Auto Refractometer

User's Manual

Contents

1.Description of the Refractometer

The Auto 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

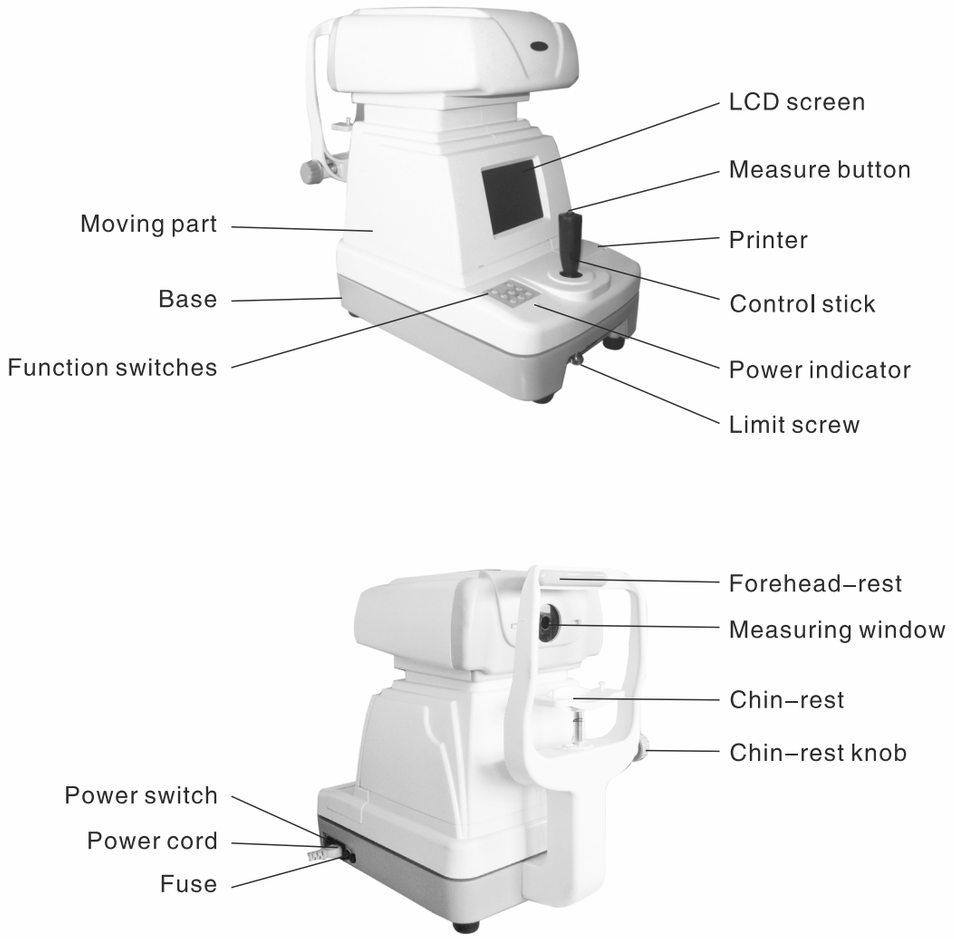
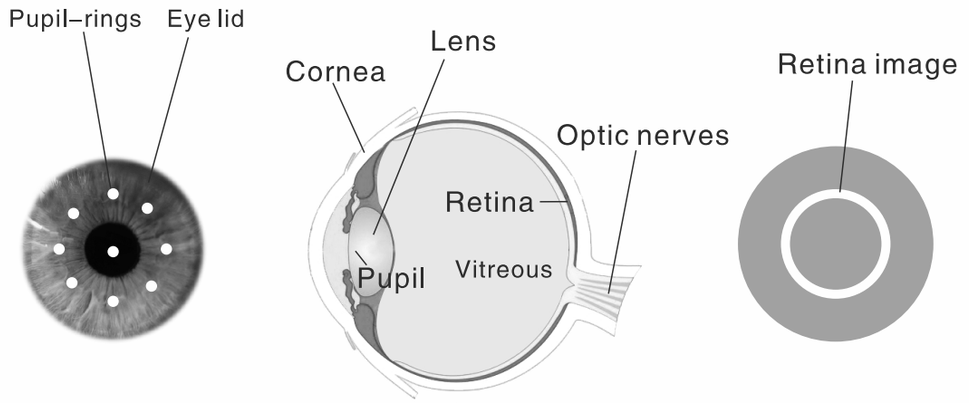


Fig.2. Principle of measurement



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 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.

In order to make precision measurement, a good alignment with the eye is essential. 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

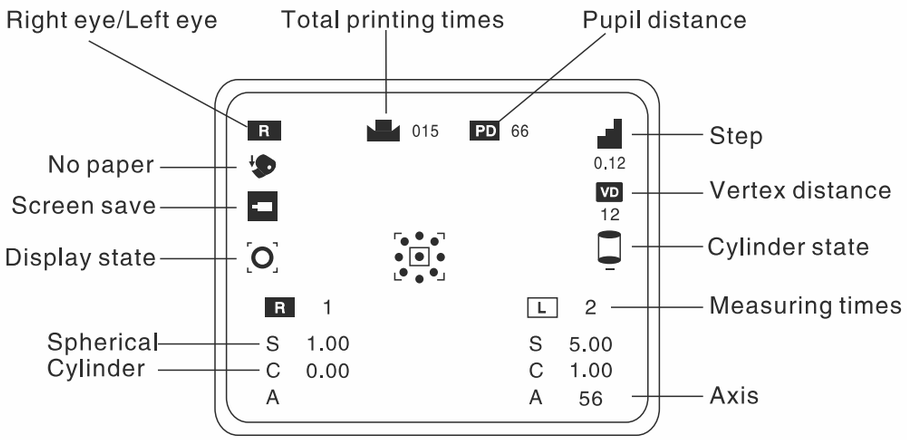
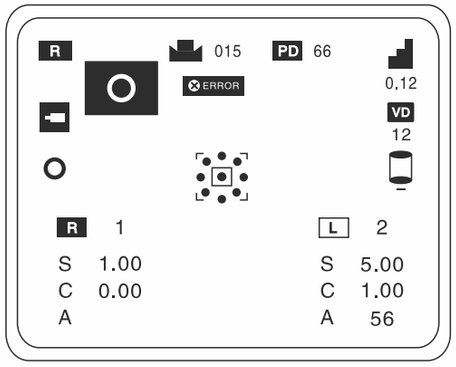


Fig.4. Messages during measurement

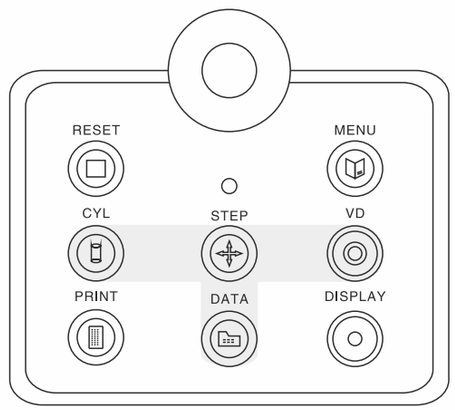


ERROR

- Displayed when the eye blinks or moves.
- Displayed when pupil diameter is less than 2mm.
- 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. Switches and button



RESET---Reset refractometer to initial state.

MENU---Dispaly the changeable options.

CYL---Select the state of astigmatism among + (positive), – (negative) and ± (mixture).

STEP---Select the measuring step between 0.12D and 0.25D.

VD---select contact lens (VD=0) or glass lens (VD=12 or 13.75mm).

PRINT---Print the measurement results.

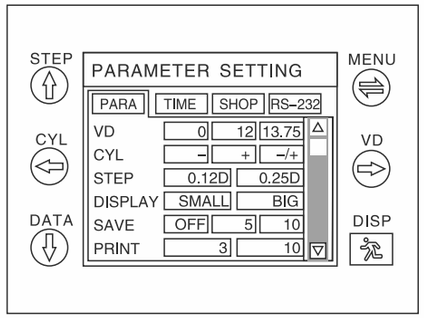
DATA---Show the measurement results.

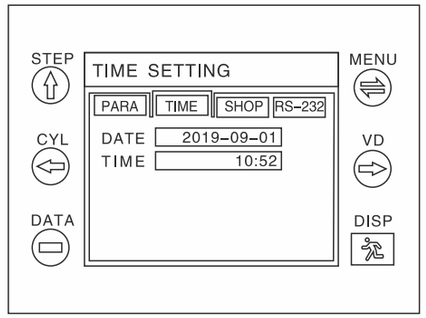
DISPLAY---Display the retina image .

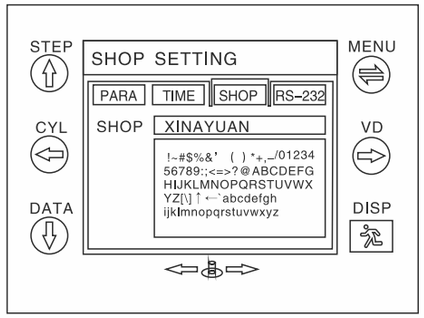
MEASURE---Start a measurement.

Fig.6. Menu display

Press MENU switch to enter setting menu interface. Change the options by pressing the switches as icons show.







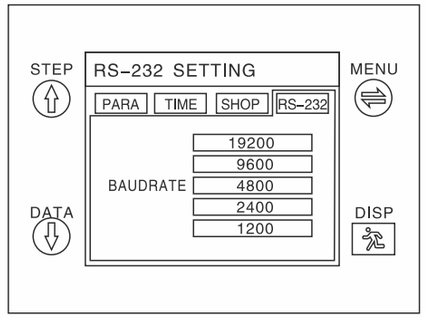
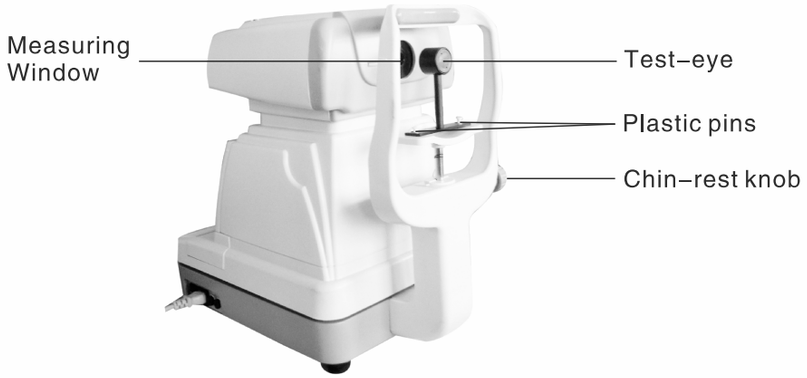


Fig.7. Position of the test-eye

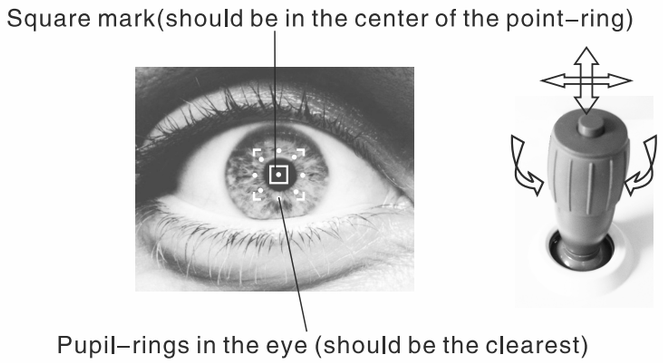


The test–eye is used for checking the refractometer. To avoid falling down, the test–eye should be fixed on the chin–rest with plastic pins.

Fig.8. Position of the patient

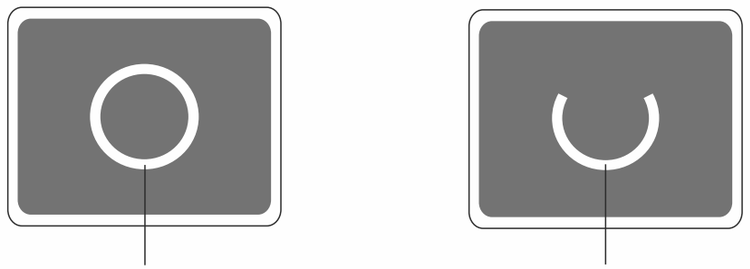
- Ensure the patient to sit on the chair comfortably.
- Let the patient's chin rest on the chin–rest and his/her forehead on forehead–rest.
- With the chin–rest knob, roughly match the eye height with the measuring window.

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.

Fig.10. Observe retina image



After a 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 made 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 and the print state was selected at 10, all results will be printed. Otherwise, at most 3 results will be printed.

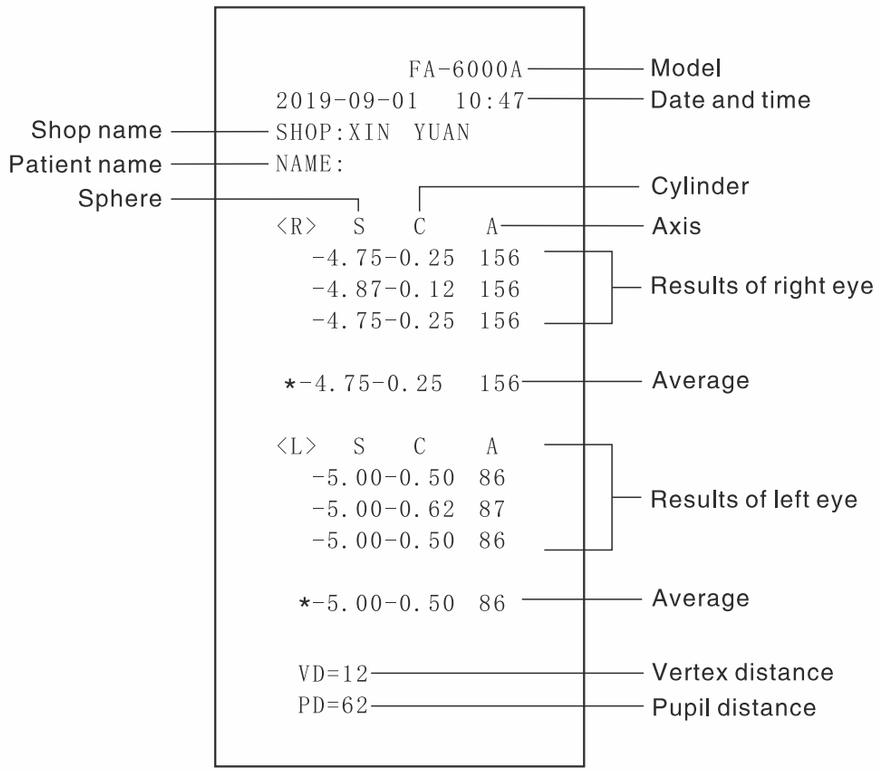
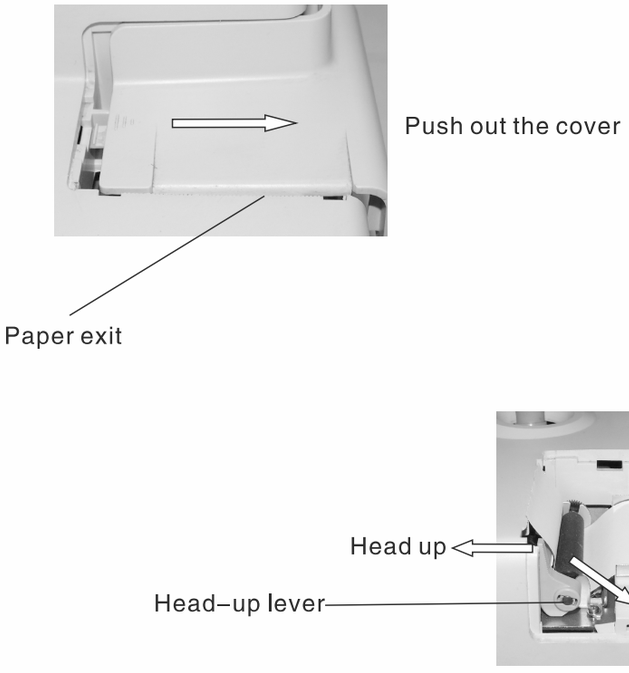


Fig.12. Load printing paper



- Push out the printer cover.
- Load a new paper roll.
- Cut the leading edge of thermal paper straight as above shown.
- Raise the head–up lever to lift the print head from the platen.
- Insert the thermal paper into the paper entrance and feed it manually until the leading edge of the paper reaches the paper exit.
- Lower the head–up lever to load the print head on the platen.
- Return the printer cover.

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)
- Screw driver(1)
- Test–eye(1)
- Print paper(1)
- Power cord(1)
- Cleaning cloth(1)
- Steel cover(2)

Select a proper place for the instrument

- Place the automatic table at a horizontal flat surface without direct sunlight. Then place the auto 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 refractometer 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 on the automatic table.
Unscrew the limit screw and uninstall two limiting stoppers first, then install the two steel covers.
Connect power cord of the 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).
- With the chin–rest knob, roughly match the test–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. The displayed result should be identical to the parameter of test eye (–5.00D when VD=12mm).
- Press CYL switch, CYL state should change among +, – and ±.
- Press STEP switch, STEP state should change between 0.12 and 0.25.
- Press VD switch, VD state should change among 0,12 and 13.75.
- Press PRINT switch, the printer should print out the results (see Fig.11).
- Press DATA switch, all stored measuring data will be displayed on the screen.
- Press DISPLAY switch, the retina image will be displayed on the screen.
- Press RESET switch, you will hear the motor moving.

- 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 Refractometer

- Turn on the power switch. The power indicator will light and the screen begin 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 rest on the chin–rest and forehead on the forehead–rest.
- With the chin–rest knob, 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 switch, the measurement result will be displayed in a moment.
- After both of the left and right eyes are measured, pupil distance (PD) value will be displayed on the LCD screen.
- Press VD switch to select contact lens(VD=0) or glass lens (VD=12 or 13.75mm).
- Press PRINT switch 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.

	SPECIFICATIONS
	Range of measurement
Vertex distance	0mm, 12mm, 13.75mm
Spherical	-20~+20m^{-1}(VD=12) 0.12/0.25m^{-1} Step
Cylinder	-8~+8m^{-1} 0.12/0.25m^{-1} Step
Axis	0~180° 1°Step
Cylinder form	−, + , ±
Pupil distance	45~88mm, 1mm Step
Min. pupil size	2.0mm
	Others
Chart	Auto fog
Display	5.6"Color LCD
Print	Thermal printer
Power supply	100~240V 50/60Hz
Dimensions	280mmX492mmX462mm
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.
Only left/right displays on the screen.	Take the little black stick under moving part into the middle gap of basement.