LCU–ONE Analog

User manual

Racing Data Power

INDICE

Chapter 1 – LCU-ONE Description

LCU-ONE is a lambda controller unit for wide band BOSCH LSU 4.9 lambda probe; it fits petrol (2 and 4 strokes), diesel and methane engines as well as alcohol based fuel engines. It is intended to check lambda probe proper working as well as to transmit the Air/fuel ratio values providing **MXL/EVO3** with lambda values through the CAN bus.

Lambda value is defined as: **LAMBDA= (A/F)/(A Stoichiometric /F Stoichiometric)**.

where:

A = incoming parts of air;
F = parts of petrol the carburetor injects into the engine;
A Stoichiometric / F Stoichiometric = parts of air needed to burn Stoichiometric F;

Speaking about gasoline, for example, it needs 14,57 parts of air to completely burn a part of gasoline, obtaining Lambda value = 1 read by the probe.

LCU-ONE controller can detect lambda values in a range of 0.65 to 1.6 (free air).

It is reminded that LAMBDA value lower than 1 means a rich mixture, while LAMBDA value higher than 1 means a lean mixture.

Wide band Lambda probes need to be heated to work properly and not poisoned with exhaust gas; **LCU-ONE** controller precisely manages the probe heater so to keep temperature value in the optimum working range.

Lambda probe used with LCU-ONE controller becomes very hot (around 700-800 °C, 1292-1472 °F) during its working period, it is thereby necessary AVOIDING:

- touching it.
- placing it in contact with flammable stuff or fuel.

Please note:
disrespect of these warnings can cause shocks, burnings or explosions.

Chapter 2 – LCU-ONE and Lambda probe mounting

LCU-ONE controller should be installed in a flat location and far from heat sources; it should be mounted steady using the suited bracket.
The wiring has to be arranged so to avoid it passing near to heat sources.

LCU-ONE is to be powered by the engine master switch.

BOSCH LSU 4.9 Lambda probe should be installed on the vehicle exhaust pipe using a specific adaptor that comes with the kit and should be welded on the same pipe. The probe should be sufficiently near to the engine.

Probe working temperature should not exceed 900°C (1652°F) and it should not be exposed to the free flame coming from the exhaust system.

Probe installation angle should be of at least 10° to avoid liquid condensation stuff to come in contact with the probe, polluting it.
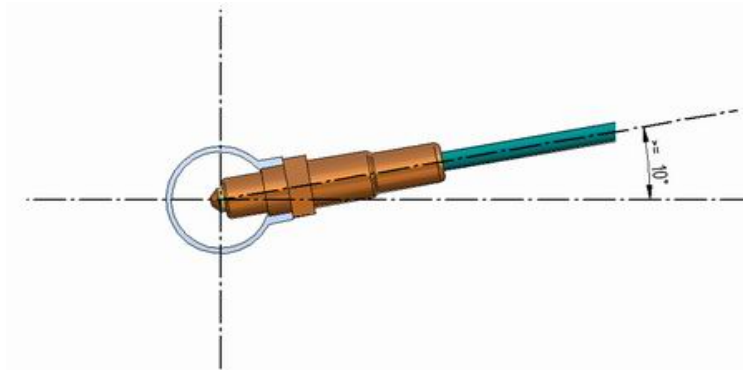
Once the probe is installed, pay attention not to let the cable pass near to excessive heat sources (the exhaust pipe for example).

Bosch LSU 4.9 probe auto-calibrates: no calibration is then required by the user.

Solvents or additives should not be used to clean the probe connector. To protect the probe we would suggest to remove it from the vehicle when cleaning the vehicle to avoid polluting the probe with detergents.

It is reminded to never switch the vehicle on with Lambda probe installed and not connected to a correctly working **LCU-ONE** controller: a probe not heated and exposed to exhaust gas would be irremediably damaged.

N.B. BOSCH LSU 4.9 Lambda probe has been designed to be used with unleaded or diesel engine: it can be used with other kind of engines too but its duration needs to be tested by the user.
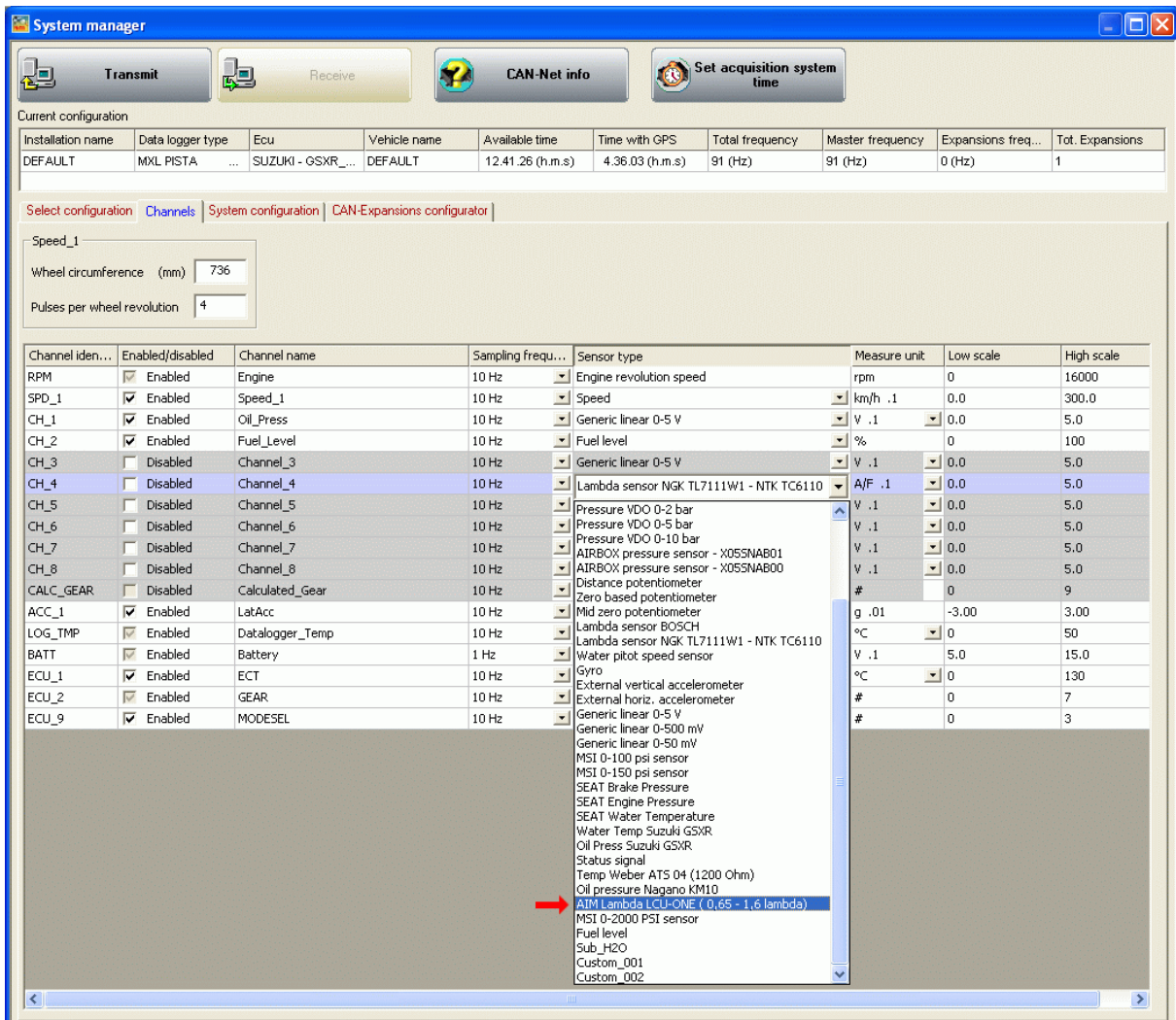
Chapter 3 – Configuration

To work properly **LCU-ONE Analog** needs to be configured. The configuration can be made both using **Race Studio 2** and using **Lambda Configurator** the free software - included in the kit - properly designed and developed by AIM to configure this device.

3.1 – LCU-ONE Analog standard configuration

Configuration through **Race Studio 2** (standard) is possible only if calibration curve default points – 1.95↩0.65 and 4.8↩1.6 – have not been modified.

To configure LCU-ONE Analog with **Race Studio Configuration** follow this procedure:

- run the software;
- press "AIM system manager" button on the left vertical keyboard;
- select the logger LCU-ONE Analog is connected to
- activate "Channels" layer
- select the analogue channel to set the probe on
- double click on "Sensor type" column corresponding to that channel and select "AIM Lambda LCU-ONE 1.65 – 1.6 Lambda)" option as shown here below; click out of the cell to confirm the choice.
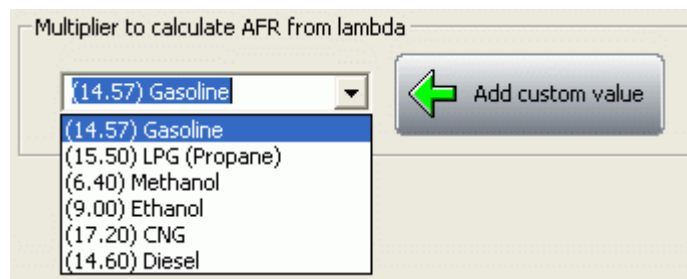
- Set the probe configuration panel that appears bottom left of channel layer, highlighted in the image below.
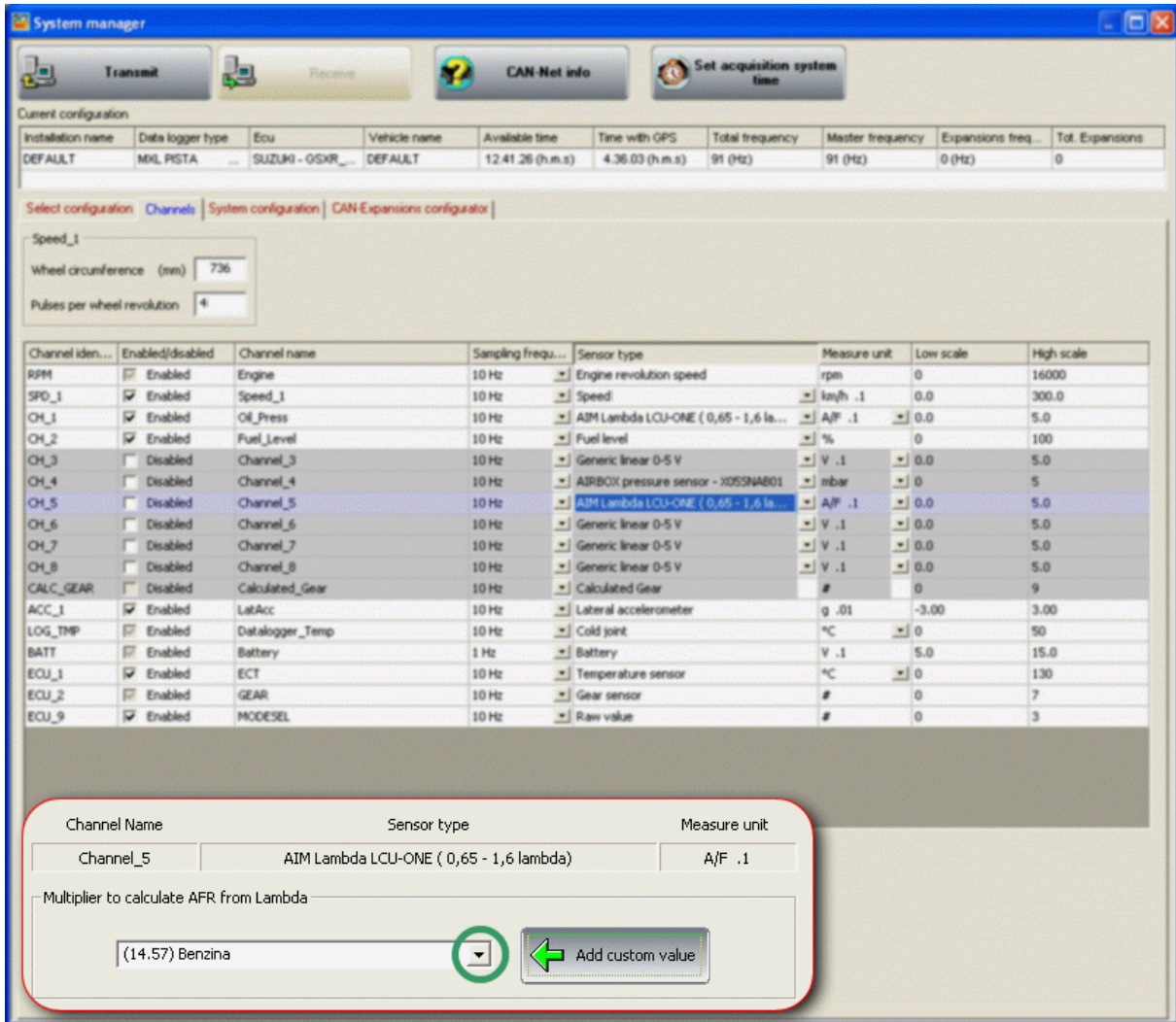
- Activate the drop down menu pressing the arrow button circled in the image above and select the fuel used by the vehicle.

- In case the fuel used by the vehicle is not included in the database (and **only in case its stoichiometric value is known**) press the button "Add custom value" and the window here below appears.
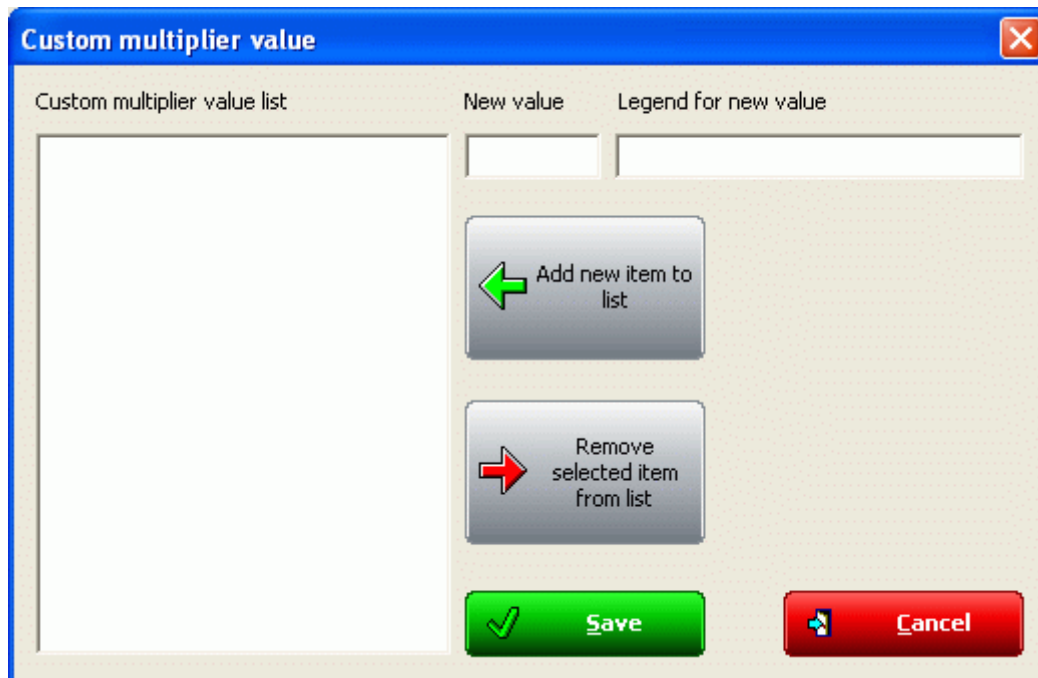
- Insert the new value and the test to match. Press "Add new item to the list" button and then "Save" button.
- The fuel is now available in the drop down menu: select it.

3.2 – LCU-ONE Analog custom configuration

In case calibration curve default points have been modified it is necessary to configure LCU-ONE Analog using **Lambda Caonfigurator** software.

Warning: to correctly configure LCU-ONE Analog, please ensure you have installed a software version 1.00.07 or later.

To configure **LCU-ONE Analog** run the software. The following window appears.
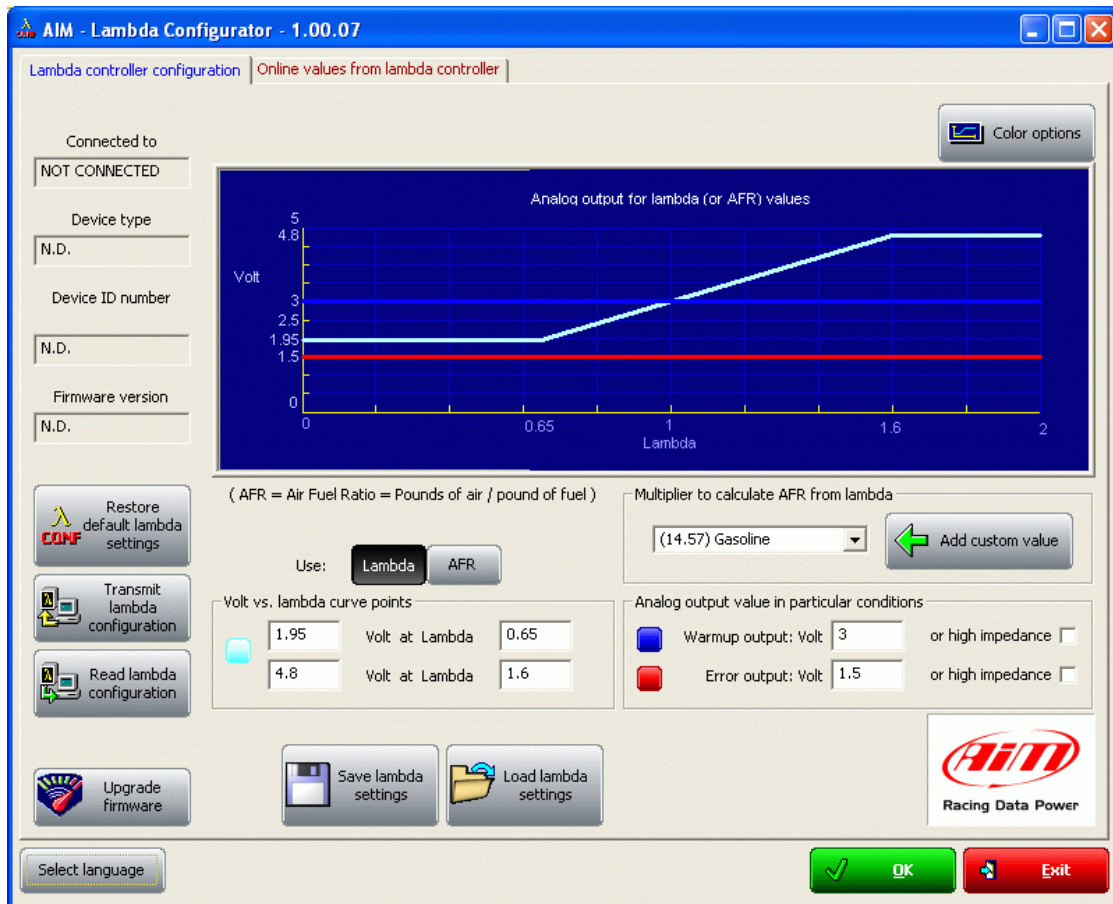
This is software main window. It is made up of two layers:

- **Lambda controller configurator**: it shows analog output graph (central) and allows the user to configure **LCU-ONE Analog**, read its configuration and transmit a new one, restore default Lambda settings, import and export the configurations and update **LCU-ONE Analog** firmware.

- **Online values from Lambda controller**: it shows LCU-ONE Analog-PC connection status.

3.2.1 – Preliminary operation

Lambda Configurator software, unlike all other AIM software, contains **LCU-ONE Analog** firmware. This is why we recommend you to always check our website www.aim-sportline.com to ensure the software release installed is the latest available. If not, please download latest release and follow carefully this procedure:

- connect **LCU-ONE Analog** to the PC
- read logger firmware version written in the case on the left of the central graph
- press "Upgrade Firmware" button
- this message appears:
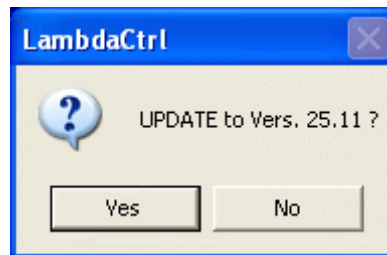
- if the firmware version offered (in the figure the system offers firmware version 25.10) is more recent that the one installed on **LCU-ONE Analog** (supposing the one installed is version 25.08), press "Yes" and upgrade the controller firmware

3.2.2 – Configuring Lambda controller
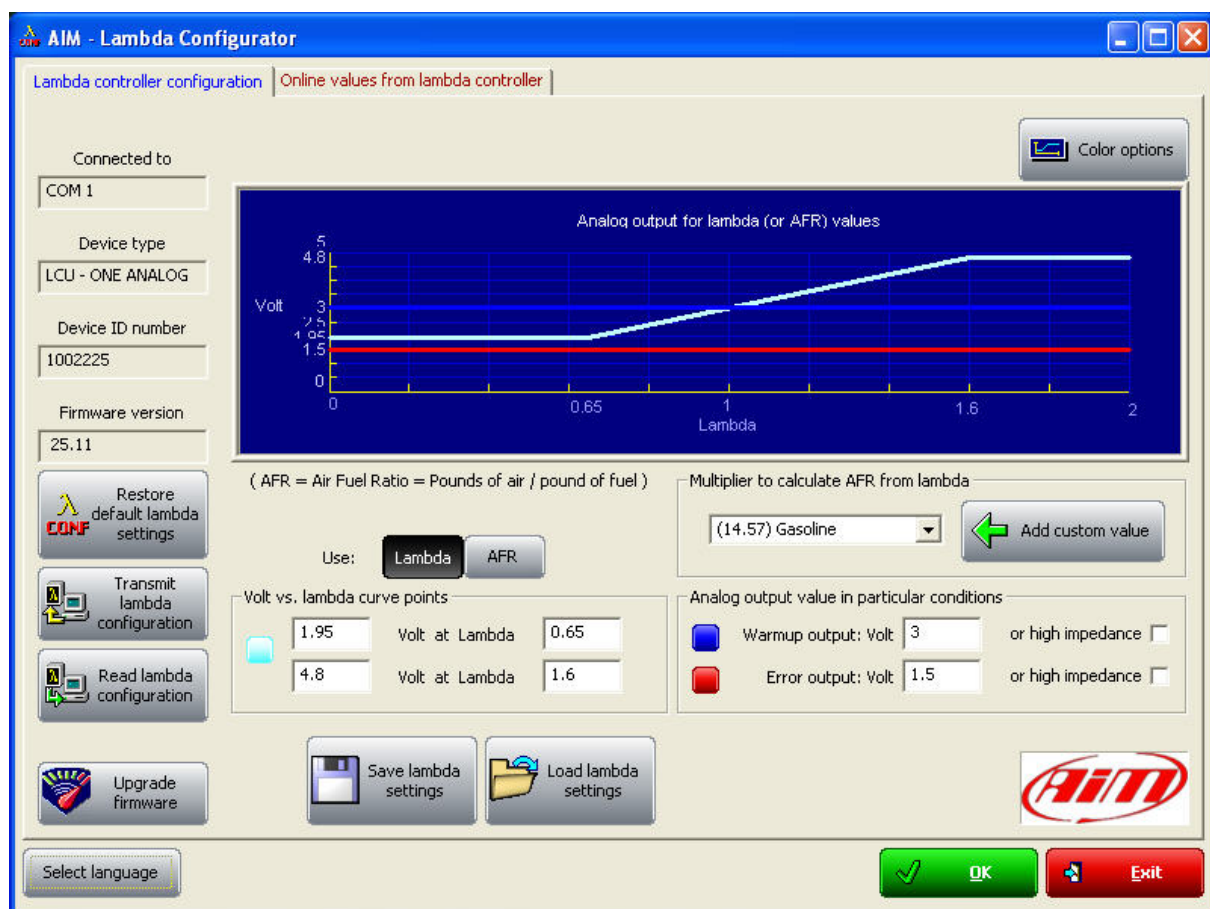
At the centre of the window are configuration panels.

The first operation to perform is selecting the used fuel in a pop up menu.
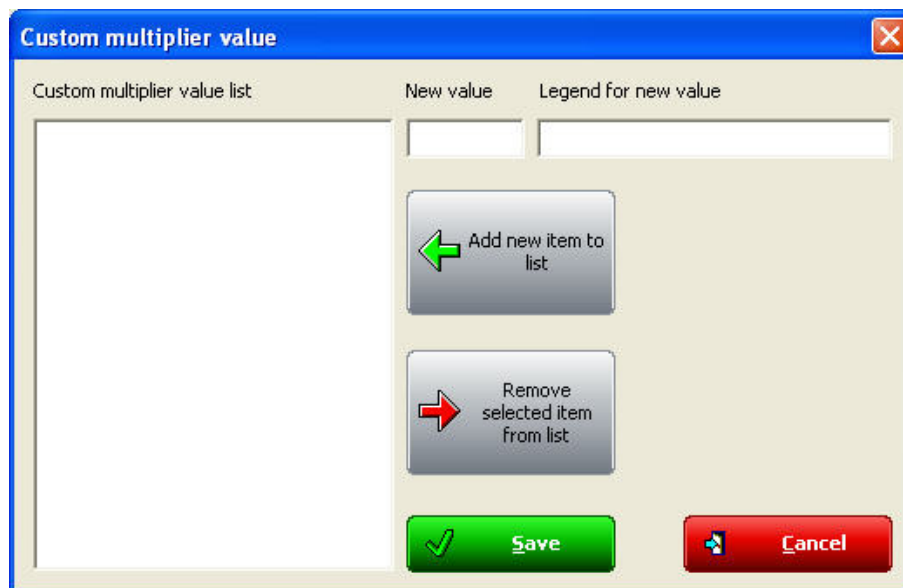
In case used fuel is not included in the database and **only in case its Stoichiometric value is known** press "Add custom value" button and the window shown below appears.
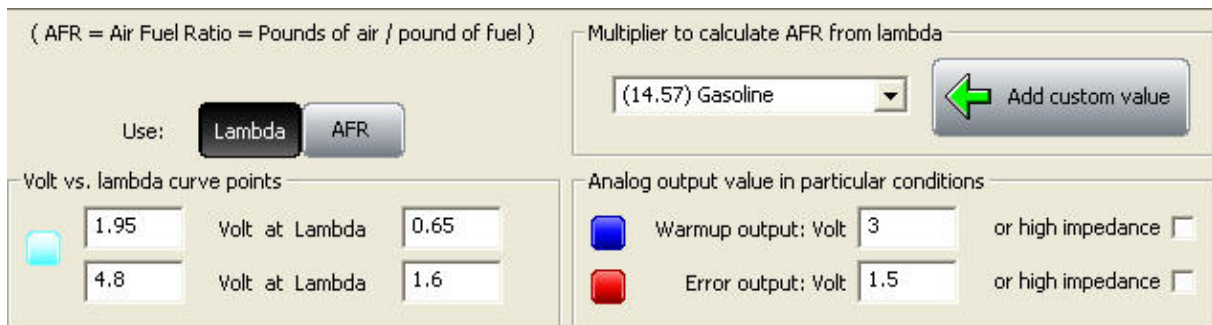
Fill in the window with Multiplier value and related legend. Press "Add new item to list value" and then "Save" button.

Likewise, selecting a multiplier from the left box labelled as "Custom multiplier value list" and pressing "Remove selected multiplier from the list" button a multiplier will be removed.

Afterwards it is possible to work on the other parameters.

"Use: Lambda/AFR" these buttons allow the user to decide whether showing Lambda values or AFR (Stoichiometric) ones. The appearance of the panel below depends on this choice; here down are the panels showing Lambda values (left) or AFR (right).

The coloured button placed on the left of the cases indicates the colour of this value on the central graph. In the example the value is showed in light blue.

Once decided which values to show, just fill in the cases.

When all the values have been inserted the configuration has to be transmitted to **LCU-ONE Analog** pressing "Transmit lambda configuration" button, placed in the left keyboard.

The system will show a confirmation message. In case **LCU-ONE Analog**-PC connection is not ok the system shows an error message (right figure).
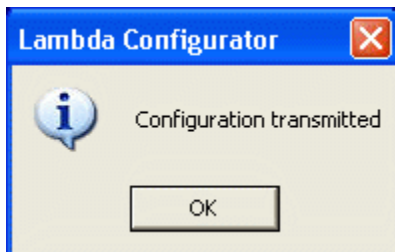
3.2.3 – The keyboard

On the left of the window are some buttons:

- "Restore default lambda settings": allows the user to restore default settings on **LCU-ONE Analog**.
- "Transmit lambda configuration": allows the user to transmit the configuration to the device
- "Read Lambda configuration": reads the configuration from the connected device
- "UpgradeFirmware": allows the user to upgrade the firmware of its device.

Bottom central are these buttons:

- "Save Lambda settings": allows the user to export Lambda configuration
- "Load lambda settings": allows the user to import a Lambda configuration and transmit it to the device

In the lower part of the window are thrre buttons:

- "Select language": allows the user to change the language
- "OK": allows the user to save the set parameters
- "Exit": allows the user to quit discarding changes.

3.2.4 – Informative panels

On top left of the software main window a series of panels shows the characteristics of the **LCU-ONE Analog** connected to the PC. These panels are different depending if the device is connected or not.
Here below you see (left) the panels with the controller connected to the Pc and (right) the same panels with the controller not connected to the PC.

Connected to	Connected to
COM 1	NOT CONNECTED
Device type	Device type
LCU - ONE ANALOG	N.D.
Device ID number	Device ID number
1002225	N.D.
Firmware version	Firmware version
25.11	N.D.

- Connected to: PC serial port
- Device type: **LCU-ONE Analog** (controller has been recognised)
- Device ID number: univocal serial number of the device
- Firmware Version: firmware version installed on the device.

If LCU-ONE Analog is not correctly connected to the Pc or if it is not connected at all, the system shows a "not connected" message and all information concerning the controller are set on N.D. (Not available)

3.2.5 – The analog output graph
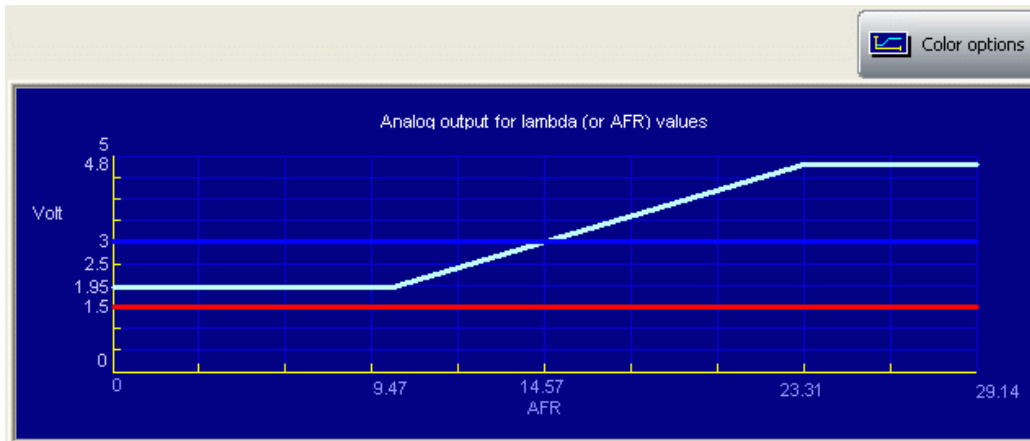
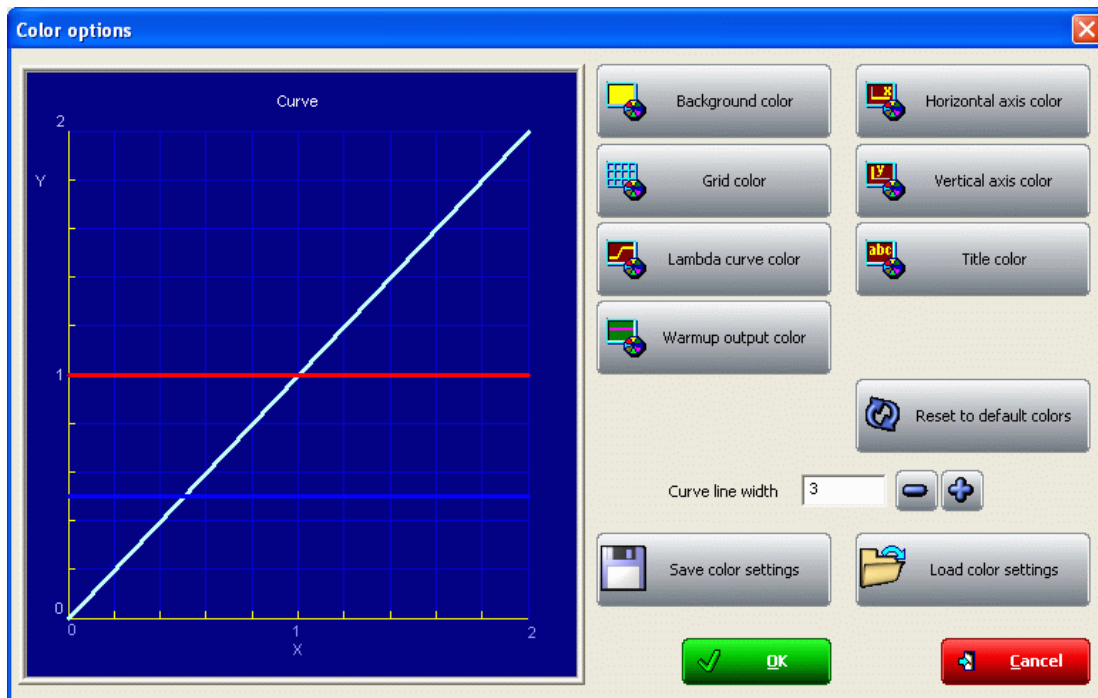The "analog output graph" shows output tension values of the controller in correspondence of the measured Lambda values. Graph colours are customizable. Pressing "Colour options" button the window shown below appears:

Pressing each button a colour panel will appear showing all the available colours for that characteristic of the graph. Selecting the desired colour and confirming the choice graph colours will change.

Chapter 4 – Online values from Lambda controller.
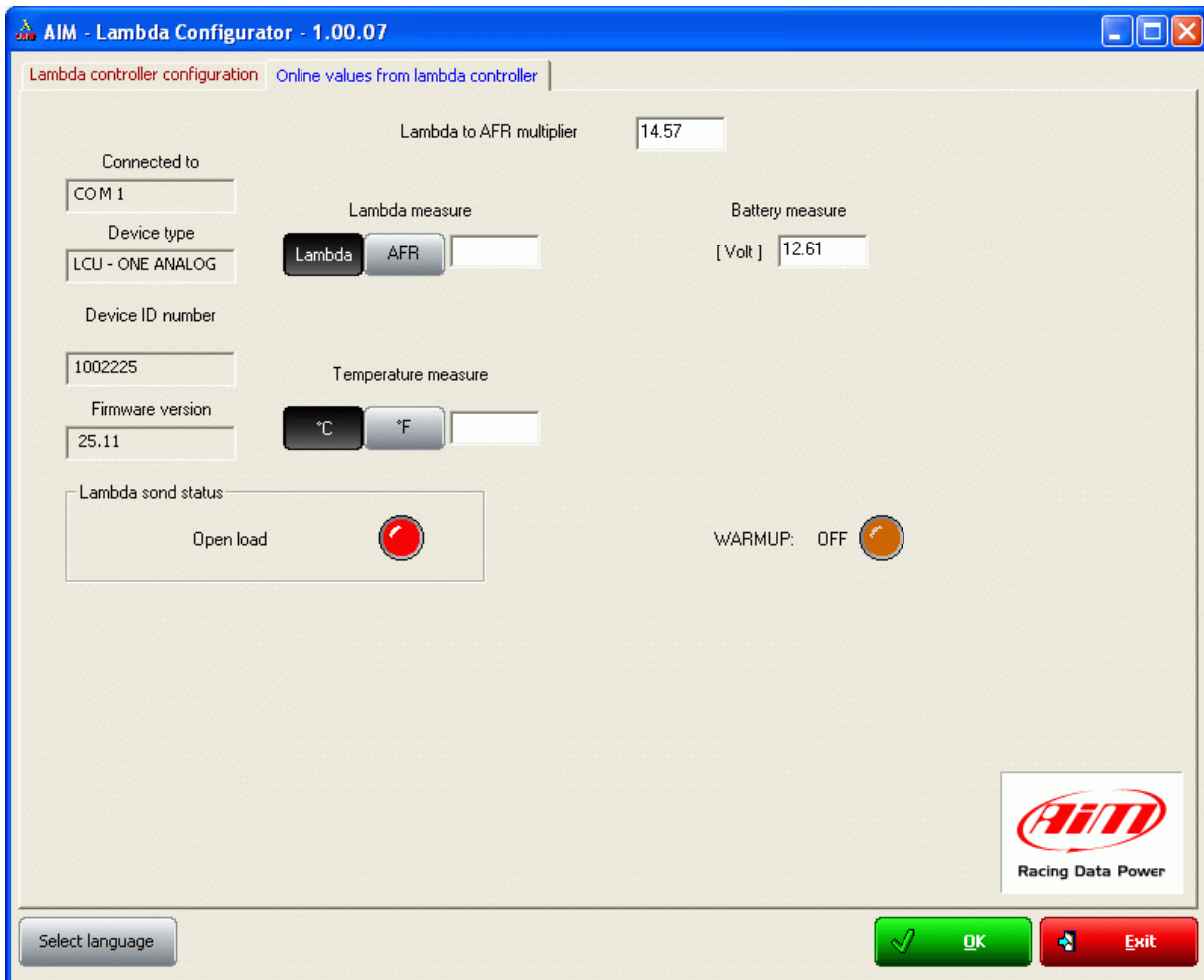
This panel shows controller status. The user is only allowed to set Lambda/AFR and temperature unit of measure for the values shown in this panel.

Appendix – Part Number and technical drawings

"A" – Part number of LCU-ONE Analog

Complete kit with cable for **MyChron3 XGLog**   **X08LCU04XG**

Complete kit with cable for **MyChron3 Plus/Gold Auto/Moto**   **X08LCU04PG**

Lambda Probe Bosch LSU 4.9   **X05LSU490**

"B" – Technical drawings

LCU-ONE Analog pinout

Analog Harness	
1	Lambda Out
2	GND
3	RS232 RX PC
4	RS232 TX PC

Lambda harness	
1	IP+
2	IP-/VS
3	H-
4	H+
5	Rcal
6	VS+

Power harness	
red	V battery
black	GND
black	GND

Titolo / Title: Pinout LCU-ONE Analog

Foglio / Sheet: 1 di 1