical and graph form. The blue vertical line sets the time moment for which numerical values are shown. After stopping the recorder you can set the blue line and therefore read the values in anytime moment in which the recorder has run. The "Save buffer" allows you to save recorders data in to a file. You can load previously saved data and display in on the recorder's chart. The parameters that are displayed can be freely changed. Just click on the name of the parameter to show the menu with a choice of all available parameters.

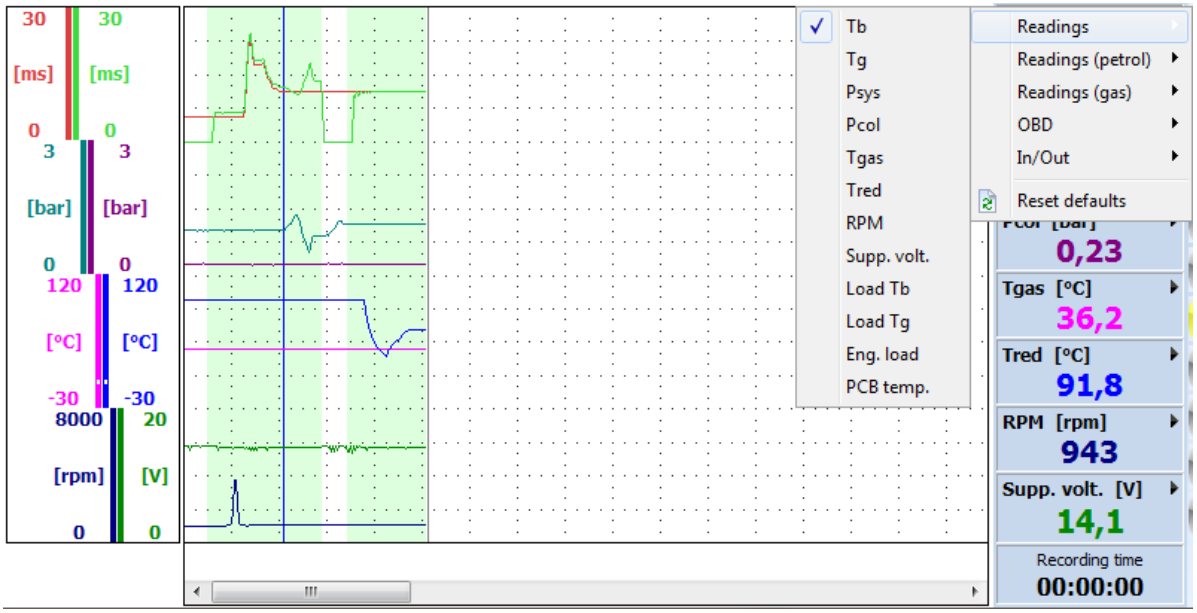


Fig. 3.49 Recorder window.

3.7 Readings window

It is window where all the important parameters of gas system are shown in a very clear way. Readings window is equivalent to readings tab from the DiegoG3 system and aims to facilitate the reading of parameters in such situations as driving the car while road test.

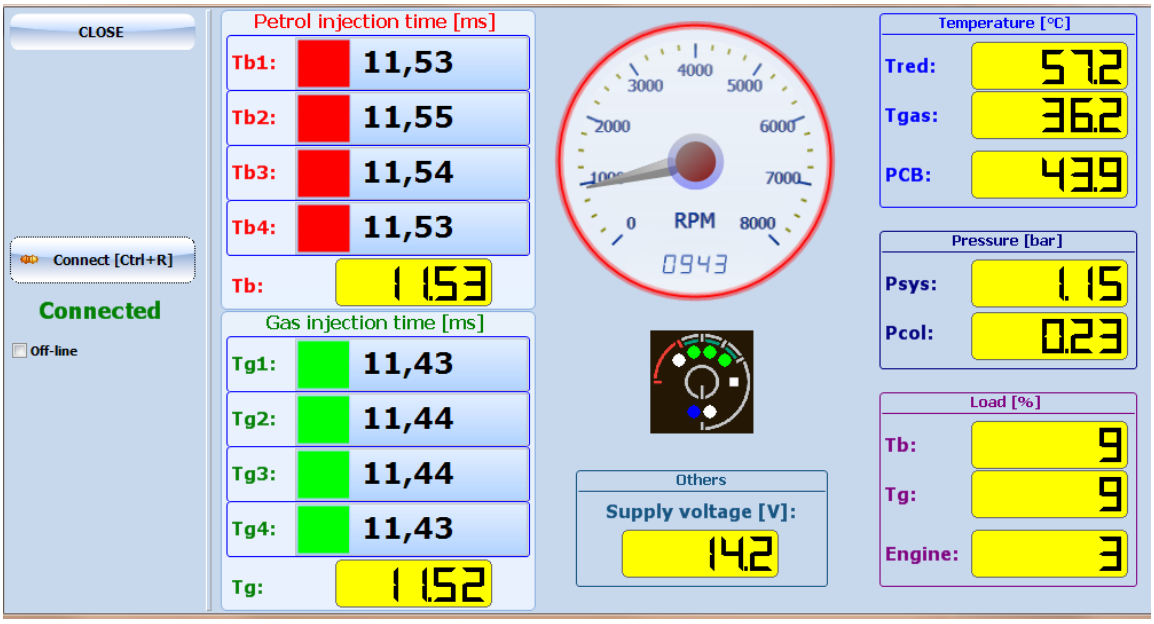


Fig. 3.50 Readings window.

3.8 In/Out tab

The tab is visible only in the case of a driver **PLUS** or **PRO**. These drivers are equipped with 4 analogue inputs with a maximum measuring range of 0..5 V.

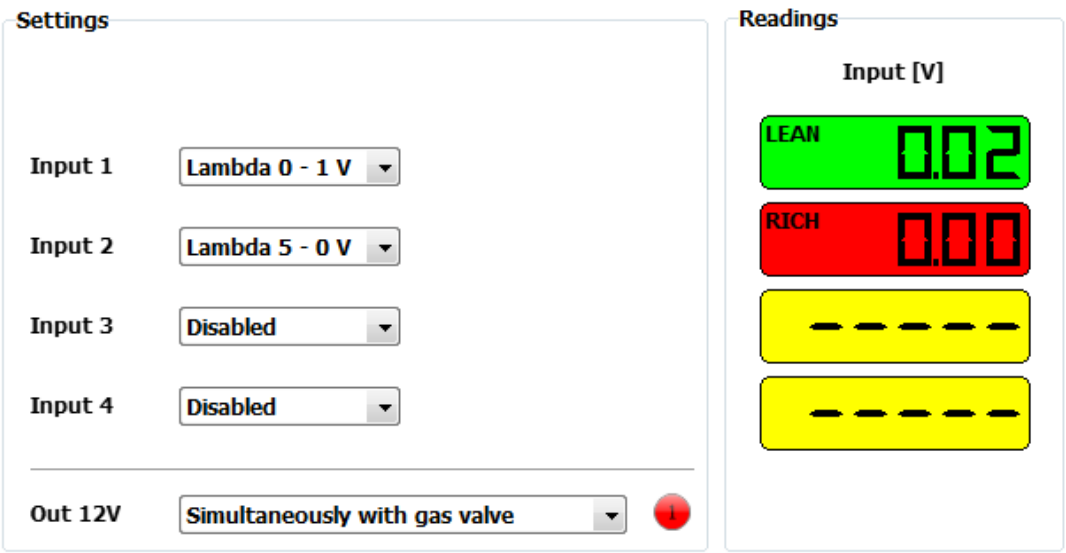


Fig. 3.51 In/Out settings window.

Using the settings you can assign functions and measuring ranges for individual inputs.

All inputs allow choosing number of lambda probes:

- Lambda 0 – 1 V
- Lambda 0 – 5 V
- Lambda 5 – 0 V
- Lambda 0.8 – 1.6 V

Input 3 also allows the connection of the PPO (flow-load transducer made by KME). The device is used to generate a load signal for NEVO gas injection system based on input from the air flow meter in Valvetronic engines (BMW, Volvo).

Input 4 allows to connect the resistive sensor to measure gas or reducer temperature.

Current readings of the analogue inputs are in the right part of the In/Out window.

12 V output is controlled double state output - the output voltage can be either 0 or 12 V. The current output status is shown by the indicator analogous to the advanced configuration functions. The output has several modes of operation:

- Simultaneously – output set in a high state simultaneously with the opening of gas valve.
- Enable before first injector – output set to high before switching the first cylinder to gas supply.
- Enable after last injector – output set to high after switching last cylinder to gas supply.

Regardless of the mode of operation the output switches to low after switching system to petrol.

12 V output is a low-load, the suggested maximum current load is 50 mA. It is designed to control other external systems such as relays.

3.9 OBD tab

The OBD tab is visible only when connected to NEVO or NEVO-PLUS with Adapter OBD V2 or to NEVO-PRO driver.

The OBD adapter enables communication between NEVO gas injection system and petrol controller that uses OBDII diagnostic interface. The applications of this communication are as following:

- reading parameters form the OBDII system, and their visualization in the NEVO application,
- reading and controlling (including deleting) recorded and awaiting errors (trouble codes) of the petrol controller,
- automatic regulation and adaptation gas system on the basis of the corrections read from OBD.

Adapter may be used only for the time of calibration. In that case it is a tool facilitating the calibration, and – to some extend – automatizing it. Adapter may also be installed in car permanently. In that case it works as an interface between petrol and gas controllers and enables the gas controller to introduce constant, adaptive correction.

The adapter may be connected to OBD using protocols that are applied in most cars produced after year 2000:

- ISO9141,
- KWP2000slow,
- KWP2000fast,
- CAN_11bitID_500kbps,
- CAN_29bitID_500kbps,
- CAN_11bitID_250kbps,
- CAN_29bitID_250kbps.

Configuration and maintenance of the OBD can be done with application NEVO 4.0.2.0 or newer. Options and functions are gathered on the tab sheet OBD. On the Start tab, basic information of adapter as: version, time and date of compilation and serial number are shown.

Elements OBD ribbon tab are divided into groups:

- OBD Connection
  - ***Protocol*** – is used to determine the protocol of the communication with the OBD.
  - ***Detect*** – enables to automatically detect the proper protocol.
  - ***Connect*** – connects with the OBD using the chosen or the detected protocol.
  - ***Disconnect*** – disconnects with OBD.
  - ***Auto connect to OBD*** – when turned on, this option makes adapter to automatically connect to the OBD after engine starts. The system waits 30 seconds after the appearance of the power then connect automatically.
  - ***State bar*** – indicates current OBD connection status.
- OBD Scanner
  - ***Live data*** – opens Live data window.
  - ***Trouble codes*** – opens Trouble codes window.
  - ***Read*** – reads trouble codes from petrol ECU.
  - ***Clear*** – clears ECU trouble codes.
- Adaptation
  - ***OBD Adaptation*** – opens OBD adaptation window (OSA).
  - ***Enable***– switching this option on causes activation of the OBD-based adaptation.
  - ***Reset*** – clears the corrections collected during adaptation on the basis of LTFT and STFT read from OBD.

!!! WARNING: In cars with flap on the OBD connector, the flap should be removed before connecting OBD module wires.

3.9.1 Live data window

Live Data tab provides functionality of controlling the readings from OBD. By every value there is a check box, which turning on causes cyclic reading of the chosen value and displaying it. If some values are not visible, they cannot be read from the OBD interface in the particular car. Any value read from OBD can be displayed on the chart of the NEVO system's recorder (Recorder tab).

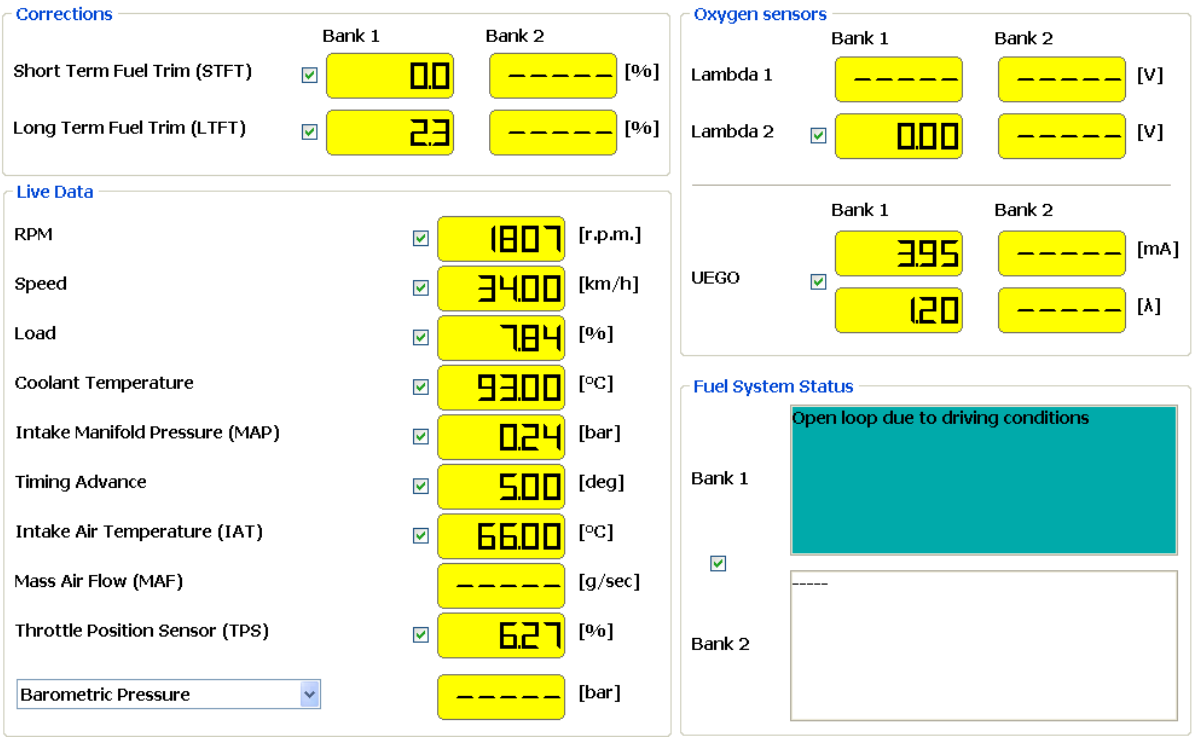


Fig. 3.52 Live data window.

3.9.2 Trouble codes window

This tab provides functionality of monitoring, controlling and deleting recorded and awaiting errors (trouble codes) of the petrol controller. To read recorded and awaiting trouble codes press the Read button. To delete all trouble codes, the Clear button is used.

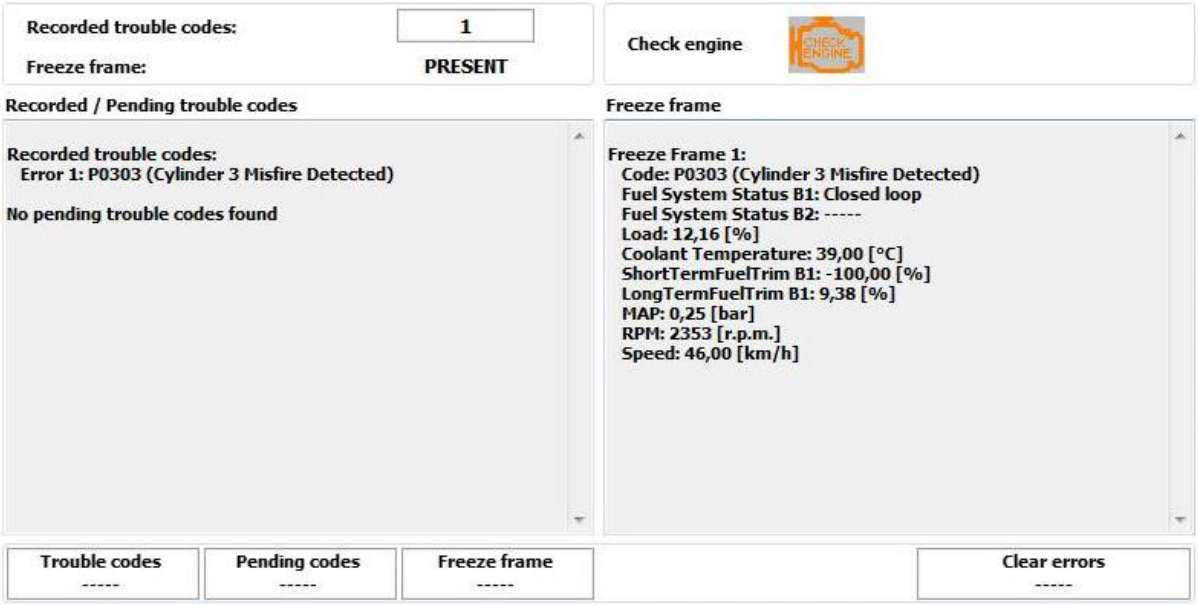


Fig. 3.53 Trouble codes window.

3.9.3 OSA (OBD System Adaptation) window

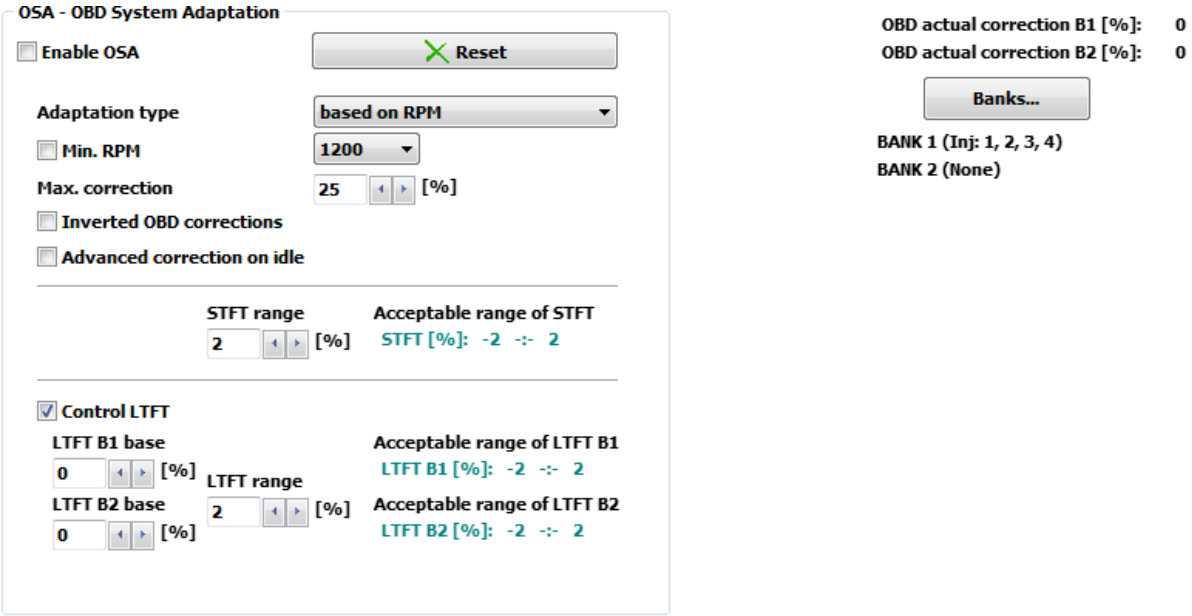


Fig. 3.54 Adaptation window (OSA).

Description of the Adaptation window options:

- ***Enable OSA*** – switching this option on causes activation of the OBD-based adaptation, that modifies corrections on the basis of information gathered from the on-board diagnostic interface of the petrol controller. Corrections of the mixture can be calculated on the basis of short term fuel trim STFT and long term fuel trim LTFT. STFT is in charge of temporary adjusting the mixture, and LTFT is changed rather slowly and depends mainly on long standing conditions as environmental conditions.
- ***Reset*** – clears the corrections collected during adaptation on the basis of LTFT and STFT read from OBD.
- ***Adaptation type*** – enables possibility of choosing adaptation type: either adaptation on the basis of RPM and petrol time or on the basis of RPM only.
- ***Minimal RPM*** – option that specifies the minimal RPM value at which the adaptation is active. This functionality can be used to turn the adaptation off at idle. In that case
- ***Maximal correction*** – is the maximal value of the correction that can be set as a result of the adaptation.
- ***Inverted OBD corrections*** – turning this option causes, that the sign of the LTFT and STFT corrections are interpreted in an opposite way than normally. Normally, positive value of the FT is treated as a necessity of increasing dose of petrol. In case of inverse corrections, positive value of the FT means that the decrease of petrol dose is needed, so, the gas controller has to make a negative correction. Inverse corrections can be found rarely in some cars of the VAG group as VW Golf 4 1.6l 2002yr.
- ***Advanced correction on idle*** – adapter use other mechanisms for correction on idle.
- ***STFT range*** – is the maximal difference of the read value and STFT base at which the adaptation does not yet changes corrections. For example, if STFT base is 10 and the STFT range is 5, the adaptation is active if the STFT correction from OBD is smaller than 5 or larger than 15. In that case the adaptation tries to bring the STFT in range from 5 to 15. The range is displayed with the green font.
- ***LTFT controlling*** – the option modifies the algorithm of the adaptation to consider also the value of the long term fuel trim.
- ***LTFT base*** (***B1*** and ***B2***) – just like in the case of STFT base – LTFT base is the value that the adaptation aims to when changing gas corrections. In case of the two-bank cars, it is necessary to correctly choose cylinders that are in the second bank. (tab Calibration → Corrections, F11).
- ***LTFT range*** – just like the STFT range, the LTFT range defines the range in which adaptation by LTFT makes no more changes, as it has accomplished its aim.