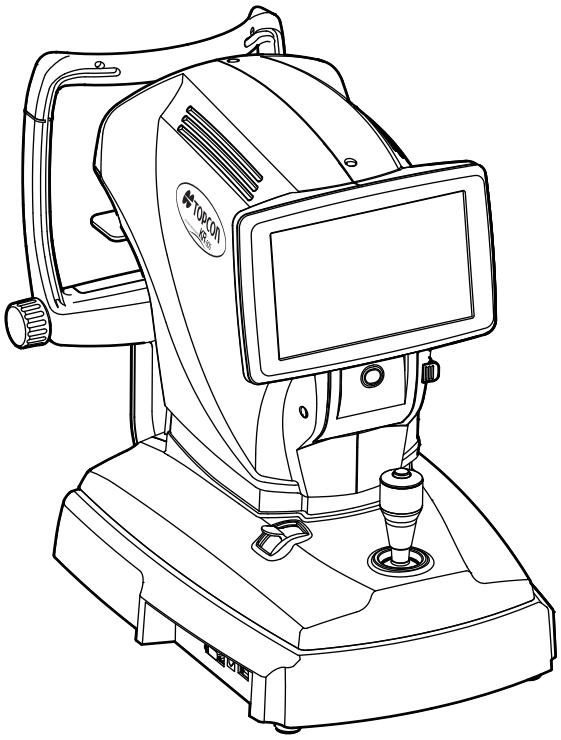
TOPCON



## USER MANUAL

# AUTO KERATO-REFRACTOMETER
# KR-800S

# INTRODUCTION

Thank you for purchasing the TOPCON AUTO KERATO-REFRACTOMETER KR-800S.

## INTENDED USE / INDICATIONS FOR USE

This instrument is used to measure the spherical refractive-power, cylindrical refractive power, the direction of astigmatic axis, the radius of curvature, to compute the corneal refractory power, corneal astigmatic power and the corneal astigmatic axis angle, and to carry out subjective optometry.

## FEATURES

**This instrument features the following:**

- By auto shoot function, the measurement is performed automatically when the patient's eye reaches within a measuring range.
- This instrument is possible to measure the refraction and corneal curvature of the eye at the same time.
- This instrument provides subjective refractive check (Far VA and Near VA). Moreover contrast test, glare test and the test by grid display can be performed.

## PURPOSE OF THIS MANUAL

This User Manual provides an overview of the basic operation, troubleshooting, checking and cleaning of the TOPCON AUTO KERATO-REFRACTOMETER KR-800S.
To get the best use of the instrument, read GENERAL SAFETY INFORMATION and DISPLAYS AND SYMBOLS FOR SAFE USE.
Keep this Manual at hand for future reference.

**[CAUTION]** Federal law restricts this device to sale by or on the order of a physician.

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1. No part of this manual may be copied or reprinted, in whole or in part, without prior written permission.
2. The contents of this manual are correct to the best of our knowledge. Please inform us of any ambiguous or erroneous descriptions, missing information, etc.
3. This manual is original instructions.

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# CONTENTS

# GENERAL SAFETY INFORMATION

## ⚠ WARNING

| Ensuring the Safety of Patients and Operators |
|---|
| When operating the instrument, do not touch the patient's eye or nose. |

| Preventing Electric Shocks and Fires |
|---|
| To avoid fire and electric shock, install the instrument in a dry place free of water and other liquids. |
| To avoid fire and electric shock, do not put cups or other containers with liquids near the instrument. |
| To avoid electric shocks, do not insert metal objects into the instrument body through the vent holes or gaps. |
| To avoid fire in the event of an instrument malfunction, immediately turn OFF the power switch "○" and disconnect the power plug from the outlet if you see smoke coming from the instrument, etc. Don't install the instrument where it is difficult to disconnect the power plug from the outlet. Ask your dealer for service. |
| Modification of this instrument is not permitted. |

## ⚠ CAUTION

| Ensuring the Safety of Patients and Operators |
|---|
| To avoid injury when operating the instrument, do not touch the main body to the patient's eye or nose. |

| Preventing Electric Shocks |
|---|
| To avoid injury by electric shock, do not open the cover. For repair, call your service engineer. |

| Ensuring Security |
|---|
| • When connecting this instrument to an external device through LAN, apply the security update to the external device, make use of anti-virus software and take other countermeasures against computer virus properly.<br>• Do not connect any USB storage device that is not checked with the anti-virus software to the USB port of this instrument.<br>• When connecting this instrument to an external device through LAN, set the ID and password of the user to the external device.<br>• When outputting data to the shared folder on an external device from this instrument, set a proper user ID and password to the shared folder |

| Electromagnetic Compatibility (EMC) |
|---|
| This instrument has been tested (with 100/120/230V) and found to comply with IEC60601-1-2:Ed.4.0: 2014. This instrument radiates radio frequency energy within standard and may affect other devices in the vicinity. If you have discovered that turning on/off the instrument affects other devices, we recommend you change its position, keep a proper distance from other devices, or plug it into a different outlet. Please consult your authorized dealer if you have any additional questions. |

# HOW TO READ THIS MANUAL

Read the instructions on pages 1 to 8 before using the machine.
Regarding connection to various devices, see "CONNECTING EXTERNAL I/O TERMINALS" on page 23.
If you would like an overview of the system, begin by reading "BASIC OPERATIONS"(page 26).
For setting various functions, see "SETTING FUNCTIONS ON SETUP SCREEN" on page 58.

# GENERAL MAINTENANCE INFORMATION

Do not perform any maintenance work while the instrument is in use on a patient.

## USER MAINTENANCE

To maintain the safety and performance of the equipment, never attempt to repair or perform maintenance. These tasks should be performed by an authorized service representative.
Maintenance tasks that can be performed by the user are as follows; for details, follow the manual's instructions.

### CLEANING OF MEASURING WINDOW

For details, See "CLEANING THE INSTRUMENT" on page 72.

# DISCLAIMERS

- TOPCON is not responsible for damage due to fire, earthquakes, actions or inactions of third persons or other accidents, or damage due to negligence and misuse by the user and any use under unusual conditions.
- TOPCON is not responsible for damage derived from inability to properly use this equipment, such as loss of business profits and suspension of business.
- TOPCON is not responsible for damage caused by operations other than those described in this User Manual.
- TOPCON is not responsible for any damage caused by unauthorized access from outside? malware or viruses.
- The device does not provide a diagnosis of any condition or lack thereof or any recommendations for appropriate treatment. The relevant healthcare provider is fully responsible for all diagnosis and treatment decisions and recommendations.

# DISPLAYS AND SYMBOLS FOR SAFE USE

In order to encourage the safe use of the instrument and to avoid danger to the operator and others as well as damage to properties, warnings are described in the User Manual and marked on the instrument body.
We suggest you thoroughly understand the meaning of the following displays/icons and Safety Cautions, as well as read the Manual, and strictly observe the instructions.

## DISPLAY

| DISPLAY | MEANING |
|---|---|
| **WARNING** | A WARNING is provided to alert the user to potential serious outcomes (death, injury, or serious adverse events) to the patient or the user. |
| **CAUTION** | A CAUTION is provided to alert the user to use special care necessary for the safe and effective use of the device. They may include actions to be taken to avoid effects on patients or users that may not be potentially life threatening or result in serious injury, but about which the user should be aware. Cautions are also provided to alert the user to adverse effects on this device of use or misuse and the care necessary to avoid such effects. |
| **NOTE** | A NOTE is provided when additional general information is applicable. |

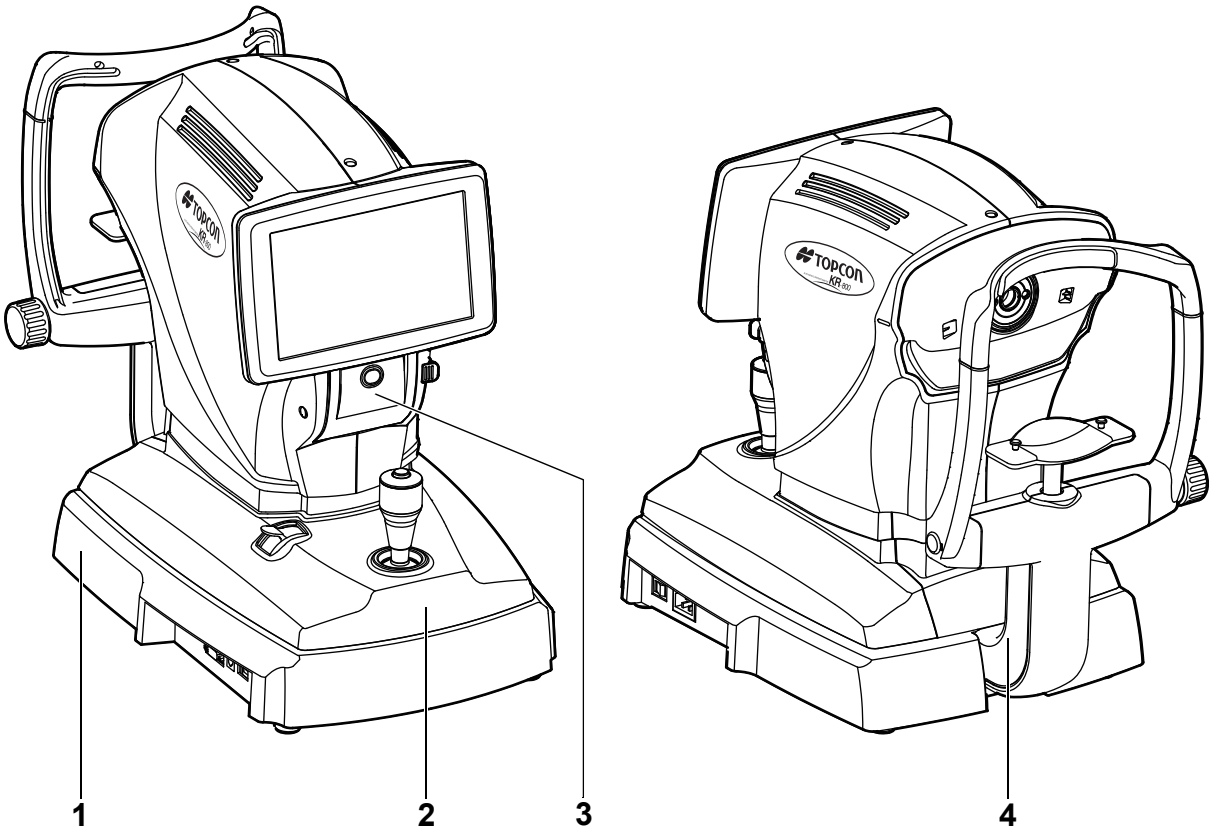
## SYMBOL

| Symbol | Description | Description (French) |
|---|---|---|
|  | Alternating Current | Courant alternatif |
|  | Off (power: disconnection from the main power supply) | Éteint (courant: coupure avec le secteur) |
|  | On (power: connection to the main power supply) | Allumé (courant: raccordement sur le secteur) |
|  | Type B applied part | Partie appliquée du Type B |
|  | General warning sign | Symbole d'avertissement général |
|  | Refer to instruction manual/booklet | Voir le manuel/la brochure |
|  | Date of manufacture | Date de fabrication |
|  | Serial number | Numéro de série |
|  | Manufacturer | Fabricant |
|  | Authorised Representative in the European Community | Représentant autorité pour l'Union européenne |

| | | |
|---|---|---|
|  | Humidity limitation | Limite d'humidité |
|  | Atmospheric pressure limitation | Limite de pression atmosphérique |
|  | Temperature limit | Limite de température |
|  | Fragile, handle with care | Fragile manipuler avec soin |
|  | Keep dry | Garder au sec |
|  | This way up | Vers le haut |
|  | Maximum number of identical packages which may be stacked on one another. | Nombre maximum d'emballages identiques pouvant être empilés les uns sur les autres. |
|  | General symbol for recovery/recyclable. (for the package) | Symbole général de tri sélectif. (pour l'emballage) |
|   | Recycling symbol for plastic in the package. Low density polyethylene | Symbole de recyclage du plastique de l'emballage. Polyéthylène basse densité |
|   | Recycling symbol for plastic in the package. Polypropylene | Symbole de recyclage du plastique dans l'emballage. Polypropylène |
|   | Recycling symbol for plastic in the package. Polystyrene | Symbole de recyclage du plastique de l'emballage. Polystyrène |
|  | Indicates that the product conforms to the requirements of the Medical Device Regulation(EU)2017/745 and of the other applicable Union legislation | Indique que le produit est conforme aux exigences du Reglement (UE) 2017/745 relatif aux dispositifs medicaux et des autres lois applicables de l'Union Europeenne |
|  | WEEE label<br>The symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling. | Marquage des DEEE<br>Il s'agit d'un symbole indiquant que le produit ne doit pas être éliminé avec les déchets non triés, mais doit être envoyé dans des installations de collecte séparées destinées à la valorisation et au recyclage. |
|  | EU Battery Directive<br>Battery users must not dispose of batteries as unsorted general waste, but treat properly | Directive européenne sur les batteries<br>Les utilisateurs de batteries ne doivent pas jeter les batteries comme des déchets géné |

# POSITIONS OF WARNING AND CAUTION INDICATIONS

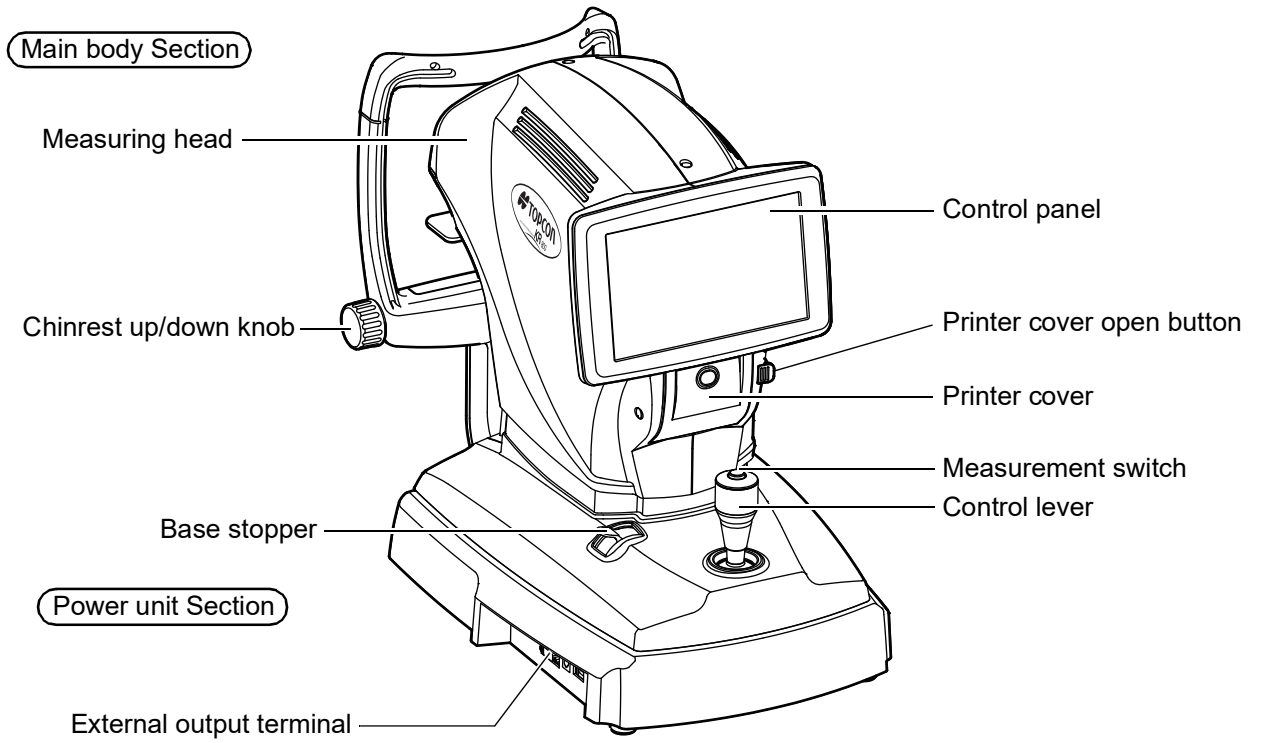
To secure safety, this equipment provides warnings.
Correctly use the equipment following these warning instructions. If any of the following marking labels are missing, please contact your dealer or TOPCON at the address stated on the back cover.

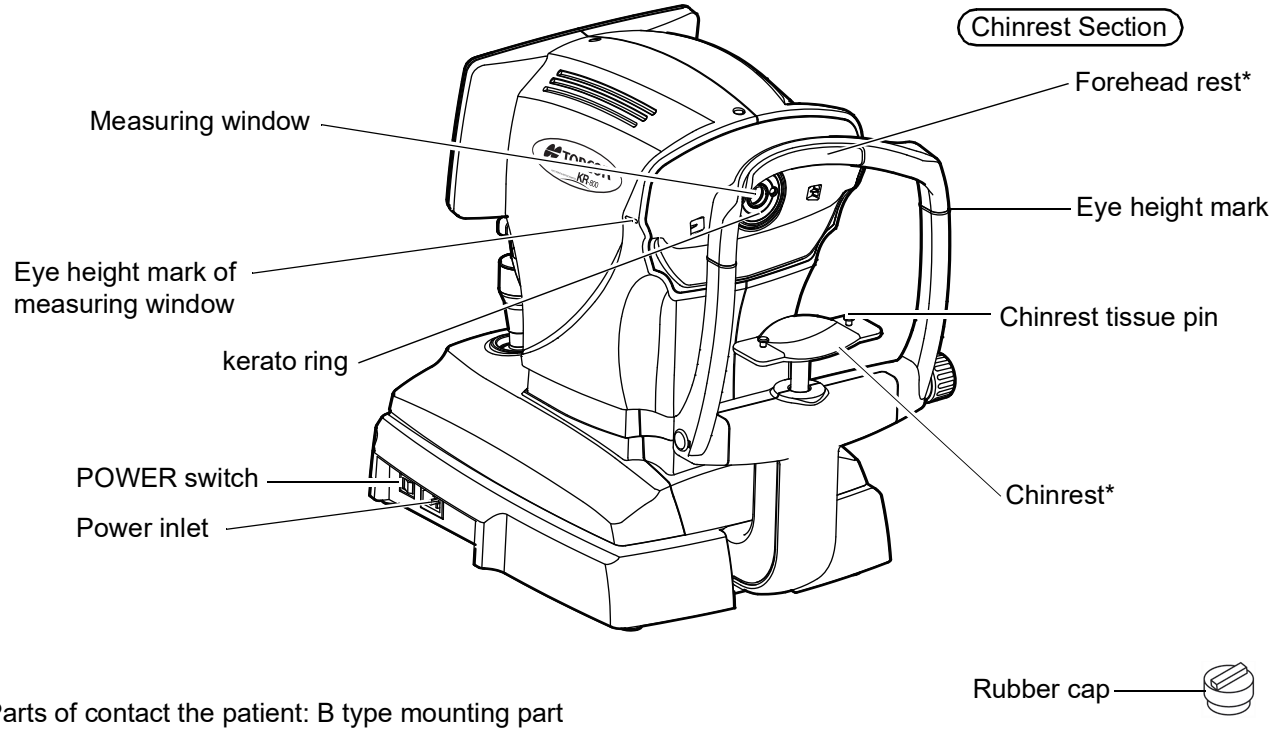



| No. | Label | Meaning | Signification |
|---|---|---|---|
| 1 |  | **WARNING**<br>To avoid injury caused by electric shock, do not open the cover.<br>Ask your dealer for service. | **MISE EN GARDE**<br>Ne pas ouvrir le couvercle pour éviter les blessures causées par un choc électrique.<br>Demander au revendeur d'effectuer le service. |
| 2 |  | **CAUTION**<br>Be careful not to hit the patient's eyes or nose with the instrument during operation. | **PRÉCAUTION**<br>Prendre garde de ne pas frapper les yeux ou le nez du patient avec l'instrument pendant l'opération. |
| 3 |  | **CAUTION**<br>Pay much attention not to touch the internal printer's body when the cover is open.<br>If touched, it may result in trouble due to electrostatic discharge. | **PRÉCAUTION**<br>Faites très attention à ne pas toucher le corps interne de l'imprimante lorsque le couvercle est ouvert.<br>En cas de contact, des problèmes peuvent survenir en raison de la décharge électrostatique. |
| 4 |  | Degree of protection against electric shock :TYPE B APPLIED PART | Degré de protection contre les chocs électriques: TYPE B PARTIE D'APPLICATION |

# COMPONENTS

## COMPONENT NAMES




* Parts of contact the patient: B type mounting part

## COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber
Chinrest : Acrylonitrile butadiene styrene resin

## OPERATION METHOD OF CONTROL PANEL

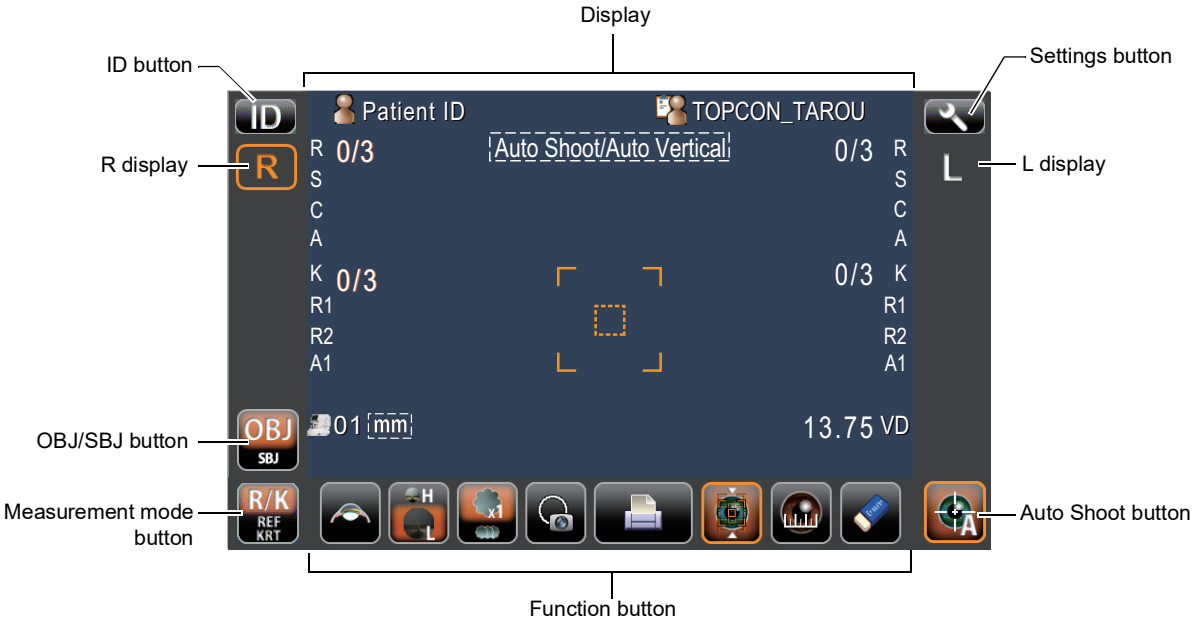
| NOTE | • The control panel is a touch panel. Do not use any sharp tools; e.g. ball point pen.<br>• Do not touch two points on a control panel simultaneously.<br>• If a control panel is tapped during the measurement and the device is moved, measurement may not be performed properly. |
|---|---|

Tap → To select any relevant item.

Touch the control panel softly with a finger.

## CONTROL PANEL COMPONENTS (IN OBJECTIVE REFRACTIVE MEASUREMENT)

The control panel is designed as a touch panel for performing various operations and settings. It displays images and shows information, including set conditions and measurement results.




ID button .....Input the patient ID (up to 13 characters) and operator ID (up to 13 characters). However, if no patient ID is input, the patient No. is allocated automatically.

OBJ/SBJ button .....Switches objective refractive measurement mode and subjective refractive check mode.

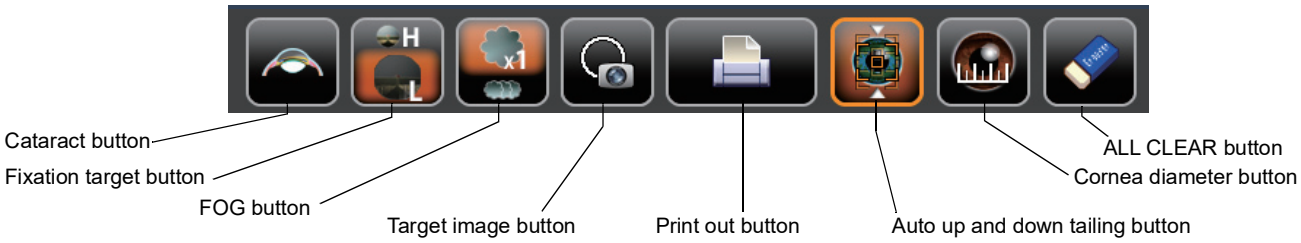
Measurement mode button .....Selects a measurement mode from R/K, REF and KRT.

R L R display/L display .....Shows the measured eye is R (Right eye) or L (Left eye). The measured eye is framed in orange.

Auto Shoot button .....Selects Auto Shoot/Manual mode.
When selected, "Auto Shoot" is displayed on the control panel, and this button is framed in orange.

Settings button .....Displays the Settings screen.

## FUNCTION BUTTON




Cataract button.....If error messages occur in patient's with cataracts, push the Cataract button may improve measurements. When the button is selected, "CAT" is displayed on the control panel and the selected button is framed in orange.

Fixation target button.....Brightness of the fixation target can be changed.

FOG button.....Changes setting temporarily to perform fogging only in the first measurement or each time in the continuous measurement.

Target image button .....The captured measurement target can be observed on the control panel.

Print out button .....Prints measurement results. Tap the button when no measurement data is present to feed the paper.
By setting the printer mode to Graphic Printer on the Settings screen, figures showing refractive conditions can be printed.
In this case, the printer button changes to .

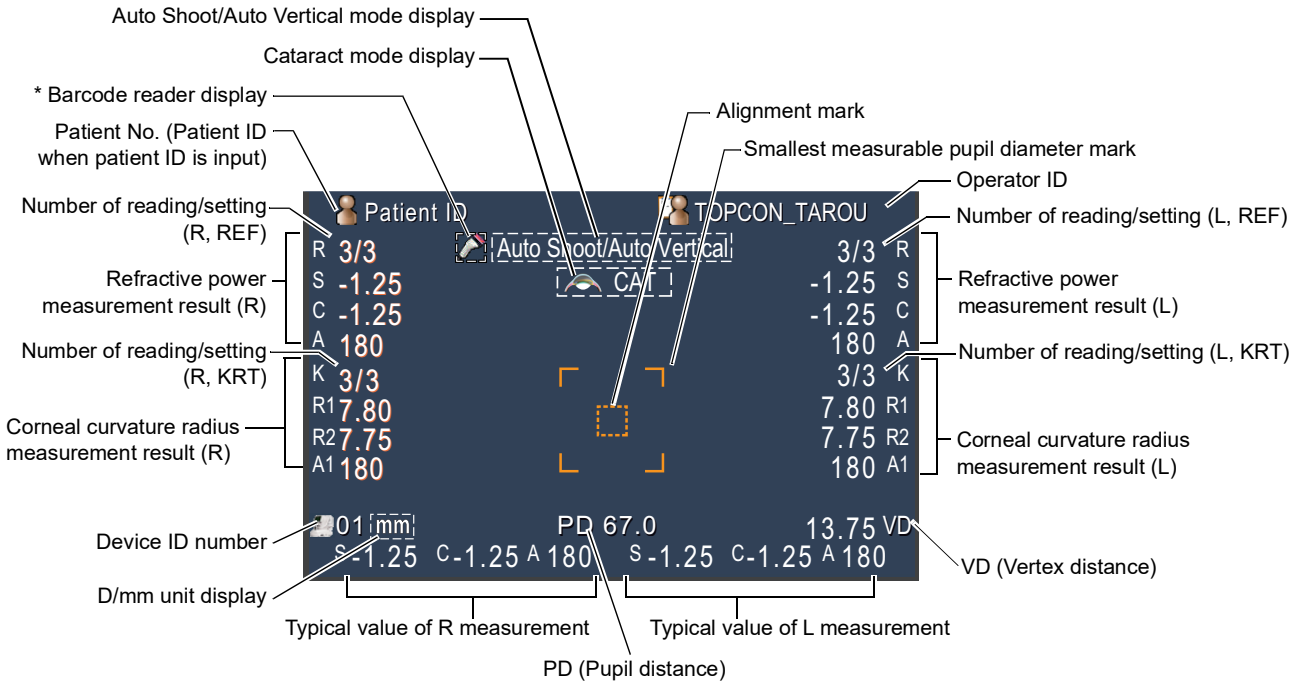
Auto up and down tailing button .....Aligns vertical position automatically. When this button is selected, "Auto Vertical" is displayed on the control panel, and the button is framed in orange.

Cornea diameter button.....Changes to cornea diameter measurement mode.

ALL CLEAR button.....Clears all measurement data.

# MONITOR SCREEN (IN OBJECTIVE REFRACTIVE MEASUREMENT)

## MEASUREMENT SCREEN




* Displayed when the barcode reader is connected.

: Barcode reader is in readable.

: Barcode reader is inhibited to read. (During measurement, printing, data output)

# CONTROL PANEL COMPONENTS (IN SUBJECTIVE REFRACTIVE FAR VA CHECK)

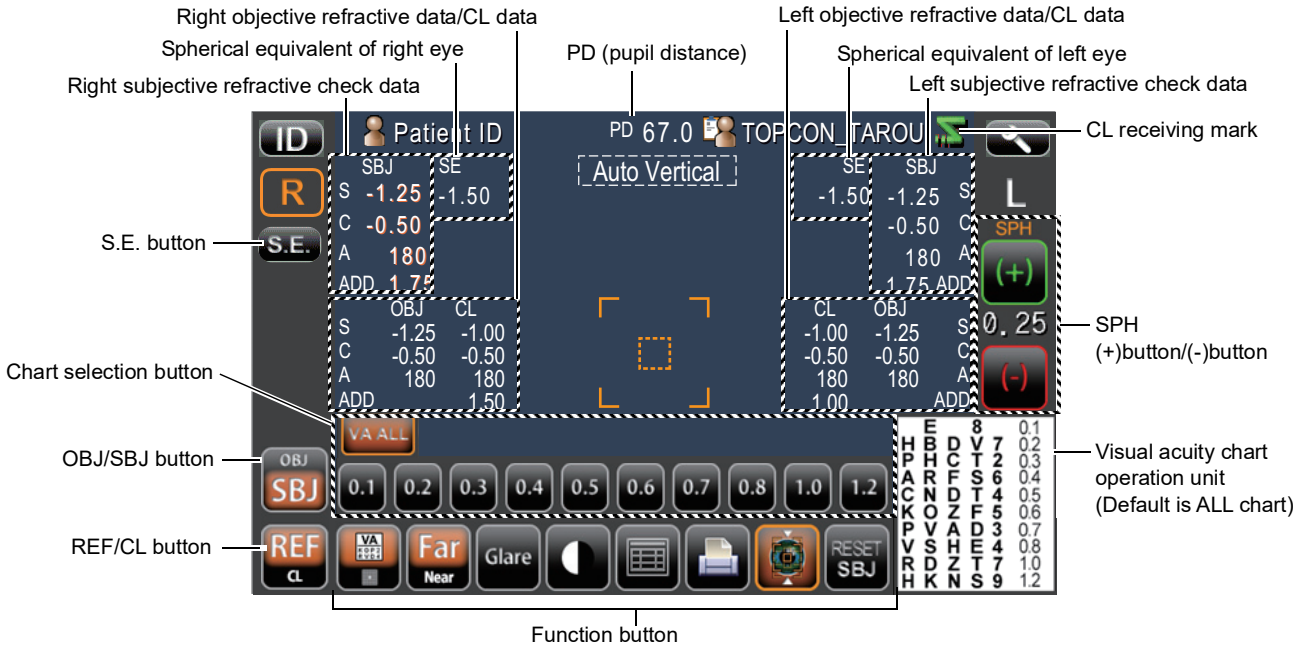


Chart selection button .....Shows the chart which measures the selected VA value to a patient. If tapping the VA ALL button, displays all charts which are shown ten charts from 0.1 to 1.2 at once.

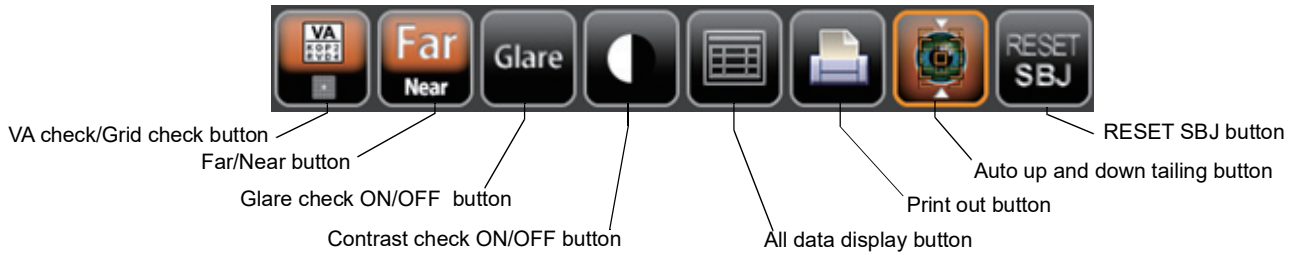
S.E. button .....Tap this button to display it into orange, the image based on the spherical equivalent power in subjective refractive check data is shown to the patient.

OBJ/SBJ button .....Switches objective refractive measurement mode and subjective refractive check mode.

REF/CL button .....Tap this button to display "CL" into orange, the image based on lens meter data is shown to the patient. If no lens meter data exists, naked vision is shown to the patient and "NoCL" displays. In "REF", the image of corrected VA is shown to the patient.

SPH (+)/(-)button .....Changes subjective SPH value of refractive power of corrected lens.

**FUNCTION BUTTON (IN SUBJECTIVE REFRACTIVE FAR VISON MEASUREMENT)**




VA check/Grid check button .....Change VA check mode and Grid check mode.

Far/Near button.....Switches subjective refractive Far VA check and Near VA check.

Glare check ON/OFF button .....Glare check ON/OFF on subjective refractive Far VA check.

Contrast check ON/OFF button .....Contrast check ON/OFF on subjective refractive Far VA check.

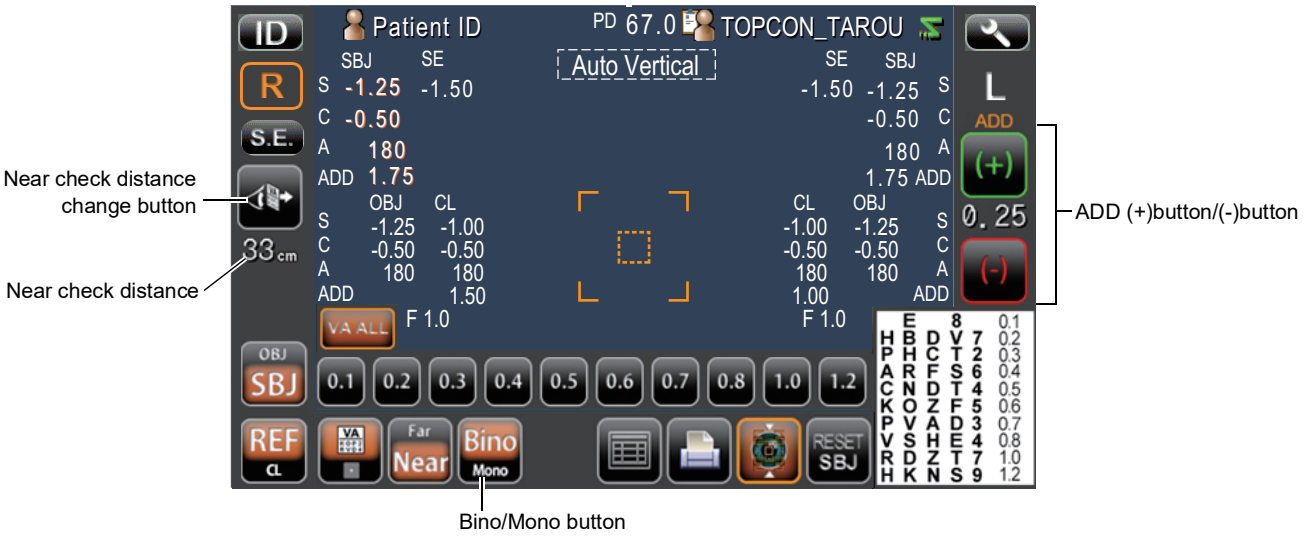
All data display button.....Shows all measurement and check data.

Print out button.....Prints out measurement and check results.

Auto up and down tailing button.....Aligns vertical position automatically. When this button is selected, "Auto Vertical" is displayed on the control panel, and the button is framed in orange.

RESET SBJ button .....Clear for subjective refractive check data.

# CONTROL PANEL COMPONENTS (IN SUBJECTIVE REFRACTIVE NEAR VA CHECK)




Near check distance change button.....Sets the distance from the chart in Near VA check.

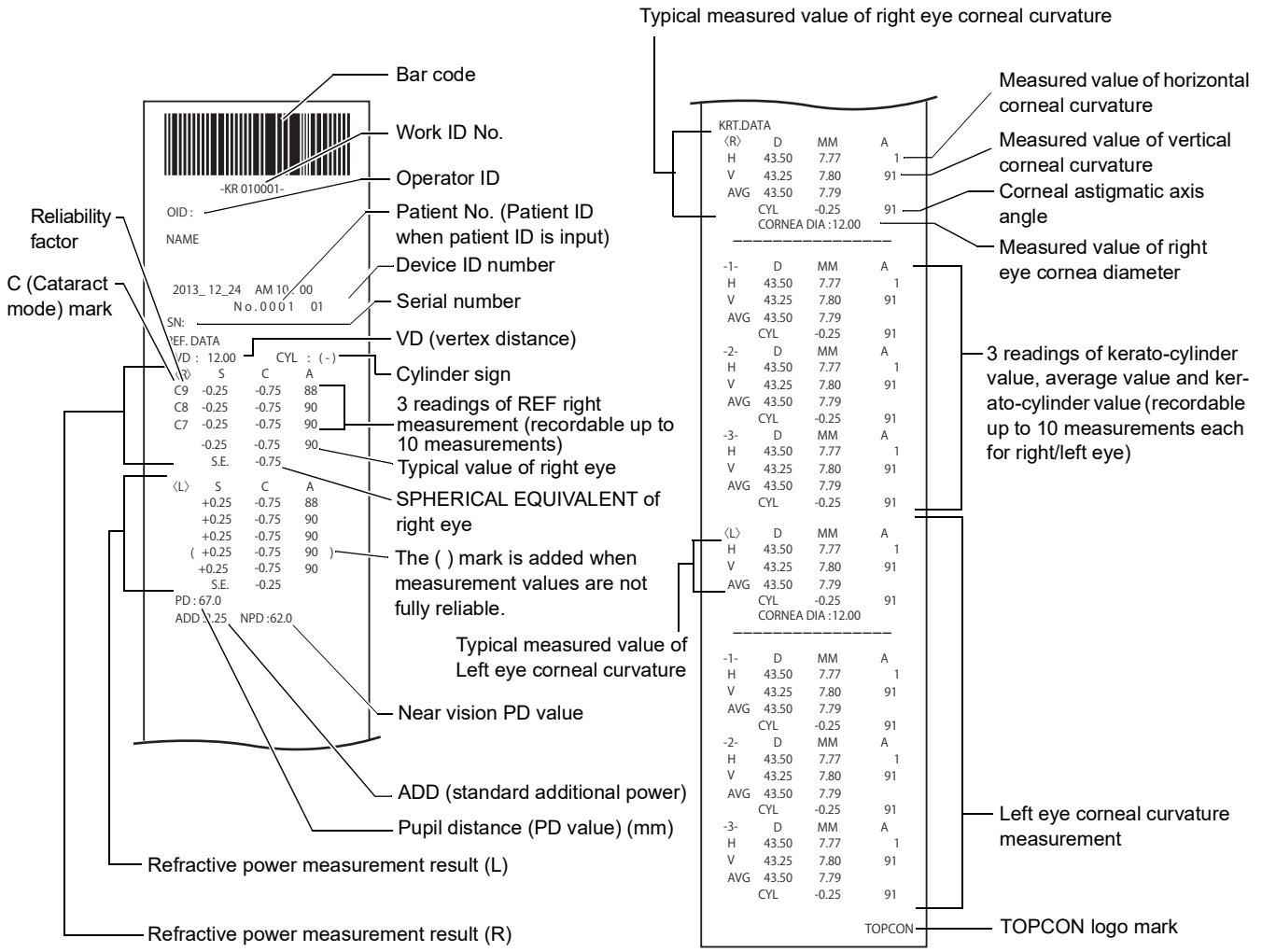
Bino/Mono button.....Selects the Bino which is changed ADD value both eye simultaneously, or the MONO which is changed one eye only.

ADD (+)button/(-)button .....Changes ADD value.

# PRINTER OUTPUT

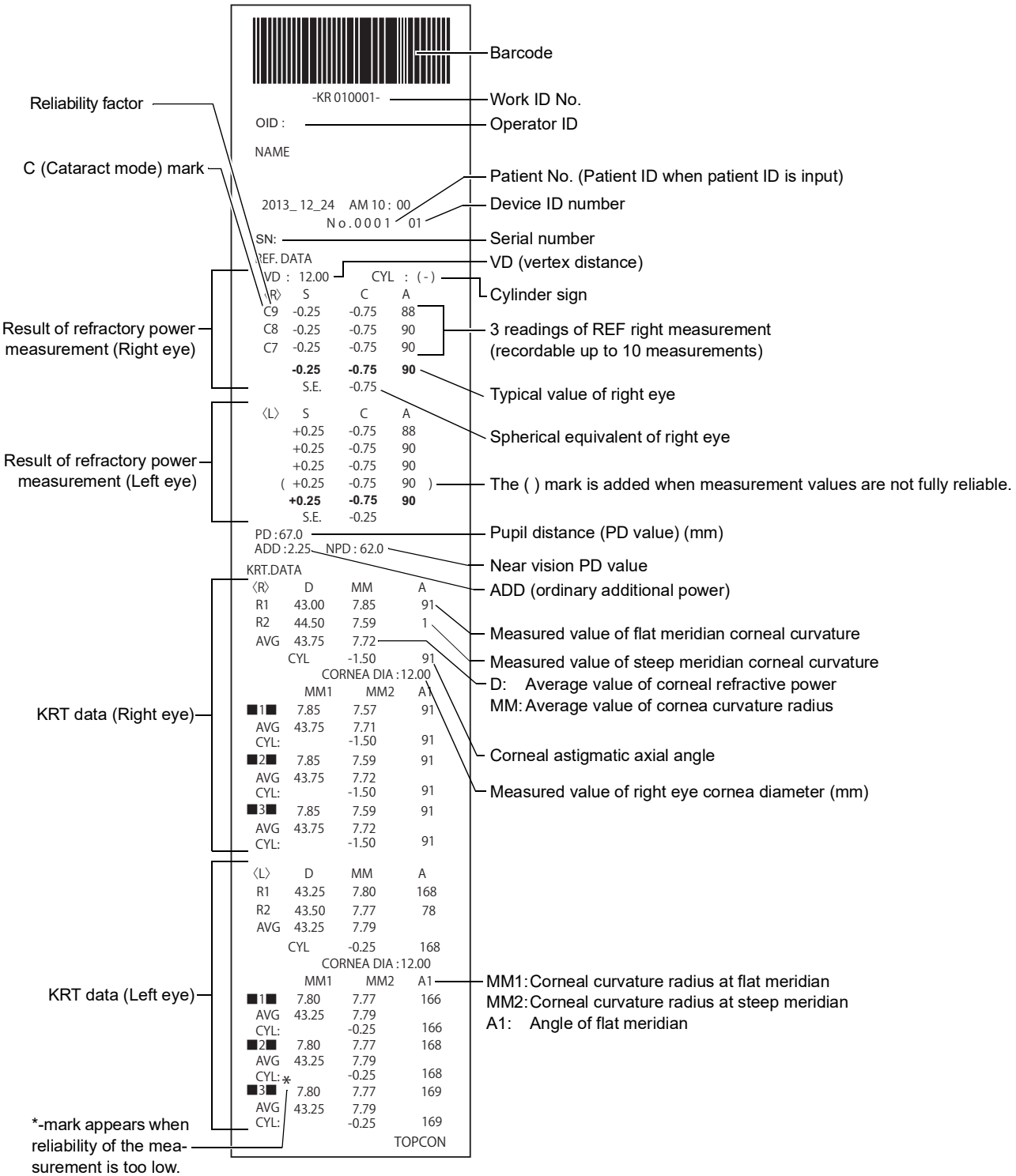
### OBJECTIVE REFRACTIVE MEASUREMENT DATA

KRT typical value style and KRT print data are HV



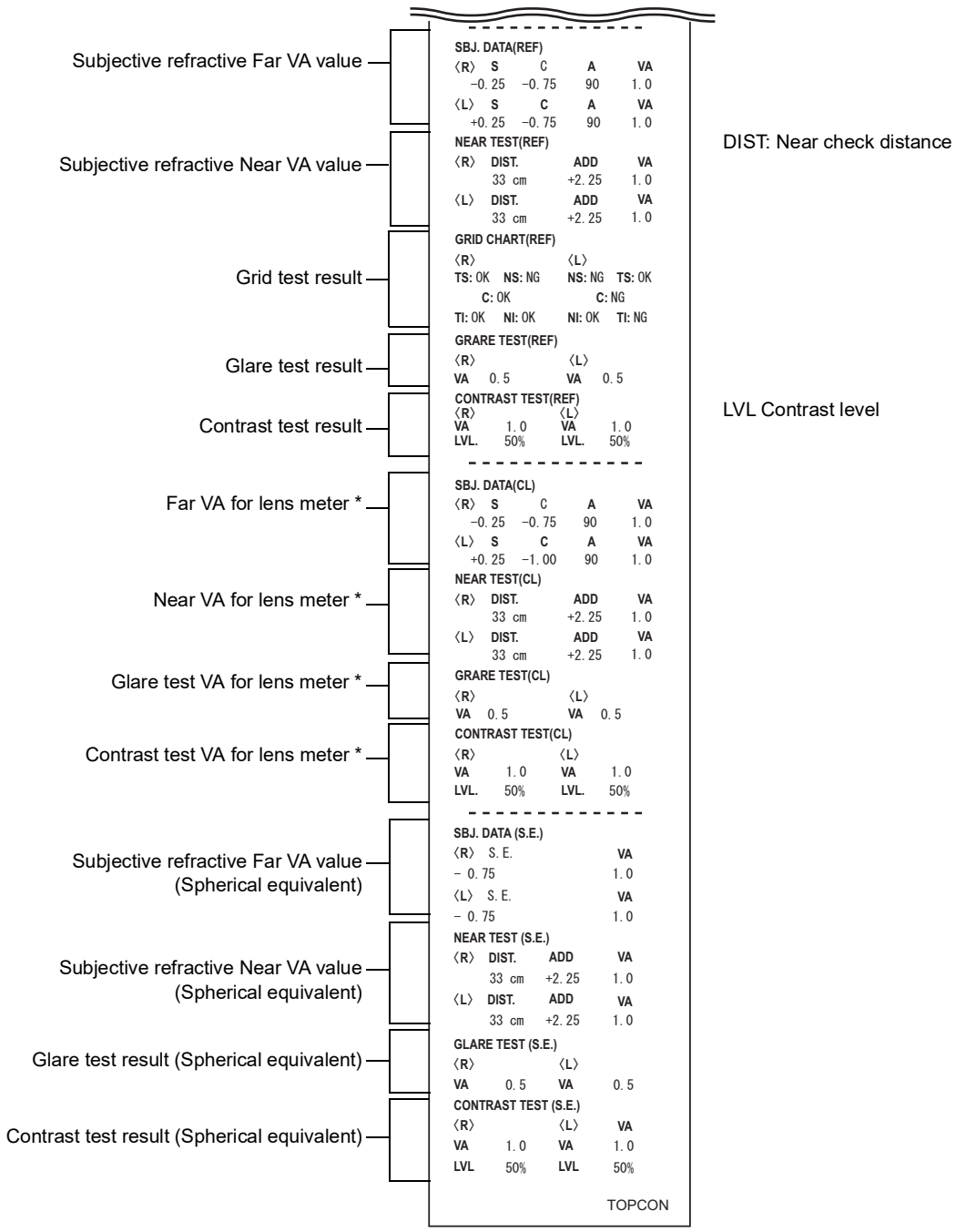

| | |
|---|---|
| **NOTE** | • The reliability factor is defined with integers 1 to 9 in increasing order of reliability.<br>Additionally, if the reliability is high enough, the reliability factor is not shown on the printout.<br>• The Near PD value is calculated based on the near check distance.<br>• ( ) appears when normal measurement is not expected due to eyelid, eyelash, or blinking.<br>• *-mark appears when normal measurement is not expected with the [Cataract] button selected. |

KRT typical value style and KRT print data are R1R2




| NOTE | • The reliability factor is defined with integers 1 to 9 in increasing order of reliability.<br>Additionally, if the reliability is high enough, the reliability factor is not shown on the printout.<br>• The Near PD value is calculated based on the near check distance.<br>• ( ) appears when normal measurement is not expected due to eyelid, eyelash, or blinking.<br>• *-mark appears when normal measurement is not expected with the [Cataract] button selected. |
|---|---|

## SUBJECTIVE REFRACTIVE CHECK




* If no lens meter data exists, SBJ DATA "No CL" displays, naked eye VA is printed.

**PRINTOUT FORMAT SETTING**

Printout format can be changed by pushing "Print" in the Settings screen. For Print settings, see "SETTING FUNCTIONS ON SETUP SCREEN" on page 58.

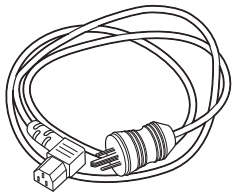
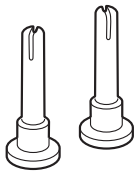
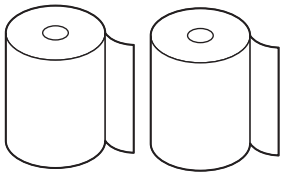
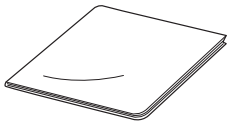
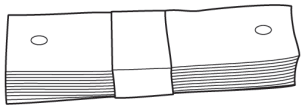
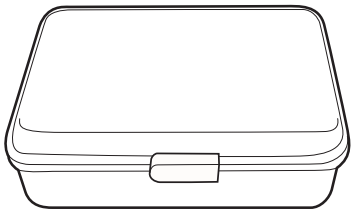
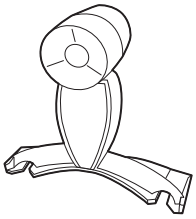
PRESET
- All: Initial setting (all measurement values are printed.)
- Avg: Only average values are printed.
- Classic: Equivalent with RM/KR-8900 Classic 2

| | ITEM | INITIAL | PRESET | | |
|---|---|---|---|---|---|
| | | | All | Avg | Classic |
| Common | Barcode | OFF | OFF | OFF | OFF |
| | Operator ID | OFF | OFF | OFF | OFF |
| | Name | ON | ON | ON | ON |
| | Date | ON | ON | ON | ON |
| | Date style | DMY* | DMY* | DMY* | DMY* |
| | Patient No./Patient ID | ON | ON | ON | ON |
| | Device ID number | OFF | OFF | OFF | OFF |
| | Serial number | ON | ON | ON | ON |
| | Include error data | OFF | OFF | OFF | OFF |
| | TOPCON logo | ON | ON | ON | ON |
| | Message print | OFF | OFF | OFF | OFF |
| | Input message | NULL | NULL | NULL | NULL |
| | Graphic print | Normal printer | Normal printer | Normal printer | Normal printer |
| | Line space | 0 | 0 | 0 | 0 |
| | Auto Cut | ON | ON | ON | ON |
| | Separate Print | ON | ON | ON | ON |
| REF/KRT | Print Layout | DATA | DATA | DATA | DATA |
| | VD | ON | ON | ON | ON |
| | Cylinder sign | ON | ON | ON | ON |
| | Print form of REF result | ALL | ALL | AVG | ALL |
| | Reliability | OFF | OFF | OFF | OFF |
| | S.E. | ON | ON | ON | ON |
| | PD | ON | ON | ON | ON |
| | ADD | OFF | OFF | OFF | OFF |
| | KRT print layout | D/mm | D/mm | D/mm | D/mm |
| | Print form of KRT result | ALL | ALL | AVG | AVG |
| | KRT avg. -HV or R1R2 | R1R2 | R1R2 | R1R2 | HV |
| | KRT data -HV or R1R2 | R1R2 | R1R2 | R1R2 | HV |
| | KRT average | ON | ON | ON | ON |
| | KRT cylinder | ON | ON | ON | ON |
| | Cornea diameter | ON | ON | ON | ON |
| REF | VD | ON | ON | ON | ON |
| | Cylinder sign | ON | ON | ON | ON |
| | Print form of REF result | ALL | ALL | AVG | ALL |
| | Reliability | OFF | OFF | OFF | OFF |
| | S.E. | ON | ON | ON | ON |
| | PD | ON | ON | ON | ON |
| | ADD | OFF | OFF | OFF | OFF |
| KRT | KRT print layout | D/mm | D/mm | D/mm | D/mm |
| | Print form of KRT result | ALL | ALL | AVG | ALL |
| | KRT avg. -HV or R1R2 | R1R2 | R1R2 | R1R2 | HV |
| | KRT data -HV or R1R2 | R1R2 | R1R2 | R1R2 | HV |
| | KRT average | ON | ON | ON | ON |
| | KRT cylinder | ON | ON | ON | ON |
| | Cornea diameter | ON | ON | ON | ON |

* : Depending on the destination, preset values differ.

## STANDARD ACCESSORIES

The following are standard accessories. Make sure that all these items are included (quantity).

| | |
|---|---|
| Power cable (1)<br>  | Chinrest tissue pin (2)<br>  |
| Printer paper (2)<br>  | Monitor cleaner (1)<br>  |
| Chinrest tissue (1)<br>  | Dust cover (1)<br>  |
| Accessory case (1)<br>  | User manual, Instruction manual,<br>Unpacking and Assembling (1 each)<br>  |
| Rubber cap (1)<br>  | Model eye (1)<br>  |

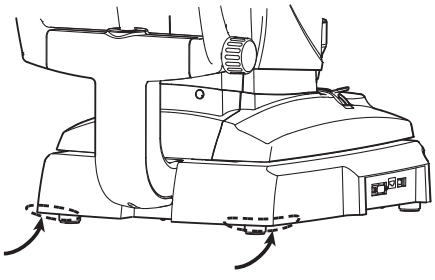
# PREPARATIONS

## INSTALLATION

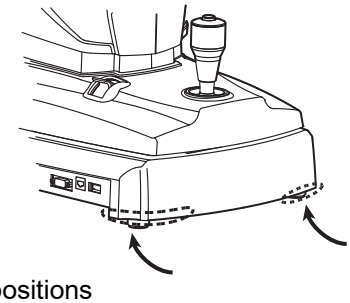
| | |
|---|---|
| **⚠ CAUTION** | • When moving the instrument, two people should lift from the bottom of the device.<br>One person lifting the device may cause harm to his back or injury by falling parts. Also, holding areas other than the bottom and holding the External I/O terminal cover may cause injury, as well as damage to the instrument.<br>• To prevent damage and injuries, do not install the instrument on an uneven, unsteady or sloped surface.<br>• When setting an instrument on an instrument table, pay attention not to injury the patient's fingers between the instrument and the table. |

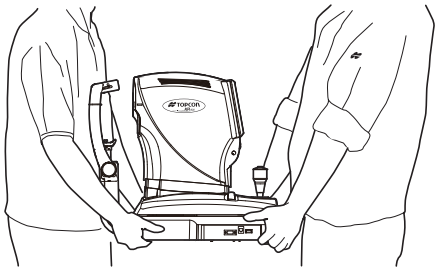
***1*** Use the base stopper to fix the main body.

***2*** Firmly hold the instrument at the position shown below and place it on the automatic instrument table.



Holding positions





Holding the instrument

***3*** After installation, turn the base stopper down. The main body can be moved.

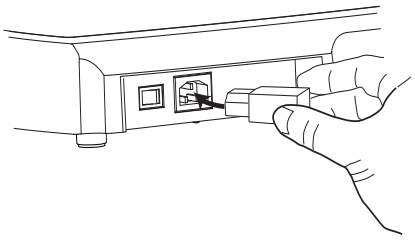
## CONNECTING POWER CABLE

| | |
|---|---|
| **⚠ WARNING** | Be sure to connect the power plug to an AC 3-pin receptacle equipped with grounding. Connection with receptacle without grounding may cause fire and electric shock in case of short-circuiting. |
| **⚠ CAUTION** | To avoid electric shocks, do not handle the power plug with wet fingers. |

***1*** Make sure the POWER switch of the instrument is OFF.

***2*** Connect the power cable to the power inlet at the right side of the instrument.

***3*** Insert the power cable plug into the 3-pin AC grounding receptacle.



## CONNECTING EXTERNAL I/O TERMINALS

| | |
|---|---|
| **CAUTION** | To avoid electric shock, do not touch the external connection terminal and the patient at the same time. |

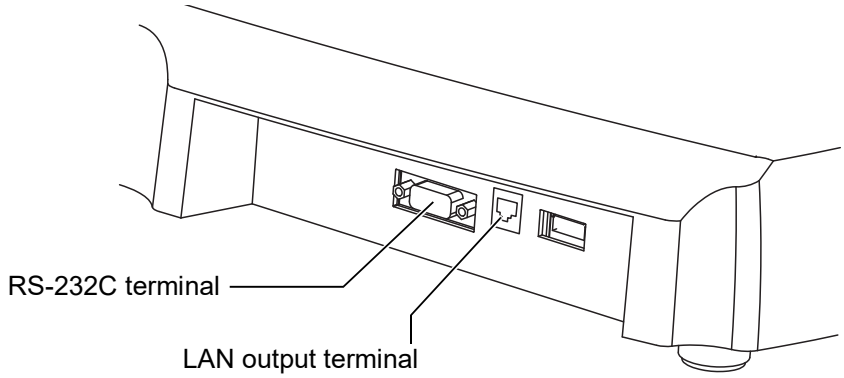
| | |
|---|---|
| **NOTE** | When connecting this product with a commercial personal computer, use one conforming to IEC62368-1, with a separation unit. |

### DATA OUTPUT

This product can be connected to a personal computer (PC) and other external devices via the RS-232C or LAN.

***1*** Connect the connection cable to the RS-232C terminal or LAN output terminal of the instrument.

***2*** Connect the other end of the connection cable to the PC, etc.




### DATA INPUT

| | |
|---|---|
| **CAUTION** | • Do not operate a touch panel during barcode data entering by barcode reader. If you enter data when tapping the button on the touch panel, the barcode may not be read normally.<br>• Do not align, measure, or output data during barcode data entering by barcode reader. If you enter data during these operations, the barcode may not be read normally.<br>• Take care not to enter the wrong patient information. It may be mistaken for information from another patient. |

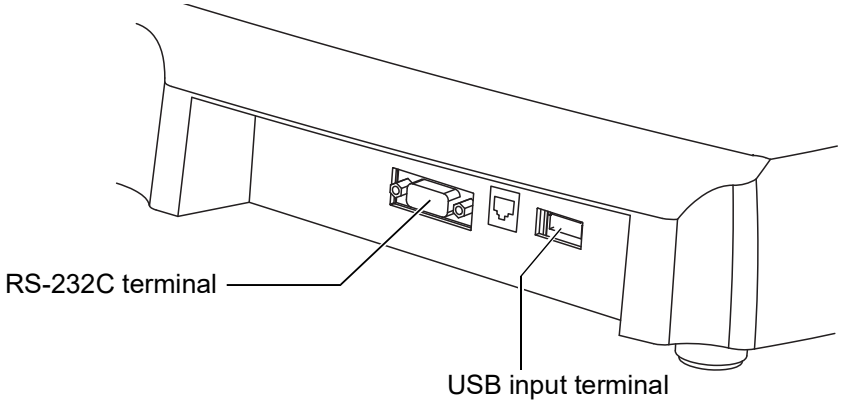
This product can be connected to the lens meter via the RS-232C and to a barcode reader etc. via USB.

***1*** Connect the connection cable to the RS-232C terminal or USB input terminal of the instrument.

| | |
|---|---|
| **NOTE** | • Please use a barcode reader with the following interface specifications.<br>Connector shape : USB (type A)<br>Interface : USB<br>Power supply : USB bus power<br>• Please connect USB devices while the power switch of this instrument is OFF. It may not correctly recognize USB devices if this instrument is in operation. |

**2** Connect the other end of the connection cable to the external device.

| NOTE | For questions about connections, contact your TOPCON dealer. |
|---|---|

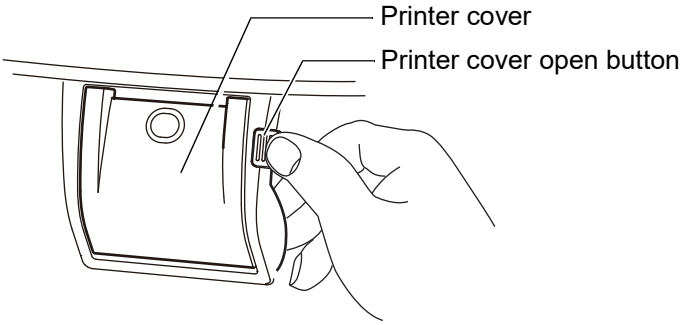



## PRINTER PAPER SETTING

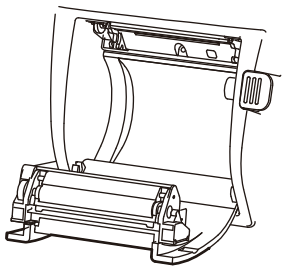
| CAUTION | • When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer button is pressed.<br>• To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.<br>• To avoid potential injury, do not touch the printer body including metal parts or the paper cutter, while the printer is in operation or when replacing the printer paper. |
|---|---|

| NOTE | • If you insert the printer paper backwards, printing will not start.<br>• Please push the printer cover OPEN button using your right thumb while placing your index and middle fingers on the projecting part which is in reverse side below the button. Unexpected movement is avoided when the printer cover OPEN button is pressed. |
|---|---|

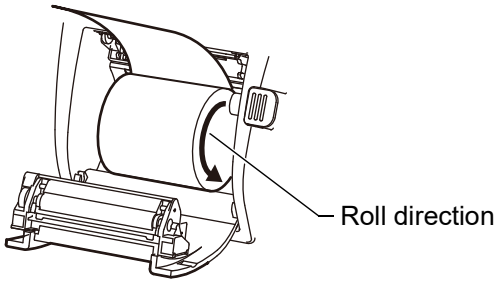
**1** Press the printer cover open button to open the printer cover.



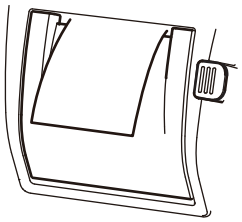
***2*** Open the printer cover to the limit.



***3*** Insert the printer paper in the direction shown below and pull out the paper end to your side by 7 to 8cm.




***4*** Bring the paper into the center, then close the printer cover.



| | |
|---|---|
| **NOTE** | • Please close the printer cover using your right thumb while placing your index and middle fingers on the projecting part which is in reverse side below the printer cover OPEN button. Unexpected movement is avoided when closing the printer cover.<br>• In case the printer cover is not firmly closed, printing will not start, and "CLOSE PRT COVER" will be displayed on the monitor screen.<br>• A 58mm wide paper roll (example: TP-50KJ-R "Nippon Paper Co.") is recommended.<br>Other paper rolls may cause abnormal printing noise or unclear print. |

## RECOVERY FROM POWER SAVE STATUS

This instrument adopts the power save system for saving electric power. When the machine is not operated for a set time, the control panel becomes a screensaver.

***1*** Tap the control panel or operate the control lever.
In a few seconds, the measurement screen is displayed and measurement is enabled.

| | |
|---|---|
| **NOTE** | The time to start the power save status can be changed in the initial setting "Start time of sleep mode" (see page 65). |

# BASIC OPERATIONS

## PREPARATION BEFORE MEASUREMENT

### TURNING ON THE INSTRUMENT

1. Insert the power cable plug into the commercial power (the 3-pin AC grounding receptacle.)
   For the details of connection, refer to "CONNECTING POWER CABLE" on page 22.
2. Press on the [POWER] switch.
3. Make sure that the title screen is displayed and then the MEASUREMENT screen is displayed in a few seconds.

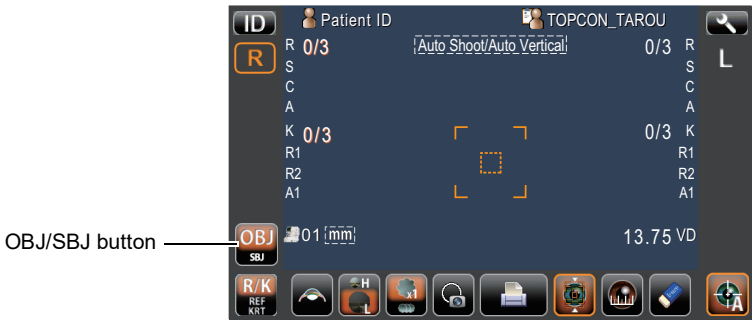
### CHECKING THE OBJECTIVE REFRACTIVE MEASUREMENT MODE

This instrument can be selected in the objective refractive measurement mode and subjective refractive check mode.

OBJ: Objective refractive measurement
SBJ: Subjective refractive check

Subjective refractive check has to perform after the objective refractive measurement. Refer to page 38.

1. Check that [OBJ/SBJ] button is at "OBJ" position colored orange.



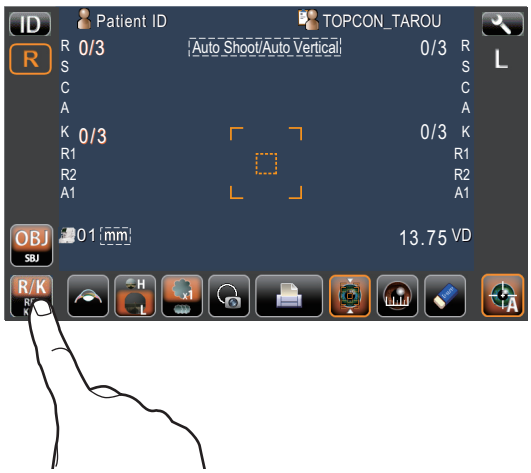
## SELECTING THE MEASUREMENT MODE

In objective refractive measurement mode, this product has three measurement modes: R/K (REF/KRT continuous measurement), REF (REF single measurement) and KRT (KRT single measurement).

***1*** Check that the MEASUREMENT screen is on.

***2*** Tap the [MEASUREMENT MODE] button on the control panel and select the measurement mode. Indication of the [MEASUREMENT MODE] button is changed.

R/K: REF/KRT continuous measurement
REF: Only REF measurement
KRT: Only KRT measurement




| NOTE | • Before shipment, the default setting is "R/K."<br>• If "KRT" (KRT single measurement) is selected, it is impossible to move subjective refractive check. |
|---|---|

## PATIENT POSITIONING

| | |
|---|---|
| **CAUTION** | • To avoid electric shock, do not touch the external connection terminal and the patient at the same time.<br>• To avoid injury, do not insert fingers under the chinrest. To avoid injury when moving the chinrest down, be careful not to catch the patient's finger. Tell this to the patient, too.<br>• To avoid injury when operating the machine (for measurement and control panel operation), be careful about the cover not to catch fingers of the patient. Tell this to the patient, too.<br>• To avoid injury by raising, falling or dropping the instrument, do not apply the strong power downward on the chinrest.<br>• When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument following "CLEANING THE FOREHEAD REST AND CHIN REST" on page 72. |

| | |
|---|---|
| **NOTE** | • Adjust the height of the adjustable instrument table so that the patient can sit on the chair comfortably. Otherwise, correct measurement values may not be obtained. |

***1*** Take off a chinrest tissue on the chinrest. If the tissue has run out, please supply new chinrest tissues.

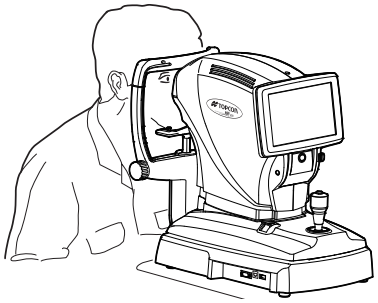
***2*** Wipe the dirt form forehead rest.

***3*** Have the patient sit in front of the instrument.

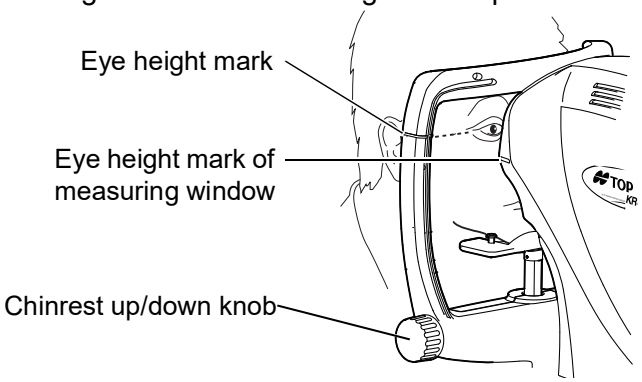
***4*** Adjust the adjustable instrument table or the chair height for the patient to put his/her chin on the chinrest comfortably.

***5*** Release the base stopper.

***6*** Hold the control lever, pull the main body towards operator side fully, place the patient's chin on the chinrest and touch patient's forehead to the forehead rest.



***7*** Adjust the chinrest height by chinrest up/down knob until the eye height mark of the chinrest reaches the same height as the patient's eye. At this moment, confirm that the height mark of the measuring window is at the height of the patient's visual line.



# OBJECTIVE REFRACTIVE MEASUREMENT (AUTO SHOOT MODE)

| | |
|---|---|
| **CAUTION** | When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument as specified in "CLEANING THE INSTRUMENT" on page 72. |

| | |
|---|---|
| **NOTE** | • Auto Shoot mode measurement may not be possible, in case the eyelid and the eyelashes cover the pupil.<br>If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid to allow for measurement.<br>• Auto Shoot mode measurement may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused corneal disease etc.<br>In this case, select manual mode. |

## SETTING THE AUTO SHOOT MODE

If Auto shoot mode is set up and the patient's eye is reached within a measuring range, the measurement is performed automatically.

***1*** If Auto shoot button is framed in orange, it is in [Auto Shoot] mode.

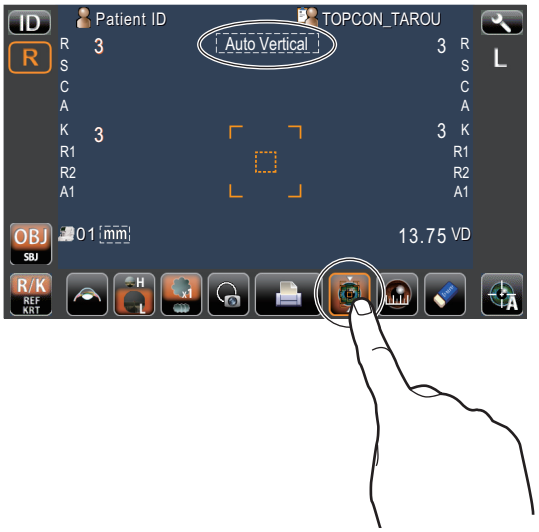
***2*** If [Auto Shoot] button is not framed in orange, it is in manual mode. Tap the Auto Shoot button to change to Auto Shoot mode.

## SETTING AUTO VERTICAL (AUTO UP AND DOWN TAILING) MODE

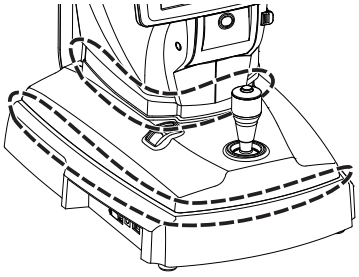
If Auto vertical (Auto up and down tailing) mode is set up and the patient's eye is focused generally, the vertical alignment is performed automatically.

***1*** Check the measurement screen. If [Auto Vertical (Auto up and down tailing)] button is framed in orange, it is in Auto Vertical (Auto up and down tailing) mode.

***2*** If [Auto Vertical (Auto up and down tailing)] button is not framed in orange, tap the [Auto Vertical (Auto up and down tailing)] button to change to Auto Vertical (Auto up and down tailing) mode.

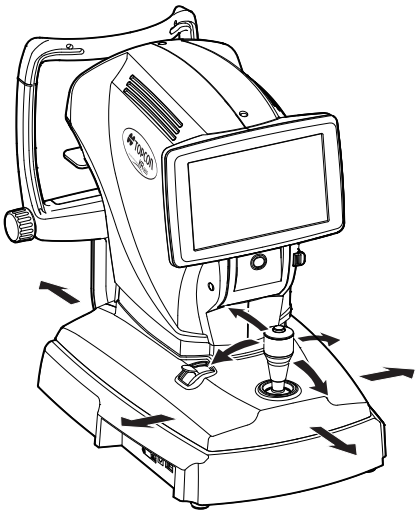


## ALIGNMENT AND MEASUREMENT

| | |
|---|---|
| **⚠ CAUTION** | To avoid injury when operating the machine (for measurement and control panel operation), be careful not to approach the finger to space of movable part.  |

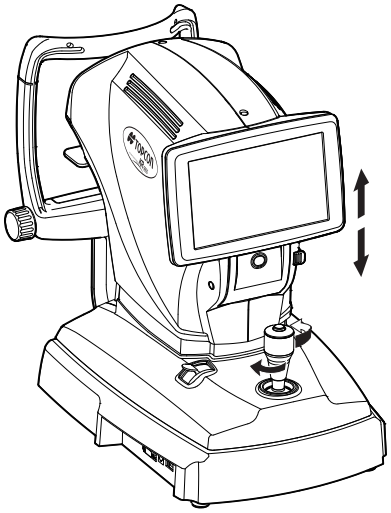
Alignment operations are done with the control lever.

- The main body position can be fine-adjusted laterally by inclining the control level to each direction.



Operating the control lever
(for lateral adjustment)

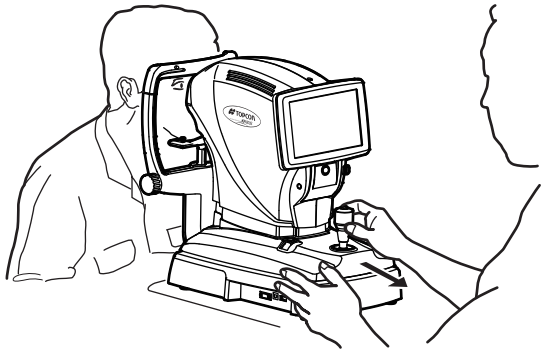
- The main body position can be fine-adjusted vertically by turning the control level right (up) and left (down).



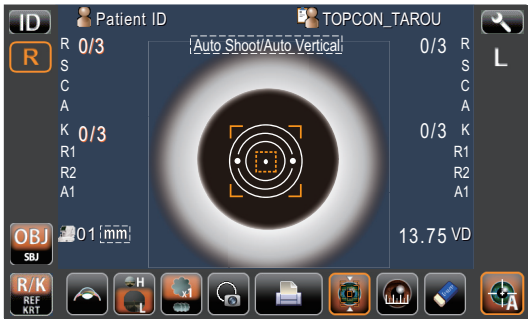
Operating the control lever
(for up/down adjustment)

| | |
|---|---|
| **NOTE** | If Auto Shoot mode measurement does not work, select manual mode.<br>Auto Shoot mode measurement may not work depending on the cornea condition. |

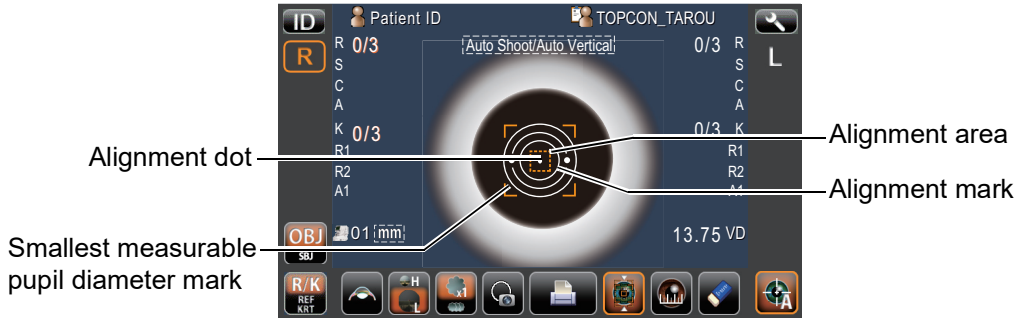
**1** Use the base stopper to release the main body.
Hold the control lever and move the main body to the operator side.



**2** Operate the control lever laterally and vertically to obtain the target eye in the center of control panel screen.

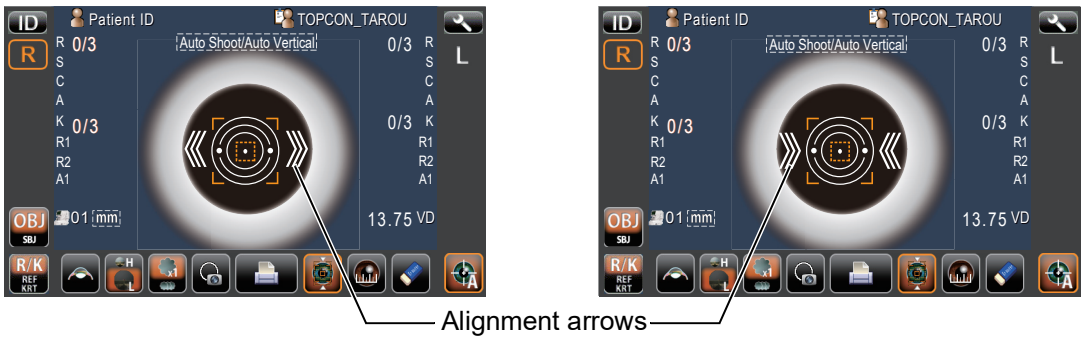



**3** While moving the main body toward the patient, focus the target eye.
A vague, reflected alignment dot appears on the cornea.



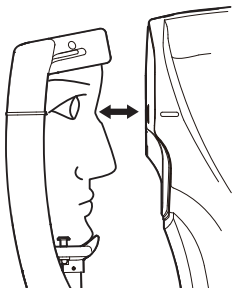

**4** Fine-adjust the main body position in all directions so that the alignment dot point comes within the alignment area.

**5** Keeping the alignment dot within the alignment area, slowly move the main body toward the patient. When the main body approaches the target eye, alignment arrows appear to the control panel screen.

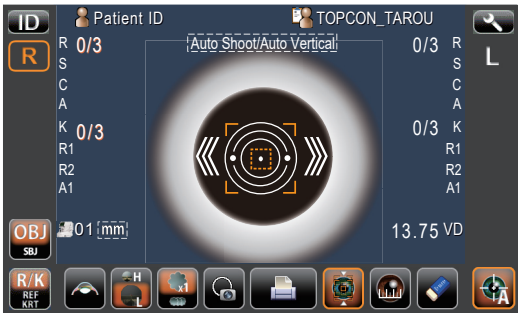


**NOTE**

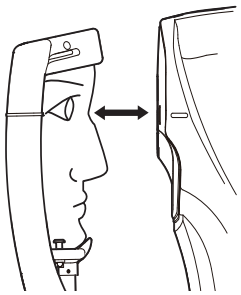
- Do not allow the eyelash and eyelid to cover the smallest measurable pupil diameter mark to ensure stable measurement.
- If the machine is too near to the patient in comparison with the optimal alignment position, the alignment arrows are displayed outward or if it is too far from the patient, the alignment arrows are displayed inward.



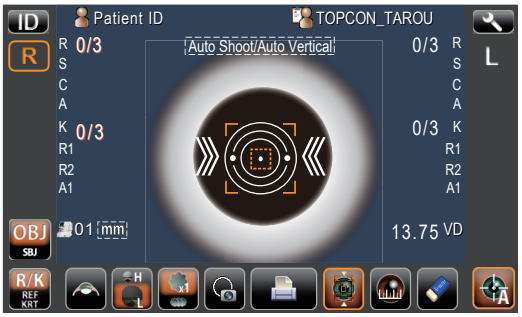
Too close



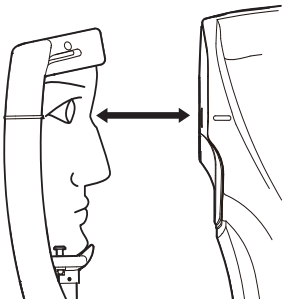

Outward alignment arrows



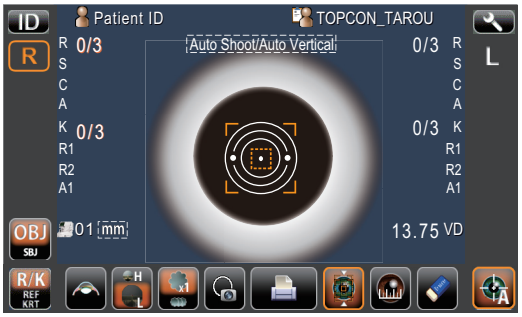
Too far




Inward alignment arrows



Positioning is incorrect at all.

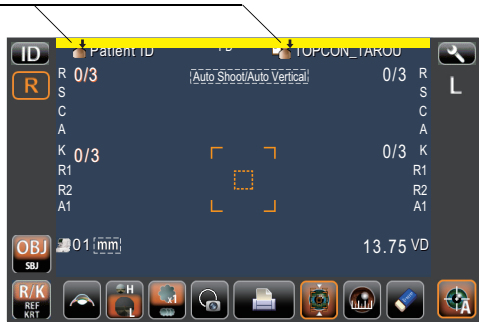



Alignment arrows not appear

**NOTE**

When the measuring head has reached the limit of movement (vertical/ lateral directions), a yellow-colored limit mark appears on the control panel's top, showing it is the movement limit in that direction. Move the measuring head or chinrest to a position that aligning is possible.

Limit mark



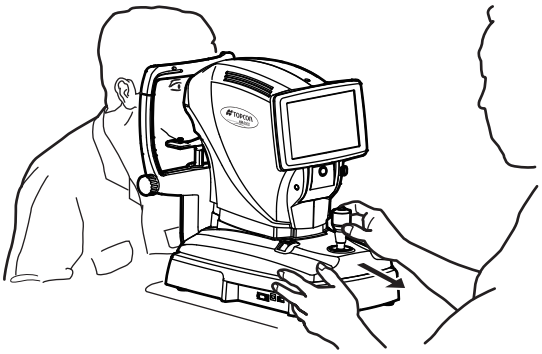
**6** After the alignment arrows appear, please push and pull main body slightly.

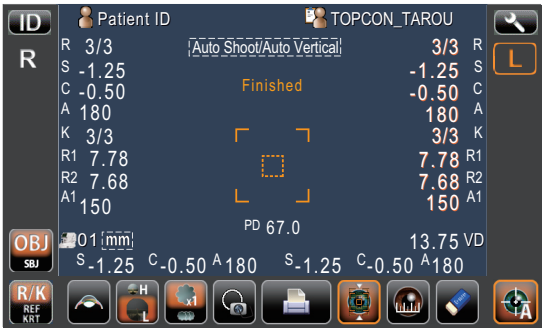
When the alignment arrows disappear, Auto shoot function is performed automatically at specified number of times of measurement.

**7** The latest measurement value is displayed on the control panel.


| | |
|---|---|
| **NOTE** | • If Auto Shoot mode measurement does not work, select manual mode. Auto Shoot mode measurement may not work depending on the cornea condition.<br>• If the machine is moved before measurement values are displayed, it might cause an incorrect measurement.<br>• Auto print (available only under Auto Shoot mode)<br>When auto print setting is "ON" in the initial setting, the buzzer sounds twice after measuring the right and left eyes, and measurement results are printed out automatically.<br>• When auto print setting is "OFF" in the initial setting, print out measurement results by tapping the Print button, as necessary. |

**8** If both eye measurements are required, hold the control lever and pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from ***1*** on page 32.






## DISPLAYING MEASUREMENT VALUES

Data of the latest measurement are displayed on the control panel screen.

Figures only: Measurement was done correctly.

ERROR: Measurement was not done correctly.

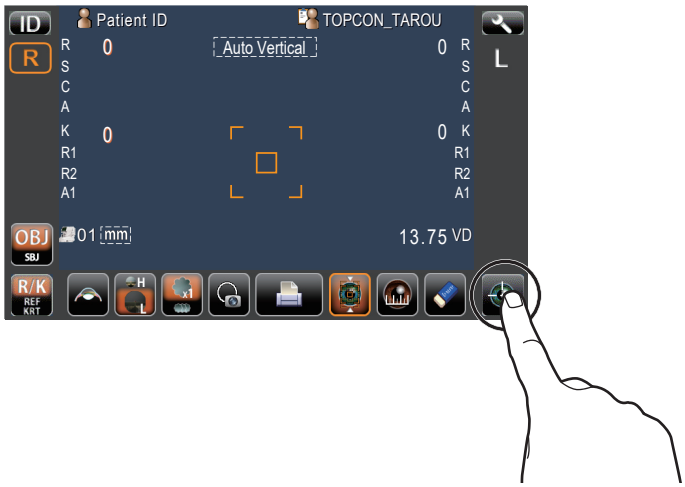
| | |
|---|---|
| **NOTE** | For explanation of the messages on the control panel screen, refer to "MESSAGE LIST" on page 77. |

# MANUAL MODE MEASUREMENT IN OBJECTIVE REFRACTIVE MEASUREMENT

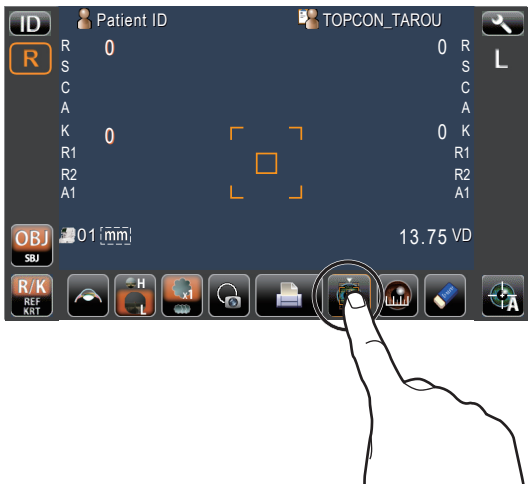
## SETTING THE MANUAL MODE

**1** Check the measurement screen. If [Auto Shoot] button is not framed in orange, it is in Manual mode.

**2** If [Auto Shoot] button is framed in orange, it is in Auto Shoot mode. Tap the [Auto Shoot] button to change to manual mode.



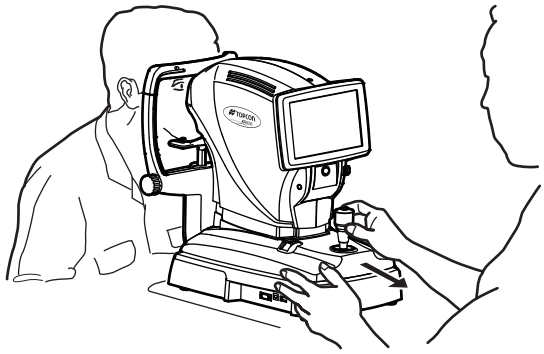

**3** If automatic vertical alignment is not required, tap the [Auto Vertical (Auto up and down tailing)] button to cancel automatic vertical alignment function and to change the color of [Auto Vertical (Auto up and down tailing)] button other than orange.



## ALIGNMENT AND MEASUREMENT

Alignment is operated on the control panel.
For the adjustment of main body using the control lever, refer to page 31.

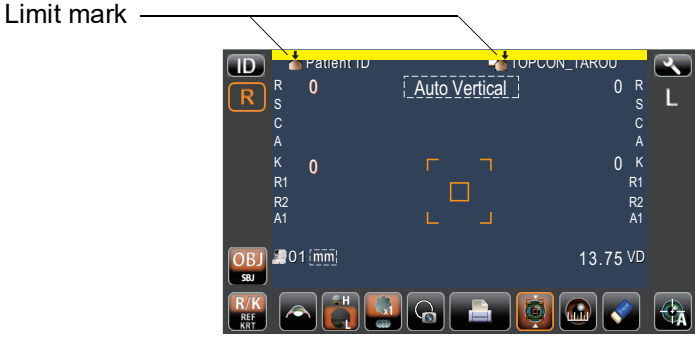
**1** Use the base stopper to release the main body. Hold the control lever and move the main body to the operator side.



**2** Operate the control lever laterally and vertically to obtain the target eye in the center of monitor screen.

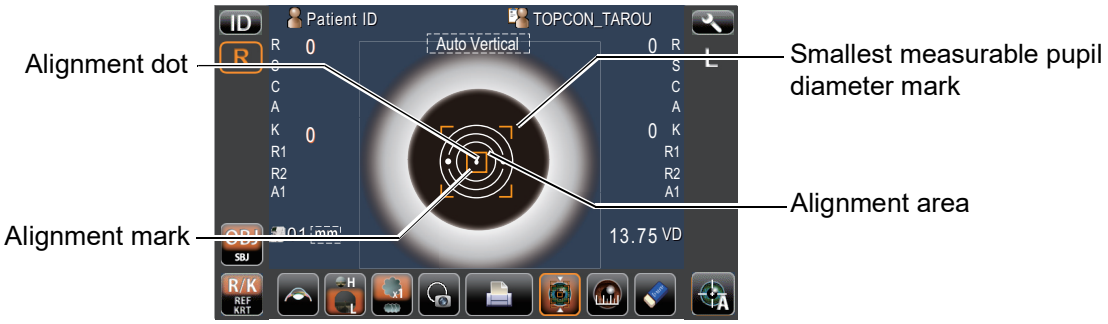
**NOTE**

- If the pupil is not displayed on the control panel, move the measuring head, checking the eye height mark on the measurement window as a guide (see page 28).
- When the measuring head has reached the limit of movement (vertical/lateral directions), a yellow-colored limit mark appears on the control panel's top, showing it is the movement limit in that direction. Move the measuring head or chinrest to a position that aligning is possible.




**3** While moving the main body toward the patient, focus the target eye.

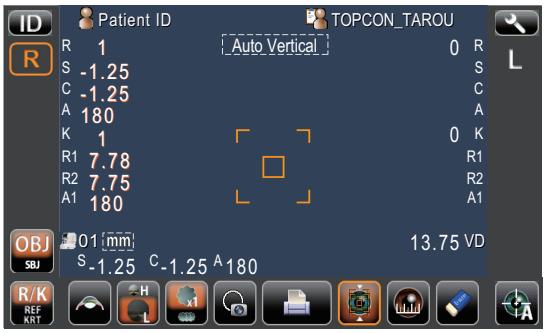
A vague, reflected alignment dot appears on the cornea.



**4** When the alignment dot becomes the minimum within the alignment area, press the MEASUREMENT switch.

| NOTE | • Do not allow the eyelash and eyelid to cover the smallest measurable pupil diameter mark to ensure stable measurement.<br>• Even if fine alignment has not been achieved, measurement can be performed by pressing the MEASUREMENT switch. To ensure correct measurement, try to get fine alignment. |
|---|---|

**5** Measurement is performed and measurement values are displayed on the control panel.




| NOTE | If the machine is moved before measurement values are displayed, it may cause incorrect measurement result. |
|---|---|

## DISPLAYING MEASUREMENT VALUES

Data of the latest measurement are displayed on the control panel screen.

Figures only: Measurement was done correctly.

ERROR: Measurement was not done correctly.

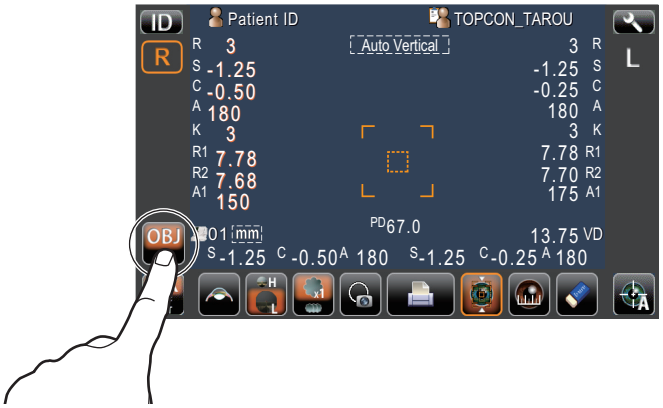
| NOTE | For explanation of the messages on the control panel screen, refer to "MESSAGE LIST" on page 77. |
|---|---|

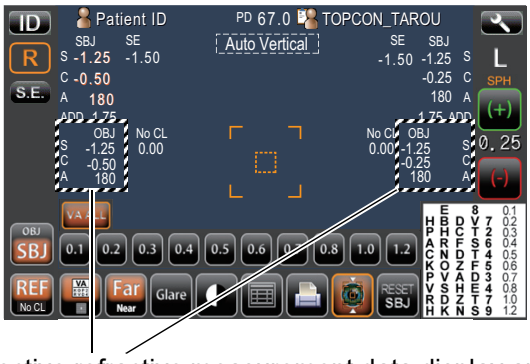
# PREPARATION OF SUBJECTIVE REFRACTIVE CHECK

Subjective refractive check is performed after objective refractive measurement. When objective refractive measurement is finished, the operator should tell the patient not to move their head.
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

| NOTE | Subjective refractive check cannot be performed if objective refractive measurement is not performed. |
|---|---|

**1** Tap the OBJ/SBJ button. The OBJ/SBJ button is set to SBJ and the color is turned in orange, the subjective refractive check screen is displayed. The objective refractive measurement data are displayed in the objective refractive measurement data display area.

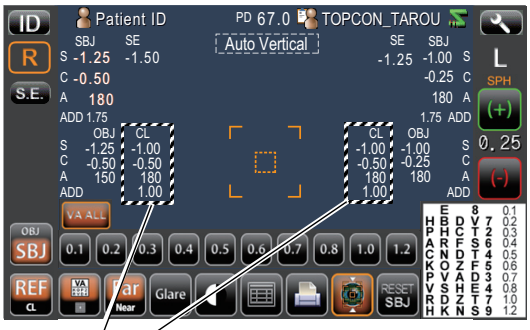



Objective refractive measurement data display area

## INPUTTING LENS METER DATA

When the lens meter (made by TOPCON) is connected, the data measured with the lens meter is displayed on CL data display area of the control panel by pushing the print button of the lens meter.



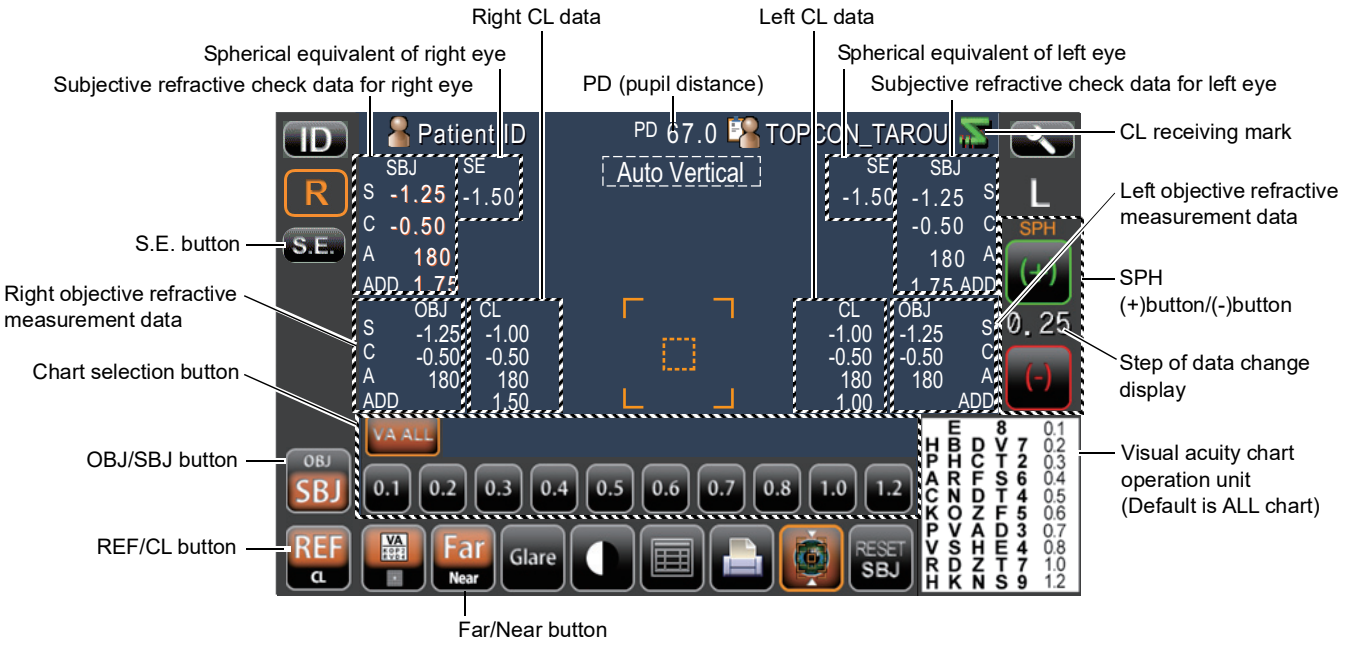

CL data display area

| NOTE | • If data communication format of this instrument and the lens meter are not uniformed, CL data is not inputted. The data communication format of this instrument can be changed by modifying "Input data format (CL)" of "Data communication"<br>• For Connecting of Lens meter, refer to "INPUT/OUTPUT USING RS-232C" on page 57.<br>• If no lens meter data exists, "0.00" displays. |
|---|---|

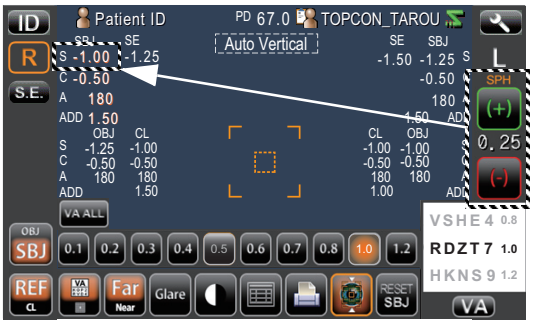
# SUBJECTIVE REFRACTIVE FAR VISION CHECK

For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

## SUBJECTIVE REFRACTIVE FAR VISION CHECK SCREEN




1. Check that [Far/Near] button is at "Far" position colored orange.
2. As "All chart" is shown check where the patient can read.
3. Tap the chart selection button to select the VA value chart which the patient can read. The chart selected is shown in "Visual acuity chart operation unit". If the [VA ALL] button is tapped all chart is displayed again.
4. Ask the patient if the chart is readable.
5. According to the answer of patient change the chart of the VA value less/more by tapping the button.
6. Repeat the procedure ***4*** to ***5*** obtain the marginal value where the patient can be read.
7. Check the result by changing the spherical refractive power as tapping the SPH (+)/(-)button as required.
   Changed value reflects on the spherical refractive power shown on control panel.



**8** If VA value is determined tap the [VA] button. The value is shown and recorded for F value (Far) on the control panel. * If selected all chart, VA value cannot be recorded.


**9** If both eye measurements are required, pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from ***1*** on page 39.

| NOTE | When you want to change from subjective refractive check data to spherical equivalent power (S.E.) for subjective check data, tap the [S.E.] button. |
|---|---|

## SUBJECTIVE REFRACTIVE NEAR VISION CHECK

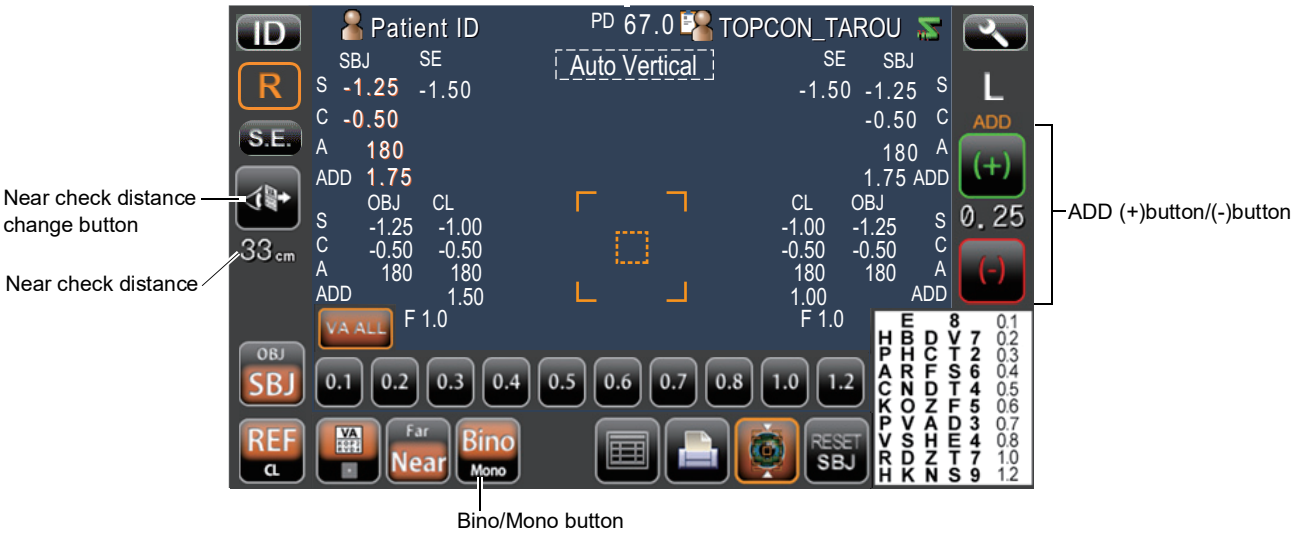
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

**1** Tap the [Far/Near] button.


[Far/Near] button colored orange at "Near" and subjective refractive near vision measurement screen is shown.

### SUBJECTIVE REFRACTIVE NEAR VISION CHECK SCREEN

subjective refractive near vision check screen is similar as subjective refractive far vision check screen except the part shown bellow.



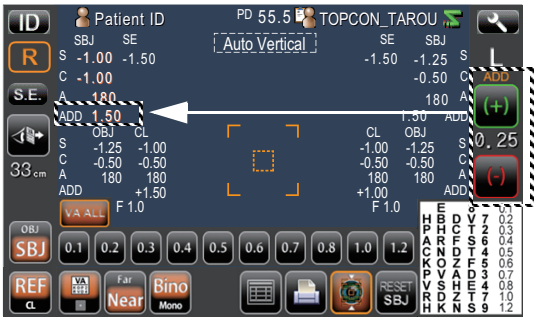

**2** Tap the [Near check distance change] button to set the Near check distance.

Changeable distance is 33cm, 40cm, 50cm or 60cm.

**3** Apply similar procedure in ***2*** to ***6*** at subjective refractive far vision check in page 39 to get marginal value where the patient can read.

**4** Check that Bino/Mono button is at "Bino" position colored orange.

**5** Check the result by changing the ADD value as tapping the ADD (+)/(-)button as required. Changed value reflects on the ADD value shown on control panel.




| NOTE | To change ADD value subjective refractive near vision check the instrument is set so that the same value is input for left and right eyes. Changing the add value of either eye is required tap the Bino/Mono button so that the "Mono" orange colored is set. Entering ADD value for either eye is possible. |
|---|---|

**6** If VA value is determined tap the VA button. The value is shown and recorded for N value (Near) on the control panel. * If selected all chart, VA value cannot be recorded.


| NOTE | To terminate Near vision measurement without ADD value tap the VA button after procedure ***3***. |
|---|---|

**7** If "contrast test", "glare test" and "grid test" are required, refer to the "OPTIONAL OPERATIONS".

**8** If both eye measurements are required, hold the control lever and pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from ***3*** on page 41.

### COMPARISON BETWEEN IMAGES OF UNAIDED VA AND CORRECTED VA

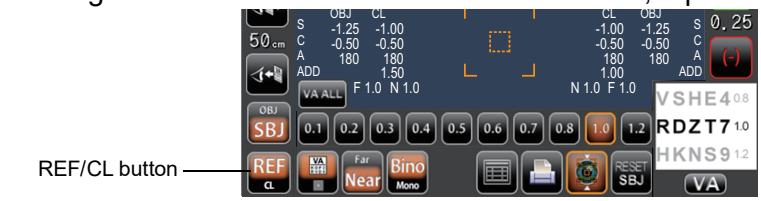
To compare between images of unaided VA and corrected VA, tap the [REF/NoCL] button.

- If no lens meter data exists, "No CL" displays, it is set for unaided VA.


- REF: Image of corrected VA
- No CL: Image with unaided VA

### COMPARISON BETWEEN IMAGES OF LENS METER DATA AND CORRECTED VALUE

To compare between images of lens meter data and corrected value, tap the [REF/CL] button.




- REF: Image of corrected VA
- CL: Image of lens meter data

- For connection of lens meter, refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 23.

## PRINT-OUT OF MEASUREMENT VALUES

| | |
|---|---|
| **NOTE** | • To avoid a paper jam in the printer, do not feed the paper if it is partly cut or wrinkled.<br>• To avoid discoloring of the printer paper (particularly the recording area) during storage, use a polypropylene bag and not one containing plasticizer (PVC, etc.).<br>• To avoid discoloring of the printer paper (particularly the recording area) after pasting, use water-soluble glue and not one containing solvent.<br>• Since the printer paper is thermosensitive, it is not suitable for keeping records for a long period. If necessary, prepare copies separately. |

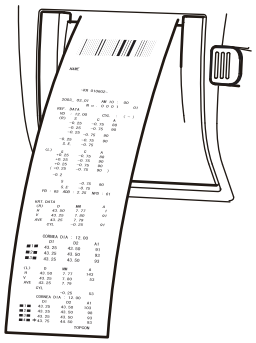
This instrument can print out measurement values by a printer.

***1*** Check the Measurement screen is on.

**2** Tap the [PRINT OUT] button on the control panel.

Measurement values on the monitor are printed out.

After being printed out, the measurement values on the screen are deleted automatically.



| NOTE | |
|---|---|
| | • When the cylindrical refractive power is "0," the direction of astigmatic axis and measurement values are not displayed/printed.<br>• When a red line is printed at the end of the printer paper, replace it with a new one. For details about the replacement of printer paper, see "PRINTER PAPER SETTING" on page 24. 58mm wide printer paper (example: TP-50KJ-R, Nippon Paper) is recommended.<br>• "CLOSE PRT COVER" is indicating that the printer cover is left opened, ensure that the printer cover is completely closed.<br>• When auto print is setting is "ON" in the initial setting, measurement is performed under Auto mode, and measurement results are printed out automatically. (See page 66.)<br>• When the Auto cut setting is off and you need to cut a printer form, the way is that erase the measurement value by tapping the [ALL CLEAR] button, and tap the [PRINT OUT] button. (See page 68.) |

## CLEARING MEASUREMENT VALUES

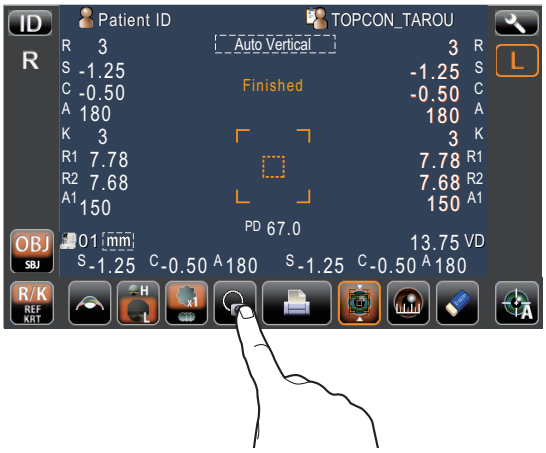
**1** Tap the [ALL CLEAR] button on the control panel.

All measurement values of both eyes are cleared.

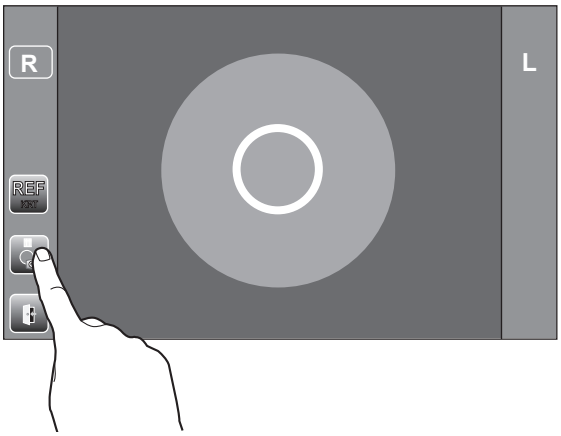
# DISPLAYING ALL OBJECTIVE REFRACTIVE MEASUREMENT DATA

It is possible to confirm all measured data and to check the existence of the variation in data. Measurement data chooses and displays "REF data" and "KRT data."

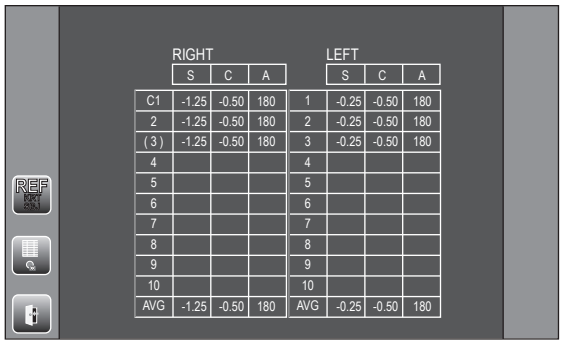
***1*** Tap the [TARGET IMAGE] button of the control panel.




***2*** Tap the [ALL DATA / TARGET] button.

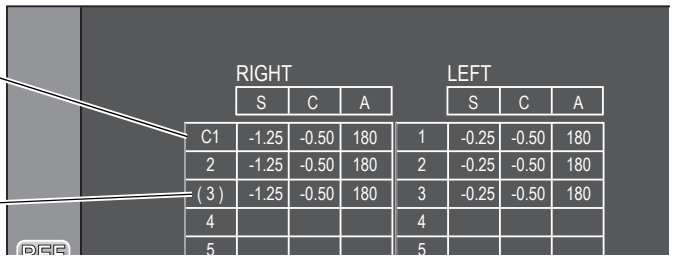



***3*** The Data Display screen is displayed.



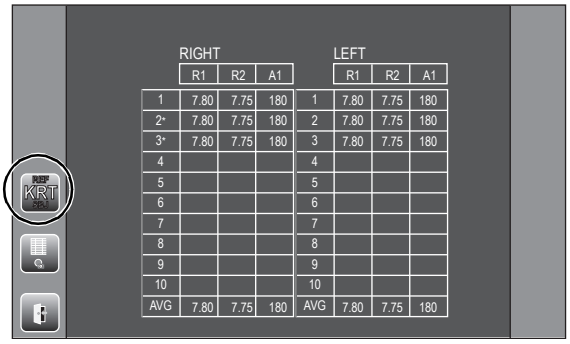

When measurement is performed with the Cataract button ON, "C" comes at the head of figures.

When Cataract mode starts automatically during the measurement, figures will be put in ( ).

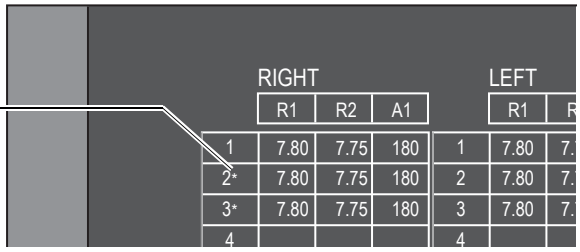



| NOTE | When no data is memorized, the data table shows blank. |
|---|---|

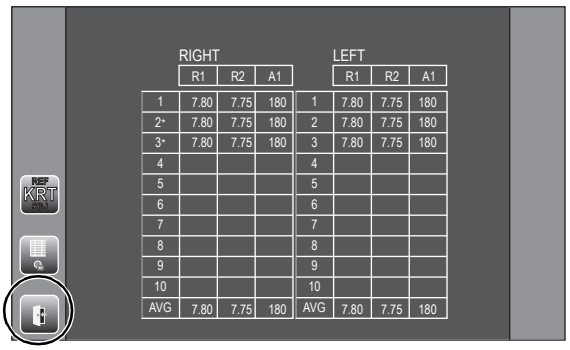
***4*** To change "REF data" and "KRT data," tap the [REF/KRT/SBJ] button.




When the reliability of KRT data is low, "*" is attached after the figures.




***5*** To exit the data display and return to the Measurement screen, tap the [EXIT] button.




***6*** If the data have many variations, perform objective refractive measurement again. If the measurement value is normal, subjective refractive check is possible.

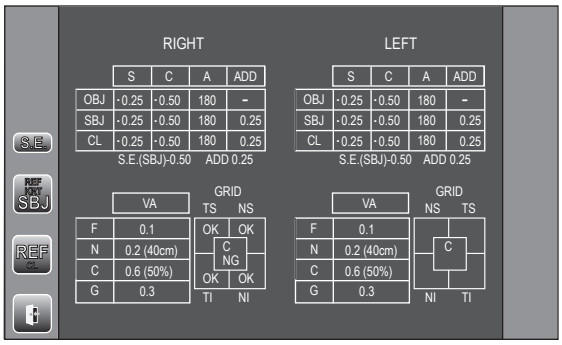
# DISPLAYING ALL MEASUREMENT/CHECK DATA

All measurement/check data including subjective check data can be displayed.
The displayed data can be selected from REF data, KRT data and SBJ data.

***1*** Apply similar procedure in ***1*** to ***3*** at "MANUAL MODE MEASUREMENT IN OBJECTIVE REFRACTIVE MEASUREMENT" on page 35 to change to the "Data Display screen".

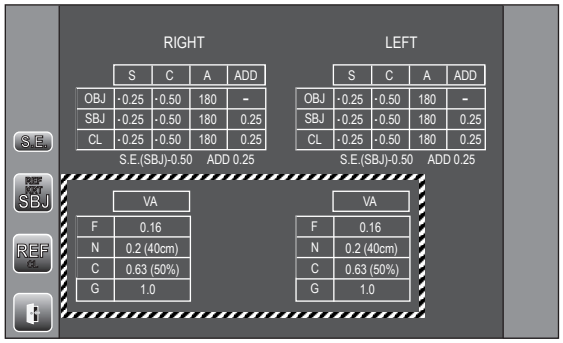
***2*** To change "REF data", "KRT data" or "Subjective refractive check data," tap the (REF/KRT/SBJ change) button.

Subjective refractive data

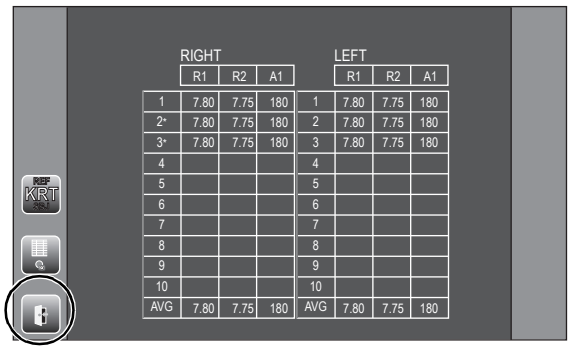



| NOTE | • OBJ (objective refractive measurement data) is same as REF data.<br>• It becomes a blank when there is no data. |
|---|---|

***3*** Tap the (S.E.) button to display VA value in spherical equivalent power (S.E.).




***4*** To exit the data display and return to the Measurement screen, tap the (EXIT) button.



## OPERATION OF AFTER USE

***1*** Use the base stopper to fix the main body.

***2*** Turn the POWER switch to off.

| | |
|---|---|
| **NOTE** | When external devices are connected to external I/O terminals, turn off the power of these devices too.<br>(If power switch is provided.) |

***3*** Unplug the power cable from Commercial power (the 3-pin AC inlet with grounding).

| | |
|---|---|
| **NOTE** | When the instrument is not used for a long period, unplug the power supply cable, and detach the cable connected to the external I/O terminal. |

# OPTIONAL OPERATIONS

## DISPLAYING THE PATIENT ID (PATIENT No.) OR OPERATOR ID

A patient ID or operator ID of up to 13 characters can be input and displayed on the control panel and printout.
However, if no patient ID is input, the patient No. is allocated automatically by the device.

1 Tap (ID) button.

2 Tap keyboard on the screen and enter characters. Tap (OK) button and fix the input value.

| NOTE | Patient ID is reset when measurement values are printed or if the (ALL CLEAR) button is tapped.<br>Patient No. reset condition can be selected such that the patient No. is reset upon power on or not, in the initial setting of setup screen.<br>"Refer to "Patient No. reset on page 65. |
|---|---|

# ADDITIONAL TEST IN SUBJECTIVE REFRACTIVE CHECK

## CONTRAST TEST

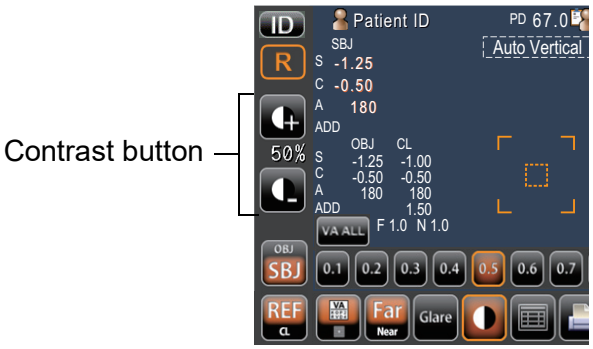
In subjective refractive far vision check, it is possible to know the reduction of visual acuity when low contrast chart is shown to a patient.
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

1 Perform FAR VA check.

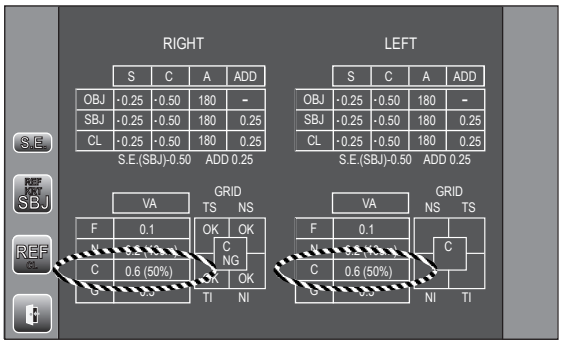
2 Tap the (Contrast check ON/OFF) button to be colored orange button.
The (Contrast) button appears on the left side of control panel.


Contrast check ON/OFF button

**3** Be the contrast of a chart lower with the [Contrast] button, obtain the marginal value where the patient can be read under low contrast.




**4** If VA value is determined tap the [VA] button. The value and contrast percentage are shown and recorded for item "C" of "All data display". (Page 42)



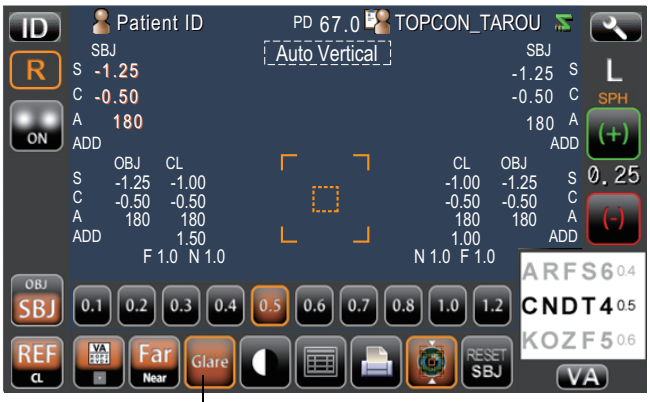

| NOTE | The result of the test may differ from computer vision depending on how the chart is seen. |
|---|---|

## GLARE TEST

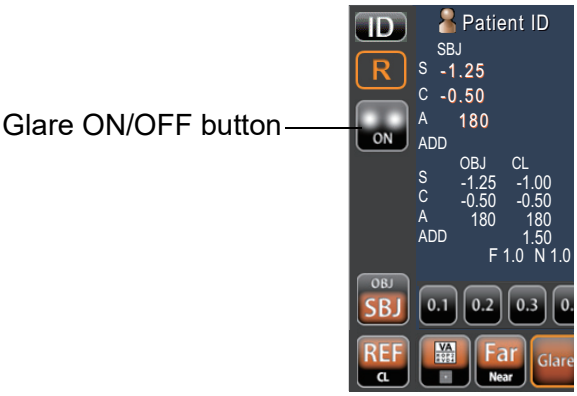
In Subjective refractive far vision check, it is possible to know the reduction of visual acuity when glaring chart is shown to a patient by applying backlight onto the chart.
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

**1** Perform FAR VA check.

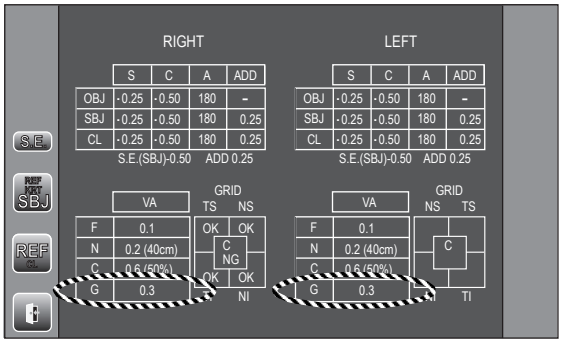
**2** Tap the [Glare check ON/OFF] button to be colored orange button. The [Glare ON/OFF] button appears on the left side of control panel. At this moment the chart for patient becomes darkened.




**3** Light the backlight by the [Glare ON/OFF] button to obtain the marginal value where the patient can be read under glaring.




**4** If VA value is determined and [Glare ON/OFF] button is "ON", tap the [VA] button. The value is shown and recorded for item "G" of "All data display". (Page 42)



## GRID TEST

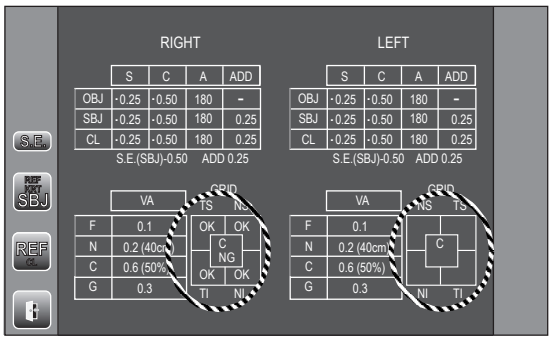
It is possible to check a condition for metamorphopsia (distorted vision in a part of the visual field) and scotoma (loss of vision in a part of the visual field), reduction of contrast sensitivity by showing a patient a grid chart.

For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

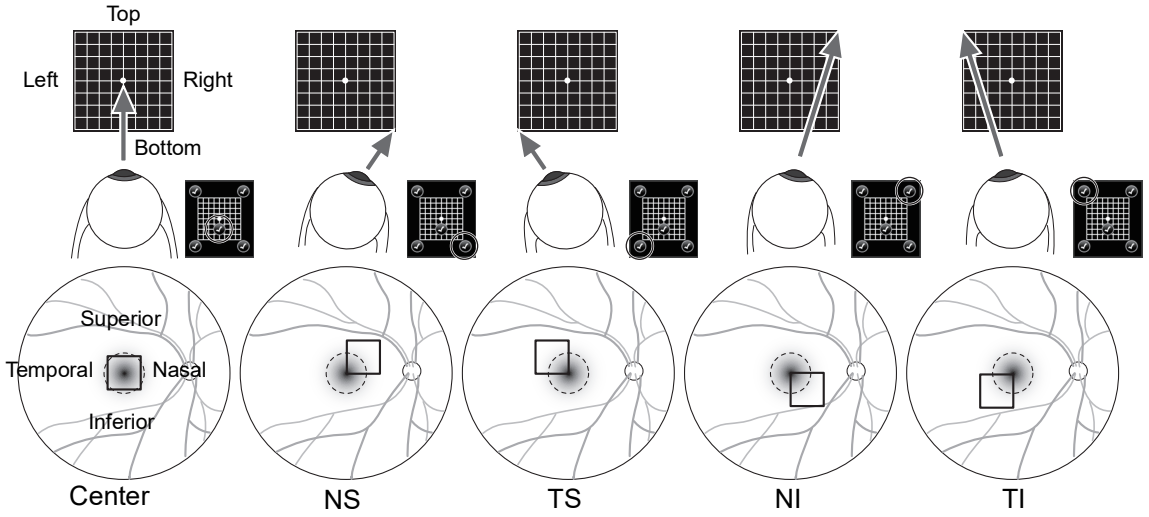
***1*** Tap the [VA check/Grid check] button to change the button into orange.
The grid chart appears on the lower right of control panel.


***2*** Tell the patient to look at center of grid, upper right of corner, upper left of corner, lower right of corner and lower left of corner, then ask the patient about sight of the grid chart.
If the patient says "The lines are blurred and dimmed", "It seems distorted." and " It is partially missing", tap the check mark of the position which the patient answered, to change the button into orange.

***3*** After checking, open all data display. Abnormal area in the item of "GRID" is displayed and recorded as "NG", and normal area is as "OK". (Page 42)




The relation of the place of a grid chart which a patient looks at and the part of the fundus of the eye is as follows. (In case of right eye)



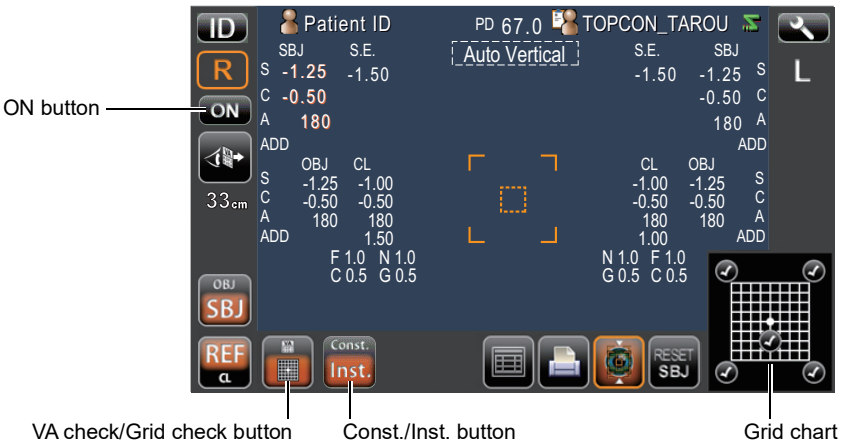
## SETTING OF GRID CHART DISPLAY TIME

It is possible to switch whether a grid chart is continuously shown to a patient or it shows momentarily during a grid check.
The display time in the case of showing momentarily can be selected on the SETUP screen.

**1** Tap the [VA check/Grid check] button on the subjective refractive check screen to change to the Grid check mode.

**2** Select whether a grid chart is continuously shown (Const.) or momentarily shown (inst.) by tapping the [Const./Inst.] button.

[Const]: A grid chart is shown continuously.
[Inst]: A grid chart is shown momentarily.




**3** If [Inst] is selected, [ON] button appears on the upper left of the screen.

**4** For the above operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

**5** Tap the [ON] button, a grid chart is momentarily shown to a patient.

| NOTE | |
|---|---|
| | • The display time in the case of showing momentarily can be selected on the SETUP screen, [SBJ] [Light time(grid)] of [Initial] from the following 8 items.<br>0.25/0.50/0.75/1.00/1.25/1.50/1.75/2.00 (sec.)<br>The default setting is 0.25.<br>• The result cannot be displayed and recorded as Const. or Inst. separately. |

# SETTING OF OPTIONAL FUNCTION IN SUBJECTIVE REFRACTIVE CHECK

## FRACTION DISPLAY FUNCTION OF CHART

* The function is not available depending on the marketing area.

VA value, VA button and chart display are provided in fraction display with numerator 6 and metric unit.

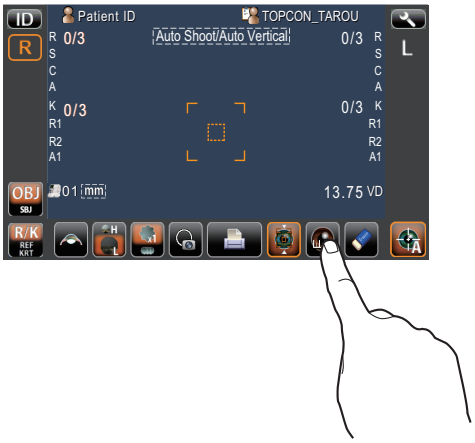
- The display unit can be changed on SETUP screen, [VA value unit] of [SBJ], [initial]. (See page 67)


| NOTE | If this function is set to on, all data display and print output will be carried out in fraction display with numerator 6 and metric unit. |
|---|---|

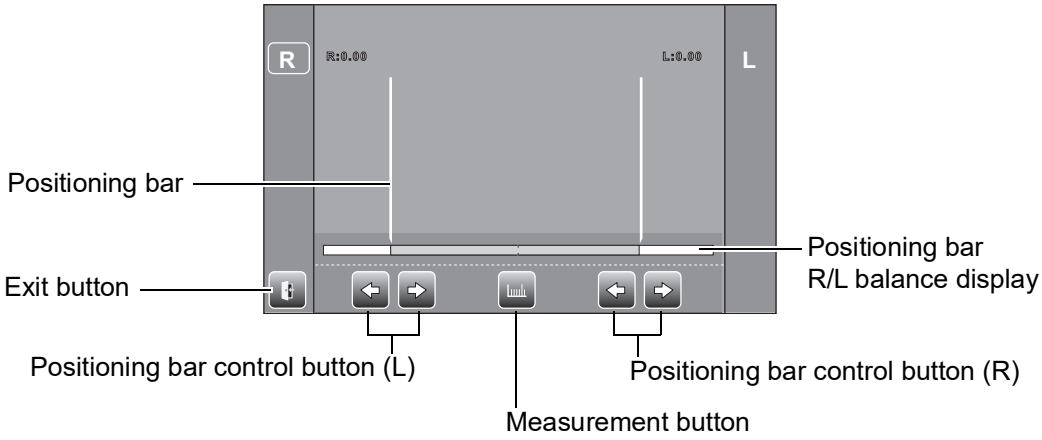
# MEASUREMENT OF CORNEA DIAMETER

## MEASUREMENT ON THE ACTUAL IMAGE

**1** Tap the [CORNEA DIAMETER] button.

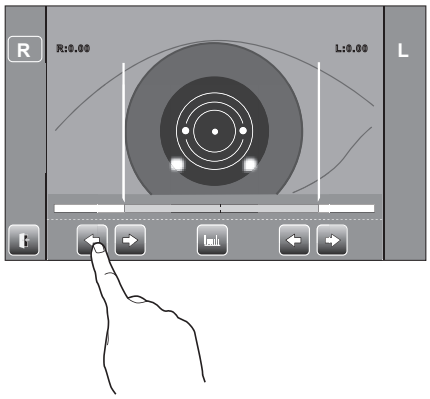



**2** The Cornea Diameter Measurement screen is displayed, and the positioning bar is displayed.

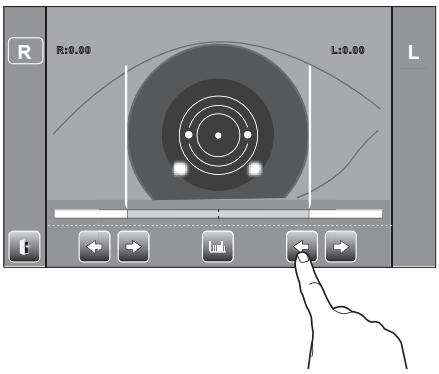



**3** When the pupil is displayed, moves the measuring head so that the pupil image and alignment dot are at the center of the screen.

**4** Using the [POSITIONING BAR CONTROL] button (L), move the left positioning bar to the left end of the iris from the control panel side.



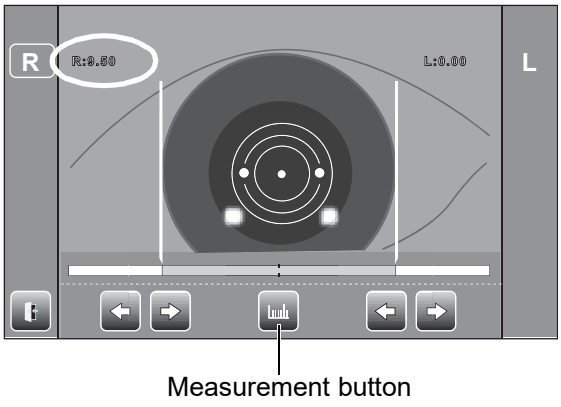
***5*** Using the [POSITIONING BAR CONTROL] button (R), move the right positioning bar to the right end of the iris from the control panel side.




| NOTE | By tapping the positioning bar R/L balance display, positioning bar can be moved. |
|---|---|

***6*** Tap the [MEASUREMENT] button.

***7*** The cornea diameter is displayed.




***8*** Move the measuring head to the other eye measurement position.
In like manner, measure the other eye.

***9*** Tap the [EXIT] button and return to the Measurement screen.

## MEASUREMENT ON THE STILL IMAGE

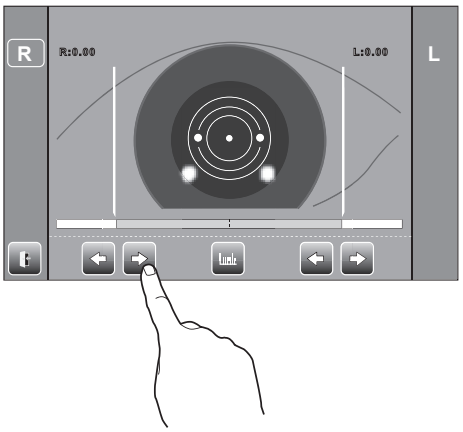
When KRT measurement values are available, the still image of the measurement is displayed.

***1*** Follow steps ***1*** to ***3*** of "MEASUREMENT ON THE ACTUAL IMAGE" and display the cornea image at the screen center.

***2*** Press the [MEASUREMENT switch] to display the saved image.

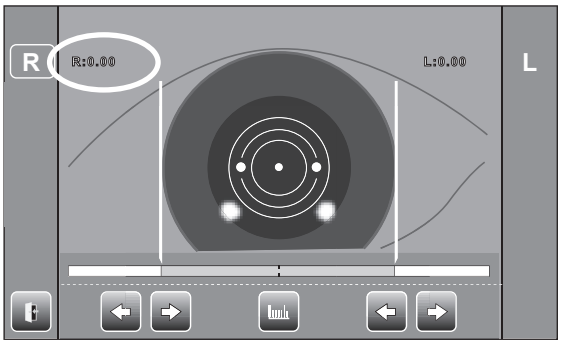
| NOTE | If you are required to get the still image again, press the [MEASUREMENT switch] to return to actual image, and press the [MEASUREMENT switch] again. |
|---|---|

***3*** Tap either of the (R)/(L) [POSITIONING BAR CONTROL] buttons and move the positioning bar.




***4*** Follow steps ***4*** to ***6*** of "MEASUREMENT ON THE ACTUAL IMAGE."

***5*** The cornea diameter is displayed.




***6*** Move the measuring head to the other eye measurement position.
In like manner, measure the other eye.

***7*** Tap the [EXIT] button and return to the Measurement screen.

## INPUT/OUTPUT USING RS-232C

This instrument can input from lens meter data and output data to a PC, etc. via the RS-232C interface.

1. Connect the interface cable to RS-232C OUT.
   Refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 23.
2. Set up of data communication settings.
   For details, refer to "DATA COMMUNICATION (COMM)" on page 70.
3. Perform measurements.
4. Tap the (PRINT OUT) button of the control panel.
   When output is completed, "RS-232C SUCCESS" is displayed on the screen.

## INPUT USING USB

This instrument can input ID numbers from a bar code reader, etc. via the USB.

1. Check the connection of USB IN.
   For connection, refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 23.
2. Input ID numbers from the external device.
   The inputted ID numbers are displayed on the screen.

## OUTPUT USING LAN

This instrument can output data to a PC, etc. via the LAN interface.

1. Connect the network cable to LAN OUT.
   For connection, refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 23.
2. Set up of LAN connection settings.
   For details, refer to "LAN CONNECTION (LAN)" on page 71.
3. Perform measurements.
4. Tap the (PRINT OUT) button of the control panel.
   When output is completed, "LAN SUCCESS" is displayed on the screen.

| NOTE | For explanation of messages during communication refer to the "MESSAGE LIST" on page 77. |
|---|---|

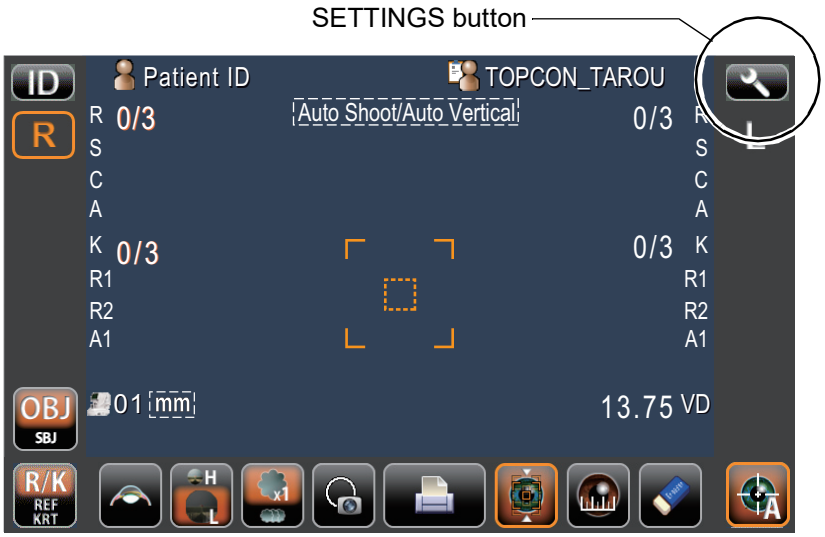
# SETTING FUNCTIONS ON SETUP SCREEN

## OPERATING THE SETUP SCREEN

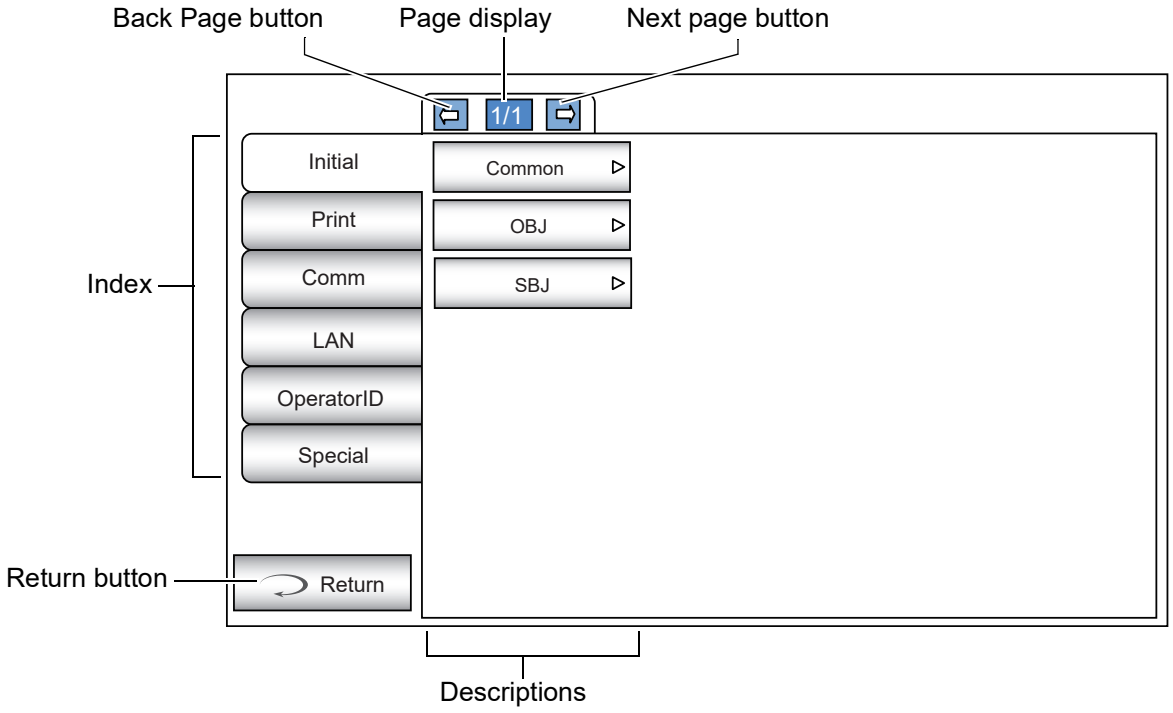
Various functions can be set on the SETUP screen.

### PREPARATONS FOR SETTING

1. Make sure that the power cable is connected.
   For connection, refer to "CONNECTING POWER CABLE" on page 22.
2. Turn ON the [POWER] switch.
3. Tap the [SETTINGS] button on the control panel.

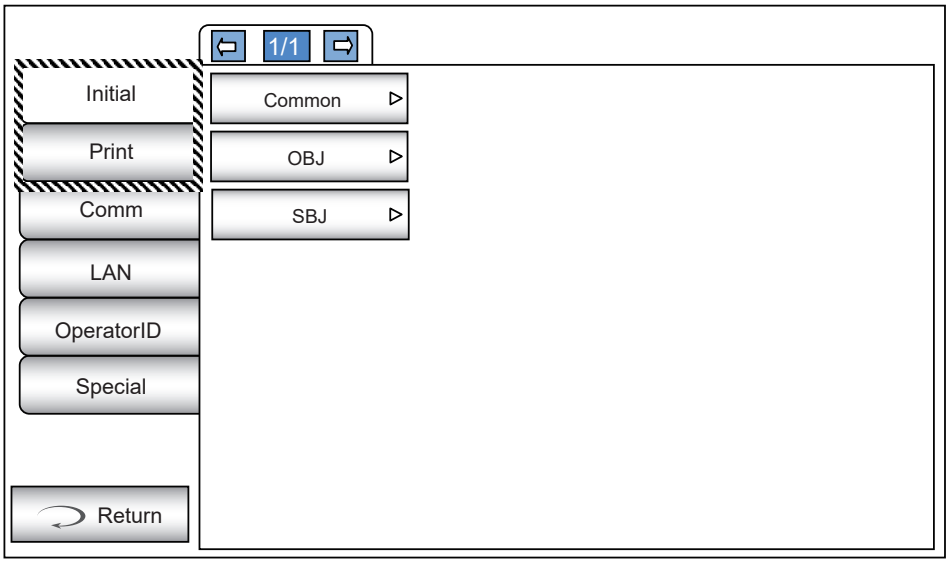



The SETUP screen is displayed.

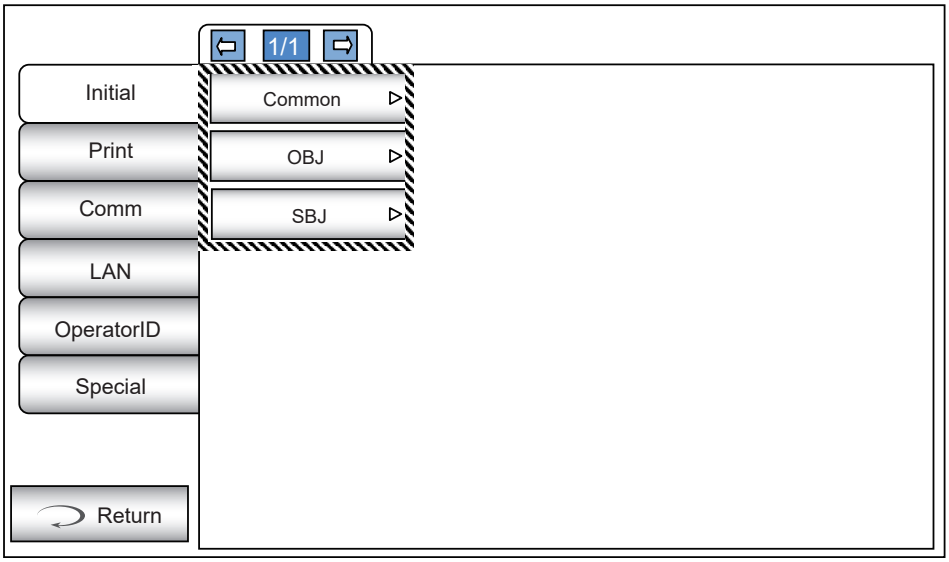


## OUTLINE OF SETUP SCREEN OPERATIONS (IN CASE OF INITIAL AND PRINT)

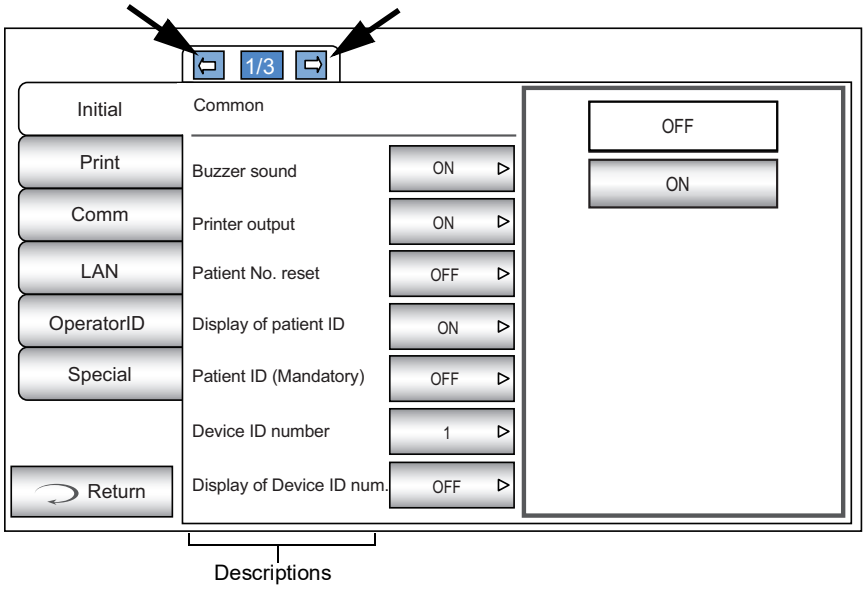
***1*** Tap INDEX and select "Initial" or "Print".



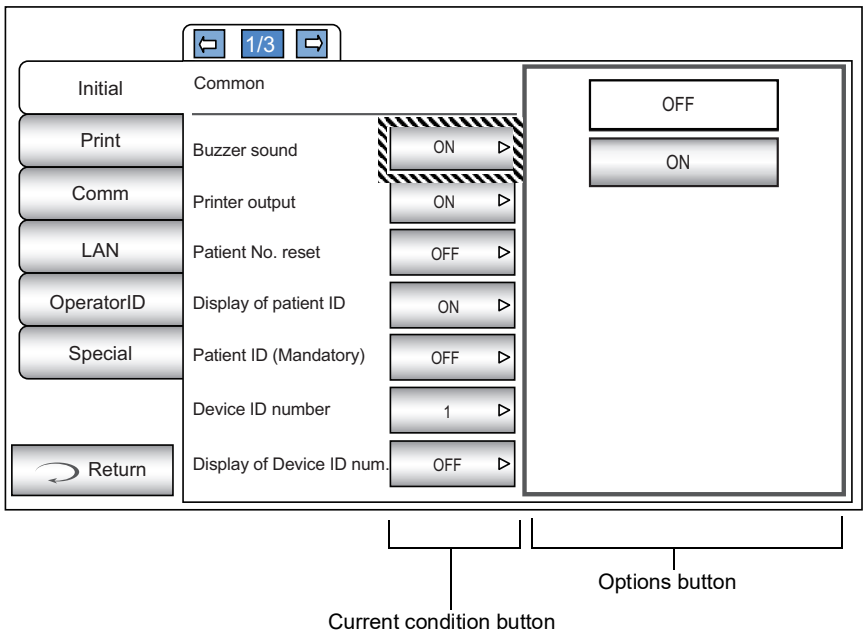

***2*** Select the settings common function "Common", objective refractive measurement function "OBJ" or subjective refractive check function "SBJ".
In the "Print" setting it is possible to select "Preset", "Common" (objective/subjective common items), "REF/KRT" (REF and KRT common items in objective refractive measurement), "REF" or "KRT" (REF and KRT individual settings) and "SBJ" (proper settings for subjective refractive check items).



***3*** When "Descriptions" are displayed, operate the [NEXT PAGE] button or [BACK PAGE] button, as necessary, and display the page to confirm/change.

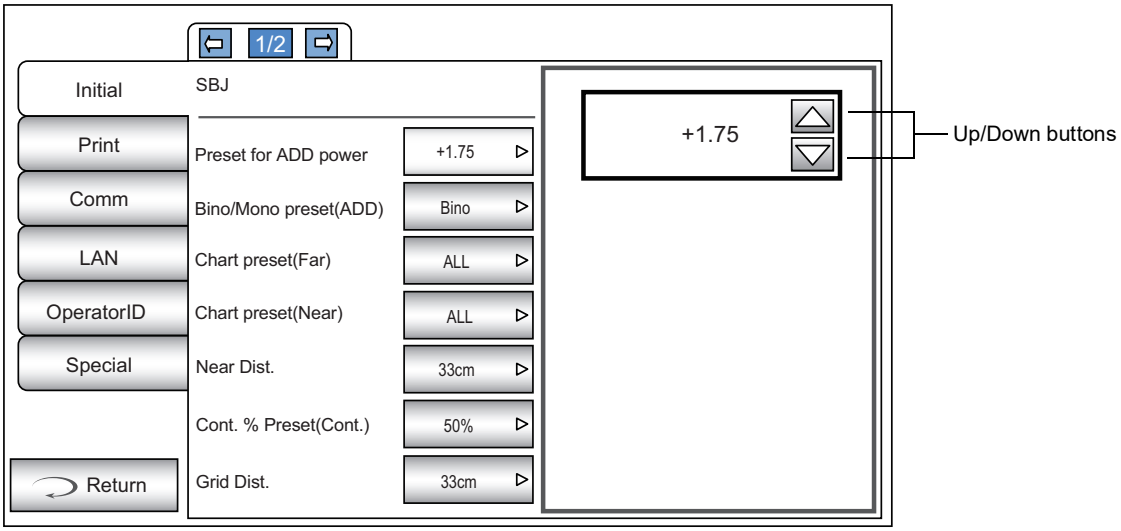



***4*** Tap the [CURRENT CONDITION] button of the item to be changed and find the [OPTIONS] button.

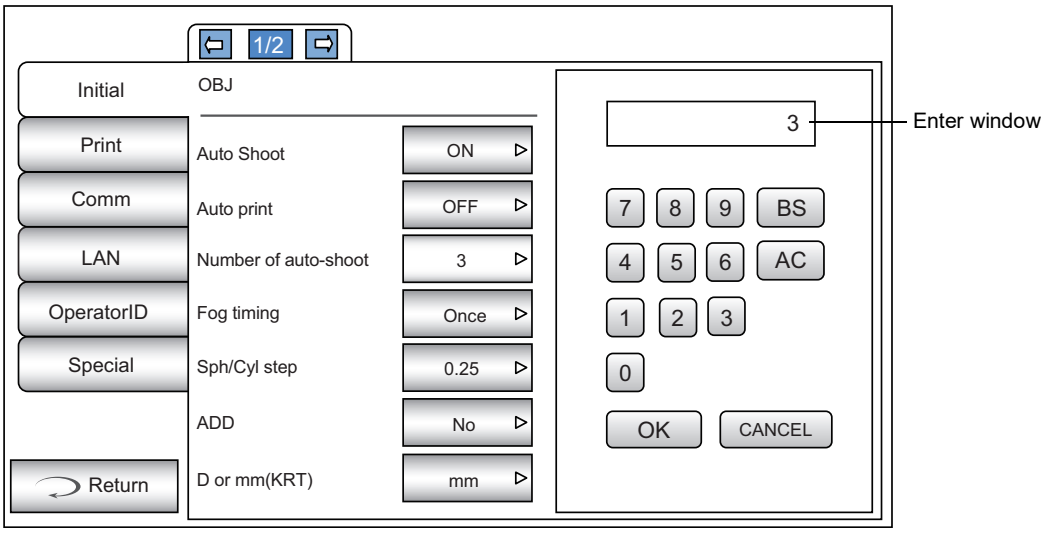



- Instead of the [OPTIONS] button, the UP/DOWN buttons and numerical pad would be displayed.

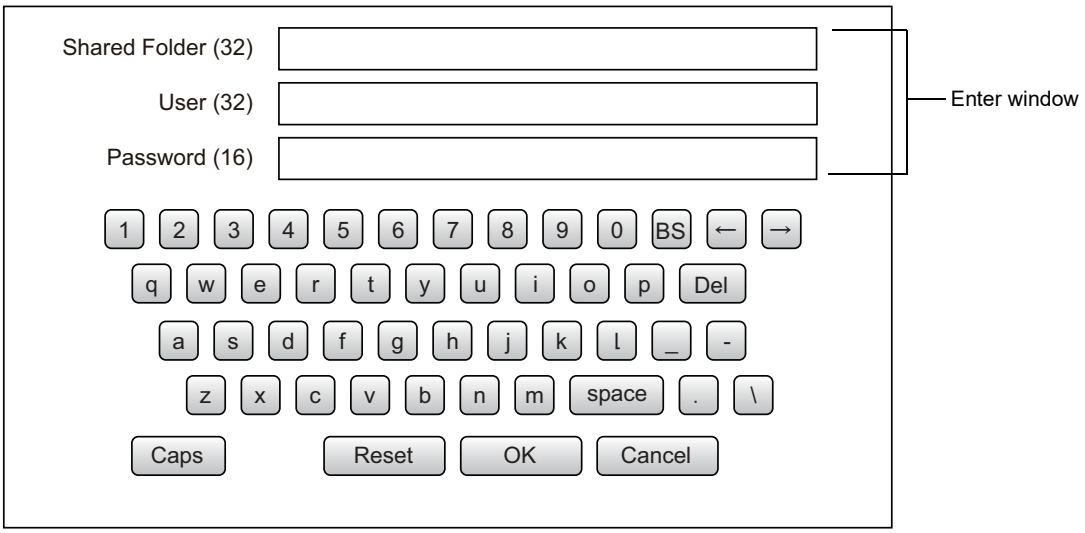
UP/DOWN BUTTON:
Tap the up or down button on the screen to change the setting.



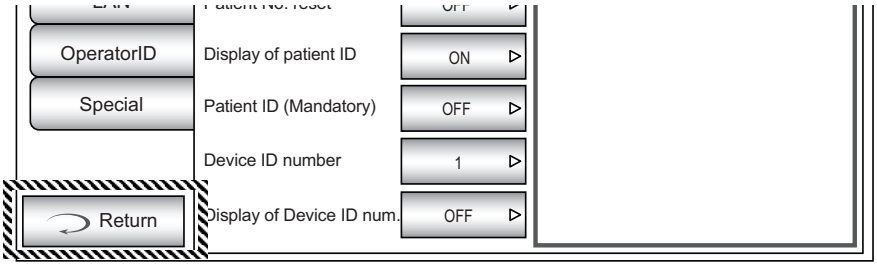

TEN-KEY:
Tap ten-key on the screen and enter the figure. If there are several windows to enter, tap the window to enter the figure by ten-key. Tap OK and fix the input value.



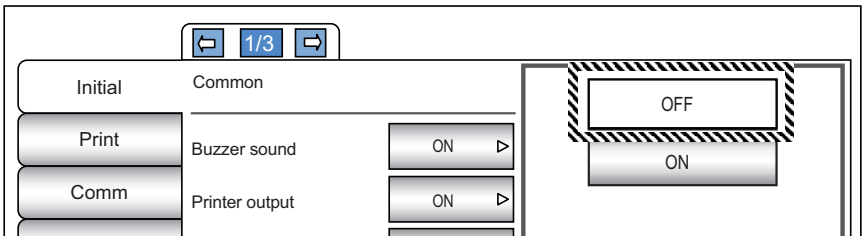

KEYBOARD:
Tap keyboard on the screen and enter characters. If there are several windows to enter, tap the window to enter the figure by keyboard. Tap OK and fix the input value.



If return to previous page is required, tap the RETURN button.



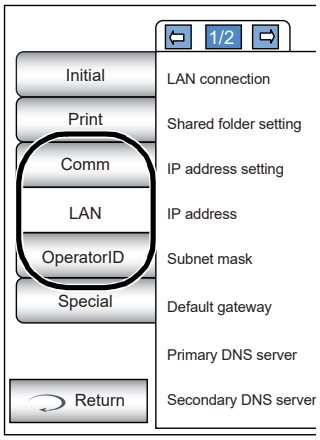

***5*** Tap the OPTIONS button and change the setting.



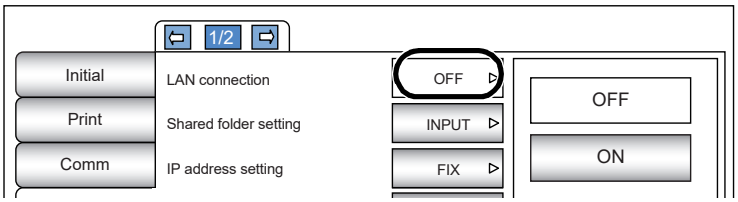

| NOTE | The set value is updated when an OPTIONS button is tapped. |
|---|---|

## OUTLINE OF SETUP SCREEN OPERATIONS (IN CASE OF "Comm", "LAN", AND "OPERATOR ID")

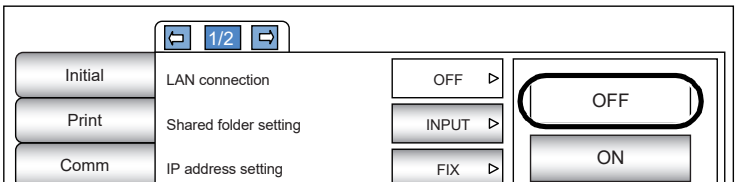
***1*** Tap [INDEX] and select the setting items.




***2*** Tap the [CURRENT CONDITION] button of the item to be changed and find the [OPTIONS] button.




***3*** Tap the [OPTIONS] button and change the setting.




- Instead of the [OPTIONS] button, the UP/DOWN buttons and numerical pad would be displayed. (See page 61)

| NOTE | The set value is updated when an [OPTIONS] button is tapped. |
|---|---|

## RETURNING TO THE MEASUREMENT SCREEN

***1*** Tap the [Return] button.


***2*** The Measurement screen is displayed.

# LIST OF SETUP ITEMS

Setup items are categorized into 6 large indexes.

"Initial" .....items related to the initial status after power on
"Print" .....items related to output from the internal printer
"Comm" .....items related to data output with the external device
"LAN".....items related to output using the LAN
"Operator ID".....items related to Operator ID
"Special".....items related to maintenance (for service engineer only)

## INITIAL (INITIAL SETTING)

Initial contains settings related to the initial status after power on, clearing all measurement values, etc.

Common.....Setting up common function for subjective refractive check and objective refractive measurement
OBJ .....Setting up for objective refractive measurement function
SBJ.....Setting up for subjective refractive check function

### Common

| Descriptions | Options | Details | Initial value |
|---|---|---|---|
| Buzzer sound | OFF | Buzzer does not sound. | ON |
| | ON | Buzzer sounds. | |
| Printer output | OFF | Internal printer is disabled. | ON |
| | ON | Internal printer is active. | |
| Patient No. reset | OFF | Patient No. is not reset upon power on. | ON |
| | ON | Patient No. is reset upon power on. | |
| Display of patient ID | OFF | Patient ID is not displayed. | OFF |
| | ON | Patient ID is displayed. | |
| Patient ID (Mandatory) | OFF | Patient ID is not displayed. | OFF |
| | ON | Patient ID is displayed. | |
| Device ID number | 1-99<br>Set by ten-key display. | Sets the Device ID number. | 1 |
| Display of Device ID num. | OFF | Device ID is not required. | OFF |
| | ON | Device ID is required. | |
| Start time of sleep mode | OFF | Power save function is not used. | 10min |
| | 1min | Power save status in 1min after last operation. | |
| | 5min | Power save status in 5min after last operation. | |
| | 10min | Power save status in 10min after last operation. | |
| | 20min | Power save status in 20min after last operation. | |
| | 30min | Power save status in 30min after last operation. | |
| | 60min | Power save status in 60min after last operation. | |
| Date/Time | Set by ten-key display. | Sets year, month, day, time (24hrs), minute and second | Installation date/time |
| Axis step | 1° | Axial angle is displayed by 1° step | 1° |
| | 5° | Axial angle is displayed by 5° step | |
| VD | 0.00 | VD value is set to 0mm (contact lens). | 13.75 |
| | 12.00 | VD value is set to 12.00mm (eyeglass lens). | |
| | 13.75 | VD value is set to 13.75mm (eyeglass lens). | |
| Cylinder sign | – | Cylinder sign is "–". | – |
| | + | Cylinder sign is "+". | |
| | MIX | Cylinder sign is "+" and "–". | |
| R/L or OD/OS | R/L | Right/left eyes is displayed by R/L. | R/L |
| | OD/OS | Right/left eyes is displayed by OD/OS. | |

| | | | |
|---|---|---|---|
| Control panel brightness | Level 1 (dark) | The brightness of control panel. | Level 4 |
| | Level 2 | | |
| | Level 3 | | |
| | Level 4 (bright) | | |
| Shaded character | OFF | Font style of measurement values is not shaded. | ON |
| | ON | Font style of measurement values is shaded. | |
| Auto Vertical detection | OFF | Automatic up and down tailing function is not used. | ON |
| | ON | Automatic up and down tailing function is used. | |

## OBJ

| Descriptions | Options | Details | Initial value |
|---|---|---|---|
| Auto Shoot | OFF | Default measurement mode is Manual. | ON |
| | ON | Default measurement mode is Auto Shoot. | |
| Auto print | OFF | Results are not printed automatically. | OFF |
| | ON | After AUTO measurement of left and right eye, results are printed out automatically. | |
| Number of auto-shoot | 1-10<br>Set by ten-key display. | The number of continuous measurements. | 3 |
| Fog timing | Every time | Fog timing is applied every time. | Once |
| | Once | Fog timing is applied only once before the 1st measurement. | |
| Sph/Cyl step | 0.12 | Sph/Cyl is displayed by 0.12D step. | 0.25 |
| | 0.25 | Sph/Cyl is displayed by 0.25D step. | |
| ADD | NO<br>40-44<br>45-49<br>50-54<br>55-59<br>60-64<br>65-69<br>70-74 | The typical additional power for the age can be selected. | NO |
| D or mm(KRT) | D | D of corneal refractive power. | mm |
| | mm | mm of corneal curvature. | |
| HV or R1R2 | HV | Corneal curvature radius measurement result on screen is displayed by HV (horizontal/vertical direction) | R1R2 |
| | R1R2 | R1R2 Corneal curvature radius measurement result on screen is displayed by R1R2 (flat/steep meridian). | |
| Display of KRT unit | OFF | KRT unit is not shown. | OFF |
| | ON | KRT unit is shown. | |
| Measure mode setting | REF | Default measurement mode is REF. | REF/KRT |
| | REF/KRT | Default measurement mode is R/K. | |
| | KRT | Default measurement mode is KRT. | |
| Display of REF average | OFF | REF average is not displayed. | OFF |
| | ON | REF average is displayed. | |

## SBJ

| Descriptions | Options | Details | Initial value |
|---|---|---|---|
| Preset for ADD power | OFF<br>+0.25<br>+0.50<br>+0.75<br>+1.00<br>+1.25<br>+1.50<br>+1.75<br>+2.00<br>+2.25<br>+2.50<br>+2.75<br>+3.00<br>+3.25<br>+3.50<br>+3.75<br>+4.00 | When starting ADD test an initial ADD power is set. | +1.75 |
| Bino/Mono preset(ADD) | Mono | ADD power is changed one eye every. | Bino |
| | Bino | ADD power is changed both eyes simultaneously. | |

| | | | |
|---|---|---|---|
| Chart preset(Far) | ALL<br>0.1<br>0.2<br>0.3<br>0.4<br>0.5<br>0.6<br>0.7<br>0.8<br>1.0<br>1.2 | When starting far VA check an initial eye-test chart is set. | ALL |
| Chart preset(Near) | ALL<br>0.1<br>0.2<br>0.3<br>0.4<br>0.5<br>0.6<br>0.7<br>0.8<br>1.0<br>1.2 | When starting near VA check an initial eye-test chart is set. | ALL |
| Near Dist. | 33cm<br>40cm<br>50cm<br>60cm | When starting near VA check an initial distance of near VA check is set. | 33cm |
| Cont. % Preset(Cont.) | 2.5%<br>5%<br>10%<br>12.5%<br>25%<br>50%<br>100% | When starting contrast test an initial contrast percentage is set. | 50% |
| Grid Dist. | 33cm<br>40cm | When starting grid test an initial distance of near VA check is set. | 33cm |
| Auto Far iniR/L Change | OFF | When changing the left and right, it is not returned to "Far". | ON |
| | ON | When changing the left and right, it is returned to "Far".<br>(In "Far", "Glare OFF" and "Cont OFF".) | |
| S.E. function | OFF | S.E. change function is not used | OFF |
| | ON | S.E. change function is used. | |
| Light time (Grid) | 0.25<br>0.50<br>0.75<br>1.00<br>1.25<br>1.50<br>1.75<br>2.00 | When starting grid test in inst. mode an initial lighting time is set. | 0.25 |
| Grid mode present | Const. | A grid chart is shown continuously during grid test. | Const. |
| | Inst. | A grid chart is shown momentarily during grid test. | |
| VA value unit | Decimal | VA value display unit is set to decimal. | Decimal |
| | Feet | VA value display unit is set to feet. | |
| | Meter | VA value display unit is set to meter. | |
| Glare light mode | Night vision | Glare light volume is set as night vision. | Day vision |
| | Day vision | Glare light volume is set as day vision. | |

## SETTING OF INTERNAL PRINTER (PRINT)

Print contains settings related to output from the internal printer.
In this setting it is possible to select "Preset", "Common" (objective refractive measurement/subjective refractive check common items), "REF/KRT" (REF and KRT common items in objective refractive measurement), "REF" or "KRT" (REF and KRT individual settings) and "SBJ" (proper settings for subjective refractive check items).

Preset.....Setting up printing function for preset
Common.....Setting up printing function for subjective refractive check/objective refractive measurement common items
REF/KRT.....Setting up printing function for REF and KRT common items in objective refractive measurement
REF.....Setting up printing function for REF in objective refractive measurement
KRT.....Setting up printing function for KRT in objective refractive measurement
SBJ.....Setting up printing function for subjective refractive check

| | Description | Options | Details | Initial value |
|---|---|---|---|---|
| Preset | – | All | All measurement values are printed. | All |
| | – | Avg | Only average values are printed. | |
| | – | Classic | Equivalent with RM/KR-8900 Classic 2. | |
| Common | Barcode | OFF | Barcode is not printed. | OFF |
| | | ON | Barcode is printed. | |
| | Operator ID | OFF | Operator ID is not printed. | OFF |
| | | ON | Operator ID is printed. | |
| | Name | OFF | "Name" space is not available. | ON |
| | | ON | "Name" space is available. | |
| | Date | OFF | Date is not printed. | ON |
| | | ON | Date is printed. | |
| | Date style | YMD | Print in Year/Month/Day format. | DMY*1 |
| | | MDY | Print in Month/Day/Year format. | |
| | | DMY | Print in Day/Month/Year format. | |
| | Patient No./Patient ID | OFF | Patient No./Patient ID is not printed. | ON |
| | | ON | Patient No./Patient ID is printed. | |
| | Device ID number | OFF | Device ID No. is not printed. | OFF |
| | | ON | Device ID No. is printed. | |
| | Serial number | OFF | Serial No. is not printed. | ON |
| | | ON | Serial No. is printed. | |
| | Include error data | OFF | "Error" data is not printed. | OFF |
| | | ON | "Error" data is printed. | |
| | TOPCON logo | OFF | TOPCON logo is not printed. | ON |
| | | ON | TOPCON logo is printed. | |
| | Message print | OFF | Message is not printed. | OFF |
| | | ON | Message is printed. | |
| | Input message | Set by keyboard display. | String of up to 72 characters. | NONE |
| | Graphic print | Normal Printer | Picture of refractive condition is not printed. | Normal Printer |
| | | Graphic Printer | Picture of refractive condition is printed. | |
| | Line space | 0-24 Set by ten key display. | Line space is set in dot units. | 0 |
| | Auto Cut | OFF | Auto cut is carried out. | ON |
| | | ON | Auto cut is not carried out. | |
| | Separate print out | OFF | The values of objective refractive measurement/subjective refractive check (REF)/subjective refractive check (CL or NoCL) are printed out at same time. | ON |
| | | ON | The values of objective refractive measurement/subjective refractive check (REF)/subjective refractive check (CL or NoCL) are printed out separately. | |

*1 : Depending on the destination, preset values differ.

| | Description | Options | Details | Initial value |
|---|---|---|---|---|
| REF/KRT (Print setting on R/K mode) | Print Layout | DATA | Measurement values are printed in terms of REF or KRT. | DATA |
| | | R/L | Measurement values are printed in terms of Right or Left. | |
| | VD | OFF | VD value (Vertex distance) is not printed. | ON |
| | | ON | VD value (Vertex distance) is printed. | |
| | Cylinder sign | OFF | Cylinder sign is not printed. | ON |
| | | ON | Cylinder sign is printed. | |
| | Print form of REF result | ALL | All refractive measurements are printed. | ALL |
| | | AVG | Only averaged is printed. | |
| | Reliability | OFF | Reliability number is not printed. | OFF |
| | | ON | Reliability number is printed. | |
| | S.E. | OFF | S.E. is not printed. | ON |
| | | ON | S.E. is printed. | |
| | PD | OFF | PD value is not printed. | ON |
| | | ON | PD values is printed. | |
| | ADD | OFF | ADD value is not printed. | OFF |
| | | ON | ADD value is printed. | |
| | KRT print layout | D/mm | KRT data is printed as follows,<br>D (corneal refractive power)/mm (corneal curvature). | D/mm |
| | | mm/D | KRT data is printed as follows,<br>mm (corneal curvature)/D (corneal refractive power). | |
| | Print form of KRT result | ALL | All measurement values are printed. | ALL |
| | | AVG | Only average value are printed. | |
| | KRT avg. -HV or R1R2 | HV | Kerato average in print out is HV (horizontal/vertical). | R1R2 |
| | | R1R2 | Kerato average in print out is R1R2 (flat/steep meridian). | |
| | KRT data -HV or R1R2 | HV | KRT measurement result is printed<br>in HV (horizontal/vertical). | R1R2 |
| | | R1R2 | KRT measurement result is printed<br>in R1R2 (flat/steep meridian). | |
| | KRT average | OFF | KRT average value is not printed. | ON |
| | | ON | KRT average value is printed. | |
| | KRT cylinder | OFF | Kerato-cylinder value and axial angle are not printed. | ON |
| | | ON | Kerato-cylinder value and axial angle are printed. | |
| | Cornea diameter | OFF | Corneal diameter is not printed. | ON |
| | | ON | Corneal diameter is printed. | |
| REF (Print setting on REF mode) | VD | OFF | VD value (Vertex distance) is not printed. | ON |
| | | ON | VD value (Vertex distance) is printed. | |
| | Cylinder sign | OFF | Cylinder sign is not printed. | ON |
| | | ON | Cylinder sign is printed. | |
| | Print form of REF result | ALL | All refractive measurements are printed. | ALL |
| | | AVG | Only typical value is printed. | |
| | Reliability | OFF | Reliability number is not printed. | OFF |
| | | ON | Reliability number is printed. | |
| | S.E. | OFF | S.E. is not printed. | ON |
| | | ON | S.E. is printed. | |
| | PD | OFF | PD value is not printed. | ON |
| | | ON | PD values is printed. | |
| | ADD | OFF | ADD value is not printed. | OFF |
| | | ON | ADD value is printed. | |

| | Description | Options | Details | Initial value |
|---|---|---|---|---|
| KRT (Print setting on KRT mode) | KRT print layout | D/mm | KRT data is printed as follows, D (corneal refractive power)/mm (corneal curvature). | D/mm |
| | | mm/D | KRT data is printed as follows, mm (corneal curvature)/D (corneal refractive power). | |
| | Print form of KRT result | ALL | Printout all measurement values. | ALL |
| | | AVG | Printout only average value. | |
| | KRT avg. -HV or R1R2 | HV | Display average of KRT measurement results is set to HV (horizontal/vertical). | R1R2 |
| | | R1R2 | Display average of KRT measurement results is set to R1R2 (flat/steep meridian). | |
| | KRT data -HV or R1R2 | HV | KRT measurement result is printed in simple format. | R1R2 |
| | | R1R2 | KRT measurement result is printed in full format. | |
| | KRT average | OFF | Do not print KRT average value. | ON |
| | | ON | Print KRT average value. | |
| | KRT cylinder | OFF | Do not print kerato-cylinder value and axial angle. | ON |
| | | ON | Print kerato-cylinder value and axial angle. | |
| | Cornea diameter | OFF | Do not print corneal diameter. | ON |
| | | ON | Print corneal diameter. | |
| SBJ | SBJ.(REF) Print | OFF | Subjective refractive check data is not printed. | ON |
| | | ON | Subjective refractive check data is printed. | |
| | SBJ.(NoCL/CL) Print | OFF | NoCL/CL data is not printed. | ON |
| | | ON | NoCL/CL data is printed. | |
| | SBJ.(S.E.) Print | OFF | S.E. data is not printed. | ON |
| | | ON | S.E. data is printed | |

## DATA COMMUNICATION (COMM)

Comm contains settings related to data output with the external device.

| Description | Options | Details | Initial value |
|---|---|---|---|
| Output data format | REF | Only REF data are output. | ALL |
| | KRT | Only KRT data are output. | |
| | ALL | All data are output. | |
| Communication Format | OLD | OLD TOPCON format | OLD |
| | NEW | NEW TOPCON format | |
| | STD1 | TOPCON STD1 format | |
| | STD2 | TOPCON STD2 format | |
| | STD4 | TOPCON STD4 format | |
| | CM1 | Custom specification | |
| | CM4 | Custom specification | |
| Use of Output port | OFF | RS-232C port is disabled. | OFF |
| | ON | RS-232C port is enabled. | |
| Baudrate setting | 2400 | Baudrate value:2400 | 2400 |
| | 9600 | Baudrate value:9600 | |
| Input data forrmat(CL) | OLD | OLD TOPCON format | STD1 |
| | NEW | NEW TOPCON format | |
| | STD1 | TOPCON STD1 format | |

## LAN CONNECTION (LAN)

LAN contains settings related to data output via LAN.

| Description | Options | Details | Initial value |
|---|---|---|---|
| LAN connection | OFF | LAN connection is off. | OFF |
| | ON | LAN connection is on. | |
| Shared folder setting | Shared Folder<br>(up to 32 characters)<br>User Name<br>(up to 32 characters)<br>Password<br>(up to 16 characters)<br>Set by keyboard display | Path and permission to shared folder is set. | NONE |
| IP address setting | FIX | Assign IP address manually. | FIX |
| | AUTO | Assign IP address automatically. | |
| IP address | 0.0.0.0<br>Set by ten-key display. | IP address of PC to output data. | NONE |
| Subnet mask | 0.0.0.0<br>Set by ten-key display. | Subnet mask address of KR-800S. | NONE |
| Default gateway | 0.0.0.0<br>Set by ten-key display. | Default gateway address of KR-800S. | NONE |
| Primary DNS server | 0.0.0.0<br>Set by ten-key display. | Primary DNS Server number. | NONE |
| Secondary DNS server | 0.0.0.0<br>Set by ten-key display. | Secondary DNS Server number. | NONE |

## OPERATOR ID

OPERATOR contains settings related to Operator ID.

| Description | Options | Details | Initial value |
|---|---|---|---|
| Use Operator ID | OFF | Operator ID will be displayed on the control panel and output. | OFF |
| | ON | Operator ID will not be displayed on the control panel and output. | |
| Prefix of Ope. ID | Set by ten-key display.<br>(up to 3 characters) | Set the Prefix of Operator ID can be registered. | NONE |
| Operator ID (Mandatory) | OFF | Operator ID is not required. | OFF |
| | ON | Operator ID is required. | |
| Fixed Ope. ID setting | OFF | Operator ID is not fixed. | OFF |
| | ON | Operator ID is fixed. | |
| Fixed Ope. ID entry | Set by ten-key display.<br>(up to 13 characters) | Input fixed operator ID | NONE |

## SPECIAL

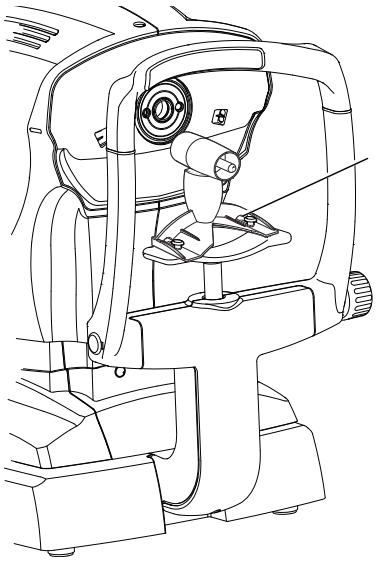
SPECIAL is the mode for service engineer only; it is not used under normal condition.

# MAINTENANCE

## DAILY CHECKUPS

### CHECKING THE MEASURING ACCURACY

- The attached model eye should be measured and the accuracy checked at regular intervals.
- To set up the model eye, insert the guide groove of the model eye to the chinrest tissue pin.
- Set the display step of spherical/cylindrical to 0.12D and perform measurement.




If the measurement result is widely different from the value shown on the model eye, call your dealer or TOPCON at the address on back cover.

### CLEANING THE INSTRUMENT

- Dust on measuring window ... Blow off dust with a blower.
- Fingerprints and oil spots on measuring window
  ..... Blow off dust by a blower and wipe the surface gently with a camera lens cleaner using clean gauze.
- Dirty instrument cover ..... Wipe the surface with the attached monitor cleaner or a dry soft cloth. Never use solvents or a chemical duster.

### CLEANING THE FOREHEAD REST AND CHIN REST

- Wipe the forehead rest and the chin rest with a cloth moistened with a tepid solution of neutral detergent for kitchenware.

### CLEANING OF EXTERNAL INPUT / OUTPUT DEVICE

Clean according to each instruction manual.

## DAILY MAINTENANCE

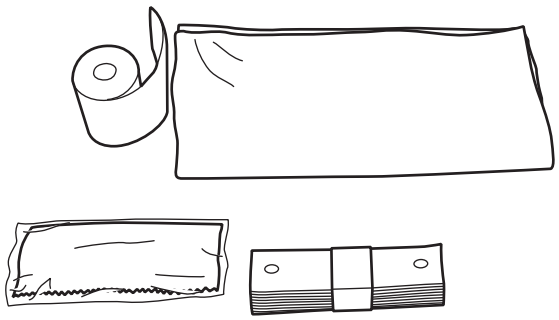
- For this instrument, dust may cause errors. When not in use, replace the measuring lens cap and dust cover.
- When not in use, turn off the POWER switch.

## ORDERING CONSUMABLE ITEMS

- When ordering consumable items, tell the product name, product code and quantity to your dealer or TOPCON at the address of back cover.

| Product name | Product code |
|---|---|
| Chinrest tissue | 40310 4082 |
| Monitor cleaner | 44800 1001 |
| Dust cover | 42360 9002 |

| Product name | Product code |
|---|---|
| Printer paper | 44800 4001 |



## USER MAINTENANCE ITEM

| Item | Inspection time | Contents |
|---|---|---|
| Inspection | Before using | The instrument works properly.<br>The objective lens must be free of stain or flaw. |
| Cleaning | When the part is stained | Objective lens<br>External cover, control panel, etc. |

## BRIGHTNESS ADJUSTMENT OF CONTROL PANEL

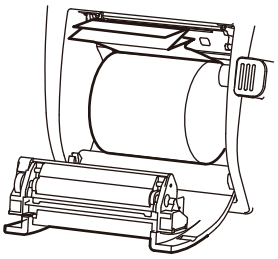
- The control panel is optimally adjusted when shipped.
- For control panel brightness adjustment, see "INITIAL (INITIAL SETTING)," "Control panel brightness" (page 66).

## PRINTER PAPER JAM

| | |
|---|---|
| **CAUTION** | • When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer button is pressed.<br>• To avoid failure or potential injury, do not open the printer cover while the printer is in operation.<br>• To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.<br>• To avoid potential injury, do not touch the printer body including metal parts or the paper cutter, while the printer is in operation or when replacing the printer paper.<br>• Pay much attention not to touch the internal printer's body when the cover is open. If touched, it may result in trouble due to electrostatic discharge. |

| | |
|---|---|
| **NOTE** | If the printer paper is jammed in the printer, printing will stop and the jam should be cleared. |

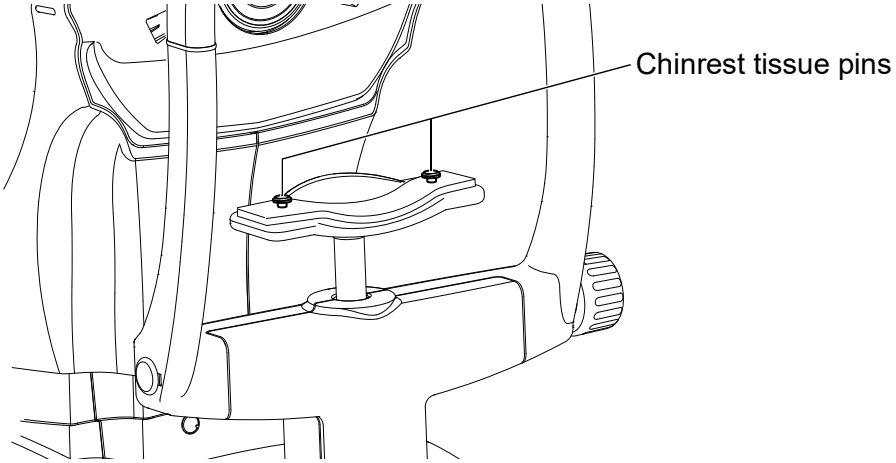
***1*** Open the printer cover, and take out the jammed paper pieces.

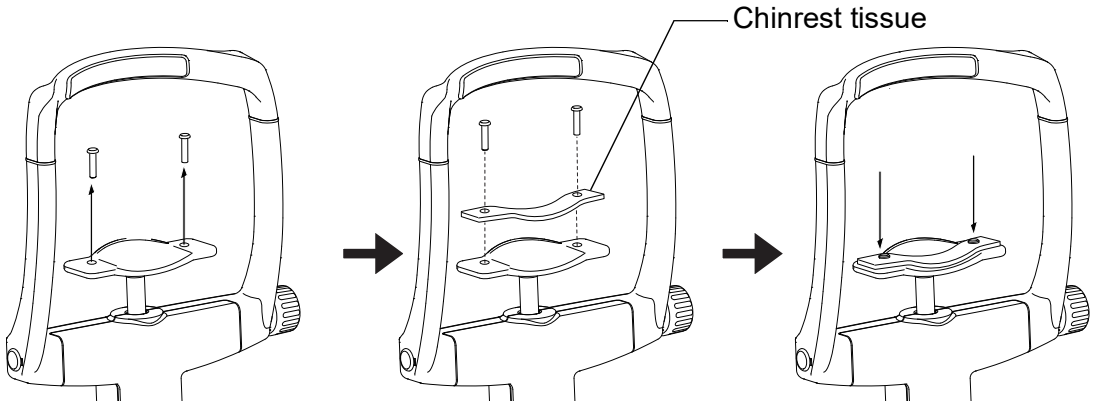


| | |
|---|---|
| **NOTE** | After removing the jammed printer paper, tap the Print button to print out the previous measurement data.<br>If no previous measurement data has saved, a blank sheet is printed out. |

## SUPPLYING THE CHINREST TISSUE

- When the chinrest tissue has run out, pull off chinrest tissue pins and place new tissue.



# MAINTENANCE

## CLEANING THE KERATO RING AND THE COVER

| NOTE | Do not clean plastic parts with solvents. Benzine, thinner, ether and gasoline may cause discoloring and decomposition. |
|---|---|

1. If the kerato ring and the cover get soiled, wipe the surface with dry cloth.
2. If the kerato ring and the cover are noticeably stained, wipe the surface with a damp cloth which is moistened in a tepid water solution of neutral detergent.

## CLEANING THE CONTROL PANEL

| NOTE | • As the control panel screen is a touch panel, be sure to turn off the POWER switch before wiping. The touch panel will react and malfunction.<br>• When the monitor cleaner has become dirty, wash it. When washing, rinse it thoroughly so no detergent is left. If the detergent is left, it may cause uneven wiping. |
|---|---|

### CONTAMINATION BY DUST

Remove the dust with a soft brush, and wipe with the attached monitor cleaner.

### CONTAMINATION BY FINGERPRINTS

Wipe with the attached monitor cleaner.

If the stain still remains, moisten the monitor cleaner with water and then wipe off the stain.

# TROUBLESHOOTING

## TROUBLE-SHOOTING OPERATIONS

### MESSAGE LIST

| | |
|---|---|
| OVER-SPH | Displayed when spherical power exceeds +22D or -25D.<br>Measurement cannot be performed for out of measuring range. |
| OVER-CYL | Displayed when cylindrical power exceeds ±10D.<br>Measurement cannot be performed for out of measuring range. |
| OVER-R | Displayed when corneal curvature exceeds 5.00-10.00mm.<br>Measurement cannot be performed for out of measuring range. |
| NO TARGET | Displayed when there is no target or the eye image is too dark.<br>You should tell the patient to open their eyes as wide as possible, and tell not to move the eyes as possible. Then perform the measurement again. Even if you cannot perform the measurement after above manner, it may be possible to measure by changing to the cataract mode(CAT). |
| AGAIN | Displayed when there is more than ±5D difference from the previous measurement value.<br>You should tell the patient to open their eyes as wide as possible, and tell not to move the eyes as possible. Then perform the measurement again. |
| NO CENTER | Displayed when Center of eye cannot be found.<br>You should tell the patient to open their eyes as wide as possible, and tell not to move the eyes as possible. Then perform the measurement again. |
| ERROR | The patient's eye blinks or moves during measurement.<br>If this message appears while with measuring model eye, the instrument may have a problems. Contact your service engineer. |
| ALIGN ERR | Displayed when the alignment is significantly failed during the measurement.<br>You should tell the patient to open their eyes as wide as possible, and tell not to move the eyes as possible. Then perform the measurement again. |
| Rescan ID. | Displayed when barcode reader is connected and the print out button is pushed without reading the barcode again in the readable state after reading barcode in the state to be inhibited to read.<br>If this message is displayed, read the barcode again. |
| LAN hostname Error | Failed in host name resolution of the destination (to be connected with the share folder). Confirm the inputted host name or DNS server address. |
| LAN mount Error | Failed in connection with the share folder.<br>Confirm the address, folder name, user name and password of the destination (to be connected with the share folder). |
| LAN create Error | Failed in file creation.<br>Confirm that write permission to the share folder is set correctly. |
| LAN write Error | Failed in writing to the file. Confirm that write permission to the share folder is set correctly. Check if other program is accessing the share folder. |
| RS-232C FAIL | Displayed when failed in RS-232C data transmission or failed in initialization for RS-232C connection.<br>Confirm that the RS-232C cable connection and the RS-232C setting are in the correct way. |
| Please check the DATE/TIME | The battery for the built-in clock becomes run down.<br>- When the battery consumed, confirm the difference in time and adjust it.<br>- When the battery becomes completely drained, to verify whether time stopping occurred and call your service engineer. |
| Previous measurements are left. Please press the Clear button. | Displayed when the output of all output-set data fails.<br>Previous measurements are left. Please tap the ALL CLEAR button. |

| | |
|---|---|
| Cannot detect y position.<br>Please turn the switch off/on. | Displayed when the auto alignment sensor and the machine are not correctly connected or not connected at all. Turn off the main power switch, turn it on again.<br>When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer. |
| Failed to initialize TF motor.<br>Please turn the switch off/on. | Displayed when the fixation target sensor and the machine are not correctly connected or not connected at all. Turn off the main power switch, turn it on again.<br>When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer. |
| Spec on Far sub. check exceeds the limit. SCA are set in meas. range. | Adjust the value to become within subjective refractive check range if the REF value of objective refractive measurement or the CL data exceeds the subjective refractive check range. |
| Spec on Far sub. check exceeds the limit. | Displayed the value is set exceeding subjective refractive check range when SPH value is increased or decreased by SPH (+)/(-) button in subjective refractive Far VA check. |
| Spec on Near sub. check exceeds the limit. | Displayed the value is set exceeding subjective refractive check range when switching subjective refractive Far VA check to Near VA check, increasing or decreasing ADD by ADD (+)/(-) button at subjective refractive Near VA check and changing the near check distance at subjective refractive Near VA check. |
| Spec on Near sub. check exceeds the limit. It goes back to Far check. | When the check will switch the other eye (changing left or right eye) of subjective refractive near VA check under subjective refractive near VA check, the value is changed exceeding subjective refractive check range of the other eye. Shown that it returns to Far VA check compulsorily. |
| Are you sure you want to reset all present subjective data? | Confirmed whether the subjective refractive check data is reset when the RESET SBJ button is pressed. |
| Near Distance is different in R/L. Are you sure you want to reset Near VA? | Displayed subjective refractive Near VA check is performed when a different value of near check distance is set for left and right eye. Confirmed whether you want to carry out from the beginning of subjective refractive Near VA check. |

## TROUBLE-SHOOTING OPERATIONS

| | |
|---|---|
| ⚠ **WARNING** | To avoid electrical shock, do not open the instrument.<br>All service should be performed by a qualified service engineer. |

If a problem is suspected, use the following check list.
If following instructions does not improve the condition, or if your problem is not included in the list, contact your dealer or TOPCON at the address on the back cover.

**CHECK LIST**

| Trouble | Condition | Check | Page |
|---|---|---|---|
| Control panel does not turn on. | ——— | Is power cable unplugged? | 22 |
| | | Is power cable connected to the instrument? | 22 |
| Control panel is not clear. | The image is dark. | Adjust the brightness by “Control panel Brightness Adjust”. | 66 |
| Any trouble is found in a movable part. | ——— | Do not move it forcibly but call our service engineer. | 31 |
| Printing is not done. | Paper comes out without printing. | Confirm the direction of paper winding. If the direction is incorrect, reset paper to the proper direction. | 24 |
| | Paper does not come out. | If “PAPER END” displayed on control panel, replenish printer paper. | 24 |

# SPECIFICATIONS AND PERFORMANCE

## SPECIFICATIONS AND PERFORMANCE

| | |
|---|---|
| Range of Refractometry Measurement | Spherical refractive power: -25 to +22D (0.12D/0.25D steps)<br>(The test range in VD:12.00)<br>Cylindrical refractive power: 0D to ±10D (0.12D/0.25D steps)<br>(The test range in VD:12.00)<br>(where, spherical refractive power + cylindrical refractive power ≦ +22D, or spherical refractive power + cylindrical refractive power ≦ -25D)<br>Direction of astigmatic axis: 0° to 180° (1°/5° steps)<br>Measured minimum pupil diameter:ϕ2mm |
| Range of Cornea Curvature Measurement | Cornea curvature radius: 5.00mm to 10.00mm (0.01mm display unit)<br>Corneal refractive power: 67.50D to 33.75D (0.12D/0.25D steps)<br>(where, corneal refractive power =1.3375)<br>Corneal astigmatic power: 0D to ±10D (0.12D/0.25D steps)<br>Direction of corneal astigmatic axis: 0 to 180° (1°/5° steps) |
| Range of Subjective refractive check | Spherical refractive power: -18D to +18D (0.25D steps)<br>(The test range in VD:12.00)<br>Test chart: Eyesight test chart of 0.1 to 1.2, Grid display<br>Chart display: Overall, Horizontal series, Contrast change<br>Test items: Far-sightedness, Near-sightedness, Glare test |
| PD measurement | 20-85mm (0.5mm display unit) |
| External I/O terminal | USB(for Import), RS-232C(for Export), LAN(for Export) |

# GENERAL INFORMATION ON USAGE AND MAINTENANCE

## INTENDED PATIENT POPULATION

The patient who undergoes an examination by this instrument must maintain concentration for a few minutes and keep to the following instructions:

- To fix the face to the chinrest, forehead rest.
- To keep the eye open.
- To understand and follow instructions when undergoing an examination.

## INTENDED USER PROFILE

Since the AUTO KERATO-REFRACTOMETER KR-800S is medical devices, the operation should be supervised by a physician.

## ENVIRONMENTAL CONDITIONS OF USE

| | |
|---|---|
| Temperature: | 10°C to 40°C |
| Humidity: | 30% to 90% RH(without condensation) |
| Pressure: | 800hPa to 1060hPa |

## STORAGE, USAGE PERIOD

1. Environmental conditions (without package)

   | | |
   |---|---|
   | *Temperature: | 10°C to 40°C |
   | Humidity: | 10% to 95% (without condensation) |
   | Pressure: | 700hPa to 1060hPa |

   * THIS INSTRUMENT DOES NOT MEET THE TEMPERATURE REQUIREMENTS OF ISO 15004-1 FOR STORAGE. DO NOT STORE THIS INSTRUMENT IN CONDITIONS WHERE THE TEMPERATURE MAY RISE ABOVE 40°C OR FALL BELOW 10°C.

2. When storing the instrument, ensure that the following conditions are met:
   (1) The instrument must not be splashed with water.
   (2) Store the instrument away from environments where pressure, temperature, humidity, ventilation, sunlight, dust, salty/sulfurous air, etc. could cause damage.
   (3) Do not store or transport the instrument on a slanted or uneven surface or in an area where it is subject to vibrations or instability.
   (4) Do not store the instrument where chemicals are stored or gas is generated.
3. Normal life span of the instrument:
   8 years from delivery providing regular maintenance is performed [TOPCON data]

## ENVIRONMENTAL CONDITIONS FOR PACKAGING IN STORAGE

(Product in its normal transport and storage container as provided by manufacturer)

| | |
|---|---|
| Temperature: | -20°C to 50°C |
| Humidity: | 10% to 95% |
| Pressure: | 700hPa to 1060hPa |

## ENVIRONMENTAL CONDITIONS FOR PACKAGING IN TRANSPORTATION

(Product in its normal transport and storage container as provided by manufacturer)

Temperature: -40°C to 70°C

Humidity: 10% to 95%

Pressure: 700hPa to 1060hPa

## ELECTRIC RATING

Source voltage: 100-240V AC

Frequency: 50-60Hz

Power input: 70VA

## SAFETY DESIGNATIONS PER IEC 60601-1 STANDARD

- Type of protection against electric shocks: Class I
  The Class I equipment provides means to connect itself to the protective grounding system of utilities to thereby independently provide protection against electric shocks by keeping connectable metal components nonconductive in case of a failure in the basic insulation.
- Degree of protection against electric shocks: B type applied component
  The B type applied component provides the specified degree of protection against electric shocks with regard to the reliability particularly of leak current, patient measuring current and protective utility connection (in case of Class I equipment).
- Degree of protection against harmful intrusion of water (IEC 60529): IPX0
  This product does not provide protection against intrusion of water.
  (The degree of protection against harmful ingress of water defined in IEC 60529 is IPX0)
- Classification by sterilization/disinfection method specified by manufacturer
  This product does not have a component requiring sterilization/disinfection.
- Classification by safety of use in air/flammable anesthetic gas, oxygen or nitrous oxide/flammable anesthetic gas atmosphere
  - Equipment not suited for use in air/flammable anesthetic gas, oxygen or nitrous oxide/flammable anesthetic gas atmosphere
  - This product should be used in an environment free of flammable anesthetic gas and other flammable gases.
- Classification by operation mode
  Continuous operation refers to an operation under normal load conditions, within the specified temperature and without limitations on the operating time.

## DIMENSIONS AND WEIGHT

Dimensions: 317~341mm(W) × 521~538mm(D) × 447~477mm(H)

Weight: 15kg

## OPERATION PRINCIPLE

REF measurement:

The instrument projects a luminous flux to retina and the reflected image is received by a CCD camera, and the spherical refractive power, cylindrical refractive power and the axis of astigmatism that are required for the correction lens for making a patient's eye stigmatism, are determined through computation.

KRT measurement:

The instrument performs measurement of the corneal curvature radius, the corneal refractive power, corneal astigmatic power and corneal astigmatic axis angle through computation, by projecting a kerato-ring to the cornea and receiving the reflected image by a CCD camera from the cornea surface.

Subjective measurement:

This instrument has internal optical system that moves to correct spherical refractive power, cylindrical refractive power and the axis of astigmatism which ware obtained in REF measurement.

The instrument projects a fixation luminous flux to retina from lighting of fixation LED, and subjective spherical refractive power is measured according to a patient's answer. Cylindrical refractive power and axis of astigmatism are used from REF measurement data.

## DISPOSAL

When disposing of the instrument and/or parts, follow local regulations for disposal and recycling.

**NOTE**

This symbol is applicable for EU member countries only.
To avoid potential damage to the environment and possibly human health, this instrument should be disposed of (i) for EU member countries - in accordance with WEEE (Directive on Waste Electrical and Electronic Equipment), or (ii) for all other countries, in accordance with local disposal and recycling laws.

This Product Contains a coin cell.
You cannot replace batteries by yourself. When you need to replace and/or dispose batteries, contact your dealer or TOPCON listed on the back cover.

EU Battery Directive

This symbol is applicable for EU members states only.

Battery users must not dispose of batteries as unsorted general waste, but treat properly.
If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration.
This will be indicated as follows:
Hg: mercury(0.0005%), Cd: cadmium(0.002%), Pb: lead(0.004%)
These ingredients may be seriously hazardous to human and the global environment.

This product contains a CR Lithium Battery which contains Perchlorate Material-special handling may apply.
See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/
Note; This is applicable to California, U.S.A. only

# ELECTROMAGNETIC COMPATIBILITY

**This product conforms to the EMC standard IEC 60601-1-2:2014(Ed.4.0).**

The expected electromagnetic environment for the whole life cycle is home medical treatment environment.

a) MEDICAL ELECTRICAL EQUIPMENT needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.
b) Portable and mobile RF communications equipment can affect MEDICAL ELECTRICAL EQUIPMENT.
c) The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the EQUIPMENT or SYSTEM as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the EQUIPMENT or SYSTEM.
d) The EQUIPMENT or SYSTEM should not be used adjacent to or stacked with other equipment. IF adjacent or stacked use is necessary, the EQUIPMENT or SYSTEM should be observed to verify normal operation in the configuration in which it will be used.
e) The use of the ACCESSORY, transducer or cable with EQUIPMENT and SYSTEMS other than those specified may result in increased EMISSION or decreased IMMUNITY of the EQUIPMENT or SYSTEM.
f) Do not use the devices generating electromagnetic waves within 30cm from all the parts of the instrument and system. Those devices may have influence on this instrument.

| Item | Length (m) | Shield | Ferrite Core |
|---|---|---|---|
| AC Power Cable (AC100/120V) | 1.5 | No | No |
| AC Power Cable (AC230/240V) | 3.0 | No | No |
| AC Power Cable for PC | 1.8 | No | No |
| AC Power Cable for Monitor | 1.8 | No | No |
| USB Cable | 1.5 | Yes | No |
| LAN Cable | 3.0 | Yes | Yes |
| Serial Cable | 3.0 | Yes | No |
| Keyboard Cable | 1.8 | No | No |
| Mouse Cable | 1.8 | No | No |
| RGB Cable | 1.8 | Yes | Yes |
| Barcode Scanner | – | – | – |
| Personal Computer | – | – | – |
| LCD Monitor | – | – | – |
| Keyboard | – | – | – |
| Mouse | – | – | – |

| Guidance and manufacturer's declaration - electromagnetic emissions | | |
|---|---|---|
| The KR-800S is intended for use in the electromagnetic environment specified below.<br>The customer or the user of the KR-800S should assure that it is used in such an environment. | | |
| **Emissions test** | **Compliance** | **Electromagnetic environment - guidance** |
| RF emissions<br>CISPR 11 | Group 1 | The KR-800S 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<br>CISPR 11 | Class B | The KR-800S is suitable for use in all establishments including domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. |
| Harmonic emissions<br>IEC61000-3-2 | Class A | |
| Voltage fluctuations/<br>flicker emissions<br>IEC61000-3-3 | Complies | |

| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|---|---|---|---|
| The KR-800S is intended for use in the electromagnetic environment specified below.<br>The customer or the user of the KR-800S should assure that it is used in such an environment. | | | |
| **Immunity test** | **IEC 60601 test level** | **Compliance level** | **Electromagnetic environment - guidance** |
| Electrostatic discharge (ESD)<br>IEC 61000-4-2 | ± 8 kV contact<br>± 15 kV air | ± 8 kV contact<br>± 15 kV air | Floors 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<br>IEC 61000-4-4 | ± 2 kV for power supply lines<br>± 1 kV for input/output lines<br>Repetition frequency 100kHz | ± 2 kV for power supply lines<br>± 1 kV for input/output lines<br>Repetition frequency 100kHz | Main power quality should be that of a typical commercial or hospital environment. |
| Surge<br>IEC 61000-4-5 | ± 1 kV<br>line(s) to line(s)<br>± 2 kV<br>line(s) to earth | ± 1 kV<br>line(s) to line(s)<br>± 2 kV<br>line(s) to earth | Main power quality should be that of a typical commercial or hospital environment. |
| Voltage dips, short interruptions and Voltage variations on power supply input lines<br>IEC 61000-4-11 | <0% $U_T$<br>for 0.5 cycle<br>(with phase angle 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°)<br>0% $U_T$<br>for 1 cycle<br>0°<br>70% $U_T$<br>for 25/30 cycles<br>0°<br>0% $U_T$<br>for 250/300 cycles | <0% $U_T$<br>for 0.5 cycle<br>(with phase angle 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°)<br>0% $U_T$<br>for 1 cycle<br>0°<br>70% $U_T$<br>for 25/30 cycles<br>0°<br>0% $U_T$<br>for 250/300 cycles | Main power quality should be that of a typical commercial or hospital environment. If the user or the KR-800S requires continued operation during main power interruptions, it is recommended that the KR-800S be powered from an uninterruptible power supply or battery. |
| Power frequency (50/60 Hz) magnetic field<br>IEC 61000-4-8 | 30 A/m | 30 A/m | 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. main voltage prior to application of the test level. | | | |

| Guidance and manufacturer's declaration - electromagnetic immunity | | | |
|---|---|---|---|
| The KR-800S is intended for use in the electromagnetic environment specified below.<br>The customer or the user of the KR-800S should assure that it is used in such an environment. | | | |
| **Immunity test** | **IEC 60601-1-2:2014 test level** | **Compliance level** | **Electromagnetic environment - guidance** |
| Conducted RF<br>IEC 61000-4-6<br><br>Radiated RF<br>IEC 61000-4-3 | 3 Vrms<br>150kHz to 80MHz<br>6Vrms<br>Within ISM band and amateur radio band of<br>150kHz to 80MHz<br>10V/m<br>80MHz to 2.7GHz<br>Proximity electromagnetic field from radio communication equipment [a)] | 3 Vrms<br>150kHz to 80MHz<br>6Vrms<br>Within ISM band and amateur radio band of<br>150kHz to 80MHz<br>10V/m<br>80MHz to 2.7GHz<br>Proximity electromagnetic field from radio communication equipment [a)] | Portable and mobile RF communications equipment should be used no closer to any part of the KR-800S, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.<br><br>Recommended separation distance<br>$d = \frac{6}{E}\sqrt{P}$<br><br>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, d is the recommended separation distance in meters (m), and E is the radiation electromagnetic field level in volt/meter (V/m). |
| NOTE | These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people. | | |

a) The table below shows the proximity electromagnetic field from radio communication equipment.

| Test frequency [MHz] | Band [MHz] | Equipment | Modulation | Maximum output (W) | Distance (m) | Immunity test value [V/m] |
|---|---|---|---|---|---|---|
| 385 | 380-390 | TETRA 400 | Pulse modulation 18Hz | 1.8 | 0.3 | 27 |
| 450 | 430-470 | GMRS 460<br>FRS 460 | FM ±5kHz<br>1kHz sine | 2 | 0.3 | 28 |
| 710 | 704-787 | LTE Band 13, 17 | Pulse modulation 217Hz | 0.2 | 0.3 | 9 |
| 745 | | | | | | |
| 780 | | | | | | |
| 810 | 800-960 | GSM 800/900<br>TETRA 800<br>iDEN820<br>CDMA850<br>LTE Band 5 | Pulse modulation 18Hz | 2 | 0.3 | 28 |
| 870 | | | | | | |
| 930 | | | | | | |
| 1720 | 1700-1990 | GSM 1800<br>CDMA1900<br>GSM 1900<br>DECT<br>LTE Band 1,3,4,25<br>UMTS | Pulse modulation 217Hz | 2 | 0.3 | 28 |
| 1845 | | | | | | |
| 1970 | | | | | | |
| 2450 | 2400-2570 | Bluetooth<br>WLAN 802.11 b/g/n<br>RFID 2450<br>LTE Band7 | Pulse modulation 217Hz | 2 | 0.3 | 28 |
| 5240 | 5100-5800 | WLAN 802.11 a/n | Pulse modulation 217Hz | 0.2 | 0.3 | 9 |
| 5500 | | | | | | |
| 5785 | | | | | | |

## REQUIREMENTS FOR THE EXTERNAL DEVICE

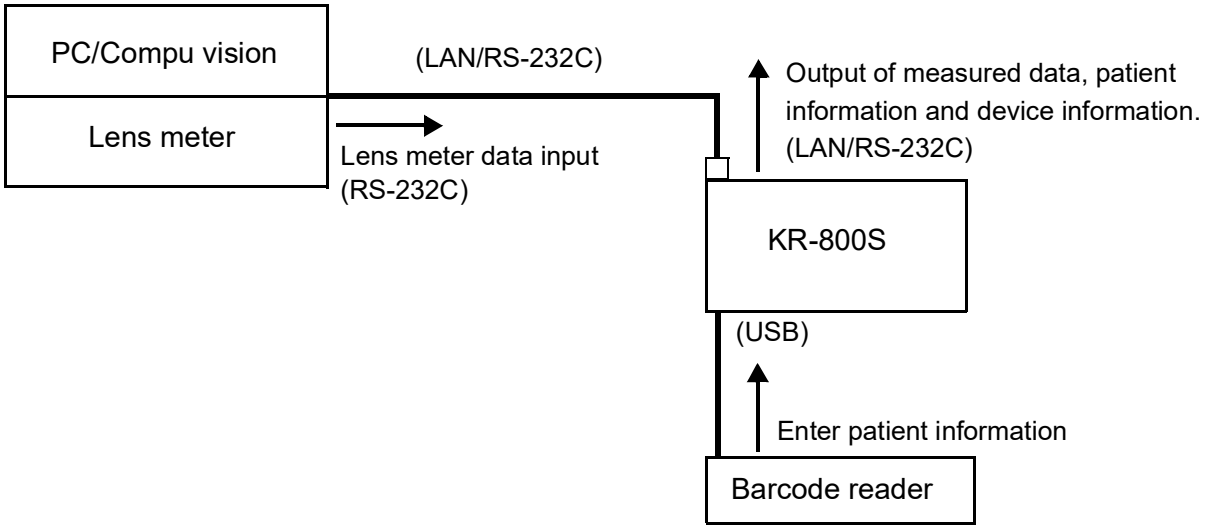
The external device connected to the analog and digital interfaces must comply with the respective IEC or ISO standards (e.g. IEC 62368-1 for data processing equipment and IEC 60601-1 for medical equipment).

Anybody connecting additional equipment to medical electrical equipment configures a medical system and is therefore responsible that the system complies with the requirements for medical electrical systems. Attention is drawn to the fact that local laws take priority over the above mentioned requirements. If in doubt, contact your dealer or TOPCON (see the back cover).

## IT NETWORK ENVIRONMENT

| | |
|---|---|
| ⚠ **CAUTION** | When connected with an IT network, ensure the appropriate and sufficient security to prevent the infection with malware and a computer virus, the leak of information, etc.<br>[There is a risk of data leakage] |

- KR-800S can be connected to a lens meter, personal computer, or comp vision for data input of the lens meter and measurement data output. And the unit can be controlled via the network, and patient information and device information can be output with using PC.
- Refer to the figure below for the characteristics, configuration, technical specification, intended information flow and route when connected with an IT network.
- When connected with an IT network, ensure the appropriate and sufficient security to prevent the infection with a computer virus, the leak of information, etc.
- When any failure occurs in IT systems, some troubles may be caused by it.
  - Poor connection (USB) may cause a failure of software update.There is a risk that the device cannot be used if update is failed.
  - Poor connection (LAN/RS-232C) may cause a failure of output of measured data, patient information and device information.There is a risk of data loss.
  - Poor connection (USB) may cause a failure of input of patient information with barcode reader.There is a risk that an examination with wrong patient information is done.
- When connected with an IT network with which a device other than KR-800S is connected, the patient, the operator or the third party may suffer unexpected and unacceptable risks. Before using KR-800S, it is recommended to identify, analyze, evaluate and manage these risks.
- When the IT network has been changed after the connection, a new risk may occur. So an additional analysis is necessary.
- The change of IT network includes the following items:
  - Change in the IT network configuration;
  - Connection of additional items to IT network;
  - Removal of items from IT network;
  - Update of the device connected with IT network;
  - Upgrade of the device connected with IT network.

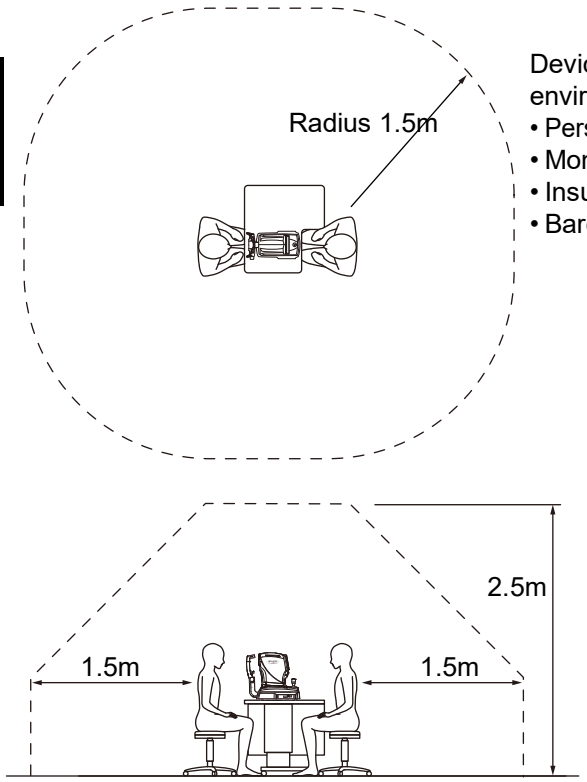


## PATIENT'S ENVIRONMENT

When the patient or inspector may touch the devices (including the connecting devices) or when the patient or inspector may touch the person that comes into contact with the devices (including the connecting devices), the patient's environment is shown below.

In the patient's environment, use the device conforming to IEC60601-1. If you are compelled to use any device not conforming to IEC60601-1, use an insulation transformer.

Do not use the power strip in the patient's environment. Connect the power supply of the device to the commercial power supply.




Devices applicable to the patient's environment
- Personal computer(Note1)(Note 2)
- Monitor display for PC(Note 1)
- Insulation transformer(Note 3)
- Barcode reader (Note 1)

Note 1: Use the personal computer conforming to IEC 62368-1.

Note 2: Do not remove the cover from the personal computer.

Note 3: Use the insulation transformer conforming to IEC 60601-1.

| | |
|---|---|
| **⚠ WARNING** | Connect only items that have been specified as part of the ME system or that have been specified as being compatible with the ME system. |
| **⚠ CAUTION** | • Do not connect an additional power strip or an extension cord to the system.<br>• The total 1kVA is the maximum allowable load of the auxiliary power supply socket for the insulation transformer, which is provided for the system. Do not connect the device exceeding this capacity.<br>• Use the auxiliary power supply socket of the insulation transformer to power only a device that will be a component of the system.<br>• It is dangerous to connect any device which is not used as a component of the system, to the insulation transformer.<br>• When the insulation transformer is not used, the personal computer and the monitor for the personal computer must be installed out of the patient's environment. |

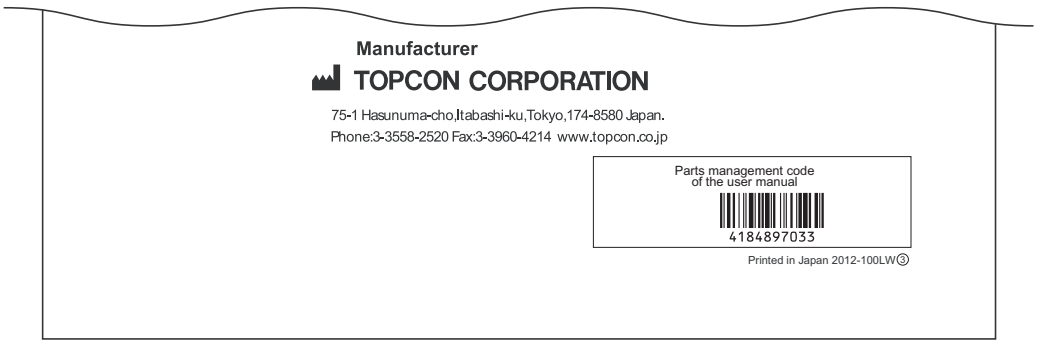
# REFERENCE

## SHAPE OF PLUG

| Country | Voltage/frequency | Shape of plug |
|---|---|---|
| Mexico | 110V/50Hz | Type C&E |
| Argentina | 220V/60Hz | Type A |
| Peru | 220V/60Hz | Type A |
| Venezuela | 110V/50Hz | Type C&E |
| Bolivia & Paraguay | 220V/60Hz | Type A (Most common)<br>Type H (Infrequently) |
| Chile | 220V/60Hz | Type A |
| Colombia | 110V/50Hz | Type C |
| Brazil | 220V/60Hz<br>127V/60Hz | Type A<br>Type C |
| Ecuador | 110V/50Hz | Type C&E |
| United States | 120V/60Hz | Type A (Hospital Grade) |
| Canada | 120V/60Hz | Type A (Hospital Grade) |

## ABOUT THE BARCODE AND THE QR CODE OF THE USER MANUAL BACK COVER

The barcode and the QR code of the user manual back cover indicates the parts management code of the user manual.



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Please specify the following when contacting us regarding questions about this operation microscope.

- Model name: KR-800S
- Serial No.: Marked on the rating nameplate.
- Period of use: Please inform us of the date of purchase.
- Defective condition: Please provide us with as much detail as possible.

AUTO KERATO-REFRACTOMETER KR-800S

USER MANUAL
Revision 4
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# AUTO KERATO-REFRACTOMETER

# KR-800S


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