

NOx Sensors – Failure Causes & Fault Diagnosis

Today's SCR (Selective Catalytic Reduction) systems are equipped with one or more NOx sensors. The NOx sensor, also known as the nitrogen oxide sensor, performs important functions in the SCR system and ensures efficient exhaust gas aftertreatment. The installation location in the hot exhaust system and unfavourable driving conditions limit the service life of the NOx sensor.

The failure of the NOx sensor is indicated by the illumination of the OBD lamp and causes the AdBlue® dosage in the SCR system to be switched off. The actual cause of the failure is not always easy to pinpoint, but the following tips have proven to be effective:

- Only a diagnostic tester that is up-to-date with the latest software can correctly read out the fault memory.
- In order to detect faults in the vicinity of the NOx sensor, all control units of the vehicle should always be read.
- Poor AdBlue® quality can affect the measurements made by the NOx sensor. A refractometer can be used to check the quality of AdBlue®: the target value is around 32.5%.
- Defective pump or dosage modules lead to massive deposits in the exhaust gas system.
- Defective wiring due to animal bites or smoldering damage as well as contact corrosion/breakage lead to the failure of the sensor.

Please note when changing the sensor!

Optical inspection: Visually check the NOx sensor after removal. In the case of heavy contamination by soot or AdBlue® residue, determine the cause. Check for discoloration of the sensor head. If the temperature is too high, it may indicate lean combustion. Damage to the connection thread must be repaired in advance with suitable tools. In most cases, it is an M22 thread with a 1.5 pitch. If the leak is not corrected, incorrect readings will occur.

Determining the correct part number: In modern SCR systems, a NOx sensor is installed at the rear and one at the front. The designation "NOx sensor 1 (bank 2)" clearly indicates a front sensor. "NOx sensor after particulate filter" can be the front or rear sensor. A clear assignment is only possible by comparing it with the OE part number.

On-board software: Due to product improvement measures and recalls by vehicle manufacturers for software updates, it may happen that sensors are not correctly detected and need to be replaced. Always pay attention to the current status of the on-board software.

Installation and adjustment: Communication between the control unit and NOx sensor takes place via the CAN bus. For some vehicle manufacturers, the sensor position is assigned based on the initial temperature increase. The front sensor is located closer to the engine, heats up more quickly and is therefore recognized by the control unit as a "front NOx sensor". If the rear NOx sensor is now replaced, it may happen that the front sensor requires a longer warm-up time due to age and wear and is therefore recognized as a "rear NOx sensor". It may therefore be necessary to replace the front sensor as well. On some vehicles, the control unit needs to be informed about the installation of a new sensor and its location. It is also sometimes necessary to modify or delete adaptation values in the engine control unit.

