Lumenition®

Air/Fuel Ratio Monitor

AFR003

Fitting Instructions

Description:

The Lumenition air/fuel meter is a precision, miniature instrument that provides an easy to read real time indication of the air/fuel ratio of an internal combustion engine. It may be used with either an existing or dedicated EGO (Exhaust Gas Oxygen) sensor. High impedance, precision circuitry is used to avoid loading the output of the EGO sensor while rejecting noise and preserving accuracy.

The output of the Lumenition air/fuel meter is a 10 segment, 3-colour LED display. The use of colour makes the meter readable with peripheral vision. It is calibrated for a 1V full-scale input range and sensitivity of 0.1V per display segment.

The Lumenition air/fuel meter is particularly useful with modified engines to assure proper air/fuel ratio. It is an ideal monitoring tool when calibrating engine air/fuel ratio or making adjustments while driving.

Features:

- Three colour display can be read with peripheral vision
- Dimming feature automatically reduces brightness at night
- Miniature size allows wide range of installation options
- Differential inputs reject induced noise and preserve accuracy
- Signal filtering enhances readability of the display
- High input impedance does not effect operation of the EGO sensor
- Battery reversal protection

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Installation Instructions:

1) Find a suitable location to mount the air/fuel monitor. Its small size and light weight make it possible to mount the unit in a wide variety of locations.

WARNING! One of the screws on the bottom of the meter is connected internally to +12V. Make sure that the screws do not contact chassis earth. Note that the screw heads are recessed and the bottom of the meter is normally spaced away from the mounting surface by velcro.

2) Secure the unit in place after routing the wires behind the dashboard. The most common method of mounting is with the self-adhesive velcro supplied. Position the display so that it is easily seen from the driver's seat.

WARNING! Disconnect the negative terminal of the battery before connecting the **RED** and **BLACK** leads. Be sure you know the code if you have an anti-theft radio before disconnecting the battery.

3) Find a convenient screw that is connected to chassis earth. Connect the **BLACK** wire to that screw using one of the ring terminal crimp connectors.

4) Locate a suitable fused +12V connection. Frequently the best place is on the fuse block. Connect the **RED** wire to +12V with either a butt or push-on crimp connector.

5) Connect the **ORANGE** wire to the signal output of the oxygen sensor. This is the black wire on the HEG001 sensor. A butt or insulation piercing crimp connector may be used. If you are connecting to an existing oxygen sensor do not disconnect it from the vehicle's computer.

6) Connect the **BROWN** wire to the signal earth of the oxygen sensor. This is usually the grey wire on a 4-wire EGO sensor. The HEG001 sensor does not have a signal earth wire, connect the **BROWN** wire to earth at the engine block or to earth at the same place as the **BLACK** wire.

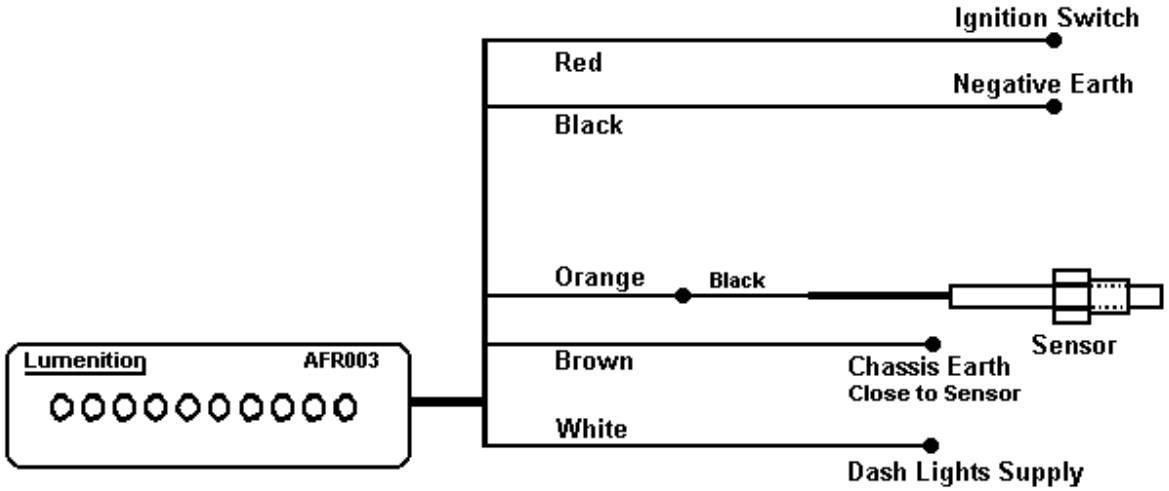
7) Connect the **WHITE** wire to the dashboard panel lights with a butt or insulation piercing crimp connector. A convenient location can be found at the fuse block or leading to one of the dash lights.

8) Reconnect the negative terminal of the battery.

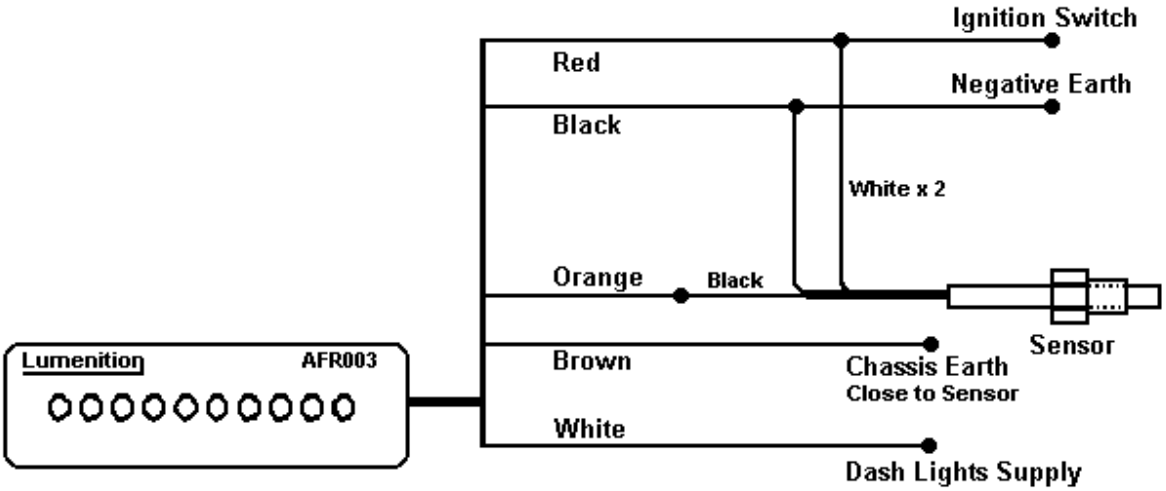
If you have any difficulty with installation, please call us at 020 7403 4334 for assistance. We hope you enjoy the precise, filtered operation of your new Lumenition air/fuel ratio monitor. Keep us in mind when your needs call for an oxygen sensor or air/fuel ratio calibrator.

Autocar Electrical Eqpt. Co. Ltd.
49/51 Tiverton Street
LONDON, SE1 6NZ

Connection for Single Wire Lambda Sensor



Connection for Three Wire Lambda Sensor



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Wire Assignments:

Label	Function	Wire Colour.
BATT +	Battery positive (+12V)	Red
BATT -	Battery negative (chassis earth)	Black
EGO +	EGO sensor output	Orange
EGO -	EGO sensor earth	Brown
LIGHT	Instrument panel lighting (+12V =ON)	White

Typical Display Characteristics:

LED	Colour	Min(V)	Max(V)	A/F Ratio	Lambda
1	RED	0	0.1	17.0:1	1.16
2	RED	0.1	0.2	16.0:1	1.09
3	RED	0.2	0.3	15.5:1	1.05
4	YELLOW	0.3	0.4	15.0:1	1.02
5	YELLOW	0.4	0.5	14.7:1	1.00
6	YELLOW	0.5	0.6	14.6:1	0.99
7	YELLOW	0.6	0.7	14.5:1	0.98
8	GREEN	0.7	0.8	14.2:1	0.97
9	GREEN	0.8	0.9	13.2:1	0.90
10	GREEN	0.9	1.0	12.5:1	0.85

Based on the EGO sensor at 650°C. The EGO will produce similar readings over a temperature range of 450°C to 800°C. At temperatures above this range, very rich readings indicate lower air/fuel ratios (more rich). At temperatures below this range, very rich readings indicate higher air/fuel ratios (less rich).

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How to Interpret the Display:

The segment illuminated indicates the instantaneous air/fuel ratio of the engine. The exact air/fuel ratio is a function of the particular EGO sensor that is used. When used with an EGO sensor with known output voltage characteristics such as the HEG001 shown in the table above, precise readings can be made. EGO sensors must be up to their normal operating temperature before they produce valid readings. After an engine runs for few minutes, its hot exhaust gas will appropriately elevate the temperature of the EGO sensor. A heated sensor will provide valid readings more quickly.

Most EGO sensors will indicate a stoichiometric air/fuel ratio of 14.7:1 with an output voltage of approximately 0.45V. This voltage corresponds to the fifth segment of the display, which is the second of the four yellow segments. In general terms, yellow indicates a near stoichiometric condition. At this operating point, the engine is mixing the proper ratio of air and fuel for complete combustion. This is the operating point for optimum driveability and economy as well as minimum emissions.

When a green segment is illuminated, the engine is running in a rich condition. A rich air/fuel ratio is associated with values less than 14.7:1. Rich operation corresponds to higher output power, lower fuel economy and higher emissions of carbon monoxide and hydrocarbons.

Red segments indicate a very lean condition. Very lean operation must be avoided when the engine is under load. Such operation results in fuel starvation and higher engine temperatures.

In closed loop applications, when the engine is operating near the stoichiometric point, the ECU continuously adjusts the air/fuel ratio. As a result the display will cycle, or dither, above and below the stoichiometric point typically at a rate of about once per second. Such cycling indicates that the ECU is able to dial in the correct air/fuel ratio.

Electrical Characteristics:

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	BATT+ to BATT-	10	13.5	16	V
Input Voltage	EGO + to EGO -	0		1	V
Dimming Voltage	LIGHT to BATT-	2	13.5	16	V
Input Resistance	EGO +	1.8			MOhms
Supply Current	BATT+ terminal (day)		40		mA
Supply Current	BATT+ terminal (night)		10		mA