

P2201: NOX SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1

OVERVIEW

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

What Does The P2201 Code Mean?

Generally speaking, diesel-fuelled engines produce a higher amount of particulate matter (PM) and Nitrogen Oxide (NOx) emissions than a petrol / gasoline engine.

As vehicles have been evolving, so have the emission vehicle standards of most state/provincial laws. This day in age, engineers are developing ways in order to lower the atmospheric emissions in most vehicles to comply and/or exceed the laws emission related requirements.

The ECM (Engine control module) monitors an uncountable amount of sensors at any given time to keep your engine efficient, reliable and functional. Not only is it doing all this but it is actively monitoring the emissions and making sure to expel as little of these hydrocarbons to the atmosphere as possible.

The ECM uses the NOx sensor to monitor nitrogen oxide levels within the exhaust to get an idea of the hydrocarbons being expelled. NOx is one of the primary PM's that diesel-fuelled engines produce. The ECM actively monitors this sensor and adjusts the system accordingly.

A diesel engine's exhaust is one of the dirtiest areas on the vehicle so keep this in mind. The soot produced in the exhaust of a diesel vehicle can, for lack of a better word, "cake" sensors and switches within the exhaust, depending on their location. This wouldn't much matter if the soot didn't possess this distinctive characteristic.

If the sensor is not free of debris, it may not be able to properly measure the values that the ECM (Engine Control Module) actively needs to adjust your EVAP (Evaporative emissions) system according to specific federal/state/provincial laws. Sometimes if going from state to state, where emission regulations differ, aftermarket sensors are sometimes used to comply with the local emission standards.

The ECM activates P2201 and related codes ([P2200](#), [P2202](#), [P2203](#), and [P2204](#)) when it monitors a fault within the NOx sensors or their circuits. My experience with this code is limited but my educated guess is that most times, this will turn out to be a mechanical issue. Especially considering the sensor's conditions mentioned earlier.

The P2201 code is set when the ECM detects an out of range electrical condition within the bank #1 NOx sensor or circuit.

Note: On engines with more than one bank of cylinders (e.g. V6, V8), bank 1 is the side of the engine that contains the #1 cylinder. Therefore, the NOx sensor is located in the exhaust of that bank. Refer to your service manual for specifics for your make/model/powertrain. This is the main resource where you can decipher which, out of a possible multitude of sensors, you are dealing with. They use similar distinctions with O2 (a.k.a. oxygen) sensors.

What Are The Symptoms Of The P2201 Code?

Symptoms of a P2201 trouble code may include:

- Increased hydrocarbon emissions
- Check engine light illuminated
- Fuel economy not consistent
- Erratic Idle
- Excessive smoke

What Are The Potential Causes Of The P2201 Code?

Causes for this P2201 fuel trim code may include:

- Defective or damaged NOx sensor
- Dirty sensor pickup
- Damaged wiring
- Internal ECM issue
- Connector problem

How Can You Fix The P2201 Code?

Visually inspect your sensor and the harness. Sometimes, the elements in which we expose our

vehicles to be the very reason for your fault. I've seen rocks, curbs, snow, and ice take out sensors like these, so make sure the sensor is intact and looks good. Keep in mind, some of these harness' may be routed in close proximity to the exhaust so there is a possibility of wires getting burnt/melted and causing all sorts of problems.

TIP: Let engine cool before working near the exhaust.

Clean the sensor. Make sure you are aware that any sensor mounted in exhaust goes through countless cycles of heating up and cooling down. Consequently, they expand and contract enough to sometimes seize in the sensor "bung" (thread hole) on the exhaust.

If this is the case, you may need to apply heat to the threads, NOT directly on the sensor, you risk damaging the NOx sensor this way. If you have never applied heat to assist in breaking free nuts or bolts, I would advise against starting with this. That being said, if you have any doubts in your skills/abilities, you should always bring your vehicle to a reputable service station.

Severity Description

Most times, I would say, emission related codes will be fairly low on the severity scale. Especially comparing to some possible hazards in other systems on the vehicle like steering, suspension, brakes, etc. Point being here is that if you have bigger fish to fry, so to say, you can put this on the back burner for now. That said, any electrical fault should be attended to with a certain sense of urgency.

Reference Sources

[P2201 NOx Sensor Circuit Range/Performance Bank 1](#), OBD-Codes.