

MICROTECH AF-1 AIR/FUEL RATIO METER

The MICROTECH AF-1 makes easy work of optimising the performance of an engine. Designed to work with petrol, alcohol, L.P.G., ~~or (optionally) diesel~~ powered motors, it is an indispensable tool for your motor workshop or performance vehicle.

Although primarily designed as a workshop tool, the case of the AF-1 has mounting holes and a pull-out plug which allow for simple permanent installation into a vehicle. With the purchase of an extra harness and sensor kit, permanent installations into other vehicles is possible; simply plug the meter into the vehicle you are using.

LAMBDA SENSOR

The lambda sensor supplied with the AF-1 kit is of a specific type suited to this application. Connecting the AF-1 to another type of sensor may cause damage to the meter, and would not give accurate results at any rate.

As the lambda sensor needs to be hot to operate correctly, an internally heated type is used. This allows for greater accuracy at lower exhaust temperatures (eg. at idle), and quicker warm-up: the meter will read accurately a couple of minutes after start-up. However, the heater element should be disconnected if the application involves exhaust temperatures in excess of 800C. Disconnect the plug with two white wires which runs from the AF-1 meter to the lambda sensor in order to turn off the heater.

If permanently installing the AF-1 into a vehicle, the lambda sensor should be installed into the exhaust system. The sensor should be screwed into a matching thread, and torqued to 50-60 Nm. The actual position to do this is not crucial, but it should be at least 50cm away from the exhaust ports to prevent damage to the sensor through excessive heat.

The life expectancy of the lambda sensor is quoted at approximately 500 Hrs, but usage with leaded fuels causes lead build-up on the sensor probe, and may reduce operating life to as little as 50 Hrs.

CONNECTIONS

- * Clamp the lambda sensor assembly into the vehicles tail pipe, and plug the two connectors into the wiring loom from the AF-1 meter. (NOTE that if the application involves exhaust temperatures in excess of 800C., the plug with two white wires SHOULD NOT be connected).
- * Plug the AF-1 meter into the vehicles cigarette lighter, or
- * Connect the RED wire of the extension harness to the positive (+) terminal of the vehicle battery, and the BLACK wire to the negative (-) terminal.
(NOTE: the AF-1 meter has a 6A fuse contained in the cigarette lighter plug).

OPERATION

When the connections have been made, the motor may be started. The lambda sensor needs to warm up in order to function correctly; this takes about 2 minutes.

On the right hand side of the AF-1 is a 3-way switch with 3 corresponding indicator lamps. Use this to set the AF-1 for the type of fuel you are using:

UP (GREEN)	= PETROL
CENTRE (YELLOW)	= ALCOHOL
DOWN (RED)	= L.P.G.

Once the lambda sensor is warm, the air/fuel ratio will be shown on the display of the AF-1. Or, more correctly, the amount of air being used per unit of fuel, eg: if the AF-1 displays a value of 14.7, this means that 14.7 parts of air are being used to every one part of fuel; the air/fuel ratio is 14.7 : 1.

Having this information available in a portable form makes light work of fine tuning your carburetors or fuel injection system to achieve peak performance from your motor, whether you are looking for extra power, cleaner emissions, or better economy, use the chart below as a guide.

A WORD ABOUT "LAMBDA"

"Lambda" is an industry standard value which relates to the operating efficiency of an engine. A lambda value of 1.00 indicates a running state with the ideal air/fuel ratio (no excess fuel or excess oxygen in the mixture). A lower lambda value indicates a richer running condition (more power), and conversely a higher lambda value indicates a leaner running condition (better economy).

This chart shows the correlation of lambda to air/fuel ratio, and is a useful tool when fine tuning.

PETROL	L.P.G.	ALCOHOL	LAMBDA	
11.0	11.6	4.8	0.75	
11.8	12.4	5.1	0.80	
12.5	13.2	5.4	0.85	POWER
13.2	14.0	5.8	0.90	
14.0	14.7	6.1	0.95	
14.7	15.5	6.4	1.00	EMISSIONS
15.4	16.3	6.7	1.05	
16.2	17.1	7.0	1.10	
16.9	17.8	7.4	1.15	ECONOMY
17.6	18.6	7.7	1.20	
18.4	19.4	8.0	1.25	

NOTES

*Fuel requirements vary according to the immediate operating conditions of the motor, ie: a richer mixture will be required when the motor is under load than is required at cruise or idle. The specific fuel requirements must be found by experimentation.

*Turbocharged motors require a richer mixture to help reduce exhaust temperatures. Leaning the mixture out too far may cause thermal damage to the turbocharger.

*If the engine misses due to flooding (over-rich mixture), unburnt air/fuel mixture is passed straight through the exhaust system. This may cause the AF-1 to falsely indicate a lean condition due to unburnt air in the exhaust gasses.

The MICROTECH AF-1 is guaranteed for a period of 24 months (2 years) from the date of purchase against defective parts or faulty workmanship on electronics. There is no warranty on the lambda sensor. MICROTECH reserves the right to inspect any faulty unit and to repair or replace as seen fit by the company. MICROTECH accepts no responsibility for failure or damage caused by incorrect fitting or inappropriate usage of the AF-1.