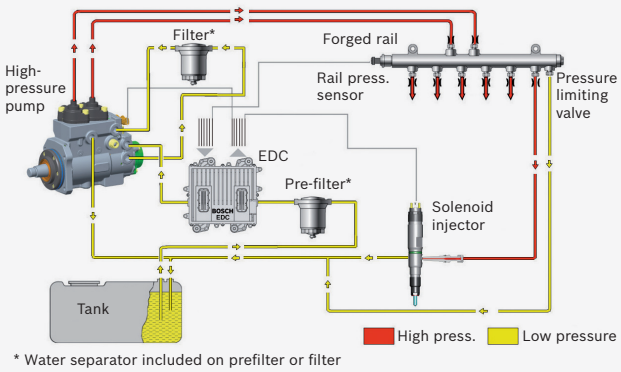
Diesel Systems

Common Rail Systems CRSN3 with 2,000 and 2,200 bar

BOSCH
Invented for life

CRSN3-22



* Water separator included on prefilter or filter

Customer benefits

- Low fuel consumption with correspondingly reduced CO_2 output
- Helps to achieve the emission targets US10, Euro VI, Tier 4 final, Stage 4, JPNLT, IMO 2, IMO 3
- High towing power and efficiency even at low engine speeds
- High-pressure generation is possible with a variety of different pump types
- Limp-home operation

Advantages by innovation

- No leakage volume at injector, therefore about 30% lower fuel return to low-pressure circuit
- Compared with 1,800 bar system, required power of high-pressure pump is equal or even lower despite higher system pressure
- Higher hydraulic system efficiency and reduced energy consumption
- No fuel cooling required despite pressure increase
- Easy integration into existing and future engines series (plug and play)
- Up to 60% higher lifetime of injection system

The CRSN3-18 with 1,800 bar for light commercial vehicles has already been on the market since 2005. The system for medium- and heavy-duty commercial vehicles has been manufactured worldwide since 2007.

A reduction in fuel consumption of just one percent can save 500 to 800 euros in operating costs per year. In combination with SCR catalytic converters, high injection pressures can also have a favorable effect on fuel consumption. This is why we have supplemented our Common Rail product range for commercial-vehicle engines by the addition of the CRSN3 with increased system pressures: CRSN3-20 (2,000 bar) for medium-duty applications, CRSN3-22 (2,200 bar) for heavy-duty applications in on- and off-highway operation.

Possible applications

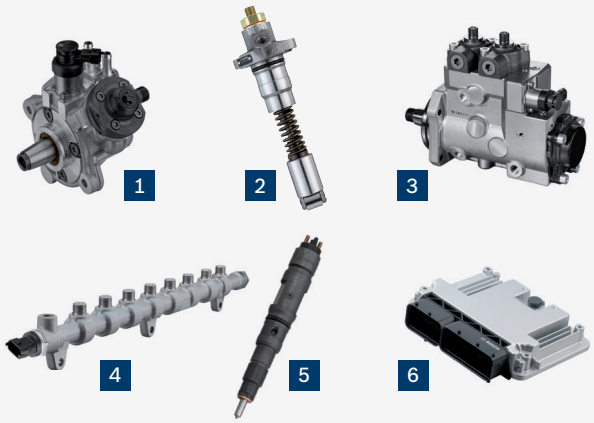
CRSN3-20 and CRSN3-22 are used for medium- and heavy-duty applications in the on- and off-highway segment and for marine applications. The engines can have 4 to 16 cylinders.

Functional principle

Thanks to its no-leakage injector concept, the CRSN3 generation achieves higher system efficiency and thus lower fuel consumption. Those parts inside the injector up to the control valve are subjected to the rail pressure. This avoids leakage between the low-pressure and the high-pressure sections. Only when the solenoid is triggered, a small control amount is fed into the fuel return via the ball valve. In order to permit the opening and closing of the nozzle needle in this “pressure-balanced” internal space of the injector, the needle is hydraulically coupled to the push rod. Optimized injector characteristics without plateaus permit volume correction throughout the entire system lifetime with the aid of software-side learning functions.

Technical features	
System pressure	250...2,200 bar
Number of injections	≤ 7
Hydraulic flow through nozzle	400...1,300 cm^3/30 s
Lifetime Medium-duty sector(MD): Heavy-duty sector (HD):	 750,000 km (on-highway) 12,000 h (off-highway) 1.6 million km (on-highway) 15,000 h (off-highway)
Operating voltage	12 V/24 V
Fields of application	MD, HD, OHW, Marine
Emission target	Euro VI, US10, Tier 4 final, Stage 4, JPNLT, IMO 2, IMO 3
Number of cylinders	4...16
Engine power/displacement	20...35 kW/l

System components and applications



1 CP4-20/1, CP4-20/2 high-pressure pump
2 PF45-20 camshaftless pump
3 CPN5-22/2 high-pressure pump
4 HFRN-20, -22 high-pressure rail
5 CRIN3-20, -22 injector
6 EDC17CV control unit

System design (recommended configuration)

Three types of high-pressure pumps are available for various engine sizes and concepts. For light- and medium-duty applications with a system pressure of 2,000 bar, our CP4 high-pressure pump derived from the passenger-car CRS is suitable. The CPN5-22/2 high-pressure pump based on the in-line fuel-injection pump meets the requirements of heavy-duty operation with a pressure of up to 2,200 bar. It includes a newly developed internal gear pump as a pre-supply pump. Alternatively, the high pressure can also be generated with PF camshaftless pumps driven by the engine camshaft.

The forged HFRN high-pressure rail is fitted with drilled throttles, a rail-pressure sensor and a pressure-limitation valve. The no-leakage CRIN3-20, -22 injector is the heart of the system.

Outlook

Bosch engineers are already involved in the evolutionary development of this modular system in order to start up series production in 2012 of equipment with pressures increased to 2,500 bar. Our proven plug-and-play system will, of course, still be guaranteed.

Bosch: Benefit from our competences

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

Robert Bosch GmbH
Diesel Systems

Postfach 30 02 20
70442 Stuttgart
Germany
Fax: +49 711 811-45090
diesel@bosch.com

www.bosch-diesel.de

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