

1. INTRODUCTION .....	1
2. SAFETY DISPLAYS .....	2
3. WORKING ENVIRONMENT .....	2
4. SAFETY CAUTIONS .....	3
5. COMPONENT NAMES .....	4
5.1 MAIN BODY .....	4
5.2 MEASURING screen .....	6
5.3 SETTING screen.....	7
6. PREPARATIONS .....	10
6.1 installation .....	10
6.2 CONNECTING POWER CABLE .....	10
6.3 INITIAL SETTINGS.....	11
7. Operation .....	11
7.1 APPLYING POWER SOURCE .....	11
7.2 POSITIONING THE PATIENT .....	11
7.3 COLLIMATION AND MEASUREMENT .....	11
8. MAINTENANCE.....	12
8.1 CLEANING THE INSTRUMENT.....	12
8.2 CLEANING APPLIED PARTS .....	12
8.3 DAILY MAINTENANCE .....	12
8.4 FUSE CHANGE .....	13

## 1. INTRODUCTION

Thank you for purchasing the Auto Refractometer RM-9000. This instrument is used to measure the spherical refractive-power, cylindrical refractive power, the direction of astigmatic axis.

This Instruction Manual covers an overview of the basic operation, troubleshooting, checking,

maintenance and cleaning of the Auto Refractometer RM-9000.

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

Keep this Manual at hand for future reference.

## 2. SAFETY DISPLAYS

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 Instruction Manual and marked on the instrument body.

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

Displays	Meaning
 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.

Injury means hurt, burn, electric shock, etc.

Physical damage means extensive damage that may involve building, peripheral equipment and furniture.

## 3. WORKING ENVIRONMENT

Temperature: 10°C-40°C;

Humidity: 30-80%;

Atmospheric Pressure: 700hPa-1,060hPa.

#### 4. SAFETY CAUTIONS

1	To ensure smooth operation, install the instrument on a level floor free of vibrations. Also, don't put things on the instrument.
2	Connect all cables properly before using.
3	Use the power at a rated voltage.
4	When not in use, switch off the power source and apply the measuring lens cap and dust cover.
5	For accurate measurement results, take care to keep the examination window clean and free of fingerprints, spots and dust.
6	To avoid electric shocks, do not attempt overhauling, rebuilding or repairs. Ask your dealer for repair.
7	To avoid electric shocks, do not remove covers from bottom and top surfaces, monitor, measuring unit, etc.
8	To prevent shock hazard, do not allow water or other foreign matter to enter the instrument.
9	To avoid fire and electric shocks in case of tumbling, do not place a cup or vessel containing water/fluid on the instrument.
10	To avoid electric shocks, do not insert objects metals through vent holes or gaps or contain them inside the machine body.
11	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 leaving the fuse box open.
12	Always use the attached fuse (1A 250V). Using any other type may cause troubles and fire.
13	Before moving the instrument, fasten the clamping knob at the bottom surface to stop movements. Negligence of this may cause injury by falling parts.
14	When moving the instrument, be sure to hold it at the bottom surface with two persons. Carrying by one person may cause a backache or injury by falling parts. Also, holding areas other than the bottom surface may cause pinching fingers between parts and injury by falling parts as well as damage to the instrument.
15	To avoid electric shocks, do not handle the power plug with wet fingers.

## 5. COMPONENT NAMES

### 5.1 MAIN BODY

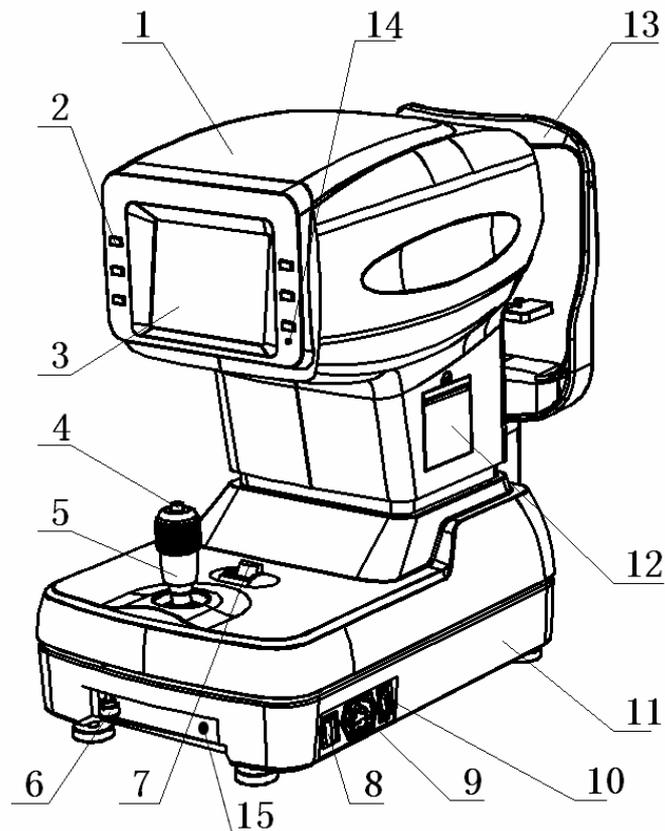


Fig 1. front view

1. Measuring head
2. Control buttons (6)
3. LCD monitor
4. Measurement switch
5. Control lever
6. Clamping knob (for movement)
7. Clamping knob
8. Power switch
9. Power plug
10. RS-232C OUT terminal
11. Base unit

- 12. Printer cover
- 13. Forehead rest
- 14. Power lamp
- 15. Fuse holder

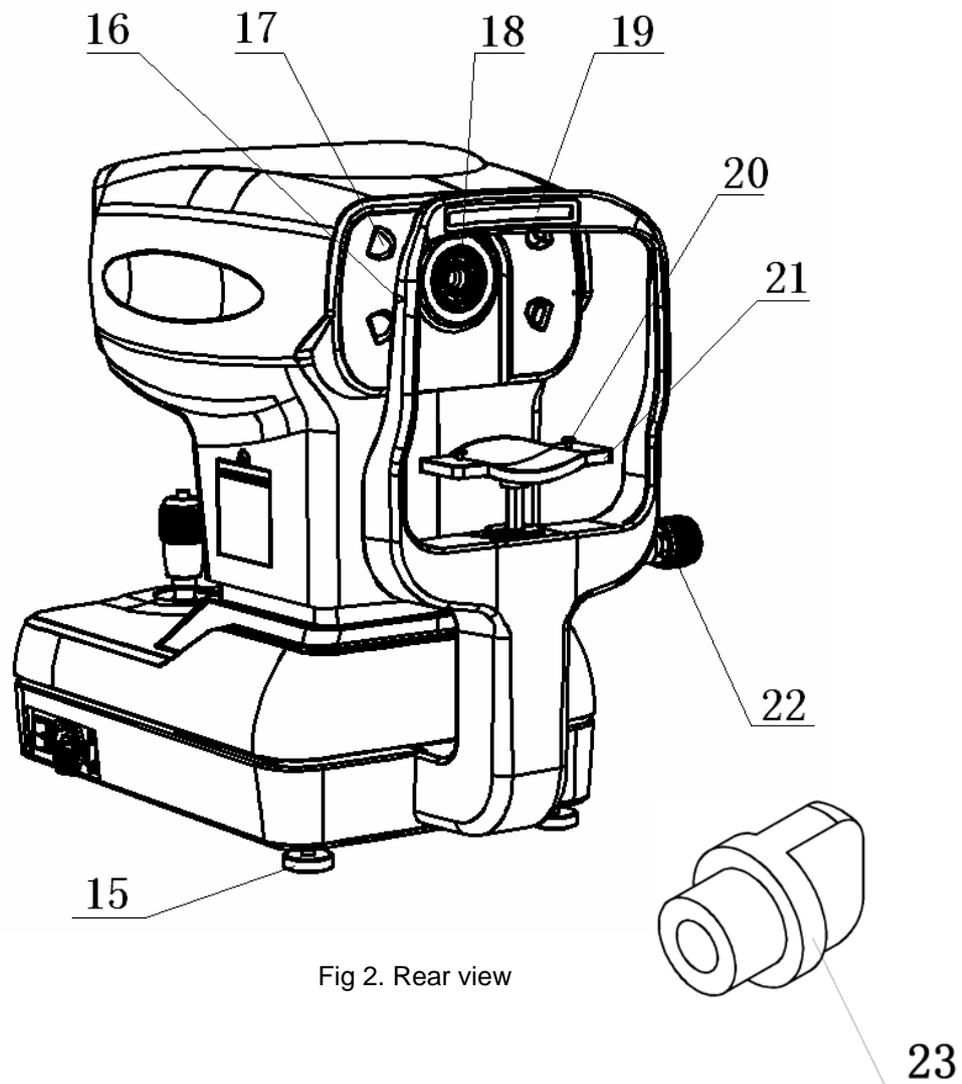


Fig 2. Rear view

- 15. Feet
- 16. Eye height mark
- 17. LED lights
- 18. Examination window
- 19. Forehead rest
- 20. Chinrest tissue pin
- 21. Chinrest
- 22. Knob for height
- 23. Cap (for examination window)

## 5.2 MEASURING screen

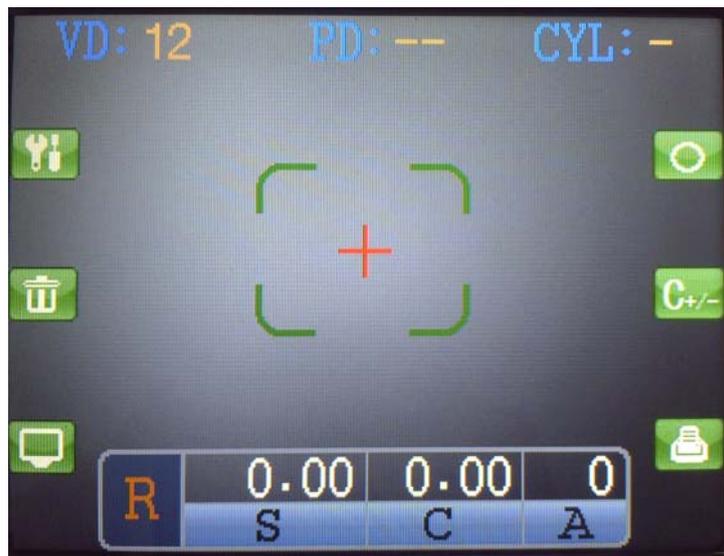


Fig 3. MEASURING SCREEN



SETTING button: To display the SETTING SCREEN.



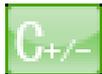
Clear button: To eliminate the measured data.



Data button: To display the measured data.



Graph button: To display the Graph SCREEN.



CYL power symbol button: To alter the CYL power symbol.



Print button: To print out the measuring data.

**VD: 12**

: To display the Vertical Distance

**PD: --**

: To display the PD value.

**CYL: -**

: To display the CYL power symbol.

<b>R</b>	0.00	0.00	0
	S	C	A

: Result of refractory power measurement (Right eye).

### 5.3 SETTING screen

Press the  button to enter the SETTING SCREEN.



Fig 4. SETTING SCREEN---Par\_A

 : Save the current data and enter into the next setting screen.

  : Alter the value.

  : Select the item.

 : Back to the measuring SCREEN.

STEP: To select the measuring step, 0.12D or 0.25D;

VD: To select the Vertical Distance , “0” 、 “12” 、 “13.5” or “15” ;

CYL: To select the CYL power symbol, “—” 、 “+” or “MIX” ;

BIAS: To modify the results.

Press the  button to enter the next SETTING SCREEN.



Fig 5. SETTING SCREEN---Par\_B

LANG: To select the language. English or Chinese.

S.off: To select the screen savers time. OFF, 5 minutes or 15 minutes.

PD: To select the PD display. On or off.

PRINT: To select the print out type. Off, average of standard.

RS232: To select the communication frequency.

Press the  button to enter the next SETTING SCREEN.



Fig 6. SETTING SCREEN---Comp.

MSG1: The Name of the manufactory.

MSG2: The telephone number of the manufactory.

Customer can also change the content.

Use the     buttons to select the character in the lower blank.

Press the 'Measurement switch' to replace the former character.

Hold on pressing the 'Measurement switch' and then press the  button, Customer can alter from MSG1 to MSG2.

Press the  button to enter the next SETTING SCREEN.:

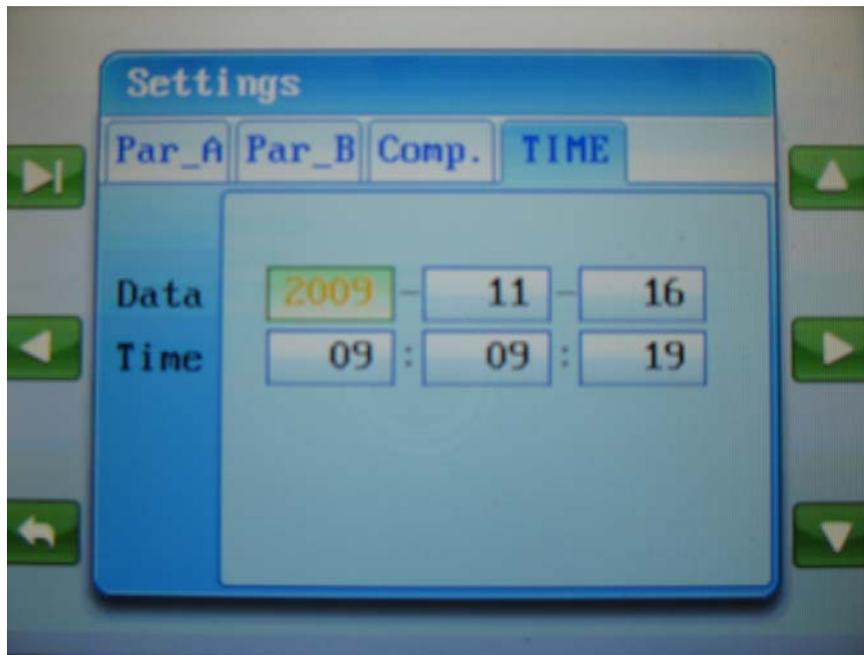


Fig 7. SETTING SCREEN---TIME

 : Alter the value.

 : Select the item.

## 6. PREPARATIONS

### 6.1 installation

Fasten the 'clamping knob'.

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

After installation, loosen the 'clamping knob'.

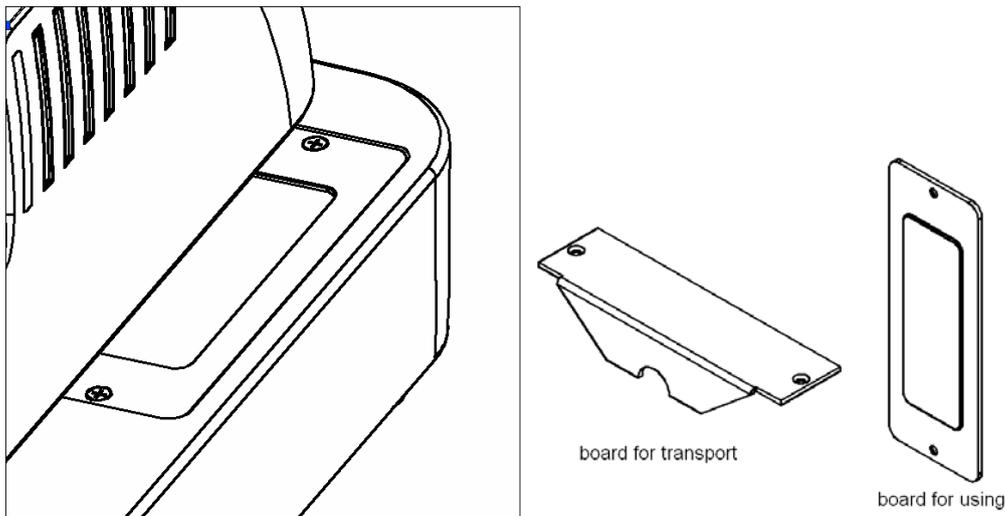


Fig 8. Replace the two boards

Replace the two boards for transport by the two boards for using.

Now the main body can be moved.

### 6.2 CONNECTING POWER CABLE

 WARNING	Be sure to connect the power plug to an AC 3-pin receptacle equipped with grounding. Connection with receptacle without grounding may cause fire and electric shock in case of short circuiting.
 WARNING	To avoid electric shocks, do not handle the power plug with wet fingers

Make sure that the power switch of the main body is off.

Plug the power cable to the main body.

Plug the power cable to a grounded 3-pin AC receptacle.

## 6.3 INITIAL SETTINGS

Before using, make sure that the values in the setting screen are correct.

Customers can also input their own information, refer to chapter 5.3.

 CAUTION	Make sure that the values in the setting screen are correct, different values may bring different results.
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## 7. Operation

### 7.1 APPLYING POWER SOURCE

Make sure of the connection of power cable.

Press on the Power switch.

Confirm that the title screen is displayed and then the MEASURING screen is displayed in a few seconds.

### 7.2 POSITIONING THE PATIENT

 CAUTION	To avoid injury, do not insert fingers under the chinrest. Be sure to instruct the patient about this.
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Let the patient sit in front of the instrument.

Adjust the automatic instrument table or the chair height so that the patient can sit on the chair with comfort.

Place the patient's chin on the chinrest and let his forehead touch the forehead rest.

Adjust the chinrest height so that the patient's eye becomes level with the 'eye height mark'.

### 7.3 COLLIMATION AND MEASUREMENT

Alignment operations are done with the control lever.

The main body position can be fine-adjusted laterally by inclining the 'control level' to each direction.

The main body position can be fine-adjusted vertically by turning the 'control level' clockwise or

anticlockwise.

While moving the main body toward the patient, focus the target eye. A vague, reflected luminous point for alignment appears on the cornea.

Focus the target eye to make the luminous point minimum.

Fine-adjust the main body position in all directions so that the luminous point comes within the alignment mark.

When the luminous point becomes the minimum within the alignment mark, press the Measurement switch.

Measurement is done and measurement values are displayed.

## 8. MAINTENANCE

### 8.1 CLEANING THE INSTRUMENT

Blow off dust on examination window by a blower.

Blow off the Fingerprints and oil spots on examination window by a blower and wipe the surface lightly 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.

### 8.2 CLEANING APPLIED PARTS

Wipe the forehead rest and the chin rest with a cloth moistened with a tepid solution of neutral detergent for kitchenware.

### 8.3 DAILY MAINTENANCE

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

When not in use, turn off the POWER switch.

## 8.4 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 leaving the fuse box open.
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 WARNING	Always use the attached fuse (1A 250V). Using any other type may cause troubles and fire.
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Make sure that the power switch of the main body is off and the power cable is off

Remove the fuse holder by rotating it counterclockwise by a screwdriver

Replace the fuse with the attached one.

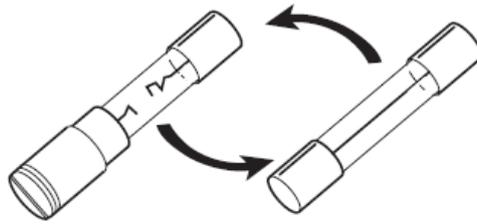


Fig.9 Changing the fuse

After inserting, rotate the fuse holder clockwise by a screw driver while pushing it lightly.

## 9. SPECIFICATIONS AND PERFORMANCE

Sphere: -25D to +22D 0.25D step display (switchable to 0.12D step display)

Cylinder: 0 to  $\pm 10D$  0.25D step display (switchable to 0.12D step display)

Axis: 0 to 180° 1° step display (switchable to 5° step display)

Minimum pupil diameter measurable: 2.0  $\phi$  mm

PD measurement: 30-85mm, 1mm display unit