OCULUS Keratograph 5M
Topographer
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Topographer

The multi-purpose topographer has become an integral part of the ophthalmology and optometry practices. User independent measurements provide reliable data, clear analysis and full documentation. Clear and easy-to-understand representations facilitate communication with your patients and ensure an efficient workflow.

“The Keratograph 5M is one of the most versatile instruments that we have in our practice. It is highly valuable and efficient for a very busy and technology-driven eye care practice such as ours.”
Barry Eiden, O.D., USA

“The Keratograph – with easy handling when it comes to performing meibography and excellent quality images really won me over!”
Elisabeth Messmer, M.D., Germany

“In my clinic we use the automated pupillometry of the Keratograph for more accurate diagnosis of mild concussions. The examination takes one minute to complete. One minute for clinicians to reduce neuropsychological problems among athletes.”
Rolando Toyos, M.D., USA

“The Keratograph 5M combines so many essential diagnostic functions in one device that I cannot imagine practicing without it. It is indispensable for managing complex CL fits and is an invaluable diagnostic and patient management tool that drives and differentiates my dry eye center.”
Art Epstein, O.D., USA

“The information that I get from this instrument plays a very important role in the fitting of all forms of rigid gas-permeable contact lenses, as well as, the simple fits of everyday soft lenses.”
Chris Eksteen, DipOptom, South Africa

“I use the Keratograph imaging tool to assess the fit of contact lenses without any additional fluorescein!”
Sebastian Marx, Dipl. Eng., Germany
OCULUS Keratograph 5M

Measurements With Placido Ring Illumination
White ring illumination is used to measure thousands of points on the entire corneal surface. Infrared ring illumination is also available for analyzing the tear film in order to prevent reflex tear secretion caused by glare.

LED Measurements
The Keratograph 5M proudly offers the perfect illumination for each function: White diodes for tear film dynamics, blue diodes for fluorescein images and infrared diodes for meibography.
Topography
Quick, Precise and Clear

Aside from topography and automatic keratoconus detection, the Keratograph 5M provides a large contact lens database and detailed analysis for daily practice. The built-in keratometer and automatic measurement ensure the utmost accuracy and reproducibility. After completing the measurement, the overview display provides a comprehensive outline.
Fourier Analysis

The refractive power of the front surface of the cornea consists of different components. The Fourier Analysis identifies and shows them in the following color maps:

- Spherical component
- Decentration
- Regular astigmatism
- Irregularities

Pathological changes can be quantified and possible effects on visual acuity can be explained.

Zernike Analysis

Zernike polynomials are adapted to the elevation data of the cornea, which is crucial for locating the apex. The apex position is labelled with a cross. This display shows you if a rear surface toric lens is applicable to the particular case. Zernike polynomials and the aberration coefficient give you important indications of the imaging quality of the corneal surface.

Keratoconus Detection

Keratoconus classification is based on multiple parameters. The indices display merges these parameters. The colored label illustrates abnormal values. To facilitate follow-ups, temporal changes of the parameters are shown side by side in a table. The Amsler-Krumeich classification system is applied to the keratoconus domains.
Complete Documentation

Follow-ups provide reliability

Follow-ups require comparison of several examinations. The Keratograph software can easily detect and document the changes. Regular follow-up examinations provide reliability and increase the trusting relationship between you and your patient. The Keratograph software contains both data and image documentation.

Comparing Examinations

The "comparing three examinations" display shows changes over a period of time, for example, monitoring the progression of Keratoconus. Choose between sagittal and tangential curvature and between elevation data and refractive power maps. Use the "comparing two examinations" display for the right/left or before/after comparison. The easy-to-understand displays help you describe even complex contexts to your patient.
A picture is worth a thousand words!

The Keratograph 5M contains features that offer optimal conditions for your image documentation, such as, the high-resolution color camera and different illumination options. An image aids in communication and patient education, thus eliminating the need for long explanations. You save time with only one mouse click.

Precise Measurements Instead of Rough Guesses

The Keratograph 5M is the ideal device for professional documentation. The imaging software includes features, such as,
- magnification function
- hand tool
- measuring tool
- angle measurement

Pathological changes can be exactly localized, and changes in size can be determined. This ensures that patient questions will be answered.

High-Resolution Images

You can visualize the wettability of contact lenses and determine the exact rotation of toric lenses. It is also possible to detect lipids and deposits on the lens surface, as well as, corneal staining or vascularization. Show your patients images they have never seen before.

Reliable Diagnosis

The classification of corneal staining requires highly skilled examiners. It is difficult to estimate the number of hyper-fluorescent dots on the corneal surface, but the integrated JENVIS grading scale facilitates this evaluation. Every image taken can be compared with a sample image on the screen. Vessel injections can also be evaluated and documented in this way.
Contact Lens Fitting
Professionalism through innovation

In the Lens Fitting display, the best fitting lens is selected from the large database and is listed on the right hand column. Based on the topographic data, a simulated fluorescein image of this particular lens is created. You can take real fluorescein images with the Keratograph 5M and compare them with the simulated images.

- Selection between RGP and soft lenses
- Contact lens suggestion from the large database
- Subjective refraction data and CVD conversion
- Keratometric data, diameter of the cornea and pupil, fixation deviation
- Distance of major meridians of the cornea from the lens
- Eccentricity values for both major meridians
- Simulated fluorescein image of a toric RGP lens
Multifocal, Bifocal, Toric

With the Keratograph 5M you can quickly and precisely measure all of the data needed for multifocal, bifocal and toric contact lenses. These measurements also facilitate the fitting of multifocal or bifocal lenses. Furthermore, the Keratograph 5M software can be linked to fitting programs of various contact lens manufacturers.

Pupillometry

Using the “Pupillometry” option is a quick and easy way to measure the pupil size of your patients under different illumination conditions. This option not only supports you when fitting multifocal lenses, but also when measuring the optical zone before refractive or cataract surgery.

Near-Portion Height Measurement

The near-portion height of RGP bifocal lenses can be simulated and precisely determined with this software, even before ordering the first-fitting lens. This also facilitates the complex fitting of multifocal lenses.

Palpebral Angle Measurement

The imaginable angle of the nasal side of the lower eyelid can be measured to determine the expected nasal rotation when fitting lenses for correcting astigmatism.
OxiMap®

Visualizing the oxygen transmissibility of soft lenses

An intact tear film and good oxygen supply to the cornea are essential for comfortable lens wear. The OxiMap® displays the oxygen transmissibility of soft lenses in different colors depending on the optical power and is easy to understand and share with your patients.

Influence of Contact Lens Wearing Time

The oxygen transmissibility is an important quality criterion of soft lenses. It is indicated as Dk/t value, and has a significant influence on the recommended lens wearing time. The higher the Dk/t value, the more oxygen gets through the lens to the cornea. Oxygen transmissibility changes depending on the material and the optical power of the lens.

Only measurements of oxygen transmissibility in the center of a lens with -3.00 dpt were available so far. For the first time, the OxiMap® integrated in the Keratograph 5M displays Dk/t values over the entire surface depending on the contact lens power. You choose the lens type and the respective power. The OxiMap® is projected on the image of the eye and you can immediately see if the selected lens is suitable for wearing overnight, for example. Explain to your patient the advantages of modern contact lenses.

The recommendations and Dk/t values stated \( \times 10^{-9} \frac{cm^2/sec}{mL \cdot mL \times mm \cdot Hg} \) refer to:

TF-Scan
Non-invasive evaluation of tear film break-up time

The non-invasive tear film break-up time (NIKBUT) measures tear film stability. The NIKBUT is automatically measured within seconds, without fluorescein application. Human eyes are not able to perceive infrared illumination. Glare and reflex tear secretion are therefore avoided during the examination. The TF-Scan presents the results in an easy to understand display for you and your patients.

The TearMap shows the affected areas: The respective break-up time is graphically illustrated for each segment in seconds similar to the principle of a traffic light.

The graph shows percent of the examined area during the measuring period.

Data field showing tear film break-up time (NIKBUT) in seconds and the corresponding classification.

You can replay the video after the measurement. The break-up areas detected by the software are highlighted accordingly.
Quantity and Quality of the Tear Film

The high-resolution color camera makes the smallest structures visible. This enables you to measure the tear meniscus height, evaluate the lipid layer, and the tear film dynamics. You gain valuable information about tear film break-up time and the quantity and quality of the tear film.

Tear Meniscus Height

Never has a precise measurement been so easy. You can evaluate the course of the tear meniscus along the eyelid by means of the new infrared illumination and precisely measure the tear meniscus height with the built-in ruler. Different magnification levels facilitate measurement and the resulting value is automatically saved in the patient file.

Evaluation of Lipid Layer

Hyper-evaporative dry eye is easily overlooked when using conventional tests. Thus evaluating the lipid layer of the tear film is even more important. With the Keratograph 5M you can record videos of interference patterns of the lipid layer. Distribution characteristics, morphology and thickness of the lipid film can be continuously evaluated.

Tear Film Dynamics

The tear film contains numerous particles. These can be made visible using a specific light source. These particles are distributed in the tear fluid from bottom to top during each blink. The velocity of these particles provides information on tear film viscosity. You can quickly and easily evaluate the quantity and movement of these tear film particles using the TF-Scan.
Meibo-Scan
Meibography of the upper and lower eyelid

The new multi-functional Keratograph 5M easily and efficiently integrates difficult examinations such as meibography. The Meibomian Gland Dysfunction (MGD) is the most frequent cause of dry eye. Morphological changes in the gland tissue are made visible using the Meibo-Scan.

Easy Operation Through Optimum Working Distance

The Keratograph 5M enables a greater working distance in the examination of the eyelids. This makes it easy to evert the upper and lower eyelid and to assess the Meibomian glands.

Convincing Images for Reliable Evaluation

Different views can be selected for a precise analysis of the Meibomian glands. The staff can easily perform this evaluation due to the labelling of the individual examination field and the high-contrast display.
## All Features at a Glance

Customize the OCULUS Keratograph 5M to match your exact needs!

### Software included
- Topography
- Lens rear surface measurement
- Overview Display
- Color maps
- 4 maps selectable
- Camera image
- 3D view
- Fourier Analysis
- Zernike Analysis
- Indices
- Elevation map
- Corneal asphericity
- Contact lens fitting
- Two examination display
- Two examination comparison
- Three examination comparison
- TF-Scan
- Contact lens package

### Optional examination functions

<table>
<thead>
<tr>
<th>My wish list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meibo-Scan</td>
</tr>
<tr>
<td>Meibography of upper and lower eyelid</td>
</tr>
<tr>
<td>Pupillometry</td>
</tr>
<tr>
<td>Examination of pupillary response using the pupillometer, asymmetry test and manual measuring mode</td>
</tr>
<tr>
<td>Imaging</td>
</tr>
<tr>
<td>Image and video documentation with fluorescein imaging, near-portion height measurement and eyelid angle measurement</td>
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</tbody>
</table>

### Optional evaluation functions

<table>
<thead>
<tr>
<th>My wish list</th>
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</thead>
<tbody>
<tr>
<td>OxiMap®</td>
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<tr>
<td>Graphic display of oxygen transmissibility (Dk/t value) of soft lenses</td>
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</table>
## Technical Data

### OCULUS Keratograph 5M

<table>
<thead>
<tr>
<th>General Information</th>
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<tbody>
<tr>
<td><strong>Precision</strong></td>
<td>± 0.1 dpt</td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>± 0.1 dpt</td>
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<tr>
<td><strong>Number of rings</strong></td>
<td>22</td>
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<tr>
<td><strong>Working distance</strong></td>
<td>78 / 100 mm</td>
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<tr>
<td><strong>Number of evaluated data points</strong></td>
<td>22,000</td>
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<tr>
<td><strong>Camera</strong></td>
<td>Digital CCD camera</td>
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<tr>
<td><strong>Illumination source</strong></td>
<td>Placido illumination: white diodes</td>
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<tr>
<td></td>
<td>Placido illumination: infrared diodes (880 nm)</td>
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<tr>
<td></td>
<td>Imaging illumination: blue diodes (465 nm)</td>
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<tr>
<td></td>
<td>Meliography: infrared diodes (840 nm)</td>
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<tr>
<td></td>
<td>Tear film dynamics: white diodes</td>
</tr>
<tr>
<td></td>
<td>Pupilometry illumination: infrared diodes (880 nm)</td>
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</table>

<table>
<thead>
<tr>
<th>Technical specifications</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Dimensions (WxDxH)</strong></td>
<td>275 x 320 - 400 x 485 - 512 mm (10.8 x 12.6 - 15.7 x 19.1 - 20.2 in)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>3.2 kg (7.1 lbs) (measuring equipment) 6.1 kg (13.5 lbs) (with xy base)</td>
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<tr>
<td><strong>Max. power consumption</strong></td>
<td>25 W</td>
</tr>
<tr>
<td><strong>Voltage</strong></td>
<td>90-264 V AC</td>
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<tr>
<td><strong>Frequency</strong></td>
<td>47-63 Hz</td>
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<tr>
<td><strong>Minimum PC requirements</strong></td>
<td>Processor: Intel Core i3 or better, 4GB main memory, Hard disk: 500GB and more, graphics card: Intel HD Graphics 2000 or better, recommended screen resolution: 1920 x 1080 (full HD)</td>
</tr>
</tbody>
</table>

In accordance with Medical Device Directive 93/42/EEC