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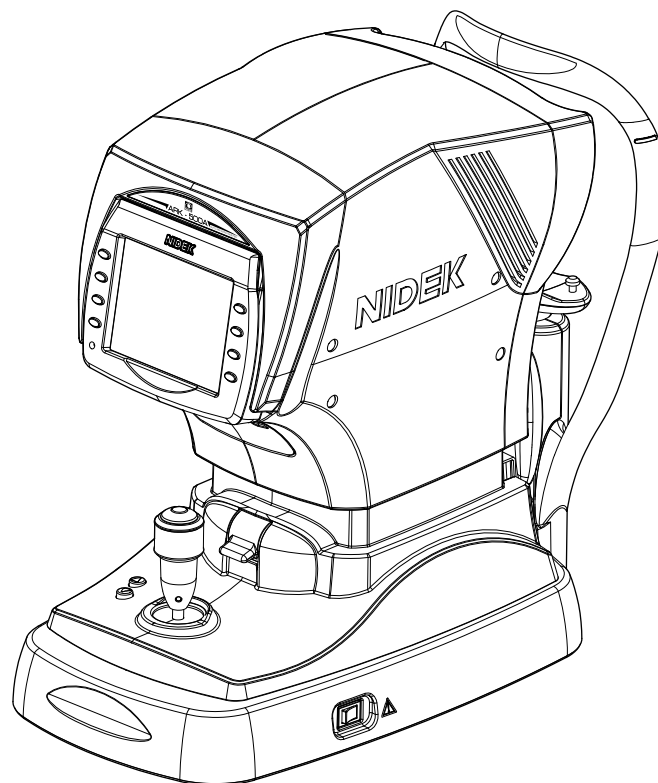
NIDEK

AUTO REF/KERATOMETER

Model ARK-500A

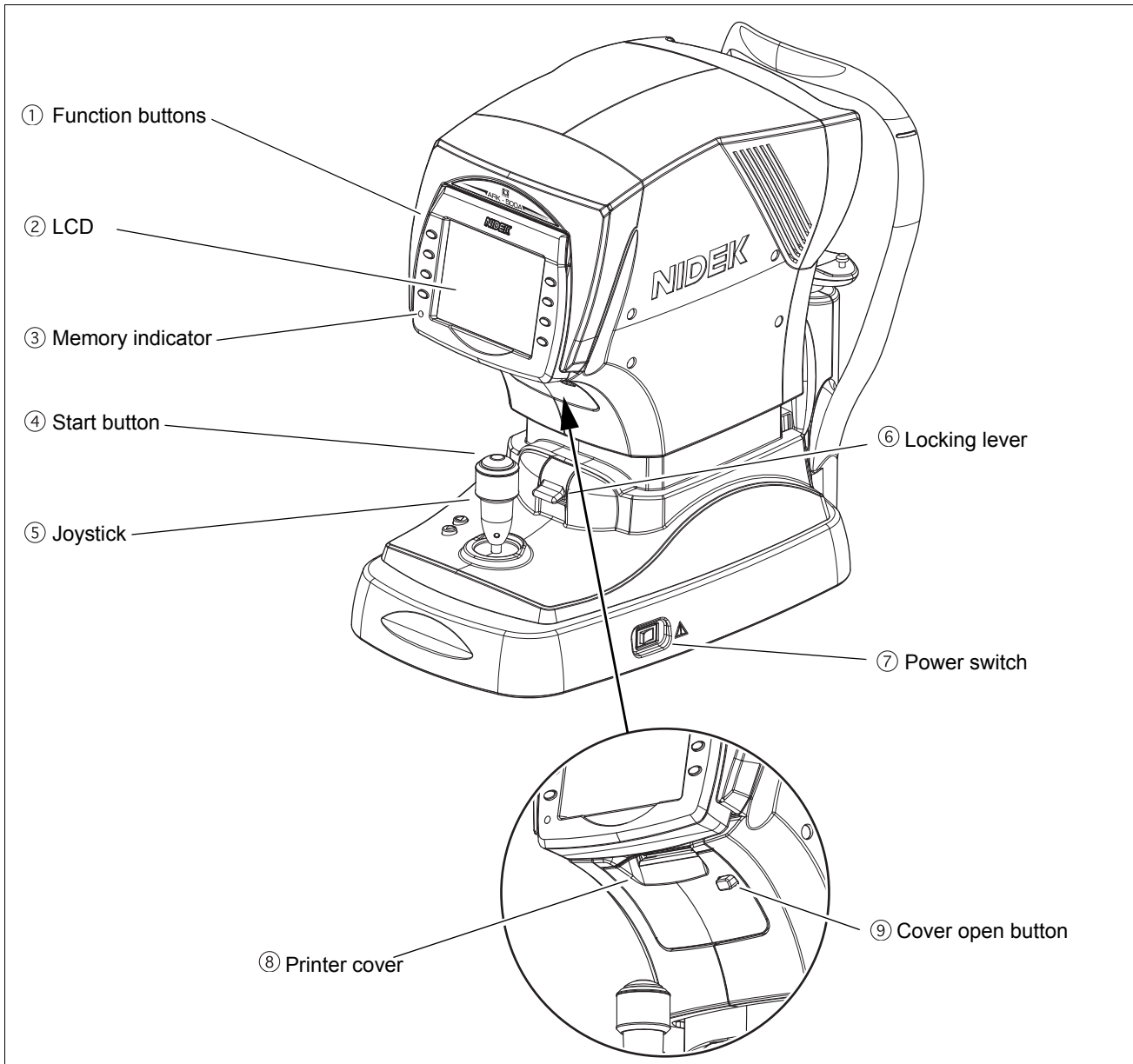
OPERATOR'S MANUAL

CE
0123



1.4 Configuration

○ Front view



① Function buttons

Set the device and switch the screen.

Functions assigned to the function buttons are displayed by icons on the screen.

Two buttons on the left of the screen have unique functions when the measurement screen is displayed.

• Clear button ()

Erases the measured data.

When the clear button is pressed for about a second, all the measured data is erased.

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• **Print button** ()

Pressing this button when the memory indicator is lit, prints out the measured data.

Pressing the button when the memory indicator is not lit, advances printer paper.

② **LCD**

5.7-inch LCD. Pulling the bottom of the display panel provides an adjustable viewing angle.

For measurement in a standing posture, set the panel at a suitable angle. The panel is reset to its original position by magnet.

③ **Memory indicator**

Indicates that measured data is being saved in memory.

| | |
|-------|-----------------|
| ON | Being saved |
| OFF | Not being saved |
| Blink | Sleep mode |



④ **Start button**

When the start button is pressed, measurement is taken regardless of the alignment or focusing condition of the device.

⑤ **Joystick**

Used for alignment and focusing.

Alignment in the side-to-side direction can be performed by moving the joystick to the right and left. Rotating the joystick is for alignment in the up-and-down direction. For focusing, move the joystick back and forth.

⑥ **Locking lever**

Secures the main body to the base.

To lock the main body, press the locking lever down.

⑦ **Power switch**

Turns on the power to the device.

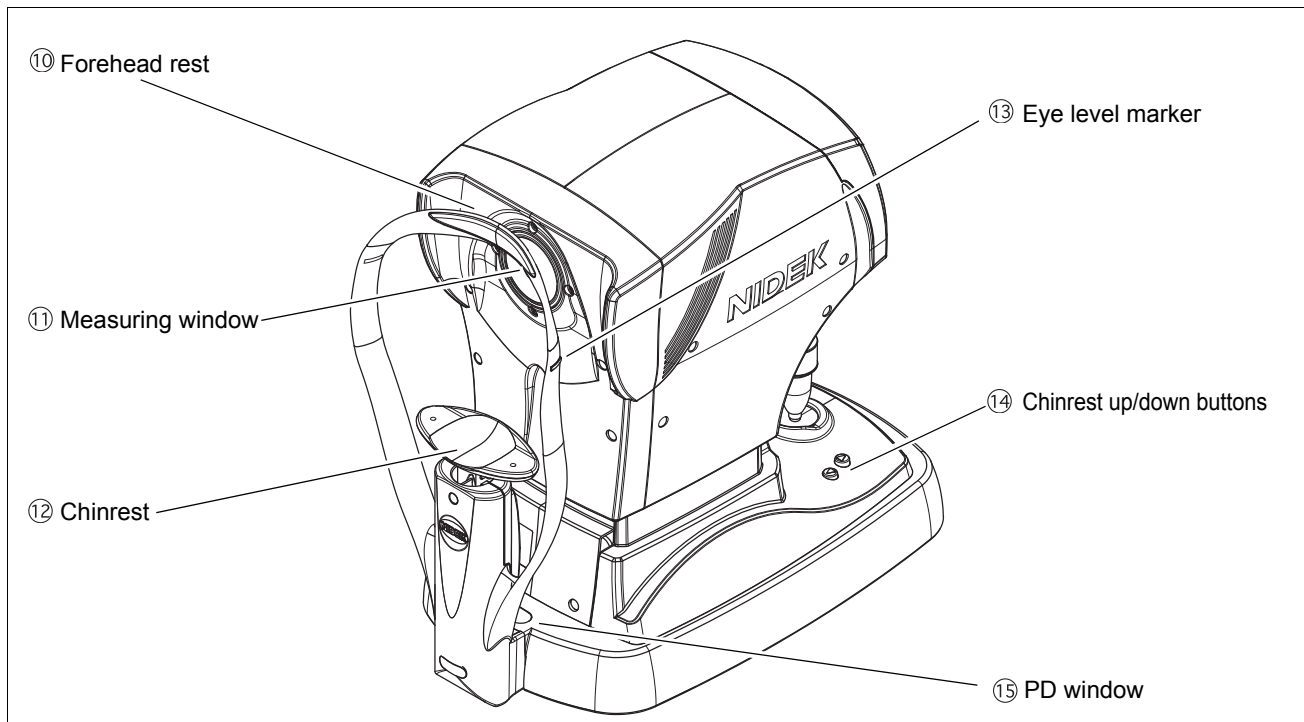
⑧ **Printer cover**

Inside is the printer equipped with the auto cutter located. Open the printer cover for replacing printer paper by pressing the cover open button.

⑨ **Cover open button**

To open the printer cover, press the button.

○ Rear view



⑩ Forehead rest

During measurement, the patient's forehead should be gently rest against the forehead rest.
Clean the chinrest for each patient.

⑪ Measuring window

Check the window cleanliness before measurement.

⑫ Chinrest

Clean the chinrest for each patient.

⑬ Eye level marker

Used as a guide for the patient's eye level during measurement.

The height of the chinrest should be adjusted so that the center level of the patient's eye almost aligns with this line.

⑭ Chinrest up/down buttons (▲, ▼)

Move up or down the chinrest.

⑮ PD window

An LED is provided to detect the PD value.

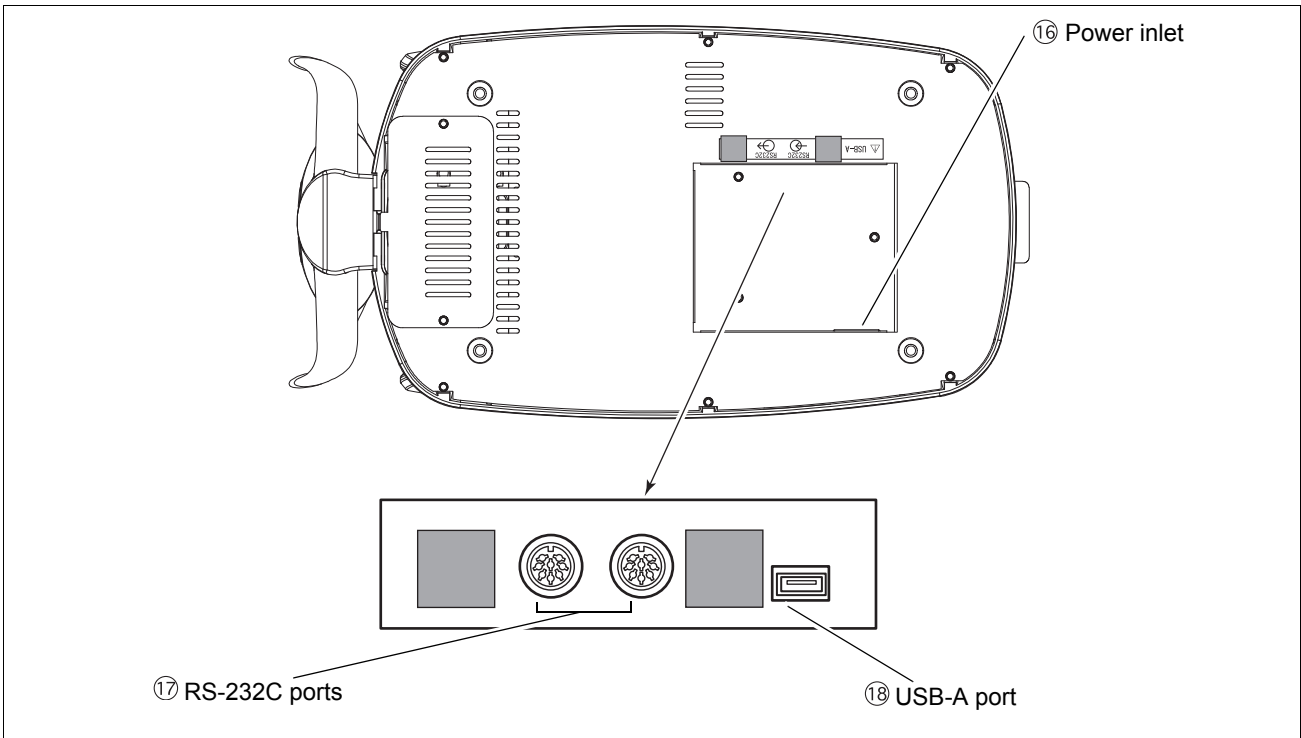
Note

- Parts that come into contact with the patient during measurement are composed of the following materials.

Forehead rest: Elastomer
Chinrest: ABS resin

○ Bottom view

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16 Power inlet



Connect a detachable power cord.



17 RS-232C ports

Connect a communication cable to send/receive the measured data to/from a diagnostic device or such.

Target device

- RT-1200 series, RT-2100 series, RT-5100
- LM-500, LM-970, LM-990/990A, LM-1000/1000P, LM-1200

| | |
|---|---|
|  (OUT) | <p>To export the measured data to the refractor (RT), an external computer or such, connect a communication cable to this side.</p> <p>The optional Eye Care card system is connected to this side.</p> |
|  (IN) | <p>To import the measured data to from a NIDEK lensmeter, connect a communication cable to a lensmeter.</p> |

Connecting the lensmeter to the  side and the RT-2100/RT-5100 to the  side allows data transmission to the connected refractor via the ARK-500A.

18 USB-A port

Connect the optional barcode scanner.

Do not connect equipment other than the barcode scanner.

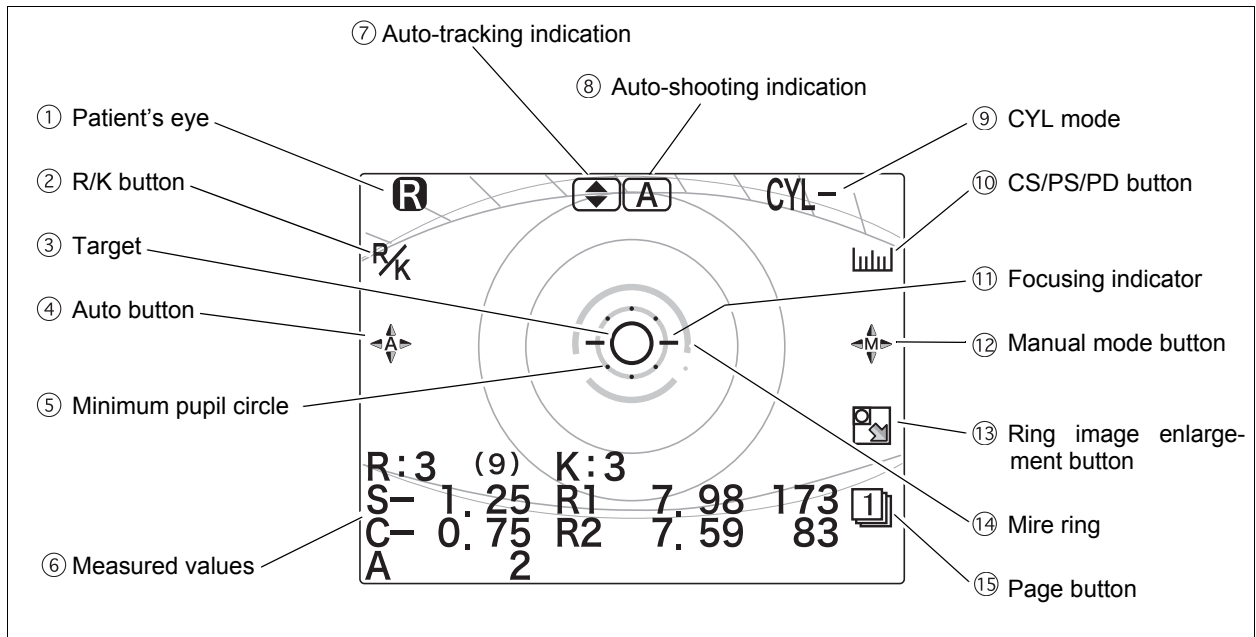
*1 Accessory equipment connected to the analog and digital interfaces must be certified according to the representative appropriate national standards (for example, UL 1950 for Data Processing Equipment, UL 60601-1 for Medical Equipment, and CSA C22.2 No. 601-1, EN 60601-1, and IEC 60601-1.) Furthermore, all configurations shall comply with the system standard IEC 60601-1-1. Anyone who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of the system standard IEC 60601-1-1. If in doubt, consult the technical service department or your local representative.

1.5 Measurement Screen Layout

The screen for AR (refractive error) and KM (corneal curvature radius) measurements is comprised of pages 1 to 3.

Each page differs only in the touch icons displayed to the right of the screen.

<When Page 1 is displayed>



① Patient's eye

Indicates the right or left eye of the patient.

② R/K button (R/K)

Selects a measurement mode in R/K measurement.

Select from AR/KM measurement mode, AR measurement mode or KM measurement mode. The selected measurement mode is displayed on the screen.

The measurement mode switches in the following order: AR/KM measurement mode (successive AR and KM measurements) → AR measurement mode (AR measurement) → KM measurement mode (KM measurement) → AR/KM measurement mode.....

③ Target

Used as a guide to locate the patient's eye in the center of the screen. Align the mire ring projected on the patient's eye with the target.

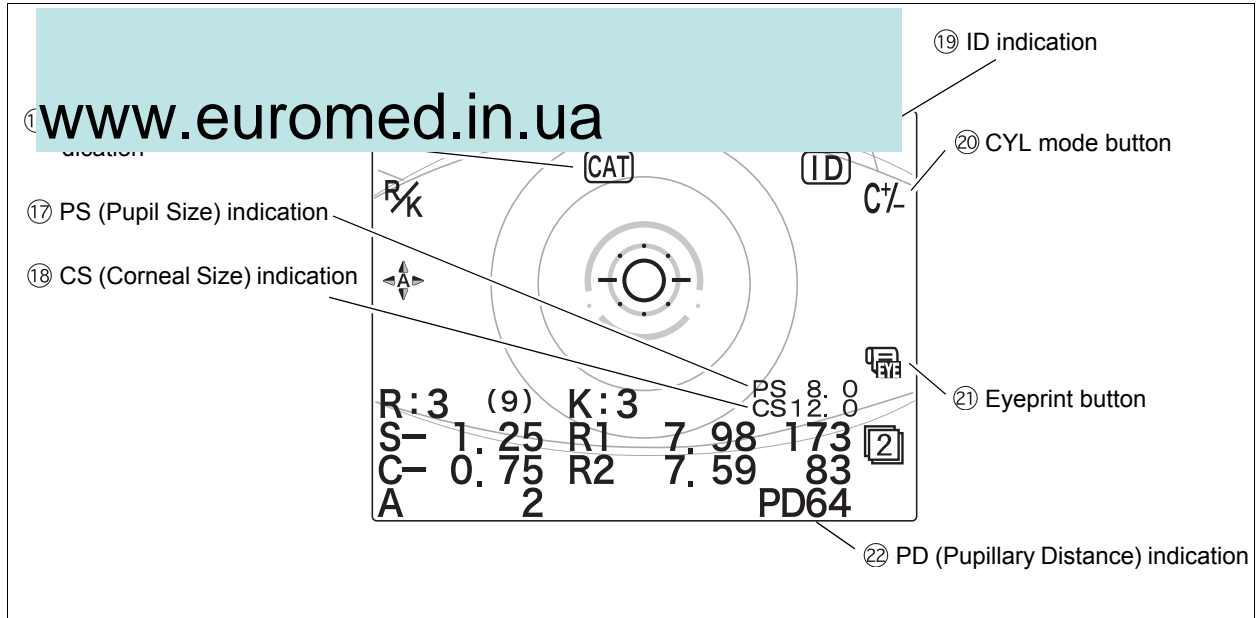
④ Auto button ($\leftarrow A \rightarrow$)

Selects the auto-tracking function and auto-shooting function.

Select auto-tracking from \blacklozenge (UpDown) or OFF. Select auto-shooting from ON or OFF.

<When Page 2 is displayed>

* CS, PS, and PD data, ID indication, Eye Care card and cataract measurement mode indication are displayed on each page.



⑱ **CAT measurement mode indication (CAT)**

Indicates that the eye has been measured in cataract measurement mode.

If cataract or abnormal eyes cannot be measured, cataract measurement mode is automatically turned on. See “2.3.1 Cataract measurement mode” (page 37) for details on cataract measurement mode.

⑳ **PS (Pupil Size) indication**

Displayed when PS (Pupil Size) is measured. (increments: 0.1 mm)

㉑ **CS (Corneal Size) indication**

Displayed when CS (Corneal Size) is measured. (increments: 0.1 mm)

㉒ **ID indication (ID)**

Displayed when the patient ID is entered.

Enter the patient ID using the optional barcode scanner.

㉓ **CYL mode button (C⁺/-)**

Switches cylinder mode, the reading direction of cylinder data in which CYL data is represented.











| | |
|-------------|---|
| CYL- | Indicates the cylindrical power by - reading. |
| CYL+ | Indicates the cylindrical power by + reading. |
| CYL± | Cylinder data is indicated by + reading when the refractive error is positive for any axis angle. Indicates the cylindrical power by - reading in other cases. |

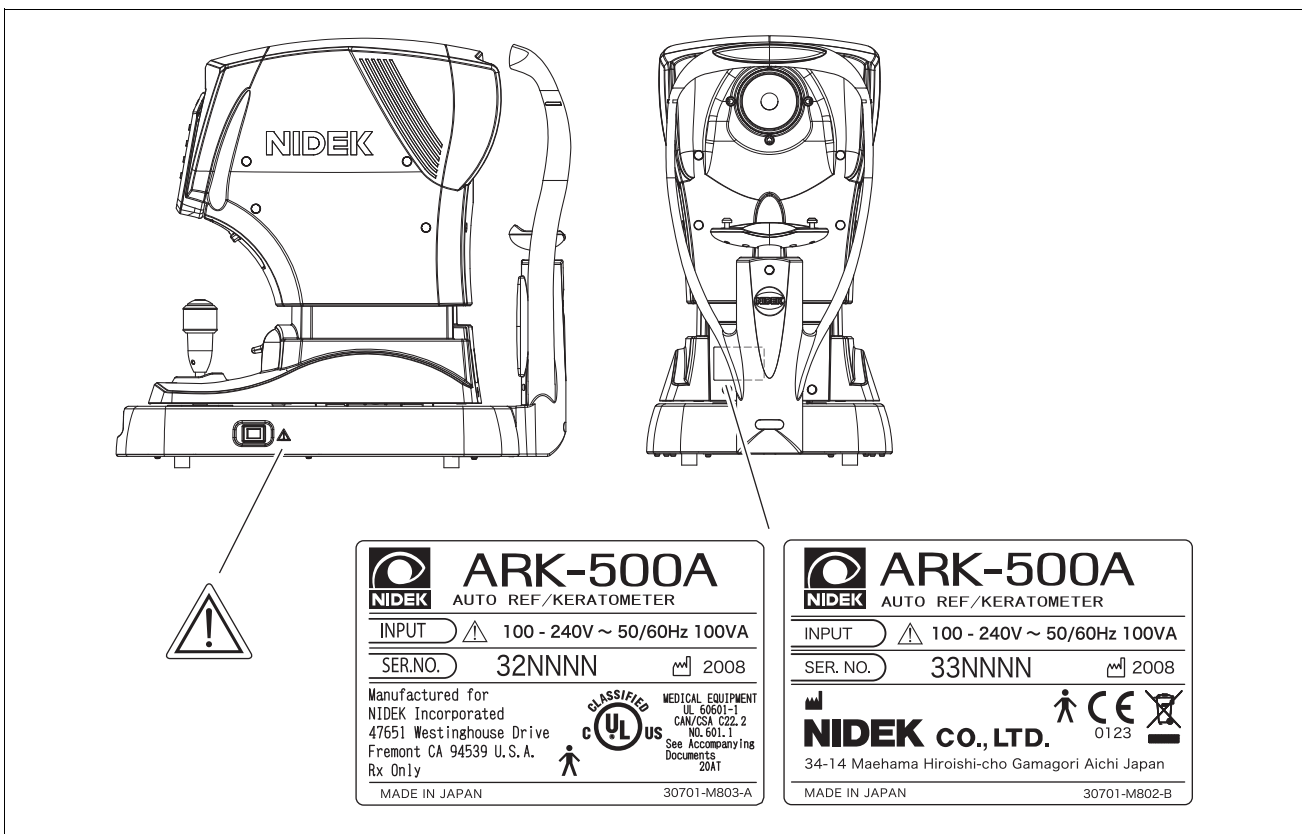
Cylinder mode can be switched even after measurement.
Data is printed out with the mode status at the time of printing.

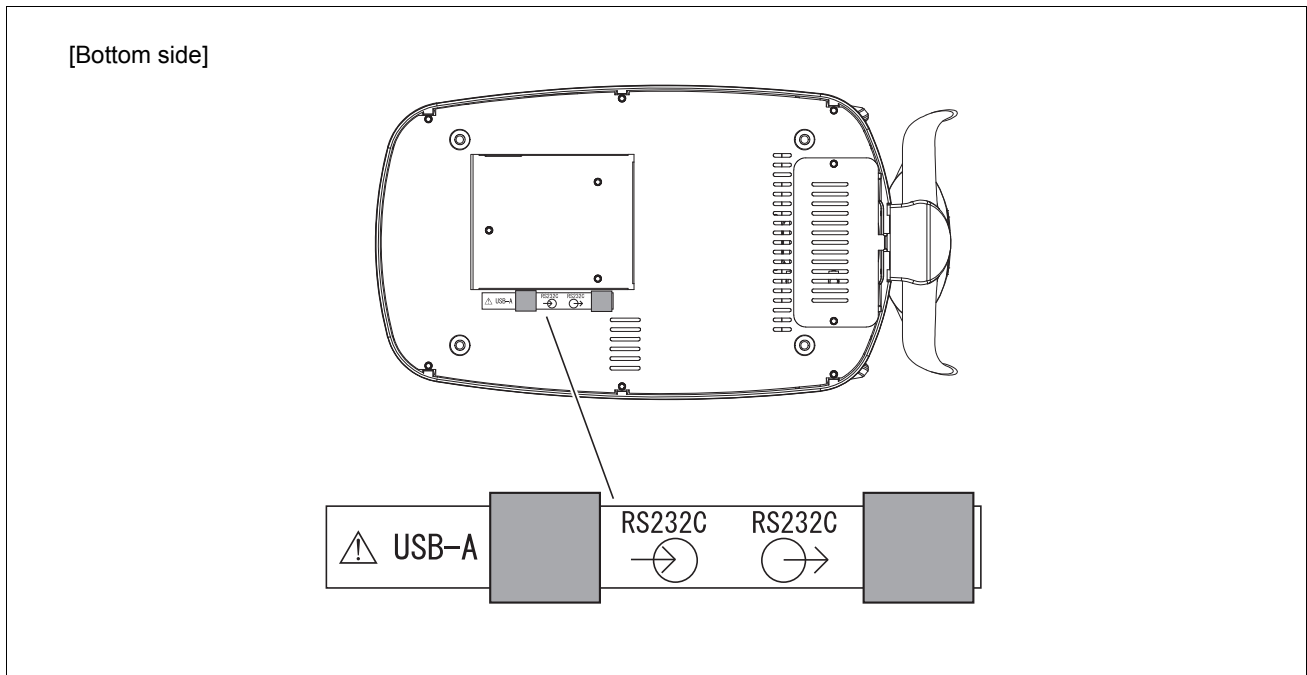
1.6 Labels

Cautionary labels are provided on the device.

If labels are curling up or characters fading and becoming barely legible, contact NIDEK or your authorized distributor.

| | |
|---|--|
|  | Indicates that caution must be taken. Refer to the operator's manual before use. |
|  | Indicates a Type B applied part as a degree of protection against electric shock for applied parts. |
|  | Indicates that the state of the power switch. When the symbol side of the switch is pressed down, power is not supplied to the device. |
|  | Indicates that the state of the power switch. When the symbol side of the switch is pressed down, power is supplied to the device. |
|  | Indicates that the device must be supplied only with alternating current. |
|  | Indicates the input part. |
|  | Indicates the output part. |
|  | Indicates the date of manufacture. |
|  | Indicates the manufacturer. |
|  | Indicates that this product shall be disposed of in a separate collection of electrical and electronic equipment in EU. |





1.7 Checking Contents

Unpack the contents from the shipping carton and check them.

The following are included in the standard configuration.

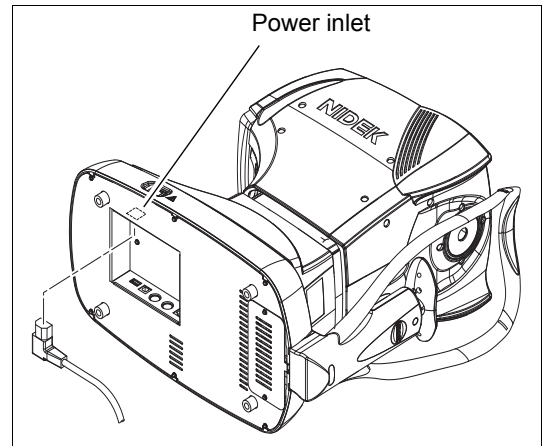
- Main body
- Printer paper (3 rolls)
- Power cord
- Dust cover
- Pack of chinrest paper
- Fixing pins for chinrest paper (2 units)
- Operator's manual (this book)
- Model eye for R/K measurement/Contact Lens (CL) holder (integral type)

1.8 Before First Use

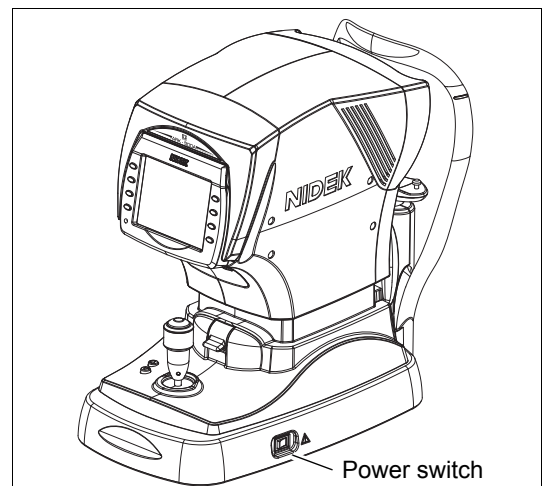
Place the device on a stable table and connect a power cord to it.

- 1 Place the main body on a stable table.
- 2 Pull the main body fully to the side on which the device is laid down, lock the main body to the base unit with the locking lever and lay the device down gently.
- 3 Connect the power cord to the power inlet.

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- 4 Connect peripheral devices if necessary.
See "3 OPERATION WHEN PERIPHERAL DEVICES ARE CONNECTED" (page 77) for the method of connecting peripheral devices.
- 5 Stand the device upright.
- 6 Confirm that the power switch is turned OFF (○) and plug the power cord into a wall outlet.



CAUTION • Be sure to use an outlet equipped with a ground terminal.

Electric shock or fire may occur in the event of device malfunction or power leakage.

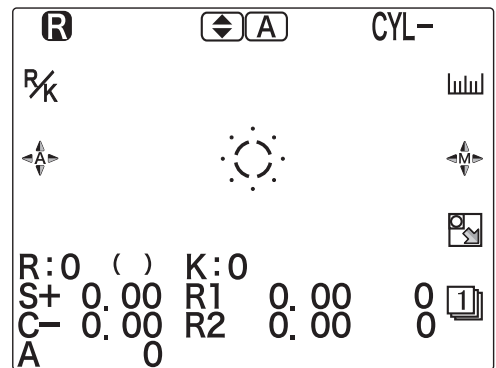
7 Turn ON (I) the power switch.

The initial screen is displayed on the LCD and the device starts initializing.



Initial screen

8 Confirm that the measurement screen is displayed.



Measurement screen

Note

• When the device is used for the first time, “NO PAPER” appears indicating that no paper is loaded.

9 Set the printer paper.

See “4.3 Replacing Printer Paper” (page 92) for details on the setting method.

This completes setup procedure.

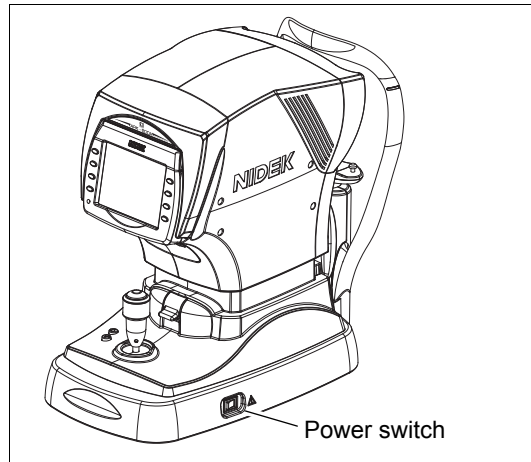
Note

- Set the parameters as necessary or desired.
See “2.12 Parameter Settings” (page 60) for the parameters and their setting methods.
- See “3 OPERATION WHEN PERIPHERAL DEVICES ARE CONNECTED” (page 77) for the method of connecting peripheral devices.

2.2 Preparation for Measurement

- 1 Turn the power switch on (I).

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The title screen is displayed and the device is initialized.

Wait for a while until the screen switches to the measurement screen.



Initial screen

 Note

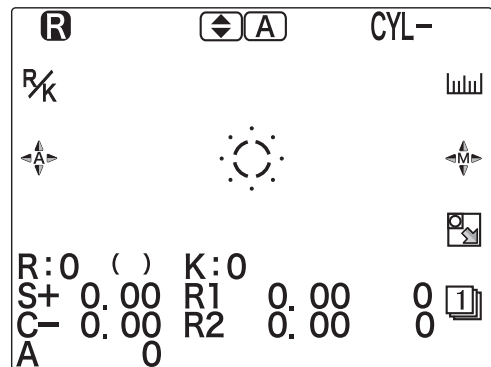
- When the WINDOW CHECK parameter is set to ON, the MEASURING WINDOW CHECKING screen is displayed before the measurement screen is displayed.

See "2.2.1 Checking the measuring window cleanliness at device start-up" (page 26) for details.

MEASURING WINDOW
CHECKING

MEASURING WINDOW CHECKING screen

2 The measurement screen is displayed.



Measurement screen



• If the power is turned on with no paper loaded, the error message “NO PAPER” appears.
Supply printer paper.

3 Perform checks before use.

Perform the following checks before use.

No error message appears.

The main body moves smoothly using the joystick.

The chinrest moves up and down by pressing the chinrest up/down button.

Printer supply is adequate.

The AR/KM measurement accuracy satisfies the specifications.

See “4.5 Checking the AR/KM Measurement Accuracy” (page 95) for details.

Follow “4.1 Troubleshooting” (page 87) if abnormal conditions are encountered.

4 Establish the measurement conditions.

The following conditions should be specified:

1 : Measurement mode

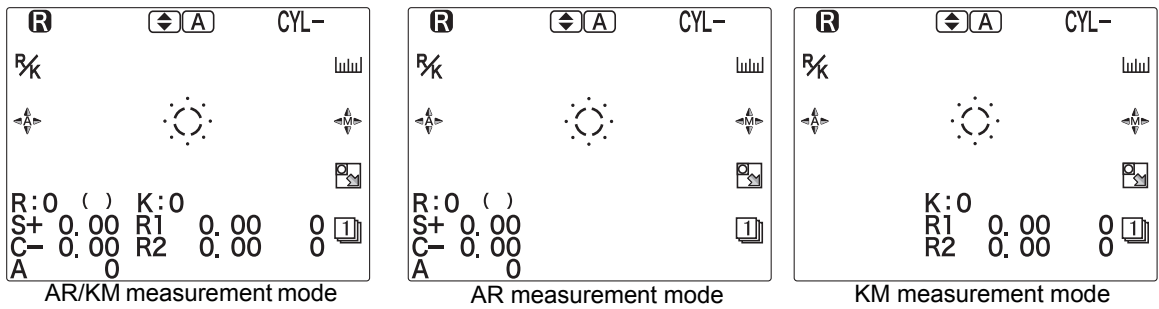
Press the R/K button R/K to select.

| Measurement mode | Description |
|------------------------|--|
| AR/KM measurement mode | AR (refractive error) and KM (corneal curvature radius) measurements are successively taken. |
| AR measurement mode | Only AR (refractive error) measurement takes place. |
| KM measurement mode | Only KM (corneal curvature radius) measurement takes place. |

When the power is turned on, a mode in which the power was turned off is established.

The measurement items corresponding to the selected measurement mode are displayed on the screen.





Pressing the button switches the measurement mode in the following order: AR/KM→ AR→ KM→ AR/KM→.....

2 : Auto-tracking function and auto-shooting function

Specify the alignment (up-and-down directions) methods and the method of triggering measurements.

Press the auto button to select the auto-tracking and/or auto-shooting function.

| Auto-tracking | Auto-shooting | Screen display | Description |
|---------------|---------------|-----------------|---|
| Up-and-down | ON | | Auto-tracking in the up-and-down direction is turned on. Manually align the device in the side-to-side direction. Measurement starts automatically when the eye is focused. |
| | OFF | | Auto-tracking in the up-and-down direction is turned on. Manually align the device in the side-to-side direction. Bring the eye into focus and press the start button to start measurement. |
| OFF | ON | | Manually align the device and bring the eye into focus. Measurement starts automatically when the eye is best aligned and focused. |
| | OFF | (No indication) | Manually align the device and bring the eye into focus. Press the start button to start measurement. |



• The functions assigned to the auto button varies according to the 62. TRACKING SW parameter setting.
See “2.12 Parameter Settings” (page 60) for the setting procedure.

3 : Parameter-set measurement conditions:

The ARK-500A is equipped with a function to change parameters of various device conditions according to the operator’s needs.

See “2.12 Parameter Settings” (page 60) for details.

4 : CYL mode

Cylinder mode, the reading direction of cylinder data in which CYL data (cylindrical power) is represented during the measurement is selected by pressing the CYL mode button .

| Screen display | CYL mode | Description |
|----------------|--------------------|---|
| CYL- | - reading | Indicates the cylindrical power by + reading. |
| CYL+ | + reading | Indicates the cylindrical power by - reading. |
| CYL± | Mix reading | Indicates the cylindrical power by + reading when the refractive error is positive for any axis angle. Indicates the cylindrical power by - reading in other cases. |



- Cylinder mode can be changed even after measurement.
- All saved data is printed out along with the mode status.
- These settings are retained even after shutdown of the device; Change these measurement conditions only if necessary.

5 Prepare the patient.

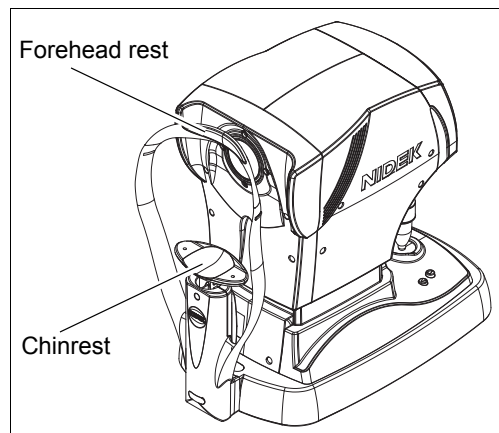
- 1) As necessary, enter the patient ID using a barcode scanner.*¹

The optional barcode scanner is needed.

See "3.4 Reading Patient IDs" (page 84) for the method of entering patient IDs.

- 2) Wipe the forehead rest and chinrest that contact the patient with clean absorbent cotton or gauze dampened with rubbing alcohol.

If a stack of chinrest paper is fixed on the chinrest, remove one sheet of paper.



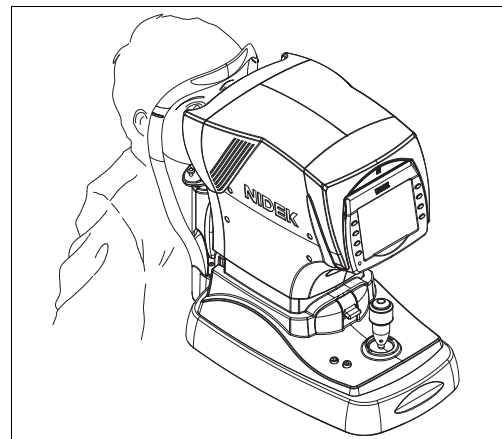
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- To reassure the patient, before measurement, explain as follows.

"This device measures your eye with infrared ray to find which kind of lens fits you. The infrared ray does no harm to your eyes."

- 3) Instruct the patient to take off glasses or contact lenses and sit on a chair.

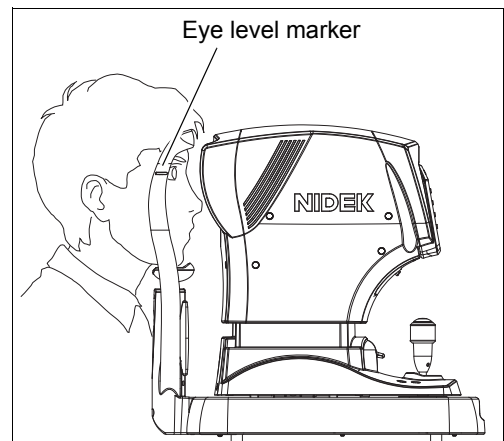


- 4) Have the patient place his/her chin on the chinrest as deeply as possible, and his/her forehead on the forehead rest lightly.

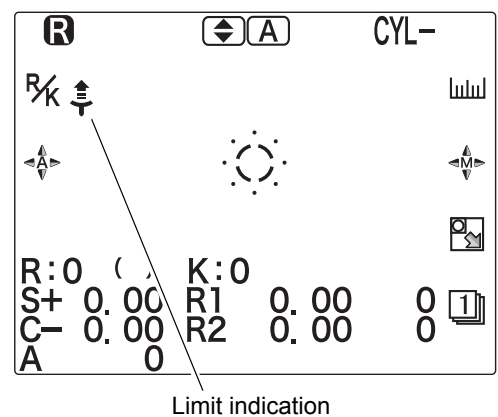
*1. Patient IDs may be read at any time prior to printing.

- 5) Adjust the height of the chinrest by the chinrest up/down button (▲, ▼) until the center level of the patient's eye aligns with the eye level marker.

Before adjusting the height of the chinrest, let the patient know that the chinrest moves up and down.



When the chinrest is at the upper (or lower) mechanical limit, the upper limit indication (⏏) (or lower limit indication (⏏)) is displayed on the screen.



Note

- When the ARK-500A displays a thumbnail, the limit indication (⏏, ⏏) is covered and cannot be seen.

6 Start measurement.

For details of each measurement, see:

“2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29)


“2.4 AR (refractive error) Measurement: AR Measurement Mode” (page 39)

“2.5 KM (corneal curvature radius) Measurement: KM Measurement Mode” (page 41)


Note

- Instruct the patient not to blink during measurement. Additionally, instruct the patient not to blink and open his/her eyes immediately before measurement to avoid measurement failure.
- Instruct the patient to open both eyes wide during measurement.
Closing one eye may cause an unstable fixation and the other eye will not open wide.

2.2.2 Switching to manual mode

It is possible to turn off both the auto-tracking and auto-shooting functions (manual mode) by pressing the manual mode button  during measurement.


The manual mode button is used to turn off the auto-tracking function according to the patient's eye after starting measurement with the auto-tracking function on. (The manual mode button functions even when only the auto-shooting function is turned on.)


Allowing the operator to turn off both the auto-tracking and auto-shooting functions with a single button. It saves the operator the trouble of pressing the auto button  repeatedly.

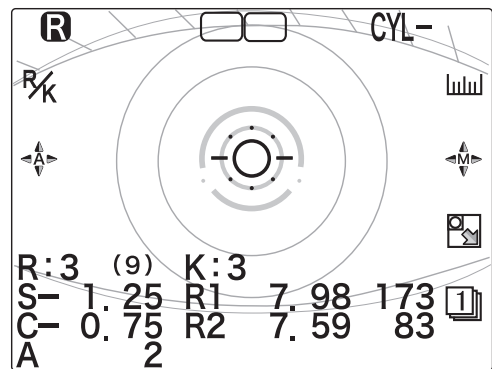
 Note

- For eyes with a small pupil and with the corneal vertex shifted from the pupil center, if the auto-tracking function is turned on and the pupil overlaps the minimum pupil circle, the eye may not be measured.

To measure such eyes, turn off the auto-tracking function and align the minimum pupil circle with the pupil.

- 1 Press the manual mode button  during measurement.




The auto-tracking indication and auto-shooting indication become blank () , indicating that these functions are turned off.



- 2 Manually align the main body to the eye and bring the eye into focus.

- 3 Press the start button to start measurement.

One of the following operations returns to the state before the manual mode button was pressed.

- Pressing the manual mode button  again.
- Switching the eye to be measured between the right and left eyes.
- Pressing the clear button .
- Press the print button .

2.2.3 Sleep mode

The device goes into sleep mode automatically to save power if no button have been pressed for a certain period of time.

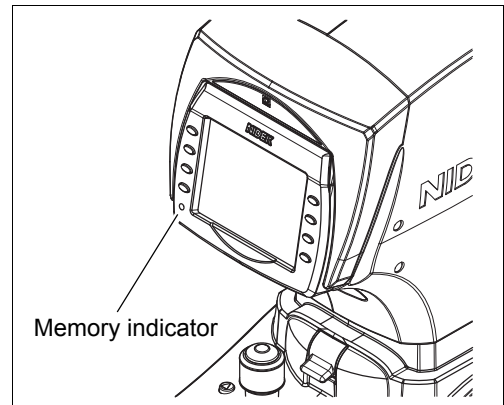
The time that the device goes into sleep mode can be selected from 5 minutes, 10 minutes, 15 minutes, or NO (no sleep mode) (factory setting: 5 minutes).

Sleep mode places the device into the following conditions:

- The LCD goes off.
- The memory indicator blinks.

The device recovers to normal mode from sleep mode by the following methods:

- Press any button.
- Manipulate the joystick to move the base R or L.



Note

- Depending on the status of the LCD, the device may not go into sleep mode.
When the PARAMETER SETTING screen is displayed, the device does not go into sleep mode.

2.2.4 Finishing the measurement

- 1** To finish the measurement, turn off (○) the power switch.
It is allowed to turn off the power with any screen displayed.
- 2** Check the measuring window and clean the lens if necessary.
See "4.6 Cleaning" (page 97).
- 3** Clean the forehead rest and chinrest, and put the supplied dust cover on the device.
Always keep them clean for the next use.

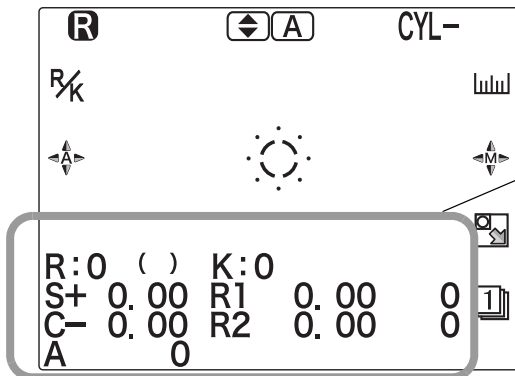


Note

- Be sure to put the dust cover on whenever the device is not in use.

2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode

In AR/KM measurement mode, AR measurement and KM measurements are successively taken. When AR/KM measurement mode is selected, refractive errors (S, C and A) and corneal curvature radius (R1, R2) are displayed on the screen.



R: AR measurement count

S: Spherical power

C: Cylindrical power

A: Cylinder axis angle

K: KM measurement count

R1: Corneal curvature radius and corneal cylinder axis angle of flattest meridian

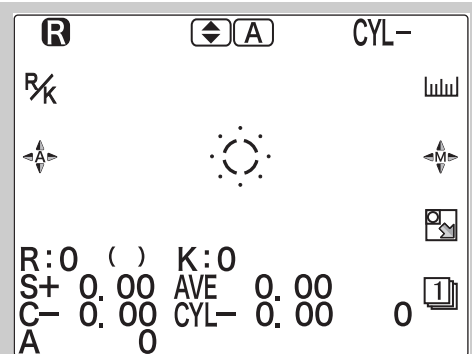
R2: Corneal curvature radius and corneal cylinder axis angle of steepest meridian

Note

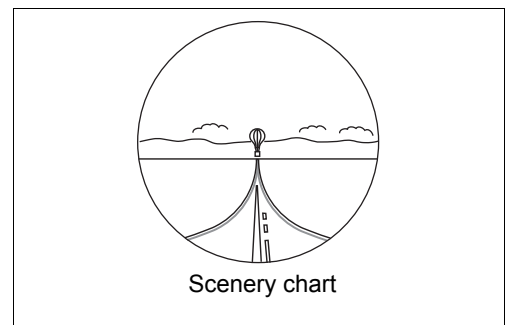
- When the 12. KM DISPLAY parameter is set to AVE, CYL, the indications on the measurement screen are as shown on the right.

AVE: Average of R1 and R2

CYL: Corneal cylindrical power & Corneal cylinder axis angle



- Instruct the patient to: "Look through the measuring window. As you will see the picture of a balloon, watch the center of it without straining".

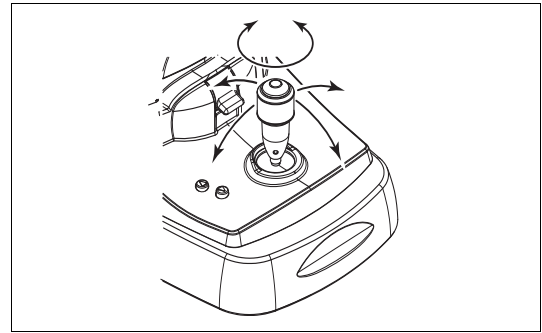


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2 Manipulate the joystick to display the patient's eye on the screen.

By moving the joystick laterally, the main body moves right, left, back and forth. By turning the upper part of the joystick, the main body moves up and down.

Align the eye position to the measuring point with right, left, up and down movements. Adjust the focus with back and forth movements.



Note

- If the mire ring is not in the center of the pupil and the minimum pupil circle is on the iris, turn off the auto-tracking function and bring the minimum pupil circle into the center of the pupil to perform measurement, ignoring the mire ring.
- Auto-tracking or auto-shooting may not work on keratoconus or postoperative cornea. In such a case, turn off the auto-tracking and auto-shooting functions.

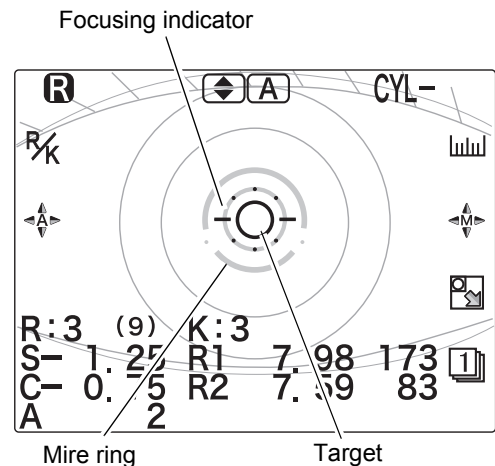
3 Perform alignment and focusing.

The methods of alignment and focusing vary according to the 26. TRACKING SW parameter setting.

* See "2.2 Preparation for Measurement" (page 20) for details.

Perform alignment by placing the mire ring reflected by the patient's eye in the center of the target.

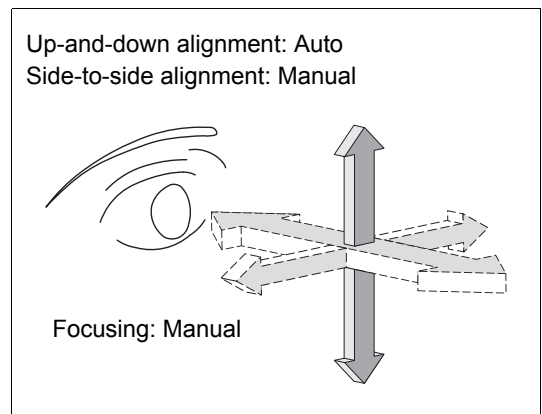
Perform focusing according to the indication of the focusing indicator displayed on the screen.



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Up-and-down auto-tracking

- 1) Perform rough alignment and focusing by manipulating the joystick to place in the working range of auto-tracking.
- 2) When the device is placed within the working range of auto-tracking, it automatically starts alignment in the up-and-down direction.
- 3) Manipulate the joystick to move the mire ring reflected on the patient's eye within the target.

As the focusing indicator is displayed, manipulate the joystick until the optimum focusing indicator is displayed.

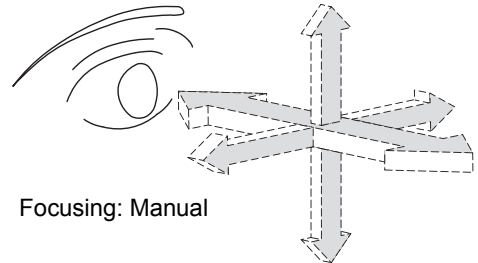


Auto-tracking OFF

- 1) Manipulate the joystick to perform rough alignment and focusing.
- 2) Manipulate the joystick to move the mire ring reflected on the patient's eye within the target.
- 3) As the focusing indicator is displayed, manipulate the joystick until the optimum focusing indicator is displayed.

During the focusing, maintain alignment between the device and the patient's eye.

Up-and-down and side-to-side alignment: Manual



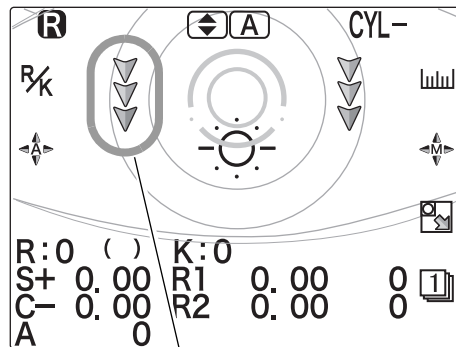
Note

- If eyelashes obstruct the minimum pupil circle, correct AR measurement may not be possible. If the eyelid or eyelashes obstruct the mire ring, KM measurement may not be possible.
 In such cases, instruct the patient to open his/her eye wider.
 If the patient cannot open wider, lift the patient's lid, paying attention not to press against the eyeball.

When the main body is not within the working range of auto-tracking:

As the limit indication is displayed, manipulate the joystick or chinrest up/down button in the direction of the arrows.

<Examples of the limit indication>



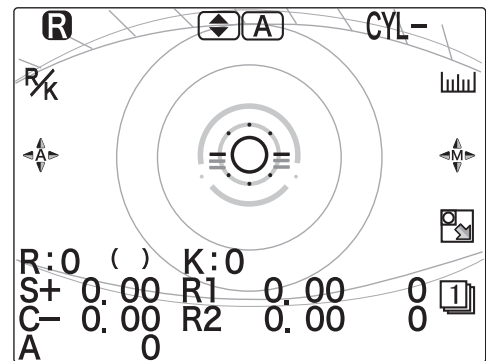
The level of the patient's eye is too high from the measuring unit.
 Move the chinrest down to lower the level of the patient's eye.

| | |
|-------------|-------------------------|
| ▲ ▲ ▲ | Move the chinrest up. |
| ▼ ▼ ▼ | Move the chinrest down. |

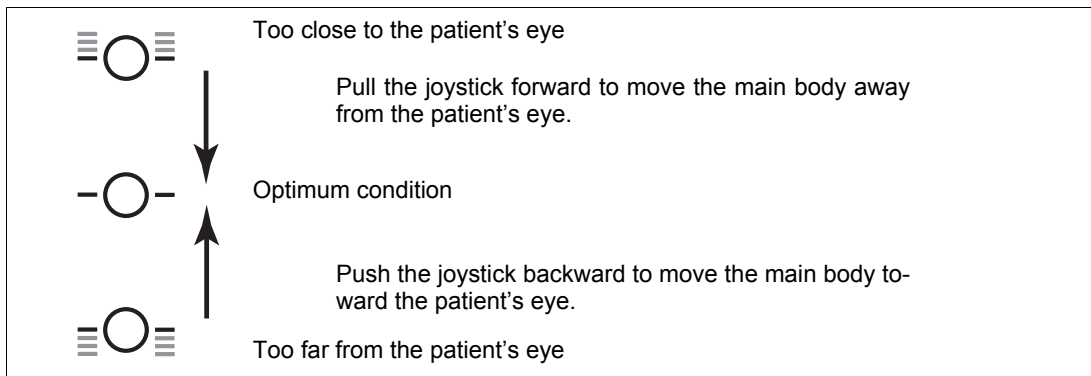
Focusing indicator displays:

The focusing indicator indicates the distance between the main body and the patient's eye.

Move the joystick back and forth until the focusing indicator shows the optimum condition.



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Note

- When the 69. MAN FOCUS DISP parameter is set to NO, the focusing indicator is not displayed in manual mode (auto-tracking OFF + auto-shooting OFF).

4 Measurement starts.

Measurements are taken automatically when the device is best aligned and focused on the eye (when the auto-shooting function is turned on).

- * When the auto-shooting function is turned off, press the start button to start measurement.

Note

- The operator can start measurement by pressing the start button.
 - Press the start button to start measurement when measurement has difficulty starting for patient's who blink often.
- Instruct the patient not to blink during measurement.
- When an error or error data appears, the cause may be one of those described below. If those signs appear again after repeating measurement, check the following:
 - a. Patient blinked during measurement.
 - b. The eyelid or eyelashes are on the minimum pupil circle during AR measurement.
 - c. The eyelid or eyelashes are on the mire ring during KM measurement.
 - d. The patient's pupil is smaller than the minimum pupil circle.
 - Have the patient sit in a dark room for a while and wait until the pupil diameter becomes large enough for measurement.
 - e. Retinal reflection is extremely low due to an optical disease such as a cataract.
 - f. There is some unusual reflection on the cornea during measurement.
 - g. There is an extreme distortion on cornea.

- ① KM measurement takes place.
▼
- ② A short beep is produced and KM-measured data and measurement count are displayed.
▼
- ③ KM measurement completes.
▼
- ④ Pre-AR measurement takes place and the scenery chart is fogged.
▼
- ⑤ AR measurement takes place.
▼
- ⑥ A short beep is produced and the AR measured data and measurement count are displayed.
- * The way of fogging in the second and subsequent measurements varies according to the 4. MEAS MODE parameter setting.

| | |
|------|---|
| CON. | Fogging stays on throughout the measurement series. This mode is useful for children who do not fixate their eyes very long. |
| NOR. | The patient's view is fogged for each measurement even though the start button is held down. This mode is useful for patients who accommodate their eyes easily. |

- ▼
- ⑦ AR measurement completes.

 Note

- If the device gets out of alignment and focus during measurement, the measurement is interrupted. If the measurement is retried, the measured results are added to the former results and saved.
- To continue the measurement, press the start button again. "<<FINISH>>" disappears and auto-tracking starts for measurement. (except when the 21. COMPARE SW or 31. PRINT parameter is set to AUTO).
- The device can save up to 10 measurements each for the right eye and left eye. If measurements exceed 10, the data is erased in order from the oldest.

<AR measurement error messages>

| Error message | Details |
|--|--|
| BLK (Blinking of the eye) | Measurement is impossible due to blinking and slight movement of the eye. Instruct the patient not to blink or not to move the eye until measurement is completed. After the eye stopped blinking and moving, perform measurement again. This error also may occur when reflected light from fundus is low. |
| ALM (Alignment error) | Focusing is not proper. Perform focusing and measurement again. |
| +OVR (Positive SPH range over error) | Spherical power is over the measurable limit of the + side. |
| -OVR (Negative SPH range over error) | Spherical power is over the measurable limit of the - side. |
| COVR (CYL range over error) | Cylindrical power is over the measurable limit. |
| CONF (Measured data confidence index) | Low-confidence data is obtained. Measure the subject again. * When the 44. ERROR DATA parameter is set to NO |
| S, C, A data displayed in yellow (Measured data confidence index) | Low-confidence data is obtained. Measure the subject again. * When the 44. ERROR DATA parameter is set to YES |

<KM measurement error messages>

| Error message | Details |
|--|--|
| BLK (Blinking of the eye) | Measurement is impossible because of blinking and slight movement of the eye. Instruct the patient not to blink or not to move the eye until measurement is completed. After the eye stopped blinking and moving, perform measurement again. |
| ALM (Alignment error) | Focusing is not proper. Perform focusing and measurement again. |
| FAR (Focus error: Too far from the patient's eye) | Focusing is not proper. Perform focusing and measurement again. |
| NEAR (Focus error: Too close to the patient's eye) | Focusing is not proper. Perform focusing and measurement again. |
| +OVR Positive corneal curvature radius range over error) | The corneal curvature radius is too large and over the measurable limit. |
| -OVR (Negative corneal curvature radius range over error) | The corneal curvature radius is too small and beyond the measurable limit. |
| COVR (CYL range over error) | The cylindrical power is over the measurable limit. |

5 Measurement completes.

- When AI mode is YES:^{*1}

When the specified number of KM measurements is performed, the measurement automatically completes.^{*2}

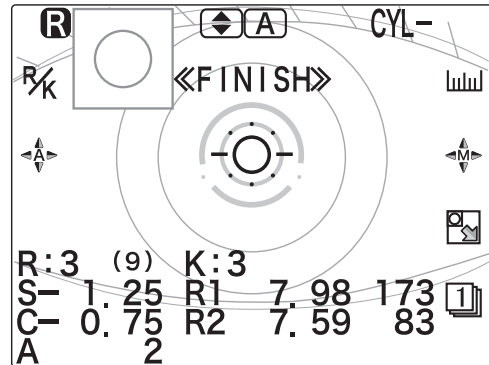
When the specified number of AR measurements is performed and the data is stable (no variations), the measurement automatically completes.^{*3}

Indications on the screen after the measurement:

"<<FINISH>>" is displayed on the screen.

When the specified number of KM measurements have not been obtained, "<<KM?>>" is displayed on the screen.

When the start button is pressed, KM measurement starts again. As soon as the specified number of KM measurements is obtained, "<<FINISH>>" is displayed on the screen.



- When AI mode is NO:

When the specified number of KM measurements^{*2} is performed, the measurement automatically completes.

When the specified number of AR measurements^{*3} is performed, the measurement automatically completes.

Release the start button to finish AR measurement.

Indications on the screen after measurement:

When the specified number of KM measurements have not been obtained, "<<KM?>>" is displayed on the screen.

When the start button is pressed, the KM measurement starts again. As soon as the specified number of KM measurements is obtained, "<<FINISH>>" is displayed on the screen.

- * If three or more measurements are obtained, the median values are printed at the time of printing.

A thumbnail of the measurement ring image is displayed when measurement is completed. If necessary, check the full screen ring image.

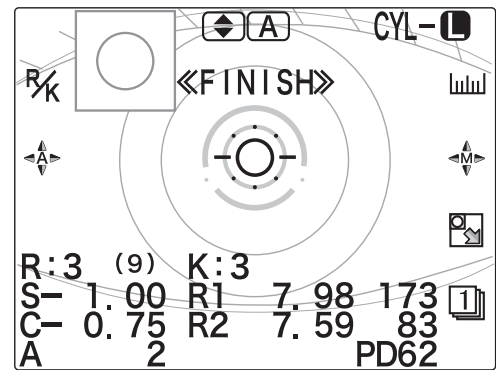
See "2.3.2 Measurement ring image display" (page 38) for details on the ring image display.

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- *1. In this mode, AR measurement automatically completes as soon as stable data is obtained by the specified number of measurements.
- *2. 3 through 10 times can be set by the 14. KM CONTINUE parameter. (Factory setting is 3 times.)
- *3. 3 through 10 times can be set by the 6. AR CONTINUE parameter. (Factory setting is 3 times.)

6 Measure the other eye in the same manner.

When the other eye is set in front of the measuring unit, the measuring unit returns to the origin in the back-and-forth and side-to-side directions.



Note

- Instruct the patient to close his/her eye before starting the next measurement.
Let the eye rest to avoid measurement failure by blinking.


7 After measurement, view comparison can be performed.

See “2.6 View Comparison Function” (page 43) for details on the view comparison function.

8 Let the patient know that the measurement is completed and instruct him or her to rest comfortably.

9 Print the measured results.

Printing operation varies according to the 31. PRINT parameter setting.

| 31. PRINT parameter | Printing method |
|---------------------|--|
| AUTO | Printing starts automatically at the completion of measurement. |
| MANUAL | Press the print button  to print the measured data out. |
| NO | Printing does not occur. |

See “2.11 Printing” (page 55) for details on printing.

Note

- The printing contents can be changed by parameter settings.
See “2.12 Parameter Settings” (page 60) for details.

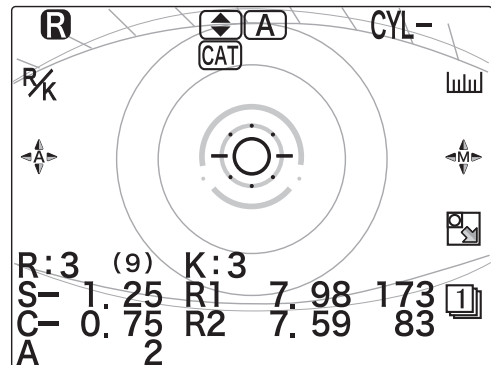
2.3.1 Cataract measurement mode

If cataract or abnormal eyes cannot be measured during AR (refractive error) measurement, cataract measurement mode turns on automatically.

In cataract measurement mode, measurement conditions are changed so as to enhance ease of measurements of even cataract or abnormal eyes.

When the device is placed in cataract measurement mode, "CAT" is displayed on the screen and then measurement starts.

The auto-tracking and auto-shooting functions work in the same manner as ordinary measurement mode.



One of the following operations cancels cataract measurement mode:

- Switching the eye to be measured between the right eye and left eye.
- Pressing the clear button
- Pressing the print button

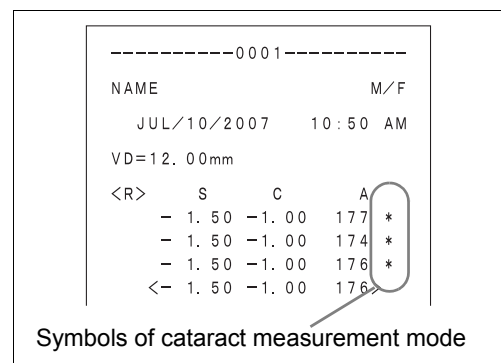
Note

- In cataract measurement mode, take note that measurement variations may occur more commonly compared to normal measurement mode.

Printout sample in cataract measurement mode

According to the 45. CAT MARK parameter setting, "*" indicating that measurement has been taken in cataract measurement mode is printed as shown on the right.

* Factory setting: NO

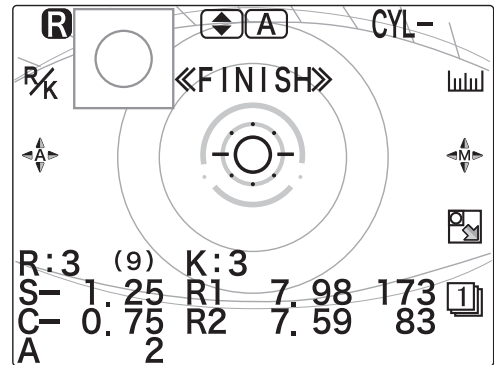



2.3.2 Measurement ring image display

The ARK-500A projects measurement beams on the patient's fundus and computation is performed by capturing the reflected beams as a ring image to measure the refractive errors of the patient's eye. The ARK-500A displays this ring for the operator to observe the patient's eye.

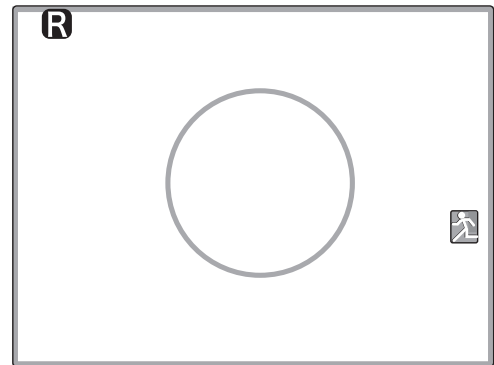
1 Perform normal measurement.

A thumbnail of the ring image is displayed along with “<<FINISH>>” when measurement is complete.



2 Press the ring image enlargement button  to switch to the full screen display.


Observe the size, shape and such of the ring image.



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 Note

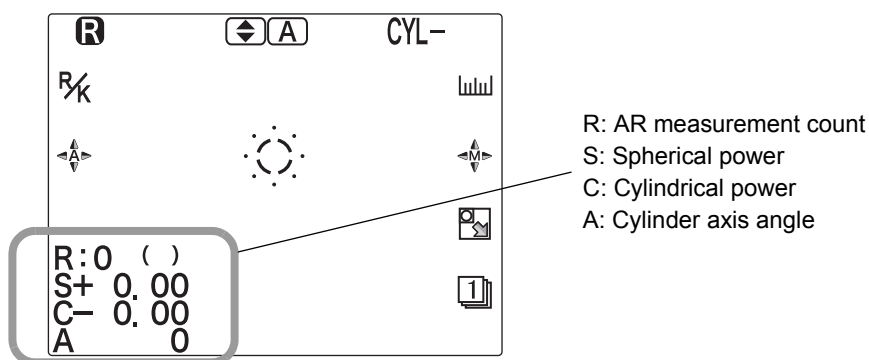
- When both eyes have been measured, manipulating the joystick to switch the main body between the right and left also changes the display of the ring image between the right and left.

3 After checking the ring image, press the exit button  to return to the measurement screen.

2.4 AR (refractive error) Measurement: AR Measurement Mode

Perform AR measurement in the same manner as AR/KM measurement mode.

KM (corneal curvature radius) measurement is not performed; KM-measured data is not displayed on the screen.



2

1 Perform alignment and focusing and start AR measurement.

See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for the procedure before starting AR measurement.

Measurements are taken automatically when the device is best aligned and focused on the eye (when the auto-shooting function is turned on).

* When the auto-shooting function is turned off, press the start button to start measurement.

- ① Pre-AR measurement takes place and the scenery chart is fogged.



- ② AR measurement takes place.



- ③ A short beep is produced and the AR measured data and measurement count are displayed.

* The way of fogging in the second and subsequent measurements varies according to the 4. MEAS MODE parameter setting.

| | |
|------|---|
| CON. | Fogging stays on throughout the measurement series. This mode is useful for children who do not fixate their eyes very long. |
| NOR. | The patient's view is fogged for each measurement even though the start button is held down. This mode is useful for patients who accommodate their eyes easily. |



- ④ AR measurement completes.

 Note

- If the device gets out of alignment and focus during measurement, the measurement is interrupted. If the measurement is retried, the measured results are added to the former results and saved.
- To continue the measurement, press the start button again. “<<FINISH>>” disappears and auto-tracking starts for measurement (except when the 21. COMPARE SW or 31. PRINT parameter is set to AUTO).
- The device can save up to 10 measurements each for the right eye and left eye. If measurements exceed 10, the data is erased in order from the oldest.

<AR measurement error messages>

Error messages are the same as those for <AR measurement error messages> of AR/KM measurement mode.

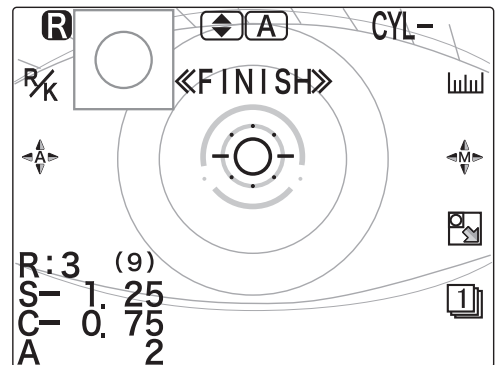
See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for details.

2 Measurement completes.

- When AI mode is YES:

When the specified number of AR measurements is performed and the data is stable (no variations), the measurement automatically completes.*¹

“<<FINISH>>” is displayed on the screen.



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- When AI mode is NO:

When the specified number of AR measurements*¹ is performed, the measurement automatically completes.

Release the start button to finish AR measurement.

* If three or more measurements are obtained, the median values are printed at the time of printing.

3 Measure the other eye in the same manner.

The subsequent procedure is the same as that for the AR/KM measurement mode.

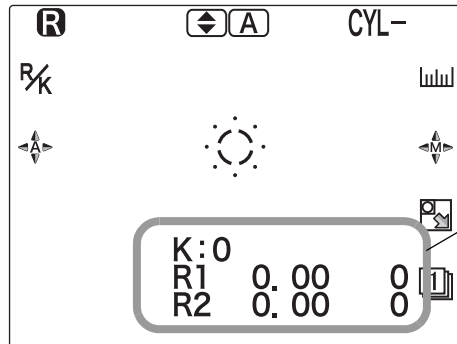
See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for details.

*1. 3 through 10 times can be set by the 6. AR CONTINUE parameter. (Factory setting is 3 times.)

2.5 KM (corneal curvature radius) Measurement: KM Measurement Mode

Perform KM measurement in the same manner as AR/KM measurement mode.

AR (refractive error) measurement is not performed; AR-measured data is not displayed on the screen.



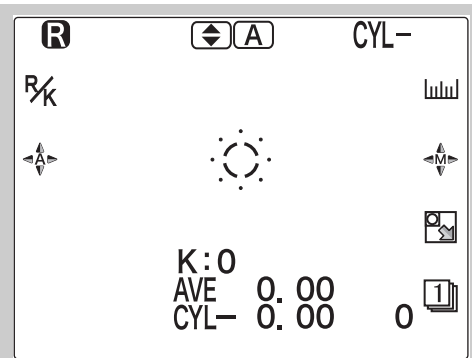
K: KM measurement count
 R1: Corneal curvature radius and corneal cylinder axis angle of flattest meridian
 R2: Corneal curvature radius and corneal cylinder axis angle of steepest meridian

Note

• When the 12. KM DISPLAY parameter is set to AVE, CYL, the indications on the measurement screen are as shown on the right.

AVE: Average of R1 and R2

CYL: Corneal cylindrical power & Corneal cylinder axis angle



1 Perform alignment and focusing to start KM measurement.

See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for the procedure before starting KM measurement.

- ① KM measurement takes place.

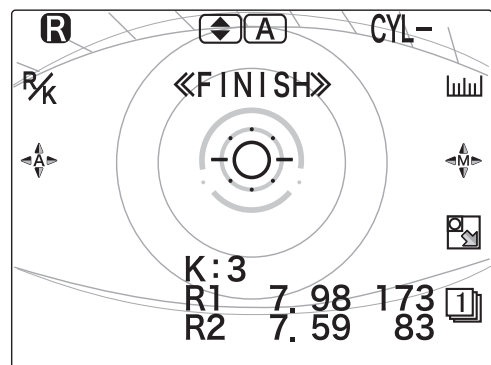


- ② A short beep is produced and KM-measured data and measurement count are displayed.



- ③ KM measurement completes.

The latest values are always displayed on the screen.



Note

- If the device gets out of alignment and focus during measurement, the measurement is interrupted. If the measurement is retried, the measured results are added to the former results and saved.
- To continue the measurement, press the start button again. “<<FINISH>>” disappears and auto-tracking starts for measurement.
- The device can save up to 10 measurements each for the right eye and left eye. If measurements exceed 10, the data is erased in order from the oldest.

<KM measurement error messages>

Error messages are the same as those for <KM measurement error messages> of AR/KM measurement mode.

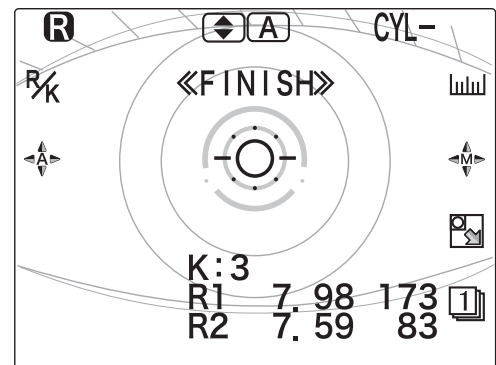
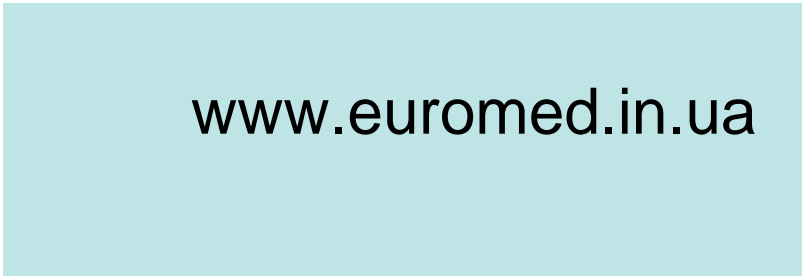
See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for details.

2 Measurement completes.

When the specified number of KM measurements is performed, the measurement automatically completes.*1

Indications on the screen after measurement:

When the specified number of KM measurements*1 is performed, “<<FINISH>>” is displayed on the screen.



When the specified number of KM measurements have not been obtained, “<<KM??>>” is displayed on the screen.

When the start button is pressed, the KM measurement starts again. As soon as the specified number of KM measurements is obtained, “<<FINISH>>” is displayed on the screen.

3 Measure the other eye in the same manner.

The subsequent procedure is the same as that for AR/KM measurement mode.

See “2.3 AR (refractive error) and KM (corneal curvature radius) Measurements: AR/KM Measurement Mode” (page 29) for details.

*1. 3 through 10 times can be set by the 14. KM CONTINUE parameter. (Factory setting is 3 times.)

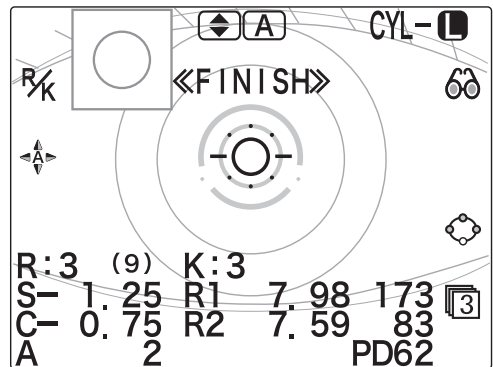
2.6 View Comparison Function


A view comparison function allows the patient to compare the current view (uncorrected eye view or that corrected by LM data) with the view corrected by AR measurement. By changing the distance to the chart, the patient can also experience the view for near vision.

For comparison with the view corrected by LM data, the power of glasses needs to be transfer beforehand from a NIDEK lens meter. The optional interface cable is required for data transfer.

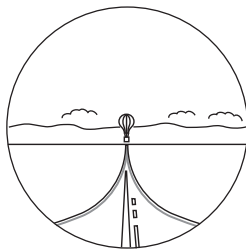
2

- 1 Perform AR measurement as normal.
Perform monocular or binocular measurement.



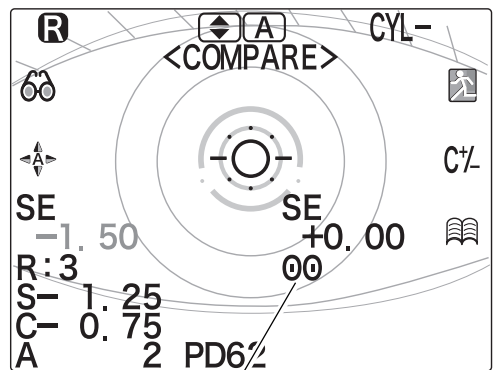
- 2 Press the comparison function button  to set the view corrected by AR measurement.

The screen switches to the view comparison screen. The patient sees a scenery chart with the view corrected objectively.

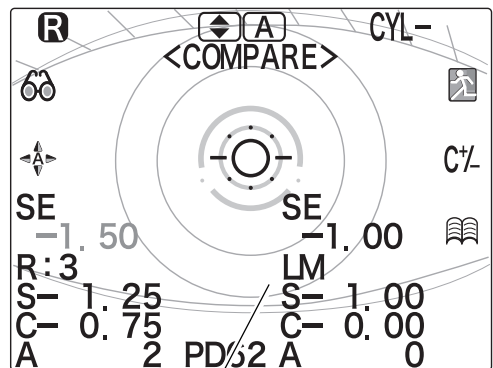


Scenery chart

The SE value of AR measurement blinks. It indicates that the view is being corrected by AR measurement at the moment.



Comparison with uncorrected eye view




Comparison with view corrected by LM data

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 Note

- When the 21. COMPARE SW parameter is set to AUTO, the screen automatically switches to the view comparison screen after measurement of both eyes.

3 Press the view comparison button  again to present the uncorrected eye view (or that corrected by LM data).

Blinking SE of  (or LM) indicates the uncorrected eye view (or that corrected by LM data) at the moment.


Blinking shows which view is presented at the moment.

| Blinking indication | Presentation to patient |
|---|---|
| SE value of  | Uncorrected eye view When LM data is not read |
| SE value of LM | View corrected by glasses that the patient uses When LM data is read |
| SE value of AR | View corrected by AR measurement |


 Note

- The dioptric power that the patient can check during the view comparison function includes only spherical component, not cylindrical component. Therefore, spherical equivalent (SE value) or highest power (spherical power and cylindrical power) is used instead of actual AR-measured data. The dioptric power to be used is shown on the display panel.
Whether to use spherical equivalent or highest power can be selected by the 22. COMPARE (AR) parameter.
Spherical equivalent is used for the view with data of the patient's glasses transferred from a lensmeter.
- The view comparison function must be performed with the target aligned in every direction and in focus, as well as in measurement. When the target is misaligned, perform alignment and focusing again, following Step 3 of AR measurement.
- If the patient's eye is hyperopic, the view does not change as much compared with a myopic eye. This is because the patient can see the chart with accommodation even with an uncorrected eye.


4 Change the view alternately to let the patient check the difference of the view.

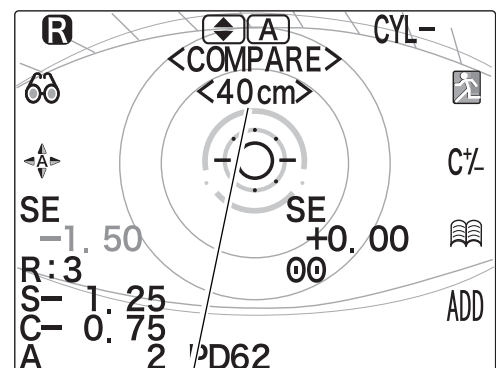
Pressing the view comparison button  switches between the view corrected by AR measurement and the uncorrected eye view (or that corrected by LM data).

5 If necessary, switch to the view for near vision.

1) Press the near button .

The working distance to the chart changes from the normal distance (5 m (16.4 feet)-equivalent) to 40 cm (16 inch)-equivalent. "<40 cm>" is displayed in the upper center of the screen.*1


Pressing the near button  again returns the working distance to the normal distance (5 m (16.4 feet)-equivalent).



View for near vision (40 cm)

*1. The near working distance of the chart can be set between 35 and 70 cm (5 cm increments) or 14 and 28 inches (2 inch increments) by the 56. WORKING D. parameter.

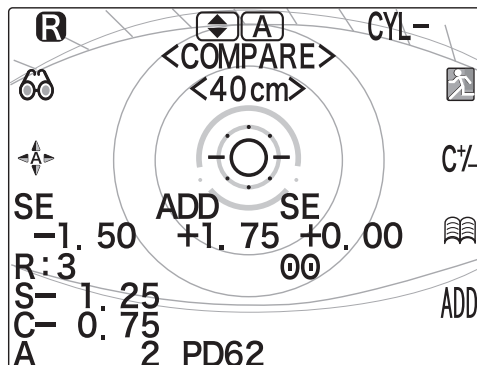
Note

- Regardless of the view (AR measurement, uncorrected eye, LM data) presented, the view for near vision is presented by pressing the near button .


2) If necessary, switch to the view with addition power.


Pressing the ADD button  with "<40 cm>" displayed adds the addition power of 1.75 D.*1

"ADD+1.75" is displayed in the center of the screen. It shows that the addition power is added.






Note

- To display the ADD button , the 23. ADD SW parameter needs to be set to YES (factory setting).
- The patient can know whether the addition power needs to be added with bifocal lenses or progressive lenses.

3) Pressing the ADD button  again cancels the addition power.

The addition power can be canceled by the following method:

- The chart distance returns to the normal distance (5 m (16.4 feet)-equivalent) by pressing the near button .
- The view switches between AR measurement and uncorrected eye (or LM data) by pressing the view comparison button .

6 Press the exit button  to finish the view comparison function and return to the measurement screen.

7 Measure the other eye in the same manner.

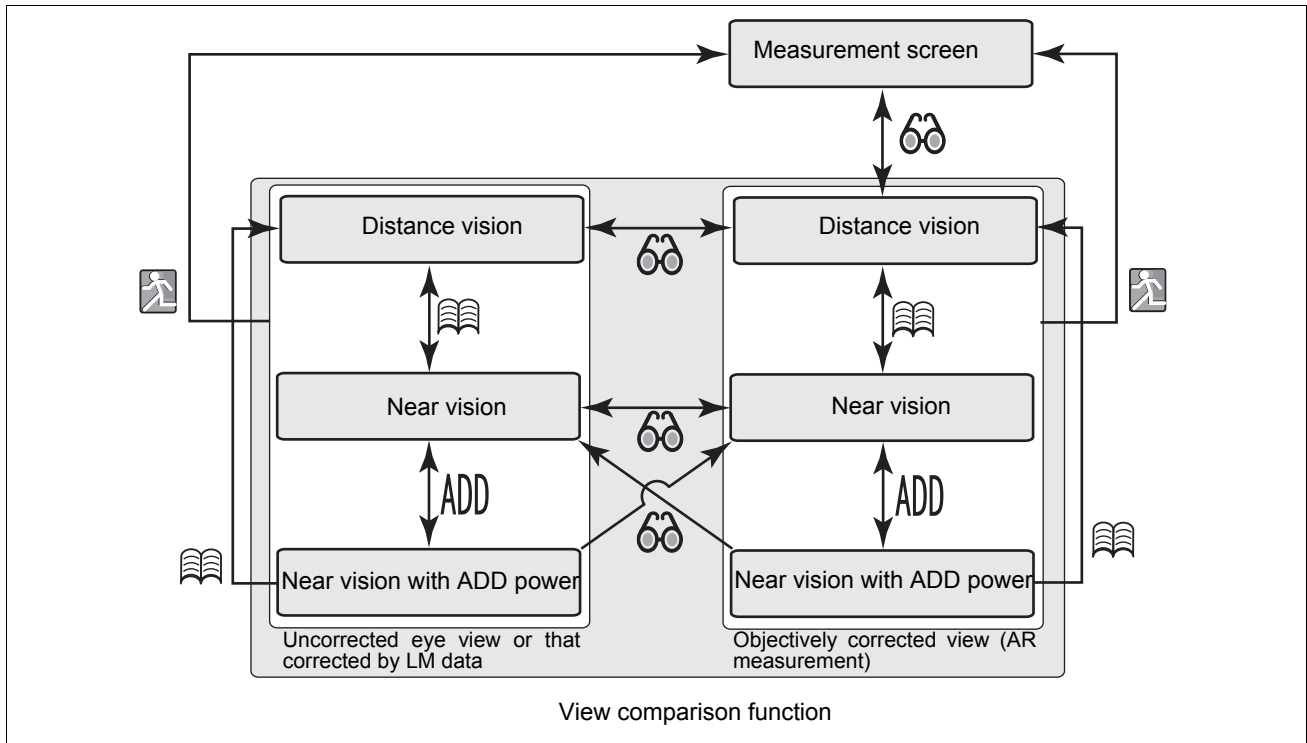
When using the view comparison function after AR measurement of both eyes, start it after alignment with the patient's eye.

8 When finishing the measurement, print the data out.

*1. The addition power can be selected by the 24. ADD SELECT parameter from 1.5D, 1.75D or 2.0D.



○ Operation on view comparison screen



○ Display of view comparison

Near vision indication
<near working distance>

Near vision indication with ADD power
Addition power (D)

View comparison function indication


| | | |
|---------|-------|-------|
| SE | ADD | SE |
| -1.50 | +1.75 | +0.00 |
| R: 3 | | 00 |
| S- 1.25 | | |
| C- 0.75 | | |
| A | 2 | PD62 |

View corrected by AR measurement
SE: Spherical Equivalent value
: Highest power

Uncorrected eye view or that corrected by LM data
00 : Uncorrected eye view
LM: View corrected by LM data
SE: Spherical Equivalent value

For glasses (LM), each value of SPH, CYL, AXIS is displayed.

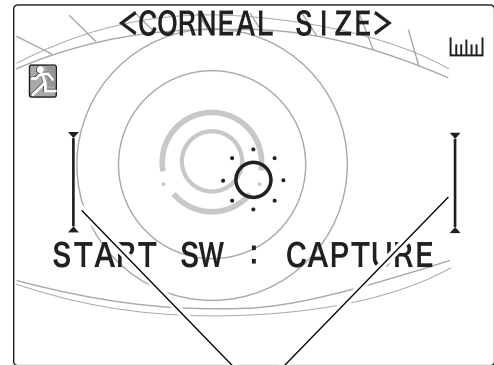
2.7 CS (Corneal Size) Measurement

- 1** Press the CS/PS/PD button  to enter CS measurement mode.

“<<CORNEAL SIZE>>”, guide lines and “START SW: CAPTURE” are displayed on the screen.

Pressing the CS/PS/PD button switches the mode in the following order:

AR/KM→ CS→ PS→ PD→ CS→ ...

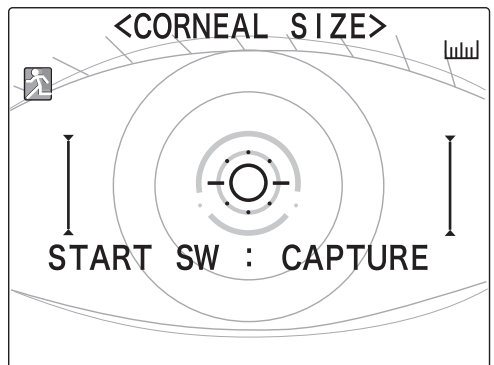


Guide lines

- 2** Manipulate the joystick to perform alignment and focusing of the patient's eye.

The auto-tracking and auto-focusing functions are automatically turned off.

Manually operate the joystick to perform alignment and focusing according to the patient's eye.







- 3** Press the start button to capture the image.

The screen switches from a moving image to a still image.


After capturing, instruct the patient to rest comfortably.

 **Note**

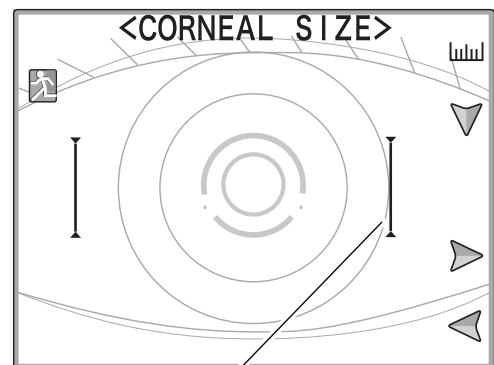
- If the mode is switched to CS measurement mode from when a still image is displayed on the PS (Pupil Size) measurement screen, a still image is displayed.
- If the start button is pressed before the right button  or left button  has been pressed, the still image returns to the moving image that allows for recapturing.

- 4** Press the right button  or left button  to align the guide line on the right of the patient's cornea.

The guide line to be aligned is displayed in pink.



- 5** Press the down button  to change the selected guide line.

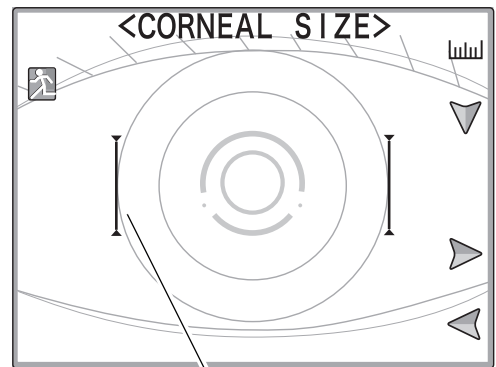
The left guide line is displayed in pink.



Align the guide line with the right end of the patient's cornea.

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- 6** Press the right button  or left button  to align the guide line with the left end of the patient's cornea.




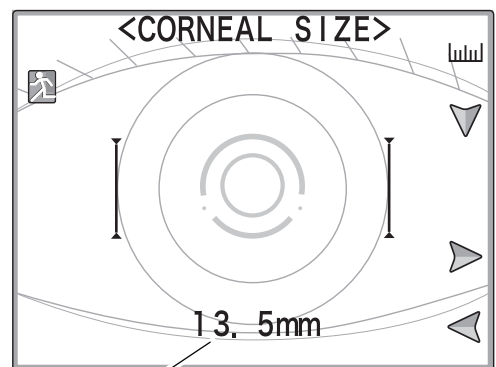
Move the guide line to the left end of the patient's cornea.

- 7** Press the start button to confirm the measurement.

A CS value (0.1 mm increments) is displayed in the lower part of the screen.



- 8** Measure the other eye in the same manner.

To perform PS measurement at the same time, press the CS/PS/PD button  to switch to the PS measurement screen.



The CS value is displayed.

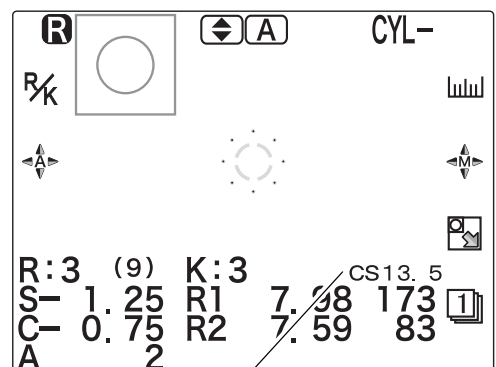
 **Note**

- When performing both CS (Corneal Size) measurement and PS (Pupil Size) measurement, switch the eye to be measured after CS measurement and PS measurement of a single eye are completed.
Only capture of one image is needed for a single eye.
- When the right button  or left button  has never been pressed, the measured values are not displayed. Start measurement again from capturing.
- When the AI MODE parameter is set to YES and the PRINT parameter is set to AUTO, CS measurement must be performed before AR and/or KM measurement to be able to print the data together with AR- and/or KM-measured data.

- 9** Press the exit button  to exit from CS measurement.

The screen returns to the measurement screen.

The CS-measured data is displayed on the screen, indicating the completion of CS measurement.




The CS value is displayed.

2.8 PS (Pupil Size) Measurement


This is the procedure to measure the pupil size (PS). To measure PS continuing from CS (Corneal Size) measurement, start from Step 5.

Note

- If the mode is switched to PS measurement mode from when a still image is displayed on the CS (Corneal Size) measurement screen, a still image is displayed.
- When recapturing the patient's eye after turning on or off the lamp button , press the start button.

The screen switches to the screen display in Step 1.

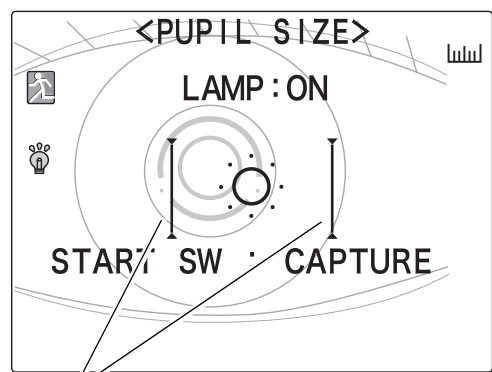
2

1 Press the CS/PS/PD button  to select PS measurement mode.

"<<PUPIL SIZE>>", guide lines and "START SW: CAPTURE" are displayed on the screen.


Pressing the CS/PS/PD button switches the mode in the following order:

AR/KM → CS → PS → PD → CS → ...



Guide lines

2 When the pupil size is measured in a dark place, turn off the chart-illuminating lamp in the measuring window.

Press the lamp button  to turn on or off the chart-illuminating lamp.

When the chart-illuminating lamp is not lit, "LAMP:OFF" is displayed below "<<PUPIL SIZE>>".

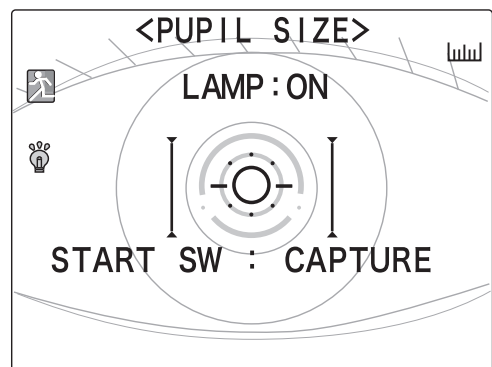
Instruct the patient not to look round and watch ahead without straining.

| | |
|----------|--|
| LAMP:ON | To measure the pupil size during AR measurement |
| LAMP:OFF | To measure the size of the pupil dilated in darkness |

3 Manipulate the joystick to perform alignment and focusing of the patient's eye.

The auto-tracking and auto-focusing functions are automatically turned off.

Manually operate the joystick to perform alignment and focusing according to the patient's eye.





4 Press the start button to capture the image.

The screen switches from a moving image to a still image.

After capturing, instruct the patient to rest comfortably.

 Note

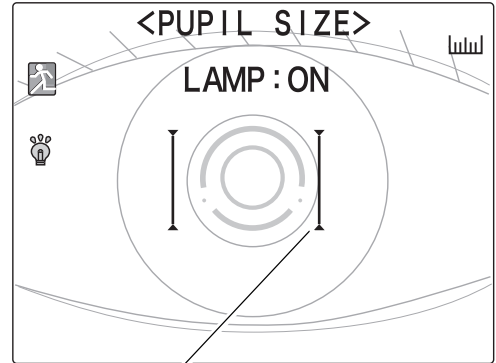
• When the right button  or left button  has never been pressed, the measured values are not displayed. Start measurement again from capturing.

5 Press the right button  or left button  to align the guide line on the right of the patient's pupil.



The guide line to be aligned is displayed in pink

6 Press the down button  to change the selected guide line.

The left guide line is displayed in pink.

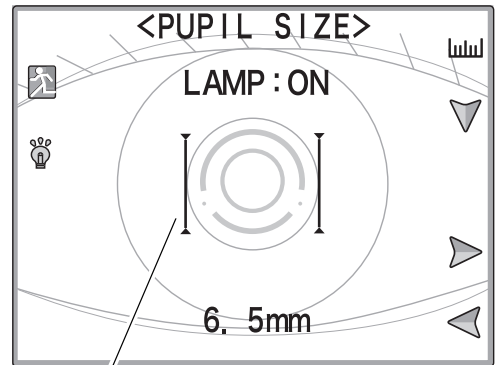


Align the guide line with the right end of the patient's pupil.

7 Press the right button  or left button  to align the guide line with the left end of the patient's pupil.

8 Press the start button to confirm the measurement.



A PS value (0.1 mm increments) is displayed in the lower part of the screen.



Move the guide line to the left end of the patient's pupil.

9 Measure the other eye in the same manner.

 Note

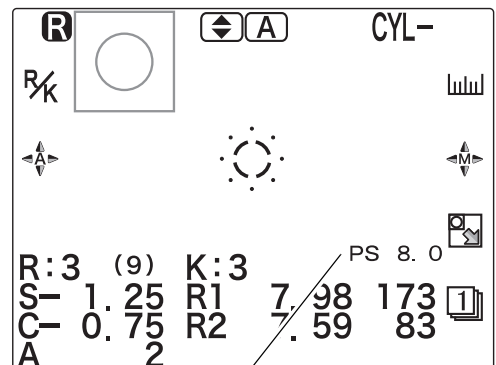
• When the right button  or left button  has never been pressed, the measured values are not displayed. Start measurement again from capturing.

• When the AI MODE parameter is set to YES and the PRINT parameter is set to AUTO, PS measurement must be performed before AR and/or KM measurement to be able to print the data together with AR- and/or KM-measured data.

10 Press the exit button  to exit from PS measurement.

The screen returns to the measurement screen.

The PS-measured data is displayed on the screen, indicating the completion of PS measurement.



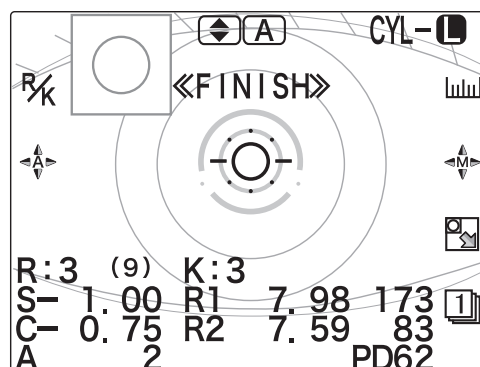
The PS value is displayed.

2.9 PD (Pupillary Distance) Measurement

2.9.1 Auto-PD measurement

When the 63. AUTO PD parameter is set to YES, at the moment where measurement of both eyes is completed, PD measurement is also completed and then the PD value is displayed.

Also, the near PD is automatically calculated.




The PD value is displayed.

Note

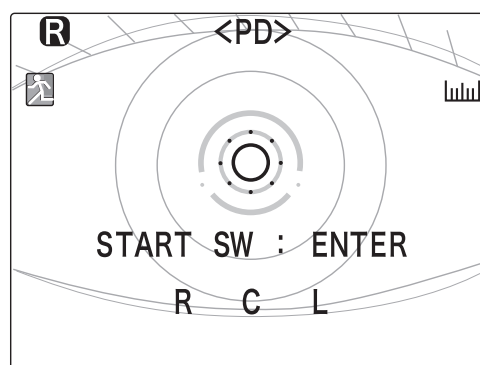
- A PD value is printed out with measured data.
- A monocular PD is not measured.
Measure the monocular PD manually.
- The calculated near PD is not displayed on the screen but is printed out with the AR-measured data (when the 55. NEAR PD PRINT parameter is set to YES).
- "PD ERR" displayed on the screen may disable PD measurement. Check the PD window.
If the PD window is blocked, remove the obstacles. If dust settles on the PD window, dampen a cloth with rubbing alcohol and gently wipe the dust off.
If "PD ERROR" is still displayed on the screen even after making the corrections described above, install the device in a low light interference environment since the error may occur due to light interference.

2.9.2 Manual PD Measurement

When the 63. AUTO PD parameter is set to NO, perform measurement by the following procedure. Even when the parameter is set to YES, manual PD measurement can be performed.

- 1 Press the CS/PS/PD button  to select PD measurement mode.

On the screen, "<PD>", "R", "C", and "L" are displayed.

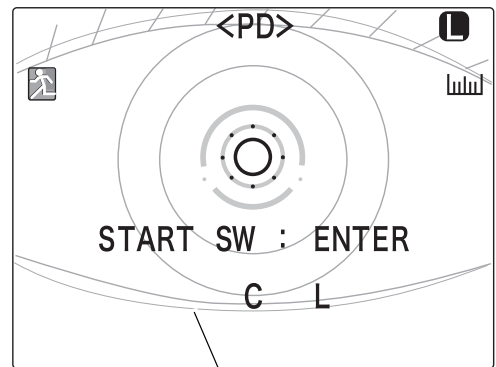


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- 2 Instruct the patient not to move his/her head and eyes during measurement.

3 After proper alignment of the right eye and left eye, press the start button each time.

To measure monocular PD at the same time as the binocular PD, press the start button every after proper alignment of the right-eye, center, and the left-eye.



The mark of the detected position disappears.

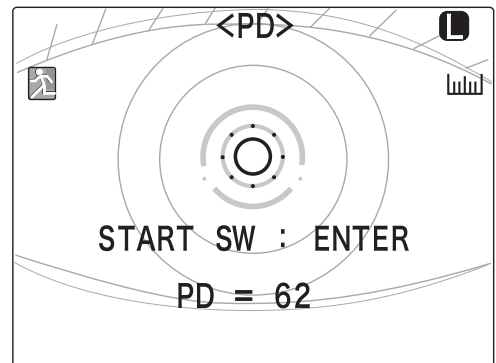
Note

- If the patient's head is tilted, straighten it before starting measurement.
- To locate in the exact center position, have the patient wear the frames with a mark in its center and bring the mark in focus.
It is recommendable to use a pupillary distance meter such as the NIDEK PM-600 in order to obtain precise monocular PD.
- "R" (right), "C" (center) and "L" (left) on the LCD disappear in order by pressing the start button to indicate that detection of each position has been completed.

4 When the measurement is completed, the measured PD is displayed on the screen.

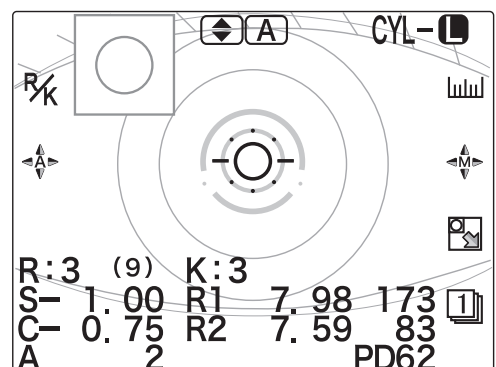
The measurement is completed when the R (right) and L (left) signs disappear.

To measure the monocular PD, press the start button in the center.



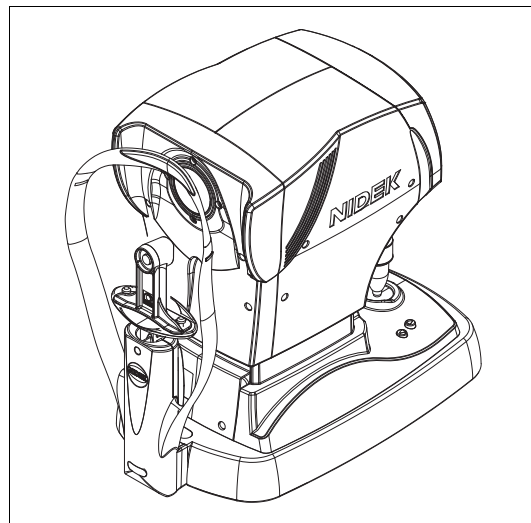
5 Press the exit button  to exit from PD measurement.

The screen returns to the measurement screen. The measured PD is displayed on the screen, indicating that the completion of measurement.



The PD value is displayed.

- 4** Place the model eye/CL holder with the surface of the contact lens to be measured facing toward the measuring window and insert the fixing pins.



- 5** Select the KM measurement mode and measure the lens in the same manner as KM measurement.

 Note

- When measuring the convex surface of a contact lens, axis angle can be read directly. When measuring the concave surface, however, the measured axis should be read inversely.
- Soft contact lenses cannot be measured.

<Sample printout 2>

| | |
|---|---|
| <pre> -----0002----- ID 12345678901234567890 NAME M/F JUL/10/2007 4:10 PM VD=12.00mm WD=40cm <R> S C A - 1.75 -0.50 173 9 - 1.25 -1.00 177 9 - 1.25 -1.00 5 8 <- 1.25 -1.00 177> <- 2.00 SE > [Diagram: Eyeprint showing a lens and eye with a circle around the eye] TL - 1.25 -1.00 177 CL - 1.25 -1.00 177 - 1.75 SE mm D deg R1 7.98 42.25 174 R2 7.65 44.00 84 AVE 7.82 43.25 CYL -1.75 174 R1 7.96 42.50 174 R2 7.63 44.25 84 AVE 7.80 43.25 CYL -1.75 174 R1 7.98 42.25 170 R2 7.65 44.00 80 AVE 7.82 43.25 CYL -1.75 170 <R1 7.98 42.25 174> <R2 7.65 44.00 84> <AVE 7.82 43.25 > <CYL -1.75 174> CS 12.5 PS 5.5 (LAMP=ON) <L> S C A Err +OVR Err -OVR Err COVR - 0.50 -0.75 2 9 0.75 6 9 PD 63 N 59 NIDEK ARK-500A </pre> | <p>Patient No. *</p> <p>Patient ID*1 *</p> <p>Space for name and sex *</p> <p>Date and time of measurement *</p> <p>Vertex distance*2</p> <p>Near working distance*3 *</p> <p>AR measurement, Confidence index*4 *</p> <p>S = Spherical powers</p> <p>C = Cylindrical powers</p> <p>A = Cylinder axis</p> <p>AR median values*5</p> <p>SE value*6 *</p> <p>Eyeprint*7 *</p> <p>Trial lens data*8 *</p> <p>CL conversion values*9 *</p> <p>KM measurement *</p> <p>R1 = Flattest meridian</p> <p>R2 = Steepest meridian</p> <p>AVE = Average of R1 and R2</p> <p>CYL = Corneal cylindrical power</p> <p>deg = Corneal cylinder axis</p> <p>KM median values*10</p> <p>CS measurement, PS measurement (ON or OFF of the lamp during PS measurement) *</p> <p>Measurable range over error</p> <p>Pupillary distance Distance PD, (Monocular PD), Near PD*11 *</p> <p>Comments*12</p> |
|---|---|


2.11.3 Printing parameter settings

The parameter settings, set time, comments and maintenance program versions are printed out.

- 1** Press the parameter button  for about a second.

The PARAMETER SETTING screen is displayed. The parameter No. and parameter names are displayed.

See “2.12 Parameter Settings” (page 60) for details on the parameters.

- 2** Press the print button .

The parameter settings are printed as follows:

The parameter settings are printed; regardless of the displayed page on the PARAMETER SETTING screen, all the parameter settings are printed out.

| PARAMETERS | |
|---------------------------|----------|
| 01: STEP | 0. 25D |
| 02: VERTEX D. | 12. 00mm |
| 03: AXIS STEP | 1° |
| 04: MEAS MODE | CON. |
| 05: AI MODE | YES |
| 06: AR CONTINUE | 3 |
| 07: AR THUMBNAIL | YES |
| 11: KM UNIT | mm |
| 12: KM DISPLAY | R1, R2 |
| 13: REF. INDEX | 1. 3375 |
| 14: KM CONTINUE | 3 |
| 21: COMPARE SW | MANUAL |
| 22: COMPARE (AR) | SE |
| 23: ADD SW | YES |
| 24: ADD SELECT | 1. 75D |
| 31: PRINT | MANUAL |
| 32: ECONO. PRINT | NO |
| 33: PRINT&CLEAR | NO |
| 34: PRINT DENCITY | MIDDLE |
| 35: PATIENT NO. | YES |
| 36: SET PATIENT NO. | 0001 |
| 37: NAME PRINT | YES |
| 38: DATE FORMAT | M/D/Y |
| 39: PRINT COMMENT | YES |
| 41: AR PRINT | ALL |
| 42: KM PRINT | SHORT |
| 43: CONF. INDEX | YES |
| 44: ERROR DATA | YES |
| 45: CAT MARK | NO |
| 46: ERROR PRINT | NO |
| 47: PRINT FORMAT | R-L |
| 51: SE PRINT | NO |
| 52: EYE PRINT | NO |
| 53: TL PRINT | NO |
| 54: CL PRINT | NO |
| 55: NEAR PD PRINT | NO |
| 56: WORKING D. | 40cm |
| 61: WINDOW CHECK | NO |
| 62: TRACKING SW TRC/ASHOT | |
| 63: AUTO PD | YES |
| 64: SLEEP | 5MIN |
| 65: BEEP | LOW |
| 66: LCD BRIGHTNESS | NORMAL |
| 67: ICON OFF | NO |
| 68: ALIGN QUALITY | NORMAL |
| 69: MAN FOCUS DISP | YES |
| 71: I/F MODE | NIDEK |
| 72: I/F FORMAT | SHORT |
| 73: BAUD-RATE | 9600 |
| 74: BIT LENGTH | 8 |
| 75: CR CODE | NO |
| 76: LM DATA PRINT | NO |
| CLOCK SET | |
| JUL/10/2007 | 10:50 AM |
| COMMENT SET | |
| NIDEK | ARK-500A |
| PROGRAM VERSION | |
| SOFT VER: | V 0. 00 |
| FPGA REV: | R 0. 00 |

Parameters


Clock setting

Comments

Program version (for maintenance)

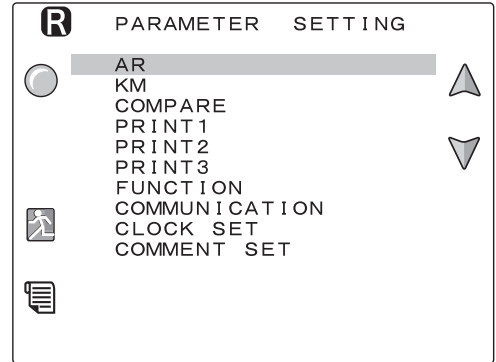
2.12 Parameter Settings

The present parameter settings, set time, comments and program versions are printed out.

- 1 Press the parameter button  for about a second.

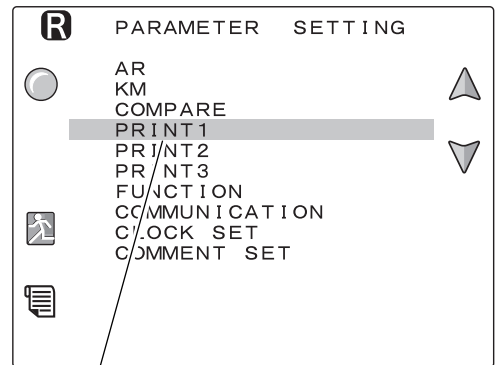
The PARAMETER SETTING screen is displayed and parameter items are displayed.

The currently selected parameter item is highlighted.





- 2 Press the up/down button to select a parameter to be changed.


See “2.12.1 Parameter tables” (page 63) for details on the parameters.



Move the highlight.

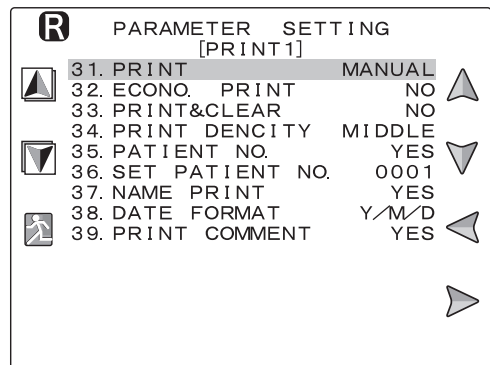
| | |
|---|-----------------------------------|
| Up button  | Moves the current selection up. |
| Down button  | Moves the current selection down. |

 Note

- See “2.12.2 Setting the time and date” (page 73) when CLOCK SET is selected.
- See “2.12.3 Entering comments” (page 75) when COMMENT SET is selected.
- To check the parameter setting, press the print button  .
See “2.11.3 Printing parameter settings” (page 59) for details on printing.

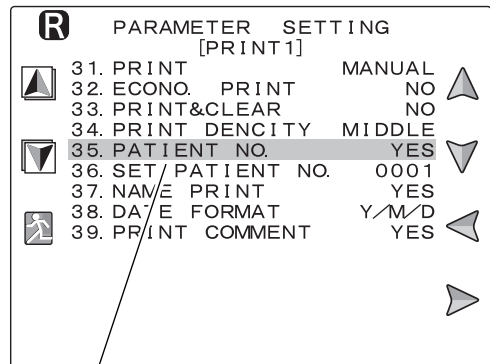
3 Press the execute button  to switch to the [PRINT1] screen.

Parameters and their settings are displayed.
A parameter that is being selected is highlighted.





PRINT1 screen

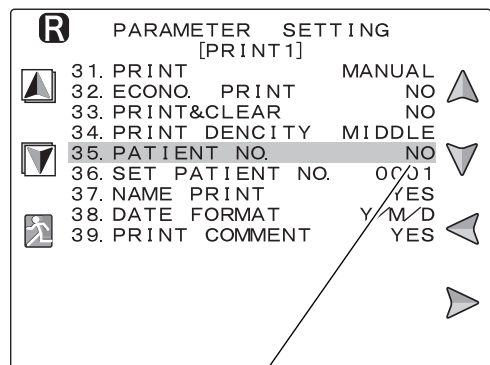
4 Press the up/down button to select a parameter to be changed.





Move the highlight.

| | |
|---|-----------------------------------|
| Up button  | Moves the current selection up. |
| Down button  | Moves the current selection down. |

5 Press the right button  or left button  to change the parameter setting.



Parameter setting changes.



| | |
|--|--|
| Right button  | Selects the next parameter option. |
| Left button  | Selects the previous parameter option. |

See "2.12.1 Parameter tables" (page 63) for the selectable options with the above switches.

 Note

- Underlined options in the parameter tables indicate factory settings.

To change the page of parameter:

| | |
|--|-----------------------------|
| Page up button  | Displays the previous page. |
| Page down button  | Displays the next page. |


6 Repeat Steps 4 to 5 to change the desired parameter settings.

7 To finish setting the parameters, press the exit button .

The set parameter settings are saved even after power-off.

The screen returns to the AR measurement screen.

 Note

- The parameter settings are maintained in memory even though the device is turned off.
- After changing parameter settings, turn off the device after pressing the exit button  .
Otherwise, parameter settings are not saved.

○ Resetting the parameters

To reset the parameters to the factory settings, follow the steps below.

 Note

- Comments, date and time are not reset.

- 1) Turn off the device.
- 2) Turn on the power switch while holding down the third function button from the top on the right of the LCD.
- 3) The parameters are reset to the factory settings and the device is turned on.

2.12.1 Parameter tables

[AR (AR measurement)]

* Underlined options indicate factory settings.

| No. | Parameter | Settings |
|-----|--------------|---|
| 1 | STEP | 0.01D / 0.12D / <u>0.25D</u> |
| 2 | VERTEX D. | 0.00mm / 10.50mm / <u>12.00mm</u> / 13.75mm / 15.00mm / 16.50mm |
| 3 | AXIS STEP | <u>1°</u> / 5° |
| 4 | MEAS MODE | <u>CON.</u> / NOR. |
| 5 | AI MODE | <u>YES</u> / NO |
| 6 | AR CONTINUE | 3 - 10 (Factory setting: 3) |
| 7 | AR THUMBNAIL | <u>YES</u> / NO / LOW CONF |

1 : STEP (AR measurement step)

Selects the indication step of SPH and CYL data for AR measurement and indication step for corneal refractive power (dioptric power converted from corneal curvature radius).

2 : VERTEX D. (vertex distance)

Selects the distance between the corneal vertex to the posterior surface of the spectacle lens when the patient wears glasses.

*13.75 mm is the factory setting of devices destined for NIDEK INCORPORATED.

3 : AXIS STEP (indication step of AXIS)

Selects the indication step of AXIS data for AR measurement.

4 : MEAS MODE (measurement mode)

Selects the way of fogging in successive AR measurements.

| | |
|------|---|
| CON. | Fogging stays throughout the measurement series. This mode is useful for children who do not fixate their eyes very long. |
| NOR. | The patient's view is fogged for each measurement even though the start button is held down. This mode is useful for patients who accommodate their eyes easily. |

5 : AI MODE (AI mode)

Selects whether or not to use AI mode.

When the AI MODE parameter is set to YES, the measurement automatically completes under the following conditions:

AR measurement automatically completes when stable data is obtained without variations after a minimum of three shots.

If unstable data is included, additional measurements are taken and then the measurement completes.



- A measurement count is set by the 6. AR CONTINUE parameter.

6 : AR CONTINUE (successive AR measurement)


Sets the measurement count for a single eye.

When the AI MODE parameter is set to OFF, the measurement automatically completes after the specified number of measurements.

When the AI MODE parameter is set to ON, variations in data are checked after the specified number of measurements. As a result of the check, the measurement completes when the data is stable. If not, the measurement completes after the set number of additional measurements.

7 : AR THUMBNAIL

Selects whether or not to display the thumbnail screen of the measurement ring image during AR measurement.

When YES is selected, a thumbnail of the measurement ring image is displayed to the left of the screen after AR measurement is complete. Press the ring image enlargement button  for full screen display of the ring image.

When LOW CONF is selected, a thumbnail of the measurement ring image is displayed as in the case of YES after AR measurement is complete with the confidence index at 7 or less.

[KM (KM measurement)]

* Underlined options indicate factory settings.

| No. | Parameter | Settings |
|-----|-------------|---------------------------------|
| 11 | KM UNIT | <u>mm</u> / D |
| 12 | KM DISPLAY | <u>R1, R2</u> / AVE, CYL |
| 13 | REF. INDEX | 1.3320 / 1.3360 / <u>1.3375</u> |
| 14 | KM CONTINUE | 3 - 10 (Factory setting: 3) |

11 : KM UNIT (unit for corneal curvature radius)

Selects whether or not to express the corneal curvature radius obtained in KM measurement in radius (mm) or in diopter (D).

12 : KM DISPLAY (representation of corneal curvature radius)

Selects the KM measurement representation between R1 (flattest meridian) and R2 (steepest meridian), and AVE (averages of R1 and R2) and CYL (amount of corneal astigmatism).

13 : REF. INDEX (corneal refractive index)

Selects the corneal refractive index.

14 : KM CONTINUE (successive KM measurement)

Selects the number of multiple KM measurements in KM measurement.


[COMPARE (View comparison function)]

* Underlined options indicate factory settings.

| No. | Parameter | Settings |
|-----|-------------|------------------------------|
| 21 | COMPARE SW | AUTO / <u>MANUAL</u> / NO |
| 22 | COMPARE(AR) | <u>SE</u> / -SPH |
| 23 | ADD SW | <u>YES</u> / NO |
| 24 | ADD SELECT | 1.50D / <u>1.75D</u> / 2.00D |

21 : COMPARE SW (comparison function button)

Selects how to enter the view comparison function screen.

| | |
|--------|---|
| AUTO | The view comparison function screen is automatically displayed when both eyes have been measured. |
| MANUAL | The view comparison function screen is displayed when the view comparison button is pressed. |
| NO | The view comparison function screen is not displayed. The icon  of the view comparison function is not displayed on the measurement screen. |

22 : COMPARE (AR)

Selects the SPH value (spherical power) to be used for the view of AR measurement during the View Comparison function.

| | |
|------|---|
| SE | The spherical power of the SE (Spherical Equivalent) value is used. |
| -SPH | The highest power (spherical power + cylindrical power) is used. |

23 : ADD SW (addition power button)Selects whether or not to add an addition power by pressing the ADD button **ADD** during the view comparison function for near vision.**24 : ADD SELECT (addition power)**

Selects the addition power to be added during the view comparison function for near vision.


[PRINT1 (Print setting 1)]

* Underlined options indicate factory settings.

| No. | Parameter | Settings |
|-----|-----------------|-----------------------------------|
| 31 | PRINT | <u>MANUAL</u> / AUTO / NO |
| 32 | ECONO. PRINT | YES / <u>NO</u> |
| 33 | PRINT&CLEAR | YES / <u>NO</u> |
| 34 | PRINT DENSITY | LOW / <u>MIDDLE</u> / HIGH |
| 35 | PATIENT NO. | <u>YES</u> / NO |
| 36 | SET PATIENT NO. | <u>0001</u> to 9999 |
| 37 | NAME PRINT | <u>YES</u> / NO |
| 38 | DATE FORMAT | Y/M/D / <u>M/D/Y</u> / D/M/Y / NO |
| 39 | PRINT COMMENT | <u>YES</u> / NO |

31 : PRINT (printing)

Selects the method of starting printing.

| | |
|--------|--|
| MANUAL | Press the print button  to print the measured data out. |
| AUTO | Printing starts automatically at the completion of measurement. |
| NO | Printing does not occur. |

32 : ECONO. PRINT (economical printing)

When YES is set, printing is performed with reduced line-spacing to save printer paper.

33 : PRINT&CLEAR (erasing of data after printing)

Selects whether or not to erase the measured data in the memory immediately after printing.

When this parameter is set to NO, the measured data is erased when the next measurement is performed after printing.



- Measured data in the memory is erased automatically regardless of the 33. PRINT&CLEAR parameter setting when the patient ID is scanned by the barcode scanner and then the measured data is printed out.

34 : PRINT DENSITY (density of printed text)


Selects the density of text to be printed.

35 : PATIENT NO. (printing of patient number)

Selects whether or not to print the patient No.

36 : SET PATIENT NO. (setting of patient ID)

Selects the patient number in the range from 0001 to 9999.

Pressing the left button  at the beginning resets the counter to 0001.

37 : NAME PRINT (printing of name)

Selects whether or not to provide printing spaces for the patient's name and sex.

3.

OPERATION WHEN PERIPHERAL DEVICES ARE CONNECTED

The ARK-500A exports data to an external device such as the NIDEK motorized refractor (hereafter referred to as RT) and computer.

It also imports data from the NIDEK lensmeter (hereafter referred to as LM).

CAUTION • Be sure to turn off each device before connecting a communication cable.
Connecting the cable with the power on may cause malfunction.

3.1 Connecting to the NIDEK Motorized Refractor (RT) or Computer

3

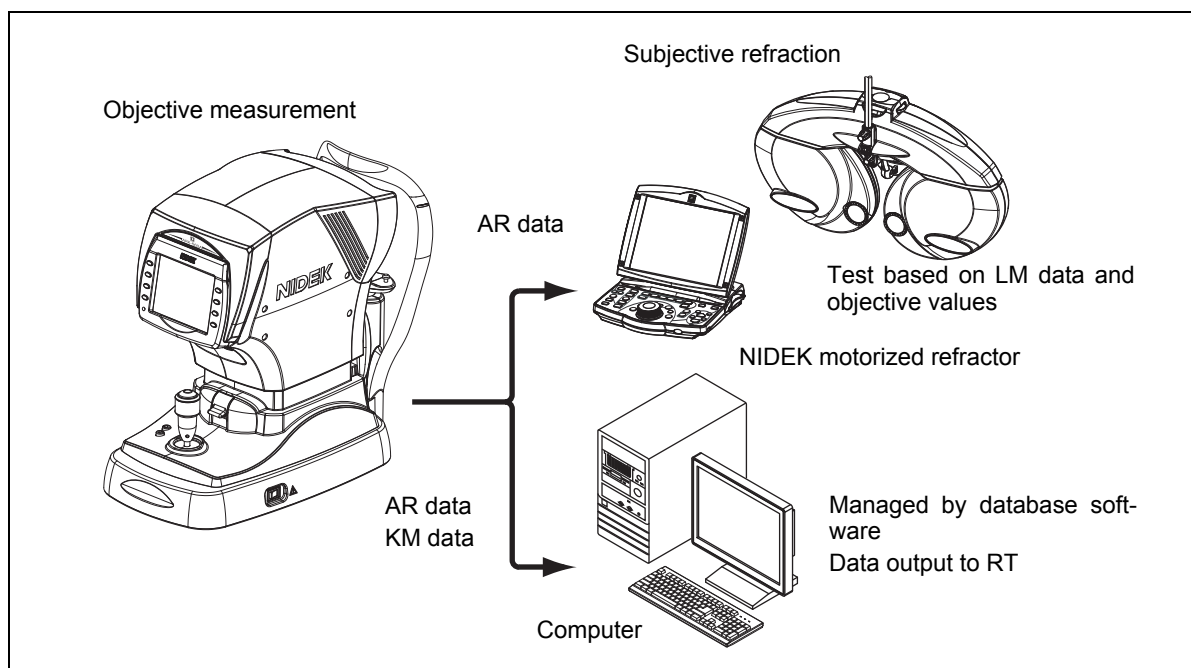
3.1.1 Outline

Any data printed can be exported to the RT or a computer.

The AR data transmitted to the RT is used as objective measurement values in the subjective tests.

Connectable devices: RT-1200 series, RT-2100 series, RT-5100

Data transmitted to a computer can be managed by various database software.



Note

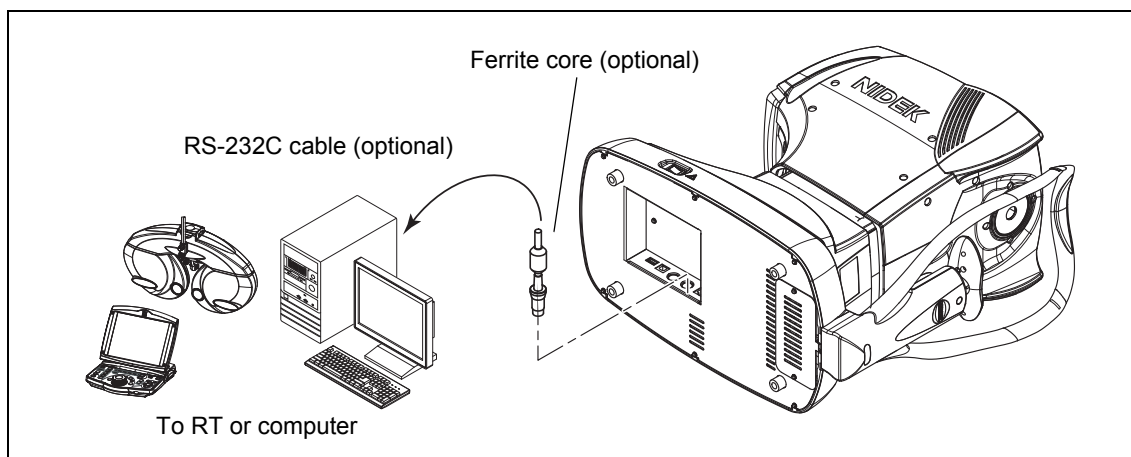
• Data communication is performed through RS-232C interface.

3.1.2 Connecting procedure


- 1 Connect the RT (or a computer) to the data output port ($\ominus \rightarrow$) of the ARK-500A via a communication cable (optional).

Connect the cable with the device laid down.

Attach a ferrite core (optional) to the the ARK-500A side connector of the communication cable.



3.1.3 Operating procedure

- 1 After measurement, press the print button .

Perform the printing process in the standard manner.

See “2.2 Preparation for Measurement” (page 20) for the measuring method.

See “2.11 Printing” (page 55) for printing.

- 2 The ARK-500A automatically transmits data to the RT (or computer).

When the ARK-500A is connected to the RT, it receives data No. (ID No.) from the RT.

When the ARK-500A is connected to a computer, it does not receive data No. (ID No.).

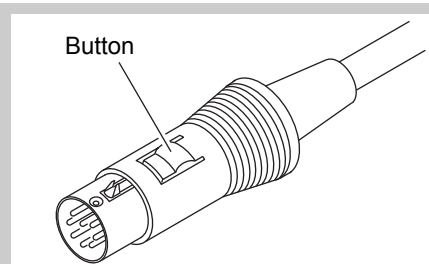
- 3 The measured data is printed.

When the ARK-500A is connected to the RT, the data No. (ID No.) is also printed.



- Disconnect the communication cable while pressing the button on the connector.

When the cable is connected, the button is located on the underside of the connector.



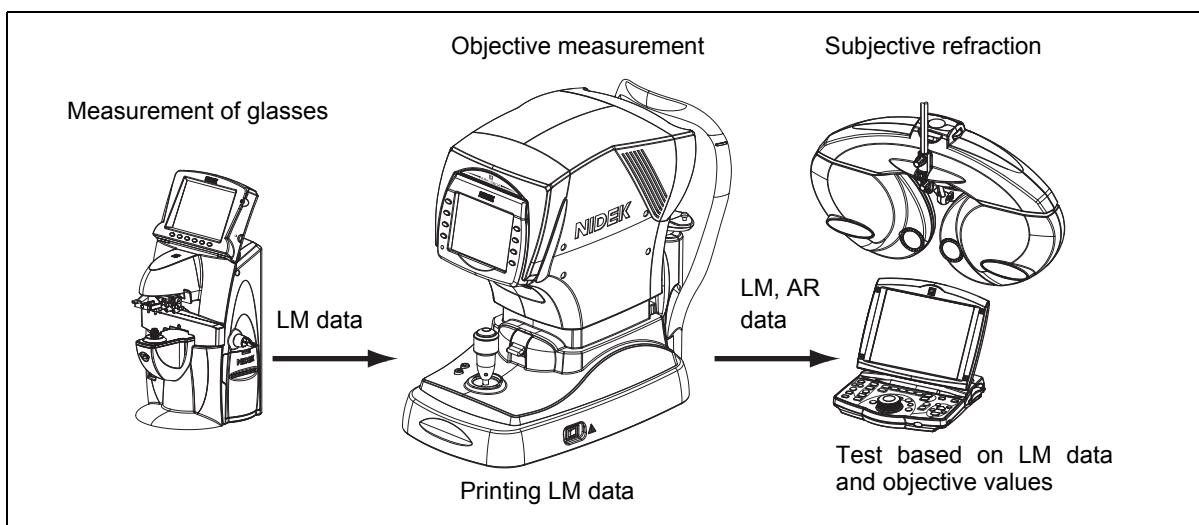
3.2 Connecting to the NIDEK Auto Lensmeter (LM)

3.2.1 Outline

The ARK-500A imports data measured with the NIDEK lensmeter, and prints the LM data (lensmeter readings). It also exports the LM data to the connected RT. (The lensmeter provided with this function is needed.)

Connectable devices: LM-500, LM-970, LM-990/990A, LM-1000/1000P, LM-1200

The LM data transmitted to the RT is used as previous eyeglass lens values in the subjective test.



3

3.2.2 Connecting procedure

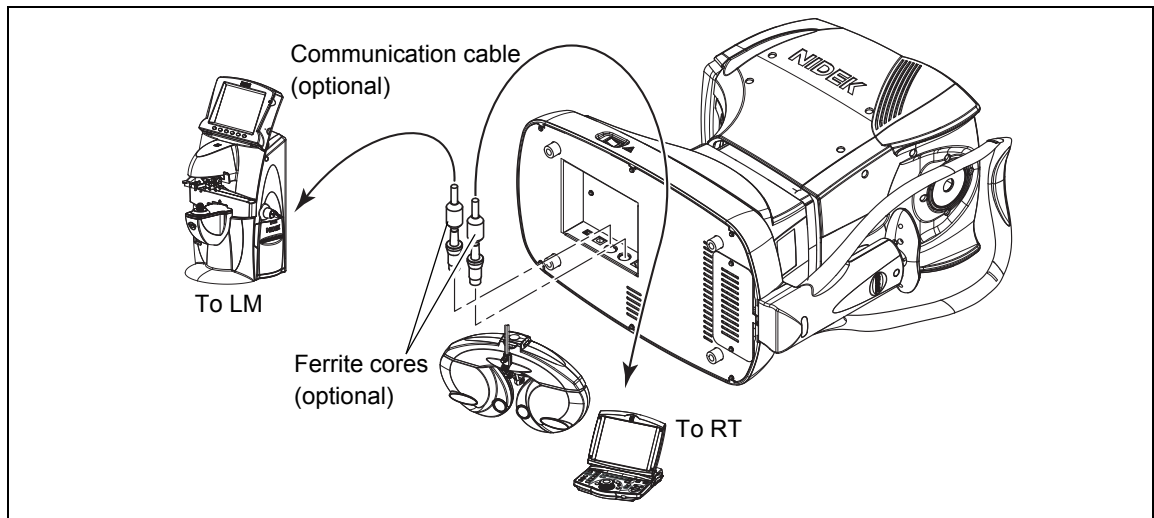
- 1 Connect the data input port (\ominus) of the ARK-500A to the lensmeter (LM) via a communication cable (optional).

Connect the cable with the device laid down.

Attach a ferrite core (optional) to the the ARK-500A side connector of the communication cable.

- 2 Connect the data output port (\oplus) of the ARK-500A to the RT via a communication cable (optional).

Attach a ferrite core (optional) to the the ARK-500A side connector of the communication cable.



3.2.3 Operating procedure

- 1** After lens measurement with the LM, press the print button on the LM.
- 2** The ARK-500A receives lensmeter readings from the LM.

 **Note**

- When the device communicates with the LM, set the communication parameters of each instrument as follows. See the operator's manual for the setting method of each device.

[Settings of ARK-500A]

- 73. BAUD-RATE = 9600
- 74. BIT LENGTH = 8
- 76. LM DATA PRINT = YES

[Settings of NIDEK lensmeter]


- PRINTER = COM PRINT
- RS-232C = NIDEK
- Baud Rate = 9600
- Parity = Odd
- Data Bits = 8
- Stop Bits = 1

- 3** The LM data is printed and data is transmitted to the RT.

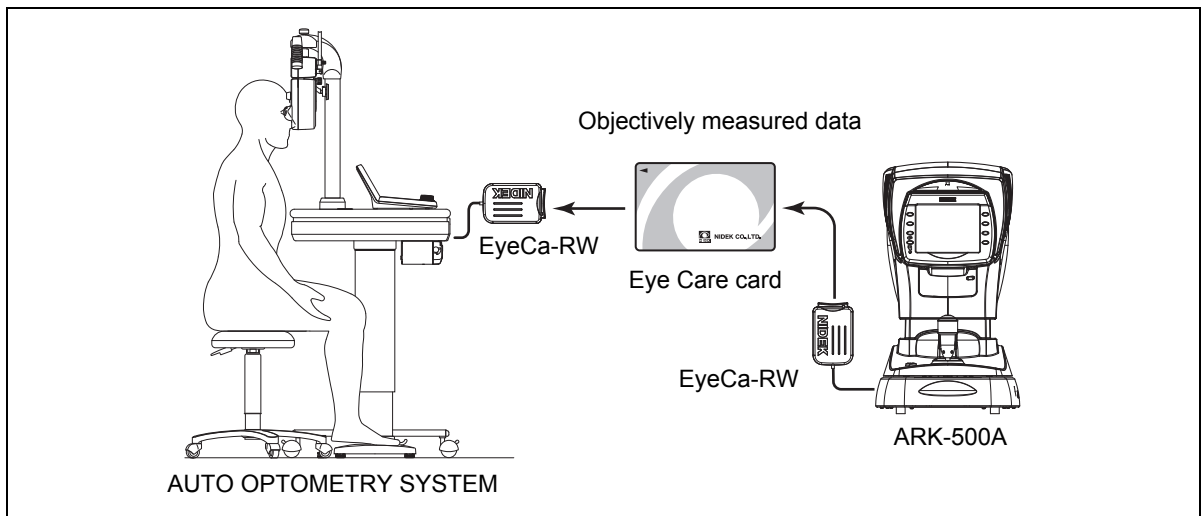
3.3 Connecting to the Eye Care Card System

3.3.1 Outline

Data transfer by way of the Eye Care card using the optional Eye Care card system “EyeCa-RW” is explained.

The Eye Care card system should be connected to the data output port () provided at the bottom of the device.

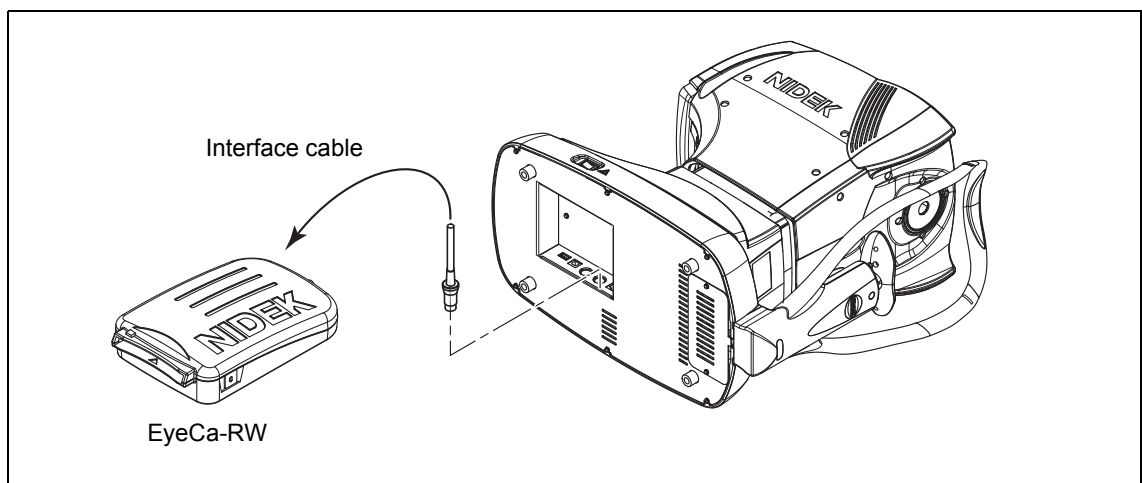
For the DIP switch settings, only set SW3 of the DIP switchpack of the Eye Care card system located at the bottom to the “ON” position.



3

3.3.2 Connecting procedure

- 1 Connect the interface cable of the EyeCa-RW to the data output port ().



3.3.3 Transferring data with the EyeCa-RW

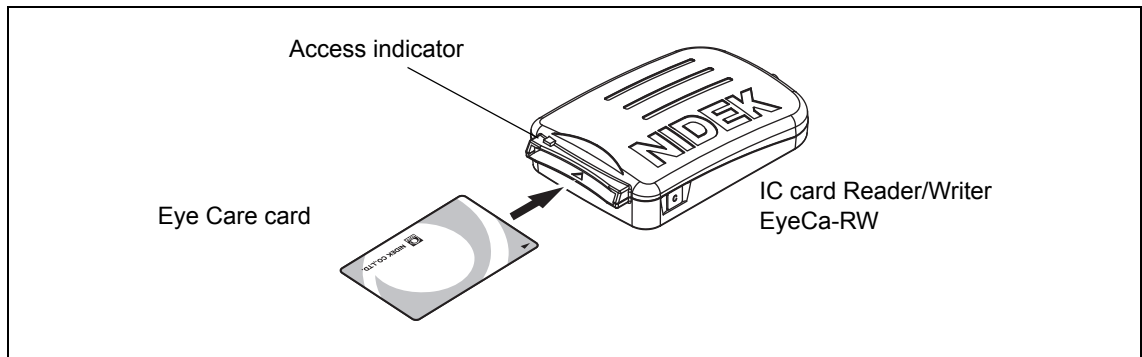
The procedure for writing data to the Eye Care card differs depending on whether the measured data is printed or not.

○ When printing measured data

1 Insert the Eye Care card into the ARK-500A on condition that the ARK-500A has no measured data in the internal memory.

The EyeCa-RW emits a short beep and the access indicator illuminates in green.

If the ARK-500A has not measured data in its memory, the memory indicator of the ARK-500A is shut off.



2 Perform measurements.

3 Press the print button .

Follow the same procedure as the normal printing procedure.

The access indicator changes to the orange one, and the data is written to the Eye Care card.

After the data has been written successfully, the EyeCa-RW emits a short beep and the access indicator flashes in green.

4 After the access indicator of the EyeCa-RW has changed to the green flashing one, eject the Eye Care card.



• Refer to the Operator's Manual supplied with the EyeCa-RW for the other procedures.

○ When not printing measured data

Set the 31. PRINT parameter to “MANUAL” or “NO” in advance.
See “2.12 Parameter Settings” (page 60) for details.

1 After measurements, insert the Eye Care card.

The EyeCa-RW emits a short beep and the access indicator illuminates in green. The access indicator changes to the orange one, and the data is written to the Eye Care card.

After the data has been written successfully, the EyeCa-RW emits a short beep and the access indicator flashes in green.

2 After the access indicator of the EyeCa-RW starts flashing in green, eject the Eye Care card.

The data in the memory of the ARK-500A is automatically erased when the next measurement has begun.



- Never eject the Eye Care card while it is being accessed.

While the card is being accessed, the access indicator is lit in orange.

The access indicator flashing in orange indicates an error occurrence. In this case, the card can be ejected.

When trying to eject the card while it is being accessed, data will not be written successfully and the Eye Care card may be irreparably damaged.

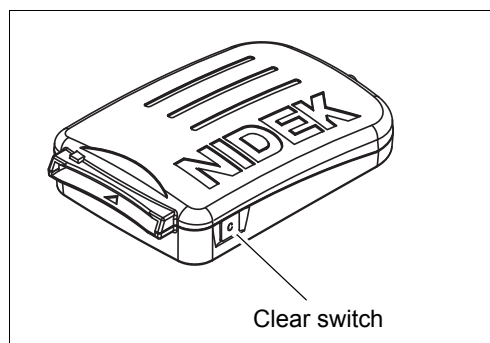
3

3.3.4 Erasing data on the Eye Care card

All the data on the Eye Care card is erased.

1 Press the clear switch of the EyeCa-RW for about a second.

The EyeCa-RW emits a short beep and the access indicator is lit in red.



2 Insert the Eye Care card.

The access indicator is lit in orange and all the data on the Eye Care card is erased.

If the data has been erased, the EyeCa-RW emits a longer beep and the access indicator flashes in green.

3.4 Reading Patient IDs

 Note

- Although a patient ID can be read before or after measurement, it is advisable to read it before printing the measured data.

If a patient ID is read after measured data has been printed and is still displayed, the device considers the displayed data to be that of a former patient and erases it automatically.

- The ARK-500A considers the patient ID entered before printing to be the ID of the printed data.

If an incorrect patient ID is entered, re-enter the correct ID.

Read patient IDs using a barcode scanner. The read patient IDs are used by NIDEK ADVANCED VISION INFORMATION SYSTEM NAVIS.

The read patient IDs are printed on the ARK-500A as well as the measured data.

 Note

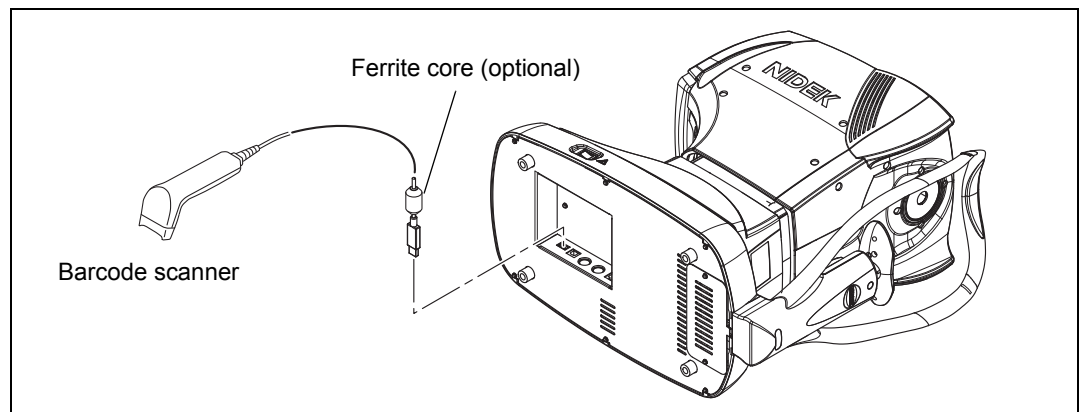
- Only the optional barcode scanner can be connected.

- The device recognizes only alphanumeric characters as patient IDs.

The ARK-500A does not recognize any symbols or such other than alphanumeric characters.

Connect the barcode scanner to the USB-A port at the underside of the device.

Attach a ferrite core (optional) to the the ARK-500A side connector of the communication cable.

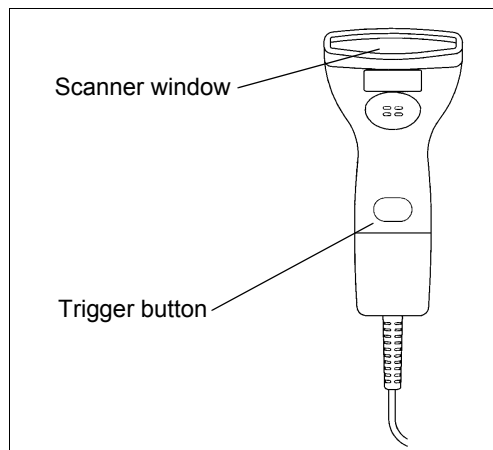


 Note

- Beeping sounds when the device is turned on with the barcode scanner connected.

The beeps indicate that connection is correct.

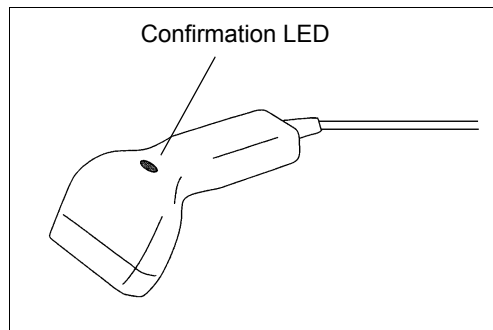
1 Place the scanner window over the barcode.



2 Press the trigger button.

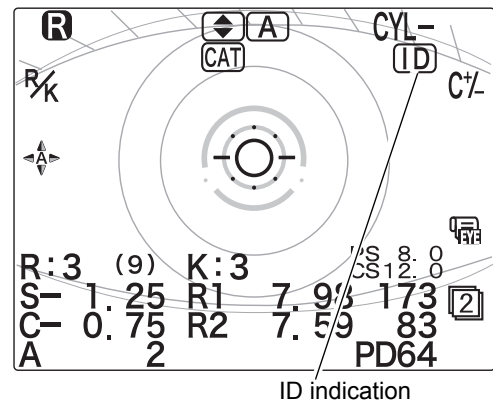
The scanner window blinks in red and the barcode is read.

After the barcode has been read successfully, the confirmation LED lights up and the scanner emits a short beep.



3

When the barcode is read successfully, the ARK-500A displays the ID indication **ID** indicating that the patient ID has been entered.



Note


- Measured data in the memory is automatically erased regardless of the 39. PRINT&CLEAR parameter setting when the patient ID is scanned by the barcode scanner and then the measured data is printed out.


4.

MAINTENANCE

4.1 Troubleshooting

In the event that the device does not work correctly, correct the problem according to the following table before contacting NIDEK or your authorized distributor.

| Symptom | Remedy |
|--|--|
| The LCD does not turn on. | <ul style="list-style-type: none">The power cord may not be correctly connected. Reconnect it securely.The power switch may not have been turned on. Check the power switch. |
| The LCD does not turn on (not clear) even though the power is on. | <ul style="list-style-type: none">The sleep function may have been executed. Try to recover the monitor ON condition by pressing any button. |
| The screen disappears suddenly. | <ul style="list-style-type: none">Sleep mode may have been activated. Press any button to exit from sleep mode. |
| The main body cannot be moved laterally. | <ul style="list-style-type: none">The locking lever may be locked. Flip up the locking lever. |
| Data is not printed out. | <ul style="list-style-type: none">Check the printer paper. If the paper has been used up, load new printer paper.The 31. PRINT parameter may be set to NO. Reset the parameter. |
| The printer does operate, however, printed results cannot be obtained. | <ul style="list-style-type: none">The printer paper may be loaded with the wrong side up. Set it with the correct side up. |
| When the power is turned on or the print button  is pressed, "ERROR" or "NO PAPER" appears even though printer paper is loaded. | <ul style="list-style-type: none">Check that the printer cover is securely closed. Open the printer cover and close it securely.The print button may have been pressed too soon after the printer cover was closed. After the printer cover is closed, it takes time for the printer to be ready. |
| Printer paper does not feed. | <ul style="list-style-type: none">Printer paper may be loaded in a tilted position or the core of the roll may not be placed properly. Open the printer cover and make sure that printer paper is properly loaded. |

| Symptom | Remedy |
|---|--|
| The auto-tracking function or auto-shooting function does not work. | <ul style="list-style-type: none"> • The auto-tracking function or auto-shooting function may not have been turned on. Turn them on with the auto button  . • Room illumination may be reflecting on the cornea. Change the location and try measurement again. • The auto-tracking function or auto-shooting function may not work on some eyes such as keratoconus or recently-operated cornea. In such cases, turn off the auto-tracking function and start measurement. • The patient who has substantial ocular ataxia or who cannot fixate his or her eyes, the auto-tracking function may not work. In such cases, turn off the auto-tracking function and start measurement. • If the device is installed in the vicinity of a window where the device is exposed to sunshine, light interference may adversely affect these functions. Change the installed position of the device and start measurement again. |
| “PD ERR” is displayed on the screen. | <ul style="list-style-type: none"> • Make sure that the PD measuring window is not blocked. |
| A measurement error appears. | <ul style="list-style-type: none"> • The patient may have blinked during measurement. Instruct the patient not to blink and try measurement again. • The eyelid or eyelashes may obstruct measurement. Instruct the patient to open his/her eye wider. If the patient cannot open wider, lift the patient’s lid, paying attention not to press against the eyeball. • The pupil may be too small for measurement. Have the patient sit in a dark room for a while until the pupil enlarges enough and try measurement again. • The data may exceed the measurable limit. |
| “CHECK MEASURING WINDOW.” is printed out at device start-up. | <ul style="list-style-type: none"> • Clean the measuring window. See “4.6.1 Cleaning the measuring window” (page 97). • If the measuring window is not dirty, make sure that the measuring window is not blocked at device start-up. |

If the symptom cannot be corrected with the above actions, contact NIDEK or your authorized distributor.

4.2 Error Messages and Countermeasures

If one of the following error codes is displayed on the screen or printed out, follow the suggestions in the cause and countermeasure column.

The error code, detailed indications and serial number of your device are helpful in proper servicing.

| Error code | Cause and countermeasure |
|------------|---|
| ERR001 | <ul style="list-style-type: none"> • Data error of backup memory (EEPROM) Data loss due to exogenous noise such as static electricity or malfunction of electric circuit board or EEPROM on the electric circuit board is probable. • If the same error code is displayed again even after the device is turned off and on again, shut off the device and contact NIDEK or your authorized distributor. |
| ERR002 | <ul style="list-style-type: none"> • Date and time setting error The built-in battery has been discharged after about one month or longer of nonuse, and the date and time settings went wrong, or malfunction of electric circuit board or timer IC on the electric circuit board is probable. • If the same error code is displayed again even after the date and time are reset in the parameter setting mode, shut off the device and contact NIDEK or your authorized distributor. |
| PD ERR | <ul style="list-style-type: none"> • Error related to the PD measurement Malfunction of the PD sensor or LED is probable. • Make sure that the PD measuring window is not blocked. • Shut off the device and contact NIDEK or your authorized distributor. |
| ERR011 | <ul style="list-style-type: none"> • Error related to control signals for communication (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR012 | <ul style="list-style-type: none"> • Error related to control signals for communication (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR013 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR014 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the parameters related to communication are properly set. |
| ERR015 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR016 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR017 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR018 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication are properly set. |
| NO DAT | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |



| Error code | Cause and countermeasure |
|------------|--|
| ERR021 | <ul style="list-style-type: none"> • Error related to control signals for communication (input port) Ensure that the communication cable is properly connected to the input port. • Also ensure that the communication parameters are properly set. |
| ERR022 | <ul style="list-style-type: none"> • Error related to control signals for communication (input port) Ensure that the communication cable is properly connected to the input port. • Also ensure that the communication parameters are properly set. |
| ERR023 | <ul style="list-style-type: none"> • Error related to control signals for communication (input port) Ensure that the communication cable is properly connected to the input port. • Also ensure that the communication parameters are properly set. |
| ERR024 | <ul style="list-style-type: none"> • Error related to control signals for communication (input port) Ensure that the communication cable is properly connected to the input port. • Also ensure that the communication parameters are properly set. |
| ERR025 | <ul style="list-style-type: none"> • Error related to control signals for communication (input port) Ensure that the communication cable is properly connected to the input port. • Also ensure that the communication parameters are properly set. |
| ERR026 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR027 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR028 | <ul style="list-style-type: none"> • Error related to communication data (output port) Ensure that the communication cable is properly connected to the output port. • Also ensure that the communication parameters are properly set. |
| ERR031 | <ul style="list-style-type: none"> • Error related to the up-and-down tracking Malfunction of the up-and-down motor, up-and-down sensor, electric circuit board, or break in cables is probable. • Shut off the device and contact NIDEK or your authorized distributor. |
| ERR034 | <ul style="list-style-type: none"> • Error related to the motorized chinrest Malfunction for the chinrest motor, motorized chinrest sensor, or electric circuit board, or break in cables is probable. • Shut off the device and contact NIDEK or your authorized distributor. |
| NO PAPER | <ul style="list-style-type: none"> • Error related to the printer If the printer is short of paper, refill paper. If the printer cover is open, close it securely. • If the same error code is displayed even after the replacement of printer paper roll, shut off the device and contact NIDEK or your authorized distributor. |
| ERR043 | <ul style="list-style-type: none"> • Error related to the printer Malfunction of the printer, electric circuit board, or break in cables is probable. • Shut off the device and contact NIDEK or your authorized distributor. |
| ERR101 | <ul style="list-style-type: none"> • Error related to the motor sensor Malfunction of the motor or sensor is probable. • Shut off the device and contact NIDEK or your authorized distributor. |
| ERR111 | <ul style="list-style-type: none"> • Error related to the temperature sensor Malfunction of the electric circuit board or temperature sensor on the electric circuit board is probable. • Shut off the device and contact NIDEK or your authorized distributor. |

| Error code | Cause and countermeasure |
|------------|--|
| ERR112 | <ul style="list-style-type: none"> • Error related to the AR motor Malfunction of the AR motor is probable. • Shut off the device and contact NIDEK or your authorized distributor. |
| ERR601 | <ul style="list-style-type: none"> • Error related to a connecting device A USB device connected to the USB-A connector was not properly recognized. • Check the connecting cable for connection. • If the same error code is displayed even after another USB device is connected, shut off the device and contact NIDEK or your authorized distributor. |
| ERR602 | <ul style="list-style-type: none"> • Error related to a connecting device The device was started with a USB device other than the optional barcode scanner connected. • Disconnect the connected device and start the device again. |

4.3 Replacing Printer Paper

When a red line appears on the side of printer paper, it means that paper is running short. In such a case, stop using the printer and replace printer paper with new one.

 Note


- Do not run the printer when printer paper is not loaded.
It may ruin the printer head.
- Do not pull the paper in the printer forcefully.
This may cause malfunction of the printer.

- 1** Press the cover open button to open the printer cover.



- 2** Remove the used printer paper.



 **CAUTION** • Do not touch the printer head at the top of the opened printer cover.
The printer head is hot right after printing and you may get burned.

3 Insert new printer paper.

Load printer paper as shown in the picture on the right.

Set printer paper so that its end is exposed from the cover.



 Note

- If the roll is loaded in such a way that paper becomes upside down, it is not possible to print data out.
- Be sure that printer paper is not loaded in a tilted position or the core of the roll is properly placed.

Printer paper may not be fed properly.

4


4 Push the printer cover toward the main body.

Press the printer cover at both ends to close the cover securely.



 Note

- Be sure that the cover is securely closed.

If the cover is insecurely closed, the auto cutter may not operate properly. In addition, when the print button  is pressed, "ERROR" or "NO PAPER" may appear and printing will not occur.

4.4 Fixing Chinrest Paper

1 Disconnect the two fixing pins from the chinrest.

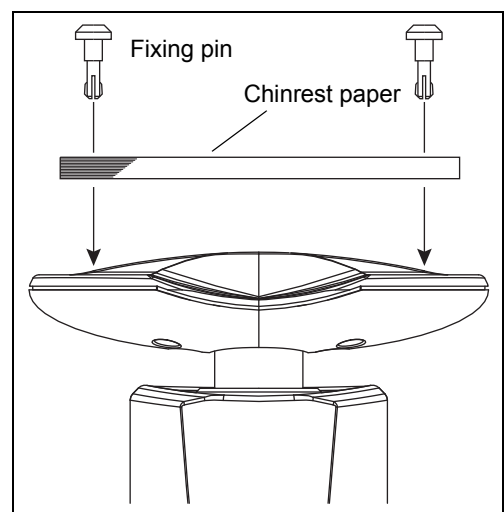
2 Remove a proper number of chinrest papers from the pack.

It is impossible to fix the whole pack of chinrest paper. Be sure to fix a stack with a thickness of 6 mm or less.

Pay attention not to scatter chinrest paper.

3 Pass the fixing pins through chinrest paper.

Pass the fixing pins through both holes of the stack of paper.



4 Fix the stack of chinrest paper onto the chinrest.

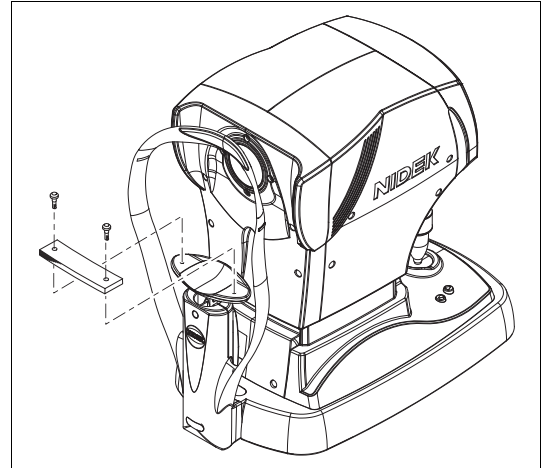
1) Insert the pins into the holes in the chinrest while holding both fixing pins and stack of paper.

2) Push the pins into the holes of the chinrest.

4.5 Checking the AR/KM Measurement Accuracy

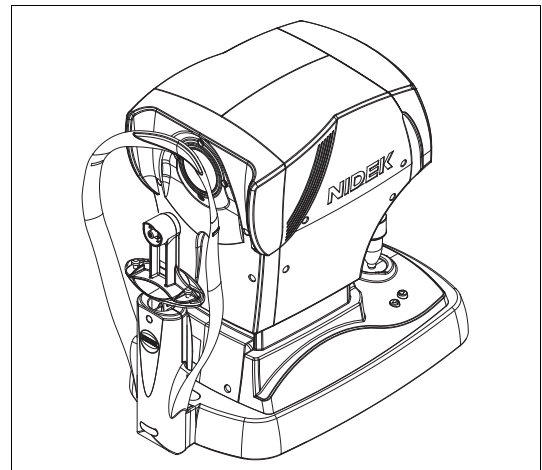
To check the accuracy of measured data, use the provided spherical model eye for R/K measurement. The spherical model eye is incorporated with a contact lens holder.

- 1 Remove the two fixing pins and remove the stack of chinrest paper from the chinrest.



- 2 Remove the cap from the spherical model eye and put the model eye on the chinrest with its lens toward the measuring window and then insert the fixing pins.

Check the lens surface of the model eye for soiling.



- 3 Align the level of the spherical model eye for R/K measurement with the eye level marker with the chinrest up/down button (▼) or (▲).

- 4 Set the 1. STEP parameter to 0.01 D.

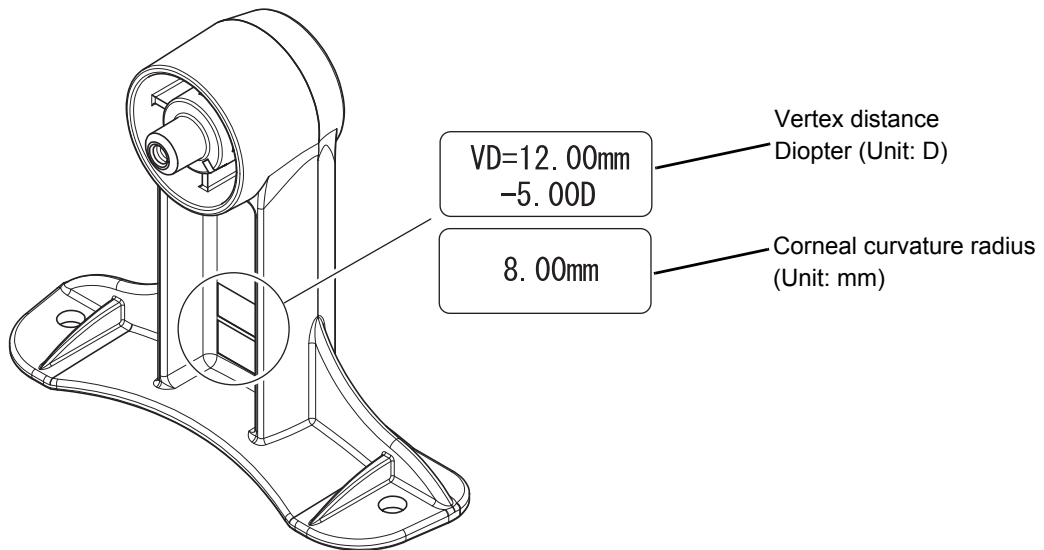
See “2.12 Parameter Settings” (page 60) for the parameter setting method.

- 5 Perform AR and KM measurements in the same manner as normal AR and KM measurements.

Note

- If the measured result is higher than the value indicated on the model eye, contact NIDEK or your authorized distributor.
- Always store the model eye with the cap on.
If the lens surface is soiled or flawed, measurement accuracy cannot be properly checked.

○ Values marked on the labels of the spherical model eye



 Note

- When the vertex distance is set to a value other than 12.00 mm (US: 13.75 mm), set the 2. VERTEX D. parameter to 12.00 mm (US: 13.75 mm) before performing AR measurement.

4.6 Cleaning

When the cover or panel of the device becomes dirty, clean it with a soft cloth. For severe stains, soak the cloth in a neutral detergent, wring well, and wipe. Finally dry with a soft, dry cloth.



CAUTION • Never use an organic solvent such as paint thinner.

It may ruin the surface of the device.

- **Lightly wipe the exterior of the LCD. Do not press the LCD using an object with a hard tip. In addition, keep magnetic objects away from the LCD.**

Scratches or failure of the LCD may result.

- **Never use a sponge or cloth soaked in water.**

The water may leak into the inside of the device and cause device failure.

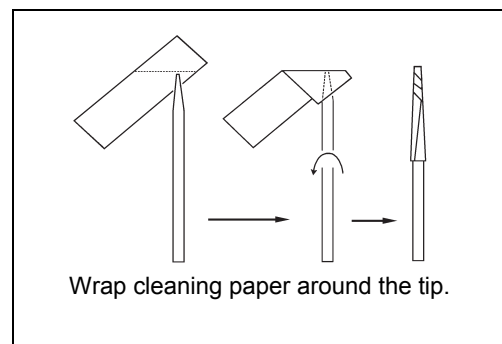
4.6.1 Cleaning the measuring window

When the measuring window gets fingerprints or dust on it, the reliability of the measured value is impaired substantially. Check for dirt on the measuring window before use, and then clean it if it is dirty.

The measuring window lens does not usually get soiled through normal use because it is recessed. Only clean it when "CHECK MEASURING WINDOW." is displayed or the lens is soiled.

- 1** Blow off dust on the measuring window with a blower.

- 2** Wrap lens cleaning paper around a thin stick such as a chopstick (or cotton swab) and wipe the lens of the measuring window with a material moistened with alcohol.



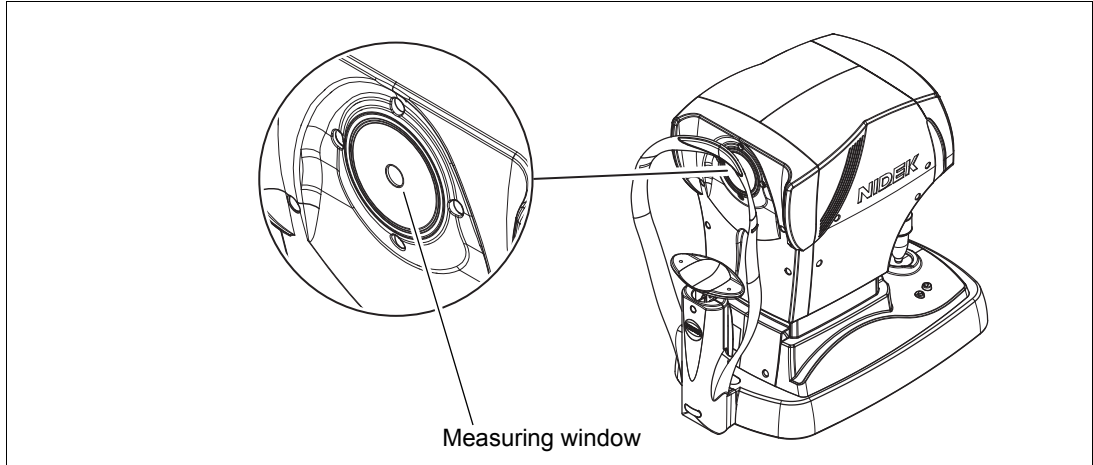
- Use a thin stick which does not damage glass lenses.

- Wipe lightly from the center of the measuring window to the outside in a circular motion.

- 3** Wipe off the glass of the mire ring around the measuring window using a gauze or such dampened with alcohol.

- 4** Check if the window is cleaned using a penlight. If not, clean it again with new cleaning paper.

Apply light with a penlight and change the view angle to check the dirt clearly.



 Note

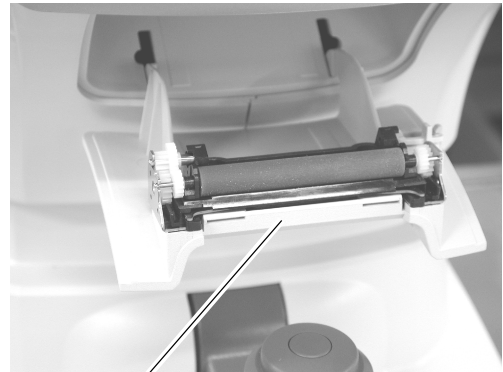
- When the 61. WINDOW CHECK parameter is set to YES or DAY, the measuring window is checked whether it is clean at device start-up.
 - YES⇒ The measuring window is checked at every start-up.
 - DAY⇒ The measuring window is checked at the first start-up of the day.
- When “CHECK MEASURING WINDOW.” is printed, clean the measuring window.
- At device start-up, do not stand or put objects in front of the measuring window.
 - If something blocks the front of the measuring window within the range of 1 m, the measuring window may not be checked correctly.

4.6.2 Cleaning the printer

After repeated usage, the paper slot of the auto cutter of the printer may become soiled with powdery paper. If the powdery paper settles, malfunction of the auto cutter may result. It must be cleaned then.

- 1** Open the printer cover and remove the printer paper roll.

See “4.3 Replacing Printer Paper” (page 92).



Auto cutter

- 2** Apply the nozzle of a vacuum cleaner to the auto cutter to remove powdery paper.
Never blow off powdery paper with a blower. If powdery paper settles on the internal working structure, malfunction may result.
- 3** Supply the printer paper as it was.