



NIDEK Advanced Vision Excimer Laser System

NAVEX *Quest*



The Art of Eye Care

NIDEK Advanced Vision Excimer Laser System *NAVEX Quest*

Delivering Ultimate Solutions Today

NIDEK delivers the **NAVEX Quest**, the evolutionary customized refractive surgery platform.

The NAVEX Quest is a unique combination - incorporating the new, advanced, fully-integrated the Quest excimer laser system, the OPD-Scan II refractive power / corneal wavefront analyzer, the OPD-Station software, the FinalFit™ software and the MK-2000 keratome system - that offers advanced technologies, superior engineering, excellent workmanship and outstanding clinical performance and clinical outcomes. With these advanced and innovative technologies, the NAVEX Quest provides all the tools needed for performing customized refractive surgery procedures and helps surgeons achieve the optimum visual outcome.



To realize a uniform ablated surface and **the optimized custom ablation with highest precision**, using an innovative scanning technology including Super Flex Scan and MultiPoint™ Ablation systems of the Quest.



To provide **easy alignment with greater accuracy and precision**, using the advanced technology of the Torsion Error Correction (TEC), 1KHz Eye tracking system and Motorized Magnification Control of the Quest.



To deliver **micro-smooth operation**, using an incomparable keratome technology - the MK-2000 Keratome System.





Begin & End Your Voyage with the NAVEX *Quest*
Delivering to You the Ability to Achieve
Your Quest with the NAVEX *Quest*



To offer optimum refractive treatments with greater precision, using intelligent diagnostic technologies of the OPD-Scan II, the OPD-Station and the Final Fit™ software.

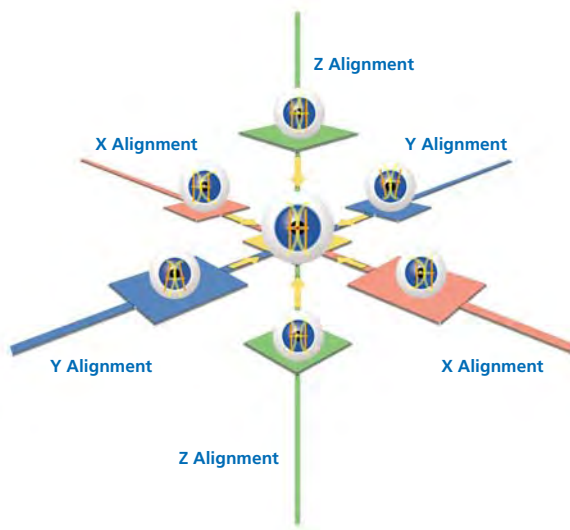
Excimer Laser System *Quest*

NIDEK offers the Quest Excimer Laser System - the ultimate refractive corneal surgery system built over years of experience to provide safer and more reliable performance with greater accuracy and stability.





An advanced technology to provide **easy alignment** with greater accuracy and precision.

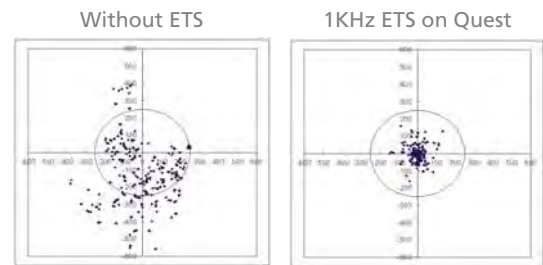


■ 1KHz Eye Tracking System

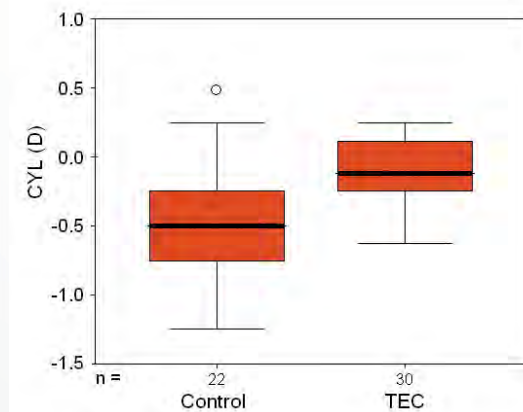
Built-In Advanced 1KHz Eye Tracking System (ETS) utilizes high-speed digital image processing technology to follow the patient's eye, ensuring accurate and precise laser alignment and delivery during the procedure. With the advanced offset function, the surgeon can set the tracking point at anywhere within $\pm 1\text{mm}$ from the pupil center as needed. Also, the alignment speed has been greatly improved, allowing faster and smoother operation. The safety laser stop function automatically stops laser ablation if the ETS cannot follow the patient's eye.

■ Torsion Error Correction

The Torsion Error Correction (TEC) detects and compensates Cyclo-Torsion and improves cylinder correction accuracy while ensuring that the Quest laser ablates the patient's eye with unparalleled precision patient's. The safety laser stop function automatically stops laser ablation, if the TEC cannot follow the patient's eyes.



*Sampling rates are 100 msec.



Manifest Refractive Cylinder at 3 months of eyes that underwent myopic LASIK or PRK with or without active torsion error compensation (TEC). ($p < 0.001$, Welch's test)

■ Motorized Magnification Controls

The Quest offers Advanced motorized magnification controls, allowing the surgeon to change the magnification easily, using a switch on the controller.



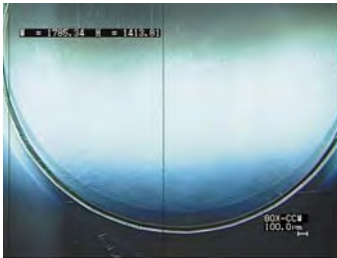
Excimer Laser System *Quest*



An innovative scanning technology to realize a uniform ablated surface and the optimized custom ablation with greater precision.

■ **Super Flex Scan**

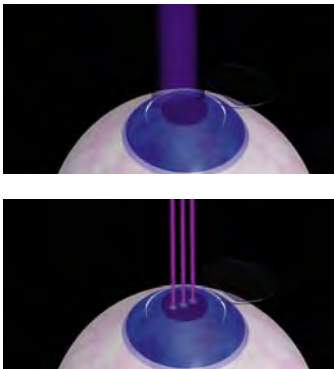
Advanced Energy Delivery Systems - Super Flex Scan - creates a unique slit scanning ablation profile that improves accuracy of the refractive correction. The scanning slit beam smoothly sweeps the cornea, quickly ablating tissue with cool, overlapping ultraviolet energy.



Slit Scanning Ablation Surface

■ **MultiPoint™ Ablation**

MultiPoint™ Ablation system can correct certain high-order aberrations. MultiPoint™ Customized Ablation module divides the rectangular-shaped laser beam into six equal gaussian spots of 1.0 mm in diameter, which can be individually or simultaneously projected onto the cornea for a highly precise ablation of small area irregularities.



Optimum Functionalities

■ **User-friendly Remote Controller**

All necessary operations before laser ablation, such as alignment, magnification change, eye tracking are controllable at hand on the optimally congregated remote controller.



■ **Special Function LCD Monitor on Laser Arm**

The LCD Monitor displays information and laser parameters for easier operation - these include eye tracking image, TEC image, laser operation time and other clinically relevant parameters.



Superior Protective & Safety Mechanisms

The system has integrated automated mirror protection windows to keep the optical mirrors clean. The special window opens when the "Laser Ready" button is pressed and closes when the operation is completed.



Refractive Power / Corneal Analyzer OPD-Scan II

The OPD-Scan II provides information on corneal topography, wavefront, refraction, keratometry and pupillometry in one unit, offering highly accurate and reliable data for optic diagnostics.



An intelligent diagnostic technology to offer optimum refractive treatments with greater precision.



■ Measurement Selection for Improved Reliability

The OPD-Scan II offers increased reliability of examination by automatically selecting the best measurement from multiple measurements, allowing a more reliable clinical decision.



Measurement Selection Screen

■ Fast Processing Speed

The OPD-Scan II offers fast processing speed, minimizing stress in daily clinical use.

■ Wide Measurement Range

Has the ability to measure high power Cylinder providing accuracy in irregular aberration measurements.
(Sphere -20.0 to +22.0D and Cylinder 0.0 to $\pm 12.0D$)

■ Easy Data Maintenance with a Detachable HDD

Patient data is saved to a detachable HDD, allowing quick and easy data transfer.

■ Improved Accessibility to a Patient Eye

With the improved forehead rest, it is easier to reach and keep the patient's eyelids open.



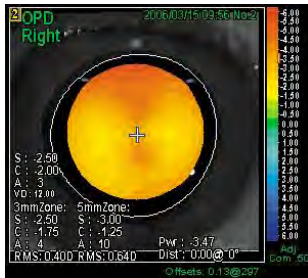
Improved Accessibility

■ Network Capabilities

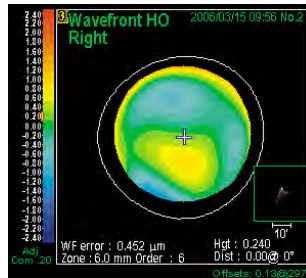
Data from the OPD-Scan II may also be analyzed at a remote location using the OPD-Station.

Various Data Maps

OPD Map
(Refractive Error Map)



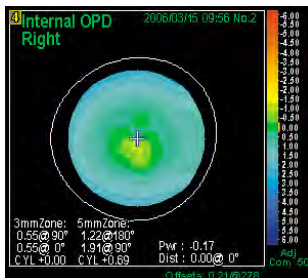
Wavefront HO Map



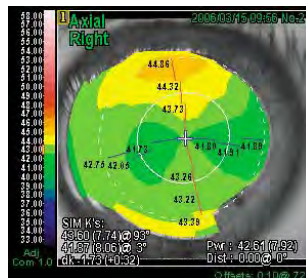
Zernike Graph

ZernikeGraph No.2 Right Zone: 6.0 Order: 6	
total#2	-1.60 -0.80 0.00 0.80 1.60
1 Tilt	
2 Tilt	
3 Astigma...	0.124 1.047
4 Defocus	
5 Astigma...	-0.279
6 Trefoil	
7 Trefoil	-1.350
8 Trefoil	0.005
9 Coma	0.377
10 Coma	0.009
11 Trefoil	-0.154
12 Trefoil	0.080
13 Astigm...	-0.043
14 Astigm...	0.124
15 Trefoil	0.039
16 Trefoil	6.831
17 Pentafol	-0.015
18 Trefoil	-0.052
19 Coma	-0.012
20 Coma	-0.010
21 Trefoil	0.045
22 Pentafol	0.035
23 Trefoil	-0.005
24 Trefoil	-0.015
25 Astigm...	0.057
26 Trefoil	0.000
27 Trefoil	-0.031

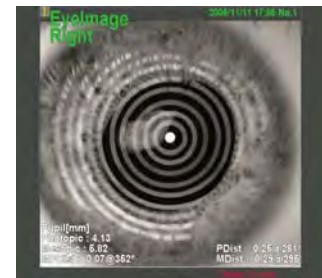
Internal OPD Map



Axial Map
(Corneal Topography)



Eye Image



"The OPD-Scan II is the instrument that couples Wavefront, Topography and Refraction into one unit. This allows the isolation of any optical problem to cornea or crystalline lens making it easy to decide if lensectomy or corneal surgery is the procedure of choice. It also provides the best data for Customized Corneal Refractive Surgery."

Jack T. Holladay, M.D., M.S.E.E., F.A.C.S.

"I see for the future the coupling of wavefront sensors with corneal topography devices for the optimal correction of aberrations in a patient's eye."



Stephen D. Klyce, Ph.D.

Professor of Ophthalmology and Anatomy, Louisiana State University
Recipient of ASCRS 2000 Innovator's Award for contributions to the field of corneal topography and refractive surgery

Custom Ablation Software Final Fit™

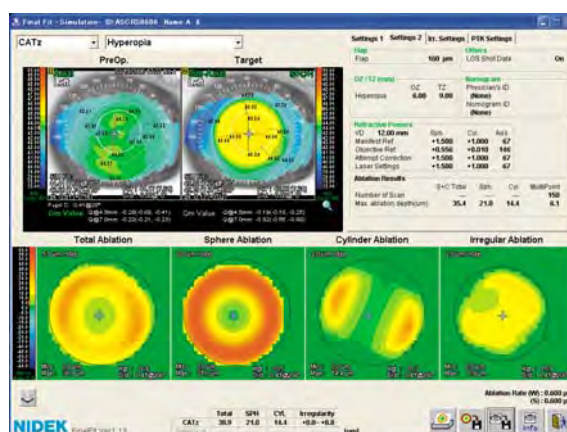
The Final Fit™ software receives the measured data from the OPD-Scan II, and performs a simulation of postoperative corneal shape and total eye refraction. It generates excimer laser shot data using the OPD-Scan II data and entered target correction data.



An intelligent diagnostic technology to offer optimum refractive treatments with greater precision.

Shot Data Generation

The Final Fit™ software evaluates and converts the OPD-Scan II's refractive and topographic data to produce the precise customized ablation parameters for the Quest excimer laser system. These unique algorithms control the Quest's MultiPoint™ Ablation Module to enable multiple, simultaneous localized ablations to correct higher order optical aberrations, corneal irregularities and decentered ablations.



Comparison of Postoperative and Preoperative Data

The Final Fit™ software compares postoperative data measured by the OPD-Scan II with the preoperative or target data.

Eye Tracking Offset function*

The Final Fit™ software outputs the Eye Tracking Offset information based on Shot data calculation.

Nomogram Functions

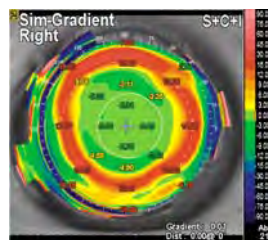
The Final Fit™ software offers NIDEK's standard nomograms, which are tables for correcting theoretical amounts of correction in diopters based on clinical results and using various environmental factors like temperature and humidity.

Useful Maps

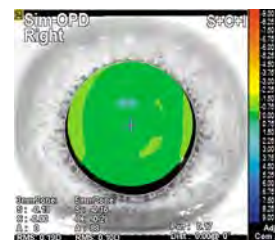
Corneal Gradient Map* - you could estimate healing process.

OPD target map*, Wavefront Map*, Zernike Graph* and all Topography maps available.

Component Maps - Illustrates the stereoscope or contour ablation amounts which were put through a simulation.



Gradient Map



OPD Target Map

■ New Innovative Ablation Algorithms

New innovative ablation algorithms (CATz, OATz, OPDCAT) provide exceptional treatment accuracy and visual outcomes.

OATz

-Optimized Aspheric Treatment Zone-
Ablations with Transition Zone (TZ) optimized to prevent Longitudinal Spherical Aberration (Red Ring), which can cause the loss of night vision, halos, glares and star bursts

CATz

-Customized Aspheric Treatment Zone-
OATz with topography-guided multipoint ablation to reduce corneal irregularities, such as irregular astigmatism, de-center, central island, etc.

OPDCAT

-OPD-Guided Customized Aspheric Treatment-
maintains corneal asphericity with aspherical ablation, and applies OPD-Guided (Wavefront Guided) multipoint ablation to reduce aberrations for the total eye.

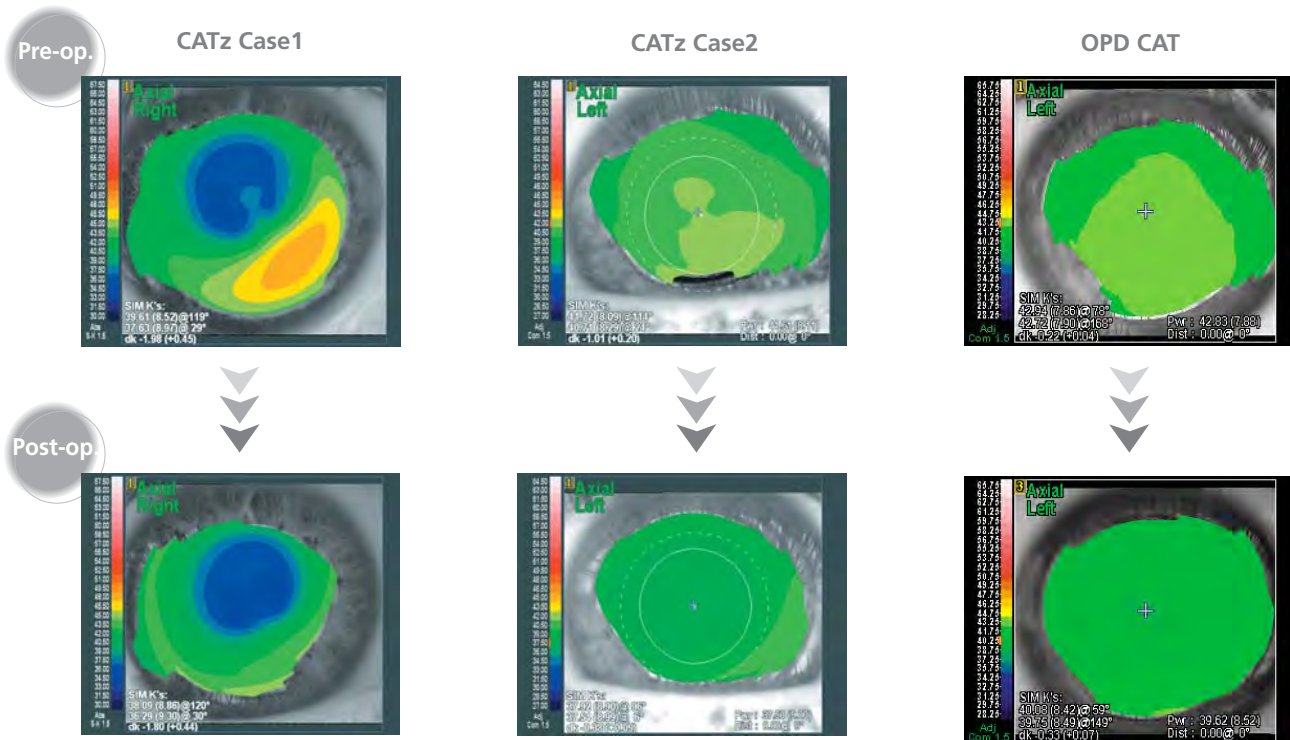
*Hyperopia custom (CATz or OPDCAT) treatment**

*Multi-stage function**

*PTK Trans-epithelial and PTK smoothing stage**

*Simple and Mix and Cross Cylinder program**

Clinical Cases of Custom Ablation



*available with Final Fit Version 1.13

Comprehensive Visual Analysis Software OPD-Station

The OPD-Station software makes a variety of corneal, total eye and internal eye analyses possible using advanced, unique and intelligent functions including the Corneal Navigator and Holladay Summary.



An intelligent diagnostic technology to offer **optimum refractive treatments with greater precision.**

■ **Corneal Navigator***

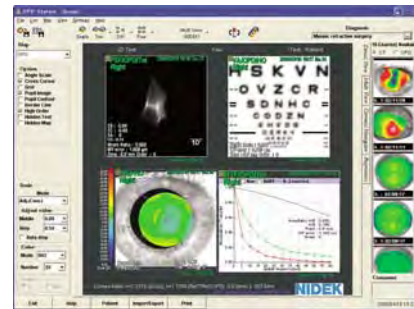
The advanced & highly sophisticated Corneal Navigator software assists surgeons in their patient diagnoses process. Utilizing various corneal parameters from topography, the Corneal Navigator automatically determines corneal features and shows by percentage the possibility of having a condition of normal (NRM), astigmatic (AST), keratoconus suspects (KCS), keratoconus (KC), pellucid marginal degeneration (PMD), myopic refractive surgery (MRS), hyperopic refractive surgery (HRS), and penetrating keratoplasty (PKP).

The Corneal Navigator is developed in collaboration with Stephen D. Klyce, PhD & Michael K. Smolek, PhD.

*This Corneal Navigator is not available in the US.



The OPD-Station provides various maps such as the OPD HO Map, PSF, MTF, MTF Graph and Visual Acuity Chart in addition to OPD-Scan II maps. For wavefront maps such as the PSF and MTF, clinicians can select the target (OPD, Cornea, Internal) and also the type (Total, HO, Group) according to their needs.



OPD-Station Screen

■ **Holladay Summary***

The "Holladay Summary" shows the patient where the aberrations are located and how they affect the quality of vision using the Wavefront, MTF, PSF and VA-chart simulations.

*Developed in cooperation with Jack T. Holladay, MD.

■ **Averaging Multiple Exams**

The OPD-Station creates an exam data average from multiple exams. Noise components such as tear film and fixation disparity are excluded, providing more stable and reliable data.

■ **Average Pupil Power (APP)**

The averaged value of the corneal refractive power in the pupil is displayed. This value can be used in IOL power calculation in place of the keratometry values K1 and K2 (D) for both normal eyes and eyes with special cases.

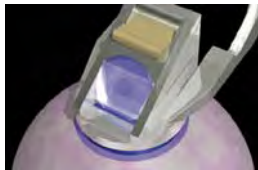
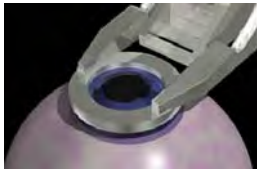
NIDEK Keratome MK-2000



An incomparable keratome technology to deliver **micro-smooth** operation.

■ *Safe, One-Hand Operation*

The one-piece, lightweight design of the MK-2000 allows the surgeon to make corneal flap incisions with one-hand operation.



EVENT

■ *NIDEK Refractive Surgery Symposium*

NIDEK holds its Refractive Surgery Symposium for all those who have an interest and dedication in advancing laser vision correction. The symposium offers an open platform for refractive surgeons to communicate and exchange their opinions on advancements in refractive surgery and technology. The latest techniques and clinical results are presented through presentations, panel discussions, workshops and wet-labs.

For further information, please visit the NIDEK website or email:

Website: www.nidek.com

Email: contact@nidek.co.jp

Quest Specifications

Therapeutic laser	
Beam control	1.0 mm spots & slit scanning
Laser source	ArF Excimer laser
Wavelength	193 nm
Repetition rate	5, 10, 20, 30, 40, 50 Hz (PTK, myopia) 34, 41, 46 Hz (hyperopia)
Cooling system	Ambient air cooling
Ablation size	
PTK	Maximum treatment size 10.0 mm
Myopia	Optical zone 3.0 to 6.5 mm Transition zone max. 10.0 mm
Hyperopia	Optical zone 5.5 to 6.5 mm Transition zone max. 10.0 mm
Alignment	LD (red) aiming beam and diagonal cross illumination 3D joystick remote controller (XY auto alignment)
Eye Tracking System (ETS)	
Sampling rate	1,000 Hz
Detectable pupil size	ø1.5 to ø7.8 mm
Torsion Error Correction (TEC)	
Control	Active
Detectable pupil size	ø1.5 to ø6.0 mm
Detectable angle range	±15 degrees
Correctable angle range	±6 degrees
Power supply	200 to 240 Vac,
Power consumption	Max. 3.3 kVA
Dimensions / Weight	1450 (W) x 1400 (D) x 1400 (H) mm / 650 kg 57.1 (W) x 55.1 (D) x 55.1 (H) " / 1,433 lbs.
Standard accessories	Multipoint™ ablation unit, Zeiss tilting microscope, LCD sub monitor in delivery arm, Motorized magnification control, Smoke evacuator, PC, LCD monitor, Key board, Foot switch, Beam splitter for microscope video camera, Duct hose, Dust cover, Laser goggles, Calibration unit, Lensmeter (LM-350), Printer, Gas value warning sheet, Gas value open / close plate
Optional accessories	Patient bed, Foot controller

OPD-Scan II (ARK-10000) Specifications

Power mapping	
Spherical power range	-20.00 to +22.00 D
Cylindrical power	0.00 to ±12.00 D
Axis	0 to 180°
Measuring area	2.0 to 6.0 mm diameter (4 zone measurement)
Measuring points	1,440 points (4 x 360)
Measuring time	< 0.4 seconds
Measuring method	Automated objective refraction (dynamic skiascopy)
Mapping methods	OPD, Internal OPD, Wavefront maps, Zernike graph, PSF
Corneal topography	
Measuring rings	19 vertical, 23 horizontal
Measuring area	0.5 to 11.0 mm dia. (r=7.9)
Dioptric range	10 to 100 D
Axis range	0 to 359°
Measuring points	More than 6,800
Mapping methods	Axial, Instantaneous, "Refractive", Elevation
Working distance	75 mm
Auto tracking	X-Y-Z directions
Observation area	14 x 8 mm
Operating system	Windows XP embedded*
Display	10.4-inch color LCD touch panel
Printer	Built-in thermal type line printer for data print External color printer (optional) for map print
Power supply	100 / 120, 220 / 240 Vac 50 / 60 Hz
Power consumption	170 VA
Dimensions / Weight	290 (W) x 524 (D) x 520 (H) mm / 25 kg 11.4 (W) x 20.6 (D) x 20.4 (H) " / 55 lbs.

FinalFit™ Specifications

Ablation mode	OATz ablation (OATz version) CATz ablation (CATz version) OPDCAT ablation (OPDCAT version)
Data import / export	Floppy disk, Interface connectors provided with the computer
Database	Patient information, Exam data
Computer requirements	
CPU	Pentium III 1200 MHz or higher
Memory	256 MB or more (512 MB or more is recommended.)
Free disk space	500 MB or more
Graphic	1024 x 768 pixels or more, 65536 colors or more
CD-ROM drive	12 x or more
LAN port (RJ-45)	1 or more
USB Port	1 or more
OS	Windows XP*, English version

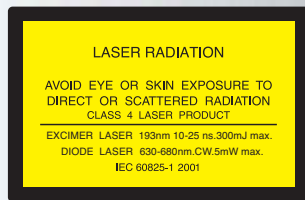
OPD-Station Specifications

Analysis and map display	
Corneal topography	Axial, Instantaneous, "Refractive", Elevation, Topoclassifier* *With corneal navigator only
OPD	OPD, OPD HO, Zonal refraction
Wavefront	Wavefront, Zernike graph, PSF, MTF, MTF graph, Visual acuity
Others	Internal OPD, Target refractive, Differential, Eye image Asphericity index (Q, e, S)
Corneal navigator (optional)	8 kinds of corneal classification, Statistics
Pupillometry	Diameters, Distances, Contours (photopic / mesopic condition)
Computer requirements	
CPU	Pentium III 1200 MHz or higher
Memory	256 MB or more (above 512 MB recommended)
Free disk space	30 GB or more
Graphic	1024 x 768 pixels, 32 bit true color or more
CD-ROM drive	12 x or more
LAN port (RJ-45)	1 or more
USB port	1 or more
OS	Windows XP*

MK-2000 Specifications

Suction ring	
Ring outer diameter	19 mm
Handpiece	
Forward movement speed	2 mm per second
Reverse movement speed	2 mm per second
Oscillation frequency	18,000 cuts
Blade holder	
Material	Stainless steel
Main console	
Display	LED (indicates power supply, suction pressure, blade motion check)
Vacuum gauge	Monitors suction pressure
Connectors	For suction & suction monitoring, handpiece
Foot switch	
Suction switch	Controls starting / stopping suction pressure
Forward pedal	Controls blade oscillation and forward movement
Reverse pedal	Controls reverse movement
Power supply	100 / 115 / 230 Vac, 50 / 60 Hz,
Power consumption	Max. 60 VA
Dimensions / Weight	
Handpiece	148 (W) x 25 (D) x 61 (H) mm / 0.23 kg 5.8 (W) x 1.0 (D) x 2.4 (H) " / 0.5 lbs.
Main console	350 (W) x 260 (D) x 150 (H) mm / 9.0 kg 13.8 (W) x 10.2 (D) x 5.9 (H) " / 20 lbs.
Foot switch	220 (W) x 213 (D) x 102 (H) mm / 5.0 kg 8.7 (W) x 8.4 (D) x 4.0 (H) " / 1.1 lbs.

* Windows is a trademark of Microsoft Corporation U.S.A.



NAVEX Quest, Custom Ablation have not been cleared by the FDA for distribution in the United States.

Product identification - Excimer Laser Corneal Surgery System EC-5000

Specifications and design are subject to change without notice.



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