Measurement of valve movement

In order to optimize engine power, fuel consumption and valve lifetime, it is important to measure the exact valve movement in the running internal combustion engine.

Using eddy-current displacement sensors it is possible to acquire the position of intake and exhaust valves. This can occur both in towing and in normal powered modes. Different measurement arrangements are practicable for these two modes of operation. In the towed mode the sensor can be mounted in the engine cavity. Where the axes of the valve and sensor are superimposed, valve movements are directly assigned to the measurement displacement. The effect of tilting is very small. The type U8 sensor is used, the measurement range of which can be extended to 11 - 12 mm. The predamping due to the cylinder head and the influence due to the relatively small measurement-object surface offered by the valve head are compensated by a special linearity calibration (option LC). The superimposition of cylinder-head vibrations over the measured valve movement can be eliminated with the aid of a second sensor and immediate analog difference formation.

In the normal mode of engine operation the sensor must be positioned outside of the combustion space due to the arduous ambient. Measurements can be made against an extension of the valve shaft (or of the tappet) or via a bevel machined on the valve shaft. A valve lift of up to 12.5 mm can be measured indirectly with the S05 sensor. With the application of two sensors displaced by 180° the effect of radial shaft movements is canceled by forming the sum of both displacement signals.

Technical details

- Measuring range: bis 12,5 mm
- Accuracy: 0,05 mm
- High speed

Ambient conditions

- Temperature: 90° C
- Medium: Dirt, oil

Reasons for the system selection

- Non-contact measurement
- Ambient compatibility
- Temperature stability.
- Speed and high accuracy

Principle