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

TopMap Pro.Surf
TopMap Pro.Surf+
Optical surface metrology for quality control applications
Datasheet

Technical specifications

Initiative Fair Data Sheet

The 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.

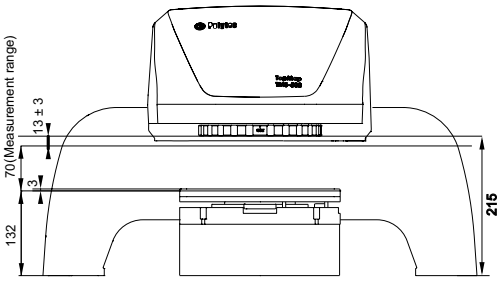
General features		
Positioning volume	200 x 200 x 70 mm = 0.028 m^3	
Max. number of points in single measurement	X: 1592, Y: 1200, X.Y: 1910400	
Optical specifications		
	Small	**Large**
Measuring area	X: 22.8 mm Y: 17.2 mm X.Y: 392.2 mm^2	X: 44.9 mm Y: 33.8 mm X.Y: 1517.6 mm^2
Working distance	13 ±3 mm	13 ±3 mm
Vertical measuring range	70 mm	70 mm
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
Extended measuring range		
	Small	**Large**
Extended lateral range	214 mm x 211 mm	228 mm x 221mm
Extended measuring area with data reduction	214 mm x 211 mm	228 mm x 221mm
Extended vertical range	corresponds with vertical measuring range	
Performance features		
Measurement noise	< 0.5 nm (Phase evaluation, smooth surfaces)	
Vertical resolution	< 1.45 nm (Phase evaluation, smooth surfaces)	
General specifications		
Dimensions [W x L]: TMS-I-500 sensor head TMS-I-500 sensor head with stand TMS-I-500/TMS-I-500-R sensor head with XY positioning table	 350 x 678 mm^2 700 x 800 mm^2 700 x 900 mm^2	
Weight: TMS-I-500 sensor head XY positioning table TMS-I-500 with stand TMS-I-500-R with stand	 ca. 25 kg ca. 22 kg ca. 57 kg ca. 69 kg	
Power	100...240 VAC ±10 %, 50/60 Hz	
Ambient temperature range	20±3 °C	
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)	

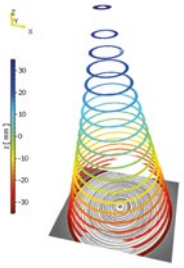
[1] Depending on the system configuration, for TMS-500-R Pro.Surf+ always included.

Other features						
Measuring principle	Scanning white-light interferometry (Michelson)					
Optical setup	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					
Data formats	Topography formats: SUR, ASCII Export formats: qs-STAT, PDF, BMP, PNG, TIFF, GIF					
Additional sensor with TopMap Pro.Surf+						
Measurement range	400 µm					
Measuring principle	chromatic-confocal measuring principle					
Working distance	10.8 mm					
Lateral resolution [10]	2.6 µm					

Application-specific features						
Typical flatness measurement (single field measurement) [1]						
Method of acquistion and evaluation	Coherence scanning on smooth surfaces [2]		Coherence scanning on rough surfaces [3]		Phase-shift[4]	
Flatness deviation	< 75 nm		< 125 nm		< 65 nm	
Reproducibility [6]	5 nm		10 nm		< 1.5 nm	
Typical step height measurement [5]						
Nominal step height	5 µm	50 µm	450 µm	1000 µm	2000 µm	5000 µm
Reproducibility [6]	0.008 µm	0.06 µm	0.05 µm	0.05 µm	0.05 µm	0.05 µm
Maximum deviation of a step height measurement [7]	0.02 µm	0.09 µm	0.12 µm	0.12 µm	0.21 µm	0.31 µm
Extended measurement uncertainty [8]	0.05 µm	0.25 µm	0.30 µm	0.30 µm	0.30 µm	0.40 µm
Typical roughness measurement [9]						
Measurable roughness values	*Ra* ≥ 100 nm					

[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] Eight measurements
[8] Margin of the confidence interval with a probability of 95.4% (2σ), determined by the standard deviation from the calibrated value of a single step (several devices under conditions).
[9] Additional roughness measurement with TMS-500-R TopMap Pro.Surf+ according to DIN EN ISO 4287.
[10] Half of the spot diameter, in the middle of measurement range.





Measurement example: Multi-step calibration standard

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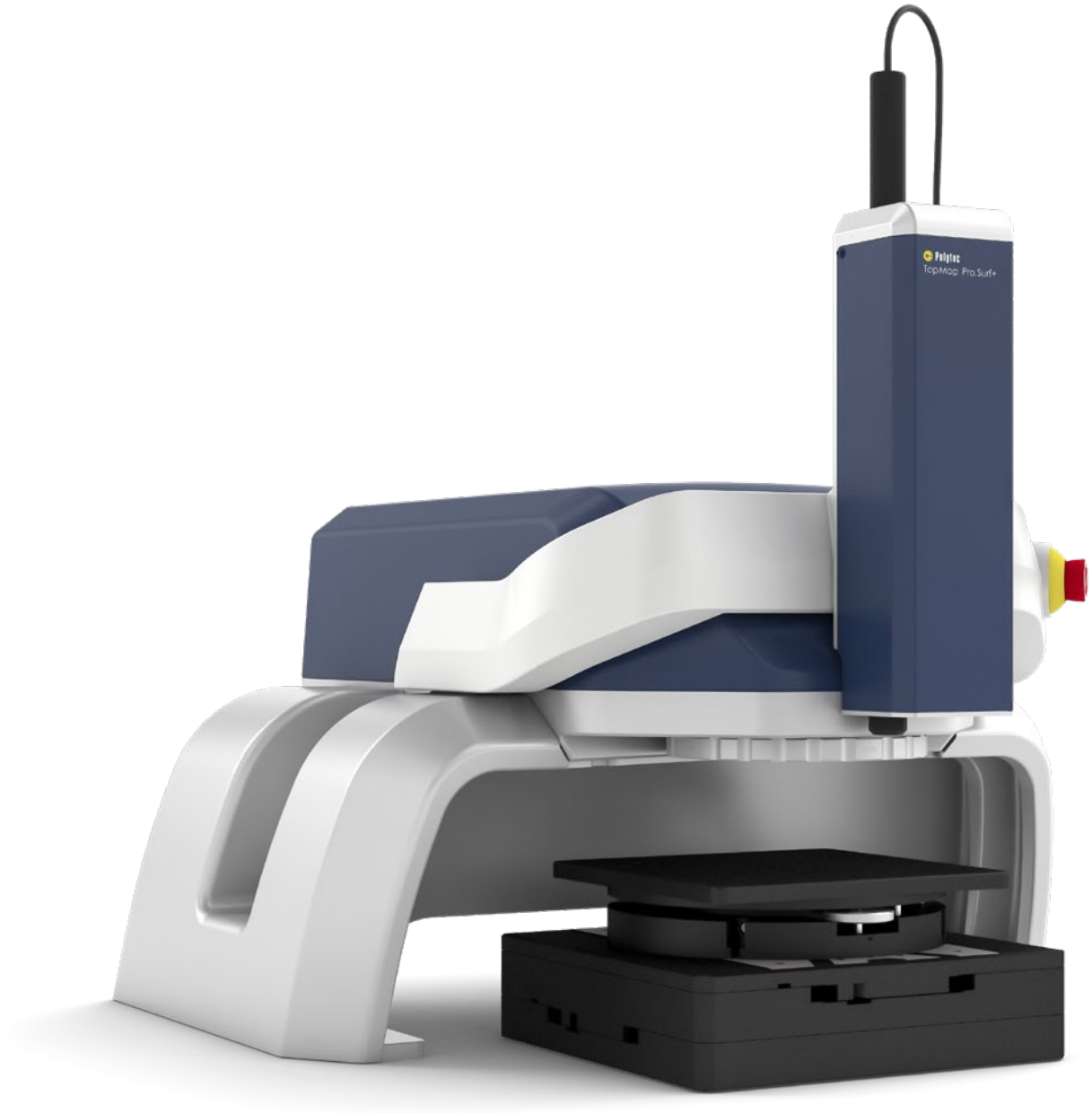

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