



Part Number 30-2310  
INLINE WIDEBAND UEGO CONTROLLER

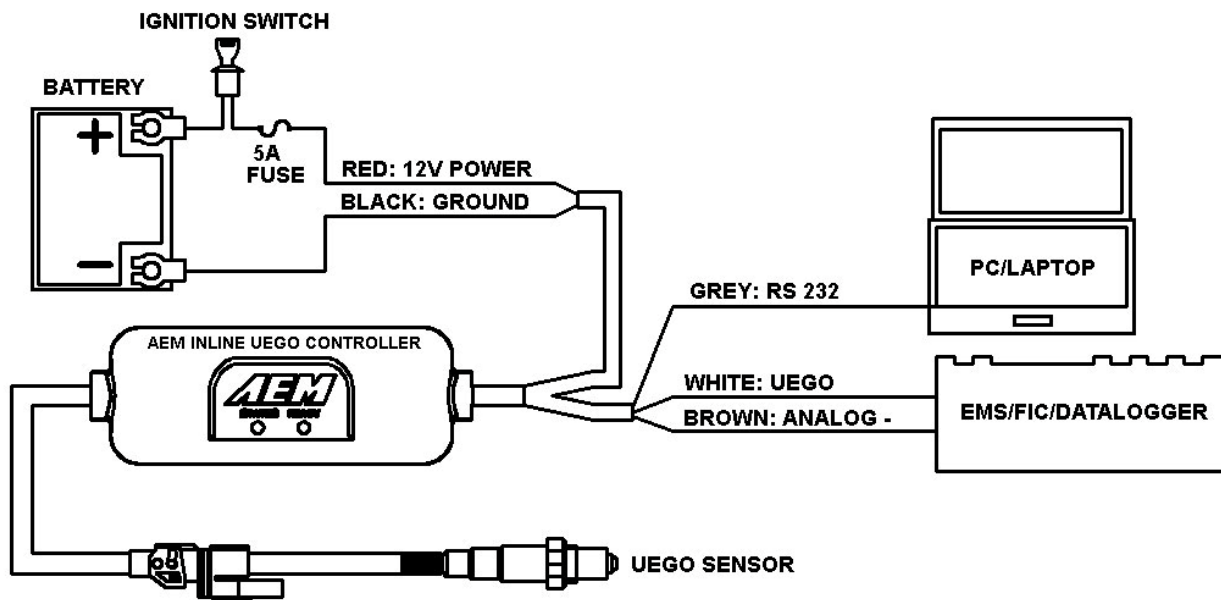


Figure 1. Wiring Schematic

**Inline Wideband UEGO Controller Parts**

- 1 x 30-2310 Inline Wideband UEGO Module
- 1 x 30-2001 UEGO Sensor
- 1 x 35-8535 Install Kit (UEGO Bung and 6 Butt Connectors)
- 1 x 10-2310 Installation Instructions
- 2 x Zip Tie

**INSTALLATION**

1. Disconnect the negative battery cable.
2. Find a suitable in-cab or under hood mounting location for the Inline UEGO controller, away from any direct heat or water sources and shielded from the elements. Secure the controller using the supplied zip ties as shown in Figure 3.
3. Connect the flying lead wires as shown in Figure 1.
4. Mount the UEGO sensor as shown in figure 2.
5. Plug the UEGO sensor connector on the UEGO controller into the mating connector on the UEGO sensor.

RED - Connect to a switched, fused (5A) 12 volt power source.

BLACK – Connect to a clean power ground.

WHITE - Connect to Lambda + Input.

BROWN - Connect to sensor ground. Connect to power ground if sensor ground is not available.

\*GREY – Connect to RS232 serial port on laptop/pc. See section on Serial Data Viewing

*\*optional – only needed for laptop/pc viewing of data.*

### **UEGO Sensor Mounting**

A weld-in UEGO bung is supplied for sensor installation. Mount the UEGO sensor in the exhaust system at least 18 inches downstream from the exhaust port. If you anticipate high EGT's (over 800C), run a turbocharger, run at high RPM for extended periods of time or plan on running leaded race fuel then you must mount the sensor at least 36 inches or more downstream of the exhaust port as all of these can cause the sensor to overheat. **On turbocharged engines the UEGO sensor must be installed after the turbo charger, if not, the pressure differential will greatly affect the accuracy of the unit.** For accurate readings, the sensor must be mounted before catalytic converters and/or auxiliary air pumps. To prevent collection of liquids between the sensor housing and sensor element during the cold start phase, the installation angle should be inclined at least 10° from horizontal with the electrical connection upwards, see Figure 2.

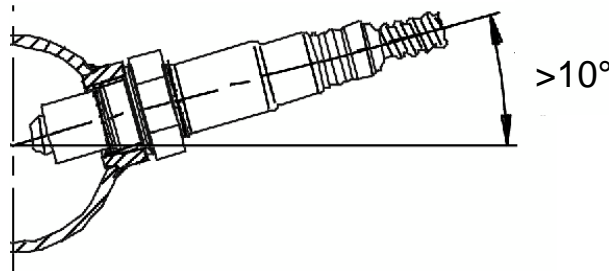


Figure 2. Minimum mounting angle for the UEGO Sensor

### **Controller Mounting**

The UEGO controller provides for quick and easy mounting with the supplied zip ties. See Figure 3 below.

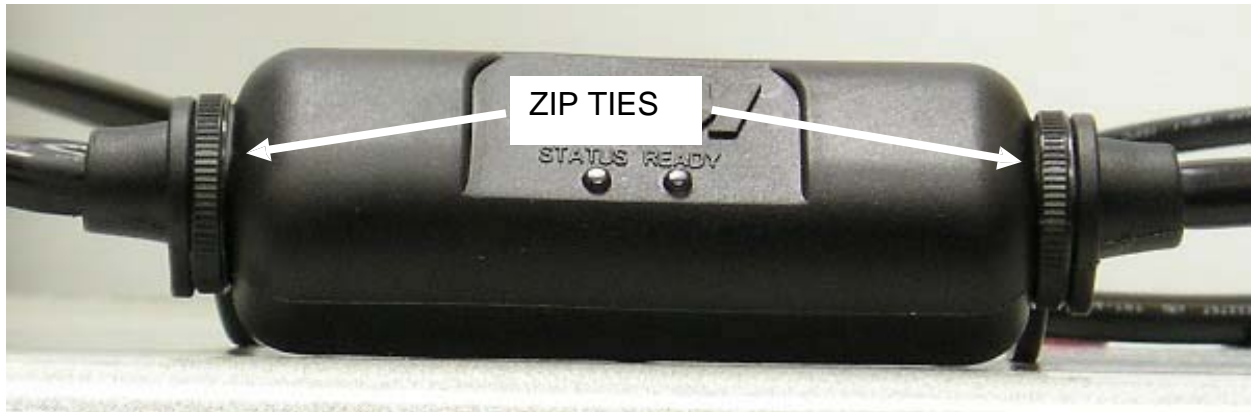


Figure 3. Inline Wideband UEGO Controller Mounting

### Indicator Lights

The Inline Wideband UEGO Controller has two indicator lights, see Figure 4. Both the ready light and the status light flash during sensor warm up. Once the sensor reaches operating temperature, usually within 30 seconds, the status light will turn off and the ready light will remain on solid. During sensor warm up, AFR readings may not be accurate. The status light will also flash if a sensor error is detected. The status light will flash on and off a number of times, followed by a short pause. The error codes are listed below in Table 1.

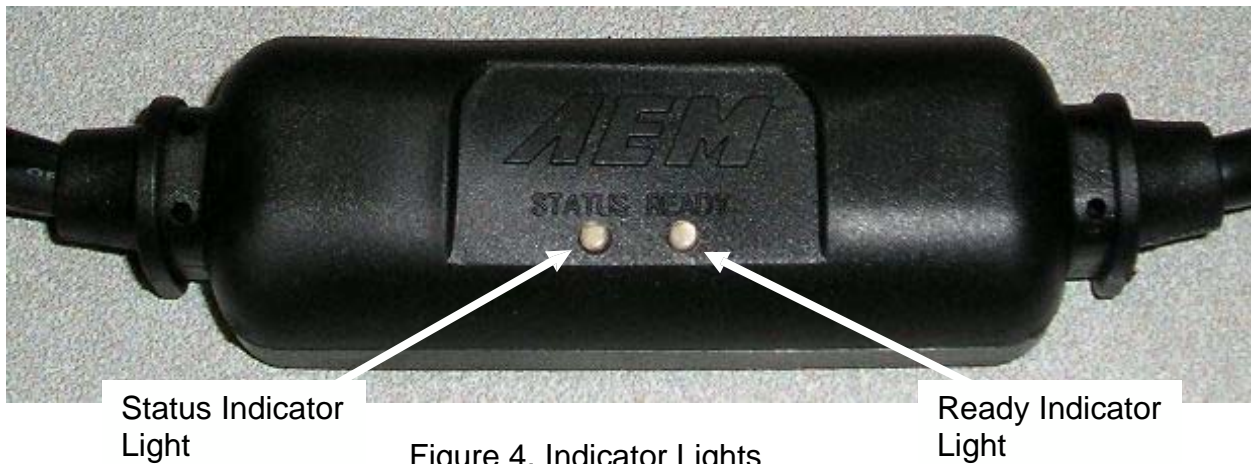


Figure 4. Indicator Lights

# of Flashes	Fault	Corrective Action
1-6	Sensor Wiring and/or sensor	Check sensor cable for broken wires/shorts
7	System voltage below 10 volts dc	Check electrical system for good connections and proper function

Table 1. Error Codes

## UEGO Analog Output

The analog output from the Inline Wideband UEGO controller is a linear dc voltage signal that varies from **0.5 Vdc at 8.5:1 AFR Gasoline (0.58 Lambda) to 4.5Vdc at 18.0:1 AFR Gasoline (1.22 Lambda)** over the operating range of the controller. The signal is used for sending information to a data logger or an engine management system like the AEM EMS or F/IC. The transfer function for the output is listed below.

$$\text{AFR} = 2.375(\text{V}) + 7.3125$$

For example, if the output is 2.0 Vdc, the AFR is 12.06:1  
 $2.375 * 2.0 + 7.3125 = 12.06$

A table showing the analog output voltage and corresponding Air/Fuel ratios for some of the common fuels is shown below in Table 2.

VOLTS	LAMBDA	AFR GAS	AFR METHANOL	AFR E85	AFR ETHANOL
0.50	0.58	8.5	3.7	5.6	5.2
0.71	0.61	9.0	3.9	5.9	5.5
0.92	0.65	9.5	4.1	6.3	5.8
1.13	0.68	10.0	4.4	6.6	6.1
1.34	0.71	10.5	4.6	6.9	6.4
1.55	0.75	11.0	4.8	7.3	6.7
1.76	0.78	11.5	5.0	7.6	7.0
1.97	0.82	12.0	5.2	7.9	7.3
2.18	0.85	12.5	5.4	8.2	7.7
2.39	0.88	13.0	5.7	8.6	8.0
2.61	0.92	13.5	5.9	8.9	8.3
2.82	0.95	14.0	6.1	9.2	8.6
3.03	0.99	14.5	6.3	9.6	8.9
3.11	1.00	14.7	6.4	9.7	9.0
3.24	1.02	15.0	6.5	9.9	9.2
3.45	1.05	15.5	6.7	10.2	9.5
3.66	1.09	16.0	7.0	10.6	9.8
3.87	1.12	16.5	7.2	10.9	10.1
4.08	1.16	17.0	7.4	11.2	10.4
4.29	1.19	17.5	7.6	11.5	10.7
4.50	1.22	18.0	7.8	11.9	11.0

Table 2. AFR Values

## Inline Wideband UEGO/AEM EMS Configuration

With an EMS calibration open, go to Setup>Sensors>Oxygen Sensor #1(2)>O2 Sensor #1(2) Cal Table>Table, and enter the values shown in Table 3 below into the O2 Sensor #1(2) Cal Table.

Voltage	AFR	Voltage	AFR	Voltage	AFR	Voltage	AFR
0.00	8.43	1.40	10.64	2.81	13.99	4.21	17.31
0.16	8.43	1.56	11.02	2.96	14.34	4.37	17.69
0.31	8.43	1.72	11.40	3.12	14.72	4.52	18.05
0.47	8.43	1.87	11.75	3.28	15.10	4.68	18.05
0.62	8.79	2.03	12.13	3.43	15.46	4.84	18.05
0.78	9.17	2.18	12.49	3.59	15.84	4.99	18.05
0.94	9.55	2.34	12.87	3.74	16.20	NA	NA
1.09	9.90	2.50	13.25	3.90	16.58	NA	NA
1.25	10.28	2.65	13.61	4.06	16.96	NA	NA

Table 3. EMS Software Values

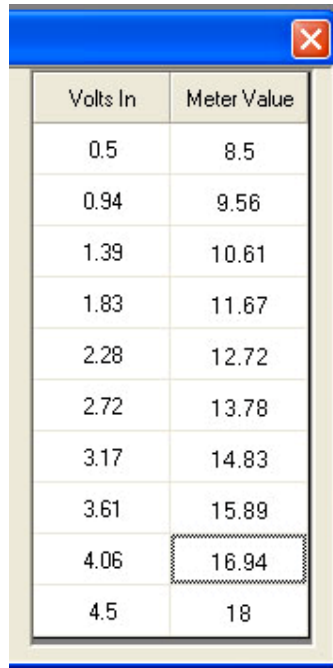
Connect the WHITE Analog Output + wire to the EMS Lambda input and the BROWN Analog Output – wire to the EMS sensor ground. Table 4 below lists the Lambda and Sensor ground pin locations for the different EMS part numbers.

AEM EMS P/N	Lambda #1 Pin	Lambda #2 Pin	Sensor GND Pin
30-1000/1001/1002/1040/1042	D14	D16	D21
30-1010/1012/1050/1052	C16	A23	C18
30-1020/1060	D7	D14	D12
30-1030/1031/1070	C13	C14	A16
30-1080	C16	C8	C14
30-1081	C16	B11	C14
30-1100/1101	B47	B48	B65
30-1110	1C	9C	13C
30-1120/1121/1130	B6	B14	B9
30-1220	30	31	60
30-1300	4	66	17
30-1310/1311/1312/1313	76	75	92
30-1320	71	73	34
30-1400	29	43	46
30-1401	44	43	46
30-1510	C2-31	C2-33	C2-32
30-1600/1601/1602/1603	19	NA	21
30-1610/1611/1612	46	52	50
30-1620/1621/1622/1623	29	55	30
30-1710	2N	4J	2C
30-1720	C3	D3	O3
30-1800	C3	A2	D4
30-1810	D19	B17	B19
30-1820/1821	A26	D25	C35
30-6100/30-6101	B47	B48	B65
30-6010/6012/6050/6052	C16	A23	C18
30-6000/6001/6002/6040/6042	D14	D16	D21
30-6060	D7	D14	D12
30-6310/30-6311/30-6313	76	75	92
30-6320	71	73	34

Table 4. EMS Pin Locations

## Inline Wideband UEGO/AEM F/IC Configuration

With an FIC calibration open, go to Setup>Aux Gauge, and complete the Aux gauge setup window as shown below in Figure 5.



The screenshot shows a software window titled 'F/IC Aux Gauge Setup' with a close button in the top right corner. The window contains a table with two columns: 'Volts In' and 'Meter Value'. The data points are as follows:

Volts In	Meter Value
0.5	8.5
0.94	9.56
1.39	10.61
1.83	11.67
2.28	12.72
2.72	13.78
3.17	14.83
3.61	15.89
4.06	16.94
4.5	18

Figure 5. F/IC Aux Gauge Setup

Connect the WHITE Analog Output + wire to the Aux Gauge input and the BROWN Analog Output – wire to the sensor ground. Table 5 below lists the Lambda and Sensor ground pin locations for the different FIC part numbers.

AEM F/IC P/N	Lambda Pin	Sensor GND Pin
30-1910(X)	Pin 18 of 22-pin connector	Pin 5 of 22-pin connector
30-1930(X)	Pin 18 of 22-pin connector Pin 20 of 20-pin connector	Pin 5 of 22-pin connector

Table 5. F/IC Pin Locations

## Displaying Data with a PC/Laptop

Real time AFR data can also be viewed via a pc/laptop using an RS232 serial port connection. Download the data viewer program and instructions from the AEM Performance Electronics forum at [www.aemelectronics.com](http://www.aemelectronics.com). See figure 6.

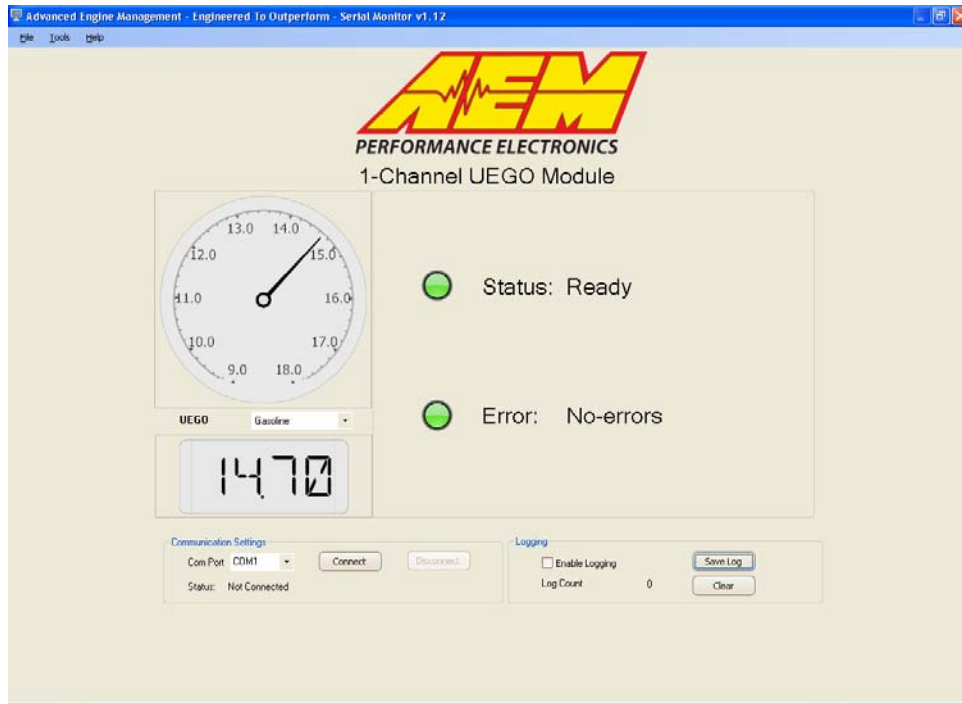


Figure 6. PC Data Viewer

The grey wire from the UEGO Controller outputs the data stream in an RS232 serial format. To connect to the pc/laptop, an RS-232 DB-9 connector is recommended. The grey wire from the UEGO Controller goes to pin 2 of the RS-232 DB-9 connector. Pin 5 of the connector goes to ground. See Figure 7.

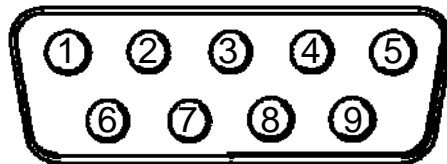


Figure 7. Wire View of RS-232 (DB-9) Male Plug

### Connector Pinouts

The pinout for the UEGO sensor connector is shown below in Figure 8.

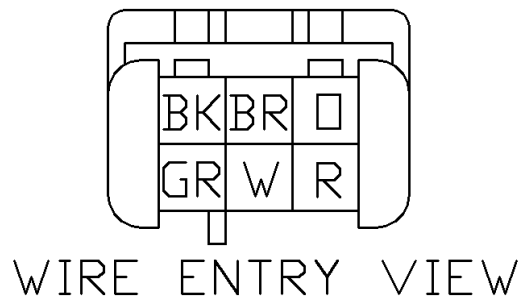


Figure 8. UEGO Connector Pinout

## Specifications

### UEGO Controller

Supply Current (nominal, peak)	1.3A, 2.7A peak
Differential Analog Outputs	1
Measuring Range: UEGO	8.5:1 to 18:1 AFR Gasoline, 0.58-1.22 Lambda
UEGO Sensor Accuracy	0.1 AFR
Operating Voltage (nominal)	8.5-15 volts dc
Harness & Connector Temp Limit:	105C

### Notes

If further tuning help is needed be sure to visit the video gallery or performance electronics forum at [www.aemelectronics.com](http://www.aemelectronics.com) for comprehensive instructional videos and information.

The UEGO sensor contains a ceramic module and should not be subject to mechanical or thermal shock or it may be damaged. The sensor is not designed for operation on leaded fuels, doing so will dramatically shorten sensor life. Long term running in the rich region ( $\text{Lambda} < 0.95$ ) will shorten sensor life. High exhaust temperatures (over 850C) will shorten sensor life. Engine oil consumption at a rate greater than 1 quart per 1,000 miles will shorten sensor life. With the UEGO Sensor installed, do not run the engine without power applied to the X-WIFI.

### Replacement/Optional UEGO Controller Components

30-2001	UEGO Sensor
35-4005	UEGO Sensor Bung
30-2003	No-Weld UEGO Sensor Install Kit

### 12 MONTH LIMITED WARRANTY

Advanced Engine Management Inc. warrants to the consumer that all AEM High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at AEM's option, when determined by AEM that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of the AEM part. In no event shall this warranty exceed the original purchase price of the AEM part nor shall AEM be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. The Bosch LSU 4.2 UEGO sensor has a limited life and is not warranted. Warranty claims to AEM must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12 month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. AEM disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by AEM. Warranty returns will only be accepted by AEM when accompanied by a valid Return Goods Authorization (RGA) number. Product must be received by AEM within 30 days of the date the RGA is issued.

Please note that before AEM can issue an RGA for any product, it is first necessary for the installer or end user to contact the AEM Performance Electronics tech line at 1-800-423-0046 to discuss the problem. Most issues can be resolved over the phone. Under no circumstances should a system be returned or a RGA requested before the above process transpires.

Need additional help? Contact the AEM Performance Electronics tech department at 1-800-423-0046 or [tech@aempower.com](mailto:tech@aempower.com), or visit the AEM Performance Electronics forum at <http://forum.aempower.com/forum/>