

SymTech Labs Intelligent Oxygen Sensor Simulator

Thank you for purchasing the SymTech Labs Intelligent Oxygen Sensor Simulator (iO₂SS)! Your iO₂SS is capable of perfectly replicating most downstream O₂ sensors' signals to eliminate check engine lights (CEL's) due to missing or modified catalytic converters and other exhaust alterations. Please take note that this product is designed to replicate zirconia, not titania, O₂ sensors and is licensed for **off-road use only**.

INSTALLATION

Required Tools:

- Automotive datalogger/code scanner
- Wire crimping and cutting tool
- Digital multi-meter (DMM)
- Soldering gun, solder and heat-shrink tubing or butt-splice crimp terminals, etc.

Your iO₂SS features a five wire connection and an eight position DIP switch for adjusting the output waveform. Please take note of each wire's function: the white wires are used to safely dissipate power from the heater circuit while the others are used to power the unit and generate the output signal.

Begin by locating the stock downstream oxygen sensor and disconnect it from its harness. Identify the type of O₂ sensor based on the number of wires stemming from it (4-wire, 3-wire, 2-wire, 1-wire); the connections to the iO₂SS are dependent on this information. Next, determine which installation type suits your application:

- **Complete Installation:** In applications where the O₂ sensor must be removed completely, a complete installation is necessary.
- **Signal-only Installation:** For many three- and four-wire O₂ sensors, it is often best to leave the O₂ sensor installed in the exhaust piping, and only utilize the iO₂SS to simulate the signal waveform but not the heater circuit. All one- and two-wire installations are signal-only installations.

Identify each of the wires on your O₂ sensor according to function (see the appendix for help). For complete installations, cut each wire between the O₂ sensor and its connector. For signal-only installations, cut the signal and ground wires (if applicable). Use the table below to determine the appropriate connections between the O₂ sensor and iO₂SS.

iO ₂ SS	4-wire	3-wire	2-wire	1-wire
Green	Signal	Signal	Signal	Signal
Black	Ground	Chassis	Ground	Chassis
White	Heater	Heater	NC	NC
White	Heater	Heater	NC	NC
Red	+12V Ign	+12V Ign	+12V Ign	+12V Ign

O₂ Snr Connection =

External Connection =

No Connection = NC

Note that the iO₂SS requires a +12V switched power source in every installation. Do not connect this wire to a constant +12V source. If applicable, you may use the O₂ sensor's heater circuit to power the iO₂SS. Turn the ignition switch to the "ON" position and use a DMM to determine which wire carries +12V.

For O₂ sensors without dedicated ground wires, be sure to connect the black iO₂SS wire to a solid chassis ground.

Solder, crimp, or otherwise connect each wire from the iO₂SS to its corresponding connection on either the O₂ sensor or the car's electrical system. SymTech Labs recommends solder and heat-shrink tubing for any automotive electrical connection. For signal-only installations, trim the white leads from the iO₂SS and tuck them neatly away.

Though the unit is sealed, ideal mounting locations are away from heat and moisture, within the passenger's compartment of the vehicle. **Securely mount the gold, aluminum housed power resistor to the vehicle chassis to dissipate excess heat in complete installations.**

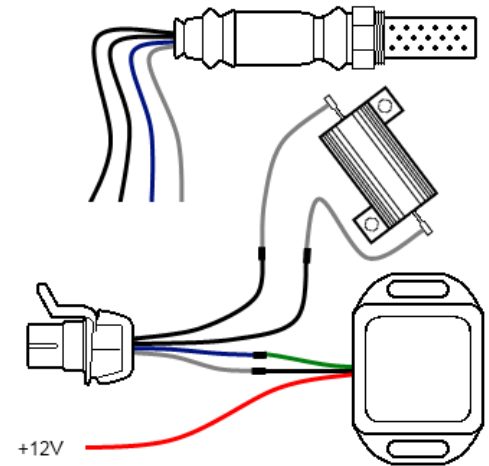


Figure 1: Typical complete installation

TUNING

Your iO₂SS is pre-configured to mimic the output waveforms of most zirconia O₂ sensors. Should a CEL or a DTC code appear after installation, the signal waveform may be adjusted accordingly. DIP switches mounted on the iO₂SS can be configured in a number of combinations to obtain the desired signal behavior.

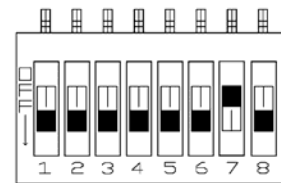


Figure 2: Factory configuration

Before adjusting anything, be sure to have a datalogger/scanner available to record the values measured from the iO₂SS by the powertrain control module (PCM), discover any subsequent error codes and clear those codes if necessary.

See figure 2 for a representation of the DIP switches. Notice that each switch is numbered, and that all are OFF except for #7. The switches are arranged in groups with #1, #2 controlling amplitude, #3, #4 controlling AFR, and #5, #6, #7, #8 controlling frequency. Use a small jeweler's screwdriver or similar tool to firmly press a switch into its desired position.

After adjusting any switch, always be sure to turn the car off and on again, resetting power to the iO₂SS. Also, reset the engine control unit (ECU) with either your datalogger/scanner or by removing the negative terminal from the car battery for a period of ten (10) minutes or more.

See figure 3 for a graph of the standard waveform along with modified amplitudes. The standard amplitude is the result of the default switch position. To achieve an increased amplitude, set switch #1 to ON. To achieve a condensed amplitude, set switch #2 to ON. Do not set both switches to ON simultaneously.

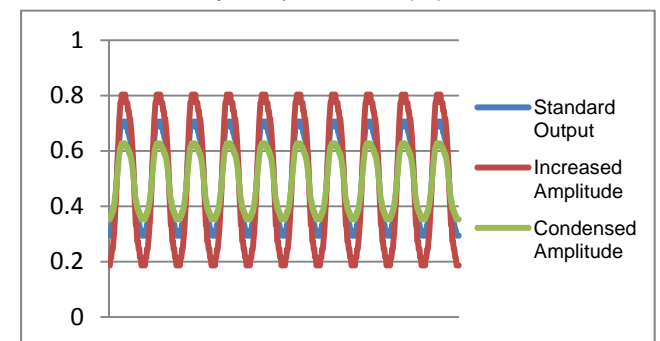


Figure 3: Amplitude modified waveforms

See figure 4 for a graph of the standard waveform along with air/fuel ratio (AFR) signals. To achieve a leaner condition, set switch #3 to ON. To achieve a richer condition, set switch #4 to ON. Do not set both switches to ON simultaneously.

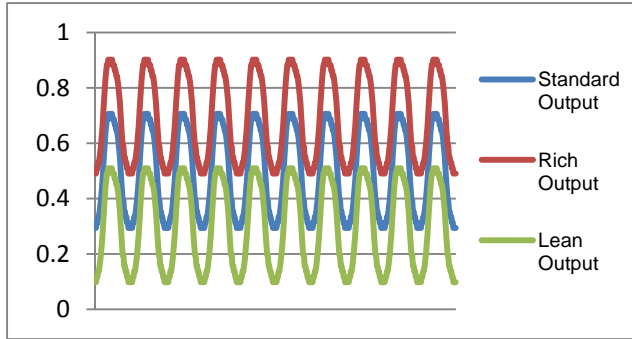


Figure 4: Frequency modified waveforms

In some cases, the datalogger/scanner might reveal that the iO₂SS is producing a signal with a frequency either too quick or too slow. Use the following table to set switches #5, #6, #7 & #8 to alternate frequency configurations:

Frequency (Hz)	#5	#6	#7	#8
15.0 (quicker)	ON	OFF	OFF	OFF
8.0	OFF	ON	OFF	OFF
2.0	ON	ON	OFF	OFF
1.6	OFF	OFF	ON	OFF
1.3 (slower)	ON	OFF	ON	OFF

Frequency, amplitude and AFR adjustments may all be made in combination with one another.

APPENDIX: STOCK O₂ SENSOR WIRE SCHEMES

Four-Wire Oxygen Sensors

Function				
Signal	Blue	White	Green	Black
Ground	White	Green	Yellow	Gray
Heater	Black	Black	Black	White
Heater	Black	Black	Black	White

Three-Wire Oxygen Sensors

Function				
Signal	Blue	White	Green	Black
Heater	Black	Black	Black	White
Heater	Black	Black	Black	White

Two-Wire Oxygen Sensors

Function				
Signal	Blue	White	Green	Black
Ground	White	Green	Yellow	Gray

One-Wire Oxygen Sensors

Function				
Signal	Blue	White	Green	Black

WARNING

Oxygen sensor simulators are to be used on OFF-ROAD ONLY vehicles. Oxygen sensor simulators potentially nullify environmental protection equipment and techniques mandated by the federal government. Usage of an oxygen sensor simulator to conceal a removed catalytic converter is illegal. SymTech Laboratories assumes no responsibility for losses or damages due to installation of this product.

LIMITED WARRANTY

SymTech Labs warrants to the original customer purchasing products directly from SymTech Labs that all such products sold will be free from defects in materials and workmanship affecting form, fit and function. SymTech Labs, at its option, will repair, replace, or provide a credit or refund of either the original purchase price or fair market value, whichever is lower, of any product that is determined by SymTech Labs to be defective during the warranty period.

Any claim must be made within one (1) year from the original date of shipment by SymTech Labs; SymTech Labs shall have no liability thereafter. Customer must notify SymTech Labs within one (1) year from the original date of shipment. The foregoing warranty granted on SymTech Labs products is to the initial customer end-user and is non-transferable.

This warranty is in lieu of any and all other warranties, whether oral, written, expressed, implied or statutory. Implied warranties of fitness for a particular purpose and merchantability are specifically excluded and shall not apply. The above warranties cover only defects arising under normal use and do not include malfunctions or failures resulting from misuse, abuse, neglect, alteration, problems with electrical power, usage not in accordance with product instructions, acts of nature or improper installation or repairs made by anyone other than SymTech Labs or a SymTech Labs-authorized third party service provider. SymTech Labs reserves the right to substitute functionally equivalent new or serviceable used parts.

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