Innovative Ophthalmology Solutions

Ref/Keratometer & Topography & Dry Eye

HRKT-1

Huvitz

Ref/Keratometer & Topography & Dry Eye

HRKT-1

All–in–One Vision Analysis Solution
Identify the Causes of Visual Decline Through Comprehensive, Multi–Dimensional Testing for Greater Diagnostic Accuracy

The HRKT–1 precisely measures refractive data, corneal status, and dry eye indicators in a single integrated device, enabling systematic analysis of the underlying causes of vision decline.
By comprehensively evaluating key factors that affect visual quality such as the cornea, crystalline lens, and tear film—the system supports a wide range of clinical applications. These include eyeglass prescription, early detection of corneal disorders, assessment of refractive surgery suitability, and identification of dry eye causes.
The HRKT–1 All–in–One Vision Analysis Solution enables a seamless workflow—from diagnosis and prescription to long–term management—on a single integrated platform.

Ocular Zernike Analysis

Contact Lens Fitting result screen

Meibography

01

Structural Cause Analysis Based on Zernike Analysis

Through ocular and corneal Zernike analysis and internal Zernike analysis, the system helps distinguish whether visual decline originates from the cornea or the crystalline lens. This allows clinicians to better understand visual discomfort that cannot be fully corrected by eyeglass lenses alone—such as differences between daytime and nighttime vision—and clearly explain these causes to patients.

02

Comprehensive Corneal Data for Diagnosis and Lens Prescription

Based on Placido disc analysis technology, the system precisely measures a wide range of corneal parameters, including keratometry, keratoconus indices, Zernike coefficients, pupillometry, and white–to–white measurements. These data provide valuable insights into corneal shape and ocular health, supporting applications such as vision correction lens prescription, early detection of keratoconus, and preoperative planning for cataract surgery.

03

3 Step Diagnostic Process
OSDI–Advanced Testing–Integrated Report

Patient–reported symptoms are quantified using the globally recognized Ocular Surface Disease Index (OSDI) questionnaire, followed by advanced diagnostic testing. Six key parameters are measured, including non–invasive tear breakup time (NIBUT), lipid layer imaging, tear film height quantification, and meibomian gland function grading. The objective data collected from both the questionnaire and advanced tests are used to determine the underlying cause of dry eye, guide treatment planning, and support patient consultation and record management.

04

System Designed for User Convenience

The LCD panel rotates 90˚ to the left and right, providing a clearer view for the examiner and allowing more accurate positioning of the eye. Images can be captured using a foot switch instead of a joystick, allowing both hands to remain free during the examination. In addition, the wide headrest accommodates a variety of facial shapes to help maintain stable patient posture while providing an optimal examination environment for precise eye positioning.

Refraction & Keratometry

Personalized Prescriptions Reflecting
Real–World Visual Experience

Structural Cause Analysis Based on Zernike Analysis

Through ocular and corneal Zernike analysis and internal Zernike analysis, the system helps distinguish whether visual decline originates from the cornea or the crystalline lens. This allows clinicians to better understand visual discomfort that cannot be fully corrected by eyeglass lenses alone—such as differences between daytime and nighttime vision—and clearly explain these causes to patients.

Zernike REF Mode – Advanced Refraction Analysis Reflecting Real-World Vision

Zernike REF Mode enables objective evaluation of the visual quality patients experience in daily life, including differences between daytime and nighttime vision. By presenting both quantitative data and visual images, the system helps identify causes of visual discomfort that may not be resolved through standard eyeglass prescriptions, allowing patients to better understand and trust the assessment of their visual condition.

❶ Total(Low Order) Aberration Map

Provides objective data to evaluate visual discomfort that patients often find difficult to describe verbally—such as reduced visual clarity, decreased contrast sensitivity, glare, and other aspects of visual quality experienced in daily life

❷ High Order Aberrations(HOA) Map

Analyzing higher-order aberrations (Coma, Trefoil, Spherical aberration, etc.) allows for evaluating the quality of vision (blurring, halos, glare, etc.) unresolved by standard myopia or astigmatism correction. This aids in selecting more precise vision correction methods.

❸ Pupil Size-based Analysis

Analyzes how visual performance changes under photopic (daytime) and mesopic (low-light) conditions, helping clinicians understand the causes of visual discomfort experienced during nighttime driving or in dim environments and enabling the selection of vision solutions suited to real-life situations.

❹ RMS(Root Mean Square) Value

Quantifies visual disturbances—such as glare, halos, and reduced contrast—allowing clinicians and patients to better understand the current visual condition and discuss potential improvement strategies.

❺ PSF(Point Spread Function) Value

Through point spread function (PSF) analysis and simulated retinal images, clinicians and patients can intuitively visualize how the current visual field appears and how it may improve after correction.

Retro Illumination – Observation of Ocular Health Including Crystalline Lens Opacity

Retroillumination is an observation mode for the crystalline lens that utilizes a retroillumination technique. By adjusting the brightness of the light source and observing the reflection of light from the retina, clinicians can clearly assess the degree of crystalline lens opacity. This enables more precise evaluation of cataract-related lens opacity and allows clinicians to observe overall ocular health, including potential corneal damage caused by contact lens wear.

Topography

Early Detection of Corneal Disorders and
Personalized Lens Fitting

Comprehensive Corneal Data for Diagnosis and Lens Prescription

Based on Placido disc analysis technology, the system precisely measures a wide range of corneal parameters, including keratometry, keratoconus indices, Zernike coefficients, pupillometry, and white-to-white measurements. These data provide valuable insights into corneal shape and ocular health, supporting applications such as vision correction lens prescription, early detection of keratoconus, and preoperative planning for cataract surgery.

Precise Analysis of Visual Distortion Based on Zernike TOPO Mode

Using high–density Placido rings, the system quantitatively analyzes corneal curvature, elevation, and aberrations to evaluate refractive error patterns and overall visual quality. It differentiates regular and irregular astigmatism while precisely assessing multiple sources of visual distortion, including refractive power variation, atypical astigmatism, and high–order aberrations (HOAs). Results are presented as intuitive visual data, enabling early detection of corneal disorders and supporting clinical applications such as Ortho–K fitting evaluation and astigmatism analysis.

Corneal Zernike Analysis

Contact Lens and Ortho–K Fitting Evaluation and Prescription

Using a Fluorescein Imaging filter – based simulation method, the system enables intuitive evaluation of fitting results for hard and soft contact lenses as well as Ortho–K lenses, without direct fluorescein instillation. Simulations can be performed for different manufacturers and lens designs. By comparing changes in the corneal curvature map, including curvature and eccentricity through MAP–based analysis, clinicians can assess lens centration, fit alignment, and potential lens displacement. This helps reduce unnecessary refitting and improves the accuracy of lens selection and prescription.

Contact Lens Fitting result screen

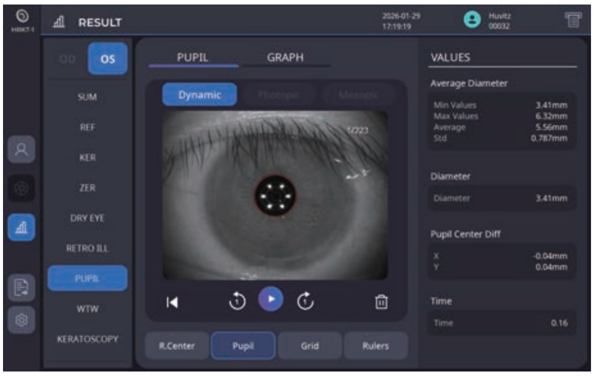
Early Detection of Keratoconus Based on Corneal Parameters

By comprehensively analyzing anterior corneal curvature, regional shape distribution, corneal protrusion, and eccentricity, the system calculates the Keratoconus Prediction Index (KPI) to estimate the likelihood of keratoconus. This provides valuable information on potential keratoconus risk and visualizes predictive results to enhance diagnostic confidence.

Keratometry result screen (KER)

Pupil Data Acquisition Through Pupillometry

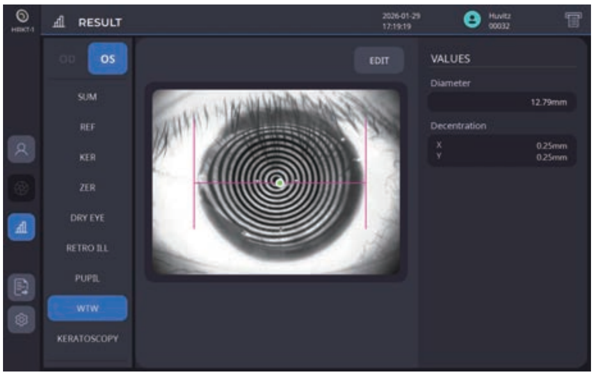
By measuring pupil size and response under photopic (daytime) and mesopic (low–light) conditions, the system provides multiple indicators, including minimum, maximum, and average pupil diameter, along with standard deviation, presented graphically. These data offer valuable insights for lens prescription and preoperative evaluation for refractive surgery.



Pupillometry result screen

White–to–White Measurement for Corneal Diameter Assessment

The system automatically measures the corneal diameter (white–to–white), which is essential for diagnosing and monitoring various ocular conditions, including congenital glaucoma, and for planning cataract and refractive surgery as well as contact lens selection and fitting. An edit function allows clinicians to manually adjust and apply measurement values when necessary.



White–to–White

Dry eye

From initial consultation to advanced testing and diagnosis a comprehensive approach to dry eye evaluation

3 Step Diagnostic Process

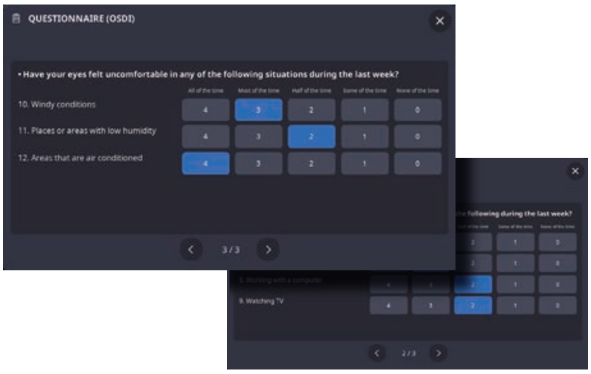
OSDI–Advanced Testing–Integrated Report

Patient-reported symptoms are quantified using the globally recognized Ocular Surface Disease Index(OSDI) questionnaire, followed by advanced diagnostic testing. Six key parameters are measured, including non-invasive tear breakup time (NIBUT), lipid layer imaging, tear film height quantification, and meibomian gland function grading. The objective data collected from both the questionnaire and advanced tests are used to determine the underlying cause of dry eye, guide treatment planning, and support patient consultation and record management.

STEP 01

Enhance Initial Diagnostic Accuracy with the OSDI Questionnaire

The OSDI is a globally standardized self-assessment questionnaire for dry eye. It enables quantitative evaluation of patient-reported symptoms, supports multiple languages, improves efficiency in initial diagnosis, and provides consistent criteria across diverse clinical settings.



STEP 02

Clear Cause Identification Through Six Advanced Tests

Meibomian Gland Function Assessment with Visual Grading

Meibomian gland function is visually evaluated and graded, providing valuable information for analyzing the underlying cause of dry eye and establishing appropriate treatment plans.

Non-Invasive Tear Film Stability Assessment Using NIBUT

Tear film stability is measured using a non-contact method, and tear film breakup is tracked in real time. Results provide a quantitative visualization of both the timing and extent of tear film disruption.

Lipid Layer Imaging for Tear Film Color and Pattern Analysis

The lipid layer of the tear film is captured in real time to visualize changes in tear film color and pattern. Recorded videos can be stored and used for tear film stability assessment, as well as for documenting diagnostic findings and supporting patient consultation.

Tear Meniscus Height Analysis for Tear Secretion Evaluation

Tear meniscus height is quantitatively measured to objectively assess tear secretion. The tear meniscus formed along the eyelid can be clearly visualized and precisely measured using a built-in scale. When the user selects measurement points, the tear meniscus height is automatically calculated.

Inter-Blink Interval (IBI) Measurement for Evaporative Dry Eye

Blink patterns are analyzed by measuring the inter-blink interval (IBI). Results provide numerical data on blink frequency and regularity, which can be used for dry eye assessment and patient counseling based on lifestyle factors.

Tear Film Assessment with Fluorescein Imaging

Fluorescein imaging using a blue LED enables rapid and precise detection of dry eye-related signs, including corneal abrasions and tear film distribution. It is also effective for evaluating ocular conditions before and after contact lens wear and for visually observing tear film stability.

STEP 03

Personalized Treatment Strategies Based on Integrated Analysis

Results from each parameter (NIBUT, fluorescein imaging, lipid layer, meniscus, meibomian glands, blink, OSDI) are consolidated into a structured, optimized diagnostic report that guides tailored treatment strategies.

User Convenience

A convenient, user-centered examination environment

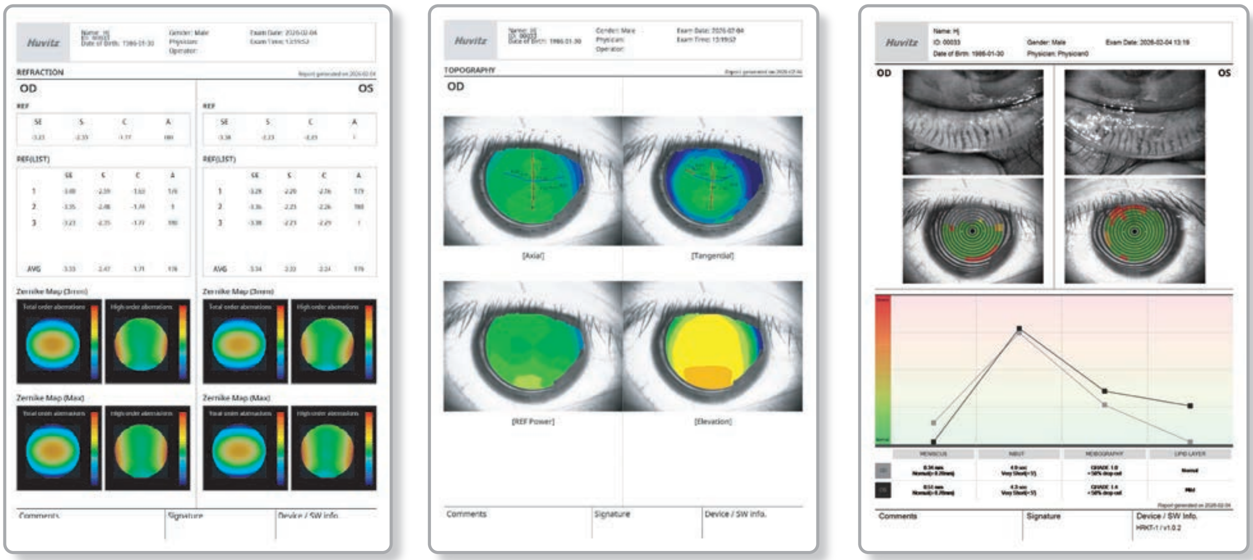
System Designed for User Convenience

90° Rotating LCD / Foot Switch / Wide Headrest

The LCD panel rotates 90° to the left and right, providing a clearer view for the examiner and allowing more accurate positioning of the eye. Images can be captured using a foot switch instead of a joystick, allowing both hands to remain free during the examination. In addition, the wide headrest accommodates a variety of facial shapes to help maintain stable patient posture while providing an optimal examination environment for precise eye positioning.

Structured Reports for Accurate Evaluation

Precisely measured data are organized into dedicated reports for each examination category, including refractor, keratometer, topography, and dry eye assessments, allowing results to be clearly reviewed and interpreted.



Report : REF, TOPO, DRY EYE

Connectivity for a Seamless Clinical Workflow

In addition to compatibility with the standard DICOM format, measured data can be easily accessed on a PC through the Huvitz HIIS-1 system, improving clinical efficiency and data accessibility.

Network in Huvitz Integrated Image Server (HIIS-1)

All-in-One Diagnostic Solution Without the Need for a Separate PC

Without requiring an external PC, all processes—from measurement and examination to analysis and integrated report generation—can be performed directly on the built-in 10.1-inch touch LCD display. This all-in-one diagnostic solution helps save space, cost, and time.

LCD Display

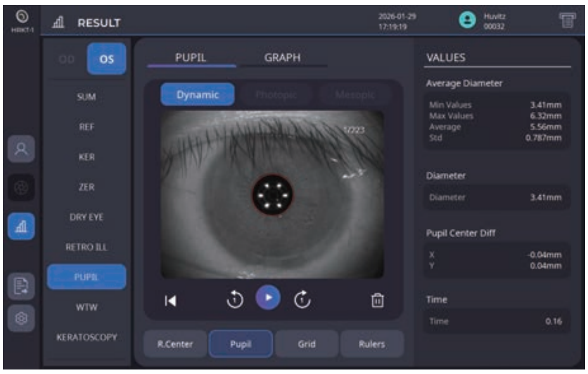
Diagnosis and Personalized Prescription Based on Vision Data

Based on measurement data from refraction/keratometry, corneal topography, and dry eye assessments, the system supports prescriptions tailored to each patient's visual condition. By comprehensively utilizing refractive, corneal, and ocular surface information, it enables eyeglass prescription, contact lens fitting, corneal disease evaluation, and refractive surgery planning.

Clinical Applications	Diagnostic Data
Eyeglass Lens Prescription	REF Data / KER Data Zernike REF Analysis / Pupillometry

Ocular Zernike Analysis

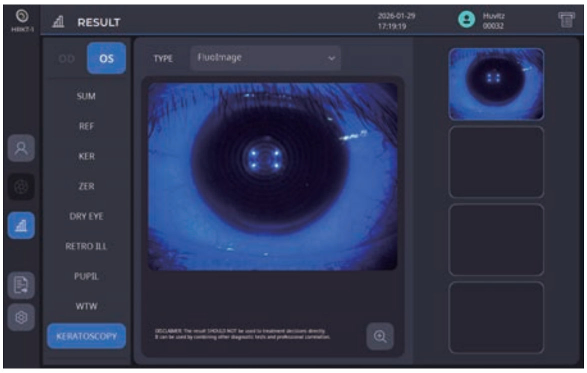
Keratometry result screen (KER)



Pupillometry result screen

Clinical Applications	Diagnostic Data
Keratoconus Assessment	Zernike TOPO Analysis / Keratoscopy

Corneal Zernike Analysis



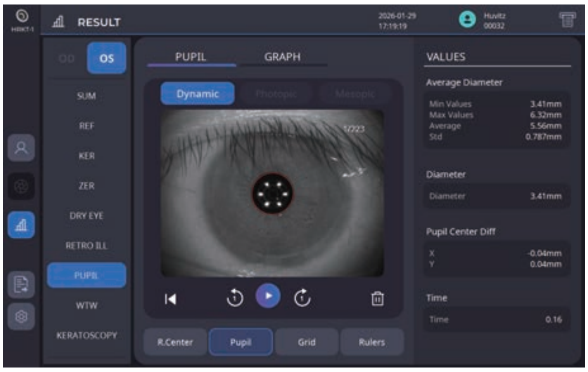
Keratoscopy: Fluorescein

Clinical Applications	Diagnostic Data
Contact Lens and Ortho-K Fitting	REF Data / KER Data / Zernike REF Analysis Pupillometry / White-to-White / Keratoscopy

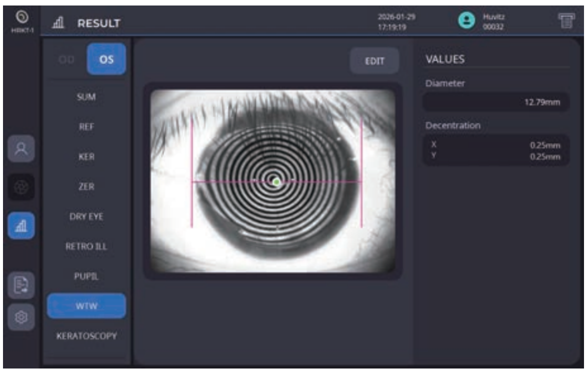
Ocular Zernike Analysis

Keratometry result screen (KER)

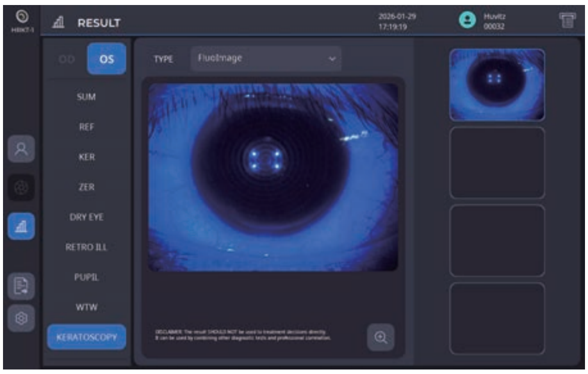
Corneal Zernike Analysis



Pupillometry result screen



White-to-White

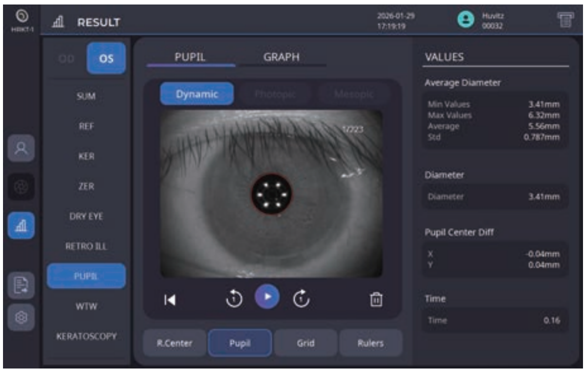


Keratoscopy

Clinical Applications	Diagnostic Data
Refractive Surgery (LASIK, LASEK, etc.)	REF Data / KER Data Zernike REF Analysis / Pupillometry

Ocular Zernike Analysis

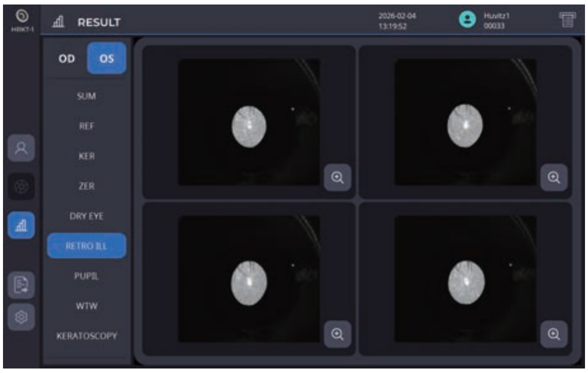
Keratometry result screen (KER)



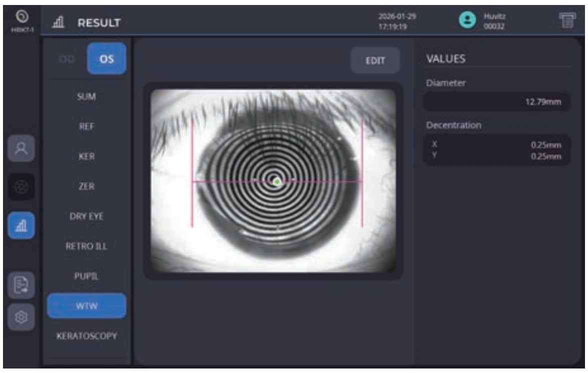
Pupillometry result screen

Clinical Applications
Cataract Diagnosis and Surgical Evaluation

Diagnostic Data
Pupillometry / Retro Illumination White–to–White



Retro illumination result screen

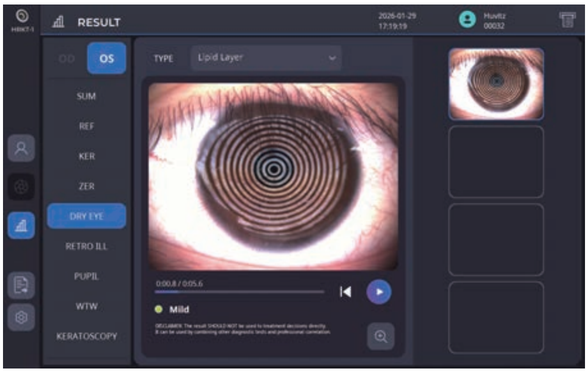


White–to–White result screen (WTW)

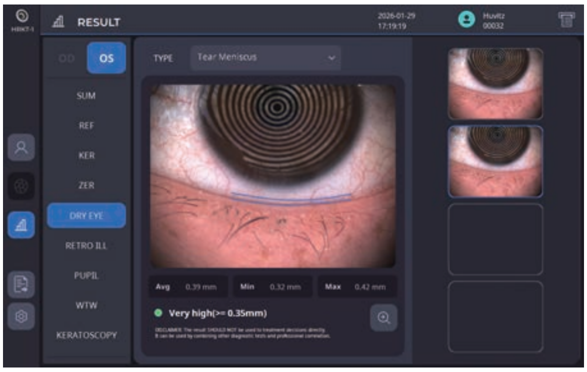
Pupillometry result screen

Clinical Applications	Diagnostic Data
Dry Eye Assessment	NIBUT / Lipid Layer / Tear Meniscus Height Meibography / Blink Analysis / Keratoscopy: Fluorescein OSDI Questionnaire

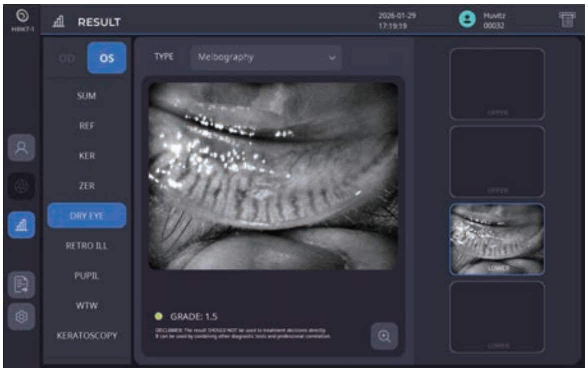
NIBUT (Non–Invasive Break–up Time)



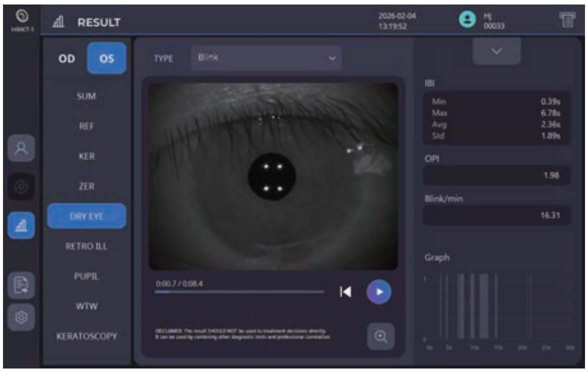
Lipid Layer



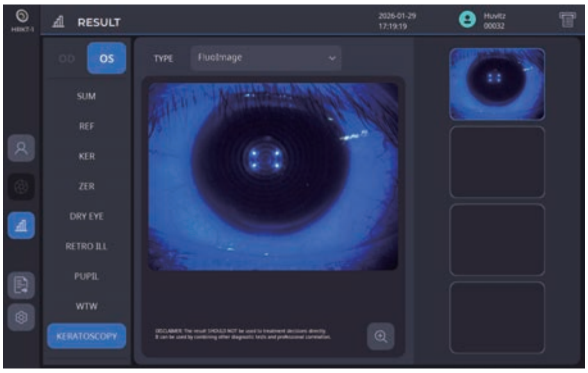
Tear Meniscus Height



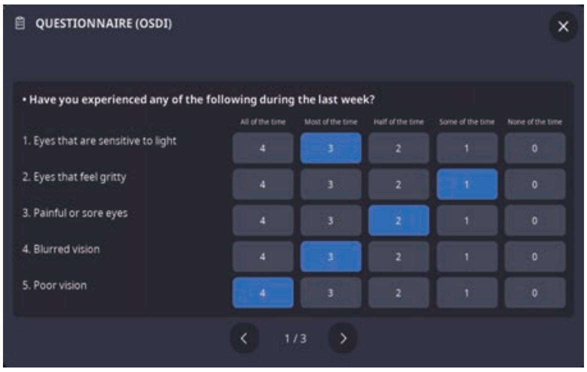
Meibography



Blink Analysis



Keratoscopy: Fluorescein



OSDI Questionnaire

HRKT-1

Ref/Keratometer & Topography & Dry Eye

Specification

Refractometry		
Parameter	Measuring Range	Accuracy
Distance between vertex of corneal (VD)	0.0, 12.0, 13.75, 15.0	-
Spherical prescription (SPH)	0.0 to ±20.00D (in case of VD=12mm) (0.01/0.12/0.25D unit)	The accuracy is in accordance with ISO 10342.
Astigmatism prescription (CYL)	0.00 to ±12.00D (0.01/0.12/0.25D unit)	
Astigmatism axis angle (AX)	0° ~ 180° (1° unit)	
Astigmatism indication	-, +, MIX	-
Pupil distance (PD)	10 ~ 85mm	-
Minimum pupil diameter that can be measured	Ø2.5mm	-
Corneal Topography		
Working distance	80mm (Meibomian Gland: 100mm)	
Placido disc	24 rings	
Points Analyzed	Over 100,000	
Keratometry		
Parameter	Measuring Range	Accuracy
Corneal measurement range	Up to 9.8 mm (R = 8.0 mm, 42.2 D, n=1.3375)	-
Corneal curvature radius (Cornea refractive power)	5.00 to 13.00 mm (26 to 67.5 Diopter, n = 1.3375)	The accuracy and repeatability are in accordance with Type A, ISO 19980
Direction of principal meridians	0° to 180°	±4° (principal meridional differences in radii of curvature ≤0.3 mm) ±2° (principal meridional differences in radii of curvature>0.3 mm)
White-to-white distance	7 to 14mm	± 0.05 mm
Pupil diameter	0.5 to 10mm	± 0.05 mm
Dry eye		
Dry Eye Function	Lipid Layer, Tear Meniscus Height, NIBUT, Meibomian Gland, Blink Analysis, OSDI	
Common		
Display	Swiveling & Tiltable 10.1 inch, Touch panel color LCD	
Horizontal Movement	55 mm (back and forth) / 100 mm (left and right)	
Vertical Movement	30 mm	
Chinrest Movement	62 mm (up and down), motorized	
Measurement method	Semi Auto Tracking	
Auto Movement Range	X, Z = ± 5mm / Y = ± 15mm (X,Y for positioning, Z for working distance)	
Auto Tracking Range	X, Y, Z = ± 5mm	
Power Supply	AC 100-240V, 50/60Hz, 1.0A - 0.5A	
Dimension	312(W)mm x 567(D)mm x 550(H)mm	
Weight	23 kg	

* Specification and design are subject to change without notice.

Huvitz CONNECTING SIGHT SUCCESS

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