Keratron®

OPTIKON™
Man and Technology

REF 161104

The Standard in Corneal Topography

The first topography unit to accurately represent the local curvature calculated by an “Arc-Step”method.

Because of its outstanding precision, test repeatability and capability to highlight even the smallest details, the Keratron® represents a standard of reference in corneal topography.

The 28-ring Placido cone allows coverage up to the 80-90% of the corneal surface. The peripheral measurements are extremely important for the analysis of the transition areas in refractive surgery, for the correct simulation of contact lens fitting and for the diagnosis of peripheral alterations.

The “Arc-Step” calculation method, as well as many other proprietary algorithms in the software, allows the measurement of both curvature and height at each point on the cornea with a resolution of one micron or less.

The patented Eye Position Control System (EPCS) allows image acquisition only at the correct focusing distance; and lateral misalignments are automatically corrected. The large, high-resolution monitor clearly displays the tear film and the still images during examinations, in order to avoid artifacts. It also allows the review of images previously acquired.

The “Keratron® Bridge” supplies power to the Keratron® videokeratoscope and performs the frame capturing of acquired images, making it fully independent from the PC. The USB port interface allows its connection with any modern PC, either desktop or laptop. All Optikon topographers use the same software, which is compatible with most recent Windows operating systems.

TECHNICAL FEATURES Keratron®

VIDEOKERATOSCOPE

- **AREA OF ANALYSIS**
  10mm x 14mm (visible on the monitor)
- **KERATOSCOPE CONE**
  28 border mires, equally spaced on a 43D sphere
- **ANALYZED POINTS**
  over 80.000
- **MEASURED POINTS**
  7168
- **CORNEAL COVERAGE**
  From 0.33mm (minimum diameter on a 43D sphere) up to 11mm on a normal eye
- **MEASURED AREA**
  90% of the corneal surface (normal eyes)
- **DIOPTRIC POWER RANGE**
  From 1D to over 120D
- **RESOLUTION**
  +/- 0.01D - 1 micron
- **FOCUSING DEVICE**
  Eye Positioning Control System EPCS (patented) automatic acquisition, with decentration correction
- **TV CAMERA**
  High resolution (C.C.I.R.)
- **MONITOR**
  6” B&W
- **OTHER FEATURES**
  Automatic OD/OS detection, Placido ring image available on the B&W screen
- **WEIGHT**
  11 Kg
- **ACCESSORIES INCLUDED**
  Table top with head rest, calibration kit, footswitch, Scout software

KERATRON® BRIDGE UNIT

- **POWER SUPPLY**
  Mains (100-110 or 220-240 Vac, 50/60Hz) to Videokeratoscope (+5, +12, -12Vdc)
- **IMAGE ACQUISITION**
  Acquisition through footswitch and EPCS, digital conversion and storage (freeze) on B&W monitor
- **PC-VK LINK**
  Through USB port
- **SOFTWARE**
  Scout release 3.2 or higher

COMPUTER (Recommended Minimal Requirements)

- **ENVIRONMENT**
  MS Windows 2000/XP/Vista/7
- **PROCESSOR/MEMORY**
  Pentium III 450MHz, minimum 64 Mb RAM
- **DISKS**
  Internal 10 Gb HD, internal 8x CD-Rom, drive 3 1/2” - minimum 1.44Mb
- **MONITOR**
  Super VGA color monitor 14”, 1024x768 points, 16 million colors
- **PRINTER**
  Color printer
- **PORT**
  USB Port

SOFTWARE

- **DIOPTRIC SCALE**
  Absolute, Normalized, Adjustable
- **KERATOMETRIC VALUES AND INDICES**
  Sim K-readings, Meridians, Hemimeridians, Maloney Indices, Eccentricity, CLMI Keratoconus indices
- **PUPIL**
  Photopic and Scotopic
  Border detection, diameter and decentration
- **ZONES AND GRIDS**
  3,5 and 7 mm, orthogonal axis or millimeter grid
- **MAPS**
  Local curvature, axial curvature, wavefront OPD or Wfe refraction map with 3D insert
- **MOVE AXIS**
  Position of the axis selectable as corneal vertex, pupil center or any other choice
- **PRINT**
  Print screen with header of the institution, or personalized print templates
- **SPECIAL FUNCTIONS**
  Profiles, difference, repeatability check, maps comparison, caliper, refraction calculator
- **IMAGE ACQUISITION AND MOVIES**
  Enabled with TV camera mounted on a slit lamp and video capture board (not included)
- **ON-LINE HELP**
  Detailed on-line multi-language help detailed for all functions
- **CONTACT LENS**
  Fluorescein pattern simulation of most of international contact lens manufacturers’ geometries
  Tilting to simulate lid pressure
  Lens displacement in any position.
  Eccentricity measured at 6 and 8 mm, over-refraction calculator.
  Personalized auto-fit for customized lens
  Adjustable clearance scale.
  Link to third party software.
- **INTERNET CONNECTION**
  Maps can be sent as attachments to e-mail messages
- **LOCAL NETWORK AND DATABASE**
  Management of one or more independent databases shareable in a network

OPTIONS

- **FAR MIRES CONE**
  For deep set eyes. 28 mires are 3mm more recessed than standard cone. Coverage 75-80% of cornea
- **KERATRON® BRIDGE**
  Upgrades Keratron® using internal FGB, in order to use USB connection and updated Scout software

REGULATORY

- **CE MARK**
  Directive 93/42/CEE

REF 161204

Accuracy and Flexibility

Fig. 1

Fig. 2

Fig. 3

KERATRON® SCOUT INTRA-OPERATIVE

With trolley base, weight-balanced arm and disposable sterile covers.

KERATRON® SCOUT FIXED

To fit on any slit lamp or on its own optional x-y-z base with chinrest.

KERATRON® SCOUT PORTABLE

Equipped with headrest and battery power supply module Keratron® Scout widens Optikon's line of corneal topographers to serve users who need a compact, transportable instrument.

Advanced industrial design and high miniaturization technology has resulted in a practical and manageable unit which keeps the features of precision measurement and reliability that have made the Keratron® the reference topographer in the field.

The Keratron® Scout's operability can be adapted to the user's requirements through a variety of options.

On a slit lamp (Fig 1): By means of a slide adaptor plugged in the tonometer socket, the operator can use the joystick of the lamp in order to precisely align the instrument.

The Scout can be pivoted out of the way in a lateral position with the slide completely lengthened so the slit lamp can be used without its interference. (Fig. 2)

By inserting a battery power supply module into its base the Scout becomes portable. Measurements are easy to acquire and reliable because of the headrest device (Fig.3) and the "repeatability check" feature.

The intra-operative weight-balanced arm (Fig. 4) allows easy alignment of a reclining patient's eye even if the patient is not able to fixate. The degrees of movement of this system, combined with controls available to the operator at the display, and software features like the "Move axis," make intra-operative use very easy. The sterile disposable covers guarantee sterility of the operating field.

Fig. 4

TECHNICAL FEATURES Keratron® Scout

CONFIGURATIONS

- **PORTABLE**
  Battery or cable operated
- **FIXED**
  Easily mounted on any slit lamp
- **INTRAOPERATIVE**
  Balanced arm surgical trolley, disposable sterile plastic covers

VIDEOKERATOSCOPE

- **AREA OF ANALYSIS**
  10mm x 14mm (visible on the monitor)
- **KERATOSCOPE CONE**
  28 border mires, equally spaced on a 43D sphere
- **ANALYZED POINTS**
  Over 80.000
- **MEASURED POINTS**
  7168
- **CORNEAL COVERAGE**
  From 0.33mm (minimum diameter on a 43D sphere) up to 11mm on a normal eye
- **DIOPTRIC POWER RANGE**
  From 1D to over 120D
- **RESOLUTION**
  +/- 0.01D - 1 micron
- **FOCUSING DEVICE**
  Eye positioning Control System EPCS (patented) automatic acquisition, with decentration correction
- **OTHER FEATURES**
  "OK" button and OD/OS acquisition keys, reverse OR keys, low-power standby function, tiltable mires cone (0°-10°)
- **TV CAMERA**
  High resolution (C.C.I.R.)
- **MONITOR**
  4" B&W
- **WEIGHT**
  1 Kg approx
- **ACCESSORIES INCLUDED**
  Calibration set, Scout software

COMPUTER (Recommended Minimal Requirements)

- **ENVIRONMENT**
  MS Windows 2000/XP/Vista/7
- **PROCESSOR/MEMORY**
  Pentium III 450MHz, minimum 64 Mb RAM
- **DISKS**
  Internal 10 Gb HD, internal 8x CD-Rom, drive 3 1/2" - minimum 1.44Mb
- **MONITOR**
  Super VGA color monitor 14", 1024x768 points, 16 million colors
- **PRINTER**
  Color printer
- **PORT**
  USB Port

SOFTWARE

- **DIOPTRIC SCALE**
  Absolute, Normalized, Adjustable
- **KERATOMETRIC VALUES AND INDICES**
  K-readings, Meridians, Hemimeridians, Maloney Indices, Eccentricity
- **PUPIL**
  Photopic and Scotopic
  Border detection, diameter and decentration
- **ZONES AND GRIDS**
  3,5 and 7 mm, orthogonal axis or millimeter grid
- **MAPS**
  Local curvature, axial curvature, wavefront OPD or Wfe refraction map with 3D insert
- **MOVE AXIS**
  Position of the axis selectable as corneal vertex, pupil center or any other choice
- **PRINT**
  Print of the axis selectable as corneal vertex, pupil center or any other choice
- **SPECIAL FUNCTIONS**
  Profiles, difference, repeatability check, maps comparison, caliper, refraction calculator

- **IMAGE ACQUISITION AND MOVIES**

  Enabled with TV camera mounted on a slit lamp and video capture board (not included)
- **ON-LINE HELP**

  Detailed on-line multi language help detailed for all functions
- **CONTACT LENS**

  Fluorescein pattern simulation of most of international contact lens manufacturers' geometries. Tilting to simulate lid pressure.

  Lens displacement in any position.

  Eccentricity measured at 6 and 8mm, over-refraction calculator.

  Personalized auto-fit for customized lens

  Adjustable clearance scale. Link to third party software.
- **INTERNET CONNECTION**

  Maps can be sent as attachments to e-mail messages
- **LOCAL NETWORK AND DATABASE**

  Management of one or more independent databases shareable in a network

ACCESSORIES

- **DOCKING BASE**

  Power supply for videokeratoscope, EPP or USB (with interface) connection to the computer battery charger, slit lamp kit
- **SLIT LAMP KIT**

  Slit lamp attachment for tonometer hole D=8mm, connection cable
- **OPERATING ROOM TROLLEY**

  Balanced arm trolley and PC interface
- **FAR MIRES CONE**

  Foor deep set eyes. 28 miresare 3mm more recessed than standard cone. Coverage 75-80% of cornea
- **OPERATING ROOM DISPOSABLE PLASTIC COVERS**

  Disposable sterile plastic covers for standard and/or far cone

- **BATTERY/HEAD REST MODULE**

  Can be connected to videokeratoscope for hand held operation.

  Battery 1200mAh (1 hour)
- **INTERFACE USB/EPP**

  Interface for USB (PC) with EPP (docking base)

REGULATORY

- **CE MARK**

  Directive 93/42/CEE

REF 161301

Keratron® Piccolo

- **Miniaturization: Keratron® technology for everyone**
- **Portable and compact**
- **Portable cable supplied.**
- **Fits on any slit lamp.**
- **Keratron capability;same precision,same repeatability,same corneal coverage.**
- **Eye position is controlled using PC monitor image.**

Keratron® Piccolo mounted on a slit lamp

TECHNICAL FEATURES Keratron® Piccolo

CONFIGURATIONS

- **PORTABLE**
  Easily mounted on any slit lamp

VIDEOKERATOSCOPE

- **AREA OF ANALYSIS**
  10mm x 14mm (visible on the monitor)
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  28 border mires, equally spaced on a 43D sphere
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- **DIOPTRIC POWER RANGE**
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- **RESOLUTION**
  +/- 0.01D - 1 micron
- **FOCUSING DEVICE**
  Eye Positioning Control System EPCS (patented) automatic acquisition, with decentration correction
- **TV CAMERA**
  High resolution (CCIR)
- **OTHER FEATURES**
  Tiltable mires cone (0°-10°)
- **WEIGHT**
  1 Kg approx.
- **ACCESSORIES INCLUDED**
  Calibration set, Scout software

COMPUTER (Recommended Minimal Requirements)

- **ENVIRONMENT**
  MS Windows 2000/XP/Vista/7
- **PROCESSOR/MEMORY**
  Pentium III 450MHz, minimum 64 Mb RAM
- **DISKS**
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  Super VGA color monitor 14”, 1024x768 points, 16 million colors
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SOFTWARE

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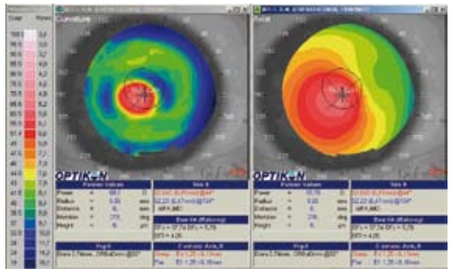
REGULATORY

- **CE MARK**
  DIRECTIVE 93/42/CEE

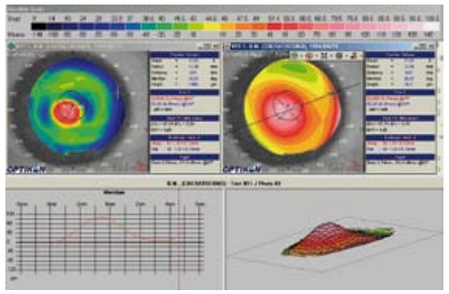
TOPOGRAPHIC CORNEAL MAPS



LOCAL CURVATURE AND AXIAL MAPS

- **KERATOCONUS**

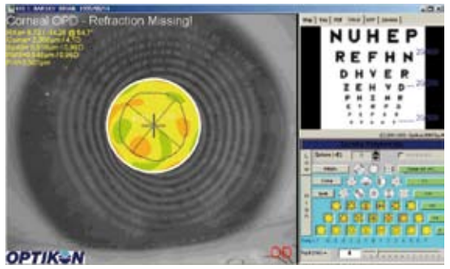
  The local curvature maps reveal the slightest details that are hidden by axial maps, thus allowing a careful diagnosis even in presence of peripheral or small localized phenomena.



HEIGHT MAPS (SPHERICAL OFFSET)

- **HEIGHTS, 3D**

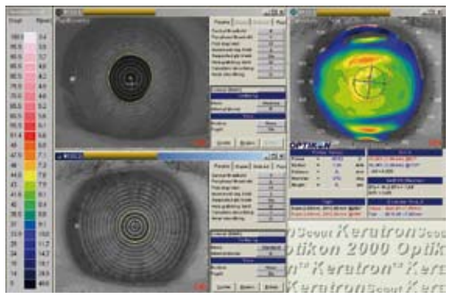
  The height is represented with reference to a sphere that can be positioned by the operator. Height difference maps (for example post-minus-preoperative) can be obtained after matching at three reference points, so to cancel the relevant “tilt”.



CORNEAL WAVEFRONT

- **VISUAL ACUITY**

  The simulations of visual acuity pictures (Visus), the PSF (Point Spread Function) and the MTF (Modulation Transfer Function) which relate to contrast sensitivity are invaluable tools for the assessment of the corneal refraction. The adoption of corneal aberration evaluation has broken new ground in the links with excimer lasers for custom ablation. The cornea is analysed to measure the corneal wavefront. The Zernike polynomials, which allow analysis of individual aberrations and the analysed pupil size and position, are user-selectable.



PUPILLOMETRY

The dual illumination of Placido rings by infrared and visible light allows measurement of the pupil size and center at different ambient light levels.

Analyzing contact lenses kit

162216 Analyzing contact lenses kit

- This device creates a topographical map of the inner and outer surfaces of gas permeable contact lenses using the Keratron®, Keratron® Scout and Keratron® Piccolo topographers.
  The map shows the geometry of the lens and the asphericity in each zone, and allows curvature measurement as well.
  Therefore, it is possible to detect changes in lens feature or discover the shape of an unknown lens.
  The device consists of a holder on which the lens is placed with a drop of water. Two separate cradles are used to measure the two surfaces of the lens.
  The device is placed against the topographer’s measuring cone, and a knob is used to adjust the focus position.
  The cone’s corneal positioning system makes it possible to acquire the map of the outer surface as usual.
  For the inner surface the lens is mechanically positioned by means of a position sensor.
  Turning the positioning knob brings the lens into contact with the sensor, which is equipped with a visual and acoustic signaler that alerts the operator to the correct mechanical position.

These procedures ensure that the map is acquired at the correct focal distance.

The maps are used for the qualitative and quantitative evaluation of the lens surfaces.

The photograph of the lens with the reflection of the topographer’s Placido rings allows qualitative evaluation of surface regularity and deposits or scratches.

This documentation may justify the need to replace the lens.

The map makes it possible to measure the curvature values at each point on the surface and the geometry of the lens.

A spherical lens will have a curvature map of uniform color, while an aspherical lens will have concentric annular zones whose curvature becomes flatter towards the periphery.
A toric lens will produce a map with a classical hourglass shape.

Three circles with different diameters can be positioned on the topographical map in the zones that you would like to measure. The average radius, the apical radius, and eccentricity can be measured in each zone.

The system is very precise and reproducible, so it documents the lens condition and parameters indisputably. In fact, it is becoming advisable to keep the documents on file in case of disputes between the lens wearer and his ophthalmologist.

We emphasize that since the method is based on the reflection of Placido rings, the system functions only if the surface is continuous. In the presence of discontinuities, the ring reflections can be duplicated or suppressed.
In fact, it is not possible to measure the lenses’ flanges, but only the surfaces as long as their tangents are continuous.
This device provides an important additional function to the Keratron®, Keratron® Scout and Keratron® Piccolo corneal topographers: it makes the topographer the perfect analyzer of contact lenses, thus making the ophthalmometer and the keratometer obsolete.

Contact Lenses

A sophisticated software module, made possible by the accurate height reproducibility of the Keratron, produces highly realistic simulations of the fluorescein patterns of any RGP contact lens, which can be fitted according to:

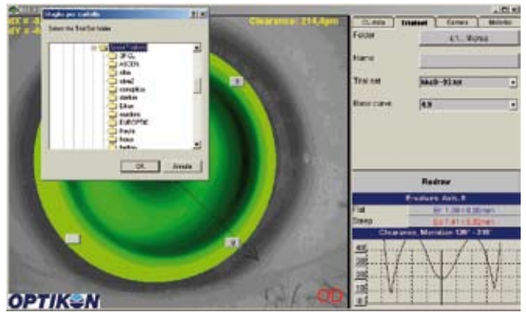
- Choice of a production lens
- Use of a custom fitting protocol
- Automatic choice according to manufacturers direction
- Custom geometry contact lens design (e.g.: CALCO, Wave etc..)

The geometries of major RGP contact lens manufacturers are available. However the user can easily create new virtual trial-sets.
By applying automatic lens selection protocols, some labs have reached a first-fit success rate up to 90%.

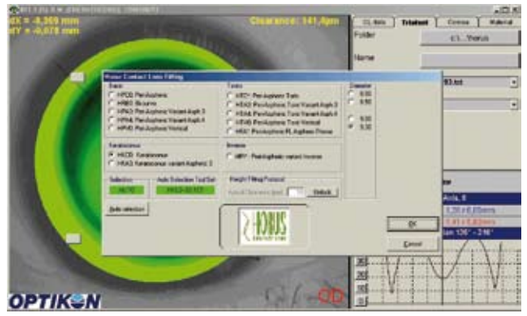
Customizable auto-fit criteria and functions, based on curvature or simple clearance height targets, help you standardize your optimal fitting choices to design lenses.
Thus custom lenses can be designed with any geometry, including inverse geometries for ortho-K or post-refractive surgery.

Linking corneal topographic data with custom design software allows the manufacture of “custom cornea contour” lenses that give a better vision, excellent wear tolerance and exceptional stability.

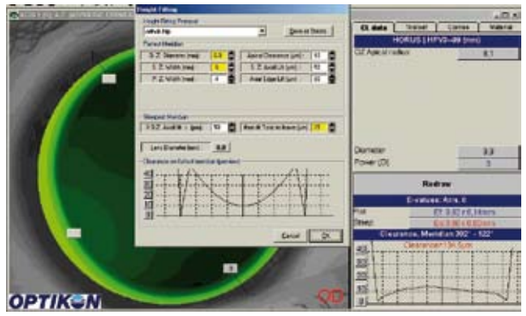
In the future, the analysis of corneal aberrations can be incorporated in the design of ideal soft and RGP lenses to compensate for all optical aberrations. The result will be a highly customized lens that achieves maximum individual vision.



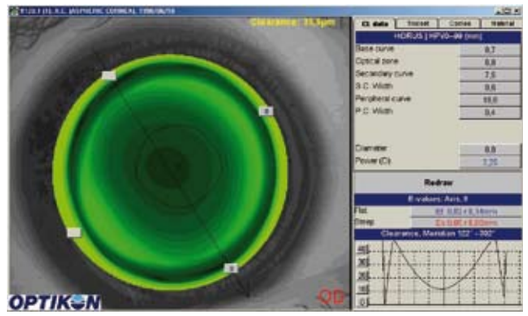
▪ **CHOOSING A TRIAL SET**



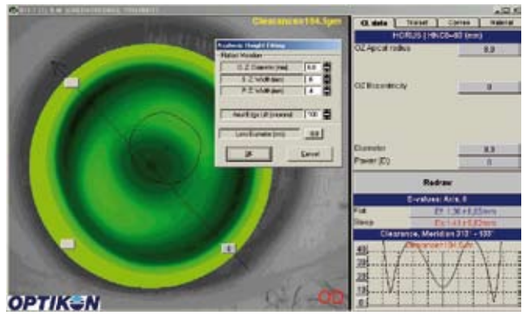
▪ **AUTOMATIC PROTOCOLS**



▪ **AUTOFIT PROGRAMS**



▪ **MOVING THE LENS**



▪ **CALCO LENSES**

KERATRON®/ KERATRON® SCOUT/ KERATRON® PICCOLO ACCESSORIES

162104 Keratron® Bridge
included in the actual configuration (except for Keratron® units belonging to the first version)

162105 Far Mire Cone for Keratron®

163102 Electric stand

163201 Operating room trolley for Scout

162202 Docking base for Scout

162205 Rechargeable battery for Scout

162206 Slit lamp adaptor kit for Scout

162208 Head rest for Scout

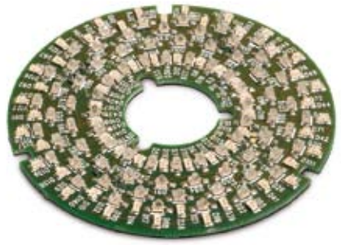
162211 Far mire cone for Scout/Piccolo

162210 EPP/USB Interface for first version units for Scout

163202 Base with joystick for Scout/Piccolo

169201 Smart case for Scout (6 pcs)

162212 Slit lamp adaptor eccentric spacer for Scout



162215 Scout IR pupillometry upgrade kit

196201 Sterile cover for Scout std cone

196203 Sterile cover for Scout far cone (6pcs)

OPTIKON™
Man and Technology

OPTIKON 2000 S.p.a.

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