

M&W NTK2000 UEGO SENSOR SYSTEM

The Ultimate Tuning Tool

The M&W Uego system uses a **U**niversal **E**xhaust **G**as **O**xygen sensor and this works completely differently from a normal oxygen sensor you would find in your car. It allows precise measurement over a wide AFR range. UEGO sensor systems are used by all original equipment manufacturers for ECU mapping and are also widely used in motorsports including F1.

The microprocessor controlled M&W Uego controller features a fully **linearized real time 0 to 5 volt analog output** giving 10 to 20/1 air fuel ratio. This simple scaling allows easy input into data acquisition systems and engine management systems. 12V operation with a cigarette lighter plug allows easy fitment for vehicle testing. The RS232 port allows connection to IBM compatible computers and laptops with DOS, Windows95/98/NT/2000/XP and PocketPC software available. The controller uses a **true wide range** NGK sensor which when used with the tail pipe probe adapter provides a very versatile tuning tool for engine mapping and diagnostic purposes.



Tail pipe probe has a simple clamp mounting. The cable may be installed through the rear hatch or window.

The system consists of a M&W Uego controller, wiring harness, NGK wide range sensor, tailpipe probe and various display and recording device options.

The NGK/NTK wide range UEGO sensor

The sensor uses a special pumping cell which gives a current output depending on the air fuel ratio. This is completely different to a "normal" oxygen sensor. The pumping cell design allows measurement of air fuel ratios over the whole range whereas a "normal" oxygen sensor is only capable of measuring a small range either side of 14.7/1 air fuel ratio. Each wide range sensor is calibrated and supplied with a calibration chip which can be easily changed should a replacement sensor be required.

Note: the sensor contains a ceramic module and should not be subject to mechanical or thermal shock or it may be damaged.



Type:

NGK/NTK L1H1 or L2H2 wide range 5 wire sensor. (Exhaust temperature should not exceed 800°C)

Warmup time:

approx 30 seconds @ 25°C ambient

Weight:

85 grams

Heater Current:

1.5A at 12.8V approx. warm

Note: 12V min recommended

Mounting:

M18 X 1.5 thread

NOTE: sensor is not rated for continuous operation on high lead content fuels. Operation in this mode may limit sensor life to approximately 50 hours.

The M&W NTK2000 UEGO Controller



Compact controller module can be easily placed on the floor, mounted on the firewall or under the dashboard.

Specifications for NTK2000 Controller

Supply voltage:

12 to 15 volts DC (negative ground only)

Warmup time:

approx 30 seconds

Inputs:

- 1 X Uego sensor
- 1 X supply voltage (internal)

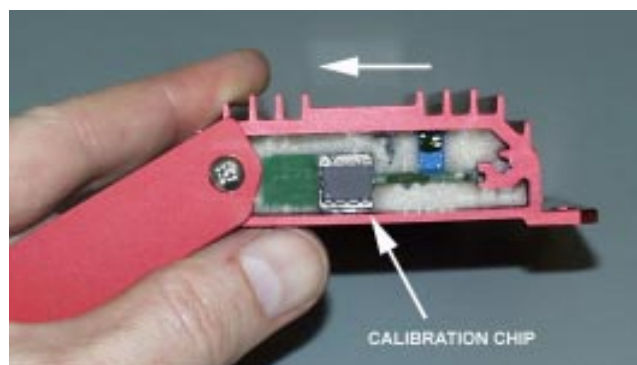
Outputs:

- 1 X RS232 port
- 1 X 0-5 volt DC analog output
(see graph on page 3 for output scaling)

Measuring range:

10 to 20/1 air fuel ratio

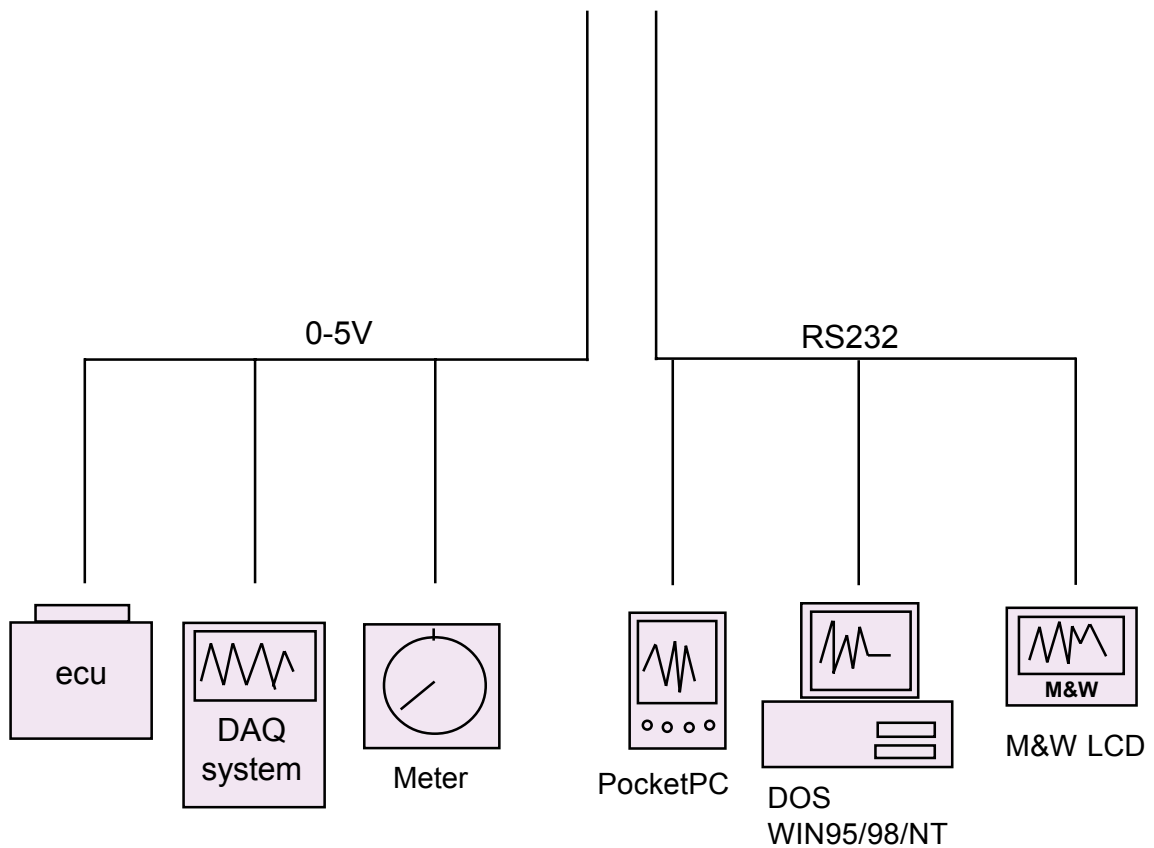
Each sensor is individually calibrated and comes with a calibration chip which can be easily changed by removing the controller end plate. The chip should be installed with the correct orientation as shown below.



Controller shown with end plate opened

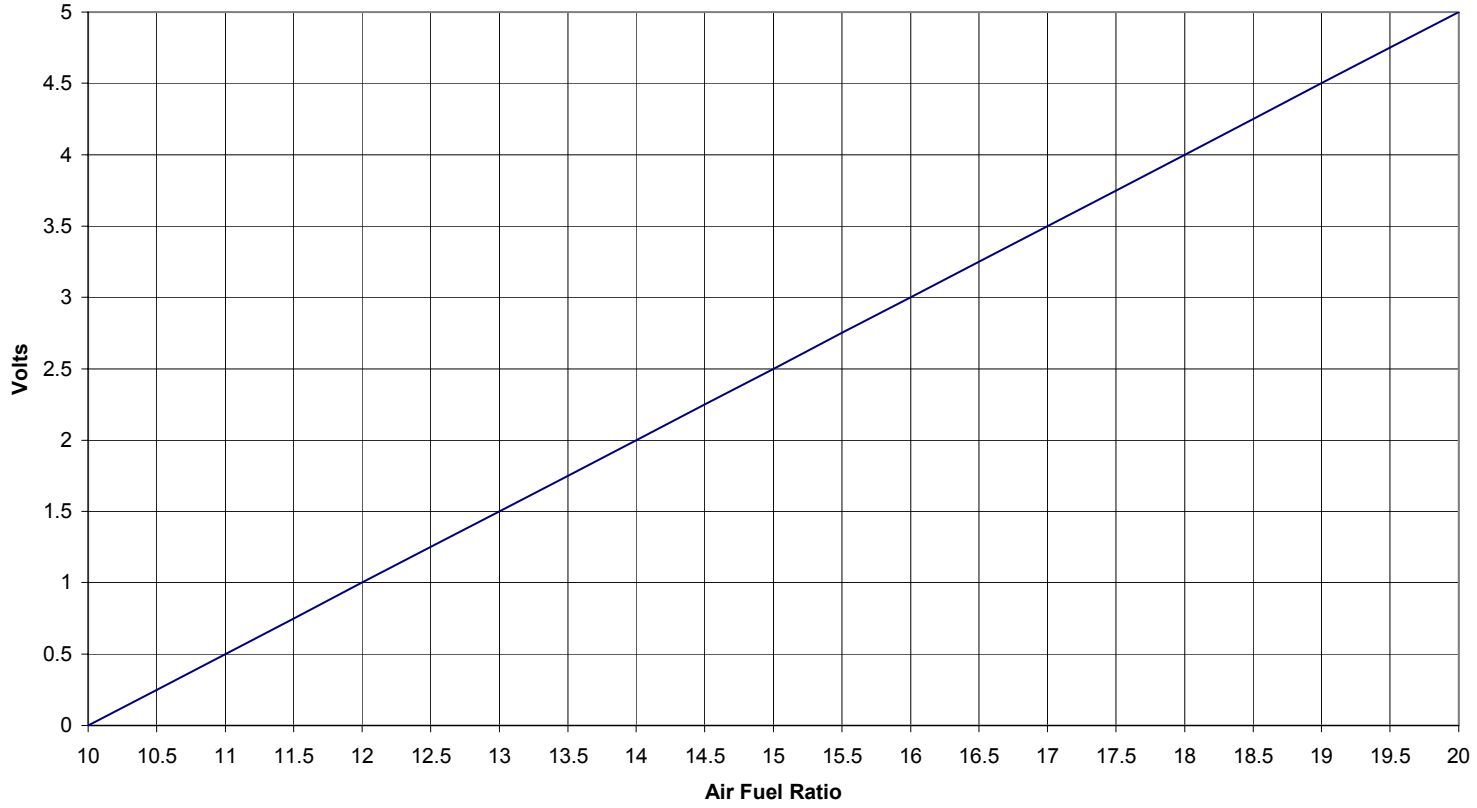
Output Configurations

0-5V analog output and RS232 provide common interface options.





M&W Uego Controller Analog Output

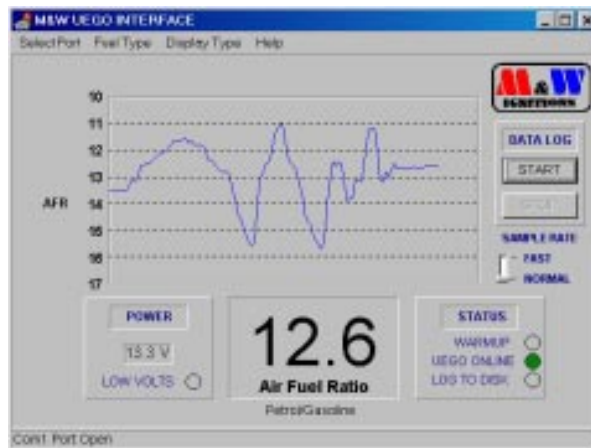


$$\text{AFR} = (\text{volts} \times 2) + 10$$

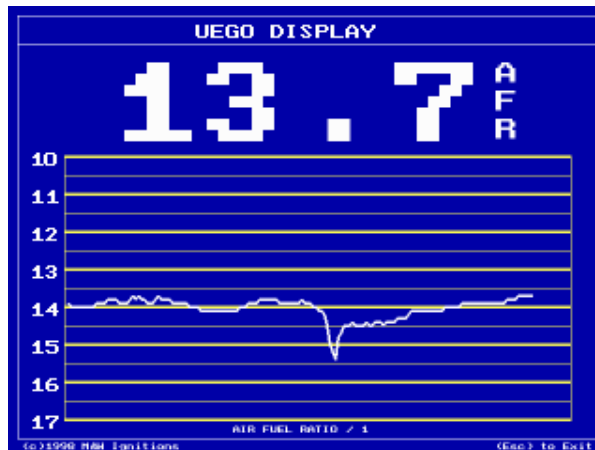
Output Scaling

Software

Software is available for DOS, PocketPC and Windows 95/98/NT/2000/XP. Interface uses a RS232 COM port connection. Windows version allows logging to disk in CSV format which may be loaded into a spreadsheet for analysis. Check the web site for the latest versions.



Dos, Windows and PocketPC versions of software feature real time moving trace display.



Operation

- (1) Insert probe with Uego sensor into exhaust tail pipe.
 - (2) Connect controller cable through back windows, hatch or trunk.
 - (3) Connect to lighter socket.
 - (4) Connect meter or laptop.
 - (5) Power may now be applied.
 - (6) Warm up cycle will take approx 30 seconds. During this time the laptop will display "WARMUP" and the meter should display 15/1 AFR.
 - (7) After warmup the current AFR will be displayed and tuning can commence.
- NOTE: Do not operate engine without power to controller when sensor is in the exhaust.

Tuning Recommendations

It is outside the scope of this document to describe correct tuning or engine mapping techniques however the following figures are offered as a guide:

Normally asperated engines at full load = 12.5 to 13.0 AFR

Turbo engines at full load = 11.0 to 12.5 AFR.

Cruise mixture both types = 14.0 to 14.7 AFR. (14.7 if closed loop operation)

Much can be learned by checking the manufactures settings as a starting point. The Uego is an ideal tool for such testing.

Tuning Tips

Be aware that on small engines with big exhausts it is not uncommon to get erratic measurements at idle. This is due to the small amount of exhaust gas available at idle. Also a strong wind can also affect this. When backing off the throttle while decelerating, erratic readings due to the same problem can be experienced.

Sensor Placement

The sensor may be removed from the tailpipe probe and mounted in the exhaust system however for all general tuning this is not necessary. If the sensor is mounted in the exhaust there is no need to place the sensor in the exhaust manifold as the heater has enough capacity to warm the sensor to operating temperature. In fact, it is generally safer to mount the sensor a little ways down the exhaust as the sensor must not exceed 800°C for any length of time. **The sensor should NOT be mounted in the exhaust manifold of a turbo charged engine. For turbo charged applications it must be installed after the turbo charger.**

DO NOT

- (1) Do not operate the sensor with high lead content fuels as this may reduce the sensor life to 50 hours.
- (2) Avoid tuning in the rain as this can cause excessive thermal shock to the sensor which may destroy the ceramic element. Also when tuning boats an influx of water into the exhaust will destroy the sensor if it is immersed.
- (3) Generally do not run the engine with the Uego installed without power applied to the controller.

NTK2000 UEGO KIT COMPONENTS

NTK2000 UEGO Kit contains:

- 1 X NTK2000 Uego controller .
- 1 X main wiring harness with lighter plug.
- 1 X RS232 cable.
- 1 X stainless steel tail pipe probe.
- 1 X NTK UEGO sensor.
- 1 X mini CD with PDF manual and PC software (95/98/NT/XP/DOS & PocketPC).
- 1 X aluminium carry case.



(NOTE: Multimode LCD shown in picture is an optional)

Display Options



M&W multimode LCD with AFR & Lambda modes



Windscreen mount option available



NORMAL GRAPH MODE



ZOOMED RICH SIDE GRAPH MODE



LARGE CHARACTER MODE



Laptop and Desktop
Dos/Win95/98/NT/2000/XP.



PocketPC (eg. Compaq iPAQ).



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