

By Professor Georg Rainer, MD



# The KR-1 Kerato-Refractometer: A Fully-Automated Visual Assessment Instrument

**E**yecare must continuously adapt to keep up with the increasing demands and expectations of patients and physicians. In today's fast-paced, highly digitalized environment, speed, accuracy, and convenience are high on this list of expectations. A new generation of automated kerato-refractometers, such as the KR-1 from Topcon Medical Systems, (Oakland, NJ), offers a 21st century ophthalmic solution, by amalgamating essential ophthalmic functions into an innovative digital instrument.

## A flexible approach to patient examination

Automated refractors offer a level of accuracy and repeatability that manual refractors cannot. By allowing refractive readings to be taken automatically, these devices remove the scope for user error during eye examinations. Patients simply have to look into the device, focus on an image within, and the machine does the rest – auto-adjusting the image focus until an accurate estimation of a patient's refractive power is determined. As the whole process is automated, the machine can determine when the image falls perfectly on the retina without any need for patient interaction. This makes it an ideal device for examining children and other patients who are unable to clearly communicate their level of vision.

Using an automated refractor also minimizes the risk of transcription errors as the machine calculates an estimated prescription at the end of the

examination. This prescription can be printed out immediately or sent to an EMR – saving time and removing the possibility of handwriting-based prescription interpretation errors. Once an estimated prescription is made, it can be refined further with a traditional phoropter.



**Figure 1: The KR-1 features a 360° rotatable monitor which gives the operator added flexibility in positioning the instrument.**

## The next step

When the action of an automated refractor is combined with a keratometer, an automated kerato-refractometer is born. These devices offer the same high-speed, accuracy, and repeatability as autorefractors, but also allow the performance of in-depth analysis of corneal shape and curvature – a particularly useful function for assessing

astigmatism severity and axis. Although fully-automated, new-generation kerato-refractometers also have additional settings for patients with specific ophthalmic conditions, such as cataracts. This ensures that all measurements taken are adequately adjusted for ocular variables. But, if a patient has a condition that the physician believes may complicate an automatic assessment, the option exists to change the operating mode from automatic to manual. In this mode, the operator can manually select the best ocular position from which to obtain the refractive data desired.

The KR-1 is a prime example of an automatic kerato-refractometer designed with today's digitally-inclined user in mind. Its color touchscreen control panel optimizes user convenience and eliminates the need for the use of a control lever during an examination. Viewing of all images captured is simple as ocular data can be viewed on the device's screen. Alternatively, the user can connect a TV monitor or video printer to the KR-1, allowing him or her to zoom into and print out ocular images as needed. I have found this function to be particularly useful in clinics as it assists the assessment process and enhances the ease with which patients can be educated about their condition and treatment.

## Diagnostic confidence via high accuracy and repeatability

Since making the change from a semi-automatic to a fully-automated kerato-refractometer, I have noticed significant time savings and more effective patient flow during clinics. The benefits of these devices extend beyond high speed and accuracy. The KR-1, for example, features a compact, space-saving design that is both stylish and user-friendly. Users of the device can capture highly precise measurements of corneal curvature radius and refractive power; in addition to viewing corneal shape maps displayed in full color. As the device has a 360° rotatable monitor, the KR-1 can be physically incorporated into the area of the examination room that best suits the operator and repositioned around the patient as needed.

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This ensures maximum operator access to the patient without compromising patient comfort. Additional features that also maximize patient comfort include a streamlined design, headrest, and 5° optical head incline.

Refractive patients who wear contact lenses have much to gain from examination with an auto kerato-refractometer. These devices permit precise measurements to be taken from the whole cornea and this ensures that contact lens fitting is virtually tailor-made. The KR-1, for example, features Topcon's exclusive Rotary Prism Measuring System – a technology that enables all measurements captured by the device to be achieved with the highest degree of accuracy and reliability, even in pupils as small as 2 mm.



**Figure 2: The KR-1 features fully automated measurement and Topcon's rotary prism technology for enhanced accuracy. All measurements are displayed on the color touchscreen for added operator convenience.**

## Focus on improvement not novelty

In today's fast changing technologic environment, it is easy for emphasis to be put on novelty rather than need. The kerato-refractometer is an essential tool in the standard ophthalmic and optometric practice and automation and

digitalization of this device ensures that its long-established utility is enhanced rather than overtaken by novelty. Having used kerato-refractometers for many years, I am excited about the improvements offered by the new generation kerato-refractometers. As these improvements ameliorate key problems faced by clinicians, such as time management, clinic workflow, and patient education, I believe that these devices are of high importance in any ophthalmic or optometric clinic today. I look forward to continuing to improve the efficiency of my practice with them.

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## Function & Aesthetics



### Combined in the **NEW KR-1** Auto Kerato-Refractometer



#### Features:

- » Flexible layout and space saving design
- » 360 degree rotatable color touch screen panel
- » Fully automated acquisition & measurement
- » Comfortable design for patients
- » Topcon's Rotary Prism Technology for reliable, reproducible results

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