



# Measuring in the smallest of spaces.

**Fiber optic precision sensor technology**  
*FDM series*

**Precise. Flexible. Fast.**

*fionec*  
fiber optic sensor technologies

# Where high speed meets dimensional accuracy.



## The series FDM fiber optic distance measuring systems

In precision manufacturing, a few micrometers or nanometers often make all the difference in innovation, functionality, design and quality. This is why the FDM Series fiber-optic distance measuring systems deliver highly accurate measurement values for distance, shape and roughness. With a diameter starting at just 50  $\mu\text{m}$ , the miniaturized probes capture microstructures in even the smallest of cavities. For quality assurance at production speeds.



### Accurate and Fast

The precision sensor technology of the FDM Series is capable of measuring frequencies of up to 20 kHz and an accuracy in the low nanometer range. The sensors perform roughness measurements ten times faster than comparable tactile methods. Automatic signal optimization allows our technology to generate consistent measurement values, even for heterogeneous surfaces.



### Flexible and Non-contact Technology

Wear-free and non-destructive optical technology for almost surface-independent, absolute measurements – even at angles. Thanks to the use of flexible fiber-optic connections, the sensor can be located at practically any distance from the actual measuring setup. Multiplexing and multi-point measuring equipment solves even complex measurement tasks.



### Easy-to-automate, Full Inspection

Using configurable interfaces, our sensors can easily be integrated in automated production processes – near-line, in-line or machine-integrated. The measurement data are available instantaneously to ensure complete quality and process control.

## Applications

**Measurements in the most confined spaces**  
such as micro-holes, narrow gaps or tight gear tooth spaces

**Characterization of surfaces**  
roughness and waviness

**Testing form and position (GD&T)**  
e.g. roundness, flatness, straightness and parallelism

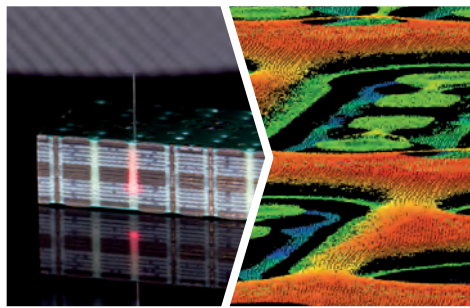
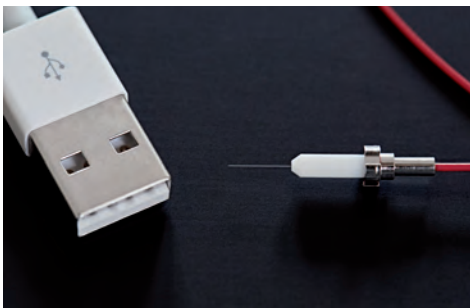
**Highly accurate position detection for component alignment and tool position determination**  
multi-point measurement possible

**Inspection of optics, optical components and molds**

**Measurements in scan mode**  
e.g. for 3D display of freeform surfaces

**Measurement of expansion, drift, wear and vibrations**  
on ultra-precision machines and machine tools

**Integration in measuring devices, automatic testing equipment or machine tools**



Micro-scale: Probe head with a diameter of only 50 µm (image left).  
Measurements in a 200 µm hole in a multi-layer circuit board and high-resolution 3D scan of the PCB surface (center images).  
Surface scans of a lens array (image right).

## System Characteristics

### FDM-1 Highest Accuracy

Measuring range	80 µm*
Accuracy (typical standard deviation)	<3 nm
Diameter of the measuring probe	≥50 µm

\*dependent on probe type

### FDM-2 Large Measuring Range

Measuring range	1 mm*
Accuracy (typical standard deviation)	<10 nm
Diameter of the measuring probe	≥50 µm

\*dependent on probe type

## General Parameters (for both systems)

Measurement principle	low coherence interferometry
Suitable materials and surfaces	glass, metal, ceramics, plastic etc. – transparent, glossy and matt
Inner diameter of the tested object	from 0.1 mm
Direction of measurement	axial (0°), angular (45° – 90°)
Measuring frequency	up to 20 kHz (depending on the surface)
Multi-point measurement	parallel or sequential read-out from multiple probes
Software	FDMControl (control software) / DataViewer (analysis software)
Programming interfaces	API, DLL
System interfaces (configurable)	Trigger IN, Gate IN, Trigger OUT: TTL 5V, Ethernet
Power supply	230 V (AC)

We will be happy to develop customized solutions for your specific measurement task. Please contact us to request a quote!



### Software DataViewer Pro

DataViewer is the perfect software for a straightforward 2D-display and the easy processing of large data series. The program can perform many mathematical operations, for example calculate moving averages and standard deviations, apply adjustable filters, establish polynomial regressions or corrections and conduct FFT operations. A package for calculating roughness values in compliance with the prevalent standards DIN EN ISO 4287, 4288 and 11562 is available as an option.

DataViewer benefits from an intuitive operational system and many configuration options. **The DataViewerPro software is included as part of the FDM sensor package.** System-independent single-user licenses are available on [fionec.de/software](http://fionec.de/software)



# Over 10 years of sophisticated fiber optic technology.

fionec has been developing, manufacturing and marketing innovative fiber optic measuring systems and components since 2007. We provide a complete and integrated range of services, from the development of customized measuring concepts and algorithms, simulations and contract measurement projects to the construction, adaptation and distribution of fiber optic measuring probes and optical fibers.

Our sophisticated miniature measuring probes are unrivaled in the high-tech industry, allowing us to maintain the technological leadership in high-precision measurements of tight or hard-to-access spaces and of delicate surface structures. Flexible and modular systems architecture, freely adaptable configurations and integrated interfaces enable us to provide customized measuring systems. For sophisticated measuring tasks and reliable quality assurance in the precision and ultra-precision manufacturing sector.

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fionec GmbH | Ritterstraße 12a | D-52072 Aachen | Germany  
Tel.: +49 (0) 241-8949 8840 | [info@fionec.com](mailto:info@fionec.com)  
[www.fionec.com](http://www.fionec.com)