Testing services

Hydraulic test bench for injection systems and components

Bosch Engineering

BOSCH
Invented for life

PRODUCT BENEFITS

- Represent realistic engine behavior in tests with real fluids
- Validate development steps by use of highly precise, modern measuring equipment
- Develop and optimize components and complete common-rail injection systems based on the measurement data collected
- Generate production precalibration data for engine control units by measuring common-rail systems at engine-relevant operating points

more than

3,000 bar

operating pressure enables testing of state-of-the-art common-rail systems

0.1 – 500 mg/stroke

injection amounts can be determined using the latest measuring technology.

TASK

Today's diesel injection systems have to ensure that the right amount of fuel is injected at the right time and at the highest possible pressure. The result is optimum mixture formation, which paves the way for efficient fuel combustion. Injection pressures of 2,500 bar are already possible today, and those figures are expected to continue rising. This will call for expensive, time-consuming developments in the future as well. With our hydraulic test bench and the expertise of our engineers, we offer reliable testing options for individual injection components or even complete common-rail injection systems, including under extreme conditions. In this way we help shorten development times and implement innovative solutions that further reduce fuel consumption and emissions.

FUNCTION

The foundation for our hydraulic test bench is our drive bench. Equipped with a specially designed mechanical and hydraulic apparatus, it can adapt to a wide array of common-rail systems. The HDA sensor head contains a closed measurement chamber filled with the test medium. An injection into the closed chamber increases the pressure; this increase depends on the compressibility of the test medium. Because directly measuring the sound velocity of the test medium corrects for all influences of temperature, density, and compressibility, the measuring device is suitable for a broad range of test media.

SCOPE OF SERVICES ON OUR HYDRAULIC TEST BENCH

- Analysis of the injectors' opening and closing behavior
- Testing of various components under real operating conditions
- Generation of pressure-dependent energizing timing maps (ET maps)
- Measurement of injection duration and generation of injection duration maps
- Evaluation of variations in injection intervals and shock wave compensation calibration
- Measurement of injection rate shape
- Measurement of the pressure gradient to assess damping
- Automated measurement of variable pump stroke positions
- Analysis of shot-to-shot deviations
- Needle lift measurements
- Analysis of temperature influences and back-pressure dependencies
- Flow rate and leakage measurements

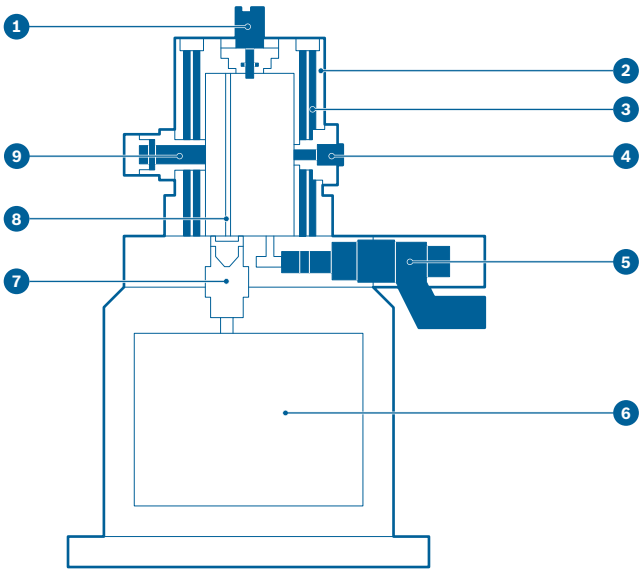
TEST RIG

Operating pressure	3,000 bar (option to choose electric fuel pump or gear pump)
Calibration fluid	compliant with ISO 4113 (diesel upon request)
Inlet temperature optional	+25 °C to +65 °C –40 °C to +120 °C
Supply pressure	1 – 8 bar

MEASURING SYSTEMS

Pump test	Coriolis flow meter, gear and spindle volumeter
Injection quantity	KMM and KMA equipment for measuring injection quantity and rate up to 30 l/h, measurement range of 0.1 – 500 mg/stroke

1. Injector
2. Conditioned stainless steel chamber
3. Cooling ducts
4. Pressure sensor (0 – 100 bar)
5. Drain valve
6. Evaluation electronics
7. Ultrasonic sensor
8. Ultrasonic path
9. Pressure limiter valve



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