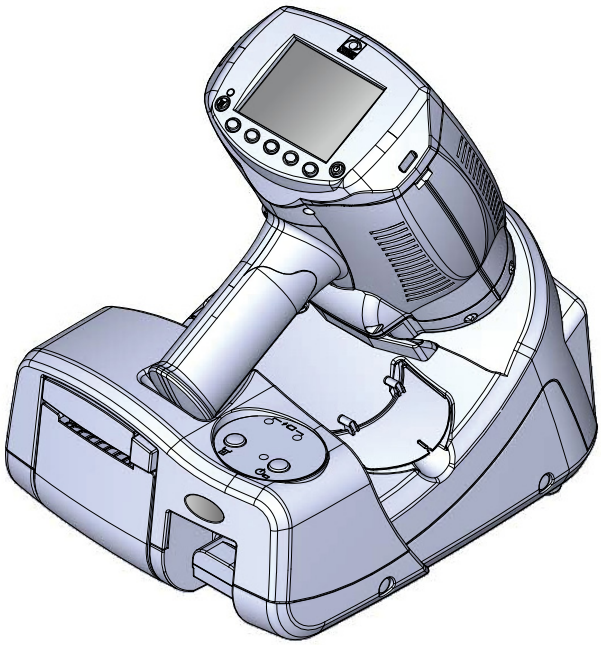
NIDEK

HANDHELD REFRACTOMETER

HandyRef

OPERATOR'S MANUAL



Be sure to read the SOFTWARE LICENSE AGREEMENT (page Ⅱ) before using this product.

Original instructions

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Before Use

This operator's manual includes operating procedures, safety precautions, maintenance, and specifications for the NIDEK HANDHELD REFRACTOMETER, HandyRef.

The cautions for safety and operating procedures must be thoroughly understood before using the device.

Keep this manual handy for reference.

For any problems or questions about the device, please contact NIDEK or your authorized distributor.

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a) such Amendments are appropriate in terms of interests for customers of this Software; or

b) such Amendments are commercially reasonable and not contrary to the objective of this Agreement, even if such Amendments are disadvantageous to you.

Prior to the amendments, NIDEK will notify you of the terms and the effective date of such Amendments on the website or by any other means.

6.3. If you use the Software after the effective date of such Amendments, you shall be deemed to have agreed to such Amendments.

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7.2. If this Agreement is terminated in accordance with the provision of 7.1., you must immediately cease the use of the Software, and delete, destroy and erase all the Software. Any fees paid by you for the license of the Software will not be refund for any reasons.

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10. GOVERNING LAW AND ARBITRATION

10.1. This Agreement will be governed by and construed in accordance with the laws of Japan.

10.2. All disputes arising between you and NIDEK relating to this Agreement or the interpretation or performance thereof will be finally settled by binding arbitration in Tokyo in accordance with the Commercial Arbitration Rules of The Japan Commercial Arbitration Association. Judgment upon the award rendered by arbitration will be final and may be entered in any court having jurisdiction thereof.

11. SEVERABILITY

11.1. If any provision or any portion of any provision of this Agreement will be held to be invalid or unenforceable, that provision will be severed from this Agreement and such invalidity or unenforceability will not affect the remaining provisions of this Agreement. The remaining provisions of this Agreement will continue in full force and effect.

12. SURVIVAL

12.1. The provisions of 2, 3, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19 and this provision will survive the termination of this Agreement and will be binding after the termination of the Agreement.

13. ASSIGNMENT

13.1. This Agreement or any part of this Agreement may not be assigned or transferred without prior written consent of NIDEK. The permitted assignee or transferee must agree to all the terms and conditions of this Agreement prior to the assignment or transfer.

13.2. This Agreement will be binding upon the permitted assignee or transferee and be enforceable by NIDEK.

14. ENTIRE AGREEMENT

14.1. This Agreement constitutes the entire agreement between you and NIDEK concerning the Software, and supersedes any prior written or oral agreement between you and NIDEK. No modification of this Agreement will be binding unless otherwise agreed in writing.

15. NO WAIVER

15.1. The failure of NIDEK to enforce at any time or for any period the provisions hereof in accordance with its terms will not be construed to be a waiver of such provisions or of the rights thereafter to enforce each and every provision.

16. NO THIRD PARTY RIGHTS

16.1. This Agreement is intended to be solely for the benefit of you and NIDEK and is not intended to confer any benefits upon or create any rights in favor of any person other than you and NIDEK.

17. HEADINGS

17.1. All headings are for convenience only and will not affect the meaning of any provision of this Agreement.

18. LANGUAGE

18.1. The license agreement for the Software may be provided in multiple languages. In such event, unless otherwise agreed in writing, the following shall apply:

a) If you use the Software in any countries outside Japan, the license agreement for the Software shall be executed and delivered in a text using the English language. The text using the English language shall prevail and control; and

b) If you use the Software in Japan, the license agreement for the Software shall be executed and delivered in a text using Japanese language. The text using the Japanese language shall prevail and control.

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19.1. If the terms and conditions of the "Software License Agreement" included in operations manuals for NIDEK product are inconsistent with the terms and conditions of the "Software License Agreement" displayed on NIDEK product, the terms and conditions of the "Software License Agreement" included in operations manuals for NIDEK product prevail.

Table of Contents

1 SAFETY PRECAUTIONS

1.1 For Safe Use

⚠ BEFORE USE, READ THIS MANUAL.

The cautions for safety and operating procedures must be thoroughly understood before using the device.

The device complies with ISO 10342 subclause 4: 2010 (Ophthalmic instruments - Eye Refractometers) and ISO 10343 subclause 4: 2009 (Ophthalmic instruments - Ophthalmometers). The dioptric powers are indicated with reference wavelength λd = 587.56 nm.

1.2 Signal Words for Safety

In this manual, signal words are used to designate the degree or level of safety alert. The definitions are as follows.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage accident.

Even situations indicated by ⚠ **CAUTION** may result in serious injury under certain conditions.

Safety precautions must be strictly followed at all times.

1.3 Usage Precautions

Before use

⚠ WARNING

- If any serious device-related incident occurs, report it to NIDEK and the competent authority in the country where the user or patient, or both reside.
- Connect the power plug to a grounded outlet.

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

⚠ CAUTION

- Do not use the device for any purposes other than the intended purpose.
  NIDEK is not responsible for accidents or malfunctions caused by misuse.
  For the intended purpose of the device, *"2.1.2 Intended use" (page 11)*
- Be sure to read the operator's manual prior to operation of the device to understand the safety precautions and operating procedures thoroughly.

  Use of the device outside the scope of this manual may cause adverse events.

  Use the accessories specified by NIDEK only.
- Do not modify the device. Never touch the internal structure of the device. There are no parts within the device that requires servicing by the user other than printer paper and battery pack.

  Electric shock or malfunction may result.
- Install the device in an environment that meets the specified conditions.

  For use conditions, *" Environment and others" (page 107)*
- For the installation location and environment of the device, always follow the cautions below.
  Malfunction, electric shock, or fire may occur.
  - A location that is not exposed to water
  - A location that is level, stable surface free from vibration and bumping.
  - A location that is not exposed to direct air flow from an air conditioner.
  - A location that is not exposed to strong electromagnetic wave.
  - A location that is not exposed to contaminant such as corrosive gas, acid, or salt.
- For the power specification requirements, always follow the instructions below.
  Malfunction, electric shock, or fire may occur.
  - Be sure to use a power outlet which meets the specified power requirements.
  - Insert the power plug fully into the power outlet.
  - Install the device in an area where the outlet that the mains plug is inserted into is easily accessible during use. In addition, ensure that the power cord can be disconnected without the use of a tool.
  - Do not place heavy objects on the power cord.
  - Never use power strips or extension cables for the power supply of the device.
  - Do not use the power cord other than the one that is provided. Also do not use the supplied cord for any other devices.
  - Before connecting the cable, turn off the power switch and disconnect the power plug from the power outlet.
- When measuring a patient lying down, do not use the occluders.
  - The occluders may fall on the patient resulting in injury.

During use

⚠ CAUTION

- Do not perform servicing or maintenance on the device during use.
- Before use, perform visual and operation checks. If abnormal conditions are encountered, stop using the device.

  If the device is used under abnormal conditions, intended results may not be obtained. Also, unanticipated malfunctions or health hazards may occur due to inappropriate diagnoses.
- In the event of smoke or strange odors, immediately turn off the device and disconnect the power plug from the power outlet.

  Once it is confirmed that the smoke has stopped, contact NIDEK or your authorized distributor.

  Use of the device under such abnormal conditions may cause fire or electric shock. In case of fire, use a dry chemical (ABC) extinguisher to extinguish the fire.
- Immediately replace the power cord if the internal wires are exposed, power is intermittent when the power cord is moved, or the cord and/or plug are hot to the touch.

  Electric shock or fire may occur.
- Should the device fail, disconnect the power cord from the power outlet and contact NIDEK or your authorized distributor without touching the interior of the device.

  Electric shock may result.
- When the device is being held for measurement, be sure to use the neck strap.

  Accidental dropping of the device may result in injury or malfunction.

  Malfunction due to the device dropping or impacting with something is not covered by the warranty. A repair fee will be charged for resulting malfunctions despite the device still being under warranty.
- Before measurement, explain the measurement purpose and method sufficiently to patients.
- Before placing the device over the patient's face, release the forehead rest.

  Otherwise, parts other than the forehead rest may come into contact to the patient's face.
- Before and after use of the device, and before measuring each patient, clean the forehead rest with clean gauze or absorbent cotton. As necessary, dampen a cloth with rubbing alcohol and gently wipe them off.
- Keep the measuring window free of fingerprints and dust.

  Measurement accuracy may be adversely affected.
- The forehead rest is made of resin and therefore cannot be sterilized. When using the device in an operating room, do not use the forehead rest.
- Do not pull the power cord to disconnect it from the power outlet. Always hold it by the plug.

  The metal core of the cord may be damaged and electric shock, malfunction, or fire may result.
- Before measurement, confirm that the eye detected is correctly indicated as the one to be measured (R/L).

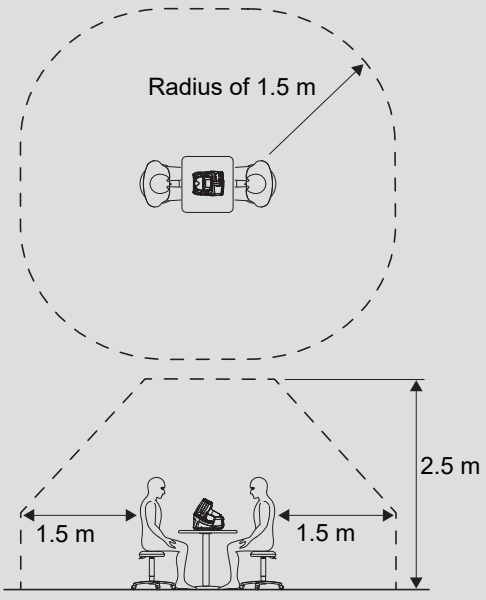
  There may be cases where the eye to be measured (R/L) is not detected correctly due to the patient's face shape or such. If the R/L indication is incorrect, press the R/L button to select the correct eye to be measured (R/L).
- The measured values of objective refractive error obtained by the HandyRef are intended to be used as a reference for lens prescription for the correction of visual acuity with spectacles or contact lenses. Manifest refraction must be performed as the basis for the spectacle or contact lens prescription.
- Instruct the patient to look at the picture of a balloon with their eyes wide open. Start measurement after confirming that the instruction is properly followed by the patient. Be careful not to perform measurement while the device is misaligned to the patient's eye.

  Proper measurement may not be performed.

⚠ CAUTION

- Never press on the LCD with a hard object such as a ball-point pen.
- There may be a few defective or constantly-lit pixels on the LCD.
  This does not represent failure of the LCD; it is due to the structure of the LCD.
- Data handled via the wireless LAN is controlled by patient numbers and IDs. Information that would personally identify an individual is not included. For security, follow the guidelines determined by medical institutions or optician facilities in which the device is to be used.
- When connecting to peripheral equipment such as a computer through LAN port via a medical facility network, insert and connect an isolation transformer between the medical electrical equipment and network devices (such as a network switch), and between the network devices and other electrical equipment. Electric shock may result. For installation of the network isolation transformer, contact NIDEK or your authorized distributor.
- The wireless LAN module incorporated in this device is approved by the governing bodies of the countries listed above. However, depending on the installation location or use environment (especially in a location where other medical devices are present such as an operating room or ICU), the wireless function may be impaired. Follow the guidelines determined by medical institutions or optician facilities in which the device is to be used.
- If the device is connected to a computer that does not comply with IEC 60601-1 (except one that uses an AC adapter that meets the Class II requirements of IEC 60950-1 or IEC 62368-1), supply power to the device and computer through an isolation transformer.
  Electric shock may result. Contact NIDEK or your authorized distributor for installing isolation transformers.
- When connecting a computer, use one that complies with CISPR 32.
- Use devices that comply with IEC 60601-1 in the patient environment. If any device that does not comply with IEC 60601-1 is to be used, install the device outside the patient environment. For a generalized information system, use the device that complies with IEC 60950-1 or IEC 62368-1. For other devices, use any separation device that complies with IEC 60601-1 and keep sufficient distance between the device and patient environment.

  The volume of space (patient environment) where contact can occur between the patient and any part of the device (including connected ones) or between the patient and any other person(s) touching the device (including connected ones) is as shown to the right.



After use

⚠ CAUTION

- This device uses a heat-sensitive printer paper. The paper degrades over time and the printed characters may become illegible. If glue containing organic solvents or adhesives such as on adhesive tape comes in contact with the printer paper, the printed characters may become illegible.

  To keep the printed data for a long period of time, make copies of the printouts or write down the measured results by hand.

- When the device is not in use, turn off the power switch and place the dust cover over the device.

  Dust may affect the measurement accuracy.

- Make sure that the power switch is turned off before connecting or disconnecting the power cord to or from the power outlet.

  If the power cord is connected or disconnected with the power switch on, device malfunction may occur.

- If the device is not to be used for a long time, disconnect the power cord from the power outlet.

- Maintain the surrounding temperature and humidity in the specified ranges during transport and storage of the device.

  For the environmental conditions, *" Environment and others" (page 107)*

- When moving the device to another location, put it in its shipping carton or optional carrying case. Do not use the carrying case alone when transporting the device by a shipping company. Excessive vibration or impact to the device may cause malfunction.

- Do not carry or store the battery pack with any metal objects.
  The battery pack is designed so that it is unlikely that the terminals will come into contact with each other. However, if contact with metallic objects such as a necklace or key occurs, a short circuit may result, causing overheating, fire, battery leakage, or malfunction.

Maintenance

⚠ CAUTION

- To ensure the continued safe use of the device, it is recommended that the manager of this device make sure that maintenance and preventive inspection (and calibration if necessary) are performed at least once a year.

  For details of maintenance and preventive inspection, ask NIDEK or your authorized distributor. If the manager of this device cannot perform the maintenance and preventive inspection, contact NIDEK or your authorized distributor.

- Only personnel authorized by NIDEK or a NIDEK distributor are allowed to disassemble or touch the interior of the device.

  NIDEK will not be responsible for accidents caused by improper servicing.

- Before performing maintenance, clean the surface of the device properly with a clean cloth dampened with rubbing alcohol.

- When performing maintenance work, secure sufficient maintenance space.

  Maintenance work in an insufficient space may result in injury.

- For the handling and replacement of the battery pack, follow the instructions below.
  Failure to do so may cause malfunction, electric shock, fire, or battery deterioration.

  - Do not use a battery pack other than that specified. Do not use the specified battery pack with any other devices.
  - Do not remove the battery pack while it is charging in the main body.
  - Do not immerse or soak the battery pack in liquid such as water.
  - Do not use or leave the battery pack near fire or a stove (60ºC or higher).
  - Do not expose the battery pack to excessive shocks such as by throwing it.
  - Do not contact the battery pack terminals or the terminals of the battery slot with fingers or patient during replacement.
  - When recharging the battery, follow the procedures described in this Operator's Manual.

    For the recharging procedure, *"2.4.3 Charging the battery pack" (page 28)*
  - Do not insert foreign items such as metallic objects into the battery slot.
  - Do not disassemble or modify the battery pack.

- Be sure to use only the printer paper (8062000001) specified by NIDEK.

  If printer paper other than that specified is used, the printer head may be damaged due to printing failure or paper jam, or printed contents may easily become illegible.

- When sending the device back to NIDEK for repair or maintenance, clean the surfaces of the device (especially, the areas that come into contact with the patient) with a clean cloth dampened with rubbing alcohol.

- If the AR-measured results differ substantially from subjectively measured results, perform the procedure described in *"4.2.3 Measurement accuracy check" (page 101)*. If the results of the "Measurement accuracy check" differ substantially from the values indicated on the spherical model eye, contact NIDEK or your authorized distributor to check whether the device needs measurement accuracy calibration.

- Do not use the device beyond its service life.

  Even with proper maintenance and check, after time, the device reliability or safety may become degraded and fail to achieve the target values.

Disposal

⚠ CAUTION

- Follow the local ordinances and recycling regulations regarding disposal or recycling of the device or its components, particularly when disposing of the battery pack (lithium ion battery), lithium battery used on the board, circuit board, plastic parts that contain brominated flame retardant, LCD, or power cord.

  It is recommended to commission the disposal to a designated industrial waste disposal contractor. Inappropriate disposal may contaminate the environment.

- When disposing of packing materials, sort them by material and follow local ordinances and recycling regulations.

  Inappropriate disposal may contaminate the environment.

Connection to network

⚠ CAUTION

- If the medical system is to be configured using an IT network, implement IT security measures with the network administrator, and check that the system operates properly.

  Virus infection, unauthorized access, or data tampering may result.

1.4 Labels and Symbols

■ To call attention to users, labels and indications are provided on the device. If labels are peeling off, characters are fading, or otherwise becoming illegible, contact NIDEK or your authorized distributor.

• Descriptions in this operator's manual are based on the WLAN-equipped model.

	Indicates that caution must be taken. Refer to the operator's manual before use.
	Indicates that the degree of protection against electric shock is of a Type B Applied Part.
	Indicates that the operator is advised to refer to the related instructions in the operator's manual.
	Indicates the power button of the main body and station. Pressing this button switches the device status between ON and power-saving. While the device is in power-saving, the following conditions are in effect. • Main body: The LCD and memory indicator are turned off. • Station: The pilot lamp is turned off even if the station is powered by the battery pack.
	Indicates the state of the power switch of the station. When this symbol side of the switch is pressed down, power is supplied to the device.
	Indicates the state of the power switch of the station. When this symbol side of the switch is pressed down, power is not supplied to the device.
	Indicates that the device must be supplied only with alternating current.
	Indicates that the connection port is suitable for direct current only.
	Indicates an input terminal.
	Indicates an output terminal.
	Indicates that this product is to be disposed of in a separate collection of electrical and electronic equipment in EU.
	Indicates the year of manufacture.
	Indicates the manufacturer.
	Indicates that this medical device incorporates a wireless communication module. Indicates that interference may occur in the vicinity of equipment marked with this symbol.
MD	Medical device
EC REP	EU authorized representative
SN	Serial number

UDI	Unique Device Identifier
REF	Catalogue number
CH REP	Swiss authorized representative

2 INTRODUCTION

2.1 Outline

2.1.1 Device outline

The NIDEK HANDHELD REFRACTOMETER, HandyRef, measures spherical, cylindrical refractive errors, and cylinder axis from the refractive status of the patient's eye.

This device is a hand-held model that allows measurement of children who cannot hold their head on the stationary chinrest, bed-ridden patients or patients in an operating room.

2.1.2 Intended use

The HANDHELD REFRACTOMETER, HandyRef, is a medical device which measures objective refractive errors of the patient's eye.

2.1.3 Intended patient population

- Age

  Adult/infant

- Health condition

  Able to answer the operator's questions

  Capable of eye fixation

  Able to sit on a chair or lie in supine position for examination

- Conditions - Visual function

  One or both eyes are normal or have disease. Eyes that have lost the visual function are not targeted.

2.1.4 Intended user profile

Ophthalmologist, nurse, clinical laboratory technician, visual trainer/optician

2.1.5 Intended use environment

Medical facility, optical store, or external sales facility

⚠ CAUTION

- If the device is used outside the specified use location, intended performance and security level cannot be maintained.

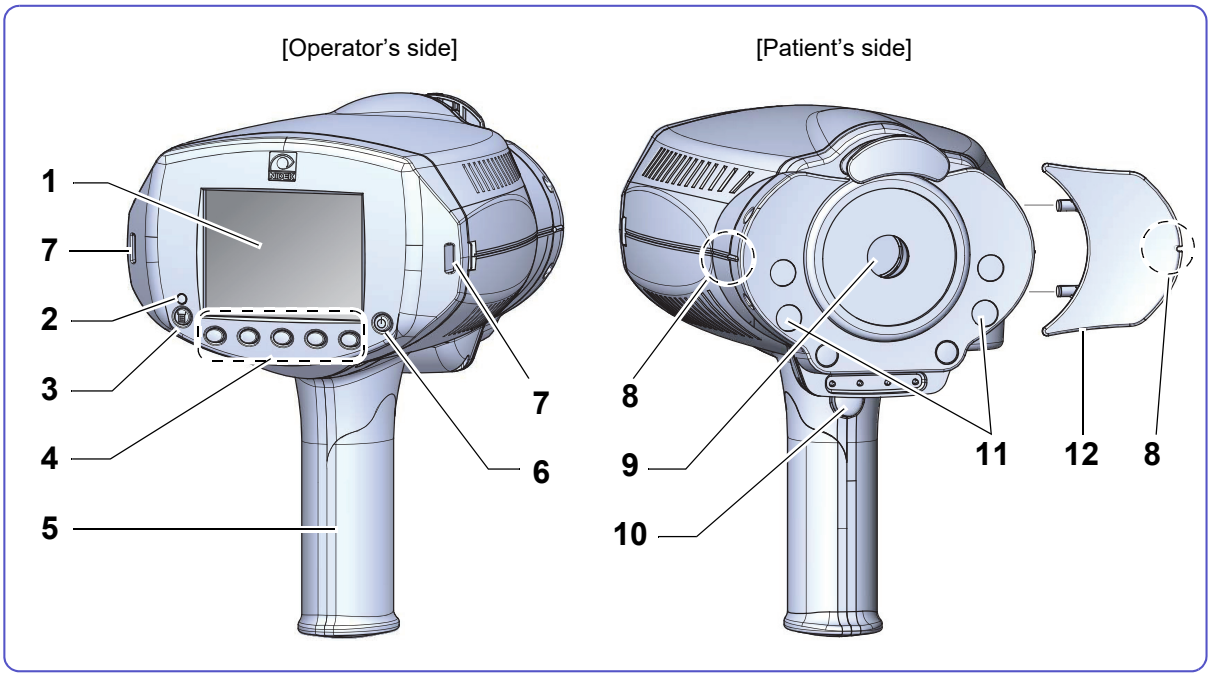
2.1.6 Principles

Objective refractive error measurement

Fine measurement beams are projected on the fundus of the patient's eye by a projecting optical system and then the ring image obtained from the reflected beams is used for computation to determine the refractive errors (SPH, CYL, AXIS) of the patient's eye.

2.2 Configuration

- Main body



1 LCD

Displays the patient's eye, target, focusing indicator, measurement values, number of measurement and such.

2 Memory indicator

Indicates that measured data is saved in memory. The indicator illuminates when data is being saved in memory.

It blinks during initialization and in sleep mode.

3 Print button

Prints or outputs the measured results.

4 Function buttons

Buttons to select the five operation icons shown on the screen. The corresponding icons change depending on function.

Select the corresponding button under each icon to change the device settings, measurement modes, and such.

5 Handle

The grip for the main body. In addition, it stores the battery pack. Open the handle cover to replace the battery pack.

"2.4.1 Removing and installing the battery pack" (page 26)

6 Power button

Turns on or off power to the device. Press to turn on the device.

To turn off the device, hold down the button for more than a second.

7 Neck strap attachment holes

Attach the neck strap here.

Holding the strap tight facilitates stable measurement. The strap also prevents the device from falling on patients lying down.

"2.4.4 Attaching neck strap" (page 30)

8 Eye level marker (R/L)

A guide mark to roughly align the patient's eye.

The marks are located on both sides of the main body and on each occludersz.

9 Measuring window

Patient views the chart through this window.

Cleanliness of the measuring window can be automatically checked using the window check function. Always keep it clean.

10 Start button

When this button is pressed on the main screen, the screen changes to the AR measurement screen.

Holding down this button for more than a second enables or disables quick measurement mode.

11 IR windows

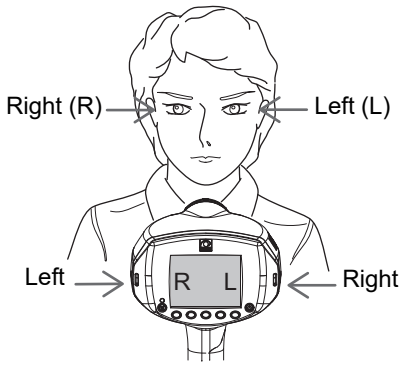
Project infrared light to communicate with the station.

12 Occluder (R/L)

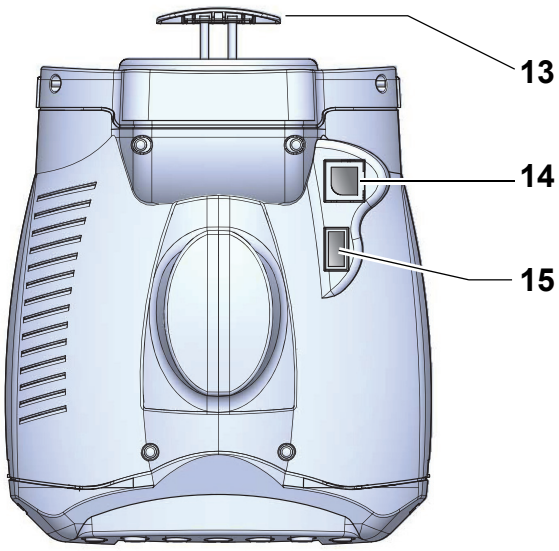
Covers the patient's eye that is not being measured. It facilitates patient eye fixation.

Note

- In this operator's manual, references to the patient's right (R) and left (L) eye and screen are as viewed from the patient as shown in the figure to the right. For the main body, the references to right and left are as viewed from the operator's side.
- Contents and images in this operator's manual are based on those of the printer-equipped model.



[Bottom view]



13 Forehead rest

Place against the patient's forehead (above the eyebrows) to stabilize the main body.

Press to release the forehead rest.

14 Connection cable port

The cable connecting the main body and station is connected here.

When the cable is connected, the battery is not necessary for measurement. It also enables wired LAN communication and printing from the station.

"2.5.1 Connection by cable" (page 37), *"3.11.1 Connecting peripheral devices" (page 76)*

15 USB port

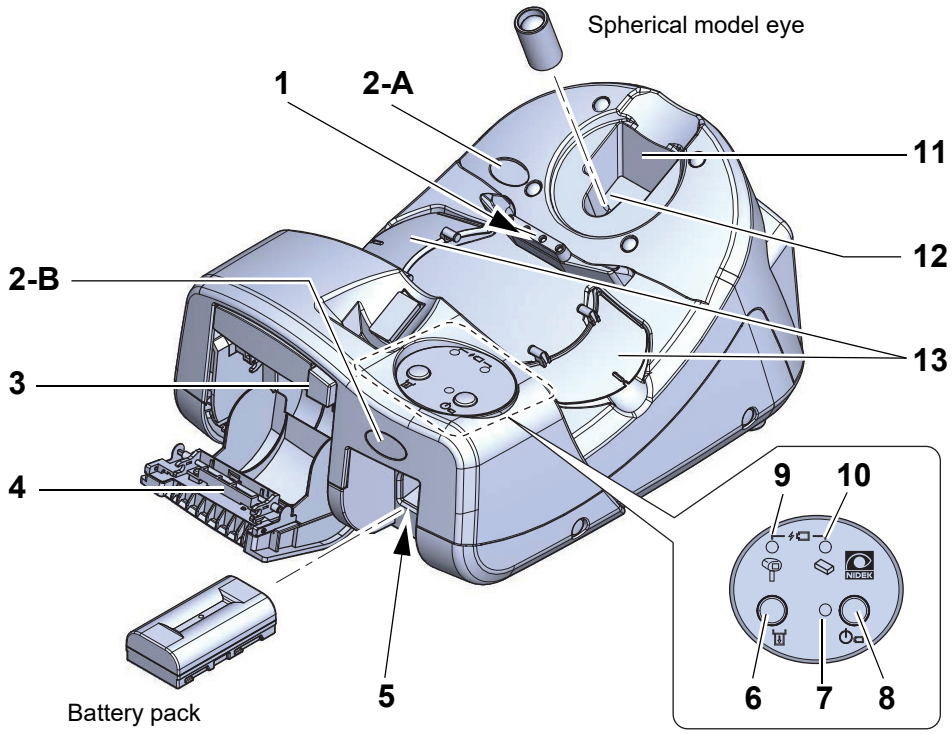
A USB flash drive is connected here.

Measurement data can be stored to the USB flash drive and copied to a computer.

⚠ CAUTION

- Equipment connected to the analog or digital interfaces must be certified according to the representative appropriate national standards (such as EN 60601-1 and IEC 60601-1). Furthermore, all configurations shall comply with the system standard IEC 60601-1. 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. If in doubt, consult the technical service department of your local representative.

- Station



For the model without the printer: The printer, cable ports, and communication ports are not equipped. Only the charging function is available.

1 Main body receptacle

Place the main body here when not in use. When the main body is placed here, the battery pack inserted to the main body is automatically charged.

2 IR receptors A/B

Receive infrared signals from the main body when printing by infrared data communication.

Placing the main body on the station enables stable communication because the IR windows and IR receptor A (2-A) are in direct alignment. When the main body is separated from the station, aim the IR windows toward the IR receptor B (2-B). (The maximum communication distance between the main body and station is 1 m.)

3 Printer cover button

Press this button to open the printer cover for printer paper replacement or cleaning.

4 Printer

Prints the measured results.

"2.4.5 Setting the printer paper" (page 32)

5 Battery slot

Insert a battery pack here to charge.

Charging completes more quickly than when left in the main body to charge.

"2.4.3 Charging the battery pack" (page 28)

6 Printer feed button

Hold down this button to feed the printer paper.

7 Pilot lamp

Indicates that the station is turned on.

When the power is supplied by the battery pack, the pilot lamp lights up when is pressed to turn on the power.

It remains lit when connected to AC power supply.

8 Battery power button

Turns on or off the station when it is powered by the battery pack. To turn off the device, hold down the button for more than a second.

To power the station by the battery pack, turn off the station main power switch and insert a charged battery pack to the battery slot. Then press .

- When the station is powered by the battery pack, the station will be automatically turned off by the auto shutdown function if there is no operation or data transmission to the station for 5 minutes.
- When the station is turned off (the pilot lamp is off) before using it, press to turn on the power.

9 Main body battery charge indicator

Lights up when the battery pack is being charged within the main body. When charging is complete, the light goes out.

If an error has occurred during charging, it blinks.

10 Station battery charge indicator

Lights up when the battery pack is being charged within the station. When charging is complete, the light goes out.

If an error has occurred during charging, it blinks.

11 Spherical model eye storage space

Store the spherical model eye here. Insert the spherical model eye on its side.

12 Spherical model eye measuring holder

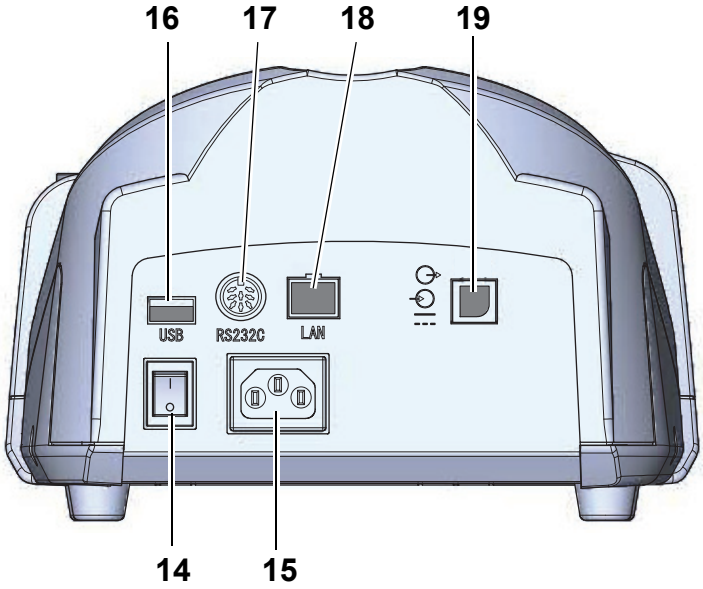
Stand the spherical model eye here for measurement.

“4.2.3 Measurement accuracy check” (page 101)

13 Occluder holder

Place the occluders here when they are removed from the main body.

[Rear view of the station]



14 Power switch

Turns on (|) or off (○) the AC power to the station.

15 Power inlet

The power cable is connected here.

16 USB port

The optional barcode scanner or magnetic card reader is connected here.

17 Serial port (RS-232C)

The refractor or EyeCa-RW2 is connected here for outputting data.

18 LAN port

The LAN cable is connected here for outputting data to a computer or such.

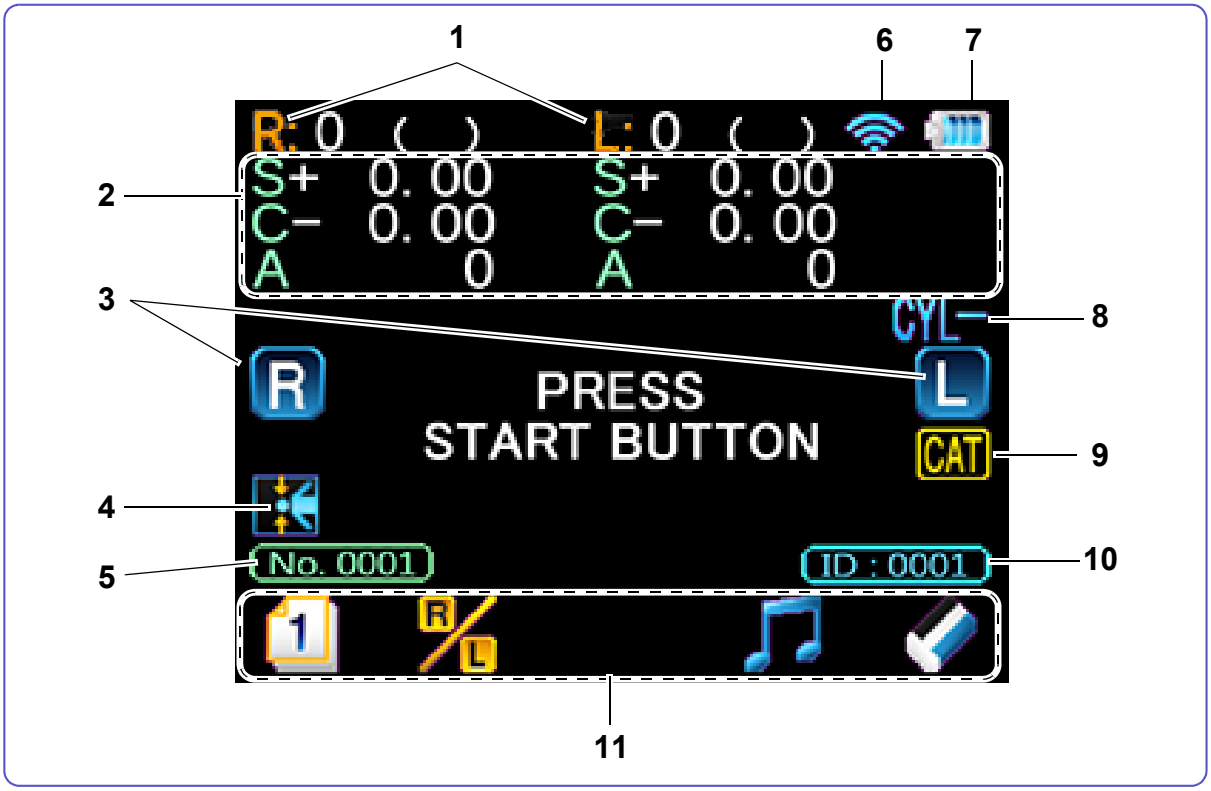
19 Connection cable port

The cable connecting the main body and station is connected here.

⚠ CAUTION

- Equipment connected to the analog or digital interfaces must be certified according to the representative appropriate national standards (such as EN 60601-1 and IEC 60601-1). Furthermore, all configurations shall comply with the system standard IEC 60601-1. 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. If in doubt, consult the technical service department of your local representative.

- Main screen



- Descriptions in this operator's manual are based on the WLAN-equipped model.

1 Measured eye indication

Indicates the measured eye (R: right eye, L: left eye).

The number shown to the right is the number of measurements performed. The number in parentheses shows the confidence index. See *"5.2 Glossary and Abbreviations" (page 108)*.

2 Measured results display

The latest measurement results are displayed here.

3 Patient's eye (R/L)

The eye of the patient being displayed on the LCD is indicated by R or L in blue.

The patient's eye can also be selected manually by pressing R/L. When the eye to be measured is set manually, the indication changes to m·R or m·L in yellow.

4 Supine position mode icon

This icon is displayed when the main body is tilted 60º or more downward so that the device enters supine position mode to measure a patient lying down.

"3.6 Supine Position Mode (measurement for patients lying down)" (page 56)

5 Patient number

Indicates the examined patient's number in 4-digit numerical order (after data is printed, performing the next measurement advances the number).

To change the patient number, *" 38. SET PATIENT NO." (page 85)*

6 Wireless LAN icon

- Blue icon: Indicates that the device is connected to WLAN. Communication is possible.
- Gray icon: Indicates that the device is not connected to WLAN.
- Yellow icon: Indicates that connection is being checked.
- Gray? icon: Indicates that connection is being initialized.

7 Battery level icon

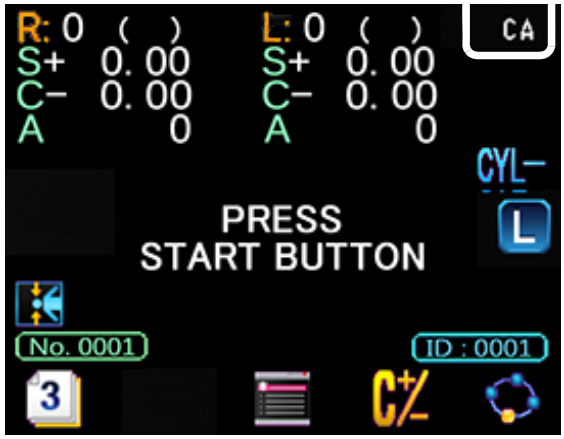
Indicates the battery level of the battery pack loaded on the main body.

There are three levels: → → .

The icon indicates that battery charge is low and needs to be charged.

"2.4.3 Charging the battery pack" (page 28)

The "CA" indication appears at the upper right of the screen while the station is connected to the cable.



8 CYL mode

Indicates the selected cylinder mode (CYL-, CYL+, CYL±).

9 Cataract measurement mode icon

Displayed in cataract measurement mode.

"3.7.2 Cataract measurement mode" (page 60)

10 Patient ID

Displayed when a patient ID has been input with the barcode scanner or magnetic card reader.

"3.11.3 Handling of barcode scanner and magnetic card reader" (page 80)

11 Operation icons

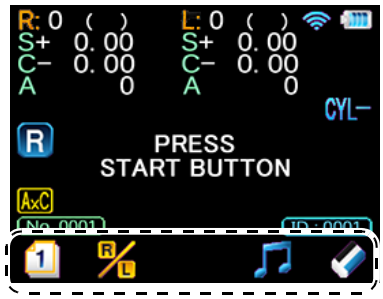
Operation icons are displayed here.

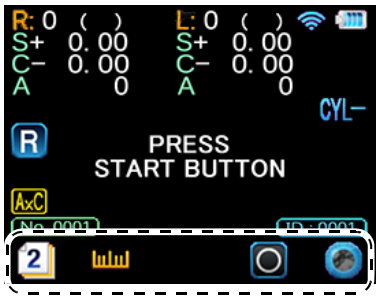
Select the icon by pressing the corresponding function button under the icon.

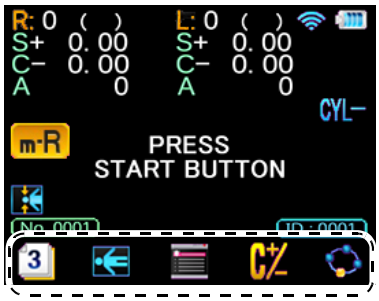
Note

- In this operator's manual, icon selection is presented as, for example, "Press 1".
  However, in actual operation, the function button under 1 is pressed.

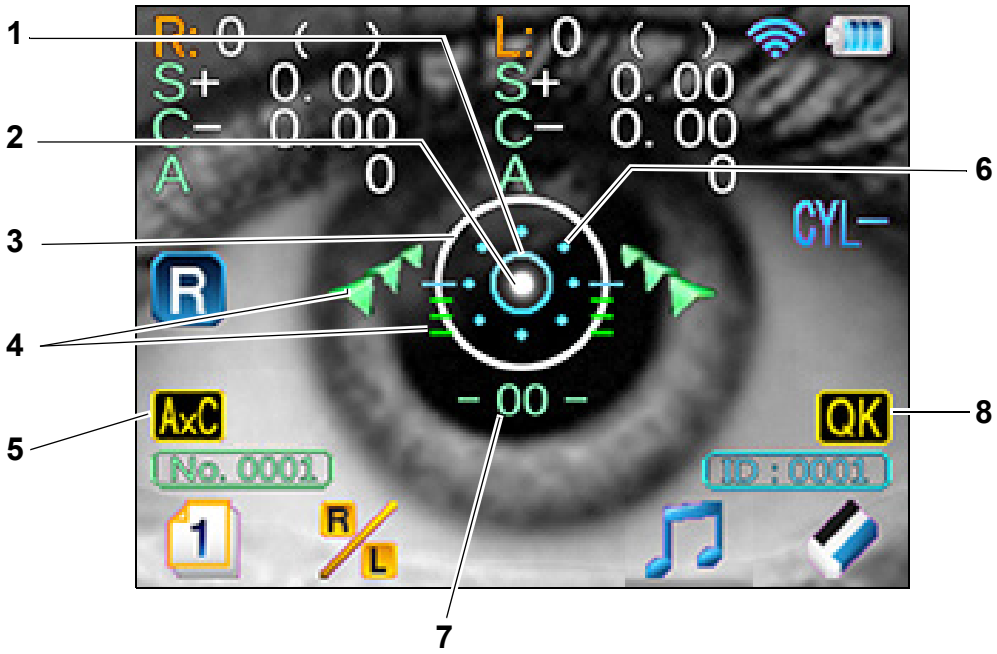
● Operation icons

Page 1	Operation icons	Function
	[Page 1]	Displays Page 2.
	[R/L]	Selects the patient's eye manually.
	[Melody]	Turns on or off the melody. A melody is played to hold a child's attention during measurement. The melody stops when the print button is pressed or clearing data is complete. However, when the "SUMMARY" parameter is set to "YES", the melody does not stop even when the print button is pressed. Press again to stop the melody.
	[Clear]	Holding down the button for about a second erases all the measured data.

Page 2	Operation icons	Function
	[Page 2]	Displays Page 3.
	[Pupil Size]	Displays the pupil size measurement screen.
	[Ring image]	Display the ring image screen.
	[Retroillumination image]	Displays the retroillumination image observation screen.

Page 3	Operation icons	Function
	 [Page 3]	Displays Page 1.
	 [Supine position]	Changes the direction in supine position mode.
	 [Memory]	Displays the memory data screen.
	 [CYL]	Changes CYL mode.
	 [Parameter]	Displays the parameter screen when held down for more than a second.

- AR measurement screen



1 Target

Used as a guide to locate the measuring optical axis in the center of the patient's eye.

2 Alignment guide mark

Used as a guide to locate the target in the center of the cornea.

3 Mire ring

Used as an alignment reference ring.

4 Focusing indicator

Indicates the distance between the main body and patient's eye to facilitate focusing.

5 AxC Axis correction icon

The sensor detects the inclination of the main body to perform automatic axis correction using the level position (0º) as the reference.

The icon is displayed when the *" 7. AXIS CORRECTION" (page 84)* parameter is set to "YES". The icon does not appear in supine position mode.

6 Minimum pupil diameter mark

Indicates the measurable minimum pupil size.

7 Inclination indicator

Indicates the main body's inclination level (ex.  ,  , ).

The value changes in 2º increments within the range from 0 to 12º, and in 3º increments within the range from 12 to 45º.

The value indicates the main body's inclination in horizontal direction as a reference.

When the main body is tilted more than 45º, the number display changes to "--".

		
Main body is horizontal.	Main body is inclined 10º to the left.	Main body is inclined 12º to the right.

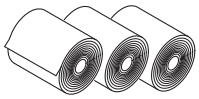
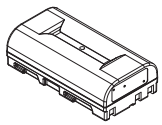
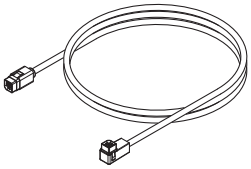
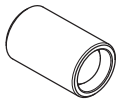
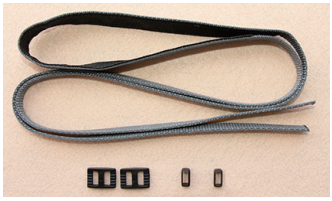
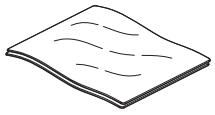
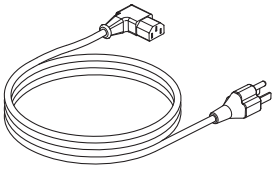
The icon is displayed when the *" 7. AXIS CORRECTION" (page 84)* parameter is set to "NO". The icon does not appear in supine position mode.

8 Quick measurement mode icon

Indicates that the device is in quick measurement mode.

2.3 Packed Contents

■ The following are included in the standard configuration. Check the contents before use.

Part name	Quantity	Appearance
Occluder	2 units	
Printer paper (printer-equipped model only)	3 rolls	
Battery pack	1 unit	
Connection cable (2 m)	1 unit	
Spherical model eye	1 unit	
Neck strap	1 set	
Dust cover	1 unit	
Power cord	1 unit	
Operator’s manual	1 volume	

2.4 Before First Use

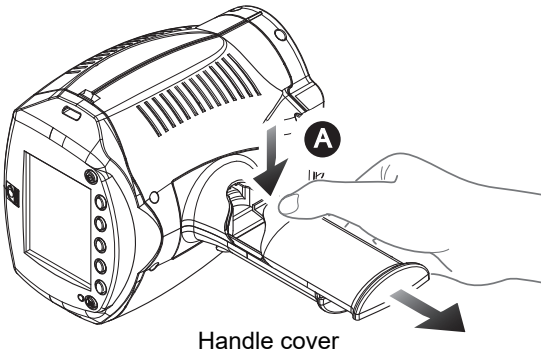
■ Perform the following operations before using the device for the first time:
"2.4.1 Removing and installing the battery pack", *"2.4.2 Power cord connection"*, *"2.4.4 Attaching neck strap"*, *"2.4.5 Setting the printer paper"*, *"2.4.6 Other preparations"*

2.4.1 Removing and installing the battery pack

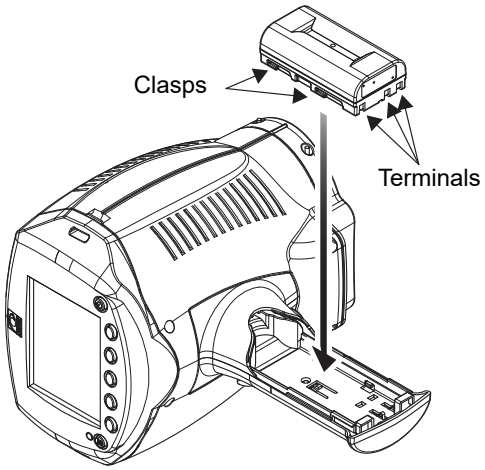
Perform the following to use the battery pack.

1 Remove the handle cover from the main body.

1) Hold down Ⓐ on the handle cover with a finger.
2) While holding down Ⓐ, slide it down to remove the cover as shown to the right.



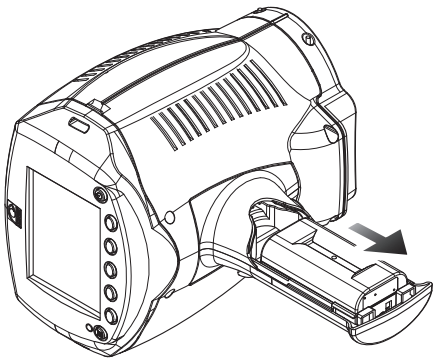
2 Install the battery pack with its terminals facing down as shown to the right.



3 Slide the battery pack to the bottom of the handle so that it is fixed to the clasps in the battery holder.

4 Attach the cover.

- To remove the battery pack, hold down ⏻ for more than a second to turn off the main body, then perform the above procedure in the reverse order.



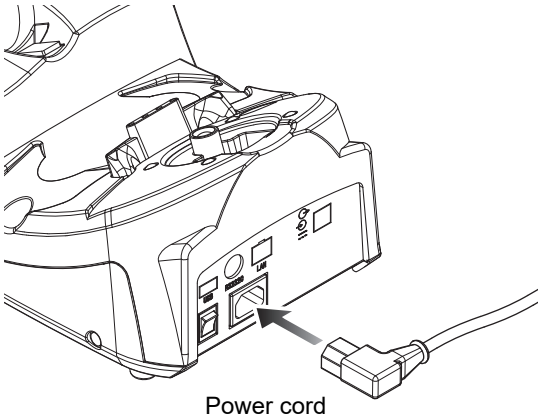
2.4.2 Power cord connection

⚠ WARNING

- Connect the power plug to a grounded outlet.
  Electric shock or fire may occur in the event of malfunction or power leakage.

1 Place the station on a stable table.

2 Connect the power cord to the power inlet.


Power cord

3 Confirm that the power switch is turned off（○）and plug the power cord into the power outlet.

4 Turn on（ | ）the power switch of the station.

2.4.3 Charging the battery pack

Charge the battery pack before use.

The battery pack can be charged by either of the following methods:

- Placing the main body on the station to charge (about 180 min.)
- Inserting the battery pack into the battery slot of the station to charge (about 140 min.)

These charging methods can be performed at the same time if there are two battery packs.

It is recommended to prepare two or more battery packs in preparation for battery discharge, deterioration, or such.

⚠ CAUTION

- The battery pack has a limited lifetime. When the battery pack fails to hold a charge, replace it with a new one.
- If any abnormalities such as odor, excessive heat, discoloration, or deformation are found during use, charging, or storage of the battery pack, immediately turn off the device and stop using it. Contact NIDEK or your authorized distributor.
- If charging of the battery pack does not finish in the specified time and the charge indicator remains lit, or if the charge indicator blinks, follow the instructions below.
  - If the battery pack is not set in the main body, set it.
  - If the battery pack is set in the main body, turn off the station, and remove the battery pack. In 5 minutes, set the battery pack again, then start charging it by turning on the power switch.

    If charging still does not finish, or the charge indicator blinks, cancel charging the battery pack and replace it with a new one.
- Do not remove the battery pack while it is charging in the main body.

○ Charging the battery pack inserted in the main body

1 Connect the power cord.

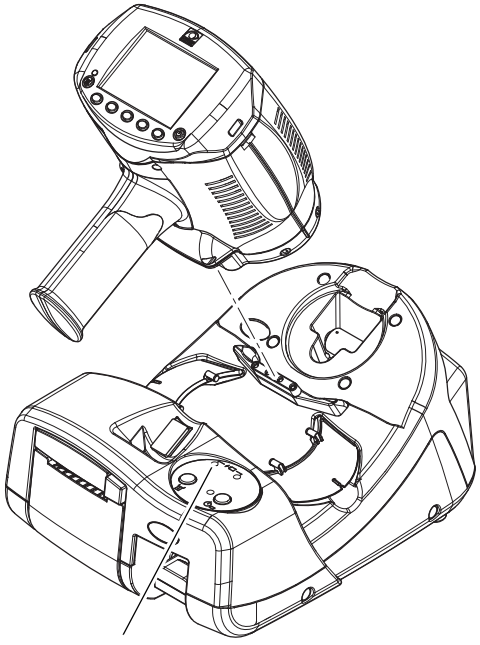
“2.4.2 Power cord connection” (page 27)

2 Turn on (|) the power switch of the station.

3 With the battery pack inserted in the main body, put it on the station as shown to the right.

The main body battery charge indicator lights up and charging starts.

The charge indicator goes out when charging is complete.



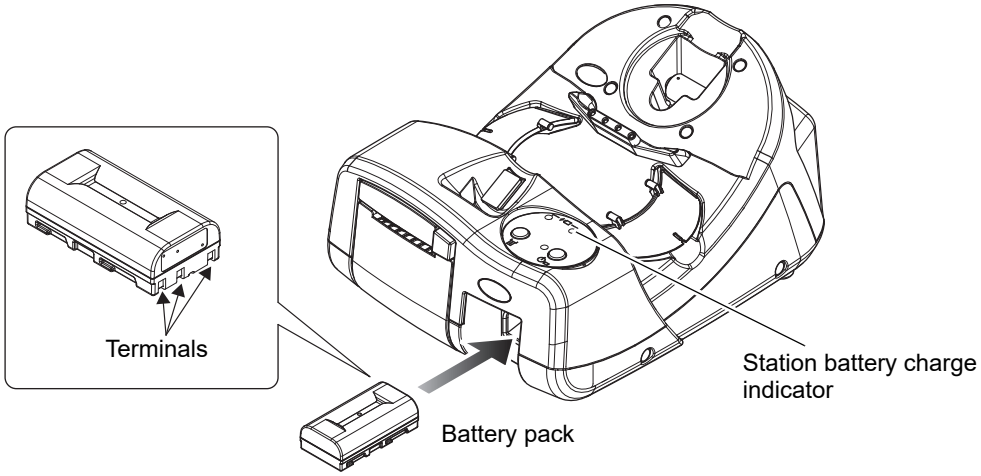
Main body battery charge indicator

○ Charging the battery pack inserted in the station

1 Connect the power cord.

2 Turn on the power switch of the station.

3 With the terminals aligned as shown below, insert a battery pack into the battery slot.
The station battery charge indicator lights up and charging starts.
The charge indicator goes out when charging is complete.

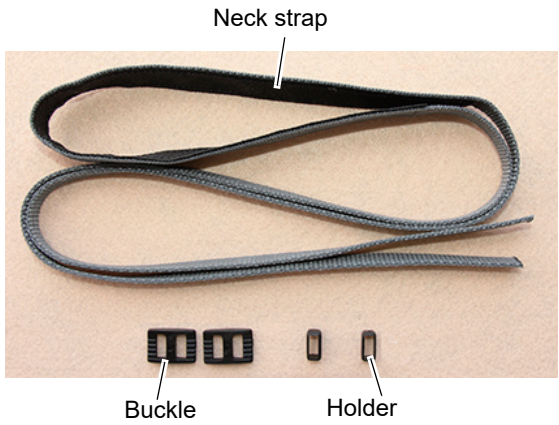


4 Pull the battery pack out to remove it.

2.4.4 Attaching neck strap

Attach the neck strap to the main body. The strap attachment holes are located on both sides of the LCD.

1 Take out the strap, buckle, and holder from the packet.

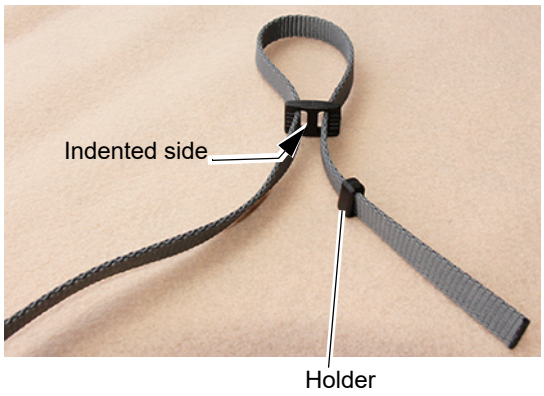


2 Pass the strap through the buckle and holder.

1) Pass one of the ends of the strap through the buckle.

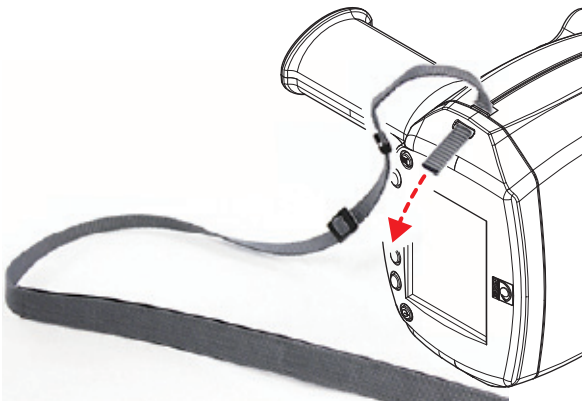
   The buckle has a proper orientation. Pass the strap with the buckle oriented as shown to the right.

2) Pass the strap through the holder.

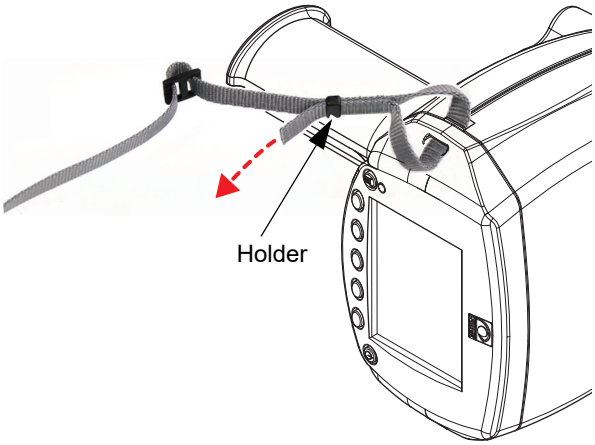


3 Attach the neck strap to the main body.

1) As shown to the right, pass the end of the strap through the attachment hole on the main body side and pull it through the hole on the measuring window side.

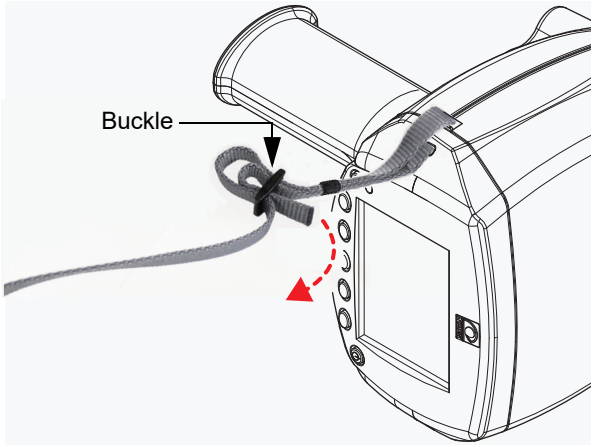


2) Fold back the strap and pass it through the holder.



3) Pass the strap through the buckle. (Pass it from the inside).

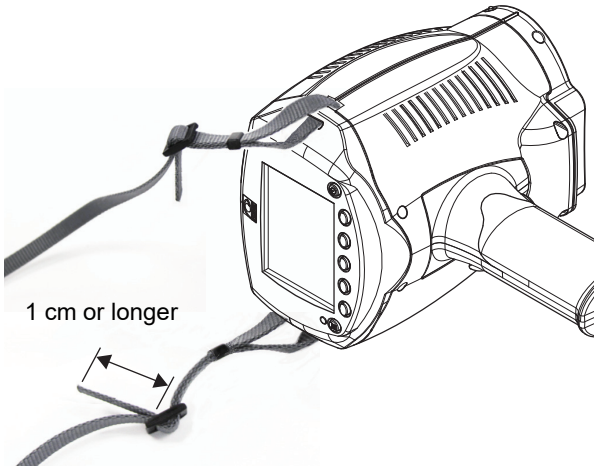
4) Take up any slack and check that there is no play in the strap.



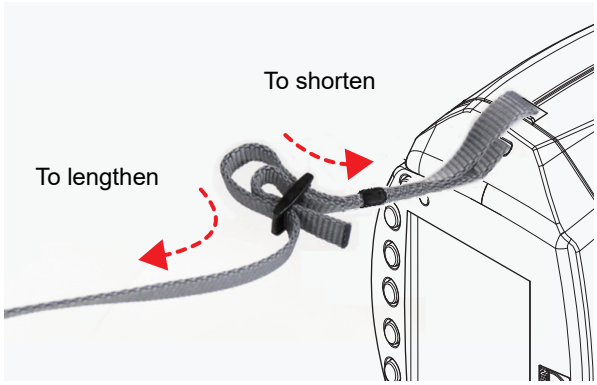
4 Attach the other end of the neck strap to the main body in the same manner.

- Leave about 1 cm or more of the strap end from the buckle.

  Otherwise, the strap may come off.



5 Move the buckle position to adjust the strap length for ease of use.



2.4.5 Setting the printer paper

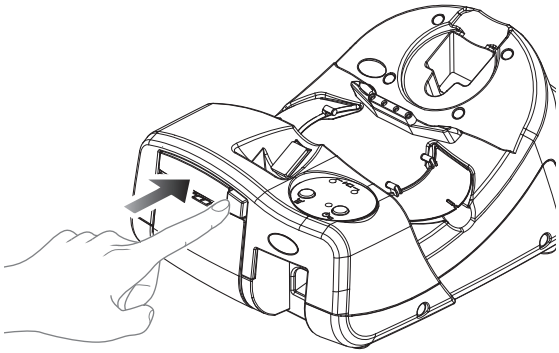
The setting and replacement procedures of the printer paper are described here.

⚠ CAUTION

- Be sure to use only the printer paper (80620-00001) specified by NIDEK. If printer paper other than that specified is used, the printer head may be damaged due to printing failure or paper jam, or printed contents may easily become illegible.

○ Setting the printer paper

1 Press  to open the printer cover.

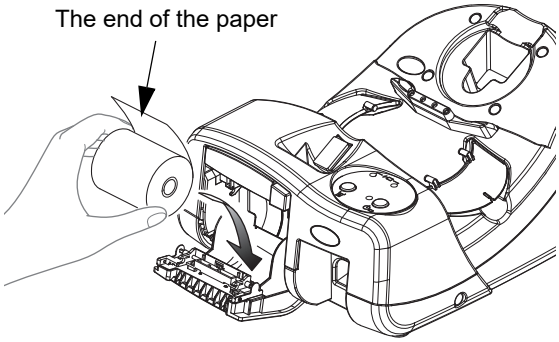


2 Set the printer paper.

As shown to the right, set the roll levelly with its end coming upward.

If the roll is loaded with the paper upside down, printing is not possible.

If the roll is not level, printer paper may not be properly fed.

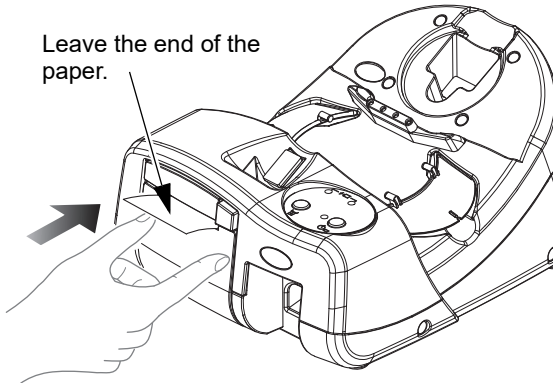


3 Close the printer cover.

1) Set printer paper so that its end extends from the cover.

   Hold down  to feed the printer paper.

2) Press the printer cover on both sides to close the cover securely.



⚠ CAUTION

- Be sure that the cover is securely closed.

  If the cover is insecurely closed, the auto cutter may not operate properly.

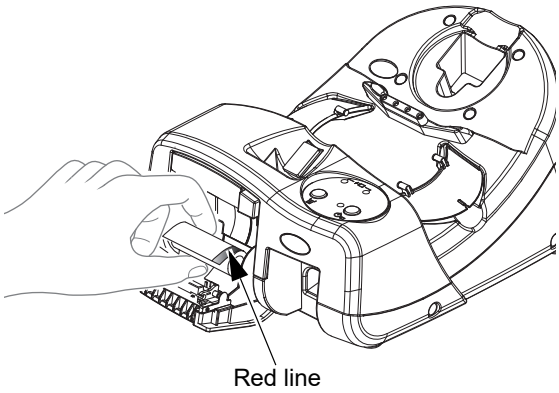
  In addition, when  is pressed, “OUT OF PAPER” may appear and printing does not start.

  (This message does not appear while the device is communicating by infrared.)

○ Replacing the printer paper

When a red line appears along the edge of the printer paper, it means that the paper is running short. In such a case, replace the printer paper with a new roll.

1 Press  to open the printer cover, then remove any remaining printer paper.



2 Perform Steps 2 and 3 from "○ Setting the printer paper".

2.4.6 Other preparations

1 Set the printer paper.

"2.4.5 Setting the printer paper" (page 32)

Note

- If no printer paper is loaded, the error message "OUT OF PAPER" appears when  is pressed. (This message does not appear while the device is communicating by infrared.)

2 As necessary, insert a charged battery pack into the main body.

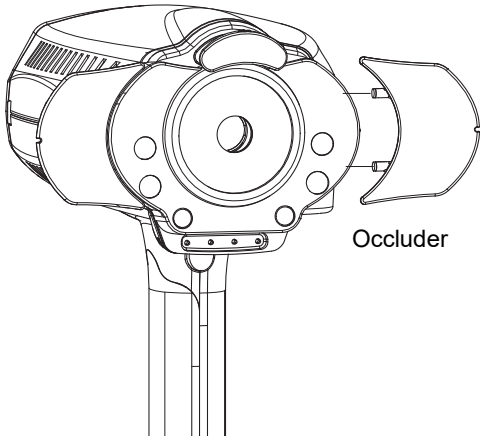
"2.4.1 Removing and installing the battery pack" (page 26)

3 Attach the occluder (R/L) to the main body.

The occluder is held in place by magnets as shown to the right (R/L).

Covering the eye that is not being measured facilitates patient eye fixation.

When the occluders are not in use, place them on the occluder base of the station.



⚠ CAUTION

- When measuring a patient lying down, do not use the occluders.
  The occluders may fall on the patient resulting in injury.

4 As necessary, connect peripheral devices.

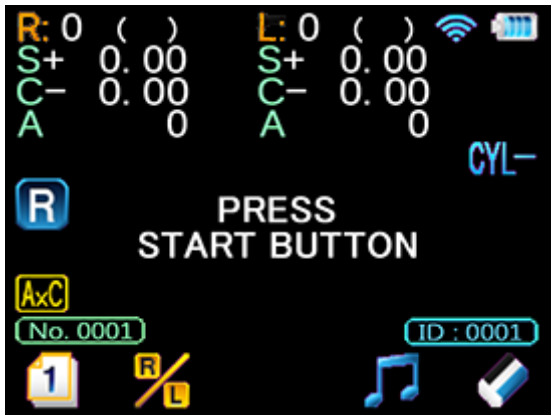
"3.11.1 Connecting peripheral devices" (page 76)

2.4.7 Startup of main body

1 Press ⏻ to turn on the main body. Confirm that the screen is displayed.

In a few seconds, the initial screen appears. Initialization starts and the memory indicator blinks.

When initialization completes, the memory indicator goes out and the screen changes to the main screen.



2 Set the parameters such as measurement and printing conditions as desired.

↳ *"4.1 Parameter Settings" (page 81)*

* The device is now ready for use.

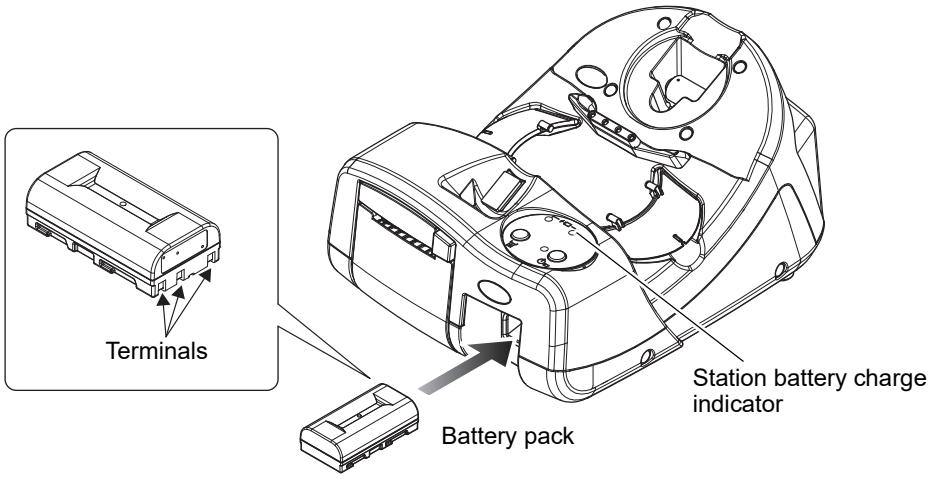
2.4.8 Powering the station by battery pack

Normally, the station operates by an AC power supply. However, the station can be powered by the battery pack by the following procedure.

This is a supplemental function. In principle, it is recommended to connect the station to an AC power supply.

1 Turn off the power switch of the station.

With its terminals facing the direction indicated by the arrow, insert a charged battery pack into the battery slot.



2 Press  .

The pilot lamp lights up. The station is now powered by the battery pack. To turn off the device, hold down the button for more than a second.

Note

- When the station is powered by the battery pack, the station will be automatically turned off by the auto shutdown function if there is no operation or data transmission to the station for 5 minutes. Five beeps sound before the station turns off.

  When the station is turned off (the pilot lamp is off) before use, press  to turn on the power.

- When the battery charge is low, three beeps sound and the pilot lamp starts blinking. Power the station from an AC power supply and charge the battery pack.
- When the station is powered by the battery pack, turning on the power switch of the station automatically changes to the AC power. At the same time, the station battery charge indicator lights up indicating that the battery pack is being charged.

2.5 Connecting the Main Body and Station

■ There are three methods to connect the main body and the station.

- Connection by cable
- Connection by infrared (wireless)
- Connection by wireless LAN

2.5.1 Connection by cable

⚠ CAUTION

- Check the plug orientation before connecting the cable. Do not connect it with excessive force.
- During measurement, make sure that the main body does not pull on the station by the connection cable.

  Accidental dropping of the station may result in injury or malfunction.
- Never drag or apply excessive force to the connection cable.

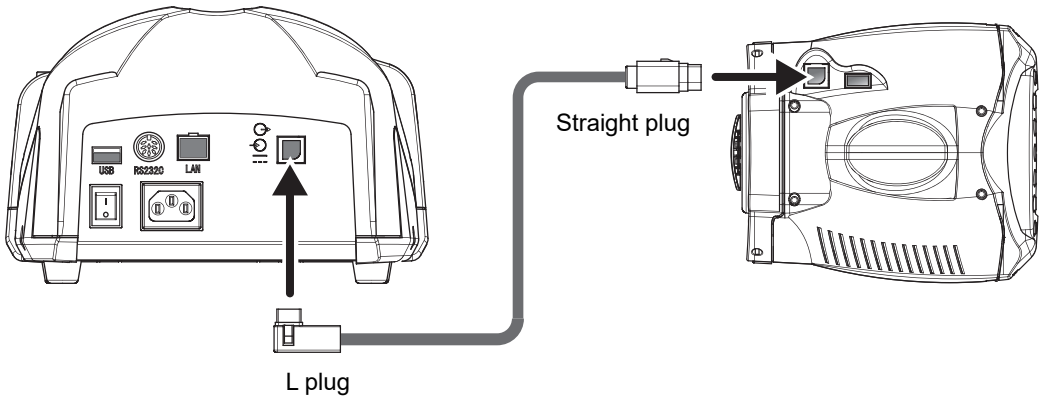
  Cable breakage may result.

Note

- Even though power is supplied to the main body by the connection cable, the battery pack inserted in the main body is not charged. To charge the battery pack, place the main body on the station.

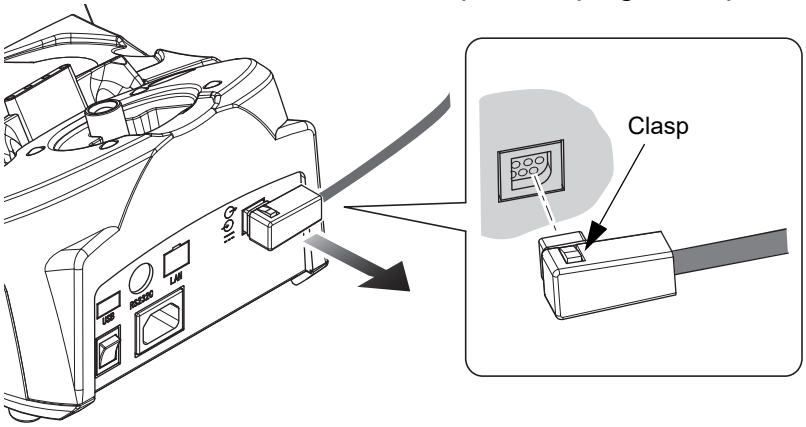
1 Connect the straight plug of the connection cable (2 m) to the connection cable port of the main body.

2 Connect the L-plug to the connection cable port of the station.



3 For the printer-equipped model, set the *" 91. STATION I/F" (page 90)* parameter to "CABLE".

4 To remove the cable, hold down the clasp of the plug, then pull it out.



2.5.2 Connection by infrared (printer-equipped model only)

The main body and station communicate by infrared light.

Communication is possible both when the main body is placed on the station or separated from the station.

⚠ CAUTION

- Place the station in a location where the IR receptors are not exposed to intense light including infrared light, such as sunlight or room illumination.

  Intense light entering the IR receptors may interfere with proper communication. Also, intense light entering the measuring window may interfere with proper measurement. As necessary, shut out sunlight with curtains or turn off the room illumination.

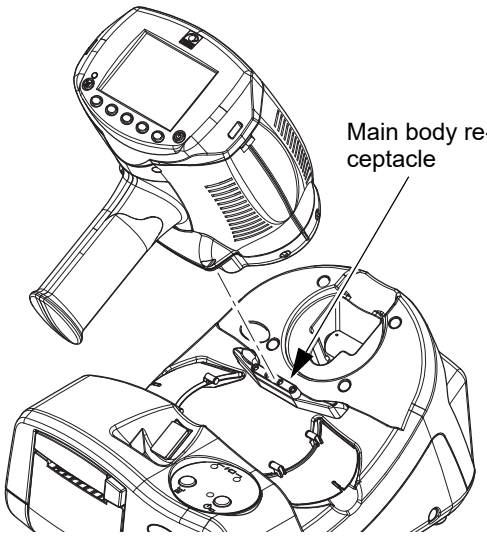
○ Communication by placing the main body on the station

Placing the main body on the station enables a stable communication because the IR windows and IR receptor are in direct alignment.

This communication method is suitable when the device is used in a location where it is exposed to intense light such as sunlight or room illumination.

1 Set the *" 91. STATION I/F" (page 90)* parameter to "IR".

2 Place the main body on the station.



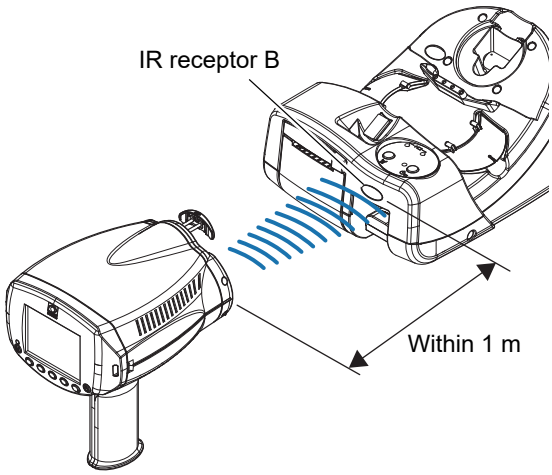
○ Communication with the main body separated from the station

Separate the main body from the station, then aim the IR windows of the main body toward the IR receptor B of the station for communication.

1 Set the *" 91. STATION I/F" (page 90)* parameter to "IR".

2 Aim the IR windows of the main body toward the IR receptor B of the station.

The maximum communication distance between the main body and station is 1 m.



2.5.3 Connection by wireless LAN (printer-equipped model only)

The main body and station communicate by wireless LAN.

1 The wireless LAN communication mode is selectable between "INFRA." mode, which requires an access point such as a wireless router, and "AD HOC" mode, which does not require such a device.

For selecting mode, *" 107. WLAN MODE" (page 92)*

2 Set the *" 91. STATION I/F" (page 90)* parameter to "WLAN".

* For the setting of the wireless LAN communication, consult NIDEK or your system administrator.

- When wireless "AD HOC" mode cannot be used due to radio interference, use infrastructure mode, the connection cable, or infrared for communication.

2.5.4 Functionality depending on communication method

Availability of the printing and external communication methods differs depending on the type of connection between the main body and the station set by the *" 91. STATION I/F" (page 90)* parameter.

The following table shows the availability of communication methods. Select the most appropriate communication method for use.

Main body - station connection method	Output to computer			Output to refractor/ Eye Care card	Printing		Barcode scanner
	USB flash drive (Main body)	WLAN (Main body)	LAN (Station)		Values	Images (retroillumination image, eye diagram)	
None (model without a printer)	○	○	×	×	×	×	×
Infrared IR	○	○	×	○ * 2	○ * 3	×	×
Cable CABLE	○	○	○ * 1	○ * 2	○	○ * 4	○
Wireless LAN WLAN (AD HOC)	○	○ (AD HOC)	○ * 1	○ * 2	○	○ * 4	○
WLAN (INFRA.) Main body: Static IP address / DHCP Station: Static IP address	○	○ (INFRA.)	×	○ * 2	○	○ * 4	○

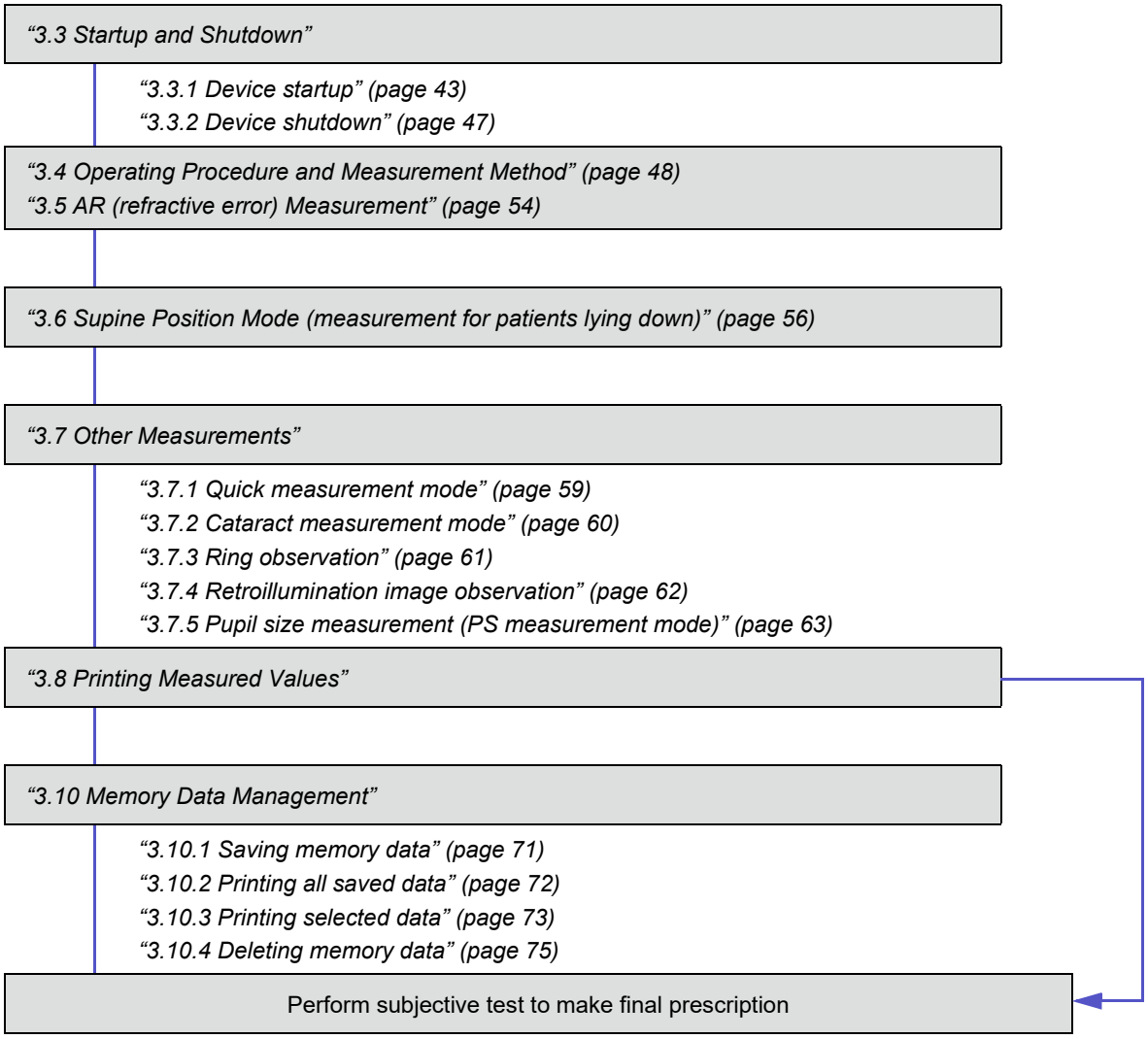
○ : Available

× : Not available

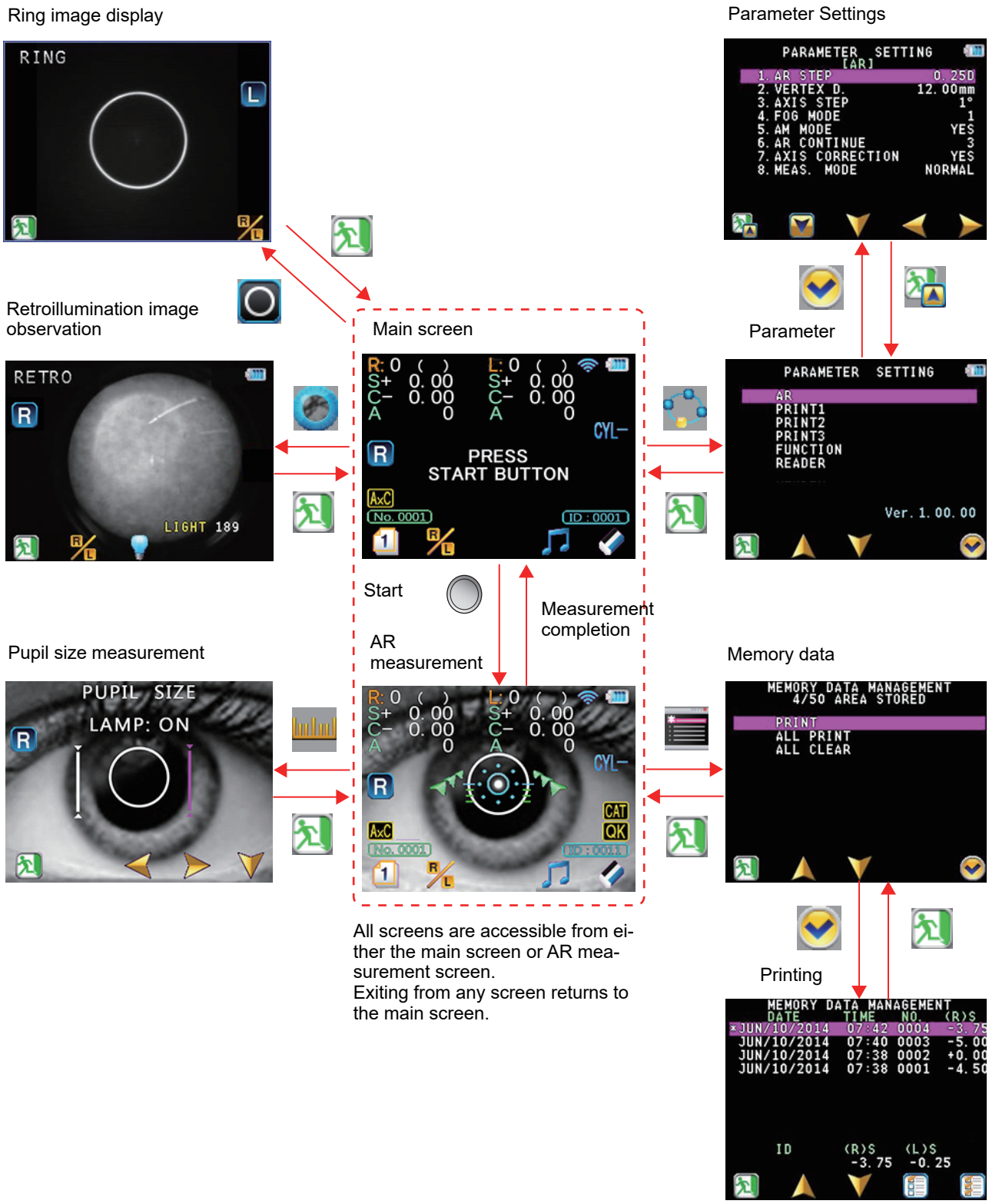
- For output to computer, select among "USB/WLAN/LAN" for the *" 92. OUTPUT TO PC" (page 90)* parameter.
- For output to refractor, select "YES" or "NO" for the *" 93. OUTPUT TO RT" (page 90)* parameter.
- * 1 Static IP address only
- * 2 Only one data set can be output to the refractor or Eye Care card at one time.
- * 3 Only one data set can be printed at one time.
- * 4 Memory data does not include image data. Images cannot be printed.

3 OPERATING PROCEDURE

3.1 Operation Flow



3.2 Screen List



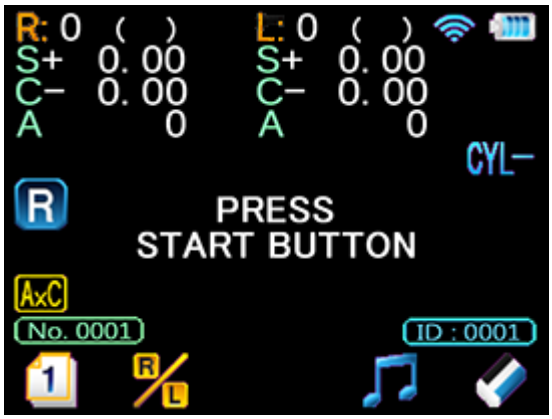
3.3 Startup and Shutdown

3.3.1 Device startup

1 Press ⏻ to turn on the main body.

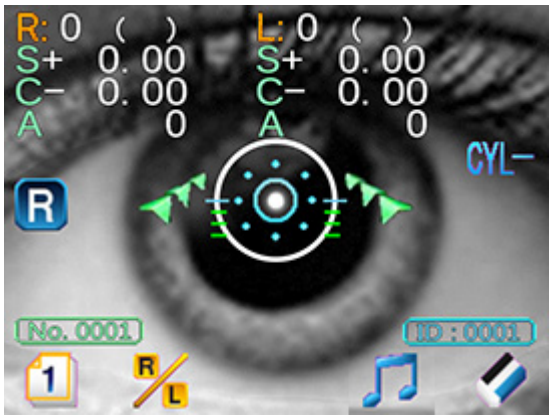
The main screen appears.

When the *" 71. WINDOW CHECK" (page 88)* parameter is set to "YES" or "DAY", the measuring window is checked for cleanliness.



2 Press ◯ on the handle.

The AR measurement screen is displayed.



3 Perform checks before use.

Before use, perform the checks listed in *"O Checklist before use" (page 44)*.

- If any abnormality is found, stop using the device. Perform the remedy described in *"4.2.1 Troubleshooting" (page 98)* before using the device.

Note

- Make some copies of the list described in *"O Checklist before use" (page 44)*. It is recommended to keep the used checklists so that check records can be reviewed later.

○ Checklist before use

Checklist before use - HandyRef

Item	Date and personnel
The power cord is securely connected to the power inlet and power outlet.	
The cables of the connected devices are securely connected.	
The measuring window is clean.	
The forehead rest is clean.	
The neck strap is securely attached and the length is appropriately adjusted.	
No abnormality is found when the station is turned on.	
No abnormality is found when the main body is turned on.	
No error message appears.	
The battery pack is sufficiently charged (when using the battery pack).	
Printer paper is sufficient (when using the printer).	
Pressing the printer feed button properly feeds the paper (when using the printer).	
The date and time set in the device are correct.	

○ Operation of the measuring window check function

When the *" 71. WINDOW CHECK" (page 88)* parameter is set to "YES" or "DAY", the measuring window is checked for cleanliness at device startup.

An unclean measuring window has considerable influence on the measured results. In addition to visual inspection, this checking function should be used to ensure measurement with a clean measuring window.

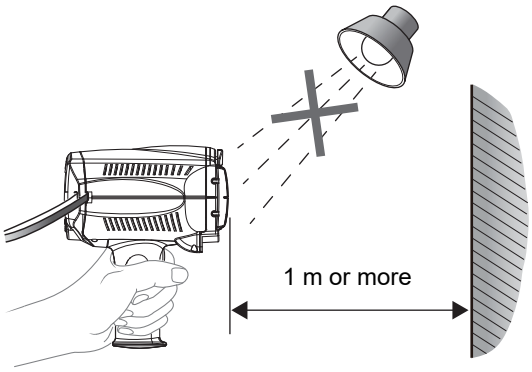
1) Press  to turn on the main body.

   The message "PRESS START BUTTON" is displayed on the WINDOW CHECK screen.

2) The following conditions are required at start up of the main body:

   - The main body is held by hand.

     If the main body is left on the station and checked for measuring window cleanliness, the message "WINDOW CHECK NG" may appear even if the measuring window is clean.
   - There are no objects beyond 1 m of the measuring window.
   - The measuring window is not exposed to interference light.



3) Press  .

   "MEASURING WINDOW CHECKING" is displayed and the measuring window is checked for cleanliness.

   Wait for checking results.

4) The check result is displayed.

   - When "WINDOW CHECK OK" is displayed:

     The measuring window is clean. The screen returns to the measurement screen.

- When “WINDOW CHECK NG” is displayed:
  Turn off the device, then check that the measuring window is clean. If not, clean it.

Note

- The measuring window is checked for cleanliness before the first measurement every time the device is turned on.
  Regardless of the result (“WINDOW CHECK OK” or “WINDOW CHECK NG”), the check is not performed from the second measurement.
  However, the device may be set so that window check is only performed at the first startup of the day.

  For the setting, ⇨ *“ 71. WINDOW CHECK” (page 88)*

3.3.2 Device shutdown

1 To finish measurement, hold down ⏻ of the main body for more than a second to turn it off.

2 Turn off the power switch of the station.

When the station is powered by the battery pack, hold down ⏻ for more than a second to turn it off.

Note

- When the device is not going to be used repeatedly, it is recommended to turn it off to avoid draining the battery power.
- When the main body is left idle for 5 minutes (changeable), it is automatically turned off by the auto shutdown function.

For the auto shutdown function setting, ↪ *" 72. AUTO OFF" (page 88)*

3 Clean the forehead rest.

Use clean gauze or absorbent cotton dampened with rubbing alcohol for cleaning.

Keep the device clean for the next use.

- Always place the dust cover on the device after use.

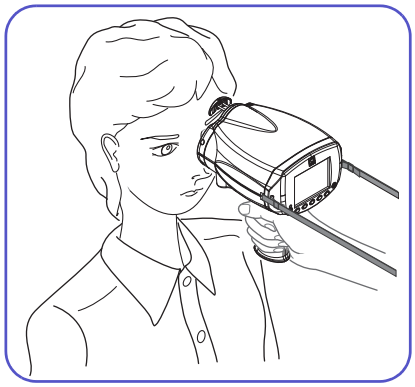
  If dust settles on the optical parts, measurement accuracy is adversely affected.

4 Place the main body on the station and place the dust cover on the device.

To prevent accidental dropping of the device, place the main body on the station whenever possible.

3.4 Operating Procedure and Measurement Method

■ This section describes the operating procedures and measurements common to all measurement modes.



1 Put the neck strap around the operator's neck.

Holding the strap tight facilitates stable measurement. The strap also prevents the device from falling.

⚠ CAUTION

- When the device is being held for measurement, be sure to use the neck strap.
  Accidental dropping of the device may result in injury or malfunction.

2 Turn on the main body.

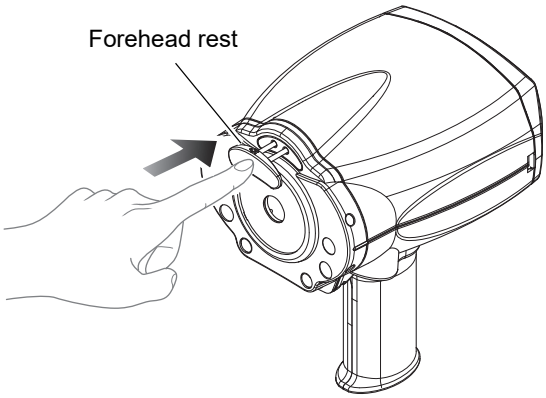
The main screen appears.

3 If necessary, read the patient ID using the optional barcode scanner or magnetic card reader.

"3.11.3 Handling of barcode scanner and magnetic card reader" (page 80)

4 Set the main body for measurement.

1) Press the forehead rest to release it.
   The forehead rest has a push-lock. Pushing the forehead rest once releases it and pushing it again locks it.
2) Wipe the forehead rest with a clean cloth such as a gauze.



⚠ CAUTION

- Release the forehead rest and then slowly bring the device into contact with the patient's forehead.
  Failure to do so may result in parts other than the forehead rest contacting the patient, or the forehead rest coming into contact with the patient's or eyes or face.
- Before and after use of the device, and before measuring each patient, clean the forehead rest with clean gauze or absorbent cotton. As necessary, dampen a cloth with rubbing alcohol and gently wipe them off.

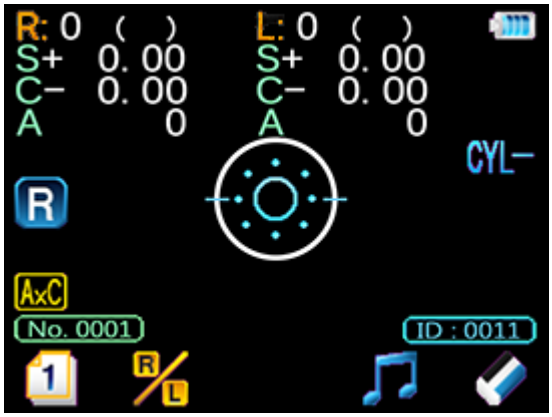
3) Attach the occluder (R/L) to the main body.
   Covering the eye that is not being measured facilitates patient eye fixation.

5 Conduct patient preparation.

1) Instruct the patient to sit on a chair and remove their glasses or contact lenses.
2) Reassure the patient before measurement by explaining the following:
   (Ex.)
   "This device measures your eye with infrared light to determine the lens most suitable for you. The infrared light does no harm to your eyes."

6 Press .

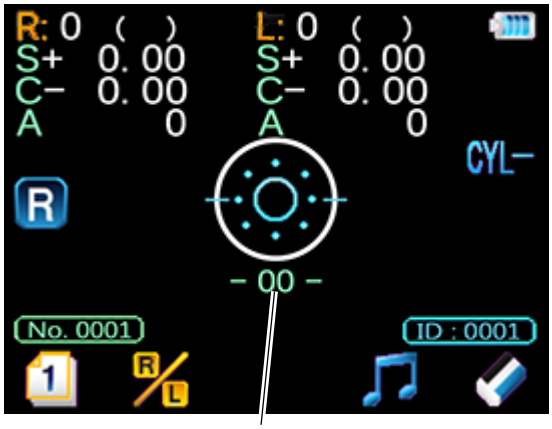
The mire ring lights up and the screen changes from the main screen to AR measurement screen.



7 Hold the main body level.

- When the *" 7. AXIS CORRECTION"* parameter is set to "NO":

  When the *" 7. AXIS CORRECTION" (page 84)* parameter is set to "NO", the inclination of the main body is displayed by the inclination indicator under the mire ring. Adjust the main body so that the indication becomes − 00 − .
  When the main body is tilted more than 45º, the number display changes to "--".



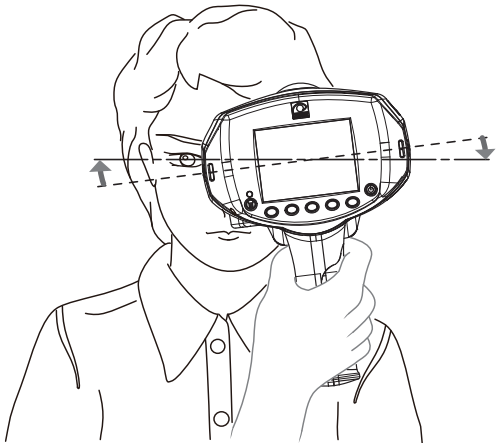
Inclination indicator

- When the *" 7. AXIS CORRECTION"* parameter is set to "YES":

  When the *" 7. AXIS CORRECTION" (page 84)* parameter is set to "YES", AxC is displayed on the screen. The sensor detects the inclination of the main body to perform automatic axis correction using the level position (0º) as the reference.

  In this step, confirm that the main body is roughly level with the patient's eye.

  When the main body is tilted more than 45º, the error indication "AxC OVER" is displayed and measurement is suspended. Measurement resumes when the main body inclination is within 45º.



8 Give the following instructions to the patient:

- "Try not to blink during measurement."

  Instruct the patient to close their eyes and open them widely just before measurement to avoid measurement failure.
- "Open your eyes as wide as you can during measurement."

  Closing one eye may cause an unstable fixation and the other eye will not open widely enough.

9 Perform alignment.

While checking the patient's eye on the screen, adjust the main body position so that the alignment guide mark comes within the target " ◯ ".

1) Give the following instructions to the patient: "Look through the measuring window. You will see the picture of a balloon. Look at the center of it without straining".

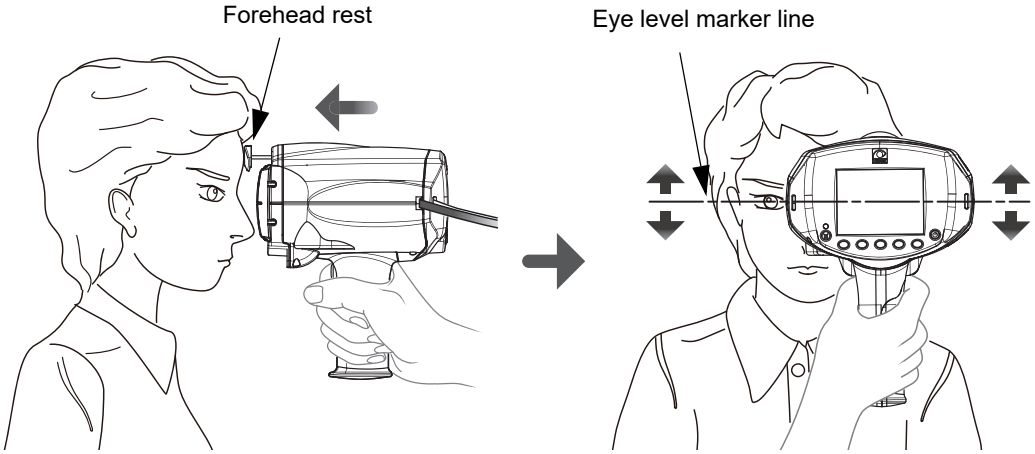
Note

- When the children's chart is used, give the following instructions to the patient: "Look through the measuring window. You will see the picture of a flower. Look at the center of it without straining".

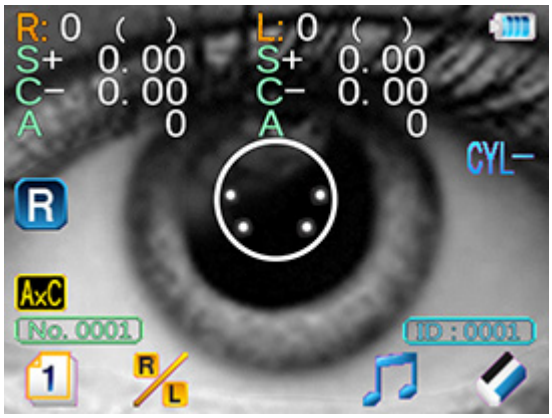
2) Bring the main body close to the patient and lightly place the forehead rest against their forehead (just above the eyebrow of the eye being measured).

   Adjust the main body position so that the eye level marker on the main body or occluder is aligned with the patient's eye. Holding the neck strap tight facilitates stable alignment.

   Either eye of the patient may be measured first.



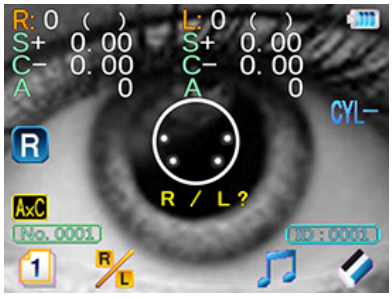
3) Adjust the main body position so that the patient's eye is displayed on the screen.



4) Confirm that the eye detected is correctly indicated as the one to be measured (R/L) on the screen.
Normally, the patient's eye (R/L) is automatically detected. However, there may be cases where the eye to be measured (R/L) is not detected correctly due to the patient's eye condition.
In such a case, press R/L to select the correct eye to be measured. When the eye to be measured is detected automatically, the R/L indication appears in blue (R / L). When the eye to be measured is set manually, it turns yellow (m-R / m-L).

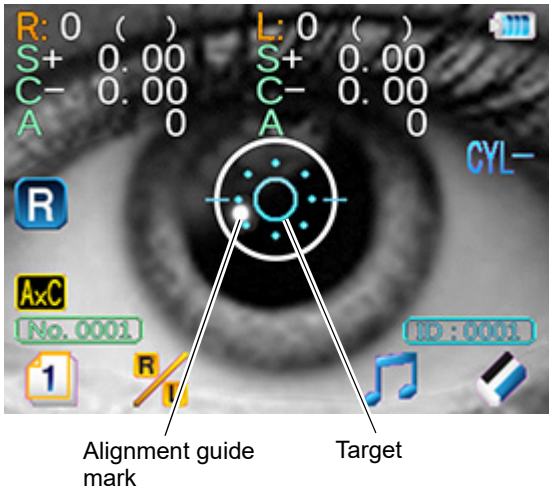
Note

- Error indication for automatic R/L detection
  Under certain conditions such as when the patient is wearing a medical mask, the eye to be measured (R/L) may fail to be detected correctly. In such a case, R / L indication blinks and the error indication R / L ? appears indicating that automatic detection has failed. Measurement cannot be started while the error indication is displayed.



- To enable measurement, perform the following:
  - Remove the medical mask so that the eye to be measured (R/L) is detected.
  - Press R/L to select the eye to be measured.
  - After the eye to be measured is selected manually, the automatic R/L detection will be enabled by deleting the measurement data, performing the next measurement after printing, or holding down R/L for more than a second.

5) Adjust the main body position so that the alignment guide mark on the patient's eye comes within the target " ◯ ".

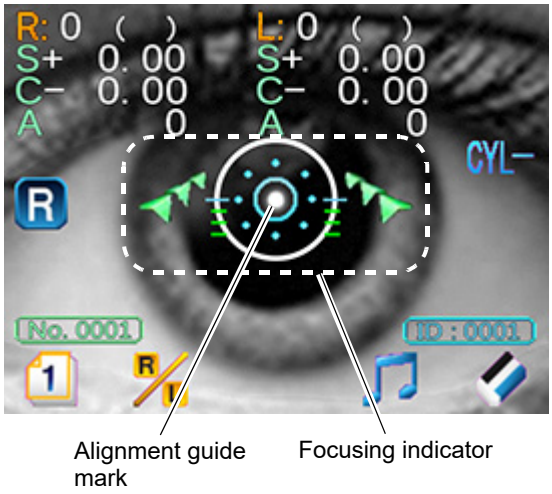


10 Bring the patient's eye into focus.

1) When the target " ◯ " is aligned with the alignment guide mark, the focusing indicator appears to facilitate focusing.

2) Move the main body forward and backward so that the focusing indicator turns yellow −◯− indicating the optimum condition.
Making sure that the main body is level with the patient's eye and aligned to the target, adjust the focus.

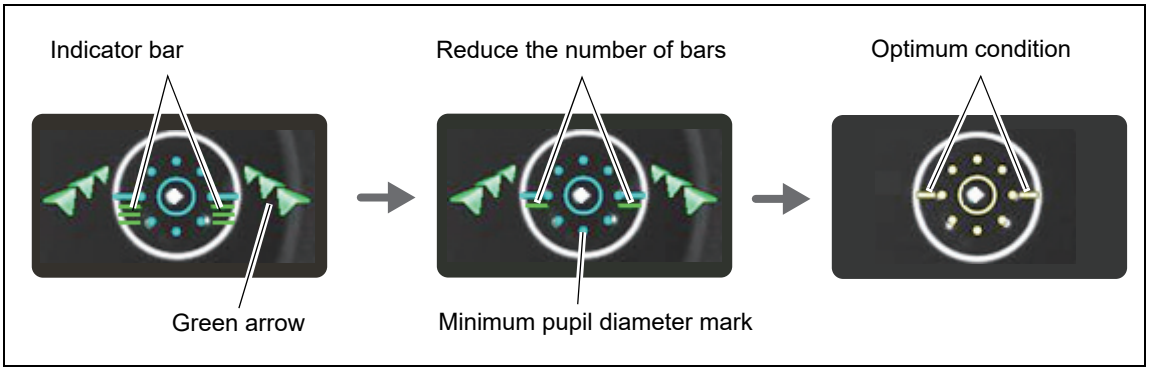
3) Measurement starts automatically by the auto shot function as soon as alignment and focusing are optimized.



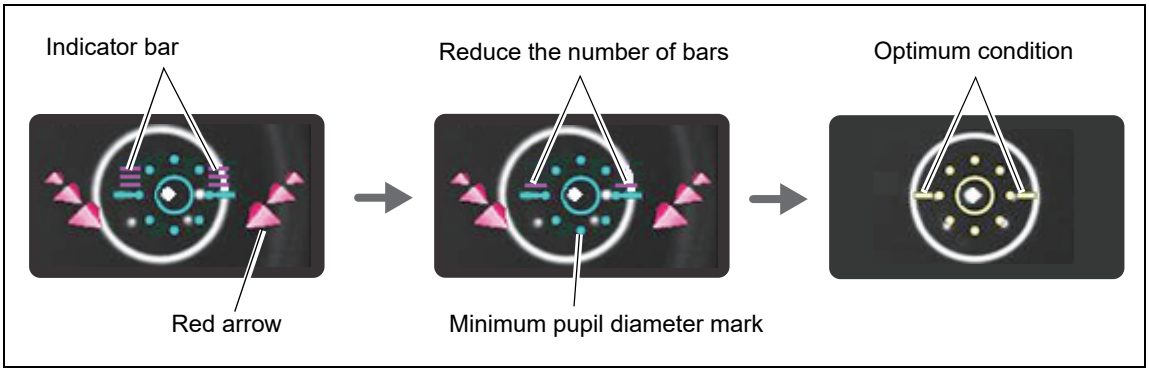
Note

- Auto shot function
  This function automatically starts measurement as soon as optimum alignment and focusing are achieved.

- Focusing indicator display
  - When the main body is too far from the patient's eye
    When the main body is too far from the patient's eye, the green focusing indicator is displayed. Move the main body in the direction of the green arrow (forward) so that the number of the indicator bars is reduced. When the focus is best aligned, the indication turns yellow −◯−.



- When the main body is too close to the patient's eye
  When the main body is too close to the patient's eye, the red focusing indicator is displayed. Move the main body in the direction of the red arrow (backward) so that the number of the indicator bars is reduced. When the focus is best aligned, the indication turns yellow  .



Note

- If eyelashes obstruct the minimum pupil diameter mark, AR measurement may not be performed properly.
  In such a case, instruct the patient to open their eye wider.
  If the patient cannot open their eye wider, lift the patient's lid, paying attention not to press against the eyeball.

* The above are the steps common to all measurement modes. For continuing the measurement procedure, refer to the section for each particular mode.

3.5 AR (refractive error) Measurement

■ AR (refractive error) measurement is performed.

3.5.1 AR measurement mode

1 Perform Steps 1 to 10 of *"3.4 Operating Procedure and Measurement Method" (page 48)*.

In Step 10, when the focus is aligned to the eye, AR measurement starts automatically.

2 The measurement is performed automatically in the following order:

1) The scenery chart is fogged.
2) AR measurement starts.
3) A beep sounds, then the AR measurement values and the number of measurements are displayed.
4) At this point, if the device remains aligned and in focus, the AR measurement is repeated from Step 1).

   If accommodation is not eliminated satisfactorily at Step 1) during the first measurement, the fogging level will be increased from the second measurement.
   When the *" 4. FOG MODE" (page 83)* parameter is set to "3", fogging will be performed in each measurement.
5) When the specified number of measurements is obtained, 《FINISH》 is displayed on the screen and measurement is complete.

- Number of AR measurements

  The number of AR measurements differs depending on the *" 5. AM MODE" (page 83)* parameter setting.

AR measurement	AM MODE / YES	When the number of measurements specified by the *" 6. AR CONTINUE" (page 83)* parameter has been performed obtaining stable data sets and median values, measurement automatically finishes. If stable data sets have not been obtained, two additional measurements will be performed then measurement finishes.
	AM MODE / NO	When the number of measurements specified by the *" 6. AR CONTINUE" (page 83)* parameter has been performed, measurement automatically finishes.

3 Measure the other eye in the same manner.

1) Instruct the patient to close their eye before starting the next measurement.

   Let the eye rest to avoid measurement failure by blinking.
2) Perform measurement in the same manner from Step 2.

   To finish measurement after only one eye and to print the data, perform Steps in *"3.8 Printing Measured Values" (page 65)*.

4 As necessary, press  to print the results.

"3.8 Printing Measured Values" (page 65)

5 To measure a following patient, continue from Step 3 in the same manner.

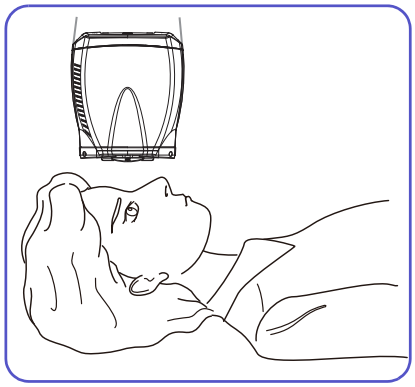
6 To finish operation, see *"3.3.2 Device shutdown" (page 47)*.

Note

- If the device goes out of alignment and focus during measurement, the measurement is interrupted. If measurement is retried, the measured results are incorporated to the former results and saved.
- To perform additional measurements after 《FINISH》 is displayed, press  again. The message disappears and the screen returns to the measurement screen.
- A maximum of 10 measurement data sets for each eye can be temporarily saved in the memory. If measurements exceed 10, the data is erased in order from the oldest.
- If the measurement results exceed the measurement range, the following error code (measurement range over error) appears.
  Err + OVR ...The spherical power is over the measurement range of the + side.
  Err - OVR ... The spherical power is over the measurement range of the - side.
  Err COVR ... The cylindrical power is over the measurement range.
- Other errors during measurement are as follows:
  - Err BLK ... Measurement failed due to the patient blinking.
  - Err CONF ... Low-confidence data is obtained due to corneal distortion.
- If measurement fails, the cause may be due to the following:
  a. The patient blinked during measurement. (Err BLK)
  b. The eyelid or eyelashes are on the minimum pupil diameter mark during AR measurement.
  c. The patient's pupil is smaller than the minimum pupil diameter mark. (Darken the room so that the pupil diameter becomes large enough for measurement.)
  d. Retinal reflection is extremely low due to an optical disease such as a cataract and corneal opacity. There is some unusual reflection on the cornea during measurement.
  e. There is an extreme distortion on the cornea. (Err CONF)
- The number of measurements shows the number of data of performed measurements.
- To save the measurement results, *"3.10.1 Saving memory data" (page 71)*.
- To print the measurement results, *"3.8 Printing Measured Values" (page 65)*.

3.6 Supine Position Mode (measurement for patients lying down)

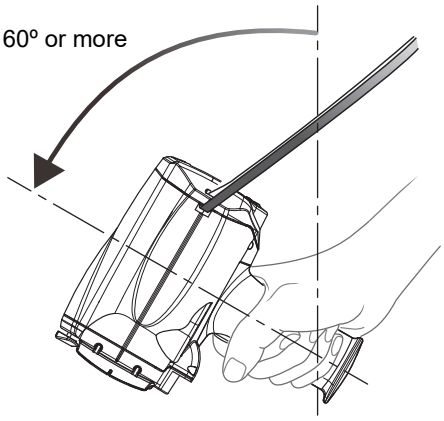
■ The following explains supine position mode when measurement is taken from the patient's side. During this measurement, the cylinder axis is compensated by 90 degrees.



- When measuring a supine patient from their side or from above the patient, make sure that the forehead rest is retracted.

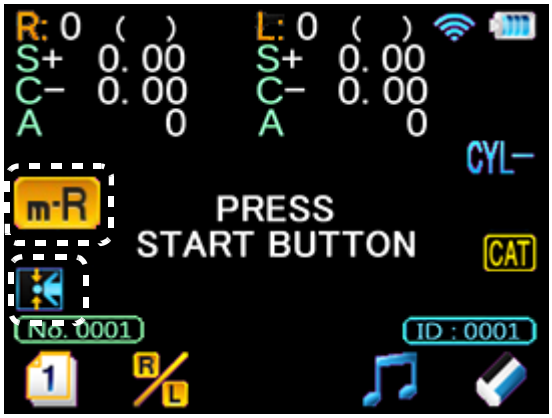
1 Enter supine position mode.

The device automatically enters supine position mode when the main body is tilted 60º or more downward as shown to the right.



The supine position mode icon appears. Measurement from the patient's side (90º axis correction) is now possible.

In supine position mode, the eye to be measured needs to be selected manually. The indication changes to m-R.



Note

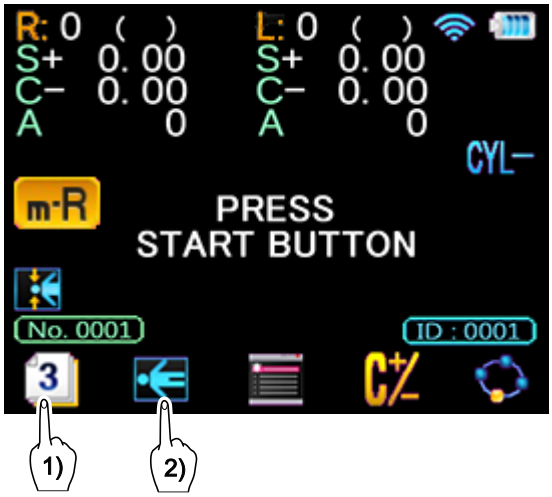
- In supine position mode, the axis correction and inclination indicator functions are disabled.
- After conducting measurement in normal measurement mode, if the device is set to supine position mode without deleting or printing the data taken in normal mode, "↑ UP ↑" is displayed on the screen and supine position mode is not activated. In the same manner, after conducting measurement in supine position mode, if the device is set to normal measurement mode without deleting or printing the data taken in supine position mode, "↓ DOWN ↓" is displayed on the screen and normal measurement mode is not activated.

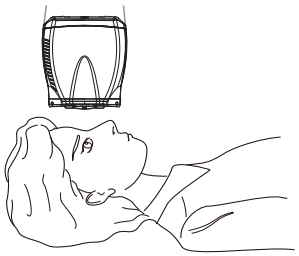
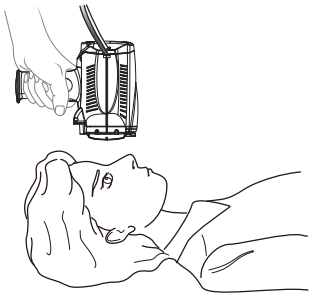
2 As necessary, change the measurement direction.

1) Press 1 on the supine position mode screen to display page 3.

2) Press to select the measurement direction.

Pressing switches the measurement direction (side ↔ above).



Icon	Measurement direction	Measurement position
	Measuring from patient's side (90°)	
	Measuring from above the patient (180°)	

⚠ CAUTION

- When using the device in supine position mode, be sure to use the neck strap to prevent the device from falling.
- When measuring a patient lying down, do not use the occluders.

  The occluders may fall on the patient resulting in injury.
- Be careful that the device does not contact the patient's face when bringing the main body closer. Steady the main body to the patient's face using your free hand.

  Be aware that the main body may accidentally contact the patient when the forehead rest is not used during measurement.

3 Press R/L to select the eye to be measured.

In supine position mode, the eye to be measured (R/L) is not automatically detected.

The right eye is selected as default. As necessary, press R/L to select the correct eye to be measured (m-R / m-L).

Right eye: Select m-R.

Left eye: Select m-L.

4 Continue by performing the procedures for normal measurement.

"3.4 Operating Procedure and Measurement Method" (page 48)

"3.5 AR (refractive error) Measurement" (page 54)

Note

- In supine position mode, even when the *" 7. AXIS CORRECTION" (page 84)* parameter is set to "YES", axis is not compensated.

3.7 Other Measurements

■ This section describes the following measurement modes:

"3.7.1 Quick measurement mode", *"3.7.2 Cataract measurement mode"*, *"3.7.3 Ring observation"*, *"3.7.4 Retroillumination image observation"*, *"3.7.5 Pupil size measurement (PS measurement mode)"*

3.7.1 Quick measurement mode

For measurement of children or patients who cannot fixate their eyes, the auto shot function does not work or is difficult to use causing measurement failure. In such a case, quick measurement mode is suitable.

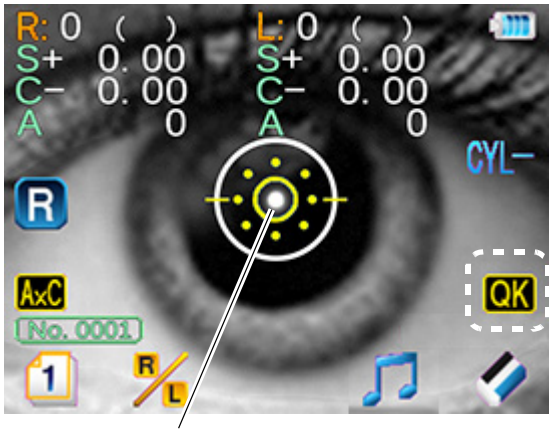
Note

Note for quick measurement mode

- The focusing indicator is not displayed.
- Be aware that measurement variations may occur more commonly in comparison with normal measurement mode.
- The fogging operation is automatically set to "1" regardless of the *" 4. FOG MODE" (page 83)* parameter setting.

1 Enter quick measurement mode.

Hold down  for more than a second and confirm that QK is displayed.



Alignment guide mark

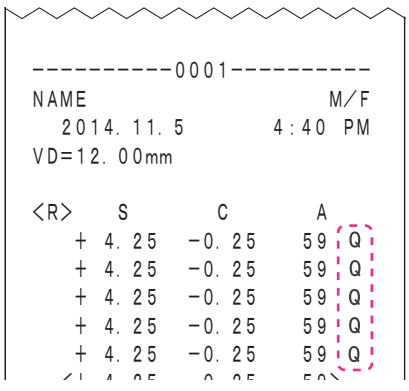
2 Adjust the main body position.

1) Adjust the main body position so that the alignment guide mark is clearly displayed.
2) Adjust the main body position so that the alignment guide mark on the patient's eye comes within the target "  ".
3) Measurement starts automatically by the auto shot function as soon as the main body position is best aligned.

3 To cancel quick measurement mode, hold down  for more than a second. Pressing  or  also cancels quick measurement mode.

● Sample printout for quick measurement mode

When data obtained in quick measurement mode is printed, "Q" is added next to the measured values to indicate that measurement was performed in quick measurement mode.



3.7.2 Cataract measurement mode

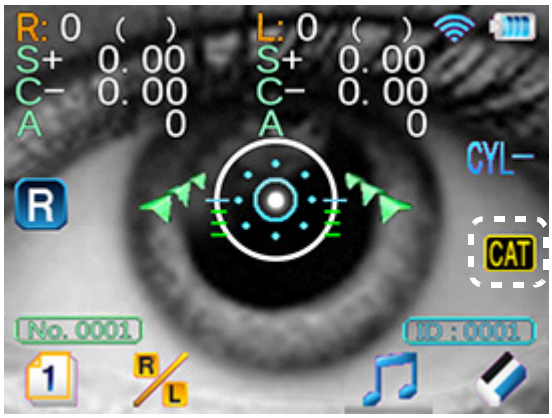
When measurement is not possible due to cataract or abnormal eyes during AR (refractive error) measurement, the device enters cataract measurement mode automatically.

1 Perform normal measurement.

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

"3.4 Operating Procedure and Measurement Method" (page 48)

"3.5 AR (refractive error) Measurement" (page 54)



2 Cataract measurement mode is canceled when or is pressed, or when or is changed

Note

- In cataract measurement mode, measurement conditions are changed so that measurement results can be easily obtained.
- In cataract measurement mode, be aware that measurement variations may occur more commonly in comparison with normal measurement mode.

- Sample printout for cataract measurement mode

  When data obtained in cataract measurement mode is printed, "*" is added next to the measured values to indicate that measurement was performed in cataract measurement mode.

  The factory setting is "NO".

```
----------0001----------
NAME                  M/F
  2014. 11. 5      4:40 PM
VD=12. 00mm

<R>    S       C       A
    - 1. 25  -1. 00  177 *8
    - 1. 25  -1. 00  174 *8
    - 1. 25  -1. 00  175 *8
  <- 1. 25  -1. 00  175>
```

Note

- When the measurement was performed in both quick measurement mode and cataract measurement mode at the same time, "Q" is printed next to the measured values.

3.7.3 Ring observation

The ring image obtained during measurement is displayed on the screen. It allows the condition of the patient's eye to be observed.

1 Perform AR measurement.

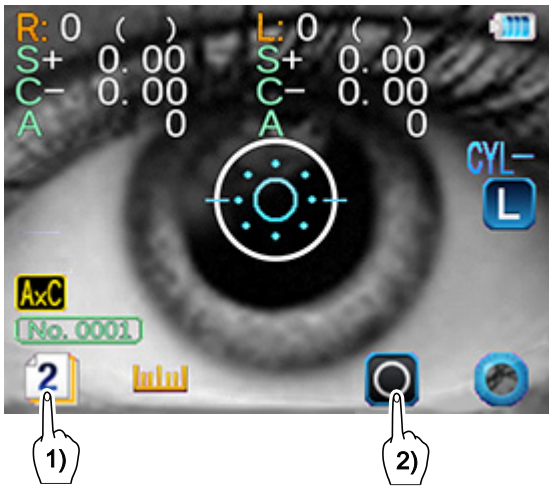
"3.5 AR (refractive error) Measurement" (page 54)

2 Display the ring image screen.

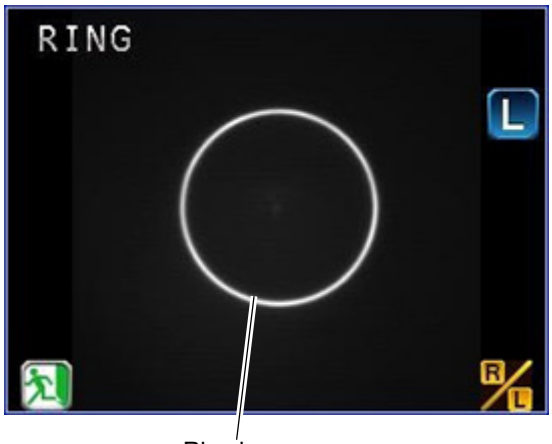
1) Press 1 to display page 2.

2) Press .

The ring image obtained in the last measurement is displayed on the ring image screen.



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



3 Press to return to the previous screen.

3.7.4 Retroillumination image observation

This procedure checks for opacity around a crystalline lens.

Note

- Keep the main body as stable as possible when capturing retroillumination images.
- When the *" 31. PRINT" (page 84)* parameter is set to "AUTO", to print the retroillumination image together with AR measurement values, capture retroillumination images before the AR measurement.
- When the *" 91. STATION I/F" (page 90)* parameter is set to "IR (infrared communication)", retroillumination images cannot be printed.

1 Display the retroillumination image observation screen.

1) Press 1 to display page 2.

2) Press .

Retroillumination image observation screen is displayed and the light intensity is automatically controlled.

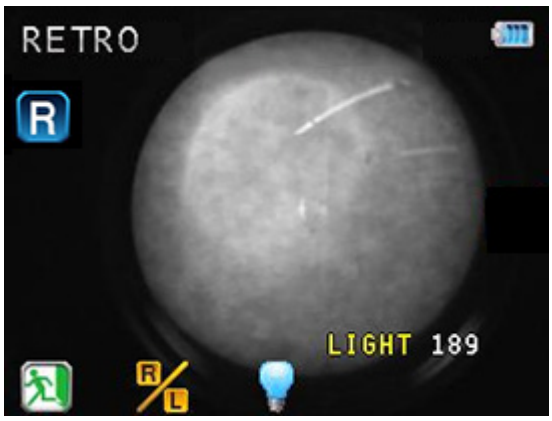
2 As necessary, adjust the light intensity manually.

1) Press .

The light intensity automatic control is deactivated.

2) Adjust the light intensity with the displayed up/down buttons. (LIGHT: 80 to 200)

- [L-UP] button: Increases the light.
- [L-DW] button: Decreases the light.



3 Adjust the main body position so that the opacity is in focus and the alignment guide mark is not prominent.

4 Press to capture image.

- When several images are captured, the last image is saved.
- After image capture, pressing on a still image changes the screen to the capture screen.

5 Change the eye to be measured (R/L). Measure the other eye in the same manner.

6 Press to return to the previous screen.

3.7.5 Pupil size measurement (PS measurement mode)

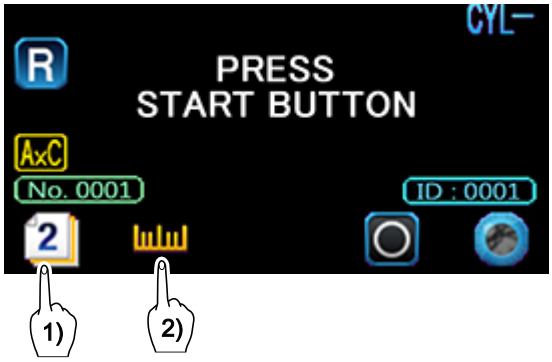
This section describes operation procedure for manual PS measurement when the *" 75. AUTO PS" (page 88)* parameter is set to "No".

When this parameter is set to "YES", the following procedure is not necessary. The pupil size (PS) is automatically measured during AR measurement.

1 Enter PS measurement mode.

1) Press 1 to display page 2.

2) Press to enter PS measurement mode.



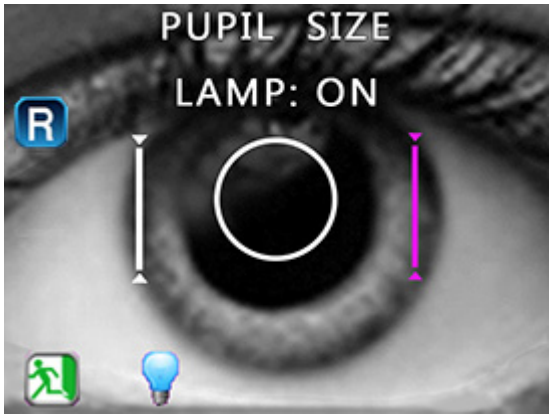
2 To measure the pupil size under reduced lighting, press to turn off the illumination lamp.

3 Adjust the main body position to bring the patient's eye into focus.

4 Press to capture image.

The screen switches from a live image to the captured image.

After image capture, instruct the patient to rest comfortably.



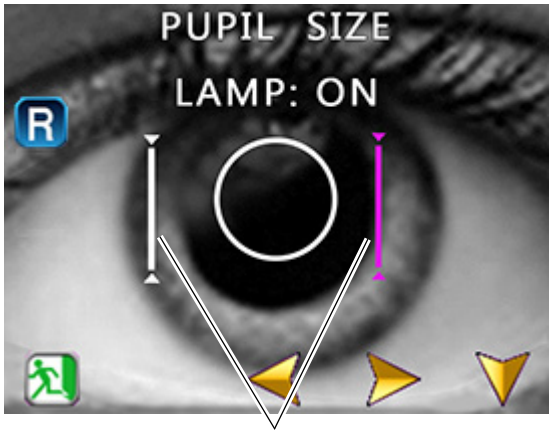
5 Press or to align the guide lines on the pupil of the patient's eye.

The guide line to be aligned is displayed in pink.

Pressing switches the guide line selection (R/L).

6 Press to perform measurement.

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



Guide line

7 Change the eye to be measured (R/L). Measure the other eye in the same manner.

Switching the eye to be measured opens the screen displayed in Step 2.

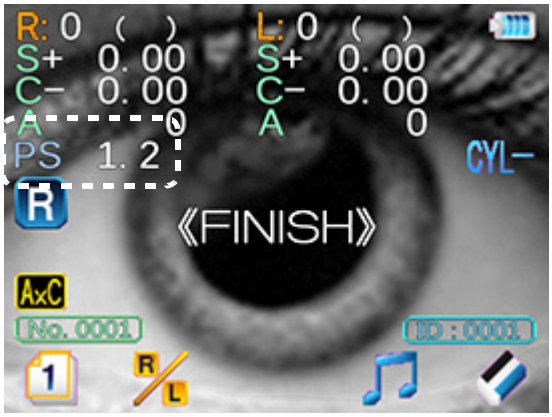
Note

- When the *" 31. PRINT" (page 84)* parameter is set to "AUTO", to print pupil size (PS) measurement values together with AR measurement values, perform pupil size (PS) measurement before the AR measurement.
- When measuring a supine patient from their side in supine position mode, the pupil size is measured in the vertical direction of the eye.

8 Press to return to the previous screen.

The screen returns to the main screen.

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



3.8 Printing Measured Values

■ Three printing settings (“PRINT1” to “PRINT3”) are available to customize the printing contents. Set the parameters as necessary or desired.

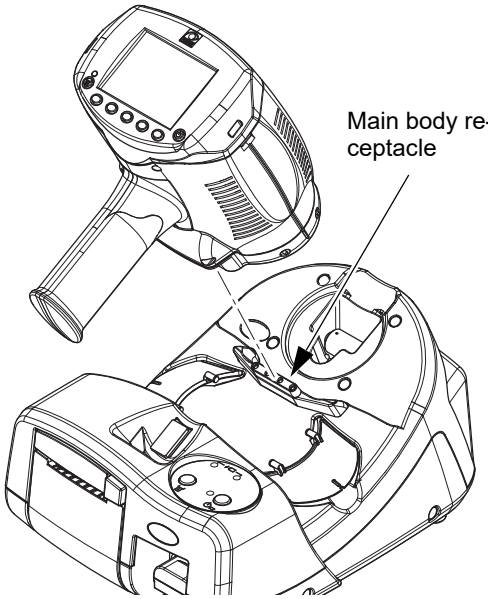
“● *PRINT1 (Print setting 1)” (page 84)*, “● *PRINT2 (Print setting 2)” (page 86)*, “● *PRINT3 (Print setting 3)” (page 87)*

1 When measurement is complete, print the measured values.

The following two methods are available for printing by infrared communication.

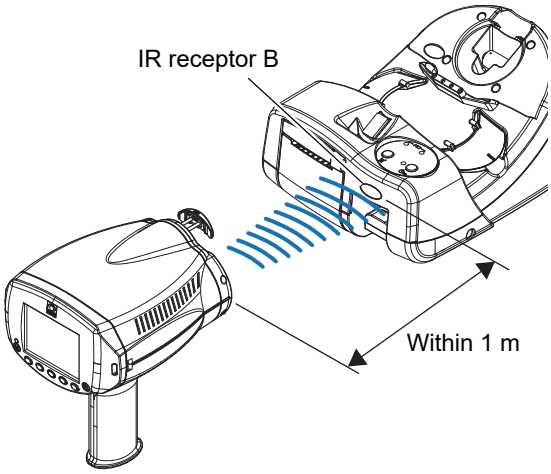
- Place the main body on the station, then press  .

  Placing the main body on the station offers more stable communication.



- Aim the main body toward the IR receptor B of the station, then press  .

  The maximum communication distance between the main body and station is 1 m.



Note

- When the *“ 31. PRINT” (page 84)* parameter is set to “AUTO”, printing starts automatically without having to press  .
- When the *“ 91. STATION I/F” (page 90)* parameter is set to “IR (infrared communication)”, press  . “AUTO” cannot be selected for the *“ 31. PRINT” (page 84)* parameter.

2 Check the printed measurement results.

- The results are printed from the station's printer. At the same time, the data is saved to the main body.
- When the *" 32. OUTPUT W/PRINT" (page 84)* parameter is set to "YES", the data is output to the destination specified by the *" 92. OUTPUT TO PC" (page 90)* parameter and to the refractor (when the *" 93. OUTPUT TO RT" (page 90)* parameter is set to "YES").

Note

- Do not touch the printer paper or printer cover during printing. Printed characters may become blurred or obscured.
- When the *" 35. PRINT&CLEAR" (page 85)* parameter is set to "NO", as long as the measurement data is saved in the main body, printing may be repeated as many times as desired.
  After printing, the printed data is automatically deleted when the next measurement is performed.
- When the *" 35. PRINT&CLEAR" (page 85)* parameter is set to "YES", the data is deleted when printed. Printing of the same data is not possible. However, when any output or printing error occurs, the data is preserved.

  "3.10.3 Printing selected data" (page 73)
- When the following is performed with the *" 91. STATION I/F" (page 90)* or *" 92. OUTPUT TO PC" (page 90)* set to "WLAN", make sure that the wireless LAN icon is displayed in blue on the screen for proper printing;
  - The display is changed to the main screen from other screens;
  - Printing is previously performed.
- Even when the wireless LAN icon is displayed in blue, the device may fail to communicate data in the WLAN setting. Then, the wireless LAN icon is displayed in a color other than blue. After making sure that the wireless LAN icon is displayed in blue, perform printing again.
- When the printer paper runs out while printing, the message "OUT OF PAPER" is displayed on the screen (this message does not appear while the device is communicating by infrared). Alternatively, the pilot lamp of the station blinks twice. Load a new printer roll.

  "2.4.5 Setting the printer paper" (page 32)
- When the printer cover is open while printing, the message "OUT OF PAPER" is displayed on the screen (this message does not appear while the device is communicating by infrared). Alternatively, the pilot lamp of the station blinks three times. Close the printer cover.
  When a paper jam occurs, either the message, "OUT OF PAPER", may appear or the pilot lamp of the station may blink depending on the condition. Check the printer.
- With errors other than paper empty or cover open, the pilot lamp of the station blinks four times repeatedly. In such a case, check the paper and cover then press  .
- Data is being transmit while "SENDING DATA" is displayed on the screen. Do not turn off the main body or the station.

- Sample printout

<Sample printout - 1>

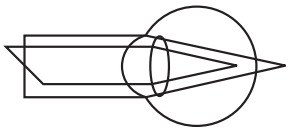
Standard printing by default

```
----------0001----------
NAME                    M/F
  2014. 11. 5       4:40 PM
VD=12. 00mm

<R>    S       C       A
    + 4. 25  -0. 25    59
    + 4. 25  -0. 25    59
    + 4. 25  -0. 25    59
    + 4. 25  -0. 25    59
    + 4. 25  -0. 25    59
  <+ 4. 25  -0. 25    59>


<L>    S       C       A
    + 4. 75  -0. 25   172
    + 4. 75  -0. 25   169
    + 4. 75  -0. 25   169
  <+ 4. 75  -0. 25   169>


        NIDEK  HandyRef
```

<Sample printout - 2>

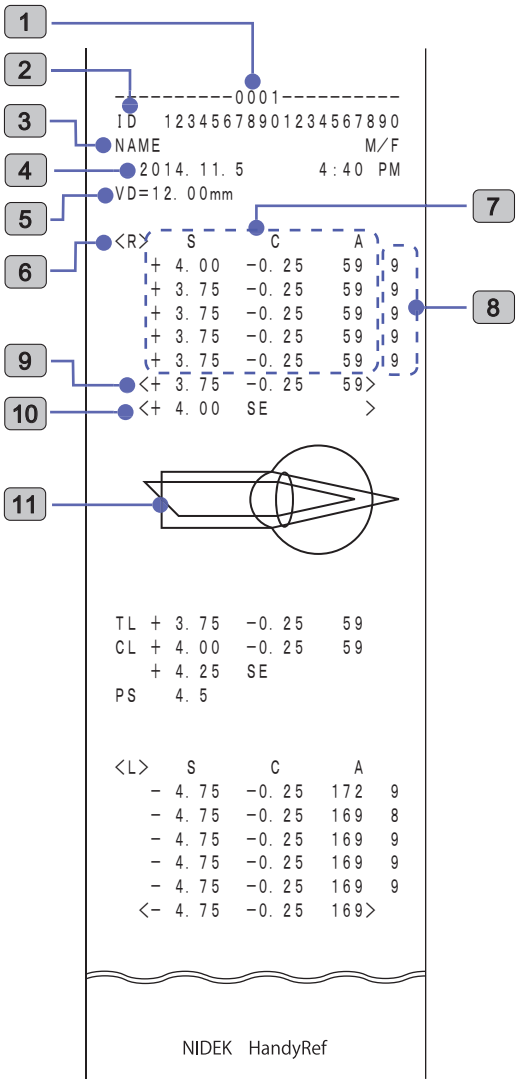
Items added to the standard printing

```
----------0001----------
ID  12345678901234567890
NAME                    M/F
  2014. 11. 5       4:40 PM
VD=12. 00mm

<R>    S       C       A
    + 4. 00  -0. 25    59   9
    + 3. 75  -0. 25    59   9
    + 3. 75  -0. 25    59   9
    + 3. 75  -0. 25    59   9
    + 3. 75  -0. 25    59   9
  <+ 3. 75  -0. 25    59>
  <+ 4. 00  SE          >
```



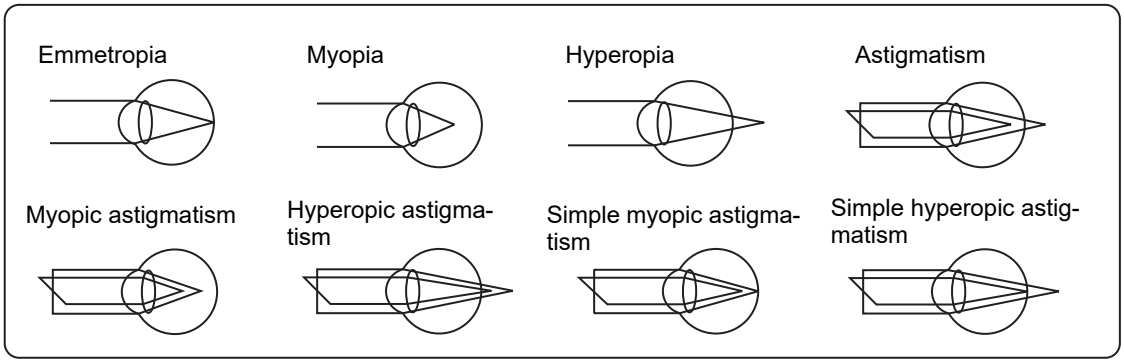
```
TL + 3. 75  -0. 25    59
CL + 4. 00  -0. 25    59
   + 4. 25  SE
PS    4. 5


<L>    S       C       A
    - 4. 75  -0. 25   172   9
    - 4. 75  -0. 25   169   8
    - 4. 75  -0. 25   169   9
    - 4. 75  -0. 25   169   9
    - 4. 75  -0. 25   169   9
  <- 4. 75  -0. 25   169>


        NIDEK  HandyRef
```

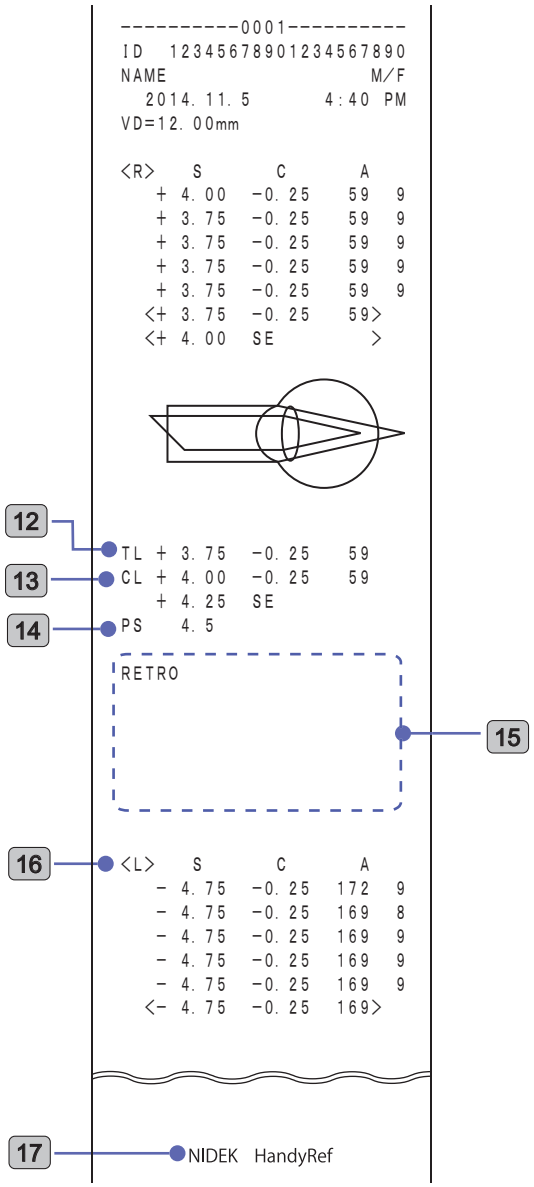
● Print contents



No.	Description
1	Patient number
2	Patient ID Patient ID scanned by the optional barcode scanner or magnetic card reader
3	Name and sex
4	Measurement date and time
5	Vertex distance The distance between the corneal vertex to the posterior surface of spectacle lenses
6	<R> Patient's right eye data
7	AR measurement data
	S: Spherical refractive error
	C: Cylindrical refractive error
	A: Cylinder axis
8	Confidence index The confidence index is displayed from best to worst in six levels (9, 8, 7, 6, 5 or E). "E" indicates erroneous data.
9	AR median values Printed when three or more AR measurement values are obtained (excluding errors and erroneous data).
10	SE (Spherical Equivalent) value Calculated for the AR median values (the latest values when the AR median values have not been obtained).
11	Eye diagram Eye diagram of refractive status of the patient's eye based on the AR median values (or the latest values when median values have not been obtained). For details, see Fig. 1*.

Fig. 1*





No.	Description
12	Trial lens data These are the values that were converted automatically from the cylinder values so that the sphere values for the trial lens become smaller based on AR median values (the latest values when the median values have not been obtained).
13	Contact lens conversion value The value from which the AR median values (the latest values when the median values have not been obtained) are converted into CL values, with the vertex distance (VD) at 0 mm.
14	PS (pupil size) measured value When the chart-illuminating lamp is turned on or off during manual PS measurement, (LAMP=ON) or (LAMP=OFF) is printed out accordingly.
15	Retroillumination image
16	<L> Patient's left eye data
17	Comments Characters and symbols can be freely entered. For the entry procedure, *"4.1.6 Entering comments" (page 97)*

3.9 Measured Value List on Summary Screen

■ Various measured values (median values or the latest values when median values have not been obtained) can be displayed together on the summary screen. Measured values can be checked, printed, or output from this screen.

To allow the summary screen to be displayed, set the *" 39. SUMMARY" (page 85)* parameter to "YES".

1 When 《FINISH》 is displayed for measurement of both eyes, the summary screen appears. To display the summary screen before 《FINISH》 is displayed for measurement of both eyes, press .

2 Confirm the measured values on the summary screen.

To return to the main screen after checking the measured values, press .

3 To print the data, press again.

Measured results are printed and the screen returns to the main screen.

Note

- The summary screen can be displayed at anytime as long as measurement data is obtained. Items that have not been measured are left blank.
- Printing from the summary screen is performed in the same manner as normal printing.

3.10 Memory Data Management

3.10.1 Saving memory data

The latest measurement data of up to 50 patients (100 eyes) can be saved in the main body memory.
The data is automatically saved when it is printed.

- When the *" 31. PRINT" (page 84)* parameter is set to "AUTO": when AUTO printing is performed.
- When the *" 31. PRINT" (page 84)* parameter is set to other than "AUTO": when  is pressed.

To save data without printing, set the *" 31. PRINT" (page 84)* parameter to "NO".
The saved data is stored in the main body even after the battery is drained.

- The following data can be saved:
  - Patient ID
  - Date and time
  - Refractive power measurement data
  - Pupil size

Note

- If saved data sets exceed 50 (maximum), the data is erased in order from the oldest so that new data can be saved.
- To check the number of data items saved in the main body, press  on the main screen or AR measurement screen. The number is displayed as "*/50 ARE STORED" on the main screen.

3.10.2 Printing all saved data

All measured data saved in the main body is printed.

By the *" 33. MEMORY PRINT" (page 85)* parameter, printing only (PRINT), data output only (OUTPUT), or both (BOTH) can be selected.

When "PRINT" is selected, even if the *" 93. OUTPUT TO RT" (page 90)* parameter is set to "YES", the data is not output to the refractor.

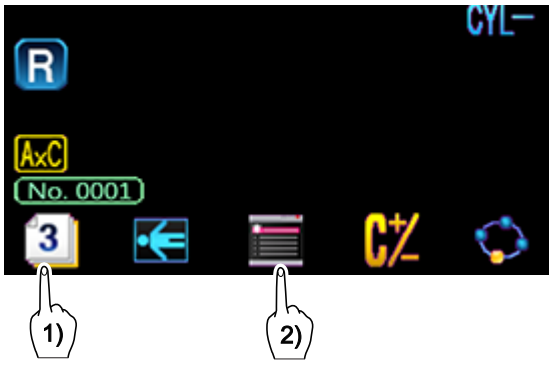
Note

- Printing of all saved data is not possible for infrared communication. Select each data one by one for printing.

1 Display the MEMORY DATA MANAGEMENT screen.

1) Press 1 to display page 3.

2) Press to display the MEMORY DATA MANAGEMENT screen.



2 Select "ALL PRINT" with or button and press .

The message "PRINT ALL SAVED DATA" appears.

3 Print all the saved data.

Select "YES" with or button and press to print all data indicated by "4/50" used as an example in the figure for Step 2.

In this example, "4/50" represents "The number of sent data / The number of saved data".

Note

- All saved data (4/50 shown in the example above) is output according to the current settings for CYL mode, vertex distance, and such.

4 During printing, the message “NOW PRINTING… □/□” is displayed.

Pressing the STOP button cancels the printing from the next data.

When printing is complete, the message “NOW PRINTING… □/□” disappears.

Note

- The printing contents differ depending on the parameters.
- Printing is possible as many times as desired until the saved data sets are deleted.

3.10.3 Printing selected data

Select the measured data saved in the main body to be printed.

By the *“ 33. MEMORY PRINT” (page 85)* parameter, printing only (PRINT), data output only (OUTPUT), or both (BOTH) can be selected.

When “PRINT” is selected, even if the *“ 93. OUTPUT TO RT” (page 90)* parameter is set to “YES”, the data is not output to the refractor.

Note

- For infrared communication, select each data one by one for printing. Multiple data cannot be selected to be printed at the same time.

1 Display the MEMORY DATA MANAGEMENT screen.

1) Press 1 to display page 3.

2) Press to display the MEMORY DATA MANAGEMENT screen.

2 Select “PRINT” with or button and press .

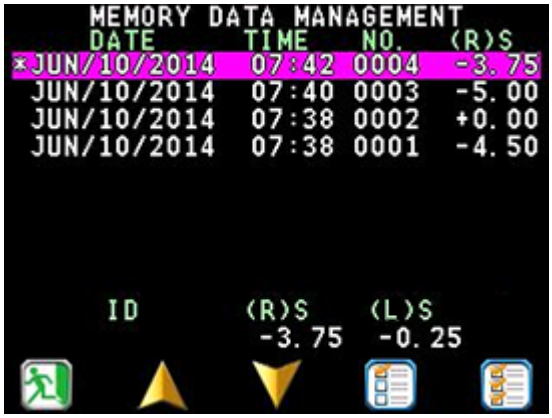
The data print screen appears (the list of date, time, No. and SPH data for the right eye).

3 Select or deselect data.

1) Select the data to be selected or deselected by pressing  or  .

2) Press  to select or deselect the data by line.

Pressing  selects or deselects the data by page.



4 Press  .

The message “PRINT SELECTED DATA” appears.

5 Print the selected data.

Select “YES” with  or  button and press  to print the selected data.

Selecting the STOP button cancels the printing from the next data.

Note

- The printing contents differ depending on the parameters.

  For the parameters related to printing, *“● PRINT1 (Print setting 1)” (page 84)*, *“● PRINT2 (Print setting 2)” (page 86)*, *“● PRINT3 (Print setting 3)” (page 87)*

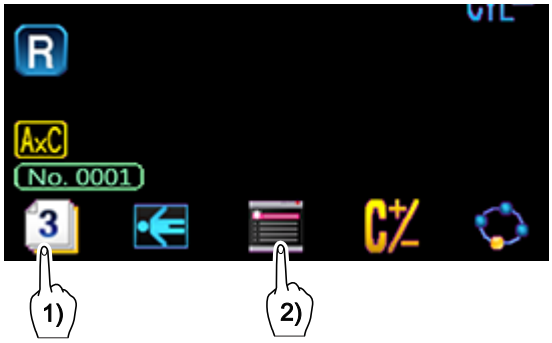
3.10.4 Deleting memory data

All measured data saved in the main body is deleted.

1 Display the MEMORY DATA MANAGEMENT screen.

1) Press 1 to display page 3.

2) Press to display the MEMORY DATA MANAGEMENT screen.



2 Select “ALL CLEAR” with or button and press .

The message “DELETE ALL SAVED DATA” appears.

3 Delete all saved data.

Select “YES” with or button and press to delete all the saved data. The message “DELETE ALL SAVED DATA” appears.

Selecting the STOP button cancels the deletion from the next data.

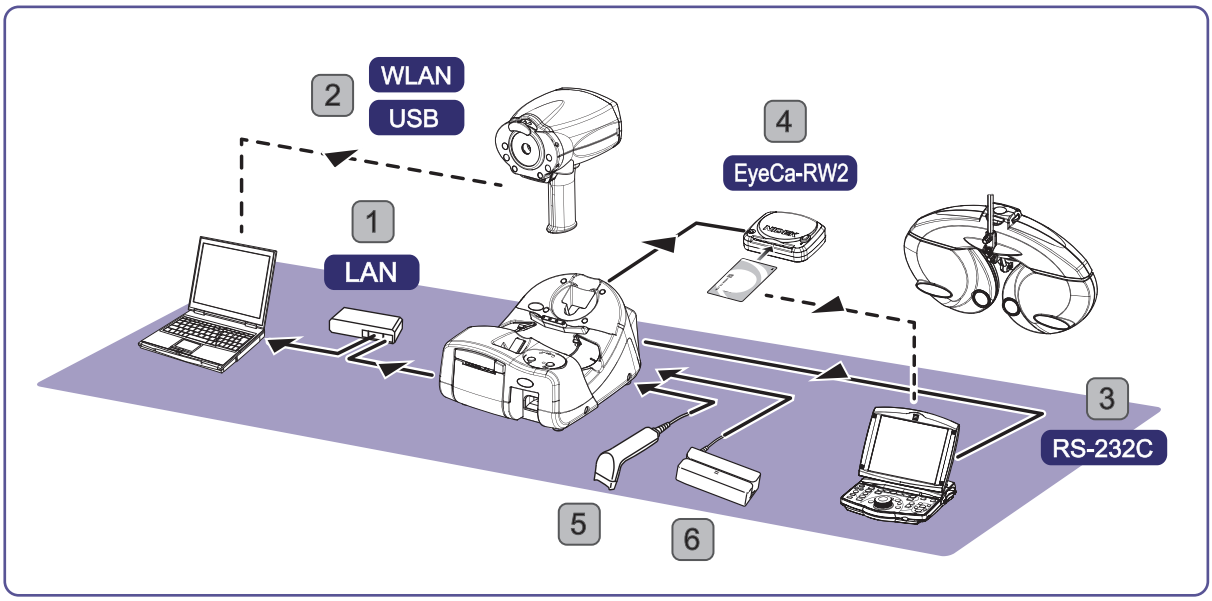
When deletion is complete, the screen returns to the MEMORY DATA MANAGEMENT screen and the message “0/50 ARE STORED” is displayed.

3.11 Connection and Handling of Peripheral Devices

- The device can export data to an external device such as the NIDEK motorized refractor or a computer.

  The patient ID can be imported using the optional barcode scanner or magnetic card reader.
- Availability of the printing and external communication functions differs depending on the communication method between the main body and the station. *"2.5.4 Functionality depending on communication method" (page 40)*

3.11.1 Connecting peripheral devices

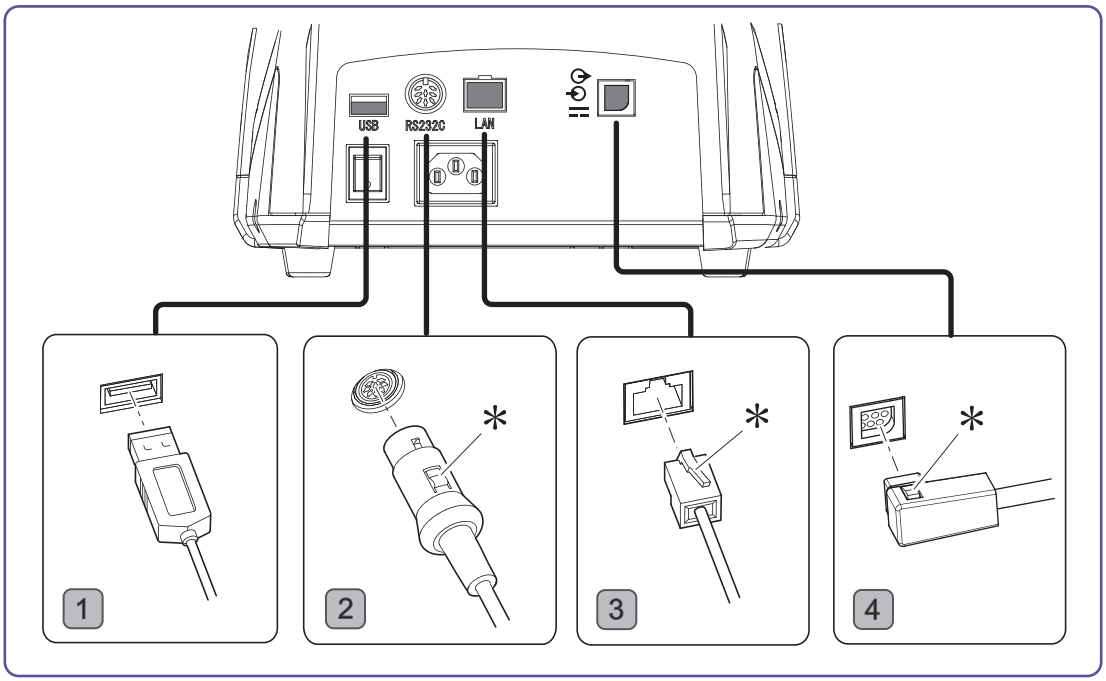


No.	Connection method / connecting device	Connection port	Function
1	LAN	LAN port of the computer	AR data are exported. Measured data is managed by database software such as NAVIS.
2	WLAN - - - - - - - - - - - - - - - - USB flash drive	Wireless LAN - USB port of the computer	AR data are exported. Measured data is managed by database software such as NAVIS.
3	RS-232C	RS-232C port of the RT-5100	AR data are exported. AR data is used as objective values in the subjective test by the RT.
4	EyeCa-RW2	Insert the Eye Care card to the RT-5100 or RT-3100.	AR data are exported. AR data is used as objective values in the subjective test by the RT.
5	Barcode scanner	USB port of the station	Patient ID is read.
6	Magnetic card reader		

⚠ CAUTION

- Do not use devices other than the specified barcode scanner or magnetic card reader.
  IDs cannot be read correctly or device malfunction may result.
- Be sure to perform LAN connection via a network switch.
  Data communication may not be properly performed.
- Before connecting a connection cable, be sure to turn off all devices.
  Connecting the cable with power on may cause malfunction.
- Ensure that the plugs are securely inserted into the ports in the proper orientation. Do not connect them with excessive force.
  Damage to the ports or communication failure may result.
- When connecting a computer, use one that complies with CISPR 32.

To remove the plugs of “2. RS-232C communication cable (optional)”, “3. LAN cable”, and “4. Connection cable”, hold down the clasp marked by “*” and pull it out.



Note

- The RS-232C communication cable (optional) to be used varies depending on the connecting device. For details, contact NIDEK or your authorized distributor.
- Before connecting the device to the network (LAN connection), set parameters of the device and computer under supervision of your network administrator.

3.11.2 Connection with computer

The following three types of connection are available for outputting data to a connected computer.

- Connection by LAN cable (by station)
- Connection by wireless LAN
- Export by a USB flash drive

The availability of the communication methods differs depending on the connection type. See *"2.5.4 Functionality depending on communication method" (page 40)*.

○ Connection by LAN cable (via station)

Connect the station and computer by a LAN cable.

In this configuration, the main body and station can only be connected by wireless LAN (AD HOC) or the connection cable.

Infrared communication and wireless LAN (INFRA.) are not available.

● Connection procedure

1) Connect the main body and the station by the connection cable. When using a wireless LAN (AD HOC only), set the relevant parameters for the main body and station.
2) Connect the station and computer by a LAN cable, then set the relevant parameters.

● Operation procedure

When measurement is complete, press  on the main body.

Pressing  prints and outputs the measured data to the computer at the same time (when the *" 32. OUTPUT W/PRINT" (page 84)* parameter is set to "YES").

When the measured data is not going to be printed (when the *" 31. PRINT" (page 84)* parameter is set to "NO"), pressing  outputs the measured data to the computer.

When the *" 31. PRINT" (page 84)* parameter is set to "AUTO", it is not necessary to press  .

○ Connection by wireless LAN

Connect the main body and the computer by a wireless LAN.

● Connection procedure

After setting up the wireless LAN network for the connected computer, set the relevant parameters for the main body.

● Operation procedure

Perform the same procedures described in *"Connection by LAN cable (via station)"*.

- When wireless LAN cannot be used due to radio interference or such, use a LAN cable or USB flash drive for communication.

○ Export to a USB flash drive

Export the data to a USB flash drive inserted in the main body, then insert this USB flash drive to the computer to transfer data.

- Connection procedure

Insert the USB flash drive (specified by NIDEK) to the USB port at the bottom of the main body.

- Set the parameter *" 32. OUTPUT W/PRINT" (page 84)* to "YES".
- Set the parameter *" 92. OUTPUT TO PC" (page 90)* to "USB MEM".

- Operation procedure

Perform the same procedures described in *"Connection by LAN cable (via station)"*.

- Do not insert or remove the USB flash drive while accessing data.
- Writing data time may increase as the USB flash drive fills with data. Move or delete data from the USB flash drive on a regular basis.

3.11.3 Handling of barcode scanner and magnetic card reader

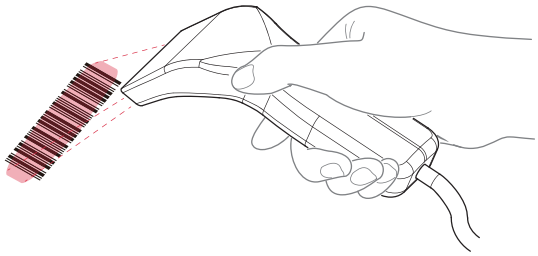
Note

- Although a patient ID can be read before or after measurement, read it before printing the measured results.
- If a patient ID is read with the measured data that has been printed still displayed, the device recognizes the displayed data as that of a former patient, and erases it automatically.
- The latest patient ID that was read before printing will be the patient ID of the printed data and the output data. To change the patient ID, read the correct ID again.
- When the main body and station are connected by infrared, data cannot be read by the barcode scanner or magnetic card reader.
- When the main body and station are connected by a wireless LAN, reading a patient ID for the first time by the barcode scanner or magnetic card reader may take some time. It is recommended to read a sample ID as soon as the device is turned on.
  There may be some time delay for subsequent readings as well depending on the connection condition.

- Reading patient ID with the barcode scanner

  Place the scanner window over the barcode and press the trigger button.

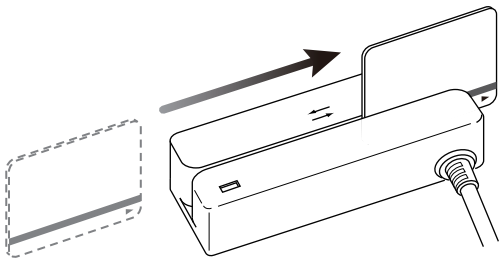
  When the barcode has been read successfully, the confirmation LED of the barcode scanner lights up.



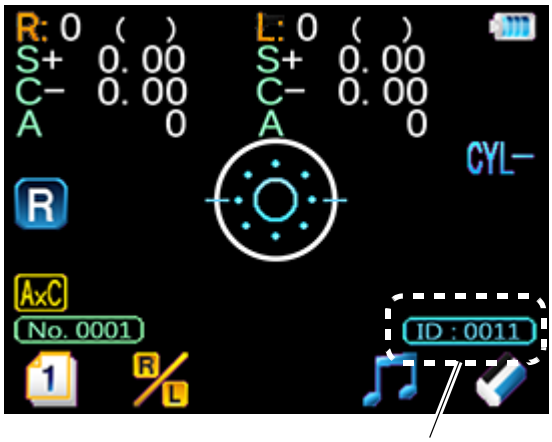
- Reading patient ID with the magnetic card reader

  Swipe the card with the magnetic card reader.

  A beep sounds and the green LED of the magnetic card reader goes out. When the card has been read successfully, the LED lights up.



When the patient ID has been read successfully, the device displays the ID.



Note

- Use a CODE39 barcode.
- Use a magnetic card utilizing a magnetic stripe format compliant with ISO 7811, AAMVA, and CA DMV.
- For the patient ID, alphanumeric characters, spaces, "_" (underscore) and "-" (hyphen) symbols can be used.
  Other symbols are not recognized by the device and converted to "~" (tilde).

4 PARAMETER SETTINGS AND MAINTENANCE

4.1 Parameter Settings

4.1.1 Setting procedure

Various device parameter settings can be changed from the PARAMETER SETTING screen.

Before changing or implementing the *"● COMMUNICATION (Communication function)" (page 90)*, *"● NETWORK 1 (LAN communication function 1)" (page 91)*, and *"● NETWORK 2 (LAN communication function 2)" (page 93)* parameters, be sure to connect the main body and the station by the cable.

When any setting has been changed, be sure to restart the main body and station after the screen returns to the main screen.

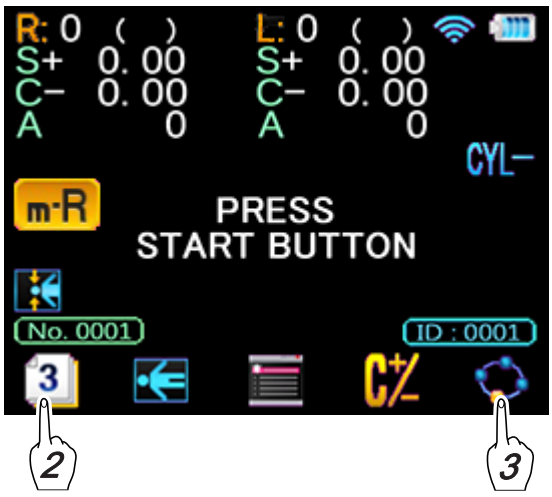
For the connection procedure, see *"2.5.1 Connection by cable" (page 37)*.

1 Turn on the main body and wait for the main screen to display.

2 Press 1 to display 3 screen.

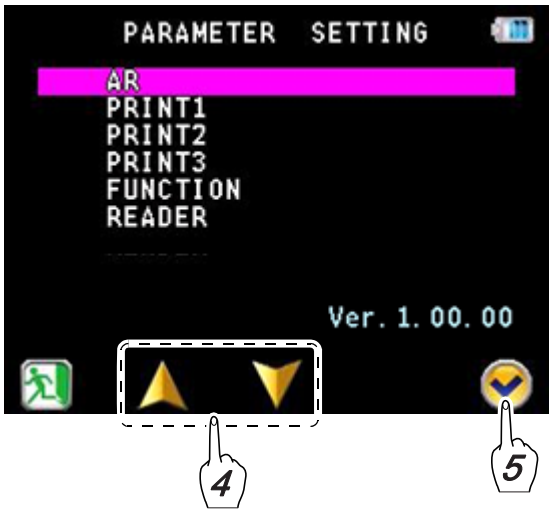
3 Hold down for more than a second.

The PARAMETER SETTING screen is displayed.



4 Press or to move the highlight to select the desired item.

5 Press to display the parameter option screen of the selected item.



6 Press ▼ to select the parameter option to be changed.

7 Press ◀ or ▶ to change the setting.

For details of the parameter options,

"4.1.2 Parameter settings" (page 83)

8 Hold down ⏏ for more than a second.

The parameter setting is saved and the screen returns to the previous screen.

9 To change other parameter settings, repeat Steps 4 to 8.

10 When the setting is complete, press ⏏ to confirm the entry.

The screen returns to the main screen.

11 Turn off power to the main body and station.

When the device is turned on again, the parameter changes will take effect.

- Steps 10 to 11 is required for any parameter change of the main body and station to take effect.

Note

- Pressing ▼ or ⏏ selects the next parameter heading (such as AR or PRINT1).
- After changing the setting, do not turn off the device until the screen returns to the main screen displayed in Step 3 by holding down ⏏. Otherwise, the settings are not saved.
- Press 🖨 to print the setting contents.

4.1.2 Parameter settings

Note

• Underlined options indicate factory settings.

- AR (AR measurement)

AR parameter screen

Parameter option	Setting contents
1. AR STEP (Refractive power measurement increments)	0.12D / <u>0.25D</u>
	Selects the display increments of SPH or CYL for refractive power measurement.
2. VERTEX D. (Vertex distance)	0.00mm / 10.50mm / <u>12.00mm</u> / 13.75mm / 15.00mm / 16.50mm
	Selects the distance between the corneal vertex to the spectacle lens when the patient wears glasses. * 13.75 mm is the factory setting of devices destined for NIDEK INCORPORATED.
3. AXIS STEP (Axis angle increments)	<u>1°</u> / 5°
	Selects the display increments of AXIS.
4. FOG MODE (Fog mode)	<u>1</u> / 2 / 3
	See (*1).
5. AM MODE (AM mode)	<u>YES</u> / NO
	Sets whether *" 5. AM MODE"* is used or not. YES: Measurements are performed for the number of measurements specified by the *" 6. AR CONTINUE"* parameter. • Measurement finishes when stable measurement values are obtained. • If measurement values are not stable, two additional measurements are performed then the measurement finishes. NO: When the number of measurements specified by the *" 6. AR CONTINUE"* parameter is complete, measurement finishes.
6. AR CONTINUE (AR successive measurement)	<u>3</u> to 10
	Sets the number of measurements to complete the AR measurement cycle.

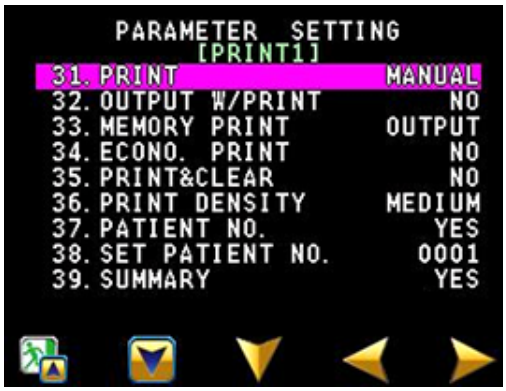
7. AXIS CORRECTION (Axis compensation)	YES / NO
	Sets whether to detect the main body's inclination by the sensor to perform automatic axis correction using the level position (0º) as the reference. The axis correction function is disabled in supine position mode.
8. MEAS. MODE (Measurement mode)	NORMAL / QUICK
	Sets the default measurement mode when the device is turned on.

(1*) 4. FOG MODE

1	2	3
Short (Only at the initial measurement of successive measurement and when additional fogging is needed)	Normal (Only at the initial measurement of successive measurement and when additional fogging is needed)	Normal (Each measurement)

- PRINT1 (Print setting 1)

PRINT1 parameter screen

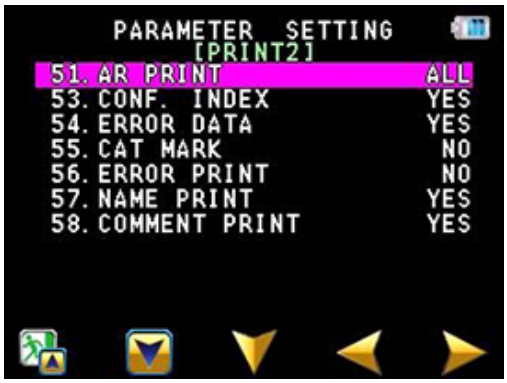


Parameter option	Setting contents
31. PRINT (Printing)	MANUAL / AUTO / NO
	Sets the printing operation from among MANUAL, AUTO, and NO. • MANUAL: Pressing the print button starts printing. • AUTO: Printing starts automatically when measurement is complete. • NO: Printing does not occur. * When the *" 91. STATION I/F" (page 90)* parameter is set to "IR", "AUTO" cannot be selected.
32. OUTPUT W/PRINT (Data output during printing)	YES / NO
	Sets whether to output data during printing. When set to "YES": • Data is output to the destination specified by the *" 92. OUTPUT TO PC" (page 90)* parameter. • When the *" 93. OUTPUT TO RT" (page 90)* parameter is set to "YES", the data is output to the refractor.

33. MEMORY PRINT (Printing memory data)	PRINT / OUTPUT /BOTH
	Sets the output type of memory data. • PRINT: Only printing occurs. • OUTPUT: Only data output occurs. • BOTH: Both printing and data output occur. • Data is output to the destination specified by the *" 92. OUTPUT TO PC" (page 90)*. When the *" 93. OUTPUT TO RT" (page 90)* parameter is set to "YES" with only one data being selected, the data is output to the refractor.
34. ECONO. PRINT (Economical printing)	YES / NO
	Sets whether to print the data with reduced line-spacing to save printer paper.
35. PRINT&CLEAR (Erasing of data after printing)	YES / NO
	Sets whether to delete the measured data when the next measurement is performed after printing. * When the *" 91. STATION I/F" (page 90)* parameter is set to "IR (infrared communication)", the data is not automatically deleted.
36. PRINT DENSITY (Density of printed text)	LOW / MEDIUM / HIGH
	Sets the density of the printed text from among LOW, MEDIUM, and HIGH.
37. PATIENT NO. (Printing of patient number)	YES / NO
	Sets whether to print the patient number.
38. SET PATIENT NO. (Setting of patient ID)	0001 to 9999
	Sets the patient number in the range from 0001 to 9999. Move the highlight to SET PATIENT NO. and press [→] or [←] to change the patient number. • [→] button: Advances the patient number. • [←] button: Reduces the patient number.
39. SUMMARY (Display of summary screen)	YES / NO
	When "YES" is selected, finishing measurement for both eyes or pressing the print button displays the summary screen before the data is printed out.

- PRINT2 (Print setting 2)

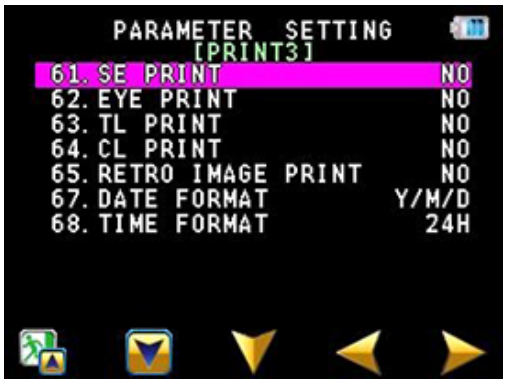
PRINT2 parameter screen



Parameter option	Setting contents
51. AR PRINT (Print format of AR data)	ALL / SHORT
	Selects the print format of AR data. • ALL: All data and median values are printed. • SHORT: Only median values are printed (when median values have not been obtained, the latest values are printed).
53. CONF. INDEX (Printing of confidence index)	YES / NO
	Sets whether to print the confidence index.
54. ERROR DATA (Erroneous data)	YES / NO
	Sets whether to display and print erroneous data of AR measurement. When set to “YES” and the measured results are erroneous, the measured values are displayed in yellow on the screen. In addition, the printed measured data is preceded by “Err”. When the *“ 53. CONF. INDEX” (page 86)* parameter is set to “YES”, “E” is printed for the confidence index.
55. CAT MARK (Cataract indication)	YES / NO
	Sets whether to print “*” representing that measurement has been performed in cataract measurement mode.
56. ERROR PRINT (Error print)	YES / NO
	Sets whether to print failed AR data. When set to “YES”, errors such as blink error, range over error, and confidence index error are printed.
57. NAME PRINT (Printing of name)	YES / NO
	Sets whether to provide printing spaces for the patient’s name and sex.
58. COMMENT PRINT (Printing of comments)	YES / NO
	Sets whether to print comments.

- PRINT3 (Print setting 3)

PRINT3 parameter screen



Parameter option	Setting contents
61. SE PRINT (Printing of SE values)	YES / <u>NO</u>
	Sets whether to print SE values based on the AR median values (or the latest values when the median values have not been obtained).
62. EYE PRINT (Printing of eye diagram)	YES / <u>NO</u>
	Sets whether to print an eye diagram based on the AR median values (or the latest values when median values have not been obtained). * When the *"91. STATION I/F" (page 90)* parameter is set to "IR (infrared communication)", EYE PRINT cannot be performed.
63. TL PRINT (Printing of trial lens data)	YES / <u>NO</u>
	Sets whether to print trial lens data based on the AR median values (or the latest values when the median values have not been obtained).
64. CL PRINT (Printing of contact lens conversion data)	YES / <u>NO</u>
	Sets whether to print contact lens conversion values based on the AR median values (or the latest values when the median values have not been obtained) and SE value based on the conversion values.
65. RETRO IMAGE PRINT (Printing of retroillumination image)	YES / <u>NO</u>
	Sets whether to print the retroillumination image. * When the *"91. STATION I/F" (page 90)* parameter is set to "IR (infrared communication)", retroillumination image cannot be printed.
67. DATE FORMAT (Date format)	Y/M/D / <u>M/D/Y</u> / D/M/Y / NO
	Sets the date format. • Y/M/D: Year, Month, Day • M/D/Y: Month, Day, Year • D/M/Y: Day, Month, Year • NO: Date is not printed.
68. TIME FORMAT (Time format)	AM/PM / <u>24H</u>
	Sets the time format. • AM/PM: 12-hour notation • 24H: 24-hour notation

● FUNCTION (Various functions)

FUNCTION parameter screen

Parameter option	Setting contents
71. WINDOW CHECK (Measuring window check)	YES / <u>DAY</u> / NO
	Sets whether to automatically check the measuring window for cleanliness. The measuring window is automatically checked for cleanliness before measurement then the result (“OK” or “NG”) is displayed, • YES: The measuring window is checked every startup. • DAY: The measuring window is checked at the first startup of the day. • NO: The measuring window is not checked.
72. AUTO OFF (Auto off)	<u>5MIN</u> / 10MIN / 15MIN / NO
	Sets the auto off function. The function to automatically turn off the device when the device is left idle for the specified time. Selectable from among “5MIN”, “10MIN”, “15MIN”, and “NO”. Before the device is automatically turned off, the screen changes as follows: • After 1 minute: Returns to the main screen (the screen displayed at startup). • After 4 minutes: The LCD backlight and fixation lamp are turned off (sleep mode) * The memory indicator blinks. • 1 minute before the set time: If data remains in the device that has not been printed or output, five beeps sound as a warning. • After the set time: The device turns off. When the device is in sleep mode, pressing any button displays the main screen. * When “NO” is selected, the screen returns to the main screen after 1 minute.
73. BEEP (Beep sound)	<u>LOW</u> / HIGH / NO
	Selects the pitch of the beep sound (electronic sound) produced during measurement or such.
74. LCD BRIGHTNESS (Brightness of LCD)	1 - <u>4</u> - 8
	Sets the brightness of the LCD.
75. AUTO PS (Automatic PS measurement)	<u>YES</u> / NO
	Sets whether to measure the pupil size (PS) automatically for AR measurement.

- READER (Barcode scanner / magnetic card reader function)

Note

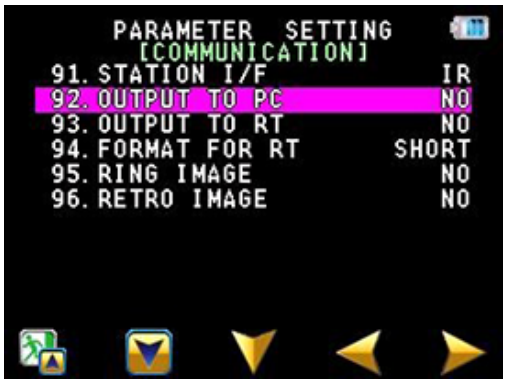
- When data is received from the barcode scanner or magnetic card reader, the results under the set reading start position and reading length are displayed in the frame.
- To check all digits that are not displayed within the frame, press the print button to print the data.

READER parameter screen

Parameter option	Setting contents
81. READER START (Position to start reading)	1 to 250
	Sets the reading start position for ID when the magnetic card reader is used. * Control codes are included in the number of characters. Set “1” when the barcode scanner is used.
82. READER LENGTH (Length of reading)	1 to 14
	Sets the length of data to be read as ID when the magnetic card reader is used. Reads the set length of data or reads up to the return code. Control codes are not included in the number of characters. Set “14” when the barcode scanner is used.

- COMMUNICATION (Communication function)

COMMUNICATION parameter screen



Parameter option	Setting contents
91. STATION I/F (Station interface)	CABLE / WLAN / <u>IR</u> / NO
	Sets the communication method between the main body and station • CABLE: A connection cable is used for communication. • WLAN: Wireless LAN is used for communication. • IR: Infrared is used for communication. • NO: Communication does not occur between the main body and station. * When the *" 92. OUTPUT TO PC" (page 90)* parameter is set to "LAN", "IR" and "NO" cannot be selected. * While the station is connected with the cable, wired communication is established even when WLAN or IR is selected. (Note that the *" 107. WLAN MODE" (page 92)* parameter is set to "AD HOC" for the WLAN setting.)
92. OUTPUT TO PC (Data output to computer)	USB MEM. / WLAN / LAN / <u>NO</u>
	• USB MEM.: Data is output to the connected USB flash drive. • WLAN: Data is output to the computer by a wireless LAN. • LAN: Data is output to the computer by a LAN cable via station. • NO: Data output does not occur. * When the *" 91. STATION I/F" (page 90)* parameter is set to "IR" or "NO", "LAN" cannot be selected. * When the *" 91. STATION I/F" (page 90)* parameter is set to "WLAN" and the *" 107. WLAN MODE" (page 92)* parameter is set to "INFRA.", "LAN" cannot be selected.
93. OUTPUT TO RT (Data output to refractor)	YES / <u>NO</u>
	Sets whether to output serial data to the refractor or Eye Care card. * When the *" 91. STATION I/F" (page 90)* parameter is set to "NO", data cannot be output.
94. FORMAT FOR RT (Serial communication format)	ALL / <u>SHORT</u>
	Sets the serial data output format for the refractor. • ALL: All data are transmitted. • SHORT: Only median values are transmitted.

95. RING IMAGE (Ring image export)	YES / LOW CONF / NO
	Sets whether to export the image data (JPEG) of a ring image. • YES: Image data is transmitted. • LOW CONF: When the confidence index is 7 or lower, image data is transmitted. • NO: Image data is not transmitted. * When the *" 92. OUTPUT TO PC" (page 90)* parameter is set to "NO", data cannot be output.
96. RETRO IMAGE (Retroillumination image export)	YES / NO
	Sets whether to export the image data (JPEG) of a retroillumination image. * When the *" 92. OUTPUT TO PC" (page 90)* parameter is set to "NO", data cannot be output.

- NETWORK 1 (LAN communication function 1)

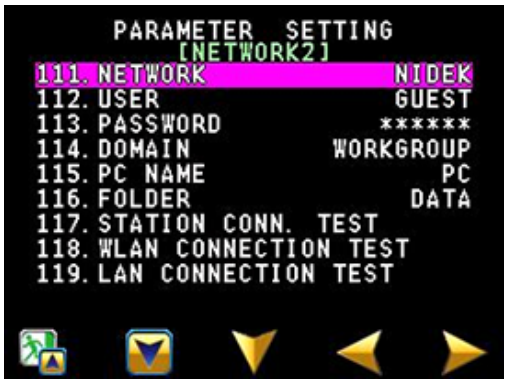
NETWORK 1 parameter screen

Parameter option	Setting contents
101. DHCP (DHCP connection)	YES / NO
	Sets whether to turn on DHCP connection. When the DHCP server is provided, IP is automatically assigned. * When the *" 107. WLAN MODE" (page 92)* parameter is set to "AD HOC", "YES" cannot be selected.
102. IP (IP address)	0 to 255. 0 to 255. 0 to 255. 0 to 255
	Input the IP address. * When the *" 101. DHCP" (page 91)* parameter is set to "YES", this parameter cannot be changed. (The IP address obtained from the DHCP server is displayed. When "0.0.0.0" is displayed, IP has not been obtained from the DHCP).
103. STA. IP (Station IP address)	0 to 255. 0 to 255. 0 to 255. 0 to 255
	Input the IP address of the station to communicate by a wireless LAN.

104. MASK (Subnet mask)	0 to 255. 0 to 255. 0 to 255. 0 to 255
	Input the subnet mask. When the *" 101. DHCP" (page 91)* parameter is set to "YES", this parameter cannot be changed. *The subnet mask obtained from the DHCP server is displayed. When "0.0.0.0" is displayed, the subnet mask has not been obtained from the DHCP).
105.GATEWAY	0 to 255. 0 to 255. 0 to 255. 0 to 255
	Input the default gateway. When the *" 101. DHCP" (page 91)* parameter is set to "YES", this parameter cannot be changed. *Enter "0.0.0.0" when the default gateway is not used.
106. WLAN SSID (SSID)	A maximum of 32 characters NIDEK-HANDY_######
	"#" represents 6-digit number. Input the SSID to identify the wireless LAN network.
107. WLAN MODE (Wireless LAN mode)	AD HOC / INFRA.
	Sets the operation mode for wireless LAN. Select from ad hoc mode (AD HOC) or infrastructure mode (INFRA.). * "AD HOC" cannot be selected when WPA or WPA2 is used as the wireless encryption method. * When the *" 91. STATION I/F" (page 90)* parameter is set to "WLAN" and the *" 92. OUTPUT TO PC" (page 90)* parameter is set to "LAN", "INFRA." cannot be selected. * When "AD HOC" is selected, the *" 101. DHCP" (page 91)* parameter is automatically set to "NO". * When the wireless LAN icon is not displayed in blue and the problem persists, turn off power to the device and then turn on power in the order of the station and the main body.
108. WLAN CHANNEL (Wireless LAN channels)	Varies depending on the shipping destination (the smallest number is set as the default).
	When there is no available channel for the wireless LAN in AD HOC mode, selects the wireless LAN channel.
109. WLAN SECURITY (Wireless encryption method)	WPA / WPA2 / WEP64/ASC / WEP64/HEX / WEP128/ASC / WEP128/HEX / NO
	Sets the wireless encryption method. * When the *" 107. WLAN MODE" (page 92)* parameter is set to "AD HOC", "WPA" and "WPA2" cannot be selected.
110. WLAN PASSWORD (Wireless LAN password)	Up to 32 characters
	Sets the password for using the wireless encryption. The saved password cannot be checked. The maximum number of characters differs depending on the selected wireless encryption method. WPA: Up to 32 characters WPA2: Up to 32 characters WEP64/ASC: 5 characters WEP64/HEX: 10 characters WEP128/ASC: 13 characters WEP128/HEX: 26 characters

- NETWORK 2 (LAN communication function 2)

NETWORK 2 parameter screen



Parameter option	Setting contents
111. NETWORK (Network connection)	NIDEK / NIDEK+ACK
	Sets the network connection (LAN/WLAN) to the computer. • NIDEK: Data is output in a specification specified by NIDEK. • NIDEK+ACK: The following error processing is added to “NIDEK”. After the receiver receives data, the file is deleted or renamed. If the file is not deleted within 5 seconds, an error occurs.
112. USER (User name)	Up to 17 characters GUEST
	Input the user name of the connected computer (up to 17 digits).
113. PASSWORD (Password)	Up to 17 characters
	Input the login password for the user name of the connected computer (up to 17 digits). The saved password cannot be checked.
114. DOMAIN (Domain name)	Up to 17 characters WORKGROUP
	Input the domain name (or workgroup name) of the connected computer (up to 17 digits).
115. PC NAME (Computer name)	Up to 17 characters PC
	Input the computer name (or IP address) of the connected computer (up to 17 digits).
116. FOLDER (Shared folder name)	Up to 17 characters DATA
	Input the shared folder name of the connected computer (up to 17 digits).
117. STATION CONN. TEST (Station communication test)	Performs communication test between the main body and station. * When the *“● COMMUNICATION (Communication function)” (page 90)*, *“● NETWORK 1 (LAN communication function 1)” (page 91)*, or *“● NETWORK 2 (LAN communication function 2)” (page 93)* parameter setting has been changed, be sure to perform the procedure described in *“4.1.4 Setting station parameters” (page 95)* and restart the main body and station before performing the communication test.

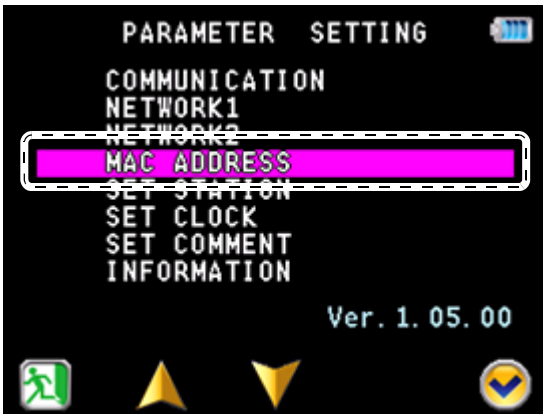
118. WLAN CONNECTION TEST (Wireless LAN communication test)	Performs communication test for the shared folder (by a wireless LAN). * When “CAN’T WRITE PC” is displayed as a result of communication test, check the share folder. If it contains the “ARK_cifs_test_******” folder, remove the folder before performing the communication test again.
119. LAN CONNECTION TEST (Station LAN communication test)	Performs communication test for the shared folder (by station LAN).

4.1.3 Checking the MAC address

MAC address of the device can be checked when it is needed for the network connection setting.

1 On the PARAMETER SETTING screen, select “MAC ADDRESS” with  or  button and press  .

The MAC ADDRESS screen appears (it may take a few seconds before the screen appears).



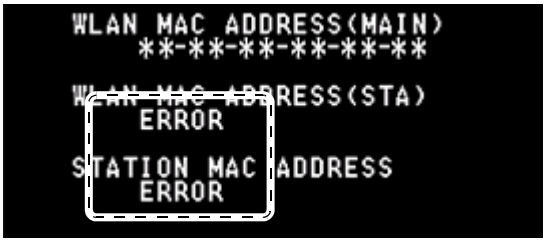
2 Check the MAC address.

MAC address of main body WLAN

MAC address of station WLAN

MAC address of station LAN

If communication between the main body and station fails such as when they are not connected by the cable or when the device is not equipped with the network function, “ERROR” or “00-00-00-00-00-00” is displayed.

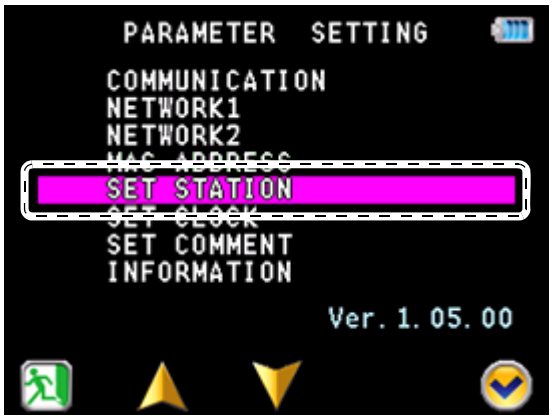


4.1.4 Setting station parameters

- When setting station parameters

  On the PARAMETER SETTING screen, select “SET STATION” with  or  button and press  .
  The station parameter settings set by the main body are applied to the station.
  While the settings are being applied, the message “SETTING OF STATION” is displayed. When complete, “SETTING FINISHED” is displayed.

  After the parameter settings are changed, press  to return to the Main screen.

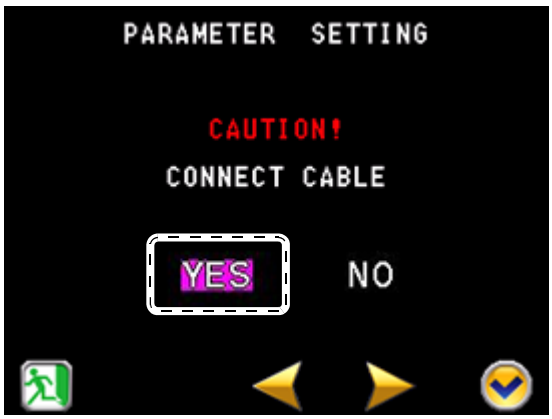


- Before performing “SET STATION” parameter

  Before performing “SET STATION” parameter, be sure to connect the main body to the station with the connection cable.

  If the cable is not connected, transfer of the parameter settings to the station will fail, and the screen shown to the right appears.

  1) Confirm that the cable is securely connected to the main body and station and that the stations is turned on.
  2) On the screen shown to the right, select “YES” with  or  button and press  .



After setting any station-related parameter, should the PARAMETER SETTING screen be exited without performing “SET STATION”, the parameter settings will still be automatically transferred to the station.

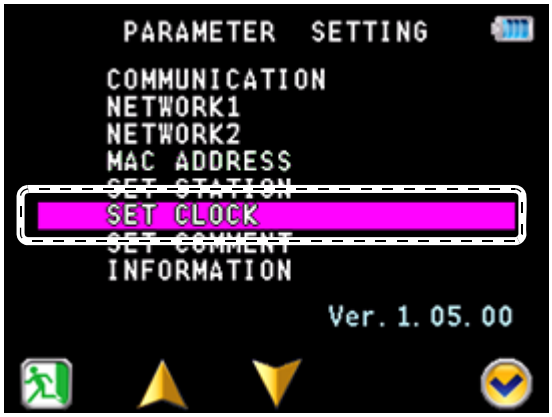
In this case as well, make sure that the main body and station are connected with the connection cable. If the cable is not connected, transfer of the parameter settings to the station will fail, and the screen shown to the right appears.

4.1.5 Setting the date and time

Set the date and time for the printout.

1 On the PARAMETER SETTING screen, select “SET CLOCK” with  or  button and press  .

The SET CLOCK screen is displayed.



2 Set the date and time in the SET CLOCK screen.

1) Press  to select the item to be changed (month/day/year/time, as shown in the example to the right).

2) Press  or  to change the numeric value.

-  : Increases the numeric value.
-  : Decreases the numeric value.

3 After changing the setting, press  to confirm the entry.

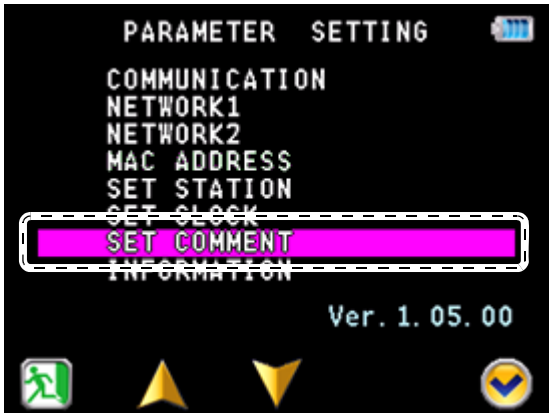
Pressing  applies the changed date and time. The screen returns to the PARAMETER SETTING screen.

4.1.6 Entering comments

Printed comments can be changed (the default setting is “NIDEK HandyRef”).

1 On the PARAMETER SETTING screen, select “SET COMMENT” with or button and press .

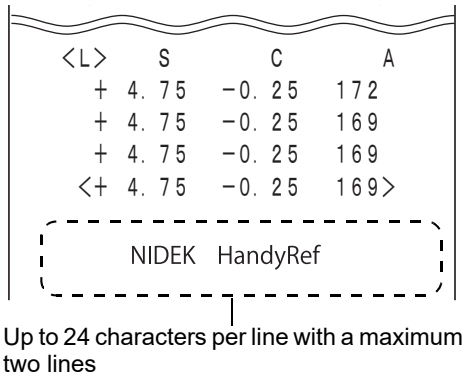
The SET COMMENT screen is displayed.



2 Enter desired comments on the SET COMMENT screen.

The currently entered comments are displayed in the entry field.

Up to 24 characters per line, with a maximum of two lines, can be input. Move the cursor (or) in the character list field to the desired character and press to confirm its entry.



Up to 24 characters per line with a maximum of two lines

: Forward movement	Moves the cursor to the left in the character list field.
: Backward movement	Moves the cursor to the right in the character list field.
: Confirm	Enters the selected character in the character list field.
: Clear	Erases the character prior to the cursor in the entry field.

3 After changing the setting, press to confirm the entry.

Pressing saves the comments and returns to the PARAMETER SETTING screen.

4.2 Maintenance

4.2.1 Troubleshooting

Should the device function improperly, attempt to correct the problem according to the following table before contacting NIDEK or your authorized distributor.

When	Remedy
The LCD does not turn on.	• Check whether the battery pack is inserted properly. *"2.4.1 Removing and installing the battery pack" (page 26)* • The battery may be discharged. Check the battery pack charge.
The screen disappears suddenly.	• The auto-off function may have activated. Press the power button. • The battery may be discharged. Check the battery pack charge.
Printing does not start.	• Check the printer paper. If the paper has run out, load new printer paper. When a paper jam occurs, remove the paper roll and reload it. *"2.4.5 Setting the printer paper" (page 32)* • The *" 31. PRINT" (page 84)* parameter may be set to "NO". Select "MANUAL" or "AUTO". • In case of IR communication, the distance between the main body and station may be too great. Press the print button when the main body is within 1 m from the IR receptor B of the station. • The setting between the main body and station may not have been complete. Connect the main body and station by the connection cable and perform SET STATION again.
The printer operates, however, printed results cannot be obtained.	• The printer paper may be loaded with the incorrect side up. Set it with the correct side up.
The auto shot function does not work.	• Room illumination or sunlight may be reflecting off the cornea. Eliminate the light or change the patient position and try measurement again. • For patients who have severe eye nystagmus, perform measurement in Quick measurement mode. *"3.7.1 Quick measurement mode" (page 59)*
The date and time settings are incorrect.	• The battery may be discharged. • Insert a charged battery pack then set the date and time settings again. *"4.1.5 Setting the date and time" (page 96)*
Measurement is not possible.	• 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 their eye wider. If the patient cannot open wider, gently 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 darkened room for a while until the pupil enlarges enough and try measurement again. • The data may exceed the measurable limit.
Data cannot be output to external computer.	• Check the network setting. • The setting between the main body and station may not have been complete. Connect the main body and station by the connection cable and perform SET STATION again.

* If the symptom is not corrected by the above actions, contact NIDEK or your authorized distributor.

4.2.2 Error messages and remedies

If one of the following error codes is displayed on the screen or printed out, follow the suggestions in the cause and remedy column. Notify NIDEK of the error code, message number, and serial number of your device so that NIDEK can offer appropriate service.

- Maintenance

Error message	Cause and remedy
ERROR 001 EEPROM ERR	• Data error of backup memory. Data loss due to external noise such as static electricity or malfunction of the electric circuit board or backup memory 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.
OUT OF PAPER	• 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 replacement of printer paper roll, shut off the device and contact NIDEK or your authorized distributor.
ERROR 011 to 018 COM (OUT) ERR	• Check whether the serial cable (RS-232C) is securely connected to the station, refractor, or EyeCa-RW2. • Check whether the communication parameters are properly set.
ERROR 080 to 088 COM(STATION) ERR	• Communication between the main body and the station may not be established. • When the connection cable is used, confirm that the cable is securely connected. When the wireless LAN is used, confirm that the blue icon (indicating the connection is established) is displayed. • Check whether the communication parameters are properly set.
ERROR 113 AC SENSOR ERR	• Error related to the mechanism inside the device. Contact NIDEK or your authorized distributor. • If this error occurs, axis correction function is disabled. The device does not enter supine position mode even when the main body is tilted. However, the device can be set to supine position mode by holding down the measurement direction icon for a second or more.
ERROR 610 USB ACCESS ERR	• This error occurs when a USB flash drive other than that specified by NIDEK is used or when it is removed while writing or reading data.
ERROR 611 USB WRITE ERR	• This error occurs when the USB flash drive is write-protected, full, or contains data with the same name.

The following are errors related to the mechanism inside the device. Shut down the device and contact NIDEK or your authorized distributor.	
ERROR 043 PRINT HARD ERR ERROR 044 PRINT CONNECT ERR	ERROR 112 AR MOTOR ERR ERROR 113 AC SENSOR ERR ERROR 123 CHART ERR

- Network communication

Error message	Cause and remedy
ERROR 700 CIFS ERR ERROR 900 CIFS ERR (WLAN)	• Error related to Windows file sharing
ERROR 902 SSID ERR	• Check the power supply, SSID name, security, and password of the access point.
ERROR 703 NETWORK ERR	• Error related to the IC board IC was damaged by some cause such as electrostatic discharge. • 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.
ERROR 904 DHCP ERR (WLAN)	• Error related to DHCP The IP address cannot be obtained.
ERROR 751 CAN'T WRITE PC ERROR 951 CAN'T WRITE PC(WLAN)	• Write-protection is enabled or no free space remains. • Check whether write permission is granted to the destination folder in the computer and sufficient free space remains. • Check whether a file with the same name exists in the output destination.
ERROR 754 NO PC NAME ERROR 954 NO PC NAME(WLAN)	• Computer with the specified name does not exist. • Check the connection of the LAN cable. Or check that the specified computer name is correct.
ERROR 756 CAN'T LOGON PC ERROR 956 CAN'T LOGON PC(WLAN)	• Cannot log on to the computer. • Check the user name, password, and domain. • Check that the account is valid.
ERROR 757 NO SHARED FOLDER ERROR 957 NO SHARED FOLDER(WLAN)	• No shared folder exists in the computer. (The name of the shared folder is incorrect.) • Check the folder name and whether the folder is set to share.
ERROR 758 NETWORK TIMEOUT ERROR 958 NETWORK TIMEOUT(WLAN)	• The computer did not finish the process in a specified time. • Check the network setting.
ERROR 759 CAN'T DELETE PC ERROR 959 CAN'T DELETE PC(WLAN)	• The data in the computer cannot be deleted. (Deletion was attempted for data with the read-only attribute.) • Disable write-protection of the shared folder in the computer.
ERROR 761 ACCESS DENIED	• Access was denied due to improper file sharing setting of the computer. • Check the file sharing setting of the computer.
ERROR 762 ACOUNT DISABLED	• The account is disabled. (The user setting is not proper.) • Check the network setting of the device.
ERROR 771 NO NETWORK CABLE	• The LAN cable is not connected. • Check the connection of the LAN cable.

Error message	Cause and remedy
ERROR 772 NO NETWORK ACK ERROR 972 NO NETWORK ACK (WLAN)	• Acknowledgment error The file is deleted within 5 seconds or not renamed. • Check whether the capture software on the computer is properly activated.

* A common remedy for network-related errors is restarting the device.

4.2.3 Measurement accuracy check

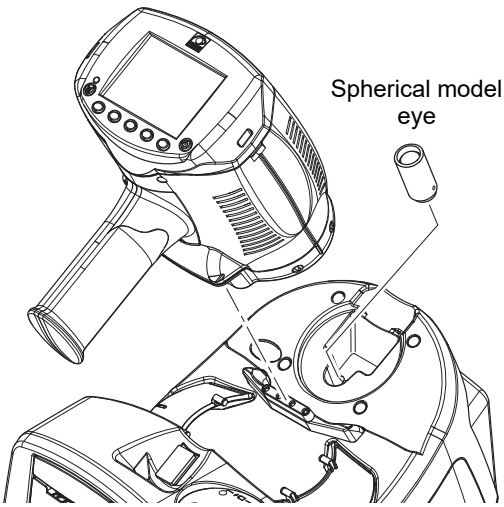
By using the spherical model eye, the measurement accuracy for refractive power measurement values can be checked.

Perform the check once every 6 months. Also, perform the check if the AR-measured results differ substantially from subjectively measured results.

Note

- Before checking the measurement accuracy, check the measuring window and the spherical model eye lens for cleanliness. If not clean, use a blower to blow off any dust.
  If stained, proper measurement results may not be obtained.

1 Stand the spherical model eye with its lens facing up in the spherical model eye measuring holder.



2 Place the main body on the station.

3 Set the following parameters as shown below:

Parameter option	Setting
" 1. AR STEP" (Refractive power measurement increments)	0.12D

4 Press R/L to select the eye to be measured.

Confirm that the R or L indication changes to m-R or m-L.

Either eye (R/L) may be selected.

Note

- When automatic eye detection is enabled, measurement may not start due to R/L automatic detection error.
  Measurement cannot be started while the error "R/L?" is displayed.

5 Perform AR measurement in the same manner as normal AR measurement to check the results.

If the measured results differ substantially from the values indicated on the spherical model eye, contact NIDEK or your authorized distributor.

- Values marked on the labels of the spherical model eye

Vertex Distance (VD)	Diopter
mm	D: 0.12D increments

6 After checking the results, store the spherical model eye in the spherical model eye storage space.

Note

- When the VD value of the spherical model eye differs from the value set by the *" 2. VERTEX D." (page 83)* parameter, change the parameter setting to match that of the model eye.

4.2.4 Cleaning

○ Cleaning the device

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 or rubbing alcohol, wring well, and wipe. Finally dry with a soft, dry cloth.

⚠ CAUTION

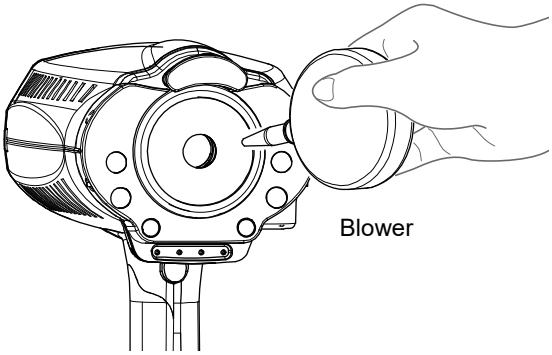
- Never use an organic solvent such as paint thinner or alcohol other than rubbing alcohol.
  The device covers may be discolored.
- Lightly wipe the exterior of the LCD. Do not press the LCD using an object with a hard tip and keep magnetic objects away from the LCD.
  It may damage the surface of the LCD. Device malfunction may also result.
- Never use a sponge or cloth soaked in water.
  Water may leak into the interior of the device resulting in device failure.

○ Cleaning the measuring window

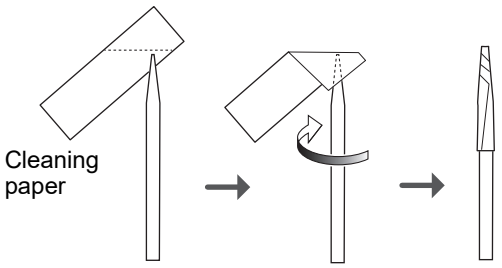
When the measuring window gets fingerprints or dust on it, the reliability of the measured values is impaired substantially. Check the measuring window cleanliness before use, and clean it if it is dirty.

Clean it when the “MEASURING WINDOW CHECKING” message is displayed at device startup or the lens is visibly soiled.

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



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



Note

- Do not use a stick made of metal or other hard material which may damage glass.
- Wipe lightly from the center of the measuring window to the outside in a circular motion.

3 Check if the window is cleaned using a penlight. If soiled areas remain, clean the window again with new cleaning paper.

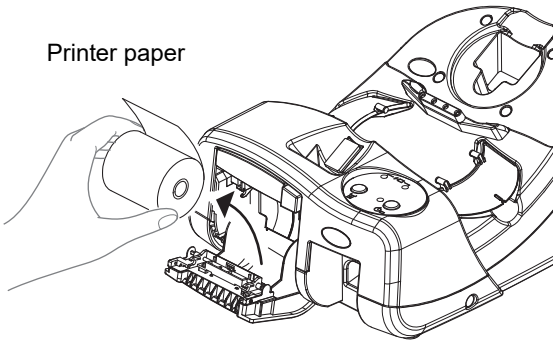
Note

- When the *" 71. WINDOW CHECK" (page 88)* parameter is set to "YES" or "DAY", the measuring window is checked for cleanliness at device start-up.

○ Cleaning the printer

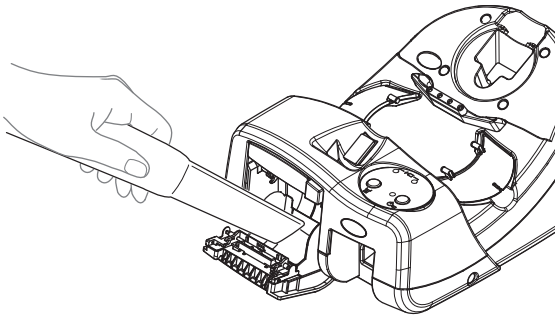
After repeated usage, the paper slot of the auto cutter of the printer may become soiled with powdery paper residue. If paper residue settles, malfunction of the auto cutter may result. Clean it periodically.

1 Press  to open the printer cover and remove the printer paper.



2 Apply the nozzle of a vacuum cleaner to the auto cutter to remove paper residue.

Never blow off paper residue with a blower. If paper residue settles on the internal working structure, malfunction may result.



3 Supply the printer paper as it was.

4.2.5 Consumable list

Part name	Part number	Remarks
Printer paper	8062000001	Width 58 mm, Length 25 m
Battery pack	30621-9202	7.2 V, 1800 mAh

5 SPECIFICATIONS AND TECHNICAL INFORMATION

5.1 Specifications

<table>
<tr><th colspan="3">Main body</th></tr>
<tr><td>• Objective refractive error measurement</td><td>Sphere
Cylinder
Axis
Minimum measurable pupil diameter</td><td>-20.00 to +20.00 D (VD = 12 mm) (0.12 / 0.25 D increments)
0 to ±12.00 D (0.12 / 0.25 D increments)
0 to 180° (1°/ 5° increments)
2 mm in diameter</td></tr>
<tr><td></td><td colspan="2">Accuracy: The accuracy specifications are based on the results of eye model testing performed in accordance with ISO 10342, Ophthalmic Instruments- Eye Refractometers.
<table>
<tr><th>Criterion</th><th>Measurement range</th><th>Maximum scale interval</th><th>Test device[a]</th><th>Tolerance</th></tr>
<tr><td rowspan="2">Spherical vertex power</td><td rowspan="2">–15 D to +15 D (Maximum meridional vertex power)</td><td rowspan="2">0.25 D</td><td>0 D, ±5 D, ±10 D</td><td>±0.25 D</td></tr>
<tr><td>±15 D</td><td>±0.50 D</td></tr>
<tr><td>Cylindrical vertex power</td><td>0 D to 6 D</td><td>0.25 D</td><td rowspan="2">Sph: approx. 0 D
Cyl: –3 D
Axis: 0° 90°</td><td>±0.25 D</td></tr>
<tr><td>Cylinder axis[b] for cylinder power</td><td>0° to 180°</td><td>1°</td><td>±5°</td></tr>
<tr><td colspan="5">a The refractive error of the test device shall not differ by more than 1.0 from the nominal value above.
b Cylinder axis shall be indicated as specified in ISO 8429.</td></tr>
</table></td></tr>
<tr><td>• Pupil size measurement</td><td colspan="2">1.0 to 10.0 mm (0.1 mm increments)</td></tr>
<tr><td>• Chart</td><td colspan="2">Scenery chart or children’s chart</td></tr>
<tr><td>• Observation/Display</td><td colspan="2">3.5-inch color LCD</td></tr>
<tr><td>• Interface</td><td colspan="2">USB: One port
Wireless LAN (WLAN): 1ch</td></tr>
<tr><td>• Power specification</td><td>Battery pack
Station feed</td><td>Lithium-ion battery (7.2 V 1800 mAh)
DC 9 V 2 A (maximum)</td></tr>
<tr><td>• Dimensions and mass</td><td>Dimensions
Mass</td><td>206 (W) × 181 (D) × 224 (H) mm (including occluders)
998 g (including battery pack)</td></tr>
</table>

Station		
• Printer	Thermal line printer with auto cutter (printer-equipped model only)	
• Interface	USB: One port, LAN: One port, RS-232C: One port (printer-equipped model only)	
• Battery charging	Battery pack	Lithium-ion battery (7.2 V 1800 mAh)
	Charging time	When inserted in the main body: Approx. 180 min. (when the main body is placed on the station) When inserted in the battery slot: Approx. 140 min.
• Power specification	Voltage, frequency	AC 100 to 240 V ±10% 50/60 Hz
	Power consumption	60 VA (maximum)
• Dimensions and mass	Dimensions	224 (W) × 283 (D) × 147 (H) mm
	Mass	2.7 kg (printer-equipped model) 2.5 kg (model without printer)

Wireless LAN

The wireless LAN module incorporated in this device conforms to the regional regulations of Japan, the USA, Canada, Singapore, and the RE Directive. When using the wireless LAN, follow the radio law of respective countries.
The following labels indicate the Dealer's individual license in Singapore.

• Standard	IEEE802.11b/g, IEE802.11n	
• Transmission method	• Orthogonal frequency-division multiplexing (OFDM) • Direct-sequence spread spectrum (DS-SS, CCK)	
• Center frequency	2412 to 2472MHz (varies depending on the region or country)	
• Effective radiated power	5.69 mW	
• Link rate	IEEE 802.11n	6.5, 13, 19.5, 26, 39, 52, 58.5, 65 Mbps
	IEEE 802.11g	6, 9, 12, 18, 24, 36, 48, 54 Mbps
	IEEE 802.11b	1, 2, 5.5, 11 Mbps
• Access method	Infrastructure mode and AD HOC mode	
• Security	• Infrastructure mode: WPA, WAP2, WEP (64/128 bit) • AD HOC mode: WEP (64/128 bit)	

Environment and others		
• Environmental conditions (during use)	Temperature	10 to 35°C (50 to 95°F)
	Humidity	30 to 90% (non-condensing)
	Atmospheric pressure	800 to 1,060 hPa
	Installation location	Indoors
	Others	A well ventilated location that is not exposed to extraneous light (direct sunlight) or water, and free from hazardous particles, vibration, bumping, smoke, or fumes
• Environmental conditions during storage (without packing)	Temperature	-10 to 55°C (14 to 131°F)
	Humidity	10 to 95% (non-condensing)
	Atmospheric pressure	700 to 1,060 hPa
• Environmental conditions during transport and storage (packed condition)	Temperature	-30 to 60°C (-22 to 140°F)
	Humidity	10 to 95% (non-condensing)
	Atmospheric pressure	500 to 1,060 hPa
• Classifications	• Protection against electrical shock: Class I ME equipment • Protection against electrical shock (applied parts): Type B applied part • Protection against harmful ingress of water or particulate matter: IPX0 • Suitability for use in an oxygen rich environment: ME equipment that is not intended for use in an oxygen rich environment • Methods of sterilization recommended by manufacturer: ME equipment that does not contain any part that needs sterilization • Mode of operation: Continuous operating device	
• Others	Expected service life (defined by manufacturer)	8 years from the date of initial operation * Proper maintenance is necessary.
	Packing unit	1 unit
Accessories		
• Accessories	Occluder (2 units), neck strap, printer paper (3 rolls / printer-equipped model only), power cord, connection cable (2 m), battery pack, dust cover, Operator's Manual, spherical model eye	
• Optional accessories	Carrying case, carrying case with portable stand, portable stand, barcode scanner, magnetic card reader, EyeCa-RW2, Eye Care card, communication cable, battery pack, USB flash drive	

5.2 Glossary and Abbreviations

■ The following terms and abbreviations are used in the device and operator's manual.

○ Glossary and Abbreviations

Term	Details
AM mode	For AR measurement, measurement automatically finishes after the specified number of measurements if the data is stable without variations. If unstable data is included, two additional measurements are taken and then measurement finishes.
AR median values	The Spherical Equivalent (SE) value is obtained from respective data. The median SE value is obtained when the values are arranged in order by the computer. The SPH median value is calculated by the following equation based on the obtained median values. SPH median value = (Median SE value) – (Median CYL value / 2) The CYL and AXIS median values are taken to be the median values when arranged in order. If the measured data is two values or less, then the latest value is selected.
Eye diagram	Eye diagram of refractive status of the patient's eye based on the AR median values (or the latest values when the median values have not been obtained) or the subjective measured values when the subjective measurement has been performed. There are eight eye diagram patterns.
SE (Spherical Equivalent) value	The value that is 1/2 of the cylindrical error added to the spherical error. Calculated for the AR median values (the latest values when the AR median values have not been obtained) and contact lens conversion values.
Auto shot	This function automatically starts measurement as soon as alignment and focusing become optimum.
Vertex distance (VD)	The distance between the corneal vertex to the posterior surface of spectacle lenses.
Comments	Characters and symbols can be freely entered. Up to 24 characters per line with a maximum of two lines can be input.
Contact lens conversion value	The value from which the AR median values (the latest values when the median values have not been obtained) are converted into CL values, with the vertex distance (VD) at 0 mm.
Trial lens data	Values that are converted automatically from the cylinder values so that the sphere values for the trial lens become smaller based on the AR median values (the latest values when the median values have not been obtained).
Fogging	Blurs the patient's view to prevent focus in order to eliminate accommodation.
Quick measurement mode	For measurement of children or patients who cannot fixate their eyes, the auto shot function may not work causing measurement failure. In this mode, the criteria required for target is relaxed to facilitate measurement.
Cataract measurement mode	If abnormal optical reflection is detected or the auto shot function does not work, measurement criteria is changed automatically so that even cataract or abnormal eyes can be measured.
Confidence index	The confidence index is displayed in six levels (9, 8, 7, 6, 5 or E). The lower the confidence index, the larger the influence of irregular astigmatism. "E" indicates erroneous data. Measured data obtained in cataract measurement mode is marked with the preceding "*" symbol.

5.3 EMC (Electromagnetic Compatibility)

The device is suitable for use in stores and hospitals except for near active HF surgical equipment and RF shielded rooms with an ME system for magnetic resonance imaging, where the intensity of electromagnetic disturbances is high, electrophysiology laboratories, or areas where short-wave therapy equipment is used.

⚠ WARNING

- Do not use the device near, on, or under other electronic equipment or electromagnetic disturbance sources. Otherwise, it could result in improper operation. If such use is necessary, the device and the other equipment should be observed to verify that they are operating normally.
- Use of accessories, cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and cause improper operation.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) or electromagnetic disturbance sources as shown below should be used no closer than 30 cm (12 inches) to any part of the device, including the specified or provided cables. Otherwise, degradation of the performance of this equipment could result.

  The following are examples of electromagnetic disturbance sources:
  - Induction cooking appliance and ovens
  - RFID readers
  - Electronic article surveillance (EAS) systems
  - Sponge detection systems
  - Equipment used for position detection (e.g. in catheter labs)
  - Wireless power transfer charging systems for electrical vehicles

○ Specified accessories

Part name
EyeCa-RW2
Eye Care card
Battery pack

○ Specified cable

Part name	Cable shielded	Ferrite core	Length (m)
Power cord	No	No	2.5
Connection cable	Yes	Yes	2.0

○ Essential performance

- Objective refraction function

◆ Compliance for Emission Standard

Phenomenon	Product family standard	Compliance
Conducted and radiated RF emissions	CISPR 11	Group 1 Class B
Harmonic distortion	IEC 61000-3-2	*1
Voltage fluctuations and flicker	IEC 61000-3-3	*2

* 1 For the regions where the rated voltage is 220 V to 240 V, this device complies with this standard.
* 2 For the regions where the rated voltage (line to neutral) is 220 V to 250 V, this device complies with this standard.

◆ Test specifications for enclosure port immunity to RF wireless communications equipment

Test frequency (MHz)	Band (MHz)	Service	Modulation	Immunity test level (V/m)
385	380 to 390	TETRA 400	Pulse modulation 18 Hz	27
450	430 to 470	GMRS 460, FRS 460	FM ±5 kHz deviation 1 kHz sine	28
710	704 to 787	LTE Band 13, 17	Pulse modulation 217 Hz	9
745				
780				
810	800 to 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	Pulse modulation 18 Hz	28
870				
930				
1720	1700 to 1990	GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS	Pulse modulation 217 Hz	28
1845				
1970				
2450	2400 to 2570	Bluetooth WLAN 802.11 b/g/n RFID 2450 LTE Band 7	Pulse modulation 217 Hz	28
5240	5100 to 5800	WLAN 802.11 a/n	Pulse modulation 217 Hz	9
5500				
5785				

◆ Compliance for Immunity Standard

Phenomenon	Basic EMC standard	Immunity test levels
Electrostatic discharge	IEC 61000-4-2	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air
Radiated RF electromagnetic field	IEC 61000-4-3	10 V/m 80 MHz - 2.7 GHz 80% AM at 1 kHz
Proximity fields from RF wireless communications equipment	IEC 61000-4-3	See “Test specifications for enclosure port immunity to RF wireless communications equipment”.
Electrical fast transients / bursts	IEC 61000-4-4	Input power port ±2 kV 100 kHz repetition frequency
		Signal input/output parts port ±1 kV 100 kHz repetition frequency
Surges Line-to-line	IEC 61000-4-5	Input power port ±0.5 kV, ±1 kV
Surges Line-to-ground		Input power port ±0.5 kV, ±1 kV, ±2 kV Signal input/output parts port ±2 kV
Conducted disturbances induced by RF fields	IEC 61000-4-6	3 V 0.15 MHz – 80 MHz 6 V in ISM and amateur radio bands between 0.15 MHz and 80 MHz 80% AM at 1 kHz
Rated power frequency magnetic fields	IEC 61000-4-8	30 A/m 50 Hz or 60 Hz
Voltage dips	IEC 61000-4-11	0% U_T; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315°
		0% U_T; 1 cycle and 70% U_T; 25/30 cycles Single phase: at 0°
Voltage interruptions	IEC 61000-4-11	0% U_T; 250/300 cycles

- Precaution by FCC

This device incorporates a wireless communication module for the specified shipping destinations. When using this device in the USA, follow the cautions below provided by the FCC.

Precaution common to the main body and station:

- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

- Precaution by FCC and IC

This device incorporates a wireless communication module for the specified shipping destinations. When using this device in the USA or Canada, follow the cautions below provided by the FCC and IC.

Station precautions:

- This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). [* But it is desirable that it should be installed and operated keeping the radiator at least 20 cm or more away from person's body.]

Main body precautions:

- This equipment complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that are deemed to comply without testing of specific absorption ratio (SAR).