DI 600
Direct Injection System

VERSION 3.0.4.0 I

REVISION STATUS				
Rev. no.	Date	Description of change	Created by	Approved by
0	October 2016	First issue	M2	R&D

CONTENTS   page

Introductory note

The Software program described in this manual applies to different types of ECUs.
The program automatically recognises the ECU connected to it through the firmware loaded during the initial program-ming carried out by the manufacturer.

On selecting the different value boxes, the minimum and maximum ranges which can be set will appear.

> **ATTENTION: if you enter a value that is outside the range, that maximum and minimum applicable value will be saved. not the previously set value and no warning box will appear.**

To activate any change made using the parameter boxes, press Enter.
If you change to another box without pressing Enter, the previous value will remain in force.
The functions available in the drop-down menu appear when you click the relevant box.

Software

Minimum hardware requirements for installation
- Operating system - Windows 98 2nd edition or later versions;
- Memory (RAM) - At least 16 Mbyte;
- Hard disk - At least 20 Mbyte free at time of installation;
- Display resolution - 800 x 600 or more;
- Internet Explorer version 5.5 or better must also have been installed

Software distribution
Energia Italy distributes the software program and future updates by CD or technical assistance:

Software installation

Program distributed by CD
Insert the CD in the computer CD reader and wait until the installation wizard appears.
If the installation does not start, select "Start" from the Application Bar. Select "run" and enter: "D:\setup.exe" (where D is the CD reader).
During installation, you will be asked in which directory you want to install the program: we suggest not changing the preset directory.
When the installation has been completed, the program icon will remain on the desktop screen.

Software operation

The calibration Software can also be started without being connected to the ECU.

The ECU and PC have to be connected with a suitable module adaptor. Depending on the characteristics of your PC, use the related module: version for Serial USB; version for Serial RS232; WIRELESS SERIAL KIT; USB/RS232 adaptor.

In addition, the ECU must be powered by a +12 Volt battery (Red/Black wire) and earth (Black wire) and with 12V when the ignition is ON (instrument panel lit - engine off).

Start the program by clicking on the specific icon on the monitor screen.

Software program error codes

CONNECTION ERRORS (C)

ERROR CODE	DESCRIPTION	POSSIBLE CAUSES
C10	Can't find an ECU to connect with. Can't connect.	ECU off, incorrectly wired, cable disconnected, serial interface faulty, USB drivers not installed, ZigBee too far away or not linked.
C11	Can't connect with the ECU. ECU in boot loader.	The ECU is in the boot loader. Before connecting, make sure you load with compatible firmware.
C12	Can't connect with the ECU. ECU model incompatible.	You are connecting with an Energia Italy product but it is not ENR3000A, ENR3000B DI108, DI60.
C13	Can't connect with the ECU. Can't ask the ECU for the client code	Contact R+D.
C14	Can't connect with the ECU. Client code not compatible.	ECU OK, connection OK, SW OK, but there is a customised setting on the ECU that is different from that available on the SW.
C15	Can't connect with the ECU. The current software is not compatible.	Obsolete SW. Update the SW.
C16	Can't connect. The ECU memory is not "writeable".	Contact R+D.

PROGRAMMING ERRORS (P)

ERROR CODE	DESCRIPTION	POSSIBLE CAUSES
P10	Can't reprogram the ECU.	Wrong connection.
P12	Can't reprogram the ECU.	The current ECU is not compatible.
P13	Can't reprogram the ECU.	Can't correctly identify an ECU.
P14	Can't reprogram the ECU.	The current client ECU is not compatible.
P15	Can't reprogram the ECU.	Can't decrypt the file selected.
P16	Attention! The firmware selected is not suited to this ECU.	Firmware not recognised.

Program home page

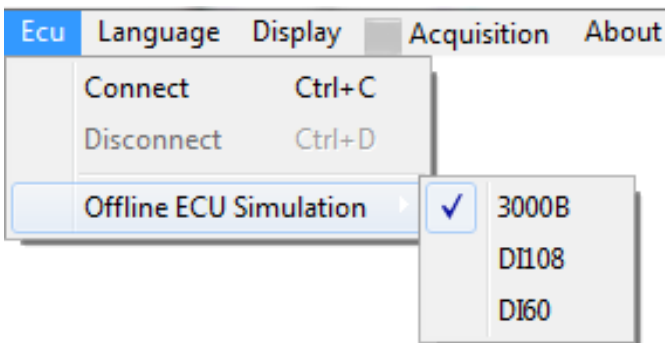(A) The main menu and drop down sub-menu on the home page lets you access different software calibration functions.
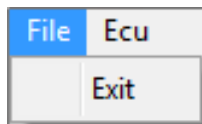
File
  Exit: lets you exit software calibration.

CONTROL UNIT
  Connect/Disconnect: lets you connect/disconnect the gas ECU from the software calibration.

• **Off-line ECU Simulation** (3000B; DI108; DI60): on selecting the ECU model, you can display and load the programming files for just the model of ECU selected. Alternatively, simultaneously press "Ctrl+A".

NOTE: With no ECU connected, the program is set for the 3000B ECU Use Ctrl+A to change the ECU settings. Base settings: 3000B no reference; with the DI108 and DI60 ECUs, the following wording appears.
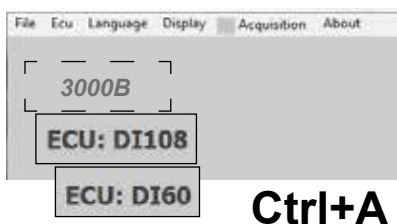
Language: click on the flag to select the software language. Confirm your choice with "Select".

View: Lets you set the view of the software to meet your needs. The view options are as follows:

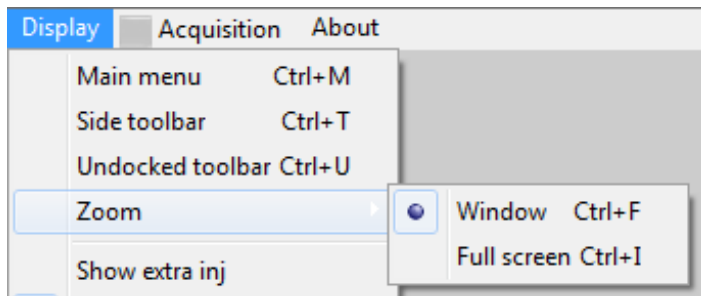- **Main menu (Ctrl+M)**: takes you back to the main menu at any time regardless of what menu you are using at that time.
- **Toolbar to the side (Ctrl+T):** lets you always have the main menu in view at the left ① side of the configuration menu. The arrow at the top left or the menu item **Unlocked Toolbar** let you view the main menu in a separate window ② which you can place wherever you want on the screen.
- **Zoom**: lets you set the Software view in **Window mode (Ctrl+F)**, default setting or in **Full Screen mode (Ctrl+I)**.

Acquisition: use this menu to detect problems in the gas system.

- **Start acquisition (Ctrl+R)**: when the "RED" dot is lit, this indicates that the program has started the acquisition procedure (function available with the engine switched off or running). You can repeat the procedure to detect the problem several times. When you feel you have acquired sufficient data, press **Stop acquisition (Ctrl+S)**. The program needs to save the acquired data which will be archived in the "**Acquisition**" file.
- **Graphs**: lets you open the saved acquisition or other previously created files.
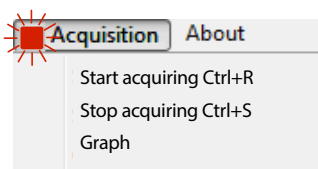
There is a more detailed description of the **Acquisition** menu in the "DISPLAY DATA" section.
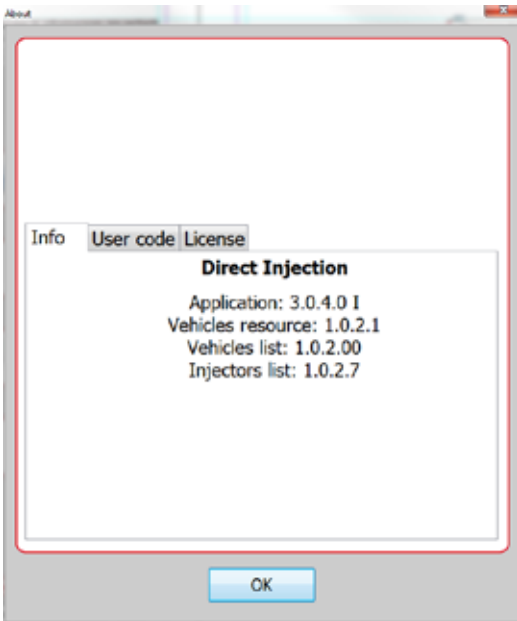
About - provides information about the version of software installed.

Ⓑ **Program page selection keys.**

Ⓒ **PC/ECU communication status bar.**

In sequence:
ECU not connected / (FW:Type ...; HW:...) - shows whether the ECU is connected to or disconnected from the Software.

If the ECU is connected through a wireless interface, the strength of the signal is shown by a bar with vertical red lines:

It is important to remember that any settings made with an unconnected ECU will be lost when the ECU is connected unless they have been previously saved in a configuration file (see "Load File" menu).
On connecting the ECU (Ctrl+C or "Connect" on the drop-down menu), the SW will automatically try to connect with the ECU.
When the connection is made, the left side of the bar will change colour and description.

NOTE: If the PC fails to connect, a window will appear showing an Error Code (e.g. "ERR.CODE: C10")*. See "SOFTWARE PROGRAM ERROR CODES " - CONNECTION ERRORS on page 5 of this manual to find a solution for the problem.*

LPG - CNG - shows the type of fuel selected when the program is being saved (the type of fuel can be selected from the sub-menu "Type of fuel " on the "Vehicle - F1") page.
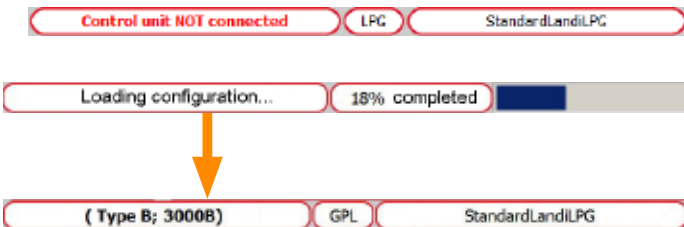
Configuration - this is the name used for the calibration map on the ECU (displays max 28 characters for model 3000B and 43 characters for models DI108 and DI60).

NOTE: To load a pre-existing configuration, the ECU must be connected to the configuration software (see the "LOAD FILE")section

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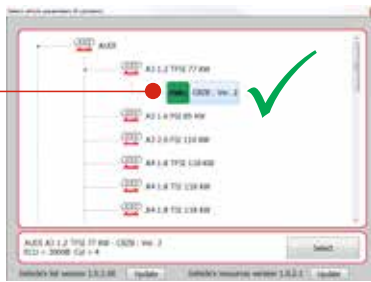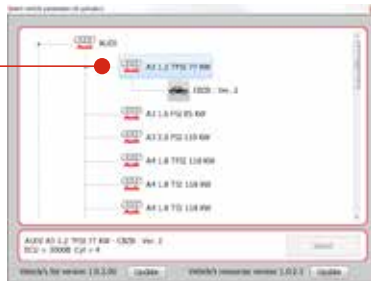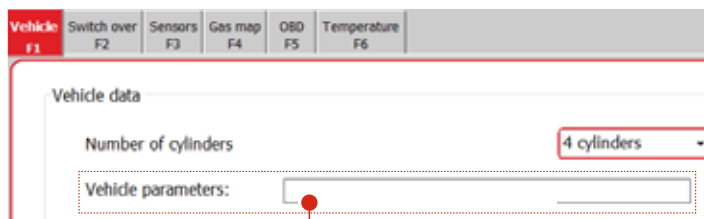
Firmware: 0.00

Firmware - shows the version of firmware loaded in the ECU to which it is connected. To update the firmware, click "REPROGRAM" on the Software home page and when the Import window opens, select new firmware from those displayed.

(No Engine)

(No Engine) / LRxID_14T_12_ .... - shows the specific configuration parameters for the vehicle selected from the program library which is accessed from the "Vehicle - F1" page; when you click on "Vehicle Parameters" ① a tree menu will appear to let you select your configuration file.

NOTE: It is important to remember that all settings made with an unconnected ECU will be deleted when the ECU is connected unless they have been previously saved in a configuration file.

CONFIGURE

| Vehicle F1 | Switch over F2 | Sensors F3 | Gas map F4 | OBD F5 | Temperature F6 | | Exit |

Configuration

The "Configuration" section contains pages that you can access by clicking the relative tab (e.g. "Vehicle", "Changeover" etc.), or by pressing the appropriate function key on the computer keyboard (F1, F2, etc.).

Vehicle F1	▶ To set the key calibration control parameters: vehicle data, RPM, type of fuel, injector and regulator pressure.
Changeover F2	▶ To set the parameters and modes which affect the fuel switch over from petrol to gas.
Sensors F3	▶ To select the type of gas level sensor connected and the gas and MAP pressure sensors.
Gas map F4	▶ To display the coefficients of multiplication, known as K, used by the ECU for calculating GAS injection times.
OBD F5	▶ To carry out "On-Board Diagnostics" (OBD). From here, you can also display system reports.
Temperature F6	▶ For setting gas temperature and engine temperature sensors.

Vehicle F1   **Vehicle page - F1**

Vehicle F1	Switch over F2	Sensors F3	Gas map F4	OBD F5	Temperature F6		Exit

Vehicle data

Number of cylinders	4 cylinders ▾
Vehicle parameters:	
Type of rpm signal	Weak ▾
Ignition type	Mono coil ▾

Device type

Fuel type	LPG ▾
Injector type	ENERGIA ITALY ▾
Pressure of the regulator	1 bar

①	**②**	**③**	**④**	**⑤**
	Rpm 0	Gas inj.T 0,00 0,00 0,00 0,00	Gas temp. 168 °C	Gas press. 0,00 bar
	Lambda1 0	Petrol Inj.T 0,00 0,00 0,00 0,00	Red. Temp. 145 °C	MAP 0,00 bar
	Lambda2 0		Petrol T 0,00 ms	Diff. Press 0,00 bar

⑥

Type 6: CAN (11 bit, 250 Kbps) (ISO 15765)

| Fuel Trim Long | 0,0 % | Rear Lambda | 0,50 V |
| Fuel Trim Short | 0,0 % | | Bank 1: Closed loop |

① Panel showing instantaneous data about:

• type of fuel used: petrol 🔴 or gas **G**;

• The presence 🔴 (in red) or absence (in grey) of power from the ignition circuit;

• The LED bar ▣▣▢▢ which shows the amount fuel in the GAS tank.

• ⚠️ The presence of this signal denotes an error in the "**DIAGNOSIS**" page (see main screen).

The panel with the arrow at the top left ⬉ lets you unpin the bar with the instantaneous data and position it or minimise it as you please.
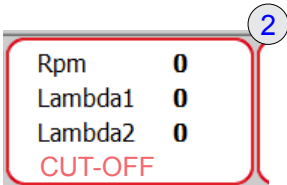
② Panel showing instantaneous data about:
• **RPM**: i.e. the engine speed signalled in real time from the gas ECU.
• **Lambda 1:** sensor reading. To see the values read by the sensor, in addition to connecting the PURPLE wire, you also have to set the sensor connection in "Lambda".
• **Lambda 2:** sensor reading. To see the values read by the sensor , in addition to connecting the PURPLE/BLACK wire, you also have to set the sensor connection in "Lambda".
• **CUT-OFF:** this appears when the system that feeds fuel to the injectors is interrupted.
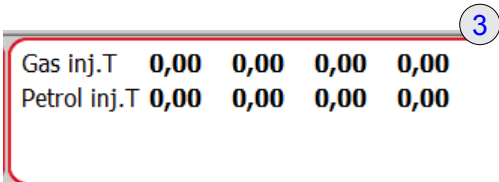
③
• **GAS** (Tinj.gas) and **BENZINA** (Tinj.benz) **INJECTION TIMES** differ for every injector in order of the sequence of cable connection (A-B-C-D) and the cut-off of petrol injectors by means of paired wires: Blue; Red; Green; Yellow.
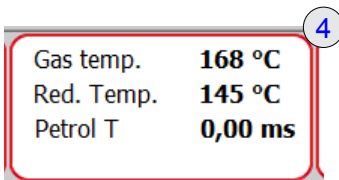
④
• **TEMPERATURE GAS** (**Temp.gas**): is the temperature of gas measured by the gas sensor (depending on the ECU used, the sensor is positioned on the injector rails or on the pipe which connects the regulator for pressure/injectors).
• **TEMPERATURE REGULATOR** (**Temp. rid**): detects the temperature from the water temperature sensor (positioned on the pressure regulator heater hose or on the regulator itself).
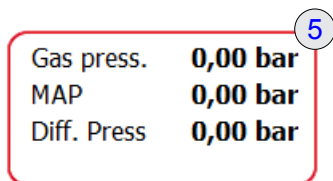
⑤
• **GAS PRESSURE** (**Press.gas**): is the gas pressure reading at the gas injector inlet.
• **MAP**: is the inlet pressure reading in the inlet manifold.
• **Press Diff**: is the difference between the gas pressure and the pressure in the inlet manifold (MAP). This difference shows the real time pressure of the gas being fed.
• **P1:** real petrol pressure, read by the petrol high pressure sensor.

⑥ This panel shows the connection/disconnection status of the OBD communication protocol and the type of protocol used for the connection (data shown below the connector symbol).

Connection active.

Connection inactive.

In addition, if OBD errors are detected, the following symbols may appear:

OBD errors detected.

OBD errors deleted.

12 - 32

Fuel Trim Long 0,0 %
Fuel Trim Short 0,0 %

Rear Lambda 0,50 V
Bank 1: Closed loop

Panel which shows the parameters read by the OBD:
- The value of the slow trimmer (**FUEL TRIM LONG**) expressed as a percentage.
- The value of the fast trimmer (**FUEL TRIM SHORT**) expressed as a percentage.
- The voltage reading for the **REAR LAMBDA SENSOR.**
- The voltage reading for the **FRONT LAMBDA SENSOR.**
- **BANK1: CLOSED LOOP** appears when the PETROL ECU manages the injection time based on values taken from the lambda sensor.
- **BANK1: OPEN LOOP** appears when the PETROL ECU manages the injection time independently of the values taken from the lambda sensor.
- **BANK1: TRANSIENT OPEN LOOP)** appears when the PETROL ECU manages the injection time independently of the values taken from the lambda sensor for just a brief moment before passing to being managed by CLOSED LOOP.
- **Engine temperature** in °C.
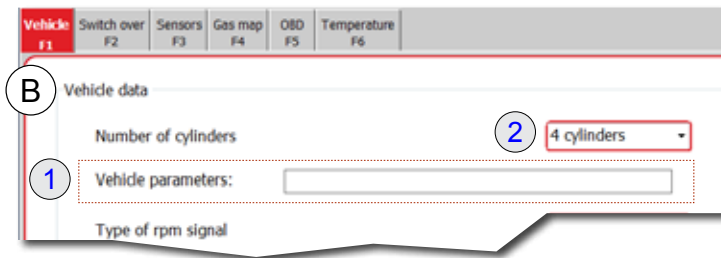
Ⓑ **VEHICLE DATA**

① **VEHICLE PARAMETERS**: on pressing "Load", you can select the configuration files from a tree menu (see page 9).
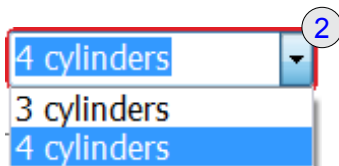
② **NUMBER OF CYLINDERS*:**
This parameter tells the ECU how many cylinders the engine has and therefore how many injectors it must manage.
Set 3 - 4 cylinders as appropriate.
In the version for **DI108** 5, 6 or 8 cylinders can be set.
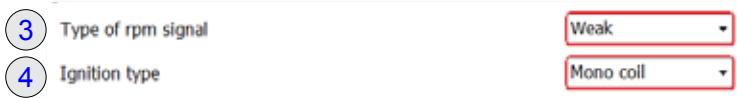
③ **RPM Signal type***: **Standard / Weak.** Leave the setting at "Standard" with signals that vary between 5V and 12V. Select "Weak" with signals that vary between 2V and 5V.
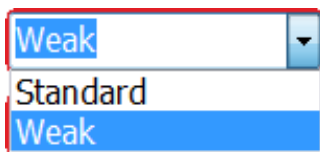
NOTE: Select WEAK signal if the RPM input is being sent to the ignition coil amplifier; Select STANDARD in the event of connecting two wires to the negative pole of the ignition coil. If connecting instead to the rpm counter, you can use either setting although WEAK SIGNAL is preferable. With signals lower than 2V, you need to fit an additional signal amplifier.

④ **TYPE OF IGNITION**
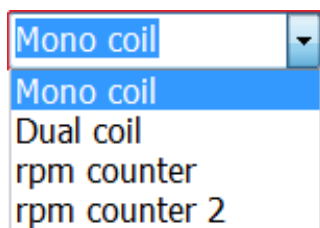
Mono-coil, Dual-coil, rpm counter, rpm Counter 2. This information is used by the ECU to correctly calculate the RPM setting that it uses in fuel mapping and as a safety system. If the engine is accidentally switched off, when the ECU senses no RPM signals but ignition on, it cuts off the power supply to the solenoids on the regulator and fuel tank.
Select **Mono-coil** if the engine has one coil per cylinder and the signal is taken from the coil negative pole or transistor. Select **Dual-coil** if the engine has one coil for two cylinders and the signal is taken from the coil negative pole or transistor.

*NOTE: some engines with one coil per cylinder may need this selection. In other cases, select the **rpm counter** option. Select **rpm counter 2** if the rpm levels seen in the "rpm counter" setting are two times the real value.*

Ⓒ

Ⓒ **TYPE OF SYSTEM**

① **TYPE OF FUEL***: **LPG / CNG**: select the type of fuel used.

② **TYPE OF INJECTOR***: this window lets you select the type of GAS injector supplied in the installation kit. In the event of loading a previously saved configuration, this window shows the type of gas injector provided for in the configuration file.

③ **PRESSURE REGULATOR* (range 0.8 - 5 bar)**: in this window, you can adjust the regulator fuel feed pressure set during the initial vehicle calibration phase.

To adjust the pressure on the pressure regulator:
• run the engine at tick-over on gas and adjust the regulator using the screw;
• check the pressure reached by the regulator in "Press.gas".
In this way, the software can correctly calculate the pressure compensation.

ATTENTION: some vehicles at tick-over nay run on PETROL, in this case, you will need to keep the engine running fast so as to exit from PETROL mode.

ATTENTION: changing parameters in an existing calibration file marked with an asterisk will affect the proper running of the gas system as these parameters are preset during the initial vehicle calibration phase.

Changeover F2

Changeover page - F2

Vehicle F1	Switch over F2	Sensors F3	Gas map F4	OBD F5	Temperature F6		Exit

① Rpm threshold for switch over   1600 rpm

② Temperature of pressure regulator for switch over   35 °C

③ Petrol-gas switch over delay   20 s

☐ Start & Stop

☐ Use engine T. for switch

Type of switch over   In acceleration ▾

[0 - 3000] ①

① RPM THRESHOLD FOR CHANGEOVER (range 0-3000 RPM)**:** identifies the RPM at which the switch over from PETROL TO GASoccurs.

[20 - 90] ②

② REGULATOR TEMPERATURE FOR CHANGEOVER (range 20-90° C): indicates the temperature which the sensor must detect so that switch over to gas is allowed. If while running on gas, the temperature drops below the value set, the ECU will continue running in gas mode.
This parameter can be personalised for engine type and at the user's discretion; however, if you sett a temperature which is too low, the switch over from PETROL TO -GAS might take place before the regulator is sufficiently hot and this would hinder the correct feed of gas. If you set a temperature which is too high, too much time would pass before the switch over between to GAS.

[20 - 250] ③

③ DELAY IN PETROL-GAS CHANGEOVER (range 20-250): indicates the minimum time and the RPM setting from when "ignition on " is detected and the RPM reading so that the switch over from PETROL to GAS occurs. This time remains fixed whether the engine is hot or cold. With the engine hot, once the time set in "CHANGEOVER DELAY" has passed the RPM switch over threshold, the ECU allows the change to gas. With the engine cold, in addition to the above-mentioned parameters for changing to gas, the temperature for switch over must also exceed the value set.

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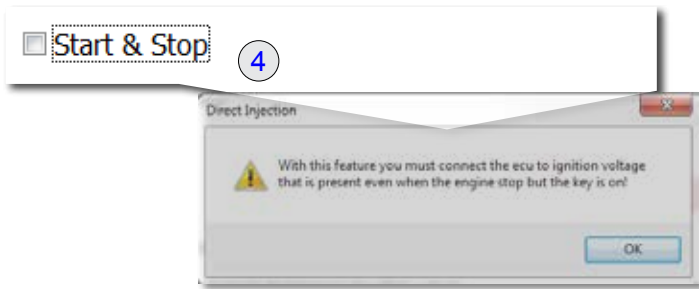
④ **START & STOP:** if you enable this function, the system will continue running despite the loss of RPM signals and will recognise the situation as operating on "ignition on signal" only condition (15). This system also allows the reading of RPM signals when connected to the ignition coil. In "Stop", RPM signals are absent. This function allows the engine to start on gas after an "S & S" and avoids the initial delay in the P/G switch over . If the function is enabled, the program displays the supply connection warning.

NOTE: the system normally enables the safety function when there are no RPM signals. In this case, to ensure that the solenoid (tank and pressure regulator) remain open in the event of an impact, the ignition wire (15) has to be connected to the petrol pump power supply control or to an ignition that is independent of the inertial switch.
When a STOP condition is recognised, after 3 seconds, the GAS SOLENOIDS will be closed and will then automatically re-open at the nest START.
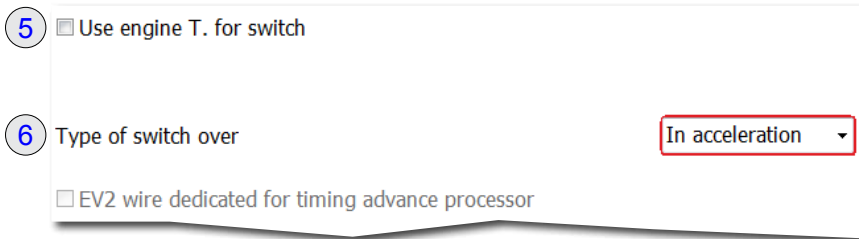
⑤ **USE OF THE ENGINE TEMPERATURE FOR CHANGEOVER**, when this function is enables, the following wording appears: **ENGINE TEMPERATURE FOR CHANGEOVER (range 50-215)**
Shows the temperature which the engine must reach to before switch over to GAS is allowed.
This parameter, detected by the OBD system, needs specific cables to be connected to the vehicle diagnosis connector.
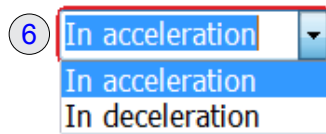
⑥ **TYPE OF CHANGEOVER - In acceleration; in deceleration**.
To implement the switch over to gas when you set:
• **In acceleration**: the number of engine revs must exceed the threshold set in "**RPM threshold for switch over** ".
• **In deceleration**: the system must recognise higher then lower revs than the value set in "**RPM threshold for switch over"** and the condition of petrol cut-off.

Ⓐ **Type of gas level sensor**: lets you select the type of gas level sensor installed. The following level indicators are available ①: ENERGIA ITALY - LANDI - 0 - 90 OHM - Non standard - Inverted non standard The preset sensors: ENERGIA ITALY, LANDI and 0-90 OHM, have pre-loaded fuel level thresholds in the Software preset, so the fuel level boxes are not active.

With the "**Non standard**" and "**Inverted non standard**" options, you can personalise the settings for the type of gas level sensors used and set suitable ascending or descending thresholds in the "1/4", "2/4" and "3/4" "Reserve" boxes.

The following procedure lets you set the thresholds at which the lights on the LED display on the switch come on:

Important: the following procedure needs the manual input of some information in certain boxes. To save the value entered in the box and before going to the next box, press Enter on the computer keyboard.

- With the fuel tank completely empty, put in the amount of fuel you want to consider as the "Reserve" level;
- connect the ECU with the computer then turn the switch to petrol mode;
- enter the number which appears in ④ "**Level**" in the ② "**Reserve**" box.
- fill the fuel tank up to the top;
- enter the values ③ in proportional scale between the maximum value that appeared in ④ "**Level**" and the value previously entered in "**Reserve**".

⑤ ☑ Enable strategy to recognize gas filling

Level offset to recognize gas filling   128

Recognition strategy for full gas. If you select "Enable Recognition strategy for full gas " ⑤ and the system passes back to petrol due to a low level of gas (low gas pressure with the indicator showing RESERVE), the level measured by the indicator is saved. In this case, every time you turn the engine on, if the level of gas measured by the sensor is greater than the level set in "Increase in level due to recognition of full gas", gas functioning mode is automatically set.

Gas map F4 — Mapping page - F4

| Vehicle F1 | Switch over F2 | Sensors F3 | **Gas map F4** | OBD F5 | Temperature F6 | | | Exit |

	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000
0,5	128	128	128	128	128	128	128	128	128	128	128	128
1	128	128	128	128	128	128	128	128	128	128	128	128
1,25	128	128	128	128	128	128	128	128	128	128	128	128
1,5	128	128	128	128	128	128	128	128	128	128	128	128
2	128	128	128	128	128	128	128	128	128	128	128	128
2,5	128	128	128	128	128	128	128	128	128	128	128	128
3	128	128	128	128	128	128	128	128	128	128	128	128
3,5	128	128	128	128	128	128	128	128	128	128	128	128
4	128	128	128	128	128	128	128	128	128	128	128	128
4,5	128	128	128	128	128	128	128	128	128	128	128	128
5,5	128	128	128	128	128	128	128	128	128	128	128	128
8	128	128	128	128	128	128	128	128	128	128	128	128

☑ Enable coloured map

Reset map

☐ Idling on petrol
☐ Return to minimum with petrol

Idling rpm   200

	Rpm	0	Gas inj.T	0,00 0,00 0,00 0,00	Gas temp.	168 °C	Gas press.	0,00 bar
			Petrol inj.T	0,00 0,00 0,00 0,00	Red. Temp.	145 °C	MAP	0,00 bar
							Diff. Press	0,00 bar

This chart shows the coefficients of multiplication, known as **K**, used by the ECU for calculating **GAS** injection times.
The three variables of the main fuel mapping system are as follows:
- RPM on the X axis;
- Petrol injection time (Tinj) on the Y axis;
- K Coefficient in the cells.

The calculation chain for gas injection times is obtained from:
• petrol injection time
• petrol injector dead time
• gas injector dead time
• map K coefficient
• gas pressure compensation
• water temperature compensation

The dot on the map identifies the RPM and petrol injection times of the engine at that moment.
the colour of the dot and the symbol ① indicate the fuel supply status of the engine:
RED: engine running on petrol;
BLUE: engine running on gas.

Connecting to the vehicle OBD socket displays the parameters for fuel feed while the engine is running on (Slow and Fast Trimmers) ② expressed as positive or negative percentages.

	500	1000	1500	2000	250
0,5	136	138	139	143	147
1	148	150	159	170	171
1,25	148	150	160	173	173
1,5	148	150	156	165	165
2	147	149	155	163	163
2,5	144	146	152	160	160
3	142	144	149	156	156
3,5	140	142	14	155	155
4	138	140	146	154	154
4,5	138	140	146	154	154
5,5	138	140	146	154	154
8	138	140	146	154	154

Gas inj.T 0,00 0,00 0,00 0,00
Petrol inj.T 0,00 0,00 0,00 0,00   ②

③ **Changing map references**: you can change the map break points respectively for:
• RPM (range: 0 - 8000)
• Petrol injection times (Tinj range: 0 - 12 ms)
To optimise the fuel feed map, we recommend limiting the values based on the characteristics of the engine and identifying the maximum rev limit and maximum petrol injection time. To adjust these values, set the new values then press OK.

NOTE: Changing the parameters on an existing calibration map may lead to incorrect fuel supply.

CHECKS TO BE CARRIED OUT BEFORE HANDING A VEHICLE OVER
• Check that the vehicle is driving properly;
• ensure that the OBD trimmers (fast and slow) do not affect the fuel supply in such a way as to lead the ECU astray.
• check that in determined fixed points on the map, the OBD trimmers remain at roughly the same values whether the engine is running on petrol or gas.

Pressing the ④ Petrol/Gas panel lets you switch directly between the two fuels and avoid the delays set by the system (manual pressure on the switch).

ATTENTION: when making trimmer adjustments, it is important that they remain as stable as possible inside a map cell.

NOTE: during these checks, variations in RRPM or engine load will not provide accurate data.

⑤ With the dot inside a single cell, check that the trimmers (fast and slow) remain at roughly the same values whether the engine is running on petrol or gas.
If these values do not match, make manual adjustments on the map.

• With the RPM and engine load stabilised at various points of the map, press the switch.

In the first few seconds after the switch to gas, you can observe the change in trimmer settings.

Double clicking on a single cell will let you modify mapping values. If you select "**Absolute**" mode, the written number is the number that will appear in the cell. If you select "**Relative**" mode, the written number is the number that will be added to or subtracted from the number currently shown in the cell. If you select "**Percentage**" mode, the written number is the percentage increase that will be added to the number currently shown in the cell.

WARNING In "Absolute" mode, the program suggests an estimated value of the correction (trim) to be implemented. We advise you to think very carefully about whether to accept that value or whether to vary very slightly the value to be entered. If you want to modify fuel feed during moments of "fuel transition", you need to select a number of cells at the same time; in this case, "Percentage" mode is more appropriate for better mapping results.

⑥ ☑ Enable coloured map

⑦ ☐ Idling on petrol

⑧ ☐ Return to minimum with petrol

Idling rpm   200

⑨ Reset map

⑥ **Enable map colouring:** lets you colour cells on the map in a shade of red that is proportional to the K correction factor.

⑦ **Petrol tick-over mode:** if the engine revs drop below the "Minimum tick-over" level", the system will switch to run on petrol and will remain as such until the revs go back to above the threshold.

⑧ **Leaving petrol tick-over:** if the engine revs drop below the "Minimum tick-over" level", the system will switch to run on petrol but will only remain as such for a certain number of injections and will then go back to running on gas.

⑨ **MAP RESET**: press the key on the initial configuration map.

OBD page - F5
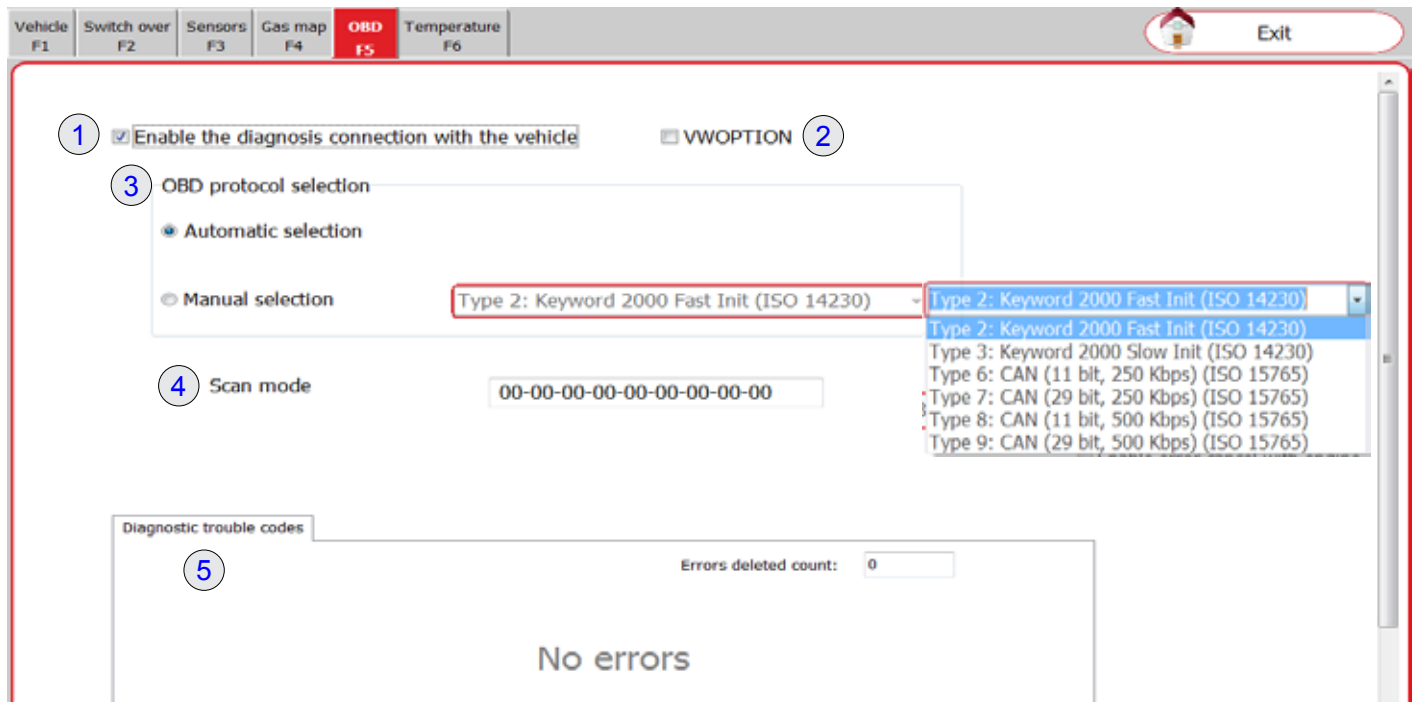
The functions of this page are set when the calibration file is created and it is best not to modify them unless advised to do so by the Technical Assistance dept. These functions however are as follows. Changing the status of the "ticks" for items or some parameters can interrupt communication between the OBD system and the engine electronics.

① **Enable vehicle diagnostic connection:** lets you enable the OBD (On Board Diagnostics) connection in one of the possible connection modes.

② **VW OPTION:** used exclusively with calibration files dedicated to engines made by the Volkswagen Group.

③ **Selection of OBD protocols**

- **Automatic selection:** when you enable this connection mode, the software will automatically try to connect with the vehicle by testing all the possible OBD connections until it finds the right one.
- **Manual selection:** enabling this connection mode, you can select the type of vehicle OBD connection by choosing from the list shown.

④ **Scanning mode:** alphanumeric OBD connection coupling codes.

⑤ **Errors in the OBD:** this panel shows if there are any errors in the OBD system that have been detected by the petrol injection ECU and displayed by the MIL warning lights on the dashboard.

Temperature page - F8

Temperature F8

| Vehicle F1 | Switch over F2 | Sensors F3 | Gas map F4 | OBD F5 | Temperature F6 | | Exit |

① Type of gas temperature sensor   [In deceleration ▾]

② ☑ Use vehicle engine temperature sensor

| Delta T | 5 | °C | | Min T | -20 | °C |
| R pull-up | 4700 | ohm | | Max T | 130 | °C |

③

-20	-15	-10	-5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125
4,53	4,39	4,24	4,04	3,82	3,59	3,33	3,06	2,78	2,51	2,24	1,98	1,75	1,53	1,33	1,16	1	0,86	0,75	0,65	0,57	0,49	0,43	0,37	0,31	0,27	0,24	0,22	0,2	0,16

✔

Modify map values ✖

④ [4,53]   **OK**

Mode
◉ Absolute
◯ Relative   **Cancel**
◯ Percentage

The functions on this page are programmed when the calibration file was created and we do not recommend changing them.

① **Type of gas temperature sensor:** select the type of gas temperature sensor fitted to the units from "in acceleration" and "in deceleration".
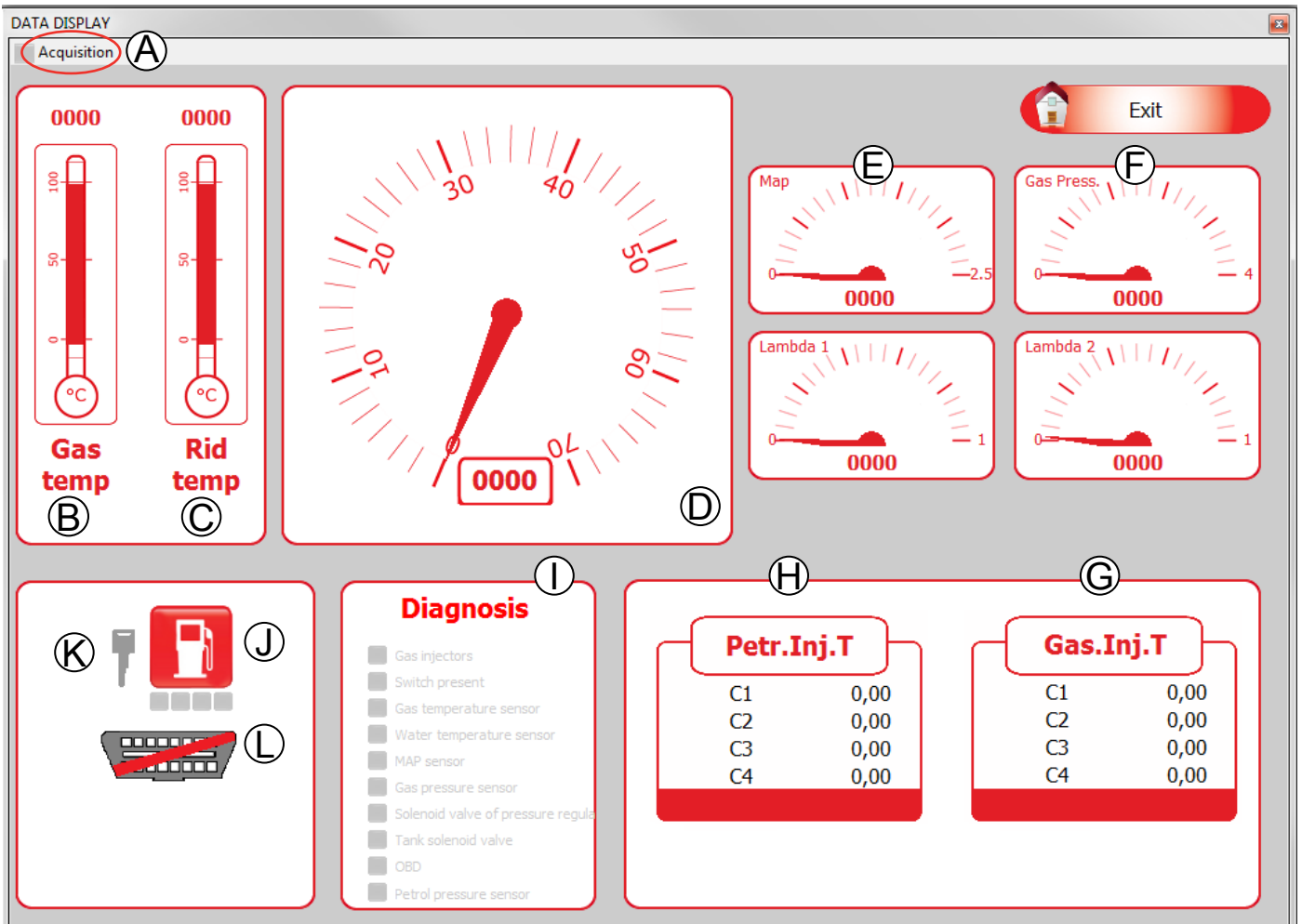
② **Use vehicle engine temperature sensor:** usually an NTC 4K7 sensor is used to measure the regulator temperature. To use the original engine temperature sensor, you will need to type the engine sensor using the table ③.

Table ③ lists the main gas injection times with based on temperature. The first row is the temperature value (in °C). This cannot be changed directly so in "T. Min" you will have to set it the first temperature value in the table, the maximum value in "T. max" and the difference between one value and the next in "Delta T". The second row is the voltage value (in Volts) associated with the same temperature.
To change to the suggested injection time values, double click on the preset value: the dialogue window ④ will open for the introduction of values in Absolute, Relative or Percentage mode.

NOTE: The signal from the temperature sensor fitted to the pressure regulator heating hose is used for calculating the gas injection times.

DATA DISPLAY

DATA DISPLAY

Acquisition (A)

	0000	0000					

Gas temp (B) — Rid temp (C)

(D) 0000

(E) Map 0000 —2.5
(F) Gas Press. 0000 — 4
Lambda 1 (—) 0000 — 1
Lambda 2 (—) 0000 — 1

Exit

(K) (J) (L)

Diagnosis (I)

- Gas injectors
- Switch present
- Gas temperature sensor
- Water temperature sensor
- MAP sensor
- Gas pressure sensor
- Solenoid valve of pressure regula...
- Tank solenoid valve
- OBD
- Petrol pressure sensor

Petr.Inj.T (H)

C1	0,00
C2	0,00
C3	0,00
C4	0,00

Gas.Inj.T (G)

C1	0,00
C2	0,00
C3	0,00
C4	0,00

Data display

This page was designed to be fast and easy to consult the more important parameters to be checked during gas operation.

(A)

Acquisition	About
Start acquiring	Ctrl+R
Stop acquiring	Ctrl+S
Graph	
Send e-mail	
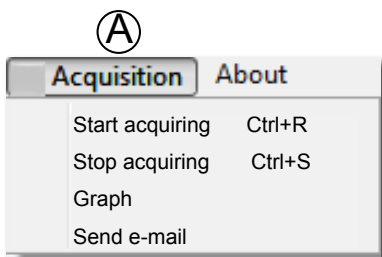
Ⓐ **ACQUISITION**: this menu is used to detect problems in the gas system. The drop down menu lets you set:
• Start acquisition
• Stop acquisition
• Graph
• Send e-mail

Start acquisition (Ctrl+R): when the "RED" dot is lit, this indicates that the program has started the acquisition procedure (function available with the engine switched off or running). You can repeat the procedure to detect the problem several times.
When you feel you have acquired sufficient data, press **Stop acquisition (Ctrl+S)**. The program needs to save the acquired data which will be archived in the "Acquisition" file.

Graph: lets you open the saved acquisition or other previously created files. The graph shown the traces of all the signals available:

- RPM: engine revs x 1000.
- LAMBDA1: value of the lambda sensor (detected on the PURPLE wire if connected).
- LAMBDA2: value of the lambda sensor (detected on the PURPLE/BLACK wire if connected).
- TINJGAS (1-2-3-4): opening time of the gas injectors.
- TINJBENZ (1-2-3-4): opening time of the petrol injectors.
- TEMPGAS (x 10): gas temperature value detected by the specific sensor multiplied by 10.
- TEMPRID (x 10): water temperature value detected by the specific sensor multiplied by 10.
- MAP: Value of the vacuum in the inlet manifold expressed in bars.

☑ RPM

☑ LAMBDA1

☑ LAMBDA2

☑ TINJGAS1

☑ TINJGAS2

☑ TINJGAS3

☑ TINJGAS4

☑ TINJBENZ1

☑ TINJBENZ2

☑ TINJBENZ3

☑ TINJBENZ4

☑ TEMPGAS

☑ TEMPRID

☑ MAP

Clicking on the parameter indication panels lets you select only the parameters that interest you in trying to identify problems.
Selecting only indispensable parameters, the graph becomes clearer; in addition, you can use the mouse to zoom in on specific details in the graph. You can also print.

Identifying the items in the panels is not complex with tools that show the values that are expressed numerically and displayed with a scale showing maximum and minimum values.

Ⓑ Gas temperature

Ⓒ Water temperature

Ⓓ RPM

Ⓔ MAP

Ⓕ Gas pressure

Ⓖ Gas injection times

Ⓗ Petrol injection times

Ⓘ Any errors saved in Diagnosis

Ⓙ Petrol/gas/petrol switch key

Ⓚ Ignition absent (grey), present (red)

Ⓛ OBD absent (barred), present (green)
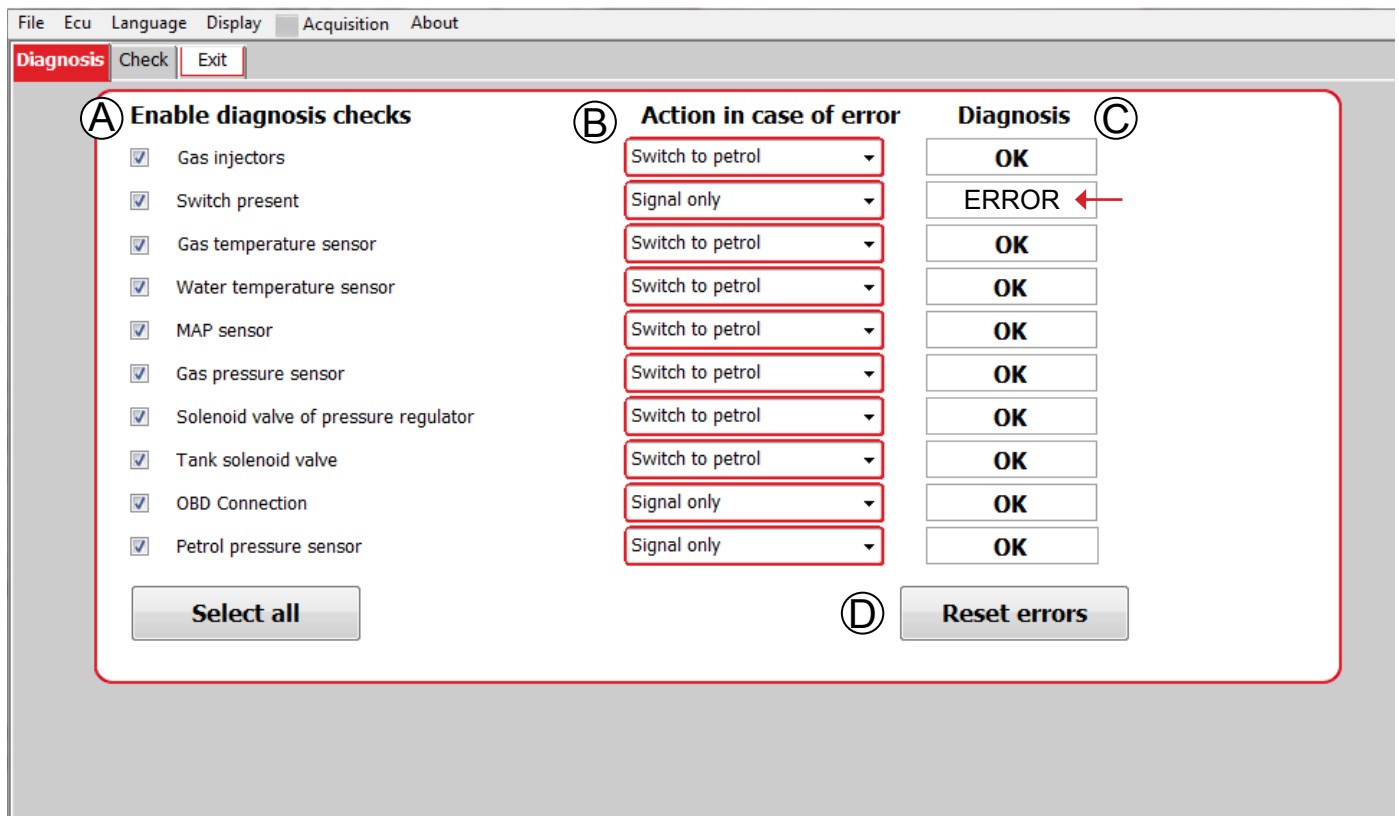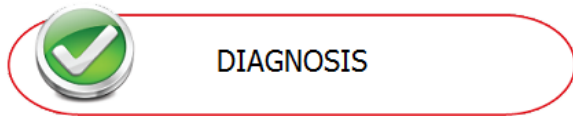
Diagnosis

"Diagnosis" chart
Ⓐ **Enabling diagnosis checks:** when the GAS ECU detects a system malfunction of a component Ⓐ, it applies the action that was selected in the Ⓑ "**Action in the event of an error**" box that corresponds with the error Ⓒ detected. Use Ⓓ "**Select all/ deselect all**" to tick/untick all the boxes.

The possible actions Ⓑ are as follows:
*   **Notification only**
*   **Switch over to petrol**

The Ⓒ "**Diagnosis**" column indicates the corresponding defect with an "**ERROR**" message.
If an error is displayed, after the problem that caused it to occur has been resolved, you can reset with Ⓓ "**Reset errors**".

Every error detected matching the "**Switch over to petrol**" action leads to automatic switching to petrol and is signalled through the switch by the YELLOW LED staying lit, the GREEN LED blinking slowly and the buzzer sounding.

To deactivate the buzzer: press the button on the switch which will change the vehicle from running on Gas to Petrol.

To go back to running on GAS, you will need to switch the vehicle off then start it again.

DEFINED ERRORS

|	ERROR	POSSIBLE CAUSE
GAS INJECTORS	The Diagnosis column signals the injector corresponding to the wiring it is connected to (A,B,C or D). THE error is signalled about the corresponding matching gas injector when the ECU fails to recognise the preset parameters for the injector to work correctly.	*Possible damage to the wiring for the relative injector or in the ECU.*
SWITCH PRESENT	This error is signalled in only two types of condition. • During installation if the switch fitted is not compatible with the ECU; • During normal operation if 1 hour has passed since the last time power was supplied or the ignition was on, an error message will be signalled if the electronics in the switch fails to "dialogue" with the ECU. The error (normally "Notification only") will reset every time the switch "dialogues" correctly with the ECU.	*Possible damage to the wiring, to the switch or to the ECU.*
GAS TEMPERATURE SENSOR	Diagnosis starts if the ECU measures a gas temperature for 10 seconds that is lower than or greater than the values set alongside the gas temperature string.	*Possible damage to the wiring, to the sensor or to the ECU.*
WATER TEMPERATURE SENSOR	Diagnosis starts if the signal from the vehicle temperature sensor or optional sensor is missing for 10 full seconds or if the ECU measures a water temperature that is lower than or greater than the values set alongside the water temperature string.	*Possible damage to the wiring, to the switch or to the ECU.*
MAP SENSOR	An error is signalled if, while running on gas, the pressure detected does not stay within the preset parameters for the correct functioning of the sensor, for 3 seconds.	*Possible damage to wiring, to the sensor or to the ECU.*
GAS PRESSURE SENSOR	An error is signalled if, while running on gas, the pressure detected does not stay within the preset parameters for the correct functioning of the sensor, for 3 seconds.	*Possible damage to wiring, to the sensor or to the ECU.*
REGULATOR SOLENOID/TANK SOLENOID	IT is possible to diagnose a short circuit or open circuit on each coil of the gas shut-off solenoids if the power consumption for each of them, measured for 2 seconds, falls outside the operating range.	*Possible damage to coil or ECU.*
OBD CONNECTION	With this software version, diagnosis is only enabled if "VWOPTION" is ticked in the "Configuration" "OBD F5" page. The error occurs, if during "Warm-up", the ECU fails to communicate with the OBD system.	*Possible damage to wiring or ECU.*
PETROL PRESSURE SENSOR	The error occurs when the engine is running on petrol and the ECU reads values that are higher or lower than the preset parameters.	*Possible damage to wiring or ECU. The cause of the problem may also be found in the petrol management system but in this case, the MIL warning light would light up with an error message.*
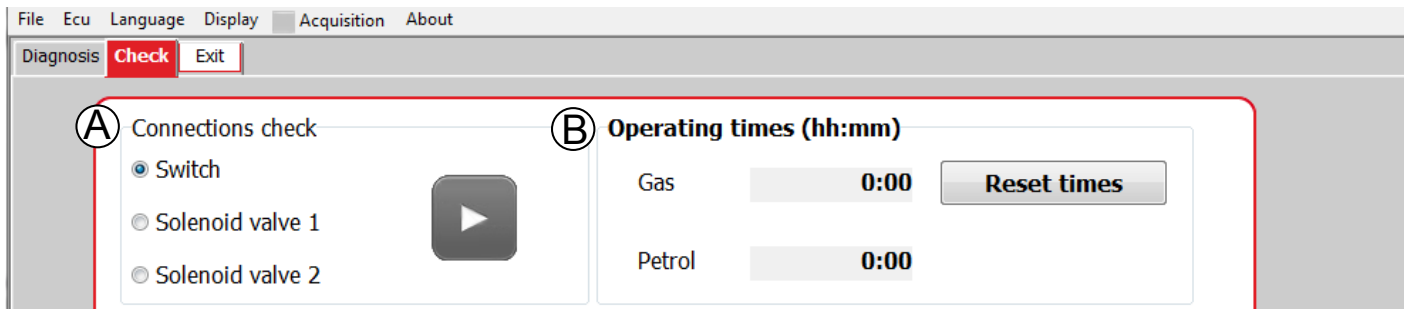
"Controls" chart
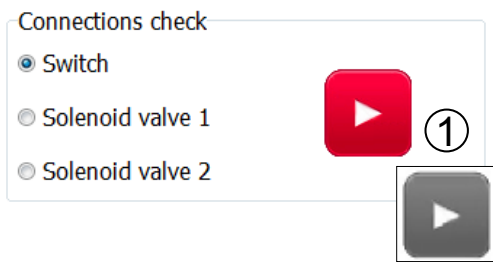
Ⓐ **Connection checks**: if you select one of the headings and press ① (red active - black inactive) you can check the following:
- **Switch:** all the LEDs come on in sequence and the buzzer sounds.
- **Solenoid 1**: the ECU powers the pressure regulator solenoid.
- **Solenoid 2:** The ECU powers the tank multivalve solenoid or the shut-off valves (if present) on the gas bottles and any other component connected to the White/Blue - White/Black wires.
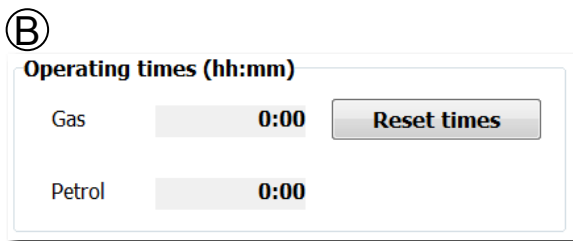
Ⓑ **Operating times (hh:mm):** separately counts the time the engine has been running on gas and on petrol. The times are displayed in multiples of 20 minutes.
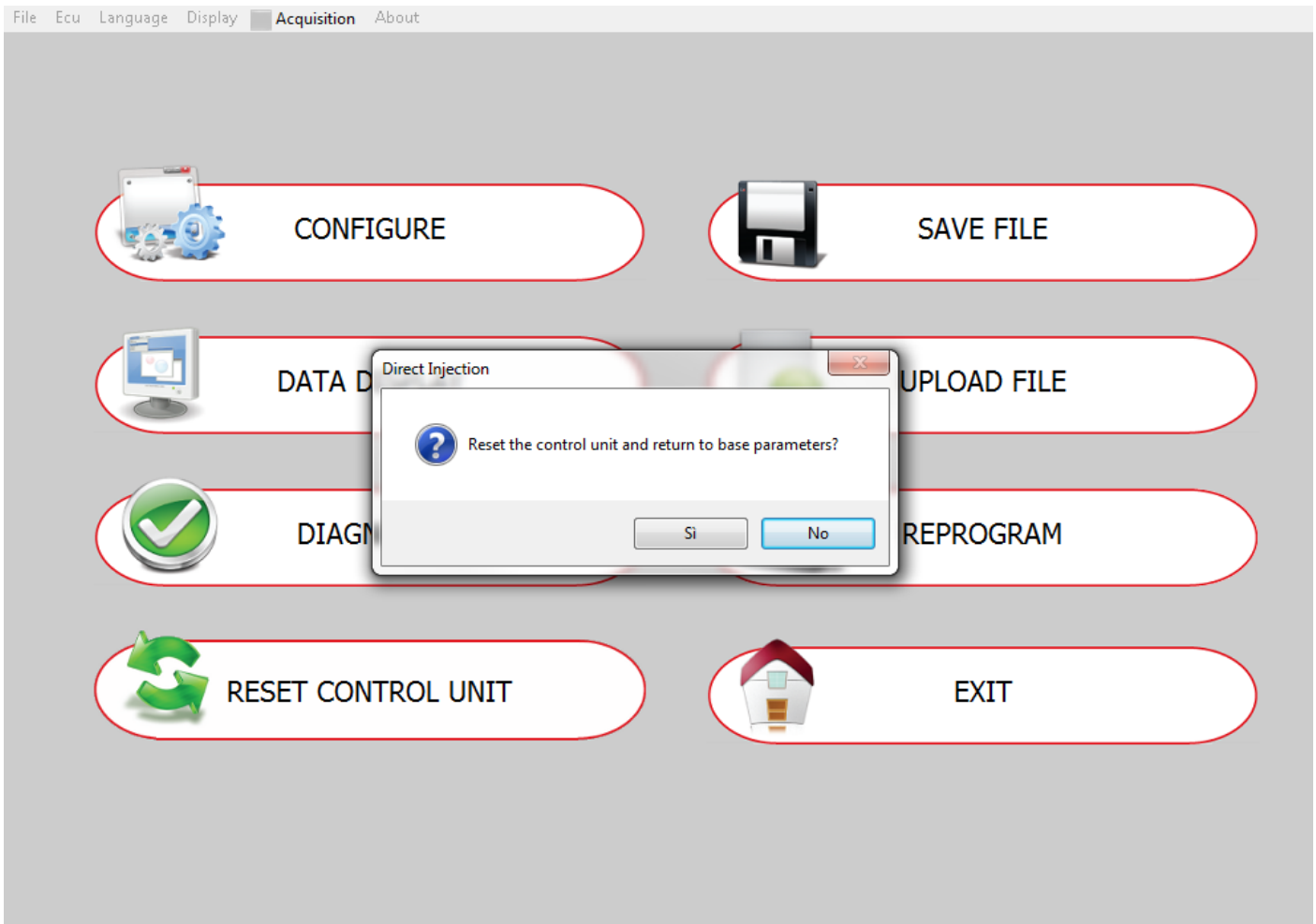
NOTE: the times saved will be reset if the ECU is reprogrammed with new firmware or with a new programming file.
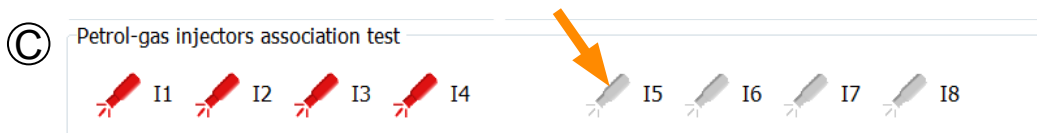
Ⓒ **Petrol-gas injector association test:** this lets you test that the gas injectors are working properly and that they are correctly associated with the petrol injectors. Click on the gas injector you want to test (while running on gas), the symbol will change colour and the corresponding cylinder will be fuelled with petrol. This function allows you to carry out various checks:
- to check the right sequence of petrol injector cut-off/gas injector connection.
- to identify any defects on injectors without having to manually check injector/inlet manifold piping.

to identify which injector might be creating the problem, press the injector symbol in sequence. In this fashion, the cylinder corresponding with the deactivated injector will be fuelled with petrol thus letting you identify the defective gas injector.

*NOTE: When you exit the Diagnosis menu, all the injectors will be fuelled by gas.*

RESET CONTROL UNIT

File Ecu Language Display Acquisition About

CONFIGURE

SAVE FILE

DATA D

UPLOAD FILE

Direct Injection

? Reset the control unit and return to base parameters?

Si   No

DIAGN

REPROGRAM

RESET CONTROL UNIT

EXIT

Reset ECU
Before you reset the ECU, you will be asked to confirm the action.
This is a quick way to cancel all the parameters and make the ECU "neutral".
It is not always possible to cancel all the parameters if you load a calibration file created with a SW version that differs from the previous version as, if in the new file, one or more parameters have not been set (because they weren't needed), the ECU may save the values from the previous calibration file.
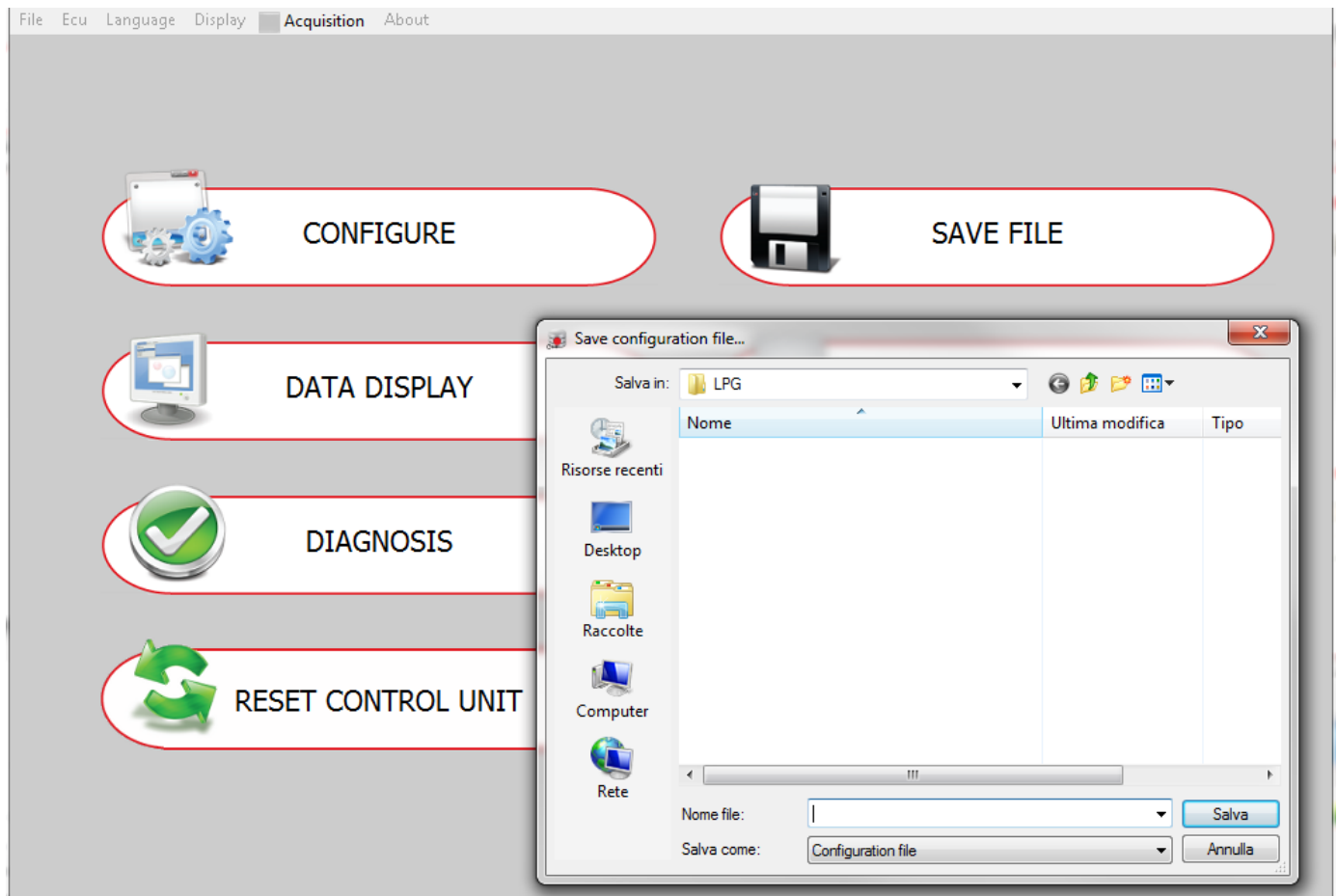
Save file

Accessing **SAVE FILE** lets you save configuration files to the computer. The program automatically opens the dialogue window.

Selecting the type of fuel CNG or LPG in "CONFIGURATION -VEHICLE F1" affects saving files in the relative folder.

IT is at the operator's discretion whether to save the file in a specific car manufacturer's folder or in a common fuel type folder. The name the file shows in the panel is the same as that which appears in the lower panel string "Configuration". The program automatically saves the file with the "**.dln**" extension for **3000B** UCUs and with "**.dl8**" for the DI108 and DI60.

Any other car manufacturer folders not on the can be created on your computer.

UPLOAD FILE
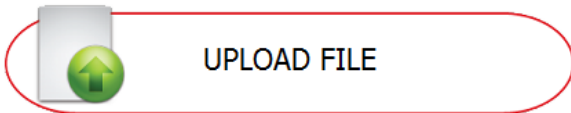
Selezionare il file di configurazione da caricare

Percorso delle configurazioni: ...C:\Users\imarti\Documents\DirectInj\Configurations\CNG   Tipo carburante   Metano (CNG)   Ⓐ

Lista dei file di configurazione   Ⓑ

N°	Alim...	Nome File	Data	Parametri veicolo	Iniettori	Note
1	CNG	AUDI_18_11_CDH A-B_Ls_M_1281.dln	08/05/2014 11:35:34	?	Landi	(*)
2	CNG	HYU_16_12_G4FD_Lss_M_1281_00.dln	08/05/2014 11:32:06	?	Landi	(*)
3	CNG	PSA_16T_11_5FV_Ls_M_1281_00.dln ①	08/05/2014 11:38:42	?	Landi	(*)
4	CNG	StandardLandiLPG.dln	23/07/2014 11:58:15	?	Landi	
5	CNG	VW-FSI_16_07_BLF_Lss_M_1281_00_.dln	08/05/2014 11:43:08	?	Landi	(*)
6	CNG	VW-TFSI_14T_11_CAX_Lss_M_1281_00.dln	08/05/2014 11:45:16	?	Landi	(*)

Lista dei file di configurazione   Ⓑ

N°	Alim...	Nome File	Data	Parametri veicolo	Iniettori	Note
1	CNG	Audi_12T_11_CBZ_A_B_Lss_M_1281_01.dl8	08/05/2014 15:50:22	?	Landi	(*)
2	CNG	VW_12T_12_CJZ_Lss_M_1281_01.dl8 ②	08/05/2014 11:46:36	?	Landi	(*)

Nome File Ⓔ

(*) Note   Ⓓ 🔍

Cambia cartella   Ⓒ ☑ Carica file dalla cartella standard

Carica Ⓕ   Esci

Load file

Accessing **Load file** lets you load archived maps.

Select "**Type of fuel**" Ⓐ as the first parameter. The system will automatically detect the type of ECO connected and display only the configuration files which can be loaded.

With no ECU connected, the program is set for the **3000B** ECU

To change the ECU setting, you have to go back to the program home page and change the setting with **Ctrl+A**. Default setting: **3000B** no reference; with the **DI108** and **DI60** ECUs, the respective models appear.
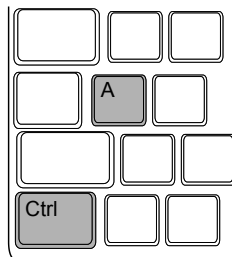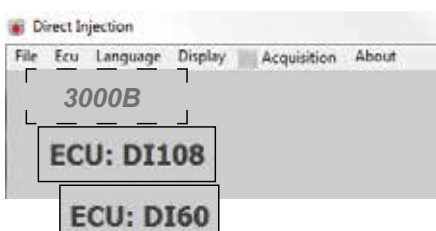
Going back to "Load file" the "**List of configuration files**" Ⓑwill only show appropriate maps with the "**.dln**" ① extension for **3000B ECUs** and with "**.dl8**" ② for the DI108 and DI60.
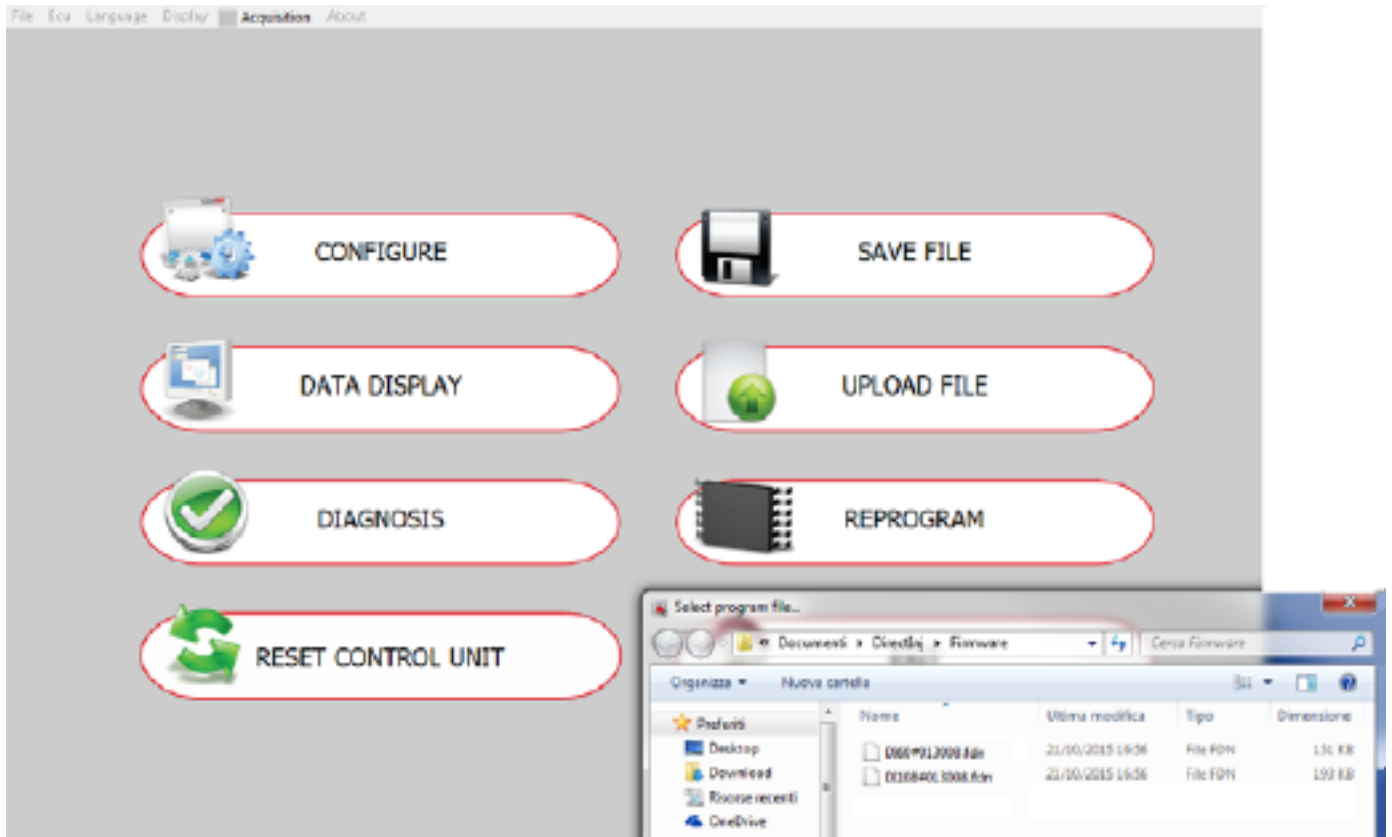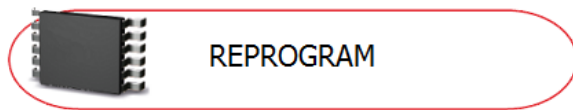
You can also tick the heading Ⓒ "**Load files from the standard folder**" or press "**Change folder**" and look in other folders.

By entering a key word or initials in the searchⒹ panel, you can reduce the search to a smaller number of files.

Once you have selected the map you want, the name of the file and other relevant notes will appear in the Ⓔ "**File name**" and **(*) Note**s" panels.

Pressing Ⓕ "**Load**" starts the ECU programming procedure.

Direct Injection

File   Ecu   Language   Display   Acquisition   About

3000B

ECU: DI108

ECU: DI60

Reprogramming

Every SW program always contains "**FIRMWARE**" (the management program present in the ECU) that has been updated for every model of ECU.
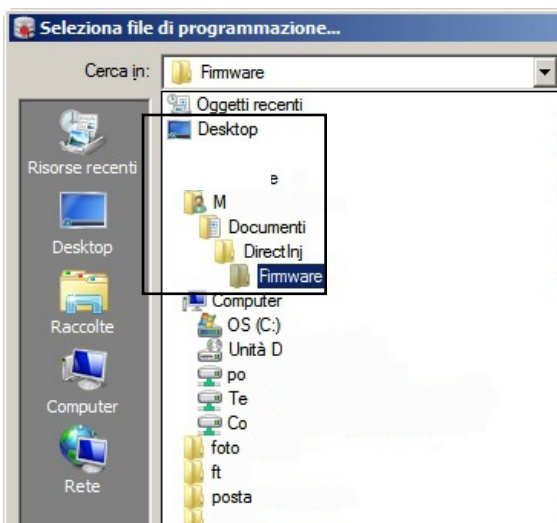
The first part of the description indicated the model of ECU, the number after the "#" indicates the number (always increasing) of the update .

Firmware updates between when a SW program was released and the next version are distributed by the usual LR communication channels (website, e-mail etc.).

To find the path you need to save programming files (Firmware) simply open the drop-down menu.

To load the FIRMWARE to the ECU, press **"REPROGRAM"**, select the update file and press "Open".

NOTE: Before updating any FIRMWARE, make sure that the ECU is connected to the computer.
Information about ECU connection status appears at the bottom left of the main menu screen.