FLUID MECHANICS

In-Cylinder Velocity Measurement

Features and Benefits

- Allows acquisition of time-resolved, spatially-resolved, cycle-resolved velocity data without optical access
- Model EP-12 designed for 12mm thread size, EP-14 designed for 14mm thread size
- User selectable reference angle
- 30-degree increments in probe rotational position
- Allows continuously variable measurement depth (reach)
- Unique design — No slip-rings, spacers or washers used
- Does not restrict aperture or f# of the fiber-optic probe
- Anti-reflection coated window
- Any TR 10 series fiberoptic probe from TSI can be used with the EP-12 and EP-14 IC Engine Probe Adaptors
- Protects the fiberoptic probe from mechanical damage

Instant Optical Access

No engine modification is needed, and the in-cylinder flow geometry stays just the way you design it.

IC Engine Probe Adaptor
Models EP-12 and EP-14

Development of internal combustion (IC) engines is becoming extremely competitive and knowledge-based. No longer can an engine design effort be considered as a one-dimensional project, because each sub-system requires advanced preparation, modeling, testing, and validation. The combustion system is one piece of the jigsaw puzzle. Emissions regulations demand the cleanest, most complete burning of the fuel. Fuel economy standards require the most efficient burning of the fuel. Pricing pressure limits the overall cost to the consumer.

Importance of Measurements

Experimental measurements of in-cylinder flows are often combined with numerical simulations to help the IC engine design team meet all these objectives. The EP-12 and EP-14 IC Engine Probe Adaptors allow time-resolved, spatially-resolved, even cycle-resolved velocity and turbulence measurements from unmodified IC engines.

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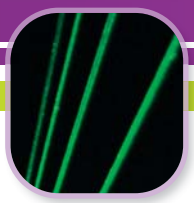
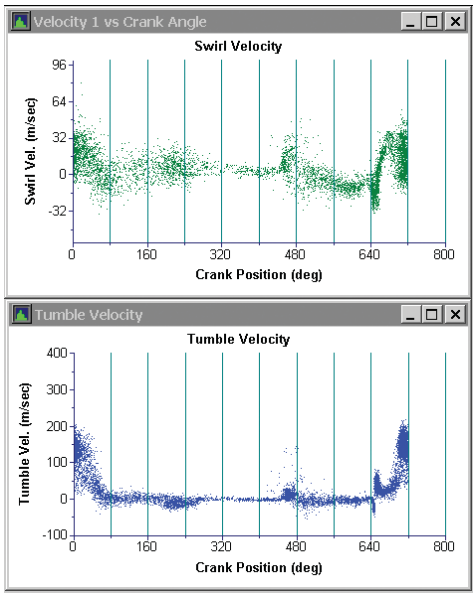
In-Cylinder Velocity Measurement



Sample Data



Special Features

The EP-12 and EP-14 IC Engine Probe Adaptors are backed by hours of engine testing and laboratory use. This experience has produced a unique, user friendly IC Engine Adaptor that allows the user to extract meaningful data from completely unmodified engines. Velocity data are acquired using the coaxial transmitter/receiver approach, which is the key to obtaining time-resolved, spatially-resolved, cycle-resolved velocity data without costly and unrealistic optical access or single-cylinder engine testing. Both 12mm and 14mm thread sizes are available, and the special design permits continuous variation of the measurement location, from the window surface outwards. Any TSI TR 10 series 15mm probe can be used in the EP-12 and EP-14 IC Engine Probe Adaptor. Efficiency and SNR are maximized by using an anti-reflection coated window. The reference angle can be set and locked, which means the probe can be removed and replaced to the same angular and axial position. The probe can be positioned in 30-degree rotational increments from the reference position – thus allowing the user to measure any dominant in-cylinder flow direction.

Related Components

The Model EP-12 and EP-14 IC Engine Probe Adaptors are used with one or two component Model TR 10 series transceiver probes. Since the TR 10 series fiberoptic probes are compatible with TSI's other transmitter/transceiver probes, the existing customer needs only to purchase the probe and EP-12 and EP-14 IC Engine Probe Adaptor. The fiberlight, PDM, and FSA can be used as-is.

Specifications

IC Engine Probe Adaptors Models EP-12 and EP-14

Thread Size	
Model EP-12	12 × 1.25mm
Model EP-14	14 × 1.25mm
Measurement Distance	
Standard TLN01-60EP Lens	0 to 15mm
Optional TLN01-50EP "High-SNR" Lens	0 to 5mm
Optional TLN01-80EP "Long Stand-off" Lens	19 to 35mm
Length*	160mm
Window	AR-Coated Fused Silica
Clear Aperture	6.4mm
Outer Diameter	
Sleeve	19.05mm
End Cap	24.61mm
Inner Diameter	15.49mm
Depth Adjustment Range (max)	17mm
Depth Adjustment Rate	0.794mm/turn
Maximum Operating Temperature	204°C (continuous)
Maximum Operating Pressure	17MPa

* Add 75mm for the armored monocoil loop
Specifications subject to change without notice.

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