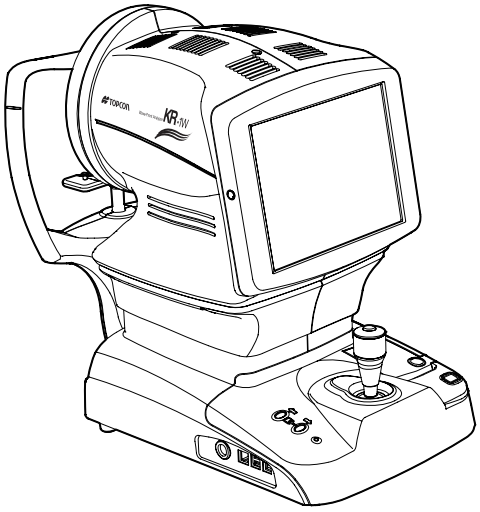
TOPCON



INSTRUCTION MANUAL
WAVE-FRONT ANALYZER

KR-1W

INTRODUCTION

Thank you for purchasing the TOPCON Wave-front Analyzer KR-1W.

This instrument has the following features:

- **The refractive power of the eye, the curvature radius of the cornea and the pupil diameter can be determined by simple operations.**
- **By displaying the Hartmann image and Mire image, wavefront aberration measurement of the eye can be done.**
- **Auto alignment and auto start functions enabling quick measurement under best conditions**

This text outlines the TOPCON Wave-front Analyzer KR-1W and describes basic operations, troubleshooting, checking, maintenance and cleaning.
To encourage the safe, efficient use of this instrument, carefully read "DISPLAYS FOR SAFE USE" and "SAFETY PRECAUTIONS."
Also, keep this Instruction Manual in a convenient location for your future reference.

PRECAUTIONS

- To ensure smooth operation, install the instrument on a leveled stand free of vibrations. Also, do not place any objects on the instrument.
- Connect all cables according to Preparation instructions on page 26.
- Use the specified source voltage.
- When not in use, turn off the power and put the measuring window cap and dust cover on.
- To ensure the correct reading, do not mar the measuring window with finger prints, dust, etc.
- Use this machine in a darkroom.

[WARNING]
When operating the instrument, be not touch the patient's eye or nose.
[Inform the patient accordingly]

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

[WARNING]
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.**

This Product Contains Mercury in the backlighting of the LCD display. Prior to disposal remove of otherwise ensure that this is disposed of in accordance with Local, State and Federal Laws. This information is applicable in U.S.A only.

This product contains a CRL Litium 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

[WARNING]
The safety and effectiveness of the Wave-front Analyzer KR-1W has not been estabrished for use of the device as an accessory interfaced to the refractive laser for the treatments of the higher order aberrations of the eye by photorefractive keratectomy(PRK), phototherapeutic keratectomy (PTK), or laser assisted in situ keratomileusis (LASIK).

CLASS I
IEC60601-1
CE 0123

CAUTIONS ON USE

BASIC NOTES

To avoid injury in changing the measurement mode, do not place fingers into the measuring opening.

To avoid electric shock, do not open cover. For repair, ask a certified Topcon Service Engineer.
When changing the fuse, turn off the power, and disconnect the power cable. Use the properly rated fuse.

DISPOSAL

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

STORING PLACE, USAGE PERIOD

1. 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.
2. Normal life span of the instrument:
   8 years from delivery providing regular maintenance is performed [TOPCON data]

USER MAINTENANCE

1. Regularly maintain and check the equipment and parts.
2. When resuming the use after a long storage time, verify that the instrument operates correctly and safely.
3. To ensure the correct reading, do not soil the measuring window with finger prints or dust.
4. If the measuring window is soiled, clean it following the "CLEANING THE INSTRUMENT" instructions on page 154.

HOW TO READ THIS MANUAL

- Read the instructions on pages 1 to 8 before using the machine.
- Regarding connection to various devices, see "PREPARATIONS" on page 26.
- If you need to see how the machine works first of all, read "BASIC OPERATIONS"(page 33) first.
- For setting various functions, see "FUNCTION SETTING USING SETTINGS SCREEN" on page 95.

DISPLAYS FOR SAFE USE

In order to encourage the safe use of the machine and prevent any danger to the operator and others or damage to properties, important warnings are placed on the product and inserted in the instruction manual.
We suggest that everyone understand the meaning of the following displays and icons before reading the "SAFETY PRECAUTIONS" and the main text.

DISPLAY	MEANING
⚠ **WARNING**	Ignoring or disregarding this display may lead to death or serious injury.
⚠ **CAUTION**	Ignoring or disregarding this display may lead to personal injury or physical damage.

- Injury refers to cuts, bruises, sprains, fractures, burn, electric shock, etc.
- Physical damage refers to extensive damage to buildings or equipment and furniture.

ICON	MEANING
	This icon indicates Prohibition. Specific content is expressed with words and/or an illustration near the icon.
	This indicates Mandatory Action. Specific content is expressed with words and/or an illustration near the icon.
	This indicates Caution. Specific content is expressed with words and/or an illustration near the icon.

SAFETY PRECAUTIONS

⚠ WARNING

Icon	Description	Page
	Do not open the cover. For repair, contact your authorized Topcon distributor. Keep the instrument in a dry place.	**8** **157**
	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 electric shock when replacing the fuse, be sure to unplug the instrument before removing the fuse cover. Do not use ungrounded outlets. Do not plug in the instrument without the fuse cover.	**8** **155**
	To avoid fire and electric shocks by short circuiting, be sure to connect the instrument into a grounded outlet.	**27**
	To avoid fire in the event of an instrument malfunction, immediately turn OFF the power switch and unplug the cable if you see smoke coming from the instrument, etc. Ask your dealer for repairs.	—

⚠ CAUTION

Icon	Description	Page
	To avoid injury, when moving the chinrest up/down, keep fingers away from moving parts.	**8**
	To prevent damage and injuries, do not install the instrument on an uneven, unsteady or sloped surface.	**26**
	To avoid electrical shock, do not handle the power plug with wet fingers.	**27**
	To avoid failure or potential injury, do not open the printer cover while the printer is in operation.	**29** **154**
	To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.	**29** **154**
	Never insert your fingers under the chinrest. * Inform the patient of this, too. Careless insertion of fingers may cause injury by pinching.	**38**
	When operating the instrument, be careful not to touch the patient's eye or nose.	**8**
	When moving the instrument, be sure to hold it at the base with two persons. Carrying by one person may cause harm to his back or injury by falling parts. Also, holding areas other than the base may cause injury, as well as damage to the instrument.	**26**
	When setting an instrument on an instrument table, pay attention not to injure the patient's fingers between the instrument and the table.	**26**
	To avoid potential injury, do not touch the internal printer body while the printer is in operation or when replacing the printer paper.	**29** **154**
	This instrument has been tested (with 100/120/230V) and found to comply with IEC60601-1-2: Ed.3.0: 2007. This instrument may emit a radio frequency energy (within the standard) and cause an adverse effect on the devices located nearby. When such effect is confirmed by the ON/OFF operation, a proper treatment as to change the direction, use another outlet, etc. is recommended. If the problem remains unsolved, call your dealer.	—

USAGE AND MAINTENANCE

PURPOSE

The Wave-front Analyzer KR-1W is a precision electrical instrument for medical use which must be used under the guidance and instructions of a doctor.

USER MAINTENANCE

To ensure the safety and performance of the instrument, all maintenance work, unless specified in this manual, shall be conducted by trained service engineers.
The following maintenance tasks may be done by the user.
For details, see the relevant part of this manual.

CHANGING THE FUSE

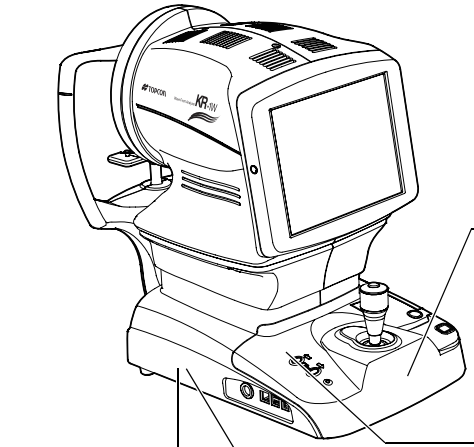
The primary fuses for the main body may be changed by a non-trained service technician.
For details, refer to "REPLACING THE FUSE" on page 155.

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 Instruction Manual.
- The device does not provide a diagnose of any condition or lack thereof or any recommendations for appropriate treatment. The relevant healthcare provider is fully responsible for all diagnose and treatment decisions and recommendations.

WARNING INDICATIONS AND POSITIONS

To ensure the safety, this machine provides warning displays.
Use the instrument correctly by observing the display instructions. If any of the following display labels are missing, contact your TOPCON dealer at the address listed on the back cover.



CAUTION

- When operating the instrument, be careful not to touch the patient's eye or nose.

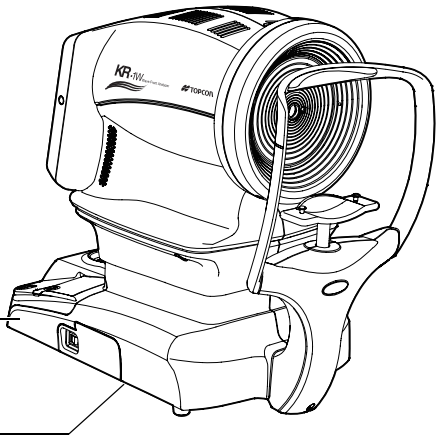
CAUTION

- To avoid injury, when moving the chinrest up/down, keep fingers away from moving parts.

WARNING

- Do not open the cover. For repair, contact your authorized Topcon distributor.
  Keep the instrument in a dry place.

CLASS I LASER PRODUCTS



WARNING

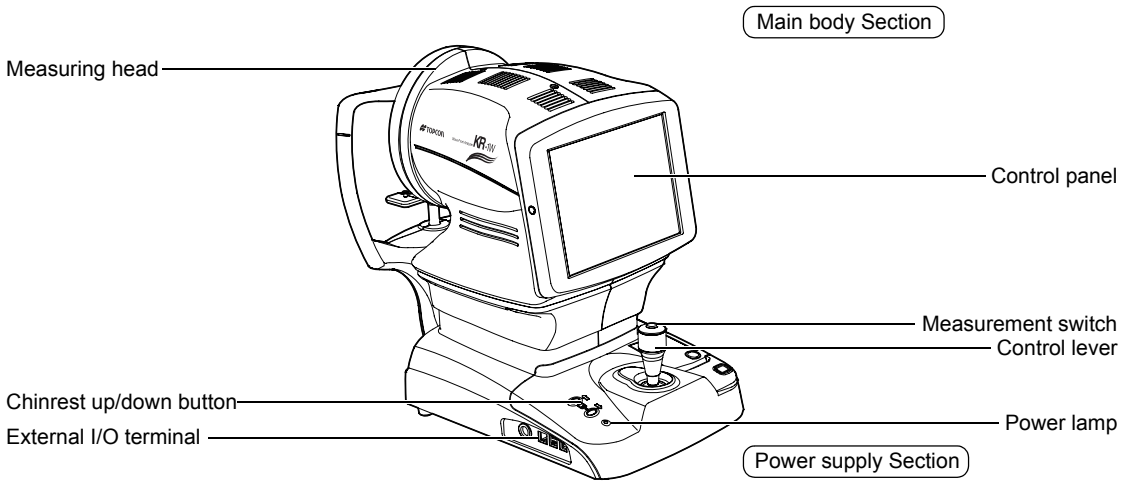
- To avoid electric shock when replacing the fuse, be sure to unplug the instrument before removing the fuse cover. Do not use ungrounded outlets. Do not plug in the instrument without the fuse cover.

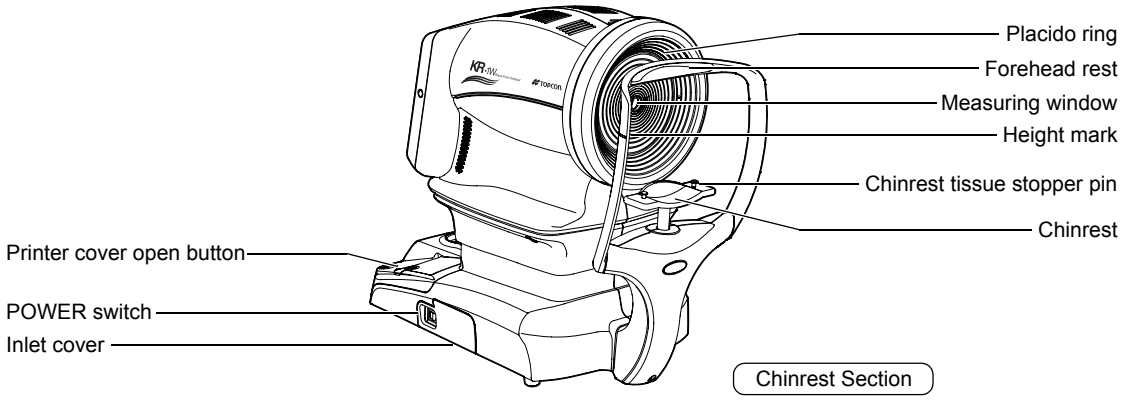
Degree of protection against electric shock:
TYPE B EQUIPMENT

CONTENT

COMPONENTS

COMPONENT NAMES





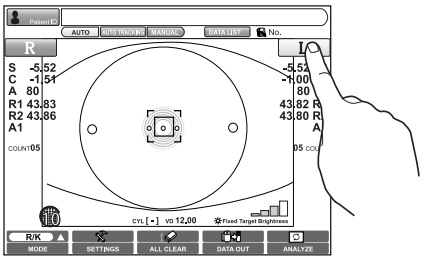
COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber
Chinrest : Acrylonitrile butadiene styrene resin

OPERATION METHOD OF CONTROL PANEL

MEMO	When operating the control panel, do not use any sharp tools; e.g. ball point pen.

Tap → To select any relevant item.

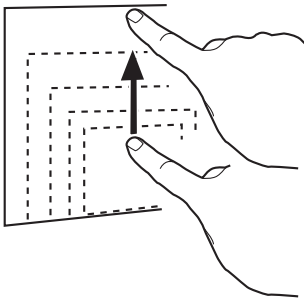


Touch the screen softly with a finger.

Drag → Used to change images.
(Overlay, Reduction of image size, etc.)

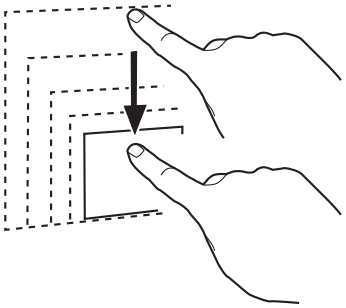
Touch the screen softly and move the finger.

(Example)
Enlarging the image (Method 1)



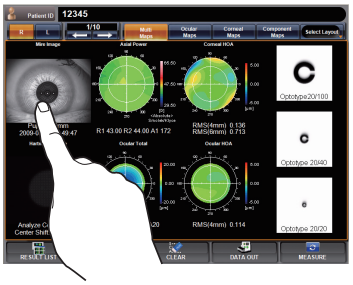
Touch the upper part of the image and drag it upward.

Reducing the image



Touch the upper part of the image and drag it downward.

Enlarging the image (Method 2)

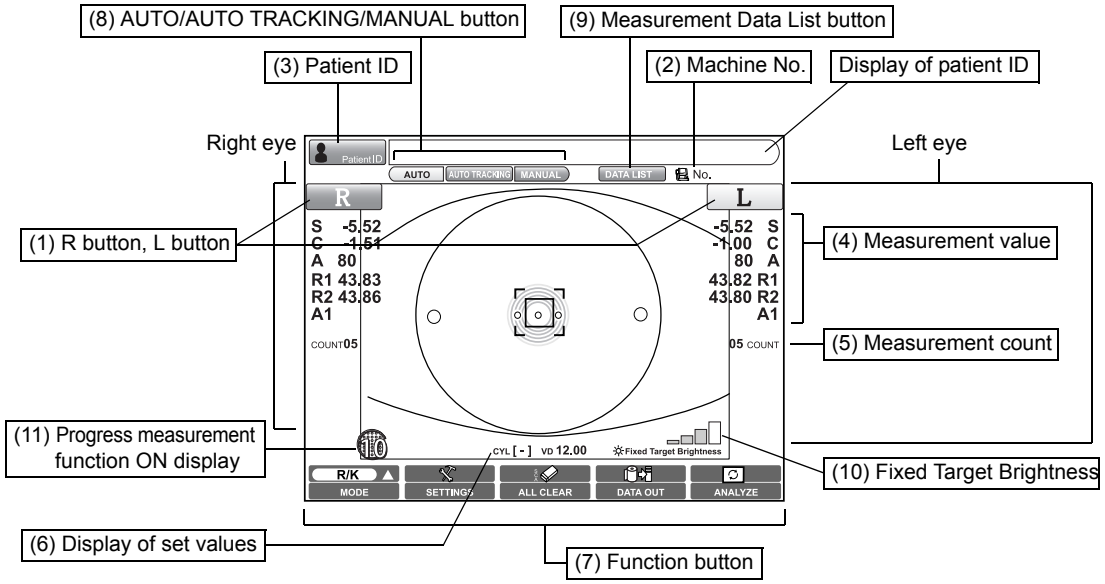


Tap the image.

CONTROL PANEL COMPONENTS (REF/KRT MODE)

AUTO MEASUREMENT SCREEN

The control panel displays observation images and shows set conditions and measurement results. The control panel is also used as a touch panel for performing various operations and settings.



(1) R button, L button Select the right/left eye. When the button is tapped, the main body moves in the selected direction. (see page 35)
The selected R/L button is displayed in orange. (see page 35)
Continuous measurements of right and left eyes and the measurement of only the right/left eye can be set.

(2) Machine No. The machine No. is displayed. This can also be hidden (see page 118).

(3) Patient ID The Patient ID INPUT screen is displayed. The patient ID is displayed on the right.

(4) Measurement value Measurement values of REF (S, C, A) and KRT (R1, R2, A1) are displayed.

(5) Measurement count The measurement count each of the right/left eye is displayed.

*(4)-(5) are displayed on the right/left ends of the screen.

(6) Display of set values Current set values of IOL mode, astigmatic axis mark, VD value, etc. are displayed.

(7) Function button A list of operable functions is displayed. Select the relevant button on the touch panel. (see page 15)

(8) AUTO button/AUTO TRACKING button/MANUAL button
Measurement mode is changed for AUTO, AUTO TRACKING and MANUAL. (see page 34)

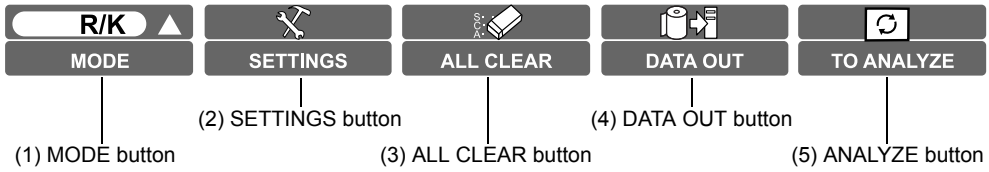
(9) Measurement Data List button
Measurement values are displayed in list form. (see page 55)

(10) Fixed Target Brightness
The patient fixation target brightness can be selected. (see page 35)

(11) Progress measurement function ON display

Displayed when the progress measurement function is ON. (see page 51)

DETAILS OF FUNCTION BUTTONS



(1) R/K MODE button

Measurement mode is changed. (See page 33.)

R/K (REF/KRT continuous measurement), REF (REF measurement), KRT (KRT measurement) and Pupillometry can be selected.

R/K : REF/KRT continuous measurement

Analysis of refractive wavefront aberration and corneal wavefront aberration can be done using the obtained results.

REF : REF measurement

Analysis of refractive wavefront aberration can be done using the obtained results.

KRT : KRT measurement

Analysis of corneal wavefront aberration can be done using the obtained results.

Pupillometry : Pupillometry

By automatically changing the brightness of the fixation target, it is possible to analyze refractive wavefront aberration when changing the pupil size.

(2) SETTINGS button

Used for setting conditions for measurement operations. (See page 95.)

(3) ALL CLEAR button

Clears all measurement data.

(4) DATA OUT button (Measurement data transmitting button)

Prints measurement data by the internal printer. Upon printing, data is transmitted to the connected external device. When measurement results are saved, the lamp blinks to orange.

(5) ANALYZE button

The display goes to the ANALYSIS RESULT screen. (See page 62.)

CONTROL PANEL COMPONENTS (MEASUREMENT RESULT LIST SCREEN)

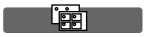
MEASUREMENT RESULT LIST SCREEN

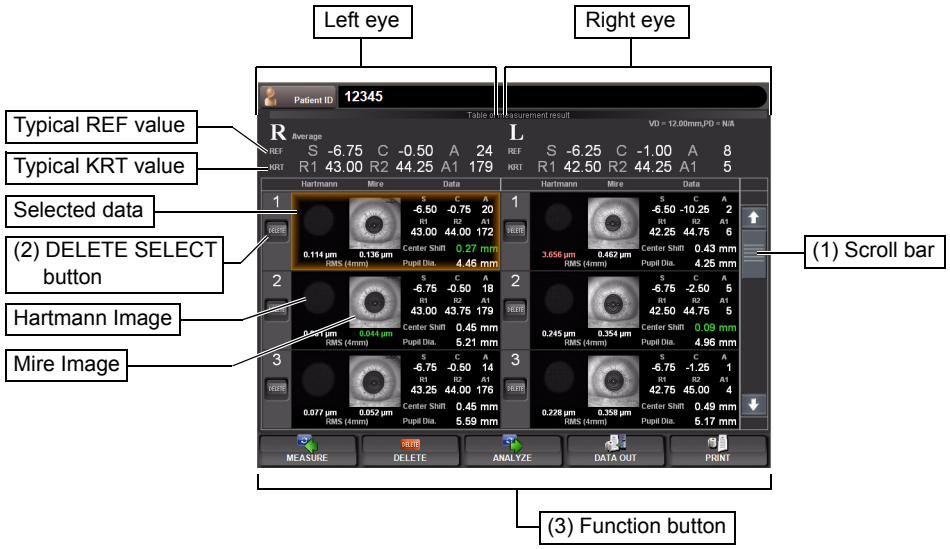
On the Measurement Result List screen, a list of measurement results can be confirmed. By selecting the data to be displayed, data output to the external PC, printing data, initial display on the Analysis screen, and clearing data can be done.

When plural measurements are performed under Auto mode, the screen is changed automatically to the Measurement Result List screen.

In the case of Manual mode or Auto Tracking mode, it is displayed by tapping the  ANALYZE button after the measurement.

In the case of progress measurement or pupillometry, the screen does not automatically go to the Measurement Result List screen after the measurement.

After the measurement, tap the  ANALYZE button and display the Summary map or the Pupillometry map, and tap the  RESULT LIST button of the displayed map to display the Measurement Result List screen.



(1) Scroll bar — By scrolling the measurement result, measurement data can be scrolled up and down.

(2) DELETE SELECT button — Select the data to be deleted. The selected DELETE SELECT button turns on in orange. Under this condition, deletion is done by tapping the DELETE button of the (3)Function button.

(3) Function button — Available functions are listed. Select the corresponding button on the touch panel.

 MEASURE button — The Measurement screen is returned and an additional measurement can be done. However, if data are outputted to the connected PC or printed by the internal/external printer, the display is changed to "NEXT MEASUREMENT" and a new measurement is started.

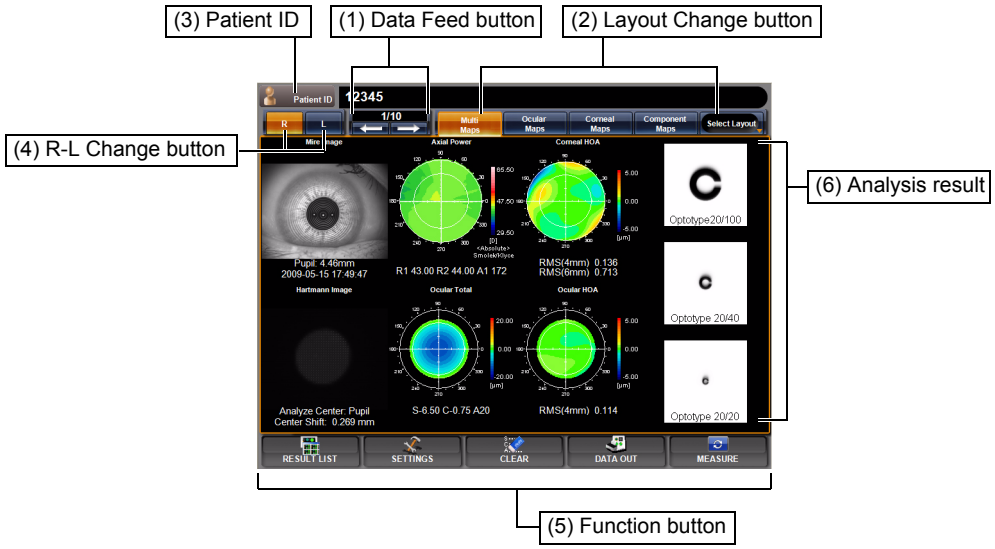
DELETE button	Selecting the data to be deleted by the DELETE SELECT button, the data can be deleted by tapping the DELETE button.
ANALYZE button	The screen is changed to the selected Analysis Result screen, and the analysis result is displayed.
DATA OUT button	Selected measurement result data can be outputted to the RS-232C or to the connected PC.
PRINT button	Selected measurement data can be printed by the internal printer or by the connected external printer.

* For details about the Measurement Result List screen, see page 59.

CONTROL PANEL COMPONENTS (ANALYSIS RESULT SCREEN)

ANALYSIS RESULT SCREEN

The KR-1W can perform REF/KRT measurements and aberration measurements by capturing Hartmann Shack and Mire images of the patient's eye. After the measurement, tap the ANALYZE button to display analysis results on Measurement Result List Screen.



(1)	Data Feed button	Moves to the analysis result to the next data, or returns to the previous data.
(2)	Layout Change button	Displays the measurement result by changing it to the previously set layout pattern. Four layout types can be registered. (For screen layout, see page 124)
(3)	Patient ID	The Patient ID INPUT screen is displayed. The patient ID is displayed on the right.
(4)	R-L Change button	Changes eyes (right/left).
(5)	Function button	A list of operable functions is displayed. Select a relevant button by the touch panel.

RESULT LIST button
Changes to Result List display mode. (See page 59.)

SETTINGS button Performs various settings. (See page 95.)

CLEAR button Clears only the data currently displayed.

DATA OUT button When the external printer is set, the displayed analysis result can be outputted to the external printer. For details about the external printer, see "SETTING THE EXTERNAL PRINTER (EXTERNAL PRINTER)" on page 117. Output layout of the external printer can be selected. For details see page 147, SETTING OF EXTERNAL PRINTER (PRINT EXT).

MEASURE button Goes to the MEASUREMENT screen. (See page 62.)

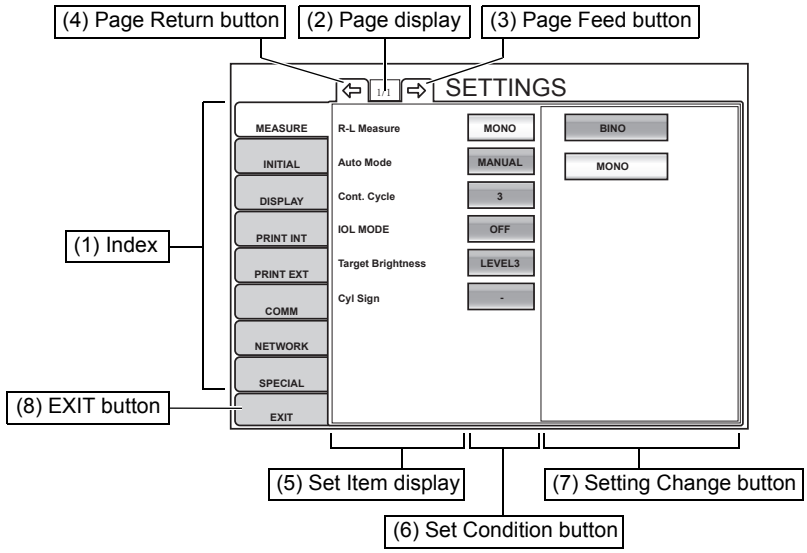
(6) Analysis result Analysis results such as Mire image, Hartmann image and wavefront aberration image are displayed. For details about displaying the analysis results, see "DISPLAYING THE MEASUREMENT RESULT" on page 59.

OTHER SCREEN DISPLAYS

MENU SCREEN

Various settings are done on this screen. (See page 95.)

The screen is displayed by pressing the SETTINGS button.



(1) Index Set items are classified by tabs for each subject. The selected index is highlighted in orange.

(2) Page display Indicates the page position of the displayed index page.

(3) Page Feed button Feeds index pages (when there are multiple pages in the index).

(4) Page Return button Returns the preceding page in the index.

(5) Set Item display Displays set items in the index.

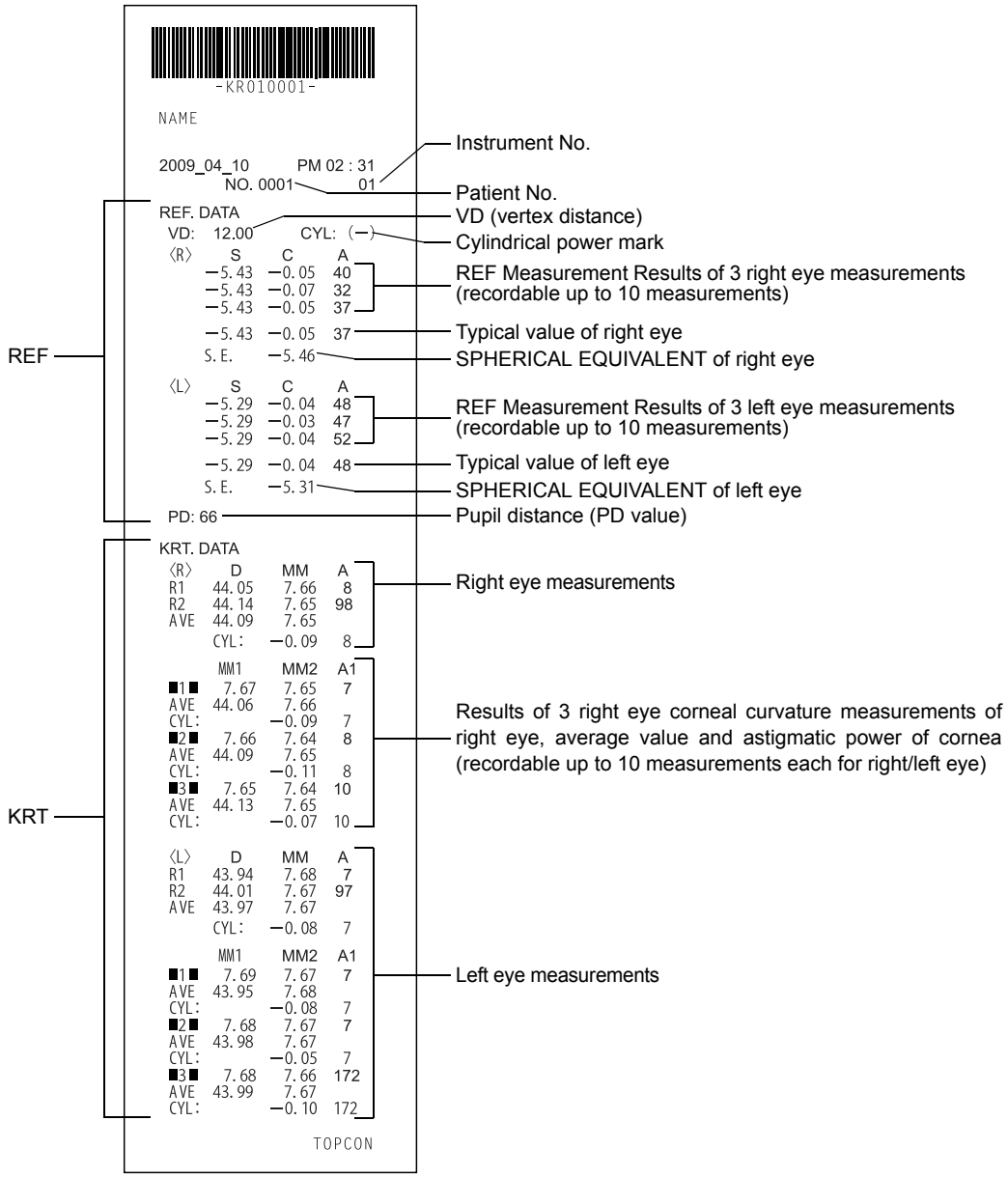
(6) Set Condition button Displays the set condition of current set items. When pressed, the color changes to orange and the Setting Change button is displayed.

(7) Setting Change button Select items for changing the setting by pressing the button. When selected, the result is reflected on the Set Condition button.

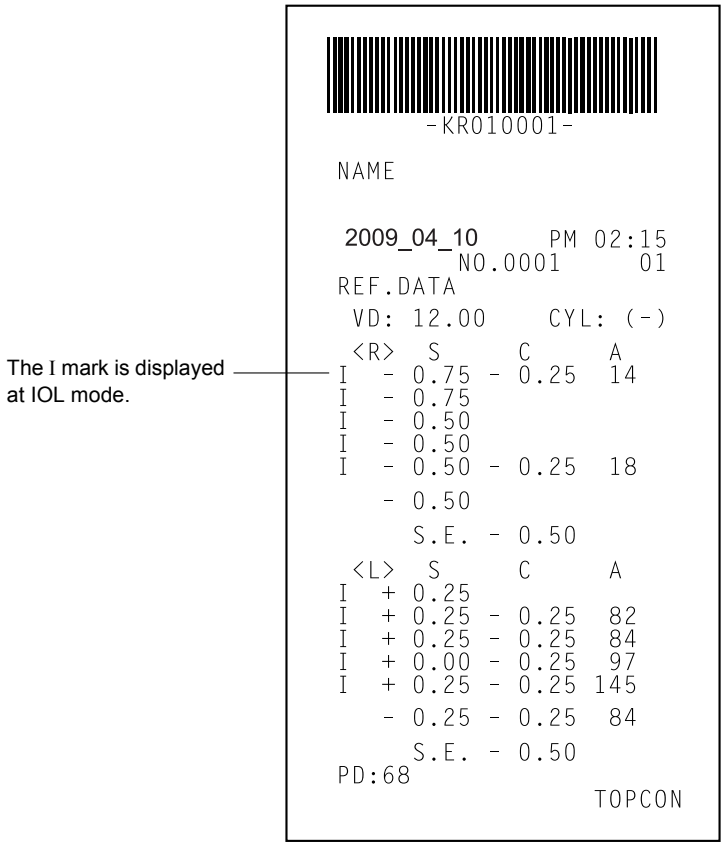
(8) EXIT button Saves the set contents and returns to the MEASUREMENT screen.

PRINTER OUTPUT

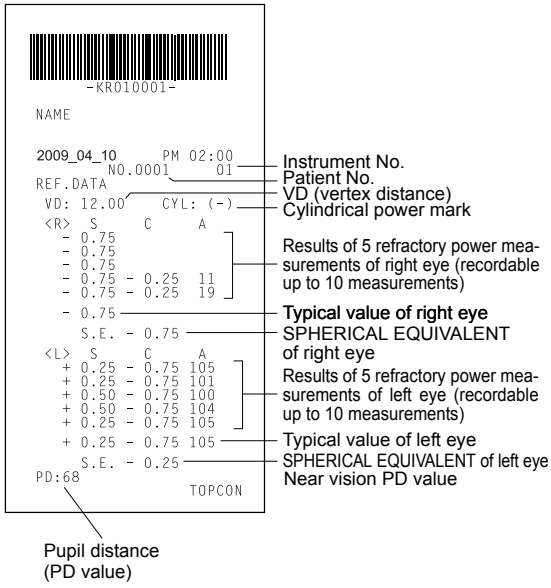
<R/K> MODE



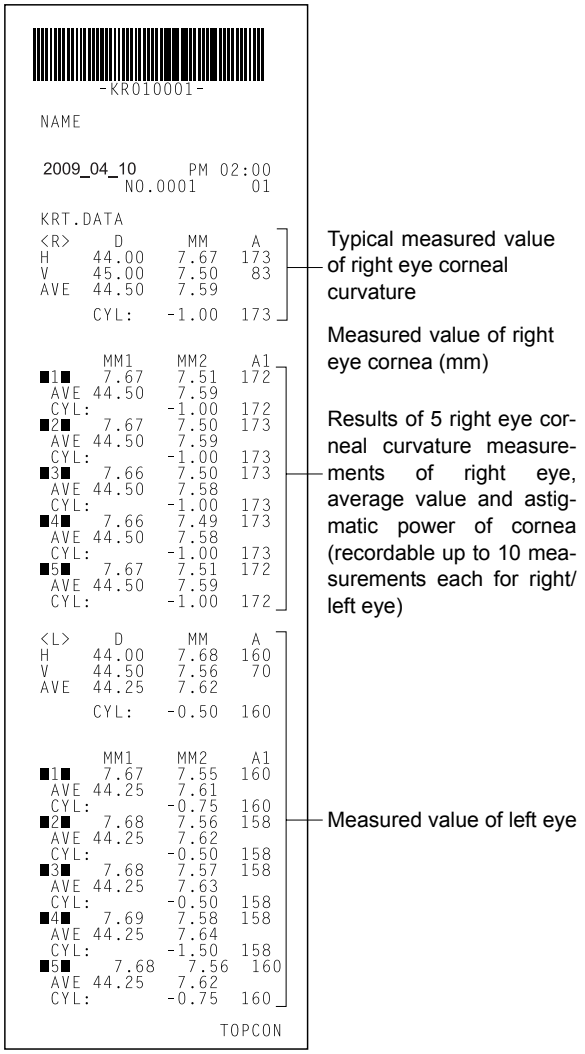
When measurement is done under the IOL mode, a reliability factor is printed out following the I mark.



<REF> MODE

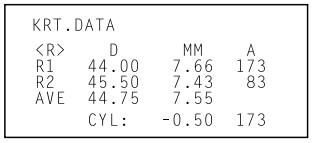


<KRT> MODE

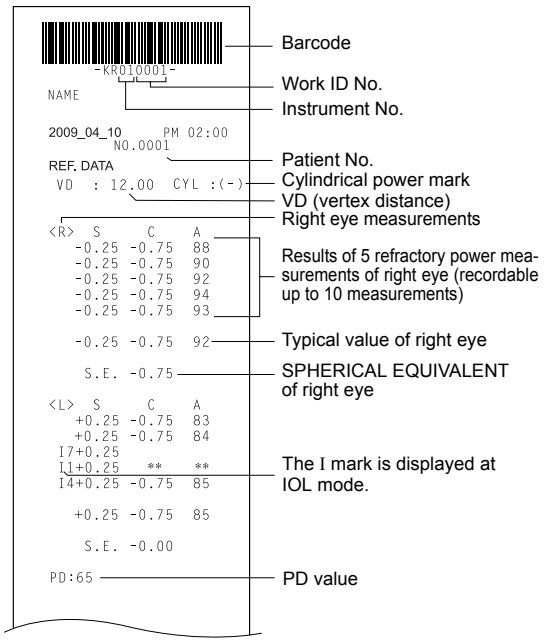


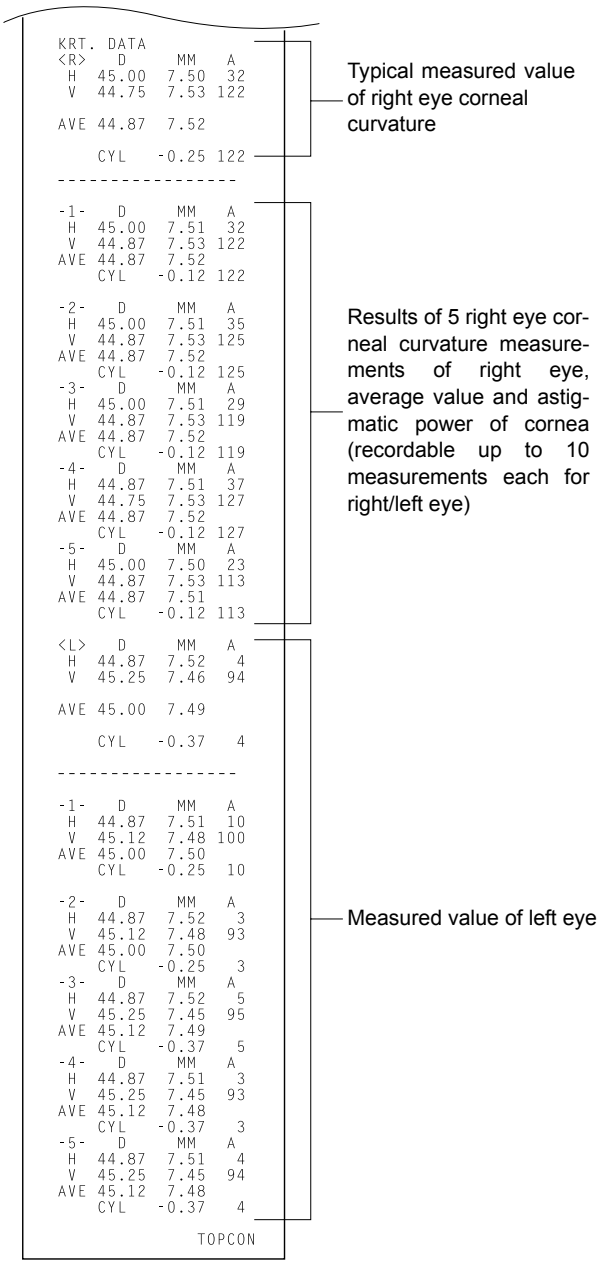
<R/K> <KRT> MODE

(Kerato data is printed as below when H/V is set to R1/R2.)



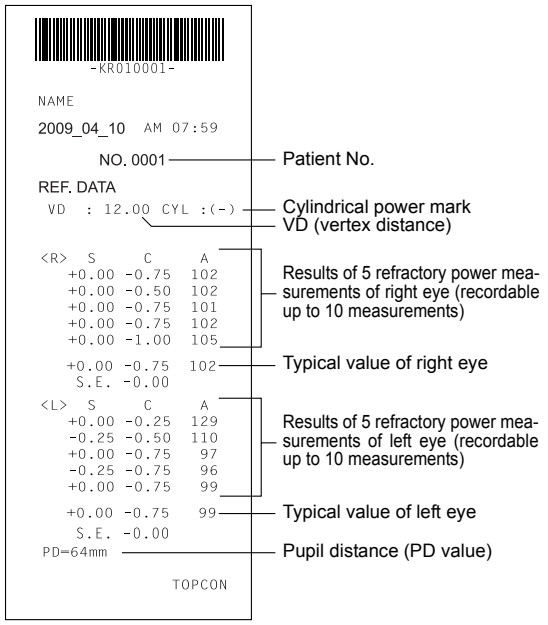
WHEN THE SETTING OF "KRT PRINT TYPE" IS CLASSIC: <R/K> MODE



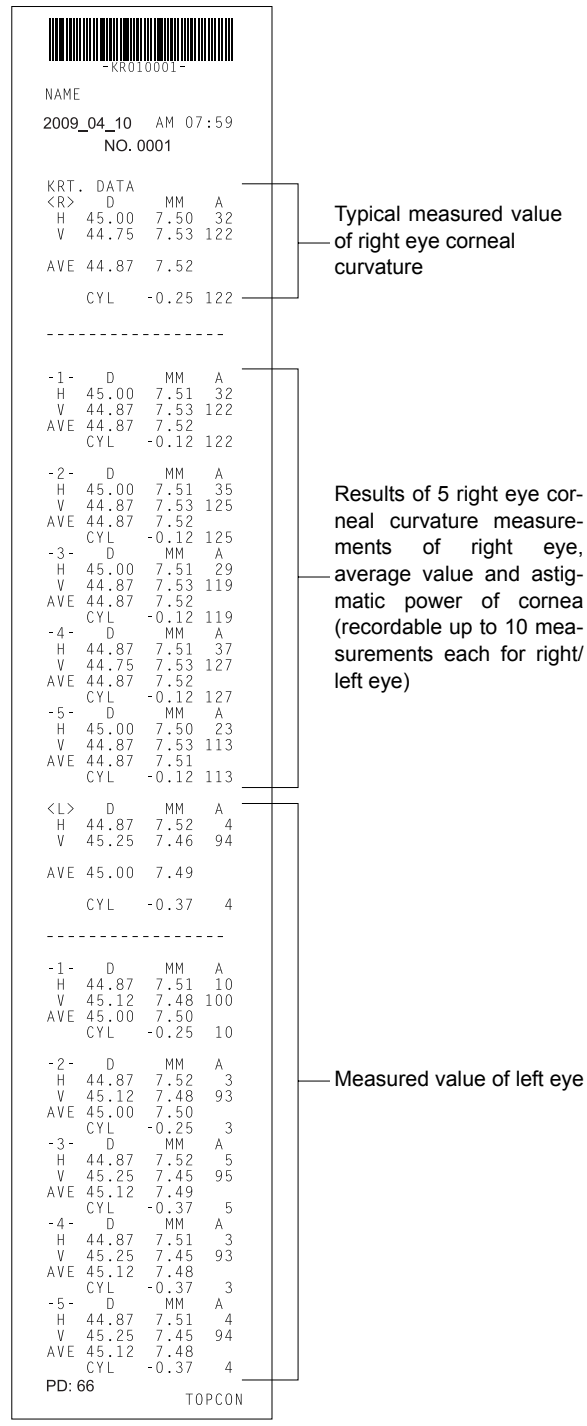


ALL mode (example)

<REF> MODE

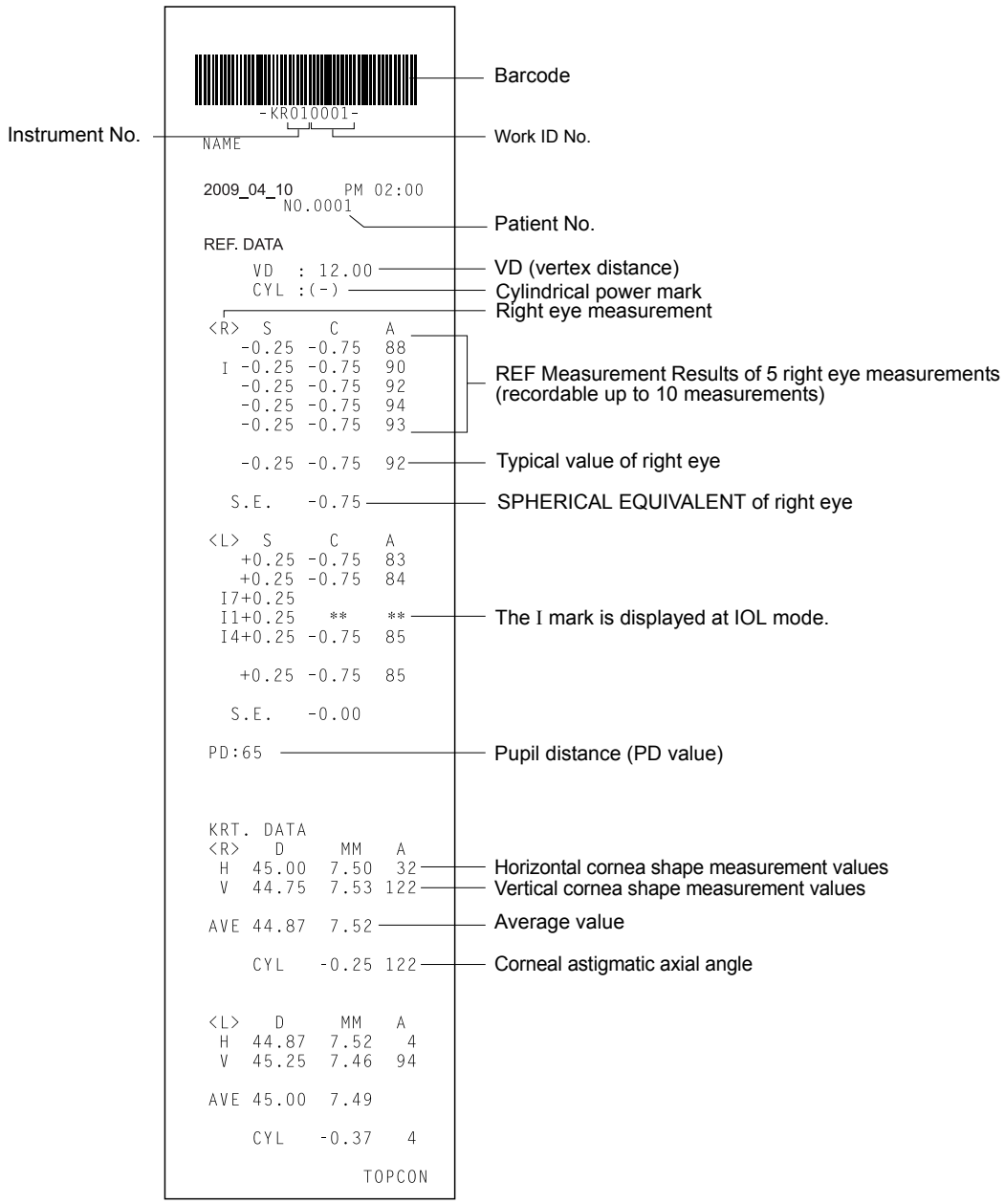


<KRT> MODE



WHEN THE SETTING OF "KRT PRINT TYPE" IS CLASSIC2:

<R/K> MODE

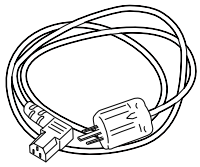
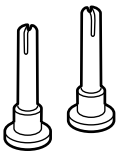
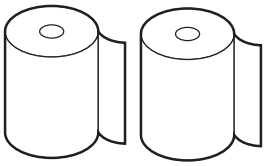
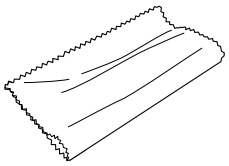
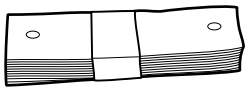
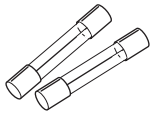
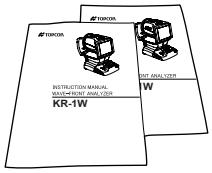
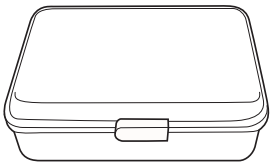
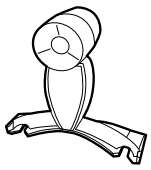


ALL mode (example)

Under REF Mode and KRT mode, printout example is same style as setting of CLASSIC.

STANDARD ACCESSORIES

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

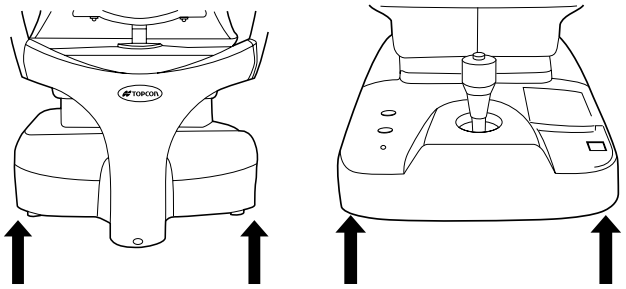
Power cable (1) 	Chinrest tissue pin (2) 
Printer paper (2) 	Monitor cleaner (1) 
Chinrest tissue (1) 	Dust cover (1) 
Fuse (2) 	Instruction manual, unpacking and assembling (1 each) 
Accessory case (1) 	Model eye (1) 
Measuring window lens cap (1) 	

PREPARATIONS

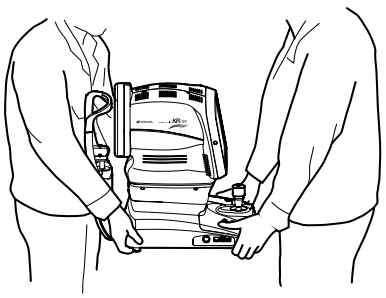
INSTALLING THE INSTRUMENT

CAUTION	When moving the instrument, be sure to hold it at the base with two persons. Carrying by one person may cause harm to his back or injury by falling parts. Also, holding areas other than the base may cause injury, as well as damage to the instrument.
CAUTION	When setting an instrument on an instrument table, pay attention not to injure the patient's fingers between the instrument and the table.
CAUTION	To prevent damage and injuries, do not install the instrument on an uneven, unsteady or sloped surface.

1 Hold the instrument body firmly at the specified positions and place it on the automatic instrument table.
For the automatic instrument table, see "OPTIONAL ACCESSORIES" on page 160.



Holding positions



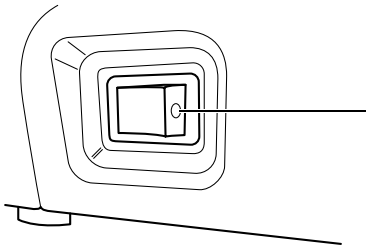
Holding the instrument

2 Place the instrument horizontally, with care not to trample cables.

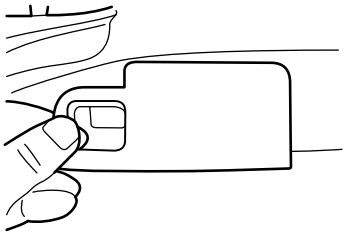
CONNECTING THE POWER CABLE

WARNING	To avoid fire and electric shocks by short circuiting, be sure to connect the instrument into a grounded outlet.
CAUTION	To avoid electrical shock, do not handle the power plug with wet fingers.

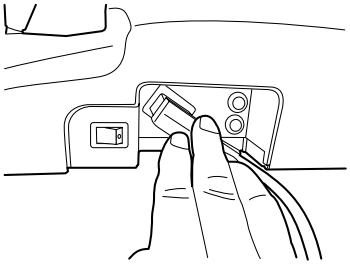
1 Make sure the power switch of the instrument is OFF.



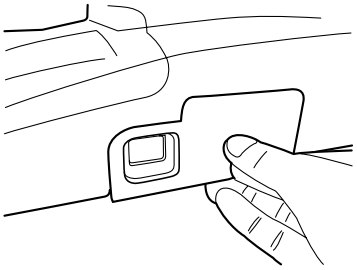
2 Remove the inlet cover.



3 Connect the power cable to the instrument body.



4 Replace the inlet cover.



5 Plug the power cable into a 3-pin AC outlet with grounding.

CONNECTING EXTERNAL I/O TERMINALS

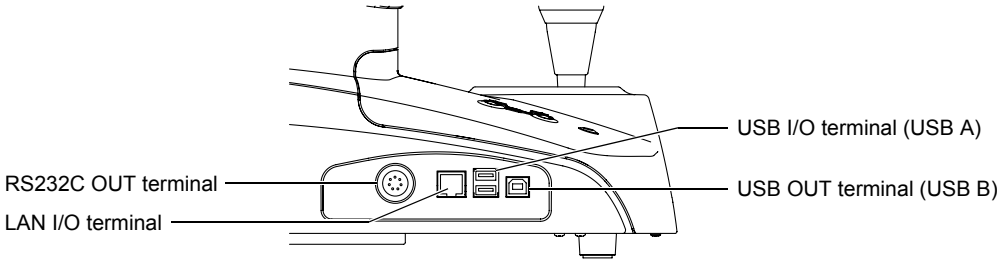
Use the external device complying with IEC60950/IEC60950-1, UL60950/ UL60950-1 or UL60601-1.

DATA OUTPUT

This instrument can be connected to a personal computer and external printer etc. via the RS232C or USB terminals.

1 Connect one end of the RS232C cable to the RS232C OUT terminal on the instrument.

2 Connect the other end of the RS232C cable to the PC and other external device.



The USB I/O terminal (USB A) is used to connect a keyboard, mouse and color printer. The USB OUT terminal (USB B) is used to connect an external PC, etc. When connecting a USB cable, be sure to use the cable with correct shape of plug.

For external printer inquiries, call your dealer or TOPCON at the address printed on the back cover of this manual.

DATA INPUT

This instrument is provided with a USB IN terminal

For inquiries about the USB in terminal, call your dealer or TOPCON at the address printed on the back cover of this manual.

LAN OUTPUT

This instrument can be connected to a PC on local area network (IMAGEnet etc.) via the LAN OUT terminal.

1 Connect the Ethernet cable to the LAN I/O terminal of this instrument.

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

For inquiries about the LAN connectivity, call your dealer or TOPCON at the address printed on the back cover of this manual.

SETTING THE PRINTER PAPER

CAUTION	To avoid potential injury, do not touch the internal printer body while the printer is in operation or when replacing the printer paper.

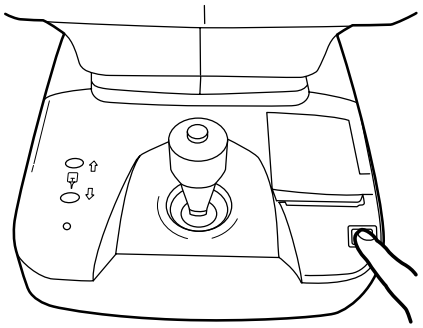
CAUTION	To avoid failure or potential injury, do not open the printer cover while the printer is in operation.

CAUTION	To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.

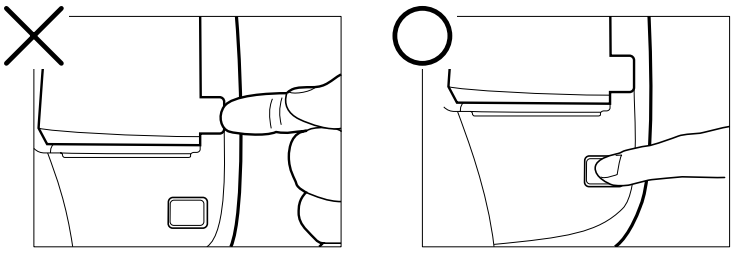
MEMO	• Note, if the printer paper roll is set with the back of the paper facing up, printing cannot be performed.

MEMO	• Please insert the paper deep enough into the printer. • Otherwise the paper may not come out. A "PAPER END" error will be displayed on the control panel screen.

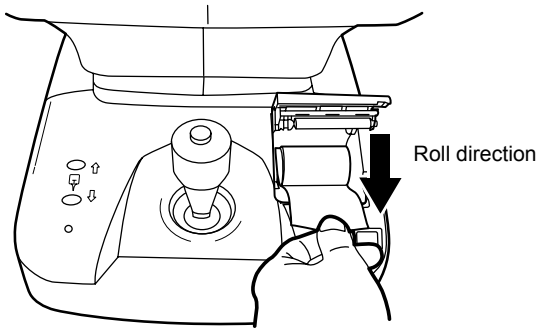
1 Press the printer cover OPEN button to open the printer cover.

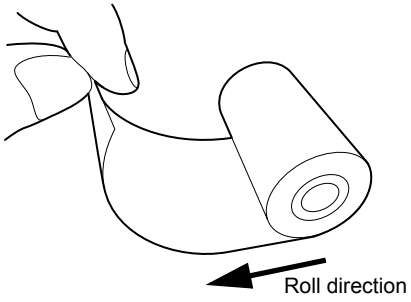


To avoid failure in the printer when opening, do not hold any part of the cover. Be sure to open the printer by pressing the opening button for the cover.

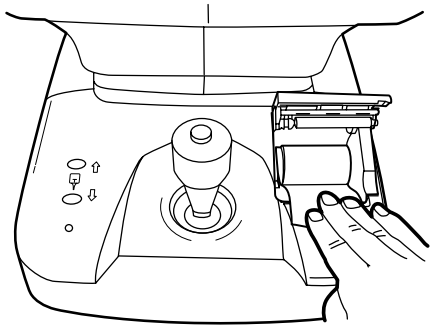


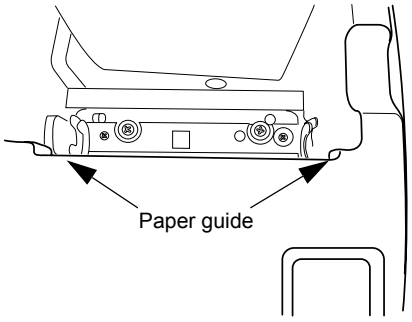
2 Set the paper into the shaft support; pay attention to the roll direction of paper. Pull the paper 2 to 3cm forward.



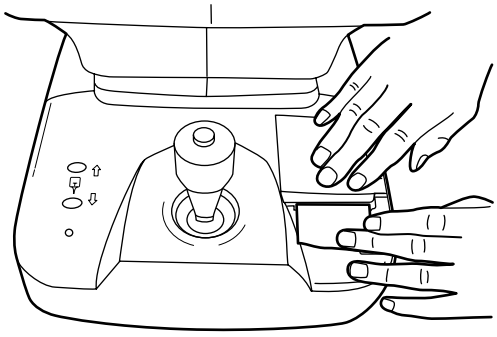


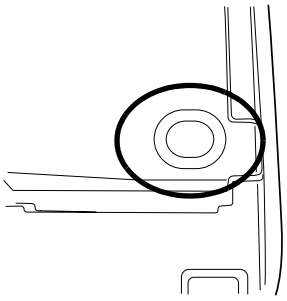
3 Pull the paper along the paper guide and draw it out straightly from the cover.





4 Close the printer cover with the paper drawn out.





Use the recommended 58mm wide printer paper
TF50KS-E2C (Nippon Paper)
Using another paper may cause a printing noise or print errors.

Please close the printer cover until it clicks.
The message "CLOSE PRINTER COVER Push it from the top." is displayed on the monitor screen if the printer cover is not properly closed.

RESETTING FROM POWER SAVE STATUS

This instrument uses the power save system for saving electric power. When the machine is not in use for approximately 10 minutes, the monitor screen becomes dark and the screen saver is displayed. Under the power save condition, only the POWER lamp is lit and the control panel screen is off.

1 Press the [MEASUREMENT switch] or tap the control panel screen.

The screen saver is released and measurement is enabled.

The time for shifting to the power save status can be changed by the initial setting "SETTING THE POWER SAVE TIME (AUTO SHUTOFF)" (see page 120).

OPERATING THE CONTROL LEVER

The control lever can perform the following operations:

1 Back-forth and right-left movements

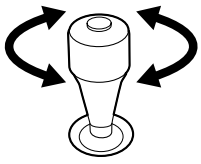
When the control lever is inclined in back-forth and right-left directions, the main body moves toward the tilted directions. For fine adjustment, the speed of movement changes with the angle of inclination: the speed increases as the angle increases.

2 Back-forth and right-left movements (high speed)

For right-left movements, and in the direction moving away from the patient, the speed of the main body increases as the control lever is inclined. When the control lever isincline limit is reached,  is displayed on the control panel: in this case, the speed is increased by pressing the [MEASUREMENT switch].

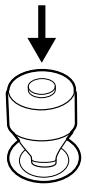
3 Vertical movement

When the control lever is rotated, the measuring head moves up and down. Turning the lever clockwise will raise the measuring head and turning counterclockwise lowers it.



4 Measurement operation

Measurement starts by pressing the MEASUREMENT switch at the top of the control lever.

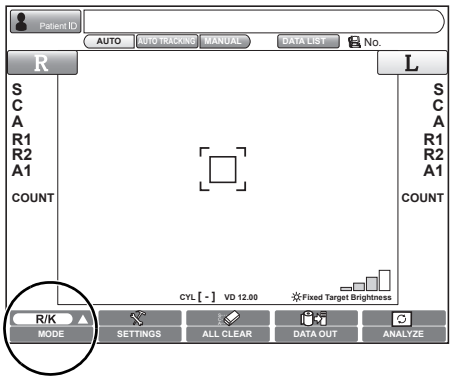


BASIC OPERATIONS

CHANGING THE MEASUREMENT MODE

MEASUREMENT MODE

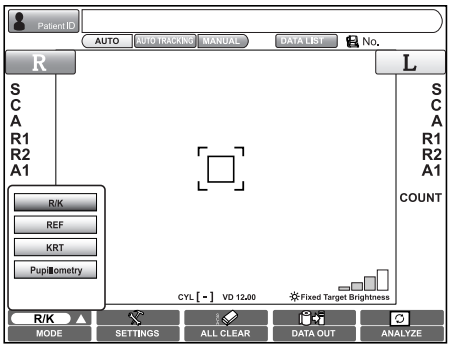
Select the desired measurement mode by pressing the Mode button of the control panel.



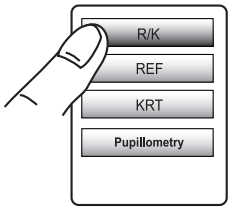
Four measurement modes are available: REF/KRT measurement, REF measurement and KRT measurement and pupillometry can be selected.

REF/KRT measurement mode (R/K) : REF and KRT measurements are performed continuously.
REF measurement mode (REF) : Only REF measurement is performed.
KRT measurement mode (KRT) : Only KRT measurement is performed.
Pupillometry mode : Brightness of the fixation target is changed and pupil measurement is performed.

1 Tap the Mode button. A popup menu is displayed.



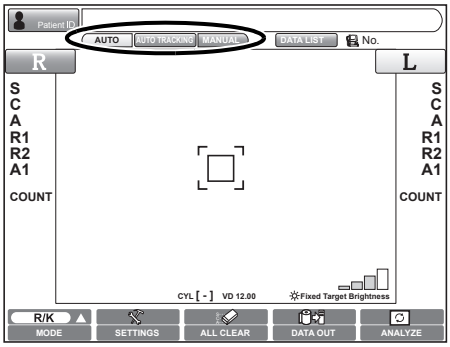
2 Tap a button of the popup menu and select the measurement mode.



In the initial setting KREF/KRT continuous measurement mode is the default setting, but this can be changed. For details see page 111.

SELECTION OF AUTO MEASUREMENT/AUTO TRACKING MEASUREMENT/ MANUAL MEASUREMENT

Select auto measurement or manual measurement by tapping the [AUTO button]/[AUTO TRACKING button]/[MANUAL button] of the control panel.

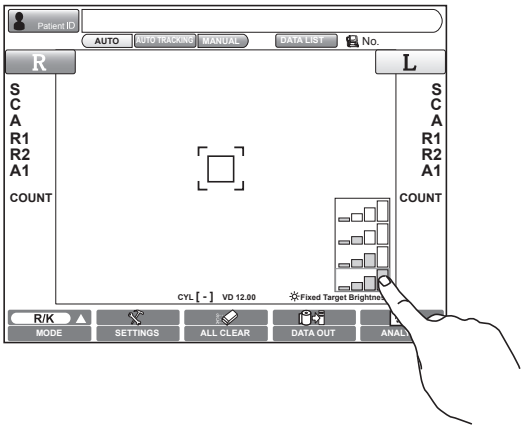


"Full Auto" : Both alignment and measurement are done automatically.
"Auto Tracking": Alignment is done automatically, but measurement is not done automatically.
"Manual" : Both alignment and measurement are done manually.

Auto mode settings may be changed within the SETTINGS menu. For details, see page 112.

SETTING THE BRIGHTNESS OF FIXATION TARGET

Select the brightness of fixation target: Tap the display of control panel while it is displayed for approx. 3sec.



- The display is the brightest at the bottom (all bars are in orange) and the top is the darkest (only the left gauge is in orange).

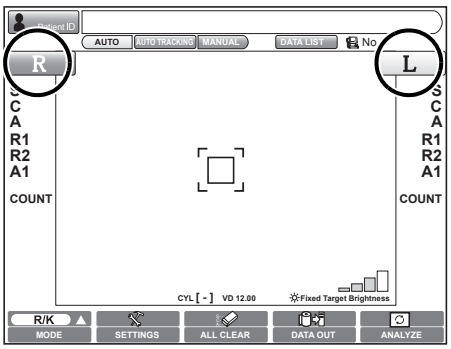
Brightness setting of the fixation target can also be changed in the SETTINGS menu. For details, see page 109.

Under pupillometry mode, the brightness of fixation target is changing automatically.

MEASURING ONE EYE ONLY

When the measurement mode is Auto, it is possible to measure one eye only.
The current measurement position may be determined by the color of the R / L button; orange indicates active measurement position.

1 Select the eye to be measured. Tap the R button or L button of the control panel.



MEASURING THE RIGHT EYE ONLY

1 Tap the [R] button to move the measuring head to the right.

2 When the movement is finished, tap the [R] button once again: the lock icon is displayed [R].

- When the lock icon is displayed, the measuring head does not move to the other eye even when the measurement of one eye is finished.

3 To release the lock, tap the [R] icon: The lock icon disappears.

MEASURING THE LEFT EYE ONLY

Operation is the same as the case of measuring the right eye.

When the lock icon is displayed (single eye measurement mode), it is possible to change eyes under the locked condition by tap the [R] button or [L] button.

MEMO	The measurement in auto mode may not be possible due to the eyelid and the eyelashes over to the pupil. If this occurs, the operator should tell the patient to open their eyes wide enough, or lift the eyelid to allow for measurement.

MEMO	The measurement in auto mode may not be possible due to the frequent blinks or existing abnormalities in the corneal surface caused by corneal disease etc. In this case, use manual mode.

PREPARATION BEFORE MEASUREMENT

TURN ON THE POWER

1 Make sure the power cable is properly connected.
For connection, see "CONNECTING THE POWER CABLE" on page 27.

2 Turn on the [POWER switch].

3 Confirm that the title screen is displayed. The MEASUREMENT screen will be displayed shortly after.

The orange-colored progress bar shows the progress of startup operation.
When it reaches the rightmost position, the measurement screen is displayed.

4 When the initial setting is Auto mode, and when the MEASUREMENT screen is displayed, a message "Get the eye aligned and press the MEASUREMENT switch" is displayed on the screen: the waiting status starts.
In this case, alignment operation is not done even when the setting of alignment mode is "Auto."

The message disappears by pressing the [MEASUREMENT switch] or by touching the screen, following the message.
When the initial setting of alignment mode is "Auto," alignment operation starts.

CAUTION	Never insert your fingers under the chinrest. * Inform the patient of this, too. Careless insertion of fingers may cause injury by pinching.

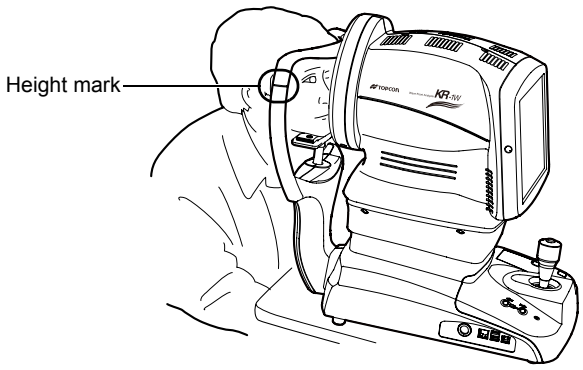
MEMO	When operating the instrument, be careful not to touch the patient's face or nose. If touched, clean the instrument following "CLEANING THE INSTRUMENT" on page 154.

1 Make sure the MEASUREMENT screen is on.

2 Let the patient sit in front of the instrument.

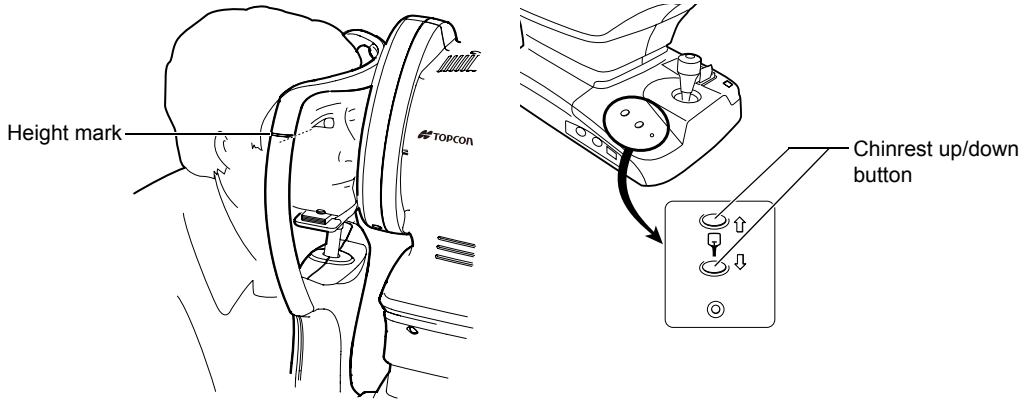
3 Adjust the height of the automatic instrument table or the chair so that the patient can place their chin on the chinrest comfortably.

4 Let the patient place their chin on the chinrest and forehead against the forehead rest.



Make sure the patient's face is placed correctly on the chinrest, with the forehead correctly against the forehead rest.

5 By pressing the ⇧ or ⇩ buttons of the main body section of the instrument, adjust the height of the chinrest so that the patient's eye becomes level with the height mark on the chinrest support.



The chinrest moves up/down while the ⇧ button or ⇩ button is pressed.
The chinrest stops if the applied load exceeds the specified weight. If the chinrest does not work even after removing the chin from it, it may be at fault. Turn OFF the [POWER switch] and disconnect the power cable: Call your dealer or TOPCON at the address printed on the back cover of this manual.

If the applied load exceeds the specified weight, the chinrest may not work. Advise the patient not to push down on the chinrest more than necessary.

If the patient's head is placed in the center of the chinrest, measurement may be disabled with a limit message. Make sure the patient's head is placed correctly.
For details about the limit message, see "Limit message" on page 40.

MEASUREMENT UNDER AUTO MODE

MEMO	Adjust the height of the automatic instrument table so that the patient can sit on the chair comfortably and correct measurement values can be obtained.

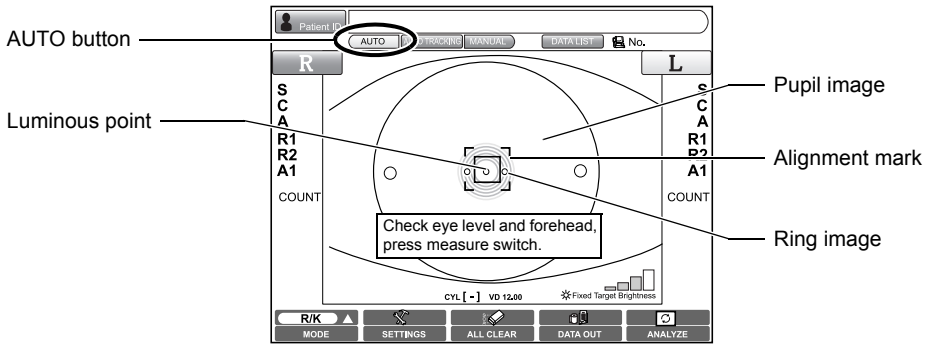
MEMO	Measurement in auto mode may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused corneal disease etc. In this case, use manual mode.

MEMO	When operating the instrument, be careful not to touch the patient's face or nose. If touched, clean the instrument following "CLEANING THE INSTRUMENT" on page 154.

SETTING THE AUTO MODE

1 Confirm the waiting status for measurement.

Confirm that the [AUTO] button of the control panel is displayed in orange. If not, tap the [AUTO] button, select Auto mode (Full Auto), and set the waiting status for measurement.



2 A message "Check eye level and forehead, press measure switch." is displayed.
Confirm that the pupil image and luminous point are displayed on the screen.

- If the image of the pupil is not shown on the screen, use the control lever to move the measuring head into the proper position, locating the patient's pupil.
  For the operation of the control lever, see "OPERATING THE CONTROL LEVER" on page 31.

3 When the pupil image is seen on the screen, tap the luminous point of the center part to start measurement, or press the [MEASUREMENT switch] on the control lever. The main body will move into the position where the pupil image and luminous point come on the screen center.

4 Confirm that a coaxial ring image is seen at the center of the pupil image.

- If the coaxial ring image cannot be recognized, it may be outside the auto alignment range. Using the control lever, move the main body forward and into to a position where the ring image can be seen.
  If the coaxial ring image is not visible, measurement will not start automatically, even if AUTO mode is set.

5 When the auto alignment range is reached, the main body performs an auto focusing function to finalize alignment, and will start the measurement process automatically.

Even in steps ***2*** to ***4***, the main body starts measurement automatically when the auto alignment range is reached.

If a limit message "  " appears during auto alignment, indicating that the main body has reached the maximum limit of movement, manually operate the unit, using the control lever, toward the direction of proper alignment.

Limit message:

 : When the main body exceeds the limit to the left (to the patient's right eye), a message "Move to the right" is displayed.

 : When the main body exceeds the limit to the right (to the patient's left eye), a message "Move to the left" is displayed.

 : When the main body exceeds the limit to the front (to the operator), a message "Push backward" is displayed.

 : When the main body exceeds the limit to the rear (to the patient), a message "Pull forward" is displayed.

Auto alignment is not done while the control lever is in use.
To enable a smooth auto alignment operation, do not utilize the control lever.

When the measurement of the first eye is complete and the measuring head moves to the other eye, a limit message may be displayed if the measuring head cannot locate the patient's pupil on the second eye, and measurement on the second eye will not be performed. If this occurs, check to confirm the patient's head position is centered in the headrest, and the chinrest is at the proper height.

6 When the measurement of one eye is finished and when R/L continuous measurement is selected, the measuring head moves automatically to the measurement position of the other eye.

7 If the alignment position with the patient's pupil is not correct, adjust the alignment by tapping on the control screen or by operating the control lever. When realignment is complete, the final alignment and focusing operations will start automatically and measurement is done.

8 After finishing the measurement, the results are displayed on the Control Panel screen.

- It will take a few seconds for measurement to be fully complete, and display the final results.

9 When all the set measurements are done, the screen is changed to the Measurement Result List screen.

Auto print (available only under Auto mode)
When the auto print function is set to "ON" in the initial settings menu, measurements will automatically print out when the exam is completed.
Note, if the measurement to be performed is set for only the right or left eye (MONO), the auto print function will not work. For the setting of eyes to be measured, see "MEASURING ONE EYE ONLY" on page 35.

It is possible to not automatically move to the position for measuring the other eye after measuring one eye. For details, see "MEASURING ONE EYE ONLY" on page 35.

If MONO mode is selected, total measurement is completed after measurement of the selected eye is performed.

After "FINISH" is displayed, it is possible to continue measurement by pressing the [MEASUREMENT switch].

To stop the auto alignment, tap [MANUAL] and stop the auto measurement. To resume the auto measurement, tap [AUTO].

MEASUREMENT UNDER AUTO TRACKING MODE

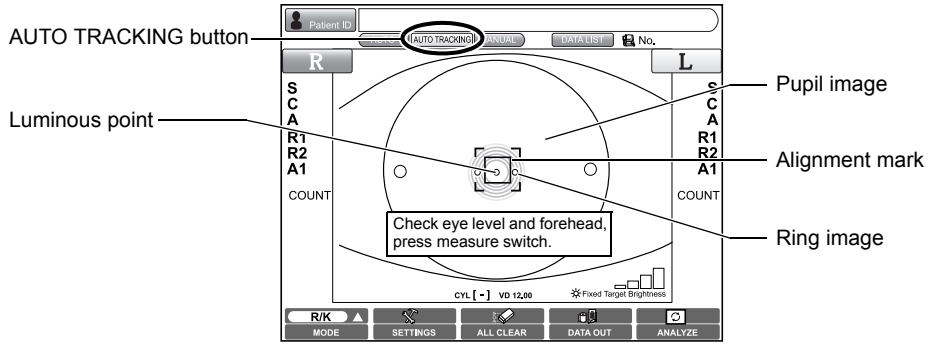
MEMO	Adjust the height of the automatic instrument table so that the patient can sit on the chair comfortably and correct measurement values can be obtained.

MEMO	When operating the instrument, be careful not to touch the patient's face or nose. If touched, clean the instrument following "CLEANING THE INSTRUMENT" on page 154.

SETTING THE AUTO TRACKING MODE

1 Confirm the waiting status for measurement.

Confirm that the [AUTO TRACKING] button of the control panel is displayed in orange. If not, tap the [AUTO TRACKING] button, select Auto tracking, and set the waiting status for measurement.



2 A message "Check eye level and forehead, press measure switch." is displayed.

Confirm that the pupil image and luminous point are displayed on the screen.

- If the image of the pupil is not shown on the screen, use the control lever to move the measuring head into the proper position, locating the patient's pupil.
  For the operation of the control lever, see "OPERATING THE CONTROL LEVER" on page 31.

3 When the pupil image is seen on the screen, tap the luminous point of the center part to start measurement, or press the [MEASUREMENT switch] on the control lever. The main body will move into the position where the pupil image and luminous point come on the screen center.

4 Confirm that a coaxial ring image is seen at the center of the pupil image.

- If the coaxial ring image cannot be recognized, it may be outside the auto alignment range. Using the control lever, move the main body forward and into to a position where the coaxial ring image can be seen.

5 When the auto alignment range is reached, the main body performs an auto focusing function to finalize alignment, and will start the measurement process automatically.

Even in steps ***2*** to ***4***, the main body starts measurement automatically when the auto alignment range is reached.

6 When the measuring head comes to the measuring position and alignment is complete, a message "Press MEASUREMENT switch to start measurement." is displayed.

7 By pressing the [MEASUREMENT switch], measurement is performed and measurement values are displayed.

- It will take a few seconds for measurement to be fully complete, and display the final results.

8 After finishing measurements, auto alignment is continued.

If a limit message "  " is displayed during auto alignment, indicating that the measuring head has reached the maximum limit of movement, manually operate the unit, using the control lever, toward the proper direction of alignment. For the limit message, see page 40.

Auto alignment is not complete while the control lever is in use.
To enable a smooth auto alignment operation, do not utilize the control lever.

After "FINISH" is displayed, it is possible to continue measurement by pressing the [MEASUREMENT switch].

To stop the auto alignment, tap [MANUAL] and stop the auto alignment. To resume the auto alignment, tap [AUTO].

MEASUREMENT UNDER MANUAL MODE

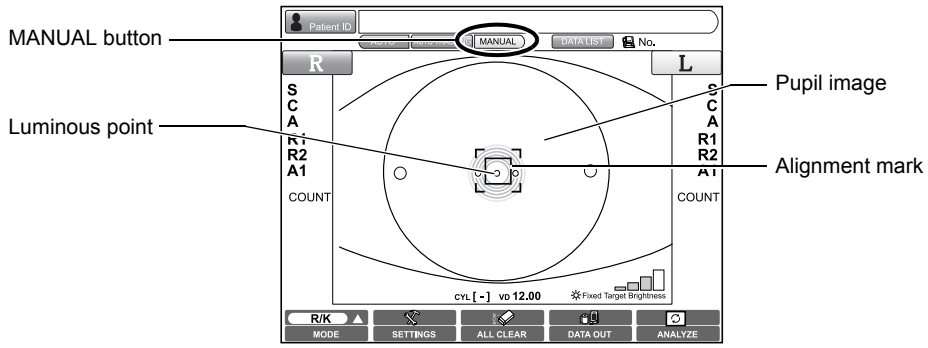
MEMO	Adjust the height of the automatic instrument table so that the patient can sit on the chair comfortably and correct measurement values can be obtained.

MEMO	When operating the instrument, be careful not to touch the patient's face or nose. If touched, clean the instrument following "CLEANING THE INSTRUMENT" on page 154.

SETTING THE MANUAL MODE

1 Make sure the MEASUREMENT screen is on.

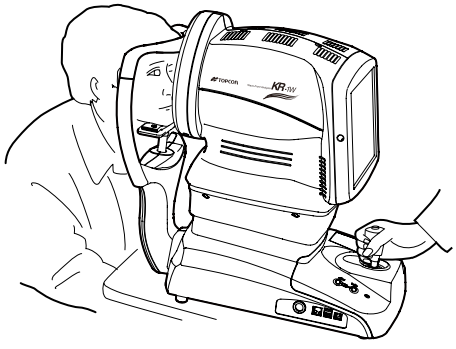
2 Tap the [MANUAL] button of the control panel, and select "Manual mode" (MANUAL).



Under Manual mode, alignment operation is done by utilizing the control lever.

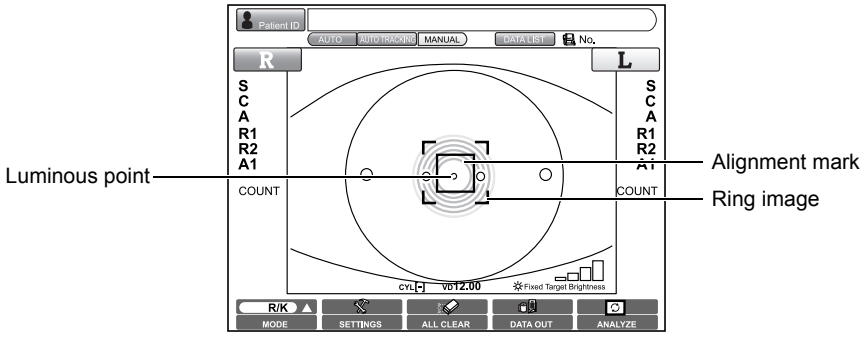
About the operation of the main body by the control lever, see "OPERATING THE CONTROL LEVER" on pager 31.

3 Hold the control lever and move the main body to the operator side; away from the patient.



4 Move the main body right-left and up-down by using the control lever. Place the patient's eye at the center of the Control Panel screen.

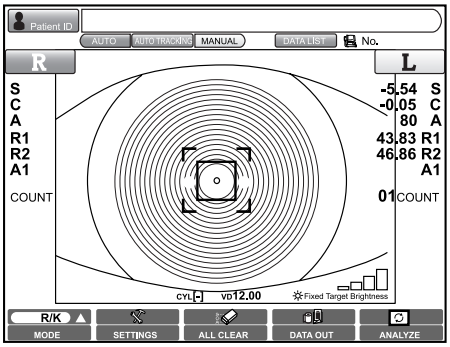
5 Tilt the control lever toward the patient and slowly bring the main body into focus with the patient eye.
A luminous point and a KRT ring image are reflected off the patient's cornea. Bring the luminous point and KRT ring image into focus by slowly moving the main body toward the patient.



6 Move the main body right-left and up-down so that the luminous point is in the center of the Control Panel screen.

Even if alignment is not correct, measurement may be performed by pressing the [MEASUREMENT switch]. To ensure accurate measurement results, be sure to obtain correct alignment before starting measurement.

7 By pressing the [MEASUREMENT switch], measurement is performed and values are displayed.



- It will take a few seconds for measurement to be fully complete, and display the final results.

8 When the measurement of one eye is complete, move the main body to the other eye, either by pushing the [R] or [L] of the control panel or by operating the control lever. When the main body is aligned properly, continue measurement of the second eye.

When changing between eyes with the control lever, first movement should be away from the patient.

DISPLAYING MEASUREMENT VALUES

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

Display of measurement values only: Measurement was done correctly.

ERROR: Measurement was not done correctly.

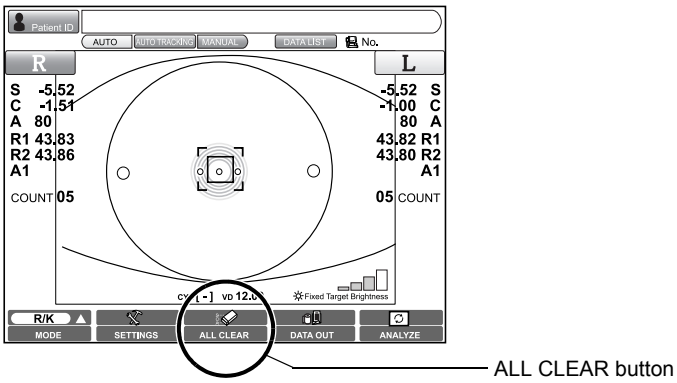
For messages on the control panel screen, see "MESSAGE LIST" on page 158.

It is possible to display all measurement data on the screen. For details, see "DISPLAYING ALL MEASUREMENT DATA" on page 55.

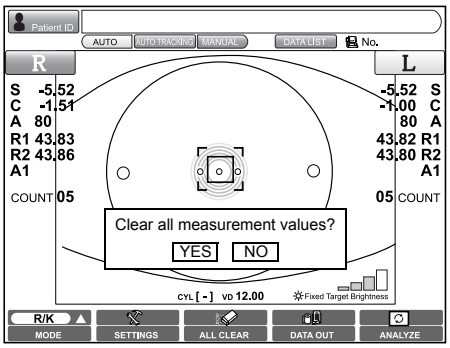
CLEARING ALL MEASUREMENT VALUES

When multiple patients are measured continuously without printing/transferring the measurement data of the previous patient, measurement values of the new patient are saved following the measurement data of the previous patient.
It is possible to clear any unnecessary data.

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



2 A message "Clear all measurement values?" is displayed.



If "Yes" is selected: All measurement values are cleared.
If "No" is selected: Measurement can be continued.

3 When "Yes" is selected, a message "Clearing data..." is displayed.

4 All the measurement values for right and left eyes are cleared, and the main body will return to the initial power on position.

When measurement values are cleared by the [ALL CLEAR button], the patient ID may reset, depending on the setting of "RESETTING THE PATIENT ID (PATIENT ID RESET)" (page 117).
When "Resetting the Patient ID" is "ON":
- The patient ID is reset to the initial patient ID set by "Setting the Patient ID" of "Initial Setting."

When "Resetting the Patient ID" is "OFF":
- The patient ID is not reset, and the same patient ID is used.

When measurement values are outputted by the [PRINT button], the data will be cleared when starting the measurement of the next patient.

TERMINATING MEASUREMENT

1 Turn off the [POWER switch] of main body.

When external devices are connected to external I/O terminals, turn off the power of these devices too.

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

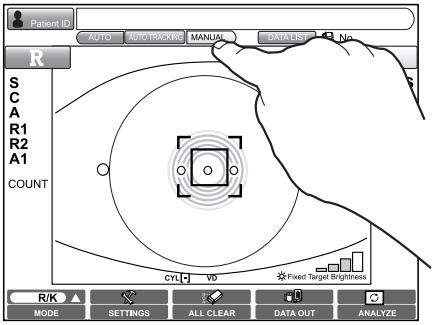
2 Clean the forehead rest and the chinrest, then cover the instrument with a dust cover.

When chinrest papers are used, remove the top sheet of chinrest paper to allow for a clean sheet for the next patient.

IN A CASE LIKE THIS

TO STOP AUTO ALIGNMENT MEASUREMENT IN THE MIDDLE

PRESSING THE MANUAL BUTTON TO STOP AUTO ALIGNMENT

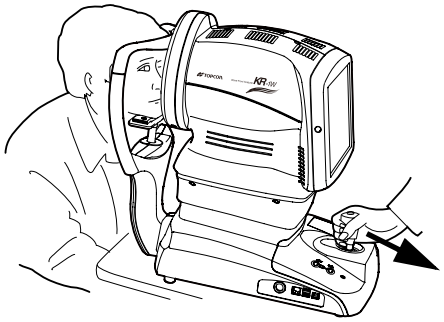


Press the [AUTO button] and press the [MEASUREMENT switch]: measurement operation restarts.

To finish measurement, output data by tapping the [DATA OUT button], or clear data by tapping the [ALL CLEAR button].

STOP THE MEASUREMENT BY OPERATING THE CONTROL LEVER

Tilt the control lever and pull toward the operator. The main body will move away from the patient.



To resume measurement, tilt the control lever toward the patient, and bring the main body slowly into focus with the patient's eye. In auto measurement mode, the measurement operation starts automatically when focus is reached.

To finish measurement, either tap the [DATA OUT button] to output data, or tap the [ALL CLEAR button] to delete data.

TO MEASURE THE RIGHT/LEFT EYE ONLY

Normally continuous measurement is used. To measure the right or left eye only, perform the following operations. For details, see "MEASURING ONE EYE ONLY" on page 35.

ALIGNMENT DOES NOT START

MEMO	The measurement in auto mode may not be possible due to the eyelid and the eyelashes over to the pupil. If this occurs, the operator should tell the patient to open their eyes wide enough, or lift the eyelid to allow for measurement.

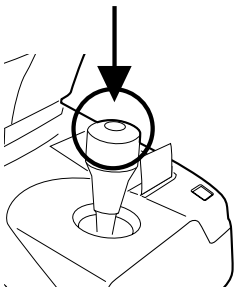
MEMO	The measurement in auto mode may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused by corneal disease etc. In this case, use manual mode.

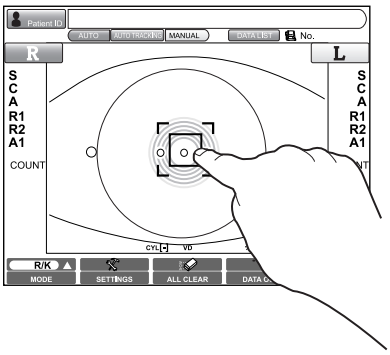
If auto alignment does not start, any of the following items may be suspected:

THE WAITING SCREEN IS DISPLAYED

1 If the message "CHECK EYE LEVEL AND FOREHEAD, PRESS MEASURE SW" is displayed on the color LCD monitor screen (waiting status), the auto alignment operation cannot be performed.

2 Tap the [MEASUREMENT switch] to start the measurement.



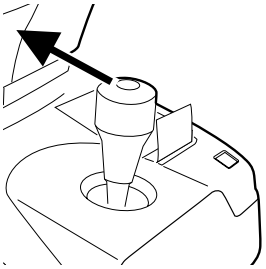


When tapping the screen, note that the measuring head may move a lot depending on the tapped position.

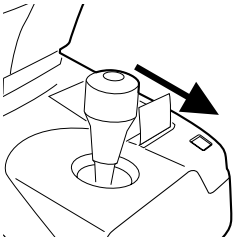
THE IMAGE OF THE PATIENT'S EYE DISPLAYED ON THE MONITOR IS NOT CLEAR

1 Check if the patient's forehead is pressed against the forehead rest. If not, move the forehead forward.

2 If the patient's eye and the main body are not aligned, tilt the control lever toward the patient, move the main body slowly toward the patient's eye and bring it into focus.



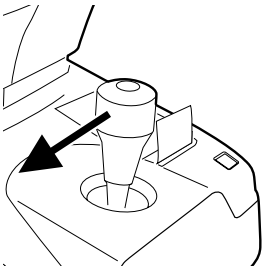
3 If the patient's eye and the main body are too close, tilt the control lever toward the operator, slowly move the main body away from the patient's eye and bring it into focus.



THE PATIENT'S EYE IS FAR FROM THE CENTER OF THE SCREEN

If the patient's eye is far from the screen center, auto alignment may not function properly, and manual alignment may need to be used.

1 Use the control lever to bring the patient's eye closer to the screen center.
For example, If the patient's eye is to the left side of the control panel screen, tilt the control lever to the left.



INDIVIDUAL OPERATIONS

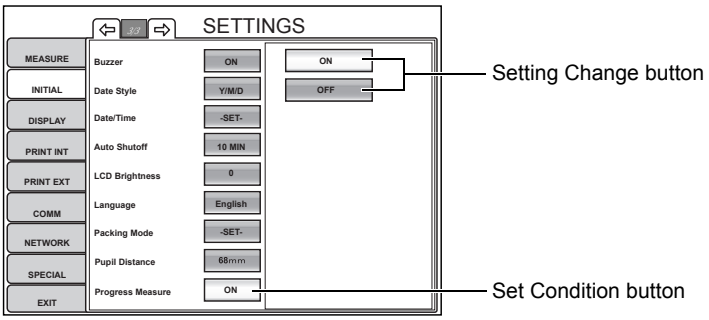
PROGRESS MEASUREMENT

By continuously performing measurement for 10 shots at a rate of 1 shot/1 sec., you can see the condition of aberration changing by elapsed time, such as dry eyes.

SETTING THE PROGRESS MEASUREMENT FUNCTION

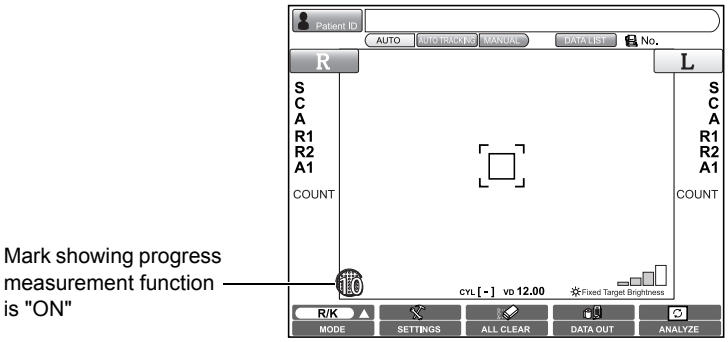
1 Tap the [SETTINGS button] of the control panel, the SETTINGS screen is displayed.

2 Tap the [Set Condition button] of "Progress Measure" of the set item display of "INITIAL."



3 Select "ON" of the [Setting Change button] : The setting is complete.

4 Tap the [EXIT button] and return to the MEASUREMENT screen. A mark showing that the progress measurement function is "ON" is displayed at the bottom left.



CANCELING THE PROGRESS MEASUREMENT FUNCTION

1 In step ***3*** of the above procedure, select "OFF" of the [Setting Change button] : The setting is complete.

2 Tap the [EXIT button] and return to the MEASUREMENT screen. The mark at the bottom left showing that the progress measurement function is "ON" is put off.

PREPARING FOR THE PROGRESS MEASUREMENT AND PERFORMING THE MEASUREMENT

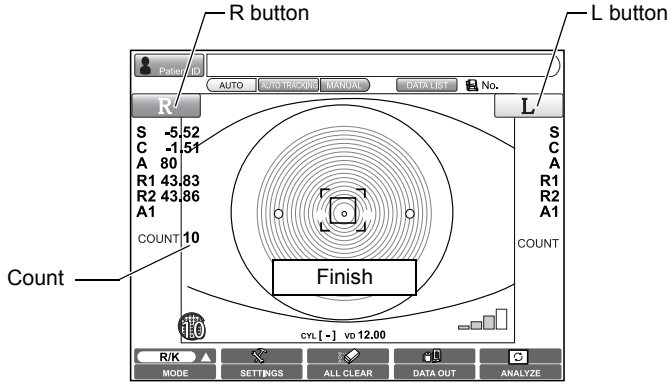
1 To prepare for the progress measurement, perform measurement once.
When a message "Get the eye aligned and press the MEASUREMENT switch" is displayed, perform alignment and press the MEASUREMENT switch. (Since this is done merely for preparation, the measurement result is not reflected in the result of continuous measurement.)

2 When a message "Press the MEASUREMENT switch again to perform 10 continuous measurements" is displayed, press the switch. Here the progress measurement is started.
The measurement count is displayed at the count column using large numerals.

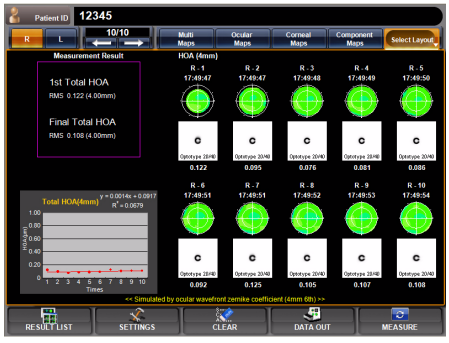
Auto alignment is not done during the 10 continuous measurements. Since measurement values are calculated after finishing 10 measurements, only measurement counts are displayed and measurement values are not displayed on the Measurement screen during the measurement.

When the measurement of one eye is finished, the measuring head does not move automatically to the measurement position of the other eye under progress measurement.

In the case of Progress measurement, the screen does not go automatically to the Measurement Result List screen after finishing the measurement.



3 By tapping the [ANALYZE] button, the Summary map is displayed. Measurement data obtained by Progress Measurement mode can be confirmed by the Summary map.



* For details about the analysis result displayed on the Summary map, see page 71.

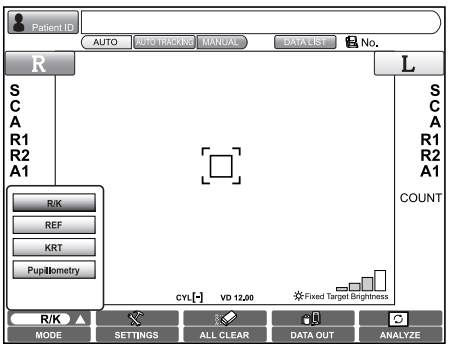
PUPILLOMETRY

The Pupillometry function is intended to change the pupil size of the patient's eye by changing the brightness of the fixation target, thereby measuring the pupil diameter and wavefront aberration.
Brightness is changed in steps automatically (under Auto mode and Auto tracking mode), and each time measurement is performed three times.

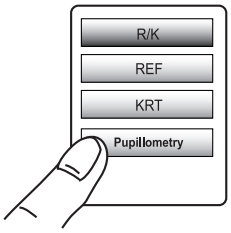
Data of the pupillometry mode cannot be mixed with the data of other modes (R/K, REF, KRT). When the measurement mode is changed in the middle (such as to measure one eye by pupillometry mode and then measure the other eye by R/K), the pupillometry data are cleared.

SETTING THE PUPILLOMETRY FUNCTION

1 Tap the Mode button. The popup menu is displayed.



2 Tap a button of the popup menu and select Pupillometry.

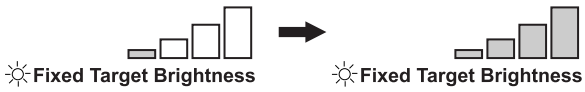


The Mode button is changed to the Pupillometry mode icon.

PUPILLOMETRY (AUTO MEASUREMENT)

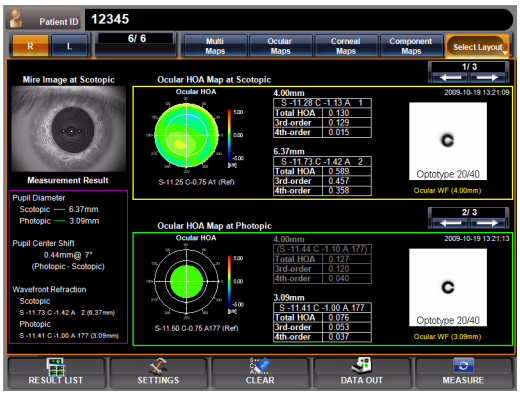
1 Roughly align the patient's eye and press the Measurement switch to start a preliminary measurement. Brightness of the fixation target is changed to the darkest state and starts pupillometry.
Measurements are performed three times with the fixation target under the darkest state

(Scotopic: dark place measurement), and three times with the fixation target under the brightest state (Photopic: bright place measurement).



2 To measure the other eye, tap the R-L Change button on the MEASUREMENT screen and change the target eye.

3 By tapping the ANALYZE button, the "Pupillometry map" is displayed. Result of the data measured under the Pupillometry mode can be checked on the Pupillometry map.



*For the analysis result displayed on the Pupillometry map, see page 75.

In the case of Pupillometry, the screen does not go automatically to the Measurement Result List screen after finishing the measurement.

When performing the pupillometry, use a darkroom.

Under the Pupillometry mode, after measuring one eye shift to the other eye is not made automatically.

When the same eye is measured repeatedly, result of the completed measurement is cleared. In this case, measurement starts from the Pupillometry (Scotopic), without performing the preliminary measurement.

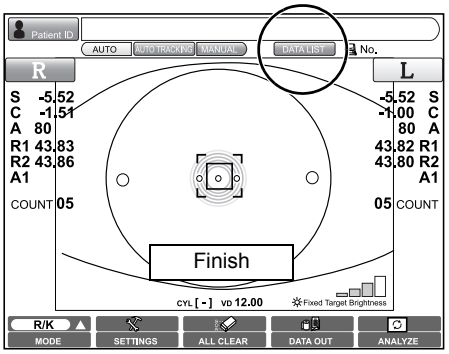
When measurement is done under the Auto Tracking mode, the waiting status starts with the patient's eye focused by the first preliminary measurement. Start measurement by pressing the MEASUREMENT switch.

When measurement is done under the Manual mode, the waiting status starts for preliminary measurement, Scotopic and Photopic, respectively. Start measurement by pressing the MEASUREMENT switch.

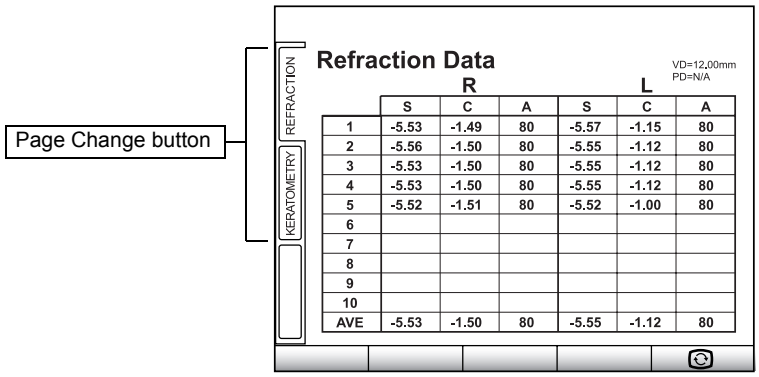
DISPLAYING ALL MEASUREMENT DATA

For measurement values, the latest data is displayed, but it is also possible to confirm and review all measurement data.
Select and display measurement data from "REF data" and "KRT data".

1 Press the [DATA LIST button] of the control panel.



The DATA LIST screen is displayed.



2 Display of measurement data can be changed by tapping the [Page Change button] (REF data, KRT data).

3 The MEASUREMENT screen is returned by pressing the [ ] button.

- The average value (AVE) of REF data excludes the highest and lowest data of S (spherical refractive power) from all measurement values. When a total of 3 or more measurements are done for one eye, AVE is displayed.

PRINTING MEASUREMENT VALUES

MEMO	• To avoid paper jam in the internal printer, do not feed the paper into the printer if it is partly cut/torn or wrinkled. • To avoid discoloration of the printing paper (particularly the recording area) during storage, use a polypropylene holder; avoid a container made of plasticizer (PVC, etc.). • To avoid discoloration of the printing paper (particularly the recording area) after pasting, use water-soluble glue. • Since the printer paper is thermosensitive, it is not suitable for long periods of storage. If necessary to keep records for long periods, prepare separate copies.

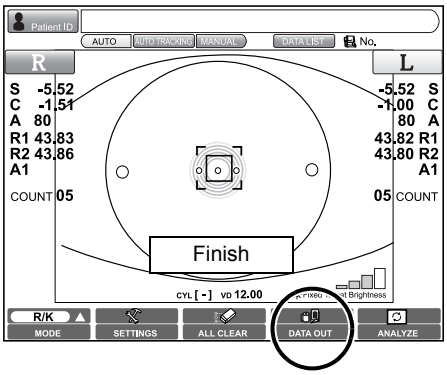
This instrument is equipped with a built-in printer.

1 Make sure the MEASUREMENT screen is on.

2 Tap the [DATA OUT button] of the control panel.

[DATA OUT button] lights, and measurement values on the control panel screen are printed out.

The light of [DATA OUT button] is turned off.



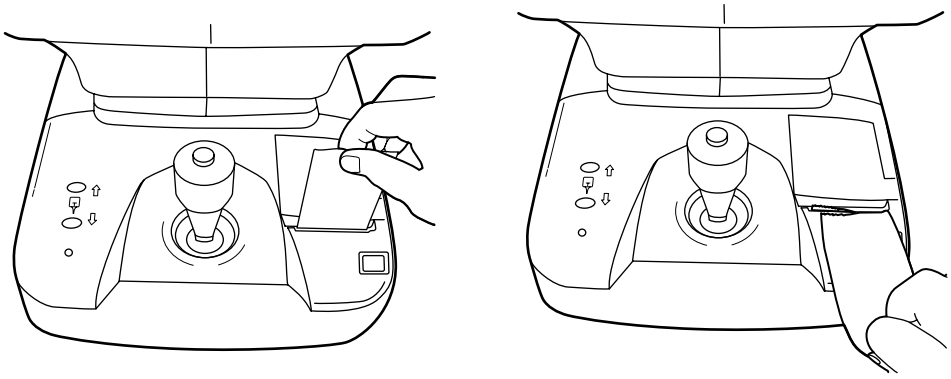
Even after the printing operation is complete and the results displayed on the screen is deleted, the results are stored within the instrument. So you can repeat printing out the data by tapping the [DATA OUT button] until a new measurement is started. The data is cleared at the start of new measurement.

1. The "ERROR" mark is not printed. Also, printing is not done if there are no measurement values.
2. When red lines appear on both sides of the printer paper, replace it with a new one earlier. For details about the replacement of printer paper, see "SETTING THE PRINTER PAPER" on page 29. Additionally, a 58mm wide printer paper (example: TF50KS-E2C (Nippon Paper) is recommended.

3 When measurement values are printed out, the paper is cut automatically.

The user may select which data items are to be printed. Refer page 139 for detail.

If the printer paper is not cut automatically at the end of printing the data, hold of the top corner of the paper and cut by pulling the paper down and diagonally.



4 When printing data is completed, the main body returns to the initial position.

The main body initial position can be changed in INITIAL SET screen.
Refer page 113 for detail.

INPUT/OUTPUT

OUTPUT USING RS-232C

This instrument can output data to PC and other devices the like via the RS-232C interface.

1. Make sure that the connection is to the RS-232C OUT.
   For connection, see "CONNECTING EXTERNAL I/O TERMINALS" on page 28.
2. Check settings for data communication.
   For data communication settings, see "SETTING OF DATA COMMUNICATION (COMM)" on page 148.

OUTPUT USING USB

This instrument can output data to an external printer or PC via the USB interface.

1. Make sure that the connection is to the USB OUT.
   For connection, see "CONNECTING EXTERNAL I/O TERMINALS" on page 28.
   Check settings for data communication.
   For data communication settings, see "SETTING OF DATA COMMUNICATION (COMM)" on page 148.

For the usable external printer, ask your dealer or TOPCON at the address printed on the back cover of this manual.

INPUT USING USB

This instrument can input data the USB interface.

1. Make sure that the connection is to the USB IN.
   For connection, see "CONNECTING EXTERNAL I/O TERMINALS" on page 28.
   Check settings for data communication.

OUTPUT USING LAN

This instrument can output data to PC on network via the LAN interface.

1. Make sure that the connection is to the LAN.
   For connection, see "CONNECTING EXTERNAL I/O TERMINALS" on page 28.
   Check settings for data communication.
   For communication settings, see "LAN CONNECTION (NETWORK)" on page 151.

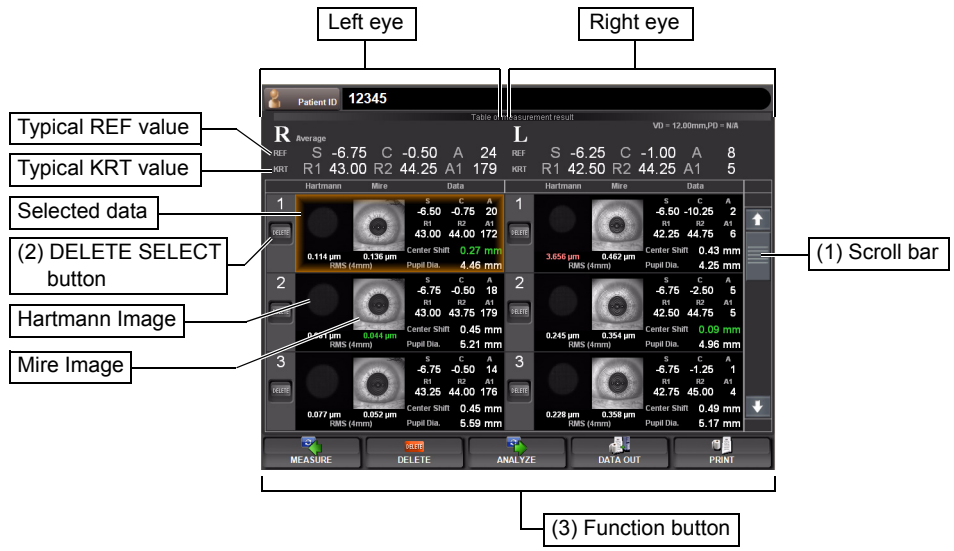
DISPLAYING THE MEASUREMENT RESULT

MEASUREMENT RESULT LIST SCREEN

On the Measurement Result List screen, a list of measurement results can be confirmed. By selecting the data to be displayed, data output to the external PC, printing data, initial display on the Analysis screen, and clearing data can be done.
When plural measurements are performed under Auto mode, the screen is changed automatically to the Measurement Result List screen.
In the case of Manual mode or Auto Tracking mode, it is displayed by tapping the [ANALYZE] button after the measurement.

In the case of progress measurement or pupillometry, the screen does not automatically go to the Measurement Result List screen after the measurement.
After the measurement, tap the [ANALYZE] button and display the Summary map or the Pupillometry map, and tap the [RESULT LIST] button of the displayed map to display the Measurement Result List screen.

- Selected data are displayed in brown. After changing the screen to the Measurement Result List screen, first the data of the largest pupil diameter are selected automatically.
- On the Measurement Result List screen, typical REF/KRT values are displayed on the screen. Also, the Hartmann Image, Mire Image, ocular high order aberration, REF/KRT data, center shift and pupil diameter are displayed for each eye.
- When plural measurements are done, the result of which the corneal high order aberration and center shift are the smallest is displayed in green. With regard to the pupil diameter, the largest result is displayed with a green background.



(1) Scroll bar — By scrolling the measurement result, measurement data can be scrolled up and down.

(2) DELETE SELECT button

Select the data to be deleted. The selected DELETE SELECT button turns on in orange. Under this condition, deletion is done by tapping the DELETE button of the (3)Function button.

(3) Function button — Available functions are listed. Select the corresponding button on the touch panel.

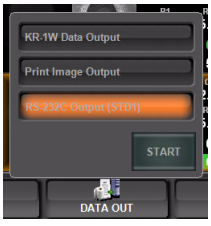
MEASURE button — The Measurement screen is returned and an additional measurement can be done. However, if data are outputted to the connected PC or printed by the internal/external printer, the display is changed to "NEXT MEASUREMENT" and a new measurement is started.

DELETE button — Selecting the data to be deleted by the DELETE SELECT button, the data can be deleted by tapping the DELETE button.

ANALYZE button — The screen is changed to the selected Analysis Result screen, and the analysis result is displayed.

DATA OUT button — Selected measurement result data can be outputted to the RS-232C or to the connected PC.
The following three settings can be assigned to the button:
(1) KR-1W data output(1WS data)
(2) Print image output (Report image)
(3) RS-232C output(STD1)
Output data can be set on the SETTINGS screen.
Incidentally, as the "print image output," left eye/right eye data framed in brown of the Measurement Result List screen are outputted.

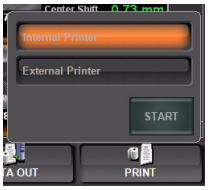
Also, by a long pressing of the DATAOUT button (approx. 2 sec), the following menu is displayed, where the desired data to be outputted can also be selected.
* The setting here is a temporary setting which will not be reflected in the following operations. To continuously change output data, set output data on the SETTINGS screen. (See pages 148 and 152).



PRINT button — Selected measurement data can be printed by the internal printer or by the connected external printer.

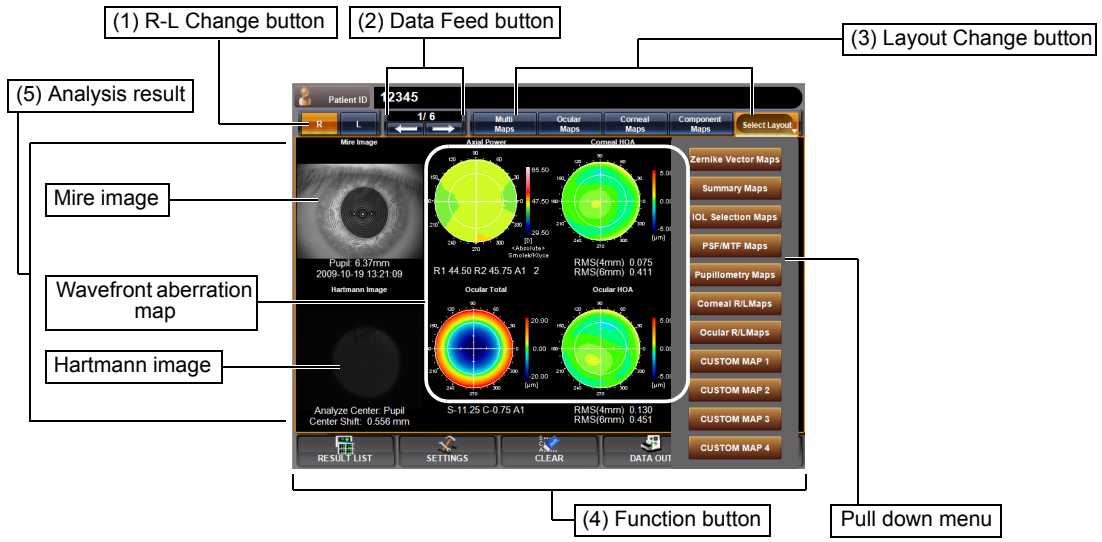
The following two settings can be assigned to the button:
(1) Internal thermal printer
(2) Connected external printer
Additionally, the data outputted to the external printer are the left eye/right eye data framed in brown of the Measurement Result List screen.

Also, by a long pressing of the PRINT button (approx. 2 sec), the desired data to be outputted can also be selected.
* The setting here is a temporary setting which will not be reflected in the following operations. To continuously change output data, set output data on the SETTINGS screen. (See pages 116 and 117).



ANALYSIS RESULT SCREEN

The KR-1W can perform REF/KRT measurements and aberration measurements by capturing Hartmann Shack and Mire images of the patient's eye. After the measurement, tap the ANALYZE button to display analysis results on Measurement Result List Screen.



(The figure shows a multi map.)

(1) R-L Change button — Changes eyes (right/left).

(2) Data Feed button — Moves to the analysis result to the next data, or returns to the previous data.

(3) Layout Change button — Displays the measurement result by changing it to the previously set layout pattern. Four layout types can be registered. Pressing the Select Layout button at the right most, a pull down menu for layout selection is displayed.

(4) Function button — A list of operable functions is displayed. Select a relevant button by the touch panel.

RESULT LIST button
Changes to Result List display mode.

SETTIGNS button
Performs various settings. For details, see page 95.

CLEAR button — Clears only the data currently displayed.

DATA OUT button
When the external printer is set, the displayed analysis result can be outputted to the external printer. For details about the external printer, see "SETTING OF EXTERNAL PRINTER (PRINT EXT)" on page 117.
When measurement results are saved, the button blinks in orange.
The output layout for the external printer can be set. For details, see "SETTING OF EXTERNAL PRINTER (PRINT EXT)" on page 147.

MEASURE button

Goes to the MEASUREMENT screen.

(5) Analysis result — Analysis results such as Mire image, Hartmann image and wave-front aberration image are displayed.

DESCRIPTION OF MAP LAYOUT

In the measurement result display screen for displaying analysis results, various types of map layout are prepared and can be selected.
A special toolbar is also prepared. Here, contents of display and features, and the switching procedure are described.

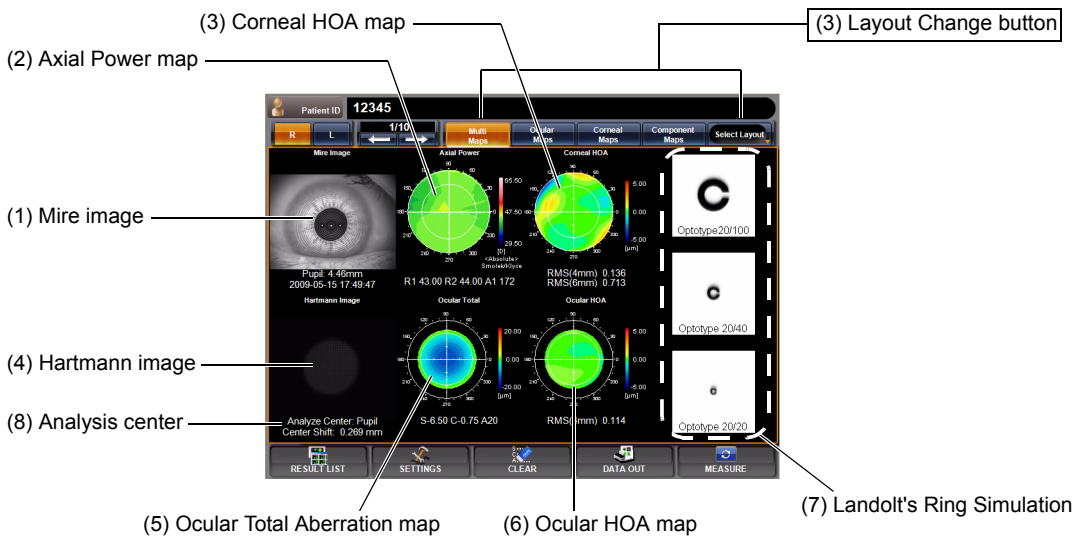
The following maps are available:

Multi map
Ocular Aberration map
Corneal Aberration map
Component map
Summary map
Zernike Vector map
IOL Selection map
PSF/MTF map
Pupillometry map
Corneal R/L map
Ocular R/L Map
Custom map 1-4

- For Custom map 1-4, layout can be set. See "CUSTOM MAP" on page 124.
- Pupillometry map can be selected under pupillometry mode measuring only.

MULTI MAP DISPLAY

Both Corneal and Ocular aberration maps and Landolt's ring simulation are displayed.



This map display facilitates qualitative comparison of aberration due to corneal topography and aberration of total refraction.
Changing to other map: Tap the Layout Change button.

Description of Each Display

(1) Mire image — Image by projecting a Placido ring to the cornea. An image of corneal surface; from this image, measurements related to the cornea are analyzed. The pupil diameter is displayed together with the time and date of measurement at the bottom part.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Axial Power map — A map to display the distribution of corneal refractive power.
KR values are displayed at the bottom part of the map.

Operation:
- When tapped, the map is changed to the cornea aberration map. (See page 67.)
- The map scale can be changed. (See page 130.)

(3) Corneal HOA map — A map to display corneal higher order aberrations (e.g. irregular astigma). At the bottom part of the map, corneal higher order aberration, 4-mm area and 6-mm area, are displayed with RMS values.

Operation:
- When tapped, the map is changed to the cornea aberration map. (See page 72.)
- The map display step can be changed. (See "Setting the Display Step of High Order Aberration Astigma Map" on page 129.)

(4) Hartmann image — A point image reflected from the internal ocular part through the pupil. From this image, REF values, ocular total aberration, high order aberrations, etc. are calculated. Description about the analysis is given at the bottom part of the image. (Analysis center/Amount of central movement (see page 88))

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(5) Ocular Total Aberration map
A total aberration map, including lower order aberration of ocular refraction. This map can distinguish near and far vision tendencies. REF values are displayed at the bottom of the map.
For example, if the center of the map is cold in color (blue), near vision tendency. If the center of the map is warm in color (red), far vision tendency.

Operation:
- When tapped, the image is changed to the ocular aberration map. (See page 66.)
- The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(6) Ocular HOA map

A map to display ocular higher order aberration (e.g. irregular astigma). This map displays irregular astigma which cannot be corrected by eyeglasses.
At the bottom part of the map, corneal higher order aberration, 4-mm area and 6-mm area, are displayed with RMS values.

Operation:
- When tapped, the map is changed to the ocular aberration map. (See page 69.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(7) Landolt's Ring Simulation

Simulation of the vision of Landolt's ring target using ocular higher order aberration. This displays reference cases completely corrected by eye glasses and the like.
Visions of target by 20/100 (0.2), 20/40 (0.5) and 20/20 (1.0) are displayed, from the top stage.

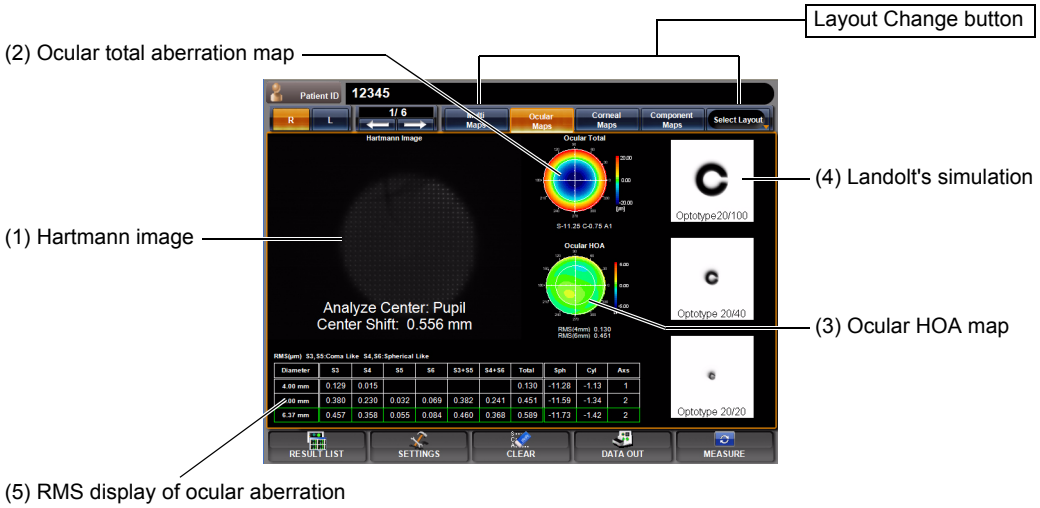
Operation:
- When tapped, the map is changed to the RSF/MTF map. (See page 74.)
- The direction of Landolt's ring can be changed. (See "SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)" on page 133.)
- The optotype of Landolt's ring can be changed (See "SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)" on page 132.)
- To normalize the brightness or not can be changed. (See "SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)" on page 133.)

(8) Analysis center

Whether the analysis center is the pupil center or the mechanical center is shown. Also, the distance between pupil center and mechanical center is displayed.
For details about the pupil center and the mechanical center, see "ANALYSIS CENTER" on page 88.)

OCULAR ABERRATION MAP DISPLAY

This map displays information about aberration related to total refraction.



To change display to another map: Tap the Layout Change button.

(1) Hartmann image (See "Hartmann image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Ocular total aberration map(See "Ocular Total Aberration Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(3) Ocular HOA map (See "Ocular High Order Aberration Map" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(4) Landolt's ring simulation(See "Landolt's Ring Simulation" on page 65.)

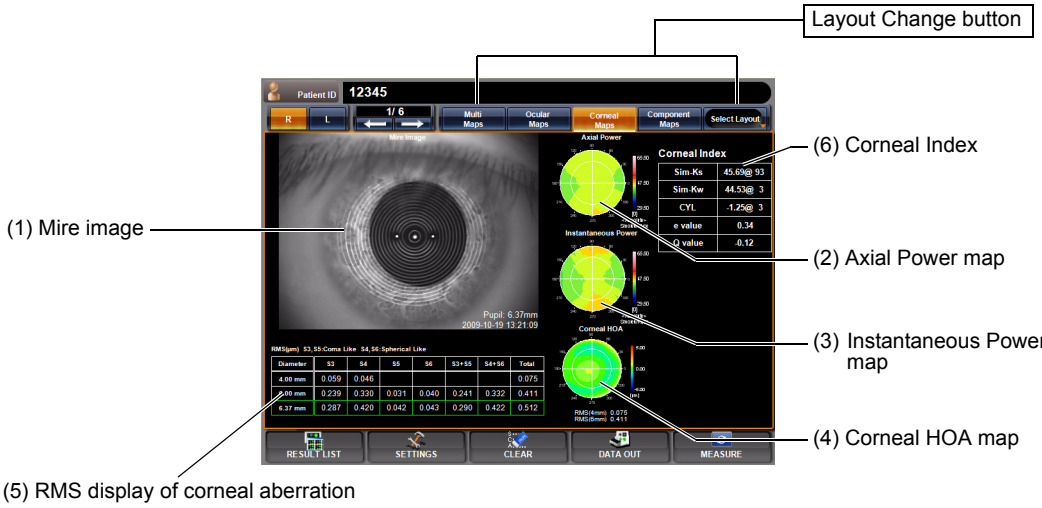
Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The direction of Landolt's ring can be changed. (See "SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)" on page 133.)
- The optotype of Landolt's ring can be changed (See "SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)" on page 132.)
- To normalize the brightness or not can be changed. (See "SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)" on page 133.)

(5) RMS display of ocular aberration

Ocular aberration is displayed quantitatively. (See "DESCRIPTION ABOUT RMS DISPLAY OF OCULAR ABERRATION" (page 88)

CORNEAL ABERRATION MAP DISPLAY

This map displays information about the cornea, including the cornea aberration map and the cornea topography map.



To change display to another map: Tap the Layout Change button.

(1) Mire image (See "Mire Image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Axial Power map (See "Axial Power Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

(3) Instantaneous Power map

The corneal refractive power is displayed by a local power distribution.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map scale can be changed. (See "SETTING THE TOPOMAP SCALE TYPE (TOPOMAP SCALE - TYPE)" on page 130.)

(4) Corneal HOA map (See "Corneal HOA Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map scale can be changed. (See "SETTING THE TOPOMAP SCALE TYPE (TOPOMAP SCALE - TYPE)" on page 130.)

(5) RMS display of corneal aberration

Corneal aberration is displayed quantitatively. (See "DESCRIPTION ABOUT RMS DISPLAY OF CORNEAL ABERRATION" (page 89)

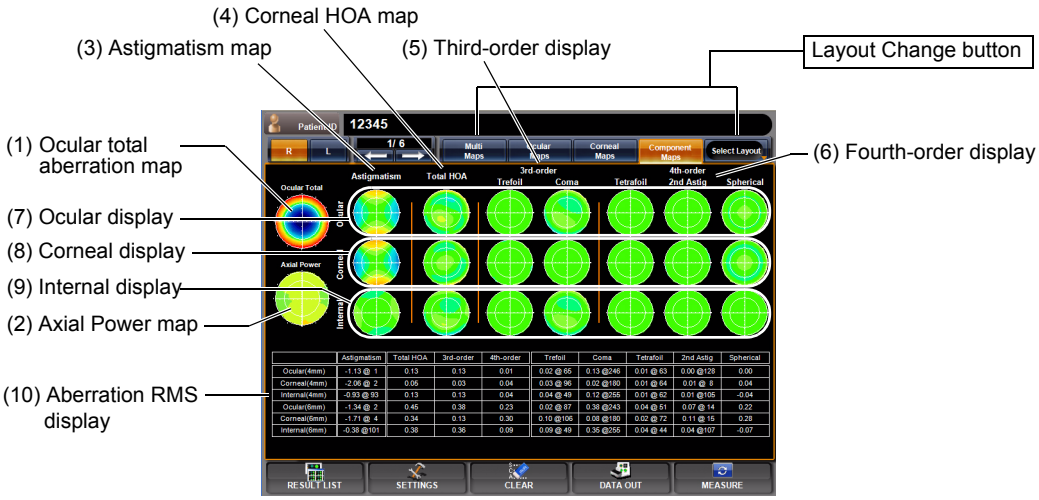
(6) Corneal Index Information on the cornea is displayed quantitatively.

Sim-Ks	Shows the refractive power and angle of the flat meridian of 3-mm area on the cornea.
Sim-Kw	Shows the refractive power and angle of the steep meridian of 3-mm area on the cornea.
CYL	Astigmatic axial power
e value	Shows the eccentricity indicating the aspheric degree. * For a perfect ball, e=0; for a shape normally flat in the periphery, 0<e<1.
Q value	Aspheric coefficient

COMPONENT MAP DISPLAY

This map displays the entire eye, cornea, behind the cornea (internal) and important components of high order aberration.

In the map, components are tabulated; 3rd-order and 4th-order aberrations are displayed vertically, and ocular, corneal and internal aberrations vertically.



To change display to another map: Tap the Layout Change button.

(1) Ocular total aberration map

(See "Ocular Total Aberration Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(2) Axial Power map (See "Axial Power Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

(3) Astigmatism map Distribution of low order cylindrical refractive power.
Ocular aberration is shown as cylindrical refractive power, and corneal aberration is shown as corneal astigmatic power.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

(4) Corneal HOA map (See "Corneal High Order Aberration Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map scale can be changed. (See "SETTING THE TOPOMAP SCALE TYPE (TOPOMAP SCALE - TYPE)" on page 130.)

(5) Third-order display Third-order aberrations of Zernike coefficient are displayed (Trefoil and Coma aberration).

(6) Fourth-order display
Fourth-order aberrations of Zernike coefficient are displayed (Tetrafoil, 2nd Astig. and Spherical aberration).

(7) Ocular display
Aberration of the whole eyeball obtained from the Hartmann image is displayed in 3rd and 4th-order.

(8) Corneal display
Aberration of the cornea surface obtained from the Placido image is displayed in 3rd and 4th-order.

(9) Internal display
Internal aberration (aberration of whole eyeball minus aberration of cornea) is displayed.

(10) Aberration RMS display
RMS values (exception: diopter for astigmatism) and angles are displayed in analysis diameters (4mm and 6mm). For the direction of RMS of each order, see "DESCRIPTION ABOUT RMS DISPLAY OF CORNEAL ABERRATION" on page 89).

ZERNIKE VECTOR MAP

This map displays important ocular higher order aberrations by components.

To change display: Tap the Select Layout button (at the rightmost of Layout Change buttons), and tap the Zernike Vector Map button from the pull down menu.
To change display to another map: Tap the Layout Change button.

(1) Hartmann image (See "Hartmann Image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Ocular total aberration map(See "Ocular Total Aberration Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(3) Ocular HOA map (See "Ocular High Order Aberration Map" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(4) HOA map Aberration of each component (3rd and 4th-order) is displayed.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

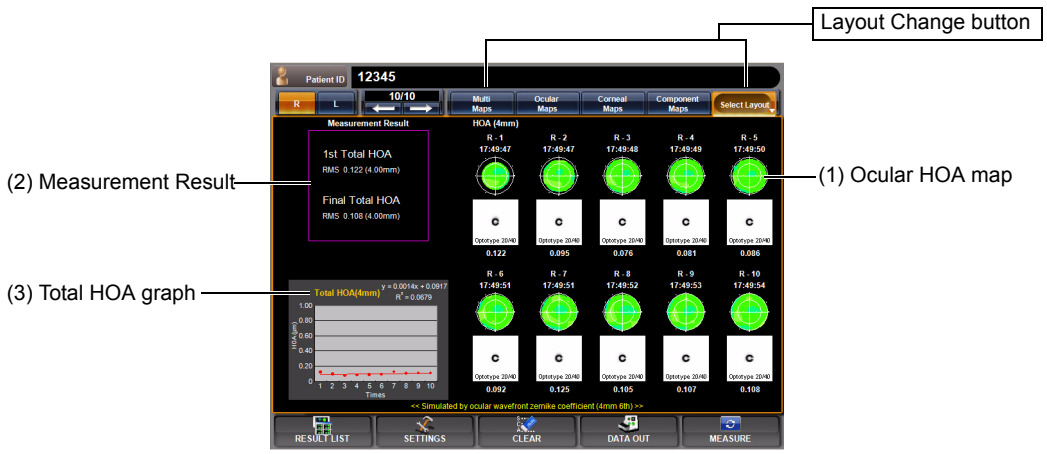
(5) Landolt's ring simulation

Landolt's ring simulation of each component (3rd and 4th-order) is displayed.

Operation:
- (See "Landolt's Ring Simulation" on page 65.)

SUMMARY MAP

This map displays higher order aberrations when multiple measurements are done (10 measurements max.)



To change display: Tap the Select Layout button (at the rightmost of Layout Change buttons), and tap the Summary Map button from the pull down menu.
To change display to another map: Tap the Layout Change button.

(1) Ocular HOA map (See "Ocular High Order Aberration Map" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(2) Measurement Result

Values of aberration in the first and last measurements are displayed.

(3) Total HOA graph

The horizontal axis shows the number of measurements and the vertical axis the value of HOA (High Order Aberration).

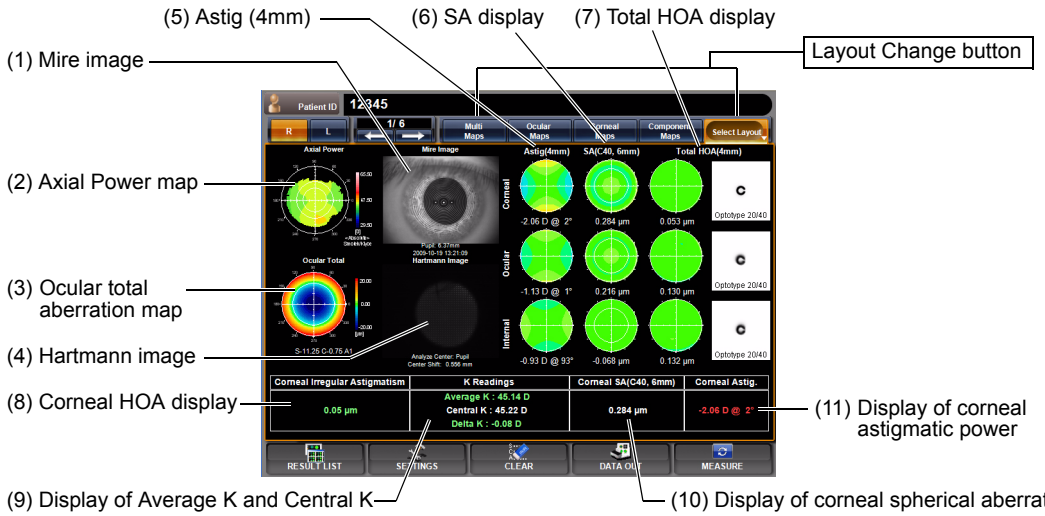
The expression at the top right of the graph indicates the approximated primary line.

R^2 is the determination coefficient showing the degree of applicability of the approximation.

- The graph scale can be changed by dragging to the right/left.
- Graph setting can be also set by the item of "DISPLAY" of the "SETTINGS screen." (See "SUMMARY MAP GRAPH SCALE" on page 135.)

IOL SELECTION MAP

This map displays information useful for the application of IOL after LASIK operation, selection of K values, spherical IOL and aspheric IOL in determining the power, application of bifocal IOL, etc.



To change display: Tap the Select Layout button (at the rightmost of Layout Change buttons), and tap the IOL Selection Map button from the pull down menu.
To change display to another map: Tap the Layout Change button.

(1) Mire image (See "Mire Image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Axial Power map (See "Axial Power Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

(3) Ocular total aberration map

(See "Ocular Total Aberration Map" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(4) Hartmann image (See "Hartmann Image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(5) Astig (4mm) Map of cylindrical refractive power when the analysis diameter of 4mm is displayed. From the top: corneal aberration, ocular aberration and internal aberration.

(6) SA display Map of spherical aberration when the analysis diameter of 6mm is displayed. From the top: corneal aberration, ocular aberration and internal aberration.

(7) Total HOA display Map of high order aberration when the analysis diameter of 4mm is displayed. From the top: corneal aberration, ocular aberration and internal aberration.

(8) Corneal HOA display

Corneal higher order aberration is displayed. When the corneal high order aberration shows an abnormal value, the corrected visual acuity may not be satisfactory even after applying IOL: This information may be valuable for patient treatment.

(9) Display of Average K and Central K

The Sim-K value (Average K) with an analysis diameter of 3mm, the Kerato value (Central K) with an analysis diameter of 1mm, and the difference are displayed: If the difference of Average K and Central K is large, possibility of the eye is high after a LASIK operation, and this value may be used as information for making a decision.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

(10) Display of corneal spherical aberration

The value of corneal spherical aberration may be used as information for making a decision in applying an aspheric IOL or a spherical IOL.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

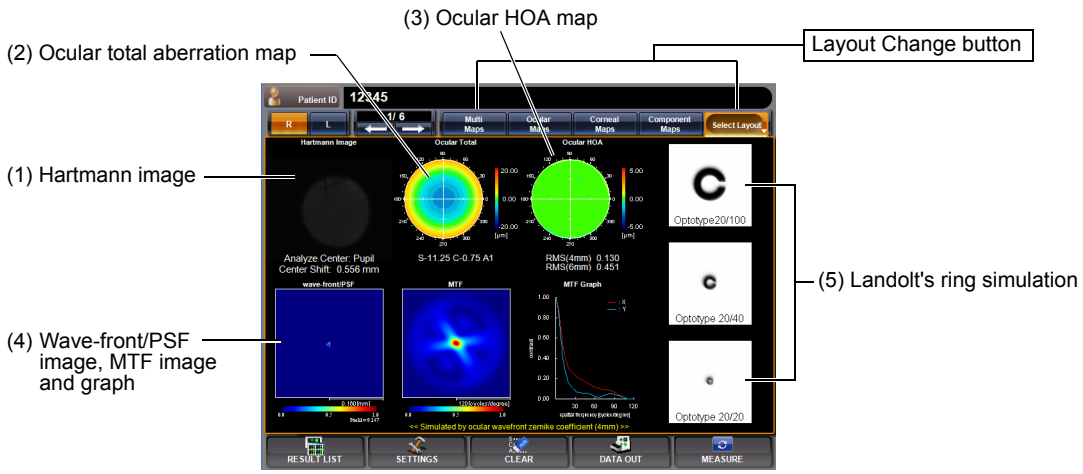
(11) Display of corneal astigmatic power

The value of corneal astigmatic power may be used as information for making a decision in applying a bifocal IOL. The operation image can be enlarged.

Operation: • When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

PSF/MTF MAP

The PSF/MTF map can be displayed.



To change display: Tap the Select Layout button (at the rightmost of Layout Change buttons), and tap the PSF/MTF Map button from the pull down menu.
To change display to another map: Tap the Layout Change.

(1) Hartmann image (See "Hartmann Image" on page 64.)

Operation: • When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
• When dragged in the right-left direction, the overlay can be changed. (See page 83.)

(2) Ocular total aberration map

(See "Ocular Total Aberration Map" on page 64.)

Operation: • When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
• The map display step can be changed. (See "SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)" on page 128.)

(3) Ocular HOA map (See "Ocular High Order Aberration Map" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(4) Wave-front/PSF image, MTF image and graph

Image formation of light on the retina is displayed. (See "Reference: PSF, MTF" on page 94.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)

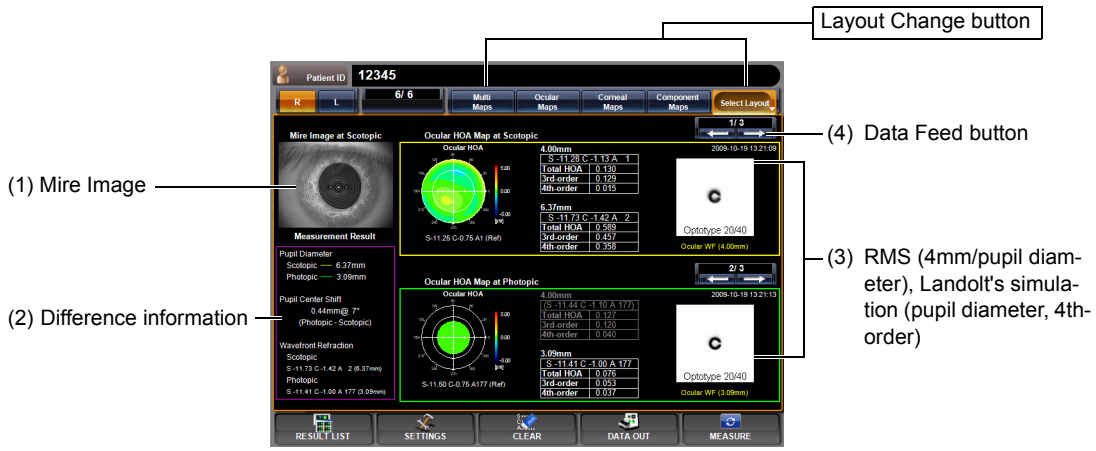
(5) Landolt's ring simulation

(See "Landolt's Ring Simulation" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The direction of Landolt's ring can be changed. (See "SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)" on page 133.)
- The optotype of Landolt's ring can be changed (See "SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)" on page 132.)
- To normalize the brightness or not can be changed. (See "SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)" on page 133.)

PUPILLOMETRY MAP

Data of measurement by the Pupillometry mode can be confirmed.
Pupillometry map can be selected under pupillometry mode measuring only.



When the ANALYZE button is tapped after finishing the pupil measurement on the Pupillometry screen, the Pupillometry map is displayed.

When the Pupillometry screen is selected, of the data measured by Scotopic, data with the largest change in pupil diameter are selected and displayed.

To change the display to other maps: Tap the Layout change button.

(1) Mire Image (Scotopic)

(See "Mire image" on page 64.)

The data with the largest pupil diameter measured by Scotopic is displayed.

In the Mire image, angle scale, pupil frame (Scotopic and Photopic) and pupil center position are overlay-displayed in colors (Scotopic: yellow, Photopic: green). Overlay information can be set to ON/OFF.

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right direction, the overlay can be changed.
- TOPO MAP overlay can be displayed.(See page 85.)
  Overlay information can be set to ON/OFF on the SETTINGS screen "DISPLAY". See page 127.

(2) Difference Information

As difference information, pupil diameter by Scotopic and Photopic, deviation of center coordinates (distance @ direction) and SCA calculated from wavefront aberration are displayed.

(3) RMS (4mm/pupil diameter), Landolt's simulation (pupil diameter, 4th-order)

From the data of three measurements performed by Scotopic and Photopic respectively, one result is selectively displayed. Measurement data can be changed by tapping the [Page Change button] displayed at the upper part.

(According to the selected data, information of (1) and (2) are updated.)

For each data, HOA map, RMS (4mm/pupil diameter), Landolt's simulation (4th order) dealing with pupil diameters up to 4mm as the analysis range, and the date of measurement are displayed.

(4) Data Feed button Moves to the analysis result to the next data, or returns to the previous data. (The information on (1), (2) and (3) is updated according to the selected data.)

Landolt's ring simulation deals with pupil diameters up to 4mm as the analysis range. Even when the pupil diameter is 5mm or more, the maximum analysis area is 4mm.

For the Mire image, the pupil overlay is not displayed when the setting is OFF. To enable the overlay, tap the [Set Condition button] of the set item display "Pupil Detection overlay" of the SETTINGS screen "DISPLAY," and tap and select "ON" of the [Setting Change button].

CORNEAL R/L MAP

The Corneal R/L map can be displayed.

To change display: Tap the Layout Select button, the rightmost button of layout change buttons, and tap the CORNEAL R/L MAPS button of the displayed pull-down menu.

To change display to other map: Tap the Layout Change button.

(1) Mire Image (See "Mire image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right direction, the overlay can be changed.
- TOPO MAP overlay can be displayed.(See page 85.)
  Overlay information can be set to ON/OFF on the SETTINGS screen "DISPLAY". See page 127.

(2) Data Feed button Moves to the analysis result to the next data, or returns to the previous data.

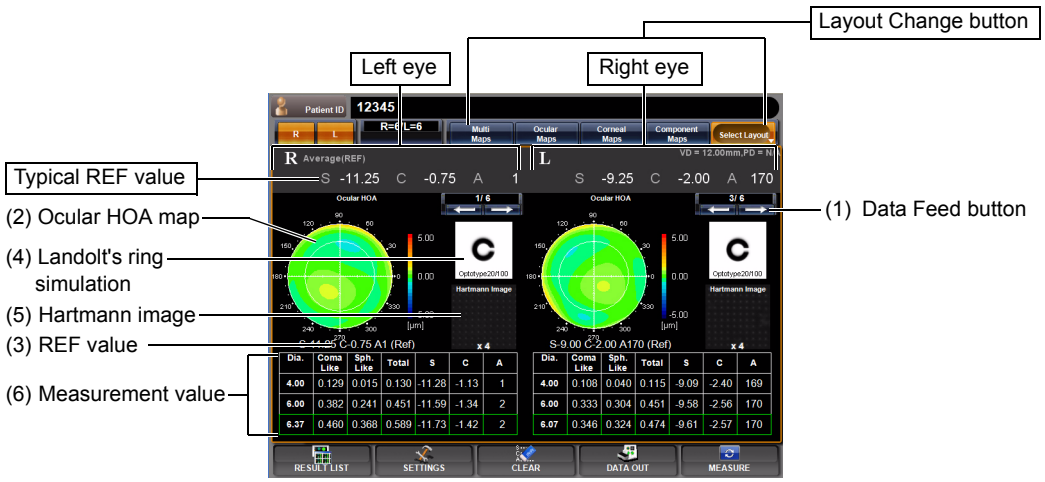
(3) KRT value KRT Value of current displayed mire image.

(4) Measurement value The measured pupil diameter and tables showing the coma aberration, spherical aberration and total aberration, e-values and Q-values in 4.00mm and 6.00mm analysis zones are displayed. (For e-values and Q-values, see page 68.)

When the TopoMap overlay (page 85) is applied to the corneal Mire image, a color scale is displayed between the right and left corneal Mire images.

OCULAR R/L MAP

The Ocular R/L map can be displayed.



To change display: Tap the Layout Select button, the rightmost button of layout change buttons, and tap the OCULAR R/L MAPS button of the displayed pull-down menu.

To change display to other map: Tap the Layout Change button.

(1) Data Feed button Moves to the analysis result to the next data, or returns to the previous data.

(2) Ocular HOA map (See "Ocular HOA map" on page 66.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The map display step can be changed. (See "SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP" on page 129.)

(3) REF Value REF Value of current displayed data.

(4) Landolt's ring simulation

(See "Landolt's Ring Simulation" on page 65.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- The direction of Landolt's ring can be changed. (See "SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)" on page 133.)
- oThe optotype of Landolt's ring can be changed (See "SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)" on page 132.)
- oTo normalize the brightness or not can be changed. (See "SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)" on page 133.

(5) Hartmann image (See "Hartmann image" on page 64.)

Operation:
- When tapped, the image is enlarged. (See "ENLARGEMENT DISPLAY" on page 79.)
- When dragged in the right direction, the overlay can be changed. (See page 83.)

(6) Measurement value The measured pupil diameter, and the coma aberration, spherical aberration, total high order aberration, and S/C/A values in 4.00mm and 6.00mm analysis zones are displayed.

ENLARGEMENT DISPLAY

When tapped, the map display is enlarged.

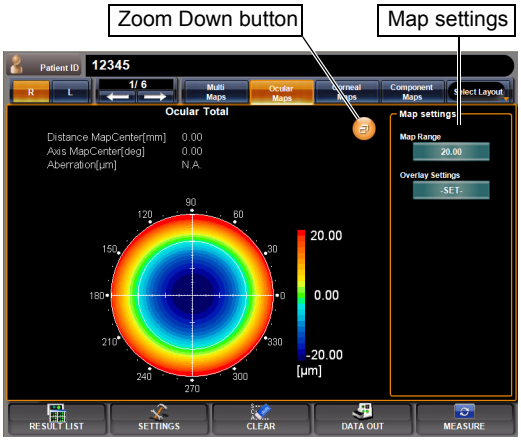
- To return to the original screen, drag the map downward, or tap the Zoom Down button. For the operation of the control panel, see "OPERATION METHOD OF CONTROL PANEL" on page 13.

EXAMPLE: TOTAL ABERRATION

The following items are displayed at the top left of the screen:

- Coordinate values (distance and angular direction from the center)
- Aberration value

◆Near the "Map Setting" displayed on the right, the following display setting can be done:



- Display step
  The display step is set.
  1. By pressing the Map Range button, ten keys are displayed.
  2. Enter the number and tap the OK button: the setting is done.

- Overlay setting
  1. By pressing the Overlay settings button, the following overlay buttons are displayed:
     - Map overlay (cross scale)
     - Map overlay (angle scale)
     - Map overlay (mm grid scale)
  2. Tap on the button of the desired overlay to be turned ON, and press the OK button: the overlay is displayed on the map.

EXAMPLE: HIGH ORDER ABERRATION

The following items are displayed at the top left of the screen:

- Coordinate values (distance and angular direction from the center)
- Aberration value

◆Near the "Map Setting" displayed on the right, the following display setting can be done:

- Display step
- Overlay setting

The contents and method of setting are the same as "Example: Total Aberration."

Items set by "Map Setting," displayed on the right side of the enlargement display, can also be set by the items of "DISPLAY" of the "SETTINGS screen." See "DISPLAY SETTING (DISPLAY)" on page 124.

EXAMPLE: CORNEA TOPO MAP

The following items are displayed at the top left of the screen:

•Distance Map Center To Pupil Center:
Pupil coordinate values (distance from the pupil center)

•Axis Map Center To Pupil Center:
Pupil coordinate values (angular direction from the pupil center)

•Distance Map Center:
Cornea coordinate values (angular direction from the cornea center)

•Distance Pupil Center:
Cornea coordinate values (distance from the cornea center)

•Axis Map Center:
Pupil-cornea coordinate difference (distance)

- Axis Pupil Center:
  Pupil-cornea coordinate difference (angular direction)
- Power:
  Corneal refractive power
- Radius:
  Corneal curvature radius.

◆Near the "Map Setting" displayed on the right, the following display setting can be done:

- Display unit

  1 By pressing the button, the display unit is changed to "mm" or "D."
- Scale type

  1 Each time the button is pressed, "Absolute," "Adjustable" and "Normalized" are changed.
- Step

  The display step is set.

  The contents and method of setting are the same as "Example: Total Aberration."
- Overlay setting

  1 By pressing the button, the following overlay buttons are displayed:
  - Map overlay (cross scale)
  - Map overlay (angle scale)
  - Map overlay (mm grid scale)
  - Map overlay (pupil)

  2 Tap on the button of the desired overlay, and press the OK button: the overlay is displayed on the map.
- Kerato axis

  1 Each time the button is pressed, "None" and "Sim-K axis" of the Kerato axis are changed.

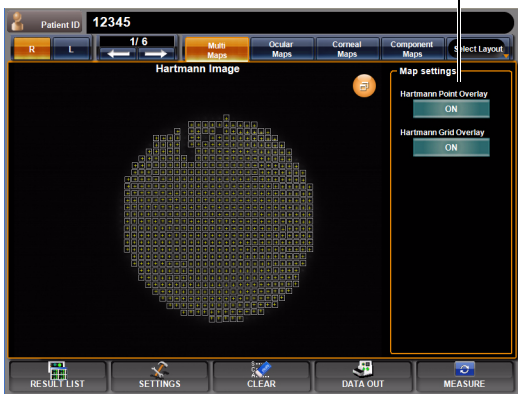
Items set by "Map Setting," displayed on the right side of the enlargement display, can also be set by the items of "DISPLAY" of the "SETTINGS screen." See "DISPLAY SETTING (DISPLAY)" on page 124.

HARTMANN IMAGE AND MIRE IMAGE

By tapping and dragging each image to the right, the context menu related to the map is displayed for overlay-displaying detection conditions, copying the image, etc. (See "ANALYSIS SETTING MENU" on page 82.)

Hartmann image

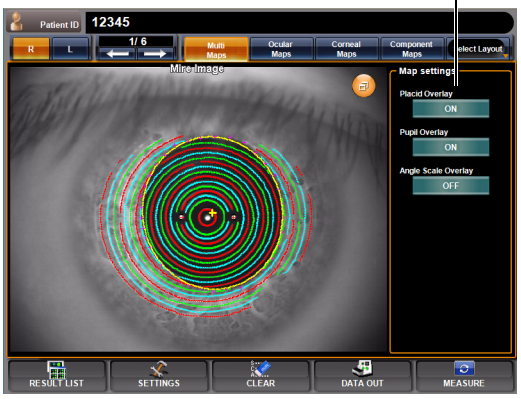
Map settings



(Overlay-displayed net)

Mire image

Map settings



(Overlay-displayed ring/pupil)

When the corneal Mire image is enlarged and displayed from the corneal aberration map and IOL selection map, the overlay cannot be changed by dragging the image. Besides, part of display items of "Map Setting" is different. For details, see page 85.

◆ Near the "Map Setting" displayed on the right, the following display setting can be done:

- Hartmann detection point overlay (Hartmann image)
  When turned on, Hartmann detection point is displayed with a yellow cross scale.
- Hartmann detection grid overlay (Hartmann image)
  When turned on, Hartmann detection grid is displayed with a white square.
- Placido ring detection overlay (Mire image)
  When turned on, the detected Placido ring is displayed.
- Pupil detection overlay (Mire image)
  When turned on, the detected pupil is displayed with a yellow circle.
- Angle Scale Overlay (Corneal Mire image)
  When turned to ON, an angle scale is displayed.

Items set by "Map Setting," displayed on the right side of the enlargement display, can also be set by the items of "DISPLAY" of the "SETTINGS screen." See "DISPLAY SETTING (DISPLAY)" on page 124.

ANALYSIS SETTING MENU

Settings can be changed from the SETTINGS screen.

SETTING TOPOMAP SCALE TYPE

- The map scale can be changed in the SETTINGS menu. See "SETTING THE TOPOMAP SCALE TYPE (TOPOMAP SCALE - TYPE)" on page 130.

SETTING ABERRATION MAPS

- The overlay object can be changed in the SETTINGS menu (cross scale, angle scale, mm grid scale). See "SETTING THE TOTAL ABERRATION MAP OVERLAY - CROSS SCALE" on page 128.

SETTING LANDOLT'S RING SIMULATION

Settings can be changed from the SETTINGS menu.

- The optotype of Landolt's ring can be changed.
  See "SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)" on page 132.
- For the Landolt's ring, the direction can be changed to top, bottom, left and right.
  See "SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)" on page 133.
- Brightness may be normalized. In the initial state, it is not normalized. When normalized, Landolt's ring is contrasted and the direction of blur is made more clearly visible. It is assumed that, when not normalized, the image is less contrasted by blur and seen nearer.
  See "SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)" on page 133.

SETTING OVERLAY OF HARTMANN IMAGE, MIRE IMAGE

EXAMPLE: HARTMANN IMAGE

The image used for point image detection can be confirmed.

(Example: Overlay display)

Operation:
- When the image is tapped and dragged to the right, the overlay condition can be changed as None → Cross → Enclose with square → Cross/Enclose with square → None in this order.

EXAMPLE: MIRE IMAGE

(Overlay-displayed ring/pupil image)

You can confirm how ring detection is performed. There are a total of 19 rings, and since rings are colored and overlaid, it is possible to confirm the detection condition. Rings are colored in red, green and blue starting from the inside and moving out so that the outermost ring is colored in red. The pupil is yellow-overlayed.

Operation:
- When the image is tapped and dragged to the right, the overlay condition can be changed as None → Ring/pupil → Ring → Pupil → None in this order.

When the corneal Mire image is enlarged and displayed from the corneal aberration map and IOL selection map, the overlay cannot be changed by dragging the image. Besides, part of display items of "Map Setting" is different. For details, see page 85.

TOPOMAP SMOOTHING FUNCTION

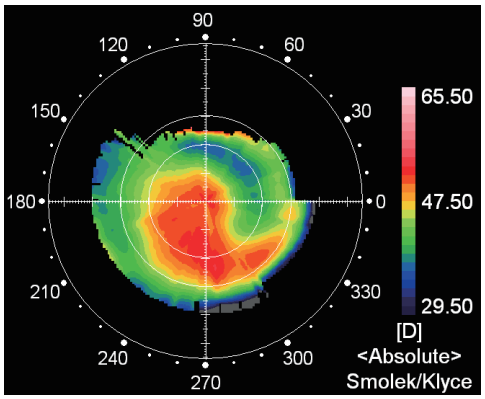
The Topo-map smoothing function performs analyses by changing the production algorithm of map information of the Axial Power map and Instantaneous Power map.

OPERATION

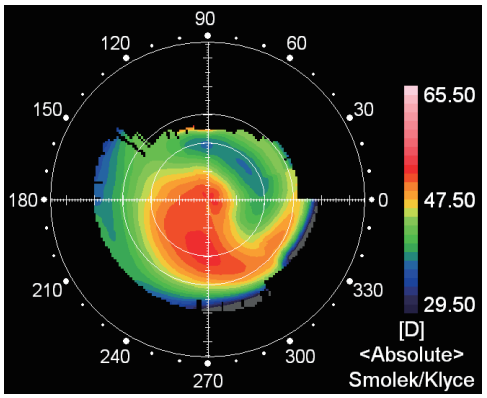
1. Tap the SETTINGS button and enter the SETTINGS screen.
2. Tap the Set Condition button of the set item display "TopoMap Smoothing" of the SETTINGS screen "DISPLAY."
3. Using the Setting Change button, select "ON" or "OFF." When "ON" is set, smoothing is applied to the topo-map display.

RESULT OF SMOOTHING

Smoothing OFF



Smoothing ON



TOPOMAP OVERLAY AND MAKER OVERLAY

When the corneal Mire image is enlarged and displayed from the Corneal Aberration map and IOL Selection map, the TopoMap overlay and Maker overlay can be set by the "Map Setting" displayed on the right.

When the corneal Mire image is enlarged and displayed from the Corneal aberration map and IOL selection map, the overlay cannot be changed by dragging the image.

TOPOMAP OVERLAY

Overlay of the Corneal Axila map and Corneal Instantaneous map can be overlayed to the corneal Mire image of the Corneal Aberration map.

1. Tap, enlarge and display the corneal Mire image from the Corneal Aberration map or IOL Selection map.
2. Tap the TopoMap Overlay button of Map Settings and display the TopoMap overlay.
   The button is changed as Axial → Instantaneous → NONE each time it is pressed.

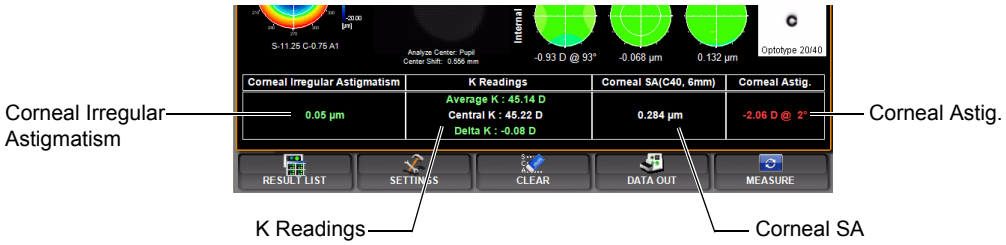
MARKER OVERLAY

The angle of the tap position with regard to the flat meridian (black) is displayed. Also, the steep meridian is displayed in gray.

1. Tap, enlarge and display the corneal Mire image from the Corneal Aberration map or IOL Selection map.
2. Tap ON the Marker Overlay button of Map Settings, the marker overlay is displayed.

IOL THRESHOLD SETTING OF IOL SELECTION MAP

Each of the "Corneal Irregular Astigmatism (high order aberration)," "K Readings," "Corneal SA" and "Corneal Astig." displayed on the IOL Selection map is displayed by changing the character color when the measurement result exceeds the set threshold value.
* The character color cannot be specified.



SETTING THE THRESHOLD VALUE

Corneal Irregular Aberration (corneal high order aberration):

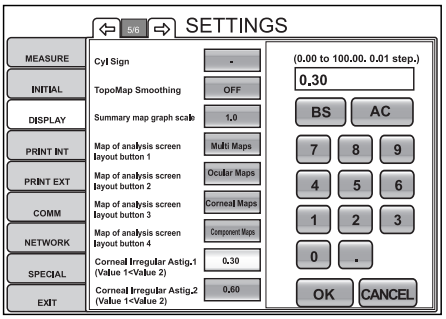
- In each of the following cases, the character color is changed based on the threshold values set to Corneal Irregular Astig.1 and Corneal Irregular Astig.2:
  - When the measurement value is not more than the threshold value of corneal irregular aberration 1
  - When the measurement value is exceeds the threshold value of corneal irregular aberration 1 and not more than the threshold value of corneal irregular aberration 2
  - When the measurement value is not less than the threshold value of corneal irregular aberration 2

  Threshold value of corneal irregular aberration 1: Lowest set threshold value of corneal irregular aberration (corneal high order aberration)
  Threshold value of corneal irregular aberration 2: Highest set threshold value of corneal irregular aberration

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.30."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal Irregular Astig.1" of "DISPLAY."

2 Enter the value by the ten-key display of the [Setting Change button].



3 Setting is complete by pressing the [OK button].

4 Following steps ***1-3***, set the set item display "Corneal Irregular Astig.2" of "DISPLAY."

K Readings:

- In each of the following cases, the character color is changed based on the set threshold K value:
  - When the K value is within the set value range
  - When the K value is outside the set value range

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.50."

1. On the SETTINGS screen, tap the [Set Condition button] of the set item display "K readings" of "DISPLAY."
2. Enter the value by the ten-key display of the [Setting Change button].
3. Setting is complete by pressing the [OK button].

Corneal Spherical Aberration:

- In the following cases, the character color is changed based on the set threshold value of corneal spherical aberration:
  - When the measurement value is below the set value

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.100."

1. On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal SA" of "DISPLAY."
2. Enter the value by the ten-key display of the [Setting Change button].
3. Setting is complete by pressing the [OK button].

Corneal Astigmatism:

- ÅEIn the following cases, the character color is changed based on the set threshold value of corneal astigmatism:
  - When the measurement value is within the set value range (Å} range)
  - When the measurement value is outside the set value range (Å} range)

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "1.5."

1. On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal Astig." of "DISPLAY."
2. Enter the value by the ten-key display of the [Setting Change button].
3. Setting is complete by pressing the [OK button].

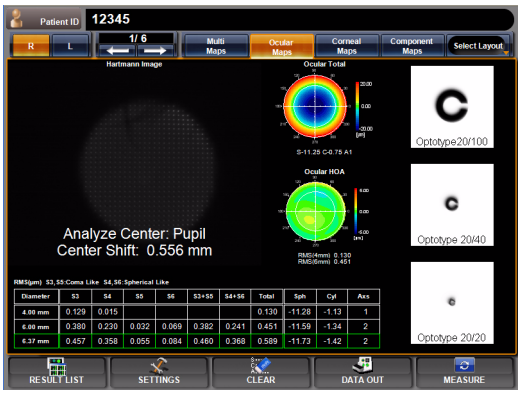
DESCRIPTION ABOUT MEASUREMENT RESULTS

Here the data display of measurement results is described.

ANALYSIS CENTER

In the analysis result, data analyzed with the detected pupil center as the analysis center is displayed.
If the pupil is not detected, the pupil diameter is not displayed. In this case, data obtained by analyzing with the mechanical center (the main body's alignment sight) as the analysis center is displayed.
The wavefront analysis center shows deviation from the mechanical center analyzed with the pupil center, using center displacement.

DESCRIPTION ABOUT RMS DISPLAY OF OCULAR ABERRATION



RMS display of ocular aberration

The table below is displayed in the ocular aberration map.
RMS display quantitatively shows higher order aberrations.
The table shows RMS values by summarizing coefficients for each order.

	Diameter	S3	S4	S5	S6	S3+S5	S4+S6	Total	Sph	Cyl	Axs
(1)	4.00mm	3rd-order RMS	4th-order RMS	——	——	——	——	Total higher-order aberration RMS	S	C	A
(2)	6.00mm	3rd-order RMS	4th-order RMS	5th-order RMS	6th-order RMS	3rd+5th-order RMS	4th+6th-order RMS	Total higher-order aberration RMS	S	C	A
(3)	(7.00mm)	3rd-order RMS	4th-order RMS					Total higher-order aberration RMS	S	C	A

(1) Analysis results in 4mm analysis zone are displayed (up to 4th order).
(2) Analysis results in 6mm analysis zone are displayed (up to 6th order).
(3) (Green frame) Analysis results with the measured pupil diameter or the specified analysis diameter are displayed (default: pupil diameter).
The analysis order can be set between 3rd order and 10th order. Display is available up to the 6th order. (See "SETTING THE ZERNIKE PD" on page 115.)

For example, 3rd-order coefficients represent asymmetrical aberration, and the 3rd-order RMS value that puts it in order represents coma aberration.
4th-order coefficients represent symmetrical aberration, and the 4th-order RMS value represents spherical aberration.

The 5th-order RMS value represents higher order coma aberration, and the 6th-order RMS value represents high order spherical aberration.
The 3rd+5th-order RMS value further puts coma aberration of 3rd order and 5th order in order.
The 4th+6th RMS value further puts spherical aberration of 4th order and 6th order in order.
And, the total high order aberration summarizes higher order aberration from 3rd order to 6th order.

Sph, Cyl and Axs are the visual acuity corrected by eyeglasses and calculated from the analysis of low order aberration. (Ocular wavefront aberration only)
When the diameter 4 mm is shown in parentheses, it indicates that the measured pupil diameter was less than 4 mm.
When the diameter 6 mm is shown in parentheses, it indicates that the measured pupil diameter was less than 6 mm.

DESCRIPTION ABOUT RMS DISPLAY OF CORNEAL ABERRATION

RMS display of corneal aberration

The table below is displayed in the corneal aberration map.
RMS display quantitatively shows higher order aberrations.
The table shows RMS values by summarizing coefficients for each order.

	Diameter	S3	S4	S5	S6	S3+S5	S4+S6	Total
(1)	4.00mm	3rd-order RMS	4th-order RMS	—	—	—	—	Total higher-order aberration RMS
(2)	6.00mm	3rd-order RMS	4th-order RMS	5th-order RMS	6th-order RMS	3rd+5th-order RMS	4th+6th-order RMS	Total higher-order aberration RMS
(3)	(7.00mm)	3rd-order RMS	4th-order RMS					Total higher-order aberration RMS

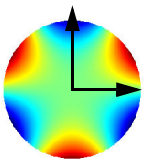
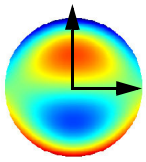
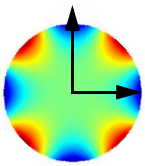
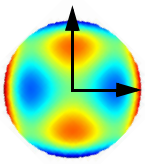
(1) Analysis results in 4mm analysis zone are displayed (up to 4th order).
(2) Analysis results in 6mm analysis zone are displayed (up to 6th order).
(3) (Green frame) Analysis results with the obtained pupil diameter, or the specified pupil diameter, are displayed. (Default: pupil diameter)
The analysis order can be set between 3rd order and 10th order. Display is available up to the 6th order. (See "SETTING ZERNIKE DEGREE" on page 115.)

For example, 3rd-order coefficients represent asymmetrical aberration, and the 3rd-order RMS value that puts it in order represents coma aberration.
4th-order coefficients represent symmetrical aberration, and the 4th-order RMS value represents spherical aberration.

The 5th-order RMS value represents higher order coma aberration, and the 6th-order RMS value represents high order spherical aberration.
The 3rd+5th-order RMS value further puts coma aberration of 3rd order and 5th order in order.
The 4th+6th RMS value further puts spherical aberration of 4th order and 6th order in order.
And, the total high order aberration summarizes higher order aberration from 3rd order to 6th order.

DISPLAY OF DIRECTION

The direction is defined as follows.

Element	Example	Definition of direction	Range of angle
Trefoil		Shown by the angle of blue area (direction where wave-front is late). 90° when blue area is higher.	0-120
Coma		Shown by the angle of red area (direction where wave-front is advanced). 90° when red area is higher.	0-360
Tetrafoil		Shown by the angle of blue area (direction where wave-front is late). 90° when blue area is higher.	0-90
2nd Astig		Shown by the angle of red area (direction where wave-front is advanced). 90° when red area is higher.	0-180

(REFERENCE) WAVEFRONT AND ZERNIKE COEFFICIENTS

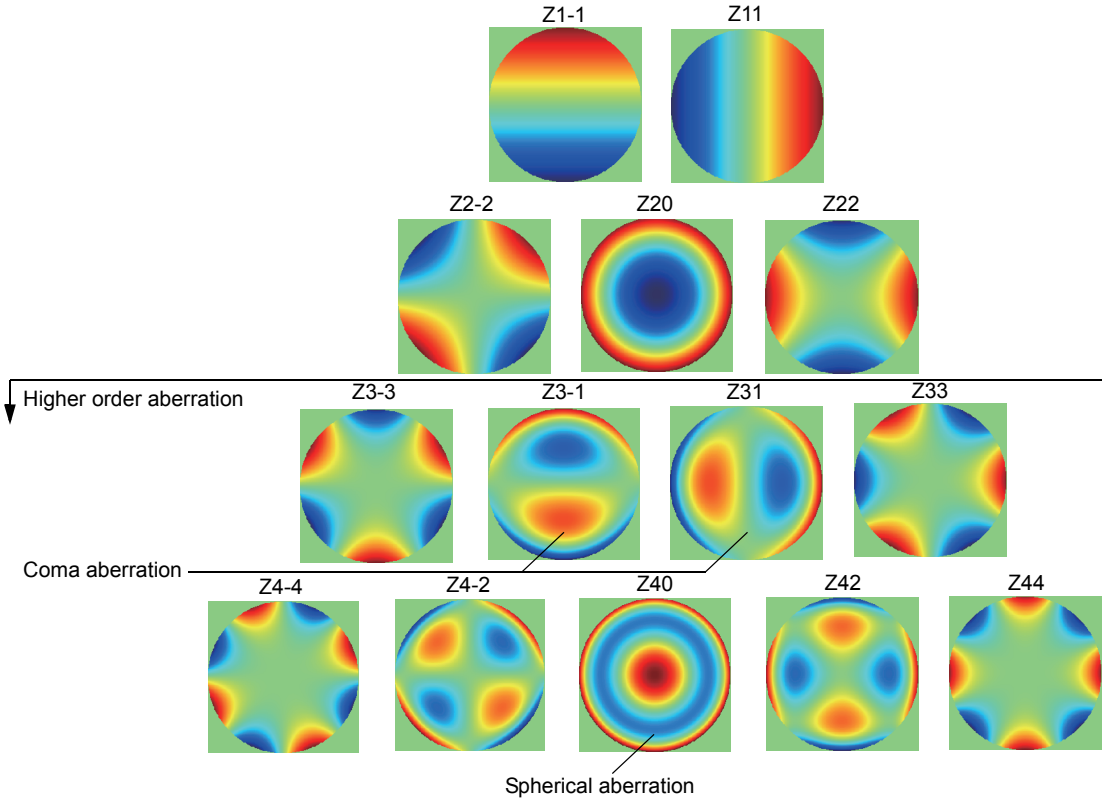
Zernike coefficients, meaning and classification are shown below.

Z_n^m	Coefficient	n	m	Z	Meaning/Classification
Z_2^{-2}	C_{2-2}	2	-2	$r^2 \sin 2\varphi$	2nd order Astigmatism
Z_2^0	C_{2-0}	2	0	$2r^2 - 1$	Defocus
Z_2^2	C_{22}	2	2	$r^2 \cos 2\varphi$	2nd order Astigmatism
Z_3^{-3}	C_{3-3}	3	-3	$r^3 \sin 3\varphi$	3rd Trifoil
Z_3^{-1}	C_{3-1}	3	-1	$(3r^3 - 2r) \sin\varphi$	Coma Y
Z_3^1	C_{31}	3	1	$(3r^3 - 2r) \cos\varphi$	Coma X
Z_3^3	C_{33}	3	3	$r^3 \cos 3\varphi$	3rd Trifoil
Z_4^{-4}	C_{4-4}	4	-4	$r^4 \sin 4\varphi$	
Z_4^{-2}	C_{4-2}	4	-2	$(4r^4 - 3r^2) \sin 2\varphi$	4th Order Astigmatism
Z_4^0	C_{40}	4	0	$6r^4 - 6r^2 + 1$	Spherical aberration
Z_4^2	C_{42}	4	2	$(4r^4 - 3r^2) \cos 2\varphi$	4th Order Astigmatism
Z_4^4	C_{44}	4	4	$r^4 \cos 4\varphi$	
Z_5^{-5}	C_{5-5}	5	-5	$r^5 \sin 5\varphi$	
Z_5^{-3}	C_{5-3}	5	-3	$(5r^5 - 4r^3) \sin 3\varphi$	5th Order Trifoil
Z_5^{-1}	C_{5-1}	5	-1	$(10r^5 - 12r^3 + 3r) \sin\varphi$	5th Order Coma Y
Z_5^1	C_{51}	5	1	$(10r^5 - 12r^3 + 3r) \cos\varphi$	5th Order Coma X
Z_5^3	C_{53}	5	3	$(5r^5 - 4r^3) \cos 3\varphi$	5th Order Trifoil
Z_5^5	C_{55}	5	5	$r^5 \cos 5\varphi$	
Z_6^{-6}	C_{6-6}	6	-6	$r^6 \sin 6\varphi$	
Z_6^{-4}	C_{6-4}	6	-4	$(6r^6 - 5r^4) \sin 4\varphi$	
Z_6^{-2}	C_{6-2}	6	-2	$(15r^6 - 20r^4 + 6r^2) \sin 2\varphi$	6th Order Astigmatism
Z_6^0	C_{60}	6	0	$20r^6 - 30r^4 + 12r^2 - 1$	6th Order Spherical aberration
Z_6^2	C_{62}	6	2	$(15r^6 - 20r^4 + 6r^2) \cos 2\varphi$	6th Order Astigmatism
Z_6^4	C_{64}	6	4	$(6r^6 - 5r^4) \cos 4\varphi$	
Z_6^6	C_{66}	6	6	$r^6 \cos 6\varphi$	

Table. 1: Zernike Terms Up to 6th Order

SHAPE OF ABERRATION

Map shapes as aberration of each coefficient are shown.



REFERENCE

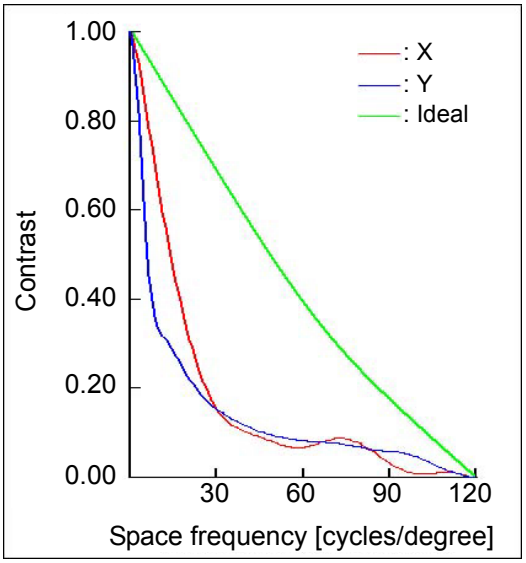
- PSF (Point Spread Function)

  PSF is defined as the power distribution of a point image, and in this simulation it shows a focused image of light on the retina. Ideally, the image is focused on one point, but actually due to aberrations in the optical system of the eye, including diffraction, it is not focused on one point and observed with extension, even using an ideal lens. The Strehl ratio is defined as the ratio of the central power of the ideal lens and the central power of the working PSF. Therefore, optically the Strehl ratio is the best when it is 1.0.

- MTF (Modulation Transfer Function)

  MTF shows the characteristics of the space frequency of an optical system, and in calculation it can be obtained with the Fourier conversion of PSF. An MTF image has black and white stripes in a certain direction and is used to determine the degree of scale reduction by which the stripes are still clearly visible.

  Accordingly, it can be observed well when the space frequency is low and the contrast is clear and becomes less observable as the space frequency rises. Normally, as shown on the left, the space frequency characteristics of only X and Y directions are drawn, but here it is displayed for all of the 180-degree directions. So, origin-symmetrically same values are displayed.



- Landolt Simulations

  As a way of simulating the retinal image viewed by the eye, there is a method to see how the image looks on the retina, and the simulation can be considered as convolution integration of the power (PSF) of the point image and the viewed image. Here convolution integration of the PSF on the retina and Landolt's rings with the supposed size on the retina is done. As the image is focused reversely with regard to top/bottom and right/left when viewed by the eye, the simulation display shows extension by PSF symmetrically with regard to top/bottom and right/left.

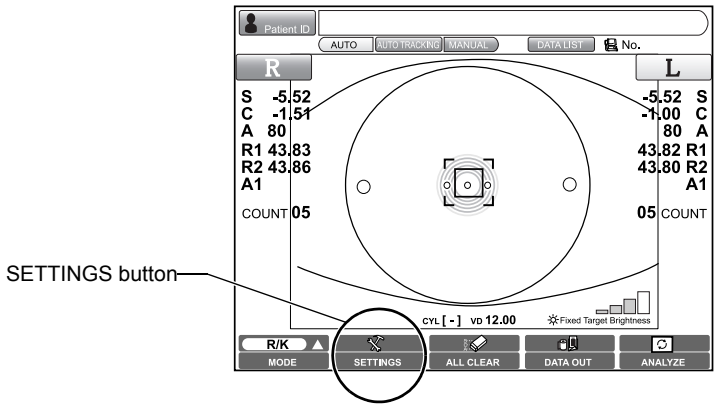
FUNCTION SETTING USING SETTINGS SCREEN

OPERATION METHOD OF SETTINGS SCREEN

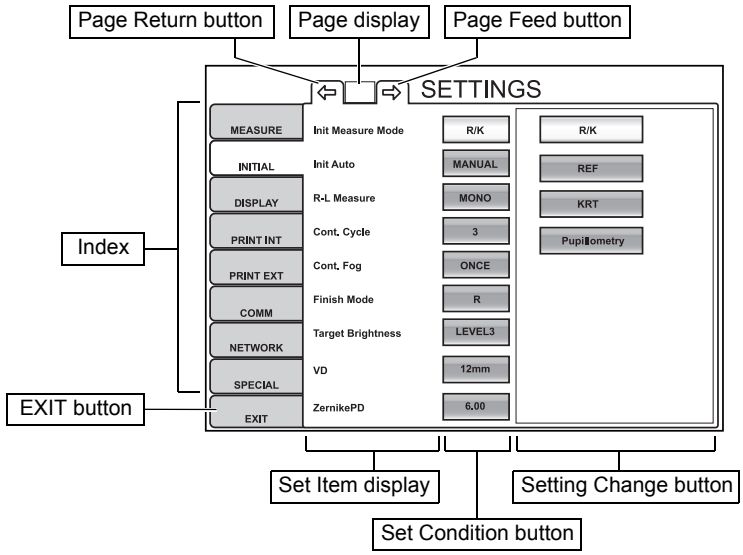
Various functions can be set on the SETTINGS screen.

PREPARATIONS FOR SETTING

1. Make sure that the power cable is connected.
   For connection, see "CONNECTING THE POWER CABLE" on page 27.
2. Turn ON the [POWER switch].
3. Tap the [SETTINGS button] on the control panel.

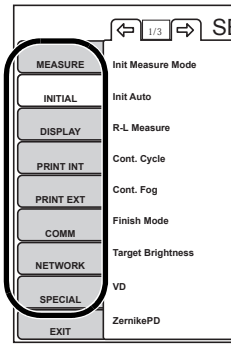


The SETTINGS screen is displayed.

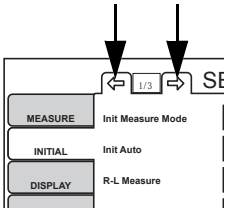


OUTLINE OF SETTINGS SCREEN OPERATIONS

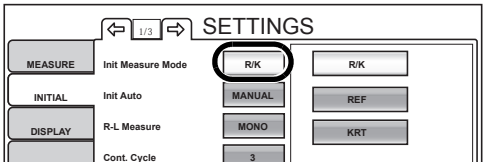
1 Tap the [Index] and select a relevant subject.



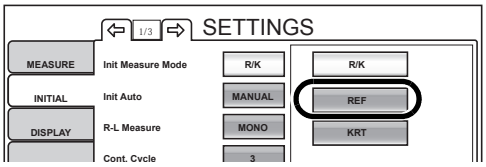
2 Display the page to confirm/change by tapping the [Page Feed button] and the [Page Return button], as necessary.



3 Tap the [Set Condition button] of the item to be changed and display the [Setting Change button].



4 Tap the [Setting Change button] and fix the change of setting.

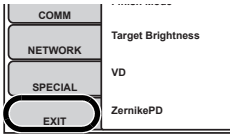


- Instead of the [Setting Change button], ten-keys or a special input screen can also be displayed.

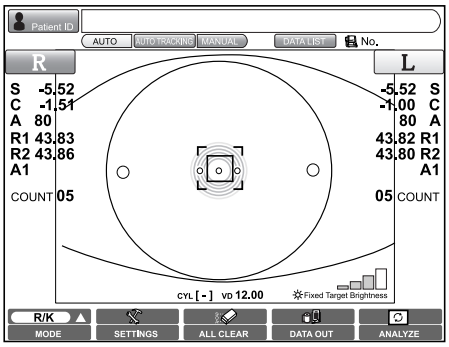
5 After entering all setting items, contents are updated by tapping the [EXIT] button.

RETURNING TO THE MEASUREMENT SCREEN

1 Tap the [EXIT] button.



2 The MEASUREMENT screen is displayed.



LIST OF SETUP ITEMS

Setup items are formed with eight indexes for each subject.

"MEASURE" Set items related to measurement functions
"INITIAL" Set items related to the initial status after power on
"DISPLAY" Set items related to screen display
"PRINT INT" Set items related to output from the internal printer
"PRINT EXT" Set items related to output from the external printer
"COMM" Set items related to data input/output between the external device
"NETWORK" Set items related to input/output using the LAN
"SPECIAL" Set items related to maintenance (for service engineer only)

MEASURE (TEMPORARY SETTING)

MEASURE contains settings related to temporarily changeable measurement functions. Unlike initial setting (INITIAL), this function is used to temporarily perform measurements under certain conditions.
After power on, clearing all measurement values, print-out and data output, the system returns to the initial status.

Set item display	Setting Change button	Set contents	Initial value	Page
R-L Measure	BINO	Set to both-eye measurement	BINO	107
	MONO	Set to single-eye measurement		
Auto Mode	FULL AUTO	Set to (FULL) AUTO mode	FULL AUTO	108
	AUTO TRACKING	Set to AUTO TRACKING mode		
	MANUAL	Set to MANUAL mode		
Cont. Cycle	1	Sets the number of continuous measurements under AUTO mode, using up/down buttons.	3	108
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
IOL Mode	OFF	IOL mode is not set.	OFF	109
	ON (300ms)	IOL mode is set, with exposure time of 300ms.		
	ON (400ms)	IOL mode is set, with exposure time of 400ms.		
	ON (500ms)	IOL mode is set, with exposure time of 500ms.		
Target Brightness	Level 1	Target brightness is set to the darkest of 4 levels.	Level 3	109
	Level 2	Target brightness is set to the 2nd darkest of 4 levels.		
	Level 3	Target brightness is set to the 3rd darkest of 4 levels.		
	Level 4	Target brightness is set to the brightest of 4 levels.		
Cyl sign	+	Display style of astigma sign is set to "+".	-	110
	-	Display style of astigma sign is set to "-".		
	MIX	Display style of astigma sign is set to "MIX".		

INITIAL (INITIAL SETTING)

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

Set item display	Setting Change button	Set contents	Initial value	Page
Init Measure Mode	R/K	MEASUREMENT mode upon power on is set to REF/KRT mode.	REF/KRT	111
	REF	MEASUREMENT mode upon power on is set to REF mode.		
	KRT	MEASUREMENT mode upon power on is set to KRT mode.		
	Pupillometry	MEASUREMENT mode upon power on is set to Pupillometry mode.		
Init Auto	FULL AUTO	Measurement mode upon power on is set to FULL AUTO mode.	FULL AUTO	112
	AUTO TRACKING	Measurement mode upon power on is set to AUTO TRACKING mode.		
	MANUAL	Measurement mode upon power on is set to MANUAL mode.		
R-L Measure	BINO	Under FULL AUTO/AUTO TRACKING mode, both-eye measurement is done automatically.	BINO	112
	MONO	Measurement is finished after single-eye measurement.		
Cont. Cycle	1	Sets the number of continuous measurements under AUTO mode, using up/down buttons.	3	112
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
Cont. Fog	ALWAYS	Fogging for continuous measurements is done each time.	ALWAYS	113
	ONCE	Fogging for continuous measurements is done only in the 1st time.		
Finish Mode	R	Waiting at the initial position for right eye measurement	Right	113
	L	Standby at the initial position for left eye measurement		
	FINISH	Waiting at the pull-position of the already measured eye		
Target Brightness	Level 1	Target brightness is set to the darkest of 4 levels.	Level 3	114
	Level 2	Target brightness is set to the 2nd darkest of 4 levels.		
	Level 3	Target brightness is set to the 3rd darkest of 4 levels.		
	Level 4	Target brightness is set to the brightest of 4 levels.		
VD	0mm	VD value is set to 0mm (contact lens).	12mm	114
	12mm	VD value is set to 12mm (eyeglass lens).		
	13.75mm	VD value is set to 13.75mm (eyeglass lens).		
Zernike PD	Set by ten-key display.	Set to pupil diameter or set by user.	Use pupil	115
Zernike Degree	3	Sets Zernike degree.Analysis is done up to the set degree.	6th degree	115
	4			
	5			
	6			
	7			
	8			
	9			
	10			

Set item display	Setting Change button	Set contents	Initial value	Page
Auto Print	ON	After finishing R-L auto measurements, results are printed out automatically.	ON	116
	OFF	Not printed automatically.		
Internal Printer	USE	Internal printer is used.	USE	116
	OFF	Internal printer is not used.		
External Printer	USE	External printer is used.	OFF	117
	OFF	External printer is not used.		
Patient ID Reset	ON	Patient ID is reset upon power on.	ON	117
	OFF	Patient ID is not reset upon power on.		
Patient ID	Set.Set by keyboard display.	String of up to 31 characters		118
Patient ID Out TV	ON	Patient ID is displayed on the monitor.	ON	118
	OFF	Patient ID is not displayed on the monitor.		
KR No.	00 - 99	Sets the machine No.	01	118
KR Out TV	ON	KR No. is displayed on the monitor.	OFF	118
	OFF	KR No. is not displayed on the monitor.		
Buzzer	ON	Buzzer sounds.	ON	119
	OFF	Buzzer does not sound.		
Date Style	Y/M/D	Date display on analysis result/printout is arranged in order of year/month/day.	Y/M/D	119
	M/D/Y	Date display on analysis result/printout is arranged in order of month/day/year.		
	D/M/Y	Date display on analysis result/printout is arranged in order of day/month/year.		
Date/Time	Set by ten-key display.	Year, month, day, time (24hrs), minute and second	10min	120
Auto Shutoff	OFF	Power save function is not used.		
	1min	Power save status in 1min of last operation.		
	5min	Power save status in 5min of last operation.		
	10min	Power save status in 10min of last operation.		
	20min	Power save status in 20min of last operation.		
	30min	Power save status in 30min of last operation.		
	60min	Power save status in 60min of last operation.		
LCD Brightness	-3	Sets the brightness of LCD monitor, using up/down buttons.	0	121
	-2			
	-1			
	0			
	+1			
	+2			
	+3			
Language	English	Monitor is displayed in English.	English	121
	Japanese	Monitor is displayed in Japanese.		
Packing Mode	Set.	Machine is arranged for packing.	-	122
Pupil Distance	Set by ten-key display.	Set the distance of right and left eyes.	68	122
Progress Measure	ON	Performs progress measurement.	OFF	123
	OFF	Progress measurement is not done.		

DISPLAY (DISPLAY SETTING)

DISPLAY performs setting related to screen display.

Set item display	Setting Change button	Set contents	Initial value	Page
Custom map	Set by special input screen.	Layout used for screen display and printing can be set/registered up to 4 types.		124
Change D/mm	D	Results of KRT measurement is displayed in D (diopter).	D	126
	mm	Results of KRT measurement is displayed in mm (millimeter).		
HV/R1R2	HV	Display style of KRT measurement results is set to HV (horizontal/vertical).	R1R2	126
	R1R2	Display style of KRT measurement results is set to R1R2 (flat/steep meridian).		
Placid Overlay	ON	When analysis results are initially displayed, Placid overlay is displayed.	OFF	127
	OFF	When analysis results are initially displayed, Placid overlay is not displayed.		
Pupil Overlay	ON	When analysis results are initially displayed, pupil detection overlay is displayed.	OFF	127
	OFF	When analysis results are initially displayed, pupil detection overlay is not displayed.		
Angle Scale Overlay	ON	When analysis results are initially displayed, Angle Scale overlay is displayed.	OFF	127
	OFF	When analysis results are initially displayed, Angle Scale overlay is not displayed.		
Topo Map Overlay	NONE	When analysis results are initially displayed, Topo Map overlay is not displayed.	NONE	127
	Axial	When analysis results are initially displayed, corneal axial overlay is displayed.		
	Instantaneous	When analysis results are initially displayed, corneal instantaneous overlay is displayed.		
Marker Overlay	ON	When analysis results are initially displayed, Marker overlay is displayed.	OFF	127
	OFF	When analysis results are initially displayed, Marker overlay is not displayed.		
Hartmann Point Overlay	ON	When analysis results are initially displayed, Hartmann detection point overlay is displayed.	OFF	128
	OFF	When analysis results are initially displayed, Hartmann detection point overlay is not displayed.		
Hartmann Grid Overlay	ON	When analysis results are initially displayed, Hartmann detection grid overlay is displayed.	OFF	128
	OFF	When analysis results are initially displayed, Hartmann detection grid overlay is not displayed.		
Total Aberration Map Range	Set by ten-key display.	0.1μm to 50.00μm (changeable with 0.01μm steps)	20μm	128
Total Aberration Map Overlay - Cross scale	ON	When analysis results are initially displayed, total aberration map overlay (cross scale) is displayed.	ON	128
	OFF	When analysis results are initially displayed, total aberration map overlay (cross scale) is not displayed.		
Total Aberration Map Overlay - Angle Scale	ON	When analysis results are initially displayed, total aberration map overlay (angle scale) is displayed.	ON	128
	OFF	When analysis results are initially displayed, total aberration map overlay (angle scale) is not displayed.		

Set item display	Setting Change button	Set contents	Initial value	Page
Total Aberration Map Overlay - mm Grid Scale	ON	When analysis results are initially displayed, total aberration map overlay (mm grid scale) is displayed.	OFF	129
	OFF	When analysis results are initially displayed, total aberration map overlay (mm grid scale) is not displayed.		
HOA, Astig. Map Range	Set by ten-key display.	Display range (maximum and minimum values) of color bar of high-order aberration and astigma map is set. (changeable with 0.01μm steps)	5.00	129
HOA, Astig. Map Overlay - Cross Scale	ON	When analysis results are initially displayed, overlay of high-order aberration map (cross scale) is displayed.	ON	129
	OFF	When analysis results are initially displayed, overlay of high-order aberration map (cross scale) is not displayed.		
HOA, Astig. Map Overlay - Angle Scale	ON	When analysis results are initially displayed, overlay of high-order aberration map (angle scale) is displayed.	ON	130
	OFF	When analysis results are initially displayed, overlay of high-order aberration map (angle scale) is not displayed.		
HOA, Astig. Map Overlay - mm Grid Scale	ON	When analysis results are initially displayed, overlay of high-order aberration and astigma map (mm grid scale) is displayed.	OFF	130
	OFF	When analysis results are initially displayed, overlay of high-order aberration and astigma map (mm grid scale) is not displayed.		
TopoMap Scale Unit	D	Display unit of topo-map is set to D (diopter).	D	130
	mm	Display unit of topo-map is set to mm (millimeter).		
TopoMap Scale - Type	Adjustable	Scale type of topo-map is set to Adjustable.	Absolute	130
	Normalized	Scale type of topo-map is set to Normalized.		
	Absolute	Scale type of topo-map is set to Absolute.		
TopoMap Scale - Adjustable Center	Set by ten-key display.	Center value when the scale type of topo-map is Adjustable is set. 30.00D to 50.00D (changeable with 0.50D steps)	47.50	131
TopoMap Scale - Adjustable Step	Set by ten-key display.	Step when the scale type of topo-map is Adjustable is set. 0.25D to 2.50D (changeable with 0.25D steps)	1.50	131
TopoMap Scale - Absolute Step	Set by ten-key display.	Step when the scale type of topo-map is Absolute is set. 0.5D to 2.50D (changeable with 0.5D steps)	1.50	131
TopoMap Overlay - Cross Scale	ON	When analysis results are initially displayed, topo-map overlay (cross scale) is displayed.	ON	131
	OFF	When analysis results are initially displayed, topo-map overlay (cross scale) is not displayed.		
TopoMap Overlay - Angle Scale	ON	When analysis results are initially displayed, topo-map overlay (angle scale) is displayed.	ON	132
	OFF	When analysis results are initially displayed, topo-map overlay (angle scale) is not displayed.		
TopoMap Overlay - mm Grid Scale	ON	When analysis results are initially displayed, topo-map overlay (mm grid scale) is displayed.	OFF	132
	OFF	When analysis results are initially displayed, topo-map overlay (mm grid scale) is not displayed.		
TopoMap Overlay - Pupil	ON	When analysis results are initially displayed, topo-map overlay (pupil) is displayed.	OFF	132
	OFF	When analysis results are initially displayed, topo-map overlay (pupil) is not displayed.		
TopoMap Scale - Kerato Axis	None	KRT axis of topo-map is not displayed.	None	132
	Sim-K axis	KRT axis of topo-map is displayed.		

Set item display	Setting Change button	Set contents	Initial value	Page
Optotype of Landolt's ring simulation 1 (Upper)	Set by ten-key display.	Optotype of Landolt's ring simulation 1 (upper) is set. 10 to 200 (changeable with 10 steps)	100	132
Optotype of Landolt's ring simulation 2 (Middle)	Set by ten-key display.	Optotype of Landolt's ring simulation 1 (middle) is set. 10 to 200 (changeable with 10 steps)	40	133
Optotype of Landolt's ring simulation 3 (Lower)	Set by ten-key display.	Optotype of Landolt's ring simulation 1 (lower) is set. 10 to 200 (changeable with 10 steps)	20	133
Landolt Direction	Upper	Direction of Landolt's ring is set to Upper.	Right	133
	Lower	Direction of Landolt's ring is set to Lower.		
	Right	Direction of Landolt's ring is set to Right.		
	Left	Direction of Landolt's ring is set to Left.		
Normalize destiny of simulations	ON	Normalization of brightness in Landolt's ring simulation is set.	OFF	133
	OFF	Normalization of brightness in Landolt's ring simulation is not set.		
Sph Step	0.25D	Display step of spherical/corneal refractive power is set to 0.25D	0.25D	134
	0.12D	Display step of spherical/corneal refractive power is set to 0.12D.		
	0.01D	Display step of spherical/corneal refractive power is set to 0.01D.		
Cyl Step	0.25D	Display step of cylindrical refractive power/corneal astigmatic power is set to 0.25D.	0.25D	134
	0.12D	Display step of cylindrical refractive power/corneal astigmatic power is set to 0.12D.		
	0.01D	Display step of cylindrical refractive power/corneal astigmatic power is set to 0.01D.		
Axis Step	1°	Display step of astigmatic axis/corneal astigmatic axis is set to 1°.	1	134
	5°	Display step of astigmatic axis/corneal astigmatic axis is set to 5°.		
Cyl Sign	+	Astigma sign is displayed with "+."	-	134
	-	Astigma sign is displayed with "-."		
	MIX	Astigma sign is displayed with "MIX."		
Topo-map Smoothing	ON	Performs top-map smoothing.	OFF	135
	OFF	Top-map smoothing is not done.		
Summary Map graph scale	0.1	Graph scale of summary map is set to 0.1.	1.0	135
	0.2	Graph scale of summary map is set to 0.2.		
	0.5	Graph scale of summary map is set to 0.5.		
	1.0	Graph scale of summary map is set to 1.0.		
	2.0	Graph scale of summary map is set to 2.0.		

Set item display	Setting Change button	Set contents	Initial value	Page
Map of analysis screen layout button 1	Multi map	Layout 1 of measurement result screen is set to Multi Maps.	Multi Maps	135
	Ocular aberration map	Layout 1 of measurement result screen is set to ocular aberration maps (Ocular Maps).		
	Corneal aberration map	Layout 1 of measurement result screen is set to corneal aberration maps (Corneal Maps).		
	Zernike vector map	Layout 1 of measurement result screen is set to Zernike vector maps (Zernike Maps).		
	Summary map	Layout 1 of measurement result screen is set to summary maps (Summary Maps).		
	Component map	Layout 1 of measurement result screen is set to component maps (Component Maps).		
	IOL selection map	Layout 1 of measurement result screen is set to IOL selection maps (IOL Selection Maps).		
	PSF/MTF map	Layout 1 of measurement result screen is set to PSF/MTF maps (PSF/MTF Maps).		
	Corneal R/L map	Layout 1 of measurement result screen is set to Corneal R/L maps.		
	Ocular R/L map	Layout 1 of measurement result screen is set to Ocular R/L maps.		
Map of analysis screen layout button 2	Same as above.	Same as above except layout 1 → layout 2.	Ocular aberration map	136
Map of analysis screen layout button 3	Same as above.	Same as above except layout 2 → layout 3.	Corneal aberration map	136
Map of analysis screen layout button 4	Same as above.	Same as above except layout 3 → layout 4.	Component map	136
Corneal irregular astig. 1	Set by ten-key display	First threshold value of corneal irregular astigmatism is set.	0.3	136
Corneal irregular astig. 2	Set by ten-key display	Second threshold value of corneal irregular astigmatism is set.	0.6	137
K Readings	Set by ten-key display	K threshold value is set.	0.5	137
Corneal SA	Set by ten-key display	Threshold value of corneal spherical aberration is set.	0.1	138
Corneal astig.	Set by ten-key display	Threshold value of corneal astigmatism is set.	1.5	138

SETTING OF INTERNAL PRINTER (PRINT INT)

PRINT INT contains settings related to output from the internal printer.

Set item display	Setting Change button	Set contents	Initial value	Page
Barcode Print	ON	Barcode is displayed in printout.	OFF	139
	OFF	Barcode is not displayed in printout.		
Name	ON	Name column is displayed in printout.	ON	140
	OFF	Name column is not displayed in printout.		
Date	ON	Time/date of measurement is displayed in printout.	ON	140
	OFF	Time/date of measurement is not displayed in printout.		
Patient ID Out Print	ON	Patient ID is displayed in printout.	ON	141
	OFF	Patient ID is not displayed in printout.		
KR Out Print	ON	Machine No. is displayed in printout.	OFF	141
	OFF	Machine No. is not displayed in printout.		
VD	ON	VD value is displayed in printout.	ON	142
	OFF	VD value is not displayed in printout.		
CYL	ON	Astigma sign is displayed in printout.	ON	142
	OFF	Astigma sign is not displayed in printout.		
Print R/L	Data	REF and KRT measurement values are printed separately.	Data	143
	R/L	Measurement values are printed in order of right eye and left eye, regardless of REF/KRT.		
Ref Date	All	All measurement values are displayed in printout.	All	143
	AVE	Only average values are displayed in printout.		
SE Data	ON	SE values (equivalent spherical power) are displayed in printout.	ON	144
	OFF	SE values are not displayed in printout.		
PD Data	ON	PD values (cornea peak distance) are displayed in printout.	ON	144
	OFF	PD values are not displayed in printout.		
KRT Data	All	All measurement values are displayed in printout.	All	145
	AVE	Only average values are displayed in printout.		
	CLASSIC	Print out in Classic type.		
	CLASSIC 2	Print out in Classic 2 type.		
KRT Average	ON	Average values of cornea shape measurement are displayed in printout.	ON	145
	OFF	Average values of cornea shape measurement are not displayed in printout.		
Data Order	D/mm	Printed in order of D (diopter) and mm (millimeter).	D/mm	146
	mm/D	Printed in order of mm (millimeter) and D (diopter).		
KRT CYL	ON	Corneal astigmatic power and axial angle are displayed in printout.	ON	146
	OFF	Corneal astigmatic power and axial angle are not displayed in printout.		
TOPCON Logo	ON	TOPCON logo is displayed in printout.	ON	146
	OFF	TOPCON logo is not displayed in printout.		

SETTING OF EXTERNAL PRINTER (PRINT EXT)

PRINT EXT contains settings related to output from the external printer.

For details, see page 147.

COMM (DATA COMMUNICATION)

COMM contains settings related to data input/output with the external device.

Set item display	Setting Change button	Set contents	Initial value	Page
RS-232C	ON	Communication is done by RS-232C.	OFF	148
	OFF	Communication is not done by RS-232C.		
Output Data	REF	Only REF data are outputted.	REF/KRT	149
	KRT	Only KRT data are outputted.		
	R/K	Both REF and KRT data are outputted.		
RS Format	STD1	TOPCON STD1 format	STD1	149
	STD2	TOPCON STD2 format		
RS Baudrate	2400	TOPCON STD1 format	2400	150
	9600	TOPCON STD2 format		

NETWORK (LAN CONNECTION)

NETWORK contains settings related to data input/output in the LAN.

Set item display	Setting Change button	Set contents	Initial value	Page
Data Transfer Method	TCP/IP Transfer	Data Transfer method is set to "TCP/IP Transfer."	TCP/IP Transfer	151
	Shared Folder Transfer	Data Transfer method is set to "Shared Folder Transfer."		
Sever IP Address	Set by ten-key display.	IP address of the PC connected for data output is set.	NONE	151
Sever Port No.	Set by ten-key display.	Server port No. of the PC connected for data output is set.	50000	151
Shared Folder Setting	Set by keyboard display	Shared folder is set.	NONE	152
Print image output	ON	Print image is outputted when DATA OUT button is pressed.	ON	152
	OFF	Print image is not outputted when DATA OUT button is pressed.		
KR-1W data output	ON	When DATA OUT button is pressed, internal printing is done, and measurement value data are outputted to the connected PC.	OFF	152
	OFF	When DATA OUT button is pressed, internal printing is done, but measurement value data are not outputted to the connected PC.		
Screen shot output	ON	When DATA OUT button is pressed, internal printing is done, and screen shot are outputted to the connected PC.	OFF	152
	OFF	When DATA OUT button is pressed, internal printing is done, but screen shot data are not outputted to the connected PC.		
Ref/Krt data output (STD2)	ON	When DATA OUT button is pressed, internal printing is done, and REF/KER data are outputted to the connected PC.	OFF	153
	OFF	When DATA OUT button is pressed, internal printing is done, but REF/KER data are not outputted to the connected PC.		
KR-1W IP address	Set by ten-key display.	IP address of KR-1W is set.	NONE	153
KR-1W Subnet Mask	Set by ten-key display.	Subnet mask of KR-1W is set.	NONE	153
KR-1W Default Gateway	Set by ten-key display.	Default gateway of KR-1W is set.	NONE	153

SPECIAL

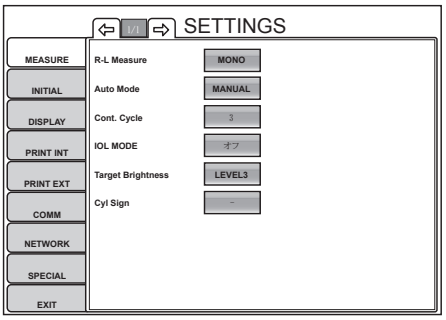
SPECIAL is the mode for service engineer and only; it is not recommended to be used.

MEASURE (TEMPORARY SETTING)

MEASURE contains settings related to measurement functions that may be temporarily changed.
Unlike initial setting, this function is used for performing measurements temporarily under certain conditions.
After power on or after clearing all measurement values, the system returns to the initial status.

1 Tap MEASURE of the index of the "SETTTINGS screen."

Set items of "temporary setting" and the [Set Condition button] are displayed.



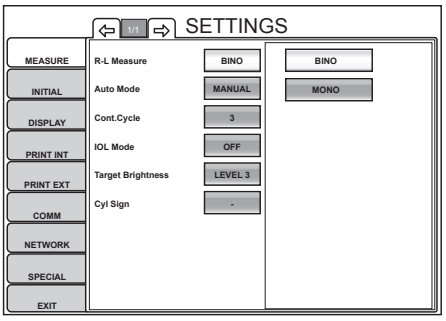
R-L MEASURE (CONTINUOUS MEASUREMENT OF RIGHT AND LEFT EYES)

Both-eye measurement (R-L) or single-eye measurement (R or L) can be set. Before shipment, the default setting is both-eye measurement (R-L).

1 Tap the [Set Condition button] of the set item display "R-L Measure" of "MEASURE."

2 Tap the [Setting Change button] and select either "BINO" or "MONO."

3 Setting is done.



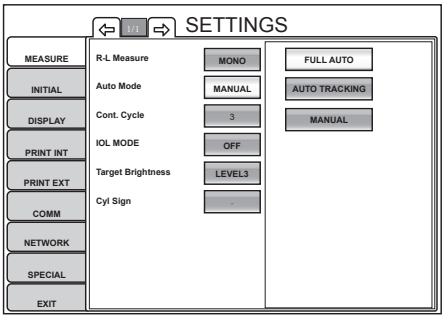
SETTING OF AUTO MODE

Measurement by Full Auto, Auto Tracking or Manual mode can be set. Before shipment the setting is Full Auto.

1 Tap the [Set Condition button] of the set item display "Auto Mode" of "MEASURE."

2 Tap the [Setting Change button] and select either "FULL AUTO," "AUTO TRACKING" or "MANUAL."

3 Setting is done.



"Full Auto" : Alignment and measurement is done automatically.
"Auto Tracking" : Alignment is done automatically, measurement is done manually.
"Manual" : Alignment and measurement is done manually.
*Normally auto mode setting can be done on the MEASUREMENT screen (see page 34).

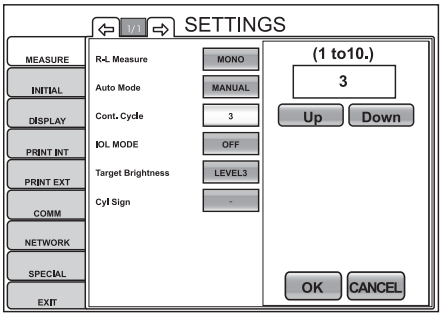
SETTING THE NUMBER OF MEASUREMENTS UNDER AUTO MODE

The number of continuous measurements performed under Auto mode can be set. Before shipment, the default setting is 3.

1 Tap the [Set Condition button] of the set item display "Cont. Cycle" of "MEASURE."

2 Tap [UP] [DOWN] of the [Setting Change button] and set the number.

3 Setting is done by pressing the [OK button].



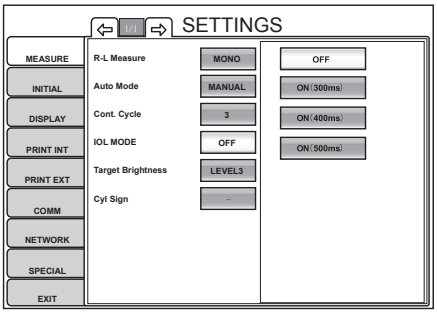
SETTING OF IOL MODE (ERROR-FREE MODE)

Whether to set the IOL mode for each exposure time or not to set the IOL mode can be selected. Before shipment, the default setting is OFF.

1 Tap the [Set Condition button] of the set item display "IOL Mode" of "MEASURE."

2 Tap the [Setting Change button] and select either "OFF," "ON (300ms)," "ON (400ms)" or "ON (500ms)."

3 Setting is done.



"OFF" : IOL mode is not set.
"ON (300ms)" : IOL mode is set, with exposure time of 300ms.
"ON (400ms)" : IOL mode is set, with exposure time of 400ms.
"ON (500ms)" : IOL mode is set, with exposure time of 500ms.

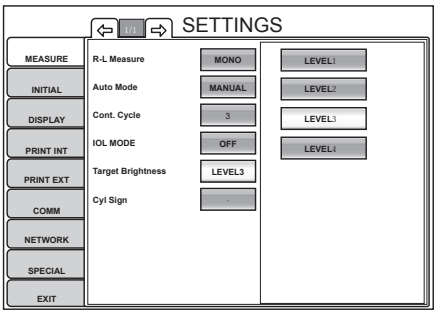
SETTING THE BRIGHTNESS OF FIXATION TARGET

The brightness of fixation target can be set in 4 steps. Before shipment, the default setting is Level 3.

1 Tap the [Set Condition button] of the set item display "Target Brightness" of "MEASURE."

2 Tap the [Setting Change button] and select the brightness of fixation target.

3 Setting is done.



"Level 1" : Target brightness is set to the darkest of 4 levels.
"Level 2" : Target brightness is set to the 2nd darkest of 4 levels.
"Level 3" : Target brightness is set to the 3rd darkest of 4 levels.
"Level 4" : Target brightness is set to the brightest of 4 levels.

Normally the setting of fixation target can be done on the MEASUREMENT screen (see page 35).

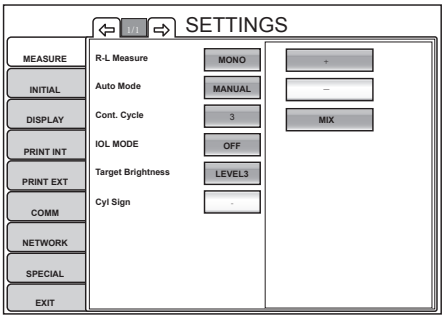
CHANGING THE ASTIGMA SIGN

The display style of astigma sign can be changed. Before shipment, the default setting is "-."

1 Tap the Set Condition button of the set item display "Cyl Sign" of "MEASURE."

2 Tap the Setting Change button and select the applicable astigma sign.

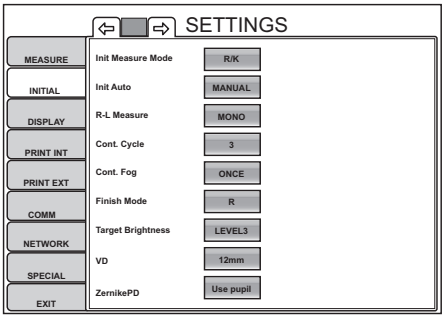
3 Setting is done.



INITIAL SETTING (INITIAL)

INITIAL contains settings related to the initial status upon power on. Measurement functions including measurement mode, auto mode and the number of continuous measurements, as well as the display of the measurement results, the date and language can be set.

1 Tap the index "INITIAL" of the "SETTTINGS screen." Set items for initial setting are displayed.



To exit from this screen

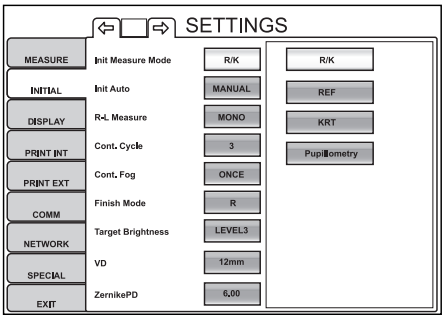
- Tap the [EXIT button].
- The "SETTTINGS screen" is exited and the "MEASUREMENT screen" is returned.

2 Tap the [Page Feed button] and/or [Page Feed button], as needed, till the set item to be checked/changed is displayed.

SETTING OF MEASUREMENT MODE (INIT MEASURE MODE)

The initial measurement mode, at power on, can be changed. Before shipment, the default setting is "R/K."

1 Tap the [Set Condition button] of the set item display "Init Measure Mode" of "INITIAL."



2 Tap the [Setting Change button] and select the desired measurement mode.

3 Setting is done.

SETTING OF AUTO MODE (INIT AUTO)

The initial start mode, at power on, can be set. Before shipment, the default setting is "FULL AUTO."

1 Tap the [Set Condition button] of the set item display "Init Auto" of "INITIAL."

2 Tap the [Setting Change button] and select "Full Auto," "Auto Tracking" or "Manual."

3 Setting is complete.

CONTINUOUS MEASUREMENT OF RIGHT AND LEFT EYES (R-L MEASURE)

Both-eye measurement (R-L) or single-eye measurement (R or L) can be set. Before shipment, the default setting is both-eye measurement (R-L).

1 Tap the [Set Condition button] of the set item display "R-L Measure" of "INITIAL. "

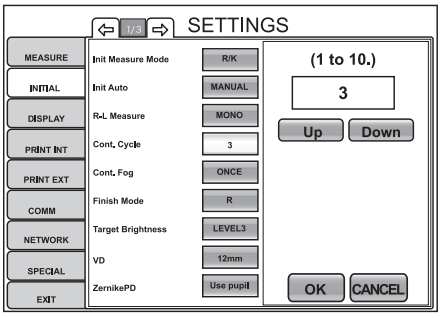
2 Tap the [Setting Change button] and select either "BINO" or "MONO."

3 Setting is complete.

SETTING THE NUMBER OF CONTINUOUS MEASUREMENTS UNDER AUTO MODE (CONT. CYCLE)

The number of continuous measurements performed under auto mode can be set. Before shipment, the default setting is 3.

1 Tap the [Set Condition button] of the set item display "Cont. Cycle" of "INITIAL."



2 Tap [UP] [DOWN] of the [Setting Change button] and set the number.

The number can be set from a range of 1 to 10.

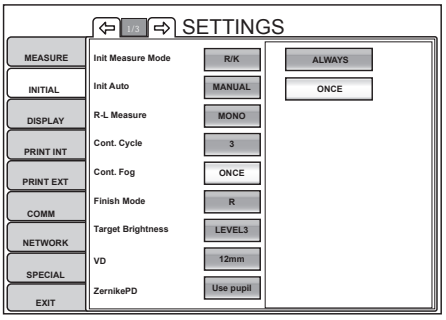
Under REF/KRT mode, the same number applies to REF and KRT.

3 Setting is done by tapping the [OK button].

FOGGING DURING CONTINUOUS MEASUREMENT (CONT. FOG)

When multiple measurements are selected for setting the number of continuous measurements, the option to perform fogging in ONLY the first measurement or to perform fogging for each measurement may be selected. Before shipment, the default setting is "ALWAYS."

1 Tap the [Set Condition button] of the set item display "Cont. Fog" of "INITIAL."



2 Tap the [Setting Change button] and select "ALWAYS" or "ONCE."

"Always" : Fogging is performed with each measurement.

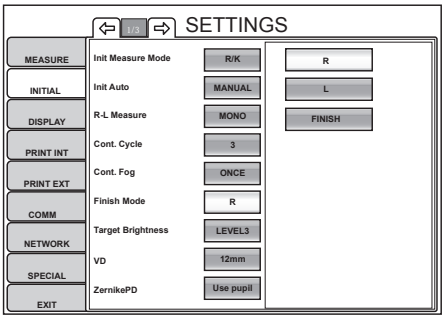
"Once" : Fogging is performed only in the 1st measurement.

3 Setting is done.

SETTING THE WAITING POSITION AFTER MEASUREMENT (FINISH MODE)

It is possible to set the waiting position (Right or Left eye) of the measuring head after finishing each measurement. Before shipment, the default setting is "R" (initial position for measuring right eye).

1 Tap the [Set Condition button] of the set item display "Finish Mode" of "INITIAL."



2 Tap the [Setting Change button] and select the desired measurement mode:

"R" : Waiting at the initial position for right eye measurement

"L" : Waiting at the initial position for left eye measurement

"FINISH" : Waiting at the away position of the last eye measured; i.e. the device will move away from the last eye measured.

3 Setting is complete.

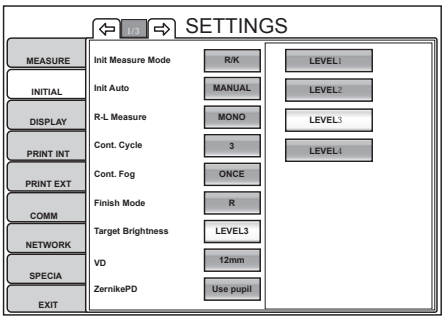
SETTING THE BRIGHTNESS OF FIXATION TARGET (TARGET BRIGHTNESS)

The brightness of fixation target can be set at 4 different steps. Before shipment, the default setting is Level 3.

1 Tap the [Set Condition button] of the set item display "Target Brightness" of "INITIAL."

2 Tap the [Setting Change button] and select the brightness of fixation target.

3 Setting is done.



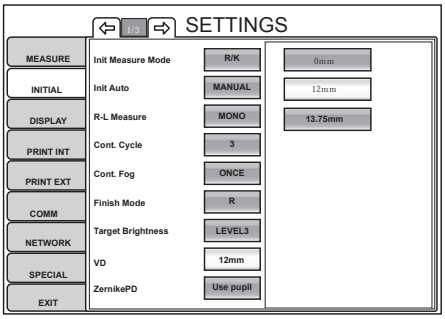
"Level 1" : Target brightness is set to the darkest of 4 levels.
"Level 2" : Target brightness is set to the 2nd darkest of 4 levels.
"Level 3" : Target brightness is set to the 3rd darkest of 4 levels.
"Level 4" : Target brightness is set to the brightest of 4 levels.

SETTING THE VERTEX DISTANCE (VD)

In vertex distance setting, contact lens (0mm) or eyeglass lens (12mm or 13.75mm) can be selected. Before shipment, the default setting is eyeglass lens (12mm).

1 Tap the [Set Condition button] of the set item display "VD" of "INITIAL."

2 Tap the [Setting Change button] and select the VD value.



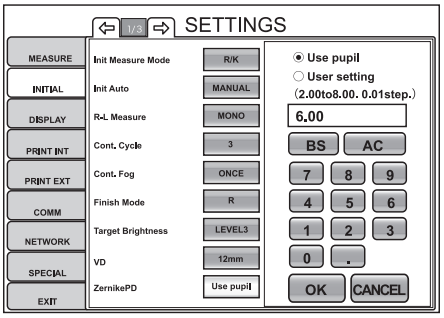
"0.00" : The VD value is set to contact lens (0.00mm).
"12.00" : The VD value is set to eyeglass lens (12.00mm)
"13.75" : The VD value is set to eyeglass lens (13.75mm)

3 Setting is complete.

SETTING THE ZERNIKE PD

The Zernike PD can be set. Before shipment, the default setting is "Use pupil."

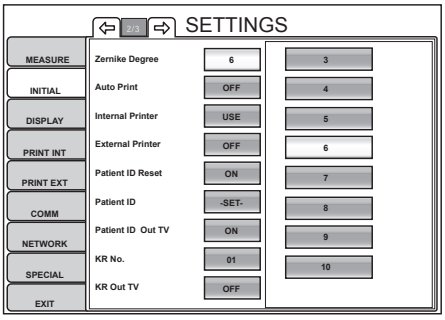
1. Tap the [Set Condition button] of the set item display "Zernike PD" of "INITIAL."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is done by tapping the [OK button].



SETTING ZERNIKE DEGREE

Zernike degree can be set. Before shipment, the default setting is "degree 6."

1. Tap the [Set Condition button] of the set item display "Zernike Degree" of "INITIAL."
2. Enter the number by the ten-key display of the [Setting Change button].

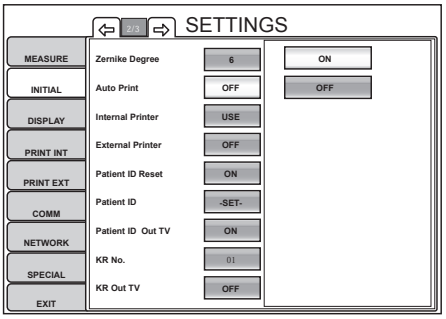


3. Setting is complete.

SETTING AUTO PRINT

After measuring the right and left eyes under auto mode, the results can be printed automatically by the internal printer. Before shipment, the default setting is "ON" (Auto Print).

1 Tap the [Set Condition button] of the set item display "Auto Print" of "INITIAL."



2 Tap the [Setting Change button] and select "ON" (Auto Print is performed) or "OFF" (Auto Print is not performed).

3 Setting is complete.

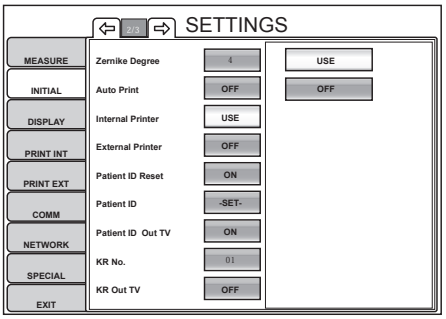
If the eye to be measured is set to the right/left eye only, the auto print function will not be performed. For the setting of the eye to be measured, see "MEASURING ONE EYE ONLY" on page 35.

SETTING THE THERMAL PRINTER (INTERNAL PRINTER)

The internal thermal printer can be set. Before shipment, the default setting is "Use." When the setting is "Do not use," printing is not performed even by tapping the [DATA OUT button].

1 Tap the [Set Condition button] of the set item display "Internal Printer" of "INITIAL."

2 Tap the [Setting Change button] and select "USE" or "OFF."



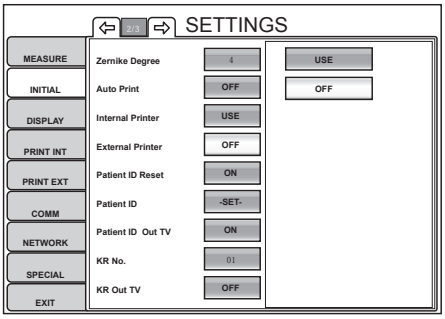
3 Setting is complete.

SETTING THE EXTERNAL PRINTER (EXTERNAL PRINTER)

It is possible to set whether or not to use the external printer via a USB connection. Before shipment, the default setting is "OFF."
A print layout should be set for the external printer. For details, see "SETTING OF EXTERNAL PRINTER (PRINT EXT)" on page 147.

1 Tap the [Set Condition button] of the set item display "External Printer" of "INITIAL."

2 Tap the [Setting Change button] and select "USE" or "OFF."



3 Setting is complete.

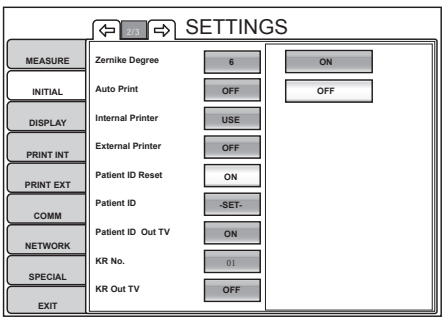
For the available external printers, contacts your dealer or TOPCON as shown on the back cover.

RESETTING THE PATIENT ID (PATIENT ID RESET)

It is possible to set whether or not to reset the patient ID upon power on. Before shipment, the default setting is "ON."

1 Tap the [Set Condition button] of the set item display "Patient ID Reset" of "INITIAL."

2 Tap the [Setting Change button] and select "ON" or "OFF."

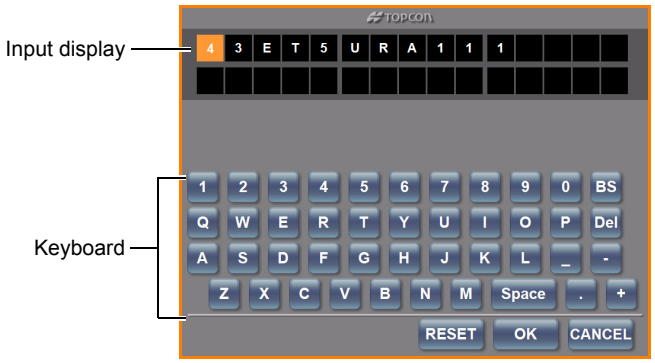


3 Setting is complete.

SETTING THE PATIENT ID

It is possible to set the initial value for patient ID (which is set upon power on, when tapping the CLEAR button when the setting of "Resetting the Patient ID" is "ON," or when pressing the MEASUREMENT switch after printing/outputting measurement values).

1. Tap the [Set Condition button] of the set item display "Patient ID" of "INITIAL." The keyboard screen is displayed.
2. Tap the displayed keyboard, enter the patient ID to the input display.
   The cursor of the input display is highlighted in orange.
   It is also possible to move the cursor by directly tapping the part to be changed.



3. Setting is complete by pressing the [OK button].

DISPLAYING THE PATIENT ID (SERIAL OUT TV)

It is possible to set whether or not to display the patient ID. Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "Patient ID Out TV" of "INITIAL." The keyboard screen is displayed.
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE MACHINE No. (KR No.)

The machine No. can be set.

1. Tap the [Set Condition button] of the set item display "Setting the Machine No." of "INITIAL."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is complete by pressing the [OK button].

DISPLAYING THE MACHINE ID (KR OUT TV)

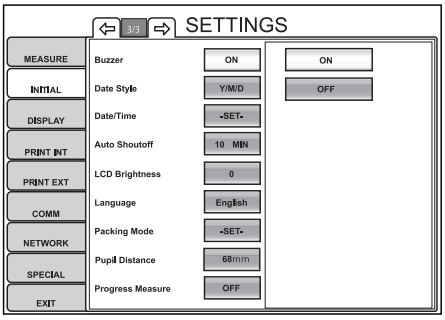
It is possible to set whether or not to display the machine No. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "Displaying the Machine ID" of "INITIAL."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is completed by pressing the [OK button].

SETTING THE BUZZER SOUND (BUZZER)

The buzzer sound can be set. Before shipment, the default setting is "ON" (Buzzer sounds).

1 Tap the [Set Condition button] of the set item display "Buzzer" of "INITIAL."



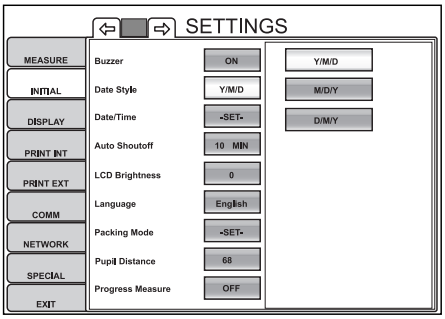
2 Tap the [Setting Change button] and select "ON" (Buzzer sounds) or "OFF" (Buzzer does not sounds).

3 Setting is completed and the changed setting is displayed on the [Set Condition button].

SETTING THE DATE STYLE

Date style can be set. Before shipment, the default setting is "Y/M/D."

1 Tap the [Set Condition button] of the set item display "Date Style" of "INITIAL."



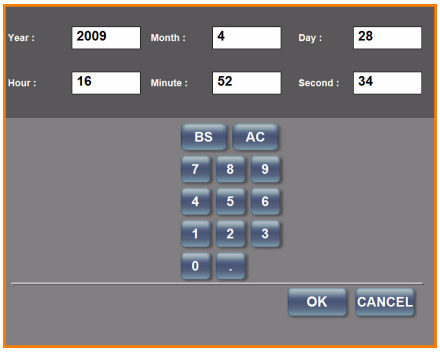
2 Tap the [Setting Change button] and select the date style.

3 Setting is completed and the changed setting is displayed on the [Set Condition button].

SETTING THE DATE AND TIME (DATE/TIME)

Date and time can be set.

1 Tap the Set Condition button of the set item display "Date/Time" of "INITIAL."



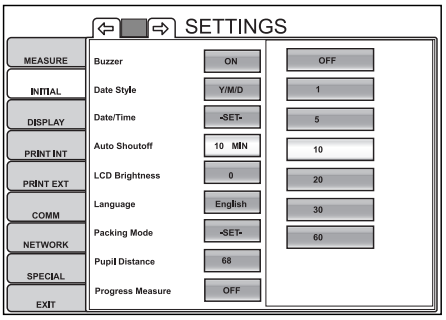
2 Tap and select the item to be set (year, month, day, hour, minute, second), and enter the number from the ten-key display shown below.

3 Setting is completed by tapping the OK button.

SETTING THE POWER SAVE TIME (AUTO SHUTOFF)

The power save timer can be set. Before shipment, the default setting is "10 MIN" (to get to the power save status in 10min).

1 Tap the Set Condition button of the set item display "Auto Shutoff" of "INITIAL."



2 Tap the Setting Change button and select "OFF," "1 MIN," "5 MIN," "10 MIN," "20 MIN," "30 MIN" and "60 MIN".

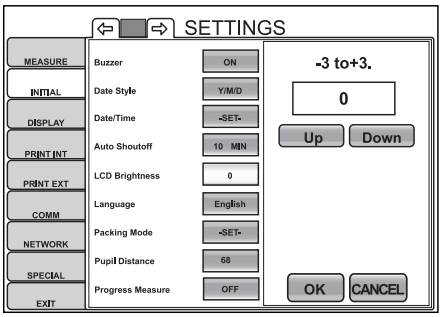
When "None" is set, the power save function does not work.

3 Setting is complete.

SETTING THE LCD BRIGHTNESS

Brightness of the LCD can be set. Before shipment, the default setting is "0."

1 Tap the [Set Condition button] of the set item display "LCD Brightness" of "INITIAL."



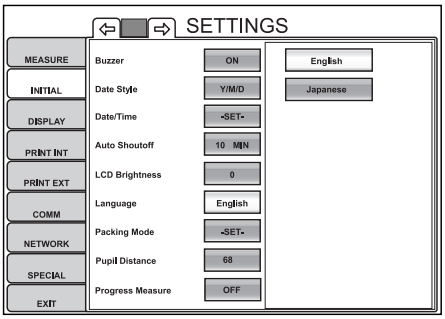
2 Tap [Up] [Down] of the [Setting Change button] and set the brightness.

3 Setting is done by tapping the [OK button].

SETTING THE LANGUAGE

The language displayed on the monitor screen can be set. Before shipment the default setting is "English."

1 Tap the [Set Condition button] of the set item display "Language" of "INITIAL."



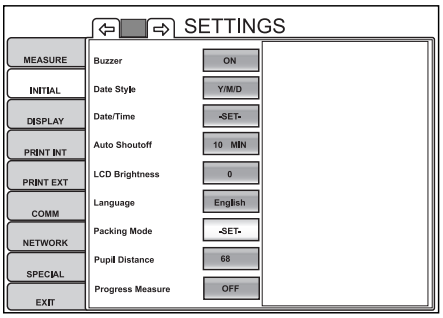
2 Tap the [Setting Change button] and select the language.

3 Setting is completed and the changes are displayed on the [Set Condition button].

PACKING MODE

Set the instrument (KR-1W) to the packing position (as-delivered condition).

1 Tap the [Set Condition button] of the set item display "Packing Mode" of "INITIAL."



2 A message "Run the Packing mode?" is displayed.

3 When "Yes" is selected, the operation starts automatically. A message "Wait until the packing operation is completed." will be displayed.

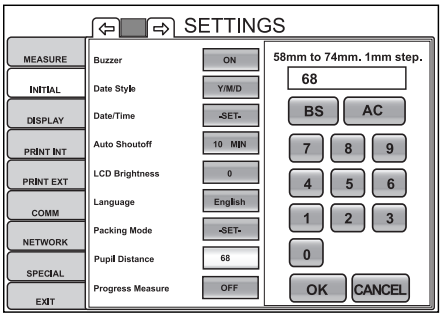
4 When the operation is complete, a message "Packing mode has been completed. Shut off the power directly." will be displayed.

5 Setting is completed by shutting off the power.

PUPIL DISTANCE

The travel distance of both eyes can be set from 58mm to 74mm. Before shipment, the default setting is "68mm."

1 Tap the [Set Condition button] of the set item display "Pupil Distance" of "INITIAL."



2 Enter the number by the ten-key display of the [Setting Change button].

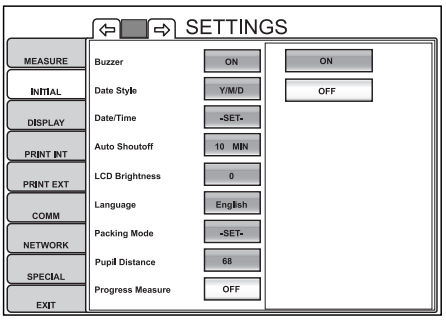
3 Setting is done by tapping the [OK button].

When moving from the measuring position of one eye to the other eye, the total R-L travel distance set does not mean the device will travel this entire distance; the actual travel distance is 1/2 of the set distance from the origin/center of R-L movement for both right and left. Thus, if the setting is "68mm" as shipped, the travel distance is 34mm from the center.

PROGRESS MEASUREMENT

Progress measurement can be set. Before shipment, the default setting is OFF (Do not perform progress measurement).

1 Tap the [Set Condition button] of the set item display "Progress Measure" of the SETTINGS screen "INITIAL."



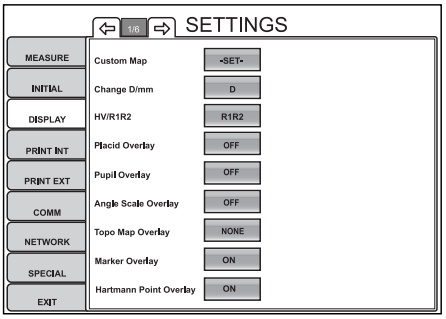
2 Tap the [Setting Change button] and select "ON" (Perform progress measurement) or "OFF" (Do not perform progress measurement).

3 The changed setting is displayed on the [Set Condition button] and the setting change is complete.

DISPLAY SETTING (DISPLAY)

Display menu contains settings related to screen display.

1 Tap the index "DISPLAY" of the "SETTTINGS screen."



To quit the screen:

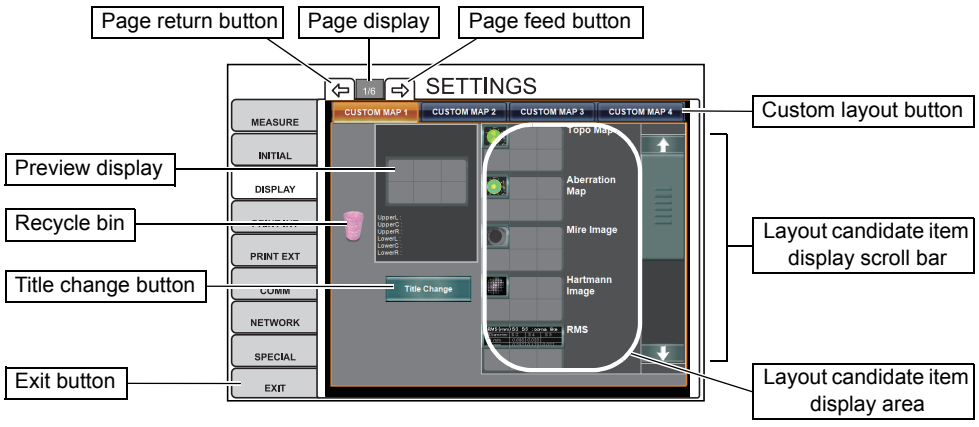
- Tap the [EXIT button].
- The "SETTTINGS screen" is quitted and the "MEASUREMENT screen" is returned.

2 Tap the [Page Feed button] and/or [Page Return button], as needed, till the set item to be checked/changed is displayed.

CUSTOM MAP

Up to 4 types of custom map layouts for the measurement results screen can be set/registered.
For each layout, up to 6 maps can be set.
For details about each map, see "DESCRIPTION OF MAP LAYOUT" on page 63.

1 Tap the [Set Condition button] of the set item display "CUSTOM MAP" of "DISPLAY."
The screen layout setting screen is displayed.



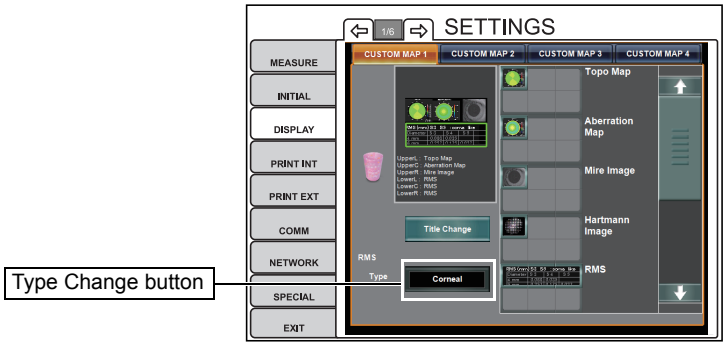
2 Select the custom layout to be registered by the [Custom Layout button], as needed.

- Title of the [Custom Layout button] can be changed on the register screen displayed by pressing the [Title Change button].

3 Select the map(s) to be placed in the preview display.

Touch the [Layout candidate item display scroll bar] and display the items to be placed in the [Layout candidate item display area].
Place the items selected onto the preview display by direct tap & drag from the [Layout candidate item display area].

Depending on the map to be placed, the [Type Change button] of the map is displayed under the Title Change button. Tap the [Type Change button], and change the type of map to be displayed, as needed.



Name of Map	Type Change button	Set contents
Topo map	Axial map	Axial map is displayed.
	Instantaneous map	Instantaneous map is displayed.
Aberration map (Upper)	Ocular	Ocular map is displayed.
	Corneal	Corneal map is displayed.
Aberration map (Lower)	HOA	High order aberration map is displayed.
	Trefoil	Trifoil map is displayed.
	Coma	Coma map is displayed.
	Tetrafoil	Tetrafoil map is displayed.
	2nd Astig	2nd astigmatic aberration map is displayed.
	Spherical	Spherical aberration map is displayed.
RMS	Corneal	RMS value of corneal aberration is displayed.
	Ocular	RMS value of ocular aberration is displayed.
Landolt's ring simulation	Simulation1	Simulation 1 is displayed.
	Simulation2	Simulation 2 is displayed.
	Simulation3	Simulation 3 is displayed.

4 To delete the placed item, tap & drag an item from the Preview display to the Recycle bin.

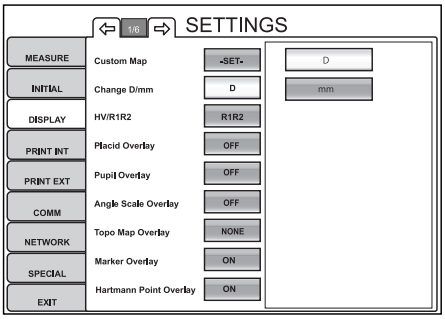
5 When layout setting is completed, save the setting by tapping the [EXIT button].

CHANGING THE D/mm DISPLAY (CHANGE D/mm)

The display sequence of the KRT measurement result displayed on the control panel screen can be selected from D (cornea refractory power) or mm (cornea radius curvature). Before shipment, the default setting is "D."

1 Tap the [Set Condition button] of the set item display "Change D/mm" of "DISPLAY."

2 Tap the [Setting Change button] and select "D" or "mm."



"D" : Cornea refractory power
"mm" : Cornea radius curvature

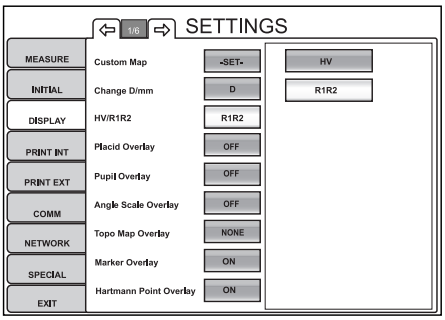
3 Setting is done.

CHANGING THE HV/R1R2 DISPLAY (HV/R1R2)

The display style of the KRT measurement result displayed on the control panel screen can be selected from HV (horizontal/vertical) or R1R2 (flat/steep meridian). Before shipment, the default setting is "HV (horizontal, vertical)."

1 Tap the [Set Condition button] of the set item display "HV/R1R2" of "DISPLAY."

2 Tap the [Setting Change button] and select " HV" or "R1R2."



"HV" : The display style of KRT measurement result is set to horizontal/vertical.
"R1R2" : The display style of KRT measurement result is set to flat/steep meridian.

3 Setting is complete.

SETTING THE PLACID RING DETECTION OVERLAY (PLACID OVERLAY)

When analysis results are initially displayed, Placido Ring Detection Overlay can be set to ON or OFF. Before shipment, the default setting is "OFF."

1 Tap the [Set Condition button] of the set item display "Placid Overlay" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE PUPIL DETECTION OVERLAY (PUPIL OVERLAY)

When analysis results are initially displayed, Pupil Detection Overlay can be set to ON or OFF. Before shipment, the default setting is "OFF."

1 Tap the [Set Condition button] of the set item display "Pupil Overlay" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE ANGLE SCALE OVERLAY

When analysis results are initially displayed, Angle Scale Overlay can be set to ON or OFF. Before shipment, the default setting is "OFF."

1 Tap the [Set Condition button] of the set item display "Angle Scale" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE TOPOMAP OVERLAY

In the Corneal Aberration map and IOL Selection map, display or not display the TopoMap overlay of corneal Axial or corneal Instantaneous is set.
Before shipment, the default setting is " NONE.."
* This is not applied except the Corneal Aberration map and IOL Selection map.

1 Tap the [Set Condition button] of the set item display "TopoMap Overlay" of "DISPLAY."

2 Tap and select "NONE," "Axial" or "Instantaneous" of the [Setting Change button].
NONE: TopoMap overlay is not displayed.
Axial: Corneal Axial overlay is displayed.
Instantaneous:Corneal Instantaneous overlay is displayed.

3 Setting is complete.

SETTING THE MARKER OVERLAY

In the Corneal Aberration map and IOL Selection map, display or not display the marker overlay is set. Before shipment, the default setting is " OFF..".
* This is not applied except the Corneal Aberration map and IOL Selection map.

1 Tap the [Set Condition button] of the set item display "Marker Overlay" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE HARTMANN DETECTION POINT OVERLAY (HARTMANN POINT OVERLAY)

When analysis results are initially displayed, Hartmann Detection Point Overlay can be set to ON or OFF. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "Hartmann Detection Point Overlay" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE HARTMANN DETECTION GRID OVERLAY (HARTMANN POINT OVERLAY)

When analysis results are initially displayed, Hartmann Detection Grid Overlay can be set to ON or OFF. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "Hartmann Detection Grid Overlay" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOTAL ABERRATION MAP DISPLAY STEP (TOTAL ABERRATION MAP RANGE)

The Total Aberration Map Display Step is set. Before shipment, the default setting is "20μm."

1. Tap the [Set Condition button] of the set item display "Total Aberration Map Range" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is completed by tapping the [OK button].

Display step setting of the Total aberration map can also be done by the Enlargement Display screen.
For details, see "ENLARGEMENT DISPLAY, Example: Total Aberration" on page 79.

SETTING THE TOTAL ABERRATION MAP OVERLAY - CROSS SCALE

When analysis results are initially displayed, Total Aberration Map Overlay - Cross Scale can be set to ON or OFF. Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "Total Aberration Map Overlay - Cross Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOTAL ABERRATION MAP OVERLAY - ANGLE SCALE

When analysis results are initially displayed, Total Aberration Map Overlay - Angle Scale can be set to ON or OFF. Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "Total Aberration Map Overlay - Angle Scale" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE TOTAL ABERRATION MAP OVERLAY - mm GRID SCALE

When analysis results are initially displayed, Total Aberration Map Overlay - mm Grid Scale can be set to ON or OFF. Before shipment, the default setting is "OFF."

1 Tap the [Set Condition button] of the set item display "Total Aberration Map Overlay - mm Grid Scale" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

Display step setting of the Total aberration map can also be done by the Enlargement Display screen.
For details, see "ENLARGEMENT DISPLAY, Example: Total Aberration" on page 79.

SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP DISPLAY STEP

The Higher Order Aberration Astigma Map Display Step is set. Before shipment, the default setting is "5.00μm."

1 Tap the [Set Condition button] of the set item display "HOA. Astig. Map Range" of "DISPLAY."

2 Enter the number by the ten-key display of the [Setting Change button].

3 Setting is completed by tapping the [OK button].

Display step setting of the Total aberration map can also be done by the Enlargement Display screen.
For details, see "ENLARGEMENT DISPLAY, Example: Total Aberration" on page 79.

SETTING THE HIGHER ORDER ABERRATION ASTIGMA MAP OVERLAY - CROSS SCALE

When analysis results are initially displayed, Higher Order Aberration Astigma Map Overlay - Cross Scale can be set to ON or OFF. Before shipment, the default setting is "ON."

1 Tap the [Set Condition button] of the set item display "HOA. Astig. Map Overlay - Cross Scale" of "DISPLAY."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP OVERLAY - ANGLE SCALE

When analysis results are initially displayed, Higher Order Aberration Astigma Map Overlay - Angle Scale can be set to ON or OFF. Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "HOA. Astig. Map Overlay - Angle Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE HIGH ORDER ABERRATION ASTIGMA MAP OVERLAY - mm GRID SCALE

When analysis results are initially displayed, Higher Order Aberration Astigma Map Overlay - mm Grid Scale can be set to ON or OFF. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "HOA. Astig. Map Overlay - mm Grid Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

Display step setting of the Total aberration map can also be done by the Enlargement Display screen.
For details, see "ENLARGEMENT DISPLAY, Example: Total Aberration" on page 79.

SETTING THE TOPOMAP DISPLAY UNIT (TOPOMAP SCALE UNIT)

The TopoMap display unit is set to "D" or "mm." Before shipment, the default setting is "D."

1. Tap the [Set Condition button] of the set item display "TopoMap Scale Unit" of "DISPLAY."
2. Tap and select "D" or "mm" of the [Setting Change button].
3. Setting is complete.

SETTING THE TOPOMAP SCALE TYPE (TOPOMAP SCALE - TYPE)

The TopoMap scale type may be set to Absolute, Adjustable, or Normalized. Before shipment, the default setting is "Absolute."

1. Tap the [Set Condition button] of the set item display "TopoMap Scale - Type" of "DISPLAY."
2. Tap and select "Adjustable," "Normalized" or "Absolute" of the [Setting Change button].
   "Adjustable" : Relative scale display. Center value or step value can be selected.
   "Normalized" : Relative scale display. Center value or step value is selected automatically.
   "Absolute" : Absolute scale display. The center value is constant, but the step value is changeable.
3. Setting is complete.

SETTING THE CENTER VALUE WHEN TOPOMAP SCALE TYPE IS ADJUSTABLE (TOPOMAP SCALE - ADJUSTABLE)

The center value when the TopoMap scale type is Adjustable is set. The value can be set between 30.00D and 50.00D with 0.50D steps. Before shipment, the default setting is "47.50."

1. Tap the [Set Condition button] of the set item display "TopoMap Scale - Adjustable" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is completed by tapping the [OK button].

SETTING THE STEP WHEN TOPOMAP SCALE TYPE IS ADJUSTABLE (TOPOMAP SCALE - ADJUSTABLE STEP)

When the TopoMap scale type is set to Adjustable, the step can be set between 0.25D and 2.50D with 0.25D steps. Before shipment, the default setting is "1.50."

1. Tap the [Set Condition button] of the set item display "TopoMap Scale - Adjustable Step" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is completed by tapping the [OK button].

SETTING THE STEP WHEN TOPOMAP SCALE TYPE IS ABSOLUTE (TOPOMAP SCALE - ABSOLUTE STEP)

When the TopoMap scale type is set to Absolute, the step can be set between 0.50D and 2.50D with 0.25D steps. Before shipment, the default setting is "1.50."

1. Tap the [Set Condition button] of the set item display "TopoMap Scale - Absolute Step" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is completed by tapping the [OK button].

SETTING THE TOPOMAP OVERLAY - CROSS SCALE

When analysis results are initially displayed, TopoMap Overlay - Cross Scale can be set to ON or OFF Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "TopoMap Overlay - Cross Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOPOMAP OVERLAY - ANGLE SCALE

When analysis results are initially displayed, TopoMap Overlay - Angle Scale can be set to ON or OFF. Before shipment, the default setting is "ON."

1. Tap the [Set Condition button] of the set item display "TopoMap Overlay - Angle Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOPOMAP OVERLAY - mm GRID SCALE

When analysis results are initially displayed, TopoMap Overlay - Grid Scale can be set to ON or OFF. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "TopoMap Overlay - mm Grid Scale" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOPOMAP OVERLAY - PUPIL

When analysis results are initially displayed, TopoMap Overlay - Pupil can be set to ON or OFF. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "TopoMap Overlay - Pupil" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE TOPOMAP KERATO AXIS

When analysis results are initially displayed, TopoMap Kerato axis can be set to ON or OFF. Before shipment, the default setting is "None."

1. Tap the [Set Condition button] of the set item display "TopoMap Kerato Axis" of "DISPLAY."
2. Tap the [Setting Change button] and select "None" or "Sim-K Axis."
3. Setting is complete.

SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 1 (UPPER)

The optotype of Landolt's Ring Simulation 1 (Upper) is set. Before shipment, the default setting is "100 (20/100)."

1. Tap the [Set Condition button] of the set item display "Optotype of Landolt's Ring Simulation 1 (Upper)" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is done by tapping the [OK button].
   * Landolt's Ring Simulation can be set between 10 and 200 (20/10 - 20/200) with 10 steps.

SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 2 (MIDDLE)

The optotype of Landolt's Ring Simulation 2 (Middle) is set. Before shipment, the default setting is "40 (20/40)."

1. Tap the [Set Condition button] of the set item display "Optotype of Landolt's Ring Simulation 2 (Middle)" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is done by tapping the [OK button].
   * Landolt's Ring Simulation can be set between 10 and 200 (20/10 - 20/200) with 10 steps.

SETTING THE OPTOTYPE OF LANDOLT'S RING SIMULATION 3 (LOWER)

The optotype of Landolt's Ring Simulation 3 (Lower) is set. Before shipment, the default setting is "20 (20/20)."

1. Tap the [Set Condition button] of the set item display "Optotype of Landolt's Ring Simulation 3 (Lower)" of "DISPLAY."
2. Enter the number by the ten-key display of the [Setting Change button].
3. Setting is done by tapping the [OK button].
   * Landolt's Ring Simulation can be set between 10 and 200 (20/10 - 20/200) with 20/10 steps.

SETTING THE DIRECTION OF LANDOLT'S RING (LANDOLT DIRECTION)

The direction of Landolt's ring may be set. Before shipment, the default setting is "Right."

1. Tap the [Set Condition button]n of the set item display "TopoMap Kerato Axis" of "DISPLAY."
2. Tap and select "Up," "Down" or "Right" or "Left" of the [Setting Change button].
3. Setting is complete.

SETTING THE NORMALIZATION OF BRIGHTNESS OF LANDOLT'S RING SIMULATION (NORMALIZE DESTINY OF SIMULATIONS)

Normalization of the brightness of the Landolt Ring Simulation can be set to ON or OFF. Before shipment, the default setting is OFF.

1. Tap the [Set Condition button] of the set item display "Normalize Destiny of Simulations" of "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. Setting is complete.

SETTING THE DISPLAY STEP OF SPHERICAL/CORNEAL REFRACTIVE POWER (SPH STEP)

The display step of spherical/corneal refractive power can be set to 0.01D, 0.12D or 0.25D. Before shipment, the default setting is 0.25D.

1 Tap the [Set Condition button] of the set item display "Sph Step" of "DISPLAY."

2 Tap the [Setting Change button] and select "0.25D," "0.12D" or "0.01D."

3 Setting is complete.

SETTING THE DISPLAY STEP OF CYLINDRICAL REFRACTIVE POWER/CORNEAL ASTIGMATIC POWER (CYL STEP)

The display step of cylindrical refractive power/corneal astigmatic power can be set to 0.01D, 0.12D or 0.25D. Before shipment, the default setting is 0.25D.

1 Tap the [Set Condition button] of the set item display "Cyl Step" of "DISPLAY."

2 Tap the [Setting Change button] and select "0.01D," "0.12D" or "0.25D."

3 Setting is complete.

SETTING THE DISPLAY STEP OF ASTIGMATIC AXIS/CORNEAL ASTIGMATIC AXIS (AXIS STEP)

The display step of astigmatic axis/corneal astigmatic axis can be set to 1° or 5°. Before shipment, the default setting is 1°.

1 Tap the [Set Condition button] of the set item display "Axis Step" of "DISPLAY."

2 Tap the [Setting Change button] and select "1°" or "5°."

3 Setting is complete.

SETTING THE ASTIGMA SIGN (CYL SIGN)

The astigma sign displayed on the monitor screen can be selected from "-," "+" and "MIX." Before shipment the default setting is "-."

1 Tap the [Set Condition button] of the set item display "Cyl Sign" of "DISPLAY."

2 Tap the [Setting Change button] and select "-," "+" or "MIX."

3 Setting is complete.

"-" : Display style of astigma sign is set to "-."
"+" : Display style of astigma sign is set to "+".
"MIX" : Display style of astigma sign is set to "MIX".

TOPOMAP SMOOTHING

To perform topo-map smoothing or not is set. Before shipment, the default setting is "OFF."

1. Tap the [Set Condition button] of the set item display "TopoMap Smoothing" of the SETTINGS screen "DISPLAY."
2. Tap the [Setting Change button] and select "ON" or "OFF."
3. The setting is complete.

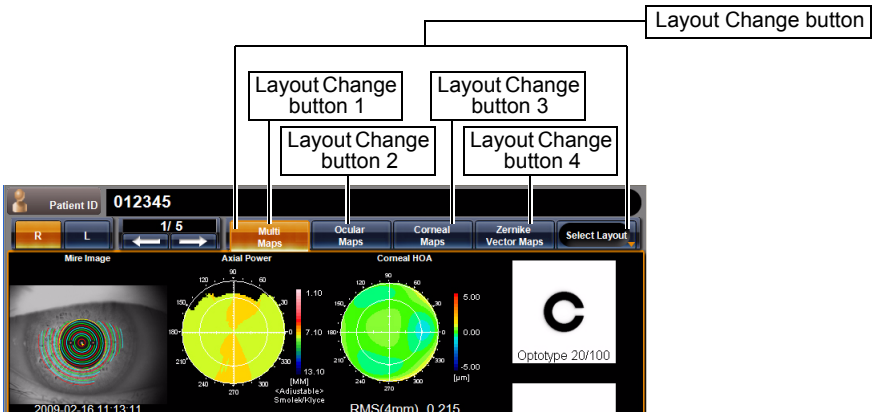
SUMMARY MAP GRAPH SCALE

The graph scale of the Summary map can be set from "0.1," "0.2," "0.5," "1.0" and "2.0." Before shipment, default setting is "1.0."

1. Tap the [Set Condition button] of the set item display "Summary Map graph scale" of the SETTINGS screen "DISPLAY."
2. Tap the [Setting Change button] and select the graph scale to be set.
3. The setting is complete.

SETTING THE MAP OF ANALYSIS SCREEN LAYOUT BUTTON 1

The map to be placed in the Layout Change button of the Analysis Result screen can be selected. Before shipment, the default setting is "Multi map."



1. Tap the [Set Condition button] of the set item display "Map of analysis screen layout button 1" of "DISPLAY."
2. Tap the [Setting Change button] and select the applicable map.
3. Setting is complete.

- For map types and details, see "DESCRIPTION OF MAP LAYOUT" on page 63.
- It is not possible to set custom maps and pupillometry map to custom layout buttons.

SETTING THE MAP OF ANALYSIS SCREEN LAYOUT BUTTON 2

The map to be placed in the Layout Change button of the Analysis Result screen can be selected. Before shipment, the default setting is "Ocular Maps."

1. Tap the [Set Condition button] of the set item display "Map of analysis screen layout button 2" of "DISPLAY."
2. Tap the [Setting Change button] and select the applicable map.
3. Setting is complete.

- For map types and details, see "DESCRIPTION OF MAP LAYOUT" on page 63.
- It is not possible to set custom maps and pupillometry map to custom layout buttons.

SETTING THE MAP OF ANALYSIS SCREEN LAYOUT BUTTON 3

The map to be placed in the Layout Change button of the Analysis Result screen can be selected. Before shipment, the default setting is "Corneal Maps."

1. Tap the [Set Condition button] of the set item display "Map of analysis screen layout button 3" of "DISPLAY."
2. Tap the [Setting Change button] and select the applicable map.
3. Setting is complete.

- For map types and details, see "DESCRIPTION OF MAP LAYOUT" on page 63.
- It is not possible to set custom maps and pupillometry map to custom layout buttons.

SETTING THE MAP OF ANALYSIS SCREEN LAYOUT BUTTON 4

The map to be placed in the Layout Change button of the Analysis Result screen can be selected. Before shipment, the default setting is "Zernike Maps."

1. Tap the [Set Condition button] of the set item display "Map of analysis screen layout button 4" of "DISPLAY."
2. Tap the [Setting Change button] and select the applicable map.
3. Setting is complete.

- For map types and details, see "DESCRIPTION OF MAP LAYOUT" on page 63.
- It is not possible to set custom maps and pupillometry map to custom layout buttons.

SETTING CORNEAL IRREGULAR ASTIG.1 (VALUE 1<VALUE 2)

The Corneal Irregular Astig.1 of the IOL Selection map is set.

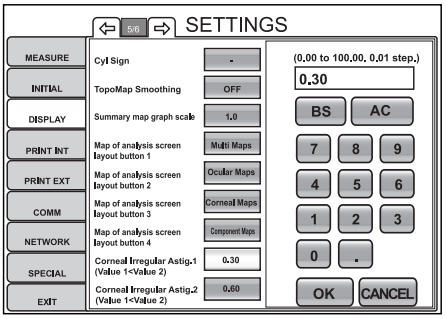
- In the following cases, the character color is changed based on the set threshold values of Corneal Irregular Astigmatism 1 and Corneal Irregular Astigmatism 2:
  - When the measurement value is not more than the set threshold value of Corneal Irregular Astigmatism 1
  - When the measurement value is more than the threshold value of Corneal Irregular Astigmatism 1 and not more than the threshold value of Corneal Irregular Astigmatism 2

- When the measurement value is more than the threshold value of Corneal Irregular Astigmatism 2

Threshold value of Corneal Irregular Astigmatism 1: Lowest setting of corneal irregular astigmatism threshold value
Threshold value of Corneal Irregular Astigmatism 2: Highest setting of corneal irregular astigmatism threshold value
The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.30."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal Irregular Astig.1"of "DISPLAY."

2 Enter the value by the ten-key display of the [Setting Change button].



3 Setting is complete by pressing the [OK button].

SETTING CORNEAL IRREGULAR ASTIG.2 (VALUE 1<VALUE 2)

The Corneal Irregular Astig.2 of the IOL Selection map is set.
The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.60."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal Irregular Astig.2" of "DISPLAY."

2 Enter the value by the ten-key display of the [Setting Change button].

3 Setting is complete by pressing the [OK button].

SETTING THE THRESHOLD K VALUE

The threshold K value of the IOL Selection map is set.

- In the following cases, the character color is changed based on the set threshold K value:
  - When the K value is within the set value range
  - When the K value is outside the set value range

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.50."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "K Readings" of "DISPLAY."

2 Enter the value by the ten-key display of the [Setting Change button].

3 Setting is complete by pressing the [OK button].

SETTING THE THRESHOLD VALUE OF CORNEAL SPHERICAL ABERRATION

The threshold value of corneal spherical aberration in the IOL Selection map is set:

- In the following case, the character color is changed based on the set threshold value of corneal spherical aberration:
  - When the measurement value is below the set value

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "0.100."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal SA" of "DISPLAY."

2 Enter the value by the ten-key display of the [Setting Change button].

3 Setting is complete by pressing the [OK button].

SETTING THE THRESHOLD VALUE OF CORNEAL ASTIGMATISM

The Threshold Value of Corneal Astigmatism in the IOL Selection map is set:

- In the following cases, the character color is changed based on the set threshold value of corneal astigmatism:
  - When the measurement value is within the set value range (± range)
  - When the measurement value is outside the set value range (± range)

The threshold value can be set between 0.00 and 100.00 in 0.01 unit.
Before shipment, the default setting is "1.5."

1 On the SETTINGS screen, tap the [Set Condition button] of the set item display "Corneal Astig." of "DISPLAY."

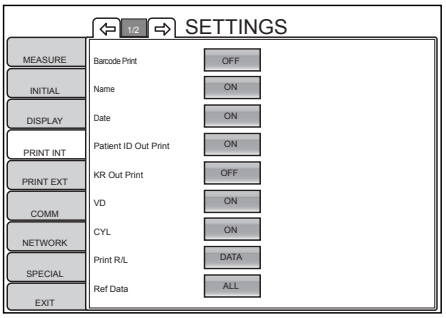
2 Enter the value by the ten-key display of the [Setting Change button].

3 Setting is complete by pressing the [OK button].

SETTING OF INTERNAL PRINTER (PRINT INT)

PRINT INT menu contains settings related to output from the internal printer.

1 Tap the index "PRINT INT" of the "SETTTINGS screen." Set items of "PRINT INT" are displayed.



To quit the screen:

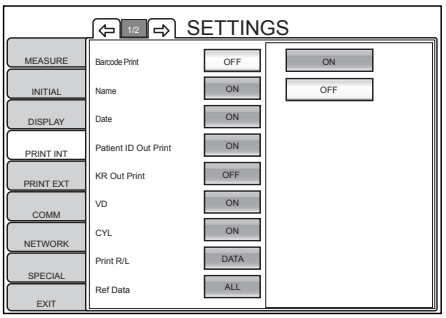
- Tap the [EXIT button].
- The "SETTTINGS screen" is quitted and the "MEASUREMENT screen" is returned.

2 Tap the [Page Feed button] and/or [Page Return button], as needed, until the set item to be checked/changed is displayed.

PRINTING THE BARCODE (BARCODE PRINT)

The barcode can be displayed on the printout. The patient ID, machine No. and work ID are outputted. Before shipment, the default setting is "OFF" (Do not print barcode).

1 Tap the [Set Condition button] of the set item display "Barcode Print" of "PRINT INT."



2 Tap the [Setting Change button] and select "ON" (Print barcode) or "OFF" (Do not print barcode).

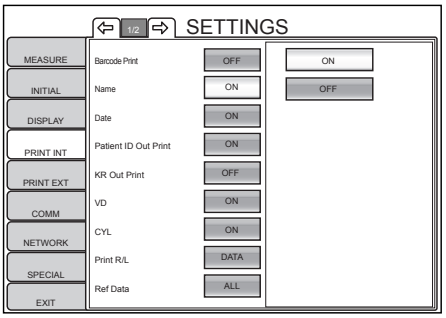
3 Setting is complete.

PRINTING THE NAME COLUMN (NAME)

The name column can be displayed in the printout.

The patient ID, machine No. and work ID are outputted. Before shipment, the default setting is "ON" (Print name column).

1 Tap the [Set Condition button] of the set item display "Name" of "PRINT INT."



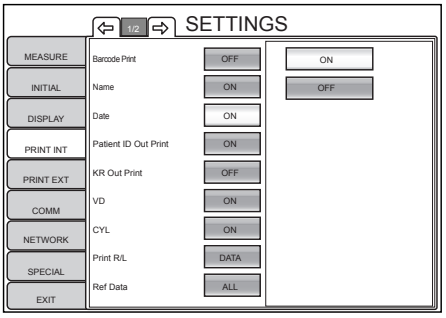
2 Tap the [Setting Change button] and select "ON" (Print name column) or "OFF" (Do not print name column).

3 Setting is complete.

PRINTING THE DATE (DATE)

The measurement date can be displayed on the printout. Before shipment, the default setting is "ON" (Print date).

1 Tap the [Set Condition button] of the set item display "Date" of "PRINT INT."



2 Tap the [Setting Change button] and select "ON" (Print date) or "OFF" (Do not print date).

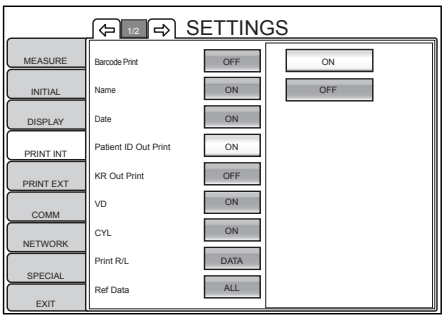
When the built-in battery runs out, the date is not printed and "DATE" is printed instead. For battery change, contact your dealer or TOPCON shown on the back cover.

3 Setting is complete.

PRINTING THE PATIENT ID (PATIENT ID OUT PRINT)

The patient ID can be displayed on the printout. Before shipment, the default setting is "ON" (Print patient ID).

1 Tap the [Set Condition button] of the set item display "Patient ID Out Print" of "PRINT INT."



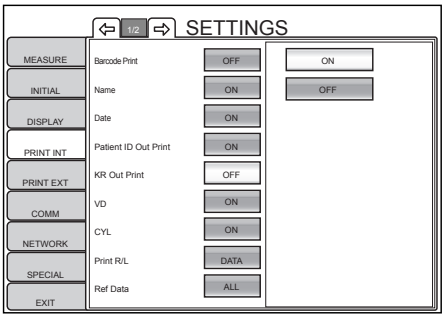
2 Tap the [Setting Change button] and select "ON" (Print patient ID) or "OFF" (Do not print patient ID).

3 Setting is complete.

PRINTING THE MACHINE NO. (KR OUT PRINT)

The machine No. can be displayed on the printout. Before shipment, the default setting is "OFF" (Do not print machine No.).

1 Tap the [Set Condition button] of the set item display "KR Out Print" of "PRINT INT."



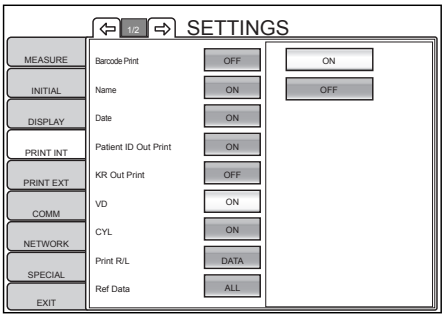
2 Tap the [Setting Change button] and select "ON" (Print machine No.) or "OFF" (Do not print machine No.).

3 Setting is complete.

PRINTING THE VD VALUE (VD)

The VD value (vertex distance) can be displayed on the printout. Before shipment, the default setting is "ON" (Print VD value).

1 Tap the [Set Condition button] of the set item display "VD" of "PRINT INT."



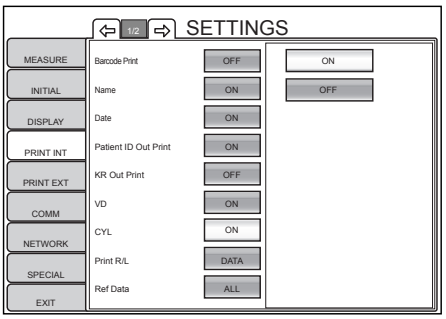
2 Tap the [Setting Change button] and select "ON" (Print VD value) or "OFF" (Do not print VD value).

3 Setting is complete.

PRINTING THE ASTIGMA SIGN (CYL)

The astigma sign can be displayed on the printout. Before shipment, the default setting is "ON" (Print astigma sign).

1 Tap the [Set Condition button] of the set item display "VD" of "PRINT INT."



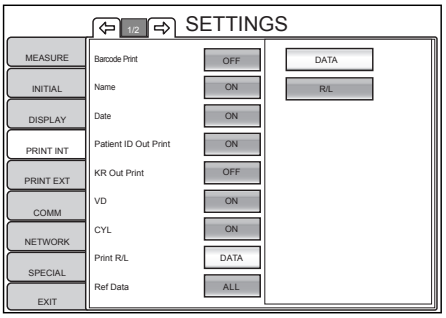
2 Tap the [Setting Change button] and select "ON" (Print astigma sign) or "OFF" (Do not print astigma sign).

3 Setting is complete.

PRINT SEQUENCE (PRINT R/L)

The print sequence can be selected. Before shipment, the default setting is "DATA" (Print REF and KRT measurement values separately).

1 Tap the [Set Condition button] of the set item display "Print R/L" of "PRINT INT."



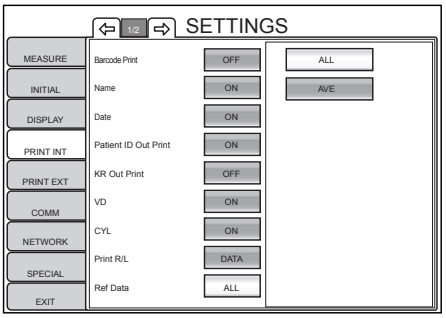
2 Tap the [Setting Change button] and select "DATA" (Print REF and KRT measurement values separately) or "R/L" (Print in order of right eye and left eye, regardless of REF/KRT).

3 Setting is complete.

PRINT STYLE OF REF VALUES (REF DATA)

The print style of REF values can be set. Before shipment, the default setting is "ALL" (Print all data).

1 Tap the [Set Condition button] of the set item display "Ref Data" of "PRINT INT."



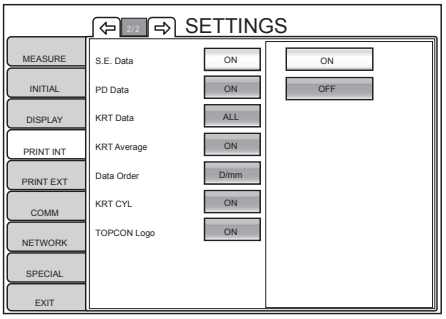
2 Tap the [Setting Change button] and select "ALL" (Print all data) or "AVE" (Print date, settings and typical REF values only).

3 Setting is complete.

PRINTING SE VALUES (S.E. DATA)

SE values can be printed. Before shipment, the default setting is "ON" (Print SE values).

1 Tap the [Set Condition button] of the set item display "S.E. Data" of "PRINT INT."



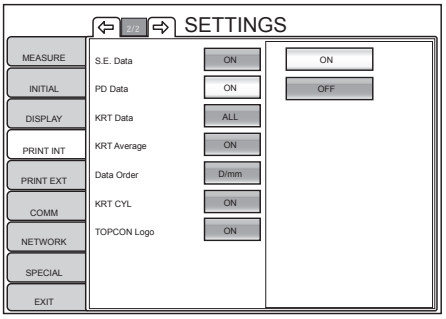
2 Tap the [Setting Change button] and select "ON" (Print SE values) or "OFF" (Do not print SE values).

3 Setting is complete.

PRINTING PD VALUES (PD DATA)

PD values (cornea peak distance) can be printed. Before shipment, the default setting is "ON" (Print PD values).

1 Tap the [Set Condition button] of the set item display "PD Data" of "PRINT INT."



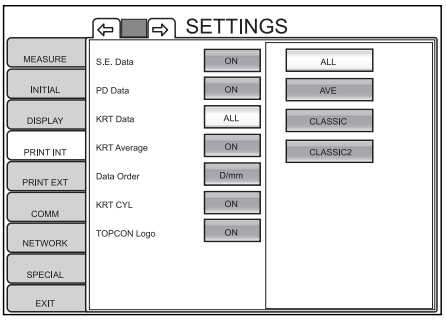
2 Tap the [Setting Change button] and select "ON" (Print PD values) or "OFF" (Do not print PD values).

3 Setting is complete.

PRINT STYLE OF KRT VALUES (KRT DATA)

The print style of KRT values (cornea shape measurement values) can be set. Before shipment, the default setting is "ALL" (Print all data).

1 Tap the [Set Condition button] of the set item display "KRT Data" of "PRINT INT."



2 Tap the [Setting Change button] and select desired print out style.

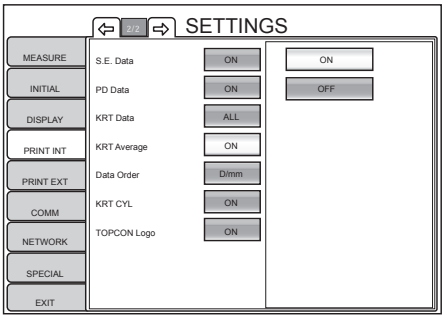
"ALL" : All data are displayed in printout.
"AVE" : Only average values are displayed in printout.
"CLASSIC" : All diopter values of KRT data are displayed in printout.
"CLASSIC 2" : All REF data are displayed in printout, and only typical values of diopter values in KRT data are displayed in printout.

3 Setting is complete.

PRINTING KRT AVERAGE VALUES (KRT AVERAGE)

Average KRT values (cornea shape measurement values) can be printed. Before shipment, the default setting is "ON" (Print average values).

1 Tap the [Set Condition button] of the set item display "KRT Average" of "PRINT INT."



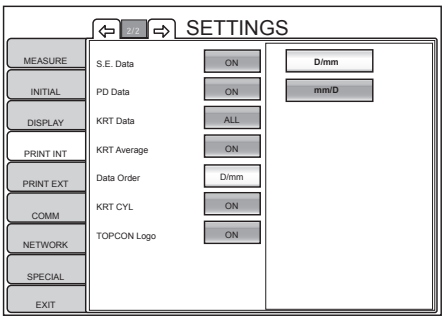
2 Tap the [Setting Change button] and select "ON" (Print average values) or "OFF" (Do not print average values).

3 Setting is complete.

PRINT SEQUENCE OF KRT VALUES (DATA ORDER)

The display sequence of cornea refractory power/radius curvature can be changed. Before shipment, the default setting is "D/mm" (Print diopter values first).

1 Tap the [Set Condition button] of the set item display "Data Order" of "PRINT INT."



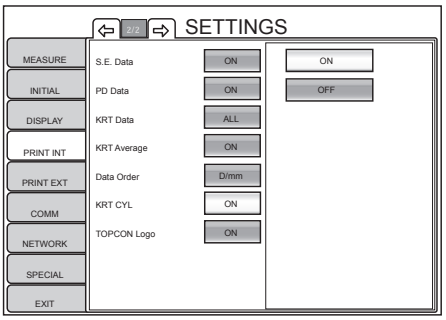
2 Tap the [Setting Change button] and select "D/mm" (Print diopter values first) or "mm/D" (Print mm values first).

3 Setting is complete.

PRINTING THE CORNEAL ASTIGMATIC POWER (KRT CYL)

The corneal astigmatic power and axial angle can be printed. Before shipment, the default setting is "ON" (Print corneal astigmatic power and axial angle).

1 Tap the [Set Condition button] of the set item display "KRT CYL" of "PRINT INT."



2 Tap the [Setting Change button] and select "ON" (Print corneal astigmatic power and axial angle) or "OFF" (Do not print corneal astigmatic power and axial angle)).

3 Setting is complete.

PRINTING THE TOPCON LOGO (TOPCON LOGO)

TOPCON logo can be printed. Before shipment, the default setting is "ON" (Print TOPCON logo).

1 Tap the [Set Condition button] of the set item display "TOPCON Logo" of "PRINT INT."

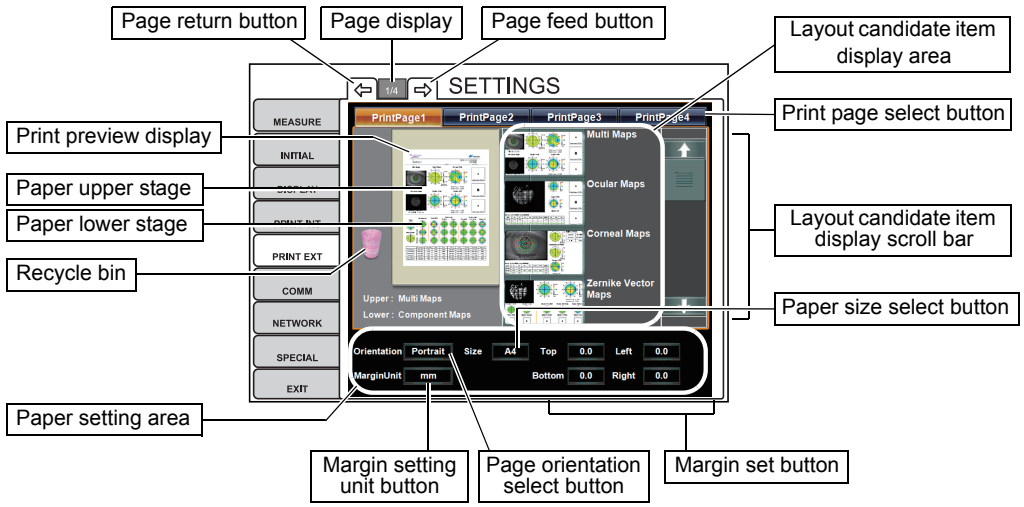
2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING OF EXTERNAL PRINTER (PRINT EXT)

PRINT EXT menu contains settings related to output layout of the external printer. The output layout can be registered up to 4 types. Before shipment, Multi map is placed at the upper stage and Component map is placed at the lower stage.

1 Tap the index "PRINT EXT" of the "SETTTINGS screen." The SETTTINGS screen for external printer is displayed.



2 Tap the [Page Feed button], [Page Return button] or [Print Page Select button] as needed, till the page to be registered is displayed.

3 Select the maps to be placed at the upper stage and lower stage of the paper.

Touch the [Layout candidate item display scroll bar] and display the items to be placed in the [Layout candidate item display area]. Place the items to be placed onto the Paper upper stage or Paper lower stage of the Print preview display by direct tap & drag from the [Layout candidate item display area].

4 To delete the placed item, carry by tap & drag the placed item from the Print preview display to the Recycle bin.

5 Tap the [Paper size select button] and select paper seize "A4" or "B5".

6 Tap the [Page orientation select button] and select the orientation of paper "Portrait" or "Landscape."

7 To adjust the margin, press the numerical display of the [Margin set button] and enter the number by the ten-key display.

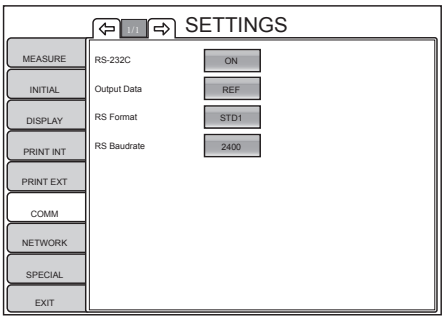
- The margin set unit can be selected from "mm" or "inch" by tapping the [Margin setting unit button].

8 Setting is complete.

SETTING OF DATA COMMUNICATION (COMM)

COMM menu contains settings related to data input/output with the external device via the RS232C.

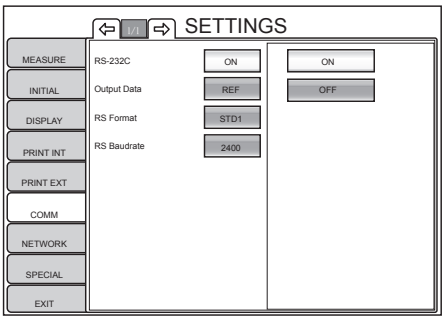
1 Tap "COMM" of the index of the "SETTTINGS screen." The Data communication setting screen is displayed.



RS-232C OUTPUT SETTING (RS-232C)

RS-232C use can be turned ON or OFF. Before shipment, the default setting is "OFF" (Do not use communication via RS-232C).

1 Tap the [Set Condition button] of the set item display "RS-232C" of "COMM."



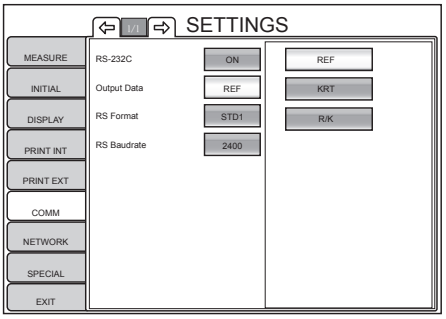
2 Tap the [Setting Change button] and select "ON" (Use communication via RS-232C) or "OFF" (Do not use communication via RS-232C).

3 Setting is complete.

SELECTING THE OUTPUT DATA STYLE (OUTPUT DATA)

The output data style can be selected. Before shipment, the default setting is "R/K."

1 Tap the [Set Condition button] of the set item display "Output Data" of "COMM."



2 Tap the [Setting Change button] and set the data style:

"REF" : Output REF measurement data only.
"KRT" : Output KRT measurement data only.
"R/K" : Output both REF measurement data and KRT measurement data.

3 Setting is complete.

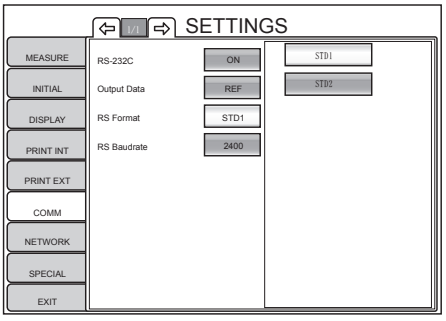
STTING THE COMMUNICATION FORMAT (RS FORMAT)

The communication format can be set. Before shipment, the default setting is "STD1."

1 Tap the [Set Condition button] of the set item display "RS Format" of "COMM."

2 Tap the [Setting Change button] and set the desired format

- When the setting of output data style is REF, KRT, REF/KRT:



To output all data of REF and KRT measurements, select "STD2."

3 Setting is complete.

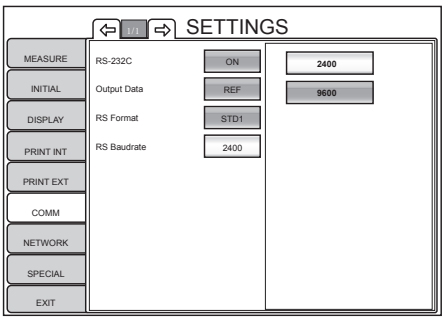
For questions about the RS-232C communication format, contact your dealer or TOPCON, as shown on the back cover.

To output data from the USB output terminal, STD1 or STD2 is used regardless of the setting here.

SETTING THE SPEED OF RS-232C COMMUNICATION (RS BAUDRATE)

The speed (baud rate) of RS-232C communication can be set. Before shipment, it is set to "2400" (baud rate 2400).

1 Tap the [Set Condition button] of the set item display "RS Baudrate" of "COMM."



2 Tap the [Setting Change button] and set the baud rate:

"2400" : Baud rate 2400

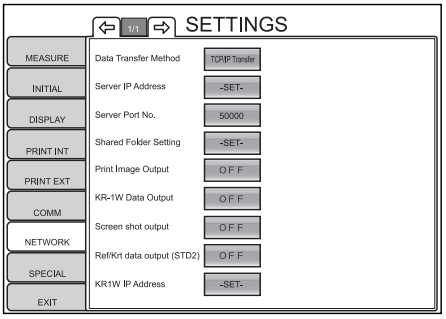
"9600" : Baud rate 9600

3 Setting is complete.

LAN CONNECTION (NETWORK)

NETWORK menu contains settings related to data input/output of the LAN.

1 Tap the index "NETWORK" of the "SETTTINGS screen." The LAN Connection screen is displayed.



SETTING THE DATA TRANSFER METHOD

The data transfer method can be set. Before shipment, the default setting is "TCP/IP Transfer".

1 Tap the [Set Condition button] of the set item display "Data Transfer Method" of "NETWORK. "

2 Tap the [Setting Change button] and select the "TCP/IP Transfer" or "Shared Folder Transfer".

3 Setting is completed by tapping the [OK button].

SETTING THE IP ADDRESS OF CONNECTED PC (SERVER IP ADDRESS)

The IP address of the PC connected to output data can be set.

1 Tap the [Set Condition button] of the set item display "Server IP Address" of "NETWORK. "

2 Enter the number by the ten-key display of the [Setting Change button].

3 Setting is completed by tapping the [OK button].

SETTING THE PORT NO. OF CONNECTED PC (SERVER PORT NO.)

The server port No. of the PC connected to output data can be set. Before shipment, the default setting is "50000."

1 Tap the [Set Condition button] of the set item display "Server Port No." of "NETWORK. "

2 Enter the number by the ten-key display of the [Setting Change button].

3 Setting is completed by tapping the [OK button].

SETTING THE SHARED FOLDER

The shared folder of data transferred can be set.

1 Tap the [Set Condition button] of the set item display "Shared folder setting" of "NETWORK. "

2 Tap the displayed keyboard, then enter "shared folder", "user" and "password".

3 Setting is completed by tapping the [OK button].

It is necessary to previously set the user, password and writing authority to the shared holder of the transferring destination.

SETTING THE PRINT IMAGE OUTPUT

When the [DATA OUT button] is pressed, output of the print image (image data) can be set to ON or OFF. Before shipment, the default setting is OFF.

1 Tap the [Set Condition button] of the set item display "Print Image Output" of "NETWORK. "

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

* Transferable print images are the image data of 4 layouts set by "SETTING OF EXTERNAL PRINTER (PRINT EXT)" on page 147. If "Setting of External Printer" has not been done yet, image data cannot be transferred.

SETTING THE KR-1W DATA OUTPUT

When the [DATA OUT button] is pressed, outputting measurement data to a connected PC, while simultaneously printing with the internal printer, can be set to ON or OFF. Before shipment, the default setting is OFF.

1 Tap the [Set Condition button] of the set item display "KR-1W Data Output" of "NETWORK."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE SCREEN SHOT OUTPUT

Screen shot is a function that allows the Analysis Result screen to be output.
In KR-1W, the Analysis Result screen displayed on the main body is outputted in the bit map style.

When the [DATA OUT button] is pressed, outputting the screen shot to a connected PC, while simultaneously printing with the internal printer, can be set to ON or OFF, Before shipment, the default setting is OFF.

1 Tap the [Set Condition button] of the set item display "Screen Shot Output" of "NETWORK. "

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is completed by tapping the [OK button].

SETTING REF/KRT DATA OUTPUT

When the [DATA OUT button] is pressed, outputting measurement data to a connected PC, while simultaneously printing with the internal printer, can be set to ON or OFF. Before shipment, the default setting is OFF.

1 Tap the [Set Condition button] of the set item display "REF/KRT Data Output" of "NETWORK."

2 Tap the [Setting Change button] and select "ON" or "OFF."

3 Setting is complete.

SETTING THE KR-1W IP ADDRESS

The IP address of KR-1W can be set.

1 Tap the [Set Condition button] of the set item display "KR-1W IP Address" of "NETWORK. "

2 Enter the number by the ten-key display of the [Setting Change button].

3 Setting is completed by tapping the [OK button].

SETTING THE KR-1W SUBNET MASK

The subnet mask of KR-1W can be set.

1 Tap the [Set Condition button] of the set item display "KR-1W Subnet Mask" of "NETWORK. "

2 Using the ten-key display of the [Setting Change button], enter the same subnet mask as that of the PC to be connected.

3 Setting is completed by tapping the [OK button].

SETTING THE KR-1W DEFAULT GATEWAY

The default gateway of KR-1W can be set.

1 Tap the [Set Condition button] of the set item display "KR-1W Default Gateway" of "NETWORK. "

2 Using the ten-key display of the [Setting Change button], enter the same default gateway as that of the PC to be connected.

3 Setting is completed by tapping the [OK button].

MAINTENANCE AND CHECKING

DAILY MEAINTENANCE

CHECKING THE MEASURING ACCURACY

Using the model eye provided with the instrument, check the measurement accuracy at regular intervals.

Keep this instrument free of dust. When not in use, put the measuring lens cap and dust cover on.

When not in use, turn off the POWER switch.

CLEANING THE INSTRUMENT

- Dust on examination window.....Blow off dust using a blower.
- Fingerprints and oil spots on measuring window .....Wipe the surface lightly with monitor cleaner, provided with the instrument.

PRINTER PAPER JAM

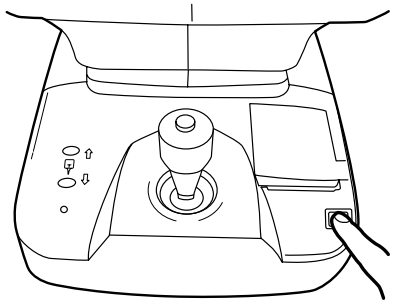
CAUTION	To avoid potential injury, do not touch the internal printer body while the printer is in operation or when replacing the printer paper.

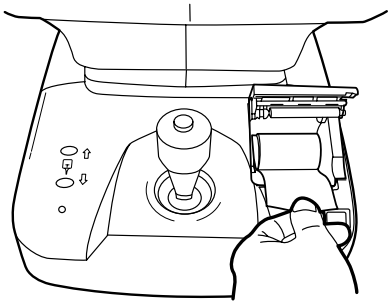
CAUTION	To avoid failure or potential injury, do not open the printer cover while the printer is in operation.

CAUTION	To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.

MEMO	• If paper jam occurs inside the printer, printing is not done, and, using the printer further without removing the jammed paper may cause a failure.

1 Press the printer cover OPEN button, open the printer cover, and take out the jammed paper with the paper retainer lever fully released.



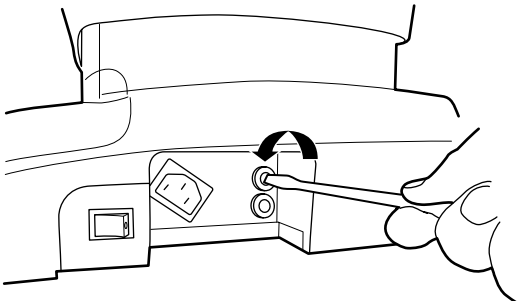


REPLACING THE FUSE

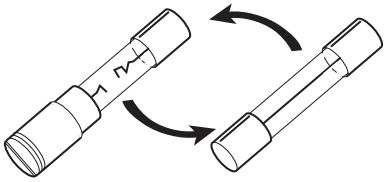
WARNING	To avoid electric shock when replacing the fuse, be sure to unplug the instrument before removing the fuse cover. Do not use ungrounded outlets. Do not plug in the instrument without the fuse cover.

1 Make sure the power is OFF and the power cable is unplugged.

2 Press the fuse holder with a screwdriver and turn it counterclockwise.
The fuse holder can be removed.

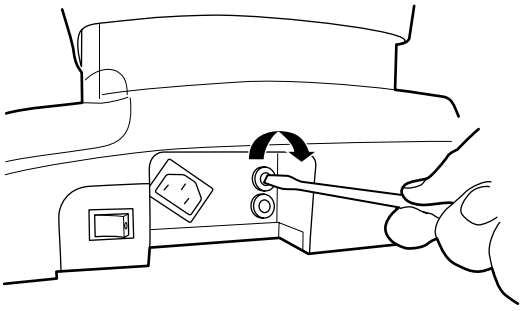


3 Replace the fuse with the proper fuse provided with the instrument.



Replacing the fuse

4 Press the fuse holder lightly with a screwdriver and turn it clockwise.
The fuse holder is now reset.



SPECIAL NOTE OF CLEANING

CLEANING THE OUTER COVER AND MONITOR SCREEN

⚠ **CAUTION**	Do not use or apply any spray-type cleaner near the instrument. If the cleaner remains inside the measuring nozzle, the patient's eye may be injured during measurement.

1. If outer covers, control panel screen and the operation panel are stained, clean them with a soft dry cloth.
2. If the stain of outer covers is extreme, use a neutral tableware detergent and warm water. Dip a soft cloth in the solution, squeeze out excess water and then wipe off the stain.

CLEANING THE MONITOR SCREEN

MEMO	As the control panel screen is a touch panel, be sure to turn of the [POWER switch] before wiping. The touch panel will react and malfunction.

MEMO	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 rub with the attached monitor cleaner.

Contamination by Fingerprints

Rub with the attached monitor cleaner.

If the stain is persistent, moisten the monitor cleaner with water and then wipe off the stain.

CLEANING THE COMPONENTS TOUCHING THE PATIENT

If the forehead rest and chinrest become stained, use a neutral tableware detergent and warm water. Dip a soft cloth in the solution, squeeze out excess water and then wipe off the stain.

ITEMS OF SPECIALIST MAINTENANCE

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

BEFORE REQUESTING SERVICE

CHECKING OPERATIONS

WARNING	Do not open the cover. For repair, contact your authorized Topcon distributor. Keep the instrument in a dry place.

If a problem is suspected, perform checks following the Check List shown below. If the problem does not improved by the suggested remedy or if it is not described in the list, call your dealer or TOPCON, printed on the back cover of this manual.

CHECK LIST

Problem:	Check point:	Remedy:	Page:
Control panel does not work.	Power cable is not plugged into receptacle.	Plug in power cable.	27
	Power cable is not plugged into instrument body.	Plug power cable into instrument body.	27
	Power save status is on.	Return to normal status by pressing the MEASRE-MENT switch on control lever.	31
	Fuse is burned.	Replace fuse.	155
Control panel is not clear.	The image is dark.	Adjust the brightness of monitor screen by the LCD brightness control of SET-TINGS screen.	121
Auto measurement is not possible.	Measuring window needs to be cleaned.	Clean measuring window.	154
	Condition of patient's eye is not good.	Do measurement under manual mode.	44,48
	Manual mode is on	Change it to auto mode.	39
Paper comes out unprinted.	Printer paper winding is reversed.	Set printer paper correctly.	29
Paper does not come out.	Printer paper is used up.	Supply printer paper.	29
Communication is not possi-ble.	Setting of communication format is incorrect.	Reset communication format.	149
Anomaly in control lever and other movable components		Leave it as is, and call Topcon service.	-
Main body does not start correctly.		Leave it as is, and call Topcon service.	-
Failed in network data trans-mission.	LAN cable is unplugged.	Plug LAN cable.	28
	IP address is not set cor-rectly in LAN connection setting.	Check and reset LAN con-nection setting of main body and connected PC.	151

REFERENCES

MESSAGE LIST

START

"Paper end. Please set the paper."	Paper end. Please set new paper.
"Close printer cover."	Printer cover is open.

MEASUREMENT SCREEN

"OVER-SPH"	Spherical power exceeds +22D or -25D (at VD=12mm).
"OVER-CYL"	Cylindrical power exceeds ±10D (at VD=12mm).
"OVER-R"	Corneal curvature exceeds 5.00-10.00mm.
"NO TARGET"	No patient's eye or the eye image is too dark.
"NO CENTER"	Not possible to find the center of patient's eye.
"Please move to center eye, and focus on."	The eye center is off the alignment range. Touch the eye center on the control panel.
"Please focus on eye"	Tilt the control lever back and forth so as the ring look clearer.
"No measurement data and analyzed result."	No measurement was done. Perform measurements.
"Close printer cover. Please push OK button and DATA OUT button after you close the cover."	Printer button is pushed with the printer cover open.
"Paper end. Please push OK button and DATA OUT button after you set the paper."	Printer paper is used up.
"Unable to connect the network."	Displayed when the KR-1W data output is turned ON and the [DATA OUT button] is pressed, without connecting the PC.
"Failed to send the data via network".	Ethernet data transmission has failed.
"Nothing is output in this setting. Please change the settings."	When settings are as follows, this is displayed by tapping DATA OUT button: • Initial setting: Thermal printer (Do not use) • Data communication: RS-232C output setting (OFF) • LAN connection: KR-1W data output (OFF) • USB: Not connected
"Outputting data..."	Data exporting...
"Data output finished."	Data export has been completed.
"ERROR : Failed to send the data via RS-232C"	RS232C data transmission has failed.
"ERROR : Failed to send the data via USB"	USB data transmission has failed.

ANALYSIS SCREEN

"USB Printer is not connected."	Check if the USB cable is connected correctly. Check if the USB printer is powered ON.
"Unable to capture Hartmann image."	Possibly damaged. Call Topcon service.
"Unable to capture Mire image."	Possibly damaged. Call Topcon service.
"Print-Layout is nothing."	Select the external printer from the settings screen, and set the print layout.
"Nothing is output in this setting. Please change the settings."	When settings are as follows, this is displayed by tapping DATA OUT button: • Initial setting: Thermal printer (Do not use) • LAN connection: Print image output (OFF) • LAN connection: Screen shot output (OFF)
"Data output finished."	Data output is completed.

SETTINGS SCREEN

"The data is invalid."	Enter a number within the reference range.
"Unable to set KR1W network setting."	IP address of KR-1W could not be changed.
"The specified IP address already exists. please change to another address."	Change the IP address of KR-1W to another address.
"Unable to write the setting data."	Displayed when the saving of setting was not successful. (Setup)
"The password is invalid."	Setting screen for service engineer only - Do not use.
"The value of analysis screen layout button set value X and Y overlaps. These values must set for it not to overlap."	Indicates that multiple layout buttons of the analysis screen are set to the same analysis screen

THUMBNAIL SCREEN

"Please select a data."	Select the data to be deleted.
"Unable to delete data."	Displayed when the data which cannot be deleted is selected.
"Failed to delete data."	Displayed when deletion of data was unsuccessful.

WHEN CLOCK CELL HAS RUN OUT

"KR-1W built-in battery is running out. Please call our service engineer. Please set data and time before you measure because calender was cleared."	Internal battery as run out. Call Topcon/Dealer service center to solve this problem. Measurement is performed as it is but recommend to reset Data/Time.

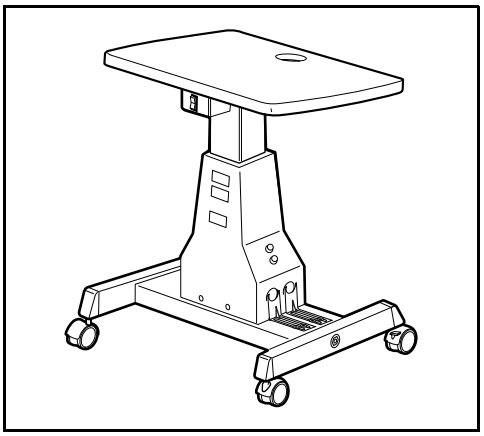
OPTIONAL ACCESSORIES

Automatic instrument table AIT-16

Because the instrument height can be adjusted to the desired position, you can take a picture more easily.

Specification

- Dimensions .....525(W)x490(D)mm
- Table height.....660 - 880mm
- Table size .....490 x 500mm
- Weight.....Approx. 23kg
  (only the instrument body)
- Power consumption ...220VA



- RS232C on-line cable

ORDERING CONSUMABLE SUPPLIES

When ordering consumable supplies, tell your dealer the product name, part No. and the necessary quantity.

Product name	Part No.
Chinrest tissue	40310 4082
Monitor cleaner	31087 2007
Dust cover	42360 9002
Printer paper	44800 4001
Fuse 3A 250V	T2400 0158A

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)

MARKS DISPLAYED OUTSIDE THE MAIN BODY

Symbol	IEC Publication	Description	Description (French)
	60417-5032	Alternating Current	Courant alternatif
	60348	Attention, consult accompanying documents	Attention, consulter les documents d'accompagnement
	60417-5008	Off (power: disconnection from the main power supply)	Eteint (courant: coupure avec le secteur)
	60417-5007	On (power: connection to the main power supply)	Allume (courant: raccordement sur le secteur)
	60878-02-02	Type B applied part	Partie appliquee du Type B

RS232C COMMUNICATION SPECIFICATIONS

BASIC SPECIFICATION

EIA RS232C

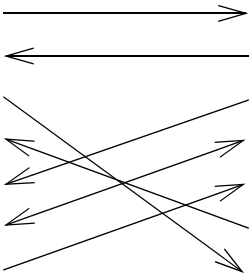
CONNECTOR TYPE

DIN 8-pin
TCS0838-0120577 (HOSIDEN): Instrument side

INPUT TERMINAL PIN ARRANGEMENT

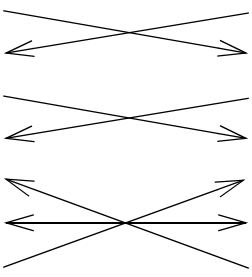
DIN 8pin - D-sub 9pin connection

Code	Description	KR-1W side	External device side
SD (TXD)	Data transmission	2	2
RD (RXD)	Data receiving	3	3
RS (RTS)	Request transmission	4	4
CS (CTS)	Transmission ready	5	5
DR (DSR)	Data set ready	6	6
SG (GND)	Signal grounding	7	7
ER (DTR)	Data terminal ready	8	8



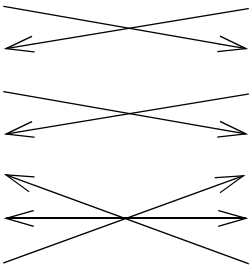
DIN 8pin - D-sub 25pin connection

Code	Description	KR-1W side	External device side
SD (TXD)	Data transmission	2	2
RD (RXD)	Data receiving	3	3
RS (RTS)	Request transmission	4	4
CS (CTS)	Transmission ready	5	5
DR (DSR)	Data set ready	6	6
SG (GND)	Signal grounding	7	7
ER (DTR)	Data terminal ready	8	20



DIN 8pin - DIN 8pin connection

Code	Description	KR-1W side	External device side
SD (TXD)	Data transmission	2	2
RD (RXD)	Data receiving	3	3
RS (RTS)	Request transmission	4	4
CS (CTS)	Transmission ready	5	5
DR (DSR)	Data set ready	6	6
SG (GND)	Signal grounding	7	7
ER (DTR)	Data terminal ready	8	8



TRANSMISSION FORMULA

RTS-CTS control

Synchronization	Non-synchronous
Communication speed	2400/9600 bps
Start bit	1 bit
Stop bit	1 bit
Data length	8 bit
Parity	None
Operating code	ASCII code

SPECIFICATIONS

SPECIFICATION AND PERFORMANCE

Range of Refractory Measurement	Spherical refractive power: -25 to +22D (0.01D/0.12D/0.25D steps) Cylindrical refractive power: 0D to ±10D (0.01D/0.12D/0.25D steps) Direction of astigmatic axis: 0 to 180° (1° /5° steps) (where, spherical refractive power + cylindrical refractive power ≤ +22D, or spherical refractive power + cylindrical refractive power ≥ -25D)
Range of Cornea Curvature Measurement	Measurement range: ϕ8mm (max.) Measured minimum pupil diameter: ϕ2mm Cornea curvature radius:5.00 to 10.00mm(0.01mm steps) Corneal refractive power:67.50 to 33.75D(0.01D/0.12D/0.25D steps) (where, corneal refractive power =1.3375) Corneal astigmatic power: 0D to ±10D (0.01D/0.12D/0.25D steps) Direction of corneal astigmatic axis: 0 to 180° (1° /5° steps) Cornea shape measurement range: ϕ0.8mm to ϕ9.2mm (where, cornea curvature radius=8mm)
Range of PD Measurement	20-85mm (1mm display units)
External connection terminal	USB (input/output, output), RS-232C (output), LAN (input/output)

* For product improvements, these specifications are subject change without notice.

Essential Performance
The character shake of the picture on LCD
Failure operation and motor sound of a control lever

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN STORAGE

ENVIRONMENTAL CONDITIONS (WITHOUT PACKAGE)

Temperature: +10°C to +40°C
Humidity: 30% to 90%RH (without condensation)
Atmospheric pressure: 700hPa to 1060hPa

ENVIRONMENTAL CONDITIONS OF STORAGE

(Product unprotected, ready for operation, power supply not connected)
*Temperature: +10°C to +40°C
Humidity: 10% to 95%RH (without condensation)
Atmospheric 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.**

ENVIRONMENTAL CONDITIONS OF STORAGE

(Product in its normal transport and storage container as provided by manufacturer)
Temperature: -20°C to +50°C
Humidity: 10% to 95%RH

ENVIRONMENTAL CONDITIONS OF TRANSPORT

(Product in its normal transport and storage container as provided by manufacturer)
Temperature: -40°C to +70°C
Humidity: 10% to 95%RH

ELECTROMAGNETIC COMPATIBILITY

This product conforms to the EMC Standard (IEC 60601-1-2 Ed.3.0:2007).

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	Parts code	Cable shield	Ferrite core	Length (m)
AC power cord	4480470020	No	No	1.5
RS-232C CROSSING CABLE	418120002	Yes	Yes	3.0
USB CABLE	-	No	No	3.0
LAN CABLE	-	No	Yes	3.0

Guidance and manufacturer's declaration - electromagnetic emissions		
The KR-1W is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-1W should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The KR-1W 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-1W 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-1W is intended for use in the electromagnetic environment specified below. The customer or the user of the KR-1W 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-1W requires continued operation during power mains interruptions, it is recommended that the KR-1W 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-1W is intended for use in the electromagnetic environment specified below.
The customer or the user of the KR-1W 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-1W, 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-1W is used exceeds the applicable RF compliance level above, the KR-1W should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the KR-1W.

[b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than $[V_1]$ V/m.

Recommended separation distance between portable and mobile RF communications equipment and the KR-1W

The KR-1W is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the KR-1W can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the KR-1W 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.

DIMENSIONS AND WEIGHT

Dimensions: 304(W)x521(D)x474-504(H)mm
Weight: 23kg

PURPOSE OF USE

To measure the refractive power of the eye with a function of cornea topography, and to present the measurement data to the eye care professional.

OPERATIONS AND PRINCIPLE OF OPERATION

To receive light flux from a secondary light source, projected from a light source (point light source) placed at a position conjugate to the eyeground and formed on the retina, by a CMOS sensor through a Hartmann board (formed with a two-dimensionally lined small lens array), and determine the spherical refractive power, cylindrical refractive power, direction of astigmatic axis and refractive wavefront aberration through computation.
To project a Placido ring to the cornea, receive the reflected image from the cornea surface using a CCD camera, and determine the curvature radius, corneal refractive power, direction of corneal astigmatic axis and corneal wavefront aberration through computation, and, to display the distribution of curvature radius by mapping.

ELECTRIC RATING

Supply voltage: 100-240VAC, 50-60Hz
Power input: 160VA

LASER ILLUMINATION SYSTEM

Laser output: 1.2mW or less
Laser wavelength: 820nm - 840nm
Laser medium: Super luminescence diode (SLD)
Laser class: 1M
Laser exit: Measuring window

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.

TERMINOLOGY

DESCRIPTION OF TERMS

Related information of terms can be found in the cited pages.

0 - 9		
Term	Description	Page
2nd Astig	A type of high order aberration. Astigmatism. Shows aberration of the 4th order of Zernike polynominal equation (-2 and 2 terms).	69,70, 125
A - Z		
Term	Description	Page
Aberration	Astigmatism.	
Absolute	A type of color code scale of analysis result. For KR-1W, three types of scales, absolute/adjustable/ normalized are available. "Absolute" is a relative scale having constant color code center value and variable display step.	130
Adjustable	A type of color code scale of analysis result. For KR-1W, three types of scales, absolute/adjustable/ normalized are available. "Adjustable" is a relative scale having variable color code center value and variable display step.	130
Alignment Mark	Range of alignment measurement. Beyond the range, reliability of measurement is low.	39
Analysis center	Analysis center used in analysis. If pupil is detected, the pupil center is used. If pupil is not detected, mechanical center (cornea vertex) is used for analysis.	65,88
Angle Scale Overlay	KR-1W can display angles, horizontal direction as 0°, in the aberration map.	79,128, 130,132
Astig (4mm)	Low order astigmatism (with 4mm analysis diameter). Also called corneal astigmatic power (corneal system) or cylindrical refractive power (ocular system).	73
Astigmatism map	Aberration map using a low order astigmatism map.	69
Auto mode	Alignment measurement mode. In KR-1W, three types of Full Auto (auto alignment) mode, Auto Tracking mode and Manual mode are available.	34,39, 108,112
Auto print	After finishing measurement, Ref/Kerato measurement values are printed out from internal printer.	41,116

Term	Description	Page
Auto Tracking Mode	Measuring head automatically performs tracking and moves to measurement position, but measurement does not start unless measurement switch is pressed. Used when automatic alignment is desired but preferably measurement timing can be selected as desired.	42,108
AVE	Average value.	55
Average K	Kerato value with 3mm analysis value (Sim K).	73
Axial Power map	Map showing the distribution of corneal refractive power.	69
Axis Map Center (deg)	Information is displayed by tapping the enlarged map. "Axis Map center (deg)" shows the angle (°) of tap position from map center.	80
Axis Map Center To Pupil Center (deg)	Information is displayed by enlarging the map. "Axis Map center To Pupil center (deg)" shows the direction of pupil center (from map center) with angle (°).	80
Axis Pupil Center (deg)	Information is displayed by tapping the enlarged map. "Axis Pupil center (deg)" shows the angle (°) of tap position from pupil center.	80
Axs	Short for Axis, meaning axial angle.	88
Brightness of Fixation Target	Brightness of the landscape chart seen when patient looks in the measuring window.	35,109
Central K	Kerato value with 1mm analysis diameter.	73
Coma	A type of high order aberration. Coma aberration. Shows aberration of the 3rd order of Zernike polynominal equation (-1 and 1 terms).	69,69, 69,125
Coma aberration	Aberrations of odd orders (as 3rd, 5th, etc.) of Zernike polynominal equation are expressed altogether as coma aberration.	89
Component map (analysis result display map)	Displays aberration of the whole eyeball obtained from Hartmann image, aberration of cornea obtained from Mire image, and intraocular high order aberration (aberration of the whole eyeball minus aberration of cornea).	69
Cont. cycle	Number of continuous measurements under Auto mode.	108,112
Continuous Measurement Of Right and Left Eyes	Under auto alignment measurement mode, KR-1W can set to measure one eye only or to measure both eyes.	107
Control lever	Used when measuring patient manually. Measuring head can be moved up/down, right/left and back/forth, and a measurement switch is attached.	12
Control Panel	Monitor screen to display patient's condition and analysis results. As KR-1W adopts touch panel system, it is also used for operation.	12,14

Term	Description	Page
Corneal aberration map (analysis result display map)	Corneal aberration map displays the corneal aberration obtained from Mire image and cornea form with color code map. Displays also corneal index (corneal form index) and RMS of corneal aberration of Zernike polynominal equation.	67,88
Corneal coordinate value	By tapping the enlarged map of analysis result, distance and angular direction from cornea center are displayed.	80
Corneal display	Display related to cornea.	70,125
Corneal HOA map	Color code map displaying the corneal high order aberration calculated by Zernike polynominal equation.	64,89
Corneal Index	Corneal form index. Displays refractive power and eccentricity (aspheric degree) of flat/steep meridian of 3mm area on the cornea.	68
Corneal RMS	Root mean square of corneal aberration obtained from Mire image.	68
Corneal R-L Map (Analysis Result Display Map)	The Corneal R-L map displays the corneal aberration and cornea shape of both eyes obtained from the Cornea Mire map.	77
Corneal spherical aberration	A type of corneal high order aberration. Corneal spherical aberration. Spherical aberration of the 4th order of Zernike polynominal equation (0 term).	73
Cross Scale	KR-1W can display cross scale on measurement result map.	79,128, 129,131
Cyl	Astigmatic axial power, meaning cylindrical refractive power (ocular) and corneal astigmatic power (cornea).	89
D/mm Display Change	Display unit of measured Kerato value can be changed between D (diopter, corneal refractive power) and mm (corneal curvature radius).	126
DATA OUT button	Function button on the measurement screen of main body. In KR-1W, this is used for printing measurement result by internal printer, or for transmitting data via network.	15
Diameter	Pupil diameter.	88
Distance Map center (mm)	Information is displayed by tapping the enlarged map. "Distance Map Center (mm)" shows the distance (mm) of tap position from pupil center.	80
Distance Map Center To Pupil Center	Information is displayed by enlarging the map. "Axis Map Center To Pupil Center (mm)" shows the distance (mm) of pupil center (from map center).	80
Drag	Operation to touch and move finger on screen.	13
e value	Eccentricity indicating aspheric degree.	68

Term	Description	Page
Fogging During Continuous Measurement	For KR-1W, when performing Ref measurement more than once, to perform fogging for each measurement or to perform fogging only once in the first measurement can be set. For example, when auto alignment mode is "FULL AOTO," number of continuous measurements under Auto mode is "3," and R-L continuous measurement is "BINO," select "ONCE" to perform fogging in the first measurement each of right/left eyes, or select "ALWAYS" to perform fogging for each measurement.	113
Fourth-order Display	4th order of Zernike polynominal equation.	70
Hartmann Detection Grid Overlay	To detect Hartmann point image, detection area is displayed.When grid overlay is displayed, Hartmann point image cannot be detected if it is out of the range.	82,128
Hartmann Detection Point Overlay	From the Hartmann image displayed on analysis result screen, the range where the recognized point image is located can be confirmed. Point overlay is overlapped.	82,128
Hartmann Image	Image taken by Hartmann-Shack sensor's principle. In KR-1W, Ref measurement values and wavefront aberration related to eyeball are calculated.	62,64,81
High Order Aberration (irregular astigmatism)	Aberrations of Zernike polynominal equation (3rd and higher orders). Called irregular astigmatism, which cannot be corrected by eyeglasses and contact lenses.	73,80,88
HOA	Short for High Order Aberration.	125
HV	Corneal curvature radius (mm) in horizontal/vertical direction or corneal refractive power (D) and the angle, obtained from the results of Kerato measurement.	126
I Mark	Mark displayed in the receipt outputted by internal printer in IOL mode measurement.	20
Instantaneous Power map	Map showing corneal refractive power with local power distribution.	68,125
Internal Aberration	Intraocular aberration obtained by (aberration of the whole eyeball minus aberration of cornea).	70
IOL Mode	Hartmann image may become unmeasurable on eyes wearing IOL and eyes suffering cataract. In this case, KR-1W, using IOL mode, can change camera's exposure time and lower error rate.	109
IOL Selection Map (analysis result display map)	Map displaying analysis information necessary for prescribing IOL.	72
K value	Kerato measurement value.	72
Landolt's Ring Simulation	View of Landolt's ring by complete correction can be seen in simulation. Landolt's ring is seen clearly when there is no high order aberration, but not seen clearly when high order aberration exists.	63,82, 132

Term	Description	Page
Limit Message	Displayed with icon when measuring head reaches the limit of movement. To clear the message, move measuring head by control lever.	40
Luminous Point	Index for performing auto alignment.	39
Machine No.	Instrument No.	14
Marker Overlay	The angle of the tap position with regard to the flat meridian (black) is displayed. Also, the steep meridian is displayed in gray.	85
Measurement Data List	Button on the measurement screen of main body. In KR-1W, Ref/Kerato measurement values are displayed in list form.	55
Measurement Result List screen	List of measurement results can be confirmed.	59
Mire Image	Image taken by CCD camera by projecting ring beam from Placido ring to patient.	64,81
mm Grid scale	KR-1W can display grid on maps of measurement results.	81,129, 130,132
MTF Image	Short for Modulation Transfer Function, showing the contrast sensitivity of eye having aberration.	74,94
MTF Image Graph	Graph showing the sensitivity calculated by MTF along vertical axis and the space frequency along horizontal axis, and featuring curves' performance which increases towards upper right and decreases towards lower left.	74,94
Multi Map (analysis result display map)	Displays the analysis result obtained by Hartmann image and Mire image.	63
Normalized	A type of color code scale of analysis result. For KR-1W, three types of scales, absolute/adjustable/ normalized are available. "Normalized" is a relative scale with automatically selected color code center value and display step.	130
Ocular	Display related to eyeball.	70,125
Ocular HOA map	High order aberration of the ocular aberration obtained from Hartmann image.	66
Ocular R-L Map (Analysis Result Display Map)	The Ocular R-L map displays the Hartmann image, ocular high order aberration map, Landolt's simulation, measurement values, etc. of both eyes.	78
Ocular Total Aberration map	Aberration of the whole eyeball obtained from Hartmann image.	64
Packing mode	Automatically returns movable parts of KR-1W (measuring head and chinrest) to packing positions (measuring head to origin position, chinrest to bottom position).	122
Patient ID button	Button to input patient ID.	14
Photopic	Means bright place measurement.	54

Term	Description	Page
Placido ring	Ring-shaped part around the measuring window of main body. In KR-1W, measuring beam is projected from Placido ring, and the measured cornea shape is calculated by receiving the ring beam reflected by patient's cornea surface.	12
Power save	When not used for certain period, screen saver is actuated and main body gets into power save status. Time to get into power save status can be set.	31
Printer cover open button	Used to open printer cover.	12,29
Progress bar	Display showing progress of startup on start screen.	37
Progress measurement	By continuously performing measurement for 10 shots at a rate of 1 shot/1 sec., you can see the condition of aberration changing by elapsed time, such as dry eyes.	51
Pupil Diameter Center Travel Distance	Distance of pupil center and mechanical center (corneal vertex).	88
Pupillometry Map (Analysis result display map)	The pupil diameter measured under pupillometry mode and analysis results of wavefront aberration are displayed.	75
Q value	Aspheric coefficient.	68
R button, L button (right/left change button)	Used to change right/left eyes, and displays the position of measuring head in orange. When measuring head is at the eye to be measured, pressing the button displays lock icon and single-eye measurement mode sets in.	14
R/K change button	Used to change measurement mode between Ref & Kerato/Ref/Kerato.	15
REF/KRT measurement mode	Measurement mode of simultaneous Ref & Kerato measurement, single Ref measurement and single Kerato measurement. Since KR-1W calculates Ref measurement values from Hartmann image, it can also perform analysis related to ocular aberration. For analysis, pupil diameter is required; Mire image can be obtained even by single Ref measurement mode. However, since only detection of pupil diameter is done and detection of Mire ring is not done, analysis related to cornea shape cannot be done. For Kerato, as Kerato measurement values are calculated from Mire image, cornea shape can also be analyzed. Since Hartmann image is not obtained, analysis of ocular aberration cannot be done.	33

Term	Description	Page
R-L Travel Distance	When measuring right/left eyes under auto alignment measurement mode, KR-1W can set the distance of movement from one eye to the other. "R-L Travel Distance" means the travel distance, and it can be set between 58mm and 74mm in 1mm unit.	122
RMS	Short for Root Mean Square. Standard deviation of ideal wavefront and actual wavefront. A unit for expressing aberration quantitatively.	-
SA (Spherical Aberration)	Short for Spherical Aberration. 4th order of Zernike polynominal equation, meaning spherical aberration.	73
Scotopic	Means dark place measurement.	54
Screen Layout	Custom layout to select and display maps and RMS as desired. In KR-1W, screen layout can be prepared up to four types.	124
Screen Shot Output	Function to data-output analysis result screen. KR-1W outputs the analysis result screen displayed in main body in bit map style.	152
Sim-K	Short for Simulated Aberration. In KR-1W, the highest refractive power value at the ϕ3mm position from cornea apex is expressed as Sim-Ks and the lowest refractive power value as Sim-Kw. Axis of Sim-Ks/Sim-Kw is called the Sim-K axis.	81
Sim-Ks	Refractive power of the flat meridian of 3mm area of Kerato analysis diameter.	68
Sim-Kw	Refractive power of the steep meridian of 3mm area of Kerato analysis diameter.	68
Smoothing	The Topo-map smoothing function performs analyses by changing the production algorithm of map information of the Axial Power map and Instantaneous Power map.	84
Sph	Spherical refractive power.	88
Spherical Aberration	Aberrations of even orders (as 4th, 6th, etc.) of Zernike polynominal equation are expressed altogether as spherical aberration.	89
Summary map (analysis result display map)	When right and left eyes are measured more than once, Summary map can display ocular total aberration and Landolt's ring simulation for each measurement.	71
Tap	Light touch to button on screen.	13
Temporary Setting	Function used to temporarily perform measurements under certain conditions. Single-eye measurement mode, IOL mode, etc. can be set. After measurement (and data output), the system returns to the initial status.	98,107

Term	Description	Page
Tetrafoil	A type of high order aberration. Shows aberration of the 4th order of Zernike polynominal equation (-4 and 4 terms).	70,125
Third-order display	In KR-1W, 3rd order terms of Zernike polynominal equation are displayed.	69
TopoMap overlay	Overlay of the Corneal Axila map and Corneal Instantaneous map can be overlayed to the corneal Mire image of the Corneal Aberration map.	85
Total HOA (Total High Order Aberration)	Analyzed total high order aberration.	73
Trefoil	A type of high order aberration. Shows 3rd order terms of Zernike polynominal equation (-3 and 3 terms)	91,125
Vertex distance	Means the right-left vertex distance.	14,114
Waiting Position After Measurement	KR-1W can select the waiting position of measuring head after finishing auto mode measurement.	113
Wave-front/PSF Image	PSF is short for Point Spread Function. In the KR-1W, it is possible to see how the point light source is focused, after being completely corrected and affected by aberration.	75
Zernike Analysis Diameter	Area for analysis of the obtained image. In KR-1W, it is both possible to use the detected pupil diameter and to specify an analysis diameter. On analysis result screen, analysis is always done in 4mm and 6mm areas.	115
Zernike Vector Map (analysis result display map)	Map to display the ocular aberration and Landolt's ring simulation obtained from Hartmann image by major components of 3rd/4th order of Zernike polynominal equation. Hartmann image, ocular total aberration and ocular high order aberration can also be displayed.	70
Zoom Down button	Used to reduce the enlarged map screen. The same effect can be attained by dragging the map from top downward.	79

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  http://go.microsoft.com/fwlink/?LinkId=25243
  - **Web Content Features.** Under the SOFTWARE's default configuration, if you are connected to the Internet, several features of the SOFTWARE are enabled by default to retrieve content from Microsoft computer systems and display it to you. When you activate such a feature, it uses standard Internet protocols, which transmit the type of operating system, browser and language code of your DEVICE to the Microsoft computer system so that the content can be viewed properly from your DEVICE. These features only operate when you activate them, and you may choose to switch them off or not use them. Examples of these features include Windows Catalog, Search Assistant, and the Headlines and Search features of Help and Support Center.
  - **Digital Certificates.** The SOFTWARE uses digital certificates based on the x.509 standard. These digital certificates confirm the identity of Internet users sending x.509 standard encrypted information. The SOFTWARE retrieves certificates and updates certificate revocation lists. These security features operate only when you use the Internet.
  - **Auto Root Update.** The Auto Root Update feature updates the list of trusted certificate authorities. You can switch off the Auto Root Update feature.
  - **Windows Media Player.** Some features of Windows Media Player automatically contact Microsoft computer systems if you use Windows Media Player or specific features of it: features that (A) check for new codecs if your DEVICE does not have the correct ones for content you attempt to play (this feature may be switched off), and (B) check for new versions of Windows Media Player (this feature will operate only when you are using Windows Media Player).
  - **Windows Media Digital Rights Management.** Content providers are using the digital rights management technology for Windows Media contained in this SOFTWARE ("WM-DRM") to protect the integrity of their content ("Secure Content") so that their intellectual property, including copyright, in such content is not misappropriated. Portions of this SOFTWARE and third party applications such as media players use WM-DRM to play Secure Content ("WM-DRM Software"). If the WM-DRM Software's security has been compromised, owners of Secure Content ("Secure Content Owners") may request that Microsoft revoke the WM-DRM Software's right to copy, display and/or play Secure Content. Revocation does not alter the WM-DRM Software's ability to play unprotected content. A list of revoked WM-DRM Software is sent to your DEVICE whenever you download a license for Secure Content from the Internet. Microsoft may, in conjunction with such license, also download revocation lists onto your DEVICE on behalf of Secure Content Owners. Secure Content Owners may also require you to upgrade some of the WM-DRM

components in this SOFTWARE ("WM-DRM Upgrades") before accessing their content. When you attempt to play such content, WM-DRM Software built by Microsoft will notify you that a WM-DRM Upgrade is required and then ask for your consent before the WM-DRM Upgrade is downloaded. WM-DRM Software built by third parties may do the same. If you decline the upgrade, you will not be able to access content that requires the WM-DRM Upgrade; however, you will still be able to access unprotected content and Secure Content that does not require the upgrade. WM-DRM features that access the Internet, such as acquiring new licenses and/or performing a required WM-DRM Upgrade, can be switched off. When these features are switched off, you will still be able to play Secure Content if you have a valid license for such content already stored on your DEVICE.

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- Instrument type: KR-1W
- Manufacturing No. (Shown on the rating plate on the back of the instrument)
- Period of Usage (Please give us the date of purchase.)
- Instrument's condition (Please provide us with as much detail as possible on the problem.)

WAVE-FRONT ANALYZER KR-1W

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