NIDEK

Auto Ref / Keratometer / Auto Refractometer

ARK-1 / AR-1

NIDEK

THE ART OF EYE CARE

ARK-1 / AR-1
AUTO REF/KERATOMETER / AUTO REFRACTOMETER

The *Superior Auto*
and *Auto*

What is the superior auto ref /

The ARK-1 / AR-1 series speak for themselves,

and auto refractometer

generating greater accuracy

Superior Functions

✓ *Accurate* Refraction Measurement

✓ *Simple* Opacity Assessment

Model	Refraction measurement	Keratometry measurement
ARK-1s	○	○
ARK-1a	○	○
ARK-1	○	○
AR-1s	○	×
AR-1a	○	×
AR-1	○	×

○ - Available   × - Not available

Ref / Keratometer
Refractometer

keratometer and auto refractometer?
surpassing a conventional auto ref / keratometer
with technologically enhanced functions
and greater clinical information.

for *Superior* Outcomes

✓ *Easy* VA Measurement with Glare Test
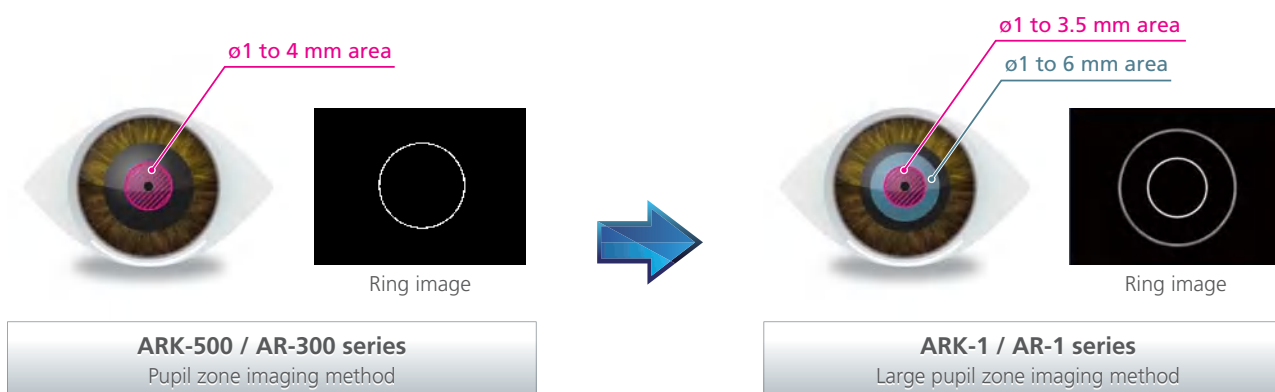
✓ *Patient-friendly* Accommodation Measurement

VA measurement Glare test	Opacity assessment	Accommodation measurement
○	○	○
×	○	○
×	×	×
○	○	○
×	○	○
×	×	×

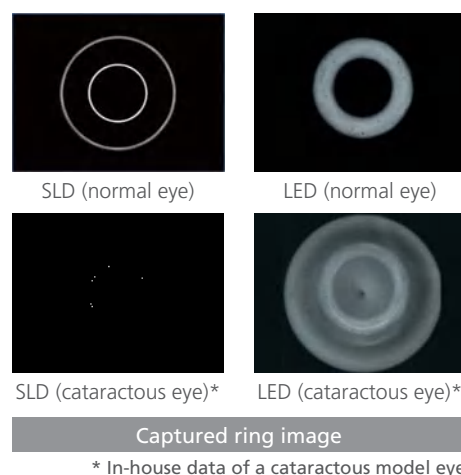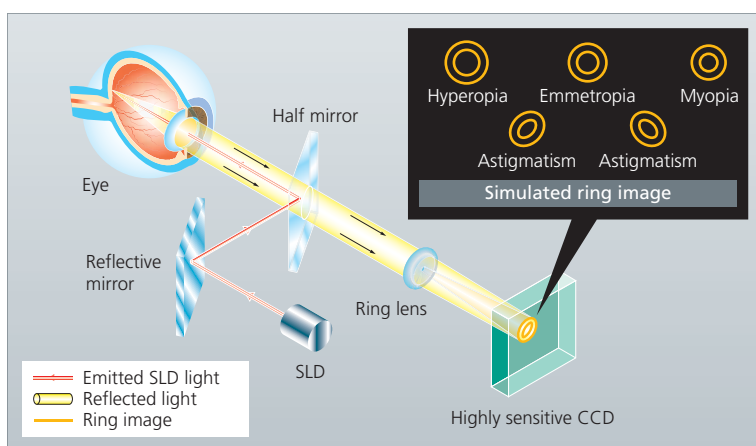# Accurate Refraction Measurement

Large Pupil Zone Imaging Method

The large pupil zone imaging method enables the measurement of wide area refraction of up to 6 mm diameter and can indicate the difference between wide area refraction and the central area refraction of up to 3.5 mm diameter. The pupil diameter is measured simultaneously. The difference of the measurement allows assessment of the effect of pupil size such as a vision in dim light.

ø1 to 4 mm area

ø1 to 3.5 mm area

ø1 to 6 mm area

Ring image

Ring image

ARK-500 / AR-300 series
Pupil zone imaging method

ARK-1 / AR-1 series
Large pupil zone imaging method

Super Luminescent Diode and Highly Sensitive CCD

Incorporation of the Super Luminescent Diode (SLD) provides a sharper and clearer image compared to a conventional LED. The highly sensitive CCD detects the ring image even if the fundus reflection is weak. The system combining the SLD and highly sensitive CCD significantly improves measurement capability even in dense cataractous eyes.

Half mirror

Hyperopia   Emmetropia   Myopia

Astigmatism   Astigmatism

Simulated ring image

Eye

Reflective mirror

Ring lens

SLD

Highly sensitive CCD

— Emitted SLD light
— Reflected light
— Ring image

SLD (normal eye)

LED (normal eye)

SLD (cataractous eye)*

LED (cataractous eye)*

Captured ring image

* In-house data of a cataractous model eye

Optimal Fogging to Minimize Accommodation (available for the ARK-1s / 1a and AR-1s / 1a)

Fogging is performed after correcting the patient's astigmatism with built-in cylinder lenses. This allows the patient to view the target clearly and minimizes the interference with accommodation even in high astigmatism.

VA Measurement with Glare Test

VA Measurement with Built-in Charts and Lenses (available for the ARK-1s and AR-1s)

The ARK-1s / AR-1s provides visual acuity (VA) measurement. This unique function enables a quick check of the patient's refractive error by comparing subjective measurement with objective measurement. Even corrected near visual acuity is measurable with easy operability to determine the need for a progressive lens.

Recall Function for Instant Vision Comparisons (available for the ARK-1s / 1a / 1 and AR-1s / 1a)

The recall function provides the instant comparison between vision corrected with AR data and uncorrected vision or vision corrected with the data of patient's own glasses. For the patient, this function demonstrates the difference in vision and the necessity for more appropriate vision correction.

Distance vision corrected with AR data	Uncorrected distance vision
	Distance vision corrected with LM data*
Near vision corrected with AR data	Uncorrected near vision
	Near vision corrected with LM data*

Vision comparisons

*The data of patient's own glasses has to be imported from a NIDEK lensmeter.

Contrast and Glare Test (available for the ARK-1s and AR-1s)

After a low contrast VA chart is projected, a glare source is projected beside the chart and the glare VA can be measured. With this test the effect of glare and halo to visual performance can be measured. This utility can be used for cataract and refractive surgery patients.

Simulated patient's vision of low contrast VA chart

Vision with glare and halo   Normal vision

Simulated patient vision of VA chart and glare source

Keratometry Measurement with Mire Ring (available for the ARK-1s / 1a / 1)
The mire ring is used to measure keratometry. It reduces eyelid artifacts.

Measurement with four points
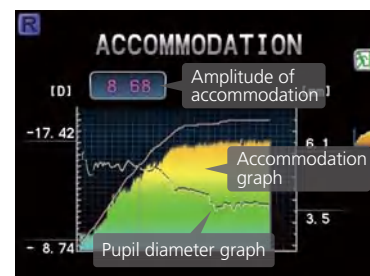

Measurement with mire ring

Patient-friendly Accommodation Measurement

(available for the ARK-1s / 1a and AR-1s / 1a)

Accommodation Measurement with Artificial Intelligence Algorithm

Objective measurement of accommodation is performed with patient's focusing on a target which moves from distance to near. The artificial intelligence algorithm detects the patient's response and reduces the measurement time in cases with a slow or weak accommodative response. The accommodation measurement helps to assess pseudomyopia, eyestrain, and accommodative palsy.


Measurement with Astigmatism Correction

Astigmatism is corrected with built-in cylinder lenses prior to measurement. It reduces the influence of astigmatism on the measurement of accommodation.

Assessment for Intermediate or Near Vision Lens

The assessment of accommodation based on the age-accommodation relation allows to suggest whether an intermediate or near lens is required.
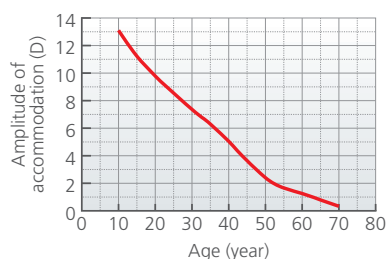
Courtesy of Masayoshi Kajita, MD, PhD

The amplitudes of accommodation on the graph are values of subjective measurement. The amplitudes of accommodation of objective measurement tend to be lower than those on the graph.
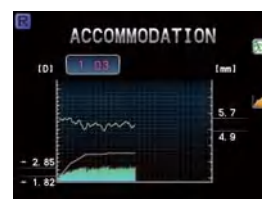
Simple Opacity Assessment

Retroillumination Image and NIDEK Cataract Indices*

The retro illumination image enables the observation of opacity of the optical media of the eye. NIDEK cataract indices indicate the severity of the opacity and helps to assess the progression of pathology.

COI.H	Opacity size within a diameter of 3 mm of the center (vertical diameter): mm
COI.A	Opacity proportion within a diameter of 3 mm of the center: %
POI	Opacity proportion within the entire periphery: %

Cataract indices

*Available for the ARK-1s / 1a and AR-1s / 1a
 The NIDEK Cataract indices are for reference only.
 The following conditions may indicate different indices from ones of actual status.
 √ Peripheral image is darkly captured due to alignment position.
 √ Opacities are not in focus.
 √ Bright spot reflecting observation light occurs on the cornea apex.
 √ Position of the 3 mm diameter circle is shifted due to incorrect pupil detection caused by opacity location.

Eye with dense opacity

Eye with light opacity

Practical and User-friendly Features

3-D* Auto Tracking and Auto Shot

The 3-D auto tracking and auto shot provide faster, simpler, and more accurate measurements. When alignment is performed correctly, measurement starts automatically.

*Y direction (vertical) auto tracking is available for the ARK-1 and AR-1.

Y direction

X direction

FOCUS

Tiltable Color LCD Screen

The color LCD with tilt function offers easy operation even when an operator is standing.

High Speed Printer with Easy Loading & Auto Cutter

The printer paper can be changed easily. The data sheet is cut by an auto cutter for quick and easy detachment.

Summary Display and Printout of Measured Values

Various measured values can be displayed simultaneously on the summary screen allowing easy and quick confirmation and printing.

Eye Care Card System*

A card slot enables the use of an Eye Care card system, which provides quick and easy wireless data transfer.

*The card is optional.

Eye Care Card System

ARK-1 / AR-1 Series Specifications

Model	ARK-1s / AR-1s	ARK-1a / AR-1a	ARK-1 / AR-1
Auto refractometer			
Measurement range	Sphere -30.00 to +25.00 D (VD = 12 mm) (0.01 / 0.12 / 0.25 D increments) Cylinder 0 to ±12.00 D (0.01 / 0.12 / 0.25 D increments) Axis 0 to 180° (1° / 5° increments)	←	←
Minimum measurable pupil diameter	ø2 mm		
Auto keratometer*1			
Measurement range	Curvature radius 5.00 to 13.00 mm (0.01 mm increments) Refractive power 25.96 to 67.50 D (n = 1.3375) (0.01 / 0.12 / 0.25 D increments) Cylindrical power 0 to ±12.00 D (0.01 / 0.12 / 0.25 D increments) Axis 0 to 180° (1° / 5° increments)	←	←
Sagittal measurement	25° each from the center (superior side, inferior side, temporal side, nasal side)		
VA measurement			
Measurement mode	Uncorrected VA, Corrected VA (distance, near)		
Measurement range	Less than 0.1, 0.1, 0.25, 0.32, 0.4, 0.5, 0.63, 0.8, 1.0, 1.25 or Less than 20 / 200, 20 / 200, 20 / 80, 20 / 60, 20 / 50, 20 / 40, 20 / 30, 20 / 25, 20 / 20, 20 / 16	Not available	Not available
Correction range	Sphere -20.00 to +20.00 D (VD = 12 mm) (0.25 D increments) Cylinder 0 to ±8.00 D (0.25 D increments) Axis 0 to 180° (1° / 5° increments)		
Vision comparison	Available with VA chart	Available with scenery chart	Available*2 / Not available*3
Retroillumination image	Available	←	Not available
Accommodation measurement range	0 to 10.00 D (0.01 / 0.12 / 0.25 D increments)	←	Not available
PD measurement range	30 to 85 mm (1 mm increments) (Near point PD: 28 to 80 mm at WD = 40 cm)	←	←
Corneal size measurement range*4	10.0 to 14.0 mm (0.1 mm increments)	←	←
Pupil size measurement range	1.0 to 10.0 mm (0.1 mm increments)	←	←
Auto tracking	X-Y-Z directions	←	Y direction
Auto shot	Available	←	←
Display	Tiltable 6.5-inch color LCD	←	←
Printer	Thermal line printer with easy loading and auto cutter	←	←
Interface	RS-232C (in / out), LAN, USB, Eye Care card system*5	←	←
Power supply	AC 100 to 240 V 50 / 60 Hz	←	←
Power consumption	100 VA	←	←
Dimensions / Mass	260 (W) x 495 (D) x 457 (H) mm / 20 kg 10.2 (W) x 19.5 (D) x 18.0 (H)" / 44 lbs.	←	←

*1 Not available for the AR-1s, AR-1a, and AR-1

*2 Available with scenery chart for the ARK-1

*3 Not available for the AR-1

*4 Not available for the AR-1s, AR-1a, and AR-1

*5 The Eye Care card is optional.