

This is the main software.

Copy it to the location of your choice and use it. Do not run it from CD/DVD!

No installation is required, just copy exe file.

There will be an error if you don't install USB drivers. You will get "ftd2xx.dll missing ..." error and the software will not start.

There are 2 two solutions:

1. Plug USB device and install drivers or
2. Copy ftd2xx.dll to the folder together with this software. Remember that in order to use hardware box you have to install drivers anyway. This solution applies to people who would like to use this software for off line analysis without prior USB initiation, without installed drivers. For example on another computer at home.

ftd2xx.dll is located in the USB driver folder.

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===== IMPORTANT!!!! =====
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- Keep the cable to the lambda probe shorter then 1 meter (less then three feet). Use cable as shortest as possible. Two feet (70 cm) or less gives cleaner signal.
- Connect terminal 10 of the box (GND of the PT100) to the electric power earth, electric PE cable - if there are problems with lambda signal. Preferably ground it always.
- Don't leave the lambda probe without power to the heater!!! The lambda probe must be heated all the time. Either you use the lambda probe or remove it from the flue pipe because you will kill the probe!
- Do not seal the lambda probe cables by tape! The lambda probe takes the reference air through the place where cables go into it's metal body!

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===== **HISTORY** =====
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Version LMBD_v3_214

- Drag and drop *.elk files. You can append and merge multiple *.elk files. To save it as a one big file toggle the switch "save to elk file". Files will be appended in the order of dragging. You can select, drag and drop multiple files but the append order will be determined by the order in your folder. Remember to catch the first file by mouse when you select multiple files. The "load file" button is gone and now only dragging is available.
- Fuel types now support condensing boilers. This is still beta and under development, please visit the website for updates.
- H2O in the flue is taken into account, it is subtracted from the volume of the flue and then recalculated again. It is based on the stoichiometric chemical reaction of complete combustion. The H2O amount is determined by the count of the carbon atoms in the fuel. In CH4 there is one "C", in the propane C3H8 there are 3. Heating oil is treated as composed of 22 carbon atoms.

Examples:

$\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ (methane)

x CO₂ = H₂O coefficient is equal to (2 moles H₂O / 1 mole CO₂) = 2.000

$2\text{C}_3\text{H}_8 + 10\text{O}_2 \rightarrow 6\text{CO}_2 + 8\text{H}_2\text{O}$ (propane)

x CO₂ = H₂O coefficient is equal to (8 moles H₂O / 6 mole CO₂) = 1.333

$2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$ (butane)

x CO₂ = H₂O coefficient is equal to (10 moles H₂O / 8 mole CO₂) = 1.250

$2\text{C}_{22}\text{H}_{46} + 67\text{O}_2 \rightarrow 44\text{CO}_2 + 46\text{H}_2\text{O}$ (oil)

x CO₂ = H₂O coefficient is equal to (46 moles H₂O / 44 moles CO₂) = 1.045

If you have a different fuel recalculate it yourself.

- Many improvements and bug fixes.

Version LMBD_v3_215

There was bug in v.214. LEDs did not follow lambda gauge when H₂O coefficient was higher than zero. Fixed. Users who did not use v.214 must recall defaults and save back lambda probe settings but if 214 was already used please only SAVE parameters in the Settings1 tab. Just only save.

If you don't know what to do LOAD DEFAULTS AND SAVE BACK YOUR LAMBDA PROBE SETTINGS!

Version LMBD_v3_217

Minor fixes and compatibility issues

Version LMBD_v3_220

USB communication fixes and compatibility issues.

Version LMBD_v3_221

USB communication fixes and compatibility issues.

Version LMBD_v3_235 2012/12/03

Read carefully !!!

Every some time, let's say every some weeks or months you have to perform lambda probe compensation in order to compensate temperature changes inside the chimney. It happens in periods of very cold and very hot days.

You can observe, that within some weeks, the "Oxygen Lambda Sensor [mV]" differs from the probe calibration parameter, programmed to the device as 21% O₂ [mV].

EXAMPLE:

3-5 minutes from the burner shut down you may notice that Oxygen Lambda Sensor [mV] = -5mV

or Oxygen Lambda Sensor [mV] = -15mV but the programmed calibration parameter of the lambda probe for 21% is for instance -10mV. Yes, this is the offset.

If you notice that the difference between programmed 21% O2 [mV] and the “Oxygen Lambda Sensor [mV]” is higher then +/-3mV then the offset compensation is needed.

Don't do it too often. 1.0, 1.5 or even 2mV really don't make a big difference but you can compensate it when the difference is close to 3mV or is higher.

PROCEDURE:

1. Use your burner in a normal way for at least some hours
2. Observe the “Oxygen Lambda Sensor [mV]” and the 21%O2 calibration parameter
3. If they differ more then 3mV go to point 4, if not don't care
4. Wait for the burner to stop it's burning cycle
5. Wait 3-5 minutes for readings to stabilize – burner must not operate
6. Turn OFF the MASTER ON/OFF switch and then press “Correct probe offset”
7. “Oxygen Lambda Sensor [mV]” will be copied to the OFFSET [mV] field
8. Save parameters and then turn ON the MASTER ON/OFF switch

And then operate as usual.

H/W and firmware: 10/05/2010 00:49 LMBD3 rev 3.00 v.2.35 / 2012-12-03

MAIN SETTINGS 1 SETTINGS 2 TIMER DIARY CONSOLE **CALIBRATION** ANALYSIS 1 ANALYSIS 2

Lambda Sensor calibration coefficients

% O2	1,00	44,00	mV
% O2	4,00	18,00	mV
4% calibration			
% O2	7,00	7,50	mV
% O2	21,00	-13,00	mV
21% air calibration			

$\Delta mV = 31.00$ mV

Manual correction

X: 0 Y: 0

OFFSET [mV]: -13,00

Correct probe offset

SAVE parameters

Restore defaults

Select fuel type

- OIL / DIESEL Mineral
- OIL / DIESEL Bio
- LPG
- LPG Condensing

Calibration value - do not change !!!

Do not change both calibration values. You can change them only when you calibrating probe yourself !!!

Calibration value - do not change !!!

In this example 21% O2 = -13mV and the probe correction offset value is also -13mV as in a new state.

Press this from time to time when you see that your probe develops offset from the calibration value for 21%. If the burner is OFF check "Oxygen Lambda sensor [mV] in the "CALLIBRATION" tab. Do it only when you see the diffence of at least +/-3mV.

When you upgrade this software from the older one you must press this button. SAVE parameters at the end.

OFFSET [mV] value may contain random, not real data the first time you run this software. Remember to perform the offset compensation described above !