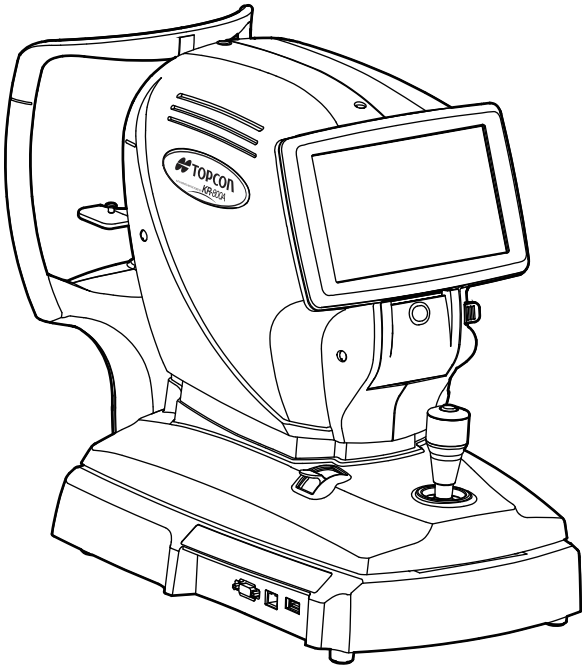
TOPCON



USER MANUAL

AUTO KERATO-REFRACTOMETER
KR-800A

INTRODUCTION

Thank you for purchasing the Auto Kerato-Refractometer KR-800A.

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.

FEATURES

This instrument features the following:

- The auto alignment function facilitates to get fine alignment and to start measurement automatically.
- This instrument is simple to operate and measures the refraction and corneal curvature of the eye.

PURPOSE OF THIS MANUAL

This User Manual provides an overview of the basic operation, troubleshooting, checking, maintenance and cleaning of the TOPCON Auto Kerato-Refractometer KR-800A.
To get the safety use of the instrument, read "DISPLAYS AND SYMBOLS FOR SAFE USE" and "GENERAL SAFETY INFORMATION".
Keep this Manual at hand for future reference.

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

CE
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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 subject to change without prior notice and without legal obligation.
3. 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.
4. Original Instructions
   This manual was originally written in English.

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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	IEC/ISO Publication	Description	Description (French)
	IEC 60417-5032	Alternating Current	Courant alternatif
	IEC 60417-5008	Off (power: disconnection from the main power supply)	Éteint (courant: coupure avec le secteur)
	IEC 60417-5007	On (power: connection to the main power supply)	Allumé (courant: raccordement sur le secteur)
	IEC 60878-02-02	Type B applied part	Partie appliquée du Type B
	ISO 7010-W001	General warning sign	Symbole d'avertissement général
	ISO 7010-M002	Refer to instruction manual/ booklet	Voir le manuel/la brochure
	ISO 7000-2497	Date of manufacture	Date de fabrication
	ISO 7000-2498	Serial number	Numéro de série
	ISO 7000-3082	Manufacturer	Fabricant
	ISO 15223-1	Authorised Representative in the European Community	Représentant autorité pour l'Union européenne

GENERAL SAFETY INFORMATION

⚠ WARNING

Ensuring the Safety of Patients and Operators
When operating the instrument, do not touch the patient's eye or nose.
Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause birth detects or other reproductive harm. Wash hands after handling.

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.

⚠ CAUTION

Important caution
The following patients need extra attention. • Patients with infectious disease such as Keratoconjunctivitis Epidemica

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.
To avoid injury when operating the up/down button for chinrest, be careful not to catch the patient's fingers.
To avoid injury when operating the measuring head up or down, be careful not to catch the patient's/operator's fingers.

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

Electromagnetic Compatibility (EMC)
This instrument has been tested (with 100/120/230V) and found to comply with IEC60601-1-2:Ed.3.0:2007. 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 9 before using the machine.
Regarding connection to various devices, see "CONNECTING EXTERNAL I/O TERMINALS" on page 19.
If you would like an overview of the system, begin by reading "BASIC OPERATIONS" (page 22).
For setting various functions, see "SETTING FUNCTIONS ON SETUP SCREEN" on page 44.

GENERAL MAINTENANCE INFORMATION

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

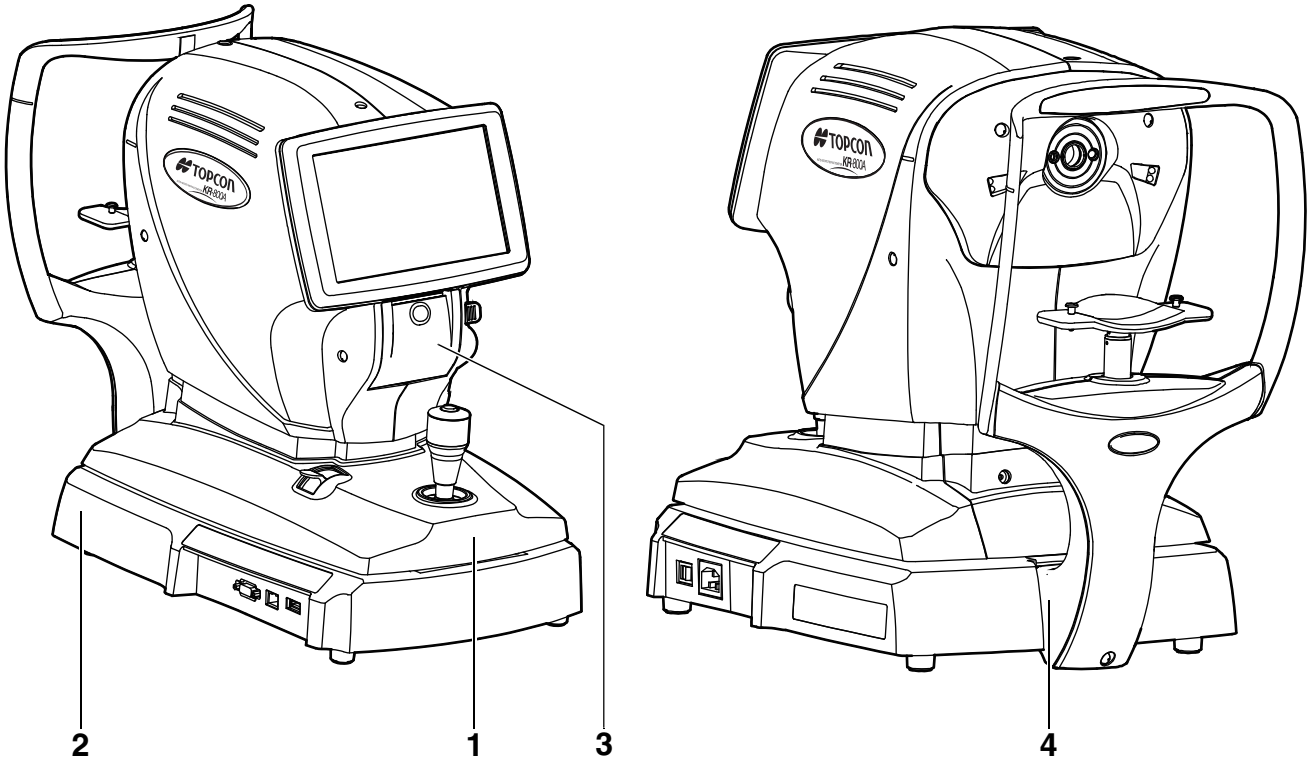
For details, See "CLEANING THE MEASURING WINDOW" on page 56.

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.
- 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.

POSITIONS OF WARNING AND CAUTION INDICATIONS

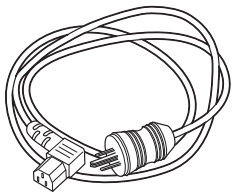
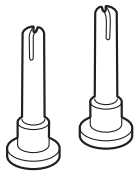
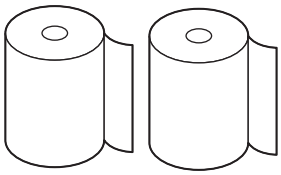
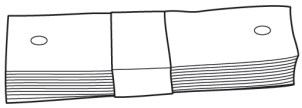
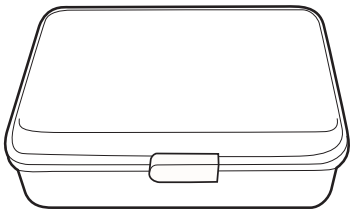
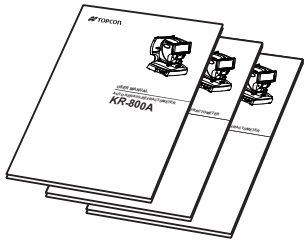
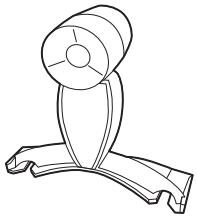
To secure safety, this equipment provides warnings.
Correctly use the equipment following these warning instructions. If any of the following marking labels are missing, please contact your dealer or TOPCON at the address stated on the back cover.



No.	Label	Meaning	Signification
1		**WARNING** Be careful not to hit the patient's eyes or nose with the instrument during operation.	**MISE EN GARDE** Prendre garde de ne pas frapper les yeux ou le nez du patient avec l'instrument pendant l'opération.
2		**CAUTION** To avoid injury caused by electric shock, do not open the cover. Ask your dealer for service.	**PRÉCAUTION** Ne pas ouvrir le couvercle pour éviter les blessures causées par un choc électrique. Demander au revendeur d'effectuer le service
3		**CAUTION** 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.	**PRÉCAUTION** Faites très attention à ne pas toucher le corps interne de l'imprimante lorsque le couvercle est ouvert. 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

STANDARD ACCESSORIES

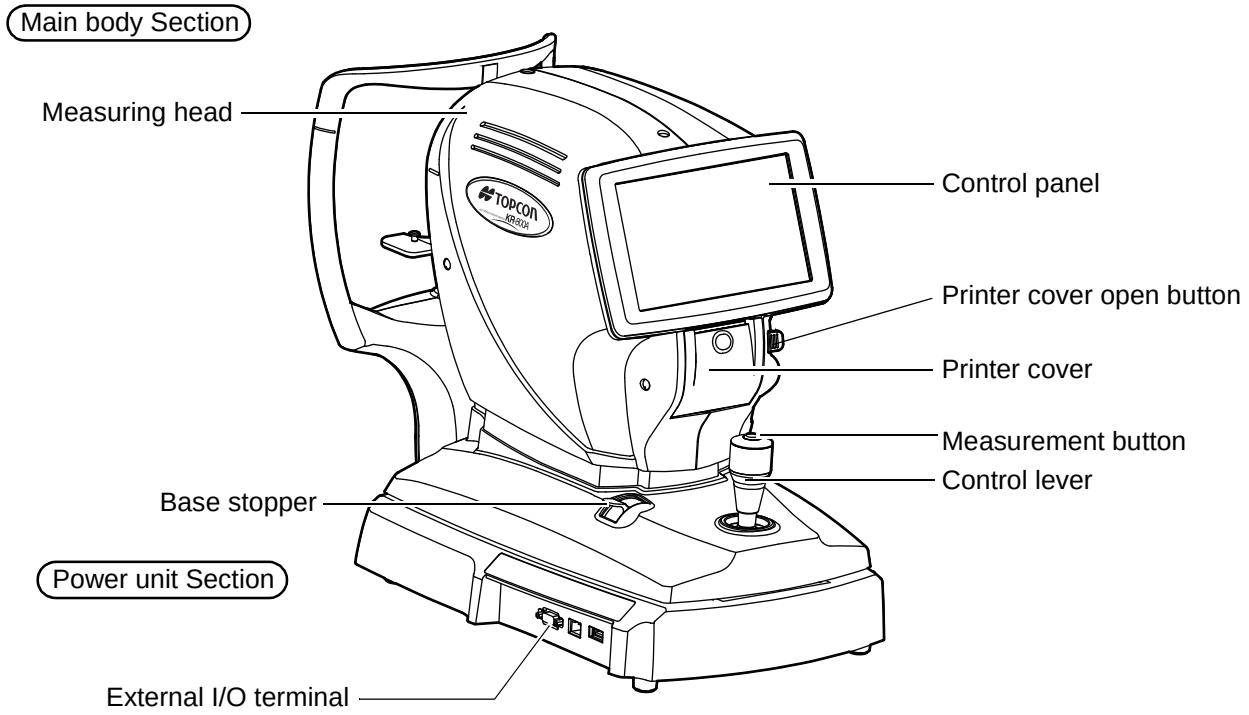
The following are standard accessories. Make sure that all these items are included (quantity).

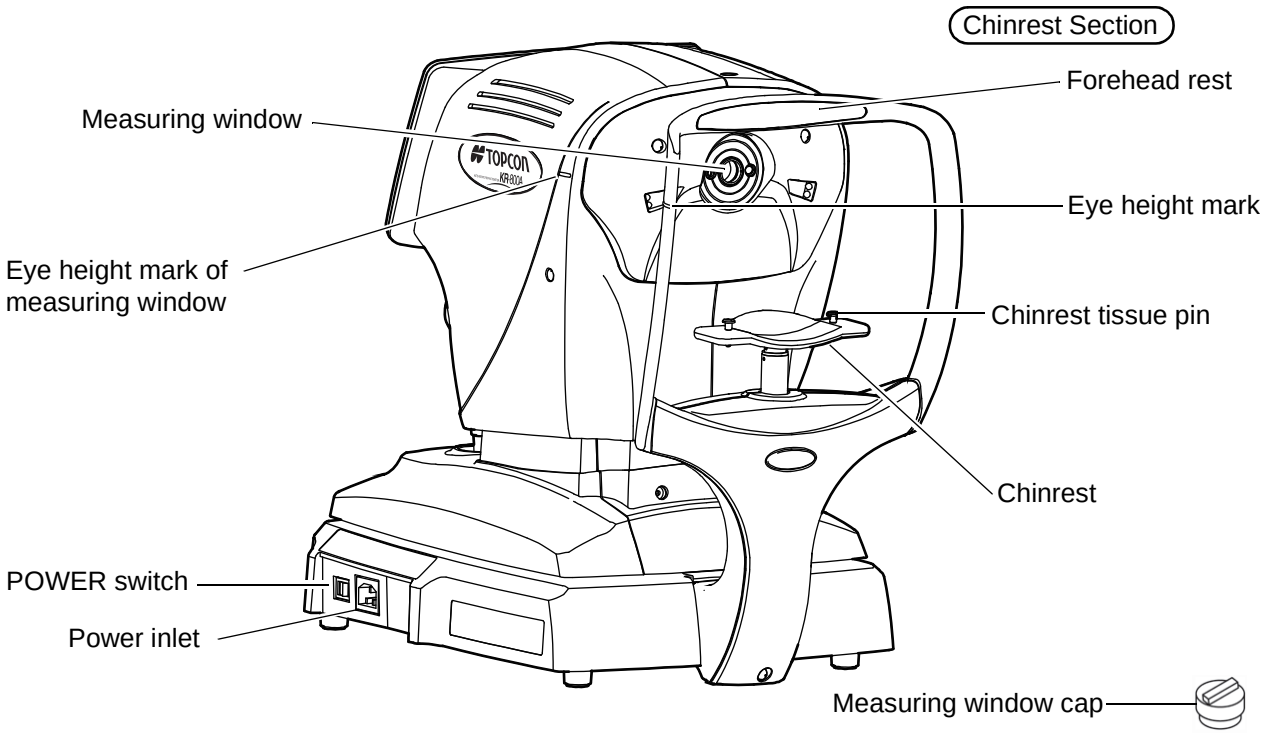
Power cable (1)* 	Chinrest tissue pin (2) 
Printer paper (2) 	Monitor cleaner (1) 
Chinrest tissue (1) 	Dust cover (1) 
Accessory case (1) 	User manual, Instruction manual, Unpacking and Assembling (1 each) 
Measuring window cap (1) 	Model eye (1) 

* More than one power cable can be included on certain occasions.

COMPONENTS

COMPONENT NAMES





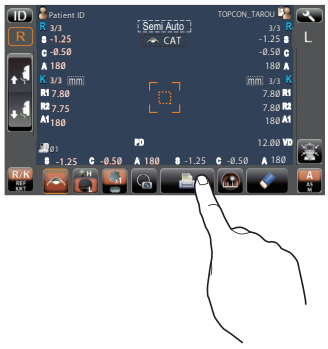
COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber
Chinrest : Acrylonitrile butadiene styrene resin

OPERATION METHOD OF CONTROL PANEL

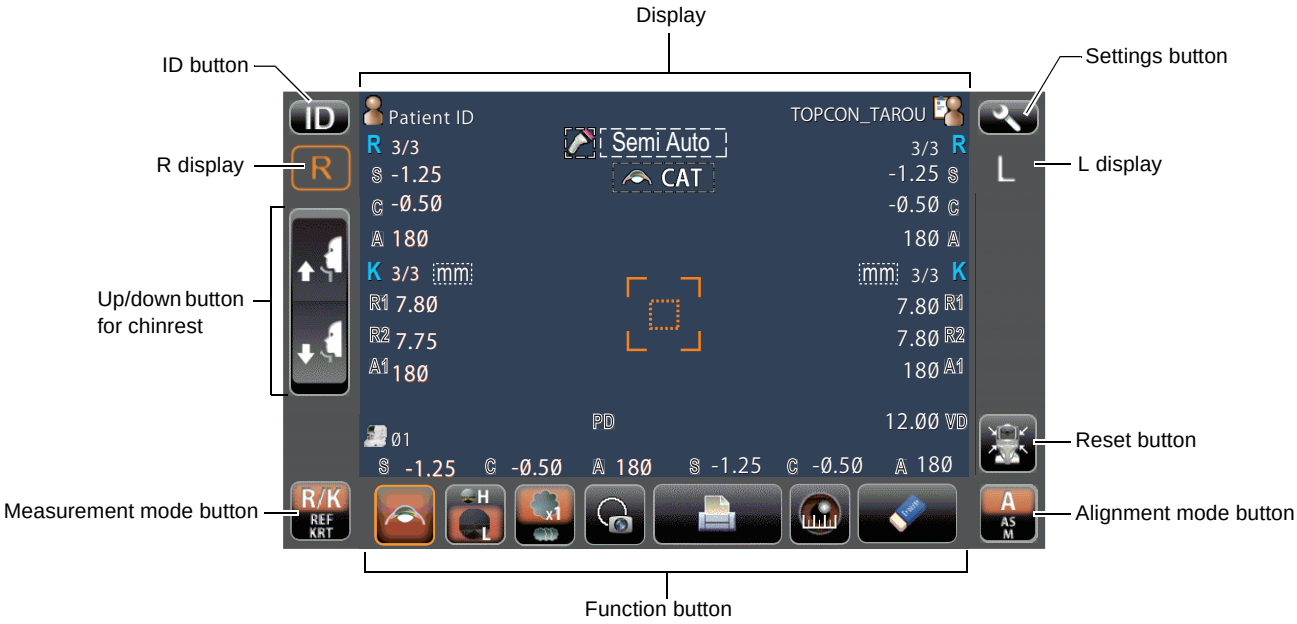
NOTE	• The control panel is a touch panel. Do not use any sharp tools; e.g. ball point pen. • Do not touch two points on a control panel simultaneously. • If machine is moved by tapping the control panel during measurement, it might cause an incorrect measurement.

Tap → Touch the control panel softly with a finger.



CONTROL PANEL COMPONENTS

The control panel is designed for performing various operations and settings by touching on the screen. It displays images and shows information, including set conditions and measurement results.



ID 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.

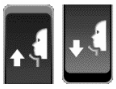
R/K REF KRT Measurement mode button ..... Selects a measurement mode from REF, KRT and R/K.

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.

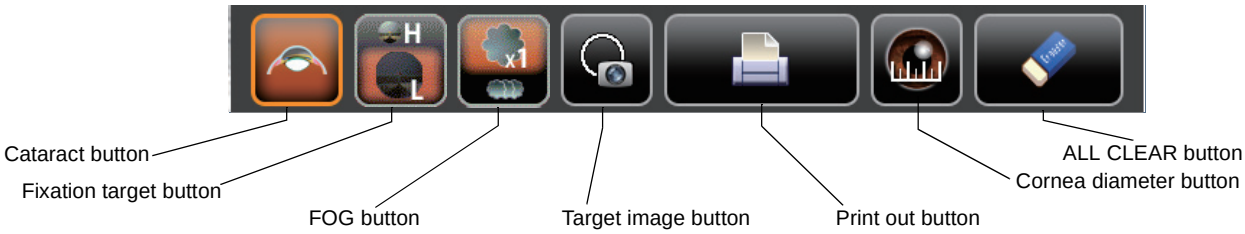
 Reset button.....Returns the measurement head (the side and the depth direction) to an initial position.

 Alignment mode button .....Switches alignment (measurement position adjustment) mode.
"A" Semi-auto mode: If approaching the automatic measuring range, fine alignment and measurement are performed automatically.
"AS Auto shoot mode: If reaching the measurable range, the measurement starts automatically.
"M" Manual mode: All processes are performed manually from alignment to measurement.

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

 Up/down button for chinrest .....Moves the chinrest up/down.

FUNCTION BUTTON



 Cataract button.....If normal measurement is not performed due to a cataract, tapping this button to be the cataract mode may improve measurements. In the cataract mode, "CAT" is displayed on the control panel and the 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.

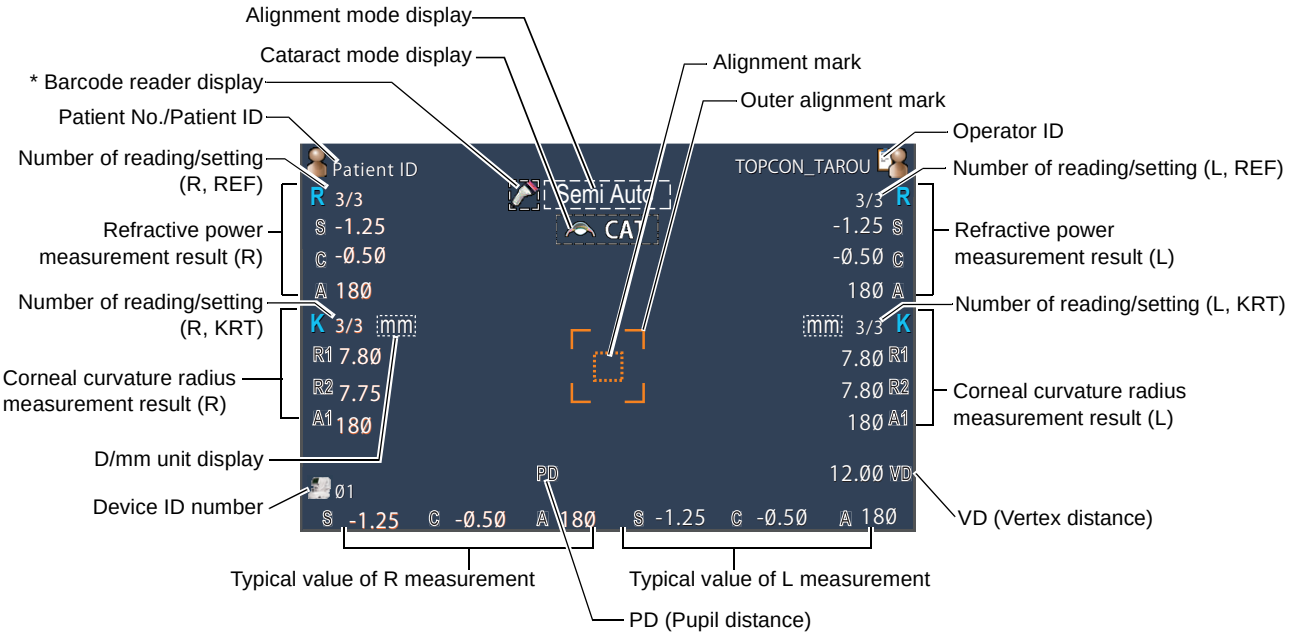
 Print out button .....Prints measurement results. Tap the button when no measurement data is present to feed the paper.
By setting the printer mode to Graphic Printer on the Settings screen, figures showing refractive conditions can be printed.
In this case, the printer button changes to  .

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

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

MONITOR SCREEN

MEASUREMENT SCREEN

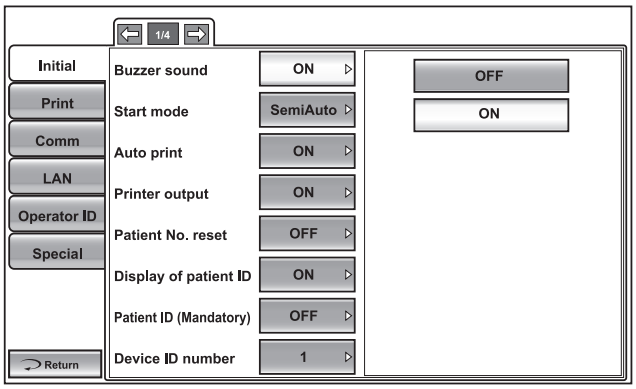


* Displayed when the barcode reader is connected.

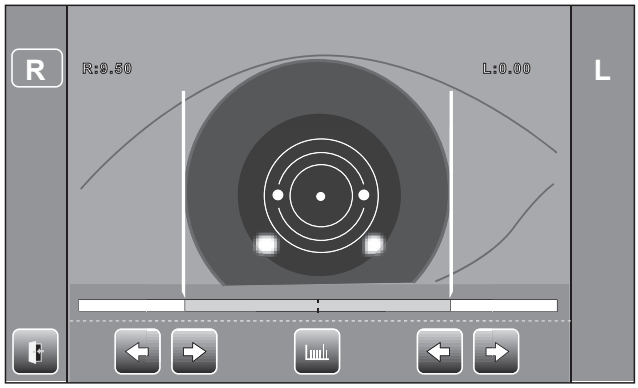
: Barcode reader is in readable.

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

SETTINGS SCREEN

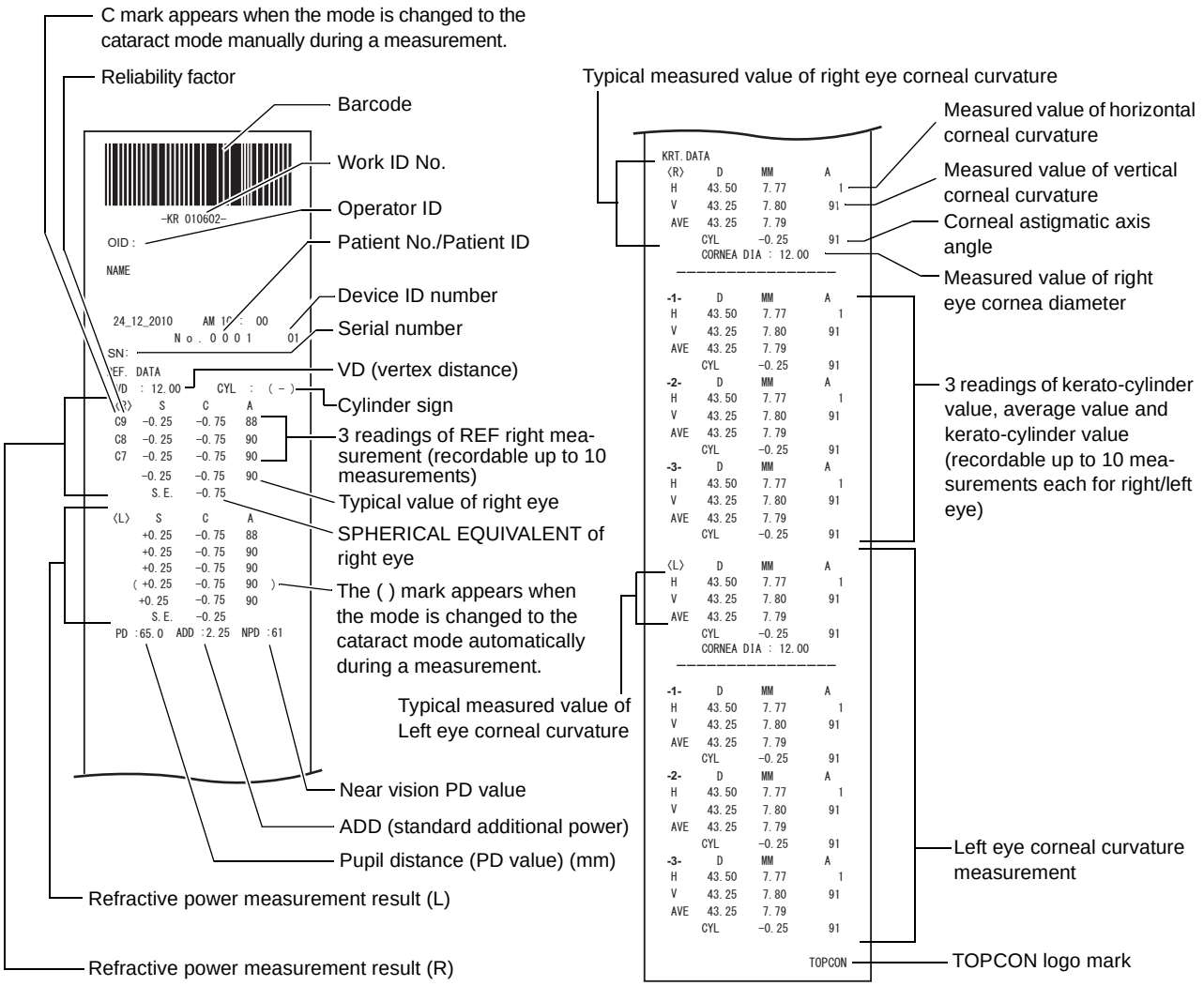


CORNEA DIAMETER MEASUREMENT SCREEN



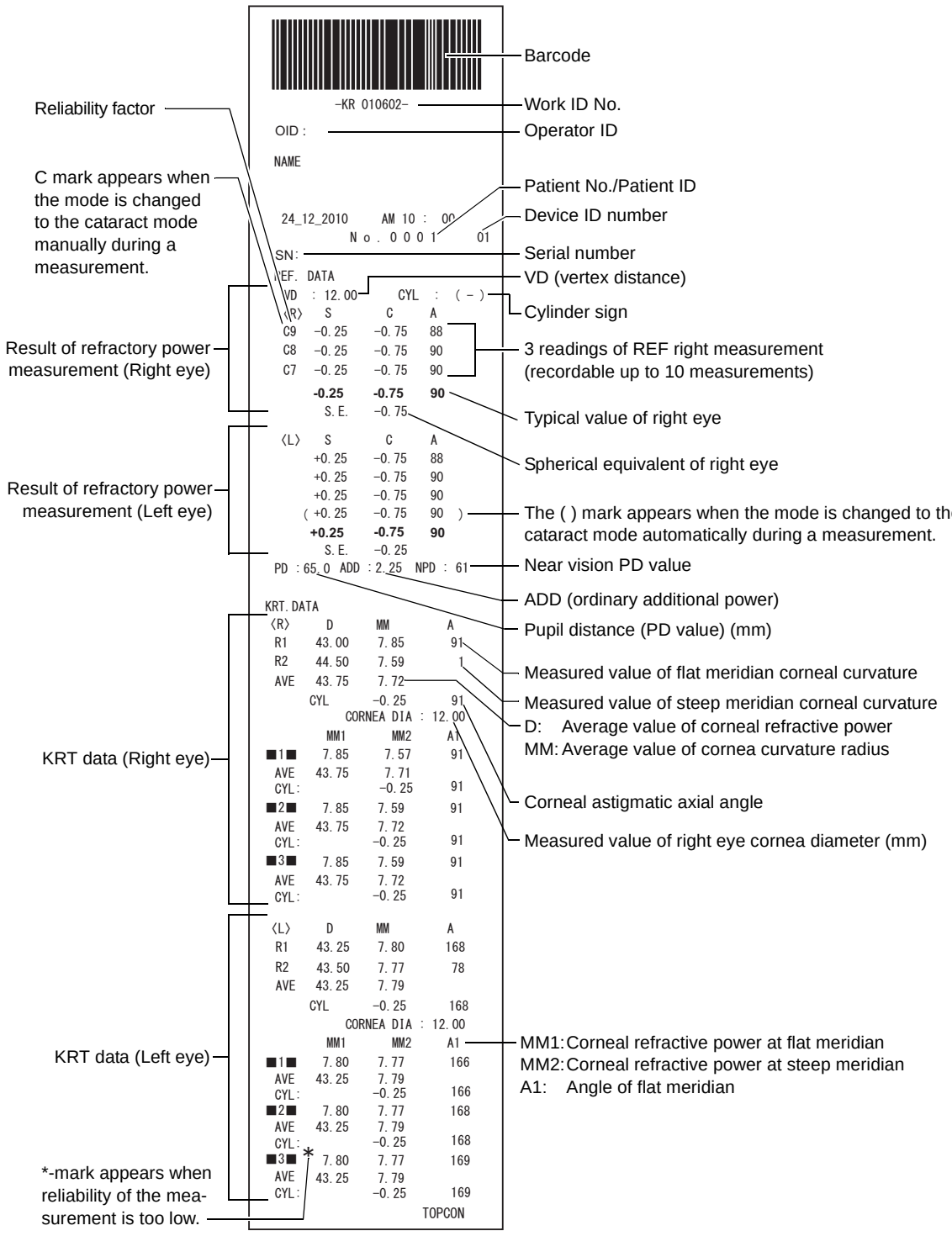
PRINTER OUTPUT

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. Additionally, if the reliability is high enough, the reliability factor is not shown on the printout. • The Near PD value is calculated based on the ADD. • C mark appears when the [Cataract] button is selected by manual operation. Adding the C mark occurs only for REF measurement values. • ( ) mark appears when it is changed to the cataract mode automatically so that normal measurement is not performed due to a cataract and the like. Adding the ( ) mark occurs only for REF measurement values.

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. Additionally, if the reliability is high enough, the reliability factor is not shown on the printout.
- The Near PD value is calculated based on the ADD.
- C mark appears when the [Cataract] button is selected by manual operation. Adding the C mark occurs only for REF measurement values.
- ( ) mark appears when it is changed to the cataract mode automatically so that normal measurement is not performed due to a cataract and the like. Adding the ( ) mark occurs only for REF measurement values.
- *-mark appears when reliability of the measurement is too low. Adding the *-mark occurs only for KRT measurement values.

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 44.

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

	ITEM	INITIAL	PRESET		
			All	Ave	Classic*1
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	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
REF/KRT*1	Print Layout	DATA	DATA	DATA	DATA
	VD	ON	ON	ON	ON
	Cylinder sign	ON	ON	ON	ON
	Print form of REF result	ALL	ALL	AVE	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	AVE	AVE
	KRT ave. -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	AVE	ALL
	Reliability	OFF	OFF	OFF	OFF
	S.E.	ON	ON	ON	ON
	PD	ON	ON	ON	ON
	ADD	OFF	OFF	OFF	OFF
KRT*1	KRT print layout	D/mm	D/mm	D/mm	D/mm
	Print form of KRT result	ALL	ALL	AVE	ALL
	KRT ave. -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

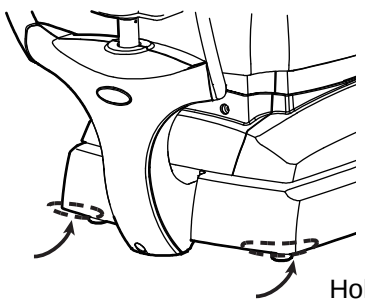
*: Depending on the destination, preset values differ.

PREPARATIONS

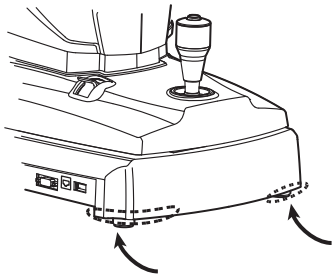
INSTALLATION

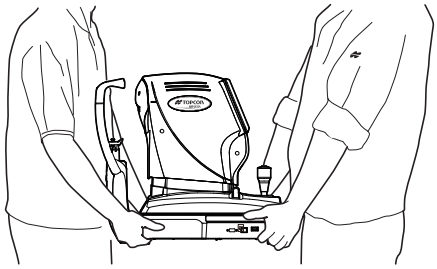
⚠ CAUTION	• When moving the instrument, two people should lift from the bottom of the device. One person lifting the device may cause harm to his back or injury by falling parts. • When holding the bottom of the instrument, avoid touching a projection of screws to prevent injuries. • To prevent damage and injuries, do not hold the part of anything but bottom. If you hold, it may cause to catch the finger or to damage the instrument by falling. • To prevent damage and injuries, do not install the instrument on an uneven, unsteady or sloped surface. • When setting an instrument on an instrument table, pay attention not to injury the patient's fingers between the instrument and the table.

1 Firmly hold the instrument at the position shown below and place it on the automatic instrument table. For the adjustable instrument table, see "OPTIONAL ACCESSORIES" on page 75.



Holding positions





Holding the instrument

CONNECTING POWER CABLE

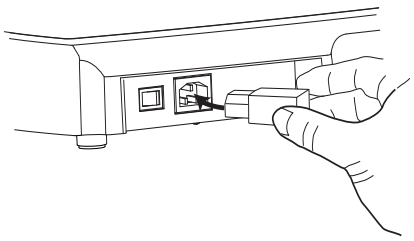
⚠ WARNING	Be sure to connect the power plug to an AC 3-pin receptacle equipped with grounding. Connection with receptacle without grounding may cause fire and electric shock in case of short-circuiting.

⚠ CAUTION	• To avoid electric shocks, do not handle the power plug with wet fingers. • The power cable in standard accessories for this instrument cannot use besides this instrument.

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.

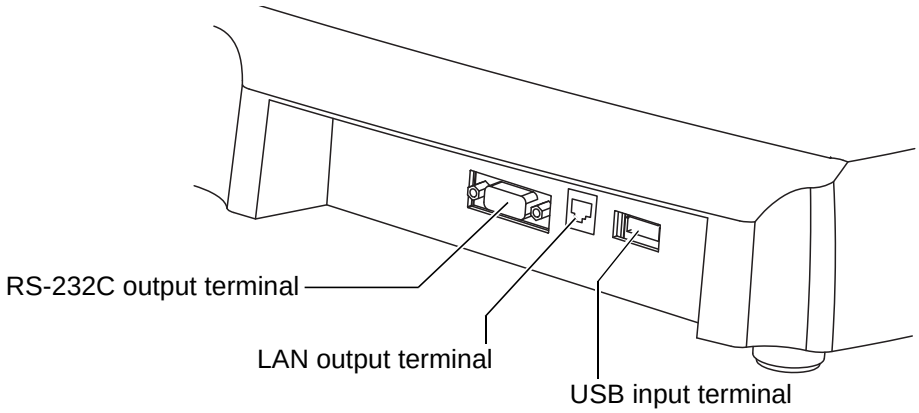
NOTE	When connecting this product with a commercial personal computer, use one conforming to IEC60950-1, with a separation unit.

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 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.

This product can be connected to a barcode reader and other external devices via USB.

1 Connect the connection cable to the input terminal of the instrument.

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

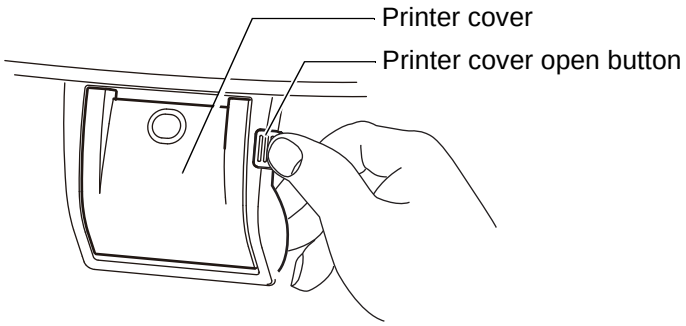
NOTE	For questions about connections, contact your TOPCON dealer.

PRINTER PAPER SETTING

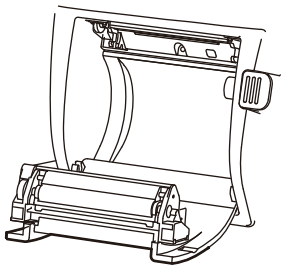
⚠ CAUTION	• When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer cover open button is pressed. • To avoid failure or potential injury, do not open the printer cover while the printer is in operation. • To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it. • 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. • 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 switch. Unexpected movement is avoided when the printer cover OPEN button is pressed.

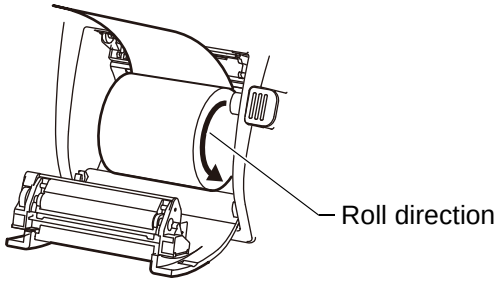
1 Press the printer cover open button to open the printer cover.



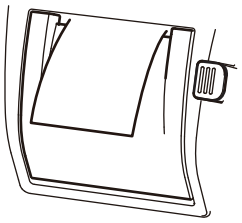
2 Open the printer cover to the limit.



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. • In case the printer cover is not firmly closed, printing will not start, and "CLOSE PRT COVER" will be displayed on the monitor screen. • A 58mm wide paper roll (example: TP-50KJ-R [Nippon Paper Co.]) is recommended. 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, operate the control lever or move the base to the left or the right.
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 48).

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 18.

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.

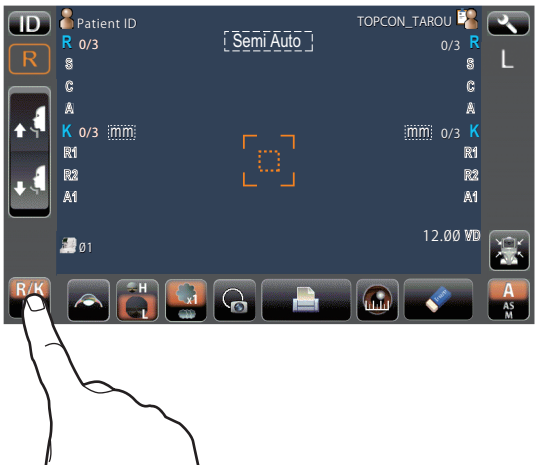
SELECTING THE MEASUREMENT MODE

This product has three measurement modes: R/K (REF/KRT continuous measurement), KRT (KRT single measurement) and REF (REF 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.

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



PATIENT POSITIONING

⚠ CAUTION	• To avoid electric shock, do not touch the external connection terminal and the patient at the same time. • 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. • 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 or operator. Tell this to the patient, too. • To avoid injury by raising, falling or dropping the instrument, do not apply the strong power downward on the chinrest. • 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 56.

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 Check the measurement screen.

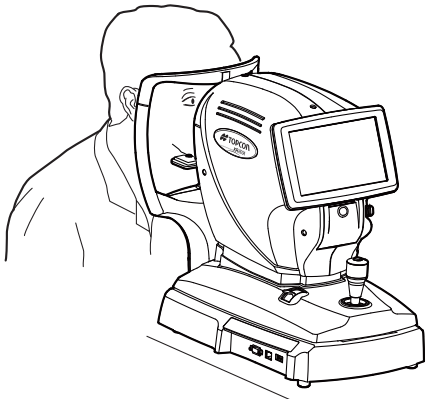
2 Take off a chinrest tissue on the chinrest. If the tissue has run out, please supply new chinrest tissues.

3 Wipe the dirt form forehead rest.

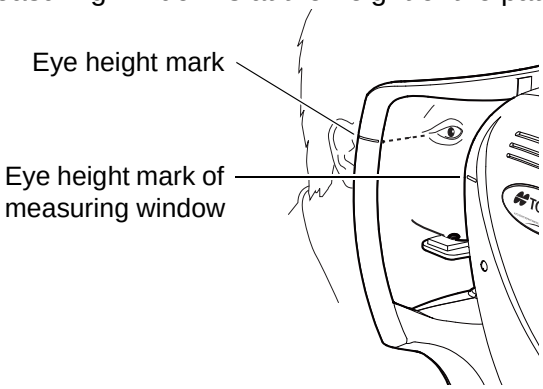
4 Have the patient sit in front of the instrument.

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

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



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



MEASUREMENT IN SEMI-AUTO MODE

If approaching the automatic measuring range, fine alignment and measurement are performed automatically in Semi-auto mode.

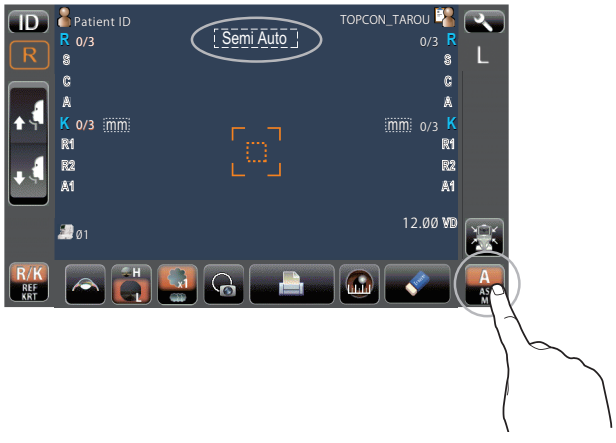
CAUTION	When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument as specified in "CLEANING THE MEASURING WINDOW" on page 56.

NOTE	• Semi-auto mode measurement may not be possible, in case the eyelid and the eyelashes cover the pupil. 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. • Semi-auto mode measurement may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused corneal disease etc. In this case, measure in manual mode.

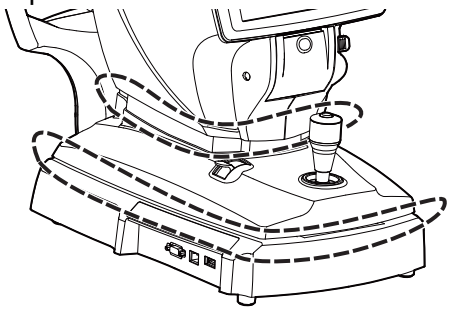
SETTING THE SEMI-AUTO MODE

1 If the large sign "A" is displayed in the Alignment mode button with orange background, it is in Semi-Auto mode.

2 If the large sign "A" is not displayed in the Alignment mode button with orange background, it is in other mode. Tap the button to change to Semi-auto mode.

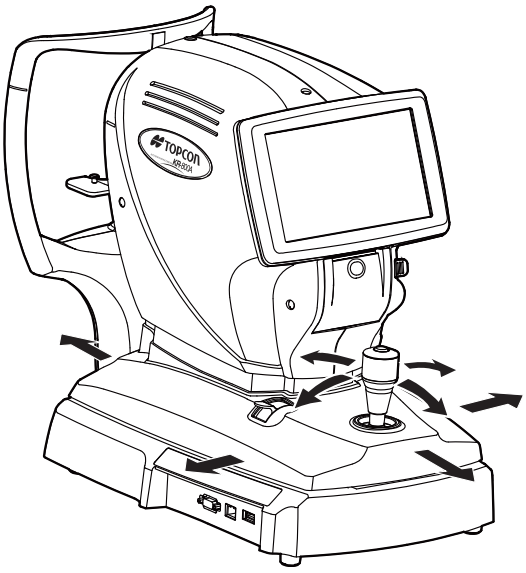


ALIGNMENT AND MEASUREMENT

⚠ **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. 

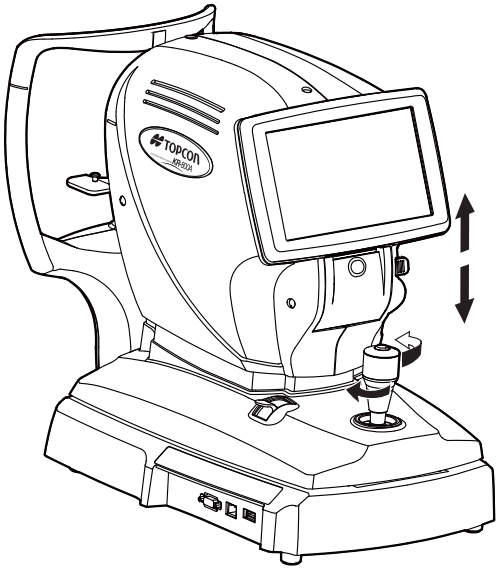
Alignment operations are done with the control lever.

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



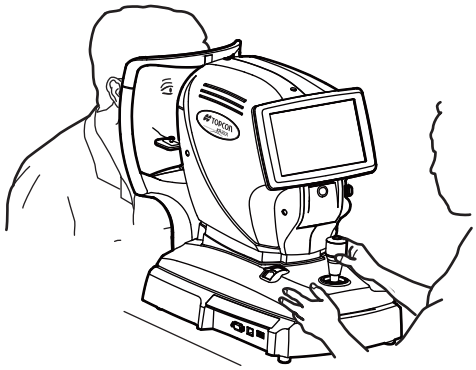
Operating the control lever (for front, back, right and left adjustment)

- 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)

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.

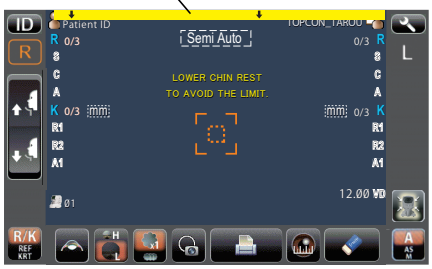
4 Fine-adjust the main body position in all directions so that the alignment dot point comes within the alignment mark.

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

NOTE	Do not allow the eyelash and eyelid to cover outer alignment mark to ensure stable measurement.

- If the machine is too close to the patient's eye in comparison with the optimal alignment position, outward Z alignment arrows appear in magenta (red purple) color, or it is too far the inward arrows appear in cyan (blue) color.

6 Move the measuring head to the direction of the arrows indicated by operating the control lever. The automatic alignment starts.

NOTE	When the measuring head has reached the limit of movement (vertical/ lateral directions), a yellow-colored limit mark appears on the control panel corner, showing it is the movement limit in that direction and the message of "MOVE *** TO AVOID LIMIT." displayed. Move the measuring head or the chinrest to a position that aligning is possible. Limit mark  In the limit of depth direction, only the message "MOVE FORWARD (BACKWARD) TO AVOID THE LIMIT." is displayed.

NOTE

Eyelid function: The more stable measured value can be obtained by using this function.
When an eyelid and eyelashes cover the patient's pupil, the beep sound comes and the message of "Check eyelid." is displayed by the eyelid function. Measurement operation is not performed while the message is displayed. If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid with care not to push the patient's eye.

- The eyelid function can be selected to ON or OFF. (See page 49)
- Even if the eyelid is not lifted within the set time, automatic measurement starts forcibly in the present condition. The set time (Eyelid Force Meas. time) can be changed. (See page 49)

7 If automatic alignment starts, the measuring head moves automatically. Alignment and the measurement for the set measurement count are performed automatically.
The measurement value is displayed on the monitor screen.

8 After one eye measuring is finished, pull the control lever forward once, and then slide to the crosswise direction to switch the measured eye. Repeat the same procedure to measure the other eye of the patient in sequence.

NOTE

- If Semi-Auto mode measurement does not work, select manual mode. Auto Shoot mode measurement may not work depending on the cornea condition
- Under Semi-auto mode, it is possible to switch to Manual mode by pushing the Measurement button.
- If the machine is moved before measurement values are displayed, it might cause an incorrect measurement.
- Auto print (available only under Semi-Auto mode and Auto shoot mode)
  When the "Auto print" is set to "ON" in the initial setting, measurement results are printed out automatically after measuring the right and left eyes. When the "Auto print" is set to "OFF" in the initial setting, measurement results are printed out by tapping the print button, if required.

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 58.

MEASUREMENT IN AUTO SHOOT MODE

In Auto shoot mode the process to fine alignment is performed manually, and the measurement starts automatically if reaching the measurable range.

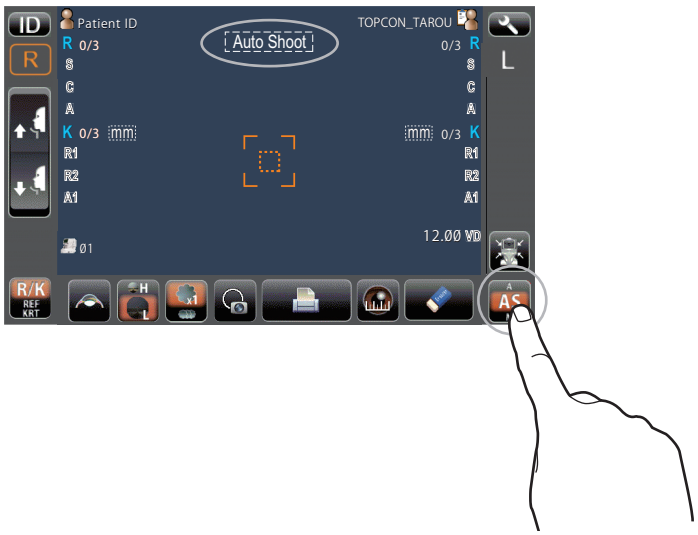
CAUTION	When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument as specified in "CLEANING THE MEASURING WINDOW" on page 56.

NOTE	• Auto Shoot mode measurement may not be possible, in case the eyelid and the eyelashes cover the pupil. 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. • Auto Shoot mode measurement may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused corneal disease etc. In this case, select manual mode. • Under Auto shoot mode, it is possible to switch to Manual mode by pushing the Measurement button.

SETTING THE AUTO SHOOT MODE

1 If the large sign "AS" is displayed in the [Alignment mode] button with orange background, it is in Auto shoot mode.

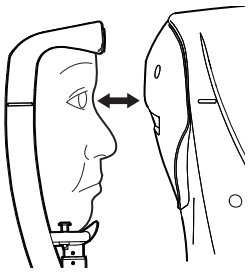
2 If the large sign "AS" is not displayed in the [Alignment mode] button with orange background, it is in other mode. Tap the button to change to Auto shoot mode.



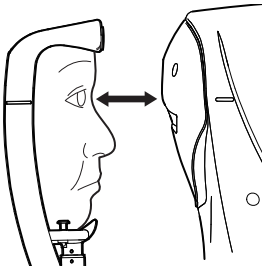
ALIGNMENT AND MEASUREMENT

1 Align as same manners for ***5*** at "ALIGNMENT AND MEASUREMENT" (page 25) in Semi-auto mode, until the Z alignment arrows appear.

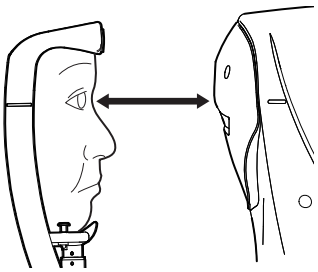
2 Move the measuring head to the direction of the arrows indicated by operating the control lever. The number of arrows is reduced accordingly as the measuring range comes closer.



Too close



Too far



Positioning is incorrect at all.

3 When reaching the measurable range, the measurement is carried out automatically at the position which the alignment mark turns green. The measurement value is displayed on the control panel.

4 After one eye measuring is finished, pull the control lever forward once, and then slide to the side direction to switch the measured eye. Repeat the same procedure to measure the other eye of the patient in sequence.

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 58.

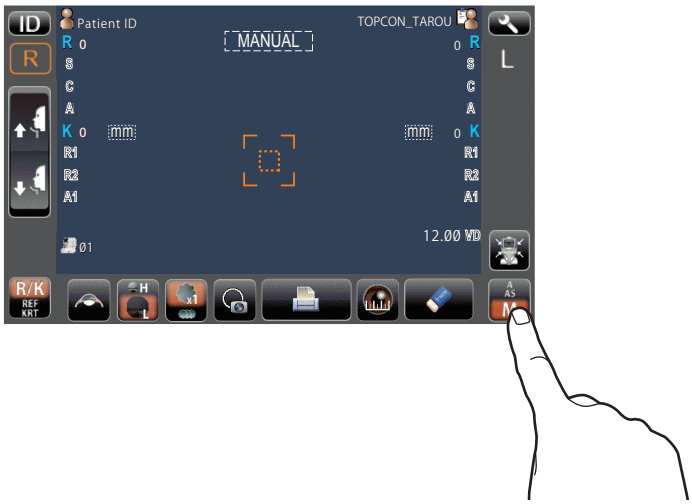
MEASUREMENT IN MANUAL MODE

In manual mode all processes are performed manually from alignment to measurement.

SETTING THE MANUAL MODE

1 If the large sign "M" is displayed in the Alignment mode button with orange background, it is in Manual mode.

2 If the large sign "M" is not displayed in the Alignment mode button with orange background, it is in other mode. Tap the button to change to Manual mode.



ALIGNMENT AND MEASUREMENT

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 24).

1 Align to make the alignment dot within the alignment mark as same manner of ***1*** at "ALIGNMENT AND MEASUREMENT" (page 30) in Auto shoot mode, until the Z alignment arrows appear.

2 Move the measuring head to the direction of the arrows indicated by operating the control lever. The number of arrows is reduced accordingly as the measurable range comes closer.

3 The alignment mark turns green at the position which the cyan (blue) or magenta (red purple) Z alignment arrows reach minimum. When "ALIGNMENT OK" is displayed, push the MEASUREMENT button.

NOTE	• Do not allow the eyelash and eyelid to cover the outer alignment mark to ensure stable measurement. • Even if fine alignment has not been achieved, measurement can be performed by pressing the MEASUREMENT button. To ensure correct measurement, try to get fine alignment.

4 The measurement is carried out automatically and the measurement value is displayed on the control panel.

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

5 After one eye measuring is finished, pull the control lever forward once, and then slide to the crosswise direction to switch the measured eye. Repeat the same procedure to measure the other eye of the patient in sequence.

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 58.

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. • To avoid discoloring of the printer paper (particularly the recording area) during storage, use a polypropylene bag and not one containing plasticizer (PVC, etc.). • To avoid discoloring of the printer paper (particularly the recording area) after pasting, use water-soluble glue and not one containing solvent. • Since the printer paper is thermosensitive, it is not suitable for keeping records for a long period. If necessary, prepare copies separately.

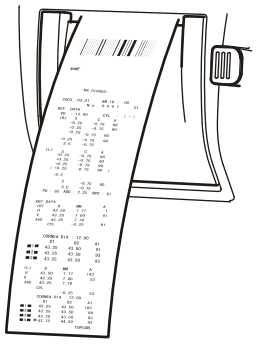
This instrument can print out measurement values by a printer.

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.

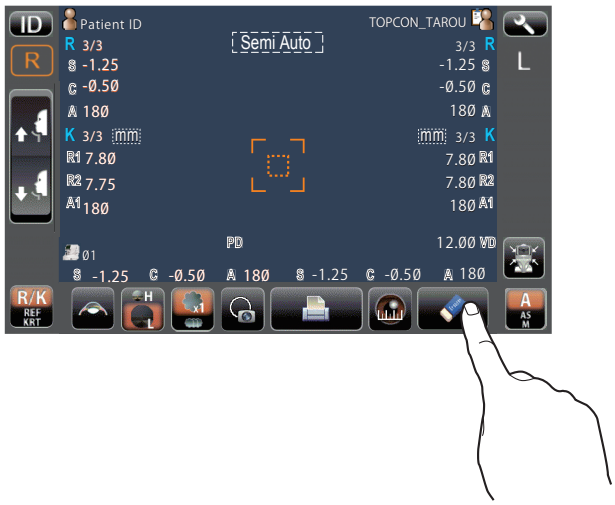


NOTE	• When the cylindrical refractive power is "0," the direction of astigmatic axis and measurement values are not displayed/printed. • When a red line is printed at the end of the printer paper, replace it with a new one. For details about the replacement of printer paper, see "PRINTER PAPER SETTING" on page 20. 58mm wide printer paper (example: TP-50KJ-R, Nippon Paper) is recommended. • "CLOSE PRT COVER" is indicating that the printer cover is left opened, ensure that the printer cover is completely closed. • 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 48.) • 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 50.)

CLEARING MEASUREMENT VALUES

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

All measurement values of both eyes are cleared.

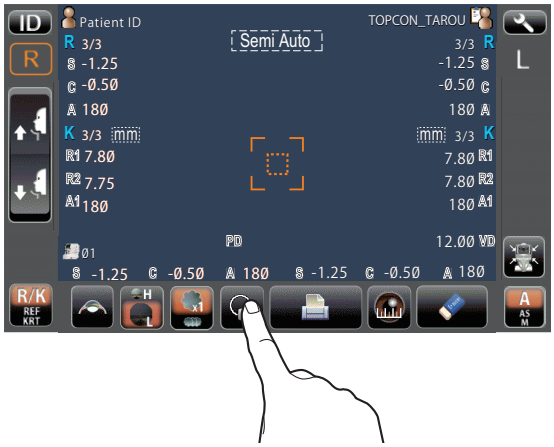


DISPLAYING ALL MEASUREMENT DATA

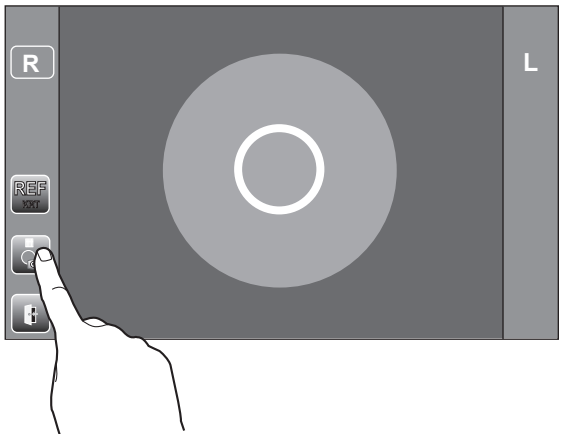
Normally the latest measurement is displayed, but it is possible to display and confirm all measurement data.

Measurement data chooses and displays "REF data" and "KRT data ."

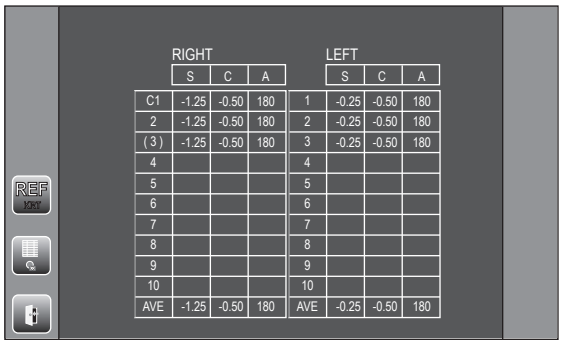
1 Tap the [TARGET IMAGE] button of the control panel.



2 Tap the [ALL DATA / TARGET] button.

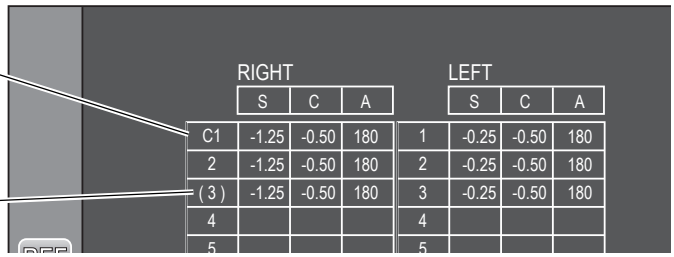


3 The Data Display screen is displayed.



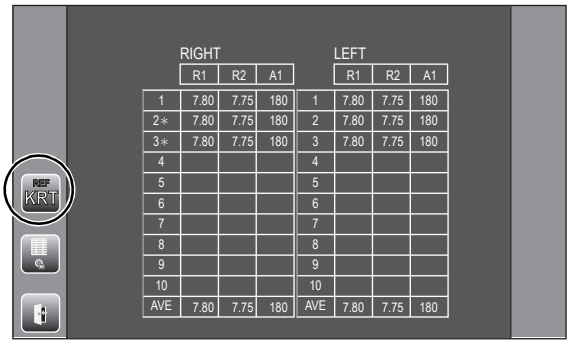
When measurement is performed with the Cataract button ON, "C" comes at the head of figures.

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

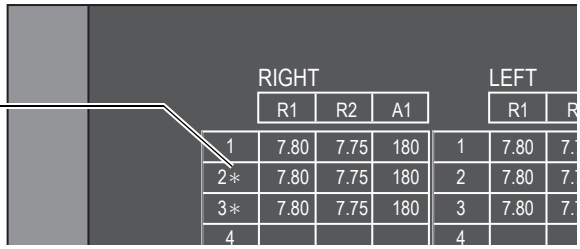


NOTE	When no data is memorized, the data table shows blank.

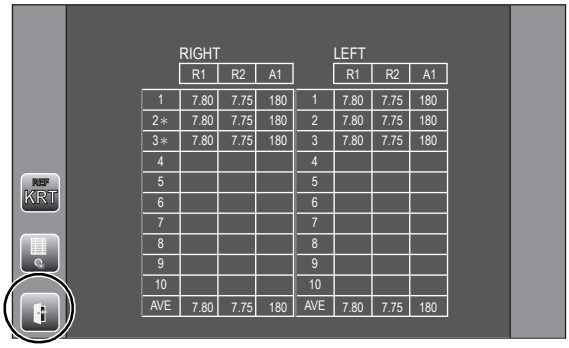
4 To change "REF data" and "KRT data," tap the REF/KRT button.



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.



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. (If power switch is provided.)

3 Unplug the power cable from a 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.

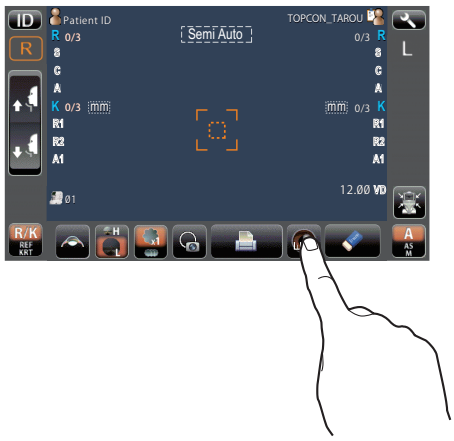
2 Tap keyboard on the screen and enter characters. Tap (OK) button and fix the input value.

NOTE	• Patient ID is reset when measurement values are printed or if the (ALL CLEAR) button is tapped. • 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. "Refer to "Patient No. reset" on page 48. • Be sure to verify the input ID to agree with data of a patient or an operator.

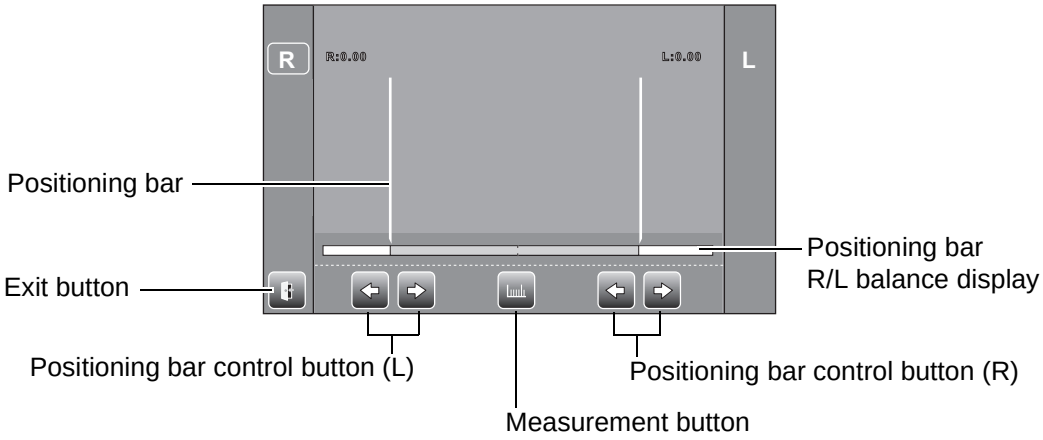
MEASUREMENT OF CORNEA DIAMETER

MEASUREMENT ON THE ACTUAL IMAGE

1 Tap the [CORNEA DIAMETER] button.

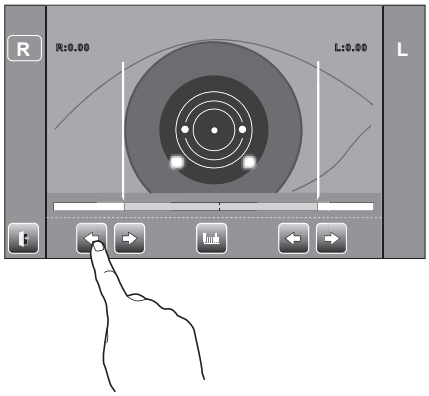


2 The Cornea Diameter Measurement screen is displayed, and the positioning bar is displayed.

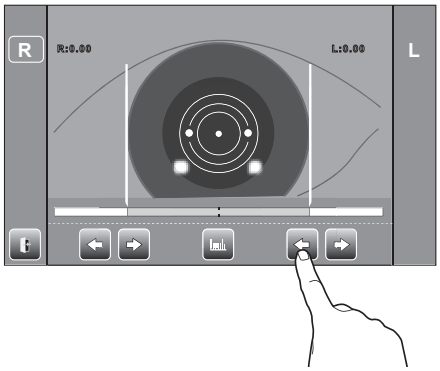


3 When the pupil is displayed, moves the measuring head so that the pupil image and alignment dot are at the center of the screen.

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.



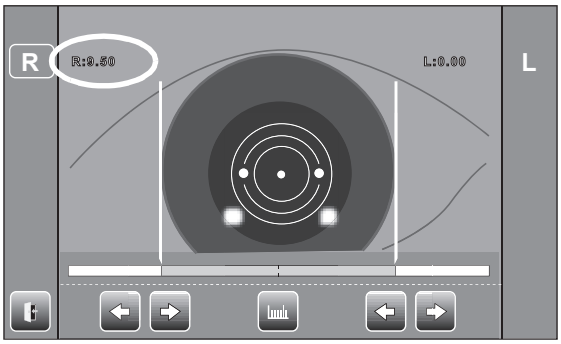
5 Using the [POSITIONING BAR CONTROL] button (R), move the right positioning bar to the right end of the iris from the control panel side.



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

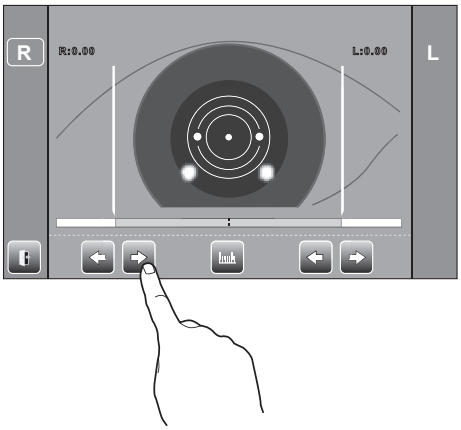
When KRT measurement values are available, the still image of the measurement is displayed.

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 button] to display the saved image.

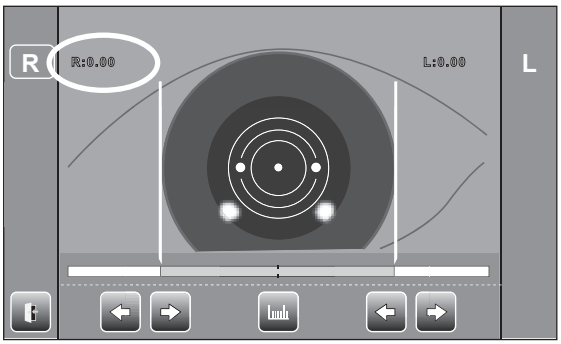
NOTE	If you are required to get the still image again, press the [MEASUREMENT button] to return to actual image, and press the [MEASUREMENT button] again.

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.

OUTPUT USING RS-232C

This instrument can 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 19.
2. Set up of data communication settings.
   For details, refer to "DATA COMMUNICATION (COMM)" on page 52.
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 barcode reader, etc. via the USB.

1. Check the connection of USB IN.
   For connection, refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 19.
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 19.
2. Set up of LAN connection settings.
   For details, refer to "LAN CONNECTION (LAN)" on page 53.
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 58.

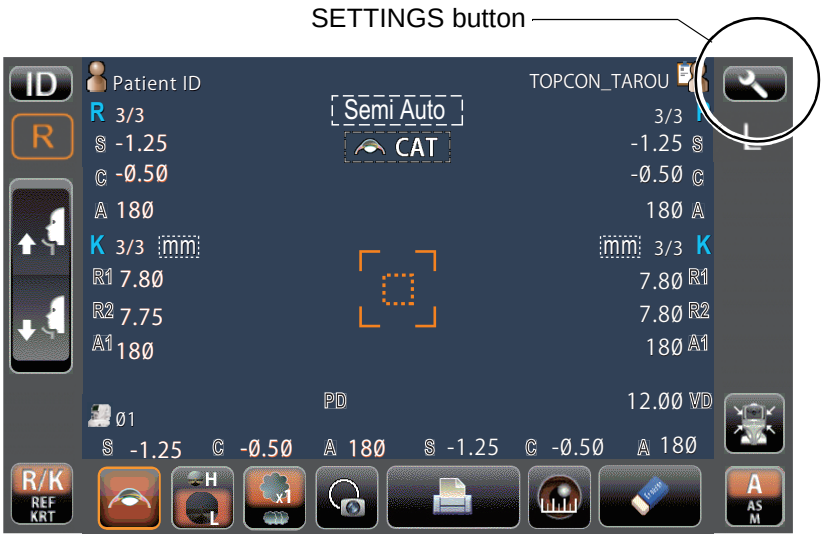
SETTING FUNCTIONS ON SETUP SCREEN

OPERATING THE SETUP SCREEN

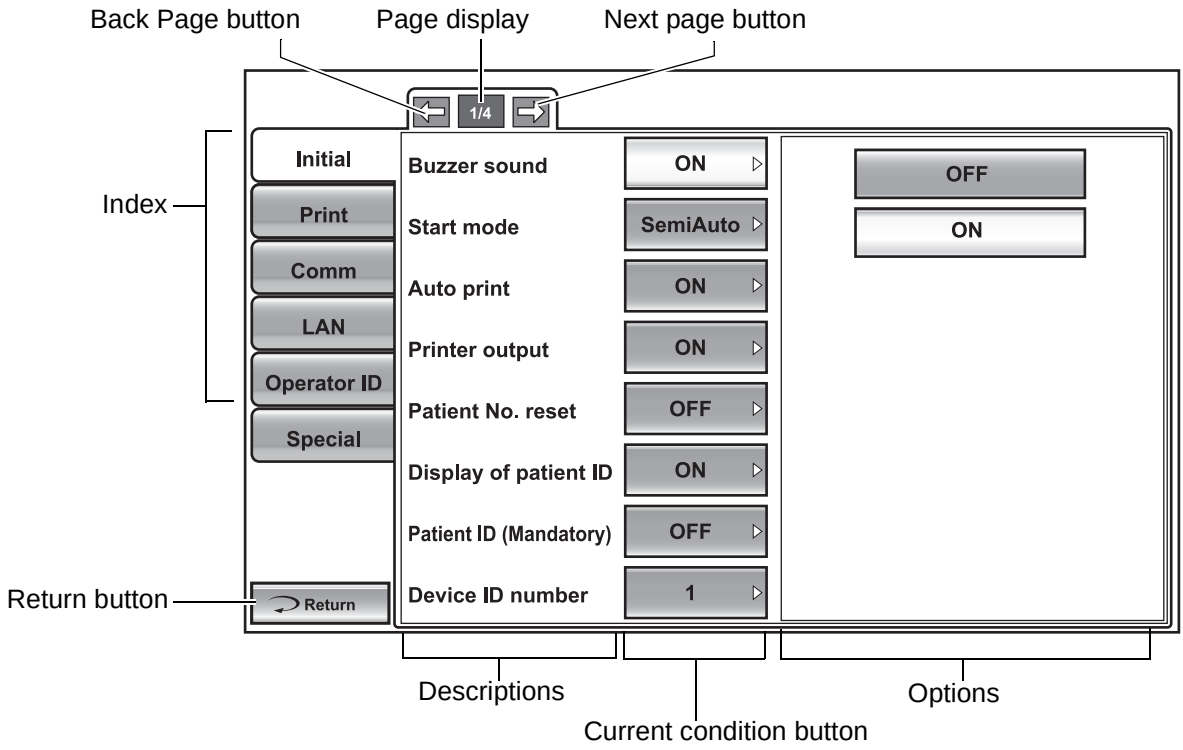
Various functions can be set on the SETUP screen.

PREPARATONS FOR SETTING

1. Make sure that the power cable is connected.
   For connection, refer to "CONNECTING POWER CABLE" on page 18.
2. Turn ON the [POWER] switch.
3. Tap the [SETTINGS] button on the control panel.

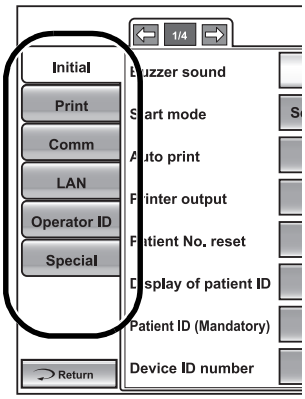


The SETUP screen is displayed.

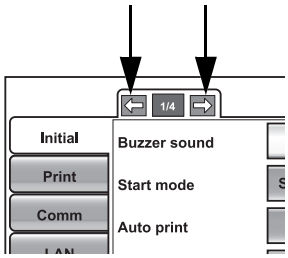


OUTLINE OF SETUP SCREEN OPERATIONS

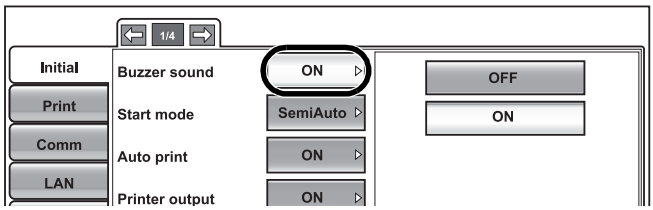
1 Tap [INDEX] and select the subject of setting.



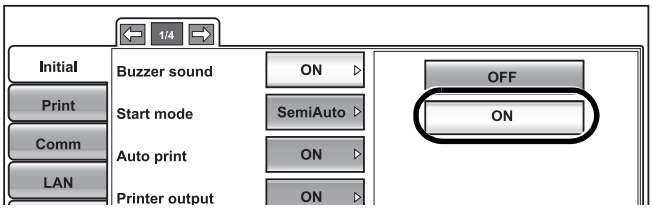
2 Operate the [NEXT PAGE] button or [BACK PAGE] button, as necessary, and display the page to confirm/change.



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

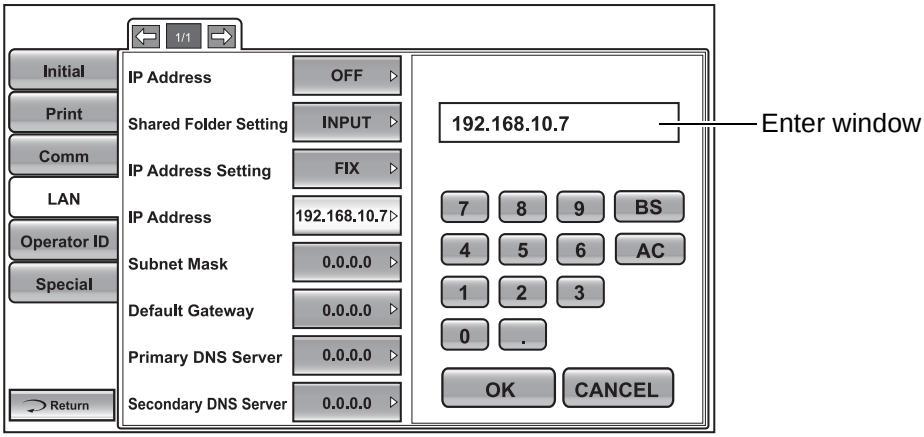


4 Tap the [OPTIONS] button and change the setting.

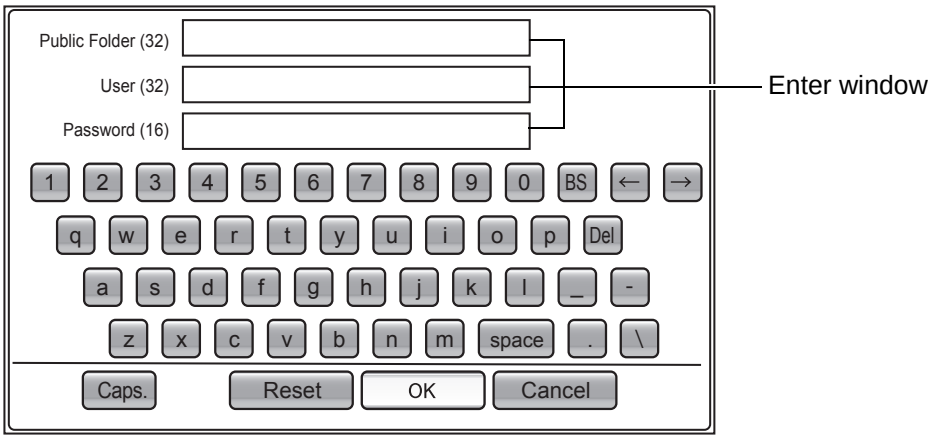


- Instead of the [OPTIONS] button, ten-key and keyboard would be displayed.

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.

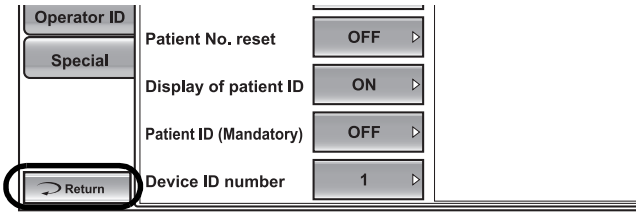


KEYBOARD:
Tap keyboard on the screen and enter characters. If there are several windows to enter, tap the window to enter the figure by keyboard. Tap [OK] and fix the input value.



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.

Descriptions	Options	Details	Initial value
Buzzer sound	OFF	Buzzer does not sound.	ON
	ON	Buzzer sounds.	
Start mode	Manual	Default start mode is set to Manual.	SemiAuto
	AutoShoot	Default start mode is set to Auto Shoot.	
	SemiAuto	Default start mode is set to Semi-Auto.	
Auto print*	OFF	Not printed automatically.	ON
	ON	After AUTO measurement, results are printed out automatically.	
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 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.	
Number of auto-shoot	1-10 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.	
Date/Time	Set by ten-key display.	Sets year, month, day, time (24hrs), minute and second	Installation date/time
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.	
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).	

Descriptions	Options	Details	Initial value
ADD	NO 40-44 45-49 50-54 55-59 60-64 65-69 70-74	The typical additional power for the age can be selected.	NO
D or mm(KRT)	D	D (diopter) 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	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.	ON
	ON	KRT unit is shown.	
Cylinder sign	–	Cylinder sign is "–".	–
	+	Cylinder sign is "+".	
	MIX	Cylinder sign is "+" and "–".	
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.	
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)		
Display of REF average	OFF	REF average is not displayed.	OFF
	ON	REF average is displayed.	
Packing mode	Execute	This instrument is set to the condition for packing.	–
Use original IPA font	OFF	A line of the frame is shown to the character of the measurement values, etc.	OFF
	ON	A line of the frame disappears in the character of the measurement values, etc.	
Eyelid fuction	OFF	The eyelid function is invalidated.	ON
	ON	The eyelid function is made effective.	
Eyelid Force Meas. time	0-99 Set by ten-key display.	The time until measurement is forcibly begun is set after eyelid detection message is displayed.	99
Inspection mode	OFF	Inspection mode is released.	OFF
	ON	Inspection mode is set to measure model eye.	
SCA display type	SIMPLE	When the measurement results of the spherical refractive-power (S) and cylindrical refractive power (C) are over 0, the plus sign (+) is not displayed. When the cylindrical refractive power is at 0D, the values of cylindrical refractive power and the direction of astigmatic axis (A) are not displayed.	SIMPLE
	ALL	When the measurement results of the spherical refractive-power (S) and cylindrical refractive power (C) are over 0, the plus sign (+) is displayed. When the cylindrical refractive power is at 0D, the cylindrical refractive power is displayed at 0.00 and the direction of astigmatic axis (A) is displayed at 0.	

SETTING OF INTERNAL PRINTER (PRINT)

Print contains settings related to output from the internal printer.

	Description	Options	Details	Initial value
Preset	–	All	Print format of preset is All. (For the details of "All," refer to "PRINTOUT FORMAT SETTING" on page 17.)	All
	–	Ave	Print format of preset is Ave. (For the details of "Ave," refer to "PRINTOUT FORMAT SETTING" on page 17.)	
	–	Classic	Print format of preset is Classic. (For the details of "Classic," refer to "PRINTOUT FORMAT SETTING" on page 17.)	
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*
		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	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.	

* : Depending on the destination, preset values differ.

	Description	Options	Details	Initial value
REF/KRT (Print setting on R/K mode)	Print Layout	R/L	Measurement values are printed in terms of Right or Left.	DATA
		DATA	Measurement values are printed in terms of REF or KRT.	
	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
		AVE	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, 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	All measurement values are printed.	ALL
		AVE	Only average value are printed.	
	KRT ave. -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 in HV (horizontal/vertical).	R1R2
		R1R2	KRT measurement result is printed 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.	
	Corneal 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
		AVE	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
		AVE	Printout only average value.	
	KRT ave. -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.	
	Corneal diameter	OFF	Do not print corneal diameter.	ON
		ON	Print corneal diameter.	

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	2400bps	Baudrate value:2400bps	2400bps
	9600bps	Baudrate value:9600bps	

LAN CONNECTION (LAN)

LAN contains settings related to data output via LAN.

Description	Options	Details	Initial value
IP Address	OFF	LAN connection is off.	OFF
	ON	LAN connection is on.	
Shared Folder Setting	Shared Folder (up to 32 characters) User Name (up to 32 characters) Password (up to 16 characters) 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 Set by ten-key display.	IP address of KR-800A to output data.	0.0.0.0
Subnet Mask	0.0.0.0 Set by ten-key display.	Subnet mask address of KR-800A.	0.0.0.0
Default Gateway	0.0.0.0 Set by ten-key display.	Default gateway address of KR-800A.	0.0.0.0
Primary DNS Server	0.0.0.0 Set by ten-key display.	Primary DNS Server number.	0.0.0.0
Secondary DNS Server	0.0.0.0 Set by ten-key display.	Secondary DNS Server number.	0.0.0.0

OPERATOR ID

OPERATOR contains settings related to Operator ID.

Description	Options	Details	Initial value
Use of 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. (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. (up to 13 characters)	Input fixed operator ID	NONE

SPECIAL

SPECIAL is the mode for service engineer only; it can not be accessed.

MAINTENANCE

DAILY CHECKUPS

USER MAINTENANCE ITEM

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

MANUFACTURER MAINTENANCE ITEMS

Item	Checking time	Contents
Cleaning each component	Within 12 months	• Cleaning outer covers • Checking the optical system • Cleaning POWER unit
Operation check	Within 12 months	• Checking the main body operation • Checking switches
Accuracy check	Within 12 months	• Confirming the measurement functions (using special tools)

MANTENACE AFTER USE

- After using, refer to "HOW TO CLEAN THIS INSTRUMENT" on page 56.
- For this instrument, dust may cause errors. When not in use, replace the measuring window cap and dust cover.
- When not in use, turn off the switch.

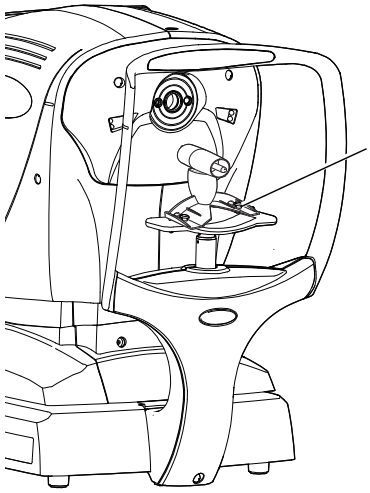
CHECKING THE MEASURING ACCURACY

- The attached model eye should be measured and the accuracy checked at regular intervals.

1 To set up the model eye, insert the guide groove of the model eye to the chinrest tissue pin.

2 Set the "Inspection mode" of "Initial" to ON in SETUP screen.

3 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.

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 49).

HOW TO CLEAN THIS INSTRUMENT

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 THE KERATO RING AND THE COVER

NOTE	Do not clean plastic parts with solvents. Benzine, thinner, ether, gasoline and chemical duster 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. • 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.

CLEANING THE MEASURING WINDOW

- 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.

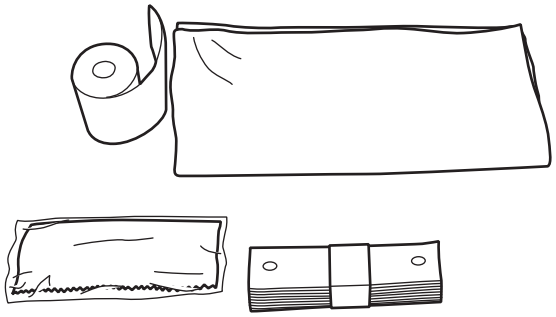
REPLACING AND ORDERING CONSUMABLE ITEMS

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.

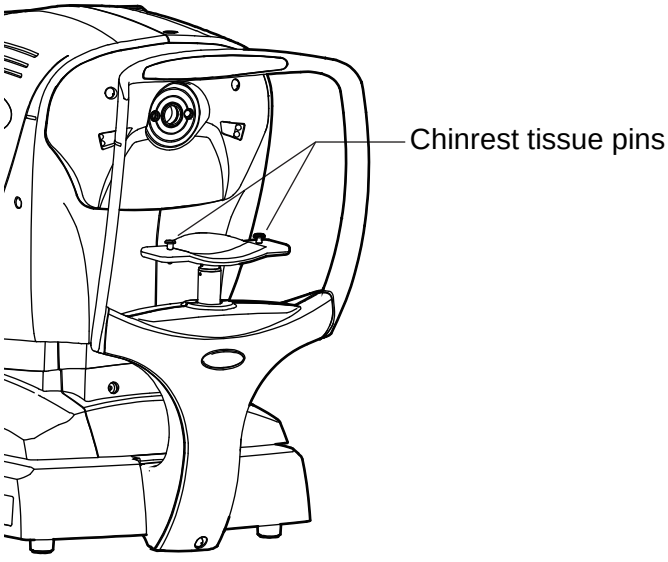
Product name	Product code
Chinrest tissue	40310 4082
Monitor cleaner	44800 1001
Dust cover	42360 9002

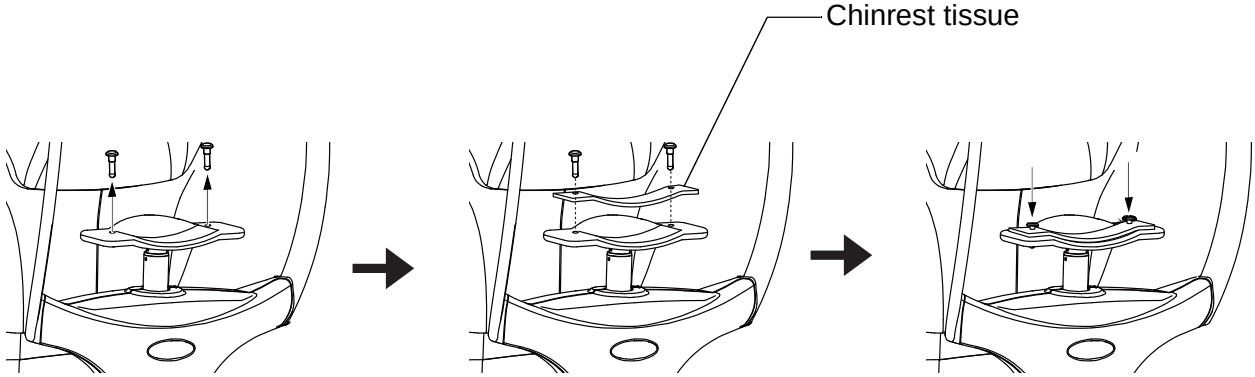
Product name	Product code
Printer paper	44800 4001



SUPPLYING THE CHINREST TISSUE

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





TROUBLESHOOTING

TROUBLE-SHOOTING OPERATIONS

MESSAGE LIST

OVER-SPH	Spherical power exceeds +22D or -25D. Measurement cannot be performed for out of measuring range.
OVER-CYL	Cylindrical power exceeds ±10D. Measurement cannot be performed for out of measuring range.
OVER-R	Corneal curvature exceeds 5.00-10.00mm. Measurement cannot be performed for out of measuring range.
NO TARGET	Displayed when there is no target or the eye image is too dark. 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. 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 can not be found. 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. If this message appears while with measuring model eye correctly, the instrument may have a problems. Contact your service engineer.
ALIGN ERR	Displayed when the alignment is significantly failed during the measurement. 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.
Finished	Displayed when normal measurements are completed for the set measurement count.
Check eyelid.	Displayed when the patient's eyelid covers the pupil. Tell the patient to open their eye as wide as possible.
MOVE LEFT TO AVOID THE LIMIT.	Displayed when it reached the limit to the left in auto alignment. Move to the left by operating the control lever.
MOVE RIGHT TO AVOID THE LIMIT.	Displayed when it reached the limit to the right in auto alignment. Move to the right by operating the control lever.
LOWER CHIN REST TO AVOID THE LIMIT.	Displayed when it reached the upward limit in auto alignment. Move the chinrest to the downward.
RAISE CHIN REST TO AVOID THE LIMIT.	Displayed when it reached the downward limit in auto alignment. Move the chinrest to the upward.
MOVE FORWARD TO AVOID THE LIMIT.	Displayed when it reached forward (patient's side) limit in auto alignment. Move to the forward by operating the control lever.
MOVE BACKWARD TO AVOID THE LIMIT.	Displayed when it reached backward (operator's side) limit in auto alignment. Move to the backward by operating the control lever.
Previous measurements are left. Please press the Clear button.	Displayed when the output of all output-set data fails. Previous measurements are left. Please press the ALL CLEAR button.
No print data, please confirm measurement mode.	Displayed when the measurement mode in measuring differs from the measurement mode in printing. Set the measurement mode to the mode in measuring, and then tap the PRINT OUT button.

Patient ID is required. Please set patient ID.	Displayed when the output operation is requested when the setting "Patient ID (Mandatory)" is ON but the patient ID is not inputted. Enter the patient ID and then request the output operation.
Operator ID is required. Please set Operator ID.	Displayed when the output operation is requested when the setting "Operator ID request" is ON but the operator ID is not inputted. Enter the operator ID and then request the output operation.
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. If this message is displayed, read the barcode again.
Applying network settings	Displayed when applying network setting as "LAN connection" in the "LAN" is switched to ON or OFF.
Output not set	Displayed when all output settings are OFF. Confirm that the output setting is in the correct way.
Close printer cover	The printer cover is open. Close the cover until it clicks.
Paper end	Printer paper is used up. Supply printer paper.
Fatal Error!	Displayed when the printer unit does not operate normally, such as the cutter does not work. Call the serviceman.
LAN output...	LAN data output is in process.
LAN SUCCESS	LAN data output is completed.
LAN hostname error	Failed to resolve the host name of the destination (to be connected with the shared folder). Confirm the inputted host name or DNS server address.
LAN mount Error	Failed in connection with the share folder. 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. 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. Please check if other program is accessing with the share folder.
LAN start error	Failed to reset the LAN connection. Confirm that the LAN cable connection and the LAN setting are in the correct way.
LAN stop error	Failed to reset the LAN connection. Confirm that the LAN cable connection and the LAN setting are in the correct way.
LAN restruct error	Failed to reset the LAN connection. Confirm that the LAN cable connection and the LAN setting are in the correct way.
DHCP bind error(Timeout)	Failed to communicate to DHCP server. Please contact your network administrator of the facility.
DHCP bind error(NAK)	Failed to communicate to DHCP server. Please contact your network administrator of the facility.
Failed to get IP address.	Failed in IP address auto assignment. Set a fixed IP address, or check if the DHCP server is running. Please contact your network administrator of the facility.
IP address conflicted	Displayed when the IP address is duplicated. Confirm that the IP address setting of main machine is in the correct way.
Unknown Error	Displayed in case of a LAN error other than the LAN errors mentioned previously. Call your service engineer.
RS-232C DATAOUT	RS-232C data output is in process.
RS-232C SUCCESS	RS-232C data output is completed.
RS-232C FAIL	Failed in RS-232C data transmission. Confirm that the RS-232C cable connection and the RS-232C setting are in the correct way.
Range of Input value is 1-10	Displayed when the "Cont. Cycle" is set to a value out of the specified input range. Enter a value within the input range.

First Octet is 1-223 Range	Displayed when the first octet of IP address, default gateway, primary DNS server or secondary DNS server is set to a value out of the specified input range. Enter a value within the input range.
Value is irregular. Input valid value	Displayed when the "Subnet mask" of the "LAN connection" is set to a value off the input rule. Enter a value within the "Subnet mask" input rule.
The IP address is 0-255 Range	Displayed when any one of the respective octets is set to a value out of the specified input range. Enter a value within the input range.
Prefix of exam. ID need 3 letter	Displayed when the input examiner ID prefix is less than 3 characters. Enter a prefix with 3 characters.
Not correct password	Displayed when the password inputted to select a special mode is incorrect.
Please wait until packing mode is finished...	Indicates that the packing operation is in process. Wait until it is completed.
Please check the DATE/TIME	Displayed when the battery for the built-in clock becomes run down. - When the battery consumed, confirm the difference in time and adjust it. - When the battery becomes completely drained, to verify whether time stopping occurred and call your service engineer.
Cannot detect x position. Please turn the switch off/on.	Displayed when the auto alignment sensor and the machine are not correctly connected or not connected at all. When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer.
Cannot detect y position. Please turn the switch off/on.	Displayed when the auto alignment sensor and the machine are not correctly connected or not connected at all. When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer.
Cannot detect z position. Please turn the switch off/on.	Displayed when the auto alignment sensor and the machine are not correctly connected or not connected at all. When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer.
Failed to initialize TF motor. Please turn the switch off/on.	Displayed when the fixation target sensor and the machine are not correctly connected or not connected at all. When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer.

TROUBLE-SHOOTING OPERATIONS

WARNING	To avoid electrical shock, do not open the instrument. 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

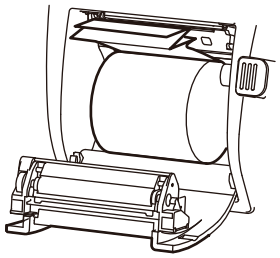
Trouble	Condition	Check	Page
Control panel does not turn on.	———	Is power cable unplugged?	18
		Is power cable connected to the instrument?	18
Control panel is not clear.	The image is dark.	Adjust the brightness by “Control panel Brightness Adjust”.	49
Any trouble is found in a movable part.	———	Do not move it forcibly but call our service engineer.	30
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.	20
	Paper does not come out.	If “PAPER END” displayed on control panel, replenish printer paper.	20

PRINTER PAPER JAM

CAUTION	• To avoid failure or potential injury, do not open the printer cover while the printer is in operation. • To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it. • 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. • 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 Shut off the power and open the printer cover, take out the jammed paper pieces.



NOTE	If the power is turned on to start after removing the jammed printer paper, a blank sheet is printed out by tapping the printer button.

SPECIFICATIONS AND PERFORMANCE

SPECIFICATIONS AND PERFORMANCE

Range of Refractometry Measurement	Spherical refractive power: -25 to +22D (0.12D/0.25D steps) Cylindrical refractive power: 0D to ±10D (0.12D/0.25D steps) Direction of astigmatic axis: 0° to 180° (1°/5° steps) (where, spherical refractive power + cylindrical refractive power ≦ +22D, or spherical refractive power + cylindrical refractive power ≦ -25D) Measured minimum pupil diameter: ϕ2mm
Range of Cornea Curvature Measurement	Cornea curvature radius: 5.00mm to 10.00mm (0.01mm display unit) Corneal refractive power: 67.50D to 33.75D(0.12D/0.25D steps) (where, corneal refractive power =1.3375) Corneal astigmatic power: 0D to ±10D (0.12D/0.25D steps) Direction of corneal astigmatic axis: 0 to 180° (1°/5° steps)
PD measurement	20-85mm (0.5mm display unit)
External I/O terminal	USB(for Import), RS-232C(for Export), LAN(for Export)

NOTE	Essential performance • Measurement must be performed correctly. • Monitor screen display must not be distorted.

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-800A are medical devices, the operation should be supervised by a physician.

ENVIRONMENTAL CONDITIONS OF USE

Temperature : 10°C to 35°C
Humidity : 30% to 90% RH(without condensation)
Pressure : 700hPa 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, 50-60Hz

Power input : 30-65VA

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.
- Class of LED product: Class 1 LED product according to IEC 60825-1:2001
  Class 1 equipment is a LED product which is safe under the rationally predictable operation conditions, and keeps safety for human eyes even if any optical system (lens or telescope) is used as a condensing unit.

DIMENSIONS AND WEIGHT

Dimensions : 317~341mm(W) × 521~538mm(D) × 437~467mm(H)

Weight : 18.0kg

OPERATION PRINCIPLE

Refraction (REF)

The instrument projects a near infra red ring of light onto the retina and the reflection of the ring is captured by a CCD camera. An internal computer analyzes the image and calculates the spherical, cylindrical and axial values.

Keratometry (KRT)

The instrument projects a near infra red ring of light onto the cornea and the reflection of the ring is captured by a CCD camera. An internal computer analyzes the image and calculates the curvature radius, corneal astigmatic axis and the corneal refractive values.

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

The product conforms to the EMC standard (IEC 60601-1-2 Ed3.0:2007)

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.

Item	Part Code	Model	Length(m)	
AC power cord	4480470170	–	1.5	*1
	4241220900	–	3.0	*2
Barcode scanner cable	–	–	2.5	
LAN cable (Cat.7)	–	–	3.0	
Serial cable	–	–	2.0	

*1: Used it for AC120V

*2: Used it for AC230V

Guidance and manufacturer's declaration - electromagnetic emissions		
The KR-800A is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-800A should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The KR-800A uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The KR-800A is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The KR-800A is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-800A should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge(ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 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 IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user or the KR-800A requires continued operation during power mains interruptions, it is recommended that the KR-800A be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 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. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The KR-800A is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-800A should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150kHz to 80MHz 3 V/m 80MHz to 2.5GHz	3 V 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the KR-800A, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the KR-800A is used exceeds the applicable RF compliance level above, the KR-800A should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the KR-800A.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended separation distance between portable and mobile RF communications equipment and the KR-800A

The KR-800A is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the KR-800A can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the KR-800A as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	**80MHz to 800MHz** $d = 1.2\sqrt{P}$	**800MHz to 2.5GHz** $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

REQUIREMENTS FOR THE EXTERNAL DEVICE

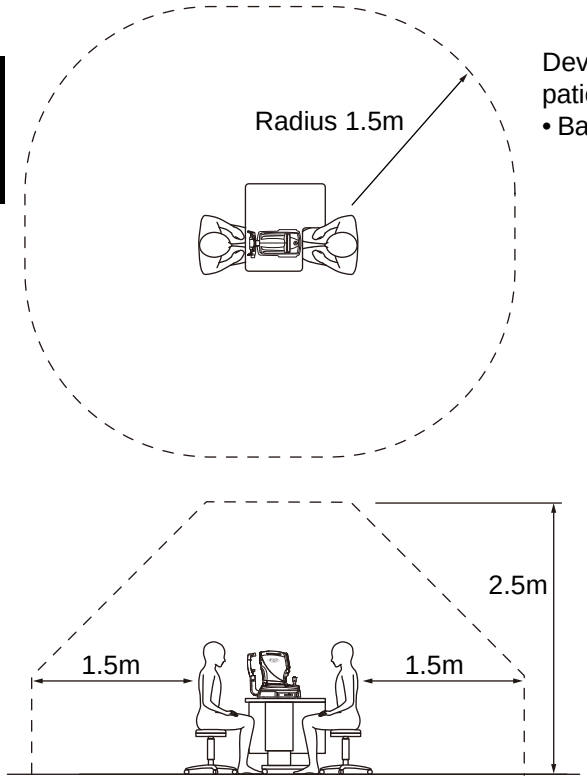
The external device connected to the analog and digital interfaces must comply with the respective IEC or ISO standards (e.g. IEC 60950-1 for data processing equipment and IEC 60601-1 for medical equipment).
Anybody connecting additional equipment to medical electrical equipment configures a medical 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).

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
• Barcode reader (Note 1)

Note 1: Use the device conforming to IEC60950-1.

⚠ CAUTION	• Don't connect an additional power strip or an extension cord to the system. • Don't connect the device which is not recognized as one component of the system.

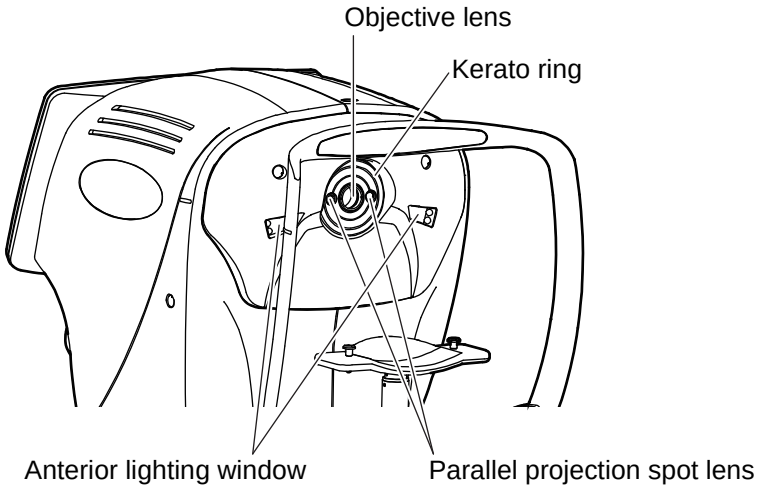
SAFETY OF LED PRODUCT

Class of LED product	CLASS1 LED PRODUCT	
LED output (Infrared)	M LED (For Measurement)	
	Aperture of LED	Objective lens *
	Output of cornea	10μW
	Wavelength	870nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 33ms (Single)
	XY LED (For XY alignment)	
	Aperture of LED	Objective lens *
	Output of cornea	10μW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8μs (270Hz)
	ZENGAN LED (For Anterior segment observation)	
	Aperture of LED	Anterior lighting window *
	Output of cornea	50μW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	0.87 rad
	Pulse width	CW - 14.8μs (270Hz)
	SRING LED (For Kerato ring)	
	Aperture of LED	Kerato ring *
	Output of cornea	40μW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	3.14 rad
	Pulse width	CW - 14.8μs (270Hz)
	SPOT LED (For parallel projection spot)	
	Aperture of LED	Parallel projection spot lens *
	Output of cornea	40μW
	Wavelength	940nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8μs (270Hz)
LED output (White)	KOSHI LED (For fixation)	
	Aperture of LED	Objective lens *
	Output of cornea	15nW
	Wavelength (Centroid)	530nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8μs (270Hz)

LED light source (Infrared)	M LED (For Measurement)	
	Class of LED	Class 3B
	Output	70mW (CW)
	Wavelength	870nm
	Half width	50nm
	Beam divergence	0.87 rad
	XY LED (For XY alignment)	
	Class of LED	Class 1
	Output	6mW (CW)
	Wavelength	950nm
	Half width	50nm
	Beam divergence	0.14 rad
	ZENGAN LED (For Anterior segment observation)	
	Class of LED	Class 1
	Output	6mW (CW)
	Wavelength	950nm
	Half width	50nm
	Beam divergence	1.40 rad
	SRING LED (For Kerato ring)	
	Class of LED	Class 1
	Output	14mW (CW)
	Wavelength	940nm
	Half width	50nm
	Beam divergence	2.09rad
	SPOT LED (For parallel projection spot)	
	Class of LED	Class 1
	Output	14mW (CW)
	Wavelength	940nm
	Half width	50nm
	Beam divergence	2.09rad
LED light source (White)	KOSHI LED (For fixation)	
	Class of LED	Class 1
	Output	0.08mW (CW)
	Wavelength (Centroid)	530nm
	Beam divergence	1.05 rad

⚠ CAUTION	• Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. • Do not remove the enclosures. LED high-power is radiated.

*: LED light is output from Objective lens, Kerato ring, anterior lighting window, and parallel projection spot lens.

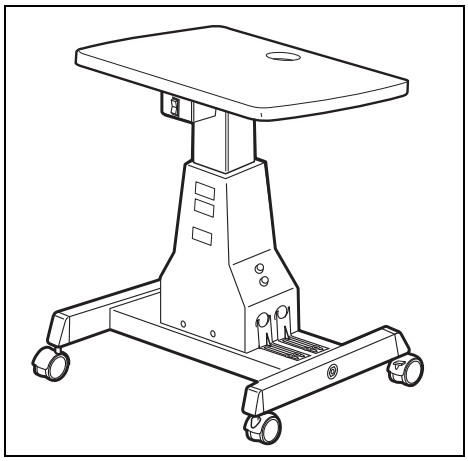


REFERENCE

OPTIONAL ACCESSORIES

- Adjustable instrument table AIT-16

The table height can be adjusted to facilitate measurement.



Specifications

- Dimensions.....525(W)x490(D)mm
- Table height.....660~880mm
- Table size 490x500mm
- Weight .....approx. 23kg
- Power consumption.....150VA (100-120V, 220-240V)

- RS-232C on-line cable

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) Type H (Infrequently)
Chile	220V/60Hz	Type A
Colombia	110V/50Hz	Type C
Brazil	220V/60Hz 127V/60Hz	Type A Type C
Ecuador	110V/50Hz	Type C&E
USA	120V/60Hz	Type A (Hospital Grade)
Canada	120V/60Hz	Type A (Hospital Grade)

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- Model name: KR-800A
- 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-800A

USER MANUAL
Rev.1 December 20, 2016

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AUTO KERATO-REFRACTOMETER

KR-800A

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