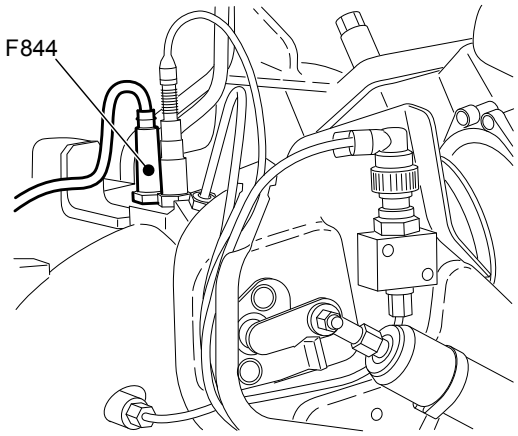
Sensor, NOx, before catalyst (F844)

The NOx sensor consists of a ceramic sensor element and an electronic control unit. The ceramic sensor element is placed in the exhaust pipe after the back pressure valve and the electronic control unit is placed on the engine. The electronic control unit of the NOx sensor has a power supply and is connected to the A-CAN network.

The NOx sensor measures the NOx concentration in the exhaust gas flow. The ECU provides the measured NOx concentration digitally via the A-CAN bus.

The sensor contains a heating element. The electronic control unit of the NOx sensor controls the power for the heating element. The sensor is heated in two stages. The first stage starts when the contact is switched on. The sensor is heated up to approximately 212°F (100°C) and any condensate evaporates from the sensor. The exhaust gas temperature increases with a running engine. When the exhaust gas temperature before the DOC, measured by the temperature sensor before the DOC, exceeds 302°F (150°C), a timer starts. During this time, the sensor stays heated to approximately 212°F (100°C). After the timer has elapsed, the EAS-3 electronic control unit sends a 'dewpoint' message via the A-CAN. The NOx sensor receives this message, and the heating element proceeds with the second stage and heats up the sensor to its operating temperature of approximately 1472°F (800°C). The sensor continues to be heated to 1472°F (800°C) for as long as the NOx sensor receives this 'dewpoint' message. As long as the exhaust gas temperature after the catalytic converter exceeds the minimum programmed value and the engine is running, the 'dewpoint' message is sent. If this message is not received, the sensor temperature drops to the standby temperature of approximately 212°F (100°C).

The electronic control unit of the NOx sensor can also detect faults. These faults are transmitted to the EAS-3 electronic control unit via the A-CAN network. The EAS-3 unit logs the faults as fault codes. These fault codes can be read out in the engine management system.



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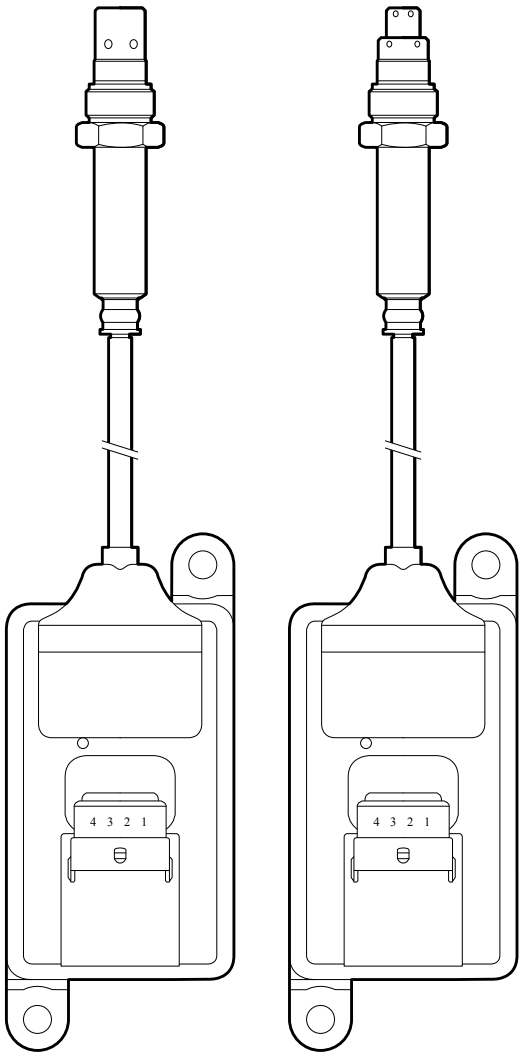

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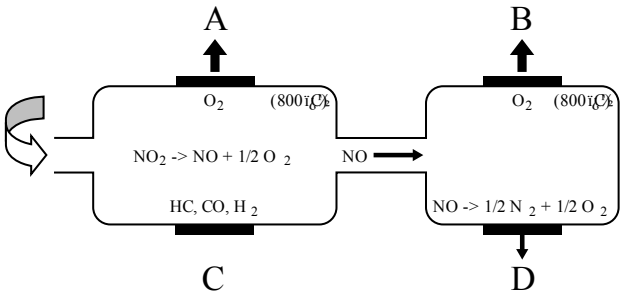
Working principle

The ceramic sensor is made of zirconia electrolyte. There are two cavities inside the sensor. In the first cavity, a constant voltage is applied to the main pumping electrodes, which are made of zirconia. The

exhaust gas enters the first cavity where, due to the high temperature, NO_2 is converted into NO + ½O_2. The oxygen is pumped out through the zirconia electrolyte (A). Other elements of the exhaust gas, such as HC, CO and H2, also enter the cavity. These elements oxidize at the pumping electrode, which is made of platinum (C).

The remaining gas, consisting of NO and a small amount of oxygen, enters the second cavity where an auxiliary pump (B) fully removes the oxygen. In the measuring pump (D), NO is converted into ½N_2 and ½O_2. The measurement result of this generated oxygen in relation to the ambient oxygen outside the exhaust represents the NOx concentration in the exhaust gases.



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Effect of the output signal on the system:

- Reads the amount of engine NOx output to check and adjust the values of the NOx prediction.
- Reads the amount of engine NOx output, which is used to determine the injected quantity of DEF.

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