

**EXPERT
 TIPS
 FOR NOx
 ISSUES**

NOx SENSOR FAILURE

The NOx sensor is responsible for measuring the vehicles' NOx (Nitrogen Oxides) levels produced following the combustion cycle. NOx emission is found in an engine due to higher in-cylinder temperatures. The diesel fuel or the ester-based biodiesel does not contain nitrogen and the NOx is formed by taking the nitrogen from the air.

Most engines feature two NOx sensors: an upstream and downstream sensor. Their role is to monitor and observe the catalyst's performance to ensure that the system isn't producing excess gases, which are harmful to the environment.

Government rules worldwide are becoming increasingly stricter, and the Euro 6 norms affect all modern diesel cars. Maintaining and controlling the emissions would not be possible without including the NOx sensor.

The assembly uses two NOx sensors: the first sensor (referred to as NOx sensor 1) is located near the turbo downpipe and measures engine out NOx. The second sensor (referred to as NOx sensor 2) measures NOx levels exiting the SCR catalyst.

The SCR assembly contains a catalyst and requires DEF (Diesel Exhaust Fluid) for activation.

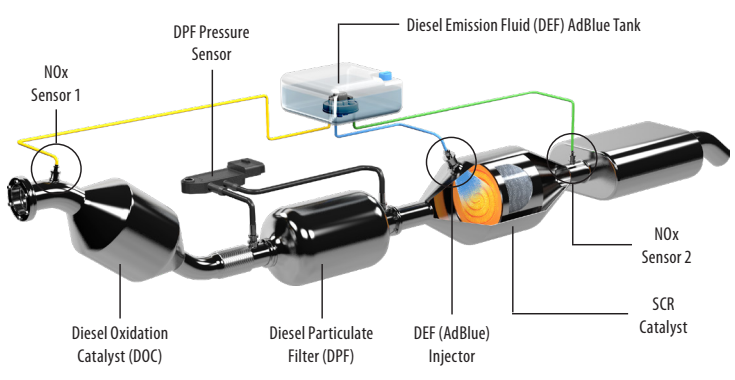
DEF is introduced to the exhaust system via a pump and injector controlled by the management system. Using the heat of the exhaust gasses the DEF will convert to ammonia and carbon dioxide.

If too much DEF is injected into the exhaust, the SCR catalyst can become saturated with ammonia. This is called "ammonia slip". To a NOx sensor, ammonia and NOx look the same. Ammonia slip will cause the downstream NOx sensor to report an incorrect amount of NOx in the system.

Crystallisation of the DEF can also cause a reduction in NOx conversion and affect the operation of the NOx sensor.

What causes a sensor to fail or show an apparent sensor failure?

- Water in the exhaust system which is a by product of combustion and catalytic conversion can damage the NOx sensor.
- Injector fouling, injector leaking or engine misfire. Excess fuel entering the exhaust system can lead to sensor failure and it is important to rectify the fault quickly to prevent sensor damage.
- Soot from the combustion process can coat the sensor and affect the reading as the sensor can no longer measure the gas effectively. The soot is also abrasive and when larger particles of soot are present in the exhaust gas the passing stream can damage the sensor.
- Impact damage. The sensor is thin and fragile and any objects hitting the sensor from the road surface can result in failure. This also includes thermal shock. Driving through a puddle of water and rapidly reducing the sensor temperature can cause the measuring plate to fracture.
- Increased oil consumption. Oil entering the exhaust system and settling on the components and sensors can result in damage being caused.





How can we avoid sensor failure?

Some sensor failures we cannot avoid, and when physical damage to the sensor has occurred through water, soot, oil or impact then sensor replacement will normally be required.

What can help to prolong life of the sensor?

Regularly running the vehicle at operating temperature will reduce moisture and water content in the exhaust, short stop/start driving allows moisture and water to collect as the vehicle is rarely at operating temperature.

SOLUTION			Passenger Vehicles	Commercial Vehicles
Keep the fuel system clean Cleaning the injectors regularly will maintain injector performance and reduce soot content in the exhaust gas and maintain exhaust gas temperatures.				
12293	Diesel Extreme Injector Cleaner	500 ml	12293	25290
25290	Injector Cleaner & Filter Primer	1 L		
Keep the exhaust system clean Reducing the soot content in the exhaust after combustion and promoting passive regeneration of the Diesel Particulate Filter.				
28392	Diesel Particulate Filter Regenerator	500 ml	28392	28090
28090	DPF Regenerator & NOx Sensor Protector	1 L		
Keep the oil system clean Maintaining cleanliness of the oil system and reducing oil burning.				
47244	Oil System Cleaner	325 ml	47244	47290
47290	Oil System Flush	1 L		