

MAZDA · POWERTRAIN

P1170

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P1170 · Mazda

HO2S Bank 1 Sensor 1 Circuit Fixed Bank 1 Sensor 1

P1170 on Mazda vehicles indicates that the powertrain control module has detected a fixed or stuck signal from the upstream heated oxygen sensor (HO2S) in bank 1, sensor 1. The sensor is responsible for reporting the oxygen content in the exhaust before the catalytic converter, and a fixed signal means the voltage is not fluctuating as it should during closed-loop fuel control. This prevents the computer from accurately adjusting the air-fuel mixture, often resulting in poor fuel economy and increased emissions.

SYSTEM

Powertrain

CODE TYPE

Mazda specific

SEVERITY

Medium

FIX DIFFICULTY

Intermediate

AREA

Fuel and air metering

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms.
- A noticeable decrease in fuel economy due to the system running rich or lean.
- Rough idle or hesitation during acceleration as the fuel mixture becomes incorrect.
- Failed emissions test due to high hydrocarbon or carbon monoxide levels.
- In some cases, a sulfur or rotten egg smell from the exhaust if the mixture is excessively rich.

Common causes, most likely first

- 1 A failed upstream heated oxygen sensor (bank 1 sensor 1) that is internally shorted or contaminated.
- 2 A wiring fault in the sensor circuit, such as a short to voltage or ground, or an open circuit.
- 3 Exhaust leaks before the sensor, allowing outside air to affect the reading.
- 4 A stuck or contaminated mass airflow sensor providing incorrect air volume information.
- 5 Fuel system issues such as a leaking fuel injector or incorrect fuel pressure causing a fixed rich condition.
- 6 A faulty powertrain control module (PCM) driver for the oxygen sensor heater circuit, though this is rare.



How to diagnose and fix it

- 1 Perform a visual inspection of the bank 1 sensor 1 wiring and connector for damage, corrosion, or loose pins.
- 2 Use a scan tool to check for other diagnostic trouble codes (DTCs) and freeze-frame data to see the conditions when the code set.
- 3 Check the oxygen sensor signal voltage with a digital multimeter or oscilloscope to confirm it is fixed rather than fluctuating between 0.1 and 0.9 volts.
- 4 Inspect for exhaust leaks upstream of the sensor using a smoke machine or by listening for ticking noises when cold.
- 5 Test the sensor heater circuit resistance and compare to specifications to rule out a failed heater element.
- 6 If the sensor is confirmed faulty, replace the upstream oxygen sensor with a quality direct-fit part.
- 7 Clear the codes and perform a road test to verify the repair and ensure the monitor runs to completion.

What a fixed O2 signal really means

- A fixed oxygen sensor signal does not always mean the sensor itself has failed; a short to voltage in the signal wire can produce the same fixed high reading, so always check the wiring before replacing parts.
- Exhaust leaks between the engine and the upstream sensor can draw in outside air and cause the sensor to report a false lean condition, which the PCM may interpret as a fixed signal under certain conditions.
- Contaminated fuel or the use of leaded fuel or certain silicone sealants can coat the sensor element and cause it to stop switching, leading to this code without any electrical fault.
- On some Mazda models, a failing mass airflow sensor can cause the fuel mixture to go extremely rich or lean, and the oxygen sensor may appear fixed because it is pegged at one end of its range.
- Technicians often overlook the oxygen sensor heater circuit; a heater that is not working can prevent the sensor from reaching operating temperature, causing a fixed signal when the engine is cold.

Can I keep driving with P1170?

You can generally drive the vehicle with this code, but avoid prolonged driving because the incorrect fuel mixture can damage the catalytic converter over time and increase emissions. Have the vehicle diagnosed and repaired promptly, especially if you notice rough running or reduced performance.

Tools that help

- OBD-II scan tool with live data capability
- Digital multimeter
- Oscilloscope (optional but helpful for viewing sensor waveform)
- Socket set and oxygen sensor wrench
- Smoke machine for exhaust leak detection



Reading P1170

- P** Powertrain: engine, transmission and emissions.
- 1** Manufacturer-specific code (Mazda): its meaning depends on the make.
- 1** Fuel and air metering.
- 70** The exact fault within that area.

Often seen with

P0130 O2 Sensor Circuit Malfunction (Bank 1 Sensor 1) · **P0131** O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1) · **P0132** O2 Sensor Circuit High Voltage (Bank 1 Sensor 1) · **P0133** O2 Sensor Circuit Slow Response (Bank 1 Sensor 1) · **P0171** System Too Lean (Bank 1)

See it working

Watch the animated explainer [Four-Stroke Engine Notebook: The Otto Cycle Explained](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/mazda-p1170/>

