Auto Refractometer

User's Manual

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Intellectual Property Right Declaration

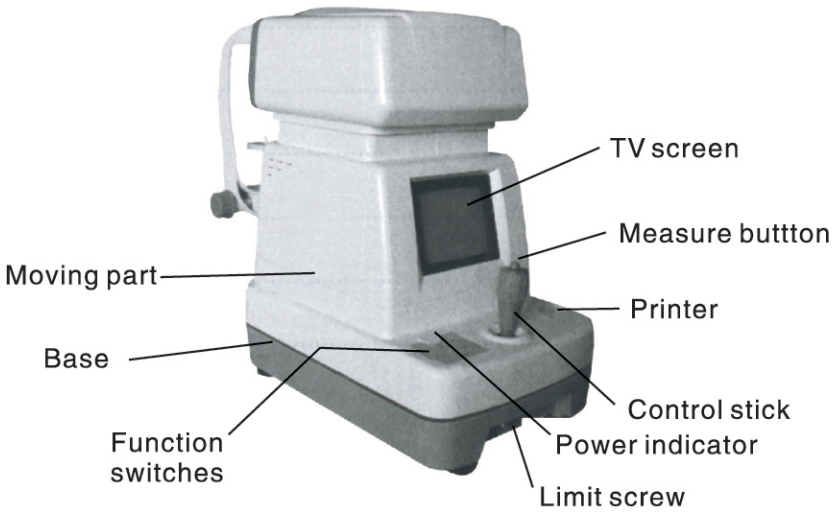
All not admitted to copy the technology or appearance of our product. If this phenomenon happened, we will investigate the legal liability according to the "Intellectual Property Right".

NOTE: Not dismantle without permit of the manufactory!

1. Description of the Refractometer

TheAuto Refractometer is a precision ophthalmic instrument. It can be used to measure the parameters of farsightedness, nearsightedness, astigmatism, axis and pupil–distance for prescription of vision correction.

Fig.1. Auto Refractometer



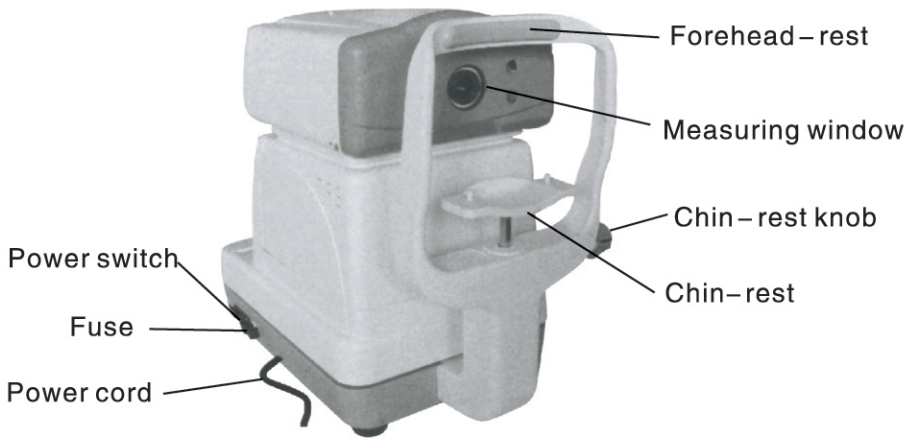
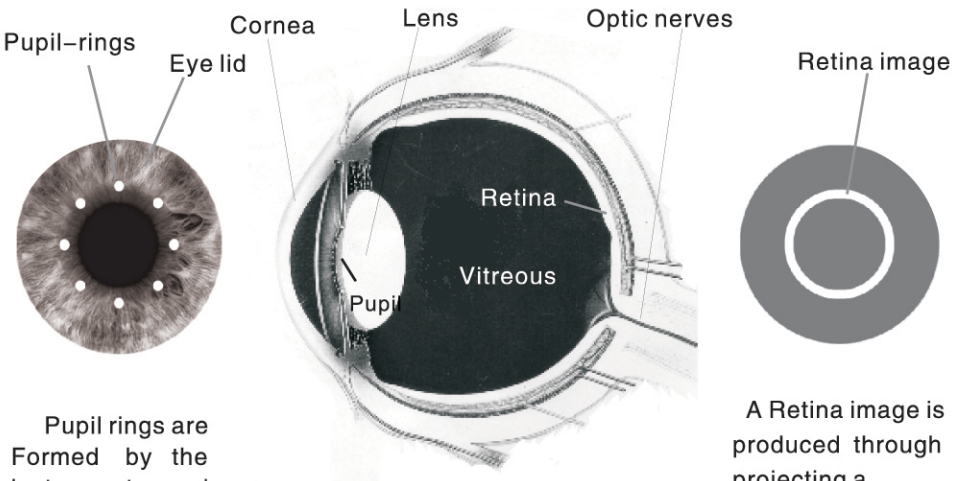


Fig.2. Principle of measurement



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 tl 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, and 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. TV monitor screen

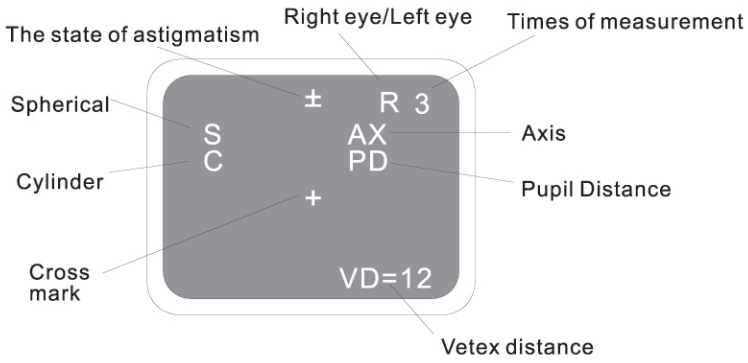


Fig.4. Switches and buttons

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

PRINT---print the measurement results

RESET---reset computer to initial state

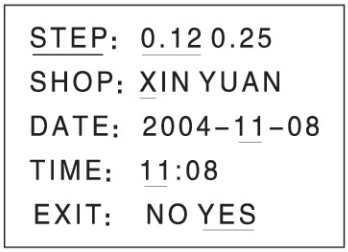
DISPLAY---display the infrared image on the retina

MEASURE--- start a measurement

CYL---select the state of astigmatism: "+" positive "– " negative "+/– "mixture

MENU---display the changeable parameter

Fig.5. Display of menu



- Press MENU button to enter the menu state.
- Use MEASURE button to select the changeable item.
- MENU button is used to change parameters.

"VD" button is used to plus number and Cyl button is used to minus number. Other Button is invalid.

Note: The word can be changed when the line is beneath it. And word can be setted with Blank number(0–9), Line (–) or word (A–Z) according to your needs.

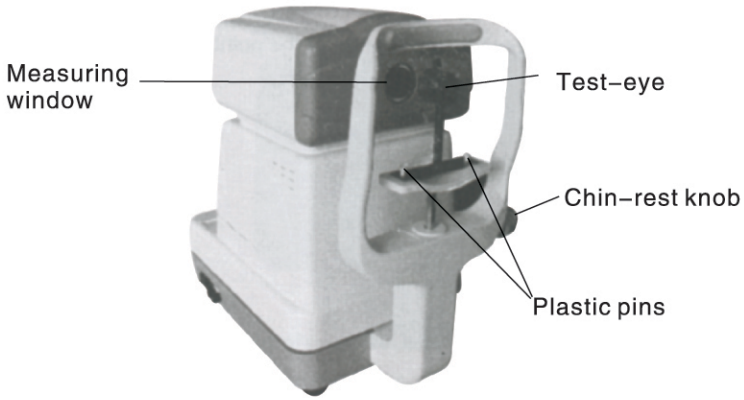
Fig.6. Change the model name

MODEL: FA-6100

EXIT: NO YES

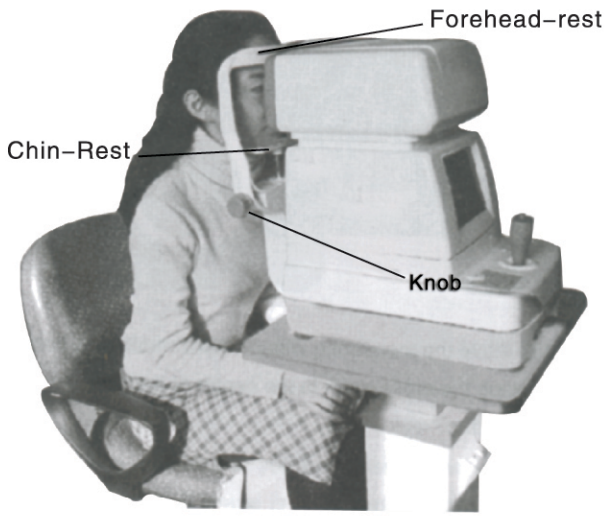
- Press MENU button to enter the menu state.
- Press MEASURE button and CYL button together to enter the next menu state.
- The process of changing the model name is as the same as above.
- After change, you can exit by EXIT item. The changed parameters can be check in the print paper (see Fig.12) .

Fig.7. Position the test–eye



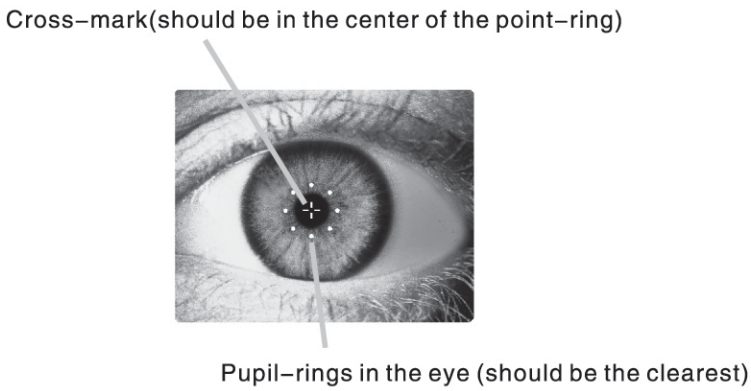
The test–eye is used for checking Auto Refractometers. To avoid falling down, the test–eye should be fixed on the chin–rest with plastic pins.

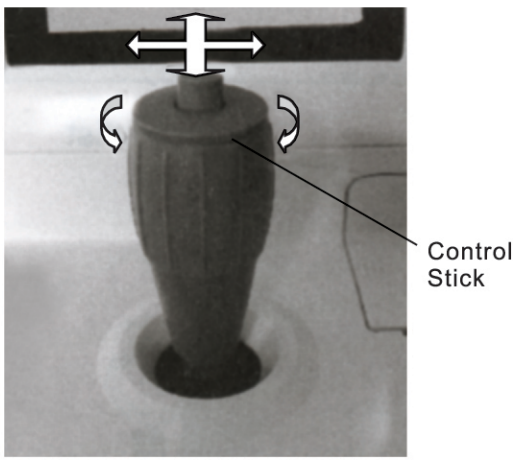
Fig.8. Position the patient



- Adjust the automatic table to 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.

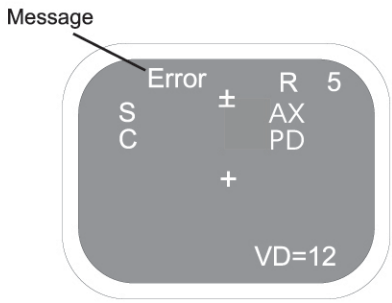
Fig.9. Aim at the eye and start a measurement





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

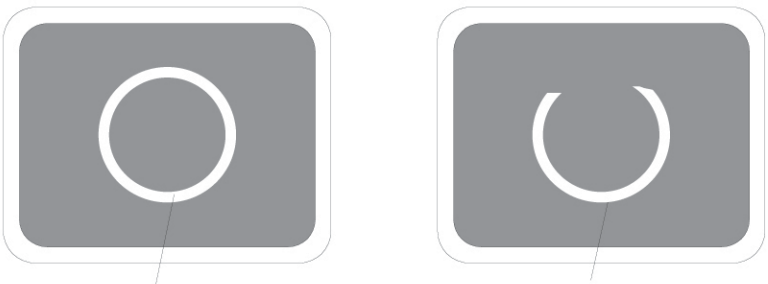
Fig.10. Messages during measurement



"ERROR":
- Displayed when the eye blinks or moves.
- Indicates that there is no eye to be measured or the cross mark is not well centered.
- Displayed when pupil diameter is less than 2mm.
- Indicates that the signal reflected from retina is too weak.

"OVER SPH":
- Indicates that spherical power exceeds the maximum.

Fig.11. Observe a retina image



A complete retina image

An incomplete retina image

After a measurement, you can observe the stored retina image by pressing the "DISPLAY" key. 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 the pupil diameter is less than 2.2mm.

Fig.12. Printout

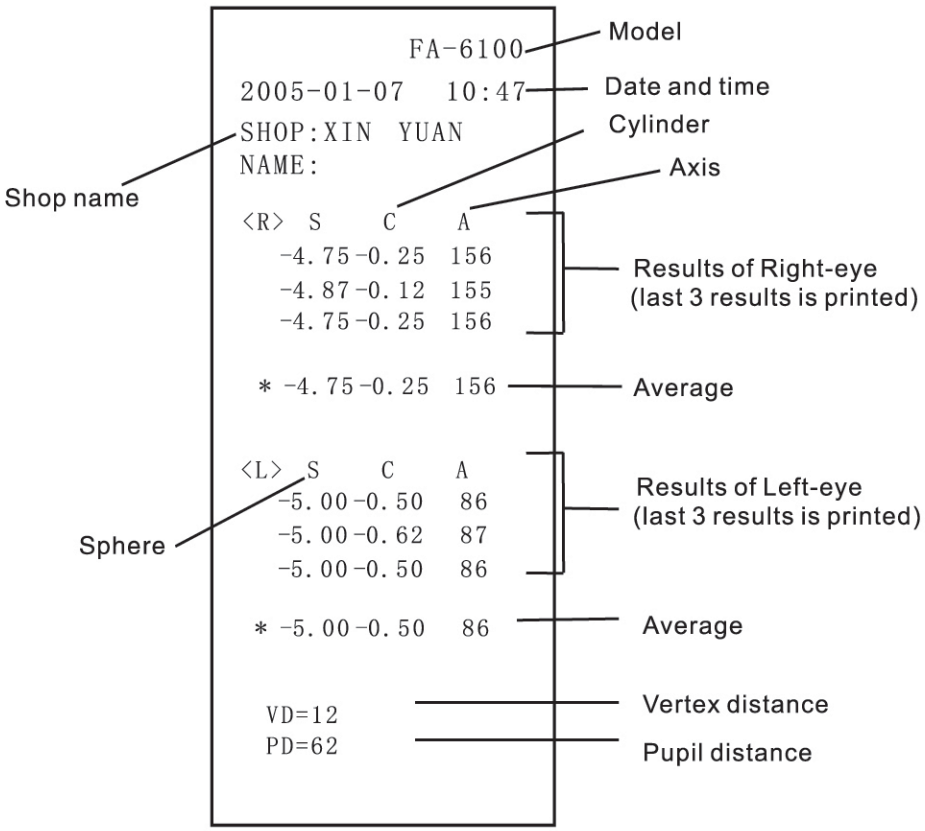
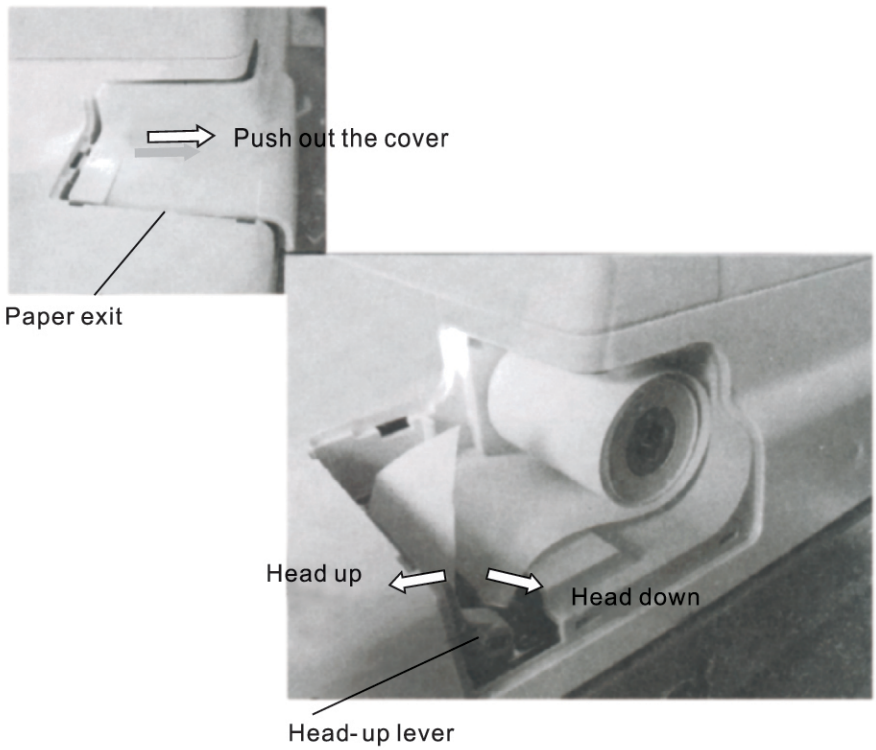
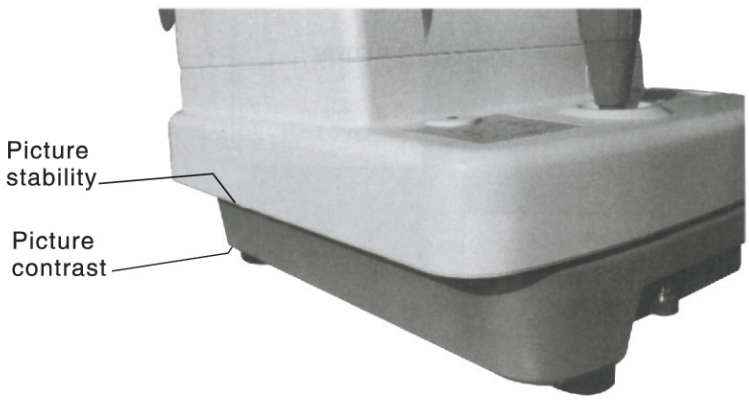


Fig.13. Load printing paper



- Push out the printer cover;
- Load a new paper roll;
- Cut the leading edge of thermal paper straight as shown above;
- 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.

Fig.14. Adjust the TV screen



At the left bottom of the moving part of the Refractometer, there are two knobs. They are used to adjust the display contrast and picture stability.

Fig.15. Automatic table (Optional)

An automatic table can make measurement easy and comfortable.

2. Unpack and Check

Unpack the box

- Tear off the adhesive tape;
- Remove the foam used for shipping;
- Take out packing list.

CAUTION:

Please keep the box and foam for ruture use.

Check the packing list

The content in the box

1. An Auto-Refractometer;
2. An Automatic table (Optional);
3. User's manual;
4. Accessories;

Select a proper place for the instrument

Place the automatic table at a horizontal flat surface without direct sunligh.Then place the auto refractometer on the automatic table.

The instrument will work at an environment of+5℃ to+35℃ (41°F to 95°F)and 80%relative humidity.

CAUTION:

Don't place the refractometer in the following environment:

1. Extremely hot or cold;
2. Temperature rapidly changes;
3. Damp and dirty;
4. Near electromagnetic facilities.

3. Installation and test

Installation

- Place the automatic table on the floor.
- Gently place the Refractometer on the automatic table.
- Unserew the limit screw and uninstall two limiting stoppers first.
- Connect power cord of the Refractometer to the automatic table.
- Connect power cord of the automatic table to an outlet of main voltage. (180–240AC)(90~130AC) 50/60HZ

Test

- Turn on the power switch. The power indicator will light, TV screen begin to
- display.
- Set the test–eye on the chin–rest (see Fig.5).
- With the chin–rest knob, roughly match the test–eye height with the measuring window.
- With the control lever, place the cross mark in the center of the pupil–rings (see Fig.7).
- Pull the moving part make sure the point ring is the clearest.
- Press "MEASURE" switch, 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 DISPLAY switch, the stored infrared image on the retina will be displayed on the TV screen.
- Press "VD" switch, and the VD value should change among 0, 12 and 13.75.
- Press "PRINT" switch, and the printer should print out the results (see Fig.10).
- 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 (MEASURE, DISPLAY, PRINT, VD, and RESET) are all okay, then the Refractometer is ready for use.

CAUTION:
Sunlight or strong light toward the measuring window will cause measurement error.

4. Using the Refractometer

- Turn on the power switch. The power indicator will light, TV 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.6).
- 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 lever, place the cross mark in the center of the pupil rings (see Fig.7).
- Pull the moving park make sure the point ring is the clearest.
- Press "MEASURE" switch, the measurement result will be displayed in a moment.
- Press DISPLAY switch, the stored infrared image on the retina will be displayed on the TV screen. If the displayed image is an incomplete circle, the result is not reliable, and you should make measurement once more.

After both of the left and right eyes are measured, pupil distance (PD) value will be displayed on the TV screen. Each eye should be measured at least three times.

- 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:

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

5. Specifications

- Measuring Range

Item	Measuring Range	Resolution	Error
Spherical(S)	–20~+20D	0.125D	0~10D: 0.25D 10~20D: 0.5D
Cylinder(C)	–8~+8D	0.125D	0.25D
Axis(AX)	0~180°	1°	3°
Pupil distance(PD)	45~85mm	1mm	1mm

- VD: 0mm, 12mm, 13.75mm
- Minimum pupil diameter measurable: 2.0mm
- TV monitor: 5" CRT
- Eye fixation: Auto fogging system
- Alignment: Pupil rings
- Power supply: AC110V, 120V, 220V, or 240V, 50/60Hz, 60VA
- Condition for use: +5~+35℃(+41°F to +95°F); <80% humidity
- Dimensions: 484 × 282 × 440mm
- Weight: ~20kg(44 lbs) (automatic table not included)

6. Safety notes and Maintenance

Safety notes

- ▲ The AC voltage should be 110~240VAC.
- ▲ 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 blowout.
Fuse blows immediately after power switch is turned on.	The line voltage is not right.
Too large error when measuring test–eye.	● est–eye is set askew. ● Measuring window is dirty. ● Test–eye surface is dirty.
Displays ERROR. Displays incomplete retina image.	● The eye blinked. ● The eye moves. ● The pupil diameter is less than 2.2mm? ● There is a disease in the eye.
Picture is not stable or not clear.	Adjust the Stable knob or Contrast knob (see Fig.12).
Paper jams.	(See Fig.11)
No paper.	Replenish printing paper (see Fig.11).

*Specifications are subject to change without notice.