



## OptiSurf® & OptiSurf® LTM

Quick measurement of  
center thicknesses and air gaps



## Passion for optics

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TRIOPTICS develops and produces the world's largest range of optical measurement and manufacturing technology for the development, quality control and production of lenses, lens systems and camera modules.

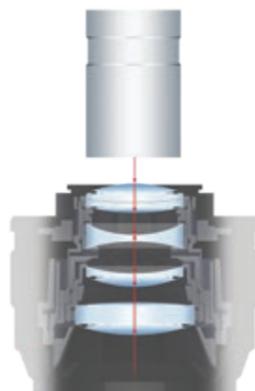


## OptiSurf®

High-precision short coherence interferometer for measuring center thicknesses and air gaps

The OptiSurf® short coherence interferometer is used for non-contact measurement of center thicknesses and air gaps of single lenses, plano optics and in optical systems. It measures all surface distances within optical VIS, UV or IR lens systems. Also it is configurable to measurement distances up to 800 mm.

With a measuring accuracy of up to 0.15  $\mu\text{m}$ , OptiSurf® meets even the highest quality standards. The motorized focusing ensures high reproducibility and also allows the identification of surfaces with weak reflections. Stable and simple calibration enables reliable use in both development and production environments.



## 3x faster measurement

Particularly in the case of complex lenses, the control of the air gaps and adherence to lens center thicknesses is essential. To ensure a high level of efficiency, the inspection of these kinds of samples with their long optical paths has to be quick. The OptiSurf® has been enhanced precisely for these tasks, in particular due to the further advancement of its electronics: Thus, the measuring cycle is shortened by a factor of 3 to 4 compared to its predecessor thanks to optimized data processing – which in turn means greater productivity.



### Key features of OptiSurf®

- Measurement accuracy of up to 0.15  $\mu\text{m}$  (OptiSurf® UltraPrecision)
- High measurement speed increases productivity
- Non-contact measurement is gentle on the samples
- Depending on the version: center thickness measurement in VIS and IR
- Software is easy to use and intuitive
- Automatic identification of lens surfaces and calculation of relative surface distances
- Easy input of sample data using standard editor
- Lens design import from Zemax files or OptiCentric® design files
- Statistical analysis of measurement results
- Compact design of measurement head
- OEM solution enables integration, e.g., into production lines or customized applications
- Software tool for quick and simple alignment of the sample



## OptiSurf® software

## Integration in other TRIOPTICS measurement technology

With the new OptiSurf® software, its simple operation has been visually enhanced, making it even more intuitive.

### Perfect for analysis of optical systems

- Supports the intuitive handling, alignment and measurement processes
- Automated surface identification for quick and precise measurements
- Easy input of lens design via OptiCentric® interface, directly from Zemax or via a design editor
- Comparison with design and engineering data and identification of deviations for use in quality control
- Statistical analysis of measurement results
- Two-level user interface: for complex analysis routines in the R&D phase and easy-to-use operation in production

A special advantage for customers who use OptiSurf® in combination with centration testing on the OptiCentric® or an ATS alignment turning station: All measuring heads are optimally aligned with each other so that all systems measure on the same axis. Furthermore, a unified software increases the process reliability: The customer is guided through the configuration and execution of all measurements.

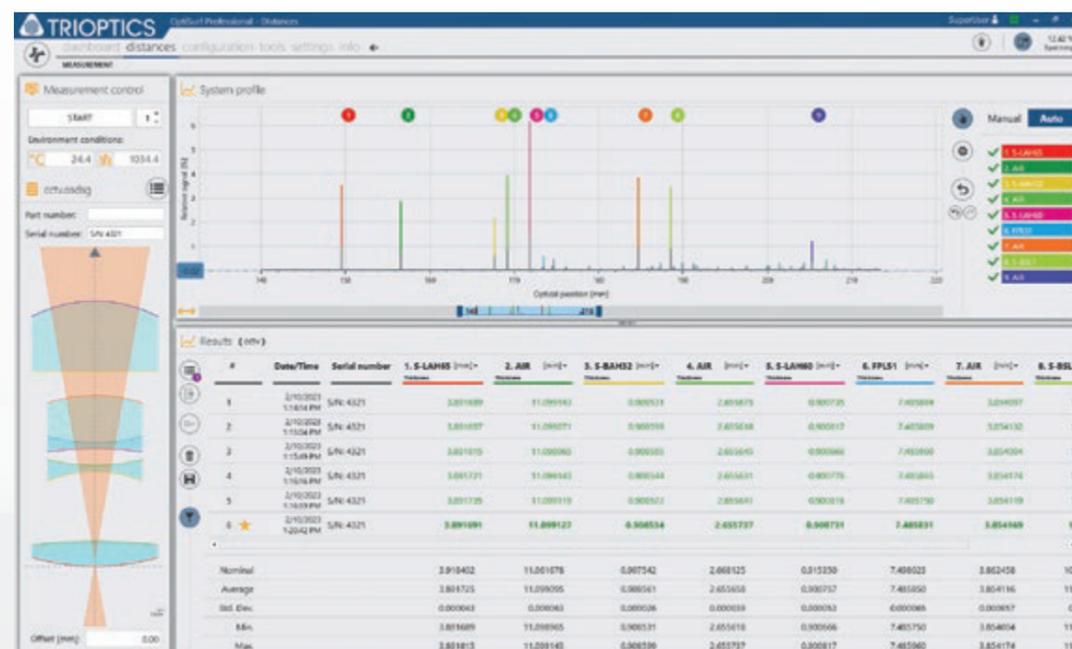
The patent-protected\* linking of the center thickness and air gap testing with the centration measurement ensures the validity of the measurements in two aspects:

#### Center thickness measurements along the optical axis

Centration testing of single lenses with the OptiCentric® helps to accurately align the sample. As a result, the center thickness and air gap measurements are performed reliably on the optical axis.

#### Centration error measurement based on real center thicknesses and air gaps

The lens design data is required to determine the centration of the inner lens surfaces. Instead of using the nominal values to perform this ray tracing, the actual lens surface positions obtained with OptiSurf® can be used. This significantly increases the reliability of the centration testing.



\* IP EP2458321B1, IP EP2458363B1

## OptiSurf® LTM

### Center thickness measurement of single lenses and doublets in production

The OptiSurf® LTM is specially tailored to the set point monitoring of the center thickness during production. The following parameters can thus be checked:

- Overall thickness of single lenses
- Overall thickness of doublets
- Individual thickness of cemented lenses in doublets
- Sag value of concave lens surfaces

Lenses that are still cemented to an arbor can also be measured without detaching and adhesive removal.



OptiSurf® LTM enables the measurement of single lenses without (A) and with (B) arbors, doublets (C) and the sag value (D).



Self-centering mechanical chucks are used to hold the lenses, which can be easily adjusted to various lens diameters. Optimized for use in the production environment, the entire device is equipped with efficient internal vibration damping.

The integrated touchscreen makes the software simple and reliable to use. All operating elements are optimized for touch operation and the measurement results and evaluation of the sample (pass/fail) are quickly available in an easy-to-understand display.

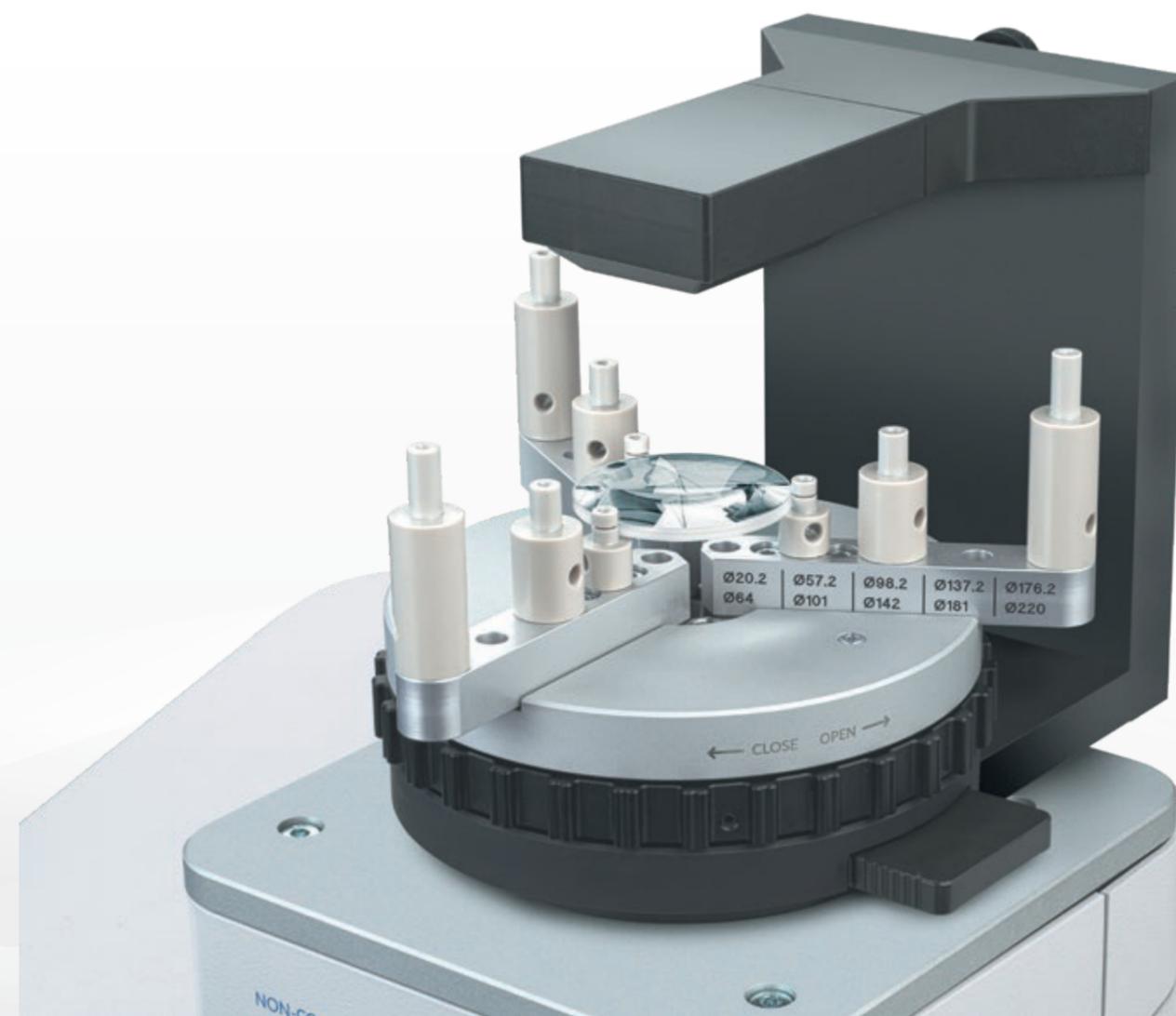
## LensGage

### Measurements without knowledge of the material

With the LensGage upgrade module, the traditional center thickness measurement function is expanded with the following applications:

1. Determination of the center thickness of single lenses without needing to know the refractive index of the material
2. Determination of the group refractive index, e.g., for quality assurance in injection molding lens production
3. Identification or narrowing down of the lens material

For flexible use in day-to-day practice, both the OptiSurf® and OptiSurf® LTM are easily upgraded with the module. To obtain accurate results, the materials for the mechanical components were carefully selected to ensure their particularly low thermal expansion, which means that calibration measurements only need to be taken after the upgrade or when the system is switched on.



## Technische Daten

	OptiSurf®	OptiSurf® UP	OptiSurf® IR
Measurement time	6 s / 100 mm	6 s / 100 mm	15 s / 100 mm
Measurement accuracy	1 µm <sup>1)</sup>	0.15 µm <sup>1)</sup>	Micrometer range <sup>2)</sup>
Repeatability	0.5 µm	< 0.075 µm	Micrometer range <sup>2)</sup>
Light source	1.3 µm	1.3 µm	2.2 µm
Scanning range	Up to 800 mm optical distance, larger on request	Up to 800 mm optical distance, larger on request	Up to 400 mm optical distance, larger on request <sup>2)</sup>
Temperature and air pressure sensors	Optional	Yes	Optional
Computer interface	USB	USB	USB
Camera-based alignment tool	Optional	Yes	No
Laser class	1	1	1
Dimensions (H x W x D)	965 mm ... 1.240 mm x 370 mm x 560 mm	965 mm ... 1.240 mm x 370 mm x 560 mm	965 mm ... 1.240 mm x 370 mm x 560 mm
Weight	50 kg	50 kg	50 kg
Type	Tabletop device	Tabletop device	Tabletop device

1) According to 2σ criterion for measuring 100 mm air gaps between optical flats

2) Depends on sample

All of the OptiSurf® versions listed here are also available as an OEM variant. The technical specifications refer to the specifications of the selected original variant.

	OptiSurf® LTM
Max. lens diameter	200 mm, optional 300 mm
Glass thickness	Up to 50 mm, expandable to 150 mm
Accuracy of center thickness measurement (geometric thickness)	±0.5 µm
Light source	1.3 µm
Dimensions (H x W x D)	350 mm x 500 mm x 560 mm
Weight	29.5 kg
Type	Tabletop device

	OptiSurf® LensGage
Max. lens diameter	200 mm
Measurement accuracy	$n_g: \sim 10^{-4}$ für $d_{geom} > 6$ mm / $d_{geom}: 1.5$ µm
Glass thickness range for LensGage module	Up to 55 mm (larger on request)



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