

# Setting up the DM-6 Multi Gauge to the SM-AFR

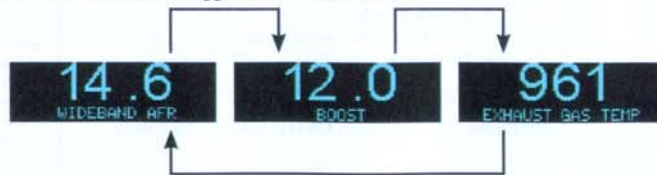


## Navigating the DM-6

There are a total of 3 capacitive touch buttons on the DM-6. They are highlighted in the image below.



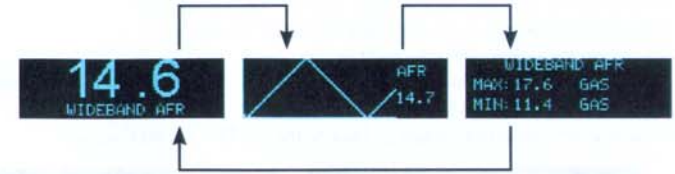
Use the left button to toggle between sensors.\*



\* - Sensors available are based on Sensor Modules in daisy chain. Display order is based on location of the Sensor Module in the daisy chain



Use the right button to toggle between Numeric, Graph, and Peak/Hold screen views.



Hold the logo button to display unit label and range. Left and right values refer to entire LED sweep range.



In the Peak/Hold view, holding the right button will open a menu option to save or reset current/all peak/hold values.



## The Menu

Pressing and holding both left and right buttons together will take you into the menu system. Once inside the menu system, use the left button to save changes, the logo button to select which menu item is currently selected, and the right button to access the current selection option. Please note the icons used.





## Setup Unit

To setup the unit for a particular sensor, follow the procedures listed below:

1. Hold both left and right button to get into the "SETUP MENU".
2. Press the right button to get into "SETUP UNIT" screen.
3. To change the sensor, press the right button.
4. To change the unit for that particular sensor, press the logo button to move down the arrow.
5. Press the right button to change the unit.
6. Press the left button to save and go back to the "SETUP MENU" screen.



## Warnings:

The DM-6 can be operated to trigger the warning by setting the limit of the parameters (Parameter 1(P1) and Parameter 2(P2)). Sensors that are daisy-chained with the DM-6 can be selected to associate with the parameter setting. The DM-6 is capable of monitoring up to 2 parameters for warnings. To trigger the warning, the reading of the DM-6 must go above or below the parameter setting as determined by the user. The table below shows the 4 schemes that are supported by DM-6.

Mode	Description
P1 and P2	Warning triggers only when the reading falls within the range set by both Parameter 1 <b>and</b> Parameter 2
P1 or P2	Warning triggers only when the reading falls within the range set by Parameter 1 <b>or</b> Parameter 2
P1 Only	Warning triggers when the reading falls within the range set by <b>Parameter 1 only</b>
P2 Only	Warning triggers when the reading falls within the range set by <b>Parameter 2 only</b>

## Example:

Trigger point settings (SET P1 or SET P2)	DM-6 Reading	Result
Parameter 1: AFR > + 15.0	AFR = 14.0	FALSE
Parameter 2: EGT > + 800	EGT = 900	TRUE

If the DM-6 measures the above values and the "SCHEME" is set to "P1 OR P2", this means that if Parameter 1 is TRUE OR Parameter 2 is TRUE, the warning will trigger. Since EGT is set in Parameter 2 and the measured value exceeds the trigger point set for this particular sensor, the warning will trigger as soon as the measured value exceeds 800.

The LEDs will be flashing, indicating that the warning has been triggered. DM-6 will also display the particular sensor that triggers the warning in the numerical mode. If mode P1 AND P2 is selected, as the warning triggers, you can press the left button to view the two sensors that trigger the warning.

To trigger the warning, first set the "SCHEME":

1. In the "SETUP MENU", choose "WARNING" by pressing the logo button.
2. Press the right button to get into the "WARNING" screen.
3. To change the "SCHEME", press the right button. Refer to the above table for the description for each "SCHEME".
4. Press the left button to save and return to the "SETUP MENU" screen.



## SET P1/SET P2:

1. In the "SETUP MENU", choose "SET P1 or SET P2" by pressing the logo button.
2. Press the right button to get into the "SET P1 or SET P2" screen.
3. To select the sensor as the warning sensor, press the right button.
4. To set the trigger value, press the logo button to move down the arrow.
5. Press the right button to change the highlighted character.
6. To highlight the next character, hold on to the right button for 3 seconds.
7. Press the left button to save and return to the "SETUP MENU" screen.
8. If the limit is invalid, the "LIMIT EXCEED RANGE" screen will show to indicate the proper range of values to be set.
9. Press the right button to re-enter the parameter or press the left button to go back to the "SETUP MENU" screen.



## Included Items:

1. DM-6 2 1/16" (52 mm) Gauge
2. 4 Pin connector for SM-AFR connectivity
3. 2 Terminals for 4 pin Connector
4. 3.5 mm Y Splitter
5. 6" M/F Extension Serial Cable
6. User guide

## Specifications:

Physical Dimensions:	Standard 2 1/16 x 0.7" (52 X 18 mm)
Display Technology:	1.10" OLED Screen (124 x 36 pixels), LED (16 Green, Yellow, Red)
Viewing Angle:	180 Degrees
Polarization:	None
Supply Voltage:	3.3 V and 8 V from SM Module
Power Consumption:	< 1 Watt
Cable Length:	6' Power, 6" Serial
Operating Temp:	0 - 85 Degrees Celsius
Human Interface:	3 Button Capacitive Touch
Number of Sensors:	16 Maximum Daisy Chain
Supported Units:	US Standard, Metric

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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 e-mail: rma@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 are 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

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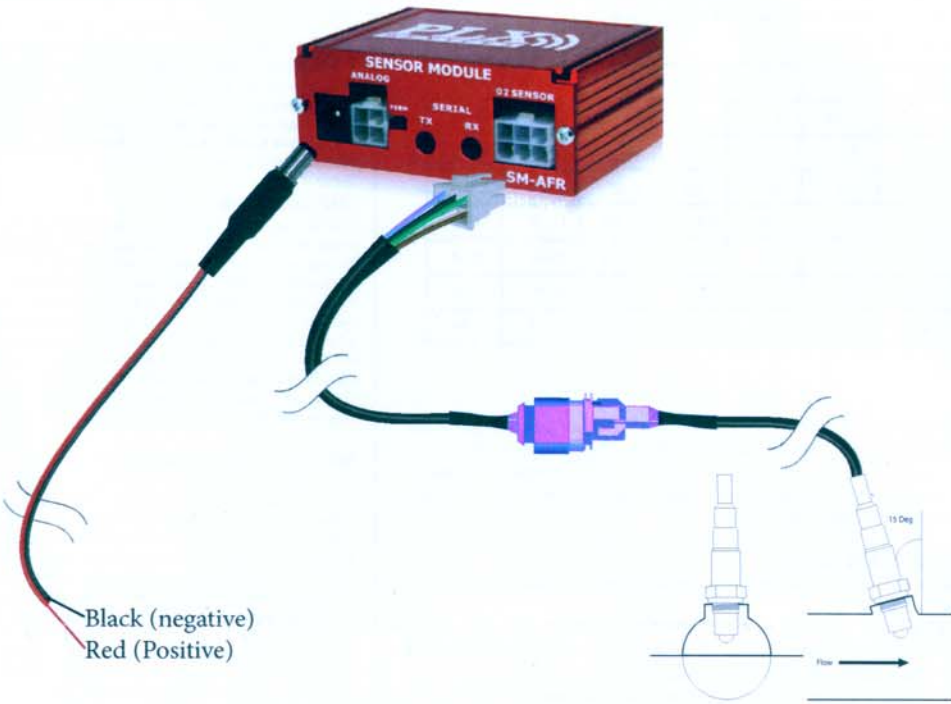
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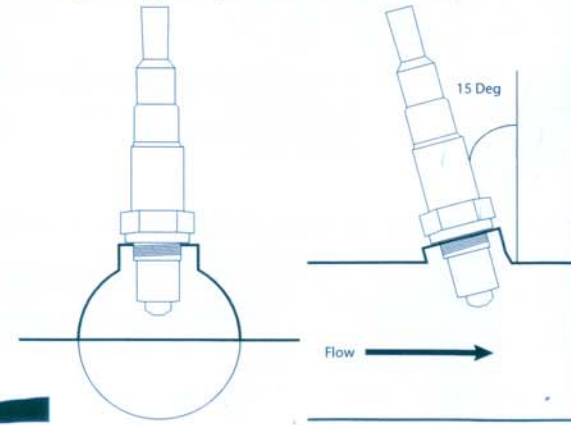
# Setting up the SM-AFR

**WARNING:**  
 \*Double-check polarity of power before powering it on for the first time. Connecting the SM-AFR in reverse polarity will damage the unit!



## 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 aspirated 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



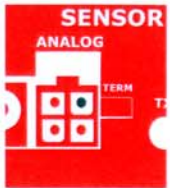
## Step Three

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.



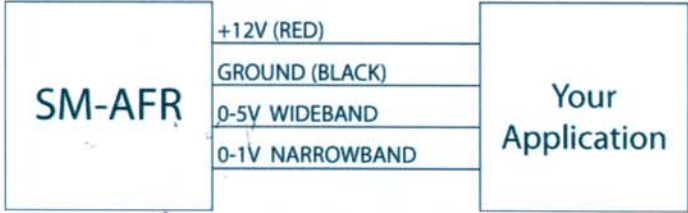
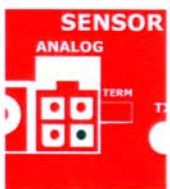
## Step Four (Only if replacing narrowband sensor)

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.



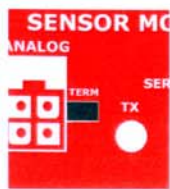
## Step Six

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.



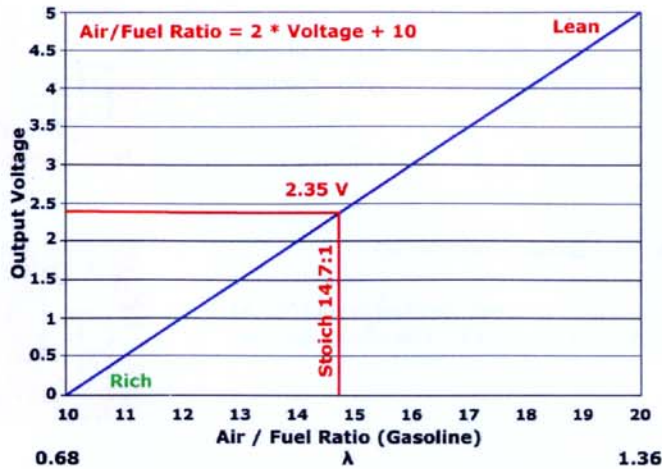
## Termination Jumper:

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.

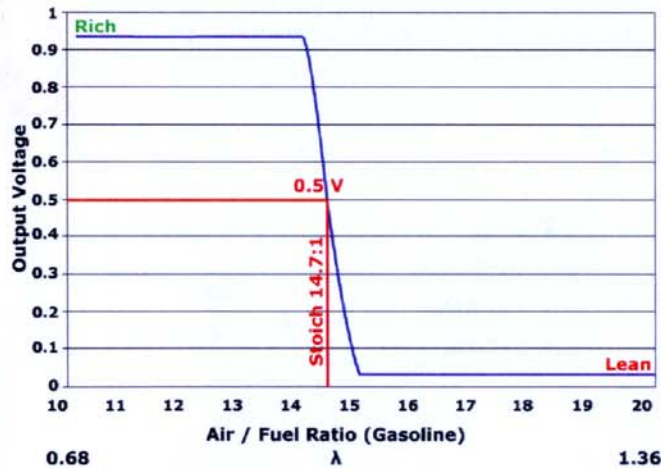




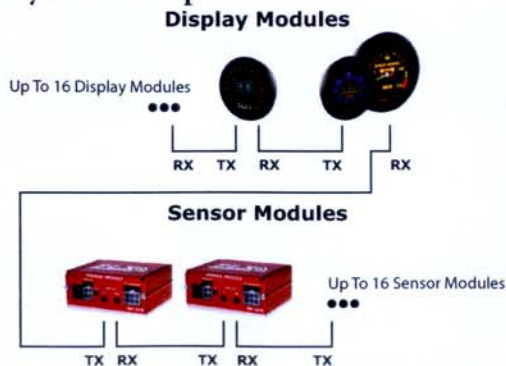
### Wideband Linear Output (Air/Fuel Ratio vs. Voltage)



### Narrowband Output (Air/Fuel Ratio vs. Voltage)



### 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](mailto: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](mailto: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 4.2 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 4.2
Enclosure	Extruded Aluminum

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