Setting up the SM-AFR

Black (negative)
Red (Positive)

Step One
Install the Wideband O2 Sensor. Install Bung. Mount the wideband oxygen sensor before the catalytic converter and at least 24 inches downstream from your engine block or turbo.
Tip: Mount the O2 Sensor before the catalytic converter or at least 24" downstream from your engine block for naturally aspired and 36" for turbo engines for optimal performance. The sensor should be mounted in the top side of the exhaust pipe at a 15 degree angle away from the flow of the exhaust.
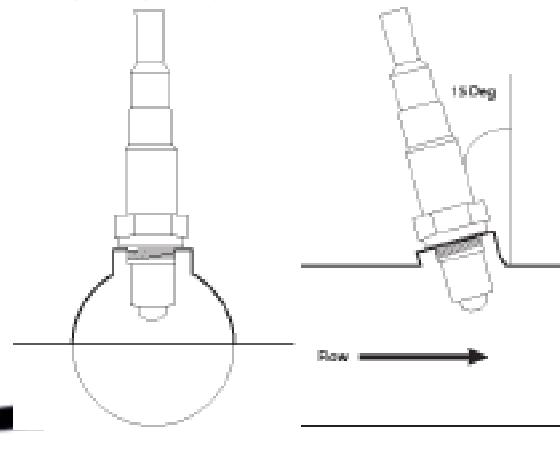
Step Two
Connect the sensor to the wire harness

Step Three
Connect the harness to the SM-AFR unit
Tip: If routing O2 Harness through a firewall, use a grommet. Avoid having the harness come in direct contact with exhaust. This will prevent damage to the O2 Sensor Harness.

Step Four (Only if replacing narrowband sensor)
Connect 0-1v output to ECU
Tip: To interface with your ECU, use the gray wire supplied in your SM-AFR Connect Kit. You will need to know the Diagram Pin Out of your specific vehicle.

Step Five (Not needed for stand alone setup)
Connect 0-5v output to third party datalogging system or aftermarket ECU
Tip: To interface with your third party application, use the gray wire supplied in your SM-AFR Connect Kit. You will need to know the Diagram Pin Out of your specific vehicle.

SM-AFR	+12V (RED)	Your Application
	GROUND (BLACK)	
	0-5V WIDEBAND	
	0-1V NARROWBAND	
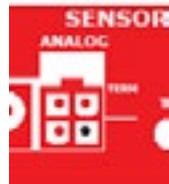
Step Six
Connect power to the SM-AFR
Tip: Find and connect to 12-18v power source (We advise the ignition switch.) A 5Amp fuse is recommended for safety.
DO NOT POWER UNIT UNTIL INSTALL IS COMPLETE.

Termination Jumper:
Termination Jumper comes pre-installed in the SM-AFR for standalone use.
Tip: When connecting multiple SM Modules, remember to remove Terminal Jumper(s) from every SM Module after the first in the iMFD daisy chain. Leave the first SM Module with the Jumper installed.

Wideband Linear Output (Air/Fuel Ratio vs. Voltage)

Air/Fuel Ratio = 2 * Voltage + 10

2.35 V

Stoich 14.7:1

Lean

Rich

0.68   λ   1.36

Narrowband Output (Air/Fuel Ratio vs. Voltage)

Rich

0.5 V

Stoich 14.7:1

Lean

0.68   λ   1.36
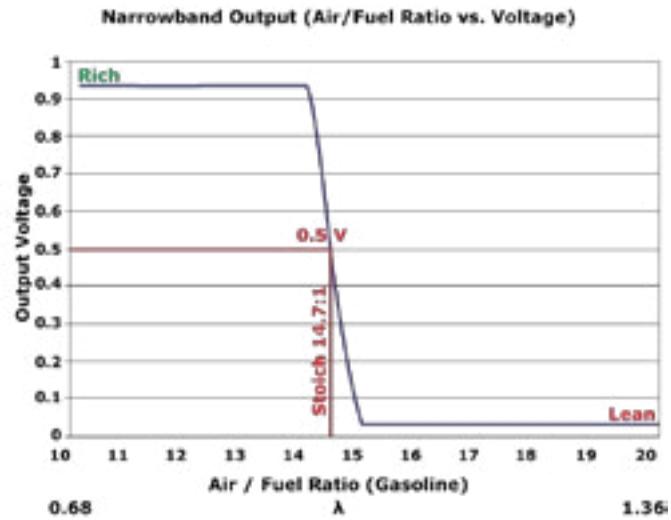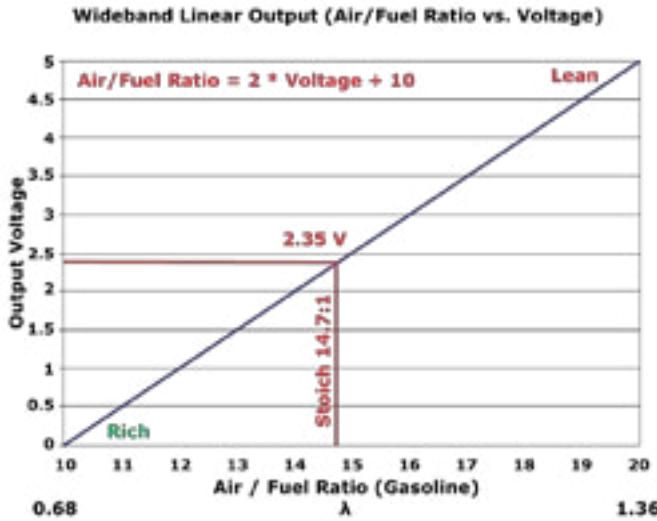
Example Daisy Chain Setup

Remove termination jumpers from all sensor modules excluding sensor module furthest from display modules.

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: Diesel (14.6), Methanol (6.4), Ethanol (9.0), LPG (15.5), CNG (17.2), E85 (9.7). 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)

Lambda	0.68	0.80	0.90	1.00	1.10	1.20	1.30	1.36
Gasoline	10.00	11.76	13.23	14.70	16.17	17.64	19.11	19.99
Diesel	9.93	11.68	13.14	14.60	16.06	17.52	18.98	19.86
Methanol	4.35	5.12	5.76	6.4	7.04	7.68	8.32	8.70
Ethanol	6.12	7.20	8.10	9.00	9.90	10.80	11.70	12.24
E85	6.60	7.76	8.73	9.70	10.67	11.64	12.61	13.19
LPG	10.54	12.40	13.95	15.50	17.05	18.60	20.15	21.08
CNG	11.70	13.76	15.48	17.20	18.92	20.64	22.36	23.39

Troubleshooting:

Upon power up, the WB analog output should read 2.30V-2.40V with the O2 sensor disconnected. With the O2 sensor connected and exposed to free air, the WB analog output should read starting from 2.3V climbing up to 5.0V within 30 seconds. If both conditions are met, your SM-AFR is properly working. If the sensor does not reach Lean/Air within 45-60 seconds, please replace your O2 sensor. Replacement sensors are available from the PLX Online Store under accessories.

1. The output is not showing the correct AFR readings:
 A. With the O2 sensor harness disconnected, at initial power-up it should display between 14.6 and 14.7 (wideband analog voltage: 2.30V - 2.40V).
  i. If it is reading below 14.5, please verify that the unit is receiving at least 12V and you have at least a 5 amp fuse. If it is still reading below 14.5 even with the correct voltage, contact rma@plxdevices.com and request a RMA number. Your unit is faulty and needs to be repaired.
  ii. If it is reading above 14.8, contact rma@plxdevices.com and request a RMA number. Your unit is faulty and needs to be repaired.
 B. Reconnect the O2 sensor with the sensor harness, with the O2 sensor exposed to free air. During the 30 second warm up phase, the voltage should increase from 2.35V to 5.0V.
  i. Voltage does not read 5.0V even after 60 seconds:
   a. Try another power source for your SM-AFR.
   b. Verify that a fuse is installed rated no less than 5A.
   c. Check connectivity of harness and O2 sensor.
   d. Your O2 sensor needs to be replaced.
 C. When the unit says AIR*, blow on the O2 sensor. The display should show LEAN*.
  i. Display does not go to LEAN*:
   a. Your O2 sensor needs to be replaced.
  * will only show "LEAN" or "AIR" on DM-6 Gauge

Included Items:
1. SM-AFR main unit
2. Bosch LSU 4.9 wideband sensor
3. O2 sensor harness 10"
4. 4" power wire with 2.1mm connector
5. 4" Analog wires and connector with 4 terminals
6. 1" Serial Cable
7. Termination jumper
8. Users guide

Specifications:

Physical Dimensions	2 x 2.875 x 1.125" (52 x 75 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	10-20 AFR, 0.68 lambda - 1.36 lambda
Analog Outputs	Wideband Linear 0-5V, Narrowband 0-1V (Driving Current 20mA)
Operating Voltage	9V-20V
Power Consumption	30 Watts (Max), 18 Watts (Typical)
Power Supply Technology	High Efficiency Switching with Soft Start Technology
Operating Temperature	0 - 85 Deg C
Sensor	One Bosch LSU 4.9
Enclosure	Automotive Grade Plastic