



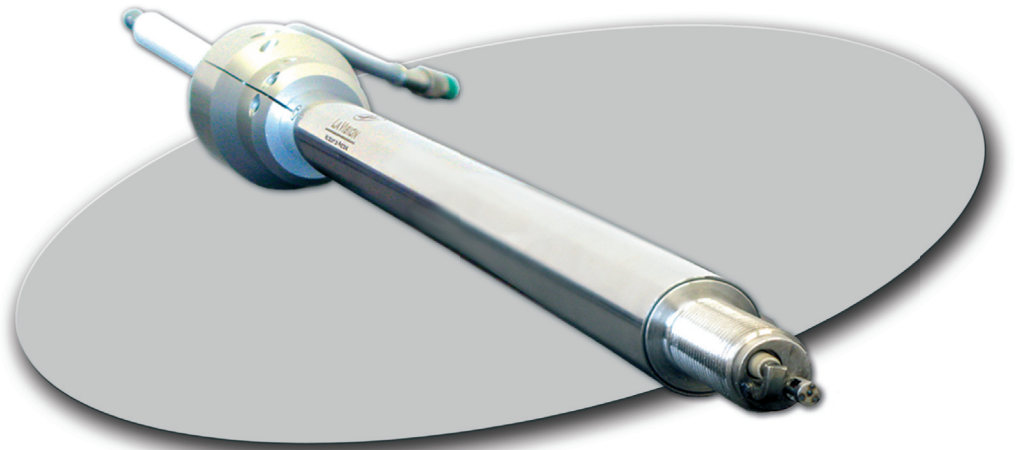
LA VISION

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ICOS-Temperature

for time-resolved in-cylinder
temperature analysis

The **Internal Combustion Optical Sensor-Temperature** system from LaVision allows analysis of time-resolved in-cylinder temperatures in an internal combustion engine. The minimally invasive sensor is available with a choice of in-cylinder probes. The system delivers crank angle resolved single cycle temperature curves. For example, the often unknown compression stroke temperature rise can be captured. Such information gives important insight for engine optimization, analysis of cycle by cycle variations and validating numerical analysis.



ICOS-Temperature spark plug probes are designed to directly replace the existing spark plug (M12 or M14) without the need for additional modifications to the engine. A smaller non-firing M5 probe can be used, e.g. for diesel engines. Additionally, line-of-sight optics are available for cross-cylinder averaged temperature measurements.

Principle

The measurement system is based on infrared absorption spectroscopy of water molecules. The absorption of the water vapor present in the cylinder gas mixture is recorded along a short path adjacent to the spark electrode. The temperature is then obtained through correlation with a spectral database. Instantaneous and non-contact temperature measurements are thus possible.

Advantages

- ▶ determination of absolute in-cylinder temperatures
- ▶ visualization of compression stroke temperature rise
- ▶ high sensitivity and crank angle resolution
- ▶ ease of use, no complex calibration procedures
- ▶ optical, minimally invasive
- ▶ no engine modification required
- ▶ fully functional spark ignition system

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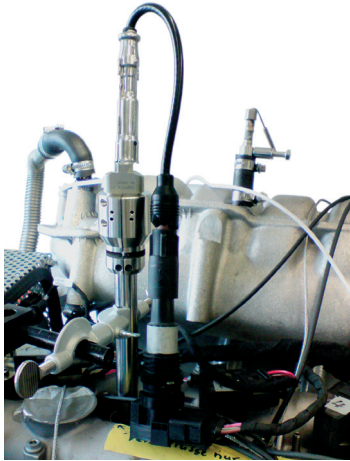
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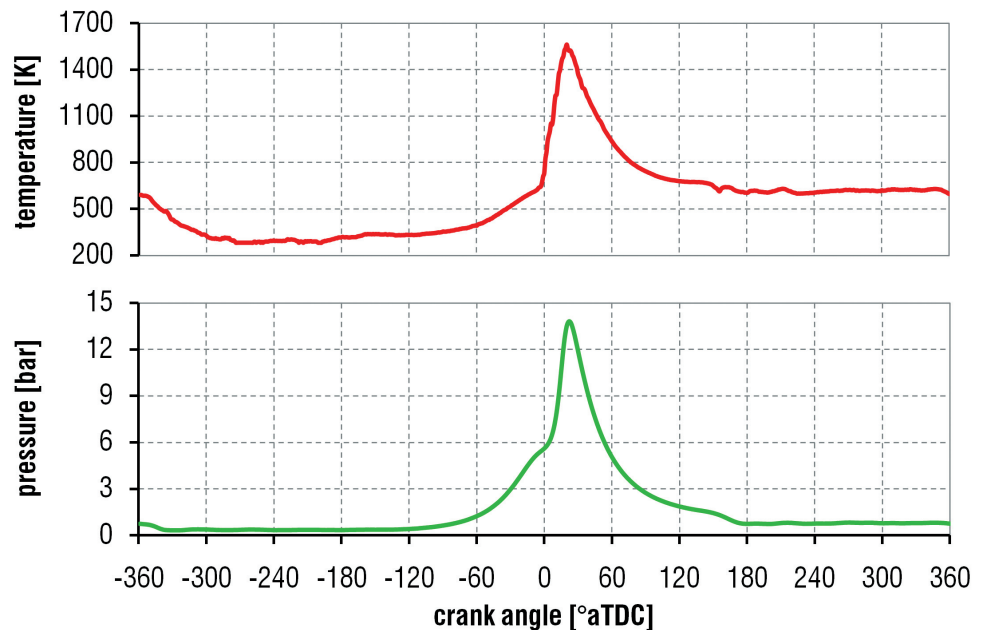
Sensor specifications



Measuring principle	IR absorption of water molecules
Temperature range	273 K - 1400 K
Precision	±20 K @ 3 vol. % H ₂ O
Sampling rate	23 kHz
Spark plug probe sizes	M12 and M14 (with adapter)
Functionality	fully functional spark ignition system
Operating conditions	max. 120 bar, max 700 K probe temperature
Additional probes	M5, glow plug and line-of-sight (requires optical access)

Example

In-cylinder temperatures were measured in a 4-stroke engine using an M12 spark plug probe. The diagram shows indicated gas temperature and pressure for a fired cycle.



Data provided by LaVision is believed to be true.
However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

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