

Measure at the speed of light ...

LENSTAR LS 900®



reddot design award
honourable mention 2009

Biometry



**HAAG-STREIT
INTERNATIONAL**

Tradition and Innovation

Explore new dimensions ...

- **Complete optical biometer –**
including CCT and lens thickness
- **Align once, get all results –**
fast biometrical assessment
- **Non contact, highest precision –**
all measurements on the visual axis

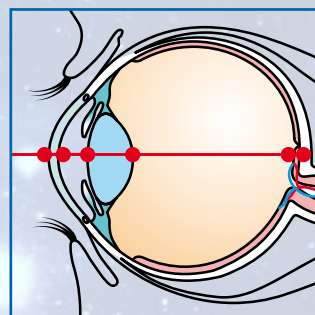


The first optical biometer of the entire eye ...

NINE MEASUREMENTS IN ONE SHOT

Precise measurement of eye parameters is critical in modern cataract treatment.

The LENSTAR® provides the surgeon with all necessary parameters needed to calculate the optimal IOL using latest multivariable formulae in one single measurement. The measurement includes corneal thickness, anterior chamber depth, lens thickness, axial length, keratometry, white-to-white distance, pupillometry, eccentricity of the visual axis and retinal thickness at the point of fixation (macula).



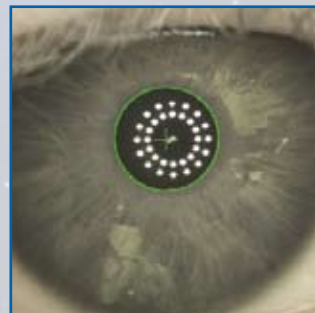
FAST AND PATIENT FRIENDLY MEASUREMENTS

The measurement process of the LENSTAR® is optimised to ensure maximum patient comfort and minimum process time. The device has to be aligned only once to get all measurements in a single shot. Blinking of the patient and loss of fixation is detected and only good measurements are used for the analysis.



PRECISION ON THE VISUAL AXIS

The patient fixates directly on the measurement beam. This ensures that all readings are taken on the visual axis. Furthermore all length measurements are assessed with optical coherence biometry, leading to highest precision and accuracy. Multiple markers ensure a stable and reliable measurement of the corneal curvature.



The future begins now ...

The all in one optical biometer

Optical coherence biometry revolutionised cataract surgery, the LENSTAR® is about to revolutionise optical biometry. State-of-the-art, multivariable IOL calculation formulae demand more than just the axial length and keratometry values of the eye. LENSTAR® provides the user with a complete biometrical assessment of the patient's eye in a single measurement procedure, including lens thickness, anterior chamber depth (lens position) and retinal thickness.

CENTRAL CORNEAL THICKNESS (CCT)

CCT is measured using optical coherence technology, leading to unmatched accuracy and precision. Reproducibility of this measurement is as good as $\pm 2\mu\text{m}$, providing a key parameter in glaucoma diagnosis and for laser refractive surgery.

KERATOMETRY

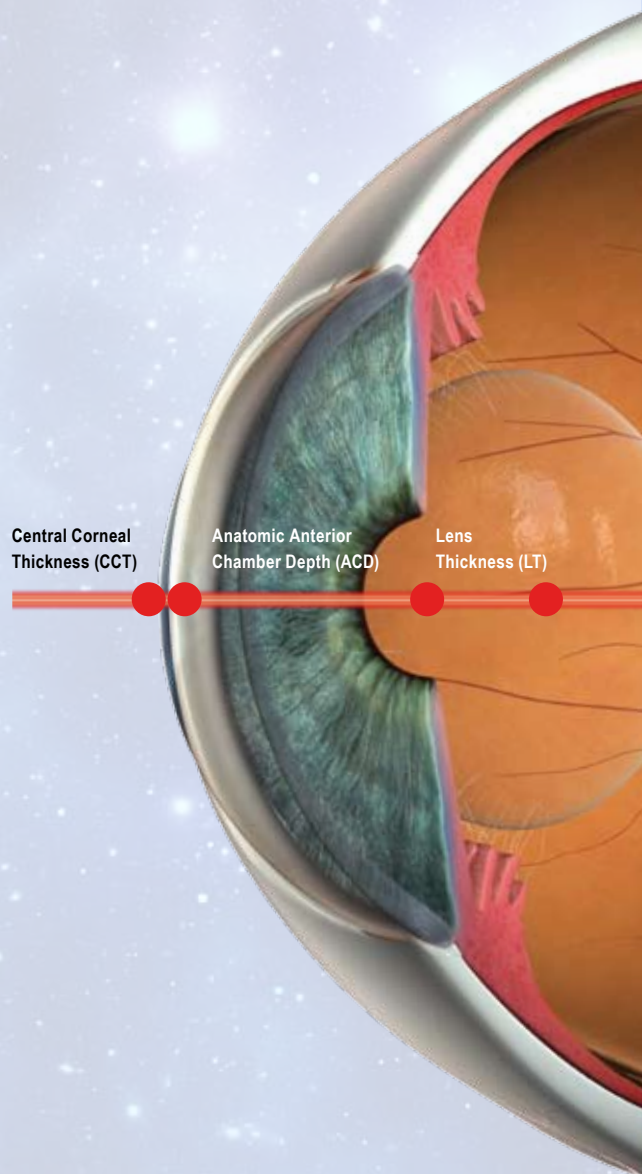
A 32 marker pattern ensures precise assessment of the corneal curvature. The distribution of the markers on two concentric circles allows stable measurements even with non-compliant patients.

WHITE-TO-WHITE

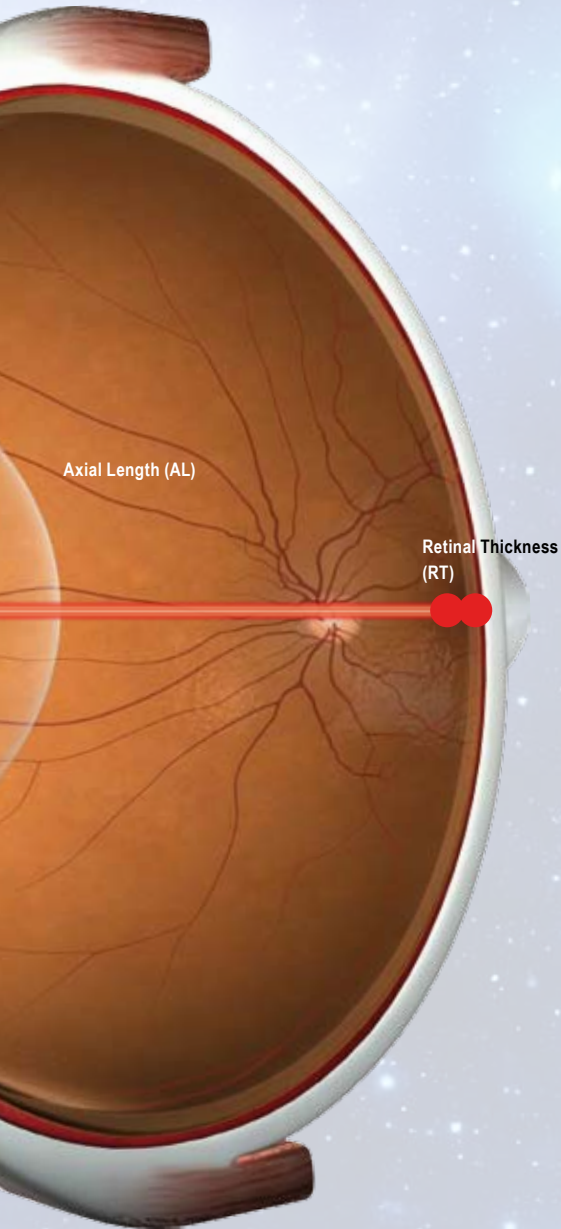
For sulcus fixated IOLs and for the calculation of the IOL power using 3rd and 4th generation formulae, LENSTAR® measures white-to-white distance (horizontal iris width).

PUPILLOMETRY

The software allows for measurement of the patient's pupil diameter in ambient light condition, serving as a baseline parameter for further exams, for phakic and multifocal IOLs as well as for laser refractive procedures.



Complete optical biometry ...



LENS THICKNESS

Modern multivariable IOL calculation formulae use the patient's lens thickness as an input parameter. LENSTAR® provides the user with the measurement of true lens thickness on the visual axis of the patient using optical coherence technology (OLCR). No estimation or additional ultrasound measurement is required to get this important parameter.

ANTERIOR CHAMBER DEPTH (ACD)

Just like all other length measurements ACD is assessed with OLCR technology. Combined with the CCT measurement, LENSTAR® provides the user with the anatomical as well as ACD as measured by ultrasound biometers.

AXIAL LENGTH (AL)

Optical coherence technology using a superluminescent diode as light source allows the measurement of the axial length of the patient's eye on the visual axis in highest precision.

ECCENTRICITY OF THE VISUAL AXIS

The eccentricity of the visual axis is assessed with respect to white-to-white as well as to the pupil centre. Both are important parameters for laser refractive procedures.

SPECIAL EYE CONDITIONS

All of the described measurements are available for the measurement of the "normal" cataract patient as well as for aphakic, pseudoaphakic and silicone oil filled eye conditions. In case of an error, you may even change the selected eye condition after completion of the measurement procedure.

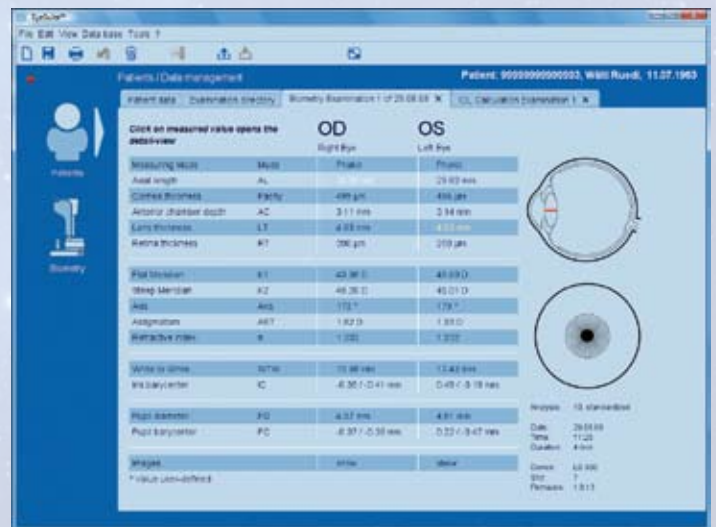
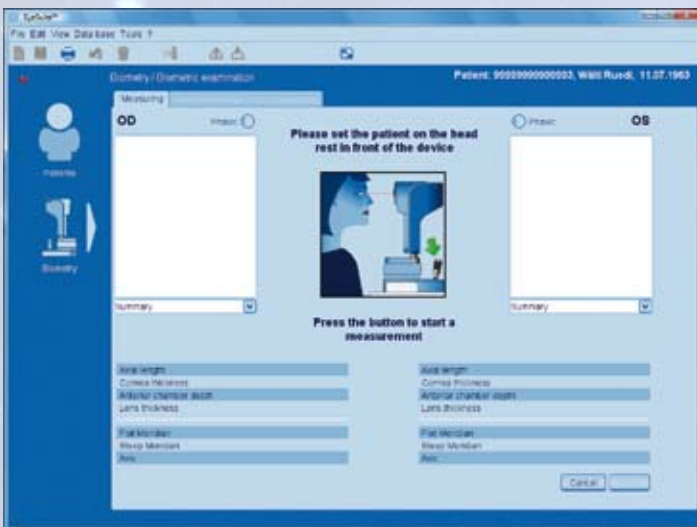
Reach for the stars ...

User-friendly and ergonomic

In addition to the ease of using only a single measurement, the LENSTAR® also provides a user-friendly application and navigation of the software interface. This allows even inexperienced persons to easily begin to use the device without intensive training, thus improving the efficiency of the clinic.

Best measurements for optimum IOL prediction

LENSTAR® provides the user with a complete assessment of the human eye with the highest precision using OLCR technology. The patient fixates on the measurement beam, ensuring that all length measurements are taken on the visual axis, including lens thickness, anatomic anterior chamber depth and central corneal thickness.



Comprehensive measurements for optimal IOL calculation ...

Ready for the future in IOL power calculation

The integrated IOL power calculator incorporates all state-of-the-art IOL prediction formulae. Measuring more parameters than what current formulae use, LENSTAR® is ready for the next generation of IOL power calculation formulae.



Intuitive and customisable

Combined with the IOL power calculator, LENSTAR® features a sophisticated database to handle the user's preferred IOL collection. Along with the power range of the IOL, LENSTAR® provides three independent IOL-constant sets as well as three independent power step sizes.



Ergonomic solutions for you and your patients ...



LENSTAR® on instrument table
HSM 901 extended with an integrated
small personal computer.

Space saving solution: LENSTAR®
on instrument table HSM 901 in
combination with a laptop.



Installation of the LENSTAR® on
refraction units is feasible as the
examination unit and the PC can be
separated.

LENSTAR LS 900® technical specifications ...

MEASURED VARIABLES

Corneal thickness (CT)

Measurement range	300 – 800 μm
Display resolution	1 μm
In-vivo repeatability	(1. σ) +/- 2 μm

Anterior chamber depth (ACD)

Measurement range	1.5 - 5.5 mm
Display resolution	0.01 mm
In-vivo repeatability	(1. σ) +/- 20 μm

Lens thickness (LT)

Measurement range	0.5 – 6.5 mm
Display resolution	0.01 mm
In-vivo repeatability	(1. σ) +/- 50 μm

Axial length (AL)

Measurement range	14 – 32 mm
Display resolution	0.01 mm
In-vivo repeatability	(1. σ) +/- 25 μm

Keratometry

Measurement range for radius	5 – 10.5 mm
Display resolution	0.01 mm
In-vivo repeatability	(1. σ) +/- 30 μm
Measurement range for axis angle	0-180°
Display resolution	1°
In-vivo repeatability	(1. σ) +/- 9°

White-to-white distance

Measurement range	7 - 16 mm
Display resolution	0.01 mm
In-vivo repeatability	(1. σ) +/- 0.3 mm

Pupillometry

Measurement range	2 – 13 mm
Display resolution	0.01 mm

Eccentricity of the visual optical line

Display resolution	0.01 mm
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Retinal thickness

Manually assessed	
Display resolution	1 μm

The above mentioned measurement ranges are based on the standard settings of the device for automatic measurement and analysis.

IOL CALCULATION FORMULAE IMPLEMENTED:

Haigis, Hoffer Q, Holladay I, SKR/T, SKR II

MEASUREMENT MODES:

- „Normal“ eye
- Aphakic eye
- Pseudo phakic eye
- Silicone filled eye
- All combination of above

Pick your star ...

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Advance to the future ...

HAAG-STREIT

Gartenstadtstrasse 10
CH-3098 Koeniz/Switzerland
Phone +41 31 978 01 11
Fax +41 31 978 02 82
info@haag-streit.com
www.haag-streit.com



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