

# Data Sheet

## FRT CFM - Field-of-View Sensor for Confocal Microscopy

Used in many sectors

- Medical Technology
- Semiconductors
- Photovoltaics
- MEMS
- Optics
- Automotive

The confocal measuring principle used in the FRT CFM sensor is an established, non-contact, measuring method for fast, high-resolution 3D analyses of small structures in research and production like MEMS,

microlenses, defects and more. Beside the investigation of microstructures, the sensor is also used for roughness measurements and the capture and analysis of 3D topography. Due to its large-area, confocal measuring principle, meaningful results are generated in less than 10 seconds. The field of view can be extended through the integrated stitching function.



FRT CFM - Field-of-View Sensor for Confocal Microscopy

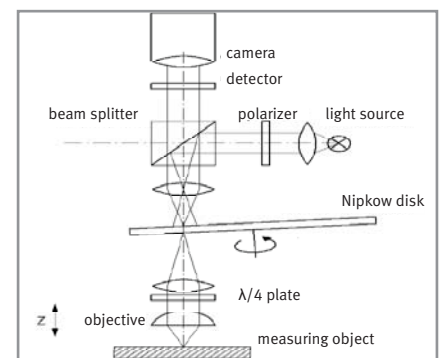
### Typical Measuring Tasks

- Structure measurement
- Roughness measurement
- 3D topography measurement

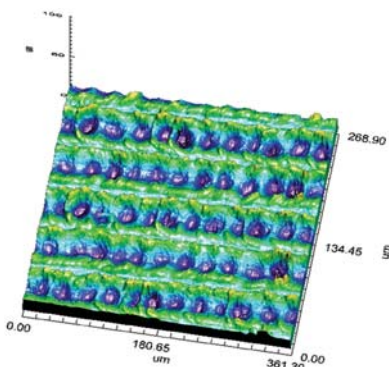
### Measuring Features

- Optical, non-contact, non-destructive measurement
- Very fast, large-area measurement
- Nanometer vertical resolution, sub-micrometer lateral resolution
- Extendible field of view through stitching
- Durable, low-maintenance LED light source

### Measuring Principle

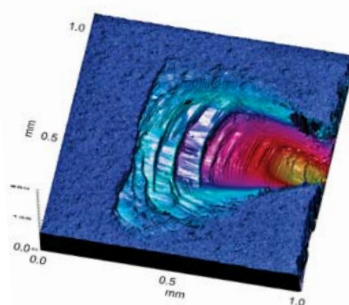


The light of a high-performance LED is focused by a lens on the surface of an object, then reflected and finally captured by a detector. Once the object is in the focus of the light beam and the detector, a maximum signal is received. If the object is out of focus, its illumination and image on the detector are blurred, which results in a very low output signal. By gradually moving the focal point in z-direction, the microscope provides precise information about the height.



Laser ablation on stainless steel, measured with FRT CFM

The 3D measurement of a stainless steel surface with laser-ablated structures. By analyzing the surface topography, the process parameters can be optimized.



Defekt at the edge of a solar wafer, measured with FRT CFM

3D topography of the edge of a solar wafer showing a breakout caused during sawing. Due to the fast, confocal measuring principle, such defects can be measured and evaluated within seconds.

Visit [whitepaper.frt-gmbh.com](http://whitepaper.frt-gmbh.com) for detailed application examples!

# Technical Data

## FRT CFM - Field-of-View Sensor for Confocal Microscopy

Objective <sup>1)</sup>	10X	20X	50X	100X
Working distance	1 mm			
Resolution z	10 nm	3 nm	2 nm	1 nm
Resolution x,y	2.31 μm	1.16 μm	0.463 μm / 0.42 μm <sup>2)</sup>	0.231 μm / 0.37 μm <sup>2)</sup>
Field of view	1780 μm x 1335 μm	890 μm x 655 μm	356 μm x 267 μm	178 μm x 134 μm
Numerical aperture	0.5	0.75	0.8	0.9
Measuring angle	90° ± 30°	90° ± 48°	90° ± 53°	90° ± 64°

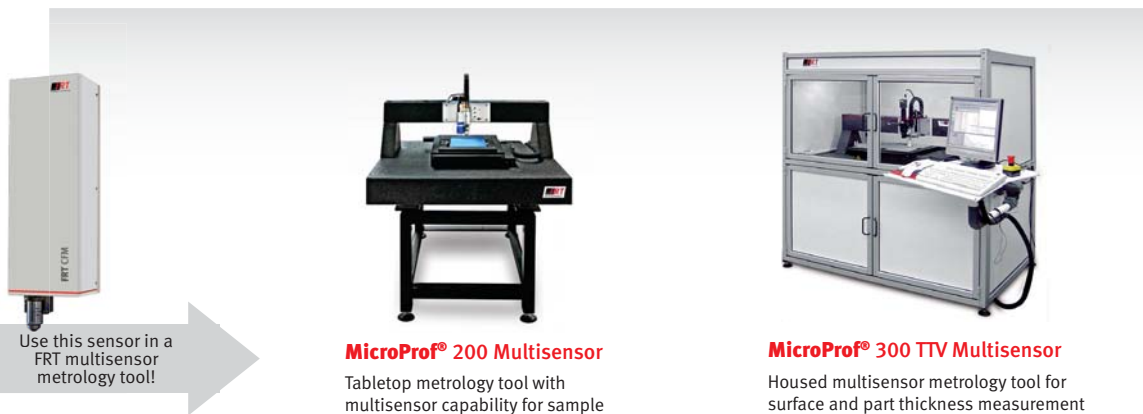
1) Further objectives available (e.g. long-distance)

2) Geometric / optical

Sensor	
Camera	768 x 582 Pixel
Travel range z	400 μm
Typical measuring time	5 - 10 sec.
Light source	LED, 505 nm, 5 W
Operating temperature	25° C ± 2° C
Dimensions (W x H x D)	140 mm x 450 mm x 140 mm

### Scope of Delivery

Measuring head, one objective of choice, operating manual



Use this sensor in a FRT multisensor metrology tool!

### MicroProf® 200 Multisensor

Tabletop metrology tool with multisensor capability for sample sizes of up to 200 mm<sup>2</sup>.

### MicroProf® 300 TTV Multisensor

Housed multisensor metrology tool for surface and part thickness measurement of sample sizes up to 300 mm<sup>2</sup>.

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