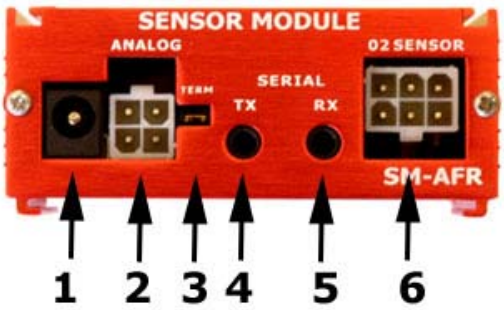
iMFD Sensor Module SM-AFR

Version 1.0 September 18, 2006

***Please read the instructions completely through at least once before proceeding with the installation to minimize errors.**

***Double check polarity of power before powering it on for the first time.**

Overview:



(Figure 1)

1. Connects to 12V-18V power source.
2. Analog outputs (0-5V linear wideband output, 0-1V narrowband output, ground)
3. Termination jumper. Closed for first SM in iMFD daisy chain.
4. Connects to next SM in iMFD daisy chain or to first DM
5. Connects to previous SM or unconnected if first SM in iMFD daisy chain
6. Connects to O2 Sensor Harness then to Bosch sensor.

Install the Wideband Sensor:

1. Mount the wideband oxygen sensor before the catalytic converter and at least 24 inches downstream from your engine block or turbo for optimal performance. The sensor element will fail if it is exposed to exhaust gas temperatures above 850 deg Celsius. If you plan to replace your stock narrowband oxygen sensor with the PLX wideband, please read PLXApp004 online for more information. The sensor will directly screw into an 18mm X 1.5mm pitch sensor bung. The bung is available from the PLX Online Store.
2. You will hear a "click" when the connectors are properly mated.

(Figure2)

3. Connect the wire harness to the Sensor Module device by mating it with the SM-AFR box indicated by “O2 Sensor”

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Connecting Power to the Unit:

CAUTION! CONNECTING THE SM-AFR IN REVERSE POLARITY WILL DAMAGE THE UNIT! CHECK CONNECTIONS BEFORE POWERING ON.

1. The SM-AFR accepts 12-18V DC for power. Connect the negative wire (black) to your vehicle's ground. This is usually the negative terminal of your automobile's battery. Connect the positive wire (red) to your vehicle's ignition power. This power is only supplied when your key is turned passed a specific position and is off when your key is removed. Your power connection must be capable of supplying at least 3 amps of current. A 5-7 Amp fuse is recommended for safety.

*If you plan to integrate the SM-AFR Plug and Play with other aftermarket devices by utilizing the analog output signal wires. Make sure that the negative wire (black) is connected as close as possible to your device's ground. This guarantees that both devices "see" the same reference ground and a more accurate interpretation of the output voltages will be achieved. Please refer to the PLXApp notes online for more information.

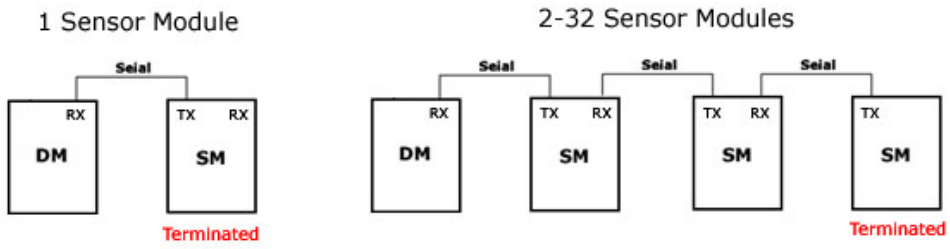
2. Locate the 2.1mm Power plug. Unscrew the plastic cover and insert it into the red/black power wires.
3. Solder or crimp the red power wire to the **CENTER** of the connector. (12-18V)
4. Solder or crimp the black power wire to the **SHIELD** of the connector. (GROUND)

(Figure 3)

5. The unit takes approximately 45 seconds for the oxygen sensor to heat up and produce accurate measurements.
6. Sensor calibration is not needed. The SM-AFR is self calibrating and no user intervention is required.

Using the Sensor Module in the iMFD Chain:

1. If the SM-AFR is the only sensor module or last sensor module in the iMFD chain, be sure to have the termination jumper installed. Otherwise, remove the jumper. Please refer to (Figure 1) for the location of the termination jumper.



(Figure 4)

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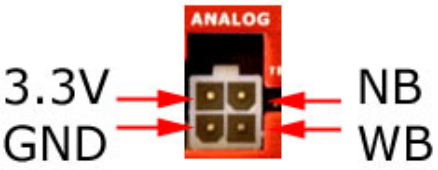
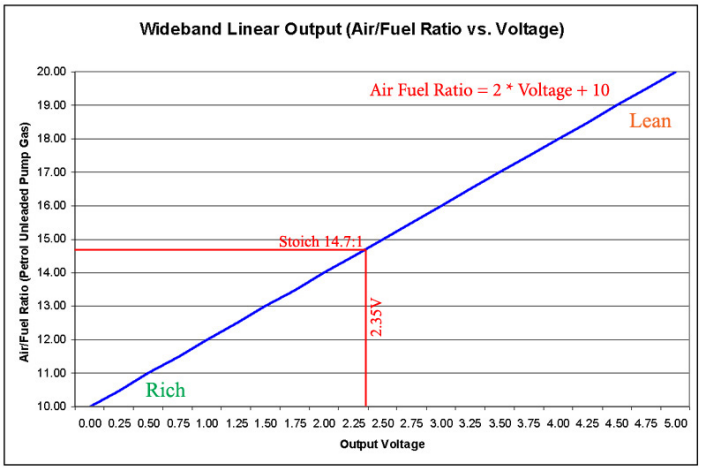
Using the Sensor Module Analog Outputs:



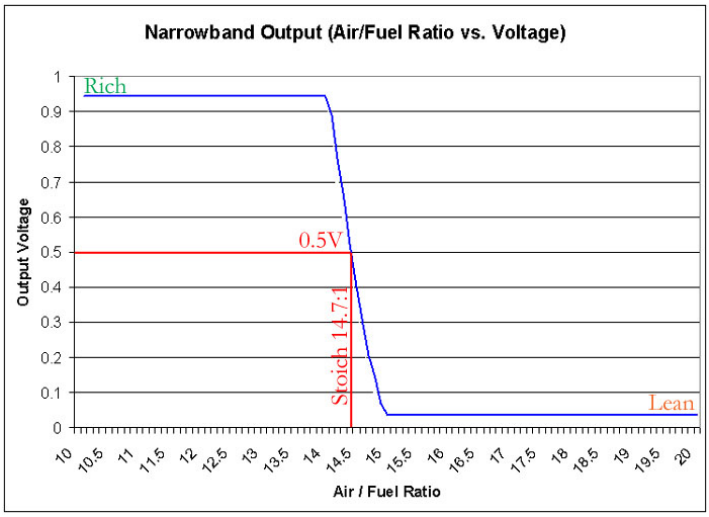
(Figure 5)

Wideband Linear Analog Output (0-5V)

0V=10AFR (Gasoline) 0.68 Lambda, 5V = 20AFR (Gasoline) 1.36 Lambda



Narrowband Analog Output (0-1V)



*If you plan to integrate the SM-AFR with stand alone engine management systems, piggy back systems, data loggers or any other devices that utilize the two analog outputs, noise filtering capacitors must be installed near the application. The included capacitors filter out unwanted electrical noise produced from your vehicle's ignition and other onboard systems. This provides added signal integrity for more accurate, reliable, and consistent measurements. Any 0.1uF 50V ceramic capacitor will work.

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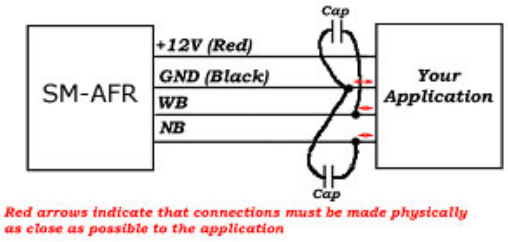

(Figure 6)

Reading Lambda:

A lambda value of 1.0 is considered to be "ideal combustion" and a stoichiometric combustion is achieved. To convert the above graphs to lambda, simply divide the air/fuel ratio axis values by 14.7

0V = 0.68 lambda, 5V = 1.36 lambda (mapped linearly)

Compatibility with Other Fuels:

The above graphs assume that the device will be used with gasoline (14.7). The SM-AFR is also compatible with the following fuels.

a. Diesel 14.6
b. Methanol 6.4
c. Ethanol 9.0
d. LPG 15.5
e. CNG 17.2

To find the new relationship of AFR to output voltage, simply multiply the lambda value by the specific fuel's stoichiometric air/fuel ratio.

Example: If your engine uses methanol instead of gasoline. The conversion will be as follows.

1) Divide the AFR value by 14.7 (gasoline) to obtain a lambda value
2) Multiply the lambda value by 6.4 (methanol)

Troubleshooting:

1. Upon power up, the WB analog output should read 2.3V-2.4V with the O2 sensor disconnected.
2. With the O2 sensor connected and exposed to free air, the WB analog output should read starting from 2.35V climbing up to 5.0V

If test #1, #2 pass, your SM-AFR is properly working, otherwise, replace the O2 sensor. Replacement sensors are available from the PLX Online Store.

Recommended Accessory:

DM-5 AFR 52mm Gauge. Ideal for affordable AFR monitoring from your SM-AFR

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Included Items:

1. SM-AFR main unit
2. Bosch LSU 4.2 wideband sensor
3. O2 sensor harness 10ft
4. 4ft power wire with 2.1mm connector
5. 4ft Analog wires and connector with 4 terminals
6. 1ft Serial Cable
7. Termination jumper
8. 0.1uF 50V ceramic capacitor QTY2
9. Users guide

Specifications:

Physical Dimensions	2" x 2.875" x 1.125" (52mm x 75mm x 28mm) L x W x H
Technology	PLX Critical Response Technology, Fast Response PID
Accuracy	< 0.1AFR (Gasoline) Wideband, < 0.2AFR (Gasoline) Narrowband
Measurement Range	10-20AFR, 0.68 lambda - 1.36 lambda
Analog Outputs	Wideband Linear 0-5V, Narrowband 0-1V (Driving Current 20mA)
Operating Voltage	8V-18V
Power Consumption	30 Watts (Max), 18 Watts (Typical)
Power Supply Technology	High Efficiency Switching
Operating Temperature	0 - 85 Deg C
Sensor	One Bosch LSU 4.2
Enclosure	Extruded Aluminum

TERMS OF USE

PLX Devices Inc. does not guarantee the SM-AFR functionality with any ECU, data logger or other devices that uses the output signals. Implementation and integration of the SM-AFR with any other device(s) must be done at your own risk. Improper installation and usage may lead to engine damage. Mount and install the SM-AFR in a location where it does not obstruct the driver's view and/or ability to safely control the vehicle.

LIMITED WARRANTY

PLX Devices Inc. warrants this product to be free from defects for 90 days from the date of purchase. If applicable, Oxygen sensors and other non-serviceable items are excluded from stated warranty. Serviceable goods must be determined by PLX Devices to be defective before any warranty or replacement is issued. PLX Devices' obligation under warranty shall be limited to repairing or replacing, under the discretion of PLX Devices, any part proven defective. This warranty is limited to the repair or replacement of parts in the manufactured good and the necessary labor done to affect its repair or replacement.

SERVICE UNDER WARRANTY

In the unlikely event that your PLX Devices hardware should fail during the warranty period, a Return Material Authorization number (RMA) must be first retrieved from PLX Devices Customer Support. Support can be contacted through email: support@plxdevices.com or by phone: 408-745-7591. All serviceable goods must be packaged securely with proof of purchase, RMA number, with all shipping charges prepaid and shipped to PLX Devices Inc. Goods returned under warranty must be received by PLX Devices Inc. within ten (10) business days after the RMA number has been issued. Goods received after this period is subject to fees for the service of repair or replacement. All repaired or replaced items shall be warranted for the remainder of the original product warranty.

RETURNS AND RESTOCKING FEE

A 15% restocking fee will apply to applicable PLX Devices products for refund. All returns are to be packed in original condition including packaging, documentation, manuals, and accessories. Returns that do not include all the accessories and components may be returned to the customer or charged on a per item basis. The customer assumes responsibility for product until receipt at PLX

Devices Inc., shipping via an insurable carrier is recommended. Any unauthorized shipping charges will be billed to the customer or shipment will be refused.

DISCLAIMER

PLX Devices Inc. shall not be liable for direct, special, incidental, or consequential damages resulting from any legal theory including, but not limited to, lost profits, downtime, goodwill, damage, injury to persons, or replacement of equipment and property due to improper installation, integration and/or misuse of any PLX Devices Inc.'s product(s). This warranty applies to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 90 day warranty period.

Revision History

Version 1.0 (9/18/06)	Initial release

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