

# MSA-400 *Topography Option*



## POLYTEC MICROSCOPE SYSTEMS

- MSV-050 Manual Microscope Adapter
- MSV-100 Remote Controlled Microscope Adapter
- MSV-400 Microscope Scanning Vibrometer
- MSA-400 Micro System Analyzer

## The All-in-One Optical Instrument for Measuring MEMS Dynamics and Topography

*In addition to its unique capability to measure MEMS and microsystem dynamics, Polytec's MSA-400 Micro System Analyzer can now perform high resolution topography measurement on MEMS and micro-components.*

### 3-D Topography Now Available for MSA-400 Micro System Analyzer

The award-winning MSA-400 Micro System Analyzer uses light for non contact measurement of three-dimensional motions in microstructures. Equipped with precision microscope optics, the MSA-400 combines scanning laser Doppler vibrometry to measure out-of-plane vibrations orthogonal to the component's surface with stroboscopic video microscopy to capture in-plane displacement parallel to the component's surface. Taken together, these techniques allow fast and complete dynamic characterization of microstructures.

In addition, static 3-D topography measurements can now be made using white light interferometry to determine structure heights and shape on both rough and specular surfaces. This is also an optical, non-contact measurement procedure, free from any impact, feedback or surface preparation to the sample.

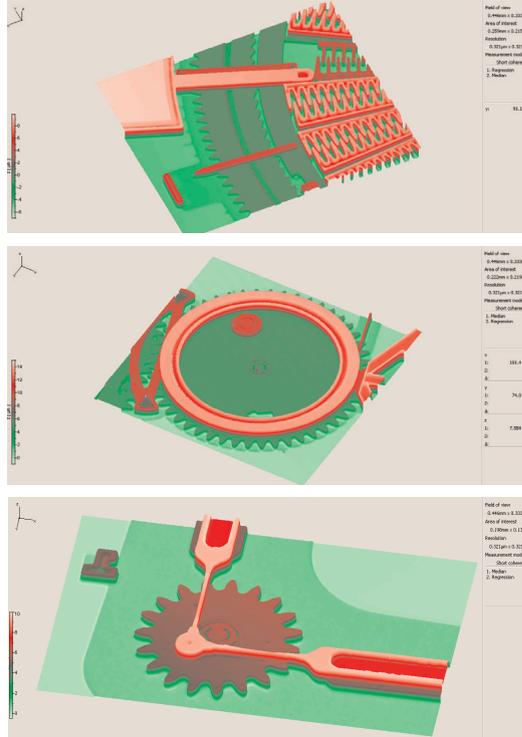
### Key Features and Benefits

- All-in-one instrument for measuring both dynamics and static topography of MEMS
- Rapid, non-contact measurement procedure
- Sub-nanometer resolution
- Rough and specular surface compatibility
- Powerful TMS software for topography and surface characterization
- Integrated microscope optics with optimized optical path for best lateral resolution and highest image quality
- Simple and intuitive operation, measurement ready within minutes
- Easy integration in MEMS probe stations

## Applications

The MSA-400 Micro System Analyzer is an ideal combination of dynamic and static measurement technology for determining the essential MEMS parameters - profile, shape, critical dimensions, roughness as well as resonance frequencies, deflection shapes, damping, settling response and decay time. The MSA-400 is designed to mount to popular MEMS probe stations and is suitable for both laboratory R&D measurements and production line, quality control applications.

Regarding the out-of-plane and in-plane vibration measurement capabilities, please refer to the Polytec MSA-400 Micro System Analyzer brochure for further specifications or visit [www.polytec.com/usa/microsystems](http://www.polytec.com/usa/microsystems).



## MSA-400 Topography Option - Technical Data

General Specifications				
Light source	as MSA-400, coherence length: 12 µm			
Camera	as MSA-400, 1.4 Mpixel (1392 x 1040) progressive scan camera			
Compatibility	as MSA-400, compatible with most of the major probe stations			
Optics				
	Magnification	Working distance	Field of vision	Optical resolution
Standard interference objective				
MUL40100 CF Plan DI	10x	7.40 mm	900 µm x 670 µm	1.6 µm
Optional objectives				
MUL42030 CF Plan TI	2.5x	10.3 mm	3590 µm x 2630 µm	6.3 µm
MUL42050 CF Plan TI	5x	9.30 mm	1800 µm x 1340 µm	3.6 µm
MUL40200 CF Plan DI	20x	4.70 mm	450 µm x 335 µm	1.2 µm
MUL40500 CF Plan DI	50x	3.70 mm	180 µm x 134 µm	0.85 µm
Performance				
Z Dynamic range	250 µm (piezo objective translation stage)			
Z Resolution (exemplary)				
Conditions*	10 nm Z increment Phase evaluation	10 nm Z increment Envelope evaluation	130 nm Z increment Envelope evaluation	
RMS Resolution	0.25 nm	7 nm	25 nm	
Reproducibility	± 2 nm	± 10 nm	± 35 nm	
Accuracy**	± 3 nm	± 35 nm	± 110 nm	
Measurement time	= ( Z distance + 20 µm ) / ( Z increment x frame rate )			
- Examples***	~ 2 min		~ 10 sec	

\* Measured on a flat plate with  $\lambda/20$  planarity, without averaging, using a vibration-isolated table

\*\* Accuracy = reproducibility +  $3\sigma$

\*\*\* At Z distance 20 µm and frame rate 30/s

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