



AUTO KERATO/REFRACTOMETER

FRK-710/FR-710

USER MANUAL

INTRODUCTION

Thank you for purchasing the AUTO KERATO/REFRACTOMETER FKR-710/ FR-710.

INTENDED USE/INDICATIONS FOR USE

This FR-710 instrument is used to measure the spherical refractive power, cylindrical refractive power, the direction of astigmatic axis. And FKR-710 instrument is used to measure the spherical refractive power, cylindrical refractive power, the direction of astigmatic axis, the radius of curvature, the corneal astigmatism axis angle and the corneal refractory power.

The instrument is composed of a body part, a power supply part and an chin rest part (by appearance), including an optical system, an electronic system and software (version number: Ver 18.1), a mechanical system and a housing (by functional system).

Expected use environment: the product is expected to be used in medical institutions, optical shops and so on.

Contraindication: no contraindication.

This instrument features the following:

- The FKR-710 is simple to operate and measures the refraction and corneal curvature of the eye.
- The position of the touch panel can be adjusted to accommodate the user's preferred position.
- The auto start function facilitates quick measurements under the optimal condition.

The corneal curvature function included in the instrument to the requirements of Type B in *ISO10343 Ophthalmic instruments —Ophthalmometers*.

This User Manual provides an overview of the basic operation, troubleshooting, checking, maintenance and cleaning.

To get the best use of the instrument, read Safety Displays and Safety Cautions.

Keep this Manual at hand for future reference.

CAUTIONS

- The patient who undergoes an examination by this instrument must maintain concentration for a few minutes and keep to the following instructions:
 - To fix the face to the chinrest, forehead rest.
 - To keep the eye open.
 - To understand and follow instructions when undergoing an examination.

Ensure that the instrument is used and maintained under controllable normal temperature, humidity and pressure. The instrument should also be placed away from direct sunlight.

- To ensure smooth operation, install the instrument on a level floor free of vibrations. Also, do not place anything on the instrument.
- Connect all cables properly before using.
- Use the power at a rated voltage.
- When not in use, switch off the power source and apply the rubber cap and dust cover.
- For accurate measurement results, take care to keep the measuring window clean and free of fingerprints , spots and dust.

Usage

- Since the Auto Refractometer FR-710/Auto Keratometer FKR-710 is medical device, the operation should be supervised by a physician.

DISCLAIMERS

- It 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.
- It is not responsible for damage derived from inability to properly use this equipment, such as loss of business profits and suspension of business.
- It is not responsible for damage caused by operations other than those described in this User Manual.
- The device does not provide a diagnosis of any condition or lack thereof or any recommendations for appropriate treatment. The relevant healthcare provider is fully responsible for all diagnosis and treatment decisions and recommendations.

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Safet Alert

Basic Operation

- For avoiding the risk of electric shock please do not open the instrument cover, if any problem please call the professional.
- Electric shock may cause burns or a fire. Before replacing the fuse please cut off the main power switch, and unplug the power cord. Only replace with the same rated power fuses.
- In order to avoid potential harm in operation, do not use the instrument to touch the patient's eyes or nose.

Working Environment

Temperature: 10-40°C

Humidity: (15-90)%RH (non-condensing)

Atmospheric pressure: 800-1060hpa

STORAGE REQUIREMENT

WHEN STORING THE INSTRUMENT. ENSURE THAT THE FOLLOWING CONDITIONS ARE MET:

- (1) The instrument should 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.

TRANSPORT AND STORAGE ENVIRONMENT WITH PACKAGING

Temperature: -10°C-70°C



Humidity: 10%-95%

DISPLAYS FOR SAFE USE












In order to encourage the safe use of the instrument and to avoid danger to the operator and others as well as damage to properties, warnings are described in the User Manual and marked on the instrument body.












We suggest you thoroughly understand the meaning of the following displays/icons and Safety Cautions, as well as read the Manual, and strictly observe the instructions.

DISPLAYS

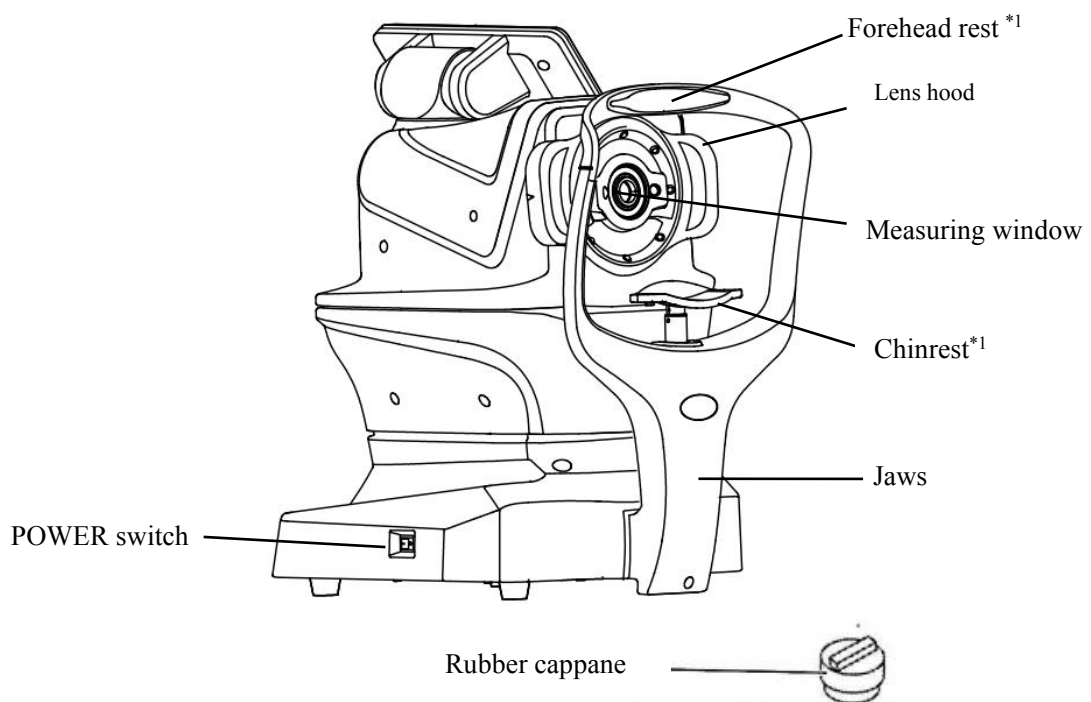
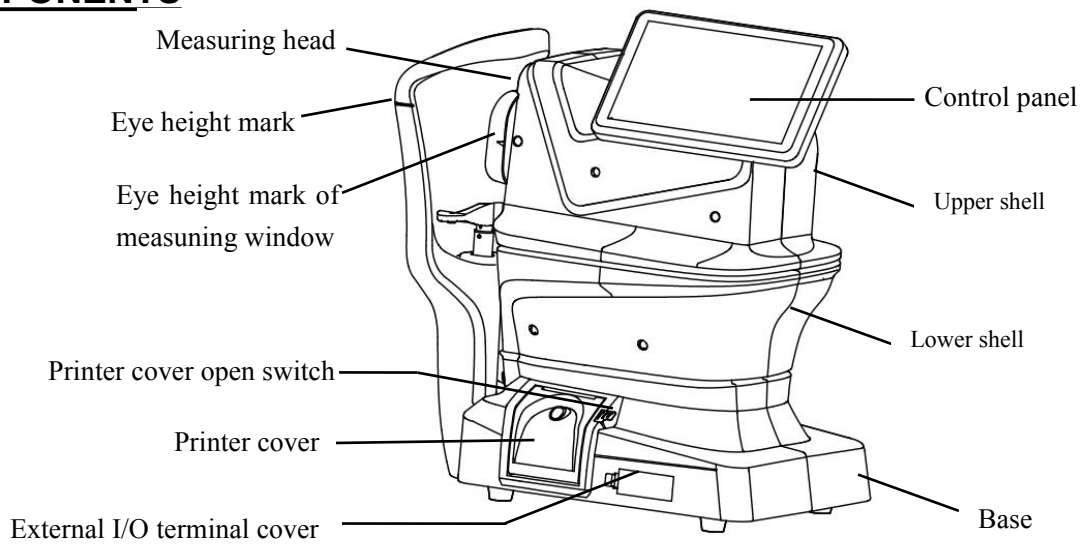
DISPLAY	WARNING
 WARNING	Improper handling or ignoring this display may lead to the danger of death or serious injury.
 CAUTION	Improper handling or ignoring this display may cause personal injury or physical damage.
<ul style="list-style-type: none"> ● Injury means hurt, burn, electric shock, etc. ● Physical damage means extensive damage that may involve building, peripheral equipment and furniture. 	

Meaning of icons

Icon	Meaning
	Please read the instructions carefully before using the instrument and follow the instructions in the user manual.
	In order to avoid potential harm to environment and human health, we should deal with and recycle according to local laws and regulations.
	Protective earthing
	Functional earthing
	B application part
	Manufacturer's name and address
	Manufacturer's production date
	Please read the meaning of the safety icons in the user manual.
	Device serial number
	Alternating current (AC)
	“ ”和“O” respectively represent the connection (ON) and disconnection (OFF) of the power switch.

Icon	Safety Precautions (Warning / Caution)
 WARNIN	To avoid electrical shock, do not open the instrument, only qualified person can provide services.
 WARNING	To avoid the risk of fire and electric shock, do not allow water or other external things into the instrument.
 WARNIN	To avoid electrical shock, do not put metal objects into the holes or cracks in the instrument.
 WARNING	To avoid fire or electric shock, do not put glass or water / liquid container on the instrument.
 WARNING	Short circuit can cause fire. Turn off the power, unplug the Plug before you replace the fuse. Replace the fuse as required.
 WARNING	Some non-normal phenomena, such as smoke / odor,immediately turn off the power, unplug it. If the instrument is not used under normal conditions for long time,it may result in fire, please ask your dealer for repairing.
 CAUTION	To avoid potential injury, get the instrument in right way.
 CAUTION	To avoid electrical shock, do not plug the power with wet hands.
 CAUTION	To avoid potential injury, do not put your finger on the chin rest.
 CAUTION	To avoid potential injury or damage to the instrument, move instrument in slight way.
 CAUTION	When moving the instrument, two people should lift the bottom. If one person lift the instrument, it may cause sprains or injured. If you do not lift the bottom of the instrument, but the other part, you may damage your finger or destroy the instrument.

COMPONENTS

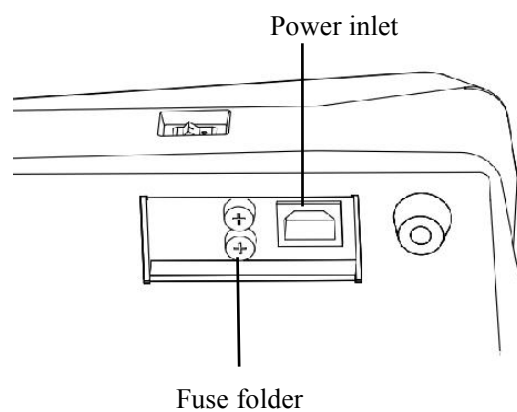


*1: Contacting part (class B)

COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest: Silicone rubber

Chinrest: Acrylonitrile butadiene styrene resin



OPERATION METHOD OF CONTROL PANEL

- The control panel is a touch panel. Do not use any sharp tools; e.g. ball point pen.
- Do not touch different points on the control panel at the same time.



Touch the screen softly with the touch pen to select any relevant item.

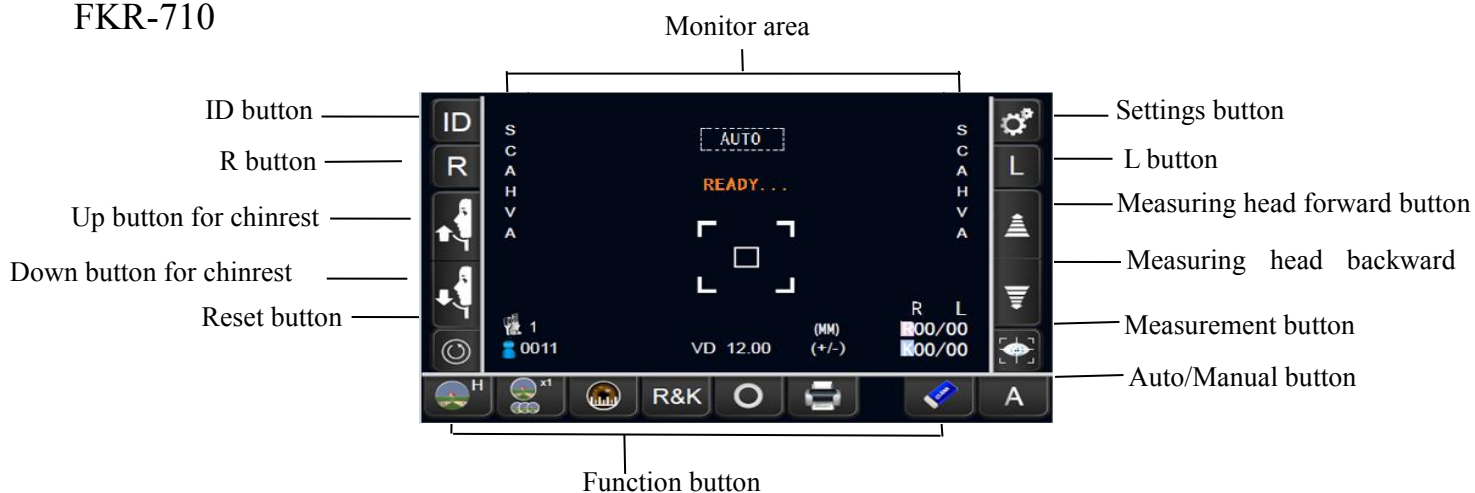


Continue to touch the screen with the touch pen.
Used for continuous moving. (Moving of chinrest and measuring head).

CONTROL PANEL COMPONENTS

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

FKR-710



ID button.....input the patient ID (up to 14 characters). However, if no patient ID is input, the patient No. is allocated automatically.



R button/L button.....Selects the right/left eye. By tapping the button, the main body moves to the selected direction. The selected button is framed in orange.



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



Reset button.....Returns the chinrest and measuring head to the initial position.



Forward/backward button for measuring head.....Moves the measuring head closer to/away from the patient's eye.



Measurement button.....Starts measurement in Manual mode.



Auto/Manual button.....Selects Auto/Manual mode.

(A: Auto mode, M: Manual mode). The name of selected (Auto/Manual) is displayed on the control panel.

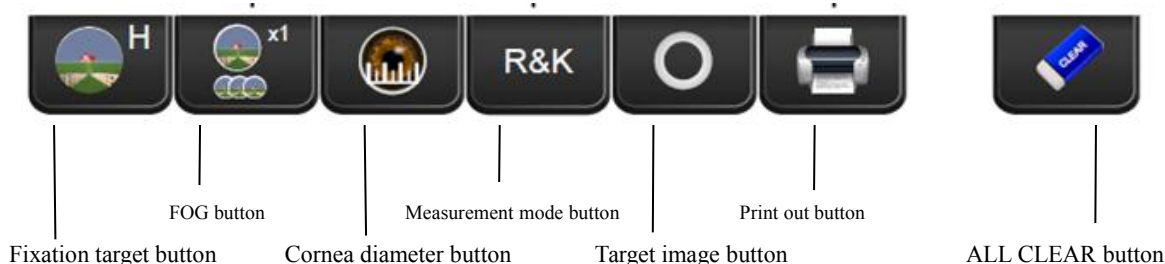


Settings button.....Displays the Settings screen.

- Touching the monitor area can control the measuring head to move quickly to the specified position and start the auto measurement (in auto measurement mode). Continuous touch can control the measuring head to move continuously until the touch is released.

FUNCTION BUTTON

FKR-710



FR-710



FKR-710:

Fixation target button.....Brightness of the fixation target can be changed.
(H stands for high brightness; L stands for ordinary brightness.)

FOG button..... **Changes setting temporarily to perform fogging only in the first measurement or each time in the continuous measurement**
(represents 1 times measurement; represents 3times measurement.)

Cornea diameter button.....Changes to cornea diameter measurement mode.
(Only for FKR-710)

Measurement mode button.....Switch the measurement mode in turn.
It is R&K mode in the illustration.

There are four modes: (Only for FKR-710)

- mode: Measurement of Refractive power and Corneal curvature radius. Print results show all values.
- mode: Measurement of Refractive power. Print results show the values and refractive power.
- mode: Measurement of Corneal curvature radius. Print results only show Corneal curvature radius.
- mode: Only for manufacturer.

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

Print out button..... Prints measurement results.

ALL CLEAR button.....Clears all measurement data, and returns to the setting position.

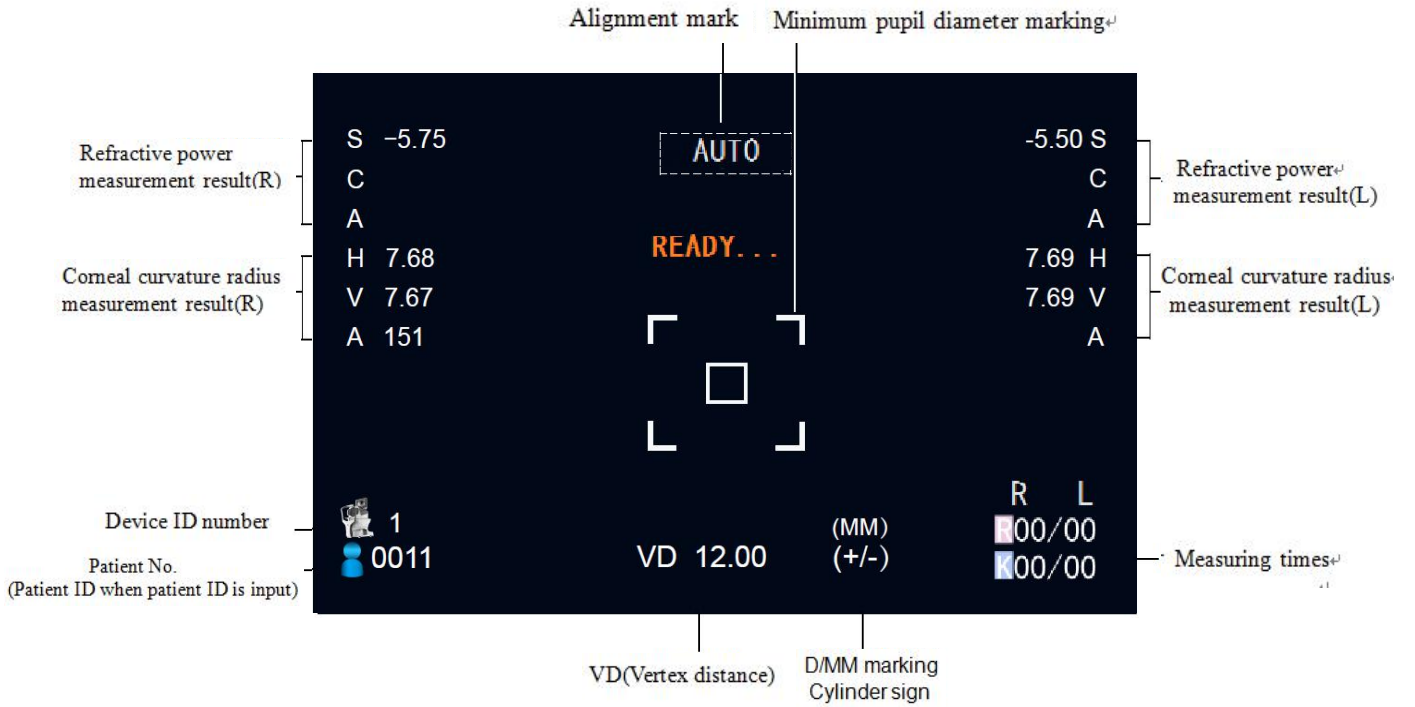
FR-710:



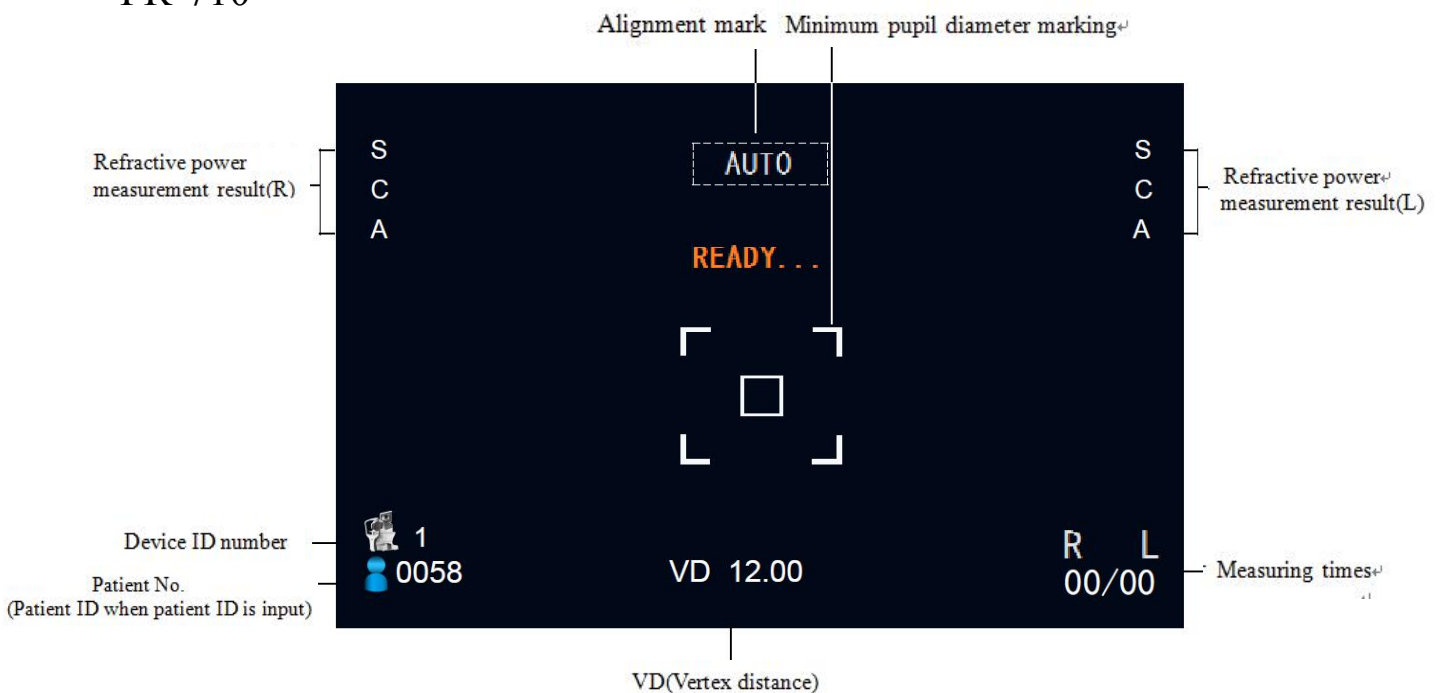
Cylinder sign button.....Switch cylinder negative, positive and mixed three display modes.

MEASUREMENT SCREEN


FKR-710




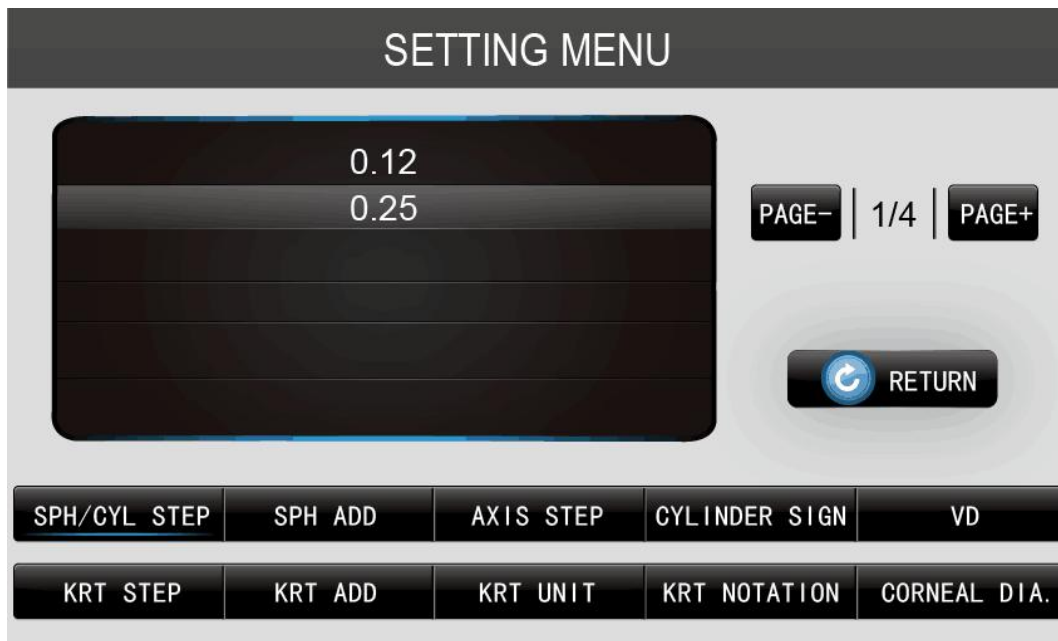
FR-710



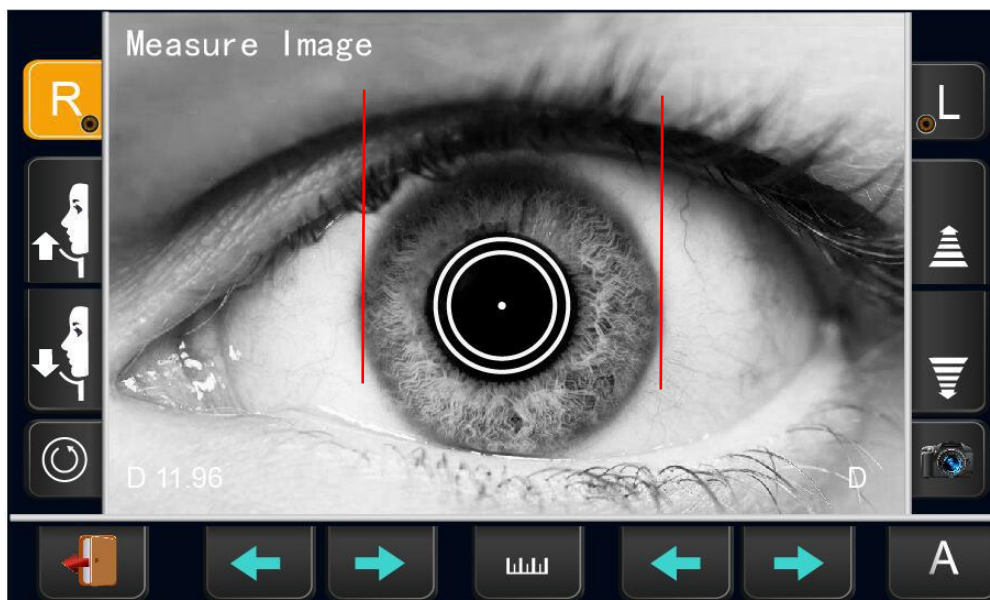
SETTINGS SCREEN

Tap the  SETTINGS button on control panel to enter the setup menu.

And tap the  RETURN button to go back to control panel interface.



Cornea Diameter Measurement Screen (Only for FKR-710)

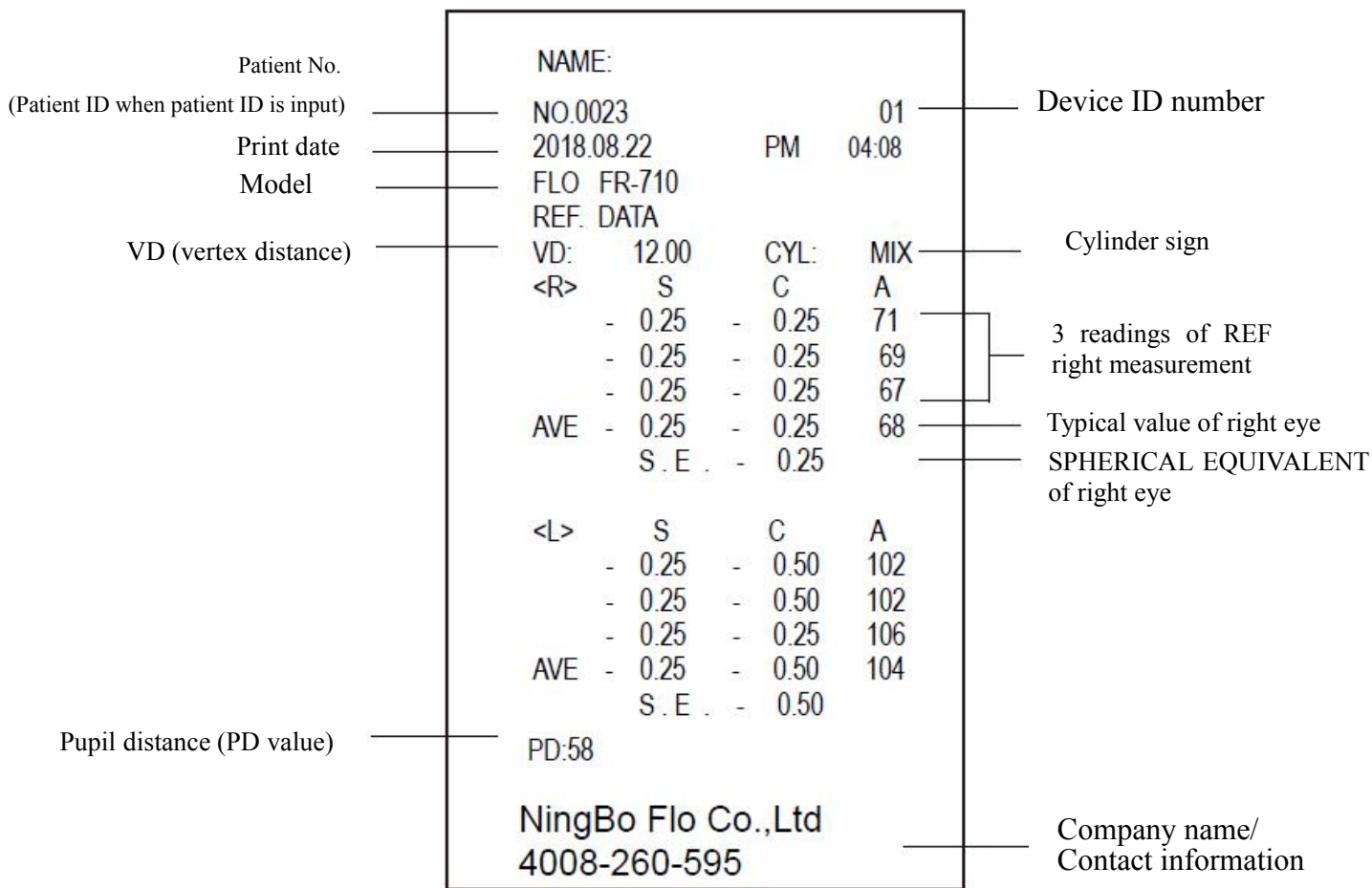


PRINTER OUTPUT

*Shows the example as FKR-710 model in R&K mode.

Patient No. (Patient ID when patient ID is input)	NAME: NO.0011	01	Device ID number
Print date	2099.12.31	PM 04:43	
Model	FLO FKR-710		
VD (vertex distance)	REF.DATA VD: 12.00	CYL:MIX	Cylinder sign
	<R> S C A		
	- 0.25 - 0.25	71	3 readings of REF right measurement
	- 0.25 - 0.50	69	
	- 0.25 - 0.25	67	
	AVE - 0.25 - 0.25	68	Typical value of right eye
	S.E. - 0.25		SPHERICAL EQUIVALENT of right eye
	<L> S C A		
	- 0.25 - 0.50	102	
	- 0.25 - 0.50	102	
	- 0.25 - 0.50	106	
	AVE - 0.25 - 0.50	104	
	S.E. - 0.50		
Pupil distance (PD value)	PD:58		Curvature coefficient
	KRT.DATA INDEX:1.3375		Measured value of horizontal Corneal curvature (R)
	<R> MM D A		Measured value of vertical corneal curvature(R)
	H 8.01 42.10 43		
	V 7.95 42.40 133		
	AVE 7.98 42.25		Corneal average value(R)
	CYL - 0.30 43		Corneal astigmatic axis angle(R)
	MM1 MM2 A1		
	[1] 8.01 7.95 43		3 readings of right cornea value
	[2] 8.01 7.95 44		
	[3] 8.01 7.95 45		
Corneal radius (mm)	<L> MM D A		Corneal refractive power
	H 8.04 41.95 178		Corneal refractive axis angle
	V 8.06 41.85 88		
	AVE 8.05 41.90		
	CYL -0.10 88		MM1:Corneal refractive power at flat meridian
	MM1 MM2 A1		MM2:Corneal refractive power at steep meridian
	[1] 8.06 8.04 94		A1: Angle of steep meridian
	[2] 8.07 8.04 84		
	[3] 8.06 8.03 88		
	NingBo Flo Co.,Ltd 4008-260-595		Company name/ Contact information

***Shows the example as FR-710 model.**



PREPARATIONS

INSTALLATION



CAUTION One person lifting the device may cause harm to his back or injury by falling parts.

Also, holding areas other than the bottom and holding the External I/O terminal cover may cause injury, as well as damage to the instrument.

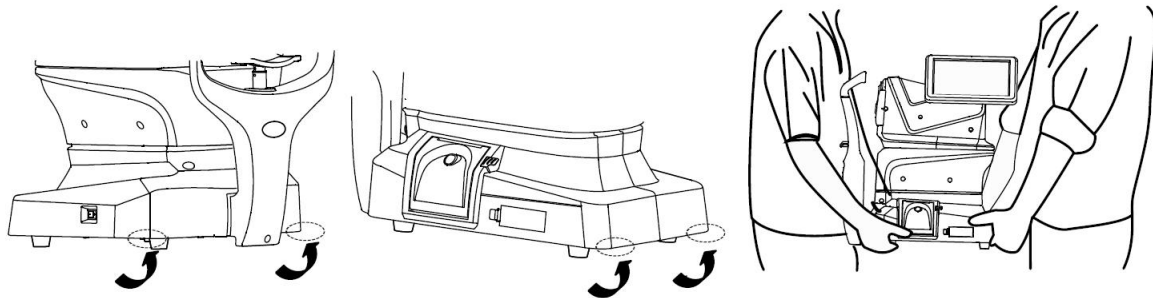


CAUTION To prevent damage and injuries, do not install the instrument on an uneven, unsteady or sloped surface.



CAUTION The instrument should also be placed away from strong light like direct sunlight.

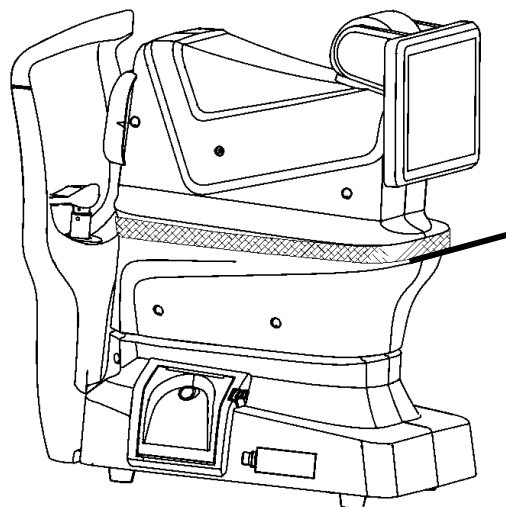
Auto alignment may not function properly.



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



CAUTION Before you turn on the machine, you must tear off the protective sticker, otherwise it will cause the malfunction of the instrument.



Protective sticker
(tear it off before booting)

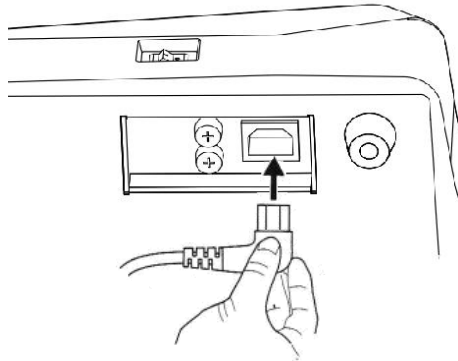
CONNECTING POWER CABLE



CAUTION Be sure to connect the power plug to an AC 3-pin receptacle grounding may cause fire and electric shock in case of short-Circuiting.



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

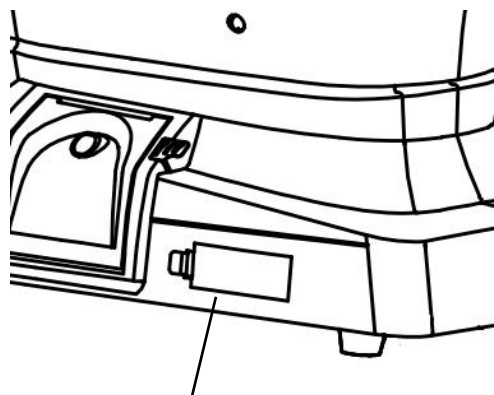


- 1** Make sure the POWER switch of the instrument is OFF.
- 2** Tilt the body slowly so that the POWER switch is on top and the power inlet at the bottom can be seen.
- 3** Connect the power cable to the Power inlet.

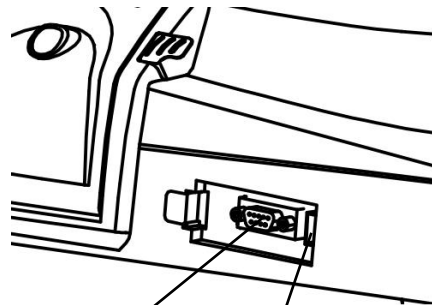
Insert the power cable plug into the 3-pin AC grounding receptacle.



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



External I/O terminal cover



RS232C output terminal

USB input terminal

Push down the filliste, release the fibulae, and remove the outer equipment connection cover. RS232C output terminal and USB input terminal are visible.

RS232C OUTPUT TERMINAL AND USB INPUT TERMINAL

They are special use for manufacturers, and are not connected to other devices.

PRINTER PAPER SETTING



CAUTION

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



CAUTION

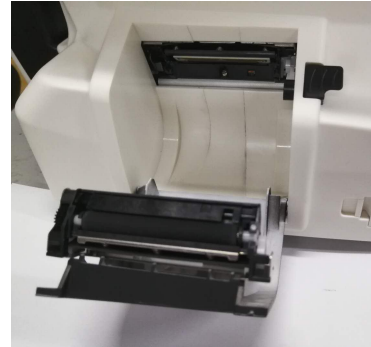
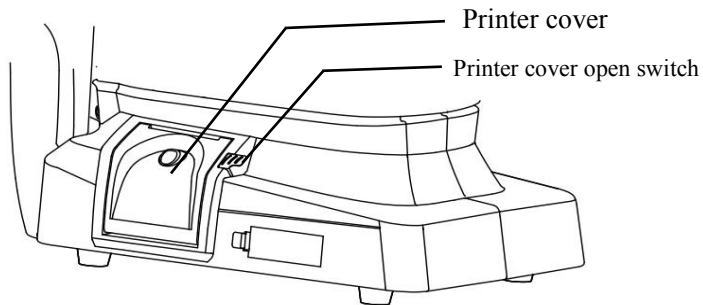
To avoid potential injury in case of malfunction, including a paper jam, be sure to shut off the power before attempting to repair it.



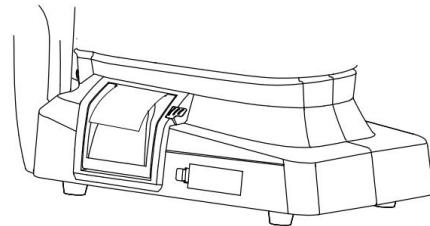
CAUTION

To avoid potential injury, do not touch the printer body including metal parts or the paper cutter, while the printer is in operation or when replacing the printer paper. If you insert the printer paper backwards, printing will not start.

- 1** Press the printer cover open switch to open the printer cover. Open the printer cover to the limit.



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



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

* In case the printer cover is not firmly closed. Printing will not start, and "PRINTER COVER IS OPEN" will be displayed on the monitor screen.

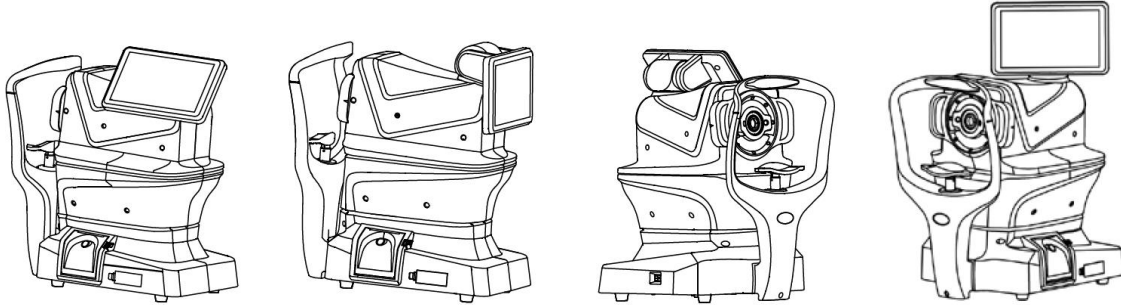
* A 57mm wide paper roll is recommended. Other paper rolls may cause abnormal printing noise or unclear print.

RECOVERY FROM POWER SAVE STATUS

This instrument adopts the power save system for saving electric power. When the machine is not operated for a set time, the control panel becomes a screen saver. Touch the control panel, it can easily recovery to measuring interface. The initial power save status in 5 minutes.




ADJUSTING THE CONTROL PANEL POSITION

The control panel may be positioned by swinging and tilting the monitor to your desired position. Touching the control panel controls operations including chin rest movements, alignment and measureme.



BASIC OPERATIONS

PREPARATION BEFORE MEASUREMENT

-  **CAUTION** To avoid injury when moving the chinrest up/down button, be careful not to catch the patients fingers. Tell this to the patient, too.
-  **CAUTION** To avoid injury when operating the machine, be careful about the cover not to catch fingers of the patient. Tell this to the patient, too.
-  **CAUTION** The chinrest is an applied part. When using the instrument, the chinrest paper must be placed in accordance with the local regulations.

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

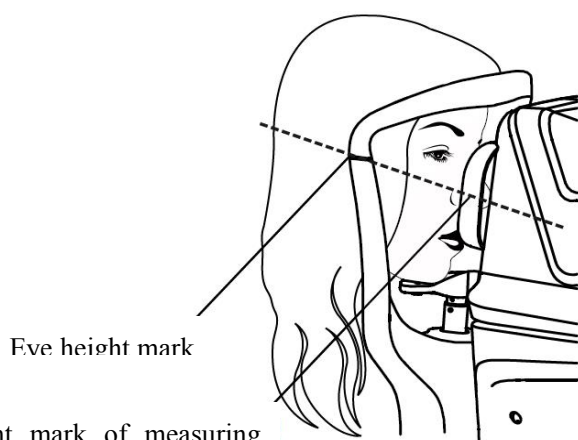
1 Make sure the power cable is connected properly. Press on the POWER SWITCH “-”. Confirm that the control panel measurement screen is normal.

2 Have the patient sit in front of the instrument. Adjust the adjustable instrument table or the chair height for the patient to put his/her chin on the chinrest comfortably. Place the patients chin on the chinrest and check that his/her forehead is touching to the forehead rest.

3 Press the  /  button to adjust the chinrest height until the eye height mark of the chinrest

Reaches the same height as the patient's eye. At this moment, confirm that the height mark of the


Measuring window is at the height of the patient's visual line.





AUTO MODE MEASUREMENT

- Auto measurement mode may not be possible, in case the eyelid and the eyelashes cover the pupil. If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid to allow for measurement.
- Auto measurement mode may not be possible due to frequent blinks or existing abnormalities in the corneal surface caused corneal disease etc. In this case, select manual mode.
- When operating the instrument, be careful that the instrument does not touch the patients face or nose. If touched, clean the instrument as specified in "CLEANING THE INSTRUMENT".
- If the patient is wearing make up on the eyelid or around the eyelid using glitter, the auto alignment may not function properly. In this case, select manual mode.

SETTING THE AUTO MODE


The lower right corner of the measurement screen in the control panel shows:  is Auto mode.

If  (Manual mode) is displayed, tap it and change to the Auto mode .



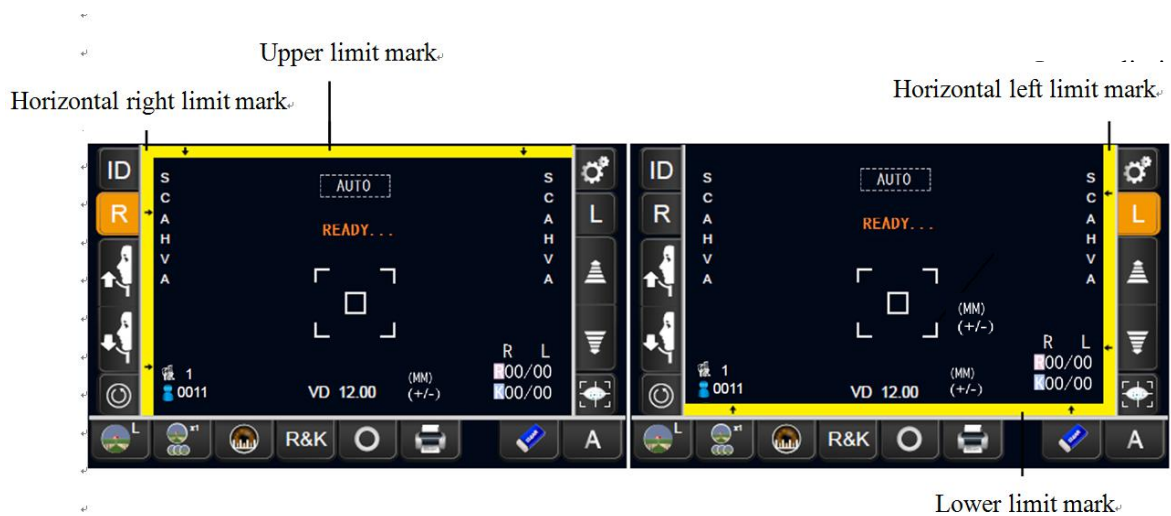
ALIGNMENT AND MEASUREMENT

I When the pupil is displayed, tap the display around the pupil. The measuring head moves to display the pupil image and alignment dot on the center of the screen. The system starts the measurement, and the "MEASURING...." is displayed in the screen.

- Patients' eye conditions is various. If the auto measurement can not be started, it may be due to the incomplete display of the central alignment dot/too far alignment dot from the forward and backward of the measuring head/eyelash occlusion interference and other reasons, it is necessary to adjust the eye opening condition or touch the  button to fine-tune the measuring head for pupil alignment, to restart the auto measurement. If it still fails, in the case of alignment ok, touch the measurement button to force starting the measurement.



- If the pupil is not displayed on the control panel, move the measuring head by press the control panel, checking the eye height mark on the measurement window.



- When the measuring head has reached the limit of movement (vertical/lateral directions), a yellow-colored limit mark appears, showing it is the movement limit in that direction. Tap the display, move the measuring head to a position until pupil image comes to the center.



Limit of movement in the Forward direction

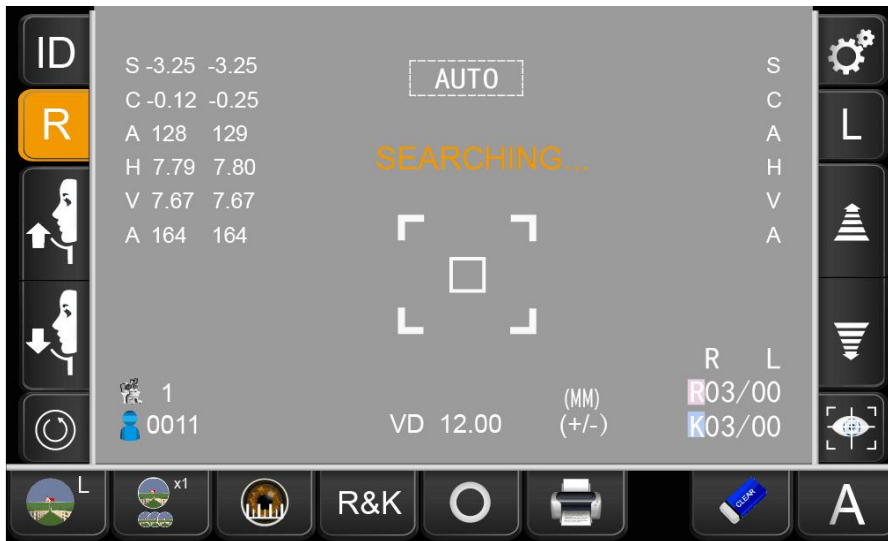
Limit of movement in the backward direction

- When the measuring head is at the limit of movement in the forward direction, "TOO CLOSE" is displayed.
- When the measuring head is at the limit of movement in the backward direction, "TOO FAR" is displayed.
- Using the Measuring Head Forward button and Measuring Head Backward button, move the measuring

head to a position until pupil image comes to the center.


2 Alignment starts automatically, and measurement is performed. The measurement result is displayed.

The instrument is initially set to measure the right eye and then the left eye sequentially, that is, the instrument measuring head moves automatically from the right to the left eye. You can modify settings in set function.



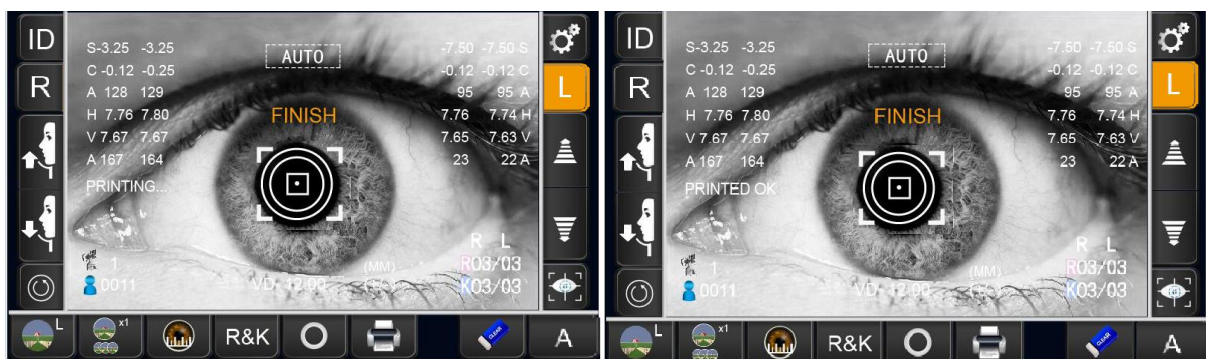
- If auto mode measurement does not work, select manual mode.

Auto mode measurement may not work depending on the cornea Condition.

- If the machine is moved before measurement values are displayed, it might cause an incorrect measurement. It needs to press the  ALL CLEAR button, the instrument returns to remeasure.

3 DISPLAYING MEASUREMENT VALUES AND PRINT OUT

When the auto measurement is finished, "Finish" is displayed on the measuring screen of the control panel, and the measurement results are displayed on the screen. If the measurement is successful and the auto printing function is turned on, the instrument automatically performs printing and displays "Printing". After printing, display "Print OK".






- PRINT FUNCTION SETTINGS

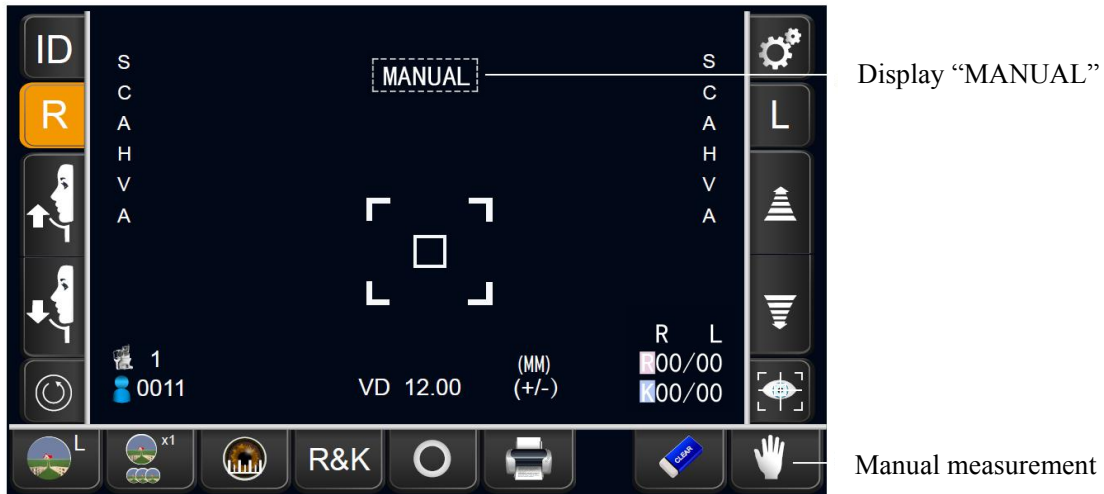
The initial setting of the instrument is in Auto & Half Cut mode, and other settings need to be changed in the setting function.

MANUAL MODE MEASUREMENT



- Matters needing attention are consistent with auto mode measurement.

SETTING THE MANUAL MODE

The lower right corner of the measurement screen in the control panel shows:  is Manual mode.
If  (Auto mode) is displayed, tap it and change to the Manual mode .

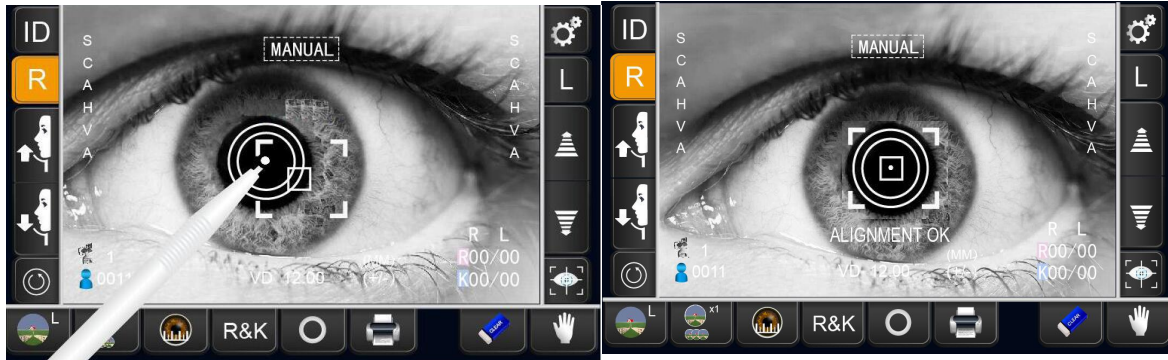




ALIGNMENT AND MEASUREMENT

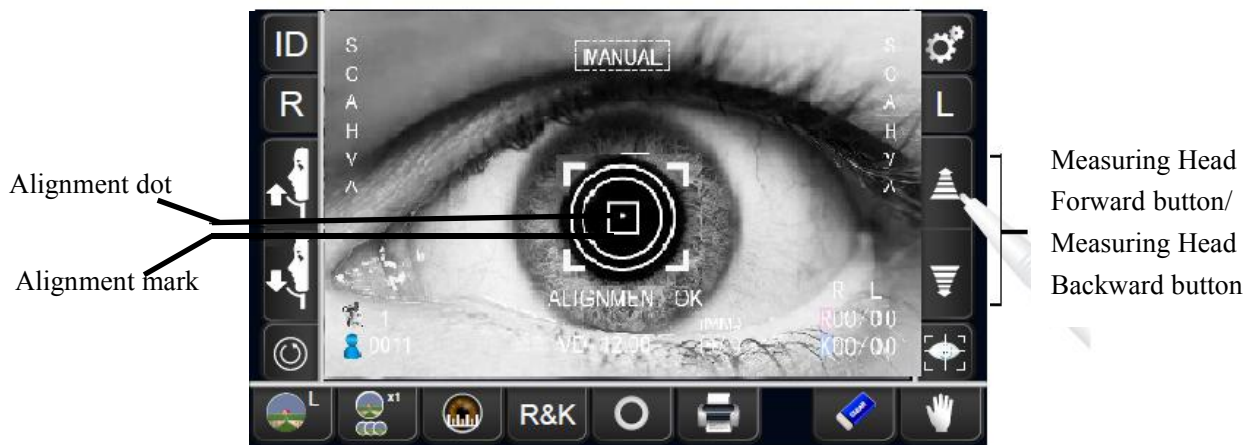
I Select the right/left eye by tapping the  button/  button on the control panel. The orange icon button indicates the current measuring position. Take the first measurement of the right eye as an example.




2 When the patient's pupil is displayed in the monitor area, the measuring head moves to a specified position by touching the center of the pupil image in the monitor area (If you want the instrument to automatically adjust the alignment dot to the alignment mark, you need to manually -> automatically -> manually change the measurement mode once, and then click on the center of the pupil image to make the self-adjustment. The pupil image is displayed on the center of the screen, that is, the alignment dot.)



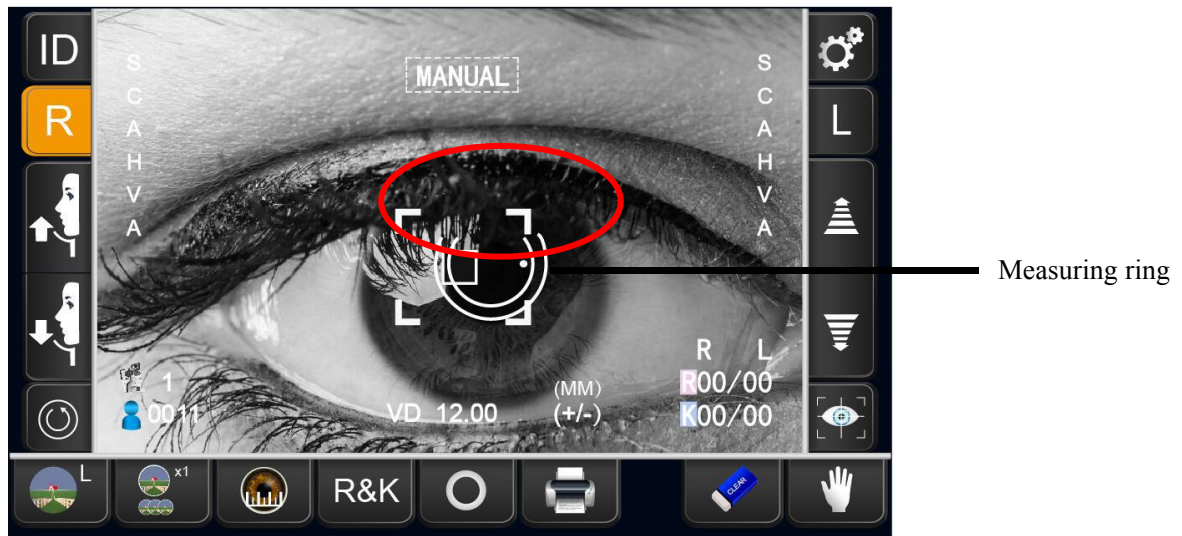
3 Tap the MEASURING HEAD FORWARD button  / MEASURING HEAD BACKWARD button  and focus on the patient's eye. Alignment dot is reflected off-focus on the cornea.




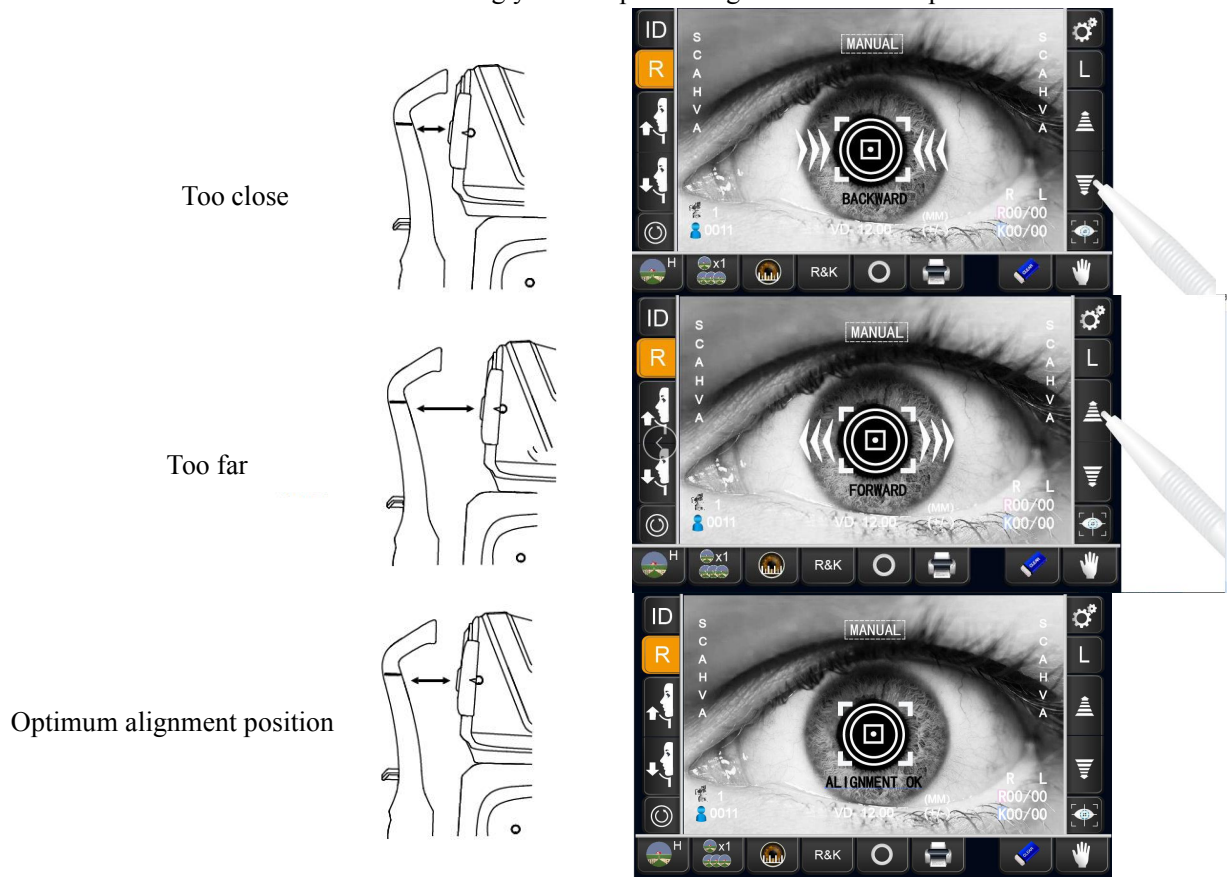
• If the machine is too far to the patient in comparison with the optimal alignment position, the alignment arrows are displayed outward with the message "FORWARD", and press the  forward button to fine tuning.




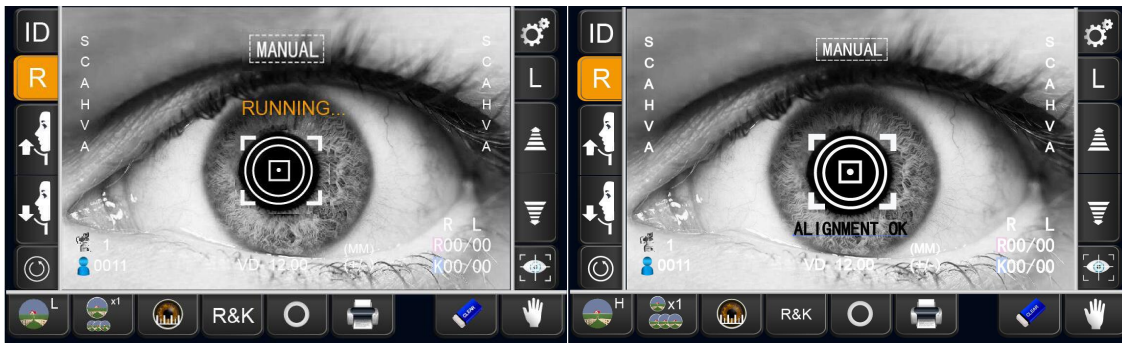
- Do not allow the eyelash and eyelid to cover the measuring ring to ensure stable measurement. If this occurs, the operator should tell the patient to open their eyes as wide as possible, or lift the eyelid to allow for measurement.




- If the machine is too near to the patient in comparison with the optimal alignment position, the alignment arrows are displayed outward with the message "BACKWARD ", and press the  backward button to fine tuning.
- The number of arrow are reduced accordingly as the optimal alignment reference position comes closer.

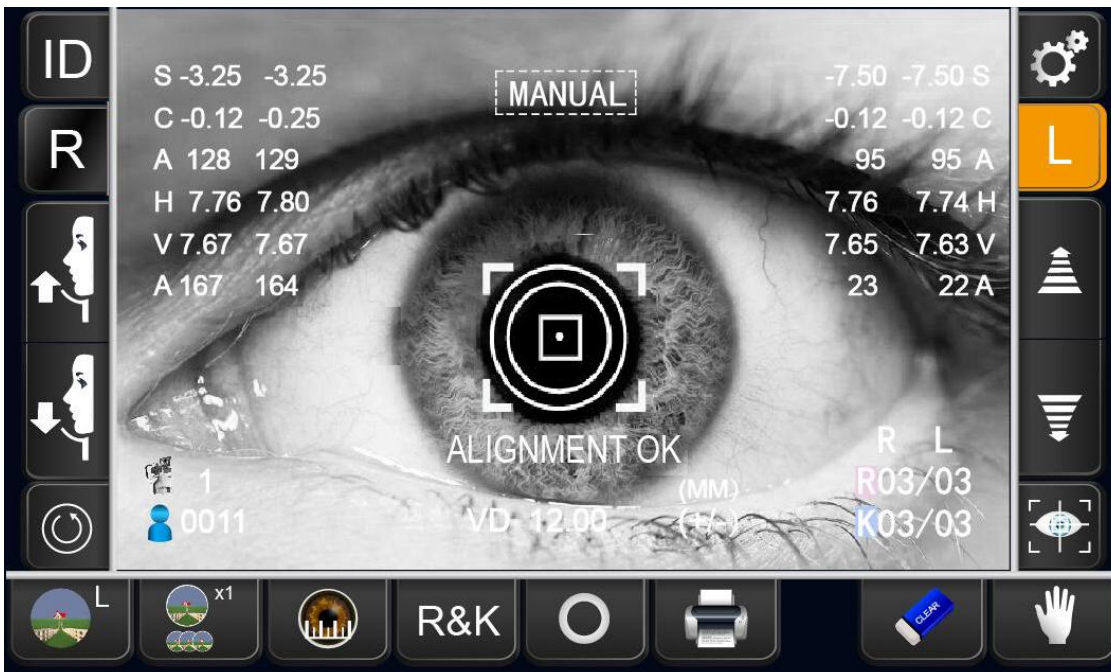


5 When the alignment dot becomes smaller in size and "Alignment OK" is displayed, tap the  MEASUREMENT button. The right eye measurements are completed and the right eye measurement values are displayed on the measurement screen.




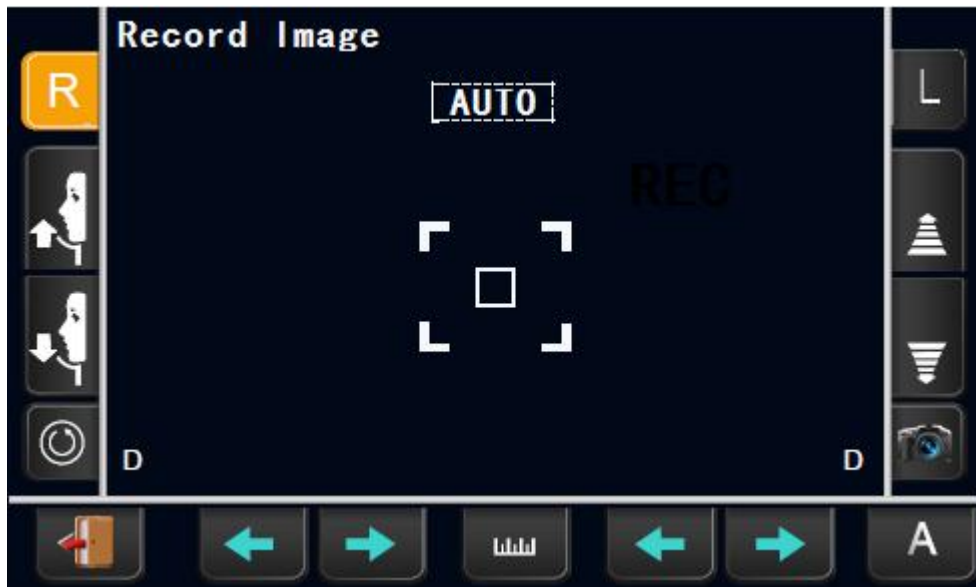
- Even if fine alignment has not been achieved, measurement can be performed by tapping the START button. To ensure correct measurement, try to get fine alignment.
- Measurements can be performed off center if necessary by tapping the MEASUREMENT button after placing the measuring head in the desired off center position.



6 Begin to measure the left eye, and press the  left eye button on the control panel. The measuring head moves to the left eye of the patient. The operation method is the same as the right eye measurement. The result of measurement is the same as auto measurement.

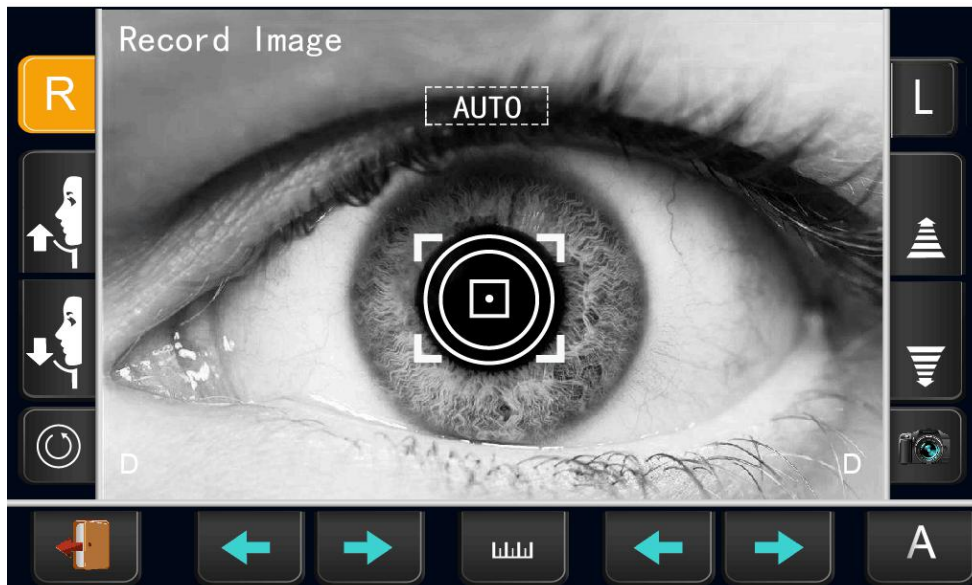




MEASUREMENT OF CORNEA DIAMETER(ONLY FOR FKR-710):

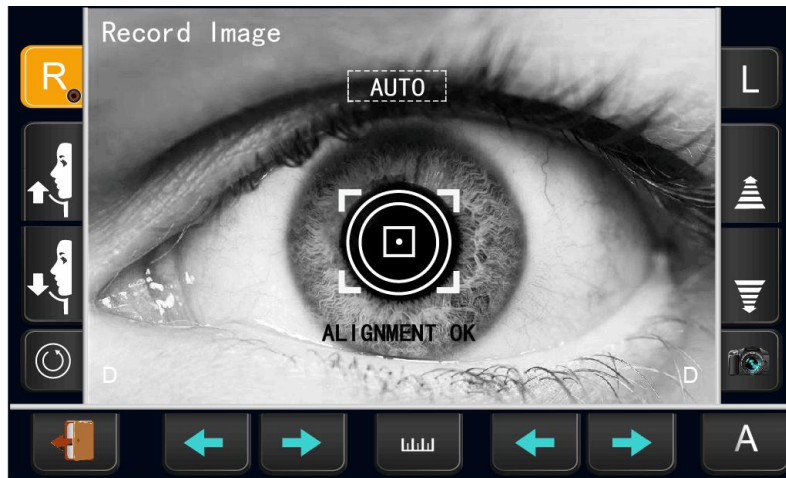
1. It can be operated in auto measurement mode or manual measurement mode. Tap the  cornea diameter measurement button on the control panel, to enter the recording image interface.






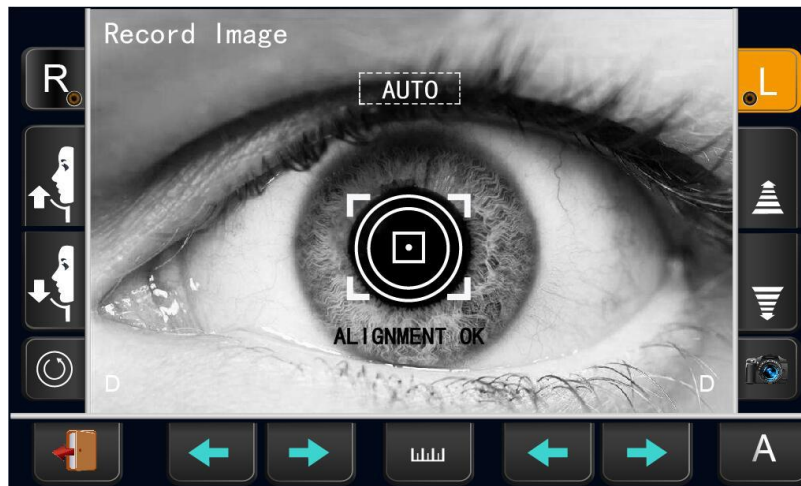
2. Take the right eye as an example. When the patient's eye image enters the monitor area, the adjustment causes the cornea image to display in the center of the screen, tap the MEASURING HEAD FORWARD button  / MEASURING HEAD BACKWARD button  to make the cornea image the most clear. The operation method is the same as the above auto measurement mode or manual measurement mode.








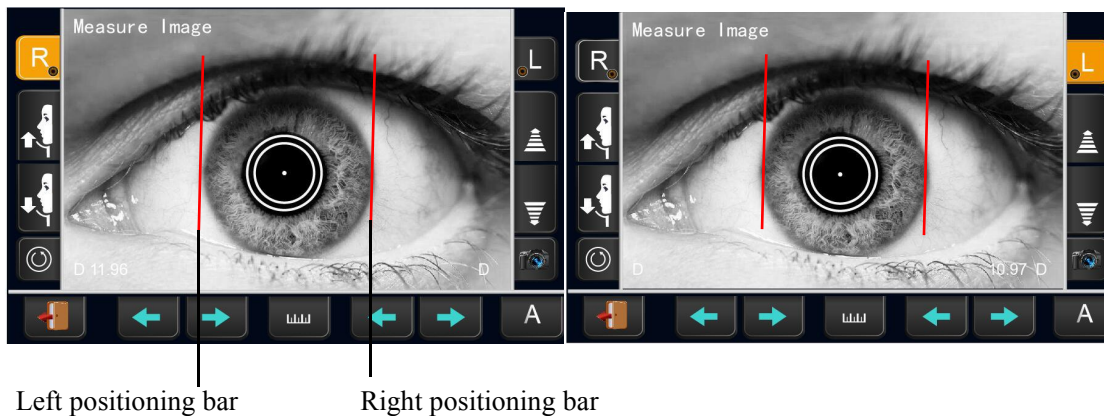
3. Tap the  CAPTURE button to finish taking the right eye cornea diameter image. The icon is displayed as .




4. Tap the  button, and the measuring head move to the left eye. In the same way, tap the  CAPTURE button to finish taking the left eye cornea diameter image. The icon is displayed as .




5. Tap the  MEASUREMENT button, and the cornea image and R/L positioning bar are displayed. Then tap the   R/L POSITIONING BAR CONTROL button to move the positioning bar to the edge of the cornea. The D value is displayed on the lower left corner of measurement screen, that is the cornea diameter. Tap the  and  button to switch the left and right eye image, and to measure with the positioning bars respectively.




6. Tap the  EXIT button to finish the measurement.

PRINT-OUT OF MEASUREMENT VALUES

Tap the  PRINT OUT button on the control panel. Measurement values on the monitor are printed out. After being printed out, the measurement values on the screen are deleted automatically.

- When the cylindrical refractive power is "0", the direction of astigmatic axis and measurement values are not displayed/printed.
- "PRINTER COVER IS OPEN" is indicating that the printer cover is left opened, ensure that the printer cover is completely closed.
- When auto print is setting is "ON" in the initial setting, measurement is performed under Auto mode, and measurement results are printed out automatically.
- After printing out measurement values, the measuring head moves to the "finish mode" position of the initial setting.

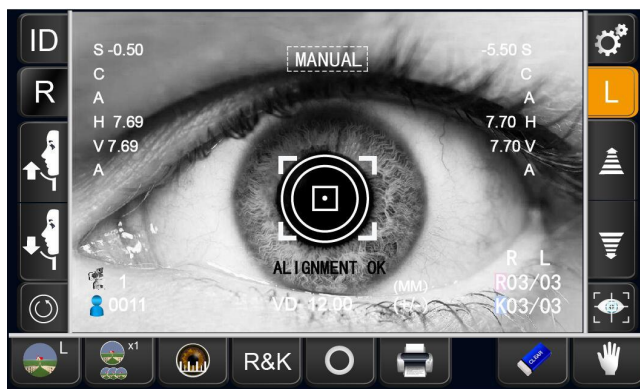
CLEARING MEASUREMENT VALUES

Tap the  ALL CLEAR button on the control panel. All measurement values of both eyes are cleared. After clearing measurement values, the measuring head moves to the "finish mode" position of the initial setting.

DISPLAYING ALL MEASUREMENT DATA



The instrument is initially set to measure three data. Normally the latest measurement is displayed, but it is possible to display and confirm all measurement data.

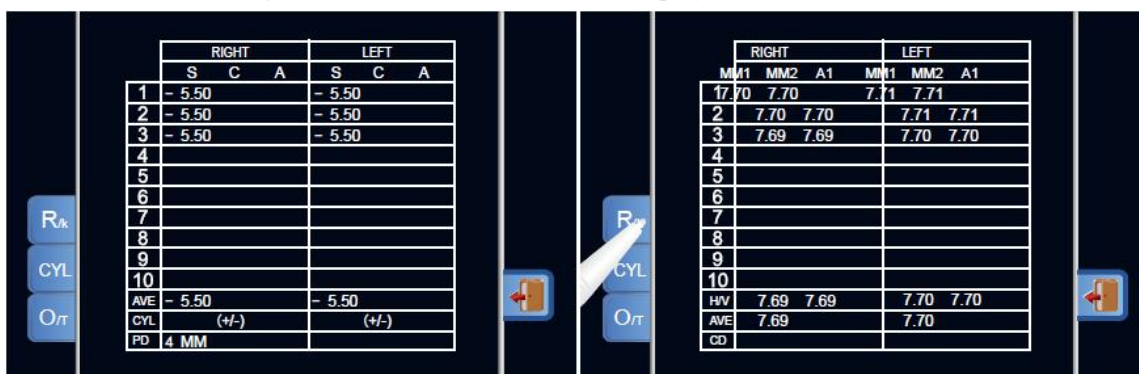
1. Tap the  TARGET IMAGD button of the control panel.



2. Tap the  button to display all data.



3. The Data Display screen is displayed. Tap the  button, and changes to Clylinder Sign; tap the  button, and changes to REF Data and KRT Data Display.



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

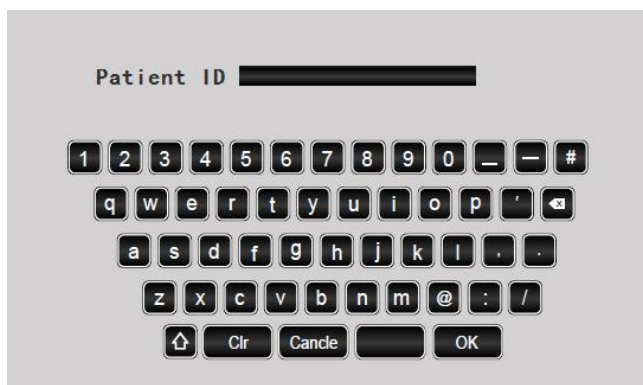
	RIGHT			LEFT		
	S	C	A	S	C	A
1	- 5.50			- 5.50		
2	- 5.50			- 5.50		
3	- 5.50			- 5.50		
4						
5						
6						
7						
8						
9						
10						
AVE	- 5.50			- 5.50		
CYL		(+/-)			(+/-)	
PD	4 MM					





OPTIONAL OPERATIONS

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

1. Patient ID or operator ID of up to 14 characters can be input and displayed on the control panel and print out.

However, if no patient ID is input, the patient No is allocated automatically by the device.




-  Clear the previous character
-  Alphabetic case switching
-  Clear all characters
-  Return to control panel


1. Tap keyboard on the screen and enter characters. Tap the OK button and fix the input value and automatically returns to the control panel. If the measuring value is printed or the ALL CLEAR button is pressed, the patient's ID is cleared.

MEASURING ONE EYE ONLY



MEASURING THE RIGHT EYE ONLY

1 Tap the  button to move the measuring head to the right.

The  button indicates that the current measuring position.

2 When the measuring head stops moving tap the  button once again: the lock icon is Displayed



- 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  icon: The lock icon disappears.

MEASURING THE LEFT EYE ONLY

When the lock icon appears, tap the  left eye button to lock the left eye.

When there is no lock icon, tap the  left eye button for two times.

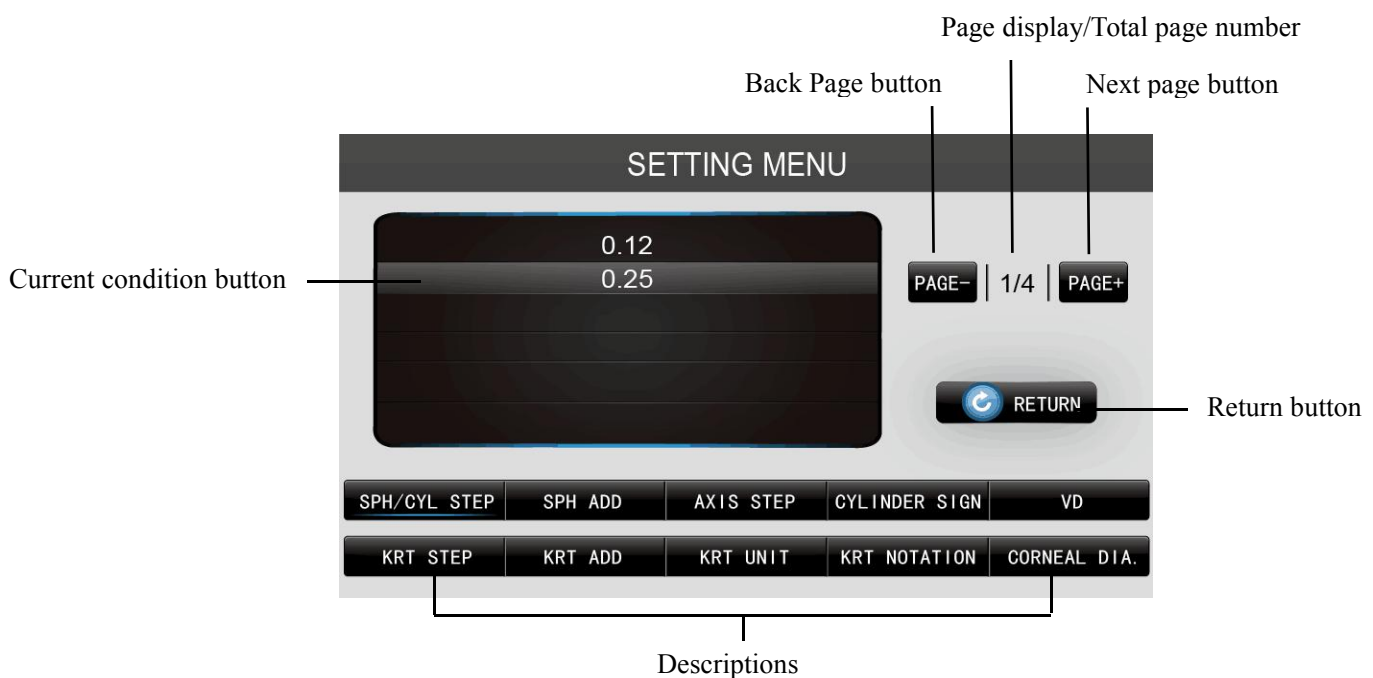
SETTING FUNCTIONS ON SETUP SCREEN

OPERATING THE SETUP SCREEN

1. Tap the SETTINGS button on the control panel to enter the setup menu interface. And tap the RETURN button to go back to control panel interface.

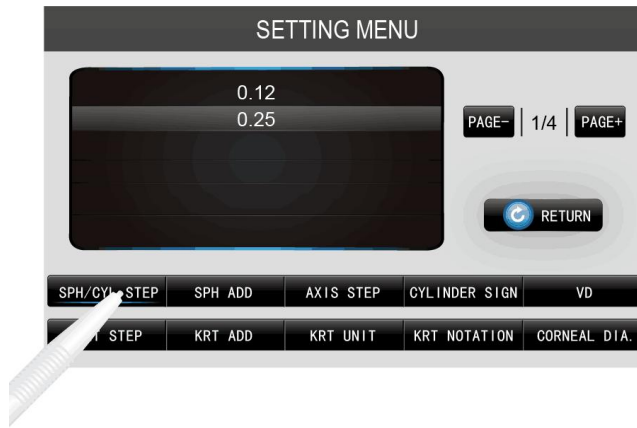


The SETUP screen is displayed.



2. Tap the button of setup menu and select the subject of setting. Operate the NEXT PAGE button or

BACK PAGE button, as necessary, and display the page to confirm/change.

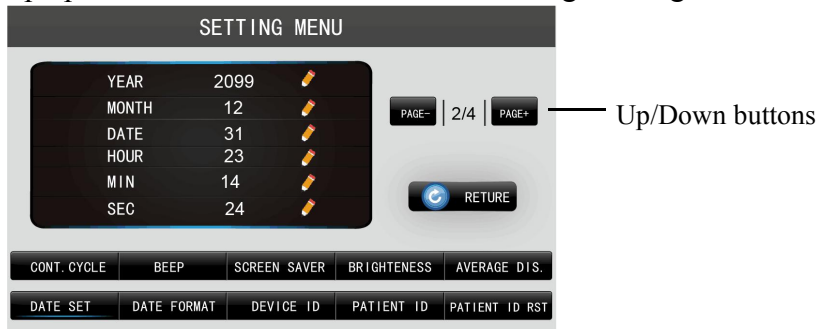


3. Tap to change the parameters of the item, the bright color is selected, that is, to complete the parameter changes.

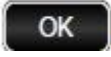


4. UP/DOWN BUTTON:

Tap up/down buttons on the screen and change setting.



5. KEYBOARD:

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



LIST OF SETUP ITEMS

Descriptions	Options	Details	Initial value
Sph/Cyl step	0. 12	Sph/Cyl is displayed by 0.12D step.	0. 25
	0. 25	Sph/Cyl is displayed by 0.25D step.	
Sph/Cyl compensation	-0. 5 - 0. 5 Set by ten-key display.	Only for manufacturer.	0
Axis step	1°	Axial angle is displayed by 1°step	1°
	5°	Axial angle is displayed by 5°step	
Cylinder sign	-	Cylinder sign is “-”	+/-
	+	Cylinder sign is “+”	
	+/-	Cylinder sign is “-” and “+”	
VD	0. 00	VD value is set to 0mm (contact lens)	12. 00
	12. 00	VD value is set to 12.00mm(eyeglass lens)	
	13. 75	VD value is set to 13.75mm(eyeglass lens)	
	15. 00	VD value is set to 15mm(eyeglass lens)	
Curvature step (Only for FKR-710)	0. 05D	Curvature step is 0. 05D.	0. 05D
	0. 12D	Curvature step is 0. 12D.	
	0. 25D	Curvature step is 0. 25D.	
Curvature compensation (Only for FKR-710)	-0. 5 - 0. 5 Set by ten-key display.	Only for manufacturer.	0
D or MM (KRT) (Only for FKR-710)	MM	MM of corneal curvature	MM
	D	D (diopter) of corneal refractive power	
HV or R1R2 (Only for FKR-710)	H/V	Corneal curvature radius measurement result on screen is displayed by HV	H/V
	R1/R2	Corneal curvature radius measurement result on screen is displayed by R1R2	
Corneal diameter (Only for FKR-710)	ON	Corneal diameter is ON.	ON
	OFF	Corneal diameter is OFF.	
Cont. Cycle	1-10 Set by ten-key display.	The number of continuous measurements.	3
Buzzer	ON	Buzzer sounds.	ON
	OFF	Buzzer does not sound.	
Auto power save	OFF	Power save function is not used.	5min
	1min	Power save status in 1min after last operation.	
	5min	Power save status in 5min after last operation	
	10min	Power save status in 10min after last operation	
	20min	Power save status in 20min after last operation	
	40min	Power save status in 40min after last operation	
Control panel brightness	50—100 Set by ten-key display.	The brightness of control panel.	50~100
Average value	ON	Average value is displayed.	ON
	OFF	Average value is not displayed.	
Date setting	Set by ten-key display.	Sets year(2000~2099), month(1~12), day(1~31),	2000/1/1/000

		time(24hrs), minute(0~59) and second(0~59)	
Date style	YMD	Print in Year/Month/Day format	YMD
	MDY	Print in Month/Day/Year format	
	DMY	Print in Day/Month/Year format	
Show Device ID Number	OFF	Device ID is not required.	ON
	ON	Device ID is required.	
	Set by ten-key display	Set device ID (1~99).	
Show Patient ID	OFF	Patient ID is not displayed.	ON
	ON	Patient ID is displayed	
	Set by ten-key display	Empty cumulative patient code (Only for manufacturer)	
Patient No. reset	OFF	Patient No. is not reset upon power on.	OFF
	ON	Patient No. is reset upon power on.	
Start mode	AUTO	Default measurement mode is AUTO.	AUTO
	MANUAL	Default measurement mode is MANUAL.	
R/L move	Full Auto	The switching of right and left eyes is performed at "Full Auto", and automatically start the measurement.	Full Auto
	Auto(RL)	The switching of right and left eyes is only performed at "Auto(RL)".	
	Manual	The switching of right and left eyes is performed at "Manual".	
Stand by mode	RIGHT	Waiting at the initial position for right eye measurement.	RIGHT
	LEFT	Waiting at the initial position for left eye measurement.	
	LAST	Waiting at the last position of the measured eye.	
Pupil distance	58-74 Set by ten-key display	Sets the default pupil distance between right and left eyes.	62
Chin rest height	HIGH	Default chinrest height is high.	LOW
	CENTER	Default chinrest height is center.	
	LOW	Default chinrest height is low.	
Print/ Concentration	OFF	Print concentration is not displayed.	100%
	60%	Print concentration is 60%.	
	80%	Print concentration is 80%.	
	100%	Print concentration is 100%.	
	120%	Print concentration is 120%.	
Print/ Cut paper	Auto & Full Cut	Auto printing, full cutting.	Auto & Half Cut
	Auto & Half Cut	Auto printing, half cutting.	
	Manual & Full Cut	Manual printing, full cutting.	
	Manual & Half Cut	Manual printing, half cutting.	

Print/ Content	Select printing content	VD/GYL/PD/Name field/Device ID/Patient ID/Time/Company name//Date/REF SE/REF number/KRT number/KRT CYL	Set up printing content
R/L notation	R/L	Right/left eyes is displayed by R/L.	R/L
	OD/OS	Right/left eyes is displayed by OD/OS.	
LAN Connection (Only for manufacturer)	OFF	LAN connection is OFF.	OFF
	ON	LAN connection is ON.	
Output port (Only for manufacturer)	OFF	RS-232C port is disabled.	OFF
	ON	RS-232C port is enabled.	
Baudrate (Only for manufacturer)	2400	Baudrate value: 2400bps	9600
	4800	Baudrate value: 4800bps	
	9600	Baudrate value: 9600bps	
	19200	Baudrate value: 19200bps	
	28800	Baudrate value: 28800bps	
Company name	Company name	Set up company name	The name and contact information of the manufacturer has been entered.
	Contact information	Set up contact information	
Packing mode	Start	Packing mode will start.	
Speical function	/	Reservation function(Only for manufacturer)	/

Parameters and Performance

Configuration	Specification	
Reference wavelength		850nm
Diopter measurement	Vertex distance (VD)	0mm、12.0mm、13.75mm、15.00mm
	Spherical refractive power	-20.00D~+20.00D
	Cylindrical refractive power	0D~6D
	Direction of astigmatic axis	0°~180°
	PD measurement	45mm~85mm
	Minimum pupil diameter	Φ2.0mm
Cornea measurement	Cornea curvature radius	6.5mm~9.4mm
	Direction of corneal astigmatic axis	0°~180°
	Cornea diameter	2.0mm~12.0mm
Product specifications	Monitor	9.0 "Touch LCD monitor
	printer	Imported Thermal Printer
	Saving mode	1/5/10/20/40 minutes automatic screensaver
	Power supply	AC230V 50Hz 75VA
	Dimensions/Weight	300(W)*450(D)*500-530(H)mm/20Kg

Measurement accuracy

Criterion	Measuring range	Measurement accuracy
Spherical vertex power	-20.00D~+20.00D	(-10.00D~+10.00D : ±0.25 D; > ±10D Tolerance: ±0.50D)
Cylindrical vertex power	0 D to 6 D	±0.25 D
Cylinder axis for cylinder power	0° to 180°	±5°
Cornea curvature radius	6.5 mm to 9.4 mm	±0.05 mm
Direction of corneal astigmatic axis	0° to 180°	for principal meridional differences in radii of curvature≤0,3 mm: ±4°; for principal meridional differences in radii of curvature>0,3 mm: ±2°

Standard Accessories

1. Power cable	1PCS
2. Print paper (Ø50*57mm)	1 Roll
3. Lens cloth	1PCS
4. Dust cover	1 PCS
5. Fuse (F3.15AH250V)	2 PCS
6. Rubber Cap	1 PCS
7. User Manual	1 Book
8. Touch pen	1 PCS

Maintenance Notes

1. Regular inspect instrument and components.
2. To ensure the instrument's safety condition before restarting from a long term shutdown.
3. Make the measuring windows to avoid fingerprints, smudges and dust. Blow the dust with a blower, use a clear cloth dipped in clearer and gently wipe the surface.
4. The instrument shell is dirty, using the supplied soft cloth or dry cloth to wipe the surface. Should not use chemical solvents.
5. Dust can damage the instrument, so put on the rubber cap and dust cover when not use.
6. It is not allowed to repair and maintenance when the instrument is in use.
7. The chinrest load is 1kg. Please gently put your chin on the chinrest when using.

Service Life

Under regular maintenance, the service life is 5 years.

MAINTENANCE

1、DAILY CHECKUPS

CLEANING THE INSTRUMENT

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

CLEANING THE APPLICATION PARTS

- **CLEANING THE CONTROL PANEL:**

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

- **CONTAMINATION BY DUST:**

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

- **CONTAMINATION BY FINGERPRINTS:**

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

- **CLEANING THE FOREHEAD REST AND CHIN REST:**

Wipe the forehead rest and the chin rest with a cloth moistened with a tepid solution of neutral detergent for kitchenware. Soak the cloth in the solution and wring it dry to wipe out the stain.



2、 DAILY MAINTENANCE

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

- When not in use, turn off the POWER switch.

When using the dust cover, tap the Reset button and return the chinrest and measuring head to their initial positions.

TROUBLE-SHOOTING OPERATIONS

 WARNING	To avoid electrical shock, do not open the instrument. All service should be performed by a qualified service engineer.
 WARNING	To avoid electrical shock, do not disassemble the instrument's top, bottom, monitor and measuring head's over.

If a problem is suspected, use the following check list.

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

CHECK LIST

Trouble	Condition	Check
Control panel does not turn on.	—————	Is power cable unplugged?
		Is power cable connected to the instrument?
		Replace the fuse.
Control panel is not clear.	The image is dark.	Adjust the brightness by “Control panel

		Brightness Adjust”.
Any trouble is found in a movable part.	—————	Do not move it forcibly but call our service engineer.
Printing is not done.	Paper comes out without printing	Confirm the direction of paper winding.
	Paper does not come out.	Is there “Printer Cover is Open” displayed on the control panel ? If displayed, please check the printer cover.
		Is the paper skew ?
		If paper is running out, replace the new paper.

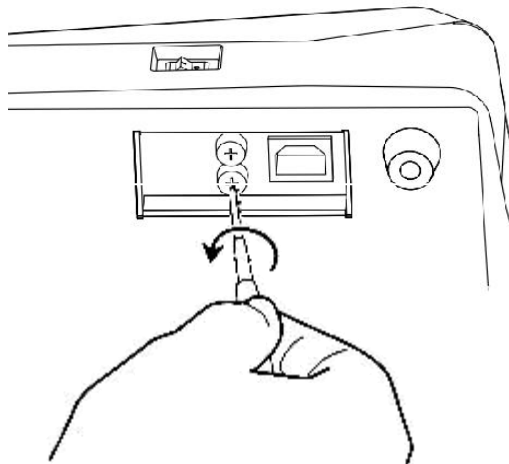


The maintenance and calibration of the instrument need professional equipment and personnel, and users are not allowed to repair and calibrate independently. If there is any need for maintenance or calibration, please contact your dealer or manufacturer.

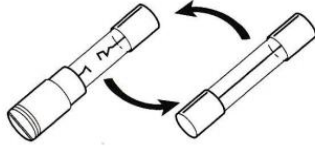
FUSE CHANGE

 WARNING	To avoid electric shocks during fuse change, be sure to unplug the power cable before removing the fuse lid. Also, do not plug the power cable with the fuse lid removed.
 WARNING	Always use the attached fuse (F3.15AH250V) .Using any other type may cause malfunction and fire.

- 1 Make sure the power is off and the power cable is unplugged.
- 2 Tilt the body slowly so that the power switch comes up and the power inlet at the bottom can be seen.
- 3 Press the fuse holder with a screwdriver and turn it counter-clockwise. The fuse holder can be taken out.



4 Replace the fuse with a spare one.



5 Press the fuse holder lightly with a screwdriver and turn it clockwise. The fuse holder is set.



The button cell battery (Panasonic CR2032) must be replaced by professional maintenance personnel, non-professional personnel unauthorized replacement can lead to danger.



To avoid potential hazards to the environment and human health, the instrument and accessories should be treated as follows:

(I) In EU Member States, they are scrapped according to WEEE (scrap electrical and Electronic Equipment Directive).

(II) For all other countries, it is processed and recycled according to local regulations.



The signal input and output part of the instrument is only connected with the equipment that meets the requirements of the GB9706.1 standard.



In the process of equipment installation and operation, strictly follow the EMC instructions.

1. Do not use the equipment together with other electronic devices to avoid electromagnetic interference.
2. Do not place equipment near other devices to avoid electromagnetic interference.
3. Do not use the equipment in the same room with other life support equipment, or other equipment that has a serious impact on the patient's life or treatment, or low current measurement, or treatment equipment.
4. Do not use the equipment together with the portable mobile wireless communication system to avoid adverse effects on the operation of the equipment.
5. Cables that do not conform to the specifications of the equipment should not be used, because it may increase the radiation of the equipment or electromagnetic waves, which may lead to electromagnetic interference.

SAFETY DESIGNATIONS

- 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.

- Degree of protection against harmful intrusion of water: IPX0

This product does not provide protection against intrusion of water.

- Classification by sterilization/disinfection method specified by manufacturer

This product does not have a component requiring sterilization/disinfection.

Wipe the surface with a clean cloth.

- 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.

ELECTROMAGNETIC COMPATIBILITY

1. Warning: Portable and mobile RF communications equipment can affect medical electrical equipment.

2. Warning: 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.

3. Warning: When using this product, it should meet the requirements of the following table.

4. Warning: 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.

5. 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 user manual.

6. Must use the cable and accessories supplied by this equipment. The cable information is as follows:

Cable name	Model	Length (m)
Power Cable	300V/500V 3*0.75 m m ²	1.5 m

7. Basic performance: In the measurement mode, the image acquisition and display are normal, and the real-time image can be observed on the screen.

EMC Guidelines

Below cables information are provided for EMC reference.

Cable	Max. cable length, Shielded/unshielded		Number	Cable classification
	1.4m	Unshielded		
AC Power Line	1.4m	Unshielded	1 Set	AC Power

Important information regarding Electro Magnetic Compatibility (EMC)

AUTO KERATO-REFRACTOMETER needs special precautions regarding EMC and put into service according to the EMC information provided in the user manual; AUTO KERATO-REFRACTOMETER conforms to this IEC 60601-1-2:2014 standard for both immunity and emissions. Nevertheless, special precautions need to be observed:

AUTO KERATO-REFRACTOMETER with no ESSENTIAL PERFORMANCE/Following ESSENTIAL PERFORMANCE is intended used in Professional healthcare facility environment.

WARNING: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the AUTO KERATO-REFRACTOMETER, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.”

The use of accessories and cables other than those specified by FLO OPTICAL, with the exception of accessories and cables sold by FLO OPTICAL of AUTO KERATO-REFRACTOMETER as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the AUTO KERATO-REFRACTOMETER.

WARNING: Use of this equipment AUTO KERATO-REFRACTOMETER adjacent to or stacked with other equipment should be avoided because it could result in improper operation.”

When the AC input voltage is interrupted, the AUTO KERATO-REFRACTOMETER will shut down and if the power supply restored, it should be recovered by operator manually, this degradation could be accepted because it will not lead to unacceptable risks and it will not result in the loss of basic safety or essential performance

EMI Compliance Table

Table 1 - Emission

Phenomenon	Compliance	Electromagnetic environment

RF emissions	CISPR 11 Group 1, Class A	Professional healthcare facility environment and
Harmonic distortion	IEC 61000-3-2 Class A	Professional healthcare facility environment
Voltage fluctuations and flicker	IEC 61000-3-3 Compliance	Professional healthcare facility environment

NOTE The EMISSIONS characteristics of this equipment make it suitable for use in industrial areas and hospitals (CISPR 11 class A). If it is used in a residential environment (for which CISPR 11 class B is normally required) this equipment might not offer adequate protection to radio-frequency communication services. The user might need to take mitigation measures, such as relocating or re-orienting the equipment.

EMS Compliance Table

Table 2 - Enclosure Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrostatic Discharge	IEC 61000-4-2	±8 kV contact ±2kV, ±4kV, ±8kV, ±15kV air
Radiated RF EM field	IEC 61000-4-3	3V/m 80MHz-2.7GHz 80% AM at 1kHz
Proximity fields from RF wireless communications equipment	IEC 61000-4-3	Refer to table 3
Rated power frequency magnetic fields	IEC 61000-4-8	30A/m 50Hz or 60Hz

Table 3 – Proximity fields from RF wireless communications equipment

Test frequency (MHz)	Band (MHz)	Immunity test levels
		Professional healthcare facility environment
385	380-390	Pulse modulation 18Hz, 27V/m
450	430-470	FM, ±5kHz deviation, 1kHz sine, 28V/m
710	704-787	Pulse modulation 217Hz, 9V/m
745		
780		
810	800-960	Pulse modulation 18Hz, 28V/m
870		
930		
1720	1700-1990	Pulse modulation 217Hz, 28V/m
1845		

1970		
2450	2400-2570	Pulse modulation 217Hz, 28V/m
5240	5100-5800	Pulse modulation 217Hz, 9V/m
5500		
5785		

Table 4 – Input a.c. power Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrical fast transients/burst	IEC 61000-4-4	±2 kV 100kHz repetition frequency
Surges Line-to-line	IEC 61000-4-5	±0.5 kV, ±1 kV
Surges Line-to-ground	IEC 61000-4-5	±0.5 kV, ±1 kV, ±2 kV
Conducted disturbances induced by RF fields	IEC 61000-4-6	3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz
Voltage dips	IEC 61000-4-11	0% U_T ; 0.5 cycle At 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°
		0% U_T ; 1 cycle and 70% U_T ; 25/30 cycles Single phase: at 0°
Voltage interruptions	IEC 61000-4-11	0% U_T ; 250/300 cycles

