LaVision

We count on Photons

ICOS

for the optimization of engine combustion processes

The **Internal Combustion Optical Sensor** (**ICOS**) from LaVision provides a measurement technique for **highly time resolved gas analysis** directly in the combustion chamber of internal combustion engines. The system is equipped with ultra fast detectors for fuel density (**ICOS-Fuel**) and/or exhaust gas concentration measurements (**ICOS-EGR**). Variations within many consecutive cycles can be visualized.

Applications

- gasoline and diesel engines
- **ICOS-Fuel:**
  air/fuel ratio – the lambda value (λ) – transients
  investigations of highly dynamic engine conditions, e.g. cold start
  capable of verifying injection strategies and systems
- **ICOS-EGR:**
  internal and external EGR-rates
  exact analysis of the EGR stability
  distribution of EGR between different cylinders
  evaluation of new valve timing strategies relating to internal EGR

Advantages of the Internal Combustion Optical Sensor system

- highly time resolved for crank angle resolution
- no gas sampling, measures directly inside the cylinder
- no modifications of the engine needed
- precise single cycle analysis possible

Operation principle

The optical system is based on infrared absorption spectroscopy and measures relevant molecules like CO_2 or hydrocarbons. The **ICOS** system is contactless and no gas sample extraction is needed. Data is measured without time delay and temporal smearing. Measurements on transient phenomena can be performed.

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The **ICOS** system from LaVision measures at data rates of up to 30 kHz and is crank angle synchronized during engine operation. It can be used to analyze either motored or fired engine cycles in both stationary and dynamic test conditions.

SenseID

The sensor data are presented to the engineer in real time on the intuitive and application-friendly user interface. The sensor management software **SenseID** is network capable and allows control of the system.

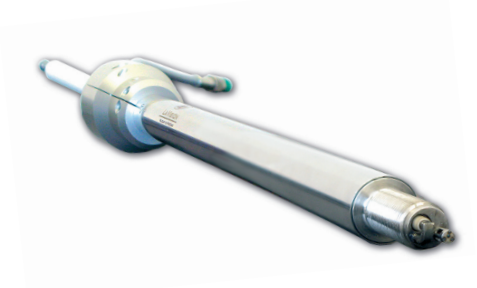
Basic layout

The system consists of

- Spark Plug Probe (M12 or M14 thread) or M5 Probe
- up to 4 receiver units for fuel or exhaust inside the Sensor Server
- incandescent lamp
- pair of fiber optics
- sensor software SenseID
- analogue pressure signal input

Firing and non-firing probes are available for the **ICOS** system. A single probe can measure air/fuel ratio and exhaust gas simultaneously.

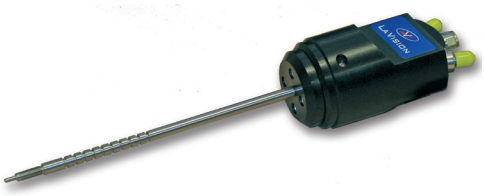
Spark Plug Probe



Spark plug probe with M12 or M14 extra long thread to adapt to different engines and sealings.

M5 Probe

The M5 Sensor Probe is used for gas detection at different positions inside an engine cylinder. Applicable in glow plug dummies for measurements in HCCI and diesel engines. The probe is compatible with a standard pressure transducer bore.



Sensor specifications

Measuring principle:	IR absorption
Measured quantities:	fuel density (air/fuel ratio) and/or exhaust gas concentration (EGR-rate)
Precision:	< 2 %
Data rate:	30 kHz
Dynamics:	14 bit
Data acquisition:	crank angle resolved multiple cycles

Mar-11

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