



Installation Instruction for WB101
Lambda Wideband Controller

Warning

THIS INSTALLATION MAY REQUIRE WELDING OR INTEGRATION INTO A VEHICLE'S ELECTRICAL SYSTEM. DAMAGE TO SENSITIVE ELECTRONICS, FIRE, OR EXPLOSION MAY OCCUR IF PROPER PRECAUTION IS NOT TAKEN. IF THERE IS ANY DOUBT, DO NOT ATTEMPT THE INSTALLATION AND CONSULT A PROFESSIONAL. NOTE: IT IS THE RESPONSIBILITY OF THE ENGINE TUNER TO ULTIMATELY CONFIRM THE CALIBRATION USE FOR ANY PARTICULAR ENGINE IS SAFE FOR ITS INTENDED USE. SPTRONICS HOLDS NO RESPONSIBILITY FOR ANY ENGINE DAMAGE THAT RESULTS FROM THE MISUSE OF THIS PRODUCT.

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Warranty

SPTRONICS warrants to the consumer that all High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at SPTRONICS's option, when determined by SPTRONICS that the product failed due to defects in material or workmanship.

This warranty is limited to the repair or replacement of the SPTRONICS part. In no event shall

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SPTRONICS will not be responsible for electronic products that are installed incorrectly, installed in a non-approved application, misused, or tampered with.

Any SPTRONICS electronics product can be returned for repair if it is out of the warranty period.

There is a minimum charge of \$20.00 for inspection and diagnosis of SPTRONICS electronic

parts. Parts used in the repair of SPTRONICS electronic components will be extra. SPTRONICS will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.

WB101 Features & Specifications:

The WB101 combines an accurate, fast response wideband AFR (Air Fuel Ratio) controller with a Bosch LSU4.9/4.2 wideband oxygen sensor. The wideband controller works with gasoline, bio diesel, ethanol, methanol, E85, LPG, and CNG. It includes two programmable analog outputs 0-5V for interfacing with 3rd party devices, one CAN bus for interfacing with our aftermarket ECU or Megasquirt family ECUs and one USB for PC communication. The analog output is ideal for interfacing with aftermarket ECU's and data loggers. The second output is ideal for stock narrowband oxygen sensor replacement where the simulated narrowband analog output is fed back into your ECU to make it operate as if the stock narrowband oxygen sensor is still installed while running the WB101 setup. All two outputs can be used simultaneously.

- Single wideband controller supports Bosch sensor LSU4.9/4.2
- Compatible with all fuel types
- All analog inputs and outputs are 12bits resolution
- Ability to calibrate O2 sensor for maximum accuracy
- PID heater and pump current control.
- Integrated 3 color status led for operation status and fault diagnostic
- 2 programmable linear 0-5V analog output
- Analog outputs can be set as high impedance during sensor heating or sensor fault.
- Power circuit protected with re-settable fuse
- CAN bus enabled
- USB port
- Comes with 1 meter harness, 1 meter sensor connector and USB cable.

Power

Operating Voltage	9.8V to 16V DC
Input Current, O ² heater initial warm-up	2.0A nominal, 3A max
Input Current, O ² normal operation	0.8A nominal, 1.1A max

Environmental

Operating ambient temperature	0° to 140° F (-17.78° to 60° C)
Storage ambient temperature	-40° to 185° F (-40° to 85° C)
Water resistance	Splash resistant, non-submersible

Sensors

Compatible Types	Bosch™ LSU4.2 & Bosch™ LSU4.9
Bosch™ Heater Control	Digital PID via pump-cell impedance

Measurements

Lambda	.5 to 8.0
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Air/Fuel Ratio 7.35 to 117 (gasoline), Fuel Type Programmable

Accuracy

For Lambda Accurate to +/- .007 (.1 AFR)

Operation Time

Heating time < 10 S
Response time 20 mS

Outputs

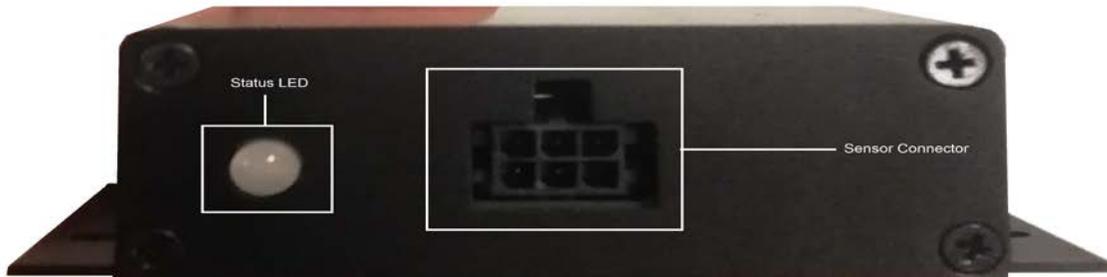
Analog 2, 0-5VDC, 12 bit resolution, programmable

Communication

USB USB port to communicate with PC
CAN bus High speed CAN bus 1Mbit/sec

Dimensions

Dimensions 80 x 60 x 23.8 mm



Harness Wiring Diagram:

Pin	Name	Wire Color	Comment
1	12V Battery supply	Red	9 – 18V
2	GND	Black	Connected to ECU GND
3	Analog Output 1	Yellow	0 – 5V
4	Analog Output 2	Blue	0 – 5V

Installation:

Grounding:

The device must have an electrically secure ground connection, which means that the battery negative must be properly grounded to the chassis AND engine. The ground wire, whether it is from the battery or to the chassis and engine, must have perfect electrical conductivity. This means that there must not be any paint or rust under the wire terminal. Make sure that when you install the ground wire there is bare metal exposed where the wire contacts the vehicle component. Both of black wires should be connected to secure ground and we also recommend that the ground wire be as short as possible and to be connected directly to the same ECU ground.

Power Requirement:

The WB101 requires a minimum supply voltage of 9V or greater to run. We recommend that the device be supplied with 13.8V nominal operating voltage. Ensure that the vehicle's charging system is in perfect operating condition prior to installation. The red wire should be connected to ignition switched and fused to the switched 12V source.

Analog Outputs:

WB101 has 2 analog outputs that can be programmed through WB101 windows software to generate analog voltage from 0V to 5V according to the lambda measured and based on 32x2 Lambda/Voltage table.

Name	Wire	Color	
Analog Output 1	3	Yellow	Programmable analog output 0 – 5V
Analog Output 2	4	Blue	Programmable analog output 0 – 5V

Mini USB Connector:

The USB connector is used to connect the WB101 to the windows software to program the analog output, calibrate the sensor and to flash the device with new firmware if needed. The USB cable is included with the device package. The USB windows driver can be downloaded from here:

https://www.silabs.com/documents/public/software/CP210x_Windows_Drivers.zip

After installing the USB driver and connected the device to the 12V and GND supply, Please make sure that you can find the virtual COM port under the device manager “Ports (COM & LPT)” menu with the name “Silicon Labs CP210x USB to UART Bridge (COMx)” before you start to connect the device to the windows application.

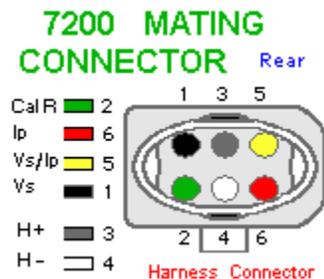
CAN Bus Connector:

The CAN bus communication port sends the output lambda reading to the ECU, Data transferred digitally is more accurate than analog output voltage. All the settings for the message transferred to the ECU can be adjusted from the SPTRONICS wideband windows software.

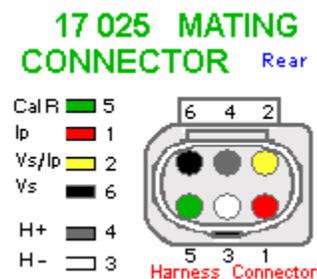
Sensor Connector:

WB101 supports 2 type of Bosch lambda wideband sensors LSU4.9 and LSU4.2 using 2 types of sensor connector harness:

LSU4.2 Connector:



LSU4.9 Connector:



Status LED:

The status LED has 3 colors each represents different device status as in the following table:

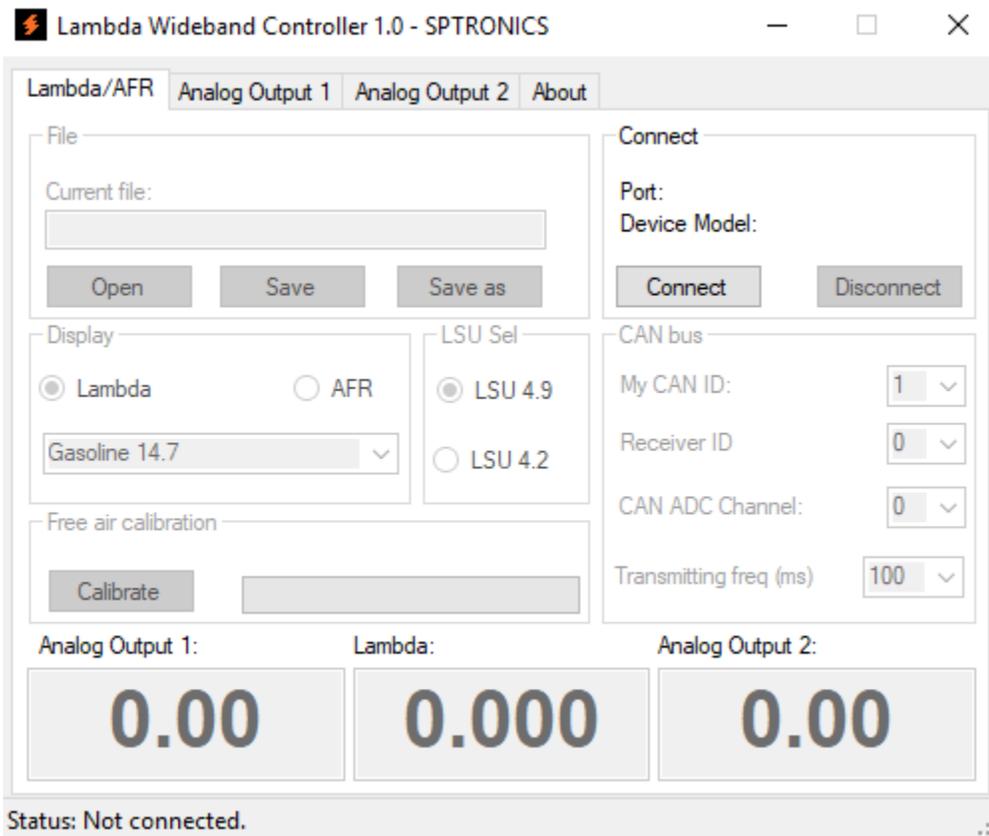
LED Color	Status
Solid RED	WB101 ready, no sensor connected.
Solid Orange	WB101 heating the sensor.
Solid Green	WB101 working probably
1 Time flashing RED	Error in the sensor heater (sensor damage)
2 Time flashing RED	Error in the sensor Nernst cell (sensor damage)
3 Time flashing RED	Battery voltage supply is low
4 Time flashing RED	Battery voltage supply is high
5 Time flashing RED	Sensor draw very high current (sensor damage)
Flashing Green	Free air calibration is running.

SPTRONICS Lambda Wideband Software:

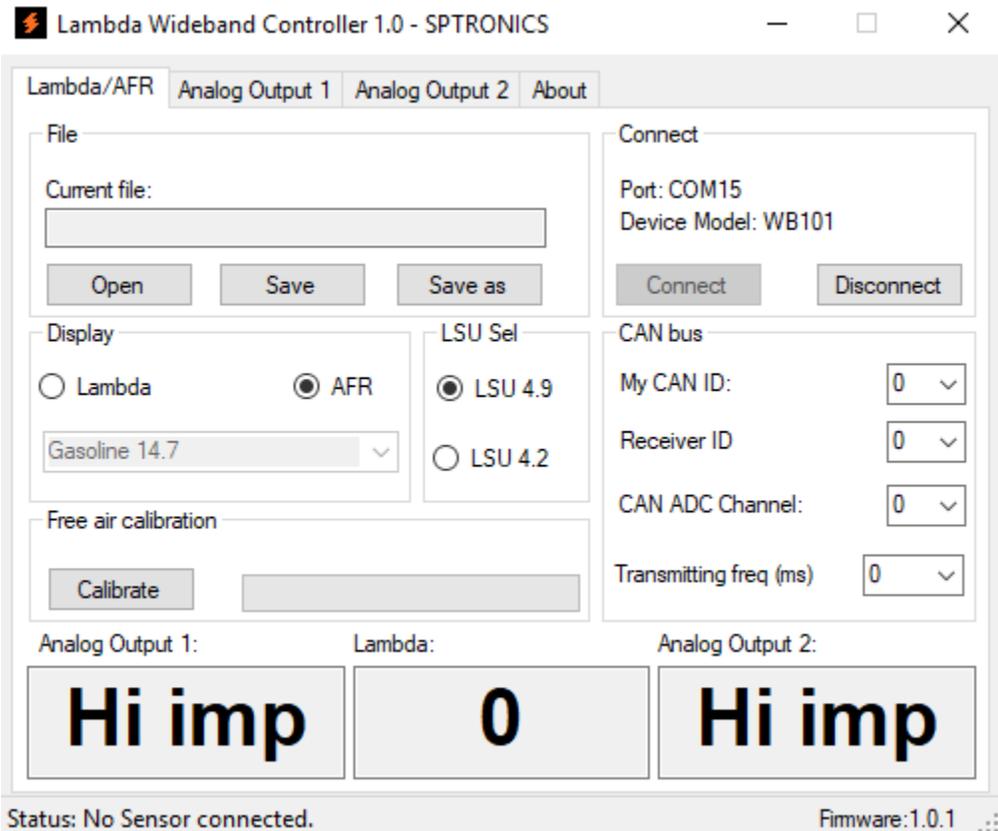
Lambda Wideband Controller software can be downloaded from the following link:

<http://www.sptronics.com/assets/images/SPTRONICS%20Widebnad%20Lambda%20Controller%20v10.rar>

After installing the software on your computer and run the application, this is the application picture:



Make sure the USB driver is installed as explain earlier before you trying to connect to the WB101. By clicking on "Connect" the software will search on all available COM port for WB101, once the software finds the device it shows the Port number the device connected to and the device model as in picture below:



After successful connection all the data on the device will replace the current data shown on the software and all the dimmed tabs will be available, the status toolbar will show the current status of the device and the firmware version.

1 – “Lambda/AFR” tab:

- “File” To save and restore data on local hard drive. Once you open a file all the data on the file will replace the data displayed on the software and replace the data stored on the device memory.
- “Connect” To search for the Wideband Controller and to connect on the first available one. The “Disconnect” is to release the port and the data communication between the software and the device.
- “Display” To choose the unit to display the Lambda value. As each type of fuel has different stoichiometric, the default AFR ratio chosen will be gasoline which has 14.7 of gasoline to 1 air. Here is the list of available fuel type and its stoichiometric point:
Gasoline 14.7:1
LPG 15.5:1

Methanol 6.4:1
Ethanol 9:1
CNG 17.2:1
Diesel 14.6:1

- “CAN bus” To determine the parameters needed to communicate with another device over CAN bus. WB101 send a CAN message on interval determine by “Transmitting freq” in millisecond. WB101 CAN ID, Receiver ID and ADC channel should be specified before the receiver can read WB101 message. The default values will send the Lambda value based on the first analog output table and send it to port ADC0 in the ECU.
- “LSU Sel” To select the type of sensor connected to the WB101. Each sensor type has different connecting cable as show in pictures under sensor connector section.
- “Free air calibration” WB101 comes already with the default free air calibration value for new sensor. However, over time sensor free air value changes and to get the most accurate reading out of the sensor it recommended to free air calibration to the sensor before using it by connecting the sensor to the WB101 and leave the sensor in the free air and wait till its fully heated and green LED is lit then start the calibration, it will take about 15 seconds before the free air values is saved in the WB101, during the calibration the green LED will be flashing till the calibration finishes.
- “Lambda/AFR” displays the Lambda/AFR value, output unit can change from “Display” group box.
- “Analog Output” displays the analog value output on both analog outputs from the device’s main connector.

2 – “Analog Output 1 & 2” tabs:

- “Output value during heating” to choose the output value during heating the sensor, the output value can be high impedance or specific voltage.
- “Output value during error” to choose the output value during sensor is not connected or during any error, the output value can be high impedance or specific voltage.
- “Output values” to choose the output value during the sensor normal operation. The output value can be linear according to the minimum, maximum voltage and

minimum, maximum lambda/afr value, in this case the Voltage/Lambda table will be automatically generated. By clicking on Table tab, a custom table can be edited. The graph is only to display the relation between the voltage and lambda/afr.

- “Default 1V” set the output values to be from 0 to 1V to be used as Narrow band O2 sensor simulator.
- “Default 5V” Set the output values to be from 0 to 5V to be use with our aftermarket ECU as default wideband O2 sensor input.

