

GENERIC · POWERTRAIN

P220E

OBD-II DIAGNOSTIC TROUBLE CODE (DTC)

P220E

NOx Sensor Heater Control Circuit Range/Performance (Bank 1 Sensor 1)

P220E indicates that the engine control module has detected a problem with the heater circuit for the upstream nitrogen oxide (NOx) sensor on bank 1. The heater is not reaching the expected temperature within the specified time, or the circuit's electrical resistance is outside the normal range, so the sensor cannot provide accurate NOx readings.

SYSTEM	CODE TYPE	SEVERITY	FIX DIFFICULTY	AREA
Powertrain	Generic (all makes)	Medium	Intermediate	Fuel and air metering (injector circuits)

Symptoms you may notice

- Illumination of the check engine light, often with no other noticeable symptoms.
- Reduced engine performance or power due to the engine control module entering a limp-home mode.
- Decreased fuel efficiency as the engine management system defaults to a richer mixture.
- Possible rough idle or hesitation during acceleration if the faulty sensor affects air-fuel ratio calculations.
- In some vehicles, a message indicating that the diesel exhaust fluid (DEF) system requires service.
- In rare cases, the vehicle may enter a regeneration-inhibit mode, preventing diesel particulate filter cleaning.

Common causes, most likely first

- 1 Failed NOx sensor heater element, which is the most common cause.
- 2 Open or shorted wiring in the heater circuit, including damage from heat, chafing, or corrosion.
- 3 Corroded or loose electrical connectors at the sensor or the engine control module.
- 4 Blown fuse that supplies power to the NOx sensor heater circuit.
- 5 Faulty engine control module, though this is rare and should be diagnosed last.
- 6 Exhaust leaks before the sensor that cause incorrect temperature readings and heater performance issues.
- 7 Aftermarket or incorrect sensor installation that does not meet the original equipment specifications.



How to diagnose and fix it

- 1 Use an OBD-II scanner to retrieve all stored codes and freeze-frame data, then clear codes and test-drive to confirm P220E returns.
- 2 Visually inspect the NOx sensor, its wiring harness, and connectors for damage, corrosion, or loose pins, and repair as needed.
- 3 Check the fuse that supplies power to the NOx sensor heater circuit and replace it if blown.
- 4 Measure the resistance of the NOx sensor heater element with a multimeter and compare it to the manufacturer's specification; replace the sensor if resistance is out of range.
- 5 Test the heater circuit wiring for continuity and shorts to ground or power using a multimeter or a test light, and repair any faults.
- 6 If the wiring and sensor are good, check the engine control module's ability to control the heater circuit with a bidirectional scan tool or oscilloscope.
- 7 After repairs, clear codes and perform a thorough test drive to verify that the heater circuit operates correctly and no codes return.

Why the NOx sensor heater fails

- A common oversight is replacing the NOx sensor without checking the heater circuit fuse, which can be blown by a shorted sensor and cause the new sensor to fail immediately.
- The heater element can fail intermittently, so the code may set only after a cold start or during specific driving conditions; a resistance check when the sensor is cold is more reliable.
- Exhaust leaks upstream of the sensor can cause the heater to overheat and fail prematurely, so always inspect the exhaust system for leaks before replacing the sensor.
- Some vehicles require a software update to the engine control module to correct overly sensitive heater circuit monitoring, so check for technical service bulletins before parts replacement.
- The NOx sensor heater is powered through a relay or a dedicated fuse in many applications; a failing relay can cause intermittent heater operation without setting a fuse-related code.

Can I keep driving with P220E?

You can usually continue driving with P220E, but the vehicle may enter limp mode or have reduced performance, and fuel economy may suffer. Avoid long trips or heavy loads until the fault is repaired, and address it promptly to prevent damage to the exhaust aftertreatment system.

Tools that help

- OBD-II scanner with live data and bidirectional control capabilities
- Digital multimeter
- Test light
- Socket set and wrench set
- Oscilloscope (optional for advanced diagnostics)



Reading P220E

- P** Powertrain: engine, transmission and emissions.
- 2** Generic (SAE) code: it means the same thing on every OBD-II vehicle.
- 2** Fuel and air metering (injector circuits).
- 0E** The exact fault within that area.

Often seen with

P2200 NOx Sensor Circuit (Bank 1 Sensor 1) · **P2201** NOx Sensor Circuit Range/Performance (Bank 1 Sensor 1) · **P2202** NOx Sensor Circuit Low Input (Bank 1 Sensor 1) · **P2203** NOx Sensor Circuit High Input (Bank 1 Sensor 1) · **P2204** NOx Sensor Circuit Intermittent Input (Bank 1 Sensor 1)

See it working

Watch the animated explainer [How an Automatic Transmission Works, Gear by Gear](#) on Auto Veteran to see the parts involved moving.

Full guide, related articles and animations: <https://www.autoveteran.tech/dtc-codes/p220e/>

