P2220: NOX SENSOR HEATER CONTROL CIRCUIT HIGH BANK 2

OVERVIEW

Severity	:	Medium
DIY Difficulty Level	:	Intermediate
Repair Cost	:	**$450-$750**
Can I Still Drive?	:	**Yes**

What Does The P2220 Code Mean?

NOx (Nitrogen Oxide) sensors are primarily used for the emission systems in diesel engines. Their primary use is to detect NOx levels coming out of the exhaust after burning in the combustion chamber. The system then recycles these using different methods. Given the harsh environment of these sensors, they are composed of a combination of ceramic and a certain type of zirconia.

One of the downfalls of emitting NOx into the atmosphere is that it may cause smog and/or acid rain at times. Failure to sufficiently monitor and adjust NOx levels would result in a significant effect to the atmosphere around us and the air we breathe.

The ECM (Engine control module) continuously monitors the NOx sensors to ensure acceptable emissions levels in your vehicle's exhaust. The NOx sensor heater control circuit is responsible for heating the sensor preemptively. It does this to expedite the sensor warm-up time, in turn bringing to operating temperature efficiently without solely relying on exhaust temperatures to warm itself up.

When it comes to P2220 and related codes, the NOx sensor heater control circuit malfunctioned somehow and the ECM has detected this. For reference sake, Bank 1 is on the side in which the number 1 cylinder is located. Bank 2 is on the other side. If your vehicle is a straight 6 or 4 cylinder, where there is only one head, it may be a two sided downpipe/ manifold. Always refer to your service manual for location designations as this will be integral in the diagnosing process.

P2220 is a generic trouble code that refers to “NOx Sensor Heater Control Circuit High Bank 2.” It appears when the ECM detects a higher than expected voltage condition in the NOx sensor heater control circuit on bank 2 .

Diesel engines especially produce a significant amount of heat so make sure to always let the system cool before working on any exhaust system components.

What Are The Symptoms Of The P2220 Code?

Symptoms of a P2220 diagnostic code may include:

- Failed emissions test
- Intermittent CEL (check engine light)

What Are The Potential Causes Of The P2220 Code?

Causes for this P2220 cruise control code may include:

- NOx sensor defective
- Heater in NOx sensor malfunctioning
- Internal open in ECM (Engine control module) or NOx sensor itself
- Water intrusion
- Broken connector tabs (intermittent connection)
- Melted harness
- Dirty sensor element
- High resistance present in heater control circuit

How Can You Fix The P2220 Code?

The first step in the troubleshooting process for any malfunction is to research the Technical Service Bulletins (TSB) for known issues with the specific vehicle.

Advanced diagnostic steps become very vehicle specific and may require the appropriate advanced equipment and knowledge to perform accurately. We include basic steps below but refer to a vehicle year/make/model/powertrain specific repair guide for specific steps for your vehicle.

Basic Step #1

Most NOx sensors used in diesel automotive and truck applications will be fairly accessible. Given that fact, keep in mind they can be extremely stubborn when removing with all the expanding and contracting that is going on with the temperature fluctuations within the exhaust system. So make sure you need to remove the sensor before doing so. Most sensor testing should be able to be done from the connector. Refer to your service manual for NOx sensor pinpoint tests to acquire the

desired values.

NOTE: You may need to use some heat when replacing the NOx sensor to avoid stripping the threads in the exhaust bung. Penetrant oil is always a good idea anytime you think you may be removing the sensor in the near future.

Basic Step #2

Follow the harness involved with the NOx sensor to assess its health. Most times the harnesses will be run in close proximity to the extreme heats mentioned earlier. So keep a close eye for any melted wire looms or connectors. Make sure to repair any chafes or damaged wire looms to prevent any future malfunctions.

Basic Step #3

Visually inspect the exhaust system. Especially inside to determine if there is enough soot present that it could potentially adversely effect the sensor's overall functionality.

Generally speaking, diesel engines produced an abnormal amount of soot anyway. That being said, aftermarket programmer upgrades may affect the fuel mixture and create more than normal soot amounts, which can consequently cause premature NOx sensor failure, given the richer fuel mixtures involved with some aftermarket programmers. Make sure to clean the sensor if you think this is the case and return fuel mixture to normal OEM specs by removing or disabling the programmer.

Basic Step #4

Finally, if you've exhausted your resources, and still can't pinpoint the issue, it would be a good idea to locate your ECM (engine control module) to verify if there is any water intrusion present. At times located in the interior of the vehicle, it can be susceptible to any moisture being created in the interior overtime (e.g. leaking heater core, leaking window seals, melting residual snow, etc.). If any substantial damage is found, it will need to be replaced. To do this, in most cases, the new ECM will need to be reprogrammed to the vehicle so adaptation is seamless. Unfortunately, generally speaking, the dealerships will be the only one equipped with the proper tools for programming.

This article is strictly for information purposes only and the technical data and service bulletins for your specific vehicle should always take precedence.

Severity Description

Medium severity for this, as emission related faults really can effect the environment around this. That said, sometimes with emission faults, there will not be any symptoms present but can still have repercussions if left unattended.

Reference Sources

P2220 NOx Sensor Heater Control Circuit High Bank 2, OBD-Codes.