



LPG CONTROLLER INSTALLATION MANUAL

**TECH-104, TECH-114,
TECH-204, TECH-214,
TECH-304, TECH-316, TECH-318,
TECH-504, TECH-516, TECH-518**

CONTROLLER PROGRAMMING MANUAL

LPGTECH GAS SETTING 1.0.0.27

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Quick start

- Mount the LPG system into the car.
- Tank a few gas units and check the tightness of the pressurized elements.
- Switch fuses for Tech installation.
- Connect your computer to the TECH driver.
- Start the **LPGTECH Gas Setting** software.
- Adjust the positioning in the **Settings** tab.
- Turn on the ignition switch without starting the engine.
- Check the data displayed in **Reading Panel**.
- Start the engine on petrol.
- Check the time index of petrol injection.
- Wait until the engine's temperature reaches more than 50°C.
- Perform **Calibration** at idle run.
- Collect the petrol index (petrol injection time map when on petrol).
- Collect the gas index (petrol injection time map when on gas).
- Check deviations between the maps.

1. LPG INSTALLATION – GENERAL OVERVIEW

Before installing the LPG into a vehicle, one you must:

- Check the overall vehicle condition.
- Check the condition of your engine and petrol system - OBD diagnozer.
- Determine which type of installation is appropriate for the vehicle (consider electronics, injectors, reducer).
- Locate the points where the electrical system is connected - see the wiring diagram of the vehicle.
- Select the gas tank and determine the location of its mounting.
- Designate the location for a gas refueling valve.
- Determine the location for the TECH controller installation.
- Designate the location in the cab where the LED switchboard should be mounted.
- Determine the location for mounting the pressure regulator and the injectors.
- Disconnect the vehicle battery.
- Start the installation process.

2. TECH CONTROLLER INSTALLATION IN VEHICLES

- TECH drivers should be always installed with joints heading up (see arrow on the cover) – so that it is possible to disconnect the joints from the driver.
- Only the above mentioned configuration protects the controller from any possible flooding.
- The location of this installation cannot be exposed to humidity or high temperatures.
- The fuses and the programming joint mounted on the wiring loom should be visible and easily accessible.

3. LED SWITCHBOARD INSTALLATION AND USAGE

- The LED switchboard mounted in the cab should be visible for the driver.
- Beeper, a signaling device should be audible for the driver.
- When the installation of the beeper is done the sealing tape should be removed from the loudspeaker.

3.1. Installing the LED switchboard in the driver's cab

- Designate the location of the switchboard on the dashboard.
- Bore a hole (9 mm diameter).
- Put a double-sided tape beneath the switchboard.
- Connect the wires with the beeper.
- Stick the switchboard into the hole.

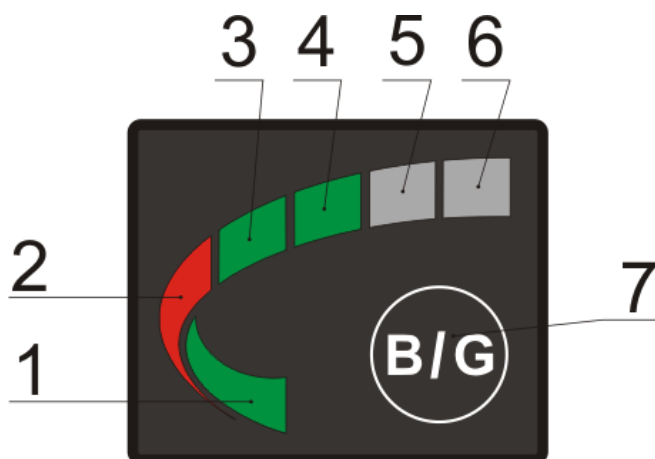


Figure 1. LED switchboard chart

- | | | |
|---|--------------------------------|--|
| 1 | - gas on indicator | - green |
| 2 | - gas reserves indicator | - red |
| 3 | - app. 25% of gas in the tank | - green |
| 4 | - app. 50% of gas in the tank | - green |
| 5 | - app. 75% of gas in the tank | - green |
| 6 | - app. 100% of gas in the tank | - green |
| 7 | - B/G | - changes the TECH Controller working mode |

- The LED switchboard indicates the controller's current working mode as well as the level of gas in the tank.
- The B/G button changes the controller's working mode. After igniting the engine the switchboard lights are on and indicate the gas level in the tank. Consecutive pressing on the B/G button changes the controller's working mode.

3.2. Working modes indication on the GAS ON Indicator (Pos. 1 in Fig. 1)

- | | |
|-----------------------|---|
| • no light | - on petrol |
| • flickering steadily | - waiting for correct gas parameters when switching |
| • fixed light | - on gas |
| • short flashes | - on petrol due to gas shortage |

3.3. Sound signals for errors during operating

Action	„Click” Click	“OK” short signal	„Error” long signal	„Pressure error” two long signals
Button	X			
Service			X	
Switching and working on gas				
Emulator switching signal (if connected)	X			
Gas pressure error and switching back to petrol				X
Switching error and switching back to petrol			X	
Powering system error and switching back to petrol			X	
Minimum reducer temperature and switching back to petrol			X	
Calibration on idle run				
Start		X		
Finish		X		
Error			X	
Calibration of gas level indicator				
Start		X		
Finish		X		
Error			X	

3.4. Auto-calibration of the LPG level indicator

It is possible to perform an auto-calibration of the LPG level indicator. This function automatically chooses the LPG level sensor type and sets the appropriate LPG level voltage thresholds.



WARNING!

The calibration is possible only when the tank is empty and when you need to fill it up.

To perform the LPG level indicator calibration you should fill the LPG tank up following these steps:

- Go to the LPG station.
- Keep the engine on; press and hold the B/G button on the switchboard.
- Turn off the ignition switch while still pressing the B/G button.
- Release the B/G button – the diodes will turn on periodically (from the lowest to the highest LPG level indication)
- Fill the LPG tank up.
- Turn on the engine.
- The auto-calibration has been finished.

The voltage thresholds that have been set automatically can be changed when needed using the **Settings** tab, *LPG level indicator* button.

If we want to check operation of the gas level indicator, we can remove it from multivalve and rotate it to check its operation and range. LEDs in switchboard and in software will change their state only when the engine is off and the ignition switch is on. After RPMs appearance, high time constant is turned on and the LEDs indicator reaction is very slow to avoid continuous LEDs blinking because of gas fluctuation in the tank.

**WARNING!**

Setting the voltage levels manually should be performed only when the engine is off and the ignition switch is on. If the engine is on the reaction will be slower.

3.5. Emergency engine launch while on LPG only

It is possible to launch the engine when there is only LPG in the tank. However it should be remembered that it is an emergency situation and a few precautions should be taken:

- Turn off the ignition with the ignition switch key– ‘0’ position on the ignition switch.
- Press the B/G button on the LED switchboard.
- Holding the B/G button start the engine with the ignition switch key.

**WARNING!**

After performing the above emergency engine launch you should wait until the engine's temperature is adequate so that the reducer can work properly. The Engine's Temperature Indicator should show app. 40°C (104 °F) Otherwise the reducer can freeze, which will start engine again. The reducer or any engine element may also be damaged.

4. CONNECTING THE TECH CONTROLLER ELECTRICALLY TO THE VEHICLE'S INSTALLATION

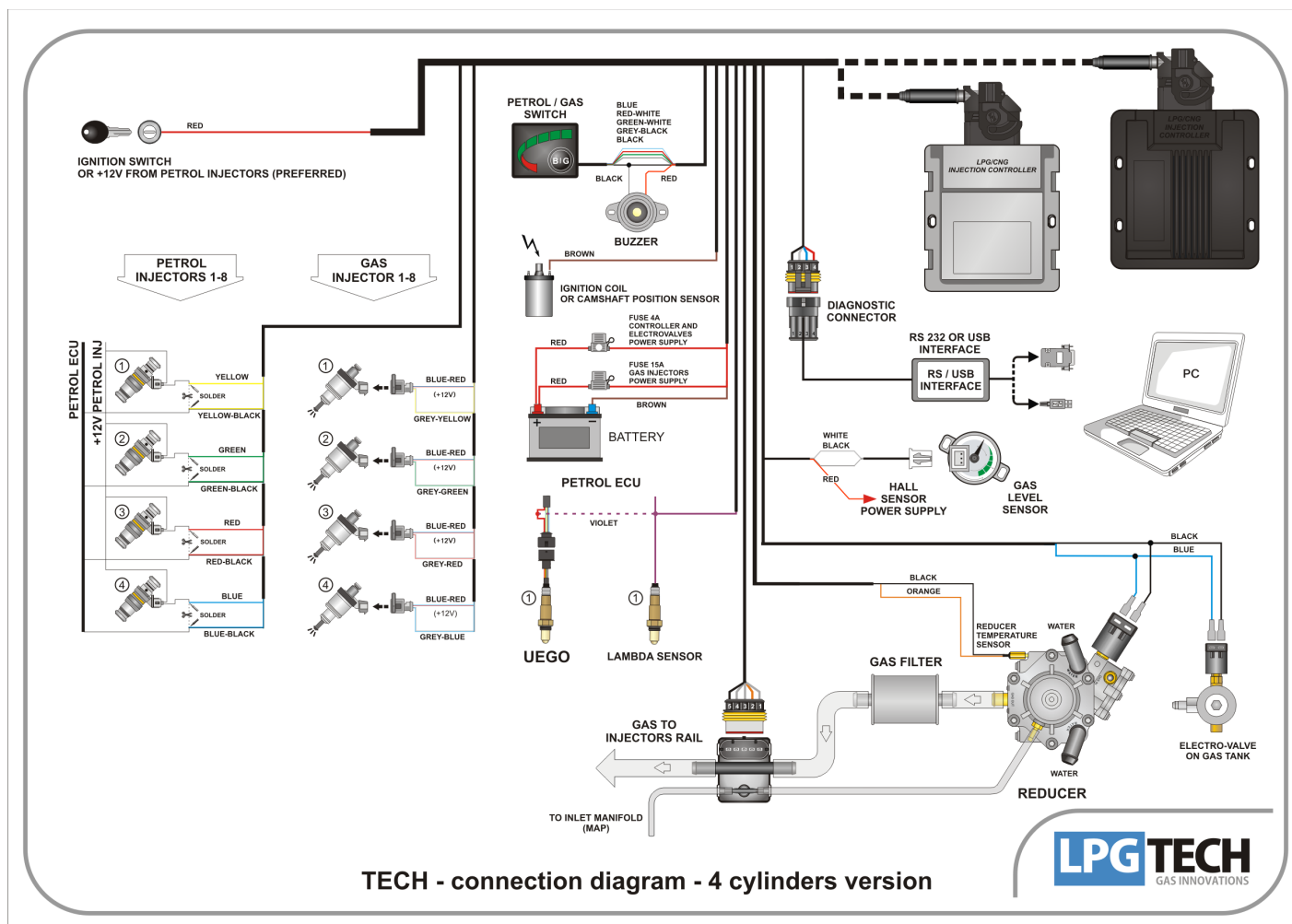


Figure 2. Connection diagram – 4 cylinders



Figure 3. Connection diagram – 6 and 8 cylinders version

- The TECH system should be installed in the vehicle accordingly to the above mentioned diagrams.
- You should pay much attention to the wire colors.
- It is prohibited to perform any action that would alter the connections as well as to make any changes in the electrical bundle.
- If you must differentiate between the injector and the controller supplying wires you should proceed accordingly to the following directions:
 - Take off both of the fuses.
 - Put the fuse 4A into one of the two empty spaces – the light on the switchboard should turn on after launching the ignition switch – the wire connected with the fuse 4A is the wire supplying the controller.
 - If the light on the switchboard does not turn on – put the fuse 4A into the alternative empty space.

During connecting gas level sensor, red wire (on connection diagram - Hall sensor power supply) is used only to power Hall sensor. In case of use resistance sensors (2 wires) red wire is not connected and should be carefully isolated. Connecting to this wire high power receiver (for example: electro-valve) or short circuit to ground will cause power supply disconnecting and displaying the message in the software: Power supply error - no power supply of switchboard, pressure sensor and gas level sensor.

5. SELECTION OF THE REGULATOR



WARNING!

It is very important to select the proper regulator on the basis of a given engine power. Using regulators that do not have enough power will result in limited engine power when on LPG. It may also cause engine error signals and uncontrolled car's behavior while driving.

- If the car's engine power exceeds 200 HSP two regulators should be installed in parallel with each other.
- LPG nominal pressure should range from 0,9 bar to 1,6 bar.

6. SELECTION OF INJECTOR NOZZLES

- When selecting the diameter of injector nozzles you should consider the injectors type, the number of cylinders and their power, the type of engine's controller and regulator's nominal pressure.
- Nozzles should be chosen in accordance with the nozzle producer guidelines along with the LPGTECH Gas Setting software directions.

Power per 1 cylinder (HP)	Recommended nozzle diameter (mm)
10	1,6
15	1,8
20	2
25	2,2
30	2,4
35	2,6
40	2,8
45	3
50	3,2

Table 1. Selecting injector nozzles diameter depending on the engine power per cylinder (LPG pressure ~ 1,2 bar)



WARNING!

When the 'Injection Mode' is set to „FullGroup”, LPG is injected after two petrol injections. In this case the nozzles diameters should be 20-25% bigger than those in Table 1.

7. DIAGNOSTIC SOFTWARE AND CONTROLLER CONFIGURATION

7.1. Installing LPGTECH Gas Setting software on PC

- Download the software from the website www.lpgtech.pl.
- Launch **LPGTECH Gas Setting Setup.exe**.
- Proceed according to directions, choose installation parameters and perform consecutive installation steps.
- Do not stop installation process as it will cause software malfunction.
- Install a USB interface controller if your computer does not have one already installed.
- Connect the TECH Controller to PC via USB interface.
- Launch LPGTECH Gas Setting.

**WARNING!**

If you decide to change the version of the software you always need to perform the installation.

7.2. Main Menu

Main

- Settings – opens section for detail personalization
- Authorization settings – you can perform the registration and set authorization details
- Save setting to a file
- Load settings from a file
- Finish

Connecting – setting communication with the controller

- Connect / Disconnect
- Auto-injection – the software finds the proper connection port automatically
- Ports, the port to which the controller should be connected is tagged

Parameters – displaying respective car and LPG installation parameters in separate windows

- Engine Revolution Frequency (RPM)
- Engine Load
- Collector's pressure/Suction Collector Pressure
- LPG pressure
- Regulator's temperature
- LPG temperature
- Lambda 1
- Lambda 2
- Battery voltage

Language – choose language

- Polish
- English

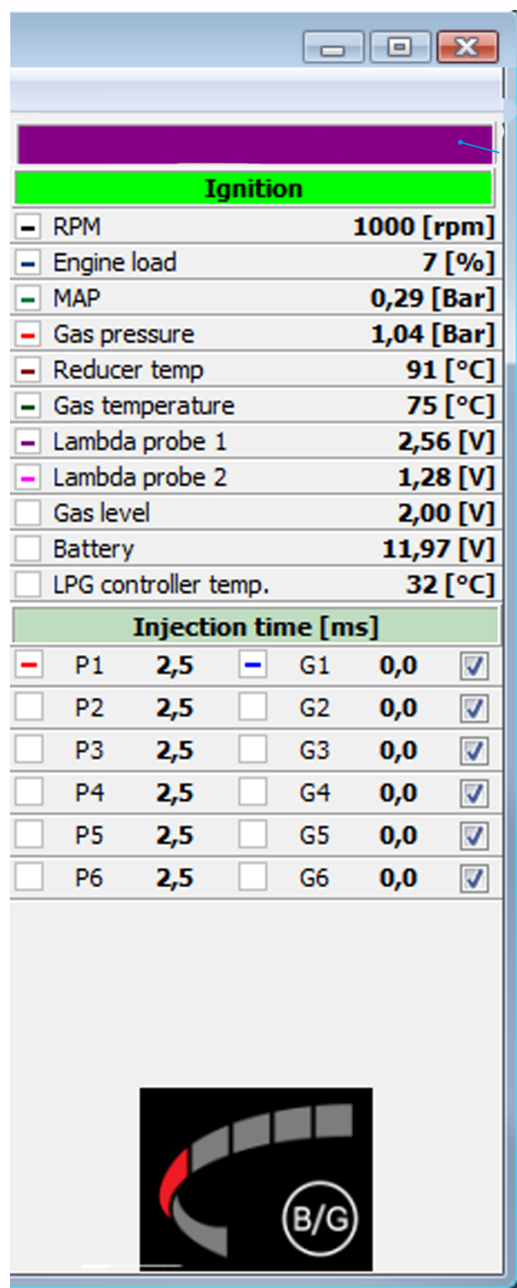
Controller – controller parameters

- Controller information
- Software update
- Beeper test
- History – a window listing all the messages and changes in controller mode.

Documentation – opening a folder with technical documentation.

Help

- About – software information
- FTDI controller installation
- PL2303 controller installation

Current Parameters window:


The screenshot shows the 'Current Parameters' window. At the top, there is a purple bar (Working mode indicator) and a green bar labeled 'Ignition' (Ignition switch indicator). Below these are various parameters with checkboxes and values:

- ☐ RPM: 1000 [rpm]
- ☐ Engine load: 7 [%]
- ☐ MAP: 0,29 [Bar]
- ☐ Gas pressure: 1,04 [Bar]
- ☐ Reducer temp: 91 [°C]
- ☐ Gas temperature: 75 [°C]
- ☐ Lambda probe 1: 2,56 [V]
- ☐ Lambda probe 2: 1,28 [V]
- ☐ Gas level: 2,00 [V]
- ☐ Battery: 11,97 [V]
- ☐ LPG controller temp.: 32 [°C]

Below these is a section titled 'Injection time [ms]' with a table of parameters:

Parameter	Value	Unit	Checkmark
P1	2,5		☒
P2	2,5		☐
P3	2,5		☐
P4	2,5		☐
P5	2,5		☐
P6	2,5		☐
G1	0,0		☒
G2	0,0		☒
G3	0,0		☒
G4	0,0		☒
G5	0,0		☒
G6	0,0		☒

At the bottom of the window is a graphic of a switchboard with a red arc and a button labeled 'B/G'.

Annotations on the right side of the window:

- Working mode indicator
- Ignition switch indicator
- Current parameters
- Diagram line color for particular parameters (visible only in Oscilloscope Tab)
- Petrol and LPG injection times
- Turning on/off particular LPG injectors
- The switchboard installed in the cab displaying LPG level
- B/G button switching between LPG and petrol

Figure 4. Current Parameters window

7.3. Parameters and Controller Setting Tabs

7.3.1. 'Car Info'

You should specify the car's and regulator's information as well as the nozzle diameters. This information will be used to perform vehicle's settings backup.

LPGTECH Gas Setting ver. 1.0.0.28 - TECH 516 ver. 2.6.12

Program Connection Gauges Language Controller Documentation Help

Car parameters **Settings** Calibration Map Oscilloscope Errors

Information about car

VIN: 1Y*****
 Car make: Mazda
 Car model: 6
 Engine code: *****
 Engine capacity: 3
 Horsepower: 158KW
 Production year: 2008

Information about gas installation

Reducer: SHARK
 Jet diameter: 2,5 [mm]

Additional information

Gas

Ignition

RPM: 1000 [rpm]
 Engine load: 7 [%]
 MAP: 0,29 [Bar]
 Gas pressure: 1,04 [Bar]
 Reducer temp: 77 [°C]
 Gas temperature: 75 [°C]
 Lambda probe 1: 2,56 [V]
 Lambda probe 2: 1,27 [V]
 Gas level: 1,98 [V]
 Battery: 11,89 [V]
 LPG controller temp.: 31 [°C]

Injection time [ms]

P	Value	G	Value	Check
P1	2,5	G1	4,5	☒
P2	2,5	G2	4,6	☒
P3	2,5	G3	4,6	☒
P4	2,5	G4	4,6	☒
P5	2,5	G5	4,6	☒
P6	2,5	G6	4,6	☒

B/G

Figure 5. 'Car Info' tab

7.3.2. 'Settings'

The classification of all the parameters required to perform vehicle's configuration.

Figure 6. 'Settings' tab

7.3.2.1. 'Car Settings' group contains:

- Engine type – select engine type: normally aspirated engine without supercharger or Turbo – supercharged engine
- Number of cylinders – set the number of cylinders.
- Number of cylinders per coil – set the number of cylinders per coil. The impulses originate from the coil or camshaft position sensor. Selected value should represent the adequacy between the RPM signal in the software and the motor's factual RPM.
- RPM signal – RPM detection threshold. For RPM signals originating from ECU set the detection threshold to app. 2,5 V, for RPM signals originating from ignition coil to more than 6 V.
- Injection Mode / Detecting Injection Mode – type of controlling petrol injectors and detecting the type of such injection. If the 'FullGroup' is on LPG is injected after every two petrol injections.
- Type of Control – set the type of control for petrol injectors: driven by '+' or ground.
- Renix – set control for the Renix injectors.
- Supply pressure – the pressure value bigger than the atmospheric one for supercharged engine.

7.3.2.2. 'LPG configuration' group contains:

- **Petrol type** – select the type of petrol.
- **Controlling algorithm:**
 - STANDARD** - used commonly, this gas injection algorithm requires setting the gas injection time multiplier at multipoint. Used in older models due to their limitations.
 - TECH** - this advanced algorithm eliminates the need to prepare the multiplier map and adjusts gas controlling to modern car's highest standards.
- **Injector type / LPG injections corrections** – you can set the type of the injector mounted in the car and open the window enabling LPG injector's corrections.
- **Adaptation / Adaptation settings** – sets multiplier self-adaptation on the basis of the maps collected along with corrections of OBD modules.
- **Regulator's Temperature Sensor** – you can set the type of sensor to measure regulator's temperature. You can use the default settings of Sensor „4k7 (TECH)" which is included in the set.
- **LPG Temperature Sensor** – you can set the type of sensor to measure LPG temperature. You can use the default settings of Sensor 10k (PTS-01) which is included in the set.
- **LPG Level Sensor / Setting LPG Level Sensor** – you can set the sensor type to measure LPG level in the tank and open a window to set voltage thresholds for particular LEDs. When you perform LPG indicator auto-calibration the sensor type and LED voltage thresholds will be already set.

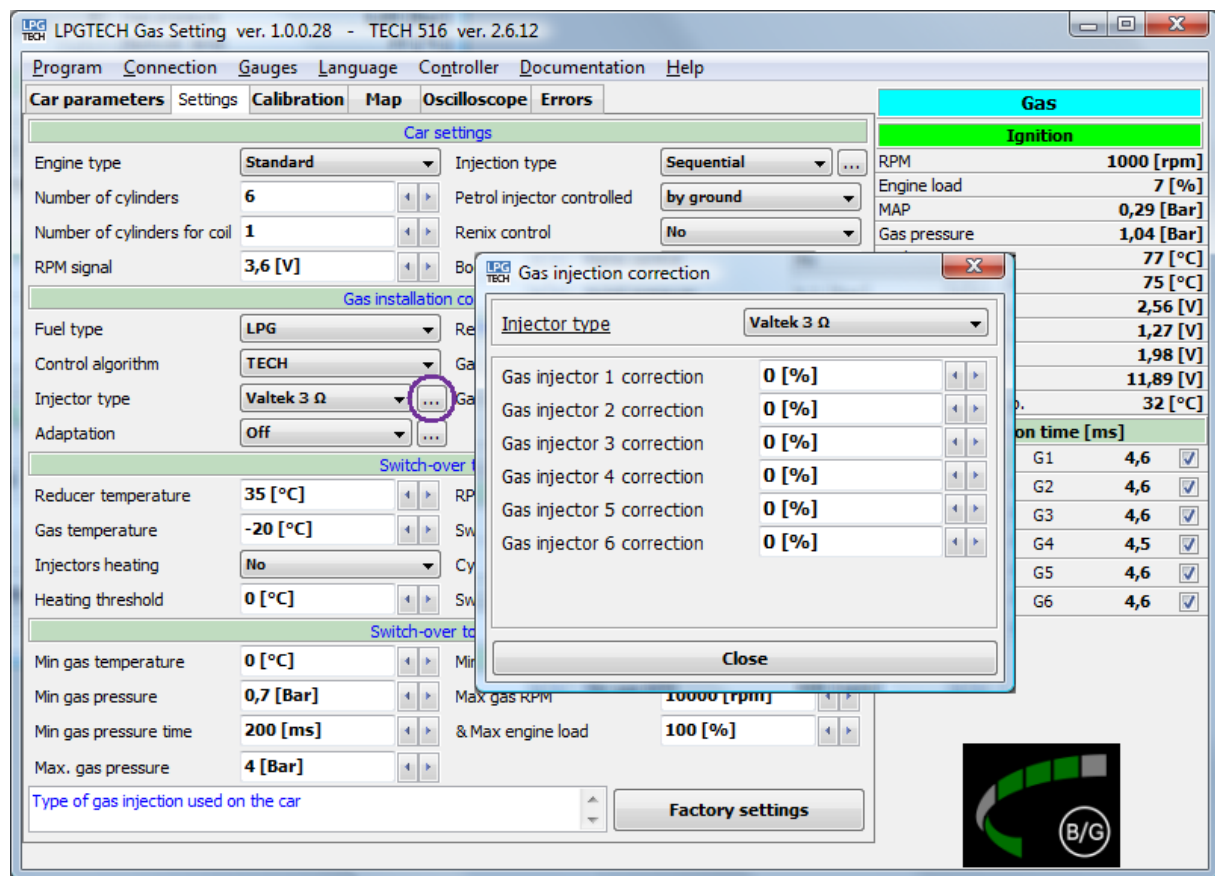


Figure 7. LPG injection correction

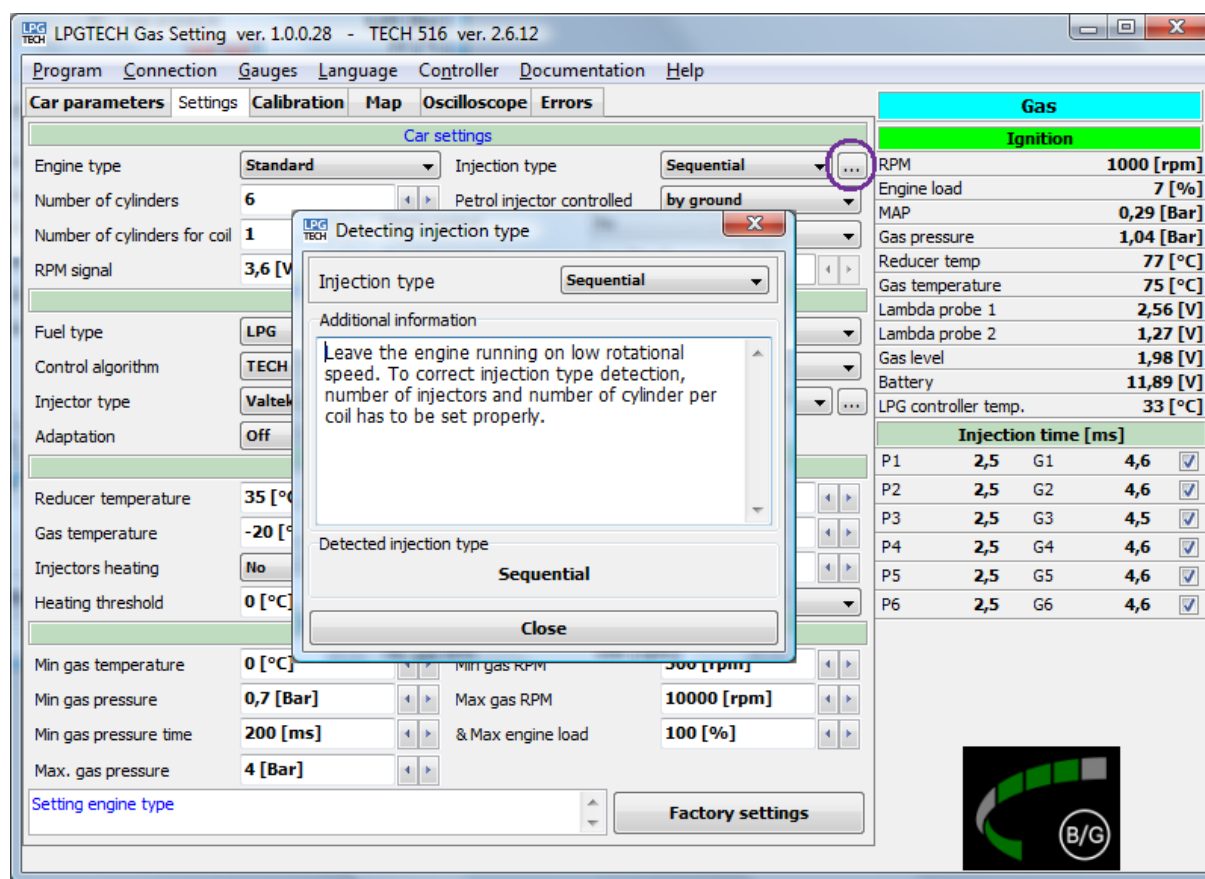


Figure 8. Detecting the type of injection

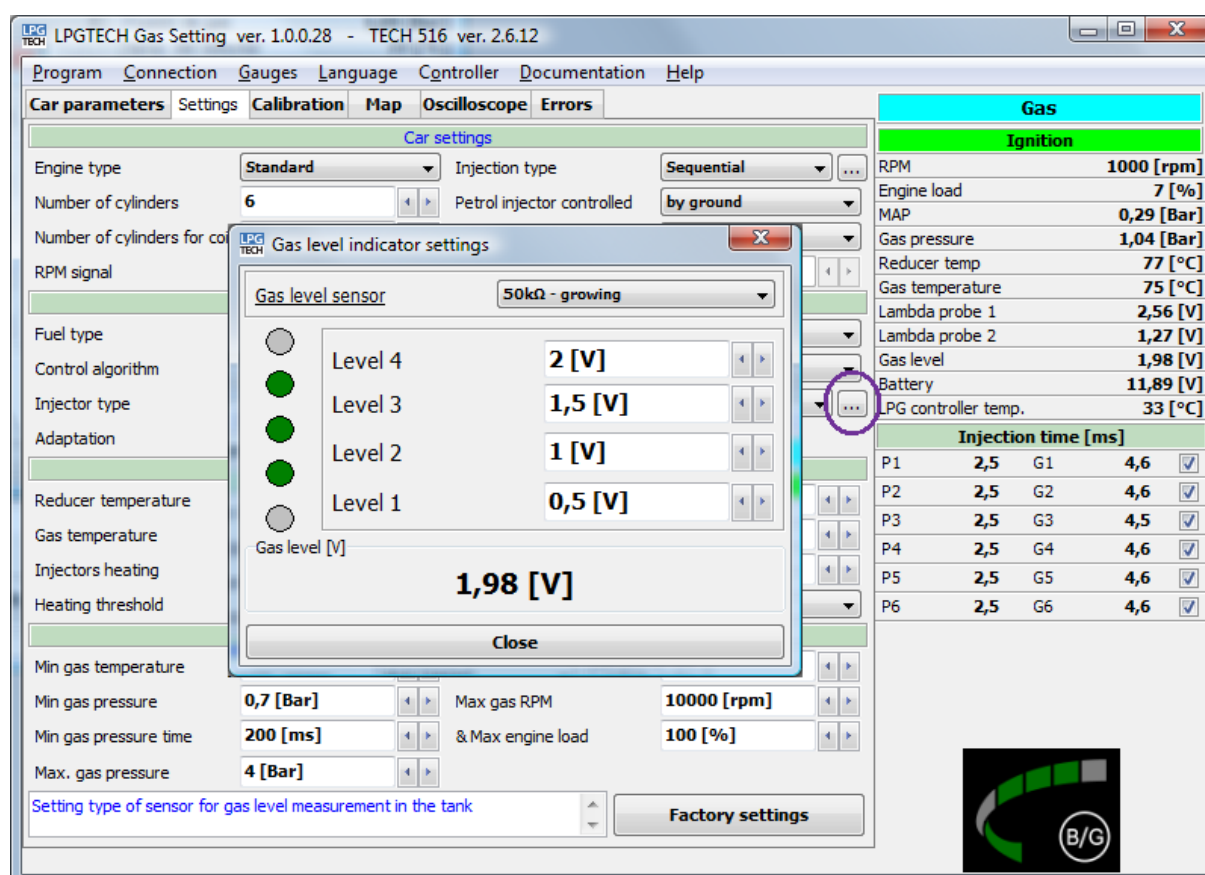


Figure 9. Setting LPG Level Sensor

7.3.2.3. 'Swichover to LPG' group contains:

- **Regulator's temperature** – minimal regulator's temperature; when lower the engine will switch to petrol
- **LPG temperature** – minimal LPG temperature, when lower the engine will switch to petrol
- **Injectors heating** – tuning on/off gas injectors heating
- **Heating threshold** – regulator's temperature, below which the heating is turned on
- **Swichover RPM** – minimal RPM required for the engine to swichover to LPG.
- **Swichover delay** – The period of time between the moment the rotation occurs and the moment the engine switches to LPG
- **Delay per cylinder** – RPM between consecutive cylinder swichovers to LPG.
- **Swichover signal** – sound of switching over consecutive cylinders to LPG.

7.3.2.4. 'Switchover to petrol' group contains:

- **min. LPG temperature** – minimal LPG temperature; when lower the engine will switch over to petrol.
- **min. LPG pressure** – minimal LPG pressure; when lower the engine will switch over to petrol.
- **min. LPG pressure time** – the time when the minimal LPG pressure occurs.
- **min. gas RPM** – minimal RPM on gas; when lower the engine will switch over to petrol. When RPM increases above the minimal value the engine will switch over to gas.
- **max. gas RPM** – maximal RPM on gas and maximal engine load; when higher the engine will switch over to petrol. When RPM decreases the engine will switch over to gas.
- **max. engine load on gas** – maximal value of engine load when working on gas, above which the engine automatically switches to petrol when the value decreases the engine switches back to gas.

7.3.2.5. Original Settings

Pressing the Original settings button restores all the producer's settings.

7.3.3. 'Calibration' tab

This tool selects parameters automatically and verifies positioning after initial LPG system installation in the car.

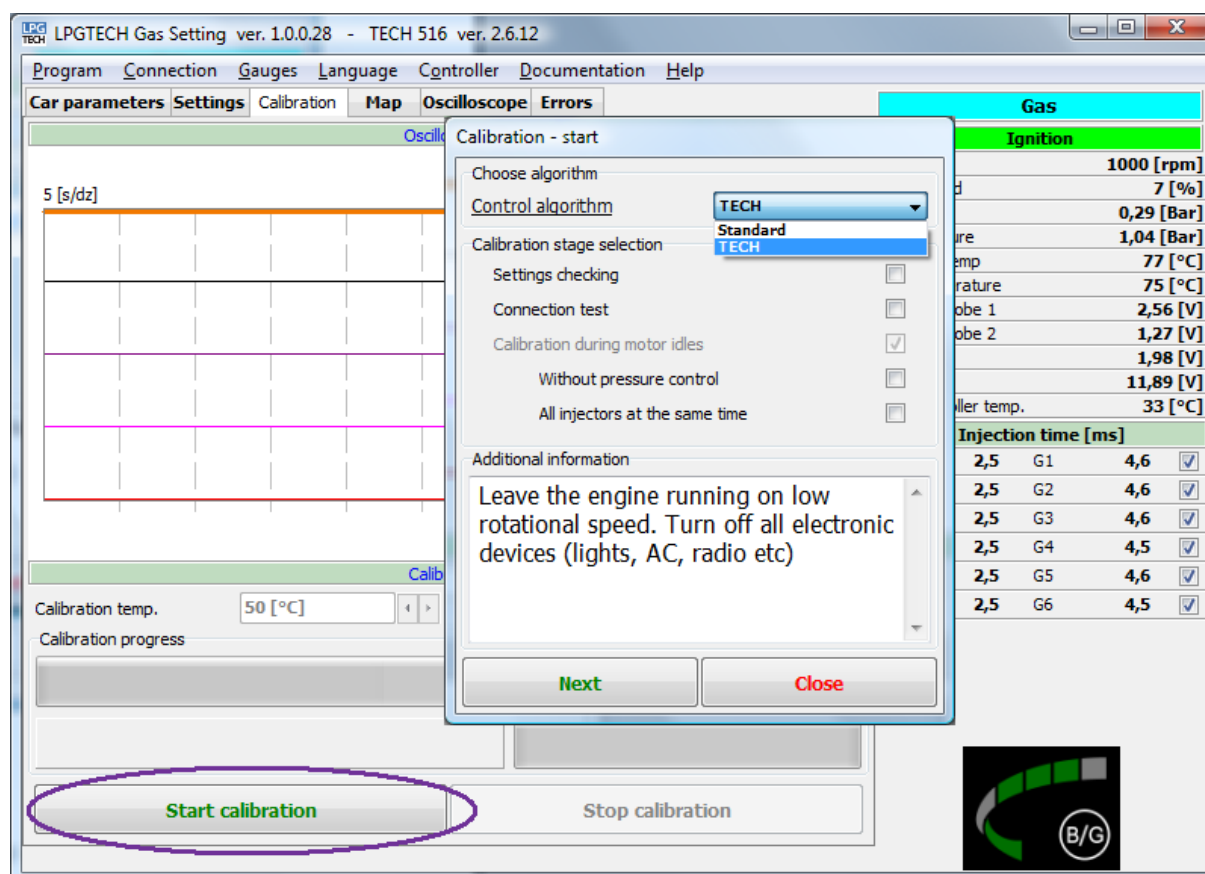


Figure 10. 'Calibration' tab

Calibration process at idle run:

- Press **Start calibration**.
- Select **Gas injection controlling algorithm (TECH recommended)**
- You will see the oscilloscope course in the columns showing calibration progress
- To end calibration press **End Calibration**.



WARNING!

Calibration provides proper controller operating only at idle run.

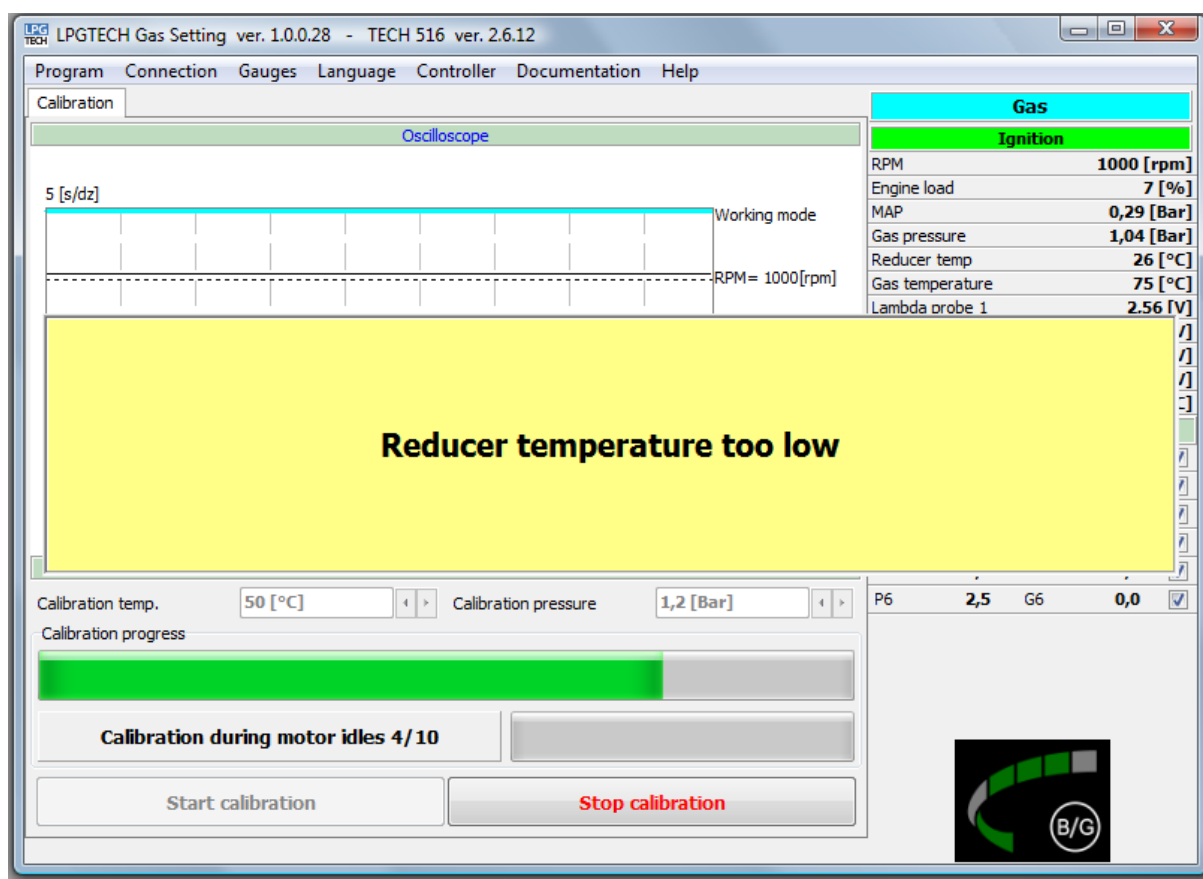


Figure 11. Messages while calibration in progress

Calibration progress can be observed on two indicators. If the process stops a message will be displayed explaining the causes of such action.

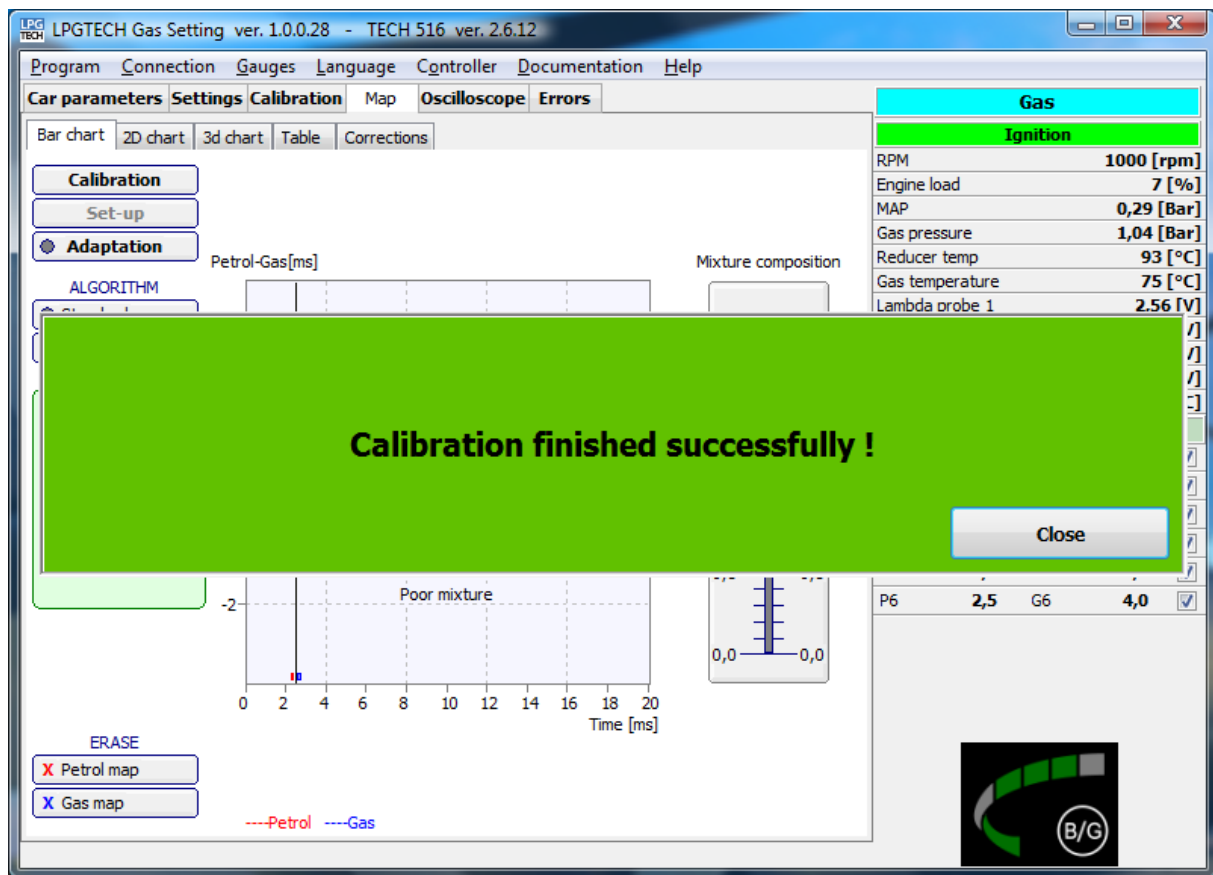


Figure 12. Calibration is done.

After the process is done the result of calibration will be displayed. Press **Close** to close the box. You will be automatically redirected to **Maps**.

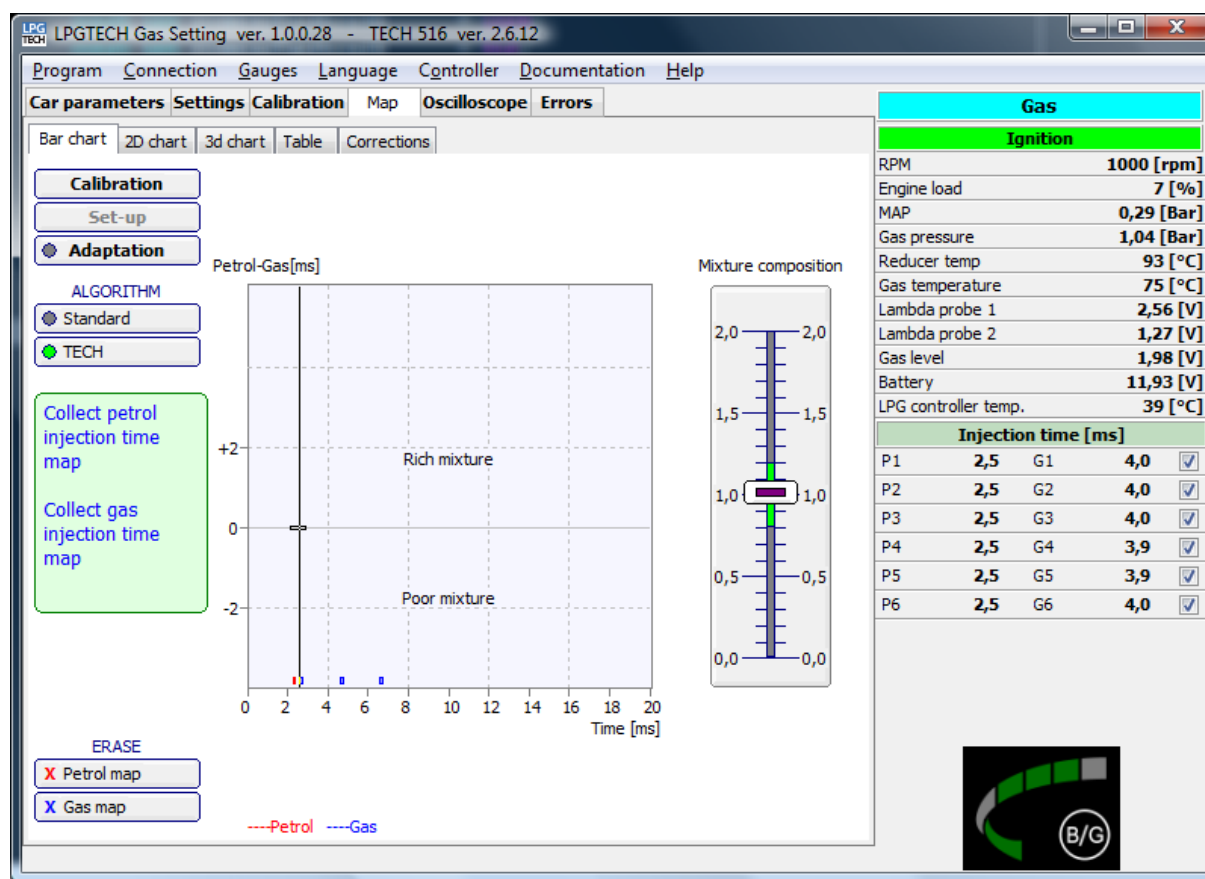


Figure 13. After calibration for TECH controlling algorithm

If the TECH controlling algorithm is used a slide bar **Blend composition** or **Set** button will be visible.

After the process is finished the 'Map' tab will display two messages on the left-hand side of the screen – on a green background – informing that collecting gasoline and LPG injection time maps is required.

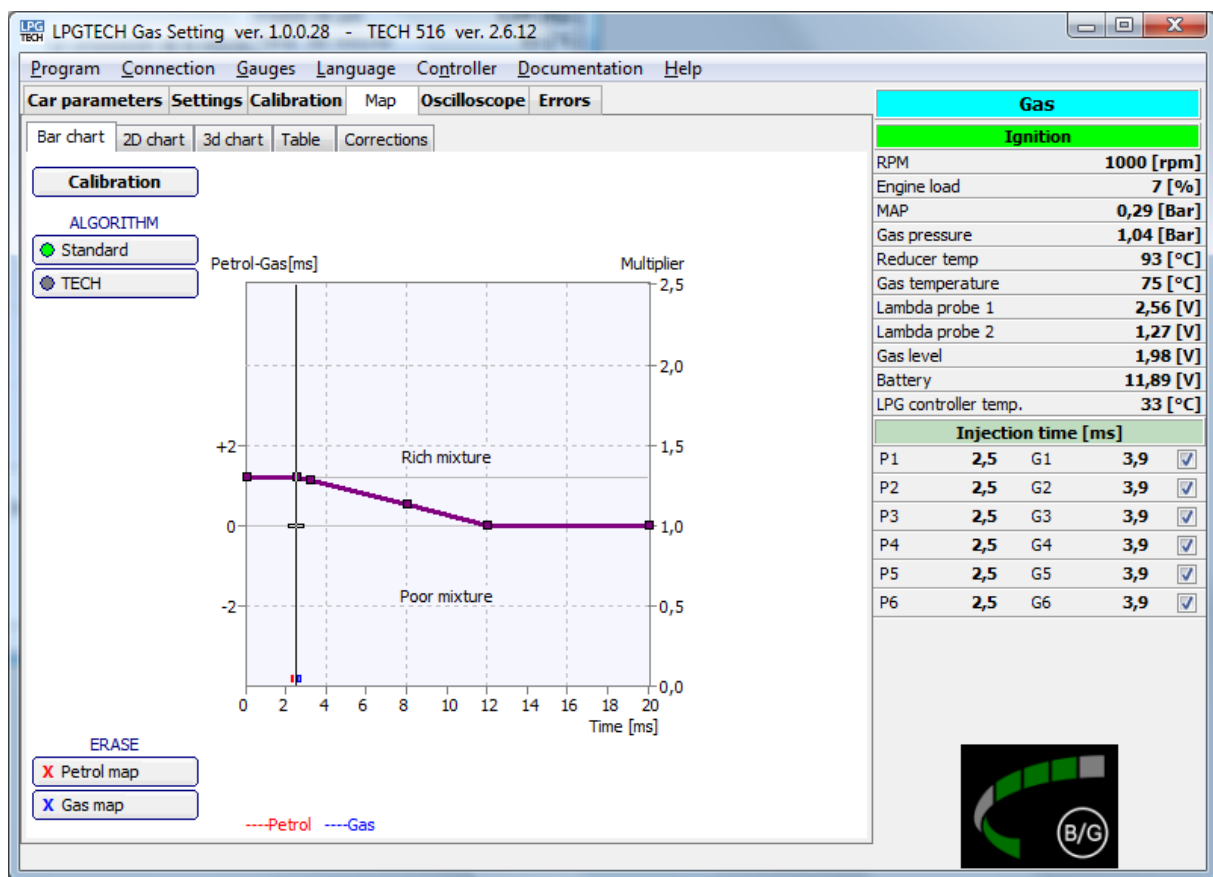


Figure 14. After calibration for STANDARD controlling algorithm

If the STANDARD algorithm is used the multiplier line will be displayed where you will find tools to perform editing.

7.3.4. 'Map' tab

The status of the collected maps: petrol (injection times when on petrol) and LPG (injection times when on petrol) maps along with the difference between those two can be observed in one of four viewing modes. Each viewing mode presents the same data in various graphic interpretations. If the deviation should be corrected, each mode is equipped with a slide bar **Blend composition** and **Set** button (for TECH algorithm) or **multiplier diagram** (for STANDARD algorithm).

From this point you can also change the algorithm controlling LPG injection (TECH/STANDARD). You can also delete petrol and gas maps if you want to collect them again after you have changed the settings or reinstalled the software.

Collecting gas map (petrol injection times when on petrol)

The engine should be switched to petrol to perform test drive in time when the petrol map is collected. To ensure correct collecting of the injection times the engine should reach maximal RPM. The engine should also work on maximal engine load. The collection status can be observed on the lower part of the diagram, where the red columns are visible or in 'Table' tab, where once the collection process is finished the table turns red. When this process is finished you should collect the map of injection times on LPG.

Collecting gas map (petrol injection times when on gas)

The engine should be switched to LPG supply and similarly to the previous scenario the test drive should be performed on maximal engine load. The engine should reach maximal RPM to ensure correct collecting of the gas injection times. Similarly to petrol map the status of gas injection times collection can be observed on a diagram in the lower part of the screen, where the blue columns are visible or in the 'table' tab, where once the collecting progresses the table turns blue.

**WARNING!**

Only when both maps are thoroughly collected the deviation will be displayed. Both test drives must be performed in combined cycle, including steady speed, starting speed and accelerating as well. Both maps should be collected under the same conditions in the maximal range of RPM and engine load possible.

Correcting deviations for TECH controlling algorithm

To perform the deviation correction between maps under **TECH** controlling algorithm (concerning the overall range of times, rotations and pressure collector alleviation) you can use the slide bar **Blend composition** or **Set** button.

The intelligent correction system does the entire job. However it can be done only when the calibration is performed at idle run.

**WARNING!**

After the deviations are corrected for the TECH algorithm slide bar should indicate app. 1.
If the value is higher, the nozzle diameter should be reduced.
If the value is lower, the nozzle diameter should be augmented.

Correcting deviations for STANDARD controlling algorithm

To perform the deviation correction between maps under STANDARD controlling algorithm a change in a multiplier line should be made. To reduce the difference between petrol and gas maps for particular injection times move the multiplier bar at the time you need. If the blend is too weak you should move the multiplier bar up. If the blend is too rich you should slide the multiplier bar down.

To change the multiplier's shape use your mouse and keyboard.

- clicking the **left mouse button** on edition point will mark it (it highlights the point)
- move the highlighted point with **left/right/up/down keys** [↑] [←] [↓] [→] ,
- clicking **left mouse button** on a diagram marks the whole multiplier (it highlights the diagram),
- move the highlighted diagram with **up/down** [↑] [↓],
- clicking **right mouse button** on the multiplier adds a new point,
- the **Delete key** deletes the highlighted point.

The diagram should be steady without rapid decreases or rises.



WARNING!

After the deviations correction the value of STANDARD algorithm multiplier under maximal load (injection times 16-18 ms) should indicate app.1.

If the value is higher, the nozzle diameter should be reduced.

If the value is lower, the nozzle diameter should be augmented.

If the nozzle diameter is too small the engine's power can be limited!

If the nozzle diameter is too big there may be problems with the engine when on idle run or during the transition to cat-off.

7.3.4.1. 'Map' tab – „Columns” view

The diagram shows the difference between the petrol and gas injection times. If the gas injection times become shorter the diagram will display a red column pointing „Rich blend”. If the gas injection times become extended the diagram will display a blue column pointing ‘Weak blend’.

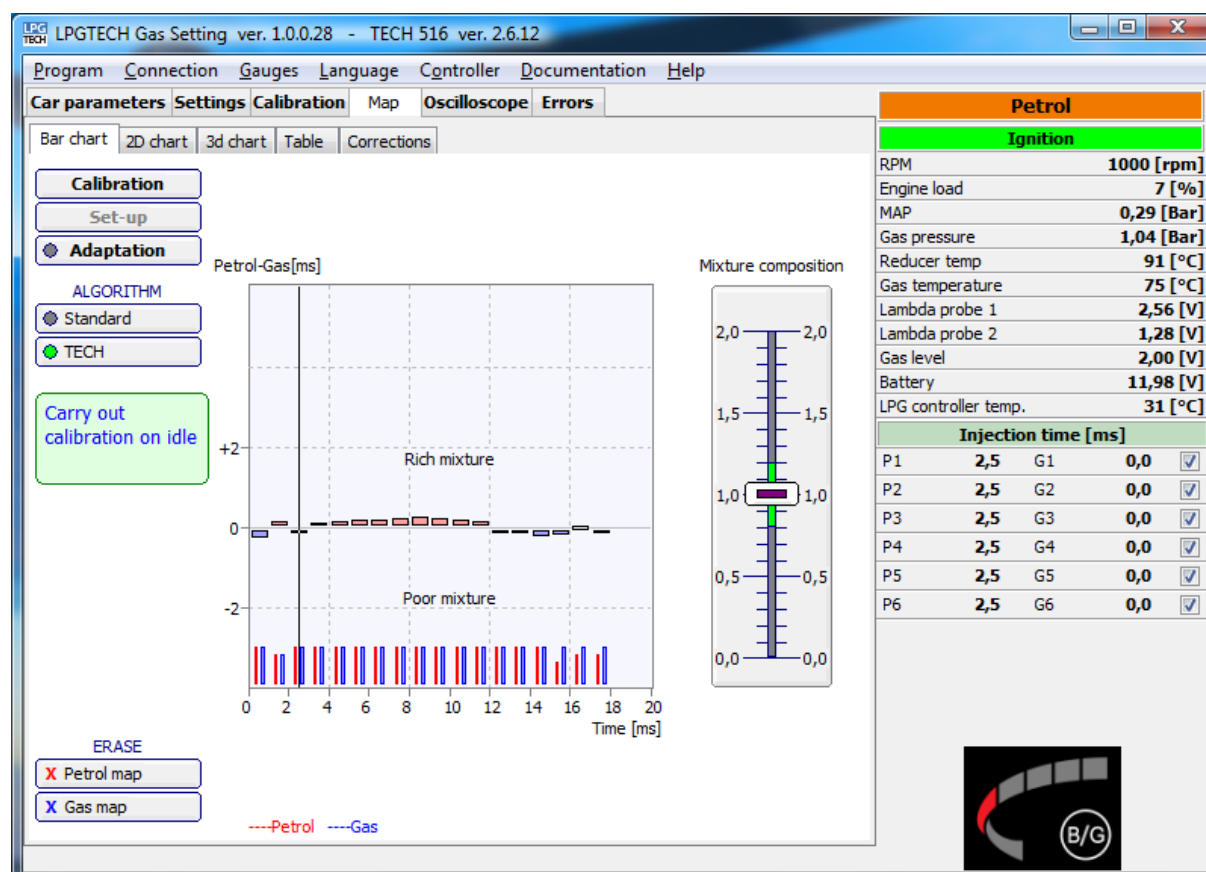


Figure 15. Columns for TECH controlling algorithm

If the system is regulated properly the columns should be low. The recommended deviation for low loads is $\pm 0.3\text{ms}$ for high ones $\pm 0.6\text{ms}$. To correct deviations use **Blend composition** slide bar under **TECH** algorithm or violet multiplier diagram under **STANDARD** multiplier algorithm.

Map collecting status can be observed in the lower part of the screen, where map collecting indicators are visible: a red one for petrol and a blue one for gas.

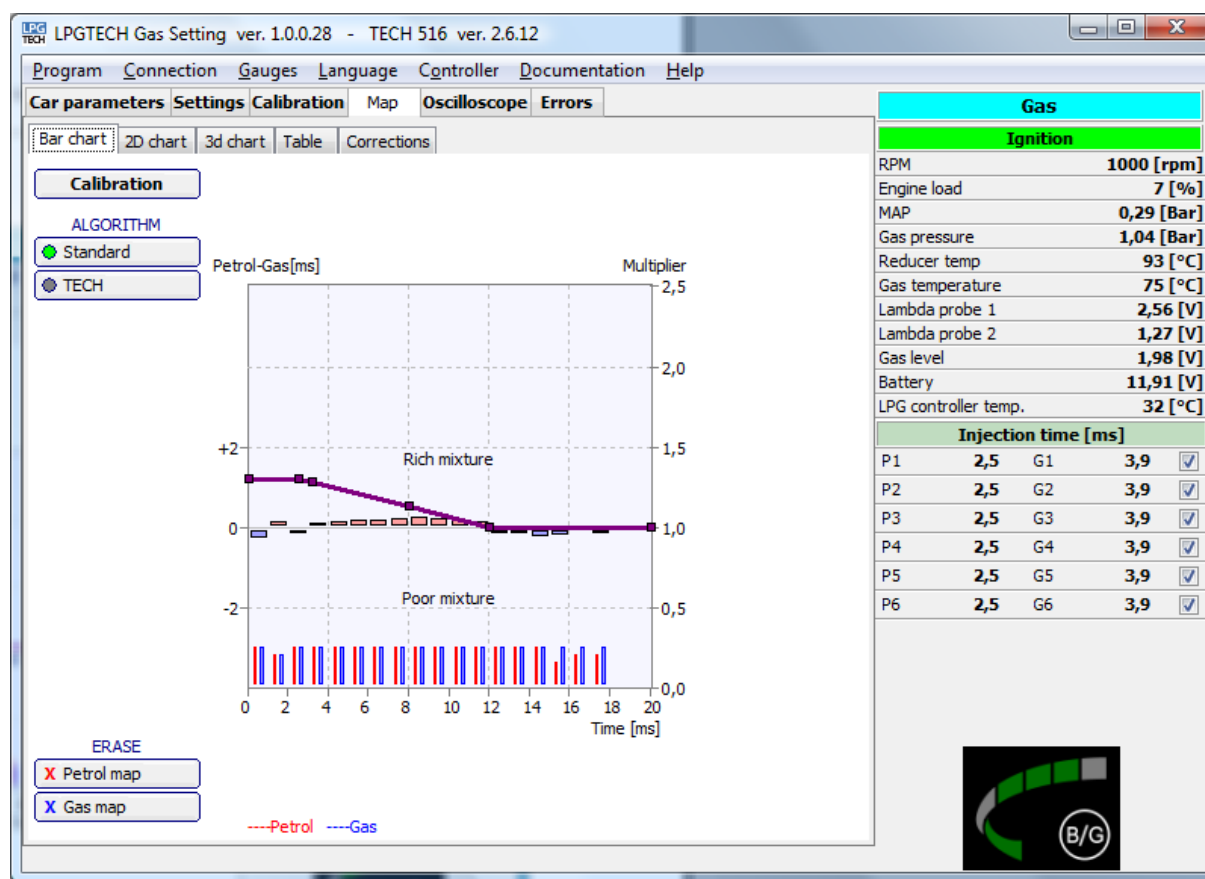


Figure 16. Columns for STANDARD algorithm

7.3.4.2. 'Map' tab – '2D diagram' view

The view show maps as diagrams:

- RED – petrol map (injection times on petrol with reference to engine load),
- BLUE – gas map (injection times on gas with reference to engine load),
- VIOLET – multiplier with editing points (only under STANDARD algorithm).

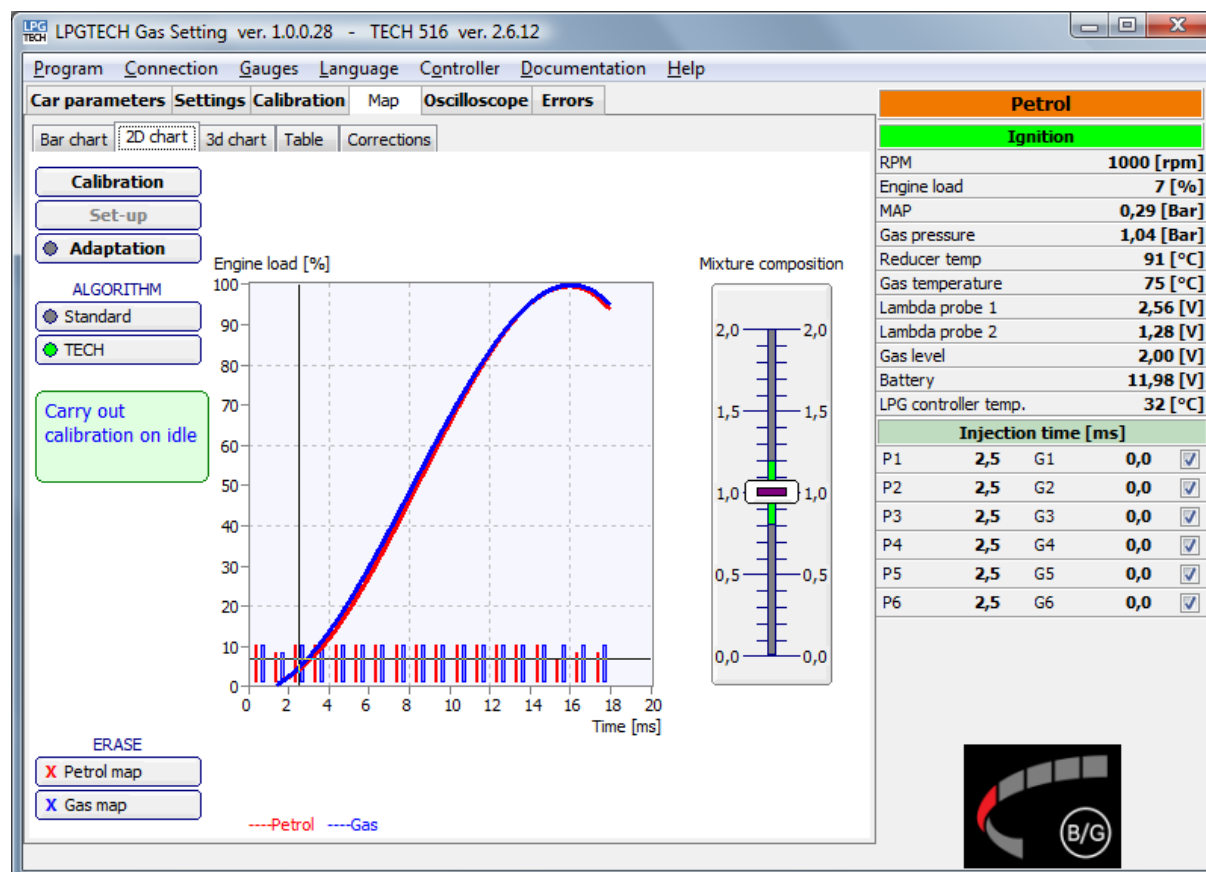


Figure 17. 2D diagram for TECH controlling algorithm

If the system is regulated properly the map diagrams should agree. The recommended deviation for low loads is ± 0.3 ms for high ones ± 0.6 ms. To correct deviations use **Blend composition** slide bar under **TECH** algorithm or violet multiplier diagram under **STANDARD** multiplier algorithm.

Map collecting status can be observed in the lower part of the screen, where map collecting indicators are visible: a red one for petrol and a blue one for gas.

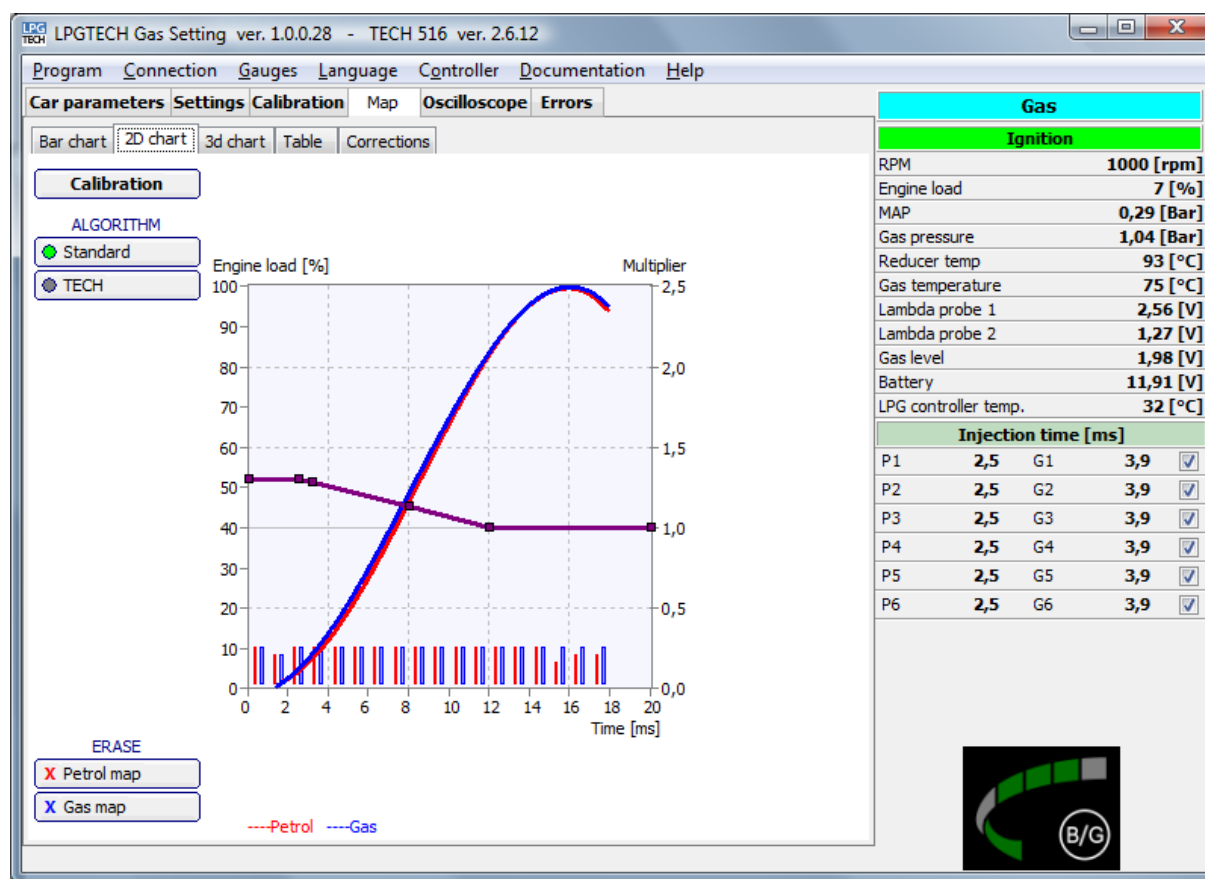


Figure 18. 2D diagram for STANDARD controlling algorithm

7.3.4.3. 'Map' tab – '3D Diagram' view

This view shows three-dimensional diagrams for petrol injection Times, gas injection Times and their deviations with reference to engine load and RPM. It is a perfect view to see whether the maps were collected properly. To change the viewing angle you should move the mouse in the upper right corner of the screen (2D/3D bar in view box).

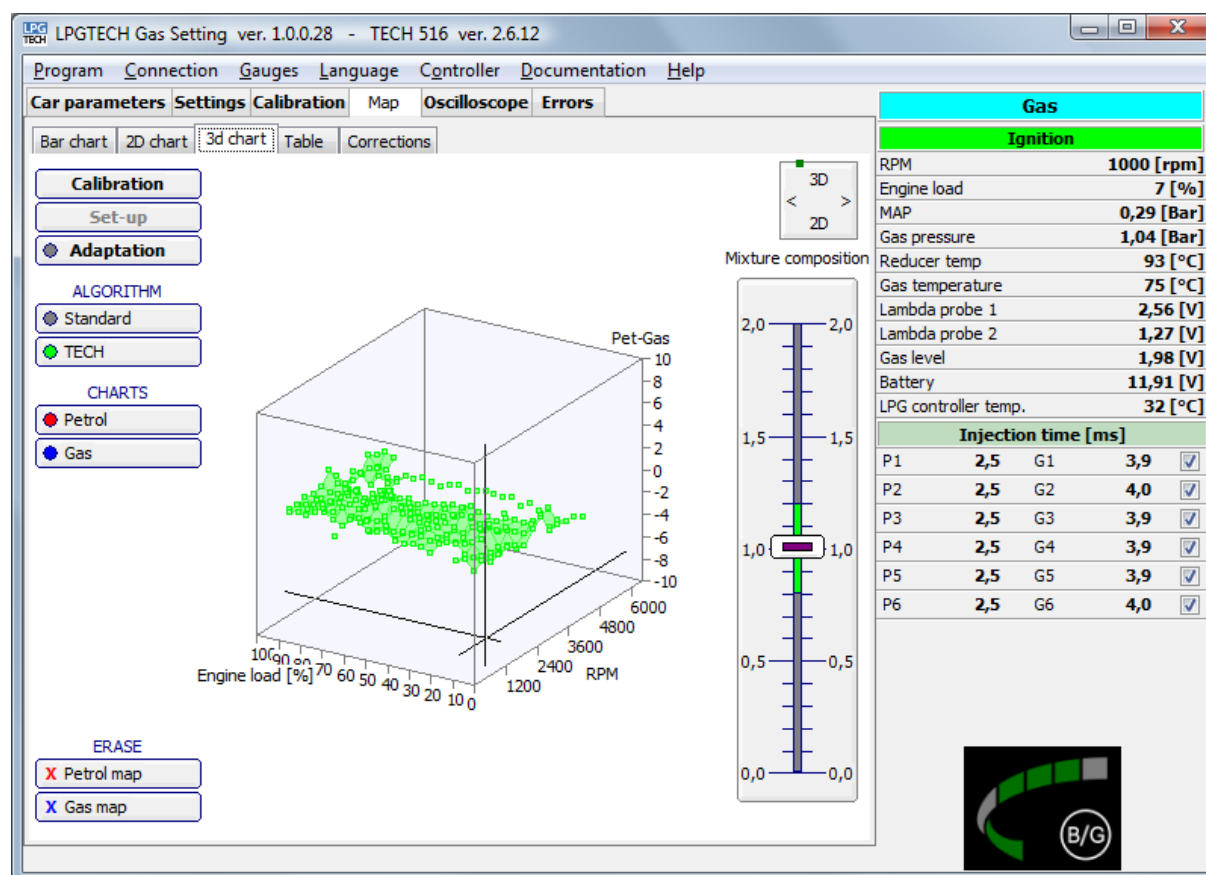


Figure 19. 3D diagram

The diagram shows:

- red - petrol map (injection times on petrol),
- blue - gas map (injection times on gas)
- green - deviation between the maps

You can switch the diagram with **Petrol** and **Gas** buttons.

If the system works properly the deviation line should be flat (0 ms). To correct deviations use **Blend composition** slide bar for **TECH** algorithm or violet multiplier diagram for **STANDARD** multiplier algorithm.

7.3.4.4. 'Map' tab – 'Table' view

This view shows the differences between petrol and gas injection times with reference to engine loads and RPM listed in a table. If the system is properly adjusted the disparity should be minimal (recommended deviation for low loads is $\pm 0.3\text{ms}$ and $\pm 0.6\text{ms}$ for high loads).

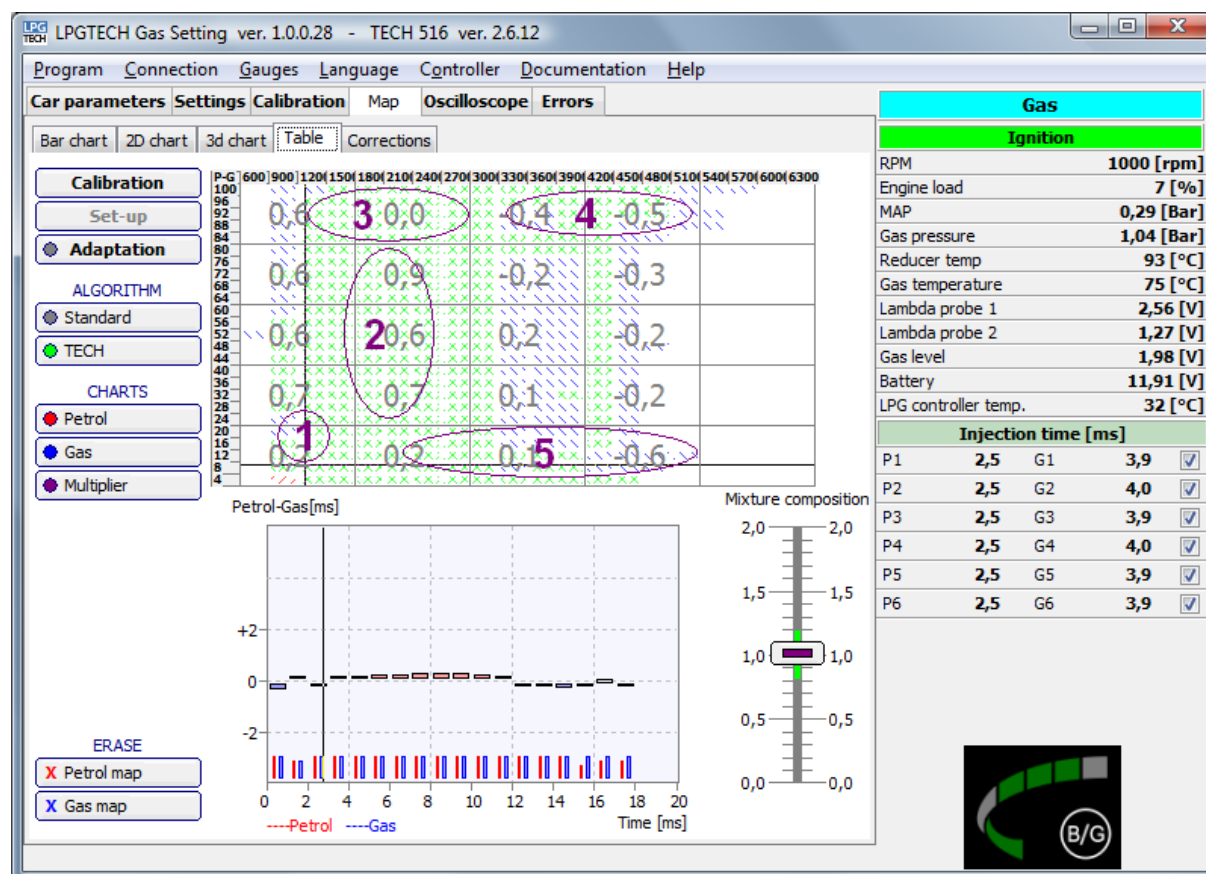


Figure 20. A table

Figure 13 shows respective ranges for petrol and gas maps.

Those ranges should be collected while driving.

- 1 – idle run range
- 2 – range of medium rotation and loads (steady driving – out of the city)
- 3 – maximum load (top gear acceleration)
- 4 – maximum power
- 5 – cut-off

If the system works properly the time difference will be displayed digitally in gray color. It should be close to 0. Recommended deviation for low loads is $\pm 0.3\text{ms}$ and $\pm 0.6\text{ms}$ for high loads. To correct deviations use **Blend composition** slide bar under **TECH** algorithm or violet multiplier diagram under **STANDARD** multiplier algorithm.

The diagrams are switched over with **Petrol** and **Gas** buttons.

Map collecting status:

- red color show already collected elements of petrol map

- blue color show already collected elements of gas map
- green color show elements of both maps

7.3.4.5. Corrections

Only when **STANDARD** algorithm is used the correction table is visible. It allows you to correct gas injection times according to RPM. To change corrections follow these directions:

- **Highlighting:** pick the required cell in the table using a mouse cursor – you can pick a single cell or a number of cell that you want to highlight. To highlight more than one cell hold left Mouse button. The number of cells can also be marked using keyboard – press and hold SHIFT using needed arrow keys [↑] [←] [↓] [→].
- **Setting correction:** after selecting the cells you have to set the value of correction. Try holding [CTRL] and pressing arrow keys up/down [↑] [↓].
- **Deleting correction:** if you press **DELETE „Correction”** button (in the left bottom corner) the correction will be deleted.

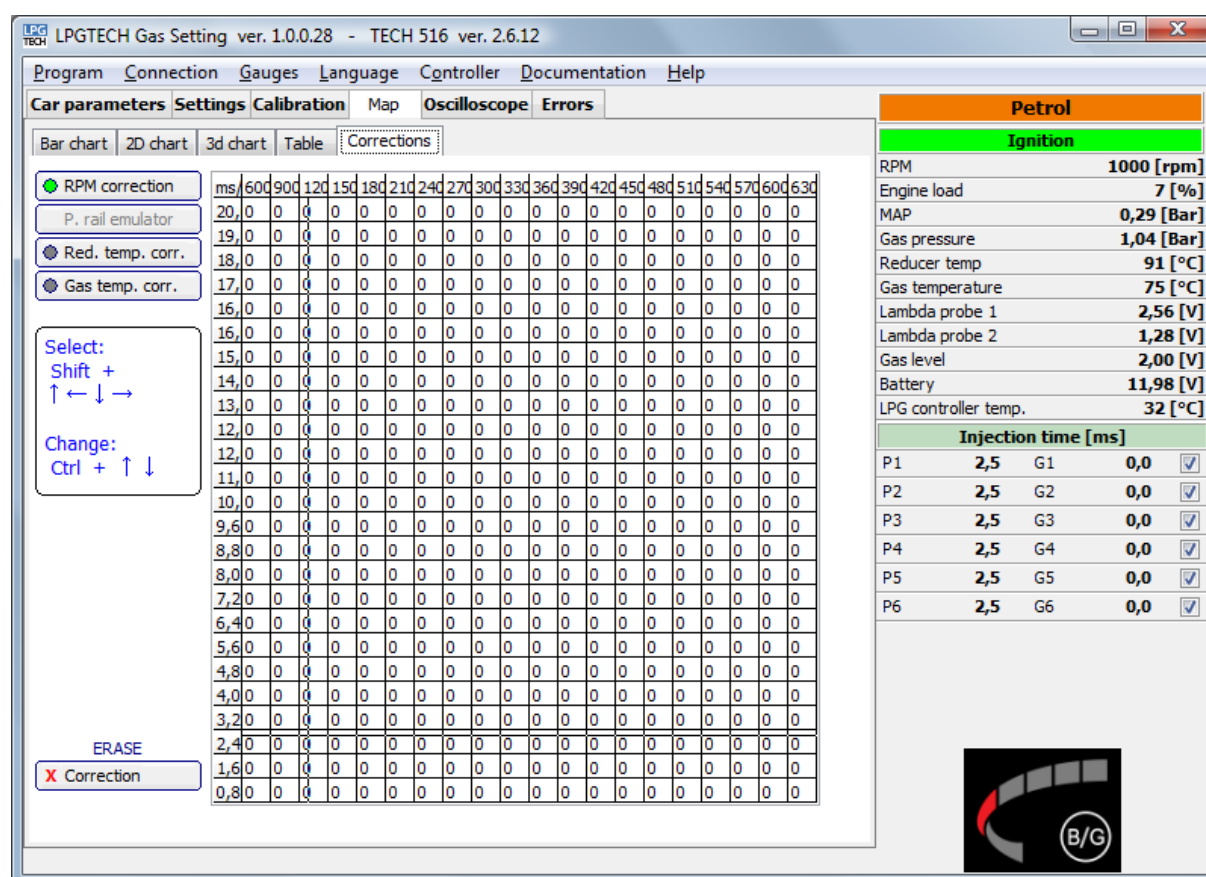


Figure 21. Corrections

7.3.5. „Oscilloscope' tab

It allows you to observe engine and LPG system parameters variations. It draws selected parameters online. It also enables you to load previously saved oscilloscope data from a file.

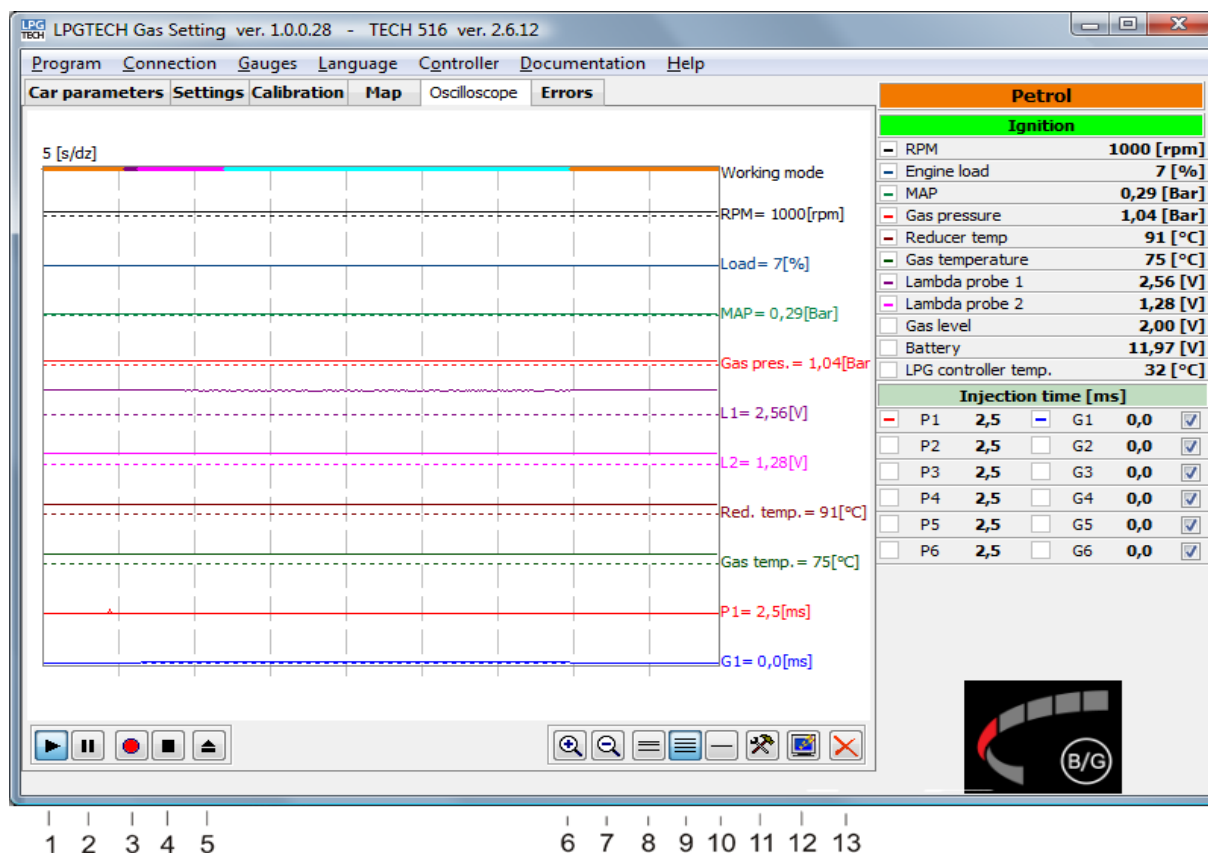


Figure 22. Oscilloscope

- 1 - **Start diagram** – starts drawing diagrams
- 2 - **Stop diagram** – stops drawing diagrams. When you stop diagram and place mouse cursor on the oscilloscope area you will be able to measure the time of a selected segment. To do so you have to press left mouse button where the segment begins, while holding the left mouse button move the cursor where the segment ends. When you release the button the time of the selected segment will be measured.
- 3 - **Save oscilloscope data** – saves oscilloscope data to a file.
- 4 - **Stop saving oscilloscope data** – ends saving to a file.
- 5 - **Load oscilloscope data** – after loading the file the controller switches over to 'Reading from a file'. To reconnect with the controller you need to use 'connect' button in 'Connection' menu.
- 6 - **Zoom in** – reduces the number of second for an element.

-
- 7 - **Zoom out** – increases the number of second for an element.
 - 8 - **Manage diagrams manual** – you can arrange diagrams manually.
 - 9 - **Place diagrams** – diagram regular spacing.
 - 10 - **All diagrams on the same line** – places the diagrams at the same line.
 - 11 - **Oscilloscope settings** – settings for particular diagrams.
 - 12 - **Screen capture** – save screen capture to a file (bitmap).
 - 13 - **Reset data** – resets every oscilloscope data.

7.3.6. 'Errors' tab

If any error occurs the 'Error' tab will be highlighted in red.



Figure 23. Error signalization



WARNING!

When the error message appears you need to analyze the message and fix the fault causing errors. Having done it you can erase the content of the widows by pressing "Delete errors".

Error messages were divided into three groups:

- Actual errors – current errors
- Registered errors – errors frequently occurring during the controller's operation
- Waiting errors – errors sporadically occurring during the controller's operation

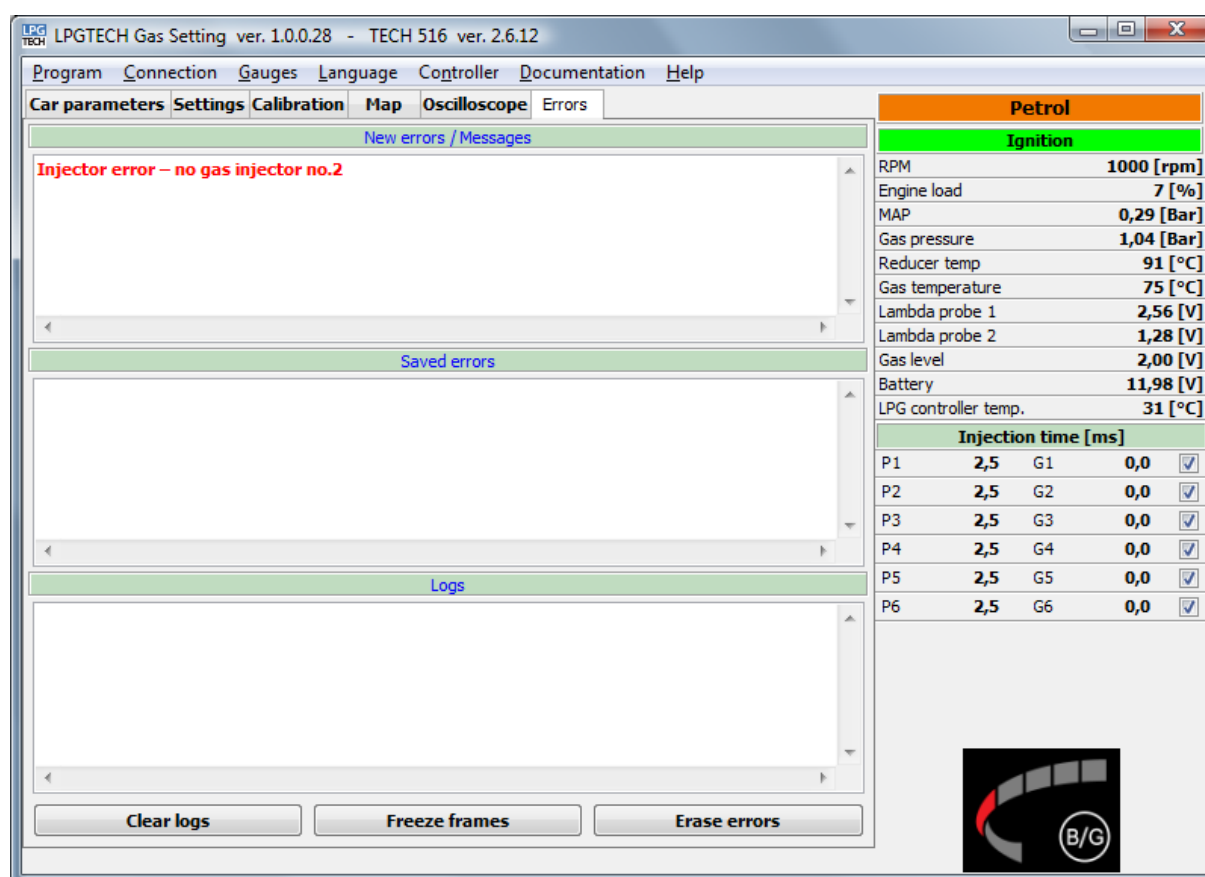


Figure 24. Errors

Error description:

Error text is displayed in red:

- Power error – no power supply (switchboard, pressure sensors and LPG level sensors),
- Power error – no power supply (motor operated valves),
- Power error – no power supply (LPG injectors),
- Collector's pressure sensor error – voltage too low / ground fault.
- Collector's pressure sensor error – voltage too high / positive sequence fault / no sensor.
- LPG pressure sensor error – voltage too low / ground fault.
- LPG pressure sensor error – voltage too high / positive sequence fault / no sensor.
- Regulator's temperature sensor error – voltage too low / ground fault.
- Regulator's temperature sensor error – voltage too high / positive sequence fault / no sensor.
- LPG temperature sensor error – voltage too low / ground fault.
- LPG temperature sensor error – voltage too high / positive sequence fault / no sensor.
- No LPG injector 1-8.

- LPG injector short circuit 1-8.

Message description:

The text of the message is displayed in black:

Message	Cause
Battery's voltage too low	Battery power supply lower than 10[V].
LPG injectors [1-8] fully open	LPG injector open. If this message occurs frequently check if the nozzle diameter and the regulator's performance indication.
Switchover to gas time exceeded	One of the petrol injectors lacks signalization or the 'Number of cylinders' positioning is wrong.
Gas pressure lowering time exceeded	Controller cannot lower gas pressure when too high. The regulator may be broken.
The rotation dropped away when the ignition switch was on	Wrong ignition switch wiring. It occurs also when the engine is off.
Out of range positioning	Incorrect values in positioning. Controller automatically sets a factory value. Unless the message occurs after installing the newest software version, controller memory is broken.
LPG pressure after starting the system too low	When the gas absolute pressure is below 1.05[Bar]. (The moment engine switches to gas). The LPG system might be leaking.
LPG pressure after starting the system too high	When the gas absolute pressure is over 3.00[Bar]. (The moment engine switches to gas). The regulator might be broken.
Gas pressure too high while operating	When the gas absolute pressure is over 3.50[Bar]. (while operating). The regulator might be working incorrectly at cat-off or it is broken.

8. TECHNICAL DETAILS

Voltage	12 [V] -20% +30%
Total current input on stand-by	<0,05 [mA]
Operating temperature	-35 +115 [°C]
Tightness class	IP54
Gas injectors resistance	$\geq 1 \Omega$

The manual is also available at the manufacturer's web page www.lpgtech.pl



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