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ICOS Probes

Access to your engine

LaVision's **Internal Combustion Optical Sensor** (**ICOS**) reveals quantified and crank angle resolved data directly from inside your engine's cylinder.

- fuel concentration and Lambda-value
- CO_2 concentration and EGR-rate
- gas temperature
- water concentration

Alternatives for optical access

Three different types of probes to maintain the optical access to the combustion chamber are available:

Line-of-sight probe suitable for any engine condition within the performance map, especially high loads and high speeds, measures across the cylinder.

M5 probe minimal invasive probe fits into standard M5 pressure transducer bores, a cooled version for gas and high performance engines is available.

Spark plug probe very convenient access to any production type engine by replacing the original spark plug by the M12 or M14-probe, while maintaining the ignition capability. The spark plug probe is limited to medium IMEP.

ICOS probe	Line-of-sight	M5	Spark plug
Engine type	Gasoline, CNG Diesel	Gasoline, CNG Diesel	Gasoline, CNG
Ignition	-	-	✓
High IMEP (>0.7 MPa)[1]	✓	-	-
Max. operating peak-pressure	30 MPa	20 MPa	20 MPa
Lambda	★★★	★★★	★★★
EGR	★★★	★★★	★★★
Temperature	★★★	★	★
Water	★★★	★★★	★★★
Measurement location	averaged across cylinder	local at wall	local at spark plug
Nominal thread size M14	✓	✓	✓
M12	✓	✓	✓
M10	✓	✓	-
M8	✓[2]	✓	-
M5	-	✓	-
Impact to engine	2 holes	1 hole M5 or glow-plug adapter	replaces spark plug
Easy adaption to engine	★	★★	★★★
High load conditions	★★★	★★[3]	★

[1] usage of M5 and spark plug probes is limited to lower/mid IMEP conditions. Typical limit for water cooled passenger car engines

[2] at reduced signal

[3] a cooled version is available for higher heat loads

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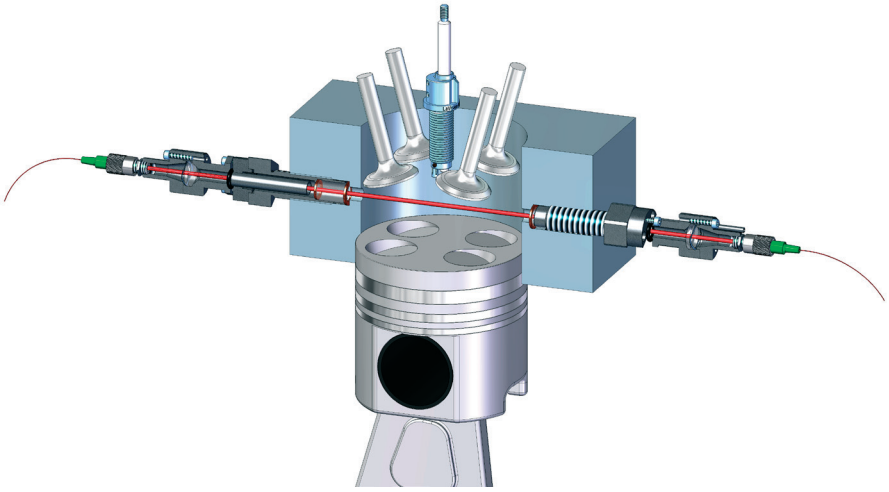
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Line-of-sight probe

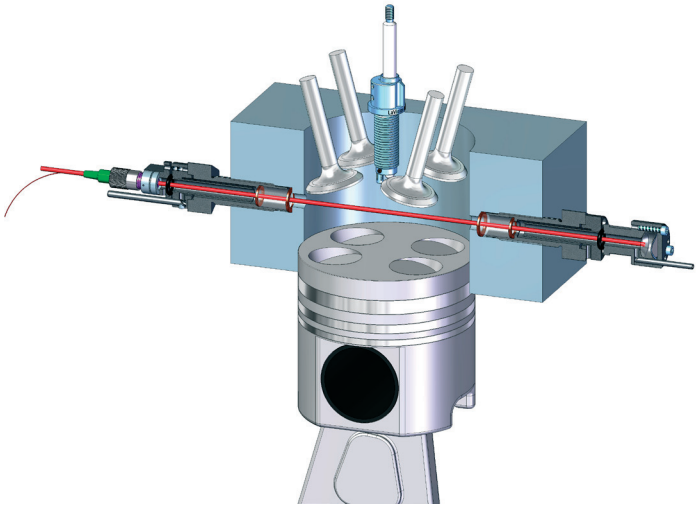
High signal-to-noise-ratios can be achieved by using line-of-sight probes. These probes are mounted in the cylinder´s walls and measure absorption integrally over a line across the cylinder. The results represent cylinder averaged information.
The adaption of line-of-sight probes need additional bores. Standard line-of-sight probes with a M14 thread are available. Customized probes with different lengths and diameter are possible.

Specifications

- peak pressure 30 MPa
- maximum combustion chamber side window surface temperature 873 K



ICOS /-CNG probe for sealing with M14 thread (1106084)



ICOS-Temperature probe for sealing with M14 thread (1106082)

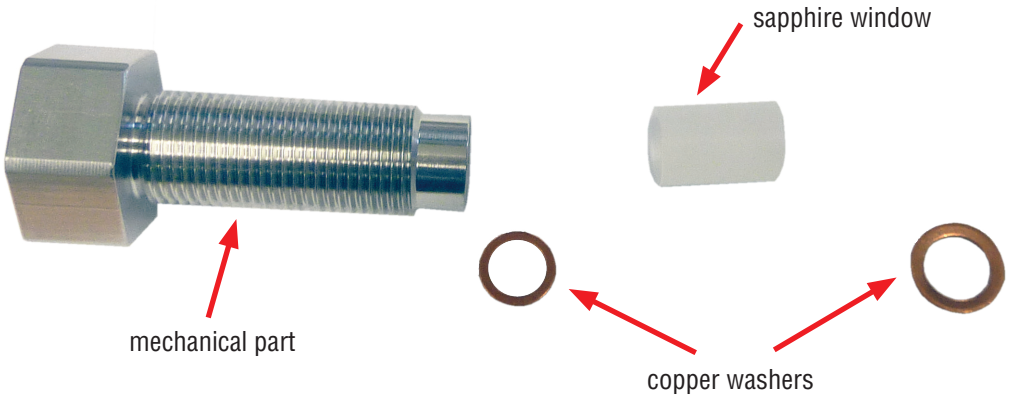
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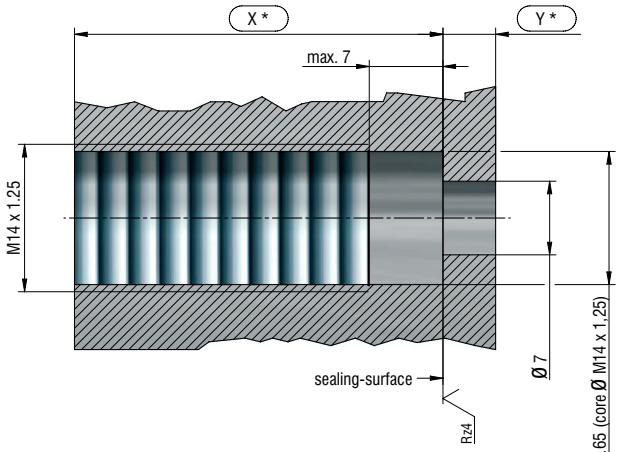
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Standard sealing insert

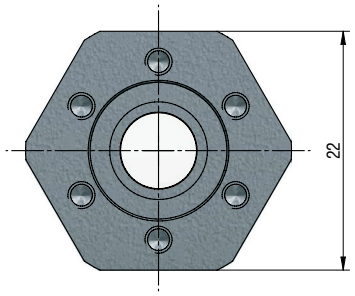


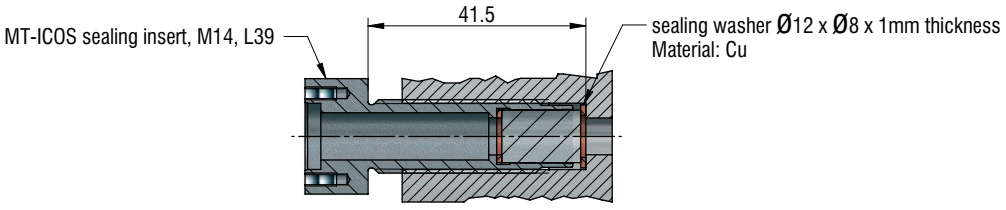
Sealing insert (1106083) with M14 thread

Sealing insert



dimensions X and Y must be defined by customer to ensure mechanical stability





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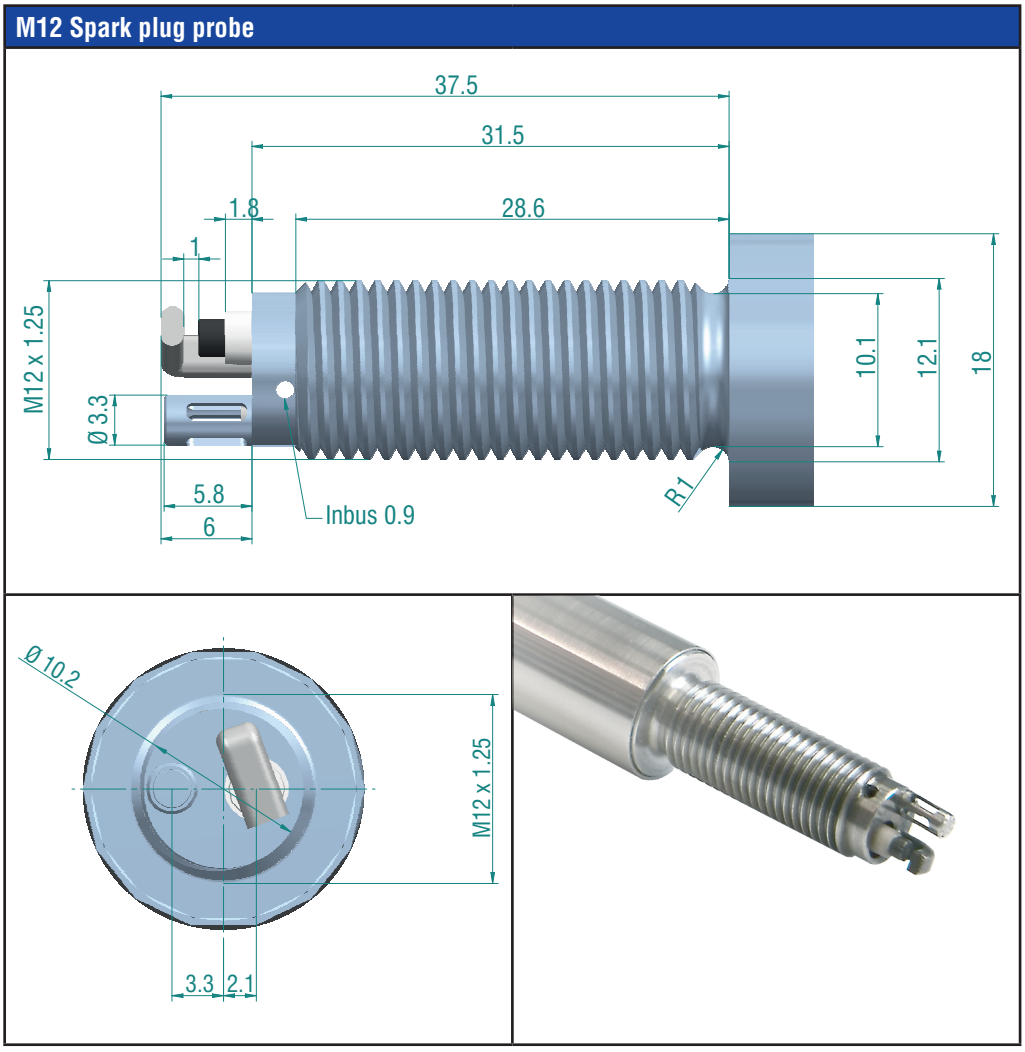
Spark plug probes

Sensor probes are available with two different spark plug threads, with M12 or M14. The thread is extra long to adapt the **Spark Plug Probe** to different engines and sealings by using exchangeable spacers. The measurement location is about 5 mm beside the spark plug´s electrode.

Specifications

- internal 5 kΩ interference suppression resistor
- maximum ignition voltage <40 kV
- max. operating peak pressure 20 MPa
- max. probe tip temperature 650 K

M12 Spark plug probe

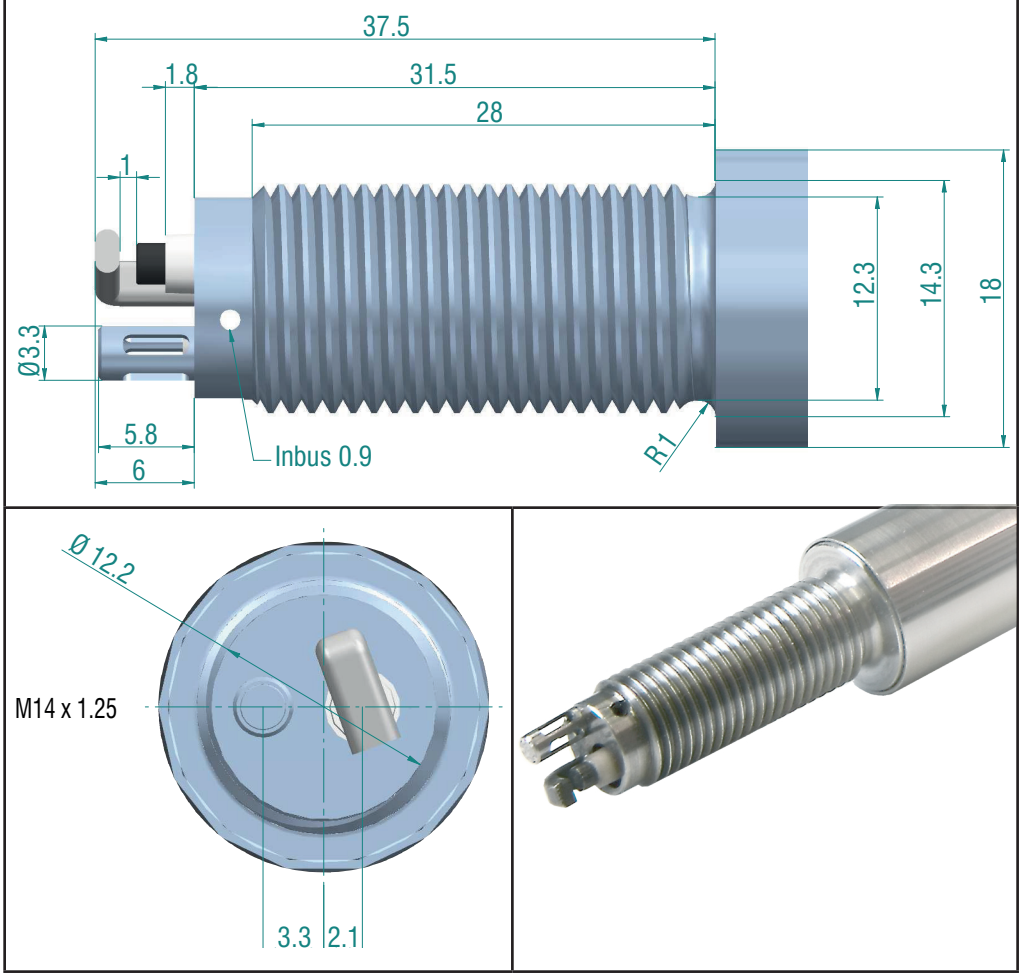


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M14 Spark plug probe



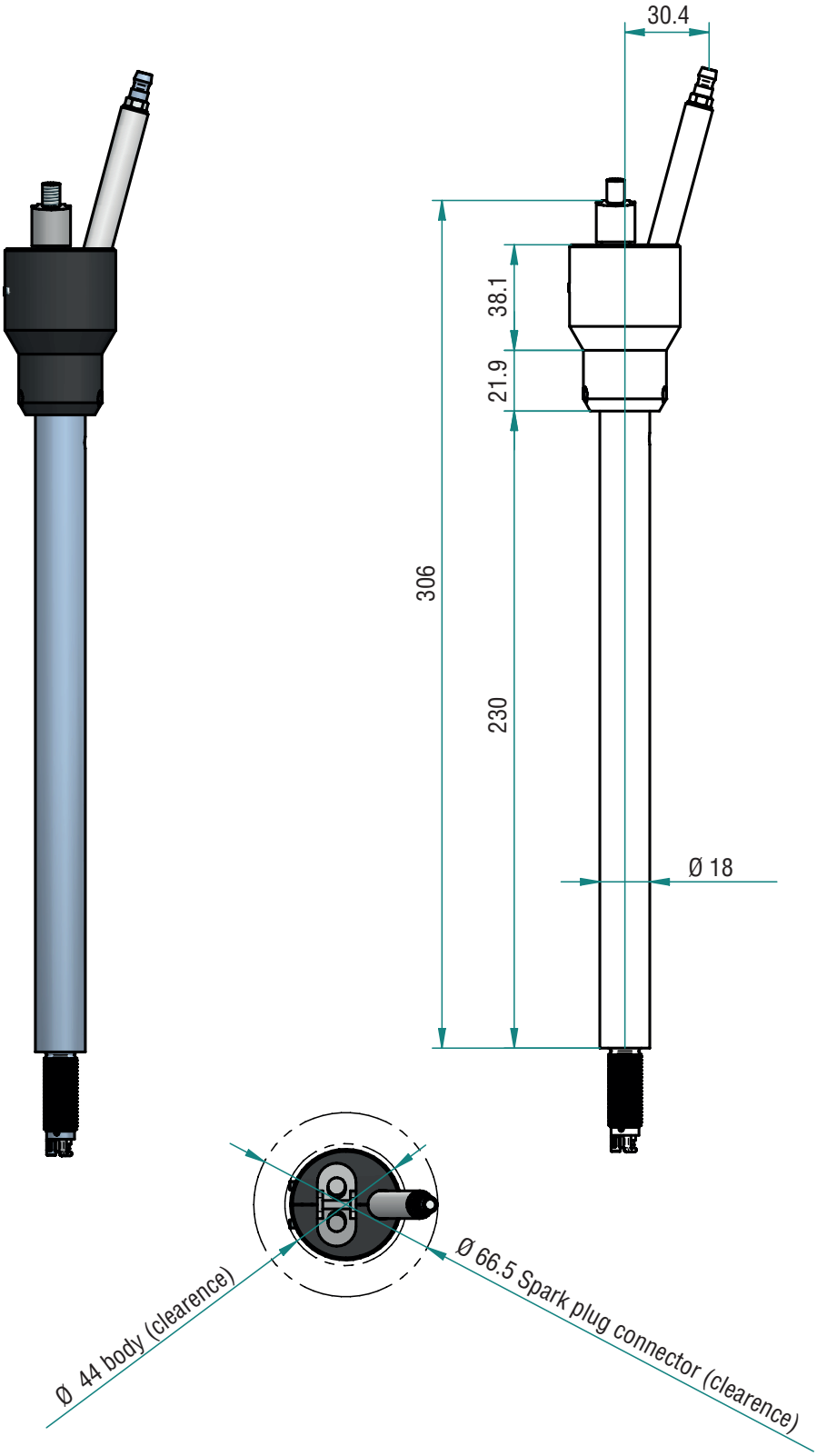
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Spark plug probe dimensions



dimensions are given in mm units

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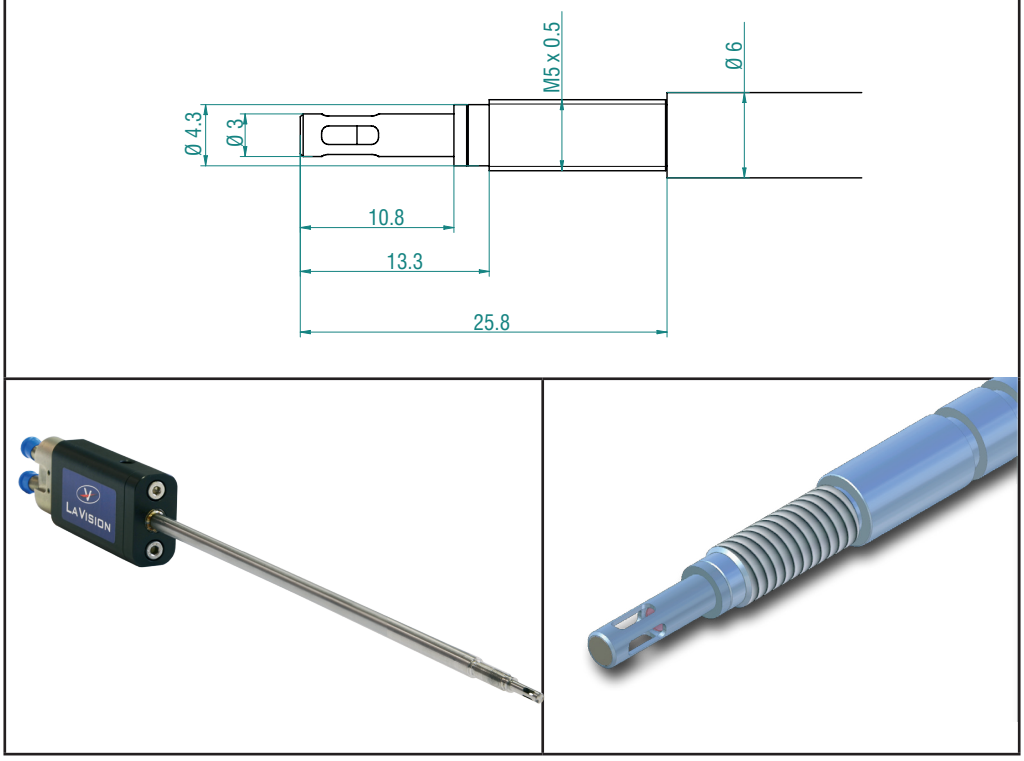
M5 probe

The **M5 Sensor Probe** is a non-firing probe and is used for gas detection at different positions inside an engine cylinder. The measurement area is located at the tip of the probe. The probe is compatible with a standard pressure transducer bore and is also applicable in glow plug dummies for measurements in HCCI and diesel engines.

Specifications

- max. operating peak pressure 20 MPa
- max. probe tip temperature 650 K

M5 probe



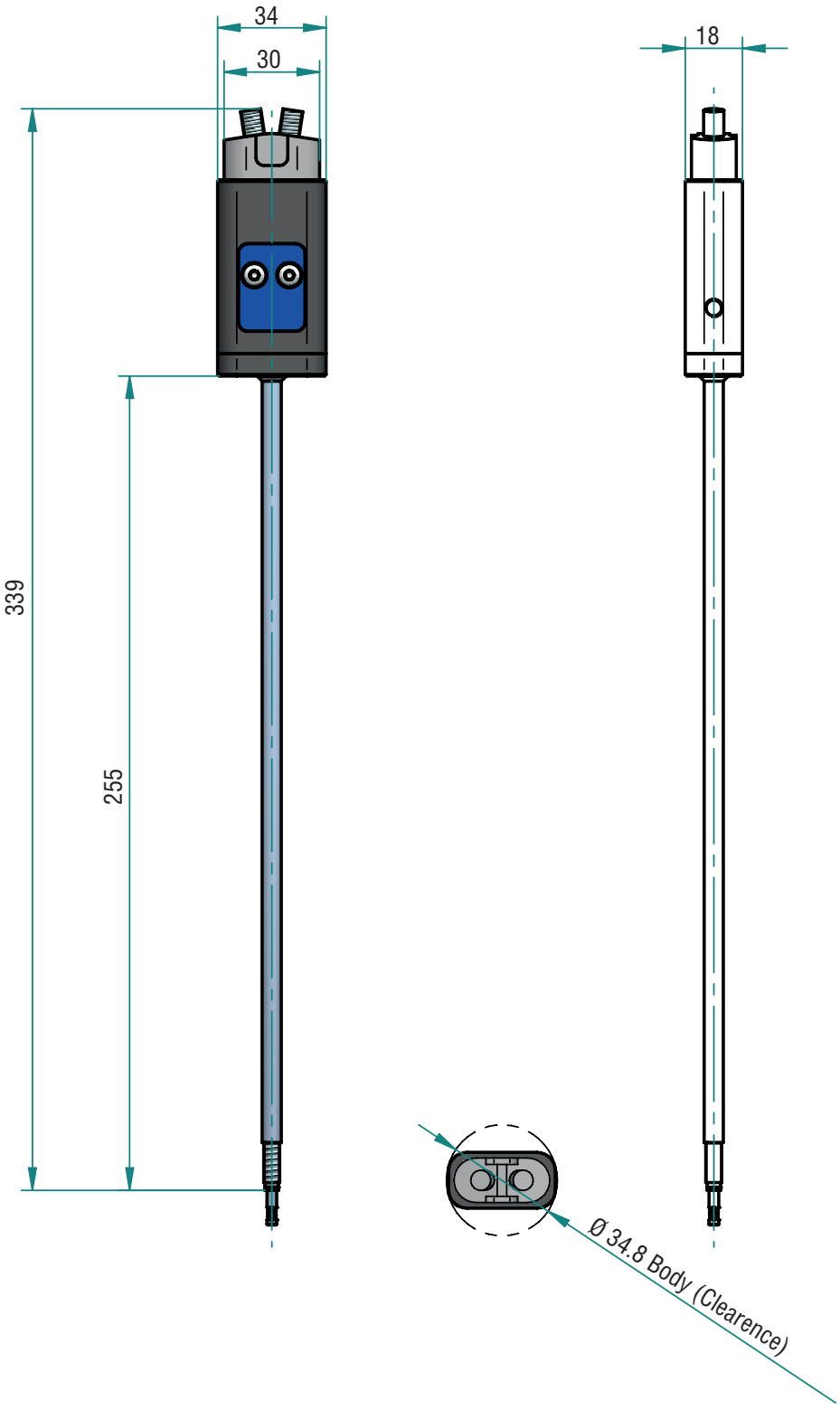
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M5 probe dimensions



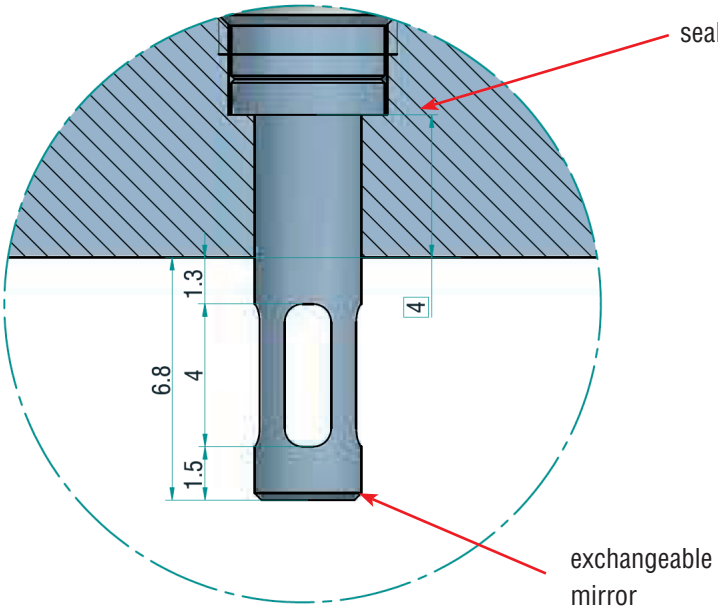
dimensions are given in mm units

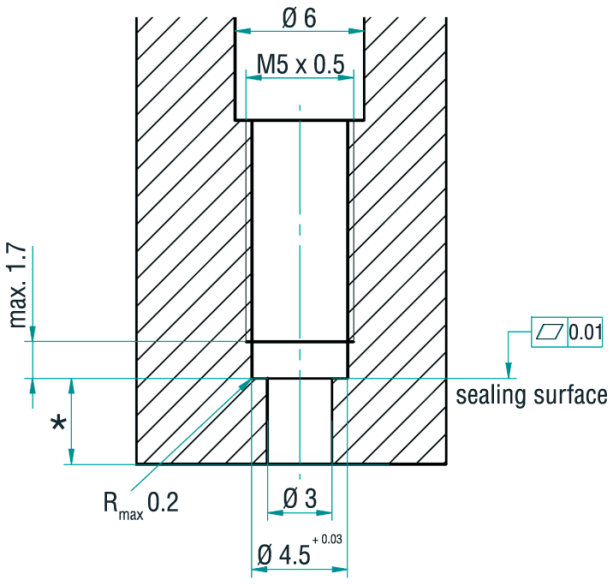
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Mounting of M5 probe





* material dependent
– al alloyed 4 mm
– gray cast iron 4 mm
– steel 2.5 mm

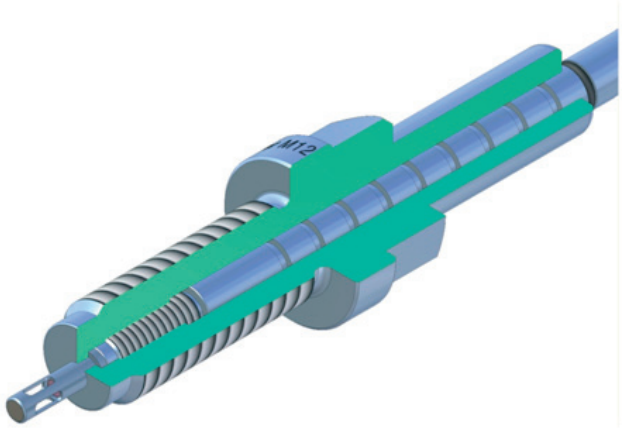
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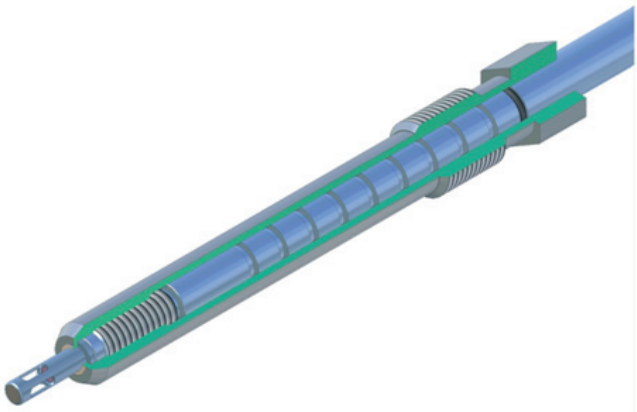
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Application examples of the M5 probe with adapter

M5 probe mounted in spark plug dummy with measurement volume at spark position



M5 probe mounted in a glow plug dummy for measurements in a Diesel engine



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Ordering information

Part number	Description
1106030	M12 spark plug probe for ICOS /-CNG
1106031	M14 spark plug probe for ICOS /-CNG
1106070	M12 spark plug probe for ICOS-Temperature
1106071	M14 spark plug probe for ICOS-Temperature
1106033	M5 probe for ICOS /-CNG
1106073	M5 probe for ICOS-Temperature
1106046	Adapter set M5 to M10
1106047	Adapter set M5 to M12
1106085	M12 to M14 adapter with tool
1106084	Line-of-sight probe for ICOS /-CNG (requires sealing insert 1106083)
1106082	Line-of-sight probe for ICOS-Temperature (requires sealing insert 1106083)
1106083	Standard sealing insert (M14)
1106007	Set of mirrors (5 units) for spark plug probe (ICOS /-CNG)
1106008	Set of mirrors (10 units) for spark plug probe (ICOS /-CNG)
1106027	Set of mirrors (5 units) for M5 probe (ICOS /-CNG)
1106028	Set of mirrors (10 units) for M5 probe (ICOS /-CNG)
1106005	Pair of fiber optics cable, 2 m (ICOS /-CNG)
1106003	Pair of fiber optics cable, 4 m (ICOS /-CNG)
1106067	Set of mirrors (5 units) for spark plug probe (ICOS-Temperature)
1106068	Set of mirrors (5 units) for M5 probe (ICOS-Temperature)
1106075	Pair of fiber optics cable (ICOS-Temperature)

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

Jan-18

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