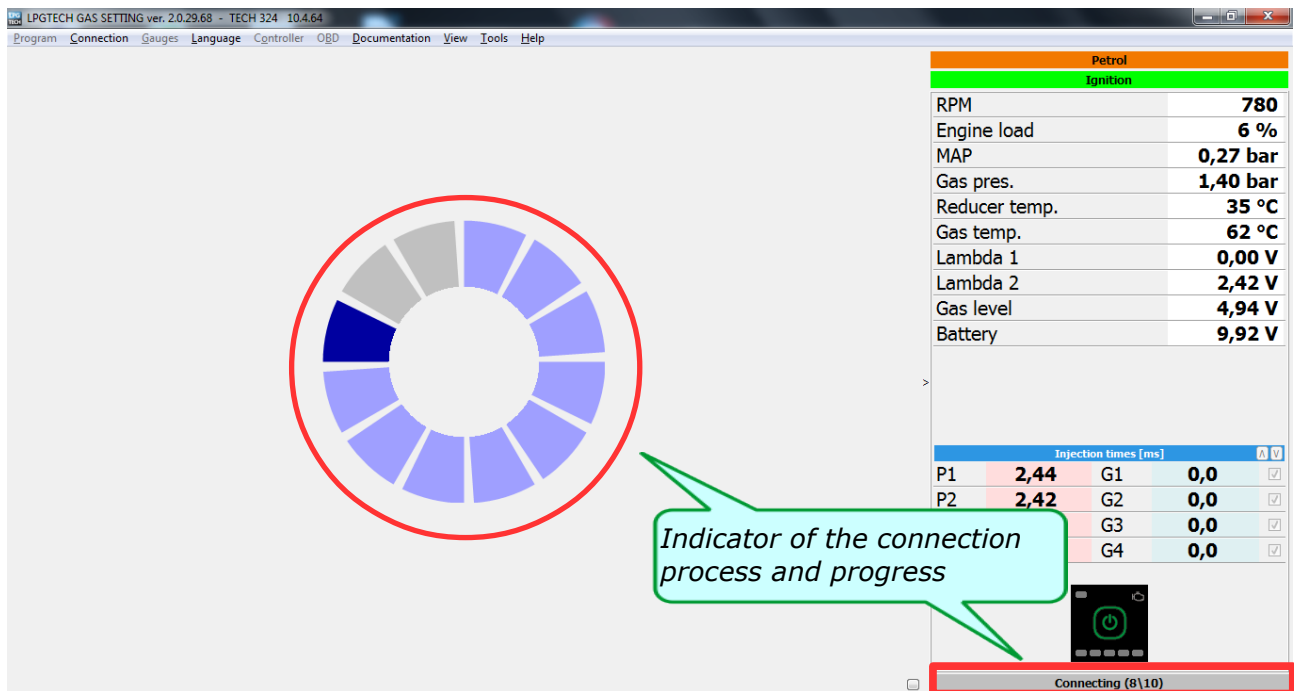
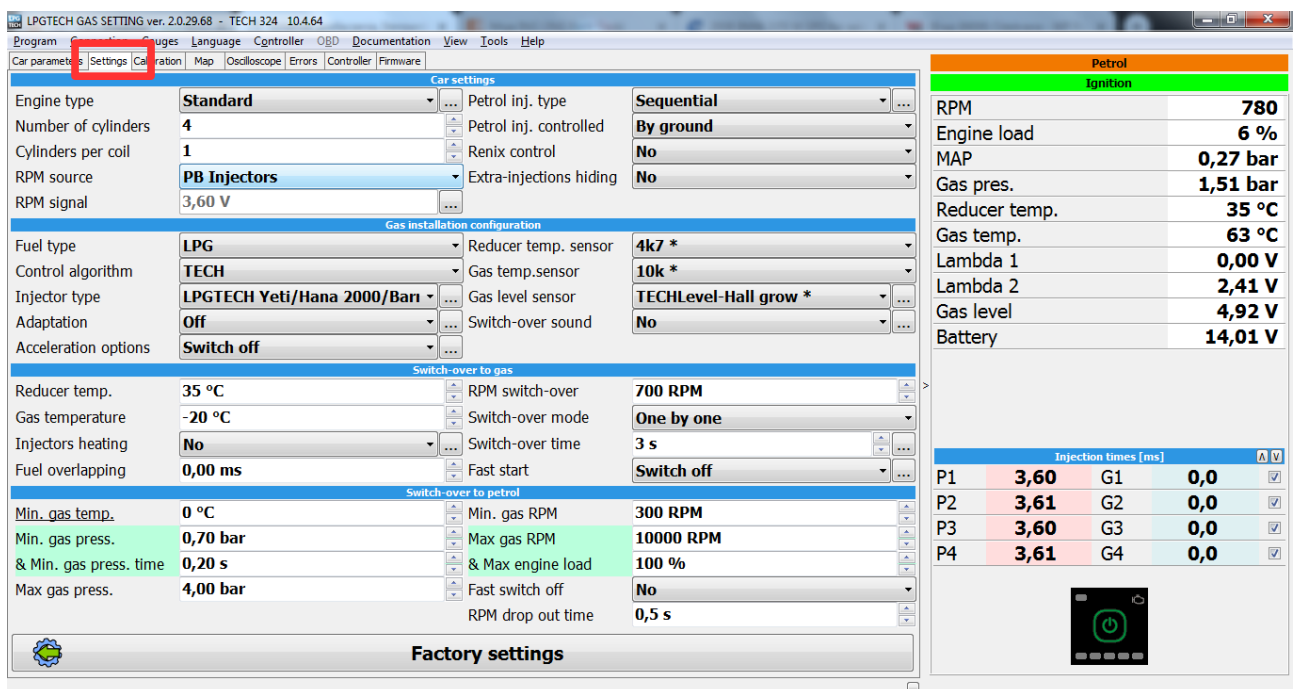


TUNING IN TECH SYSTEM

- I. Connect the diagnostic interface in to your computer.
- II. Run the LPGTECH Gas Setting software.



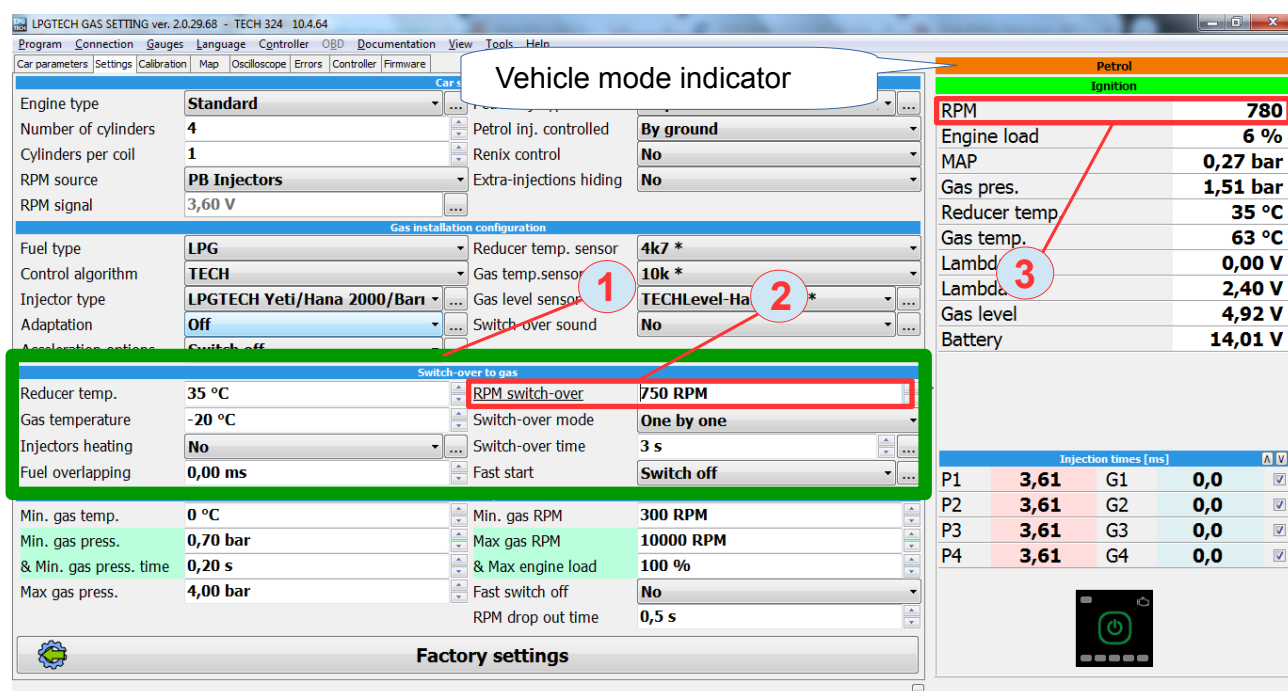
Img. 1. Window overlooking initiate TECH controller connection with a computer



Img. 2. Window < Settings> with view after connection process

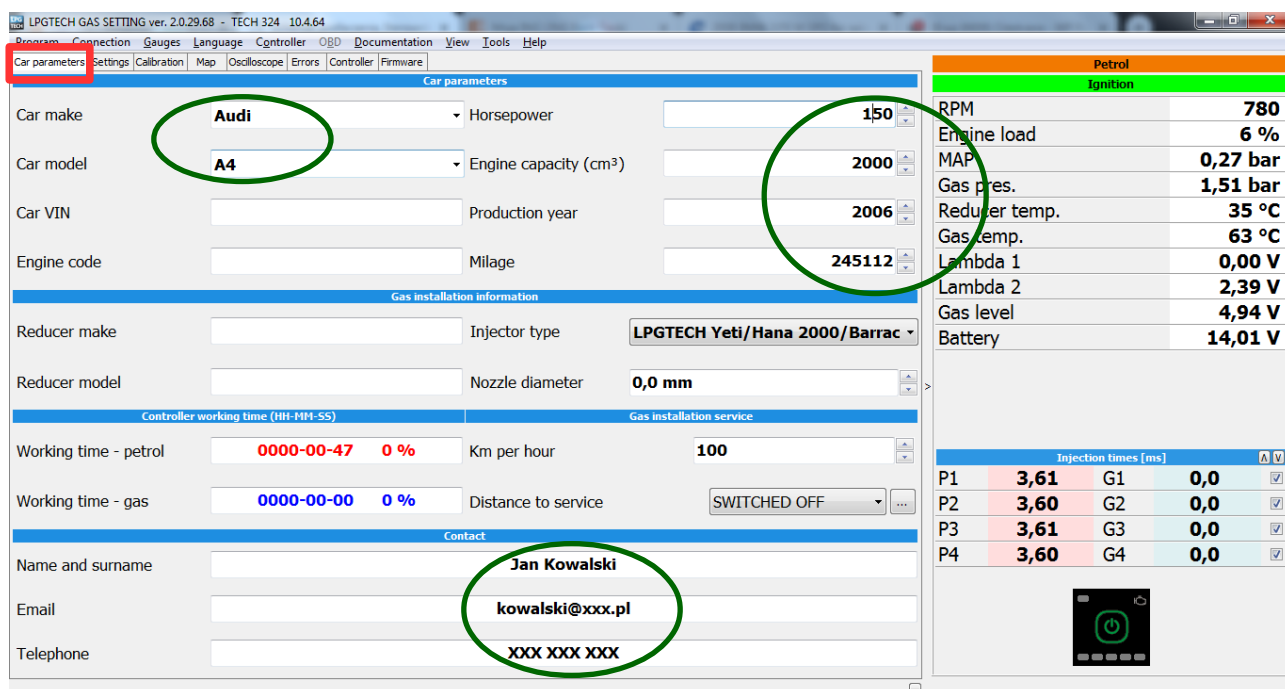
- III. Run the engine at idle. Switch to petrol using the button on the switcher.

a) In the **<switching to gas>** section (1) set the switching RPM speed (2), which should be below the engine speed to idle (3) [Img. 3].



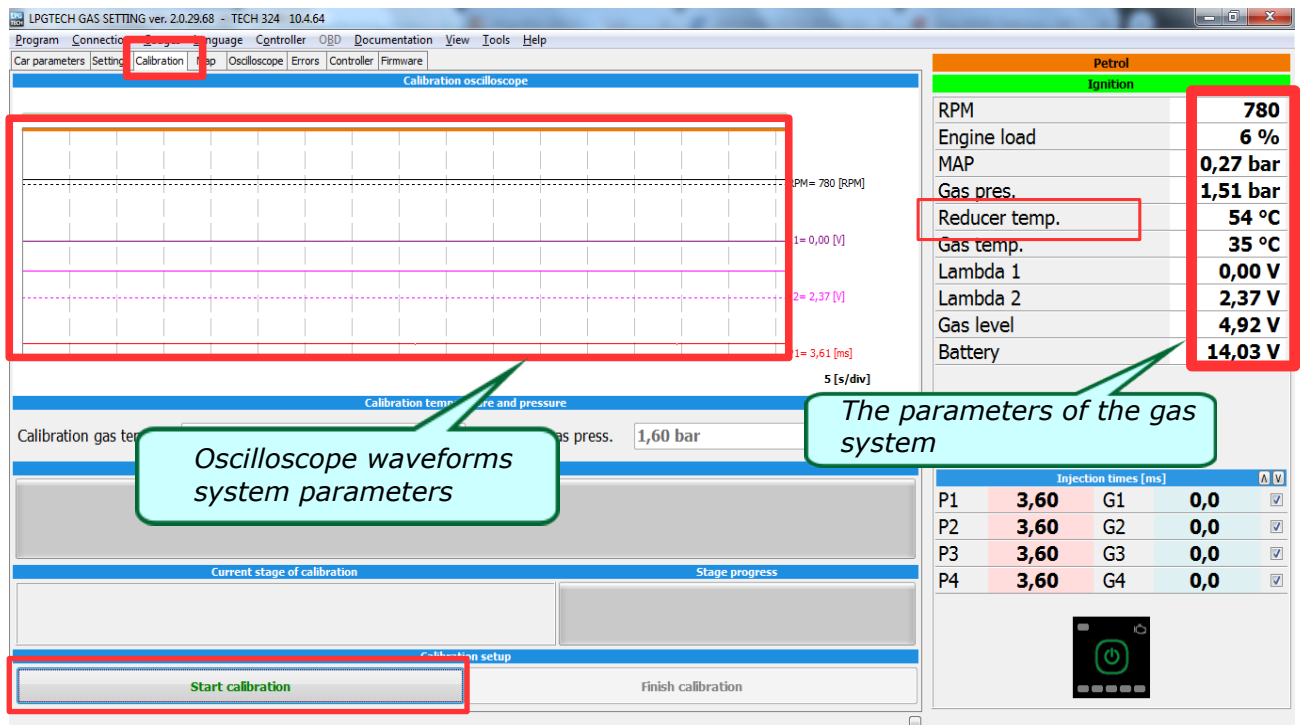
Img. 3. Window <Settings> with setting RPM speed to switch on the gas equal on 650 [RPM]

IV. For easier contact with LPGTECH support, we introduce the basic data - contact and information about the car. Enter the tab **<Car parameters>** [Img. 4].



Img. 4. Window <Car parameters> with, for example, the data entered

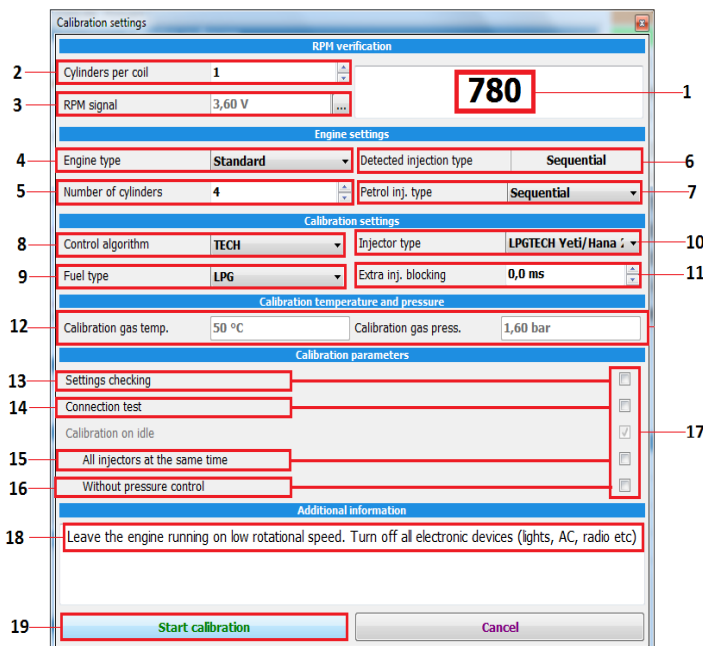
V. Then select the tab **<Calibration>** where we make auto-calibration process.



Img. 5. Window <Calibration> - on the right we have reducer temperature parameter: 54dg.

The auto-calibration should be performed with hot engine. If fact, the auto-calibration process will start at the temperature of 50 degrees however, the closer it is to the normal engine temperature of 90 degrees is better.

VI. If the reducer warmed up to above 50 degrees – press the button “start calibration”.



Img. 6. Additional window will allow verification of your basic settings and turn on the additional options.

- (1) Now we check the engine RPMs so the shown RPMs match the actual RPMs
- (2) According to the set number of cylinders per coil
- (3) You can stabilize the RPMs by regulating the RPM level.

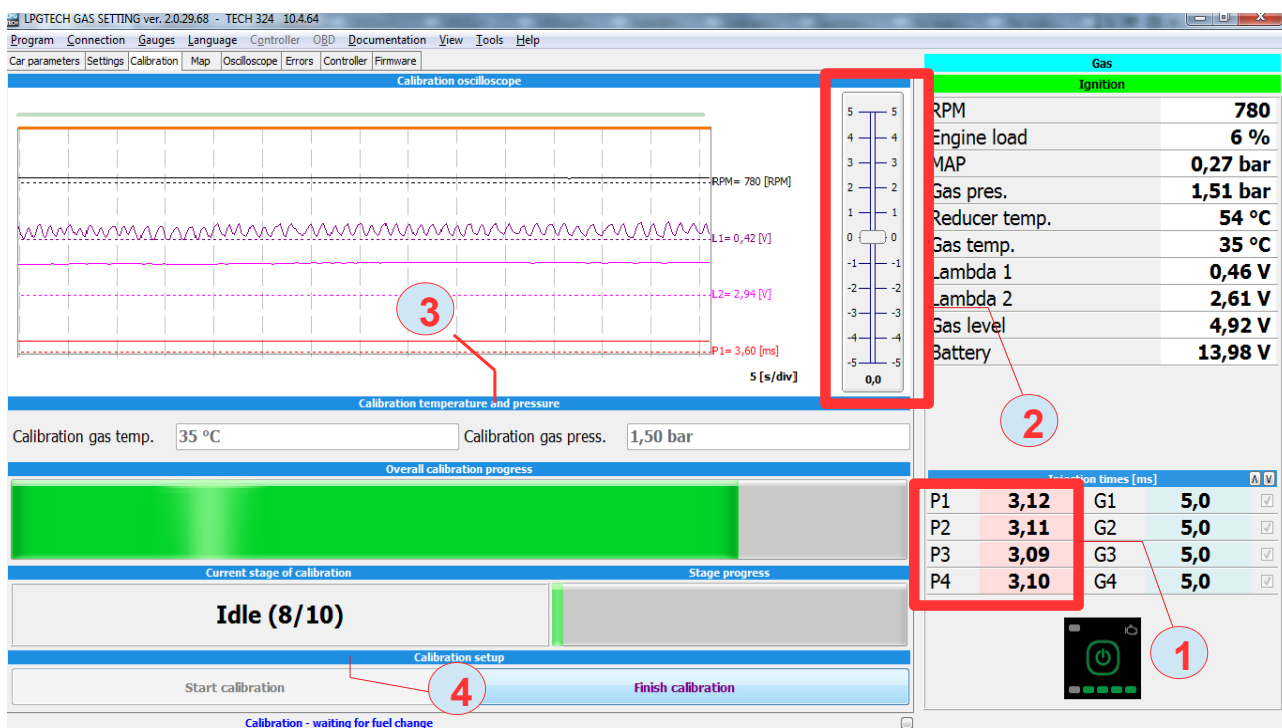
- (4) Chose the <engine type>.
- (5) Set the <number of cylinders>.
- (6) Check the detected injection type.
- (7) Here you can change the <petrol injection type> manually. Mostly, we leave it as <Sequential>
- (8) The Control algorithm – the settings show **TECH**
- (9) Chose the <fuel type>.
- (10) Chose the <injectors type> installed in the vehicle.
- (11) Set time of <Extra-injection blocking> if necessary.
- (12) The correct gas temperature and pressure readout will be available after auto-calibration process has finished successfully.
- (13) The setting check – it is an automatic verification of set parameters.
- (14) The connection test is the verification of the cylinder connection sequence.

CAUTION!

Auto-calibration assures the correct controllers settings and performance only at idle.

- (15) All injectors at ones – it is the way injectors will be turned on in full group engine.
- (16) No manifold pressure control – should be set in cars without throttle.
- (17) If you are sure that the settings and connections are correct, you can turn off the additional options.
- (18) As per instructions, your vehicle should remain on idle and all functions impacting the engine load such as heating or air-conditioning should be off.
- (19) Press <Start calibration>

VII. We expect to complete the auto-calibration.



Img. 7. Window with overall calibration progres

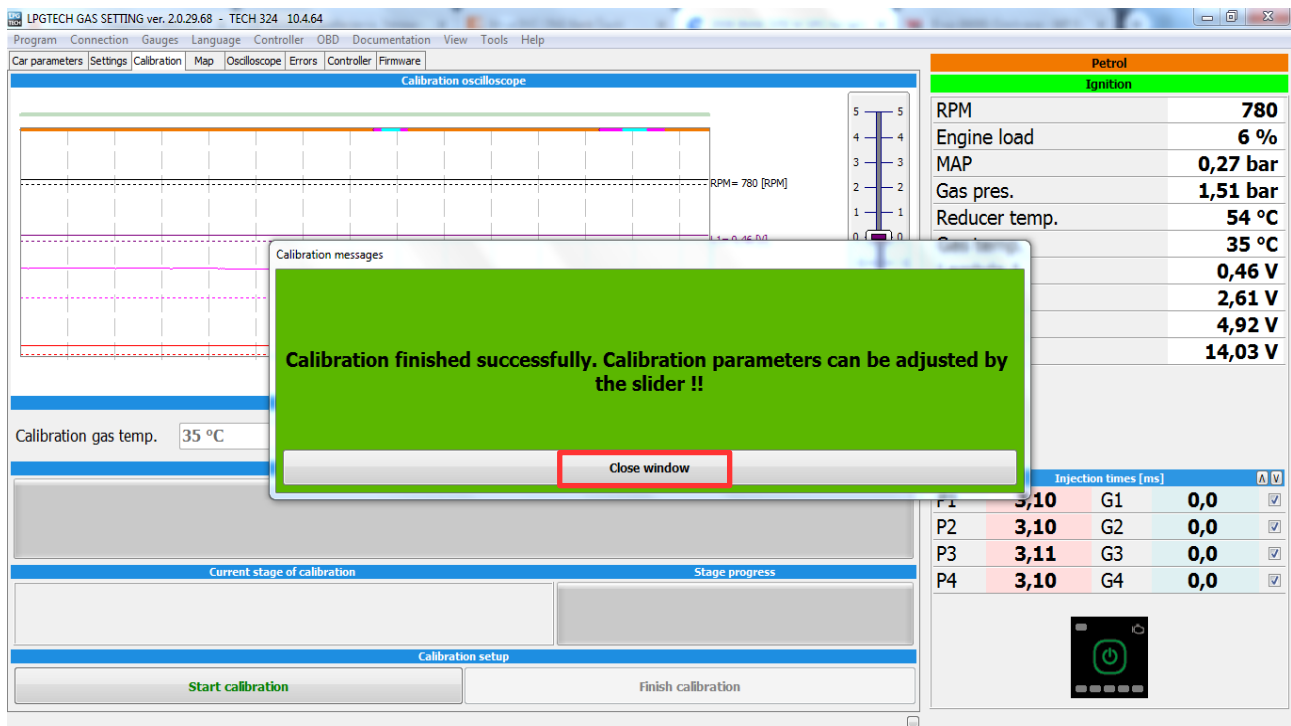
(1) Now, the controller will adjust the gas injection so that the petrol injection times while your vehicle is fueled by gas are unchanged from the petrol injection times while your vehicle is fueled by petrol.

(2) At the third step, the calibration slider will appear.

If necessary, you will be able to correct the gas injection time after auto-calibration manually with the slider, so the petrol injection time on LPG is identical with the petrol injection time on petrol.

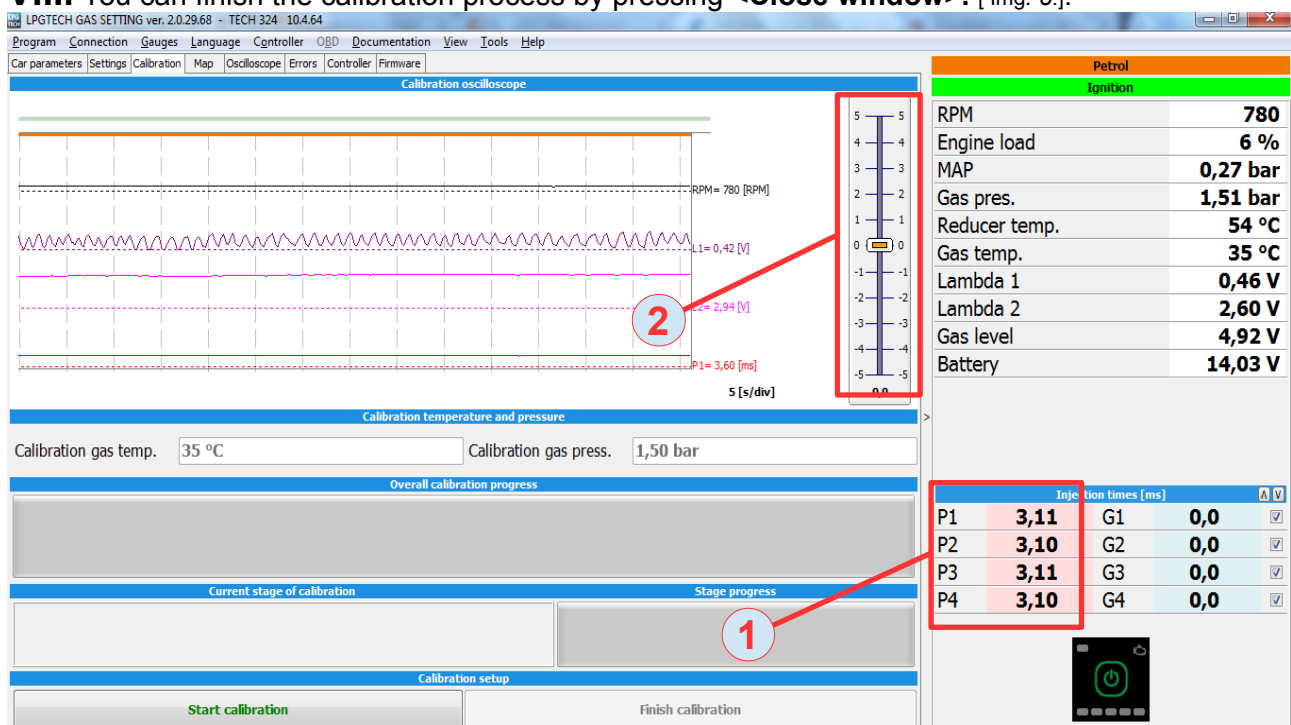
The change of auto-calibration parameters by the slider will be available only during auto-calibration.

- (3) Below, you will see auto-calibration temperature and pressure. Those values will be set in the program after auto-calibration.
- (4) In addition, you'll see the overall progress and detailed steps of the auto-calibration.



Img. 8. After completion of the calibration process, window appear with the message of the result

VIII. You can finish the calibration process by pressing <Close window>. [Img. 8].



Img. 9. Window after the calibration process with the available slider

- (1) Check petrol injection times – about 3,6ms.

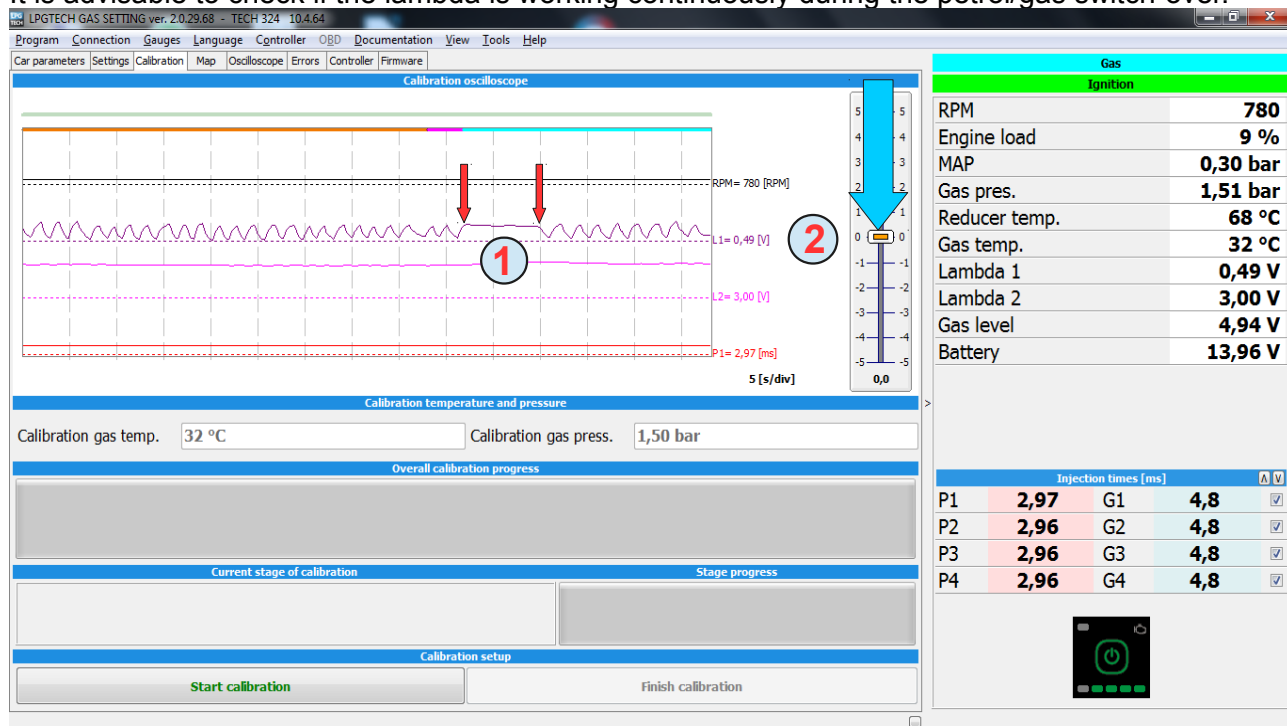
(2) We also have an option to correct auto-calibration parameters by the slider available after calibration.

IX. Switch to gas by using the button in switcher. Turn LPG on.



Img. 10. View after the switch on the gas with gas injection times

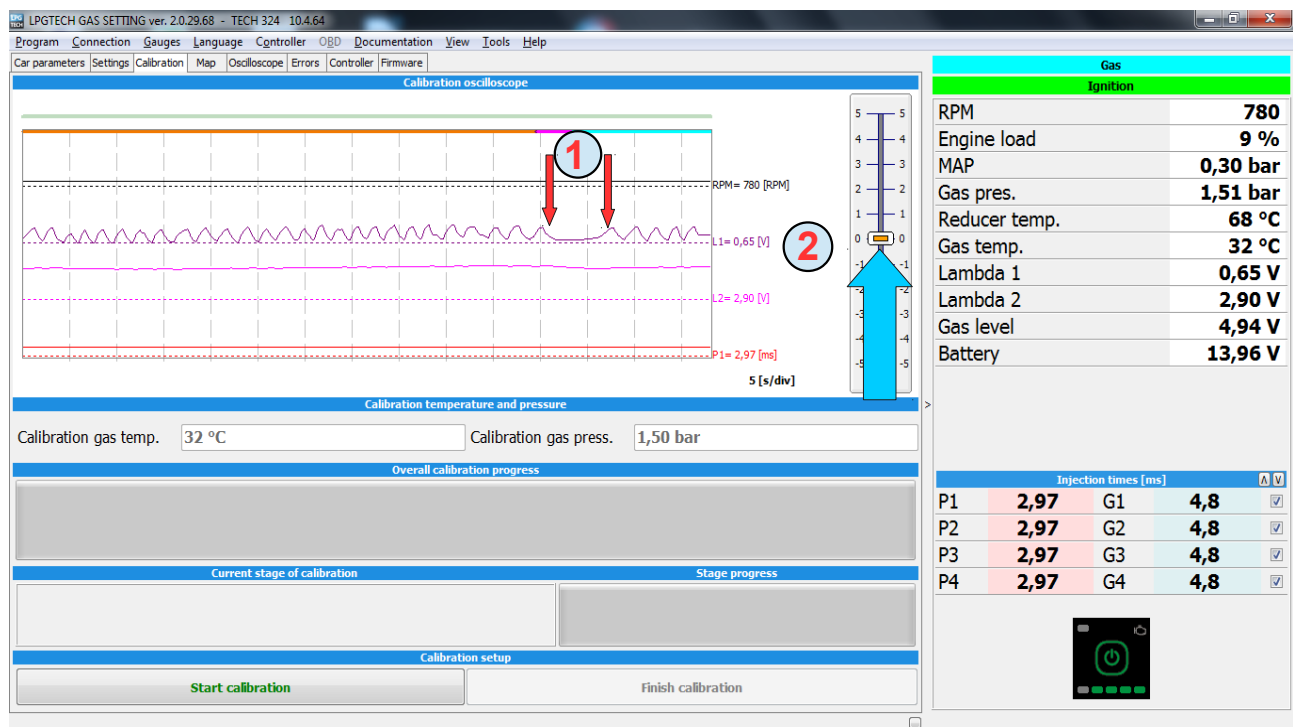
It is advisable to check if the lambda is working continuously during the petrol/gas switch-over.



Img. 11. Example overlooking oscillating lambda sensors

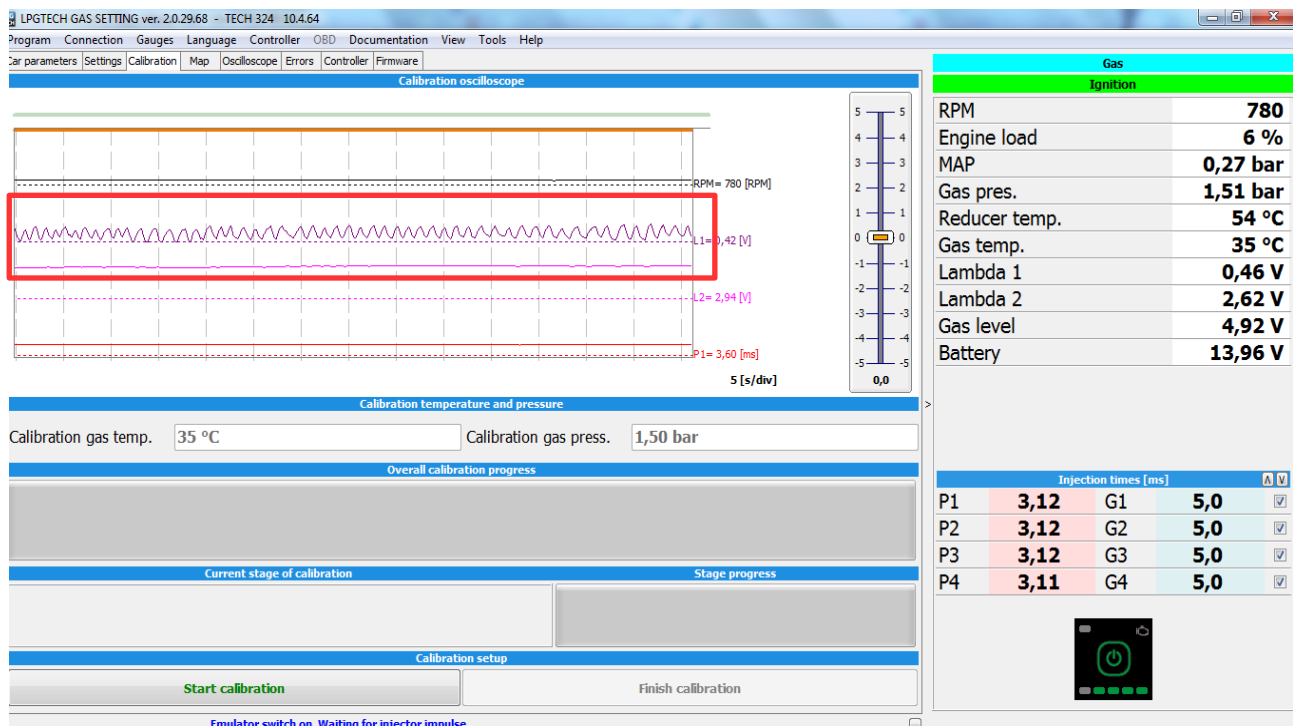
When oxygen sensor indicate is frozen on ~0.8-1V after switching over to gas it means that

mixture is too rich **(1)** for a long time remain in the upper position this means that the fuel mixture is too rich you correct it by moving the slider **(2)** downward.



Img. 12. Example overlooking oscillating lambda sensors

If the lambda readout stays down **(1)**, the fuel mixture is too lean. It is then possible to correct it by moving the slider **(2)** upward.

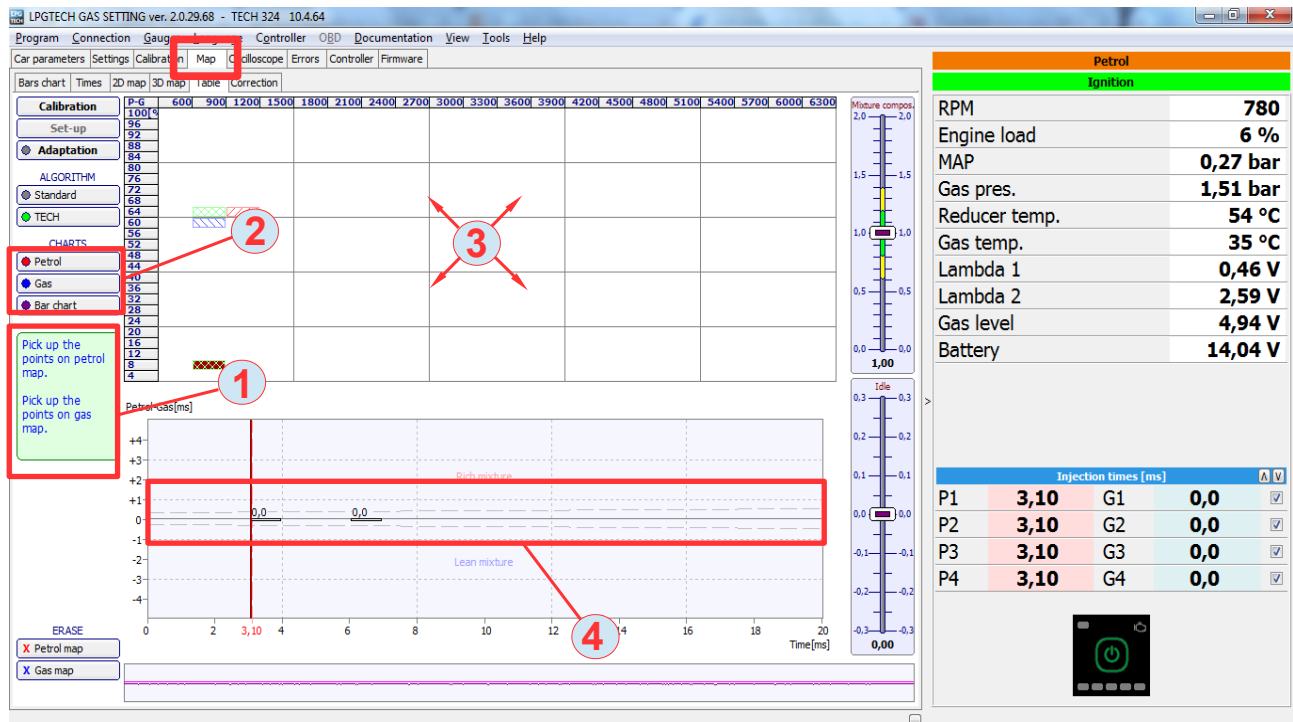


Img. 13. View oscillations lambda sensors after proper calibration of the system

If your calibration is done correctly, the lambda readout will be shown in fluent waving motion.

X. If at the turn on gas, times petrol on petrol work and petrol on gas work did not change, we can complete the calibration. Back to petrol.

XI. Now we go to the <MAP> tab and switch <Table>.



Img. 14. After selecting <Map> tab, go to the <Table> tab

The information **(1)** [Img.14] in this tab, tells us that we need to collect maps for both fuels. During the map collection, you can create an additional load for the engine by turning on the air-conditioning, heating or headlights.

a) Your driving at the beginning, should not be too aggressive. At first, you should set as many engine load areas as possible at about 2 thousand RPMs.

b) When you get to about 90 -100% engine load, you should slowly increase the RPMs and observe the subsequent injection times.

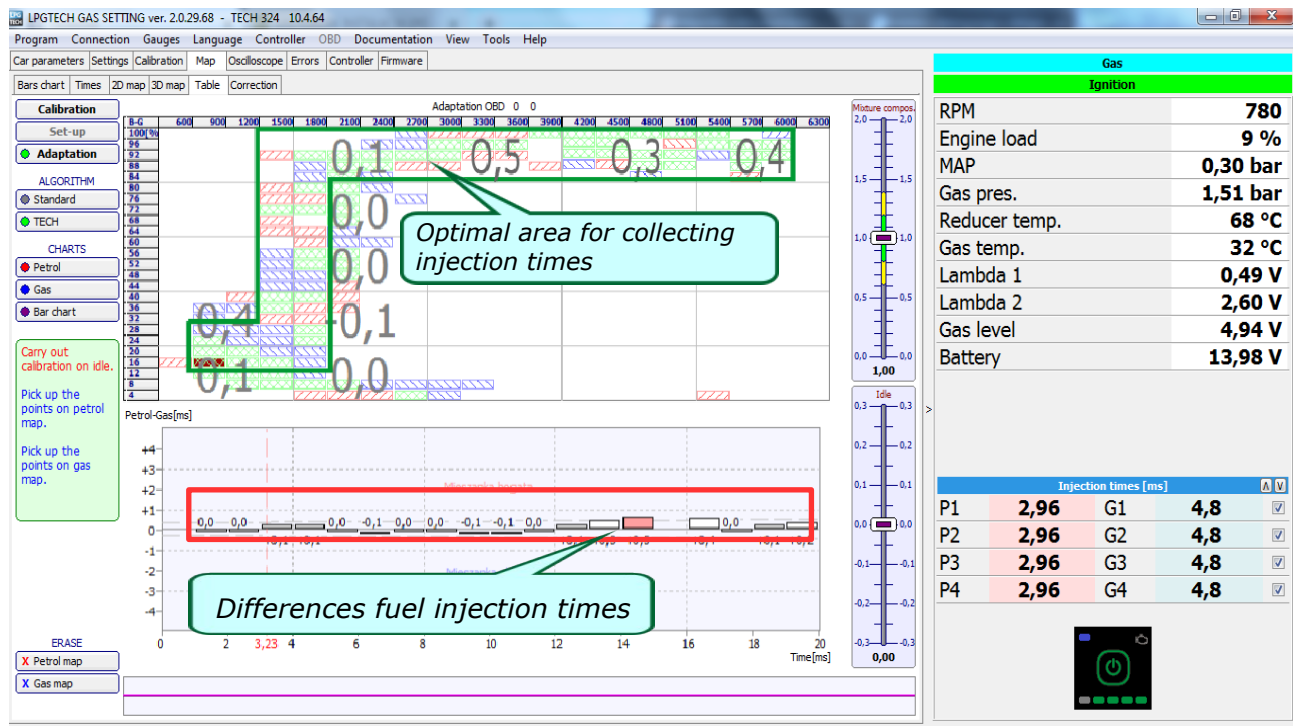
c) After the basic petrol map is collected – you should switch to the gas. [img.15].

Having the diagrams of petrol and gas on **(2)** [Img.14], you will see in the Table the timing differences. Petrol injection **(3)** [Img.14, 15].

Simultaneously, those differences will appear on the vertical diagram **(4)** [Img. 14, 15].

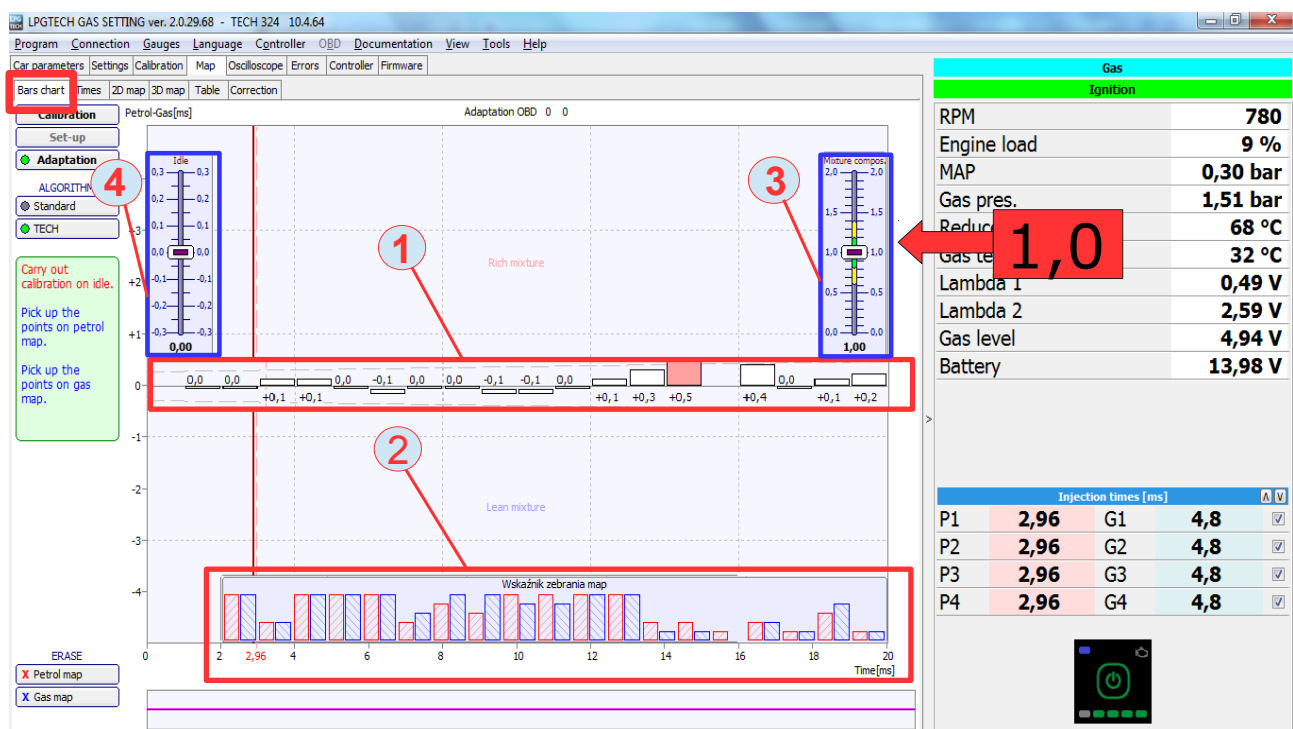
XII. While driving, first we collect the map at the whole range of RPMs at about 2 - 2,5 thousand RPMs and then we turn our attention to RPMs and collect the map at full power [Img.15].

XIII. Now, we will take a look at the collected map.



Img. 15. Result collect fuel map - at the top of the table view. Bar graph at the bottom.

As we can see, in the diagram, we have basic range of injection timing in optimal engine load and RPMs. This range is enough to quickly adjust gas installation because as you can see on the fuel injection indicator diagram, we have full range of injection times.



Img. 16. Indicators gather maps for injection times are available under the <Bars chart> tab.

In this example [img.16] bars showing the fuel injection time differences **(1)** are within the acceptable range $\pm 0,5\text{ms}$, so mixture slider **(3)** leave on the 1,0 value. Possible correction of deviation (difference of fuel injection times), separately in terms of idling can be performed using the slider idle **(4)**.

CAUTION!

Note that the optimal range of the slider reduces green field.

a) If we have the situation when the slider is moved beyond the green area then the enriched mixture with small nozzles diameter, will prolong gas injection times which will cause the system to looping the gas injection.

This will cause the warning *"Multiplier too high. Use the nozzles with larger diameter"*

b) In the case lean mixture, when slider is beyond green area, with too large diameter nozzles, results in a less precise regulation of installation and in effect higher gas usage.

This will cause the warning *"Multiplier too low. Use the nozzles with smaller diameter"*

XIV. The optional slider setting for the properly set installation is in the middle, meaning value 1, which will also mean the correct choice of nozzles diameter.