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Bosch LSU 4 Technical Information

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This section contains information on specific topics about the Bosch **LSU wideband pump cell sensors**. The LSU commercially available range includes the 4.0, 4.2 and now the 4.9 sensors. Go here for a description of [how 5 wire pump cell sensors work](#).

Using LSU Sensors With Leaded Fuel

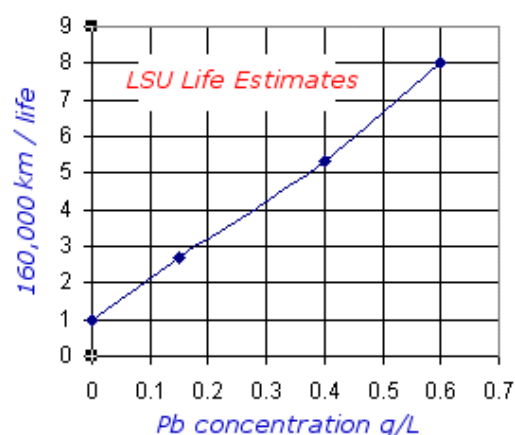
Depending on the lead content of the fuel used, the expected service life time is: (preliminary data)

- for 0.6 g Pb/l: 20,000 km
- for 0.4 g Pb/l: 30,000 km
- for 0.15 g Pb/l: 60,000 km
- for 0.00 g Pb/l: 160,000 km (ie. unleaded)

Extrapolating this Bosch data suggest that at 1.5 g/l the life may be as low as 2,000 km or just 20 hours at 100 km/h. AvGas 100LL has 0.56 g/l Pb, suggesting a sensor life of 200 hours. Compare this to a suggested life of 1,600 hours for unleaded.

Of course there are other contaminants that shorten the sensor's life and they include

- [Ethylene Glycol](#) (anti-freeze - note that it is sweet & *toxic* to humans).
- [Silicones](#) as used in automotive gasket cements.
- [Metal Contaminants](#) - as well as [lead](#) the metal [zinc](#) (from galvanised parts) can cause rapid sensor degradation.



Typical LSU Sensor - the 6066 (Bosch part # 0 258 006 066)

Shown here is the Bosch part # 0 258 006 066 - known as the 6066 sensor (*Tech Edge* part number **[06066]**). Images below show the business end of the 6066 sensor after the two shrouds have been removed. Note the largest image clearly shows the small hole from the outside to the sensor itself.





Bosch LSU Sensor Pressure dependency

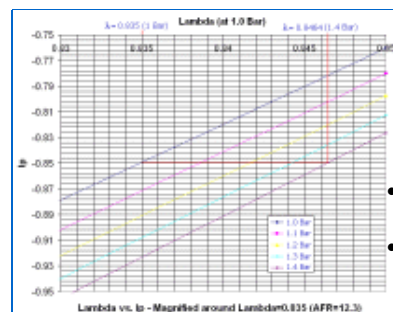
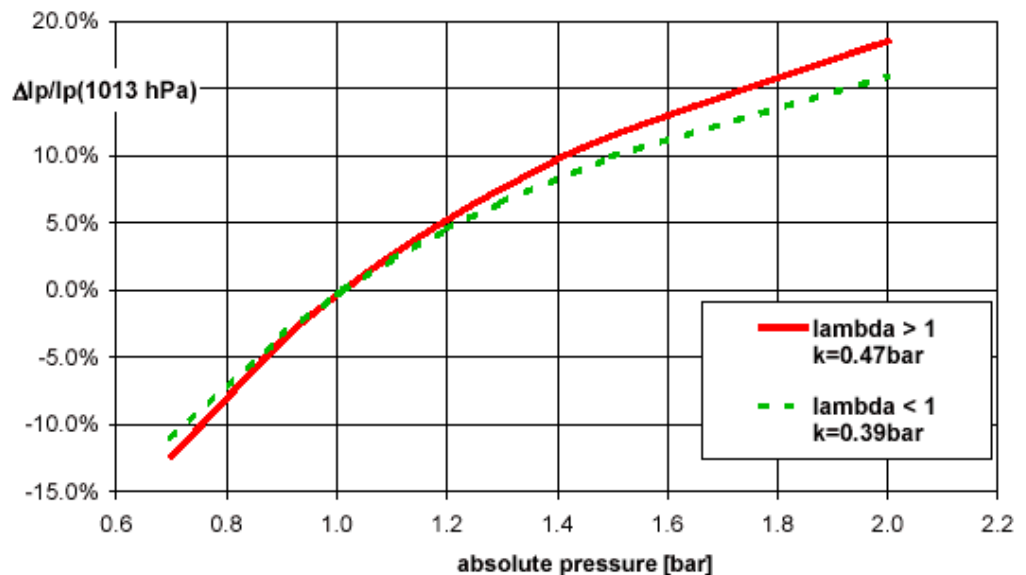
A pressure change of the measured gas gives a deviation of the sensor output signal of:

$$I_p(p) = I_p(p_0) * p / (k + p) \\ * (k + p_0) / p_0$$

The factor **k** is dependant on **rich** ($\lambda < 1.0$) or **lean** ($\lambda > 1.0$) and is for the measuring gas from an LSU test bench as described in section 4.2 of the Bosch document Y 258 K01 005 000e (see below):

- $k_{\text{lean}} = 0.47 \text{ bar}$
- $k_{\text{rich}} = 0.39 \text{ bar}$

The image *at left* is taken from [spreadsheet lsuIpVsP.xls](#) that plots the pressure dependency



curve shown above right.

You can play with the spreadsheet's X and Y axis to get the curves to look like the one shown above, but it's more interesting to look at a small part of the curve to investigate the pressure dependency of I_p in the rich region and how that affects indicated Lambda. Click on the small image if you have not already.

- Follow the vertical line down from the $\lambda=0.835$ (1 Bar) graph point. This corresponds to an I_p of just less than -0.85 (on the Y-axis).
- Now track right (horizontal red line) until you get to the 1.4 Bar graph line. This is the same I_p , but the actual Lambda at 1.4 bar pressure is different to the Lambda at pressure of 1.0 Bar.
- Track up (vertical red line) where you get to the $\lambda=0.8464$ (1.4 Bar) point. This is the indicated Lambda at 1.4 bar for an actual Lambda of 0.835.

More LSU 4 Information

Advance LSU specifications and engineering information is available from the Bosch document [Y 258 K01 005 000e](#) for the 0 258 007 xxx range of LSU 4.2 sensors.

Here is an informational article about Bosch LSU sensors ([oxygen13-17.pdf](#)) that appears to be no longer generally available on the web (as of Feb. 2005). That article was originally available from a number of sources and is attributed to **Service Tech Magazine** May 2001. This article is made available without permission from the [SAE](#). Here's more information about the **Service Technology Program Office** ([STPO](#)) of the SAE).

Secret (?) LSU Information ...

- Go to the [WBo2.com](#) main LSU page for more information on [LSU sensors](#).
- Go to the [6066 extension cable page](#) to find out how to make an extension cable out of an old sensor connector and our [Tech Edge 6066 connector kit](#) and a [Tech Edge 2.6m cable kit](#).
- Go to the [WBo2 home page](#) to **search** this site.
- Here's more information about specific cases of [sensor failure](#) with particular emphasis on harsh environments.
- Information on [percentage oxygen measurement](#).

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