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# FOCUS

## Diesel high pressure pumps

Diesel high pressure pumps are essential components in modern diesel engines, responsible for injecting fuel (diesel) into the engine under high pressure. Their primary role is to **convert low-pressure fuel into high pressure**, enabling precise and efficient injection into the engine's combustion chamber through the injectors.



Function of diesel high pressure pumps:

### 1 Supplying the injection system

The diesel pump is responsible for supplying fuel to the injection system, ensuring it reaches the correct pressure for optimal injection.

### 2 High pressure

High-pressure pumps generate pressures of up to 2000-2500 bar or higher, depending on the engine type and injection system requirements. This pressure is necessary to "atomize" the fuel, ensuring better combustion efficiency.





### 3 Fuel quantity control

The pump controls the amount of fuel to be injected based on the engine's demand, which is controlled by the engine's electronic control unit (ECU) through pressure and flow regulators.

## Types of diesel high-pressure pumps

### Electronic pumps

High-pressure pumps with pressure and flow regulators.

### Electronic high-pressure phased pumps

## Application and benefits

### ■ Engine efficiency

A properly calibrated injection system, aided by a high-pressure pump, promotes more complete combustion through the injectors, enhancing engine efficiency, reducing fuel consumption, and ensuring compliance with emission standards as specified by the car manufacturer.

### ■ Reliability and durability

The high-pressure pump contributes to the engine's long lifespan by maintaining operational efficiency over time.

## Defect symptoms on car

Difficulty in starting up

Excessive smoke

Abnormal noises

Power loss

Engine warning light on

Idle irregularities





## Checks

### ■ Checking for correct operating pressure

#### Operating pressure control

High-pressure pumps must generate pressures of up to 2000-2500 bar or higher. It is crucial to ensure that the pressure remains within the parameters specified by the engine manufacturer.

#### Tools

Use diesel-specific diagnostic gauges to measure injection pressure under various engine load conditions.

### ■ Fuel quality control

#### Fuel check

Impurities in the fuel, such as water, dirt particles, or other contaminants, can damage the pump and injectors. Regular checks on fuel quality and potential contaminants are essential to prevent such damage.

#### Fuel filtration

Ensure that fuel filters are clean and in good condition. Clogged or damaged filters can affect fuel quality and cause damage to the pump.

### ■ Fuel flow control

#### Fuel flow check

The high-pressure pump must provide a consistent and adequate fuel flow. If the flow is insufficient, the pump may struggle to maintain the required pressure. It is important to measure the fuel flow rate and compare it with the manufacturer's specifications.

#### Check the low-pressure pump

Check using specific low-pressure gauges, as the optimal operating pressures typically range from 1.5 bar to 5/6 bar, depending on the manufacturer's specifications and the installed system.

#### Fuel line inspection

Inspect the fuel supply lines for any obstructions that could restrict the flow to the pump.





## ■ Leakage control

### Checking for fuel leaks

Check the pump and its piping for fuel leaks. Leaks can reduce system efficiency and lead to damage or fire in the case of severe leaks.

### Inspection of gaskets and fittings

Use diesel-specific diagnostic gauges to measure injection pressure under various engine load conditions.

## ■ Checking the correct functioning of the electronic system (for electronic pumps)

### Electronic diagnostics

If the pump is controlled by an electronic control unit (ECU), it is essential to perform an electronic diagnostic to detect any malfunctions or errors in the system. The ECU monitors and regulates fuel pressure and flow, so electronic issues could negatively impact performance.

### Checking sensors and controllers

Sensors, pressure, temperature, and flow controllers should be checked to ensure they are providing accurate data to the ECU.

## ■ Components check

### Wear control

Checking the wear status of components.

## ■ Alignment and position check

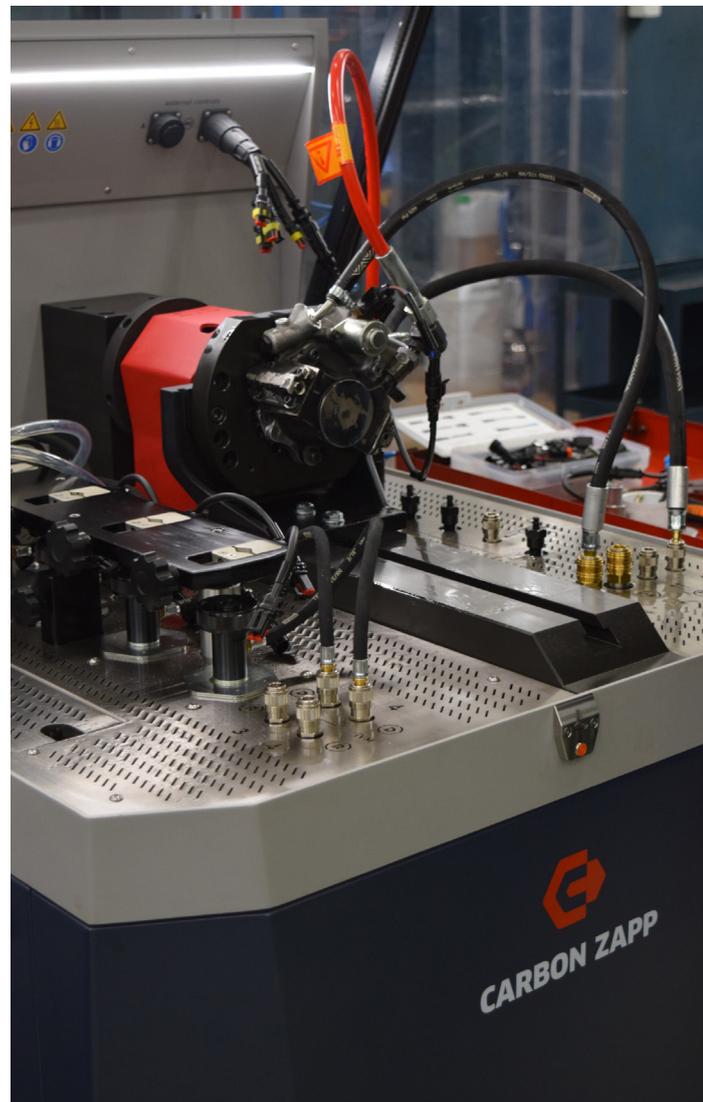
### Alignment inspection

It is important to ensure the pump is properly aligned with the engine axis. Incorrect alignment can lead to abnormal wear and potential damage to the pump.

### Perform proper timing for phased high-pressure pumps to ensure optimal performance and efficiency.

### Checking the pump supports

Ensure that the pump is securely attached to the motor flange and check that the mounts are not damaged or loose.





## ■ Injector check

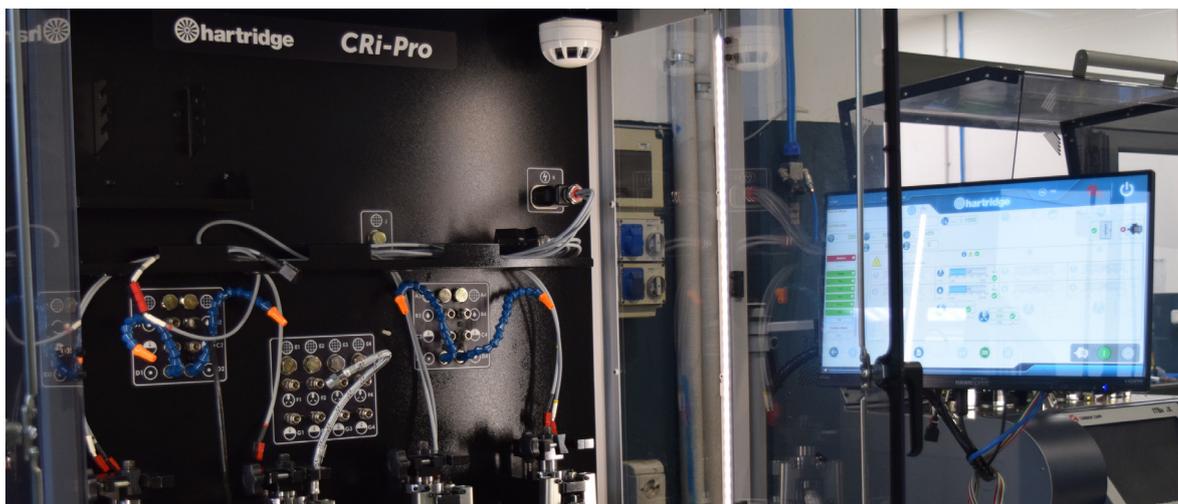
### Injector inspection

**The injectors must be inspected alongside the pump**, as a faulty pump can affect their performance. It is important to ensure that the injectors are not clogged and that fuel injection is occurring properly, including proper atomization and flow.

## ■ Control of coding and programming

### Pump coding verification

Use diesel-specific diagnostic gauges to measure injection pressure under various engine load conditions.



## Common error codes of high-pressure pumps for diesel engines

### ■ P0087 – Low fuel pressure

**Possible cause:** clogged fuel filter, faulty high-pressure pump, or a malfunctioning fuel pressure sensor.

**Solution:** Check the fuel filter, inspect the pump for leaks or malfunctions, and test the pressure sensor.

### ■ P0088 – High fuel pressure

**Possible cause:** defective pressure regulator, damaged high-pressure pump.

**Solution:** Check the pressure regulator and test the high-pressure pump for any issues or abnormalities.

### ■ P0200 – Injector circuit

**Possible cause:** Problems with injector circuits, damaged wiring harnesses.

**Solution:** Check injector connection and wiring harnesses.

**Solution:** Check the high pressure pump, check the injectors.



## ■ P0190 – Fuel flute/rail pressure sensor

## ■ P0089 – Fuel pressure regulator

Irregular engine operation

Initial poor quality behavior

No power in the upper speed range

The engine stops, the check engine light comes on

**N.B. Causes of failure of the CP4 version**, installed in the latest generation car models.

The defect is the breakage of the internal components of the pump. The cause of the failure is due to **poor maintenance** (services not performed or services performed incorrectly) and the **presence of non-compliant diesel inside**.

## Repair instructions for diesel high pressure pumps

### ■ Initial diagnosis

- | **Required tools:** diagnostic, fuel pressure gauge, tools for pump removal.
- | Read the error codes using a diagnostic tool.
- | Analyze the data to identify any issues related to the high-pressure pump or the sensors connected to it.

### ■ Fuel pressure check

- | Connect the diagnostic tool or pressure gauge to the fuel supply line to measure pressure.
- | If the pressure is too low or too high, it may indicate a faulty pump or an issue with the pressure regulator.

### ■ Fuel filter check

- | Replace or clean the fuel filter, as a clogged filter can restrict fuel flow and lead to insufficient pressure.

### ■ Tank and piping inspection

- | Ensure the system is clean.



## ■ Removal and replacement of high-pressure pump

- Remove the protective cover and pump connections.
- Disconnect the electrical circuit of the pump, unscrew the fuel fittings.
- Remove the pump.
- Once removed, inspect the pump for any signs of wear or visible damage, such as broken bearings or worn components.

## ■ Pump testing on test bench

- **Test bench:** The high-pressure pump should be tested on a test stand to assess its ability to maintain pressure and fuel delivery. This requires specialized equipment that simulates engine operation.
- **Flow rate test:** Measure the flow rate of the pump to see if it meets the manufacturer's specifications.
- **Pressure test:** Check that the pump maintains pressure in a proper range during the test.

## ■ Checking sensors and controllers

- Check fuel pressure sensors and regulators, fuel temperature sensors, as these can affect pump adjustment.

## ■ Replacement of worn-out components

- If the pump or pressure regulator is damaged, replace it with specific quality spare parts.
- If necessary, also replace pressure sensors or other connected electronic components.

## ■ Bench test for high-pressure pump

A high-pressure pump test bench simulates real operating conditions and measures fuel pressure and flow. The main steps for a bench test include:

- **Adjustment of rotation speed** according to manufacturer's specifications.
- **Measurement of the flow rate and pressure** delivered by the pump under different conditions.
- **Verification of pump response** to changing speed and pressure, analysis of nominal values.

The bench test is crucial for confirming whether the pump is faulty and for diagnosing any other issues within the vehicle system.

## Related products

### Pressure regulators



Meat&Doria **9341**  
Hoffer Products **8029341**



Meat&Doria **9418**  
Hoffer Products **8029418**



Meat&Doria **9122**  
Hoffer Products **8029122**



Meat&Doria **9768**  
Hoffer Products **8029768**

### Fittings



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Meat&Doria **9497**  
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Meat&Doria **98698**  
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Meat&Doria **98261**  
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### Camshafts

### Bushings



Meat&Doria **98859**  
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Meat&Doria **98549**  
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### Pump repair kits



Meat&Doria **98163**  
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### Tappet pumps



Meat&Doria **98289**  
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### CP1 pump elements



Meat&Doria **98636**  
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### Seal caps



Meat&Doria **98874**  
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### Gaskets



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