FuelTech

ALCOHOL-O2

High precision wideband
O2 sensor conditioner

Installation and Operation Guide

Summary

1. Presentation

FuelTech Alcohol O2 is a high precision tool used for monitoring and tuning internal combustion engines that runs extremely low AFRs, recommended mainly for Drag Race application.

The main differences in relation to WB-O2 Slim are the number of channels, the sensor type and the reading scale, capable of reading from 1.80 AFR Alcohol up to infinite.

The equipment also has analog outputs the O2 reading to send to FT500/FT500LITE.

1.1 Characteristics

Dual channel sensor input
AFR or lambda reading (from 1.80 AFR Alcohol up to free air)
0-5V analog outputs (same as the reading scale)
Free air calibration (when using FT500/FT500LITE)
CAN communication with FT500/FT500LITE (future update)

Dimensions:

4.5in x 3.5in x 1.8in

2. Warranty

The use of this equipment implies the total accordance with the terms described in this manual and exempts the manufacturer from any responsibility regarding to product misuse.

Read all the information in this manual before starting the product installation.

This product must be installed and tuned by specialized auto shops and/or personnel with experience on engine tuning.

Before starting any electric installation, disconnect the battery.

The inobservance of any of the warnings or precautions described in this manual might cause engine damage and lead to the invalidation of this product warranty. The improper adjustment of the product might cause engine damage.

This product does not have a certification for the use on aircrafts or any flying devices, as it has not been designed for such use purpose.

In some countries where an annual inspection of vehicles is enforced, no modification in the OEM ECU is permitted. Be informed about local laws and regulations prior to the product installation.

Important warnings for proper installation of this product:

- Always cut the unused parts of cables off – NEVER roll up the excess
- The black wire of the harness MUST be connected directly to the **battery's negative terminal**, as well as each one of the sensors' ground wires.

Limited Warranty

All products manufactured by FUELTECH are warranted to be free from defects in material and workmanship for one year following the date of original purchase. Warranty claim must be made by original owner with proof of purchase from authorized reseller. This warranty does not include sensors or other products that FUELTECH carries but did not manufacture. If a product is found defective, such products will, at FUELTECH's option, be replaced or repaired at cost to FUELTECH. All products alleged by Purchaser to be defective must be returned to FUELTECH, postage prepaid, within one year warranty period.

This limited warranty does not cover labor or other costs or expenses incidental to the repair and/or replacement of products or parts. This limited warranty does not apply to any product which has been subject to misuse, mishandling, misapplication, neglect (including but not limited to improper maintenance), accident, improper installation, tampered seal, modification (including but not limited to use of unauthorized parts or attachments), or adjustment or repair performed by anyone other than FUELTECH.

The parties hereto expressly agree that the purchaser's sole and exclusive remedy against FUELTECH shall be for the repair or replacement of the defective product as provided in this limited warranty. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as FUELTECH is willing and able to repair or replace defective goods.

FUELTECH reserves the right to request additional information such as, but not limited to, tune up and log files in order to evaluate a claim.

Seal violation voids warranty and renders loss of access to upgrade releases.

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3. Wideband O2 sensor

3.1 NTK sensor

The Alcohol O2 was developed to use a NTK wideband O2 sensor that is used in engine laboratories, because of its extreme accuracy and speed in reading at different AFRs. To purchase the NTK sensor, contact FuelTech.

3.2 Bosch LSU 4.2 sensor

As a lower cost alternative, you can use the same Bosch LSU 4.2 sensor used in WB-O2-Meter Slim, with Bosch part number 17014, 0258007057 or 0258007351 and VW 021-906-262-B.

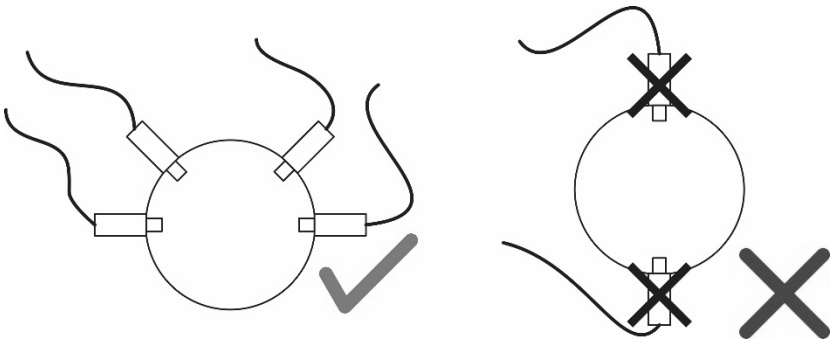
3.3 O2 sensor installation

The sensor must be inserted in the exhaust system in an angle between 10 to 80 degrees to horizontal position, that is, with its end downward, in such a way that steam droplets cannot be accumulated between the body of the sensor and its ceramic part, which could damage the sensor.

When installing the sensor after the turbo, it must have its tip exposed to the exhaust gas flow. When placing it before the turbo, on the exhaust manifold, its tip must stay hidden from direct exhaust gas flow.

The sensor must stay away from the cylinder head and from areas where one cylinder might affect the exhaust air more than the others. Avoid placing the sensor close to the exhaust manifold joints, as some allow the inflow of air, resulting in incorrect readings.

The sensor must never be installed in the exhaust in the 6 and 12 o'clock position. The correct is to install the sensor in the 2, 3, 9 or 10 o'clock positions.



4. Alcohol O2 installation and calibration

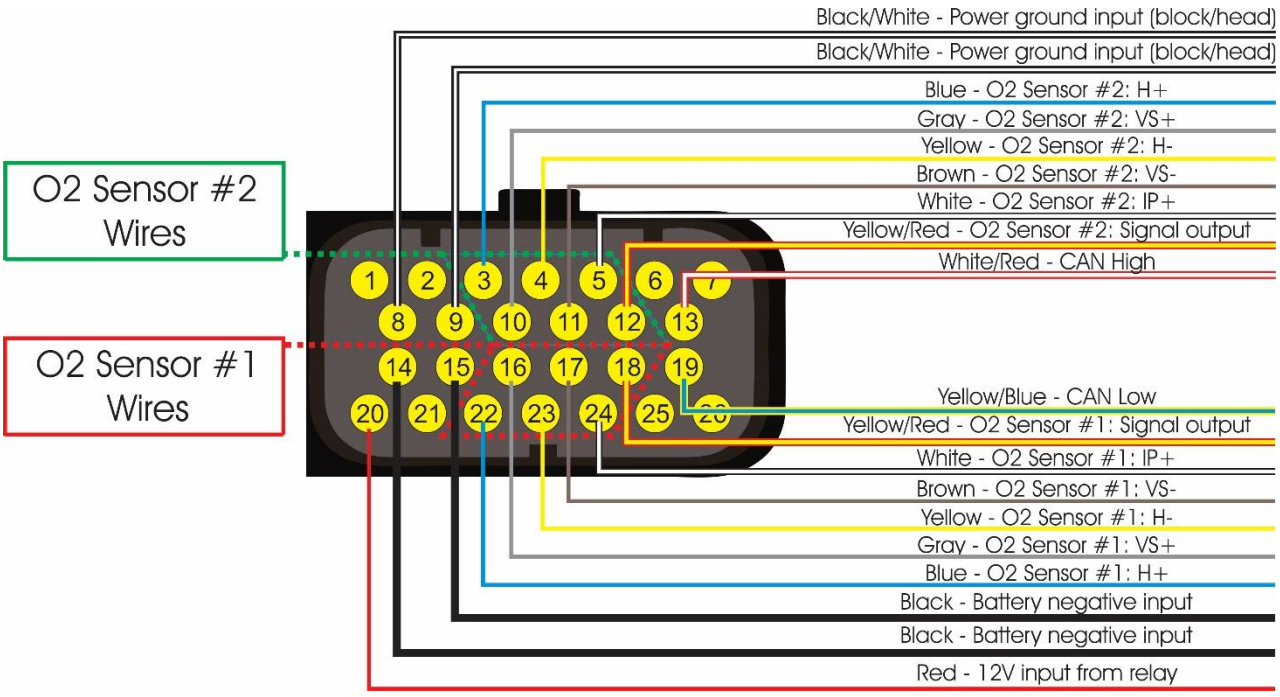
The Alcohol O2 has a sealed AMP connector, where you will find all the wires of sensors, feed, analog outputs and CAN.

See the following wiring diagram for details on the connections

4.1 Harness connection

Wire color	Pin	Function	Information
Blue	3	O2 #2 (right)	H+ O2 #2 (right)
Yellow	4	O2 #2 (right)	H- O2 #2 (right)
White	5	O2 #2 (right)	IP+ O2 #2 (right)
Black/White	8 e 9	Power ground input	Engine ground (head/block). Connect to chassis or engine head/block. **Do not connect it to the battery negative.**
Gray	10	O2 #2 (right)	VS+ O2 #2 (right)
Brown	11	O2 #2 (right)	VS- O2 #2 (right)
Yellow/Red	12	O2 #2 (right) analog output	0-5V analog output O2 #2 (right)
White/Red	13	CAN FT	CAN HI
Black	14 e 15	Battery's negative input	Connected **directly** to the battery. **Do not connect this wire to the chassis, engine block or head.**
Gray	16	O2 #1 (left)	VS+ O2 #1 (left)
Brown	17	O2 #1 (left)	VS- O2 #1 (left)
Yellow/Red	18	O2 #1 (left) analog output	0-5V analog output O2 #1 (left)
Yellow/Blue	19	CAN FT	CAN LO
Red	20	12V input from relay	Connect to pin 87 of Main relay. 15A fuse is recommended
Blue	22	O2 #1 (left)	H+ O2 #1 (left)
Yellow	23	O2 #1 (left)	H- O2 #1 (left)
White	24	O2 #1 (left)	IP+ O2 #1 (left)

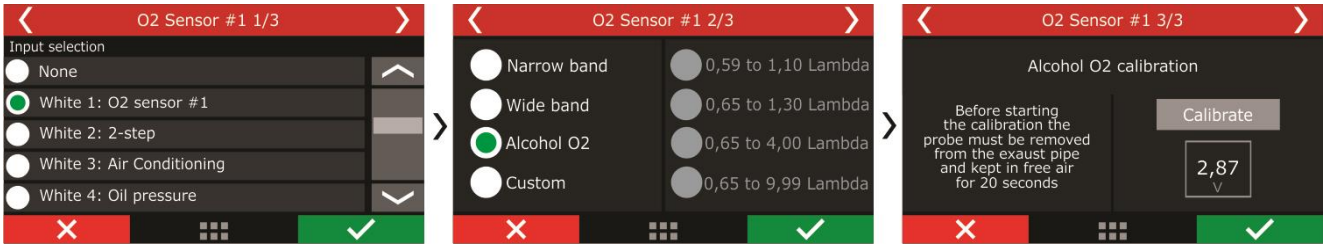
4.2 Harness wiring



4.3 Free-air calibration

To use the Alcohol O2 the free-air calibration of the sensors is mandatory. To perform this calibration, **remove** the sensor from the exhaust and let it ventilate for 20 seconds, power on the Alcohol O2 and the FT500.

After the sensors are heated wait at least 3 more minutes then go through the interface: Main Menu / Sensors and Calibration / O2 sensor (1 or 2) / Alcohol O2 and press calibrate.

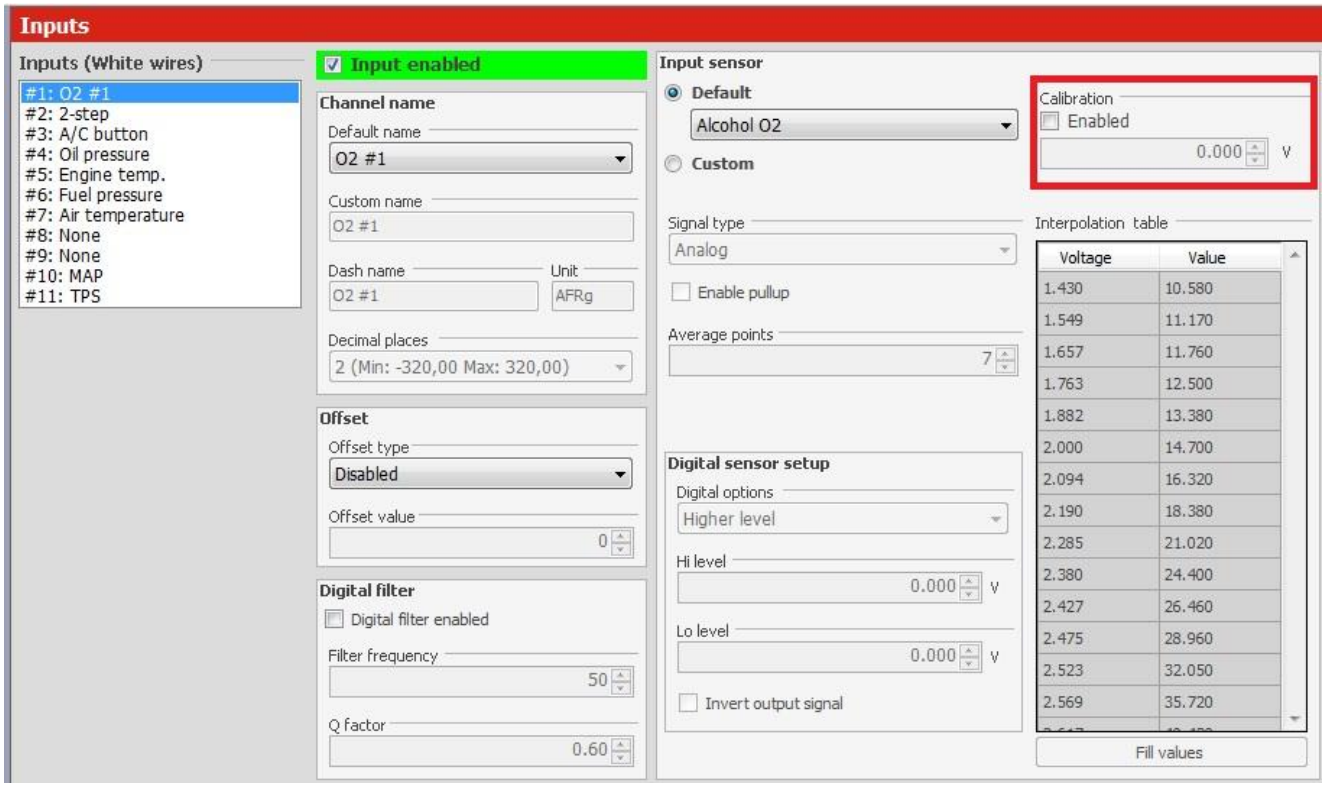


The free-air calibration also can be performed through FTManager Software. To reach the calibration screen, with an open map, go to **Sensors and Calibration** in the left menu, then enter **Inputs** and select the channels where the Alcohol O2 analog outputs are connected.

With the sensors **out** of the exhaust, turn the Alcohol O2 on and wait them to heat for at least 3 minutes. After that, enable the calibration.

This procedure must be done in both channels. Whit everything done, confirm changes, save the map and write ECU.

Below is the screen where the calibration is done:



For NTK sensors, free air voltage is around 3.000V. For Bosch sensors, free air voltage is around 2,700V.

While the sensors are heating, analog output voltage is 5.000V.

Voltage differences higher than 0.100V when heating may indicate a wrong calibration, a damaged sensor or a wiring problem, especially on the negative (black wire) and/or power ground (black/white wire).

4.4 Analog output Lambda/AFR X Voltage table

Voltage (V)	AFR (Gasoline)	AFR (Alcohol)	Lambda
0.048	4.120	1.800	0,280
0.521	6.470	2.820	0,440
0.765	7.640	3.340	0,520
1.003	8.530	3.720	0,580
1.145	9.260	4.040	0,630
1.287	10.000	4.370	0,680
1.430	10.580	4.620	0,720
1.549	11.170	4.880	0,760
1.657	11.760	5.140	0,800
1.763	12.500	5.460	0,850
1.882	13.380	5.840	0,910
2.000	14.700	6.420	1,000
2.094	16.320	7.130	1,110
2.190	18.380	8.030	1,250
2.285	21.020	9.180	1,430
2.380	24.400	10.660	1,660
2.427	26.460	11.560	1,800
2.475	28.960	12.650	1,970
2.523	32.050	14.000	2,180
2.569	35.720	15.600	2,430
2.617	40.430	17.660	2,750
2.665	46.310	20.220	3,150
2.711	53.950	23.560	3,670
2.736	59.240	25.870	4,030
2.760	65.420	28.570	4,450
2.783	72.770	31.780	4,950
2.808	82.320	35.950	5,600
2.854	110.250	48.150	7,500
2.902	167.870	73.320	11,420
2.973	343.250	149.910	23,350
3.006	470.400	205.440	32,000