

Compact
non-contact
3D surface
profiler



SENSOFAR[®]
METROLOGY



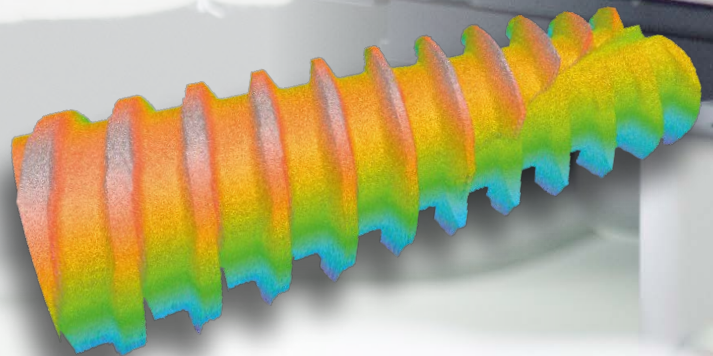
Compact 3D Profiler

Compact. Flexible. Powerful.

S lynx is a new non-contact 3D surface profiler designed for use in industry and research. It has been designed as a compact and versatile system. S lynx is able to measure differing textures, structures, roughness and waviness – all across varying surface scales. The S lynx's versatility makes it appropriate for a broad range of high-end surface measurement applications. Ideal performance is guaranteed by Sensofar's proprietary 3-in-1 measurement technology, and complemented by the incredibly intuitive operation of the system with the associated SensoSCAN software.

Applications

- | Automotive
- | Consumer electronics
- | Energy
- | LCD
- | Materials science
- | Microelectronics
- | Micromanufacturing
- | Micropaleontology
- | Optics
- | Tooling
- | Semiconductors
- | Watch manufacturing

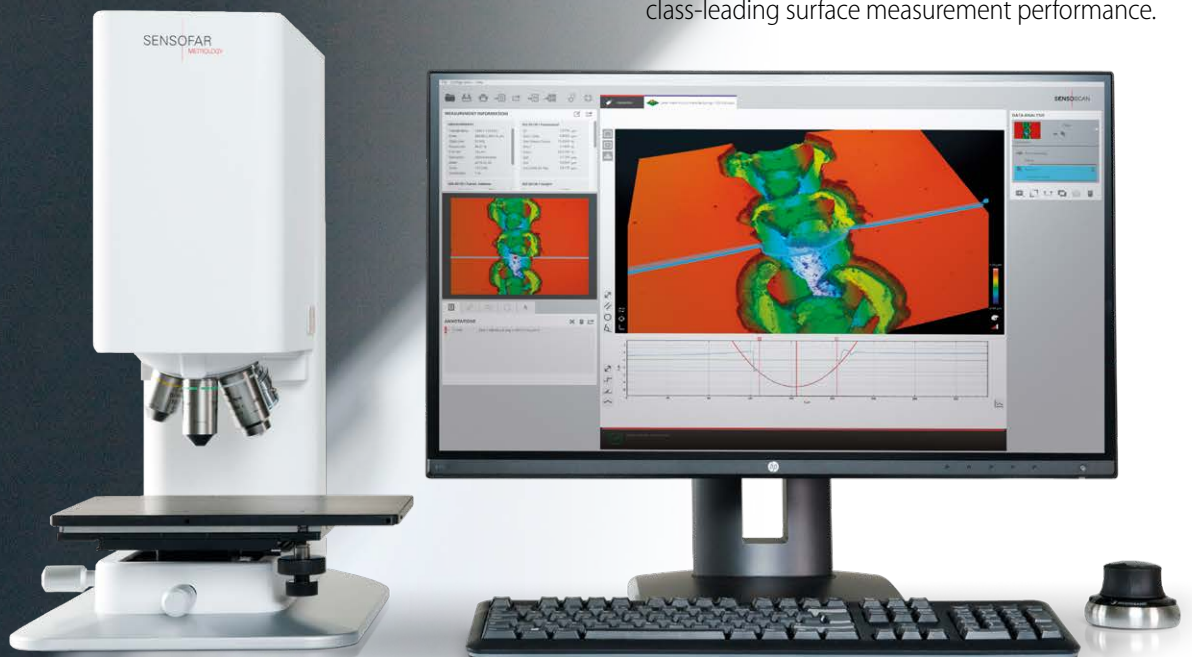




Why 3-in-1 technologies?

Single-technology systems are subject to a lack of versatility. When confronted with measurement tasks that push the boundaries of their physics-based limitations, the only option is to manipulate the measurement parameters to favor the requisite result. However, favoring either speed, resolution or accuracy usually means sacrificing one or both of the others, and the user is thus confronted with some sort of compromise in the data acquisition.

With Sensofar's 3-in-1 approach – as found in the S line of measurement systems – a single click in SensoSCAN switches the system to the best technique for the task at hand. The three measurement techniques found in the S lynx sensor head – confocal, vertical scanning interferometry & focus variation – thus each contribute critically to the versatility of the system, help minimize undesirable compromises in the data acquisition, and together provide Sensofar's class-leading surface measurement performance.



Confocal

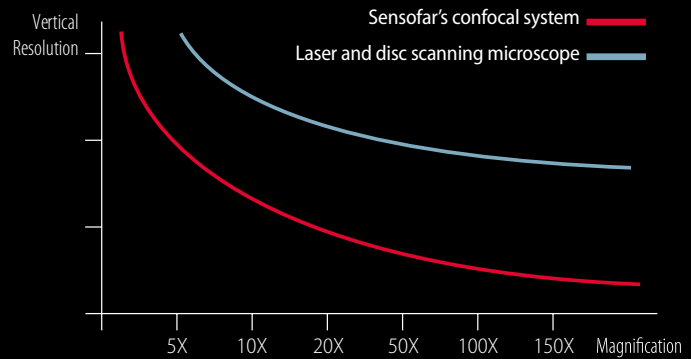
Confocal profilers have been developed for measuring smooth to very rough surfaces. Confocal profiling provides the highest lateral resolution that can be achieved by an optical profiler. Thus, spatial sampling can be reduced to 0.09 μm , which is ideal for critical dimension measurements. High NA (0.95) and magnification (150X) objectives are available to measure smooth surfaces with steep local slopes over 70° (for rough surfaces up to 86°). The proprietary confocal algorithms provide the unique vertical repeatability on the nanometer scale.

Interferometry

White-light vertical scanning interferometry (VSI) is a widely used and powerful technique for measuring surface characteristics such as topography or transparent film structure. It is best suited for measuring smooth to moderately rough surfaces, and provides nanometer vertical resolution regardless of the objective's NA or magnification.

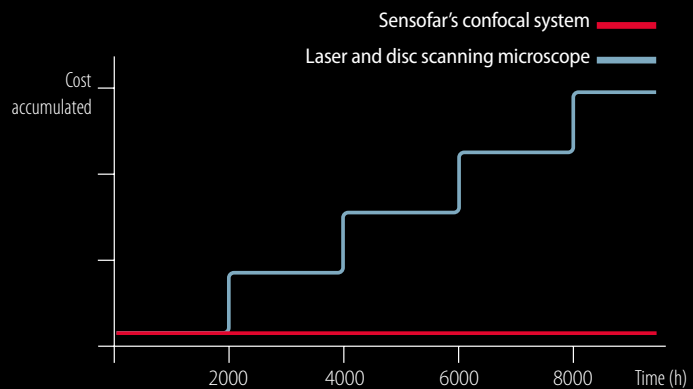
Focus Variation

Focus Variation is an optical technology that has been developed for measuring the shape of large rough surfaces. Sensofar's implementation of this approach has been specifically designed to complement confocal measurements at low magnification. Highlights of the technology include high slope surfaces (up to 86°), highest measurement speeds (mm/s) and large vertical range. This combination of measurement capabilities is mainly used for tooling applications.



Confocal with no moving parts

The confocal scanning technique implemented in Sensofar's systems utilizes a patented microdisplay scanning technology. The microdisplay is based on ferroelectric liquid crystal on silicon (FLCoS) technology, creating a rapidly switching device with no moving parts that makes the scanning of confocal images fast, reliable and accurate. Due to the microdisplay and the associated algorithms, Sensofar's confocal technique yields a class-leading vertical resolution, better than other confocal approaches and even better than laser scanning confocal systems.



No maintenance

Alternative confocal microscopes use mirror scanning heads or a scanning disc approach. Both are moving mechanisms that can limit lifetime and that certainly degrade pixel dithering at high magnifications.

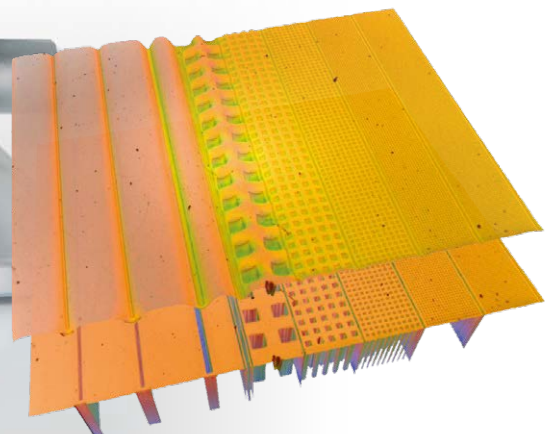
Sensofar's approach with a microdisplay has no moving parts, yielding a very stable system with unlimited lifetime and zero consumables.

Automated acquisition



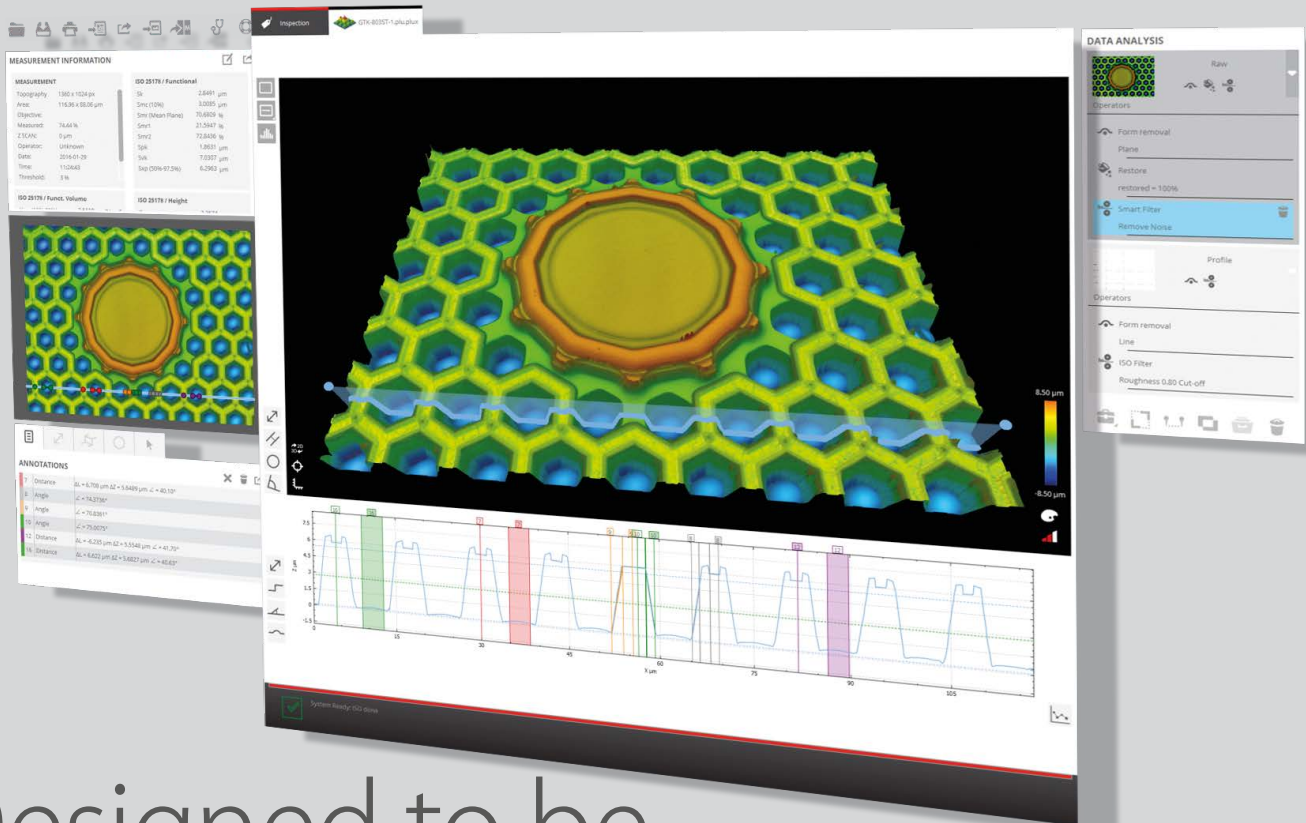
3D Auto function

This new feature vastly simplifies the data acquisition process. By placing the sample at the desired position, focusing it and selecting 3D Auto function, the SensoSCAN software automatically determines the correct illumination (light) and the appropriate measurement range, and then performs the chosen measurement type. A high-quality result can thus be obtained within just a few seconds.



Live image options

SensoSCAN now displays the confocal live image as you have never seen it before. Quality and speed have been improved to yield a frame rate of 9 fps (frames per second) for confocal images and 30 fps for brightfield images. Together with the other live image options, sample viewing is now significantly more accessible and flexible.



Designed to be simple and easy to use

Guided interface

When switching between measurement techniques (confocal, interferometric and focus variation), the system is automatically optimized and settings parameters are trimmed to those permissible for the chosen measurement type (image, surface, thickness or profile). Visual distinction between the different measurement techniques is provided in SensoSCAN through the use of color schemes. At the same time, the user is guided through the interface by the use of an intuitive structure and descriptive icons.

Multiple powerful acquisition settings

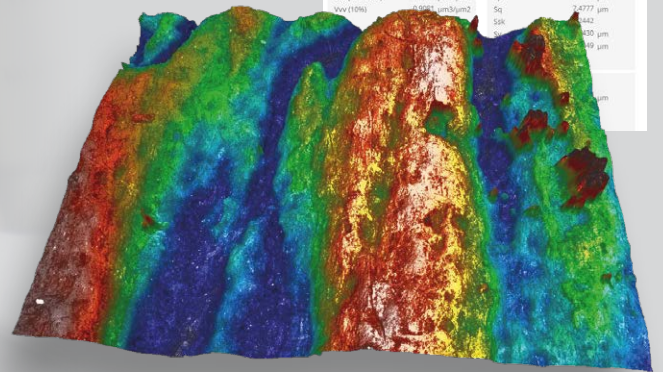
Numerous acquisition parameters can be adapted to best suit the intended measurement. For example, various autofocus settings help to reduce the acquisition time, multilevel light strategies help improve the illumination of complex 3D structures and selectable Z-scan options also provide an opportunity to optimize the acquisition for varying 3D surfaces. All acquisition parameters can be saved as a template for re-use individually (SMR) or for repetitive measurements (MMR).

ISO parameters

SensoSCAN is compliant with ISO 25178. A complete selection of ISO 3D areal surface texture parameters is available: height, spatial, hybrid, functional and volumetric parameters.

2D and 3D surface texture parameters

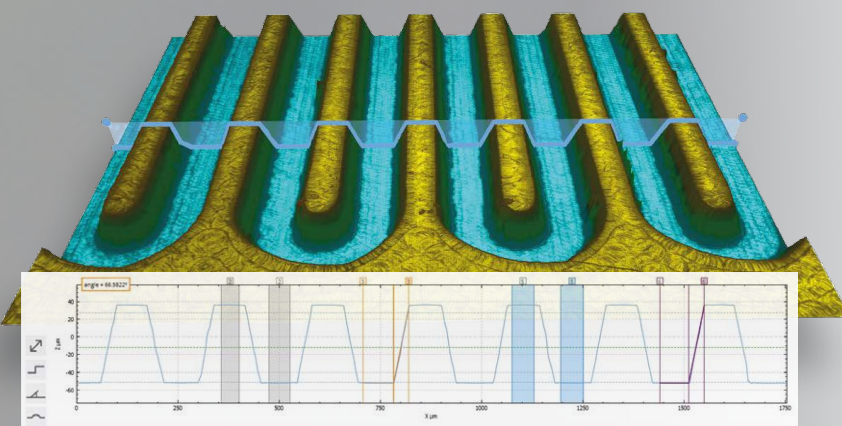
MEASUREMENT INFORMATION	
MEASUREMENT	ISO 25178 / Functional
Topography: 1365 x 1024 μm	Sk: 21.760 μm
Area: 277.23 x 650.48 μm^2	Smc(10%) : 6.351 μm
Objective: EPI 20X x35	Smr (Mean Plane): 51.041 %
Measured: 100 %	Smr1: 4.248 %
Z SCAN: 97.5678 μm	Smr2: 90.6348 %
Operator: Administrator	Skh: 3.0051 μm
Date: 2016-01-25	Skv: 6.4880 μm
Time: 18:02:04	Skp (50%-47.5%) : 15.600 μm
Threshold: 1 %	
ISO 25178 / Func. Volume	ISO 25178 / Height
Vmc (10%-40%) : 7.0993 $\mu\text{m}^3/\mu\text{m}^2$	Sa: 6.2087 μm^2
Vmp (10%) : 0.2100 $\mu\text{m}^3/\mu\text{m}^2$	Sku: 2.3692
Vv (10%) : 9.4819 $\mu\text{m}^3/\mu\text{m}^2$	Smean: 0.0000 μm
Vvc (10%-40%) : 8.5738 $\mu\text{m}^3/\mu\text{m}^2$	Sp: 18.018 μm
Vvv (10%) : 0.5861 $\mu\text{m}^3/\mu\text{m}^2$	Sq: 2.4777 μm
	Sk: 14.42
	Skl: 830 μm
	Sks: 189 μm



It is time to play...

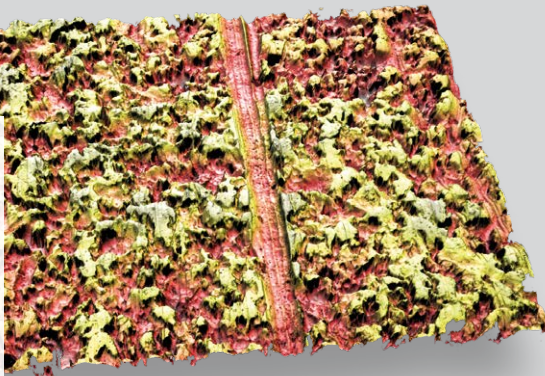
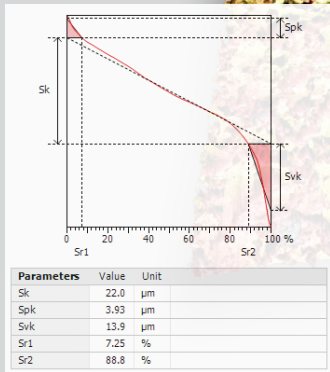
Interactive analysis tools

3D and 2D interactive views provide multiple scaling, display and render options. A comprehensive suite of tools for preliminary examination and analysis of 3D or 2D measurements is provided. Critical dimensions, angles, distances, diameters can be measured and features highlighted with new annotations tools. All of these features make the new SensoSCAN an ideal software package for a broad range of analysis tasks. For applications requiring a more complete analysis suite, advanced software packages are optionally available – SensoMAP and SensoPRO.



Step height and angle

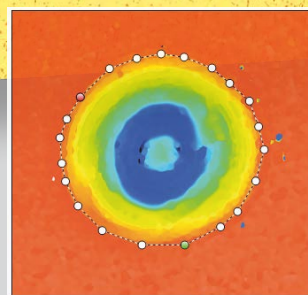
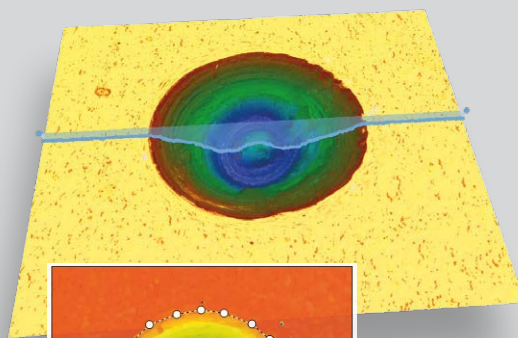
... and get your results!



Tribology, lubrication and grinding parameters

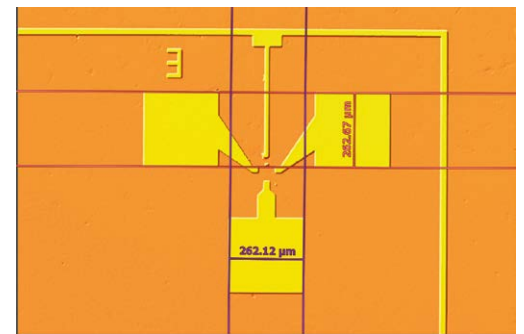
Sequential operators

A comprehensive set of operators provides the opportunity to retouch data points, restore non-measurable data, remove form (plane, sphere, polynomial), apply a range of filters and/or generate alternative layers by cropping, subtracting or extracting a profile. It is also possible to create analysis templates to apply pre-determined filter and operator configurations to repeated measurements.



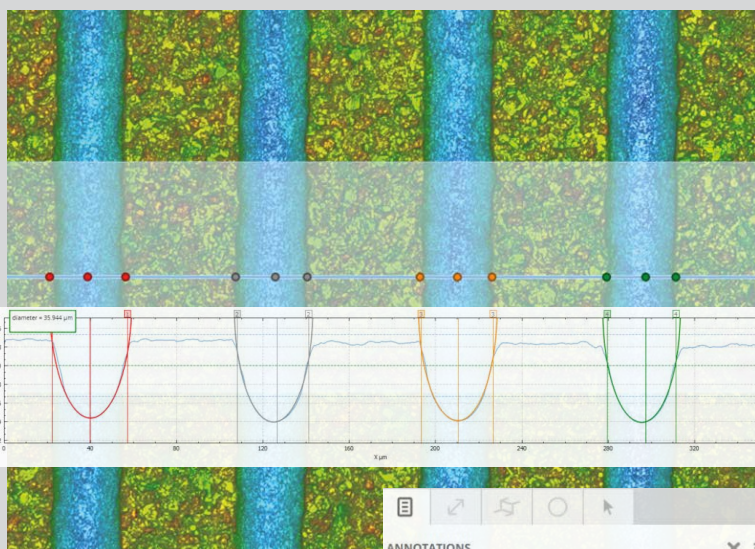
Volume

Parameters	Unit	Hole
Surface	µm²	64282
Volume	µm³	2850297
Max. depth/height	µm	106
Mean depth/height	µm	44.3



Analysis report

Obtain a clear and well-structured report for each measurement, showing the 3D data, a 2D profile and all the ISO parameters. SensoSCAN can also export data into *.csv and *.dat formats, and graphics into *.png, *.tif or *.jpg formats.



Form and contour

ANNOTATIONS	
1	Circle Dxy = 38.246 µm Axy = 1148.87 µm²
2	Circle Dxy = 36.362 µm Axy = 1036.44 µm²
3	Circle Dxy = 36.474 µm Axy = 1044.84 µm²
4	Circle Dxy = 35.944 µm Axy = 1014.71 µm²



Its incredibly compact design with integrated sensor head and controller results in a small footprint and makes for a robust, and reliable system that is easy to install. Vibration isolation pads give the system high stability - in most cases, no vibration isolation table is needed.

Hardware

Large range of objectives

The S lynx uses premium CF60-2 Nikon objectives that exhibit the largest working distance for each NA. Over 30 objectives are available. An encoded nosepiece recognizes a change of objective and switches software automatically.



Adjustable column

Sensofar has developed a 4-position column that allows up to 150 mm of height adjustment. This type of flexible option is designed to avoid restrictions between samples with differing heights.



Movement system

The S lynx positioning system comprises a motorized Z stage with 40 mm of travel range and high positional accuracy, and a manual XY stage with 150 mm x 100 mm of travel range. A tip-tilt goniometer, providing a point of rotation that remains in focus, completes the movement system.



Objectives

Brightfield

Interferometric

MAGNIFICATION	2.5X	5X	10X	20X	50X	100X	150X	5X	10X	20X	50X	100X
NA	0.075	0.15	0.30	0.45	0.80	0.90	0.95	0.13	0.30	0.40	0.55	0.70
WD (mm)	6.5	23.5	17.5	4.5	1.0	1.0	0.2	9.3	7.4	4.7	3.4	2.0
FOV ¹ (µm)	6800x5675	3400x2837	1700x1420	850x710	340x284	170x142	113x95	3400x2837	1700x1420	850x710	340x284	170x142
Spatial sampling ² (µm)	5.52	2.76	1.38	0.69	0.28	0.14	0.09	2.76	1.38	0.69	0.28	0.14
Optical resolution ³ (µm)	2.23	1.11	0.55	0.37	0.21	0.18	0.17	2.76	1.38	0.69	0.30	0.24
Measurement time ⁴ (s)	>3							>3				

Confocal

VSI

Vertical resolution ⁵ (nm)	–	75	25	8	3	2	1	1				
Maximum slope ⁶ (°)	–	8	14	21	42	51	71	8	14	21	25	42

Focus Variation

Min. measurable roughness	Sa > 10 nm
Maximum slope (°)	up to 86°

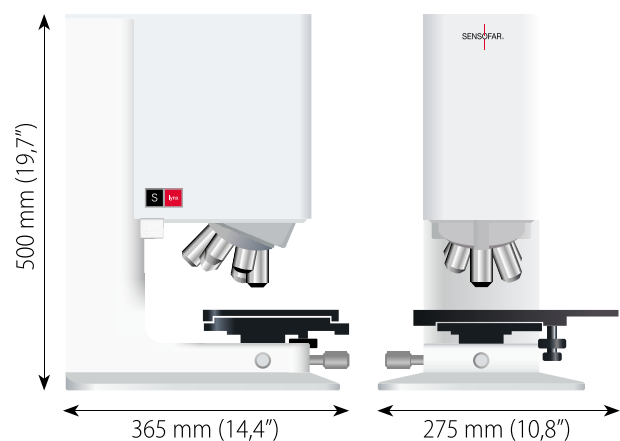
1 Maximum field of view with 2/3" camera and 0.5X optics. **2** Pixel size on the surface. **3** L&S: Line and Space, half of the diffraction limit according to the Rayleigh criterion. Values for white LED. Spatial sampling could limit the optical resolution for interferometric objectives. **4** For brightfield objectives, 21 scanning planes (confocal). **5** System noise measured as the difference between two consecutive measurements of a calibration mirror placed perpendicular to the optical axis. **6** On smooth surfaces, up to 86° on rough surfaces. Other objectives are available.

System specifications

Measurement array	1232 x 1028 pixels
LED light source	white (lifetime 40000 h)
XY travel range	150 mm x 100 mm (6" x 4")
XY stage	250 mm x 200 mm (10" x 8")
Manual goniometer	± 3°
Maximum sample weight	10 kg (22 lbs)
Sample height	up to 150 mm (6") (adjustable)
Z travel range	40 mm (1.6")
Z stage linearity	< 0.5 µm/mm
Z stage resolution	2 nm
Max. vertical scanning range	Confocal 36 mm; VSI 7 mm; Focus Variation 25 mm
Step height repeatability	< 3 nm
Sample reflectivity	0.05 to 100 %
Display resolution	0.01 nm
Computer	Latest INTEL processor; 2560 x 1440 pixel resolution (27")
Operating system	Microsoft Windows 10, 64-bit
System	Line Voltage 100-240 V AC; Frequency 50/60 Hz single phase
Environment	Temperature 10 - 35°C; Humidity < 80 % RH; Altitude < 2000 m

Dimensions

Weight: 26 kg (57 lbs)



Software

User Management rights	Administrator, advanced operator, operator
Acquisition technologies	Confocal, VSI & Focus Variation
Measurement types	Image, 3D, 3D thickness, profile and coordinates
Advanced Software Analysis	SensoMAP and SensoPRO (optional)



SENSOFAR is a leading-edge technology company that has the highest quality standards within the field of surface metrology.

Sensofar Metrology provides high-accuracy optical profilers based on confocal, interferometry and focus variation techniques, from standard setups for R&D and quality inspection laboratories to complete non-contact metrology solutions for in-line production processes. Sensofar Metrology offers technology that enables our customers to achieve real breakthroughs, particularly in semiconductor, precision optics, data storage, display devices, thick and thin film and materials testing technology fields.

The Sensofar Group has its headquarters in Barcelona, also known as Spain's technological heart. The Group is represented in over 30 countries through a global network of partners and has its own offices in Asia and USA.



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METROLOGY

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