

OCULUS
Pentacam®/Pentacam® HR
Anterior Segment
Tomography



OCULUS Pentacam®/Pentacam® HR

The Gold Standard for Anterior Segment Tomography



Since its introduction in 2002 the OCULUS Pentacam® has proven to be an indispensable tool for ophthalmologists, clinicians and surgeons committed to providing precise diagnostics and successful treatment.

Efficient preliminary and follow-up examinations

In a single delegable step the OCULUS Pentacam® measures the entire anterior eye segment independent of tear film. From the high-resolution Scheimpflug images it calculates a motion-corrected 3D model.

Comprehensive analysis

As the basis for precise keratometry, a prerequisite for IOL calculation, and for detection of ectasia and irregularities as well as wavefront calculation, the Pentacam® provides a complete description of the entire cornea (pachymetry as well as elevation and curvature data).

Scientifically reliable screenings

To perform quick and reliable glaucoma screenings the OCULUS Pentacam® determines anterior chamber volume, angle and depth automatically and then compares the values in the Indices Report with a normal and a pathological population.

Reliable values for your diagnoses

Using blue light, the OCULUS Pentacam® makes opacities of the cornea, the crystalline lens and IOLs visible so that corneal diseases are detected reliably and cataract progression can be assessed objectively.

The Pentacam® HR stands out by virtue of its bright optics, which make for extremely sharp, highest-quality Scheimpflug images.

Testimonials of satisfied international Pentacam® users

"I cannot imagine any cornea or refractive surgery without a pre and post-op Pentacam® examination."

Dr. Paolo Vinciguerra, MD, Italy



"I have been using the Pentacam® since its inception. I could not imagine taking a refractive patient into surgery without a full tomographic examination. It is the single most important piece of diagnostic equipment in our laser suite. I consider it an indispensable part of my practice."

Dr. Michael W. Belin, MD, USA



"Since the first day I found the Pentacam® to be very reliable and essential for screening refractive candidates for ectasia risk. The Pentacam® is also very important for evaluating patients for corneal diseases, cataract and glaucoma."

Dr. Renato Ambrósio Jr, MD, PhD, Brazil



"In my opinion, the Pentacam® HR is a very useful device for screening before cataract surgery especially for premium IOLs. A detailed assessment can be performed to select the optimal IOL for the respective patient. Especially for toric IOL implantation, the influence of the posterior cornea can be assessed with the Pentacam®."

Dr. Naoyuki Maeda, MD, Japan



"Curvature measurement precision with Pentacam® HR has proved to be better than other tomographers and autokeratometers."

Dr. Jaime Aramberri, MD, Spain



*"The Pentacam® is a must for anyone performing cataract or refractive surgery. No other instrument provides more clinically relevant information."**

Dr. Tobias Neuhann, MD, Germany



* Translated from German by OCULUS.

The Register

- Automatic measurement activation
- Functions at a glance

- General Overview
- Indices Report
- Topography
- Pachymetry
- Elevation

- Quality of corneal imaging
- Premium IOL
- Corneal wavefront
- Pre-operative diagnostics

- Refractive Overview
- Corneal Rings
- Corneal Optical Densitometry
- Progression analysis

- Belin/Ambrósio
- Holladay Report
- pIOL Simulation
- Contact Lens Fitting

- Networkability
- Patient consultation
- Software overview
- Scheimpflug images

Basic principles

Screening

Cataract

Refractive

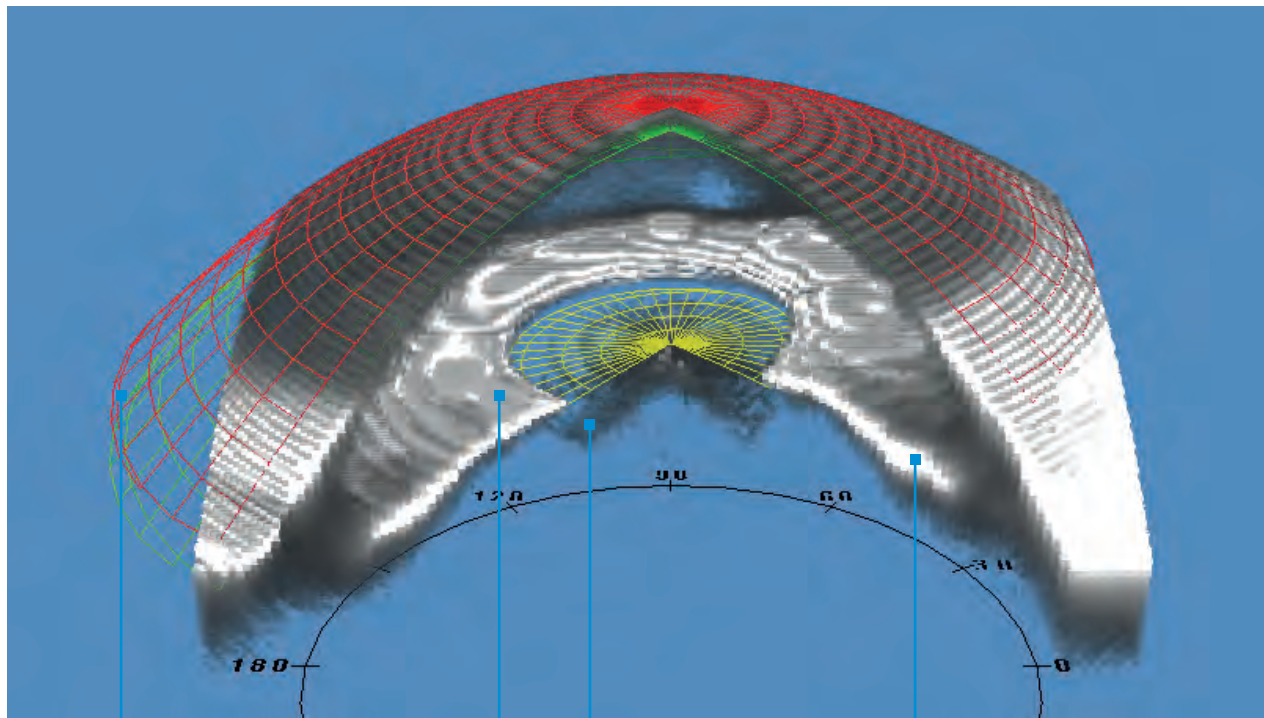
Optional Software

Configuration & Tech.

Anterior Segment Tomography

Fast, reproducible, delegable

Thanks to automatic measurement activation the Pentacam® gives you an overall view of the anterior eye segment in mere seconds. Measurements are made independent of tear film and examiner. The Pentacam® HR evaluates up to 138,000 real measuring points.



Anterior and posterior
corneal surface

Anterior and posterior
surface of crystalline lens

Iris

Anterior chamber

The most important functions at a glance:

- Topography of anterior and posterior corneal surface
- Full-surface pachymetry
- Early ectasia detection
- 3D anterior chamber analysis
- Indices Report with normal data for all crucial parameters
- Normative corneal wavefront data
- Total Corneal Refractive Power (TCRP)
- 3D-densitometry of the cornea and the crystalline lens
- Contact lens fitting software
- Anterior segment tomography

The Pentacam®: Indispensable for you and your patients

Before the surgery my doctor explained what the Pentacam® examination involved by showing me on the iPad. I was amazed that I was still even able to see at all with such a clouded lens!



I simply didn't want to wear spectacles anymore! During the pre-op examination the Pentacam® results gave me certainty.



My risk of developing glaucoma was detected by my ophthalmologist early on. He was able to initiate appropriate measures immediately.



Cataract

Benefit from simple, comprehensive corneal screenings. Indices Report, early detection of ectasia according to Belin/Ambrósio software and evaluation of corneal optical densitometry – four clearly defined steps help you select the optimal IOL. The Pentacam® calculates Total Corneal Refractive Power (TCRP), supporting you in particular when it comes to selection, orientation and calculation of toric IOLs. The function for importing axis length from optical biometers and access to ray-tracing programs such as Phaco Optics and OKULIX make it possible to perform IOL calculations on any cornea.

Refractive assessment

Early detection of corneal ectasia using Belin/Ambrósio software is unique. A final parameter is calculated and represented in colour. This is how the Pentacam® software assists you in making diagnoses. Keratometry, asphericity and full-surface pachymetry assist you in planning refractive surgery. The Pentacam® measures irregular corneas with great precision, presenting the necessary parameters in a clear and application-oriented fashion. This ensures reliable planning for implantation of corneal rings, CXL and cornea transplantations.

Glaucoma

Glaucoma is one of the most common eye diseases. The Indices Report is a unique screening tool for detecting it. Make use of the evaluation of anterior chamber angle and volume based on normal data and clinical pictures. In particular, studies have identified automatically calculated anterior chamber volume as a sensitive parameter.

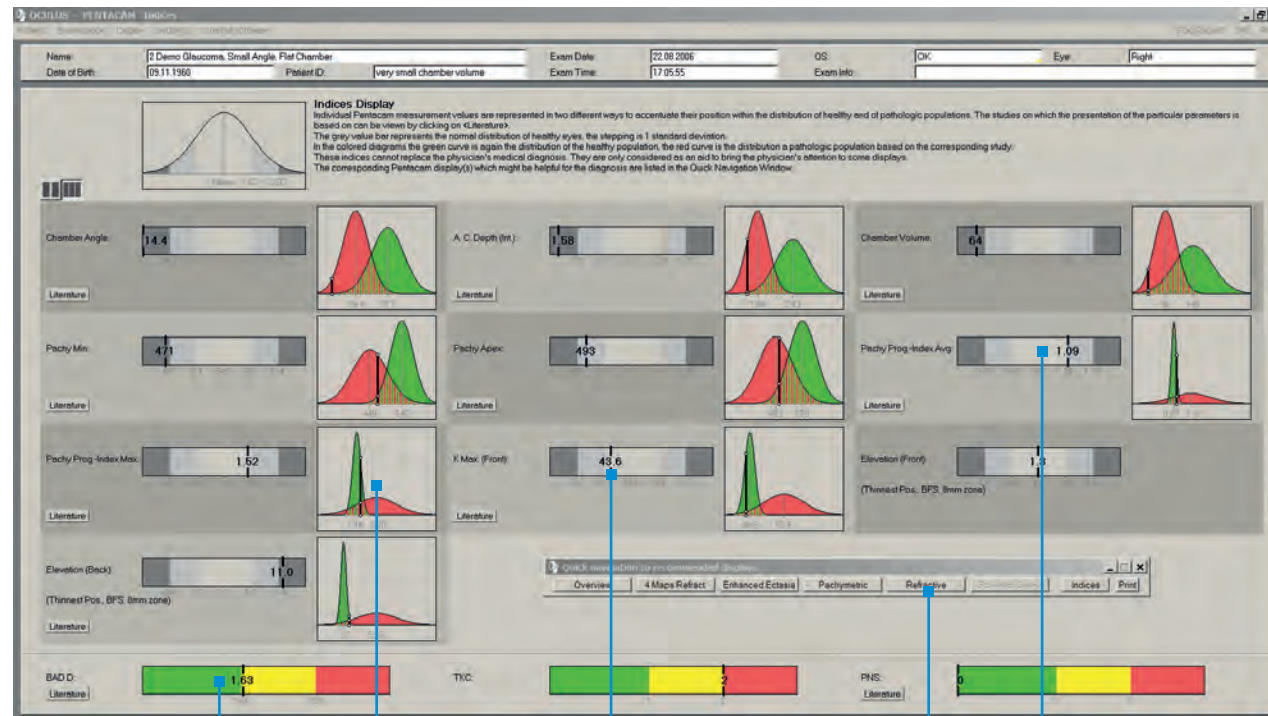
* Assessment of the anterior chamber parameters after laser iridotomy in primary angle close suspect using Pentacam® and gonioscopy; Alireza et al; Int J Ophthalmol, 2013, 6(5):680-684

Comparison of scheinpflug imaging and spectral domain anterior segment optical coherence tomography for detection of narrow anterior chamber angles; Grewal et al; Eye Vol.: 25

Screening: Filter, Evaluate, Represent

All the important information at a glance

The great challenge in clinical routine is filtering, evaluating and representing data in a clear-cut way. This is exactly what the Indices Report does. The crucial data are represented in such a way that you can gain a comprehensive picture of your patient at a glance.



Early detection of corneal ectasia

Distribution of a normal (green) and a pathological (red) population

Individual patient value

Interactive navigation bar

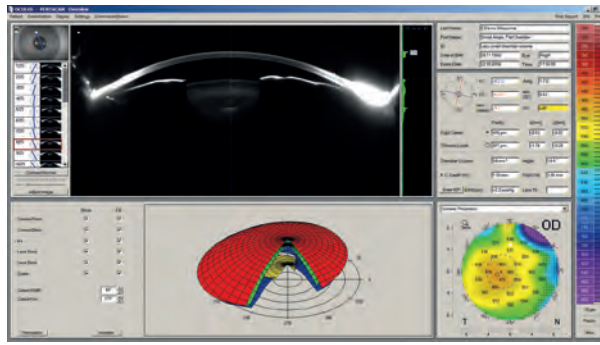
Distribution in normal population

Indices Report

- Normative data are gathered from published studies and stored in the Pentacam® software.
- The distribution of normal values in a population is represented by the bars shaded in gray.
- The diagrams show the distribution for normal (green) and pathological (red) eyes.
- Sources which the evaluations are based on are cited to provide additional information.
- In cases of irregularities the individual displays for detailed findings appear in the interactive navigation bar.

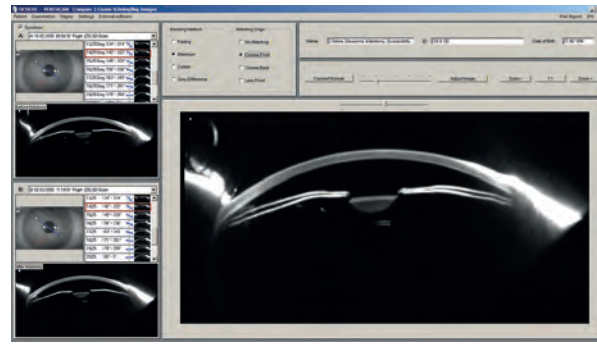
Screening and follow-up exams ensure safety

After initial information has been provided by the Indices Report additional displays show further, case-specific information. Depending on the irregularities in question the interactive navigation bar recommends displays which lead you to suitable detailed analyses – custom-tailored to the individual patient.



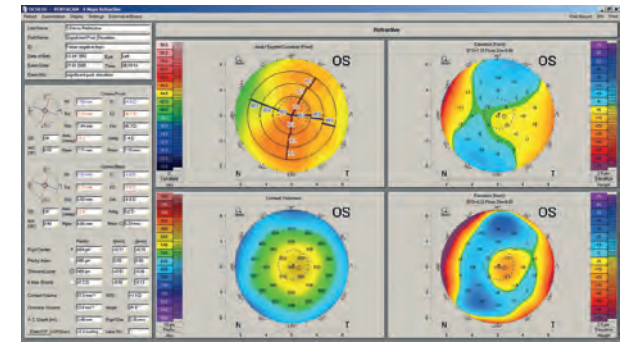
General Overview

The Scheimpflug images allow you to make a qualitative assessment of the anterior eye segment. Opacities of the cornea or the crystalline lens are represented impressively. Keratometry, pachymetry and asphericity allow for an initial analysis of the corneal surface. The anterior chamber is defined by chamber volume, angle and depth. Intraocular pressure is corrected on the basis of central corneal thickness.



Superimposition of Scheimpflug images

For better patient consultation you can superimpose 2 Scheimpflug images. This way numerous changes in the anterior eye segment can be detected which you can explain to your patient with the help of visualization.



4 Maps Refractive

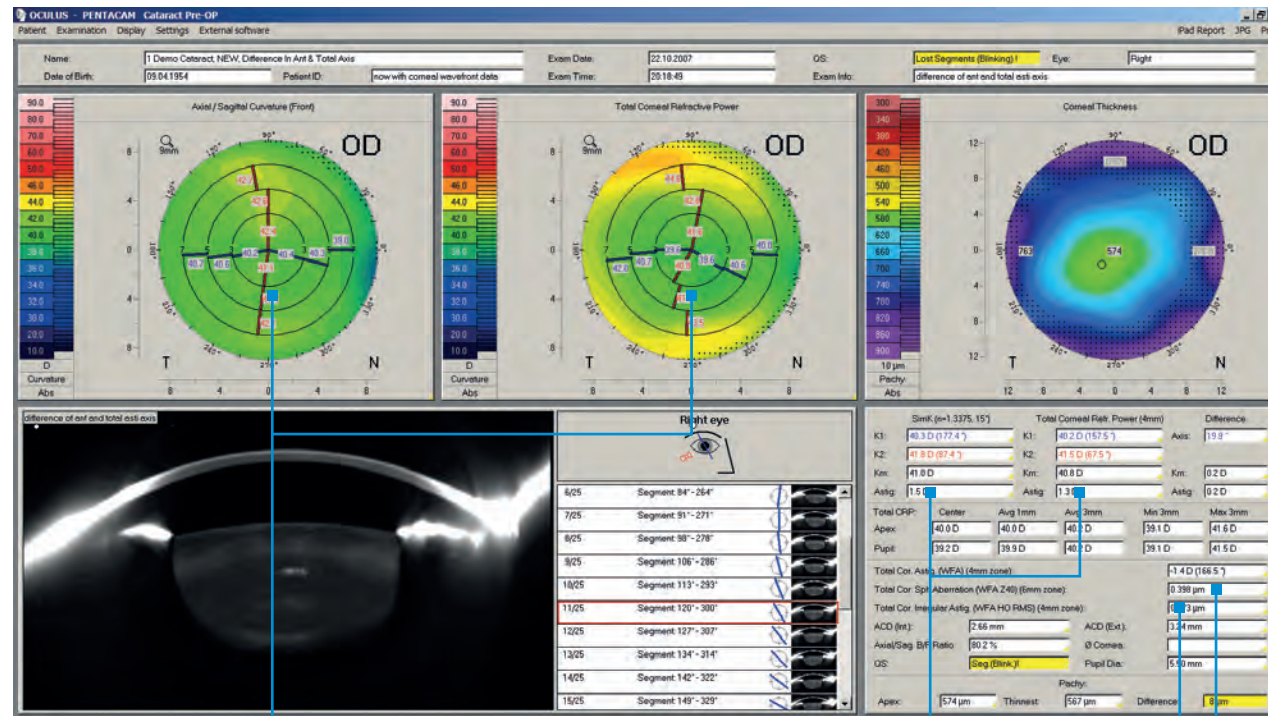
Topography and elevation maps make quantitative assessments of the corneal surface possible. Especially the posterior elevation map shows pathological changes very early on. The corneal thickness map clearly shows the thinnest position to help you plan refractive surgery, for example.

Combining elevation data of the anterior and posterior corneal surface, topography and pachymetry will help you detect abnormalities early on.

Cataract: IOL Selection

Premium IOL in 4 easy steps

Premium IOLs make it possible to improve your patients' visual function considerably. Whether through toric, aspheric or multifocal geometry, the exact measuring data gathered by the Pentacam® will assist you in selecting the right lens.



Detection and evaluation of the influence of the posterior corneal surface

Influence of the posterior corneal surface on overall corneal astigmatism

Total corneal irregularities

Total corneal spherical aberrations

Cataract Pre-OP Display

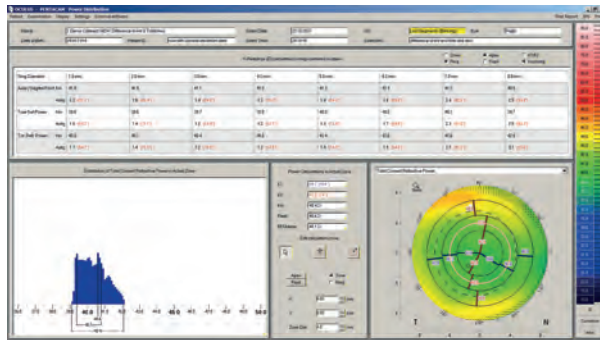
Cataract Pre-OP Display was developed in collaboration with Prof. Dr. Naoyuki Maeda from the University Medical School in Osaka, Japan. This display assists users in selecting the optimal premium IOL.

To do this, the following parameters are taken into consideration:

1. overall corneal astigmatism,
2. total corneal spherical aberrations,
3. total corneal irregularities and
4. the influence of the posterior corneal surface.

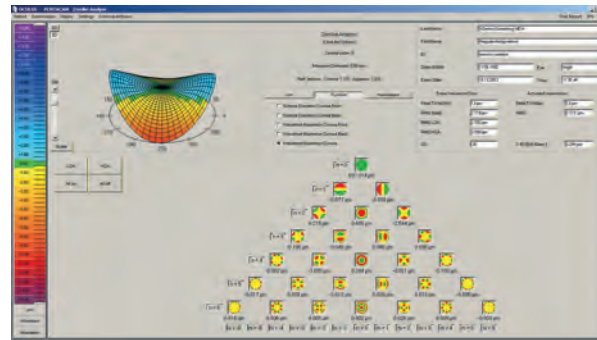
Pre-operative diagnostics is your success concept

For documentation of cataract progression and optimal surgery planning the Pentacam® provides cataract surgeons with comprehensive analysis options.



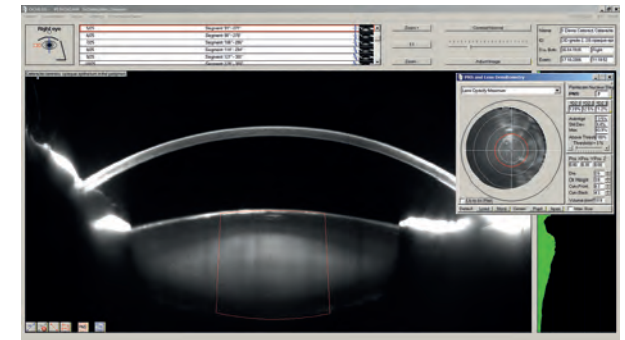
Refractive power distribution display

The table shows the refractive power of the cornea in various zones and rings. This allows for individual assessment of the influence of the posterior corneal surface on overall sphericity, toricity and irregularity of the cornea.



Normative Corneal Wavefront

The wavefront error of the cornea as a whole is calculated individually using ray tracing. Higher-order aberrations are calculated and represented in comparison to a normal population.



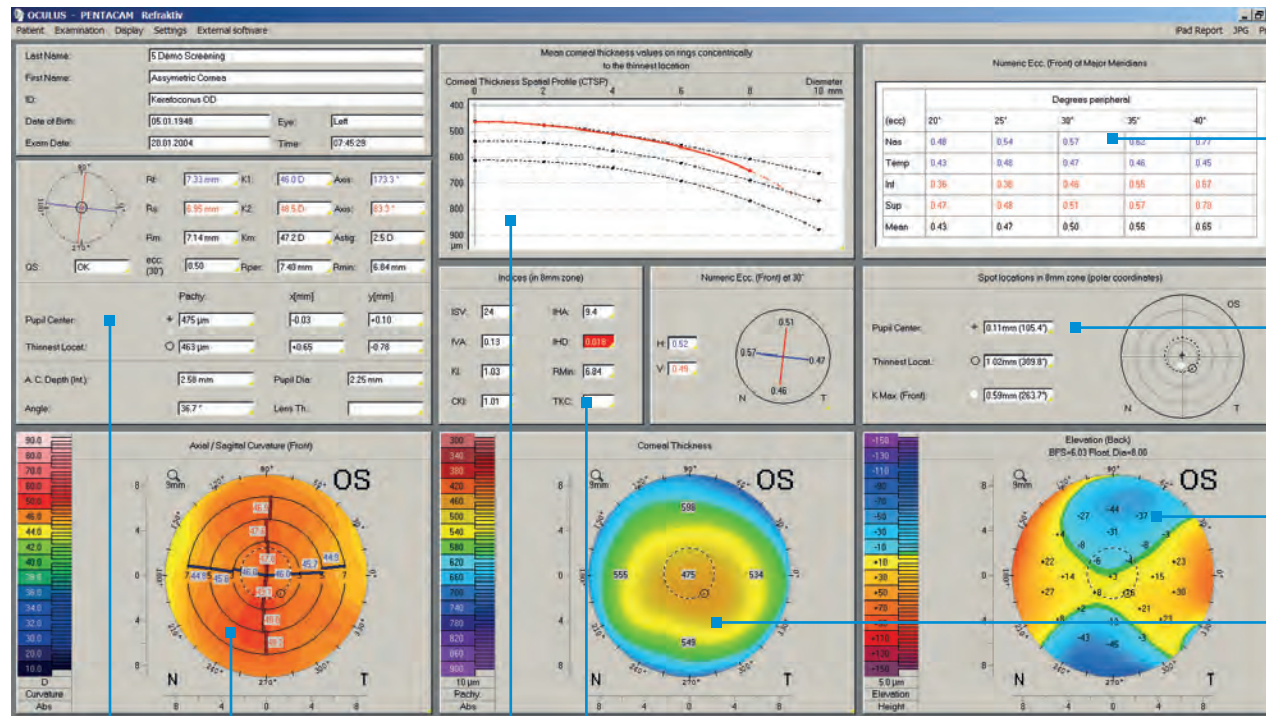
3D-Densitometry and PNS

Through blue-light illumination opacities of the natural lens become visible. Two- and three-dimensional quantification of lens opacification in the individual layers and of posterior capsular opacification is performed. The unique PNS (Pentacam® Nucleus Staging) function permits optimized ultrasonic energy output in phacoemulsification as well as optimized effective phaco time (EPT) in Femto assisted cataract surgery.

Refractive Screening

Planning refractive laser surgery

The Pentacam® measures the entire cornea from limbus to limbus non-invasively. This ingenious method is unaffected by tear film and it guarantees precise measurements of the corneal centre. You can benefit from the structured representation of all the parameters crucial for planning refractive surgery.



Corneal asphericity

Position of thinnest point
Position of pupil centre
Position of Kmax

Elevation map of posterior corneal surface

Corneal thickness map

Sagittal curvature map

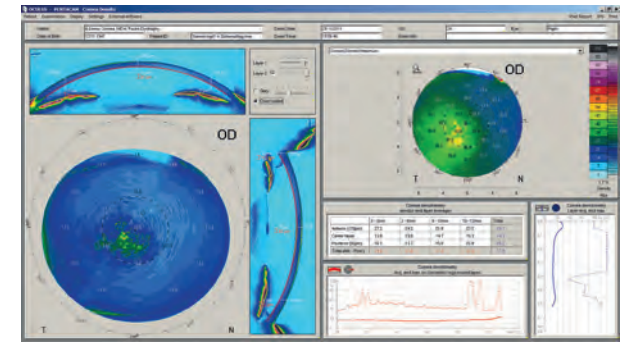
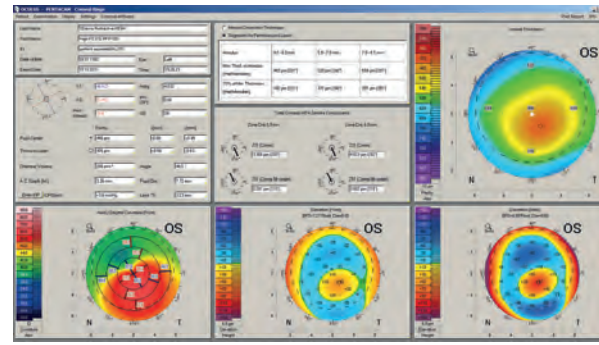
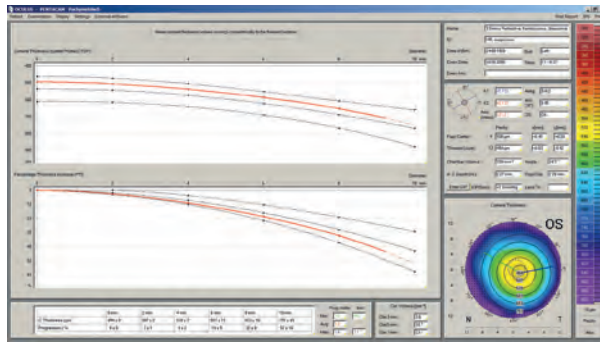
Topographic classification of anterior corneal surface

Keratometry and corneal thickness

Pachymetric Progression

Assess the entire cornea qualitatively and quantitatively

Corneal assessment involves more than mere topography. In fact it calls for holistic evaluation. The Pentacam® represents pachymetric progression, allowing for structural evaluation in this way. Optical densitometry facilitates targeted slit lamp examinations so as to enable you to detect diseases early on.



Pachymetric Progression

Starting at the thinnest point and moving in the direction of the periphery, corneal thickness progression is represented in the form of concentric rings. Using two diagrams, the display shows the patient's corneal thickness progression as compared to normative data. From this data the individual progression index is calculated, permitting early detection of ectatic abnormalities.

Corneal Rings

This display shows all the parameters necessary for planning corneal ring implantation. Dependent on the selected surgical procedure – manual dissection technique or femtosecond laser – corneal thickness is represented in specific areas and segments.

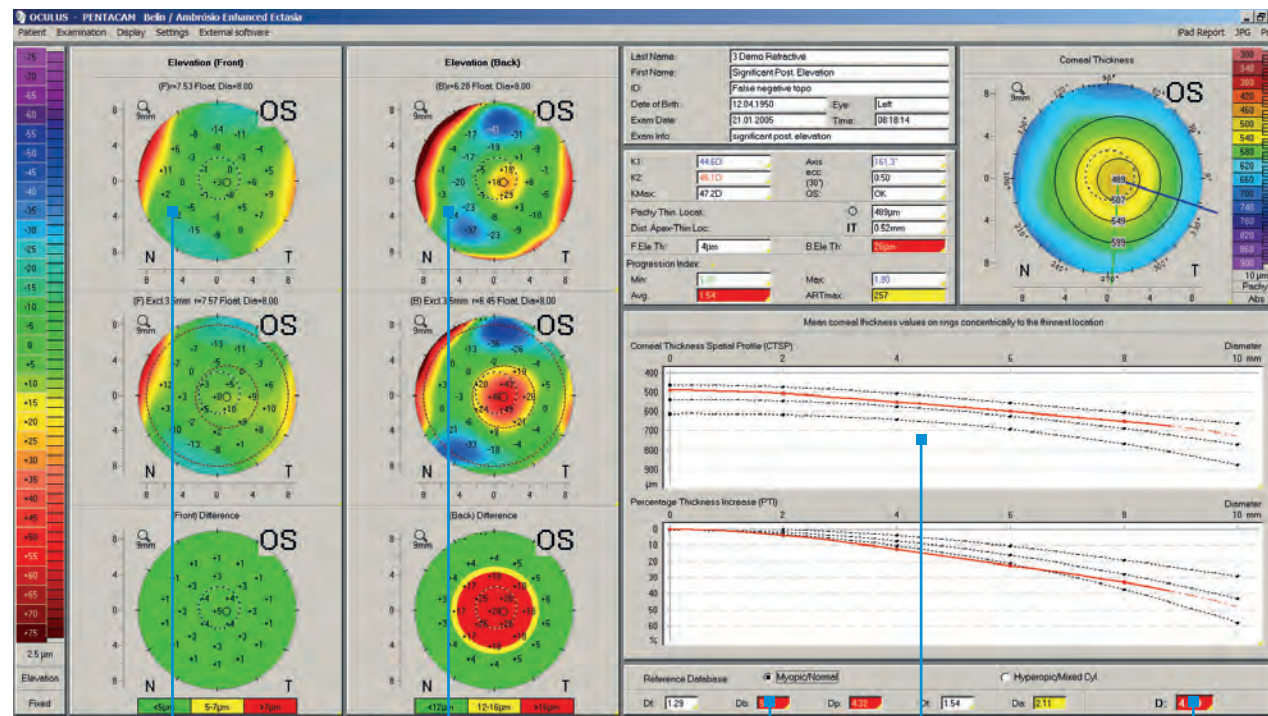
Corneal Optical Densitometry

Panorama images of the cornea make corneal diseases visible. This allows for objective quantification and follow-up. Optical densitometry can be evaluated using a table or a colour chart. In the table the measured values are represented according to various zones and layers. Corneal optical densitometry results are displayed in reference to published age-related normative data. This provides a basis for the detection of other diseases such as Fuchs' Dystrophy.

Optional Software Modules

The Pentacam®: individual and flexible

The flexibility of the software allows you to custom-configure your Pentacam®. You can add software supplements at any time, even after the first configuration has been carried out.



Calculation and analysis of standard and enhanced anterior elevation maps

Calculation and analysis of standard and enhanced posterior elevation maps

Deviation of individual parameters from normal data

Pachymetric Progression

Final factor for early detection of corneal ectasia

Belin/Ambrósio Enhanced Ectasia

In addition to keratoconus detection this screening is geared towards early detection of ectasia. Using this program structural pachymetric progression and the anterior and posterior corneal surface are evaluated. It also has a database for myopic and hyperopic eyes. All the individual parameters are consolidated in one final factor based on regression analysis.

The individual parameters and the final factor are represented in the colours white, yellow and red.

All Features at a Glance

Customize the OCULUS Pentacam®/Pentacam® HR to your own requirement

Software included

General Overview
Indices Report ✳
Topographical Keratoconus Classification
Topography Maps of the Anterior and Posterior Corneal Surface
Pachymetry Maps
4 Maps Refractive
Iris Image and HWTW
Comparison and Differential Analysis of 2 Exams
Tomography
Scheimpflug Image Overview

Optional evaluation functions

	My wish list	
	Pentacam®	Pentacam® HR
DICOM Interface	<input type="checkbox"/>	<input type="checkbox"/>

Optional examination functions

	My wish list	
	Pentacam®	Pentacam® HR
Cataract Software Package → Cataract Pre-OP Display → Corneal Power Distribution → Zernike Analysis and Normative Corneal Wavefront → PNS and 3D Cataract Analysis ✳ → Total Corneal Refractive Power → Automatic calculation of the anterior chamber angle in 360°, measurement based on Scheimpflug images → 4 Maps Topometric and 4 Maps Chamber → Show 2 Exams → Compare 4 Exams	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Refractive Software Package → Corneal Optical Densitometry ✳ → Corneal Rings → Fourier Analysis → Refractive → Pachymetric ✳ → 4 Maps Selectable → Show 2 Exams → Compare 4 Exams	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Belin/Ambrósio Enhanced Ectasia Display ✳	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Holladay Report	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Contact Lens Fitting	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3D pIOL Simulation Software and Aging Prediction ✳	n/a	<input type="checkbox"/>

✳ These functions are unique and are only available with the OCULUS Pentacam®/Pentacam® HR

These functions are included

These functions are optional

The Fascination of Technology

Ingenious yet simple

The Floating License Key – for maximum flexibility

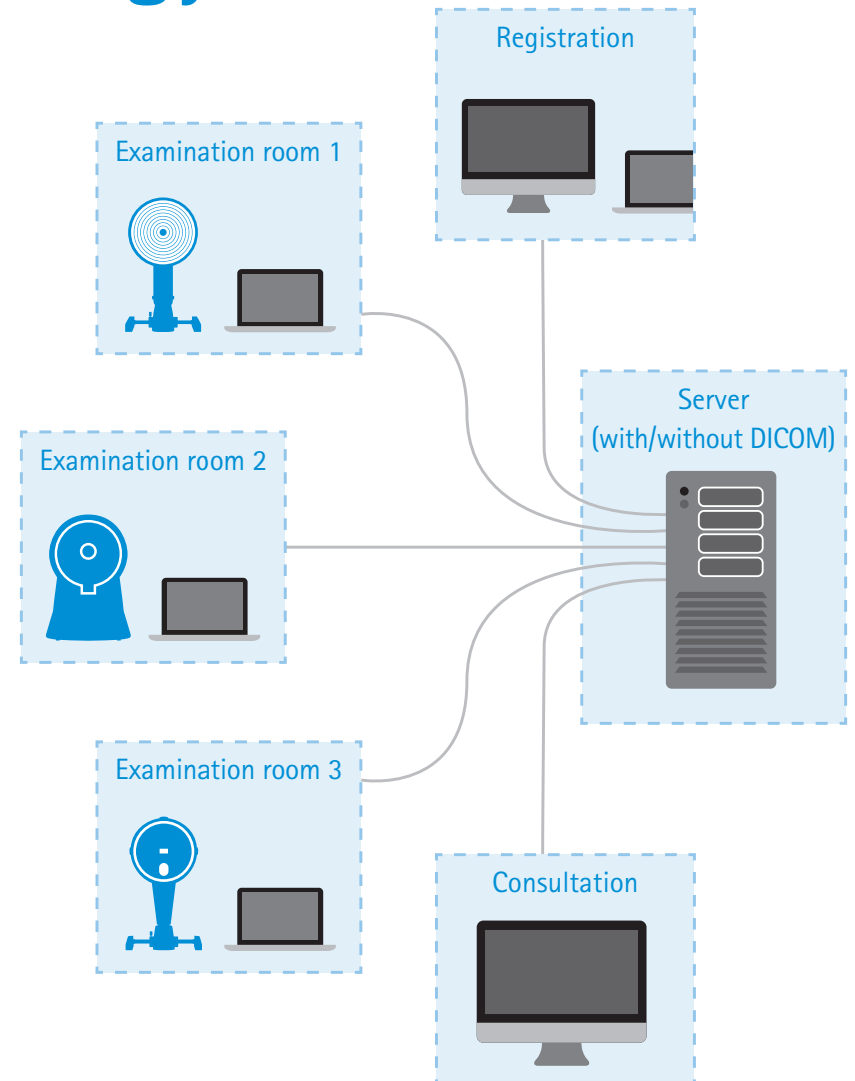
This basic Pentacam® software is already available at all workplaces in your network. You decide which optional examination and evaluation functions you need in addition. You also choose the number of optional evaluation software features which should be available simultaneously. The Floating License Key (FLK) activates the corresponding licenses and makes them available on your network. To help you decide what you need all the optional evaluation functions can be accessed 20 times for demonstration purposes.

Efficiency and productivity through networking

The OCULUS Patient Data Management system (PDM) optimises your work processes. It is always included in the scope of delivery; it organises patient and examination data from all OCULUS instruments. The PDM is network-compatible and can be incorporated into many Electronic Medical Record (EMR) systems. Needless to say, the OCULUS PDM communicates with the DICOM environment and makes results available in DICOM format.

Patient consultation

By using the Pentacam® Viewer-App for iPads you underscore your competence. Colour representations generated by the Pentacam® and two- and three-dimensional tomographic images make it possible to explain abnormalities to your patients in a clearly illustrated way as well as to discuss treatment options.



Technical Data

Pentacam®/Pentacam® HR

Scheimpflug Camera	Pentacam®	Pentacam® HR
Camera	digital CCD camera	digital CCD camera
Light source	blue LED (475 nm UV-free)	blue LED (475 nm UV-free)
Processor	DSP with 400m operations/s	DSP with 400m operations/s
Speed	50 images in 2 seconds ¹⁾	100 images in 2 seconds ²⁾
Measurement range	Pentacam®	Pentacam® HR
Curvature	3 to 38 mm 9 to 99 dpt	3 to 38 mm 9 to 99 dpt
Precision	± 0.2 dpt	± 0.1 dpt
Reproducibility	± 0.2 dpt	± 0.1 dpt
Operating distance	80 mm (3.1 in)	80 mm (3.1 in)
Technical specifications	Pentacam®	Pentacam® HR
Dimensions (W x D x H)	280 x 360 x 505-535 mm (11 x 14 x 20-21 in)	280 x 360 x 505-535 mm (11 x 14 x 20-21 in)
Weight	10.5 kg (23.1 lbs)	11 kg (24.3 lbs)
Max. power consumption	50 W	50 W
Recommended computer specifications	Win 7 pro, 2.7 GHz, 8 GB RAM, 1 TB HDD, NVIDIA graphic board (1024 x 768 true colour), USB interface	Win 7 pro, 2.7 GHz, 8 GB RAM, 1 TB HDD, NVIDIA graphic board (1024 x 768 true colour), USB interface

¹⁾ Scheimpflug image of the entire anterior segment

²⁾ Cornea fine scan

CE₀₁₂₃ in accordance with Medical Products Directive 93/42/EEC

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OCULUS is certified by TÜV according to
DIN EN ISO 13485

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