

ALLEGRO Oculyzer

see the difference

A New Dimension in Quality of Vision

WaveLight is the specialist for optics in the eye. As a full-range supplier we provide professional and process-oriented solutions for refractive surgery.

We are a research company. This is both our genesis and our mission. Thus, we remain committed to continuing our research for even better ways to improve your practice and to provide patients with more safety, precision and quality.

With a focus on innovation and an intimate customer orientation, WaveLight offers high-tech product quality and outstanding customer support. It is a part of the WaveLight philosophy to be more than simply a provider of medical devices. We strive to establish a long-term partnership with our customers by supporting them with technical, clinical, practice marketing, and other services well after the purchase of a WaveLight product.

Choose from the largest product portfolio in refractive laser surgery to customize your practice exactly to your needs. With WaveLight, you may obtain all devices from one single provider and so rely on consistently high quality and an optimum coordination of the different products.

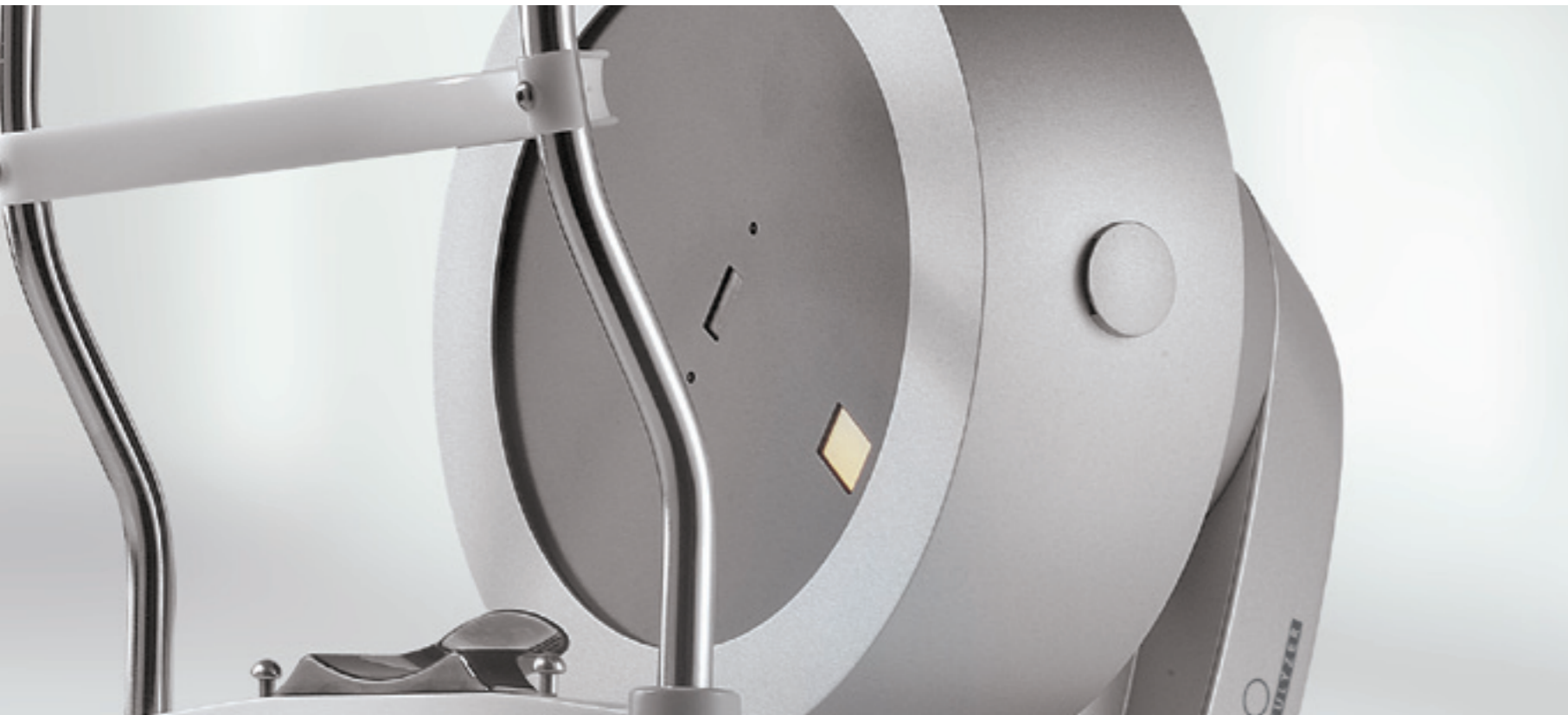
If you are looking for a business partner rather than a technology provider, your search is over. With WaveLight, you can stay on the forefront of technology, while improving your workflow and reducing costs.





ALLEGRO Oculyzer

Truly Advanced Anterior Segment Analysis



The Oculyzer is WaveLight's latest high-precision tool providing a new level of **diagnostic information** about the anterior eye chamber and supporting the decision-making process for **customized laser vision correction**.

It can be used as a **stand-alone diagnostic instrument** for enhanced and comprehensive measurements of the cornea, making refractive and intraocular surgery safer and increasing the level of predictability.

Based on the proven Oculus Pentacam technology, the Oculyzer utilizes a **three dimensional Scheimpflug camera**. It is an advanced system for comprehensive **corneal topography, geometry measurements** and the analysis of the **complete anterior eye chamber**.

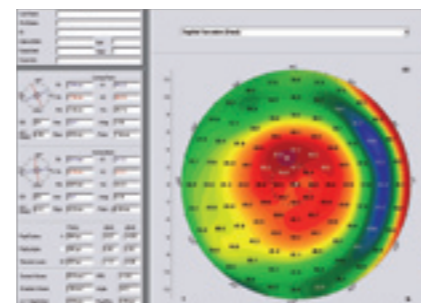
The Oculyzer measures and generates **true and real height** data of the cornea and therefore supports the physician in post-LASIK patients and those with high astigmatism or corneal irregularities. These additional data can be used also for the preparation of keratoplastics.

Optimized to work in **perfect alignment with the WaveLight laser systems**, the Oculyzer and its corresponding software **OcuLink** enable customized cornea based refractive treatments.

The Oculyzer is the **professional solution especially for highly complicated cases** in which wavefront and regular topography measurements would not work clinically efficient: Extensive diagnosis providing ultimate treatment capabilities and plays for safety.

Based on the proven Pentacam technology, the Oculyzer provides:

- Scheimpflug image
- Corneal topography
- Pachymetry
- 3D chamber analysis
- Cataract analysis, densitometry
- Topography-guided treatments in combination with the WaveLight laser systems



The Oculyzer also delivers reliable data of very steep corneas (e.g. post-hyperopia treatments).

Three Dimensional Analysis, True Elevation Measurements

Scheimpflug Imaging

The Oculyzer's integrated Pentacam technology provides a **three dimensional analysis** based on the Scheimpflug principle and represents the measurements and data of **Scheimpflug imaging, topography, pachymetry, anterior chamber and densitometry analysis** with various displays. Diagnosis becomes **comfortable and time saving**, making the Oculyzer the perfect tool for refractive and cataract surgeons.

Scheimpflug imaging allows the assessment of the **complete anterior segment** of the eye, from the front of the cornea to the back of the lens, in a sagittal plane.

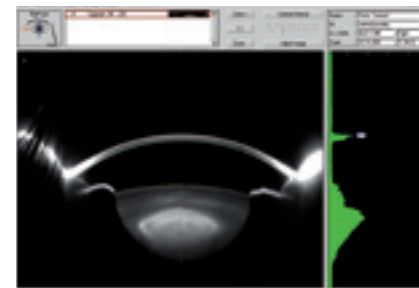
The Oculyzer performs a **real time measurement** by a multiple rotation process that is centered on the apex of the cornea and so ensures **high definition measurement within the central part of the cornea**.

Compared with regular topography systems, the Oculyzer measures a considerably larger area of the eye **without being affected by the tear film** and provides true elevation data which are not derived from interpolation. The measurement of up to **25,000 true**

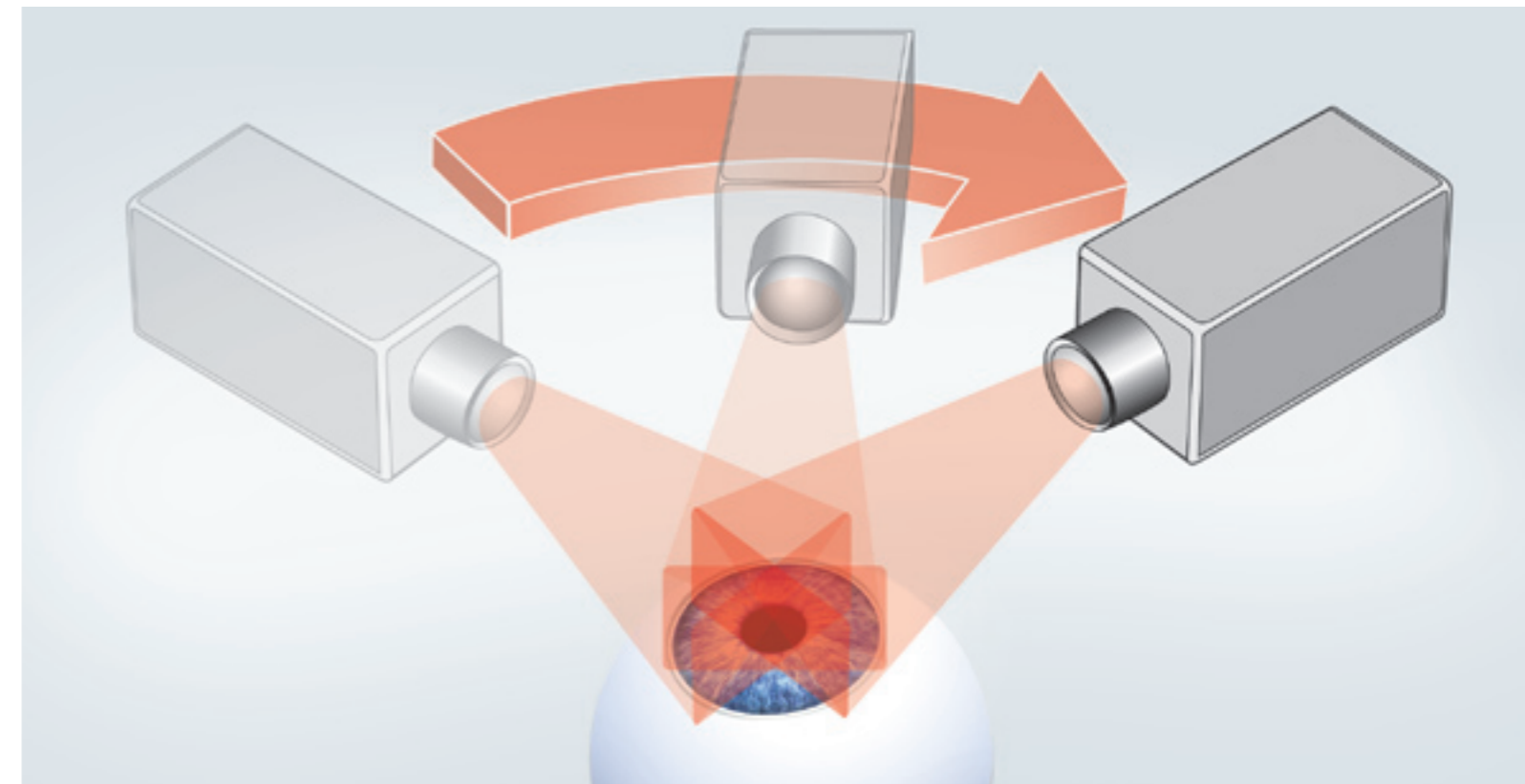
elevation points is made possible through lateral recording.

A three dimensional model of the anterior eye chamber is calculated based on true elevations derived from the Scheimpflug camera rotating along the apex of the cornea and iris. All further information can be deduced from this **3D model**.

The complete imaging of the anterior eye chamber takes **less than two seconds**. At the same time possible eye movements are captured and corrected to generate **reliable and accurate data**.



Scheimpflug image provides reliable data from the complete anterior segment of the eye.



The camera rotates around the eye. The number of images can be individually selected from 12, 25, and 50. Each image delivers 500 elevation points. A 3D model of the complete anterior eye segment is calculated, delivering also high resolution data from the center.

Advanced Topography & Pachymetry Measurements

Multiple High Precision Diagnosis



The Oculyzer performs **topography measurements** of the front and back surfaces of the cornea displayed by means of **sagittal and tangential axis** as well as the corresponding elevation maps. Anterior and posterior corneal surface are described and classified using **Zernike polynomials** that enable the comparison of the corneal aberrations in relation to the total wavefront of the individual eye.

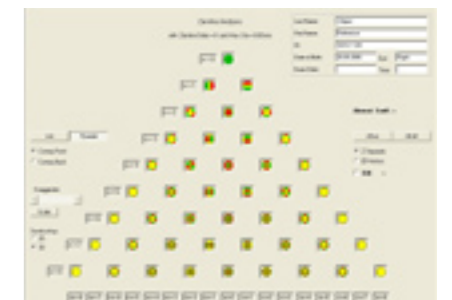
Advanced topography measurements enable pre-operative planning for any corneal refractive treatment and allow progression control after corneal surgery. An **integrated keratoconus detection and qualification function** provides the highest level of safety when performing laser vision correction.

The corneal thickness is displayed as a color image over its entire area, almost from limbus to limbus. **Pachymetry** is measured with a precision of $\pm 5 \mu\text{m}$ and provides data even in cases of thin corneas. **Thickness in the pupil center,**

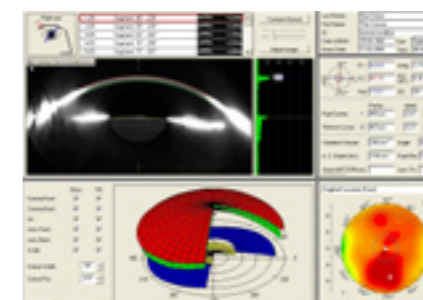
thickness of the apex, thinnest location and corneal volume are some of the important points which are displayed in values and location.

Additionally, the Oculyzer supports an **integrated Glaucoma screening function** and allows **pre-operative planning** for corneal surgery and **IOP modification** with regard to corneal thickness.

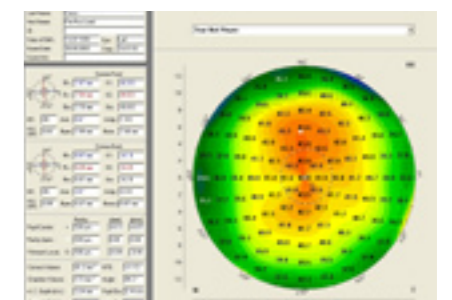
The total refraction of the cornea is related to the anterior and posterior curvature and the pachymetry at the specific point. With the **true net power representation** extrapolations or estimations of traditional topography are replaced with true refractive values.



Zernike polynomials



Overview and corneal thickness



True net power

Fast, Reliable, Accurate

3D Chamber & Cataract Analysis

A **3D chamber analyzer** allows improved pre-operative planning for the implantation of phakic lenses. The IOP adjusted by different mathematical formulas addresses the compensation related to pachymetry after refractive surgery and very thin or thick corneas.

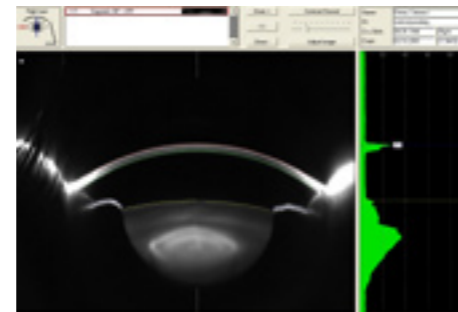
The integrated **tomography** function shows the incision of the complete anterior chamber. An overall impression of the cornea is given and a separate visualization of the cornea, the lens and the anterior eye chamber is provided. Iris pigment disorders can be represented and the tomography display offers also an excellent visualization of the cataract location.

Also integrated into the device is a **cataract analyzer** enabling analysis and quantification of the densitometry of the lens.

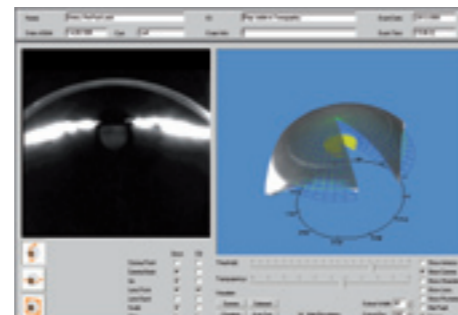
The superb quality of the Scheimpflug images allows visualizing the **bowman's layer, the lens' cataract and the posterior capsular opacification (PCO)**. **Real time measurements** show **comprehensive data** from the anterior and posterior corneal surface as well as tangential and sagittal data. They provide up to **50 scans with 500 true elevation points** within an **entire examination area of up**

to 12 mm for an appropriate amount of **peripheral and central data**.

One **non-contact measurement** is performed in less than 2 seconds and enables **fast and simple qualification and quantification** of several visual disorders.



Cataract analysis



Tomography



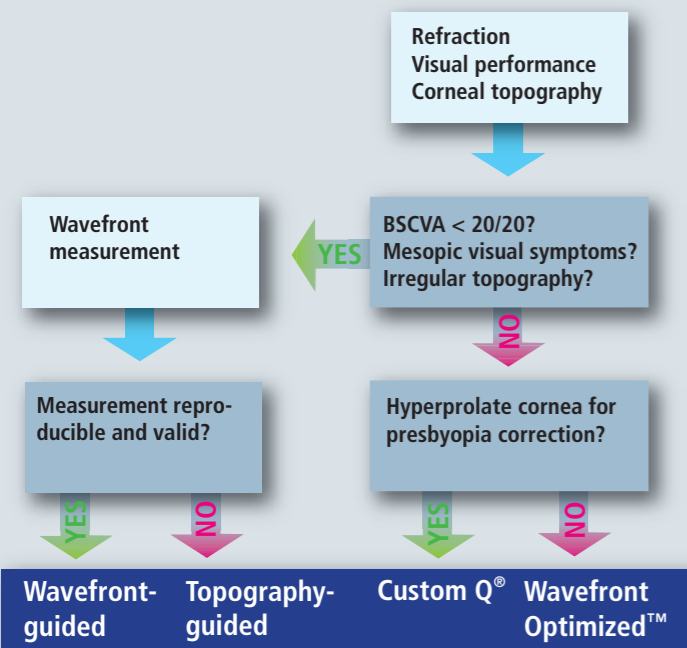
The 3D chamber analysis provides:

- Manual measurement function within Scheimpflug images
- Different correction factors of the intraocular pressure (IOP) due to corneal thickness
- Colored map of the anterior chamber depth
- Tomography tool, virtual model of the anterior segment
- Evaluation of the chamber angle, the chamber volume and the chamber depth

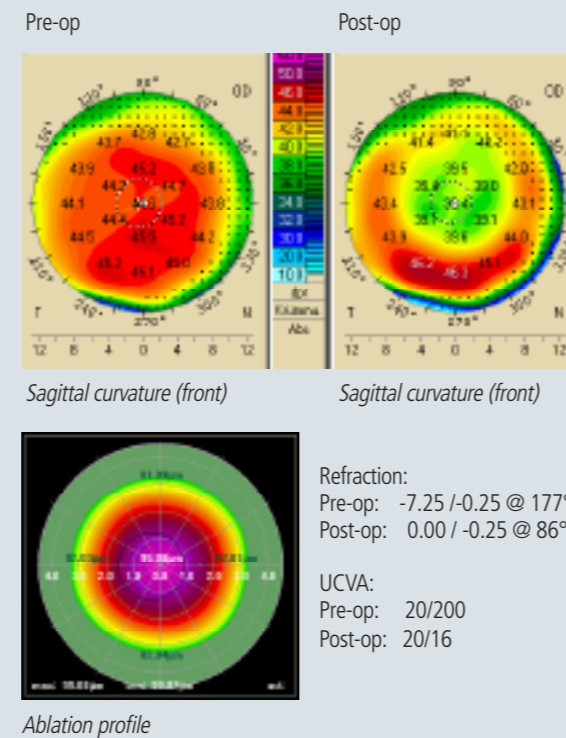
Integrated Keratoconus Detection

Highest Standard of Safety for Refractive Surgery

Customizing treatments:
Possible decision finding process

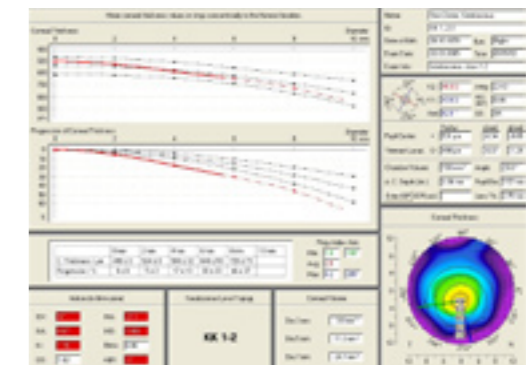


Example of an excellent topography-guided treatment result with the Oculyzer:



One of the Oculyzer's most important features is the **keratoconus detection and qualification function**. This application enables to detect even unusual special forms of keratoconus.

All measurements can be displayed in **two or four different colored maps in one window** for combined assessment and analysis at a glance. A special **difference map** allows the selection of different examinations in order to track process and changes of the patient's eye. This also makes the Oculyzer a perfect tool for **impressive patient education** and guarantees an **ultimate level of safety** for physician and patient.



Keratoconus detection

The asphericity is offered in mm and in degrees for seamless **Custom Q® planning**.

WaveLight's **decision tree** facilitates quick and simple decision making for which treatment method to use. **High patient flow** will be enabled with the **comfortable patient adjustment** and the **integrated automatic measurement release** for user independent and immediate image capture with fast mathematical analysis.

Additional safety tools:

- Pachymetry map
- Anterior and posterior elevation map
- Detection of the thinnest corneal point
- Propagation of pachymetry from the thinnest point
- Integrated expert system for anterior keratoconus detection and quantification as well as comparison to expert database

Complementing Customized Laser Vision Correction

Advanced Topography- Guided Treatments

WaveLight has developed unique expertise in advanced topography-guided corrections.

The Oculyzer with its **OcuLink** software was specifically optimized for the treatment of patients with **higher order cornea based aberrations** who suffer from corneal irregularities, high astigmatism or decentered or irregular ablations after previous refractive surgery.

Due to the **high density of measuring points** at the center of the eye the Oculyzer is the perfect tool for reshaping central irregularities.

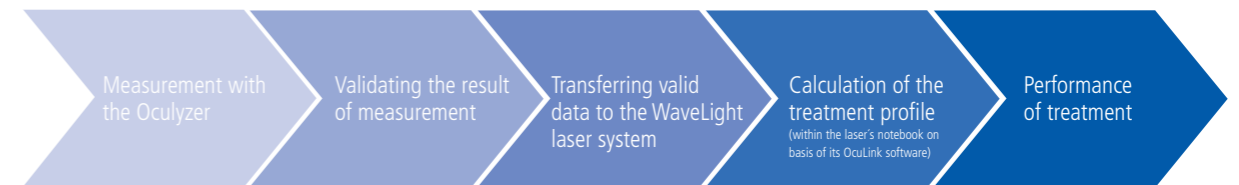
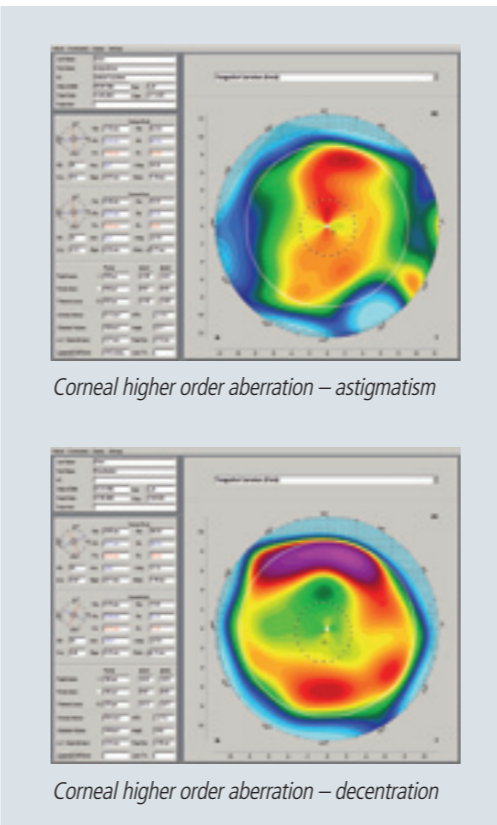
All necessary treatment and patient parameters generated by the Oculyzer are transferred to the WaveLight laser systems.

Integrated into the laser's notebook, the **OcuLink** software calculates the appropriate customized ablation pattern.

However, the physician is still able to make changes to individual parameters at any stage of the process.

Indication*	WaveLight customized treatment capabilities				
	Wavefront Optimized™	Custom Q*	Wavefront-guided (ALLEGRO Analyzer)	Topography-guided (ALLEGRO Topolyzer)	Topography-guided (ALLEGRO Oculyzer)
Myopia	-14 D	-14 D	-12 D	-14 D	-14 D
Hyperopia	+6 D	+6 D	+6 D	+6 D	+6 D
Astigmatism	-6 D to +6 D	-6 D to +6 D	-3 D to +3 D	-6 D to +6 D	-6 D to +6 D
Mixed astigmatism	6 D	6 D	3 D	6 D	6 D
Presbyopia	•	•			
Enhancements	•	•	•	•	•
Ocular aberrations			•	•	•
Corneal irregularities			•	•	•
Small optical zones		•	•	•	•
Decentrations			•	•	•
Suboptimal corneal asphericity		•		•	•

*Possible treatment range depends on corneal thickness and optical zone size. Approved treatment range can differ from country to country.



Process flow of topography-guided treatments with the Oculyzer in combination with a WaveLight laser system.

ALLEGRO Oculyzer



Overview of Functions Measuring the Complete Anterior Eye Segment

	<p>Scheimpflug image</p> <ul style="list-style-type: none">· Imaging the complete anterior eye segment
	<p>Cataract analysis</p> <ul style="list-style-type: none">· Objective quantification of the lens density· Visualization of the lens cataract· Visualization of PCO
	<p>3D chamber analysis</p> <ul style="list-style-type: none">· Allows improved pre-operative planning for implanting phakic lenses as well as post-operative control· Glaucoma screening
	<p>Pachymetry</p> <ul style="list-style-type: none">· Pre-operative planning for corneal surgery· Glaucoma screening· IOP modification with regard to corneal thickness· Keratoconus detection and quantification
	<p>Corneal topography</p> <ul style="list-style-type: none">· Keratoconus detection· Pre-operative planning for any corneal refractive surgery· Progression control after corneal surgery· Elevation for forme fruste and keratoconus detection

Technical Data & References

Technical data:	
Type	Diagnostic device
Working principle	Scheimpflug principle: The rotating measuring process supplies images with a high number of data in the center of the eye and shows the complete anterior eye segment
Camera	Digital CCD camera with synchronous pixel sampling
Light source	Blue LEDs, 475 nm, UV free
Processor	Ultra fast DSP with 400 million operations per second
Speed	50 scans in two seconds with approx. 500 true elevation points per scan and surface
Measurement range	Corneal radius: 3 to 38 mm Refractive power: 9 to 99 D
Centration	Graphical supported manual centration
Accuracy	± 0.02 D
Reproducibility	± 0.02 D
Focusing	Graphical supported manual focusing
Acquisition time	1 - 2 seconds
Operation	Data input and data output via PC, patient acquisition with XYZ stage, integrated left-right eye recognition
Capturing	Manual or automatic Automatic capturing if the pupil in x/y-axis is within ± 100 µm and in the z-axis within ± 200 µm
Link to WaveLight laser systems	Export function to the WaveLight laser systems; advanced topography-guided treatment calculation is done at the laser's notebook using the OcuLink software
Number of data points evaluated	25,000 (max.)
Traverse path	x = 110 mm (right/left), z = 30 mm (up/down), y = 90 mm (forward/backward)
Working distance	80 mm
Cooling	Ambient air
Weight	9 kg, 19.5 pounds
Dimensions (LxWxH)	28 x 36 x 53.5 cm, 11 x 14.2 x 21.1 inches
Compliance:	
In compliance with	Medical Device Directive (MDD) 93/42/EEC, IEC 60601
Certified by	LGA InterCert notified body no. 1275
Electrical safety class	Class II, type B
Medical device class	Class IIa according MDD
Degree of protection against damaging ration of water	IP 20

Specifications are subject to change!

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