

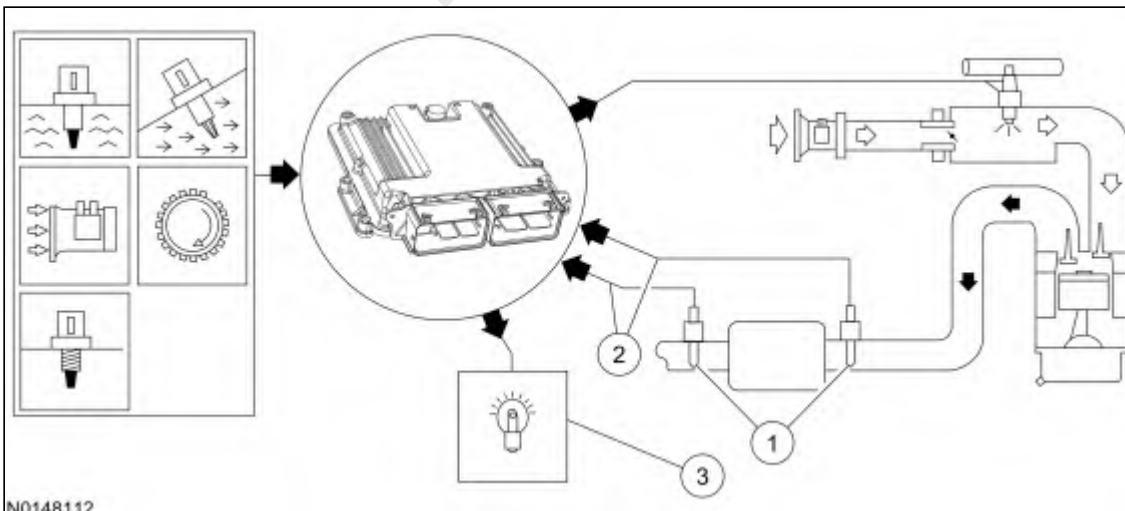
Heated Oxygen Sensor (HO2S) Monitor

The HO2S monitor is an on board strategy designed to monitor the heated oxygen sensors for concerns or deterioration which can affect emissions. The fuel control or stream 1 HO2S are checked for correct output voltage and response rate. Response rate is the time it takes to switch from lean to rich or rich to lean. The rear or stream 2 HO2S is monitored for correct output voltage and is used for catalyst monitoring and fore aft oxygen sensor (FAOS) control. Input is required from the camshaft position (CMP) sensor, the crankshaft position (CKP) sensor, the engine coolant temperature (ECT) sensor or the cylinder head temperature (CHT) sensor (if equipped), the fuel rail pressure temperature (FRPT) sensor, the fuel tank pressure (FTP) sensor, the intake air temperature (IAT) sensor, the mass airflow (MAF) sensor (if equipped), the manifold absolute pressure (MAP) sensor, the throttle position (TP) sensor and vehicle speed to activate the HO2S monitor. The fuel system monitor and misfire detection monitor must also have completed successfully before the HO2S monitor is enabled.

1. The HO2S senses the oxygen content in the exhaust flow. Lean of stoichiometric, air to fuel ratio of approximately 14.7 to 1 (9 to 1 E100), the HO2S generates a voltage less than 0.45 volt. Rich of stoichiometric, the HO2S generates a voltage greater than 0.45 volt. The current required to maintain the universal HO2S at 0.45 volt is used by the PCM to calculate the air to fuel ratio. The HO2S monitor evaluates the HO2S for correct function.
2. The time between HO2S switches is monitored after vehicle startup and during closed loop fuel conditions. Excessive time between switches or no switches since startup indicates a concern. Since lack of switching concerns can be caused by HO2S concerns or by shifts in the fuel system, DTCs are stored that provide additional information for the lack of switching concern. Different DTCs indicate whether the sensor always indicates lean, rich, or disconnected. The HO2S signal is also monitored for high voltage. An over voltage condition is caused by a HO2S heater or battery power short to the HO2S signal line.

A functional test of the rear HO2S is done during normal vehicle operation. The peak rich and lean voltages are continuously monitored. Voltages that exceed the calibrated rich and lean thresholds indicate a functional sensor. If the voltages have not exceeded the thresholds after a long period of vehicle operation, the air to fuel ratio may be forced rich or lean in an attempt to get the rear sensor to switch. This situation normally occurs only with a green, less than 804.7 km (500 miles), catalyst. If the sensor does not exceed the rich and lean peak thresholds, a concern is indicated. Also, a deceleration fuel shut off rear HO2S response test is done during a deceleration fuel shut off (DFSO) event. Carrying out the HO2S response test during a DFSO event helps to isolate a sensor concern from a catalyst concern. The response test monitors how quickly the sensor switches from a rich to lean voltage. It also monitors if there is a delay in the response to the rich or lean condition. If the sensor responds very slowly to the rich to lean voltage switch or is never greater than a rich voltage threshold or less than a lean voltage threshold, a concern is indicated.

3. The malfunction indicator lamp (MIL) is activated after a concern is detected on 2 consecutive drive cycles.



HO2S Monitor

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