

Ecumaster
Lambda
Wide Band Oxygen
Sensor Controller
Manual
Revision 0.2

1 Device description

Ecumaster Lambda sensor controller is a device used to control Bosch LSU4.9 Oxygen sensor and send lambda readout on CAN-BUS and two programmable 0-5V analog signal lines. The controller uses dedicated Bosch integrated circuit paired with automotive digital microcontroller to precisely control the oxygen sensor and calculate Lambda and AFR.

- Voltage range: 9V - 16.5V
- Input current: up to 3A during warm-up, ~1A nominal
- Operating temperature: -40°C to 85°C
- Lambda range: 0.5 - 8.0
- Programmable analog outputs: 0-5V
- Water resistance: IP64 with sensor connected
- Communication and setup: CAN-BUS 2.0B

2 Precautions and sensor installation

- During operation lambda sensor is heated to high temperature. Do not touch hot sensor and do not operate sensor near highly flammable liquids or gases.
- Sensor installed in the exhaust must be connected to the controller. Sensor not connected to the controller will degrade quickly.
- Locate the sensor as close to the engine as possible, respecting sensor temperature range. Temperature at the mounting location should not exceed 500°C
- Locate the sensor after turbocharger and before catalytic converter
- The exhaust pipe in front of the sensor must be free of places where condensation water could accumulate.
- Any leaks in exhaust system upstream of the sensor will cause inaccurate readings.
- Make sure, that front hole of the sensor does not point against exhaust gas stream.
- To reduce risk of condensation water getting into the heated sensor, newer start sensor heater before engine start.
- Sensor must be inclined ad least 10° towards horizontal with electrical connection going upwards.
- Protect sensor cables from high temperatures.

3 Configuration

The screenshot shows the ECU Master Light Client interface. The main window title is "Ecumaster Light Client: 1 Mbps --- wbo """.

Devices Table:

Type	Rev	Serial num...	Firmware	Comment	Info
wbo	B	1916-0115	FW 1.1		Out: 664

Buttons: Refresh, Set comment, User manual, Upgrade (highlighted), More...

Properties Panel:

- CAN ID: 0x664 Standard
- Heater PID:**
 - P: 10.000
 - I: 0.502
 - D: 0.000
- Output 1:**
 - Lambda 1: 0.000
 - Voltage 1: 0.000 V
 - Lambda 2: 5.000
 - Voltage 2: 5.000 V
- Output 2:**
 - Lambda 1: 0.950
 - Voltage 1: 0.000 V
 - Lambda 2: 1.050
 - Voltage 2: 5.000 V
- Enable voltage: 13.0 V
- Save error flags:

Channels Panel:

- Supply voltage: 14.5 V
- Heater power: 35 %DC
- Sensor temp.: 780 °C
- Lambda: 16.390
- vm short vcc: 0
- vm short gnd: 0
- un short vcc: 0
- un short gnd: 0
- iaip short vcc: 0
- iaip short gnd: 0
- vub low voltage: 0
- heater short vcc: 0
- heater short gnd: 0
- heater open load: 0

All frames Table:

ID	DLC	Bytes	Freq	Count
334h	8	13 88 13 88 0D 0D 00 BB	20.0 Hz	311052
335h	8	0D 00 00 00 00 00 00 00	20.0 Hz	311054
336h	8	0D 00 00 00 00 00 00 00	20.0 Hz	311055
664h	8	00 91 59 C3 40 06 00 00	19.9 Hz	307111

Buttons: Clear trace, Save trace

Transmit Panel:

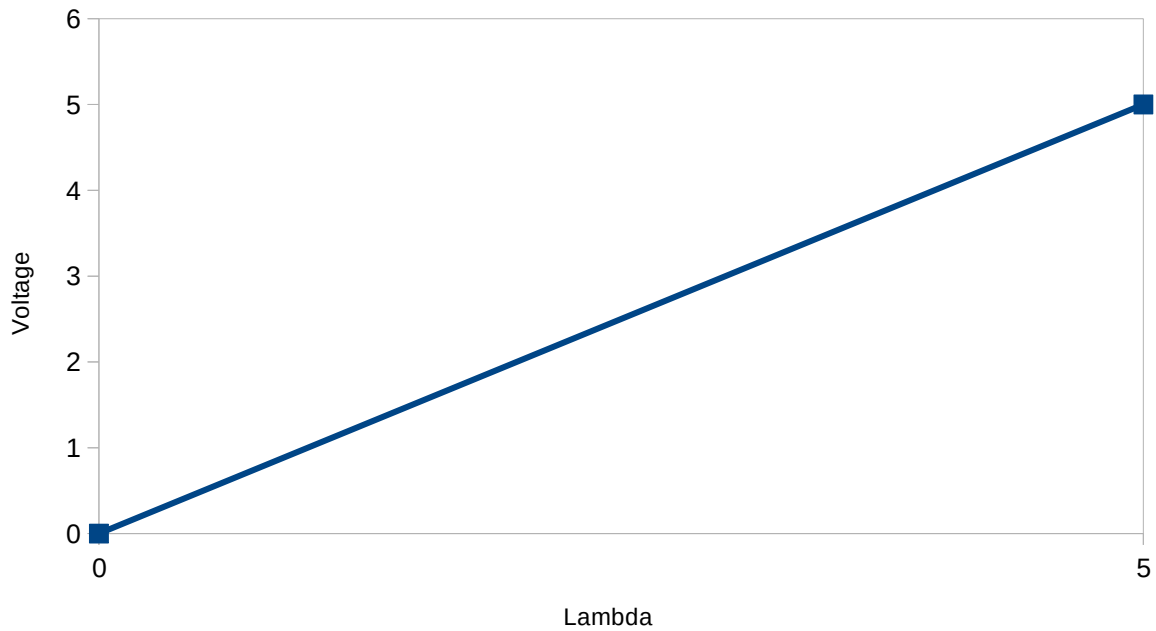
ID	DLC	Bytes	Freq	Count
0FFh	8	FC 00 00 00 00 00 00 00	Manual	0

Buttons: Transmit (play icon), Stop (stop icon), Refresh (refresh icon), Close (close icon)

Footer: Bit rate: 1 Mbps, Set bit rate, Status: OK

Properties:

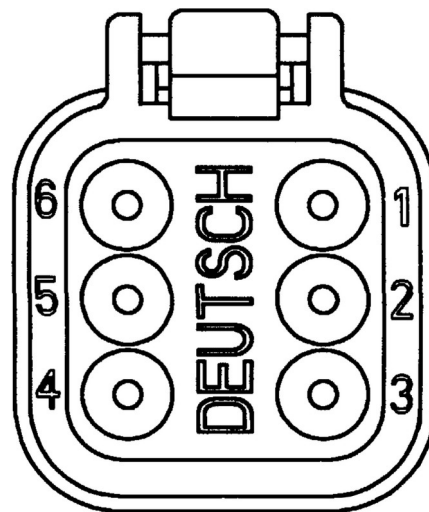
- **CAN ID** - CAN-BUS message id with measurement data. Data format can be accessed by exporting .CANX file under "More..." button.
- **Heater PID** - sensor heater PID controller settings. These are for advanced users only and should be left default if not needed.
- **Output 1,2** - analog output configurations. Two point configuration for analog output characteristic. In the example of output 1 configuration, lambda 0 correspond to output voltage 0V and for lambda 5 to voltage 5V. All points in between are interpolated. In the example output 2 is configured to emulate narrow band sensor.



- **Enable voltage** - supply voltage threshold to enable sensor heater. It is used to prevent heating the sensor when engine is not running.
- **Save error flags** - When checked, the controller keeps detected sensor errors until power is cycled. Sensor will not be heated while there are errors detected.
- **Crank. clears flags** - When checked, error flags are cleared when supply voltage goes from below 9.5V to above 9.5V. Helps to clear flags resulting only from low voltage during cranking.

4 Pinout

- 1 - GND
- 2 - CAN low
- 3 - Analog output 1
- 4 - Analog output 2
- 5 - CAN high
- 6 - V+ (9V - 16.5V)



5 Revision history

Revision	Date	Changes
0.1	5.07.2019	Initial revision
0.2	19.12.2019	Clear flags after cranking added