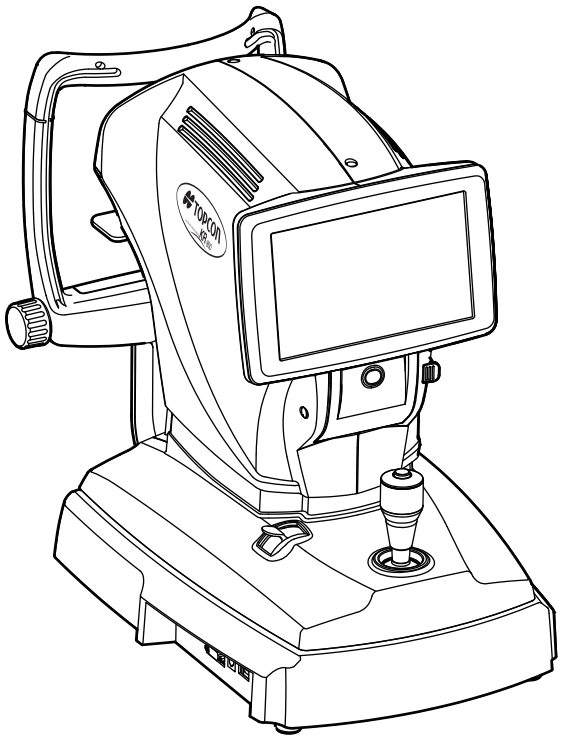
TOPCON



USER MANUAL

AUTO KERATO-REFRACTOMETER
KR-800S

INTRODUCTION

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

INTENDED USE / INDICATIONS FOR USE

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

FEATURES

This instrument features the following:

- The auto shoot function facilitates quick measurements under the optimal condition.
- This instrument is simple to operate and measures the refraction and corneal curvature of the eye.
- This instrument provides subjective refractive check (Far VA and Near VA). It is easy to perform contrast test, glare test and the test by grid display.

PURPOSE OF THIS MANUAL

This User Manual provides an overview of the basic operation, troubleshooting, checking, maintenance and cleaning of the TOPCON Auto Kerato-Refractometer KR-800S.
To get the best use of the instrument, read Safety Displays and Safety Cautions.
Keep this Manual at hand for future reference.

- Since this product is a precision instrument, always use and keep it in a normally controlled living environment, within a temperature range of 10-40°C, humidity levels between 30-90% and an atmospheric pressure range of 700hPa-1,060hPa.
- The instrument should also be placed away from direct sunlight.
- To ensure smooth operation, install the instrument on a level floor free of vibrations. Also, do not place anything on the instrument.
- Connect all cables properly before using.
- Use the power at a rated voltage.
- When not in use, switch off the power source and apply the rubber cap and dust cover.
- For accurate measurement results, take care to keep the measuring window clean and free of fingerprints, spots and dust.

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

Since this product partly uses a program derived from IPA Font, using the product is regarded as consent to the IPA Font License Agreement v1.0.
For the IPA Font License Agreement v1.0, see page 88 or the following URL.
http://ipafont.ipa.go.jp/ipa_font_license_v1.html

1. No part of this manual may be copied or reprinted, in whole or in part, without prior written permission.
2. The contents of this manual are subject to change without prior notice and without legal obligation.
3. The contents of this manual are correct to the best of our knowledge. Please inform us of any ambiguous or erroneous descriptions, missing information, etc.
4. Original Instructions
   This manual was originally written in English.

CONTENTS

GENERAL SAFETY INFORMATION

⚠ WARNINGS

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

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

⚠ CAUTIONS

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

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

Electromagnetic Compatibility (EMC)
This instrument has been tested (with 100/120/230V) and found to comply with IEC60601-1-2:Ed.3.0:2007. This instrument radiates radio frequency energy within standard and may affect other devices in the vicinity. If you have discovered that turning on/off the instrument affects other devices, we recommend you change its position, keep a proper distance from other devices, or plug it into a different outlet. Please consult your authorized dealer if you have any additional questions.

HOW TO READ THIS MANUAL

Read the instructions on pages 1 to 8 before using the machine.
Regarding connection to various devices, see "CONNECTING EXTERNAL OUTPUT 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 54.

GENERAL MAINTENANCE INFORMATION

USER MAINTENANCE

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

CLEANING OF MEASURING WINDOW

For details, See "CLEANING THE INSTRUMENT" on page 68.

DISCLAIMERS

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

DISPLAYS AND SYMBOLS FOR SAFE USE

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

DISPLAYS

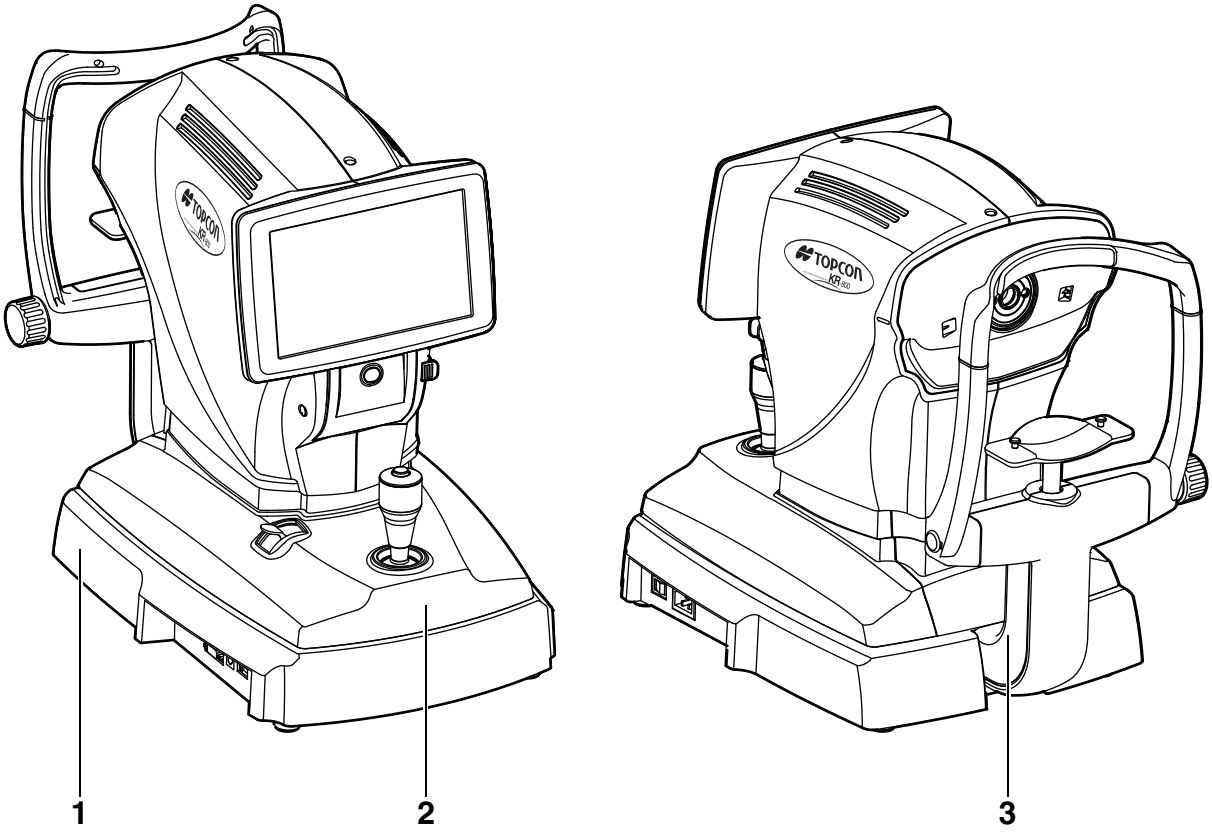
DISPLAY	MEANING
WARNING	A WARNING is provided to alert the user to potential serious outcomes (death, injury, or serious adverse events) to the patient or the user.
CAUTION	A CAUTION is provided to alert the user to use special care necessary for the safe and effective use of the device. They may include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

SYMBOLS

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

POSITIONS OF WARNING AND CAUTION INDICATIONS

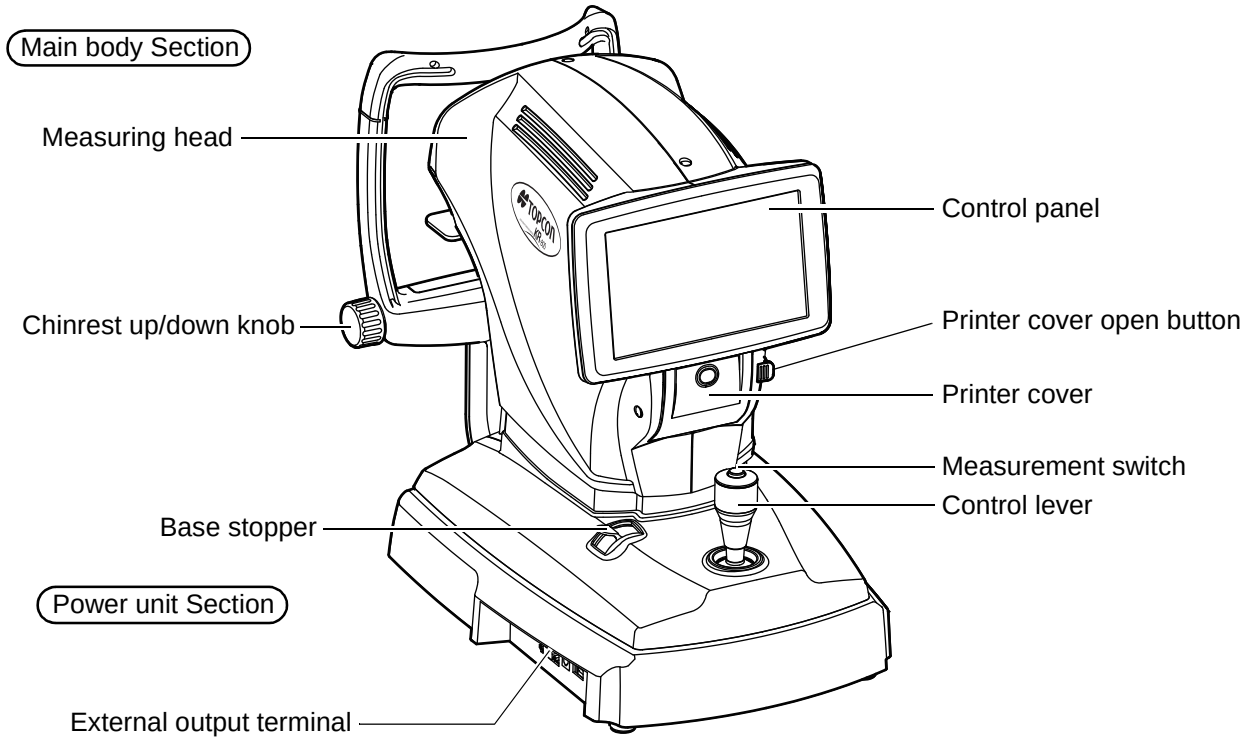
To secure safety, this equipment provides warnings.
Correctly use the equipment following these warning instructions. If any of the following marking labels are missing, please contact your dealer or TOPCON at the address stated on the back cover.

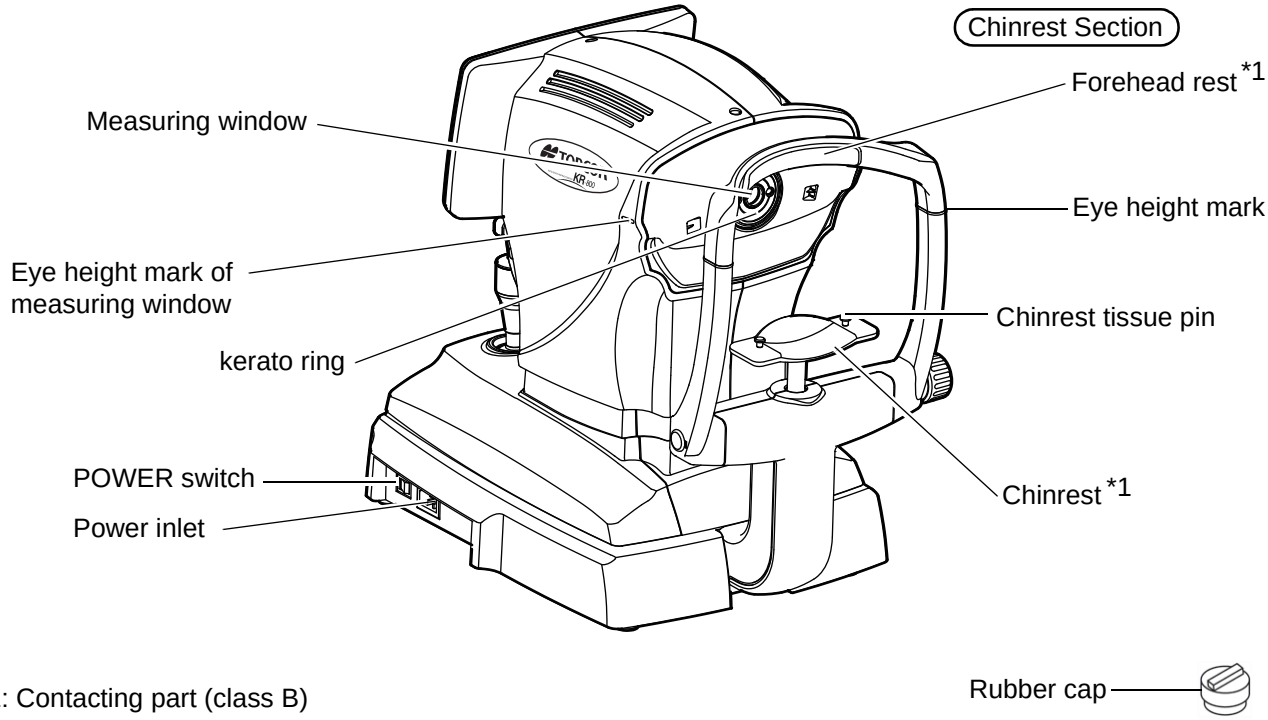


No.	Label	Meaning
1		**WARNING** To avoid injury caused by electric shock, do not open the cover. Ask your dealer for service.
2		**CAUTION** Be careful not to hit the patient's eyes or nose with the instrument during operation.
3		Degree of protection against electric shock: TYPE B APPLIED PART

COMPONENTS

COMPONENT NAMES





*1: Contacting part (class B)

Rubber cap

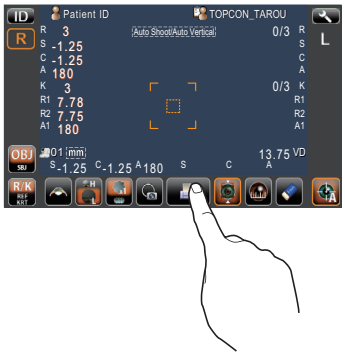
COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber
Chinrest : Acrylonitrile butadiene styrene resin

OPERATION METHOD OF CONTROL PANEL

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

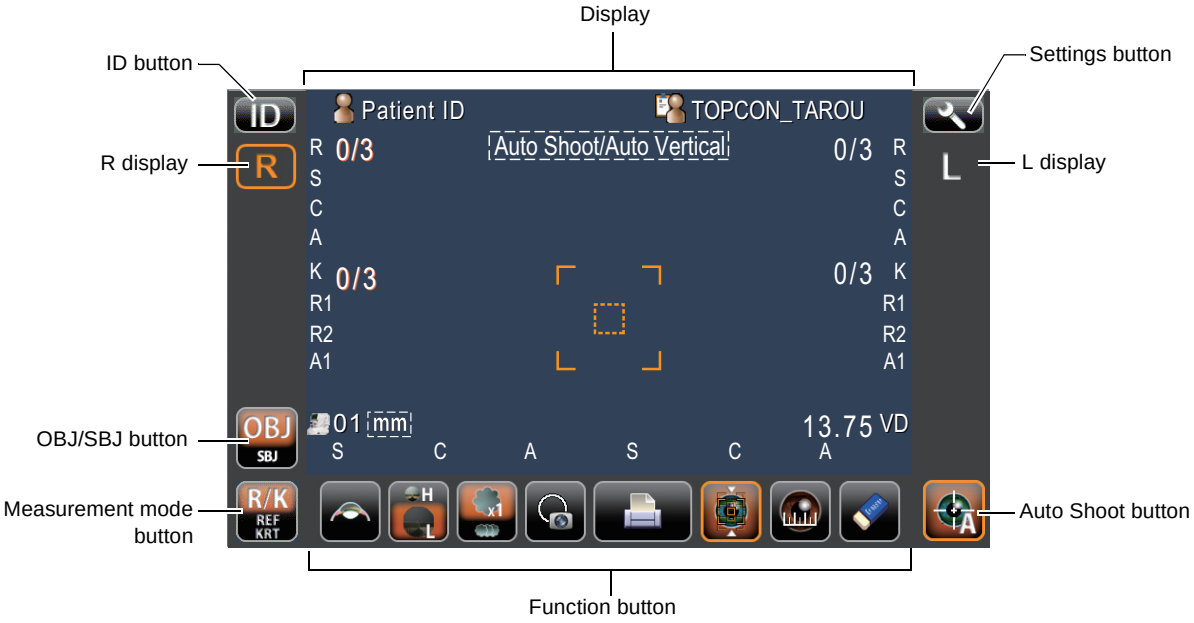
Tap → To select any relevant item.



Touch the control panel softly with a finger.

CONTROL PANEL COMPONENTS (IN OBJECTIVE REFRACTIVE MEASUREMENT)

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



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

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

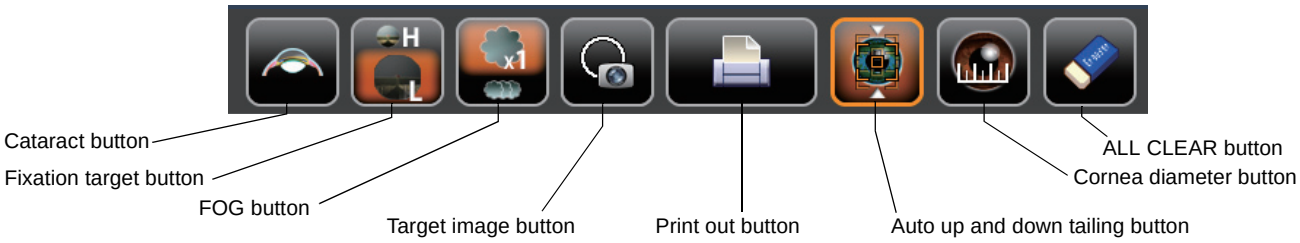
Measurement mode button .....Selects a measurement mode from R/K, REF and KRT.

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

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

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

FUNCTION BUTTON



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

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

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

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

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

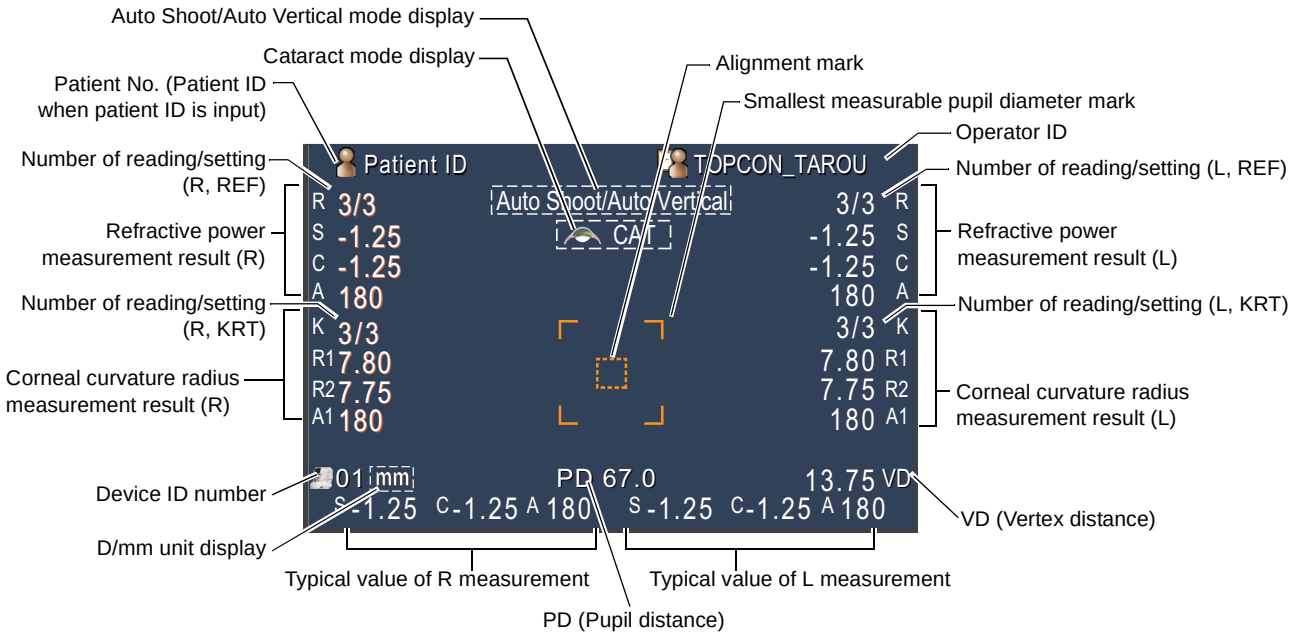
Auto up and down tailing button .....Aligns vertical position automatically. When this button is selected, "Auto Vertical" is displayed on the control panel, and the button is framed in orange.

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

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

MONITOR SCREEN (IN OBJECTIVE REFRACTIVE MEASUREMENT)

MEASUREMENT SCREEN



CONTROL PANEL COMPONENTS (IN SUBJECTIVE REFRACTIVE FAR VA CHECK)

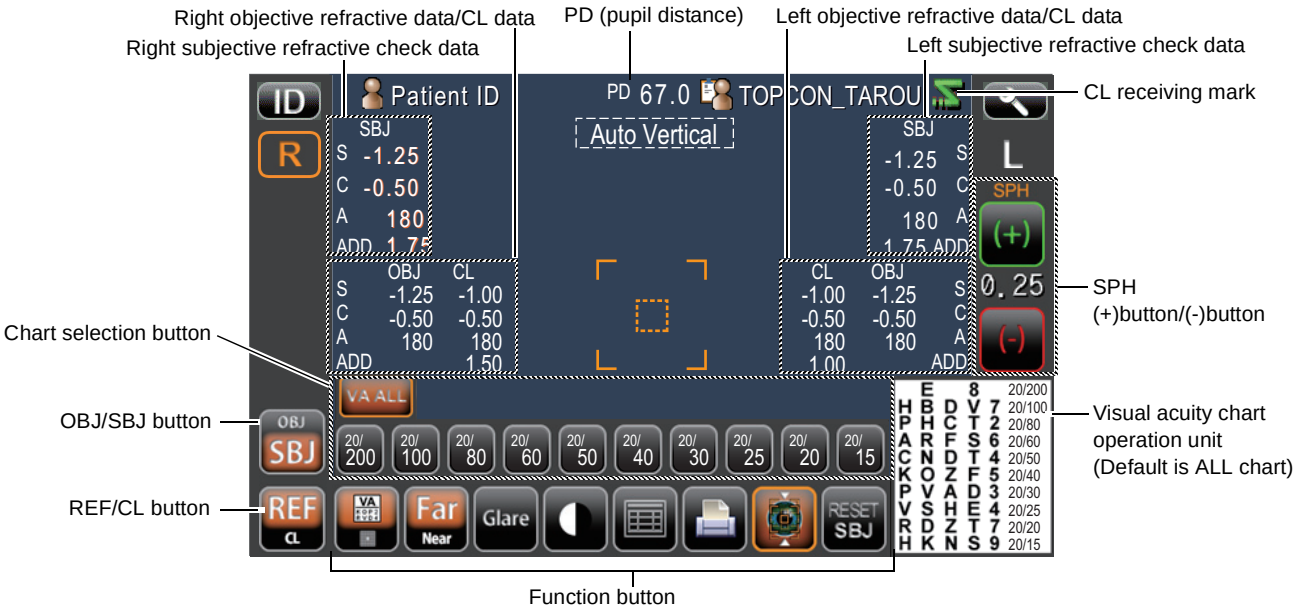


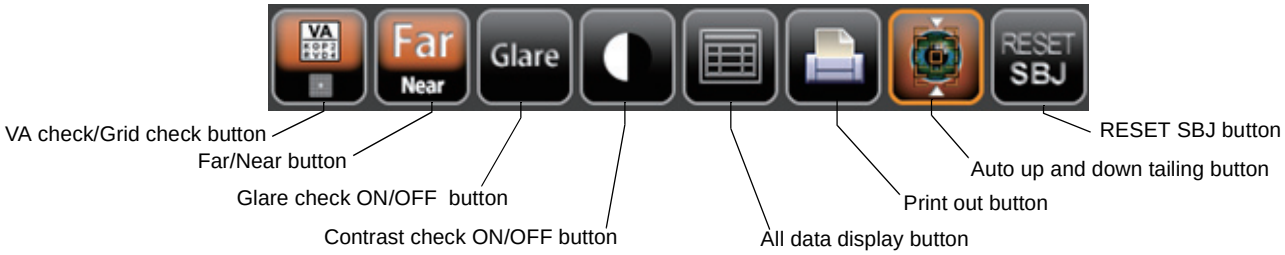
Chart selection button .....Shows the chart which measures the selected VA value to a patient. If tapping the VA ALL button, displays all charts which are shown ten charts from 20/200 to 20/15 at once.

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

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

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

FUNCTION BUTTON (IN SUBJECTIVE REFRACTIVE FAR VISON MEASUREMENT)



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

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

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

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

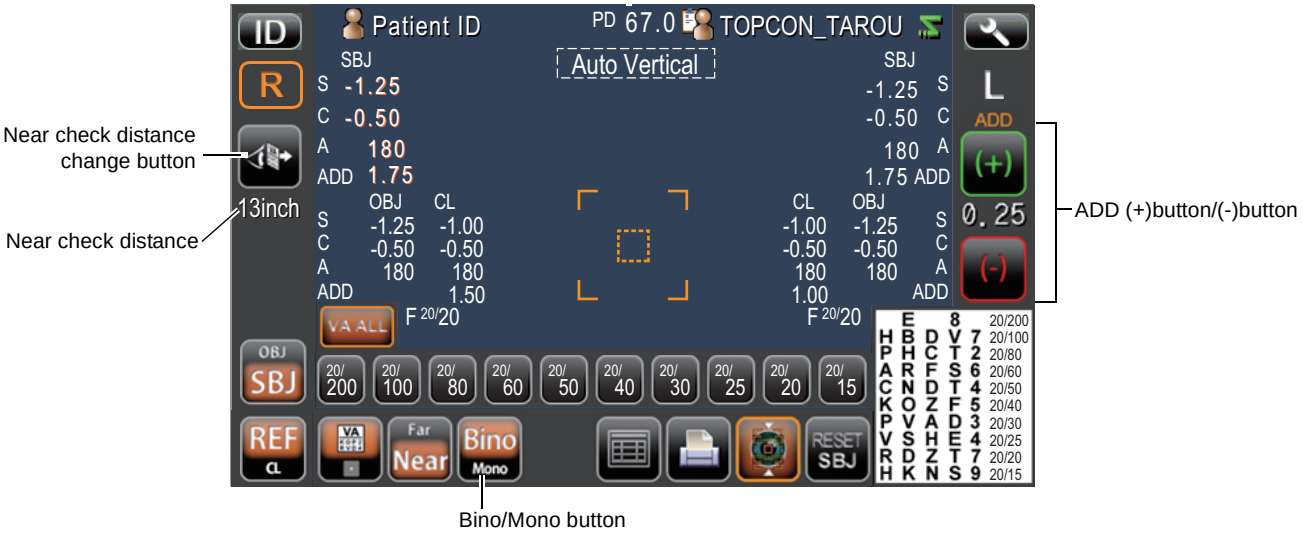
All data display button.....Shows all measurement and check data.

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

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

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

CONTROL PANEL COMPONENTS (IN SUBJECTIVE REFRACTIVE NEAR VA CHECK)



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

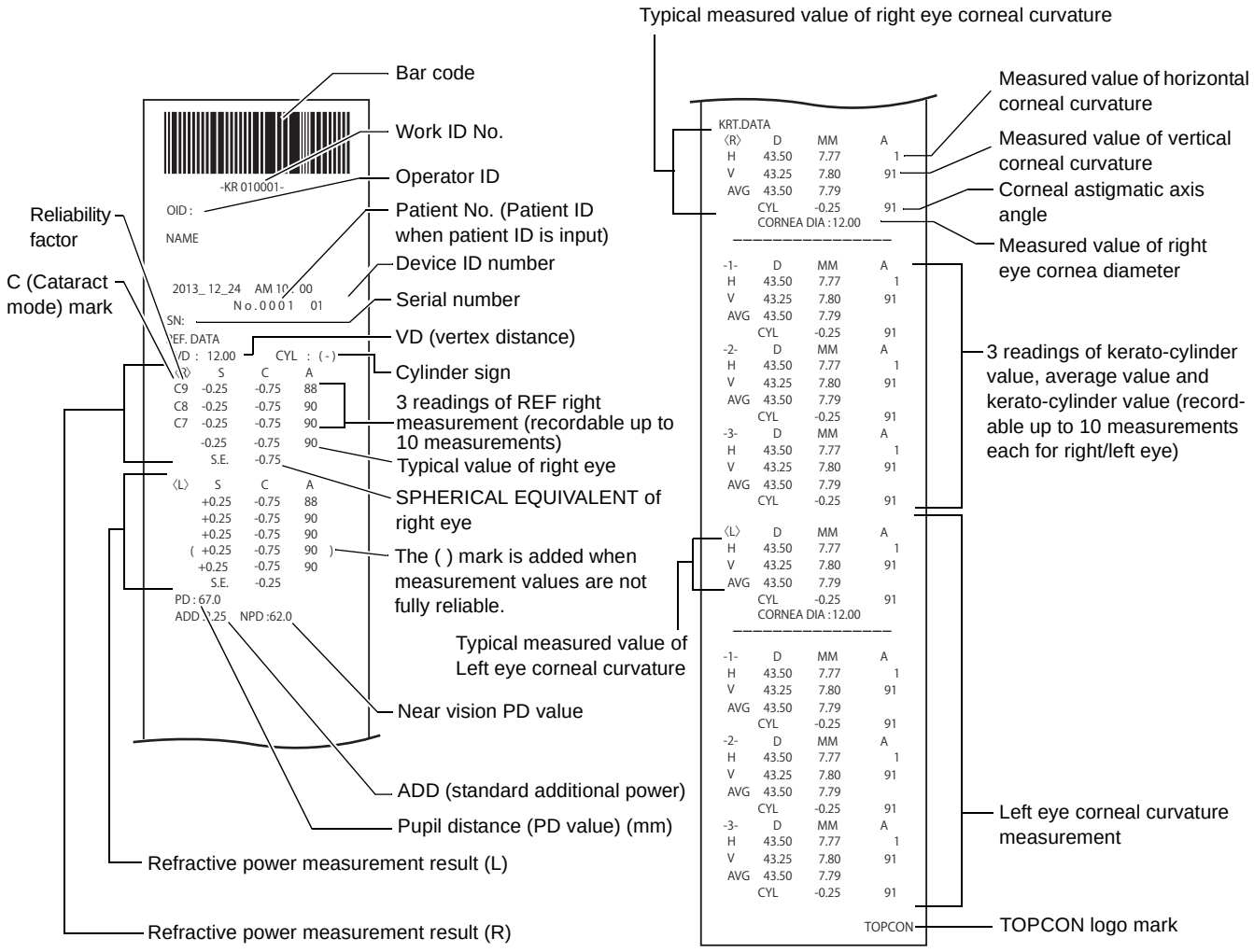
Bino/Mono button.....Selects the Bino which is changed ADD value both eye simultaneously, or the MONO which is changed one eye only.

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

PRINTER OUTPUT

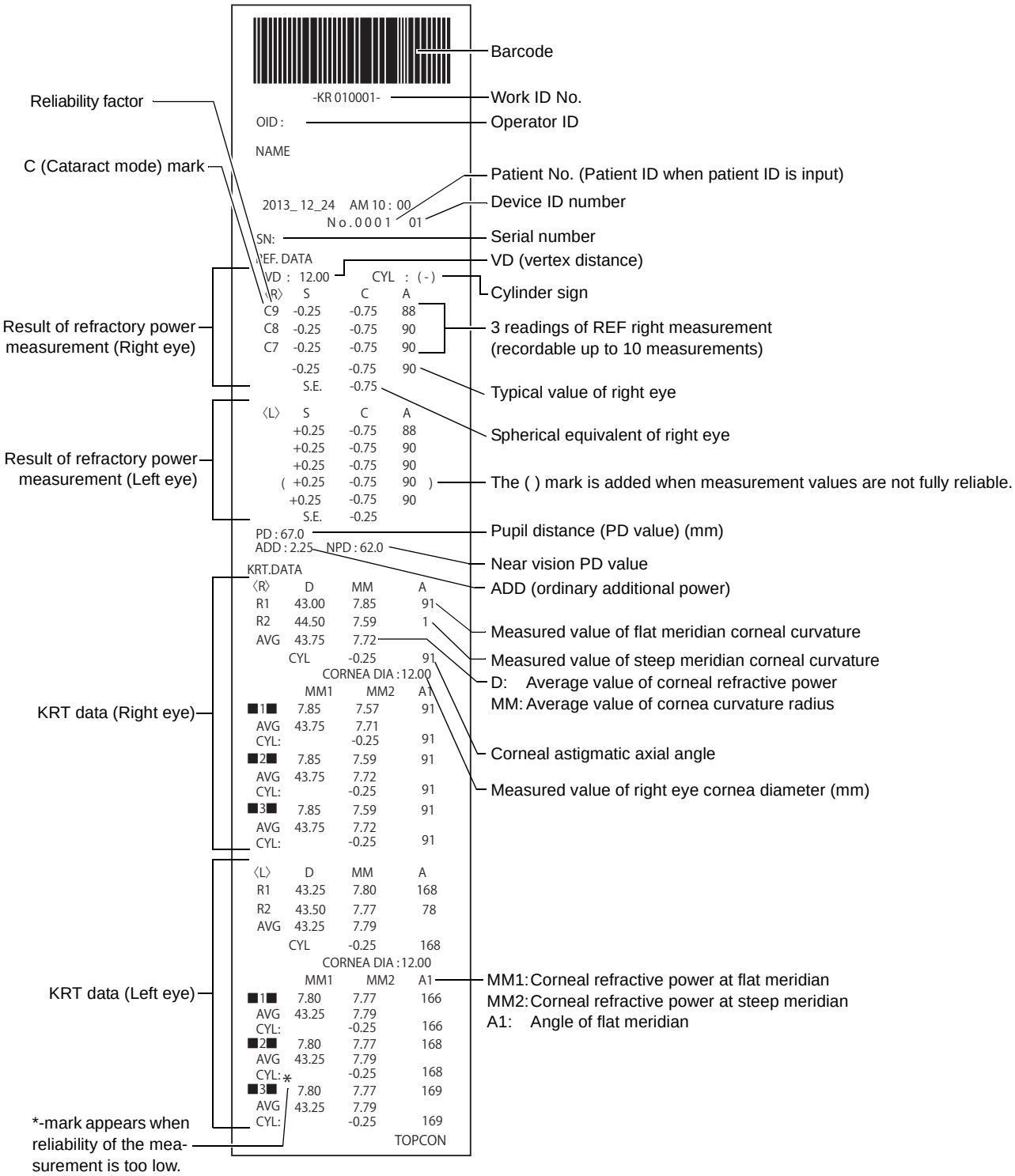
OBJECTIVE REFRACTIVE MEASUREMENT DATA

KRT typical value style and KRT print data are HV



NOTE	• The reliability factor is defined with integers 1 to 9 in increasing order of reliability. 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 near check distance. • ( ) appears when normal measurement is not expected due to eyelid, eyelash, or blinking. • *-mark appears when normal measurement is not expected with the [Cataract] button selected.

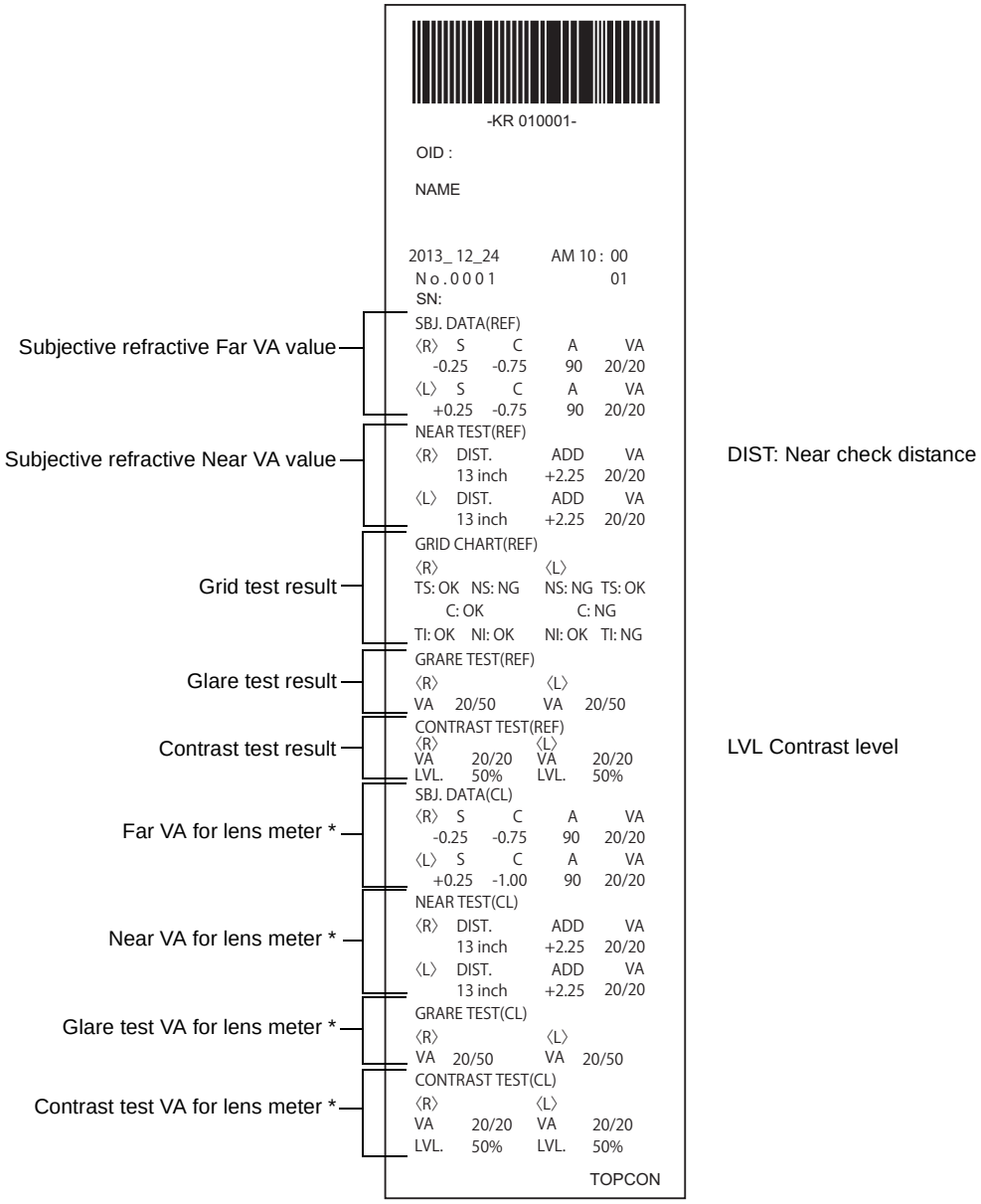
KRT typical value style and KRT print data are R1R2



NOTE

- The reliability factor is defined with integers 1 to 9 in increasing order of reliability.
  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 near check distance.
- ( ) appears when normal measurement is not expected due to eyelid, eyelash, or blinking.
- *-mark appears when normal measurement is not expected with the [Cataract] button selected.

SUBJECTIVE REFRACTIVE CHECK



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

PRINTOUT FORMAT SETTING

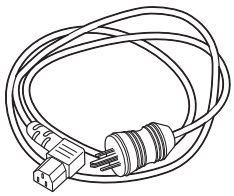
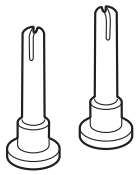
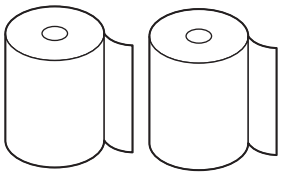
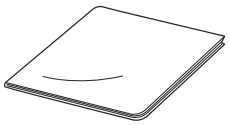
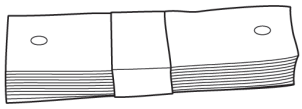
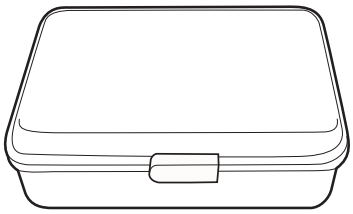
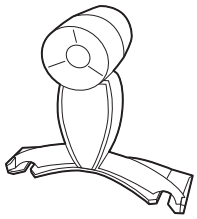
Printout format can be changed by pushing "Print" in the Settings screen. For Print settings, see "SETTING FUNCTIONS ON SETUP SCREEN" on page 54.

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

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

STANDARD ACCESSORIES

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

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

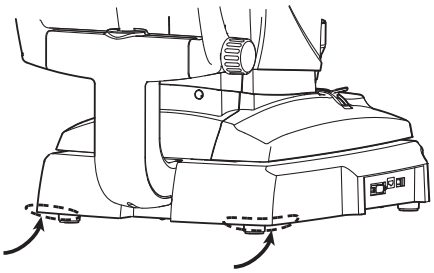
PREPARATIONS

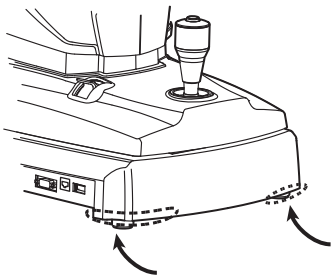
INSTALLATION

⚠ 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.

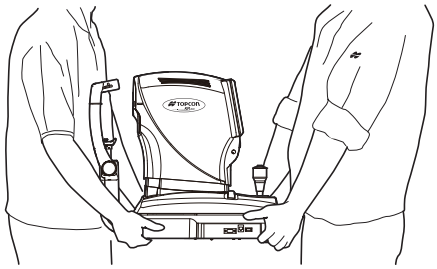
1 Use the base stopper to fix the main body.

2 Firmly hold the instrument at the position shown below and place it on the automatic instrument table. For the adjustable instrument table, see "OPTIONAL ACCESSORIES" on page 87.





Holding positions



Holding the instrument

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

CONNECTING POWER CABLE

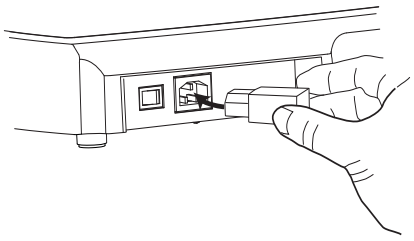
⚠ WARNING	Be sure to connect the power plug to an AC 3-pin receptacle equipped with grounding. Connection with receptacle without grounding may cause fire and electric shock in case of short-circuiting.

⚠ CAUTION	To avoid electric shocks, do not handle the power plug with wet fingers.

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

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

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



CONNECTING EXTERNAL OUTPUT TERMINALS

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

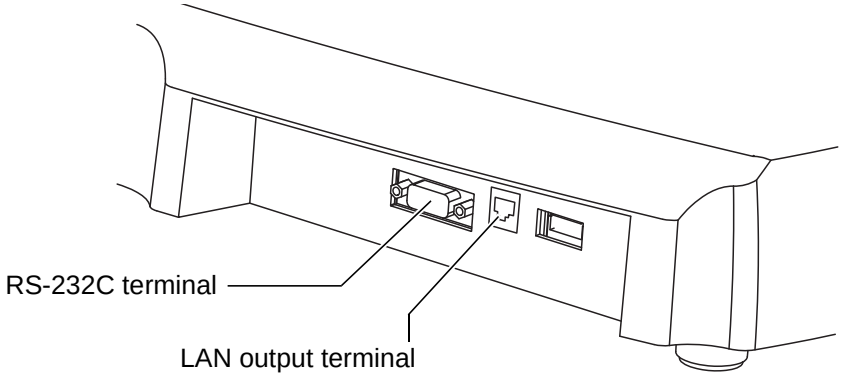
NOTE	When connecting this product with a commercial personal computer, use one conforming to IEC60950/IEC60950-1, with a separation unit.

DATA OUTPUT

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

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

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



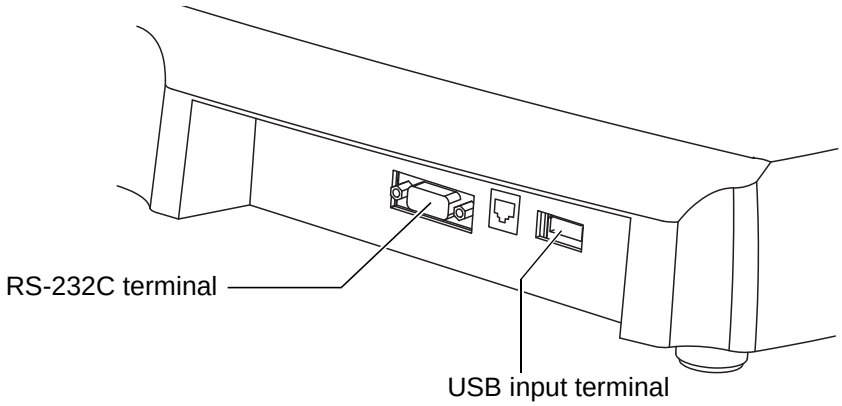
DATA INPUT

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

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

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

NOTE	For questions about connections, contact your TOPCON dealer.

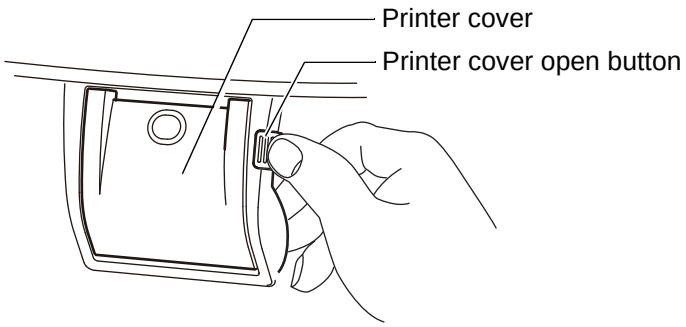


PRINTER PAPER SETTING

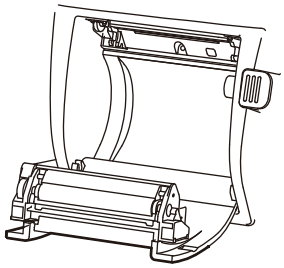
⚠ CAUTION	• When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer button is pressed. • To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting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

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

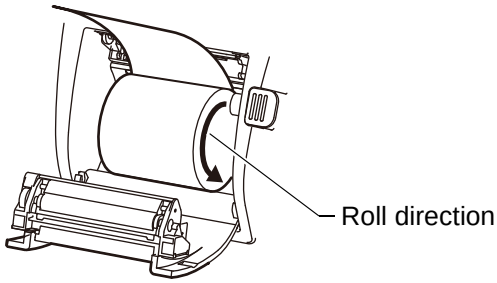
1 Press the printer cover open button to open the printer cover.



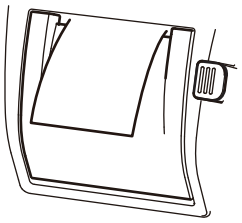
2 Open the printer cover to the limit.



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



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



NOTE	• Please close the printer cover using your right thumb while placing your index and middle fingers on the projecting part which is in reverse side below the printer cover OPEN button. Unexpected movement is avoided when closing the printer cover. • 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 61).

BASIC OPERATIONS

PREPARATION BEFORE MEASUREMENT

TURNING ON THE INSTRUMENT

1. Insert the power cable plug into the commercial power (the 3-pin AC grounding receptacle.)
   For the details of connection, refer to "CONNECTING POWER CABLE" on page 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.

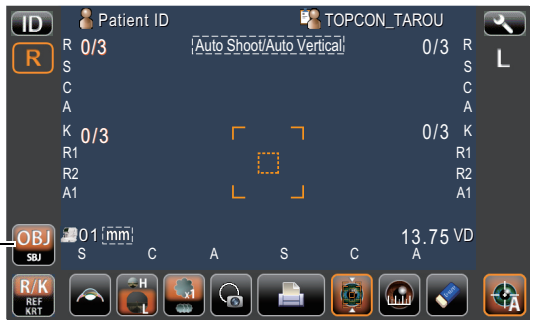
CHECKING THE OBJECTIVE REFRACTIVE MEASUREMENT MODE

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

OBJ: Objective refractive measurement
SBJ: Subjective refractive check

Subjective refractive check has to perform after the objective refractive measurement. Refer to page 36.

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



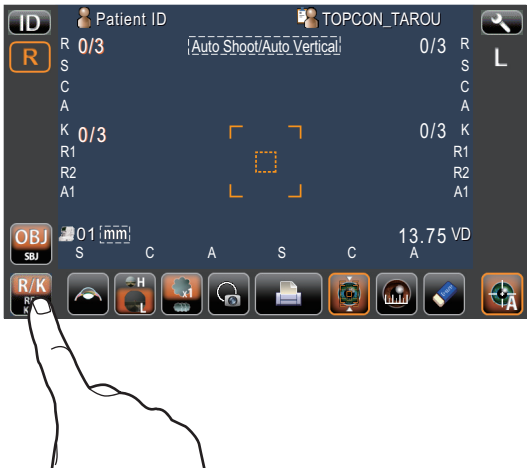
SELECTING THE MEASUREMENT MODE

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

1 Check that the MEASUREMENT screen is on.

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

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



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

INPUTTING THE PATIENT ID (PATIENT No.)

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 DATA 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. • If a bar code reader is connected, refer to "INPUT USING USB" page 53.

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 68.

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

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

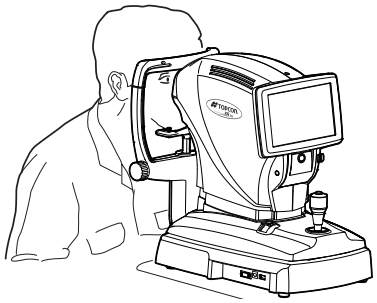
2 Wipe the dirt form forehead rest.

3 Have the patient sit in front of the instrument.

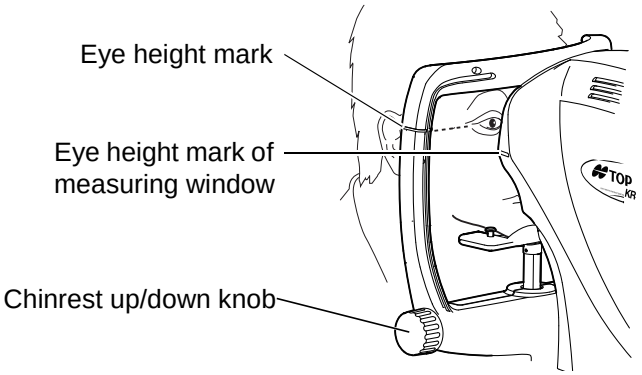
4 Adjust the adjustable instrument table or the chair height for the patient to put his/her chin on the chinrest comfortably.

5 Release the base stopper.

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



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



OBJECTIVE REFRACTIVE MEASUREMENT (AUTO SHOOT MODE)

CAUTION	When operating the instrument (for measurement and control panel operation), be careful that the instrument does not touch the patient's lip or nose. If touched, clean the instrument as specified in "CLEANING THE INSTRUMENT" on page 68.

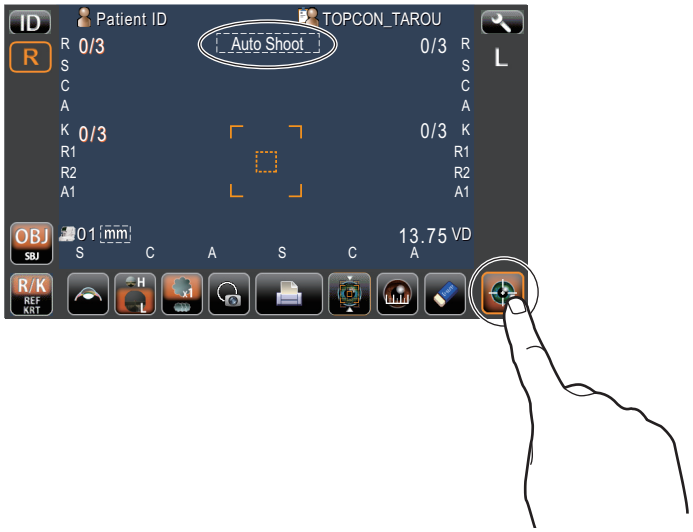
NOTE	• Auto Shoot mode measurement may not be possible, in case the eyelid and the eyelashes cover the pupil. If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid to allow for measurement. • Auto Shoot mode measurement may not be possible due 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 If Auto shoot button is framed in orange, it is in [Auto Shoot] mode.

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

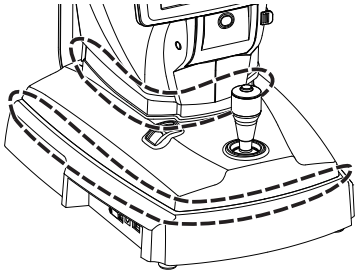


SETTING AUTO VERTICAL (AUTO UP AND DOWN TAILING) MODE

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

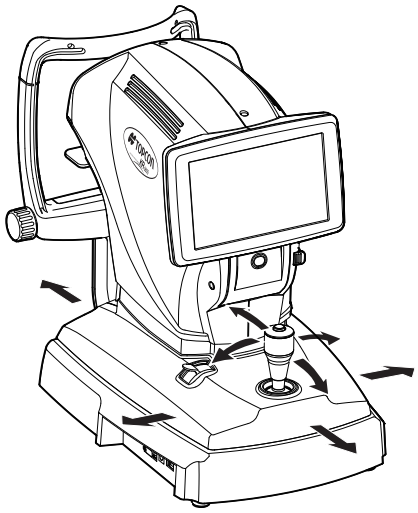
1 Check the measurement screen. If [Auto Vertical (Auto up and down tailing)] button is framed in orange, it is in Auto Vertical (Auto up and down tailing) mode.

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

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

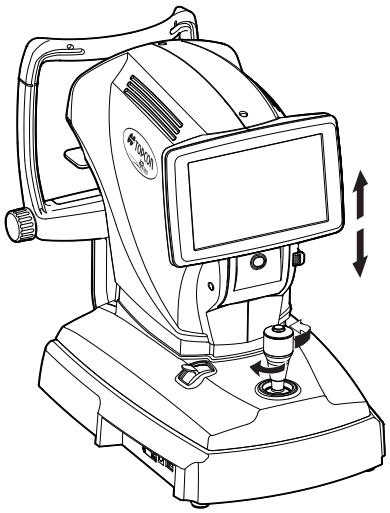
Alignment operations are done with the control lever.

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



Operating the control lever
(for lateral adjustment)

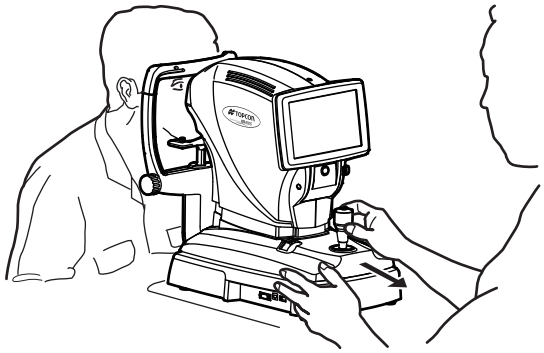
- The main body position can be fine-adjusted vertically by turning the control level right (up) and left (down).



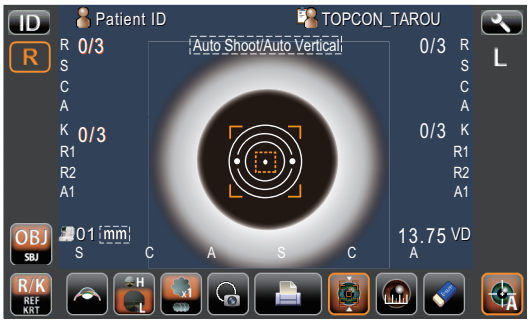
Operating the control lever
(for up/down adjustment)

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

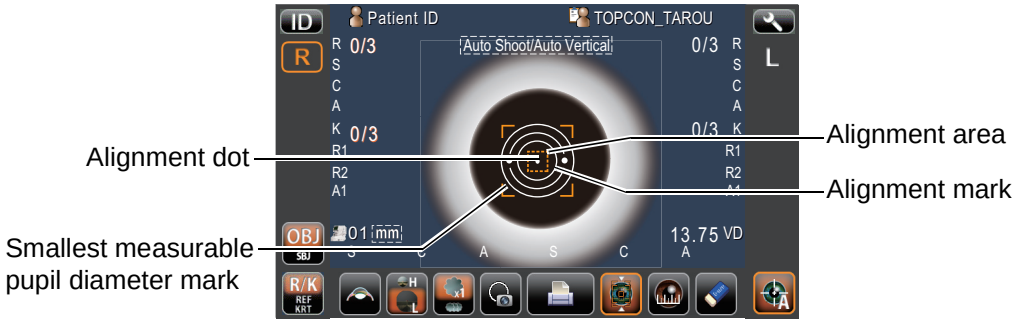
1 Use the base stopper to release the main body.
Hold the control lever and move the main body to the operator side.



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



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

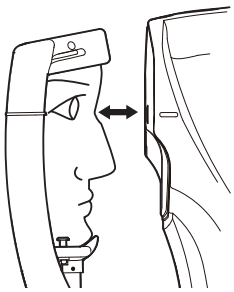


4 Fine-adjust the main body position in all directions so that the alignment dot point comes within the alignment area.

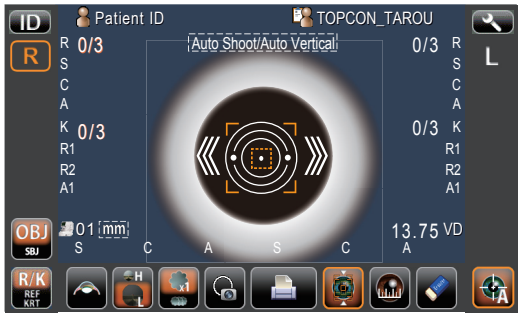
5 Keeping the alignment dot within the alignment area, slowly move the main body toward the patient. When the main body approaches the target eye, alignment arrows appear to the control panel screen.

NOTE

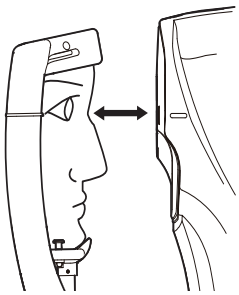
- Do not allow the eyelash and eyelid to cover the smallest measurable pupil diameter mark to ensure stable measurement.
- If the machine is too near to the patient in comparison with the optimal alignment position, the alignment arrows are displayed outward or if it is too far from the patient, the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



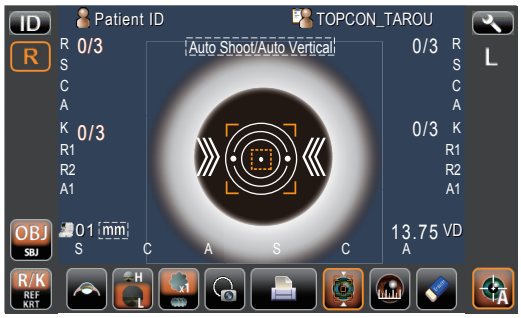
Too close



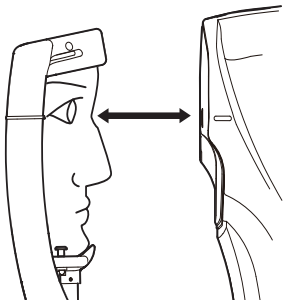
Outward alignment arrows



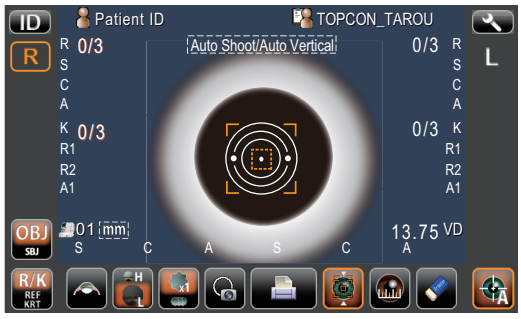
Too far



Inward alignment arrows



Positioning is incorrect at all.

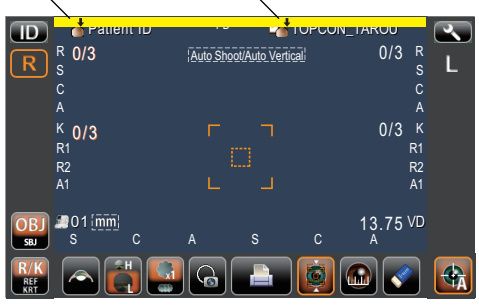


Alignment arrows not appear

NOTE

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

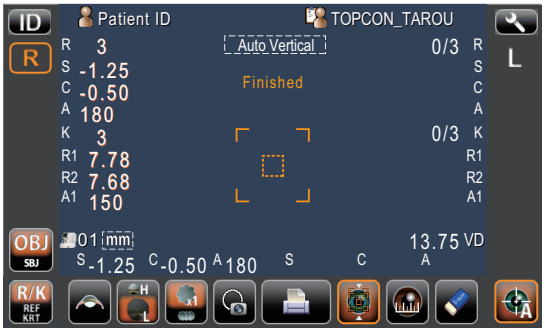
Limit mark



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

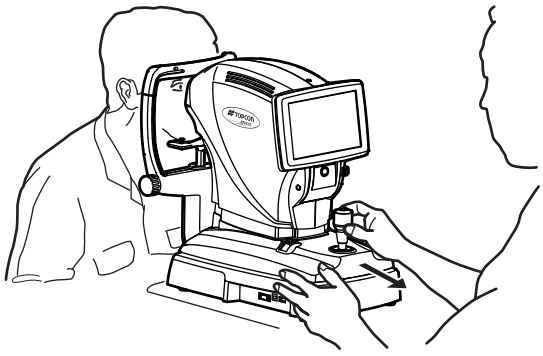
When the alignment arrows disappear, Auto shoot function is performed automatically at specified number of times of measurement.

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



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

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 31.



DISPLAYING MEASUREMENT VALUES

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

Figures only: Measurement was done correctly.

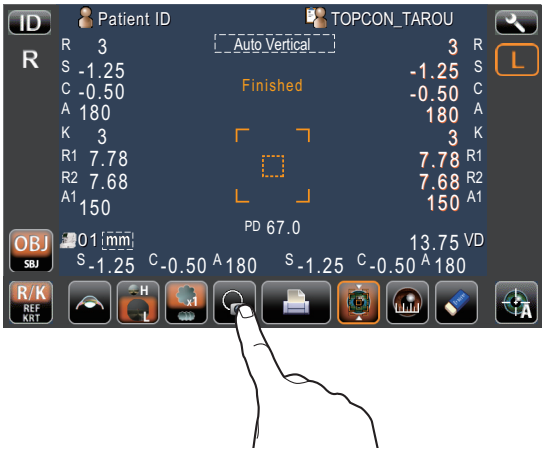
ERROR: Measurement was not done correctly.

NOTE	For explanation of the messages on the control panel screen, refer to "MESSAGE LIST" on page 73.

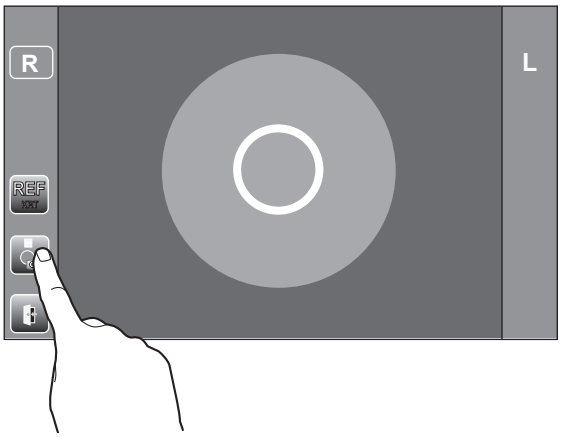
DISPLAYING ALL OBJECTIVE REFRACTIVE MEASUREMENT DATA

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

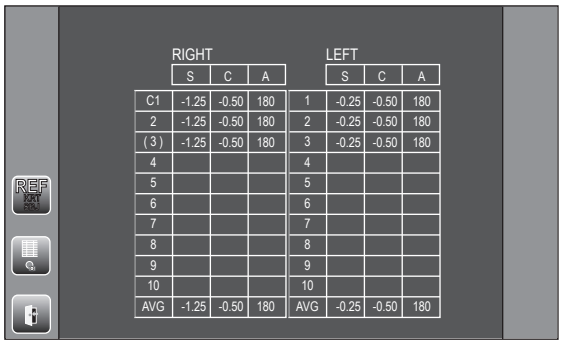
1 Tap the TARGET IMAGE button of the control panel.



2 Tap the ALL DATA / TARGET button.

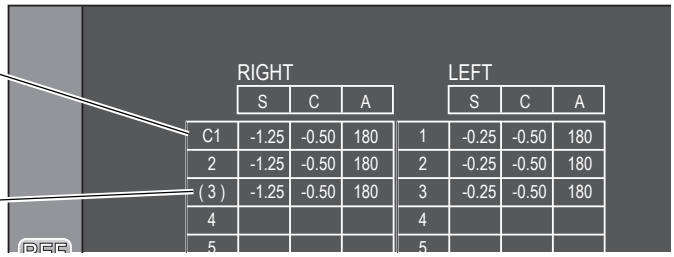


3 The Data Display screen is displayed.



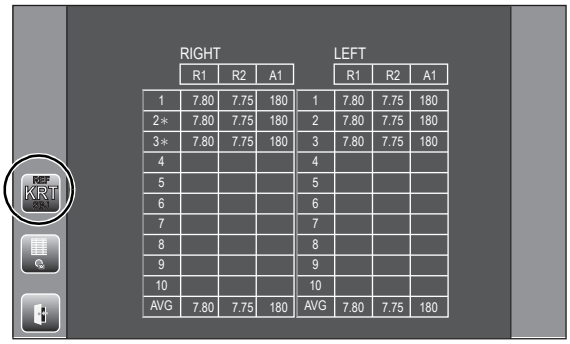
When measurement is performed with the Cataract button ON, "C" comes at the head of figures.

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

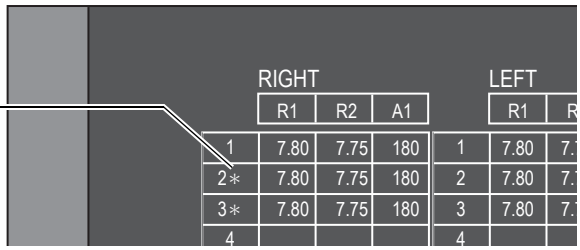


NOTE	When no data is memorized, the data table shows blank.

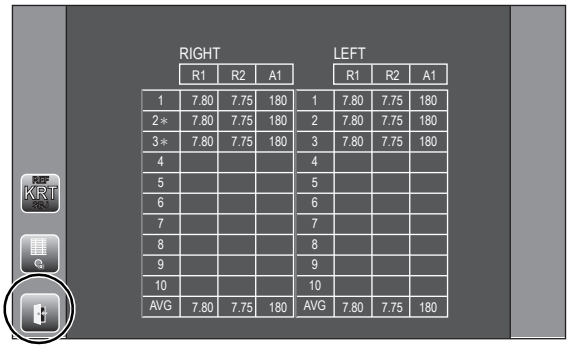
4 To change "REF data" and "KRT data," tap the [REF/KRT/SBJ] button.



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



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



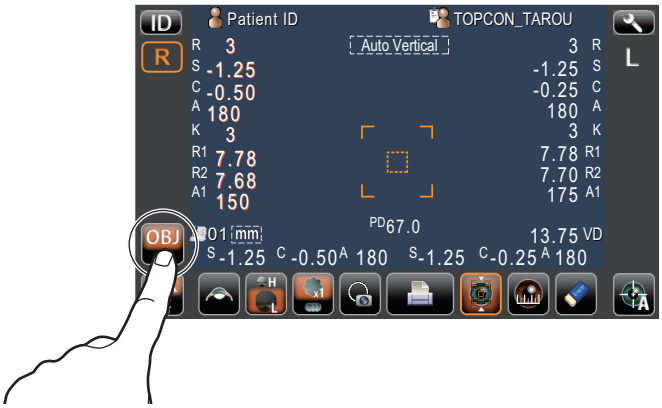
6 If the data have many variations, perform objective refractive measurement again. If the measurement value is normal, subjective refractive check is possible.

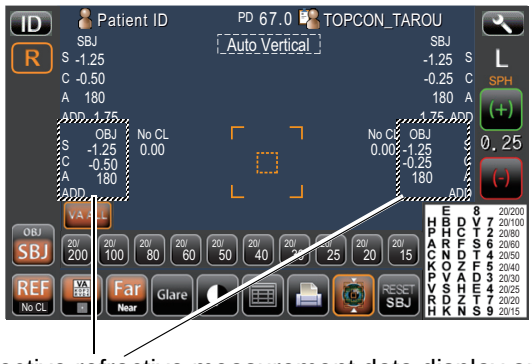
PREPARATION OF SUBJECTIVE REFRACTIVE CHECK

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

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

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

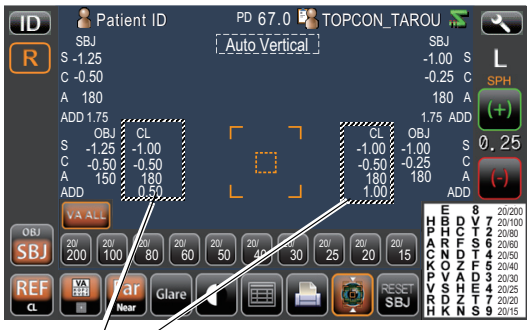




Objective refractive measurement data display area

INPUTTING LENS METER DATA

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



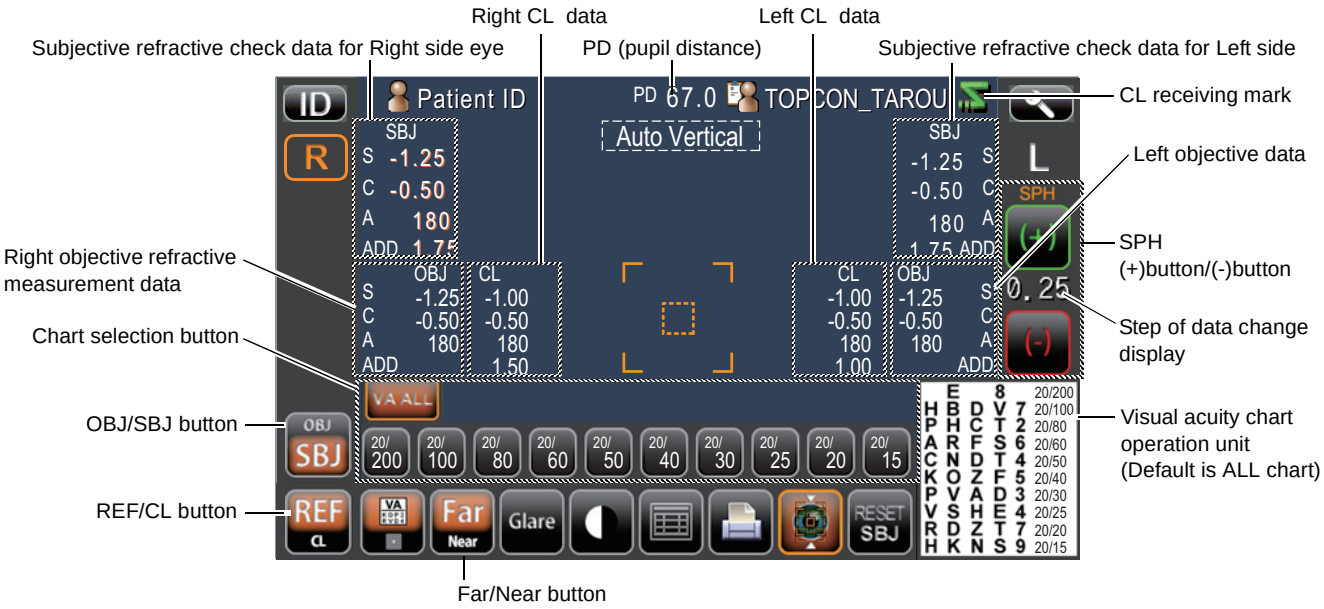
CL data display area

NOTE	• If data communication format of this instrument and the lens meter are not uniformed, CL data is not inputted. The data communication format of this instrument can be changed by modifying "Input data format (CL)" of "Data communication" • For Connecting of Lens meter, refer to "INPUT/OUTPUT USING RS-232C" on page 53. • If no lens meter data exists, "0.00" displays.

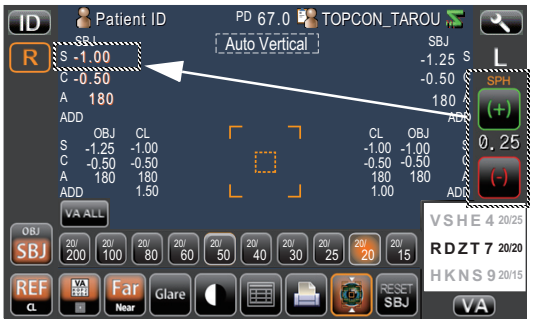
SUBJECTIVE REFRACTIVE FAR VISION CHECK

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

SUBJECTIVE REFRACTIVE FAR VISION CHECK SCREEN



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



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

9 If both eye measurements are required, pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from ***1*** on page 37.

SUBJECTIVE REFRACTIVE NEAR VISION CHECK

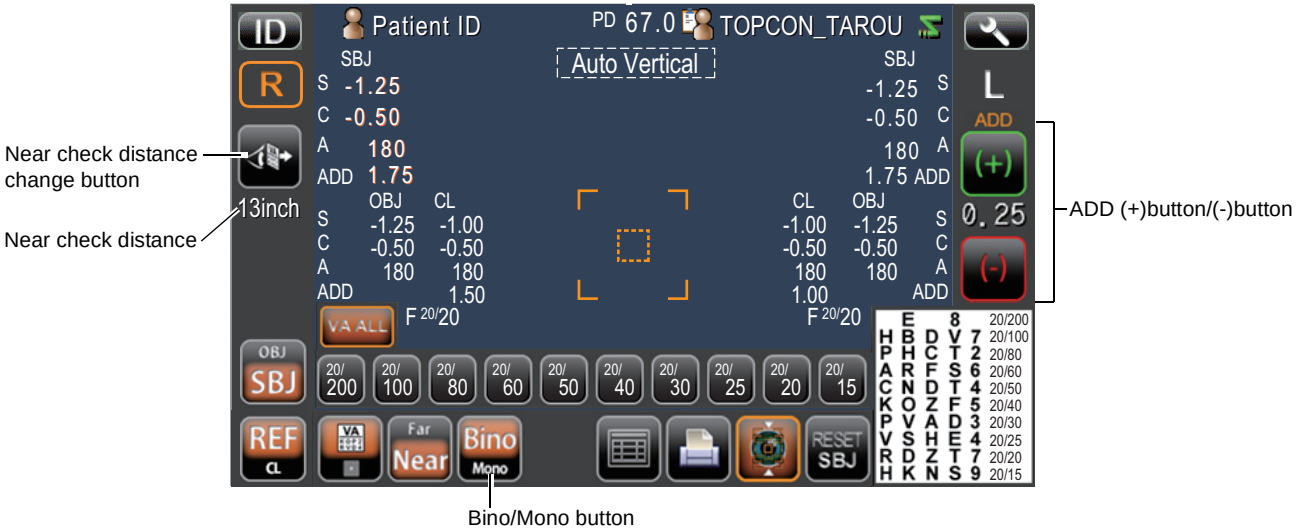
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

1 Tap the [Far/Near] button.

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

SUBJECTIVE REFRACTIVE NEAR VISION CHECK SCREEN

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

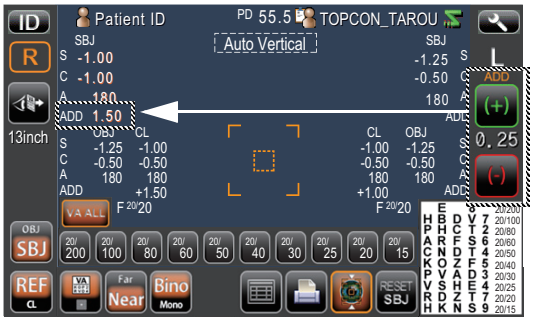


2 Tap the [Near check distance change] button to set the Near check distance.
Changeable distance is 13inch, 16inch, 20inch or 24inch.

3 Apply similar procedure in ***2*** to ***6*** at subjective refractive far vision check in page 37 to get marginal value where the patient can read.

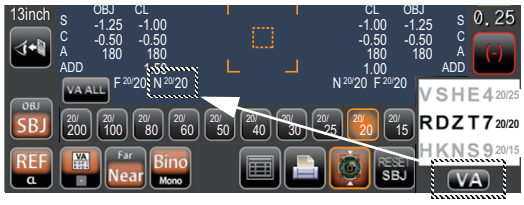
4 Check that [Bino/Mono] button is at "Bino" position colored orange.

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



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

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



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

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

8 If both eye measurements are required, hold the control lever and pull the main body towards operator side fully then move the main body to the other eye measurement position. So, repeat the same procedure from ***3*** on page 38.

COMPARISON BETWEEN IMAGES OF UNAIDED VA AND CORRECTED VA

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

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

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

COMPARISON BETWEEN IMAGES OF LENS METER DATA AND CORRECTED VALUE

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

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

- For connection of lens meter, refer to "CONNECTING EXTERNAL OUTPUT TERMINALS" on page 22.

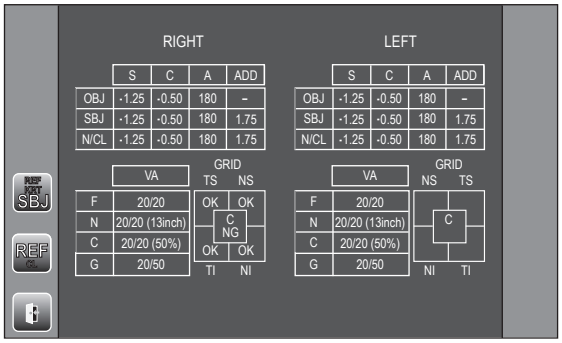
DISPLAYING ALL MEASUREMENT/CHECK DATA

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

1 Apply similar procedure in ***1*** to ***3*** at "DISPLAYING ALL OBJECTIVE REFRACTIVE MEASUREMENT DATA" on page 34 to change to the "Data Display screen".

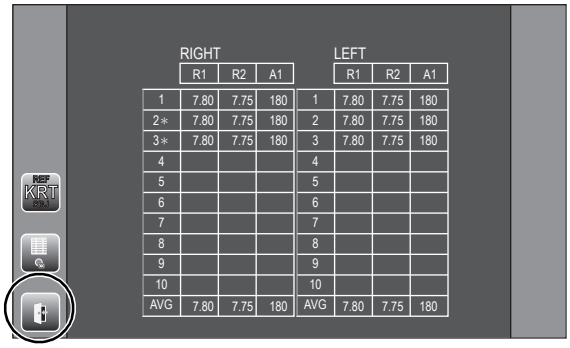
2 To change "REF data", "KRT data" or "Subjective refractive check data," tap the [REF/KRT/SBJ change] button.

Subjective refractive data



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

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



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.

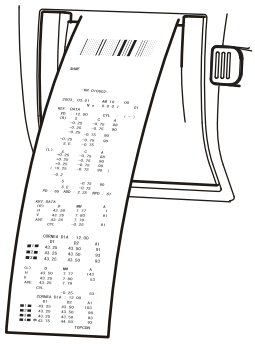
This instrument can print out measurement values by a printer.

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 62.) • 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 64.)

END OF MEASUREMENT

Tell the patient a measuring is end and leave from the instrument.

CLEARING MEASUREMENT VALUES

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

OPERATION OF AFTER USE

1 Use the base stopper to fix the main body.

2 Turn the POWER switch to off.

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

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

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

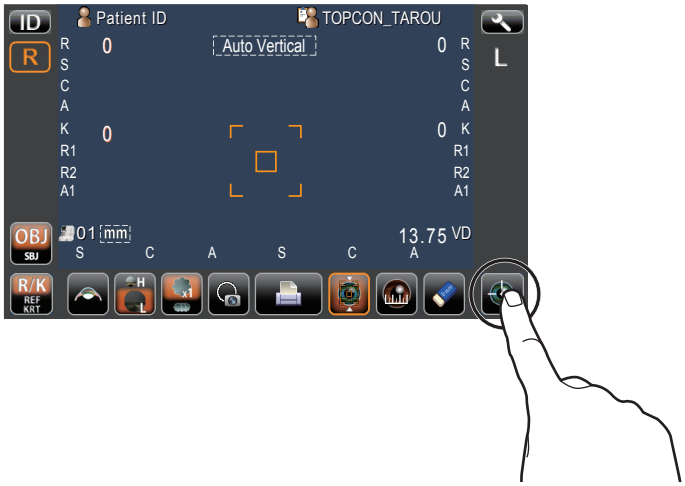
OPTIONAL OPERATIONS

MANUAL MODE MEASUREMENT IN OBJECTIVE REFRACTIVE MEASUREMENT

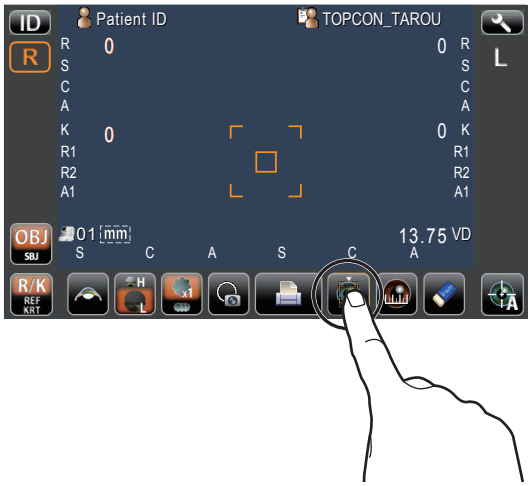
SETTING THE MANUAL MODE

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

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



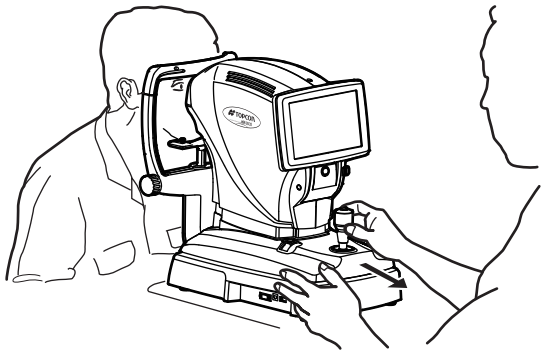
3 If automatic vertical alignment is not required, tap the [Auto Vertical (Auto up and down tailing)] button to cancel automatic vertical alignment function and to change the color of [Auto Vertical (Auto up and down tailing)] button other than orange.



ALIGNMENT AND MEASUREMENT

Alignment is operated on the control panel.
For the adjustment of main body using the control lever, refer to page 30.

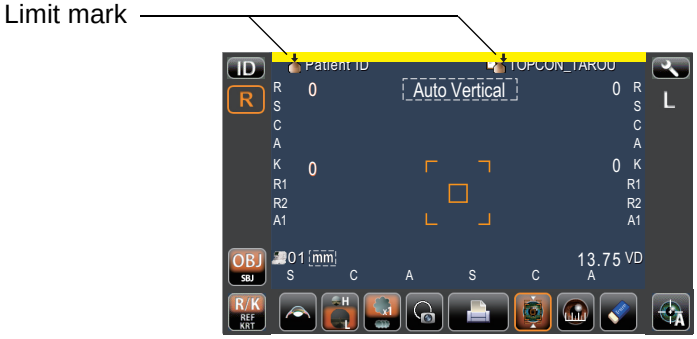
1 Use the base stopper to release the main body. Hold the control lever and move the main body to the operator side.



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

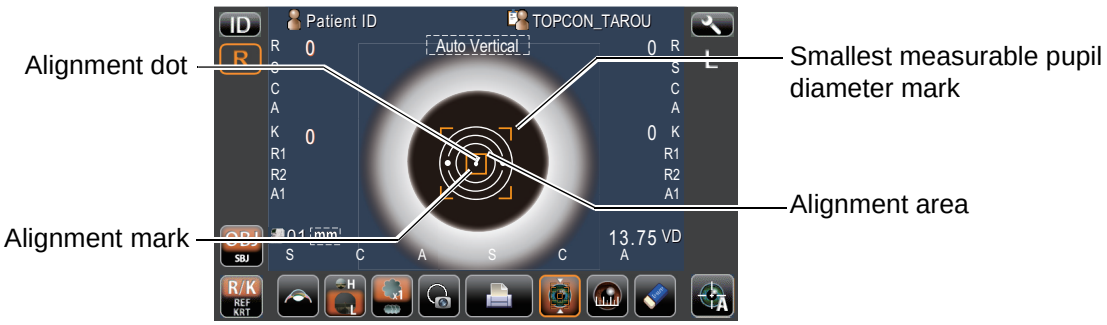
NOTE

- 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 27).
- When the measuring head has reached the limit of movement (vertical/lateral directions), a yellow-colored limit mark appears on the control panel's top, showing it is the movement limit in that direction. Move the measuring head or chinrest to a position that aligning is possible.



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

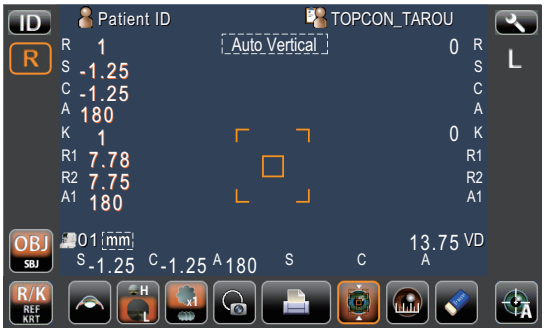
A vague, reflected alignment dot appears on the cornea.



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

NOTE	• Do not allow the eyelash and eyelid to cover the smallest measurable pupil diameter mark to ensure stable measurement. • 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 73.

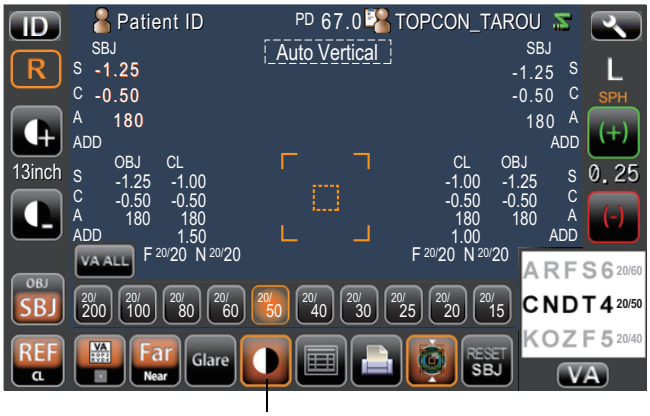
ADDITIONAL TEST IN SUBJECTIVE REFRACTIVE CHECK

CONTRAST TEST

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

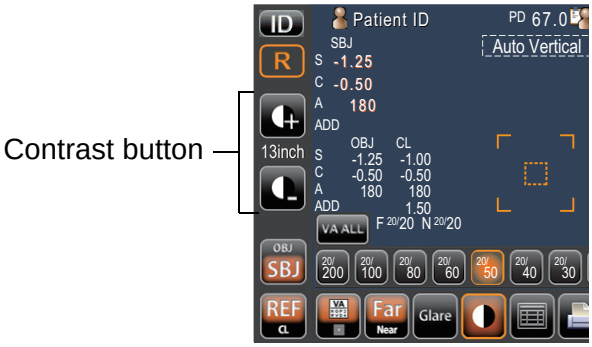
1 Perform FAR VA check.

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

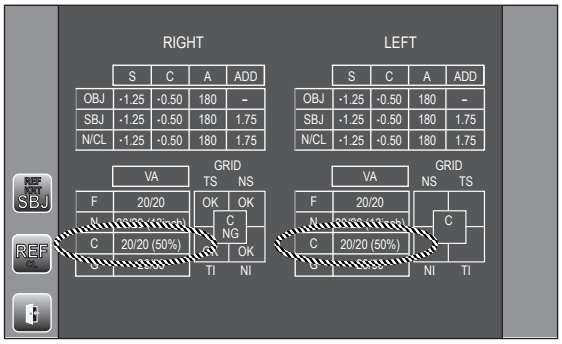


Contrast check ON/OFF button

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



4 If VA value is determined tap the [VA] button. The value and contrast percentage are shown and recorded for item "C" of "All data display". (Page 41)



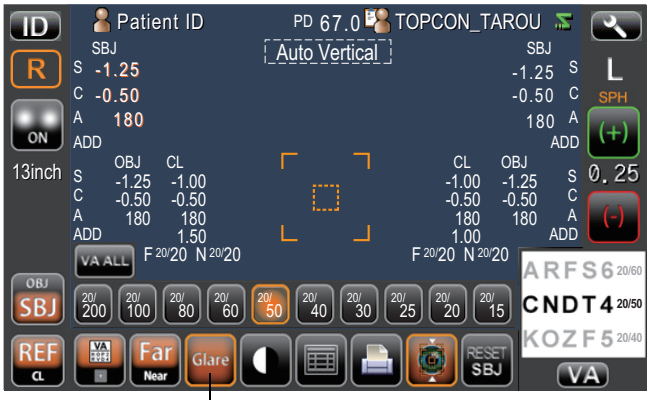
NOTE	The result of the test may differ from computer vision depending on how the chart is seen.

GLARE TEST

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

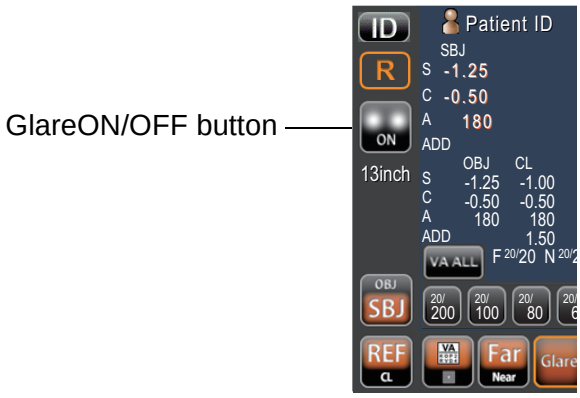
1 Perform FAR VA check.

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

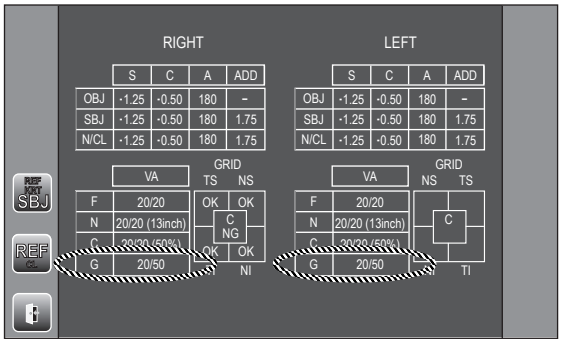


Glare check ON/OFF button

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



4 If VA value is determined and [Glare ON/OFF] button is "ON", tap the [VA] button. The value is shown and recorded for item "G" of "All data display". (Page 41)

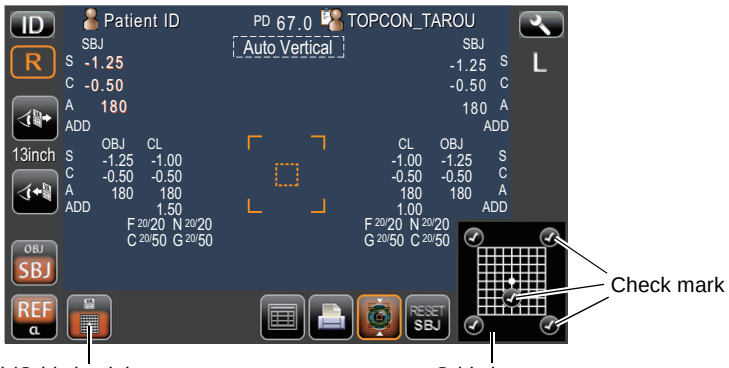


GRID TEST

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

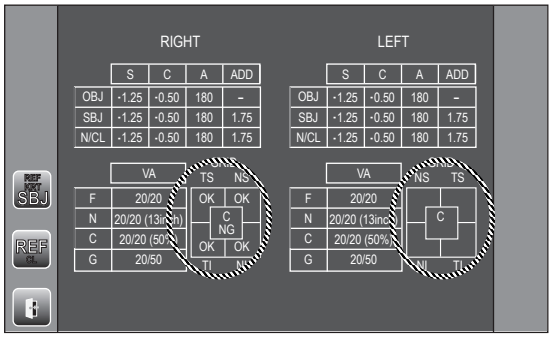
For the following operation, use one hand to hold the control lever and to align patient's eye, use the other hand to touch the control panel.

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

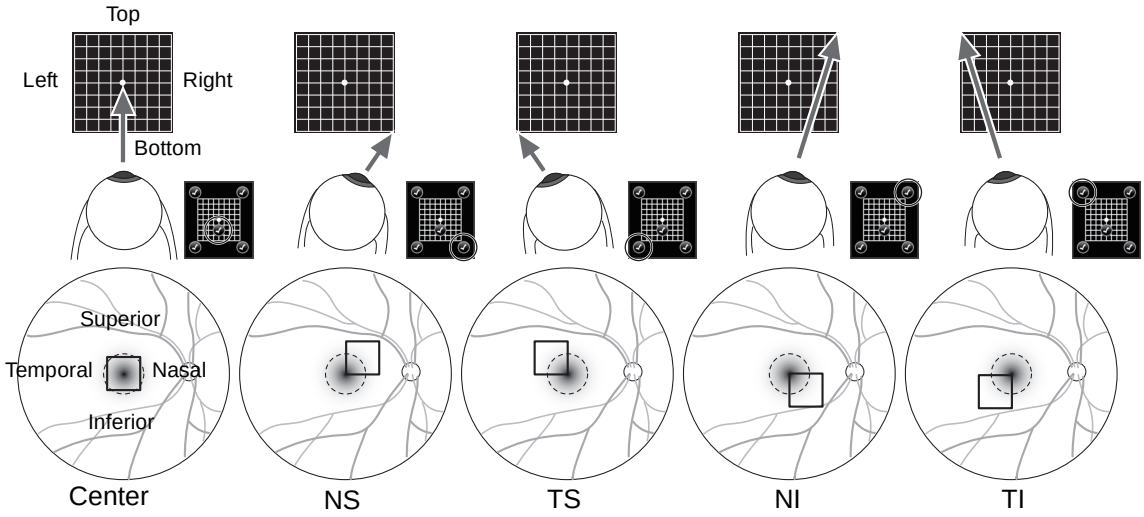


2 Tell the patient to look at center of grid, upper right of corner, upper left of corner, lower right of corner and lower left of corner, then ask the patient about sight of the grid chart.
If the patient says "The lines are blurred and dimmed", "It seems distorted." and " It is partially missing",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

3 After checking, open all data display. Abnormal area in the item of "GRID" is displayed and recorded as "NG", and normal area is as "OK". (Page 41)



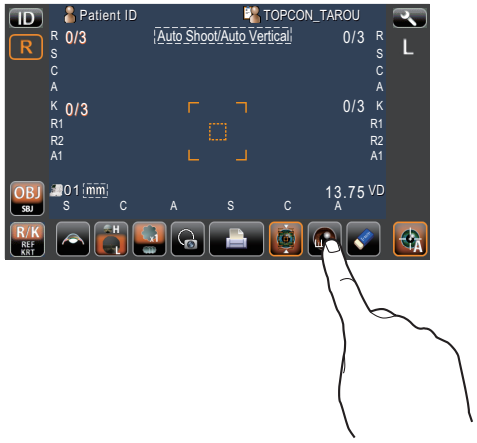
The relation of the place of a grid chart which a patient looks at and the part of the fundus of the eye is as follows. (In case of right eye)



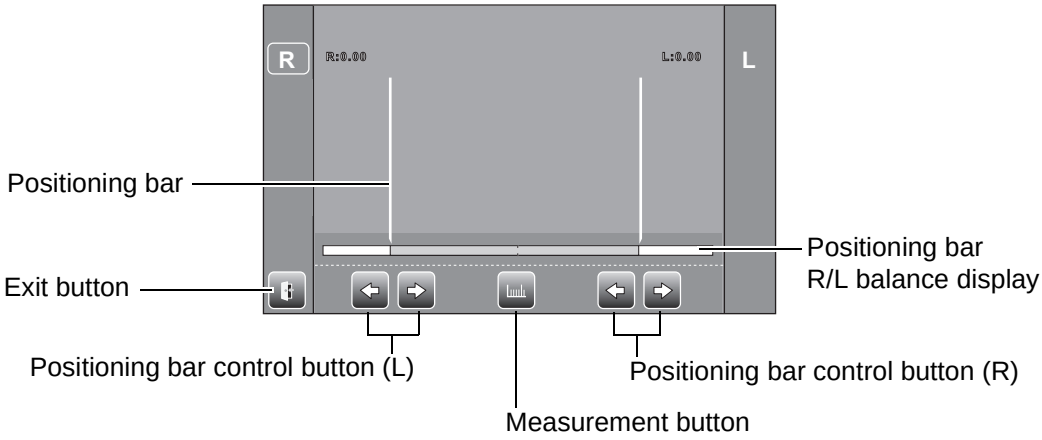
MEASUREMENT OF CORNEA DIAMETER

MEASUREMENT ON THE ACTUAL IMAGE

1 Tap the [CORNEA DIAMETER] button.

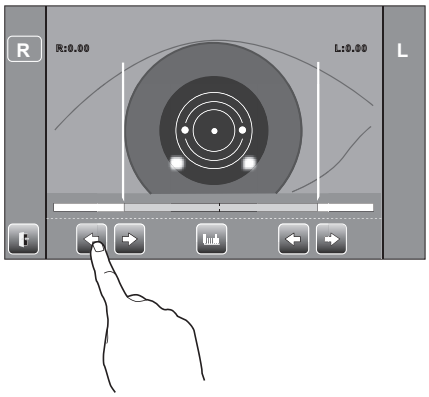


2 The Cornea Diameter Measurement screen is displayed, and the positioning bar is displayed.

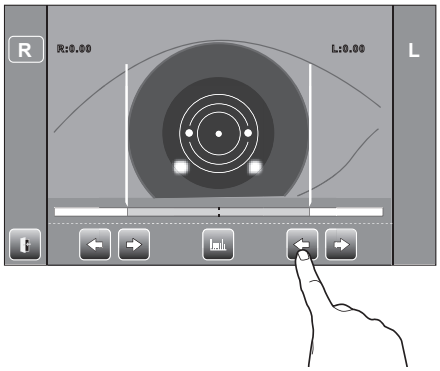


3 When the pupil is displayed, moves the measuring head so that the pupil image and alignment dot are at the center of the screen.

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



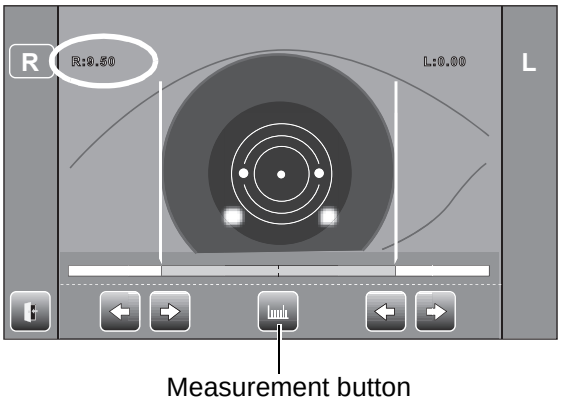
5 Using the [POSITIONING BAR CONTROL] button (R), move the right positioning bar to the right end of the iris from the control panel side.



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

6 Tap the [MEASUREMENT] button.

7 The cornea diameter is displayed.



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

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

MEASUREMENT ON THE STILL IMAGE

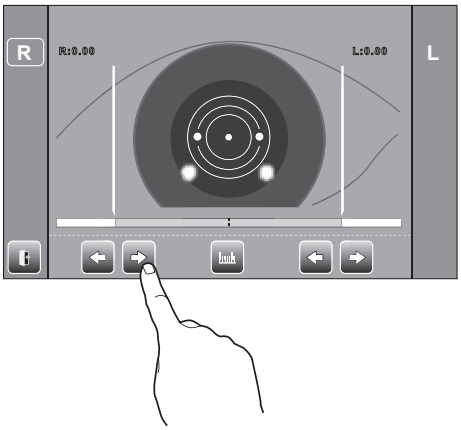
When KRT measurement values are available, the still image of the measurement is displayed.

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

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

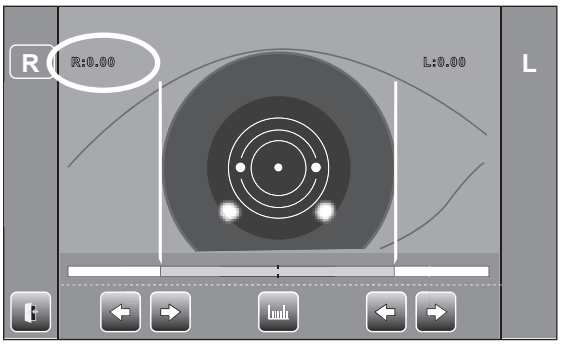
NOTE	If you are required to get the still image again, press the [MEASUREMENT switch] to return to actual image, and press the [MEASUREMENT switch] again.

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



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

5 The cornea diameter is displayed.



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

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

INPUT/OUTPUT USING RS-232C

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

1. Connect the interface cable to RS-232C OUT.
   Refer to "CONNECTING EXTERNAL OUTPUT TERMINALS" on page 22.
2. Set up of data communication settings.
   For details, refer to "DATA COMMUNICATION (COMM)" on page 66.
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 OUTPUT 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 OUTPUT TERMINALS" on page 22.
2. Set up of LAN connection settings.
   For details, refer to "LAN CONNECTION (LAN)" on page 67.
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 73.

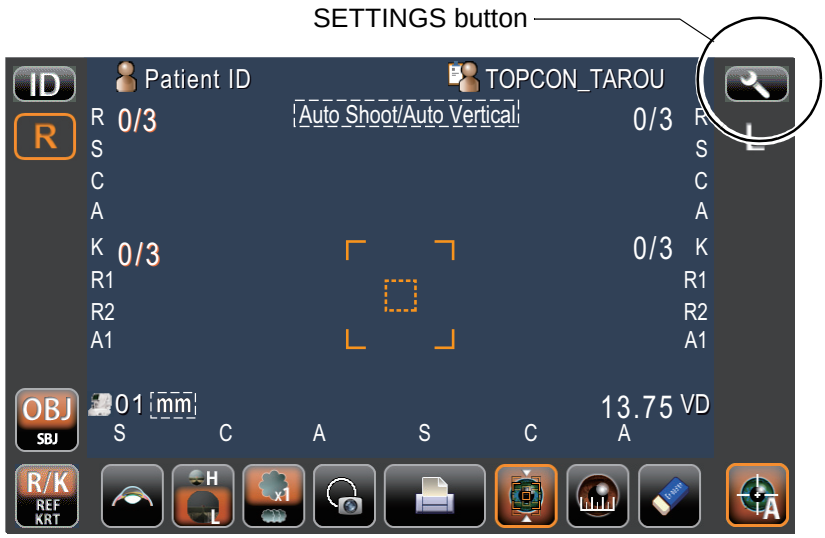
SETTING FUNCTIONS ON SETUP SCREEN

OPERATING THE SETUP SCREEN

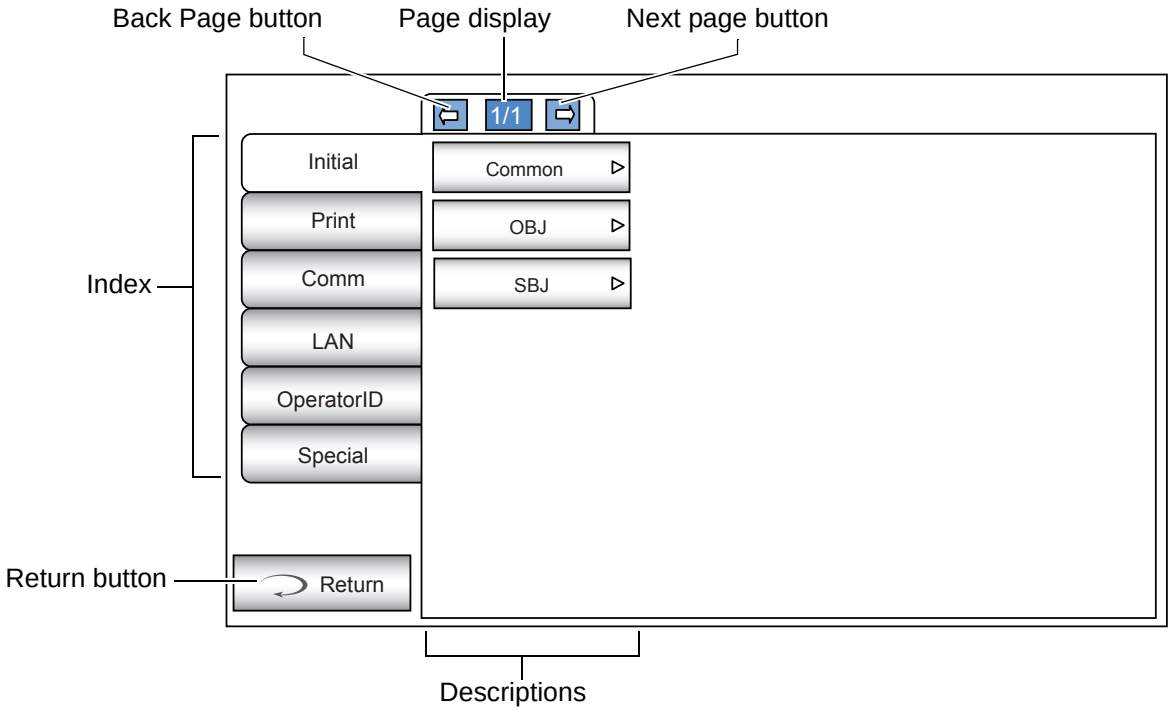
Various functions can be set on the SETUP screen.

PREPARATONS FOR SETTING

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

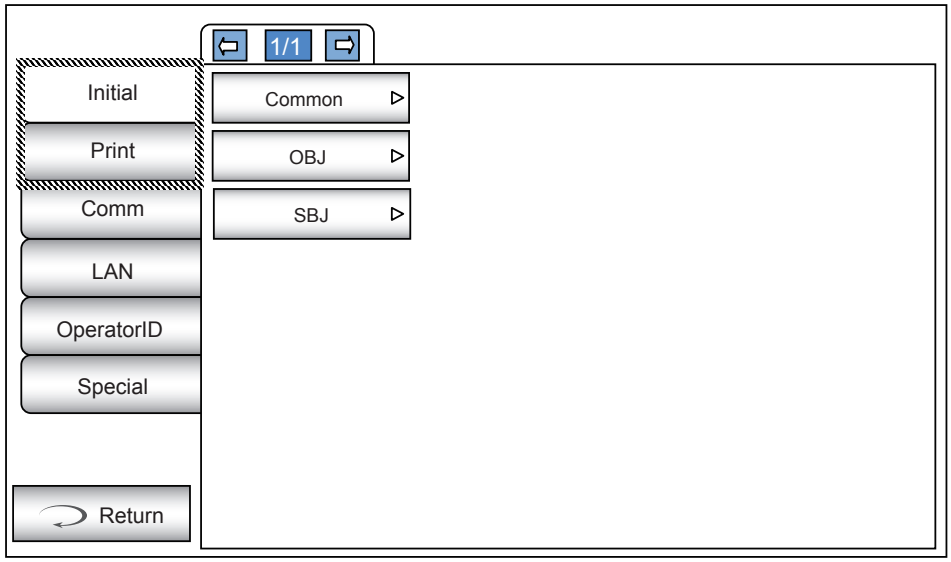


The SETUP screen is displayed.

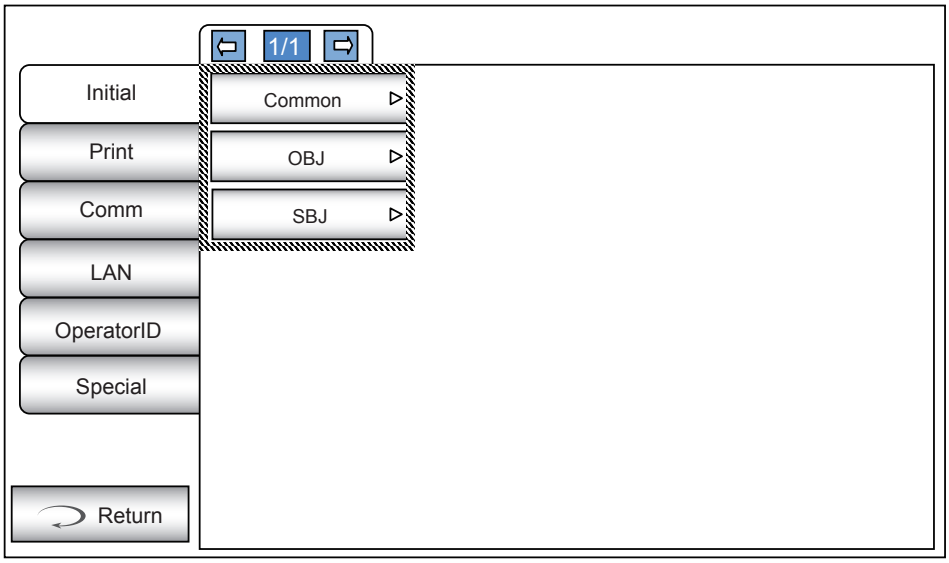


OUTLINE OF SETUP SCREEN OPERATIONS (IN CASE OF INITIAL AND PRINT)

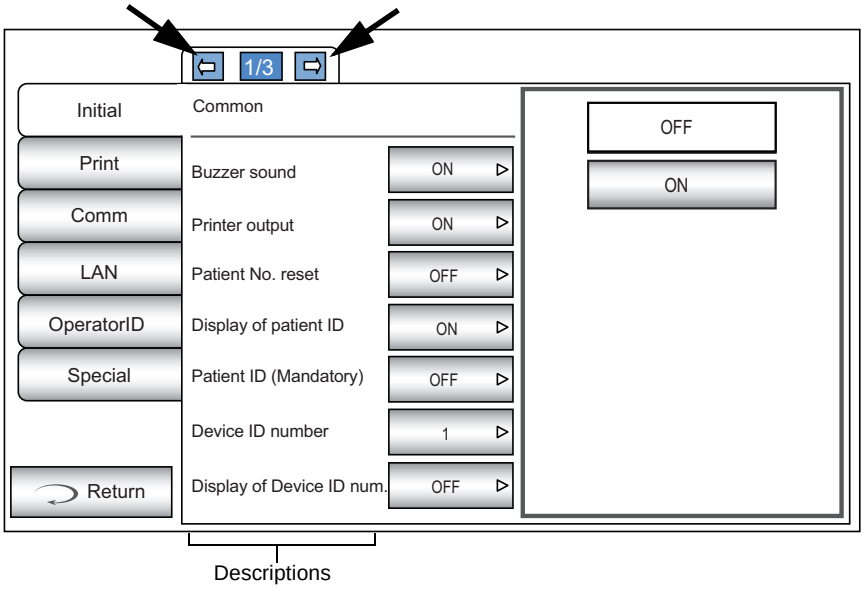
1 Tap INDEX and select "Initial" or "Print".



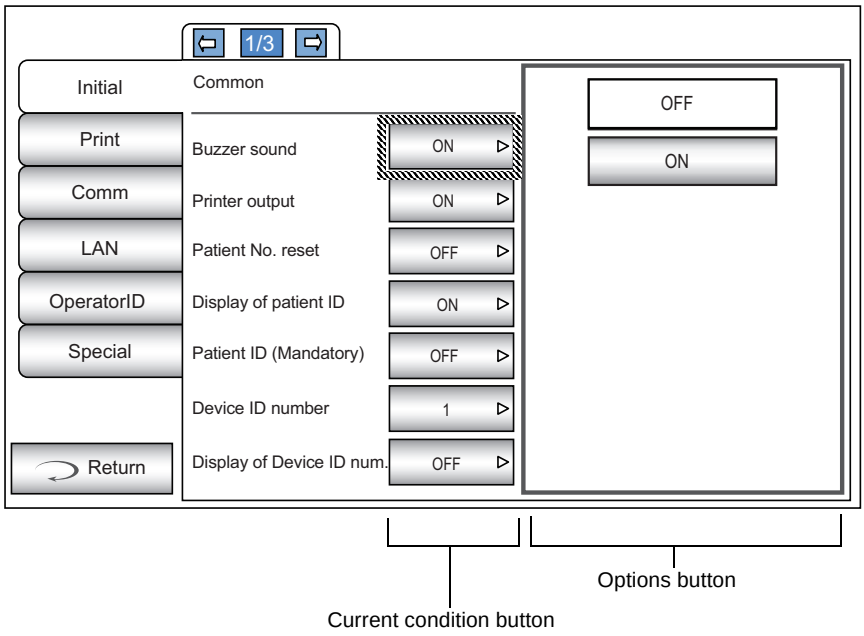
2 Select the settings common function "Common", objective refractive measurement function "OBJ" or subjective refractive check function "SBJ".
In the "Print" setting it is possible to select "Preset", "Common" (objective/subjective common items), "REF/KRT" (REF and KRT common items in objective refractive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



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

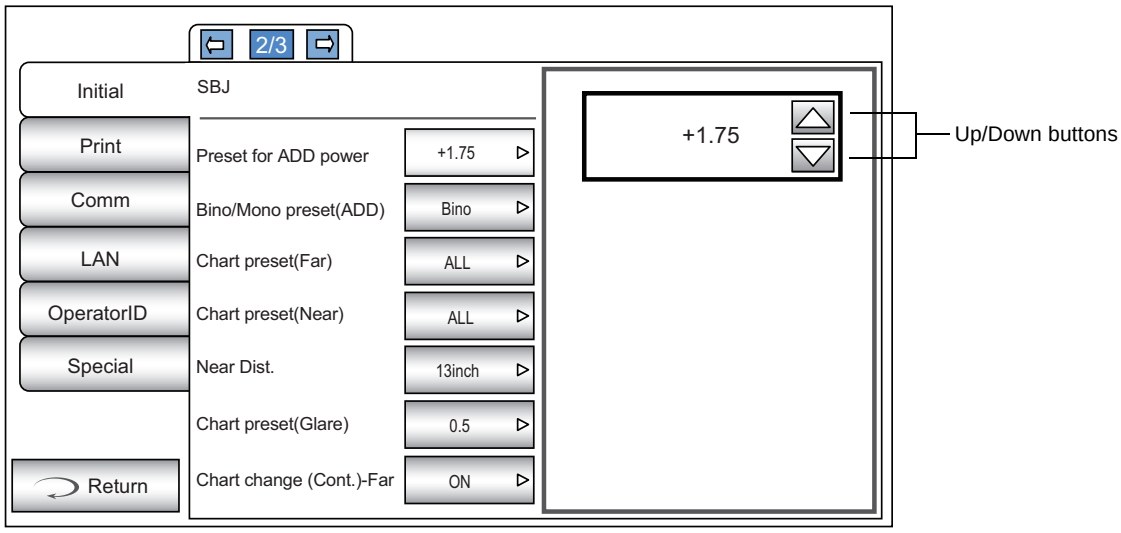


4 Tap the CURRENT CONDITION button of the item to be changed and find the OPTIONS button.

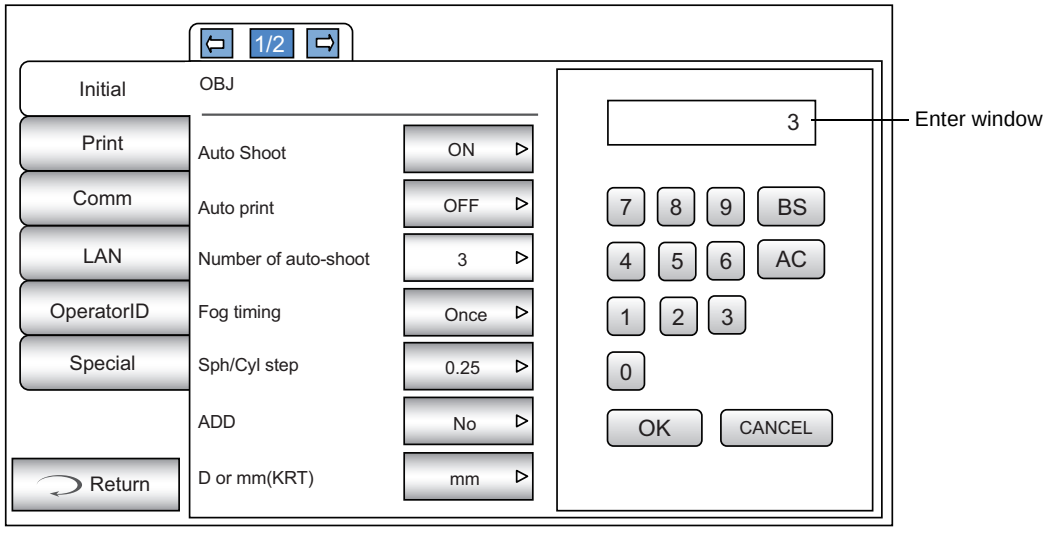


- Instead of the OPTIONS button, the UP/DOWN buttons and numerical pad would be displayed.

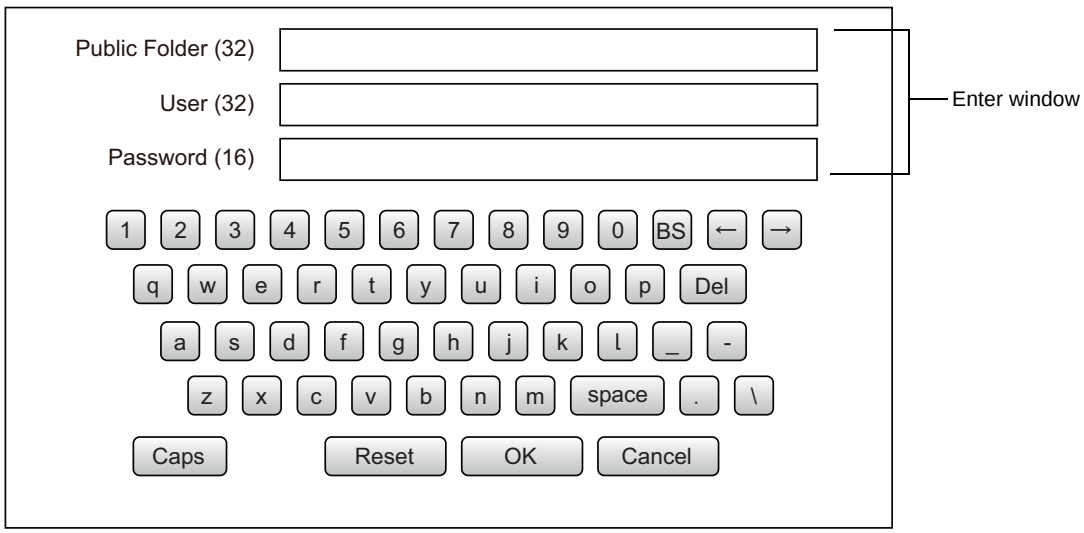
UP/DOWN BUTTON:
Tap the up or down button on the screen to change the setting.



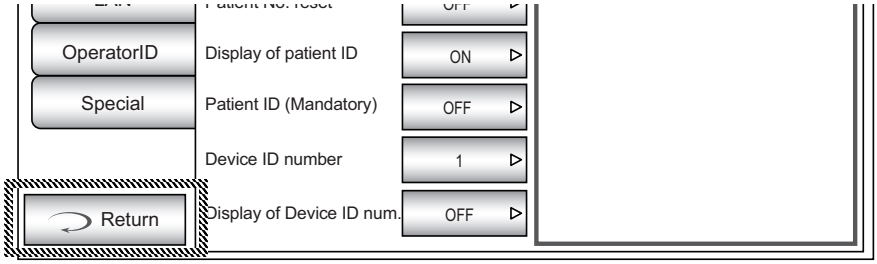
TEN-KEY:
Tap ten-key on the screen and enter the figure. If there are several windows to enter, tap the window to enter the figure by ten-key. Tap [OK] and fix the input value.



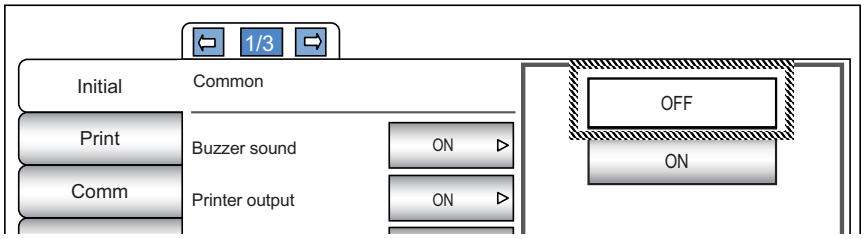
KEYBOARD:
Tap keyboard on the screen and enter characters. If there are several windows to enter, tap the window to enter the figure by keyboard. Tap [OK] and fix the input value.



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



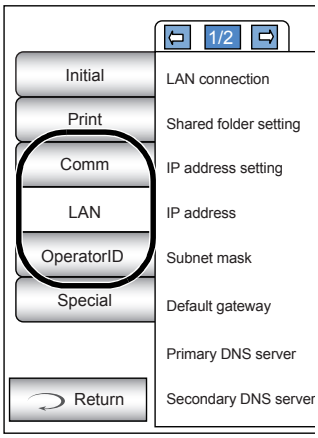
5 Tap the OPTIONS button and change the setting.



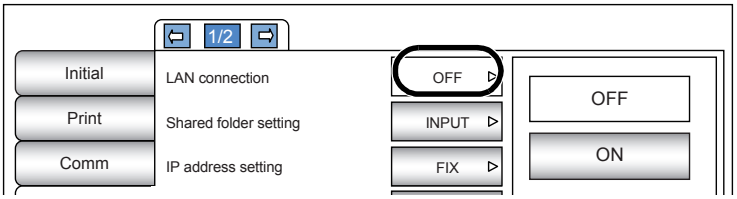
NOTE	The set value is updated when an OPTIONS button is tapped.

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

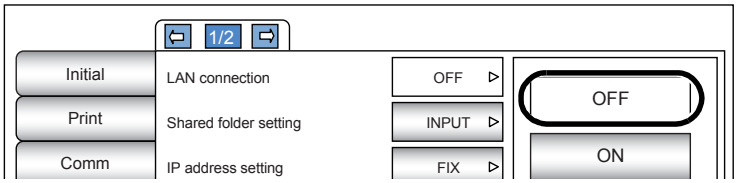
1 Tap [INDEX] and select the setting items.



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



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



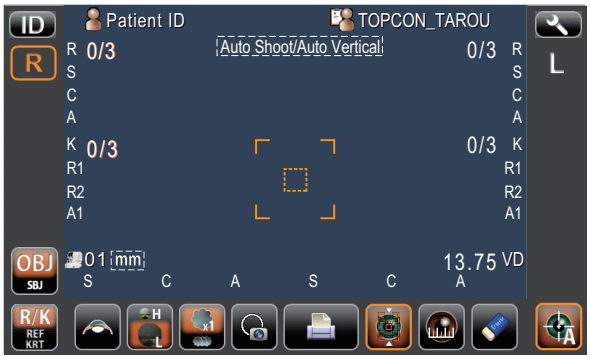
- Instead of the [OPTIONS] button, the UP/DOWN buttons and numerical pad would be displayed. (See page 57)

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

RETURNING TO THE MEASUREMENT SCREEN

1 Tap the Return button.

2 The Measurement screen is displayed.



LIST OF SETUP ITEMS

Setup items are categorized into 6 large indexes.

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

INITIAL (INITIAL SETTING)

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

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

Common

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

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

OBJ

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

SBJ

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

Chart preset(Far)	ALL 20/200 20/100 20/80 20/60 20/50 20/40 20/30 20/25 20/20 20/15	When starting far VA check an initial eye-test chart is set.	ALL
Chart preset(Near)	ALL 20/200 20/100 20/80 20/60 20/50 20/40 20/30 20/25 20/20 20/15	When starting near VA check an initial eye-test chart is set.	ALL
Near Dist.	13inch 16inch 20inch 24inch	When starting near VA check an initial distance of near VA check is set.	13inch
Chart preset(Glare)	20/200 20/100 20/80 20/60 20/50 20/40 20/30 20/25 20/20 20/15	When starting glare test an initial chart is set.	20/50
Chart change (Cont.)-Far	OFF	When switching far VA check to contrast test, the chart used in far VA check is applied in contrast test.	ON
	ON	When switching far VA check to contrast test, the chart returns to default setting.	
Chart preset(Cont.)	ALL 20/200 20/100 20/80 20/60 20/50 20/40 20/30 20/25 20/20 20/15	When starting contrast test an initial eye-test chart is set.	20/50
Cont. % Preset(Cont.)	2.5% 5% 10% 12.5% 25% 50% 100%	When starting contrast test an initial contrast percentage is set.	50%
Grid Dist.	13inch 16inch	When starting grid test an initial distance of near VA check is set.	13inch
Auto Far iniR/L Change	OFF	When changing the left and right, it is not returned to "Far".	ON
	ON	When changing the left and right, it is returned to "Far". (In "Far", "Glare OFF" and "Cont OFF".)	

SETTING OF INTERNAL PRINTER (PRINT)

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

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

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

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

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

DATA COMMUNICATION (COMM)

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

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

LAN CONNECTION (LAN)

LAN contains settings related to data output via LAN.

Description	Options	Details	Initial value
LAN connection	OFF	LAN connection is off.	OFF
	ON	LAN connection is on.	
Shared folder setting	Shared Folder (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 PC to output data.	NONE
Subnet mask	0.0.0.0 Set by ten-key display.	Subnet mask address of KR-800S.	NONE
Default gateway	0.0.0.0 Set by ten-key display.	Default gateway address of KR-800S.	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 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

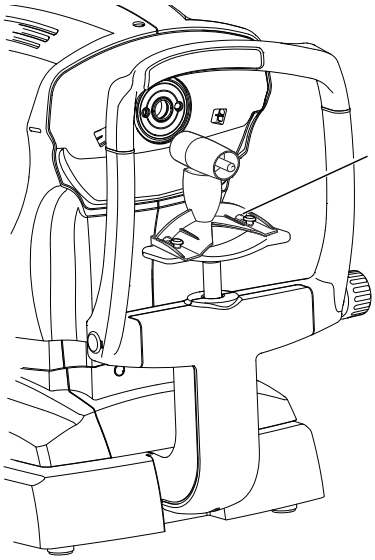
SPECIAL is the mode for service engineer only; it is not used under normal condition.

MAINTENANCE

DAILY CHECKUPS

CHECKING THE MEASURING ACCURACY

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



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

CLEANING THE INSTRUMENT

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

CLEANING THE FOREHEAD REST AND CHIN REST

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

DAILY MAINTENANCE

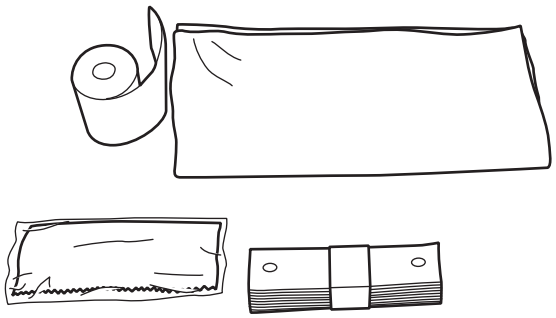
- For this instrument, dust may cause errors. When not in use, replace the measuring lens cap and dust cover.
- When not in use, turn off the POWER switch.

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

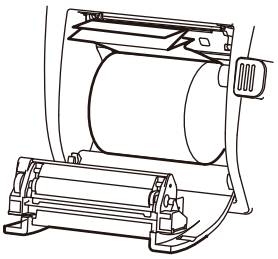
- The control panel is optimally adjusted when shipped.
- For control panel brightness adjustment, see "INITIAL (INITIAL SETTING)," "Control panel brightness" (page 62).

PRINTER PAPER JAM

CAUTION	• When setting a printer paper, keep a patient's face away from the instrument. Some part of the instrument may touch the patient's lip or nose if the printer button is pressed. • 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.

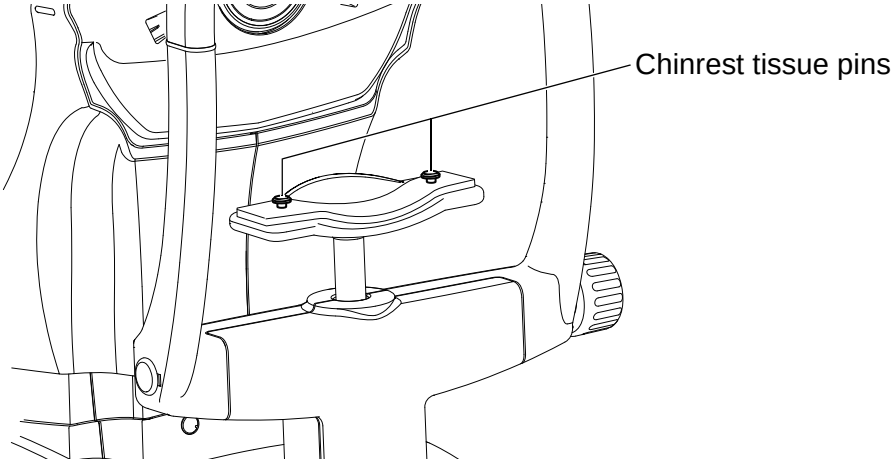
1 Open the printer cover, and take out the jammed paper pieces.

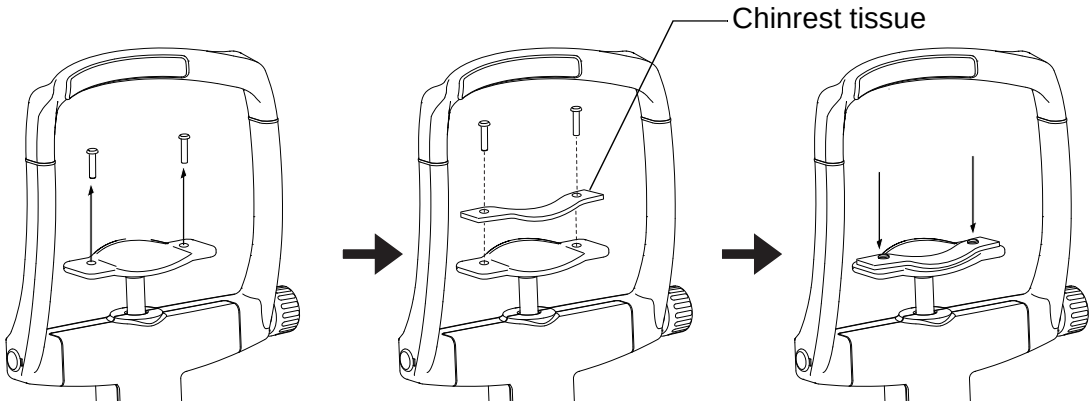


NOTE	After removing the jammed printer paper, tap the Print button to print out the previous measurement data. If no previous measurement data has saved, a blank sheet is printed out.

SUPPLYING THE CHINREST TISSUE

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





MAINTENANCE

CLEANING THE KERATO RING AND THE COVER

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

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

CLEANING THE CONTROL PANEL

NOTE	• As the control panel screen is a touch panel, be sure to turn off the POWER switch before wiping. The touch panel will react and malfunction. • 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	Spherical power exceeds +22D or -25D.
OVER-CYL	Cylindrical power exceeds ±10D.
OVER-R	Corneal curvature exceeds 5.00-10.00mm.
NO TARGET	There is no target or the eye image is too dark.
AGAIN	There is more than ±5D difference from the previous measurement value.
NO CENTER	Center of eye can not be found.
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	The alignment is significantly failed during the measurement.
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. Check the free space capacity at the save location.
RS-232C FAIL	Failed in RS-232C data transmission.
Please check the DATE/TIME	The battery for the buit-in clock become run down. Before using, confirm the time and date on the SETUP menu. If the message comes up frequently, call your service engineer.
Previous measurements are left. Please press the Clear button.	Displayed when an output is required while output operation is not completed after measurement so that the output of all output-set data fails.
Spec on Far sub. check exceeds the limit. SCA are set in meas. range.	Adjust the value to become within subjective refractive check range if the REF value of objective refractive measurement or the CL data exceeds the subjective refractive check range.
Spec on Far sub. check exceeds the limit.	Displayed the value is set exceeding subjective refractive check range when SPH value is increased or decreased by SPH (+)/(-) button in subjective refractive Far VA check.
Spec on Near sub. check exceeds the limit.	Displayed the value is set exceeding subjective refractive check range when switching subjective refractive Far VA check to Near VA check, increasing or decreasing ADD by ADD (+)/(-) button at subjective refractive Near VA check and changing the near check distance at subjective refractive Near VA check.
Spec on Near sub. check exceeds the limit. It goes back to Far check.	When the check will switch the other eye (changing left or right eye) of subjective refractive near VA check under subjective refractive near VA check, the value is changed exceeding subjective refractive check range of the other eye. Shown that it returns to Far VA check compulsorily.
Are you sure you want to reset all present subjective data?	Confirmed whether the subjective refractive check data is reset when the RESET SBJ button is pressed.
Near Distance is different in R/L. Are you sure you want to reset NearVA?	Displayed subjective refractive Near VA check is performed when a different value of near check distance is set for left and right eye. Confirmed whether you want to carry out from the beginning of subjective refractive Near VA check.

TROUBLE-SHOOTING OPERATIONS

WARNING	To avoid electrical shock, do not open the instrument. All service should be performed by a qualified service engineer.

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

CHECK LIST

Trouble	Condition	Check	Page
Control panel does not turn on.	———	Is power cable unplugged?	21
		Is power cable connected to the instrument?	21
Control panel is not clear.	The image is dark.	Adjust the brightness by “Control panel Brightness Adjust”.	62
Any trouble is found in a movable part.	———	Do not move it forcibly but call our service engineer.	30
Printing is not done.	Paper comes out without printing.	Confirm the direction of paper winding. If the direction is incorrect, reset paper to the proper direction.	23
	Paper does not come out.	If “PAPER END” displayed on control panel, replenish printer paper.	23

SPECIFICATIONS AND PERFORMANCE

SPECIFICATIONS AND PERFORMANCE

Range of Refractometry Measurement	Spherical refractive power: -25 to +22D (0.12D/0.25D steps) Cylindrical refractive power: 0D to ±10D (0.12D/0.25D steps) (where, spherical refractive power + cylindrical refractive power ≦ +22D, or spherical refractive power + cylindrical refractive power ≦ -25D) Direction of astigmatic axis: 0° to 180° (1°/5° steps) 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)
Range of Subjective refractive check	Spherical refractive power: -18D to +18D (0.25D steps) Test chart: Eyesight test chart of 20/200 to 20/15, Grid display Chart display: Overall, Horizontal series, Contrast change Test items: Far-sightedness, Near-sightedness, Glare test
PD measurement	20-85mm (0.5mm display unit)

NOTE

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

GENERAL INFORMATION ON USAGE AND MAINTENANCE

INTENDED PATIENT POPULATION

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

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

INTENDED USER PROFILE

Since the Auto Kerato-Refractometer KR-800S 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% RH(without condensation)
Atmospheric pressure: 700hPa to 1060hPa

STORAGE, USAGE PERIOD

1. Environmental conditions (without package)
   *Temperature: 10°C to 40°C
   Humidity: 10% to 95% (without condensation)
   Air 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 air 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%

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%

ELECTRIC RATING

Source voltage: 100-240V AC, 50-60Hz

Power input: 70VA

SAFETY DESIGNATIONS PER IEC 60601-1 STANDARD

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

DIMENSIONS AND WEIGHT

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

Weight: 15kg

OPERATION PRINCIPLE

REF measurement:

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

KRT measurement:

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

Subjective measurement:

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

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

DISPOSAL

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

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

ELECTROMAGNETIC COMPATIBILITY

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

a)MEDICAL ELECTRICAL EQUIPMENT needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.

b)Portable and mobile RF communications equipment can affect MEDICAL ELECTRICAL EQUIPMENT.

c)The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the EQUIPMENT or SYSTEM as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the EQUIPMENT or SYSTEM.

d)The EQUIPMENT or SYSTEM should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, the EQUIPMENT or SYSTEM should be observed to verify normal operation in the configuration in which it will be used.

e)The use of the ACCESSORY, transducer or cable with EQUIPMENT and SYSTEMS other than those specified may result in increased EMISSION or decreased IMMUNITY of the EQUIPMENT or SYSTEM.

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

*1: Used it for AC120V

*2: Used it for AC230V

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

Guidance and manufacturer's declaration - electromagnetic immunity			
The KR-800S is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-800S should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge(ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0, 5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	<5% U_t (>95% dip in U_t) for 0, 5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user or the KR-800S requires continued operation during power mains interruptions, it is recommended that the KR-800S be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_t is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The KR-800S is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-800S should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150kHz to 80MHz 3 V/m 80MHz to 2, 5GHz	3 V 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the KR-800S, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2, 5GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			

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

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

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

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

Rated maximum output power of transmitter W	**Separation distance according to frequency of transmitter m**		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	**80MHz to 800MHz** $d = 1.2\sqrt{P}$	**800MHz to 2,5GHz** $d = 2.3\sqrt{P}$
0, 01	0, 12	0, 12	0, 23
0, 1	0, 38	0, 38	0, 73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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

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

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

REQUIREMENTS FOR THE EXTERNAL DEVICE

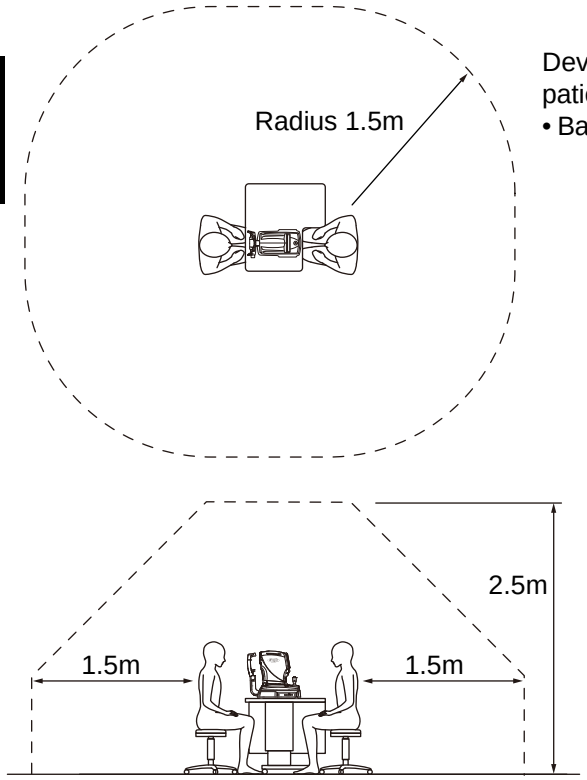
The external device connected to the analog and digital interfaces must comply with the respective IEC or ISO standards (e.g. IEC 60950-1 for data processing equipment and IEC 60601-1 for medical equipment).
Anybody connecting additional equipment to medical electrical equipment configures a medical system and is therefore responsible that the system complies with the requirements for medical electrical systems. Attention is drawn to the fact that local laws take priority over the above mentioned requirements. If in doubt, contact your dealer or TOPCON (see the back cover).

PATIENT'S ENVIRONMENT

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

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

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



Devices applicable to the patient's environment
• Barcode reader (Note 1)

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

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

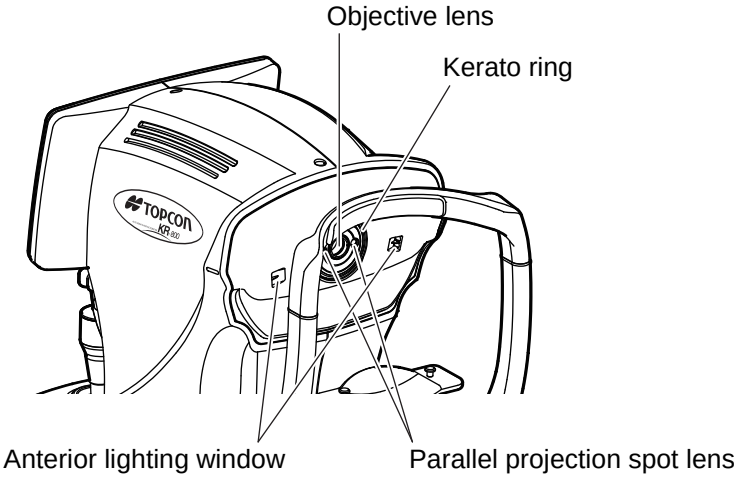
SAFETY OF LED PRODUCT

Class of LED product	CLASS1 LED PRODUCT (IEC60825-1:2001)	
LED output (Infrared)	M LED (For Measurement)	
	Aperture of LED	Objective lens *
	Output of cornea	10uW
	Wavelength	870nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 33ms (Single)
	XY LED (For XY alignment)	
	Aperture of LED	Objective lens *
	Output of cornea	10uW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8us (270Hz)
	ZENGAN LED (For Anterior segment observation)	
	Aperture of LED	Anterior lighting window *
	Output of cornea	50uW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	0.87 rad
	Pulse width	CW - 14.8us (270Hz)
	SRING LED (For Kerato ring)	
	Aperture of LED	Kerato ring *
	Output of cornea	40uW
	Wavelength	950nm
	Half width	50nm
	Beam divergence	3.14 rad
	Pulse width	CW - 14.8us (270Hz)
	SPOT LED (For parallel projection spot)	
	Aperture of LED	Parallel projection spot lens *
	Output of cornea	40uW
	Wavelength	940nm
	Half width	50nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8us (270Hz)
LED output (White)	KOSHI LED (For fixation)	
	Aperture of LED	Objective lens *
	Output of cornea	15nW
	Wavelength (Centroid)	530nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8us (270Hz)
	Glare Test LED (For Glare Test)	
	Aperture of LED	Objective lens *
	Output of cornea	50nW
	Wavelength (Centroid)	530nm
	Beam divergence	(Parallel)
	Pulse width	CW - 14.8us (66Hz)

LED light source (Infrared)	M LED (For Measurement)	
	Class of LED	Class 3B
	Output	70mW (CW)
	Wavelength	870nm
	Half width	50nm
	Beam divergence	0.87 rad
	XY LED (For XY alignment)	
	Class of LED	Class 1
	Output	6mW (CW)
	Wavelength	950nm
	Half width	50nm
	Beam divergence	0.14 rad
	ZENGAN LED (For Anterior segment observation)	
	Class of LED	Class 1
	Output	6mW (CW)
	Wavelength	950nm
	Half width	50nm
	Beam divergence	1.40 rad
	SRING LED (For Kerato ring)	
	Class of LED	Class 1
	Output	14mW (CW)
	Wavelength	940nm
	Half width	50nm
	Beam divergence	2.09rad
	SPOT LED (For parallel projection spot)	
	Class of LED	Class 1
	Output	14mW (CW)
	Wavelength	940nm
	Half width	50nm
	Beam divergence	2.09rad
LED light source (White)	KOSHI LED (For fixation)	
	Class of LED	Class 1
	Output	0.08mW (CW)
	Wavelength (Centroid)	530nm
	Beam divergence	1.05 rad
	Glare Test LED (For Glare Test)	
	Class of LED	Class 1
	Output	0.28mW (CW)
	Wavelength (Centroid)	530nm
	Beam divergence	1.05 rad

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

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

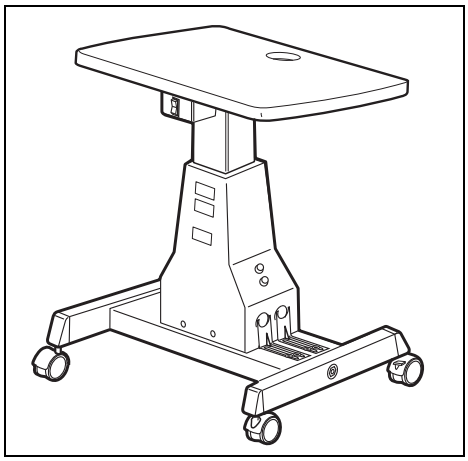


REFERENCE

OPTIONAL ACCESSORIES

- Adjustable instrument table AIT-16

The table height can be adjusted to facilitate measurement.



Specifications

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

- RS-232C on-line cable

SHAPE OF PLUG

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

IPA FONT LICENSE AGREEMENT v1.0

The Licensor provides the Licensed Program (as defined in Article 1 below) under the terms of this license agreement (“Agreement”). Any use, reproduction or distribution of the Licensed Program, or any exercise of rights under this Agreement by a Recipient (as defined in Article 1 below) constitutes the Recipient’s acceptance of this Agreement.

Article 1 (Definitions)

1. “Digital Font Program” shall mean a computer program containing, or used to render or display fonts.
2. “Licensed Program” shall mean a Digital Font Program licensed by the Licensor under this Agreement.
3. “Derived Program” shall mean a Digital Font Program created as a result of a modification, addition, deletion, replacement or any other adaptation to or of a part or all of the Licensed Program, and includes a case where a Digital Font Program newly created by retrieving font information from a part or all of the Licensed Program or Embedded Fonts from a Digital Document File with or without modification of the retrieved font information.
4. “Digital Content” shall mean products provided to end users in the form of digital data, including video content, motion and/or still pictures, TV programs or other broadcasting content and products consisting of character text, pictures, photographic images, graphic symbols and/or the like.
5. “Digital Document File” shall mean a PDF file or other Digital Content created by various software programs in which a part or all of the Licensed Program becomes embedded or contained in the file for the display of the font (“Embedded Fonts”). Embedded Fonts are used only in the display of characters in the particular Digital Document File within which they are embedded, and shall be distinguished from those in any Digital Font Program, which may be used for display of characters outside that particular Digital Document File.
6. “Computer” shall include a server in this Agreement.
7. “Reproduction and Other Exploitation” shall mean reproduction, transfer, distribution, lease, public transmission, presentation, exhibition, adaptation and any other exploitation.
8. “Recipient” shall mean anyone who receives the Licensed Program under this Agreement, including one that receives the Licensed Program from a Recipient.

Article 2 (Grant of License)

The Licensor grants to the Recipient a license to use the Licensed Program in any and all countries in accordance with each of the provisions set forth in this Agreement. However, any and all rights underlying in the Licensed Program shall be held by the Licensor. In no sense is this Agreement intended to transfer any right relating to the Licensed Program held by the Licensor except as specifically set forth herein or any right relating to any trademark, trade name, or service mark to the Recipient.

1. The Recipient may install the Licensed Program on any number of Computers and use the same in accordance with the provisions set forth in this Agreement.
2. The Recipient may use the Licensed Program, with or without modification in printed materials or in Digital Content as an expression of character texts or the like.
3. The Recipient may conduct Reproduction and Other Exploitation of the printed materials and Digital Content created in accordance with the preceding Paragraph, for commercial or non-commercial purposes and in any form of media including but not limited to broadcasting, communication and various recording media.
4. If any Recipient extracts Embedded Fonts from a Digital Document File to create a Derived Program, such Derived Program shall be subject to the terms of this agreement.
5. If any Recipient performs Reproduction or Other Exploitation of a Digital Document File in which Embedded Fonts of the Licensed Program are used only for rendering the Digital Content within such Digital Document File then such Recipient shall have no further obligations under this Agreement in relation to such actions.
6. The Recipient may reproduce the Licensed Program as is without modification and transfer such copies, publicly transmit or otherwise redistribute the Licensed Program to a third party for commercial or non-commercial purposes (“Redistribute”), in accordance with the provisions set forth in Article 3 Paragraph 2.
7. The Recipient may create, use, reproduce and/or Redistribute a Derived Program under the terms stated above for the Licensed Program: provided, that the Recipient shall follow the provisions set forth in Article 3 Paragraph 1 when Redistributing the Derived Program.

Article 3 (Restriction)

The license granted in the preceding Article shall be subject to the following restrictions:

1. If a Derived Program is Redistributed pursuant to Paragraph 4 and 7 of the preceding Article, the following conditions must be met:
   (1)The following must be also Redistributed together with the Derived Program, or be made available online or by means of mailing mechanisms in exchange for a cost which does not exceed the total costs of postage, storage medium and handling fees:
      (a)a copy of the Derived Program; and
      (b)any additional file created by the font developing program in the course of creating the Derived Program that can be used for further modification of the Derived Program, if any.
   (2)It is required to also Redistribute means to enable recipients of the Derived Program to replace the Derived Program with the Licensed Program first released under this License (the “Original Program”). Such means may be to provide a difference file from the Original Program, or instructions setting out a method to replace the Derived Program with the Original Program.
   (3)The Recipient must license the Derived Program under the terms and conditions of this Agreement.
   (4)No one may use or include the name of the Licensed Program as a program name, font name or file name of the Derived Program.
   (5) Any material to be made available online or by means of mailing a medium to satisfy the requirements of this paragraph may be provided, verbatim, by any party wishing to do so.
2. If the Recipient Redistributes the Licensed Program pursuant to Paragraph 6 of the preceding Article, the Recipient shall meet all of the following conditions:
   (1)The Recipient may not change the name of the Licensed Program.
   (2)The Recipient may not alter or otherwise modify the Licensed Program.
   (3)The Recipient must attach a copy of this Agreement to the Licensed Program.
3. THIS LICENSED PROGRAM IS PROVIDED BY THE LICENSOR “AS IS” AND ANY EXPRESSED OR IMPLIED WARRANTY AS TO THE LICENSED PROGRAM OR ANY DERIVED PROGRAM, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED. IN NO EVENT SHALL THE LICENSOR BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXTENDED, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO; PROCUREMENT OF SUBSTITUTED GOODS OR SERVICE; DAMAGES ARISING FROM SYSTEM FAILURE; LOSS OR CORRUPTION OF EXISTING DATA OR PROGRAM; LOST PROFITS), HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE INSTALLATION, USE, THE REPRODUCTION OR OTHER EXPLOITATION OF THE LICENSED PROGRAM OR ANY DERIVED PROGRAM OR THE EXERCISE OF ANY RIGHTS GRANTED HEREUNDER, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
4. The Licensor is under no obligation to respond to any technical questions or inquiries, or provide any other user support in connection with the installation, use or the Reproduction and Other Exploitation of the Licensed Program or Derived Programs thereof.

Article 4 (Termination of Agreement)

1. The term of this Agreement shall begin from the time of receipt of the Licensed Program by the Recipient and shall continue as long as the Recipient retains any such Licensed Program in any way.
2. Notwithstanding the provision set forth in the preceding Paragraph, in the event of the breach of any of the provisions set forth in this Agreement by the Recipient, this Agreement shall automatically terminate without any notice. In the case of such termination, the Recipient may not use or conduct Reproduction and Other Exploitation of the Licensed Program or a Derived Program: provided that such termination shall not affect any rights of any other Recipient receiving the Licensed Program or the Derived Program from such Recipient who breached this Agreement.

Article 5 (Governing Law)

1. IPA may publish revised and/or new versions of this License. In such an event, the Recipient may select either this Agreement or any subsequent version of the Agreement in using, conducting the Reproduction and Other Exploitation of, or Redistributing the Licensed Program or a Derived Program. Other matters not specified above shall be subject to the Copyright Law of Japan and other related laws and regulations of Japan.
2. This Agreement shall be construed under the laws of Japan.

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

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

AUTO KERATO-REFRACTOMETER KR-800S

USER MANUAL
2014 version (2014.01-100LW0)
Date of issue: January 14, 2014

Published by TOPCON CORPORATION

75-1 Hasunuma-cho, Itabashi-ku, Tokyo, 174-8580 Japan.

AUTO KERATO-REFRACTOMETER

KR-800S

TOPCON MEDICAL SYSTEMS,INC.
111 Bauer Drive, Oakland, NJ 07436, USA Phone:+1-201-599-5100 Fax:+1-201-599-5250 www.topconmedical.com

TOPCON CANADA INC.
110 Provencher Avenue, Boisbriand, QC J7G 1N1 CANADA Phone:+1-450-430-7771 Fax:+1-450-430-6457 www.topcon.ca

EC REP **TOPCON EUROPE MEDICAL B.V.**
(European Representative)(European Sole Sales Company)
Essebaan 11; 2908 LJ Capelle a/d IJssel; P.O.Box145; 2900 AC Capelle a/d IJssel; THE NETHERLANDS
Phone:+31 -(0)10-4585077 FAX:+31 -(0)10-4585045 Email: medical@topcon.nl; www.topcon.eu

ITALY OFFICE
:Viale dell' Industria 60; 20037 Paderno Dugnano; (Milano), ITALY Phone:+39-02-9186671 Fax:+39-02-91081091 E-mail: topconitaly@tiscali.it; www.topcon.it

DANMARK OFFICE
:Praestemarksvej 25; 4000 Roskilde, DANMARK Phone:+45-46-327500 Fax:+45-46-327555 E-mail: topcon@topcondanmark.dk www.topcondanmark.dk

IRELAND OFFICE
:Unit 276, Blanchardstown; Corporate Park 2 Ballycoolin Dublin 15, IRELAND Phone:+353-18975900 Fax:+353-18293915 E-mail: medical@topcon.ie; www.topcon.ie

TOPCON DEUTSCHLAND G.m.b.H.
Hanns-Martin-Schleyer Strasse 41; D-47877 Willich, GERMANY Phone:+49-(0)2154+8850 Fax:+49-(0)2154-885177 E-mail: med@topcon.de; www.topcon.de

TOPCON ESPAÑA S.A.
HEAD OFFICE:Frederic Mompou 4 Esc. A Bajos 3, 08960 Sant Just Desvern Barcelona, Spain Phone:+34-93-4734057 Fax:+34-93-4733932 E-mail: medica@topcon.es; www.topcon.es

TOPCON S.A.R.L.
BAT A1 3 route de la révolte 93206 SAINT DENIS CEDEX, FRANCE Phone:+33 1 49 21 23 23 Fax:+33 1 49 21 23 24 E-mail:topcon@topcon.fr; www.topcon.fr

TOPCON SCANDINAVIA A.B.
Neongatan 2; P.O.Box 25; 43151 Mölndal, SWEDEN Phone:+46-(0)31-7109200 Fax:+46-(0)31-7109249 E-mail:medical@topcon.se; www.topcon.se

TOPCON (GREAT BRITAIN) LTD.
Topcon House, Kennet Side, Bone Lane, Newbury, Berkshire RG14 5PX United Kingdom
Phone:+44-(0)1635-551120 Fax:+44-(0)1635-551170 E-mail:info@topcon.co.uk; www.topcon.co.uk

TOPCON POLSKA Sp. z. o. o.
ul. Warszawaka 23; 42-470 Siewierz, POLAND Phone:+48-(0)32-6705045 Fax:+48-(0)32-6713405 www.topcon-polska.pl

TOPCON SINGAPORE MEDICAL PTE. LTD.
1 Jalan Kilang Timor, Pacific Tech Centre #09-01 Singapore 159303 Phone:+65-68720606 Fax:+65-67736150 www.topcon.com.sg

TOPCON INSTRUMENTS (MALAYSIA) SDN.BHD.
No. D1, (Ground Floor), Jalan Excella 2, Off Jalan Ampang Putra, Taman Ampang Hilir, 55100 Kuala Lumpur, MALAYSIA Phone:+60(0)3-42709866 Fax:+60-(0)3-42709766

TOPCON INSTRUMENTS (THAILAND) CO.,LTD.
77/162 Sinnsathorn Tower, 37th Floor, Krungthonburi Rd., Klongtonsai, Klongsarn, Bangkok 10600,THAILAND Phone:+66(0)2-440-1152~7 Fax:+66-(0)2-440-1158

TOPCON CORPORATION BEIRUT OFFICE
P.O.Box 70-1002 Antelias, Beirut, LEBANON Phone:+961-4-523525/523526 Fax:+961-4-521119

TOPCON CORPORATION DUBAI OFFICE
P.O.Box 293705, Dubai Airport Free Zone L.I.U J-12, Dubai, U.A.E. Phone:+971-4-299-5900 Fax:+971-4-299-5901

Manufacturer

TOPCON CORPORATION

75-1 Hasunuma-cho,Itabashi-ku,Tokyo,174-8580 Japan.
Phone:3-3558-2520 Fax:3-3960-4214 www.topcon.co.jp

41848 95010
Printed in Japan 1401-100LW0