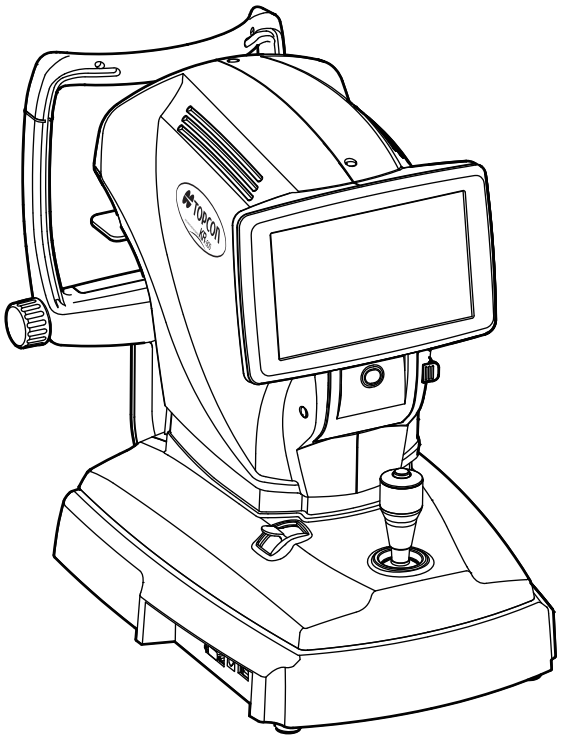
TOPCON



USER MANUAL

AUTO REFRACTOMETER
RM-800
AUTO KERATO-REFRACTOMETER
KR-800

INTRODUCTION

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

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.
(Function to measure the radius of curvature, to compute the corneal refractory power, corneal astigmatic power and the corneal astigmatic axis angle is possible only with KR-800.)

FEATURES

This instrument features the following:

- The auto shoot function facilitates quick measurements under the optimal condition. (Only in KR-800)
- This instrument is simple to operate and measures the refraction and corneal curvature of the eye. (Function to measure the corneal refraction is possible only with KR-800.)

PURPOSE OF THIS MANUAL

This manual provides an overview of the basic operation, troubleshooting, checking, maintenance and cleaning of the TOPCON AUTO REFRACTOMETER RM-800, AUTO KERATO-REFRACTOMETER KR-800.
To get the best use of the instrument, read Safety Displays and Safety Cautions.
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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https://moji.or.jp/ipafont/license/

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

CONTENTS

DISPLAYS AND SYMBOLS FOR SAFE USE

To encourage safe and proper use and to prevent injury to the operator and others or potential damage to property, important messages are put on the instrument body and inserted in the manual.
We suggest that everyone understand the meaning of the following displays, icons and text before reading the "GENERAL SAFETY INFORMATION" and observe all listed instructions.

DISPLAY

DISPLAY	MEANING
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTE	Useful functions to know. Paying attention to these will prevent the noted problems.

SYMBOL

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

	Humidity limitation	Limite d'humidité
	Atmospheric pressure limitation	Limite de pression atmosphérique
	Temperature limit	Limite de température
	Fragile, handle with care	Fragile manipuler avec soin
	Keep dry	Garder au sec
	This way up	Vers le haut
	Maximum number of identical packages which may be stacked on one another.	Nombre maximum d'emballages identiques pouvant être empilés les uns sur les autres.
	General symbol for recovery/recyclable. (for the package)	Symbole général de tri sélectif. (pour l'emballage)
	Recycling symbol for plastic in the package. Low density polyethylene	Symbole de recyclage du plastique dans l'emballage. Polyéthylène basse densité
	Recycling symbol for plastic in the package. Polypropylene	Symbole de recyclage du plastique dans l'emballage. Polypropylène
	Recycling symbol for plastic in the package. Polystyrene	Symbole de recyclage du plastique dans l'emballage. Polystyrène
	Indicates that the product conforms to the requirements of the Council Directive 93/42/EEC and of the other applicable Union legislation.	Indique que le produit est conforme aux exigences de la directive 93/42/CEE du Conseil et des autres législations applicables de l'Union.
	United States Federal law restricts medical devices to sale by or on the order of a licensed healthcare practitioner. (See 21 Code of Federal Regulations (CFR) sec. 801.109(b)(1))	La loi fédérale des États-Unis n'autorise la vente de dispositifs médicaux que par ou sur ordonnance d'un professionnel de la santé autorisé. (Voir 21 Code of Federal Regulations (CFR) sec. 801.109(b)(1))
	CSA listing mark	Marque de certification CSA
	WEEE label The symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.	Marquage des DEEE Il s'agit d'un symbole indiquant que le produit ne doit pas être éliminé avec les déchets non triés, mais doit être envoyé dans des installations de collecte séparées destinées à la valorisation et au recyclage.
	EU Battery Directive Battery users must not dispose of batteries as unsorted general waste, but treat properly.	Directive européenne sur les batteries Les utilisateurs de batteries ne doivent pas jeter les batteries comme des déchets généraux non triés, mais les traiter correctement.

GENERAL SAFETY INFORMATION

⚠ WARNING

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

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

Proposition65 warning sentence
⚠ **WARNING:** This product can expose you to chemicals including Lead, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

⚠ CAUTION

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

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

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

HOW TO USE THIS MANUAL

Read the instructions on pages 1 to 6 before using the machine.
Regarding connection to various devices, see "CONNECTING EXTERNAL I/O TERMINALS" on page 22.
If you would like an overview of the system, begin by reading "BASIC OPERATIONS"(page 25).
For setting various functions, see "SETTING FUNCTIONS ON SETUP SCREEN" on page 44.

GENERAL MAINTENANCE INFORMATION

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

USER MAINTENANCE

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

CLEANING OF MEASURING WINDOW

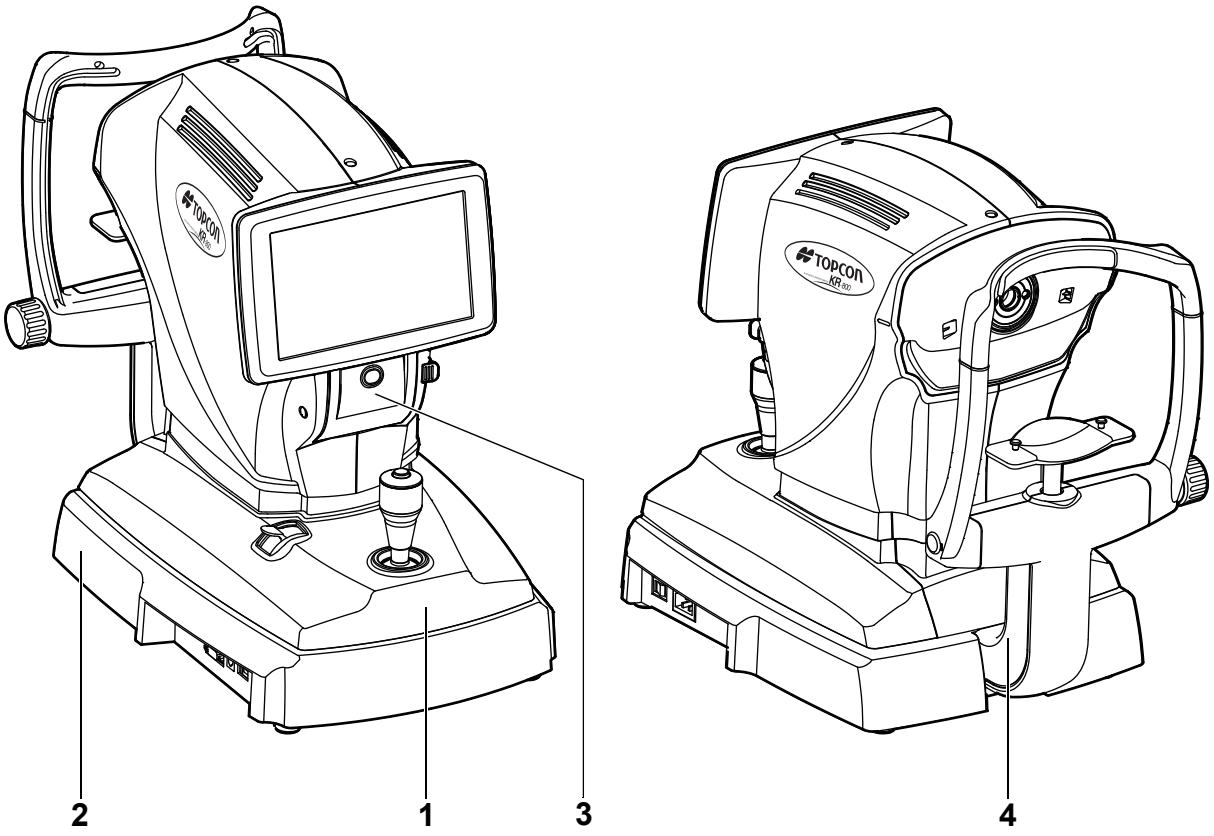
For details, See "CLEANING THE INSTRUMENT" on page 54.

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 manual.
- TOPCON is not responsible for any damage caused by unauthorized access from outside, malware or viruses.
- The device does not provide a diagnosis of any condition or lack thereof or any recommendations for appropriate treatment. The relevant healthcare provider is fully responsible for all diagnosis and treatment decisions and recommendations.

POSITIONS OF WARNING AND CAUTION INDICATIONS

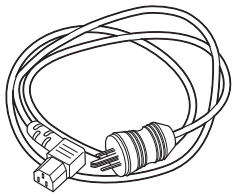
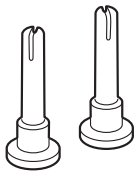
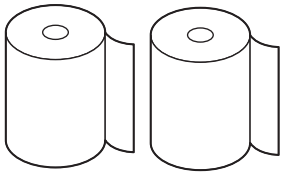
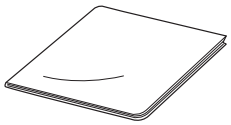
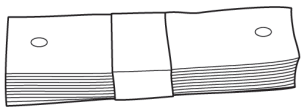
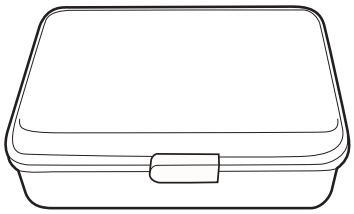
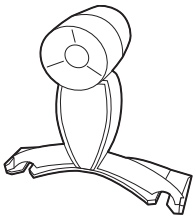
To secure safety, this equipment provides warnings.
Correctly use the equipment following these warning instructions. If any of the following marking labels are missing, please contact your dealer or TOPCON at the address stated on the back cover.



No.	Label	Label	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

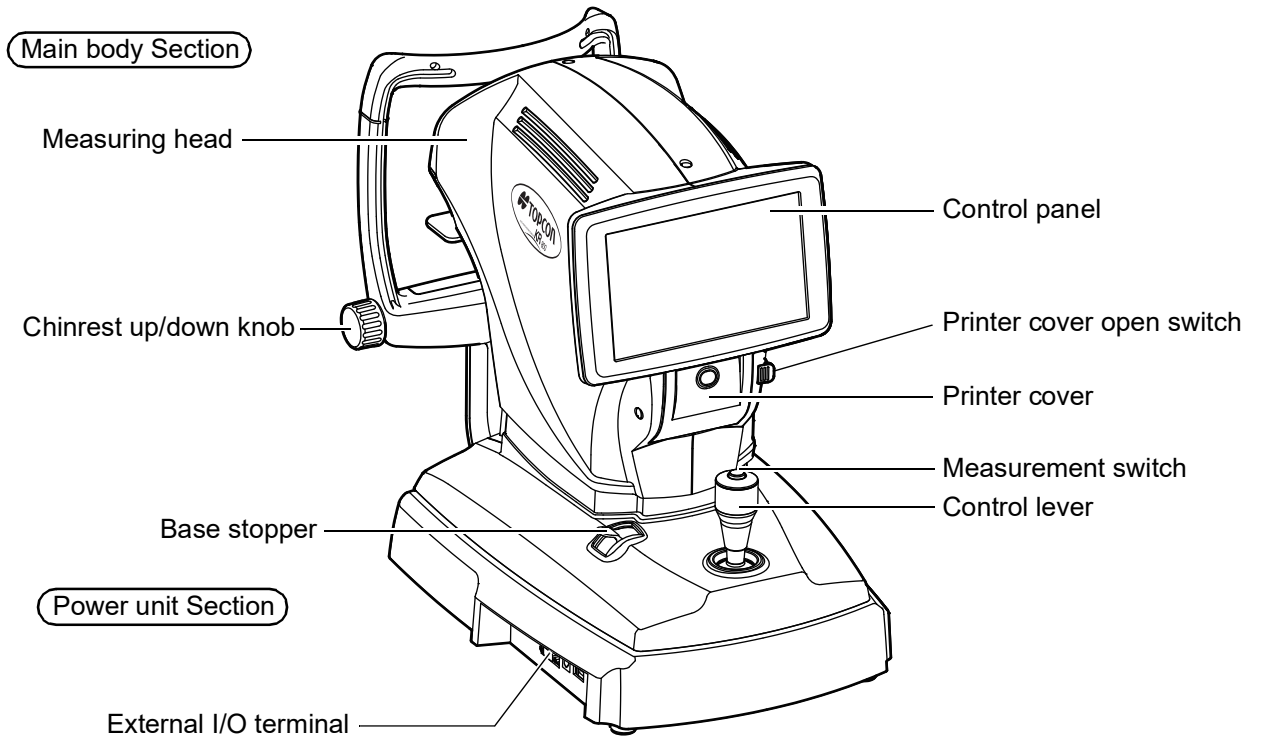
The following are standard accessories. Make sure that all these items are included (quantity).

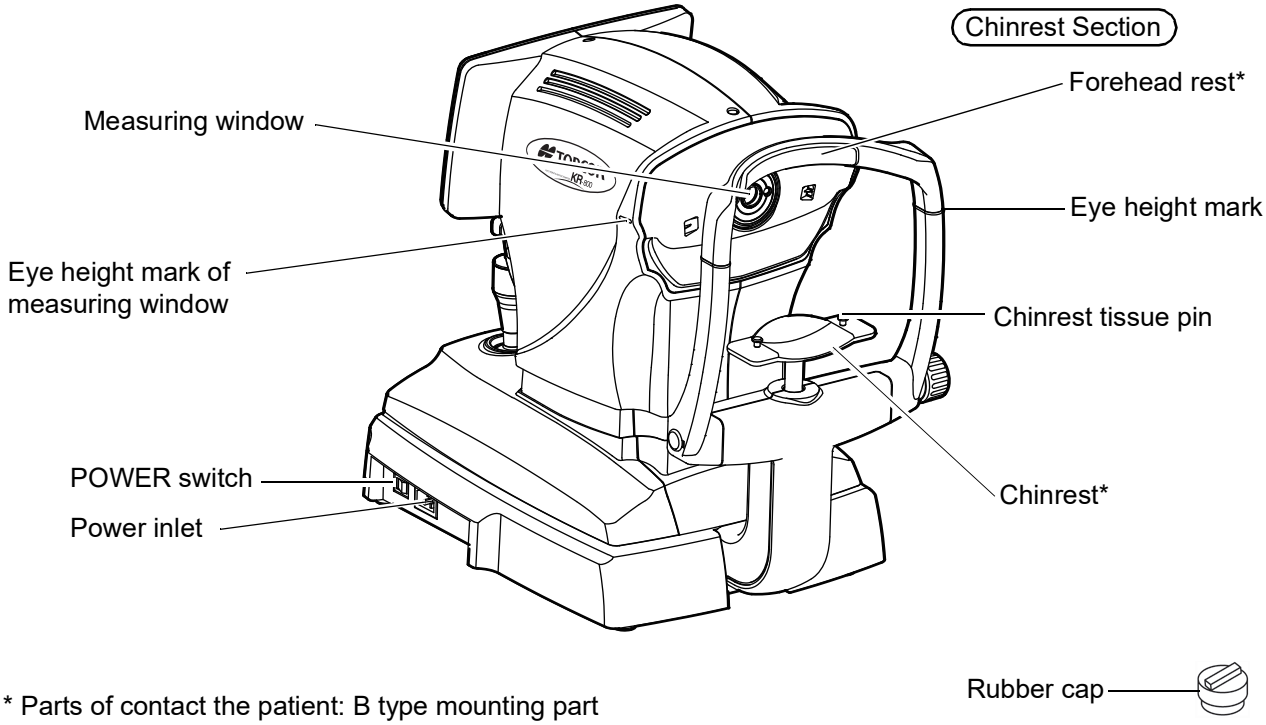
Power cord (1)*1 	Chinrest tissue pin (2) 
Printer paper (2) 	Monitor cleaner (1) 
Chinrest tissue (1) 	Dust cover (1) 
Accessory case (1) 	User manual, Instruction manual*2, Unpacking and Assembling (1 each) 
Rubber cap (1) 	Model eye (1) 

*1 More than one power cord can be included on certain occasions.
*2 Depending on the destination, this is not attached.

COMPONENTS

COMPONENT NAMES





Rubber cap

* Parts of contact the patient: B type mounting part

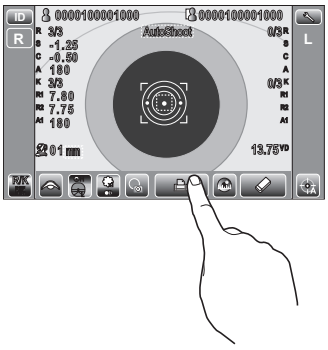
COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber
Chinrest : Acrylonitrile butadiene styrene resin

OPERATION METHOD OF CONTROL PANEL

NOTE	• The control panel is a touch panel. Do not use any sharp tools; e.g. ball point pen. • Do not touch two points on a control panel simultaneously.

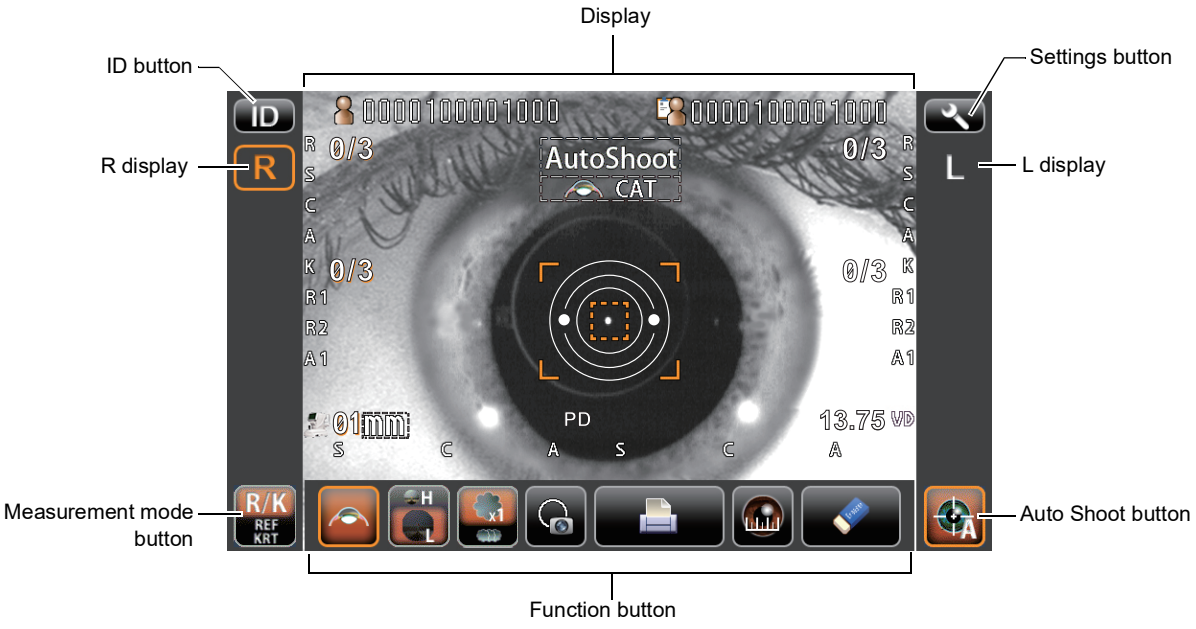
Tap → To select any relevant item.



Touch the control panel softly with a finger.

CONTROL PANEL COMPONENTS

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



ID 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.

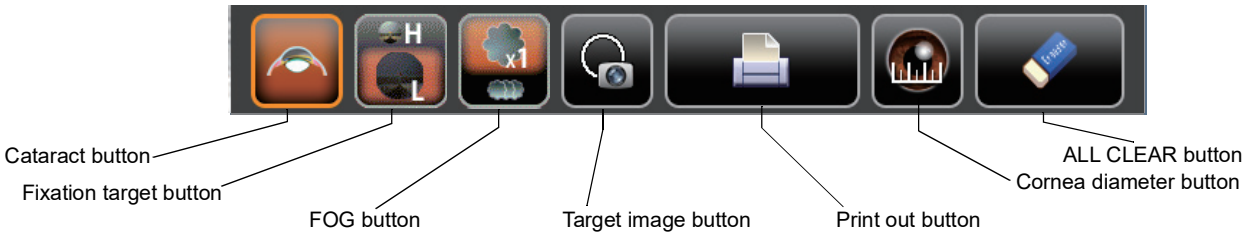
R/K REF KRT Measurement mode button.....Selects a measurement mode from REF, KRT and R/K. (Only in KR-800)

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

Auto Shoot button .....Selects Auto Shoot/Manual mode.
When selected, "Auto Shoot" is displayed on the control panel, and this button is framed in orange. (Only in KR-800)

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

FUNCTION BUTTON



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

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

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

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

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

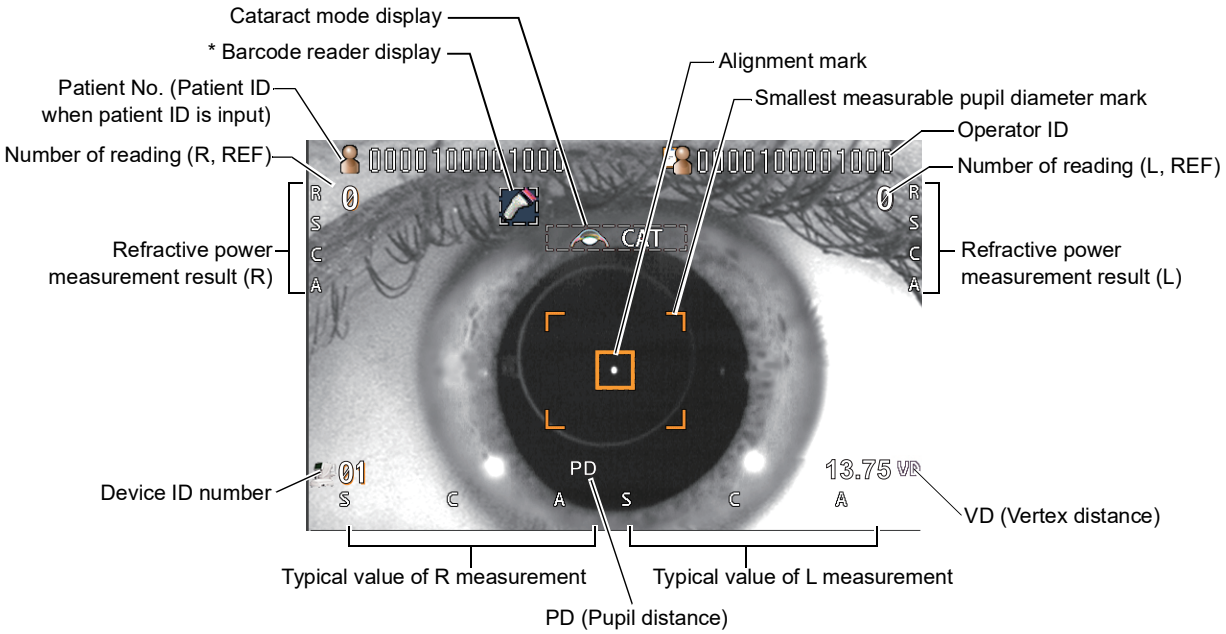
Cornea diameter button.....Changes to cornea diameter measurement mode.
(Only in KR-800)

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

MONITOR SCREEN

MEASUREMENT SCREEN

RM-800

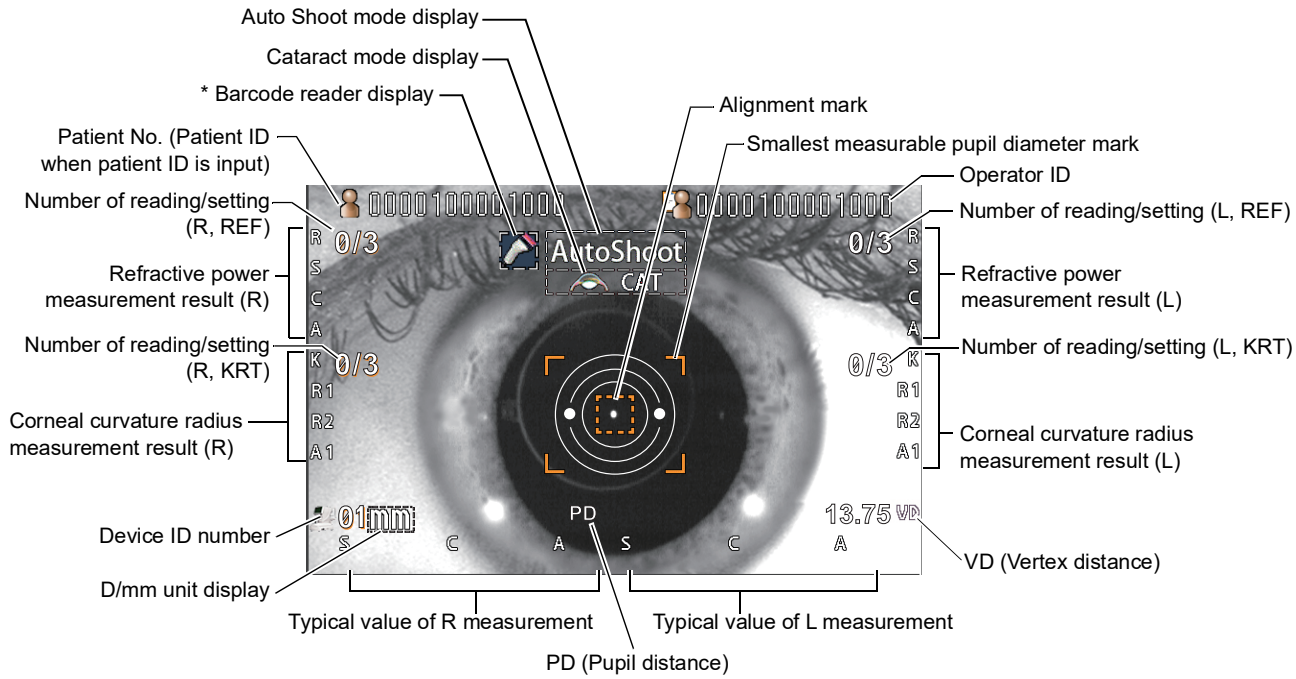


* Displayed when the barcode reader is connected.

: Barcode reader is in readable.

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

KR-800

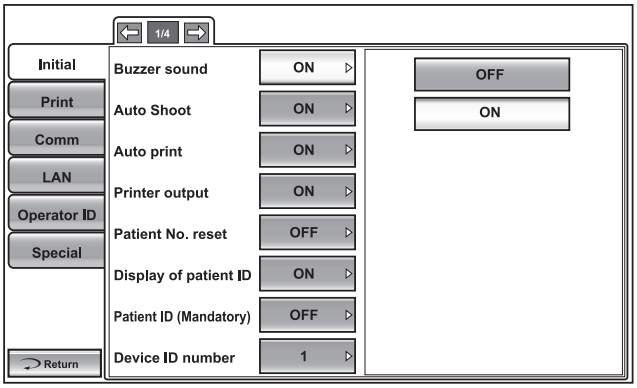


* Displayed when the barcode reader is connected.

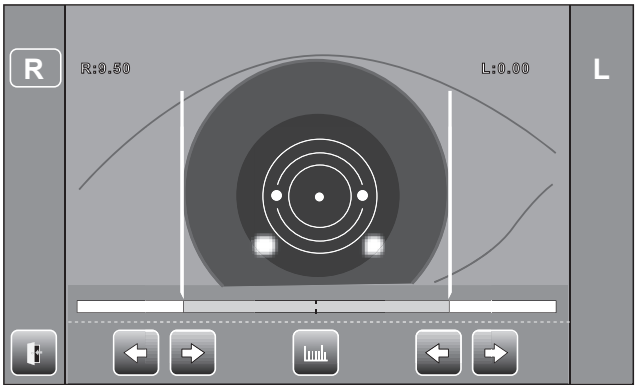
: Barcode reader is in readable.

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

SETTINGS SCREEN

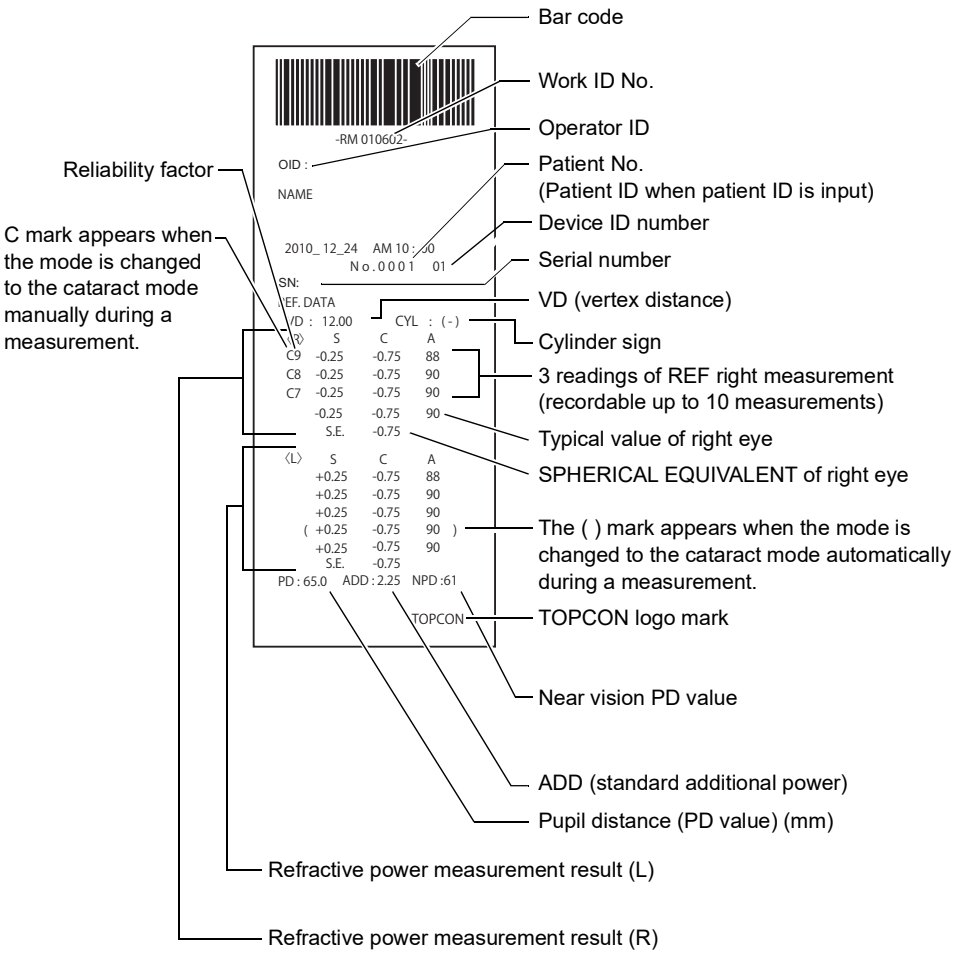


CORNEA DIAMETER MEASUREMENT SCREEN (ONLY IN KR-800)



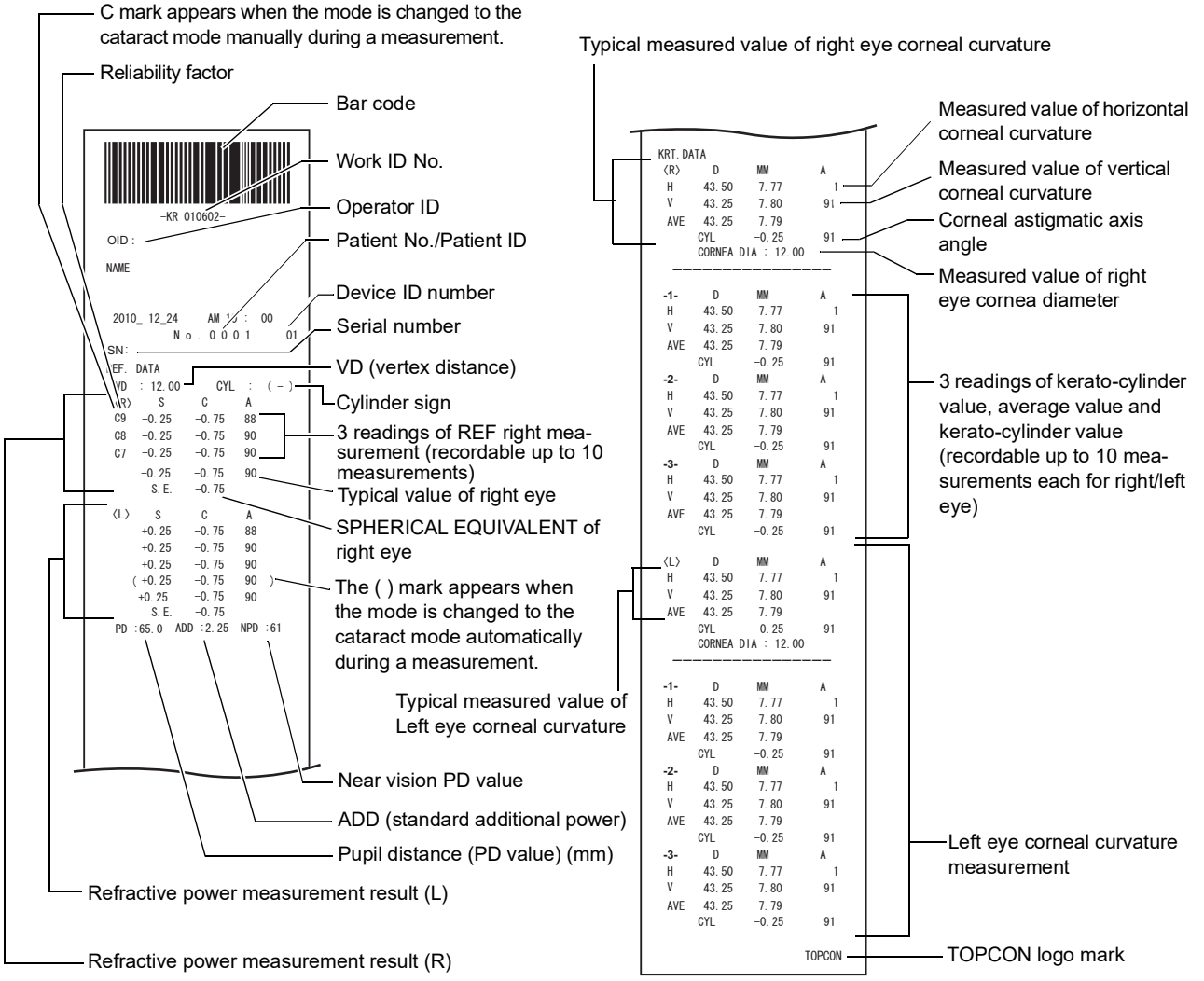
PRINTER OUTPUT

RM-800



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. • ( ) 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.

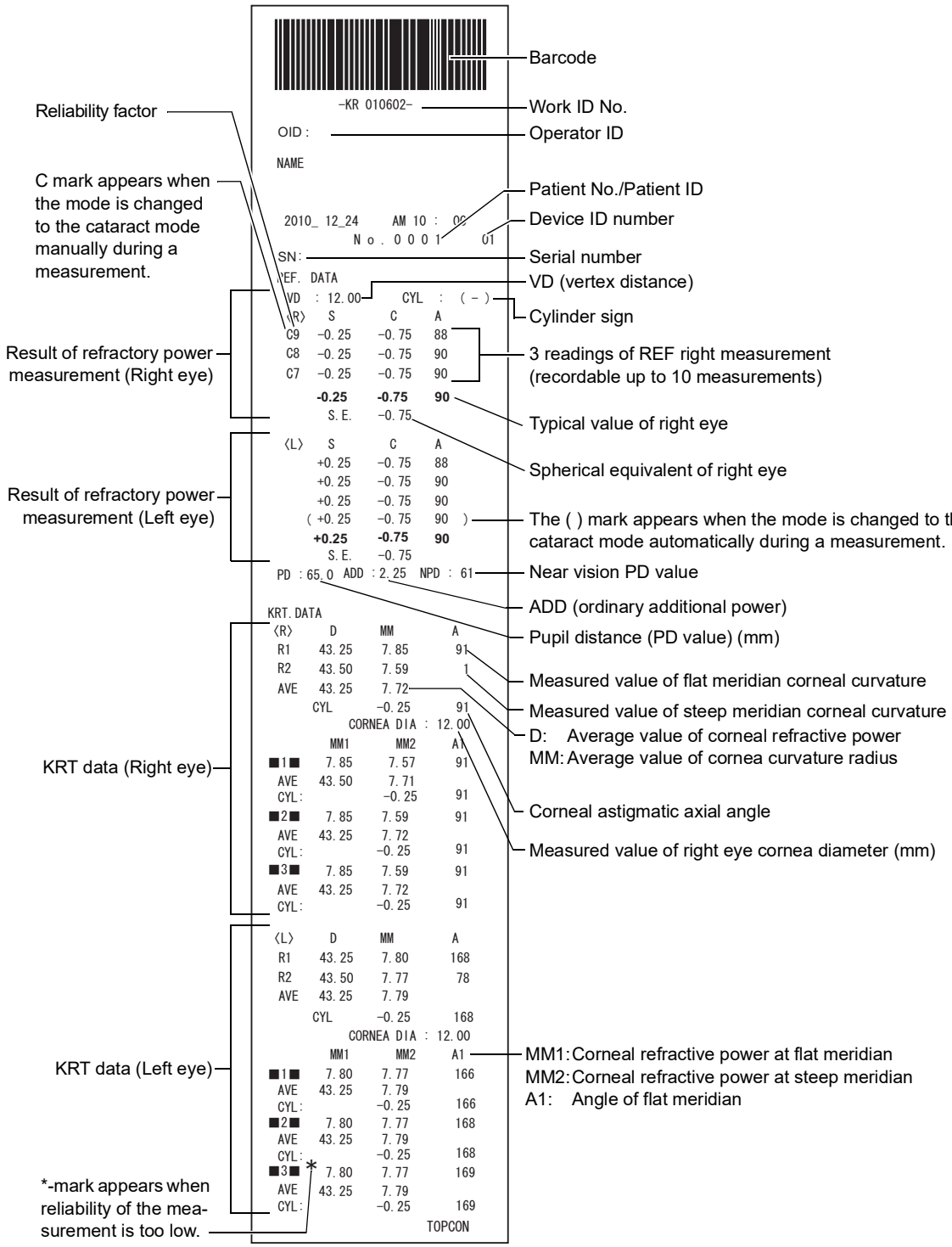
KRT typical value style and KRT print data are HV



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	OFF	ON	ON	ON
	Date	ON	ON	ON	ON
	Date style	DMY*2	DMY*2	DMY*2	DMY*2
	Patient No./Patient ID	OFF	ON	ON	ON
	Device ID	OFF	OFF	OFF	OFF
	Serial number	OFF	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

*1 : Only in KR-800
*2 : Depending on the destination, preset values differ.

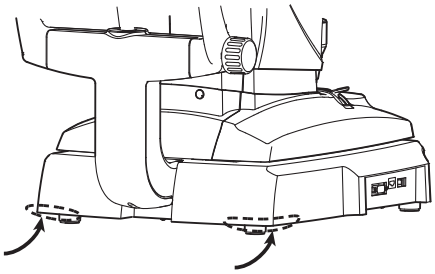
PREPARATIONS

INSTALLATION

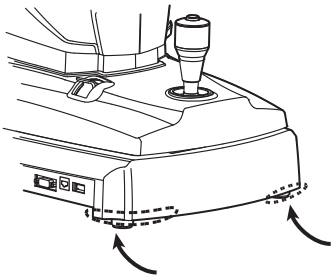
⚠ CAUTION	• When moving the instrument, two people should lift from the bottom of the device. One person lifting the device may cause harm to his back or injury by falling parts. Also, holding areas other than the bottom and holding the External I/O terminal cover may cause injury, as well as damage to the instrument. • 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.

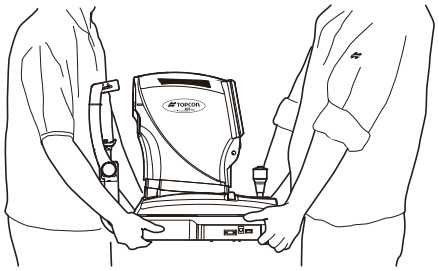
1 Use the base stopper to fix the main body.

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



Holding positions





Holding the instrument

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

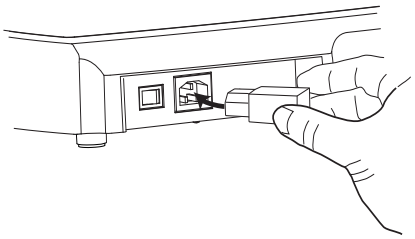
CONNECTING POWER CORD

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

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

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

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



CONNECTING EXTERNAL I/O TERMINALS

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

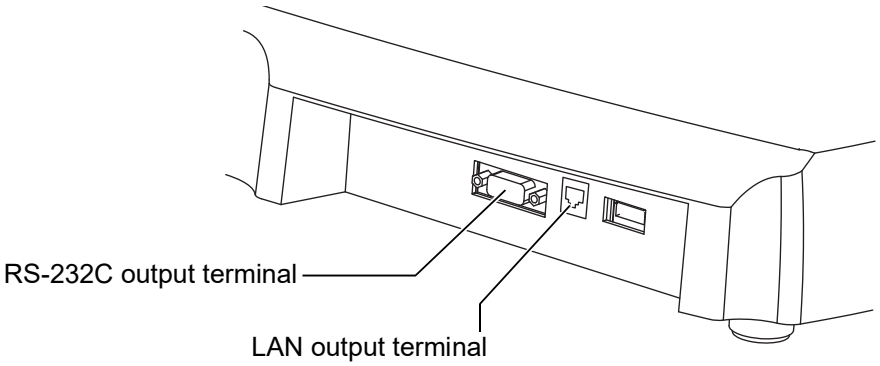
NOTE	When connecting this product with a commercial personal computer, use one conforming to IEC62368-1, with a separation unit.

DATA OUTPUT

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

1 Connect the connection cable to the 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. • Do not align, measure, or output data during barcode data entering by barcode reader. If you enter data during these operations, the barcode may not be read normally. • Take care not to enter the wrong patient information. It may be mistaken for information from another patient.

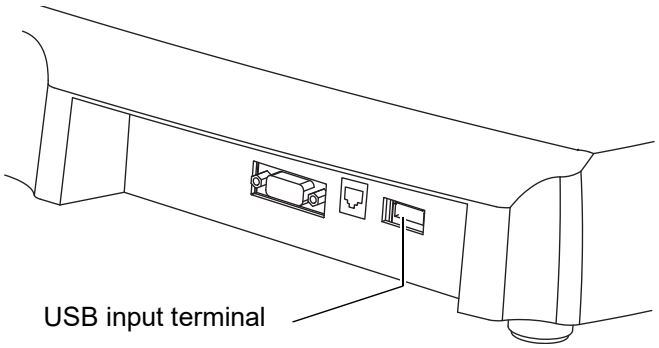
This product can be connected to a barcode reader and other external devices via USB.

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

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

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

NOTE	For questions about connections, contact your TOPCON dealer.

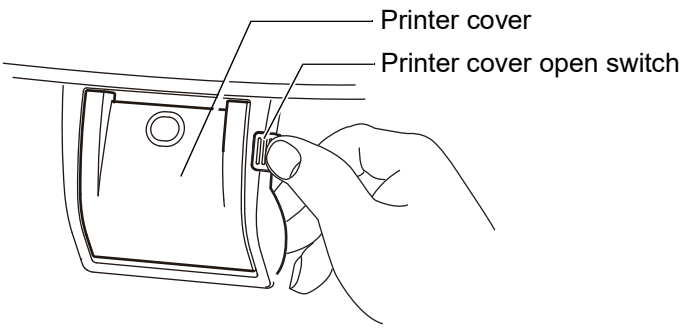


PRINTER PAPER SETTING

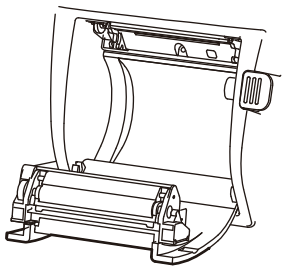
CAUTION	• When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer cover open button is pressed. • To avoid failure or potential injury, do not open the printer cover while the printer is in operation. • 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. • 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 you insert the printer paper backwards, printing will not start. • Please push the printer cover OPEN switch 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 switch is pressed.

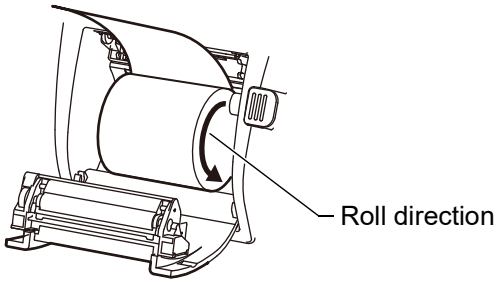
1 Press the printer cover open switch to open the printer cover.



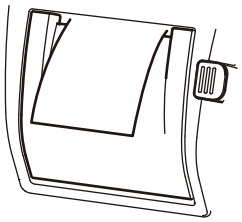
2 Open the printer cover to the limit.



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 switch. 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 or operate the control lever.
In a few seconds, the measurement screen is displayed and measurement is enabled.

NOTE	The time to start the power save status can be changed in the initial setting "Start time of sleep mode" (see page 48).

BASIC OPERATIONS

PREPARATION BEFORE MEASUREMENT

TURNING ON THE INSTRUMENT

1 Make sure the power cord is connected properly.
For the details of connection, refer to "CONNECTING POWER CORD" on page 21.

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.

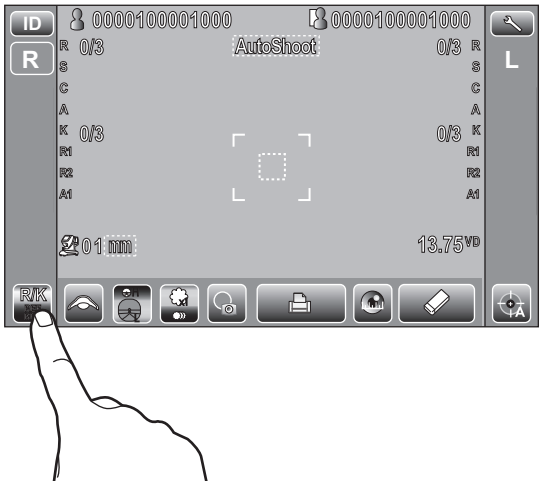
SELECTING THE MEASUREMENT MODE (ONLY IN KR-800)

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. 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 54.

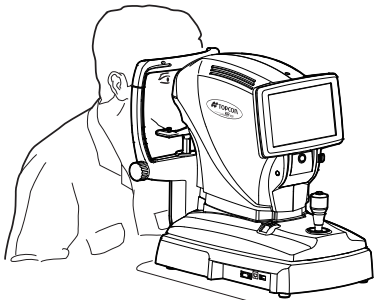
NOTE	• Adjust the height of the adjustable instrument table so that the patient can sit on the chair comfortably. Otherwise, correct measurement values may not be obtained.

1 Check the measurement screen.

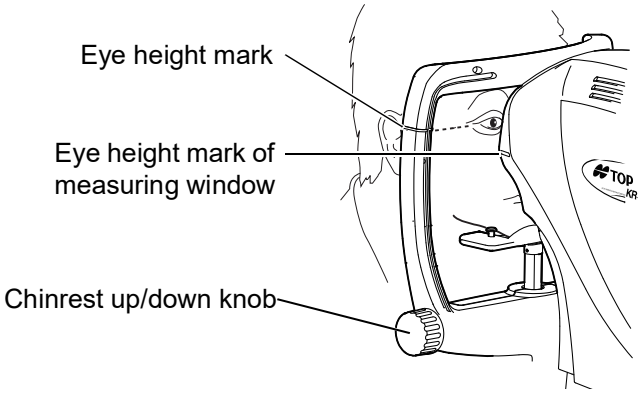
2 Have the patient sit in front of the instrument.

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

4 Place the patient's chin on the chinrest and check that his/her forehead is touching to the forehead rest.



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



AUTO SHOOT MODE MEASUREMENT (ONLY IN KR-800)

CAUTION	When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument as specified in "CLEANING THE INSTRUMENT" on page 54.

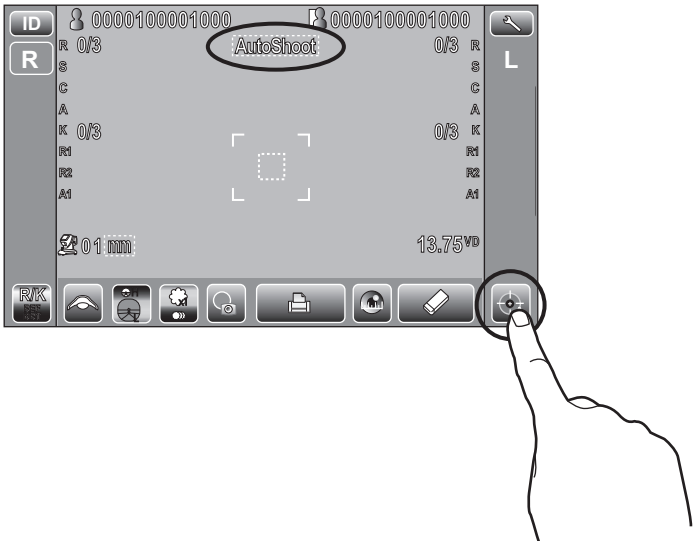
NOTE	• Auto Shoot mode measurement may not be possible, in case the eyelid and the eyelashes cover the pupil. If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid to allow for measurement. • Auto Shoot mode measurement may not be possible due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

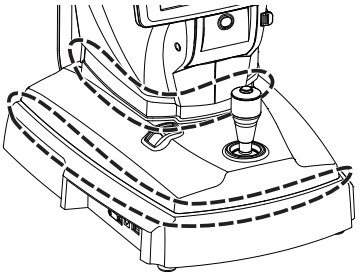
SETTING THE AUTO SHOOT MODE

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

1 Check the measurement screen. If [Auto Shoot] button is framed in orange, it is in Auto Shoot mode.

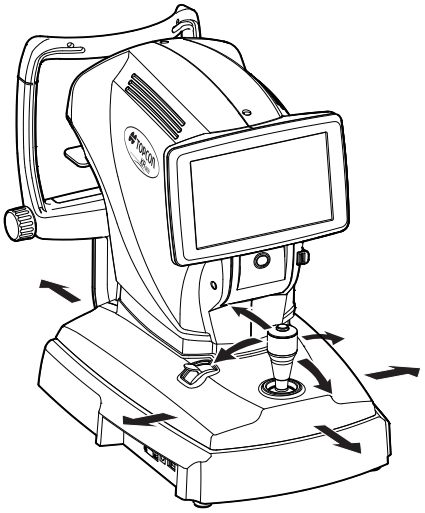
2 If [Auto Shoot] button is not framed in orange, it is in manual mode. Tap the Auto Shoot button to change to Auto Shoot mode.



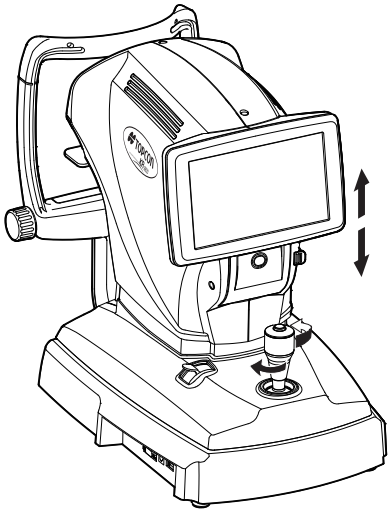
CAUTION	To avoid injury when operating the machine (for measurement and control panel operation), be careful not to approach the finger to space of movable part. 

Alignment operations are done with the control lever.

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



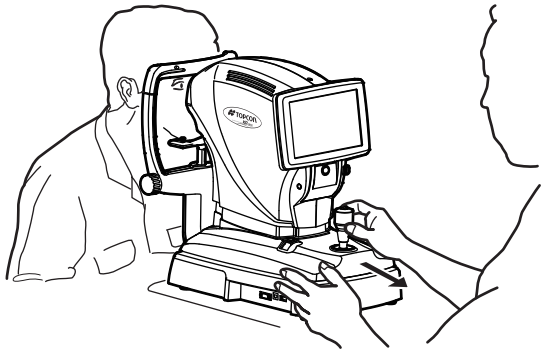
- The main body position can be fine-adjusted vertically by turning the control level right (up) and left (down).



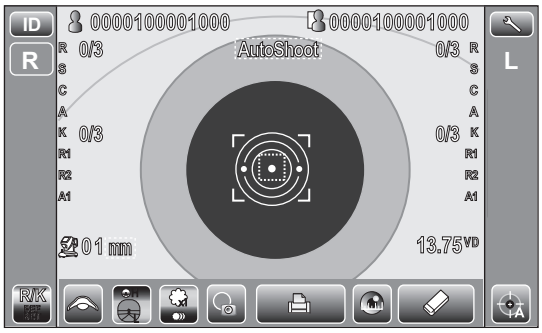
NOTE	If Auto Shoot mode measurement does not work, select manual mode. Auto Shoot mode measurement may not work depending on the cornea condition.

1 Use the base stopper to release the main body.

Hold the control lever and move the main body to the operator side.

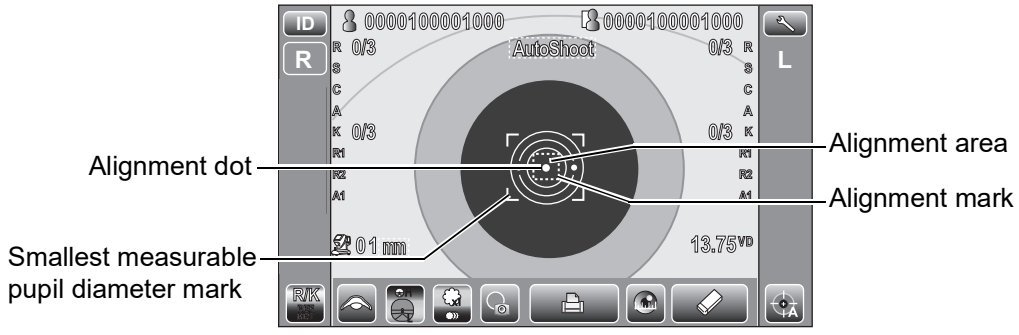


2 Operate the control lever laterally and vertically to obtain the target eye in the center of control panel screen.



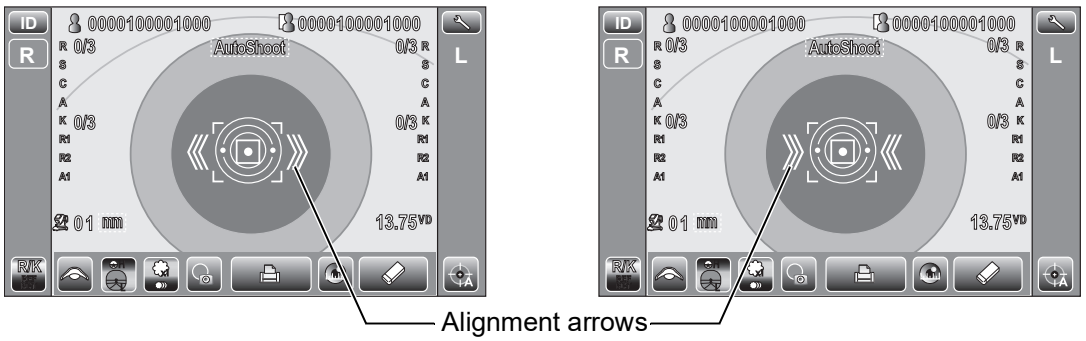
3 While moving the main body toward the patient, focus the target eye.

A vague, reflected alignment dot appears on the cornea.

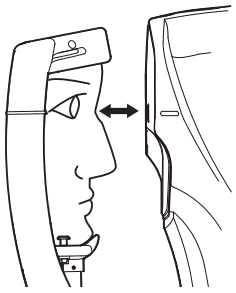


4 Fine-adjust the main body position in all directions so that the alignment dot point comes within the alignment area.

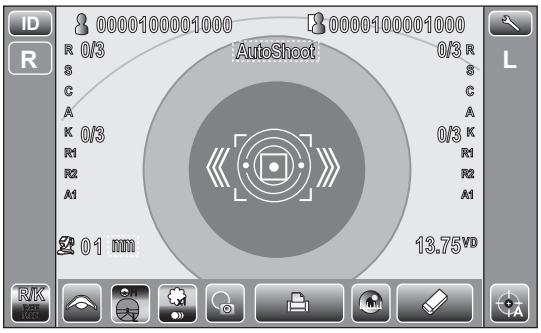
5 Keeping the alignment dot within the alignment area, slowly move the main body toward the patient. When the main body approaches the target eye, alignment arrows appear to the control panel screen.

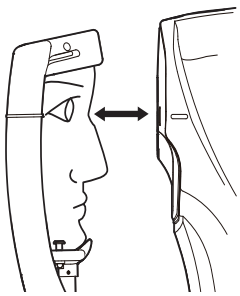


NOTE	• Do not allow the eyelash and eyelid to cover the smallest measurable pupil diameter mark to ensure stable measurement. • If the machine is too near to the patient in comparison with the optimal alignment position, the alignment arrows are displayed outward or if it is too far from the patient,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

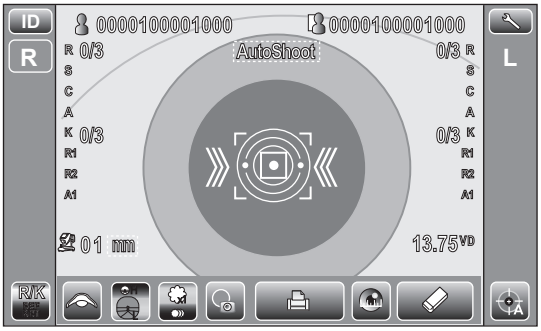


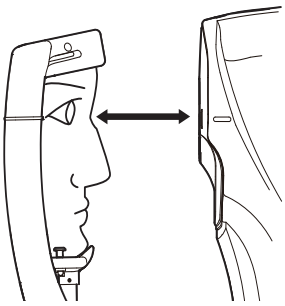
Too close



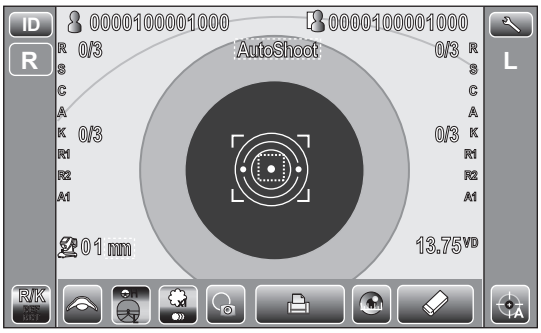


Too far





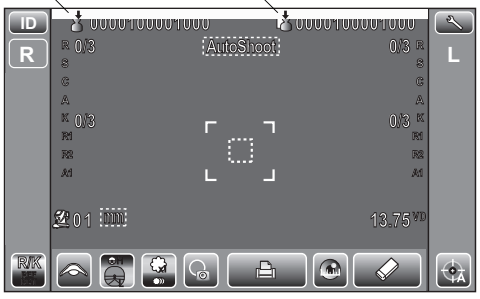
Positioning is incorrect at all.



NOTE

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

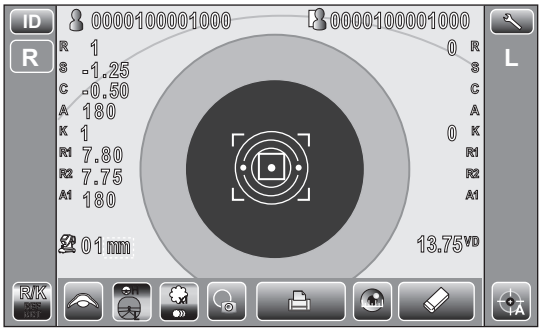
Limit mark



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

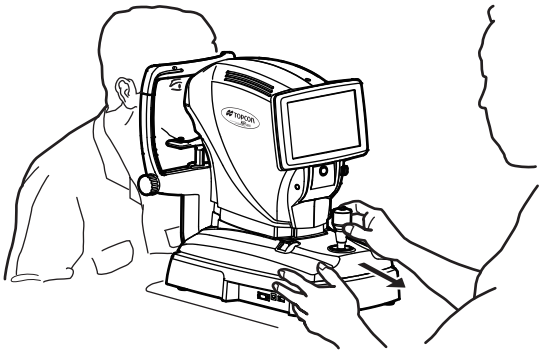
When the alignment arrows disappear, Auto shoot function is performed automatically at specified number of times of measurement.

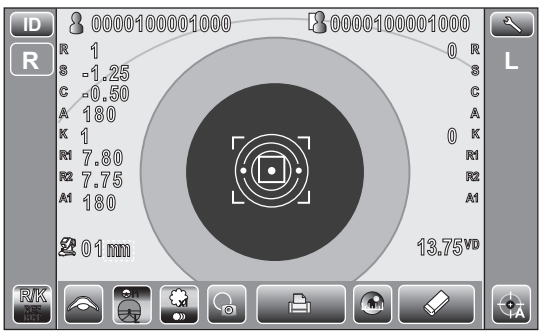
7 The latest measurement value is displayed on the control panel.



NOTE	• If Auto Shoot mode measurement does not work, select manual mode. Auto Shoot mode measurement may not work depending on the cornea condition. • If the machine is moved before measurement values are displayed, it might cause an incorrect measurement. • Auto print (available only under Auto Shoot mode) When auto print setting is "ON" in the initial setting, the buzzer sounds twice after measuring the right and left eyes, and measurement results are printed out automatically. • When auto print setting is "OFF" in the initial setting, print out measurement results by tapping the Print button, as necessary. (Only in KR-800)

8 If both eye measurements are required, hold the control lever and pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from 1 on page 29.





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.

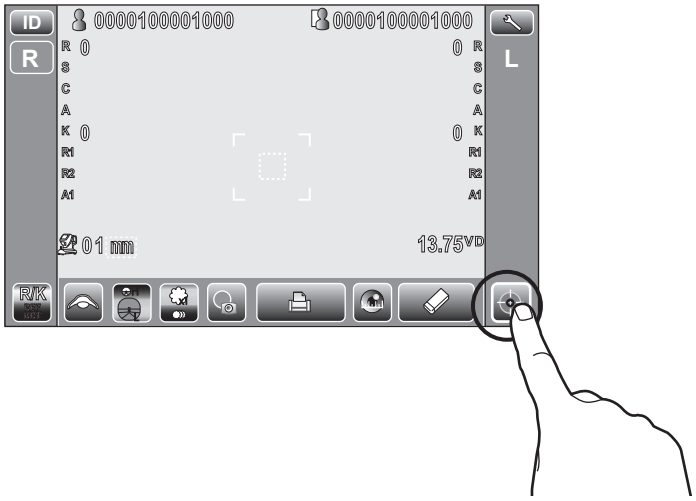
NOTE	For explanation of the messages on the control panel screen, refer to "MESSAGE LIST" on page 59.

MANUAL MODE MEASUREMENT

SETTING THE MANUAL MODE (ONLY IN KR-800)

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

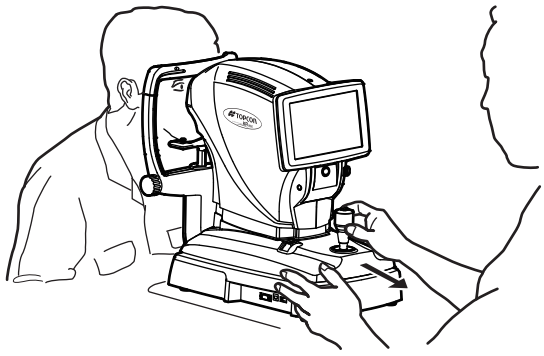
2 If [Auto Shoot] button is framed in orange, it is in Auto Shoot mode. Tap the [Auto Shoot] button to change to manual mode.



ALIGNMENT AND MEASUREMENT

Alignment is operated on the control panel.
For the adjustment of main body using the control lever, refer to page 28.

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

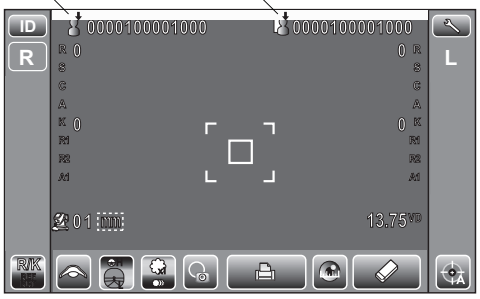


2 Operate the control lever laterally and vertically to obtain the target eye in the center of monitor screen.

NOTE	If the pupil is not displayed on the control panel, move the measuring head, checking the eye height mark on the measurement window as a guide (see page 26).

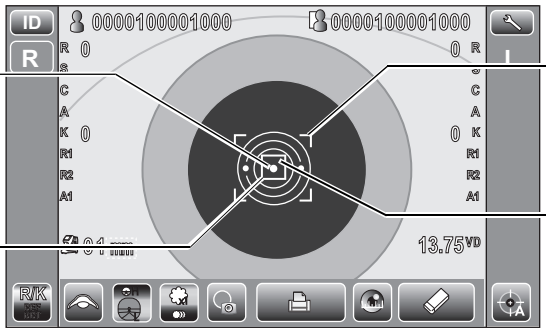
NOTE	When the measuring head has reached the limit of movement (vertical/ lateral directions), a yellow-colored limit mark appears on the control panel's top, showing it is the movement limit in that direction. Move the measuring head or chinrest to a position that aligning is possible.

Limit mark



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

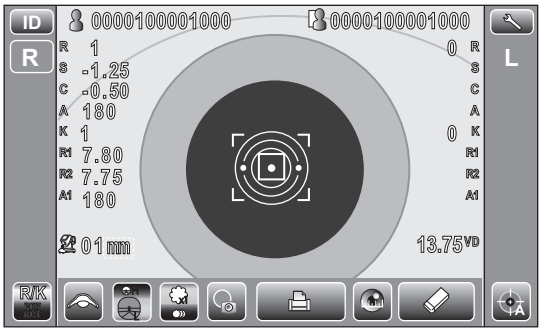
A vague, reflected alignment dot appears on the cornea.



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

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

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



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

DISPLAYING MEASUREMENT VALUES

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

Figures only: Measurement was done correctly.

ERROR: Measurement was not done correctly.

NOTE	For explanation of the messages on the control panel screen, refer to "MESSAGE LIST" on page 59.

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.

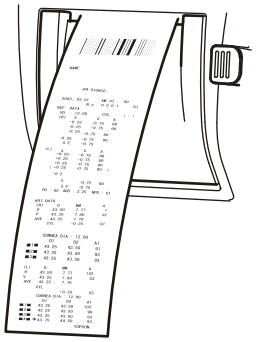
This instrument can print out measurement values by a printer.

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.

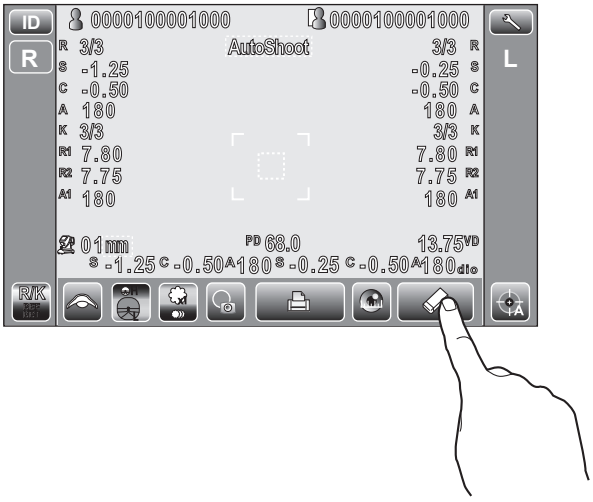
After being printed out, the measurement values on the screen are deleted automatically.



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 23. 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. Only in KR-800) • 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

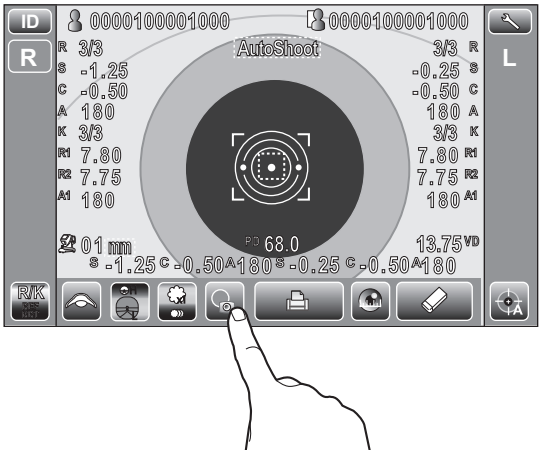
1 Tap the ALL CLEAR button on the control panel.
All measurement values of both eyes are cleared.



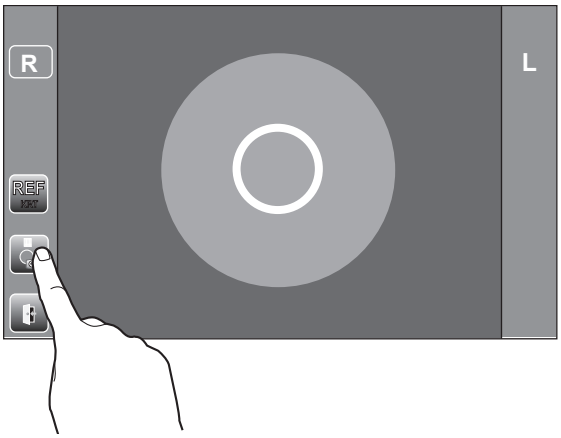
DISPLAYING ALL MEASUREMENT DATA

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 (Only in KR-800)."

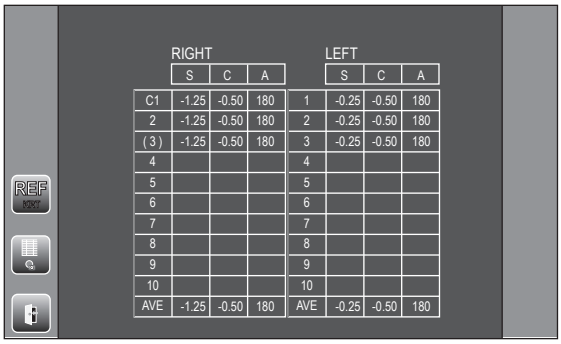
1 Tap the [TARGET IMAGE] button of the control panel.



2 Tap the [ALL DATA / TARGET] button.

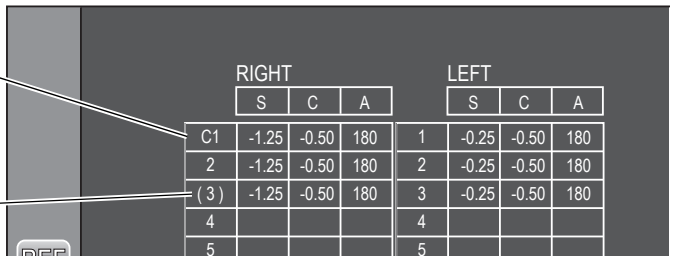


3 The Data Display screen is displayed.



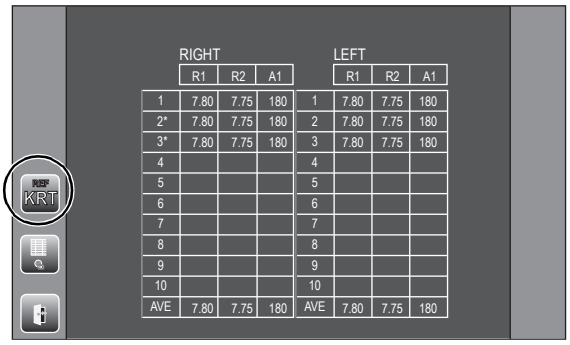
When measurement is performed with the Cataract button ON, "C" comes at the head of figures.

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



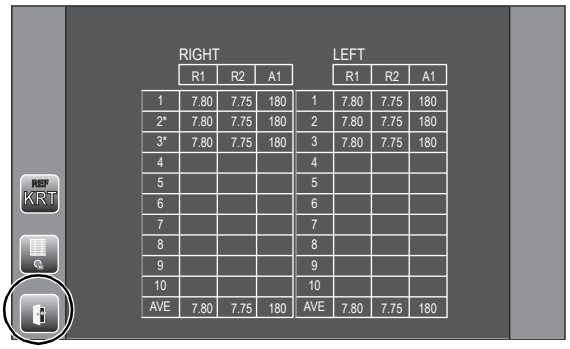
NOTE	When no data is memorized, the data table shows blank.

4 To change "REF data" and "KRT data (Only in KR-800)," 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 Cord 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.

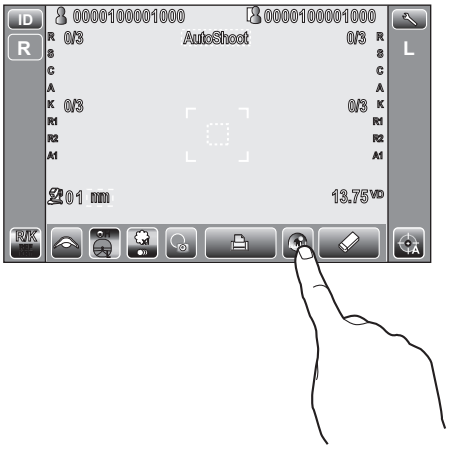
2 Tap keyboard on the screen and enter characters. Tap (OK) button and fix the input value.

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.

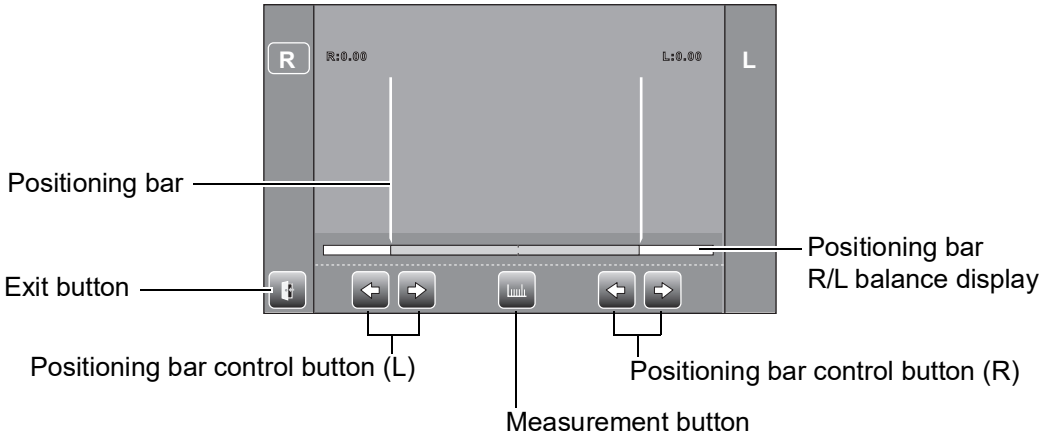
MEASUREMENT OF CORNEA DIAMETER (ONLY IN KR-800)

MEASUREMENT ON THE ACTUAL IMAGE

1 Tap the [CORNEA DIAMETER] button.

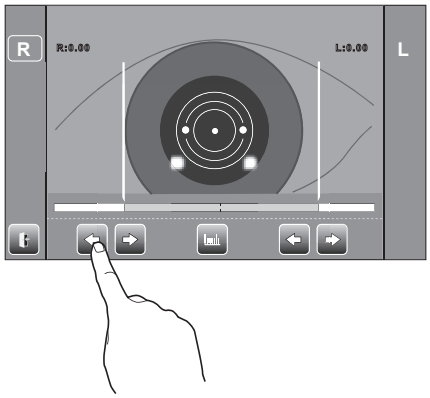


2 The Cornea Diameter Measurement screen is displayed, and the positioning bar is displayed.

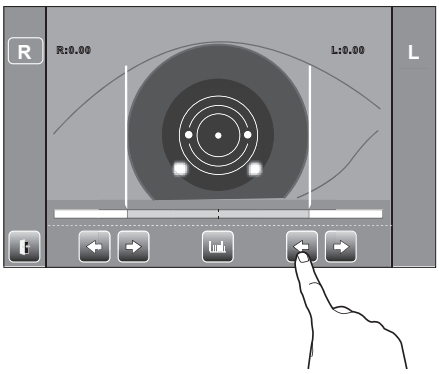


3 When the pupil is displayed, moves the measuring head so that the pupil image and alignment dot are at the center of the screen.

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



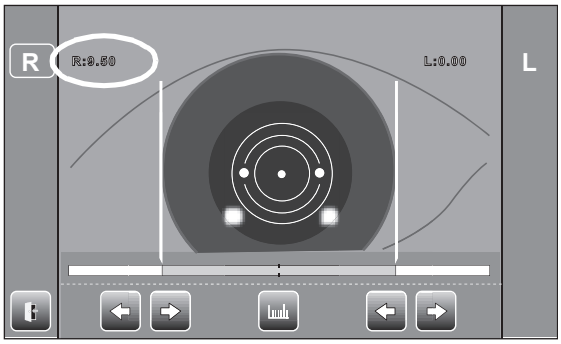
5 Using the [POSITIONING BAR CONTROL] button (R), move the right positioning bar to the right end of the iris from the control panel side.



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

6 Tap the [MEASUREMENT] button.

7 The cornea diameter is displayed.



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

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

MEASUREMENT ON THE STILL IMAGE

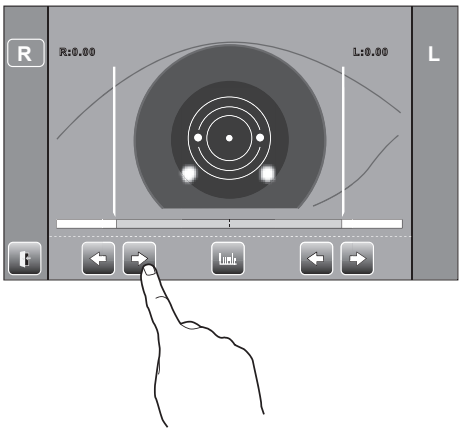
When KRT measurement values are available, the still image of the measurement is displayed.

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

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

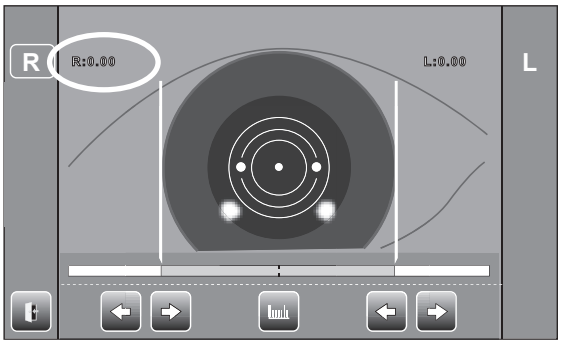
NOTE	If you are required to get the still image again, press the [MEASUREMENT switch] to return to actual image, and press the [MEASUREMENT switch] again.

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



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

5 The cornea diameter is displayed.



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

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

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 22.
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 bar code reader, etc. via the USB.

1. Check the connection of USB IN.
   For connection, refer to "CONNECTING EXTERNAL I/O TERMINALS" on page 22.
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 22.
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 59.

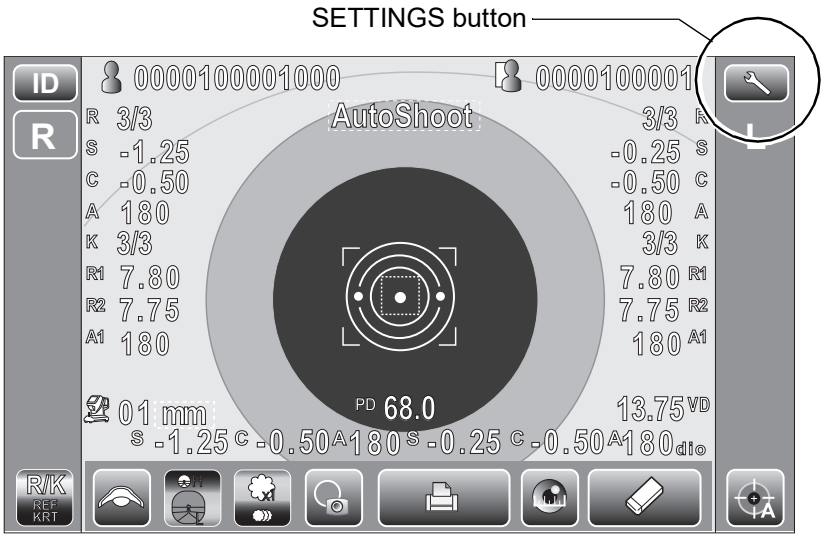
SETTING FUNCTIONS ON SETUP SCREEN

OPERATING THE SETUP SCREEN

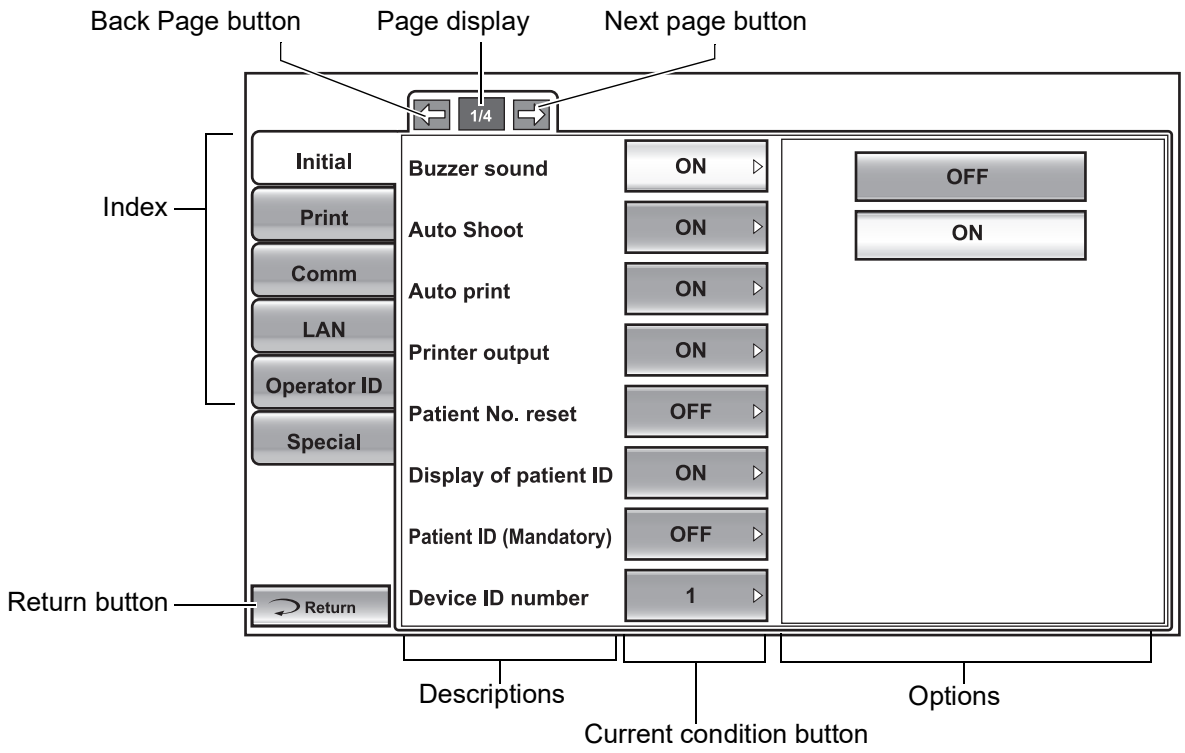
Various functions can be set on the SETUP screen.

PREPARATONS FOR SETTING

1. Make sure that the power cord is connected.
   For connection, refer to "CONNECTING POWER CORD" on page 21.
2. Turn ON the [POWER] switch.
3. Tap the [SETTINGS] button on the control panel.

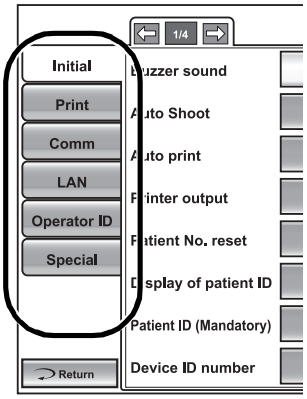


The SETUP screen is displayed.

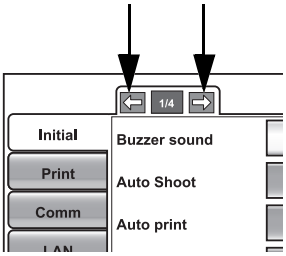


OUTLINE OF SETUP SCREEN OPERATIONS

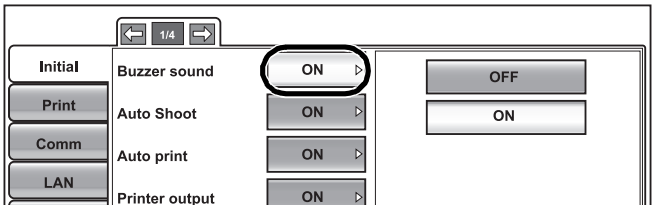
1 Tap [INDEX] and select the subject of setting.



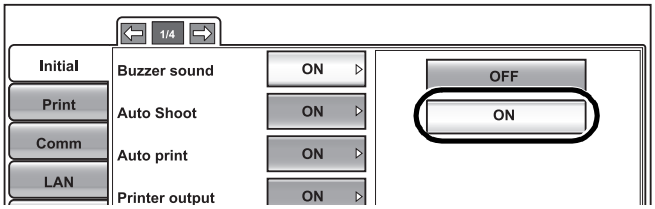
2 Operate the [NEXT PAGE] button or [BACK PAGE] button, as necessary, and display the page to confirm/change.



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

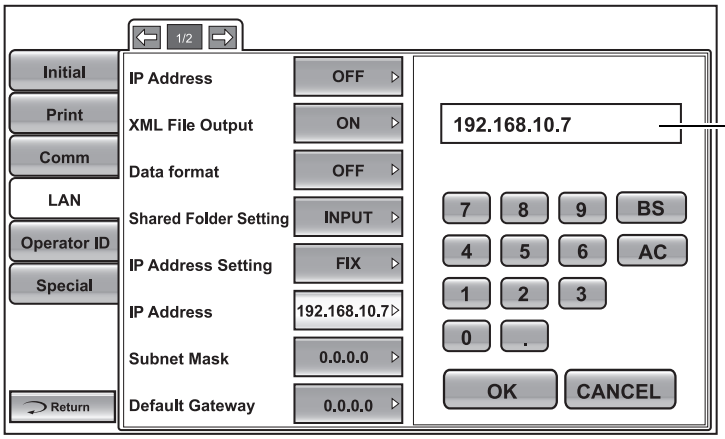


4 Tap the [OPTIONS] button and change the setting.

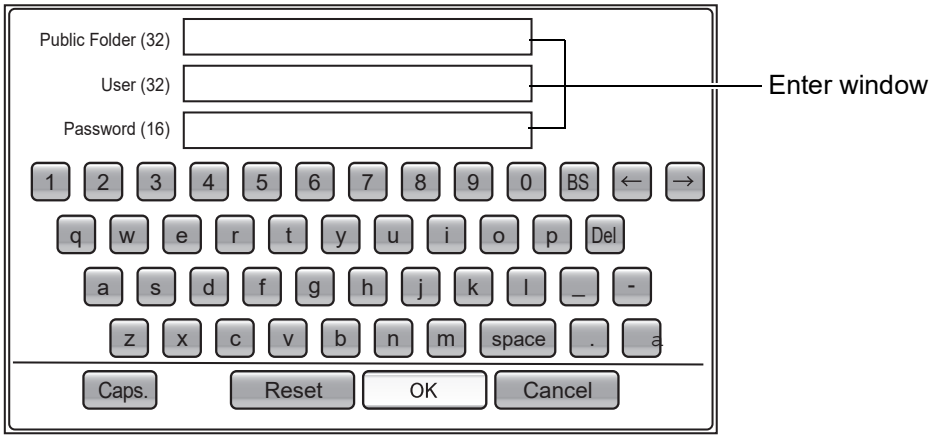


- Instead of the [OPTIONS] button, up/down buttons and ten-key would be displayed.

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.

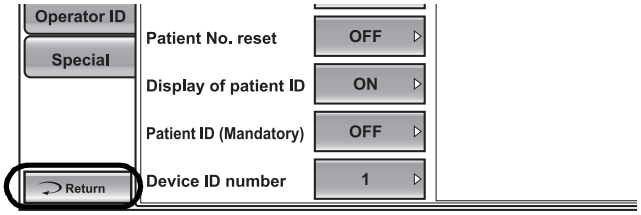


KEYBOARD:
Tap keyboard on the screen and enter characters. If there are several windows to enter, tap the window to enter the figure by keyboard. Tap [OK] and fix the input value.

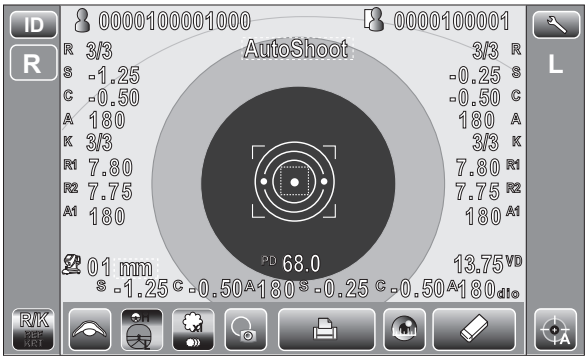


RETURNING TO THE MEASUREMENT SCREEN

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.	
Auto Shoot*	OFF	Default measurement mode is Manual.	ON
	ON	Default measurement mode is Auto Shoot.	
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).	

* : Depending on the destination, preset values differ.

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.	
Shaded character	OFF	Font style of measurement values is not shaded.	ON
	ON	Font style of measurement values is shaded.	

* : Only in KR-800

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 20.)	All
	–	Ave	Print format of preset is Ave. (For the details of "Ave," refer to "PRINTOUT FORMAT SETTING" on page 20.)	
	–	Classic*1	Print format of preset is Classic. (For the details of "Classic," refer to "PRINTOUT FORMAT SETTING" on page 20.)	
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.	OFF
		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*2
		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.	OFF
		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.	

*1 : Only in KR-800

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

	Description	Options	Details	Initial value
REF/KRT (Print setting on R/K mode) *	Print Layout	DATA	Measurement values are printed in terms of REF or KRT.	DATA
		R/L	Measurement values are printed in terms of Right or Left.	
	VD	OFF	VD value (Vertex distance) is not printed.	ON
		ON	VD value (Vertex distance) is printed.	
	Cylinder sign	OFF	Cylinder sign is not printed.	ON
		ON	Cylinder sign is printed.	
	Print form of REF result	ALL	All refractive measurements are printed.	ALL
		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.	

* : Only in KR-800

	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.	

* : Only in KR-800

DATA COMMUNICATION (COMM)

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

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

* : Only in KR-800

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.	
XML File Output	OFF	XML file is not output.	OFF
	ON	XML file is output.	
Data format	OFF	Data is not output.	OFF
	STD2	REF/KRT data are output in TOPCON STD2 format	
	STD4	REF/KRT data are output in TOPCON STD4 format	
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 RM-800/KR-800.	NONE
Subnet Mask	0.0.0.0 Set by ten-key display.	Subnet mask address of RM-800/KR-800.	NONE
Default Gateway	0.0.0.0 Set by ten-key display.	Default gateway address of RM-800/KR-800.	NONE
Primary DNS Server	0.0.0.0 Set by ten-key display.	Primary DNS Server number.	NONE
Secondary DNS Server	0.0.0.0 Set by ten-key display.	Secondary DNS Server number.	NONE

OPERATOR ID

OPERATOR contains settings related to Operator ID.

Description	Options	Details	Initial value
Use 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

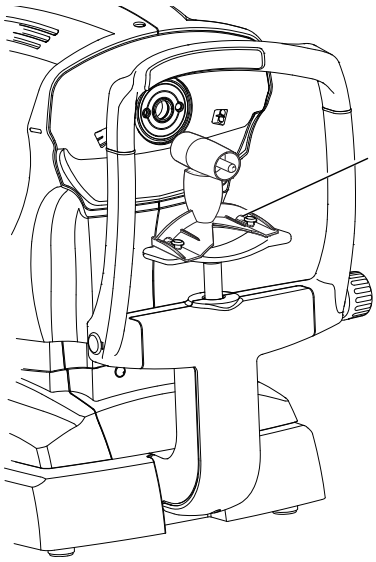
SPECIAL is the mode for service engineer only; it can not be accessed.

MAINTENANCE

DAILY CHECKUPS

CHECKING THE MEASURING ACCURACY

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



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

CLEANING THE INSTRUMENT

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

CLEANING THE FOREHEAD REST AND CHIN REST

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

CLEANING OF EXTERNAL INPUT / OUTPUT DEVICE

- Clean according to each instruction manual.

DAILY MAINTENANCE

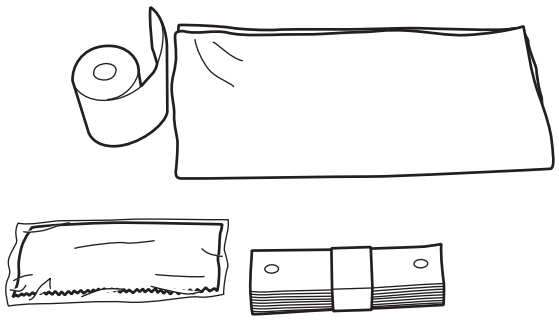
- For this instrument, dust may cause errors. When not in use, replace the measuring lens cap and dust cover.
- When not in use, turn off the POWER switch.

ORDERING CONSUMABLE ITEMS

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

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

Product name	Product code
Printer paper	44800 4001



USER MAINTENANCE ITEM

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

BRIGHTNESS ADJUSTMENT OF CONTROL PANEL

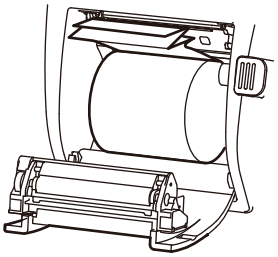
- The control panel is optimally adjusted when shipped.
- For control panel brightness adjustment, see "INITIAL (INITIAL SETTING)," "Control panel brightness" (page 49).

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.

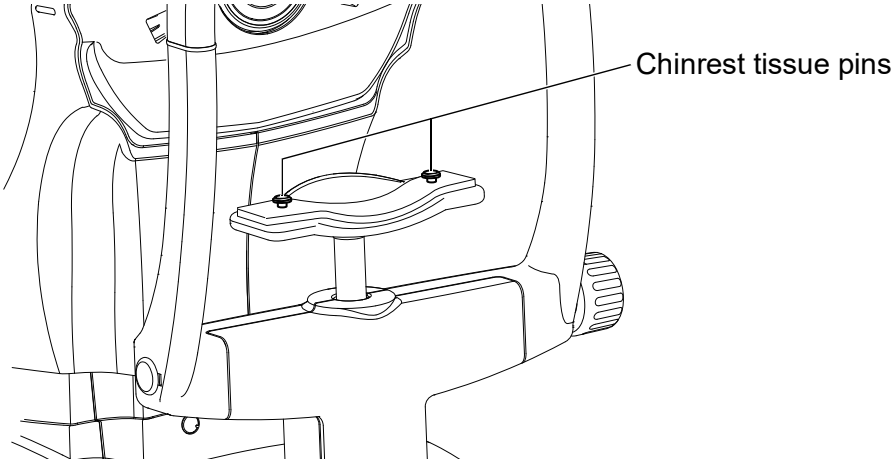
1 Open the printer cover, and take out the jammed paper pieces.

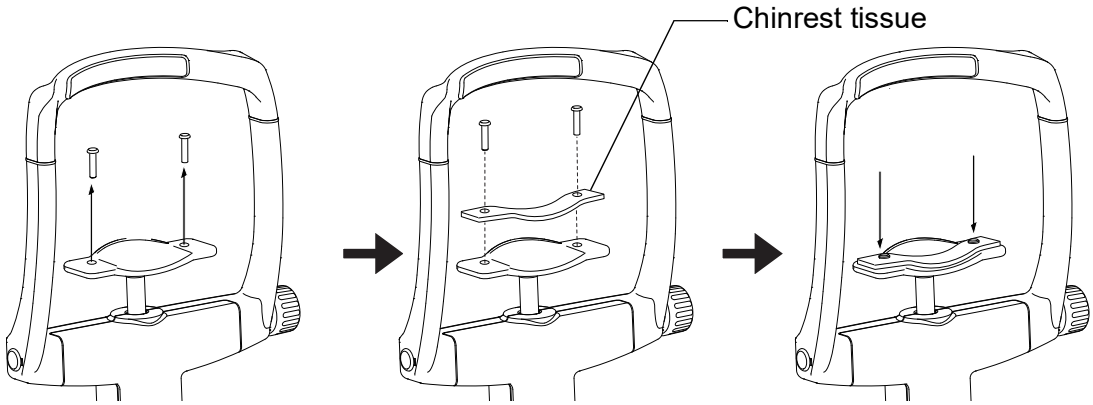


NOTE	If the power is turned on to start after removing the jammed printer paper, a blank sheet is printed out by tapping the printout button.

SUPPLYING THE CHINREST TISSUE

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





MAINTENANCE

CLEANING THE KERATO RING AND THE COVER

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

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

CLEANING THE CONTROL PANEL

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

CONTAMINATION BY DUST

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

CONTAMINATION BY FINGERPRINTS

Wipe with the attached monitor cleaner.

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

TROUBLESHOOTING

TROUBLE-SHOOTING OPERATIONS

MESSAGE LIST

"OVER-SPH"	Displayed when spherical power exceeds +22D or -25D. Measurement cannot be performed for out of measuring range.
"OVER-CYL"	Displayed when cylindrical power exceeds ±10D. Measurement cannot be performed for out of measuring range.
"OVER-R" *	Displayed when 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 cannot 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, 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.
"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.
"LAN hostname Error"	Failed in host name resolution of the destination (to be connected with the share folder). Confirm the inputted host name or DNS server address.
"LAN mount Error"	Failed in connection with the share folder. 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. Check if other program is accessing the share folder.
"RS-232C FAIL"	Displayed when failed in RS-232C data transmission or failed in initialization for RS-232C connection. Confirm that the RS-232C cable connection and the RS-232C setting are in the correct way.
"Please check the DATE/TIME"	The battery for the built-in clock becomes run down. - 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.

"Previous measurements are left. Please press the Clear button."	Displayed when the output of all output-set data fails. Previous measurements are left. Please tap the ALL CLEAR button.
"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. Turn off the main power switch, turn it on again. 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. Turn off the main power switch, turn it on again. When this message is displayed repeatedly, even if you turn the switch on again, please call your service engineer.

* : Only in KR-800

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 cord unplugged?	21
		Is power cord connected to the instrument?	21
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.	28
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.	23
	Paper does not come out.	If “PAPER END” displayed on control panel, replenish printer paper.	23

SPECIFICATIONS AND PERFORMANCE

SPECIFICATIONS AND PERFORMANCE

RM-800

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
PD measurement	20-85mm (0.5mm display unit)
External I/O terminal	USB(for Import), RS-232C(for Export), LAN(for Export)

KR-800

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)

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 REFRACTOMETER RM-800, AUTO KERATO-REFRACTOMETER KR-800 are medical devices, the operation should be supervised by a physician.

ENVIRONMENTAL CONDITIONS OF USE

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

STORAGE, USAGE PERIOD

1. Environmental conditions (without package)
   *Temperature: 10°C to 40°C
   Humidity: 10% to 95% (without condensation)
   Pressure: 700hPa to 1060hPa
   *** THIS INSTRUMENT DOES NOT MEET THE TEMPERATURE REQUIREMENTS OF ISO 15004-1 FOR STORAGE. DO NOT STORE THIS INSTRUMENT IN CONDITIONS WHERE THE TEMPERATURE MAY RISE ABOVE 40°C OR FALL BELOW 10°C.**
2. When storing the instrument, ensure that the following conditions are met:
   (1) The instrument must not be splashed with water.
   (2) Store the instrument away from environments where pressure, temperature, humidity, ventilation, sunlight, dust, salty/sulfurous air, etc. could cause damage.
   (3) Do not store or transport the instrument on a slanted or uneven surface or in an area where it is subject to vibrations or instability.
   (4) Do not store the instrument where chemicals are stored or gas is generated.
3. Normal life span of the instrument:
   8 years from delivery providing regular maintenance is performed [TOPCON data]

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN STORAGE

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

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

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN TRANSPORTATION

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

Temperature: -40°C to 70°C

Humidity: 10% to 95%

Pressure: 700hPa to 1060hPa

ELECTRIC RATING

Source voltage: 100-240V AC

Frequency: 50-60Hz

Power input: 30-70VA

SAFETY DESIGNATIONS PER IEC 60601-1 STANDARD

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

DIMENSIONS AND WEIGHT

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

Weight: 15kg

OPERATION PRINCIPLE

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

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

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

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

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

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

Guidance and manufacturer's declaration - electromagnetic immunity			
The RM-800/KR-800 is intended for use in the electromagnetic environment specified below. The customer or the user of the RM-800/KR-800 should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 8 kV contact ± 15 kV air	± 8 kV contact ± 15 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines Repetition frequency 100kHz	± 2 kV for power supply lines ± 1 kV for input/output lines Repetition frequency 100kHz	Main 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	Main power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<0% U_T for 0.5 cycle (with phase angle 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 0% U_T for 1 cycle 0° 70% U_T for 25/30 cycles 0° 0% U_T for 250/300 cycles	<0% U_T for 0.5 cycle (with phase angle 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°) 0% U_T for 1 cycle 0° 70% U_T for 25/30 cycles 0° 0% U_T for 250/300 cycles	Main power quality should be that of a typical commercial or hospital environment. If the user or the RM-800/KR-800 requires continued operation during main power interruptions, it is recommended that the RM-800/KR-800 be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. main voltage prior to application of the test level.			

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

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

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

REQUIREMENTS FOR THE EXTERNAL DEVICE

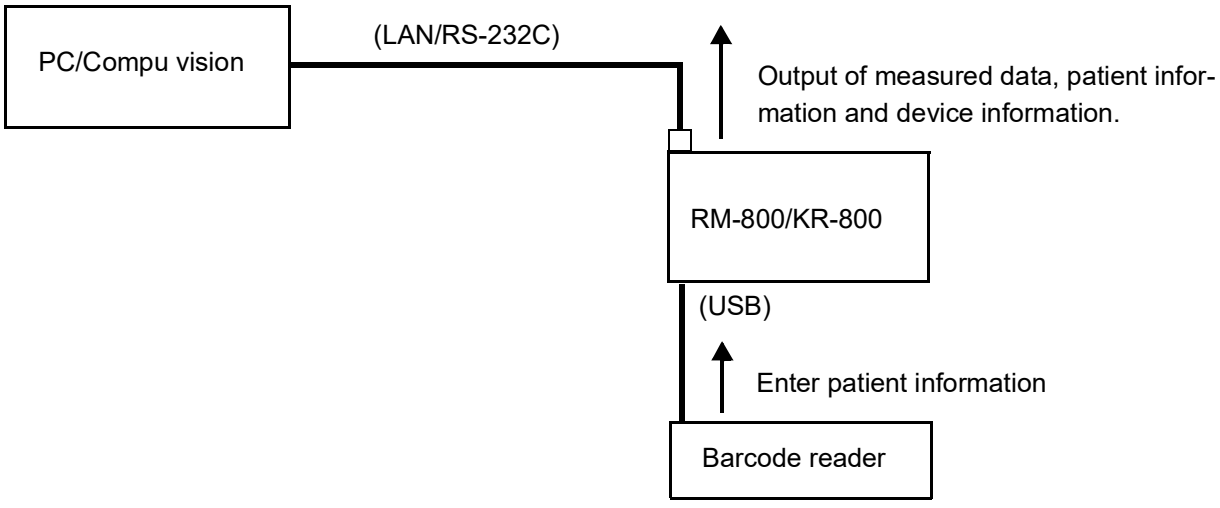
The external device connected to the analog and digital interfaces must comply with the respective IEC or ISO standards (e.g. IEC 62368-1 for data processing equipment and IEC 60601-1 for medical equipment).
Anybody connecting additional equipment to medical electrical equipment configures a medical system and is therefore responsible that the system complies with the requirements for medical electrical systems. Attention is drawn to the fact that local laws take priority over the above mentioned requirements. If in doubt, contact your dealer or TOPCON (see the back cover).

IT NETWORK ENVIRONMENT

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

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

  .

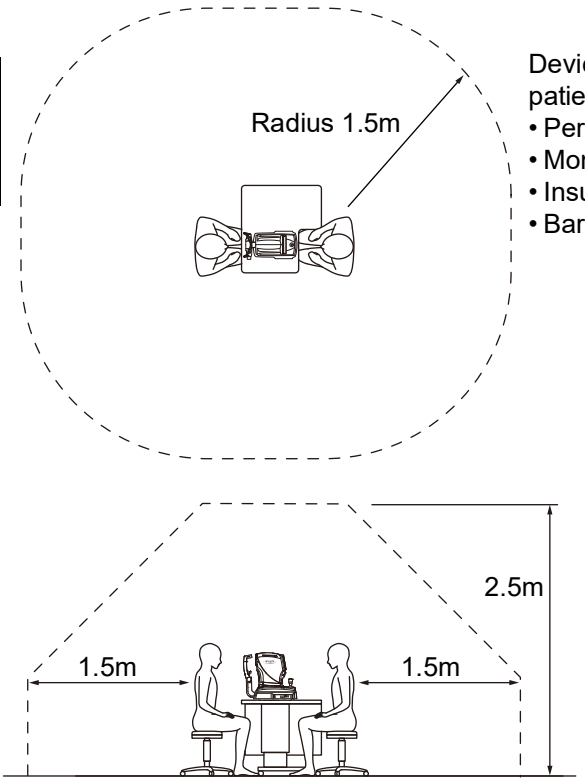


PATIENT'S ENVIRONMENT

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

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

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



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

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

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

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

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

REFERENCE

SHAPE OF PLUG

Country	Voltage/frequency	Shape of plug
Mexico	110V/50Hz	Type C&E
Argentina	220V/60Hz	Type A
Peru	220V/60Hz	Type A
Venezuela	110V/50Hz	Type C&E
Bolivia & Paraguay	220V/60Hz	Type A (Most common) 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
United States	120V/60Hz	Type A (Hospital Grade)
Canada	120V/60Hz	Type A (Hospital Grade)

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Please provide the following information when contacting us regarding questions about this instrument:

- Model name: RM-800,KR-800
- 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 REFRACTOMETER RM-800
AUTO KERATO-REFRACTOMETER KR-800

USER MANUAL

Revision 6
Date of issue 2023-2-14

Published by TOPCON CORPORATION

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AUTO REFRACTOMETER

RM-800

AUTO KERATO-REFRACTOMETER

KR-800

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