

COMPUTERIZED VISION TESTER
OPERATOR' S MANUAL

KF-ZD6000

Operation environment of optometer control software

Function description of optometer control software optometer control software is a tablet control software based on Android system. It controls the optometry system to perform specified operations, interacts with customers, carries out optometry analysis and diagnosis, and finally generates optometry report and provides corresponding Glasses Prescription. Through the WiFi module, the optometer control software takes the tablet computer as the center, and forms the isolated units in the traditional optometry system, such as the operation end, the optical head, the computer optometer, the liquid crystal visual acuity chart and the prescription printer, into a WiFi LAN, which realizes the real-time data transmission and forms an organic whole. Through the way of WiFi communication, the more rapid and stable lens combination control of the optometer is realized, the accurate and rapid combination of spherical lens power, cylindrical lens power, axial position and prism power is realized, and the fast switching of special auxiliary lenses is realized: the optometry of the computer optometer is quickly read and loaded; Realize the sensitive and reliable control of LCD visual acuity chart: realize the reliable output of printing information of prescription printer. The optometrist control software provides a more comprehensive, convenient and powerful optometry and auxiliary system for optometrists. Through the touch operation of the tablet computer, the rapid optometry lens combination switching operation is realized: by providing a user-defined program editing system, some optometrists' optometry experience can be saved in the form of program steps, which greatly improves the optometry efficiency: by enriching and perfecting the operation of the liquid crystal visual acuity chart, the visual acuity chart can be directly switched to the specified state, The flexible control operation of LCD visual acuity chart is realized, and the user-defined visual acuity chart editing function is introduced to greatly improve the efficiency of optometry: the optometry results are completely saved and shared in real time by establishing a customer data database, so as to push the traditional optometry to the Internet data age. The optometer control software gives a new interpretation of the traditional optometry process, integrates the advanced mobile terminal into the modern optometry system, and integrates the ideas of optometrists' personality customization and the Internet data age, bringing a fast, fashionable and scientific optometry experience.

Kingfisher manufacture CO,.LTD.

1. Introduction

Computerized vision tester is used to subjective examination of visual acuity and refractive error of subject's eyes.

1.1 Classify

Model number: KF-ZD6000

Security category: I class Medical electrical equipment

1.2 Storage and transport environment conditions

a) temperature: $-10^{\circ}\text{C}\sim 55^{\circ}\text{C}$

b) Air pressure: $700\text{hpa}\sim 1060\text{hpa}$ (transport), $500\text{hPa}=1060\text{hPa}$ (storage)

c) Humidity: $10\%\sim 85\%$

1.3 Working environment condition

a) temperature: $10^{\circ}\text{C}\sim 40^{\circ}\text{C}$

b) Air pressure: $800\text{hpa}\sim 1060\text{hpa}$

c) Humidity: $10\%\sim 80\%$

1.4 Power adapter requirement

a) input: AC $100-240\text{V}\sim 5060\text{Hz}$

b) output: DC $24\text{V}2.5\text{A}85\text{VA}$

2. Main performance index

2.1 Measurement range

a) Sphere: $+16.75\text{D}\sim -19.00\text{D}$;

b) Cylinder: $0\sim -6.00\text{D}$;

c) Axis: $0\sim 180^{\circ}$;

d) Prism: $0\Delta\sim 20\Delta$;

e) Prism base: $0\sim 360^{\circ}$;

f) PD range: $50\sim 80\text{mm}$;

2.2 Step

a) Sphere: $0.25\text{D}/0.5\text{D}/1.0\text{D}/3.0\text{D}$;

b) Cylinder: 0.25D ;

- c) Axis: $1^\circ / 5^\circ$;
- d) Prism: 0.1cm/m;
- e) Prism base: 1° ;
- f) PD range: 0.5cm;

2.3 Tolerance

- a) The tolerance of sphere should accord with the requirement table 1.1

Table 1.1 sphere tolerance

item	Standard	tolerance	Tolerance $ s_1-s_2 $
球镜度 \ddot{O} (D)	$0 \leq \ddot{O} \leq 3.00$	± 0.06	0.03
	$3.00 < \ddot{O} \leq 6.00$	± 0.09	
	$6.00 < \ddot{O} \leq 9.00$	± 0.12	
	$9.00 < \ddot{O} \leq 12.00$	± 0.15	
	$12.00 < \ddot{O} \leq 15.00$	± 0.18	
	$15.00 < \ddot{O} $	± 0.25	

Table 1.2 Astigmatic power tolerance

Meridian direction Maximum absolute dioper	Astigmatic power nominal diopter				
	≤ 0.50	$>0.50 \sim 1.00$	$>1.00 \sim 3.00$	$>3.00 \sim 6.00$	>6.00
Tolerance D					
0.00~5.00	0.06	0.06	0.06	0.09	0.12
>5.00~10.00			0.09	0.12	0.18
>10.00~15.00		0.09	0.12	0.18	0.25
>15.00			0.12	0.18	0.25

Table 1.3 Cylinder axis and prism base tolerance

item	Nominal diopter (Absolute)	Tolerance
Cylinder axis	$>0D \sim 0.25D$	$\pm 5^\circ$
	$>0.25D \sim 1D$	$\pm 3^\circ$
	$>1D$	$\pm 2^\circ$
Prism base	$\leq 1\text{cm/m}$	$\pm 5^\circ$
	$>1\text{cm/m} \sim 10\text{cm/m}$	$\pm 3^\circ$
	$>10\text{cm/m}$	$\pm 2^\circ$
PD&VD (mm)	VD	± 0.5
	PD	± 0.5

Table 1.4 optical center tolerance of mechanical system of sphere and cylinder combinative optical system

Nominal diopter(Absolute)D	Tolerance (cm/m)
0.00	0.12
>0.00~6.00	0.25
>6.00~12.00	0.37
>12.00	0.50

2.1 Function introduction

2.1 The minimum aperture of all lenses of the optometer shall not be less than 16mm; For prisms of 6cm / M and above, the minimum luminous aperture can be reduced to 11mm.

2.1.2 There are mirror eye distance monitoring windows on both sides of the instrument of the comprehensive optometer. Through the mirror eye distance monitoring window, it can be observed that a dividing plate is engraved with a long line and three short lines, and the spacing between two adjacent lines is 2mm. The position of the anterior apex of human cornea should be on the long line of the dividing plate, which is the reference plane of the instrument of the comprehensive optometer.

2.1.3 The comprehensive optometer shall be equipped with a covering and splitting device, and each system shall be equipped with a Jackson cross column mirror;

2.1.4 There is no stray light interference or structural occlusion in

the observation optical path of the optometer.

2.1.5 The structure of lens cavity shall not affect the examination of patients' visual function;

2.1.6 When the lens and accessories are fixed in front of the observation hole, the instrument shall be aligned and centered.

2.1.7 The operation keys of the optometer shall be clearly marked. When pressing the keys, the instrument function or state shall change to normal.

2.1.8 When the optometer has WiFi function, the communication is effective at 10m.

3 Security considerations

3.1 Security identity

In this manual, the words used to indicate the degree or level of safety alarm are defined as follows:

Warning: indicates a potentially dangerous situation that, if not avoided, may result in death or serious injury

Note: it indicates a potential dangerous situation. If it cannot be avoided, it may lead to slight or medium injury or property loss. Under certain conditions, even if the situation is attention, it may lead to serious injury. Therefore, safety precautions must be strictly observed at all times

Safety precautions before use

warning

1. Make sure the optometer is fixed on the support arm of the
2. If the optometer drops or falls, it may cause personal injury or equipment failure.
3. Ensure that the power box is installed and placed vertically according to the method shown in Figure 1 in 1.2 classification in this manual.

caution

1. Safety precautions and operating procedures must be thoroughly understood before using the equipment

2. Unexpected use may lead to unexpected failure or adverse results.

3. The equipment shall not be exposed to rain, water or fog. Do not place containers containing liquid or gas on the top of the instrument.

4. The storage environment shall not be in dusty, hot, humid places or direct sunlight

5. Do not carry the equipment to another place alone, which may damage the back or slide the equipment

6. Install the equipment on a stable and horizontal table. If the equipment slips, it may cause injury or equipment damage Do not install equipment where there is water. Contact with liquid may cause electric shock or equipment failure

7. Please install the equipment in an environment that meets the following conditions. The following conditions must also be met in the use of the equipment.

a) temperature:10°C~40°C

b) Air pressure:800hpa~1060hpa

c) Humidity:10%~80%

Installation position: dust-free and clean dark light room

Place free from vibration and impact

8. Be sure to adjust the horizontal refractometer before use.

If the refractometer is not installed horizontally, it may affect the accuracy of the data. The level adjustment knob is used to calibrate the refractometer until the foam concentration is at the level.

9. Be sure to use sockets that meet the requirements of equipment voltage parameters. If the voltage is too high or too low, the equipment cannot operate normally, and the fault may cause fire

10. To avoid the risk of electric shock, the equipment must be connected to the power supply with protective grounding.

11. Do not overload the socket, which may cause fire

12. Fully insert the power plug into the socket.

13. Improper connection may cause fire.

14. Do not use any power cord other than equipment, which may cause failure or fire.

15. Do not place heavy objects on the power cord.

15. Damaged power cord may cause fire or electric shock.

16. When installing and operating the equipment, observe the following EMC instructions (electromagnetic compatibility):

It cannot be used together with other electronic equipment to avoid electromagnetic interference between equipment operation and other electronic equipment

It cannot be used in the same room with other equipment, including life support equipment, other equipment that has a significant impact on the patient's life and treatment results, and measuring or therapeutic instruments containing small current

It cannot be used simultaneously with the equipment of portable and mobile radio frequency communication systems, because the electromagnetic interference they emit may adversely affect the operation of the device.

Do not use cables and accessories not specified by the company, which may increase the electromagnetic wave emission of the equipment or system and reduce the anti electromagnetic interference ability of the device. If there is potential electromagnetic interference between the equipment and other equipment, shielding measures shall be taken or the installation position of the equipment shall be changed to reduce the possible interference

Maintenance and inspection

Any repair and service of this instrument must be provided by personnel trained by Hangzhou Jingfei Optical Instrument Manufacturing Co., Ltd. Be able to operate correctly and maintain by experienced personnel or dealers. Removing the safety screw may cause the instrument to separate from the support arm and cause serious injury. Do not open the outer cover of the instrument or try to repair any internal parts. Any maintenance and service of the equipment must be carried out by experienced staff of Hangzhou Jingfei Optical Instrument Manufacturing Co., Ltd. or authorized distributors trained by Hangzhou Jingfei Optical Instrument Manufacturing Co., Ltd

The adjustment of the instrument must be carried out by the technical service personnel or other authorized personnel of Hangzhou Jingfei Optical Instrument Manufacturing Co., Ltd

The use and operation of the optometer must be in strict accordance with the instructions in the user's Guide. If it is not used in the way specified by Hangzhou Jingfei Optical Instrument Manufacturing Co., Ltd., the patient's safety and the normal operation of the instrument will not be guaranteed

Do not use solvent or strong cleaning solution on any part of the instrument, otherwise the instrument may be damaged

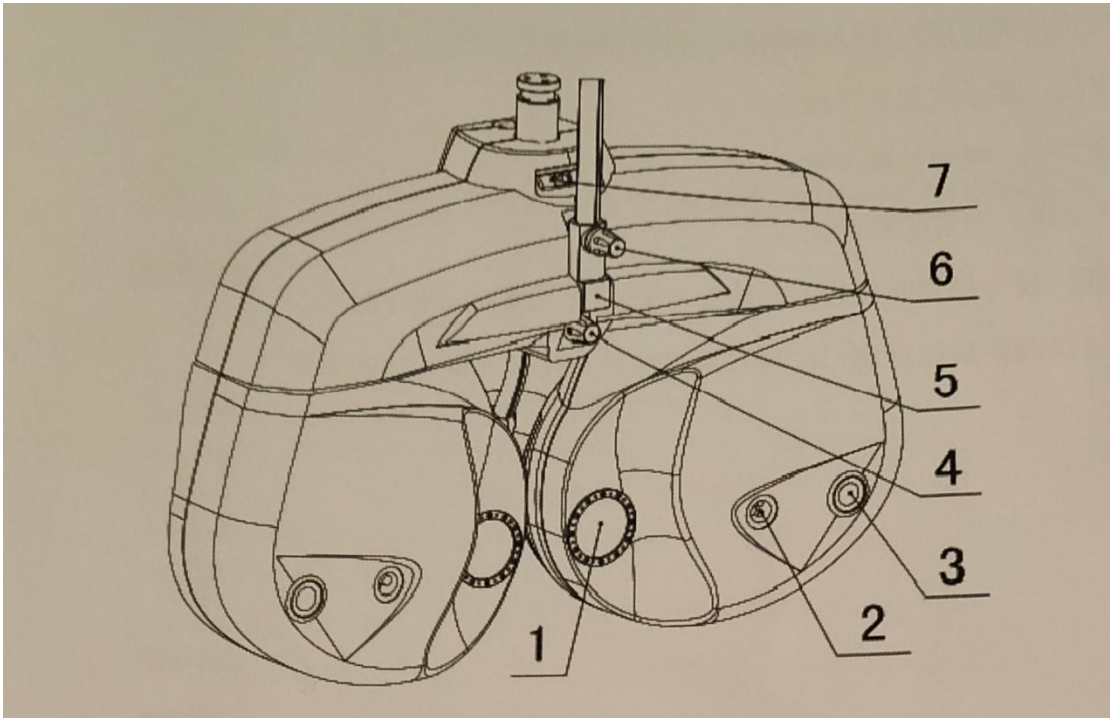
Do not use organic solvents such as paint thinner to clean the outside of the equipment, which can damage the surface of the equipment

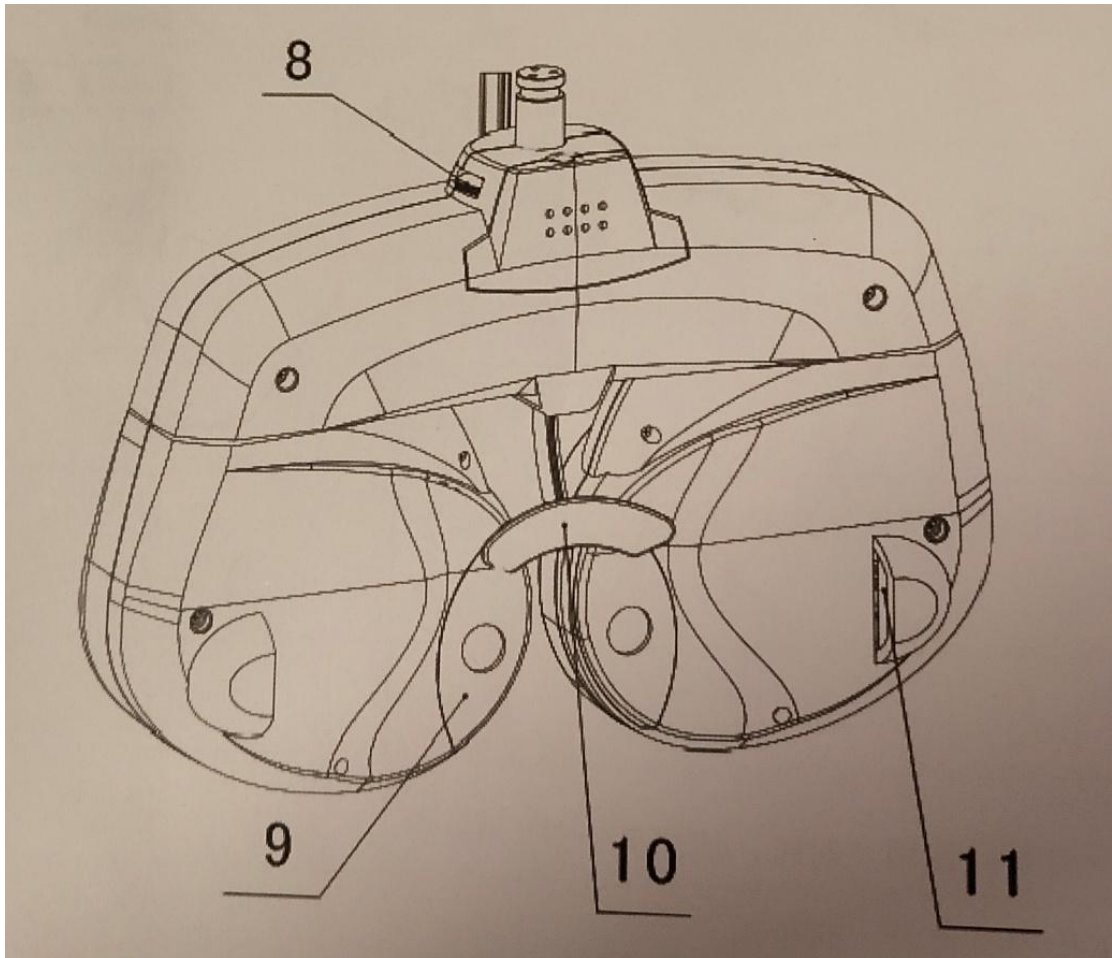
Do not immerse the optometer in liquid, otherwise it will cause damage to the instrument.

Avoid touching the optical components of the instrument to prevent performance degradation caused by fingerprints or oil stains on the lens group. Note: pixels may occasionally disappear or appear red, blue or green pixels on the screen. This does not mean that the LCD panel is broken: it is caused by the LCD screen in the production process.

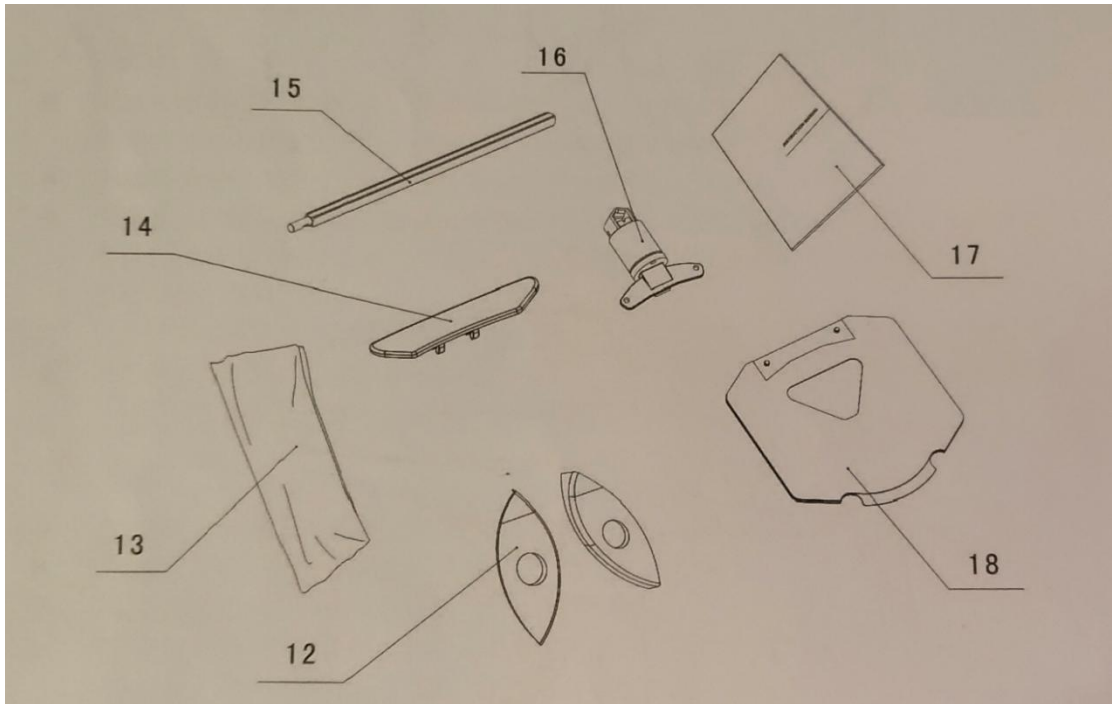
4. Configuration

4.1 Refractor head con figuration





- (1) Examination window: The patient's eyes are observed through the window, and patient observe charts through the window.
- (2) Near vision illumination: Light up when bear vision testing, light off when far vision testing.
- (3) Corneal aligning windows: The position of patient's cornea can be observed through the window.
- (4) Forehead rest adjust knob: Moves the forehead rest forward and backward in order to adjust the VD.
- (5) Near-point rod holder: the near_point rod is inserted and attached here.
- (6) Near_point rod clamp screw.....Fix the near-point rod.
- (7) spirit level..... Used to confirm that the refractor head.
- (8) Leveling knob.....Adjust the level of the refractor head.
- (9) Forehead rest magnet.....Fix the face shield.
- (10) forehead restThe patient's forehead rests here when test.
- (11) Cornea alignment scale.....Measures the VD.
- (12) Face shield(2sets)..... Attached to the instrument to put the patient's face in place, use one while the other is being sterilized
- (13) Dust cover..... Covers and protects the instrument body from Dust and dirt during storage.



(14) Forehead rest (2 sets)The patient's forehead rests here.

Detachable by a touch use one while the other is being sterilized
 (15) Near-point rod.....The card holder is attached at the near point examination

(16) Card holder.....The near-point card is attached

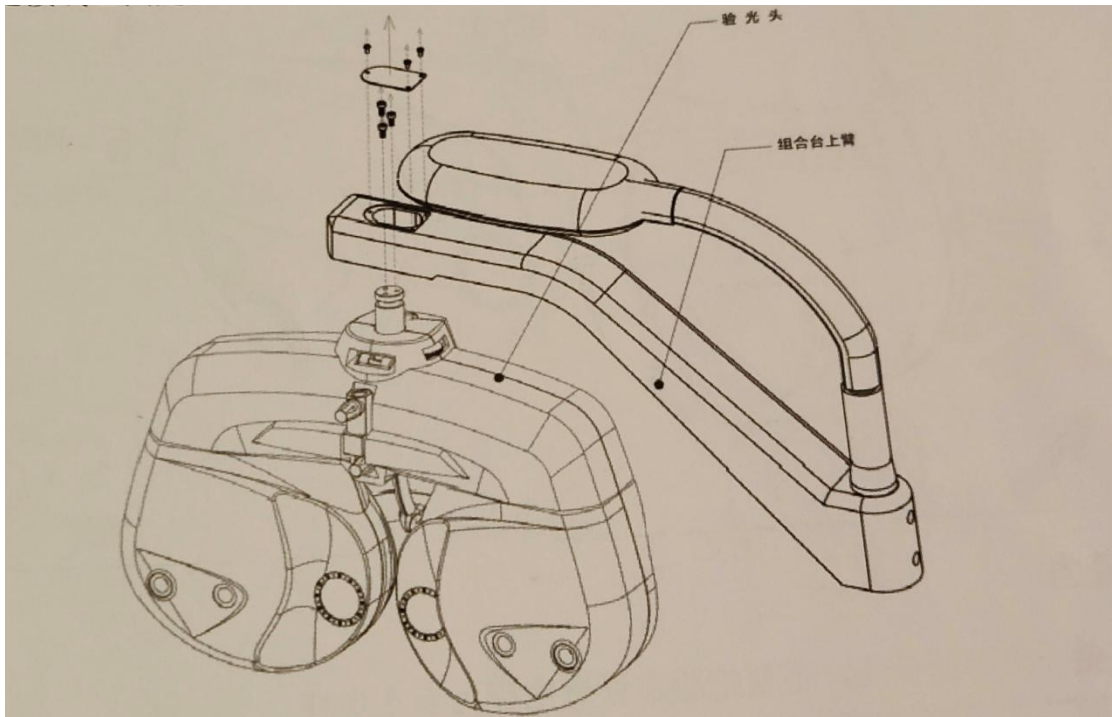
(17) Operator's manual.....Describes instructions about handling the instrument

(18) Near-point card.....Contains the near-point charts, for testing the near vision

(19) Dust cover.....used for dust prevention of instruments during storage

5. Ready use

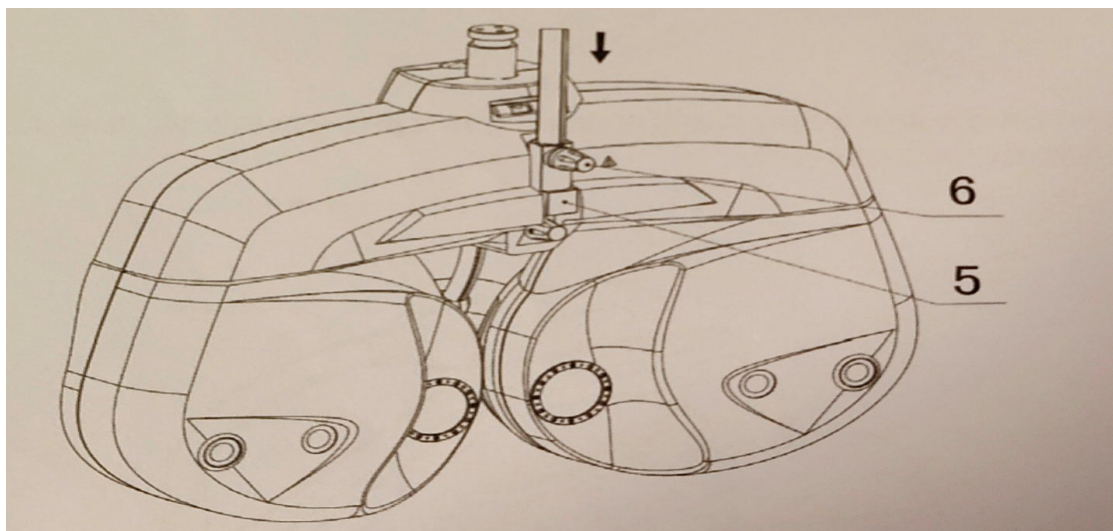
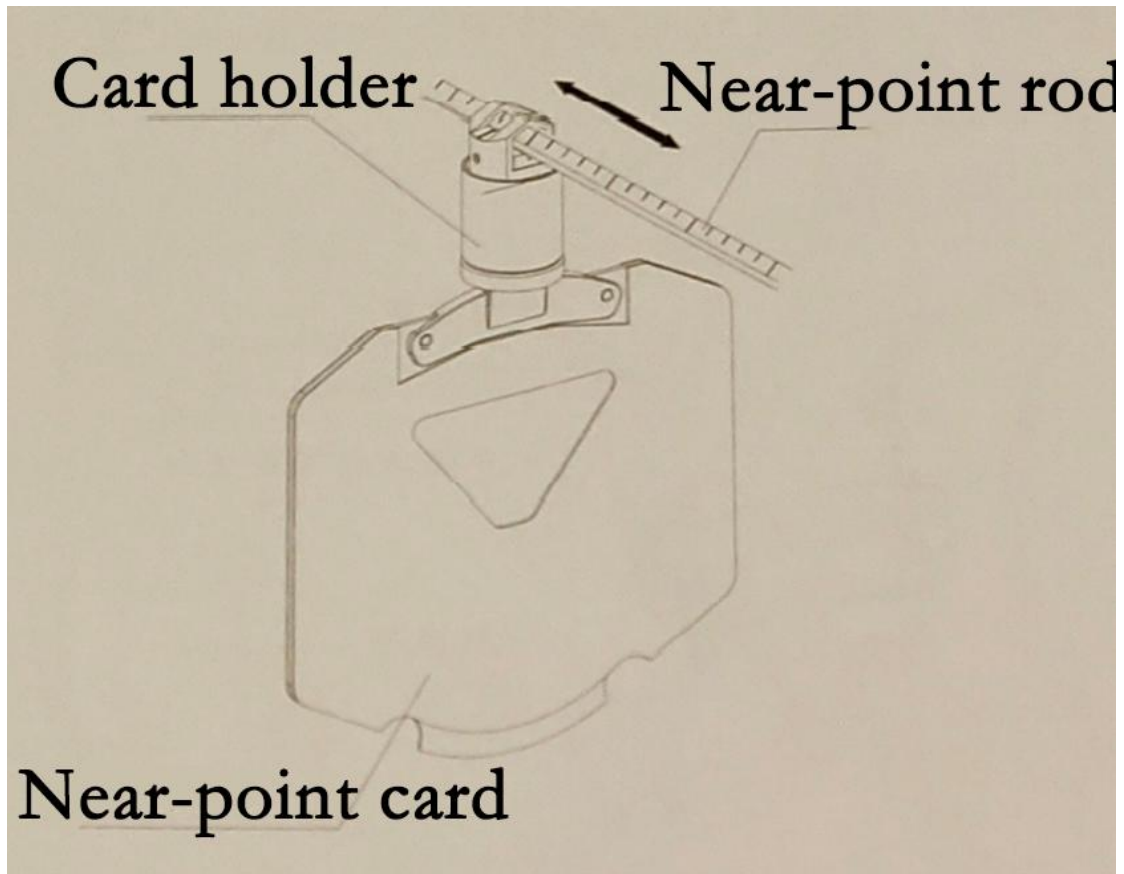
4.1 Setup connection of the device.



It shall be installed by professional personnel of the company or personnel trained and authorized by the company

It shall be used together with other supports or other combination tables, and the connectors provided by the company shall be equipped during installation. As shown in the figure, it is fixed on the support or other combined arms. After the main engine is connected, adjust the horizontal adjustment knob to adjust the main engine to maintain its level. The forehead support is facing the patient.

Installation of near vision chart



Before using the instrument, the supporting rod of the visual acuity chart, the clamp seat of the near visual acuity chart and the near visual acuity chart shall be installed first

Insert the near vision chart holder into the top of the support rod. The clamp seat shall be able to slide with the extension rod.

Tablet application interface and function introduction

Main interface: operation program the main interface is divided into three parts: optometer operation and data display area, LCD visual acuity chart operation area and system status and menu area. The layout of the main interface and the distribution of the above three parts in the main interface are shown in the figure.



Optometer operation and data display area

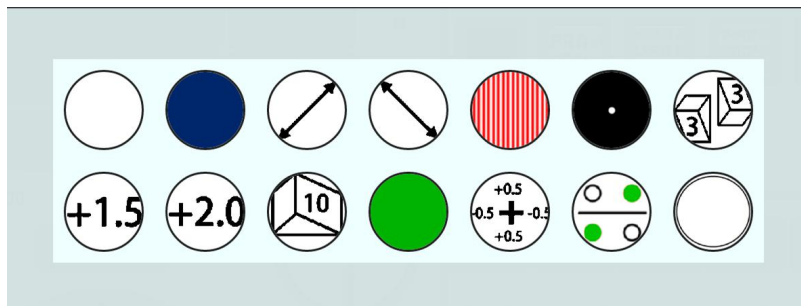
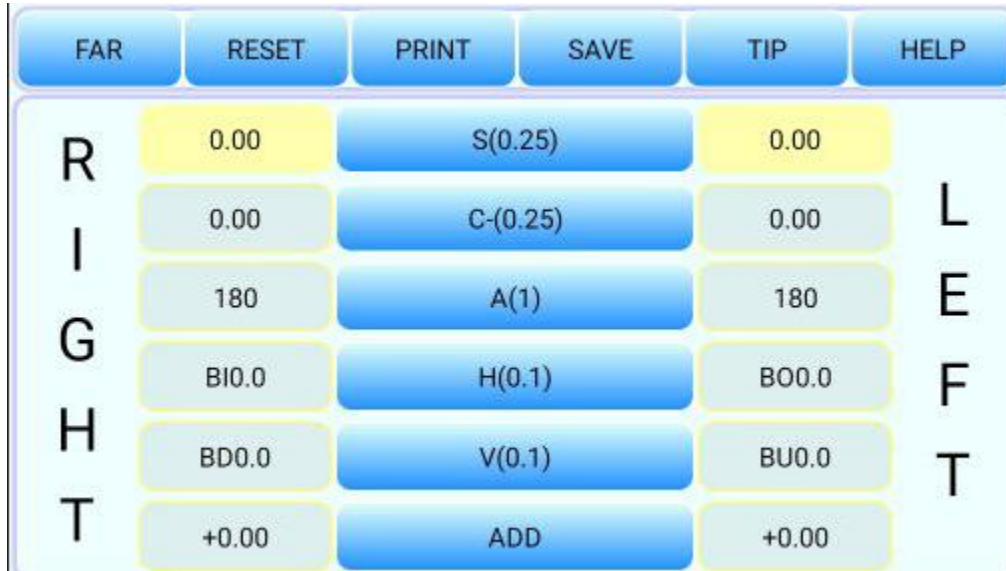
The optometer operation and data display area are shown in the figure below.



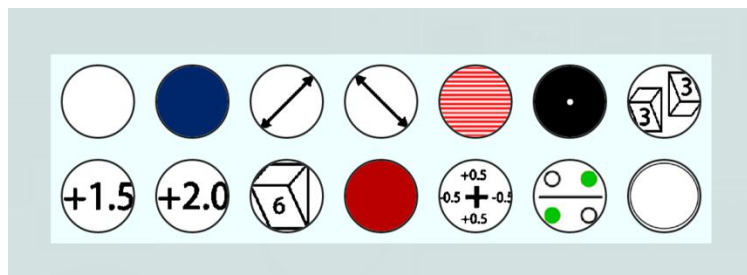
The data display area of the optometer mainly has two functions.

1. Display of lens parameters of optometer
2. Realize the selection of project status and parameters of refractometer

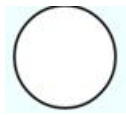
The detailed block of the optometer is shown in the figure below:



Left eye auxiliary lens selection interface



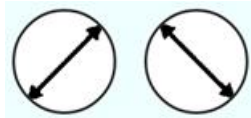
Right eye auxiliary lens selection interface



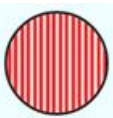
Open aperture



Shading plate



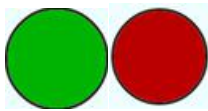
Linear polarizer



Vertical Markov rod



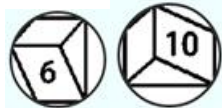
Horizontal Markov rod



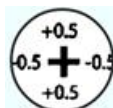
Left eye green filter right eye red filter



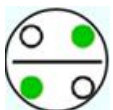
Pinhole plate



Left eye 10 Δ prism right eye 6 Δ prism



Fixed cross column lens



Crossed column mirror



Circular polarizer

Instrument operation

Fog inspection

1. The spherical mirror degree of the right eye is manually set at a place + 3.00d higher than the approximate degree, because the

customer's current right eye degree is $-1.00d$, which becomes $+ 2.00d$ after adding $+ 3.00$

2、 At this time, the visual acuity value should be lower than 0.1. Manually project a visual acuity icon, and then gradually adjust the degree to reduce the spherical lens degree by 0.25D, from $+ 200D$ to $+ 1.76d$, and then to $+ 500$ until his visual acuity value is about 0.5.

3、 Call up the radiation vision chart radiation vision chart and ask the customer "do you have any lines that look particularly clear? If the customer answers "all look the same", it means that there is no astigmatism. After the measurement, if the customer answers "one line looks particularly clear", multiply 30° by the small number of the line that looks the most clear. This value is a negative correction value. For example, if the third line looks clear, it is $3 \times 30^\circ = 90^\circ$

4、 Adjust the astigmatism axis, adjust the astigmatism, transfer from 0 to -0.25 , and then adjust to -0.50 until every line is clear.

5、 Change the ball mirror in gear 1 of 0.25D.

The customer has myopia, and the spherical lens degree is $-1.75d$. After general inspection, his degree is shown in the figure below.

Accurately check the astigmatism axis position and degree

one Manually select the point group sight mark, and the cross cylindrical mirror is automatically applied to the right eye; Or cross the cylindrical lens from the auxiliary lens, with a single line of sight, or press M1 or M2 directly into the cross column mirror. Automatically jump to a, and first accurately measure the astigmatism axis position.

two Precise astigmatism axis position: press M1 or m2 to exchange both sides of the cross column mirror, so that the customer can distinguish which side to see more clearly under the payment request. If M1 is clearer, it is allowed to press the plus button above the button. If M2 is clearer, it is necessary to press the minus button above the button, and the equipment will automatically change the astigmatism axis position. After pressing, repeat the above steps by pressing M1 and M2 until they think that the clarity of both sides is almost the same, and then the accurate astigmatism can be obtained.

three Accurate astigmatism degree: after accurate astigmatism axis position, press C (-) to accurately calculate the astigmatism degree (keep the right cross column mirror state). Press M1 or m2 to change both sides of the cross column mirror, so that the customer can distinguish which side he sees more clearly. If M1 is clearer, press the plus button above the button. If M2 is clearer, press the minus button above the button, The device automatically changes the astigmatism. After pressing, repeat the above steps by pressing M1 and M2 until they think that the clarity of both sides is almost the

same, and then the accurate astigmatism can be obtained. When the astigmatism degree is changed, the equipment can automatically carry out ball column linkage, that is, the column mirror is changed to $\pm 0.50dc$, the ball mirror is automatically changed to $\pm 0.25ds$, and the result is: $-0.50dc \times 100^\circ$

four After the accurate measurement of astigmatism axis position and astigmatism degree is completed, it will be removed automatically according to any visual acuity charts (0.25) cross cylindrical mirror

Accurately measure whether there is any deviation in the sphericity

(red and green test is used in this method. If the red and green test is not applicable to any customer, whether there is deviation can be

determined directly according to the visual acuity)



Project red and green icons and ask the customer which word in the red and green picture can be seen more clearly. The customer says that the green is slightly clearer, which means that myopia is over corrected, so the spherical mirror degree is increased, $+0.25D$. Or press the Add button directly, and the equipment will automatically complete the increase, and then ask the customer. His answer in red is a little clearer, which means that myopia is not corrected, increase $-0.25d$, or press the decrease button directly, and the equipment will automatically complete the decrease. It indicates that the degree of the customer should be between $-1.50d$ and $-1.75d$, and whether it is high or low should be selected according to the requirements and purpose of the customer's glasses. The screen displays.