

Hydrogen on Demand Dual Fuel Generator Systems

O2 Sensor Extender Installation Manual

Put money in your pocket instead in your fuel tank! Save Fuel Now With Our Hydrogen Generators. Make your car a low cost hybrid. Use free hydrogen from water!



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SAFETY PRECAUTIONS

IMPORTANT INFORMATION

Read and follow the safety precautions here and in relevant places throughout this manual to avoid hazards. If you do not understand these instructions or do not like working on vehicles, please contact us or have a qualified mechanic do the installation for you. Incorrectly installing this equipment may result in serious damage to you and or your vehicle.

It should take approximately 30 to 45 minutes to install the O2 sensors extenders so ensure you have enough time to complete the installation. Be sure to that during the installation; the engine is off and very importantly, NOT HOT.

SAFETY EQUIPMENT

Be sure to wear goggles and rubber gloves and only use professional tools; use common sense and general safety procedures used for any work carried out on automotive installations and maintenance.

SAFETY OPERATION

Before the installation disconnect the battery, making sure that any radio and security codes are available to re-enable affected systems once power is restored. If unavailable, the codes are obtainable from a dealership. Disconnect the negative (black) cable from the battery.

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INSTALLING A HHO GENERATOR TO A DIESEL ENGINE

There are no special devices or requirements to fit the Hydrogen on Demand Dual Fuel Generator System to a diesel vehicle, except the Common Rail cars that need some adaptation just like petrol cars.

INSTALLING A HHO GENERATOR TO A PETROL OR LPG VEHICLE

In general Diesel engines are not affected and do not need electronic computerized enhancer devices for fuel consumption efficiency. Such devices are referred to as "EFIE's" (electronic fuel injection enhancers) which are applicable to petrol, LPG or similar gas injected vehicle engines. You may however only need to install an Oxygen Sensor Spacer which removes the oxygen sensors from the flow of air and gasses through the system. Please consult us for full details or take a look at our on-line manual for O2 Sensor Extender Installation Guide.

OXYGEN SENSORS

Oxygen sensor measures the amount of the oxygen in the exhaust gases. This information is used by the automotive engine computer system to control engine operation. There are few types of oxygen sensors available, but here we will consider most commonly used - voltage-generating type.

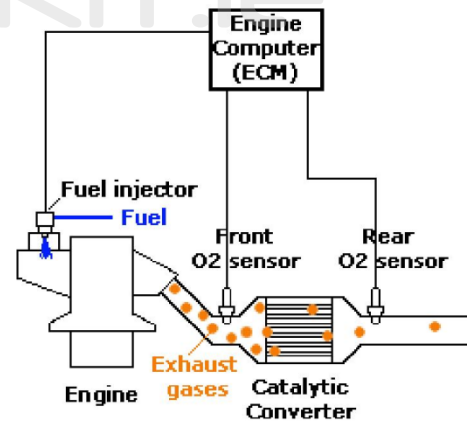
FRONT (UPSTREAM) OXYGEN SENSOR.

Front or upstream oxygen sensor located in the exhaust manifold or in the downpipe before catalytic converter. It monitors the amount of oxygen in the exhaust gases and provides the "feedback" signal to the engine computer.

If the sensor senses high level of oxygen, the engine is running too lean (not enough fuel). The engine computer adds more fuel. If the level of oxygen in the exhaust is too low, the computer decides that the engine is running too rich (too much fuel) and subtracts fuel accordingly.

This process is continuous - the engine computer constantly cycles between slightly lean and slightly rich to

keep the air/fuel-ratio at the optimum level. If you look at the front oxygen sensor voltage signal, it will be cycling somewhere between 0.2 and 0.8 Volts (see lower picture)



REAR (DOWNSTREAM) OXYGEN SENSOR

Rear or downstream oxygen sensor is located after catalytic converter. It monitors the efficiency of the catalytic converter. **The front oxy sensor should be the only one which needs to be altered.** Check the installation steps next.



OXYGEN SENSORS EXTENDERS

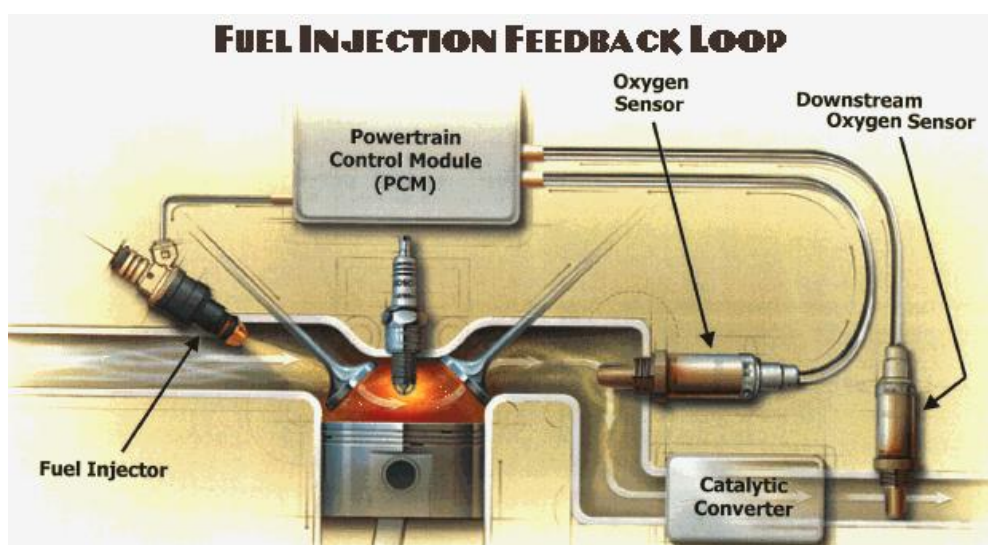
O₂ sensor extenders are used in conjunction with a supplemental gas system, such as our HHO Generators Kits. In this type of system the extenders effect a correction voltage back to the vehicle ECU, so that the ECU does not deliver excess fuel to the engine as it tries to compensate for the increase of oxygen in the exhaust--which is a result of burning clean fuels, such as hydrogen.

In practice, this extender stands-off the O₂ sensor from its normal position. Thus the sensor is made less sensitive to the increased level of oxygen in the exhaust that results from the burning of supplemental (HHO) gas. Only O₂ sensors located between the engine and the first catalytic converter, in each exhaust pipe, needs to be fitted with an extender. Sensors downstream of the converter(s) are of no concern here, as they simply monitor the effectiveness of the converters. V6 and V8 engines typically require two extenders, one for each cylinder bank. Many require four however.

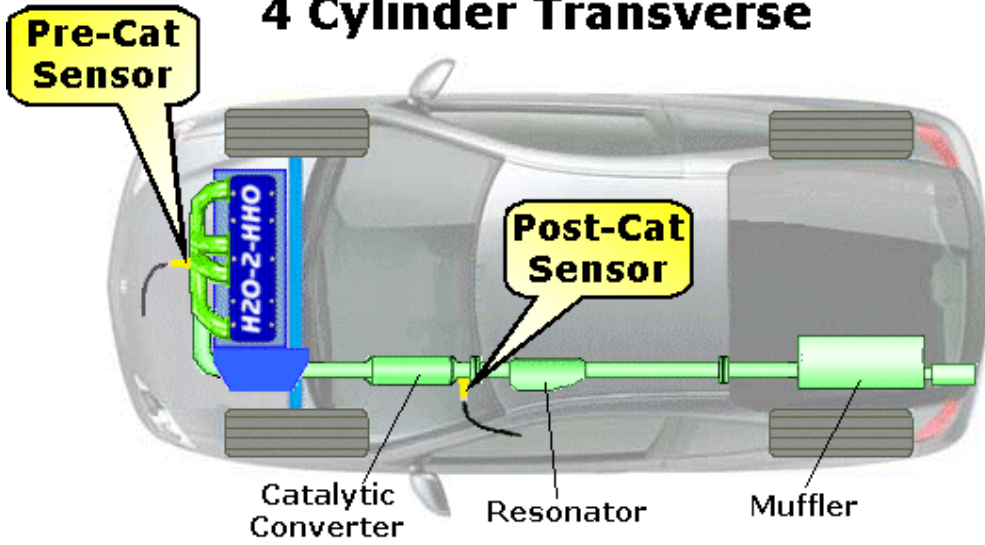
You do not need to use a MAF/MAP/EFIE sensor enhancer with the extender because this extender accomplishes the exact same thing as the enhancer does, but for much less the cost and hassle. It also eliminates the risk associated with enhancers, which are problematic to adjust properly. The physical dimensions of this extender provide well defined parameters of operation, and the ideal air to fuel ratio needed by your vehicle in order to optimize fuel efficiency gains one could expect over the 14.7:1 air to fuel ratio in standard production vehicles.

LOCATE OXYGEN SENSORS:

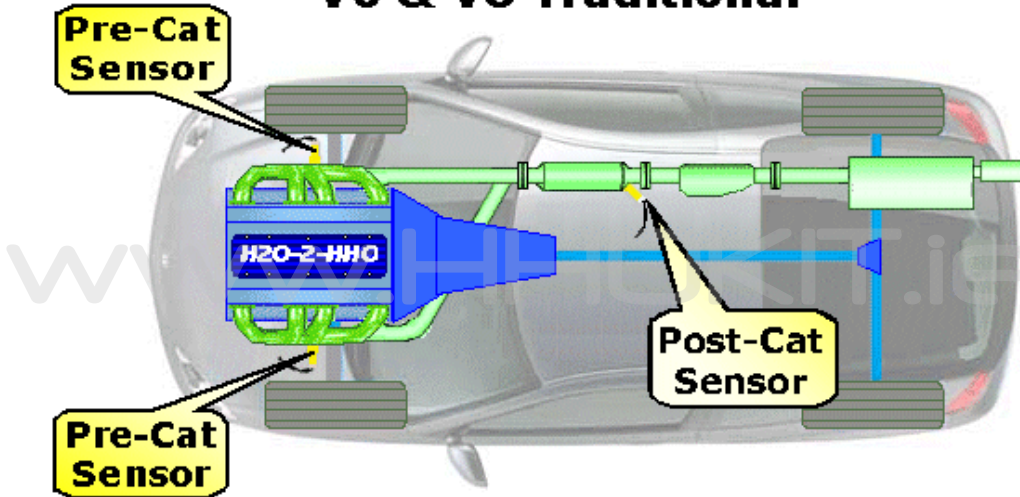
O₂ sensors can be found in a variety of places, depending on the vehicle make, model and engine type. The accompanying illustrations depict some of the more common locations. As a general rule, each exhaust manifold has at least one pre-cat sensor. Most vehicles manufactured since the early 1980s are equipped with pre-cat sensors. With the advent of Onboard Diagnostic Systems II (OBDII) in the mid-1990s, O₂ sensors were positioned both upstream and downstream of the catalytic converter.



4 Cylinder Transverse

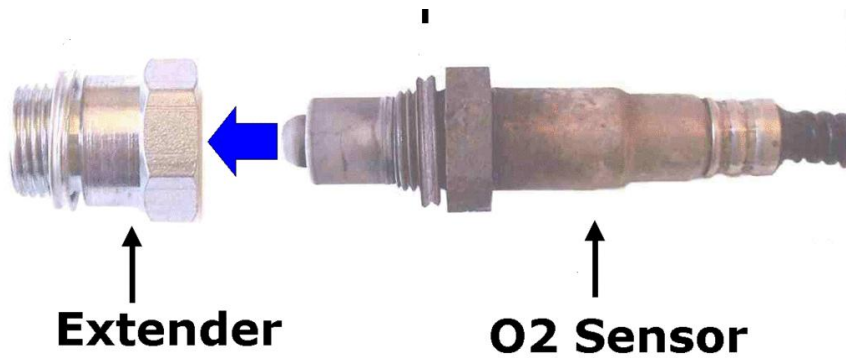


V6 & V8 Traditional



STEPS OF THE INSTALLATION

Each O₂ sensor upstream of the cat(s) needs to be mounted on an O₂ sensor extender as shown here.



STEP 1.

Before disconnecting the battery, make sure any radio and security codes are available to re-enable affected systems once power is restored. If unavailable, the codes are obtainable from a dealership. Disconnect the negative (black) cable from the battery.

**STEP 2.**

Unscrew the pre-cat O2 sensor from the exhaust using an oxygen sensor socket or a 22mm wrench. Be careful not to lose the compression washer. Apply penetrating oil around the threads to loosen a stubborn sensor. Inspect the sensor probe. If it is cracked or contaminated, replace it with a new one.



STEP 3.

Thread the extender into the exhaust, in place of the sensor. Tighten to 50 Nm (37 ft-lbs) maximum. If a torque wrench is not available, tighten until the compression washer starts to crush.

**STEP 4.**

Thread the sensor into the extender. Tighten to 50 Nm (37 ft-lbs) maximum. If a torque wrench is not available, tighten until the compression washer starts to crush.



STEP 5.

Reconnect the negative battery cable. Re-enter any codes. It may take a few days of driving for the ECU to relearn the new sensor position. It is okay if the check engine light comes on while the ECU relearns.

Note: It is good practice to apply a small amount of anti-seize compound (available at most auto parts stores) to the threads of both the extender and sensor before installation. Use great care in handling O2 sensors to avoid damage; do not touch, or otherwise contaminate the sensor probe, or element, with compound, oil, etc. Proper sensor function is crucial to good performance and fuel economy.

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