BOSCH
Invented for life

Bosch diesel system components

for professional repairs on modern and conventional diesel systems

Modern diesel injection systems
Overview

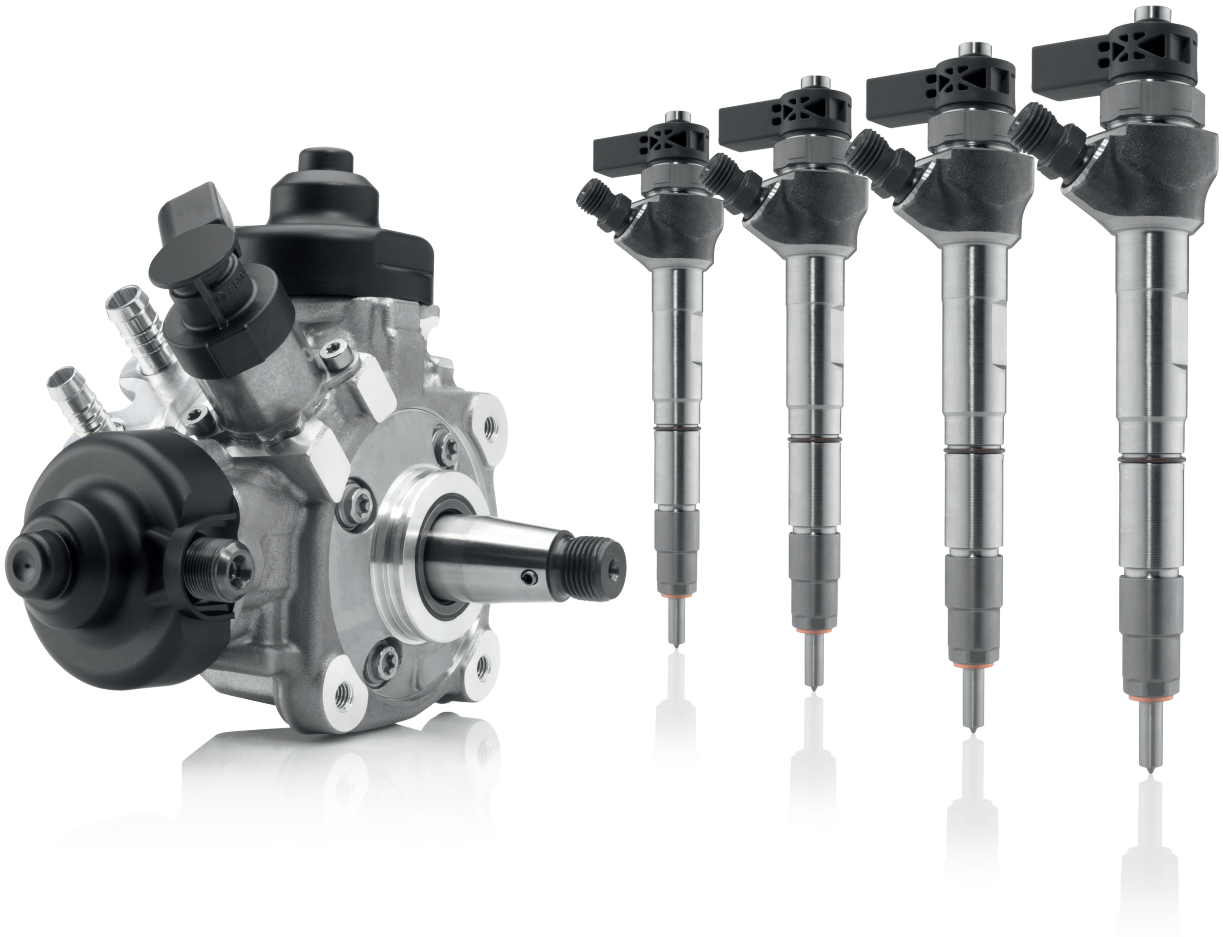
The common-rail system: By means of products such as unit pumps, unit injectors or even the common-rail system, Bosch made a significant contribution to the development of modern diesel systems. Bosch technology stands for the powerful performance and the efficient fuel combustion of modern diesel engines.

Common-rail injection: pioneering diesel engine technology

In 1997, Bosch launched the first common rail system onto the market. The system's name is based on the common rail supplying all cylinders with fuel. At conventional diesel injection systems, the fuel pressure for each injection cycle has to be generated separately. At common-rail systems, however, pressure build-up and injection are separated from each other. Fuel is thus always available at the required injection pressure.

History of modern diesel injection systems

1994 UIS unit injector system
1995 UPS unit pump system
1996 VP44 radial-piston distributor injection pump
1997 CRS common-rail system
2001 2nd generation CRS
2003 3nd generation CRS (Piezo injector)
2004 Denoxtronic 1
2006 Denoxtronic 2
2008 Denoxtronic for cars
2014 CPN5 high-pressure pump (2500 bar)

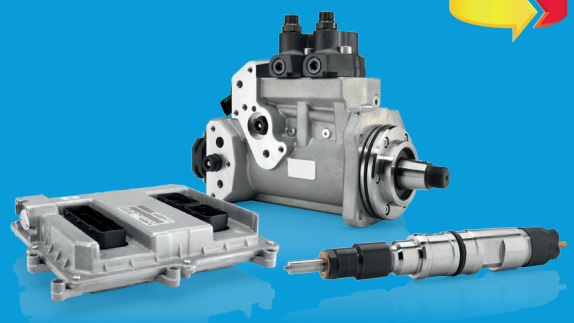


Modern diesel injection systems
Product range & details



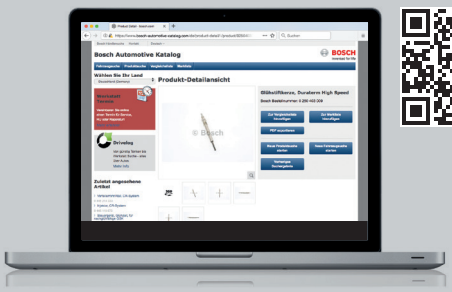

	CR pump	CR injectors	Unit injector system	Unit pump systems
	At common rail systems, the high-pressure pump compresses the fuel to up to 2 700 bar and provides the amount required. For this purpose, it constantly supplies the high-pressure rail with fuel and maintains a consistent system pressure. As the pressure build-up is not linked to the engine speed, the pressure required is thus available even at low engine speeds.	Injectors inject fuel right into the combustion chamber. They are supplied by the fuel rail and via short high-pressure fuel lines. The engine control unit manages the switch valve integrated into the injector thus opening and closing the injection nozzle. The switch valve can be controlled either electromagnetically or by a Piezo element.	The unit injector system (UIS) also known as pump/nozzle system is an electronically controlled diesel direct injection system developed by Bosch. At unit injector systems, the single-plunger pump and the injection nozzle are combined into a single unit.	The unit pump system (UPS) is used for commercial vehicles only. It uses a pressure pump for each cylinder. Therefore, the system also known as “pump/line/nozzle” system is closely related to the unit injector system (UIS). This system allows injection pressures of up to 2 000 bar.
Areas of application				
Advantages at a glance	▶Highly efficient fuel injection ▶High engine running smoothness and performance at any operating point ▶Injection can be controlled individually for each cylinder	▶High engine performance concomitant with low fuel consumption ▶High level of efficiency ▶Low noise level	▶High engine performance concomitant with reduced engine emissions and low consumption ▶Very high injection pressures and accurate quantity control ▶High wear resistance	

Bosch eXchange



With its comprehensive range of series-remanufactured products, Bosch eXchange provides an attractive option for value-based vehicle repairs.
Bosch eXchange parts come with same warranty as new Bosch parts.

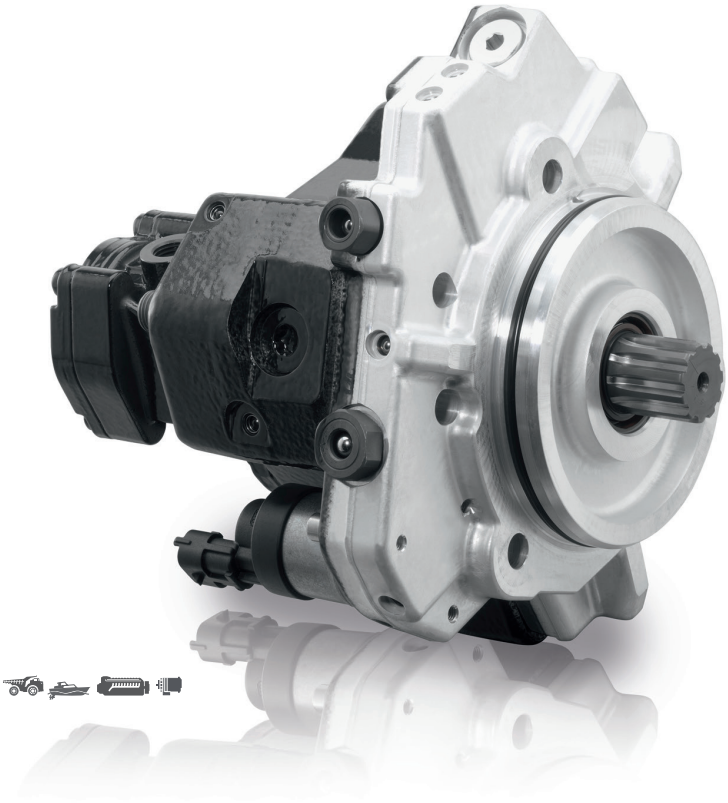
Bosch Automotive Catalog



All vehicle-specific products within the Bosch product portfolio can be identified both accurately and quickly. The eCat online catalog, prevents tedious searching – for retailers, workshops and consumers alike.
www.bosch-automotive-catalog.com

Common-rail pumps
Product details

At common rail systems, the high-pressure pump compresses the fuel to up to 2 700 bar and provides the amount required. For this purpose, it constantly supplies the high-pressure rail with fuel and maintains a consistent system pressure. As the pressure build-up is not linked to the engine speed, the pressure required is thus available even at low engine speeds. Most common rail systems are equipped with radial piston pumps.



Advantages at a glance:

- **High engine performance and smooth operation** combined with low consumption
- **High efficiency** since the rail pressure is already available at low engine speeds
- **Reduced consumption**in combination with start/stop systems
- **Long service life** due to robust design

Bosch eXchange

By means of CP4, Bosch eXchange provides a series-remanufactured product of the latest generation as an attractive option for value-based vehicle repairs. Bosch eXchange parts come with same warranty as new Bosch parts.

Common-rail injectors
Product details

Injectors inject fuel right into the combustion chamber. They are supplied by the fuel rail and via short high-pressure fuel lines. The engine control unit manages the switch valve integrated into the injector thus opening and closing the injection nozzle. The switch valve can be controlled either electromagnetically or by a Piezo element.

Advantages at a glance:

- **Highly efficient fuel injection** due to extremely short injection intervals and multiple injection
- **Pilot, main and post injections increase the efficiency of fuel combustion,** the running smoothness of the engine and the engine performance at any operating point
- **The injection into each cylinder** can be controlled individually
- **Closing hydraulically, the nozzle needle** ensures a quick injection stop

Bosch QualityScan (BQS)

Professionals rely on high quality.

In future, Bosch common rail injectors and injection pumps will thus be equipped with the repair-ID label proving they were repaired by an authorized Bosch diesel specialist. On the left side of the picture: data matrix code on the blue repair-ID clip on a common-rail injector for trucks (CRIN)

Unit injector system
Product details

The unit injector system (UIS) also known as pump/nozzle system is an electronically controlled diesel direct injection system developed by Bosch. At unit injector systems, the single-plunger pump and the injection nozzle are combined into a single unit.

Advantages at a glance:

- **High and optimized engine performance** combined with low fuel consumption
- **High coefficient of performance** due to compact design
- **Low noise generation** due to installation right into the engine block
- **Injection pressures of up to 2 200 bar** for best possible air/fuel mixture formation

Unit injectors for champions

This season, four-time European Truck Racing Champion (FIA ETRC) Jochen Hahn again relies on Bosch unit injectors for his race truck.

Unit pump systems
Product details

The unit pump system (UPS) is used for commercial vehicles only. It uses a pressure pump for each cylinder. Therefore, the system also known as “pump/line/nozzle” system is closely related to the unit injector system (UIS). In the UPS in fact the nozzle holder combination and the injection pump are connected via a short high pressure connection. This system allows injection pressures of up to 2 000 bar.

Advantages at a glance:

- **Very high injection pressures** and accurate quantity control
- **High engine performance** concomitant with reduced engine emissions and low consumption
- **Very high wear resistance** of the roller plungers
- **Lower emissions** thanks to pilot injection
- **Quick and easy** replacement in case of servicing

ESI[tronic] Truck

In Europe,

2 600

workshops subscribed to ESI[tronic] Truck software.

Conventional diesel systems
Overview

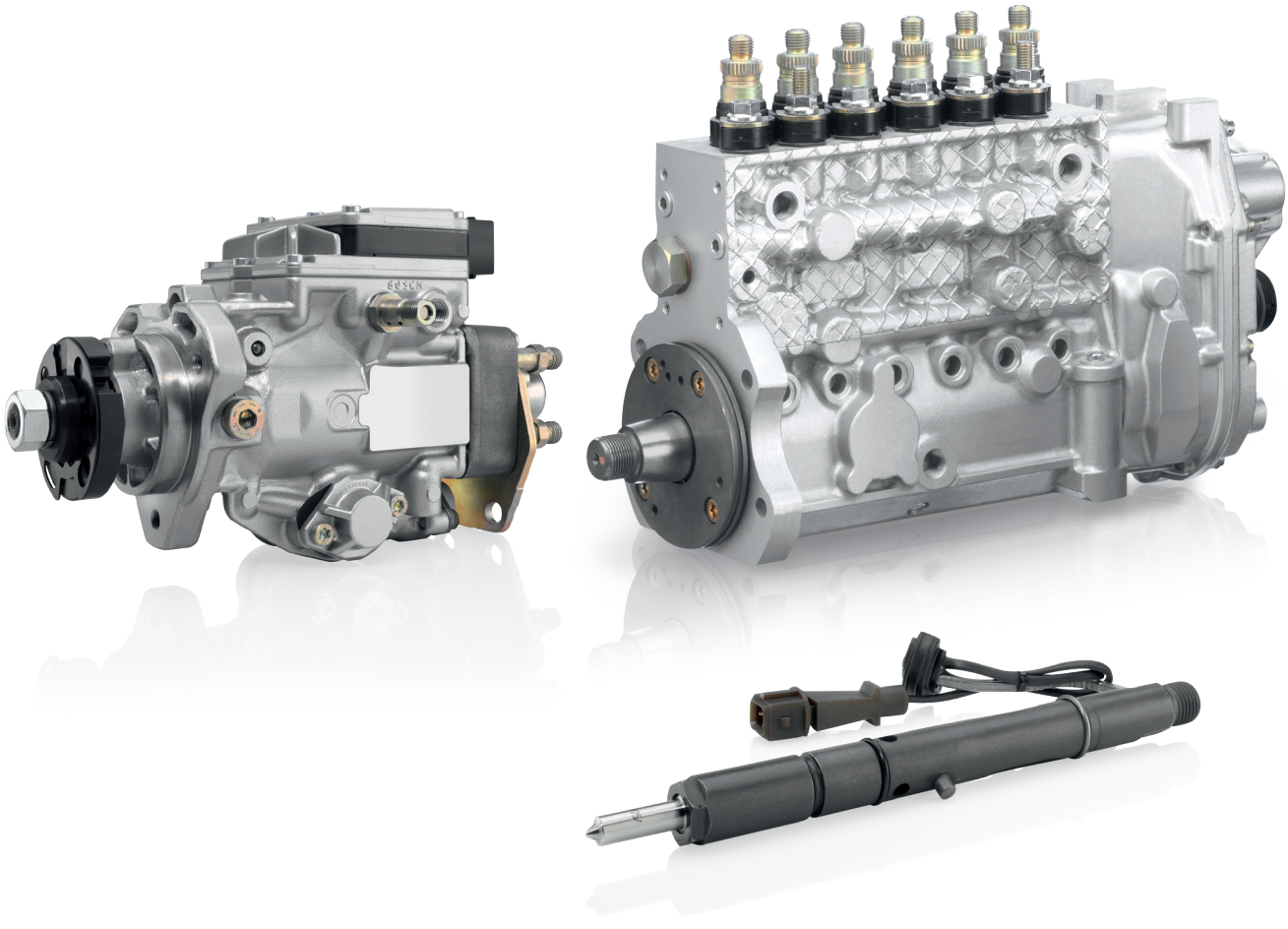
Bosch started producing in-line injection pumps back in 1927. The distributor injection pump (1962), the electronic diesel control (1987) and the control-sleeve in-line fuel injection pump (1993) marked important milestones at the development of conventional diesel systems.

Designed for high cylinder outputs,
in-line injection pumps are used for 2-to-12-cylinder engines – mainly engines of commercial vehicles, construction and agricultural machinery and stationary engines.

As this type of pump is lubricated by means of the engine oil circuit, it even copes with lower-quality fuels. Nevertheless, lasting reliability and a long service life can only be ensured in case of regular maintenance and proper installation of Bosch spare parts.

Small diesel engines running at high speeds
need a high-performance injection system combining quick injection sequences, low weight and a small installation volume. Distributor-type injection pumps meet these requirements. They consist of a small, compact assembly containing the supply pump, the high-pressure pump and the regulator.

Injection into the combustion chamber
Specifically for the injection of the air/fuel mixture into each of the cylinders of an engine, Bosch also developed the nozzle-and-holder assembly.



In-line pumps
Product details

In-line injection pumps allow high cylinder outputs at 2-to-12-cylinder engines. They are used in engines of commercial vehicles, construction and agricultural machinery as well as for stationary engines. Their name is based on the pump cylinders arranged in lines. At engines equipped with this pump, each cylinder is supplied with fuel by an own pump element and via a pressure valve and a high-pressure line.

Advantages at a glance:

- **Due to the top fitting accuracy of the pump pistons,** no special seal is required – not even in case of high pressures and low rotational speeds
- **Can also be operated with lower-quality fuels** due to lubrication via engine oil circuit
- **Lasting reliability and a long service life** in case of regular maintenance and use of the proper Bosch spare parts

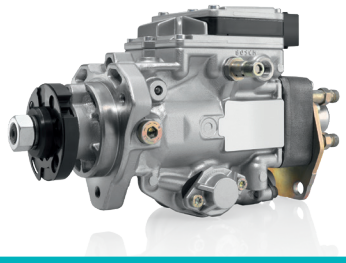
Diesel component repair

BOSCH Diesel Center

BOSCH Diesel Service

Bosch Diesel Center & Bosch Diesel Service have an excellent reputation as centers of competence for all aspects of maintenance and servicing of diesel injection systems. They are competent contacts for authorized workshops, fleet operators, business customers and private vehicle owners.

VE/VP distributor injection pumps
Product range & details



	Distributor injection pump (VE)	Distributor injection pump (VP)
	Due to their compact design,**distributor-type injection pumps** can be used for diverse application purposes in passenger cars, commercial vehicles, stationary engines as well as construction and agricultural machinery (off-highway). Axial-piston distributor injection pumps (VE) for engines with indirect injection (IDI) generate pressures of up to 250 bar at the nozzle. Used for engines with direct injection (DI), they generate peak pressures of approx. 1950 bar. Axial-piston distributor injection pumps are used for engines with a power output of approx. 30 kW per cylinder.	Due to their compact design,**distributor-type injection pumps** can be used for diverse application purposes in passenger cars, commercial vehicles, stationary engines as well as construction and agricultural machinery (off-highway). Used for direct injection (DI) engines, radial-piston distributor injection pumps (VP) generate peak pressures of approx. 1950 bar. Radial-piston distributor injection pumps (VP) are used for engines with a power output of up to 45 kW per cylinder.
Scope of application		
Advantages at a glance	▶ **Accurate fuel dosing** by means of variable injection pressures and injection timing due to electronically controlled injection with electric supply pump ▶ **Long service life** due to high robustness ▶ **Wide-spread application** in vehicles due to its space-saving design ▶ **Maintenance-free** due to lubrication by fuel	

Bosch eXchange

Bosch eXchange spare-parts range for VP30 and VP44 distributor injection pumps

Having been produced for decades and in millions, these days distributor injection pumps of the types VP30 and VP44 are often used in vehicles featuring a high mileage. For value-based repairs on these pumps, Bosch supplies:

- Pump control-unit part kits (PSG 5)
- Pressure solenoid valve part kits (DMV 10, DMV 11)
- Program changeover from new parts to Bosch eXchange (as of 2016)

Nozzle-and-holder assemblies
Product details

A nozzle-and-holder assembly (NHA) consists of a nozzle holder, an injection nozzle, a nozzle clamping nut and different smaller bits and pieces (e.g. spring, pressure bolt, shim washer). Nozzle-holder assemblies are needed to inject fuel into the combustion chamber of diesel engines.

Accurate injection into the combustion chamber

Nozzle-and-holder assemblies are robust components. They work with injection pressures of up to 1 800 bar and reach up to 20 000 hours of operation. For the fuel injection, a nozzle-and-holder assembly is assigned to each of the cylinders of an engine. Thanks to their resilient design, nozzle holders can be operated with a large variety of different fuels. The selection of the matching nozzle-and-holder assembly is based on the required supply volume, spray pattern and injection pressure.

Advantages at a glance:

- Optimization of engine performance, exhaust-gas and noise development due to major influence on both mixture formation and combustion
- Different types of Bosch nozzle-and-holder assemblies suitable for all conventional systems and types of engines – from single-cylinder engines to car and truck engines.

Service parts for diesel specialists
Overview

Global production of reliable spare parts: By now, Bosch produces conventional and modern diesel systems and a comprehensive range of spare parts in case they need any repair at a total of 30 locations on four continents. After all, high-quality spare parts are a prerequisite for the optimum functionality of these systems. Bosch spare parts stand out for their high quality and reliability.

Bosch – original-equipment diesel competence

No matter whether common-rail or unit injector system, in-line or distributor injection pump, Bosch innovations ensure powerful performance and efficient fuel combustion of and in millions of diesel engines. Bosch products and spare parts are based on the system know-how gained over decades. They need to meet top quality expectations at all times. Workshops can thus be sure, they will always install modern and robust spare parts featuring well-known Bosch quality.

Bosch supplies workshops with a comprehensive range of parts for diesel injection systems:

- genuine spare parts and spare parts of equivalent quality for almost any vehicle – even for older cars
  - Pump elements
  - Injection nozzles
  - Pressure valves and valve sets
  - Rail-pressure sensors
  - Sealing kits
- Innovative workshop equipment and software
- Practice-oriented service trainings
- Technical hotline

Pump elements
Product details

Each cylinder of an in-line injection pump is supplied with fuel by an own pump element and via a pressure valve and a high-pressure line. The engine drives the pump's camshaft by means of either gears or a chain. The pump runs synchronously with the pistons – that is, half as fast as the engine. To ensure this performance throughout hundreds of thousands of kilometers of operation, Bosch pump elements feature a particularly high material and production quality.

Pump elements consist of a pump piston and a pump cylinder.

They work with overflow principle and beveled-edge control. Thanks to the high fitting accuracy of the pump piston, no special seal is required – not even in case of high pressures and low rotational speeds.

High quality down to the last detail

No matter whether contact surfaces, bores or threads, pump elements need to be processed thoroughly and with top precision to prevent pump damages affecting the operation of the engine. Bosch pump elements are produced according to a clearly defined quality guideline.

Advantages at a glance:

- As human eyes hardly see the details involved in the production of pump elements, being a Bosch product provides certainty and safety at the product selection
- Production with high precision prevents increased fuel consumption, loss of power and a shortened service life of both pump and engine as well as breakdowns and engine damage

Valves
Product details

Valves are among the most strained components of conventional and modern diesel injection systems. Therefore, the high quality of Bosch valves is particularly important. Especially valve pistons and pieces have to fit into one another accurately. As one of the world's largest OE suppliers and diesel system developer, Bosch provides pressure valves with excellent quality both as original equipment and on the aftermarket

Advantages at a glance:

- **Low friction losses** due to valve pistons and pieces perfectly fitting into one another
- **Reduced surface roughness** of valve sets due to accurate processing
- **Increased service life** and consumption benefits due to the use of high-tenacity materials – in part even with additional tempering or hard chromium plating
- **Particularly high manufacturing precision** due to stringent checks and permanent monitoring of the dimensional accuracy throughout the production

Outstanding material quality!

Bosch valves are made of high-quality materials with a special alloy. The risk of worn valve seats and material damage is thus minimized.

Injection nozzles
Product details

Injection nozzles are used in conventional and modern diesel systems to precisely atomize the fuel spraying it into the combustion chamber for an optimum combustion. Concomitantly, the nozzle also seals off the fuel system against the combustion chamber in a reliable manner. The versatile and broad range of Bosch nozzles covers all common applications. It includes comprehensive know-how Bosch bears as an important partner of international vehicle manufacturers.

Advantages at a glance:

- **Production with very high precision** due to moving parts' guide clearance amounting to 0.002 mm and fuel pressures of up to 2 000 bar
- **Particularly long service life** of Bosch nozzle needles due to their carbon coating
- **Bosch injection nozzles prevent increasing smoke formation** – especially after cold starting – as well as combustion noises with a cold engine, uneven engine performance and even loss of power or increased consumption

Increased service life!

Nozzle needles with carbon coating:
Dealing with system pressures of up to 2 700 bar, high-strength steels are to be used for the production of nozzles and injectors. Thanks to their carbon coating, the service life of Bosch nozzle needles is increased even further.

Denoxtronic exhaust-gas treatment
Product range & details

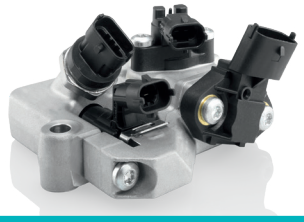
	Supply module	Dosing module	Heater kit
	With the aid of the AdBlue® reduction agent, SCR catalytic converters split nitrous oxides contained in exhaust gases into nitrogen and water. Bosch Denoxtronic permanently aligns the AdBlue® dosing with the actual operating condition of the engine and current exhaust-gas values. This technology helps vehicle manufacturers in several countries to comply with applicable emission limits. The supply module generate the required AdBlue® pressure and delivers the pressurized reduction agent to the dosing module.	**With the aid of the AdBlue® reduction agent,** SCR catalytic converters split nitrous oxides contained in exhaust gases into nitrogen and water. Bosch Denoxtronic permanently aligns the AdBlue® dosing with the actual operating condition of the engine and current exhaust-gas values. The main task of the control unit (within the dosing control unit) is the model-based calculation of the required dosing quantity in line with a predefined dosing strategy. The dosing module ensures a precise AdBlue® quantity control and handles its atomization and distribution within the exhaust pipe.	**Denoxtronic injects AdBlue® into the exhaust stream.** With the aid of the AdBlue® reduction agent, SCR catalytic converters split nitrous oxides contained in exhaust gases into nitrogen and water. Bosch Denoxtronic permanently aligns the AdBlue® dosing with the actual operating condition of the engine and current exhaust-gas values. The heating pot contains the level sensor and the tank heating for AdBlue® thawing in case of temperatures below 0 degrees Celsius. In addition, it is also equipped with a maintenance-free filter.
Scope of application			
Advantages at a glance	▶ Contributes to compliance with emission standards by reducing the NO_x emissions ▶ Long service life thanks to well-proven and robust technology ▶ Quick and easy replacement of the modules possible in case of servicing		

Workshop tip

Test equipment and kits

For the diagnosis, a Bosch KTS tester and the Denoxtronic tool kit (see fig.) are used: In this manner, defective modules having to be replaced can easily be identified.

Departronic particulate-filter regeneration
Product range & details



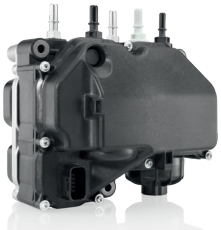
	Dosing module	Injection unit
	Unlike pure engine-internal measures of particulate-filter regeneration such as post-injection for instance, Departronic doses and injects the fuel upstream of the oxidation catalytic converter and the diesel particle filter. Efficient regeneration of particle filters is achieved by optimum adjustment of injection timing and quantity. The dosing module determines the required dosing quantity and forwards it to the injection unit.	**Unlike pure engine-internal measures** of particulate-filter regeneration such as post-injection for instance, Departronic doses and injects the fuel upstream of the oxidation catalytic converter and the diesel particle filter. Efficient regeneration of particle filters is achieved by optimum adjustment of injection timing and quantity. The injection unit ensures a precise fuel injection and handles its atomization and distribution within the exhaust pipe.
Scope of application		
Advantages at a glance	▶ Increasing the active regeneration efficiency, it contributes to reduced fuel consumption ▶ Particularly robust and maintenance-free for a long service life	

Did you know?

Departronic

Departronic is integrated into the low-pressure fuel circuit Without compressed air support, it injects an accurately metered amount of diesel fuel into the exhaust tract upstream the oxidation catalytic converter. Flowing through the oxidation catalytic converter, the exhaust-gas temperature thus rises to 600°C and burns off any soot retained by the particulate filter The flow rate varies depending on the current requirements. The robust and completely maintenance-free system controls the fuel addition as required and independent of the engine injection system.

Denoxtronic exhaust-gas treatment for CV
Product range & details



	Supply module for commercial vehicles	Dosing module for commercial vehicles
	With the aid of the AdBlue® reduction agent, SCR catalytic converters split nitrous oxides contained in exhaust gases into nitrogen and water. Bosch Denoxtronic permanently aligns the AdBlue® dosing with the actual operating condition of the engine and current exhaust-gas values. This technology helps vehicle manufacturers in several countries to comply with applicable emission limits. The supply module generate the required AdBlue® pressure and delivers the pressurized reduction agent to the dosing module.	**With the aid of the AdBlue® reduction agent,** SCR catalytic converters split nitrous oxides contained in exhaust gases into nitrogen and water. Bosch Denoxtronic permanently aligns the AdBlue® dosing with the actual operating condition of the engine and current exhaust-gas values. The main task of the control unit (within the dosing control unit) is the model-based calculation of the required dosing quantity in line with a predefined dosing strategy. The dosing module ensures a precise AdBlue® quantity control and handles its atomization and distribution within the exhaust pipe.
Scope of application		
Advantages at a glance	▶ Contributes to compliance with emission standards by reducing the NO_x emissions ▶ Long service life thanks to well-proven and robust technology ▶ Quick and easy replacement of the modules possible in case of servicing	

Workshop tip

Regular filter replacement

Replacing the Denoxtronic filter is a maintenance measure to be performed regularly.
It ensures the vehicle's ongoing compliance with the legal emission limits. The replacement intervals are specified by the vehicle manufacturers and can be looked up at the maintenance schedules included in ESI[tronic]. Before changing the filter, the AdBlue® circuit is to be drained using a KTS tester in order to depressurize the system. Using water, all components are to be cleaned thoroughly and crystalline deposits are to be removed. Once the new Denoxtronic filter has been installed, the circuit is to be reactivated and vented using a KTS.

Glow plugs
Overview

Bosch diesel technology and glow plugs – an excellent combination! This opinion is shared by international vehicle manufacturers equipping their vehicles with Bosch glow plugs. Know-how gained with original equipment is implemented in the Bosch workshop range.

Professional quality for workshop experts
The comprehensive Bosch diesel experience directly influences each and every detail of Bosch glow plugs. They are developed in cooperation with the vehicle manufacturers and exactly matched to each engine type. Workshops relying on Bosch glow plugs thus rely on professional Bosch quality.

A program without equal
At Bosch, workshops benefit from a comprehensive range of glow plugs providing the right solution for almost any diesel vehicle – older models included.

More than 95 years of experience with glow plugs
As a worldwide leader in development of injection systems, Bosch possesses comprehensive system know-how concerning diesel drives. Therefore, many international vehicle manufacturers rely on innovative Bosch glow systems.

Innovative technology
Glow plugs for modern diesel engines do not only support cold starts by means of preheating, their post-glowing function also ensures smooth operation and comfort across all load ranges. Modern diesel engines work with a compression so low that they require post glow. Bosch provides suitable glow plugs for precisely this purpose – featuring a long service life and being highly reliable. They ensure smooth operation, low consumption and thus reduced emissions.

A good choice for vehicle manufacturers
International vehicle manufacturers rely on Bosch glow-plug quality for their vehicles' original equipment.

Glow plugs
Program & product details

	Duraterm	Duraterm High Speed	DuraSpeed
	Bosch-patented 11-volts glow plug with short preheating and extended post-glow times	**In diesel engines, this reliable low-voltage glow plug is more than just a starting aid (preheating function). Thanks to its intermediate glow and post glow capabilities, it also contributes to efficiency and thus reduced engine emissions.**	**With its Bosch-patented design, this glow plug is particularly robust. The shape of its ceramic heating element and its location inside a protective tube reduce the risk of breakage even if lateral forces are applied.** Thanks to its excellent intermediate glow and post glow capabilities, it also contributes to efficiency and thus reduced engine emissions.
Scope of application			
Heating element	Metal	Metal	Ceramic
Voltage	11 V	4.4 to 5 V	7 V
Heating	850 °C < 4 s	1000 °C < 3 s	1000 °C < 2 s
Max. glow temperature	950 °C	1030 °C	1350 °C
Post-glow time	3 min	6 min	15 min
Advantages at a glance	▶ Comfortable starting behavior	▶ Comfortable starting behavior ▶ Easy on the on-board power supply during the start-up	▶ Comfortable starting behavior ▶ Easy on the on-board power supply during the start-up ▶ Regeneration glowing

Workshop-oriented packaging

Bosch glow plugs are available as **single packs** or in **packs of ten.**

KeySecure Code label

The **KeySecure Code label** contributes to protection against product counterfeiting.

A special sealing label ensures the integrity of the packaging.

Test equipment for workshops
Troubleshooting and repair

Qualified diagnoses are of increasing importance for automotive workshops. They are the only way to ensure professional maintenance and repair – the basis for high customer satisfaction.

Well-equipped and ready for the future

Besides all of the current vehicle interfaces, the latest generation of Bosch diagnostic testers – such as the KTS 560/590 ECU-diagnostic modules, the mobile KTS 350 all-rounder, the DCU 100 tablet computer or the DCU 220

DCI 700 injector test bench

Since Bosch invented the common-rail system, a large number of system variants have emerged that need regular maintenance and repair at automotive workshops or at the diesel specialist. The quick measuring system of the new DCI 700 diesel test bench tests both Bosch injectors – even those ones equipped with Valve Closing Control (VCC) / Needle Closing Control (NCC) technology or pressure-intensified commercial-vehicle technology – and injectors of third-party manufacturers.

- Retrofit kits for future technological developments are planned
- Short set-up and testing times (4 injectors can be connected and removed in less than 5 minutes)

Driven by efficiency

Bosch technologies are used worldwide in almost all vehicles. People, and assuring their mobility, is what we are focused on.

Therefore, we have dedicated the last 125 years of pioneering spirit and expertise in research and manufacturing to achieving this.

We continue to work on our unique combination of solutions for spare parts, diagnostic devices, workshop equipment and services:

- Solutions for efficient vehicle repairs
- Innovative workshop equipment and software
- The world's most comprehensive range of new and replacement parts
- Large network of wholesale customers, for quick and reliable parts supply
- Competent hotline support
- Comprehensive educational and training offers
- Targeted sales and marketing support

Additional information on Bosch diesel system components upon request:

bosch-automotive-aftermarket.com

What drives you, drives us

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