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# FOCUS SCR systems



The SCR system is an emissions reduction technology found in many modern diesel vehicles. This system uses a fluid called "**urea fluid**" (a 32.5% urea-based solution) to **reduce nitrogen oxide (NOx) emissions in diesel engines.**

The urea fluid is injected into the exhaust system, where it reacts with the high-temperature exhaust gases, reducing NOx levels and **transforming them into nitrogen and water vapor**, which are harmless to the environment.

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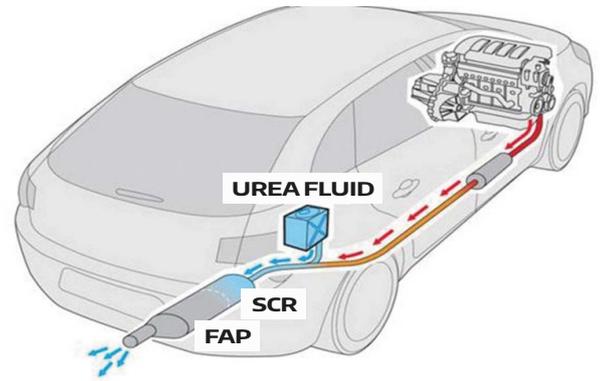


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## Operation

- The urea fluid is stored in a dedicated tank in the vehicle.
- The injection system introduces the urea fluid into the exhaust system through the SCR (Selective Catalytic Reduction) catalyst.
- The fluid reacts with the high-temperature exhaust gases, reducing the amount of NOx.
- The system is monitored by temperature sensors, liquid level sensors, and NOx sensors, which send signals to the engine control unit (ECU).



## Components of the SCR system

### Urea tank

It contains the urea solution

### Injection pump

It injects urea into the exhaust system

### Level sensors

They monitor the amount of urea fluid in the tank

### Temperature sensors

They detect the temperature of the urea solution and the exhaust gases

### SCR Catalyst

The component that reduces NOx emissions

### Injection valve

It regulates the flow of urea fluid into the exhaust system

## Attention

Depending on the operating logic of the control units in different vehicles, a system malfunction could trigger specific strategies: **the engine might enter a recovery mode**, or **it could have limited autonomy** in terms of distance traveled or the number of starts. Therefore, it is advisable to **periodically check the condition of the urea injector** and, if necessary, remove any solid material deposited on it to avoid the need for replacement or more serious issues with the entire system.



In the case of replacing the injector, a learning procedure must be performed (using a diagnostic tool that supports this function) so that the appropriate control unit can assess the "new" performance of the component.

If the urea level in the tank reaches the minimum level, the engine control unit may limit the vehicle's range or its maximum number of starts. Once this mileage threshold is exceeded, it will no longer be possible to start the engine without first restoring the proper amount of urea fluid in the system. Even after doing so, to reset the "start lock" status, **a learning procedure must be carried out using a diagnostic tool capable of supporting this function.**



## Common issues in the SCR system

### ■ Lack of urea fluid in the tank

**Symptoms:** Warning light on the dashboard, loss of engine power.

**Cause:** The tank is empty or has an insufficient level of urea fluid.

**Resolution:** Refill the urea tank with the specific liquid. If the warning light does not turn off after refueling, perform a system reset using a diagnostic tool.

### ■ Urea level sensor error

**Symptoms:** Error message on the dashboard, warning light for the system.

**Cause:** Malfunction of the level sensor, which does not correctly detect the amount of urea solution.

**Resolution:** Check the level sensor and, if necessary, replace it. Inspect the wiring and connectors for any damage or corrosion.

### ■ NOx sensor issue

**Symptoms:** Increased emissions, engine warning light on.

**Cause:** The NOx sensor is faulty or damaged and does not correctly detect the NOx levels in the exhaust gases.

**Resolution:** Perform a system diagnosis, check the NOx sensor, and replace it if necessary. Clean any obstructions in the exhaust system.

### ■ Urea fluid freezing

**Symptoms:** The engine does not start or shuts down during operation, warning light on.

**Cause:** The urea fluid is frozen, as its freezing point is around -11°C.

**Resolution:** Heat the SCR system in a warmer environment. Check the liquid temperature and, if necessary, replace the urea fluid.





## ■ Urea injection pump issues

**Symptoms:** Increased emissions, engine warning light on, reduced engine power.

**Cause:** The injection pump is not working properly.

**Resolution:** Perform a thorough diagnosis, check the pump, and replace it if necessary. Inspect the injection lines for any blockages.

## ■ Dirty fuel module

**Symptoms:** Increased emissions, engine warning light on, reduced engine power.

**Cause:** Solid residue deposits on the component.

**Resolution:** Remove the solid material deposited on the component or replace the module.



## Common error codes

- **P20E8**  
Emission Reduction System Malfunction (General).
- **P205C**  
Insufficient urea level detected.
- **P21B6**  
Faulty urea injection pump.

- **P205B**  
Faulty urea level sensor.
- **P22A6**  
Faulty NOx sensor.

## Repair procedure

- 1 Initial diagnosis**  
Connect the diagnostic tool to the vehicle to detect any error codes in the system.
- 2 Urea level check**  
Check the fluid level in the tank. If the level is insufficient, refill the tank with urea solution that meets the manufacturer's specifications.
- 3 Sensor check**  
Check the level and NOx sensors for malfunctions. If defective, replace them.
- 4 Injection pump check**  
If the error code indicates an issue with the pump, perform a thorough inspection and replace it if necessary.
- 5 System reset**  
After completing the repair, perform a system reset using the diagnostic tool to clear the error codes and restore the functionality of the SCR system through the learning procedure as per the manufacturer's specifications.