

### 7 Color Needle Wideband Air/Fuel Ratio Gauge



The following instructions are for the installation of your Needle Wideband Air/Fuel Ratio Gauge. Before you begin, lay out all items and ensure there are no missing parts. If any items are missing, please STOP immediately and contact GlowShift Gauges.

#### What's Included

- Needle Wideband Air/Fuel Ratio Gauge
- 4.9 LSU Wideband o2 Sensor
- Power, Sensor, Gauge & Data Logging Harnesses
- Data Logging Controller
- Weld-In Bung & Plug
- Mounting Bracket
- Gauge Visor

#### Wire Schematic

**Yellow:** 12v Constant Source (+)

**Red:** 12v Ignition Switched Source (+)

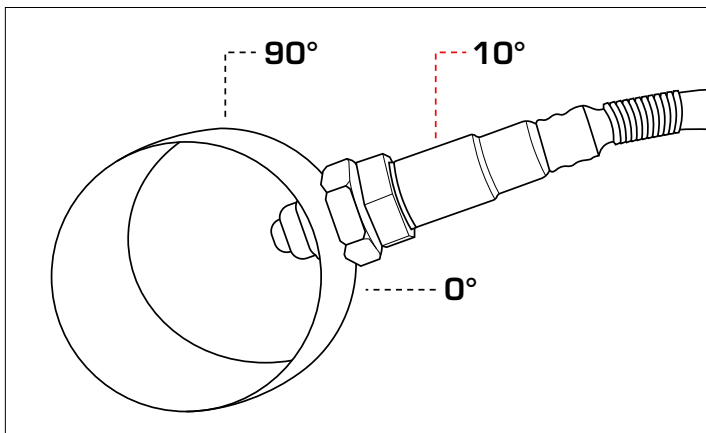
**Orange:** 12v Headlight Switched Source (+)

**Black:** Vehicle/Engine Ground (-)

**⚠ WARNING** Disconnect negative battery terminals before starting any work on the vehicle.

**🔧 TECH TIP** It is important to install your Wideband o2 sensor 12-18" from the collector or turbo when available. If this is not available, then 3-6" is the minimum distance but heat could effect the life of the sensor. However, the sensor needs to be installed 18-24" before the end of the pipe to ensure that you are not drawing in fresh air which will give you inaccurate AFR readings. This is important for open header, fender exit, and hood exit vehicles.

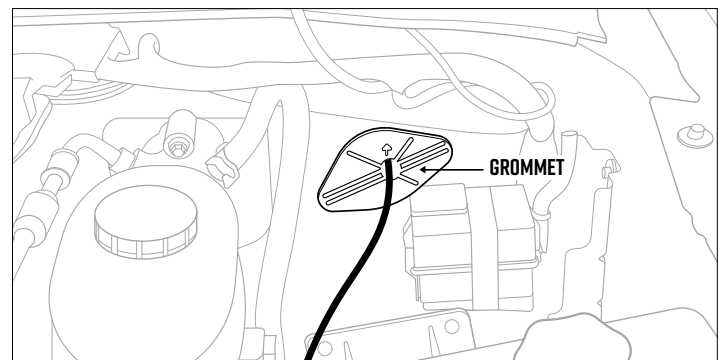
1. If your exhaust does not have an available M18 x 1.5 bung to install the Wideband o2 Sensor, locate an open space on the exhaust before the catalytic converter. We recommend 3 feet from the exhaust ports to avoid excessive heat.
  - The bung should be placed in a 10-90 degree upward angle with the tip of the sensor pointing down to prevent condensation build-up in the sensor.



4. Thread the provided Wideband o2 sensor into the bung in the exhaust.

**Note:** After calibration we recommend applying fresh Anti-Seize on the threads of the Wideband o2 sensor after it has been removed so that you can unscrew the sensor when necessary for calibration.

5. Next, route and secure the sensor wire harness from the sensor into the vehicle, close to the controller's location. Be sure to use a grommet when routing the wires through the firewall to protect them from any damage.



2. To install the weld-in bung, drill a hole into the exhaust using a 15/16" size drill bit. Once drilled, weld the bung to the pipe.
 

**Note:** Clamp-on Bung Adapters are available at [www.GlowShift.com](http://www.GlowShift.com) if welding is not available.
3. Mount the controller inside the vehicle in an easily accessible location away from heat, water, moisture, dirt and all moving parts to allow for any future calibration.

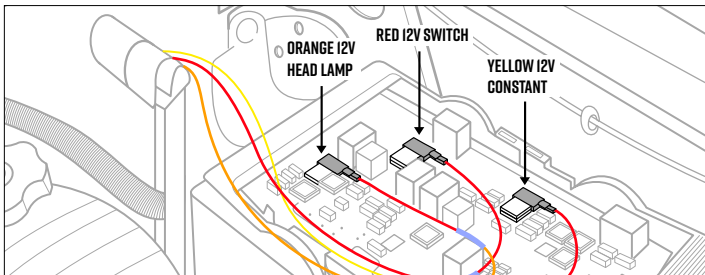
#### Gauge Wiring

1. Plug your Wideband o2 sensor harness into the controller.
2. Plug your Wideband gauge harness into the controller and route up to the gauge location.
3. Plug the Wideband power harness into the controller.
4. In order to test for power, reconnect the Negative Battery Terminal.

5. It may be necessary to remove the Vehicle Trim and/or Kick Panels in order to gain access to the vehicle's Fuse Box.
6. Using a test light, locate a constant 12-Volt power source in the vehicle's fuse panel that receives 12- Volt power when the ignition is turned off. You can splice into the circuit or use an optional Expandable Circuit. Connect the **Yellow Wire** of the gauge to the Constant 12-Volt Power Source.
7. Repeat the same step for the **Red Wire** of the gauge to locate an Ignition Switched 12-Volt Power Source. This source should not have any power with the key turned off and have 12- Volts with the key turned on.
8. Connect the **Orange Wire** of the gauge to the positive Headlight Switch Power Source using a Splice Connector, either in the fuse box or at the switch itself.

**Note:** Make sure the connection source does not dim. If the voltage is reduced when you lower the Dimmer Wheel it will cause the gauges to flicker from not having enough voltage.

9. Locate a clean, reliable grounding source and connect the **Black Wire** from the gauge.
10. After all wiring is complete, turn the vehicle's key to the "On" position and confirm that your gauge illuminates.
11. Press the **COLOR** Changing Button on your gauge and scroll through the 7 Color options as well as the Color Change and Color Fade option: this will allow you to have the Gauge Face change between all of the colors automatically.
12. Turn on the headlights to ensure that the gauge is dimming.
13. Reinstall any panels that may have been removed.
14. Ensure your gauge is functioning properly.



## Gauge Start Up

1. Prior to operation, the sensor must warm up for 30 seconds. This is a mandatory process every time the gauge and sensor are powered. The needle will point to 10, the back light and needle will flash.
2. If necessary you may perform a manual calibration by pressing the button on the controller for 3 seconds, to initialize a controller /sensor calibration sequence. The needle will point to 10, the back light will be bright and the needle will flash.
3. If it is necessary to reset the control box, press and hold the button until the needle points to 10 and the back light and needle go out.
4. If your sensor is disconnected or bad the needle will point to 20 and the back light and needle will flash.

## Calibration Schedule

Prior to calibration remove the sensor from the bung. This will ensure a proper calibration. To obtain the most accurate results from your gauge, please follow the calibration schedule pre and post installation:

### A. For Everyday Driven Vehicles

- Calibrate after installation.
- Calibrate again, after 3 months of use.
- Calibrate twice a year or every 10,000 miles (whichever comes first).

### B. For Race Vehicles

- Calibrate after installation.
- Calibrate once per race weekend.

### C. Dynamometer Use

- Calibrate after installation.
- Calibrate every 2-3 days, depending on the amount of usage.



**Data Logging Reference Chart**

**Wideband Formula in AFR = (V/0.5)+10**

**Wideband Formula in Lambda = (v7.42942)+0.686**

Volts	Gasoline AFR	Lambda	E85
0.00	10.01	0.683	6.66
0.125	10.26	0.700	6.83
0.16	10.33	0.705	6.87
.250	10.50	0.717	6.99
.031	10.62	0.725	7.07
0.375	10.75	0.734	7.16
0.47	10.94	0.747	7.28
0.500	11.00	0.751	7.32
0.62	11.25	0.768	7.49
0.78	11.57	0.790	7.70
0.875	11.76	0.803	7.83
0.94	11.88	0.811	7.91
1.000	12.01	0.820	8.00
1.09	12.19	0.832	8.11
1.125	12.26	0.837	8.16
1.25	12.51	0.854	8.33
1.375	12.76	0.871	8.49
1.40	12.80	0.874	8.52
1.500	13.01	0.888	8.66
1.56	13.13	0.896	8.74
1.625	13.26	0.905	8.82
1.72	13.45	0.918	8.95
1.750	13.51	0.922	8.99
1.87	13.76	0.939	9.16
2.000	14.01	0.956	9.32
2.03	14.06	0.960	9.36
2.125	14.25	0.973	9.49
2.18	14.37	0.981	9.56
2.250	14.50	0.990	9.65
2.34	14.69	1.003	9.78
2.375	14.77	1.008	9.83

Volts	Gasoline AFR	Lambda	E85
2.50	15.02	1.025	9.99
2.625	15.27	1.042	10.16
2.65	15.31	1.045	10.19
2.750	15.51	1.059	10.33
2.81	15.63	1.067	10.40
2.875	15.76	1.076	10.49
2.96	15.92	1.087	10.60
3.000	16.01	1.093	10.66
3.12	16.25	1.109	10.81
3.125	16.26	1.110	10.82
3.250	16.51	1.127	10.99
3.28	16.55	1.130	11.02
3.375	16.76	1.144	11.15
3.43	16.88	1.152	11.23
3.500	17.01	1.161	11.32
3.625	17.26	1.178	11.49
3.59	17.27	1.179	11.50
3.74	17.49	1.194	11.64
3.750	17.51	1.195	11.65
3.875	17.76	1.212	11.82
3.90	17.81	1.216	11.86
4.000	18.02	1.230	11.99
4.06	18.11	1.236	12.05
4.125	18.27	1.247	12.16
4.21	18.43	1.258	12.27
4.250	18.52	1.264	12.32
4.37	18.75	1.280	12.48
4.52	19.06	1.301	12.68
4.68	19.37	1.322	12.89
4.84	19.67	1.343	13.09
4.99	20.00	1.365	13.31

### Data Logging Output

Offers an analog output for monitoring and capturing Air/Fuel Ratios using a third party data log device.

Wire	Function	Signal	Signal Voltage
Brown	Provides the positive (+) analog WIDEBAND voltage output signals.	Data Logger (+)	0-5 volts
Black	Provides the negative (-) ground reference for WIDEBAND voltage output signals.	Data Logger (-)	Ground

### Sensor Lifetime

The lifetime of the sensor is highly dependent on the application in which it is being used. Some factors that reduce sensor lifetime include:

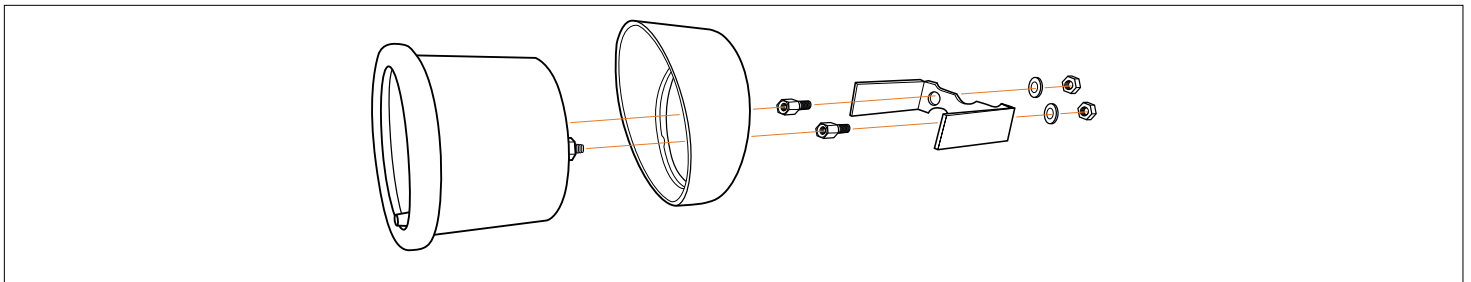
- If the sensor is not positioned at at least a 10(degree) upward angle moister will collect at the sensor tip and fail the sensor.
- Dropping the sensor, which will break the ceramic tip
- Contaminants such as water, moisture, silicon, lead, oil, etc. (be sure to use sensor-friendly sealants)
- Thermal cycling and exposure to exhaust fumes without any heating control active
- Incorrect placement in the exhaust that can overheat the sensor
- Leaded fuel, which will quickly reduce sensor life

At the end of its life the sensor becomes slow to respond and does not read rich properly. In some cases a sensor error code will be displayed on the gauge face. Regular free air calibrations will maintain the accuracy of the sensor over its lifetime.

<b>CONTROL BOX RESET</b>	Needle with point to 10, the back light and needle will go out.
<b>SENSOR ERROR</b>	Needle will point to 20, the back light and needle will flash.
<b>CALIBRATION</b>	Needle will point to 10, the back light will be bright and the needle will flash.
<b>SENSOR WARM UP</b>	Needle will point to 10, the back light and needle will flash.

Periodic cleaning of the sensor may be necessary by removing the sensor and spraying it with brake cleaner. Be sure to hold it so that the tip is facing down allowing everything to flow out of it. Afterwards, let the sensor air dry and then reinstall.

### Additional Information



- The supplied optional gauge visor is intended to be placed on the gauge so that the thickest part is at the top, creating a cover over the gauge to help keep sun glare off of the gauge face.
- The included mounting bracket is designed to be used on a universal-style mount in order to keep the gauge secure. In some cases one or both legs of the bracket may need to be modified to fit the thickness and contour of the mount. Our A-pillar gauge pods do not require the use of the mounting bracket but can be used if you desire, and there is enough space to fit it between the gauge and the gauge pod. When installing the bracket onto the gauge, make sure not to over-tighten as it could pull the rear studs on the back of the gauge and damage it.
- GlowShift Gauges Installation Instructions: Installation documents are solely to provide a guide for individuals that are mechanically and electronically able to install products. If you are unsure about the correct procedure for the installation of a product, you should consult a licensed professional.



## ONE YEAR NON-TRANSFERRABLE LIMITED WARRANTY & DISCLAIMER

GlowShift Gauges, LLC ("GlowShift") warrants to the original retail consumer purchaser, and not any other purchaser or subsequent owner, that this Product will be free from defects in material or workmanship for a period of **one (1) year** from the purchase date.

For a period of **one (1) year** from the date of purchase, at no charge to the Purchaser, GlowShift will repair or replace this Product if it is determined by GlowShift to be defective. After the warranty period, the Purchaser must pay all charges for parts and labor.

Coverage under this warranty is only valid within the United States, including its territories, as well as in certain other countries. Purchasers should check our website, [www.GlowShift.com](http://www.GlowShift.com), to determine the warranty coverage in the countries in which they are located.

GlowShift does **not warrant the installation** of the Product, which is the sole responsibility of the Purchaser. Installation should be done by licensed professionals. Improper installation may cause damage to the Product and any vehicle in which it is installed, and may cause burns and electrical injury to individuals. GlowShift's warranty does not cover any expenses incurred in removing Products that are defective or reinstalling replacement Products in their place.

During the warranty period, to have the Product repaired or replaced, the Purchaser must return the Product, freight prepaid by the Purchaser, to GlowShift (but for customers in the contiguous United States, GlowShift will pay the shipping charges if any Product fails during the first thirty (30) days after purchase). The Product must be returned in its original carton or in a similar package affording an equal degree of protection. GlowShift will return the repaired or replaced Product, freight prepaid, to the Purchaser. GlowShift does not provide Purchasers with temporary replacement units during the warranty period or at any other time.

This limited warranty is nontransferable and will automatically terminate if the original retail consumer purchaser resells the Product or transfers the vehicle in which the Product is installed. An "original retail consumer purchaser" is a person who originally purchases the Product, or a gift recipient of a new Product that is in its original packaging and unopened.

This limited warranty is subject to all of the following terms and conditions:

### TERMS & CONDITIONS

- 1. NOTIFICATION OF CLAIMS; WARRANTY SERVICE:** If Purchaser believes that a Product is defective in material or workmanship, written notice with an explanation of the claim shall be given promptly by Purchaser to GlowShift. All warranty claims must be made within the warranty period, and any Products returned to GlowShift must be shipped in accordance with GlowShift's procedures (including use of RMA numbers supplied by GlowShift after notification). The repair or replacement of any Product or part thereof shall not extend the original warranty period. The specific warranty on the repaired part only (not including gauge sensors) shall be in effect for a period of ninety (90) days following the repair or replacement of that part, or the remaining period of the Product warranty, whichever is greater. GlowShift does not provide a warranty on replacement gauge sensors.
- 2. EXCLUSIVE REMEDY; ACCEPTANCE:** Purchaser's exclusive remedy and GlowShift's sole obligation is to supply (or pay for) all labor necessary to repair any Product found to be defective within the repair or replacement fails to remedy the defect. Purchaser's failure to make a claim as provided in paragraph 1 above or continued use of the Product shall constitute an unqualified acceptance of such Product and a waiver by Purchaser of all claims thereto.
- 3. EXCEPTIONS TO LIMITED WARRANTY:** GlowShift shall have no obligation to Purchaser with respect to any Product that is subjected to any of the following: abuse, improper use, negligence, accident, modification, failure to follow the operating procedures outlined in the user's manual, failure to follow the maintenance procedures in the service manual for the Product, attempted repair by nonqualified personnel, operation of the Product outside of the published environmental and electrical parameters, or if the Product's original identification (trademark, serial number) markings have been defaced, altered, or removed. GlowShift excludes from warranty coverage Products sold AS IS and/or WITH ALL FAULTS. GlowShift also excludes from warranty coverage any consumable items such as fuses and batteries.  
  
All software and accompanying documentation furnished with, or as part of the Product is furnished "AS IS" (i.e., without any warranty of any kind), except where expressly provided otherwise in any documentation or license agreement furnished with the Product.
- 4. PROOF OF PURCHASE; REGISTRATION:** The Purchaser's dated bill of sale must be retained as evidence of the date of purchase and to establish warranty eligibility. Registration of any Product or of this limited warranty is voluntary, and failure to register will not diminish any rights available under this warranty.

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### LIMITATION OF LIABILITY

THE LIABILITY OF GLOWSHIFT, IF ANY, AND PURCHASER'S SOLE AND EXCLUSIVE REMEDY FOR DAMAGES FOR ANY CLAIM OF ANY KIND WHATSOEVER, REGARDLESS OF THE LEGAL THEORY AND WHETHER ARISING IN TORT OR CONTRACT, SHALL NOT BE GREATER THAN THE ACTUAL PURCHASE PRICE OF THE PRODUCT FOR WHICH SUCH CLAIM IS MADE. IN NO EVENT SHALL GLOWSHIFT BE LIABLE TO PURCHASER FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING, BUT NOT LIMITED TO, COMPENSATION, REIMBURSEMENT OR DAMAGES ON ACCOUNT OF THE LOSS OF PRESENT OR PROSPECTIVE PROFITS OR FOR ANY OTHER REASON WHATSOEVER.

**GOVERNING LAW:** This nontransferable limited warranty shall be governed by the law of the State of New Jersey, U.S.A., and the United States of America, excluding their conflicts of laws principles. The courts of Camden County, New Jersey, shall have the exclusive jurisdiction over any legal action with respect to this warranty.

This limited warranty gives specific legal rights. You may also have other rights that may vary from state to state or from country to country. Some states or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you. You are advised to consult applicable state or country laws for a full determination of rights.