nazorati®
AUTOGAS EQUIPMENT

USER MANUAL

ultima

GAS INJECTION SYSTEM

www.nazorati.com

Presentation & Index

Dear Customer,

We wish to thank you for the purchase of this product.
This Manual is related to the program you are using, or a compatible version.

We strongly recommend that you carefully go through all the pages before starting any operation or setting of the system: this will allow you to get more confidence and avoid all possible troubles and delays during your job.

For any question you may contact our Distributor's After Sales Service.
Have a nice time with your job and our products.

NOTE:
This manual is refered to software version 4.xx

All functions shown in this manual are referred
to latest version of ECUs firmware available with software.

All details about installation can be found in the
Appendix 1: Software & Drivers Installation

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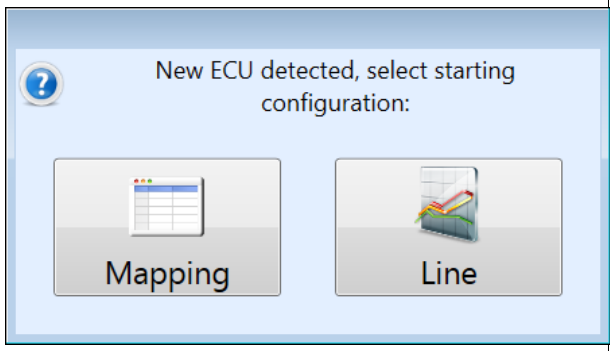
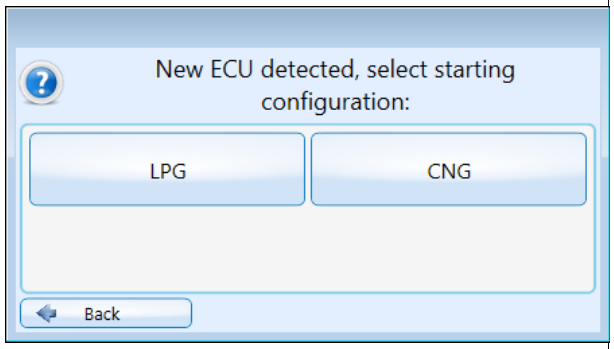
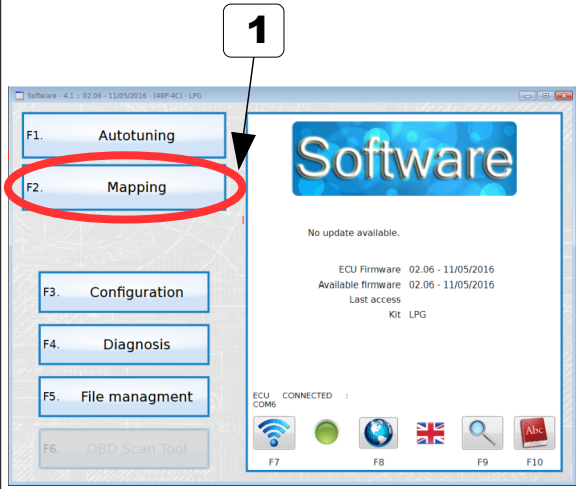
1- First Initialization

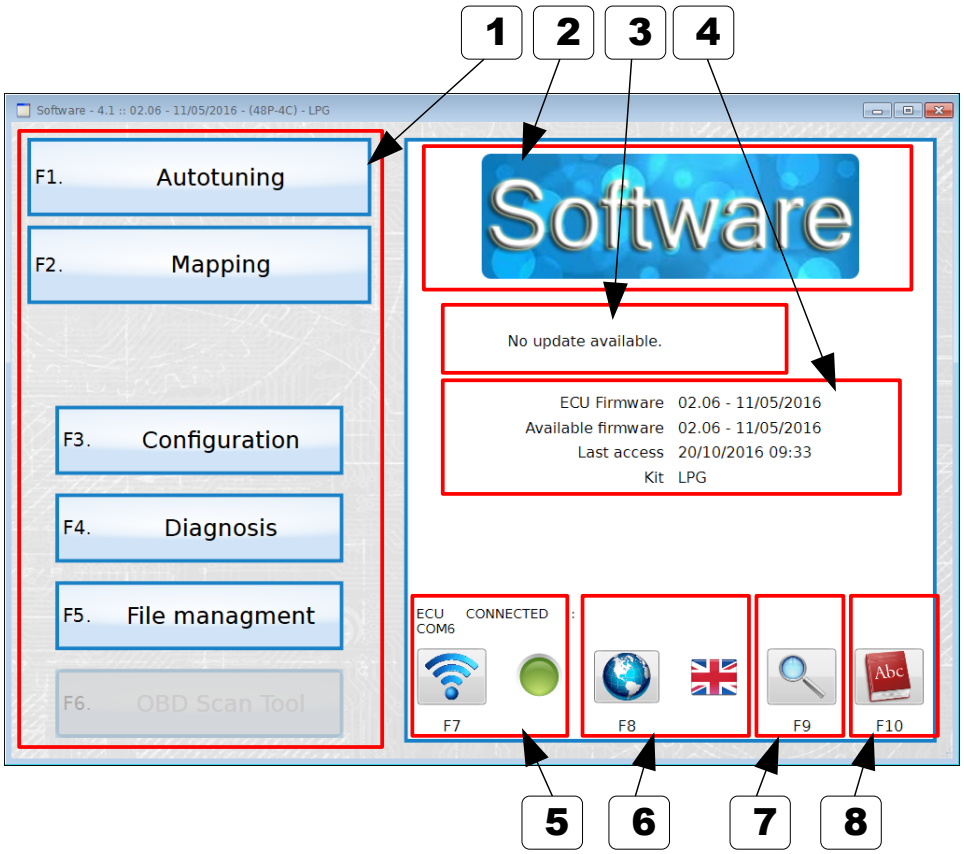
The very first time you connect a **new** ECU, it is required to select a configuration to be stored in it.

1		Select the tune adjust mode you would like to use: - Mapping - Line
2		Select the right configuration installed. 90% of the autotuning result depends on this choice.

3		Selecting **Mapping** on step #1 the “Mapping” menu will be available on the main screen.
4		Selecting **Line** on step #1 the “Line” menu will be available on the main screen.

2- The HOME folder

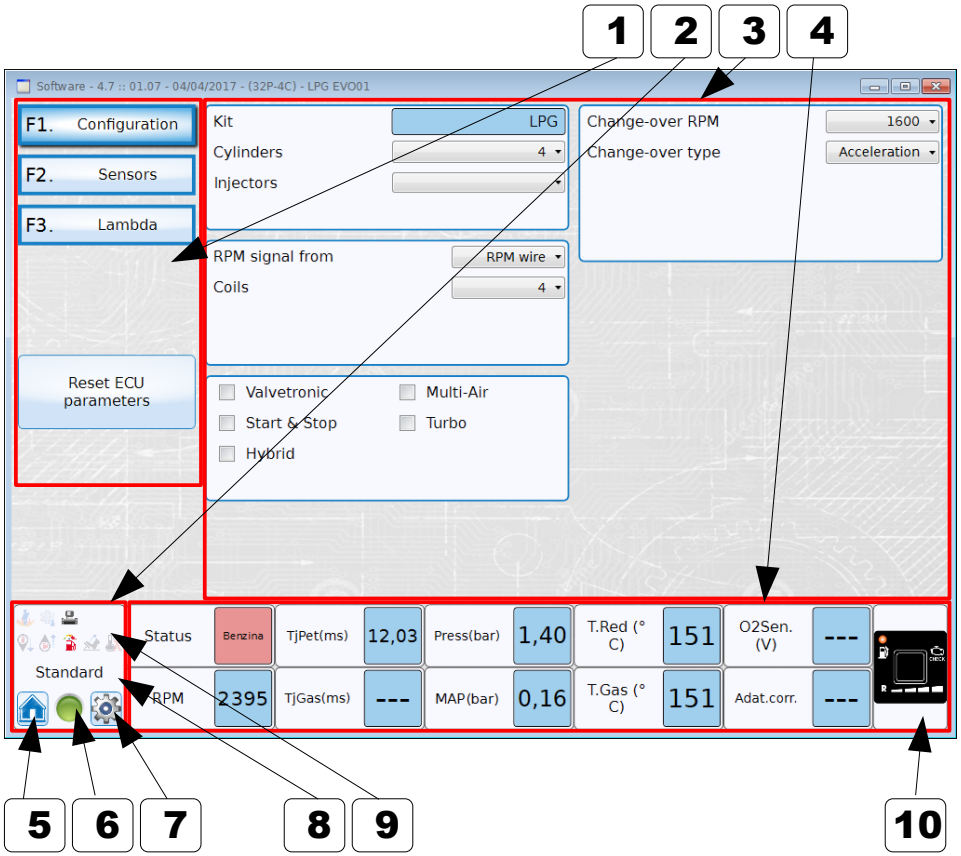
This is the starting menu for all functions.



	Description	Value
1	**WORKING FOLDER selection buttons**	
2	**LOGO / Trademark**	
3	**UPDATE button + INFO** When an updated version of the SW or FW is available in the PC program, the info is shown	
4	**ECU Firmware data and KIT details** Useful when contacting After Sales Services	
5	**ECU connection** Point the button and press the right mouse click to open the combo for the COM port selection. Or just press the button for automatic search …. If no ECU is connected will be possible to use the software in OFFLINE mode.	**Green Led = connected** **Red Led = not conncted**
6	**LANGUAGE selection button.** Click on button to open the combo for the Language selection. This selection will be memorized for all future connections.	
7	**Magnifying lens button** By clicking the button, a screen with the index of the info relevant to the connected ECU will appear.	
8	**DOCUMENTS** Press to scroll the documents available: installation diagrams, manuals, etc.	

3- The Working folder

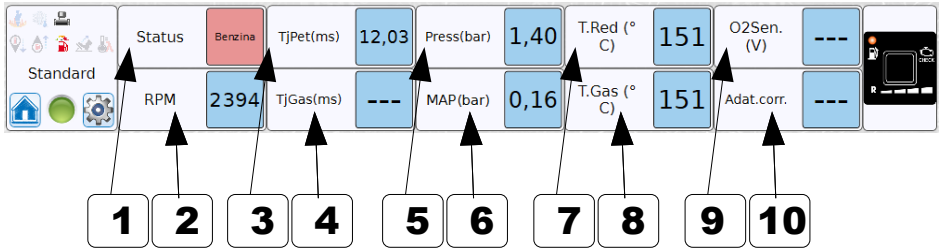
Short review of the common details which are present in any of the Working Folders. The screenshot below is **only a sample**.



	Description	Value
1	**WORKING SUB-FOLDER selection buttons, specific in any section**	
2	**HOME & EXPERT selection buttons**	
3	**DIALOGUE area**	
4	**MONITOR section is shown in many pages.**	
5	**HOME button:** press to go back to HOME folder	
6	**ECU Connection status**	
7	**EXPERT functions button:** press to enter the expert settings for the actual folder	
8	**VISUALIZATION LEVEL:** show the level of visualization changed by pressing button #7	
9	**STRATEGIES SUMMARY PANEL:** show all available strategies, active or not, working or not	
10	**VIRTUAL SWITCH:** it is same as the real one	

4- Dashboard: "24" & "32" Version

The screenshot below is only for sample.



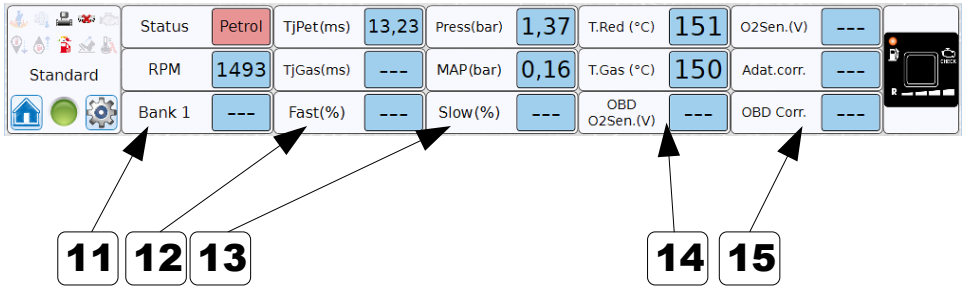
	Description	Value
1	FUEL in use	
2	RPM	
3	INJECTION TIME: Petrol	
4	INJECTION TIME: Gas	
5	REDUCER (GAS) Working Pressure	
6	MAP SENSOR (Vacuum) Pressure	
7	WATER Temperature (Reducer)	
8	GAS Temperature (Injectors)	
9	OXIGEN SENSOR (Lambda) Readout	
10	ADAPTIBITY CORRECTION values (MAP)	

THE MONITOR SECTION IS VISIBLE IN MOST SCREENS.
THE STRUCTURE IS THE SAME IN EVERY SITUATION:
PLS. REFER TO THIS PAGE FOR DETAILS

4.1- Dashboard: "48" Version - Changes vs. "24" & "32" version

The upper part is the same as "24" & "32" version: only the bottom line is added. The screen-shot below is **only a sample**.

The only difference in the "48" version is that in any folder there is one more line of monitoring.
It is specifically dedicated to OBD connection and information updating.
This powerful tuning tool is giving information at any time through this additional line.



THE MONITOR SECTION IS VISIBLE IN MOST SCREENS.
THE STRUCTURE IS THE SAME IN EVERY SITUATION:
PLS. REFER TO THIS PAGE FOR DETAILS

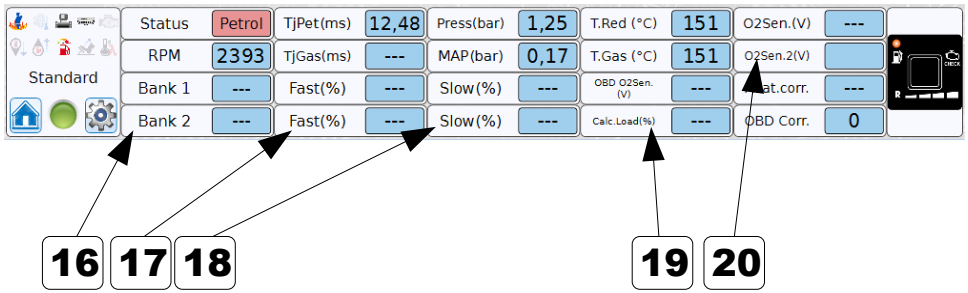
	Description	Value
11	**OBD Trim bank #1** Shows the value of the bank #1 according the OBD	
12	**Fast (%)** Refers to OBD correction trim Fast (main O2 sensor)	
13	**Slow (%)** Refers to OBD correction trim Slow (post catalyst O2 sensor)	
14	**OBD O2 Sen. (V)** This is the value of O2 sensor (post-catalyst) through the OBD system (not same as using the wire of the gas system)	
15	**OBD Corr.** Here is shown the actual value of correction that petrol ECU OBD system applies according to actual carburation (as if petrol was the gas in use)	

NOTE: all the above values are the same as read by the OBD of the car. For this reason, it's possible to get an instant visualization of the changes that are made to the gas mapping/tuning and their effects on the "On Board Diagnosis" system of the vehicle.

4.2- Dashboard: "486" & "488" Version - Changes vs. "48" version

The upper part is the same as "48" version. The screen-shot below is only for sample.

The only difference in the "486" & "488" version is that in any folder there is one more line of monitoring OBD values for 2nd Bank and 2nd Oxigen sensor (Lambda)



THE MONITOR SECTION IS VISIBLE IN MOST SCREENS.
THE STRUCTURE IS THE SAME IN EVERY SITUATION:
PLS. REFER TO THIS PAGE FOR DETAILS

	Description	Value
16	**OBD Trim bank #2** Shows the value of the bank #2 according the OBD	
17	**Fast (%)** Refers to OBD bank#2 correction trim Fast (main O2 sensor)	
18	**Slow (%)** Refers to OBD bank#2 correction trim Slow (back O2 sensor)	
19	**Calc Load (%)** This is the value of Engine Load readed through the OBD system	
20	**O2Sens.2 (V)** 2nd OXIGEN SENSOR (Lambda) Readout	

NOTE: all the above values are the same as read by the OBD of the car. For this reason, it's possible to get an instant visualization of the changes that are made to the gas mapping/tuning and their effects on the "On Board Diagnosis" system of the vehicle.

4.3 Dashboard: Strategies Summary Panel

It shows all strategies available into ECU:

Icon colourized means that the strategy is enabled

When the strategy is working, a green background will highlight the icon

Icon transparent means that the strategy is not enabled.

The Electric Valves icon has 2 different highlight: yellow for EV1 and green for EV2

5- Autotuning: Main folder

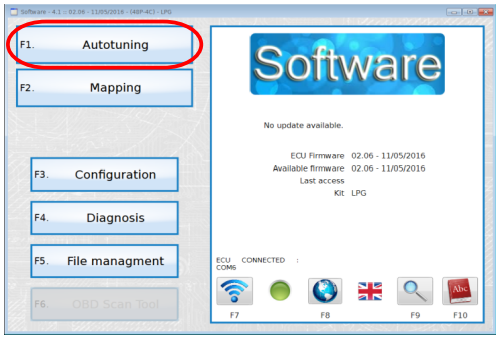
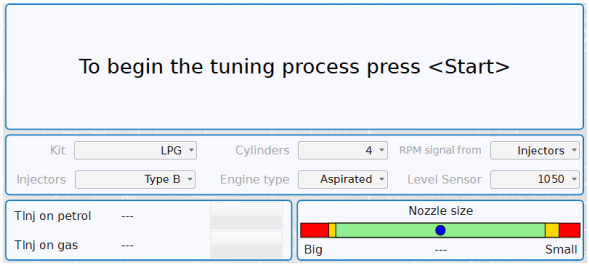
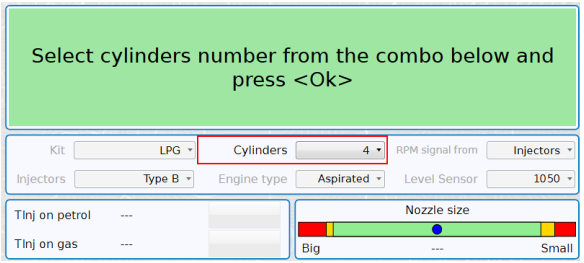
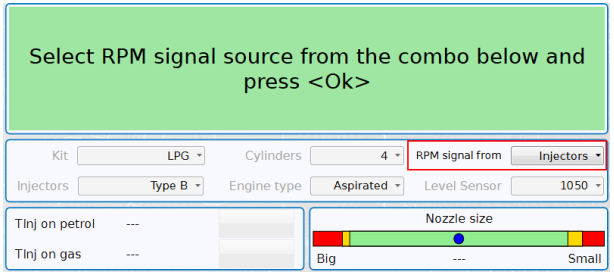
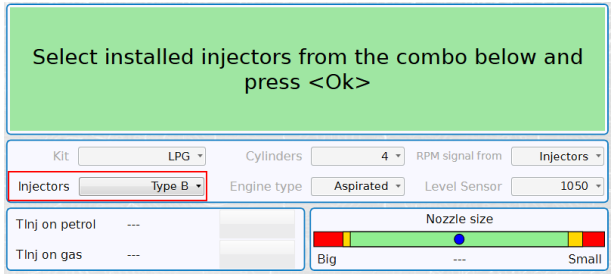
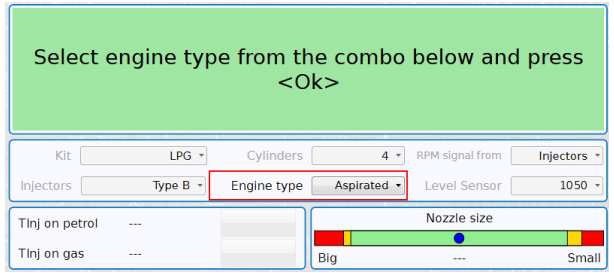
The first (and easier) way to get a map done … with unexpected excellent results!

WHEN THIS PAGE IS SHOWN, FOLLOW THE STEP BY STEP INSTRUCTION AS SHOWN IN THE NEXT CHAPTER AND ON THE SCREEN ….
IT IS POSSIBLE TO REPEAT THE PROCESS
IT'S EASY

	Description	Value
1	**INSTRUCTIONS/DIALOG BOX** Follow the instructions in this box	
2	**KIT TYPE** Name of configuration selected during first initialization	
3	**PARAMETERS to be Confirmed/Changed** During the process, these parameters will be asked for confirmation or modification. See next chapter	
4	**ADDITIONAL MONITOR**	
5	**INJECTION TIMES DISPLAY** When on petrol, petrol times are shown When on gas, petrol time is shown together with gas time	
6	**NOZZLE SIZE INDICATOR** At the end of the process, the position of the blue dot indicator can give an idea about how the size is close to the correct one. There are also error messages (see next chapter)	

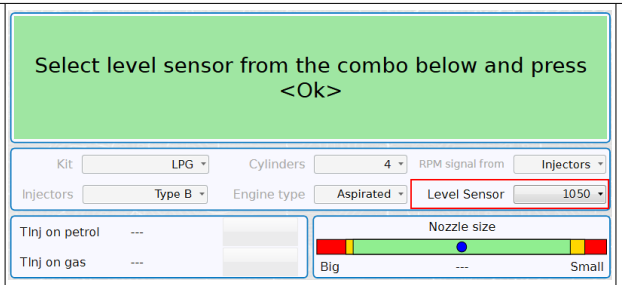
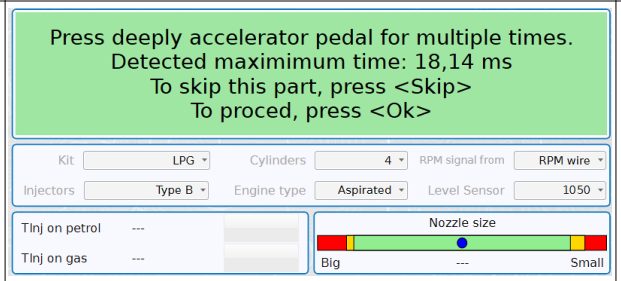
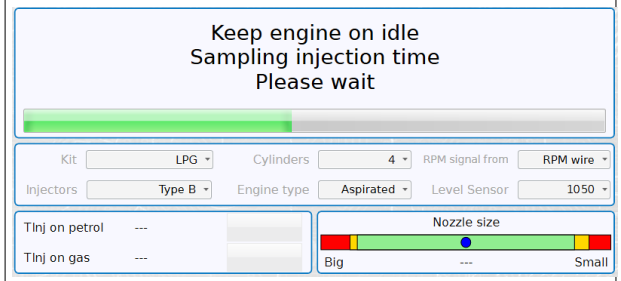
5.1 – Autotuning: Step by step … (1/4)

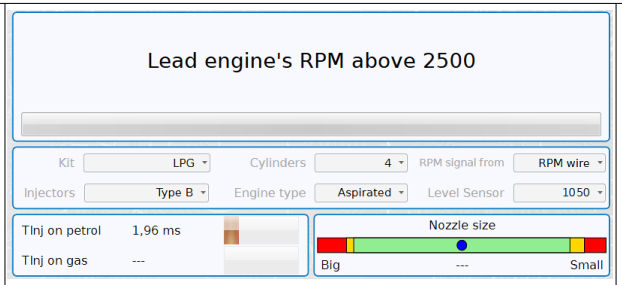
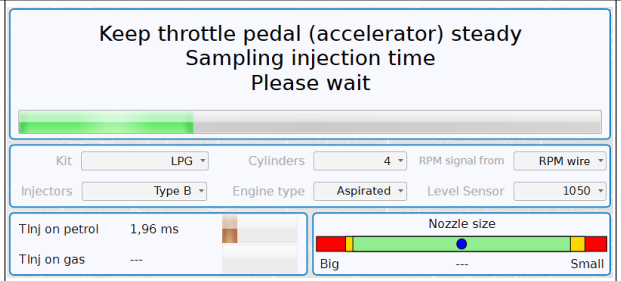
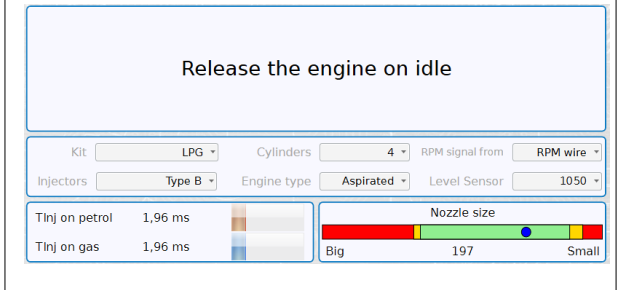
We follow all steps of this easy and fast tuning process which leads to almost perfect calibration

1		In the HOME FOLDER select “Autotuning” to enter the “Autotuning” main folder (explained in above page)
2		Now, start to follow the dialog box and execute what is requested time by time. Engine running on petrol First command says: “Press START” ..
3		Select/confirm the cylinder number (4,3,2,1) and confirm by pressing Enter or OK
4		Select “RPM wire” if you have connect the RPM wire to an RPM source. Select “Injectors” if you want to calculate RPM by reading petrol injectors. In this case some functions will not be enabled.
5		Select/confirm the Injectors type (Depends on the list installed) and confirm by pressing Enter or OK
6		Select/confirm the engine type (Aspirated or Turbo) and confirm by pressing Enter or OK

5.1 – Autotuning: Step by step … (2/4)

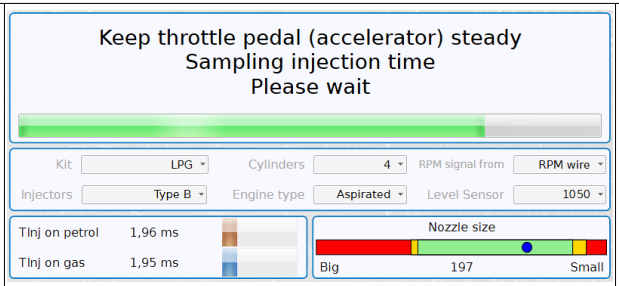
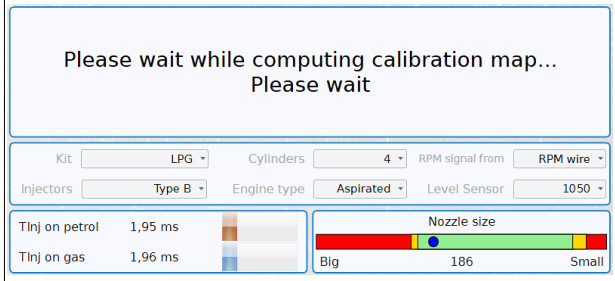
We follow all steps and all questions have to be answered during the process ….

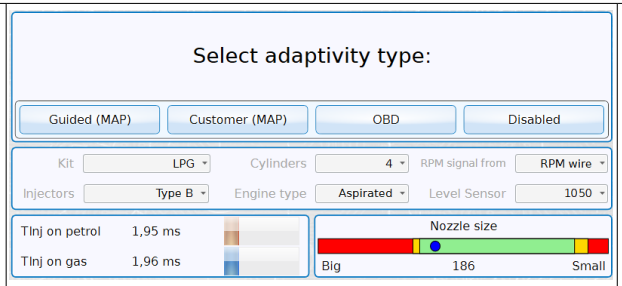
7		Select the Level Sensor type (Depends on the list) and confirm by pressing Enter or OK
8		Press suddenly and deeply the accelerator pedal, and as the engine reaches high RPM (4500 RPM) release the pedal. Repeat for a few times (3-5). Than press OK
9		Wait with the engine idling while the Tinj petrol is acquired ...

10		Lead the engine above 2500, but not over 3000. Important is to keep accelerator pedal steady … **do not follow RPM fluctuation**
11		Important is to keep accelerator pedal steady … **do not follow RPM fluctuation**
12		Release now the accelerator pedal and leave the engine idling

5.1 – Autotuning: Step by step … (3/4)

We follow all steps and all questions have to be answered during the process ….

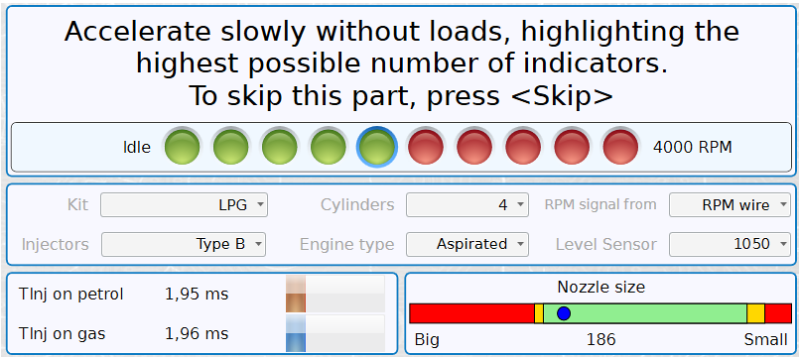
13		Wait with the engine idling ...
14		The map is being calculated. The Nozzle size bar gives an indication about the size of injector's nozzles to be suitable or not

15	 **NOTE:** **OBD Selection only with 48, 486, 488 versions ECU** **Guided (MAP) available only in "Map" tuning mode, not using "Line" tuning mode**	If the choice is Disabled, **THE CALIBRATION IS COMPLETED.** If the road test won't be satisfactory, it's possible to repeat autotuning easly if the choice is Guided or Customer, see next page for more calibration steps

5.1 – Autotuning: Step by step … (4/4)

We follow all steps and all questions have to be answered during the process ….

This step is possible and needed only if in step 16 the choice was “Guided (MAP)” or “Customer (MAP)” (see relevant chapter for more details)

16		Switch loads ON (A/C, lights, etc.) and accelerate slowly and constantly, in order to turn the RED led to GREEN colour. As soon as a sufficient number of acquisitions is reached, the instruction in the circle comes active. Press OK and release the pedal. **AUTOTUNING with LOAD ACQUISITION IS COMPLETED**

Now it's possible to see the results in “MAPPING: MAIN FOLDER” and correct/modify the map.
It is also possible to use the facilities: “MAP Adaptivity” (or “OBD Adaptivity”) to fine tune the map.

5.2 – Autotuning: Error Messages

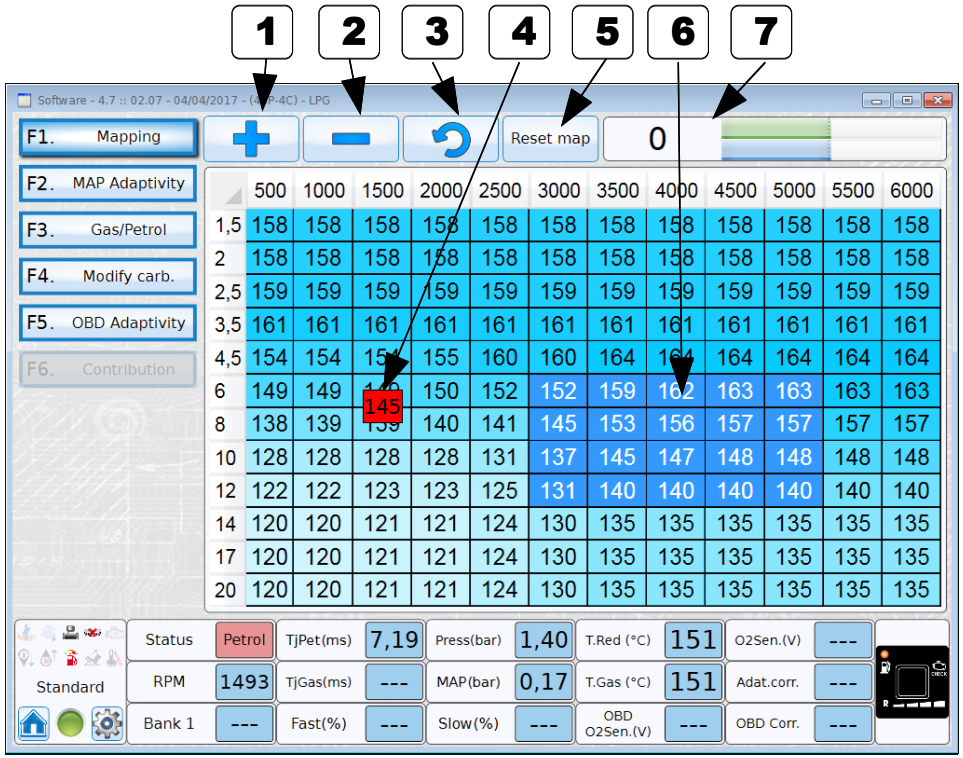
After the Autotuning, the system could give some error messages ...

	POSSIBLE ERROR MESSAGES	
		This message is linked to the wrong size of injector's nozzles. Look at the position of the blue dot in the Nozzle bar. Change the nozzles accordingly and proceed to a new Autotuning.

6- Tune Adjust: Mapping

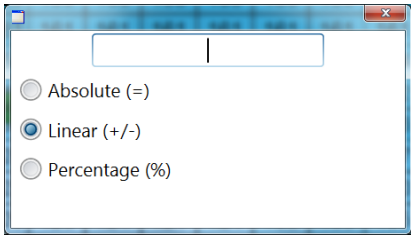
* Expert functions available

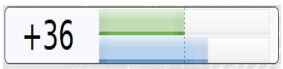
This is the gas map. It's available if during first installation you have selected the "Mapping" as tuning system.



NOTE: - X axis shows RPM
- Y axis shows Injection Times in milliseconds

Pressing ENTER key, a popUp window appears allowing for the change of the values of selected cells.

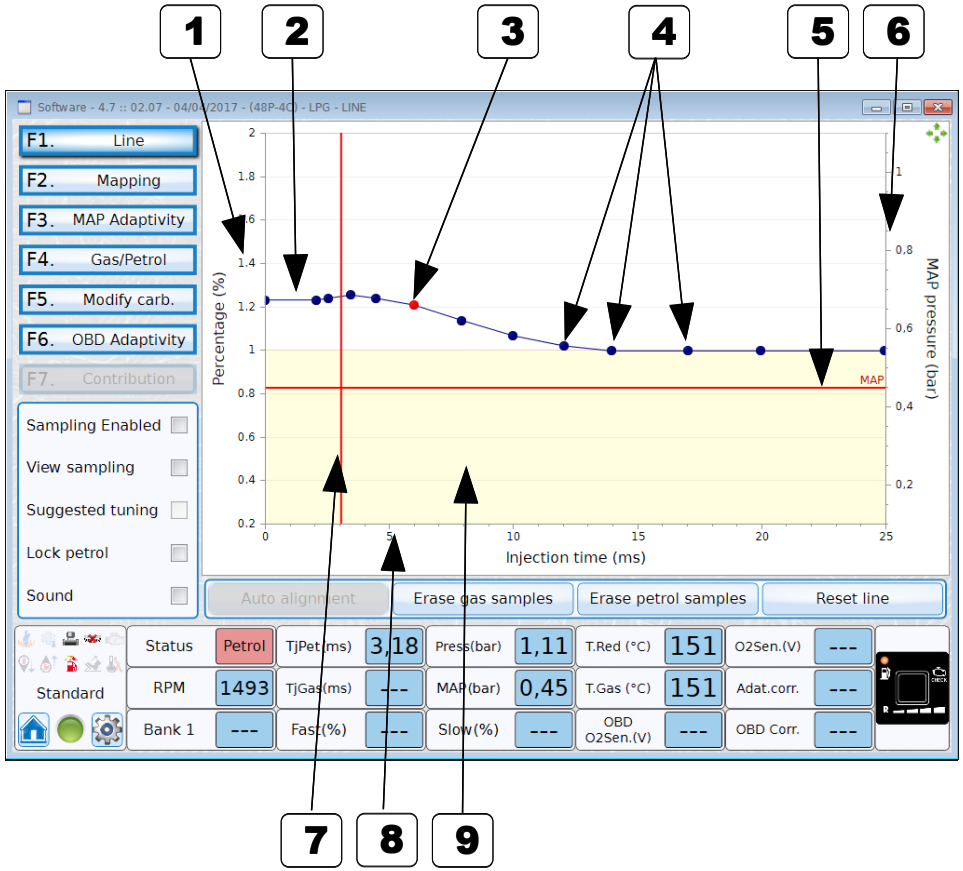


	Description	Value
1	**INCREASE VALUE** in the selected are (one or more cells has to be selected)	
2	**DECREASE VALUE** in the selected are (one or more cells has to be selected)	
3	**UNDO last change** It is possible to go back for 1 step	
4	**ACTUAL Engine Working Point**	
5	**RESET MAP button**	
6	**SELECTION of the MAP AREA** where it is required to apply for an increase or decrease in correction values shown. Use the mouse to select one cell or an area. The selected squares change to BLUE colour	
7	**TARGET AID BAR** referred to ACTUAL Working point	
	How it works: • **On Petrol**, the UPPER bar is working around the centreline , the LOWER is shown but not changing. • **Switch to Gas**, the UPPER bar is shown fixed in the centreline, and is the TARGET: depending on the actual gas injection time, the LOWER/BLUE bar is shorter (with a -X number) or longer (with a +Y number). Act on the buttons "+" or "-" (#1 and #2) to set the time as the TARGET (UPPER and LOWER/BLUE bars should almost match in order to have proper mixture). • **NOTE:** To get reliable informations from this "AID BAR", you should drive approximately in a specific mapping area that you want to check or fix, and try to drive as steady as possible while switching from gas to petrol and vice versa. • If you're moving too far from your petrol target, the UPPER bar will turn from GREEN to RED: it means that the suggested number is no more reliable, and you **should** switch back to petrol and acquire the proper petrol target again.	 **Increase gas**  **Decrease gas**  **OK**  **Re-acquire petrol**

6.1- Tune Adjust: Line (1/2)

* Expert functions available

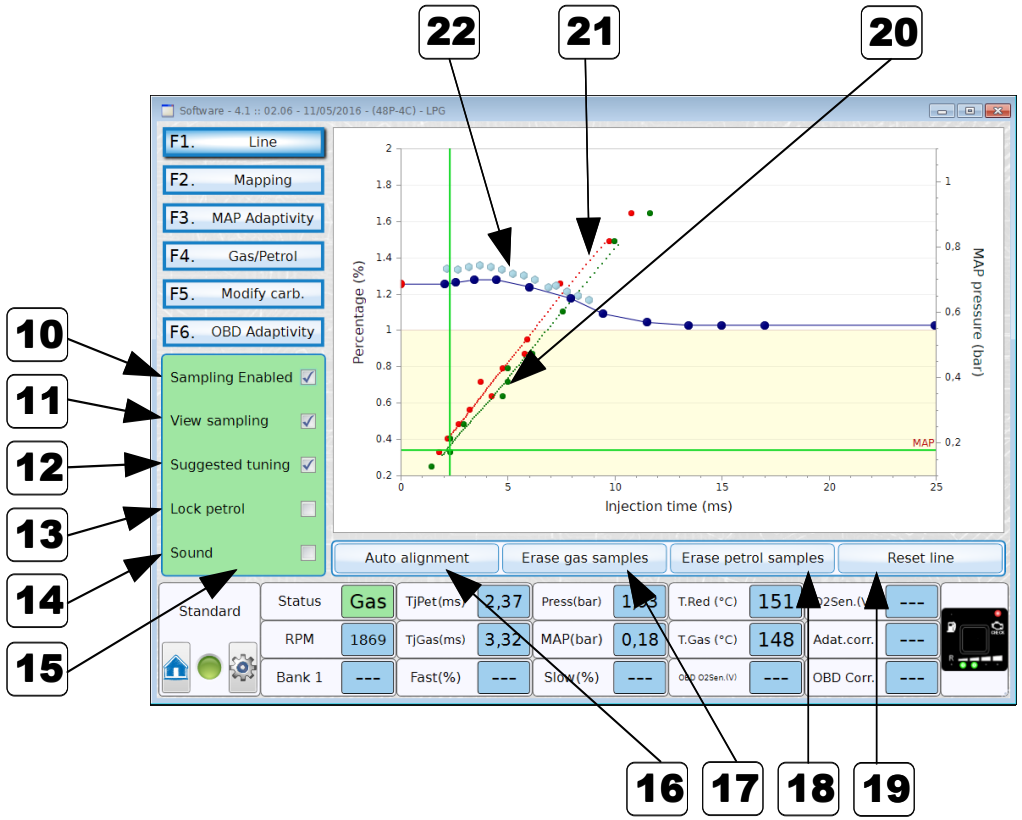
In this case gas correction is shown as a line. It's available if during fists installation you have selected the "Line" as tuning system.
Tune can be changed moving manually each pivot on the line or use the AUTO ALIGNMENT (see chapter 6.1.1 and 6.1.2)



	Description
1	**PERCENTAGE SCALE of correction**
2	**CORRECTION LINE**
3	**SELECTED PIVOT** Point of line that can be moved
4	**PIVOTS**
5	**ACTUAL VALUE OF MAP Pressure** **RED** = drive on petrol **GREEN** = drive on gas
6	**PRESSURE SCALE**
7	**ACTUAL VALUE OF PETROL INJECTION TIME** **RED** = drive on petrol **GREEN** = drive on gas
8	**TIME SCALE in ms**
9	**Yellow area means decrease area**

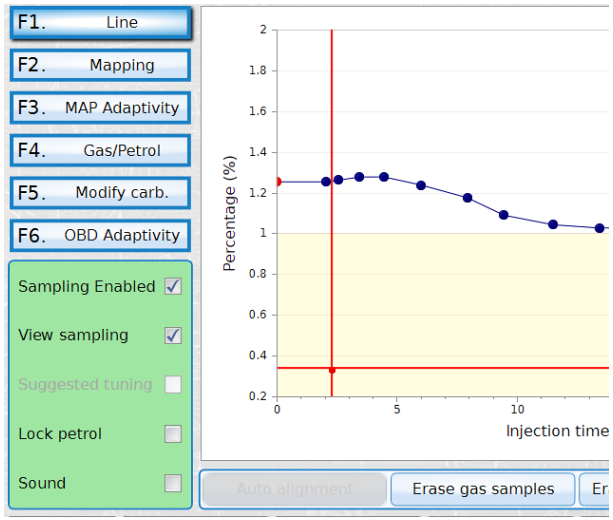
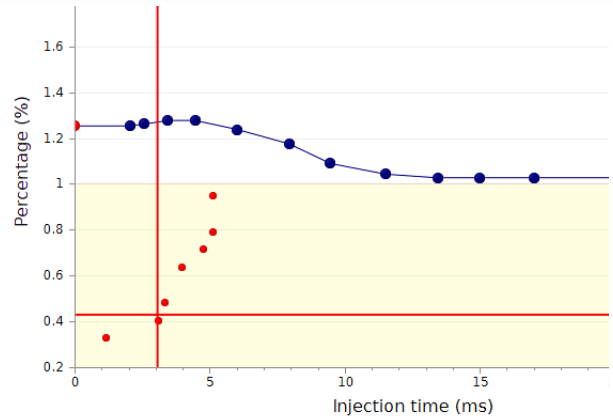
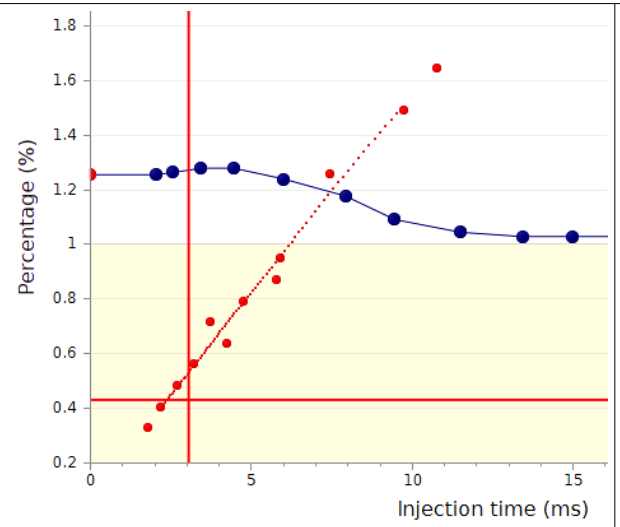
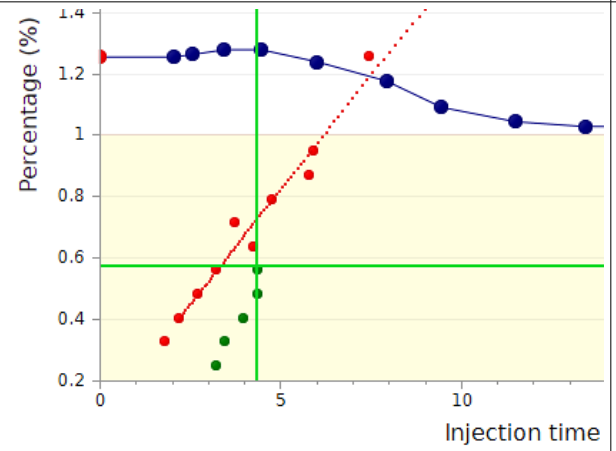
6.1- Tune Adjust: Line (2/2)

* Expert functions available



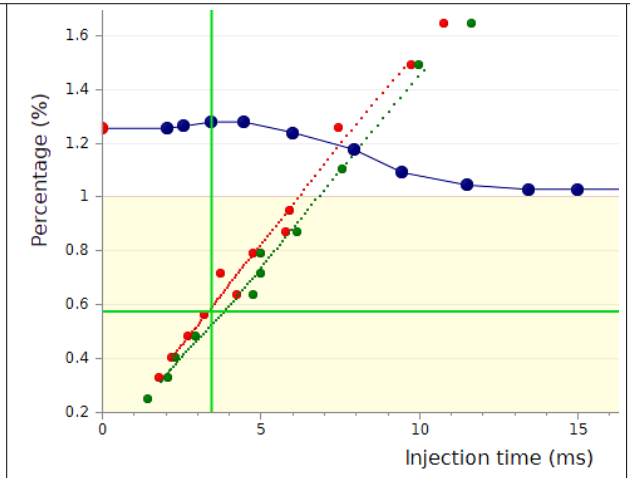
	Description
10	**Sampling Enabled** Enables the sampling of injection time
11	**View Sampling** Enables the visualization on chart of petrol and gas sample
12	**Suggested Tuning** become available only when petrol and gas sample are enough to perform an automatic tuning
13	**Lock Petrol** **W**hen flagged, the ECU does not acquire more petrol samples
14	**Sound** When flagged a “bip” from computer, with engine working, advise that no samples are captured in actual engine working range. This inform the driver to stay in this engine situation to acquire samples.
15	**This background becomes green when ECU is capturing samples and engine situation is stable**
16	**AUTO ALIGNMENT** pressing this button the LINE will be moved to the suggested line (22)
17	**ERASE GAS SAMPLES**
18	**ERASE PETROL SAMPLES**
19	**RESTORE LINE** Restore as software default
20	**GAS sample (GREEN)**
21	**PETROL sample (RED)**
22	**Suggested correction for LINE (pale blue dots) calculated using petrol samples and gas samples.**

6.1.1 - Tune Adjust: Line - How Works the Sampling for AUTOTUNE (1/2)

1		Flag SAMPLING ENABLE to start the acquisition Flag VIEW SAMPLING to see the points on chart
2		Drive on PETROL and RED points will appear on chart Time/Pressure crosshairs is RED
3		Continue driving on PETROL until a RED line appear through petrol points. This is the avarege of petrol samples.
4		Switch to GAS and acquire gas samples. GREEN points will appear. Time/Pressure crosshairs is GREEN

6.1.1 - Tune Adjust: Line - How Works the Sampling for AUTOTUNE (2/2)

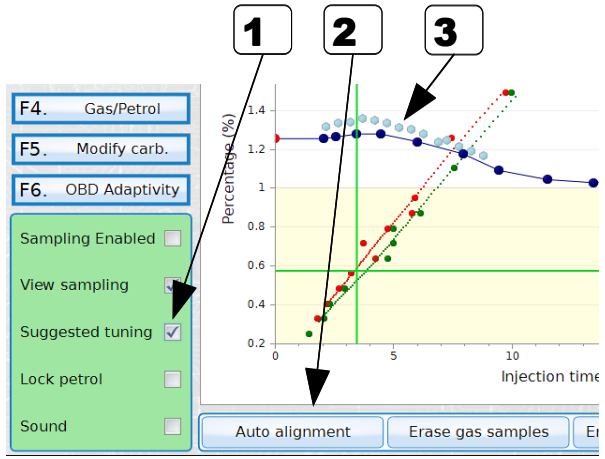
5



Continue driving on GAS until a GREEN line appear through gas points.

This is the avarege of gas samples.

6

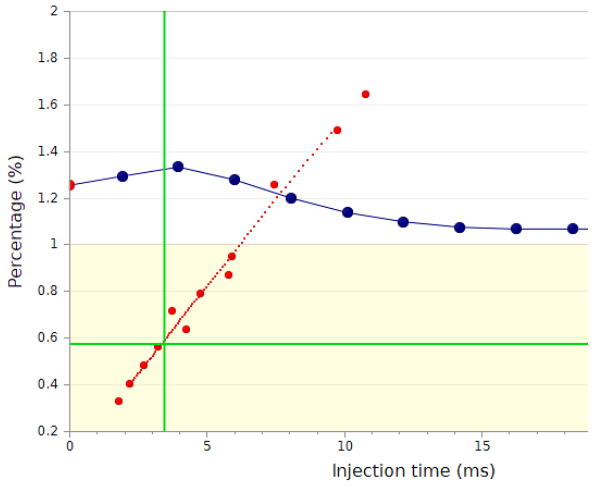


Now is possible to flag SUGGESTED TUNING [1]

AUTO ALIGNMENT [2] button becomes available

Suggested Line [3] appears

7



Press the AUTO ALIGNMENT button confirm the proposal changes

- line is moved over suggested one.
- gas sample are cleared
- suggested line disappear

now you can repeat step from 5 to 7 each time you want

OR

go to next page for manual tuning

OR

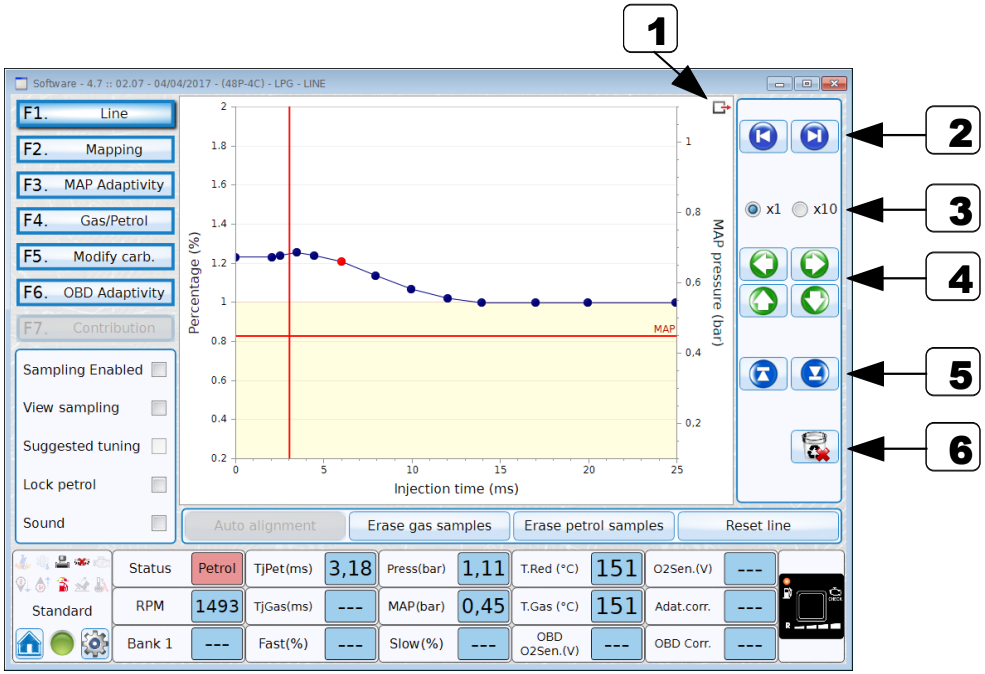
exit without changes (press ESC)

6.1.2 - Tune Adjust: Line – Manual TUNE

Selected PIVOTs (one at a time) on the line can be moved manually using keyboard shortcut:

Space Bar	Switch from Petrol to Gas, Gas to Petrol
Arrows	Move selected pivot
Canc	Remove selected pivot
PgUp	Select next pivot on the right
Ctrl + RightArrow	Select next pivot on the right
PgDwn	Select next pivot on the left
Ctrl + LeftArrow	Select next pivot on the left
Ctrl + UpArrow	Move all Line upward of little step
Ctrl + DwnArrow	Move all Line downward of little step
Ctrl + Shift + UpArrow	Move all Line upward of big step
Ctrl + Shift + DwnArrow	Move all Line downward of big step
Shift + RightArrow	Move selected pivot to the right of big step
Shift + LeftArrow	Move selected pivot to the left of big step

6.1.3 - Tune Adjust: Line – Manual TUNE using Control Panel



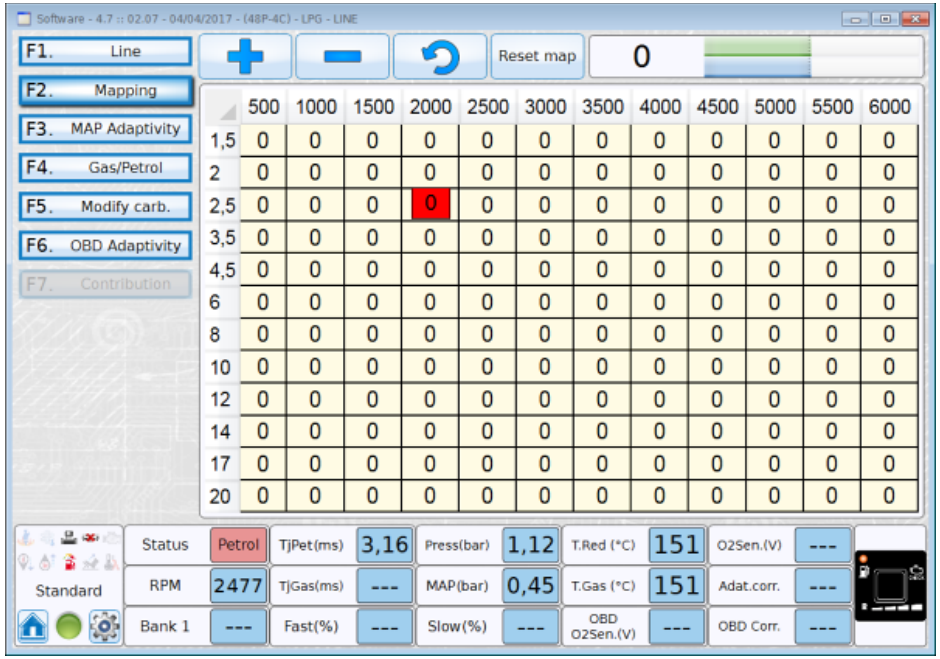
	Description
1	Hide/Show control panel
2	Select previous/next pivot
3	Step of movements
4	Move selected pivot Up/Down/Right/Left
5	Move entire line Up/Down
6	Delete selected pivot

Note: To add a new Pivot over the line, click with Right Mouse button where it's needed to add it.

6.2- Tune Adjust: Line Additional Mapping

* Expert functions available

Additional Mapping is available if during the first installation you have selected the “Line” as tuning system.



Buttons, gird selections and values changing works as
6-Tune Adjust: Mapping

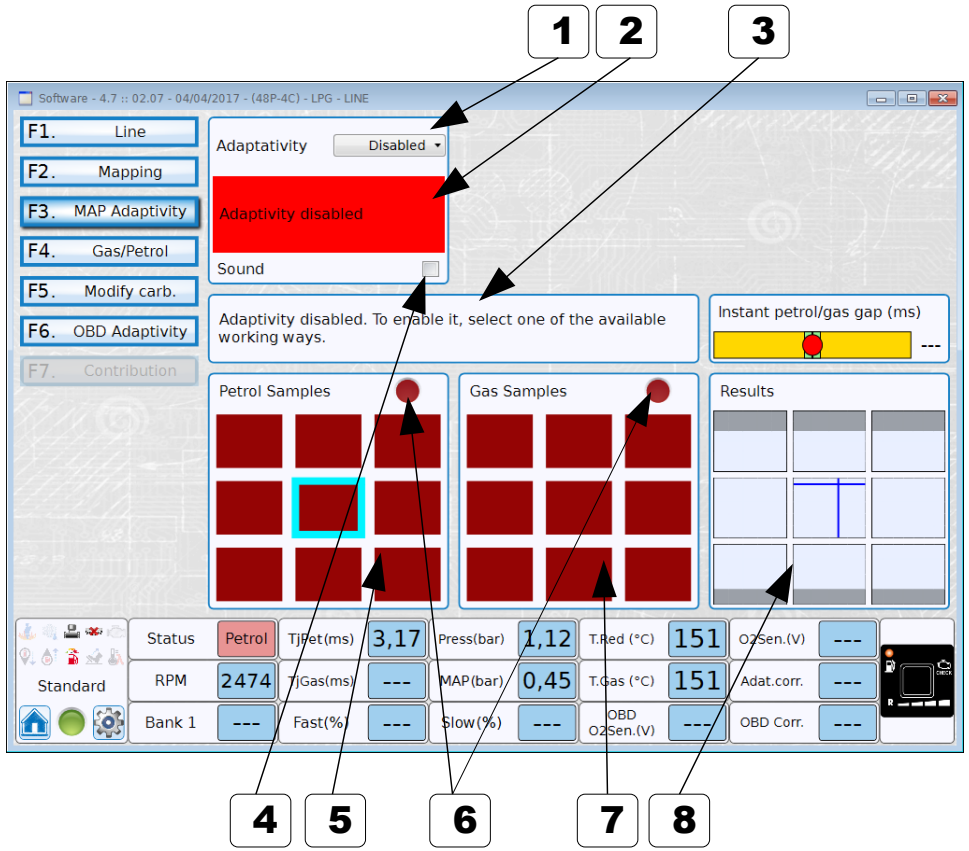
This is used to add or remove a percentage of time on calculated times resulting from Line, linked to RPM.
Values can be from -50 to 50 %.

NOTE: - X axis shows RPM
- Y axis shows Injection Times in milliseconds

6.3 – Tune Adjust: MAP Adaptivity (1/2)

* Expert functions available

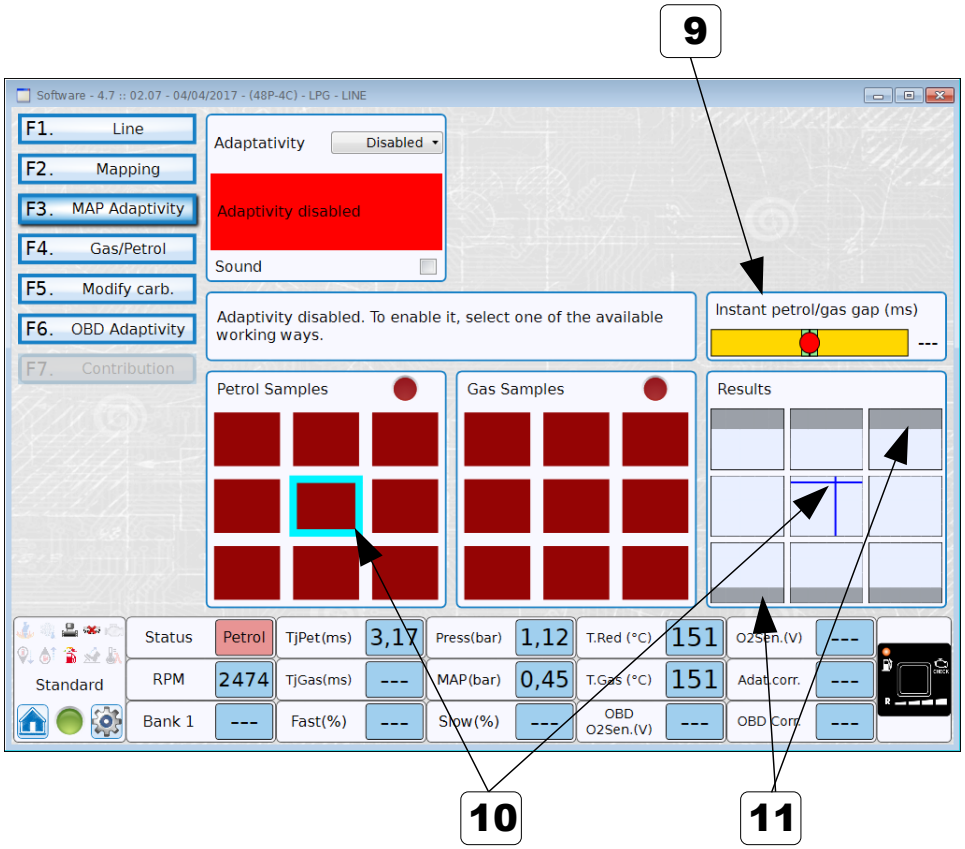
MAP adaptivity is a way to monitor the tuning using the MAP sensor and, if enabled, it modifies the map of the tuning.



	Description	Value
1	**ADAPTIVITY enabling flag** - Guided: follow the wizard proposed by the system - Customer: follow the status of the led on the virtual switch (or the real switch) and drive the adaptivity path. - Disabled	**- Disabled (default)** **- Guided** **- Customer**
2	**ADAPTIVITY working status**	RED = Disabled GREEN = Enabled
3	**MESSAGES/INSTRUCTIONS BOX** Follow carefully the instructions/messages shown	
4	**SOUND enabling flag** For every valid acquisition during the process, a “bip” will be heard (the buzzer of the switch is used for the purpose)	
5	**PETROL SAMPLES sub-map** This sub-map shows a load/RPM diagram While driving on petrol, the 9 box will turn to GREEN as soon as the number of acquisitions for each box/condition is sufficient.	
6	**NUMBER OF ACQUISITIONS REACHED** The light turns GREEN as soon as a sufficient number of valid acquisitions has been recorded. The next fuel acquisition can be started (or the result will be shown in the Results box)	RED = Not enough GREEN = Enough
7	**GAS SAMPLES sub-map** Same as above #4 but used for gas sampling.	
8	**RESULTS sub-map** As soon as enough acquisitions have been recorded, this box shows the results found.	**Result is shown in form of a color scale**

6.3 – Tune Adjust: MAP Adaptivity (2/2)

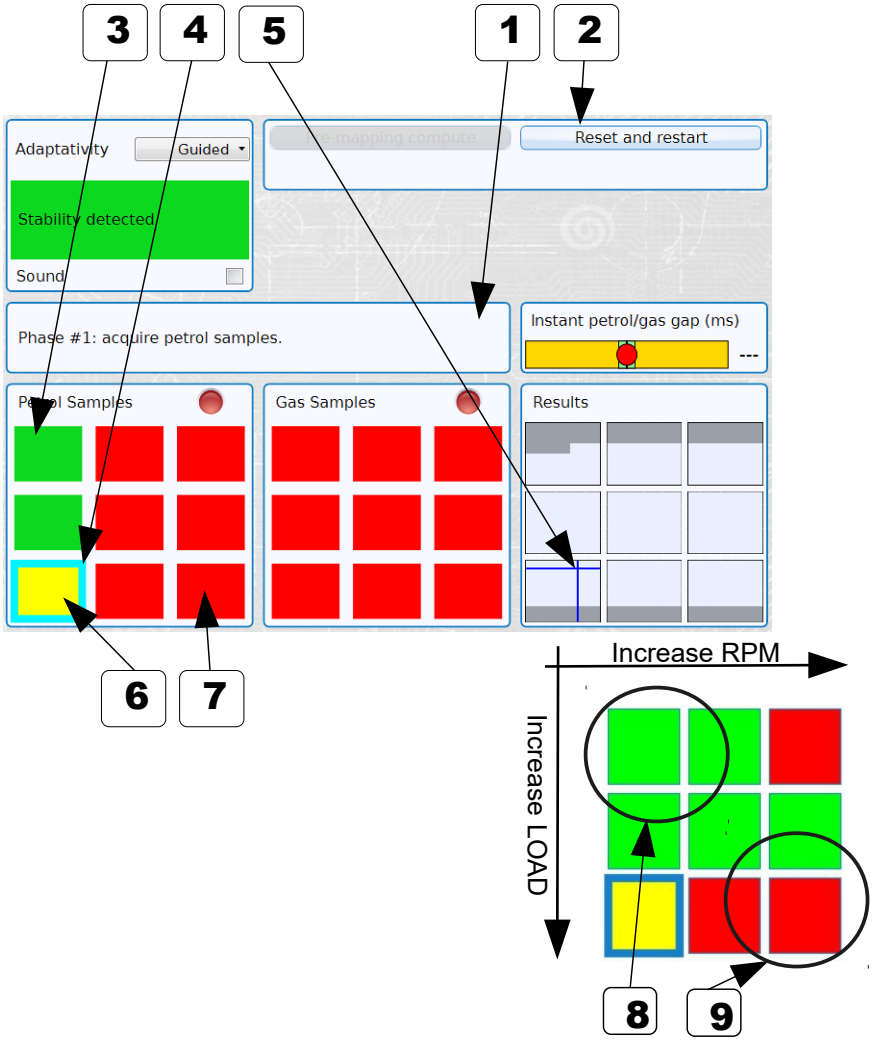
* Expert functions available



	Description	Value
9	**INSTANT petrol/gas GAP** The indication shown is the difference between the actual injection time in working position and the “optimum” injection time as calculated in the same position. If this difference exceeds the allowed tolerance, the ECU will provide to “Adapt” the map. There is nothing that can be done manually. To see the situation in another cell move the accelerator pedal to enter a different engine working position.	
10	**CURSOR position:** actual engine working point	
11	**GREY zone** engine working area where adaptivity in disabled	

6.3.1 – Tune Adjust: MAP Adaptivity Guided – Phase #1

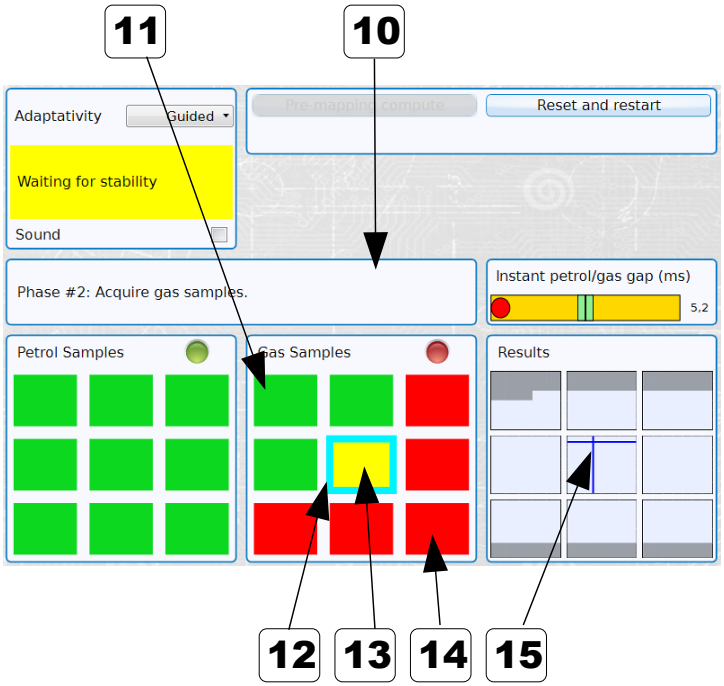
Drive the vehicle on petrol till the completion of the “Petrol Samples” table; once all the cells turn green, manually switch over to gas.



	Description	Value
1	**MESSAGES/INSTRUCTIONS BOX** Follow carefully the instructions/messages shown	
2	**Reset and Restart button:** all parameters are set to factory values, the procedure starts from scratch	
3	**GREEN cell:** sample acquired is correct	
4	**CURSOR position:** actual engine working point. This box around cell appears in “Petrol Samples” if vehicle is running on Petrol, and in “Gas Samples” if it’s running on Gas.	
5	**CURSOR position:** actual engine working point in result map, whether the engine is on petrol or on gas	
6	**YELLOW cell:** samples only partially acquired	
7	**RED cell:** sample **NOT** acquired	
8	**IDLE zone:** top left cell	
9	**HIGH POWER zone:** bottom right cell	

6.3.1 – Tune Adjust: MAP Adaptivity Guided – Phase #2

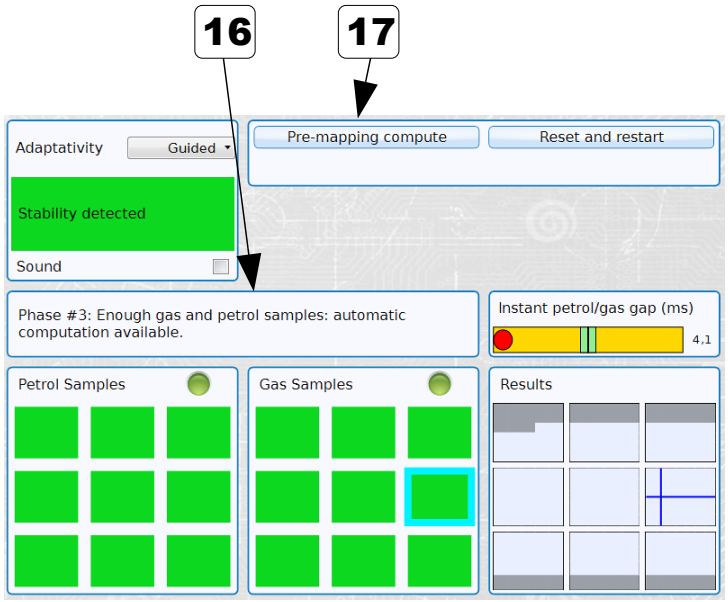
Drive the vehicle on gas till the “Gas samples” table is completed.



	Description	Value
10	**MESSAGES/INSTRUCTIONS BOX** Follow carefully the instructions/messages shown	
11	**GREEN cell:** sample acquired is correct	
12	**CURSOR position:** actual engine working point. This box around cell appears in “Petrol Samples” if vehicle is running on Petrol, and in “Gas Samples” if it’s running on Gas.	
13	**YELLOW cell:** samples only partially acquired	
14	**RED cell:** sample **NOT** acquired	
15	**CURSOR position:** actual engine working point in result map, whether the engine is on petrol or on gas	

6.3.1 – Tune Adjust: MAP Adaptivity Guided – Phase #3

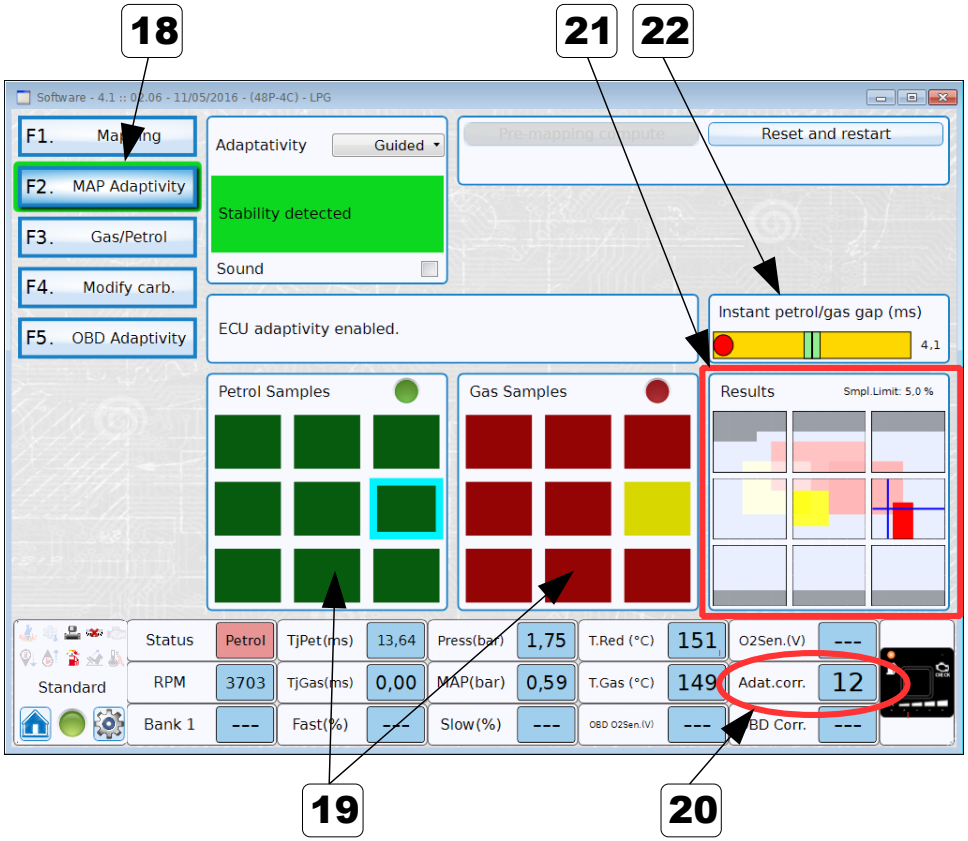
Once the map tables are completed GREEN, press the “Pre-mapping compute” button.



	Description	Value
16	**MESSAGES/INSTRUCTIONS BOX** Follow carefully the instructions/messages shown	
17	**Pre-mapping compute button** Press the “Pre-mapping compute” and the ECU will calculate the difference between the injection times acquired in the Petrol Samples and in Gas Samples. The “Result Map” is the optimized calculated map for vehicle's best working.	

6.3.1 – Tune Adjust: MAP Adaptivity Guided – Phase #4

From now on, the Adaptivity is active and the ECU will continue adaptation depending on the drive style and situations.

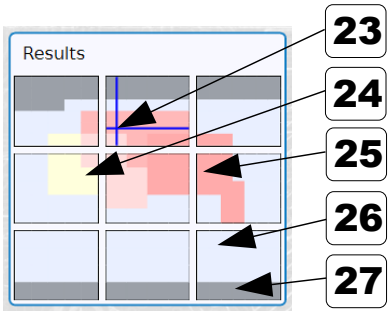


	Description	Value
18	**GREEN edge:** Adaptivity is working	
19	**DARK colours:** the mapping tables turned colours to dark colour as there is no longer the need to control them as they have been acquired	
20	**Adat. Corr.:** Adaptivity correction shows in real time the correction relevant or actual engine working point	
21	**Results:** this is the map calculated by PC	
22	**INSTANT petrol/gas GAP** The indication shown is the difference between the actual injection time in working position and the “optimum” injection time as calculated in the same position. If this difference exceeds the allowed tolerance, the ECU will provide to “Adapt” the map. There is nothing that can be done manually. To see the situation in another cell move the accelerator pedal to enter a different engine working position.	

6.3.1 – Tune Adjust: MAP Adaptivity Guided – Results

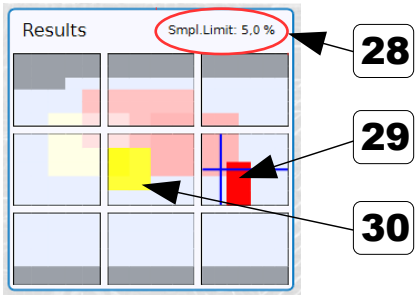
How to read the “Results Map”

Adaptivity is within tolerance
Nothing to do



	Description	Value
23	**CURSOR position:** actual engine working point	
24	**PALE YELLOW** carburation is **slightly** on the rich side	
25	**PALE RED** carburation is **slightly** on the lean side	
26	**PALE BLUE** engine working area not explored or not needing correction	
27	**GREY** engine working area where adaptivity in disabled	

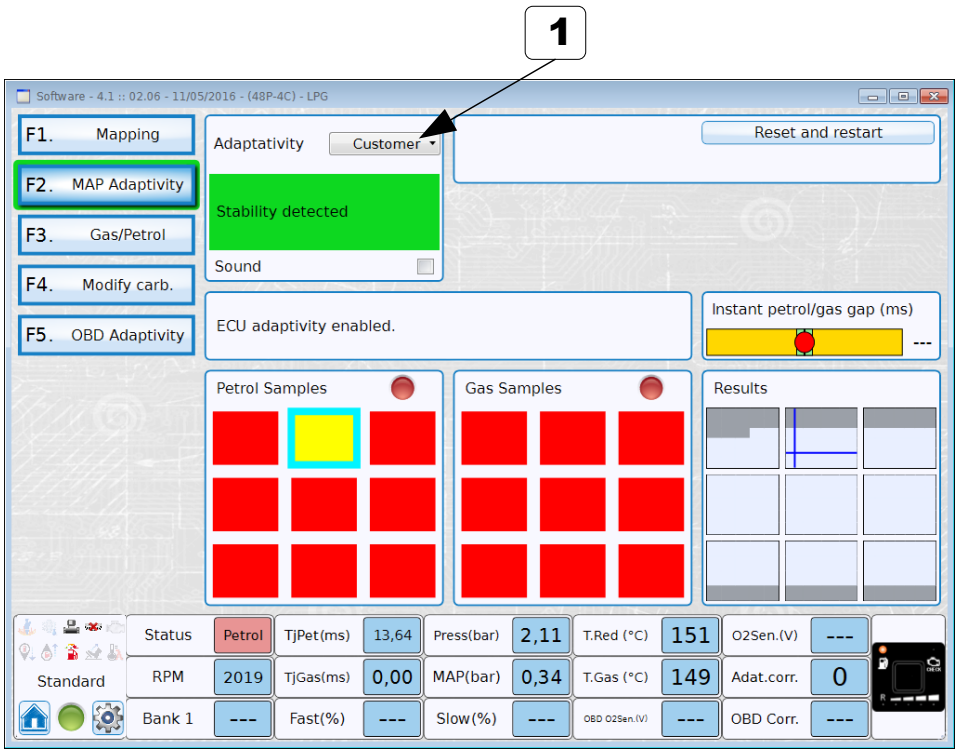
Adaptivity close to the high limit
It is needed to do something to correct the map
i.e. in the area where yellow or red are shown bright, it’s needed to adjust the map or the line



	Description	Value
28	Percentage of samples close to the high limit	
29	**RED** carburation is **too much** on the lean side	
30	**YELLOW** carburation is **too much** on the rich side	

6.3.2 – *Tune Adjust: MAP Adaptivity Customer*

"Customer" Adaptivity

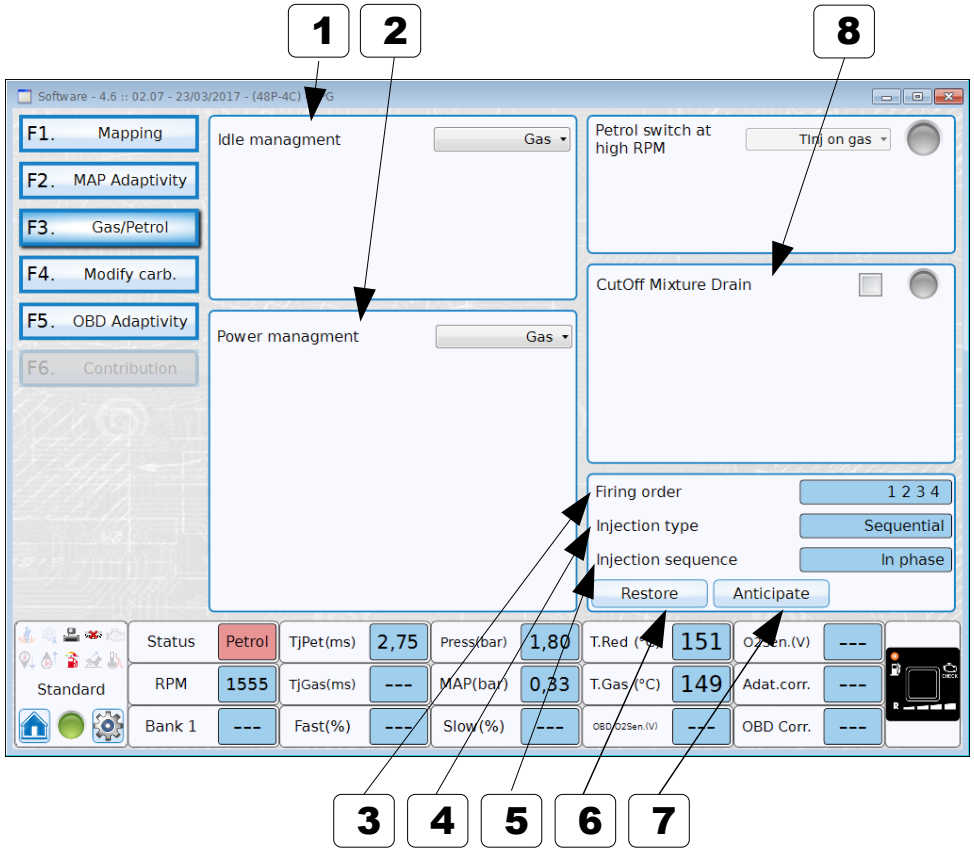


	Description	Value
1	**CUSTOMER** Customer adaptivity has been developed for all those situation where it is not possible a test/calibration driving the vehicle on the road (typically too much traffic, expensive cars and so on) . • Flag the "Customer" choice and proceed as for "Guided" choice but without using the PC. • At start, the vehicle will be forced on petrol and it won't be possible to change-over to gas for 15-20 minutes, This is the minimum acquisition time for petrol injection time. • At the end of this time or, in any case, as soon as there are enough acquisitions for the map to be calculated by the ECU, it will be possible to change-over to gas. The first change-over will be advised by a beeping of the switch. **Suggestions:** • For a quick acquisition, leave the switch in "ready-to-change" position: as soon as the ECU will complete the job, it will change-over to gas immediately. • For a more accurate acquisition, tell the driver to keep the ECU on petrol for few days (or approx. 250-300 km.) before switching to gas.	

6.4 – Tune Adjust: Gas/Petrol Fuel Management

* Expert functions available

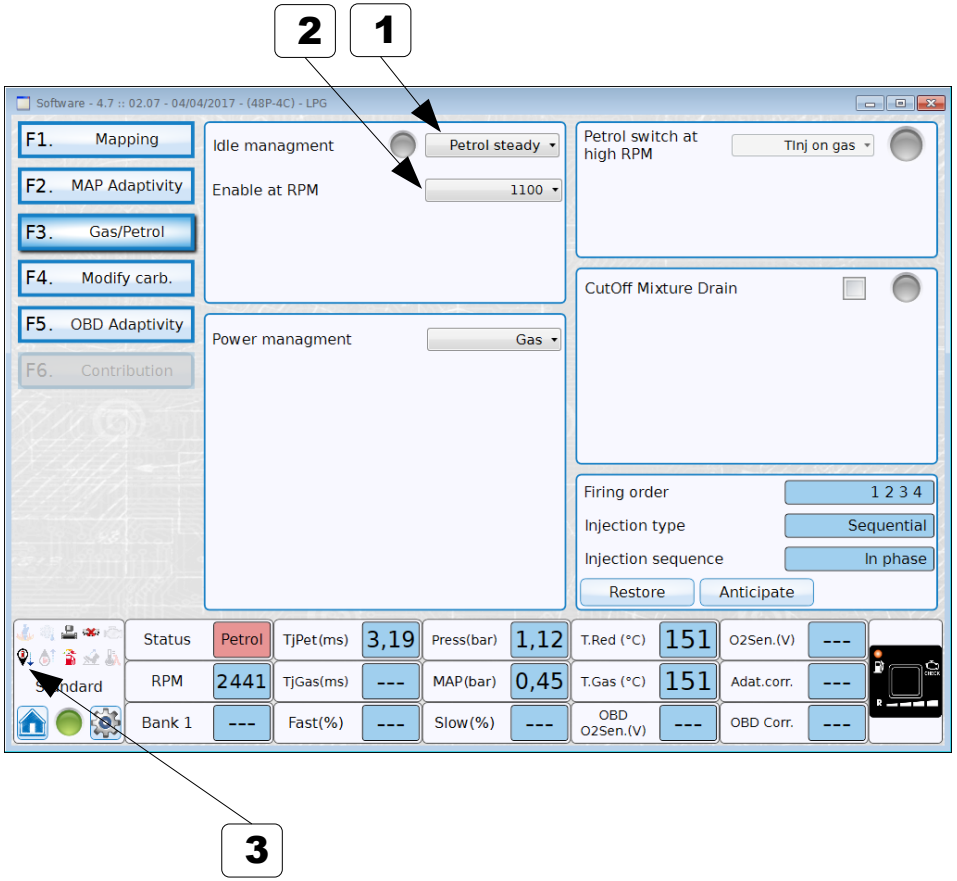
The management of both fuels is used to increase performance or keep the check engine light off.



	Description	Value
1	**IDLE MANAGEMENT** When GAS is the choice, no more parameters are shown. RPM Wire **shall be** connected to enable the alternative choices	**Default = Gas** **Petrol steady,** **Return only,** **Petrol Small TInjGas**
2	**POWER MANAGEMENT** When GAS is the choice, no more parameters are shown. RPM Wire **shall be** connected to enable the alternative choices	**Default = Gas** **Contribution, Petrol,** **Contributions Map**
3	**FIRING ORDER** Petrol injection sequence	**Display only**
4	**INJECTION TYPE**	**Display only**
5	**INJECTION SEQUENCE** The gas injection sequence	**Display only**
6	**RESTORE**	
7	**ANTICIPATE**	
8	**CUTOFF MIXTURE DRAIN** When flagged, during CutOff the amount of GAS will be reduced due to high pressure in the reducer - injectors	

6.4.1 - Tune Adjust: Gas/Petrol → Idle Management → Petrol Steady

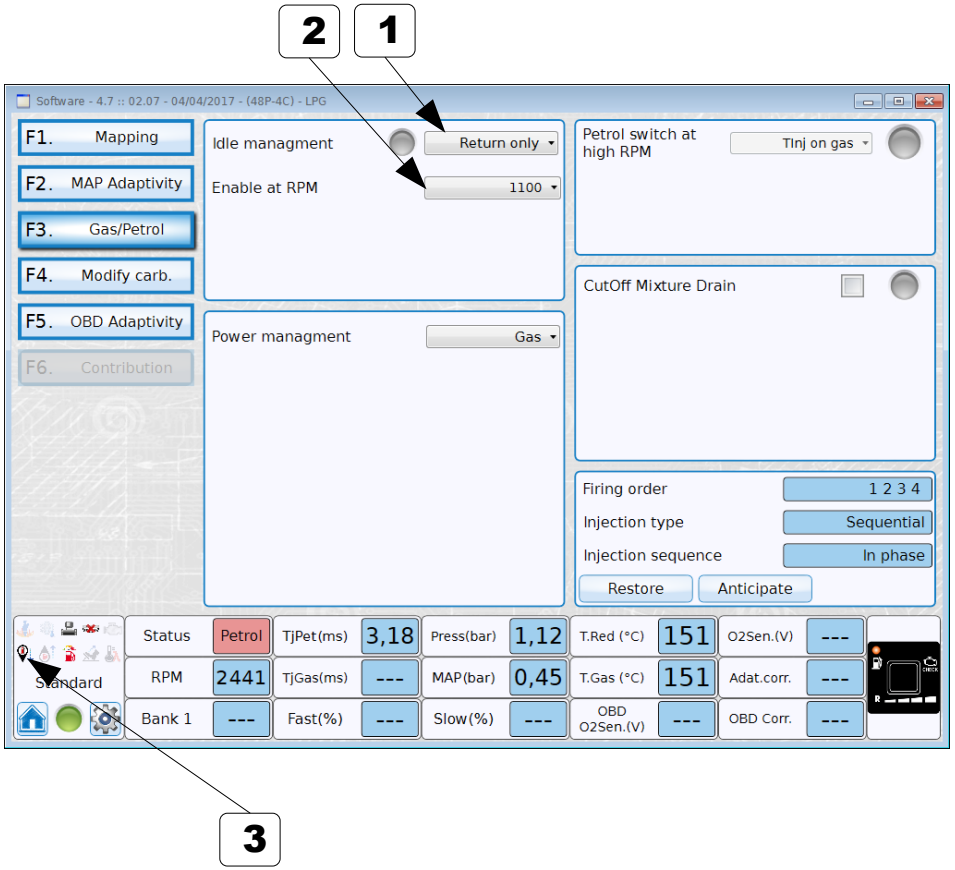
* Expert functions available



	Description	Value
1	**Petrol steady** By selecting this option, the vehicle remains on petrol when the engine is on idle (basically when the RPM are below the **"Enable at RPM"** threshold).	
2	**Enable at RPM** Below this RPM threshold the ECU switches back to petrol.	
3	**Idle Management Icon** Colourized icon indicate the activation of strategy	

6.4.2 - Tune Adjust: Gas/Petrol → Idle Management → Return Only

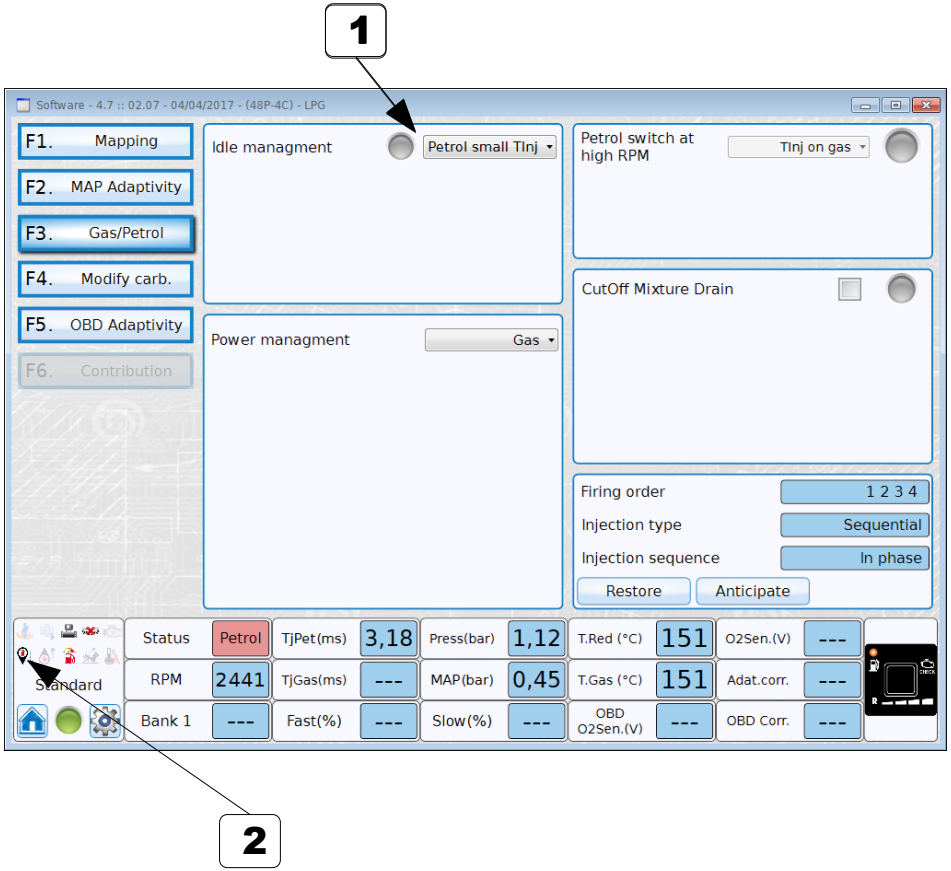
* Expert functions available



	Description	Value
1	**Return only** Selecting this option, the vehicle switches to petrol for a specific amount of engine cycles when the engine returns on idle (basically when the RPM falls below the **"Enable at RPM"** threshold).	
2	**Enable at RPM** Below this RPM threshold the ECU switches back to petrol.	
3	**Idle Management Icon** Colourized icon indicate the activation of strategy	

6.4.3 - Tune Adjust: Gas/Petrol → Idle Management → Petrol Small TInjGas

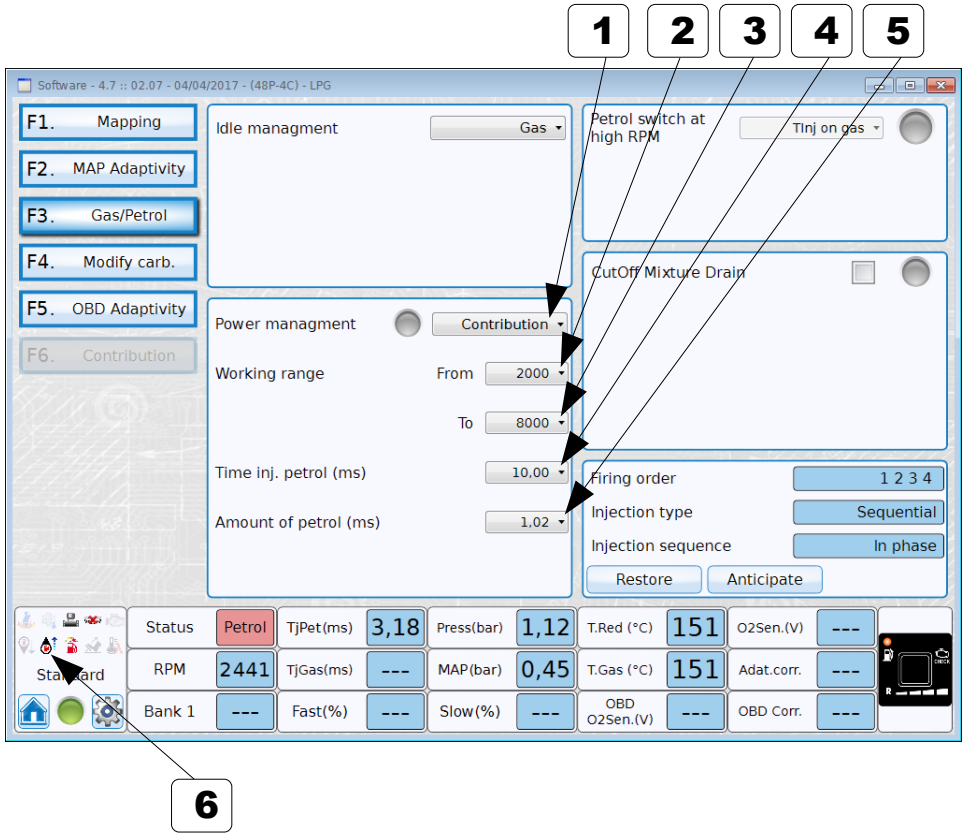
* Expert functions available



	Description	Value
1	**Petrol Small TinjGas** Selecting this option, the vehicle switches to petrol when the calculated time of gas injection is too small for the injector installed.	
2	**Idle Management Icon** Colourized icon indicate the activation of strategy	

6.4.4 - Tune Adjust: Gas/Petrol → Power Management → Contribution

* Expert functions available



	Description	Value
1	**Contribution** Selecting this option, the vehicle will inject a small amount of petrol (**#5**), in the selected conditions (**#2 #3 #4**), while running on gas.	
2. 3.	**Working range** The Contribution function works when the engine RPM are over **From (#2)** value and below **To (#3)** value and Petrol injection time is over threshold (**#4**)	
4	**Time inj. Petrol** The Contribution function works when Petrol injection time is over this time injection threshold and RPM values are in Working range (between values selected in **#2** and **#3**)	
5	**Amount of petrol** Amount of petrol that is inject in Contribution	
6	**Power Management Icon** Colourized icon indicate the activation of strategy	

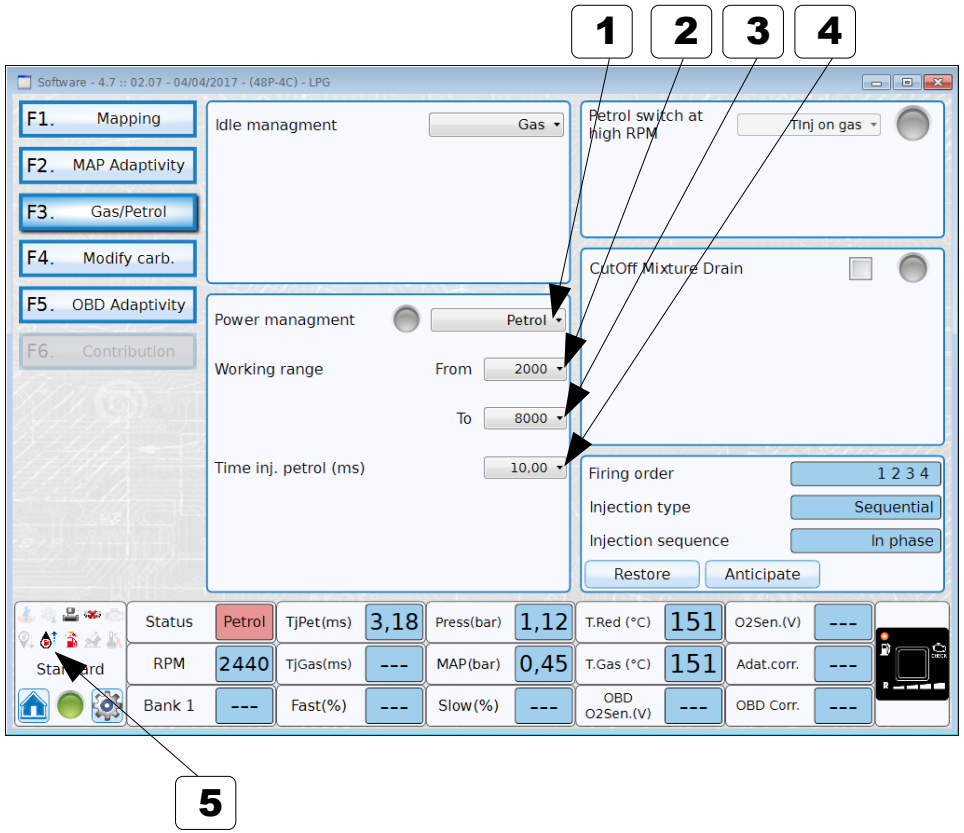
Example only to understand the working range referred to the selected parameters as shown here

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
1,5	158	158	158	158	158	158	158	158	158	158	158	158
2	158	158	158	158	158	158	158	158	158	158	158	158
2,5	159	159	159	159	159	159	159	159	159	159	159	159
3,5	161	161	161	161	161	161	161	161	161	161	161	161
4,5	154	154	154	155	160	160	164	164	164	164	164	164
6	149	149	149	150	152	152	159	162	163	163	163	163
8	138	139	139	140	141	145	153	156	157	157	157	157
10	128	128	128	128	131	137	145	147	148	148	148	148
12	122	122	123	123	125	131	140	140	140	140	140	140
14	120	120	121	121	124	130	135	135	135	135	135	135
17	120	120	121	121	124	130	135	135	135	135	135	135
20	120	120	121	121	124	130	135	135	135	135	135	135

Contribution
(Gas + Petrol)

6.4.5 - Tune Adjust: Gas/Petrol → Power Management → Petrol

* Expert functions available



	Description	Value
1	**Petrol** Selecting this option, the vehicle will run **only** on petrol in the selected conditions (**#2 #3 #4**)	
2. 3.	**Working range** The Petrol function works when the engine RPM are over **From (#2)** value and below **To (#3)** value and Petrol injection time is over threshold (**#4**)	
4	**Time inj. Petrol** The Petrol function works when petrol injection time is over this time injection threshold and RPM values are in Working range (between values selected in **#2** and **#3**)	
5	**Power Management Icon** Colourized icon indicate the activation of strategy	

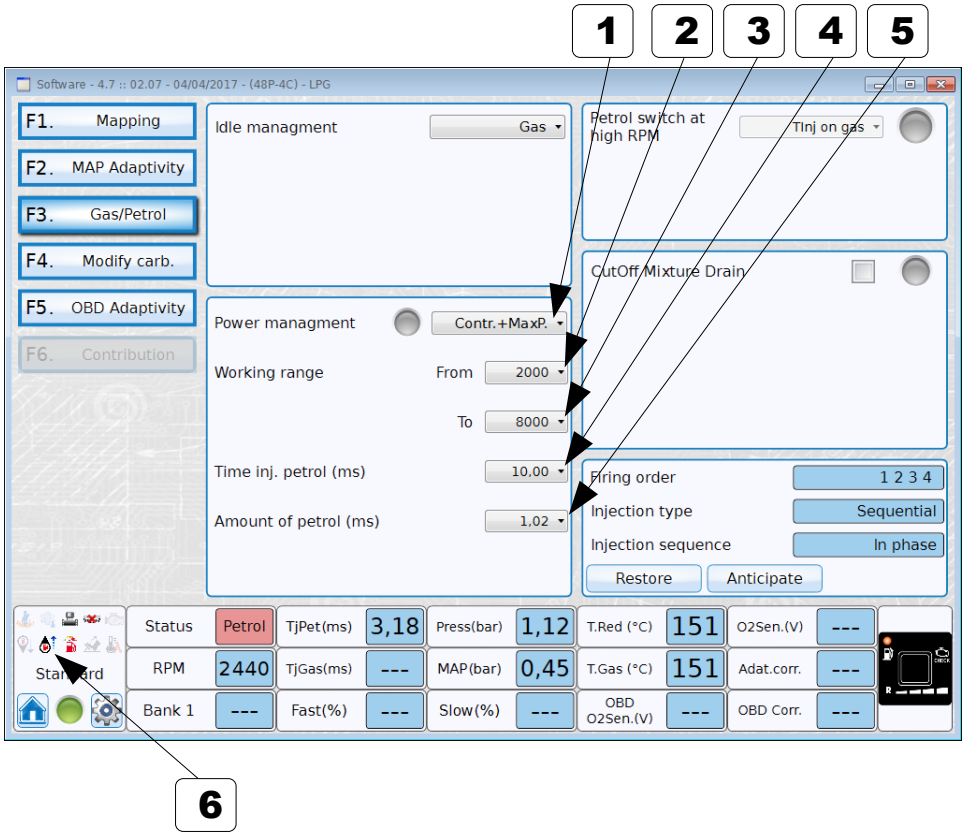
Example only to understand the working range referred to the selected parameters as shown here

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
1,5	158	158	158	158	158	158	158	158	158	158	158	158
2	158	158	158	158	158	158	158	158	158	158	158	158
2,5	159	159	159	159	159	159	159	159	159	159	159	159
3,5	161	161	161	161	161	161	161	161	161	161	161	161
4,5	154	154	154	155	160	160	164	164	164	164	164	164
6	149	149	149	150	152	152	159	162	163	163	163	163
8	138	139	139	140	141	145	153	156	157	157	157	157
10	128	128	128	128	131	137	145	147	148	148	148	148
12	122	122	123	123	125	131	140	140	140	140	140	140
14	120	120	121	121	124	130	135	135	135	135	135	135
17	120	120	121	121	124	130	135	135	135	135	135	135
20	120	120	121	121	124	130	135	135	135	135	135	135

Petrol

6.4.6 - Tune Adjust: Gas/Petrol → Power Management → Contr.+MaxP.

* Expert functions available



	Description	Value
1	**Contribution + Max Power** Selecting this option, the vehicle will inject a small amount of petrol, in the selected range, while running on gas. Over the selected rage the vehicle will run **only** on petrol.	
2. 3.	**Working range** The Contribution function (gas and petrol together) works when the engine RPM are over **From (#2)** value and below **To (#3)** value and Petrol injection time is over threshold (**#4**) The MaxPower function (only petrol) works when the engine RPM are over **To (#3)** value and Petrol injection time is over threshold (**#4**)	
4	**Time inj. Petrol** The Contribution function works when Petrol injection time is over this time injection threshold and RPM values are in Working range (between values selected in **#2** and **#3**)	
5	**Amount of petrol** Amount of petrol that is inject in Contribution	
6	**Power Management Icon** Colourized icon indicate the activation of strategy	

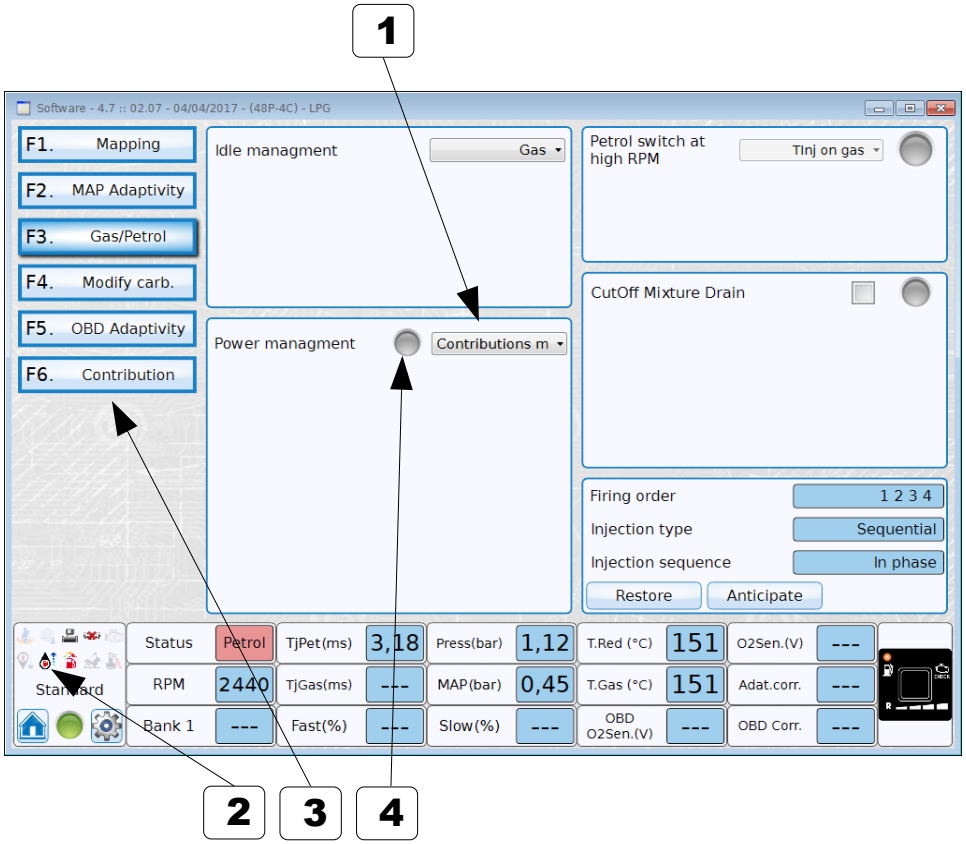
Example only to understand the working range referred to the selected parameters as shown here

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
1,5	158	158	158	158	158	158	158	158	158	158	158	158
2	158	158	158	158	158	158	158	158	158	158	158	158
2,5	159	159	159	159	159	159	159	159	159	159	159	159
3,5	161	161	161	161	161	161	161	161	161	161	161	161
4,5	154	154	154	155	160	160	164	164	164	164	164	164
6	149	149	149	150	152	152	159	162	163	163	163	163
8	138	139	139	140	141	145	153	156	157	157	157	157
10	128	128	128	128	131	137	145	147	148	148	148	148
12	122	122	123	123	125	131	140	140	140	140	140	140
14	120	120	121	121	124	130	135	135	135	135	135	135
17	120	120	121	121	124	130	135	135	135	135	135	135
20	120	120	121	121	124	130	135	135	135	135	135	135

Contribution (Gas + Petrol)

MaxPower (Petrol)

6.4.7 - Tune Adjust: Gas/Petrol → Power Management → Contributions Map

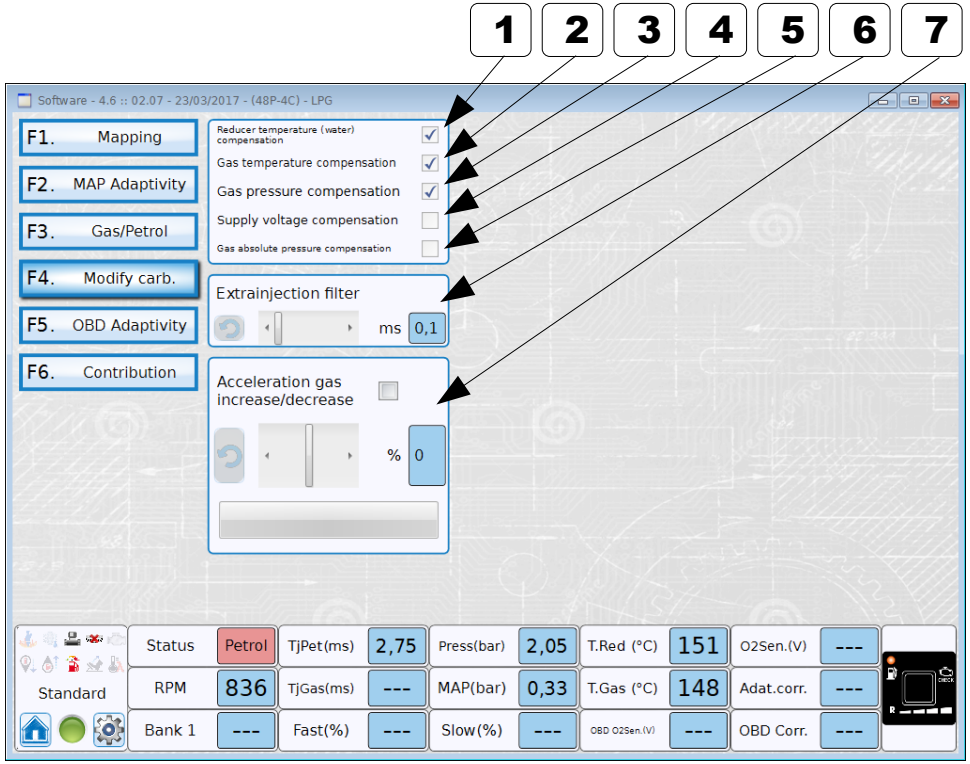


	Description	Value
1	**Contributions Map** Selecting this option, the ECU will use the Contributions Map to calculate the amount of petrol to inject while vehicle is running on gas. Please refer to charapter 6.7	
2	**Power Management Icon** Colourized icon indicate the activation of strategy	
3	**Contribution** This button become enable only when is selected the option Contributions Map for Power management **#1**	
4	This Led indicator become green when the Contributions Map is working in a cell with value greater than zero	

6.5 – *Tune Adjust: Modify Carburation*

* Expert functions available

Choice of compensations, signal filtering, strategies ….



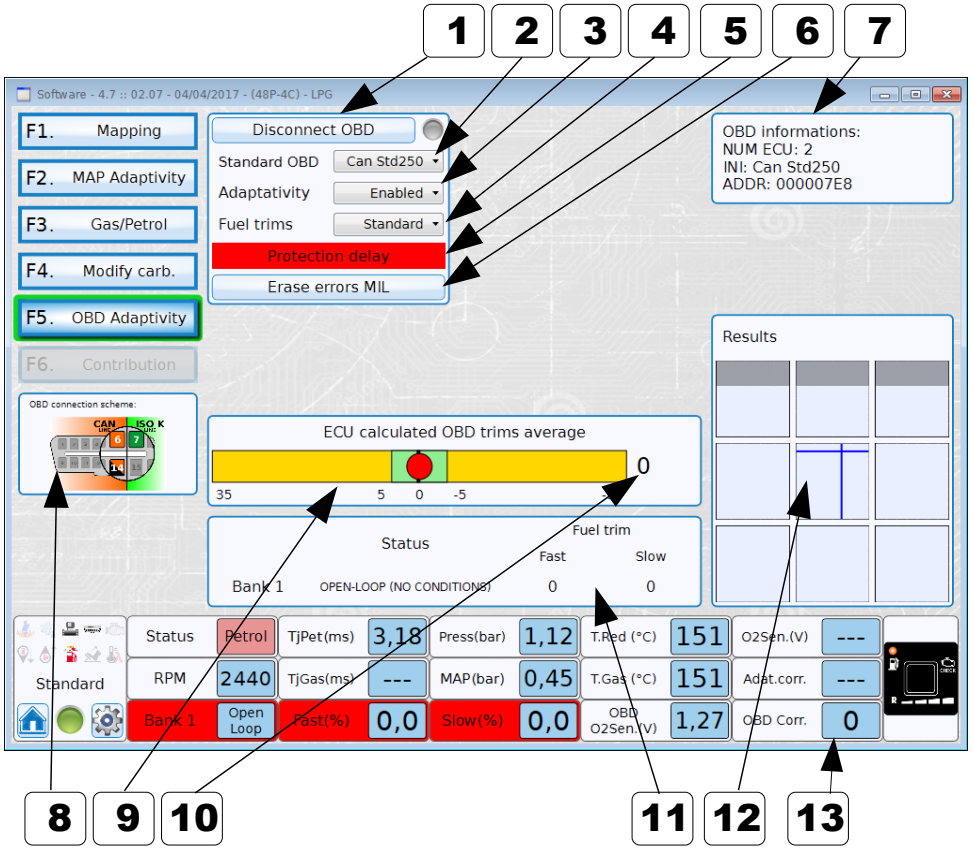
	Description	Value
1	**Reducer Temperature compensation** When flagged, there is a gas increase or decrease in injection time linked to the **water temperature** (usually measured at reducer) according to a preset table. The table is linked to the reducer type selected during calibration.	**Flag**
2	**Gas Temperature compensation** When flagged, there is a gas increase or decrease in injection time linked to the **gas temperature** (usually measured at the injectors rail) according to a preset table. The table is linked to the rail type selected during calibration.	**Flag**
3	**Gas Pressure compensation** When flagged, there is a gas increase or decrease in injection time linked to the **gas pressure** (measured by the MAP sensor) according to a preset table.	**Flag**
4	**Supply voltage compensation** When flagged, there is a gas increase or decrease in injection time linked to the battery supply voltage, and Injector type installed	**Since ver. 4.7**
5	**Gas absolute pressure compensation** When flagged, there is a gas increase or decrease in injection time linked to Gas Pressure and Injector type installed	**Since ver. 4.7**
6	**Extrainjection filter** The threshold filter of the petrol injection times. Injection times under the threshold are not considered valid for gas injection.	**Default = 0,5** **Range = 0,1 to 2,5** (Values in ms) X = reset default

7	**Acceleration gas increase / decrease** This parameter is used to compensate for certain situation depending on the engine or the fuel. When an acceleration status is detected, the system increases / decreases the gas injection time according to the selected value (on a fix basis)	**Default = 0** **Range = -30 to +30** (Values in %) X = reset default

6.6 – Tune Adjust: OBD Adaptivity (“48” & “486” & “488” version ONLY)

* Expert functions available

How to take advantage from the use of OBD signals to improve the adaptivity of gas ECU



NOTE:
When the OBD Standard is unknown , it is possible to try one connection (see box #8) and push “Connect OBD”. If the standard is compatible with connection, the details will appear in box #7.
Or try with another connection and do the same.

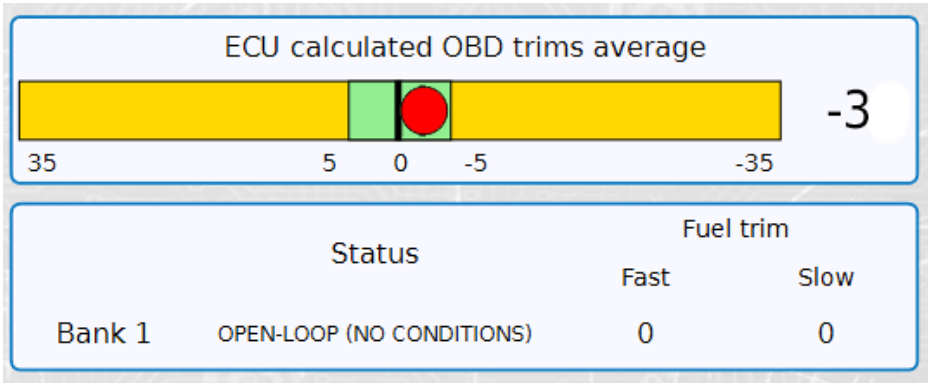
	Description	Value
1	**Connect/Disconnect OBD button**	
2	**OBD Standard Choice (combo)**	**Default = Generic (List of standards)**
3	**Adaptivity (combo)**	**Default= Disabled Frozen, Enabled**
4	**Fuel Trims (combo)**	**Default = Standard Inverted, Fiat**
5	**Stability Detection = GREEN background Adaptivity disabled = RED background**	**Info box/light**
6	**Erase MIL errors button**	**Clears MIL errors**
7	**OBD: connection INFO**	**Info only**
8	**OBD: connection Diagram**	**Info only**
9	**ECU calculated OBD trims average (graphic)** See next pages for an explanation	**Red Dot shown**
10	**ECU calculated OBD trims average (value)** Same as above but in numeric value	**Numeric value shown**
11	**OBD Fuel Trim visualization** This panel shows the actual OBD System readouts for the parameters shown.	**Display only**
12	**Results box visualization** See 4.1.5	**Display only**
13	**OBD Corr:** real time OBD adaptivity correction	**Display only**

IMPORTANT NOTE:
When Adaptivity is ENABLED, a message is shown in the Mapping Main Folder: “Adaptivity = Enabled”. It's not suggested to change the map with adaptivity enabled.

6.6.1 – Tune Adjust: OBD Adaptivity Explained

How OBD Adaptivity works

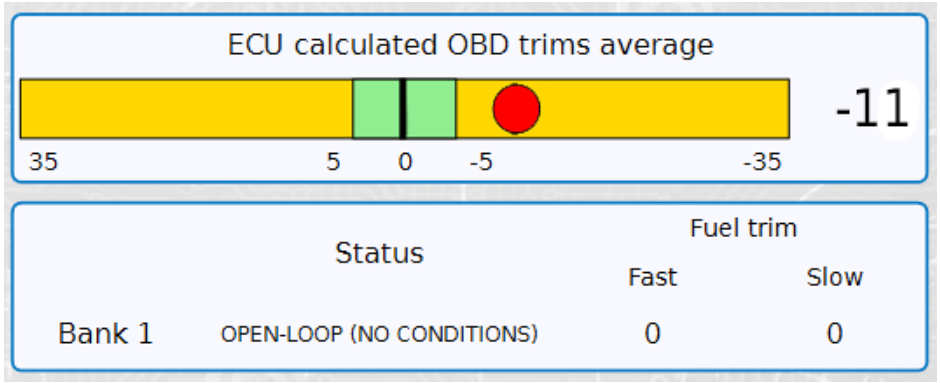
OBD corrections within tolerance



The “Results” map, in this condition, will NOT be changed because the carburation is within the tolerances (Thresholds).

The RED DOT indicator is within the green area.

OBD corrections OUT OF tolerance



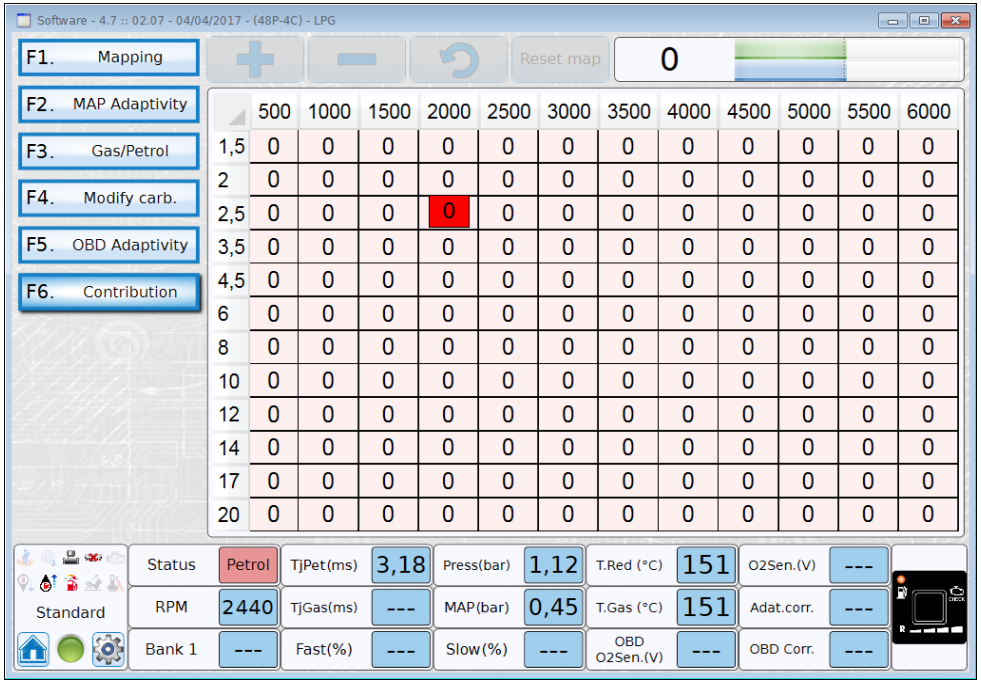
The “Results” map, in this condition, WILL BE changed because the carburation is OUT OF the tolerances (Thresholds).

The RED DOT indicator is OUT OF the green area.

6.7 – Tune Adjust: Contribution (Contributions Map)

* Expert functions available

This menu is available since software version 4.7.

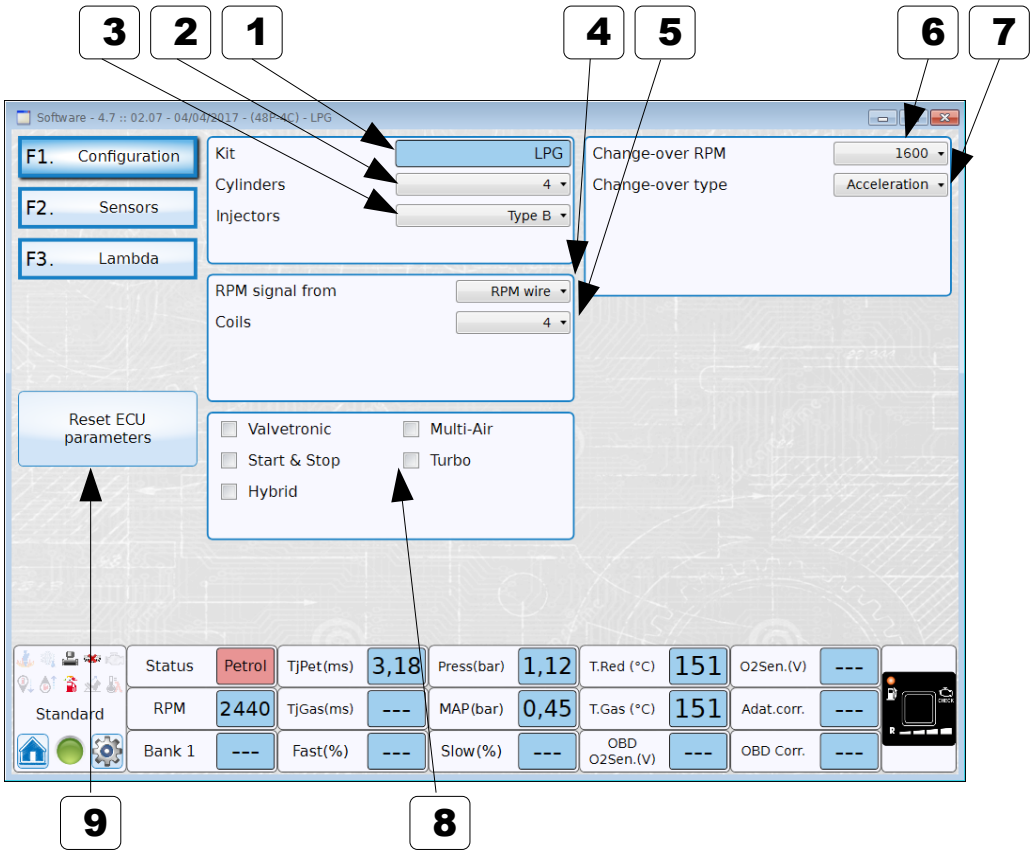


This table show the percentage of petrol that is used when vehicle is running on GAS

7- Configuration: Main folder

* Expert functions available

How to give instructions to the system on the possible choices about the engine management and gas kit configuration

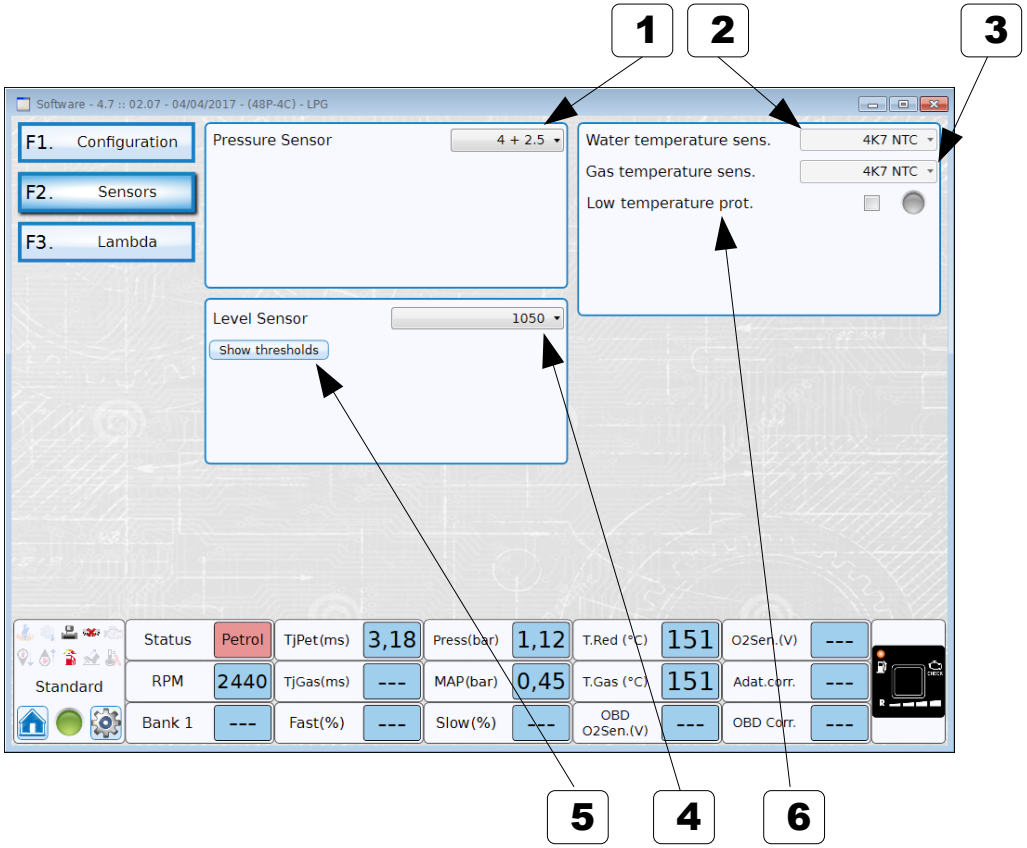


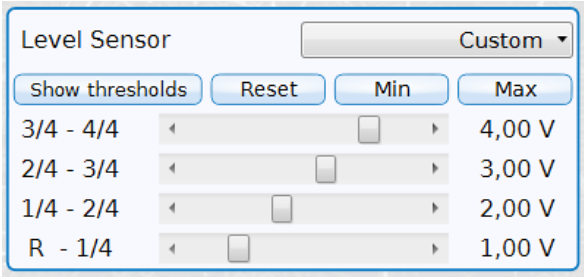
	Description	Value
1	**Kit type**	**01 to xx (List)**
2	**Cylinders number**	**Default = 4** **Range = 1 to 4**
3	**Injector type** Here are listed all the possible choices. They are set according to Distributor/Manufacturer request	**List upon request**
4	**RPM signal from** **"Injectors" selection = many functions of the board are disabled** **(i.e. Petrol management and more)**	**Default = Injectors** **RPM Wire**
5	**RPM Multiplier** When RPM at idle is not 700/900, selection of the multiplier takes the RPM to the real value readout	**Default = x2** **x1**
6	**Change-over RPM**	**Default = 1600** **Range = 0 to 2600**
7	**Change-over type**	**Def. = Deceleration** **Acceleration**
8	**Flag selections** These are linked to some engine management characteristics. Flag the ones that occur on the converted vehicle	
9	**Reset ECU parameters** Push the button and all values will be restored to default ones **NOTE: ALL VALUES OF ECU will be set to default, even the map, not only the ones of this page**	

7.1- Configuration: Sensors

* Expert functions available

Configuration and thresholds for level sensors

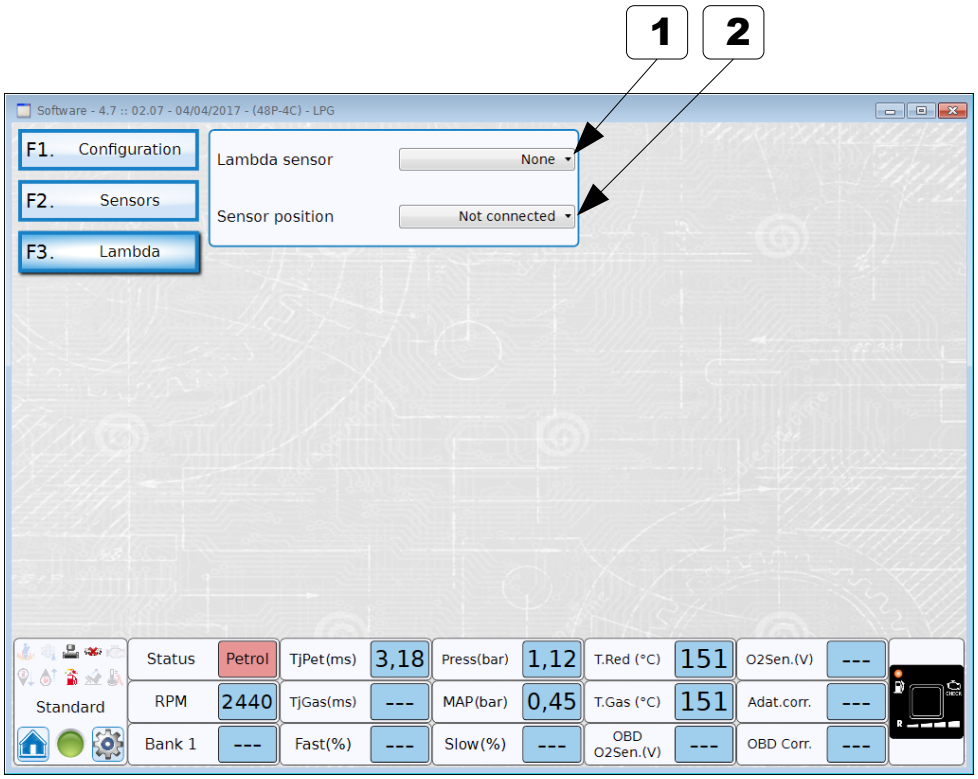


	Description	Value
1	**Pressure sensor** Select pressure sensor from installed list	
2	**Water Temperature sensor**	**Display only**
3	**Gas Temperature sensor**	**Display only**
4	**Level Sensor selection** Please select correctly the sensor in use	**Default = 1050** **0-90 ohm, 806,** **Custom,** **Custom (INV)**
5	**Show thresholds** Push the button and the box below will be shown. Use the cursors or the arrows to modify the thresholds or Reset to set the default values.  **MIN** button read the value of Level Sensor and use it as minimum value **MAX** button read the value of Level Sensor and use it as maximum value These 2 values are used to regulate automatically the 4 ranges.	
6	**Low Temperature protection** When flagged, if temperature is too low, engine works only on petrol	

7.2- Configuration: Lambda

* Expert functions available

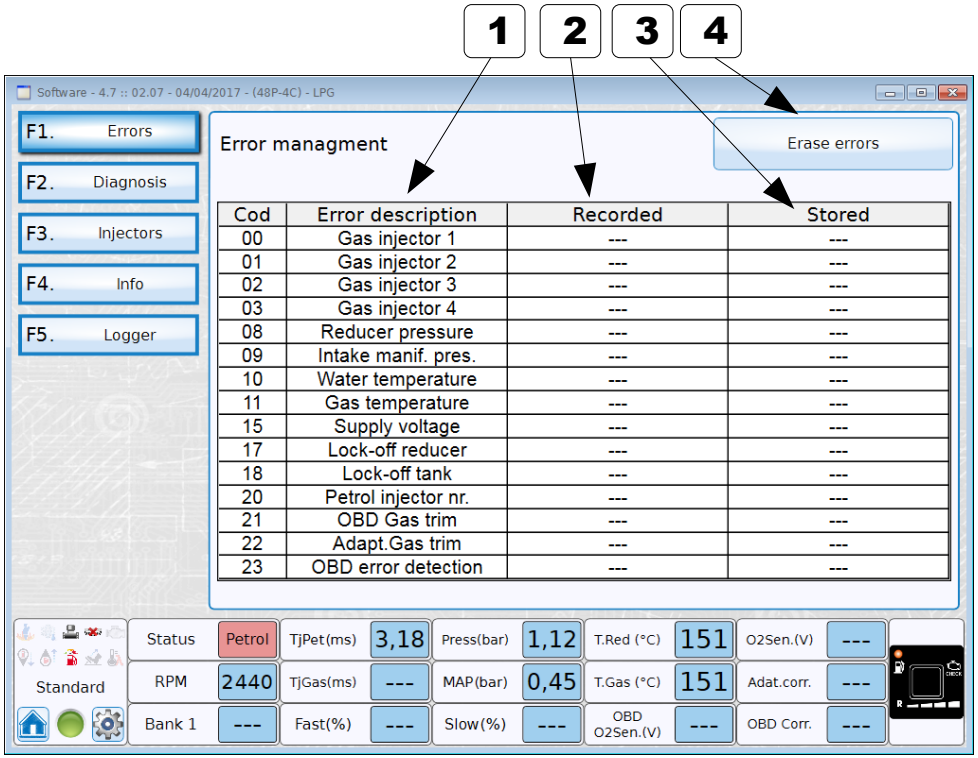
Readout only.



	Description	Value
1	**Lambda sensor**	**Default = Not connected 0..1, 0..5 Direct, 0..5 Inverted, 0,8..1,6, UEGO, 2,5..3,5**
2	**Sensor position**	**Default = Not connected Front Rear (post-catalyst)**

8- Diagnosis: Errors

* Expert functions available



	Description	Value
1	**ERRORS Code and Description**	

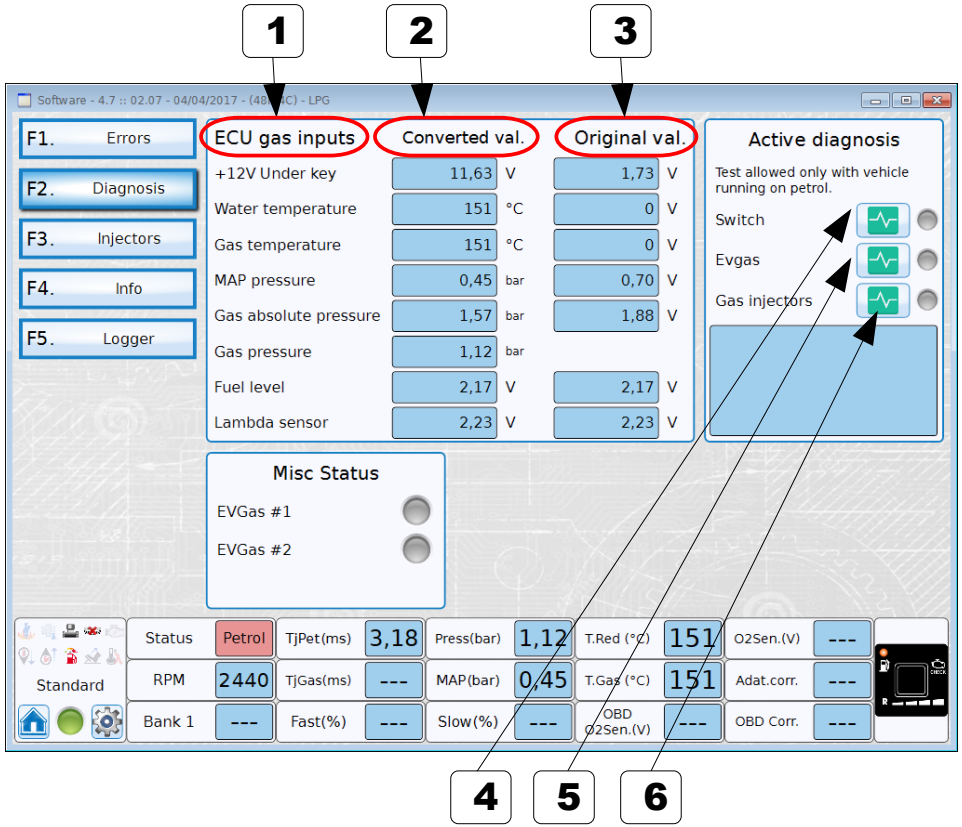
00	**Gas Injector 1**	**15**	**Supply voltage**
01	**Gas Injector 2**	**16**	**Current drawn**
02	**Gas Injector 3**	**17**	**Lock-off reducer**
03	**Gas Injector 4**	**18**	**Lock-off tank**
08	**Reducer pressure**	**20**	**Petrol injector number**
09	**Intake manifold pressure**	**21**	**OBD Gas trim**
10	**Water temperature**	**22**	**Adaptive Gas trim**
11	**Gas temperature**	**24**	**Petrol injectors system temperature**
12	**Gas injectors system temperature**		

2	**RECORDED Errors** Errors recorded on a Key ON - Key OFF cycle	
3	**STORED Errors** Errors saved on the ECU memory after the Key OFF	
4	**ERASE Errors button** Used to erase all Recorded and Stored errors	

Note: Some errors code are available only for some ECU type.

8.1- Diagnosis: Diagnosis

Diagnosis information about installation.

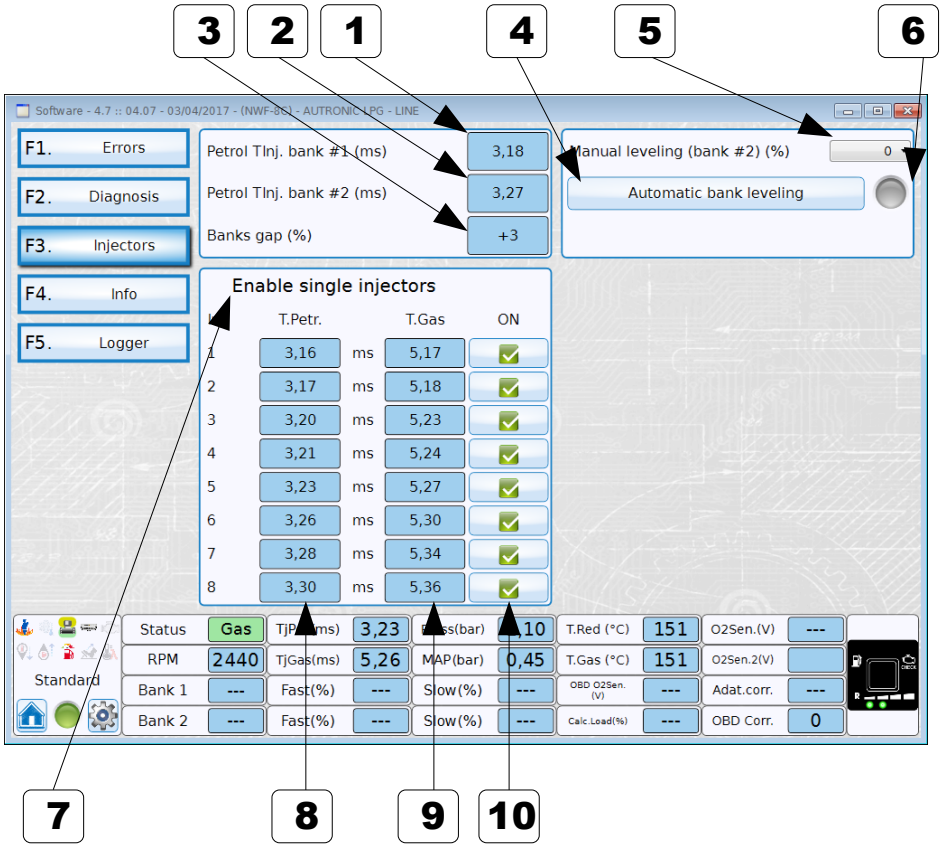


	Description	Value
1 2 3	**ECU GAS INPUTS** Some basic values of the inputs for the gas ECU are shown to compare the real input “Original value” (always in Volts) to the readout “Converted values” (shown in different scale)	**Display only**
4	**ACTIVE DIAGNOSIS: Switch** **Press and follow instructions in the window to verify** switch functions.	
5	**ACTIVE DIAGNOSIS: Gas Lock-off (EvGas)** Same as 4 but for the **lock-off valves.**	
6	**ACTIVE DIAGNOSIS: Gas injector** Same as 4 but for the **gas injectors.**	

8.2- Diagnosis: Injectors

* Expert functions available

Diagnosis information about settings for injectors.

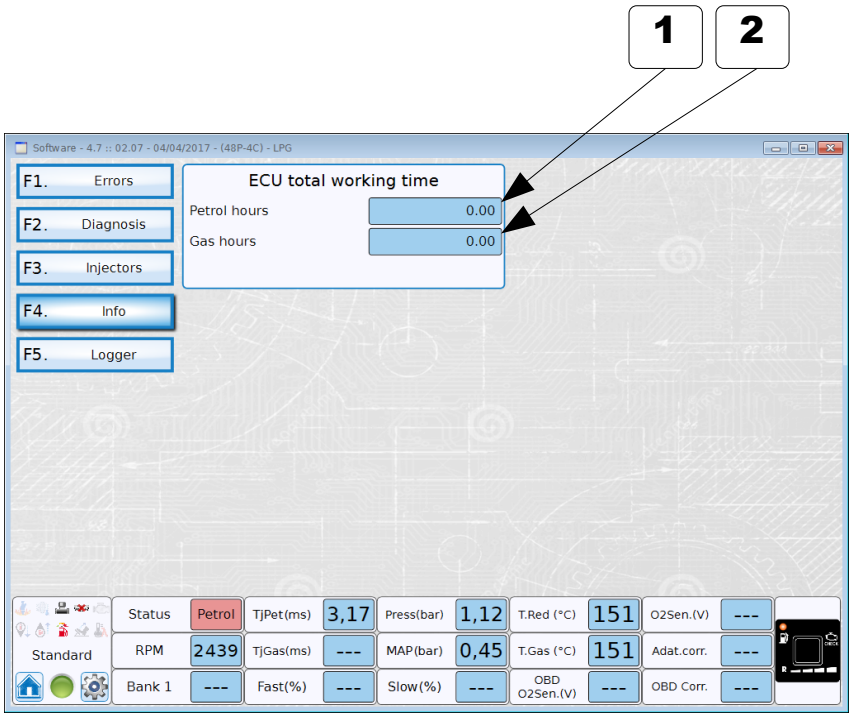


	Description	Value
1	**PETROL TINJ BANK#1** Average Petrol injection time for bank #1	
2	**PETROL TINJ BANK#2** Average Petrol injection time for bank #2 If there is not a bank#2 it show “---”	
3	**BANKS GAP (%)** Gap between banks If there is not a bank#2 it show “---”	
4	**AUTOMATIC BANK LEVELLING** Automatic calculations for the offset for bank#2. It set the same values of “Manual Levelling”	
5	**MANUAL LEVELLING (BANK #2) (%)** offset for injectors on bank #2	
6	**Result for “AUTOMATIC BANK LEVELLING”**	**YELLOW** = calculation inprogress **GREEN** = OK **RED** = no change (proceed manually)
7	**ENABLE SINGLE INJECTORS** Used to check each single gas injector after installation: verifies the correspondence between the petrol and gas injector working on the same cylinder.	
8	**T.PETR.** Petrol injection time for each injector	
9	**T.GAS** *Gas injection time for each injector*	
10	**ON** Enable or Disable single injector	

8.3- Diagnosis: Information

* Expert functions available

Info about how long the ECU worked on gas.

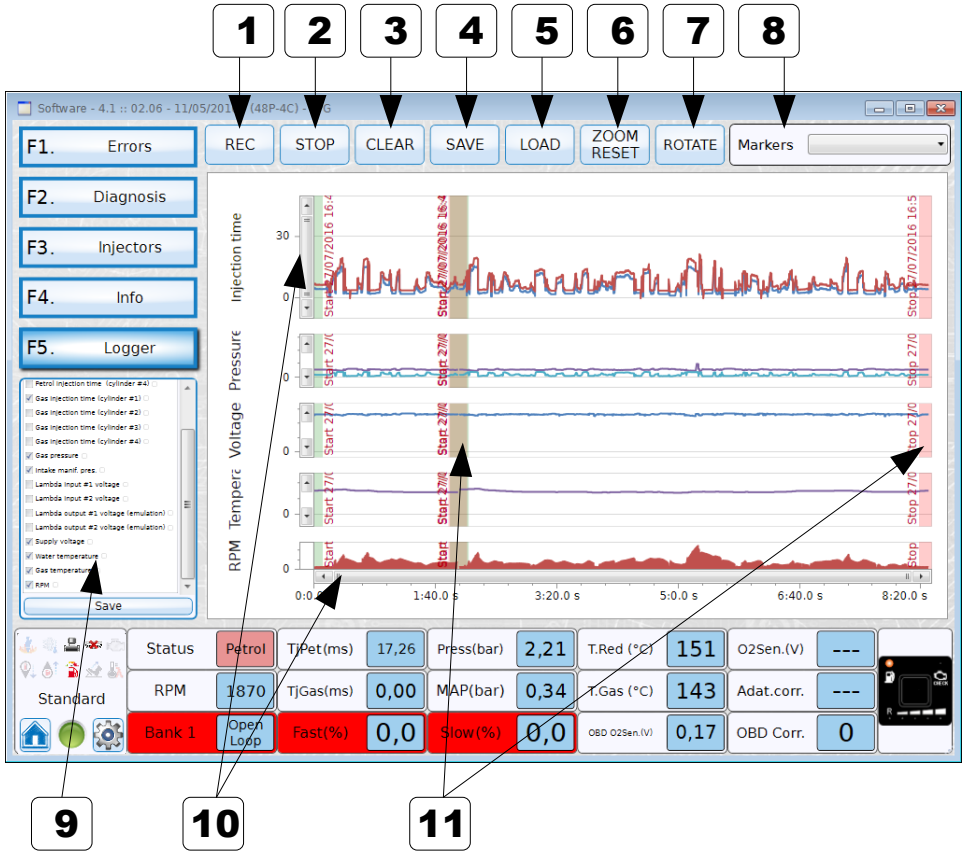


	Description	Value
1	ECU total working time ON PETROL	Hours
2	ECU total working time ON GAS	Hours

This detail is useful to get indication for After Sales Services and Assistance.

8.4- Diagnosis: Logger (1/3)

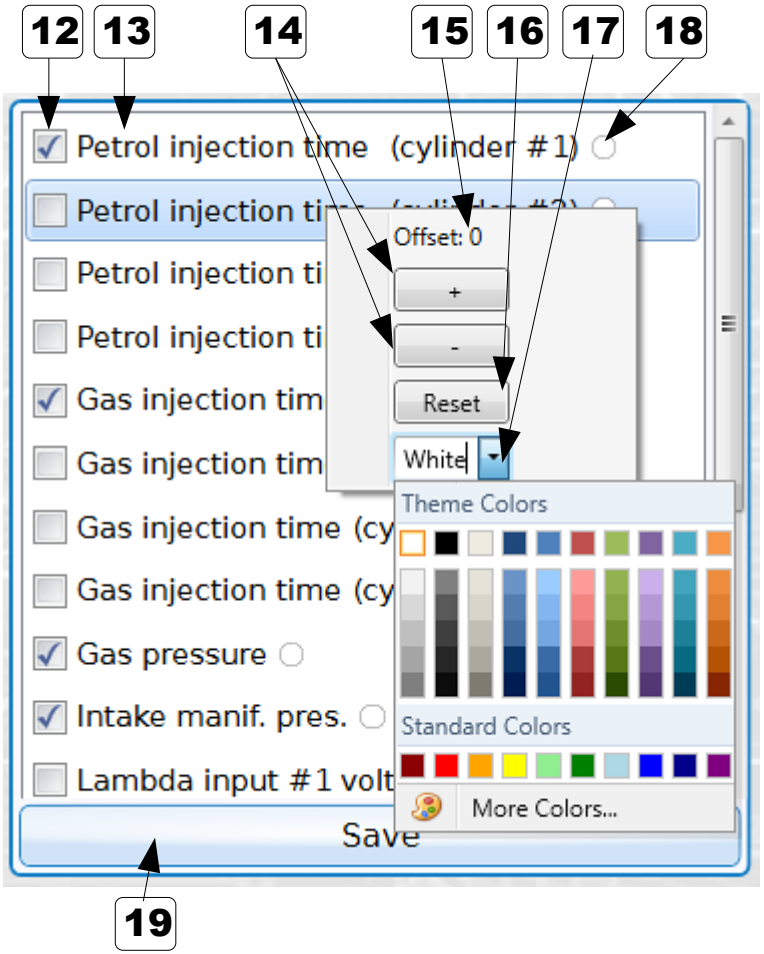
The logger shows the main working parameters of the engine. It works both off-line (to scroll data) and real time (show or record).



	Description
1	**REC** start logging data
2	**STOP** stop logging data
3	**CLEAR** delete all logging data
4	**SAVE** Store data on Hard Drive into software document folder. The file is named as “Logger_” + date and time of saving.
5	**LOAD** Load file from PC
6	**ZOOM RESET** restore vertical zoom factor, **not** time zoom
7	**ROTATE** Draw charts from bottom to top.
8	**MARKERS** List of marks placed during data logging. To add a marker during logging press Space Bar key.
9	**Vehicle variables:** variables that are possible to be checked.. see next page
10	**Zoom commands**
11	**Markers points**

8.4- Diagnosis: Logger (2/3)

Vehicle variables that can be activated for logger visualization.
They are always acquired by pressing REC button but not shown on chart if not flagged.

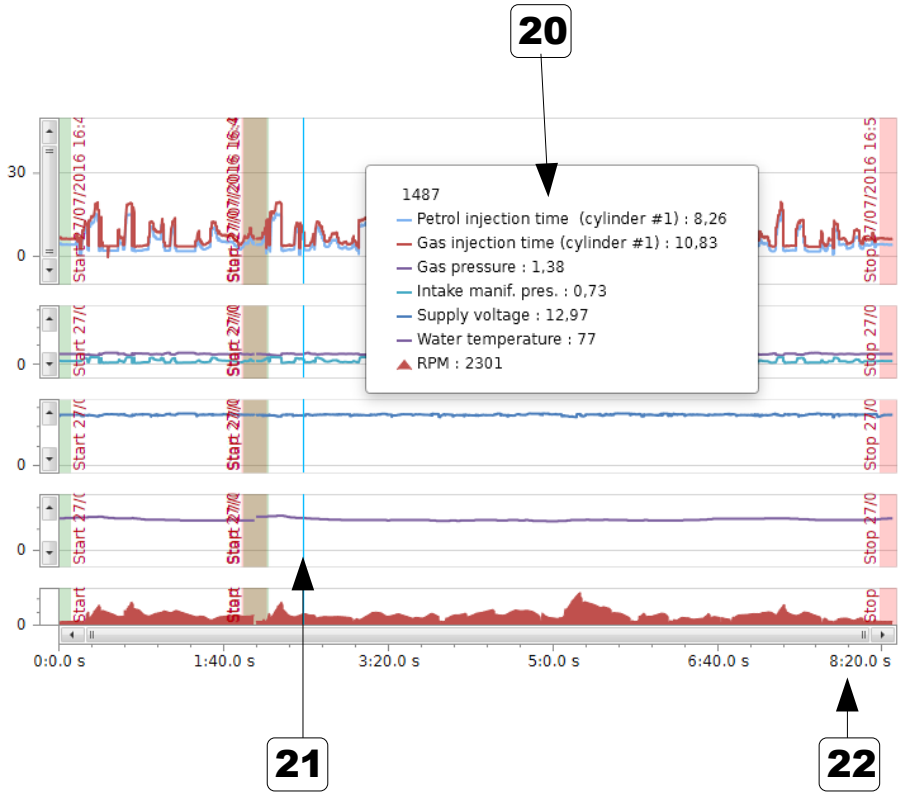


Personalization menu appear with Right mouse click on variable name

	Description
12	**Visualization Flag**
13	**Variable description**
14	**Add or remove Offset**
15	**Actual offset applied to chart line** this is used to move up or down the line to prevent overlapping with other charts
16	**Reset** Clear offset
17	**Color of line shown on chart** White means auto selection color
18	**Actual color of chart line**
19	**SAVE** save all variables selection and personalization that are automatically load each time the software starts.

8.4- Diagnosis: Logger (3/3)

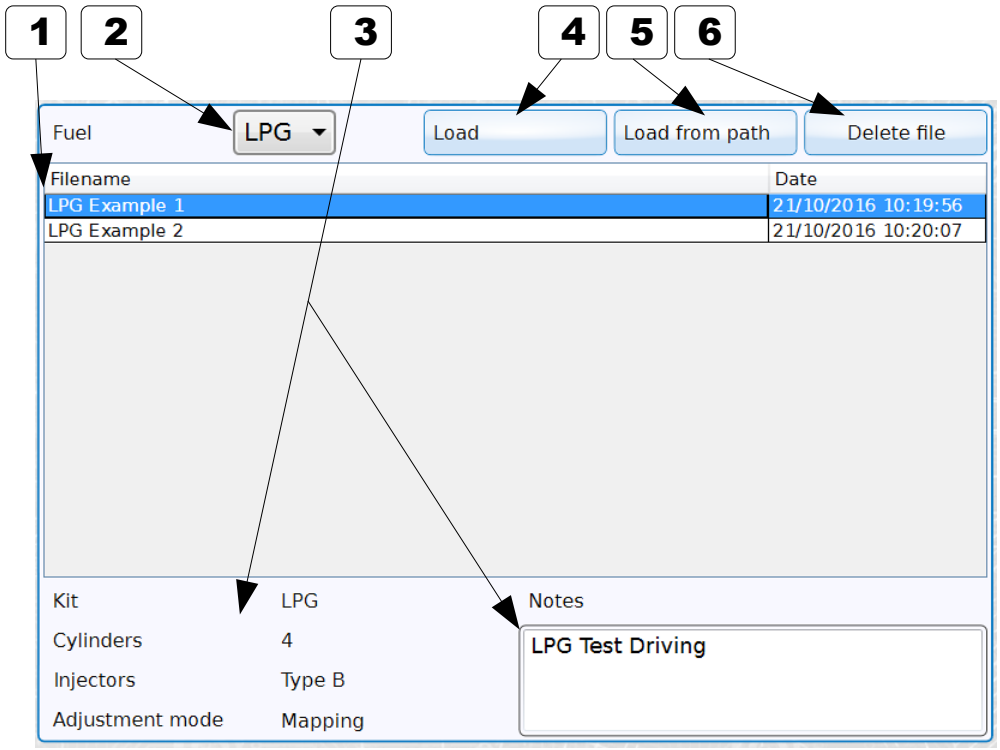
Variables data acquired values.



	Description
20	**Box with values at current mouse position** this box is shown only when data acquisition is stopped. It not appear while the system is recording
21	**Time point where box values is related** it follows the mouse across chart
22	**Time line**

9- File management: Load

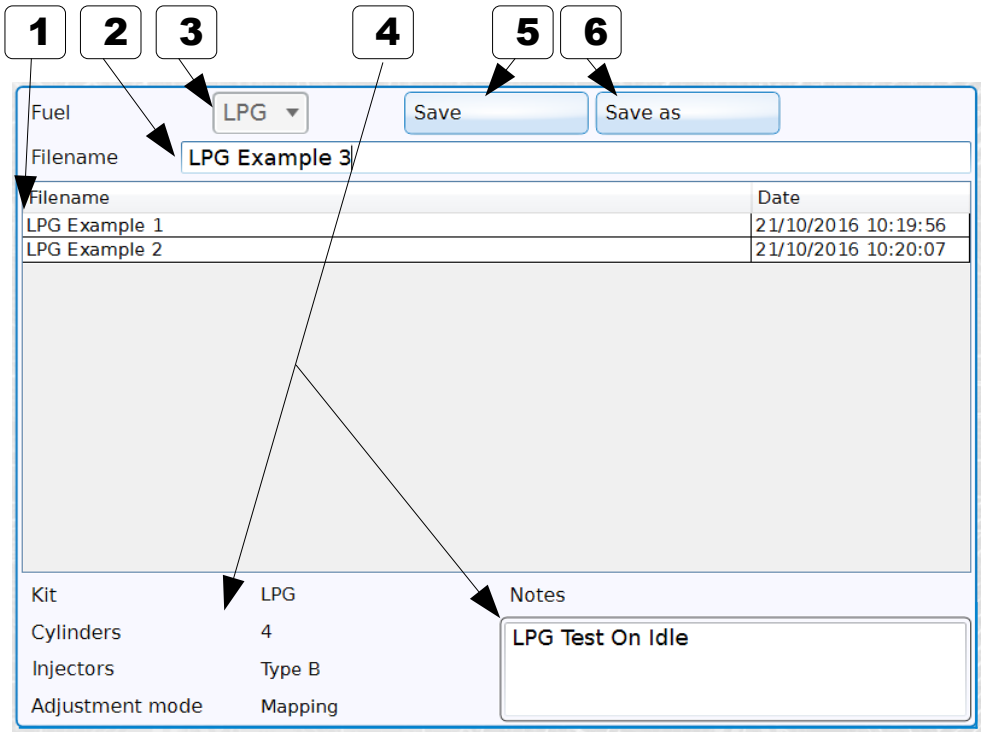
Here it's possible to find all saved configuration of the connected ECU.



	Description	Value
1	**FILES LIST**	**Select the file with the mouse**
2	**Filter for file selection** (usually is the type of gas, LPG or CNG)	
3	**Main details of file, with reference to:** - Kit type - Number of cylinders - Type of injectors - Adjustment mode (Line / Map) - Notes	**See "Files Management: Save" for more details**
5	**LOAD button** Press to load into the gas ECU the file selected	
6	**LOAD FROM PATH button** Press to load a known file from a path in the PC	**It opens "the File Manager of the PC**
7	**DELETE FILE button** Press to delete the selected file	

9.1- File management: Save

How to save the actual configuration of the gas ECU for future needs.

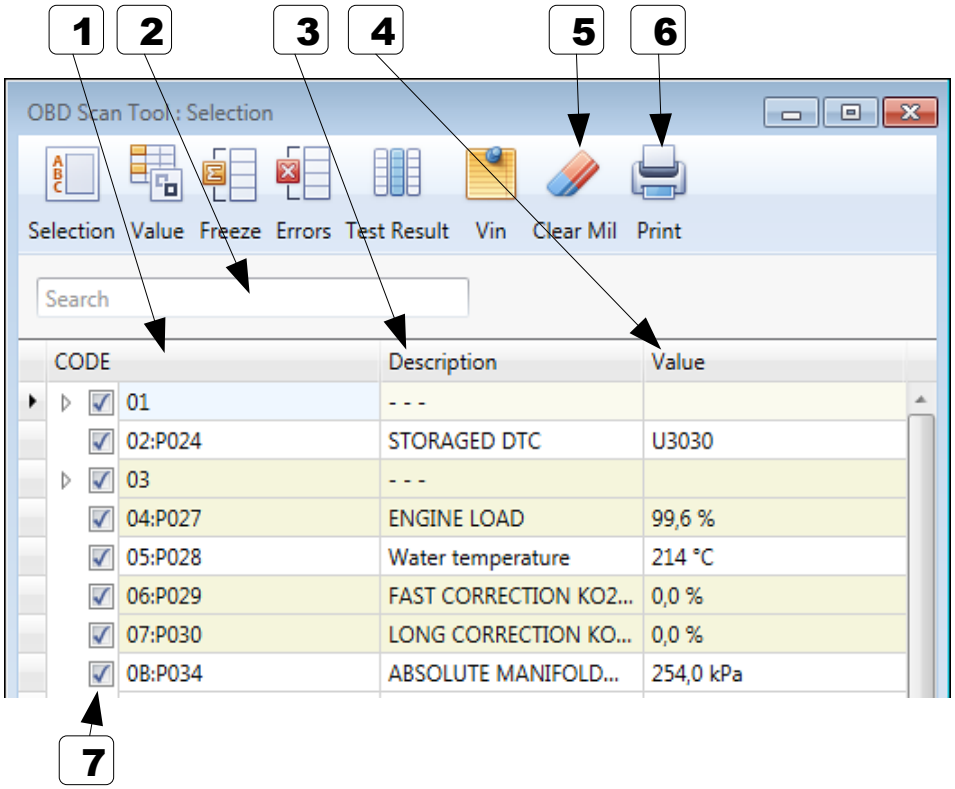


	Description	Value
1	**FILES LIST**	**Select the file with the mouse**
2	**Naming the file** **can be filled by the installer at his own discretion**	
3	**Filter for file selection** (usually is the type of gas, LPG or CNG)	
4	**Main details of file, with reference to:** - Kit type - Number of cylinders - Type of injectors - Adjustment mode (Line / Map) - Notes: **can be filled by the installer at his own discretion**	**See "Files Management: Save" for more details**
5	**SAVE button** Press to Save a file into the default folder in the PC	
6	**SAVE AS button** Press to Save a file into a specific folder in the PC **can be selected by the installer**	**It opens "the File Manager" of the PC**

10- OBD Scan Tool: Selection

Available in ECU's with OBD support.
In order to open the OBD scan tool an active OBD connection is needed (OBD adaptivity enabled/frozen)

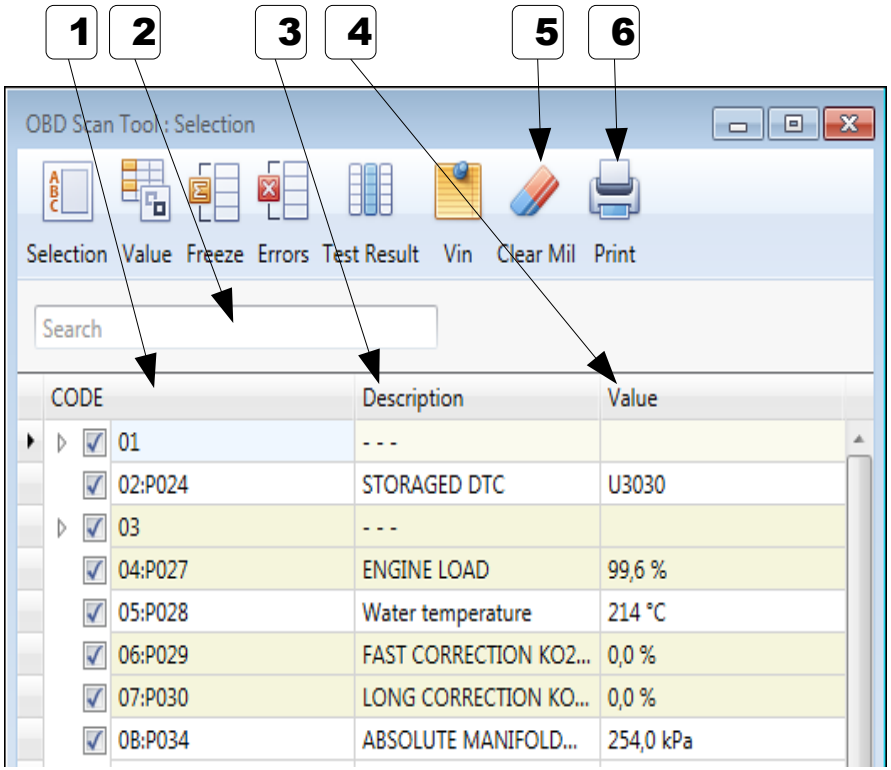
Below is a list of the OBD services supported by the Petrol ECU. It is possible to flag/select the ones that are needed to be monitored.
The ones highlighted yellow are always needed by the gas ECU. They cannot be removed or disabled.



	Description	Value
1	**CODE** (Parameter ID)	
2	**SEARCH box** Filter parameter by Code or Description ex: Type **ENGINE** to have only parameters with **ENGINE** into description	
3	**DESCRIPTION**	
4	**VALUE** of selected (FLAG) parameters	
5	**CLEAR MIL** (Malfunction Indicator Lamp) Press this button and an error erasing command will be sent to the OBD ECU	
6	**PRINT** Press the button to print the current page	
7	**FLAG** (Select/Deselect)	

10.1- OBD Scan Tool: Values

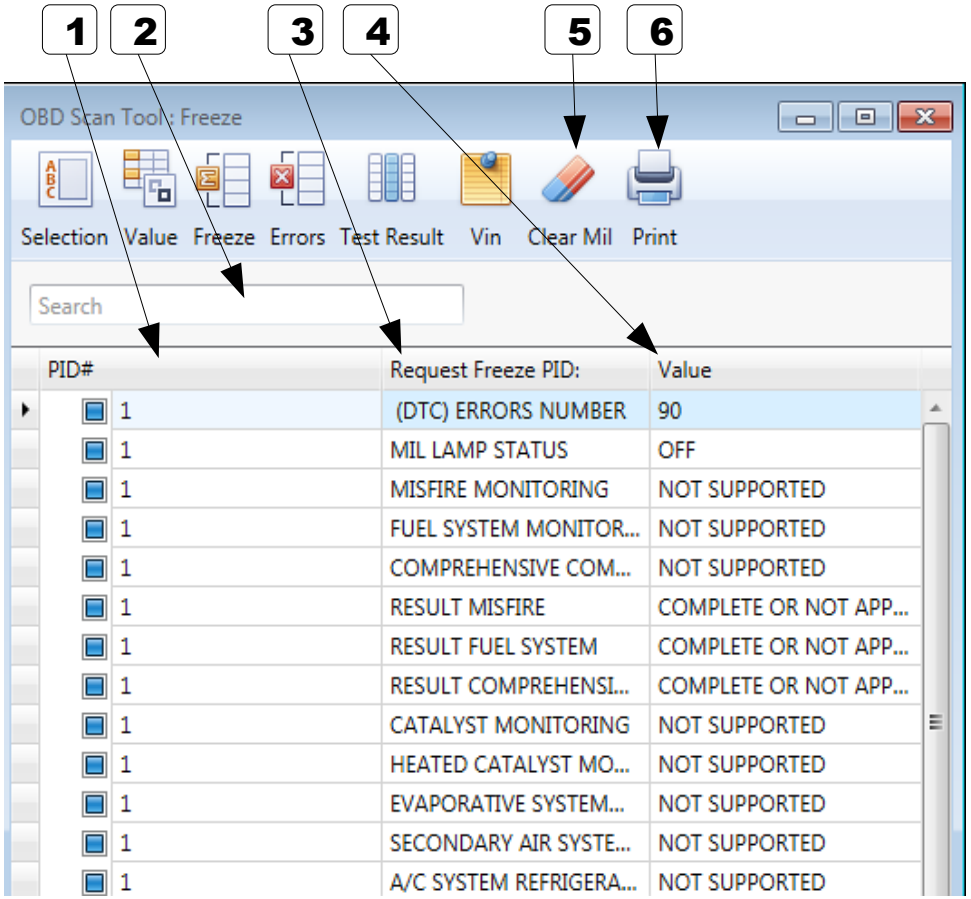
The list below shows ONLY the parameters flagged in the previous page. The values shown are read in real time via OBD.



	Description	Value
1	**CODE** (Parameter ID)	
2	**SEARCH box** Filter parameter by Code or Description ex: Type **ENGINE** to have only parameters with **ENGINE** into description	
3	**DESCRIPTION**	
4	**VALUE** of selected (FLAG) parameters	
5	**CLEAR MIL** (Malfunction Indicator Lamp) Press this button and an error erasing command will be sent to the OBD ECU	
6	**PRINT** Press the button to print the current page	
7	**FLAG** (Select/Deselect)	

10.2- OBD Scan Tool: Freeze Frame

This page shows the “freeze frame”: this is the condition of the vehicle when an error, memorized in the petrol ECU, happened.

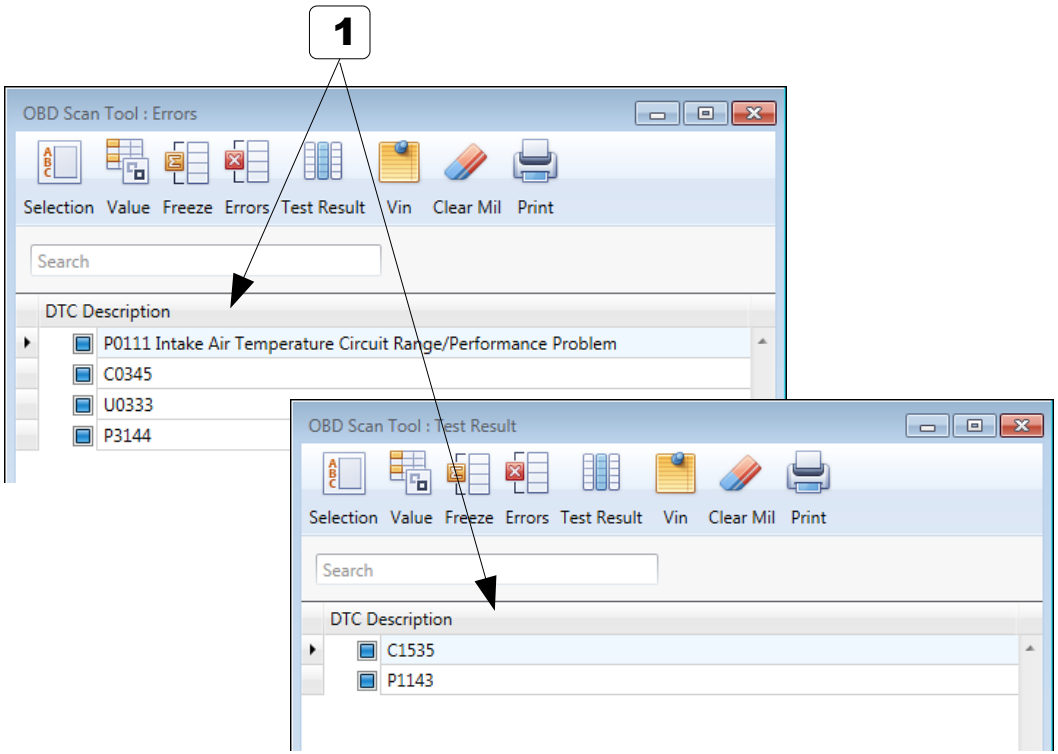


	Description	Value
1	**CODE** (Parameter ID)	
2	**SEARCH box** Filter parameter by Code or Description ex: Type **ENGINE** to have only parameters with **ENGINE** into description	
3	**REQUEST FREEZE PID** Parameter description	
4	**VALUE**	
5	**CLEAR MIL** (Malfunction Indicator Lamp) Press this button and an error erasing command will be sent to the OBD ECU	
6	**PRINT** Press the button to print the current page	

10.3- OBD Scan Tool: Errors and Test Result

In these two pages there are the lists of

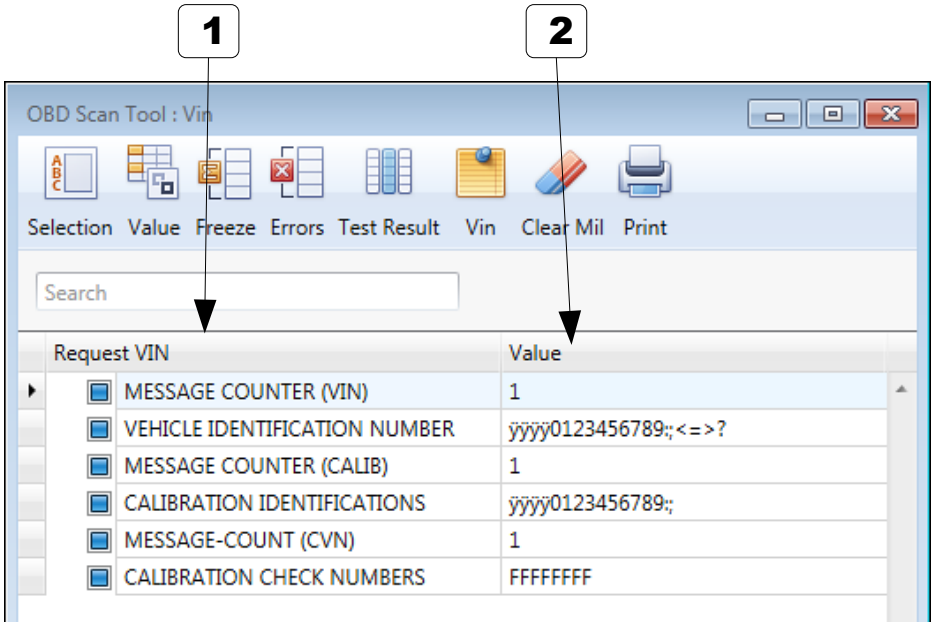
- Errors: the permanent errors (DTC) memorized in the ECU (which caused the MIL to come on)
- Test result: the latent errors, which happened in the actual live key contact cycle, not memorized yet (they did not caused the MIL lamp to come on yet).



	Description	Value
1	**ERROR DESCRIPTION**	

10.4- OBD Scan Tool: VIN

This is the place where the VIN (Vehicle identification number car) can be found and is memorized.



	Description	Value
1	Request VIN	
2	VALUE	

xx- Sample page

Short description

	Description	Value
1		
2		
3		
4		
5		

NOTE