

# **Instruction of connection and programming of the OSCAR-N SAS MINI / PLUS / OBD CAN controller**

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# 1. OSCAR-N SAS product line controllers description

## OSCAR-N MINI SAS

- Very fast Central Processing Unit 120 MHz
- Built-in petrol injection emulator with resistance 100 Ohm
- Full feedback diagnostic of gas injectors circuits (system signalizes an error after detecting an circuit intermittence and automatically goes back to petrol)
- Possibility of connection and reading the parameters of one Lambda probe
- Possibility of starting the vehicle directly on gas by holding switch button
- Feature of filtering petrol injector pre-pulses (extra-injections)
- Software makes possible to adjust parameters of fuel supply system in very large scale. Besides the correction due the vacuum in the intake manifold, installer can adjust gas dosage regarding to RPM level, gas temperature and gas pressure. It is also possible to adjust mixture dosage for each cylinder separately and possibility of preheating the gas injectors before changeover
- „Exit from cut-off on petrol” feature (from too high gas pressure during cut-off conditions)
- Calculation of the multiplier value corrections can be done by a single click on the „Calculate adjustments” button in the software after collecting petrol and gas maps.
- Auto-adaptation feature ensures that during the driving on gas multiplier line is being automatically corrected within desired ranges (tolerance in %) in places on the map where petrol and gas lines are not close enough to each other (works even without connected PC)



## OSCAR-N PLUS SAS

- All features present in OSCAR-N MINI SAS are included in OSCAR-N PLUS SAS moreover it has all features mentioned below
- Possibility of connection and reading the parameters of two Lambda probes at the same time
- Feature of „full-injection opening mode” for chip tuned cars with petrol injectors constantly opened during very high loads
- Possibility to force gas injector to be opened at minimum opening time value (to avoid not full gas injector opening when too slow injector has been installed)
- Separate wire from ECU harness to cut-off petrol fuel pump circuit after changeover to gas with programmable time delay.



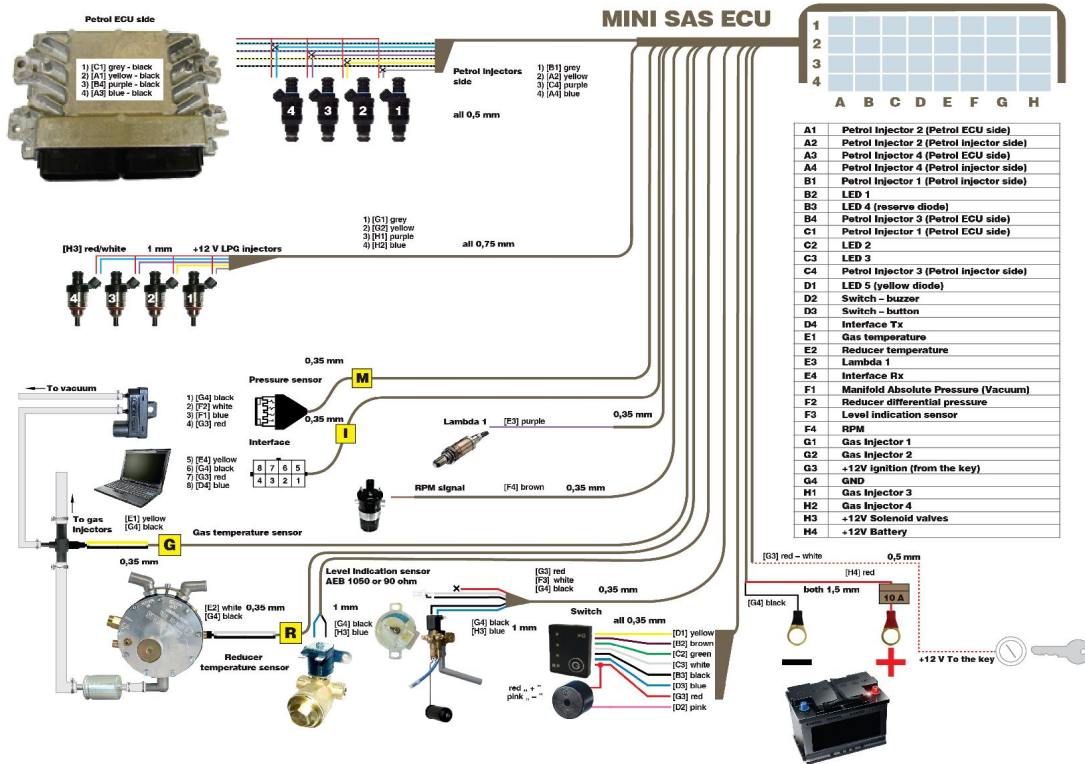
## OSCAR-N OBD CAN SAS

- All features present in OSCAR-N MINI AND PLUS SAS are included in OSCAR-N OBD CAN SAS moreover it has all features mentioned below.
- Built-in 100 Ohm and 75 Ohm petrol injection emulator with possibility of changing resistance value to from the level of software (special feature for customer's request)
- Built-in datalogger circuit activated by holding the switch button during the driving makes possible to register and save to memory all system parameters. Helpful to diagnose a malfunction when the car is out of workshop
- Possibility of erasing OBD errors plus monitoring and making corrections of gas injection opening times regarding petrol injection Fuel Trims separately for both Banks for OBD CAN protocols and for older OBDII protocols directly from ECU harness (no OBD adapter necessary)

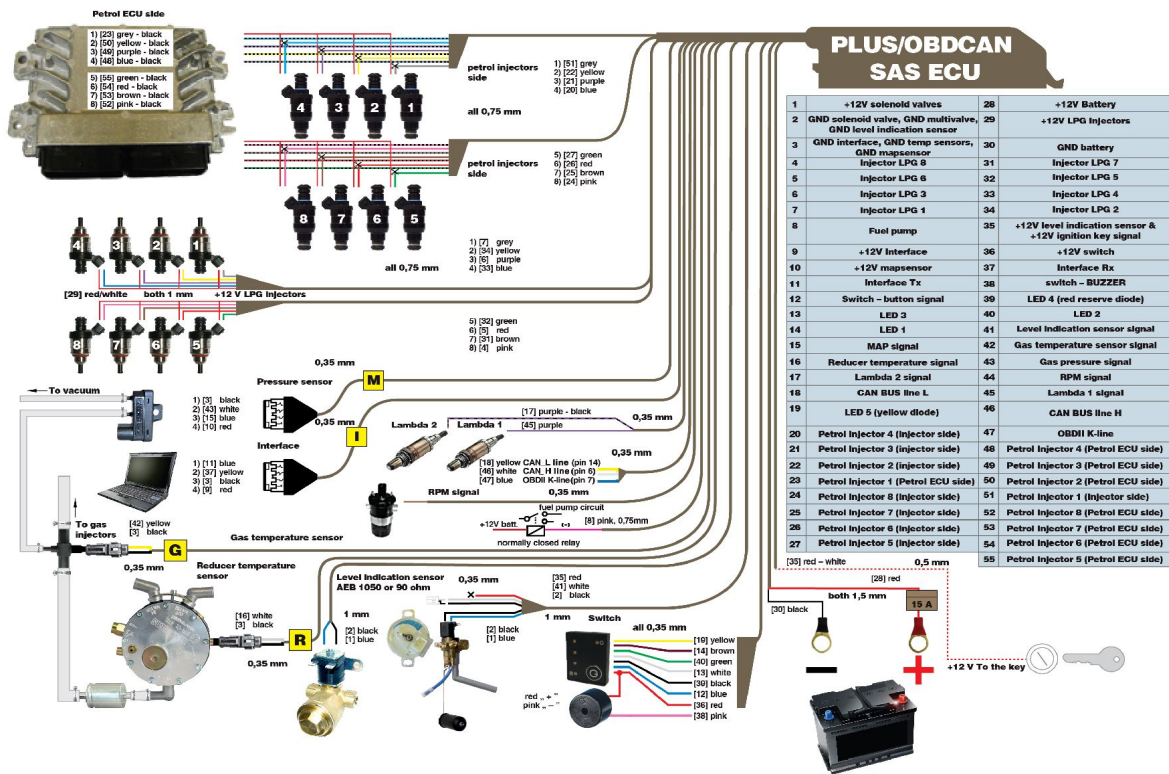


## 2. OSCAR-N SAS MINI / PLUS / OBD CAN way of assembling

### 2.1. OSCAR-N MINI SAS installation diagram

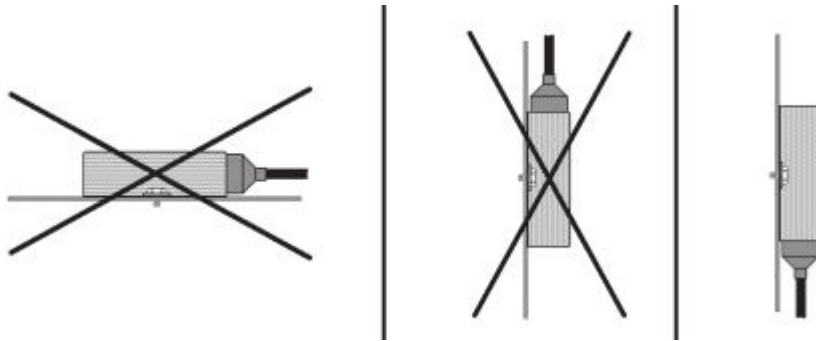


### 2.2. OSCAR-N SAS PLUS/OBD CAN SAS installation diagram



### 2.3. Proper installation of OSCAR-N SAS ECU

During the installation of OSCAR-N SAS sequential gas injection system it is suggested for the wire set to point downwards. It is also suggested that it should be placed in such a way to avoid the negative impact of high temperature and humidity. It is highly prohibited to spray ECU box with water jets or expose it to longlasting contact with water.



### 2.4. Selecting proper type of EG2000 injector according car's horsepower



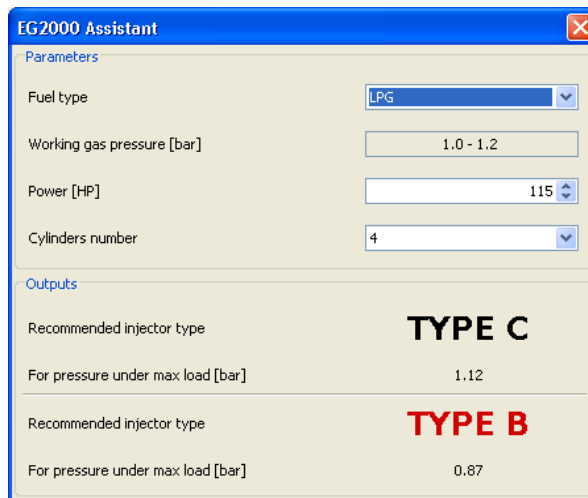
The injectors efficiency should be selected in such way so that at high engine load conditions the petrol injection opening time on gas should be equal to petrol injection opening time on petrol. Tables given below should help to make right choice.

Spec(Type)	For CNG Max Power(HP)				Remarks
	HP/cylinder(+/-15%)	x 4-cyl	x 6-cyl	x 8-cyl	
<b>Type A+</b> (Blue Label)	<b>38 / 45 / 53 HP</b>	<b>152 ~ 212 HP</b>	<b>228 ~ 318 HP</b>	<b>304 ~ 424 HP</b>	For pressure 1.3/1.5/1.7 bar (under max load)
<b>Type A</b> (Green Label)	<b>30 / 38 / 43 HP</b>	<b>120 ~ 172 HP</b>	<b>180 ~ 258 HP</b>	<b>240 ~ 344 HP</b>	For pressure 1.3/1.5/1.7 bar (under max load)
<b>Type B</b> (Red Label)	<b>22 / 28 / 34 HP</b>	<b>88 ~ 136 HP</b>	<b>132 ~ 204 HP</b>	<b>176 ~ 272 HP</b>	For pressure 1.3/1.5/1.7 bar (under max load)
<b>Type C</b> (Black Label)	<b>15 / 20 / 26 HP</b>	<b>60 ~ 104 HP</b>	<b>90 ~ 156 HP</b>	<b>120 ~ 208 HP</b>	For pressure 1.3/1.5/1.7 bar (under max load)

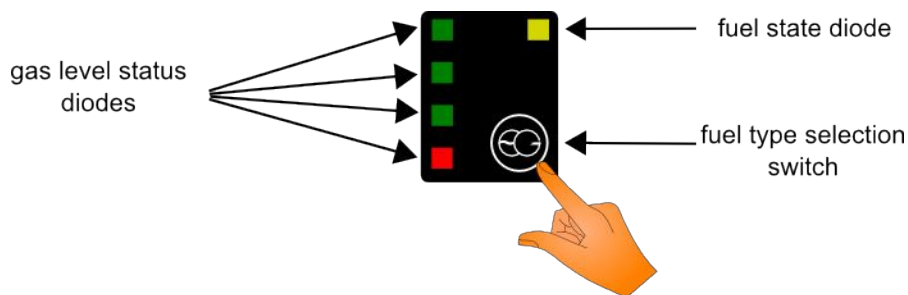
**For LPG**

Spec(Type)	Max Power(HP)			Remarks	
	HP/cylinder(+/-15%)	x 4-cyl	x 6-cyl		x 8-cyl
<b>Type A+</b> (Blue Label)	<b>40 / 50 / 60 HP</b>	<b>160 ~ 240 HP</b>	<b>240 ~ 360 HP</b>	<b>320 ~ 480 HP</b>	For pressure 0.8/1.0/1.2 bar (under max load)
<b>Type A</b> (Green Label)	<b>33 / 42 / 50 HP</b>	<b>132 ~ 200 HP</b>	<b>198 ~ 300 HP</b>	<b>264 ~ 400 HP</b>	For pressure 0.8/1.0/1.2 bar (under max load)
<b>Type B</b> (Red Label)	<b>26 / 32 / 39 HP</b>	<b>104 ~ 156 HP</b>	<b>156 ~ 234 HP</b>	<b>208 ~ 312 HP</b>	For pressure 0.8/1.0/1.2 bar (under max load)
<b>Type C</b> (Black Label)	<b>20 / 25 / 30 HP</b>	<b>80 ~ 120 HP</b>	<b>120 ~ 180 HP</b>	<b>160 ~ 240 HP</b>	For pressure 0.8/1.0/1.2 bar (under max load)

You might also use EG2000 assistant available in OSCAR-N SAS software.



## 2.5. Understanding the usage of changeover switch



**Fuel state diode** -the yellow diode show current fuel status. It can indicate 5 following states:

- 1) turned off -system is in petrol mode
- 2) blinking at 1Hz frequency (once per second) -system awaits for reaching min. reducer temperature
- 3) blinking at 2Hz frequency (twice per second) -system is in Auto mode and awaits for reaching other conditions required for changeover (eg RPM, preheating injectors etc.)
- 4) blinking at 4Hz frequency (4 times per second) -system is signalling an error (eg “no RPM signal” or “Low gas pressure error”), which is causing instant changeover to petrol
- 5) emits light constantly -system is in gas mode.

**Gas level status diodes** -4 diodes shows amount of fuel level left in the gas tank. 4 diodes emitting light simultaneously indicates full tank. All 4 diodes turned off means that the gas tank is almost empty.

**Fuel type selection switch** -every single press of the button changes the type of selected fuel.

For an emergency start of gas -without usage of petrol (eg. when the petrol fuel pump has been damaged) it is necessary to:

- 1) press and the switch button before starting the engine,
- 2) move the ignition key to ACC position,
- 3) wait for opening of solenoid valve
- 4) start the engine on gas

**Attention:**

In OSCAR-N OBD/CAN SAS pressing and holding the button for 5 seconds during driving on petrol or gas will enable/disable registering the system data parameters to the controller memory. Later on recorded parameters might be downloaded to the PC with diagnostic software.



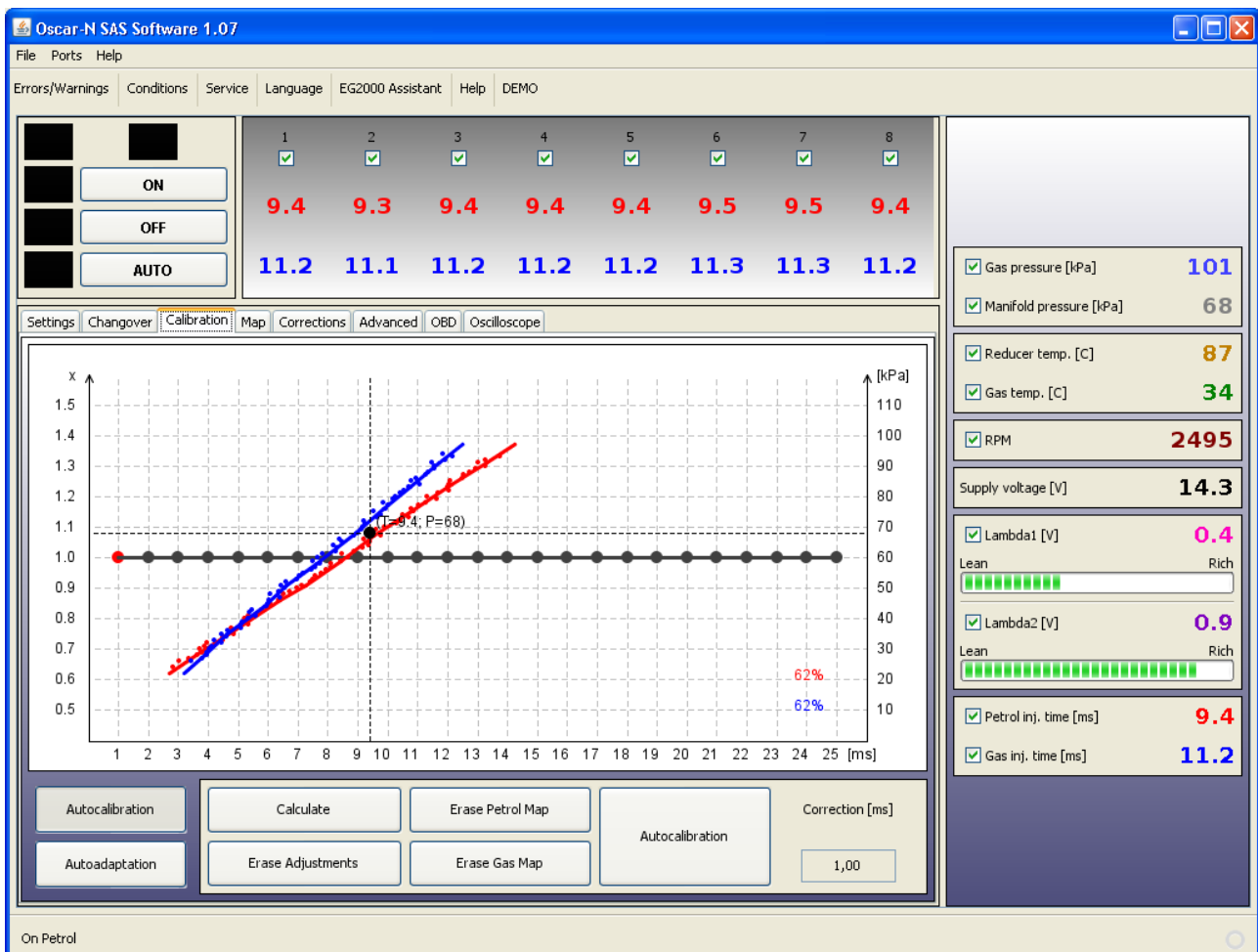
### 3. OSCAR-N SAS diagnostic program description

#### Attention:

Before running the software please make sure that You have Java Runtime Enviroment in version not lower than 6 update 24 installed on Your PC. You can always download the latest version from:

<http://www.java.com/>

#### 3.1. Main software window description



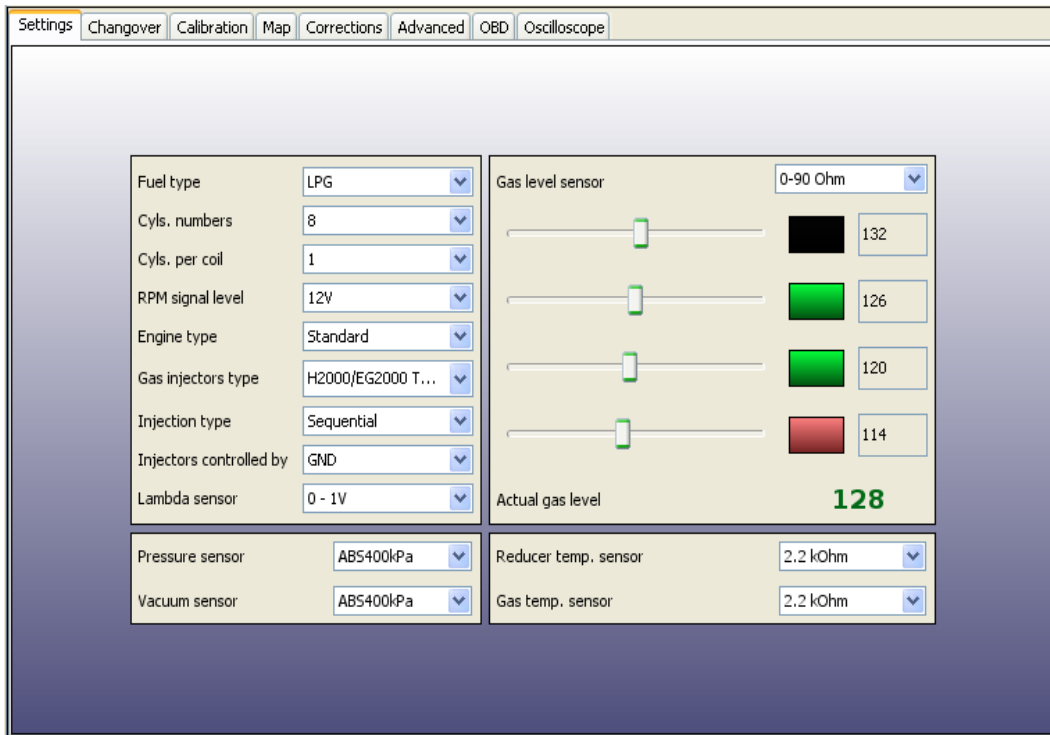
The software's main window contains of:

- 1) Fuel type changeover switchboard with fuel level indication diodes-left top part of the window,
- 2) List of active petrol/gas injectors with their injection opening times [ms] -middle top part of the window,
- 3) Visualisation of actual system parameters -right side part of the window,
- 4) Panels with system parameters/settings -central part of the window,
- 5) System status indication bar -bottom part of the window.



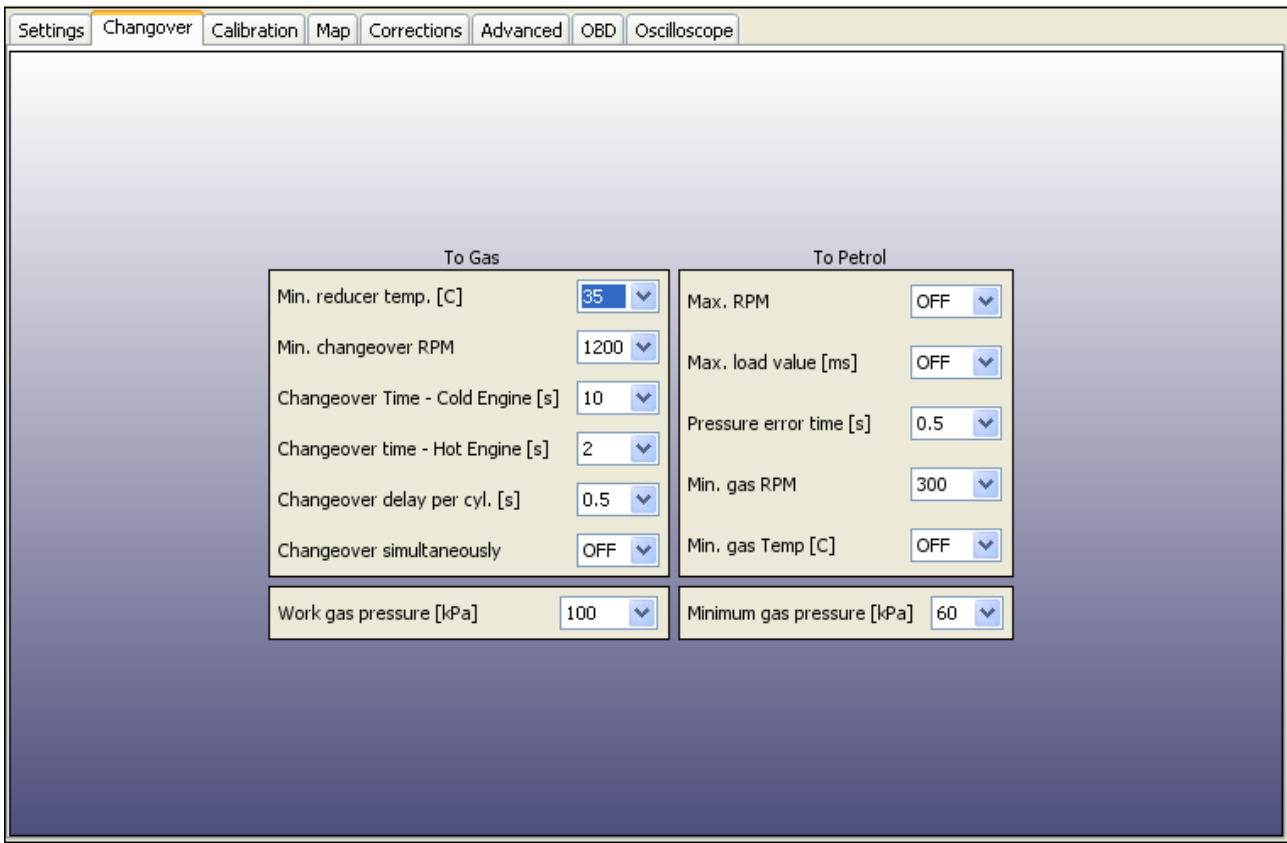
## 3.2. Settings Panel

During every first start of the software please choose the OSCAR-N SAS ECU work mode LPG or CNG (depending on the type of installation in the car).



- set *Fuel type* on which car is running,
- set proper *Cyls. Numbers* -[1...8] - according to amount of petrol/gas injectors connected,
- set proper value of *Cyls. per coil* -[1...8] – how many cylinders we have for 1 ignition coil (to get proper value of RPM),
- set proper value of *RPM signal level* -[5V or 12V] -(usually 12V if signal is taken from ignition coil),
- set proper *Engine type* [Standard or Turbo] to have proper vacuum range on the map,
- set proper *Gas injectors type* -[H2000/EG2000 type ABC 1,9 Ohm; H2100; EG2000 type A+ 1,3 Ohm; Keihin; BRC 1.9 Ohm; Rail IG1 3 Ohm; Rail IG5 3 Ohm; MagicJet; Matrix; Matrix HD344/HD544; Rail IG3 Horizon 2 Ohm; Rail IG3 Horizon 2.8 Ohm; Reg OMLV Fast; Valtek 30 3 Ohm; Valtek 30/Rail IG1 2 Ohm; Valtek 30/Rail IG1 1 Oh; Valtek 34],
- for cars with Injectors controlled by full group strategy (all injectors controlled by single signal) change the petrol *injection type* from “Sequential” to “Full-group”,
- only for cars with petrol injectors controlled by positive pulse please change the value *Injection controlled by* field from “GND” to „+”,
- set proper Lambda sensor type if connected,
- select proper type of gas level indication sensor/pressure gauge installed,
- in case of using a Pressure/Vacuum sensor, Reducer temperature sensor or/and Gas temperature sensor different from standard ones (**ABS400kPa** and **2.2kOhm** type sensors, which are provided with the ECU set and set as default types) please change sensor type in a proper field.

### 3.3. Changeover Panel



Set desired parameters for system change over To Gas and To Petrol:

#### 3.3.1. Parameters To Gas

- *Min. reducer temp. [C]* -minimum temperature of reducers required for opening to solenoid valve before first changeover to gas.
- *Min. changeover RPM* -minimum value of engine RPM required for the controller to changeover to gas
- *Changeover time -Cold Engine [s]* -additional time period added to “changeover to gas” time. This extra time is being counted from moment of opening the solenoid valves if reducers temperature is lower than “Hot engine” temperature value (default: 50 C degree)
- *Changeover time -Hot Engine [s]* - additional time period added to “changeover to gas” time. This extra time is being counted from moment of opening the solenoid valves if reducers temperature is equal or higher than “Hot engine” temperature value (default: 50 C degree)
- *Changeover delay per cyl. [s]* -time delay between changing over subsequent cylinders from petrol to gas. In example: when this parameter is set at 0.2 [s] the complete change over to gas of a 4-cylinder engine from gasoline to gas will last  $4 \cdot 0.2$  [ms].

When this parameter is set to 0 [ms] all the cylinders will changeover to gas / petrol at the same time (reccomended value for full-group controlled cars)

- *Changeover simultaneously* -feature of forcing all cylinder to changeover simultaneously during first autocalibration changeover

### **Attention!:**

For full-group controlled cars please remember to set *Changeover delay per cyl. [s]* to “0.0” s. and *Changeover simultaneously* to “ON” before running auto-calibration.

### **3.3.2. Parameters To Petrol**

- *Max. RPM* -maximum value of engine's RPM at which car can still run on gas. If RPM value will be higher than this value the car will changeover to gasoline. When the RPM will fall back below this value the car will go back to gas mode.
- *Max. load value [ms]* -maximum value of petrol injection opening time at which car can still run on gas. If petrol injection time value will be higher than this value the car will changeover to gasoline. When the petrol injection time will fall back below this value the car will go back to gas mode.
- *Pressure error time [s]* -time period during which the gas pressure could be lower than the *minimum pressure* value. If the pressure will drop and stay below this value for time longer than this time period the car will change over to gasoline from “too low gas pressure error”.
- *Min. gas RPM* - minimum value of engine's RPM at which car can run on gas. If RPM value will be lower than this value the car will changeover to gasoline. When the RPM will go back above this value the car will go back to gas mode.
- *Min. gas Temp [C]* -if gas temperature will fall below that value during driving on gas the system will go back to petrol mode and will not allow to go back to gas mode until the gas temperature will be greater than this value.

### **3.3.3. Working and Minimum gas pressure**

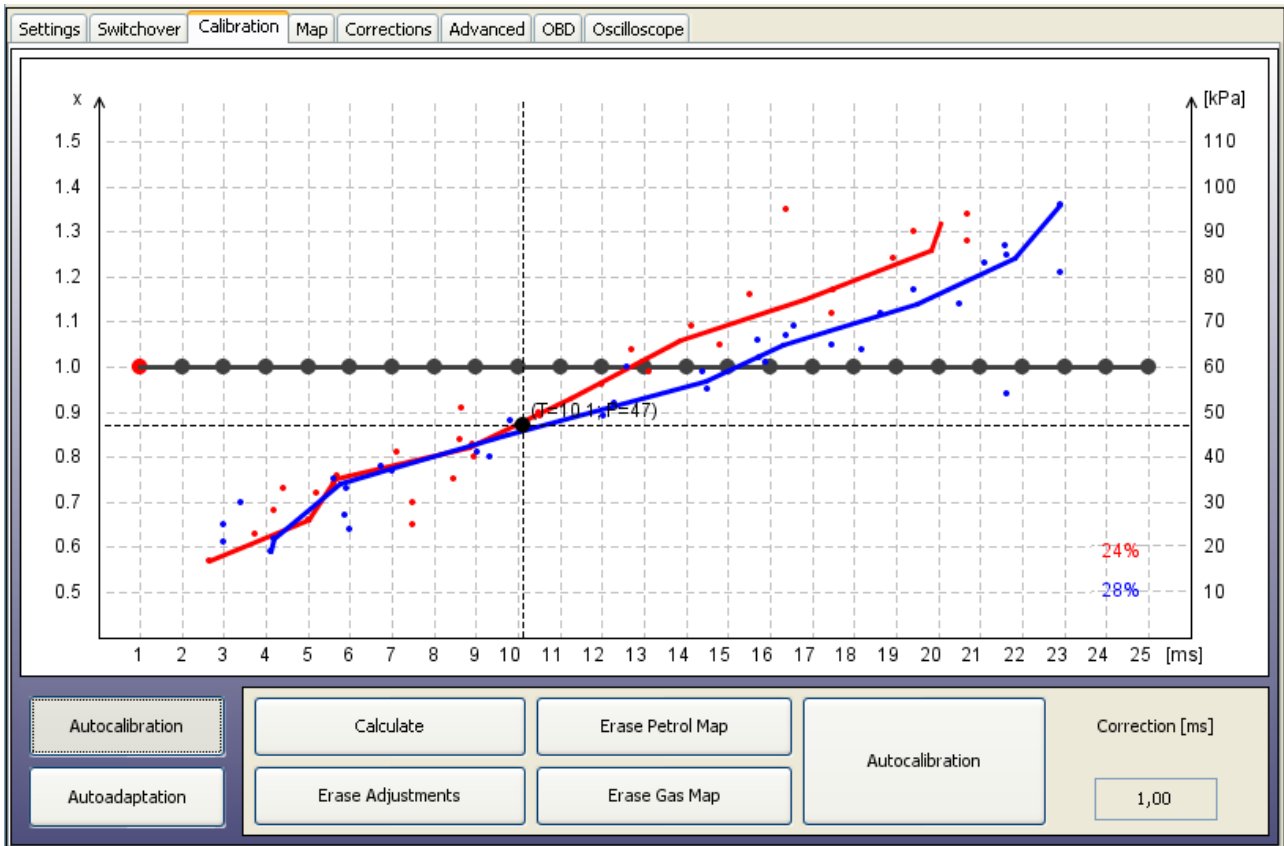
- *Minimum pressure* -it is the lowest value of gas pressure during which the car can still drive on gas. If the gas pressure will fall below this value, for time longer than value set in *Pressure error time* the car will change over to gasoline from “too low gas pressure error”.
- *Working pressure* -is the normal value of gas pressure during last autocalibration on idle.

Working and Minimum gas pressure values will be updated automatically after autocalibration. In case of manual change of reducers pressure these values must be updated every time.

**Attention:** It is important to have working gas pressure parameter value in the software corresponding to real value of gas pressure in the system because the system is making corrections of gas injection opening time according this value.

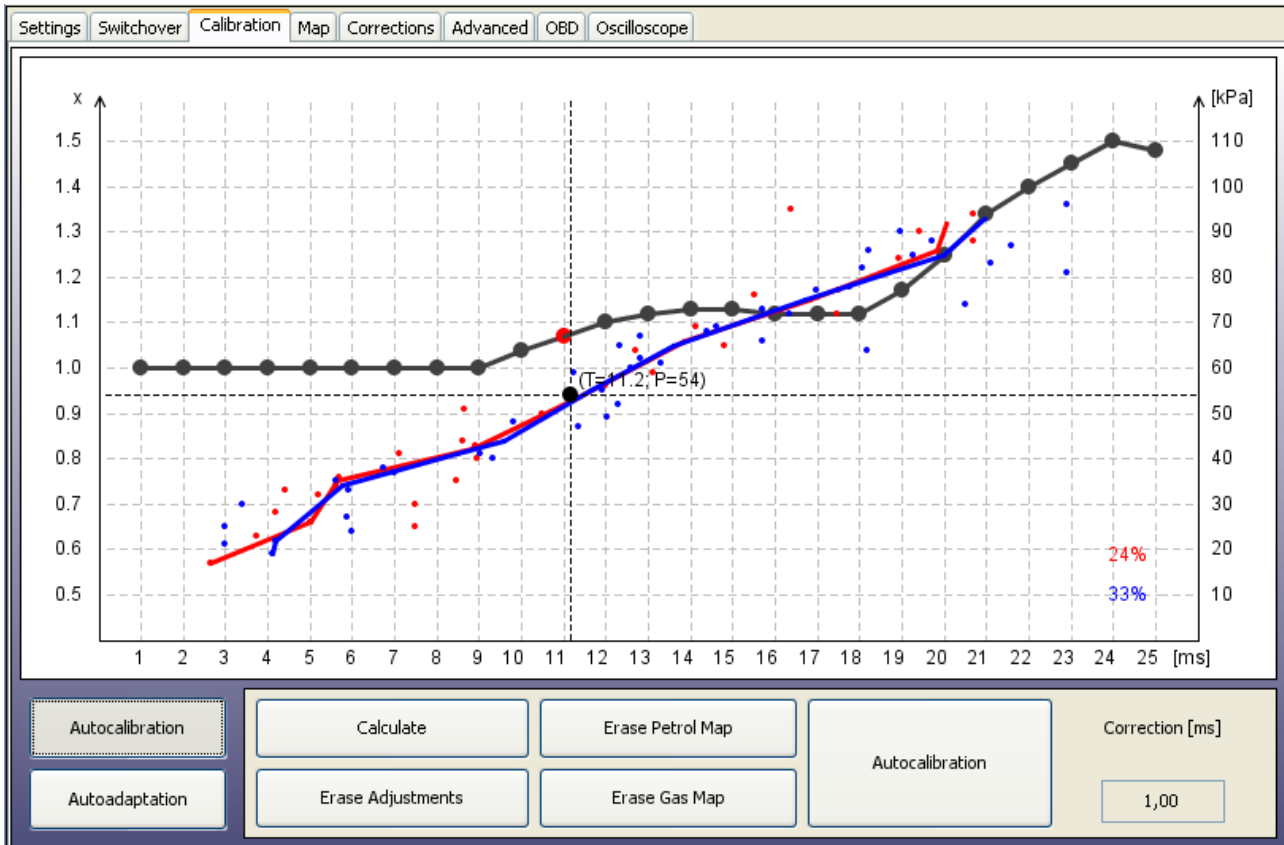
### 3.4. Calibration Panel

#### 3.4.1. Auto-calibration on idle



- Wait for the reducer to reach temperature of 50 C degree. The engine should be running on petrol, on idle revs, air-conditioning must be turned off.
- Press *Autocalibration* button and follow the instructions displayed during autocalibration process.
- If calculated *Correction [ms]* value after autocalibration will be within safe margins  $<0.5\text{ ms} - 2.5\text{ ms}>$  erase the petrol map (by pressing *Erase Petrol Map* button) and gas map (by pressing *Erase Gas Map* button), if not please change the injectors type/nozzle size or gas pressure and go back to point **3.4.1.a**).

### 3.4.2. Calibration Panel (self-adaptation during the drive)



- Go for a drive to collect petrol and gas maps (drive until 60% of both maps will be collected).
- If petrol and gas maps are not close enough to each other press *Calculate* button.
- Press *Erase gas map* button to erase old gas map and collect new one.
- If the map are not close enough You can do manual correction by moving multiplier line points, erase gas map (by pressing *Erase gas map* button) and go back to step **3.4.2.a**).
- If maps are close enough to each other You may turn Autoadaptation feature “ON” to prevent them from growing apart.

If everything has been installed properly 5 steps mentioned above should guarantee proper driving on both fuels. In more sophisticated cars there may be necessity of using features located in „Map”, „Corrections”, Advanced” and „OBD” bookmarks. To learn more details refer to later chapters of User's Manual located in “docs” folder attached to the software (Press “Help” bookmark to open that folder).