



 Swiss made

## EYESTAR 900

Swept-source OCT for cataract & refractive surgery

Look closer. See further.

 HAAG-STREIT  
GROUP

## EYESTAR 900

# One fully-automated device, for both cataract & refractive surgery

The growing demand for improved outcomes, both in cataract and refractive surgery, has raised the bar for anterior chamber diagnostics. To meet the needs of the ambitious surgeon in a busy practice, the Eystar 900 offers versatile diagnostic tools for both cataract and refractive surgery, in one fully-automated combination device.

Its cutting-edge swept-source OCT technology enables precise measurement of the entire eye and offers comprehensive data and high-quality images of the anterior chamber. It allows for cornea-to-retina biometry, as well as topographic assessment of the anterior and posterior corneal surface and visualisation of the anterior chamber, including the lens.

The Eystar 900 features excellent cataract penetration. It boasts well-established dual zone reflective keratometry, specifically for cataract application, providing precise keratometry and astigmatism measurement compatible with existing IOL formulas. Equipped with this information, the eye care specialist may achieve excellent outcomes in cataract surgery, accurately diagnose diseases, and simply document the eye status.

Furthermore, it also offers Class-A topography to 12 mm diameter of the anterior and posterior surface of the cornea, Keratoconus screening\* and OCT imaging of the anterior segment, including the crystalline lens and the chamber angle. This allows the user to easily verify any measurement and to identify anatomical anomalies that may interfere with planned surgical procedures.

Full automation enables fast data acquisition in typically under 40 seconds for both eyes, allowing for easy delegation, and thus improving workflow efficiency in a busy practice.

In sum, the Eystar 900 is a swept-source OCT device designed specifically for the ambitious surgeon wanting to measure, diagnose, plan and image the eye for improved outcomes, and more confidence.

\* Available in a future EyeSuite software release



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## Precise data, for excellent surgical outcomes

The Eystar 900's swept-source OCT technology provides precise measurements of the entire eye, from the cornea to the retina and imaging of the anterior chamber including the lens. This provides the basis for reliable diagnosis and accurate surgical planning.

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## Fully-automated, for easy delegation

The fully-automated measurement process allows for easy delegation, optimises workflow and enables the user to measure both eyes in typically under 40 seconds.

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## Identify anatomical anomalies with confidence

Imaging of the entire anterior chamber, topographic maps of the anterior and posterior cornea and pachymetry maps enable users to improve their surgical plan and review patients' suitability for specific interventions, such as toric, multifocal IOL or refractive surgery.



# EYESTAR 900

## Diagnose, plan, predict & control

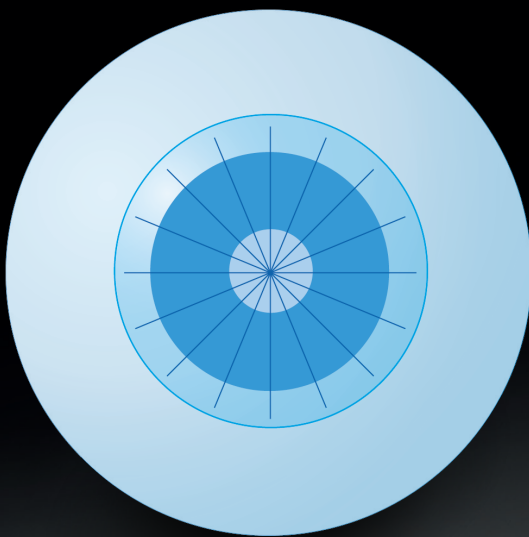
The Eystar 900 is based on future-proof technology: swept-source OCT. It provides the user with precise measurements, comprehensive topography and pachymetry maps, complete cornea-to-retina biometry and high quality, detailed cross-sectional eye images.

Acquiring all this data simultaneously, in a fast, fully-automated measurement process results in excellent data quality, usability and patient comfort.

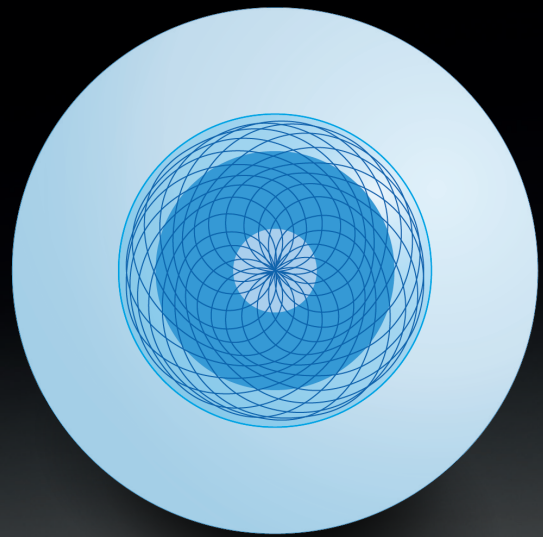
The Eystar 900 also uses unique, patent-protected Mandala scan technology, which is designed for highly precise data acquisition.

Unlike classic radial or line scans, that scan any point only once (besides the apex), trajectories of the Mandala scan are aligned in an interwoven and highly dense pattern, both in the centre and in the periphery. This, combined with the OCT inherent motion compensation, results in a detailed and highly precise three-dimensional data set.

This comprehensive information set supports the eye care specialist to accurately diagnose a patient, plan surgical procedures, predict outcomes and control the intervention efficacy of cataract, refractive and anterior chamber surgeries.



TYPICAL RADIAL SCAN

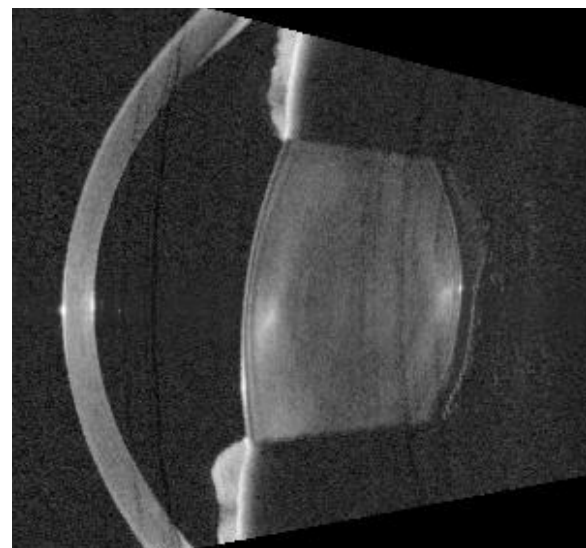


UNIQUE MANDALA SCAN

#### SWEPT-SOURCE OCT TECHNOLOGY

## Quantify what you see...

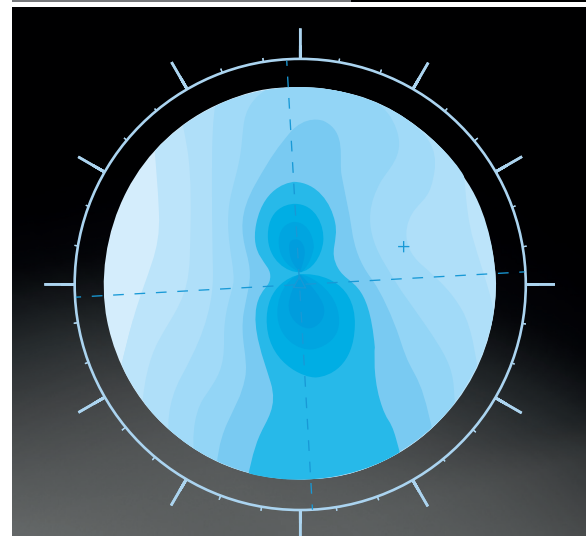
The refraction-corrected B-scan OCT imaging of the anterior chamber allows visual anatomy assessment. In addition, the software also determines the three-dimensional lens orientation and location and displays the respective information and numerical data in an intuitive detailed results screen, featuring the B-scan cross-section in the direction of the maximum lens tilt.



#### TOPOGRAPHICAL DATA

## Tear film independent topography...

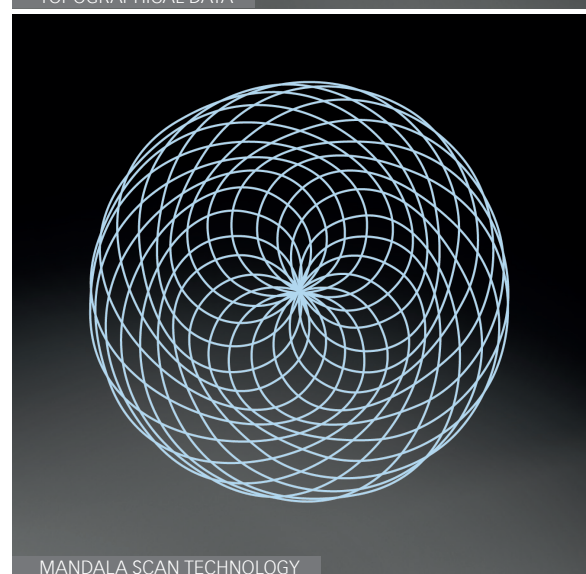
Eyestar 900 provides corneal topography in compliance with Class A-topographer standards. The maps of the Cataract Suite cover 7.5 mm and the maps of the Anterior Chamber Suite up to 12 mm in diameter, and provide comprehensive information of the anterior and posterior surface of the cornea, and pachymetry. The Anterior Chamber Suite offers additional tools like trend/progression and difference views for more detailed analysis of the topographic data collected.



#### MANDALA SCAN TECHNOLOGY

## Makes rescanning obsolete

Due to the highly dense Mandala scan pattern, the user can create virtual radial scans or line scan stacks, as well as individual B-scans, any time after the data acquisition, and at any location of the 18mm diameter OCT scan volume previously acquired. This unique feature eliminates the need for time-consuming rescans, if a new cross-section is required.



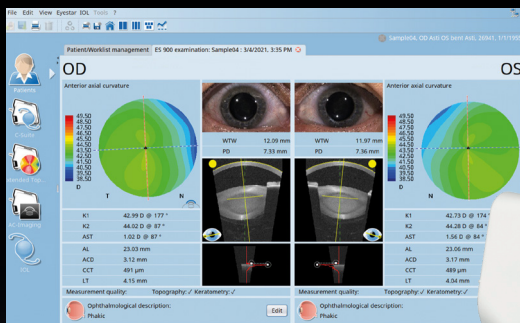
# Cataract Suite Optimized workflow, fewer surprises

The Eyestar 900's Cataract Suite enables acquisition of all measurement data necessary for state-of-the-art cataract planning in an optimized, fully-automated measurement workflow.

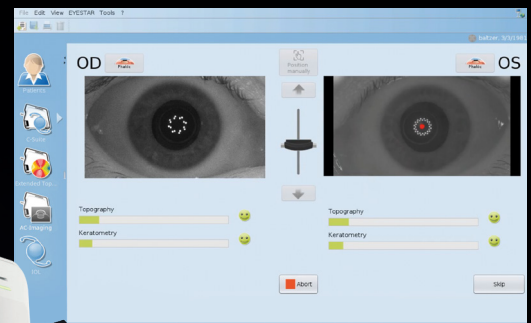
The binocular measurement is typically completed in under 40 seconds, from the time the patient is asked to look into the device to the finalization of the measurements. In this short time, all data useful for planning of spherical, toric, multifocal and phakic IOL is collected.

The result overview presents all data from axial measurements to topography maps and 16 B-scans of the anterior chamber in an intuitive display. All data can be reviewed on detail screens.

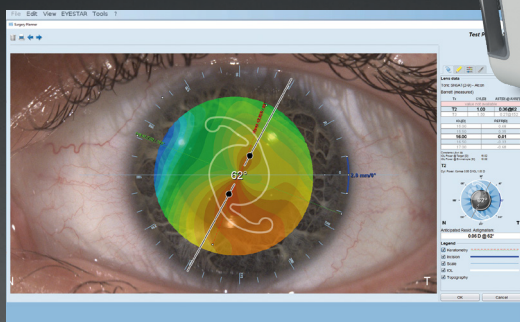
Measurements taken include axial measurements of all eye compartments, corneal front and back topography as well as keratometry, B-scan imaging of the anterior chamber, including the lens, and assessment of lens tilt and decentration, as well as Zernike analysis and vision simulation.



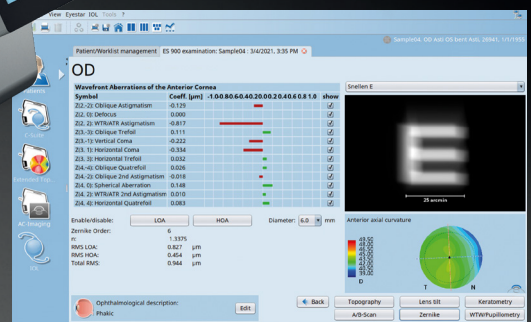
COMPREHENSIVE OVERVIEW OF DATA



FULLY-AUTOMATED MEASUREMENT PROCESS



GRAPHIC IOL PLANNING & LATEST GENERATION IOL CALCULATION



VISION SIMULATION & ZERNIKE WAVE FRONT ANALYSIS

#### FULLY-AUTOMATED ACQUISITION PROCESS

## Precise & efficient

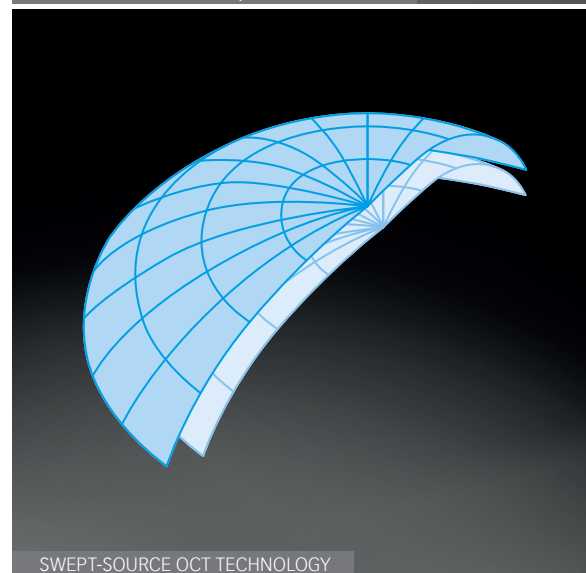
Fast and reliable measurement acquisition is the key to efficiently achieving excellent outcomes. Providing a fully-automated and quick acquisition process enables easy delegation, improved patient comfort and compliance. Built-in tear film quality assessment leads to highly precise keratometry, complemented by swept-source OCT based laser precision biometry, topography, pachymetry and tomography of the entire eye.



#### SWEPT-SOURCE OCT TECHNOLOGY

## Detailed information, excellent outcomes

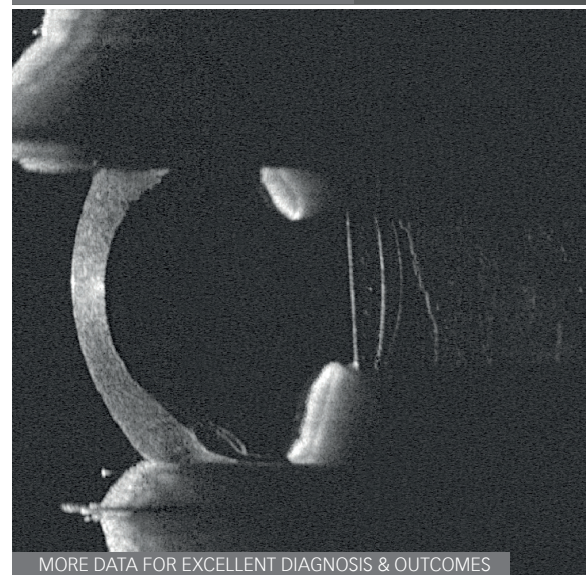
Biometry based on swept-source OCT provides the user with much more than just axial length measurements and keratometry. Detailed information of the cornea front and back surface have the potential to significantly improve cataract planning for astigmatic and post-refractive patients. The topography maps allow the surgeon to screen for signs of corneal pathologies, that may limit the patient's post-cataract surgery visual potential. In toric candidates, the symmetry and regularity of the astigmatism on the cornea front and back are readily available, allowing a thorough judgement of the patient's eligibility for a premium IOL.



#### MORE DATA FOR EXCELLENT DIAGNOSIS & OUTCOMES

## Measure, visualize & understand

Anterior chamber B-scan imaging, including the lens, and identification of lens tilt and decentration are beneficial for patient education, particularly when it is a question of premium toric or multifocal IOL. Vision simulation and Zernike analysis support the surgeon to set the patients expectation right and helps to choose the optimum procedure.



## EyeSuite IOL

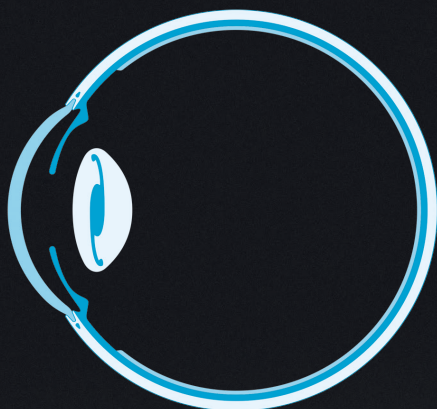
# The ultimate planning platform for any IOL

EyeSuite IOL features a comprehensive set of state-of-the-art IOL calculation formulas for any IOL-type or corneal condition in cataract surgery. It includes the latest generation calculation methods – Hill-RBF, Barrett and Olsen – for spherical, as well as toric, IOL calculations.

One of the key features of these methods is the use of biometry data beyond axial length (AL) and keratometry (K). Central corneal thickness (CCT), anterior chamber depth (ACD), lens thickness (LT), posterior keratometry (simPK) and white-to-white (WtW) are additional parameters that improve prediction accuracy.

Extreme and unusual eyes, in particular, will benefit from the additional information. Toric calculations incorporate the front and back corneal surface for increased accuracy in calculating the IOL spherical equivalent, cylinder power and orientation. This information is then displayed in an intuitive graphic planning tool, enabling accurate transfer of the plan to the operating room.

For post-refractive cases, EyeSuite IOL again features a complete set of state-of-the-art calculation methods, such as Barrett's True K and True K Toric, which both incorporate measurement of the posterior cornea, the Masket formula or Shammas No-History method.





#### HILL-RBF METHOD

## Certainty

Hill-RBF is a purely data-driven IOL calculation technique incorporating pattern recognition and sophisticated data interpolation. It features a boundary model, informing the user of the calculation's reliability. Hill-RBF performs equally well on long, normal and short eyes. It clearly outperforms second- and third-generation formulas. Paired with the Abulafia-Koch method, Hill-RBF is available for spherical and toric IOL calculations. Unlike static theoretical formulas, the Hill-RBF method is an ongoing project and is continuously updated for even better overall depth of accuracy.

#### FEWER REFRACTIVE SURPRISES

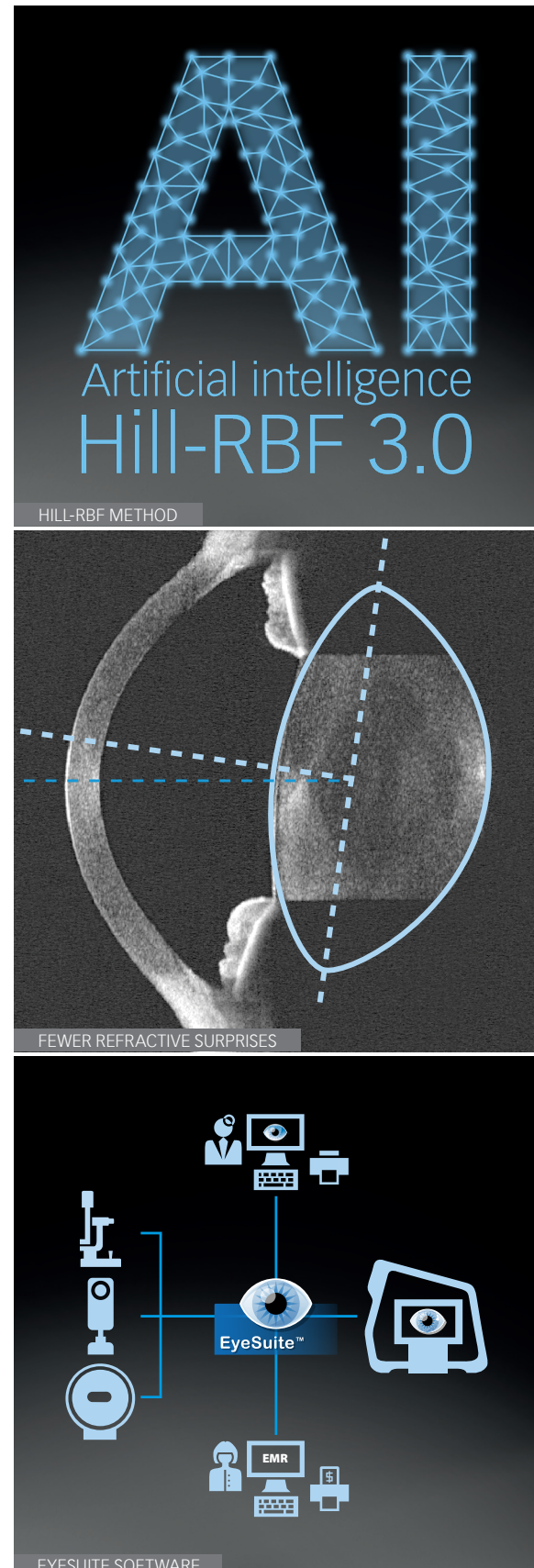
## Identify the unusual

Having B-scan swept-source OCT images of the entire anterior chamber available at the time of measurement allows visual identification of unusual tilt and decentration of the crystalline lens. Furthermore, it facilitates easy monitoring of automated gate positions for the biometry measurements. All this additional information enables further minimization of refractive surprises.

#### EYESUITE SOFTWARE

## Flexible integration

The EyeSuite software is designed for optimum patient flow in busy practices. The easy-to-use Eystar 900 is fully networkable with Haag-Streit devices and your own practice network. The EyeSuite script language or command line interface works fluently with almost any EMR system, and supports standard interfaces like DICOM for excellent compatibility.



# Anterior Chamber Suite

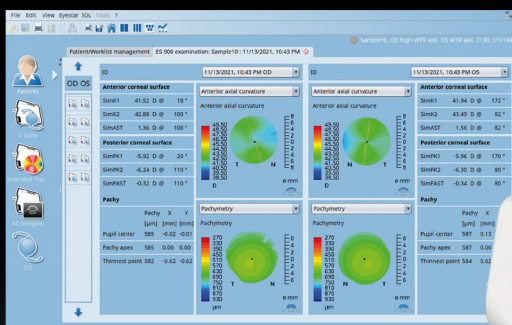
## Comprehensive data for thorough diagnosis, clear visualization for more understanding

The Eystar 900 Anterior Chamber Suite offers precise measurements, comprehensive data analysis, and excellent images of the anterior chamber.

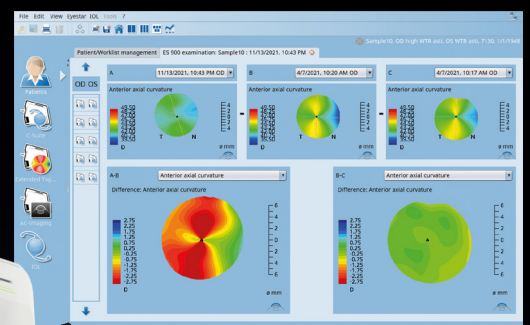
Thanks to its cutting-edge swept source OCT technology, the Anterior Chamber Suite provides class A-topography up to 12 mm diameter of the anterior and posterior surface of the cornea, and OCT imaging of the anterior segment, including the lens and the chamber angle, with up to 18mm diameter coverage. Its corneal topography feature set includes difference and trend views for maps and indices, as well as sophisticated screening aids for corneal ectasia.

The integrated Belin ABCD grading system provides the user with intuitive data for efficient keratoconus classification. A user definable progression display enables intuitive follow-up on any measurement parameter available with the Eystar. Other tools include Zernike wavefront analysis of the cornea and simulation of visual acuity for patient education.

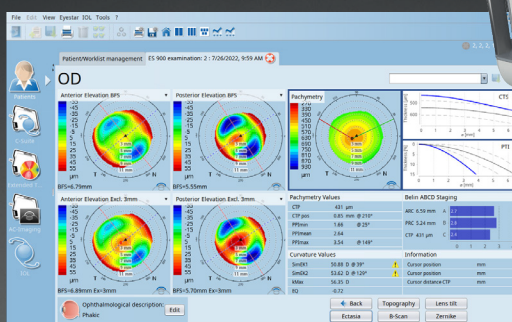
Due to image acquisition using the cutting-edge, patent-protected Mandala scan technology, virtual B-scans may be created any-time and anywhere in the already acquired volume, minimizing the need for the rescanning of patients to visualize details.



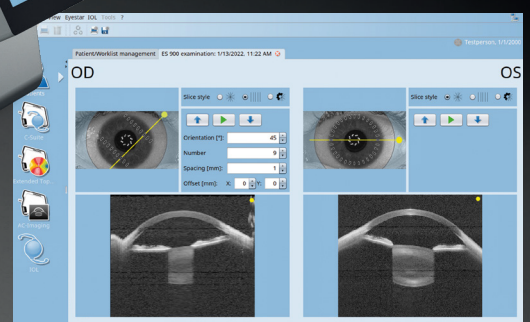
FOUR-IN-ONE



DIFFERENCE MAP – THREE TIME POINTS



CORNEAL ECTASIA DISPLAY INCLUDING BELIN ABCD GRADING SYSTEM



CROSS-SECTIONS AT INDIVIDUAL LOCATIONS

CONFIDENCE THROUGH OCT TECHNOLOGY

## Comprehensive analysis of the anterior chamber

The swept source OCT-based topography of the Eyestar 900 covers up to 12 mm diameter on the anterior cornea and provides highly accurate assessment of the cornea front and back, as well as data on its thickness.

Intuitive displays, such as difference, trend and corneal ectasia displays, support the user in the diagnostic process.

HIGH QUALITY IMAGES & DENSE SCANS

## Visualize key structures

The Eyestar 900 Anterior Chamber Suite offers high quality 18 mm diameter images for visual inspection of key structures, such as lens position, ICL vault\* or chamber angle\*. The basic measurement tool kit supports manual point-to-point distance, angle and area measurements in the refraction-corrected radial scans.

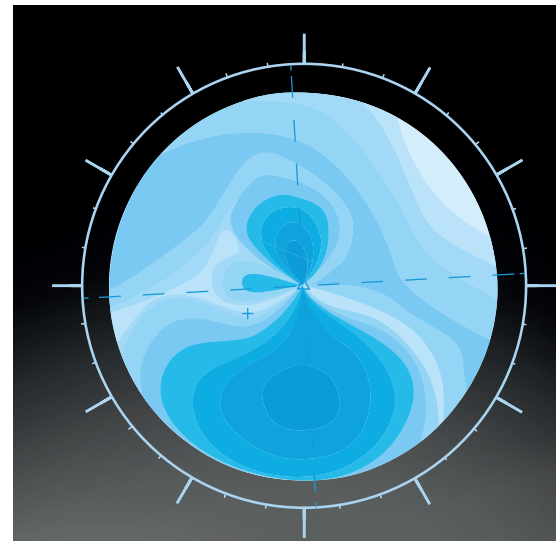
Due to the highly dense Mandala scan pattern, the user can create virtual, radial and line scan stacks, as well as individual B-scans, any time after the data acquisition and at any location of the 18 mm OCT scan volume previously acquired.

FUTURE PROOF

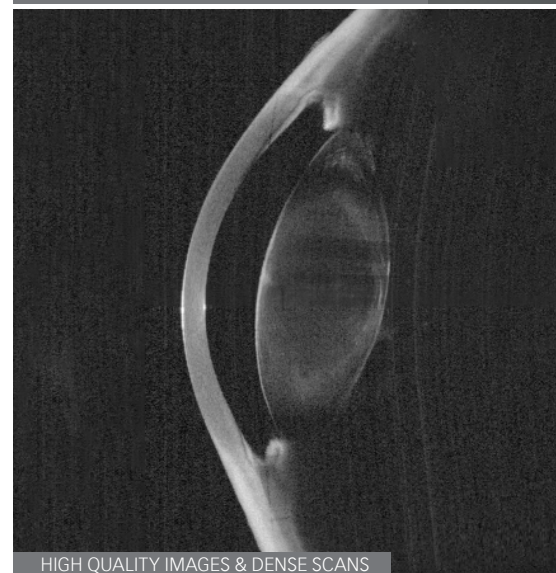
## Enhanced features, increased functionality

An expandable device, the Eyestar 900 will boast increased functionality in the future. Recent EyeSuite software releases include integrated corneal ectasia screening aids with dedicated summary displays, including the Belin ABCD grading system. Other planned software releases include ICL vault analysis\* and chamber angle assessment\*.

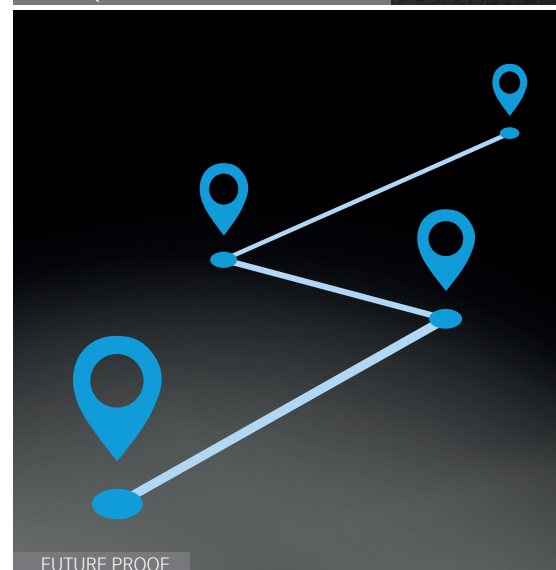
\*New future modules and suites are currently being developed.



CONFIDENCE THROUGH OCT TECHNOLOGY



HIGH QUALITY IMAGES & DENSE SCANS



FUTURE PROOF

## Intuitive & efficient **Ergonomics for patient comfort & precision**

Precise measurement data, intuitive map information and OCT imaging of the anterior chamber is essential in efficiently diagnosing and treating patients. The combination of swept-source OCT, reflective keratometry, high-resolution imaging and the fully-automated measurement allow efficient, patient-friendly, simultaneous acquisition of all this information in a single device.

Patient comfort and short examination time are key contributors to optimized data quality. Moreover, data collection delegation is crucial to efficiently running a busy practice. Taking this into account, Haag-Streit developed a unique fully-automated measurement process for the Eyestar 900, minimizing the user's learning curve and optimizing patient comfort.



#### FULLY-AUTOMATED ACQUISITION PROCESS

## Patient compliance & efficacy

Patients, especially the elderly, tend to tire quickly during an eye exam, impairing optimal data collection. The fully-automated data acquisition process and its fast measurement with simultaneous data recording lead to excellent patient comfort and thus improved cooperation, which has a positive effect on measurement quality.



FULLY-AUTOMATED ACQUISITION PROCESS

#### INTUITIVE USER INTERFACE

## Optimized workflow

The familiar look-and-feel of the touch-screen optimized EyeSuite software, used in all Haag-Streit devices, enables efficient interaction and improved adaptation. Like any Haag-Streit device, the Eyestar 900 is easy to integrate into almost any practice management system.

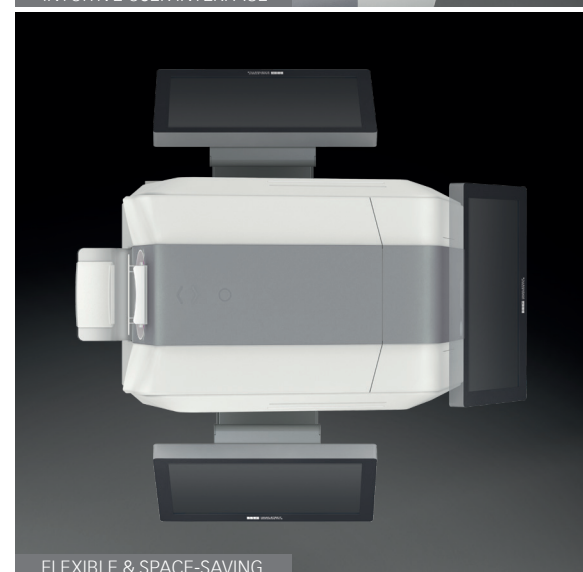


INTUITIVE USER INTERFACE

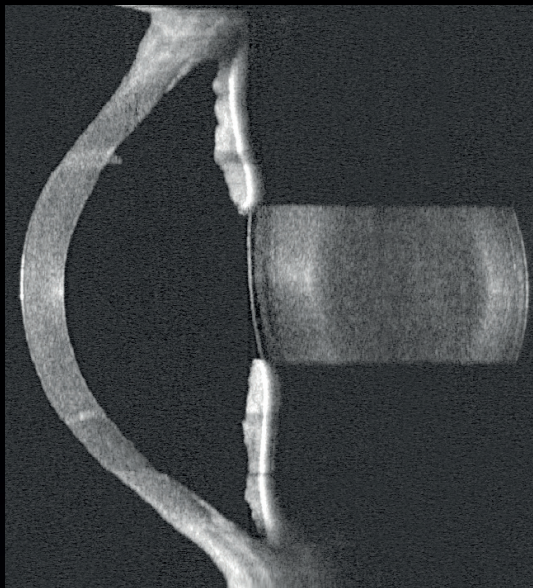
#### FLEXIBLE & SPACE-SAVING

## Fits any room

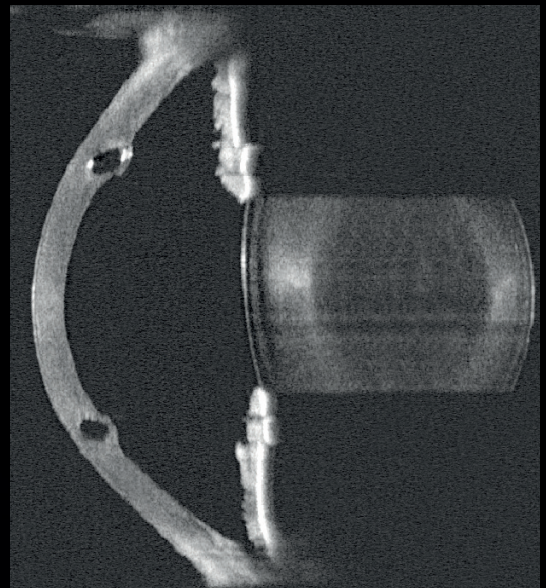
The Eyestar 900 touch screen can be mounted on either side of the device, or even on its back. In combination with the all-in-one device's small footprint, this makes it a space-saver that will fit in any examination room.



FLEXIBLE & SPACE-SAVING



CORNEAL TRANSPLANT



INTRA CORNEAL RING SEGMENTS (INTACS)



DMEK PRE-OP & IOL



DMEK POST-OP & IOL

Swept-source OCT  
visualizes details in  
high definition

# Technical specifications

## Eyestar 900

### Technology

#### Swept-source OCT

Wave length	1060nm
Scan Speed	30kHz
Topography, Imaging, Measurement	

#### Dual Zone Keratometry

Infrared LED	850nm
Measurement points	32
Anterior Keratometry	

#### High resolution imaging

Resolution	Full HD 1080p
Color and Infrared	
Enface eye imaging, Measurement	

#### Laser safety

Class 1 laser product	
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#### Supported EMR interfaces

DICOM
EyeSuite script language
GDT
Eyesuite command line interface

### Measurement variables & modes

#### Cataract Suite

##### Corneal Thickness CCT

Measurement range	300–800µm
Display resolution	1µm

##### Anterior chamber depth ACD

Measurement range	1.8–6.3mm
Display resolution	0.01mm

##### Lens thickness LT

Measurement range	0.5–6.5mm
Display resolution	0.01mm

##### Axial length AL

Measurement range	14–38mm
Display resolution	0.01mm

##### Topography

Topography system	Type A
Map display	7.5mm

##### Anterior Keratometry K

Measurement range	32.1–67.5dpt
Display resolution	0.01dpt

##### Posterior simulated Keratometry SimPK

Measurement range	3.9–9.5dpt
Display resolution	0.01dpt

##### White to white WTW

Measurement range	7–16mm
Display resolution	0.01mm

##### Pupillometry PD

Measurement range	2–13mm
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##### Onboard IOL Calculation methods

Hill-RBF
Hill-RBF/Abulafia-Koch for toric IOL
Barrett Universal 2
Barrett Toric Calculator
Barrett True K and True K Toric
Olsen and Olsen Toric
Haigis
Hoffer Q
Holladay 1
SRK/T and SRK II
Masket and Modified Masket
Shammas No-History

##### IOL calculation data interfaces

Holladay IOL Consultant
PhacoOptics

##### Measurements

Dimensions: 480 × 560 × 460 mm
Weight: 31.0 kg

#### Anterior Chamber Suite

##### Topography

Topography system	Type A
Map display	Up to 12mm

##### Maps/Displays

Anterior corneal topography maps
Posterior corneal topography maps
Pachymetry maps
Difference maps
Progression (timeline) displays
Corneal ectasia display
Belin ABCD grading

##### OCT Imaging

Area/Volume	Up to 18mm on anterior cornea converging to the retina
Scans	Patented Mandala scan technology Radial scans Line scan stacks Custom single line scan

##### Included in future software release

Total Keratometric Power
ICL vault analysis
Chamber angle

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

### Intended purpose

The Eyestar 900 is a non-invasive, non-contact biometer used for obtaining the following information:

- Corneal shapes
- Axial eye length
- Lens dimension and position
- Anterior chamber dimensions
- Front- and cross-sectional images

**Contraindication:** There are no known contraindications.

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