

# TSI MINI-FIBER PROBES SERIES TR110/TR210

THE LATEST IN FIBEROPTIC PROBE  
TECHNOLOGY IN THE SMALLEST  
PACKAGE SIZE AVAILABLE FROM TSI

TSI's Mini-Fiber Probe Series TR 110/TR210 are the next generation of fiberoptic miniprobes from TSI, the pioneer in fiber probe-based Laser Doppler Velocimetry (LDV) measurements. The new probes integrate advances in fiber technology, optics miniaturization, and performance, enabling measurements never-before-possible. They provide the ideal combination of ruggedness and flexibility needed for accurate flow diagnostics in confined spaces using fiberoptic probes immersed in the flow.



## Applications

- + Underwater LDV
- + Turbulence characterization
- + Velocity measurement
- + IC engine measurements
- + Boundary layer flows
- + Back scatter LDV measurements

## Operation

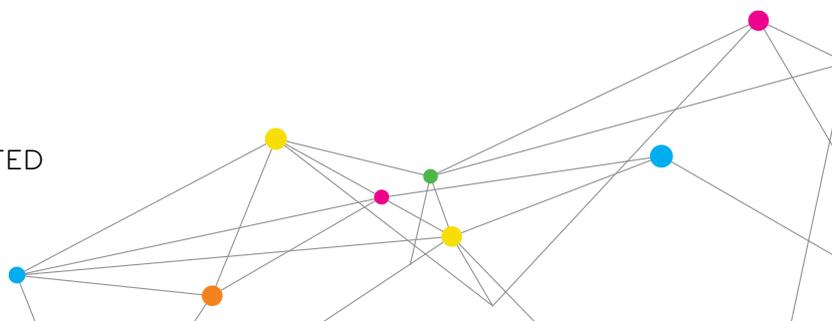
The TR110 and TR210 series probes incorporate the latest advances in fiberoptic technology, miniature optics, specialty metals, and precision machining to enable trouble-free measurements. A new lens design offers a choice of three interchangeable lenses, all able to operate in air or underwater.

## Features and Benefits

- + Super-compact size
- + Sealed construction
- + Stainless steel construction
- + Selection of three multi-purpose lenses
- + Transmits as well as receives the scattered light
- + Can be immersed in the flow with minimum disturbance



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## SPECIFICATIONS

### TSI® MINI-FIBER PROBES SERIES TR110/TR210

**Diameter**  
15.2 mm

**Length**  
159 mm

**Weight**  
200g

**Fringe Spacing**  
4.1  $\mu\text{m}$  standard; 5.5  $\mu\text{m}$  and 8.2  $\mu\text{m}$  optional

**Measurement Region**  
Diameter 79  $\mu\text{m}$  standard; 105  $\mu\text{m}$  and 157  $\mu\text{m}$  optional

**Number of Fringes**  
19

**Construction**  
Multi-alloy stainless steel and ceramic

**Underwater Operation**  
Water-tight to 1 Atm

**Temperature Range**  
0 to 50°C (storage, shipping);  
0 to 25°C (operating)

**Lens Focal Length**  
60 mm supplied with the probe; 80 mm and 120 mm optional

**Lens Usage**  
All lenses can be used in air or underwater

**Fiber Cable Length**  
8 m standard; 15 m and 20 m optional

**Interchangeability**  
Interchangeable with all other TSI fiberoptic probes

**Output Fiber Connection**  
SMA

**Lens Model Numbers**  
TLN01-60, TLN01-80, TLN01-120

Specifications are subject to change without notice.

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### Operation

The probes use single-mode transmitting fibers and a SNR-optimized multimode fiber-based receiving system. Miniature optics components produce a smaller measurement volume, higher spatial resolution, and a more stable beam crossing. The fibers and optics work together to provide cleaner, stronger signals and higher data rates.

Specialty stainless alloys and ceramics, combined with appropriate stabilization processes, reduce internal stress buildup, and improve long-term stability, even with changes in environmental conditions. This ensures more years of trouble-free performance before the probe will require servicing.

Special CNC and EDM machining techniques are used to manufacture the miniature high-precision parts used only in the new TR110 and TR210 series. A sealed and purged design makes them the choice for underwater and in-flow measurement situations. They also are ideal for measurements in restricted or confined spaces. The lightweight probe body can be placed inside ducts or flow channels or in test enclosures and the like.

The TR110 and TR210 series probes are particularly suited for use in TSI's IC engine probes, which can be used in either 12mm or 14mm spark plug ports. Thanks to a wide operating temperature range, they also can be used inside furnaces and boilers, provided a suitable cooling jacket is used.

The three multipurpose interchangeable lenses combine to offer a 2:1 range in fringe spacing and waist size. All can be used in air or in submerged flow applications. Only high accuracy, coated, chromically- and spherically-corrected optics are used, as in all TSI LDV and PDPA optics.

A single TR110 probe measures one component of velocity and a TR210 probe two velocity components. Combining TR110 and TR210 probes allows all three velocity components to be measured.



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TSI Incorporated - Visit our website [www.tsi.com](http://www.tsi.com) for more information.

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