

TMS-500 TopMap Pro.Surf TMS-500-R TopMap Pro.Surf+



The TopMap Pro.Surf and Pro.Surf+ (models TMS-500 and TMS-500-R) are high-precision, non-contact measurement systems with a large field of view for fast and efficient surface characterization of precision parts.

Incorporating a traceably calibrated white-light interferometer with large vertical measurement range, TopMap Pro.Surf and Pro.Surf+ can precisely characterize surfaces near steep edges such as drilled holes or on parts with large steps. Flatness and parallelism parameters, even for macroscopic samples, can be checked quickly and with excellent repeatability.

An additional chromatic-confocal sensor enables roughness evaluation in a single measurement with the TopMap Pro.Surf+.



Highlights

- Quick and precise 3D surface characterization
- Detect large areal form deviation even without stitching
- Optical roughness measurement (TopMap Pro.Surf+)
- Short measurement time and large field-of-view for automation
- Non-invasive measurements
- Measures almost any surface
- Check tolerance values with high reliability and high repeatability
- Large vertical scan range of 70 mm
- Measure hard to reach areas such as holes

TMS-500 TopMap Pro.Surf
TMS-500-R TopMap Pro.Surf+
Optical Surface Metrology
for Quality Control Applications
Preliminary Datasheet



Technical Specifications

All information for the models TMS-500 TopMap Pro.Surf and TMS-500-R TopMap Pro.Surf+ comply with the initiative "Fair Data Sheet" for optical surface measurement devices.



Metorological Specifications

Extended measuring range	Small	Large
Extended lateral range	214 mm x 211 mm	228 mm x 221 mm
Extended lateral range w/o data reduction	214 mm x 211 mm	228 mm x 221 mm
Max. number of points in single measurement	X: 1592, Y: 1200, X.Y: 1910400	
Extended vertical range	70 mm	
Performance features		
Measurement noise	< 0,5 nm (Phase evaluation)	
Vertical resolution	< 1,45 nm (Phase evaluation)	

Application-specified features

Typical flatness measurement¹

Measuring principle	Coherence Scanning on smooth surfaces ²	Coherence scanning in rough surfaces ³	Phase-Shift ⁴
Flatness deviation	< 75 nm	< 125 nm	< 65 nm
Repeatability of a flatness measurement	5 nm	10 nm	< 1.5 nm

Typical step height measurement⁵

Nominal step height	5 µm	50 µm	450 µm	1000 µm	2000 µm	5000 µm
Reproducibility ⁶ (standard deviation)	0.008 µm	0.06 µm	0.05 µm	0.05 µm	0.05 µm	0.05 µm
Extended measurement uncertainty ⁷	0.05 µm	0.25 µm	0.3 µm	0.3 µm	0.3 µm	0.4 µm

Typical roughness measurement with TopMap Pro.Surf+⁸

Measurable roughness values	$Ra \geq 100$ nm
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¹ Rounded values derived by empirical measurement data and a statistical evaluation of the measured flatness for several TMS-500 TopMap Pro.Surf at different sample increments and for both correlogram evaluation procedures. Measurements on a plane mirror (95% of the maximum field of view used).

² Evaluation of the correlogram phase

³ Evaluation of the correlogram envelope

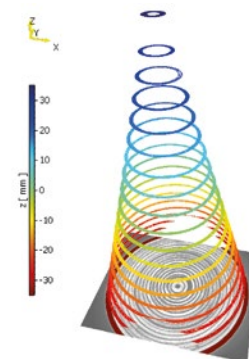
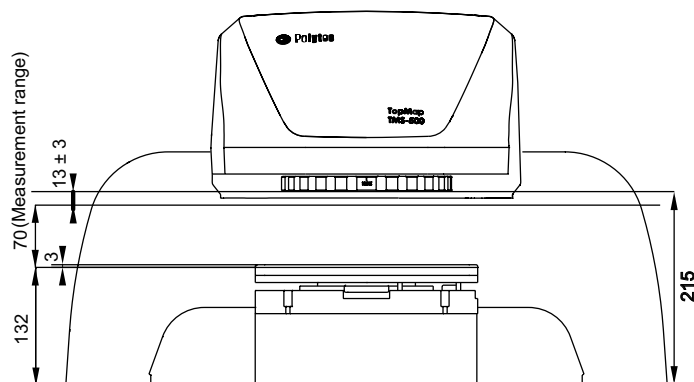
⁴ In the phase-shift method, the interference phase is varied in steps. The single interference intensity determines the phase value of each measurement point and thus the height value.

⁵ Empirically determined representative performance for measurements on a calibrated PTB depth setting standard type A1 (ISO 5436-1).

⁶ Variation of the measurement values for a series of measurements under repeatability conditions, averaged for several measurement devices.

⁷ Margin of the confidence interval with a probability of 99.7% (3 σ), determined by the standard deviation from the calibrated value of a single step (several devices under conditions).

⁸ Additional roughness measurement with TMS-500-R TopMap Pro.Surf+ according to DIN EN ISO 4287.



Measurement example: Multi-step calibration standard

Optical Specifications		
	Small	Large
Measurement method	Scanning white-light interferometry (Michelson)	
Imaging system	Telecentric; light source: long-life LED, 525 nm	
Other features	Manual filter wheel with 3 filters for adapting to different sample reflectivities; Optical tool for automatically identifying the measurement position	
Lateral measuring area	X: 21.9 mm Y: 16.5 mm X.Y: 361.4 mm ²	X: 43.3 mm Y: 32.7 mm X.Y: 1415.9 mm ²
Positioning volume	200 x 200 x 70 mm = 0.028 m ³	
Working distance	13 ±3 mm	13 ±3 mm
Vertical dynamic range	70 mm	70 mm
Numerical aperture	0.038	0.02
Calculated maximum angle	2.18	1.15
Measurement point spacing	X: 14.3 µm Y: 14.3 µm	X: 28.2 µm Y: 28.2 µm
Calculated lateral optical resolution	8.4 µm	16 µm
Roughness sensor of TopMap Pro.Surf+¹		
Measurement range	150 µm	
Imaging system	chromatic-confocal sensor, white LED	
Working distance	3.35 mm	
Measurement point spacing	2.7 µm	

¹ As standard integrated in TMS-500-R TopMap Pro.Surf+

General Specifications	
Dimensions [W x L]:	
TMS-I-500 sensor head	350 x 678 mm ²
TMS-I-500 sensor head with stand	700 x 800 mm ²
TMS-500/TMS-500-R sensor head with XY positioning table	700 x 900 mm ²
Weight:	
TMS-I-500 sensor head	ca. 25 kg
XY positioning table	ca. 22 kg
TMS-I-500 with stand	ca. 57 kg
TMS-500-R with stand	ca. 69 kg
Power	100...240 VAC ±10%, 50/60 Hz
Operating/storage temperature	+10 °C ... +33 °C / -10 °C ... +65 °C
Relative humidity	max. 80%, non-condensing
Photobiological Safety	IEC/EN 62471:2009-03
Electrical safety	IEC/EN 61010-1:2011-07; EMV: IEC/EN 61326:2006-10
Scope of delivery	TMS-I-500 interferometer sensor head / TMS-I-500-R interferometer sensor head with roughness sensor, XY-positioning table ¹ , 19" controller unit, portal stand, 19" PC with industry casing and TFT-monitor, connection cable, TMS software with hardlock (dongle)
Options & accessories	reworkstation, flatness reference, calibration kit

¹ Depending on the system configuration, for TMS-500-R Pro.Surf+ always included.



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