Program and configuration manual for sequential gas injection system DiegoG3

Software version: 3.0.8.0

Full compatibility with gas controller 3.0J

and OBD Adapter 10B and OBD Adapter v2 2.0A

Table of contents

1 Introduction

The DiegoG3 controllers are compatible with the software in version 3.0.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.

When using older versions of software with newer gas controllers an information about availability of newer program version may be displayed.

Program for communication with DiegoG3 controller allows to communicate and is compatible with all controllers of 1.4 and 1.5 family. During connection with older controllers some of the newer functionalities may be inaccessible.

Since version 3.0.2.1 it is also possible to work with older families of controllers (families 1.3x). After detecting controller of that family, program automatically switches its operation to allow communication with older controller. This functionality does not need installing any additional software as it is included in the installation package of DiegoG3

Notice: Is is not possible to update firmware of controllers earlier than 30C.

Software for DiegoG3 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 proper 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 Changes since versions

2.1 Since version 3.0.8.0 (full compatibility with 30J)

- Added support for Adapter OBD v2 (ready for NEVO and DiegoG3).
- Added Magic FX gas injectors.
- Updated connection diagrams.
- Add more values for options:
  - (on Switching page) Switching to PETROL with automatic return to GAS when: RPM<
  - (on Switching page) Switching to PETROL with automatic return to GAS when: RPM<
  - (on Basic page) Minimum gas injection time

2.2 Since version 3.0.7.1 (full compatibility with 30I)

- Improvements for detecting the type of injection system.
- Improvements for displaying the level of gas on the control panel.
- Standard RPM range of the collection of maps set on the extended R2000 (1750-2750rpm)
- Extended range of vacuum to 1.1bar on the Map
- Amendments algorithms for cars with a long petrol injection times
- On Map tab added button "Adjust" automatically adjust system based on maps.

2.3 Since version 3.0.6.1 (full compatibility with 30H)

- Improvements in "Start (F5)" window
- Add selection for COM port and Connect button.
- Add information about software, gas controller and Adapter OBD version.
- Improvements in communication with gas controller (also working with Adapter OBD).
- Improving Off-line mode.
- Added HANA gas injector type.

2.4 Since version 3.0.6.0 (full compatibility with 30H)

- Update for the Adapter OBD-1.0B:
  - improved reading error codes' algorithms,
  - improvement of the OBD communication, especially for cars that have more than one OBD controller (cars with automatic gearbox).
- Added Start (F5) window to facilitate the movement through the program options.
- Simplification of user simplification (less tabs).
- All basic configuration parameters in one tab – "Basic".
- Improved and simplified calibration procedure (initialization tab) .
- Communication amendments when working with and without OBD Adapter.
- Improved Off-line mode.
- Added new option “Search ports”, retrieving the ports automatically when changing the port number (cyclic device search on all available ports).
- Added Bulgarian language.

2.5 Since version 3.0.5.1 (full compatibility with 30H)

- Idle points are visible in both simple and advanced view.
- Buttons "Clear TEMPLATE" and "Load from file..." are invisible for nonsupporting them versions of gas ECU.

- Added auto-verification on tab Verification (untypical values of parameters are displayed in red)

2.6 Since version 3.0.5.0 (full compatibility with 30H)

- Added information about communication ports into the Windows system.
- Added support for Adapters OBD.

2.7 Since version 3.0.4.3 (full compatibility with 30G)

- Translation modification.
- Added gas injector: Valtek Type34 and changed control algorithms for the gas injectors.

2.8 Since version 3.0.4.2 (full compatibility with 30G)

- Translation modification.
- Improvement of the firmware update window.

2.9 Since version 3.0.4.1 (full compatibility with 30G)

- Translation modification.
- Corrections configuration moved to new tab Corrections (F11)
- Option: Return from cut-off on petrol as a new option for automatic return to GAS mode
- Option: Min and Max gas injection time
- Improved program scaling for different resolutions
- Improved calibration process
- Modification for gas injector list
- Sound notification if gas system starts on petrol (3x buzzer beep with 10 sec intervals)
- Inspection management (Sound notification - 10x buzzer beep after switching to gas)
- Configuration changes registration (date and computer code for each modification)
- Vacuum and RPM corrections (changes possibility)
- Additional correction map (RPM/petrol injection time)

2.10 Since version 3.0.3.3 (full compatibility with 30F)

- Translation modification.
- Possibility of adding and removing model points using keyboard.
- Improved compatibility with gas controllers of versions 1.4x, 1.5x.
- Possibility of setting the "Earlier valves opening time" parameter to 10 seconds.

2.11 Since version 3.0.3.2 (full compatibility with 30F)

- Added simple and advanced view.
- Improved *Set model* function on Map tab.
- Improved compatibility with gas controllers of versions 1.4x, 1.5x.

2.12 Since version 3.0.3.1 (full compatibility with 30F)

- Doing the autocalibration is no longer needed to make adaptation possible to be enabled. Collecting of the petrol map is now the only criterion.
- Possibility of moving model points with keyboard.
- ***Set model*** function added: it automatically moves model points to fit calculations.
- Option Enrichment during cut-off added to tab Configuration wizard → Advanced.
- Option Correction during changes of injection system type added to tab Configuration wizard → Advanced.
- Detected types of injection systems displayed on Diagnostics → Advanced tab.

- Possibility of saving map of the controller 30D or newer and saving it to file and also loading it back to the controller 30F or newer. This option is useful during updates of controller's firmware.
- Message about necessity of deleting gas map after changing the model is displayed after writing the model to the controller.
- Changes in the method of detecting injection system.
- Mechanism of detecting working pressure corrected (controller 30F).
- Adaptation mechanism corrected (controller 30F).
- Changes in emergency start mechanism (controller 30F).
- Fuel overlapping mechanism corrected (controller 30F).
- Gas injectors heating mechanism (controller 30F).
- Suggesting size of nozzles corrected.
- Notification about possibility of updating the controller (to the most recent firmware).
- ***Sounds for RPM*** option activates sound when the reducer temperature is higher than 40 Celsius degrees (the minimal temperature for collecting map points). On the Calibration tab, the reducer temperature is displayed red if the reducer temperature is below 40 Celsius degrees.

2.13 Since version 3.0.2.4

- Added English, Russian, Lithuanian and Czech languages.
- Recorder tool improved.

2.14 Since version 3.0.2.3

- Solved problem with function "Recalculate model".
- Improved compatibilities with older gas controlers version (1.4x, 1.5x).

2.15 Since version 3.0.2.2

- Option Adaptation has been moved to tab Modeling → Adaptation.
- Information about actualization file is shown.
- Corrections mechanisms has been moved to tab Modeling → Corrections regardless the controller G3 version.

2.16 Since version 3.0.2.1

- **Gas injectors test**
  Available in tab Diagnostics→Advanced, see chapter 3.6.3.5 on page 41.
- Availability to set separate corrections for each gas injector on the basis of injectors test. Those corrections are shown on Readings tab. See chapter 3.6.3.5 on page 41.
- **Configuring mechanism of pressure controlling during cut-off**
  (Configuration wizard→Advanced, see chapter 3.4.3 on page 22)
- **New RPM and gas temperature correction mechanisms**
  Tab Calibration → Modeling, see chapter 3.5.1 on page 28
- Function **„Switch to petrol with automatic return to gas when Tg<X°C and load >X%”.**
  see Configuration wizard → Switching, chapter 3.4.2 .
- Working pressure and Petrol injection time on petrol when idle parameters moved from Configuration wizard to Calibration → Modeling tab.
- **Improved switching method between gas and petrol** with virtual panel and button on status bar. (see 3.3.1 on page 15)
- **Possibility of updating controllers' firmware.**
  Added in menu Device. See chapter 3.1.2 on page 9.
- **Mechanism of detecting changes in settings**
  After user changes parameters and switches tab without saving configuration, program informs

user about it by displaying message.

- **Adaptation mechanism added**.
  Controller sets model on its own, on the basis of data collected during driving on petrol. Option activating adaptation is available on tab Calibration → Adaptation after completing acutocalibration and collecting petrol map. See chapter 3.5.5.

3 Program interface

3.1 Main menu

3.1.1 Menu File

- ***Print diagram... (Ctrl+P)*** – print diagram of connections (see Diagram, F5).
- ***Save configuration as... (Ctrl+S)*** – allows to save controller's current configuration to a file on a PC.
- ***Load configuration from file... (Ctrl+O)*** – allows to load configuration that has been saved earlier.
- ***Exit (Alt+F4)*** – close the program.

3.1.2 Menu Device

- ***Auto connect (Ctrl+R)*** – allows to search COM port to which controller is connected and establish communication.
- ***COM...(_) (Alt+0)*** – COM port selection.
- ***Off-line (Ctrl+E)*** – enabling/disabling Off-line mode (working without communication with the gas controller)
- ***COM ports auto search (Ctrl+W)*** – enabling/disabling mode that periodically searches the device within all available ports and tries to establish communication.
- ***Lock*** – 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 (see figure 3.1) and Configuration wizard → Engine tabs are possible to be read. Unlocking the device is possible after giving password, or writing the default configuration (menu Device → Write default configuration/Reset). Function Lock is available in controllers of version 1.4 or newer.

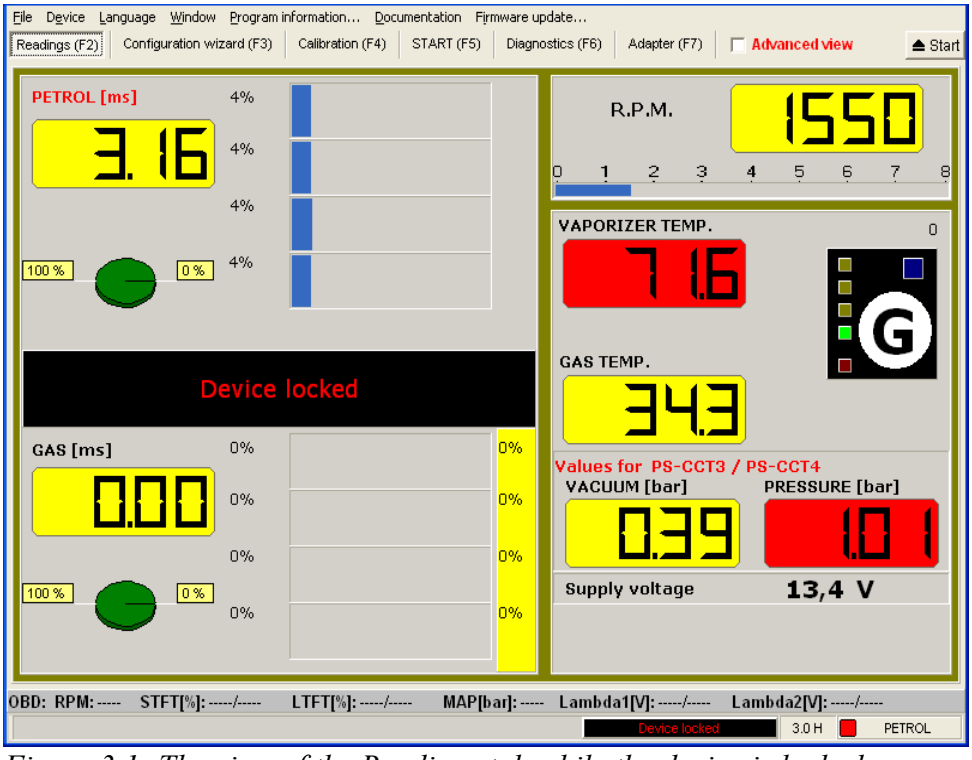


Figure 3.1: The view of the Readings tab while the device is locked

- ***Unlock*** – allows to unlock the controller. Password is needed to do so.
- ***Write default configuration/Reset*** – enables to return to factory settings of controller. After that configuration is lost.
- ***Firmware update*** – this option is available in controllers 30C and newer. It allows to reprogram controller by loading into it special file upg. Upg files are distributed with the program DiegoG3 and are put in the subfolder *...\DiegoG3\Data*. The upg file name contains version of the controller (e.g. 30D) and date of compilation (e.g. 20090605). Actualization causes changes in controller program and writes default settings for the new version. Therefore, if old configuration will be used in future, it is recommended to save old configuration to the file before making the update (see figure 3.3).
- ***Remind about update*** **–** this option is enabled by default. It reminds that connected gas controller can by updated to the newer firmware version. To disable this function uncheck this option.

3.1.3 Firmware update

After pressing the **Firmware update** button the new window will appear - "Connection status". This window enables to update DiegoG3 firmware as well as OBD Adapter. It also facilitates to change communication port and load configuration from file. There is no possibility to damage gas controller during update process.

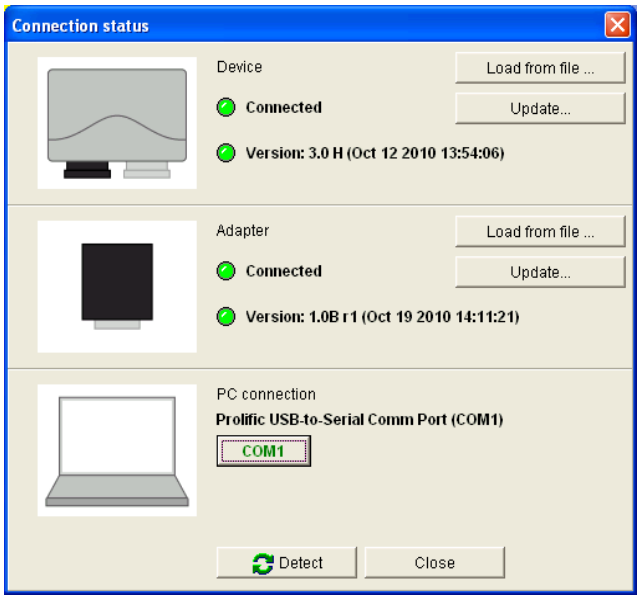


Figure 3.2: „Connection status" window

Actualization changes the firmware in connected device 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.

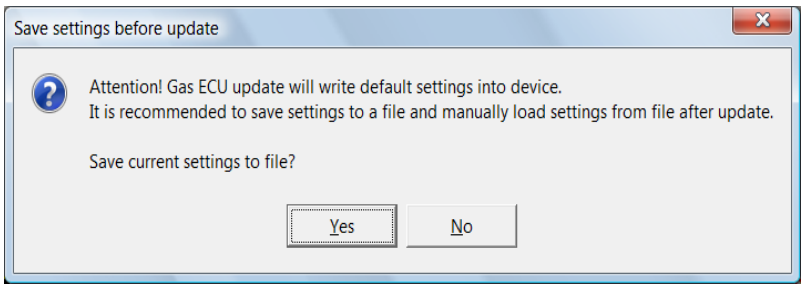


Figure 3.3: Save settings before update

Firmware update window is shown on the figure 3.4. The current version (on figure 3.4 - 30D) and compilation date (09:57:54 Jul 09 2009) is shown there.

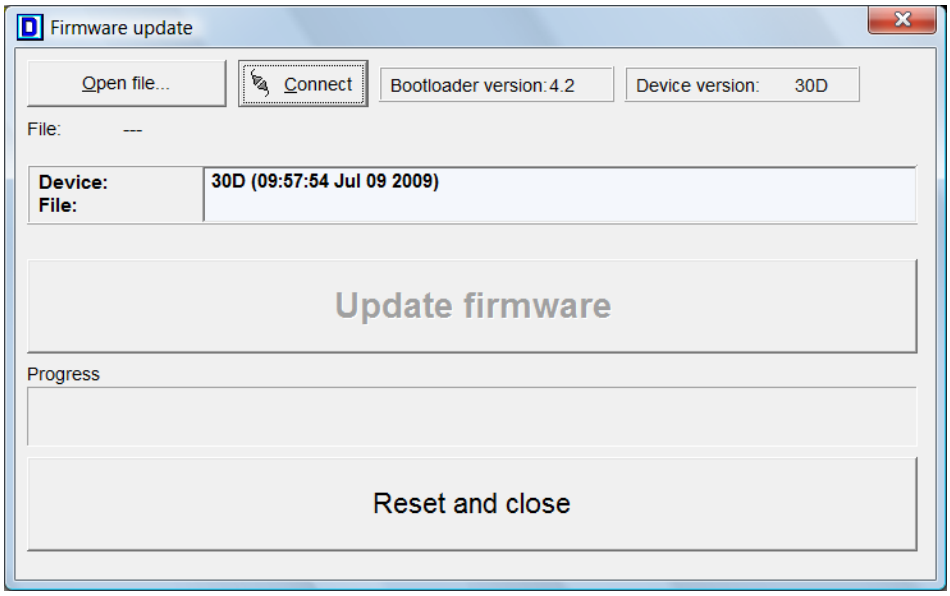


Figure 3.4: Firmware update window

Procedure of updating is as follows:

- Press “open file” button, choose file upg to be loaded into a controller. After choosing file version and compilation date of firmware in file appears (30E, see figure 3.5).
- Press “update firmware” button, confirm choice by pressing “Yes” (Figure 3.6) and wait for update to finish (Figure 3.7).
- In case of fault in communication during actualization, (Figure 3.8, press „OK”) press “Connect” and again press “update firmware”. Then, the program starts updating again.
- After finishing update, the program informs user about it (Figure 3.9, press „OK”).
- Then press “Reset and close”. Controller resets and goes to the normal work procedure.

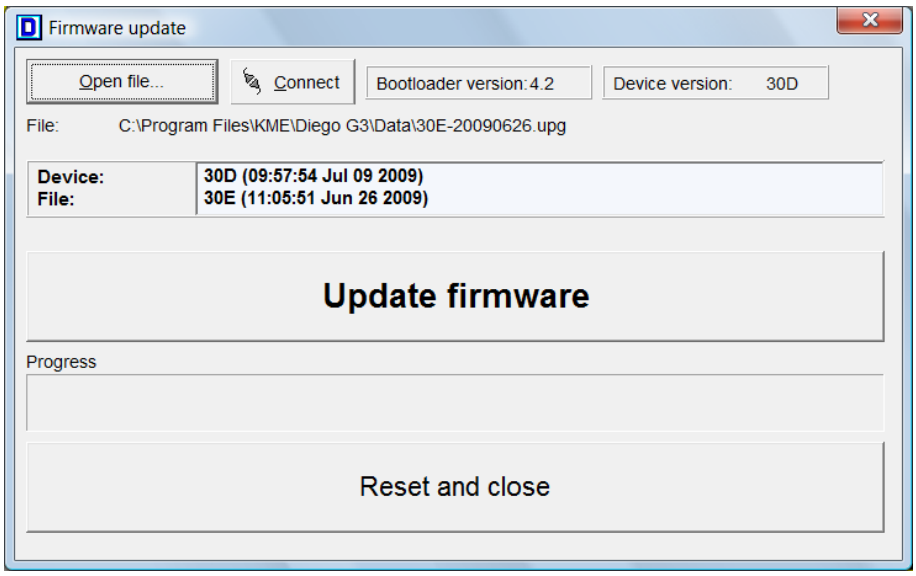


Figure 3.5: Firmware update window after opening file

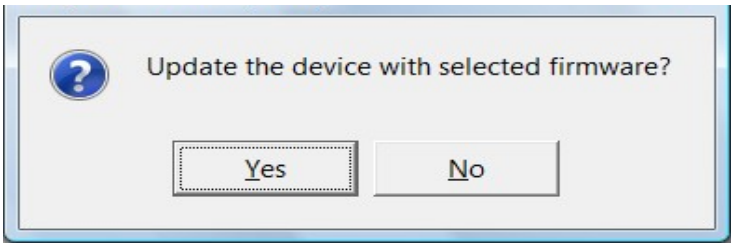


Figure 3.6: Confirmation of update

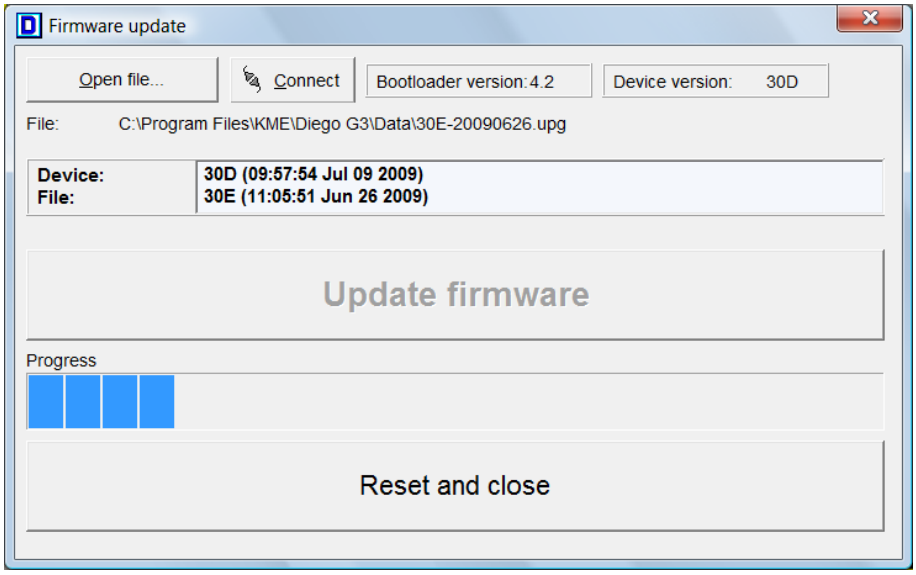


Figure 3.7: Update window during updating

Figure 3.8: Error during updating

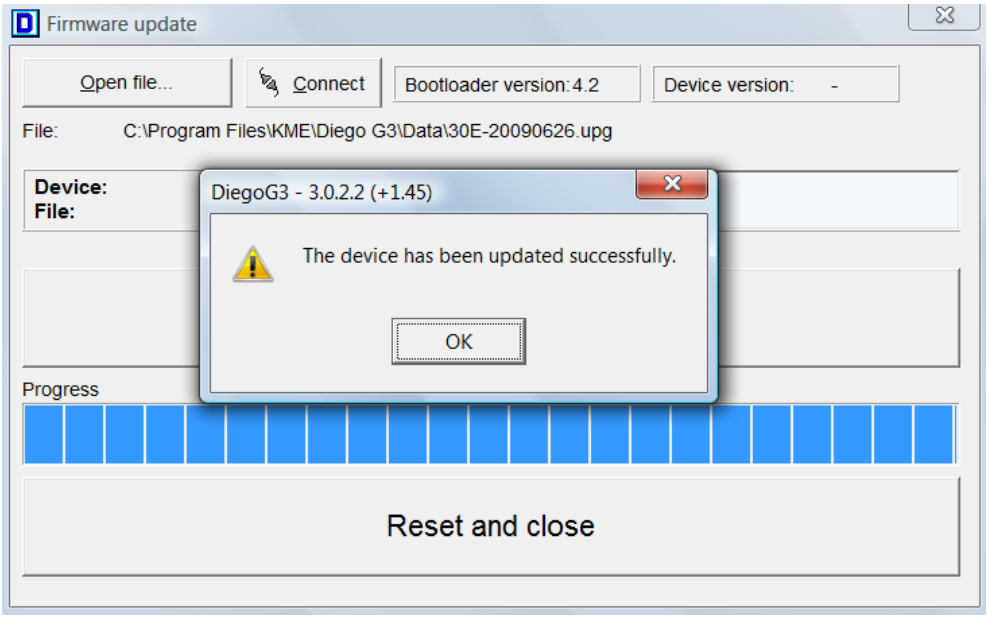


Figure 3.9: Update window after successful update

3.1.4 Advanced/simple view

The Advanced/simple view option has been introduced to improve clarity of the program and to bring attention to some most important options of the program. Advanced/simple view is an option that enables to hide from the user some of the options that in most cases are not used, yet in particular cases may be needed. Those options are visible only when the Advanced view is enabled.

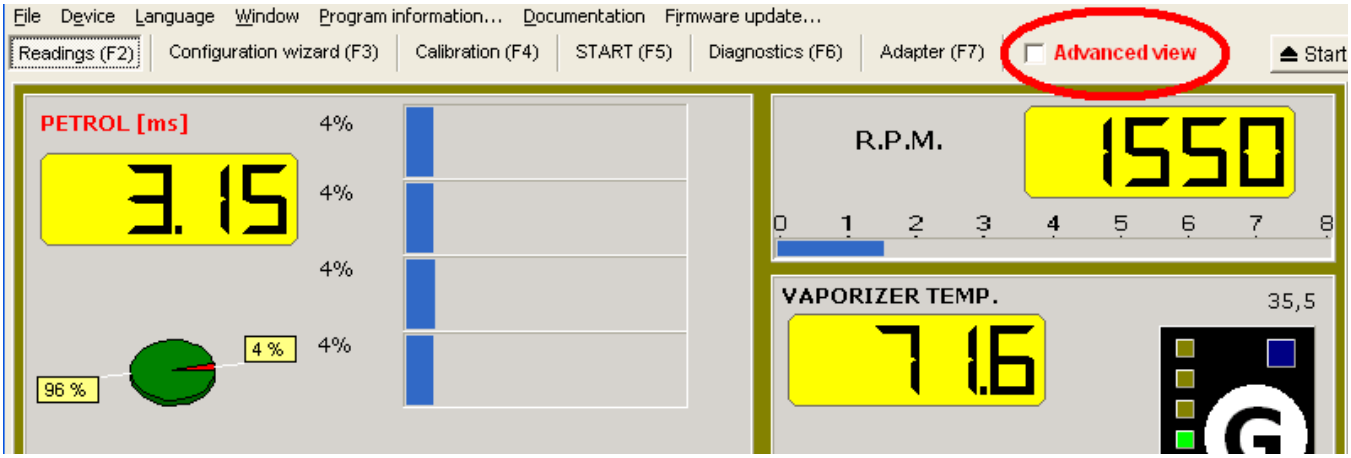


Figure 3.10: Advanced view option

3.1.5 OBD readings bar

The OBD readings bar, located at the bottom of the Diego's software window enables easy monitoring most important parameters read from the OBD by external OBD Adapter. On the readings bar, the values of RPM, STFT and LTFT corrections, Lambda sensor, manifold pressure (MAP) are seen. Depending on the petrol controller state of work, the lambda sensor is displayed in different color. The color is green, when the lambda loop is closed, and petrol controller uses lambda sensor for computation of mixture, and the color is teal if the loop is opened, and lambda sensor is not used.

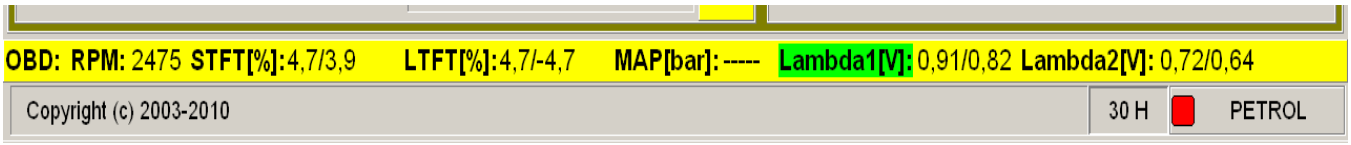


Figure 3.11: OBD readings bar

3.2 Start (F5) window

Start window (shortcut F5) is the first window that will be seen after the connection to the controller[1]. It ensures fast and easy access to the majority of the program functions. It is always possible to get back to this window by pressing F5 key or pressing the button placed in the right top corner of the program window.

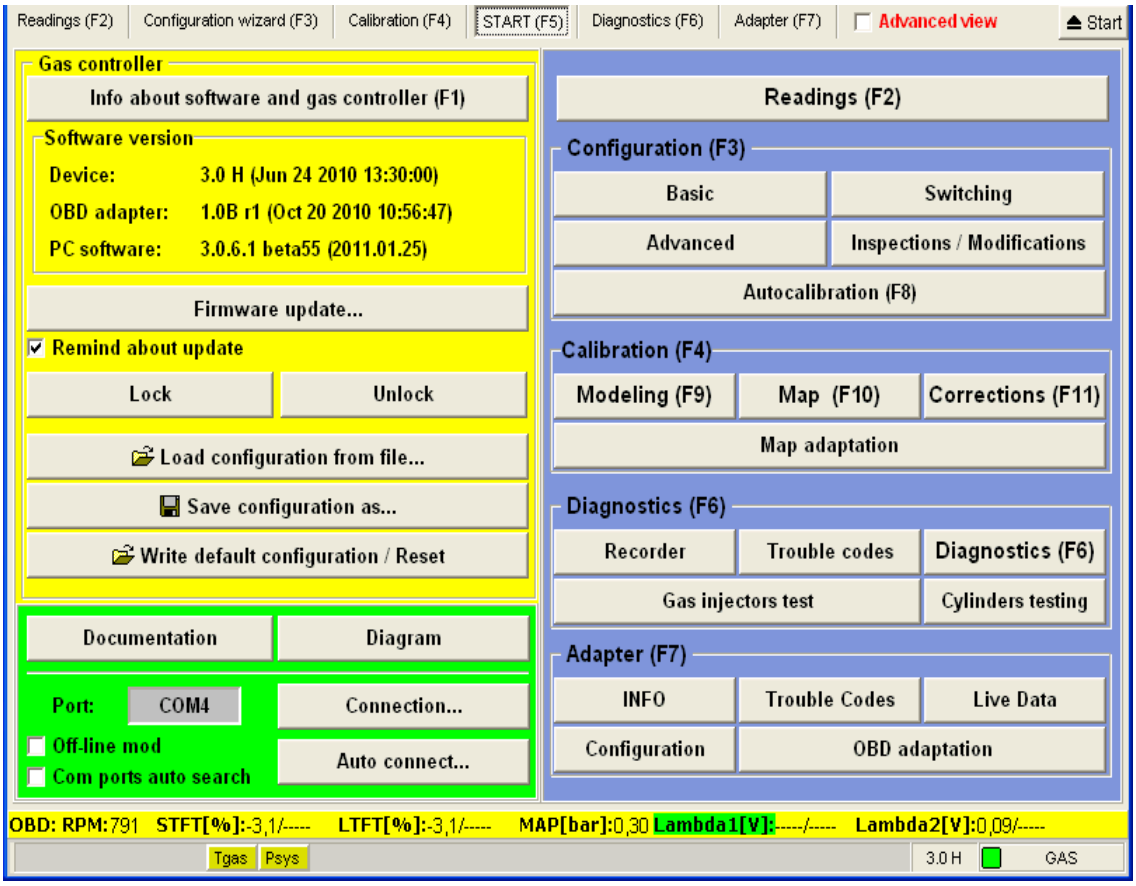


Figure 3.12: "Start" window

1 If the system registers some incorrectness, the program opens the diagnostic tab and trouble codes are shown with the explanation which element is not working properly or has not been connected correctly.

3.3 Readings

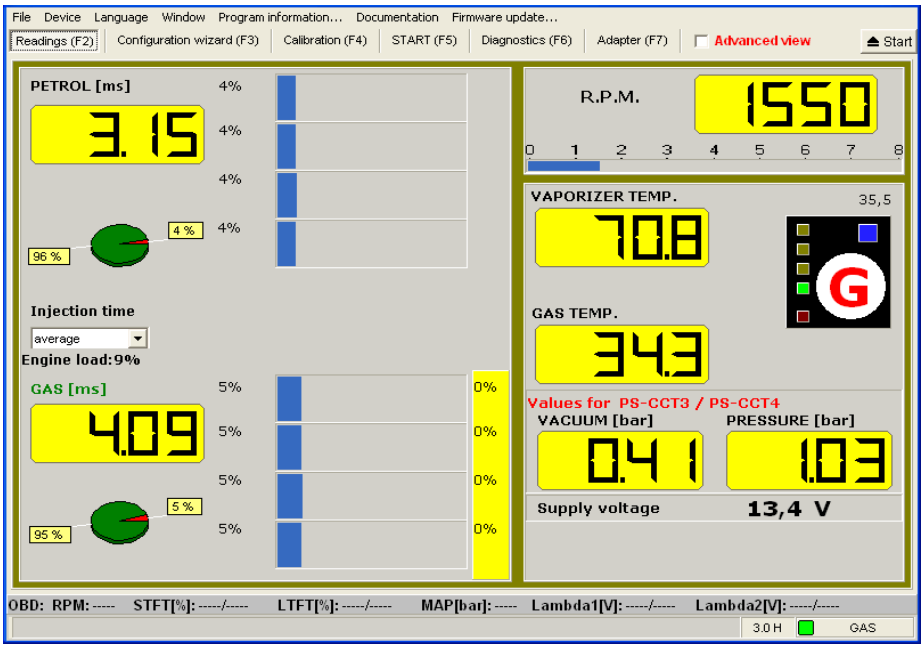


Figure 3.13: Readings tab

The basic tab in the program window is Readings – shortcut F2 (figure 3.23). This window allows to examine, if the device properly reads all the parameters and values (injection time, rounds per minute, supply voltage) and has communication with the sensors (lambda, pressure and vacuum, gas temperature and vaporizer temperature sensors). Some of the shown parameters (such as rounds per minute, gas pressure) at the beginning of the configuration process may have incorrect values. These inaccuracies shall be eliminated during further configuration.

3.3.1 Virtual panel and button on status bar

Figure 3.14: Virtual panel

On Readings page control virtual panel is also visible. It is possible to change type of work (petrol or gas) by clicking on the "G" button on the panel image.

Clicking on the panel image using left mouse button works as clicking on a real control panel. If right button was used – the switching is done **regardless any switching conditions** (e. g. without proper RPM, temperature).

Pressing Ctrl button and any mouse button opens context menu (figures 3.15 i 3.16), from which switching method can be chosen:

- petrol standard – that is directly, all cylinders at once.
- gas standard – that is sequentially, after checking switching conditions.
- petrol sequential – switching cylinders in sequence, starting from last one.
- gas direct – all cylinders at once, without checking switching conditions. (more about switching conditions in chapter 3.4.2 on page 19)

The button in the right bottom application window corner (on the status bar) has the same functionality, (Figure 3.17).

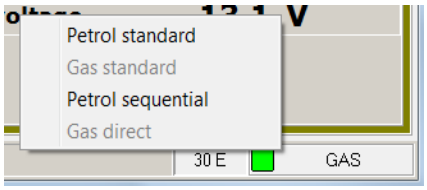


Figure 3.16: Context menu for switching to petrol

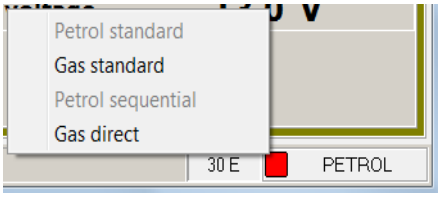


Figure 3.15: Context menu for switching to gas

Figure 3.17: Button on status bar

3.4 Configuration wizard

Configuration wizard leads through the procedure of configuring the controller and helps to carry out the initial Autocalibration.
Configuration wizard steps:

1. Basic configuration
2. Switching
3. Advanced
4. Verification
5. Autocalibration (with verification)
6. Ready.

3.4.1 Basic configuration

In this step basic information about the car and gas installation components should be given (figure 3.18). During this step nozzle sizes are being suggested. After entering value of the engine's capacity and power, number of cylinders and type of the injectors the approximate nozzle size that should be installed in the injectors are shown. This function is provided even before the engine is started, thanks to that it is possible to obtain this information before starting the gas system installation. In this tab all data about gas installation's elements are gathered. Types of installed sub-assemblies have to be chosen in this step. Correctness of choice can be checked by looking at parts images (they appear when magnifying glass button is clicked on).

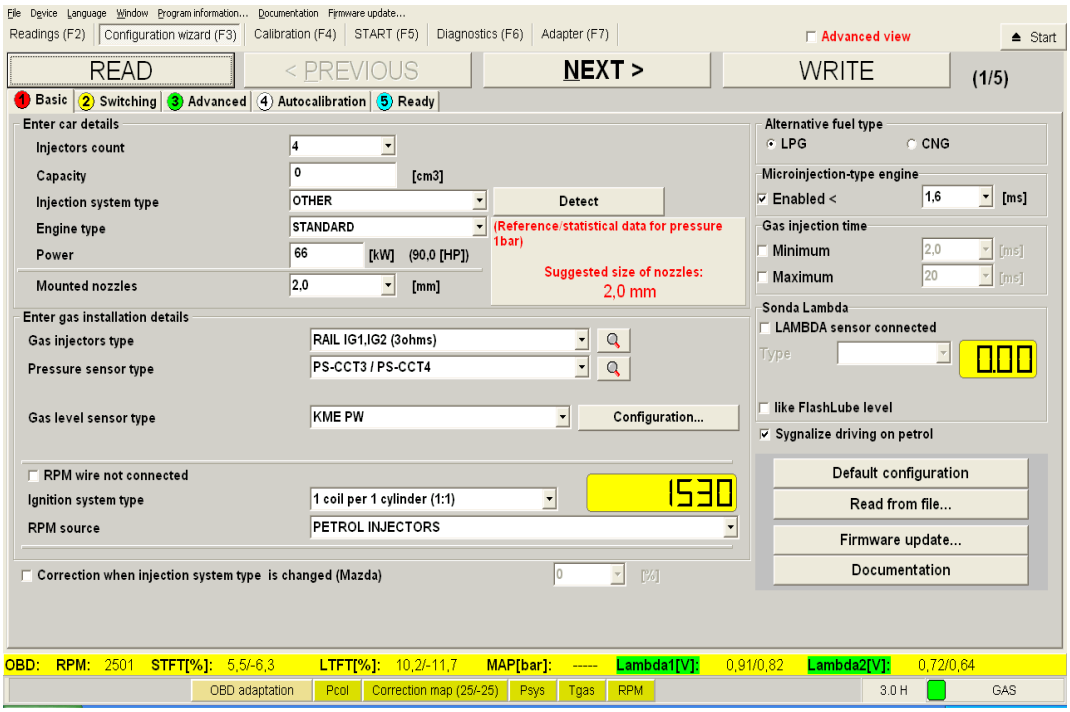


Figure 3.18: Basic tab in configuration wizard

"Default configuration" button enables to write factory settings to gas controller. Option also available from menu Device option "Write default configuration\Reset".

"Read from file…" button enables to read settings from the file on the computer hard drive or other mass storage device. Option available from menu File option "Load configuration from file…". Shortcut Ctrl+O.

"Firmware update..." button enables to update the gas controller or OBD Adapter firmware. Option also available from main menu.

Options available on "Basic" tab:

- ***Enter car details*** – information about engine injectors count, capacity, injection system type, engine type and power. If you do not know exactly what is the injector system type, click „Detect" button and the controller will determine the type.
- ***Suggested size of nozzles*** – on the basis of the given car details, program will show approximate size of nozzles. It has to be remembered, that it is only rough value and can be different from the factual size of the nozzles that has to be used.
- ***Mounted nozzles*** – enter the size of installed nozzles.
- ***Gas injectors type*** – 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.
- ***Pressure sensor type*** – enter installed pressure sensor type.
  Option "PS-CCT3/PS-CCT4+PPO" needs to be chosen in case of engines without vacuum but with installed PPO (converter flow-meter to load) device. In those cars it is recommended to use OBD information for system calibration and PPO device for map collecting.
- ***Temperature sensor in flow*** – enable, when the gas temperature is measured in the flow (stream) of gas. This option affects on gas temperature corrections.
- ***Gas level sensor type*** – choose the installed gas level sensor type.

Configuration… button next to this option enables to configure thresholds for the Control panel diodes on the basis of gas level in the tank and to change color for state diode (red or blue) on the Control panel. (figure 3.19).

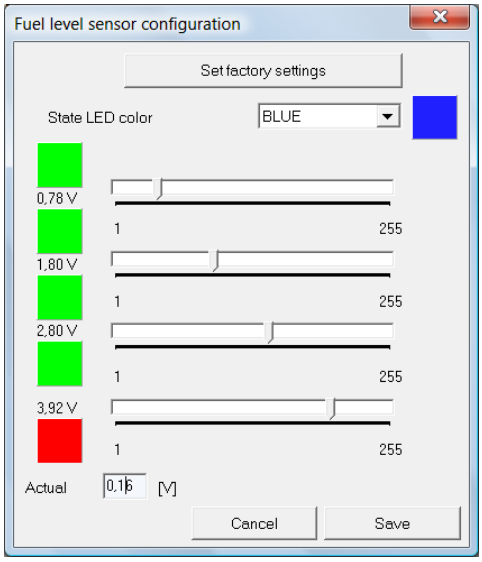


Figure 3.19: Fuel level sensor configuration window

- ***Reducer type*** – choose installed reducer/vaporizer type.
- ***RPM 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.
- ***RPM source*** – enter what is the source of the RPM signal. If RPM wire is not connected petrol injectors are the only source possible.
- ***Ignition system type*** – 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.
- ***Correction during changes of injection type (Mazda)*** – in some engines (often in Mazda's cars) dynamic changes of injection system type occurs. Injection system type may be changed from sequential to full-group or semi sequential. In some cases during that dynamic changes 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. Detected types of injection are displayed on the Diagnostics → Advanced tab.

- ***Alternative fuel type*** – determine the type of alternative fuel
- ***Microinjection-type engine*** – 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 (see figure 3.20). In that case small values means microinjections time (0,76ms in figure 3.20). It is advised to set the microinjection time longer than values visible on Readings tab (for this example the proper value is minimum 0,90ms).

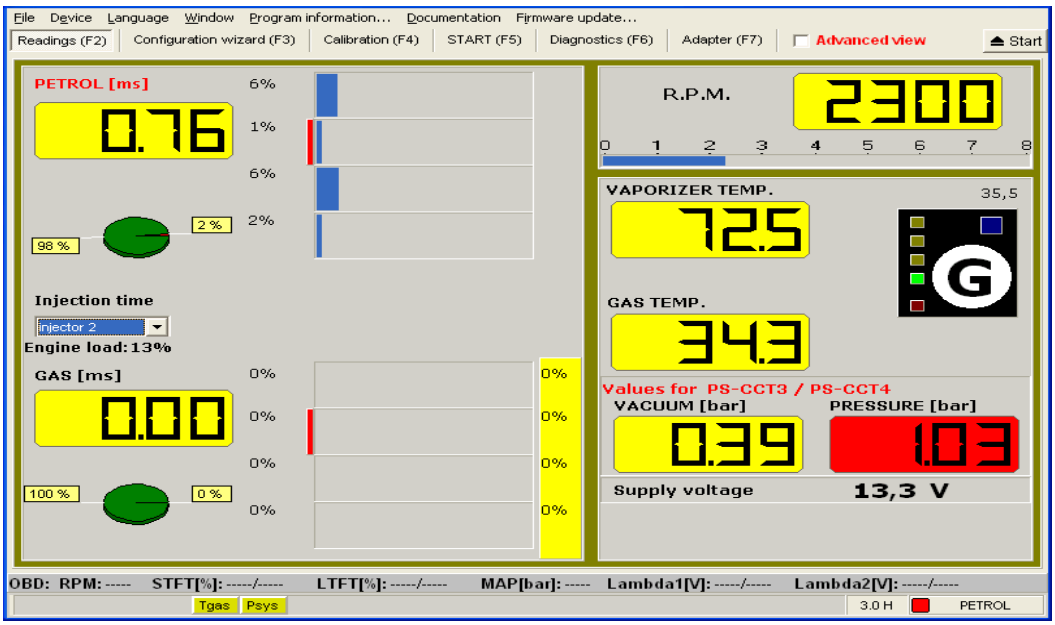


Figure 3.20: Microinjections visible on readings tab

- ***Min 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.
- ***Max gas injection time*** – parameter determines the maximal time of driving gas injector. Gas injection times will not be longer than parameter given here, even, if it would result from model and corrections.
- ***LAMBDA sensor connected*** – enable this option when LAMBDA sensor is connected to the gas installation. If so, choose also the correct sensor type. This signal is only for visualization purposes.
- ***Signalize driving on petrol*** – when this option is enabled controller generates three short sounds, those indicates that system is started in "petrol-mode" and is not going to switch to gas.

After entering the information listed above, click **NEXT**.

3.4.2 Switching

In this step all the switching conditions between fuel types are set. See figure 3.22.

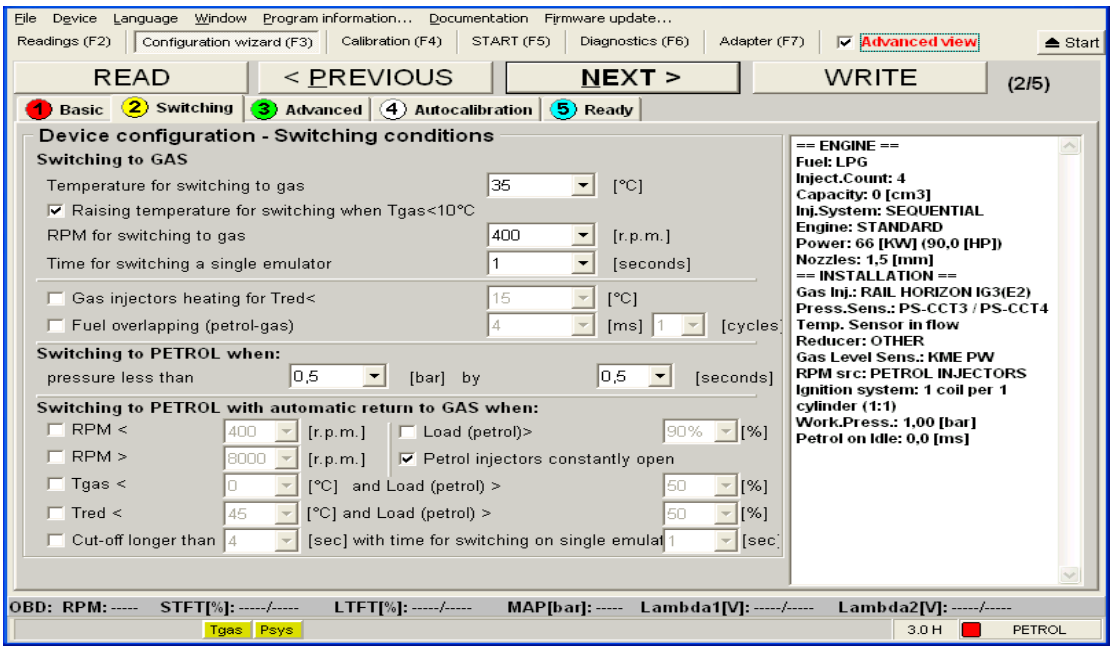


Figure 3.21: Step "Switching" in configuration wizard

Description of options:

- ***Temperature for switching to gas*** – reducer temperature, that has to be reached before switching to gas.
- ***Raising temperature for switching when Tgas<10°C*** – if this option is enabled, the engine temperature at which controller is switching to gas is being raised when gas temperature is under 10°C.
- ***RPM for switching to gas*** – the value of RPM that has to be reached before the controller can switch to gas.
- ***Time for switching single emulator*** – is the period between switching on the consecutive gas injectors during switching from petrol to gas. Long period smooths switching. The value of 0 causes all cylinders to switch on gas at one moment.
- ***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.
- ***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.
- ***Switching to PETROL when:***
  - **pressure less than** – set pressure value at 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)
- **Switch to petrol with automatic return to gas, when**:*

* These options have the job of preventing the engine from working on gas in inaccurate

- ***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.
- ***Obciążenie (benzyna) >*** – 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 chart next to petrol injection time display on Readings (F2) 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% (more about calibration in chapter 3.5.1)
- ***Petrol injectors constantly open*** – This function allows to retain full power and maximal performance even with the highest load. When this option is enabled, controller switches the engine to petrol when the injection times are so long that gas injectors would be constantly open. To avoid that, controller may (if this option is enabled) switch to petrol for the time gas injectors are not adequate.
- ***Tgas < and load (petrol) >*** – set the minimal gas temperature at which controller may work on gas on high load. This function prevents engine from using not vapored gas during long and big loads. This option is recommended for engines with power 300 PH and above.
- ***Tred < and load (petrol) >*** – 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 time for swithing on single emulator ...[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.

After entering the information listed above, click **NEXT**.

conditions. „Automatic return to gas" means, that if those inaccurate conditions passes, automatic return to gas occurs.

3.4.3 Advanced

Advanced configuration of controller is set during this step.

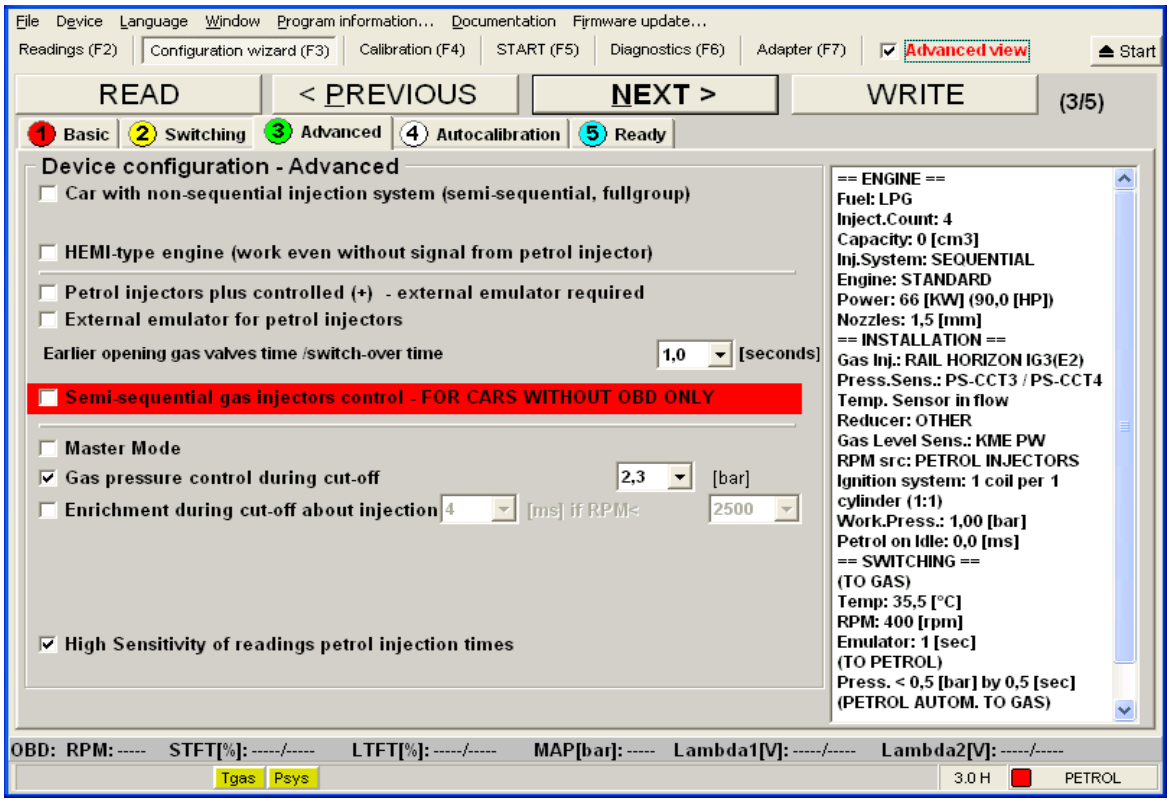


Figure 3.22: "Advanced" step in configuration wizard

Description of options:

- ***Car with non-sequential injection system (semi-sequential, full-group)*** – this option changes algorithms for gas control to be better for semi-sequential and fullgroup engines.
- ***HEMI-type engine (work even without signal from petrol injector)*** – enable this option if engine is HEMI-type. Engines of this type turn cylinders off at idle to reduce fuel consumption and emission.
- ***Petrol injectors plus controlled (+) - external emulator required*** – enable this option if petrol injectors are controlled by positive voltage signal. To this type of injectors, external emulators are required.
- ***External emulator for petrol injectors*** – enable this option when external emulator for petrol injectors are used. Choosing this option require connecting external emulator activation wire to „+12V gas valve" signal (blue wire – grey connector, B8 pin)
- ***Earlier valves opening time*** – set how long before switching to gas valves are to be opened. This option is unavailable if "External emulator for petrol injectors" is active, than this time is set to zero.
- ***Semi-sequential gas injectors control- FOR CARS WITHOUT OBD ONLY*** – 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 can not be used if engine has OBD.
- ***MASTER mode*** – 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.
- ***Gas pressure control during cut-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.

- ***Enrichment during Cut-Off with injection of […]ms if RPM less than[…]*** - 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.
- ***High sensitivity of reading petrol injection time*** – this option enables to choose the algorithm of reading petrol injection. If the high sensitivity is enabled, then the measurement is more precise, yet more vulnerable to possible electromagnetic interferences, that are generated by ignition system. It is recommended to turn that function off only in cases of big interferences.

3.4.4 Autocalibration

In this step, after entering all the important information about the system and engine, it is possible to verify if all the parameters are correct. All suspicious values are marked with red color.

After verification system is ready to the autocalibration process. Autocalibration sets the parameters of the gas installation controller on the basis of the engine behavior at idle and prepares the car to the road test. Procedure can be executed when reducer temperature reaches 50°C. During autocalibration process proceed with the displayed info's.

Notice: The Autocalibration is not sufficient enough to ensure proper work of gas installation in a whole range of load. After the autocalibration, proceed to collecting gas map and set model according to it (see chapter 3.5)

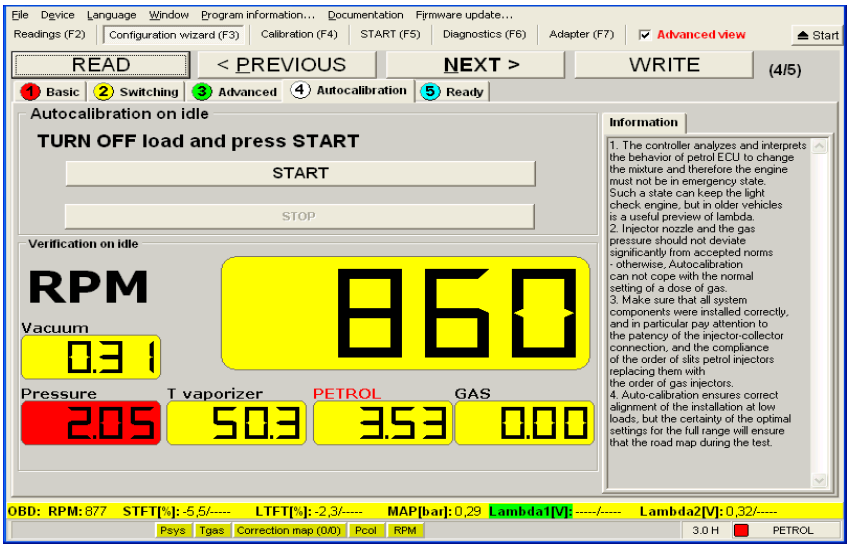


Figure 3.23: Autocalibration tab

Autocalibration procedure can be one stage (only one load at idle) or two stage (without load at idle and with full load at idle). It depends on user choice in autocalibration initialization window.
After pressing the START button autocalibration initialization window will be shown. It allows for finally verification all important parameters for autocalibration process (for example: gas injectors type, injection system type, autocalibration type and model parameters).

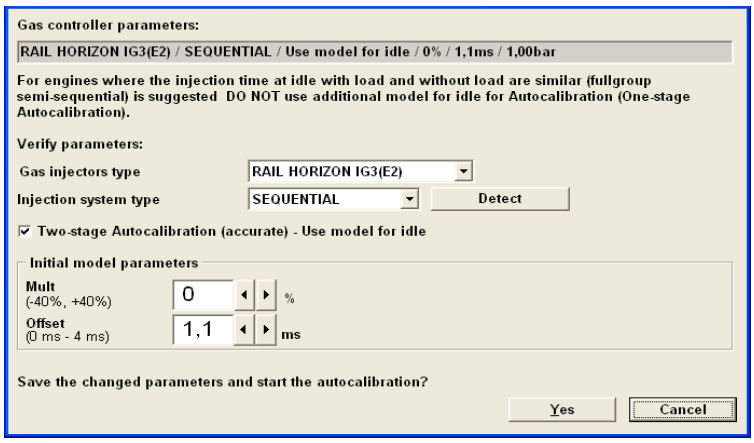


Figure 3.24: Autocalibration initialization window

For engines, whose petrol injections times are similar with and without load on idle (full-group and semi-sequential), it is suggested NOT TO USE model for idle (therefore it is recommended to use one stage autocalibration).

During first step – **WITHOUT LOAD** switch engine to petrol and turn all possible load off (e.g. radio, air conditioner, lights, heating) and press **START** button. For one stage autocalibration it is advised to set load as in normal operation.

Pressing YES button will cause that new window is shown. See figure 3.25

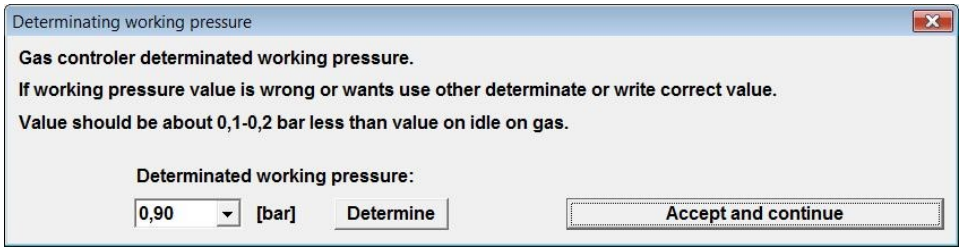


Figure 3.25: Determining of the working pressure

After verification of determined working pressure press “Accept and continue” to proceed. Then wait until the first step of the autocalibration finishes. The progress of the first autocalibration step is displayed on the screen. autocalibration window during first step can be seen on figure 3.27 and after finishing first step on figure 3.26.

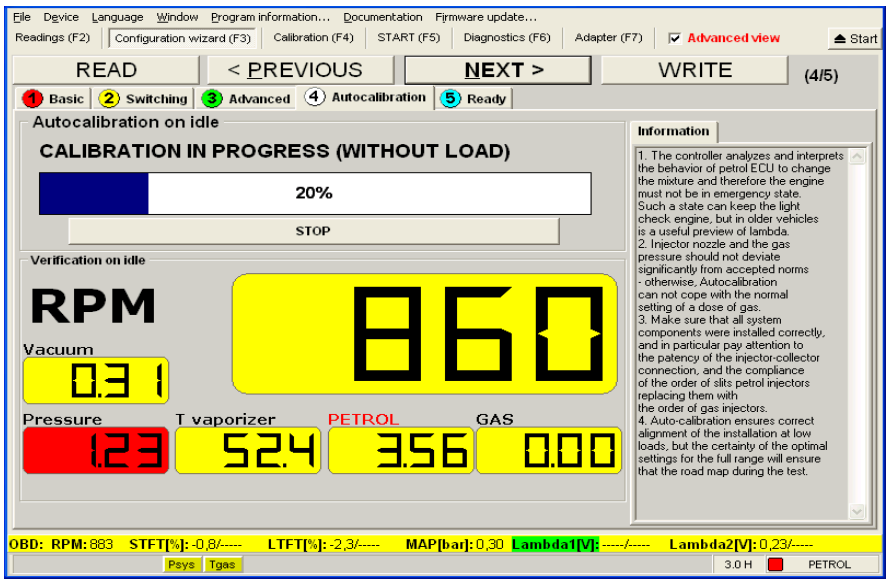


Figure 3.26: Autocalibration window during calibration without load

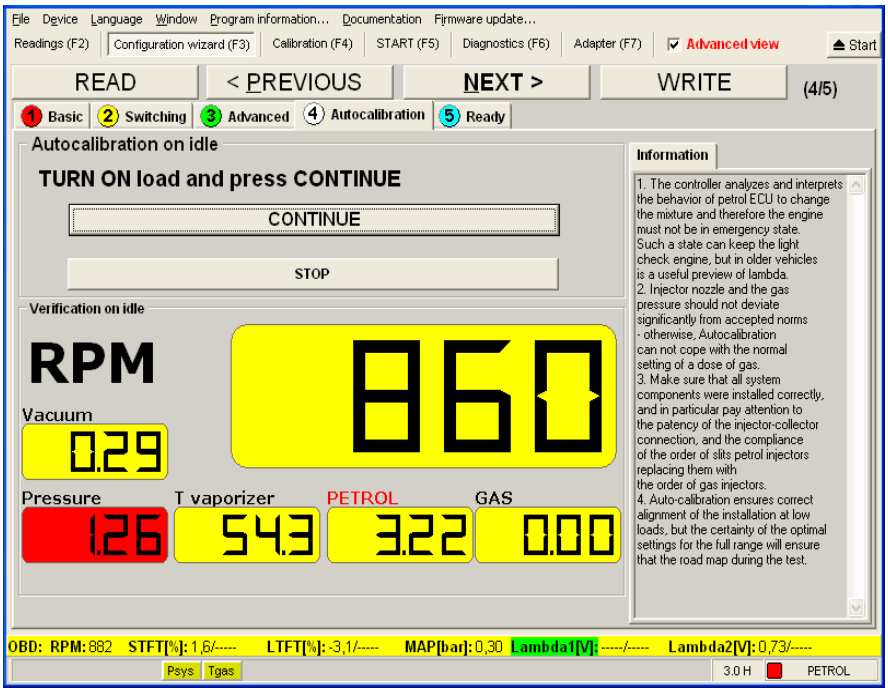


Figure 3.27: Autocalibration window after finishing first step

Second step of the Autocalibration – Autocalibration **WITH LOAD** (unavailable for one stage autocalibration) before proceeding turn on radio, air conditioner, lights, heating etc.. For cars equipped in automatic gearbox set “Drive” position. Load should be as stable as possible, so air conditioning that switches on and off during work can disturb autocalibration process.
Next press **CONTINUE** button and wait until the Autocalibration finishes.

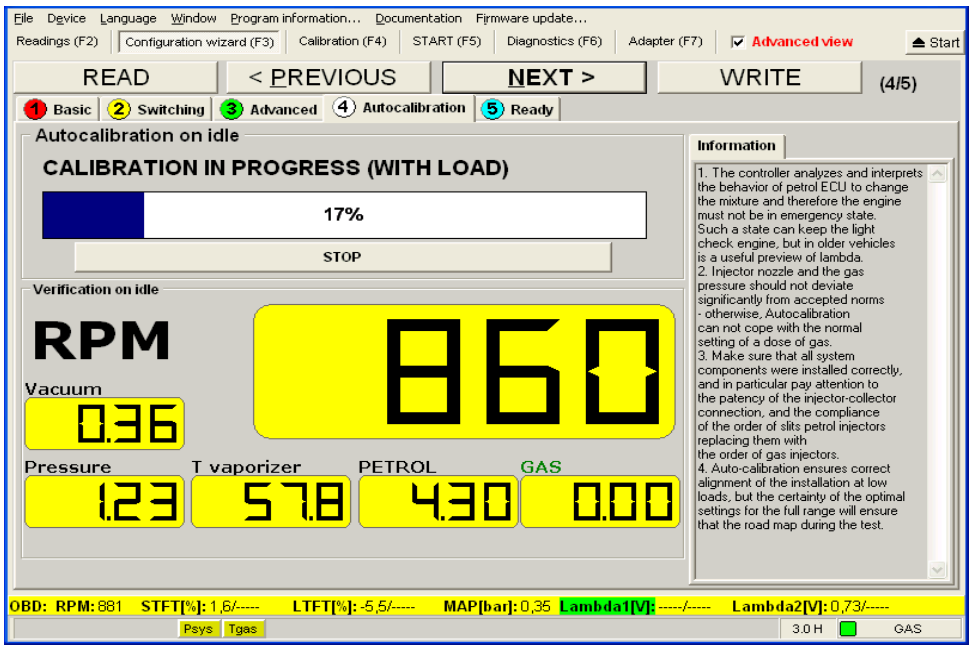


Figure 3.28: Second step of autocalibration in progress

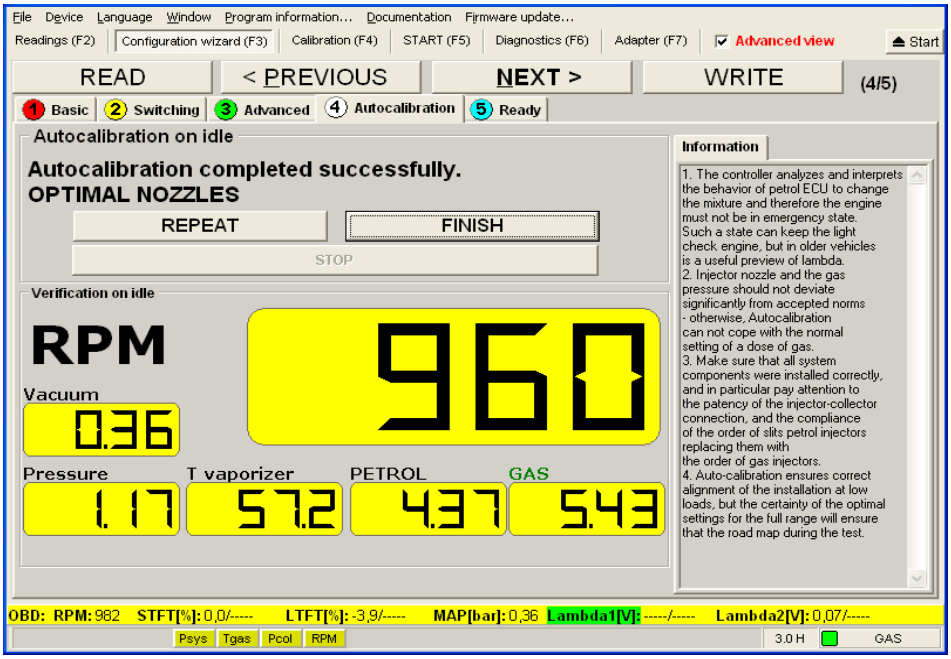


Figure 3.29: Finished autocalibration

After the Autocalibration is finished (figure 3.29) new message is shown: "Autocalibration completed successfully" and **despite off all other notices gas controller has been set optimal.**
One of the following messages can also be shown:

- **nozzles optimal** – if so, proceed to the next step: map collecting(see chapter 3.5.4)
- **nozzles in norm** – diameter is suitable, though it may be necessary to match it better. If mult parameter (see Calibration → Modeling, chapter 3.5.1 on page 28) is positive, nozzles may be in some cases too small (in engines, that have petrol time of 18ms or longer, turbo engines). When mult is negative, nozzles may be too big (semi-sequential, full-group engines).
- **nozzles in some cases may be 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 in some cases may be 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 mult is dangerous to the engine, becaues of the lack of possibility of controlling the mixture during the high load.

3.4.5 Ready (Inspections)

- ***Change list*** **–** the list of changes in configuration, along with the list of codes of computers from which the changes were done and dates of that changes.
- ***Inspections*** **–** 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.

After finishing the Autocalibration process (this state is marked into device) proceed to the road test and collect map points. To do so press "COLLECT MAP POINTS" button and the software switches to Calibration → Map (F10) page and the gas system switches to petrol (because it is needed to collect petrol points first).

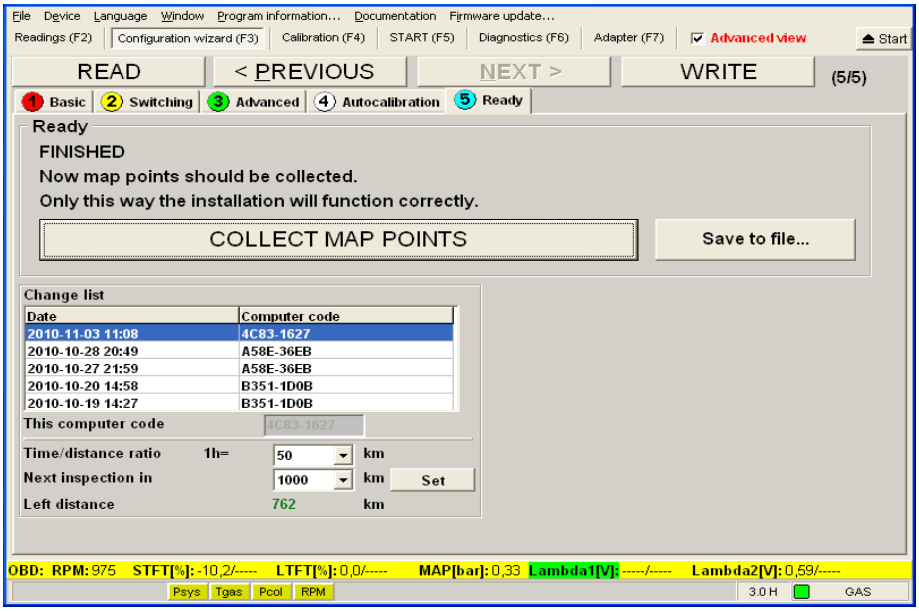


Figure 3.30: Configuration wizard's last page

Button "Save to file…" enables to write configuration to the file. Option is also available from menu File option "Save configuration as…".

3.5 Calibration

The Calibration page (shortcut F4) is divided into three tabs: Modeling (shortcut F9), Map (shortcut F10) and Corrections (F11).

3.5.1 Modeling

The Modeling tab (figure 3.31) enables to adjust the gas system to proper work. The model is a function calculating gas injector opening time (Tg) on the basis of petrol (Tb) injectors opening time. It is possible to set up to 20 model points, but the recommended number is 5-10. Actual working point is represented on the chart (figure 3.32) by dark green point that moves along the model line. On the chart additional model just for idle work is also visible – it consists of two points (P1 and P2).

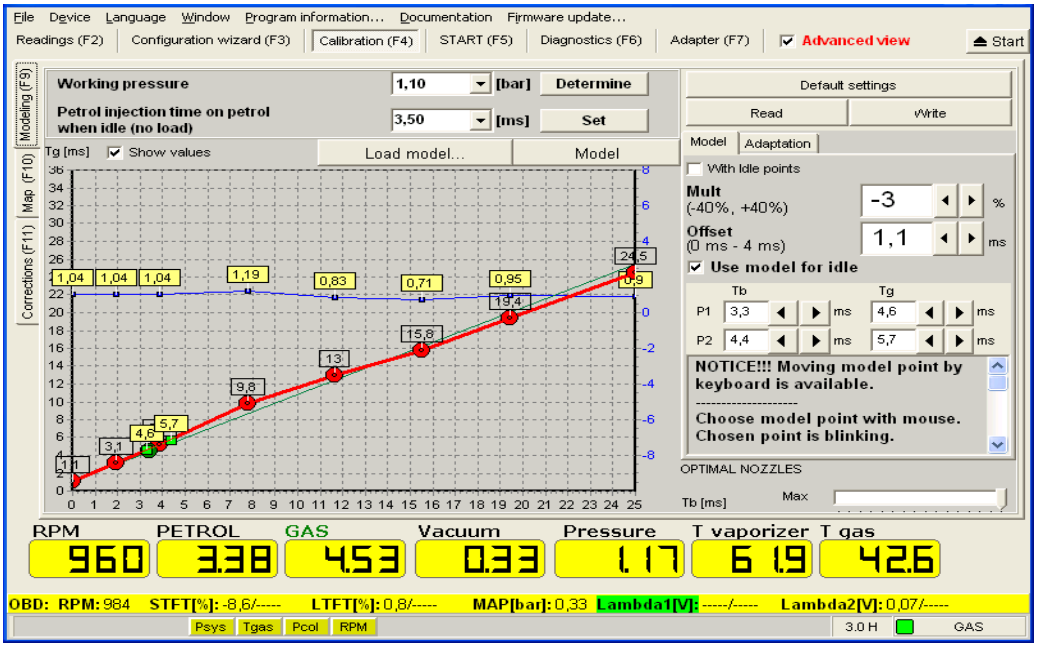


Figure 3.31: Model tab

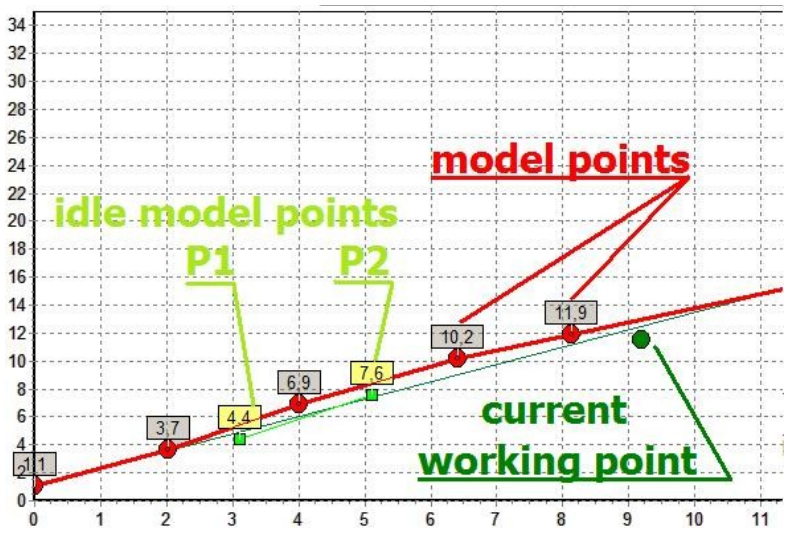


Figure 3.32: Points on model chart

Functions on Calibration → Modeling tab:

- 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 PgUp or PgDn 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.
- 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 klicking any point deletes the point.
- ***Working pressure*** – press „Determine" to set the value of the working pressure. Corrections will be calculated reference to the value entered here.
- ***Petrol injection time on petrol when idle (no load)*** – to determine that value press „Set" button when the engine is hot (Tred>50°C) and working at idle.
- ***Load model form file*** – button enables to load model (and only model) parameters from the configuration file.
- ***Set new model*** – button enables to set the model (the red line) on the basis of idle model points that were calculated during autocalibration.
- ***Default settings*** – sets the default model settings on the basis of the configuration.
- ***Model panel***:
  Model can be modified with mouse or with parameters on Model panel.
  Mult – 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. Recommended mult for groups of engine types:

Engine type	Recommended mult
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 mult parameter can be lower and this should prevent from merging injection times.
  - ***Offset*** – 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.
  - ***Use model for idle*** – enables using additional model for the idle work. This model is represented by points P1 and P2. Thanks to that, idle work can be reacher or leaner than it would be with normal model. P1 and P2 coordinates are calculated during autocalibration, but may be also set manually.
    - ***P1*** represents work at idle with no load. The first P1 coordinate (Tb) represents petrol injection time on petrol at idle without load. The second – (Tg) represents gas injection time on gas at idle without load. To set coordinates of P1, firstly turn all the additional load off and check the value of petrol injection time.(save it as Tb coordinate of P1 point)

then switch car to work on petrol and modify Tg value until petrol time on petrol and petrol time on gas will be equal.

- ***P2*** represents work at idle with full possible load. The first P2coordinate (Tb) represents petrol injection time on petrol at idle with load. The second – (Tg) represents gas injection time on gas at idle with load. To set coordinates of P2, firstly turn all the additional load on and check the value of petrol injection time.(save it as Tb coordinate of P2 point) then switch car to work on petrol and modify Tg value until petrol time on petrol and petrol time on gas will be equal.

- With idle points enables to move points P1 and P2 with all the other model points (red ones) by changing Offset and Mult parameters. When this option is not enabled, the P1 and P2 points are not changed by changing Mult and Offset. After the autocalibration, the With idle points option is automatically turned off, to prevent from the changes in calibrated idle model points.

- ***Read*** – reads the model from the gas controller
- ***Write*** – writes the model to the gas controller
- ***Max*** – slider allows to scale model chart, by changing maximal petrol injection time that is visible on the chart.

3.5.2 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) the RPM field changes color to green and collected working points are saved in the controller and shown on the chart.

Options available on Calibration → Map tab:

- ***Collect points in range*** – choose range of RPM within which points are collected. Recommended 2500RPM; for cars with automatic gearbox – 2000RPM. Since software version 3.0.3.4 it is possible to choose wider range of RPMs (e.g. R2500RPM: 1750-2750 in comparison with ~2500RPM: 2250-2750). After that that collecting map is easier and takes less time, but modeling by maps is less precise, especially, when the map strongly depends on the RPMs.
- ***Read map*** – reads maps from the controller and displays them on the chart.
- ***Auto refresh*** – option enables cyclic reading of map without necessity of pressing "Read map" button.
- ***RPM sounds*** – activates the software sound signal (if the PC has a speaker) indicating that the engine is in the correct RPM range.
- ***Clear petrol map*** – deletes petrol map points from the controller.
- ***Clear gas map*** – deletes gas map points from the controller.
- ***Clear template*** – deletes petrol template for adaptation.
- ***Load from file*** – load petrol template for adaptation from the file.
- **Adjust** – (useful button) function automatically calibrates the system (set the model points) on the basis of collected maps (petrol and gas) without having to confirm the settings (such as in he case of the Set model function)
- ***Set model*** – recalculates gathered map points on model, and modifies model to fit the calculations. Notice: Does not save the modified model to the controller. To modify the controller's model, ***Save*** button has to be clicked on.
- ***Recalculate model*** – recalculates gathered map points on model. This function enables easy calibration of the gas system after collecting map.
- ***Clear calculation*** – removes calculated map points from the model chart.
- ***Save as*** – saves map to the file on the PC hard drive.
- ***Load from file…*** – enables to read maps from the file on the PC hard drive only for the

visualization purposes. This option does not load map to the controller.

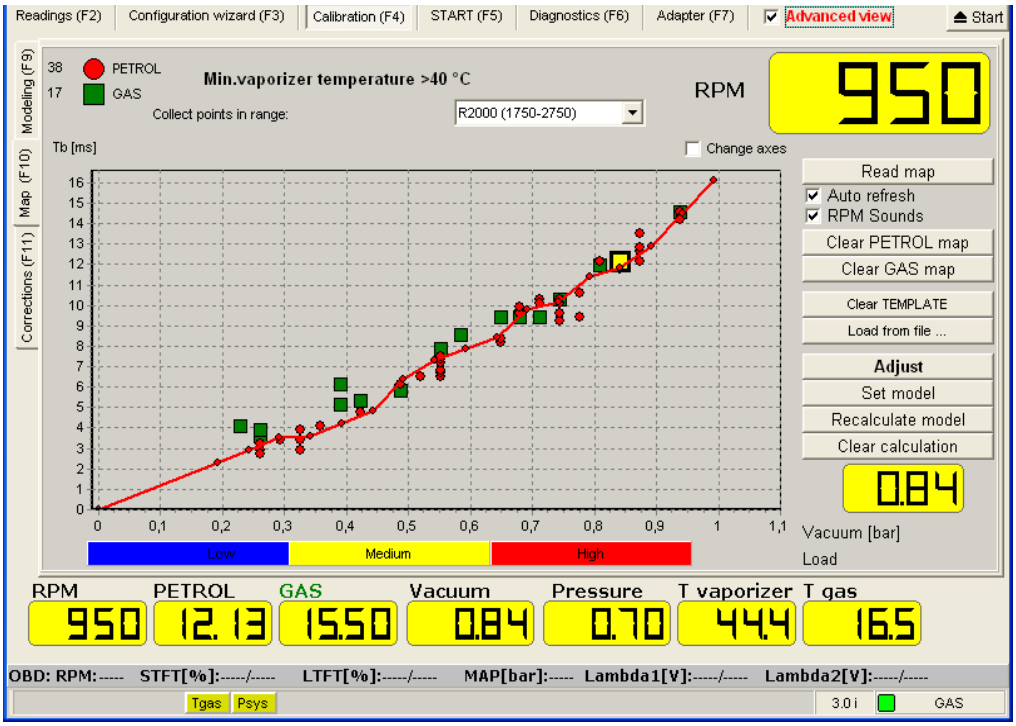


Figure 3.33: Calibration → Map

3.5.3 Corrections

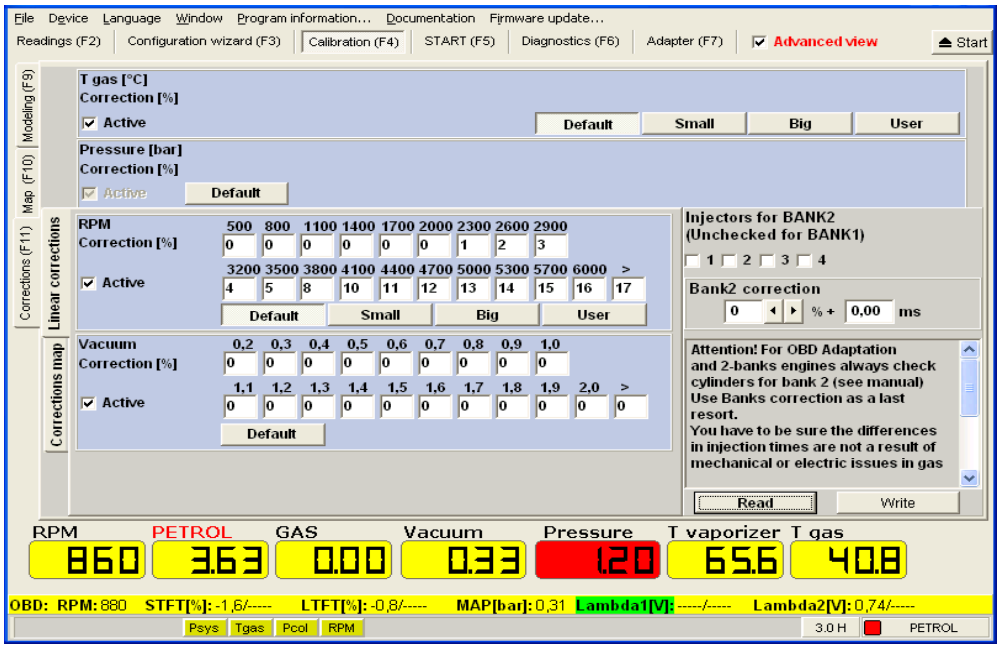


Figure 3.34: Corrections tab

-
- ***Bank corrections*** – 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.

- ***Tgas correction*** – enables to add correction from gas temperature. It is possible to add standard, low and high corrections, as well as turn corrections off. 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 (see figure 3.36) and petrol time on gas (Figure 3.35). Such a correction has to be chosen, so that the difference between those times would be the smaller.

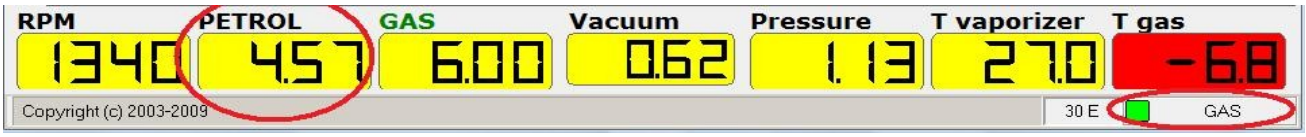


Figure 3.35: Petrol time on gas

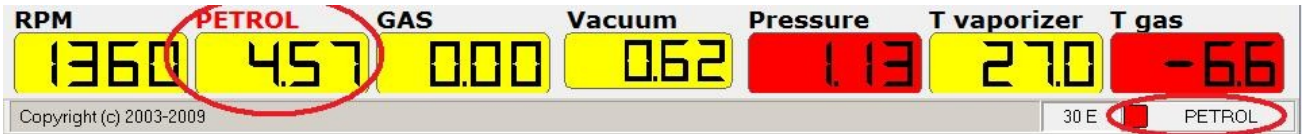


Figure 3.36: Petrol time on petrol.

- ***RPM correction*** – this option enables to add correction from RPM. It is possible to add standard, low and high corrections, as well as turn corrections off. Is is also possible to define corrections precisely, by writing a correction value under an RPM value. Anfter configuring the system in road test RPM correction has to be chosen, when during stable driving on petrol in high RPM (e.g. 4000RPM, medium load) switching to gas results in lengthening of petrol times. Such a option of correction should be chosen so that the difference between petrol time on petrol and petrol time on gas would be the smaller.
  RPM corrections can be also verified by changing the map RPM range eg. To ~4000 and collecting a few points of both maps. If gas points does not fit petrol points, the RPM correction for that range of RPM should be changed.
- ***Pressure correction*** – it is only possible to turn this corrections off.
- ***Vacuum corrections*** – a precise corrections on vacuum value can be set.
- ***Co*** orrections on

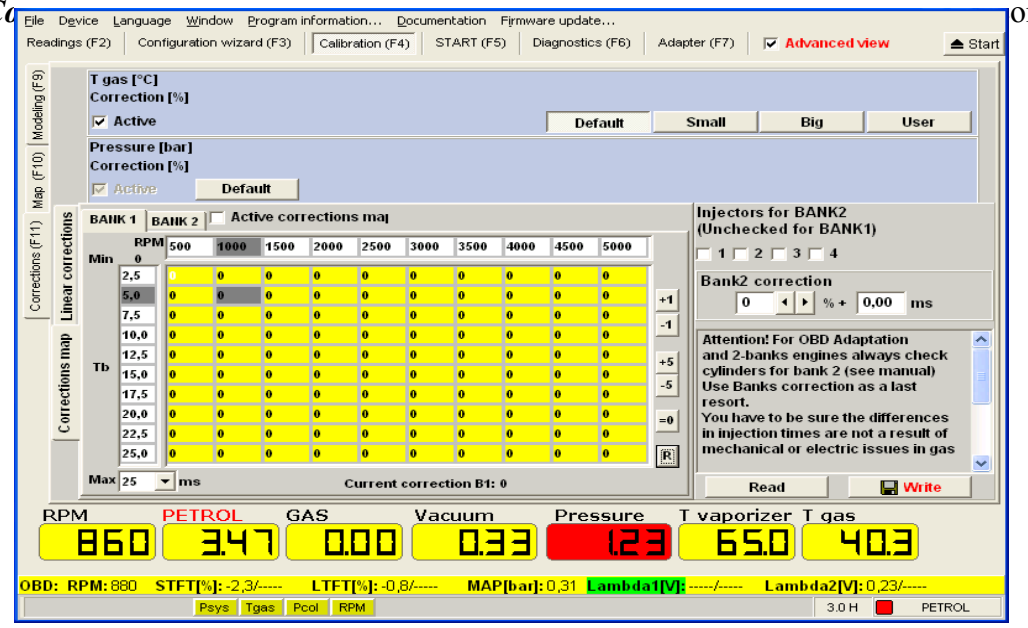


Figure 3.37: Corrections map

To activate correction map, select ***Active 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 inejction times and is visible below the correction map.

3.5.4 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 2500RPM range was chosen, both petrol and gas map has to be collected in range of RPM between 2250 and 2750. After changing RPM range maps should be cleared and collected again. When servicing it is recommended to collect a new petrol map if the old one was collected earlier than a month ago because of changes of external conditions).

After change of RPM range the program will prompt weather to clear petrol and gas map.

2) Clear petrol and gas map.

3) Switch the controller to work on petrol.

4) Collect petrol map.

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

Example for RPM range ~ 2500 (+/- 250) RPM

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

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 figure 3.38.

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. Gas map after collecting may look like on figure 3.39.

Example for ~ 2500 (+/- 250) RPM

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

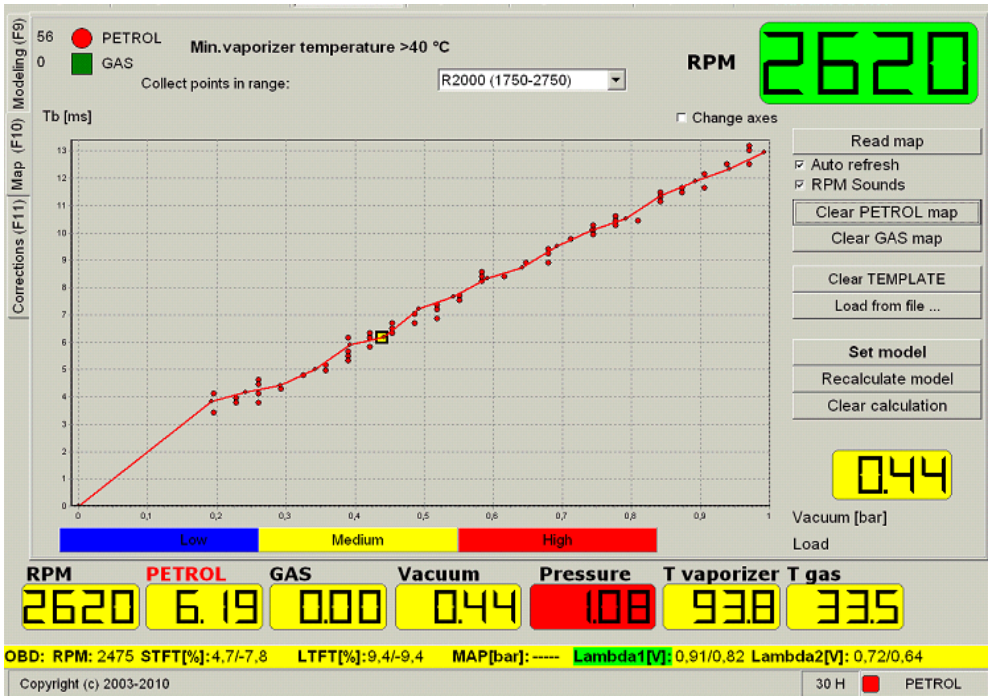


Figure 3.38: Collected petrol map

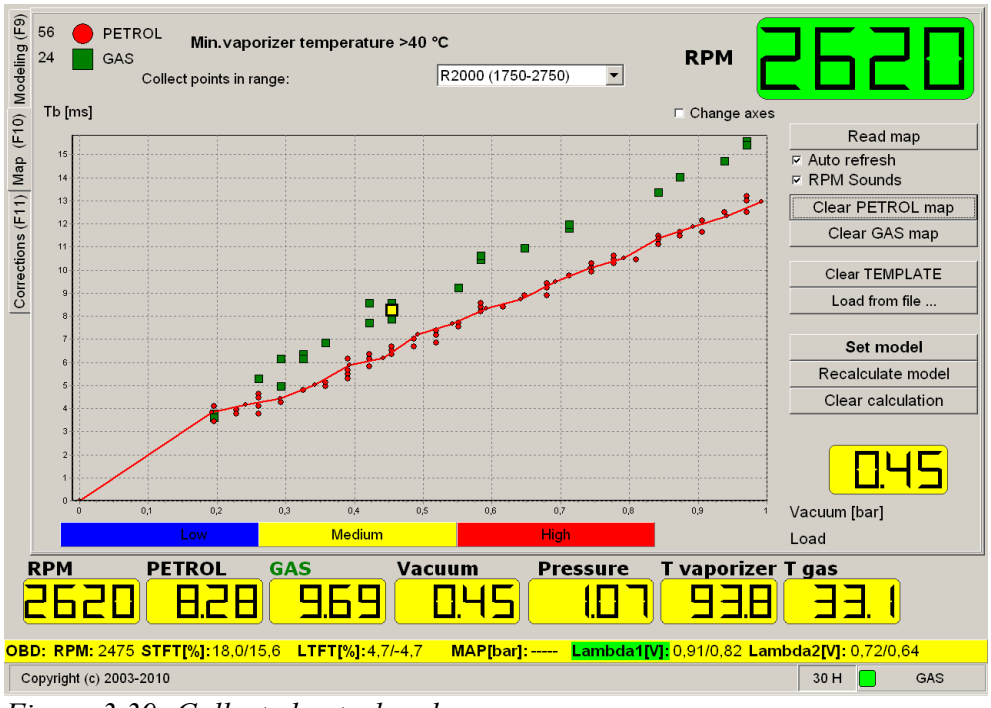


Figure 3.39: Collected petrol and gas map

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).

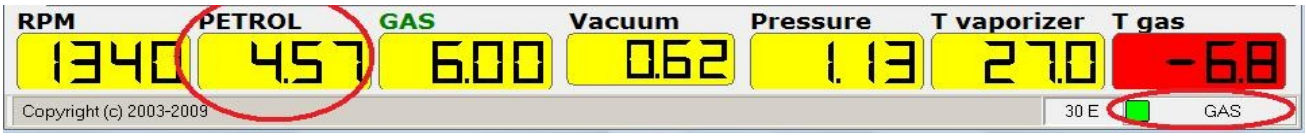


Figure 3.40: Petrol time on gas

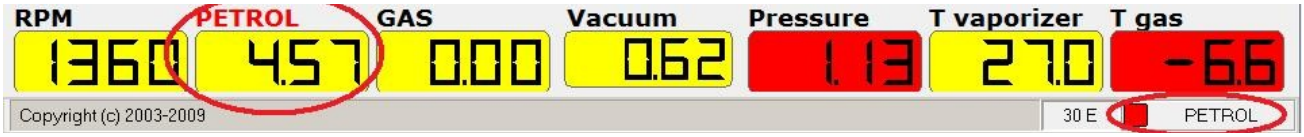


Figure 3.41: Petrol time on petrol

If those time are drastically different (difference bigger than 0,2 ms) idle model should be set again by moving P1 and P2 points (tab Calibration → Modelling, chapter 3.5.1 on page 28). In that situation, gas map may be needed to be collected again.

8) After collecting maps, proceed to calculating model. Press ***Set model*** button, and Modeling tab will open automatically. Map points will be recalculated and shown on model chart. The model points will then be automatically changed, to fit the calculations.

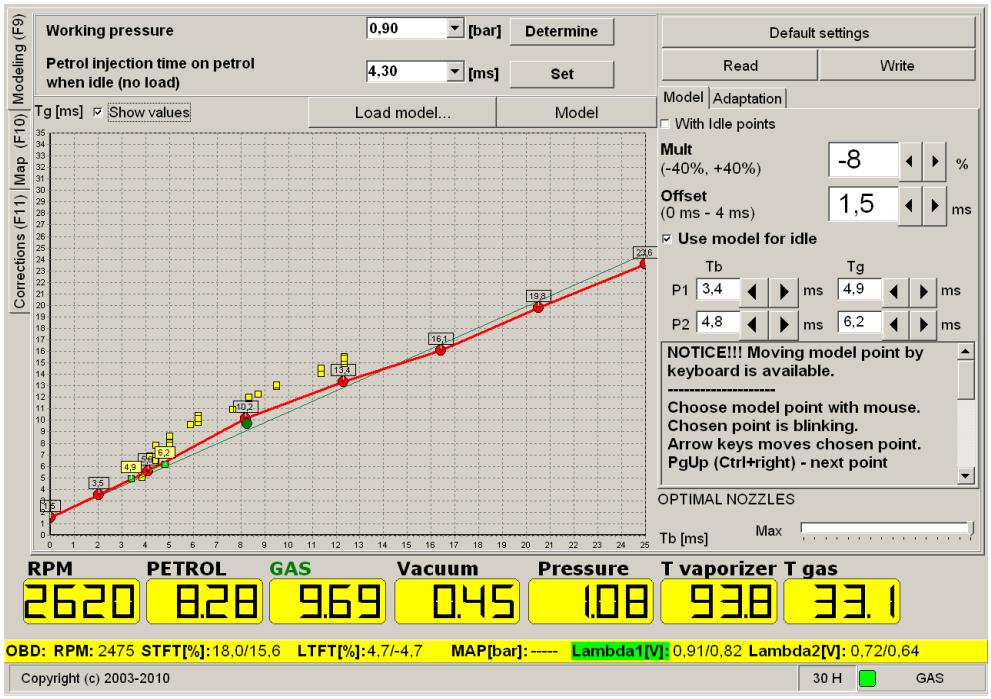


Figure 3.42: Model with visible calculations

9) Then, if needed, the model can be also changed by mouse, keyboard keys or by changing mult and offset parameters. After changing the model, when it fully fit the yellow calculation points, press ***Write***.

10) Then the program will monits about the necessity of deleting the gas map after each change of the model. (figure 3.43) Clear old gas map by pressing "Yes" and collect it again to check if modified model is correct. Do not clear petrol map.

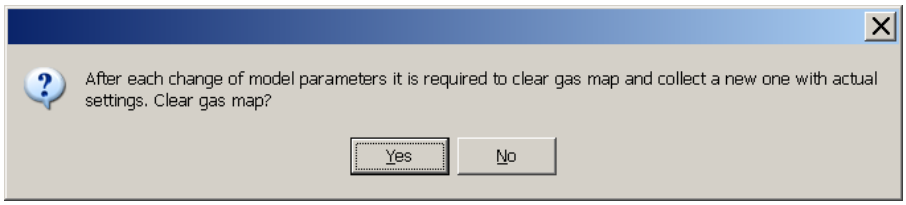


Figure 3.43: Deleting the gas map after changing the model

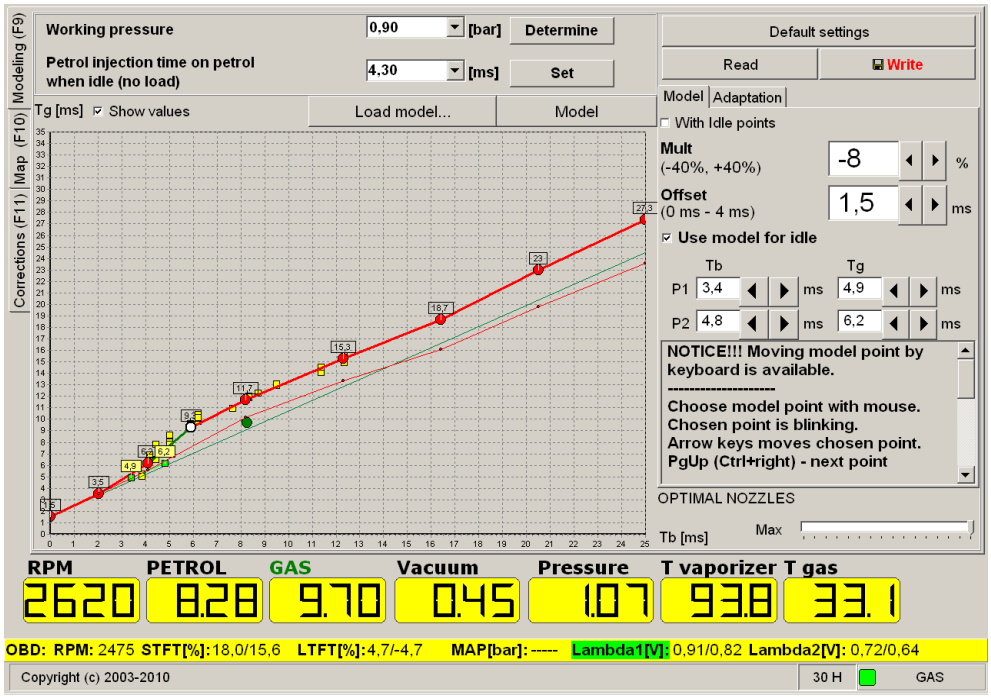


Figure 3.44: Modified model covers calculation points

11) Procedure should be repeated until petrol and gas maps covers completely (like on figure 3.45).

Figure 3.45: Gas map covering petrol map

3.5.5 Adaptation

Adaptation is an option that enables the automatic adjustment to changing engine's working conditions, as, for example, driving on low quality gas.

Turning the adaptation option on is available only in controller 3.0D and newer, after calibration of the system, and when the petrol map has been precisely collected within all ranges of load.

Turning adaptation on should be preceded by rad 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 adaptation may not differ from the original model more than 20% and that is why adaptation may not be the only mechanism calibrating the controller.

The original model, from which the adaptation started (called *model trace*) is visible on the model chart and marked with the thin red line (see figure 3.46).

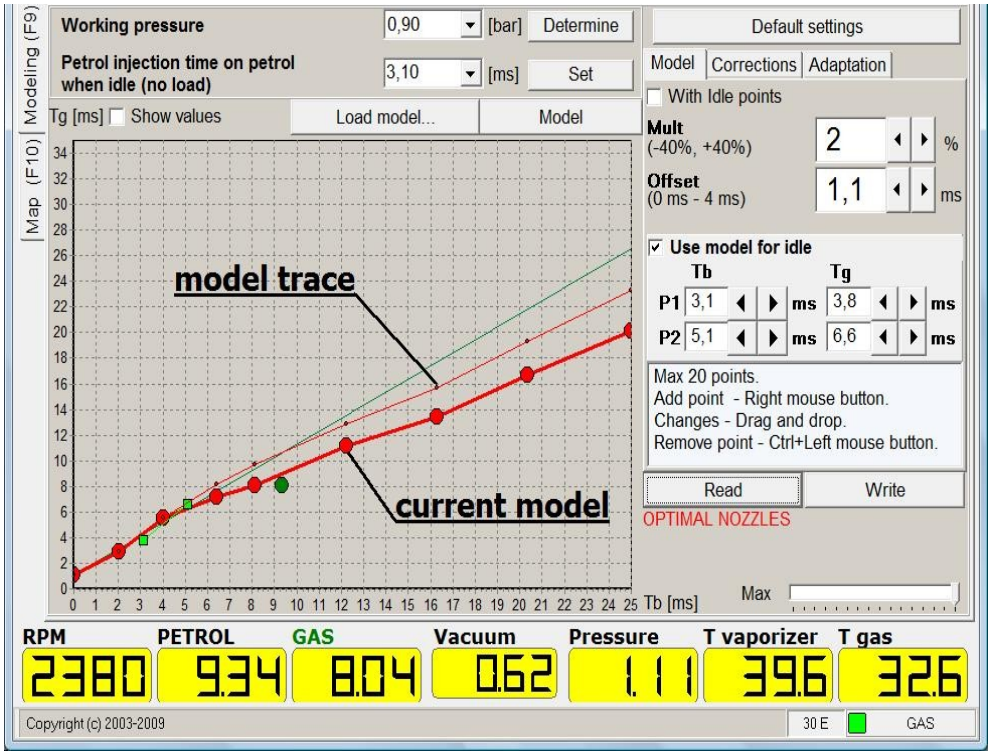


Figure 3.46: Current model and model trace

Model trace is actualized when the ***Save*** button is clicked on the ***Modeling*** tab.

3.6 Diagnostics

The diagnostic tab is divided into three tabs:

1) Recorder (shortcut Shift+F8)
2) Trouble codes (shortcut Shift+F9)
3) Advanced (shortcut Shift+F10)

3.6.1 Recorder

Function enables to analyze working conditions of the system on the basis of information gathered and shown on chart (see figure 3.47). When an OBD adapter is attached to the Diego controller, the Recorder can also display parameters read from OBD.

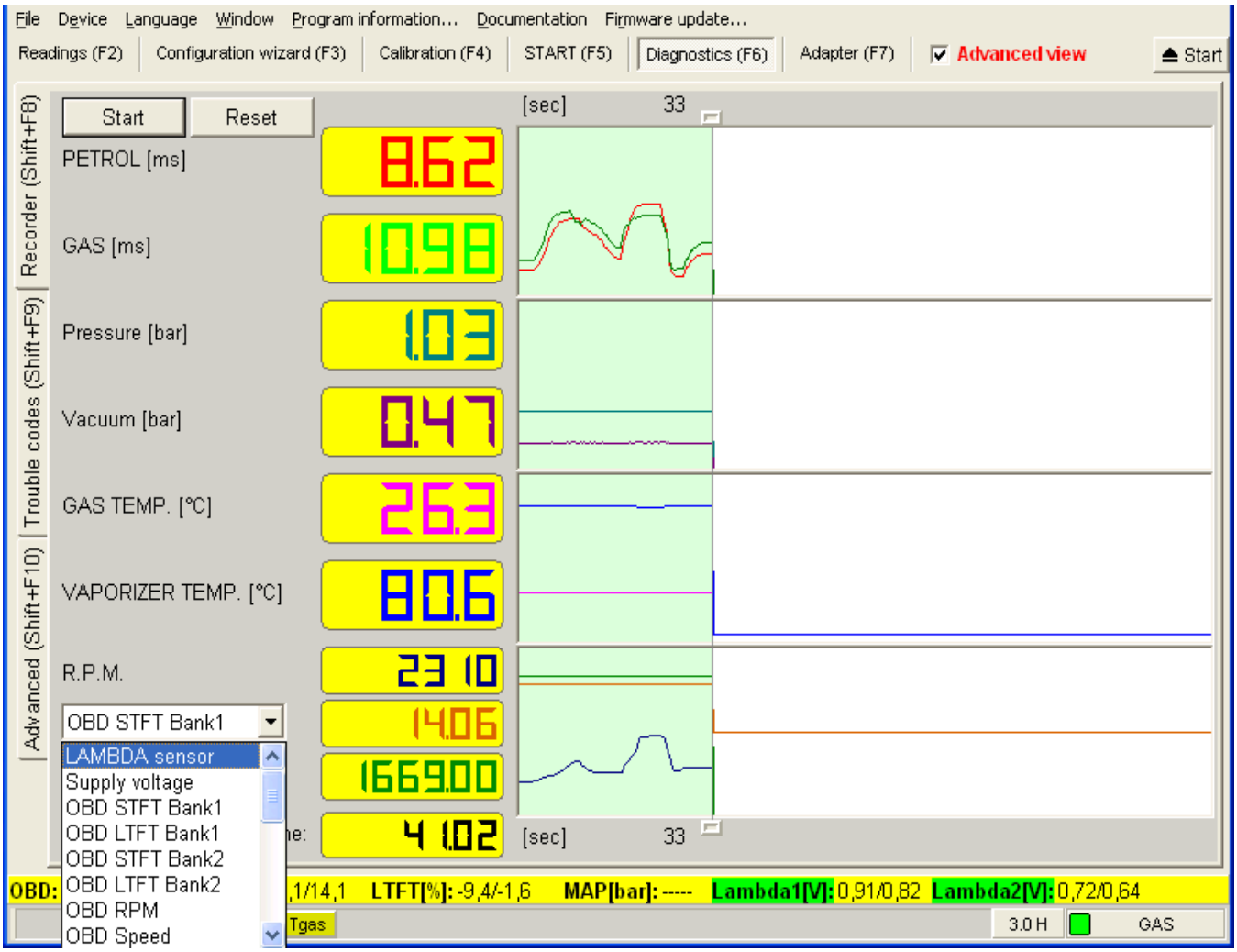


Figure 3.47: Recorder

3.6.2 Trouble codes

Controller has a self-diagnosis system that enables to detect errors occurring during work and determine conditions of their occurrence (Figure 3.48).

Trouble codes are divided into current and recent. For the last trouble code, the frozen parameters (parameters at which the error occurred) are saved.

ERROR-type trouble codes causes switching to petrol. INFO-type trouble codes are only saved, but do

not cause switching to petrol.

List of trouble codes:

- ERROR/INFO 101X= No signal from petrol injector (X stands for the number of the injector). ERROR of INFO: depends on the software configuration (option: ***HEMI type engine*** in ***Configuration wizard → Advanced***)
- ERROR 1031= Reducer temperature sensor short circuit
- ERROR 1032= Reducer temperature sensor open circuit
- ERROR 1033= Gas temperature sensor short circuit
- ERROR 1034= Gas temperature sensor open circuit
- ERROR 1035= Sensors supply voltage +5V too low
- ERROR 1036= Sensors supply voltage +5V too high
- ERROR 1041= Gas pressure too low – condition depends on the software configuration (see option ***Switch to petrol, when gas pressure less than …*** in ***Configuration wizard → Switching***)
- ERROR 1043= Inefficient vaporizer heating system (<15 °C)
- INFO 1045= Gas temperature very high (>90 °C)
- ERROR 1042= Gas injectors fully open (Gas mixture out of control)
- ERROR/INFO 1044= Petrol injectors fully open. (option: Petrol injectors constantly open). ERROR or INFO – depends on option ***Petrol injectors fully open*** in ***Configuration wizard → Switching***)
- INFO (other number)= Electromagnetic disorder

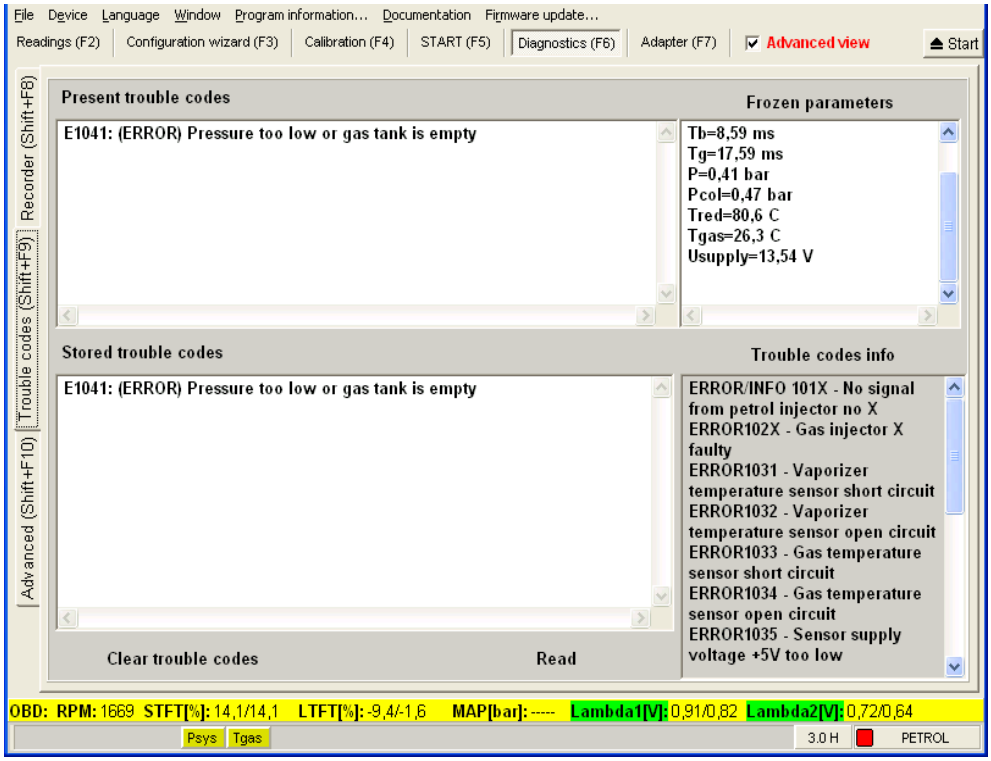


Figure 3.48: Trouble codes

3.6.3 Advanced

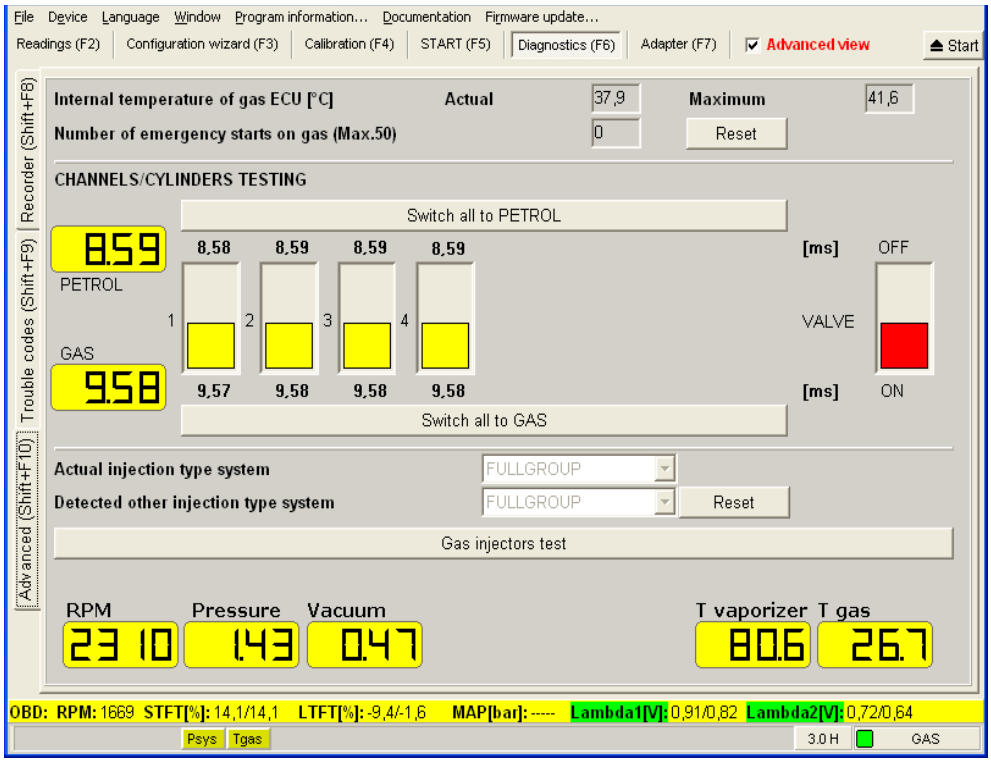


Figure 3.49: Advanced diagnostics

Description of options:

3.6.3.1 Internal temperature of gas ECU

In ***Diagnostics*** → ***Advanced*** tab current temperature of the controller can be checked. It allows to estimate conditions in which the controller works.

3.6.3.2 Number of emergency starts on gas

The controller has a procedure of emergency starting on gas.

Procedure is as follows:

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.

3.6.3.3 Channels/cylinder 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.

3.6.3.4 Injection system type

Thanks to detecting injection system type it is possible to determine current injection type and other types, detected during engine work. If more than one type of work of injection system has been detected, it may be needed to use special correction for changing types of injection. (see Configuration wizard → Advanced).

3.6.3.5 Gas injectors test

Gas injectors test 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 has to be put into operation to restore proper, even work of the gas injection system.

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.

Procedure of g

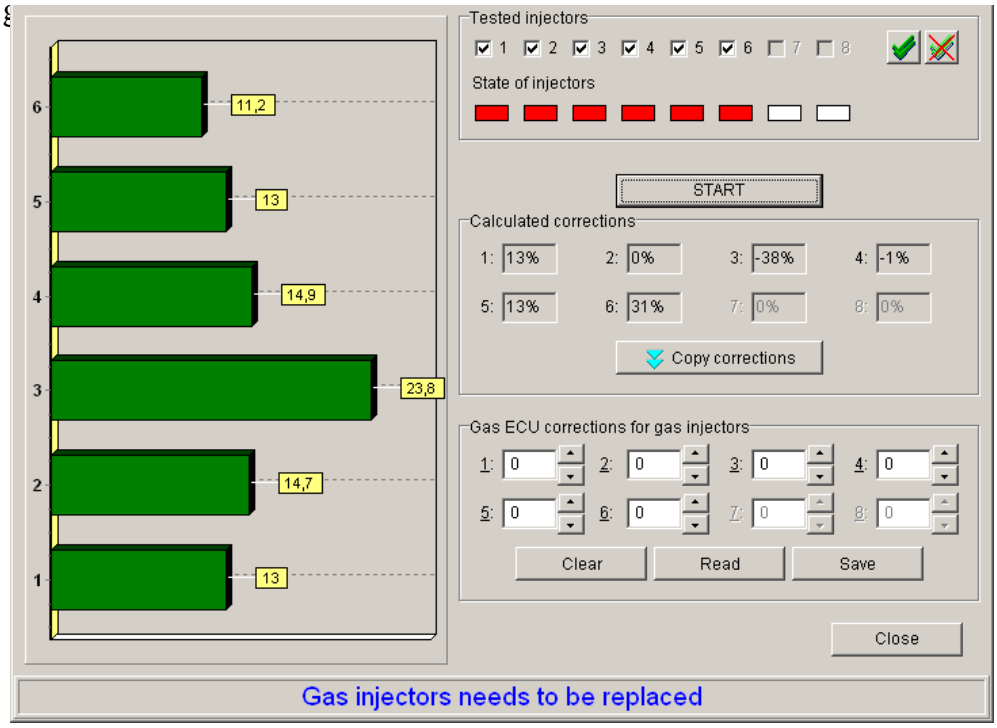


Figure 3.50:Window of the gas injectors test

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

3.7 Adapter

The adapter tab provides the interface to the OBD Adapter and OBD Adapter v2, that can be connected to Diego G3 controller.

The OBD adapter enables communication between Diego gas injection system and petrol controller that uses OBSII diagnostic interface. The applications of the adapter are as following:

- reading parameters form the OBDII system, and their visualization in the Diego 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 (only in Diego G3 of versions 3.0H or newer).

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 OBD adapter may be applied in cars equipped with Diego 1.4x 1.5x or 3.0x families gas system. Gas controllers in versions 3.0H or newer are fully compatible with adapter, that is they have functionality of adaptive corrections on the basis of the OBD corrections. Older versions of controllers enables only functionality of OBD scanner (that is: reading parameters and erasing engine errors.)

OBD Adapter v2 can work only with program in version 3.0.8.0 or higher.

The adapter may be connected to OBD using protocols that are applied in most of new European cars:

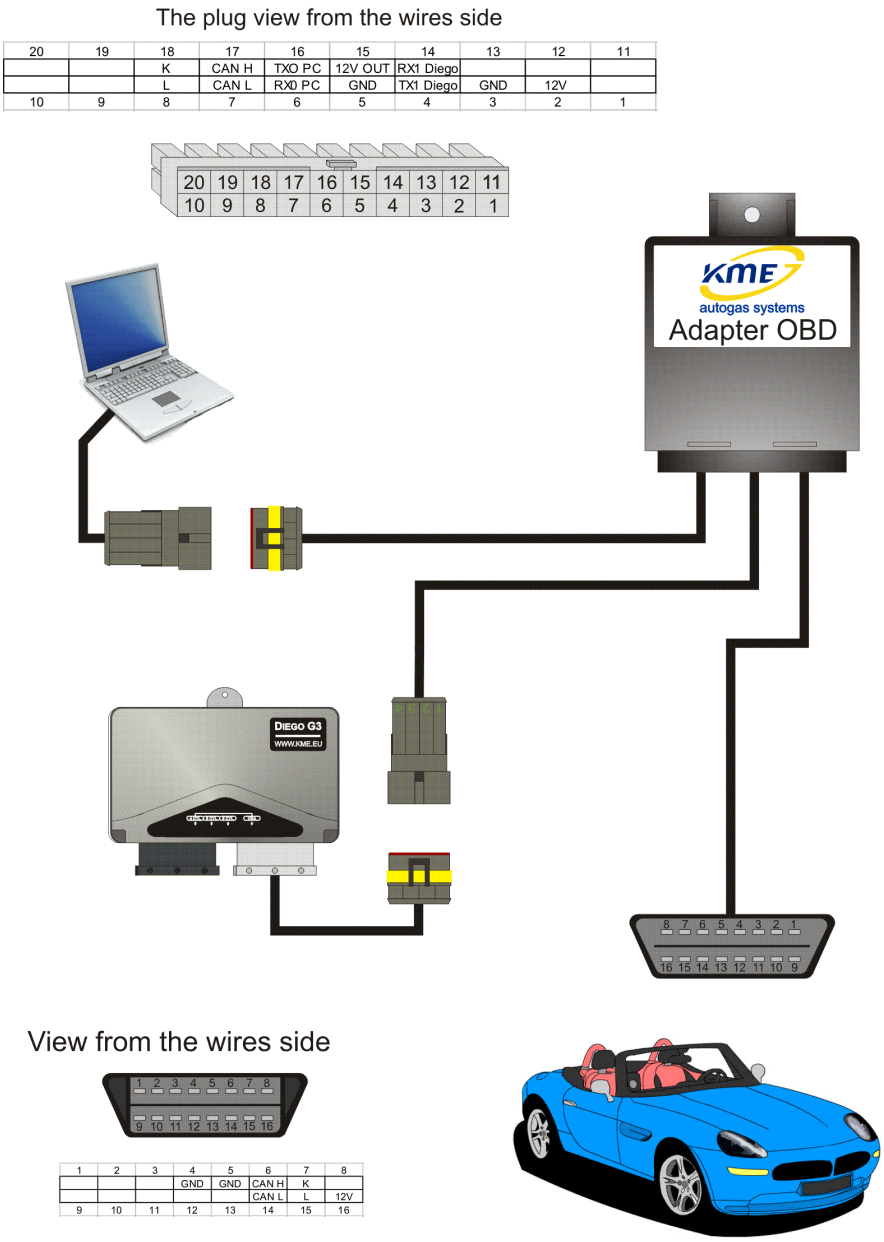
- ISO9141,
- KWP2000slow,
- KWP2000fast,

- CAN_11bitID_500kbps,
- CAN_29bitID_500kbps,
- CAN_11bitID_250kbps,
- CAN_29bitID_250kbps.

Assembly

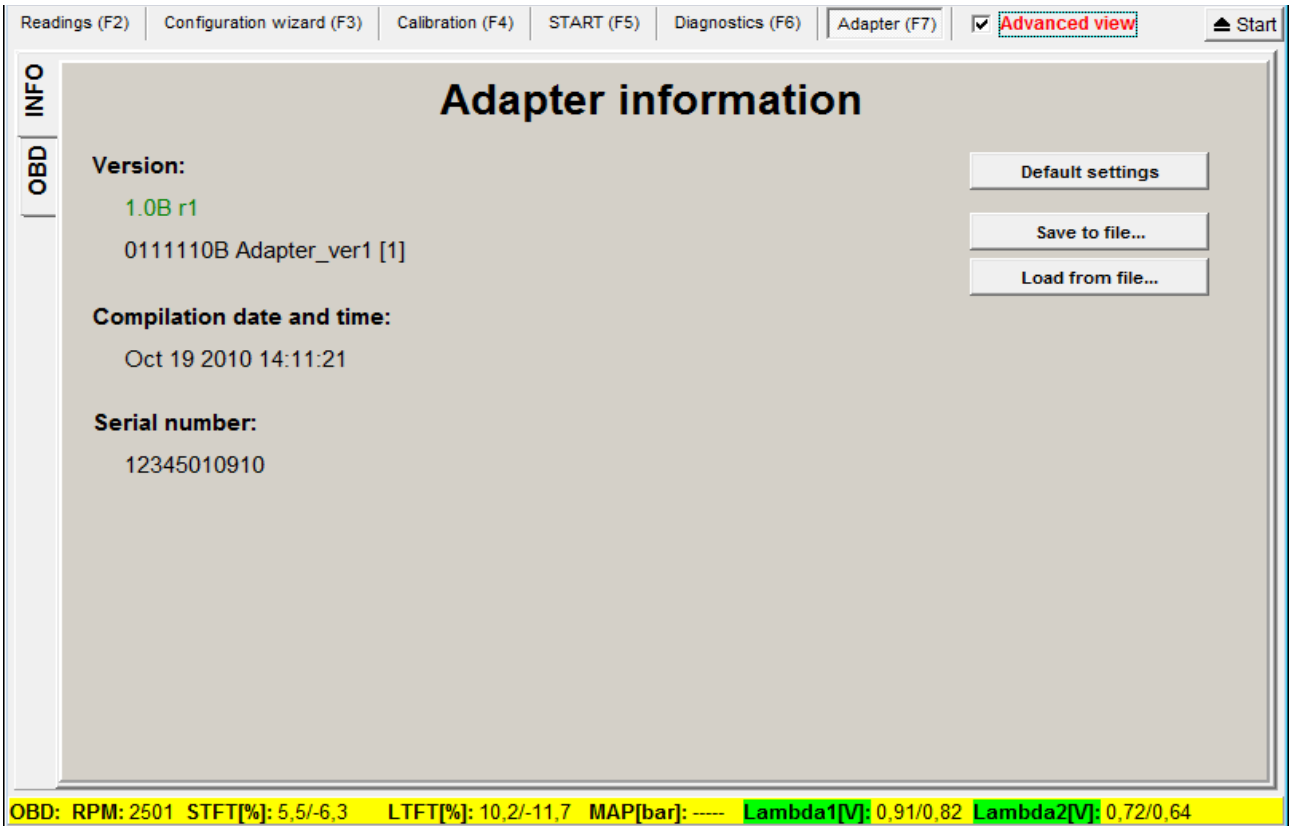
The adapter is designed to make its installation as easy as it is possible. The assembly requires only connecting three plugs: two to the communication interface (one to the PC and one to Diego), and one to OBD. Adapter is installed serially into the communication path between PC computer and the controller and should be mounted inside the driver cabin, which requires putting the communication wire through into the driver cabin. For the convenience, extension cords to communication interface are added to the installation set. If the gas controller has and old, non-hermetic standard of the communication plug, it needs to be replaced by a plug in a new, hermetic standard (trade number: 239 000 033).

The connection diagram is shown on the figure below.



Usage

Configuration and maintenance of the adapter can be done with application Diego 3.0.5.0 or newer. Options and functions for the adapter are gathered on the tab sheet **Adapter**,(see figure below) that may be opened with the F7 shortcut. On the **INFO** tab, basic information of adapter as: version, time and date of compilation and serial number are shown. The default configuration can be restored by pressing **Default configuration** button. The configuration can be saved and read by pressing **Save to file... and Read from File...** buttons.



Options available on the **OBD** tab enables management of the adapter.

Configuration Tab

OBD 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.

Automatic connecting after engine starts – when turned on, this option makes adapter to automatically connect to the OBD after engine starts.

Reset OBD adaptation – clears the corrections collected during adaptation on the basis of LTFT and STFT read from OBD.

Enable OBD adaptation – 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.

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.

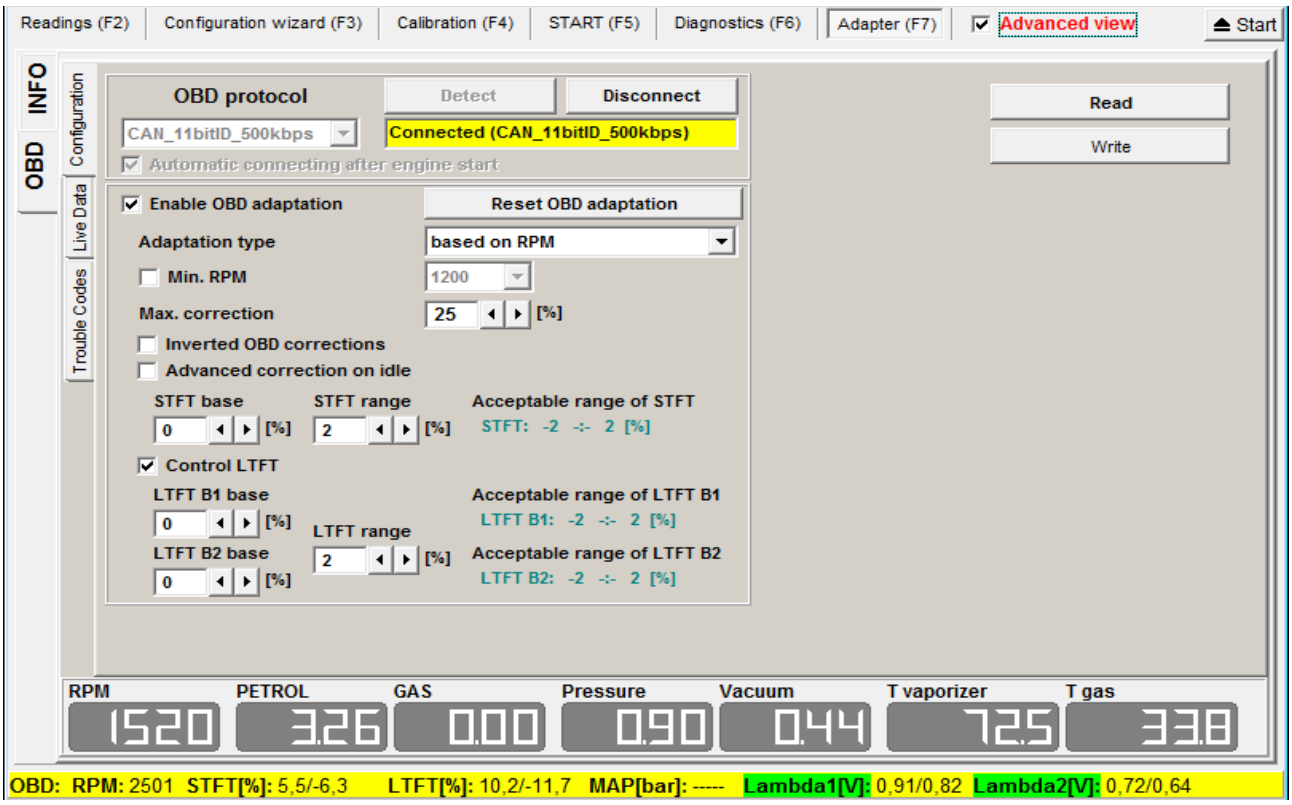
Minimal RPM – option that specifies the minimal RPM value at which the adaptation is active. This functionality can be used to turn the adaptation off at idle. In that case

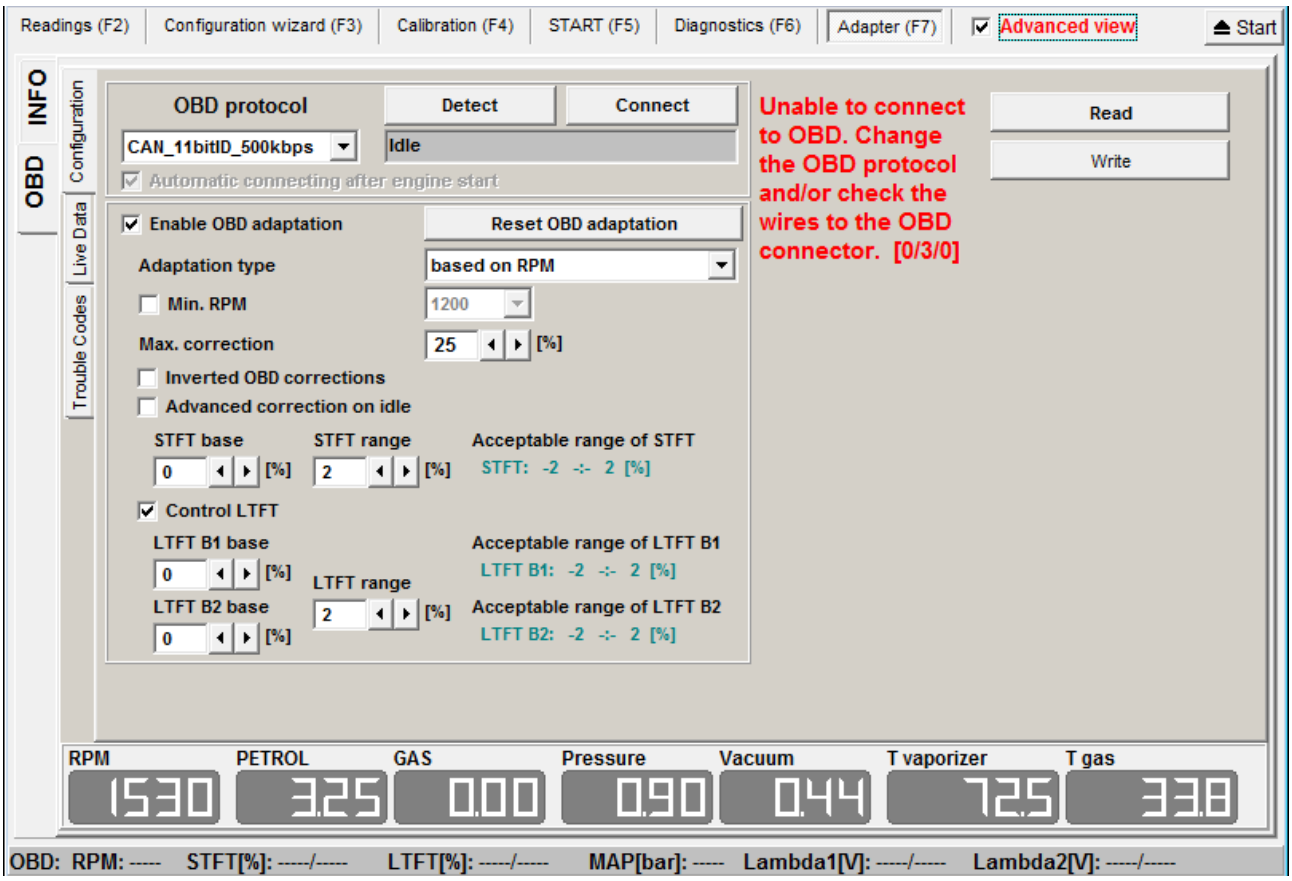
Maximal correction – is the maximal value of the correction that can be set as a result of the

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 base – is the value of the STFT correction, which achieving is purpose of the OBD adaptation. The corrections in gas controller are changed in a such way that causes changes of STFT correction towards the value of STFT base.

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 thatn 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.

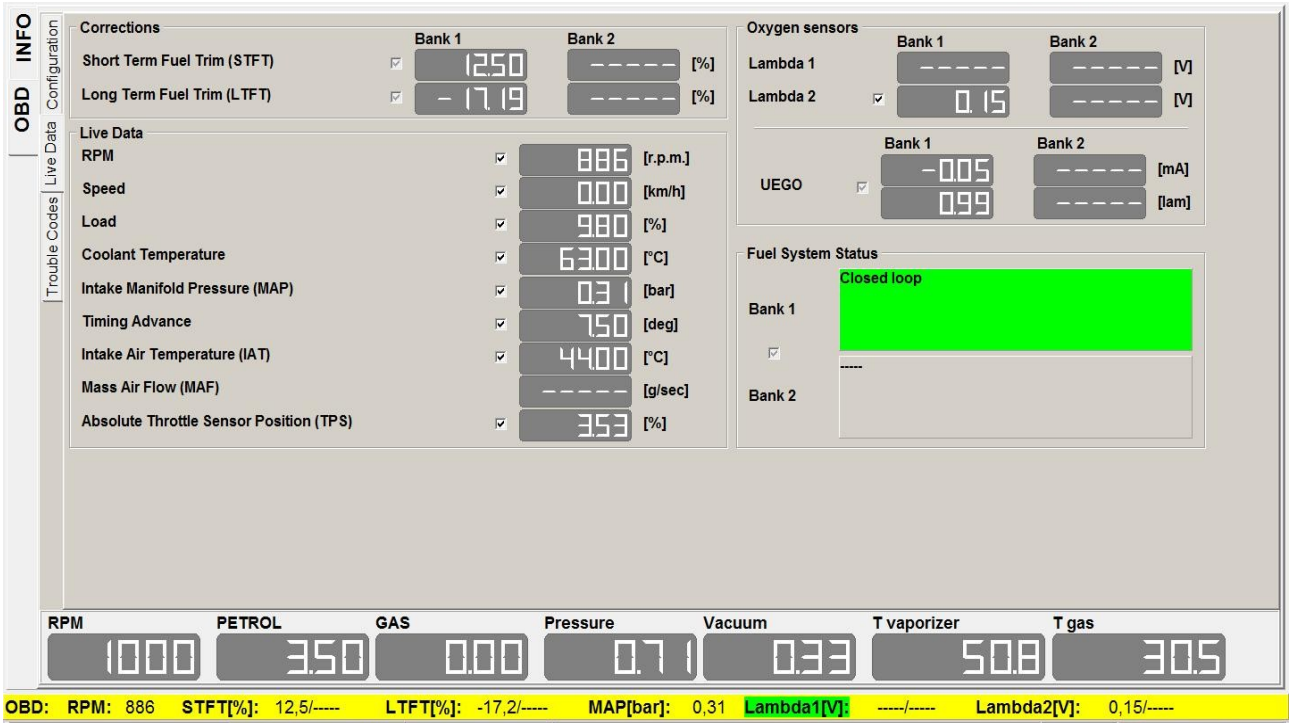
LTFT controlling – the option modifies the algorithm of the adaptation to consider also the value of the long term fuel trim.

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.

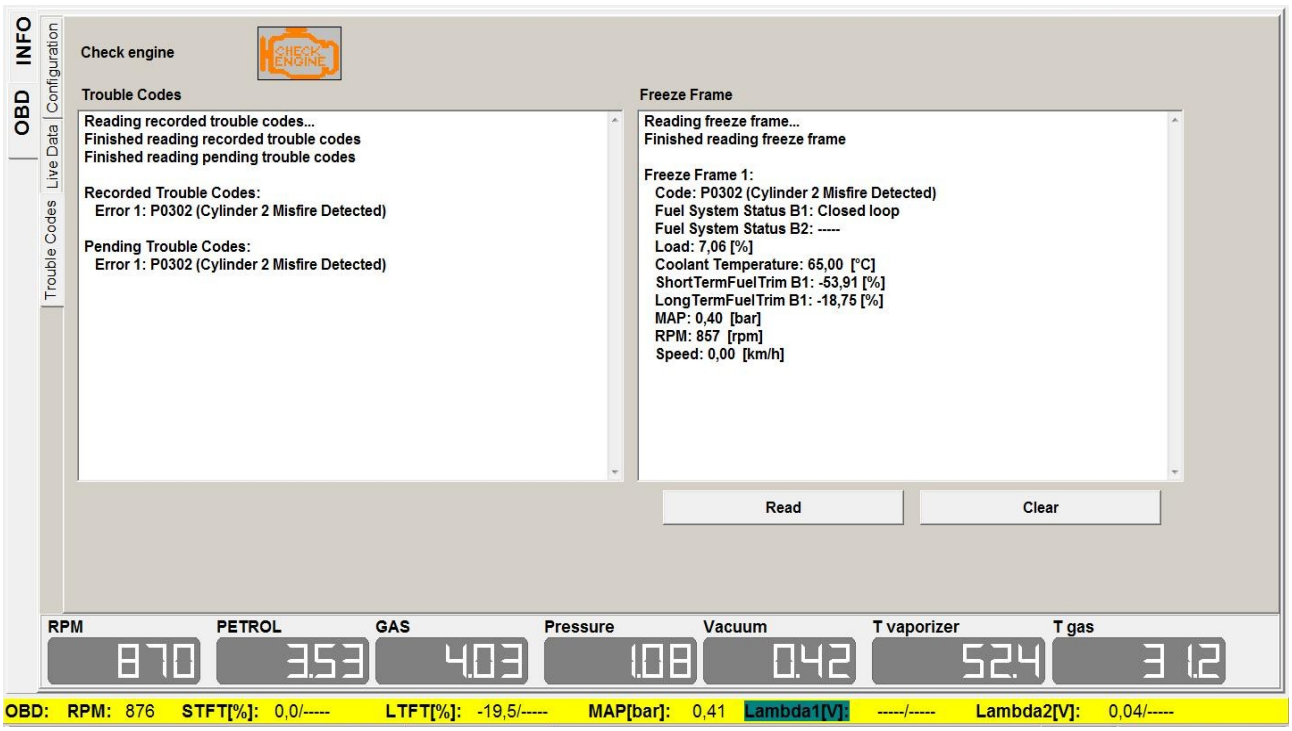
Live Data tab

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 two of the values read from OBD can be displayed on the chart of the Diego system's recorder (tab Diagnostics → Recorder)



Trouble Codes tab

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.

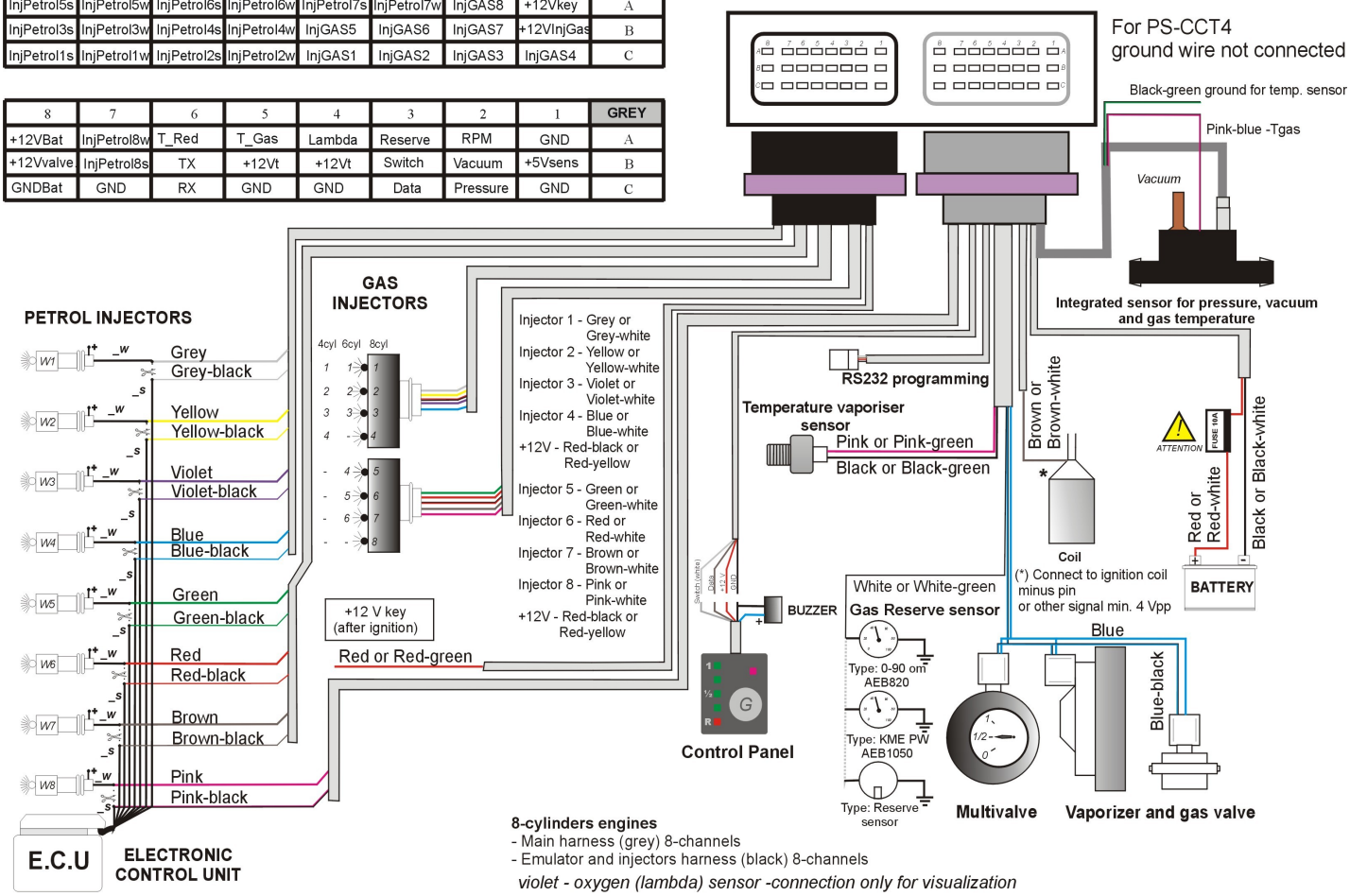


3.8 Connection diagram

8	7	6	5	4	3	2	1	BLACK
InjPetrol5s	InjPetrol5w	InjPetrol6s	InjPetrol6w	InjPetrol7s	InjPetrol7w	InjGAS8	+12Vkey	A
InjPetrol3s	InjPetrol3w	InjPetrol4s	InjPetrol4w	InjGAS5	InjGAS6	InjGAS7	+12VInjGas	B
InjPetrol1s	InjPetrol1w	InjPetrol2s	InjPetrol2w	InjGAS1	InjGAS2	InjGAS3	InjGAS4	C

8	7	6	5	4	3	2	1	GREY
+12VBat	InjPetrol8w	T_Red	T_Gas	Lambda	Reserve	RPM	GND	A
+12Vvalve	InjPetrol8s	TX	+12Vt	+12Vt	Switch	Vacuum	+5Vsens	B
GNDBat	GND	RX	GND	GND	Data	Pressure	GND	C

Connection guide for gas control unit



8-cylinders engines
- Main harness (grey) 8-channels
- Emulator and injectors harness (black) 8-channels

violet - oxygen (lambda) sensor -connection only for visualization

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