Tips & Technology
For Bosch business partners

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Gasoline injection

BOSCH
Invented for life

High-pressure injector HDEV4

Background information

Development of the first piezo-controlled injectors from Bosch started in the year 2000. Successful series launch with a pilot customer was already achieved by the end of 2005. Bosch personnel were awarded the 2005 German Future Prize for industrial production of the innovative piezo injector.

Requirements

The crucial factors are the high fuel pressure and the relatively short time available for the delivery of fuel directly to the combustion chamber.

With manifold injection, two crankshaft revolutions are available for injecting the fuel into the intake manifold. At an engine speed of 6000 min-1 this corresponds to an injection time of 20 ms.

Far less time is available with gasoline direct injection. For homogeneous operation, the fuel must be injected on the induction stroke. This means that only half a crankshaft revolution is available for the injection operation. At 6000 min-1 this corresponds to an injection time of 5 ms.

Features

- Applications: Gasoline direct injection spray-controlled and supercharged, up to 20 MPa
- Outward opening valve (nozzle) with spray angle independent of back pressure and a steady mixture cloud at the spark plug
- Direct needle drive by 140 V piezo actuator and hydraulic coupler
- Extremely broad dynamic range even with constant pressure system
- Optimum spray preparation and minimal quantity scatter even with very small injected quantities
- Excellent shot-to-shot performance
- Multiple injection with extremely short spray interval possible
- Spray-controlled combustion process (not wall-controlled)
- Stratified and homogeneous operation possible
- 200 bar injection pressure, thus ensuring excellent atomization quality and extremely rapid vaporization

Customer benefits

Customers can enjoy the following advantages from use of the HDEV4:

- Distinct reduction in emission and consumption values and extended stratified range as compared to wall-controlled methods
- One injector version for all power and capacity ratings and numbers of cylinders within an engine family, including supercharging

Advantages of encoding

- Encoding of the HDEV4 provides the following benefits:
- Equality of injectors with regard to reference needle lift
- Attainment of minimum needle lift ensured (contamination)
- Correlation of needle lift and flow rate within the nozzle group tolerance, thus enhancing metering accuracy