

TopMap Pro.Surf & Pro.Surf+ //

Datasheet



Fast and large area profiling
of 3D form & flatness

TopMap Pro.Surf and Pro.Surf+ are production-ready optical profilers for traceable and ultra-fast quality control measurements. Analyze 3D form parameters and flatness with utmost repeatability, capturing ~2M data points within just seconds. The exceptionally large single field with 44 x 33 mm² misses no details, while True Stitching secures accurate data of up to 230 x 220 mm². Automatic pattern recognition enables fast and efficient multi-sample measurements without the need for mechanical fixture. Reach recessed areas and inner surfaces with telecentric optics, covering up to 70 mm large steps. This Coherence Scanning Interferometer features the SST Smart Scanning Technology for seamless measurements on almost any material with one technology, perfectly handling altering reflectivities.

The large set of analysis routines enables easy and ISO-conform evaluation of roughness and form parameters. The integrated recipe management simplifies routine inspections and ensures consistency, while 1-click-operations speed up pass-fail analysis on shop floor. The unique FTP accessory gathers Flatness, Thickness & Parallelism by measuring top and bottom surfaces of a sample in one shot. For noisy shop floors and disturbances, the patented ECT Environmental Compensation Technology secures stable measurement results.

Highlights //

Fast, areal form and flatness measurement with utmost repeatability



Exceptionally large field ~44x33 mm² sees more details



True Stitching extends measurement area to ~230x 220 mm²



70 mm large vertical scan range plus telecentric optics for large steps and recessed areas



Smart Scanning Technology measures on almost any surface

Recipe-based workflows with ISO parameters, automation and 1-click operation



Pro.Surf+ for combined form +2D roughness and multi-sensor measurements



FTP module for combined top & bottom measurement gathers Flatness, Thickness & Parallelism



Patented ECT Environmental Compensation Technology for stable results in production

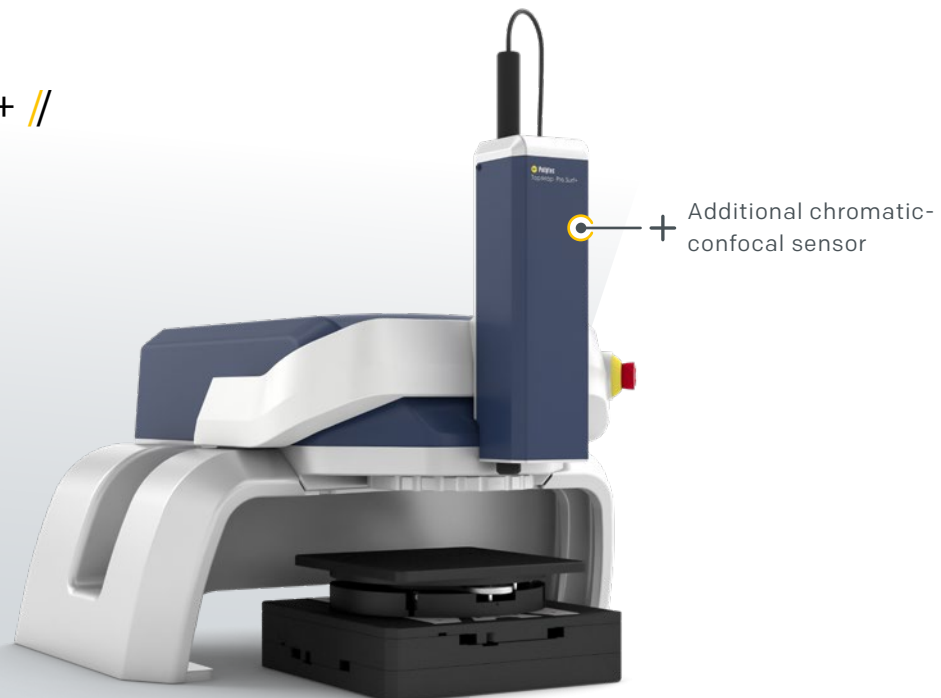
Technical data //

The information for the models TopMap Pro.Surf and TopMap Pro.Surf+ comply with the Fair Data Sheet (VDI/VDE-EE 2655-3) for optical surface measurement devices. Additional specs are highlighted in grey.

| General features | |
|---|---|
| Working principle | Coherence scanning interferometry |
| Nominal vertical measurement range in a single measurement | 70 mm |
| Positioning range of workpiece¹ | X = 200 mm, Y = 200 mm, Z = 70 mm; motorized |
| Tip/tilt | automated and motorized options |
| Max. number of measuring points in a single measurement | N_x : 1592; N_y : 1200; N_{xy} : 1910400 |
| Max. number of measuring points in a stitched measurement | $N_{xy,max}$ = 500 million |
| Surface reflectivity | SST Smart Scanning Technology works on any surface from shiny to scattering; reflectivity 100% to 0.05% |

¹ With optional XY-positioning stage

TopMap Pro.Surf+ //



Optics-specific features

| | Small field | Large field |
|---|-------------|-------------|
| Measurement area in a single measurement | | |
| X [mm] | 22.8 | 44.9 |
| Y [mm] | 17.2 | 33.8 |
| X · Y [mm ²] | 392.2 | 1517.6 |
| Extended lateral measurement range (stitching) ¹ | | |
| Maximum area [mm ²] | 45,154 | 50,388 |
| Maximum unidirectional length [mm] | 211 | 221 |
| Working distance [mm] | 13 ± 3 mm | 13 ± 3 mm |
| Usable vertical measuring range [mm] | 70 | 70 |
| Maximum workpiece height [mm] | 70 | 70 |
| Numerical aperture | 0.038 | 0.02 |
| Theoretical maximum measurable surface angle φ_{\max} | 2.18° | 1.15° |
| Measuring point spacing Δ_x/Δ_y [μm] | 14.3 | 28.2 |
| Calculated lateral optical resolution δL^2 [μm] | 8.4 | 16 |

¹ With optional XY-positioning stage

² According to Rayleigh criterion, related to a central wavelength of 525 nm

Optics-specific features

| | Small field | Large field |
|---|-------------|--|
| Measurement noise N_M^{1,2} | | < 0.5 nm |
| Digital resolution | | 0.01 nm |
| Maximum deviation of a step height measurement³ | | 5 μm step: 0.02 μm 50 μm step: 0.09 μm 450 μm step: 0.12 μm 5000 μm step: 0.31 μm |
| Step height measurement repeatability⁴ | | 5 μm step: 0.16 % 50 μm step: 0.12 % 450 μm step: 0.011 % 5000 μm step: 0.001 % |
| Flatness deviation z_{FLT}¹ | | < 75 nm |
| Flatness measurement repeatability¹ | | < 5 nm |

¹ Evaluation of the correlogram phase

² Based on DIN EN ISO 25178-700, 30 („Smooth surfaces“) measurements at 11.9 $\mu\text{m}/\text{sec}$, on a parallelly aligned optical flat ($R \approx 4\%$, $\lambda/20$).

Postprocessing: levelling, 5 x 5 spike-removal, high pass filter $\lambda_c = \text{FoV width}/4$, no denoising

³ 8 measurements per step at 11.9 $\mu\text{m}/\text{s}$, on a calibrated PTB depth-setting standard, type KNT A1 (ISO 5436-1), in various sections of the 70 mm nominal vertical measurement range

⁴ Standard deviation of the measured step height under repeatability conditions

Other features

| | |
|------------------------------------|--|
| Optical setup | Telecentric; light source: long-life LED |
| Other features | Manual filter wheel with 3 filters for adapting to different sample reflectivities; Optical tool for automatically identifying the measurement position |
| Export and exchange formats | Topography formats: SUR, ASCII, STL, X3P (ISO 25178-72) Export formats: qs-STAT, PDF, BMP, PNG, TIFF, GIF |

General specifications

Dimensions [L x W x H]

| | |
|--|---------------------------------|
| Pro.Surf sensor head | 678 x 350 x 205 mm ³ |
| Pro.Surf sensor head with stand | 800 x 700 x 420 mm ³ |
| Pro.Surf+ sensor with stand and XY positioning stage | 885 x 700 x 755 mm ³ |

Weight

| | |
|----------------------|---------------|
| Pro.Surf sensor head | approx. 25 kg |
| XY positioning stage | approx. 22 kg |
| Pro.Surf with stand | approx. 57 kg |
| Pro.Surf+ with stand | approx. 69 kg |

| | |
|--|----------|
| Recommended temperature range for measurement | 20 ±3 °C |
|--|----------|

| | |
|---|-------|
| Permissible temperature gradient | 1 K/h |
|---|-------|

| | |
|--------------------------------------|--|
| Operation/storage temperature | +10 °C ... +35 °C (50 °F ... 95 °F) / -10 °C ... +65 °C (14 °F ... 149 °F) |
|--------------------------------------|--|

| | |
|--------------------------|--------------------------|
| Relative humidity | max. 80%, non-condensing |
|--------------------------|--------------------------|

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| Power consumption | 100...240 VAC ±10 %, 50/60 Hz, 50 VA system + 120 W PC |
|--------------------------|--|

Additional sensor with TopMap Pro.Surf+

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|---|--------|
| Nominal vertical measurement range | 400 µm |
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|--------------------------|--------------------|
| Working principle | Chromatic-confocal |
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|-------------------------|---------|
| Working distance | 10.8 mm |
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| | |
|--|--------|
| Lateral resolution ¹ | 2.6 µm |
|--|--------|

| | |
|---|-------------|
| Typical roughness measurement ² | Ra ≥ 100 nm |
|---|-------------|

¹ Half of the spot diameter, in the middle of measurement range.

² Additional roughness measurement with TopMap Pro.Surf+ according to DIN EN ISO 4287.

Configuration possibilities

| | |
|--------------------------|---|
| Hardware included | Sensor head, Tip-tilt unit, Control unit, PC, Monitor |
|--------------------------|---|

| | |
|-------------------------|---|
| Hardware options | Roughness sensor, Positioning stages: motorized tip-tilt and motorized xy, Barcode reader, Calibration set, Optical tables: pneumatically and electronically damped |
|-------------------------|---|

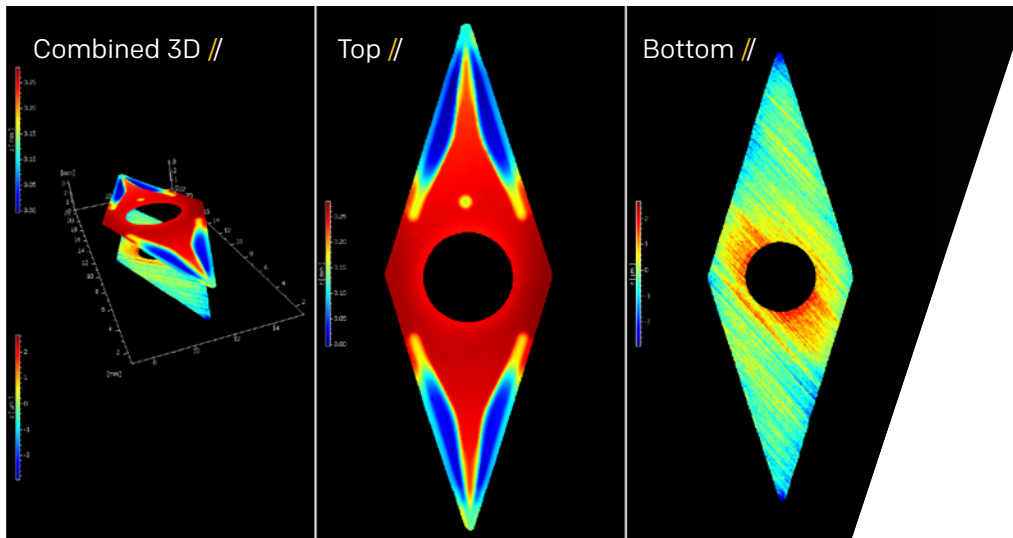
| | |
|--------------------------|---|
| Software included | 3D data acquisition with multiple operation modes, Easy wizard, Smart Surface Scanning Technology, Pre-scan, 2D/3D data evaluation, Automation with recipes, ISO roughness analysis (ISO 25178, ISO 21920), Critical dimensions |
|--------------------------|---|

| | |
|-------------------------|---|
| Software options | Environmental Compensation Technology, Quality Control (QC) package, Operator Interface, Pattern matching, Software customization, MountainsMap |
|-------------------------|---|

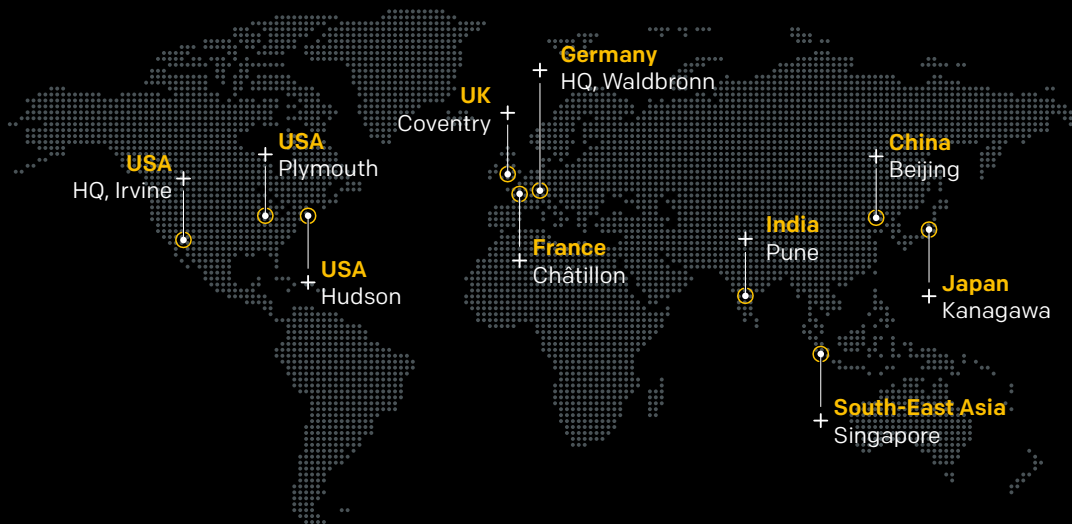
Accessories //

FTP Module

| | |
|----------------------------------|---|
| Purpose | Evaluating Flatness, Thickness & Parallelism (FTP) of top & bottom surfaces of samples |
| Benefit | The FTP module allows to measure top and bottom surfaces in a single shot. This eliminates measurement uncertainties caused by re-positioning the sample as it is the case for conventional surface topography systems. |
| Maximum sample dimensions | Lateral: 19 mm x 19 mm or 15 mm x 22 mm Thickness: 12 mm |
| Compatibility | Requires Pro.Surf with large measurement field |
| Scope of delivery | FTP base module, a sample specific holder and measurement recipe |
| Hardware options | Additional sample holders |



| Evaluation | Value |
|---------------------|----------------------|
| Flatness (ISO 1101) | 275.77 μm |
| Flatness (ISO 1101) | 5.39 μm |
| Thickness | 3.256 mm |
| Parallelism // | 33.76 μm |



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