OPTIMA
PICO
OBD READY

INSTRUCTION

OPTIMA

PICO OBD READY



ALEX

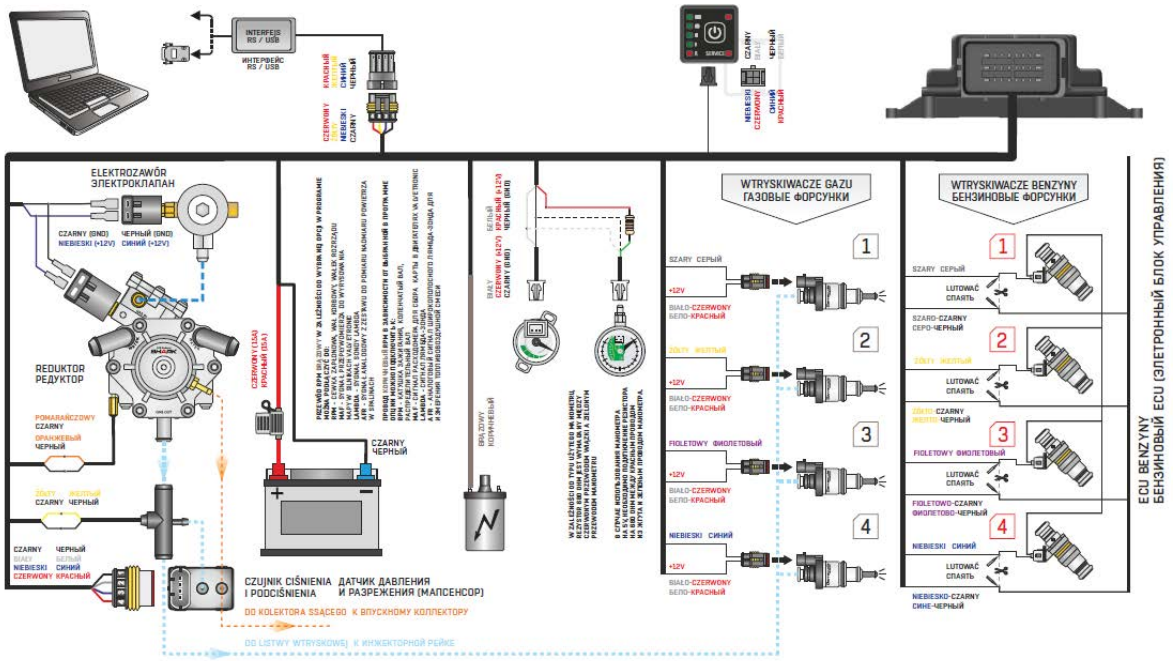
PROFESSIONAL AUTOGAS INSTALLATIONS

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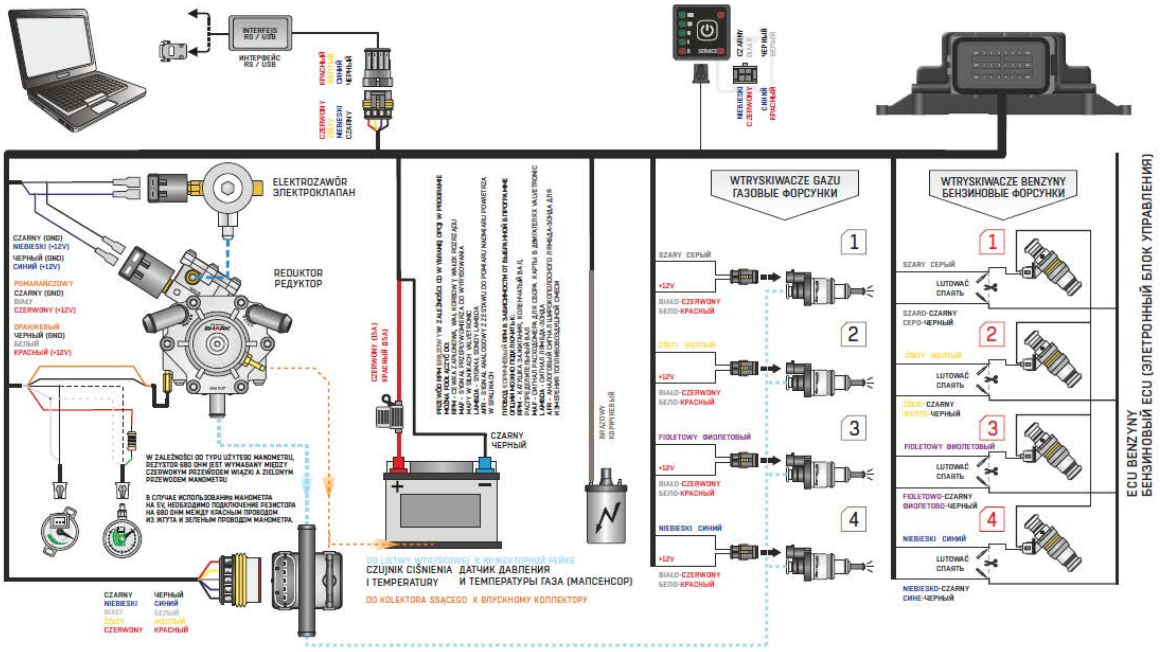
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1. Connecting the OPTIMA PICO System

1.1 Wiring Diagram



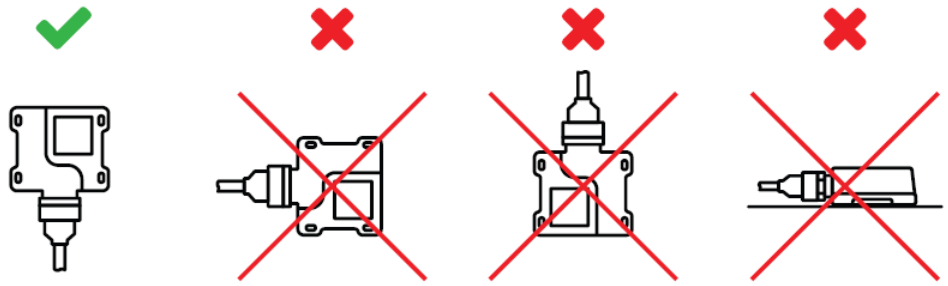
Rys. 1



Rys. 2

1.2 Installing the OPTIMA PICO Controller

The OPTIMA PICO controller should be installed with the connector facing downward, in a position that protects it from direct exposure to water and high temperatures. Installation must be carried out in accordance with the wiring diagram specific to the controller.



Rys. 3

1.3 Gas reducer

When installing the OPTIMA PICO sequential gas injection system, it is important to select the correct pressure regulator based on the engine's power output and the injector nozzle sizes. An incorrectly chosen reducer may not be able to maintain sufficient gas pressure under full engine load. If the pressure drops below the threshold set in the controller, the system will automatically switch back to petrol.

1.4 Injector nozzles

Injector nozzles must also be selected according to the engine's power output. The table below provides example nozzle sizes. To use it correctly, divide the engine's total power by the number of cylinders.

NOZZLE DIAMETER [mm] (REDUCER PRESSURE 1 bar)	Power per 1 cylinder [HP]
1.8-2,0	12-17
2.1-2,3	18-24
2,4-2,6	25-32
2,7-2,9	33-40
3	41-48

Rys. 4

The values in the table above should be considered as guidelines only. Nozzle sizes may vary depending on the type of gas injector and the injection control method used in the vehicle. If any issues arise, you can use the calculator available in the PC software.

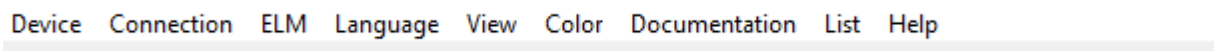
2. OPTIMA 2.18 diagnostic software

2.1 Connecting controller to PC

After proper installation, connect the computer (with the diagnostic software installed) to the OPTIMA PICO controller using the ALEX USB or Bluetooth interface. Before launching the software, turn the car's ignition key and start the engine; otherwise, the controller will enter sleep mode, making communication impossible. This situation will be indicated by a connection failure when starting the OPTIMA diagnostic program.

If the interface is connected and installed correctly, the software will scan all available COM ports on the computer. When connecting for the first time, you need to select the correct port number; subsequent connections will be established automatically.

2.2 Software menu



Rys. 5

DEVICE

- **Device info** – displays information about the connected controller.
- **Service** – remind about installation maintenance.
- **Firmware update** – updates the controller's firmware.
- **Read settings from file**– loading a previously saved settings file.
- **Save settings to file** – saves current controller settings to a file.

CONNECTION

- **Connect/Disconnect** – communication with the controller.
- **COM(x)** – x is the port number available on your PC.

LANGUAGE – change the program's language.

VIEW – three display options to choose from, depending on user expertise.

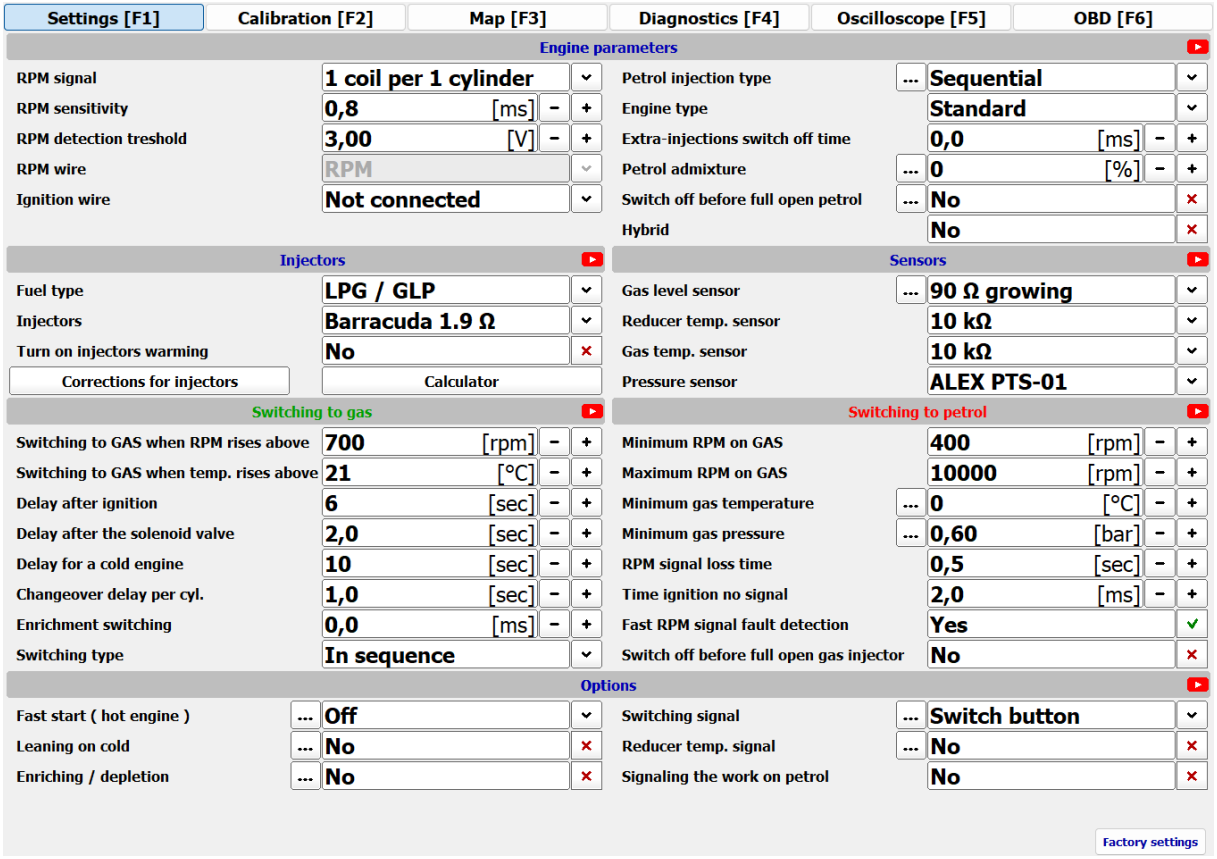
COLOR – color scheme options.

DOCUMENTATION – installation diagrams, user manual, and pinout information.

HELP

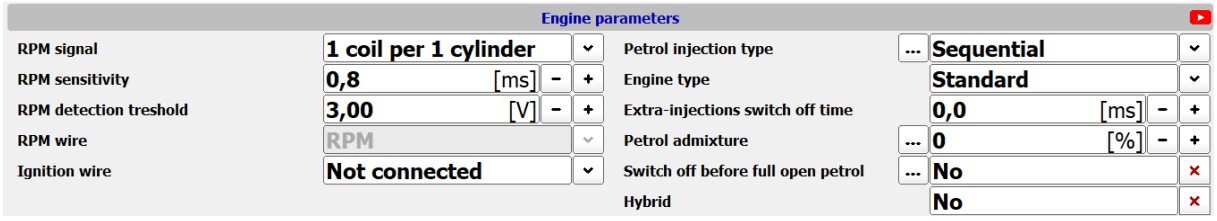
- **Contact**
- **Technical support** – remote desktop assistance via TeamViewer.

2.3 Settings window OPTIMA 2.18



Rys. 6

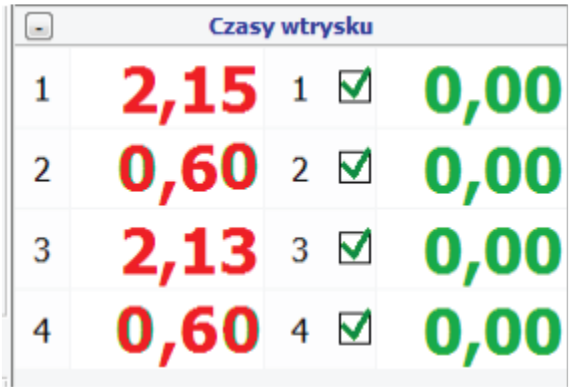
2.4 Engine parameters



Rys. 7

- **RPM signal** – the RPM signal wire should be connected at a point where the engine speed displayed in the software matches the actual engine RPM.

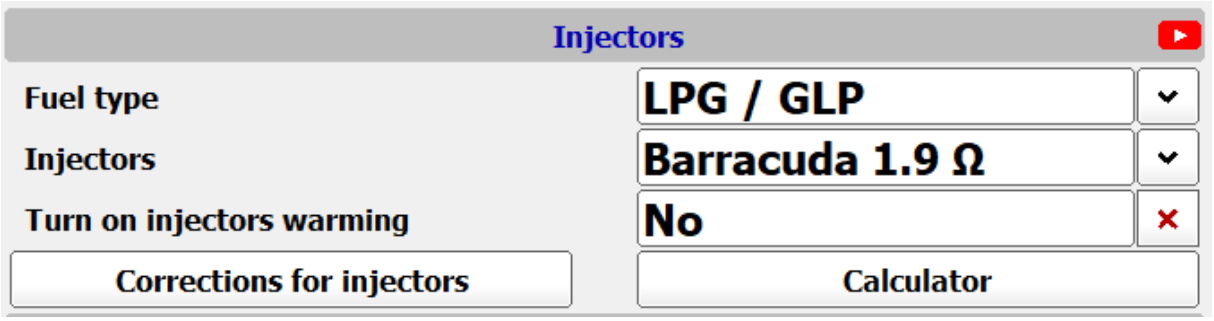
- **RPM sensitivity** – in case of a problem with RPM reading, decrease this parameter.
- **RPM signal divider** – divider available after selecting the RPM signal source from the injectors or the crankshaft.
- **RPM detection threshold** – supply voltage level at which the RPM signal is correctly detected without interference (standard value for ignition coil is 12V, for crankshaft sensor 0-5V).
- **Ignition wire** – default, the PICO controller does not require connection to the ignition. However, if such a connection is needed, the signal should be connected to the red wire of the gas switch panel, and the corresponding option in the software should be set to "connected".
- **Petrol injection type** – type of injection system used in the vehicle. By clicking […] you can activate the automatic detection function for the injection control method and access a window that allows full configuration of the injection sequence, bank assignment, and permanent deactivation of specific gas injectors.
- **Engine type** – type of engine: standard or turbo.
- **Extra injection switch off time** – filtering out short pulses in engines with fuel additional injections, such as those found in vehicles like Mazda, Opel Antara, or Chevrolet Captiva. In such a case, the value should be set above 0.6.



Rys. 8

- **Petrol admixture** – this function allows the system to periodically switch to petrol operation in order to reduce pressure in the fuel rail or to lubricate the intake valves.
- **Switch off before full open petrol** – this option should be enabled when the petrol injectors in the vehicle reach full opening during operation.
- **Hybrid** – this option should be enabled for hybrid vehicles, it helps minimize the clicking noise of the solenoid valves.

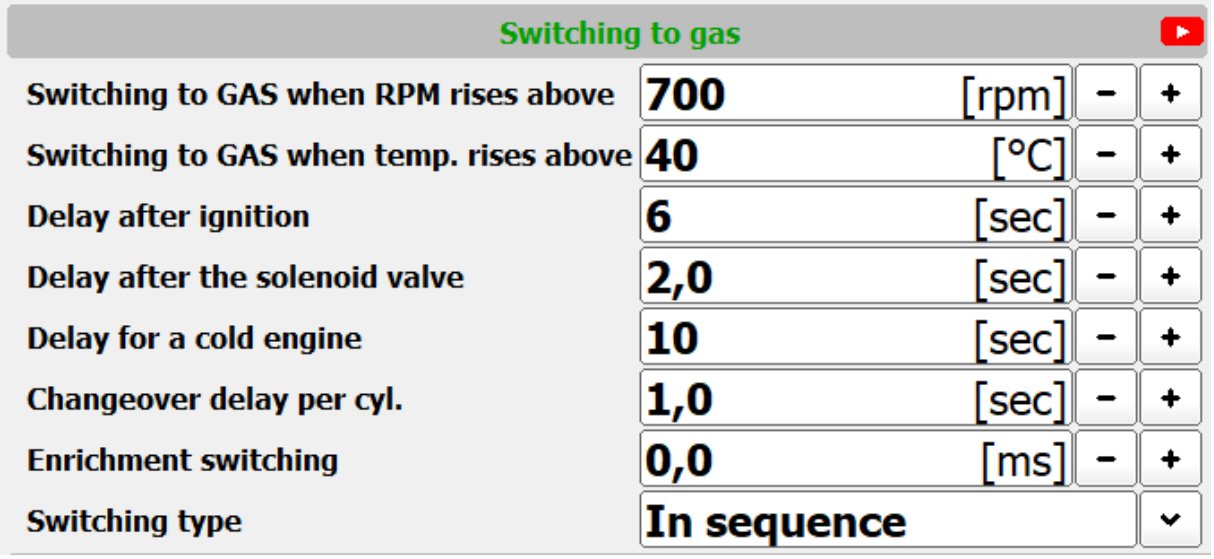
2.5 Injectors



Rys. 9

- **Fuel type** – type of fuel: LPG or CNG.
- **Injectors** – type of injector installed in the vehicle.
- **Turn on injectors warming** – allows warming gas injectors before the switch-over to gas and before reaching the switch-over temperature.
- **Corrections for injectors** – allows you to compensate for any differences in injection times between the banks in V-type engines.
- **Calculator** – helps to select the right size of injector nozzles.

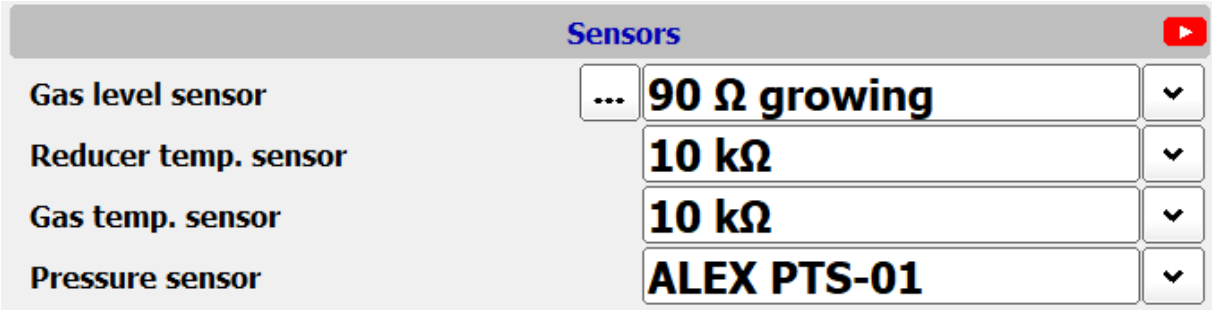
2.6 Switching to gas



Rys. 10

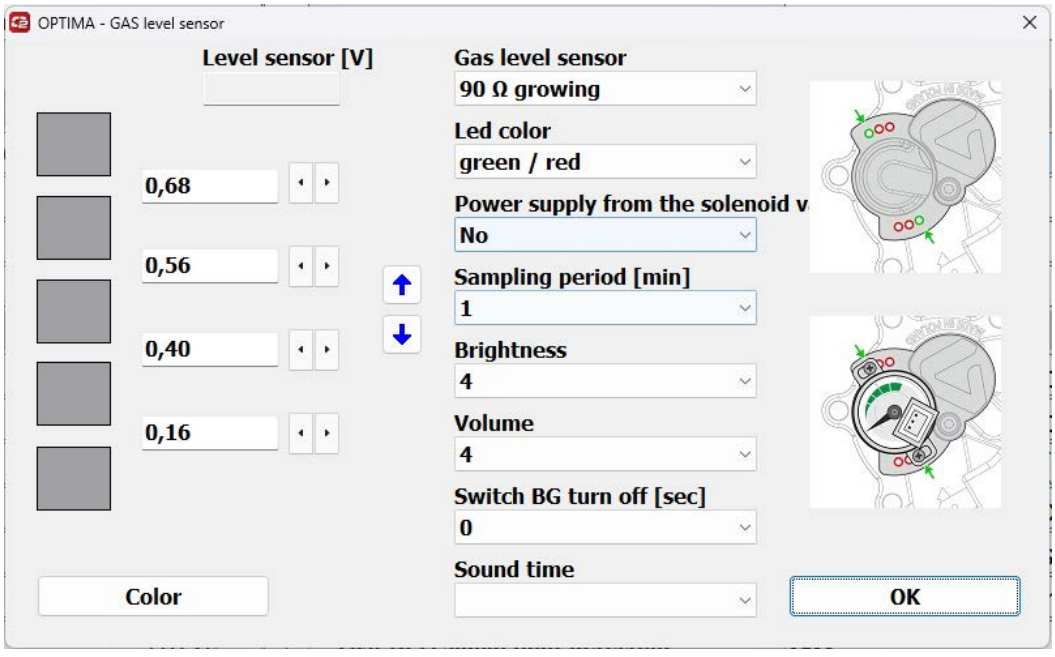
- **Switching to GAS when RPM rises above** – minimal RPM required to switch over to gas.
- **Switching to GAS when temp. rises above** – minimal temperature required to switch over to gas.
- **Delay after ignition** – time necessary for switching into gas after engine ignition.
- **Delay after solenoid valve** – regulated solenoid activation time preceding switching into gas.
- **Delay for cold engine** – time necessary for switching into gas at first switchover.
- **Changeover delay per cyl.** – time between switching of subsequent cylinders.
- **Enrichment switching** – the possibility of momentary overlap when switching fuels.
- **Switching type** – switching type between cylinders: in sequence or all cylinders at the same time.

2.7 Sensors



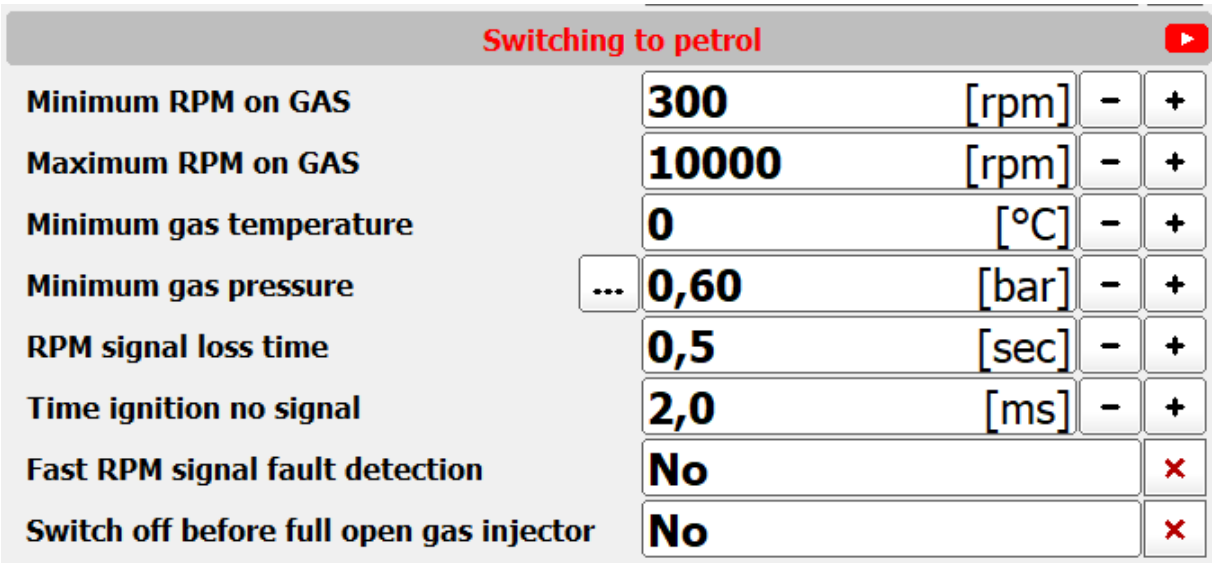
Rys. 11

- **Reducer temp. sensor** – type of sensor used for measuring reducer temperature (included in kit: 4,7 kOhm).
- **Gas temp. sensor** – type of sensor used for measuring gas temperature (included in kit: 10 kOhm).
- **Pressure sensor** – installed pressure sensor.
- **Gas level sensor** – Selection of the sensor installed on the gas tank. By clicking [...] you can fine-tune LED indicators by adjusting individual voltage thresholds.



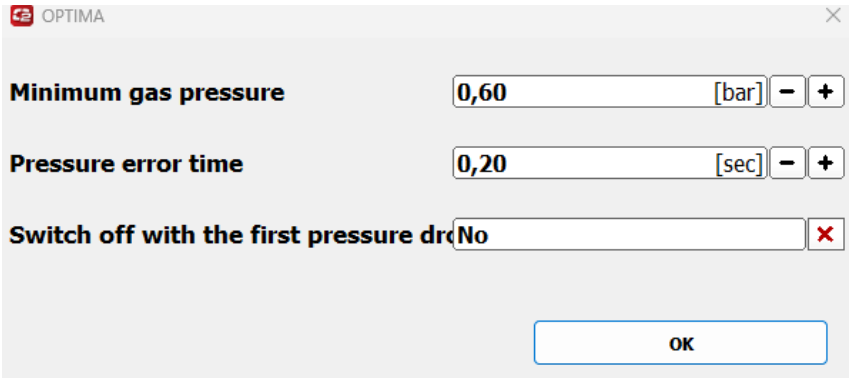
Rys. 12

2.8 Switching to petrol



Rys. 13

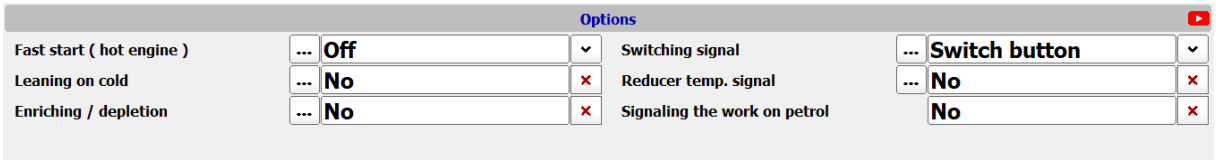
- **Minimum RPM on GAS** – value of RPM below which system will switch over to petrol.
- **Maximum RPM on GAS** – value of RPM above which system will switch over to petrol.
- **Minimum GAS temperature** – temperature below which the system switches over to petrol.
- **Minimal gas pressure** – the gas pressure threshold below which any further drop will cause the system to switch to petrol operation. Additional options become available by clicking [...].



Rys. 14

- **Pressure error time** – period of time with gas pressure lower than minimal after which the system switches over to petrol.
- **Switch off with the first pressure drop** – **YES** – when the pressure drops below the minimum and the pressure error time is over the system will switch into petrol with a sound signal. **NO** – when the pressure drops below the minimum and the pressure error time is over the system at first switches only one cylinder into gas to reduce the gas consumption. If the decline remains the controller will switch the next cylinder up the full petrol work. This mode will be recorded as work on both fuels, „MIX".
- **RPM signal loss time** – adjustment of a closure time of the solenoid valve and injectors following the RPM disappearance. For the chosen option of RPM reading from the injectors the time should be set to 5s.
- **Fast RPM signal fault detection** – in vehicles in which power supply "through the ignition switch" is turned on after the engine was switched off.
- **Switch off before full open gas injectors** – the system will switch to petrol operation when the gas injectors reach full opening.

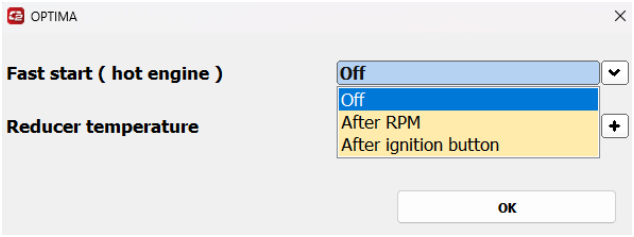
2.9 Additional options



Rys. 15

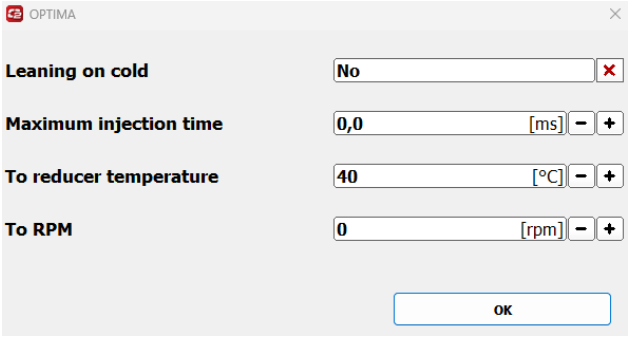
- **Fast start (hot engine)** – if selected the heated engine starts directly on gas. There are two options available:
  - After RPM – The controller starts the gas injection and opens the solenoid valves after detecting RPM
  - After ignition button – the controller begins the gas injection directly after receiving the injection signal. It's important to start the engine directly after the ignition and

activation of solenoid valves (if there is a problem with starting the option „after RPM" should be chosen.



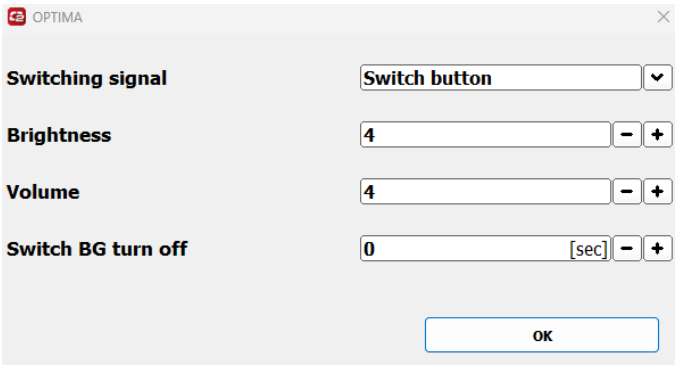
Rys. 16

- **Leaning on cold** – the option is used when there is flooding on a cold engine, – the parameters are chosen in a way that prevents the jerks while acceleration. It mainly applies to the VAG group cars to a temperature up to 40 degrees.



Rys. 17

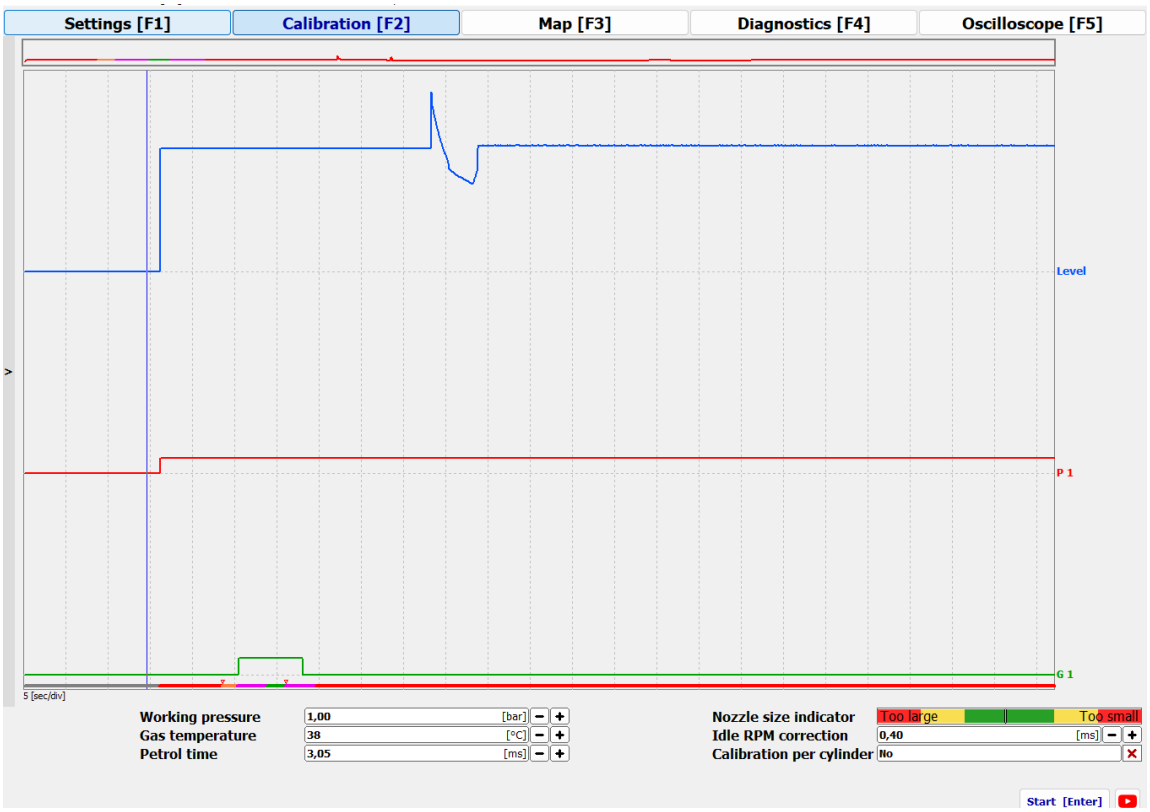
- **Enriching/depletion** – this option allows you to reduce the rate of increase in gas injection time during acceleration, expressed as a percentage. This function is especially useful in CNG installations.
- **Switching signal** – when expanded, four options are available for configuring the switch panel signaling inside the vehicle.



Rys. 18

- **Reducer temp. signal** – this option allows you to set an alarm for a selected reducer temperature. When enabled, the vehicle switches to gas once the specified temperature is reached, and the MODE LED flashes green. Once the target temperature is achieved, the LED stops flashing and the switch panel emits a sound to indicate that the reducer has reached the set temperature.
- **Signaling the work on petrol** – this option activates a sound alert 10 seconds after the engine starts, serving as a reminder that the system is set to petrol-only mode (MODE LED is red).

3. Calibration



Rys. 19

Before starting the calibration process, you have the option to select the calibration method and its parameters:

- **Working pressure** – gas pressure during calibration (will be set automatically by the system).
- **Gas temperature –** gas temperature at which the system can perform calibration (will be set automatically by the system).
- **Petrol time** – the value of petrol injection time – while working on idle run (will be set automatically by the system).
- **Idle RPM correction** – Time corrections for an idle gear(the system sets automatically during calibration).
- **Calibration per cylinder** – (It is advised to select [NO]) selecting YES, – calibration will occur on individual cylinders thus the calibration time will be greatly extended. If deselected, – the calibration will be performed – on all cylinders at the same time.

During calibration, the engine must be idling. If, during the process, the gas injection time is shorter than the petrol injection time, this may indicate that the nozzles are too large and should be replaced with smaller ones — a message in the software will suggest this.

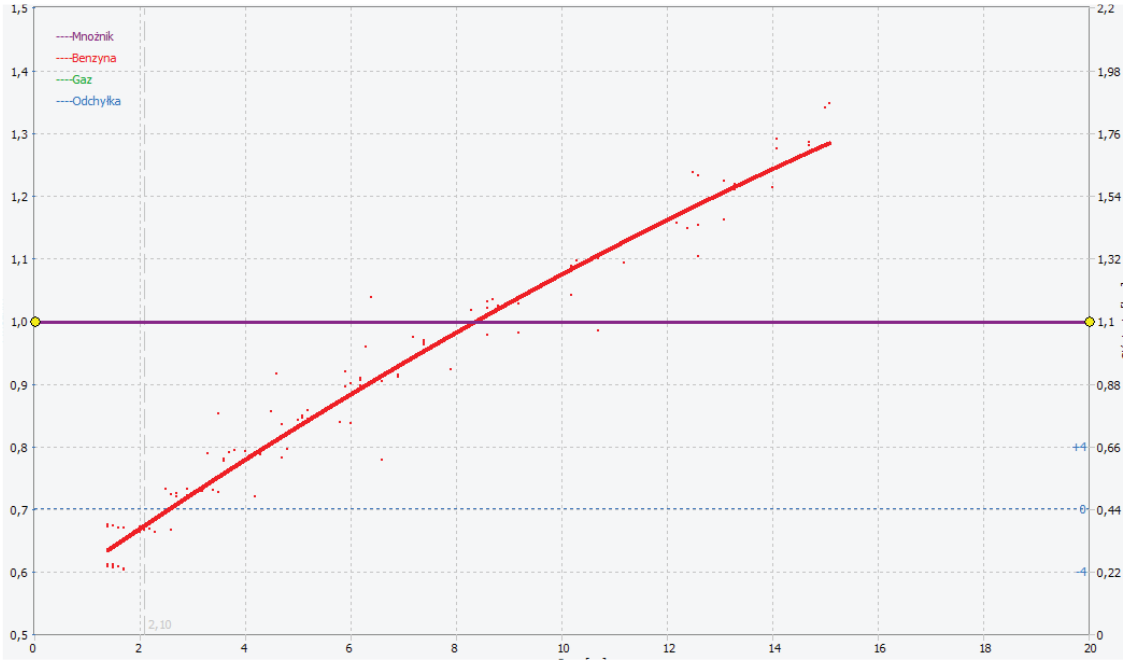
In most cases, after the initial calibration, the idle correction value should fall within the range of 0.8 to 1.2 ms. A correction below 0.8 ms suggests the nozzles may be too large, while a correction above 1.2 ms indicates they may be too small.

4. Map

4.1 Corrections 2D

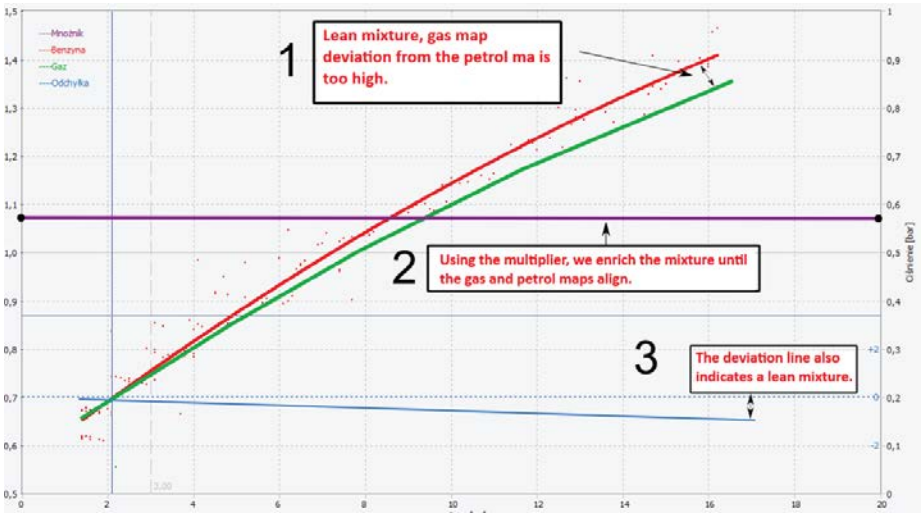
After the calibration process, the next step is to collect the map. This can be done in two ways: either with the PC disconnected or connected. Using a connected PC allows you to monitor which areas of the map still need to be collected.

Start by ensuring the vehicle is running on petrol, then perform a test drive of approximately 5 km, staying in one gear while varying the speed and accelerating sharply several times. If the drive is done with the PC connected, you can go to the “Map” tab to observe the creation of the petrol map in real time, displayed as a red line.



Rys. 20

The next step is to switch to gas and perform another test drive of approximately 5 km, driving as similar as possible to the previous petrol run. During this drive, the injection map for gas will be drawn as a green line.

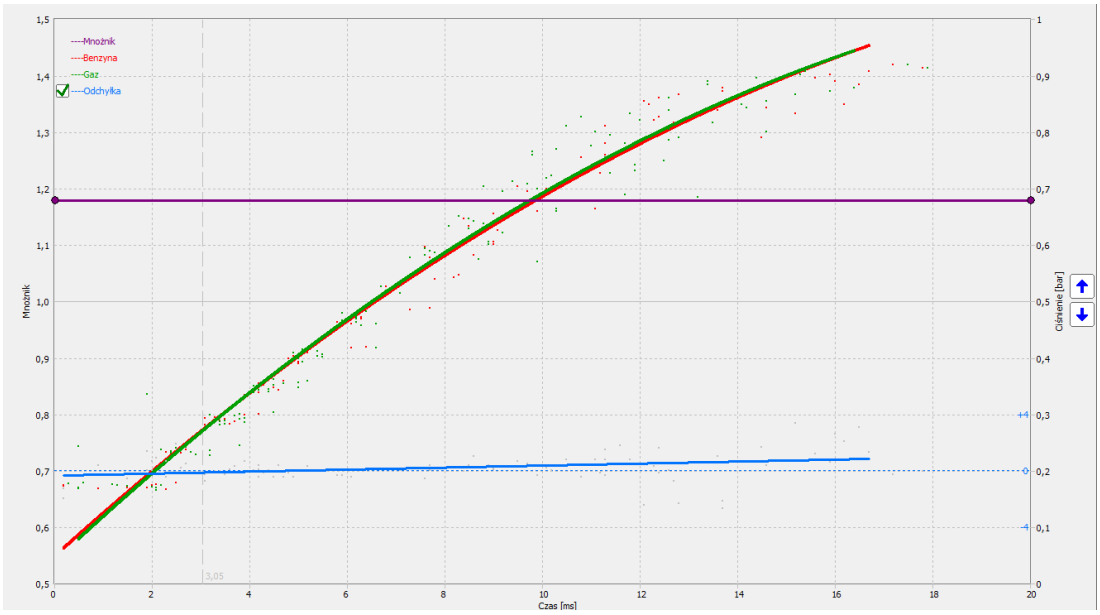


Rys. 21

Once both the petrol and gas maps have been drawn, you can assess how much the air-fuel mixture under gas operation differs from that under petrol. In the example above, both the gas map and the correction curve indicate a mixture that is too lean. In this case, you should increase the multiplier and repeat the test drive on gas.

ANY MULTIPLIER ADJUSTMENT WILL ONLY BE REFLECTED IN THE GAS MAP AFTER RE-LEARNING THE MAP AT THE SPECIFIC POINT.

After increasing the multiplier and performing the test drive, the gas map closely matches the petrol map. This indicates an optimal mixture, which is also confirmed by the deviation line.



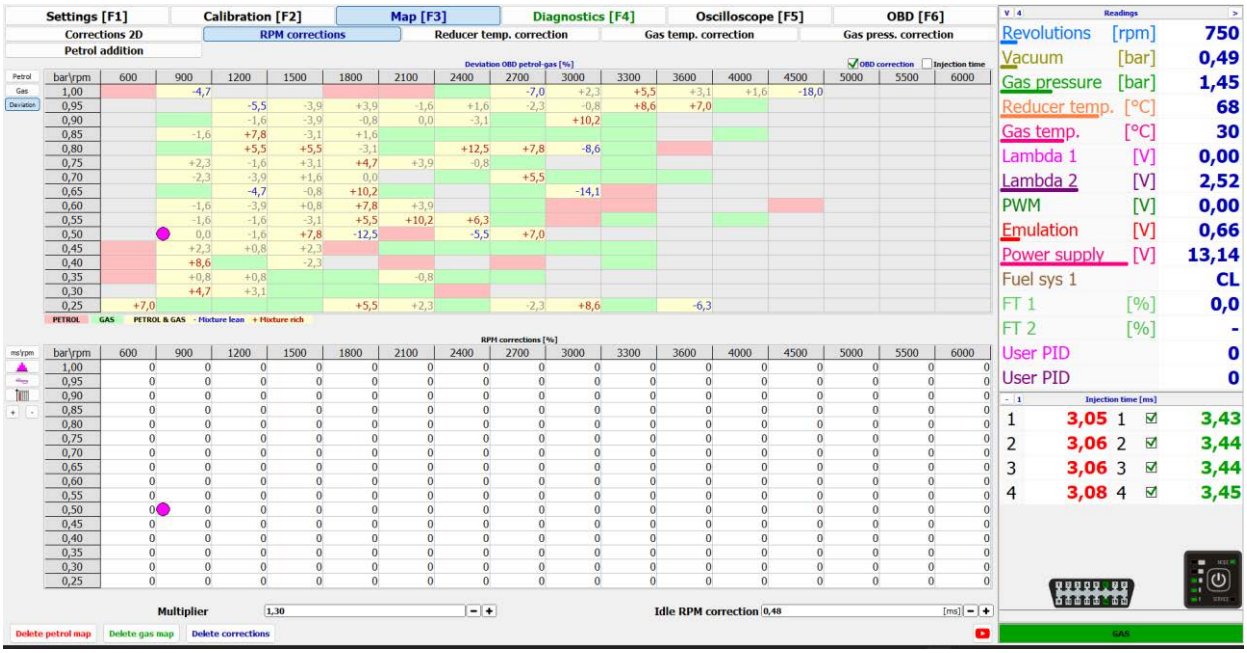
Rys. 22

The system can be considered properly tuned when the petrol and gas maps closely align, and the correction stays within a range of ±0.5 ms.

In addition, in the **RPM Correction** tab, we can verify the accuracy of the collected diesel and gas maps. Path: Map > RPM Corr. > Injection Time Deviation (toggle view using the switches).

The table displays the engine operating range used to generate the 2D map.

- **Red squares** illustrate the range of collected diesel maps.
- **Green squares** illustrate the range of the collected gas map.
- **White squares** illustrate the differences between injection times during diesel and gas operation.



Rys. 23

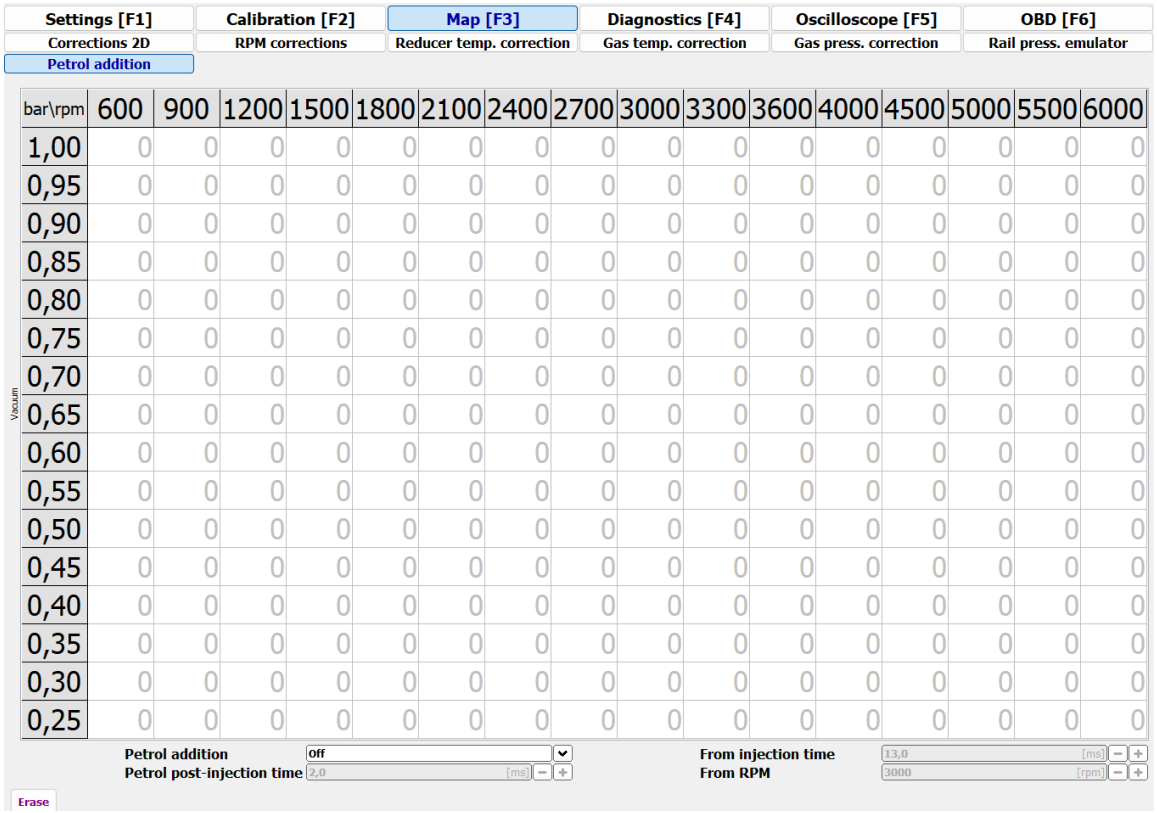
Collecting both diesel and gas maps can be performed with the PC disconnected; however, performing this process while connected to the diagnostic software allows you to monitor and correct the map graph in real time.

4.2 Additional corrections

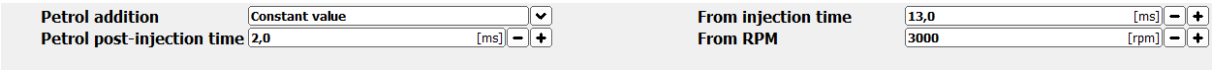
If needed, additional corrections are available, such as:

- **RPM corrections** - corrections at specific engine speeds and manifold vacuum levels.
- **Reducer temp. correction** - the controller features a built-in correction algorithm based on the reducer temperature and does not require manual adjustment, though it is possible to apply additional fine-tuning to this correction if needed.
- **Gas temp. correction** - the controller has a built-in correction algorithm based on the gas temperature and does not require manual adjustment, but it does allow for additional fine-tuning of this correction if necessary.
- **Gas press. correction** - the correction is also integrated into the controller's algorithm and does not require any manual intervention; however, the software allows for applying additional adjustments if needed.

4.3 Petrol addition



Rys. 24



Rys. 25

The controller supports fuel enrichment injection in every engine cycle. There are two configuration options available:

Constant value (recommended) – allows setting the enrichment injection duration, the engine RPM threshold, and the minimum injection time required to activate the enrichment.

Value from the table – in this mode, you enter numbers from 0 to 100 in a table, representing the percentage of petrol enrichment relative to the total injection duration (i.e., the portion of the total injection time that the petrol enrichment occupies).

5. Diagnostics

The controller logs errors that occur during the operation of the system and records how many times each error has occurred, allowing for faster diagnostics. Additionally, it creates an event history for further analysis.

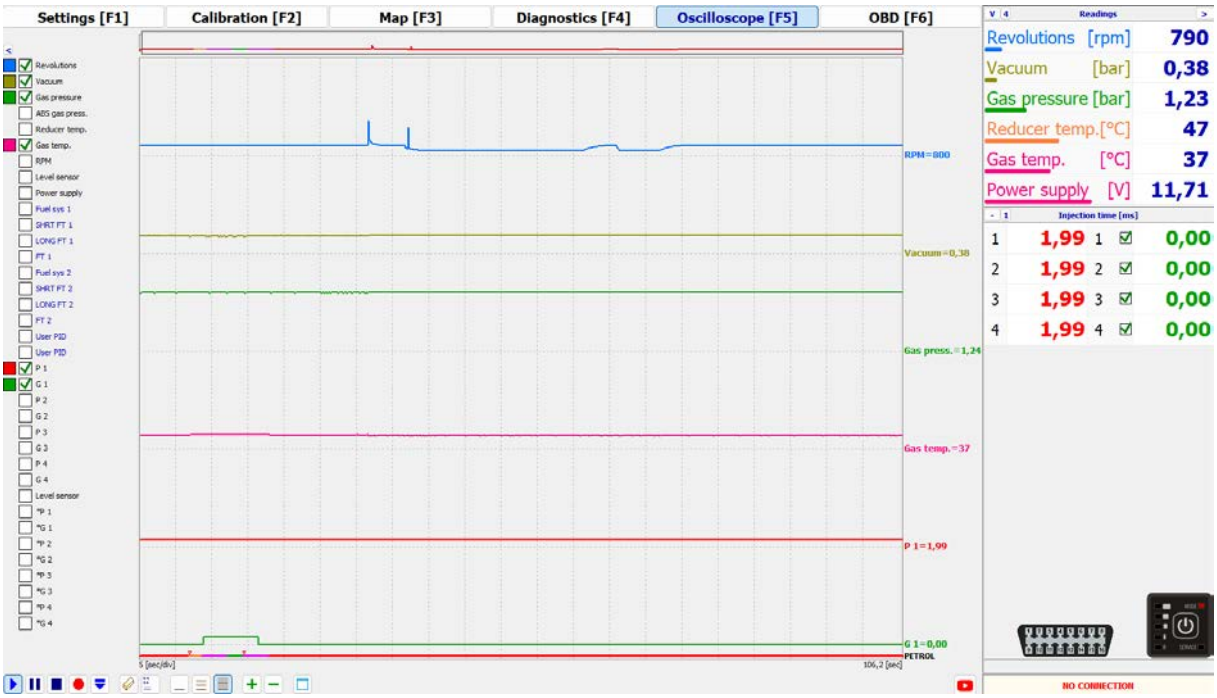
5.1 Possible errors

- **Manifold – pressure sensor error –** the value of voltage is too low. Improper voltage value in a manifold pressure sensor, – check the wires and connectors.
- **Manifold – pressure sensor error – the value of voltage is too high.**
- **Gas pressure sensor error – the value of voltage is too low.**
- **Gas pressure sensor error – the value of voltage is too high.**
- **Reducer temperature sensor error – the value of voltage is too high.**
- **Reducer temperature sensor error – the value of voltage is too low.**
- **Gas temperature sensor error – the value of voltage is too high.**
- **Gas temperature sensor error – the value of voltage is too low.**
- **Too low power supply** – Voltage dropped below 9V, – it may indicate the problem with battery or charging system.
- **Too high power supply** – Voltage rises above – 16V, – check the battery charging system.
- **No power supply on LPG valve.**
- **No power supply on LPG injectors.**
- **No power supply on PTS.**
- **Too low gas pressure before solenoid-valves switching**– possible leakage in the system.

- **Too high gas pressure before solenoid-valves switching** – possible solenoid valve or reducer malfunction.
- **Minimum RPM on gas** – system switched to petrol due to dropping below the minimum RPM threshold.
- **Loss of RPM while the ignition is ON** – RPM signal lost with ignition on, or the ignition signal is incorrectly connected.
- **Minimum reducer temperature on the LPG** – system switched to petrol due to the reducer temperature dropping below the minimum threshold.
- **Maximum gas pressure** – system switched to petrol due to gas pressure exceeding 4 bar.
- **Work on both LPG and petrol due to the minimal gas temperature** – partial cylinder switch to petrol due to gas temperature dropping below the minimum threshold.
- **Work on both LPG and petrol due to the minimum gas pressure** – partial cylinder switch to petrol due to gas pressure dropping below the minimum threshold — this may occur when the gas tank is near empty or if the reducer is underperforming.
- **Work on both LPG and petrol after the gas injectors looping** – partial cylinder switch to petrol triggered by continuous full opening of the gas injectors.
- **Fault on gas injector number: x**
- **Short circuit of gas injector number: x**

6. Oscilloscope

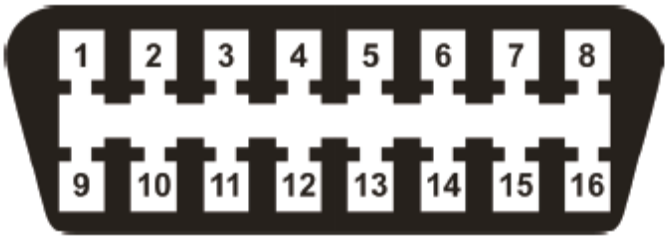
Displays all the signals selected on the left side of the program window in a graphical format.



Rys. 26

7. OBD

If the car was manufactured after 2002, it is possible to connect the OPTIMA PICO controller to the EOBD bus.



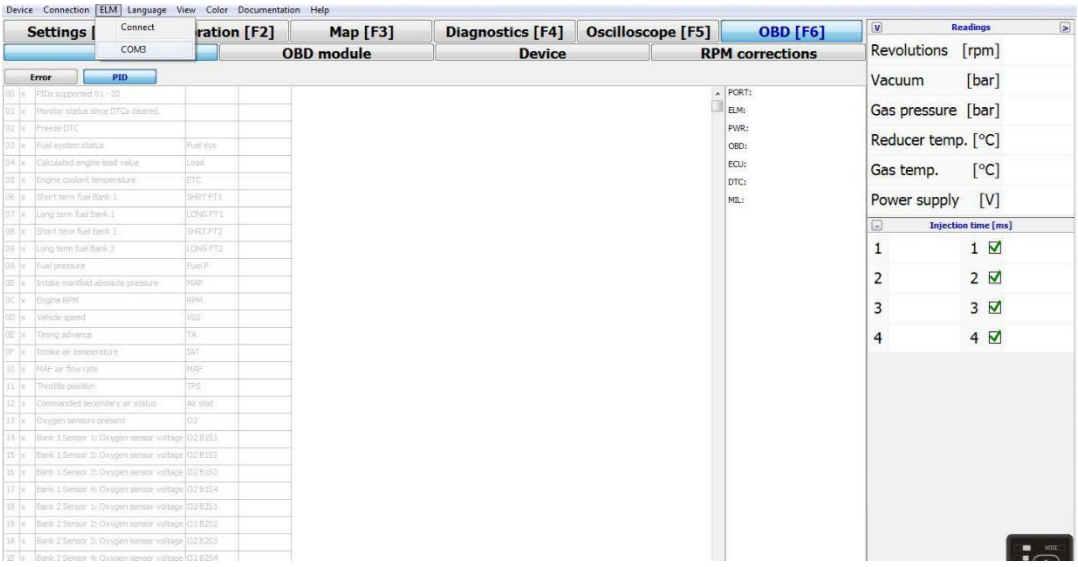
Rys. 27

7.1 Connecting to OBD/CAN using the ELM327 interface



Rys. 28

We connect the standard interface to the OPTIMA PICO controller and the PC. Next, we connect the ELM327 interface to the vehicle's OBD socket and the computer's USB port. Once a connection with the controller is established via the Optima 2.XX software and the "Connect to ELM" option is selected, all OBD functionalities become available.



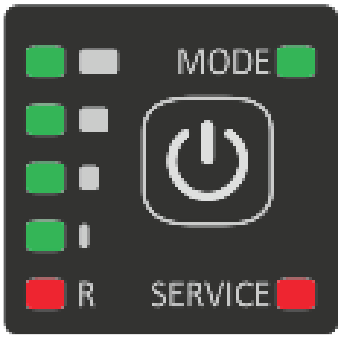
Rys. 29

8. Switch

The „MODE" LED indicates the operating mode of the gas system. When it glows red, the engine is running on petrol only. Pressing the button causes the control unit to pulse with a green blinking light, indicating automatic mode. Once the reducer reaches the set temperature and engine RPM, the system switches to gas operation, signaled by a steady green "MODE" LED.

If the gas pressure in the tank drops too low, the system will automatically switch back to petrol, alerting with a double beep, while the "MODE" LED will flash green rapidly. After refilling the gas, the system will automatically switch back to gas operation.

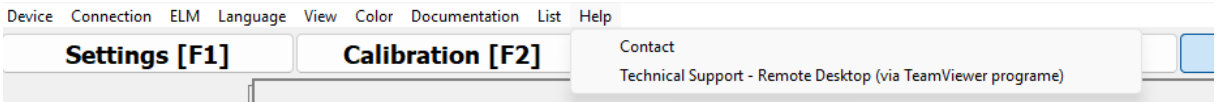
- **The R LED and the vertical LED bar** - indicate the approximate gas level in the tank.
- **Red MODE LED** – the system is running on petrol.
- **Green MODE LED blinking** – the system is in automatic mode, waiting to reach the set temperature and RPM parameters.
- **Green MODE LED** steady – the system is running on gas.
- **Green MODE LED blinking rapidly** – the system is in automatic mode, e.g., after a drop in gas pressure.
- **SERVICE LED** – service is required, such as filter replacement.



Rys. 30

9. Technical support

Using the dedicated TeamViewer program, ALEX technical support can connect directly to the installer's computer to provide assistance with operating the OPTIMA system.



Rys. 31

The installer's computer must have internet access as well as a connection to the controller.

The installer provides their TeamViewer ID number over the phone to the ALEX technical advisor, allowing them to connect to the installer's computer.



Rys. 32