Exhaust gas treatment
Denoxtronic 5 – dosing system for AdBlue® in SCR systems

Product benefits
- Support for meeting today’s and future emission standards (LEV II, III, EU6)
- Diesel engine operation optimized for fuel efficiency
- Business model adapted to established fuel business model
- Highly economical due to standardized supply module
- Less installation space needed, robust design

Vehicle segments

1. AdBlue® supply module SM 5 with delivery module
2. AdBlue® dosing module: air cooled (DM 3.2)
3. AdBlue® dosing module: water cooled (DM 3.4)
4. Dosing control unit (DCU) with SCR functions
**Exhaust gas treatment** Denoxtronic 5 – dosing system for AdBlue® in SCR systems

**Task** The Denoxtronic dosing system injects AdBlue®, a solution of 32.5% urea in water, into the exhaust gas flow. The urea is then converted via thermolysis and hydrolysis into ammonia, which in turn breaks down the nitrogen oxides in the exhaust into water and nitrogen.

**Function** A supply module draws the AdBlue® from a tank using a diaphragm pump and compresses it to the system pressure of 4.5 to 8.5 bar required for atomization. The dosing module calculates the optimum quantity of AdBlue® based on engine operating and sensor data in order to reduce the NOx efficiently. Once the quantity has been calculated, the dosing module adds the atomized urea solution into the exhaust gas flow upstream of the SCR catalytic converter. A dosing or engine control unit controls the dosing and heating strategy and handles on-board diagnostics. Maximum nitrogen oxide reduction can be achieved by means of precise operating data and adapting to the specific catalytic-converter requirements. Because the AdBlue® solution freezes below -11 °C, the supply module in the AdBlue® tank is ice-pressure resistant. The dosing module is emptied when the engine is switched off.

**Variants** The lineup includes a standardized supply module for cars (SM 5.1) and light-duty commercial vehicles (SM 5.2); the module which is welded to the AdBlue® tank via a standardized mechanical interface. SCR control is handled by either the dosing control unit (DCU) or an engine control unit (with HCU-PC or GCU). Delivery includes dosing modules for use in the underbody (air cooled, DM 3.2) or in the engine compartment (water cooled, DM 3.4).

**Technical characteristics**

- **Dosing quantity**
  - min./max.: 200/2,000 g/h

- **Operating pressure**: 4.5 – 8.5 bar

- **Spray quality**: 100 μm SMD (Sauter Mean Diameter)

- **Spray angle**: 10° – 23°

- **Filter retention capacity**
  - Pkw: 8 g, LD: 26 g

- **Service life**: 8,000 h

- **Operating voltage**: 12 V

- **Bosch control unit**: MDG1 or DCU

- **Heater control**: HCU-PC or integrated in DCU

- **Emission standards**: LEV II, III, EU6

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Helps reduce **nitrogen oxide emissions** by up to 95% **up to 5% fuel savings**

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**Bosch components**

1. Dosing control unit DCU/electronic engine control unit MDG1
2. Optional with MDG1: heater control unit HCU-PC
3. Optional with MDG1: glow control unit GCU
4. Supply module SM 5.1 (PC)/SM 5.2 (LD)
5. Dosing module DM 3.2/DM 3.4
6. Lambda sensor
7. Differential pressure sensor
8. NOx sensor
9. Particulate matter sensor

**Other components**

10. Temperature sensor
11. Oxidation catalytic converter (optional: NOx storage catalyst)
12. Diesel particulate filter
13. Mixer
14. SCR catalytic converter
15. AdBlue®
16. Electrical connection
17. heat/cold

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Diesel Systems

Sensors for exhaust-gas treatment systems

All functions from mixture formation to exhaust-gas treatment rely on precise, constantly updated data from the exhaust tract. This data is provided by sensors developed by Bosch specifically for this application.

The next stages of U.S. and EU emission legislation will stipulate the ability for comprehensive exhaust-gas treatment system diagnosis in order to ensure compliance with emission targets over the vehicle’s lifetime.

Internal mixture formation, which is controlled by the EDC Electronic Diesel Control, is an important factor for reducing the pollutant content of the engine’s raw emissions. The control for minimizing tolerances in raw emissions is supported by the lambda sensor with precise metering of the residual oxygen in the exhaust gas.

Bosch offers fuel-efficient solutions for the operation of closed particulate filters. As soon as the particulate filter (DPF) is fully loaded it has to be regenerated by burning the stored particulate matter. The solution is built upon software functions based on the evaluation of sensor signals. A differential pressure sensor is used to monitor DPF loading and functionality at the same time.

Further restrictions in emissions legislation will require additional sensors, including the NO\textsubscript{X} sensor and the particulate matter sensor.

Possible applications

Bosch exhaust sensors can be applied in every conceivable diesel system configuration for the fulfillment of ambitious emission targets.
**Customer benefits and techn. features NO\textsubscript{X} sensor**

- System competence in monitoring and controlling the SCR system by precise measurement of exhaust-gas NO\textsubscript{X} content
- Fast operational availability, good signal dynamics, continuous signal availability and high robustness in the exhaust stream
- Flexible application due to CAN interface

<table>
<thead>
<tr>
<th>NO\textsubscript{X} measuring range</th>
<th>0 - 1,600 ppm</th>
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<tbody>
<tr>
<td>Measuring precision</td>
<td>± 10 ppm</td>
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</table>

**Particulate matter sensor**

The particulate matter sensor enables diagnosis of the particulate filter. It is integrated into the exhaust tract downstream of the filter. The sensor function is based on resistance measurements: Adsorbed soot particles form conductive paths between electrode combs on which an electric current is flowing. The sensor element is regenerated regularly by heating. The diagnostic software uses the measured current to evaluate DPF functionality. This sensor is available for passenger car and commercial vehicle applications.

**Lambda sensor for diesel engines**

The wide-band lambda sensor measures the residual oxygen content in the exhaust gas and helps to comply with strictest exhaust and OBD regulations. At the heart of the sensor is a planar sensor element with integrated measuring cell and heater. The measured data serves to adjust the optimal air-fuel mixture via the air-intake system. The latest-generation lambda sensor is specifically adapted to customer requirements regarding diesel engines.

**Differential pressure sensor**

The differential pressure sensor measures the exhaust pressure difference across the particulate filter using a piezo-resistive sensor element. The measured value can be used to calculate the loading stage of the filter. This is the precondition for demand-controlled, fuel-saving particulate filter regeneration.

**Bosch: Automotive competence from a single source**

- Comprehensive range of services and know-how
- System and network competence
- Innovator and technology leader
- Warrantor for quality and dependability
- Worldwide presence
- Universal partner

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