INSTALLATION INSTRUCTIONS

MSD Dual Wide-Band O2 Sensor

PN 7766

ONLINE PRODUCT REGISTRATION: Register your MSD product online. Registering your product will help if there is ever a warranty issue with your product and helps the MSD R&D team create new products that you ask for! Go to www.msdperformance.com/registration.

Note : This product cannot be used with Solid Core spark plug wires.

Parts Included:
1 - MSD Dual Channel Wide Band Oxygen Sensor Module PN 7766
1 - Sensor 1 Extension Harness PN 2274
1 - Oxygen Sensor PN 2268
1 - Parts bag

Parts Required:
PN 7730 Power Grid
PN 7740 MSD Hub

Optional Parts:
1 - Exhaust Pressure Module PN 7767
1 - O2 Sensor 2 Kit PN 2273

Replacement Parts:
1 - Main Harness PN 2266
1 - O2 Sensor 1 Harness PN 2274
1 - O2 Sensor 2 Harness PN 2275
1 - O2 Sensor 2 Extension Harness PN2276

FEATURES

- Plug and Play Power Grid module
- Works seamlessly with additional MSD Wide-Band O2 Sensor Modules
- No setup or calibration required (Free Air Calibration is optional for added precision)
- Can be expanded to operate with a second sensor MSD PN 2268
- Fully potted and sealed unit with Automotive-Grade connectors
- 0.5-4.5V Analog Output Voltage for a gauge or data acquisition
- LEDs to monitor system operation and health
- High speed data acquisition when used with the Power Grid Controller (PN 7730)
- Back Pressure Compensated AFR's when used with the optional Exhaust Pressure module

OPERATION

The Dual Wide-Band O2 sensor is a dual channel air-fuel ratio (AFR) module designed to interface with the Power Grid (PN 7730) to monitor and record the AFR of internal combustion engines. The Dual Wide-Band O2 sensor module is capable of measuring AFR as low as λ = 0.5 (7.35:1 Gasoline AFR equivalent). The AFR range is configurable using the MSDView software in conjunction with the Power Grid Controller (PN 7730).

The MSD Wide-Band O2 Sensor module also provides a 0.5-4.5VDC analog output proportional to the AFR. This analog output can be sent to a gauge or a data acquisition system. The dual-color LED provides the system status at a glance.

Note: To use the MSD Wide-Band O2 Sensor module in pressurized exhaust (such as turbocharged applications), an Exhaust Pressure Module PN 7767 must be used to compensate for the exhaust pressure. Using four PN 7766 modules allows cylinder-to-cylinder distribution to be monitored for V8 applications.

If equipped with two pressure transducers, a single Exhaust Pressure Module (PN 7767) can sense exhaust back pressure for both engine banks.

MOUNTING

The MSD Wide-Band O2 Sensor module must be mounted in a sturdy, dry location and not exposed to extreme heat. Also take note of the module's location with respect to the O2 sensor locations and harness lengths. The included parts bag will contain required hardware for mounting the unit. The unit should not be immersed or subjected to direct spray from a power washer.

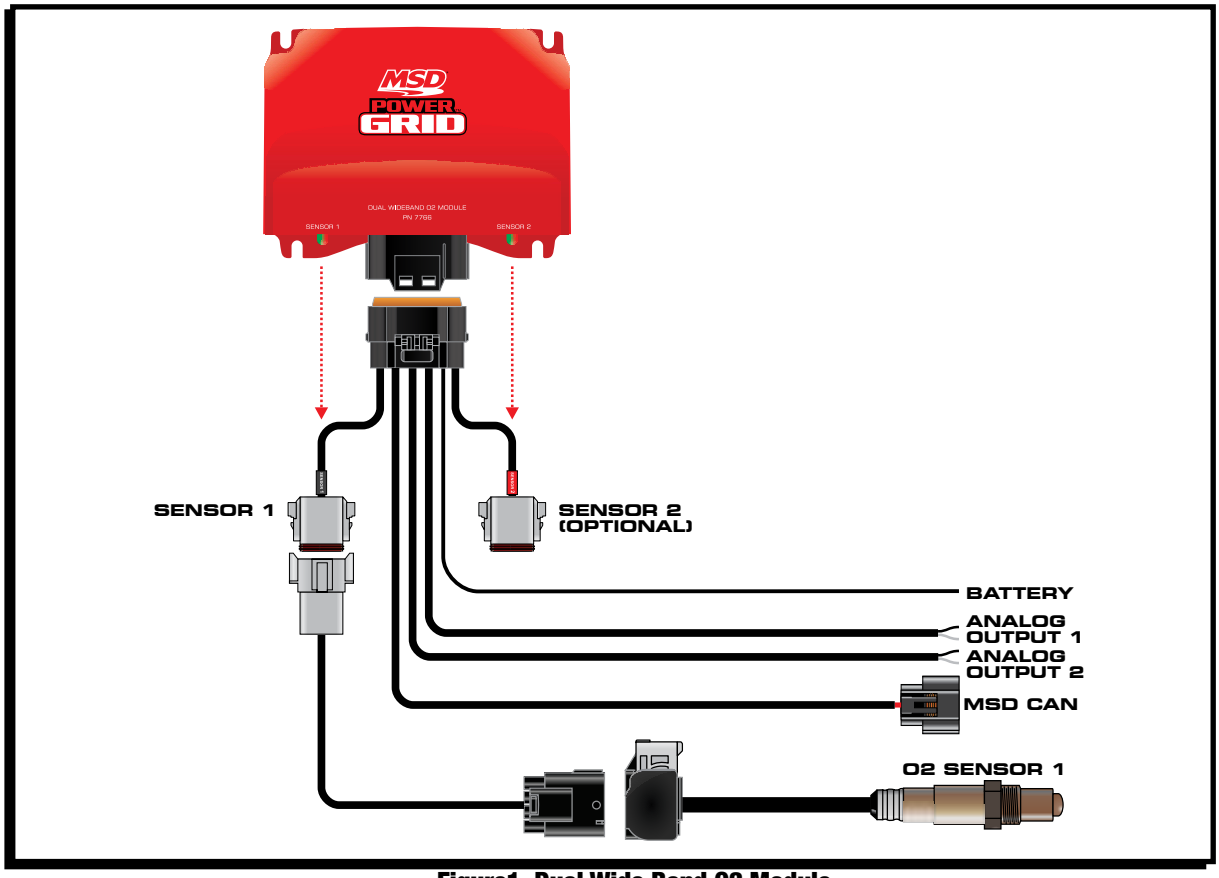


Figure1. Dual Wide Band 02 Module

WIRING

The MSD Wide-Band O2 Sensor module comes with one Oxygen sensor and corresponding harness. To power the module, connect the Red wire to a switched 12v source. When the unit is powered up, the Status LEDs will show O2 Sensor activity. An Orange LED means the oxygen sensor is warming up. When ready, it will turn Green. **(Table 1)**

The Analog 1 and Analog 2 paired wires can be used for a gauge or external data acquisition. The output voltages range from 0.5V to 4.5V and can be calibrated via MSDView to correspond to correct air fuel ratio for the type of fuel used.

The MSD CAN pigtail is used to communicate with the Power Grid CANBUS system. **(Figure 2)** Multiple Wide-Band O2 modules and sensors can be connected in the same Power-Grid setup.

STATUS LEDS	
INDICATION	**DESCRIPTION**
Orange	Warm up in progress
Red	Fault
Green	Normal operation
Blinking (any color)	Communicating with MSD View

Table1. Status LED's Color Code

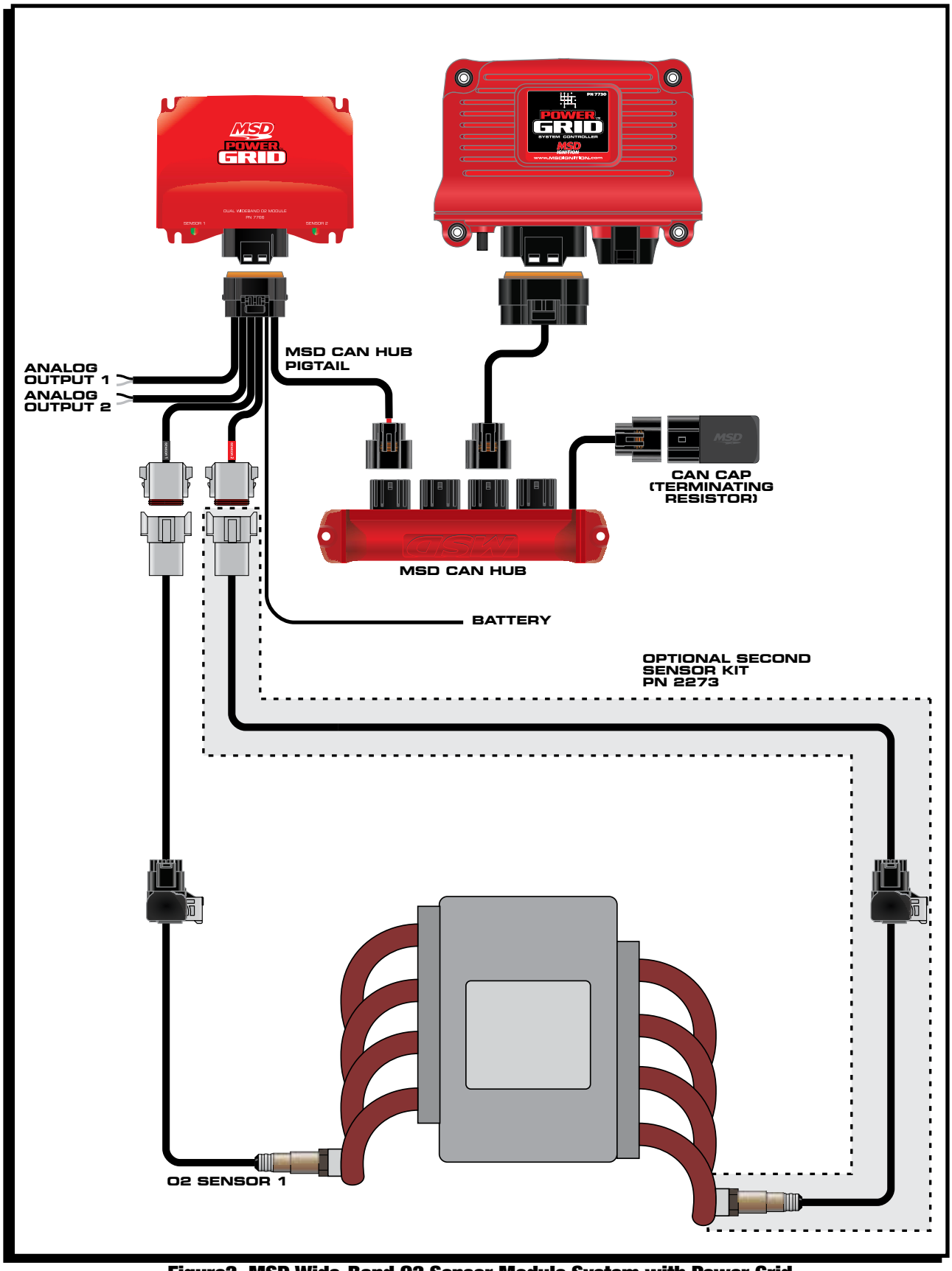


Figure2. MSD Wide-Band 02 Sensor Module System with Power Grid

OXYGEN SENSOR INSTALLATION

The boss fitting included in the kit is recommended and should be mounted to give the oxygen sensor a 10° to 170° angle on the upper half of the exhaust pipe. The short O2 boss walls reduce the risk of condensation and contamination.
Installing the O2 horizontal or lower on the exhaust pipe can expose the sensor to water which may cause breakage or malfunction. **(Figure 3)**

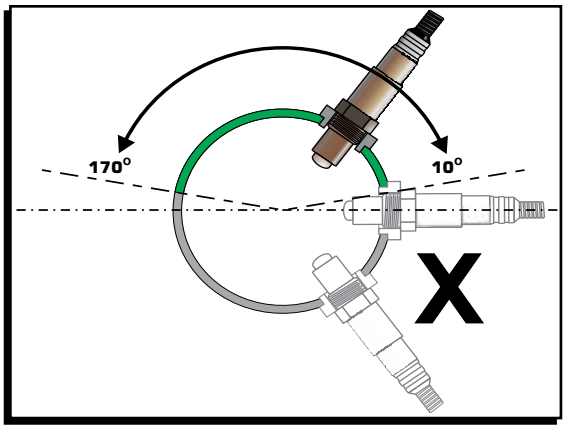


Figure3. Oxygen Sensor Mounting

The included oxygen sensor should be installed at +30 or -30 degree angle from the vertical direction **(Figure 4)**
The oxygen sensor wires should never bend over a 60 degree angle to stress the wires. This could damage the wire leads, or stress the grommet and allow contamination to seep into the sensor causing failure. **(Figure 5)**

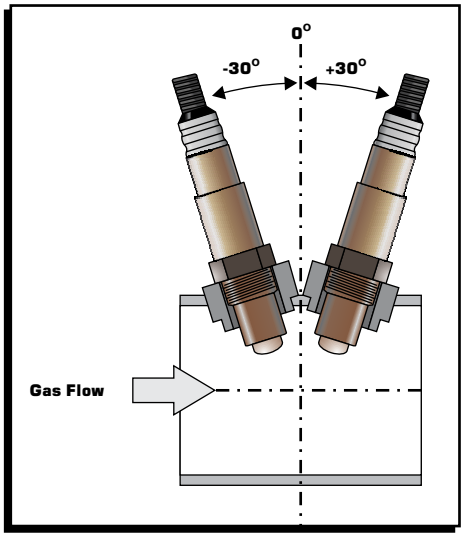


Figure4. 02 Sensor Orientation

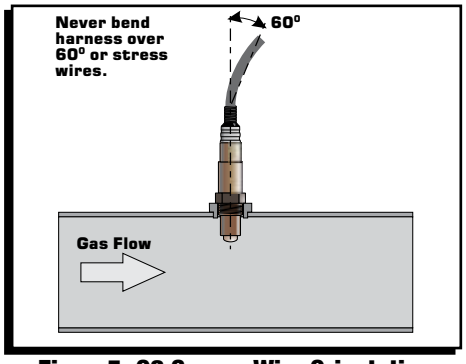


Figure5. 02 Sensor Wire Orientation

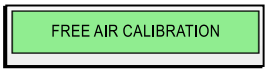
FREE AIR CALIBRATION

Note: The MSD Wide-Band O2 Sensor module uses the calibration resistor within the sensor's connector to correct the air-fuel readings. Therefore, the Free Air calibration is not required. Nevertheless, free air calibration will obtain the maximum possible accuracy.

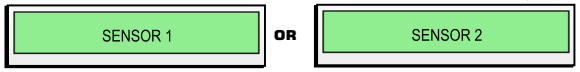
To accurately calibrate the MSD Wide-Band O2 Sensor module, the sensor must be placed in an environment with 21% oxygen and operating at normal temperature. Therefore, the sensor must be removed from the exhaust, away from combustion gasses and heated to its operating temperature.
The user initiates the Free-Air-Calibration command via MSD View.

FREE AIR CALIBRATION PROCESS

1. Engine OFF.
2. Place the oxygen sensors in clean free air environment.
3. Connect PC to the MSD Wideband Oxygen sensor module, via the PN 7730 Power Grid.
4. MSD View running.
5. Ignition Power - ON (Engine OFF).
6. Press the left button labeled “FREE AIR CALIBRATION.”

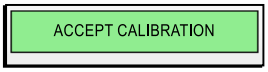


7. Press the button for the sensor to calibrate, “SENSOR 1” or "SENSOR 2".

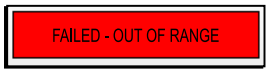


8. After Warm-up and Calibration in progress is complete, press the “ACCEPT CALIBRATION” button to confirm the calibration process and store the Calibration values.

The Heater will turn OFF.



9. If the button turns red (FAILED - OUT OF RANGE), make sure the sensor is removed from the exhaust pipe. If the sensor is removed and fails, the sensor will need to be replaced.



10. Turn the Ignition OFF and return the Sensors to their location when calibration is complete.

SETTINGS & PROGRAMMABLE SETTINGS

SETTINGS

Under the SETTINGS tab the user can scale the air-fuel ratio range of the analog voltage output, and select the fuel calibration value used to convert lambda to air-fuel ratio. **(Figure 6)**

O2 AFR Low Limit: This setting controls the low limit of the air-fuel ratio. 0.5 volts output voltage would be equal to this AFR setting.

O2 AFR High Limit: This setting controls the high limit of the air-fuel ratio. 4.5 volts output voltage would be equals to this AFR setting.

Fuel Calibration: This setting controls the calibration value used in the lambda-to-AFR conversion. For fuel calibration options see **Table 2**.

Heater: Auto Wideband O2 heater is powered off after 30 seconds with no detectable engine speed.

Always ON The sensor's heater voltage is ON while the ignition is ON.

Custom Fuel Calibration: Custom fuel calibration value (Stoichiometric AFR) entered by the user is only available when the user selects CUSTOM in the Fuel Calibration setting. **(Table 2)**

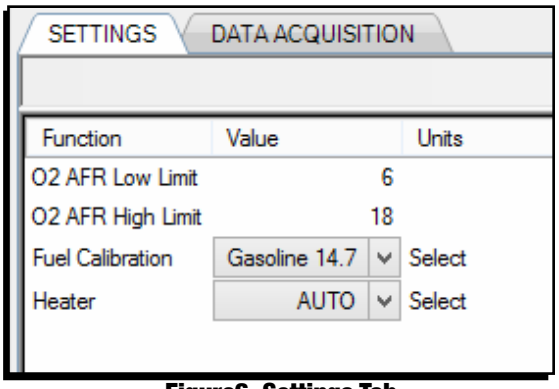


Figure6. Settings Tab

Stoichiometric AFR's for various fuels	
Gasoline	14.7
Methanol	6.4
Ethanol	9
E85	9.8
Propane	15.5
Diesel	14.6
Methane	17.2
Lambda	1
Custom	User configurable

Table2. Fuel Calibration Options

DATA ACQUISITION

The data acquisition in this module works in conjunction with the Power Grid data recorder **(Figure 7)**. It can record the AFR and heater voltage. When connected to the Power Grid, the Wide-Band O2 sensor sends the enabled data acquisition channels over the CAN bus to be recorded by the Power Grid. These channels will be recorded at a rate of up to 10 samples per second. **(Table 3)**

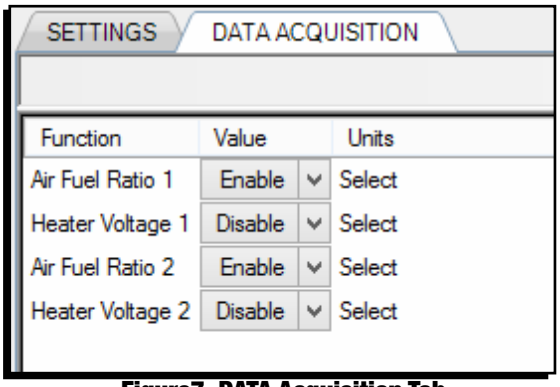


Figure7. DATA Acquisition Tab

ANALOG OUTPUTS

Each of the Wide-band channels has a corresponding analog voltage output. The output(s) can be used with an analog gauge or a different data acquisition using the Analog 1 (Orange, Brown paired wires) and Analog 2 (Orange/White, Brown/White paired wires).

Connect the Orange and/or Orange-White wires to the analog inputs of the other devices. The Brown wires need to be connected to the target device for reference ground.

The user can set the output range while connected with MSD View. "O2 AFR Low Limit" corresponds to 0.5 Volts and "O2 AFR High Limit" corresponds to 4.5 Volts. **(Figure 8)**

CHANNELS	
CHANNEL	**DESCRIPTION**
Air Fuel Ratio 1	AFR Measurement - Sensor 1
Heater Voltage 1	Heater Voltage Sensor 1
Air Fuel Ratio 2	AFR Measurement - Sensor 2
Heater Voltage 2	Heater Voltage Sensor 2

Table3. Data Acquisition Channels

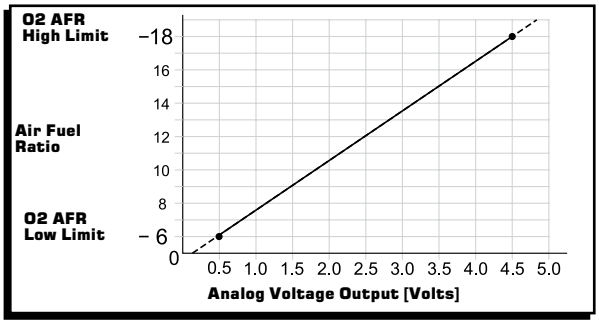


Figure8. Default Gasoline Air Fuel vs Voltage

MONITOR ITEMS

Under the Monitor/Gauge tabs, a real time display of the oxygen sensor readings such as Air Fuel Ratio, Heater Voltage, Sensor Calibration and Battery Voltage can be displayed. **(Figure 9)**

Sensor Calibration will show 'CALIBRATED' if the oxygen sensor was calibrated via the Free Air Calibration process covered on page 4. Otherwise the display will show 'DEFAULT'.

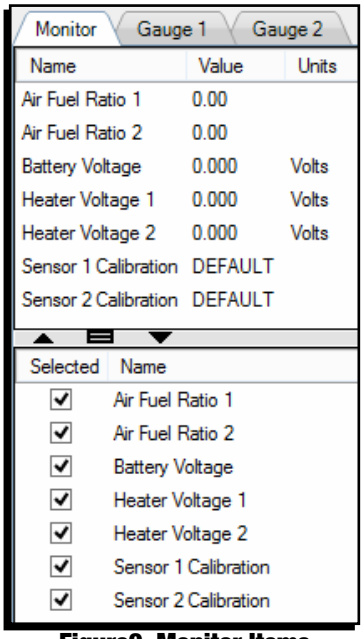


Figure9. Monitor Items

ALERTS

Alerts can assist in trouble shooting certain issues that affect the operation of the Dual Wide Band O2 module.
The alerts window will display both active and older alerts **(Figure 10)**. The alerts pop up window can be disabled by checking the 'Disable auto Popup' box and the history of alerts can be cleared using the 'Clear History' button. See **Table 4** for the list of alerts for the Dual Wide Band O2 module.

ALERTS	
ALERT	**DESCRIPTION**
Low Battery Voltage	Battery Voltage is Low
High Battery Voltage	Battery Voltage is High
Heater 1 Open	Connection to Heater 1 is open
Heater 2 Open	Connection to Heater 2 is open
EEPROM Error	Internal Error. Requires setting "Defaults" (under the "Edit" menu) and "Clear History". If this does not correct the error, contact customer service.

Table4. Alerts

Figure10. Alerts

WIRING CHART

FUNCTION	PIN	WIRE COLOR	WIRE DESCRIPTION	NOTES
CAN	1	Black 22Ga	Can Lo	Data Acquisition Connects To Power Grid Can Bus
	2	Gray (Yel Slv)	Can Shield	
	3	Black	Ground	
	4	Red 22Ga	Can Hi	
	5	Red	Ignition 12V	
	6	Not Used	Not Used	
O2 (Sensor 1)	1	Black/Red	Heater Voltage H+ / Uh+	Connect To Oxygen Sensor (PN 2268)
	2	Black/White	Heater Voltage H- / Uh-	
	3	White	Pump Current Ape / Ip	
	4	Black	Nernst Voltage / Com	
	5	Gray	/ Vs	
	6	Green	/ Rcal	
	7	Green/White	/ Rcal 0 V	
	8	-	Not Used	
O2 (Sensor 2)	1	Black/Orange	Heater Voltage H+ / Uh+	Connect To Oxygen Sensor (PN 2268)
	2	Black	Heater Voltage H- / Uh-	
	3	Yellow/White	Pump Current Ape / Ip	
	4	Orange/Black	Nernst Voltage / Com	
	5	Gray/White	/ Vs	
	6	Lt. Green	/ Rcal	
	7	Brown/Green	/ Rcal 0 V	
	8	-	Not Used	
Analog 1	1	Orange	0-5 Volt A/F Output	Output Voltage Can Be Calibrated Via Msd View. The Default Output Voltage, 0.5 -4.5V, Corresponding To An Afr (Air Fuel Ratio) Of 9-18 On Gasoline. A 0.5 Volt Reading Is An Afr Of 9 And 4.5V Is An Afr Of 18.
	2	Brown	Reference	
Analog 2	1	Orange/White	0-5 Volt A/F Output	
	2	Brown/White	Reference	
Loose Wire	-	Red	Battery +	Continuous Power Source

MSD INSTALLATION INSTRUCTIONS

TECH NOTES

Service

In case of malfunction, this MSD component will be repaired free of charge according to the terms of the warranty. When returning MSD components for warranty service, **Proof of Purchase** must be supplied for verification. After the warranty period has expired, repair service is based on a minimum and maximum fee.

All returns must have a Return Material Authorization (RMA) number issued to them before being returned. To obtain an RMA number please contact MSD Customer Service at 1 (888) 258-3835 or visit our website at www.msdperformance.com/rma to automatically obtain a number and shipping information.

When returning the unit for repair, leave all wires at the length in which you have them installed. Be sure to include a detailed account of any problems experienced, and what components and accessories are installed on the vehicle. The repaired unit will be returned as soon as possible using Ground shipping methods (ground shipping is covered by warranty). For more information, call MSD at (915) 855-7123. MSD technicians are available from 7:00 a.m. to 5:00 p.m. Monday - Friday (mountain time).

Limited Warranty

MSD warrants this product to be free from defects in material and workmanship under its intended normal use*, when properly installed and purchased from an authorized MSD dealer, for a period of one year from the date of the original purchase. This warranty is void for any products purchased through auction websites. If found to be defective as mentioned above, it will be repaired or replaced at the option of MSD. Any item that is covered under this warranty will be returned free of charge using Ground shipping methods.

This shall constitute the sole remedy of the purchaser and the sole liability of MSD. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representation whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall MSD or its suppliers be liable for special or consequential damages.

*Intended normal use means that this item is being used as was originally intended and for the original application as sold by MSD. Any modifications to this item or if it is used on an application other than what MSD markets the product, the warranty will be void. It is the sole responsibility of the customer to determine that this item will work for the application they are intending. MSD will accept no liability for custom applications.

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