Auto Refractometer
Auto Kerato–refractometer

User's Manual

Contents

1.Description of the Instrument

The Auto Refractometer/Kerato–refractometer is a precision ophthalmic instrument. It can be used to measure the parameters of farsightedness, nearsightedness, astigmatism, axis, pupil–distance and cornea curvity for prescription of vision correction.

Fig.1.Auto Refractometer/Kerato-refractometer

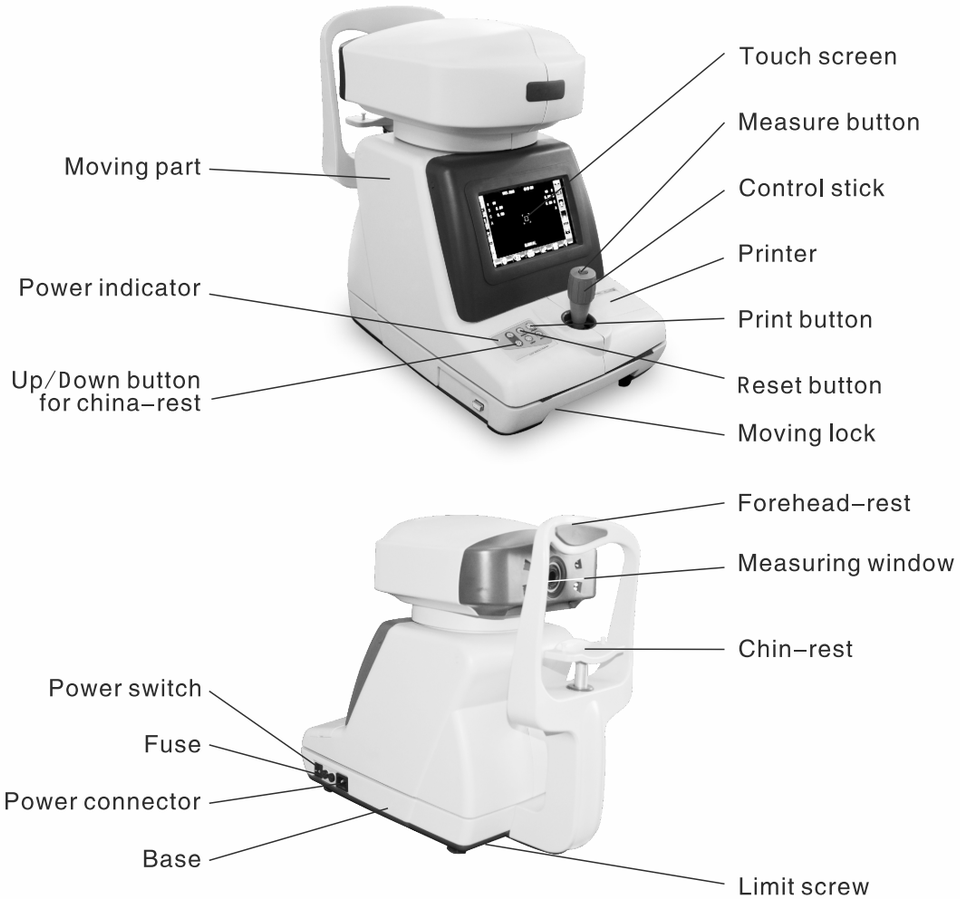
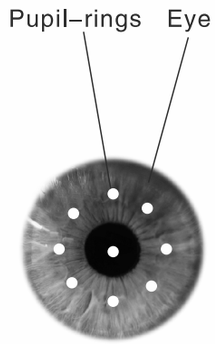
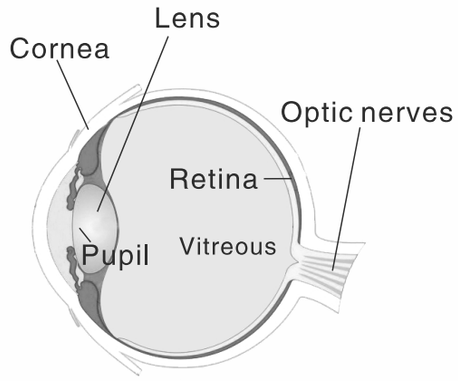


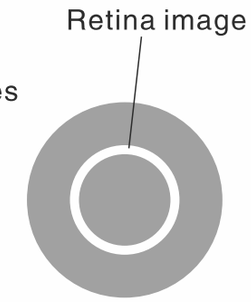
Fig.2. Principle of measurement



Pupil rings are formed by the instrument and used for good aiming at the eye.



The eye adjusts its refraction power to focus the objects at different distances to the retina. But it may be nearsighted(myopia). A lens is needed to correct the refraction power.

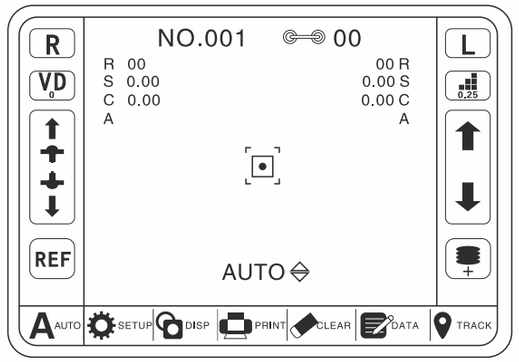


A retina image is produced through projecting a standard image to the eye which is used to analyze the refraction power.

The Refractometer/Kerato–refractometer projects a standard infrared image (generally a circle) to the retina of an eye. By means of analyzing the image on the retina, it can measure hyperopia, myopia, astigmatism, axis and cornea curvity.

In order to make precision measurement, a good alignment with the eye is essential. Refractometer/Kerato–refractometer provides pupil rings to assist in operation. Pupil size smaller than the median ring means that its diameter is less than 2.0mm.

Fig.3. Screen display



NO.001 Total printing times

Pupil distance

R L Right eye/Left eye

VD 0 Vertex distance button to choose among 0,12 and 13.75

0.25 Step button to choose measuring step between 0.12 and 0.25

Up/Down button to adjust chin rest

Up/Down button to adjust optical system

REF KER R&K Mode switch button to switch different measurement mode among REF, KER and R&K(only use for kerato–refractometer)

Cylinder mode button to choose among +, – and ±

A AUTO M MANUAL Fucus sign/button to switch auto fucus or manual focus function

SETUP Setup button to display the setting menu

DISP Display button to display the retina image after measuring

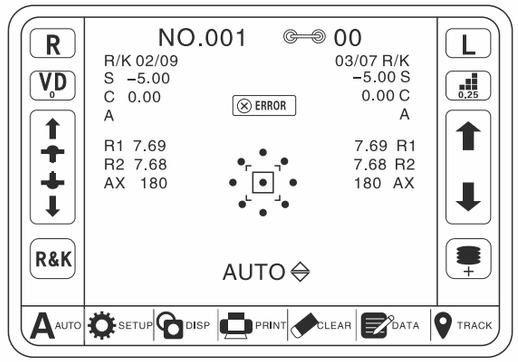
PRINT Print button to print the measured data

CLEAR Clear button to eliminate the measured data

DATA Data button to display the measured data

TRACK Track sign/button to switch the auto tracking function of optical system

Fig.4. Messages during measurement



R/K 02/09 Measuring times of diopter or/and corneal curvity value

S –5.00 Sphere value

C 0.00 Cylinder value

A Axis value

R1 7.69 Radius value

R2 7.68 Radius value

AX 180 Axis value

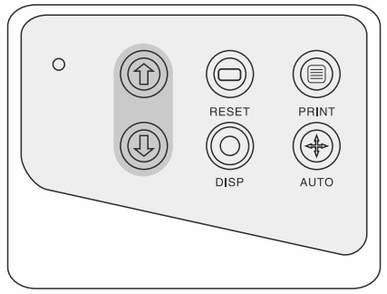
only for kerato–refractometer

ERROR

- Displayed when the eye blinks or moves.
- Displayed when pupil diameter is less than 2.0 mm.
- Indicated that the signal reflected from retina is too weak.
- Indicated that the square mark is not well centered.

If the display state was selected at small in the setting menu, it displayed when you press DISPLAY switch after measurement.

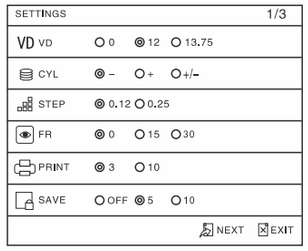
Fig.5. Function button

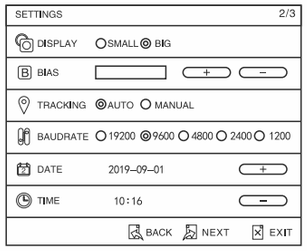


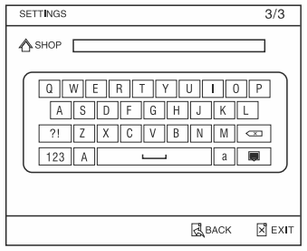
MEASURE	Move the control stick to focus and start measuring by pressing measure button
PRINT	Print the measured data
RESET	Reset the refractometer/kerato–refractometer to initial status
DISP	Display button to display the retina image after measuring
AUTO	Fucus sign/button to switch auto fucus or manual focus function

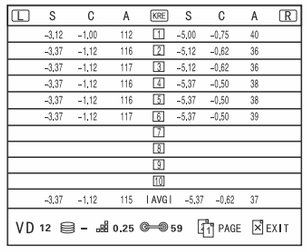
Fig.6. Setting menu and Data menu

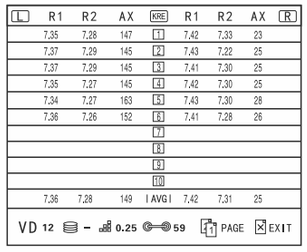
Press SETUP button to enter setting menu and change it by pressing the options.





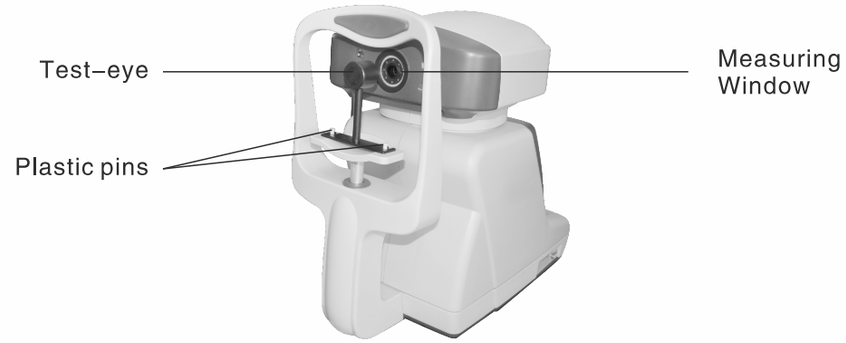






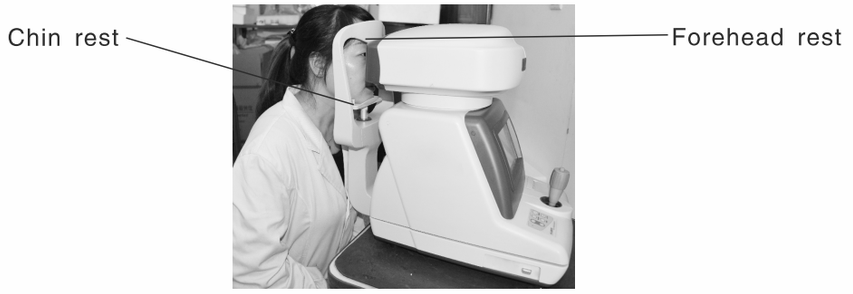
only for kerato–refractometer

Fig.7. Position of the test-eye



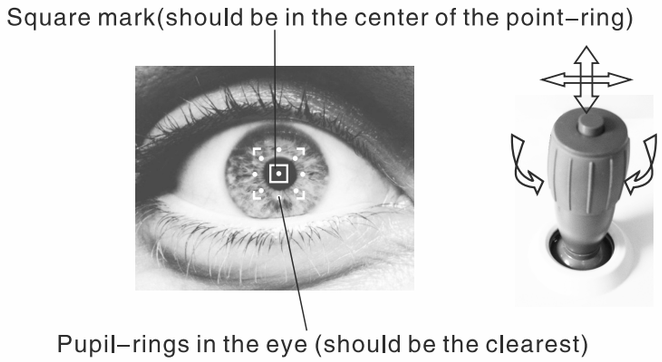
The test–eye is used for checking the Refractometer/Kerato–refractometer. To avoid falling down, the test–eye should be fixed on the chin–rest with plastic pins.

Fig.8. Position of the patient



- Ensure the patient to sit on the chair comfortably.
- Let the patient's chin rest on the chin rest and his/her forehead on the forehead rest.
- Press the Up–Down button for chin rest to match the eye height with the measuring window roughly.

Fig.9. Aim at the eye and start a measurement



The control stick is used to move the measuring window horizontally and vertically. With the control lever, one can place the square mark in the center of the pupil–rings and make the pupil–rings sharply focused.

The Refractometer/ Kerato–refractometer could also automatically track the eye vertically and automatically measure it by switching these functions when you start measurement.

Fig.10. Observe retina image

After measurement you can observe the stored retina image by pressing DISPLAY switch. You could select the display state in the setting menu. If the image is an incomplete circle, the measurement is not reliable, and should be measured once again.

Incomplete retina images may be caused by eye blinking or by eye movement. Sometimes it is because the signal reflected from the retina is too weak, or pupil diameter is less than 2.0 mm.

Fig.11. Printout

If the stored measuring results were more than 3 times and the print state was selected at 10, all results will be printed. Otherwise, at most 3 results will be printed.

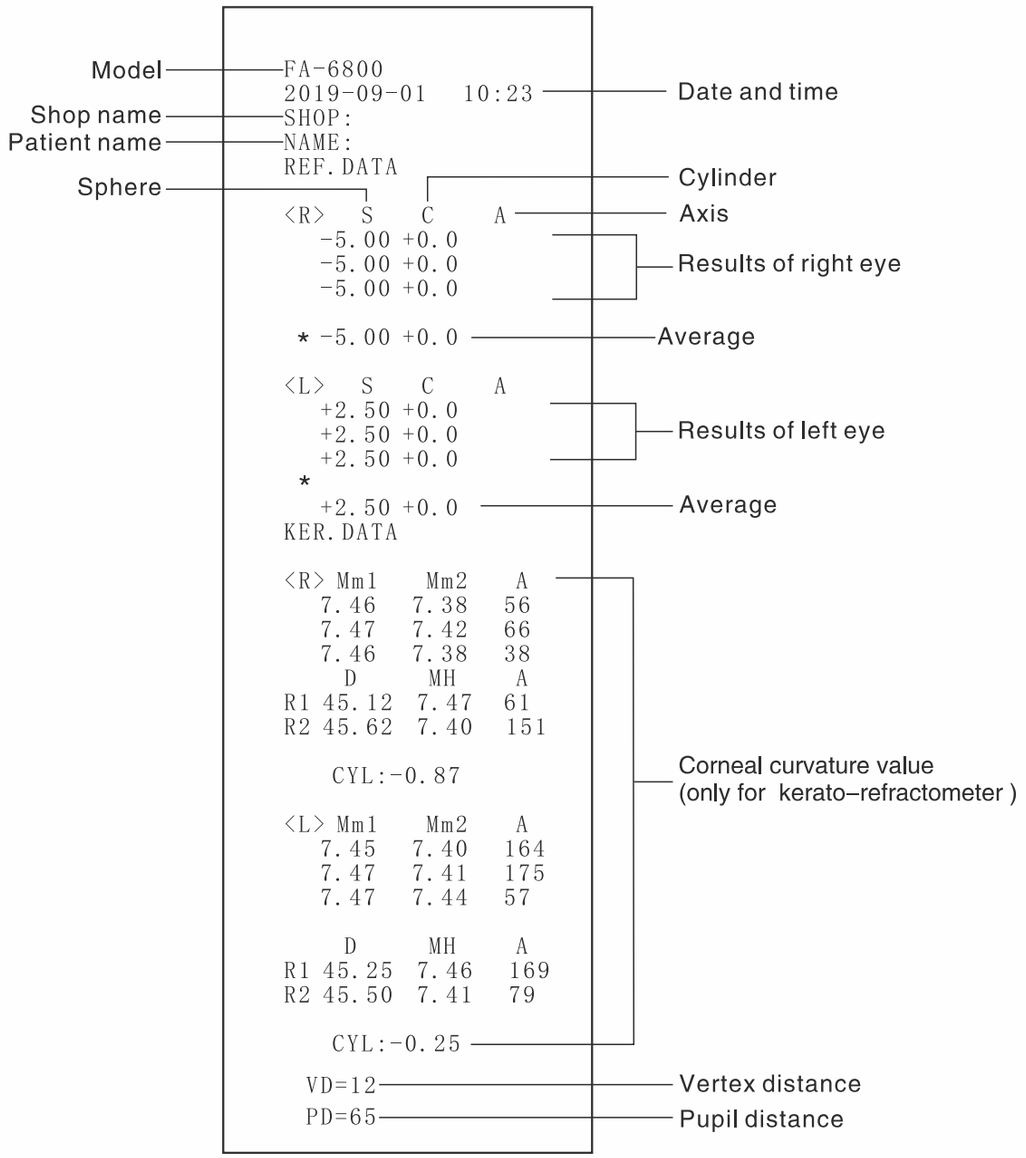


Fig.12. Load printing paper

▶ Step1

▶ Step2

▶ Step3

- Pluck out the printer cover.
- Hold the printer cover ,replace the old paper and install on new thermal paper correctly as above picture shown.
- Push the printer cover upward and tight it.

Note: Please use anti-roll thermal coating paper of the size 57*40

2.Unpack and Check

Unpack the box

- Tear off the adhesive tape.
- Remove the foam used for shipping.
- Take out the accessories.

CAUTION:
Please keep the box and foam for future use.

Check the accessories

The accessories in the box

- User's manual(1)
- Dust cover(1)
- Fuse(2)
- Hexagonal wrench(1)
- Print paper(2)
- Power cord(1)
- Cleaning cloth(1)
- Test–eye(1)

Select a proper place for the instrument

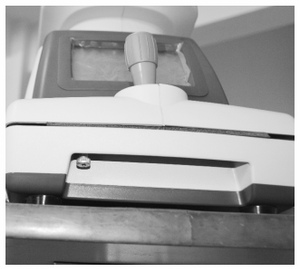
- Place the automatic table at a horizontal flat surface without direct sunlight. Then place the auto Refractometer/Kerato–refractometer on the automatic table.
- The instrument will work at an environment of +5℃ to +35℃ (41^{0}F to 95^{0}F) and 80% relative humidity.

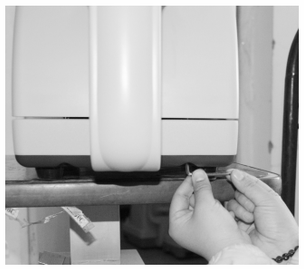
CAUTION:
Don't place the instrument in the following environment:

- Extremely hot or cold.
- Temperature rapidly changes.
- Damp and dirty.
- Near electromagnetic facilities.

3. Installation and Test

Installation





- Place the automatic table on the floor.
- Gently place the Refractometer/Kerato–refractometer on the automatic table.
- Unscrew the screw with hexagonal wrench.
- Connect power cord of the Refractometer/Kerato–refractometer to the automatic table.
- Connect power cord of the automatic table to an outlet of main voltage. (100–240V AC) 50/60Hz.

Test

- Turn on the power switch. The power indicator will light.
- Set the test–eye on the chin–rest (see Fig.7).
- Roughly match the test–eye height with the measuring window by pressing Up–Down button for chin rest.
- With the control stick, place the square mark in the center of the pupil–rings (see Fig.9).
- Pull the moving part to make sure the point ring is the clearest.
- Press Measure button, the measurement result will be displayed in a moment. The displayed result should be identical to the parameter of test eye (–5.00D when VD=12mm).
- Check all other buttons of the screen by pressing the icons.
- Press the Print button to print the measured data.
- Press the Reset button to start initial status.
- If the measurement result is the same to the test–eye (an error of 0.25D is normal) and the functions are all okay, then the refractometer is ready for use.

4. Using the Instrument

- Turn on the power switch. The power indicator will light and the screen begins to display.
- Always reset the instrument when examine a new patient.
- Adjust the automatic table to ensure the patient to sit on the chair comfortably (see Fig.8).
- Let the patient's chin on the chin rest and forehead on the forehead rest.
- Roughly match the eye height with the measuring window.
- With the control stick, place the square mark in the center of the pupil rings (see Fig.9) .
- Pull the moving part to make sure the point ring is the clearest.
- Press Measure button, the measurement result will be displayed in a moment.
- It could also automatically track the eye vertically and automatically measure it by switching these functions when you start measurement.
- After both of the left and right eyes are measured, pupil distance (PD) value will be displayed on the touch screen.
- Press Print button to print out the results.

CAUTION:

- Strong light toward the measuring window will cause measurement error.
- The instrument should be regularly tested by the test–eye.
- Each eye should be measured at least three times.

5. Specifications

	SPECIFICATIONS
	Range of measurement
Sphere	-20~+20m^{-1}(VD=12) 0.125m^{-1} step
Cylinder	-8~+8m^{-1} 0.125m^{-1} step
Axis	0~180° 1° step
PD	45~88mm,1mm step
VD	0mm,12mm,13.75mm
Min.Pupil Size	Ø2.0mm
	Keratometry
Radius of curvature	5.0~10mm(increment: 0.01mm)
Corneal power	33.75~67.50D(when corner equivalent refractive index is 1.337) (increment selectable from 0.12, 0.25m^{-1})
Corneal astigmatism	0.0~8.00D(increment selectable from 0.12,0.25m^{-1})
Axis	1~180°(increment:1°)
Corneal diameter	2.0~14.0mm(increment: 0.1mm)
Memory of data	10 measure value for each right and left eye
	Others
Chart	Follow-up colorful fogging chart system
Display	7" TFT LCD
Print	Thermal printer
Power supply	220V±10% 50Hz 60VA
Dimension	514mm×284mm×465mm
Weight	~15.5kg(34lb)

*Specifications are subject to change without notice.

6. Safety Notes and Maintenance

Safety notes

- The AC voltage should be 100–240V AC.
- Never put heavy objects on the instrument.
- Keep the instrument and the ambient air clean.
- Exposure to sunlight is prohibited.
- Handle the instrument with care when moving it.
- Do not use chemical on the surface of the instrument.
- The producer will not be responsible for the problems caused by unauthorized repairing.

Cleaning the instrument

- If dust accumulates on the measuring window, use a blower to blow off the dust.
- If there is fingerprint or oil on the measuring window, wipe lightly with clean gauze and a little camera lens cleaner.
- When the instrument cover is dirty, wipe with a dry soft cloth. Do not use benzine, thinner or a chemically treated cloth.

7.Troubleshooting

PROBLEMS	CAUSE or REMEDY
The power indicator does not light up.	• The power cord is not properly plugged into the power outlet. • The power cord is not connected to the instrument. • The fuse blows out.
Fuse blows immediately after power switch is turned on.	The line voltage is not right.
Too large error displays when measuring test–eye.	• Test–eye is set askew. • Measuring window is dirty. • Test eye surface is dirty.
Displays ERROR.	• The eye blinks. • The eye moves. • The pupil diameter is less than 2.0mm. • There is a disease in the eye.
Paper jams or no paper.	Replenish the thermal paper (see fig.12).
No data printed out	Please install thermal paper correctly . Please use anti–rolled thermal paper.