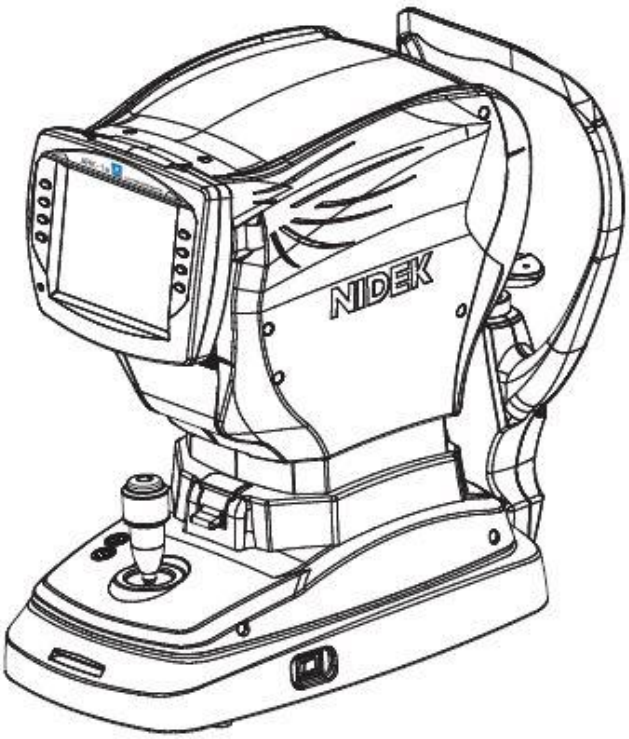
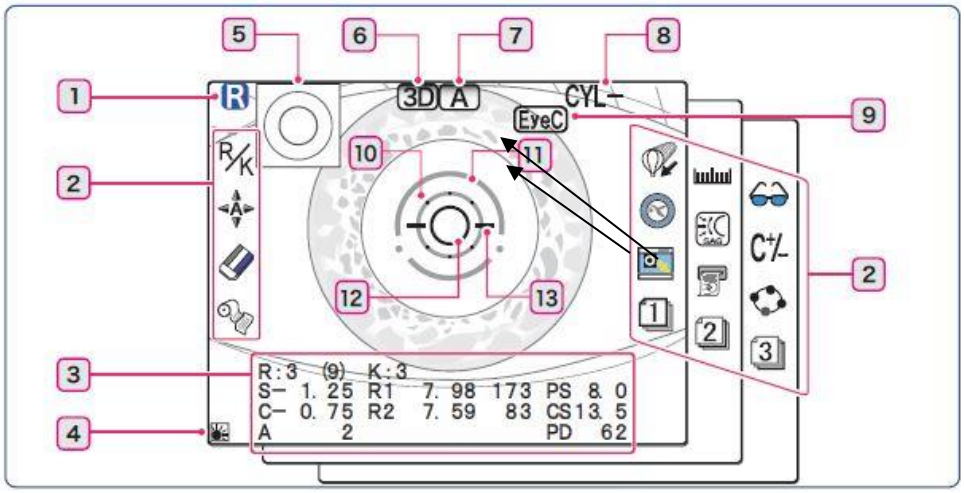
AUTO REF/KERATOMETER
ARK-1a/ARK-1



Quick Guide

Autorefraction:

The Nidek ARK calculates a quick and automatic measurement of patient's refractive error (prescription) without any patient input (objectively).
The device uses a large pupil imaging method to simultaneously measure patient prescription at 2 pupil diameters (large and small).

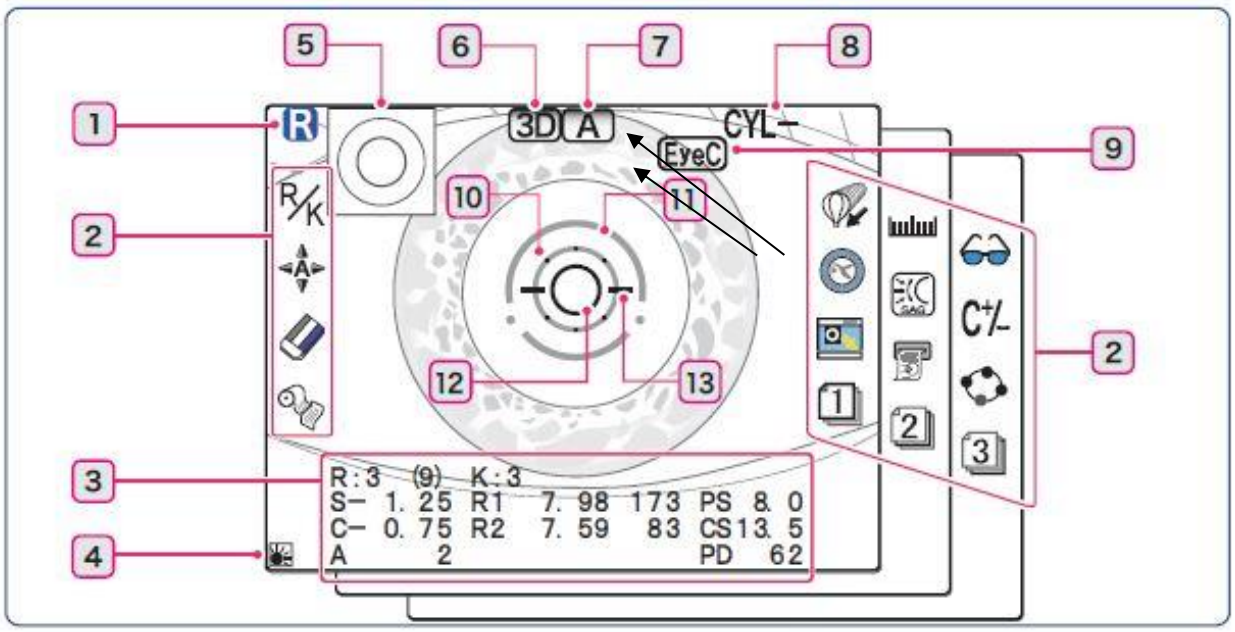


This improves accuracy and allows an estimation of the effects on pupil size on night vision. If the patient has a large difference in their prescriptions at small and large pupil diameters, this may indicate a different spectacle prescription is needed at night (eg. Night driving).
The minimum pupil size required for autorefraction measurement using the Nidek ARK is 2mm.
During measurement, the patient is asked to fixate on using a distance target (hot air balloon at the end of a road). A distance target is used to help relax patient accommodation as much as possible during measurement.

The patient should be advised that the target will change focus throughout the measurement. This is to further relax their eyes.

Keratometry:

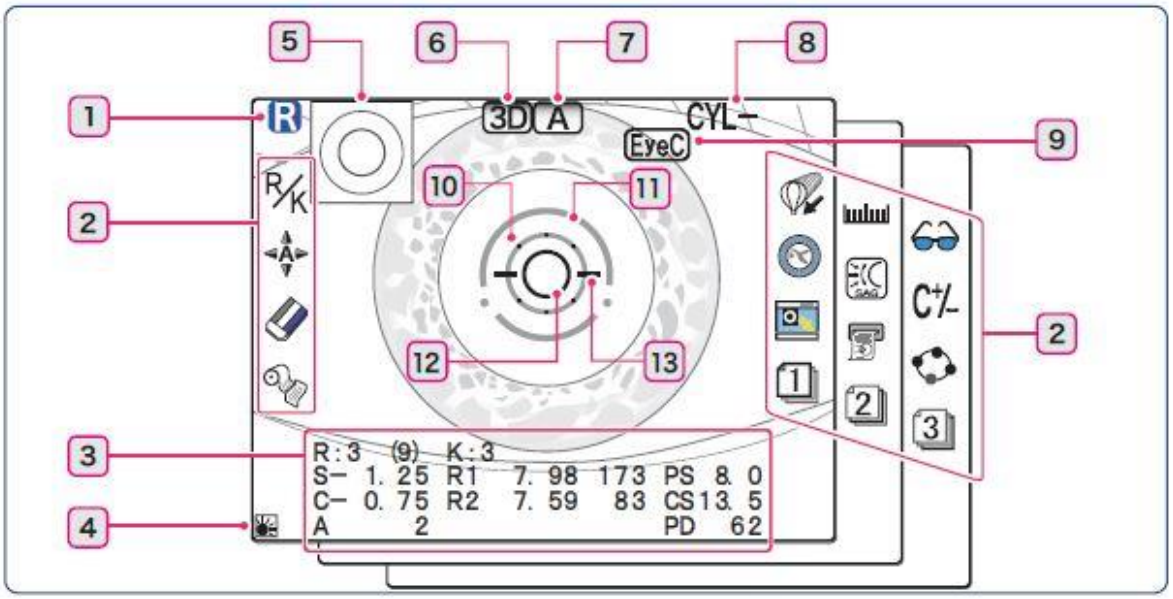
The Nidek ARK calculates a quick and automatic measurement of patient's corneal curvature. This measurement is essential for the fitting of contact lenses.
The device uses the same double ring method as used in autorefraction capture.
By using 2 different measurement mires, the Nidek ARK improves accuracy, as the keratometry measurement is less likely to be influenced by the patient eyelid.

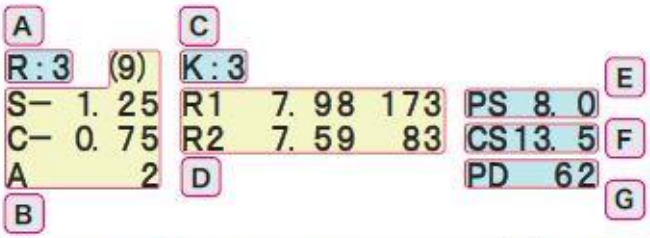


As the keratometry mires are produced by infrared light, which is invisible to the human eye, the patient does not have a specific fixation target during measurement.
Instead they should be asked to fixate straight ahead.
Most commonly, keratometry measurements are taken at the same time as autorefraction on the Nidek ARK.

Touch Screen:

The Nidek ARK has a 6.5-inch, tilt-able touch screen display.
This displays the measurement screen as below:





E	PS: Pupil Size
F	CS: Corneal Size
G	PD: Pupillary Distance

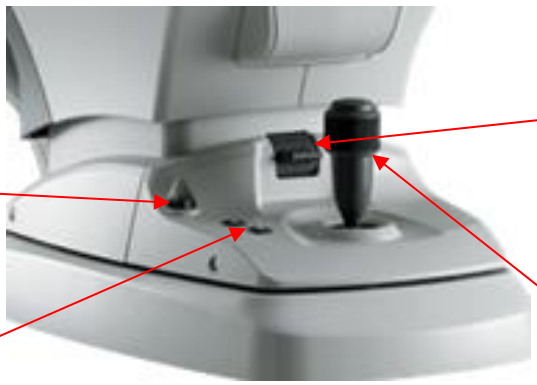
A	R: Number of AR measurements	C	K: Number of KM measurements
B	AR latest values S: Spherical refractive error C: Cylindrical refractive error A: Cylinder axis * The number in parentheses indicates a confidence index.	D	KM latest values R1: Corneal curvature radius and axis angle in the flat-test meridian direction R2: Corneal curvature radius and axis angle in the steepest meridian direction

R/K	Selects measurement mode (AR/KM, AR, or KM).
Auto	Selects auto tracking mode (3D, 2D, OFF) and auto shot mode (ON, OFF).
Clear	Holding down the button for about a second erases all the measured data.
Print	Pressing the button while the memory indicator is lit prints the measured results. Pressing the button while the memory indicator is not lit advances printer paper.
Accommodation measurement	Displays the accommodation measurement screen (ACCOMMODATION).
Retroillumination image	Displays the retroillumination image observation screen (RETRO ILLUMINATION).
Ring image	Pressing the button while the ring image thumbnail is shown displays the ring image in full screen.
1/2/3 Page switch	Switches the measurement screen among Page 1, Page 2, and Page 3.
CS/PS/PD	Switches from AR/KM measurement to CS/PS/PD measurement.
Sagittal	Displays the sagittal measurement screen (SAGITTAL).
Eye print	Prints the eye diagram of measured data.
Vision comparison	Displays the vision comparison screen (COMPARE).

CYL mode	Switches cylinder (cylindrical refractive error) mode.
Parameter	Holding down the button for about a second displays the parameter setting screen.

Base unit:

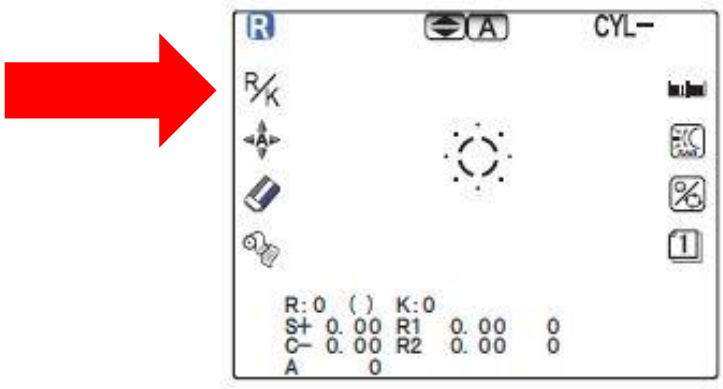
The Nidek ARK base unit is simplified to assist with ease of use.



Measurement Capture:

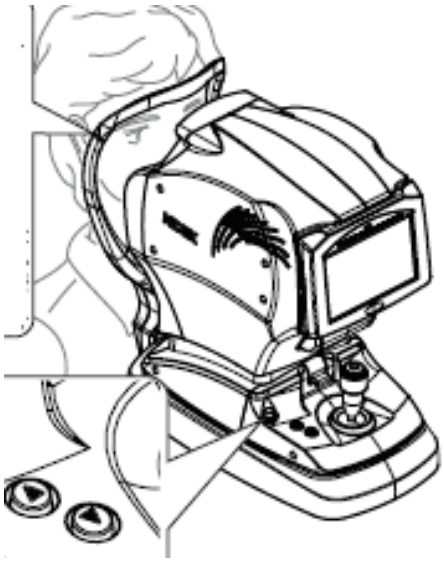
STEP 1: Measurement mode selection

The measurement mode (autorefractor, keratometry or both) is selected by cycling through the 3 options using R/K and the test explained to the patient.



STEP 2: Patient positioning

Before measurement can be captured, the patient needs to place their chin on the chin rest and forehead firmly against the forehead rest.

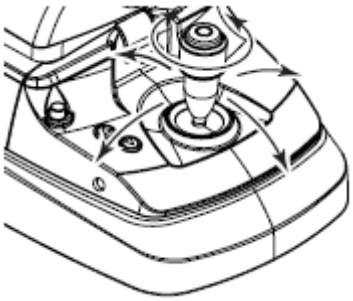


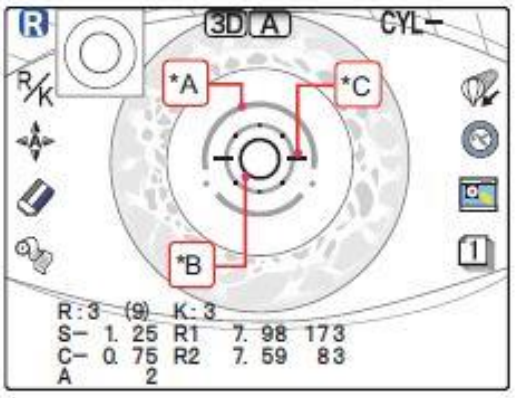
The patient's eyes should be aligned with the eye level markers on the side of the forehead rest support. The patient position can be adjusted by altering the height of the supporting table or the patient chinrest, using the directional arrows on the base unit.

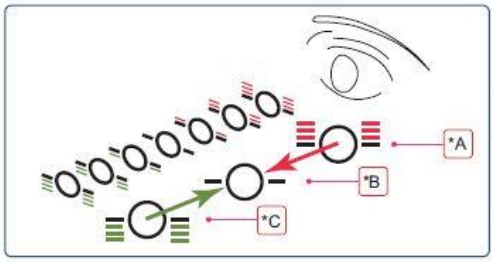
STEP 3: Patient Alignment & measurement

It is possible to measure autorefraction, keratometry, or both together.

To begin measurement, the joystick should be used to align the capture rings with the centre of the patient's pupil. The patient should be advised to fixate on the hot air balloon target during measurement. Measurement starts automatically when alignment is met (capture rings turn yellow). Measurement happens in the order of KM measurement and then AR measurement.







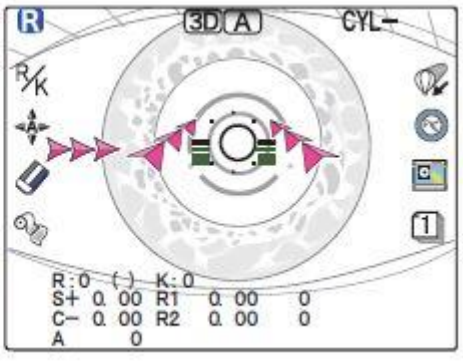
*A	Too close to the patient's eye
*B	Optimum focusing condition
*C	Too far from the patient's eye

Guide arrows will appear if device needs to be moved closer to, or further away from the patient.

The limit indicator (red arrows) is displayed. Manipulate the joystick in the direction of the arrows.

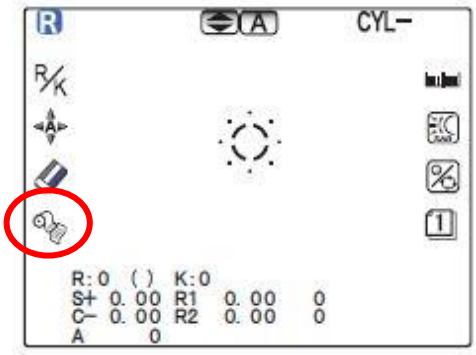
Limit indicators are displayed in each direction of up/down (/), right/left (/), or forward/backward (/). (ARK-1a)

Limit indicators are displayed in the up or down (/) direction. (ARK-1)

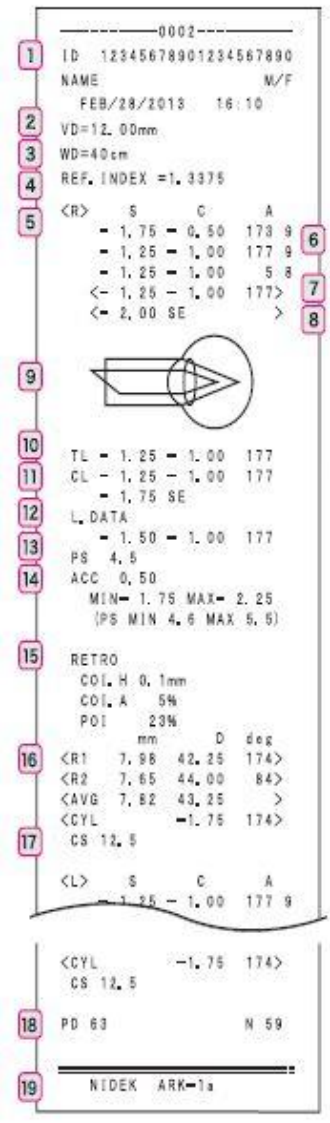


STEP 4: Summary and print out

Once measurements are complete, results can be printed.



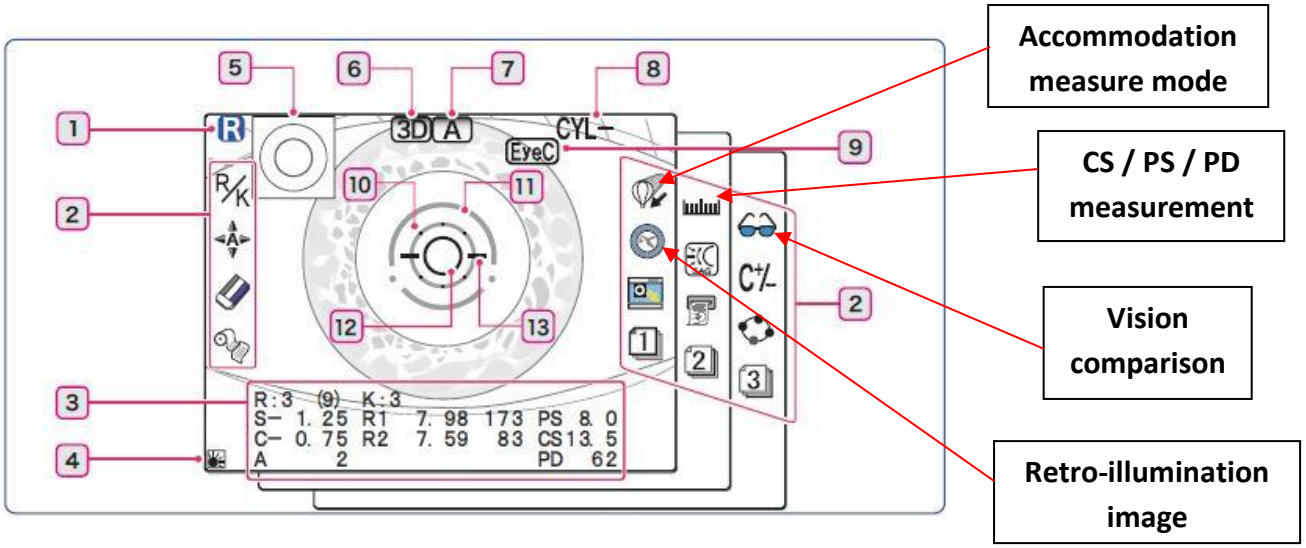
The Printout explained:



1	Patient ID Patient ID scanned by the optional barcode scanner or magnetic card reader
2	Vertex distance
3	Near working distance
4	Corneal refractive index
5	AR-measured values (center) S: Spherical refractive error C: Cylindrical refractive error A: Cylinder axis
6	Confidence index
7	AR median values
8	SE value
9	Printing of eye diagram
10	Trial lens data
11	Contact lens conversion value
12	AR large area measured values
13	PS (Pupil Size) measured value "(LAMP=OFF)" is printed out for PS measurement conducted with the chart-illuminating lamp off and "(LAMP=ON)" when the lamp is on.
14	Accommodation measured values MIN: AR-measured minimum value MAX: AR-measured maximum value (PS MIN: Pupil size minimum value, MAX: Pupil size maximum value) An accommodation graph is printed out depending on the "58. ACC GRAPH PRINT" parameter setting.
15	Retroillumination analysis values COI. H: Central Opacity Index Height COI. A: Central Opacity Index Area POI: Peripheral Opacity Index
16	KM median values R1: Flattest meridian R2: Steepest meridian deg: Corneal cylinder axis AVG: Average of R1 and R2 CYL: Corneal cylindrical error
17	CS (Corneal Size) measured value
18	PD (Pupillary Distance) Distance PD, monocular PD, near PD
19	Comments Characters and symbols can be freely entered.

Advanced assessment features:

The Nidek ARK1 can perform several advanced assessments (dependant on device)



RETRO-ILLUMINATION IMAGE

The Nidek ARK1 contains a retro-illumination camera for the improved imaging of media opacities.

When analysis is complete, the opacity indexes for the center (COI. H, COI. A) and periphery (POI) and a circle indicating the 3 mm range in diameter are displayed

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: %

The Nidek cataract indices can give clinicians an indication of severity of opacities and allow easier monitoring.

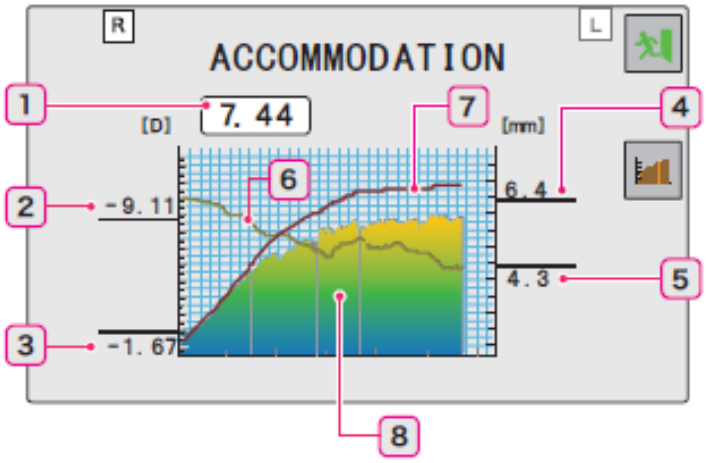
TIP! - Cataract indices are a guide only and will be variable depending on exact alignment.

ACCOMODATION MODE

The Nidek ARK1 can provide an assessment of a patient's accommodation using the '*Accommodation Measurement Mode*'.
The patient is advised to fixate on a distance target (hot air balloon).

The target will be moved between a distance and near focus in ± 0.25D increments.
The device measures the patient's objective response to change in focus over a 30 second period.

The Nidek ARK1 will then plot the patient's accommodative response on a graph:



1	Accommodation (D)
2	Maximum AR measured value (D)
3	Minimum AR measured value (D)
4	Maximum pupil size (mm)
5	Minimum pupil size (mm)
6	Pupil size graph
7	Graph indicating chart position ([TPOS])
8	Graph indicating the change of AR measured values (Accommodation graph)

As with other capture modes on the Nidek ARK, the operator will need to align with the centre of the patient's pupil.
Measurement will be started by selecting the capture button in the centre of the joystick.

TIP! - Accommodation measurements can only be taken after R / K measurement is complete.

CS / PS / PD MANUAL MEASUREMENT MODE

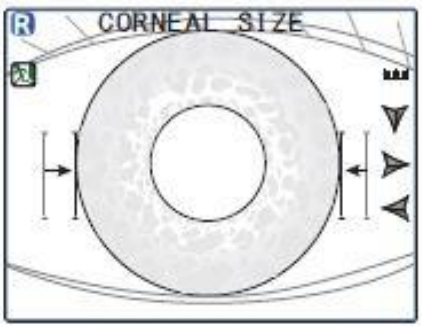
The CS / PS / PD manual measurement mode allows the operator to take measurements of the anterior eye structures such as cornea and pupil size under both photopic and mesopic conditions.

It also acts as a dispensing tool by allowing measurements such as PD and heights (*NB. PD is measured automatically during auto-refraction stage*).

Cycle through CS / PS / PD measurement by pressing the icon. Once the operator has aligned with patient pupil, the capture button on the centre of the joystick should be pressed to begin measurement.

Press the right button or left button to align the guide lines on the edge of the patient's cornea.

The guide line to be aligned is displayed in pink. Press the down button to change the selected guide line.



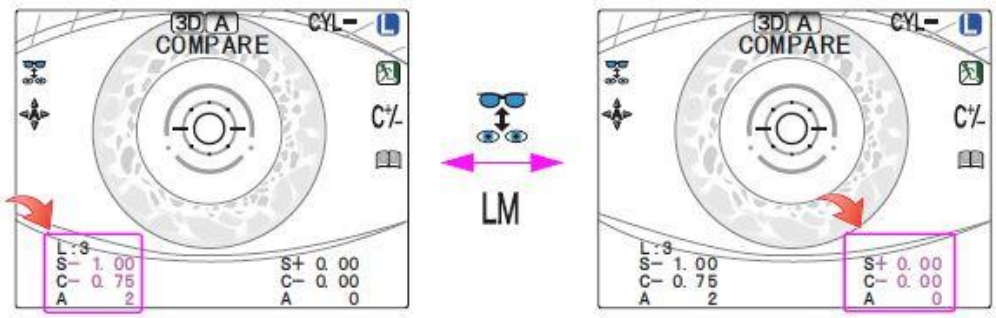
The arrows can then be used to align markers.

The central button of the joystick can then again be pressed to finalise measurement.

VISION COMPARISON MODE

The Nidek ARK1 '*Vision Comparison Mode'*, allows a quick comparison of patient's visual acuity with autorefractor results and a patient's current spectacles and / or their unaided visions.

To compare visual acuity from autorefractor results to a patient's current spectacle prescription, the Nidek ARK must be connected to the lens meter (LM) and the data must have been input.



Corrected distance values

Uncorrected vision (0 D) or LM values

Once in '*Vision Compare Mode'*, the internal scenery will change to distance view. The spectacles icon can be pressed to change between patient's autorefraction prescription and inputted LM data or uncorrected vision.

The same process can be done for reading by pressing the book icon on the RHS of the screen.