



AiM Infotech

LCU-ONE CAN connected to MyChron 4 User manual

Release 1.04





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Chapter 1 – LCU-ONE

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 **MyChron4** with lambda values through the CAN bus.

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

where:

A = incoming parts of air;

F = parts of petrol the carburettor introduces in the engine;

A/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 poison 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 inflammable stuff or fuel.

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

1.1 – Part Numbers

LCU-ONE CAN part numbers are:

- **Controller LCU-ONE** (Complete kit with Lambda probe) **X08LCU03K0;**
- **BOSCH LSU 4.9 Lambda probe** **X05LSU490.**

Chapter 2 – LCU-ONE and Lambda probe mounting

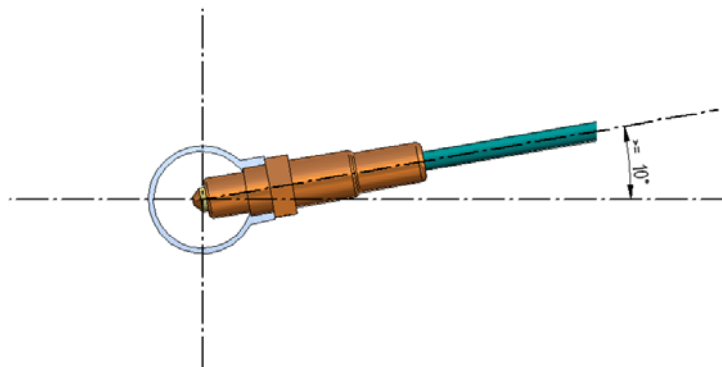
LCU-ONE controller should be installed in a flat location and far from heat sources; it should be mounted steady using the suited bracket.

The wiring has to be arranged so to avoid it passing near to heat sources.

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 installed, it is reminded to pay attention not to let the cable pass near to excessive heat sources (the exhaust pipe for example).

Bosch LSU 4.9 probe auto-calibrate and no calibration is thereby required to the user.

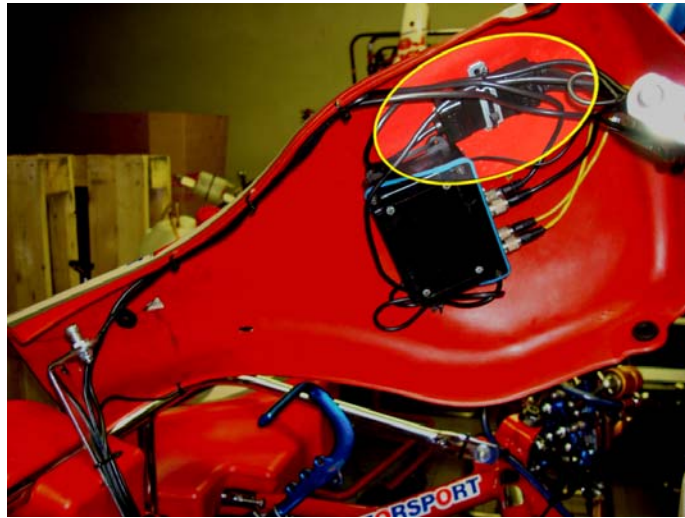
Solvents or additives should not be used to clean the probe connector. To protect the probe we would suggest to remove it from the kart when cleaning the vehicle to avoid polluting the probe with detergents.

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.

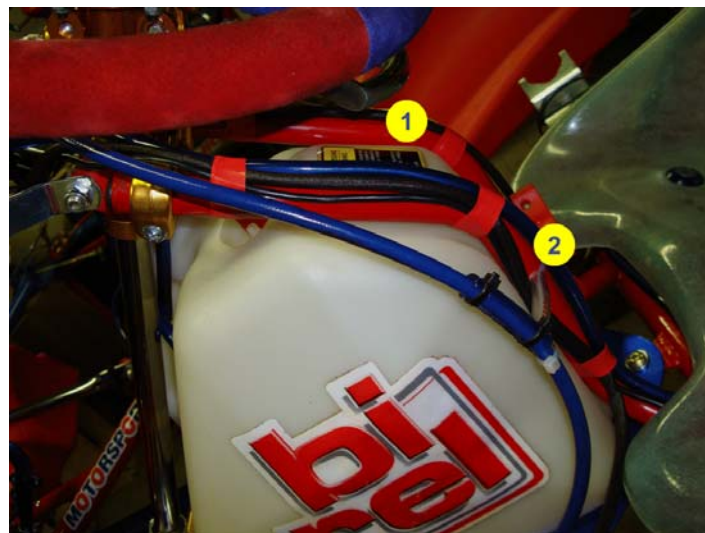
N.B. BOSCH LSU 4.9 Lambda probe has been designed to be used with unleaded or diesel engine: it can be used with other kind of engines too but its duration needs to be verified by the user with specific tests.

We would suggest to install Lambda controller and the related probe as shown in the following figures.

It is suggested to place LCU-ONE highlighted below under the kart number plate:



Let the power cable (2) and the probe cable (1) pass around the steering wheel castle.



Probe cable should be fixed to the driver seat as in the figure below:

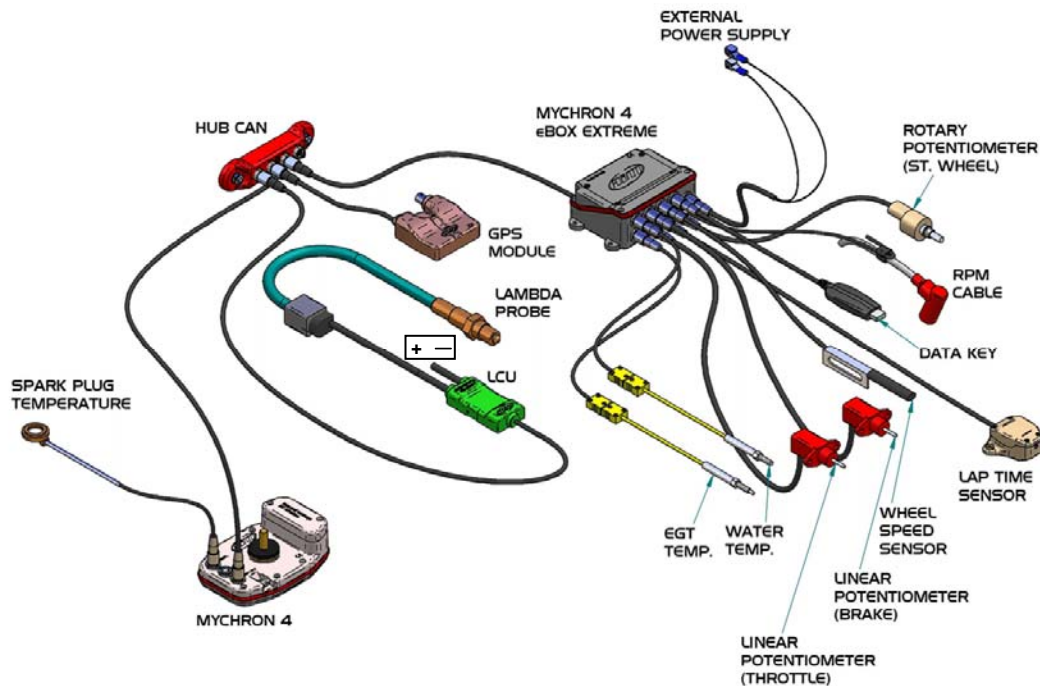


The probe should be inserted in the most suitable location of the exhaust pipe.
We would suggest to install it in the exhaust pipe flexible tube (see figures below):



Lambda Probe

Chapter 3 – Connection with MyChron4



Connecting Lambda controller to **MyChron4**, the system automatically switches on and recognises the peripheral at start up.

Warning: connect LCU-ONE CAN to MyChron4 OFF.

In the figure above, **LCU-ONE CAN** controller is connected to **MyChron4** through **Data Hub**, the CAN connections multiplier.

In case the only available peripheral is **LCU-ONE CAN**, it can be connected directly to MyChron4 through the back connector labelled as EXP/PC.

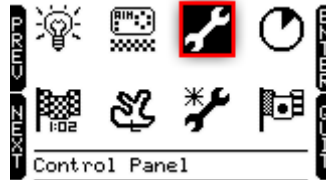
Though the system is powered through Lambda controller connected to the battery, it is suggested to leave in **MyChron 4** and in the possible **eBox** the related internal batteries.

Lambda controller switches automatically off when **MyChron4** is switched off.

Chapter 4 – Configuration on MyChron4

The only configuration needed to better use **MyChron4** is choosing the temperature channel shown together with **LAMBDA** value.

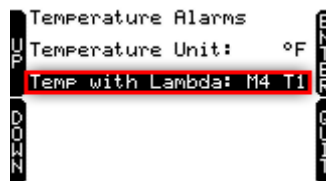
Press Menu button selecting **Configuration** icon:



Afterwards select **temperatures setup** icon:



This window appears:



Using left buttons (“UP”/”DOWN”) select “Temp with Lambda” row.

Pressing “ENTER” the desired input is set.

Available options are:

- **M4 T1**: MyChron4 Temperature;
- **M4 T2**: MyChron4 2nd Temperature (only 2T version);
- **eBoxT1**: eBox 1st Temperature (assuming this peripheral is connected);
- **eBoxT2**: eBox 2nd Temperature (assuming this peripheral is connected);

Chapter 5 – Visualisation on MyChron4

Switching **MyChron4** on Lambda controller is recognised at start up and probe WarmUp procedure starts. During this period the controller takes the probe to its working temperature (until around 780 °C – 1436 °F).

During warmup (around 20-30 seconds), displayed lambda value is 1.00.

When the probe is 100% working, displayed value turns, with the engine off, into 1.60 (free air value).

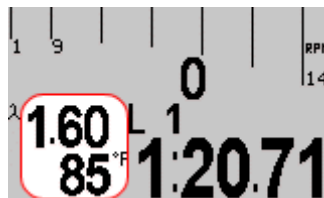
Clicking on **MyChron4** ">>/OFF" button the system switches from temperature visualisation to lambda visualisation, following this visualisation order:

1st page: MyChron4 temperature (2 values for MyChron4 2T)

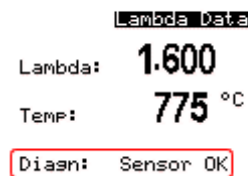
2nd page: eBox temperature (if present)

3rd page: selected temperature between these in input and Lambda value (as shown below);

After the third page the system comes back to the first one. Here below is shown where temperatures are shown.



Pressing "ON/VIEW" Lambda controller diagnosis page is shown:



It shows lambda value, lambda temperature and diagnosis. The last can be:

- **Sensor OK:** probe status is OK
- **Sensor Open:** the probe is not connected to the controller and the circuit is open
- **Sensor Fault:** short circuit on the wiring

During the session, lambda value page shows a lambda value (1) and the selected temperature (2).



Chapter 6 – Data Analysis with Race Studio Analysis

During data analysis, the presence of Lambda controller adds two channels to Measures and laps toolbar (as shown in the figure below):

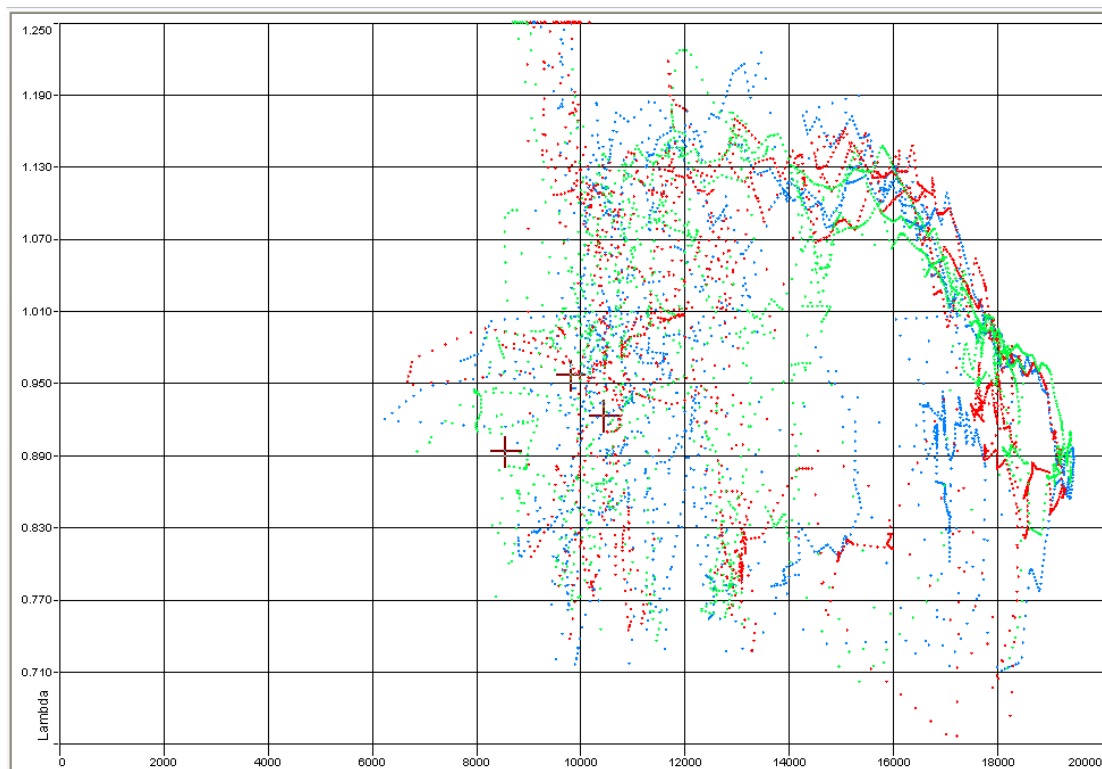
Lambda : shows lambda value recorded during the session;

Lambda_Temp: indicates the probe internal temperature while working;

Misure e giri					
Misure	Giri	Modelli			
LONATO NICO			13	14	
Engine			10448	9819	
Datalogger_Temp			2	2	
Battery			11.9	11.9	
<input checked="" type="checkbox"/> Lambda			0.92	0.96	
<input type="checkbox"/> Lambda_Temp			778	783	

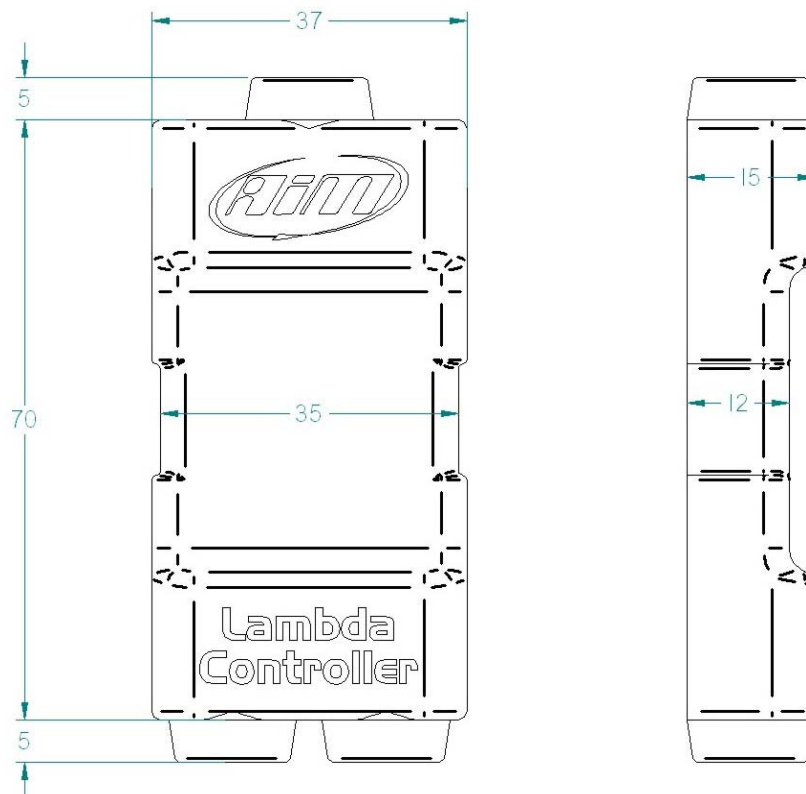
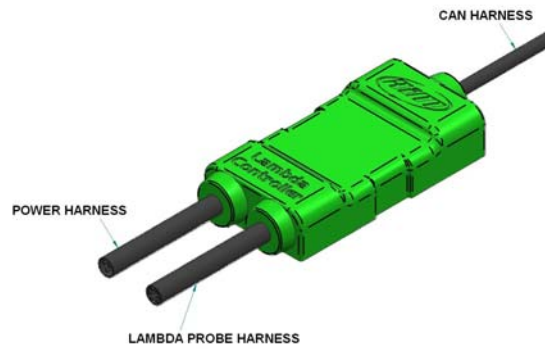
To better analyse carburettor values, we would suggest you to show XY diagram of Lambda probe with RPM values on abscissa axle and Lambda values on ordinate axle of the graph.

In this way a more immediate reading of carburation status will be available.

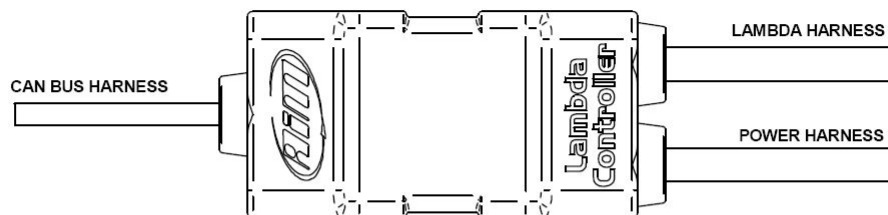


At www.aim-sportline.com, "Download Area", "On-track sessions" Pdf documents concerning track tests and related data analysis for a correct use of **LCU-ONE CAN** with **MyChron4** are available.

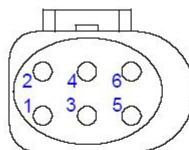
Appendix – Technical drawings



LCU-ONE CAN pinout



CAN BUS HARNESS	
1	CAN+
2	GND
3	+Vb
4	CAN-
5	Vbext



LAMBDA HARNESS	
1	IP+
2	IP-/VS
3	H-
4	H+
5	Rcal
6	VS+

POWER HARNESS	
red	V battery
black	GND
black	GND