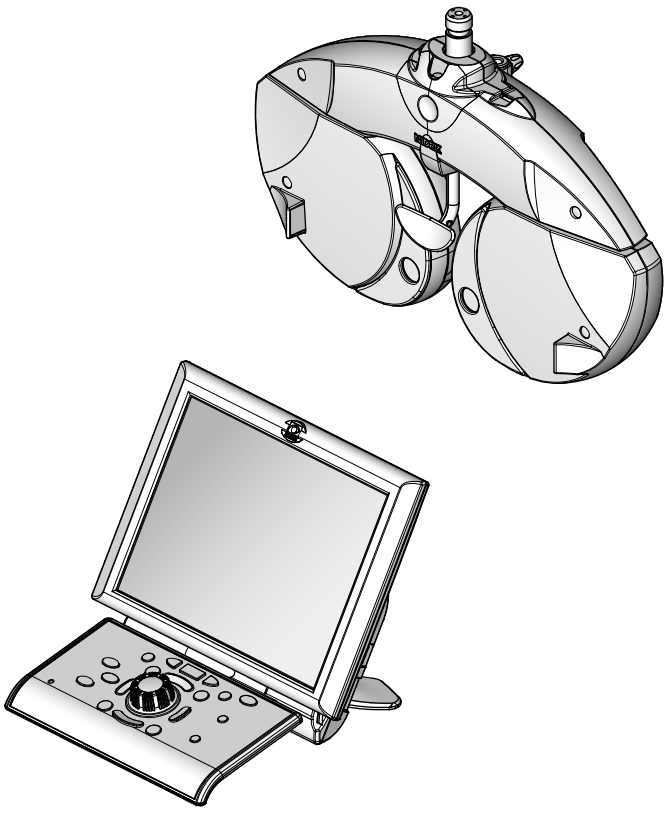
NIDEK

REFRACTOR
RT-6100

OPERATOR'S MANUAL



Original instructions

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Before Use

Be sure to read the SOFTWARE LICENSE AGREEMENT (page 2) before using this product.

This operator's manual includes operating procedures, safety precautions, maintenance, and specifications for the Nidek REFRACTOR RT-6100. Be sure to read the operator's manual before using the device to understand the safety precautions and operating procedures thoroughly. Keep this manual handy for reference.

If you encounter any problems or have questions about the device, please contact Nidek or your authorized distributor.

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RT015-P902-B2

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The Software and NIDEK hardware product (collectively, "NIDEK product") may include a third party's software which is linked, whether dynamically or statically, with the Software (the "Third-Party-Software"). The Third-Party-Software shall not be included in the definition of the "Software" in this Agreement. The rights and title of the Third-Party-Software belong to the third party, and the terms of use of the Third-Party-Software are set forth separately from this Agreement. The terms in this Agreement will not apply to the use of the Third-Party-Software except as expressly stipulated herein.

By using or installing the Software, you agree to be bound to the terms and conditions of this Agreement. If you do not agree with this Agreement, please do not use or install the Software and return the Software to the company from which you obtained the Software.

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3.6. You may not create derivative works or cause or permit others to create derivative works based upon the Software without prior written consent of NIDEK.

3.7. You may not disclose operation manuals for the Software to any third party without prior written consent of NIDEK; provided, however, for the avoidance of doubt, the "third party" in this section will not include doctors, examiners, nurses, employees, patients and other persons who need to know the Software.

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6.2. NIDEK may, at its own discretion, make amendments to any provisions of this Agreement (the "Amendments"), if NIDEK deems that:

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.

7. TERMINATION

7.1. This Agreement is effective until terminated. If you breach any term or condition of this Agreement, NIDEK may, without giving any prior notice to you, terminate this Agreement with immediate effect. Upon termination of this Agreement due to the breach of this Agreement, NIDEK reserves all the rights to claim damages resulting from such breach.

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.

8. NO WARRANTIES

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9.1. EXCEPT OTHERWISE EXPRESSLY STIPULATED IN THIS AGREEMENT, IN NO EVENT WILL NIDEK BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES, LOSS, CLAIMS OR COSTS WHATSOEVER, INCLUDING, WITHOUT LIMITATION, ANY LOST DATA, PROFITS, REVENUES, BUSINESS OPPORTUNITIES OR INFORMATION, LOSS OF USE OF ANY PRODUCT, PROPERTY OR EQUIPMENT, DOWNTIME COST , COST OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, OR ANY CLAIMS BY A THIRD PARTY, ARISING OUT OF OR RELATED TO THE USE OR INABILITY TO USE THE SOFTWWARE AND/ OR THE THIRD-PARTY-SOFTWARE, CHANGES, UPDATES OR MODIFICATIONS OF THE SOFTWARE AND/OR THE THIRD-PARTY-SOFTWARE, OR MAINTENANCE OR REPAIR SERVICE OF THE SOFTWARE IF ANY (collectively, the "DAMAGES"). THE ABOVE LIMITATIONS WILL APPLY REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, STRICT PRODUCT LIABILITY, OR OTHERWISE, EVEN IF NIDEK IS NOTIFIED OF THE POSSIBILITY OF SUCH DAMAGES.

9.2. THE LIMITATIONS PROVIDED IN THE PROVISION OF 9.1. SHALL NOT APPLY IN THE CASE WHERE THE DAMAGES ARE ATTRIBUTABLE TO NIDEK OR NIDEK IS LIABLE FOR SUCH DAMAGES IN ACCORDANCE WITH THE LAWS. EVEN IN SUCH CASE, NIDEK SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, PUNITIVE OR SPECIAL LOSS OR DAMAGE. NIDEK'S TOTAL AGGREGATE LIABILITY FOR THE DAMAGES SHALL NOT EXCEED AN AMOUNT ACTUALLY PAID BY YOU FOR PURCHASE OF NIDEK PRODUCT; PROVIDED, HOWEVER, THAT THE LIMITATION OF THE AMOUNT SHALL NOT APPLY IN THE CASE WHERE THE APPLICABLE LAW PROHOBITS SUCH LIMITATION OR THE DAMAGES ARISING FROM NIDEK'S GROSS NEGLIGENCE OR WILLFUL MISCONDUCT.

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.

19. APPLICATION OF SOFTWARE LICENSE AGREEMENT

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 safety precautions and operating procedures must be thoroughly understood before operating the device. Keep this manual handy for reference. Use of the device is limited to ophthalmologists or personnel involved in medical practice under the ophthalmologists' instructions.

In this manual, signal words are used to designate the degree or level of safety alerting. 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.

1.2 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.
- Be sure to firmly secure the refractor head so that it will not fall off.
  If the device falls off, injury or device failure may result.
- Be sure to connect the power plug to a grounded power outlet.
  Electric shock or fire may occur in the event of malfunction or power leakage.
- Do not modify the device. Do not remove the cover to touch the device interior.
  Electric shock or malfunction may result. The device contains no user-serviceable parts other than printer paper.

⚠ CAUTION

- Do not use this device for any purposes other than those intended.
  Nidek is not responsible for accidents or malfunctions caused by misuse.
  "♦ Intended use" (page 19)
- Be sure to use only the accessories specified by Nidek.
  Use of the accessories other than specified by Nidek may cause malfunctions or adverse events.
- If the connection between devices needs to be disconnected or reconnected, contact Nidek or your authorized distributor.
- Be sure to use only the connection cables specified by Nidek to connect with chart presenting devices.
- Install the device in a location that meets the following conditions. If the following conditions are not met, inaccurate measurement, electric shock, malfunction, or toppling over causing injury may occur.
  - Free from impact and vibration
  - Level and stable
  - Not exposed to water
  - No dust or smoke that interferes with refraction
  - No interference light such as direct sunlight or spot light directly shines on the measuring window front.
  - No magnetic force near the device
- Install the device in an environment that meets the usage conditions.
  " Environmental conditions (during use)" (page 287)
- Check the following before use:
  - The forehead rest is attached.
  - The glass of the measuring windows is clean and undamaged.
  - The near point chart is undamaged.
  - The near point rod is securely fastened.
  - The forehead rest can be moved using the forehead rest adjustment knob.
  - The level of the refractor head can be adjusted.
  - The refractor head tilt unit is securely fastened (only when the optional refractor head tilt unit is provided).
  - The cover open button on the printer is undamaged.
- Do not damage the measuring windows, or smudge it with fingerprints or dust.
  Scratch or dirt may result in an inaccurate measurement.

- Clean the forehead rest and face shields using a cloth dampened with rubbing alcohol before refraction.
- If the glass of the measuring window is broken, do not use it.
- When handling the power supply and electrical components, observe the following precautions. Failure to do so may result in malfunction, electric shock, or fire.
  - Be sure to use the supplied power cord. Also do not connect the supplied power cord to any other device.
  - Be sure to use a power outlet that meets the specified power requirements.
  - Fully insert the power plug into the power outlet.
  - Install the device in a place where the power plug can be easily disconnected from the power outlet.
  - Do not use power strips or extension cables for power supply.

During use

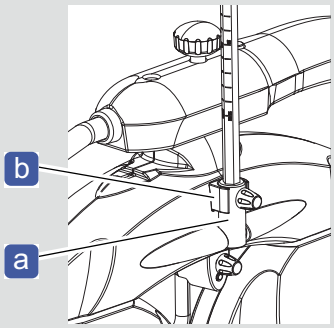
⚠ CAUTION

- Do not perform servicing or maintenance on the device during use.
- Be sure to perform a pre-use check before using the device for the first time each day.

  "3.1.1 Pre-use check and startup" (page 41)
- When moving the refractor head, maintain a distance of 20 cm or more between the refractor head and the patient's face.

  The refractor head may strike the patient's face during movement.
- When the refractor head moves to switch between the distance vision test and near vision test, keep the patient's face 20 cm or more away from the refractor head.
- When changing the pupillary distance widely (including AR/LM measurement data entry), keep the patient's face away from the refractor head.
- Do not look directly into the near point lamp.
- Be aware that fingers are not pinched when changing the inclination of the touch screen.
- Confirm that the holder a is securely fastened to the latch b when the near point rod is in the raised position.

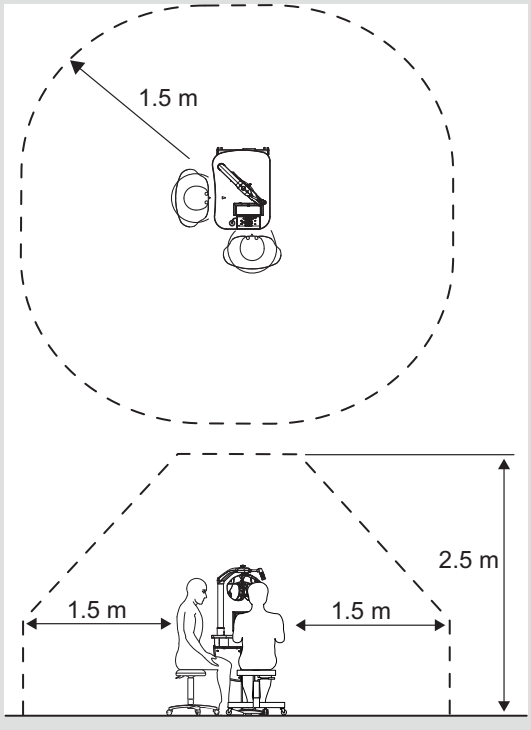
  An improper fastening may cause the near point rod to fall resulting in injury.



- 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), supply power to the device and computer through an isolation transformer.

  Electric shock may result. For installation of an isolation transformer, contact Nidek or your authorized distributor.
- 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, use an isolation transformer or common protective grounding.

  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.



Wireless LAN (when wireless LAN module is incorporated)

⚠ CAUTION

- The wireless LAN module incorporated in this device conforms to the radio laws of the USA and Canada, and the Radio Equipment Directive. Use the device following the radio law of each country.
- Even with conformity to the regional regulations, the wireless function may be impaired depending on the installation location or use environment (especially in a location such as an operating room or ICU where advanced medical devices are present). Use the device following the guidelines determined by medical institutions or optician facilities.
- Data handled via the wireless LAN is controlled by patient numbers and IDs, not by information that directly identifies individuals. However, for security, follow the guideline determined by each facility where the device is to be used.

Note

- Change the channel or frequency depending on the wireless LAN use condition.
  If other wireless equipment that uses the same radio frequency as this device is used at the same time, a decrease in transfer rate or a communication error may occur and the device may not operate properly.

After use

⚠ CAUTION

- Be sure to perform an after-use check.
  "3.1.2 Device shutdown and after-use check" (page 42)
- Be sure to remove the near point rod from the refractor head and store it after use.
  Leaving it attached may cause the near point rod to fall and cause injury.
- Turn off the device while not in use and put the dust cover on the device.
  Dust and such may adversely affect the examination results.
- If the device will not be used for an extended period of time, disconnect the power cord from the power outlet.
- When changing the installation location of the device, contact Nidek or your authorized distributor.

Device movement and maintenance

⚠ CAUTION

- Only service personnel trained by Nidek are allowed to disassemble or repair the device.
  Nidek assumes no responsibility for any adverse events resulting from improper servicing.
- Secure a sufficient work space when performing maintenance and inspection.
  Work in an insufficient space may result in injury.
- Wipe the surfaces of the device (especially, the areas that the patient contacts) with a clean cloth dampened with rubbing alcohol before maintenance or when the device is sent back to Nidek or your authorized distributor for repair.
- 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 are performed at least once a year.
  "7.3 Periodical Inspection" (page 263)

Disposal

⚠ CAUTION

- Follow the local ordinances and recycling regulations regarding disposal or recycling of the components. Follow the local governing ordinances, particularly when disposing of lithium-ion batteries, printed circuit board, plastic parts containing brominated flame retardant, LCD, or power cord.
  It is recommended to entrust 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.

Other

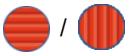
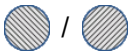
- Use the supplied touch pen or your fingertips to operate the touch screen.
  The touch screen may be irresponsive with the thin tip of the supplied touch pen. In this case, use the thick end of the touch pen or your fingertips.
  Touching with a hard object such as a ballpoint pen tip may scratch the touch screen.
  In addition, pressing the touch pen excessively may damage the touch screen.
- This device uses heat-sensitive printer paper. When keeping the printed data for a long period of time, make copies of the printouts or write down the results by hand.
  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.
- There may be a few dead or constantly-lit pixels on the LCD.
  This does not represent failure of the LCD.
- When connecting to peripheral equipment such as a computer through LAN of a medical facility, insert or connect an isolation transformer between the medical electrical equipment and network devices (network switch etc.), or the network devices and other electrical equipment.
  Electric shock may result. For installation of the network isolation transformer, consult Nidek or your authorized distributor.
- Do not use the device beyond its service life.
  Even with proper maintenance and inspection, after time, the device reliability or safety may become degraded and fail to achieve the target values.
- Equipment connected to the analog or digital interfaces must be certified according to the representative appropriate national standards such as IEC 60601-1.
  Furthermore, all configurations must 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 you have any questions, contact Nidek or your authorized distributor.
- Using the device in a noisy environment may cause improper operation because operation sounds are hardly heard. It is recommended to use the device in a quiet environment so that operation sounds can be heard.

1.3 Labels and Symbols

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

	Indicates that the operator is advised to refer to the related instructions in the operator's manual. This symbol is provided on the identification label.
	Indicates that the degree of protection against electric shock is of a Type B Applied Part. The applied part is the forehead rest.
	Indicates the power switch state. When the switch is set to this symbol position, power is not supplied to the device.
	Indicates the power switch state. When the switch is set to this symbol position, power is supplied to the device.
	Indicates that the device must be supplied only with alternating current.
	Indicates the manufacturer. This symbol is provided on the identification label.
	Indicates the date of manufacture. This symbol is provided on the identification label.
	Indicates that this product shall be disposed of in a separate collection of electrical and electronic equipment in EU. This symbol is provided on the identification label.
	Medical device
	EU authorized representative
	Serial number

The symbols displayed on the control box touch screen correspond to the symbols and names defined in ISO 10341 (Ophthalmic instruments - Refractor heads) as shown in the table below.

Auxiliary lens	Symbol		
	Touch screen	ISO 10341	
Horizontal/Vertical Maddox		MR	Maddox rods
Pinhole plate with a hole diameter of 2 mm		PH or 	Pinhole
Occluder		BL or 	Occluder
PD check lens		CL or 	Cross line
Red filter		RF	Red filter
Green filter		GF	Green filter
Polarizing filter		PF	Polarizing filter
Open aperture		OA	Open aperture
Spherical lens for retinoscope		RL	Retinoscope lens

2 BEFORE USE

2.1 Device Outline

The RT-6100 is a motorized refractor for subjective refraction designed to be connected with other Nidek products such as the Auto Refractometer and/or Lensmeter to import their measurement data. Measurement of refractive errors (spherical power, cylindrical power, and cylinder axis) and binocular visual function testing are performed according to the patient's response.

◆ Intended use

The RT-6100 is a device that provides means of positioning spherical and cylindrical lenses, prisms, and other optical devices in front of the patient's eyes to determine refractive error and binocular functions. It can also be combined with a device that optically presents charts for distance and near vision.

◆ Intended patient population

- Age

  Except babies and infants (under 3 years old)
- Health condition

  Those who can sit on a chair and answer operator's questions
- Conditions - Visual function

  One or both eyes are normal or diseased. Eyes that have lost the visual function are not targeted.
  Those who desire application of glasses or contact lenses.

◆ Intended user profile

Any qualified personnel such as ophthalmologists, nurses, orthoptists (ORT), or optometrists (irrespective of nationality, culture, or style of dress)

◆ Intended use environment

Medical facility or optical store

⚠ CAUTION

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

◆ Principles

The operator presents various charts to the patient to measure subjective refraction of the patient while switching test lenses in the refractor head.

◆ Connectable devices

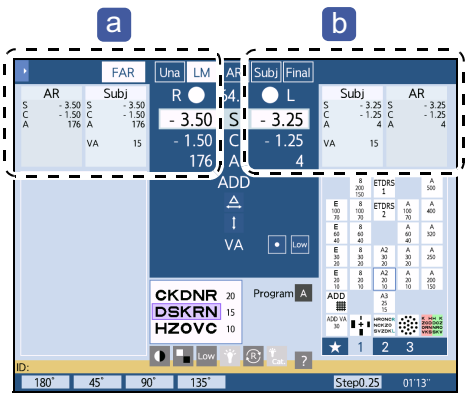
Chart presenting device	Space Saving Chart	SSC-330 Type T, SSC-370, SSC-100
	Chart Projector	CP-9, CP-770
	System Chart	SC-1600, SC-1600Pola
Lensmeter	LM-1800P, LM-1800PD, LM-7, LM-7P	
Auto refractometer	AR-1 series, AR-310A, AR-330A, AR-360A, AR-F, HandyRef, ARK-1 series, ARK-510A, ARK-530A, ARK-560A, ARK-F, HandyRef-K, OPD-Scan III series *a, TONOREF II, TONOREF III	
Memory box	MEM-200	

*a. To connect the OPD-Scan III series, the optional memory box is required.

◆ Descriptions in this manual

- On the touch screen, the values for the right eye are displayed on the left [a], and the values for the left eye are displayed on the right [b].

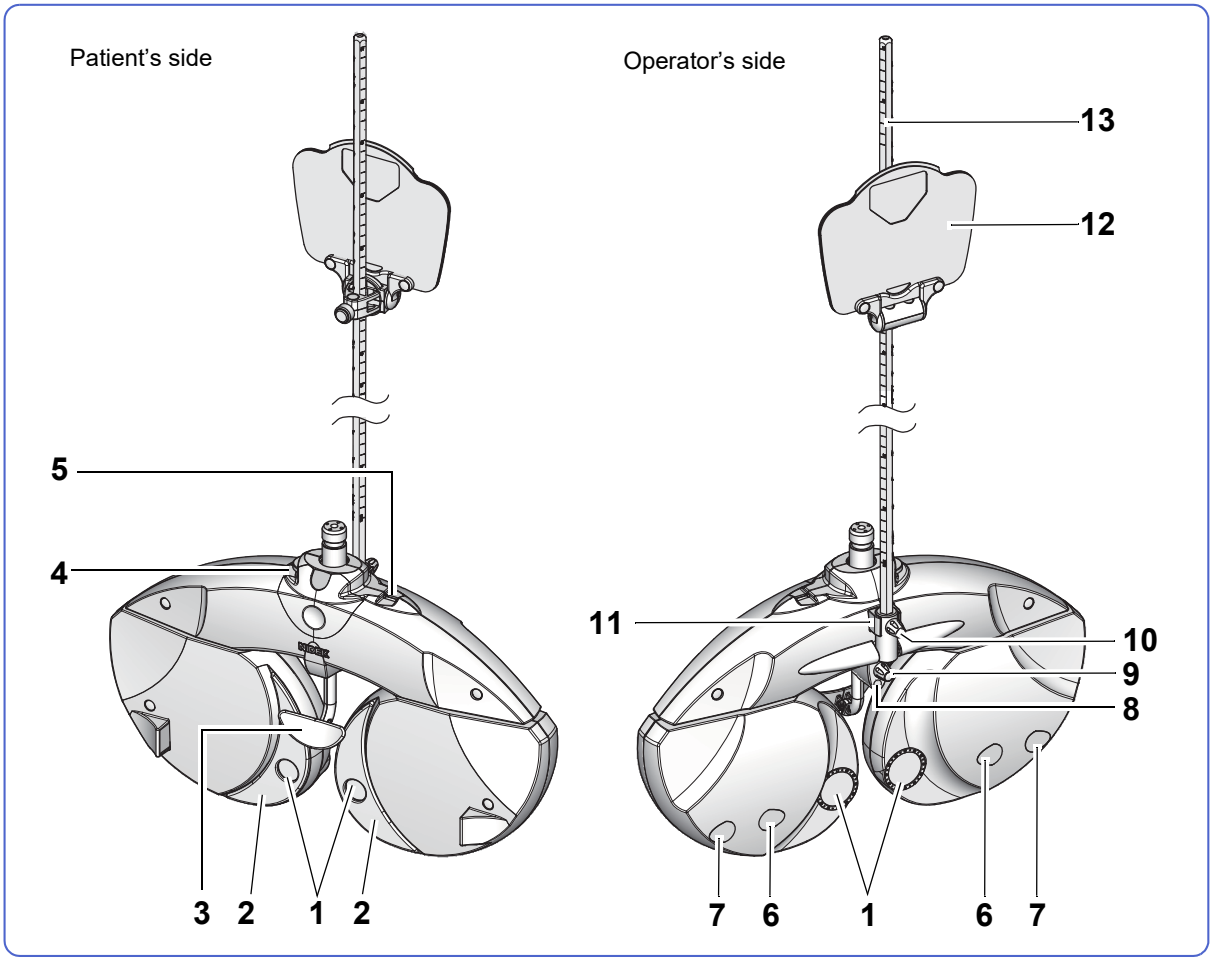
  This arrangement reflects the positions of the patient's eyes as viewed by the operator.



- Buttons grayed out on the touch screen are those that cannot be used due to constraints of the chart presenting device or such.
- Shift + ⊖ indicates pressing ⊖ while holding Shift.
- In this manual, objective measurement devices such as the Auto Refractometers, Auto Ref/Keratometers, Tonoref, and OPD-Scan are referred to as auto refractometers (AR).
- The touch screens and chart illustrations in this manual show examples of when the chart presenting device SC-1600Pola Type M is used. For other chart types, the method of use is the same, but the chart appearances and such partly differ from the illustrations.
- Depending on the chart presenting device or chart type, the appearances of the chart differ from those in this manual, or some charts may not be included. Any charts that are not included in the chart presenting device cannot be used. Refer to the operator's manual of each chart presenting device.

2.2 Device Configuration and Functions

2.2.1 Refractor head



1 Measuring windows

Windows through which the patient views the chart.

2 Face shields

Locations where the patient places their cheeks. Be sure to clean it before refraction.

"7.6.2 Face shields" (page 267)

3 Forehead rest

Location where the patient places their forehead. Be sure to clean it before refraction.

"7.6.1 Forehead rest" (page 267)

4 Level adjustment knob

Adjusts the level of the refractor head.

5 Level

Used to check the horizontal level of the refractor head.

Turn the level adjustment knob until the bubble is centered.

6 Near point lamp

Illuminates the near point chart. The lamp is lit for the near vision test.

The lamp is also illuminated by pressing the [Near Lamp] button in the side menu.

The lamp does not illuminate when the SSC-100 is connected.

7 VD check windows

Windows through which the operator can check the patient's vertex distance.

8 Forehead rest indicator

Shows whether the patient's forehead is properly placed against the forehead rest. The indicator lights up when the forehead is removed from the forehead rest.

9 Forehead rest adjustment knob

Moves the forehead rest forward and backward to adjust the vertex distance.

10 Near point rod mounting knob

Secures the near point rod to the refractor head.

11 Latch

Retains the near point rod when the near point rod is in the raised position.

12 Near point chart

Used for the near vision test (except when the SSC-100 is connected).

"♦ Near point charts" (page 69)

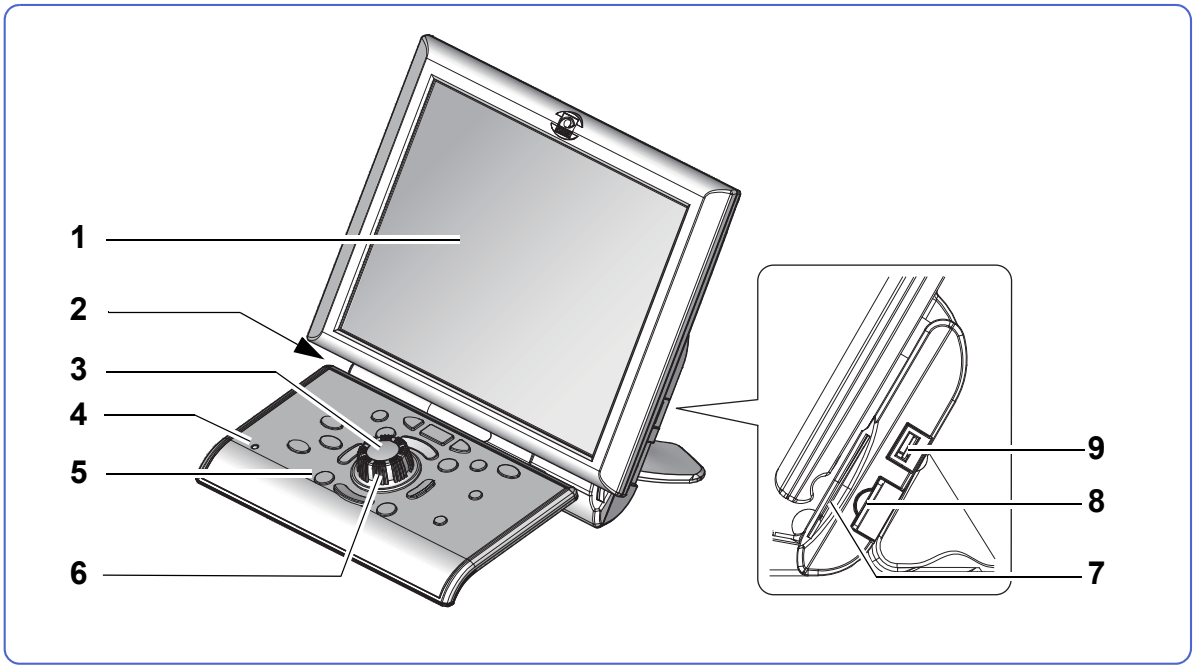
13 Near point rod

Used to hang the near point chart (except when the SSC-100 is connected).

The scale shows the distance from the patient's eye.

"3.7.2 Setting the near point chart (excluding SSC-100)" (page 68)

2.2.2 Control box



1 Touch screen

This is an LCD touch screen.

Operation buttons and data are displayed.

2 Touch pen holder

Stores the touch pen a while not in use.

3 Dial button

Switches the mode among SPH, CYL, AXIS, and such.

The switching type and order of SPH, CYL, AXIS, and VA can be changed by the setting of the parameter “Dial switch”.

4 Power indicator

Illuminates while the power switch is on.

Blinks while the device is in Auto light off mode.

5 Control panel

“♦ *Control panel” (page 25)*

6 Dial

Changes measurement values.

The numeric value currently selected and highlighted in white can be changed.

Dial rotation	Measurement value
Turning counterclockwise.	Increases the value.
Turning clockwise.	Decreases the value.

7 Eye Care card reader

Reads AR data or LM data using an Eye Care card.

An Eye Care card (optional) is required.

8 SD card slot

An SD memory card containing image data and such is inserted. Do not remove the SD card while the device is in use.

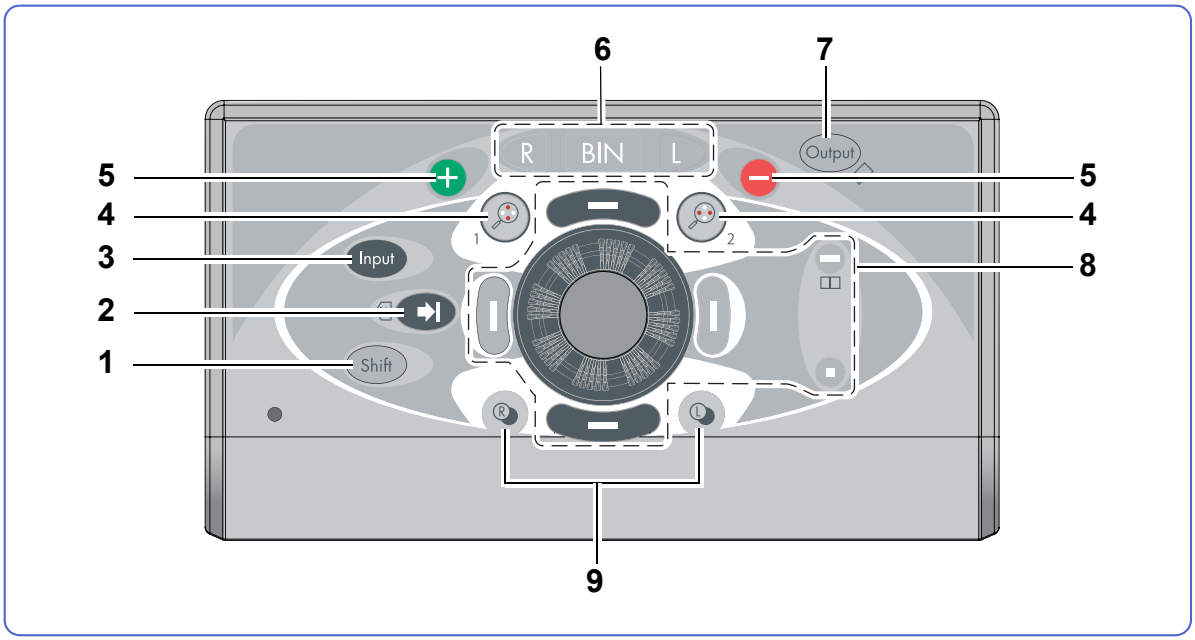
Parameter settings and refraction programs can be written to the SD card.

9 USB connector

Connect the optional barcode scanner or magnetic card reader.

This connector is also used for software upgrade.

◆ Control panel



1 Shift button

Pressing a button or turning the dial while holding Shift changes functions or increments.

Shift is displayed in the upper left of the screen when Shift is held.

"♦ *Function examples with + other buttons" (page 28)*

2 Program advance button

Starts each program.

Advances the program to the next test while a program is running.

Shift + ⏭ returns to the previous test.

3 Input button

Imports data.

- Imports AR data from an auto refractometer.

  "*3.2.1 Importing data from auto refractometer or lensmeter" (page 45)*

- Imports LM data from a lensmeter

  "*3.2.1 Importing data from auto refractometer or lensmeter" (page 45)*

- Imports data measured with a refractor.

  "*5.10 Importing Refractor Measurement Data" (page 205)*

- Imports image data from the OPD-Scan III.

  "*5.12.1 Importing OPD images" (page 208)*

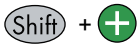
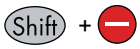
4 Cross cylinder switching buttons

Places the cross cylinder lens. The device enters Cylinder axis refinement or Cylindrical power refinement mode.

Button	Function
 Cross cylinder 1	• In the cylinder axis refinement, the minus axis of the cross cylinder lens is placed at 45 degrees to the minus axis of the cylinder lens. • In the cylindrical power refinement, the minus axis of the cross cylinder lens is placed at 90 degrees to the minus axis of the cylinder lens. • In Prism entry mode, the prism value is cleared from the right eye.
 Cross cylinder 2	• In the cylinder axis refinement, the minus axis of the cross cylinder lens is placed at 135 degrees to the minus axis of the cylinder lens. • In the cylindrical power refinement, the minus axis of the cross cylinder lens is placed at 0 degrees to the minus axis of the cylinder lens. • In Prism entry mode, the prism value is cleared from the left eye.

5 Numeric entry buttons

Changes the numeric value (functions the same as the dial).

Button	Function
	Increases the numeric quantity by one step of the set increment.
	Decreases the numeric quantity by one step of the set increment.
	Changes the numeric quantity by one step of the set increment.
	

6 Patient's eye select buttons

Selects the right eye, both (binocular) eyes, or left eye.

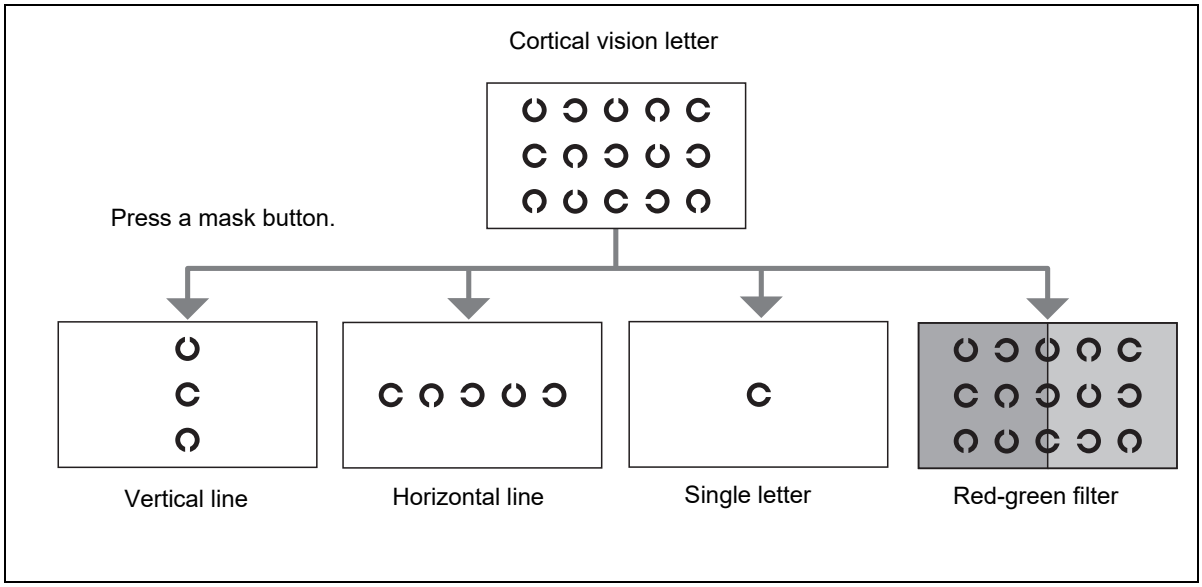
Button	Function
	The right eye is uncovered and the left eye is covered. Numeric entry is possible only for the right eye.
	Both eyes are uncovered. Numeric entry is possible for both eyes.
	The left eye is uncovered and the right eye is covered. Numeric entry is possible only for the left eye.

7  Output button

Prints data or exports data to the external computer.

8 Mask buttons

Masks the visual acuity chart to isolate the intended letters and presents the red-green background.



Button	Function
Top row isolation	Isolates the top row. Moves the isolation up when a row is already isolated.
Shift +	Isolates the top row.
Bottom row isolation	Isolates the bottom row. Moves the isolation down when a row is already isolated.
Shift +	Isolates the bottom row.
Middle row isolation	Isolates the middle row.
Shift +	Applies the red-green filter to the visual acuity chart.
Single letter isolation	Isolates a single letter in the upper right corner.
Shift +	Isolates a single letter in the upper left corner of the cortical vision letter.
Left column isolation	Isolates the left end column. Moves the isolation to the left when a column is already isolated.
Shift +	Isolates a single letter in the lower left corner of the cortical vision letter or vertical line.
Right column isolation	Isolates the right end column. Moves the isolation to the right when a column is already isolated.
Shift +	Isolates a single letter in the lower right corner of the cortical vision letter or vertical line.

❖ For details of the mask buttons, see *"3.5.2 Selecting visual acuity charts" (page 59)*.

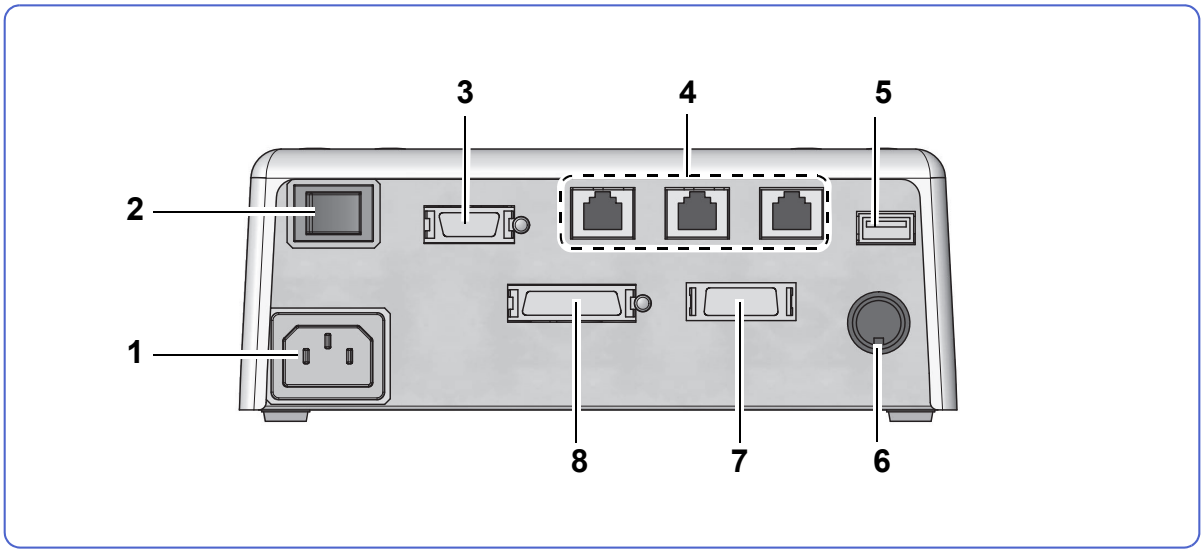
9 Measuring window right button, Measuring window left button

Switches the measuring window Right or Left to be covered or uncovered.

◆ Function examples with Shift + other buttons

Button	Function
Shift + Final	Enters Distance power auto adjustment mode when the parameter "Shift+Final" is set to [Final Fit].
Shift + ADD	Enters the mode to enter the near point of convergence (NPC).
Shift + R	Specifies the right eye as the dominant eye.
Shift + L	Specifies the left eye as the dominant eye.
Shift +	Isolates the top row.
Shift +	Isolates the bottom row.
Shift +	Isolates a single letter in the lower left corner of the cortical vision letter or vertical line.
Shift +	Isolates a single letter in the lower right corner of the cortical vision letter or vertical line.
Shift +	Isolates a single letter in the upper left corner of the cortical vision letter or vertical line.
Shift +	Applies the red-green filter to the visual acuity chart. Pressing these buttons again releases the filter.
Shift +	Returns to the previous step of the program while a program is running.
Shift +	Changes the clock indication to the refraction time indication. The time required for refraction can be measured. When the refraction time indication is already displayed, the refraction time is cleared and restarts.
Shift + dial Shift + Shift +	Changes the sphere, cylinder, or axis in increments set by parameter.
Shift + Output	Clears all data. Pressing the desired measurement mode select button together with these buttons clears the measurement data of that mode.

2.2.3 Relay box



1 Power inlet

Connect the power cord here.

2 Power switch

Turns on/off the power supply to the refractor head, control box, relay box, and printer.

3 Control box connector

Used to connect the control box.

4 LAN connector*1

Used to connect the auto refractometer, lensmeter, or external computer.

5 USB connector*1

Used to connect the optional barcode scanner or magnetic card reader.

6 Chart connector*1

Used to connect the chart presenting device.

7 Printer connector*1

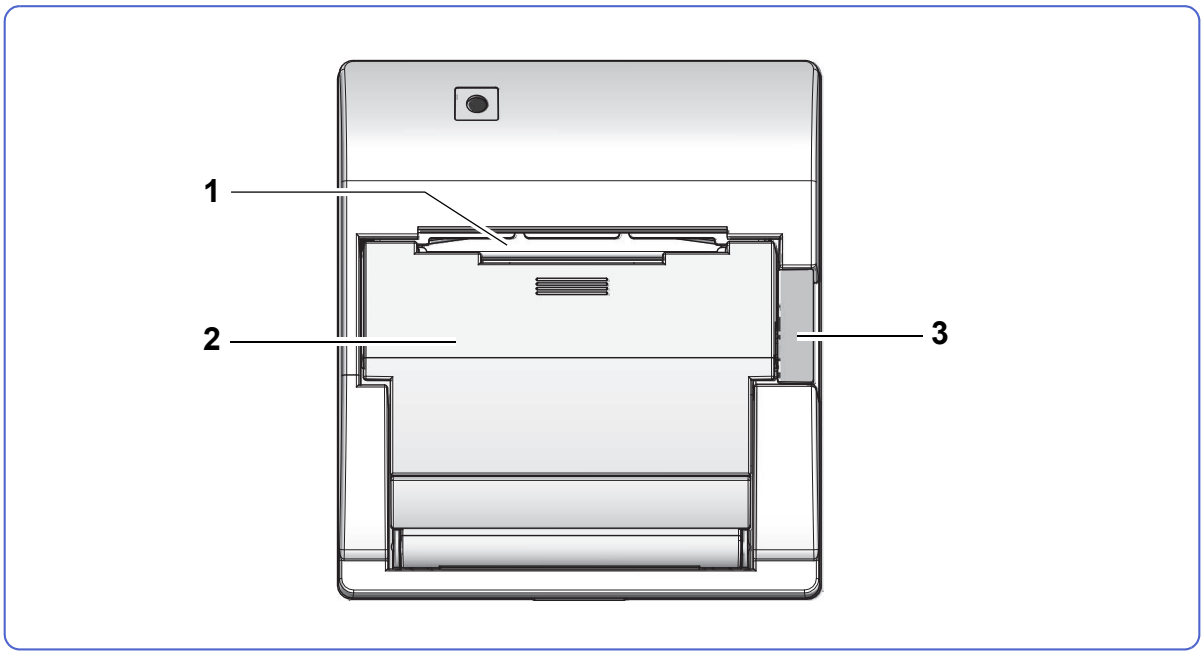
Used to connect the printer.

8 Refractor head connector*1

Used to connect the refractor head.

*1. Equipment connected to the analog or digital interfaces must be certified according to the representative appropriate national standards such as IEC 60601-1. Furthermore, all configurations must 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 you have any questions, contact the Nidek Service Department.

2.2.4 Printer



1 Printer paper slot

Ejects printer paper from here.

2 Printer cover

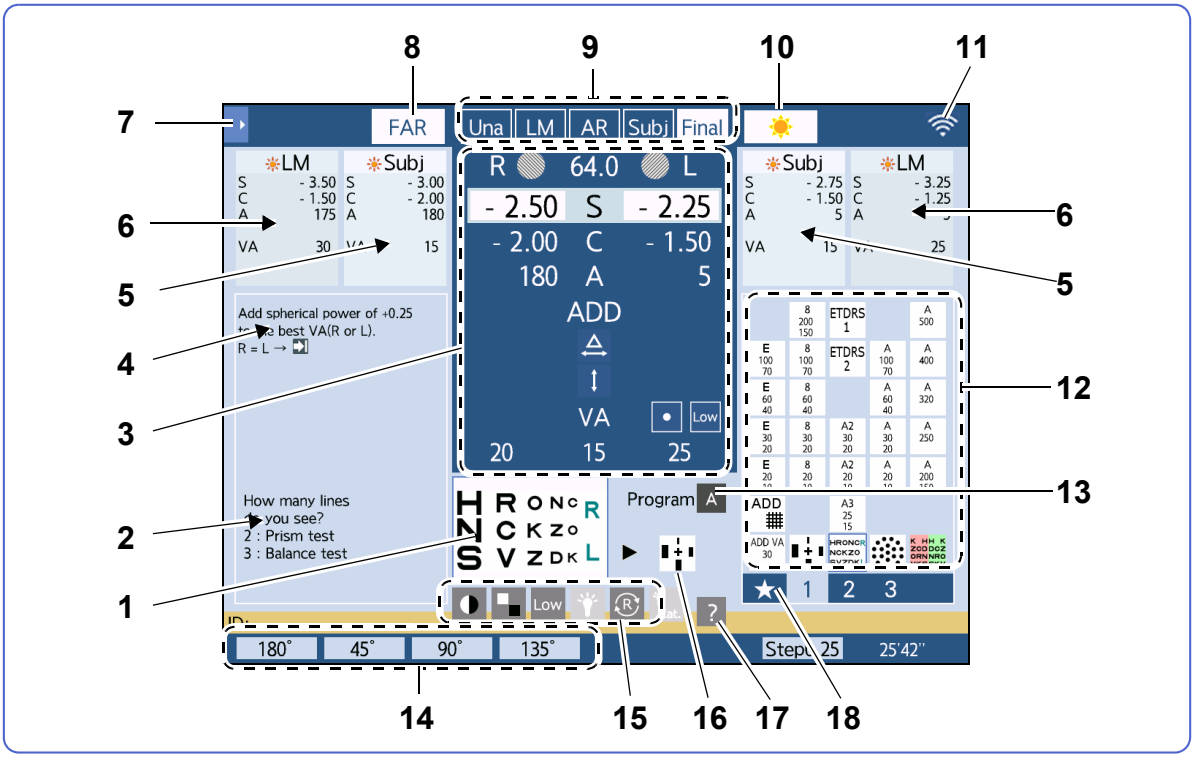
3 Cover open button

Opens the printer cover.

2.3 Screen Configuration and Functions

2.3.1 Measurement screen

This is the screen displayed after device startup. This screen can also be displayed by pressing End on the menu screen.



1 Currently presented chart

2 Operation message area

Displays the refraction operating procedure according to the selected chart.

3 Current data area

Displays the data of the lens that is currently placed in the refractor head. Press each data to change it.

"3.2.2 Entering data manually" (page 47)

- 64.0 : Pupillary distance
- R ● ● L : Right or Left of auxiliary lenses
- S : Spherical power (sphere value)
- C : Cylindrical power (cylinder value)
- A : Cylinder axis (axis value)
- ADD : Addition power (addition value)
  The refractor head automatically converges to the working distance of 40 cm (changeable).
- VA : Right-eye visual acuity, binocular visual acuity, and left-eye visual acuity

-  : Base IN/OUT prism power in rectangular coordinates
-  : Base UP/DOWN prism power in rectangular coordinates
-  : Prism absolute values in polar coordinates
-  : Prism angles in polar coordinates

4 Program message area

Displays the message written in the refraction program.

5 Subwindow 1

Displays the measurement values previously set.

Display items can also be specified. *"5.7 Specifying Subwindow Display Data" (page 195)*

6 Subwindow 2

Displays the measurement values set before the previous setting.

If display items are specified in Subwindow 1, the measurement values previously set are displayed.

Display items can also be specified. *"5.7 Specifying Subwindow Display Data" (page 195)*

7 Side menu button

Displays the side menu.

"♦ Side menu" (page 34)

8 FAR / NEAR Distance/Near toggle button

Toggles between the distance vision test and near vision test. The button indication shows the mode currently selected.

"3.7.1 Toggling between Distance mode and Near mode" (page 67)

9 Measurement mode select buttons

Selects the mode for data entry and measurement.

The background of the button of the selected mode becomes gray.

Una	Unaided mode	Measures unaided visual acuity.
LM	LM mode	Imports LM data obtained by measuring current glasses using a lensmeter.
AR	AR mode	Imports AR data obtained by measuring the patient's eyes using an auto refractometer.
Subj	Subjective mode	Determines the full correction.
Final	Final mode	Determines the final prescription and visual acuity values.

10 / Day/Night toggle button

Toggles between the day vision test and night vision test. The button indication shows the mode currently selected.

* The button is not displayed when the CP-9, CP-770, or SSC-330 Type T is connected.

11 Wireless LAN status

Indicates the connection status when the optional wireless LAN module is mounted to the control box.

Indication	Wireless LAN connection status
 Blue icon	Connecting
 Gray icon	Disconnected
 Yellow icon	Connection confirmation
 Gray ? icon	Initializing

12 Chart select icons

Select the icon of the desired chart to present a chart.

13 Program select button

Shows the refraction program currently selected. Press the button to reselect the program included in memory.

14 Function buttons

Measurement data and function buttons corresponding to the selected chart are displayed.

15 Chart auxiliary function select buttons

Changes the contrast and brightness of the chart.

“3.6 Contrast Change, Low Illumination, Inverted Black and White” (page 64)

16 Chart presented in next step during refraction program

17 ? Help button

Displays the explanation for the presented chart.

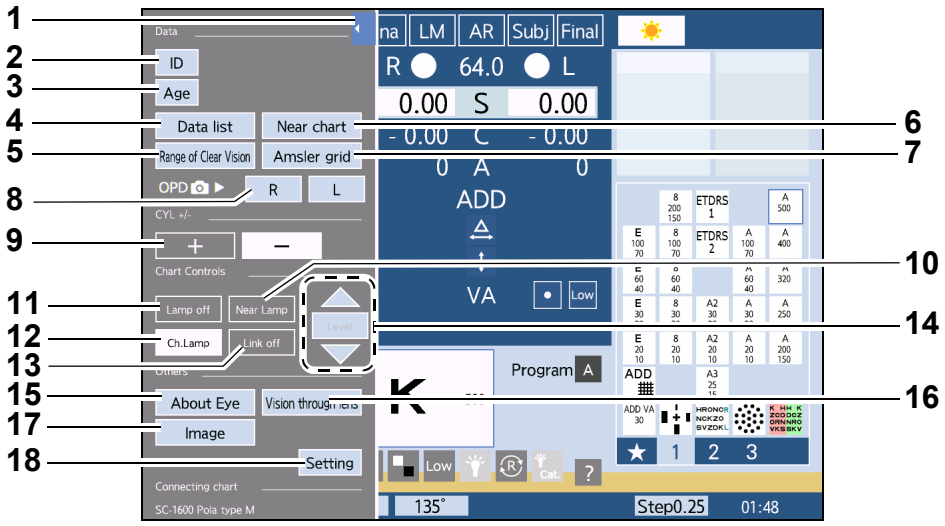
Pressing ? while a standard program or a program containing questioning examples is running displays its questioning examples.

18 ★ Favorites button

Displays a list of icons for charts added as favorites.

◆ Side menu

This menu is displayed by pressing in the upper left corner of the measurement screen.



1 Close button

Closes the side menu.

2 [ID] button

Used to enter the patient ID No.

3 [Age] button

Used to enter the patient's age.

4 [Data list] button

Displays a list of measurement data.

5 [Range of Clear Vision] button

Displays the clear vision range check screen.

6 [Near chart] button

Displays the near chart screen.

7 [Amsler grid] button

Displays the Amsler grid screen.

8 [R] and [L] buttons

Displays OPD images.

[R]: Displays OPD images entered for [R] in the import data select screen.

[L]: Displays OPD images entered for [L] in the import data select screen.

These buttons are displayed only when OPD images have been imported.

9 [+] and [−] buttons

Selects a cylinder reading sign from plus reading and minus reading.

10 [Near Lamp] button

Turns on or off the near point lamp mounted on the refractor head.

11 [Lamp off] button

Turns off the chart lamp, touch screen backlight, and near point lamp.

To recover from lamp-off status, press any button.

12 [Ch.Lamp] button

Turns on or off the chart lamp.

13 [Link off] button

Disables auxiliary lenses or mode (SPH, CYL, AXIS) from being automatically switched when the chart is changed.

14 [Level],  ,  buttons

Used to align the chart height to the eye level of the patient when the SSC-330 Type T or SSC-370 is connected.

"4.1.3 Adjusting the chart height (SSC-330 Type T, SSC-370 only)" (page 91)

15 [About Eye] button

Displays the Refraction diagram list screen.

16 [Vision through lens] button

Displays the vision image screen.

17 [Image] button

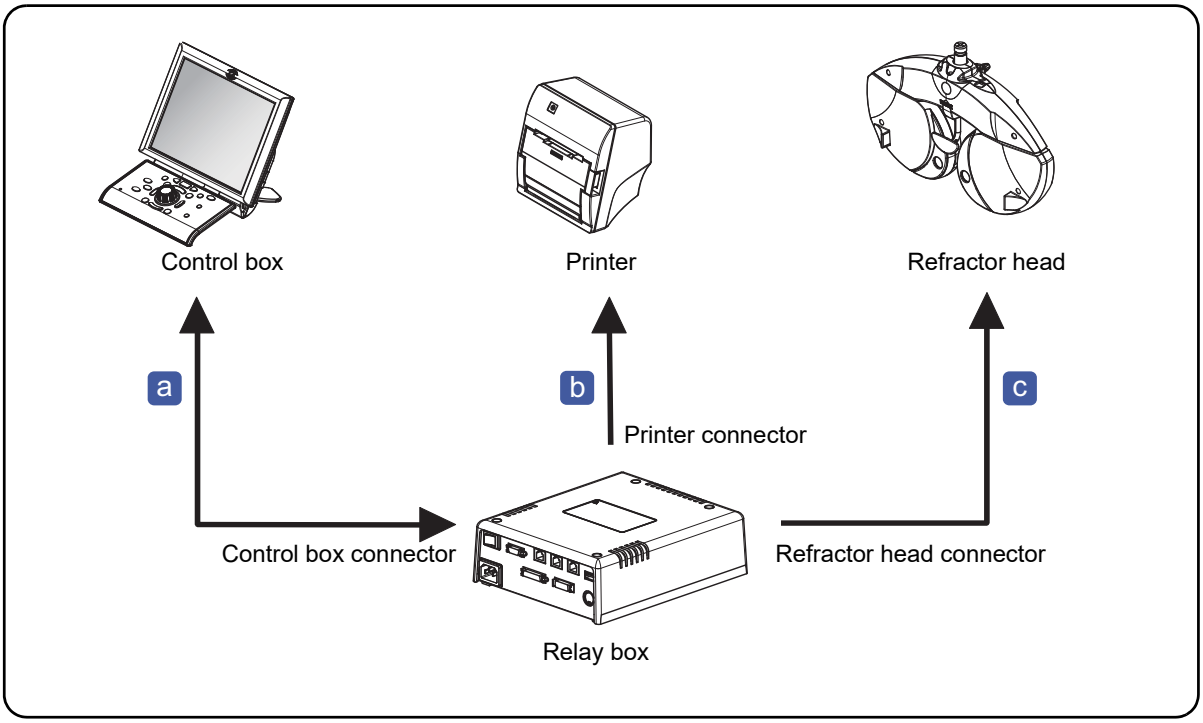
Displays the menu screen of images saved in the SD card.

18 [Setting] button

Displays the menu screen.

2.4 Unit Connection

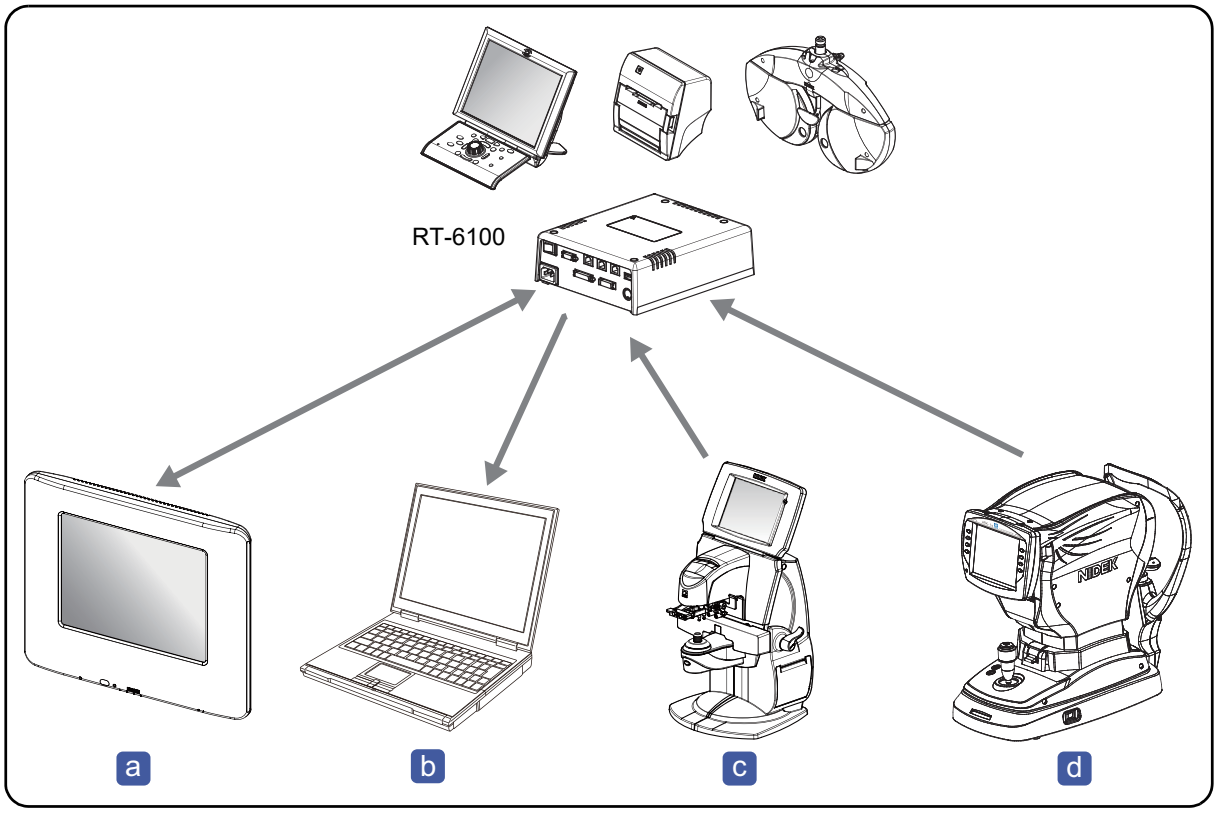
■ This section explains how to connect the refractor head, control box, and printer to the relay box. The relay box is incorporated into the system table.



a	Relay box - control box cable
b	Printer cable
c	Refractor head cable

2.5 Peripheral Device Connection

■ The device imports measurement data (AR data, LM data) from an auto refractometer or lensmeter. The data measured based on the imported data can be exported to an external computer.



Connected device	Connection port	Function
a Nidek chart presenting device	Chart connector	Switches charts.
b External computer	LAN connector	Exports measurement data.
c Nidek lensmeter	LAN connector	Imports LM data.
d Nidek auto refractometer	LAN connector	Imports AR data. The data is used in subjective refraction.

- When connecting a computer, use a computer compatible with CISPR32.
- Ensure that the cables do not pose a risk to the patient, operator, or others when connecting this device to other devices. Also when connecting, removing, or upgrading devices, ensure that there is no risk to the patient, operator, or others.

2.6 Before Initial Use

◆ Before initial use or after movement

1 Confirm that the power cord of the system table connected is plugged into the power outlet.

2 Attach the forehead rest to the refractor head.

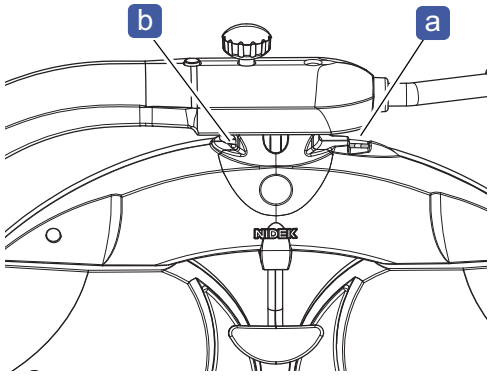
For the attachment procedure of the forehead rest, see *"7.6.1 Forehead rest" (page 267)*.

3 Attach the face shields to the refractor head.

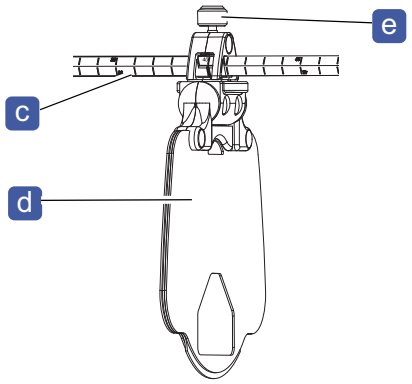
The face shields are magnetically held to the refractor head.

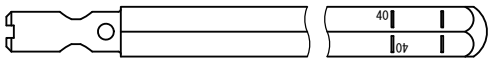
4 Check the horizontal level of the refractor head.

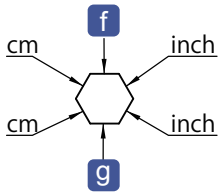
Check that the bubble in the level a is in the center. If the bubble is not in the center, turn the level adjustment knob b until the bubble is centered.



5 Slide the near point rod c through the near point chart d and lightly tighten the knob e.





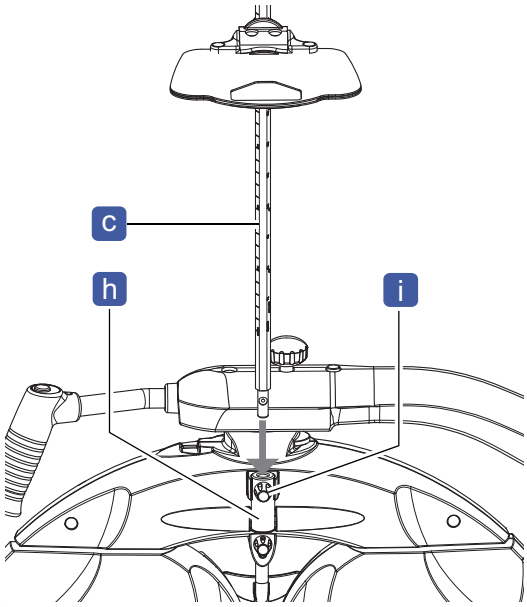


The scale of the near point rod is marked as shown in the figure to the upper right.

Marking orientation	Installation orientation
Markings for "cm" are on the right as viewed from the patient's side.	Install the rod so that the f surface is in contact with the knob.
Markings for "cm" are on the left as viewed from the patient's side.	Install the rod so that the g surface is in contact with the knob.

6 Insert the near point rod c into the holder h of the refractor head.

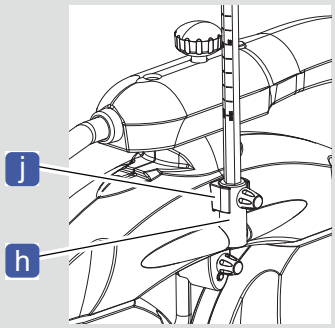
There are two round indentations at the base of the near point rod. Align the indentation of the near point rod that is the same side as the near point chart with the knob i and fully insert the rod, then tighten the knob.



⚠ CAUTION

- Confirm that the near point rod is securely fastened.
- Confirm that the holder h is securely fastened to the latch j when the near point rod is raised.

  An improper fastening may cause the near point rod to fall resulting in injury.



7 Load the printer paper.

“7.5 Printer Paper Replacement” (page 265)

This completes the setup procedure.

3 OPERATING PROCEDURE

This chapter explains the basic operations and functions for refraction.

3.1 Device Startup and Shutdown

3.1.1 Pre-use check and startup

⚠ CAUTION

- Be sure to perform a pre-use check according to the Pre-use Checklist. It is recommended to record the check items.

  Failure to perform a pre-use check may result in an inaccurate measurement. Device malfunction may also result.

  "♦ Pre-use Checklist" (page 43)

1 Remove the dust cover from the refractor head.

2 Install the near point rod and near point chart.

"2.6 Before Initial Use" (page 38)

3 Perform the pre-use check according to the Pre-use Checklist before turning on the device.

"♦ Pre-use Checklist" (page 43)

4 Turn on the connected chart presenting device.

5 Turn on the power switch of the system table.

The startup screen appears in a few seconds after the device is turned on. Then, the screen returns to the measurement screen.

6 Continue the pre-use check according to the Pre-use Checklist after turning on the device.

3.1.2 Device shutdown and after-use check

Note

- Recovery from Auto light off mode
  The device enters Auto light off mode when the device is idle for 15 minutes (changeable by parameter setting). The following occur in Auto light off mode.
  - The backlight of the control box touch screen goes off.
  - The power indicator on the control panel blinks.
  - The backlight of the chart presenting device goes off.

  To recover from Auto light off mode, press any button on the control box.

- Do not turn off the device during printing. Malfunction may occur.
- When the device will not be used for an extended period of time, disconnect the power cord from the power outlet.

“ Environmental conditions (during storage, unpacked condition)” (page 287)

1 Turn off（ ○ ）the power switch.

Turn off the system table.

2 Remove the near point rod and near point chart from the device.

3 Clean the forehead rest, face shields, and measuring windows.

“7.6 Cleaning” (page 267)

4 If the device cover, touch screen, or control panel is dirty, wipe it with a soft cloth.

For severe stains, soak the cloth in a neutral detergent, wring well, and wipe.

5 Clean the printer or Eye Care card reader if necessary.

“7.6 Cleaning” (page 267)

6 Perform the after-use check according to the After-use Checklist.

“♦ After-use Checklist” (page 44)

7 Place the dust cover on the refractor head.

◆ Pre-use Checklist

Pre-use Checklist

Item	Checked (date and by whom)
Check items before turning on the device	
The power plug is fully inserted into the power outlet.	
The cables of the connected devices are connected securely.	
The near point rod is securely fastened.	
The device is clean and undamaged (also check the printer and near point chart).	
The face shields and the forehead rest are attached to the refractor head.	
The face shields and the forehead rest are clean.	
The forehead rest can be moved using the forehead rest adjustment knob.	
The measuring windows of the refractor head are clean.	
The refractor head is level.	
The touch screen is clean.	
Printer paper is sufficient.	
The connected devices are turned on.	
The refractor head is locked so that it will not move when the optional refractor head tilt unit is equipped.	
Check items after turning on the device	
No error message appears when the device is turned on.	
The touch screen shows the measurement screen.	
The chart can be changed by the control box.	
The chart presented matches that shown on the touch screen.	

◆ After-use Checklist

After-use Checklist

Item	Checked (date and by whom)
The device is turned off.	
The connected devices are turned off.	
The face shields, forehead rest, and measuring windows are clean.	
The device is clean and undamaged.	
Printer paper is sufficient.	
Accessories are all accounted for and undamaged.	

3.2 Data Entry before Refraction

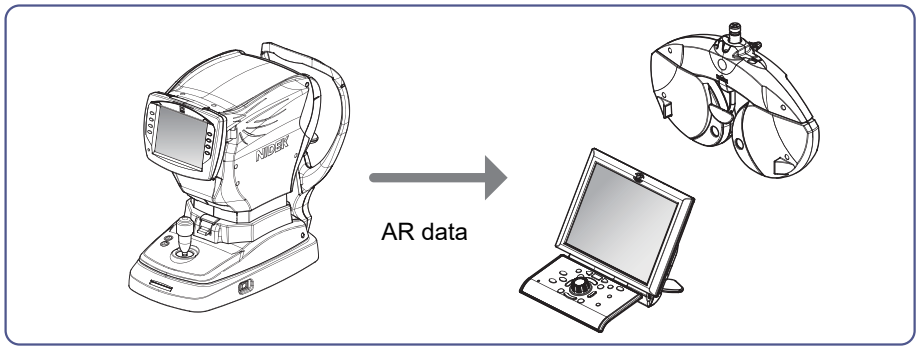
■ This section explains how to import objective (AR) data measured with an auto refractometer or the patient's glasses data measured with a lensmeter. The following three methods are available:

- Importing data from the auto refractometer or lensmeter via LAN.
  "3.2.1 Importing data from auto refractometer or lensmeter" (page 45)
- Manually entering values of printout produced from the auto refractometer or lensmeter.
  "3.2.2 Entering data manually" (page 47)
- Reading data from the Eye Care card.
  "3.2.3 Reading data from Eye Care card" (page 48)

3.2.1 Importing data from auto refractometer or lensmeter

This section explains how to import AR data from the auto refractometer. The section also explains how to import LM data from the lensmeter.

For the operating procedure of the auto refractometer or lensmeter, refer to the operator's manual of each device.



Note

- It is recommended to specify Manual mode as Print mode of the auto refractometer.
  Set the print parameter to the manual setting.

1 Measure the patient's eyes with an auto refractometer or measure the patient's glasses with a lensmeter.

2 When measurement is complete, press the print button of the auto refractometer or lensmeter.

The measurement values are automatically transferred to the shared folder upon printing.

3 Press Input.

The import data select screen is displayed.

4 Press the function button AR/ARK.

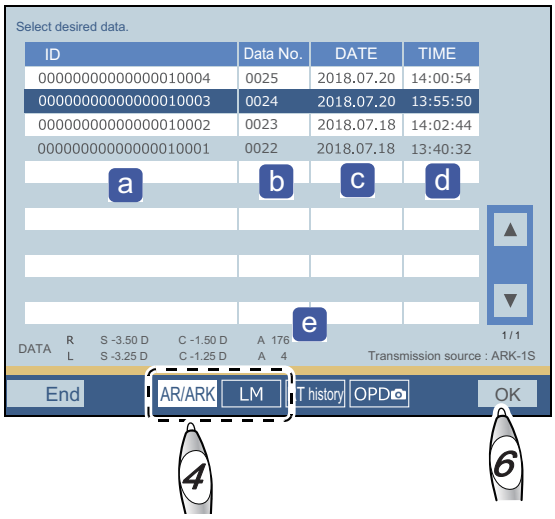
To import LM data, press LM.

5 Select the desired data.

Select the patient's data to be examined with the refractor referring to the patient ID a, data No. b, date c, time d, and data e.

Data No. b indicates a four-digit number included on the printout output from an auto refractometer or lensmeter. For the OPD-Scan III series, it is the number included in the data No. for RT field on the printout.

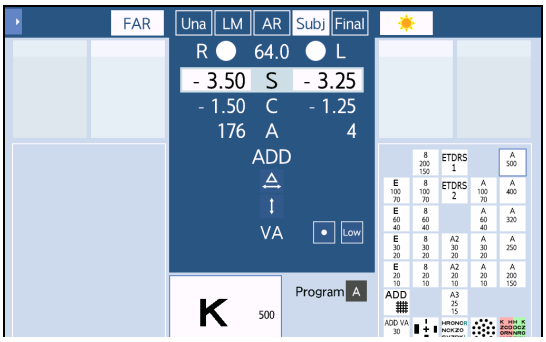
[▲], [▼]: Switches pages.



6 Press OK or the dial button.

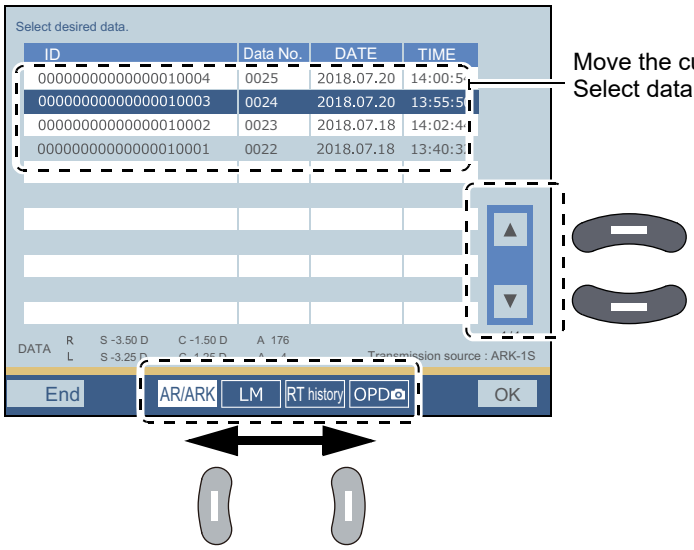
AR data or LM data is imported and the device enters Subjective mode.

When data is already entered in the subjective data field with the parameter *" Preset power of Subj 1" (page 228)* set to [LM], AR data is not automatically entered in the subjective data field.



◆ Button operations on control panel

The import data select screen can also be accessed by the buttons on the control panel.



Move the cursor with the dial.
Select data with the dial button.

3.2.2 Entering data manually

This section explains how to enter data measured with an auto refractometer or lensmeter using the dial (manual operation).

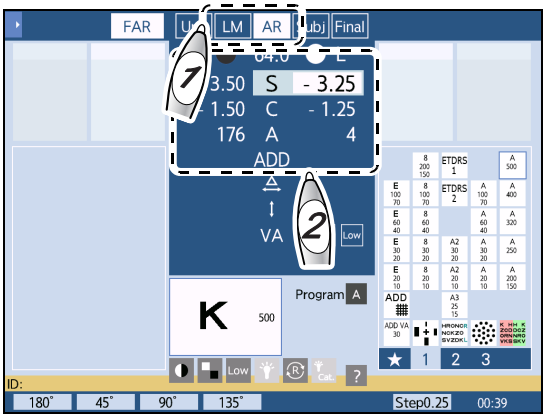
For the operating procedure of the auto refractometer or lensmeter, refer to the operator's manual of each device.

Note

- If a PD value is entered with LM specified, it will be treated as glasses PD (PD of current glasses) and will not be reflected on the measurement screen. To enter the patient's PD, select a mode other than LM.

1 Select LM or AR.

- LM : For data measured with a lensmeter
- AR : For data measured with an auto refractometer



2 Press the desired numeric field.

Pressing a numeric field highlights its background in white, indicating that the value is changeable.

Pressing S, C, A, or ADD allows binocular value entry.

Pressing 64.0 allows PD value entry.

3 Turn the dial to enter the values measured with the auto refractometer or lensmeter.

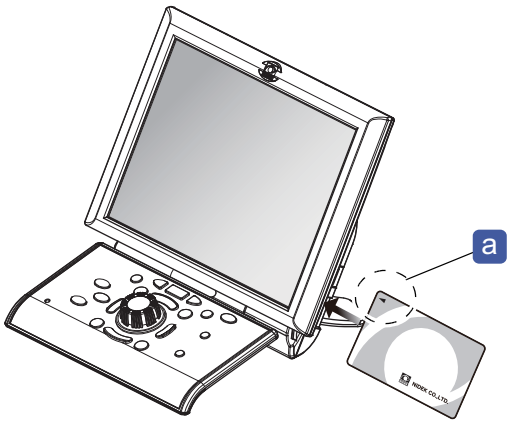
3.2.3 Reading data from Eye Care card

This section explains how to read data measured with an auto refractometer or lensmeter using an optional Eye Care card. For the procedure to write data measured with an auto refractometer or lensmeter, refer to the operator's manual of each device.

- Note the following when handling the Eye Care card:
  - Do not remove the card while it is being accessed, which is indicated by EyeCa displayed in the upper right of the screen.
  - Do not fold or strike the card.
  - Do not allow the IC terminal (gold part of the card) to become wet or soiled.
  - Do not leave the card in a location exposed to high temperatures or static electricity.
- Data measured with an auto refractometer or lensmeter in the Eye Care card is automatically cleared when reading is complete. Use the card with all data cleared by saving or reading data for each patient.

1 Insert an Eye Care card into the Eye Care card slot.

Fully insert the Eye Care card in the orientation shown to the right a.

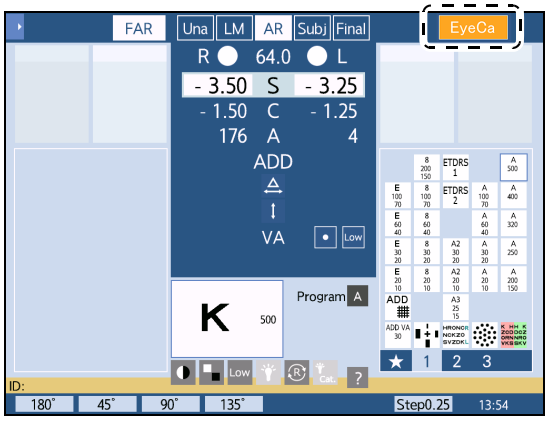


Eye Care card

2 The Eye Care card indication EyeCa is temporarily displayed in the upper right of the screen when the card is correctly inserted.

Measurement data is automatically read in the AR or LM field from the Eye Care card.

The data on the Eye Care card is automatically erased when the reading is complete.



Note

- When the parameter "Data clear confirmation by Eye Care card insertion" is set to [Yes] and data is read from the Eye Care card with measurement data displayed, a window is displayed asking whether to read the Eye Care card data after all displayed data is cleared.
  - [Clear+Input]: Reads data from the Eye Care card after all displayed data is cleared.
  - [Overwrite]: Overwrites data in the Eye Care card without clearing any displayed data. Items in the displayed data that are not included in the Eye Care card remain as they are (however, for the subjective field, the setting of the parameter "Preset power of Subj 1" is applied).

Note

- If measurement data of both the auto refractometer and lensmeter are written on the Eye Care card, the setting of the parameter *" Preset power of Subj 1" (page 228)* is applied. Data is automatically entered in the subjective field and the device enters Subjective mode.
- Parameter setting is possible to allow the specified program to be automatically activated according to the type of data read.

  " Program for imported WF data" (page 226), *" Program for imported AR data" (page 227)*,*" Program for imported Night data" (page 227)*
- The following data read from the Eye Care card is displayed only in the data list and printed together with other data at the time of printing.
  - Kerato data of auto ref/keratometer
  - Intraocular pressure data of tonoref

3 When the test is complete, remove the Eye Care card.

◆ Importing Wave Front data

If data measured with the OPD-Scan III series is Wave Front, it is imported instead of AR data. In this case, the indication "WF" is shown instead of "AR" on the screen or printout.

To import and use Wave Front data, set the parameter *" Program for imported WF data" (page 226)* to [C] that is available for user configuration (recommended).

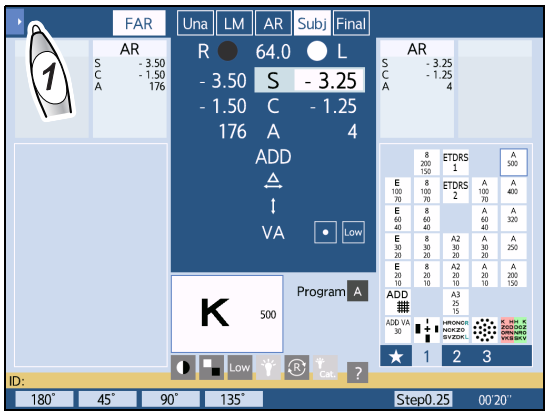
After that, rewrite the program C to a program that supports Wave Front data.

3.2.4 Entering the patient's age

This section explains how to enter the patient's age.

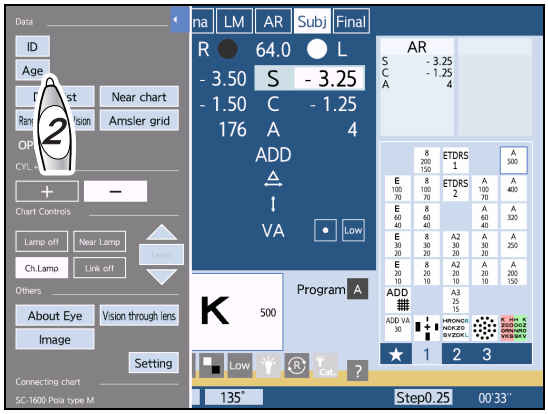
1 Press .

The side menu is displayed.



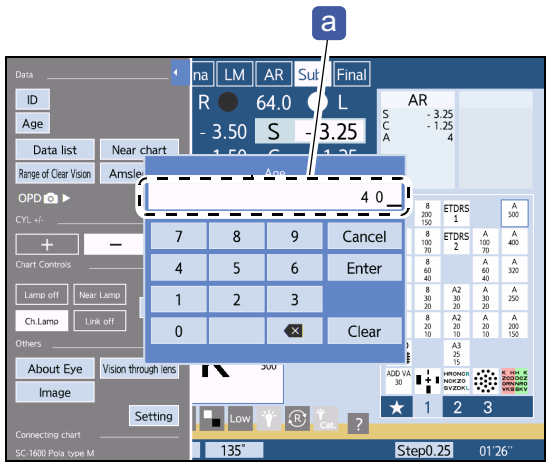
2 Press [Age].

The age entry screen is displayed.



3 Enter the patient's age a.

Numeric key	Enter the patient's age.
[⌫]	Deletes one character to the left of the cursor.
[Clear]	Clears the age entered.
[Cancel]	Closes the age entry screen without changing the age.
[Enter]	Closes the age entry screen with the age changed.



4 Press [Enter].

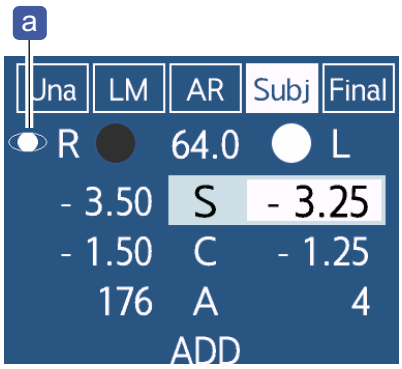
3.2.5 Specifying the dominant eye

Whether the patient's dominant eye is right eye or left eye can be specified.

Specify the dominant eye by pressing R or L while holding Shift.

Shift + R	Specifies the right eye as the dominant eye.
Shift + L	Specifies the left eye as the dominant eye.

The dominant eye indicator a is displayed on the specified side.

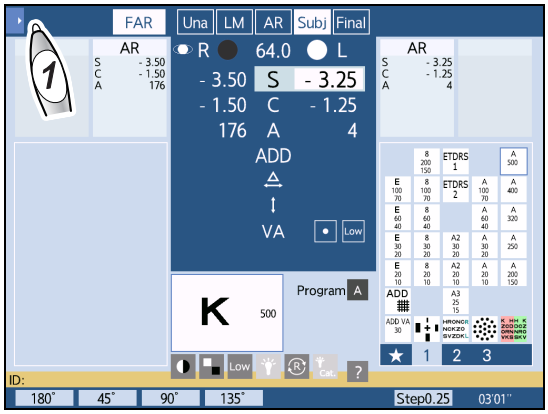


3.2.6 Entering patient ID

◆ Entering patient ID manually

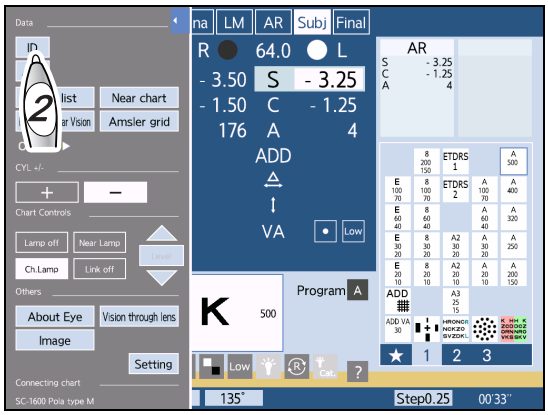
1 Press [▶].

The side menu is displayed.

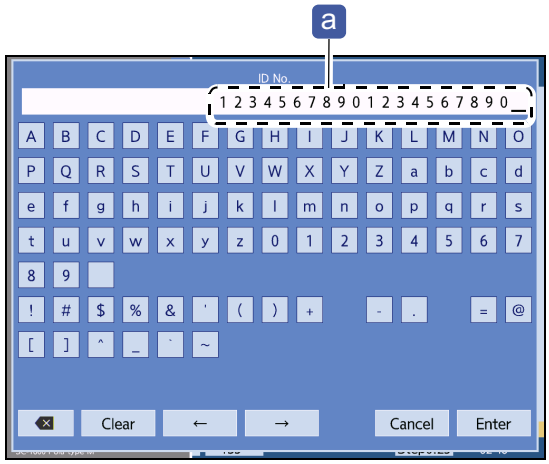


2 Press [ID].

The ID entry screen is displayed.



3 Enter the desired patient ID [a].



Alphanumeric key	Enter the patient ID.
[⌫]	Deletes one character to the left of the cursor.
[Clear]	Clears the patient ID entered.
[←]	Moves the cursor to the left.
[→]	Moves the cursor to the right.
[Cancel]	Closes the ID entry screen without changing the patient ID.
[Enter]	Closes the ID entry screen with the patient ID changed.

4 Press [Enter].

◆ Reading patient ID from barcode or magnetic card

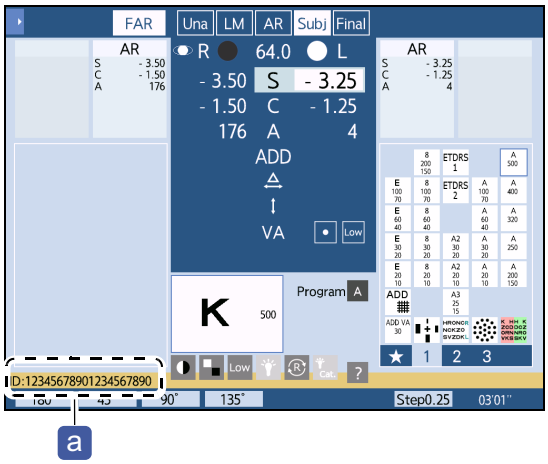
Patient ID can be read from the barcode or magnetic card using the optional barcode scanner or magnetic card reader.

The section of the read data used as patient ID is determined by parameter setting.

"6.1.3 Changing barcode scanner or magnetic card reader settings" (page 247)

Display the measurement screen and read the barcode with the barcode scanner or read the magnetic card with the magnetic card reader.

The patient ID a is displayed.



Note

- Use CODE 39 for the barcode.
- Use magnetic cards formatted with Magnetic Stripe Format: ISO 7811, AAMVA, and CA DMV.
- Only numbers, alphabetic characters, spaces, underscores, and hyphens may be used for the patient ID.

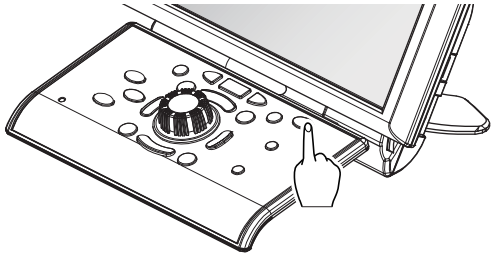
  The device does not recognize any other symbols. All unrecognized symbols are converted to "~".

3.3 Data Export

This section explains how to export data measured with a refractor.

Pressing Output exports all displayed data to the shared folder.

The connected computer acquires data through the shared folder.



Data is exported to (1) and (2) in the table below as well while exported to the shared folder ((2) is only for when an Eye Care card is inserted).

Export destination	Intended use	Setting
(1) RT history folder *a	Importing data with the RT-6100 within the same network. *(page 205)*	Set the parameter “RT history" to [To be used]. *(page 244)*
(2) Eye Care card *a	Reading written measurement data with the RT-6100 or RT-5100. *(page 206)*	Set the parameter “Write to Eye Care Card” to [Yes] in advance. *(page 229)*

*a. For CYL = 0, data is exported as AXIS = 0 regardless of the AXIS value.

◆ When printing and exporting data

When the parameter “Print” is set to [Yes], printing starts along with data export.

* For CYL = 0, data is exported as AXIS = 0 regardless of the AXIS value.

◆ When exporting data after checking the data list screen

Set the parameter “Data list at output” to [Yes].

1 Press Output.

The data list screen is displayed.

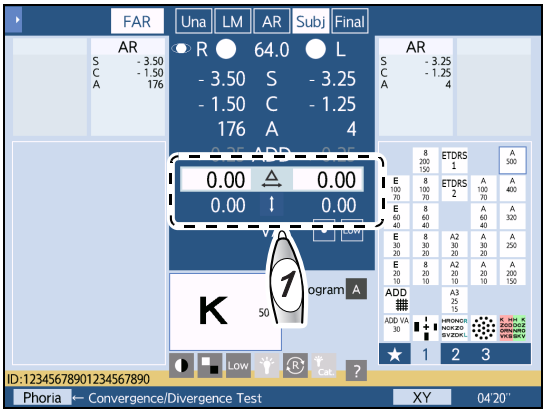
2 Press Output.

The data is exported to the shared folder.

3.4 Prism Entry

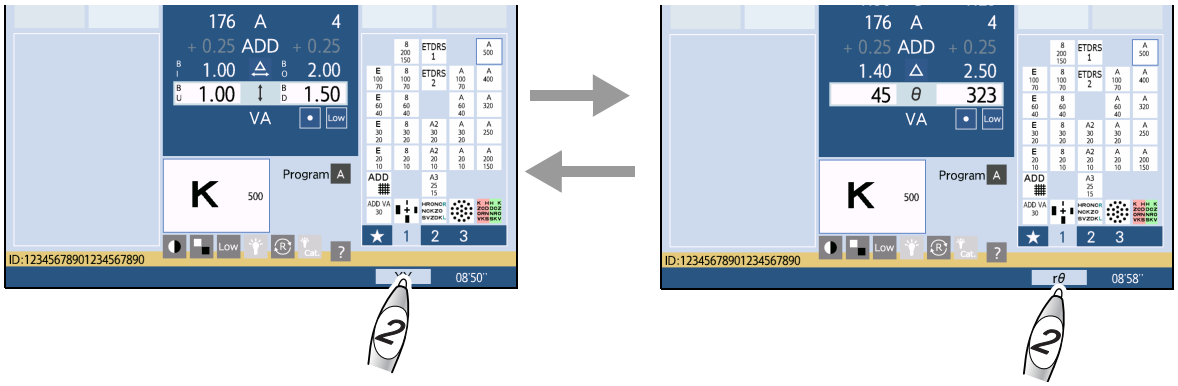
3.4.1 Changing the prism display format

1 Press the prism field.



2 Select rectangular coordinates or polar coordinates.

Press the rectangular coordinates XY or polar coordinates rθ. Pressing the button toggles the indication.



Ex.— Right eye 1.0ΔBI, 1.0ΔBU → 1.40Δ, BASE 45°
Left eye 2.0ΔBO, 1.5ΔBD → 2.50Δ, BASE 323°

3.4.2 Entering prism values in rectangular coordinates (XY)

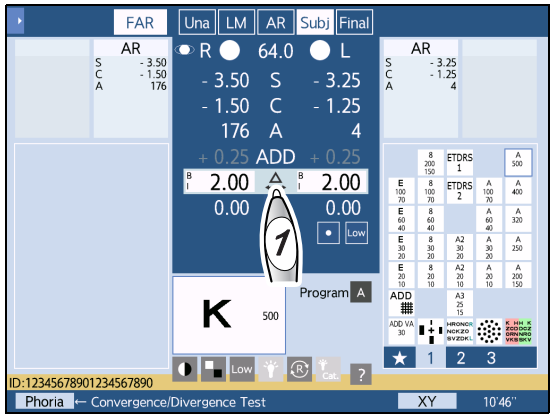
1 Press △.

Prism values can be entered in rectangular coordinates.

2 Enter the prism power in the BASE IN/OUT direction.

Turn the dial to change the value in 0.5Δ increments.

- Turning clockwise → In the BO (BASE OUT) direction
- Turning counterclockwise → In the BI (BASE IN) direction

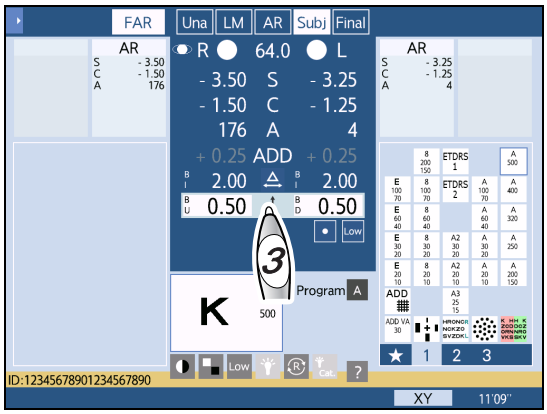


3 Press ↕.

4 Enter the prism power in the BASE UP/ DOWN direction.

Turn the dial to change the value in 0.5Δ increments.

- Turning clockwise → In the left eye BD (BASE DOWN) direction
  In the right eye BU (BASE UP) direction
- Turn counterclockwise → In the left eye BU (BASE UP) direction
  In the right eye BD (BASE DOWN) direction



Instead of turning the dial, pressing ⊕ or ⊖ changes the value in 0.1Δ increments. In addition, pressing and holding the button changes the prism value continuously.

Turning the dial while holding Shift changes the value in 2Δ increments.

3.4.3 Entering prism values in polar coordinates (rθ)

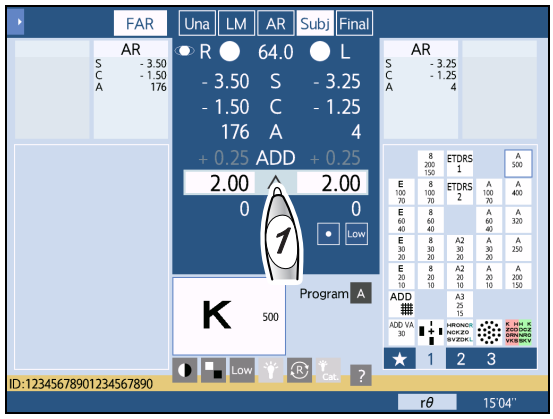
1 Press △.

2 Enter the prism absolute value.

Turn the dial to change the value in 0.5Δ increments.

Turning the dial while holding Shift changes the value in 2Δ increments.

Instead of turning the dial, pressing ⊕ or ⊖ changes the value in 0.1Δ increments. In addition, pressing and holding the button changes the prism value continuously.

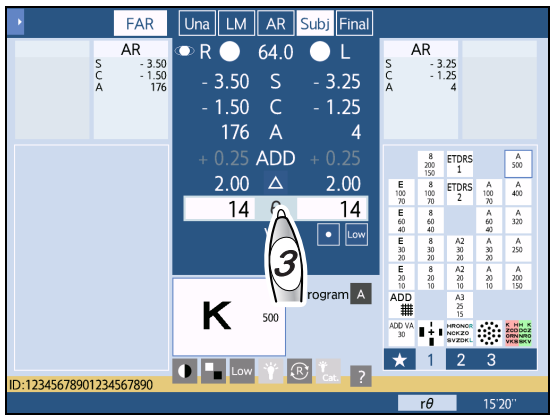


3 Press θ.

4 Enter the angle in the prism base direction.

Turn the dial to change the value in 1° increments.

Turning the dial while holding Shift changes the value in 5° increments.

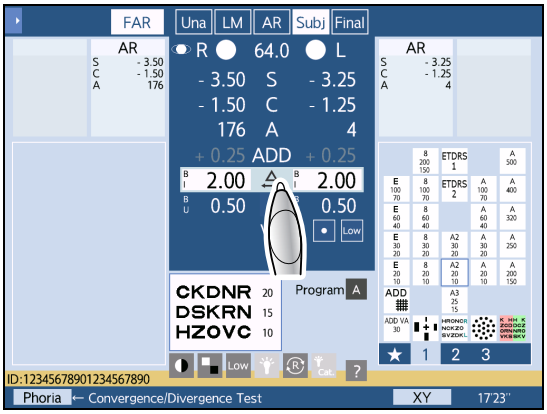


3.4.4 Removing rotary prisms

The rotary prisms can be temporarily removed from the view of the patient.

◆ Removing all rotary prisms

With the rotary prisms placed, press the button of the numeric field highlighted in white among [Δ], [θ], [Δ↔], and [↕] (when only the numeric field of a single eye is highlighted, press its numeric field).

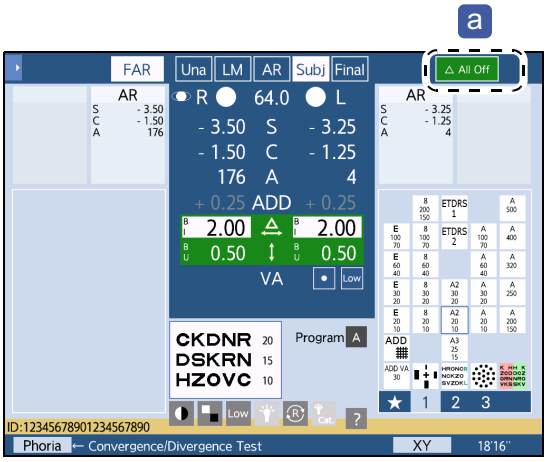


The rotary prisms are removed from the measuring windows.

The cursor on the touch screen turns green and "ΔAll Off" [a] is displayed, indicating that the rotary prisms are removed.

Even if the rotary prisms are removed, the selected prism values are changeable.

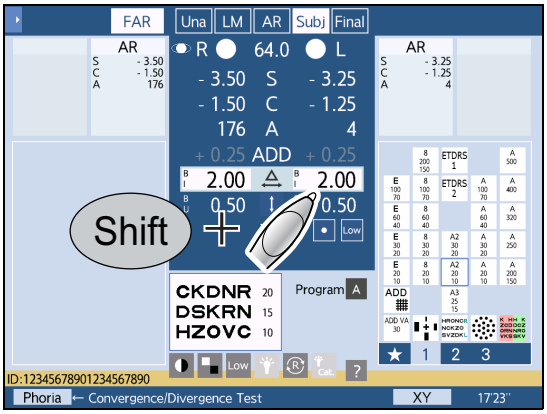
Pressing the value of the selected prism reinserts the rotary prism.



◆ Removing the selected prisms

With the rotary prisms placed, press the button of the numeric field highlighted in white between [Δ↔] or [↕] while holding (Shift) (when only the numeric field of a single eye is highlighted, press its numeric field).

This function is disabled in polar coordinates (Δ or θ) mode.

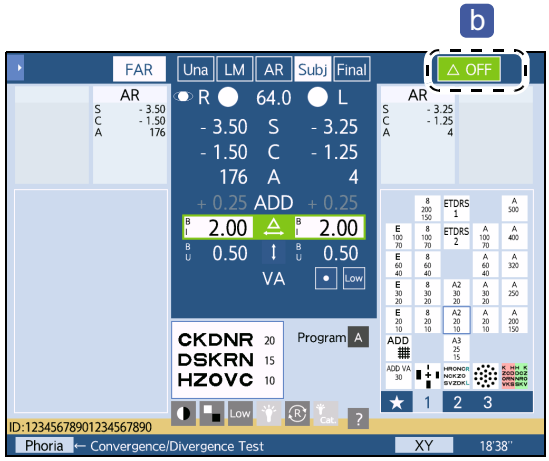


The rotary prisms in the selected direction (horizontal or vertical) are removed from the measuring windows.

The cursor on the touch screen turns green and "ΔOFF" b is displayed, indicating that the rotary prisms are removed.

Even if the rotary prisms are removed, the selected prism values are changeable.

Pressing  or  again reinserts the rotary prisms.



◆ Clearing prism data

Prism values can be cleared (0.00) separately for the right and left eyes.

 button → Clears the right-eye prism.

 button → Clears the left-eye prism.

3.5 Chart Presentation

This section explains how to present charts such as cortical vision letter, vertical line, horizontal line, single letter, or red-green filter.

3.5.1 Selecting charts

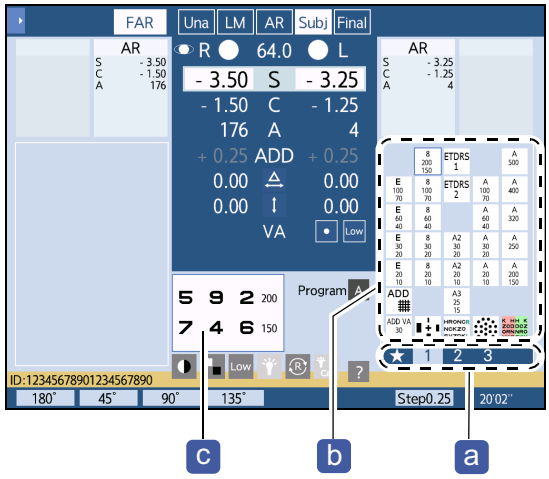
Specify charts in the chart select area on the measurement screen.

1 Press one of the page buttons [1]-[4] in the page select area a to display the icon of the desired chart in the chart select area b.

2 Press the icon of the desired chart.

The selected chart is presented.

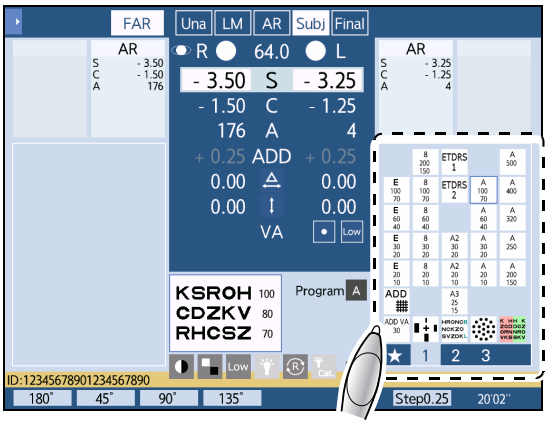
The presented chart can be checked in the chart display field c at the lower center of the screen.



3.5.2 Selecting visual acuity charts

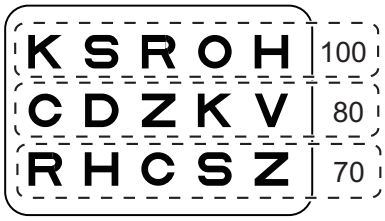
Press the desired visual acuity chart icon.

The selected visual acuity chart is presented with the cortical vision letter.



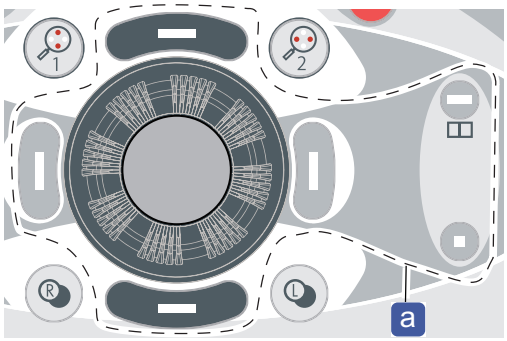
Note

- The cortical vision letter shows multiple letters in the order of visual acuity. The letters surrounded by the dotted lines in the figure below indicate the same visual acuity.



◆ Mask buttons

With the mask buttons a, the cortical vision letter can be changed to the vertical line, horizontal line, single letter, or red-green filter.



◆ Vertical line switching

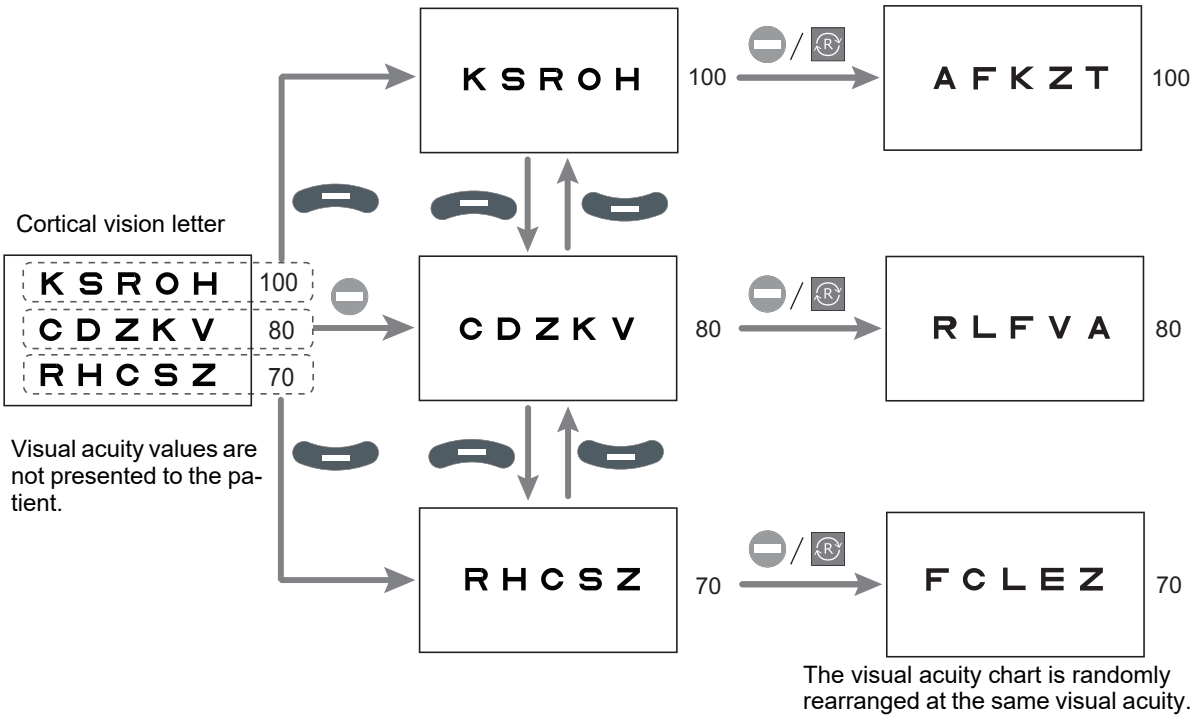
Button	Function
	Displays the upper row of the presented visual acuity chart.
	Displays the lower row of the presented visual acuity chart.

◆ Horizontal line

Pressing  with the cortical vision letter shown displays the middle horizontal line.

Button	Function
	• Displays the middle horizontal line of the cortical vision letter. • Pressing  or  again displays another chart with the same visual acuity randomly (SC-1600 series and SSC-100 only).

● Mask button operation and flow for horizontal line

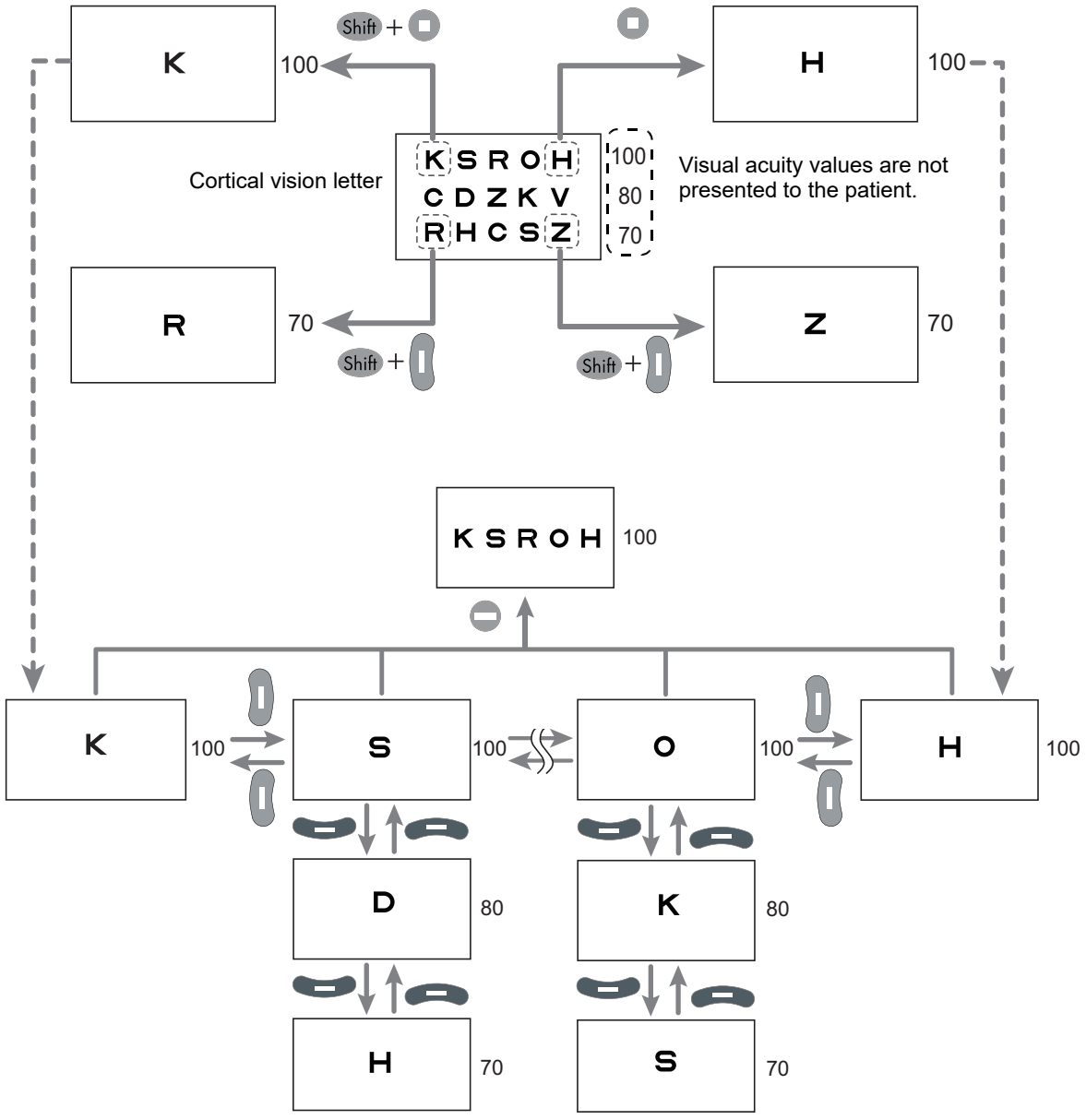


◆ Single letter

Pressing + Shift or with the cortical vision letter shown displays a single letter.

Button	Function
Shift +	Displays a single letter in the upper left corner of the cortical vision letter.
	Displays a single letter in the upper right corner of the cortical vision letter.
Shift +	Displays a single letter in the lower left corner of the cortical vision letter.
Shift +	Displays a single letter in the lower right corner of the cortical vision letter.

● Mask button operation and flow for single letter

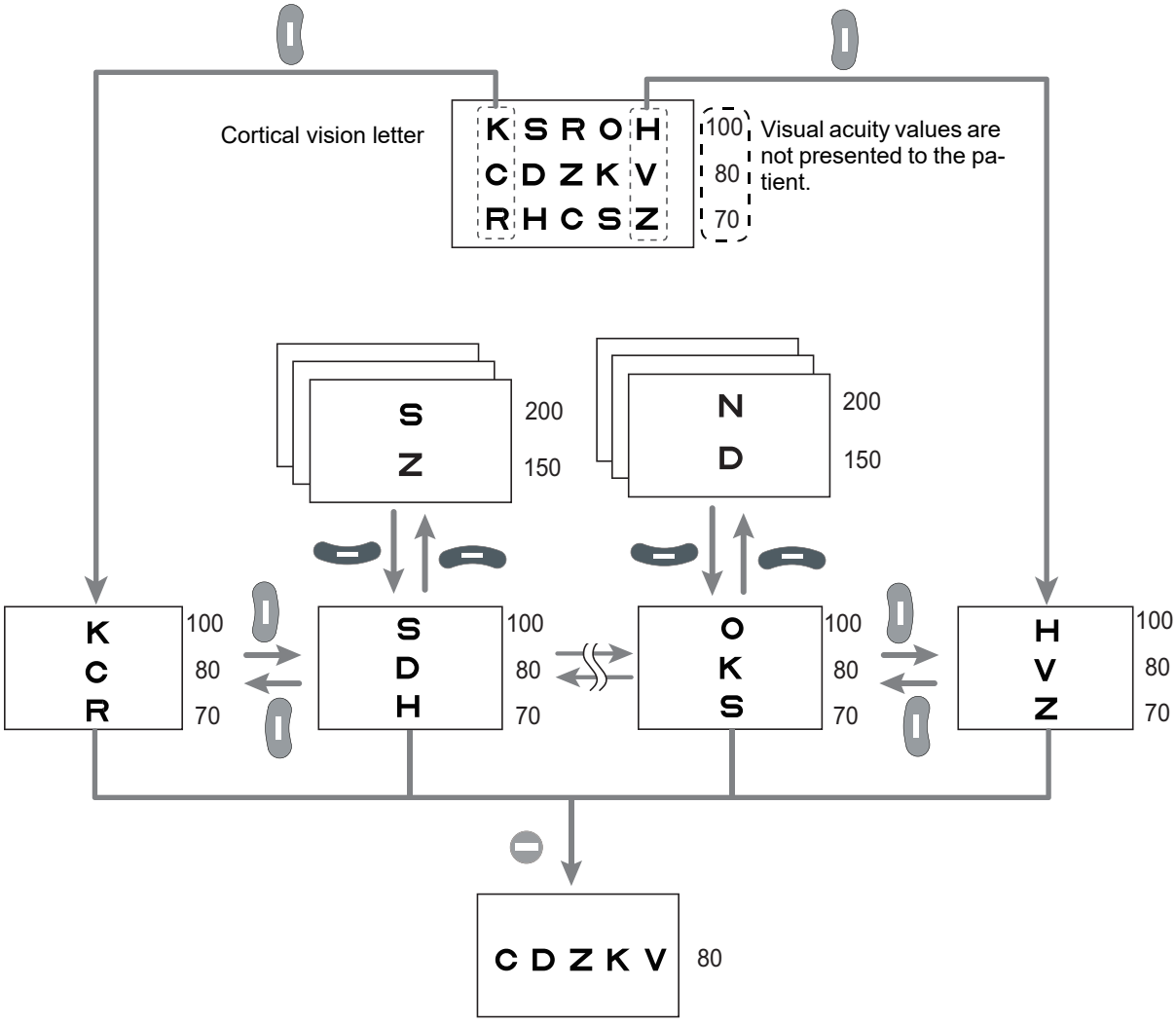


◆ Vertical line

Pressing or with the cortical vision letter shown displays a vertical line.

Button	Function
	• Displays the left end column. • Pressing or again with the cortical vision letter shown displays the vertical line on the left or right at the same visual acuity.
	• Displays the right end column. • Pressing or again with the cortical vision letter shown displays the vertical line on the left or right at the same visual acuity.

● Mask button operation and flow for vertical line



Note

- For the SSC-330 Type T or SSC-370, only the following columns can be displayed.
  - Middle two columns for the four-column chart
  - Leftmost, middle, and rightmost three columns for the five-column chart

◆ Releasing the vertical line, horizontal line, or single letter isolation

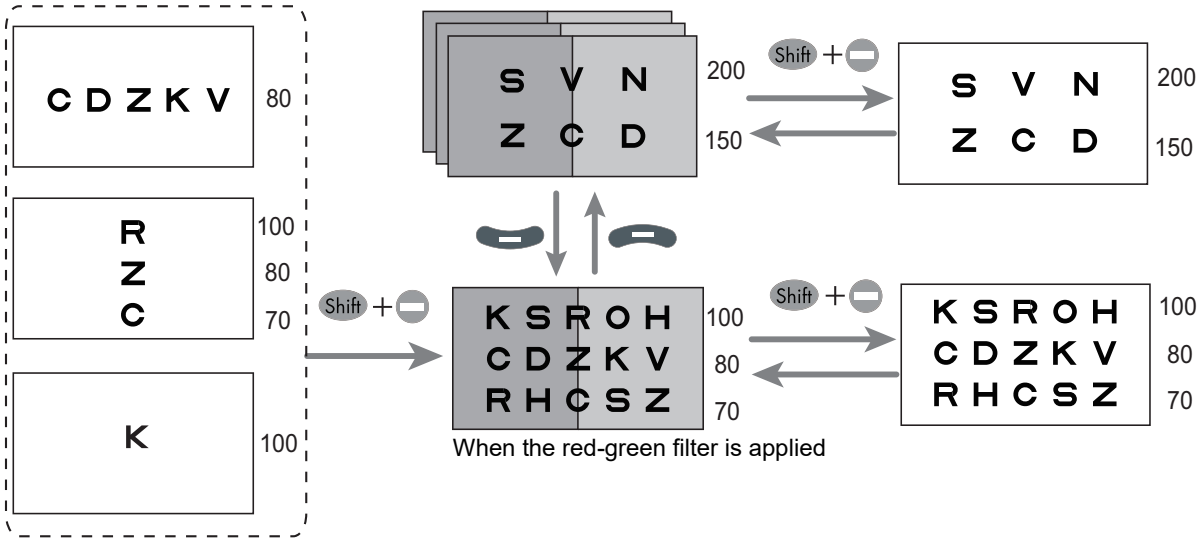
Selecting another chart in the chart select area releases the mask and returns to the cortical vision letter.

◆ Applying the red-green filter

Pressing ⊖ while holding Shift applies the red-green filter to the visual acuity chart.

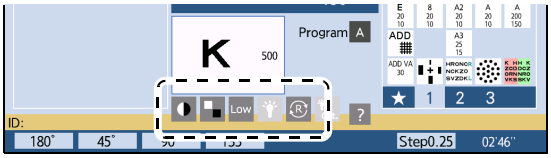
Button	Function
Shift + ⊖	• Applies the red-green filter to the cortical vision letter. • Additional Shift + ⊖ releases the red-green filter.
⊖	Displays the visual acuity chart above with the red-green filter applied.
⊖	Displays the visual acuity chart below with the red-green filter applied.

● Mask button operation and flow for red-green filter



3.6 Contrast Change, Low Illumination, Inverted Black and White

This section explains , , , , , and displayed on the measurement screen.



- Supported functions for each chart presenting device

	CP-9, CP-770, SSC-330 Type T	SC-1600	SC-1600Pola	SSC-100	SSC-370
Glare lamp	No	No	No	No	MG MCG
Contrast	No	Yes	Yes	Yes (distance use only)	MCG
Low illumination	No	Yes	Yes	Yes	Yes
Low illumination + glare lamp	No	No	No	No	MG MCG
Inverted black and white	No	Yes	Yes	Yes	No
Random horizontal line	No	Yes	Yes	Yes	No

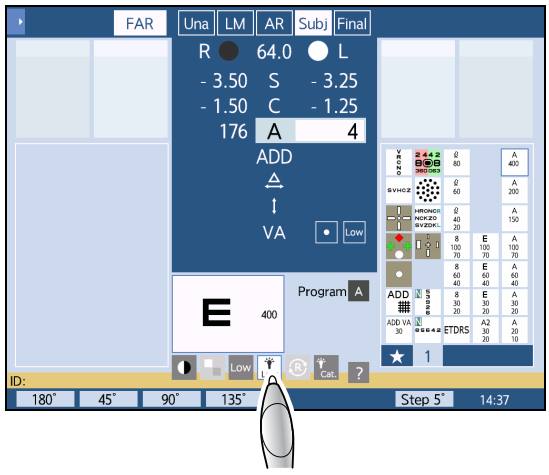
Yes: Supports all chart types.
No: Does not support any chart types.
MG or MCG: Supports only Type MG or MCG.

❖ Buttons that cannot be used due to constraints of the chart presenting device are grayed out.

- : Turns on or off the glare lamp.

  The state of the glare lamp is displayed on the button.

	The glare lamp is off.
	The glare lamp is on. Low, Middle, and High indicate its brightness. Pressing the button toggles the indication.



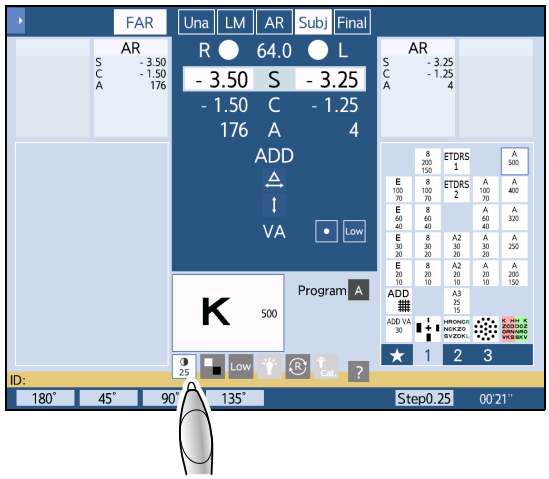
- : Changes the chart contrast in the order of 25%, 12.5%, 6%, and 100% (normal contrast).

  The contrast value is displayed on the button.

  Ex.) : Contrast 25%

  The contrast change function enables measurement of visual acuity with low contrast conditions.

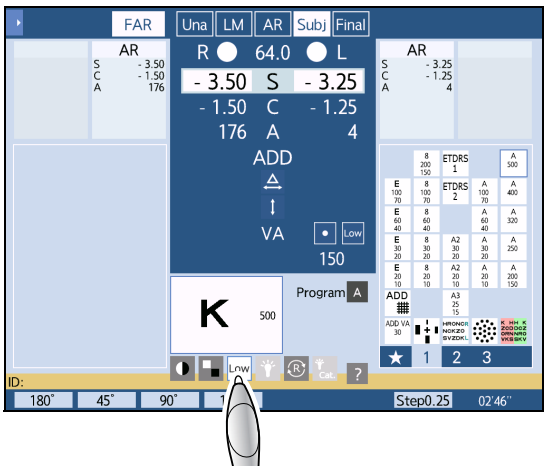
  This function enables evaluation of the visual function according to contrast sensitivity and observation of changes over time.



- Low : Toggles between low illumination and normal illumination.

  Low illumination is used to measure visual acuity in dark ambient conditions. Testing the visual performance to recognize low intensity charts may be used in the determination of a visual defect such as disturbance of light sense.

  The button shows Low during low illumination.



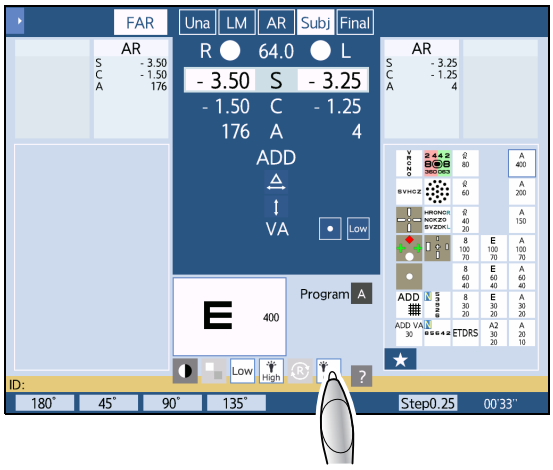
Note

- The low illumination function is only available for visual acuity charts.
- The low illumination function is not available when the contrast is not 100% or in inverted black and white.

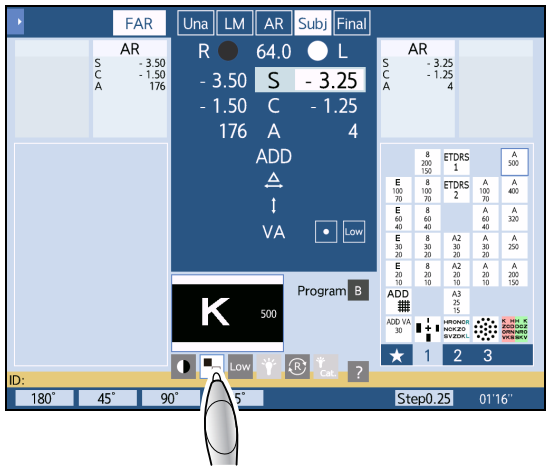
- Cat. : Turns on the glare lamp and low illumination at the same time. Press the button again to return to normal illumination.

  The brightness of the glare lamp is High.

  When both glare lamp illumination and low illumination are performed, the button shows Cat..



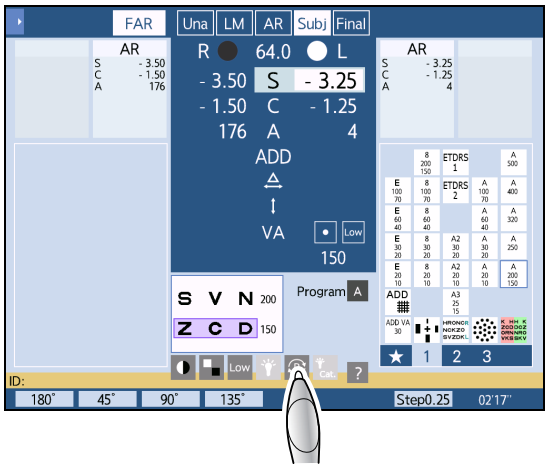
- : Inverts the black and white of the visual acuity chart. Press the button again to return to its original.



Note

- Inverted black and white visual acuity charts (white letters on the black background) are used for special testing such as amblyopia.
- The inverted black and white function is only available for visual acuity charts.
- The inverted black and white function is disabled when the contrast is not 100% or in low illumination.

- : Randomly switches the sequence of letters in the horizontal line.



3.7 Near Vision Test

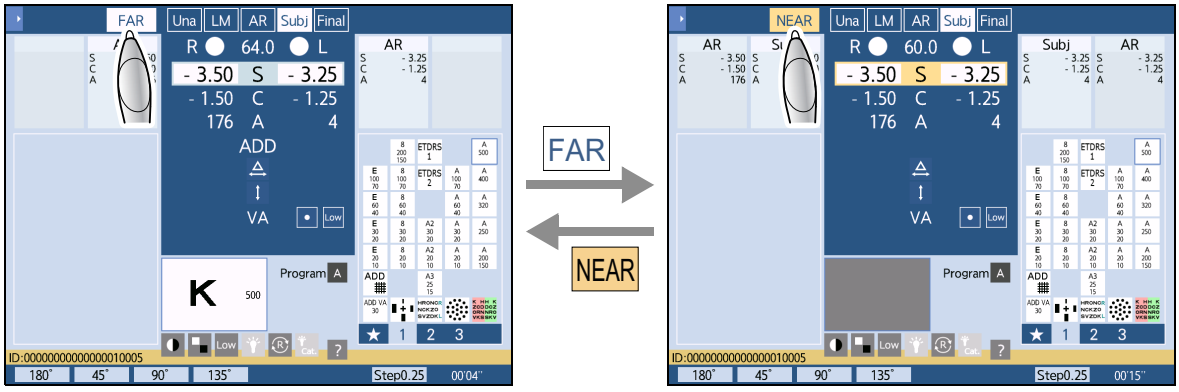
⚠ CAUTION

- When switched to Distance mode or Near mode, the refractor head moves for divergence or convergence. Instruct the patient to keep their face away from the refractor head before pressing FAR or NEAR. After the movement has been completed, start refraction with the patient's forehead touching the forehead rest.

3.7.1 Toggling between Distance mode and Near mode

Press FAR or NEAR on the measurement screen to toggle between Distance mode and Near mode.

FAR or NEAR shows the current mode.



Distance mode　　Near mode

◆ Changing to near chart (SSC-100 only)

For the SSC-100, the near chart can be changed with the control box.

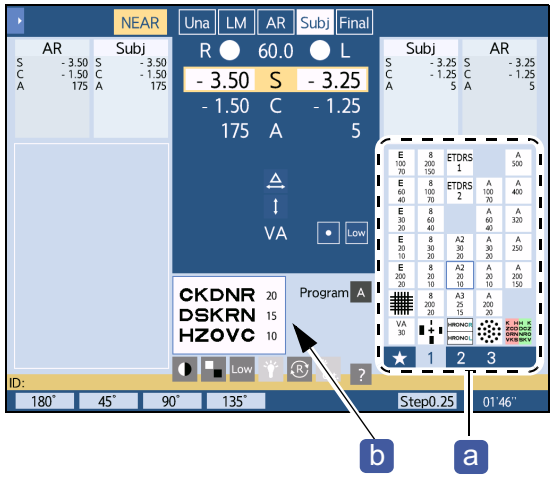
1) Enter Near mode.

2) Press the icon of the desired chart in the chart select area a.

The selected chart is presented.

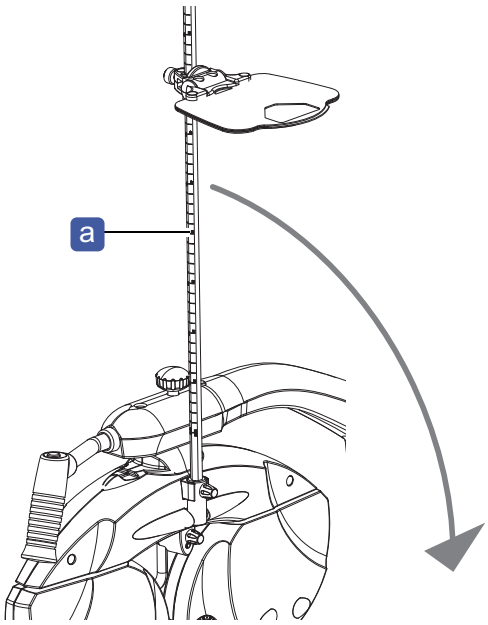
The presented chart can be checked in the chart display field b at the lower center of the screen.

Even in Near mode, visual acuity chart selection and mask button operation are possible in the same manner as in Distance mode.



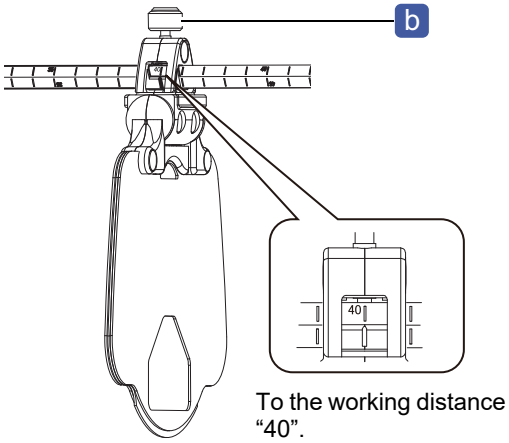
3.7.2 Setting the near point chart (excluding SSC-100)

1 Lower the near point rod a.



2 Set the near point chart to the working distance (usually 40 cm).

1) Move the near point chart referring to the scale on the near point rod.
2) Tighten the knob b to fasten the near point chart.



To the working distance "40".

3 Select the desired near point chart and flip it toward the patient.

"8.4 Near Point Charts" (page 294)

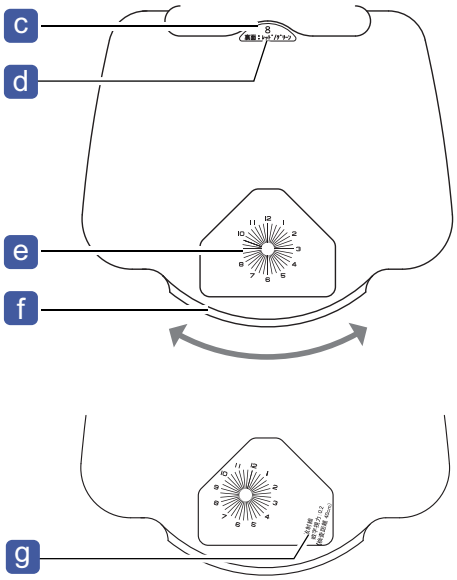
4 After measurement, raise the near point rod.

⚠ CAUTION

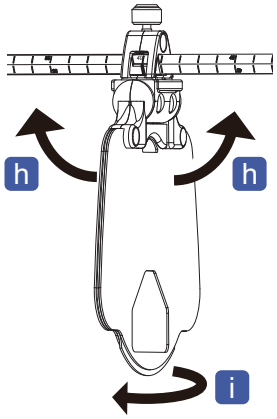
- Confirm that the near point rod is securely fastened.
  An improper fastening may cause the near point rod to fall resulting in injury.

◆ Near point charts

c	Number of chart
d	Chart name on the back side
e	Near point chart
f	Turn this part to change the near point chart. There are four charts on one side, eight on both sides. “8.4 Near Point Charts” (page 294)
g	Shifting the chart slightly to the left reveals the chart information.



h	The near point chart may be raised so that it is parallel with the near point rod to keep it out of the way.
i	Flip the chart over to show the patient the near point chart set by the operator.



- Do not grasp the frame of the window on the near point chart when flipping the near point chart.
  The near point chart may be smudged and hardly visible.

3.7.3 Displaying the near chart on control box touch screen

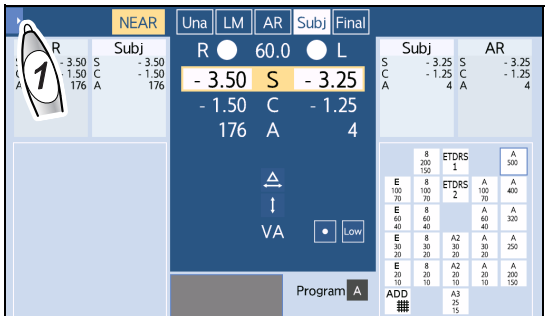
This function is useful in the following cases:

- Trial frame test
- When the refractor head is tilted by the optional refractor head tilt unit

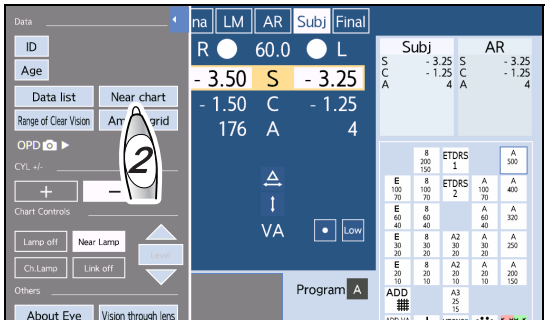
Note

- Use the chart as reference only. For accurate measurement, use the supplied near point rod and near point chart.

1 Press ▶ to display the side menu.



2 Press [Near chart].



3 Select the desired near chart with a function button.

The selected near chart is displayed on the touch screen.

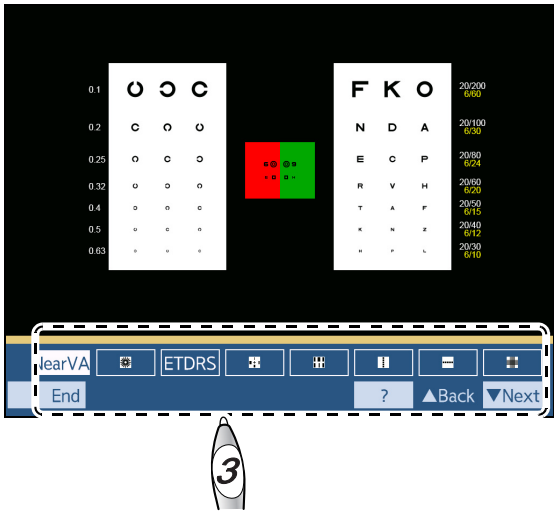
"8.3 Near Charts Displayable on Touch Screen" (page 291)

4 Show the patient the near chart at a distance of 40 cm from the touch screen.

"5.8.4 Presenting the screen to patient" (page 202)

5 After the test, press End.

The measurement screen is displayed.

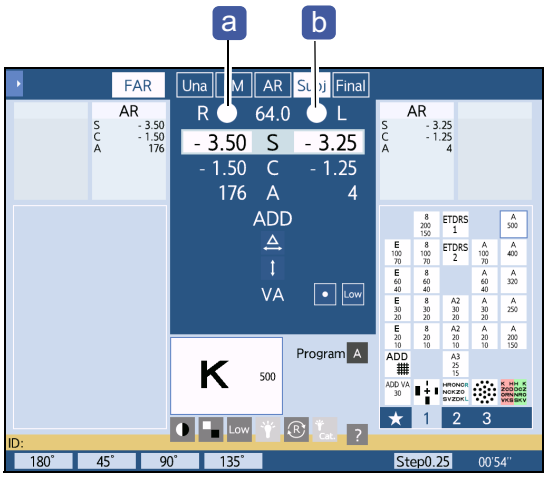


3.8 Auxiliary Lens Placement

This section explains how to place auxiliary lenses.

1 Display the auxiliary lens select window.

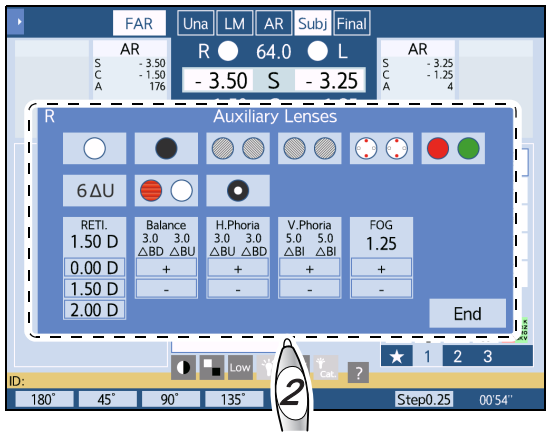
Press the R auxiliary lens display button a or L auxiliary lens display button b.



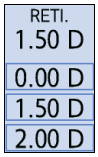
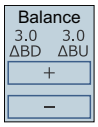
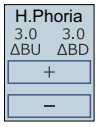
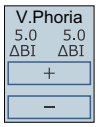
2 Press the desired auxiliary lens button.

The measurement screen is displayed and the selected auxiliary lens is placed.

Pressing [End] returns to the measurement screen without selecting any auxiliary lenses.



Auxiliary lens	Description
	Open aperture
	Occluder
	Polarizing filter 45° for the right eye and 135° for the left eye
	Polarizing filter 135° for the right eye and 45° for the left eye
	Fixed cross cylinder lens for the right eye and occluder for the left eye
	Occluder for the right eye and fixed cross cylinder lens for the left eye
	Red filter for the right eye and green filter for the left eye
	BASE UP 6Δ for the right eye

	BASE IN 10Δ for the left eye
	Horizontal Maddox rod for the right eye and open aperture for the left eye
	Open aperture for the right eye and vertical Maddox rod for the left eye
	Pinhole plate with a hole diameter of 2 mm
	Spherical lens for retinoscope Select the power from among 0.0, 1.5, and 2.0.
	Dispersion prism for binocular balance Change the prism amount with + or –.
	Dispersion prism for horizontal phoria Change the prism amount with + or –.
	Dispersion prism for vertical phoria Change the prism amount with + or –.
	Fogging Change the fog amount with + or –.

◆ Linkage between charts and auxiliary lenses

The following explains the auxiliary lenses linked to the charts.

Chart	Auxiliary lens		Mode
	Right eye	Left eye	
Visual acuity chart	Open aperture  or occluder 	Open aperture  or occluder 	SPH
Astigmatism clock dial			CYL/AXIS
Red-green			SPH
Dots	Cross cylinder or occluder 	Cross cylinder or occluder 	AXIS/CYL (XC mode)
Binocular balance	Polarizing filter  (for the SC-1600 and SSC-100, prism 3ΔBD)	Polarizing filter  (for the SC-1600 and SSC-100, prism 3ΔBU)	SPH
Binocular red-green			

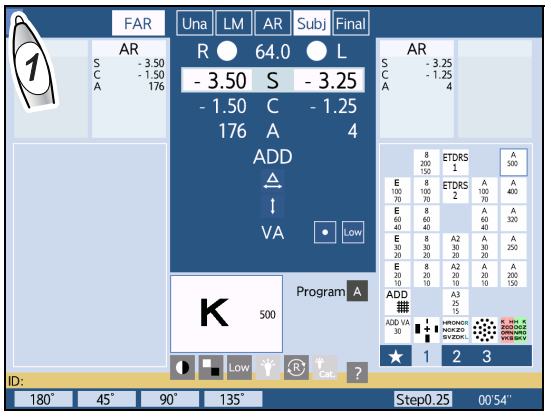
<table>
<tr><th rowspan="2">Chart</th><th colspan="2">Auxiliary lens</th><th rowspan="2">Mode</th></tr>
<tr><th>Right eye</th><th>Left eye</th></tr>
<tr><td>Phoria</td><td rowspan="5">Polarizing filter (for the SC-1600 and SSC-100, red filter)</td><td rowspan="5">Polarizing filter (for the SC-1600 and SSC-100, green filter)</td><td rowspan="2">Prism H/V</td></tr>
<tr><td>Phoria with fixation</td></tr>
<tr><td>Vertical/Horizontal coinci-dence</td><td>Prism V</td></tr>
<tr><td>Cyclophoria</td><td rowspan="4">N/A</td></tr>
<tr><td>Precise four-line stereo</td></tr>
<tr><td>Stereo</td><td>Polarizing filter / (for the SC-1600 and SSC-100, red filter)</td><td>Polarizing filter / (for the SC-1600 and SSC-100, green filter)</td></tr>
<tr><td>Worth four-dot</td><td>Red filter</td><td>Green filter</td></tr>
<tr><td>Vertical line</td><td>Prism 6ΔBU</td><td>Open aperture</td><td>Prism H</td></tr>
<tr><td>Horizontal line</td><td>Open aperture</td><td>Prism 10ΔBI</td><td>Prism V</td></tr>
<tr><td rowspan="2">Fixation point</td><td>Horizontal Maddox</td><td>Open aperture</td><td>Prism H</td></tr>
<tr><td>Open aperture</td><td>Vertical Maddox</td><td>Prism V</td></tr>
<tr><td>Cross grid</td><td>Fixed cross cylinder</td><td>Fixed cross cylinder</td><td>SPH</td></tr>
<tr><td>Schober</td><td>Red filter</td><td>Green filter</td><td>Prism H/V</td></tr>
<tr><td>Cross grid for near vision</td><td colspan="2">Fixed cross cylinder lens or occluder</td><td rowspan="2">ADD</td></tr>
<tr><td>Near visual acuity</td><td colspan="2">Open aperture</td></tr>
</table>

❖ Prism H indicates horizontal (BI/BO) and V indicates vertical (BU/BD).

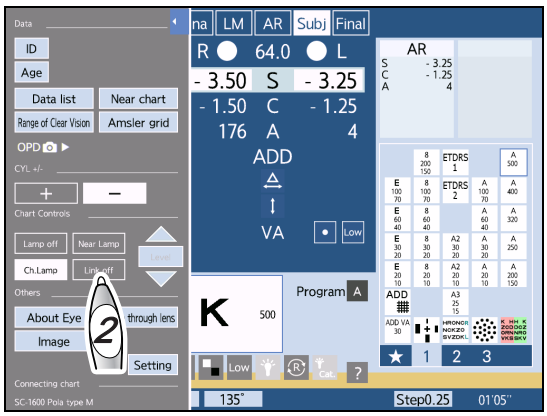
3.9 Auxiliary Lens Link OFF Function

This function prevents auxiliary lenses or SPH/CYL/AXIS mode setting from being switched automatically when the chart is switched.

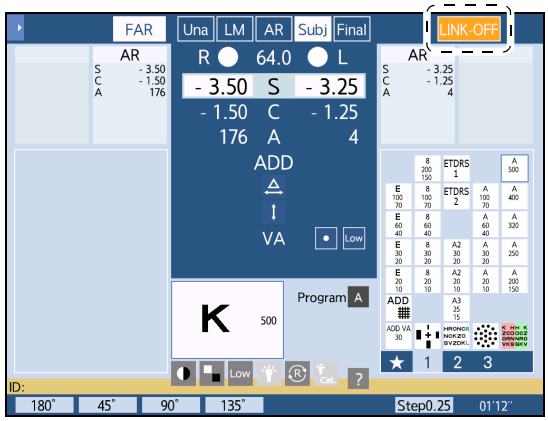
1 Press ▶ to display the side menu.



2 Press [Link off].



"LINK-OFF" is displayed in the upper right of the measurement screen, indicating that the link off function is enabled.

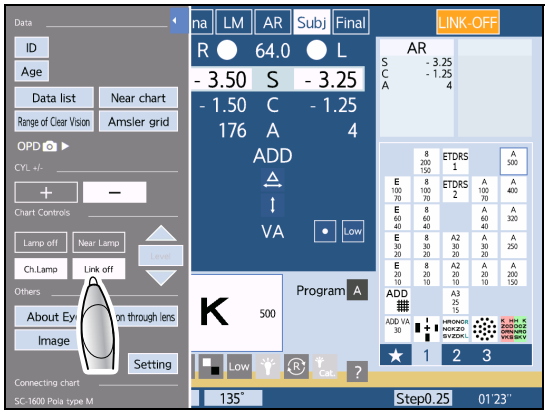


Note

- The following occur in “link off” state:
  - Auxiliary lenses are not automatically placed and SPH/CYL/AXIS mode does not change when the chart is switched.
  - Pressing a mask button does not change the visual acuity value automatically.
  - Pressing  while a refraction program is running only changes charts.
- Even if the link off function is enabled, the link for  or  functions (except while a refraction program is running).
- Even after the device is turned off, the link off setting is retained.

◆ Clearing the link OFF function

Pressing [Link off] in the side menu again clears the link off function and returns to the normal state.



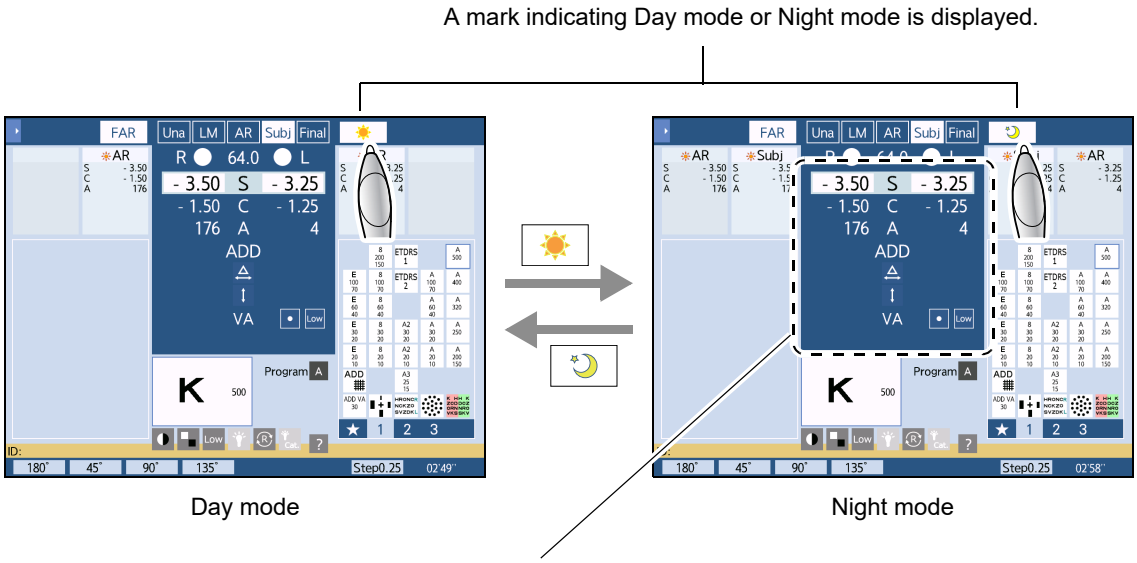
3.10 Night Mode

- This section explains how to toggle between Day mode and Night mode and to import AR or LM night data.
- Night mode is for performing subjective refraction in a dark place, and presenting charts with brightness for night vision.
- Night mode is not available for the chart presenting device CP-9, CP-770, or SSC-330 Type T.

3.10.1 Toggling between Day mode and Night mode

Pressing [☀] or [☾] toggles between Day mode and Night mode.

[☀] or [☾] shows the current mode.



Note

- When the device is activated or the displayed data is cleared, the device enters Day mode.
- [☀] or [☾] is displayed in the following cases:
  - Set the parameter *" Display the Day/Night switching button" (page 230)* to [Yes].
  - When AR/LM night data is entered with day data

3.10.2 Importing AR or LM night data

The following data can be imported as the reference used for the test in Night mode.

- Night data measured with the OPD-Scan III series
- AR large area measurement data of ARK-1 series or AR-1 series

◆ Importing data via LAN or wireless LAN

AR/LM night data can be imported along with day data.

"3.2.1 Importing data from auto refractometer or lensmeter" (page 45)

◆ Reading data with Eye Care card

The following data can be all read with one Eye Care card.

- AR day data
- AR night data
- LM day data

a

To read LM night data, another Eye Care card is required.

1) Read data a.

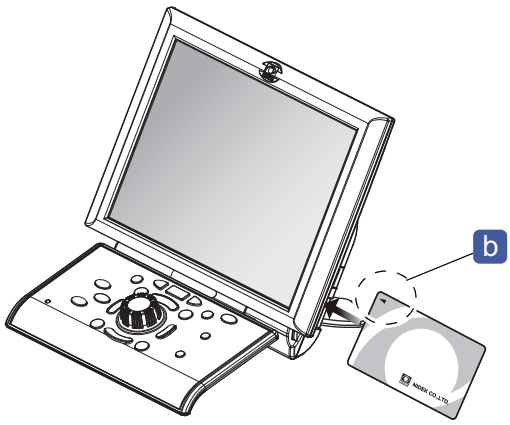
"3.2.3 Reading data from Eye Care card" (page 48)

❖ To read LM night data as well, the following operation is required.

2) Press [☀] to put the RT-6100 into Night mode.

3) Fully insert the Eye Care card containing LM night data is saved in the orientation shown to the right b.

LM night data is added to the RT-6100 as the night data.



Eye Care card

3.10.3 Day vision test / night vision test

To perform the night vision test continuously after the day vision test, Program is provided in the standard program. For details, see the following.

(page 171)

1 Import day data and night data.

The device enters Subjective mode for day vision.

2 Perform subjective refraction based on the day data.

3 Press .

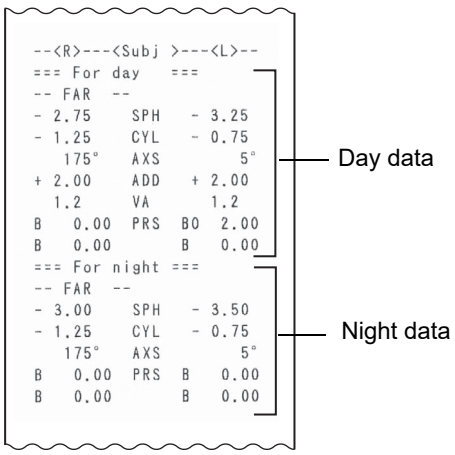
The device enters Subjective mode for night vision.

The program specified by the parameter *" Program for imported Night data" (page 227)* is automatically activated.

4 Make the environment suitable for the night vision test, perform subjective refraction based on the night data, and then print measurement data.

"For day" is printed above the day measurement results, indicating that it is data for glasses to be used in bright places.

"For night" is printed above the night measurement results, indicating that it is data for glasses to be used in dark places.



3.11 Printing

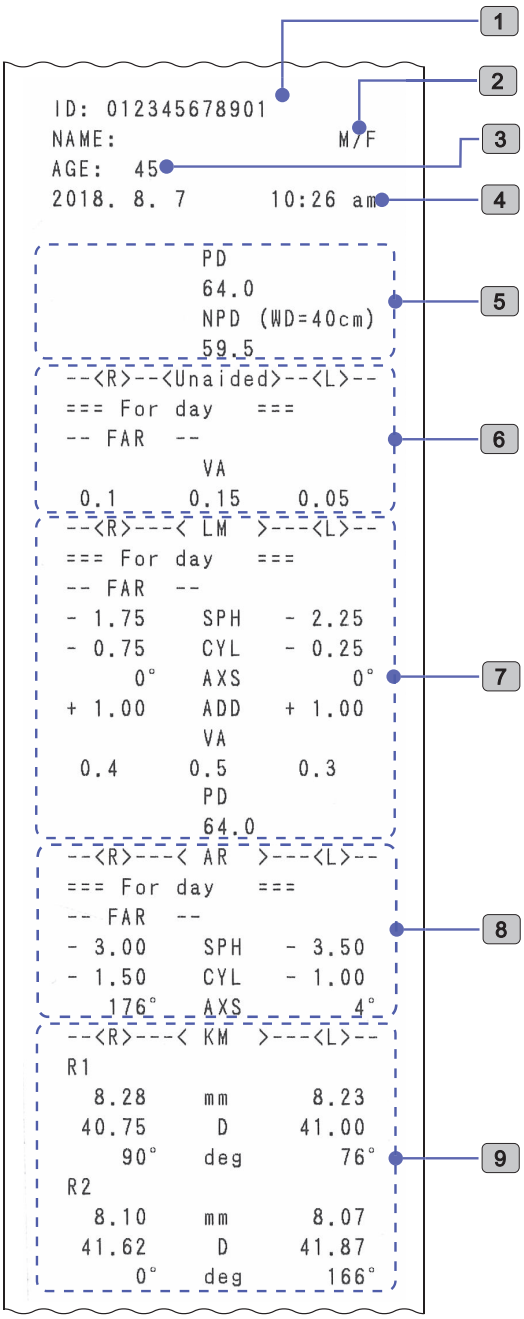
Pressing Output prints data.

Note

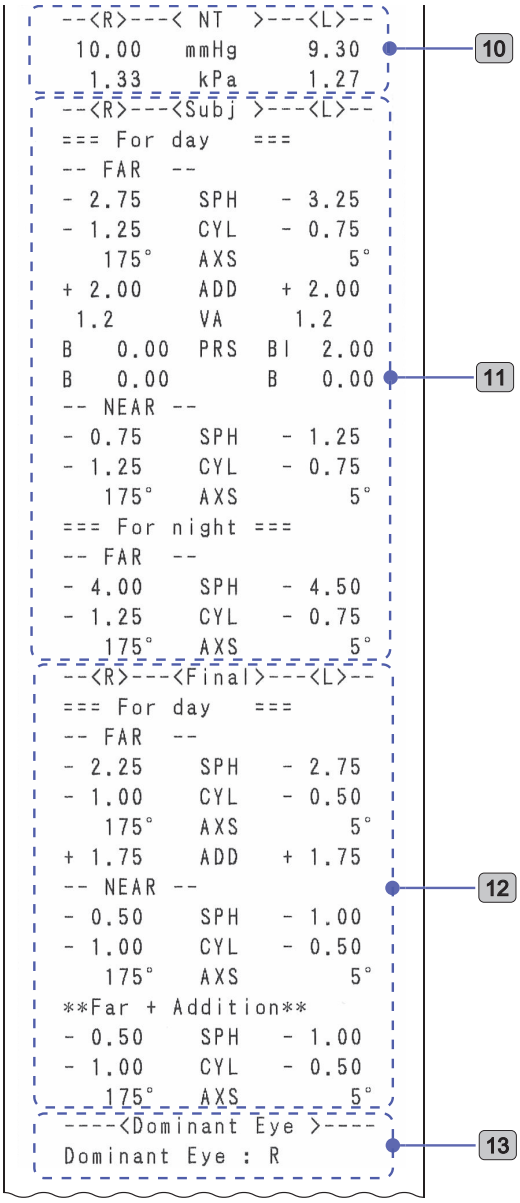
- Printing is not possible when the parameter *" Print" (page 224)* is set to [No].
- For CYL = 0, data is exported as AXIS = 0 regardless of the AXIS value.

- This device uses heat-sensitive printer paper. When keeping the printed data for a long period of time, make copies of the printouts.

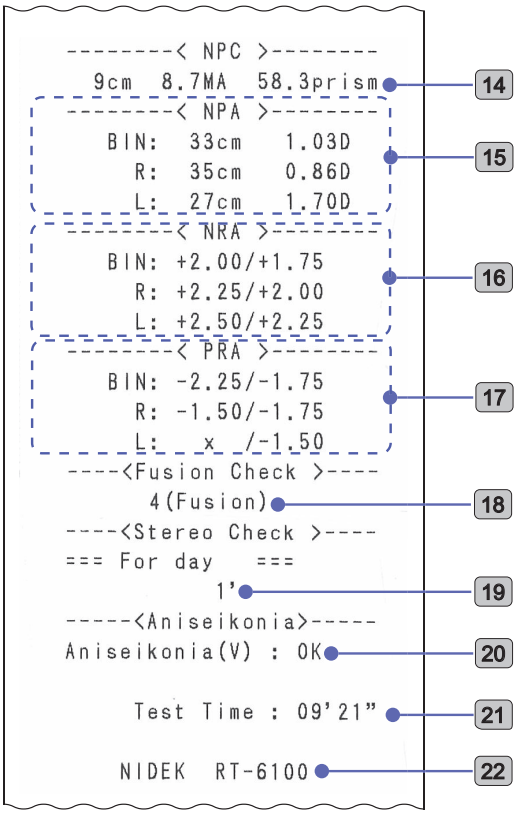
◆ Sample printout



No.	Item
1	Patient ID
2	Space for patient's name and sex
3	Age
4	Measurement date and time
5	PD: Pupillary distance NPD: Near pupillary distance Near pupillary distance corresponding to working distance
6	Unaided visual acuity values
7	LM values VA: Visual acuity values corrected by glasses PD: Spectacle pupillary distance
8	AR values
9	KM values



No.	Item
10	Intraocular pressure values
11	Subjective values For day: Day vision test FAR: Distance power NEAR: Near power For night: Night vision test
12	Prescription values FAR: Distance power NEAR: Near power Far+Addition: Distance power + addition
13	Dominant eye



No.	Item
14	Near point of convergence
15	Near point of accommodation
16	Negative relative accommodation
17	Positive relative accommodation
18	Fusion/suppression/diplopia
19	Stereopsis
20	Aniseikonia
21	Refraction time
22	Comments *"6.6 Entering Comments on Printout" (page 256)*

◆ Whether to print contact lens conversion data

The parameter *“ Print CL data” (page 224)* selects whether the contact lens conversion value of the subjective data is printed together with the normal data.

◆ Whether to print trial lens data

The parameter *“ Print TL data” (page 224)* selects whether the trial lens data is printed together with the normal data.

◆ Whether to clear data after printing

The parameter *“ Clear after output” (page 224)* selects whether the displayed data is automatically cleared after printing.

Even if the data on the control box touch screen is cleared, it is saved in the shared folder as RT history data and can be imported.

“5.10 Importing Refractor Measurement Data” (page 205)

◆ KM measurement

To print the diopter conversion values of KM measurement, set the parameter “I/F Format” of the ARK to [All].

3.11.1 Printing QR codes

The final data (subjective data or prescription data) can be printed as a QR code.

Note

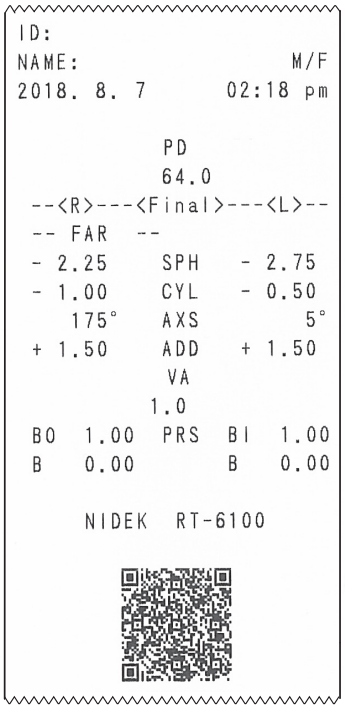
- The QR code may be unreadable when the paper is curled. Flatten out the paper and read it.
- For details on the QR code to be printed, contact Nidek or your authorized distributor for the QR code manual.

◆ When the parameter “QR code” is set to [QR 1]

The final data and its QR code are printed.

“ QR code” (page 225)

Sample printout



◆ When the parameter “QR code” is set to [QR 2]

The QR code of the final data and all data are printed.

“ QR code” (page 225)

Sample printout

```
ID:
NAME:                    M/F
2018. 8. 7       02:17 pm

            PD
            64.0
            NPD (WD=40cm)
            60.0
 --<R>---<Subj >---<L>--
 -- FAR  --
 - 2.25     SPH    - 2.75
 - 1.00     CYL    - 0.50
    175°    AXS         5°
 + 1.25     ADD    + 1.25
  1.2       VA       1.0
 BO  1.00   PRS   BO  1.00
 BD  0.50         BU  0.50
 --<R>---<Final>---<L>--
 -- FAR  --
 - 2.25     SPH    - 2.75
 - 1.00     CYL    - 0.50
    175°    AXS         5°
 + 1.50     ADD    + 1.50
            VA
           1.0
 BO  1.00   PRS   BO  1.00
 B   0.00         B   0.00
 -- NEAR --
 - 0.75     SPH    - 1.25
 - 1.00     CYL    - 0.50
    175°    AXS         5°
 B   0.00   PRS   B   0.00
 B   0.00         B   0.00
 **Far + Addition**
 - 0.75     SPH    - 1.25
 - 1.00     CYL    - 0.50
    175°    AXS         5°
            NPD (WD=40cm)
            60.0

      Test Time : 03'32"

     NIDEK  RT-6100
```

3.12 Measurement Modes

This section explains five measurement modes: Unaided, LM, AR, Subjective, and Final.

The measurement screen consists of five measurement modes: Unaided, LM, AR, Subjective, and Final, and unspecified (measurement mode not specified). For each measurement mode, Distance/Near mode and Day/Night mode can be specified.

Measurement mode	Description
None specified	No measurement mode has been specified. The device enters this mode when turned on or data is cleared.
Unaided mode	Used to measure unaided visual acuity. Pressing Una enters Unaided mode. Sphere, cylinder, axis, addition, and prism values cannot be entered.
LM mode	Used to enter LM data of the patient. Pressing LM enters LM mode.
AR mode	Used to enter AR data of the patient. Pressing AR enters AR mode.
Subjective mode	Used to perform subjective refraction. Pressing Subj enters Subjective mode.
Final mode	Used to refine the full correction determined in Subjective mode to determine the prescription. Pressing Final enters Final mode.

- Changing measurement modes

Press Una , LM , AR , Subj , or Final to enter the desired mode.

Sphere, cylinder, axis, addition, visual acuity, and prism values are retained for each measurement mode. Vision comparison is possible with the values of each mode. For example, after the prescription is determined in Final mode, Subjective mode and LM mode can be switched, which allows for vision comparison with full correction and LM values.

- Copying values

Switching to measurement mode with no value entered copies the values of sphere, cylinder, and axis displayed before switching.

The following cases are excluded:

- When the device enters Unaided mode, the values are not copied.
- When the device enters Subjective mode, data specified by the parameter *" Preset power of Subj 1" (page 228)* is copied.
- When the mode is switched with no measurement mode specified, all data is copied. However, only visual acuity values are copied when the device is switched to Unaided mode.

Pressing LM , AR , Subj or Final while holding Shift copies the values of sphere, cylinder, and axis displayed before switching.

4 REFRACTION

This chapter explains the detailed operating procedures for refraction.

⚠ CAUTION

- Clean the device before refraction.
  "7.6 Cleaning" (page 267)
- Instruct the patient not to bump their face or head against the device when they sit or stand for refraction.
- When moving the refractor head, maintain a distance of 20 cm or more between the refractor head and the patient's face.
  The refractor head may strike the patient's face during movement.
- Instruct the patient not to push their forehead against the forehead rest and not to move away from the forehead rest during refraction. Refraction may not be properly performed.
- When changing the pupillary distance widely (including AR/LM measurement data entry), keep the patient's face away from the refractor head.
- When the refractor head switches between the distance vision test and near vision test, the refractor head moves for divergence or convergence. Instruct the patient to keep their face 20 cm or more away from the refractor head before switching. After the movement has been completed, start refraction with the patient's forehead touching the forehead rest.

❖ Depending on the chart presenting device or chart type, the appearances of charts differ from those in this manual, or some charts may not be included. Any charts that are not included in the chart presenting device cannot be used. Refer to the operator's manual of each chart presenting device.

4.1 Preparation before Refraction

- This section explains how to adjust the position of the refractor head, vertex distance, and pupillary distance.
- Provide sufficient explanation of the test purpose and method to the patient before refraction.

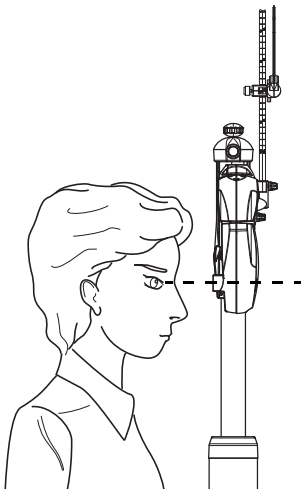
4.1.1 Adjusting the refractor head position

1 Instruct the patient to remove their glasses or contact lenses and sit on the chair.

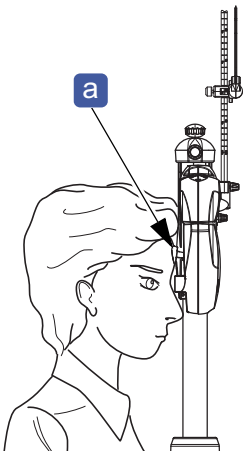
Instruct the patient to keep their head away from the refractor head.

2 Align the refractor head with the patient's eye level.

1) Instruct the patient to move their face toward the refractor head, paying attention not to contact it.
2) Align the measuring windows of the refractor head with the patient's eye level.



3 Instruct the patient to look through the measuring windows and lean their forehead against the forehead rest a.



4.1.2 Adjusting the pupillary distance and vertex distance

This section explains how to adjust the pupillary distance (PD) and vertex distance (VD).

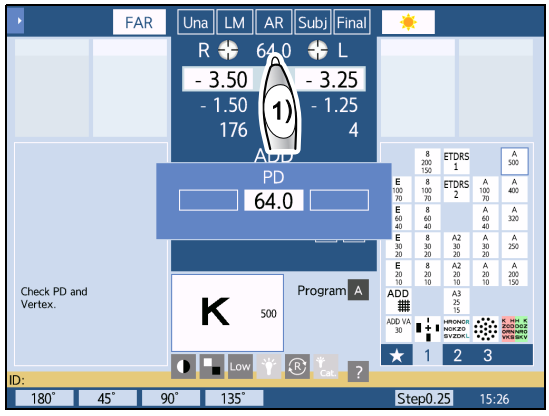
The following is an explanation from the state where positioning of the refractor head has been completed.

"4.1.1 Adjusting the refractor head position" (page 88)

⚠ CAUTION

- When changing the pupillary distance widely (including AR/LM measurement data entry), keep the patient's face away from the refractor head.

1 Check the pupil of the patient's eyes through the measuring windows. If their eyes are not located to the center of the right and left PD check lenses, adjust the pupillary distance of the patient.

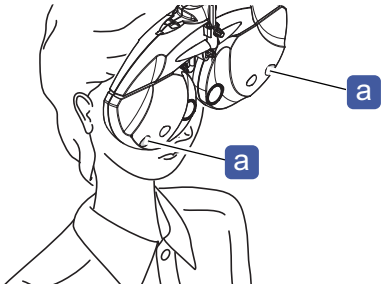


1) Press 64.0.

   The PD check lenses are placed and the patient's eyes are illuminated.

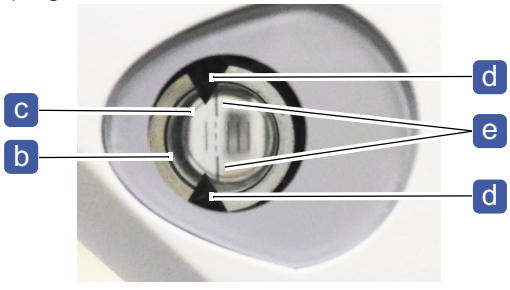
2) Turn the dial to locate the pupil of the patient's eyes to the center of each PD check lens.

2 Look through the VD check windows a from the front to check the vertex distance.

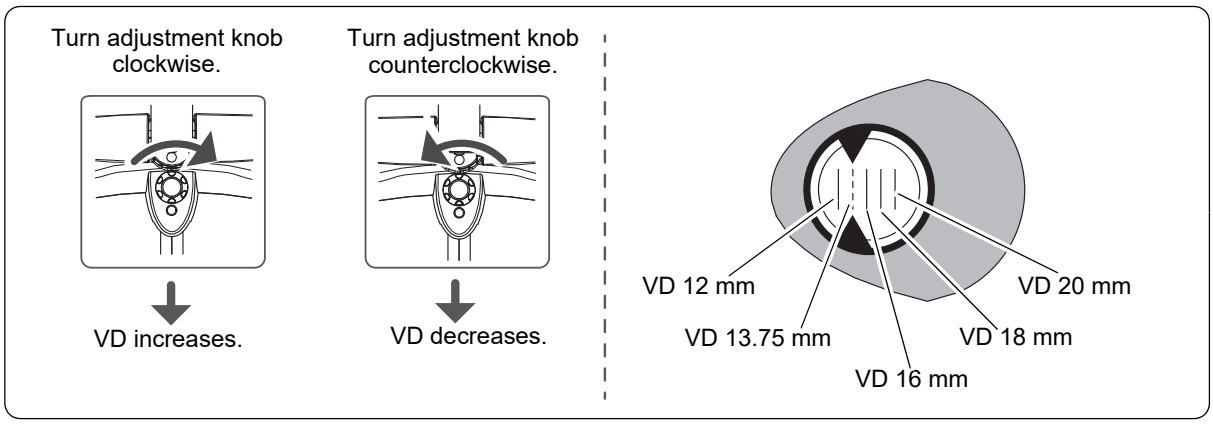


If the VD check windows are viewed at an angle, the vertex distance cannot be checked correctly. The following is the figure that the VD check windows are viewed from the front.

- The circle in the front b and the circle in the back c look concentric.
- The triangles in the front d and the upper and lower solid lines in the back e look overlapping.



3 Align the patient's corneal vertex to the desired marking with the forehead rest adjustment knob.



4 Press 64.0 again to exit from PD mode.

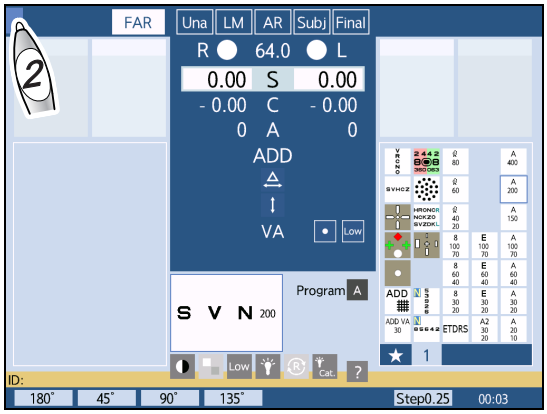
4.1.3 Adjusting the chart height (SSC-330 Type T, SSC-370 only)

The chart height is automatically adjusted according to the position of the refractor head when the RT-6100 is mounted on the system table ST-6100/ST-600.

If it is mounted on another table, the chart height needs to be adjusted. Perform the following operation for each patient.

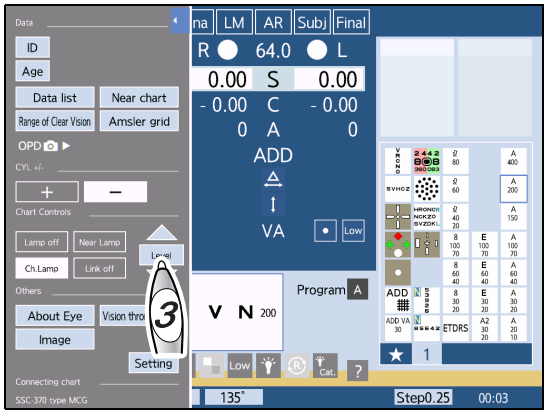
1 Align the measuring windows with the patient's eye level.

2 Press ▶ to display the side menu.



3 Press [Level].

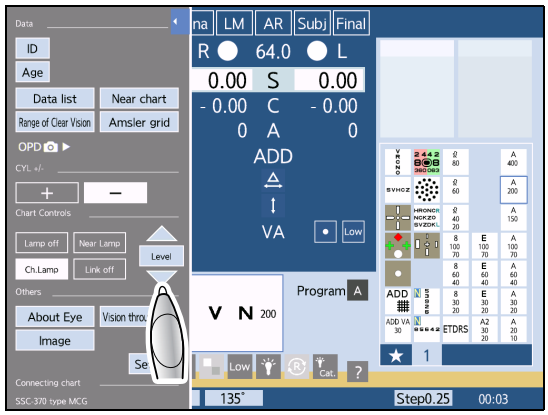
The chart height of the SSC-330 Type T or SSC-370 is automatically adjusted.



◆ Manual adjustment

Instruct the patient to view the chart window of the SSC-330 Type T or SSC-370 and adjust the chart height until the chart is centered.

▲	The chart moves up.
▼	The chart moves down.

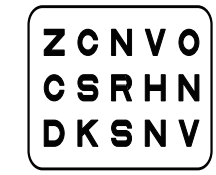


4.2 Visual Acuity Test

This section explains the testing method of unaided visual acuity and visual acuity corrected by glasses.

4.2.1 Measuring unaided visual acuity

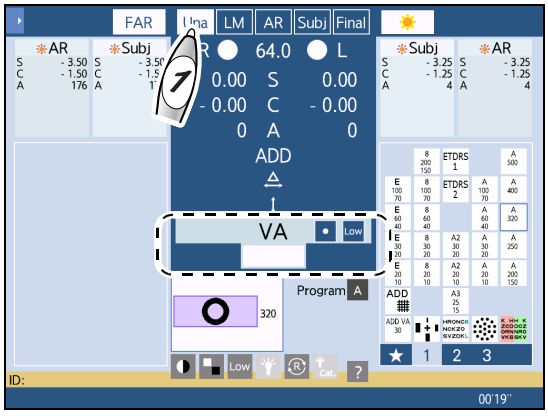
Purpose	To measure the unaided visual acuity of the right, left, or both eyes
Chart used	Visual acuity chart*a
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart



*a. Letters, Numbers, Tumbling E, Landolt ring, ETDRS

1 Press Una.

The device enters Unaided mode.



2 Press R.

The left eye is covered.

The chart of the visual acuity estimated from AR data is presented.

"8.9 Estimated Visual Acuity Table" (page 303)

3 Measure the unaided visual acuity of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Press − or − to change the visual acuity value.

The visual acuity of the last presented chart is displayed in the VA field.

"3.5 Chart Presentation" (page 59)

4 Press L to measure the unaided visual acuity of the left eye.

Follow the same procedure as Step 3.

5 Press BIN to measure the unaided visual acuity of both eyes.

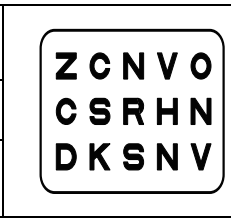
Both eyes are uncovered.

Follow the same procedure as Step 3.

4.2.2 Measuring visual acuity corrected by glasses

The visual acuity corrected by glasses can be measured when LM data is imported.

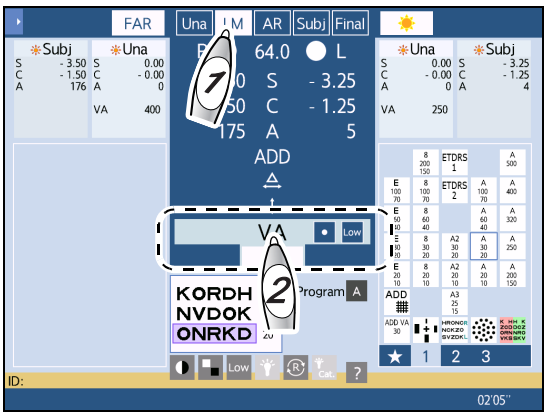
Purpose	To measure the visual acuity corrected by glasses of the right, left, or both eyes
Chart used	Visual acuity chart
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart



1 Press LM.

The device enters LM mode.

The corrective lenses are placed in the measuring windows according to the LM data.



2 Press VA.

3 Press R.

The left eye is covered.

The chart of the visual acuity estimated from the difference between AR data and LM data is presented.

"8.9 Estimated Visual Acuity Table" (page 303)

4 Measure the visual acuity corrected by glasses of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Press − or − to change the visual acuity value.

The visual acuity of the last presented chart is displayed in the VA field.

5 Press L to measure the visual acuity corrected by glasses of the left eye.

Follow the same procedure as Step 4.

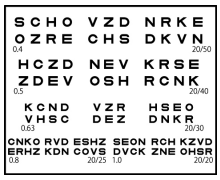
6 Press BIN to measure the visual acuity corrected by glasses of both eyes.

Both eyes are uncovered.

Follow the same procedure as Step 4.

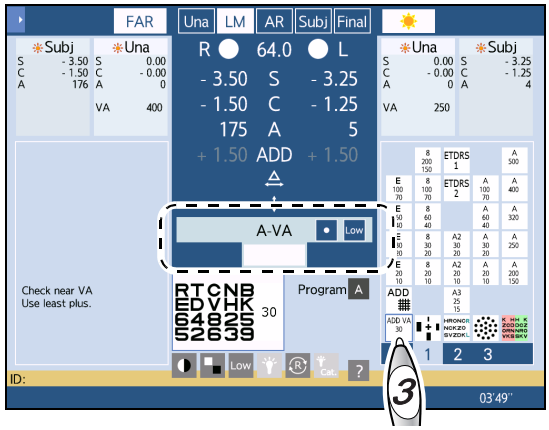
4.2.3 Measuring visual acuity with addition (ADD VA)

Purpose	To measure the near visual acuity with addition
Chart used	Near chart - 1: Letters, 4: Landolt rings, or 5: Letters (near chart 20/200 (0.1) - 20/20 (1.0) for the SSC-100)
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart



1 Measure the addition.

"4.11 Addition (ADD) Test" (page 149)



2 Prepare the near point chart.

3 Press ADD VA 30.

4 Press ADD VA 30 again.

The device enters ADD VA mode.

The indication "VA" changes to "A-VA".

5 Press R to measure the visual acuity with addition of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Turn the dial to enter visual acuity. Entry using ⊖ or ⊕ is not possible.

6 Press L to measure the visual acuity with addition of the left eye.

Follow the same procedure as Step 5.

7 Press BIN to measure the visual acuity with addition of both eyes.

Follow the same procedure as Step 5.

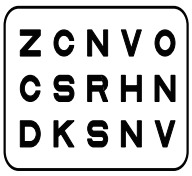
Note

- When the measurement mode is changed among LM - Final in ADD VA mode, ADD VA mode remains. However, ADD VA mode is exited when no addition is entered in the specified mode.

8 Press S, C, or A to change the mode and exit from ADD VA mode.

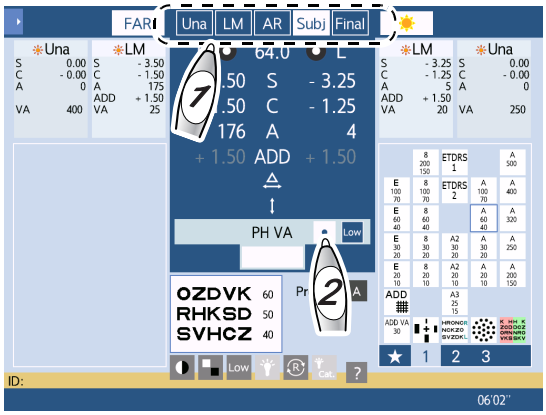
Pressing ADD VA 30 also exits from the mode.

4.2.4 Measuring pinhole visual acuity (pinhole VA)

Purpose	To measure the visual acuity when the patient views charts through a pinhole (small hole)	
Chart used	Visual acuity chart	
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart	

1 Select the desired measurement mode from among Una - Final.

The corrective lenses of the selected mode are placed.



2 Press •.

The device enters Pinhole VA mode.

The indication “VA” changes to “PH VA”.

3 Press R to measure the pinhole visual acuity of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Press − or − to change the visual acuity value.

The visual acuity value of the last presented chart is displayed in the PH VA field on the touch screen.

4 Press L to measure the pinhole visual acuity of the left eye.

Follow the same procedure as Step 3.

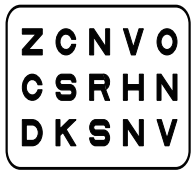
5 Press BIN to measure the pinhole visual acuity of both eyes.

Both eyes are covered with pinhole lenses.

Follow the same procedure as Step 3.

6 Press S, C, or A to change the mode and exit from Pinhole VA mode.

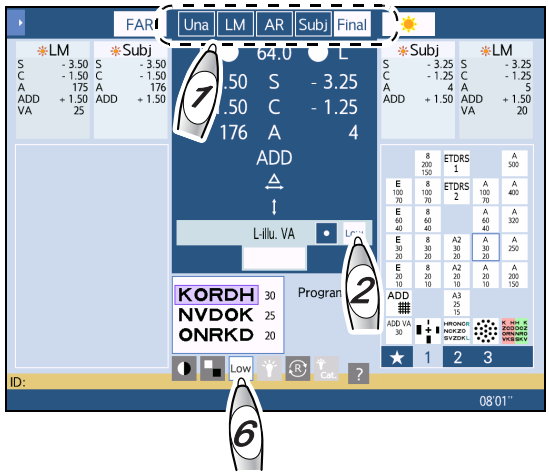
4.2.5 Measuring visual acuity with day data in low illumination (low illumination VA)

Purpose	To measure the visual acuity by presenting a chart in low illumination with the corrective lenses of day data placed This visual acuity is used as reference of the vision when the day glasses are used at night.	
Chart used	Visual acuity chart	
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart	

This measurement is not available for the chart presenting device CP-9, CP-770, or SSC-330 Type T.

1 Select the desired measurement mode from among Una - Final.

The corrective lenses of the selected mode are placed.



2 Press Low.

The device enters Low illumination VA mode and the touch screen becomes dark.

The indication “VA” changes to “L-illu. VA”.

3 Press R to measure the low illumination visual acuity of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Press − or + to change the visual acuity value.

The visual acuity value of the last presented chart is displayed in the L-illu. VA field on the touch screen.

4 Press L to measure the low illumination visual acuity of the left eye.

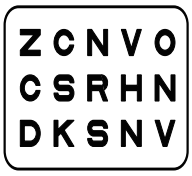
Follow the same procedure as Step 3.

5 Press BIN to measure the low illumination visual acuity of both eyes.

Follow the same procedure as Step 3.

6 Press Low to exit from Low illumination VA mode.

4.2.6 Measuring visual acuity with glare and contrast function (glare/contrast VA) (only for the user interface in English)

Purpose	To measure the visual acuity when the contrast function (or low illumination function) and the glare function are used	
Chart used	Visual acuity chart	
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart	
Supported chart presenting devices	SC-1600 Type M, SC-1600Pola Type M, SSC-100 Type M, SSC-370 Type MG/MCG	

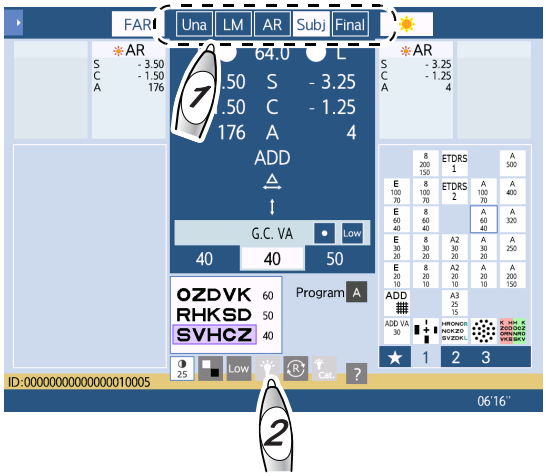
1 Select the desired measurement mode.

The corrective lenses of the selected mode are placed.

2 Turns on the contrast (or low illumination) and the glare lamp.

"3.6 Contrast Change, Low Illumination, Inverted Black and White" (page 64)

Functions not available in the chart presenting device cannot be selected.



3 Press VA while holding Shift.

The indication "VA" changes to "G.C. VA".

4 Press R to measure the glare/contrast visual acuity of the right eye.

Determine the minimum visual acuity value at which the patient can read the chart.

Press − or − to change the visual acuity value.

The visual acuity value of the last presented chart is displayed in the G.C. VA field on the touch screen.

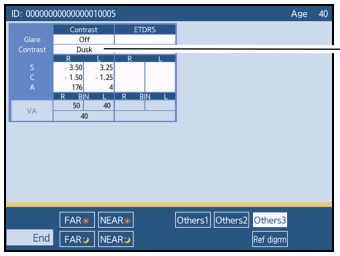
5 Press L to measure the glare/contrast visual acuity of the left eye.

Follow the same procedure as Step 3.

6 Press BIN to measure the glare/contrast visual acuity of both eyes.

Follow the same procedure as Step 3.

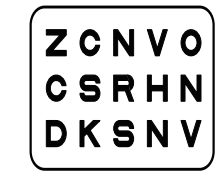
- The measurement results are shown with Others3 in the data list.



"Dusk" is displayed in the contrast field when low illumination is selected.

4.2.7 Measuring visual acuity using ETDRS charts (ETDRS VA) (only for the user interface in English)

Purpose	To measure the visual acuity using ETDRS charts
Chart used	ETDRS chart
Measurement method	Assessing the minimum visual acuity at which the patient can read the chart
Supported chart presenting devices	SC-1600 Type M, SC-1600Pola Type M, SSC-100 Type M, SSC-370 Type M/MG/MCG, CP-770 Type M



1 Select the desired measurement mode.

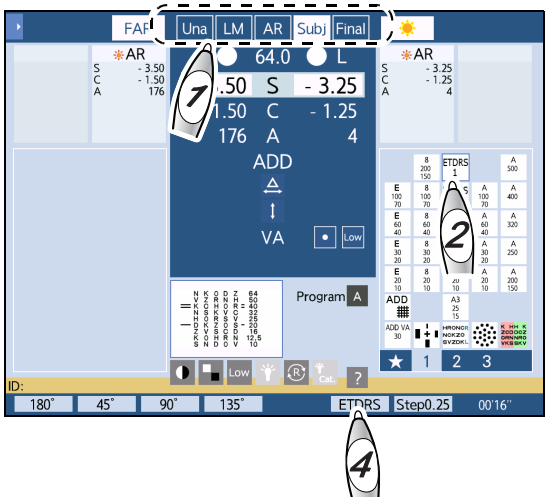
The corrective lenses of the selected mode are placed.

2 Press ETDRS 1 or ETDRS 2 to present the ETDRS chart.

3 Press R.

4 Press the function button ETDRS.

The ETDRS window is displayed.



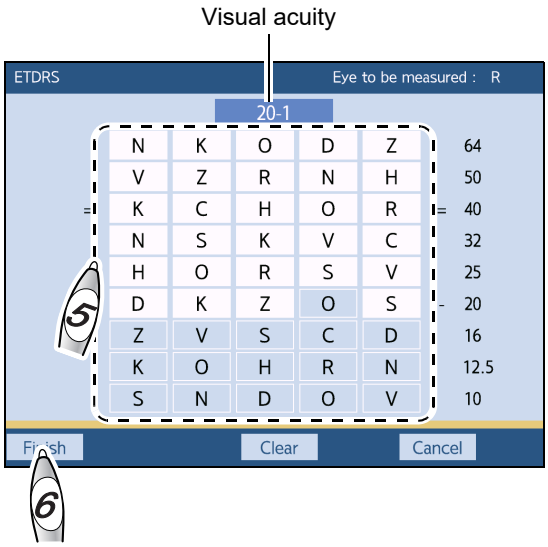
5 Ask the patient to read the chart from the top and only press the buttons when correct answers are given.

6 Press Finish to close the ETDRS window.

Clear : Clears measurement results.

Cancel : Closes the ETDRS window without saving any measurement results.

7 Press L to measure the visual acuity of the left eye in the same manner as Steps 4 to 6.



8 Press BIN to measure the visual acuity of both eyes in the same manner as Steps 4 to 6.

4.2.8 Entering correct or incorrect answers

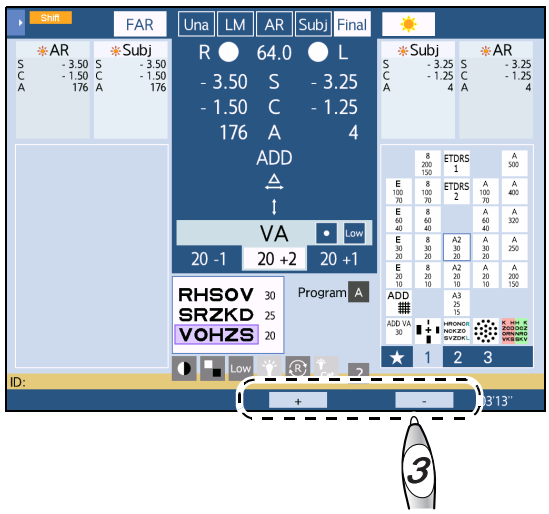
The values such as “+2”, “+1”, “−1”, and “−2” can be added to the entered visual acuity values. The number of letters that the patient was able to read or the patient failed to read can be entered.

1 Measure the visual acuity.

2 Press Shift during the visual acuity test.

The function buttons [+] and [−] are displayed.

3 Enter the number of letters that the patient was able to read or the patient failed to read with [+] or [−].



Ex.— When the chart contains four letters per row,

The patient was able to read three letters out of four letters at a visual acuity of 20/20 (1.0) → 1.0 − 1

The patient was able to read one letter out of four letters at a visual acuity of 20/16 (1.2) → 1.0 + 1

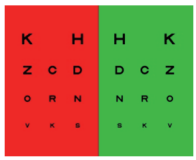
Ex.— When the chart contains five letters per row,

The patient was able to read three letters out of five letters at a visual acuity of 20/20 (1.0) → 1.0 − 2

The patient failed to read three letters out of five letters at a visual acuity of 20/16 (1.2) → 1.0 + 2

4.3 Spherical Power Refinement

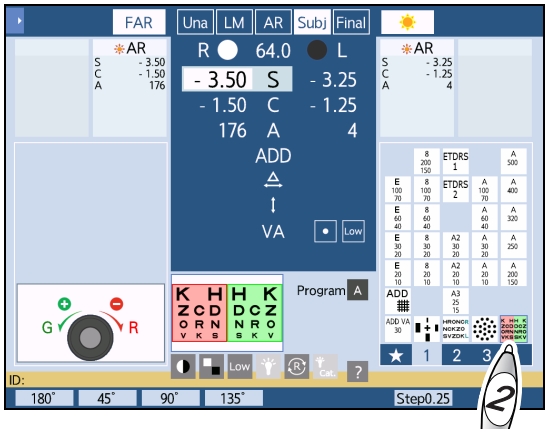
4.3.1 Red-green test

Purpose	To refine the spherical power in the red-green test	
Chart used	Red-green	
Ideal appearance	The letters on the red and green sides appear equally sharp.	

1 Press R or L to select the eye to be measured.

2 Press  to present the Red-green chart.

The device enters SPH mode.

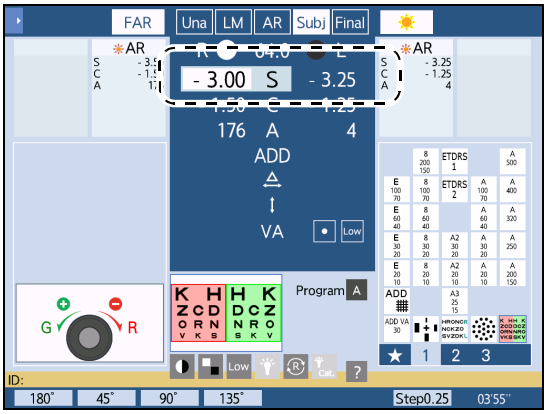


3 Add +0.50 D sphere to fog the patient's vision.

Turn the dial counterclockwise by two steps.

4 Turn the dial clockwise to reduce the fog until the letters on the red and green sides appear equally sharp.

Ask the patient, "Which is sharper, the red or the green?"



Adjust the following as necessary.

The letters on the red and green sides appear equally sharp.	End
The letters on the red side appear sharper.	Turn the dial clockwise or press  .
The letters on the green side appear sharper.	Turn the dial counterclockwise or press .

4.3.2 Cross grid test for distance vision

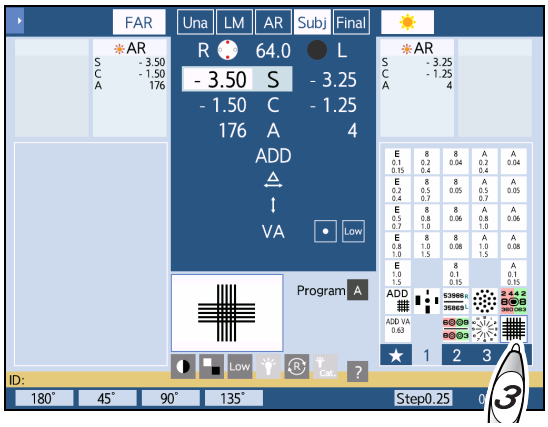
Purpose	To refine the spherical power	
Chart used	Cross grid	
Auxiliary lens	Fixed cross cylinder lens	
Ideal appearance	The horizontal and vertical lines appear equally clear.	

1 Press Subj.

2 Press R or L to select the eye to be measured.

3 Press to present the Cross grid chart.

The cross cylinder lens is placed.



4 Turn the dial clockwise or counterclockwise until the horizontal and vertical lines appear equally clear.

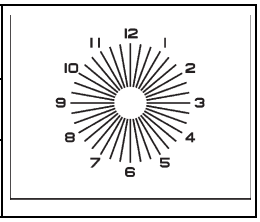
Ask the patient, “Which lines are clearer, the horizontal lines or the vertical lines?”

Adjust the following as necessary.

The horizontal and vertical lines appear equally clear.	End
The horizontal lines appear clearer.	Turn the dial counterclockwise.
The vertical lines appear clearer.	Turn the dial clockwise.

4.4 Cylinder Test

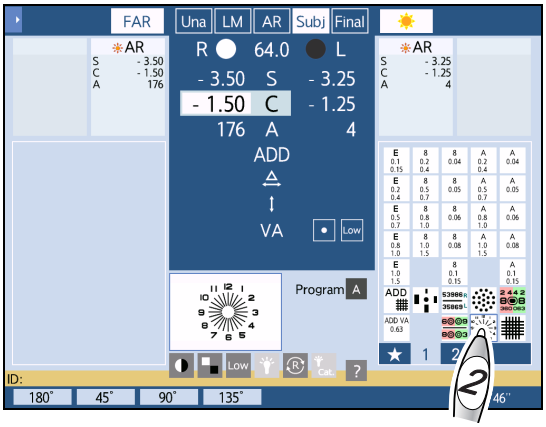
4.4.1 Cylinder axis refinement with Astigmatism clock dial chart

Purpose	To test and refine the cylinder axis using the Astigmatism clock dial chart	
Chart used	Astigmatism clock dial	
Ideal appearance	All bars appear equally clear.	

1 Press R or L to select the eye to be measured.

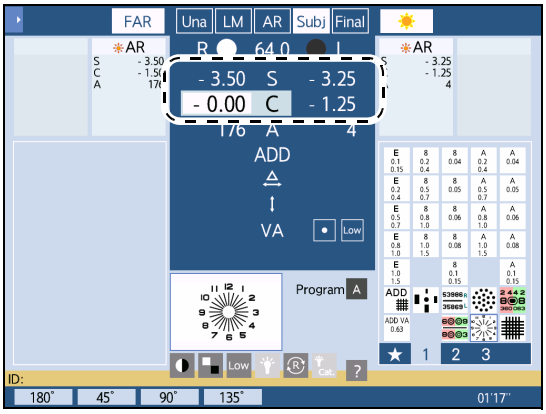
2 Press  to present the Astigmatism clock dial chart.

The device enters CYL mode.



3 Fog the vision until the visual acuity becomes approximately 20/200 (0.1).

1) When the cylinder value is not 0, change it to 0.
2) Press the sphere numeric field of the measured eye to enter SPH mode.
3) Turn the dial counterclockwise to add plus power.



4 Turn the dial clockwise to reduce the fog until the visual acuity becomes approximately 20/40 (0.5).

The numbers (1-12) beside the bars correspond to the visual acuity of 20/40 (0.5).

5 Refine the cylinder axis until all the bars appear equally clear.

Ask the patient, “Does any bar appear especially clearer than the others?” Adjust the following as necessary.

All the bars appear equally clear.	End
One of the bars appears clearer.	Determine the orientation of the minus cylinder axis by multiplying the smaller number (1-6) beside the clearer bar by 30°. When Bar 2 appears clearer: 2×30° = 60°

6 Enter the value of the minus cylinder axis determined in Step 5.

Press the axis numeric field of the measured eye and turn the dial.

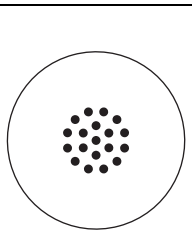
7 Add minus cylinder in 0.25 D increments until all the bars appear equally clear.

Press the cylinder numeric field of the measured eye and turn the dial clockwise.

When adding the cylindrical power changes the clearer bar, follow the procedure below.

The clearer bar moves counterclockwise.	Turn the cylinder axis clockwise.
The clearer bar moves clockwise.	Turn the cylinder axis counterclockwise.

4.4.2 Cylinder refinement with cross cylinder

Purpose	To test and refine the cylinder axis and cylindrical power using the cross cylinder lens.	
Chart used	Dots	
Auxiliary lens	Cross cylinder lens	
Ideal appearance	Even if the cross cylinder lens is flipped, the clarity of dots does not change.	

1 Set the refractor head according to the AR data and press R or L to select the eye to be measured.

2 Perform the red-green test.

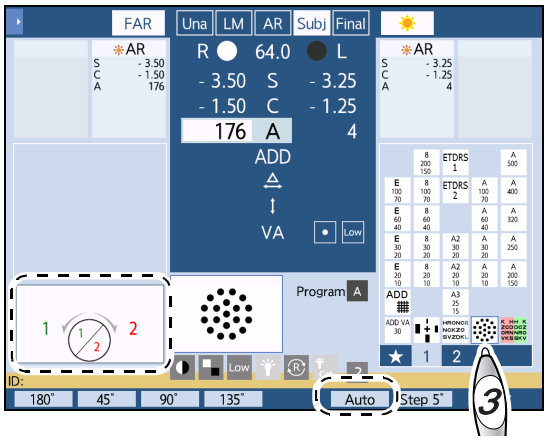
“4.3 Spherical Power Refinement” (page 100)

3 Press  to present the Dots chart.

The device enters AXIS mode.

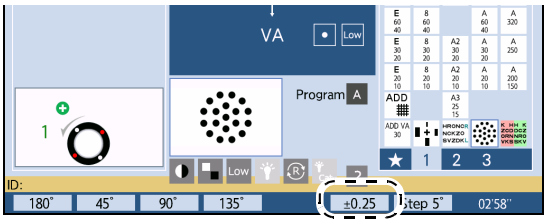
The cross cylinder lens is placed.

4 Refine the cylinder axis until Chart 1 and Chart 2 appear equally clear.



- When the parameter “Cross cylinder(XC) test” is set to [Auto]:

  Chart 1 and Chart 2 are presented at the same time. The position of each chart is displayed in the operation message field.



- When the parameter “Cross cylinder(XC) test” is set to [±0.25] or [±0.50]

  Present Chart 1 by pressing  and Chart 2 by pressing  , then ask the patient which is clearer.

Adjust the following as necessary.

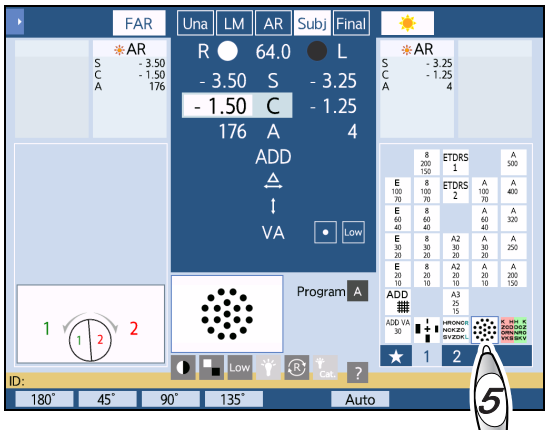
Chart 1 appears clearer.	Turn the dial counterclockwise by one step or press ⊕.
Chart 2 appears clearer.	Turn the dial clockwise by one step or press ⊖.

5 Press [◎] again.

The device enters CYL mode.

The axis of the cross cylinder lens is changed.

6 Refine the cylindrical power in the same manner of Step 4.



Note

- When the cylindrical power of the AR data is 0, astigmatism can be retested by the following procedure.

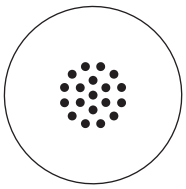
  When a message asking whether to skip the cylinder test is displayed during refraction program, press [No].

  1) After performing the red-green test, refine the cylindrical power.
  2) Set a cylindrical power of 0.25 D.
  3) Check the clarity in the order of 180° -> 45° -> 90°-> 135°. If the patient indicates that Chart 1 looks clearer for all axes, set the cylindrical power as 0.

  If the patient indicates that Chart 2 looks clearer for any axis, proceed to the cylinder axis refinement for the axis in which the patient indicated that Chart 2 was clearer.

4.4.3 Cylindrical power refinement with cross cylinder lens (with and without method)

Purpose	To test and refine the cylindrical power using the cross cylinder lens
Chart used	Dots
Auxiliary lens	Cross cylinder lens
Ideal appearance	The Dots chart appears clearer when the cross cylinder lens is removed.



1 Refine the cylinder axis.

See Steps 1 to 4 of *"4.4.2 Cylinder refinement with cross cylinder" (page 104)*.

2 Press  again.

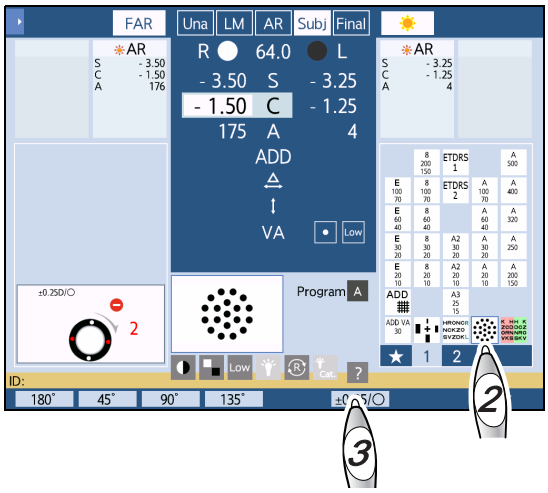
The device enters CYL mode.

The axis of the cross cylinder lens is changed.

3 Press the cross cylinder switching button to change it to [±0.25/○].

The axis does not need to be changed when the parameter *" Cross cylinder(XC) test" (page 221)* is set to [±0.25D/○].

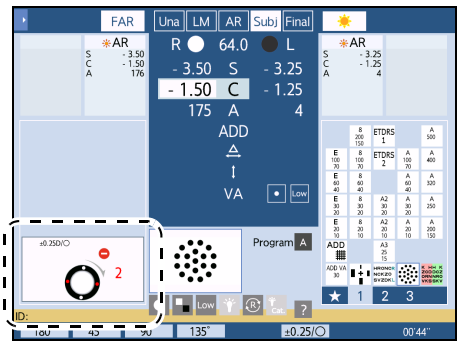
4 Turn the dial to refine the cylindrical power until the chart appears clearer when the cross cylinder lens is removed.



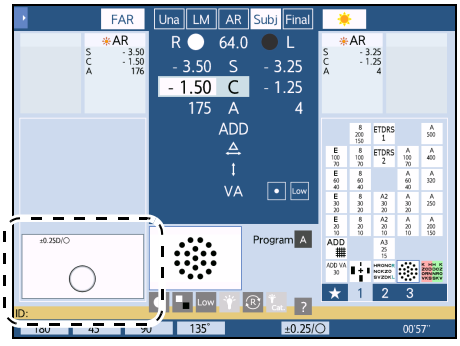
- When the chart appears clearer with the cross cylinder lens placed

1) Turn the dial clockwise by one step.

2) Place or remove the cross cylinder lens by pressing  and turn the dial clockwise one by one until the chart appears clearer with the cross cylinder lens removed.



When the cross cylinder lens is placed



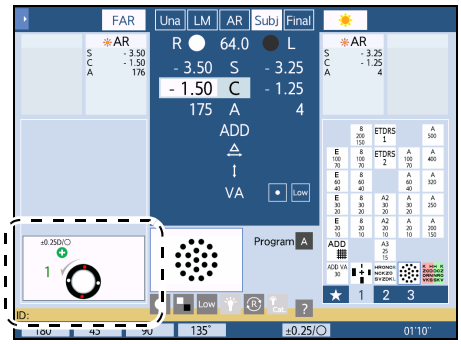
When the cross cylinder lens is removed

- When the chart appears clearer with the cross cylinder lens removed

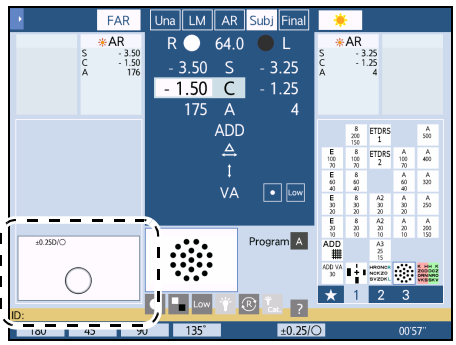
  When the chart appears clearer with the cross cylinder lens removed, change the orientation of the cross cylinder lens.

  1) Press  to change the orientation of the cross cylinder lens.

  2) Place or remove the cross cylinder lens by pressing  and turn the dial counterclockwise one by one until the chart appears clearer with the cross cylinder lens removed. The refinement is complete when the chart appears clearer with the cross cylinder lens removed.



When the cross cylinder lens is placed



When the cross cylinder lens is removed

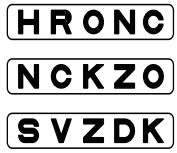
Note

- Pressing  in Binocular mode selects the right eye automatically and the left eye is covered.
- To perform refinement with both eyes open, press the auxiliary lens indication and press [FOG] in the auxiliary lens select window to fog the vision with both eyes open.

4.5 Binocular Visual Function Test

❖ Depending on the chart presenting device or chart type, the appearances of the chart differ from those in this manual, or some charts may not be included. Any charts that are not included in the chart presenting device cannot be used. Refer to the operator's manual of each chart presenting device.

4.5.1 Binocular balance test

Purpose	To adjust the accommodation balance if necessary when the best-corrected visual acuity is equal in the right and left eyes	
Chart used	Binocular balance	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Right eye 3ΔBD prism, left eye 3ΔBU prism (for the SC-1600 and SSC-100)	
Ideal appearance	The letters on the upper and lower rows appear equally clear.	

- SC-1600, SSC-100

Appearance		
Right eye	Left eye	Ideal appearance
		 

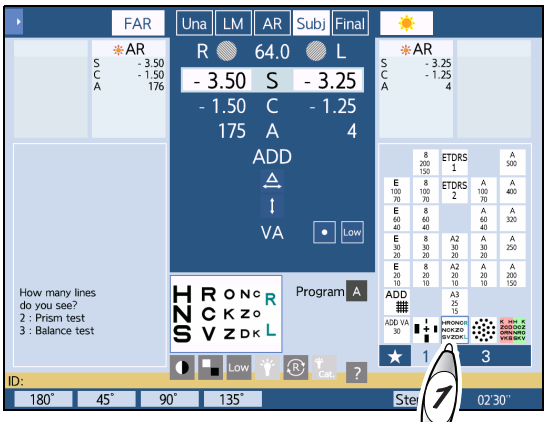
- Other

Appearance		
Right eye	Left eye	Ideal appearance
		

1 Press HRONCR NCKZO SVZDKL to present the Binocular balance chart.

The device enters SPH mode.

The auxiliary lens (polarizing filter or prism) is placed.

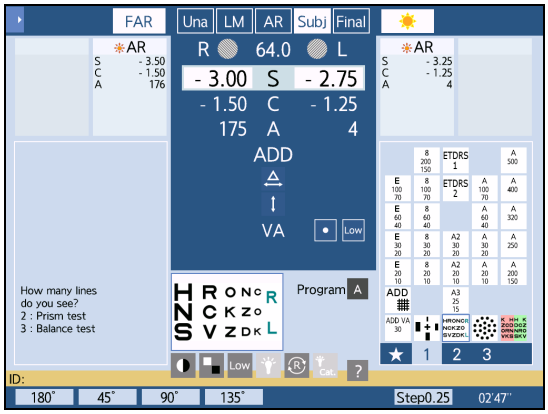


2 Fog both eyes.

Press BIN and turn the dial counterclockwise until the binocular visual acuity becomes approximately between 20/32 (0.6) and 20/25 (0.8).

The visual acuity of each letter on the chart is 20/50 (0.4), 20/40 (0.5), 20/30 (0.63), 20/20 (1.0), and 20/16 (1.2) from the left to right.

If the patient cannot see the chart in two rows, the balance test cannot be performed. In this case, present the visual acuity chart with one eye covered and repeat for the other eye to adjust the vision until it appears equal for the right eye and left eye.



3 Make adjustments until the upper and lower letters appear equally clear.

Ask the patient, “Which is clearer, the upper or the lower?”

Adjust the following as necessary.

The upper letters appear clearer.	Press R and turn the dial counterclockwise to add +0.25 D sphere.
The lower letters appear clearer.	Press L and turn the dial counterclockwise to add +0.25 D sphere.
The upper and lower letters do not appear equally clear.	Determine with which eye the patient views the Binocular balance chart more clearly while referring to the LM data or dominant eye.

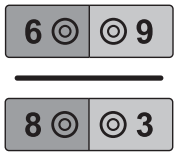
Note

- If the measurement results in Subjective mode differ between the right and left visual acuity, do not use the Binocular balance chart. Perform the binocular red-green test with the Binocular red-green chart.

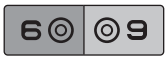
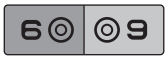
  “4.5.2 Binocular red-green test” (page 110)

- If the vision differs between the right and left eyes in the binocular balance test using the Binocular balance chart, determine with which eye the patient views the Binocular balance chart more clearly while referring to the LM data or dominant eye *(page 51)*.

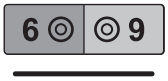
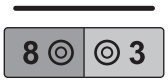
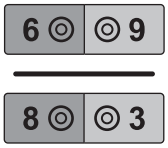
4.5.2 Binocular red-green test

Purpose	To test and achieve accommodation balance (equalization) in both eyes	
Chart used	Binocular red-green	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Right eye 3ΔBD prism, left eye 3ΔBU prism (for the SC-1600 and SSC-100)	
Ideal appearance	All numbers and symbols on the upper and lower rows appear equally sharp.	

- SC-1600, SSC-100

Appearance		
Right eye	Left eye	Ideal appearance
		

- Other

Appearance		
Right eye	Left eye	Ideal appearance
		

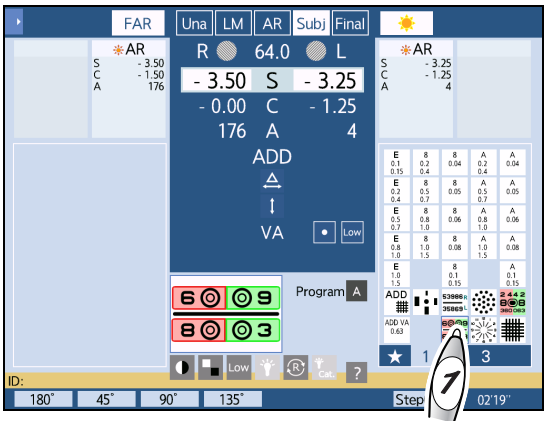
Note

- Precise balance can be achieved compared to the test using the Binocular balance chart.

1 Press  to present the Binocular red-green chart.

The measurement screen is displayed and the device enters SPH mode.

The auxiliary lens (polarizing filter or prism) is placed.



2 Adjust the accommodation balance for both eyes.

As in the table below, ask the appearance of numbers and symbols. Adjust the following as necessary.

All the numbers and symbols on the upper and lower rows appear equally sharp.	Binocular balance is achieved.
The red side appears sharper on the upper and lower rows.	
The green side appears sharper on the upper and lower rows.	
The green side appears sharper on the upper row and the red side appears sharper on the lower row.	Press R and turn the dial counterclockwise to add +0.25 D sphere.
The red side appears sharper on the upper row and the green side appears sharper on the lower row.	Press L and turn the dial counterclockwise to add +0.25 D sphere.

4.5.3 Phoria test

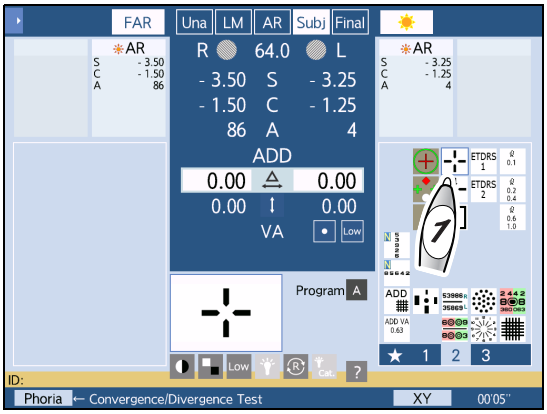
Purpose	To detect and correct horizontal and vertical phoria	
Chart used	Phoria	
Auxiliary lens	Polarizing filter 135° for the right eye, 45° for the left eye, and rotary prism for both eyes	
	Red filter for the right eye, green filter for the left eye, and rotary prism for both eyes (for the SC-1600 and SSC-100)	
Ideal appearance	A cross is seen.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Phoria chart.

The device enters BASE IN/OUT prism entry mode.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Ask the patient, “Can you see four bars?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

3 Ask the patient, “Do the vertical and horizontal bars form a cross at the center?”

- Yes → Orthophoria
- No → Heterophoria. Go to the next step.

4 Ask the patient, “Are the vertical bars shifted to the right or left?”

- Shifted to the right → Esophoria
- Shifted to the left → Exophoria
- Not horizontally shifted → No horizontal phoria

5 Ask the patient, “Are the horizontal bars shifted upward or downward?”

- Shifted upward → Right eye hyperphoria
- Shifted down → Left eye hyperphoria
- Not vertically shifted → No vertical phoria

6 Make adjustments until a cross is seen.

If a cross is not seen, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Esophoria		Turn the dial clockwise to add the BO prism until the vertical bars are centered in the horizontal bars.
Exophoria		Turn the dial counterlockwise to add the BI prism until the vertical bars are centered in the horizontal bars.
Left eye hyperphoria		Press ↕. Turn the dial clockwise to add the BU prism to the right eye and the BD prism to the left eye until the horizontal bars are centered in the vertical bars.
Right eye hyperphoria		Press ↕. Turn the dial counterclockwise to add the BD prism to the right eye and the BU prism to the left eye until the horizontal bars are centered in the vertical bars.
Esophoria + Right eye hyperphoria		Correct the horizontal phoria in the same manner as for esophoria and the vertical phoria in the same manner as for right eye hyperphoria.
Esophoria + Left eye hyperphoria		Correct the horizontal phoria in the same manner as for esophoria and the vertical phoria in the same manner as for left eye hyperphoria.
Exophoria + Right eye hyperphoria		Correct the horizontal phoria in the same manner as for exophoria and the vertical phoria in the same manner as for right eye hyperphoria.
Exophoria + Left eye hyperphoria		Correct the horizontal phoria in the same manner as for exophoria and the vertical phoria in the same manner as for left eye hyperphoria.

4.5.4 Phoria with fixation test

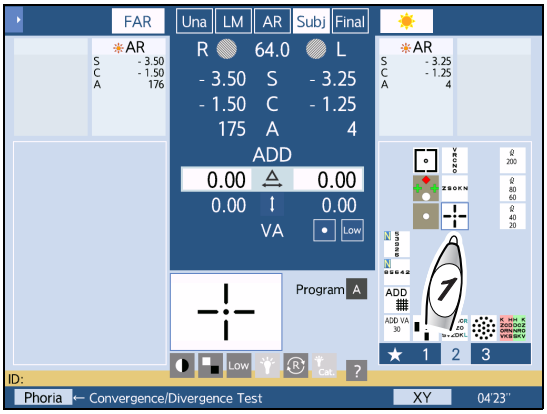
Purpose	To detect and correct heterophoria by giving stimuli for fusion	
Chart used	Phoria with fixation	
Auxiliary lens	Polarizing filter 135° for the right eye, 45° for the left eye, and rotary prism for both eyes	
	Red filter for the right eye, green filter for the left eye, and rotary prism for both eyes (for the SC-1600 and SSC-100)	
Ideal appearance	A cross is seen.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Phoria with fixation chart.

The device enters BASE IN/OUT prism entry mode.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Ask the patient, “Can you see four bars?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

3 Ask the patient, “Do the vertical and horizontal bars form a cross at the center?”

- Yes → Orthophoria
- No → Heterophoria. Go to the next step.

4 Ask the patient, “Are the bars vertically aligned?”

- Yes → No horizontal phoria
- No → Horizontal phoria

5 Ask the patient, “Is the top bar shifted to the right or left of the bottom bar?”

- Shifted to the right → Esophoria
- Shifted to the left → Exophoria

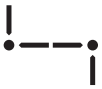
6 Ask the patient, “Are the bars horizontally aligned?”

- Yes → No vertical phoria
- No → Vertical phoria

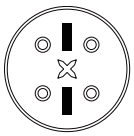
7 Make adjustments until a cross is seen.

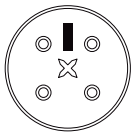
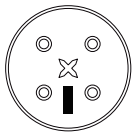
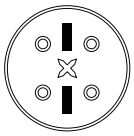
If a cross is not seen, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Esophoria		Turn the dial clockwise to add the BO prism until the bars are vertically aligned.
Exophoria		Turn the dial counterclockwise to add the BI prism until the bars are vertically aligned.
Left eye hyperphoria		Press ↕. Turn the dial clockwise to add the BU prism to the right eye and the BD prism to the left eye until the bars are horizontally aligned.
Right eye hyperphoria		Press ↕. Turn the dial counterclockwise to add the BD prism to the right eye and the BU prism to the left eye until the bars are horizontally aligned.
Esophoria + Right eye hyperphoria		Correct the horizontal phoria in the same manner as for esophoria and the vertical phoria in the same manner as for right eye hyperphoria.
Esophoria + Left eye hyperphoria		Correct the horizontal phoria in the same manner as for esophoria and the vertical phoria in the same manner as for left eye hyperphoria.
Exophoria + Right eye hyperphoria		Correct the horizontal phoria in the same manner as for exophoria and the vertical phoria in the same manner as for right eye hyperphoria.
Exophoria + Left eye hyperphoria		Correct the horizontal phoria in the same manner as for exophoria and the vertical phoria in the same manner as for left eye hyperphoria.

4.5.5 Mallet test (horizontal phoria)

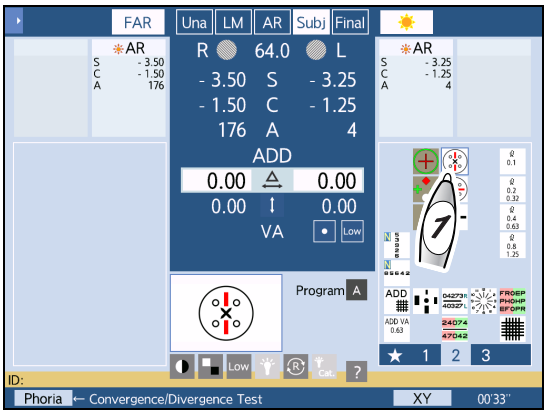
Purpose	To detect and correct heterophoria by giving stimuli for fusion	
Chart used	Mallet chart (vertical bars)	
Auxiliary lens	Polarizing filter 135° for the right eye, 45° for the left eye, and rotary prism for both eyes	
	Red filter for the right eye, green filter for the left eye, and rotary prism for both eyes (for the SC-1600 and SSC-100)	
Ideal appearance	The two bars appear vertically aligned.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Mallet chart (vertical bars).

The device enters BASE IN/OUT prism entry mode.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Have the patient look at a cross in the center.

3 Ask the patient, “Can you see two vertical bars?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

4 Ask the patient, “Are the bars vertically aligned?”

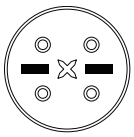
- Yes → No horizontal phoria
- No → Horizontal phoria. Go to the next step.

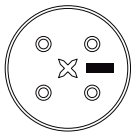
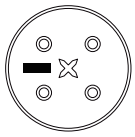
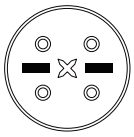
5 Ask the patient, “Is the top bar shifted to the right or left of the bottom bar?”

- Shifted to the right → Esophoria. Turn the dial clockwise to add the BO prism until the bars are vertically aligned.
- Shifted to the left → Exophoria. Turn the dial counterclockwise to add the BI prism until the bars are vertically aligned.

For fine adjustment, use  or  instead of the dial.

4.5.6 Mallet test (vertical phoria)

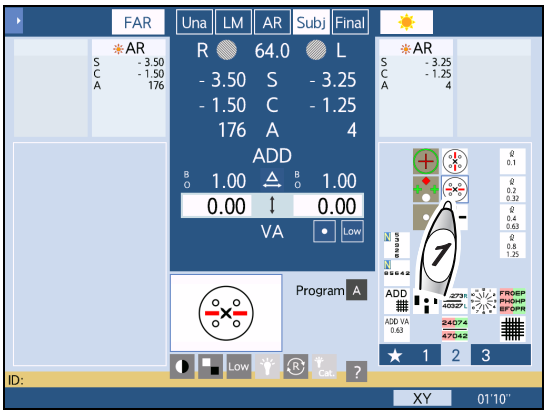
Purpose	To detect and correct heterophoria by giving stimuli for fusion	
Chart used	Mallet chart (horizontal bars)	
Auxiliary lens	Polarizing filter 135° for the right eye, 45° for the left eye, and rotary prism for both eyes	
	Red filter for the right eye, green filter for the left eye, and rotary prism for both eyes (for the SC-1600 and SSC-100)	
Ideal appearance	The two bars appear horizontally aligned.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Mallet chart (horizontal bars).

The device enters BASE IN/OUT prism entry mode.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Have the patient look at a cross in the center.

3 Ask the patient, “Can you see two horizontal bars?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

4 Ask the patient, “Are the bars horizontally aligned?”

- Yes → No vertical phoria
- No → Hyperphoria or hypophoria. Go to the next step.

5 Ask the patient, “Is the right bar shifted upward or downward?”

- Shifted upward → Left eye hyperphoria. Turn the dial clockwise to add the BU prism to the right eye and the BD prism to the left eye until the bars are horizontally aligned.
- Shifted downward → Right eye hyperphoria. Turn the dial counterclockwise to add the BD prism to the right eye and the BU prism to the left eye until the bars are horizontally aligned.

For fine adjustment, use  or  instead of the dial.

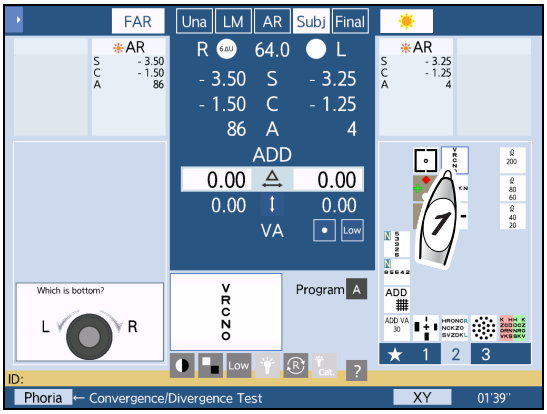
4.5.7 Von Graefe test (horizontal phoria)

Purpose	To detect and correct horizontal phoria	V R C N O V R C N O
Chart used	Vertical line	
Auxiliary lens	6ΔBU prism for the right eye and rotary prism for the left eye	
Ideal appearance	The two columns appear vertically aligned.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
V R C N O	V R C N O	V R C N O V R C N O

1 Press V R C N O to present the Vertical line chart.

The 6ΔBU prism is placed in the right measuring window. The device enters BASE IN/OUT prism entry mode.



If the Vertical line chart is not available, follow the procedure below:

1) Display the chart with letters for the patient's best-corrected visual acuity or that with their slightly larger letters in a vertical line.
2) Set the 6ΔBU prism to the right eye.
3) Press △ .

2 Press L to cover the left eye.

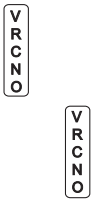
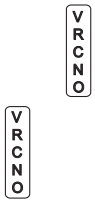
3 Press L again to uncover the left eye.

4 Ask the patient, "Can you see two vertical columns? Are they vertically aligned?"

5 Make adjustments until the columns appear vertically aligned the moment the occluder is removed.

If the position is shifted, adjust the following (use the Flashing Technique described in Steps 2 and 3).

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Esophoria (The upper column is shifted to the left.)		Add the BO prism until the two columns are vertically aligned. Turn the dial clockwise.
Exophoria (The upper column is shifted to the right.)		Add the BI prism until the two columns are vertically aligned. Turn the dial counterclockwise.

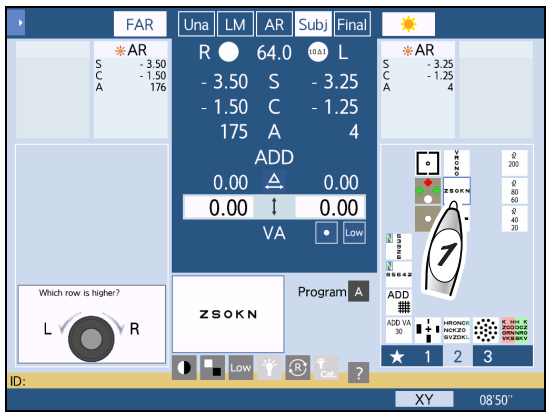
4.5.8 Von Graefe test (vertical phoria)

Purpose	To detect and correct vertical phoria	ZSOKN ZSOKN
Chart used	Horizontal line	
Auxiliary lens	Rotary prism for the right eye and 10ΔBI prism for the left eye	
Ideal appearance	The two rows appear horizontally aligned.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
ZSOKN	ZSOKN	ZSOKN ZSOKN

1 Press ZSOKN to present the Horizontal line chart.

The 10ΔBI prism is placed in the left measuring window. The device enters BASE UP/DOWN prism entry mode.



If the Horizontal line chart is not available, follow the procedure below:

1) Display the chart with letters for the patient's best-corrected visual acuity or that with their slightly larger letters in a horizontal line.
2) Set the 10ΔBI prism to the left eye.
3) Press ↕.

2 Ask the patient, "Can you see two horizontal rows? Are they horizontally aligned?"

3 Make adjustments until the rows appear horizontally aligned.

If the position is shifted, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Right eye hyperphoria (The left row is higher.)	ZSOKN ZSOKN	Turn the dial counterclockwise until the two rows are horizontally aligned.
Left eye hyperphoria (The right row is higher.)	ZSOKN ZSOKN	Turn the dial clockwise until the two rows are horizontally aligned.

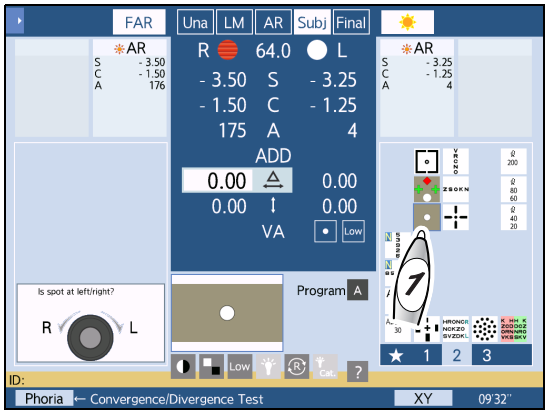
4.5.9 Maddox test (horizontal phoria)

Purpose	To detect and correct horizontal phoria	
Chart used	Fixation point	
Auxiliary lens	Horizontal Maddox rod for the right eye and rotary prism for the left eye	
Ideal appearance	A white spot is seen in the center.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Fixation point chart.

The horizontal Maddox rod is placed in the right measuring window. The device enters BASE IN/OUT prism entry mode.



2 Make adjustments until the white spot is centered.

Ask the patient, “Is the white spot shifted to the right or left of the red rod? or is it on the red rod?”

If the white spot is horizontally shifted, adjust the following.

For fine adjustment, use  or  instead of the dial.

Phoria	Appearance	Procedure
Esophoria (The white spot is shifted to the left.)		Press  . Turn the dial clockwise to add the BO prism until the white spot appears to be completely within the red rod.
Exophoria (The white spot is shifted to the right.)		Press  . Turn the dial counterclockwise to add the BI prism until the white spot appears to be completely within the red rod.

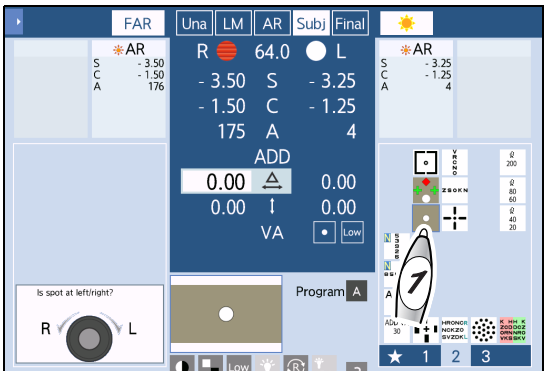
4.5.10 Maddox test (vertical phoria)

Purpose	To detect and correct vertical phoria	
Chart used	Fixation point	
Auxiliary lens	Rotary prism for the right eye and vertical Maddox rod for the left eye	
Ideal appearance	A white spot is seen in the center.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
○	▬	▬○

1 Press [•] to present the Fixation point chart.

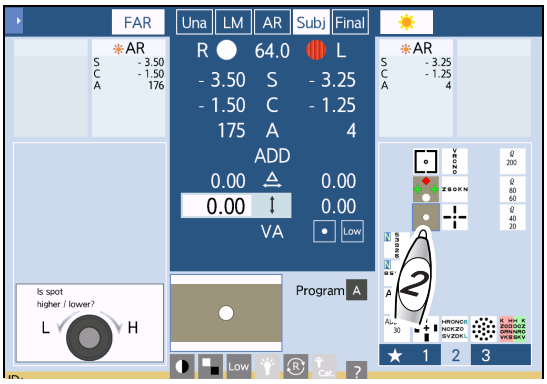
The horizontal Maddox rod is placed in the right measuring window. The device enters BASE IN/OUT prism entry mode.



2 Press [•] again.

The horizontal Maddox rod is removed from the right measuring window and the vertical Maddox rod is placed in the left measuring window.

The device enters BASE UP/DOWN prism entry mode for the left eye.



3 Make adjustments until the white spot is centered.

Ask the patient, “Is the white spot shifted upward or downward? or is it on the red rod?”

If the white spot is vertically shifted, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Left eye hyperphoria (The white spot is shifted upward.)	○ ▬	Press [R]. Turn the dial clockwise to add the BU prism to the right eye until the white spot appears to be completely within the red rod.
Right eye hyperphoria (The white spot is shifted downward.)	▬ ○	Press [R]. Turn the dial clockwise to add the BD prism to the right eye until the white spot appears to be completely within the red rod.

4.5.11 Aniseikonia test (vertical phoria)

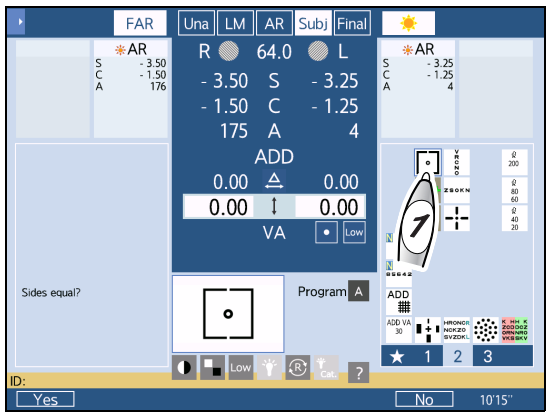
Purpose	To detect aniseikonia and correct vertical phoria	
Chart used	Vertical coincidence (vertical phoria)	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Red filter for the right eye and green filter for the left eye (for the SC-1600 and SSC-100)	
Ideal appearance	• The right and left frames appear the same in size. • The right and left frames appear the same in height.	

Appearance		
Right eye	Left eye	Binocular ideal (no aniseikonia, orthophoria)
		

◆ Aniseikonia detection

1 Press  to present the Vertical coincidence chart.

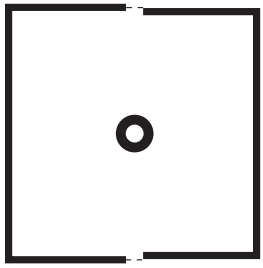
The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Ask the patient, “Can you see the frames with a dot in the center? Are the right and left frames the same in size?”

Ex.— 3.5% aniseikonia

The width of a line corresponds to 3.5% aniseikonia.



- When the aniseikonia is due to anisometropia (refractive error difference of 2.00 D or greater between the right and left eyes), a spectacle lens prescription is suitable for axial anisometropia and contact lens prescription is suitable for refractive anisometropia.

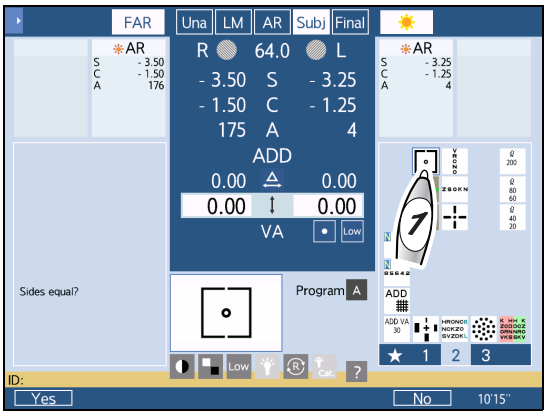
3 When the right and left frames are the same in size, press the function button [Yes]. When the size is different, press [No].

◆ Vertical phoria correction

1 Press [ ] to present the Vertical coincidence chart.

The device enters BASE UP/DOWN prism entry mode for the left eye.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Align the right and left frames vertically.

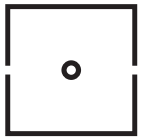
Ask the patient, “Can you see the frames with a dot in the center? Are the right and left frames vertically aligned?”

If the frames are vertically shifted, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Right eye hyperphoria (The left frame is higher.)		Press BIN. Turn the dial counterclockwise to add the BD prism to the right eye and the BU prism to the left eye until the right and left frames are vertically aligned.
Left eye hyperphoria (The right row is higher.)		Press BIN. Turn the dial clockwise to add the BU prism to the right eye and the BD prism to the left eye until the right and left frames are vertically aligned.

4.5.12 Aniseikonia test (horizontal phoria)

Purpose	To detect aniseikonia and correct horizontal phoria	
Chart used	Horizontal coincidence (horizontal phoria)	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Red filter for the right eye and green filter for the left eye (for the SC-1600 and SSC-100)	
Ideal appearance	• The upper and lower frames appear the same in size. • The upper and lower frames appear horizontally aligned.	

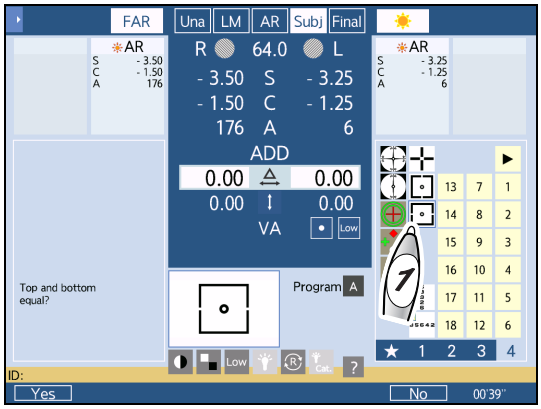
Appearance		
Right eye	Left eye	Binocular ideal (no aniseikonia, orthophoria)
		

◆ Aniseikonia detection

1 Press  to present the Horizontal coincidence chart.

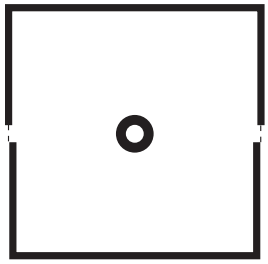
The auxiliary lenses (polarizing filter or red-green filter) are placed.

2 Ask the patient, “Can you see the frames with a dot in the center? Are the upper and lower frames the same in size?”



Ex.— 3.5% aniseikonia

The width of a line corresponds to 3.5% aniseikonia.



- When the aniseikonia is due to anisometropia (refractive error difference of 2.00 D or greater between the right and left eyes), a spectacle lens prescription is suitable for axial anisometropia and contact lens prescription is suitable for refractive anisometropia.

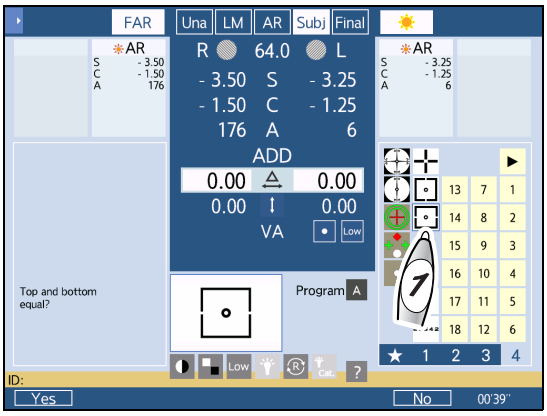
3 When the upper and lower frames are the same in size, press the function button [Yes]. When the size is different, press [No].

◆ Horizontal phoria correction

1 Press  to present the Horizontal coincidence chart.

The device enters BASE IN/OUT prism entry mode.

The auxiliary lenses (polarizing filter or red-green filter) are placed.

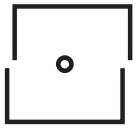


2 Align the right and left frames horizontally.

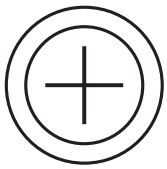
Ask the patient, “Can you see the frames with a dot in the center? Are the right and left frames horizontally aligned?”

If the frames are horizontally shifted, adjust the following.

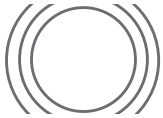
For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Exophoria (The upper frame is shifted to the left.)		Press BIN. Turn the dial counterclockwise until the upper and lower frames are horizontally aligned.
Esophoria (The upper frame is shifted to the right.)		Press BIN. Turn the dial clockwise until the upper and lower frames are horizontally aligned.

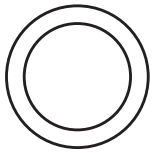
4.5.13 Schober test

Purpose	To detect and correct phoria	
Chart used	Schober	
Auxiliary lens	Red filter for the right eye, green filter for the left eye, and rotary prism for both eyes	
Ideal appearance	A cross is seen in the center.	

- SSC-100

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

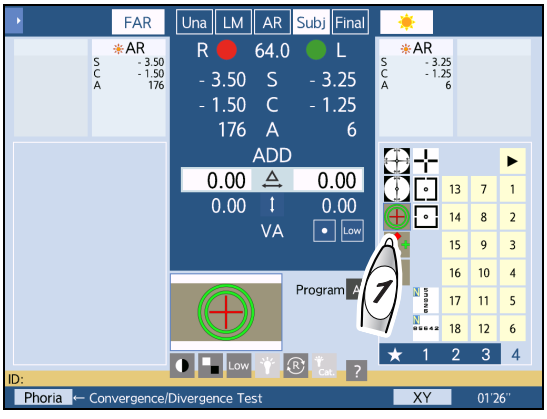
- Other

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Schober chart.

The device enters BASE IN/OUT prism entry mode.

The red filter is placed in the right measuring window and the green filter is placed in the left measuring window.



2 Ask the patient, “Can you see the green circles with a red cross?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

3 Ask the patient, “Is the cross in the center of the circle?”

- Yes → Orthophoria
- No → Heterophoria. Go to the next step.

4 Ask the patient, “Is the cross shifted to the right or left?”

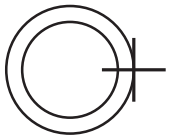
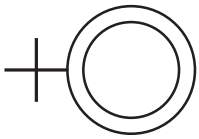
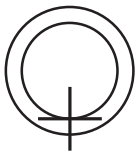
- Shifted to the right → Esophoria
- Shifted to the left → Exophoria
- Not horizontally shifted → No horizontal phoria

5 Ask the patient, “Is the cross shifted upward or downward?”

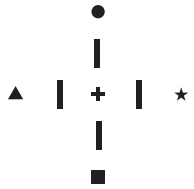
- Shifted upward → Left eye hyperphoria
- Shifted downward → Right eye hyperphoria
- Not vertically shifted → No vertical phoria

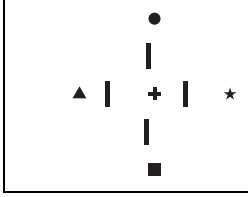
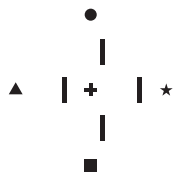
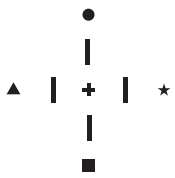
If the position is shifted, adjust the following.

For fine adjustment, use ⊕ or ⊖ instead of the dial.

Phoria	Appearance	Procedure
Esophoria (The cross is shifted to the right.)		Turn the dial clockwise to add the BO prism until the cross is seen in the center of the circle.
Exophoria (The cross is shifted to the left.)		Turn the dial counterclockwise to add the BI prism to until the cross is seen in the center of the circle.
Left eye hyperphoria (The cross is shifted upward.)		Press ↕. Turn the dial clockwise to add the BU prism to the right eye and the BD prism to the left eye until the cross is seen in the center.
Right eye hyperphoria (The cross is shifted downward.)		Press ↕. Turn the dial counterclockwise to add the BD prism to the right eye and the BU prism to the left eye until the cross is seen in the center.

4.5.14 Stereo test

Purpose	To detect stereoscopic vision	
Chart used	Stereo	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Red filter for the right eye and green filter for the left eye (for the SC-1600 and SSC-100)	
Ideal appearance	The vertical bar with a circle appears closest and then in the order of the vertical bars with a star, square, and triangle.	

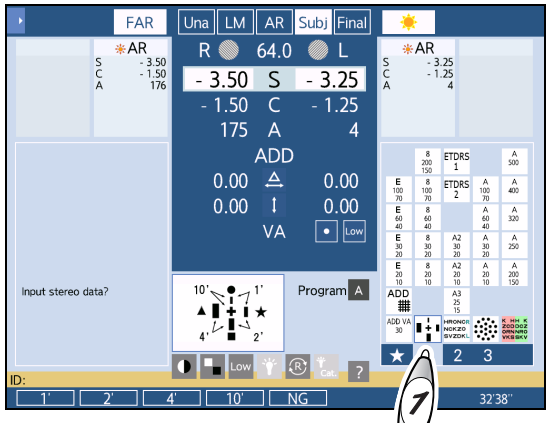
Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

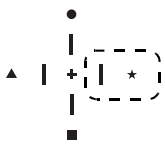
1 Press  to present the Stereo chart.

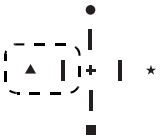
The auxiliary lenses (polarizing filter or red-green filter) are placed.

2 The four vertical bars should appear closer. Test whether the patient can see the four bars at different depths.

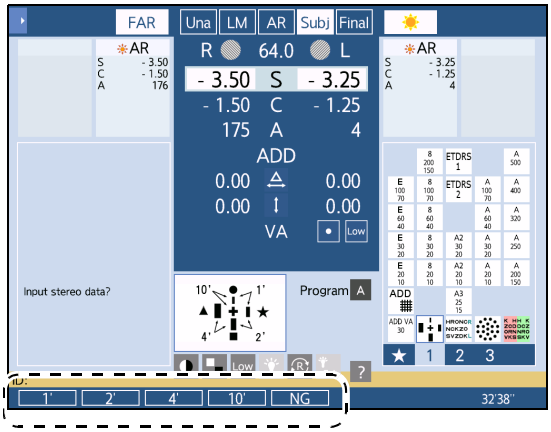
Ask the patient, “Do the vertical bar with a circle appear closest and then in the order of the vertical bars with a star, square, and triangle with respect to the cross in the center?”



Bar position		Stereoparallax
Vertical bar with a circle		The stereoparallax from the vertical bar with a cross is 10 minutes.
Vertical bar with a star		The stereoparallax from the vertical bar with a circle is 1 minute.
Vertical bar with a square		The stereoparallax from the vertical bar with a star is 2 minutes.

Vertical bar with a triangle		The stereoparallax from the vertical bar with a square is 4 minutes.

3 Enter the test result (1', 2', 4', 10', or NG (No Good)) with a function button.



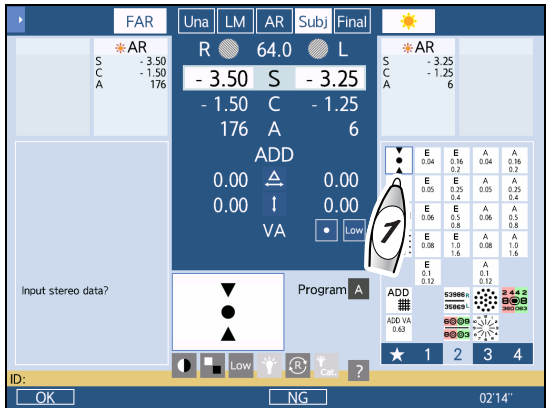
4.5.15 Stereo test (triangle test)

Purpose	To detect stereoscopic vision	
Chart used	Stereo	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
Ideal appearance	The upper and lower triangles appear closer than the circle in the center.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Stereo chart.

The auxiliary lenses (polarizing filter) are placed.



2 Test whether the patient can see the upper and lower triangles stereoscopically.

For the stereoparallax of 10'30", refraction distance of 5 m, and PD 60 mm, they should appear approximately 101 cm closer.

3 Enter the test result (OK or NG) with a function button.

4 Press  again to test whether the patient can see the upper and lower triangles farther away.

For the refraction distance of 5 m and PD 60 mm, they should appear approximately 171 cm farther away.

5 Repeat Steps 1 to 4 to change the stereoscopic vision.

Only pop-out is slow.	Exophoria tendency
Only recession is slow.	Esophoria tendency
Both pop-out and recession are slow.	Hyperphoria or hypophoria tendency

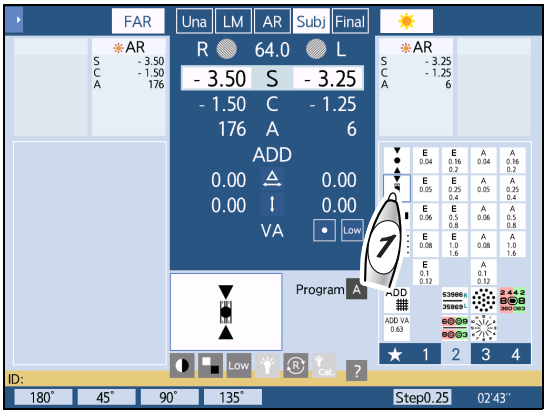
4.5.16 Stereo balance test

Purpose	To detect stereoscopic vision	
Chart used	Stereo balance	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
Ideal appearance	The upper and lower triangles appear closer than the circle in the center.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

1 Press  to present the Stereo chart.

The auxiliary lenses (polarizing filter) are placed.



2 Test whether the patient can see the upper and lower triangles stereoscopically.

For the stereoparallax of 13'45", refraction distance of 5 m, and PD 60 mm, they should appear approximately 125 cm closer.

3 Press  again to test whether the patient can see the upper and lower triangles farther away.

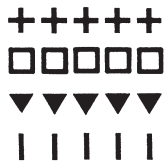
For the refraction distance of 5 m and PD 60 mm, they should appear approximately 250 cm farther away.

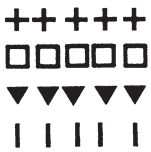
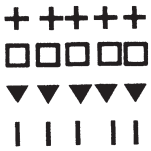
4 Check the displacement between the upper and lower triangles and the central circle.

Displacement of pop-out > Displacement of recession	Exophoria tendency
Displacement of pop-out < Displacement of recession	Esophoria tendency
Displacement of pop-out = Displacement of recession	Hyperphoria or hypophoria tendency

A shifted perception of the triangles to the first (inner), second (thin), or third (outer) grade means a prevalence of the relevant eye of 20%, 60%, or 100%.

4.5.17 Precise four-line stereo test

Purpose	To detect stereoscopic vision of smaller than parallax 1 minute	
Chart used	Stereo four-line	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
Ideal appearance	The plus shape second from the left, square fourth from the left, triangle third from the left, and bar fourth from the left appear closer than the other shapes.	

Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
		

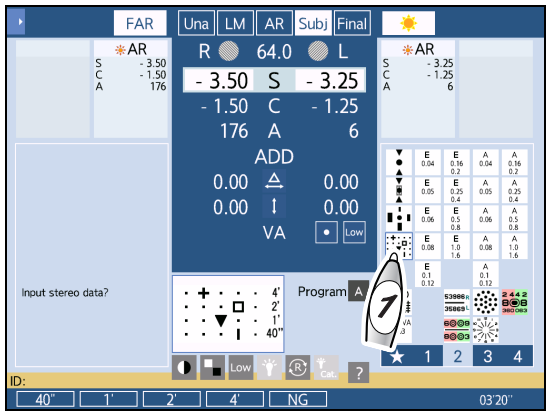
1 Press  to present the Stereo four-line chart.

The auxiliary lenses (polarizing filter) are placed.

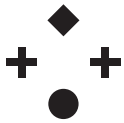
2 Test whether one of the shapes in each row appears closer than others.

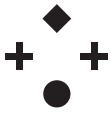
The stereo parallaxes are 4 minutes, 2 minutes, 1 minute, and 40 seconds from the top.

3 Enter the test result (40", 1', 2', 4', or NG) with a function button.



4.5.18 Worth four dot test

Purpose	To detect fusion or suppression	
Chart used	Worth four dot	
Auxiliary lens	Red filter for the right eye and green filter for the left eye	
Ideal appearance	Red diamond, green pluses, and pink or red/green circle are seen.	

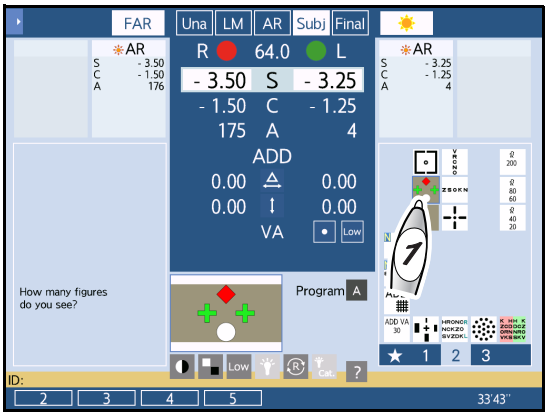
Appearance		
Right eye	Left eye	Binocular ideal (orthophoria)
Red diamond and red circle	 Green pluses and green circle	 Red diamond and green pluses and pink or red/green circle

1 Press  to present the Worth four dot chart.

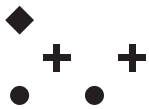
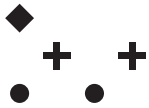
The red filter is placed in the right measuring window and the green filter is placed in the left measuring window.

2 Check the number, shape, and color of bright spots.

Ask the patient, “How many bright spots can you see? What colors are they?”



Determination	Appearance	Symptom
Fusion (four spots)		A red diamond, green pluses, and a pink or alternate red/green circle are seen. However, if the patient has an obvious dominant eye: Right dominant eye → Red circle Left dominant eye → Green circle
Right eye suppression (three spots)		Two green pluses and a green circle are seen.
Left eye suppression (two spots)		A red diamond and a red circle are seen.

Diplopia (five spots)		Red  and green  are seen at the same time.
Alternate suppression (five spots) Right eye suppression and left eye suppression appear alternately.		Red  and green  appear alternately.

3 Enter the test result (number of bright spots: 2, 3, 4, 5) with a function button.

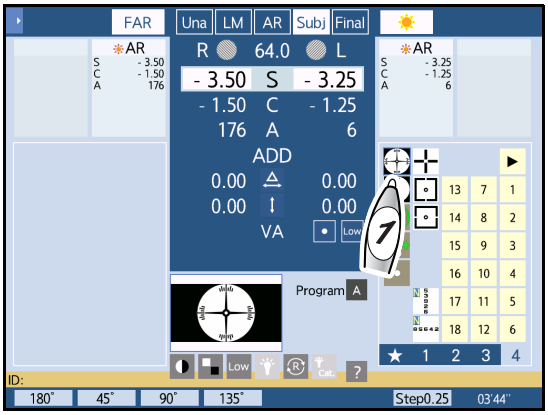
4.5.19 Cyclophoria test

Purpose	To detect and correct cyclophoria	
Chart used	Cyclophoria	
Auxiliary lens	Polarizing filter 135° for the right eye and 45° for the left eye	
	Red filter for the right eye and green filter for the left eye (for the SSC-100)	
Ideal appearance	The vertical and horizontal pointers intersect at right angles.	

Appearance		
Right eye	Left eye	Binocular ideal appearance
		

1 Press  to present the Cyclophoria chart.

The auxiliary lenses (polarizing filter or red-green filter) are placed.



2 Ask the patient, “Can you see upper, lower, right, and left pointers and scales?”

- Yes → Testing can be continued.
- No → Testing cannot be continued.

3 Ask the patient, “Do the upper, lower, right, and left pointers point to the middle scale?”

- Yes → Orthophoria
- No → Heterophoria. Go to the next step.

4 Ask the patient, “Do the vertical and horizontal pointers intersect at right angles?”

- Yes → Functional cyclophoria
- Yes → Optical cyclophoria

Adjust the following as necessary.

Phoria	Appearance	Procedure
Functional cyclophoria (The vertical and horizontal pointers intersect at right angles.)		Dysfunction of extraocular muscle is suspected. Correction with glasses is not possible.
Optical cyclophoria (The vertical and horizontal pointers do not intersect at right angles.)		This may occur at the time of oblique astigmatism correction or due to optical cause. Reduce the symptoms by the following method: • Reduce the cylindrical power. • Bring the cylinder axis close to the horizontal or vertical axis.

4.6 Divergence Test and Convergence Test

■ This section explains how to assess the divergence or convergence ability.

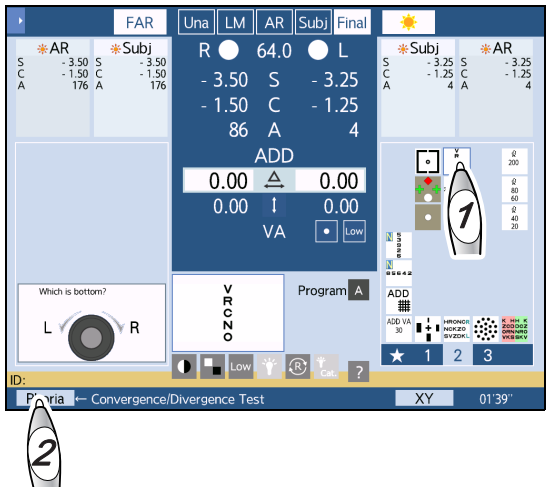
4.6.1 Divergence test

Purpose	To assess the divergence ability of the eye	VRCNO
Chart used	Vertical line	
Auxiliary lens	Rotary prism for both eyes	

1 Press VRCNO to present the Vertical line chart.

For near vision, press NSGNS and manually set the Vertical line chart for near vision.

If the Vertical line chart is not available, display the chart with letters for the patient's best-corrected visual acuity or that with their slightly larger letters in a vertical line, then press △▽.



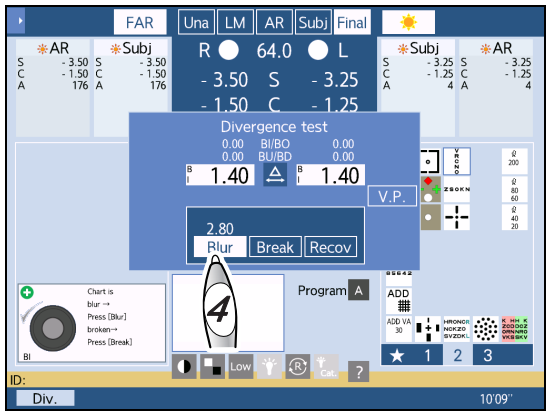
2 Press [Phoria] to display the Divergence test window.

Note

- When this test is performed following the Von Graefe test, the prism power for correcting the horizontal or vertical phoria is cleared by pressing [Phoria].
- Pressing [V.P.] sets the vertical prism corresponding to the vertical phoria. Press [V.P.] if necessary.

3 Turn the dial counterclockwise to add the BI prism to both eyes until the chart appears blurred.

⊕ on the control panel may also be used.



4 When the chart appears blurred, press [Blur].

The prism power is entered as the blur point.

The [Blur] indication is highlighted in white, which means that the prism power has been entered.

Pressing the highlighted [Blur] again clears the entered prism power.

When the chart does not appear blurred, go to the next step.

5 Turn the dial counterclockwise to add the BI prism to both eyes until the chart appears as two.

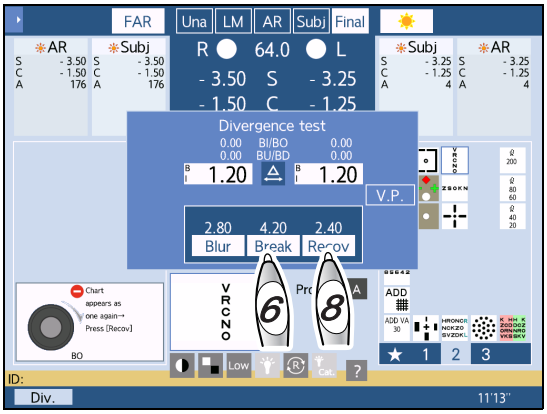
on the control panel may also be used.

6 When the chart appears as two, press [Break].

The prism power is entered as the break point.

The [Break] indication is highlighted in white, which means that the prism power has been entered.

Pressing the highlighted [Break] again clears the entered prism power.



7 Turn the dial clockwise to reduce the BI prism from both eyes until the chart appears as one again.

on the control panel may also be used.

8 When the chart appears as one again, press [Recov].

The prism power is entered as the recovery point.

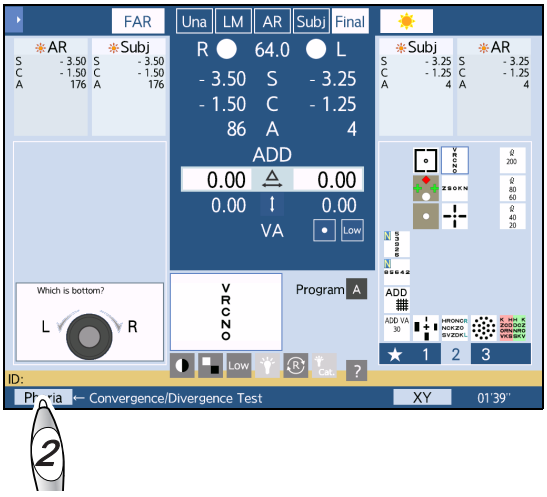
4.6.2 Convergence test

Purpose	To assess the convergence ability of the eye	
Chart used	Vertical line	
Auxiliary lens	Rotary prism for both eyes	

1 Press to present the Vertical line chart.

For near vision, press and manually set the Vertical line chart for near vision.

If the Vertical line chart is not available, display the chart with letters for the patient's best-corrected visual acuity or that with their slightly larger letters in a vertical line, then press .



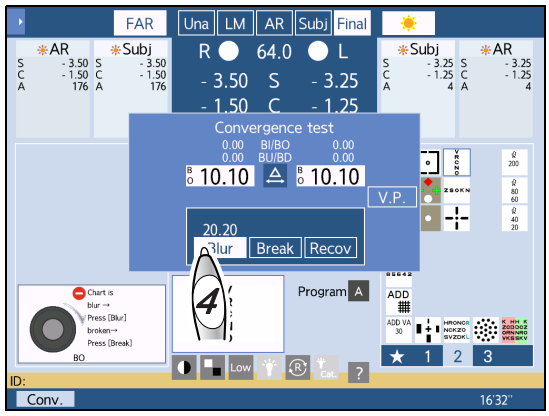
2 Press [Phoria] twice to display the Convergence test window.

Note

- When this test is performed following the Von Graefe test, the prism power for correcting the horizontal or vertical phoria is cleared by pressing [Phoria].
- Pressing [V.P.] sets the vertical prism corresponding to the vertical phoria. Press [V.P.] if necessary.

3 Turn the dial clockwise to add the BO prism to both eyes until the chart appears blurred.

on the control panel may also be used.



4 When the chart appears blurred, press [Blur].

The prism power is entered as the blur point.

The [Blur] indication is highlighted in white, which means that the prism power has been entered.

Pressing the highlighted [Blur] again clears the entered prism power.

When the chart does not appear blurred, go to the next step (the chart seldom appears blurred in Distance mode).

5 Turn the dial clockwise to add the BO prism to both eyes until the chart appears as two.

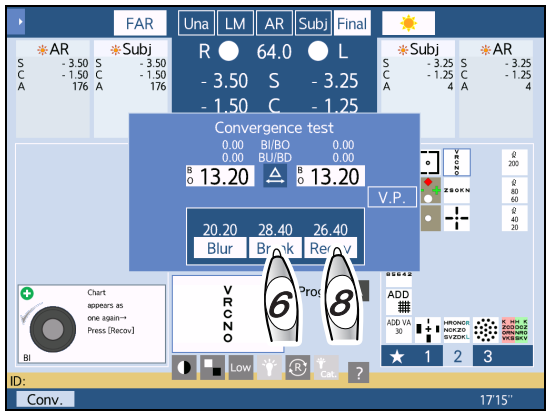
on the control panel may also be used.

6 When the chart appears as two, press [Break].

The prism power is entered as the break point.

The [Break] indication is highlighted in white, which means that the prism power has been entered.

Pressing the highlighted [Break] again clears the entered prism power.



7 Turn the dial counterclockwise to reduce the BO prism from both eyes until the chart appears as one again.

on the control panel may also be used.

8 When the chart appears as one again, press [Recov].

The prism power is entered as the recovery point.

4.7 Near Point of Convergence (NPC) Test

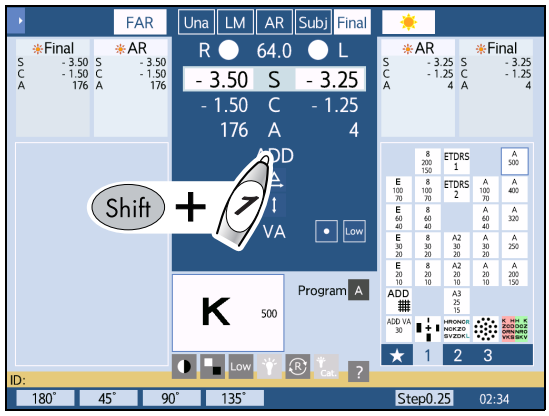
This test does not require a refractor head. Have the patient wear their glasses if they usually wear glasses.

Purpose	To assess the convergence break point
Chart used	No chart is used in this test. Use a fixation object such as the tip of a pencil or pen that helps to determine whether the patient has diplopia.

1 Press ADD while holding Shift.

The device enters NPC test mode.

The device changes to Near mode when in Distance mode and enters NPC test mode.



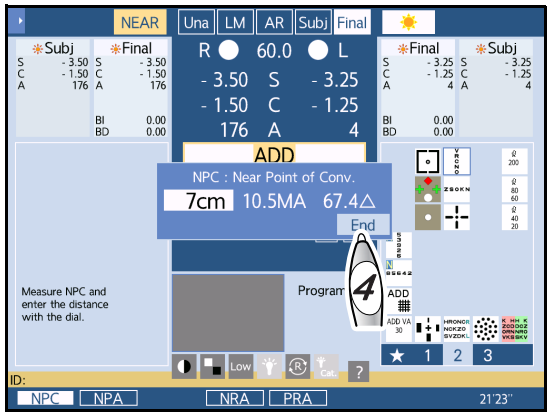
2 Gradually bring the tip of a pen (chart) closer to the patient's eyes and measure the distance from the tip of the pen to the root of the nose (posterior surface of the lens) at the point where the image appears as two.

3 Enter the distance using the dial.

or on the control panel may also be used.

The meter angle (MA) and prism power are calculated and displayed automatically.

Ex.— Enter 7 cm as the distance when the PD is 6.4 cm.



- When the parameter "NPC calculation" is set to [Detail]:

  MA = 1 / (0.07 + 0.025) = 10.5

  Δ = MA × 6.4 = 67.4

  NPC = 7 cm: 10.5 MA, 67.4Δ

- When the parameter "NPC calculation" is set to [Simple]:

  A = 1/(0.07 + 0.025) = 14.3

  Δ = MA × 6.4 = 91.4

  NPC = 7 cm: 14.3 MA, 91.4Δ

4 Press [End] to exit from NPC test mode.

Near mode remains selected.

4.8 Near Point of Accommodation (NPA) Test

This test assesses the point closest to the patient's eye at which a chart is focused.

Purpose	To assess the near point of accommodation
Chart used	The minimum visual acuity letter chart that the patient can read correctly at the position of 40 cm away from the near point chart.

Note

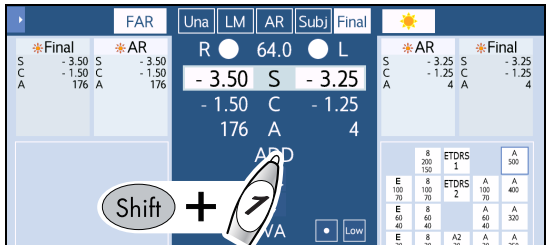
- Confirm that the parameter "SPH Far→Near" is set to [SPH+ADD].
- Use the trial frame with full corrective power including addition for the near point of accommodation test.
- Perform the test in Subjective mode with full corrective power entered.
  If it is in another mode or data is not entered correctly, accommodation (D) will not be calculated correctly.

1 Press ADD while holding Shift.

The device enters NPC test mode.

The function buttons [NPC], [NPA], [NRA], and [PRA] are displayed.

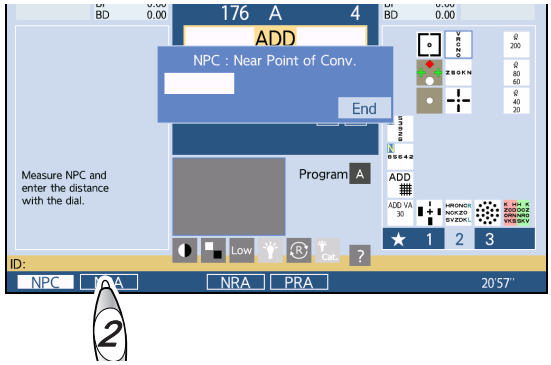
For cases just after the near point of convergence test has been performed, start with the following procedure.



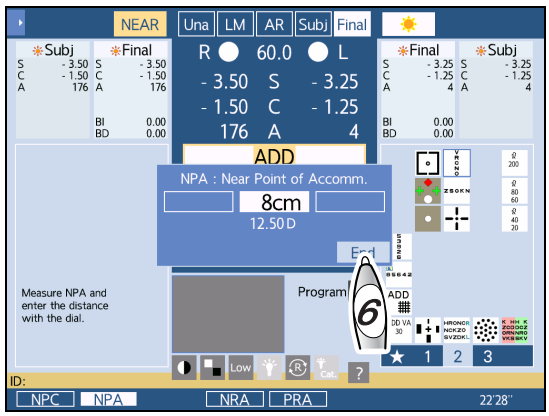
2 Press [NPA].

The NPA window is displayed.

3 For measurement of the near point of accommodation with one eye, press R or L to select the eye to be measured.



4 Gradually bring the near point chart closer to the patient's eyes and measure the distance from the blur point to the root of the nose (posterior surface of the lens) at the point where the chart appears blurred.



5 Enter the distance using the dial.

 or  on the control panel may also be used.

The accommodation is calculated and displayed automatically.

Ex.— When 33 cm is entered as the distance with ADD of +2.0 D (addition is entered in Distance mode).

Accommodation = 1/0.33 − (+2.0) = 1.03 D

6 Press [End] to exit from NPA test mode.

Near mode remains selected.

4.9 Negative Relative Accommodation (NRA) Test

Purpose	To assess the negative relative accommodation when both eyes are converged at a specified working distance
Chart used	Near point chart with a vertical line isolation at 40 cm away from the patient's eye (near point chart 7)

Note

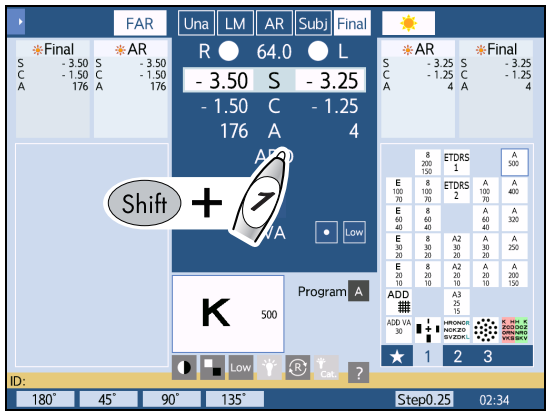
- Confirm that the parameter "SPH Far→Near" is set to [SPH+ADD]

1 Press ADD while holding Shift.

The device enters NPC test mode.

The function buttons [NPC], [NPA], [NRA], and [PRA] are displayed.

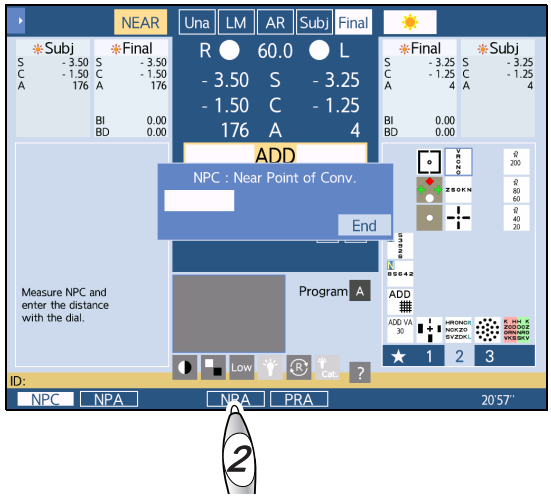
For cases just after the near point of accommodation test has been performed, start with the following procedure.



2 Press [NRA].

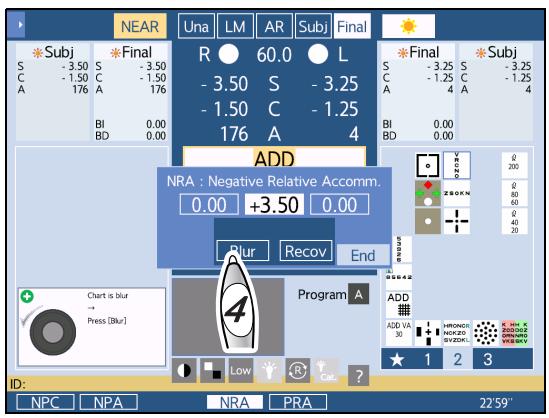
The NRA window is displayed.

3 For measurement of the negative relative accommodation with one eye, press R or L to select the eye to be measured.



4 Gradually turn the dial counterclockwise and press [Blur] when the chart appears blurred.

The [Blur] indication is highlighted in white, which means that the value has been stored.



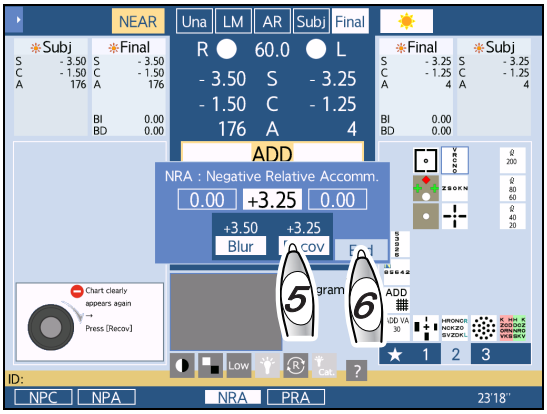
5 Gradually turn the dial clockwise and press [Recov] when the chart appears clear again.

The [Recov] indication is highlighted in white, which means that the value has been stored.

Pressing the highlighted [Blur] or [Recov] again clears the stored values.

6 Press [End] to exit from NRA test mode.

Near mode remains selected.



4.10 Positive Relative Accommodation (PRA) Test

Purpose	To assess the positive relative accommodation when both eyes are converged at a specified working distance.
Chart used	Near point chart with a vertical line isolation at 40 cm away from the patient's eye (near point chart 7)

Note

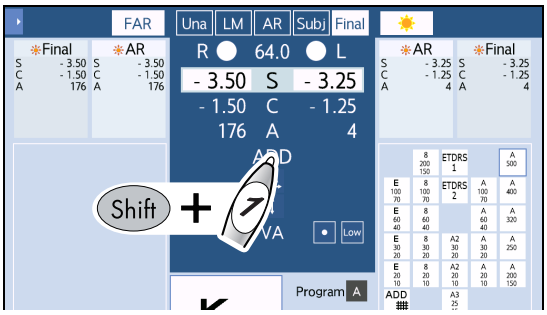
- Confirm that the parameter "SPH Far→Near" is set to [SPH+ADD].

1 Press ADD while holding Shift.

The device enters NPC test mode.

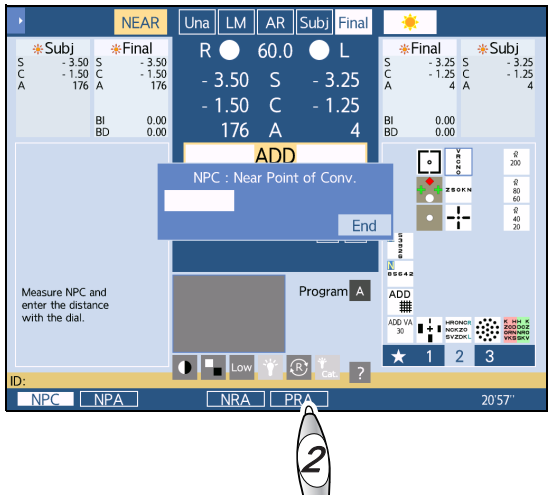
The function buttons [NPC], [NPA], [NRA], and [PRA] are displayed.

For cases just after the negative relative accommodation test has been performed, start with the following procedure.



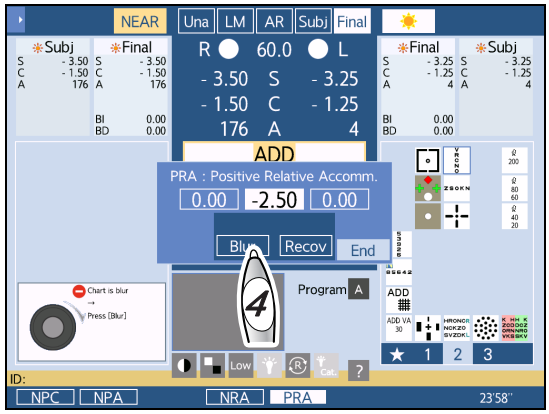
2 Press [PRA].

3 For measurement of the positive relative accommodation with one eye, press R or L to select the eye to be measured.



4 Gradually turn the dial clockwise and press [Blur] when the chart appears blurred.

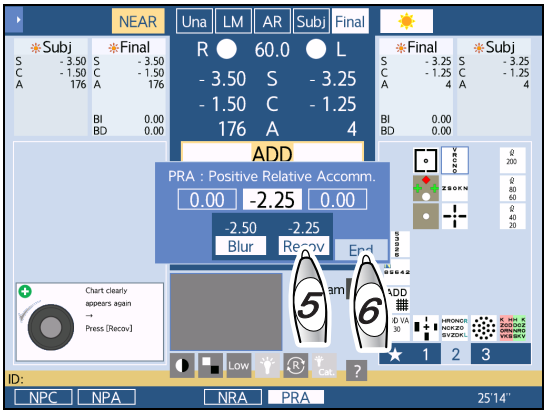
The [Blur] indication is highlighted in white, which means that the values have been stored.



5 Gradually turn the dial counterclockwise and press [Recov] when the chart appears clearly again.

The [Recov] indication is highlighted in white, which means that the value has been stored.

Pressing the highlighted [Blur] or [Recov] again clears the stored value.

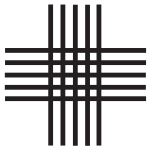


6 Press [End] to exit from PRA test mode.

Near mode remains selected.

4.11 Addition (ADD) Test

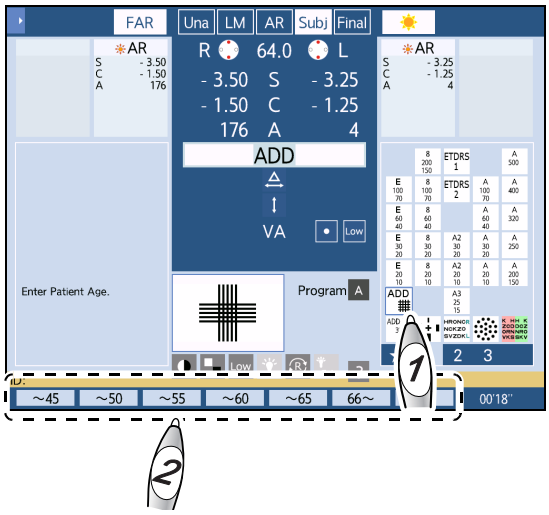
This section explains how to measure the addition (ADD) required for the prescription of glasses for near vision with distance vision corrected and to measure visual acuity with addition.

Purpose	To measure the near addition for the right, left, or both eyes	
Chart used	Cross grid	
Auxiliary lens	Fixed cross cylinder lens	
Ideal appearance	Both the vertical and horizontal lines appear equally clear.	

1 Press ADD.

The device enters ADD mode.

Instruct the patient to keep their head away from the refractor head while the refractor head is moving.



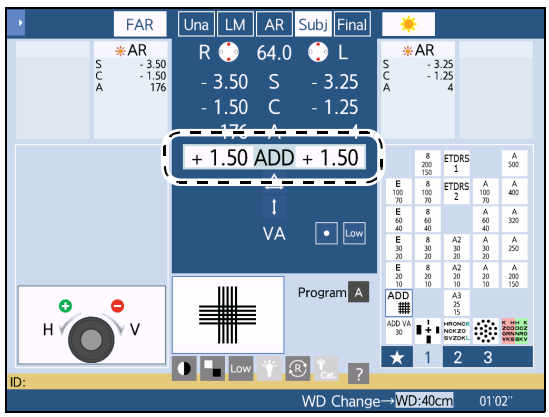
2 Select the patient's age with a function button.

When the parameter "Preset ADD" is set to [No], go to Step 3.

3 Lower the near point rod and set the Cross grid chart for near vision to the working distance (usually 40 cm) (excluding the SSC-100).

4 Measure the addition.

1) Ask the patient, "Which lines are clearer, the horizontal lines or the vertical lines? or are they about the same?"
2) Adjust the following until they appear equally.

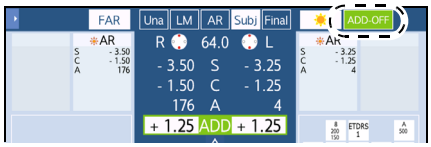


The horizontal and vertical lines appear equally clear.	End
The horizontal lines appear clearer.	Turn the dial counterclockwise.
The vertical lines appear clearer.	Turn the dial clockwise.
The horizontal and vertical lines do not appear equally clear.	The horizontal lines should appear slightly clearer than the vertical lines.

5 Measure the visual acuity if necessary.

“4.2.3 Measuring visual acuity with addition (ADD VA)” (page 94)

Note



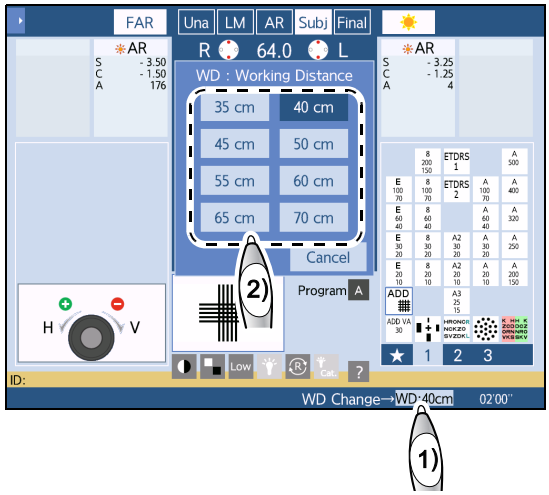
- Pressing ADD allows the addition to be placed or removed with the refractor head converged. The highlight color for ADD on the touch screen changes and “ADD-OFF” is displayed in the upper right when the addition is removed. Pressing ADD again returns the ADD indication to its original and the addition is placed. Pressing LM , AR , Subj or Final allows the mode to be changed with ADD mode set.

◆ Changing the working distance (WD)

Adjust the working distance of the patient to that primarily used.

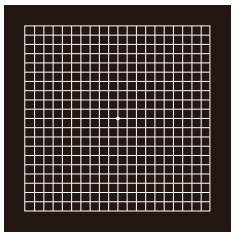
It cannot be changed when the SSC-100 is connected.

1) Press the numeric field of the working distance.
2) Select the desired working distance.



4.12 Amsler Grid Test

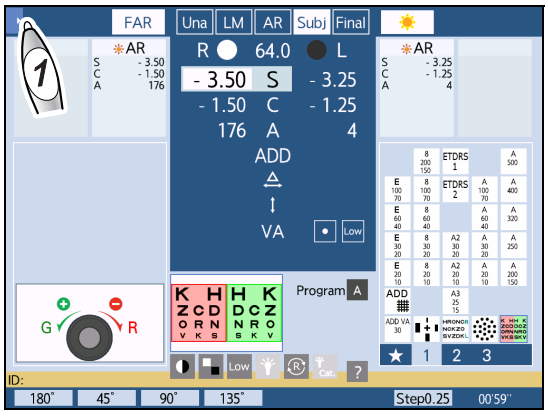
This section explains how to present the Amsler grid chart on the touch screen and to perform the Amsler test.

Purpose	To examine the appearance of the central part (macula) of the fundus retina	
Chart used	Amsler grid	
Measurement method	Trace the touch screen with the touch pen or fingers to show the part that appears distorted.	

Note

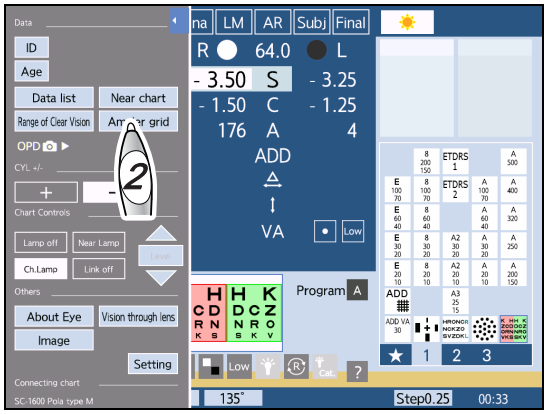
- Ask the patient to wear their glasses or reading glasses if they usually wear them.

1 Press to display the side menu.



2 Press [Amsler grid].

The Amsler grid test screen is displayed on the control box touch screen.

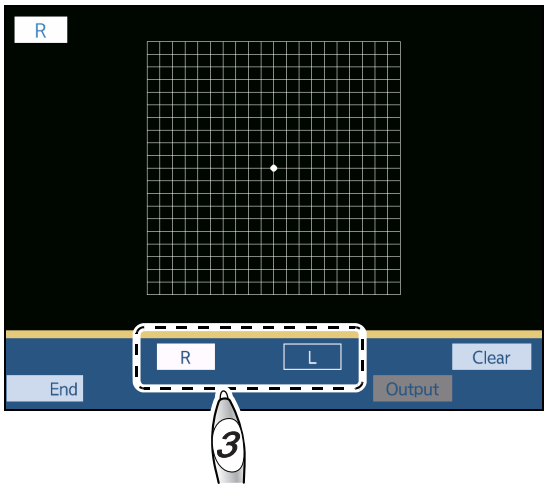


3 Press [R] or [L] to select the eye to be measured.

4 Flip the touch screen toward the patient to show the patient the Amsler grid test screen.

Present the screen at a distance of 40 cm from the patient's eyes.

Ask the patient to wear their glasses or reading glasses if they usually wear them.



5 To test with the eye specified in Step 3, cover the opposite eye.

6 Ask the patient to look at the central point of the chart.

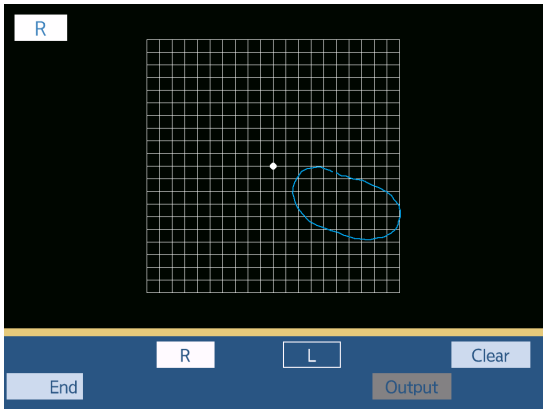
7 Ask the patient whether surrounding grids or lines are distorted or broken. Trace the distorted or broken areas slowly with the touch pen or fingers.

[Clear]: Clears the traced lines.

8 Press [Output] if necessary.

(only when the "External output function" parameter is set to [To be used])

The image is captured and exported in bmp file format.



Note

- Switching R/L or finishing the Amsler grid test clears the traced data. To save the traced data, use the external output function.

9 Test the opposite eye in the same procedure as Steps 3 to 8.

10 Press End to return to the measurement screen.

5 PROGRAMMED REFRACTION

■ This chapter explains refraction through the standard programs and Program Day/Night.

Explanations of the following operations and functions are provided to make full use of the device.

⚠ CAUTION

- Clean the forehead rest, face shields, and measuring windows before refraction.
  "7.6 Cleaning" (page 267)
- Instruct the patient not to bump their face or head against the device when they sit or stand for refraction.
- When moving the refractor head, have the patient's hands put on their lap, maintain a distance of 20 cm or more between the refractor head and the patient's face. Also move the refractor head while checking the patient position.
  The refractor head may strike the patient's face during movement.
- When the refractor head switches between the distance vision test and near vision test, the refractor head moves for divergence or convergence. Instruct the patient to keep their face 20 cm or more away from the refractor head before switching. After the movement has been completed, start refraction with the patient's forehead touching the forehead rest.

5.1 Refraction Programs

This section explains how to select a refraction program, start a program, proceed to the next test, and return to the previous test.

◆ Refraction program usage

A refraction program is a function to place charts and auxiliary lenses in a predetermined order. This allows the operator to concentrate on refraction without switching charts and auxiliary lenses.

This device can contain up to seven refraction programs: A, B, C, D, E, MF (open), and  (Day/Night). Factory standard programs are provided for A, B, MF, and  .

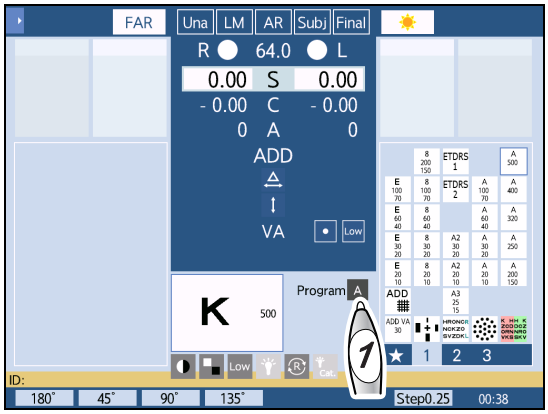
 is not available for the chart presenting device CP-9, CP-770, or SSC-330 Type T.

◆ Selecting a refraction program

Selection is possible among seven refraction programs: A, B, C, D, E,  , and MF (open).

1 Press the program select button.

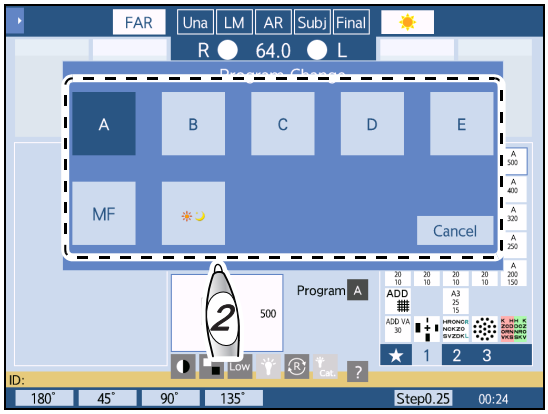
The program select window is displayed.



2 Select the desired refraction program.

The selected refraction program is displayed on the program select button.

Pressing the Cancel button returns to the measurement screen.



Note

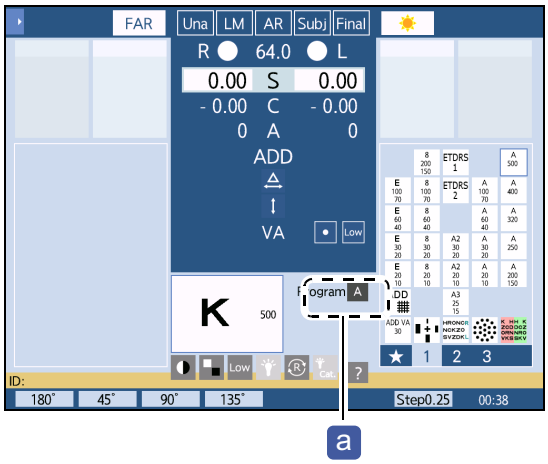
- When the same refraction program is selected while a refraction program is in progress, the device returns to the first test of that program.

◆ Starting a refraction program

1 Check [a] for the refraction program selected.

Change the refraction program if necessary.

"♦ *Selecting a refraction program" (page 154)*



2 Press [→|] on the control panel.

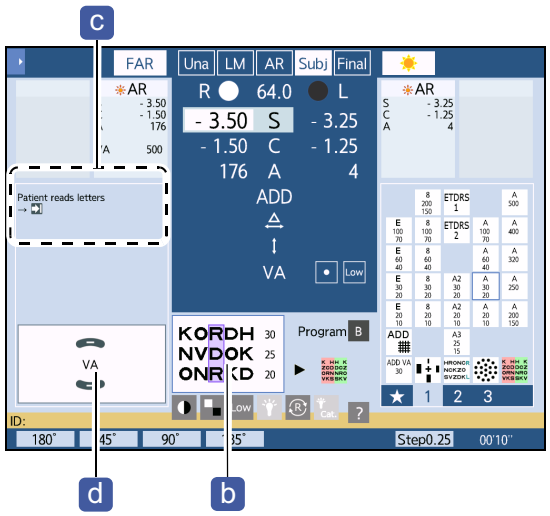
A refraction program starts.

The chart and auxiliary lenses specified in the initial test of the refraction program are placed.

3 Perform the test of the set program.

The presented chart is shown in the chart display [b].

If a program message [c] and operation message [d] are displayed, perform the test by referring to them.



◆ Proceeding to next test

Press [→|] on the control panel.

The refraction program proceeds to the next test.

The chart and auxiliary lenses specified in the test are placed.

◆ Returning to previous test

Press [→|] while holding [Shift] on the control panel.

The refraction program returns to the previous test.

The chart and auxiliary lenses specified in the test are placed.

5.2 Standard Programs

- This section explains the details of Standard programs A, B, MF and  .
- Standard 1 or Standard 2 can be selected by parameter for Standard programs A and B.

Program name	Refraction purpose
Standard program A (Standard 1)	Adjustment of full correction and determination of prescription in subjective refraction test
Standard program A (Standard 2)	
Standard program B (Standard 1)	
Standard program B (Standard 2)	
Standard program MF	Adjustment of full correction and determination of prescription in subjective refraction test with both eyes open
Standard program 	Adjustment of full correction and determination of prescription for bright and dark places

- As an example, the procedure is provided to determine the prescription with Standard program A (Standard 1).

5.2.1 Refraction with Standard program A (Standard 1)

This section explains how to determine the prescription with Program A (the following is an example of the program).

The final data (prescription) is obtained after the monocular full correction (subjective data) is stored.

The binocular balance test and stereo test are performed in Final mode. Then the precise addition is measured in Subjective mode.

◆ Refraction flow with Program A (Standard 1)(factory setting)

Order	Refraction item	Details
No mode specified		
1	AR data import	Import of AR data of patient's eyes
Unaided mode		
2	Unaided visual acuity test	Unaided visual acuity test for right eye, left eye, and both eyes
LM mode		
3	Visual acuity test with LM data	Visual acuity test with LM data for right eye, left eye, and both eyes
Subjective mode		
4	R (right eye): AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
5	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
6	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
7	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder

8	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
9	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
10	L (left eye): AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
11	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
12	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
13	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
14	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
15	L: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
Final mode		
16	B (binocular eyes): Balance test	Binocular balance test
17	B: Stereo test	Check of stereopsis and entry of stereoparallax
18	Power adjustment (auto adjustment)	Power adjustment by intended use (auto adjustment)
Near vision test in Subjective mode		
19	B: Addition test	Addition test with Cross grid chart for near vision
Near vision test in Final mode		
20	B: Addition check	Addition check with near point chart

◆ Refraction procedure

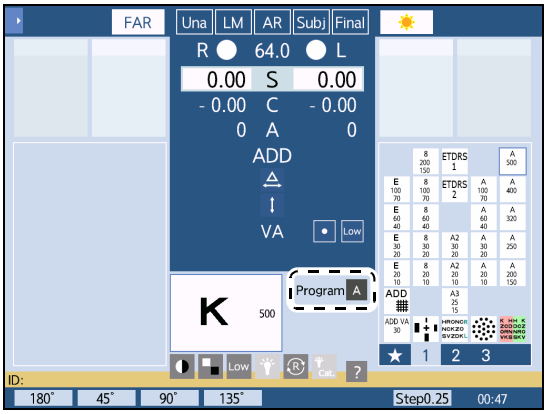
1 Measure the patient's eyes with an auto refractometer and print the results.

2 Measure the patient's current glasses with a lensmeter and print the results.

3 Confirm that Program A is selected on the touch screen.

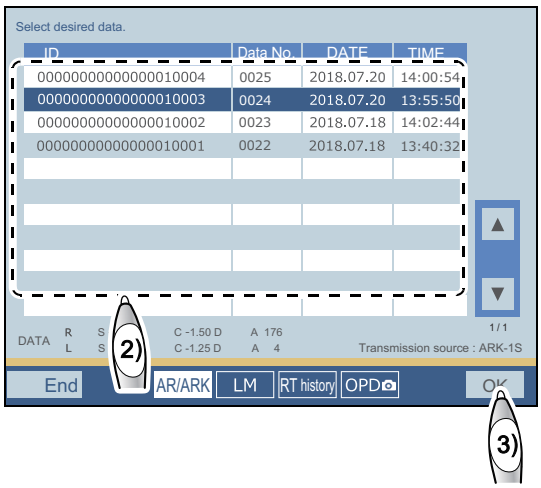
4 Press on the control panel.

Refraction program A starts.



5 Import AR data.

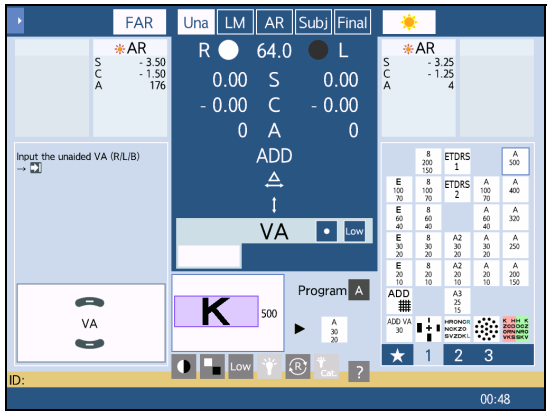
1) Press Input on the control panel.
   The import data select screen is displayed.
2) Select the desired patient data.
3) Press OK.
   The selected data is entered in the measurement screen.



Unaided mode

6 Measure unaided visual acuity.

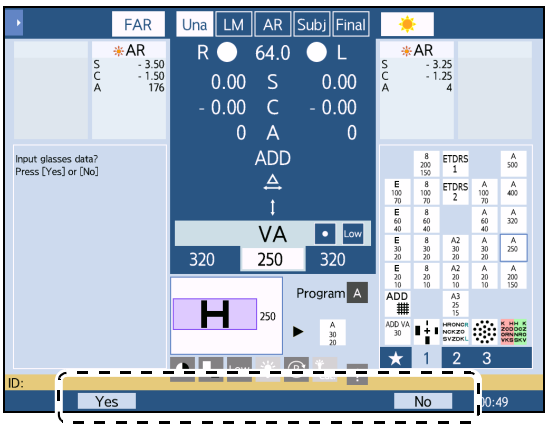
1) Have the patient look into the chart through the measuring windows.
2) Press [−] or [−] to measure the visual acuity of the right eye.
3) Press L on the control panel.
4) Press [−] or [−] to measure the visual acuity of the left eye.
5) Press BIN on the control panel.
6) Press [−] or [−] to measure the visual acuity of both eyes.



7 Enter whether the patient has their glasses.

1) Press [→|].
2) Enter whether the patient has their glasses with a function button.

Without glasses	Press [No]. Go to Step 10.
With glasses	Press [Yes].



8 Import LM data.

1) Press Input.

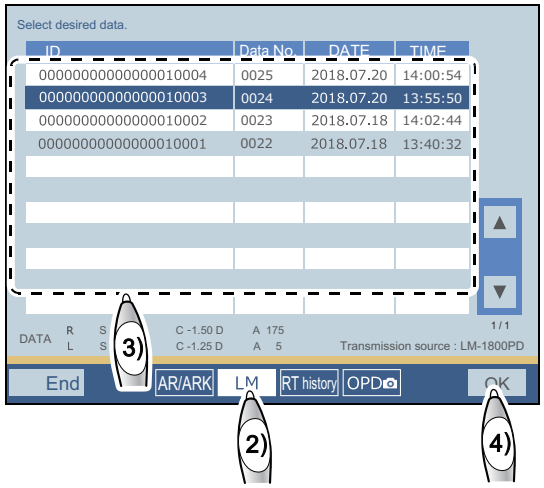
   The import data select screen is displayed.

2) Press LM.

3) Select the desired patient data.

4) Press OK.

   The selected data is entered in the measurement screen in LM mode.



LM mode

9 Measure visual acuity corrected by glasses.

The patient may wear their glasses for the visual acuity test without looking through the refractor head.

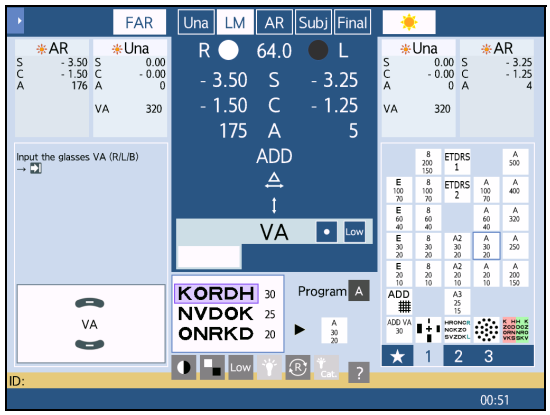
1) Press − or − to measure the visual acuity of the left eye.

2) Press L.

3) Press − or − to measure the visual acuity of the left eye.

4) Press BIN.

5) Press − or − to measure the visual acuity of both eyes.



Subjective mode

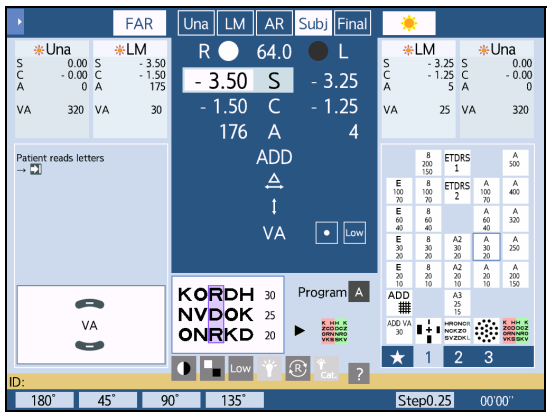
10 Start subjective refraction for the right eye.

1) Press →|.

   The left eye is covered and the device enters Subjective mode.

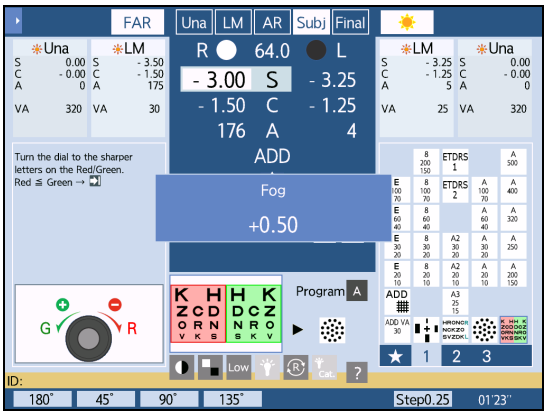
2) Ask the patient whether they can read the presented chart (visual acuity of approximately 20/40-20/30 (0.5-0.63).

   When the patient can read even one letter on the chart, go to the next red-green test.



11 Refine the spherical power in the red-green test.

"4.3 Spherical Power Refinement" (page 100)



1) Press ➔| .

   The Red-green chart is presented and the +0.50 D sphere is added to fog the vision.

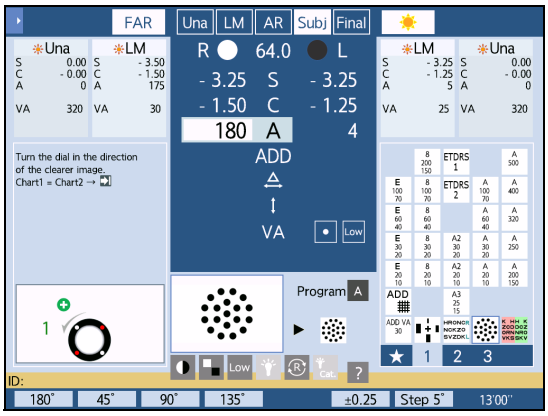
2) Turn the dial clockwise to reduce the fog gradually until the letters on the red and green sides appear equally sharp.

Adjust the following as necessary.

The letters on the red side appear sharper.	Turn the dial clockwise.
The letters on the green side appear sharper.	Turn the dial counterclockwise.
The letters on the red and green sides appear equally sharp.	End

12 Refine the cylinder axis.

"4.4.2 Cylinder refinement with cross cylinder" (page 104)



Depending on the cylinder value, the order of cylinder axis refinement and cylindrical power refinement may be changed automatically.

When the AR cylindrical power is 0, a message asking whether to skip the cylinder test is displayed. To skip, press [Yes] and go to Step 14. When [No] is pressed, if the cylindrical power becomes 0 during its refinement, further refinement can be performed by changing the axis. For details, see the note of *(page 105)*.

1) Press ➔| .

   The cross cylinder lens (±0.25) is placed and the Dots chart is presented.

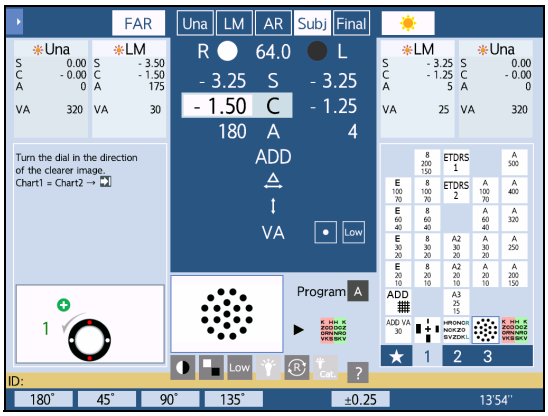
2) Refine the cylinder axis using the cross cylinder.

   Present Chart 1 by pressing $_1$ and Chart 2 by pressing $_2$, then ask the patient which is clearer.

3) Repeat the above until both charts appear equally clear.

Chart 1 appears clearer.	Turn the dial counterclockwise by one step or press ⊕.
Chart 2 appears clearer.	Turn the dial clockwise by one step or press ⊖.
Chart 1 and 2 appear equally clear.	End

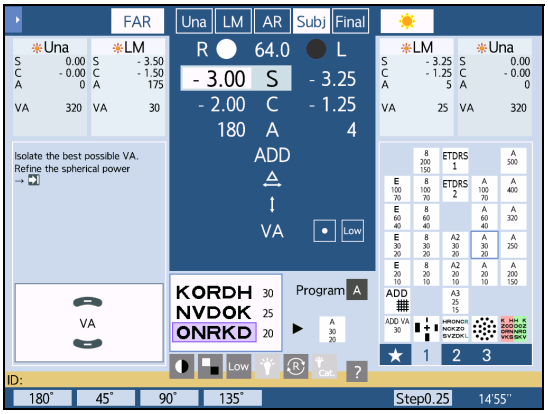
13 Refine the cylindrical power.



1) Press ⏭.
   The axis of the cross cylinder lens is changed.
2) Refine the cylindrical power using the cross cylinder.
   Follow the same procedure as 2)-3) of *Step 12*.

14 Refine the spherical power in the red-green test performed in *Step 11* again.

15 Refine the lens power to the most plus power that provides the best-corrected visual acuity.



1) Press ⏭.
   The visual acuity chart for visual acuity 20/20 (1.0) is presented.
2) Change the visual acuity by pressing − or − to determine the best-corrected visual acuity that the patient can see.
3) Refine the lens power to the most plus power that provides the best-corrected visual acuity.

Ex.— Turn the dial counterclockwise to add +0.25 D sphere. If the chart appears blurred, turn back the dial clockwise by one step.

Note

• Instead of 2)-3) in Step 15, the following procedure is available.

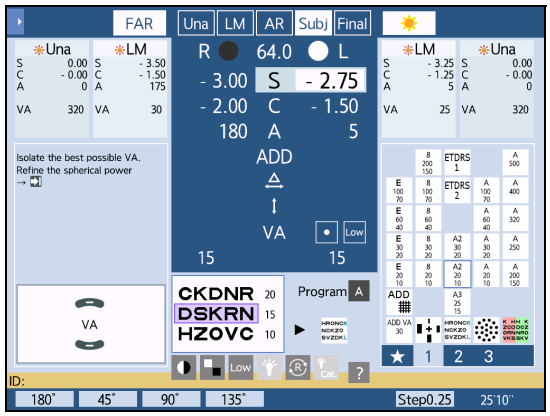
1) Add approximately +0.75 D sphere of fogging.
2) Present a visual acuity chart with which the visual acuity is decreased by a few steps.
3) When the patient can read the visual acuity chart, press − to increase the visual acuity. When they cannot read the chart, add -0.25 D sphere to release the fog and ask them to read it again.
4) Repeat the procedure to determine the best-corrected visual acuity with the most plus power.

❖ The full corrective power for the right eye is perfectly refined.

16 Refine the left eye.

Follow the same procedure as *Step 10* to *Step 15*.

❖ The full corrective power for the left eye is perfectly refined.



17 Press .

Three short beeps sound.

Final mode

18 Perform the binocular balance test.

"4.5.1 Binocular balance test" (page 108)

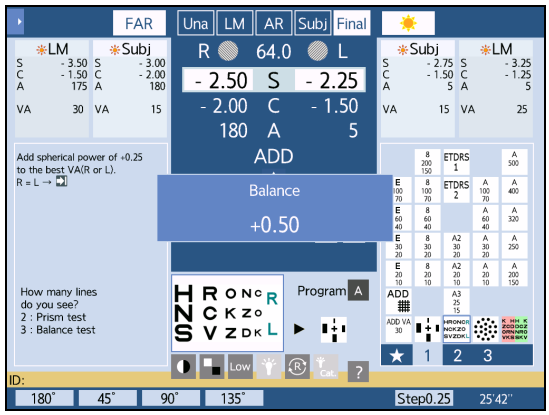
1) Press .

The Binocular balance chart is presented.

When the parameter "Fog for binocular balance" is set to [Yes] and the visual acuity is 20/20 (0.9) or better, the vision is automatically fogged.

2) Make the upper and lower letters appear roughly equal.

Ask the patient, "Which is clearer, the upper or the lower?"



Adjust the following as necessary.

The upper letters appear clearer.	Press R and turn the dial counterclockwise by one step.
The lower letters appear clearer.	Press L and turn the dial counterclockwise by one step.
The upper and lower letters appear equally clear.	End
The upper and lower letters do not appear equally clear.	Determine with which eye the patient views the binocular balance chart more clearly while referring to the LM data or dominant eye.

Note

- When the measurement results in Subjective mode differ between the right and left visual acuity, do not use the Binocular balance chart. Perform the binocular red-green test with the Binocular red-green chart.

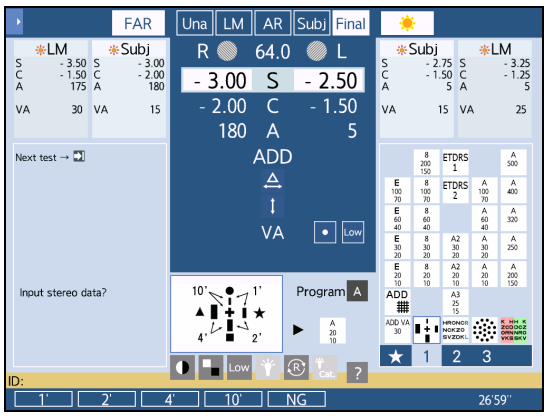
"4.5.2 Binocular red-green test" (page 110)

❖ The binocular full corrective power is perfectly refined.

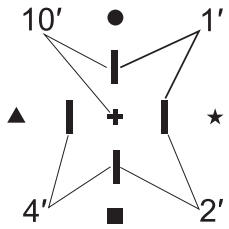
19 Perform the stereo test.

"4.5.14 Stereo test" (page 130)

1) Press .
   The Stereo chart is presented.



2) Test whether the patient can see the four vertical bars stereoscopically.
   Ask the patient, "Do the vertical bar with a circle appear closest and then in the order of the vertical bars with a star, square, and triangle with respect to the cross in the center?"



3) Enter the test result (1', 2', 4', 10', or NG) with a function button.

4) For patients who cannot see those bars stereoscopically, perform the binocular visual function test.

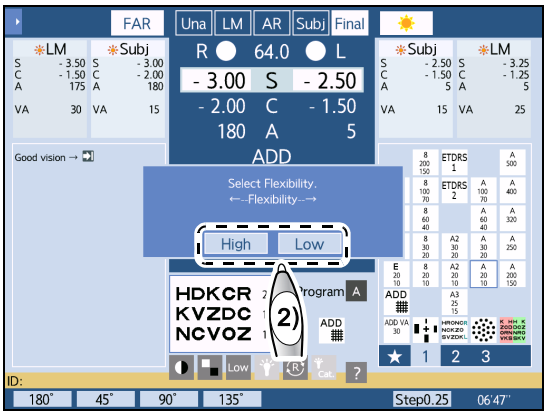
"4.5 Binocular Visual Function Test" (page 108)

20 Perform auto adjustment.

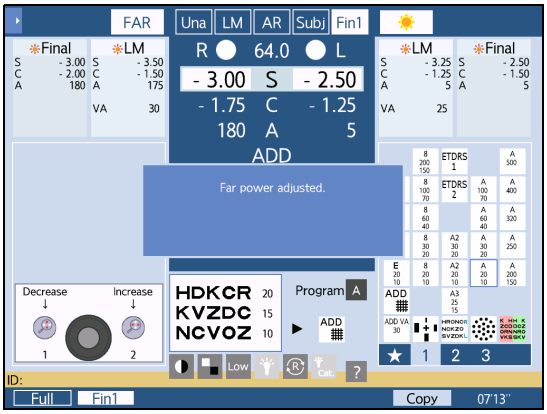
"5.5.1 Distance power auto adjustment" (page 181)

1) Press .

2) Enter the adaptability to the patient's glasses as [High] or [Low].
   When determining the adaptability by age, separate it by around 40 years old.



   The distance power is automatically adjusted and set to Fin 1.



3) Ask the patient how it looks.

"Poorly visible." or "The power is weak."	Press . The power is increased by one step and set to [Fin 2].
"The power is strong." or "There is a uncomfortable feeling."	Press . The power is decreased by one step and set to [Fin 2].

Check and test that are not included in program

21 Measure the visual acuity with the prescription.

The patient's vision can be compared by recalling the prescription history with function buttons such as [Full] (full correction), [Fin 1], and [Fin 2].

If necessary, raise the refractor head, then check the visibility and visual acuity in a trial frame.

1) Press R.
2) Press − or − to measure the visual acuity of the right eye.
3) Press L.
4) Press − or − to measure the visual acuity of the left eye.
5) Press BIN.
6) Press − or − to measure the visual acuity of both eyes.

22 Compare the patient's vision using the values of the patient's glasses and those of the prescription.

1) Press LM.
   According to the LM data, the corrective lenses are placed in the measuring windows.
2) Ask which is better compared to Final.

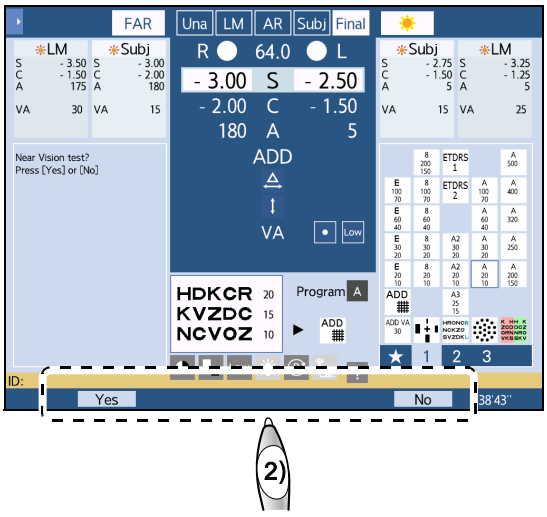
23 If the near vision test is performed next, instruct the patient to keep their head away from the refractor head.

For the near vision test, the refractor head moves for convergence.

24 Select whether to perform the near vision test.

1) Press →|.
   A message for the near vision test is displayed.
2) Select whether to perform the near vision test with a function button.
   - To perform the near vision test, press [Yes].
   - To skip the near vision test, press [No].

   Standard program A is complete. Go to *Step 31*.

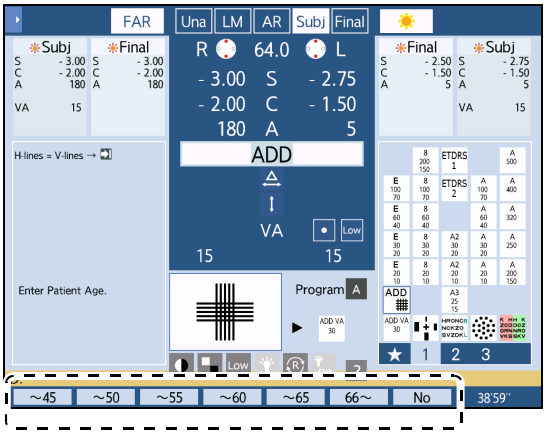


Near vision test in Subjective mode

25 Select the patient's age with a function button.

The refractor head moves for convergence. Instruct the patient to keep their head away from the refractor head while the refractor head is moving.

When the parameter "Preset ADD" is set to [No], go to Step 24.



26 Prepare the near point chart (excluding SSC-100).

"3.7.2 Setting the near point chart (excluding SSC-100)" (page 68)

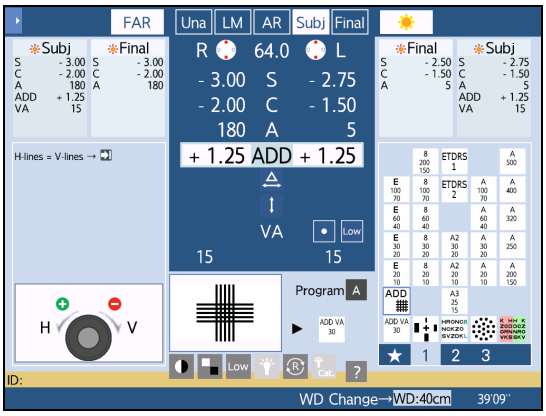
1) Lower the near point rod.
2) Set the near point chart to the working distance (usually 40 cm).
3) Select the Cross grid chart for near vision.

27 Instruct the patient to lean against the forehead rest and look through the measuring windows.

28 Measure the addition.

"4.11 Addition (ADD) Test" (page 149)

1) Ask the patient, "Which lines are clearer, the horizontal lines or the vertical lines? or are they about the same?"



2) Adjust the following until they appear equally clear.

The horizontal lines appear clearer.	Turn the dial counterclockwise.
The vertical lines appear clearer.	Turn the dial clockwise.
The horizontal and vertical lines appear equally clear.	End
The horizontal and vertical lines do not appear equally clear.	The horizontal lines should appear slightly clearer than the vertical lines.

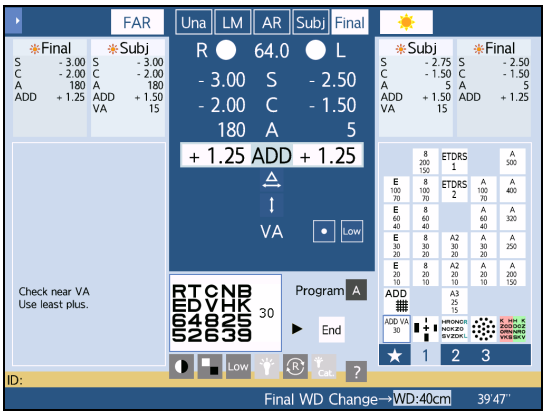
Note

- To continue visual acuity test with addition, see *"4.2.3 Measuring visual acuity with addition (ADD VA)" (page 94)*.

Near vision test in Final mode

29 Measure near visual acuity.

1) Press ⇨|.
2) Flip the near point chart to show the visual acuity chart.
3) Ask the patient whether they can read the letters of visual acuity 20/30 (0.63).



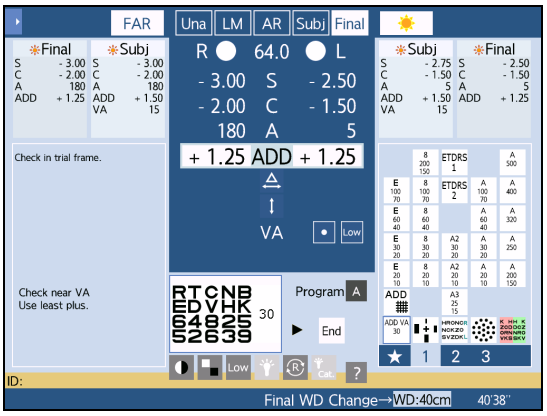
30 Press ⇨|.

❖ This completes Standard program A.

31 Press Output to print the measurement data.

32 Raise the refractor head and test the final prescription in a trial frame.

Test the final prescription referring to the printed measurement data.



5.2.2 Other standard programs

For the following standard programs, the tables below list the included refraction items.

- Standard program A (Standard 2)
- Standard program B (Standard 1)
- Standard program B (Standard 2)
- Standard program MF
- Standard program ☀️🌙

◆ Refraction flow with Program A (Standard 2)(factory setting)

Order	Refraction item	Details
Subjective mode		
1	PD check	PD adjustment
2	R: Spherical power refinement	Best-corrected visual acuity refinement with most plus power after best-corrected visual acuity is determined and vision is fogged
3	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
4	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
5	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
6	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
7	L: Spherical power refinement	Best-corrected visual acuity refinement with most plus power after best-corrected visual acuity is determined and vision is fogged
8	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
9	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
10	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
11	L: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
12	B: Balance test	Binocular balance test
13	B: Visual acuity check and power adjustment	Power adjustment by intended use
14	Phoria test (horizontal)	Detection and correction of horizontal phoria
15	Phoria test (vertical)	Detection and correction of vertical phoria
16	B: Addition test	Addition test
17	B: Addition check	Check of visual acuity with addition (ADD VA)

◆ Refraction flow with Standard program B (Standard 1) (factory setting)

Order	Refraction item	Details
Subjective mode		
1	R: AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
2	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
3	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
4	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
5	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
6	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
7	L: AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
8	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
9	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
10	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
11	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
12	L: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
Final mode		
13	B: Balance test	Binocular balance test
14	B: Stereo test	Check of stereopsis and entry of stereoparallax
15	B: Visual acuity check and power adjustment	Power adjustment by intended use (auto adjustment possible)
Near vision test in Subjective mode		
16	B: Addition test	Addition test with Cross grid chart for near vision
Near vision test in Final mode		
17	B: Addition check	Addition check with near point chart

◆ Refraction flow with Standard program B (Standard 2) (factory setting)

Order	Refraction item	Details
Subjective mode		
1	PD check	PD entry
2	R: Spherical power refinement	Best-corrected visual acuity refinement with most plus power after best-corrected visual acuity is determined and vision is fogged
3	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
4	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
5	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
6	L: Spherical power refinement	Best-corrected visual acuity refinement with most plus power after best-corrected visual acuity is determined and vision is fogged
7	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
8	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
9	L: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
10	B: Visual acuity check and power adjustment	Power adjustment by intended use
11	B: Addition test	Addition test
12	B: Addition check	Check of visual acuity with addition (ADD VA)
13	R: Visual acuity check in contrast or glare (SSC-370 Type MG/MCG only)	Visual acuity check in conditions such as twilight and backlighting
14	L: Visual acuity check in contrast or glare (SSC-370 Type MG/MCG only)	Visual acuity check in conditions such as twilight and backlighting

◆ Refraction flow with Standard program MF (factory setting)

Order	Refraction item	Details
No mode specified		
1	AR data import	Import of AR data of patient's eyes
Unaided mode		
2	Unaided visual acuity test	Unaided visual acuity test for right eye, left eye, and both eyes
LM mode		
3	Visual acuity test with LM data	Visual acuity test with LM data for right eye, left eye, and both eyes
Objective mode		
4	B: Balance test	Check that the upper row is visible with the right eye and the lower row with the left eye.
5	B: Visual acuity test with AR data	Binocular visual acuity test with AR data
Subjective mode		
6	B: Check of fog amount	Reduction of fogging until patient can read visual acuity chart of 20/30 (0.63) Amount of fog remaining = Fog amount
7	R: Spherical power refinement	Refinement of lens power to most plus power that provides best-corrected visual acuity
8	R: Red-green test	Spherical power refinement with Red-green chart
9	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
10	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
11	R: Check of best-corrected visual acuity (monocular full correction)	Refinement of lens power to most plus power that provides best-corrected visual acuity (+1.0 fogging)
12	L: Spherical power refinement	Refinement of lens power to most plus power that provides best-corrected visual acuity
13	L: Red-green test	Spherical power refinement with Red-green chart
14	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
15	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
16	L: Check of best-corrected visual acuity (monocular full correction)	Refinement of lens power to most plus power that provides best-corrected visual acuity (+1.0 fogging)
17	B: Balance test	Balance test with Red-green chart
18	B: Binocular full correction measurement	Refinement of lens power to most plus power that provides best-corrected visual acuity (+1.0 fogging)
19	B: Stereo test	Check of stereopsis and entry of stereoparallax
20	Power adjustment	Power adjustment by intended use
Near vision test in Subjective mode		
21	B: Addition test	Addition test
22	B: Addition check	Check of visual acuity with addition (ADD VA)

◆ Refraction flow with Standard program (factory setting)

For the night vision test, the room needs to be darkened.

Standard program is not available for the chart presenting device CP-9, CP-770, or SSC-330 Type T.

Order	Refraction item	Details
Subjective mode		
1	R: AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
2	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
3	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
4	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
5	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
6	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
7	L: AR data check	Check of whether visual acuity of AR data is at least approx. 20/30 (0.63)
8	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
9	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
10	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
11	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
12	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
13	B: Balance test	Binocular balance test
14	B: Stereo test	Check of stereopsis and entry of stereoparallax
15	Visual acuity check and power refinement	Power adjustment by intended use
Near vision test in Subjective mode		
16	B: Addition test	Addition test with Cross grid chart for near vision
17	B: Addition check	Addition check with near chart
Night vision test in Subjective mode		
18	Day subjective visual acuity test in Night mode	Night visual acuity test for right eye, left eye, and both eyes
19	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
20	R: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
21	R: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
22	R: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)

23	R: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
24	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
25	L: Cross cylinder test (cylinder axis)	Cylinder axis refinement with cross cylinder
26	L: Cross cylinder test (cylindrical power)	Cylindrical power refinement with cross cylinder
27	L: Red-green test	Spherical power refinement with Red-green chart (+0.5 D fogging)
28	L: Check of best-corrected visual acuity (monocular full correction)	Best-corrected visual acuity with most plus power using VA chart
29	B: Balance test	Binocular balance test
30	B: Stereo test	Check of stereopsis and entry of stereoparallax
31	B: Best-corrected VA check and power adjustment	Best-corrected visual acuity with most plus power using VA chart

5.3 Programming

- This section explains how to edit refraction programs.
- This device can contain up to seven refraction programs: A, B, C, D, E, MF, and . Factory standard programs are provided for A, B, MF, and . C to E are freely used. All of them may be edited.

  is not available for the chart presenting device CP-9, CP-770, or SSC-330 Type T.
- To edit Program A, B, , or MF, set the parameter “Program A”, “Program B”, “Program ”, or “Program MF” to [User].

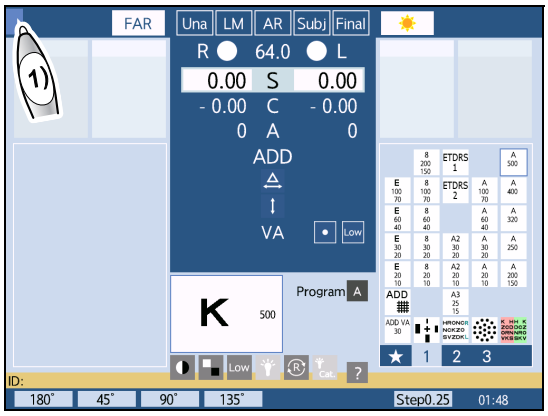
5.3.1 Deleting test items

Test items included in programs can be deleted.

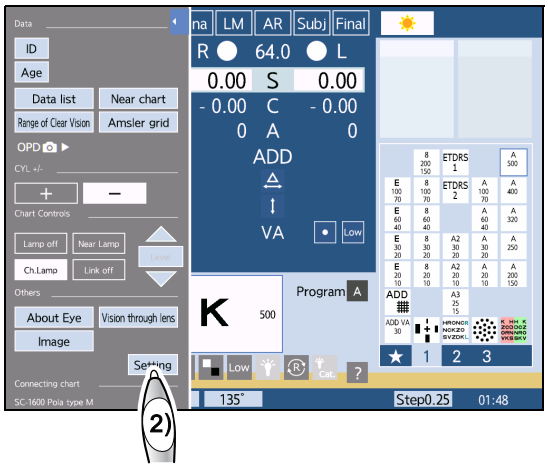
Deleting all test items or the selected test items is possible.

1 Display the menu screen.

1) Press to display the side menu on the measurement screen.

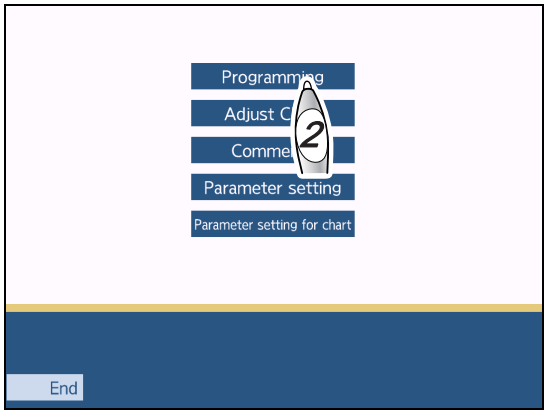


2) Press [Setting] to display the menu screen.



2 Press [Programming].

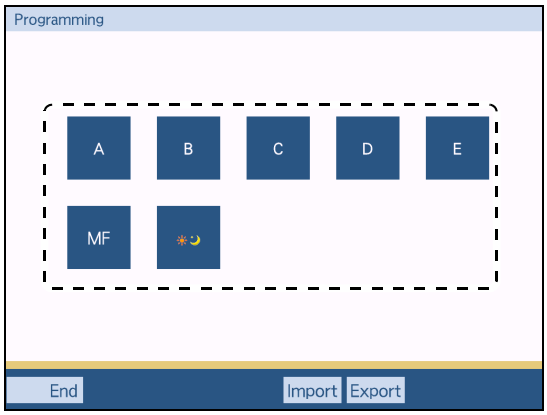
The Programming screen is displayed.



3 Select the program to be edited.

Press the desired button from among [A], [B], [C], [D], [E], [MF], and [ ].

The items of the selected program are displayed in a list (all programs are displayed blank if no program is written).



4 Press [Delete] or [Delete All].

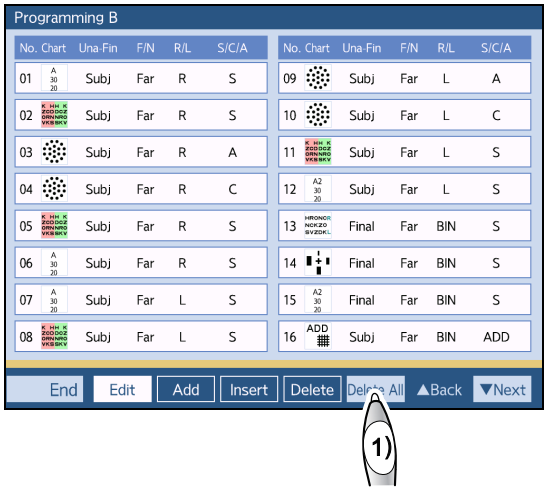
- Deleting all test items of the selected program

1) Press [Delete All].

A delete confirmation message appears.

2) Press [Yes].

All items of the selected program are deleted.



- Deleting the selected test item

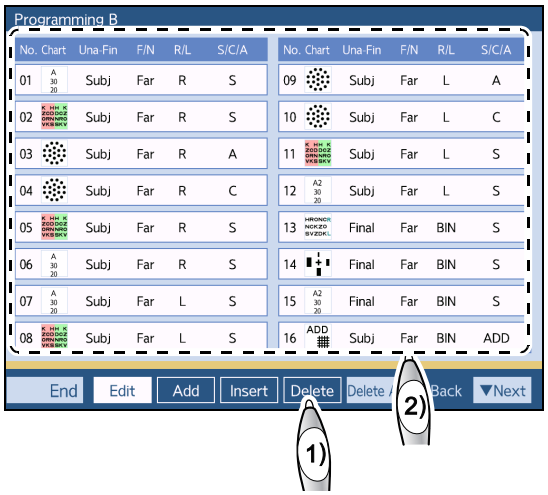
  1) Press [Delete].

  2) Select the test item to be deleted.

     A delete confirmation message appears.

  3) Press [Yes].

     The selected test item is deleted.



5 Press [End].

The Programming screen is displayed.

6 Press [End].

The menu screen is displayed.

7 Press [End].

The measurement screen is displayed.

5.3.2 Adding test items

Test items can be added to the program in the places specified.

They can be added before or after the selected test item.

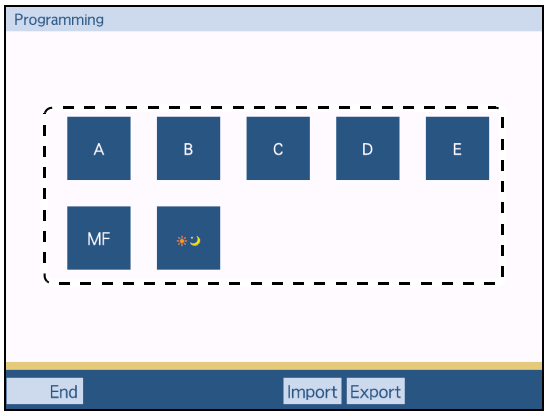
1 Display the Programming screen.

See Steps 1 to 2 of *"5.3.1 Deleting test items" (page 173)*.

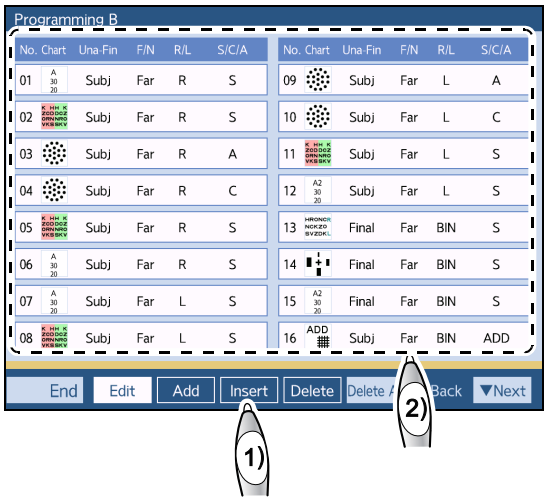
2 Select the program to be edited.

Press the desired button from among [A], [B], [C], [D], [E], [MF], and [☀☽].

The items of the selected program are displayed in a list (all programs are displayed blank if no program is written).



3 Add test items.



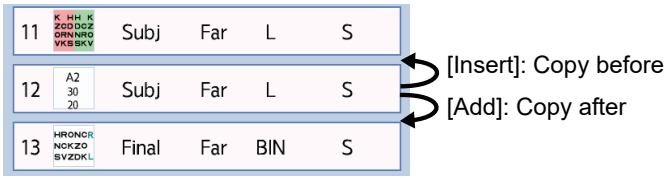
- Inserting a test item before the selected test item

  1) Press [Insert].

  2) Select the test item before which a test item is to be added.

     A copy of the selected test item is inserted before the selected test item.

     The test setting window is displayed.



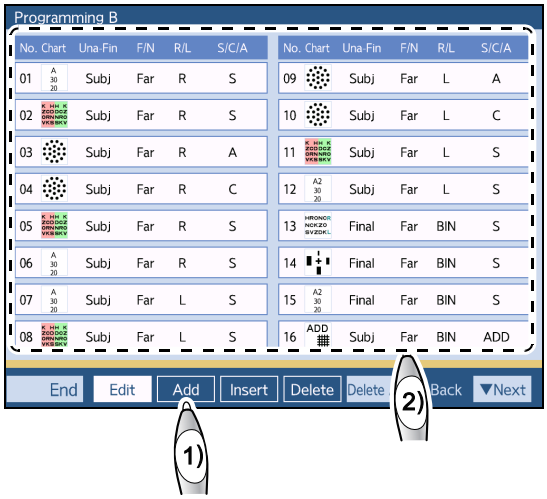
- Inserting a test item after the selected test item

  1) Press [Add].

  2) Select the test item after which a test item is to be added.

     A copy of the selected test item is inserted after the selected test item.

     The test setting window is displayed.



4 Edit the inserted test item.

See Steps 5 to 11 of *"5.3.3 Editing test items" (page 177)*.

5.3.3 Editing test items

The test items in program can be edited.

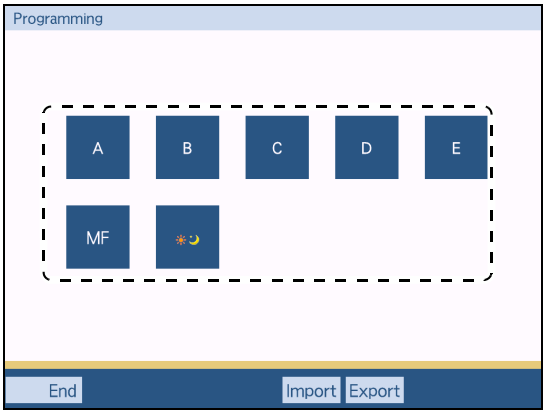
1 Display the Programming screen.

See Steps 1 to 2 of *"5.3.1 Deleting test items" (page 173)*.

2 Select the program to be edited.

Press the desired button from among [A], [B], [C], [D], [E], [MF], and [☀ ☾].

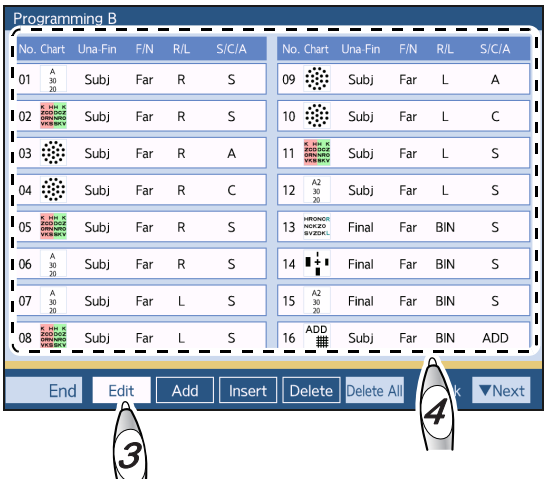
The items of the selected program are displayed in a list (all programs are displayed blank if no program is written).



3 Press [Edit].

4 Select the test item to be edited.

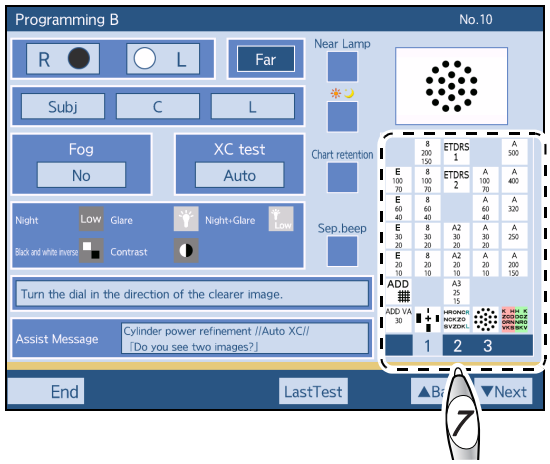
The test setting window is displayed.



5 Select [Far] or [Near].

6 Select measurement mode (Unaided-Final).

7 In the chart select area on the right, select the chart to be presented.



8 Select the mode to work with when the selected chart is presented.

Select items to be included in the test setting window.

- Auxiliary lenses and fog amount can be specified.
- To display the vertical line, horizontal line, or single letter or to apply the red-green filter, specify here. *"3.5.2 Selecting visual acuity charts" (page 59)*

● The following can be included.

- Charts (vertical line, horizontal line, single letter, red-green filter)
- Low illumination, contrast change, inverted black and white, glare, night vision + glare
- Measurement mode (Unaided to Final, auto adjustment)
- Day/Night mode
- Distance/Near mode
- Change mode (SPH, CYL, AXIS, etc.)
- Eye to be examined (R, L, BIN, R/L retention)
- Auxiliary lens
- Cross cylinder test

  Selection of cross cylinder lens (auto cross cylinder lens, ±0.25 D, ±0.50 D, Lens retention)
  Lens retention: Select this option to maintain the placed cross cylinder lens when running a refraction program.
- Chart retention
  Check this item to maintain the presented chart in the cross cylinder test.
- Beep sounds (Three beeps sound at the end of each test.)
- Fog amount (Select [FOG] and turn the dial to enter the fog amount.)
- Near point lamp ON/OFF
- Operation message

  Pressing the comments field (above sample instructions) displays a list. Select one from the list.
- Program message

  Pressing the sample instructions field displays a list. Select one from the list.

Note

- Program messages can be displayed in Near mode only when the device is connected with the SSC-100.

9 When the current test item is complete, press [▼Next] to go to the next item.

- To return to the previous item, press [▲Back].
- If you want the selected test item to be the final test and to clear all subsequent test items, press [Last Test].

10 Repeat *Step 5* to *Step 9* until the desired charts are written in the presentation order.

Up to 32 tests can be stored.

11 Press End .

12 Press End .

The menu screen is displayed.

13 Press End .

The measurement screen is displayed.

5.4 Writing or Reading Programs

This section explains how to write refraction programs to SD cards or read refraction programs from SD cards.

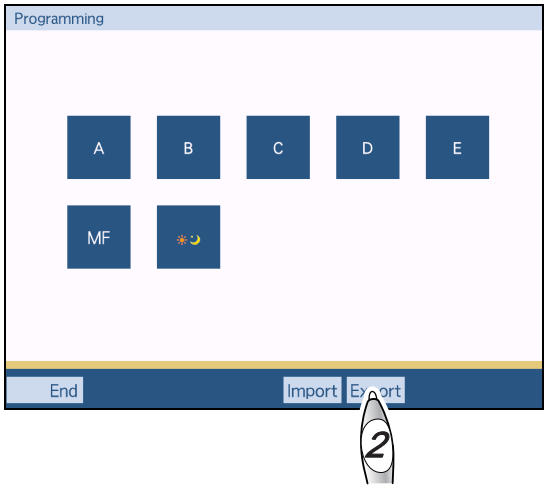
5.4.1 Writing all refraction programs to SD card

1 Display the Programming screen.

See Steps 1 to 2 of *"5.3.1 Deleting test items" (page 173)*.

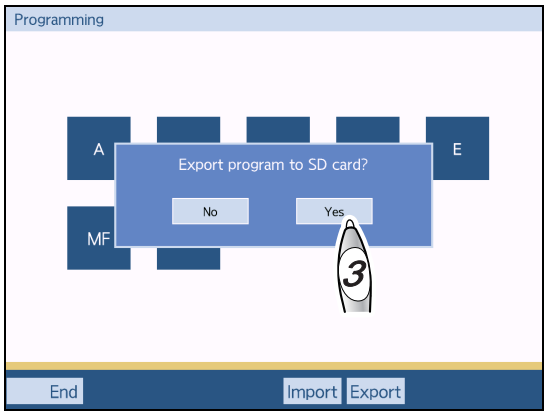
2 Press [Export].

A confirmation message is displayed.



3 Press [Yes].

All the current programs are written to the SD card.



5.4.2 Reading all refraction programs from SD card

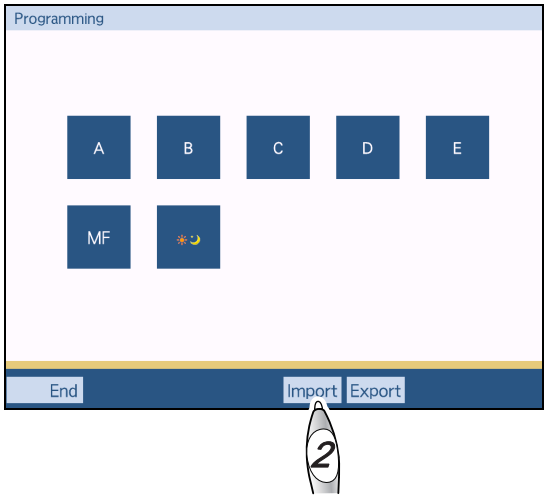
All refraction programs are overwritten by the read programs.

1 Display the Programming screen.

See Steps 1 to 2 of *"5.3.1 Deleting test items" (page 173)*.

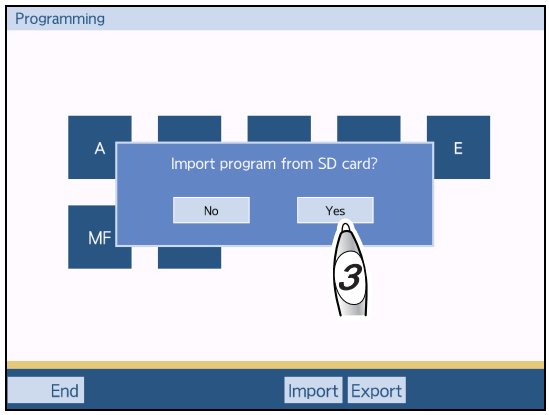
2 Press [Import].

A confirmation message is displayed.



3 Press [Yes].

All refraction programs are read from the SD card and overwritten.



5.5 Power Adjustment

■ This section explains how to adjust the power based on the full correction (the value adjusted to the most plus power that provides the best-corrected visual acuity for each eye).

■ Auto adjustment, semi-auto adjustment, and manual adjustment are provided.

Auto adjustment	Conditions such as spectacle values, adaptability (age), type of refractive error (myopia, hyperopia, astigmatism, oblique astigmatism, anisometropia) are automatically determined and wearing comfort values are obtained from the full correction of both eyes. (This calculation function of wearing comfort values is called FinalFit.)
Semi-auto adjustment	Fine adjustment of wearing comfort values obtained by auto adjustment
Manual adjustment	Power adjustment according to the determination of the operator without using the auto adjustment function. Or manual adjustment of wearing comfort values obtained by auto adjustment.

5.5.1 Distance power auto adjustment

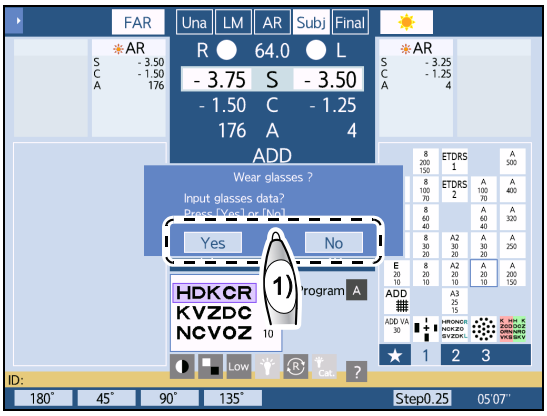
Refraction	For auto adjustment
Standard program A (Standard 1)	The program includes auto adjustment. *"5.2.1 Refraction with Standard program A (Standard 1)" (page 156)*
Other standard programs	Perform Step 1 and later in power adjustment after binocular full correction is obtained.
Other than above	Perform Step 1 and later after the binocular full correction is obtained.

- The wearing comfort values in this device should be used only as a guide of power determination. The final determination should be made by the operator based on confirmation and consent to the patient.
- When using the auto adjustment function, measure and enter the basic full correction and/or spectacle values. If the full correction is inaccurate, LM data is not entered even though the patient has glasses, or incorrect values are entered, the power that the patient is satisfied may not be obtained.
- The automatically adjusted wearing comfort values are a little weaker than the average ones to avoid uncomfortable feeling. Be sure to perform the semi-auto adjustment.
- Auto adjustment is not available for night data.

1 Press Final while holding Shift.

A message to confirm whether or not the patient has glasses is displayed.

2 Select whether or not the patient has glasses.



- With glasses

1) Press [Yes].
2) Enter LM data.

"3.2.2 Entering data manually" (page 47)

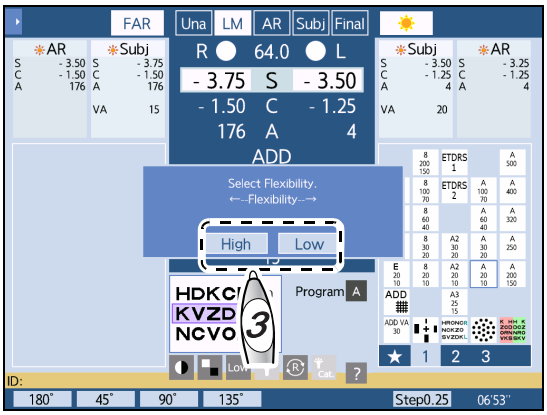
3) Press Final while holding Shift.

- Without glasses

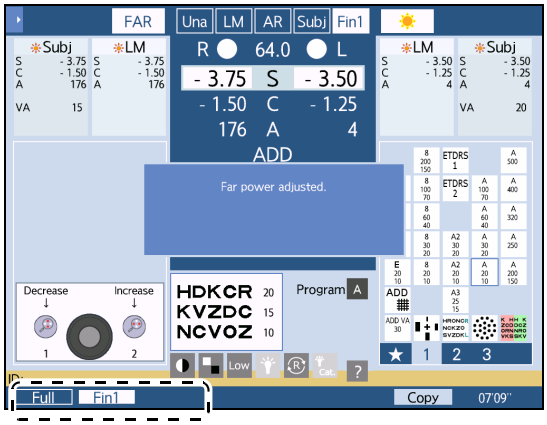
1) Press [No].

3 Enter the adaptability to the patient's glasses as [High] or [Low].

When determining the adaptability by age, separate it by around 40 years old.



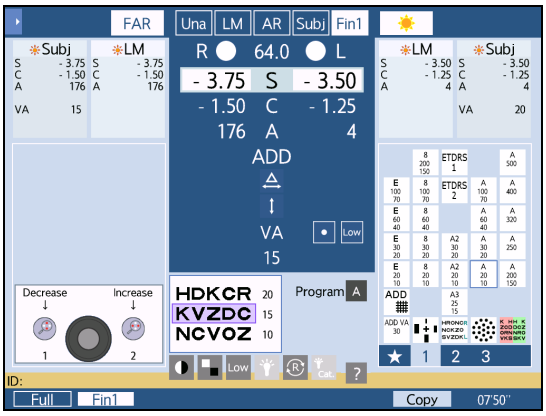
4 The distance power is automatically adjusted and set to Fin 1.



5.5.2 Fine adjustment after auto adjustment (semi-auto adjustment)

Perform fine adjustment with the semi-auto adjustment function after the auto adjustment of distance power.

1 Ask the patient how it looks with Fin 1 after auto adjustment.



2 Press (1) or (2) to perform fine adjustment.

“Poorly visible.” or “The power is weak.”	Press (2). The power is increased by one step and set to [Fin 2].
“The power is strong.” or “There is a uncomfortable feeling.”	Press (1). The power is decreased by one step and set to [Fin 2].

3 Repeat Steps 1 and 2 while comparing the patient’s vision.

New data is stored as Fin 3. A maximum of five prescription data sets can be stored. Exceeding it overwrites Fin 2.

5.5.3 Fine adjustment after auto adjustment (manual adjustment)

Instead of semi-auto adjustment, manual adjustment is possible after the auto adjustment of distance power.

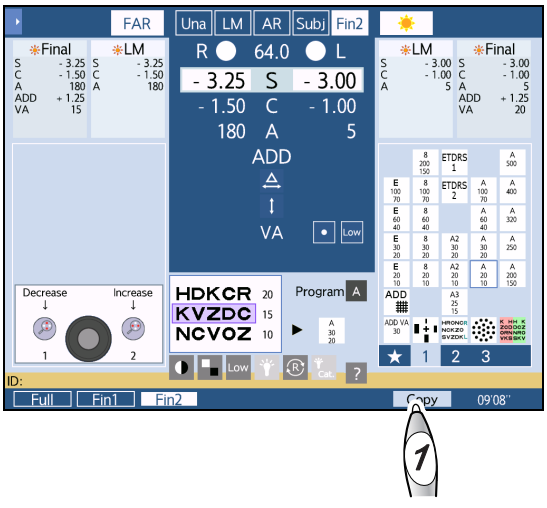
1 Select [Fin 1] and press [Copy].

Data of Fin 1 is copied to Fin 2.

2 Present the chart of the visual acuity desired by the patient.

3 Change the sphere and cylinder to the most plus power that allows the patient to see the visual acuity chart.

4 Press function buttons [Fin 1] and [Fin 2] alternately to compare the patient’s vision.



5.5.4 Manual adjustment without using auto adjustment function

Instead of auto adjustment, manual adjustment is possible.

1. Determine the full correction in Subjective mode, then press Final.
   The device enters Final mode.
2. Press BIN.
3. Present the chart of the visual acuity desired by the patient.
4. Change the sphere and cylinder to the most plus power that allows the patient to see the visual acuity chart.

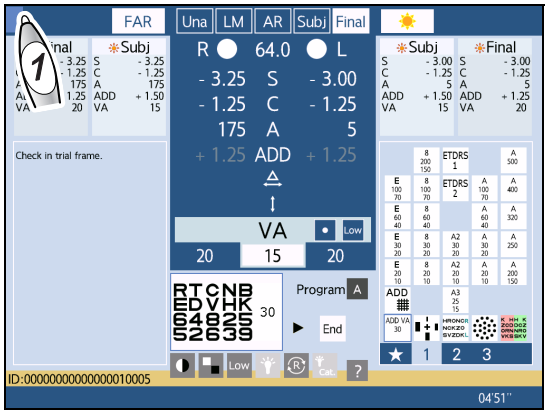
5.6 Checking Refraction Data

This section explains how to display the data list, refraction diagram, and the range of clear vision based on the measurement results.

5.6.1 Displaying the data list

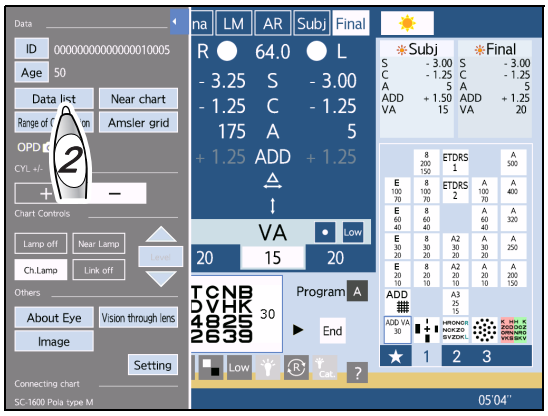
All measurement data can be displayed in a list.

1 After measurement, press ▶ to display the side menu.

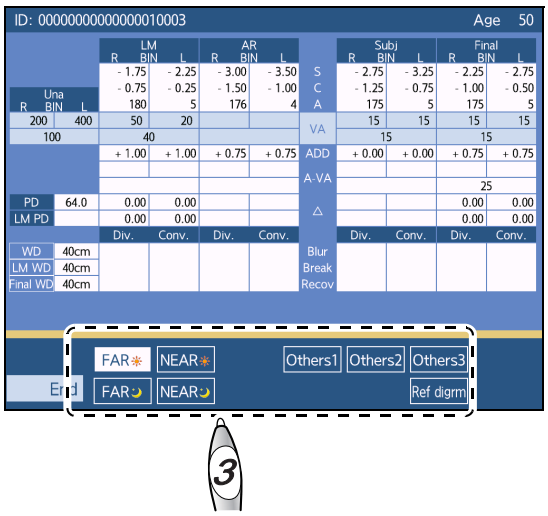


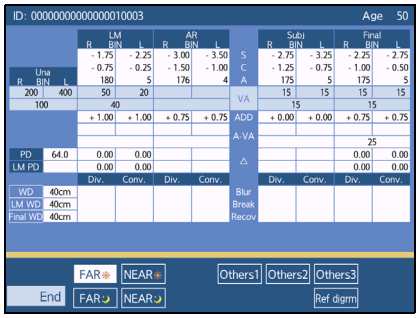
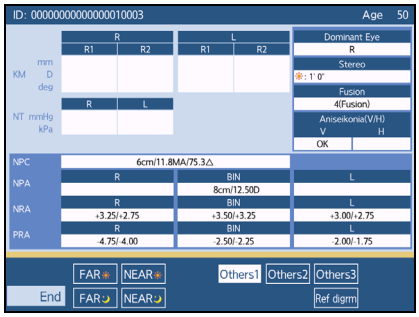
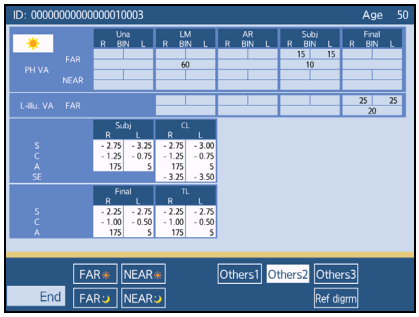
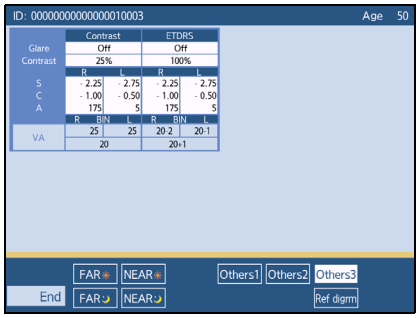
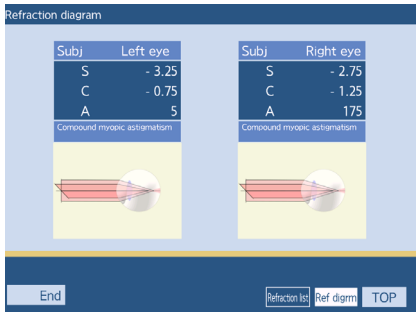
2 Press [Data list].

The data list screen is displayed.



3 Display the desired list with a function button.



Function button	Displayed screen	
FAR *a		Day distance data A-VA: Visual acuity with addition PH VA: Pinhole visual acuity
NEAR *a		Day near data
FAR *a		Night distance data
NEAR *a		Night near data
Others1		KM, NT, dominant eye, stereoparallax, fusion, aniseikonia, NPC, NPA, NRA, PRA
Others2		L-illu. VA, CL, TL L-illu. VA: Visual acuity with day data in low illumination CL: Contact lens contact lens conversion value TL: Trial lens data
Others3		Contrast, ETDRS visual acuity
Ref digrm		Refraction diagram of patient's eyes

*a. Day and night are distinguished on the button only when the parameter "Display the Day/Night switching button" is set to [Yes] or when night data has been entered.

4 Press End .

The measurement screen is displayed.

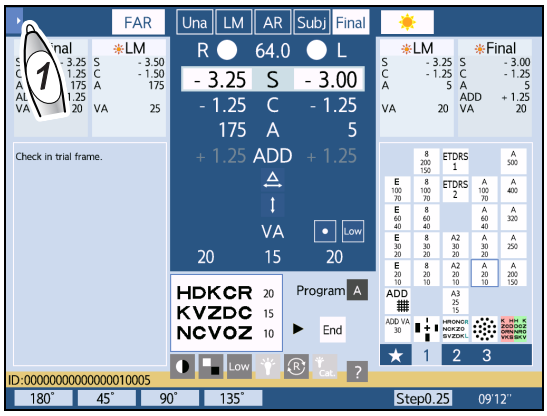
5.6.2 Displaying refraction diagrams of patient's eyes

This section explains how to display the screen that shows the refractive status of the patient's eyes in diagram based on the subjective sphere and cylinder values.

Note

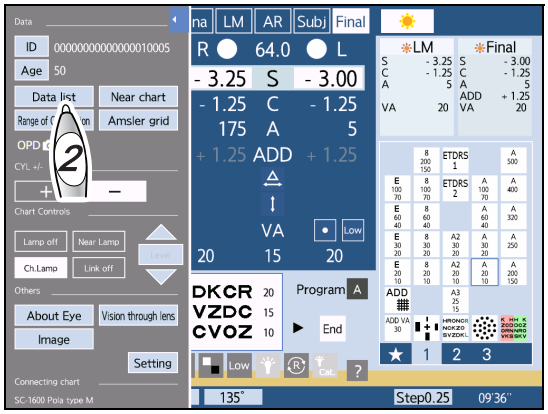
- The refractive status corresponding to the patient's eyes is displayed from among eight refraction diagrams (emmetropia, myopia, hyperopia, astigmatism, simple myopic astigmatism, simple hyperopic astigmatism, compound myopic astigmatism, compound hyperopic astigmatism). Refraction diagrams do not exactly reflect sphere, cylinder, or axis values.
- The refractive status screen is displayed based on the subjective values (full correction). If there are no subjective values, it is displayed based on the AR values.

1 After measurement, press ▶ to display the side menu.



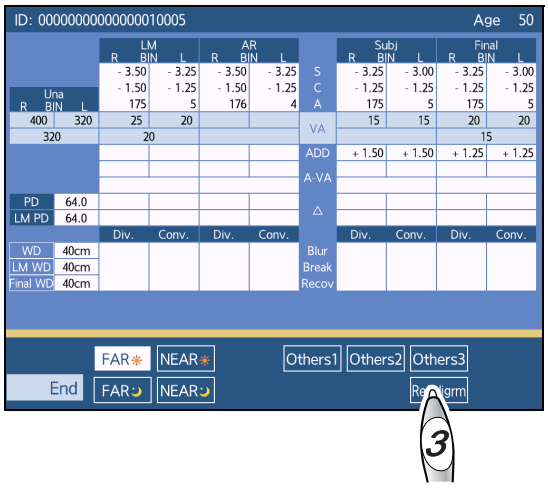
2 Press [Data list].

The data list screen is displayed.



5

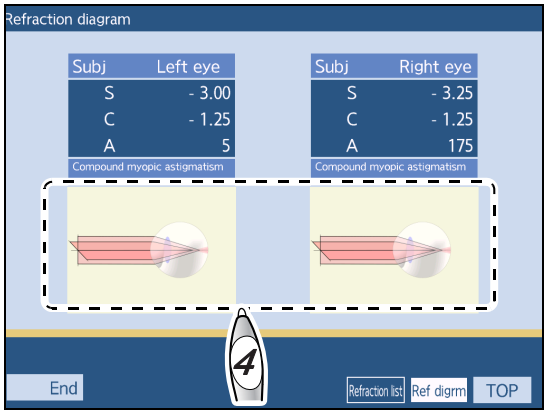
3 Press Ref digrm .



The refractive status screen is displayed.

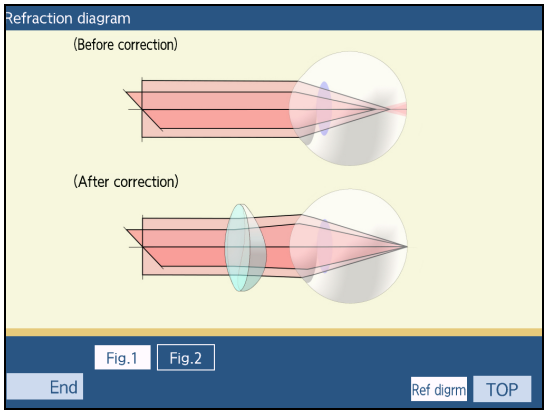
Subjective data and refraction diagrams of the patient's eyes are displayed.

This screen shows the right eye data on the right side the left eye on the left side.

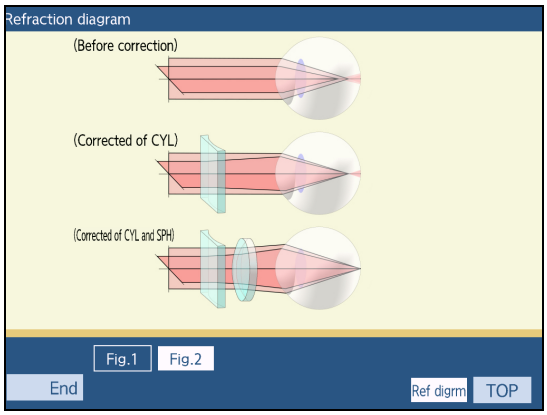


4 Press the displayed refraction diagram.

The enlarged view of the pressed refraction diagram and the refraction diagram corrected by spectacle lens are displayed.



For astigmatism, the screen can be switched between [Fig.1] and [Fig.2]. Pressing [Fig.2] displays the diagram corrected by cylinder and the diagram corrected by sphere and cylinder.



5 Press End .

The refractive status screen is displayed.

6 Press End .

The measurement screen is displayed.

5.6.3 Checking the range of clear vision

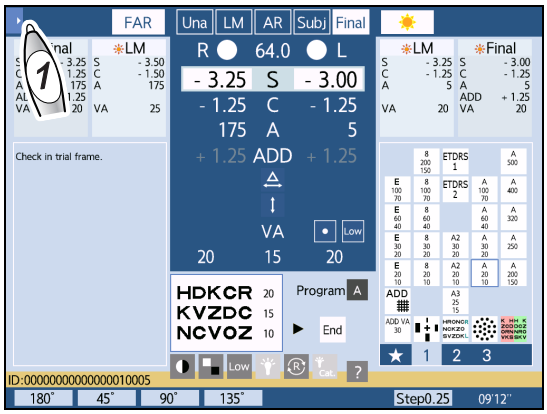
This section explains the clear vision range check screen that is used to check the clearly visible range (depth) when correction is made based on the measurement data.

It can be checked by lens type.

Note

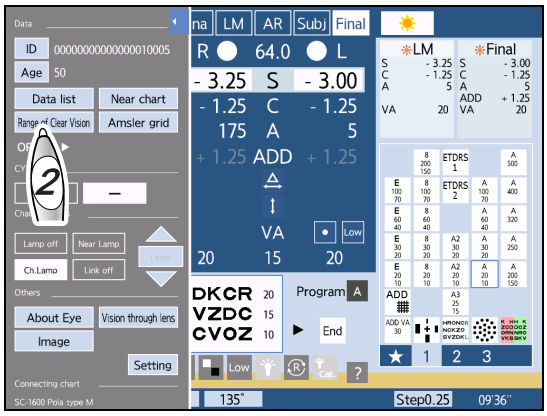
- To check the range of clear vision, subjective values (full correction) with addition or prescription with addition are necessary.
  If full correction or addition is inaccurately entered, the range of clear vision is not displayed correctly.
- Clear vision range checking is not available for night data.

1 After measurement, press ▶ to display the side menu.



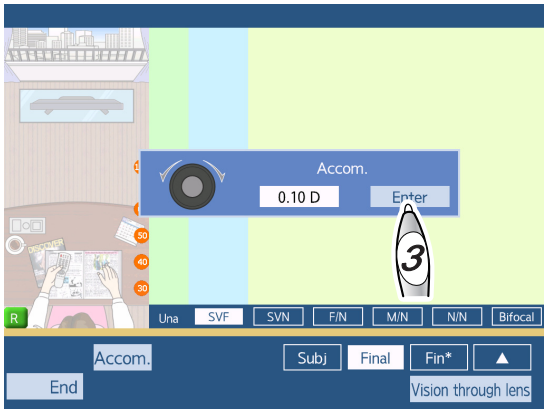
2 Press [Range of Clear Vision].

The clear vision range check screen is displayed.



3 Enter the accommodation used for calculation of the clear vision range check with the dial, press [Enter].

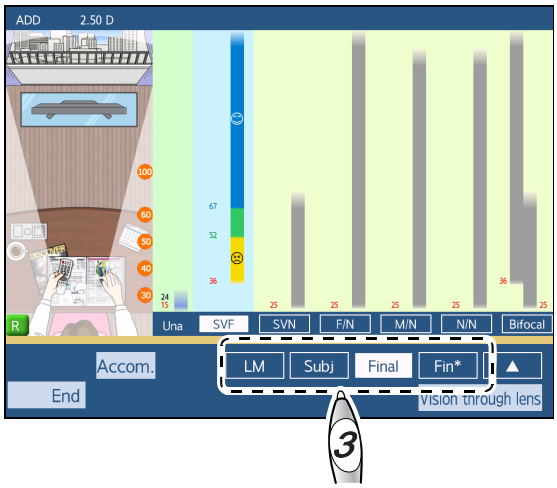
(only when the “Accomm. power for Range of Clear Vision” parameter is set to [Manual])



5

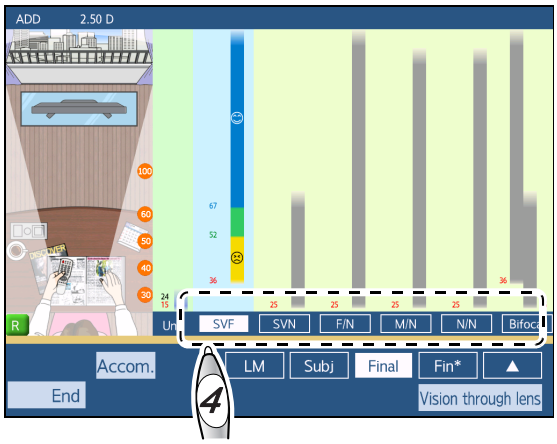
4 Select the measurement data for clear vision range checking ([LM]-[Fin*]).

[LM]	LM data
[Subj]	Subjective data (full correction)
[Fin]	Prescription data
[Fin*]	Adjust power based on prescription data.



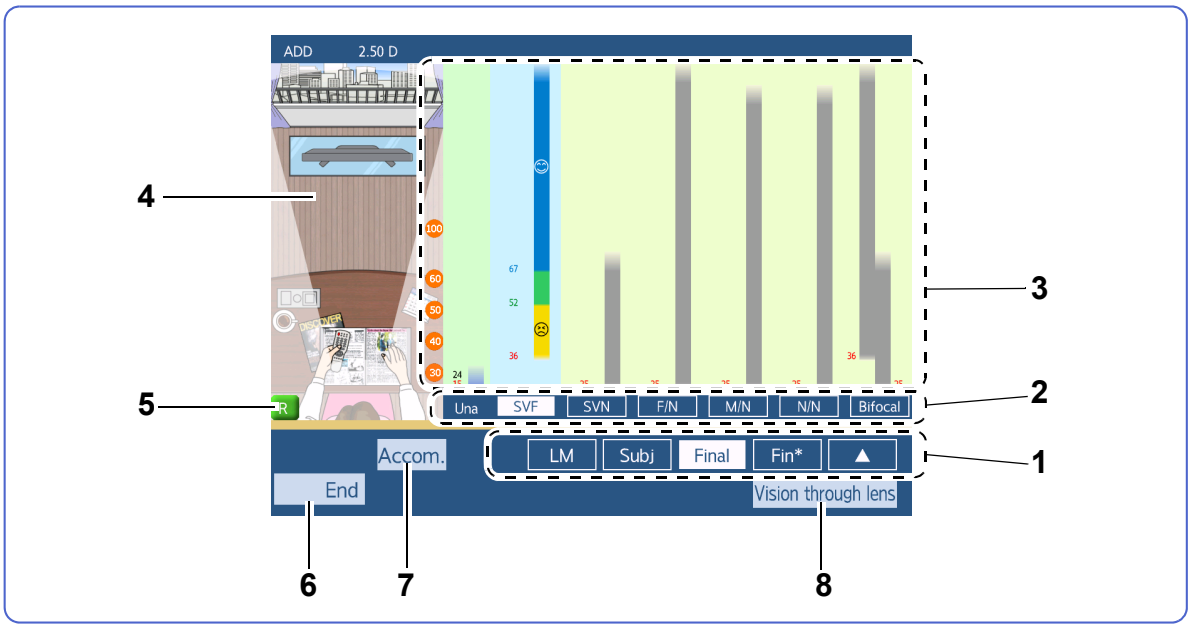
5 Select the desired lens type ([SVF]-[Bifocal]).

[SVF]	Single vision lens for distance vision
[SVN]	Single vision lens for near vision
[F/N]	Progressive lens (distance-near)
[M/N]	Progressive lens (intermediate-near)
[N/N]	Progressive lens (near-near)
[Bifocal]	Bifocal lens



6 Check the range of clear vision in the clear vision range graph.

◆ Clear vision range check screen



1 Measurement data

Selects measurement data to be displayed in graph.

Pressing [▲] displays the selected measurement data. Pressing it again hides the measurement data indication.

2 Lens type

Selects a lens type.

3 Clear vision range graph

Displays the range of clear vision for each lens type (clear depth range).

The lower side of the graph is the near point and the upper side is the distance point.

The graph of the selected lens type shows by color how much accommodation is required for clear vision.

Blue portion of graph ( )	Clearly visible area using less than half accommodation
Green portion of graph	Clearly visible area using half to two-thirds accommodation
Yellow portion of graph ( )	Clearly visible area using two-thirds to all accommodation

Note

- In the graph of unaided vision, it is difficult to see clearly when the cylinder is 0.75 D or greater. Therefore, changes to (the indication is not displayed if the graph is short).
- In the following cases for [Fin] or [Fin*], the blue portion of the graph turns red and changes to .
  - When the eye is myopic and overcorrected
  - When the eye is hyperopic and the sphere prescription is a minus value with cylinder minus reading

  For these cases, the vision can be improved by accommodation but it may impose eye strain. It is recommended to change the prescription so that the graph turns blue.

- Numbers on clear vision range graph

Numbers on the clear vision range graph indicate the distance from the eyes (unit: cm).

Red number	Near point (clearly visible closest point using 100% accommodation)
Blue number	Position where half accommodation is used (selected lens type only)
Green number	Position where two-thirds accommodation is used (selected lens type only)
Black number	Distance point with unaided vision
30 - 100	Scale indicating the distance from the eyes. Pressing a circled number displays an additional line indicating the distance on the clear vision range graph.

4 Image for range of clear vision

Displays the clearly visible range with the selected lens type.

The range or clear vision is displayed as an image for easy understanding.

5 R (right) / L (left) indication

Shows that the clear vision range graph is for the right eye or the left eye.

Pressing this button toggles between the right eye and left eye.

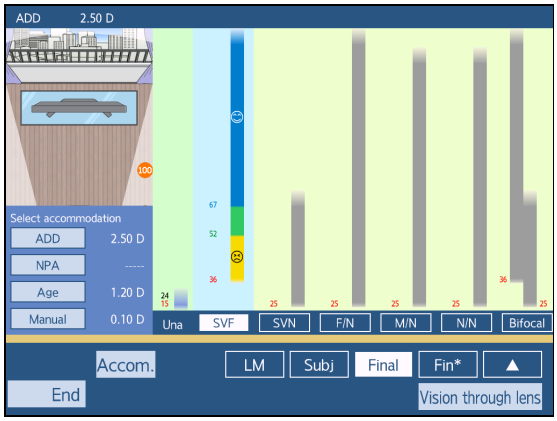
6 End

The screen returns to the measurement screen.

7 [Accom.]

Changes accommodation used as the basis for calculation of the range of clear vision.

The accommodation used for calculation is displayed in the upper left of the clear vision range check screen.



ADD	Conversion is made assuming that the addition value determined by the Cross grid chart for near vision is half of full accommodation. Accommodation = ((1/WD) − ADD) x 2 WD: working distance
NPA	The measurement values of NPA (near point of accommodation) are used. *"4.8 Near Point of Accommodation (NPA) Test" (page 143)*
Age	The accommodation estimated from the age is used. *"8.8 Relational Table of Age and Accommodation" (page 302)* When no age is entered, a numeric keypad appears.
Manual	Accommodation is manually entered in units of diopters (D).

8 [Vision through lens]

Displays the vision image with the selected lens type.

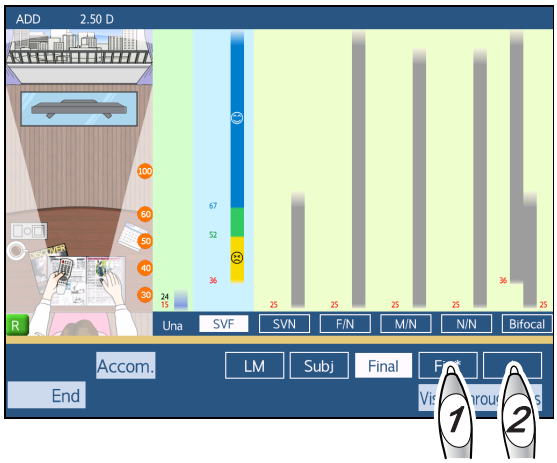
Vision comparison is possible by changing the lens type with the function buttons at the bottom of the screen.

5.6.4 Adjusting power while checking the range of clear vision

The sphere, cylinder, addition, or working distance values can be changed when [Fin*] is selected on the clear vision range check screen. Changed values are reflected in the clear vision range graph. Adjust the values to suit the patient's needs by changing the clear vision range graph based on the prescription.

1 Press [Fin*] on the clear vision range check screen.

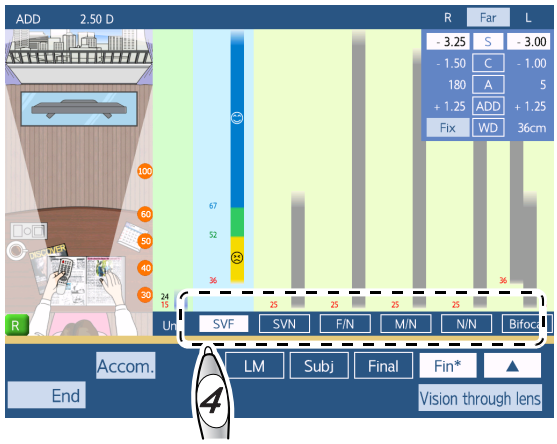
2 Press [▲] to display the data window.



3 Select the desired lens type ([SVF]-[Bifocal]).

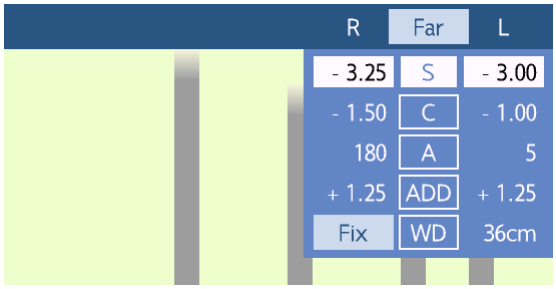
[SVF]	Single vision lens for distance vision
[SVN]	Single vision lens for near vision
[F/N]	Progressive lens (distance-near)
[M/N]	Progressive lens (intermediate-near)
[N/N]	Progressive lens (near-near)
[Bifocal]	Bifocal lens

For [SVN] and [N/N], the data window for near vision is displayed.



4 Select the item to be changed and change the value with the dial.

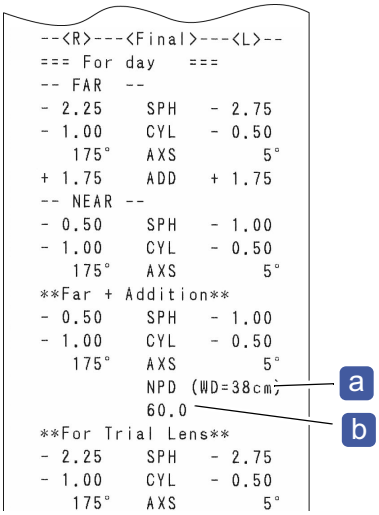
Because the near power is fixed, values other than those specified are also changed.



- To change the data without fixing the near power

Press Fix to display Fix.

Changing values in this condition also changes the working distance (for prescription) and near pupillary distance (for prescription). When the working distance has been changed, the near power is changed regardless of whether Fix is pressed. Working distance (for prescription) a and near pupillary distance (for prescription) b values are printed in the <FINAL> field at the time of printing.



Note

- The near pupillary distance calculated here is only a guide.

5 After power adjustment, press End to return to the measurement screen.

The values changed on the clear vision range check screen are set in [Fin*].

6 To check the vision with addition, press ADD.

Instruct the patient to keep their head away from the refractor head while the refractor head is moving. After the convergence has been completed, have the patient look into the measuring windows with the patient's forehead touching the forehead rest.

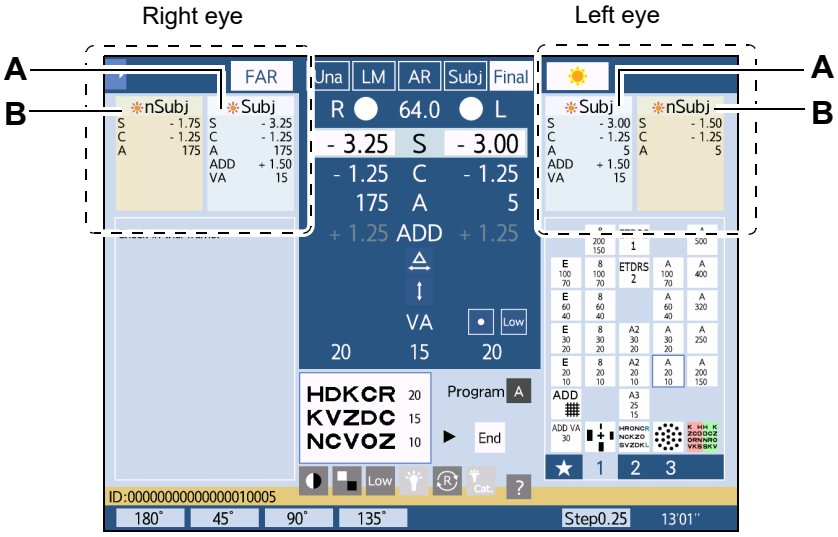
7 Determine the final prescription with [Final] or [Fin*].

[Final]: Prescription data before adjustment

5.7 Specifying Subwindow Display Data

This section explains how to specify items to be displayed in Subwindow 1 and 2.

- When no item is specified, the measurement data previously set in Subwindow 1 and measurement data set prior to the previous one is displayed in Subwindow 2.
- When display items are specified in Subwindow 1, the measurement data previously set is displayed in Subwindow 2.

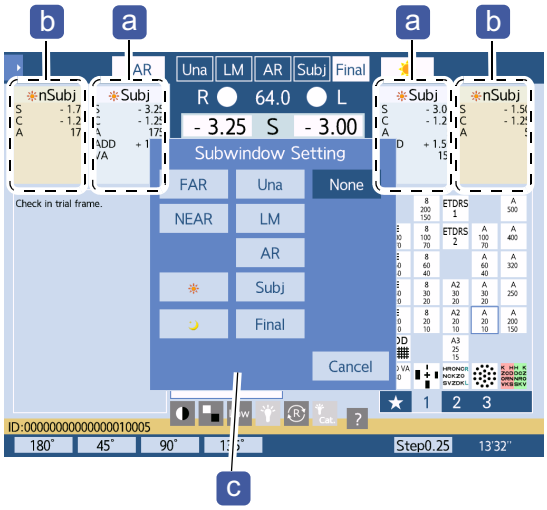


A: Subwindow 1
B: Subwindow 2
* The subwindow in orange shows near data.

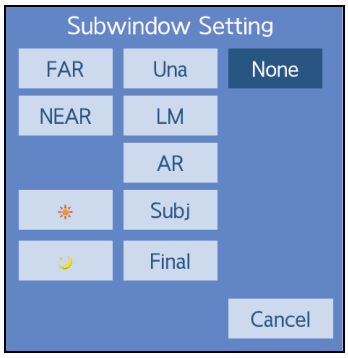
1 Press Subwindow 1 a or Subwindow 2 b.

- To specify items displayed in Subwindow 1, press Subwindow 1.
- To specify items displayed in Subwindow 2, press Subwindow 2.

The subwindow setting window c is displayed.



2 Specify items to be displayed in the subwindow.



- [FAR]: Selects Distance mode.
- [NEAR]: Selects Near mode.
- [ ]: Selects Day mode.
- [ ]: Selects Night mode.
- [Una]: Displays unaided vision data.
- [LM]: Displays LM data.
- [AR]: Displays AR data.
- [Subj]: Displays subjective data.
- [Final]: Displays prescription data.
- [None]: Clears the display data settings in the subwindow.
- [Cancel]: Closes the subwindow setting window without changing any settings.

Note

- Display data settings specified in the subwindow are retained once the device is turned off.
- [ ] or [ ] is not displayed depending on the setting of the parameter “Display the Day/Night switching button” or depending on the chart presenting device to be connected.

5.8 Displaying Descriptive Images

■ This section explains how to display the following descriptive images on the control box touch screen.

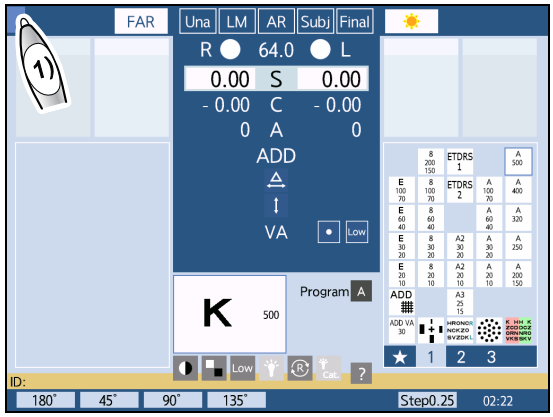
- Eyes (refraction diagrams, eye diagram, visions by cases)
- Vision image
- Images (written in the SD card on the control box)

■ The touch screen can be flipped toward the patient to show those images.

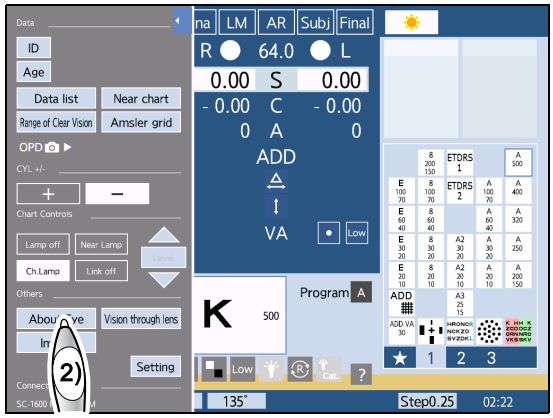
5.8.1 Displaying refraction diagrams, eye diagram, visions by cases

1 Display the Refraction diagram list screen.

1) Press [▶].
The side menu is displayed.

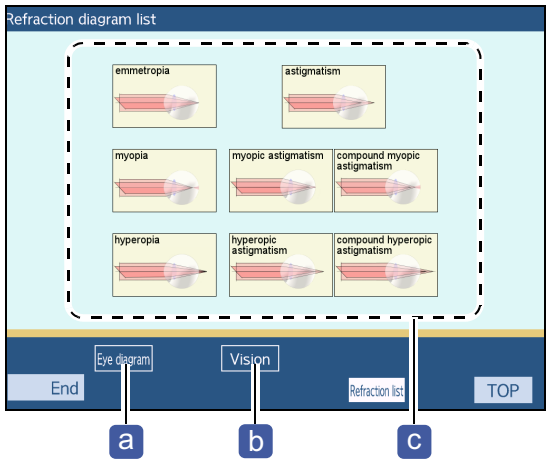


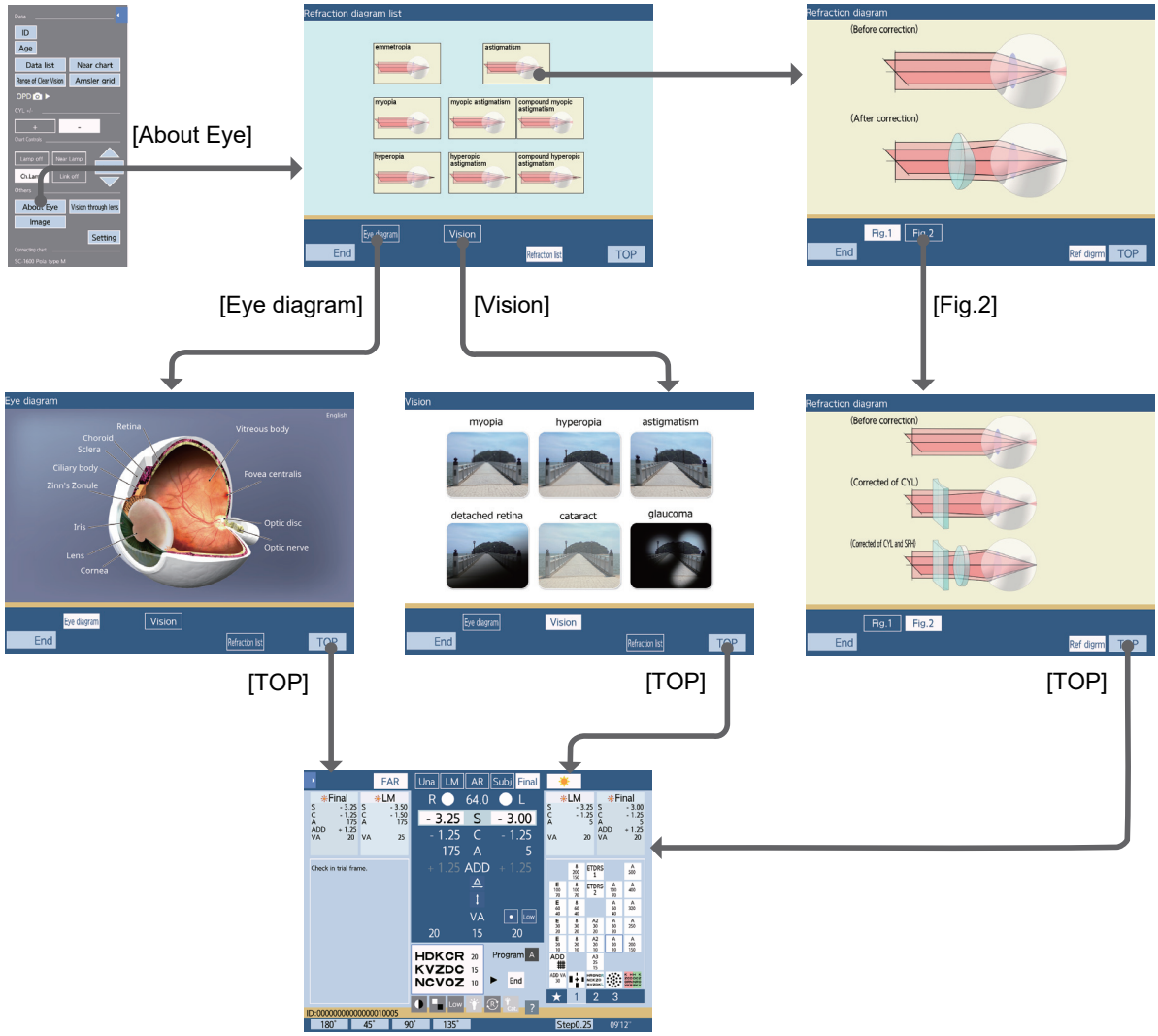
2) Press [About Eye].
The Refraction diagram list screen is displayed.



2 Select the figure to be displayed.

[Eye diagram] a	Displays an eye diagram.
[Vision] b	Displays vision images by cases.
Refraction diagrams c	Displays the enlarged view of the pressed refraction diagram and the refraction diagram corrected by spectacle lens. For astigmatism, pressing [Fig.2] displays the diagram corrected by cylinder and the diagram corrected by sphere and cylinder.





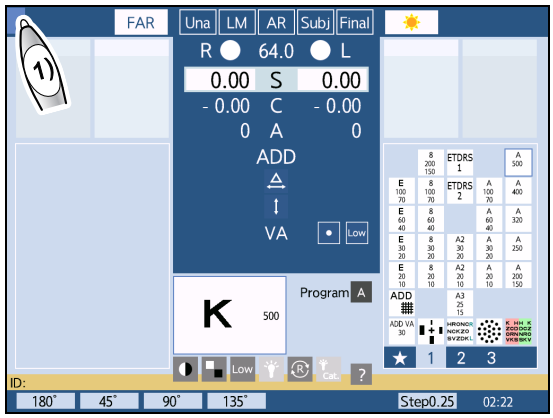
3 Press [TOP] to return to the measurement screen.

Pressing End returns to the Refraction diagram list screen.

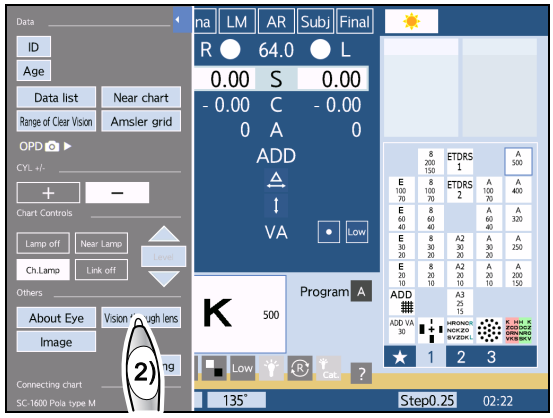
5.8.2 Displaying vision images by lens type

1 Display the vision image.

1) Press ▶.
The side menu is displayed.



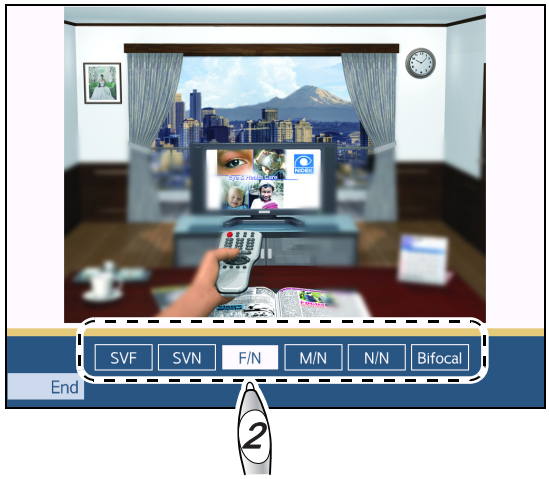
2) Press [Vision through lens].
The vision image screen is displayed.



2 Select the desired lens type.

The vision image with the selected lens type is displayed.

3 Press End to return to the measurement screen.



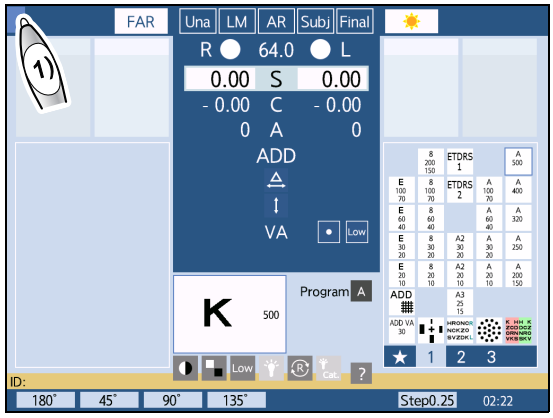
5.8.3 Displaying images

This section explains how to display images written in the SD card of the control box on the touch screen.

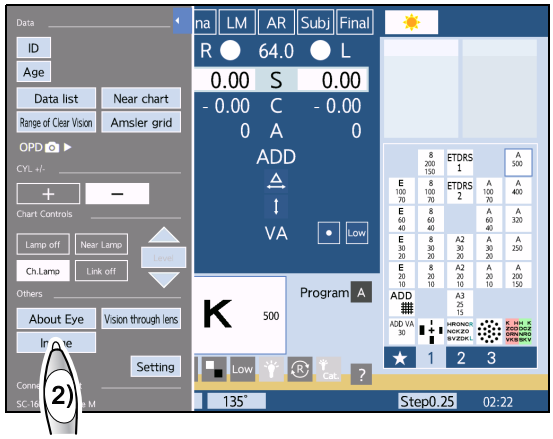
1 Display the vision image.

1) Press .

The side menu is displayed.

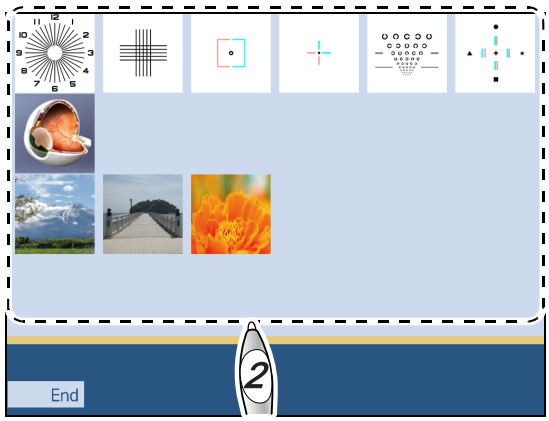


2) Press [Image].



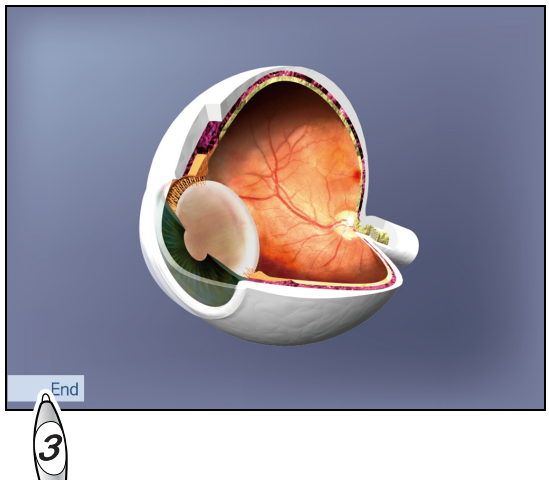
2 Thumbnails of the images are displayed. Press the thumbnail of the desired image.

The selected image is displayed.



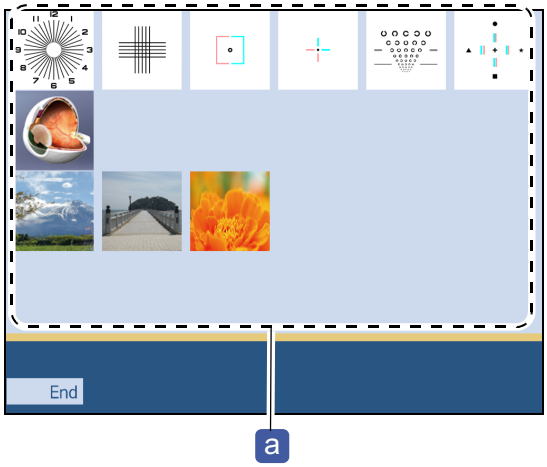
3 Press End to return to the thumbnail list display.

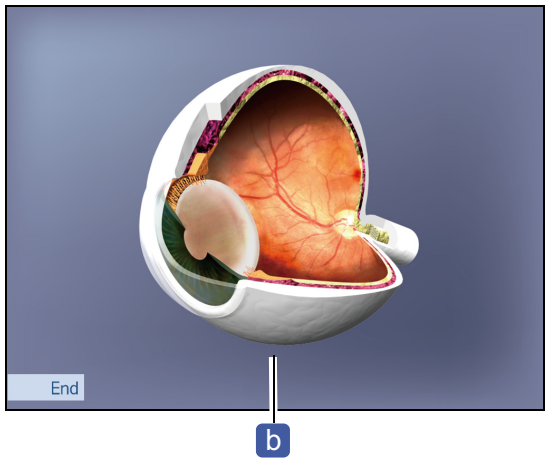
4 Press End to return to the measurement screen.



◆ Copying images to SD card

To display images, they need first to be copied to the SD card used by the control box. Image data can be written as thumbnail images a and full images b.





Follow the procedure below to copy images from a computer.

1) Turn off the power.

2) Gently push the card in to eject it from its slot, then pull it out.

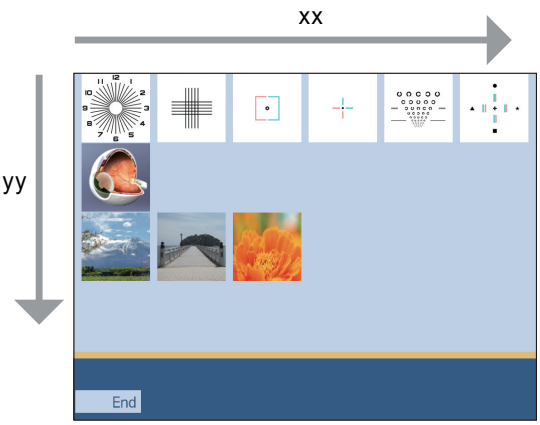
3) Insert the SD card into the computer.

4) Copy images in the specified folder using the specified file name and image size.
The file format supports 24-bit color Windows Bitmap image files.

Image	Input destination folder	File name*	Image size
Thumbnail image a	USER\01	IMGxxyy_t.bmp	151x151 pixels
Full image b		IMGxxyy.bmp	1024x768 pixels

* xxyy of the file name indicates the position where the thumbnail is shown on the thumbnail list display.
xx: Two-digit value indicating the position from the left of the screen (01 to 06)
yy: Two-digit value indicating the position from the top of the screen (01 to 04)

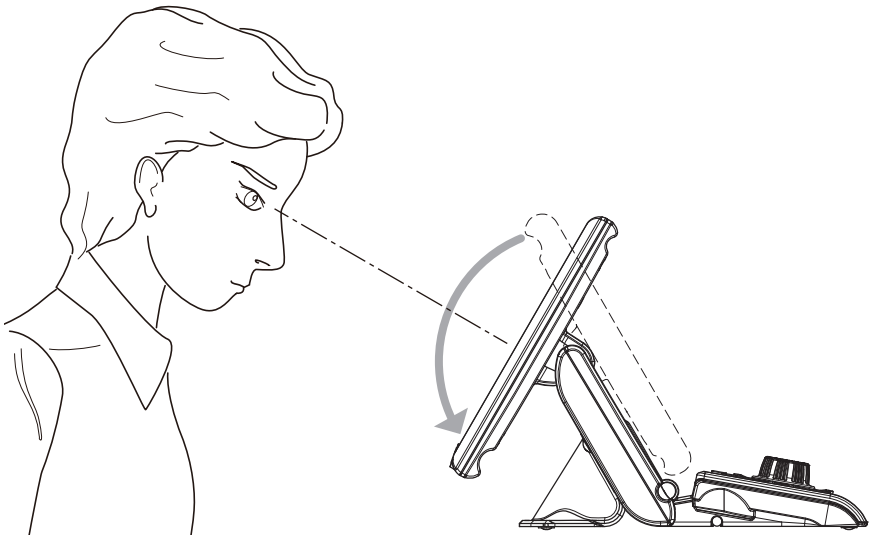
For  on the figure to the right, xxyy is “0102”.



5) Insert the SD card into the slot of the control box with gold contacts facing forward until it clicks into place.

5.8.4 Presenting the screen to patient

The touch screen can be flipped toward the patient to show the patient the measurement screen and various images. Flipping the touch screen toward the patient automatically turns the screen upside down.

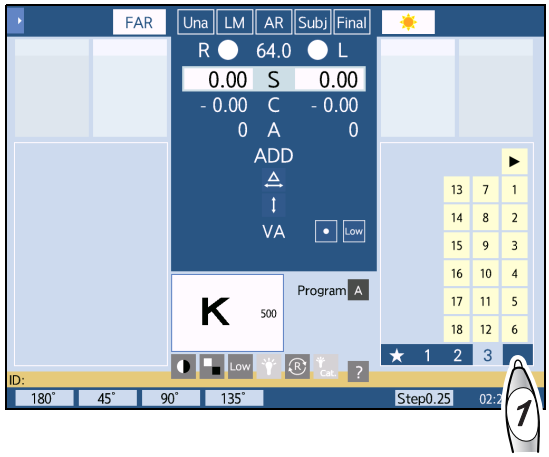


5.9 Displaying Images (SC-1600 series and SSC-100 only)

■ This section explains how to display images instead of charts on the chart presenting device.

■ Images in the SD card of the chart presenting device can be presented instead of charts.

1 Press one of the page buttons [1]-[4] in the chart select area to display the icons 1 - 18.



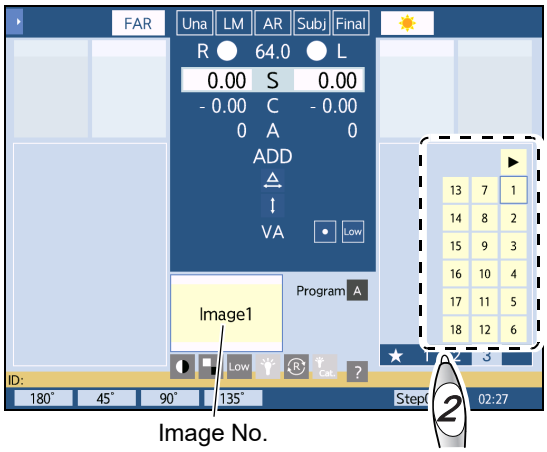
2 Press ▶.

Images are displayed as a slide show.

The function to display multiple images sequentially allows images to change every 5 seconds.

1 - 18 : Among images stored in the SD card, the image corresponding to the number is displayed.*1

3 To finish the slide show of images, press any chart button.



Note

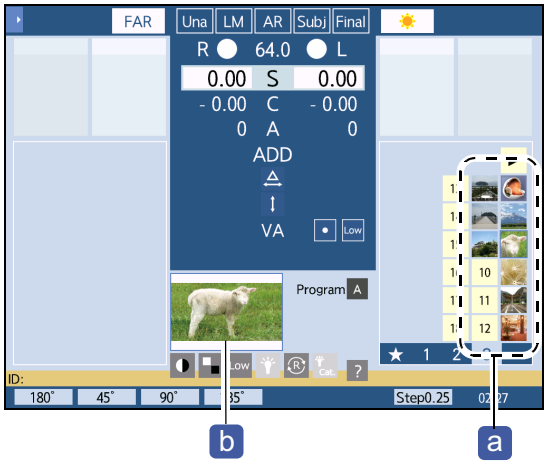
- There is a pause of a few seconds between pressing a button and displaying the image.
  The device does not respond to any operation on the control box during this time. However, this is not an error.

*1. If images need to be added to the SD card of the SC-1600 series or SSC-100, contact Nidek or your service personnel.

◆ Displaying thumbnails of images

Copying images to the SD card used by the control box enables the thumbnails of images to be displayed on the measurement screen.

- a Thumbnails are displayed as icons in the chart select area.
- b A full image is displayed in the lower center of the screen instead of a number.



Remove the SD card from the control box so that it can be used to copy images from a computer.

1) Turn off the power.

2) Gently push the card in to eject it from its slot, then pull it out.

3) Insert the SD card into the computer.

4) Copy images in the specified folder using the specified file name and image size.
The file format supports 24-bit color Windows Bitmap image files.

	Image	Input destination folder	File name*a	Image size
(1)	a image (for distance)	USER\Image_Far	CHT01_t.bmp-CHT18_t.bmp	49x49 pixels
(2)	b image (for distance)		CHT01.bmp-CHT18.bmp	210x110 pixels
(3)*b	a image (for near)	USER\Image_Near	CHT01_t.bmp-CHT18_t.bmp	49x49 pixels
(4)*b	b image (for near)		CHT01.bmp-CHT18.bmp	210x110 pixels

*a. A two-digit number of the file name is the number of the corresponding button. When the number is one digit, enter a leading “0”.

*b. Only SSC-100 for (3) and (4)

- Be sure to copy images so that they match the images presented on the chart presenting device when the corresponding buttons are pressed.
  Unmatched images may cause improper operation.

5) Insert the SD card into the slot of the control box with gold contacts facing forward until it clicks into place.

5.10 Importing Refractor Measurement Data

- This section explains how to import data measured with a refractor from the RT history folder.
- Measurement data can be imported into not only the RT-6100 that exported its data but also other RT-6100s on the same network.

1 Press Input.

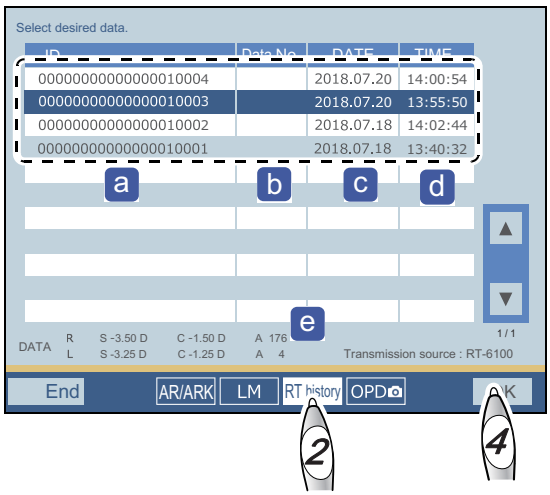
2 Press the function button RT history.

3 Select the desired data.

Select the patient's data to be examined with the refractor referring to the patient ID a, date c, time d, and data e.

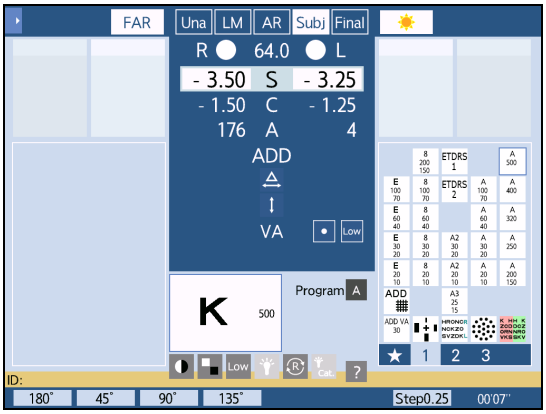
Data No. b is not displayed in the current version.

[▲], [▼]: Switches pages.



4 Press OK or the dial button.

All data displayed on the measurement screen is cleared and the selected refractor measurement data is imported.



5

5.11 Reading or Writing Measurement Data using Eye Care Card

This section explains how to read data measured with a refractor from the optional Eye Care card (IC card) or to write data measured with a refractor to an Eye Care card.

◆ Writing refractor measurement data to Eye Care card

The displayed measurement data of the patient can be written to an Eye Care card.

The written data can be read to other RT-6100s or RT-5100s.

* For CYL = 0, data is written as AXIS = 0 regardless of the AXIS value.

- Note the following when handling the Eye Care card:
  - Do not remove the card while it is being accessed, which is indicated by EyeCa displayed in the upper right of the screen.
  - Do not fold or strike the card.
  - Do not allow the IC terminal (gold part of the card) to become wet or soiled.
  - Do not leave the card in a location exposed to high temperatures or static electricity.

Note

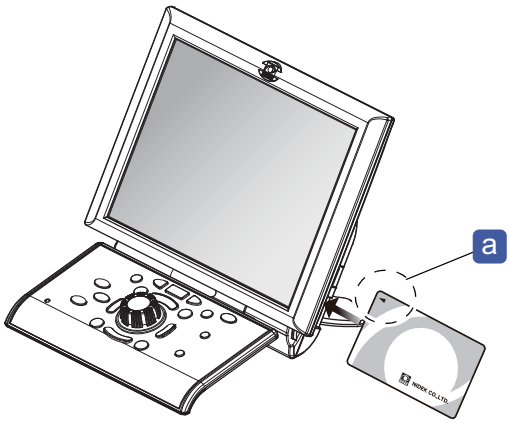
- The parameter “Write to Eye Care card” needs to be set to [Yes] in advance.
- Do not write data measured with an auto refractometer or lensmeter to an Eye Care card written by the RT-6100.

  Cards containing mixed measurement data result in abnormal data.
  Clear all data on the Eye Care card before writing data measured with an auto refractometer or lensmeter. When the Eye Care card is inserted into the Eye Care card slot on the control box, the data is read to the RT-6100 and cleared.

1 Insert an Eye Care card into the Eye Care card slot.

Fully insert the Eye Care card in the orientation shown to the right a.

2 Measure the patient’s eyes with the RT-6100.



Eye Care card

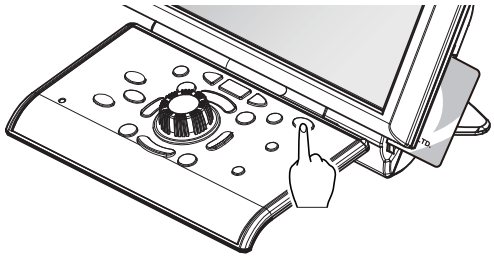
3 Press Output to write data.

"3.3 Data Export" (page 54)

The measurement data is written to the Eye Care card.

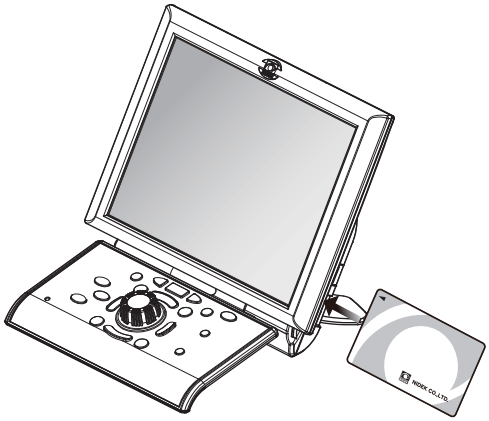
When both day data and night data are included, day data is written first and then a message asking whether to write night data appears.

To write night data, insert another Eye Care card. To skip, press [Cancel].



◆ Reading refractor measurement data from Eye Care card

When an Eye Care card containing measurement data of the RT-6100 or RT-5100 is inserted into the slot, the measurement data is entered in the measurement screen. At this time, the data in the EyeCare card is cleared.



Note

- If the connected chart of the refractor with which data was written to the Eye Care card differs from that of the refractor with which data is to be read from the Eye Care card, the visual acuity values may not be entered correctly.
- If the data to be written includes night data, read the Eye Care card containing day data first, then read the Eye Care card containing night data.

5.12 Displaying OPD Images

This section explains how to display images exported from the OPD-Scan III series on the touch screen.

Note

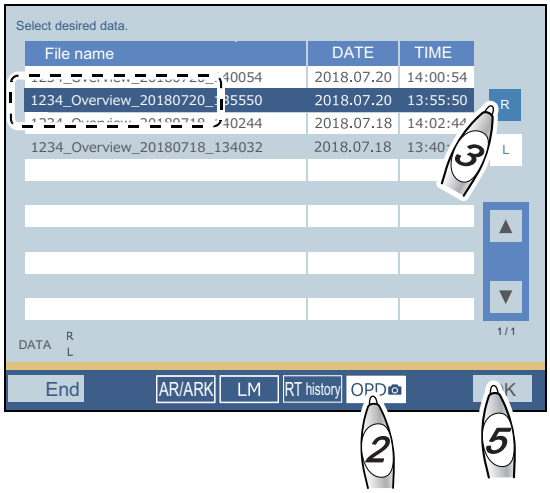
- If the file name of an OPD image becomes too long, it may become difficult to read due to the reduction in font size. When exporting image files from the OPD-Scan III series, keep the following in mind for file names:
  - Less than 20 characters when “Patient’s Name” is selected
  - Less than 60 characters for manual entry

5.12.1 Importing OPD images

To display OPD images, OPD images need to be imported from the shared folder.

One image of the right eye and left eye each can be imported.

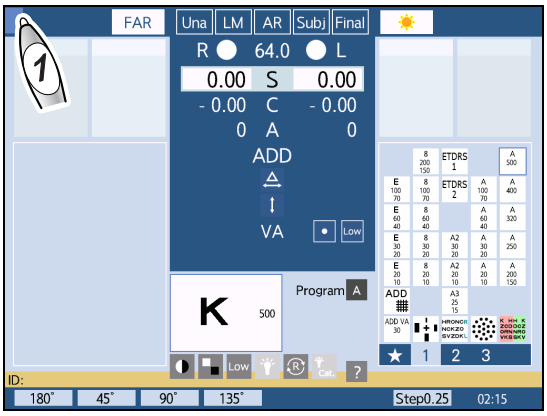
1. Press Input.
2. Press the function button OPD.
3. Press [R].
4. Select the desired image data.
5. Press OK or the dial button.
6. Press Input.
7. Press [L].
8. Select the desired image data.
9. Press OK or the dial button.



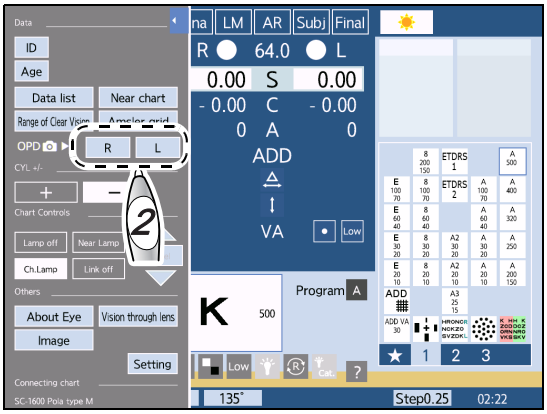
5.12.2 Displaying OPD images

1 Press .

The side menu is displayed.



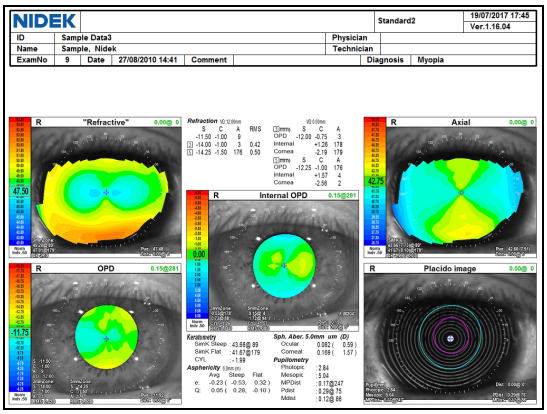
2 Press [R] or [L] to select the desired image.



3 OPD images are displayed.

Pressing R or L allows image switching between the right-eye image and left-eye image.

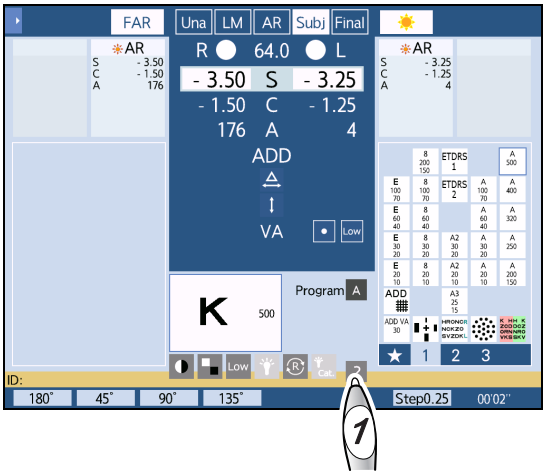
4 Press the dial button to return to the measurement screen.



5.13 Displaying Chart Description

- This section explains how to display the help screen that provides the description of the presented chart.
- The near chart of the SSC-100 is not supported.

1 Press [?].

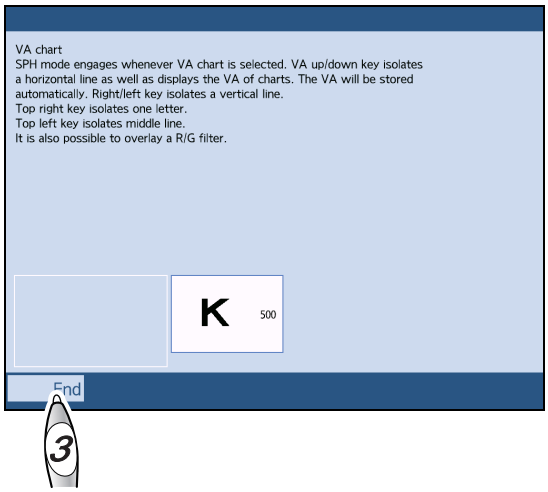


2 The help screen that provides the descriptions of the chart presented is displayed.

Note

- The assist message (refraction questioning) is displayed during refraction program.

3 Press [End] to return to the measurement screen.



5.14 Saving Charts as Favorites

■ This section explains how to save charts that are frequently used as favorites and select them easily.

■ The following three procedures are provided:

- Saving charts as favorites
- Selecting charts saved as favorites
- Clearing charts saved as favorites

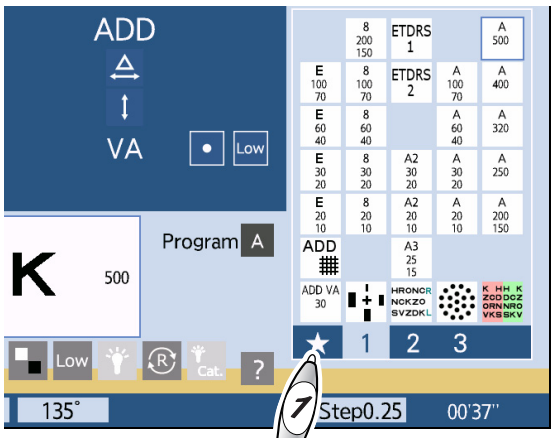
Note

- A maximum of 15 charts can be saved as favorites.
- Charts saved as favorites are retained after the device is turned off.

5.14.1 Saving charts

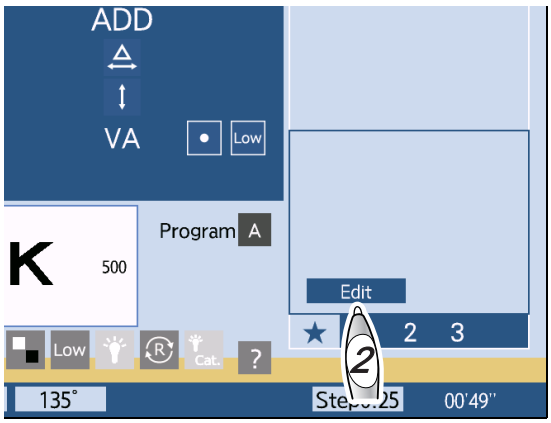
1 Press ★.

The Favorites area is displayed.



2 Press [Edit].

The device enters Edit mode. The Favorites area moves to the left with the cursor inside it.

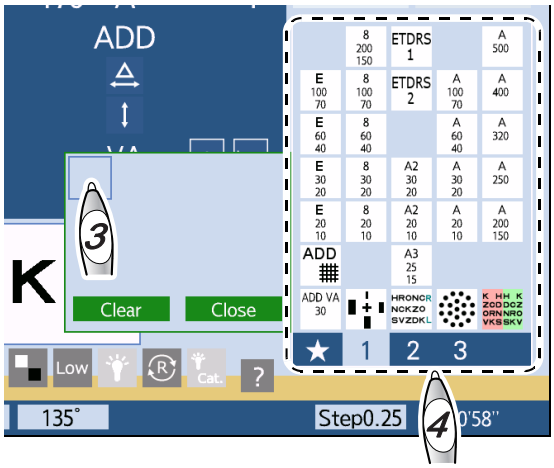


3 Move the cursor to the position where a chart is to be placed.

4 Select the icon of the desired chart in the chart select area.

The selected chart is saved as a favorite. The icon is displayed at the position specified in Step 3.

5 Repeat Steps 3 to 4 until all charts are added as favorites.

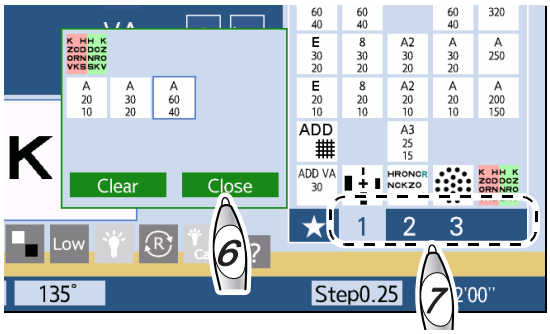


6 Press [Close].

The device exits from Edit mode.

7 Press one of the page buttons [1]-[4] in the chart select area.

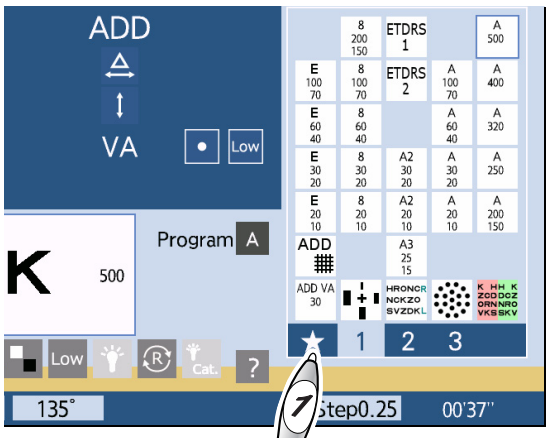
The Favorites area is closed.



5.14.2 Selecting saved charts

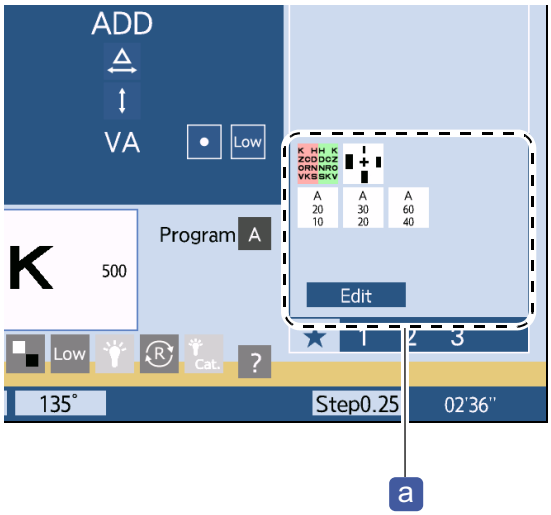
1 Press ★.

The Favorites area is displayed.



2 Select the icon of the desired chart in the Favorites area a.

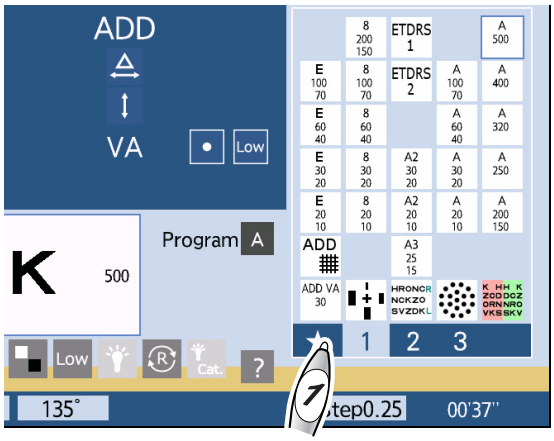
The selected chart is presented.



5.14.3 Clearing saved charts

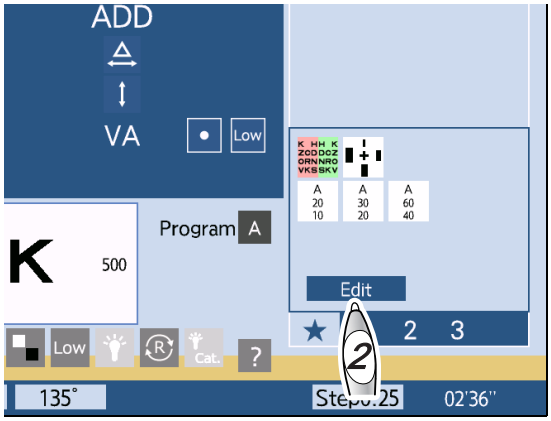
1 Press ★.

The Favorites area is displayed.



2 Press [Edit].

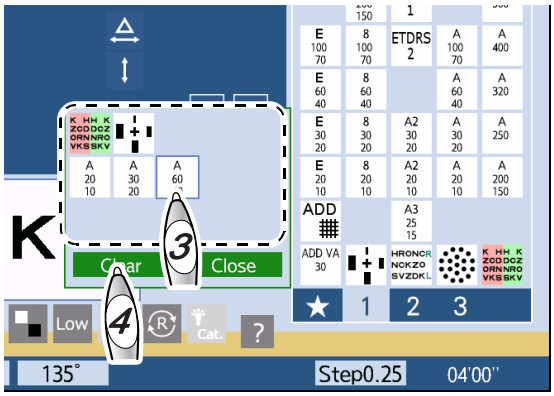
The device enters Edit mode. The Favorites area moves to the left with the cursor inside it.



3 Select the chart icon to be cleared.

4 Press [Clear].

The saved chart is cleared. The icon selected in Step 3 is removed from the Favorites area.



5.15 Tilting the Refractor Head

■ This section explains how to tilt the refractor head using the optional refractor head tilt unit.

■ When nearby objects are viewed, the visual line is not horizontal but diagonally downward. The refractor head tilt unit is used to tilt the refractor head so that the patient can look through the refractor head in a near vision position during the near vision test.

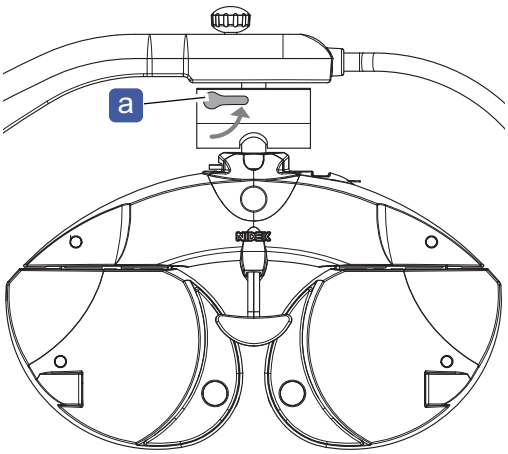
⚠ CAUTION

- Check that the refractor head is locked at the vertical position (not tilted) before turning on the device.
- When tilting the refractor head, maintain a distance of 20 cm or more between the refractor head and the patient's face.
- Release the lock before tilting the refractor head.
  Tilting the refractor head without releasing the lock may result in malfunction.
- Check that the refractor head tilt unit is locked before refraction.
  An improper refractor head movement may cause injury.

Note

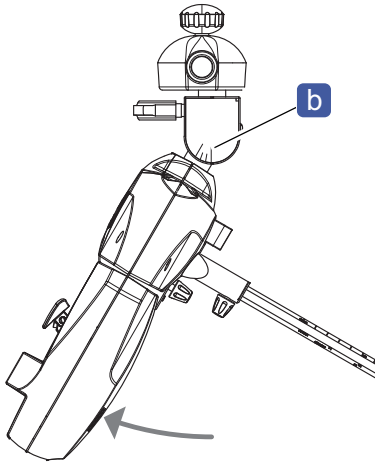
- The lever of the refractor head tilt unit is released by pulling it forward, which allows you to change its basic position. Therefore, the position of the lever in the locked state and unlocked state may differ from the figure in this manual.
- The lever of the refractor head tilt unit may be attached to either the patient's side or the operator's side. This manual shows the figures attached to the patient's side.

1 Turn the lever a of the refractor head tilt unit counterclockwise to unlock it.

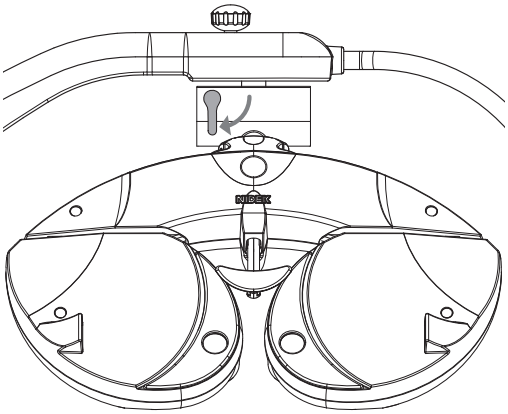


2 Tilt the refractor head.

As a guide of the tilting angle, markings b (0°, 10°, 20°, 30°) are provided on the side of the refractor head tilt unit.



3 Turn the lever clockwise to lock the inclination of the refractor head.



- Turn the lever clockwise to lock the inclination of the refractor head until the refractor head does not move.
- Hold the refractor head by hand until locked.
- Release your hand after ensuring that the refractor head is locked.
- To release the lock, turn the lever counterclockwise while holding the refractor head by hand.
- When locking the refractor head after returning the refractor head to the vertical position (no inclination), push the refractor head completely to the operator's side and then lock it. Otherwise, the refractor head may spring back to the tilting position.
- Repeatedly overtightening the lever may weaken the lock mechanism. If the lever can be locked only by tightening it firmly, parts replacement is necessary. Contact Nidek or your authorized distributor.

6 PARAMETER SETTING

6.1 Parameter Setting

■ This section explains how to change parameter settings.

■ Parameters are divided into the following three groups. Parameter settings can be changed on each dedicated screen.

- Refraction settings

  "6.1.1 Changing parameter settings" (page 219)

- Network settings

  "6.1.2 Changing network settings" (page 231)

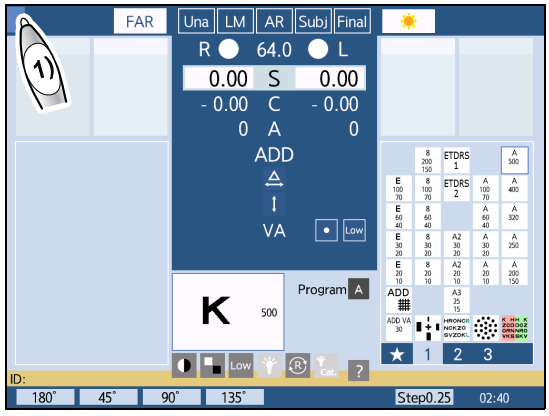
- Barcode scanner or magnetic card reader settings

  "6.1.3 Changing barcode scanner or magnetic card reader settings" (page 247)

1 Display the menu screen.

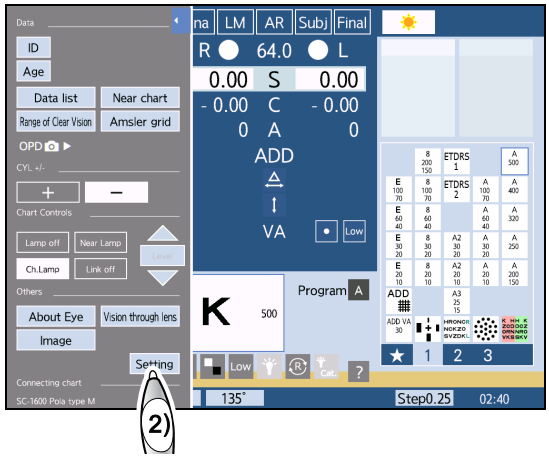
1) Press .

The side menu is displayed.



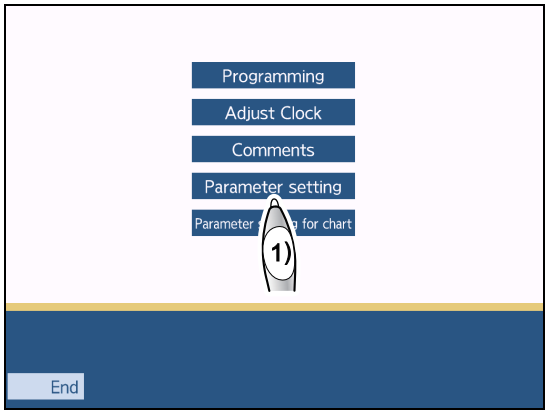
2) Press [Setting].

The menu screen is displayed.

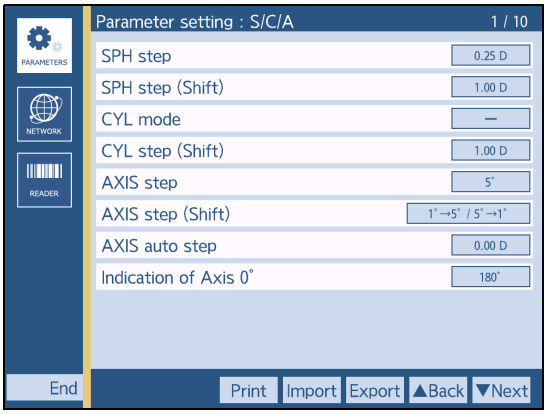


2 Display the desired parameter setting screen.

1) Press [Parameter setting].
The parameter setting screen is displayed.



2) To display the network setting screen, press  . To display the reader setting screen, press  .



3 With [▲Back] or [▼Next], display the page on which the parameter to be changed is displayed.

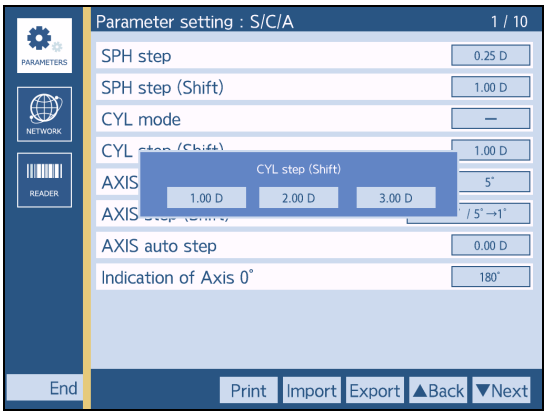
4 Press the setting field of the parameter to be changed.

- For two options

  Pressing the setting field toggles the setting.

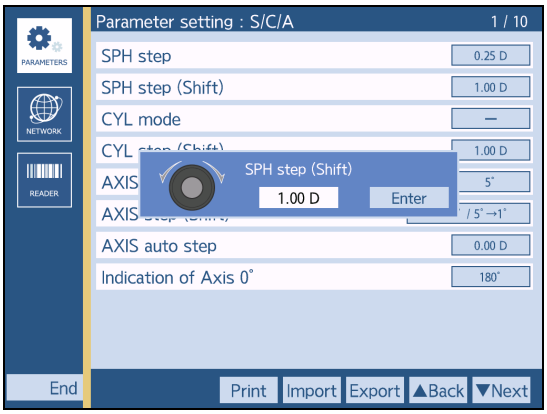
- For three options

  1) A dialog box is displayed.
  2) Select the desired setting button.



- For four or more options

  1) A dialog box is displayed.
  2) Change the setting using the dial.
  3) Press [Enter].



5 As necessary, change the parameter settings in the same procedure as in Steps 3 to 4.

6 Press End to return to the menu screen.

7 Press End to return to the measurement screen.

8 Press Output while holding down Shift to reflect setting changes.

6.1.1 Changing parameter settings

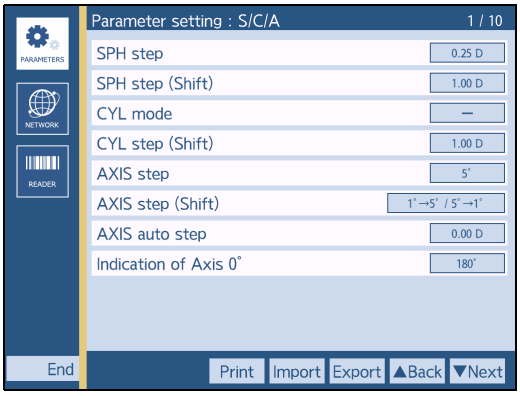
This section provides parameter settings for other than barcode scanner, magnetic card reader, and network.

The underlined **setting options** in bold indicate the factory default settings.

The description contained in parentheses is printed on the printout.

◆ Sphere, cylinder, and axis settings

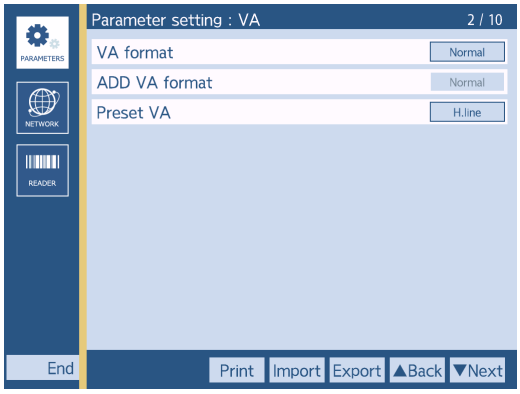
Parameter: Sphere/Cylinder/Axis



Parameter	Setting options
SPH step (SPH step)	0.12 D, **0.25 D**
	Selects the sphere value increments.
SPH step (Shift) (SPH step(Shift))	0.50 D, 0.75 D, **1.00 D**, 1.25 D, 1.50 D, 1.75 D, 2.00 D, 2.25 D, 2.5 D, 2.75 D, 3.00 D
	Selects the sphere value increments of when the sphere value is changed while Shift is held.
CYL mode (CYL mode)	+, **–**
	Sign of cylinder values

CYL step (Shift) (CYL step(Shift))	**1.00 D**, 2.00 D, 3.00 D
	Selects the cylinder value increments of when the cylinder value is changed while Shift is held.
AXIS step (AXIS step)	1°, **5°**
	Selects the axis value increments.
AXIS step (Shift) (AXIS step(Shift))	1° → 5° / 5° → 15°, **1° → 5° / 5° → 1°**
	Selects the axis value increments (15° or 1°) of when the axis value is changed while Shift is held with the parameter “AXIS step” set to 5°.
AXIS auto step (AXIS auto step)	**0.00 D** to 4.00 D
	During cylinder axis refinement using a cross cylinder lens, the axis step becomes 5° when the cylinder value is less than this setting. The axis step becomes 1° when the cylinder value is this setting or greater. This value can be changed in 0.25 D increments. The axis step does not change regardless of the cylinder value when this setting is 0.00 D.
Indication of Axis 0° (Indication of Axis 0°)	0°, **180°**
	Selects the axis value of when the cylinder axis is horizontal. * 0° regardless of this setting when the cylinder value is 0.00 D.

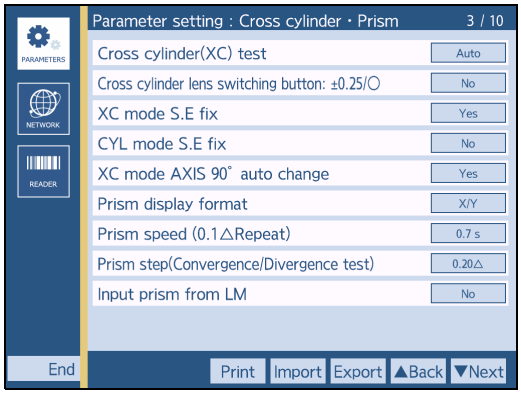
◆ Visual acuity settings

Parameter: Visual acuity	
	
Parameter	Setting options
VA format (VA format)	**Normal**, 5-mark record (Normal, 5-mark record)
	Selects the notation for near or distance vision. * “5-mark record” is a notation of visual acuity value that is mainly used in China.
ADD VA format (ADD VA format)	**Normal** (fixed) (Normal)
	Selects the notation for near vision with addition.

Preset VA (Preset VA)	1 letter, **H.line**, No (1 letter, H. line, No)
	Selects whether to present estimated visual acuity charts. 1 letter: Single letter display H.line: Horizontal line display No: Does not present estimated visual acuity charts. * An estimated visual acuity is calculated based on AR data or LM data. A visual acuity chart with the estimated visual acuity is presented at the start of measurement for unaided visual acuity or visual acuity corrected by glasses.

◆ Cross cylinder and prism settings

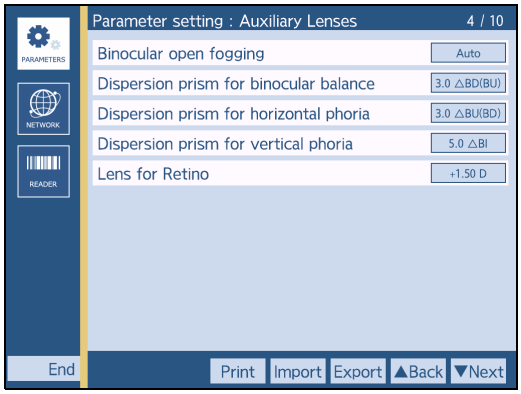
Parameter: Cross cylinder and prism



Parameter	Setting options
Cross cylinder(XC) test (Cross cylinder(XC) test)	**Auto**, ±0.25 D, ±0.50 D, ±0.25 D/○ (Auto, ±0.25D, ±0.50D, ±0.25D/○)
	Selects the cross cylinder lens placed in the cross cylinder test. Auto: Auto cross cylinder lens ±0.25 D: ±0.25 D flipping cross cylinder lens ±0.50 D: ±0.50 D flipping cross cylinder lens ±0.25 D: ±0.25 D switches between flipping cross cylinder lens and open aperture. However, it cannot be switched in AXIS mode.
Cross cylinder lens switching button: ±0.25/○ (XC lens switch: ±0.25/○)	Yes, **No** (Yes, No)
	Selects whether to display [±0.25/○] on the function button used to switch the cross cylinder lens in the cross cylinder test.
XC mode S.E fix (XC mode SE fix)	**Yes**, No (Yes, No)
	Selects whether to change the sphere value automatically to retain the spherical equivalent (SE) value when the cylinder value is changed during cylinder refinement in the cross cylinder test.
CYL mode S.E fix (CYL mode SE fix)	Yes, **No** (Yes, No)
	Selects whether to change the sphere value automatically to retain the spherical equivalent (SE) value when the cylinder value is changed during normal cylinder refinement.

XC mode AXIS 90° auto change (XC mode AXIS90° auto chg)	**Yes**, No (Yes, No)
	Selects whether to automatically rotate the axis 90 degrees when a plus reaction is given for -0.00 D during cylinder refinement in the cross cylinder test.
Prism display format (Prism display format)	**X/Y**, rθ
	Selects the prism display format. X/Y: Rectangular coordinates rθ: Polar coordinates
Prism speed (0.1ΔRepeat) (Prism speed (0.1Δ inc))	1.0 s, **0.7 s**, 0.5 s, 0.2 s (1.0 s, 0.7 s, 0.5 s, 0.2 s)
	Pressing and holding the + or − button changes the prism value in 0.1Δ increments continuously. Select the time required to change 0.1Δ at this time.
Prism step(Convergence/Divergence test) (Prism step (Conv./Div.))	**0.20**Δ, 1.00Δ
	Selects the prism value increments during the convergence or divergence test. The setting value is for both eyes.
Input prism from LM (Input prism from LM)	Yes, **No** (Yes, No)
	Selects whether to include prism values when LM data is imported from a lensmeter.

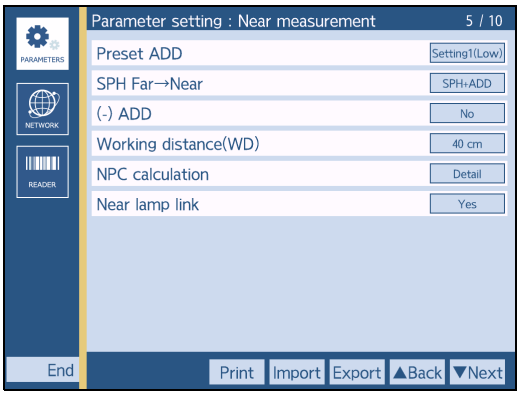
◆ Auxiliary lens settings

Parameter: Auxiliary lenses	
	
Parameter	**Setting options**
Binocular open fogging (Binocular open fogging)	0.00 D to 9.00 D, **Auto** (default setting: 1.75 D)
	Specifies the fog amount placed when measurement is performed with both eyes open.
Dispersion prism for binocular balance (Disp prism (bin balance))	**3.0ΔBD (BU)** to 10.0ΔBD (BU)
	Specifies the dispersion prism for binocular balance. BD indicates that a prism is placed in the right eye and BU indicates a prism placed in the left eye. ex.: 3.0ΔBD (BU): R 3.0ΔBD / L 3.0ΔBU
Dispersion prism for horizontal phoria (Disp prism (hor phoria))	**3.0ΔBU (BD)** to 10.0ΔBU (BD)
	Specifies the dispersion prism for horizontal phoria. BU indicates that a prism is placed in the right eye and BD indicates a prism placed in the left eye. ex.: 3.0ΔBU (BD): R 3.0ΔBU / L 3.0ΔBD

Dispersion prism for vertical phoria (Disp prism (ver phoria))	**5.0ΔBI** to 15.0ΔBI
	Specifies the dispersion prism for vertical phoria.
Lens for Retino (Lens for Retino)	0.00 D, **+1.50 D**, +2.00 D
	Selects the spherical lens for retinoscope. Distance between the refractor head and retinoscope: 67 cm: +1.50 D 50 cm: +2.00 D

◆ Near vision test settings

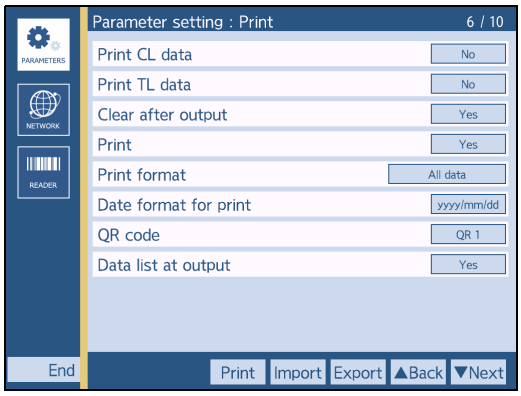
Parameter: Near vision test



Parameter	Setting options
Preset ADD (Preset ADD)	**Setting1(Low)**, Setting2(High), No (Setting1(Low), Setting2(High), No)
	Selects whether to enter the patient's age and preset the estimated addition when ADD, ADD ###, or ADD VA 30 is pressed. Setting1(Low): Enters a low estimated addition. Setting2(High): Enters a high estimated addition. No: Does not enter any estimated addition.
SPH Far→Near (SPH Far→Near)	SPH, **SPH+ADD** (SPH, SPH+ADD)
	The sphere, cylinder, and axis values for distance vision are copied when the device is switched from Distance mode to Near mode. Selects whether the sphere value is copied as it is or the sphere value with addition is copied.
(-)ADD ((-)ADD)	Yes, **No** (Yes, No)
	Selects whether to enter minus data as addition.
Working distance(WD) (Working distance(WD))	35 cm, **40 cm**, 45 cm, 50 cm, 55 cm, 60 cm, 65 cm, 70 cm
	Selects the working distance. * The distance is fixed to 40 cm when the SSC-100 is connected.

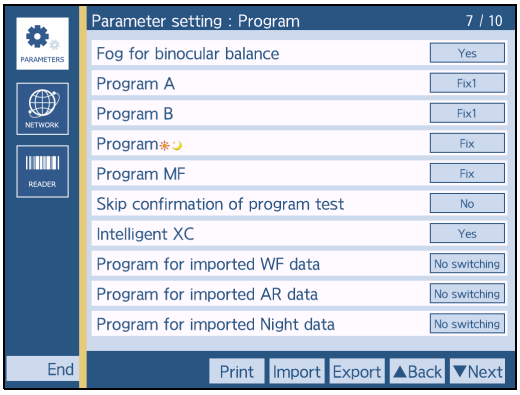
NPC calculation (NPC calculation)	**Detail**, Simple (Detail, Simple)
	Selects whether to include the distance (0.012 + 0.013 = 0.025) between the root of the patient's nose (the inner side of glasses lens) and the cycloduction point when the meter angle (MA) is calculated for the near point of convergence. Detail: Calculates including 0.025. Simple: Calculates without including 0.025.
Near lamp link (Near lamp link)	**Yes**, No, Other than grid (Yes, No, Other than grid)
	Selects whether to automatically turn on or off the near point lamp in conjunction with convergence. Yes: The near point lamp automatically illuminates in ADD mode or Near mode. No: The near point lamp does not illuminate automatically. Other than grid: The near point lamp automatically illuminates in ADD mode or Near mode. It does not illuminate when the Grid chart for near vision is selected. * This setting is not supported when the SSC-100 is connected.

◆ Print settings

Parameter: Printing	
	
Parameter	**Setting options**
Print CL data (Print CL data)	Yes, **No** (Yes, No)
	Selects whether to print the contact lens conversion value of the subjective data together with regular data.
Print TL data (Print TL data)	Yes, **No** (Yes, No)
	Selects whether to print the trial lens data based on the prescription data. If the device does not have any prescription data, the subjective data is printed.
Clear after output (Clear after output)	**Yes**, No (Yes, No)
	Selects whether to clear measurement data automatically after printing or data export.
Print (Print)	**Yes**, No (Yes, No)
	Selects whether to print the measurement data when Output is pressed.

Print format (Print format)	**All data**, w/o AR, Unaided,Subj,Final (All data, w/o AR, Unaided, Subj, Final)
	Selects the contents to be printed. All data: All data w/o AR: All data excluding AR values Unaided,Subj,Final: Unaided visual acuity values, subjective values, and prescription values data
Date format for print (Date format for print)	**yyyy/mm/dd**, mm/dd/yyyy,dd/mm/yyyy (yyyy/mm/dd, mm/dd/yyyy, dd/mm/yyyy)
	Selects the format of date to be printed (the following is an example for August 20, 2018). yyyy/mm/dd: 2018. 8.20 mm/dd/yyyy: AUG/20/2018 dd/mm/yyyy: 20/AUG/2018
QR code (QR code)	QR 1, QR 2, **Off** (QR 1, QR 2, Off)
	Selects whether to print a QR code. Select the data to be printed together with the QR code as well. QR 1: The final data (subjective or prescription data) and its QR code are printed. QR 2: The QR code of the final data and all data are printed.
Data list at output (Data list at output)	**Yes**, No (Yes, No)
	Selects whether to display the data list screen before data export or printing when Output is pressed. When [Yes] is selected, confirm that there is no skipped measurement on the data list screen, then press Output again.

◆ Program settings

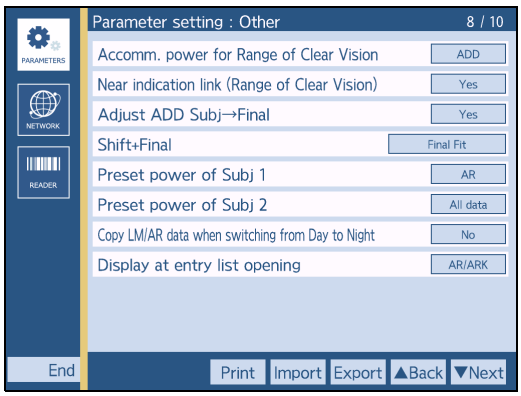
Parameter: Refraction program	
	
Parameter	Setting options
Fog for binocular balance (Disp prism (bin balance))	**Yes**, No (Yes, No)
	Selects whether to fog the vision automatically in the binocular balance test during refraction program.

Program A (Program A)	**Fix1**, Fix2, User (Fix 1, Fix 2, User)
	Program A contents Fix1: Pre-written program A Standard 1 Fix2: Pre-written program A Standard 2 User: Program rewritten by the user
Program B (Program B)	**Fix1**, Fix2, User (Fix 1, Fix 2, User)
	Program B contents Fix1: Pre-written program B Standard 1 Fix2: Pre-written program B Standard 2 User: Program rewritten by the user
Program (Program)	**Fix**, User (Fix, User)
	Program contents Fix: Pre-written program User: Program rewritten by the user
Program MF (Program MF)	**Fix**, User (Fix, User)
	Program MF (open aperture) contents Fix: Pre-written program MF User: Program rewritten by the user
Skip confirmation of program test (Test skip confirmation)	Yes, **No** (Yes, No)
	Selects whether to display the confirmation dialog box when attempting to proceed to the next test without conducting any test during refraction program.
Intelligent XC (Intelligent XC)	**Yes**, No (Yes, No)
	When the setting is [Yes] in the cross cylinder test of the refraction program, the following are performed, which allows the test to be performed easily. CYL = 0: The confirmation message asking whether to skip the cross cylinder test and previous red-green test appears. CYL = 0.25: The cross cylinder test is performed in the order of cylindrical power, cylinder axis, and cylindrical power. When the cylinder value is 0 in the first cylinder test, the next cross cylinder test is not performed. CYL ≥ 0.5: The cross cylinder test is performed in the order of cylinder axis and cylindrical power. When the setting is [No], the cross cylinder test is performed in the programmed order regardless of the cylinder value.
Program for imported WF data (Program for WF data(OPD))	A, B, C, D, E, , MF, **No switching** (A, B, C, D, E, , MF, No switching)
	Selects a program automatically set when Wave Front data is entered. * is not displayed when the CP-9, CP-770, or SSC-330 Type T is connected.

Program for imported AR data (Program for AR data(OPD))	A, B, C, D, E, , MF, **No switching** (A, B, C, D, E, , MF, No switching)
	Selects a program automatically set when AR median data is entered. * is not displayed when the CP-9, CP-770, or SSC-330 Type T is connected.
Program for imported Night data (Prog for night data(OPD))	A, B, C, D, E, , MF, **No switching** (A, B, C, D, E, , MF, No switching)
	Selects a program automatically set when the mode is changed to Night mode with day and night data entered. * is not displayed when the CP-9, CP-770, or SSC-330 Type T is connected.

◆ Other settings

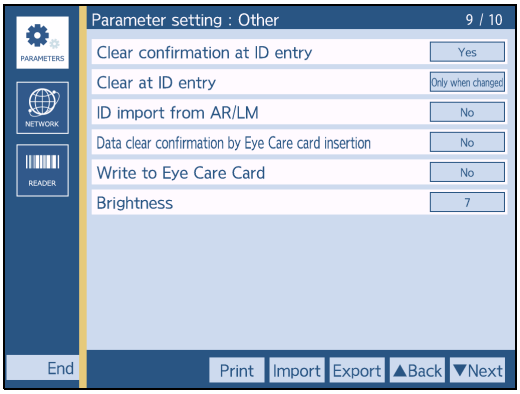
Parameter: Other 1



Parameter	Setting options
Accomm. power for Range of Clear Vision (Acc. for clear vision)	**ADD**, NPA, Age, Manual (ADD, NPA, Age, Manual)
	Selects which accommodation value is used for calculation of clear vision range checking. ADD: Accommodation calculated from addition value NPA: NPA value Age: Accommodation calculated from age Manual: Manual value entry
Near indication link (Range of Clear Vision) (Clear vision near link)	**Yes**, No (Yes, No)
	Selects whether to switch the distance / near indication automatically along with the lens type when the lens type is changed with the data window displayed during clear vision range checking.
Adjust ADD Subj→Final (Adjust ADD Subj→Final)	**Yes**, No (Yes, No)
	Selects whether to automatically set the addition obtained by the difference between sphere and cylinder values of the subjective data and prescription data to the prescription data when ADD is pressed in Final mode. This setting is not supported when the subjective data does not include any addition.

Shift+Final (Shift+Final)	**Final Fit**, Copy the data (Final Fit, Copy the data)
	Selects the function of when Final is pressed while Shift is held. Final Fit: Enters Auto adjustment mode for distance vision. *"5.5.1 Distance power auto adjustment" (page 181)* Copy the data: Copies the displayed numeric values to the prescription field regardless of whether data in Final mode is present.
Preset power of Subj 1 (Preset power of Subj 1)	**AR**, LM (AR, LM)
	Selects the data to be used initially for subjective refraction when data is entered in both the AR and LM fields. AR values are used for the pupillary distance. If only monocular data is entered, that data is used.
Preset power of Subj 2 (Preset power of Subj 2)	**All data**, CYL=0,Clear (All data, CYL = 0, Clear)
	Selects whether to use the data entered as the preset value (see "Preset power of Subj 1") without any correction. All: Uses all data without any correction. CYL = 0: Enters sphere only (cylinder and axis are "0"). Clear: Enters "0" for all data. Entry using the dial does not function.
Copy LM/AR data when switching from Day to Night (Day -> Night copy AR/LM)	Yes, **No** (Yes, No)
	Selects whether to copy the day data to the unentered night LM value and night AR value fields when Day mode is switched to Night mode. It is selectable only when a chart presenting device with the night vision test function is connected.
Display at entry list opening (Display at list opening)	**AR/ARK**, LM, RT (AR/ARK, LM, RT)
	Selects which data is displayed on the import data select screen when Input is pressed.

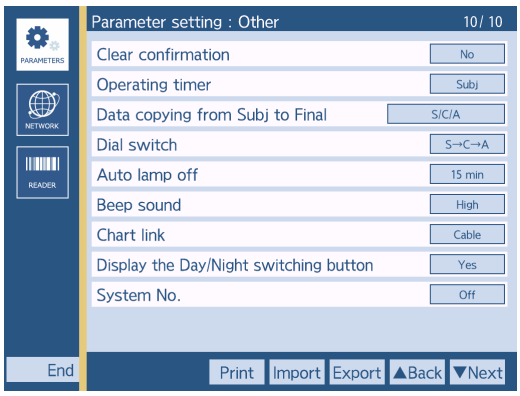
Parameter: Other 2



Parameter	Setting options
Clear confirmation at ID entry (ID entry clear confirm)	**Yes**, No (Yes, No)
	Selects whether to display a message confirming to enter data after the current measurement data is cleared when the patient ID is entered or changed.

Clear at ID entry (Clear at ID entry)	Yes, No, **Only when changed** (Yes, No, Only when changed)
	Selects whether to clear the current measurement data when the patient ID is entered or changed with the parameter “Clear confirmation at ID entry” set to “No”. Yes: Clears data. No: Does not clear data. Only when changed: Clears only when the patient ID is changed.
ID import from AR/LM (ID import from AR/LM)	Yes, **No** (Yes, No)
	Selects whether to import the patient ID of the AR or LM data.
Data clear confirmation by Eye Care card insertion (Card insert clr. confirm)	Yes, **No** (Yes, No)
	Selects whether to display a message confirming to enter data after the current measurement data is cleared when data is entered in the device via an Eye Care card.
Write to Eye Care Card (Write to Eye Care Card)	Yes, **No** (Yes, No)
	Selects whether to use the function for writing refraction data to an Eye Care card (IC card). Selecting [Yes] writes refraction data for one person to the Eye Care card when printing is performed or data is exported to a computer with the Eye Care card inserted. *“5.11 Reading or Writing Measurement Data using Eye Care Card” (page 206)*
Brightness (Brightness)	1 to **7**
	Sets the brightness of the control box touch screen.

Parameter: Other 3



Parameter	Setting options
Clear confirmation (Clear confirmation)	Yes, **No** (Yes, No)
	Selects whether to display the clear confirmation dialog box before data is cleared with Shift + Output.

Operating timer (Operating timer)	**Subj**, Prog., No (Subj, Prog., No)
	Selects whether to display and print the refraction time. Subj: Measures the refraction time from the entry of subjective data. Prog.: Measures the refraction time from the start of the refraction program. No: Does not measure the refraction time.
Data copying from Subj to Final (Subj to Final copy data)	**S/C/A**, S/C/A/VA/ADD, S/C/A/VA/ADD/Prism, All data (S/C/A, S/C/A/VA/ADD, S/C/A/VA/ADD/Prism, All data)
	Selects the data to be copied when data is copied from Subjective mode to Final mode.
Dial switch (Dial switch)	**S→ C→ A**, S→C→A→VA, S→A →C, S→A→C→VA (S→C→A, S→C→A→VA, S→A→C, S→A→C→VA)
	Selects the dial switch function. Pressing the button switches the mode of SPH, CYL, AXIS, and VA in the selected order.
Auto lamp off (Auto lamp off)	Off, 5 min, **15 min**, 30 min (Off, 5 min, 15 min, 30 min)
	Selects whether to enable Auto light off mode or the time setting that the device goes into Auto light off mode when the device is idle.
Beep sound (Beep sound)	**High**, Low, Off (High, Low, Off)
	Selects the beep tone produced by pressing a button.
Chart link (for other than SC series) (Chart link)	**Yes**, No (Yes, No)
	Select [Yes] when using a Nidek chart presenting device.
Chart link (for SC series) (Chart link)	**Cable**, Wireless 1 to 8, No (Cable, Wireless 1-8, No)
	Selects the communication method with SC series. Cable: Connected using cables. Wireless1 to 8: Communication channel when the optional infrared communication unit is used. No: Does not communicate.
Display the Day/Night switching button (Day/Night switch display)	Yes, **No** (Yes, No)
	Selects whether to display  or  .  or  is displayed regardless of this setting when day or night data has been entered.
System No. (System No.)	**Off**, 1 to 10 (Off, 1 to 10)
	Assigns the system No. to identify devices when multiple RT-6100s are used. Off: Does not add a system number to the xml file to be output. 1 to 10: Assigns a system number to the xml file be output.

6.1.2 Changing network settings

This section provides network parameter settings.

There are parameters regarding the control box (CB), relay box (RB), and other. Those parameters are switched by function buttons.

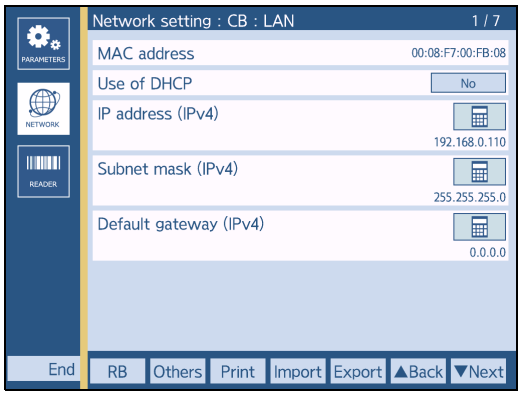
The underlined **setting options** in bold indicate the factory default settings.

The description contained in parentheses is printed on the printout.

- After completing network settings, turn off and on the device to reflect setting changes.

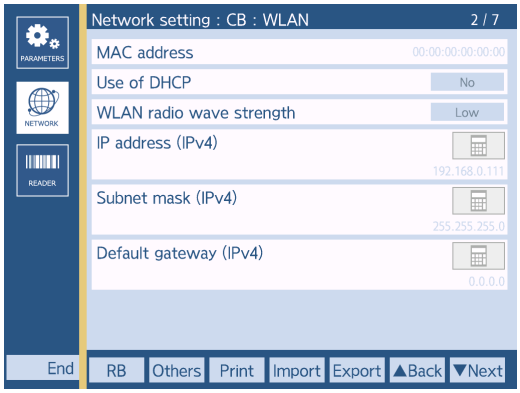
◆ Wired LAN settings of control box

Network: CB: LAN setting

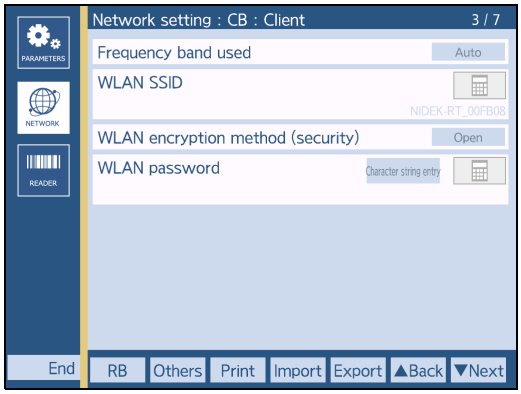


Parameter	Setting options
MAC address (MAC address)	Displays a MAC address in the wired LAN. It cannot be changed.
Use of DHCP (Use of DHCP)	Yes, **No** (Yes, No)
	When [Yes] is selected, the DHCP server assigns the IP address, subnet mask, and default gateway automatically if provided. In this case, the IP address, subnet mask, and default gateway cannot be changed.
IP address (IPv4) (IP address (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 192.168.0.110)
	Enter the IP address for the wired LAN.
Subnet mask (IPv4) (Subnet mask (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 255.255.255. 0)
	Enter the subnet mask for the wired LAN.
Default gateway (IPv4)) (Default gateway (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 0. 0. 0. 0)
	Enter the default gateway for the wired LAN.

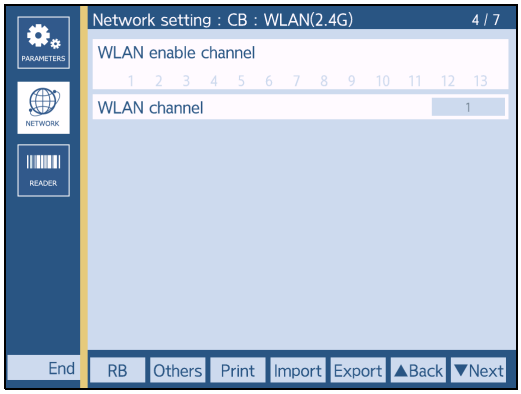
◆ Wireless LAN settings of control box

Network: CB: WLAN	
	
Parameter	**Setting options**
MAC address (MAC address)	Displays MAC address in the wireless LAN. It cannot be changed.
Use of DHCP (Use of DHCP)	Yes, **No** (Yes, No)
	When [Yes] is selected, the DHCP server assigns the IP address, subnet mask, and default gateway automatically if provided. In this case, the IP address, subnet mask, and default gateway cannot be changed.
WLAN radio wave strength (WLAN radio intensity)	**Low**, Medium, High (Low, Medium, High)
	Selects the wireless LAN radio intensity.
IP address (IPv4) (IP address (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 192.168.0.111)
	Enter the subnet mask for the wireless LAN.
Subnet mask (IPv4) (Subnet mask (IPv4)))	0-255. 0-255. 0-255. 0-255 (default setting: 255.255.255. 0)
	Enter the subnet mask for the wireless LAN.
Default gateway (IPv4) (Default gateway (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 0. 0. 0. 0)
	Enter the default gateway for the wireless LAN.

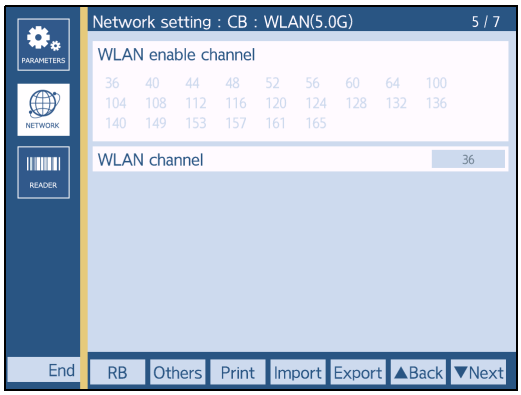
◆ Wireless LAN settings of control box (client mode)

Network: CB: Client	
	
Parameter	**Setting options**
Frequency band used (Frequency band used)	2.4 GHz, 5 GHz, **Auto** (2.4 GHz, 5 GHz, Auto)
	Selects the frequency used for the wireless LAN.
WLAN SSID (WLAN SSID)	A maximum of 32 alphanumeric characters (default setting: NIDEK-RT_FFFFFF)
	Enter the SSID of the access point to be connected.
WLAN encryption method (security) (WLAN encrypt (security))	**Open**, WPA, WPA2, WPA/WPA2, WEP64, WEP128 (Open, WPA, WPA2, WPA/WPA2, WEP64, WEP128)
	Select the same setting as the access point to be connected.
WLAN password (WLAN password)	WPA: A maximum of 63 alphanumeric characters WPA2: A maximum of 63 alphanumeric characters WEP64: 5 alphanumeric characters WEP128: 13 alphanumeric characters
	Select the same setting as the access point to be connected.

◆ Wireless LAN 2.4 GHz settings of control box

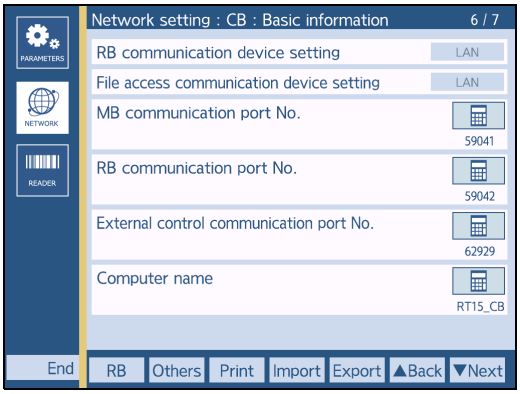
Network: CB: WLAN (2.4 G)	
	
Parameter	Setting options
WLAN enable channel (WLAN enable channel)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 (ch)
	Displays available channels. It cannot be changed. Available channels vary by region.
WLAN channel (WLAN channel)	**1**, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 (ch)
	Specifies the channel to be preferentially connected when the channel is full.

◆ Wireless LAN 5.0 GHz settings of control box

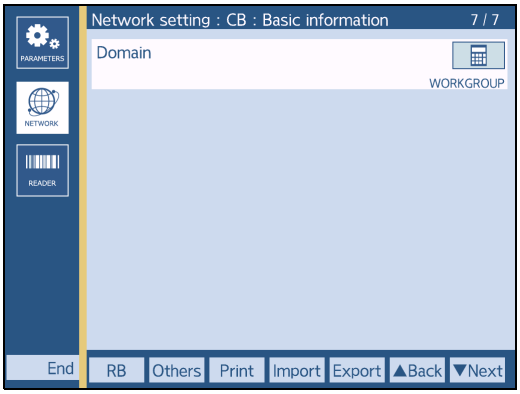
Network: CB: WLAN (5.0 G)	
	
Parameter	Setting options
WLAN enable channel (WLAN enable channel)	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (ch)
	Displays available channels. It cannot be changed. Available channels vary by region.
WLAN channel (WLAN channel)	**36**, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (ch)
	Specifies the channel to be preferentially connected when the channel is full.

◆ Basic information settings of control box

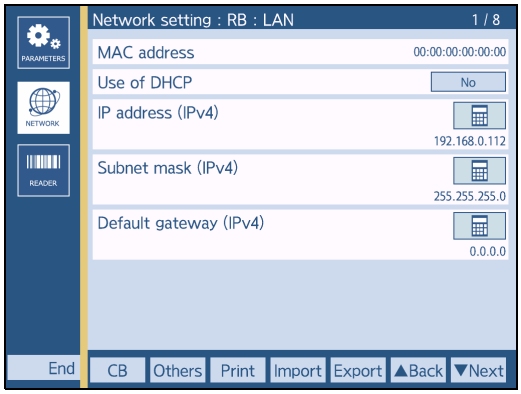
Network: CB: Basic information 1



Parameter	Setting options
RB communication device setting (RB comm device setting)	**LAN**
	Displays the communication method with the relay box. It cannot be changed.
File access communication device setting (File comm device setting)	**LAN**, WLAN
	Selects the communication method to export the measurement results from the control box.
MB communication port No. (MB comm port No.)	**59041** Setting range: 49152-65535
	Enter the refractor communication port No.
RB communication port No. (RB comm port No.)	**59042** Setting range: 49152-65535
	Enter the relay box communication port No.
External control communication port No. (Ext. ctl comm port No.)	**62929** Setting range: 49152-65535
	Enter the external control communication port No.
Computer name (Computer name)	**RT015_CB** A maximum of 15 characters
	Enter the computer name of the control box.

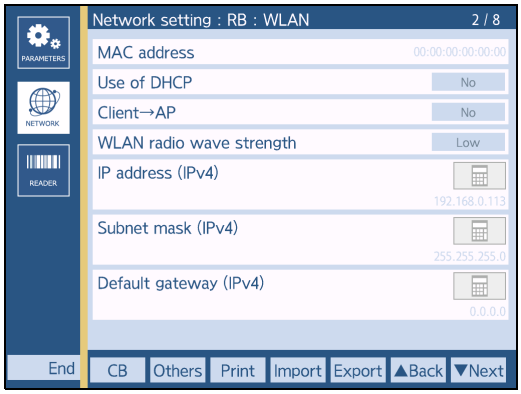
Network: CB: Basic information 2	
	
Parameter	Setting options
Domain (Domain)	**WORKGROUP** A maximum of 20 characters
	Enter the domain name to which the RT-6100 belongs.

◆ Wired LAN settings of relay box

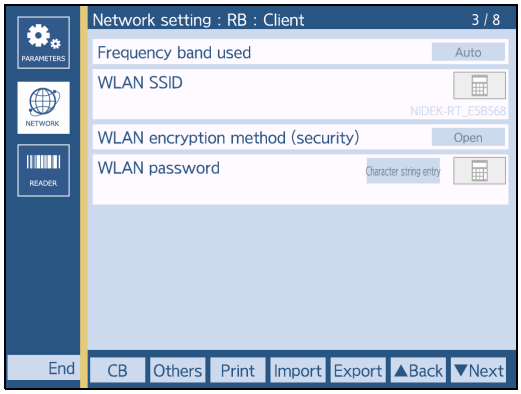
Network: RB: LAN setting


Parameter	Setting options
MAC address (MAC address)	Displays MAC address in the wired LAN. It cannot be changed.
Use of DHCP (Use of DHCP)	Yes, **No** (Yes, No)
	When [Yes] is selected, the DHCP server assigns the IP address, subnet mask, and default gateway automatically if provided. In this case, the IP address, subnet mask, and default gateway cannot be changed.
IP address (IPv4) (IP address (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 192.168.0.112)
	Enter the IP address for the wired LAN.
Subnet mask (IPv4) (Subnet mask (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 255.255.255. 0)
	Enter the subnet mask for the wired LAN.
Default gateway (IPv4) (Default gateway (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 0. 0. 0. 0)
	Enter the default gateway for the wired LAN.

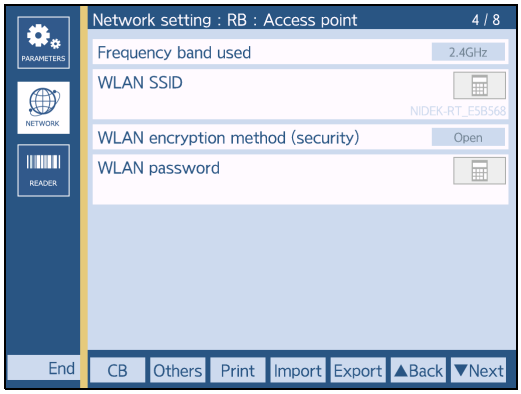
◆ Wireless LAN settings of relay box

Network: RB: WLAN setting	
	
Parameter	**Setting options**
MAC address (MAC address)	Displays MAC address in the wireless LAN. It cannot be changed.
Use of DHCP (Use of DHCP)	Yes, **No** (Yes, No)
	When [Yes] is selected, the DHCP server assigns the IP address, subnet mask, and default gateway automatically if provided. In this case, the IP address, subnet mask, and default gateway cannot be changed.
Client→AP (Client→AP)	AP, Client, Client→AP, **No** (AP, Client, Client→AP, No)
	Selects the operation mode of the wireless LAN. : Access point (master device) : Client (receiver device) : Wireless LAN mode automatically switches from the client to the access point when the access point cannot be detected. No: Does not use wireless LAN.
WLAN radio wave strength (WLAN radio intensity)	**Low**, Medium, High (Low, Medium, High)
	Selects the WLAN radio intensity.
IP address (IPv4) (IP address (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 192.168.0.113)
	Enter the subnet mask for the wireless LAN.
Subnet mask (IPv4) (Subnet mask (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 255.255.255. 0)
	Enter the subnet mask for the wireless LAN.
Default gateway (IPv4) (Default gateway (IPv4))	0-255. 0-255. 0-255. 0-255 (default setting: 0. 0. 0. 0)
	Enter the default gateway for the wireless LAN.

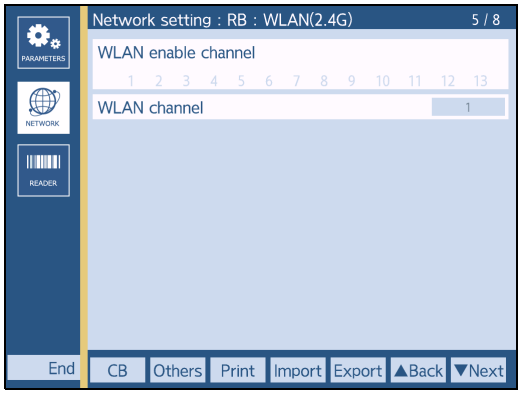
◆ Wireless LAN settings of relay box (client mode)

Network: RB: Client	
	
Parameter	**Setting options**
Frequency band used (Frequency band used)	2.4 GHz, 5 GHz, **Auto** (2.4 GHz, 5 GHz, Auto)
	Selects the frequency used for the wireless LAN.
WLAN SSID (WLAN SSID)	A maximum of 32 alphanumeric characters (default setting: NIDEK-RT_FFFFFF)
	Enter the SSID of the access point to be connected.
WLAN encryption method (security) (WLAN encrypt (security))	**Open**, WPA, WPA2, WPA/WPA2, WEP64, WEP128 (Open, WPA, WPA2, WPA/WPA2, WEP64, WEP128)
	Select the same setting as the access point to be connected.
WLAN password (WLAN password)	WPA: A maximum of 63 alphanumeric characters WPA2: A maximum of 63 alphanumeric characters WEP64: 5 alphanumeric characters WEP128: 13 alphanumeric characters
	Select the same setting as the access point to be connected.

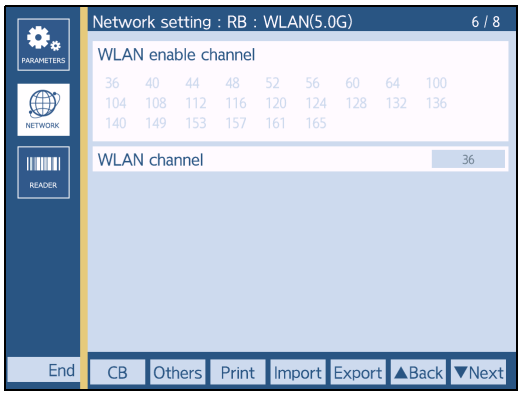
◆ Wireless LAN settings of relay box (access point)

Network: RB: Access point	
	
Parameter	**Setting options**
Frequency band used (Frequency band used)	**2.4 GHz**, 5 GHz
	Selects the frequency used for the wireless LAN.
WLAN SSID (WLAN SSID)	A maximum of 32 alphanumeric characters (default setting: NIDEK-RT_FFFFFF)
	Enter the identifier of the access point.
WLAN encryption method (security) (WLAN encrypt (security))	**Open**, WPA, WPA2, WPA/WPA2, WEP64, WEP128 (Open, WPA, WPA2, WPA/WPA2, WEP64, WEP128)
	Selects the wireless LAN cipher. Open is a state without security.
WLAN password (WLAN password)	WPA: A maximum of 63 alphanumeric characters WPA2: A maximum of 63 alphanumeric characters WEP64: 5 alphanumeric characters WEP128: 13 alphanumeric characters
	Enter PSK (Pre-Shared Key) of the security method selected in “WLAN encryption method (security)”.

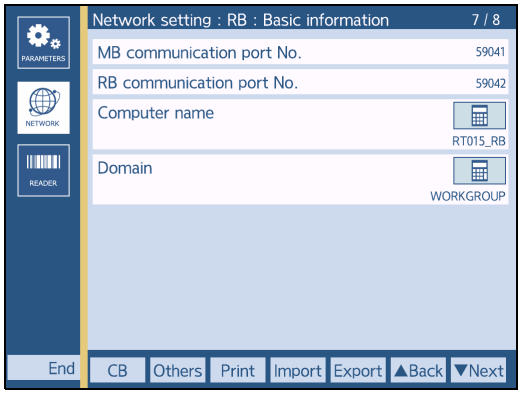
◆ Wireless LAN 2.4 GHz settings of relay box

Network: RB: WLAN (2.4 G)	
	
Parameter	Setting options
WLAN enable channel (WLAN enable channel)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 (ch)
	Displays available channels. It cannot be changed. Available channels vary by region.
WLAN channel (WLAN channel)	**1**, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 (ch)
	Specifies the channel to be preferentially connected when the channel is full.

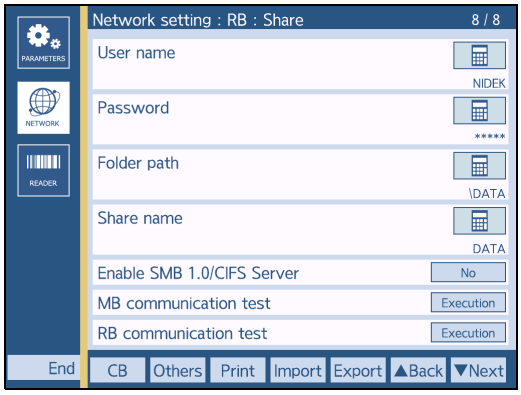
◆ Wireless LAN 5.0 GHz settings of relay box

Network: RB: WLAN (5.0 G)	
	
Parameter	Setting options
WLAN enable channel (WLAN enable channel)	36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (ch)
	Displays available channels. It cannot be changed. Available channels vary by region.
WLAN channel (WLAN channel)	**36**, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 149, 153, 157, 161, 165 (ch)
	Specifies the channel to be preferentially connected when the channel is full.

◆ Basic information settings of relay box

Network: RB: Basic information	
	
Parameter	**Setting options**
MB communication port No. (MB comm port No.)	**59041** Setting range: **49152-65535**
	Displays the refractor communication port No. Use the control box to change the setting.
RB communication port No. (RB comm port No.)	**59042** Setting range: **49152-65535**
	Displays the relay box communication port No. Use the control box to change the setting.
Computer name (Computer name)	**RT015_RB** A maximum of 15 characters
	Enter the computer name of the relay box.
Domain (Domain)	**WORKGROUP** A maximum of 16 characters
	Enter the domain name to which the RT-6100 belongs.

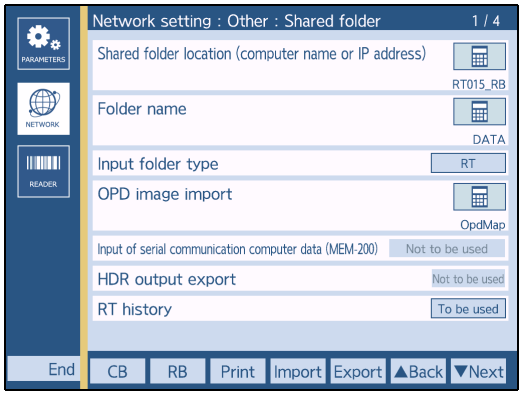
◆ Settings when sharing folder is placed on relay box

Network: RB: File sharing	
	
Parameter	**Setting options**
User name (User name)	**NIDEK** A maximum of 20 characters
	Enter the user name to access the shared folder on the relay box.

Password (Password)	**RT015** A maximum of 20 characters
	Enter the password to access the shared folder on the relay box.
Folder path (Folder path)	**\DATA** A maximum of 20 characters
	Enter the password of the shared folder on the relay box.
Share name (Share name)	DATA A maximum of 20 characters
	Enter the share name of the shared folder on the relay box.
Enable SMB 1.0/CIFS Server (Enable SMB1.0/CIFS SVR)	Yes, **No** (Yes, No)
	Selects whether to enable or disable SMB 1.0/CIFS Server.
MB communication test	Press [Execution] to conduct the refractor head (MB) communication test.
RB communication test	Press [Execution] to conduct the relay box (RB) communication test.

◆ Shared folder settings

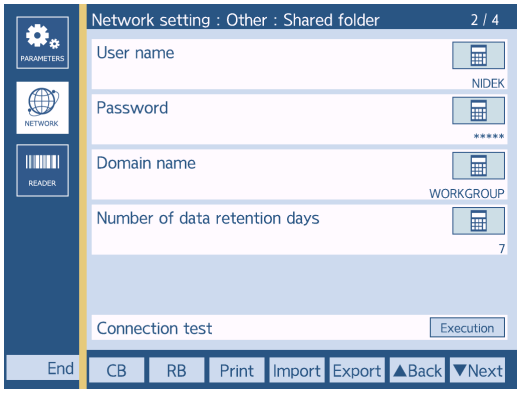
Network: Other: Master share 1



Parameter	Setting options
Shared folder location (computer name or IP address) (Shared folder location)	**RT015_RB** A maximum of 15 characters
	Specify the device containing the shared folder with a computer name or IP address.
Folder name (Folder name)	**DATA** A maximum of 20 characters
	Enter the shared folder name.
Input folder type (Input folder type)	**RT**, MEM-200
	Selects whether the shared folder for importing is on the relay box or on the optional MEM-200.
OPD image import (OPD image import)	**OpdMap** A maximum of 15 characters
	Enter the shared folder name of the OPD image.
Input of serial communication computer data (MEM-200) (Ser. comm PC data input)	Master port 4, Port 2 of slave 1, Port 4 of slave 1, Port 2 of slave 2, Port 4 of slave 2, Port 2 of slave 3, Port 4 of slave 3, **Not to be used** (Master port 4, Port 2 of slave 1, Port 4 of slave 1, Port 2 of slave 2, Port 4 of slave 2, Port 2 of slave 3, Port 4 of slave 3, Not to be used)
	Selects which port of the MEM-200 is used as an input port of the serial communication computer data.

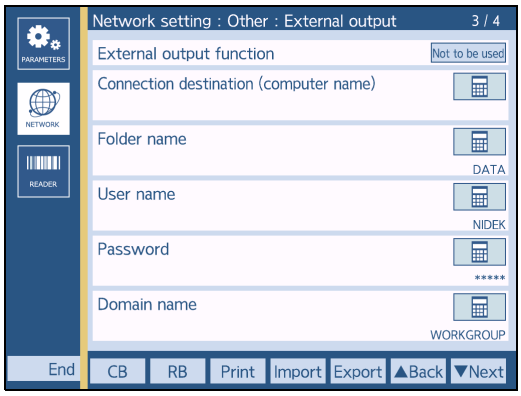
HDR output export (HDR output export)	To be used, **Not to be used** (To be used, Not to be used)
	To allow the patient view simulation on the OPD-Scan III (V 1.05 or later) using the refractor measurement data, select [To be used]. Only when the import folder type is [MEM-200].
RT history (RT history)	**To be used**, Not to be used (To be used, Not to be used)
	To enable the function for importing refractor measurement data from the RT history folder, select [To be used].

Network: Other: Master share 2

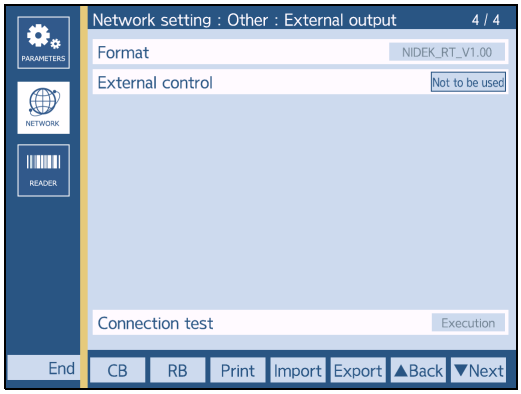


Parameter	Setting options
User name (User name)	**NIDEK** A maximum of 20 characters
	Enter the user name used to access the shared folder.
Password (Password)	**RT015** A maximum of 20 characters
	Enter the password used to access the shared folder.
Domain name (Domain name)	**WORKGROUP** A maximum of 48 characters
	Enter the domain name to which the user name belongs.
Number of data retention days (Data retention days)	**7** Setting range:1 to 60
	Enter the number of days to retain data when the shared folder is placed on the relay box. Data after the specified number of days is deleted from the shared folder.
Connection test	Press [Execution] to conduct the connection test.

◆ Settings for exporting data to external computer

Network: Other: External output setting 1	
	
Parameter	**Setting options**
External output function (External output function)	To be used, **Not to be used** (To be used, Not to be used)
	To export data to an external computer, select [To be used].
Connection destination (computer name) (PC connect destination)	A maximum of 15 characters
	Specify the computer of the data export destination by computer name.
Folder name (Folder name)	**DATA** A maximum of 20 characters
	Enter the shared folder name of the data export destination.
User name (User name)	**NIDEK** A maximum of 20 characters
	Enter the user name used to access the data export destination.
Password (Password)	**RT015** A maximum of 20 characters
	Enter the user name used to access the data export destination.
Domain name (Domain name)	**WORKGROUP** A maximum of 48 characters
	Enter the domain name to which the user name belongs.

Network: Other: External output setting 2



Parameter	Setting options
Format (Format)	NIDEK_RT_V1.00
	Specify the network connection format.
External control (External control)	To be used, **Not to be used** (To be used, Not to be used)
	To use the external control function, select [To be used]. For details of the external control function, contact Nidek or your authorized distributor.
Connection test	Press [Execution] to conduct the connection test.

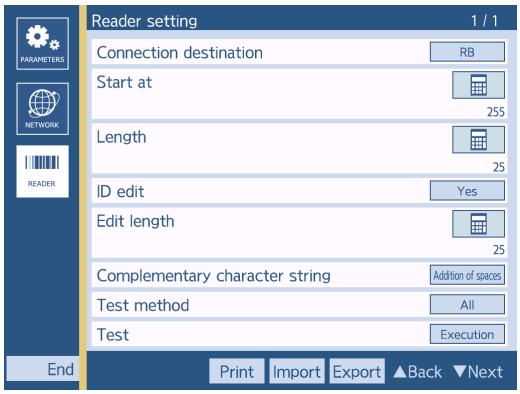
6.1.3 Changing barcode scanner or magnetic card reader settings

This section provides parameters for reading patient ID from the barcode scanner or magnetic card reader.

The underlined **setting options** in bold indicate the factory default settings.

The description contained in parentheses is printed on the printout.

Reader setting 1



Parameter	Setting options
Connection destination (Connection destination)	**CB**, RB
	Selects the connection destination of the barcode scanner or magnetic card reader. CB: USB connector on the control box RB: USB connector on the relay box
Start at (Start at)	**1** Setting range: 1 to 250
	Specifies at which number from the left of the read characters the initial number of the patient ID is set.
Length (Length)	**20** Setting range: 1 to 20
	Specifies the length of the patient ID (number of digits).
ID edit (ID edit)	Yes, **No** (Yes, No)
	Selects whether to fill the missing digits if the reader reading length is less than the number of digits of the patient ID.
Edit length (Edit length)	**1** Setting range: 0 to 20
	Specifies how many digits is used for complementation (0 indicates that ID is not to be edited).
Complementary character string (Complementary character)	**Addition of leading zeros.** Addition of spaces (Addition of leading zeros, Addition of spaces)
	Specifies the characters to fill the missing digits at the beginning.
Test method (Test method)	ID, All (ID, All)
	Specifies the data to be read in the test. ID: Reads ID. All: Readings all data.
Test	Press [Execution] to conduct the reading test.

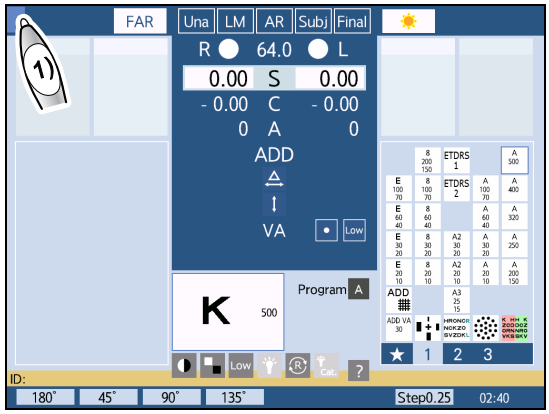
6.2 Printing Parameter Settings

Printing settings are divided into the following three groups.

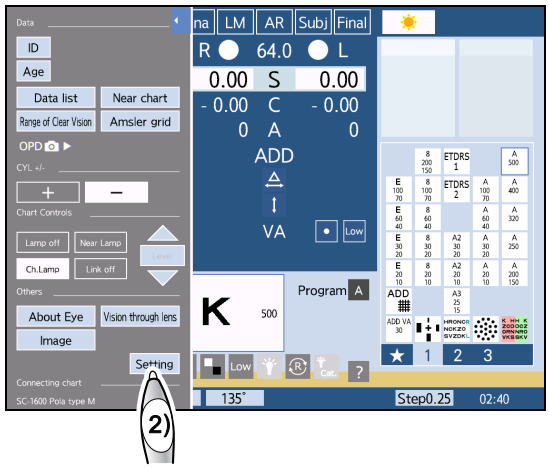
- Refraction settings
- Network settings
- Barcode scanner or magnetic card reader settings

1 Display the menu screen.

1) Press .
The side menu is displayed.

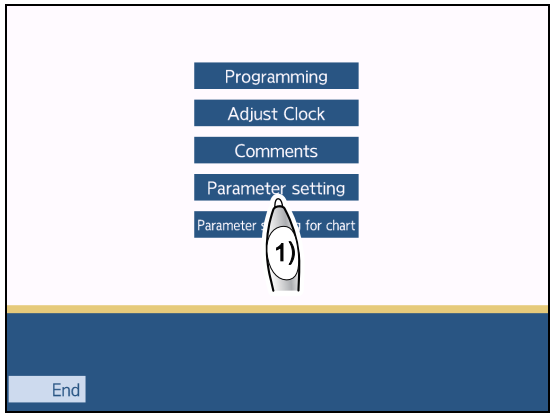


2) Press [Setting].
The menu screen is displayed.



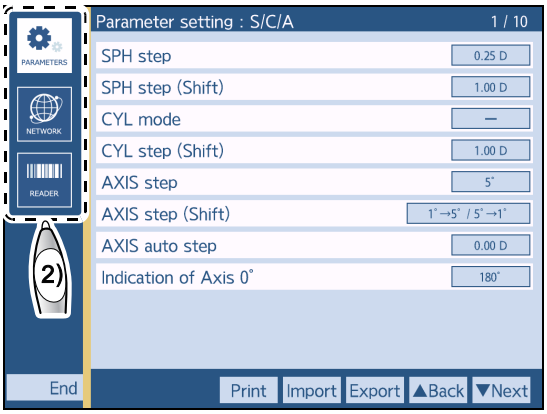
2 Display the desired setting screen.

1) Press [Parameter setting].
The parameter setting screen is displayed.



2) Select the setting screen to be printed.

PARAMETERS	Refraction settings
NETWORK	Network settings
READER	Barcode scanner or magnetic card reader settings



3 Press Print .

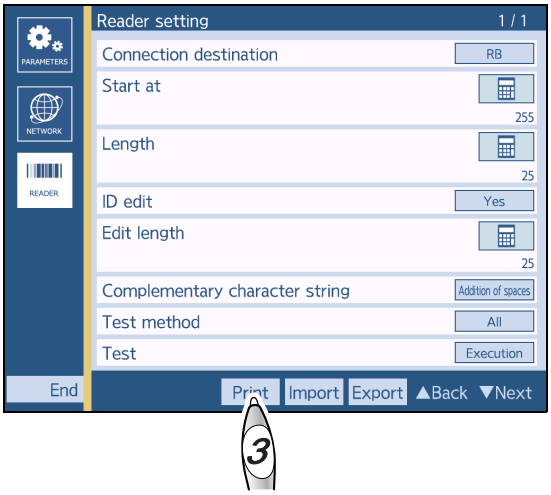
A print confirmation message appears.

4 Press [OK].

The settings selected in Step 2 are printed.

5 Press End to return to the menu screen.

6 Press End to return to the measurement screen.



Note

- Parameters are printed on the printout in English.

6.3 Writing Parameter Settings to SD Card

This section explains how to write parameter settings to an SD card. Writing is performed for the following three parameter sets.

- Refraction settings
- Network settings
- Barcode scanner or magnetic card reader settings

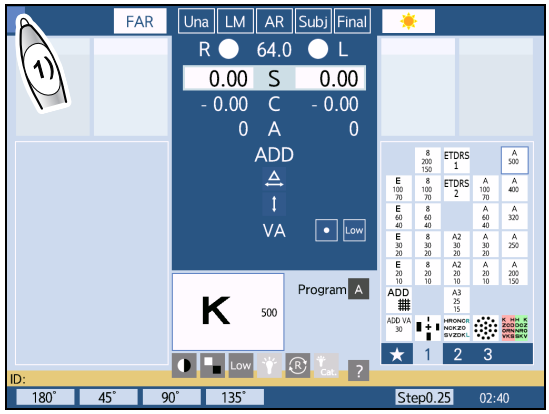
Note

- Only one set of parameter settings can be written at a time. Writing a parameter set again overwrites the previously written set.

1 Display the menu screen.

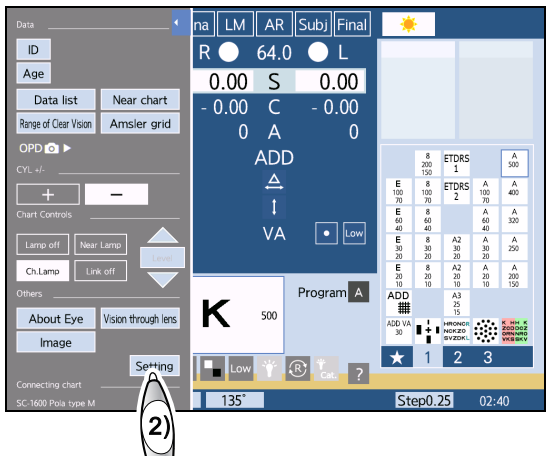
1) Press .

The side menu is displayed.



2) Press [Setting].

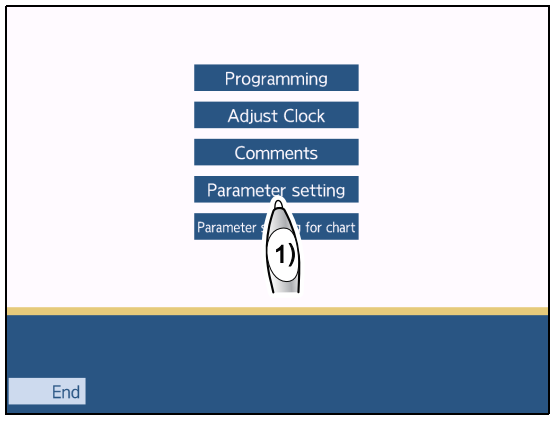
The menu screen is displayed.



2 Display the desired setting screen.

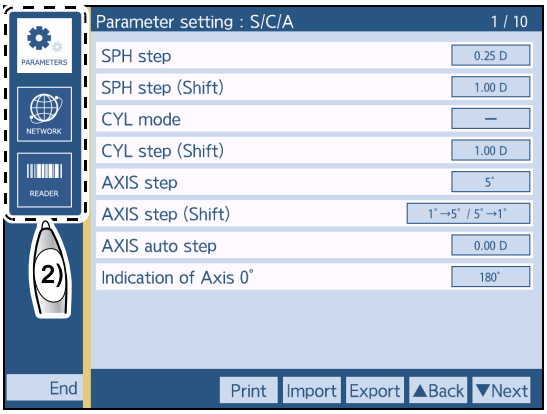
1) Press [Parameter setting].

The parameter setting screen is displayed.



2) Select the setting screen to be written.

PARAMETERS	Refraction settings
NETWORK	Network settings
READER	Barcode scanner or magnetic card reader settings



3 Press Export .

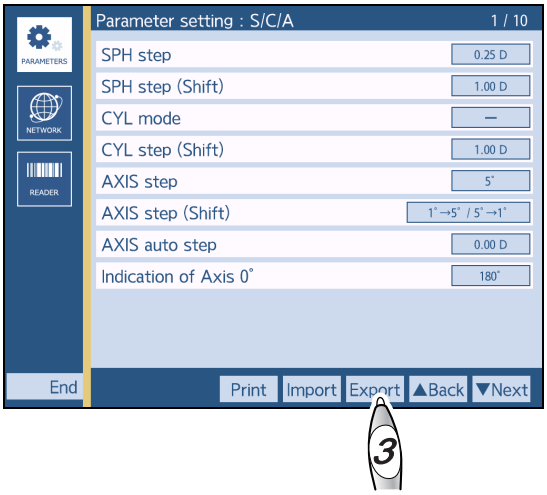
A write confirmation message appears.

4 Press [OK].

The settings selected in Step 2 are written to the SD card.

5 Press End to return to the menu screen.

6 Press End to return to the measurement screen.



6.4 Reading Parameter Settings from SD Card

This section explains how to read parameter settings from an SD card. Reading is performed for the following three parameter sets.

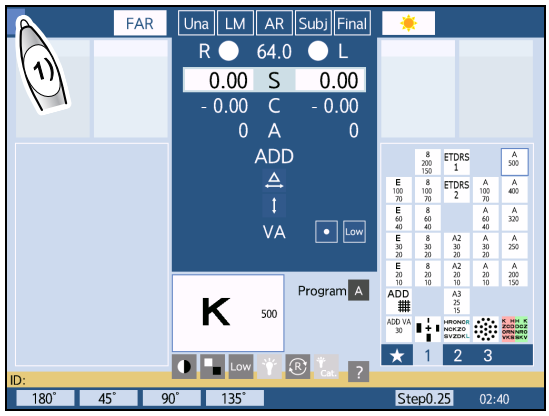
- Refraction settings
- Network settings
- Barcode scanner or magnetic card reader settings

Note

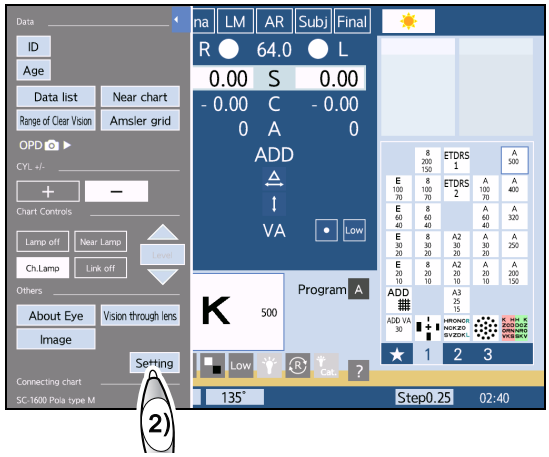
- Reading settings overwrites the current settings.
- Settings can be read from the SD card in other RT-6100s to copy the settings.
- If the software version of the RT-6100 that writes settings to an SD card differs from that of the RT-6100 that reads the settings, an error may occur and the settings may not be read. In this case, contact Nidek or your authorized distributor.

1 Display the menu screen.

1) Press ▶.
The side menu is displayed.

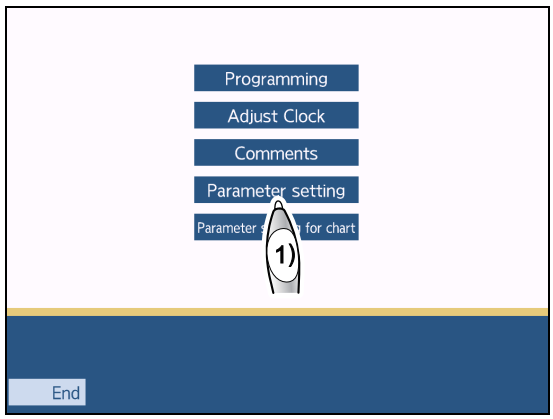


2) Press [Setting].
The menu screen is displayed.



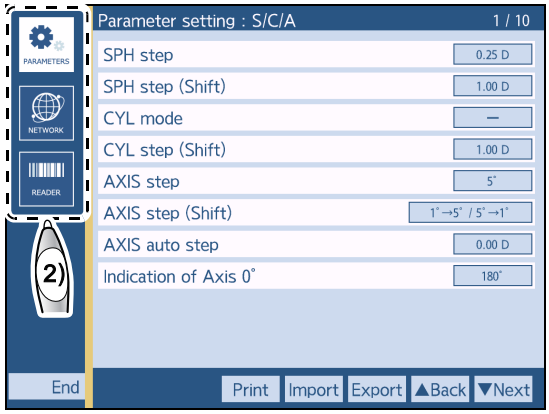
2 Display the desired setting screen.

1) Press [Parameter setting].
The parameter setting screen is displayed.



2) Select the setting screen to be read.

PARAMETERS	Refraction settings
NETWORK	Network settings
READER	Barcode scanner or magnetic card reader settings



3 Press Import .

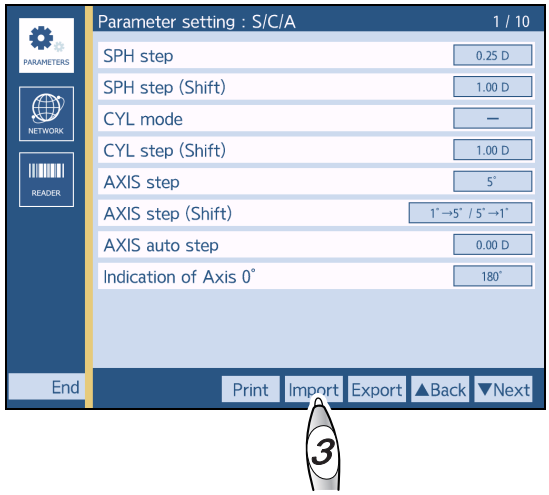
A read confirmation message appears.

4 Press [OK].

Parameter settings selected in Step 2 are overwritten by the settings read from the SD card.

5 Press End to return to the menu screen.

6 Press End to return to the measurement screen.



6.5 Setting Date and Time

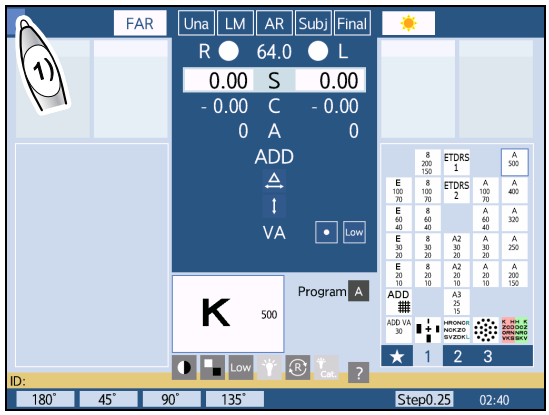
This section explains how to adjust the clock inside the device.

Note

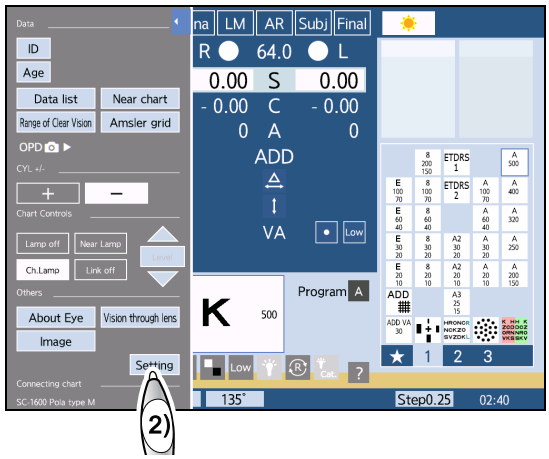
- Date and time cannot be set while refraction time is measured.

1 Display the menu screen.

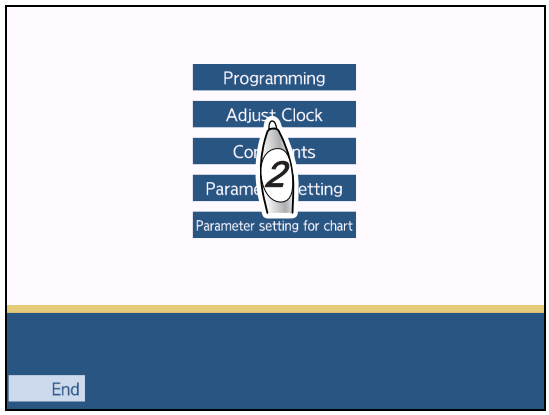
1) Press .
The side menu is displayed.



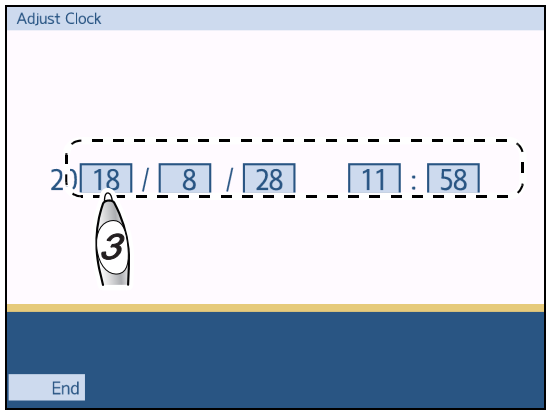
2) Press [Setting].
The menu screen is displayed.



2 Press [Adjust Clock].



3 Press the item to be changed.

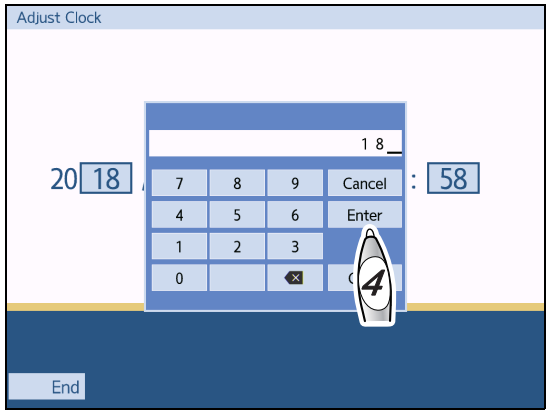


4 Enter the desired value with the numeric keypad and press [Enter].

5 Repeat Steps 3 to 4 to set the date and time.

6 Press End to return to the menu screen.

7 Press End to return to the measurement screen.

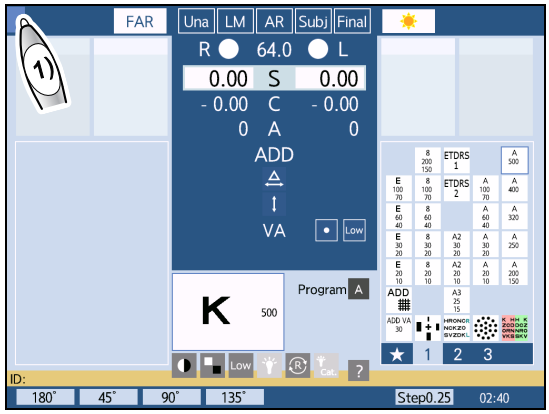


6.6 Entering Comments on Printout

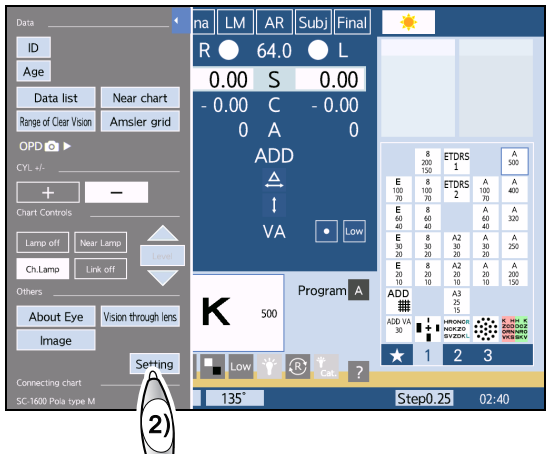
- This section explains how to include comments such as a retailer name together with measurement results on the printout.
- A maximum of 24 characters x 2 lines can be entered.

1 Display the menu screen.

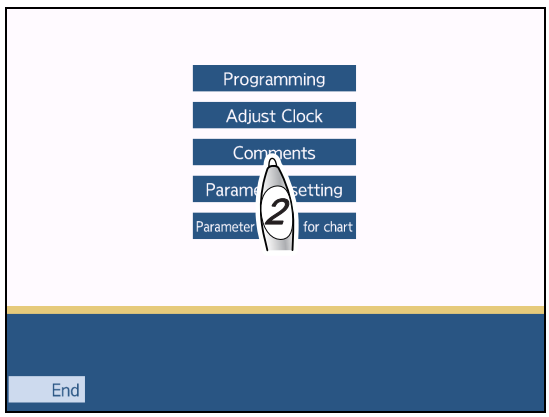
1) Press ▶.
The side menu is displayed.



2) Press [Setting].
The menu screen is displayed.



2 Press [Comments].



3 Press the square where a character is to be entered.

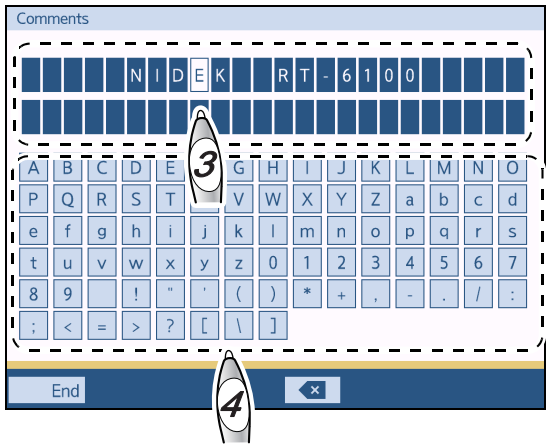
4 Press the desired character.

[⌫]	Deletes the character to the left side of the cursor and deletes one space.

5 Repeat Steps 3 to 4 to enter characters.

6 Press End to return to the menu screen.

7 Press End to return to the measurement screen.



7 MAINTENANCE

7.1 Troubleshooting

If the device does not function properly, attempt to correct the problem according to the following table before contacting Nidek or your authorized distributor.

Symptom	Remedy
The device is not activated when turned on.	• Check whether the power plug is connected to the power outlet.
The measurement screen is not displayed and an error appears when the device is turned on.	• Turn off and on the power switch.
The control box touch screen or chart presenting device LCD goes out suddenly.	• The device may have gone into Auto light off mode. Press any button to recover from Auto light off mode.
No button works.	• Turn off and on the power switch.
Printing does not start when Output is pressed.	• Check whether the printer paper is not upside down. • Replace the printer paper. *"7.5 Printer Paper Replacement" (page 265)* • If the parameter *" Print" (page 224)* is set to [No], change the setting to [Yes].
The reaction of the touch screen is bad, or it responds at mis-aligned positions.	• Adjust the detection positions of the touch screen. *"7.4 Touch Screen Calibration" (page 264)*
Data is not read when an Eye Care card is inserted.	• Reading is not possible when no AR data is included. • Reading is not possible when right or left is not specified by a lensmeter. • The contact of the Eye Care card reader may be dirty. Clean the contact. *"7.6.5 Eye Care card reader" (page 270)* • If an error occurs when data is being written by an auto refractometer or lensmeter, clean the card reader part.
The vision is blurry for the chart.	• Clean the measuring windows of the refractor head. *"7.6.3 Measuring windows" (page 268)* • If the vision does not become clear even after cleaning as described above, internal cleaning is necessary. Contact Nidek or your authorized distributor.

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

7.2 Error Messages

◆ Error messages and causes

One of the following messages is displayed on the touch screen when an error occurs in charts or such. Follow the suggestions in the cause column.

Error message	Cause
Eye Care card--Read Error!!	• Eye Care card read error If the Eye Care card is dirty, wipe it. Clean the Eye Care card reader. *"7.6.5 Eye Care card reader" (page 270)* Replace the Eye Care card with a new one.
Eye Care card--Write Error!!	• Eye Care card write error If the Eye Care card is dirty, wipe it. Clean Eye Care card reader. *"7.6.5 Eye Care card reader" (page 270)*
Communication Error CB-MB	• Communication error between the control box (CB) and refractor head (MB) Check cable connection.
Communication Error CB-RB	• Communication error between the control box (CB) and relay box (RB) Check cable connection
No specified data!!	• There is no specified data.
Chart doesn't work.	• Connection failure with a chart presenting device Be sure to check cable connection with a chart presenting device.
Print failed.	• If the printer cover is open, close it securely. • If the printer is short of paper, refill paper. *"7.5 Printer Paper Replacement" (page 265)*
Data output failed. Output destination: ***** Transmission destination: *****	• Data output error
SD card--Card not found!!	• No SD card is inserted. Insert the supplied SD card again.
SD card--Read Error!!	• SD card read error. Data cannot be read from the SD card. Insert the supplied SD card again.
SD card--Write Error!!	• SD card write error. Data cannot be write to the SD card. Insert the supplied SD card again.
SD card--File Error!!	• Files in the SD card cannot be read.
SD card--File not found!!	• There is no file in the SD card.
Invalid value	• Specify the value within the range.
Different from RB setting. Change to setting in CB.	• Relay box setting error
CB and RB IP addresses are duplicated.	• The IP address of the control box and the refractor is the same. Change either IP address.

Error message	Cause
Error: 20 ** Error: 21 ** Error: 22 ** Error: 23 ** Error: 24 ** Error: 25 ** Error: 27 ** Error: 28 ** Error: 29 ** Error: 30 **	• Relay box internal error
Error: 4001 Error: 4002 Error: 4004	• Shared folder related error Check the settings of [Network setting:] - [Other:] - [Shared folder].
Error: 4003	• Improper image file format and size
Error: 4005	• Data input error The following may be causes. Input the data again. • AR data that does not contain AR values is read. • LM data without right or left specified is read. • The network is temporarily disconnected. • The same data is read from another terminal at the same time.
Error: 5001	• Error in IP acquisition from DHCP on wired LAN Consult the DHCP server administrator.
Error: 5002	• Error in IP acquisition from DHCP on wireless LAN Consult the DHCP server administrator.
Error: 6000	• Invalid date information error Check the date and time setting.
Error: S1 R Error: S1 L Error: S2 R Error: S2 L Error: C1 R Error: C1 L Error: C2 R Error: C2 L Error: CA R Error: CA L Error: A1 R Error: A1 L Error: A2 R Error: A2 L Error: P1 R Error: P1 L Error: P2 R Error: P2 L Error: PD R Error: PD L Error: CON R Error: CON L	• Refractor sensor error

Error message	Cause
Error:R DRIVER BOARD Error:L DRIVER BOARD	• Refractor board error

❖ If the symptom is not corrected by the above actions, contact Nidek or your authorized distributor. Notify Nidek of the error message and symptom as well as the serial number of your device so that Nidek can offer appropriate service.

7.3 Periodical Inspection

Perform periodical inspection of the device once a year according to the following inspection item list.

For details of maintenance and inspection, contact Nidek or your authorized distributor. If periodical inspection cannot be performed by the user, request assistance from Nidek or your authorized distributor.

⚠ CAUTION

- Only service personnel trained by Nidek are allowed to disassemble or repair the device.
  Nidek assumes no responsibility for any adverse events resulting from improper servicing.
- Wipe the device exterior using a cloth dampened with rubbing alcohol before maintenance and inspections.
- With the expected service life as a guide, consider planned replacement of the device.
  If the expected service life of the device is exceeded, even with proper maintenance and inspection, the device reliability or safety may become degraded and fail to achieve the target values.

Inspection items	
Appearance	ID label, labels, stains, scratches, LCD (scratches etc.), cover failures
Safety	Earth leakage current, touch current, protective grounding connection, power cord, and near point chart holder
Device main body	Power switch, LCD touch screen, buttons on the control panel, buttons on the touch screen, dial, sphere/cylinder/axis switching, PD switching, auxiliary lens switching, convergence, near lighting, and measurement windows dirt
Manuals	Software version, Operator's Manual
Environment	Installation location, temperature, humidity, voltage, frequency
Other	If there is a problem other than performance, measurement, and the above inspection items, take appropriate measures or contact Nidek.

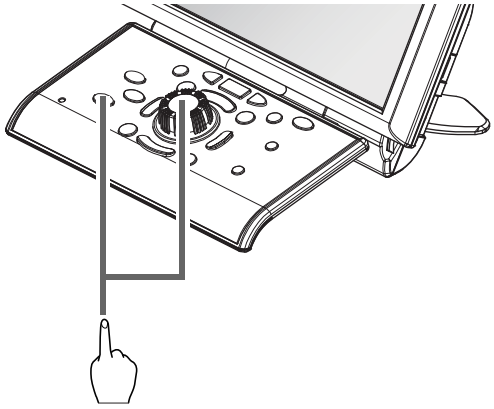
7.4 Touch Screen Calibration

■ This section explains how to calibrate the control box touch screen when the touch screen detection position is misaligned.

If the reaction of the touch screen is bad or it responds at misaligned positions, the detection position may be misaligned.

1 Press the dial button while holding Shift.

A message to confirm whether to display the calibration screen appears.



2 Press the dial button while holding Shift.

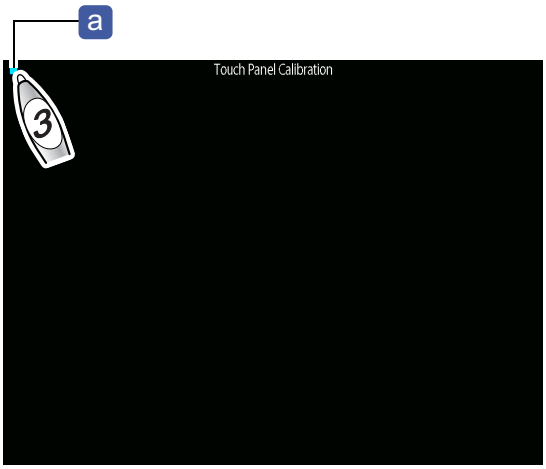
The calibration screen is displayed.

3 Press the blue square ■ a in the upper left corner.

4 Press the blue square ■ in the upper right corner.

5 Press the blue square ■ in the lower left corner.

6 Press the blue square ■ in the lower right corner.



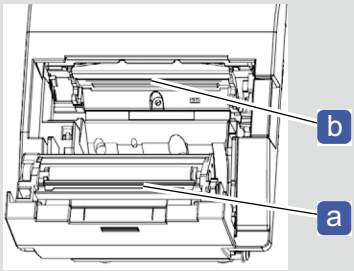
After all four corners ■ are complete, a message asking whether to finish the touch screen calibration appears.

7.5 Printer Paper Replacement

A red line appearing along the edge of the printer paper indicates that the paper is running short. When this occurs, stop using the printer and replace the printer paper with a new roll.

⚠ CAUTION

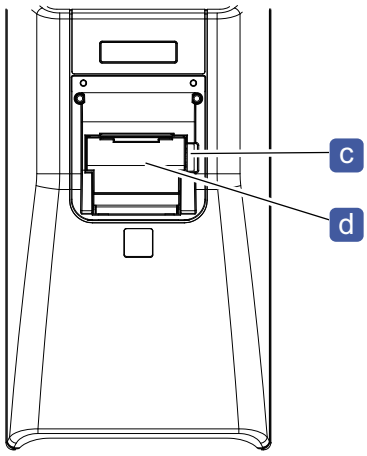
- Do not touch the auto cutter a.
  The auto cutter may hurt fingers.
- Do not touch the printer head b when replacing the printer paper.
  Because the printer head immediately after printing is hot, burns may result.



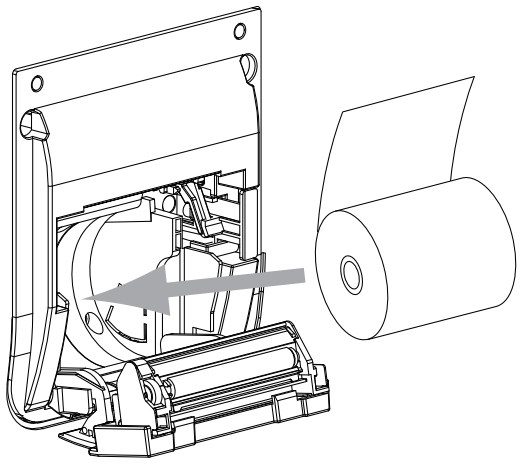
- Do not attempt to print without printer paper loaded.
- Be sure to use only the specified printer paper (part number: 8062000001).
  If printer paper other than those specified is used, the printer head may be damaged due to printing failure or paper jam.
- Do not use strong force to pull the printer paper threaded through the printer.
  Printer malfunction may occur.
- If the printer paper becomes jammed, remove the paper roll by the procedure as when replacing the printer paper. Cut off the crumpled portion and then return the paper roll.

1 Press the cover open button c to open the printer cover d.

2 Remove the used printer paper roll.



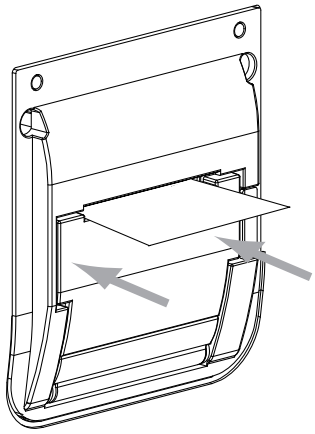
3 Install a new printer paper roll in the same orientation as shown to the right.



- If the roll is loaded with the paper upside down, printing is not possible.
- Confirm that there is no slack in the printer paper.
  Printing failure may result.
- Confirm that printer paper is not loaded in a tilted angle and that the core of the roll is properly placed.
  Printer paper may not be fed properly.

4 Close the printer cover so that a short length of printer paper extends from the cover.

5 Press the printer cover on both sides to close the cover securely.



- Confirm that the cover is securely closed.
  If the cover is insecurely closed, the auto cutter may not operate properly.
  In addition, an error may appear and printing will not occur when Output is pressed.

7.6 Cleaning

This section explains how to clean the forehead rest, face shields, measuring windows, printer, Eye-Care cards, and exterior.

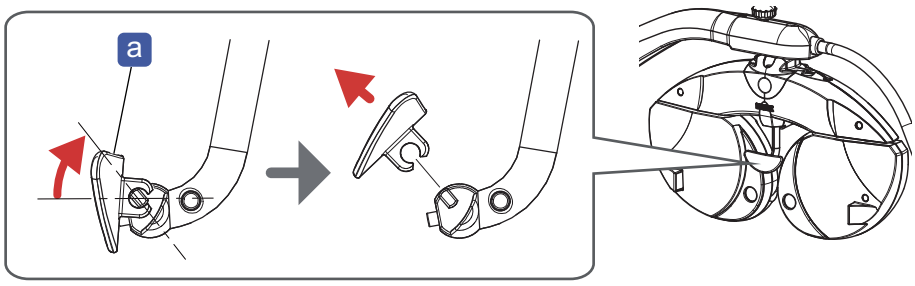
7.6.1 Forehead rest

⚠ CAUTION

- Wipe the forehead rest using a cloth dampened with rubbing alcohol before refraction.
- Be sure to attach the forehead rest after cleaning.
  Using the device without attaching the forehead rest may cause injury.

1 Remove the forehead rest a.

1) Tilt the forehead rest upward.
2) Pull the forehead rest at an angle to remove it.



2 For severe stains, dampen the cloth with a neutral detergent, wring well, and wipe. Finally dry with a soft, dry cloth.

3 Wipe the forehead rest using a cloth dampened with rubbing alcohol before refraction.

4 Press the forehead rest at an angle from above to reattach it.

7.6.2 Face shields

⚠ CAUTION

- Wipe the face shields using a cloth dampened with rubbing alcohol before refraction.
- Hold the refractor head when removing or attaching the face shields.
  An improper refractor head movement may cause injury.

- Do not wipe the inside of the face shields with neutral detergent.
  If the inside is moistened, it may rust.

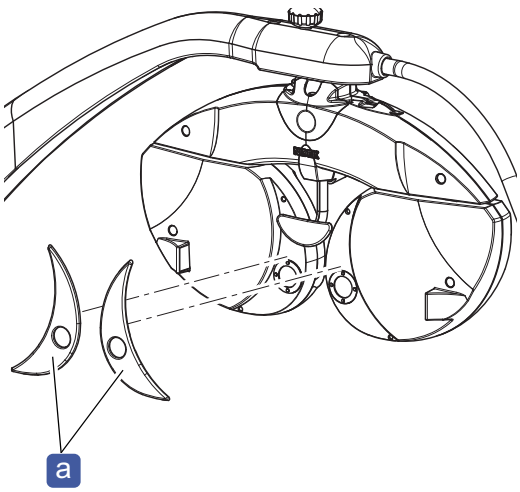
1 Remove the face shields a.

The face shields are magnetically held to the refractor head.

2 For severe stains, dampen the cloth with a neutral detergent, wring well, and wipe. Finally dry with a soft, dry cloth.

3 Wipe the face shields using a cloth dampened with rubbing alcohol before refraction.

4 Reattach the face shields.



7.6.3 Measuring windows

⚠ CAUTION

- Remove any dust on the windows with a blower brush before cleaning them.
  Wiping the windows with dust on may scratch the glass of the measuring windows.
- If the measuring window is dirty with fingerprints, eyelash oil, or dust, accurate measurement cannot be performed. Be sure to check the measuring windows before refraction. Clean them if necessary.
- Clean the measuring windows before refraction.
- Do not clean the measuring windows using a cloth moistened with detergent or such.
  Wiping marks may be left or the surface coating may be damaged.

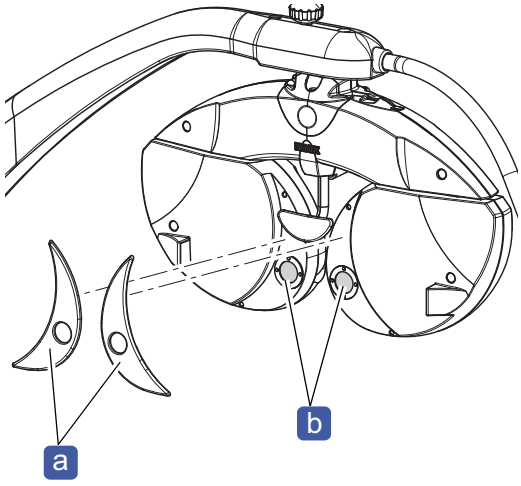
1 Remove the face shields a.

2 Blow off the dust on the measuring windows b with a blower.

Clean the measuring windows of both the patient's side and the operator's side.

3 For severe stains, lightly wipe with a soft cloth that does not scratch the protective glass of the measuring windows.

4 Reattach the face shields.

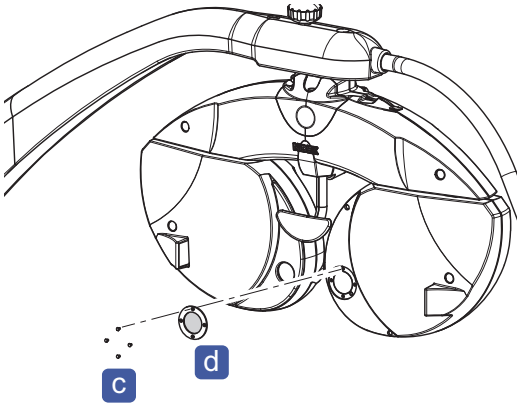


- When the inside of the measuring window becomes dirty

If the inside of the measuring window becomes dirty due to condensation or such, remove the protective glass and wipe its inside.

Remove the protective glass on both the operator's side and patient's side with a Phillips precision screwdriver.

1) Remove the face shields before removing the protective glass on the patient's side.
2) Unscrew the set screws (n = 4) c to remove the protective glass d.
3) Reattach the protective glass after cleaning and fasten it with the set screws removed earlier.



⚠ CAUTION

- Do not touch the internal lens.
- Ensure that dust does not enter the measuring windows.

7.6.4 Printer

The auto cutter of the printer becomes dirty with paper residue when used for extended periods of time. Leaving it may cause auto cutter malfunction. Clean the auto cutter.

⚠ CAUTION

- Do not touch the auto cutter.
  The auto cutter may hurt fingers.

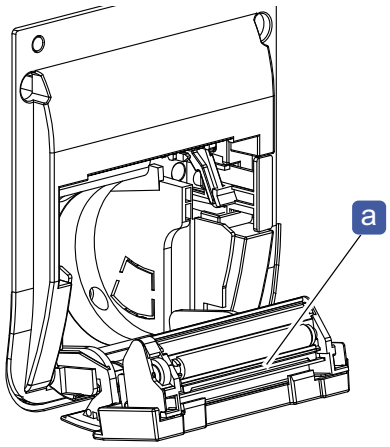
1 Open the printer cover and remove the printer paper roll.

"7.5 Printer Paper Replacement" (page 265)

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

Do not blow off paper residue with a blower. If paper residue settles on the internal working structure, malfunction may result.

3 Reload the printer paper.



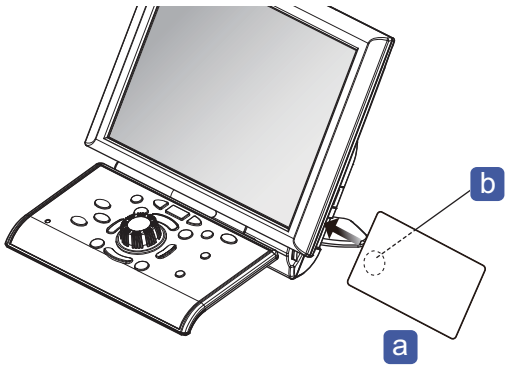
7.6.5 Eye Care card reader

- Be sure to turn off the device before cleaning the Eye Care card reader slot.
  Cleaning while power is on may cause malfunction.

Dirt may adhere to the contact area of the Eye Care card reader slot.

Clean the Eye Care card slot using a contact cleaner (optional) a when using the Eye Care card for data communication between devices.

The contact surfaces of the Eye Care card reader slot is on the back. Cleaning is possible by inserting and removing the card several times with the wiper face (face with woven fabric) b of the contact cleaner facing backward.



Wipe the contact surfaces of the Eye Care card with a soft cloth as well.

Note

- For details on how to use the contact cleaner, refer to the instructions for use included with the contact cleaner.

7.6.6 Exterior

- Do not use organic solvents such as paint thinner to clean the exterior.
- Do not use a sponge or cloth soaked in water.

1 Turn off the system table.

2 For severe stains, dampen the cloth with a neutral detergent, wring well, and wipe.

3 Finally dry with a soft, dry cloth.

7.7 Consumable List

Part name	Part number
Printer paper	8062000001
Contact cleaner (optional)	8060500023

8 SPECIFICATIONS AND TECHNICAL INFORMATION

8.1 Peripheral Devices Connection

If the connection between devices needs to be disconnected or reconnected, contact Nidek or your authorized distributor.

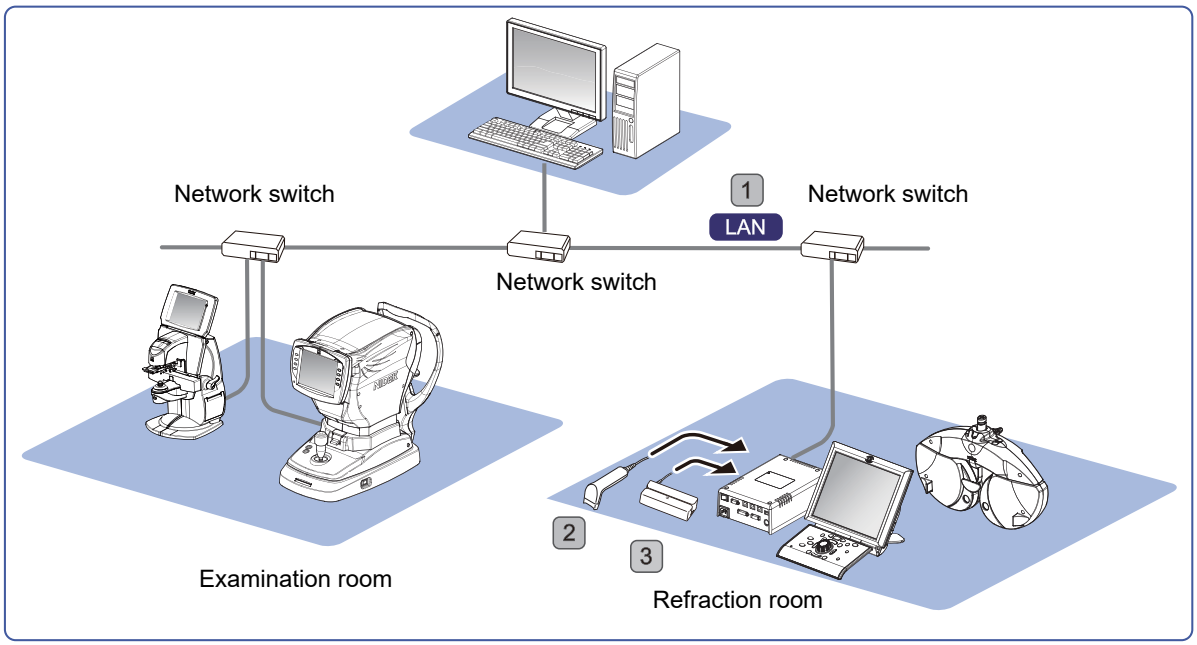
8.1.1 Connection examples

⚠ CAUTION

- Do not use devices other than the specified barcode scanner or magnetic card reader.
  ID cannot be read correctly or device malfunction may result.
- Perform LAN connection via a network switch.
  Data communication may not be properly performed.
- Set parameters of this device and computer under supervision of your network administrator before connecting the device to the network (LAN connection).
- Ensure that the cables do not pose a risk to the patient, operator, or others when connecting this device to other devices. Also when connecting, removing, or upgrading devices, ensure that there is no risk to the patient, operator, or others.
- Use a computer compatible with CISPR32 when connecting a computer.

◆ Connection example 1

The following is an example of connecting this device with a computer, auto refractometer, and lensmeter via a LAN.



No.	Communication equipment	Connection port	Function
1	Computer LAN cable Network switch Auto Refractometer Lensmeter	LAN connector on relay box LAN connector on computer Network switch LAN connector on auto refractometer or lensmeter	• AR/LM data import Used as AR data and LM data in the subjective refraction. • RT data export Measurement data is managed by database software such as NAVIS.
2	Barcode scanner	USB connector on the relay box or control box	Patient ID entry
3	Magnetic card reader		

- Location of shared folder

Import shared folder	Relay box
Export shared folder	Computer

- RT-6100 settings

Major item	Secondary item	Parameter	Setting
Control box (CB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.110
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	Basic information	File access communication device setting	LAN
		Computer name	RT015_CB
		Domain	WORKGROUP
Relay box (RB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.112
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	Basic information	Computer name	RT015_RB
		Domain	WORKGROUP
	Share	User name	NIDEK (changeable) a
		Password	RT015 (changeable) b
		Folder path	\DATA
		Share name	DATA

Major item	Secondary item	Parameter	Setting
Other	Shared folder	Shared folder location (computer name or IP address)	RT015_RB
		Folder name	DATA
		Input folder type	RT
		User name	Same as a
		Password	Same as b
		Domain name	WORKGROUP
		Number of data retention days	7
	External output	External output function	To be used
		Connection destination (computer name)	Specify the computer of the data output destination by computer name.
		Folder name	Enter the shared folder name of the data output destination.
		User name	Enter the user name used to access the data output destination.
		Password	Enter the password used to access the data output destination.
		Domain name	Enter the domain name to which the user name belongs.

- Auto refractometer or lensmeter settings

Configure LAN and shared folder settings for auto refractometers or lensmeters.

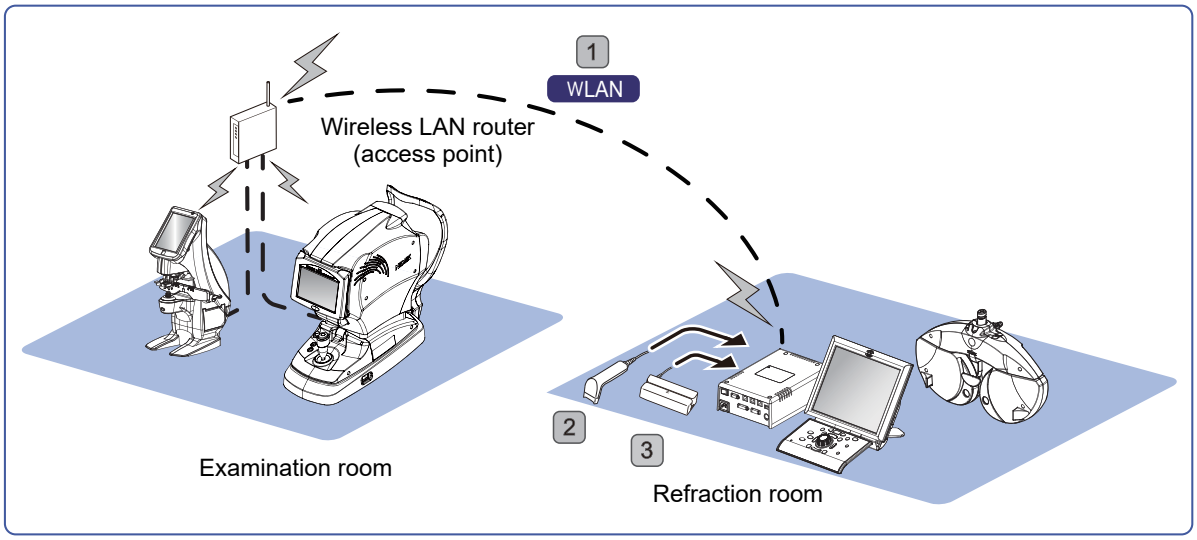
Parameter	Setting
DHCP	No
IP address	192.168.0.30 (Set not to overlap.)
Subnet mask (IPv4)	255.255.255.0
Default gateway	0.0.0.0
Shared folder location (computer name or IP address)	RT015 _ RB or 192.168.0.112
Folder name (for auto refractometer)	DATA
Folder name (for lensmeter)	DATA/LM/TXT
User name	Same as a
Password	Same as b
Domain	WORKGROUP

◆ Connection example 2

The following is an example of connecting this device with an auto refractometer and lensmeter via wireless LAN.

The optional wireless LAN module needs to be mounted to the relay box.

The auto refractometer and lensmeter must be compatible with wireless LAN.



No.	Communication equipment	Connection port	Function
1	Wireless LAN router Auto Refractometer Lensmeter Wireless LAN module (optional)	Wireless LAN router	• AR or LM data input Used as AR data and LM data in the subjective refraction.
2	Barcode scanner	USB connector on the relay box or control box	Patient ID entry
3	Magnetic card reader		

- Location of shared folder

Import shared folder	Relay box

- RT-6100 settings

Major item	Secondary item	Parameter	Setting
Control box (CB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.110
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0

Major item	Secondary item	Parameter	Setting
	Basic information	RB communication device setting	LAN
		File access communication device setting	WLAN
		MB communication port No.	59041
		RB communication device setting	59042
		External control communication port No.	62929
		Computer name	RT015_CB
		Domain	WORKGROUP
Relay box (RB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.112
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	WLAN	Use of DHCP	No
		Client→AP	Client
		WLAN radio wave strength	High
		IP address (IPv4)	192.168.0.113
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	Client	Frequency band used	Auto
		WLAN SSID	Match the access point settings.
		WLAN encryption method (security)	
		WLAN password	
	Basic information	Computer name	RT015_RB
		Domain	WORKGROUP
	Share	User name	NIDEK (change-able) a
		Password	RT015 (change-able) b
		Folder path	\DATA
		Share name	DATA

Major item	Secondary item	Parameter	Setting
Other	Shared folder	Shared folder location (computer name or IP address)	RT015_RB
		Folder name	DATA
		Input folder type	RT
		User name	Same as a
		Password	Same as b
		Domain name	WORKGROUP
		Number of data retention days	7

- Auto refractometer or lensmeter settings

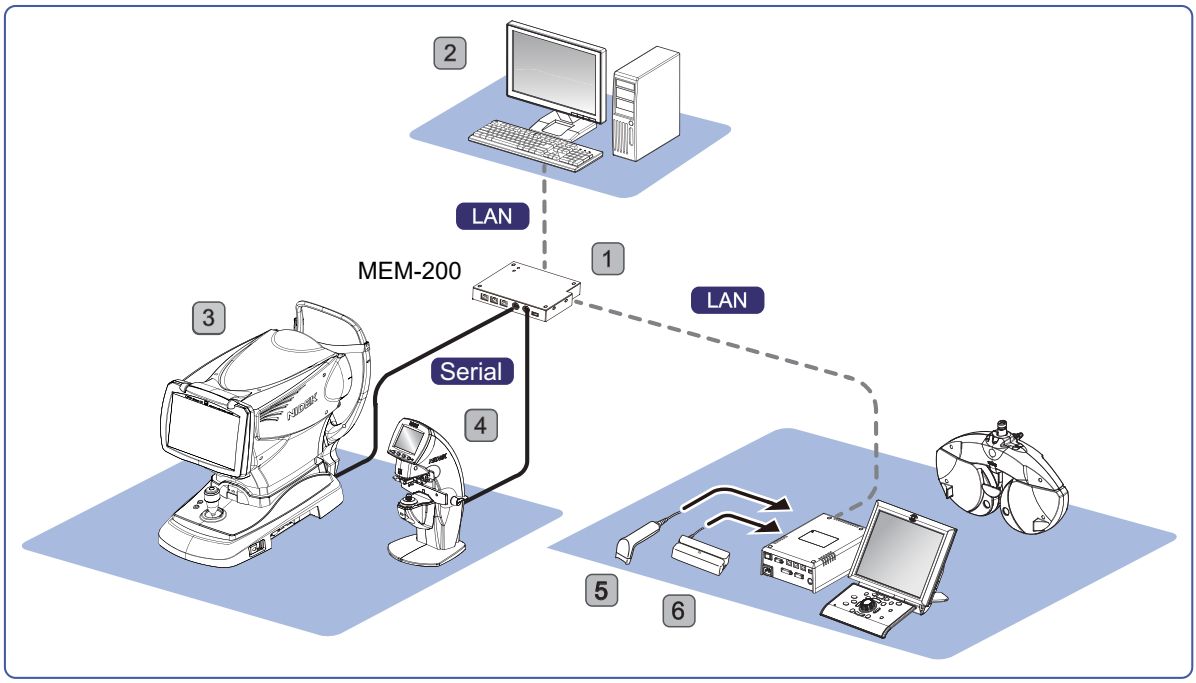
  Configure wireless LAN and shared folder settings for auto refractometers or lensmeters.

Parameter	Setting
DHCP	No
IP address	192.168.0.30 (Set not to overlap.)
Subnet mask (IPv4)	255.255.255.0
Default gateway	0.0.0.0
WLAN SSID	Match the access point settings.
WLAN encrypt (security)	
WLAN password	
Shared folder location (computer name or IP address)	RT015_RB or 192.168.0.113
Folder name (for auto refractometer)	DATA
Folder name (for lensmeter)	DATA/LM/TXT
User name	Same as a
Password	Same as b
Domain	WORKGROUP

◆ Connection example 3

The following is an example of connecting a lensmeter or auto refractometer (OPD-Scan III or such) that has only a serial port.

The optional memory box is required.



No.	Communication equipment	Connection port	Function
1	Memory Box (MEM-200) LAN cable	LAN connector on relay box LAN connector on MEM-200	• AR/LM data import • Used as AR data and LM data in the subjective refraction.
2	Computer LAN cable	LAN connector on computer LAN connector on MEM-200	• RT data export Measurement data is managed by database software such as NAVIS.
3	Auto Refractometer Communication cable	Serial port on auto rerfractometer Serial port on MEM-200#1	• Exports AR data to the shared folder on the MEM-200.
4	Lensmeter Communication cable	Serial port on lensmeter Serial port on MEM-200#2	• Exports LM data to the shared folder on the MEM-200.
5	Barcode scanner	USB connector on the relay box or control box	Patient ID entry
6	Magnetic card reader		

- Location of shared folder

Import shared folder	MEM-200
Export shared folder	Computer

- RT-6100 settings

Major item	Secondary item	Parameter	Setting
Control box (CB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.110
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	Basic information	RB communication device setting	LAN
		File access communication device setting	LAN
		MB communication port No.	59041
		RB communication port No.	59042
		External control communication port No.	62929
		Computer name	RT015_CB
		Domain	WORKGROUP
Relay box (RB)	LAN	Use of DHCP	No
		IP address (IPv4)	192.168.0.112
		Subnet mask (IPv4)	255.255.255.0
		Default gateway (IPv4)	0.0.0.0
	Basic information	MB communication port No.	59041
		RB communication port No.	59042
		Computer name	RT015_RB
		Domain	WORKGROUP

Major item	Secondary item	Parameter	Setting
Other	Shared folder	Shared folder location (computer name or IP address)	MEM-200 or IP address of MEM-200
		Folder name	DATA
		Input folder type	MEM-200
		User name	nidek1 (user name a specified with MEM-200)
		Password	nidek1 (password b specified with MEM-200)
		Domain name	WORKGROUP
	External output	External output function	To be used
		Connection destination (computer name)	Specify the computer of the data output destination by computer name.
		Folder name	Enter the shared folder name of the data output destination.
		User name	Enter the user name used to access the data output destination.
		Password	Enter the password used to access the data output destination.
		Domain name	Enter the domain name to which the user name belongs.

- MEM-200 settings

Configure LAN, shared folder, and serial port settings (refer to the MEM-200 Operator's Manual).

	Parameter	Setting
Shared folder settings	Master PC name	MEM-200
	User name	nidek1 a
	Password	nidek1 (default setting) b
	Domain/Workgroup	WORKGROUP
	Folder name	DATA (cannot be changed)
	Wired LAN settings Master IP address	192.168.0.120
Wired LAN settings	DHCP	OFF
	Subnet mask	255.255.255.0
	Default gateway	0.0.0.0
Serial port settings	PORT#1	Specify the device connected to the serial port #1.
	PORT#2-#4	Specify the device connected to the serial ports #2-#4.

- Auto refractometer settings

Configure auto refractometer communication settings.

Parameter	Setting
Baud rate	9600
Bit length	8
Line feed code	NO
I/F mode	NIDEK/NIDEK2
I/F format	ALL
RT type	5100

- Lensmeter settings

Configure lensmeter settings.

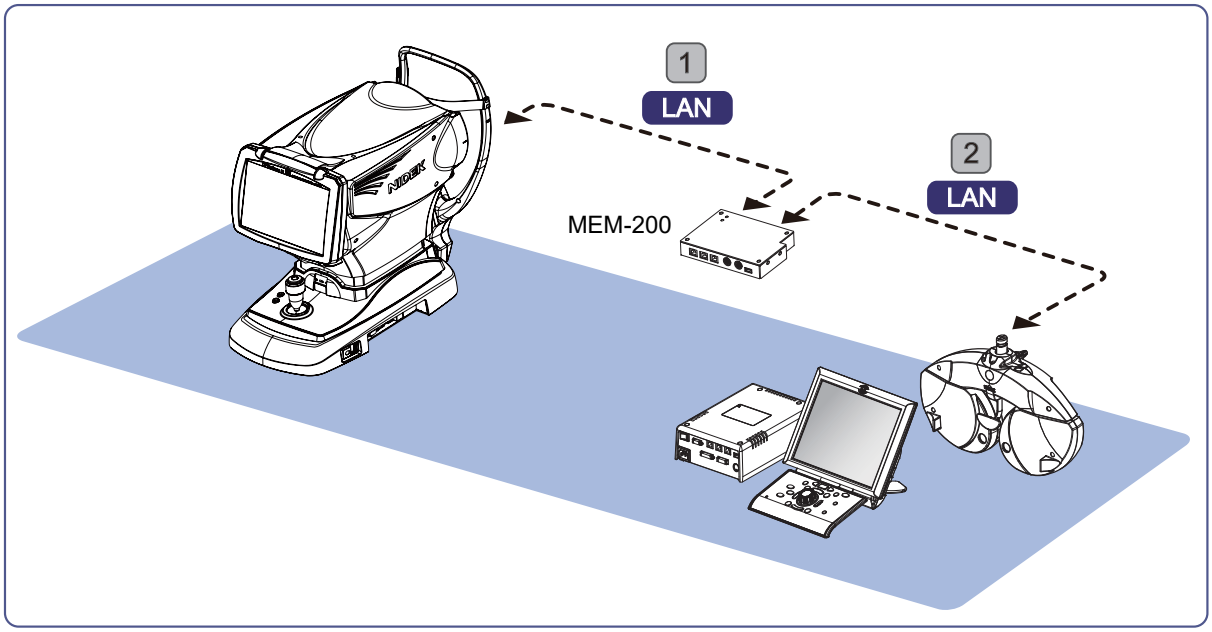
Parameter	Setting
Communication speed	9600
Bit length	8
Stop bit length	1
CR code addition	No
Communication mode	NIDEK/NIDEK2

◆ Connection example 4

The following is a connection example of importing OPD images from the OPD-Scan III.

To import OPD images, LAN cable connection is required.

To import measurement values from the OPD-Scan III, see *"♦ Connection example 3" (page 279)*.



No.	Communication equipment	Connection port	Function
1	OPD-Scan III LAN cable	LAN connector on OPD-Scan III LAN connector on MEM-200	• Exports OPD images to shared folder on MEM-200
2	Memory box (MEM-200) LAN cable	LAN connector on relay box LAN connector on MEM-200	• Imports OPD images *"5.12 Displaying OPD Images" (page 208)*

● Location of shared folder

Import shared folder	MEM-200

- RT-6100 settings

Major item	Secondary item	Parameter	Setting
Other	Shared folder	Shared folder location (computer name or IP address)	MEM-200 or IP address of MEM-200
		Folder name	DATA
		Input folder type	MEM-200
		OPD image import	TEMP2
		User name	nidek1 (user name a speci-fied with MEM-200)
		Password	nidek1 (password b speci-fied with MEM-200)
		Domain name	WORKGROUP

- MEM-200 settings

Configure LAN and shared folder settings (refer to the MEM-200 Operator's Manual).

	Parameter	Setting
Shared folder settings	Maser PC name	MEM-200
	User name	nidek1 a
	Password	nidek1 (default setting) b
	Domain/Workgroup	WORKGROUP
	Folder name	DATA (cannot be changed)
	Wired LAN settings Master IP address	192.168.0.120
Wired LAN settings	DHCP	OFF
	Subnet mask	255.255.255.0
	Default gateway	0.0.0.0

- OPD-Scan III settings

  - Configure LAN settings of the OPD-Scan III series.

	Parameter	Setting
OPD-Scan III	IP Address	192.168.0.80
Connect PC Settings	PC Name	MEM-200 or IP address of MEM-200
	User Name	WORKGROUP\nidek1 (Insert “WORK-GROUP\” before user name a specified with MEM-200.)
	Password	nidek1 (password b specified with MEM-200)
	Shared Folder 1	TEMP2

  - Specify the shared folder with the OPD-Scan series.

1) Press the [Data Output] tab on the Settings screen.
2) Press the Browse button in the Common Settings field.
3) Press [Shared Folder].
4) Press the [V] button.
5) Specify the destination shared folder, then press [OK].

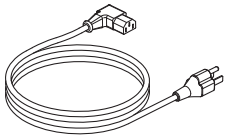
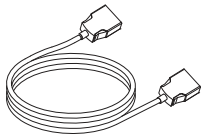
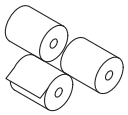
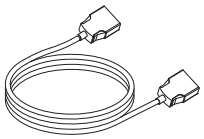
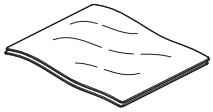
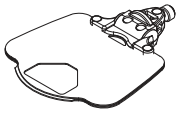
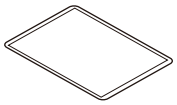
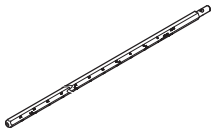
8.2 Specifications

Measurement range	
Spherical power	−29.00 to +26.75 D (0.12, 0.25, 0.5, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 2.75, 3.00 D increments)
Cylindrical power	0.00 to ±8.75 D (0.25, 1.00, 2.00, 3.00 D increments)
Cylinder axis	0 to 180° (1, 5, 15° increments)
Pupillary distance	Distance PD: 48 to 80 mm Near PD (35 cm): 50 to 74 mm Full convergence Distance PD: 54 to 80 mm
Prism	0.00 to 20.00Δ (0.1, 0.5, 2Δ increments)
Refractor head	
Auxiliary lens	• Cross cylinder : ±0.25D, ±0.50D, ±0.25 D auto cross • Occluder • Pinhole: 2.0 mm in diameter • Color filter: Right red, Left green • Polarizing filter: Right 135° / Left 45°, Right 45° / Left 135° • Fixed cross cylinder: ±0.50 D • Spherical lens for retinoscope: 0D, +1.5D, +2.0 D (selectable by setting) • Maddox rod (red): Right horizontal, Left vertical • Dispersion prism (fixed): Right 6ΔBU, Left 10ΔBI • Dispersion prism for binocular balance: Right 3-10ΔBD, Left 3-10ΔBU • Dispersion prism for horizontal phoria: Right 3-10ΔBU, Left 3-10ΔBD • Dispersion prism for vertical phoria: Right 5-15ΔBI, Left 5-15ΔBI • Binocular open fogging: 0.00 to +9.00 D
Near gaze distance	350 to 700 mm (can be changed in 50 mm increments)
Field of vision	40° (at VD = 12 mm) 39° (at VD = 13.75 mm)
Pupillary distance	Distance PD: 48 to 80 mm Near PD (working distance of 35 cm): 50 to 74 mm Full convergence distance PD: 54 to 80 mm
Forehead rest adjustment range	25 ±5 mm
Vertex distance scale	12, 13.75, 16, 18, 20 mm
Horizontal level adjustment	±2.5°
Control box	
Touch screen	10.4-inch color LCD
Interface function	
Wired LAN	3 ports on relay box
Wireless LAN	Installed in the relay box or control box (optional) Wireless LAN interface is installed only for the countries (regions) certified by the Radio Law.

Serial interface	Installed in the relay box for connecting chart presenting devices	
USB	Installed in the relay box or control box Relay box: Barcode scanner or magnetic card reader connectable Control box: Barcode scanner or magnetic card reader connectable	
Dimensions and mass		
Dimensions	Refractor head	408 (W) × 107 (D) × 277 (H) mm
	Control box	260 (W) × 230 (D) × 207 (H) mm
	Relay box	189 (W) × 221 (D) × 73 (H) mm
	Printer	101 (W) × 86 (D) × 121 (H) mm
Mass	Refractor head	3.2 kg
	Control box	2.1 kg
	Relay box	1.4 kg
	Printer	0.6 kg
Power supply		
Voltage	100 to 240 V AC * The voltage fluctuation does not exceed ±10% of the nominal voltage.	
Frequency	50/60 Hz	
Power consumption	Max. 90 VA	
Environmental conditions (during use)		
Installation location	Interior (Ensure that no interference light such as direct sunlight or spot light shines on the measuring window front.)	
Temperature	10 to 35°C (50 to 95°F)	
Humidity	30 to 90% (non-condensing)	
Atmospheric pressure	800 to 1,060 hPa	
Environmental conditions (during storage, unpacked condition)		
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, packed condition)		
Temperature	−30 to 70°C (−22 to 158°F)	
Humidity	10 to 95% (non-condensing)	
Atmospheric pressure	500 to 1,060 hPa	
Other		
Expected service life	8 years from the date of initial operation (defined by manufacturer) * Proper maintenance is necessary.	
Unit per package	1 unit	

Classifications	
Protection against electrical shock	Class I ME equipment
	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
Method(s) of sterilization	ME equipment that does not contain any part that needs sterilization
Mode of operation	Continuous operation

Wireless LAN (optional wireless LAN module)	
Compliance standard	IEEE 802.11a/b/g/n
Modulation method	Orthogonal frequency division multiplexing (OFDM) Direct-sequence spread spectrum (DSSS/CCK)
Center frequency	2.4 GHz: 2412 to 2472 MHz (varies depending on the region or country) 5 GHz: 5180 to 5320 MHz, 5500 to 5700 MHz, 5745 to 5825 MHz (varies depending on the region or country)
Effective radiated power	8.24 mW
Link speed	802.11n: 6.5 to 150 Mbps 802.11a/g: 6 to 54 Mbps 802.11b: 1 to 11 Mbps
Access method	Infrastructure mode (access point, client)
Security	WPA, WPA 2, WEP (64/128 bits)
Certification	The wireless LAN module incorporated in this device is certified in accordance with the requirements stipulated by the following regulations and organizations. Radio law (Japan), FCC (U.S.A.), Industry Canada (Canada), 2014/53/EU Radio Equipment Directive (EU) IMDA Standards (Singapore) The following labels indicate the Dealer's individual license in Singapore. 

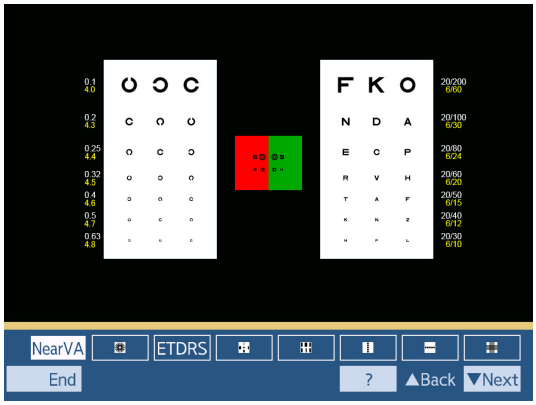
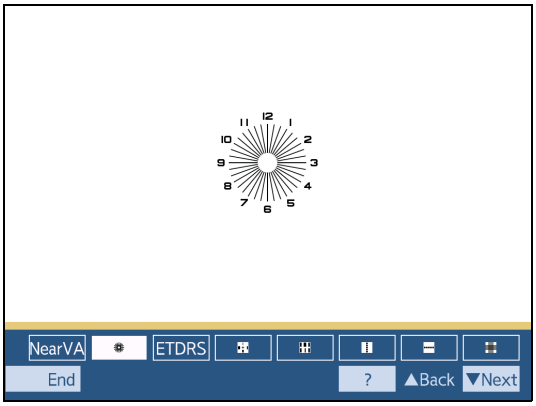
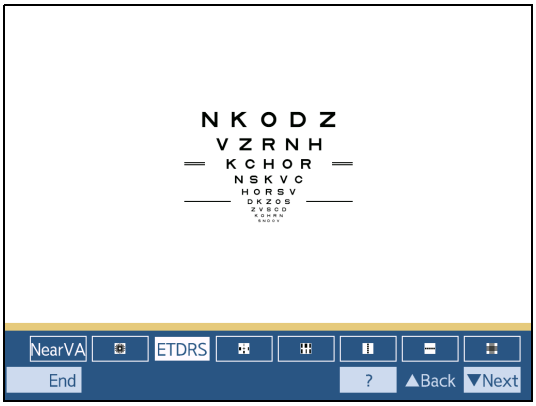
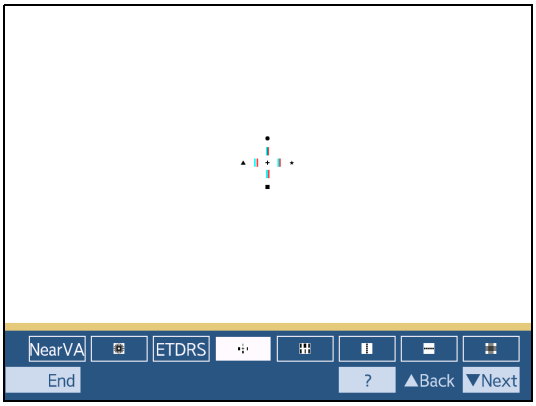
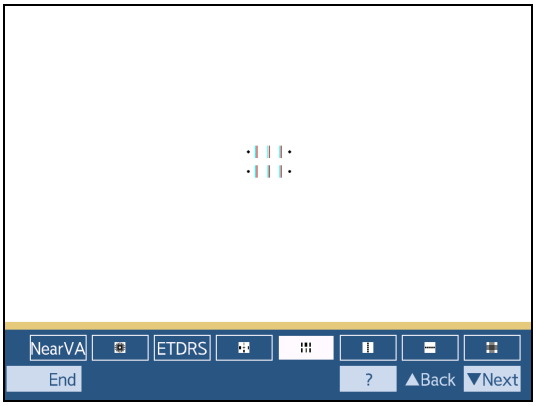
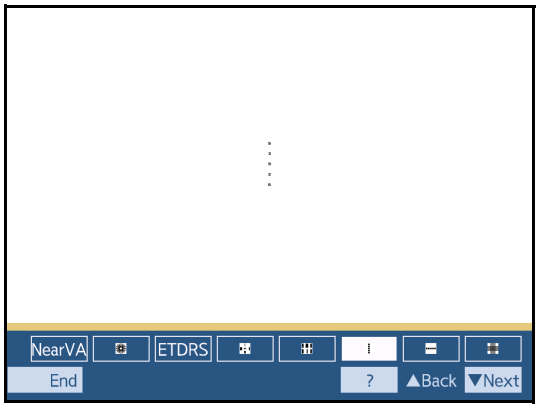
Standard accessories					
Part name	Quantity	Appearance	Part name	Quantity	Appearance
Face shields (provided with the refractor head)	1 set		Knob (except for the SSC-100)	1	
Forehead rest	1		Power cord	1	
Touch pen	1		Refractor head cable	1	
Printer paper	3		Relay box - control box cable	1	
Dust cover (except for the SSC-100)	1		Operator’s manual	1	
Near point chart (except for the SSC-100)	1		Quick reference guide	1	
Near point rod (except for the SSC-100)	1				

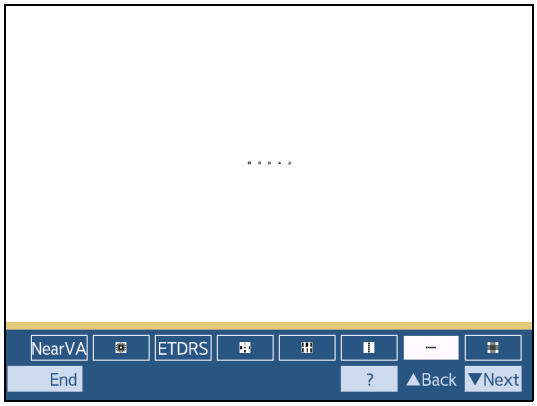
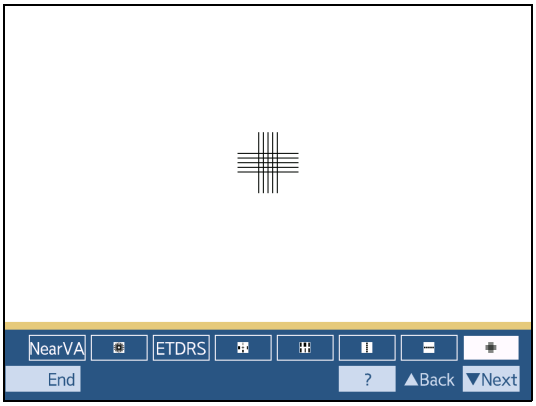
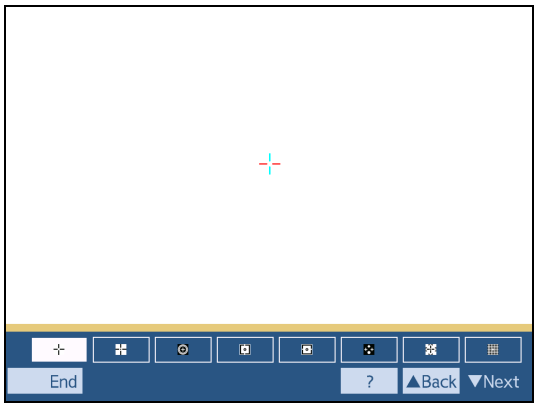
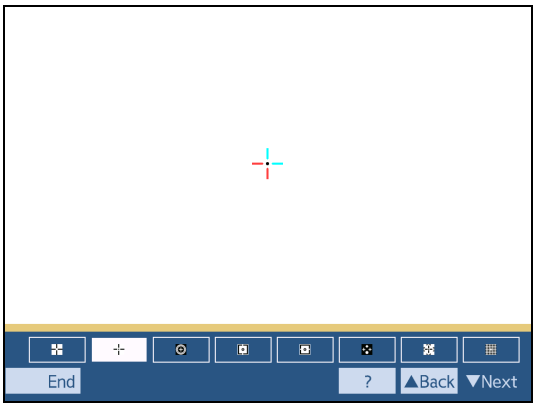
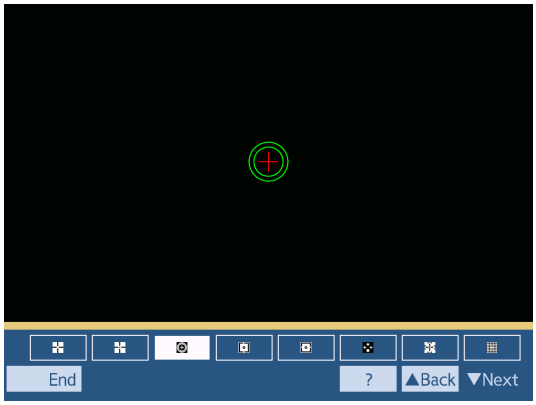
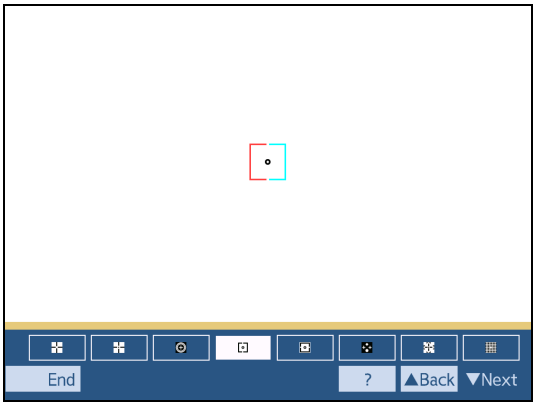
Optional accessories

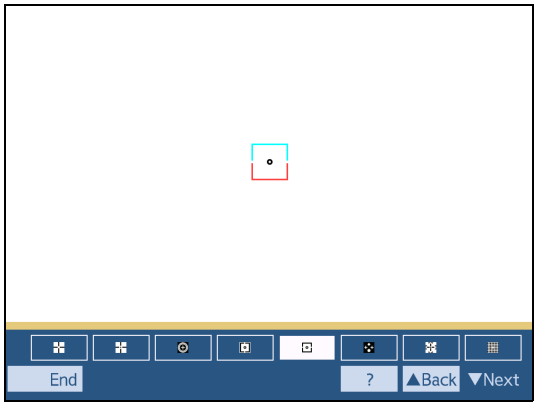
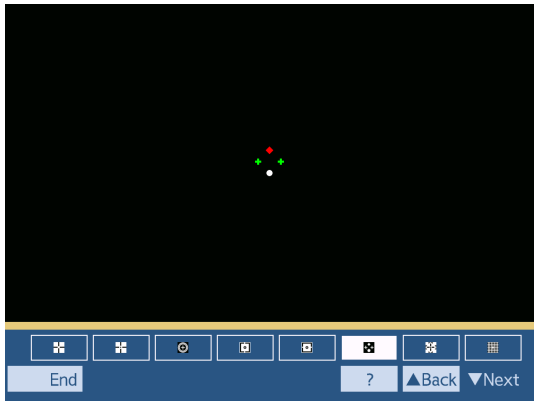
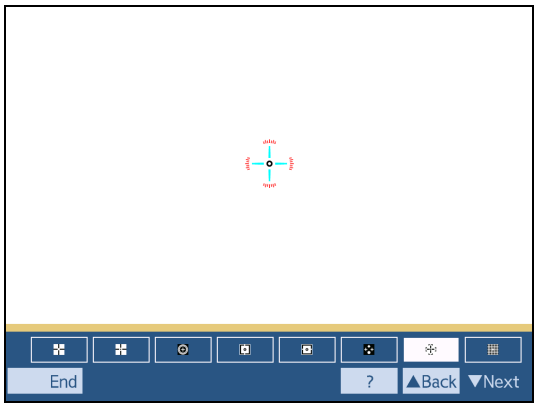
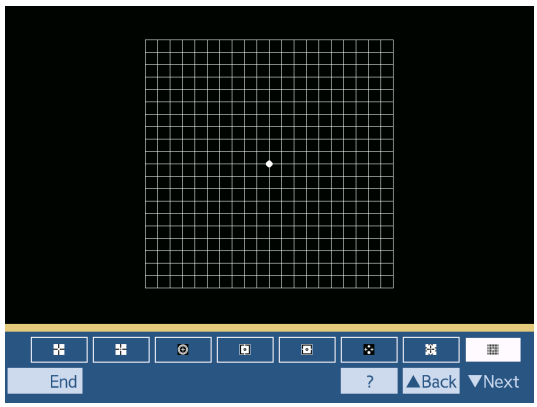
- Eye Care card (5 units per set)
- Infrared communication unit (except for the SSC-100)
- Refractor head tilt unit (except for the SSC-100)
- Control box stand
- Wireless LAN module
- Magnetic card reader
- Barcode scanner
- Memory box
- Polarization switching unit (except for the SSC-100)
- Space Saving Chart SSC-100
- Near point rod (except for the SSC-100)
- Relay box - control box cable 10 m
- LAN cable
- RT-6100 CB for Windows
- Fully Assisted Refraction System

8.3 Near Charts Displayable on Touch Screen

The following lists the near charts that can be displayed on the control box touch screen.

Visual acuity charts	Astigmatism clock dial
	
ETDRS chart	**Stereo 1**
	
Stereo 2	**Vertical line**
	

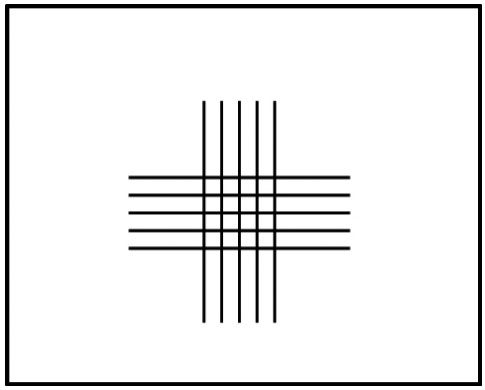
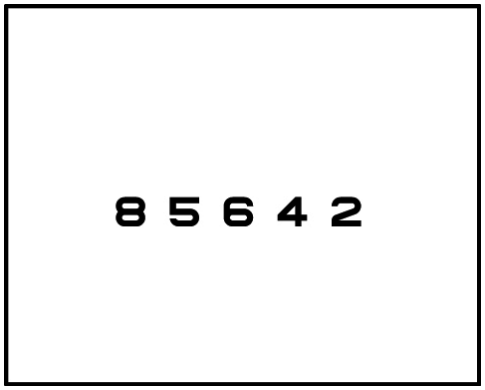
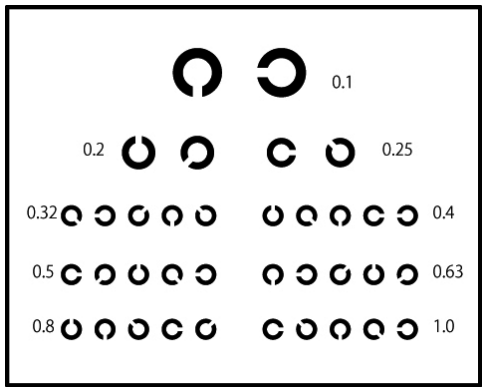
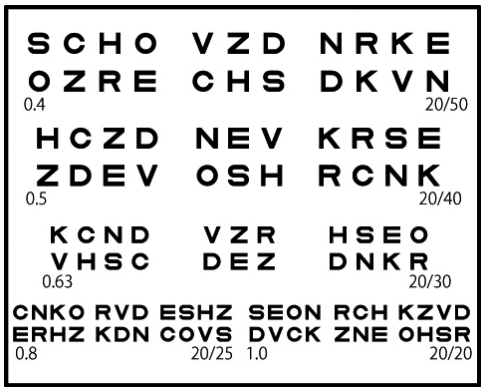
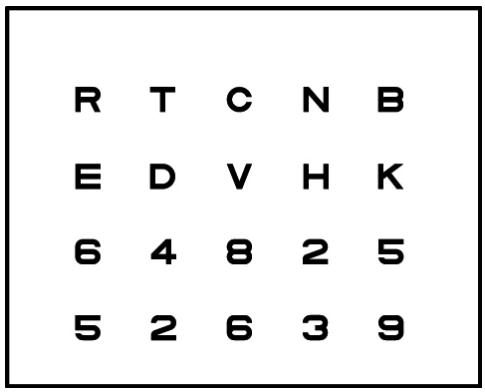
Horizontal line	Cross grid
	
Phoria	**Phoria with fixation point**
	
Schober	**Vertical coincidence**
	

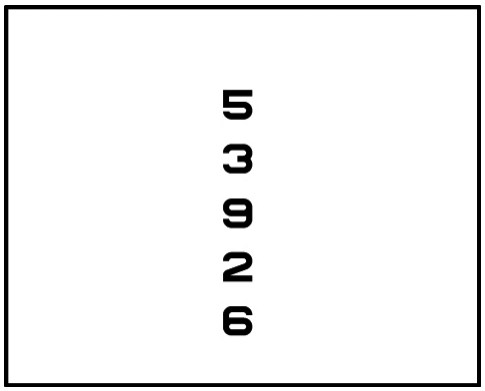
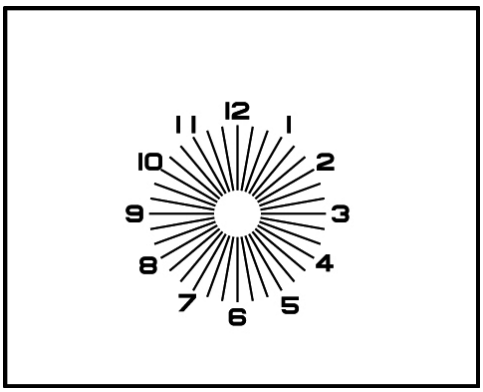
Horizontal coincidence	Worth four-dot
	
Cyclophoria	**Amsler grid**
	

❖ For Stereo 1, Stereo 2, Phoria, Phoria with fixation, Schober, Vertical line, Horizontal line, and Worth four-dot, place the red filter to the right eye and the green filter to the left eye of the trial frame.

8.4 Near Point Charts

The following lists the near point charts attached to the near point rod.

1: Letters 20/200-20/60 (0.1-0.32) (40 cm)	2: Cross grid
	
3: Numbers H 20/30 (0.63) (40 cm)	4: Landolt rings (40 cm)
	
5: Letters 20/50-20/20 (0.4-1.0) (40 cm)	6: Letters&Numbers 20/30 (0.63) (40 cm)
	

7: Numbers V 20/30 (0.63) (40 cm)	8: Astigmatism clock dial
	

8.5 Power Adjustment Description

This device is provided with auto adjustment and semi-auto adjustment functions. The following explains the details of the adjustment functions by refractive errors.

- Auto adjustment: Adjusts the binocular full correction after binocular balance is achieved.
- Semi-auto adjustment: Performed after auto adjustment. The semi-auto adjustment is operated by pressing  or  according to the patient's response.

The Final Fit values calculated with the auto adjustment function is lower than an average prescription. Be sure to perform the semi-auto adjustment.

Be sure to perform the semi-auto adjustment according to the patient's intended purpose as well. Use  when high visual acuity is required for distance vision such as driving.

Note

- Hereafter, the description is provided with Minus CYL mode. For Plus CYL mode, it is necessary to convert the mode to Minus CYL mode once.

◆ Myopia

When the sphere values of both eyes are minus, or when the sphere value of one eye is minus and the other is 0 D:

● First glasses

For patients who do not have their glasses.

(This adjustment is also applicable when the patient does not bring their glasses or LM data is not entered in the refractor.)

Auto adjustment	• A certain value is reduced from each eye. • The difference between the right and left eyes should be within 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each sphere value (to the minus direction). Adjustable within the full correction. If the value attempts to be changed out of the range, a beep sounds and the value does not change.  → 0.25 D is reduced from each sphere value (to the plus direction). Adjustable within 0 of each sphere value. If the value attempts to be changed out of the range, a beep sounds and the value does not change. • When the difference between the right and left eyes is large, the value may be changed up to −0.25 D only. This is because the patient's eyes do not adjust to the glasses well with 0 D of monocular vision.

● With glasses

For patients who have their glasses.

Auto adjustment	• A certain value is reduced from each eye. • The full correction is selected when the LM data is overcorrected. • The difference between the right and left eyes should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D. • The amount increased from the LM data should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D.

Semi-auto adjustment	 → 0.25 D is added to each sphere value (to the minus direction). Adjustable within the full correction. However, the value can be adjusted within the LM data over the full correction only when the LM data is overcorrected.  → Same as “First glasses”.

◆ Hyperopia

When the sphere value of each eye is plus, or when the sphere value of one eye is plus and the other is 0 D:

● First glasses

Auto adjustment	• The full correction remains as it is basically. • The difference between the right and left eyes should be within 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each sphere value (to the minus direction). Adjustable within the range that each sphere value is not minus.  → This button does not function basically.

● With glasses

For patients who have their glasses.

Auto adjustment	• The full correction remains as it is basically. • The difference between the right and left eyes should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each sphere value (to the minus direction). Adjustable within the range that each sphere value is not minus.  → This button does not function basically. However, the sphere value can be adjusted to the LM data only when the data is larger than the full correction to the plus direction.

◆ Astigmatism

● First glasses

Auto adjustment	• A certain value is reduced from each eye. • The difference between the right and left eyes should be within 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each cylinder value (to the minus direction). Adjustable within the full correction. If the value attempts to be changed out of the range, a beep sounds and the value does not change.  → 0.25 D is reduced from each cylinder value (to the plus direction). Adjustable within 0 of each cylinder value. If the value attempts to be changed out of the range, a beep sounds and the value does not change. • If the difference between the right and left eyes is large, the value may be changed up to −0.25 D only. This is because the patient’s eyes do not adjust to the glasses well with 0 D of monocular vision.

● With glasses

For patients who have their glasses.

Auto adjustment	• A certain value is reduced from each eye. • The full correction is selected when the LM data is overcorrected. • The difference between the right and left eyes should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D. • The amount increased from the LM data should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each cylinder value (to the minus direction). Adjustable within the full correction. However, the value can be adjusted within the LM data over the full correction only when the LM data is overcorrected.  → Same as “First glasses”.

◆ Oblique astigmatism

When the cylinder axis is 16° to 74° or 106° to 164°:

● First glasses

Auto adjustment	• The cylinder values are set to 0 for the patient who has slight astigmatism in both eyes (C: −0.25 D, −0.50 D). • If the value is −0.50 D or greater, a certain value is reduced from each value. However, the difference between the right and left eyes should be within 0.75 D.
Semi-auto adjustment	 → 0.25 D is added to each cylinder value (to the minus direction). Adjustable within the full correction.  → The adjustment below is performed in the following order depending on the cylinder values: • 0.25 D is reduced from the cylinder value (to the plus direction). • The cylinder axis is changed to either 90° or 180° (closer one). • The cylinder value is reduced and the axis changes. • If the difference between the right and left eyes is large, the value may be changed up to −0.25 D only. This is because the patient’s eyes do not adjust to the glasses well with 0 D of monocular vision.

● With glasses

For patients who have their glasses.

Auto adjustment	• A certain value is reduced from each eye. • The full correction is selected when the LM data is overcorrected. • The difference between the right and left eyes should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D. • The amount increased from the LM data should be within 0.75 D. However, if the difference between the right and left eyes in the LM data is large, the increased amount may be over 0.75 D.
Semi-auto adjustment	Same as “First glasses”.

◆ Myopia/hyperopia and astigmatism in combination

The adjustments described in *"♦ Myopia" (page 296)* - *"♦ Oblique astigmatism" (page 298)* can be respectively performed in combination for the sphere and cylinder values.

◆ Anisometropia

Based on the concept that the difference between the right and left eyes is within 0.75 D, the patient who has the difference of 1 D or greater is regarded as anisometropia. The higher value is adjusted close to the lower one as described in *"♦ Myopia" (page 296)* - *"♦ Oblique astigmatism" (page 298)*.

When LM data is entered in the refractor, the auto adjustment function adds 0.75 D to the eye with a higher value of the LM data.

◆ One is myopia and the other is hyperopia

The auto adjustment is not performed. The indication "Dominant Far:+S→0, Dominant Near:-S→0" appears.

If the power is low, correction may be not necessary. However, it is recommended to adjust the power depending on the patient's intended purpose.

- For patients who wear glasses for distance correction → Adjust the plus sphere value close to 0.
- For patients who wear glasses for near correction → Adjust the minus sphere value close to 0.

ex.: To correct the powers with sphere values of R +1.00 D and L −1.00 D for distance vision,

1) Press S.
2) Press R.
3) Turn the dial clockwise until the desired visual acuity is obtained.

   This adjustment should be performed manually by the operator. Copy the full correction and compare the vision for easy adjustment.

8.6 Visual Acuity Conversion Table

Decimal	Fraction (feet)	Fraction (meters)
0.03		6/200
0.032	20/600	
0.04	20/500	6/150
0.05	20/400	6/120
0.06		6/100
0.063	20/320	
0.08	20/250	6/75
0.1	20/200	6/60
0.125		6/48
0.15	20/150	
0.16		6/38
0.2	20/100	6/30
0.25	20/80	6/24
	20/70	
0.3		6/20
0.32	20/60	
0.4	20/50	6/15
0.5	20/40	6/12
0.6		6/10
0.63	20/30	
0.7		
0.8	20/25	6/7.5
0.9		
1.0	20/20	6/6
1.2		6/5
1.25		
	20/15	
1.5		6/4
1.6		
2.0	20/10	6/3
2.5		

8.7 Preset Addition Table

The following is a table listing the additions to be preset based on the patient's age.

Age	Preset additions (D)	
	Setting 1(Low)*a	Setting2(High)*a
45 or younger	0.75	1.00
to 50	1.25	1.75
to 55	1.50	2.00
to 60	1.75	2.25
to 65	2.00	2.50
66 or older	2.25	3.00

*a. "Setting1(Low)" or "Setting2(High)" can be set by the parameter "Preset ADD".

❖ No addition is preset when the parameter "Preset ADD" is set to [No].

8.8 Relational Table of Age and Accommodation

For accommodation used for calculation of the range of clear vision, accommodation estimated according to the age can be used.

Age	Accommodation (D)
10	13.2
15	11.2
20	9.8
25	8.5
30	7.3
35	6.1
40	4.9
45	3.4
50	2.3
55	1.6
60	1.2
65	0.7
70	0.3

❖ Reference: Sakuyama, Fujio ed. and Izumi, Yukio, Ippankussetsukensa

8.9 Estimated Visual Acuity Table

The following explains the visual acuity chart presented first during the unaided visual acuity test or the test of visual acuity corrected by glasses.

Measurement	AR data	Calculation of estimated visual acuity
Unaided visual acuity	Provided	Enter the spherical power of AR values (add the minus cylinder value if a cylinder value is included) in a of the following table.
	Not provided	Minimum value
Visual acuity corrected by glasses	Provided	Enter the spherical power of AR values – spherical power of LM values (add the minus cylinder value if a cylinder value is included) in a of the following table.
	Not provided	20/30 (0.63)

Spherical power (D) a	Estimated visual acuity value			
	Decimal	Fraction (feet)	Fraction (meters)	5-mark record
From −7.25	0.03	20/600	6/200	3.7
	0.032			
−6.25 to −7.00	0.04	20/500	6/150	
−5.25 to −6.00	0.05	20/400	6/120	
−4.25 to 5.00	0.06	20/320	6/100	
	0.063			
−3.25 to 4.00	0.08	20/250	6/75	3.9
−2.25 to −3.00	0.1	20/200	6/60	4.0
−2.00	0.2	20/100	6/30	4.3
−1.75	0.3	20/60	6/20	4.5
	0.32			
−1.50	0.4	20/50	6/15	4.6
−1.25	0.5	20/40	6/12	4.7
−1.00	0.6	20/30	6/10	4.8
	0.63			
−0.75	0.7		6/7.5	
−0.50	0.8	20/25		4.9
−0.25	0.9	20/20	6/6	
0	1.0			5.0

- The visual acuity in the table may not be applicable depending on the chart presenting device.
- The estimated visual acuity does not work when the parameter “Preset VA” is set to [No] or when there is a value is in Final mode.

8.10 Fog Amount in Binocular Balance

The vision is fogged automatically during the binocular balance test. The following is the fog amount applied.

Visual acuity value (subjective)			Binocular fog amount (D)
Decimal	Fraction (feet)	Fraction (meters)	
Up to 0.8	Up to 20/25	Up to 6/7.5	0
0.9	—	—	+0.25
1.0	20/20	6/6	+0.25
1.2	—	6/5	+0.50
1.25	—	—	+0.50
—	20/15	—	+0.50
1.5	—	6/4	+0.50
1.6	—	—	+0.50
2.0	20/10	6/3	+0.75
2.5	—	—	+0.75

❖ The vision is not automatically fogged when the parameter “Fog for binocular balance” is set to [No].

8.11 License Information of Software Library

This section provides the license information on the MD4, MD5, and XML parser used by the RT-6100.

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◆ SHA256:

SHA256 hash implementation and interface functions
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8.12 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.

⚠ WARNING

- 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 result improper operation.
- Do not use the device near, on, or under other electronic equipment.
  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.
- Portable RF communications equipment (including peripherals such as antenna cables and external antennas) 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.

◆ Specified cables

Part name	Connector shielded	Cable shielded	Ferrite core	Length (m)
Power cord	No	No	No	2.5
Refractor head cable	Yes	Yes	No	7.0
Relay box - control box cable	Yes	Yes	No	5.0
Printer cable	Yes	Yes	No	2.0
Barcode scanner cable	Yes	Yes	No	2.0
Magnetic card reader cable	Yes	Yes	No	1.8
LAN cable (AR)	Yes	Yes	No	5.0
LAN cable (LM)	Yes	Yes	No	5.0
Communication cable (CP)	Yes	Yes	Yes	15.0

◆ Specified multimedia equipment

Specified multimedia equipment	Standard compliance
Network switch	CISPR 32 Class B
Computer	

◆ Essential performance

Measurement of subjective refractive power

Guidance and manufacturer's declaration - electromagnetic emissions		
The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The device is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	*1	
Voltage fluctuations/ Flicker emissions IEC 61000-3-3	*2	

* 1 For the regions where the rated voltage is 220 V or greater, this device complies with class A. For the regions where the rated voltage is 127 V or less, this standard is not applicable.

* 2 For the regions where the rated voltage is 220 V or greater, this device complies with this standard. For the regions where the rated voltage is 127 V or less, this standard is not applicable.

Guidance and manufacturer's declaration - electromagnetic immunity			
The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air	Floor should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines 100 kHz repetition frequency	±2 kV for power supply lines ±1 kV for input/output lines 100 kHz repetition frequency	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage, dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	Dips: 0% U_T in 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% U_T in 1 cycle and 70% U_T in 25/30 cycles in single phase (at 0°) Short interruptions: 0% U_T in 250/300 cycle	Dips: 0% U_T in 0.5 cycle at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315° 0% U_T in 1 cycle and 70% U_T in 25/30 cycles in single phase (at 0°) Short interruptions: 0% U_T in 250/300 cycle	Mains power quality should be that of a typical commercial or hospital environment. If the user of the device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power supply or a battery.
Power frequency (50/ 60 Hz) magnetic field IEC 61000-4-8	30 A/m 50 Hz or 60 Hz	30 A/m 50 Hz or 60 Hz	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The device is intended for use in the electromagnetic environment specified below. The customer or the user of the device should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6	3 V 0.15 MHz to 80 MHz 6 V in ISM and amateur radio bands between 0.15 MHz and 80 MHz 80% AM at 1 kHz	3 V 0.15 MHz to 80 MHz 6 V in ISM and amateur radio bands between 0.15 MHz and 80 MHz 80% AM at 1 kHz	Portable and mobile RF communications equipment should be used no closer than 30 cm to any part of the device, including cables.[a]
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.7 GHz 80% AM at 1 kHz	10 V/m 80 MHz to 2.7 GHz 80% AM at 1 kHz	
Proximity field from RF wireless communications equipment IEC 61000-4-3	See “Test specifications for enclosure port immunity to RF wireless communications equipment”.	See “Test specifications for enclosure port immunity to RF wireless communications equipment”.	
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the device is used exceeds the applicable RF compliance level above, the device should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the device.			

Test specifications for enclosure port immunity to RF wireless communications equipment					
Test frequency (MHz)	**Band[a] (MHz)**	**Service[a]**	**Maximum power (W)**	**Distance (m)**	**Immunity test level (V/m)**
385	380 - 390	TETRA 400	1.8	0.3	27
450	430 - 470	GMRS 460, FRS 460	2	0.3	28
710	704 - 787	LTE Band 13, 17	0.2	0.3	9
745					
780					
810	800 - 960	GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5	2	0.3	28
870					
930					
1,720	1,700 - 1,990	GSM 1800, CDMA 1900, GSM 1900, DECT; LTE Band 1, 3, 4, 25: UMTS	2	0.3	28
1,845					
1,970					
2,450	2,400 - 2,570	Bluetooth, WLAN, 802.11: b/g/n, RFID 2450, LTE Band 7	2	0.3	28
5,240	5,100 - 5,800	WLAN 802.11 a/n	0.2	0.3	9
5,500					
5,785					
NOTE: If necessary to achieve the immunity test level, the distance between the transmitting antenna and the ME equipment or ME system may be reduced to 1 m. The 1 m test distance is permitted by IEC 61000-4-3.					
[a] For some services, only the uplink frequencies are included.					

9 INDEX