NTK L1H1 Sensor Information

Tech Edge **WideBand** | **NTK L1H1 UEGO Sensor** | Technical Data | Sumitomo Connector

The single most expensive and vital component of the DIY-WB kit is the **NTK** wide band sensor (also called a **UEGO**, or Universal Exhaust Gas Oxygen sensor).

The DIY-WB kit works **ONLY** with a specific **5** wire **NTK** sensor (with a **7** pin plug). This sensor is available as a replacement part for a Honda (part # **36531-P07-003** - Honda Civic 1.5 3 Door, circa 1995, US, non-Californian model).

The NTK sensor is stamped with the text **L1H1** and is often referred to using this name. Napa have recently found stocks of the **L2H2** and we have found this sensor works too. Any other sensor **will not work** and may damage your DIY-WB circuit. The sensor requires an 18 mm bung with 1.5 threads/mm pitch (this is one of the standard lambda sensor & sparkplug base sizes).

click on image for enlargement

The following can supply the correct NTK sensor. Note that the links **may not always show the correct part** if they are out of stock.

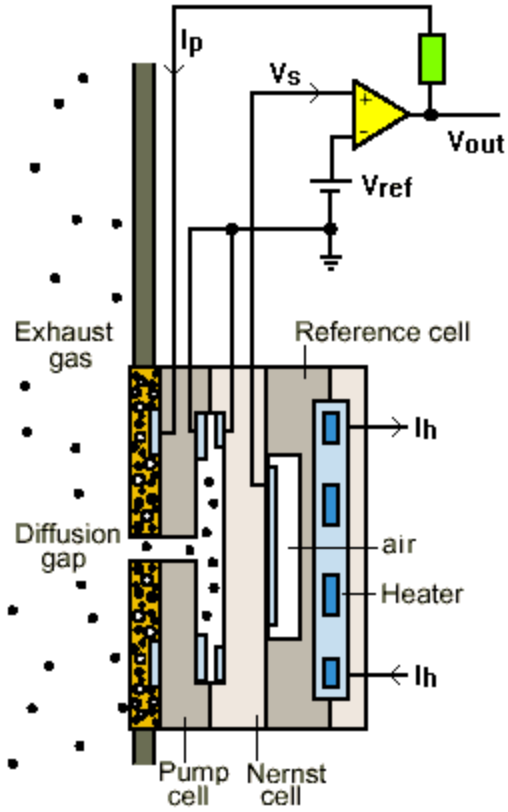
- **ShoNut Performance** - select the **Misc.** link at the top of the page.
- **AutoZone** part 36531P07003 for 1985 HONDA CIVIC 4 Cylinders 01488 1.5L 3BL
- **The Parts Bin**, or go to their catalogue entry - C5010-75044 - *see **RED** note above*.
- **NAPA** Online, or go to their catalogue entry - ECHOS791
- www.**OxygenSensor**.net or go to their **L1H1** Catalogue entry.

The correct part will be an **NTK** sensor although the box it comes in may say **Bosch** (as in the image shown here), **Echlin**, etc.

click on image for enlargement

You will also need a cable with a Sumitomo connector.

How the NTK Pump Cell Sensor Works



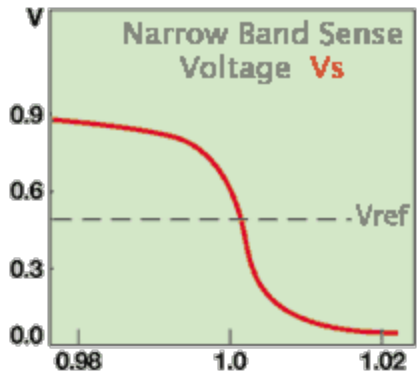
Briefly, the NTK sensor requires a controller because it is more complex than a standard switching type sensor. It's made up of a **narrow band oxygen sensor** *(the **Reference Cell** in the image)* coupled to a **pump cell** and a small **diffusion chamber**. The electronics (in the WB unit case) are represented by the yellow and green symbols.

The **pump cell**, in conjunction with a catalytic reaction at the surface of the cell's electrodes, can either consume oxygen or consumed hydrocarbon fuel in the pump cell cavity, depending on the direction of the Ip current flow.

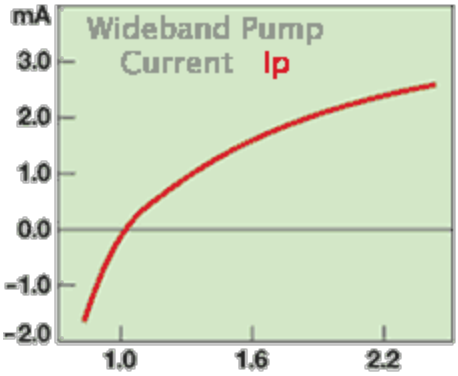
In normal sensor operation, a small sample of the exhaust gas passes through the *diffusion gap* into the pump cell. That exhaust gas is either **rich** or **lean** and both conditions are sensed by the reference cell which produces a voltage **Vs** above or below the **Vref** signal (this voltage has the characterictics of a **narrow band switching type sensor**).

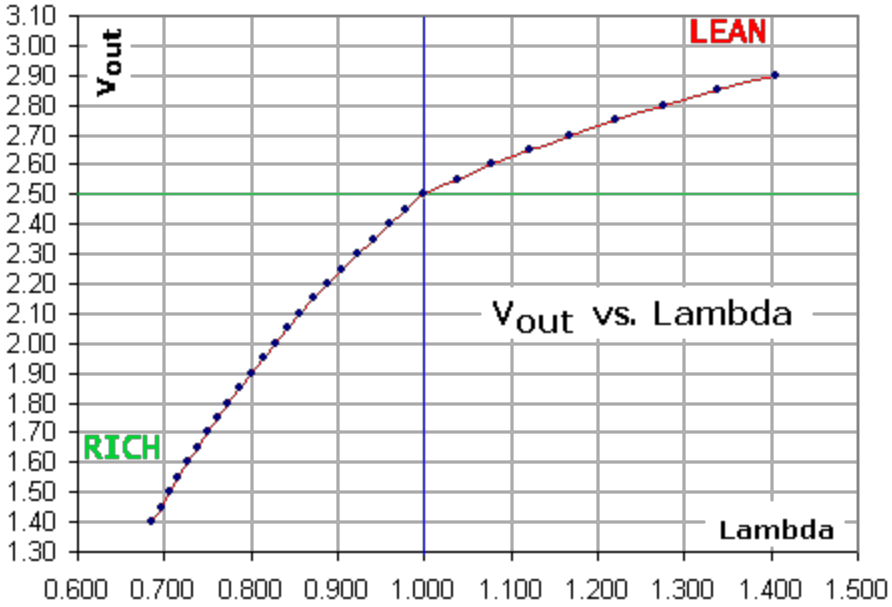
A rich exhaust will produce a high **Vs** voltage and the electronics produces a pump current **Ip** in one direction to consume the free fuel. A lean exhaust produces a low **Vs** and the electronics sends the pump current in the opposite direction to consume free oxygen.

When the free oxygen or free fuel has been neutralised, the **Vs** feedback signal goes to about **450 mVolts** (the same as the **Vref** value). The pump current required to produce this **equilibrium** is a measure of the **Lambda** or **Air Fuel Ratio**. The electronics in the WB unit converts the **Ip** into a **Vout** which is the output of the WB unit. Not shown is the **Rcal**, or calibration resistor, in the sensor's connector which compensates for manufacturing variations between sensors.



Here are some representations of the **Vs** or narrow band **Sense Voltage** (left) and **Ip** or **Pump Current** characteristics described above. Note that the narrow band graph's *x-axis* covers only a very narrow lambda range (**+/- 0.02**), whereas the wideband's *x-axis* covers the range **0.9** to **2.2**.





This graph shows the actual Vout of the DIY-WB unit. Note that the curve takes the same general shape as the above Ip graph.

In particular, note that the rich and lean regions have a different **slope**. This occurs because the chemical reactions in the rich and lean regions are fundamentally different, and the magnitude of Ip has a different effect in each region.

For more information about the DIY-WB's AFR or Lambda curve see the technical data section here.

Here's some information from Bosch USA about their narrow band LSF-4 and their wideband LSU-4 sensor. The LSU-4 is similar in operation to the NTK L1H1 (although they are not interchangeable at all).

And here's another Bosch information paper (300 k PDF) about oxygen sensors in general, with specific reference to their wide band lambda sensor (ie. the LSU-4).

... more info here as soon as time permits ...

If you still have any questions on the Oz DIY-WB parts kit then email us.

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