

**YPC-100/YPC-100K**  
**EYE REFRACTOMETER**  
**User Manual**



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Revision date: 2024.07

Product Name: Eye Refractometer  
Nome do produto: refratômetro oculars  
Nombre del producto: refractómetro oculares  
Ürün Adı: göz refraktometreleri  
Nome prodotto: rifrattometri oculari  
Produktname: Augenrefraktometer  
Nom du produit : réfractomètre oculaires  
Име на продукта: рефрактометри за очи  
Produkto pavadinimas: akių refraktometrai  
Nazwa produktu: refraktometry do oczu  
Název produktu: oční refraktometry  
Toote nimi: silma refraktomeetrid  
Produkta nosaukums: acu refraktometri  
Όνομα προϊόντος: διαθλασίμετρα ματιών  
Productnaam: Oogrefractometer  
Nume produs: Refractometru pentru ochi

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File No.: SM-YPC100-002

# Preface

Thank you for purchasing and using our eye refractometer.



Please read this User Manual carefully before using this device. We sincerely hope that this User Manual will provide you with sufficient information to use the device.

Our pursuit is to provide people with high-quality, complete-function and more personalized devices. Information in promotional materials and packing boxes is subject to changes due to performance improvement without additional notice. Chongqing Yeasn Science - Technology Co., Ltd. reserves the rights to update the devices and materials.

If you have any questions during using, please contact at our service hotline: (86-023) 62797666, we will be very happy to help you.

Your satisfaction, our impetus!

## Information of manufacturer



Name: CHONGQING YEASN SCIENCE - TECHNOLOGY CO., LTD.

Address: 5 DANLONG ROAD, NANAN DISTRICT, CHONGQING, CHINA

Tel: 86 - 23 62797666



Shanghai International Holding Corp. GmbH (Europe)

Eiffestrasse 80, 20537 Hamburg, Germany

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# 1. Introduction

## 1.1 Device outline

### 1.1.1 Intended use

The eye refractometer measures the objective refractive errors (including spherical, cylindrical refractive errors, cylinder axis) and corneal curvature radius of the patient's eye (including corneal refractive power, principle meridian directions, and corneal cylindrical power).

Note: YPC-100 has no corneal curvature measurement function, while YPC-100K has corneal curvature measurement function.

### 1.1.2 Product model

YPC-100, YPC-100K

Software release version: V1.00

### 1.1.3 Target groups of patients

- Age

All ages except babies and infants.

- Health condition

Able undergo an examination while seated

- Conditions (Visual function)

One or both eyes are normal or have disease. Eyes that have lost the visual function are not targeted.

### 1.1.4 Intended users

Ophthalmologist or nurse, clinical laboratory technician / OD, or optician.

### 1.1.5 Intended use place

Medical facility or optical store.

### 1.1.6 Principles

Objective refractive errors measurement:

The measurement light of the optical system is projected on the fundus of the human eye, and the annular image of the fundus obtained from the reflected light is used for calculation to measure the refractive errors (SPH, CYL, AXIS) of the human eye.

Corneal curvature radius measurement:

The measuring light of the optical system is projected on the surface of the cornea of the human eye,

and the mire ring image obtained from the reflected light is used for calculation, measuring the radius of curvature of the cornea (diopter) and the principal meridian directions.

1.1.7 Specific qualifications of device users and/or other persons:

- After training and obtaining the corresponding qualifications;
- Understand the optometry procedure and pass the corresponding training.

1.1.8 Classifications

Protection against electrical shock: Class I ME equipment

Protection against electrical shock (applied part): Type B applied part

Protection against harmful ingress of water or particulate matter: IPX0

Safety degree when using the flammable anesthetic gas mixed with air or with oxygen or nitrous oxide: Not intended for use with flammable anaesthetics, not intended for use in conjunction with flammable agents.

Suitability for use in an oxygen rich environment: Not used in conjunction with oxygen rich environments.

## 1.2 Performance Parameters

### 1.2.1 Measurement range

Objective refractive error measurement	
Criterion	Measuring range
Spherical vertex power	-30.00 D to + 25.00 D (VD = 12 mm), increments: 0.12 D, 0.25 D
Cylindrical vertex power	-10.00 D to + 10.00 D, increments: 0.12 D, 0.25 D
Cylindrical axis	0 ° to 180 °, increments: 1 °, 5 °
Pupillary distance	30 mm to 85 mm, increment: 1 mm
Corneal curvature measurement (applicable to YPC-100K)	
Criterion	Measuring range
Corneal curvature radius	5.00 mm to 10.00 mm, increment: 0.01 mm
Corneal refractive power	33.75 D to 67.50 D, increments: 0.12 D, 0.25 D
Corneal cylindrical power	-10.00 D to + 10.00 D, increments: 0.12 D, 0.25 D
Corneal cylinder axis	0 ° to 180 °, increment: 1 °, 5 °

### 1.2.2 Accuracy

#### 1) Vertex power accuracy

Criterion	Measuring range	Maximum scale interval	Test device <sup>a</sup>	Tolerance
Spherical vertex power	-15 D to +15 D (maximum meridional vertex power)	0.25 D	0 D, ±5 D, ±10 D	±0.25 D
			±15 D	±0.50 D
Cylindrical vertex power	0 D to 6 D	0.25 D	Sphere: approx 0 D Cylinder: -3 D Axis: 0°, 90°	±0.25 D
Cylindrical axis <sup>b</sup> for cylinder power	0° to 180°	1°		±5°
<sup>a</sup> The refractive error of the test device shall not differ by more than 1.0 D from the nominal value above.				
<sup>b</sup> Cylinder axis shall be indicated as specified in ISO 8429.				

The accuracy specifications are based on the results of eye model testing performed in accordance with ISO 10342, Ophthalmic instruments – Eye refractometers.

#### 2) Radius of curvature accuracy (applicable to YPC-100K)

Criterion		Requirement
Measuring range		6.5mm to 9.4mm(52.0 KD to 36.0 KD)
Indications given in terms of radius of curvature	digitally indicating instruments	increment 0.02mm(0.125KD)
Measurement accuracy(twice the standard deviation, i.e. $2\sigma$ )		$\pm 0.05$ mm

The measuring accuracy is in accordance with Type B, ISO 10343.

### 3) Measurement of direction of principal meridians (applicable to YPC-100K)

Criterion		Requirement
Measuring range		0° to 180°
Meridian direction reading	digitally indicating scales	increment 1°
Measurement accuracy using test device(twice the standard deviation, i.e. $2\sigma$ )	for principal meridional differences in radius of curvature $\leq 0.3$ mm	$\pm 4^\circ$
	for principal meridional differences in radius of curvature $> 0.3$ mm	$\pm 2^\circ$
Angular indications shall be in accordance with ISO 8429.		

The measuring accuracy is in accordance with Type B, ISO 10343.

### 4) Pupillary distance measurement accuracy

Criterion	Measuring range	Increment	Tolerance
Pupillary distance	30 mm to 85 mm	1mm	$\pm 1$ mm

## 1.3 Power Supply Parameters

- 1) Input voltage            AC 100 V to 240 V ( $\pm 10\%$ )
- 2) Input frequency        50/60 Hz
- 3) Input power             70 VA

## 1.4 Weight and Size

Weight    18 kg

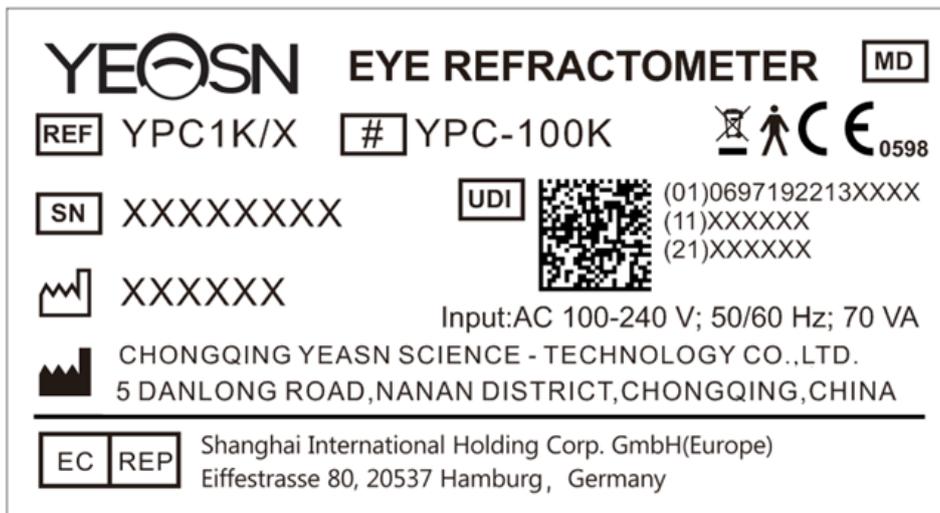
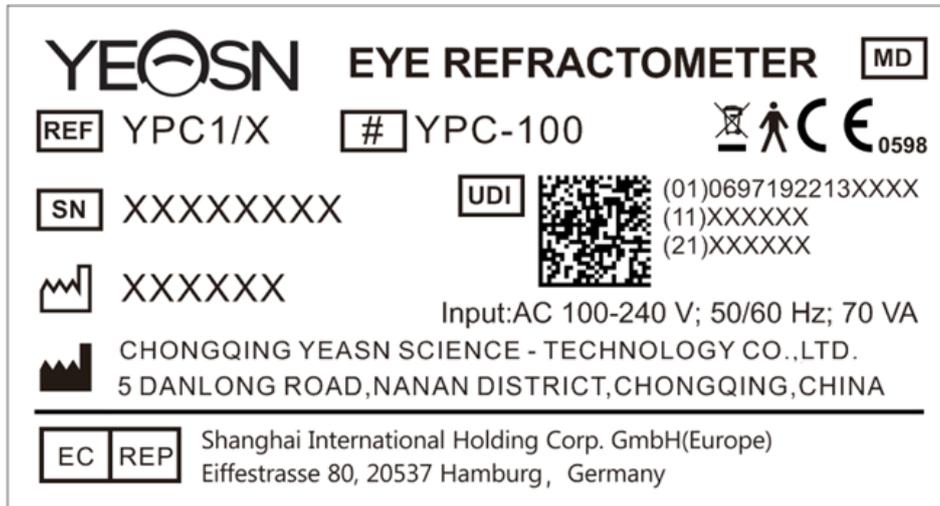
Size        345mm (W)  $\times$  530 mm (D)  $\times$  465mm (H)

## 1.5 Safety load of Chinrest: 5 kg

## 1.6 Name plate and indications

Name plate and indications are pasted on the instrument to arise end-users' notice.

In case the name plate is not pasted well or the characters become unclear to recognize, please contact authorized distributors.



	Manufacturer		Date of manufacture
	Serial number		CE marking
	Medical device		Catalogue number
	Unique Device Identifier	(01)0697192213XXXX	UDI-DI Device Identifier

(11)XXXXXX	Date of manufacture	(21)XXXXXX	Serial number
	Model number		Type B application part (The applied parts are forehead rest and chinrest)
	Correct Disposal of This Product (Waste Electrical & Electronic Equipment)		Authorized European representative
<b>G.W.</b>	Gross Weight	<b>DIM.</b>	Dimension
	To turn on (power)	○	To disconnect (a power supply)
	Refer to instruction manual / booklet		Fuse marking
DEBUG	Debug interface		USB interface
LAN	LAN interface	RS-232	RS232 interface
	Handle mark clockwise rotation - measuring unit up counter clockwise - measuring unit descending		 Measuring unit unlocking  Measuring unit locking
	Fragile, handle with care		This way up
	Keep dry		Stacking limit by 3
	Humidity range limitation		Atmospheric pressure range limitation
	Temperature range limit		Country of manufacture

We will make available on request circuit diagrams, component part lists, descriptions, calibration instructions, or other information that will assist service personnel to repair those parts of ME equipment that are designated by the manufacturer as repairable by service personnel.

## 2. Safety Precautions



Please read the following precautions carefully to avoid personal injury, device damages or other possible hazards:

- Use the device indoors and keep it clean and dry; do not use it under inflammable, explosive, high temperature and dusty environment.
- Do not use the device near water, and pay attention to prevent any kind of liquid falling on the device. Do not place the device in a humid or dusty place, or place where the humidity and temperature change rapidly.
- Make sure that the device is installed stably and reliably before use. If the device is dropped, it may cause personal injury or device failure.
- The input voltage of the power supply should be consistent with the rated power supply before use.
- In order to avoid the risk of electric shock, the device must be connected to the power supply network with protective grounding.
- Do not use multi hole socket or extended power line to plug the device into the power socket.
- There should be enough space between the installation position of the device and the power socket to prevent it from difficult to pull out the power plug. Do not leave the product in a location where it is difficult to disconnect from the grid.
- Especially in case of emergency, pull out the power plug and cut off the power supply of the device, but do not pull out the plug by pulling the power line.
- Do not touch the power line with wet hands. Check the power cord so that it will not be trampled or flattened by heavy objects. Do not knot the power line.
- The device power line damage may cause fire or electric shock, so it should be checked frequently.
- Before and after use of the device, and before measuring each patient, clean the chinrest and forehead rest with clean gauze or absorbent cotton. If necessary, dampen a cloth with rubbing alcohol and gently wipe them off.
- Do not use a cloth that is overly dampened with rubbing alcohol to clean the chinrest and forehead rest. Otherwise, its performance may deteriorate.
- During the measurement, please remind the patient not to let their hands get stuck in the moving parts of the device, so as to avoid personal injury.

- After the measurement, when the patient gets up and leaves the device, please remind the patient not to grab the forehead support, so as to avoid the device overturning and causing personal injury.
- Do not disassemble or touch the interior of the device, otherwise electric shock injury or device failure may occur.
- If the installed device needs to be moved and transported in a short distance, the locking lever should be moved to fix the measuring unit on the base. When handling, both hands should hold the bottom of the device.
- During long-distance transportation, the measuring unit and chinrest shall be placed at the lowest position, the screws at the bottom of the device shall be locked, and the measuring unit shall be fixed on the base, and then transported after being packed again.
- When the device is not in use, the power supply shall be cut off and the dust cover shall be covered.
- The body part detected by the device is the eye of the patient, and the posture and physical condition of the patient will affect the measurement process.
- If not stored or used within the specified temperature and humidity range of the device, the reliability of the measurement results may be affected.
- The product cannot be repaired or maintained when used with a patient.
- Do not modify the device.
- The device has passed the electromagnetic compatibility test. Follow below instructions related to EMC (electromagnetic compatibility) when installing and using the device:
  - Do not use the device with other electric devices at the same time to avoid electromagnetic disturbance to the device;
  - Do not use the device nearby other electric devices to avoid electromagnetic disturbance to the device;
  - Do not use the power line that is not configured with the device, otherwise it may increase the emission of electromagnetic wave, which may reduce the capacity of resisting disturbance.
- Information related to the use of lasers
  - Laser output
 

Built-in (internal components) laser lamps have a wavelength range of 850 nm  $\pm$  5 nm.
  - The maximum output value of laser radiation
 

The maximum output value of built-in (internal components) laser radiation is 10 mW.

The maximum output value of Measurement window: 167 uW.

- Laser standard name and release date

1) Laser standard name: IEC 60825-1:2014 Safety of laser products - Part 1: Equipment classification and requirements;

2) Release date: 2014-07;

3) Level: Class 1.

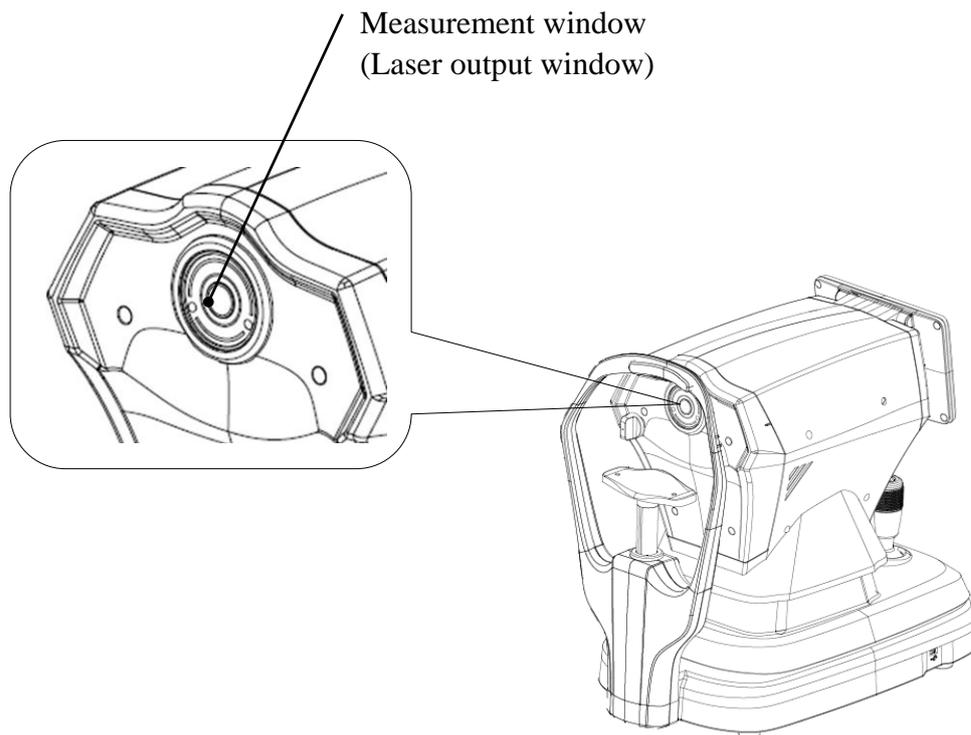
- Laser wavelength

850 nm  $\pm$  5 nm

- Eye protection information

When maintaining the product, please turn off the power first, and then carry out maintenance work after the power is cut off, please wear goggles during the maintenance process to avoid looking directly at the laser light.

- Laser output position



Schematic view of the laser output window

- List of controls, adjustments and procedures for operation and maintenance, and warning statements

1) The parameters of the equipment regarding the laser have been set by the manufacturer, and there is no need for the user to control and debug during use;

- 2) Please operate the equipment according to the instructions for use;
- 3) If the equipment fails and cannot be solved, please contact CHONGQING YEASN SCIENCE-TECHNOLOGY CO., LTD. or authorized dealers, and do not disassemble the equipment at will;
- 4) Caution - If the controls or adjustment device is not used in accordance with this regulation, or the various steps are performed, harmful radiation exposure may be caused.

- Additional warning regarding skin or corneal burns for Class 1

Please wear goggles during maintenance, avoid eyes looking directly at the laser light, and do not observe for a long time.

- Available maintenance information

#### 1) Maintenance plan

Maintain normal laser output, maintenance cycle: semiannual.

#### 2) Protective procedures for service personnel

When maintaining the product, please turn off the power first, and then carry out maintenance work after the power is cut off, please wear goggles during the maintenance process to avoid looking directly at the laser light.

#### 3) Labels and hazard warnings

Laser output level: Class 1  
Maximum output of laser radiation: 167  $\mu$ W  
Laser wavelength: 850 nm $\pm$ 5 nm  
Laser standard: IEC 60825-1:2014  
Release date: 2014.07

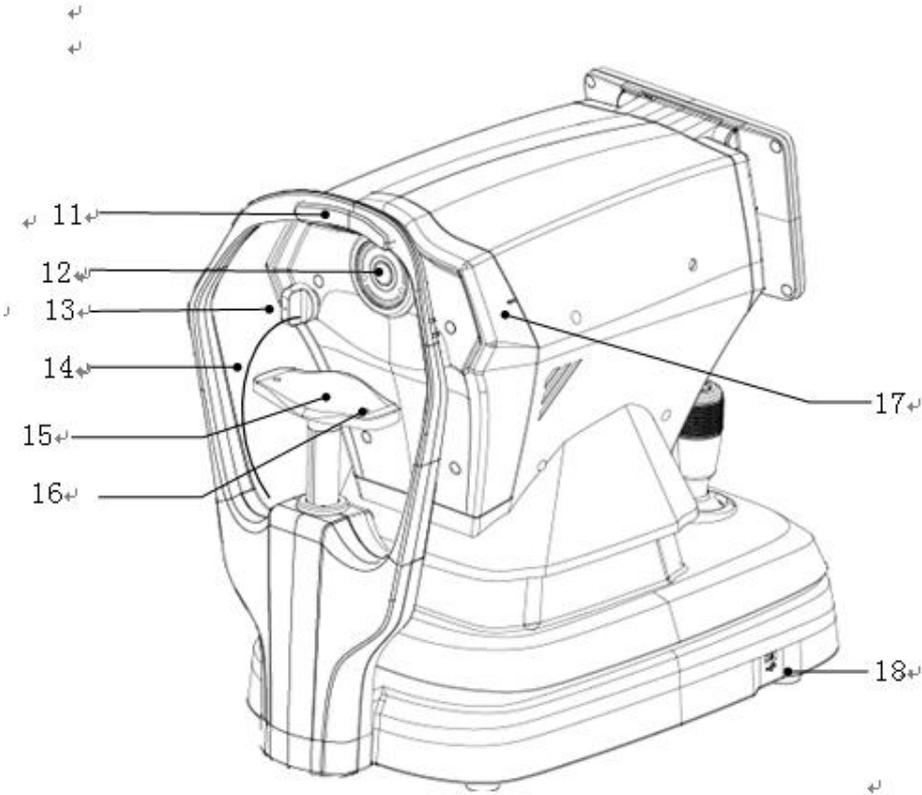
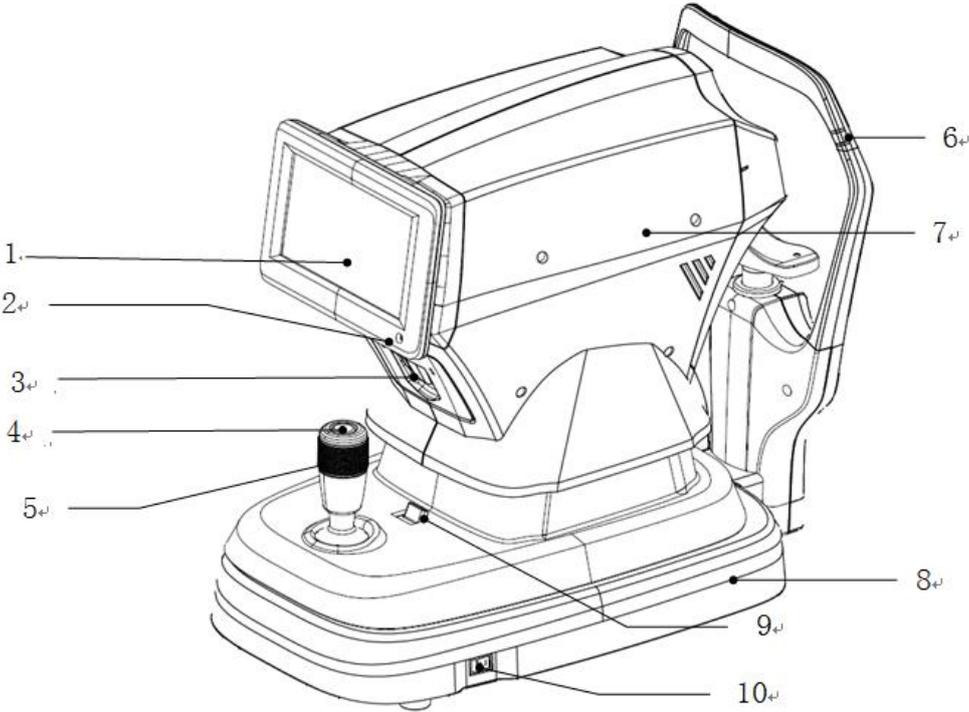
- Contraindications: None.
- Notification: Any serious event related to the device to the user and/or patient shall be reported to the manufacturer and competent authority of the Member State where the user and/or patient is located.



Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

- during the measurement process, when reaching the measurement position, do not push the measurement unit 7 over the head, so as not to touch the nose of the measured person.

### 3. Main Structure



1. LCD screen

Display the measurement results. 7 inch capacitive touch screen with adjustable angle.

2. Work indicator

When the device starts working and enters standby mode, the green indicator light illuminates.

3. Printer

Print the measurement results.

4. Measurement button

Press the measurement button to start the measurement.

5. Joystick

Adjust the position of the measurement window for alignment and focusing.

6. Eye level marker (forehead support)

Adjust the height of the chinrest to make the patient's eye aligns with this mark.

7. Measuring unit

8. Base

9. Locking lever

Secure the measuring unit to the base.

10. Power switch

11. Forehead rest

Support the patient's forehead and position the patient's head.

12. Measurement window

The eye was measured through the measurement window.

13. Dust plug

Prevent dust from entering the measurement window.

14. Dust plug rope

15. Chinrest

Support the patient's mandible and position the patient's head.

16. Locating pin

Secure the spherical model eye. (2 units in total)

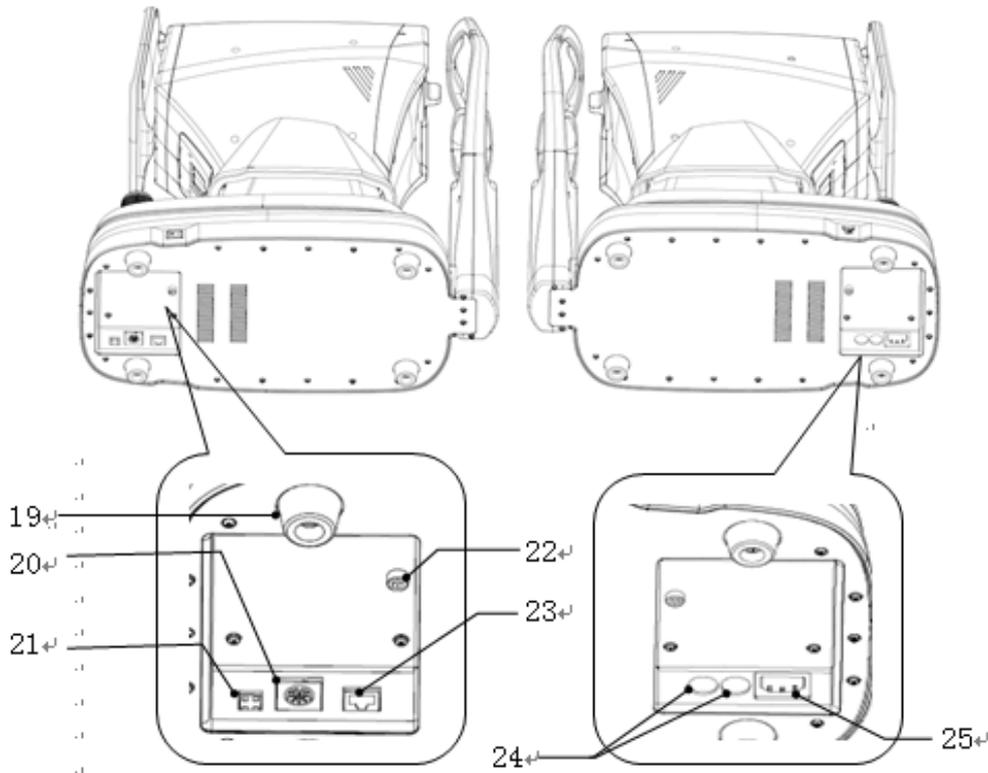
17. Eye level marker (measuring unit)

When measuring, it is convenient for the user to observe that the eye level marker on the measuring

unit is aligned with the eye level marker on the forehead support, so as to quickly lift the measuring unit.

18. USB interface (Reserve interface)

CAUTION: Do not connect other device to this interface to avoid unacceptable risk.



19. Foot pad

It is used for supporting devices. (4 units in total)

20. RS232 interface (Reserve interface)

CAUTION: Do not connect other device to this interface to avoid unacceptable risk.

21. Debug interface (Reserve interface)

CAUTION: Do not connect other device to this interface to avoid unacceptable risk.

22. Locking screw

Lock the measuring unit on the base to stabilize the device.

23. LAN interface (Reserve interface)

CAUTION: Do not connect other device to this interface to avoid unacceptable risk.

24. Fuse base

Built-in fuse. (2 units in total)

25. Power interface

## 4 Installation

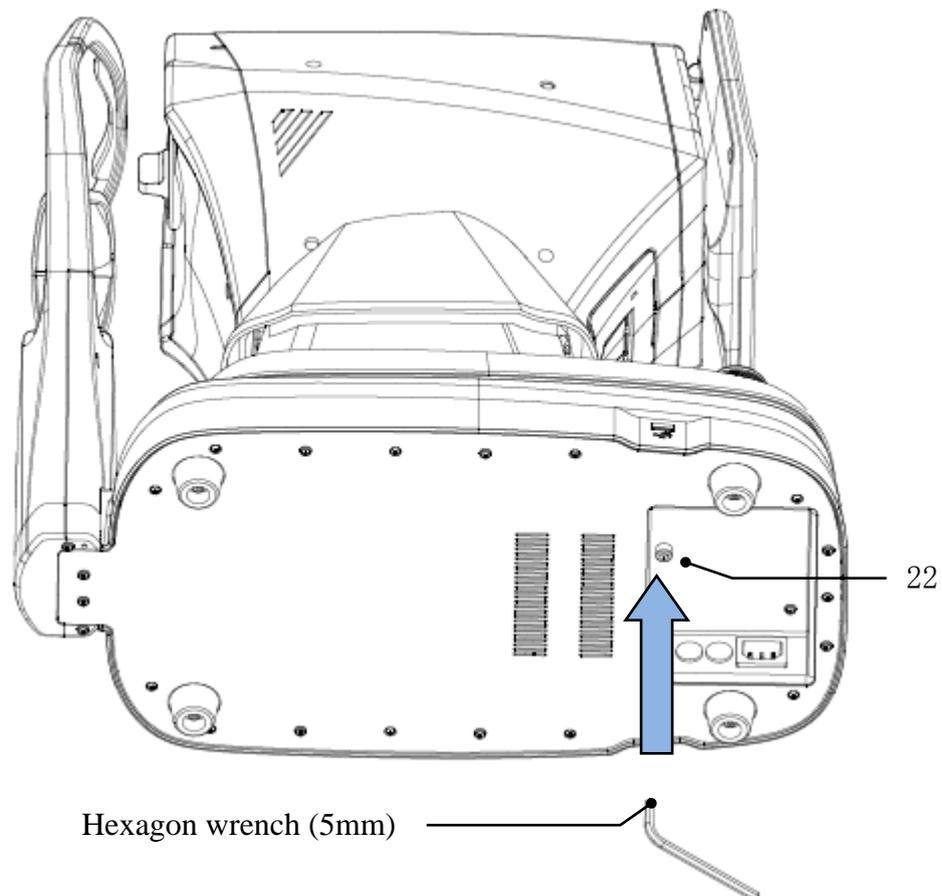
### 4.1 List of accessories

1) Spherical model eye	1 Set
2) Power cord	1 Unit
3) Printing paper (the paper is placed in the printer)	1 roll
4) Dust cover	1 Unit
5) Hexagon wrench (5mm)	1 Unit
6) Fuse	2 Unit
7) User manual	1 volume
8) Glare shield	1 Unit

### 4.2 Installation steps

4.2.1 Place the device on a level, stable work station surface.

4.2.2 Unlock the device.



Remove the locking screw from the bottom of the device using a hexagon wrench (5mm) to unlock

the device.

#### 4.2.3 Connect the power cord

Make sure that the power switch is off, connect the power cord plug to the power interface on the device, and then plug the other end of the power cord into the grounded AC power socket.

#### 4.2.4 Installation of printing paper

Please refer to the "Printing paper replacement" in Chapter 8.

## 5. Preventive inspection

Preventive inspection should be carried out before using the device.

### 5.1 Power plug

Please select the power socket that matches the power cord of this device.

Note: Please use the dedicated power cord configured with this device.

### 5.2 Inspection

Power on and check the following contents:

- The LCD screen should be clean.
- The LCD screen display complete, stable and no flickering.
- The visual mark can be switched.
- The installation of the device should be firm without obvious loosening, and the chinrest should be able to rise and fall smoothly. By manipulating the joystick, the measuring unit should be able to move and position flexibly.

5.3 Inspection cycle: before use every day.

## 6. Directions for Use

### 6.1 Device Startup and Shutdown

#### 6.1.1 Device startup

6.1.1.1 Plug the power plug into the socket.

Note: Please use the dedicated power cord configured with this device.

6.1.1.2 Turn on the power switch (  ) of the device, and the green indicator light will be on.

6.1.1.3 After the device is powered on, the measurement unit and chinrest will move slightly to initialize.

6.1.1.4 After the initialization of the device, it will enter the main interface.

Note: Do not touch the measuring unit and chinrest in motion.

## 6.1.2 Device shutdown

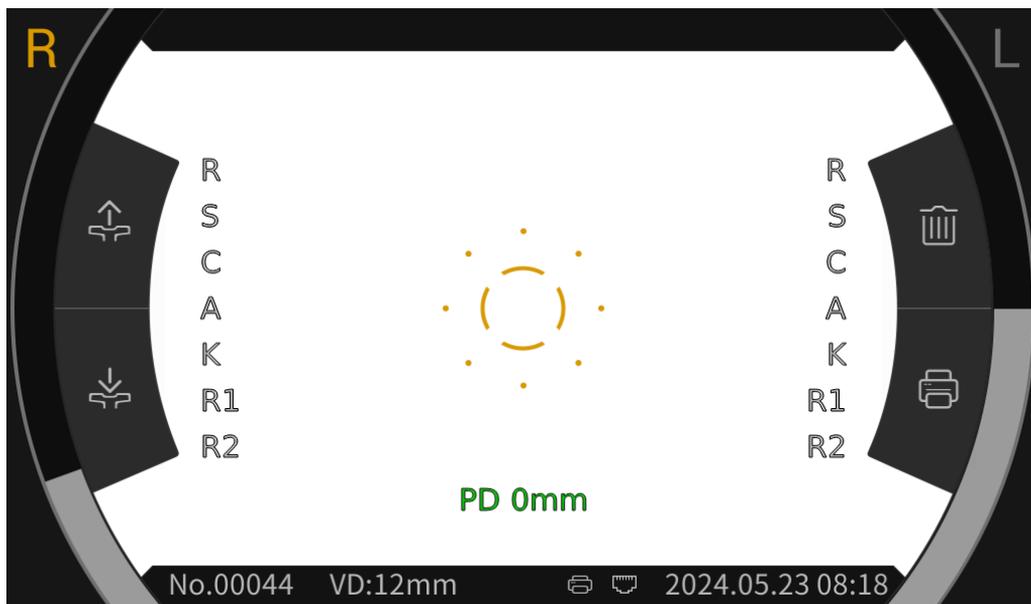
6.1.2.1 Press down the power switch (  ) to turn off the device, and the indicator light goes out.

6.1.2.2 Clean the forehead rest and chinrest, and put the dust cover on the device.

## 6.2 Operation interface

### 6.2.1 Main interface

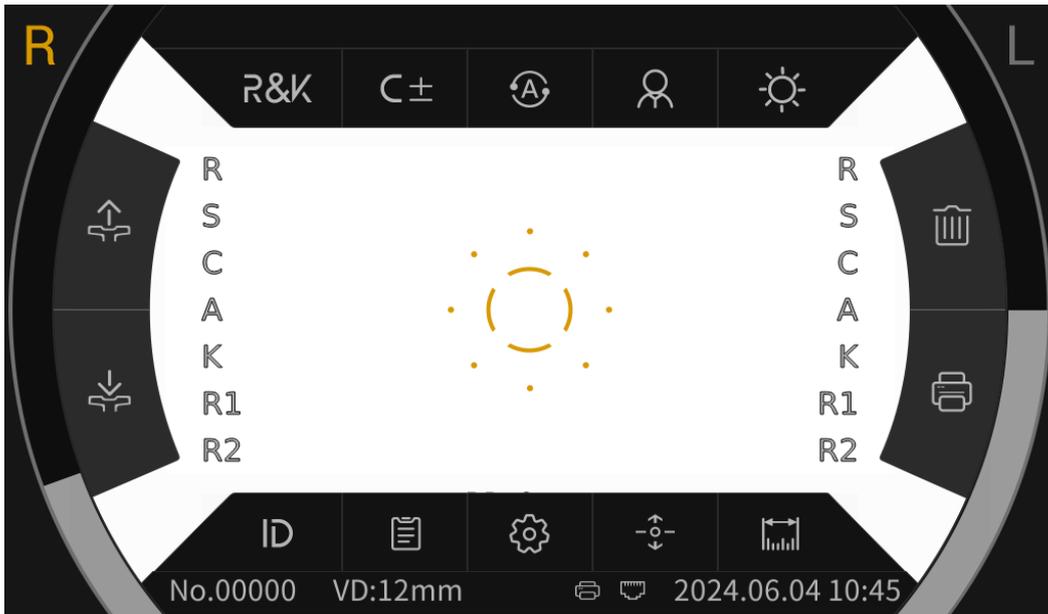
Power on the device and turn on the power switch. When the progress bar is loaded, it will enter the main interface.



Main interface

After entering the main interface, click the focusing ring icon (  ) in the middle of the display screen, and the toolbar will pop up automatically at the top and bottom of the main interface.

Click on the blank space in the display screen or if there is no click on the screen for about 5 seconds, the toolbar will be automatically hidden.



Main interface (Toolbar Pop-Up)

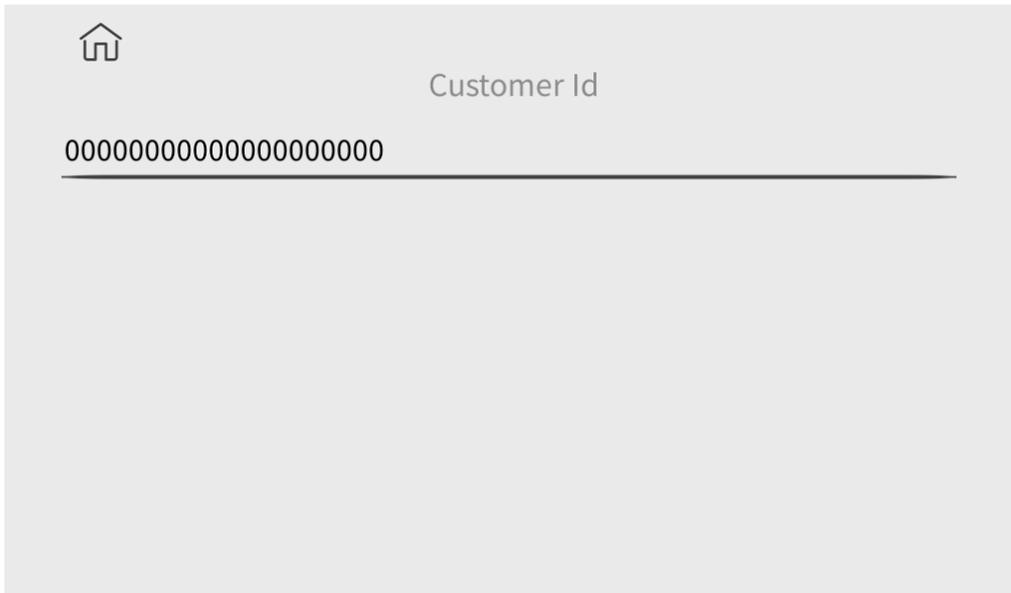
**6.2.1.1 The function icons of the main interface are described as follows:**

	The patient's right eye is measuring. When it's not measuring, the icon is shown in gray.
	The patient's left eye is measuring. When it's not measuring, the icon is shown in gray.
	After clicking, the chinrest will rise automatically.
	After clicking, the chinrest will fall automatically.
	After clicking, the measurement data will be cleared.
	After clicking, the measurement data will be printed.
	Focusing ring is used to locate the eyes of patients.
	Real-time display of the patient's eye movement in the vertical direction.
	Real-time display of the measurement window's movement in the vertical direction.
	Manual printing. After the measurement is completed, press the print button to print the measurement data.
	Automatic printing. After the measurement is completed, the measurement data will be printed automatically.
	USB connection.
	External device connection.

### 6.2.1.2 The main interface toolbar icons are described as follows:

	Refractive error and corneal curvature measurement mode
	Refractive error measurement mode
	Corneal curvature measurement mode
	Cylinder model: CYL-
	Cylinder model: CYL+
	Cylinder model: CYL±
	Automatic measurement, when the alignment and focusing are in the best state, the measurement starts automatically.
	Manual measurement, press the measurement button to start the measurement.
	Fast mode. Can quickly measure the top focus of the subject.
	Adult mode, the chinrest is automatically preset to the adult position.
	Child mode, the chinrest is automatically preset to the child position.
	Scieropia brightness, daytime mode.
	Scieropia brightness, night mode.
	Click to enter the patient number interface to edit the patient number.
	Click to enter the report interface and display the measurement results.
	Click to enter the parameter setting interface to modify the commonly used parameters.
	automatic centering switch, open, up and down automatic fast centering.
	Click to enter the ranging interface, and measure pupil size and corneal size through fundus image.

### 6.2.2 Patient number interface



Click the characters on the horizontal line in the interface to pop up the keyboard to edit the patient number. Click the  icon to return to the main interface.

### 6.2.3 Report interface

ID:0000000000000000000001				No.:00001		
SPH	CYL	AX		SPH	CYL	AX
			1			
			2			
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
0.00	0.00	0	AVE	0.00	0.00	0

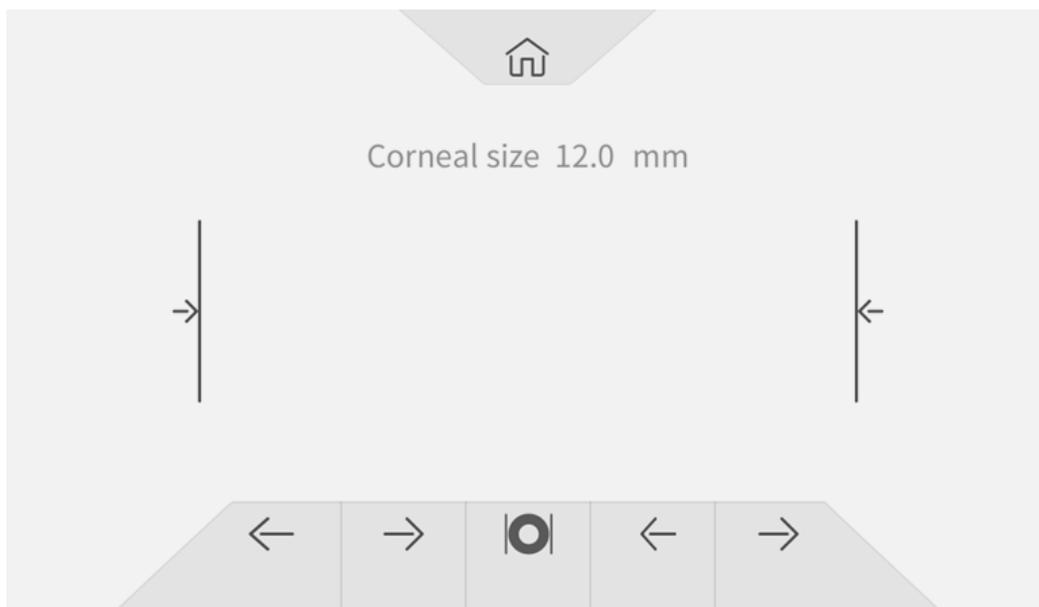
Click **REF** **KER** **SIZE** to display the measurement results of diopter, corneal curvature, pupil size, corneal size and pupillary distance. Click  to return to the main interface.

### 6.2.4 Parameter setting interface



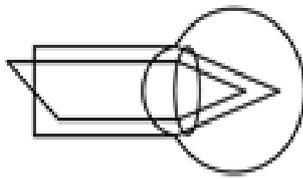
After modifying the commonly used parameters, the parameters can be saved automatically.

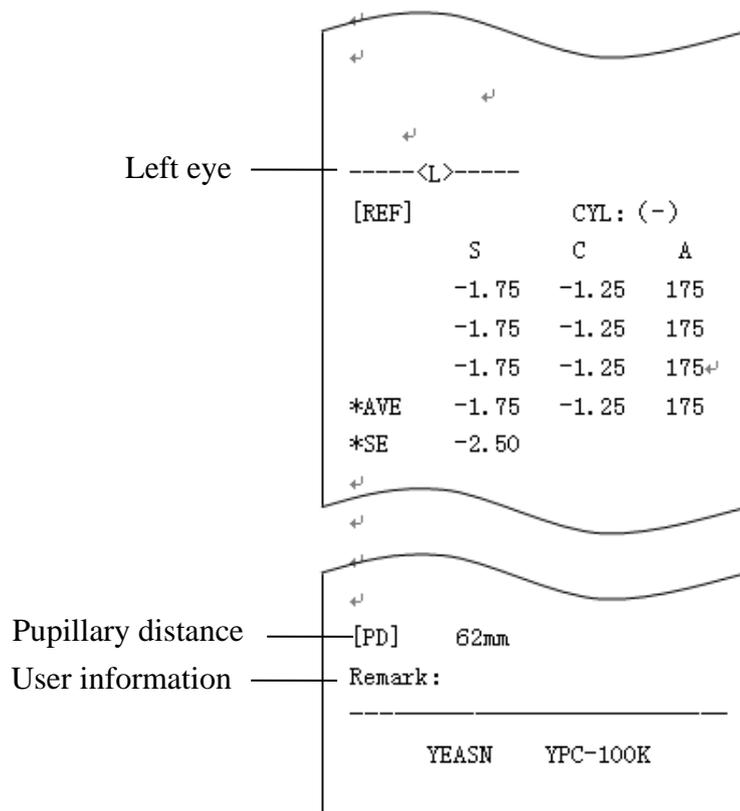
### 6.2.5 Ranging interface



	Click to return to the main interface.
	Alignment line for measuring corneal or pupil size.
	Controls the alignment line to move left and right.
	Measure the pupil size.
	Measure the corneal size.

### 6.3 Printout sample

Optometry serial number	No: 00001			
Patient number	ID: 000000000000000012345			
	2023.02.20 09:30			
Vertex distance	VD: 12.00 INDEX: 1.3375	Refractive index		
	<R>	Right eye		
Refractive error measurement	[REF] CAT CYL: (-)	Cylinder model		
	S C A			
Cataract mode	-1.75 -1.25 115			
Average value of Refractive error measurement	-1.75 -1.25 115	S: Spherical vertex power		
	*AVE -1.75 -1.25 115	C: Cylindrical vertex power		
Equivalent spherical value	*SE -2.50	A: Cylindrical axis		
Eye diagram				
	[PS] 6.50mm	Pupil size (right eye)		
Corneal curvature measurement	[CS] 12.00mm	Corneal size (right eye)		
	[KER]			
	mm D A			
The flattest longitude	R1 7.87 43.00 6			
The steepest longitude	R2 7.73 43.75 96			
Average value of R1 and R2	AVE 7.80 43.25			
Corneal cylinder value	CYL -0.75 6			
	R1 7.86 43.00 6	mm: Corneal curvature radius		
	R2 7.72 43.75 96	D: Corneal refractive power		
	AVE 7.79 43.25	A: Corneal cylinder axis		
	CYL -0.75 6			
	R1 7.86 43.00 6			
	R2 7.72 43.75 96			
	AVE 7.79 43.25			
	CYL -0.75 6			
Mean value of corneal curvature measurement	*R1 7.86 43.00 6			
	*R2 7.72 43.75 96			
	*AVE 7.79 43.25			
	*CYL -0.75 6			



## 6.4 Parameter Setup

### 6.4.1 Main interface

Click the button in the main interface to set.

### 6.4.2 Parameter setting interface

- 1) Click the  icon in the main interface to enter the parameter setting interface.
- 2) Press the parameter value which needs to be modified, the selected parameter value will be highlighted, and the modified parameter value will be automatically saved.

### 6.4.3 Parameter setting items

#### 6.4.3.1 Main interface parameter settings

- 1) Measurement mode: R&K, REF, KER. Factory setting: R&K.
- 2) Cylinder: C -, C +, C ± Factory setting: C -.
- 3) Alignment mode: Automatic, manual. Factory setting: Automatic.
- 4) Chinrest: Adults, child. Factory setting: Adult.
- 5) Scieropia brightness: Daytime, night. Factory setting: Daytime.

Note: When the device turns on for the first time, the main interface displays the default setting parameters. When the device turns on, the setting parameters of the last shutdown will be displayed automatically.

### 6.4.3.2 Setting interface parameter settings

1) AR Vertex power step: 0.12D, 0.25D. Factory setting: 0.25D.

2) AR Vertex distance: 0mm, 12mm, 13.75mm, 15mm. Factory setting: 12mm.

The distance of corneal apex can be set between 0mm, 12 mm, 13.75 mm and 15 mm.

3) AR Axial step: 1 ° and 5 °. Factory setting: 5 °.

4) AI Mode: Yes, No. Factory setting: Yes.

Yes: If the measurement data is unstable and the measurement value changes more than 1.0d, continuous measurement should be carried out;

No: When the number of times set in 5) AR continuous measurement is completed, the measurement is automatically completed.

5) AR Continuous measurement: 3 – 10. Factory setting: 3.

Set the frequency of monocular automatic measurement, which can be selected from 3, 4, 5, 6, 7, 8, 9, and 10.

6) AR Scieropia mode: Continuously, Every time. Factory setting: Continuously.

Continuously: Always fog vision during the measurement (for those who can't concentrate for a long time, such as children).

Every time: Before each measurement of fog vision (for eyes with strong accommodation).

7) KM Display format: mm, D. Factory setting: mm.

8) KM Radius display: R1, R2 / AVE, CYL. Factory settings: R1, R2.

The display method of KM measurement data can be selected between R1 and R2, AVE and CYL.

R1, R2: R1 is the flattest meridian, R2 is the steepest meridian.

9) KM Diopter step: 0.12D 0.25D. Factory setting: 0.25D.

10) KM Axial step: 1 °, 5 °. Factory setting: 5 °.

11) KM Refractive index: 1.3375, 1.3360, 1.3320. Factory setting: 1.3375.

12) Number of KM measurements 3 – 10. Factory setting: 3.

Set the number of times of monocular automatic measurement, which can be selected from 3, 4, 5, 6, 7, 8, 9, and 10. When measuring, the measurement will be completed automatically after reaching the set number of times.

13) KM Peripheral measurement: Yes, no. Factory setting: No. (This function is not applicable)

14) Printer: Off, Manual, Auto. Factory setting: Manual.

Off: the measurement data will not be printed after the measurement is completed;

Manual: after the measurement is completed, press the print key to print the measurement data;

Auto: after the measurement is completed, the measurement data will be printed automatically.

15) Printer mode: Normal, Economic. Factory setting: Normal.

Normal: print measurement data in the form of standard line spacing;

Economic: print measurement data in the form of reduced row spacing, which is about one third of the standard line spacing.

16) Date format: Off, yyyy.mm.dd, mm/dd/yyyy. Factory setting: yyyy.mm.dd.

17) Auto clear: Off, On. Factory setting: Off.

Set whether to clear the measurement data after printing.

Off: the measurement data will not be cleared after printing;

On: automatically clear the measurement data after printing.

18) KM Peripheral printing: Yes, No. Factory setting: No. (This function is not applicable)

19) AR data print format: total, Only average; Factory setting: total.

20) KM data print format: total, Only average; Factory setting: total.

21) Eye diagram printing: Yes, No. Factory setting: No.

22) Baud rate: 2400, 9600, 19200, 115200. Factory setting: 19200.

Select the communication transmission rate that matches the peripheral device.

23) Parity check: Off, Even, Odd. Factory setting: Off.

24) Data bits: 7 bits, 8 bits. Factory setting: 8 bits.

25) Stop bits: 1 bit, 2 bits. Factory setting: 1 bit.

26) CR Mode: Off, On. Factory setting: Off.

Select whether to append a Cr (carriage return) to the end of the data to be transmitted.

27) Data transmission: Off, Manual, Auto. Factory setting: Off.

28) Measurement window check: Yes, No. Factory setting: No.

Yes: automatically check the measurement window when starting up.

When the measurement window does not become dirty, the screen will prompt: The measurement window is OK!

When the measurement window has become dirty, the screen will prompt: Please check the measurement window!

No: it will not check the measurement window when starting up.

29) Brightness: 25%, 50%, 75%, 100%. Factory setting: 75%.

30) Screensaver: Off, 5 mins, 30 mins, 45 mins. Factory setting: 30 mins.

31) Buzzer: Off, Low, Middle, and High. Factory setting: Middle.

Set whether to send out "beep" when operating the product.

32) Guide page: Off, On. Factory setting: On.

33) Restore factory settings: Reset.

Press this button to restore all parameters to the factory settings.

34) Date & time: Edit.

Press "Edit" to set the date and time.

35) Information: Edit.

Press "Edit" key to display serial number, user and remark information. The serial number can't be edited. Click the corresponding input area to edit user and remark information.

36) Cataract: Off, On. Factory setting: Off.

"On" is a temporary setting and will be automatically turned to "off" when the measurement is completed.

Press to "On", the pop-up box shows: Turning on the cataract will increase the measuring light entering the fundus, do you want to continue?

Press Cancel or OK.

Cancel: turn off the cataract measurement function. OK: start the cataract measurement function.

30 seconds after the start of measurement, the light source will turn off automatically.

37) Automatic centering: Yes, No. Factory setting: Yes.

38) Language: Spanish, Portuguese, English, Chinese. Factory setting: English.

39) LAN: Edit.

Press the "Edit" key to display the Local IP and Local port.

Local IP: 0 ~ 255.0 ~ 255.0 ~ 255.0 ~ 255. Factory setting: 192.168.11.252.

Click the corresponding input area to pop up the keyboard and input the IP address.

Local port: factory setting: 8899.

Click the corresponding input area to pop up the keyboard and input the port number of the machine.

40) Terminal: Edit.

Press "Edit" key to display Remote IP, Account, Password and Path.

Remote IP: 0 ~ 255.0 ~ 255.0 ~ 255.0 ~ 255. Factory setting: none.

Set the IP address of the connected terminal device.

Account: set the account name of the connected terminal device. Factory setting: none.

Password: set the password of the connected terminal device. Factory setting: none.

Path: set the path name to export data to the connected terminal device. Factory setting: none.

41) About: Note.

Press "Note" key to view system information (including software version, manufacturer, etc.)

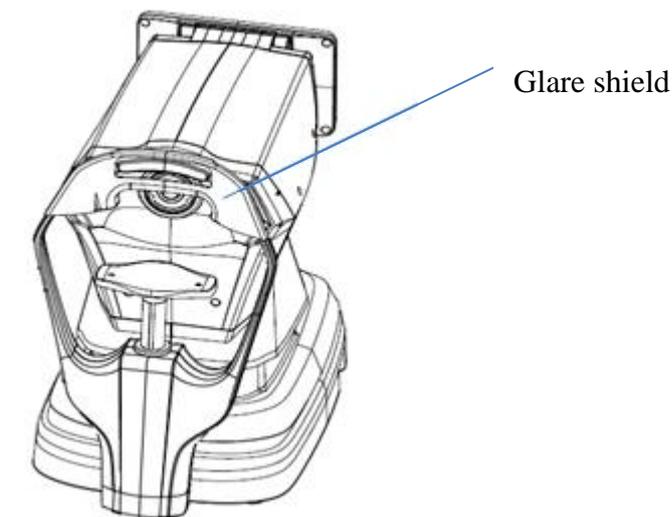
## 6.5 Preparation before measurement

1) Please check before use, refer to Chapter 5 "Preventive inspection";

2) Connect the power cord of the device, connect the power supply and turn on the power switch.

After the device initialization, enter the main interface;

3) Clean gauze or absorbent cotton dipped in disinfectant alcohol shall be used to gently wipe the forehead rest and chinrest, When in a dark room or semi-dark room environment, a light mask can be used to block the ambient light to avoid direct exposure to the eyes of the subject.



4) Ask the patient to sit in front of the device and remove the glasses or contact lenses they are wearing;

5) Make the patient's mandible was placed on the chinrest, and his forehead was lightly supported on the forehead rest;

6) Click the   icon on the main interface to adjust the height of the chinrest. Make the patient's eyes in the same horizontal position with the eye level marker on the forehead support.

Note: patients should be prompted to open their eyes and not blink during the measurement; otherwise the measurement results will be affected.

## 6.6 R & K measurement (applicable to YPC-100K)

Click the measurement mode **R&K** icon in the toolbar of the main interface, switch to refractive error and corneal curvature measurement mode.

1) Instruct the patient to observe the images that appear through the measurement window.

2) Displaying the patient's eyes on the display screen.

By adjusting the joystick, the patient's eyes are displayed on the screen. (Align the eye level marker on the measuring unit with the eye level marker on the forehead support)

Tilt the joystick in the left and right directions to make the measuring unit move in the left and right directions;

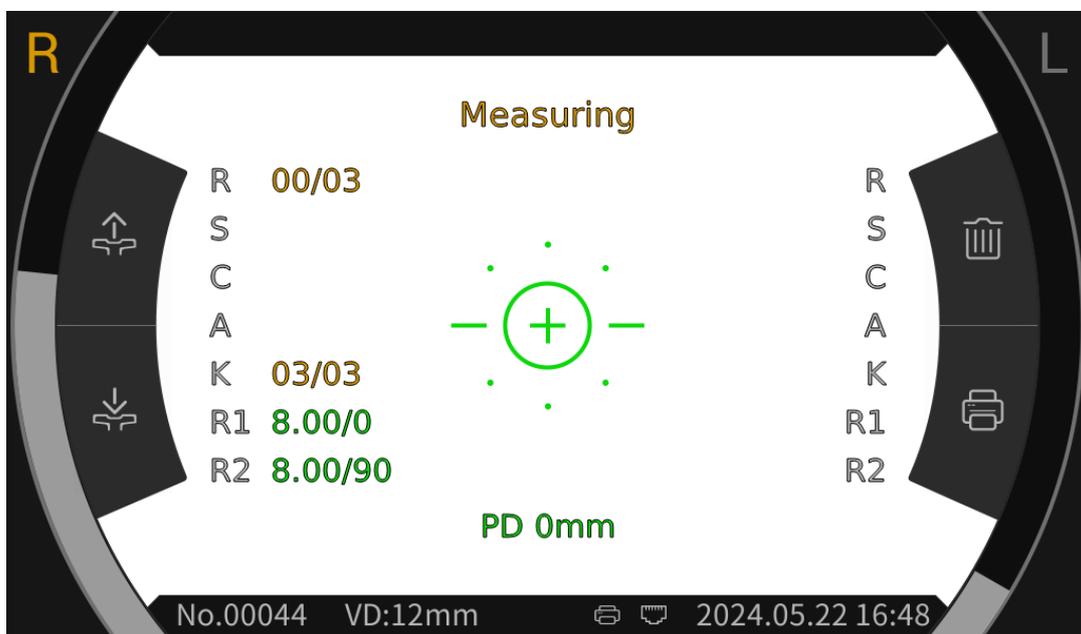
Tilt the joystick in the front and back directions to make the measuring unit move forward and backward;

By rotating the upper part of the joystick, the measuring unit moves up and down.

Move left, right, up and down to adjust the measurement position, move forward and backward to adjust focus.

3) Alignment and focusing.

Adjust the operating handle so that the focusing ring is in the mire ring projected on the patient's eye for alignment.



When the focusing ring is located in the mire ring, the focusing ring will display the focusing prompt, and focus according to the focusing prompt.

According to the focusing tips, tilt the operating handle in the front and back directions to make the focus in the best state.



Mire ring: reference for alignment.

Note: if the mire ring is blocked by eyelashes or eyelids, measurement may not be possible. Please do not blink.

	If it is too close to the patient's eyes, it is necessary to tilt the joystick backward (in the direction of the operator) to move the measuring unit
	Focus best
	It is too far away from the patient's eyes. It is necessary to tilt the joystick forward (in the direction of the patient) to move the measuring unit

Focus state description

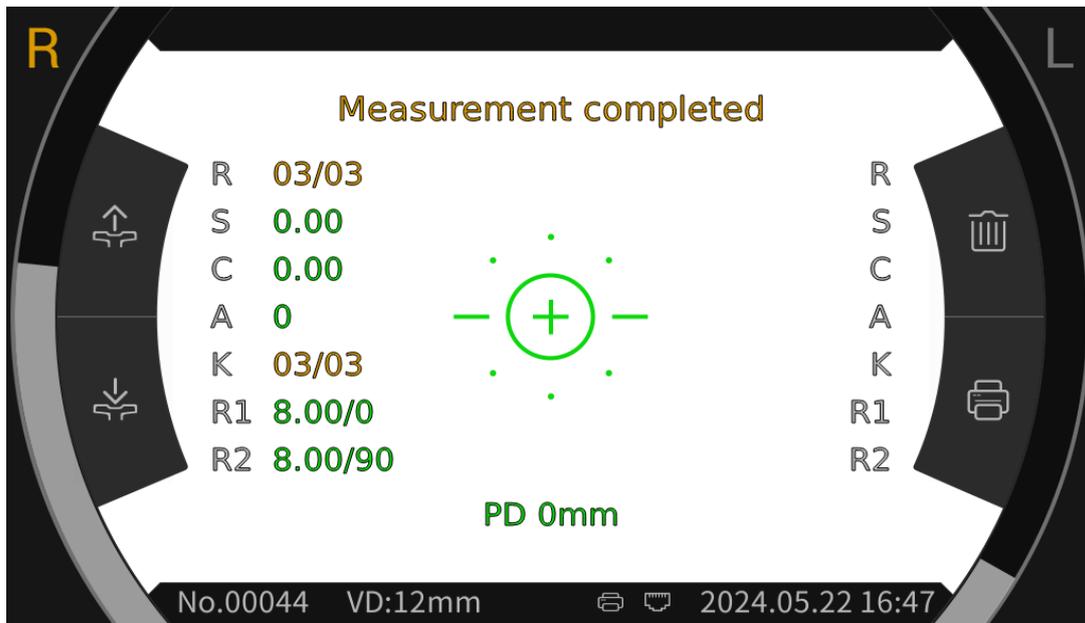
#### 4) Performing measurements.

When the alignment and focus are in the best condition, start the measurement.

When the measurement mode is set to automatic, the measurement will start automatically; when the measurement mode is set to manual, press the measurement button to start the measurement.

#### 5) End of measurement.

When the measurement is finished, the display screen will display the measurement data and prompt "Measurement completed".



6) Measure the other eye in the same way.

 Attention: During the measurement process, when reaching the measurement position, do not push the measurement unit 7 over the head, so as not to touch the nose of the measured person.

 Attention: Before measurement, the eye position of the subject's eyes should be aligned with the eye position markers on both sides of the frontal bracket.

## 6.7 REF measurement (applicable to YPC-100)

Click the measurement mode **REF** icon in the toolbar of the main interface, switch to refractive error and corneal curvature measurement mode.

1) Instruct the patient to observe the images that appear through the measurement window.

2) Displaying the patient's eyes on the display screen.

By adjusting the joystick, the patient's eyes are displayed on the screen. (Align the eye level marker on the measuring unit with the eye level marker on the forehead support)

Tilt the joystick in the left and right directions to make the measuring unit move in the left and right directions;

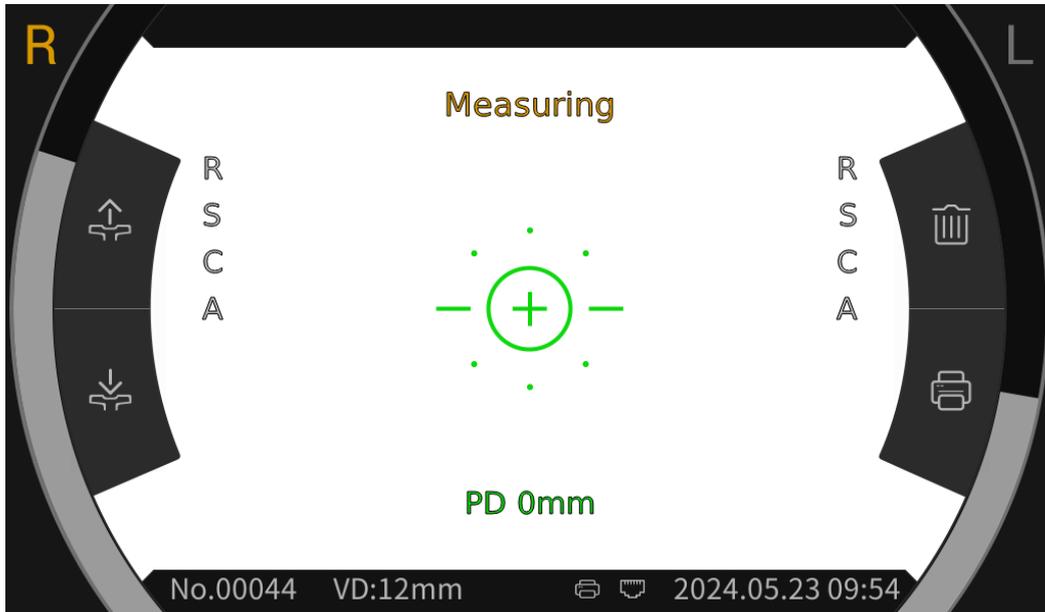
Tilt the joystick in the front and back directions to make the measuring unit move forward and backward;

By rotating the upper part of the joystick, the measuring unit moves up and down.

Move left, right, up and down to adjust the measurement position, move forward and backward to adjust focus.

3) Alignment and focusing.

Adjust the operating handle so that the focusing ring is in the mire ring projected on the patient's eye for alignment.



When the focusing ring is located in the mire ring, the focusing ring will display the focusing prompt, and focus according to the focusing prompt.

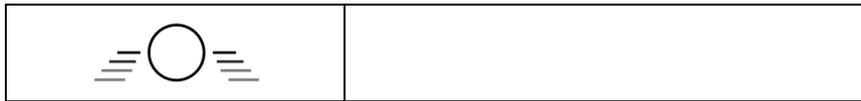
According to the focusing tips, tilt the operating handle in the front and back directions to make the focus in the best state.



Mire ring: reference for alignment.

Note: if the mire ring is blocked by eyelashes or eyelids, measurement may not be possible. Please do not blink.

	If it is too close to the patient's eyes, it is necessary to tilt the joystick backward (in the direction of the operator) to move the measuring unit
	Focus best
	It is too far away from the patient's eyes. It is necessary to tilt the joystick forward (in the direction of the patient) to move the measuring unit



Focus state description

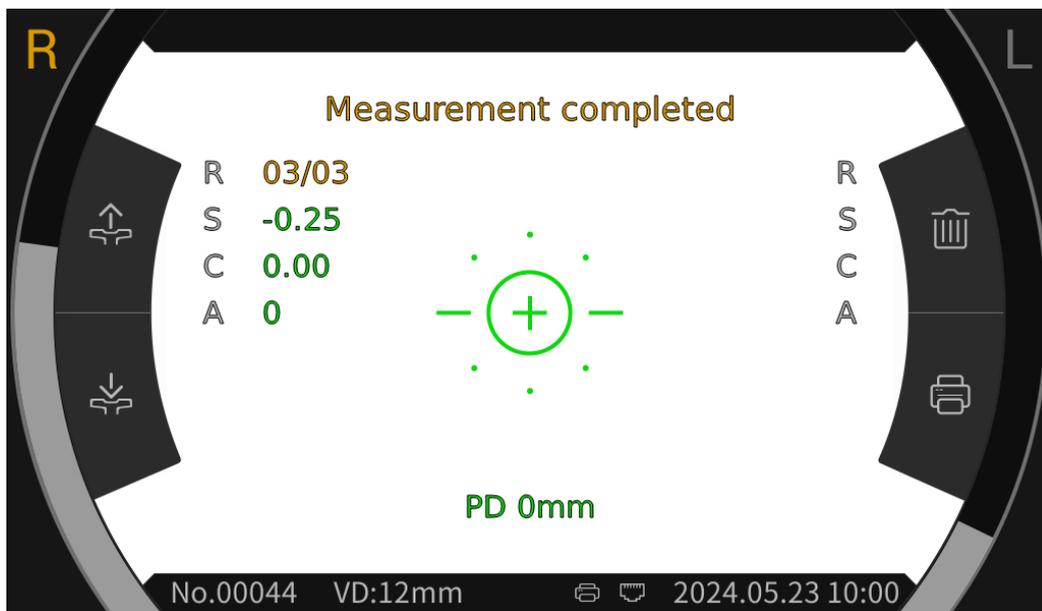
4) Performing measurements.

When the alignment and focus are in the best condition, start the measurement.

When the measurement mode is set to automatic, the measurement will start automatically; when the measurement mode is set to manual, press the measurement button to start the measurement.

5) End of measurement.

When the measurement is finished, the display screen will display the measurement data and prompt "Measurement completed".



6) Measure the other eye in the same way.

 Attention: During the measurement process, when reaching the measurement position, do not push the measurement unit 7 over the head, so as not to touch the nose of the measured person.

 Attention: Before measurement, the eye position of the subject's eyes should be aligned with the eye position markers on both sides of the frontal bracket.

## 6.8 CS measurement

1) By adjusting the handle to align and focus the patient's eyes, the test is started, and the system automatically obtains the fundus image of the patient.

2) Click the ranging  icon in the toolbar of the main interface to enter the ranging interface, and



then switch to the  icon at the bottom of the screen to corneal size measurement.

3) Click the  or  icons respectively to adjust the left and right alignment  , until the alignment lines are aligned with the left and right edges of cornea. At this point, the corneal size is displayed on the screen.

4) Measure the other eye in the same way.

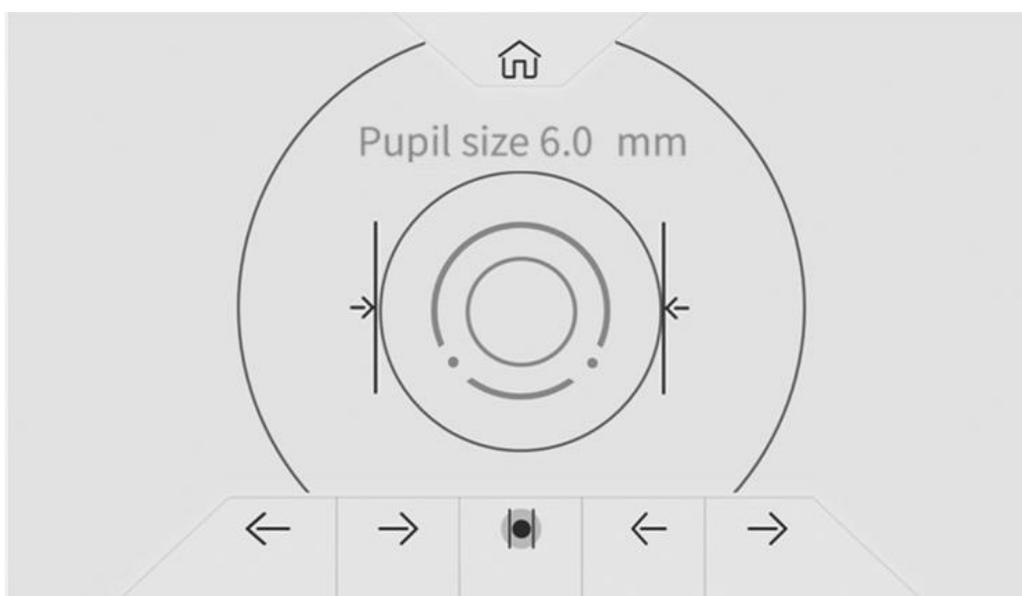
5) Click the  icon to return to the main interface.



## 6.9PS measurement

1) By adjusting the handle to align and focus the patient's eyes, the test is started, and the system automatically obtains the fundus image of the patient.

2) Click the ranging  icon in the toolbar of the main interface to enter the ranging interface, and then switch to the  icon at the bottom of the screen to pupil size measurement.



3) Click the ← or → icons respectively to adjust the left and right alignment → | ← , until the alignment lines are aligned with the left and right edges of pupil. At this point, the pupil size is displayed on the screen.

4) Measure the other eye in the same way.

5) Click the 🏠 icon to return to the main interface.

## 6.10 PD measurement

The pupillary distance will be measured automatically during REF measurement.

## 6.11 Cataract measurement

During the measurement period, if the measurement cannot be carried out due to cataract, cataract measurement can be started.

In the parameter setting interface, set the cataract option to "On" and "On" as a temporary setting without saving. After the measurement is completed, it will automatically turn to "off".

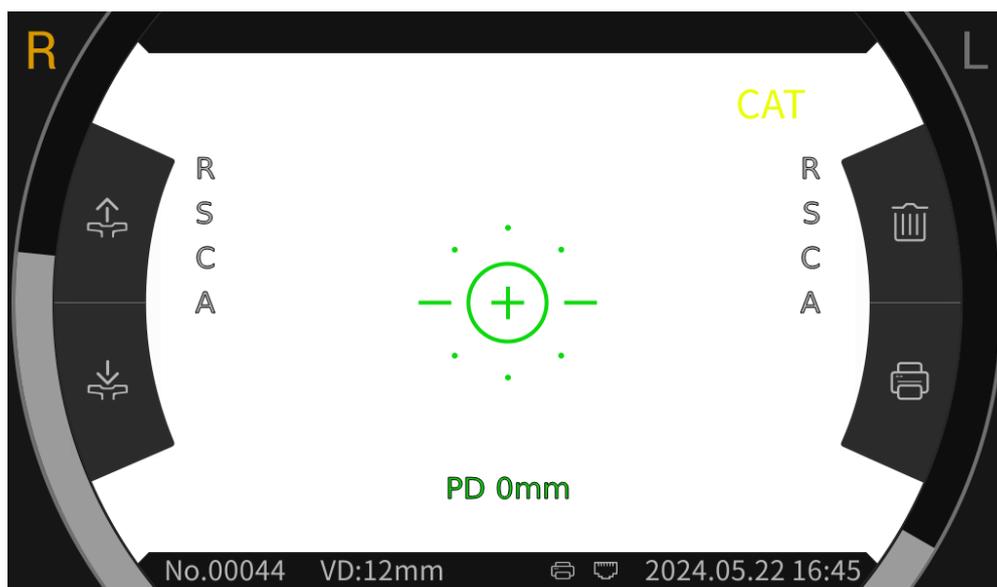
Press to "On", the pop-up box shows: Turning on the cataract will increase the measuring light entering the fundus, do you want to continue?

Press Cancel or OK.

Cancel: turn off the cataract measurement function. OK: start the cataract measurement function.

30 seconds after the start of measurement, the light source will turn off automatically.

When the device is placed in cataract measurement mode, "CAT" is displayed on the screen.



## 6.12 Measurement accuracy check

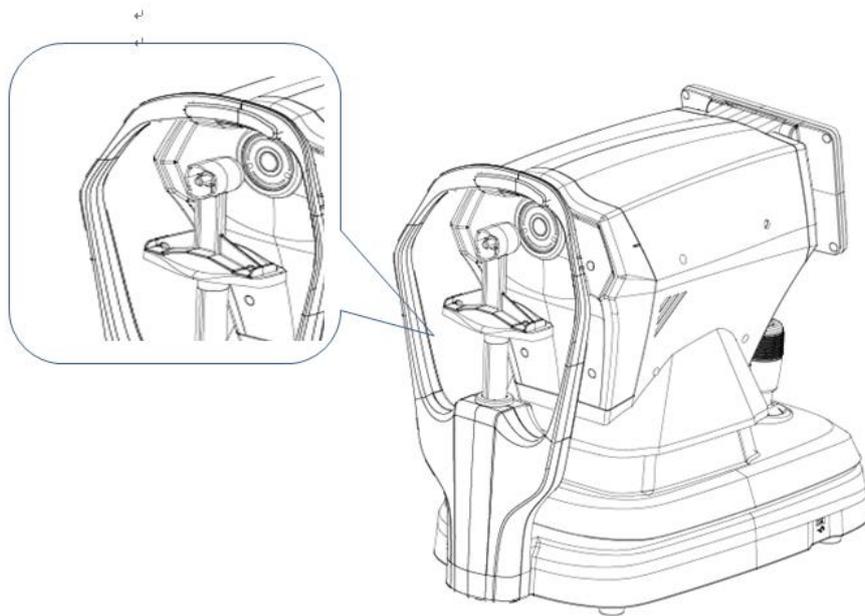
After the device is used for half a year, the accuracy of the measurement data can be checked by

using a spherical model eye. The equipment operator is responsible for checking the measurement accuracy.

1) Place the spherical model eye on the chinrest, with one side of the lens facing the measurement window, insert the locating pin into the positioning hole on the chinrest, and fix the spherical model eye.

2) Align the level of spherical model eye with eye level marker on the forehead support by click the  icon in the main interface.

3) Set the AR vertex distance to 12mm, and the measurement method was the same as that of R & K measurement.



Note: The nominal values of spherical vertex power and corneal curvature radius marked on the spherical model eye. The nominal value is for reference only. If the measurement results differ greatly from the nominal value, please contact Chongqing Yeasn Science - Technology Co., Ltd. or the authorized dealer.

Note: Do not touch the lens surface with fingers. For stubborn stains, please use clean gauze dipped in alcohol to wipe gently.

## 7. Cleaning and protection



Attention: Do not use any corrosive detergent to clean the device, so as not to damage the device surface.

### 7.1 Cleaning the display

You need to clean the LCD screen if it's too dirty to see the information clearly.

- 1) Cut off power.
- 2) Unplug the power cord from the socket.
- 3) Wipe the LCD screen with soft and clean cotton cloth or absorbent wool gently.



Attention: Cut off power and unplug the power cord from the socket before cleaning.

Otherwise, it may cause electric shock.



Attention: Do not wipe the LCD screen with stiff cloth or paper; otherwise it may scratch the screen.



Attention: Make sure no water drops on the LCD screen; if there is a water drop, please wipe it away with soft and clean cotton cloth or absorbent wool.

Otherwise, it may leave a stain on the LCD screen,



Attention: Wipe the LCD screen gently when cleaning it. Otherwise, excessive force may cause device failure.

## **7.2 Clean measurement window**

If the measurement window is dirty, it will affect the reliability of the measurement results. Please check the measurement window before use.

When the message "Please check the measurement window!" is displayed on the screen (It is necessary to set "Measurement window check" to "Yes" in parameter setting) or the measurement window is obviously dirty, the measurement window needs to be cleaned.

- 1) For dust: blow off the dust with a blower;
- 2) For stains and finger marks: Wipe the glass lens gently with a soft and clean cotton cloth dampened with alcohol.



Attention: Do not wipe the glass lens with stiff cloth or paper; otherwise it may scratch the glass lens.



Attention: Wipe gently along the arc shape from the center of the measurement window; otherwise, excessive force may scratch the measurement window lens.

## **7.3 Clean the external parts of the device**

When the external parts of the device, such as the shell or panel are dirty, please wipe them with a

clean soft cloth.

For stubborn stains, please dip clean soft cloth into neutral detergent, wring well and wipe. Finally dry with a dry, soft cloth.



Attention: Do not use a soft cloth soaked in water to wipe the device. Otherwise, water may enter the device and cause device failure.

## 8. Maintenance

### 8.1 Printing paper replacement

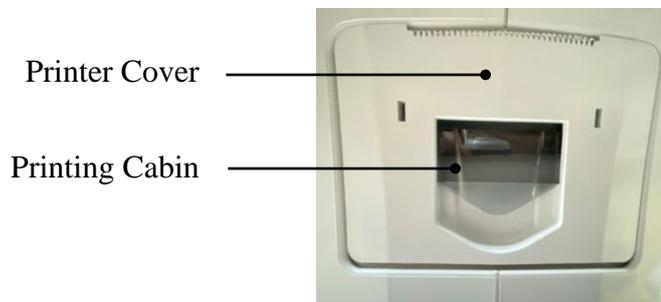
When a red line appears on the edge of the printing paper, please stop using the printer and replace it with a new roll.



Attention: The printer of this product uses thermal printing paper with specification width 57mm.

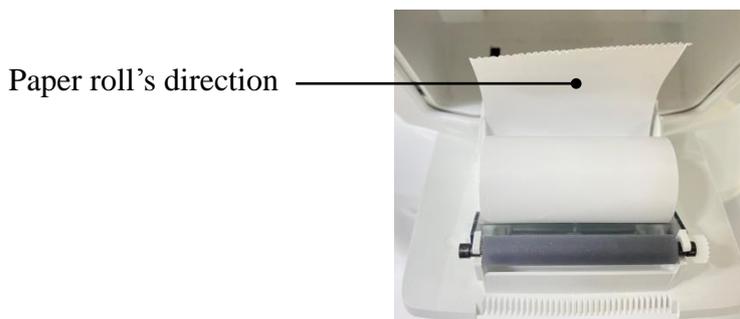
The replacement steps are as follows:

1) Pull the transparent printing cabin door, open the printer cover, and take out the remaining printing paper.



2) Put the new printing paper roll into the printing box.

Note: Pay attention to the paper roll's direction, if the paper roll is reversed, the printer won't print any data.

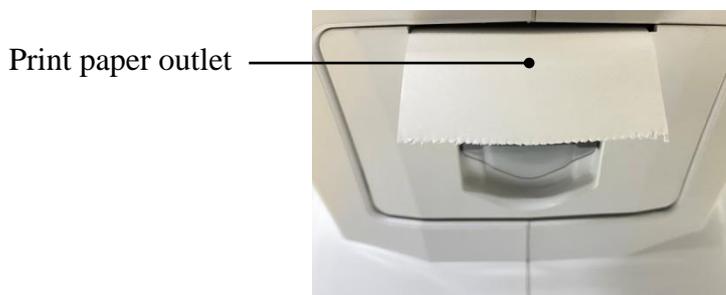


3) Pull out the printing paper along the paper outlet of the printer cover.

4) Close the printer cover and the transparent printing compartment door will reset automatically to

complete the replacement.

Note: Please do not print without printing paper, or pull the printing paper in the printer forcefully, this kind of operation will reduce the life of the printer.



8.2 Repairable and replaceable parts, such as power cord, fuse, etc., can only be supplied by our company. Other unauthorized components may reduce the minimum safety of the device.

8.3 The fuse is located at the bottom of the device. If damaged, please replace it provided by the company with type of 5KT1A 250V.

8.4 Do not disassemble and repair the device arbitrarily. Please contact the local dealer or manufacturer.

8.5 Before returning the device to the manufacturer for repair or maintenance, please use a clean soft cloth dipped in disinfectant alcohol to wipe the surface of the device (especially the parts contacted with the patient).

8.6 The company promises to provide the circuit diagram, component list and other relevant information necessary for the maintenance of the device according to the needs of users.

## 9. Troubleshooting

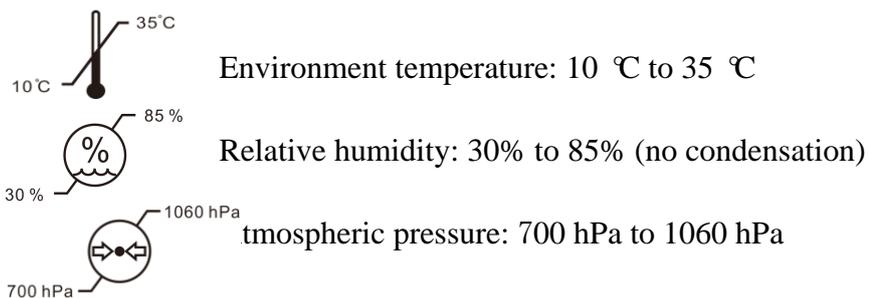
In the event of device trouble, please check the following table for guidance. If the fault is not eliminated, please contact with Chongqing Yeasn Science - Technology Co., Ltd. or the authorized dealer.

Fault phenomenon	Possible causes	Solutions
The device failed to start	The power cord is not properly connected to the power outlet	Connect the power cord correctly
The display screen does not turn on	The screen saver is on and the device is in standby mode	Wake up the device through any touch operation
The printer does not work	The printing paper has been used up; Set "Printer" to "Off" in parameter	Replace with new printing paper; Set parameters to "Manual" or

	setting	"Auto"
No data on printing paper	The paper roll is reversed	Adjust paper roll's direction
The measuring unit cannot be moved	The locking lever is locked	Pull the locking lever to  side to unlock the device

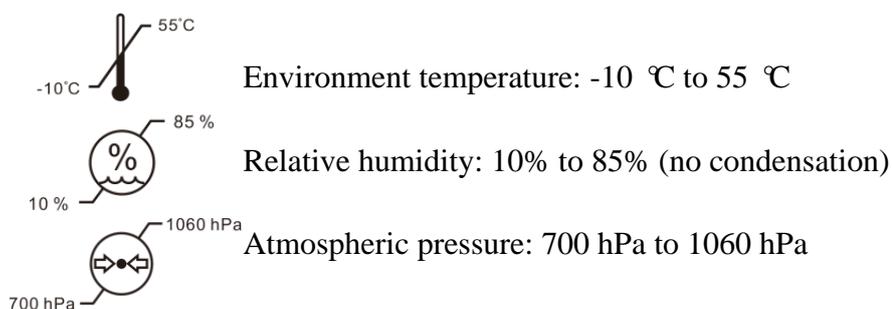
## 10. Environmental Conditions and Service Life

### 10.1 Environmental conditions for normal operation



Indoor conditions: clean and without direct high light.

### 10.2 Environmental conditions for transportation and storage



Indoor conditions: good ventilation and without corrosive gas.

### 10.3 Service life

The service life of the device is 8 years from first-time use with proper maintenance and care.

The service life of the device is assessed based on a normal temperature environment of 23 °C.

## 11. Disposal and Environmental protection



## INFORMATION FOR USERS

Please recycle or properly dispose of the used batteries and other wastes to protect the environment.

This product bears the selective sorting symbol for waste electrical and electronic equipment (WEEE). This means that this product must be handled to the local collecting points or given back to retailer when you buy a new product, in a ratio of one to one pursuant to European Directive 2012/19/EU in order to be recycled or dismantled to minimize its impact on the environment.

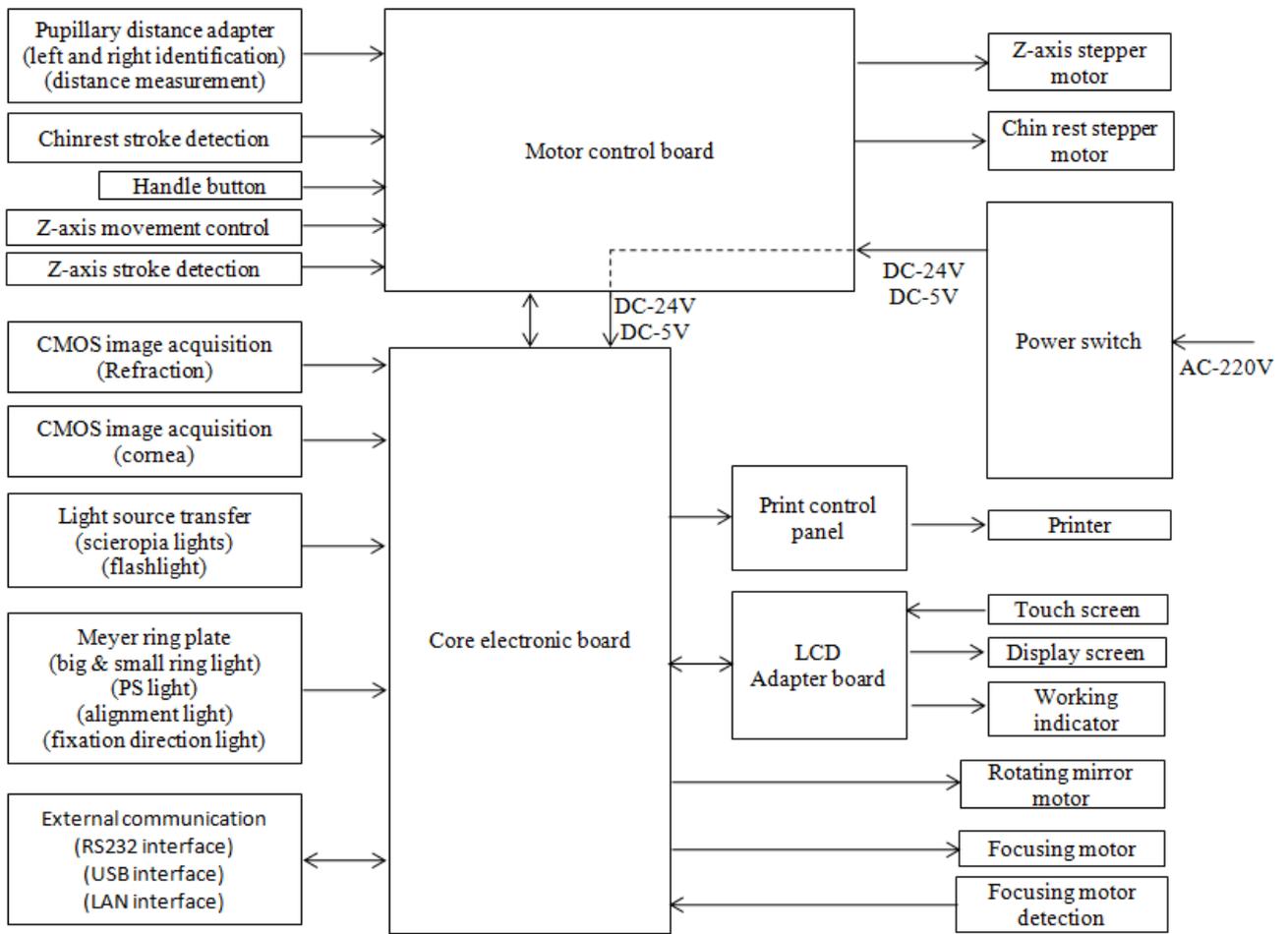
Very small WEEE (no external dimension more than 25 cm) can be delivered to retailers free of charge to end-users and with no obligation to buy EEE of an equivalent type. For further information, please contact your local or regional authorities. Electronic products not included in the selective sorting process are potentially dangerous for the environment and human health due to the presence of hazardous substances. The unlawful disposal of the product carries a fine according to the legislation currently in force.

## **12. Manufacturer's Responsibility**

The company is responsible for the safety, reliability and performance impact under below circumstances:

- Assembly, addition, modifications, alterations and repairs are carried out by authorized personnel by the company;
- Electrical facilities in the room are in conformity with relevant requirements, and
- The device is used according to the User Manual.

## **13. Electrical Schematic Diagram**



For further information and services, or any questions, please contact with the authorized dealer or manufacturer. We will be happy to help you.

## 14. Guidance of EMC and other interference

- 1) This device needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided, and this device can be affected by portable and mobile RF communications equipment.
- 2) Do not use a mobile phone or other devices that emit electromagnetic fields, near the device. This may result in incorrect operation of the device.
- 3) Caution: This device has been thoroughly tested and inspected to assure proper performance and operation!
- 4) Caution: this device should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, this device should be observed to verify normal operation in the configuration in which it will be used.

<b>Guidance and manufacture's declaration – electromagnetic emission</b>		
The YPC-100/YPC-100K is intended for use in the electromagnetic environment specified below. The customer or the user of the YPC-100/YPC-100K should assure that it is used in such an environment.		
<b>Emission test</b>	<b>Compliance</b>	<b>Electromagnetic environment – guidance</b>
RF emissions CISPR 11	Group 1	The YPC-100/YPC-100K use RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class B	The YPC-100/YPC-100K is suitable for use in all establishments, other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

**Guidance and manufacture's declaration – electromagnetic immunity**

The YPC-100/YPC-100K is intended for use in the electromagnetic environment specified below. The customer or the user of YPC-100/YPC-100K should assure that it is used in such an environment.

<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV contact ±15 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2kV for power supply lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	±1 kV differential mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the YPC-100/YPC-100K requires continued operation during power mains interruptions, it is recommended that the YPC-100/YPC-100K be powered from an uninterruptible power supply or a battery.
Power frequency (50Hz/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE UT is the a.c. mains voltage prior to application of the test level.

**Guidance and manufacture's declaration – electromagnetic immunity**

The YPC-100/YPC-100K is intended for use in the electromagnetic environment specified below. The customer or the user of the YPC-100/YPC-100K should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
<p>Conducted RF IEC 61000-4-6</p> <p>Radiated RF IEC 61000-4-3</p>	<p>3 Vrms 150 kHz to 80 MHz</p> <p>3 V/m 80 MHz to 2.5 GHz</p>	<p>3 Vrms</p> <p>3 V/m</p>	<p>Portable and mobile RF communications equipment should be used no closer to any part of the YPC-100/YPC-100K, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> <p><math>d=1.2\sqrt{P}</math></p> <p><math>d=1.2\sqrt{P}</math> 80 MHz to 800 MHz</p> <p><math>d=2.3\sqrt{P}</math> 800 MHz to 2.5 GHz</p> <p>Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,<sup>a</sup> should be less than the compliance level in each frequency range.<sup>b</sup></p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the YPC-100/YPC-100K is used exceeds the applicable RF compliance level above, the YPC-100/YPC-100K should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the YPC-100/YPC-100K.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

**Recommended separation distances  
between portable and mobile RF communications equipment and the YPC-100/YPC-100K**

The YPC-100/YPC-100K is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the YPC-100/YPC-100K can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the YPC-100/YPC-100K as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter(W)	Separation distance according to frequency of transmitter(m)		
	150 KHz to 80 MHz $d=1.2\sqrt{P}$	80 MHz to 800 MHz $d=1.2\sqrt{P}$	800 MHz to 2.5 GHz $d=2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance  $d$  in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.