

# Nidek Tonoref III

## QUICK GUIDE



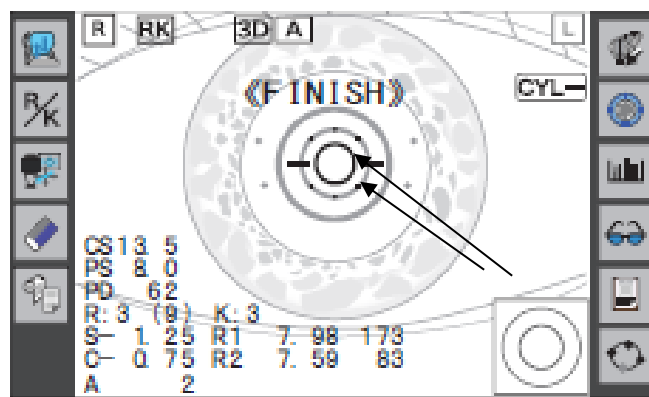
### Features:

- 4 in 1 testing - Autorefractometry, keratometry, pachymetry, non-contact tonometry
- Fully automated capture and eye tracking
- Tilttable, 7-inch, colour screen
- Quick and comfortable measurements for patient and clinician
- Connectivity to other Nidek devices (eg. RT phoropter series, LM focimeter series)
- Advanced assessment tools including accommodation measurement and opacity imaging

## Autorefraction:

The Nidek Tonoref III 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 autorefractive measurement using the Nidek Tonoref III is 2mm.

During measurement, the patient is asked to fixate on using a distance target (hot air balloon). A distance target is used to help relax patient accommodation during measurement.



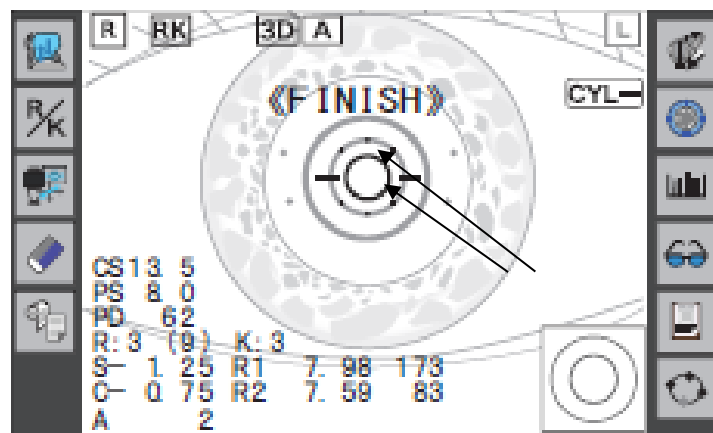
The patient should be advised that the target will change focus throughout the measurement. This is to further relax their eyes.

## Keratometry:

The Nidek Tonoref III 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 autorefractometer capture.

By using 2 different measurement mires, the Nidek Tonoref II 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 autorefractometer on the Nidek Tonoref III.

## Pachymetry:

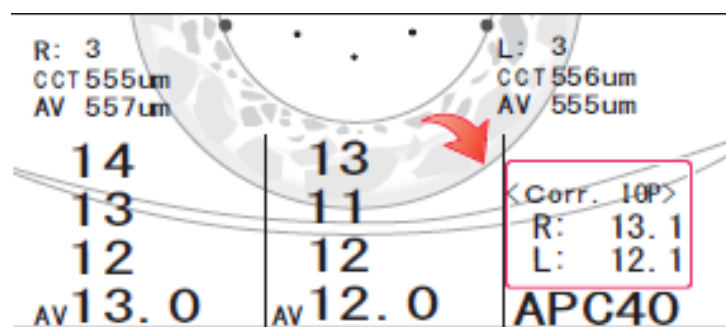
Pachymetry is the measurement of corneal thickness. This measurement gives the optometrist important information about the health of the patient's cornea and the potential risk of developing eye disease such as glaucoma.

Traditional pachymetry methods involve touching the patient's eye with an ultrasound probe. The Nidek Tonoref III uses infrared light to conduct quick and accurate pachymetry measurement without contact.

As infra-red light is invisible to the human eye, the patient has no specific fixation target during measurement and instead should be asked to look straight ahead

Most commonly, pachymetry measurements are taken at the same time as tonometry on the Nidek Tonoref III.

The pachymetry and tonometry measurements can be used together to calculate a corrected IOP (intraocular pressure) reading.



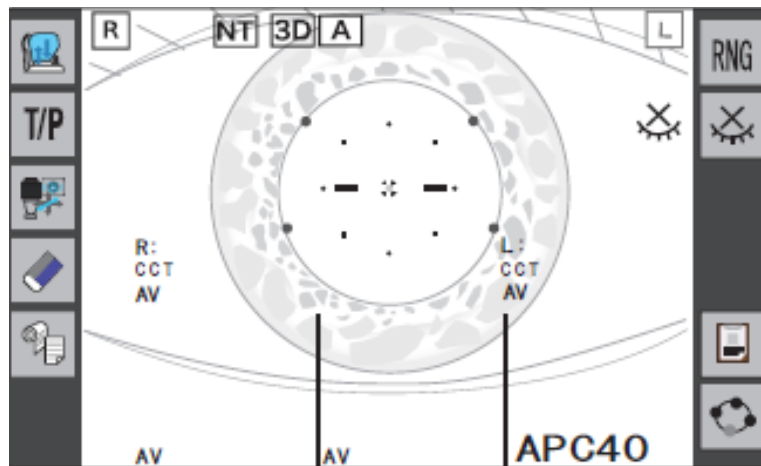
Without pachymetry, tonometry devices assume that all patient's have the same corneal thickness. In reality, corneal thickness can vary greatly between patients. The thickness of the cornea effects how the eye will respond to the 'puff of air' used in the tonometry measurement. The response of the cornea will affect the final tonometry result. This means that non-contact tonometry devices without pachymetry, could be under or overestimating a patient's IOP, and therefore could be miscalculating the patient's risk of having or developing glaucoma.

## NCT (Non-Contact Tonometry):

The Nidek Tonoref III performs non-contact measurements of patient IOP.

Non-contact tonometry measurements are calculated by firing a 'puff of air' at the patient's cornea. The IOP is calculated by the amount of air pressure needed to flatten the cornea. This technique can be uncomfortable and is often unpopular with patients.

The Nidek Tonoref III uses Automated Puff Control (APC) to create a more 'patient friendly' air puff. For a final IOP to be calculated, the measurement must be repeated several times. The Nidek APC technology adapts the amount of air pressure based on the first measurement taken. This ensures the minimum amount of air pressure is 'puffed' at the patient.



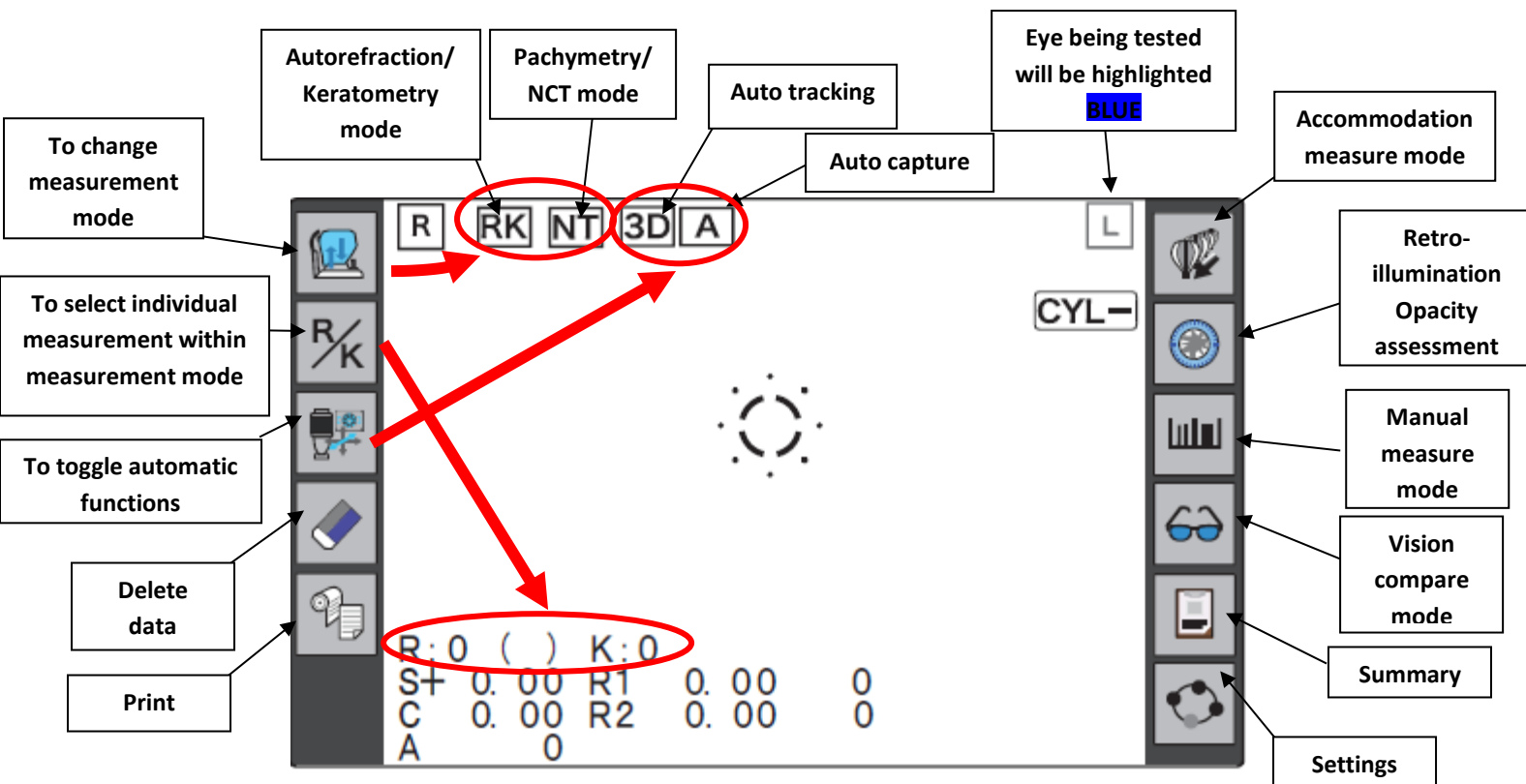
The Nidek Tonoref III has a gentle nozzle design to create a quieter puff of air, again aiming to improve patient comfort.

During IOP measurement, the patient should be asked to look at the green fixation light within the air nozzle.

## Touch Screen:

The Nidek Tonoref III has a 7-inch, tilt-able touch screen display.

This displays the measurement screen as below:



## Base unit:

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



## Measurement Capture:

### STEP 1: Patient positioning

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



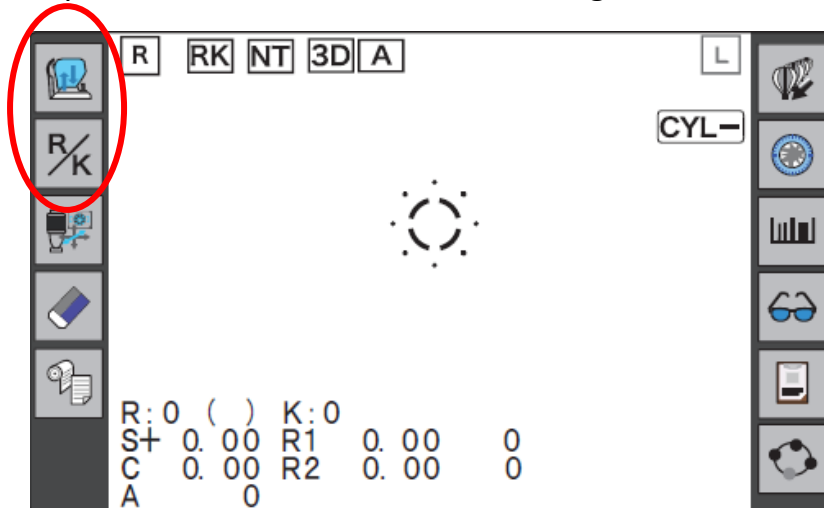
The patient's eyes should be aligned with the eye level markers on the side of the forehead rest support.



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.

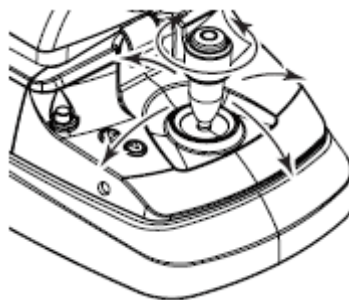
## STEP 2: Capture mode selection

The capture mode and specific measurement to be taken should be identified, the test explained to the patient and the correct fixation target advised.



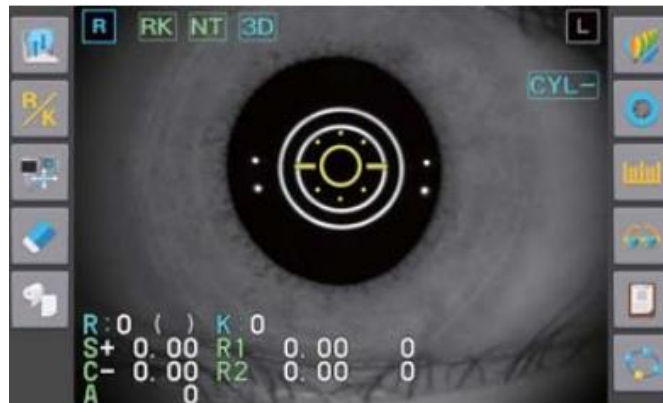
## STEP 3: Patient Alignment

To begin measurement, the joystick should be used to align the capture rings with the centre of the patient's pupil.

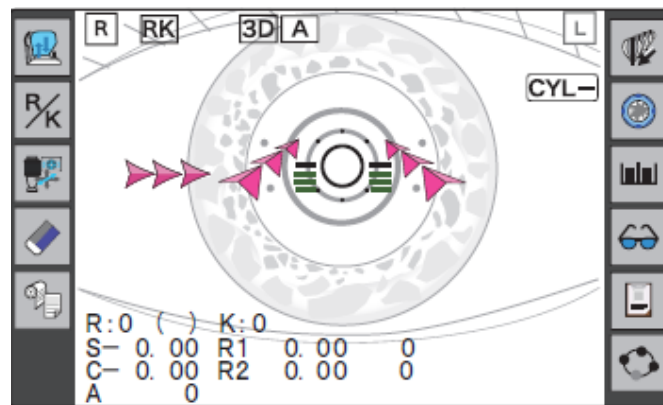


Once aligned with the patient's pupil, the base unit should be pushed forward towards the patient. Measurement will begin automatically when the capture rings are yellow.





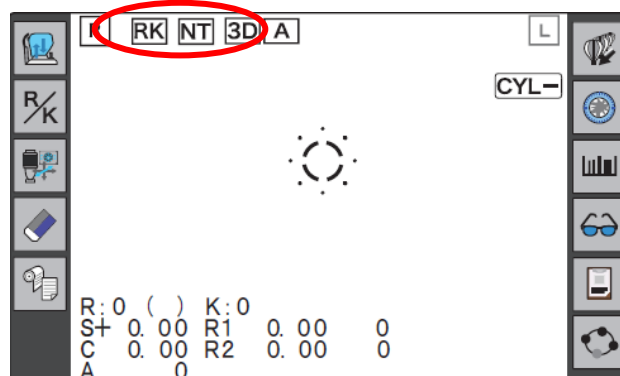
Guide arrows will appear if device needs to be moved closer to, or further away from the patient.



#### STEP 4: RK Measurement Mode

It is possible to measure autorefractometry, keratometry, or both together in RK mode.

It is possible to combine the measurements with NT mode by leaving all capture modes on the display screen before capture start.

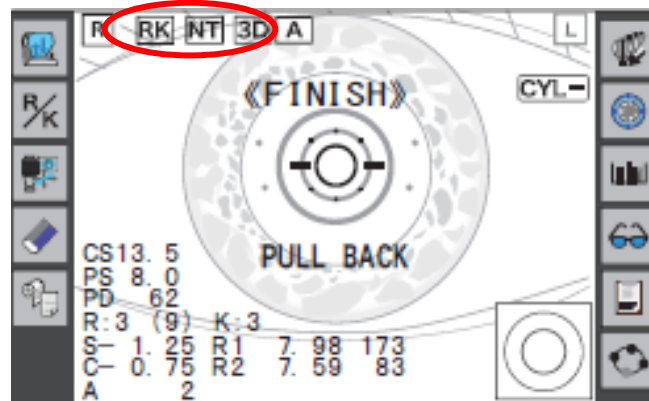


The patient should be advised to fixate on the hot air balloon target during measurement.

## STEP 5: NT Measurement Mode

It is possible to measure pachymetry, tonometry, or both together in NT mode.

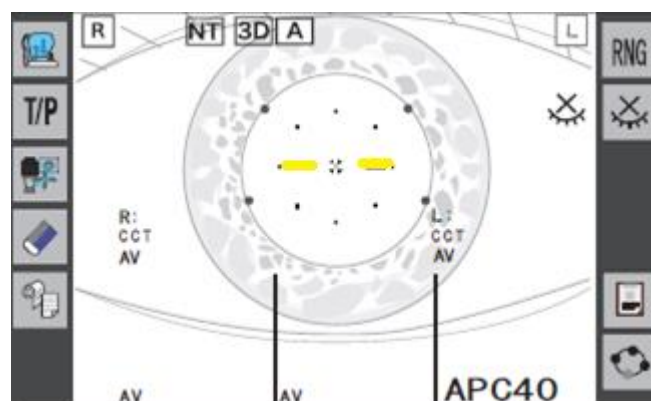
It is possible to capture NT measurements directly after RK, if all capture modes are on display screen at start of measurement of capture.



After RK is complete, 'PULL BACK' will display on the screen. The operator will need to pull the device away from the patient, where it will automatically lower ready NT measurement.

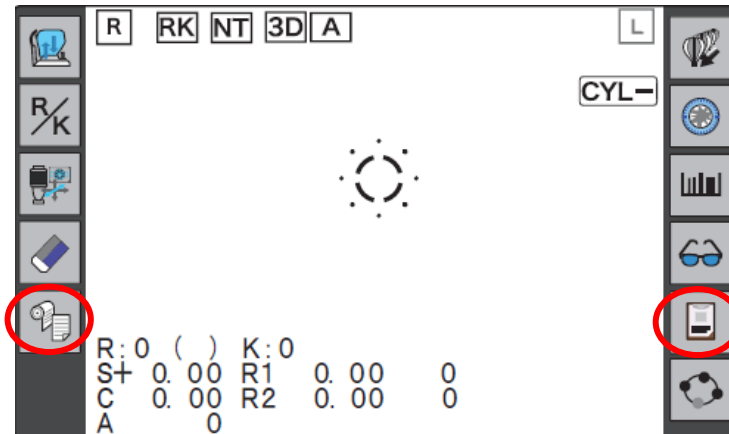
Before NT measurement will begin, the operator will need to realign with the centre of the patient's pupil. The patient should be advised to fixate on the green light in the centre of the air nozzle.

Measurement will begin when the alignment lines appear yellow.



## STEP 6: Summary and print out

Once measurements are complete, results can be viewed on the summary screen of the display unit or printed.



The summary page displays all the patient data on a single screen for the optometrist to analyse.

ALL	AR	KM	NTP	CS	PS	ACC	RETRO
<F>							
[AR]	S	C	A	S	C	A	
	- 5.75	- 0.75	172	- 5.00	- 1.00	9	
[KM]	R1	R2	deg	R1	R2	deg	
	8.22	7.92	172	8.22	7.95	11	
[NTP]	IOP (mmHg)	CCT (um)		IOP (mmHg)	CCT (um)		
	9.7	525		10.0	536		
	Corrected IOP (mmHg)						
	11.0			10.8			



# The Printout explained:

• Sample printout 2

```

-----0000-----
ID 12245678901234567890
NAME M/F
2010/ 1/21 10:10
VD=12.00mm
WD=49mm
REF. INDEX =1.3375
<R>
  S      C      A
  -1.75  -1.50  173.0
  -1.25  -1.50  177.0
  -1.25  -1.00   8.8
  -1.25  -1.00  177.0
  -2.00  0.00
  >

FL  -1.75  -1.50  173
CL  -1.25  -1.00  177
    -1.75  0.00
L DATA
  -1.50  -1.50  177
RS  4, 8
AGG 0.50
MIN -1.75 MAX -0.25
    (PS MIN 4.0 MAX 5.0)

RETRO
CDI. H 0.10mm
CDI. A  6%
POI  12%

KM (Phi=2.4)
mm      D deg
<R1  3.40 42.00 14>
<R2  3.32 44.00 104>
AVG  3.35 43.25
<CYL  -1.00 14>

KM (Phi=2.3)
mm      D deg
<R1  3.35 42.00 14>
<R2  3.35 44.00 104>

SIZE      S, C
NIDEK     HARP      7.50
NIDEK     80P      8.00
12.0      8.00

PD  60      M  58

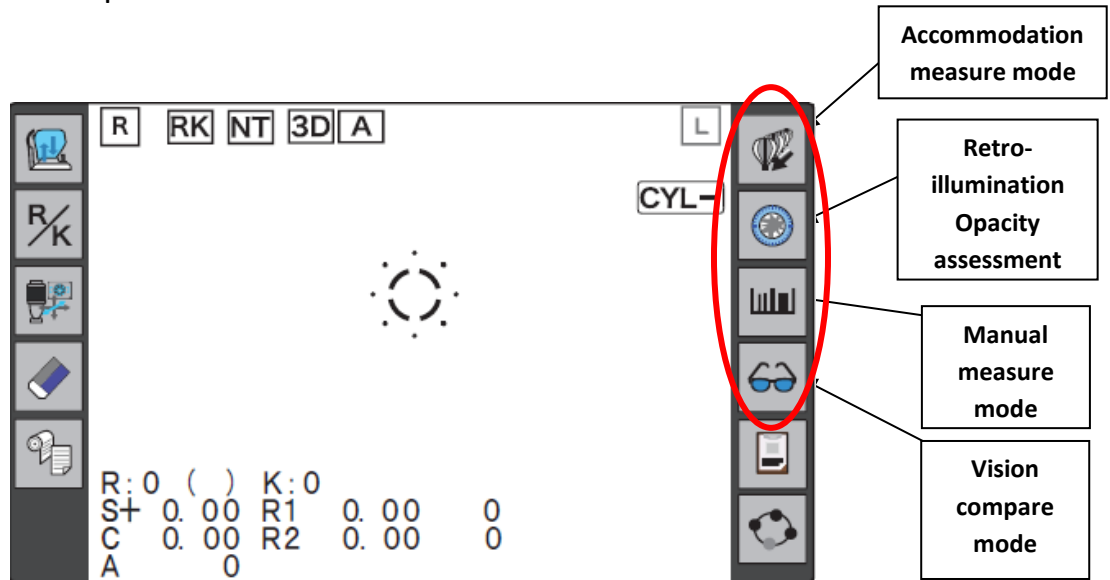
IOP (mmHg)
(R)  : 13  (L)
13  : 13
13  : 13
13  : 13
Avg. 13.0  13.0
Corrected IOP (mmHg)
(R)  : 13.0  (L)
13.0 : 13.0
CCT (um)
(R)  : 517  (L)
520  : 517
520  : 517

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1	Patient ID Patient ID scanned by the optional barcode scanner or magnetic card reader or entered on the summary screen
2	Vertex distance
3	Near working distance
4	Corneal refractive index Printed in KM measurement mode with the parameter [PRINT] > [PRINT2] > [KM PRINT] set to [ALL] or [ALL(KM)]
5	AR measured value (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 When measurement is performed with the chart-illuminating lamp turned off during manual PS measurement, [LAMP-OFF] is printed, and [LAMP-ON] is printed with the lamp turned on.
14	Accommodation measured values [MIN]: AR minimum measured value, [MAX]: AR maximum measured value ([PS MIN]: Pupil size minimum value, [MAX]: Pupil size maximum value) An accommodation graph is printed depending on the setting of the parameter [PRINT] > [PRINT3] > [ACC GRAPH PRINT].
15	Retrolumination analysis values [COI. H]: Central Opacity Index Height, [COI. A]: Central Opacity Index Area POI: Peripheral Opacity Index A retrolumination image is printed depending on the setting of the parameter [PRINT] > [PRINT3] > [RETRO IMAGE PRINT].
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	CL select data When the CL select function is activated with (CL select), contact lens data for brands selected by the parameter [PRINT] > [PRINT3] > [CL List] is printed. For brands that have no lenses corresponding to KM measured values, only the brand names are printed. (In the B.C. field, "*" is printed.)
19	Pupillary distance Distance PD, (Monocular PD), Near PD
20	Intraocular pressure values
21	Corrected intraocular pressure values
22	Corneal thickness
23	Comments Characters and symbols can be freely entered.

## Advanced assessment features:

The Nidek Tonoref III can perform a number of advanced assessments.



### ACCOMODATION MODE

The Nidek Tonoref III can provide an assessment of a patient's accommodation using the 'Accommodation Measure Mode'.

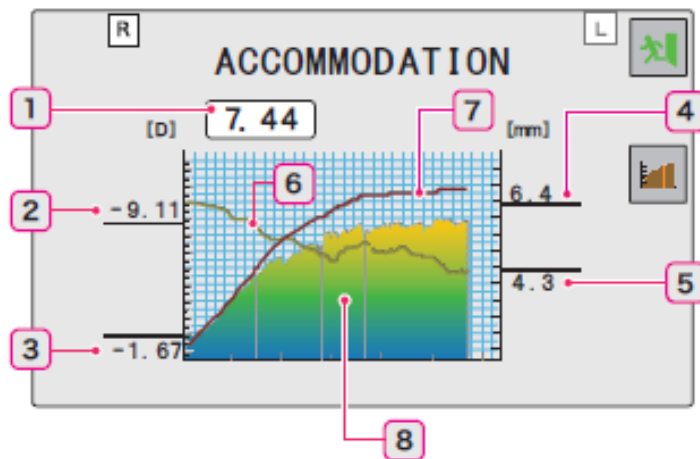
The patient is advised to fixate on a distance target (hot air balloon).



The target will be moved between a distance and near focus in  $\pm 0.25D$  increments.

The device measures the patient's objective response to change in focus over a 30 second period.

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



As with other capture modes on the Nidek Tonoref III, the operator will need to align with the centre of the patient pupil

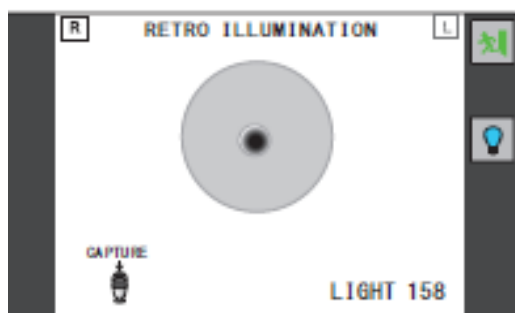
Measurement will be started by selecting the capture button in the centre of the joystick.

**TIP!** - Accommodation measurements can only be taken after RK measurement is complete.



## RETRO-ILLUMINATION OPACITY ASSESSMENT

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



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

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

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

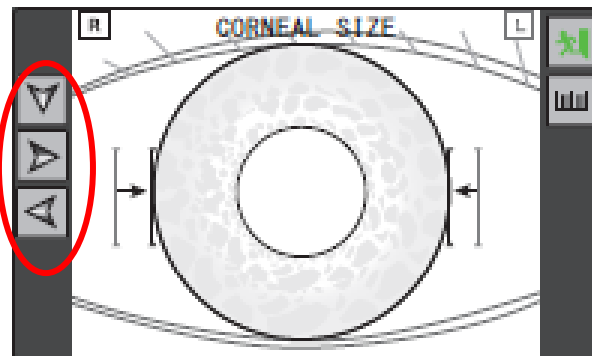


## MANUAL MEASURE MODE

The manual measure 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*).

Once the operator has aligned with patient pupil, the capture button on the centre of the joystick should be pressed to begin measurement.



The arrows can then be used to align markers.

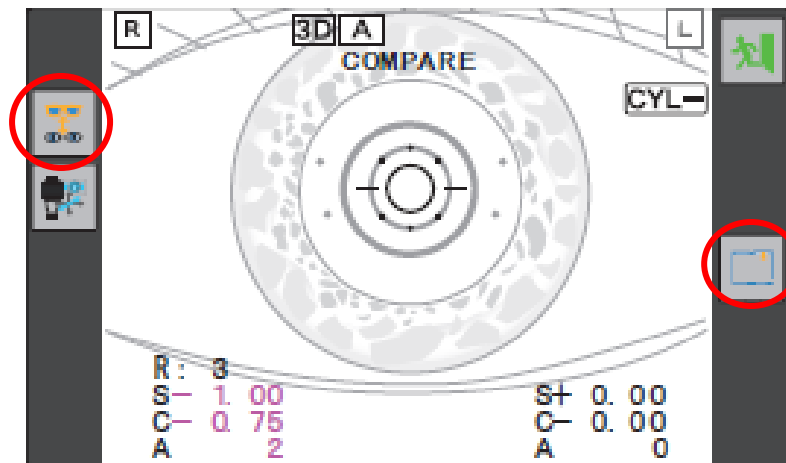
The central button of the joystick can then again be pressed to finalise measurement.



## VISION COMPARE MODE

The Nidek Tonoref III 'Vision Compare Mode', allows a quick comparison of patient's visual acuity with autorefractor reading and patient's current spectacles and / or their unaided visions.

To compare visual acuity with autorefractor to patient's current spectacle prescription, the Nidek Tonoref III must be connected to the lens meter (LM) and the data must have been inputted.



Once in 'Vision Compare Mode', the internal scenery will change to distance view. The orange spectacles can then be pressed to change between patient's autorefractometer prescription and inputted LM data.

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

**TIP!** - There is no facility to compare with patient's SUBJECTIVE (ie. Final) prescription that would be found during the sight test with the optometrist.

## CONTACT LENS SELECTION MODE

The Nidek Tonoref III contains software to help with ideal contact lens selection based on patient's RK measurements.

The contact lens selection mode can be accessed on the summary screen once all measurements have completed. The Nidek Tonoref III will then attempt to select the best lens size, BC (*base curve / BOZR*) and prescription for the patient compared to the internal contact lens database.

**TIP!** - The current Nidek Tonoref III contact lens database does not contain many lenses commonly used in the UK market.



