



Zenit Pro
SOFTWARE MANUAL

AG Centrum

Zenit Autogas Systems

Radom 2015

I. Connecting the Zenit Pro ECU to a PC computer and the diagnostic program Zenit Pro Setup.

1. USB and Bluetooth Interface

To connect Zenit Pro / Pro OBD control unit to PC a dedicated USB or Bluetooth interface is required. All of the **USB** enabled interfaces working with Zenit and Zenit Compact units are fully compatible and allow Zenit Pro installation.

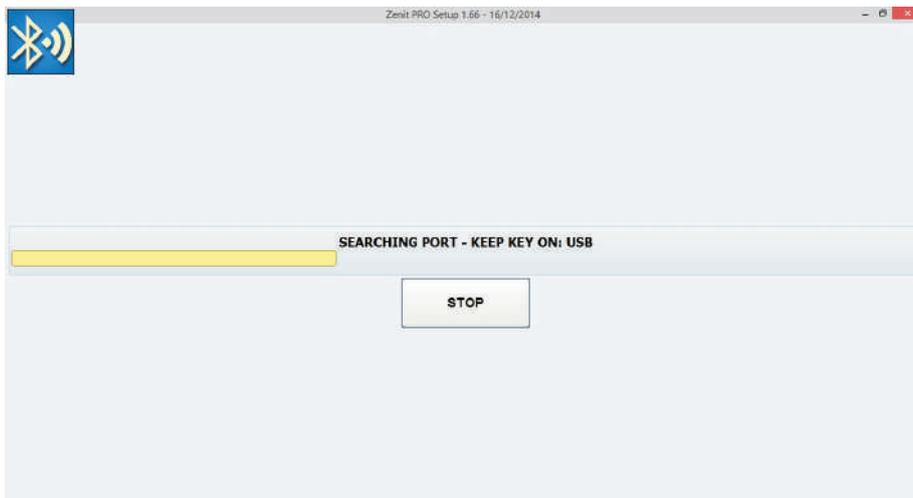
The USB/Bluetooth interface is connected to both PC and Zenit Pro through diagnostic socket which is located on the wiring harness within approx. 30 cm from the unit's power outlet. **To perform testing disconnect wiring harness and plug in interface instead.**

ATTENTION: USB enabled interface, like almost every device connected via USB port, requires drivers to be installed. Installation is usually performed only once when connecting interface to PC for the first time and it runs the same way as installing other similar devices on PC. For step by step installation guide or to download required drivers visit our website www.agcentrum.pl

Your PC has to be Bluetooth enabled in order to connect USB/Bluetooth interface. If your PC doesn't have Bluetooth capability then universal external module connected via a USB port is required.

Once initiated, the software automatically scans all active ports and tries to connect to the control panel. **At this time, the ignition must be switched on.**

Until getting a connection the display will show "Searching Port - Keep Key On"



After getting a connection the display will show:



II. Zenit Pro PROGRAM DESCRIPTION

1. Information panel

Power indicator "+ V under key"

Electrovalve power indicators

System errors indicator

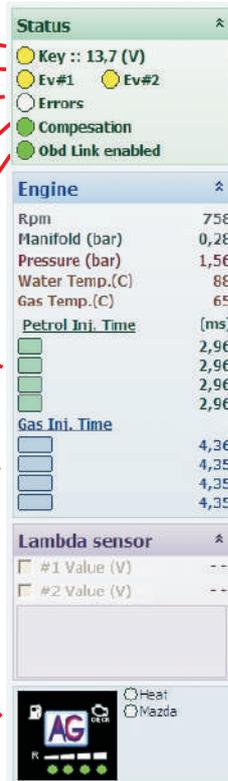
Compensation indicator

OBD indicator (Zenit Pro OBD only)

Petrol injectors opening times indicator

Gas injectors opening times indicator

Switch



Tachometer

Absolute pressure in the intake manifold

Gas pressure

Water/Reducer temperature

Gas temperature

Petrol injectors opening times

Gas injectors opening times

Lambda

Additional functions indicator

The information panel is located on the left side of the program window, it is available irrespective of the chosen tab and it enables watching the basic system parameters:

Power indicator "+V after ignition" - change of the indicator's colour into yellow means that the ECU sees the ignition on. In addition, the current supply voltage value is displayed. **The indicator should be active right after turning the ignition on. When the ignition is off it should go off immediately.**

Electrovalve power indicators (Ev#1, Ev#2) - when the light is yellow it means that power supply was placed onto the right electrovalve.

System errors indicator - when the light is red it means that there are system errors. The details can be found in the tab **Errors**.

Compensation indicator - when the light is green the compensations are on. The details can be found in the tab **Tuning -> Compensation**.

OBD indicator (Zenit Pro OBD only) - system OBD status information:

- **Green indicator light** and the message "**OBD Link enabled**" when the ECU is connected to the vehicle OBD system and works properly

- **Red indicator light** and the message "**OBD Link ready**" when the ECU is waiting for the suitable conditions to connect to OBD system in the vehicle (the situation takes place mainly when the system is in "petrol" mode and after manual switching it into the automatic mode OBD will be on)

- **No indicator light**, the message "**OBD Link disabled**" - the ECU is not connected to the OBD system of the vehicle.

More details in the **OBD** tab.

Switch- it is a button with the same function as the one installed inside the car cabin. It switches on / off the gas installation and shows the level of gas in the tank.

RPM - tachometer. Its data can be corrected when changing the number of coils in the tab "**Setting ->Change-over parameters -> Coils**"

Pressure- display of the pressure in the gas system, behind the reducer.

Reducer temperature is read by the sensor placed on the reducer.

Gas temperature is read by the sensor placed on the injection rail.

Lambda - voltage data from the oxygen sensor and the choice of the sensor chart to be shown. The window is active only when the oxygen sensor is physically connected and when in the tab **Setting ->Additional services -> Lambda type** the right sensor type is chosen.

Additional functions indicator - shows information whether heating of the injectors and power strategies are on and active in the moment. The details can be found in the tab **Setting and Fuel strategy**.

2. Settings

In the **Setting** tab the main parameters of installation are to be set. The settings window is divided into 5 sections:

The screenshot shows a software settings window with the following sections and parameters:

- Change-over parameters:**
 - Signal from Rpm wire: ENABLED
 - Coils: 4
 - Rpm multiplier: x 1
 - Threshold Rpm Signal (V): 2,5
 - Change-over threshold (Rpm): 1800
 - Change-over direction: Deceleration
 - Rpm hysteresis (deceleration): 200
 - Water temperature (C): 40
 - Petrol start delay: 5
 - Injectors delay sequence (number of injections): 0
 - Fuel overlap (number of injections): 1
- End of fuel management:**
 - Enable: ENABLED
 - Pressure (bar): 0,5
 - Delay (s): 0,2
 - Sequential change-back: DISABLED
 - Gas level sensor type: AI-200
 - Gas level setup: [button]
- Configuration:**
 - 000_STANDARD_LPG
- Additional services:**
 - Emergency start: ENABLED
 - Services: DISABLED
 - Lambda type: Disable
 - Water/gas temp. sensor (ohm): 4K7
 - Pressure control: DISABLED
 - Maximum pressure (bar): 1,8
 - Pressure sensor type: AA-612 A1.0
- Injector setting:**
 - Cylinders number: 4
 - Fuel Type: LPG
 - Injector type: VALTEK 3 Ohm
 - Minimum open (ms): 2,5
 - Sensitivity: 0,1
 - Turbo engine: DISABLED
 - Injector heating: DISABLED
 - Injector setting: [button]
- Special function:**
 - Start and stop: DISABLED
 - Valvetronic: DISABLED
 - Multiair: DISABLED
 - Multiair setting: [button]

CHANGE-OVER PARAMATERES

Signal from RPM wire - when the function is active the signal of engine speed is read from the RPM wire, otherwise it is calculated on the basis of petrol injectors opening times and RPM wire connection is unnecessary. **In this case the functions in the Fuel strategies tab are disabled. Recommended setting: Active**

Coils - section allows setting the number of engine coils. This number does not always match the actual number of coils. The value should be chosen in such a way so the reading of the RPM in the program is correct (this field is active only if the function RPM Signal from the cable is on).

RPM multiplier - enables adjusting RPM view in the program to the real one. (active only when the function **signal from RPM wire** is disabled)

Threshold RPM signal- threshold voltage above which the rpm signal will be read. If the signal is taken from the ignition coil, the sensitivity needs to be set to about 4V. For pulses from the petrol computer the threshold is to be set to about 2.5V. **CAUTION!!! For Nissan Micra threshold RPM signal must be set to 1V.**

Change-over threshold (RPM) - rpm per minute of the crankshaft beyond which the power is switched. Values can be selected from **0** (the function is off) (**in this case or when the switch takes place on low rpm it is recommended to activate the function Sequential switching**) to **3500** (the switch will take place when reaching 3500 rpm).

Change-over direction - selection whether the switch to gas is to take place during acceleration or deceleration.

RPM hysteresis - value of rpm decrease to cause switching (active only for the settings **Change-over direction** for **deceleration**).

Water temperature - selected from **20** to **70** degrees C. It's temperature beyond which the engine switches to gas power. **Recommended setting min. 30 degrees C.**

Petrol start delay- system delay time. After choosing another value than 0, the ECU will always wait for the chosen number of seconds until it switches to gas. **0** - function off - switching to gas will take place immediately after reaching the set temperature and rpm. **Recommended setting min. 2 s**

Injectors delay sequence - the number of cycles of injectors opening after which switching another cylinder will follow. The higher rotational speed the sooner another cylinder's switch will follow. **Recommended setting min. 15**

Fuel overlap- the number of cycles for which, in the moment of switching, both fuels will be applied. Used mainly when switching to gas does not take place fluently.

END OF FUEL MANAGEMENT

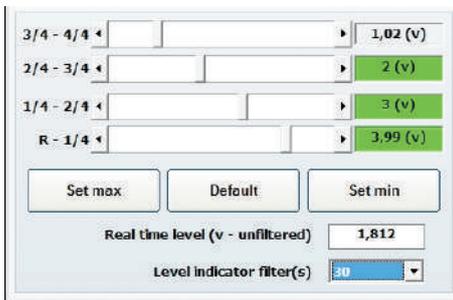
Enable - automatic or manual return to petrol supply when the min. pressure (set in **Pressure** function) is achieved

Pressure - pressure threshold below which the system will revert back to petrol supply.

Delay - delay time of switching to petrol after reaching the min. pressure threshold.

Sequential change-back - a mode which enables single cylinders to revert back to petrol within certain time intervals. Concerns only switching in the case of pressure drop in the installation below the one that had been set in the option **Pressure**.

Gas sensor type - possibility to select the sensor type which had been set up in the certain installation.



Gas level setup - launches the window of the calibration of the sensor of the gas level. The calibration is done by setting the voltage thresholds above which certain diodes should light up. In order to do that, move the slider arrows to the left or right setting the desired value.

The button **Set min** lets you save the voltage threshold for the fuel reserve in the tank, while the button **Set max** - for the full tank.

The button **Default** lets you return to the default settings.

Level indicator filter allows you to change the refresh rate of the gas level indication on the switch. The recommended setting is 30 seconds.

CONFIGURATION- shows the actual settings. The choice is made during auto calibration.

ADDITIONAL SERVICES

Emergency start - activates the function that allows the engine to start directly on the gas. If you want to start the car on gas in an emergency, you have to push the switch petrol/gas while the ignition is off. Next, holding the switch pushed, turn the ignition on and start the starter. After starting the engine the switch must be released. Regardless of activating in the settings **the function will not work if the temperature of the reducer is below 10 degrees C.**

Services - after activating this option, one of the output controlling electrovalves is turned on while the gas injectors are started. The blue and black wire is to be attached to electrovalves - it normally works, meaning it opens the valves earlier in order to fill the system. On the blue wire voltage appears in the moment of starting the first gas injector and it can be used to control external devices (e.g. ignition timing variator).

If the function is not active then the voltage appears earlier on both wires and you can use it to control every electrovalve separately.

Lambda type - allows you to select the type of oxygen sensor installed in the vehicle.

WARNING!!! Connecting the sensor is not necessary for correct function of the system.

Water/gas temp. sensor - this is a temperature sensor selector. **Recommended setting for sensors series: 4K7, 4K7 or 4K7 T-map (pressure sensor with integrated in-line temperature sensor)**

Pressure control - prevents excessive pressure build up on the regulating valve when heavy engine braking occurs. **It is recommended to switch this function to "ON" when pressure increases by 0.6 bar (or more) above the operating pressure.**

Maximum pressure - is a pressure threshold on regulating valve above which gas pressure control function is activated.

Pressure sensor type - selects the type of dedicated pressure sensor. The standard sensor (AA-612 A 4.0) or one with in-line gas temperature control (AA-612 T-MAP).

INJECTOR SETTING

Cylinders number- allows to choice of the number of the engine cylinders. The ECU (depending on the version) can work with the engines 1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-cylinder.

Fuel type - the type of fuel that will be used in installation -> LPG or CNG.

Injector type - the choice of gas injectors. Here you need to choose the injector or the injection rail used in the installation.

Minimum open - prevents from controlling the injectors with very short timings during which the gas injector is not physically capable of opening, after changing the injectors type the program will automatically set minimum opening time for the given injector type.

Sensitivity - the filter of the signal from the petrol injectors. Below the set value the injectors opening times will not be considered. **For the value 0.1 the filter is off.**

Turbo engine - activation of this function extends the mapping of gasoline and gas to 1.85 bar allowing engines with turbine or compressor to be fully serviceable.

Injector heating - the function allows to warm up the gas injectors while the car is still working on petrol power. The pre-start of the gas injectors is designed to smooth the switch-over from petrol to gas(particularly useful with low temperatures outside).

Injectors setting- shows the window which allows to control each injector separately. When there are differences in work of certain Banks or cylinders, they can be corrected by changing the value of **Fix correction**.

CAUTION!!! Fix correction doesn't replace calibration of gas injectors.

When there are differences between certain cylinders you need to check the correctness of calibration of gas injectors.

Additionally, you can set the **Mode** of an injector work:

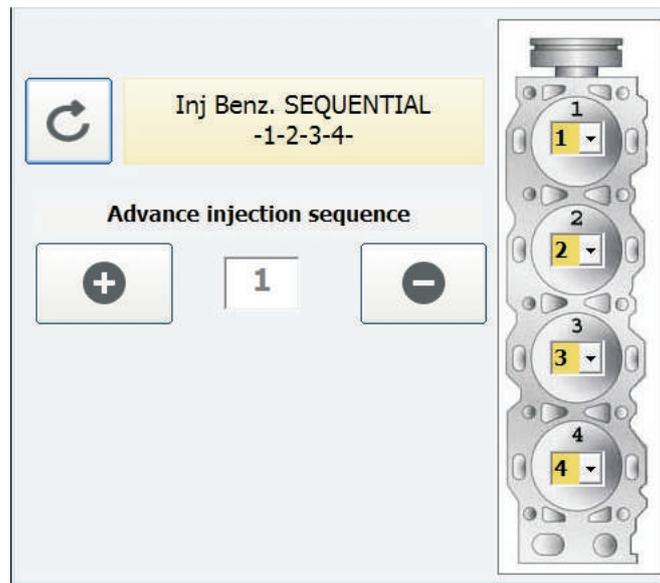
Normal - work on gas

Disable - petrol and gas injector is off.

Petrol - work on petrol.

Inj	Petr	Gas	Fix correction			Mode	
1	3,22	4,56	0	<input type="text"/>	<input type="text"/>	X	Normal
2	3,23	4,57	0	<input type="text"/>	<input type="text"/>	X	Normal Disable Petrol
3	3,20	4,54	0	<input type="text"/>	<input type="text"/>	X	Normal
4	3,17	4,51	0	<input type="text"/>	<input type="text"/>	X	Normal
5	0	0	0	<input type="text"/>	<input type="text"/>	X	
6	0	0	0	<input type="text"/>	<input type="text"/>	X	
7	0	0	0	<input type="text"/>	<input type="text"/>	X	
8	0	0	0	<input type="text"/>	<input type="text"/>	X	

Injection sequence advance - allows advancing of the injection sequence by a preset number of cycles when advanced injection of gas is needed. In this window, we also have the ability to assign a specific cylinder to the appropriate input connector. This feature is especially useful in case of any injectors' connecting errors.



TECHNOLOGIES

Start and stop - applies to vehicles equipped with "Engine off when stopped" function (e.g. ...: at the crossroads). First switchover to gas is carried out in a standard way (including all provisions of the configuration). With this function engaged if the engine is automatically turned off while driving (Start & Stop function of a vehicle activates) and ignition is "on" at the same time, then after pressing on a clutch (engine "restart") engine will run solely on gas.

Valvetronic - this function optimizes operation of the control system for engines with Valvetronic. A multiplier is assumed automatically for engines with constant intake pressure.

MultiAir - this function optimizes Zenit Pro system performance with Multiair engine technology (continuous valve timing and air boost). It enables an additional adjustment to the gas pressure (its reference point is the absolute value).

3. Fuel strategy

The tab contains options that determine how the system is to work on high rpm, on high rpm and with a heavy load, during decelerations and on low rpm. Normally, after switching to gas, the engine is powered by the gas until the ignition is off or the pressure drops as a result of lack of gas in the tank. However, in certain situations described above, it is sometimes necessary to temporarily switch the engine to petrol. It can happen when e.g. the petrol injectors are still open or when the engine cuts out after deceleration to idle.

You will also find here an additional function designed for engine types like Mazda which change the way of fuel distribution under the influence of load change.

High RPM

Disabled - the system works on high rpm on gas the same as on petrol until the rpm limiter works.

Max power - the system, above the given rpm and injectors opening time, switches to petrol. After falling below the preset value the system automatically returns to gas. The switch in the cab shows the normal operation on gas, whether in the program next to the virtual switch there is indication of this function.

In the example here, after reaching 5000 rpm if the gas injector opening time is more than 20ms, the ECU will switch the engine to petrol, after falling below the value, it will revert back to gas.

PDM - the system, at a given engine load, regardless of rpm, switches to petrol with automatic return to gas at a differential load. This function is useful for engines with very long petrol injectors opening times. At high rpm, there may be the case in which the injectors are still open (e.g. the opening times of 25 ms at 4800 rpm means that the injector is still open and the engine load is equal to 100%). The Zenit Pro ECU can for a moment control gas injectors in the same way, but in this situation it is no longer able to control the mixture, thus it is recommended (e.g. at 90% load) to switch to petrol earlier. The switch in the cab shows normal operation on gas, while in the program next to the virtual switch, there is indication of this function.

Intervention - the system above certain rpm and injectors opening time, begins to shorten gas injectors opening times and additionally inject petrol by opening the petrol injectors to the time set in the window **Petrol intervention (ms)**. The **Enrichment** function can also additionally increase the mixture of petrol not shortening the time of opening of the gas injectors. After falling below the preset value of rpm and time the system automatically returns to work only on gas. This function is used primarily to support the gas injectors and make it more flexible and increase the dynamics of the engine on high loads. The switch in the cab shows the normal operation on gas, while in the program next to the virtual switch, there is indication of this function.

Full open - this function allows you to operate engines in which gasoline injection looping may occur. If the system detects a full opening of the gasoline injectors then control unit maintains level of gas dosing. Next to the virtual switch there is "Function on" indication and in place of numerical values of injectors' opening display will show "Full".

Low RPM

Disable - the system works on low rpm on gas.

Min Power - when the rpm fall below the threshold set by the installer (**Threshold min power (rpm)**) the system switches to petrol and only if the speed increases by value (**Hysteresis min power (rpm)**) it gets back to gas. The ECU always switches all the injectors at the time, return to gas depends on the settings, if in the settings the cylinder sequential switching is chosen then the return to gas will look the same. The switch in the cab shows the normal operation on gas, while in the program next to the virtual switch, there is indication of this function.

Return to petrol - when the rpm fall below the threshold set by the installer (**Threshold min power (rpm)**) the system switches to petrol and after the number of openings of the petrol injector set in the window (**Timed cycles (petrol)**) it automatically returns to gas. The control panel always switches all the injectors at the time, return to gas depends on the settings, if in the settings the cylinder sequential switching is chosen then the return to gas will look the same. **To activate this function, the speed level before the decrease should exceed the activation threshold by app. 200.**

The switch in the cab shows the normal operation on gas, while in the program next to the virtual switch, shows there is an indication of this function.

Low Rpm

DISABLED Min power Return to petrol

Threshold min power (rpm) 900

Hysteresis min power (rpm) 300

Timed cycles (petrol) 8

Mazda strategy

This function is used for the engines in Mazda cars, in which under some load the way of controlling the petrol injectors changes - the petrol controller switches from sequential system to half-sequential. Petrol injectors (and consequently the gas ones as well) start to open twice as often and for about twice as short a time (e.g. they shorten from 8 ms to 4 ms although the engine load does not change or increase). As a result of this change, when working on gas, there appears rich mixture and ignition loss and jerking may happen. Activating this function allows perfect adjustment of the mixture both at low load at sequential work and under heavy load at non-sequential work. The switch in the cab shows the normal operation on gas, while in the program next to the virtual switch, there is indication of this function.

Mazda strategy

DISABLED ENABLED

rate of leaning (%) 14

The ECU automatically detects the moment of change engine fuel supply strategy. The installer's task is only to set the right value in the window **Rate of leaning (%)** so that after this change, the mixture can be optimal.

4. Logger

The logger allows simultaneous tracking of seven parameters, and readings from the OBD system (Zenit Pro OBD only) as a function of time. Readings are taken immediately at the speed chosen by the operator. Location of the individual line graphs and their scale can be freely changed. To do this, select the parameter you want to change - by pressing on its name - and with the corresponding buttons set the desired position. The active function has a highlighted box (under its name) in a colour corresponding to the line of the graph.

The recorder is a very useful diagnostic tool with which the operator can easily assess the status and behaviour of the entire installation. The diagram can be saved to disk for later analysis.

Change of location of the chosen graph up/down

Reducing / enlarging the graph

Name of the tracked function

Turn on/off recording of the given parameter

OBD system parameters (Zenit Pro OBD only)

Time scale

Write to file

Read from file

Start recording

Stop recording

Previous page

Narrow time window (longer part of recording is seen on the screen)

Return to default settings of the recorder

Enlarging the time window (the chart is more accurate and changes faster)

Next page

Data export to file

The screenshot shows the 'Logger' window with a toolbar containing icons for file operations (write, read), recording control (start, stop), and navigation (previous, next, zoom). The main area displays a multi-line graph with various parameters plotted against time. The left sidebar lists parameters such as 'Key', 'Ev#1', 'Ev#2', 'Compesation', 'Obd Link enabled', 'Engine' (Rpm, Manifold, Pressure, Water Temp, Gas Temp, Petrol Inj. Time), and 'Lambda sensor'. The right sidebar shows OBD system parameters like 'Gas Inj. Time #1', 'Petrol Inj. Time #1', 'Rpm', 'Reducer Press.', 'Manifold Press.', 'Lambda in 1', 'Water Temp.', and 'Gas Temp.'.

5. Errors

Zenit Pro system has internal diagnostic tool that identifies and stores the errors occurring during operation of the system. On the errors tab, we can read the saved and the current errors and, after the removal of the cause, cancel them.

You can choose which errors in the system should switch supply to petrol and also which are to be monitored and reported by the system.

#	Device name	Recorded	Stored		
Err 00	Gas injector 1	---	---		<input checked="" type="checkbox"/>
Err 01	Gas injector 2	---	---		<input checked="" type="checkbox"/>
Err 02	Gas injector 3	---	---		<input checked="" type="checkbox"/>
Err 03	Gas injector 4	---	---		<input checked="" type="checkbox"/>
Err 04	Gas injector 5	---	---		<input type="checkbox"/>
Err 05	Gas injector 6	---	---		<input type="checkbox"/>
Err 06	Gas injector 7	---	---		<input type="checkbox"/>
Err 07	Gas injector 8	---	---		<input type="checkbox"/>
Err 08	Reducer pressure	---	---		<input checked="" type="checkbox"/>
Err 09	Intake manifold pressure	---	---		<input checked="" type="checkbox"/>
Err 10	Water temperature	---	---		<input checked="" type="checkbox"/>
Err 11	Gas temperature	DOWN LIMIT	---		<input checked="" type="checkbox"/>
Err 15	Supply voltage	---	---		<input checked="" type="checkbox"/>
Err 17	electrovalve #1	---	---		<input checked="" type="checkbox"/>
Err 18	electrovalve #2	---	---		<input type="checkbox"/>
Err 20	Petrol Injector nr.	---	---		<input checked="" type="checkbox"/>
Err 21	Gas trim	---	---		<input type="checkbox"/>

Selecting the option “**Enable switch signal on error detected**” causes that after recording the error in the gas ECU, the switch in the cab will beep a few times and the light “CHECK” will start flashing.

Activating the icon (change of colour to red) leads to switching the system to petrol after the error appearance.

The box allows you to choose whether the component is to be monitored or not.

Using the **Checking** button opens a new window (visible on the right) with additional diagnostic and service options.

Section "Electrovalves", gives the ability to manually control each individual solenoid valve for testing. The "Drain Pipe" window allows closing of the solenoid valves while working on gas. The engine will work until entire amount of gas in copper tubes is burnt out. That helps on any maintenance works such as filters replacement. Section "injectors" allows to manually switching individual gas injectors on or off (check the appropriate injection and press "Switch") for diagnostic proposes.

Conditions of recording and possible causes of errors in control unit Zenit Pro and Zenit Pro OBD

Diagnosed element	Possible messages	Conditions of error recording	Possible causes
Injector_GAS1...8 (gas injector 1 to 8)	OPEN LOAD	$I < 75 \mu A$	Break in the wiring loom or damaged injector coil.
	CUR. LIMIT	$I > 7A$ or $T > 150^{\circ}C$ ($I_{max}=12A$)	Short circuit in the wiring loom or damaged injector coil.
Gas pressure	UP LIMIT	> 3.8 bar	Damaged or contaminated reducer, damaged pressure sensor.
	DOWN LIMIT	< 50 mbar	Lack of gas in the tank or contaminated reducer or electrovalves. Damaged pressure sensor, multivalve or power pipe of the reducer.
M. A. P.	UP LIMIT	$> 0,8$ bar gdy RPM <1500	Damaged wiring loom or pressure sensor, incorrect mechanical connection.
	DOWN LIMIT	< 50 mbar	Damaged wiring loom or pressure sensor, incorrect mechanical connection.
Temperature of the reducer	UP LIMIT	$> 100^{\circ}C$	Damaged sensor of the reducer temperature, short circuit in the wiring loom of the sensor, assembly near elements emitting large amounts of heat (e.g. exhaust manifold).
	DOWN LIMIT	$< 10^{\circ}C$	Damaged sensor of the reducer temperature, break in the wiring loom of the sensor, lack of circulation of coolant through the reducer or incorrect circulation, too low efficiency of the reducer.
Temperature of gas	UP LIMIT	$> 90^{\circ}C$	Damaged sensor of gas temperature, short circuit in the wiring loom of the sensor, assembly near elements emitting large amounts of heat (e.g. injectors assembly under the bonnet).
	DOWN LIMIT	$< -10^{\circ}C$	Damaged sensor of gas temperature, break in the wiring loom of the sensor.
Voltage	UP LIMIT	$> 18V$	Damaged alternator.
	DOWN LIMIT	$< 9V$	Discharged battery, damaged alternator.
Electrovalve 1	OPEN LOAD	$I < 50 \mu A$	Break in the wiring loom or damaged electrovalve coil.
	CUR. LIMIT	$I > 5A$ or $T > 150^{\circ}C$ ($I_{max}=6A$)	Short circuit in the wiring loom or damaged electrovalve coil.
Electrovalve 2	OPEN LOAD	$I < 50 \mu A$	Break in the wiring loom or damaged electrovalve coil.
	CUR. LIMIT	$I > 5A$ or $T > 150^{\circ}C$ ($I_{max}=6A$)	Short circuit in the wiring loom or damaged electrovalve coil.
Petrol injector no.	NOT READ	No message from the petrol injector (it shows the number of the injector which was the first with no messages)	Damaged wiring loom, incorrect assembly. Petrol computer has turned off the injector because of e.g. misfire.
OBD correction	UP LIMIT	The error is shown when correction of gas injectors opening time connected to the work of OBD tuning reaches the maximum value specified by parameter „Max adaptive gas trim (%)”	Wrong choice, excessive wear or damage to the installation of mechanical components. Too low value of the „Max adaptive gas trim (%)”
	DOWN LIMIT	The error is shown when correction of gas injectors opening time connected to the work of OBD tuning reaches the maximum value specified by parameter „Max adaptive gas trim (%)”	Wrong choice, excessive wear or damage to the installation of mechanical components. Too low value of the „Max adaptive gas trim (%)”

6. OBD (Zenit Pro OBD only)

Zenit Pro OBD has an advanced internal system to connect and read the parameters from the vehicle's OBD system. This allows dynamic correction of the mixture based on read parameters

Wiring the OBD socket.

The wiring loom Zenit Pro OBD has four wires for connecting to the OBD system. These wires are to be connected to wires within the OBD diagnostic socket.

Orange - pin 6 - CAN H
Orange/black - pin 14 - CAN L
Green - pin 7 - ISO K
Green/black - pin 15 - ISO L

If we are not sure what OBD standard operates in the given car, the safest way is to connect all the wires to the active pins. The system detects connection type itself. It may e.g. happen that in the socket there will be active (occupied) pins 6, 14 for CAN and pin 7. We need to connect the wires orange, orange / black and green as it can prove that the ECU connects to the OBD ISO standard only with a line K.

Connection with OBD

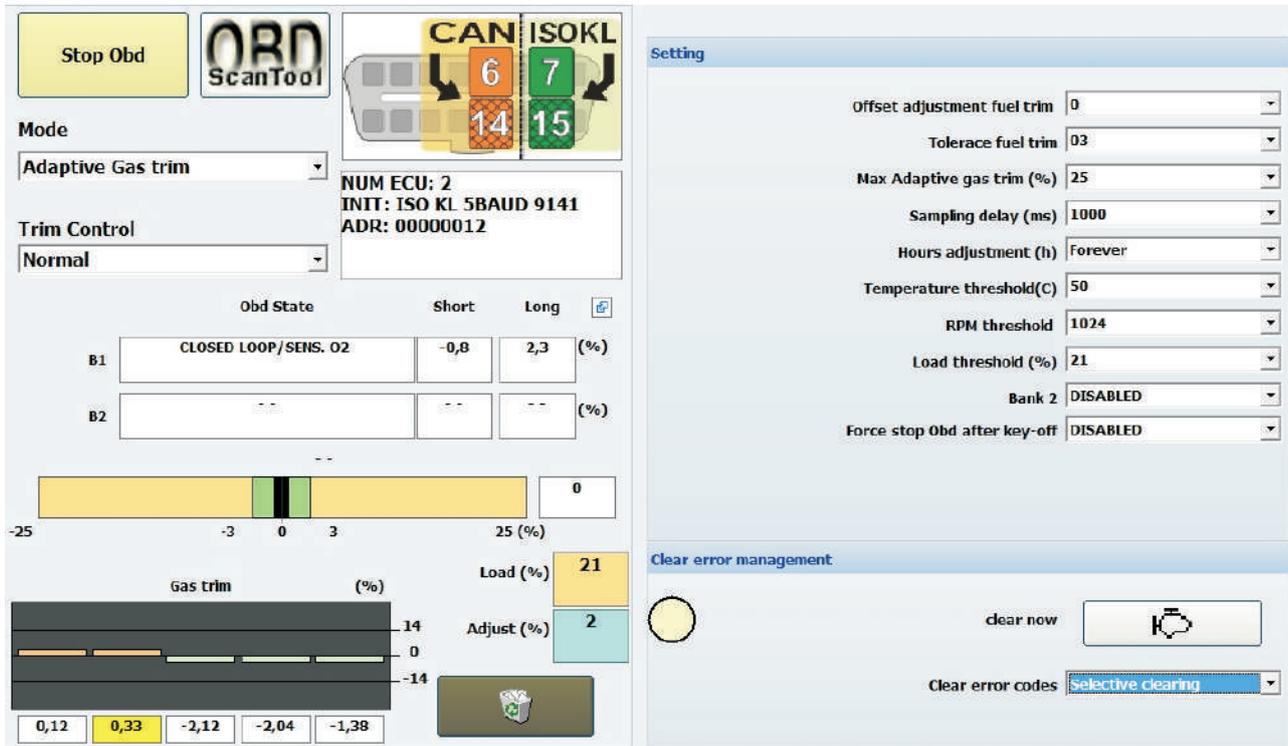
Establishing the connection occurs immediately after the ignition is switched on, provided that the system is in "Auto" mode if, when during the ignition on system it is in "Petrol" mode, the ECU does not try to connect to OBD.

If after the ignition is switched, transmission channel is busy because the OBD socket is connected to another device (e.g. OBD scanner), the ECU goes into passive mode and no longer tries to connect until the next ignition.

Reading OBD parameters when working with petrol is possible only when car had been working on gas before, the ECU had established a connection to OBD and then was switched to petrol.

The general algorithm of OBD function.

After ignition and connecting to OBD, the ECU checks whether all the conditions to start collecting maps and correction of mixture are fulfilled, i.e. whether the system is in open loop or closed loop and whether the temperature is higher than "**Temperature threshold**". Additional conditions that must be fulfilled is "**Rpm threshold**" (prevents points collection at idle) and "**Load threshold**" (prevents the collection of points, e.g. at low loads, at so called Pre cut-off, etc.) the ECU reads the correction of short- and long-term, averages them and stores in its internal "OBD corrections map". Then, on the basis of this map, it corrects the mixture of gas.



Mode - way of work of OBD; **Off** - all OBD functions are off; **Monitor OBD** - the ECU only monitors (shows) OBD parameters but OBD adaptation doesn't work i.e.: the ECU doesn't update OBD corrections map and doesn't take it into account in calculating the mixture of gas; **Static Gas Trim** - the ECU adjusts the mixture of gas accumulated by earlier OBD corrections map but does not update the map, **Adaptive Gas Trim** - the panel gathers samples all the time, updates the OBD corrections map and adjusts the mixture of gas according to the map; **Monitor & static** - the control panel connects to OBD, reads adjustments and system status, adjusts gas dosage according to the previously collected data contained in OBD corrections' map but it does not update it.

Trim Control - Normal - classical control system for the fuel system in which positive correction is a tendency to lean mixture and the need to increase the amount of fuel, and negative correction is a rich mixture and the need to reduce the amount of fuel; **Reverse** - the control system in which adjustments are reversed, i.e. positive correction indicates a rich mixture, and negative correction poor mixture (some cars from the VW group); **Fiat** - a system characteristic of some of the Fiat group, usually cars with the ECU Magneti Marelli

Gas Trim - shows graphically and numerically the value of the gas dose adjustments for different engine loads

Offset adjustment fuel trim - the value meaning the base value of the adjustment of the mixture (i.e. the one for which we seek, the ideal) usually should be zero, sometimes, in cars with high mileage, you should check what it is on petrol and in such cases may be different from zero, e.g. ...: +5

Tolerance fuel trim - is the maximum difference between the currently read correction and average value "offset adjustment fuel trim OBD" at which adaptation does not yet introduce additional corrections of the model. For example, if the "offset adjustment fuel trim OBD" is 10 and the range of "Tolerance" is 5, this adaptation will be activated when the correction read from OBD is less than 5 or greater than 15 and works to maintain the correction in the range from 5 to 15.

Max adaptive gas trim(%) - maximum correction of gas mixture.

Sampling delay (ms) - the parameter specifies for how long the vacuum in the intake manifold is to be stable, for system to record a given sample to memory.

Hours adjustment(h) -

Time for "learning", after this time the system goes from "**Dynamic correction**" to "**Static correction**". Selecting "**Continuous**" makes this function not active and the control throughout the operation will adjust the mixture of gas according to OBD. Selecting a different value will cause the system for the specified time will collect and refresh the corrections map and correct the mixture of gas according to it. After the preset time has elapsed, the system will continue to correct the mixture of gas by the collected map but the map will be "frozen", i.e.: no longer refreshed. This option prevents "force" correction of the mixture, despite the excessively worn parts of gas installation. After the course of tens of thousands km it may be that the wear of certain elements (such as unstable pressure on reducer or uneven work of gas injectors) is so large that the lack of OBD adaptation in such a situation will cause turning the CHECK ENGINE light on and will force the user of the car to visit the service and repair the worn parts.

Temperature threshold (C) - adjustment will only be active when the reducer's temperature is above the set value.

RPM Threshold (RPM)- adjustment will only be active when the engine rotations are above the set value, e.g. the chosen values e.g. 1024 cause that the system doesn't take OBD corrections at idle into account .

Load Threshold(%) - load threshold (vacuum, expressed in percentage) above which OBD adaptation will work. Load threshold prevents collecting maps at very light loads, e.g.: when engine decelerating, for a moment before the cut-off in some cars we read very large values of the corrections even though the mixture is normal. When this feature is on, such situations will not be taken into account when adjusting the mixture.

- **For naturally aspirated engine** 100% = 0.95 bar, for example, at idle when the vacuum pressure (MAP) is 0.35 bar, we can assume that the load is approximately 35%.

- **For turbocharged engine** 100% = 1.9 bar, for example, at idle the engine with the turbo, when vacuum pressure (MAP) is 0.35 bar, we can assume that the load is approximately 18%.

- **0%** - function is off, OBD adjustment will be active in the entire load range.

Bank 2 - Inactive - the program takes into account only the corrections from the first Bank; **Active** - the ECU takes into account the corrections of the first and second Bank and averages them.

Clear error management

Clear Now - control unit erases errors from the gasoline controller (once). Note: In some cases, the errors can be deleted only when the ignition is turned on but the engine is not running.

Off - errors will not be automatically deleted

Always delete - auto reset of OBD error codes. The control panel will reset error codes when connected to the OBD which means when engine operates in Automatic / gas or gasoline mode if it has been gas powered before.

Note: In some vehicles cars above function may interfere with engine start-up and operation, so we recommend using it only in justified cases.

Delete after ignition is turned on - automatic error reset procedure will be carried out after the ignition is turned on (if the 'Delete all the time' is off)

Delete when the ignition is turned off - automatic error reset procedure will be carried out after the ignition is turned off (if the 'Delete all the time' is off)

Delete after selected error - the function sends a resetting command only when specific error from the list is detected. In order to set up the code list, click on the "Gear" button on the left and in a new window add a new list of error codes in P0xxx format, where xxx is the error code number.

Switch to gasoline after detecting an error - in case of any error in the vehicle's OBD structure system switches engine supply to gasoline.

WARNING!!! We do not recommend using the OBD tuning function without collecting maps of petrol and gas, and tuning the system using the model in the whole range of engine loads.

OBD ScanTool

There is some additional options under the **OBD ScanTool** button. This section allows OBD control module Zenit Pro to be used as a universal OBD scanner. In order to employ its full potential OBD module must be active, and the engine must be running on gasoline. New window opens after initiation of OBD ScanTool (see below).

PID	Description	
1	(DTC) ERRORS NUMBER	<input checked="" type="checkbox"/>
3	FUEL SYSTEM STATUS-BANK 1	<input checked="" type="checkbox"/>
4	ENGINE LOAD	<input checked="" type="checkbox"/>
5	WATER TEMPERATURE	<input type="checkbox"/>
6	FAST CORRECTION KO2 BANK 1	<input checked="" type="checkbox"/>
7	LONG CORRECTION KO2 BANK 1	<input checked="" type="checkbox"/>
11	ABSOLUTE MANIFOLD PRESSURE	<input type="checkbox"/>
12	ENGINE SPEED	<input type="checkbox"/>
13	VEHICLE SPEED	<input type="checkbox"/>
14	CILYNDER 1 IGNITION ADVANCE	<input type="checkbox"/>
15	AIR TEMPERATURE	<input type="checkbox"/>
16	AIR BREATHED MASS	<input type="checkbox"/>
17	THROTTLE POSITION	<input type="checkbox"/>
19	SENSORS O2 POSITION Bank 1-Sensor 1	<input type="checkbox"/>
20	OXYGEN 1 SENSOR VOLTAGE-BANC 1	<input type="checkbox"/>

Selection

Value

Freeze

Errors

Vin

Clear Mil

Selectable PIDs (max 9): 3

Reserved PIDs: 5

Selection - displays all engine parameters accessible from vehicle's OBD (e.g. : throttle angle, amount of air flow (air flow meter), lambda probe heating circuit, etc.). In this window you can select the parameters you want to watch constantly. To do this, select the check box on the right side of the parameter you want to watch.

PID	Description	
1	(DTC) ERRORS NUMBER	0
3	FUEL SYSTEM STATUS-BANK 1	CLOSED LOOP/SENSO
4	ENGINE LOAD	21,6 %
6	FAST CORRECTION KO2 BANK 1	-0,8 %
7	LONG CORRECTION KO2 BANK 1	2,3 %

Selection

Value

Freeze

Errors

Vin

Clear Mil

Selectable PIDs (max 9): 3

Reserved PIDs: 5

Value - allows monitoring of the previously selected parameters' values sent from the vehicle's OBD in real time.

Freeze - allows you to view the most important engine parameters when error is saved in the vehicle's OBD system's memory. If OBD errors do not occur in a vehicle, this option does not store any data (it is cleared by clearing any vehicle's errors).

Errors - displays the error codes and descriptions stored in the engine control unit (if there are any)

Vin - allows you to view the vehicle identification number.

Clear Mil - deletes errors stored in the engine controller's memory.

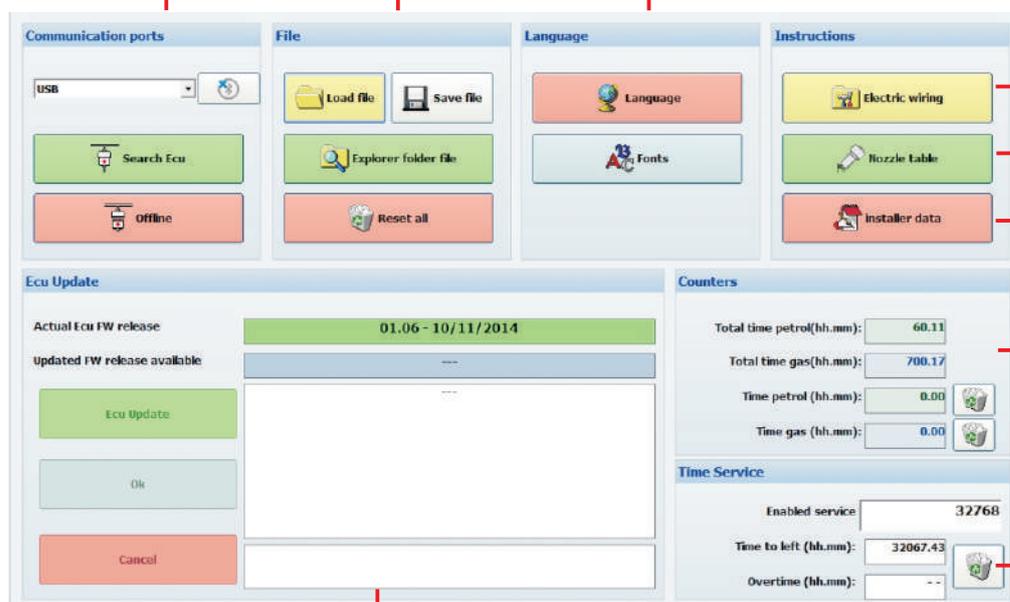
7. Sundries

In this tab you will find other options for the program including communication port selection, writing and reading of configuration files, firmware update, etc.

The ECU automatically finds the port it is connected via interface. In this window you can also make that choice yourself, manually start the auto search or switch the program mode to "Offline"

These options enable the ECU to save configuration of the ECU to the file, load the configuration from the file to ECU, browse the installation folder and restore system to factory settings (Reset all)

Selection of language version, and the font (in case of problems with the display of Polish characters, select the Arial font)



Wiring diagram

Charts of suggested nozzle sizes

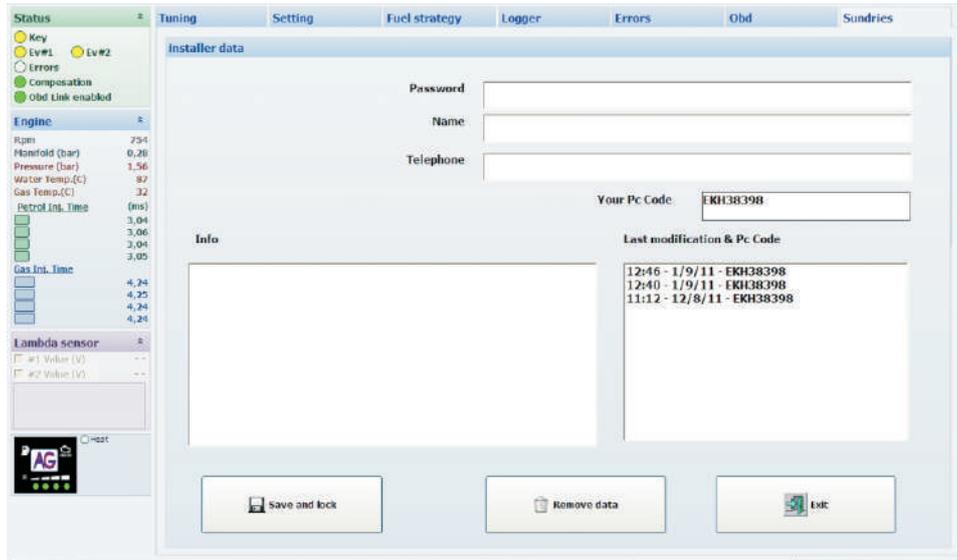
Description on the next page

Recording of work time on gas and petrol

The system can remind the car user of approaching scheduled maintenance. After enabling the box "Enabled service" and entering the number of hours left to the visit in the service point, the system starts counting. After the desired time, after each switch to gas, the switch in the cab will start short beeps and the lamp "CHECK" lights up in red on a permanent basis.

System Zenit Pro software lets you upgrade the firmware of the ECU. With Dual Memory function, this process is completely safe. For successful update you need to ensure stable power supply conditions. A special wizard guides you step by step through the update process.

When you click on the **Installer Data** button you will see the window, in which you will be able to set the security password, enter setup data and additional information and viewing time, date, and PC-computer code in which modifications were made in the system.



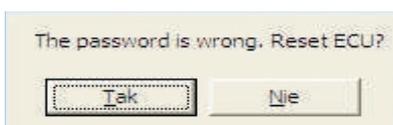
In the windows **Name**, **Telephone** and **Information** you can enter setup data and additional information which after clicking the **Save and lock** button will be visible to anyone who connects to the ECU and uses tab **Installer Data**. If you additionally fill in the **Password** window, the ECU will be locked, and modifications can be made only after entering the correct password. Your changes are visible when you reconnect to the system. If the control panel is password protected, it will only be possible to see the **Model** tab and in the status window on the left you will see a **yellow button with a key symbol**.



To make changes to the system settings, click on the button with a key symbol and then a window appears to enter a password and temporarily unlock the system (until you disconnect from the ECU)



After entering the correct password and pressing **Ok.**, the system will be unlocked and you can make configuration changes. If the password is forgotten or unknown, it is possible to restore the system to factory settings and remove the password. To do this, click the **Cancel** button and the window will appear.



If you are determined to load the factory settings and simultaneously remove security password key, select **Yes**. Please note, that after such operation you should program the system again from the beginning.

In the **Installer Data** window you can also check the history of any connections to the system. In addition to accurate date and time of system connection, it also saves the unique PC code, generated from each computer during software installation. In this way, the installer can easily verify if in the past there were unauthorized connection attempts or changes in the system.

8. Preliminary selection of nozzles

Preliminary selection of nozzles can be performed using the following chart. It is also available from the tab **Sundries-> Instructions-> Nozzle table**. These values should be treated as estimated. The final nozzle size is determined by parameters of the **multiplier** after calibration is carried out.

WARNING! The following charts are applicable only in sequential injection systems. In the case of half-injection or "full group" type use smaller nozzles.

HANA H2000 ,H2001/HERCULES GISM-i1000 Injector - sequential fuel injection

Injector type / nozzle	Power on 1 cyl.	Power on 4 cyl.	Power on 6 cyl.	Power on 8 cyl.
Yellow / 1.9 mm	< 20 HP	< 80 HP	< 120 HP	< 160 HP
Black / 2.1 mm	17 – 27 HP	68 – 108 HP	102 – 162 HP	136 – 216 HP
Red / 2.4 mm	24 – 36 HP	96 – 144 HP	144 – 216 HP	192 – 288 HP
Green / no nozzle	33 – 47 HP	132 – 188 HP	198 – 282 HP	264 – 376 HP
Blue / BF	42 – 60 HP	168 – 240 HP	252 – 360 HP	336 – 480 HP

MATRIX HD 344 injector- sequential fuel injection

Nozzle diameter	Power on 1 cyl.	Power on 4 cyl.	Power on 6 cyl.	Power on 8 cyl.
1,8 mm	10 – 13 HP	40 – 56 HP	60 – 78 HP	80 – 112 HP
2,1 mm	14 – 20 HP	56 – 84 HP	78 – 120 HP	112 – 168 HP
2,4 mm	21 – 25 HP	84 – 100 HP	126 – 156 HP	168 – 200 HP
2,7 mm	26 – 32 HP	100 – 128 HP	156 – 192 HP	200 – 256 HP

VALTEK 3 OHM, RAIL 3 OHM, TOMASETTO It01 injector- sequential fuel injection

Nozzle diameter	Power on 1 cyl.	Power on 4 cyl.	Power on 6 cyl.	Power on 8 cyl.
1,8 mm	18 – 23 HP	72 – 92 HP	108 – 138 HP	144 – 184 HP
2,1 mm	23 – 28 HP	92 – 112 HP	138 – 168 HP	184 – 224 HP
2,4 mm	28 – 33 HP	112 – 162 HP	168 – 198 HP	224 – 264 HP
2,7 mm	33 – 40 HP	132 – 160 HP	198 – 240 HP	264 – 320 HP

OMVL Reg Fast injector- sequential fuel injection

Nozzle diameter	Power on 1 cyl.	Power on 4 cyl.	Power on 6 cyl.	Power on 8 cyl.
1,8 mm	12 - 17 HP	48 - 70 HP	72 - 105 HP	96 - 140 HP
2,1 mm	18 - 24 HP	70 - 98 HP	105 - 147 HP	140 - 196 HP
2,4 mm	25 - 32 HP	98 - 130 HP	147 - 195 HP	196 - 260 HP
2,7 mm	33 - 40 HP	130 - 162 HP	195 - 243 HP	260 - 325 HP

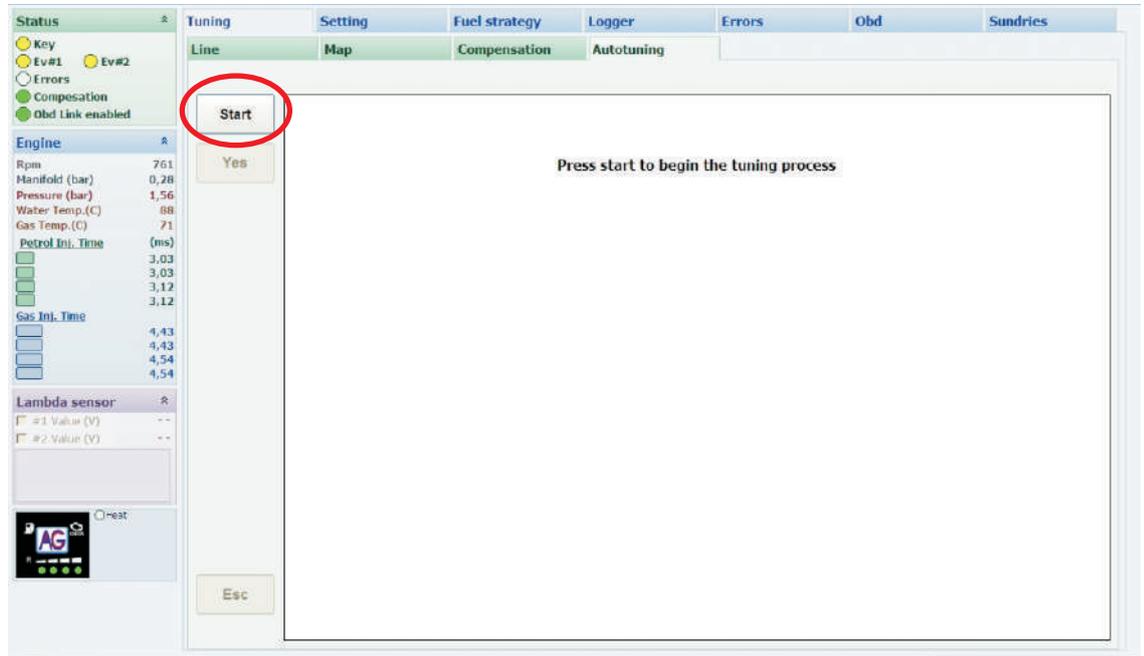
Recommended system pressure 1.0 to 1.3 bar.

9. Tuning - Autotuning

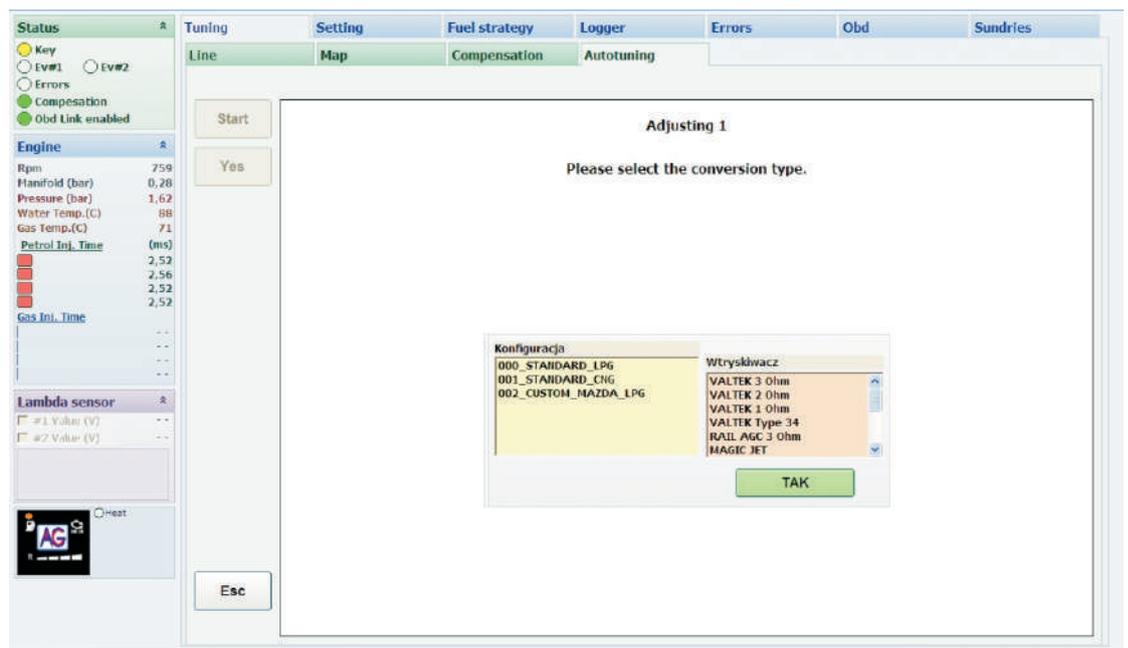
System **autotuning** is to adapt the basic installation of Zenit Pro to a particular engine. The user is led by on-screen instructions throughout the process.

WARNING! Autotuning can be performed only when the temperature of the reducer is higher than 40 degrees C.

Press **"Start"** to begin calibration and follow the instructions.



The first step is to choose the right settings and the type of gas injectors installed in the vehicle.

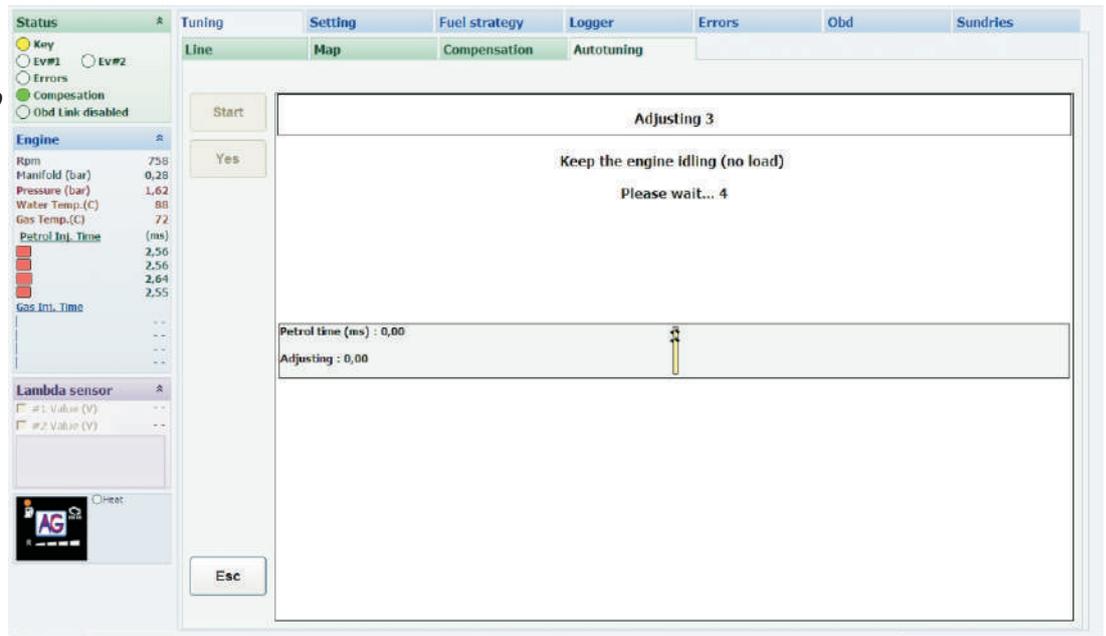


The calibration takes several minutes. During this time, it is recommended to turn off any additional devices that may interfere with the process of calibration (air conditioning, fan, lights, radio, etc..) in the vehicle.

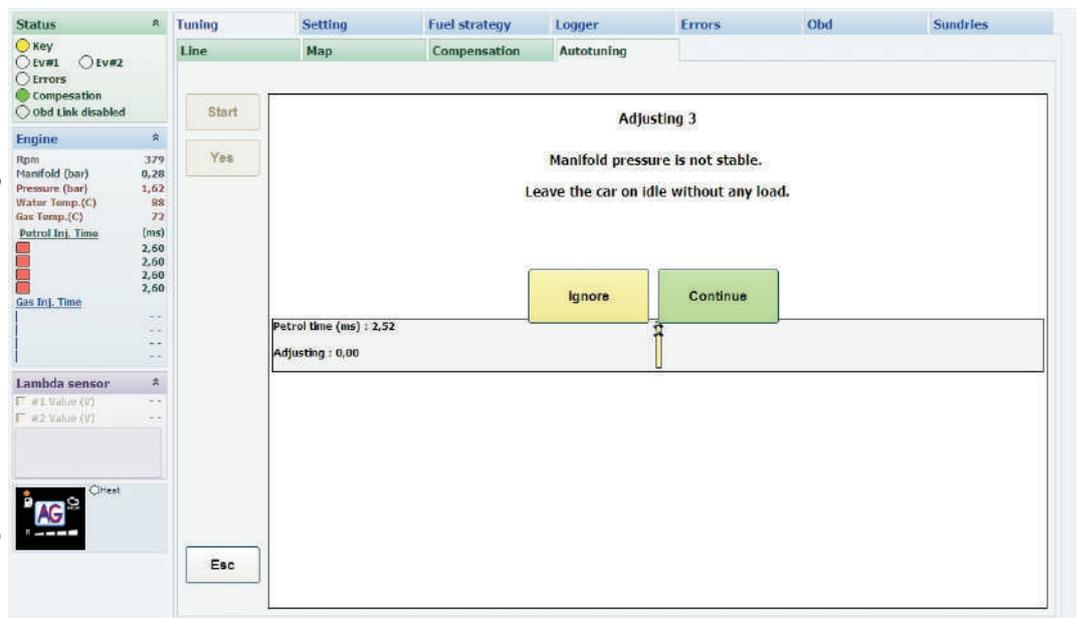
Follow the instructions of Zenit Pro system on the screen.

Leave the engine idling with no load ...

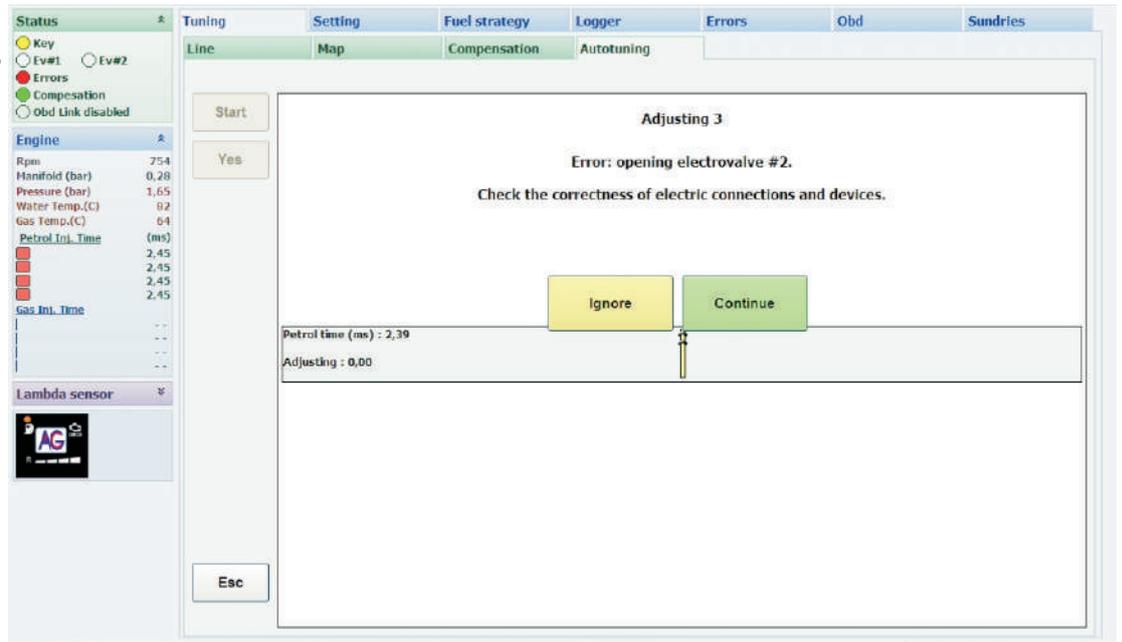
... wait a few seconds to begin the next step of calibration.



The system checks the petrol injector opening times and the stability of engine load. In the absence of apparent stability the message on the right appears. Please check what is causing the instability, remove it, then use the **Continue** button to check the stability again. If you use the **Ignore** button, the system will move to the next step without re-checking stability, which may affect the quality and accuracy of the calibration.

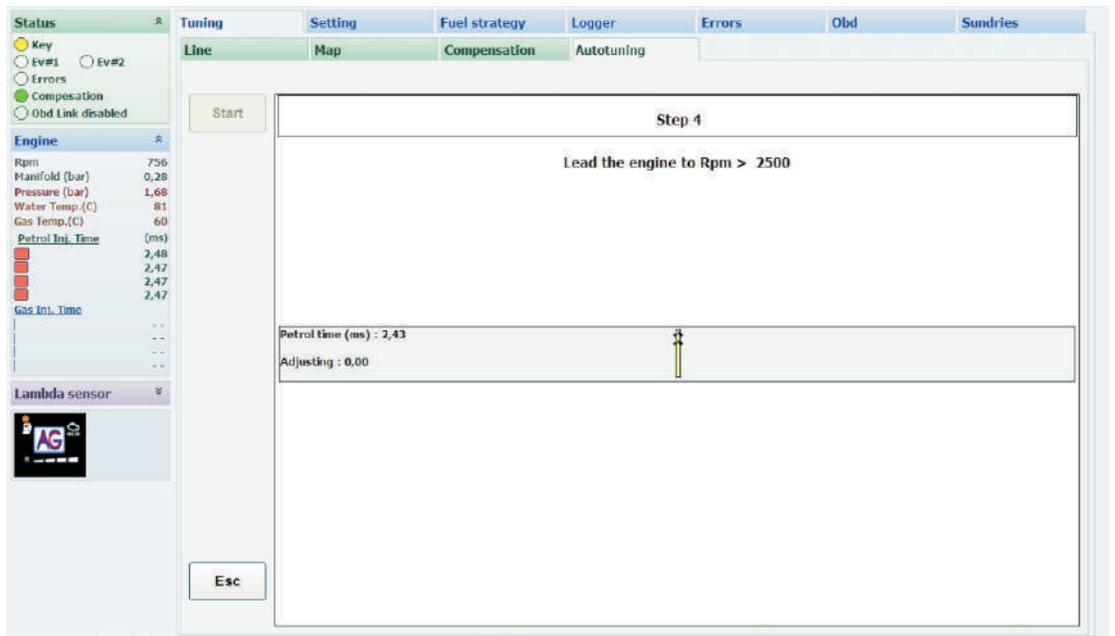


Next step is to check the electrovalves, and then the gas pressure in the system. In case of problems with the electrovalves the message on the right appears. Please check what is the cause, remove it, and then use the **Continue** button to check the electrovalves work again. If you use the **Ignore** button, the system will move to the next step without re-checking the electrovalves, but with absence of pressure in the system a message appears: "**Error: gas pressure too low . Check the level of gas in the tank, the correctness of mechanical and electrical connections, and the electrovalves work**" and the calibration is stopped.



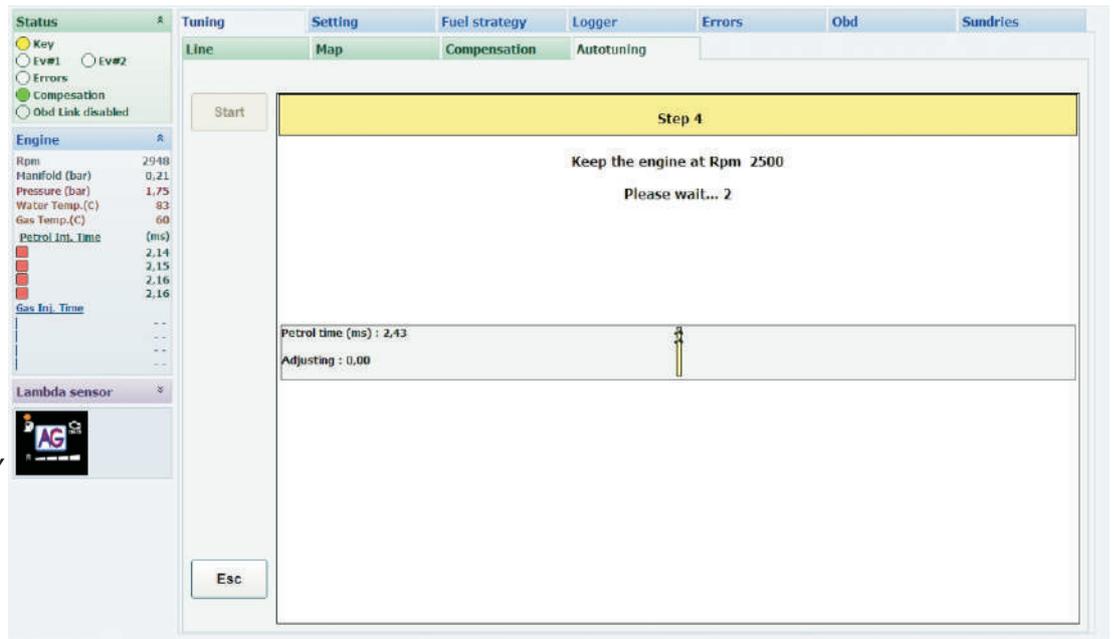
In the next step you should increase rpm above 2500 rpm and maintain a constant position of the accelerator pedal.

At this point, the system waits for an increasing in the engine rpm.

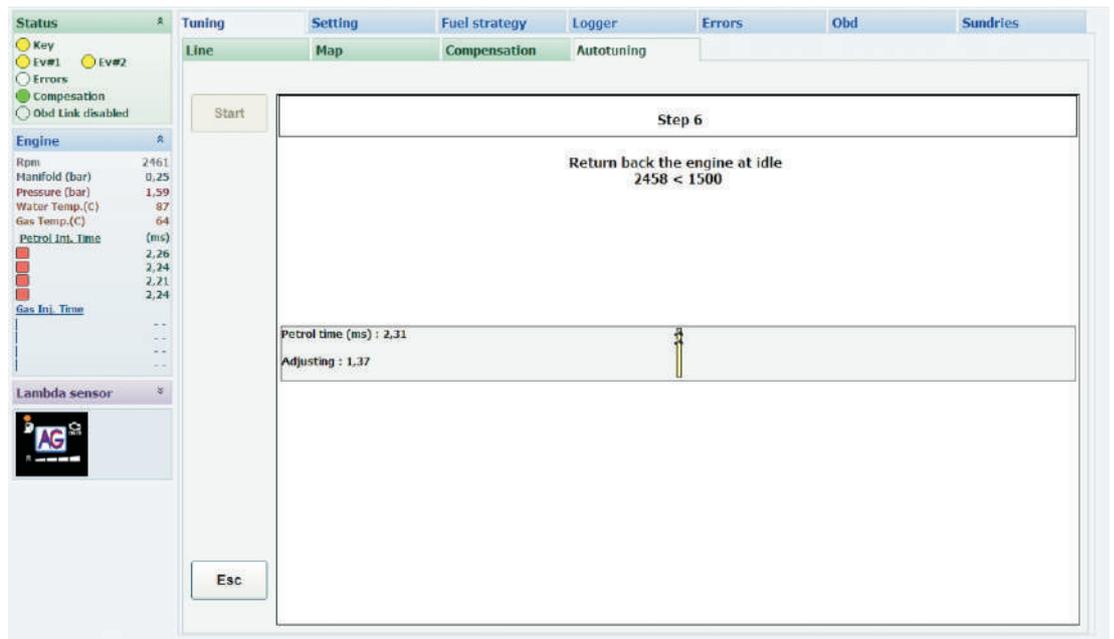


When the engine rpm exceeds 2500 and stabilizes, the system will switch between fuels several times.

In spite of small fluctuations in rpm at this stage of calibration, hold the accelerator pedal in a fixed position, until the system displays the next information.



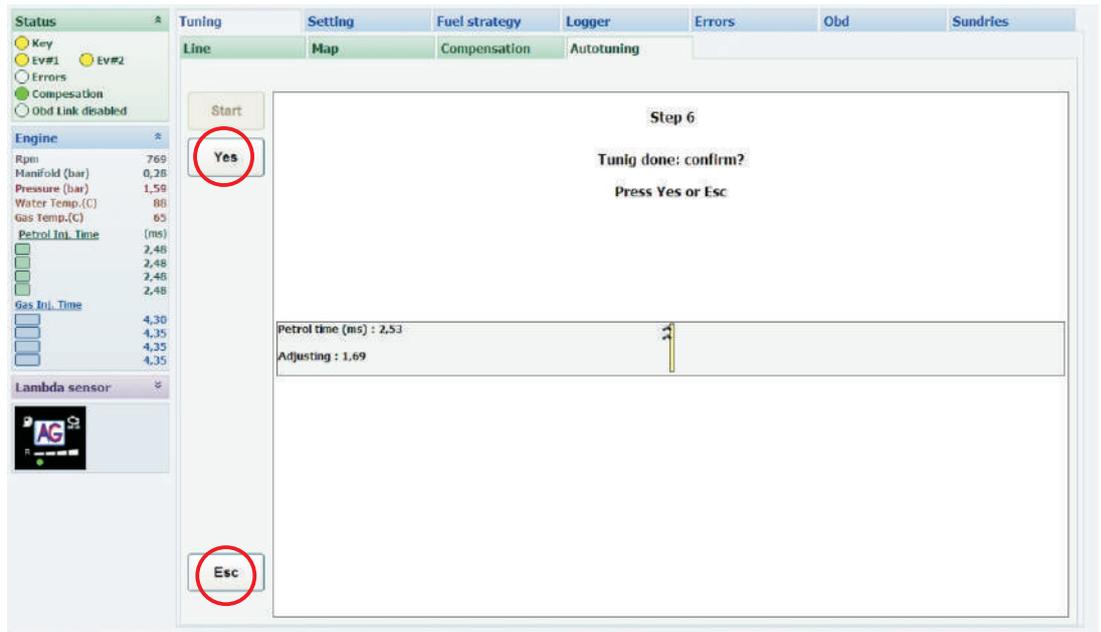
The next step is to return to idle. This should be done at the time when the system displays the message "Return back the engine at idle" **"Return back the engine at idle"**



After a few moments, the calibration should end with the message "Tuning done: confirm?"

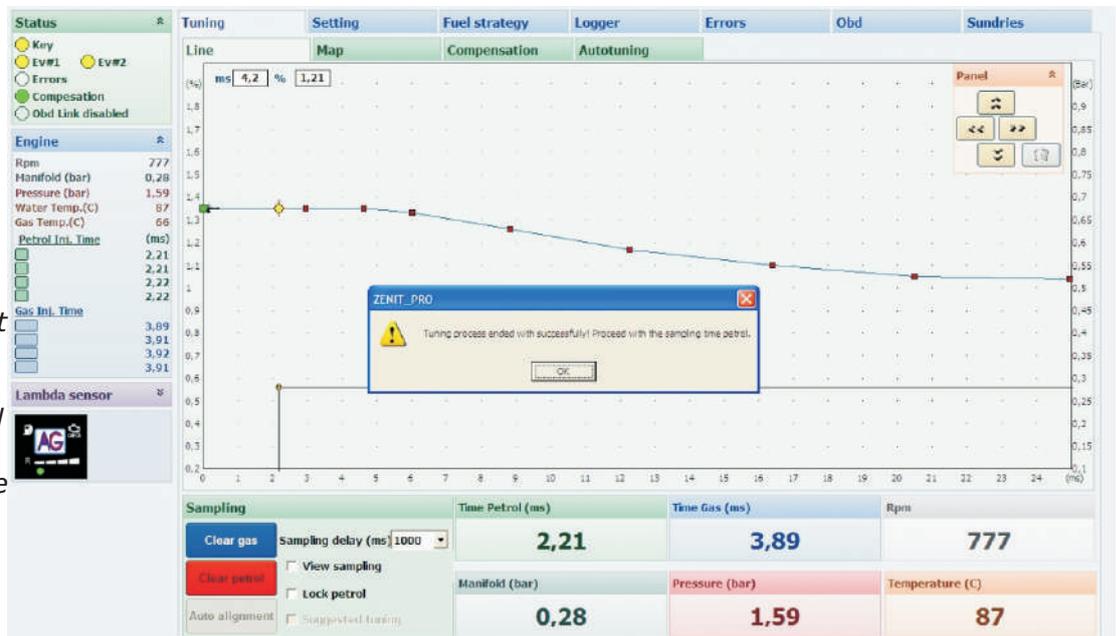
Click the **Yes** button to save your changes or **Esc** to exit the calibration without saving changes.

WARNING! If during the calibration the button "Esc" is pressed - calibration will be aborted.



After autotuning the system automatically takes you to the model tab, the vehicle will switch to petrol and the screen will display a message depending on the version of the installed ECU.

Confirming with the OK button will start the next stage of adjustment, which is collecting maps of petrol and gas, and tuning the vehicle at various engine loads.



10. Tuning - Line

The **Line** tab consists of a graph showing multiplier ratio percentage (used to calculate the gas injection time) to the petrol injection time. On the model tab there are petrol and gas maps. There are panels to manage the graph, maps and readings of the most important parameters of the installation.



The model curve can be corrected in several ways:

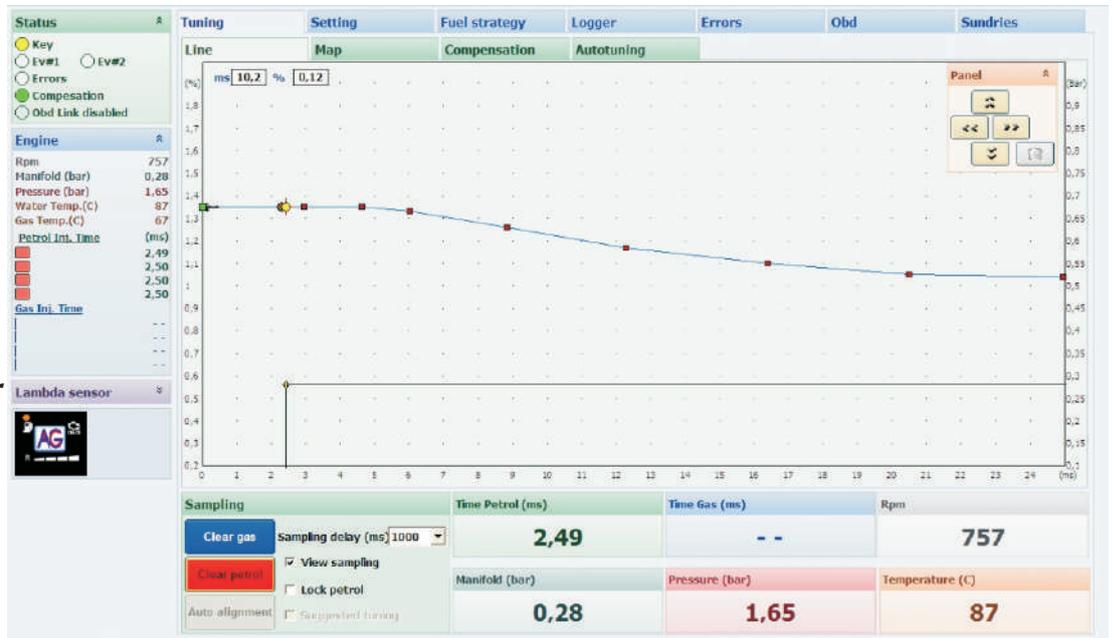
- To increase the gas mixture, the model curve must be moved upward, to reduce the gas mixture, the model curve must be moved down.
- To move all the points of the model down or up, click on one of the points with the **left mouse button** (the point turns green), then hold down the **CTRL key** and use the **keyboard arrow keys down or up**.
- To change the position of a particular point on the model line, click on the specific point by the **left mouse button**, then using the **arrow keys on your keyboard** change its position **vertically** or **horizontally**. (For this purpose, you can also use the **Panel** window, located in the upper right corner. The icon "**trash bin**" restores the default model settings).
- Switching between the active points can be made using **CTRL** and **arrow keys** or **PGUP** and **PGDN** keys.
- For adjusting the settings using the **keyboard**, holding down the **SHIFT** key during the adjustment increases the adjustment steps.
- You can **add points on the model line**, in order to do this, click the **right mouse button** (model curve can contain a maximum of **16 points**).
- To delete the selected point, you tick it with the **left mouse button** and then use the **DEL** key.
- The **yellow point and a black vertical line** moving along the model curve and the horizontal axis show the momentary values of injection time.
- The **black horizontal line** moving along the right vertical axis indicates a momentary vacuum in the intake manifold.

Properly connected and calibrated installation is necessary to conduct the next phase of tuning - the collection of petrol and gas points during drive is called maps.

WARNING! We do not recommend the use of OBD tuning without collecting the gas and petrol characteristics, and tuning the system using the model in the whole range of engine load (Zenit Pro OBD only)

After successful calibration, a test drive must be carried out, during which the following maps will be created: **Petrol** and **Gas**.

Petrol and Gas map is created automatically in the controller memory regardless of the connection to your computer and diagnostic software. But in order to speed up the process, we recommend to carrying out a test drive with the computer connected. Then you will be able to observe the formation of the map and generate the load so as to collect all the characteristics of the engine.



We start collecting the **map** when driving "on petrol". For the map points to be visible in the program you must select **View sampling**. Regardless of whether the function is active, the map points are collected and stored in memory. Points are "collected" with different loads but only when the temperature of the reducer is above the value set at **Setting>Change-over Parameters> Water Temperature**



If the points are visible in the whole range of engine loads and the dotted line is visible you can start creating the gas map.

When using our system, the maps will automatically refresh. To turn off the gasoline map refreshing, select the option **Lock petrol**. If the discrepancy between the certain points is too large, change the value of the window **Sampling delay** to a higher rate. **Recommended settings 1000-2000ms** - the higher the value, the more slowly the map is collected, but it is more accurate.



After creating a petrol map, switch system to gas and create a **gas map** in exactly the same way as petrol one.

When the gas points line (blue) corresponds within the entire load range with the petrol points line (red), the adjustment is complete.



When there are discrepancies, the correction procedure should be performed. We do this by selecting the **Suggested tuning** (this option activates automatically and highlights in yellow when we collect a sufficient number of map points).



On the chart there will appear green points suggesting what the model should look like for the petrol and gas maps to overlap. At this point, the model must be adjusted. You can do this in two ways: using the automatic **Auto alignment** function or you can do it manually. Deciding for manual adjustment, by "pulling" individual regulatory model points you lead a line as close as possible to the green points, gently, with no sudden curves.



In the automatic option, after pressing the **Auto alignment**, the program will correct the model itself.



After adjusting the model you have to collect the gas map again. To do this, select the option **View sampling**. Only the petrol map will appear as the gas map is automatically deleted. A new map of the gas is made in the same way as the previous one.



Calibration is complete when the gas map line overlaps with the petrol map line. If after adjusting the model line maps, the lines do not overlap, you should make another adjustment in the same way as the first time. So select the function **Suggested tuning** (when it is active and highlighted in yellow), press the **Auto alignment** button or carry out a manual adjustment of the model curve. Then select the option **View sampling** and create a new gas map. These steps are to be repeated until the gas and petrol map lines overlap.

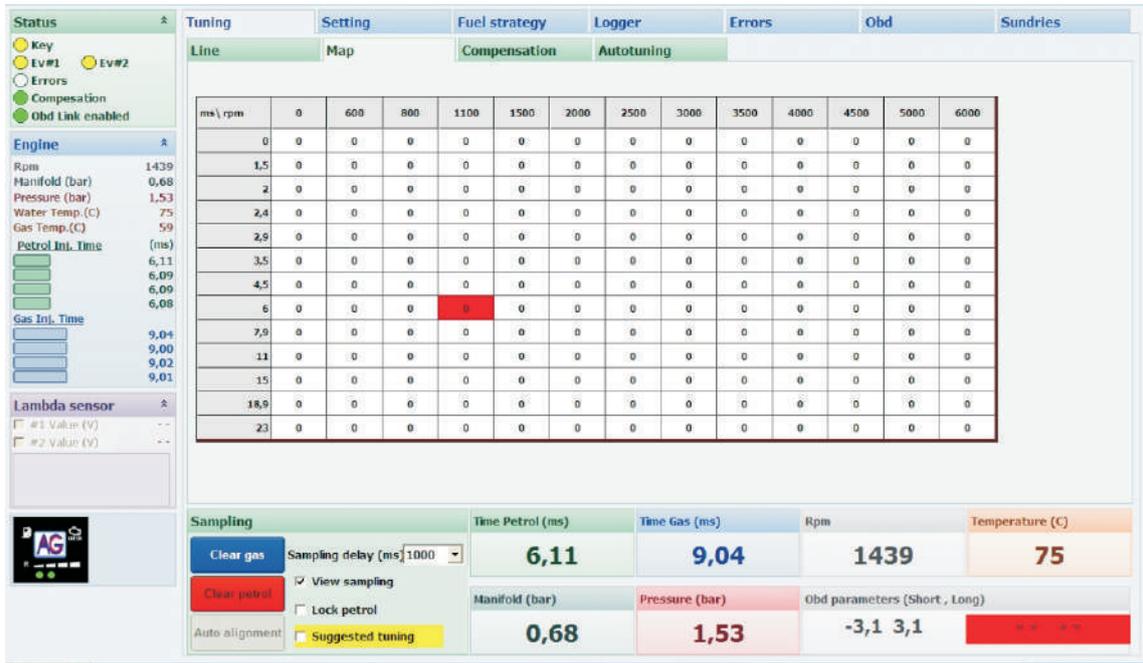
Finally we suggest that you check the engine at low rpm. To do this, you leave the car idling, on **petrol** and watch the **petrol** injection time. Then you change the power supply to **gas** and again observe **petrol** injection time. After changing the power this time should remain unchanged or should not significantly change. Permissible difference is about 3%.



In the example above, the petrol injection time at low rpm is 3.05 ms. After changing to gas supply, the time should be within 3% error which should be from 2.95 to 3.13. If this difference is greater, it must be corrected by setting using the tab **Tuning -> Map**.

11. Tuning- Map

Map tab contains a chart in which you can correct the value of the gas injection time, depending on engine rotations and the petrol injection times.



Red box moving along the chart shows the current engine operating parameters (rpm and petrol injector opening time).

To change the mixture of gas in a particular box, just select it by clicking the **left mouse button**. **The area that is several boxes** at once can be selected by holding down the **left mouse button**. Clicking or selecting the **yellow boxes** containing the injection time values or the engine rpm, respectively, we can select **rows or columns of boxes**.

To make a correction, after selecting the appropriate box or area press **ENTER**. Such window opens:

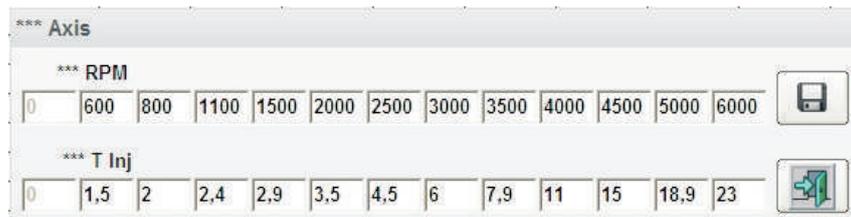


Corrections can be changed in two ways:

[+/-] Linear - correction increases or decreases (depending on the sign) by a specified percentage. In the given example, correction will increase by 2% compared to the values contained in the selected window or area.

[=] Absolute - correction takes the set point value regardless of previous values. In the case here, correction will change in the selected field or area by 2%.

Right mouse button clicking on the gray boxes containing the injection time values or the engine rpm opens the following window:



In this window you can change the values on the axes **T Inj.** and **RPM** - ranges of petrol injector opening times and engine rotations can be adjusted to the characteristics of the engine.

RPM Adjustment function allows very precise tuning of the mixture of gas for various speeds and engine loads. It can also be used for precise correction of the gas injection time at low rpm and low rpm with load (with air-conditioning turned on, or "D" (Drive) selected in a car with an automatic gearbox).

12. Tuning- Compensation

The **Compensation** tab contains charts with which it is possible to reduce the impact of changes in temperature and pressure, or acceleration on the mixture.

Reducer temperature compensation

°C	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100
%	-8	-7	-6	-5	-4	-3	-2	-2	-1	-1	0	0	0	1	2

Gas temperature compensation

°C	10	15	20	25	30	35	40	45	50	55	60	65	70	80	90
%	-8	-7	-6	-5	-4	-3	-2	-1	0	0	1	2	2	3	4

Reducer pressure compensation

Bar	0,69	0,77	0,83	0,91	0,98	1,06	1,12	1,2	1,25	1,31	1,36	1,41	1,46	1,52	1,62
%	24	20	16	12	8	4	2	0	-2	-4	-6	-8	-10	-12	-16

Pres. Vo (bar) Col

Acceleration compensation Disable over temp.

Mixture alteration Return Speed

Compensations for the reducer temperature and the gas temperature help maintain optimal mixture when the engine is warming up or when the gas temperature rises above the standard:

- immediately after the switch after a long standstill when the engine is still not warmed up and the gas has low temperature and high density - enabled compensation prevents too rich mixture - gas injectors opening times are shortened, eg .. at Tred = 30 at 4%
- when the gas temperature increases, gas density decreases and it may lead to serious impoverishment of the mixture, when you turn the corrections on, the high gas temperatures the ECU enriches the mixture, for example.: At T of gas = 90 at 4%.

Compensation for gas pressure prevents changes in the mixture at pressure fluctuations.

Working pressure - the pressure at which the correction = 0

By changing the **cols**, you change the range of pressures to be adjusted.

Acceleration compensation helps maintaining the best mixing ratio in the event of a sudden increase in the injection time (e.g.: during acceleration). In addition, due to ability to switch compensation off after reaching preset regulating valve's temperature (**Disable over temp.**) allows you to operate **VAG with long injection time on cold start**.

It graphically illustrates injector opening times in successive cycles.

Mixture alteration - allows setting the percentage of enrichment or impoverishment of the mixture at the time of acceleration. Recommended setting for engines with VAG: -15 to -20%.

Return Speed - allows setting injector's timing return time value without compensation during acceleration. Recommended setting: 5- 10.

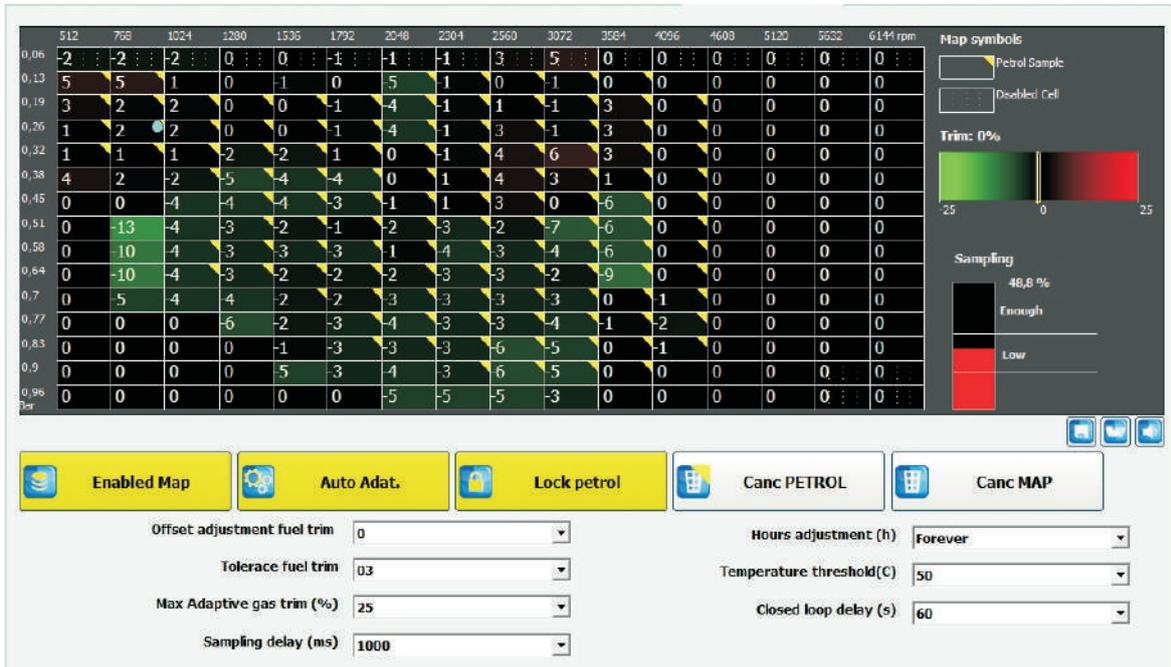
We recommend turning on compensation for temperature, and leaving the correction turned on for the pressure, checking the working pressure settings and setting the reference column according to your preferences.

Preset value - **recommended** - corrections values can be varied. To do this, select the value you want to change and with the buttons "+" and "-" set the desired size. While changing, holding down the **SHIFT** key causes a change of corrections at the 10th.

After the adjustment, close the program and disconnect the system interface wire from installation, and reconnect the diagnostic plug to the socket of the loom of the switch.

13. Tuning- Adaptive Map

Adaptive Map enables real-time automatic optimization of fuel delivery while working on natural gas; it uses map of previously collected samples of gasoline injectors' opening times.



To pre-activate this feature, go to **"Enabled Map"** button located below the samples' map (it will be highlighted yellow). The first step is to create maps of injectors' opening times while driving on gasoline. The values are collected over a wide range of vacuum values and engine revs. Saved data of the gasoline injector opening time is indicated by a yellow triangle showed at the upper right corner of the map's respective cells. The accuracy of the Adaptive Map is determined by the quality of the gasoline mapping! For proper operation of this function an appropriate amount of collected mapping cells is required (more samples makes adaptation process more accurate).

Progress bar, called **"Sampling"** on the right side of the screen, shows progress of the mapping process. The minimum number of map points required to fully activate the Adaptive Map option is set at 80% (progress bar must be filled above "Enough" level).

With that function enabled active gasoline samples are collected regardless of whether the Control Unit is connected to a PC or not, however, for faster and more accurately gasoline mapping it is recommended to perform a test drive with the computer hooked up (allows an overview of mapping progress).

The next step, after collecting sufficient samples, is to engage the **"Auto Adat."** which makes adjustments to the gas supply.

At the same time we recommend use of the **"Lock Petrol"** function. With this option, the Control Unit will not be overwriting the original gasoline base map.

Control unit Zenit Pro with Adaptive Map option works by controlling dose of the gas by introducing a multiplier of basic settings along with additional adjustments resulting from the difference between the gasoline map and the multiplier. Automatic correction improves the setting of multiplier values (basic regulation) and dynamically reacts to any changes in engine's operation (e.g. changes in driving style).

For best results "Adaptive Map" should be configured using the options found at the bottom of the screen:

Offset Adjustment Fuel Trim - indicates the base mix correction value (i.e. one for which we strive, optimal). Normally it should be zero, but by setting a positive or negative value for this function you can, if necessary, enrich or make leaner the gas - gasoline mixture.

Tolerance Fuel Trim- is the maximum difference (in percentage points) of gasoline opening time and the "Offset Adjustment Fuel Trim" value, at which Adaptive Map still does not introduce any additional gas amount adjustments. For example, if the "Offset Adjustment Fuel Trim" is 10 and the range of "Tolerance Fuel Trim" is 5, then the adaptation will introduce correction if the difference between the times of gasoline and gas will be less than 5 or greater than 15, and will work to maintain a correction range from 5 to 15%.

Max Adaptive gas trim (%) - the maximum correction of gas injectors opening times. These settings make corresponding changes to the **"Trim"** bar visible on the right side which also displays graphically and numerically the current instantaneous correction value of the gas mixture, taking into account the gasoline map.

Sampling delay (ms) - parameter determines amount of time in which constant vacuum value in the intake manifold is needed for the system to record the sample data value. This option should be set to the same value as the value under "Sampling value" in "Line" tab. Default setting (1000) is suitable for most cars.

Hours adjustment (h) - the period in which system tunes up itself (making some adjustments and updating them based on the base map). After a preset time the system will still correct gas dosing but the map will be "frozen", which means that it no longer will be refreshed. This option prevents forcing the mix correction despite excessively worn parts of the gas line.

After putting a mileage of tens of thousand kilometers you may find that the wear of certain parts (e.g. unstable pressure on regulating valve or erratic functioning of gas injectors) is so significant that in such situation, the lack of "Adaptive Map" causes CHECK ENGINE light to go off and service visit will be necessary to replace or repair worn parts if you select "Forever", the control unit will keep adjusting the gas dosing based on gasoline map.

Temperature threshold (C) - "Adaptive Map" will be active only when the temperature of the reducer is above the preset value. Below this value there will be no corrections carried out.

Closed loop delay (s) - to prevent accidental map correction changes "Adaptive Map" will be activated after preset time.

With "Adaptive Map" engaged correction values appear on the map. They show graphically and numerically what adjustments have been made by Zenit Pro control unit, in relation to the original settings, to get full coverage on gas and gasoline maps.

To delete gasoline points from the map use "**Canc PETROL**" button.

"**Canc MAP**" button removes correction map for natural gas mixture.

To optimize "Adaptive Map" (e.g.: to ensure correct operation in open loop setting), you can limit access to certain fields or areas of the map. These areas will not be considered for auto adaptation.

To limit some areas of the map: hold down **Shift** key and click the mouse to a specific area or select the appropriate area of the map. From the pop-up menu select "**Lock**". The blocked area will show white spots.

To unlock any area of the map, select it with the mouse while holding down **Shift** key. From the menu, select "**Unlock**".

To cancel these operations, select **Esc** from pop-up menu.

III. ELECTRIC WIRING

It is also available from within the tab **Miscellaneous-> Installers-> Electric wiring.**



Sekwencyjny System Wtrysku z OBD Sequential Injection System with OBD

Schemat Elektryczny - Electric Wiring

4,6,8 CYL
Strona 1 z 2
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