Daytona Sensors LLC
Engine Controls and Instrumentation Systems

Installation Instructions for WEGO IID Wide-Band Exhaust Gas Oxygen Sensor Interface (Automotive Version)

CAUTION: CAREFULLY READ INSTRUCTIONS BEFORE PROCEEDING

OVERVIEW

The WEGO IID is a dual channel air/fuel ratio (AFR) metering system designed to be used with an existing data acquisition system. The system has two 0-5 volt analog AFR outputs. The compact size and wide supply voltage range also allow operation from small rechargeable batteries in a broad range of applications.

The system uses new low cost Bosch LSU 4.2 5-wire wide-band oxygen sensors. By utilizing miniature surface mount electronics technology, digital signal processing techniques, and a switching power supply for the sensor heater, the WEGO IID provides the same level of accuracy as lab systems costing thousands of dollars.

REPLACEMENT SENSORS AND ACCESSORIES

The WEGO IID uses standard Bosch LSU 4.2 sensors used on a VW production application (Bosch P/N 0 258 007 057/058 or VW P/N 021 906 262B). The proprietary VW connector is replaced with a smaller Deutsch DT-04-6P. We offer replacement sensors with the Deutsch connector installed.

If you are testing multiple engines, we also offer additional 18 x 1.5 mm weld nuts for sensor mounting and 18 x 1.5mm hex socket plugs that screw into the weld nuts and allow removing sensors after tuning.

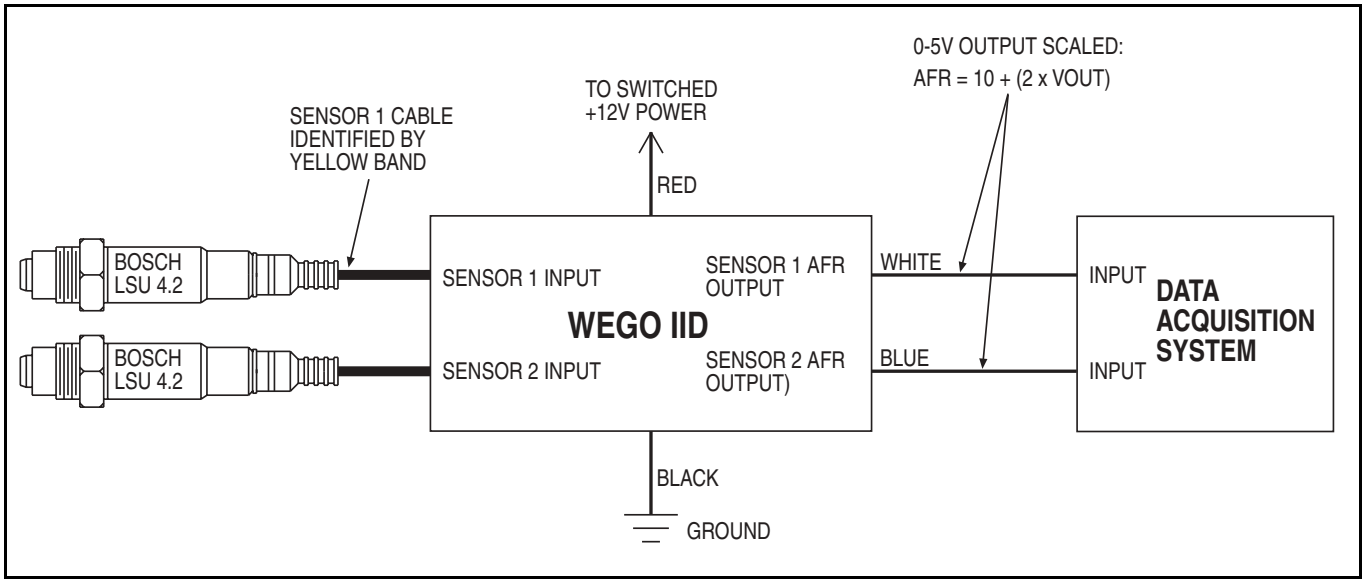
INSTALLATION

1. For multiple unit installations (individual cylinder AFR monitoring), please refer to the WEGO IID Race Pack Tech Note. Turn off the ignition switch and disconnect the battery ground cable before proceeding.
2. The Bosch LSU 4.2 sensors should be located on the header pipe about 6-8 inches from the head flange. Ideally the sensor tip should face down to avoid accumulation of condensation. When choosing a mounting location, allow several inches clearance for the sensor wire harness. The wire harness must exit straight out from the sensor. Do not loop the harness back onto the sensor body.
3. 18 x 1.5 mm weld nuts must be welded onto the exhaust pipe. After welding, run an 18 x 1.5 mm tap through the threads. Failure to clean the threads may result in sensor damage. Note that most automotive muffler shops are familiar with oxygen sensor weld nut installation on custom pipes. Do not install the sensors until after the free air calibration procedure described in the following section. Always use an anti-seize lubricant such as Permatex 133A on the sensor threads.

Figure 1 – WEGO IID

4. Install the WEGO IID unit. The unit is fully sealed, but should be mounted away from sources of engine or exhaust heat. You can secure the WEGO IID with Velcro tape strips or a few tie wraps on the wire harness.
5. Connect the Bosch sensors to the 6 pin mating connectors on the WEGO II wire harness. Extension cables (P/N WEGO2-CBL-12) are available. The cable for sensor 1 exits at the top of the WEGO II housing and is identified with a yellow band.

Figure 2 - WEGO IID Hookup



6. Refer to Figure 2. Connect the black WEGO IID wire to ground at the same point that the data acquisition system is grounded. Keep the ground connection as short as possible.
7. If your race vehicle uses any type of CD (capacitive discharge) ignition such as the MSD 6, 7, or 8 series, you must properly ground and filter the ignition unit. Unless your ignition unit is directly connected to the battery terminals, you must install a filter capacitor such as MSD P/N 8830. Visit www.msdignition.com, download the MSD 8 installation instructions, and refer to Figure 1 as a guide for installing the filter capacitor and grounding the ignition system. Do not ground your WEGO IID unit and data acquisition system to the same ground point used for the ignition system.
8. Connect the red WEGO IID wire to switched +12 volt power.
9. The WEGO IID parts bag includes Packard Weather Pack connectors that you can use to make a connection to your data acquisition system.
10. Reconnect the battery ground cable.

OPERATION

For more information about wide-band oxygen sensors including the Bosch LSU 4.2, we suggest that you visit the Tech FAQ on our website at www.daytona-sensors.com.

The WEGO IID has red status LEDs for each channel. When power is turned on, the LEDs blink at a slow rate until the corresponding sensor has reached normal operating temperature.

After installation, the WEGO IID requires free air calibration. This should be done with the sensors dangling in free air. The environment must be free of hydrocarbon vapors. We suggest that you perform the free air calibration outdoors. Turn the free air adjustment trimpots on the WEGO IID full counterclockwise. Turn on power and wait until both LEDs stop blinking at a slow rate. Wait an additional 30 seconds for the system to fully stabilize. Then slowly turn each free air calibration trimpot clockwise until the corresponding LED starts flashing at a rapid rate. Try to set each trimpot at the point where its LED just starts to flash.

CAUTION: Racing gasoline containing lead will quickly degrade the sensors. Under these conditions, expected sensor life is less than 10 hours. There is no warranty on sensors.

The free air calibration procedure should be performed at reasonable intervals (every 250-500 hours if using unleaded gas or every 2-5 hours if using leaded racing gas) or whenever a sensor is replaced. If you cannot get an LED to flash when its trimpot is turned full clockwise, you either have a damaged sensor or very high hydrocarbon levels in your environment.

The WEGO IID includes internal diagnostics for abnormal battery voltage (less than 11 volts or greater than 16.5 volts), sensor open circuit, and sensor short circuit conditions. A fault condition causes the status LEDs to blink at the slow rate.

EXHAUST CONSIDERATIONS

The WEGO IID system may give inaccurate results in certain situations:

Excessive exhaust back pressure. Wide-band sensors are affected by back pressure. Excessive back pressure causes exaggerated AFR indications under rich and lean conditions, but has little effect at 14.7 AFR (stoichiometric). Race vehicle exhaust systems are free flowing and problems with exhaust back pressure are not likely.

Exhaust reversion. Reversion is the term for a negative pressure wave that can suck ambient air back into the exhaust and cause an erroneous lean AFR indication. Open “drag pipes” usually suffer from reversion effects and may not be suitable for use with the WEGO IID except near wide open throttle. Reversion effects will be most noticeable at idle, part throttle low RPM, and decel.

Excessive scavenging. Tuned exhausts in combination with a high overlap camshaft profile can pull unburned air and fuel mixture through the cylinder into the exhaust and cause an erroneous rich AFR indication. The same effect can occur with high boost turbo/supercharger applications.

Misfiring. If the AFR is so rich that the engine misfires, high levels of oxygen will remain in the exhaust gas and result in an erroneous lean indication.

ENGINE TUNING GUIDELINES

Higher AFR values correspond to a leaner (less fuel) condition. The practical operating range for most engines using gasoline fuel is from approximately 11.5 to 14.7 AFR. Combustion of a stoichiometric mixture (exactly enough air to burn all the fuel) results in 14.7 AFR indication. Automotive engines with catalytic converters operate near 14.7 AFR during cruise and idle. Race engines usually require a richer mixture to limit cylinder head temperature and prevent detonation. The table below lists reasonable AFR values for race engines without emission controls.

Operating Mode	**Recommended AFR**
Cold Start (first 30 sec)	11.5-12.5
Idle	12.8-13.5
Part Throttle Cruise	13.0-14.0
Wide Open Throttle	12.5-12.8 (values down to 11.5 may be used to reduce detonation)

DATA ACQUISTION

The 0-5 volt analog outputs (white and blue wires) from the WEGO IID are compatible with most data acquisition systems that have available analog inputs. **We do not offer any technical assistance on interfacing to your data acquisition system. You must contact the vendor for support.**

After free air calibration, accuracy of the WEGO IID system is ±0.1 AFR over the 10.3-19.5 AFR range. The 0-5 volt analog outputs are scaled:

AFR = 10 + (2 x Vout) or

Vout = (AFR – 10)/2

For example, an output of 2.5 volts corresponds to 15.0 AFR. Note that when power is first turned on and the sensors are not yet at their normal operating temperature, the analog outputs are held at less than 0.20 volts. During free air calibration and while the WEGO IID status LEDs are rapidly blinking, the analog outputs will be near 5.0 volts.

TROUBLESHOOTING FLOWCHART

Follow the troubleshooting flowchart shown on the next page. Experience has shown that most units returned for warranty are OK and another problem, such as user error, degraded sensors, or bad power connections is later identified.

Troubleshooting Flowchart