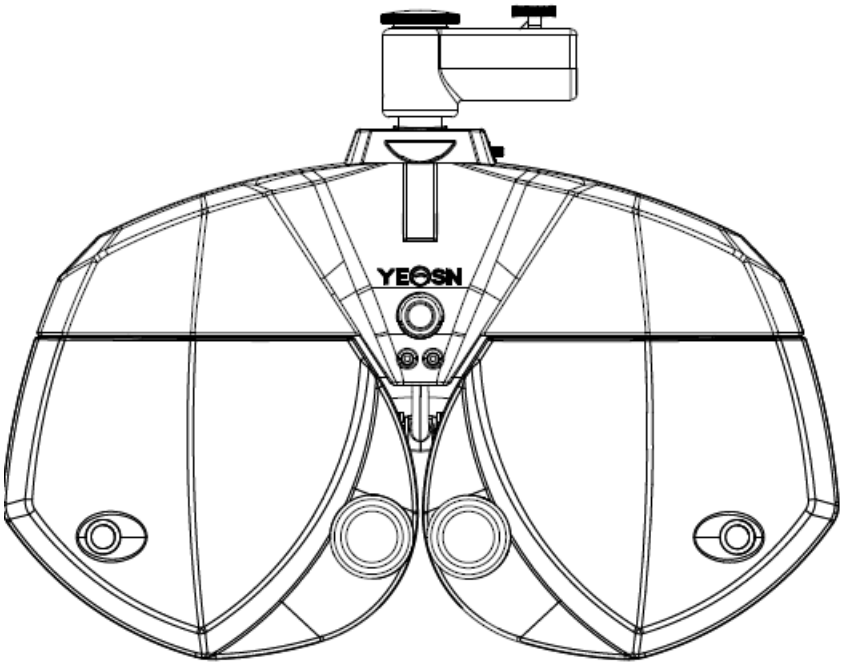
YPA-2100

DIGITAL REFRACTOR

User Manual



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Preface

Thank you for purchasing and using our digital refractor.

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!

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1. Specifications

1.1 Measurement range

The measuring range conforms to the requirements in Table 1.

Table 1 Vision tester measurement range

Item	Measuring range
Spherical power	-29.00D~+26.75D, Step size: 0.12D, 0.25D, 1D
Cylindrical power	－8.75D～＋8.75D, Step size: 0.25D, 1D
Cylindrical axis	0~180°, Step size: 1°, 5°
Prismatic power	0~20△, Step size: 0.1△, 0.5△
Prism base	0~360°, Step size: 1°, 5°. Prim base can be marked horizontally or vertically.

1.2 Host

1.2.1 Assistant lens

a. Automatic crisscross cylinder: automatic crisscross cylinder ±0.25D and ±0.50D, one at left, one at right (the axle is self-rotatory);

b. Fixed crisscross cylinder: fixed crisscross cylinder ±0.50D, one at left, one at right (the axle is fixed at 90°)

c. Pinhole plate: hole diameter 1mm, one at left, one at right;

d. ross plate: used when setting pupil distance, one at left, one at right;

e. Red and green optical filter: one is red optical filter (right) and one is green optical filter (left);

f. Inear polarized optical filter: one at 135° right and one at 45° left

One at 135° right/sphere 0.125D, one at 45° left/sphere 0.125D;

g.Circular polarized optical filter: two at left, two at right, one includes sphere 0.125D;

h. Maddox rod lens: right eye: red, horizontally, left eye: white, vertically;

i. Sphere for retinoscopy: +1.5D and +2.0D, one at left, one at right;

j. Decomposing prism: right eye: 6△BU, right eye: 10△BI

k. Single-slit lens: used for quick astigmatism test, one at left and one at right.

1.2.2 Adjustment range

1）Adjustment range of pupil distance: 48mm~82mm

2）Forehead base can be adjusted continuously; the adjustment range should reach at least 14mm;

3）Adjustable range of near vision optometry distance: 150mm~400mm;

4）Corneal vertex marking: 12mm, 13.75mm, 16mm, 18mm and 20mm;

5）Horizontal adjustment: ±2.5°.

1.3 Power parameters

Input voltage	AC 110V~220V(±10%)
Input frequency	50/60 Hz
Input power	70 VA

1.4 Dimensions

1)	Host	400mm (L) × 92mm (W) × 275mm (H)
2)	Printing base	200mm (L) × 200mm (W) × 80mm (H)

1.5 Weight

1)	Host	about 3.9kg
2)	Printing base	about 0.6kg

* The design and specifications are subject to changes due to technical updates without additional notice.

2. Safety Precautions

Please read the following matters needing attention carefully in case of 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 fever and dusty environment;

●Do not use the device near water; also be careful not to make any kinds of liquid drop onto the device. Do not place the device in damp or dusty places, or places where humidity and temperature change quickly;

●Make sure the device host is stably and reliably installed before using it; fall of the device host

may cause personal injury or device failure;

●Dedicated power adaptor configured for the device should be used: model MDS-060AAS15 B, Input 100V- 250V～1.5-0.75A 50Hz, Output 15V 4.0A.

●Make sure the input voltage is consistent with rated input voltage and the electric wire is correctly connected and well grounded;

●Do not use multi-pin socket or extend the power line to insert the plug of the device into power socket;

●Unplug power line and cut off power supply line especially under emergency circumstances; hold the power plug to pull out it from the socket rather than pulling the power cord;

●Do not touch the power line with wet hands. Check the power line and do not allow the power cord to be stamped, pressed by heavy objects or knotted;

●Power line damage may cause fire or electric shock. Please check it regularly;

●Before testing each patient, clean the contacting part with ethanol for disinfection;

●Cut off power and put on dust cover when not using it;

●Do not dismantle or touch the interior parts of the device, otherwise it may cause electric shock or device failure;

●The device has passed electromagnetic compatibility test, which is in accordance with YY 0505－2012 standard. Follow below instructions related to EMC (electromagnetic compatibility) when mounting and using the device:

- Do not use the device with other electronic devices to avoid electromagnetic disturbance;
- Do not use the device nearby other electric devices to avoid electromagnetic disturbance;
- Do not use a power adaptor that is not configured with the device, otherwise it may increase the
- electromagnetic emission measure, which may reduce the capacity of resisting disturbance.

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.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

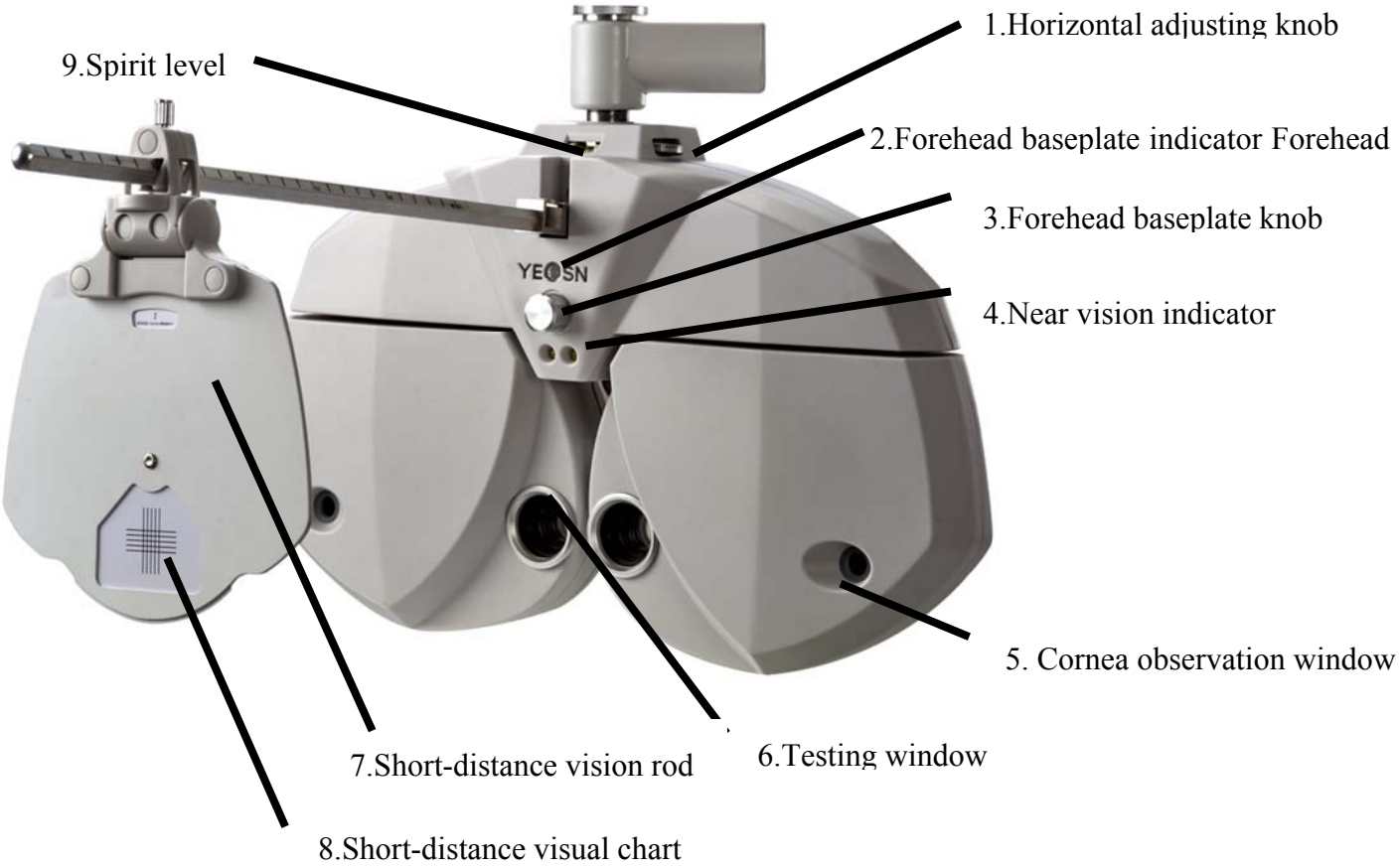
End user must follow the specific operating instructions for satisfying RF exposure compliance.

The portable device is designed to meet the requirements for exposure to radio waves established by the Federal Communications Commission (USA). These requirements set a SAR limit of 1.6 W/kg averaged over one gram of tissue. The highest SAR value reported under this standard during product certification for use when properly worn on the body

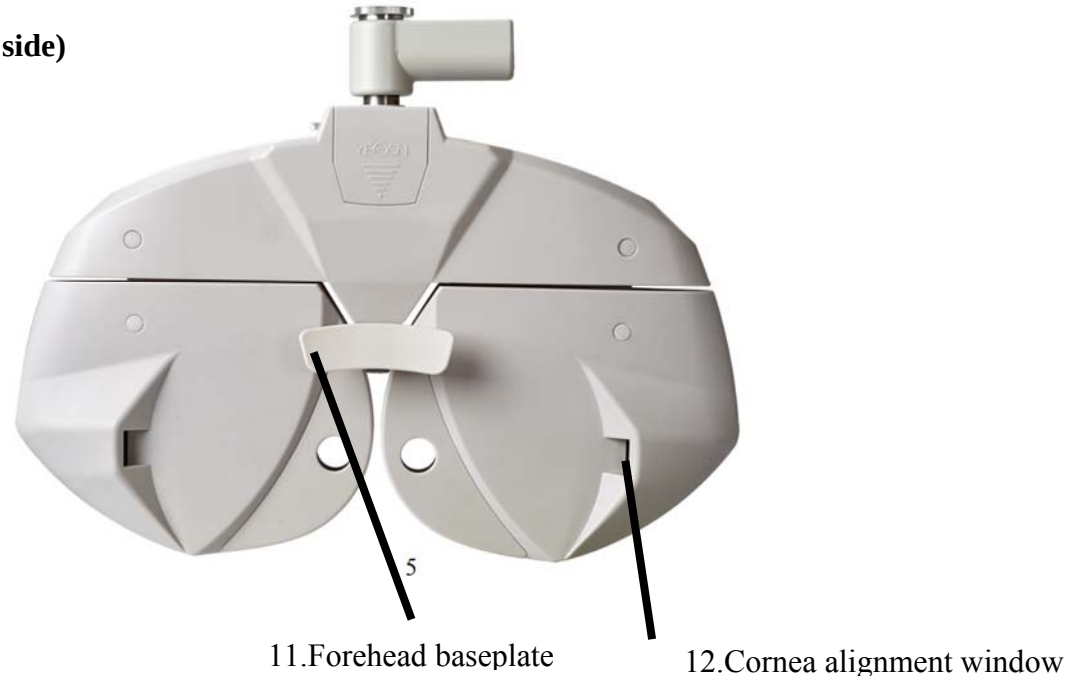
3. Main Structure

3.1 Host

Front side (tester side)



Back side (testee side)



1.Horizont 10.Nose baseplate

Adjust the horizontal level of the vision tester.

2.Forehead baseplate indicator

Make sure the forehead of the testee contact the baseplate. The indicator is always on when the forehead doesn't contact the baseplate; the indicator is off when the forehead contacts the baseplate.

3.Forehead baseplate knob

Adjust the distance of the testee's corneal vertex

4.Near vision indicator

Light up short-distance visual chart during short-distance test.

5.Cornea observation window

⚠ Observation distance should be 200mm-250mm。The window through which to observe and confirm the distance of the tester's corneal vertex.

6.Testing window

Light aperture for testing.

7.Short-distance vision rod

Install and support the short-distance visual chart.

8.Short-distance visual chart

For testing short-distance vision.

9.Spirit level

Confirm the horizontal location of the vision tester. Rotate the horizontal adjusting knob to keep the air bubble in the spirit level in the middle.

10.Nose baseplate

The nose or face of the testee may contact the nose baseplate during vision test. Clean this part before every time of vision test.

11.Forehead baseplate

The forehead of the testee may contact the forehead baseplate during vision test. Clean this part before every time of vision test.

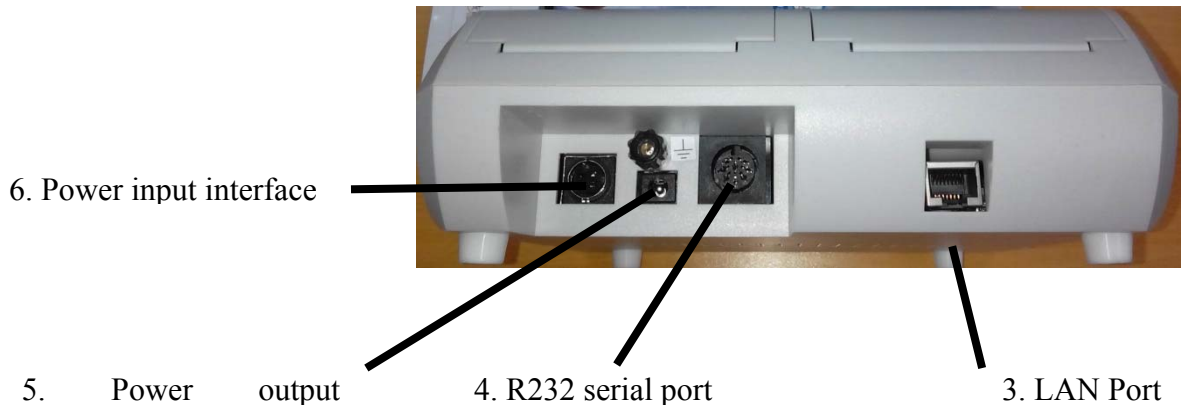
12.Cornea aiming window

Shows the alignment position of the testee's corneal vertex.

3.2 Printing base

Front

Back



1.Power switch

Turn on power switch; power indicator is lit up.

2.Printing bin

Install printing papers.

3.LAN Port

Connect to LAN (preserved port).

4.R232 serial port

Connect to lens meter LM, computer vision tester RK and PC (preserved port).

5.Power output interface

Connect to the power input interface of the host.

6.Power input interface

Connect to the output interface of the power adapter.

4. Installation Method

4.1 Part List

Digital refractor 1Set

Printing bin 1Pcs

Near Vision Chart 1Pcs

Near Vision Rod 1Pcs

Power adaptor 1Pcs

Dust cover 1Pcs

Blowing balloon with brush 1Pcs

Printing paper 2Rolls

Power Cord 1Pcs

DC power cord 1Pcs

Hex wrench (2.0mm) 1Pcs

Hex wrench (2.5mm) 1Pcs

Hex wrench (3mm) 1Pcs

Stainless steel flat head set screw(M6*8) 2Pcs

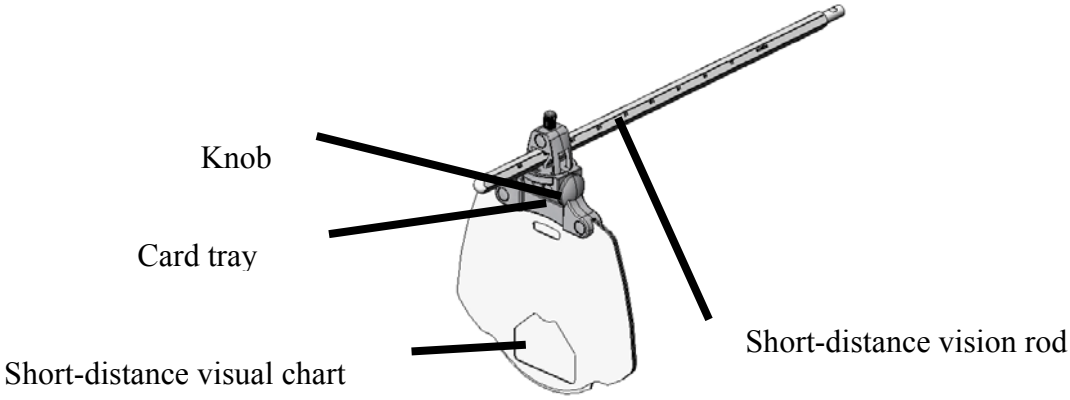
4.2 Installation Instructions

4.2.1 Install the device onto the compound table

Take out 3 Pcs Stainless steel flat head set screw((M6*8)), and then please refer to compound table manual.

4.2.2 Install short-distance visual chart

Insert the card tray of the visual chart into the short-distance vision rod and screw the knob tight. The card tray can slide on the rod and rotate 360°.



4.2.3 Install short-distance vision rod.

Insert the vision rod into the installation hole in the vision tester host and screw the knob.

Attention during installation: align the flute on the vision rod at the knob and keep the end of the vision rod close to the end of the installation hole in the vision tester host.

4.2.4 Horizontal adjustment after installation

Rotate the horizontal adjusting knob until the air bubble in the spirit level in the middle.

4.2.5 Install printing paper

Please refer to “Replace printing paper” (see 8.1).

4.2.6 Router settings

Follow the setup guide provided by the router supplier to enter the router setup screen. Router parameters are set as follows:

1)LAN IP ADDRESS: 192.168.1.253

2) Router working mode: Access Point mode (AP)

3)SSID：yeasn_xxxxxx (xxxxxx is consistent with the nameplate serial number)

4)WPA-PSK/WPA2-PSK PSK password：yeasn2002

5)After the setting is completed, click the "Reboot Router" button on the setting interface

4.2.7 Install APP

1) Please contact the dealer to download the dedicated APP

2) Install the APP pad recommendation: Samsung and Huawei 10-inch Android pad.

If you use other pad, fonts and images may be mismatched.

3) Connect the tablet WIFI to the router with "SSID: yeasn_xxxxxx".

4) The first time you open the app, you are prompted to enter the SSID number. The SSID number is: yeasn_xxxxxx.

5. Directions for Use

5.1 Device Startup and Shutdown

5.1.1 Device startup

1）Insert the power plug into the socket.

The power adaptor configured with the device is three-pin plug, please select suitable power socket.

Note: please use dedicated power line configured with the device.

2）Start up the host first: press the power switch on the printing base, the power indicator is on.

3）After the host is initialized, start up the compound laptop and open the operation interface.

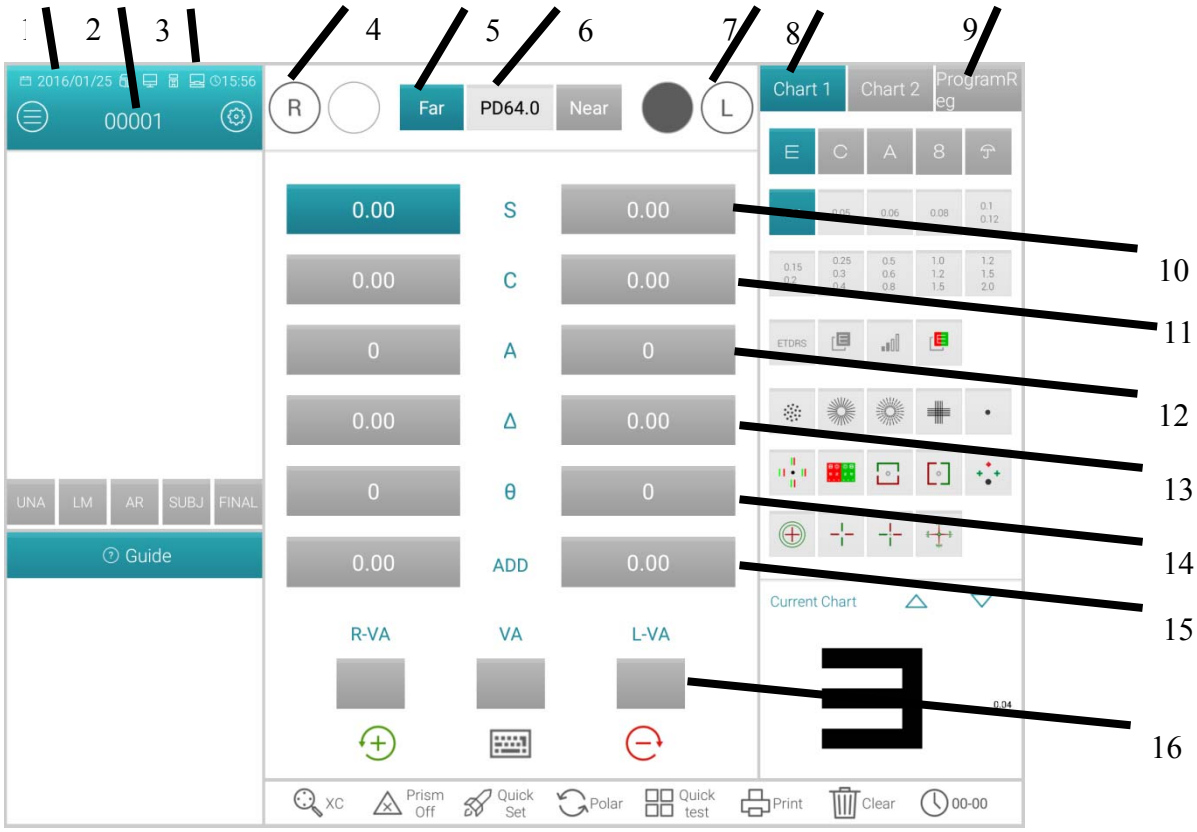
5.1.2 Device shutdown

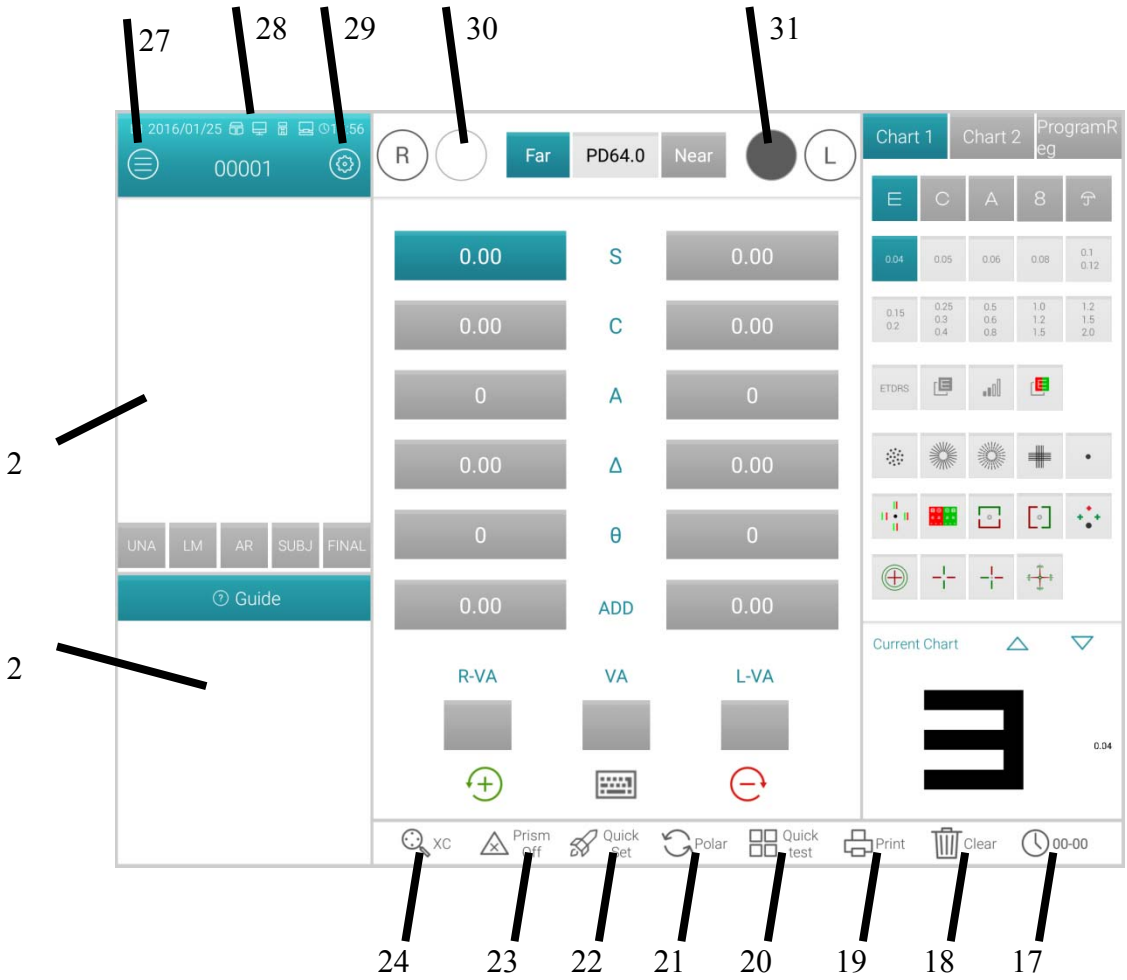
1）Press the power swtich on the printing base to turn off the device, the power indicator is off.

2）Put the dust cover on the host.

5.2 Operation Interface

5.2.1 Main interface





1. Date

2. Test number

3. Time

4.R

Right testing window, input right eye data and select right eye as the dominant eye.

5. Measurement mode

LD: Long-distance mode, SD: short-distance mode. Press “LD” or “SD” to shift between long-distance mode and short-distance mode.

6. PD

Press this key to display left pupil distance, right pupil distance and binocular pupil distance.

7.L

Left testing window, input left eye data and select left eye as the dominant eye.

8. Sighting mark area

Select and display sighting marks.

9. Procedure

Display current procedure.

10.S

Spherical power input window

Press S input window aside R to input the spherical power of right eye; press S input window aside L to input the spherical power of left eye.

11.C

Cylindrical power input window

Press C input window aside R to input the cylindrical power of right eye; press C input window aside L to input the cylindrical power of left eye.

12.A

Cylindrical axis input window

Press A input window aside R to input the cylindrical axis of right eye; press A input window aside L to input the cylindrical axis of left eye.

13.△

Prismatic power input window

Press △ input window aside R to input the prismatic axis of right eye; press △ input window aside L to input the prismatic axis of left eye.

14. Prism base input window

Press input window aside R to input the prism base of right eye; press input window aside L to input the prism base of left eye.

15.ADD

Additional power input window

Press ADD input window aside R to input the additional power of right eye; press ADD input window aside L to input the additional power of left eye.

16.VA

VA Input box

17. Operation time

Display the time spent from beginning to the end.

18. Del: data deletion

Delete displaying data

19. Print: Printing is enabled when UNA, LM, AR, SUBJ or FINAL state requires measurement data.

20. Quick test

Under non-prism mode, click this key to do near vision test.

Under prism mode, click this key to do near vision test and also converge and diverge test.

21. Polar coordinate: prismatic power mode key

Press this key to shift prismatic power between △/(polar coordinate model) and X/Y (rectangular coordinate model).

22. Quick Set

Click this key to quickly set spherical lens step, cylinder axis step and cylinder axis angle

23. Cylinder shift-out/shift-in

Press this key to shift in and out cylinder.

24. Cross cylinder: crisscross cylinder

Press this key to call in crisscross cylinder and Shift among 0.25XC, 0.50XC and Slit Prism.

25. Wizard

Prompt operating information.

26. Current data.

Display current data.

27. Data Report

Click this key to check test data.

28.Peripheral device connectivity status

1) :Phoropter Head is connected

2) :LCD visual chart is connected

3) :LM is connected.

4) :Print Box is connected.

Remarks: All peripheral devices are connected automatically after powering on. If icons disappear, the peripheral devices are not well connected.

29. System Setting

Click this key to set system

30. Right auxiliary lenses

Click this key to popup the choice box related to right auxiliary lenses.

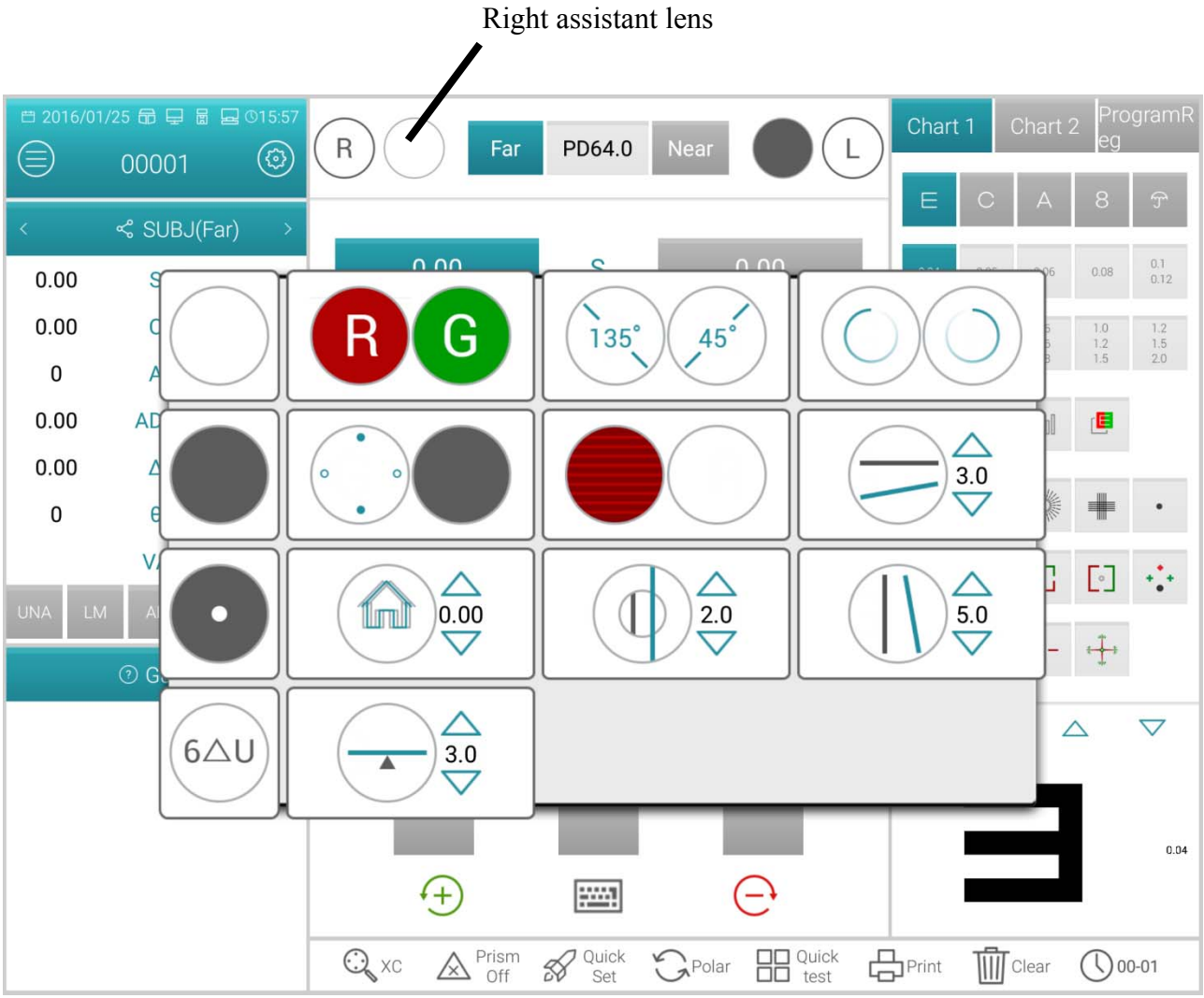
31. Left auxiliary disc lenses

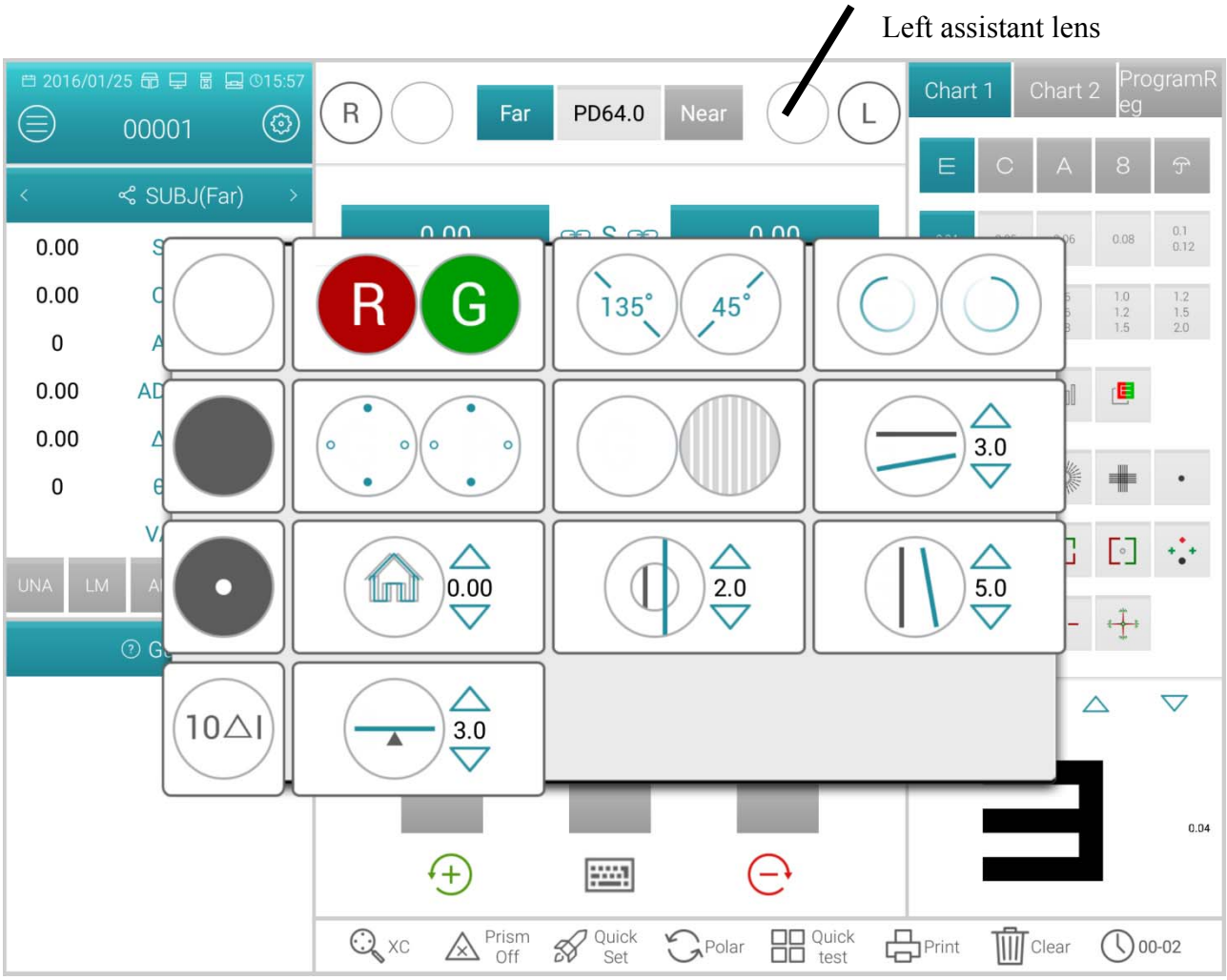
Click this key to popup the choice box related to left auxiliary lenses.

5.2.2 Assistant lens setup

1. Press “Assistant lens” key to display assistant lens interface.

2. Press corresponding keys in the interface to. The selected assistant lens will be called in the testing window and return to testing interface automatically.





Keys description:

Open testing window

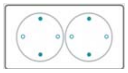
Baffle plate, shelter testing window

Pinhole plate (hole diameter 1mm)

Right eye: red optical filter, left eye: green optical filter

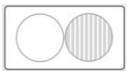
Right eye: 45° linear polarized optical filter, left eye: 135° linear polarized optical filter

Binocular: circular polarized optical filter



Right eye: fixed crisscross cylinder, left eye: fixed crisscross cylinder

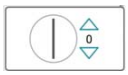
Right eye: horizontal Maddox rod, left eye: open testing window



Right eye: open testing window, left eye: vertical Maddox rod

Scieropia, press △ ▽ to change scieropia value.

Retinoscopy lens, 1.50D and 2.0D optional



Single-slit lens, press △ ▽ to change angle.

Binocular equilibrium prism, press △ ▽ to change prismatic power

Horizontal heterophoria prism, press △ ▽ to change prismatic power

Vertical heterophoria prism, press △ ▽ to change prismatic power

Right eye: 6△ base-upward prism

Left eye: 10△ base-inward prism

5.2.3 Pupil distance input

1. Press to display PD input interface, PD adjusting lens is called into the testing window.

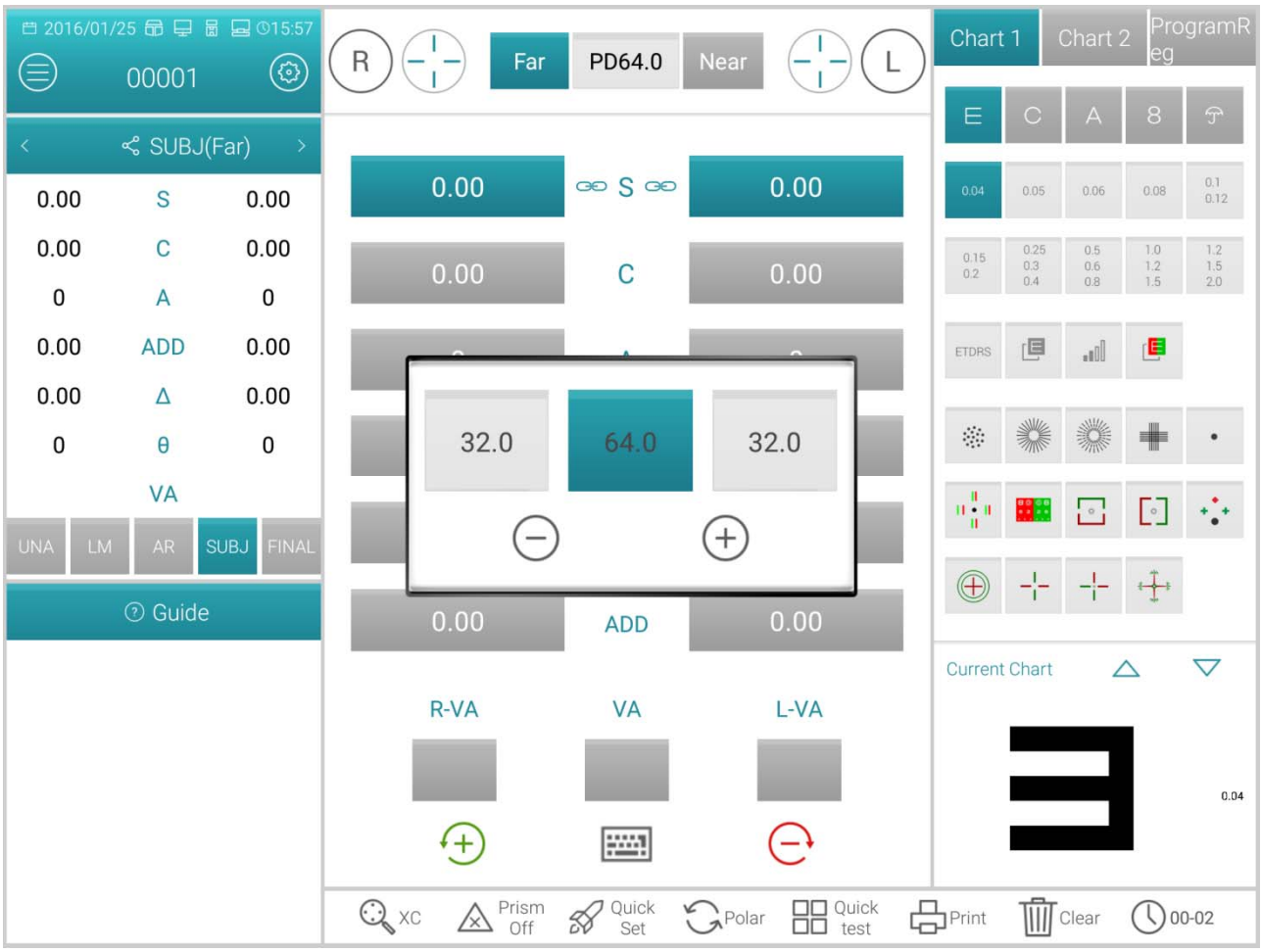
The factory default PD value is 64.0.

2. Click the data frame to be changed and input pupil distance.

Input left eye PD, binocular PD and right eye PD respectively.

Press “+” to enlarge PD, press “-” to reduce PD.

3. Press to exit PD input interface.



5.2.4 System parameter setup

1.Press to enter system parameter setup interface

2. Select needed parameter to change parameter setup.

3. When the setup is finished, press “exit” to return to testing interface.

Detailed parameters are set as follows:

AXIS step : 1°, 5°; Factory default: 5°

Set step size for cylindrical axis, selectable between 1°and 5°.

△step : 0.1△, 0.5△; Factory default: 0.5△

Set step size for prismatic power, selectable between 0.1△ and 0.5△.

△Angle step: 1°, 5°; Factory default: 5°

Set step size for prism base, selectable between 1°and 5°.

SPH step : 0.12D, 0.25D; Factory default: 0.25D

Set step size for small spherical power, selectable between 0.12D and 0.25D.

The default setup for big spherical power (1D or above) is 1D.

Slit step : 1°, 5°; Factory default: 5°

Set step size for single-slit axis, selectable between 1°and 5°.

△Display: X/Y and r/θ; Factory default: r/θ

Selectable between rectangular coordinate (X/Y) and polar coordinate (r/θ).

CYL Sign: + and -; Factory default: -

Set the input method of cylindrical power.

When “-” is set, negative cylindrical power can only be input; When “+” is set, positive cylindrical power can only be input.

XC Type: ±0.25D,±0.50D and Auto; Factory default: ±0.25D

Set the crisscross cylinder in the testing window, Shift among 0.25 XC, 0.50 XC and Slit Prism.

XC Auto Occlusion: on, off; factory default: on

Set this item “On” during crisscross cylinder test, the testing content changes according to cylindrical power value.

When the cylindrical power value C = 0, prompt message “skip crisscross cylinder test?” occurs:

“Yes” means, don’t carry out crisscross cylinder test;

“No” means, carry out crisscross cylinder test.

When the cylindrical power value C ≠ 0, carry out crisscross cylinder test in the organized sequence.

Set this item “Off”, carry out crisscross cylinder test in the organized sequence.

S.E.Fix(XC): on, off; factory default: on

Select if adjust spherical power value, so as to keep refraction spherical equivalency during crisscross cylindrical test.

S.E.Fix(CYL): on, off; factory default: on

Select if adjust spherical power value, so as to keep refraction spherical equivalency during crisscross cylindrical test.

Retinoscopy: +1.50D and +2.00D; factory default: +2.00D

Set spherical lens for retinoscopy.

N.V.illumination: on, Except Grid, off; factory default: on

If the short-distance indicator is automatically lit on when setting short-distance vision test.

Set it “On”: the short-distance indicator is automatically on during ADD testing mode and short-distance vision test

Except grid: the short-distance indicator is automatically on during ADD testing mode and short-distance vision test

But only when the cross-matrix sighting mark is used for near vision test, the short-distance indicator is off.

Set it “Off”: the short-distance indicator is not automatically on.

F → N Link: SPH, SPH+ADD; factory default: SPH+ADD

Set the spherical value shifting from long-distance mode to short-distance mode.

SPH: the spherical value in long-distance mode is used in short-distance mode.

SPH+ADD: the additional power is added to the spherical value in the long-distance mode.

ADD Estimation: on, off; factory default: on

Set if pre-add additional power according to the age of the patient during short-distance vision test.

Working Distance : 35cm and 40cm; factory default: 40cm

Set working distance.

Div&Con Test: on, off; factory default: on

Set if test the eyes' collecting capability.

Printing mode: all, except for AR; U.S.F, U, LM, AR, SUBJ and FINAL; factory default: all

Set data content to be printed

All: all data

Except for AR: all data except for AR;

U.S.F: uncased eye, subjective and final data.

LM: lens meter data and vision functional test data;

AR: auto refractometer data and vision functional test data;

SUBJ: subjective and vision functional test data;

FINAL: final data and vision functional test data.

Date Format: M/D/Y, D/M/Y, Y/M/D; factory default: M/D/Y

Set printing data format.

Clear data after print: on, off; factory default: off

Set if delete measuring data after printing.

Clear data: on, off; factory default: off

Set if prompt "Confirm delete" message when pressing "delete".

Set it "Yes" to avoid mistaken deletion of data when the "Delete" key is accidentally pressed.

CYL from LM: on, off; factory default: off

Import data from lens meter, set if automatically input prism data.

Fog:Balance :on, off; factory default: open

Set if automatic scieropia during vision test to keep the patient's vision to 1.0 from 0.7.

AR data: on, off; factory default: off

Set if automatically receive computer refractor data.

LM data: on, off; factory default: off

Set if automatically receive lens meter data.

Close link: on, off; factory default: off

Avoid shifting assistant lens or mode through a corresponding sighting mark during optometric test.

Operation time: on, off; factory default: on

Set if display test time.

Set it “on”, all time spent from beginning to the end of the test displays.

Set it “off”, operation time doesn’t display.

SUBJ Startup: AR, LM; factory default: AR

When inputting a set of AR or LM data, the vision tester automatically selects input data to carry out subjective optometry.

When inputting two sets of AR or LM data, the vision tester automatically selects input data.

AR: the vision tester automatically selects computer refractor data to carry out subjective optometry (priority option);

AR: the vision tester automatically selects computer lens meter measurement data to carry out subjective optometry.

5.3 Preparations before Use

1）Turn on power switch, the device is automatically initialized.

2）Confirm the device is leveled.

If the device is not leveled, rotate horizontal adjusting knob to keep the air bubble in the spirit level in the middle.

Start up the combined tablet computer used and open the operation interface.

4）Press to input the patient’s PD, call the PD adjusting lens in the testing window.

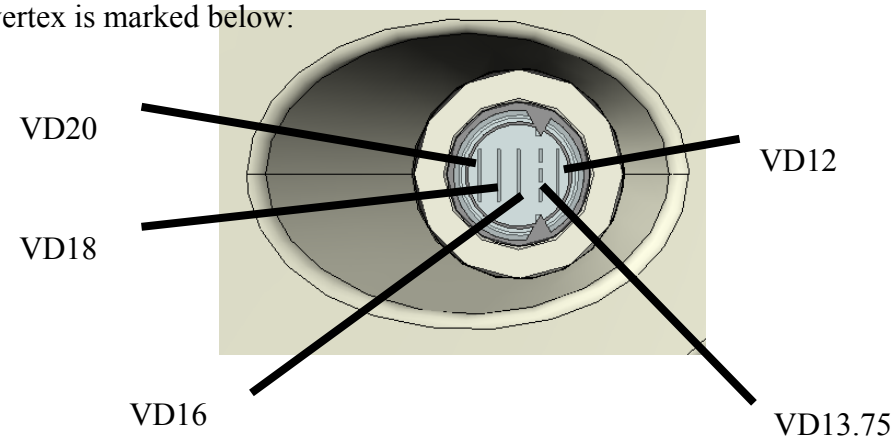
5）Keep the patient’s forehead on the baseplate, the indicator is off.

6）The tester can observe the testee’s eyes through testing window to make sure his eyes are in the center of the testing window.

7）Adjust corneal vertex distance (VD).

The tester can confirm the corneal vertex distance of the testee through cornea observation window. Rotate the forehead baseplate knob, adjust the corneal vertex of the testee to needed position.

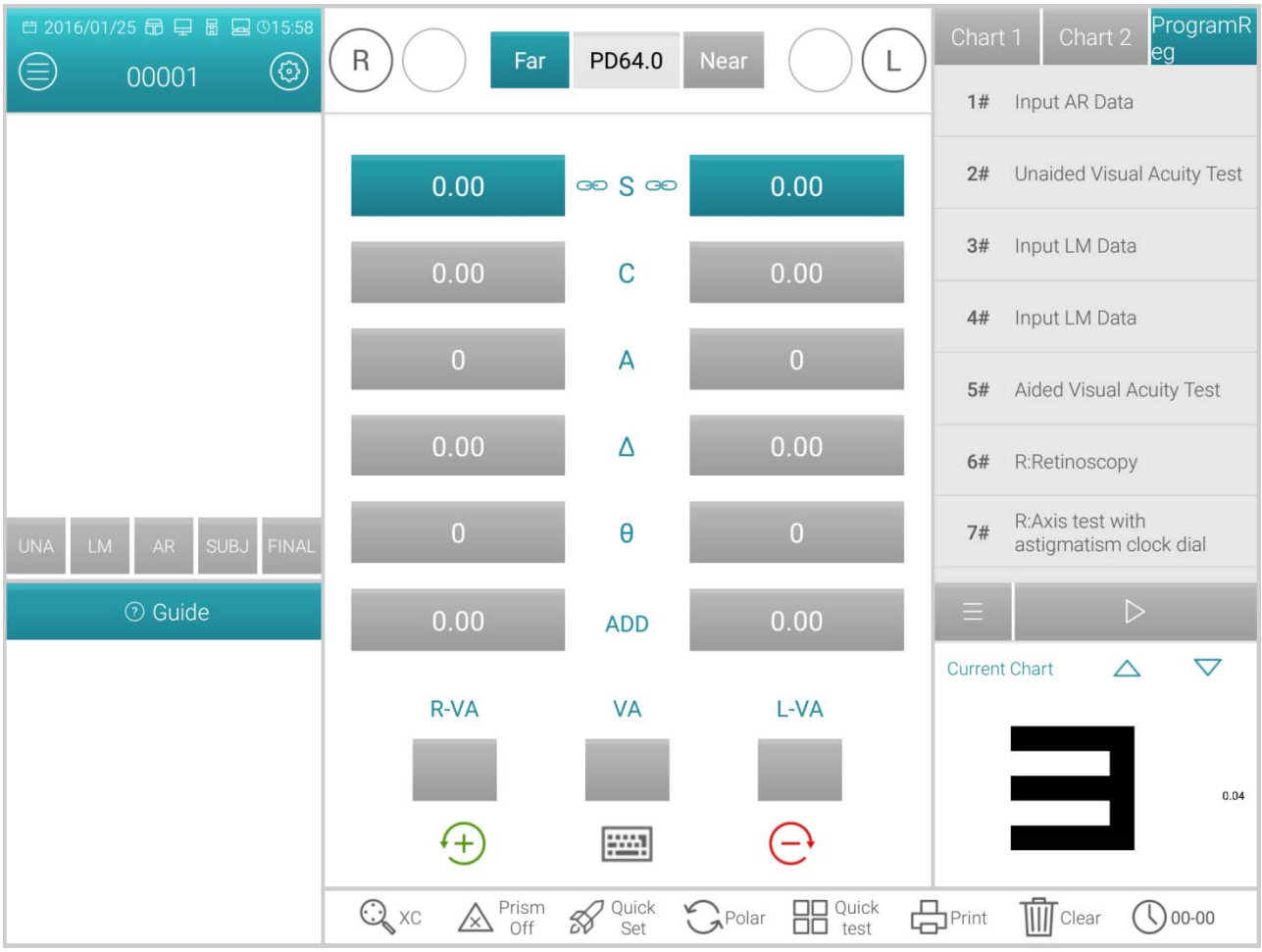
The corneal vertex is marked below:



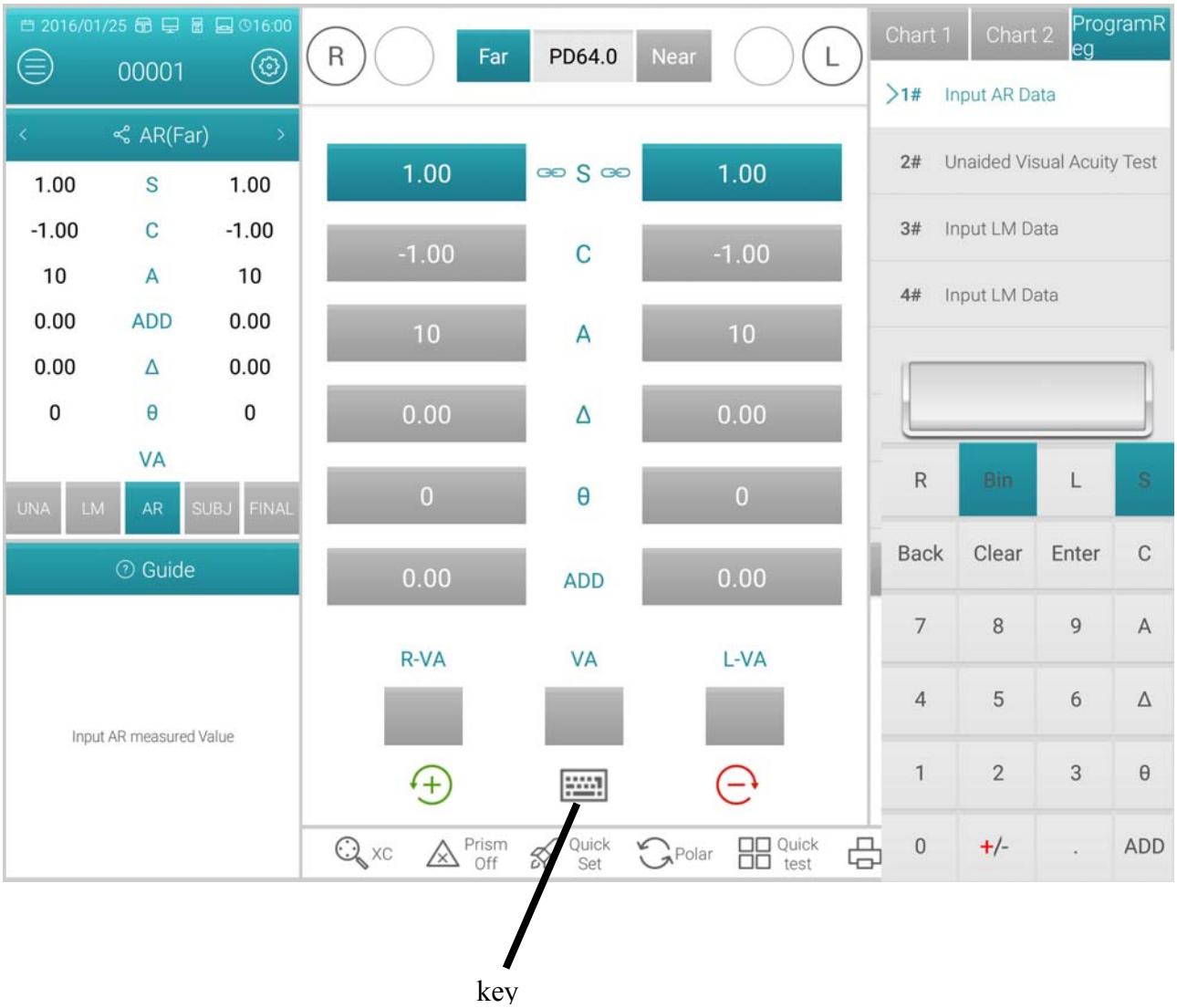
8）Press the PD adjusting lens exits the testing window.

5.4 Standard Optometry Procedure

Press “Program Reg”to start up standard optometry procedure .

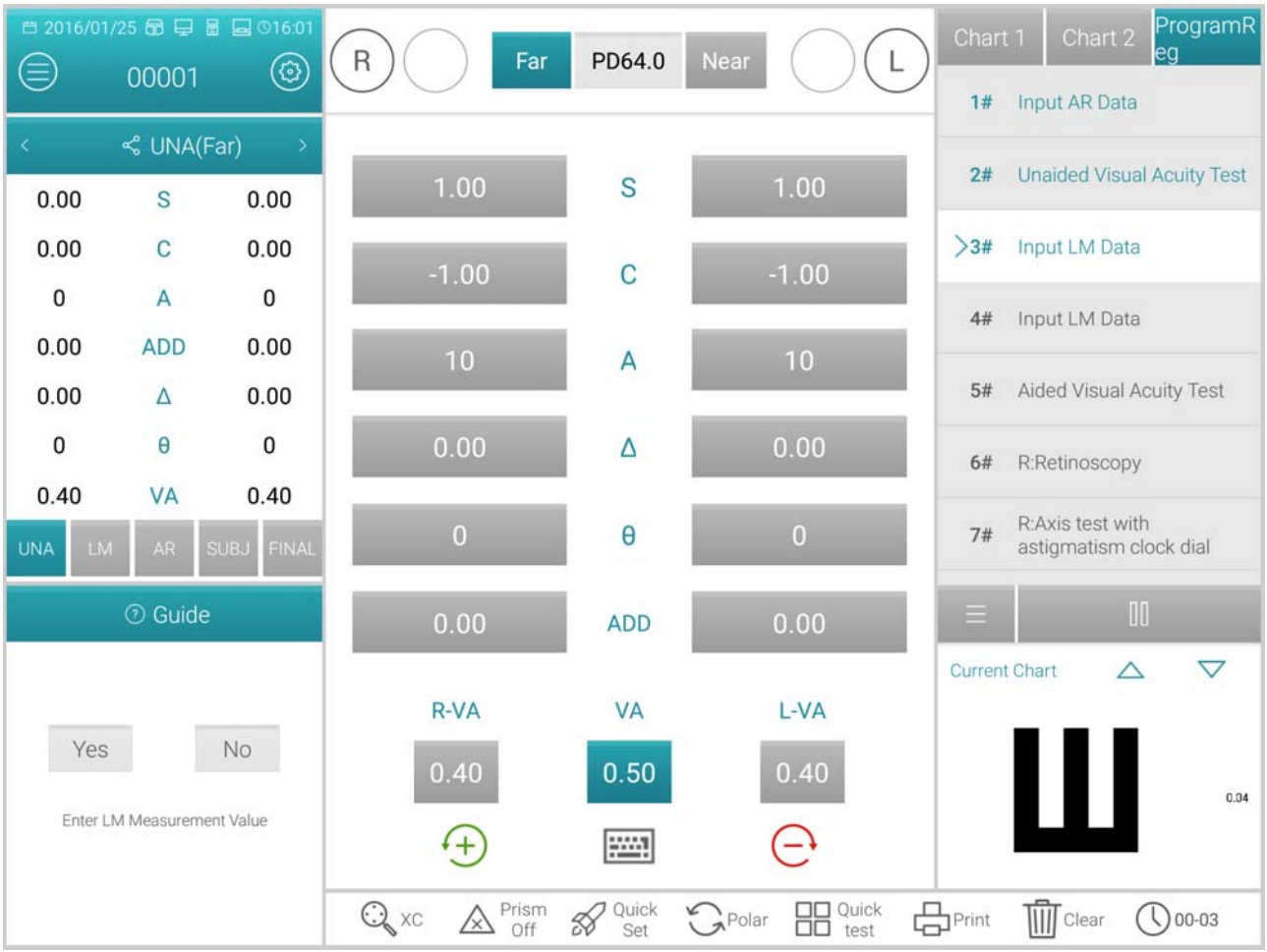


1. Press to input AR (computer refractor) measurement data:


2016/01/25
16:00
00001
AR(Far)
1.00 S 1.00
-1.00 C -1.00
10 A 10
0.00 ADD 0.00
0.00 Δ 0.00
0 θ 0
VA
UNA
LM
AR
SUBJ
FINAL
Guide
Input AR measured Value
R
Far
PD64.0
Near
L
1.00 S 1.00
-1.00 C -1.00
10 A 10
0.00 Δ 0.00
0 θ 0
0.00 ADD 0.00
R-VA
VA
L-VA
XC
Prism Off
Quick Set
Polar
Quick test
Chart 1
Chart 2
ProgramReg
1# Input AR Data
2# Unaided Visual Acuity Test
3# Input LM Data
4# Input LM Data
R
Bin
L
S
Back
Clear
Enter
C
7 8 9 A
4 5 6 Δ
1 2 3 θ
0 +/- . ADD

key

2. Press ▷ to test the uncased eye vision of the patient.



The lens degree tested by the vision tester host is automatically 0.

1）Right eye test

L testing window is baffled, test uncased right eye vision.

Call in visual chart to test the best right eye vision.

Input the tested right eye vision.

2）Left eye test

R testing window is baffled, test uncased left eye vision.

Call in visual chart to test the best left eye vision.

Input the tested left eye vision.

3）Binocular test

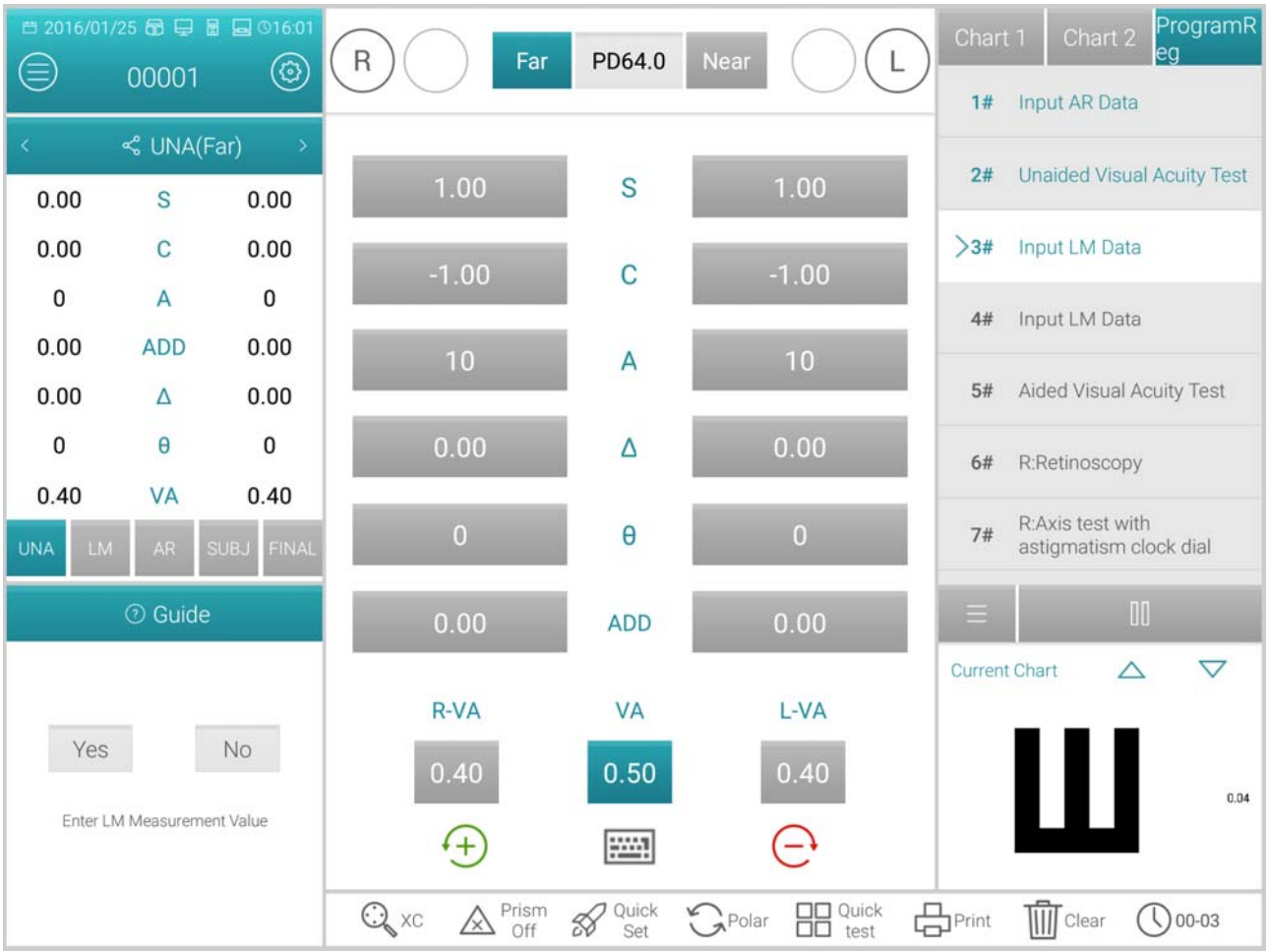
Open L and R testing windows, test the uncased binocular vision.

Call in visual chart to test the best binocular vision.

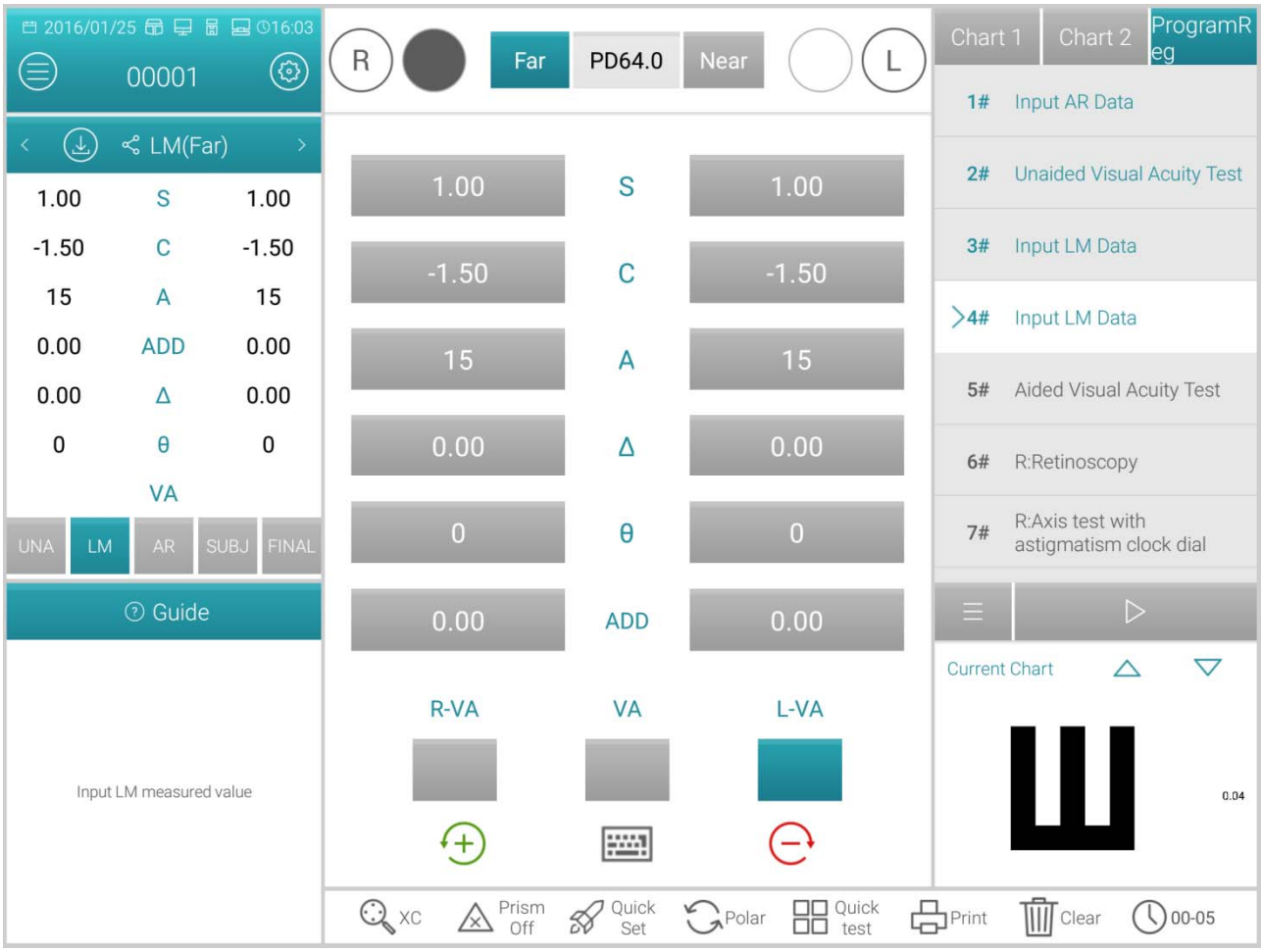
Input the tested binocular vision.

3. Press ▷ to select if input degree with glasses.

Select “No” to skip to step 6; select “Yes” to skip to step 4.

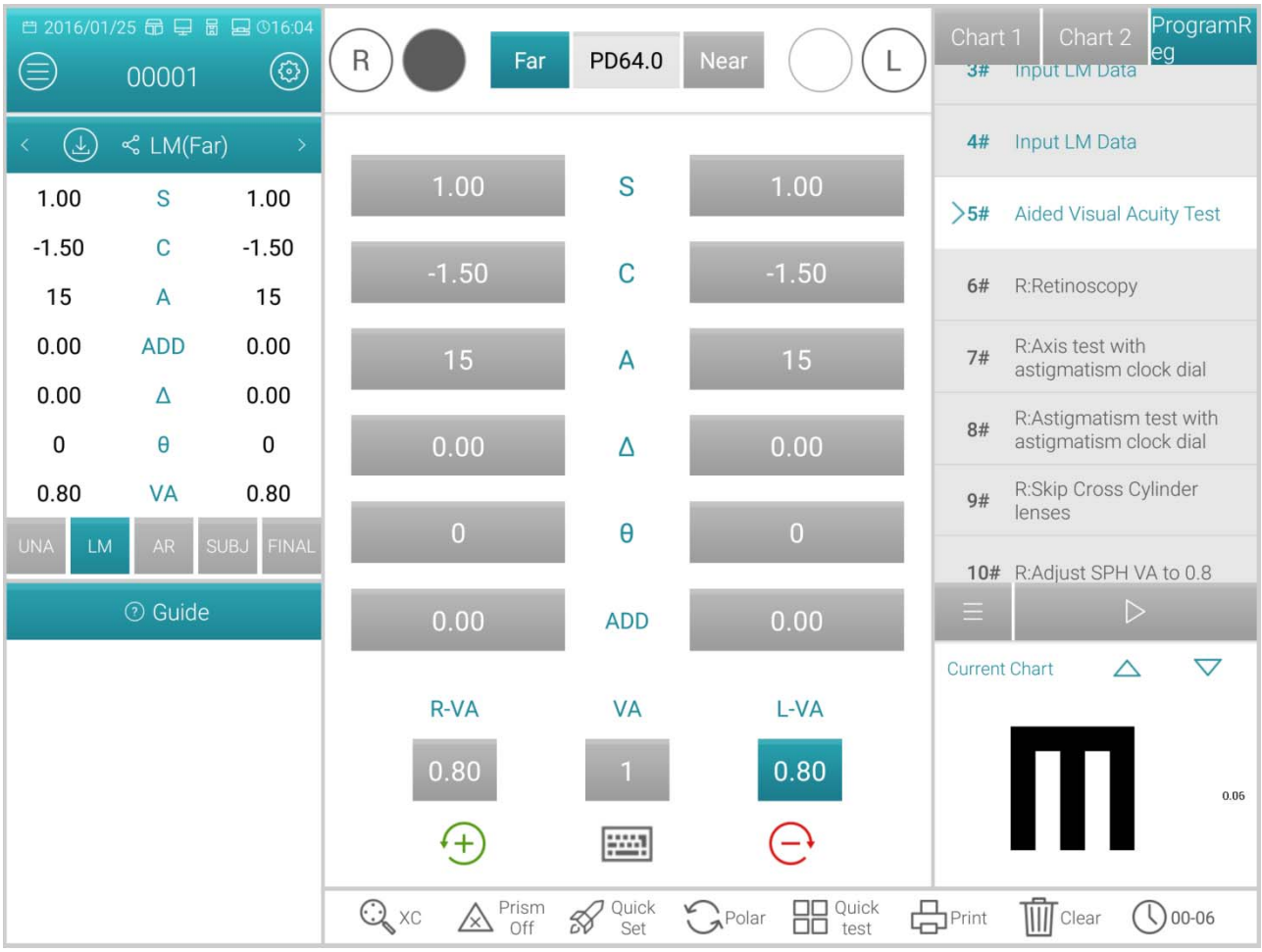


4. Press ▷ to input degree with glasses. Use LM to measure the degree of the glasses the patient wears and input measurement data.



5. Press ▷ to test the patient's vision with glasses.

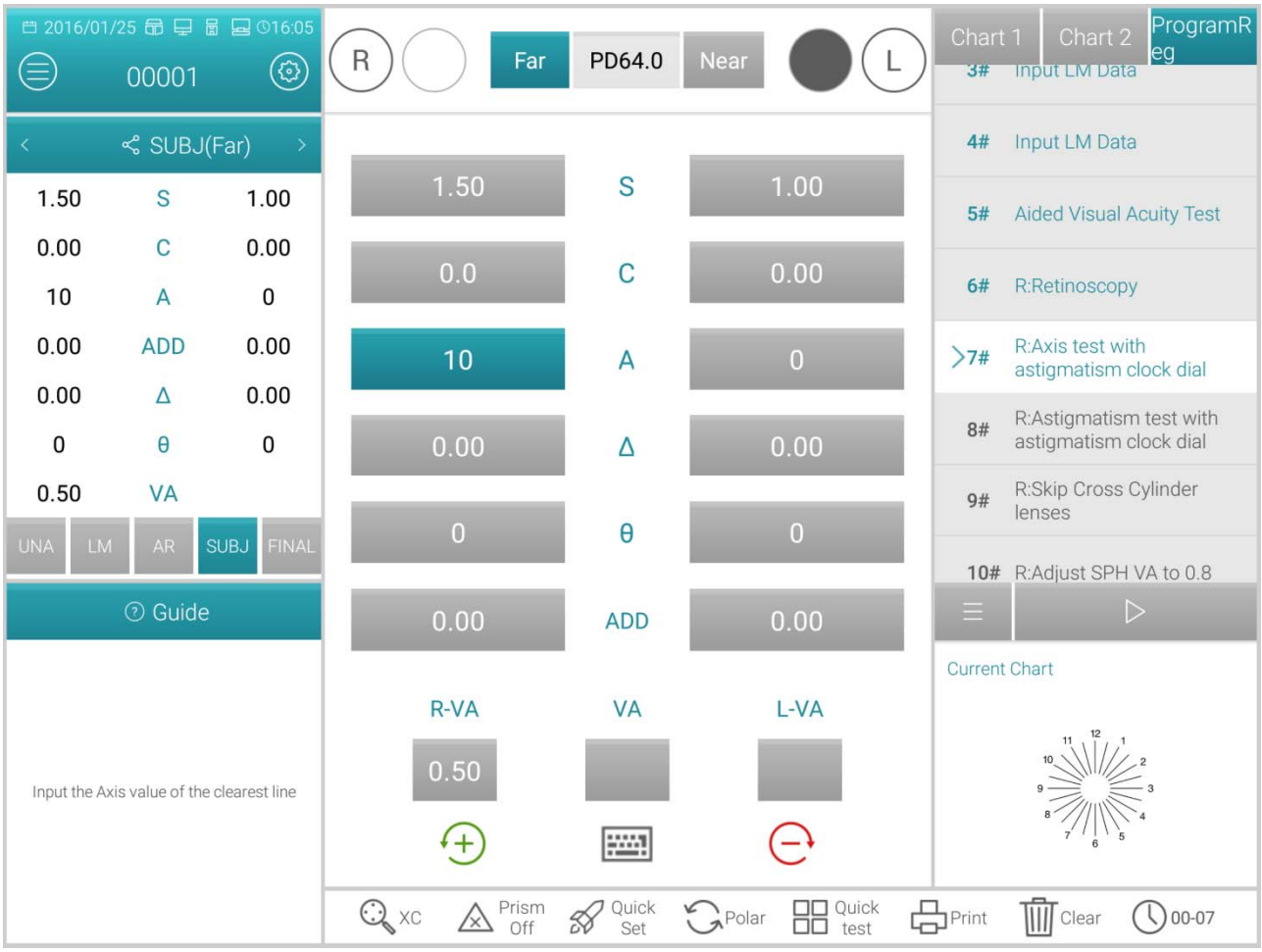
Test the patient's vision with glasses according to step 2 – the method to test the uncased eye vision of the patient.



6. Press ▷ to begin SUBJ subjective correction.

Right eye scieropia. Baffle the left eye, change the cylindrical power of right eye to 0. Put on 0.5 sighting mark, and then gradually increase the positive spherical power until the 0.5 sighting mark becomes blurred.

7. Press ▷ to test the astigmatic axis with astigmatism disk.



（1）Call in astigmatism disc sighting mark. Ask the patient:

●Do the definitions of all lines look the same?

●Which line looks especially distinct?

If the answers are:

●The definitions of all lines look the same.

No astigmatism, turn to step 9.

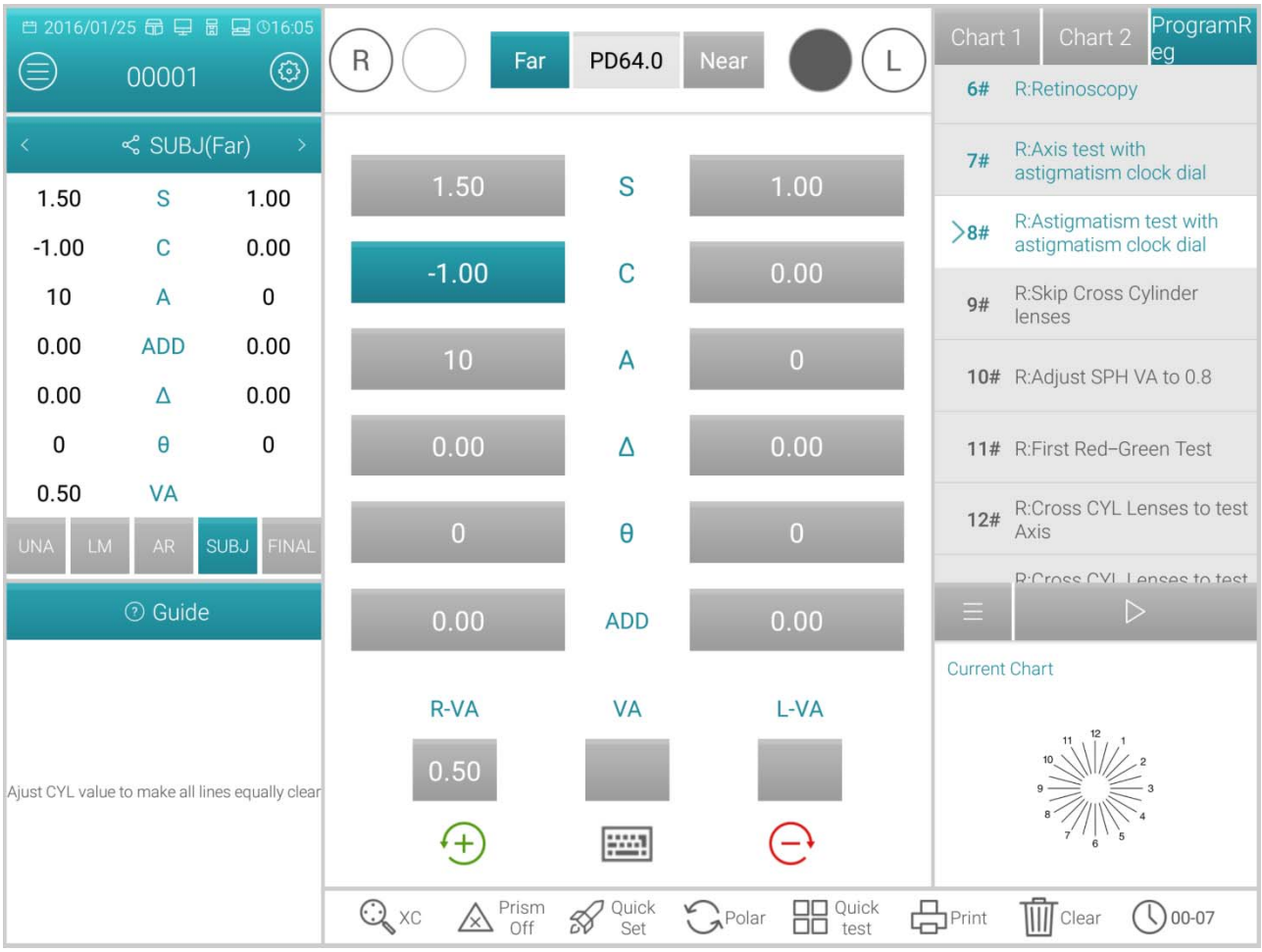
One line looks especially distinct.

Multiply the smaller figure (1~6) corresponding to the especially distinct line with 30°, the astigmatic axis of the negative cylinder can be obtained. For example: line 3-9 is especially distinct, the astigmatic axis is 3×30°=90°.

（2）Input the obtained axis data.

8.Press to ▷ test the astigmatic power with astigmatism disk.

Take -0.25D cylinder as increment, gradually adjust the cylindrical power until the definitions of lines to all directions in the astigmatism disc are the same.

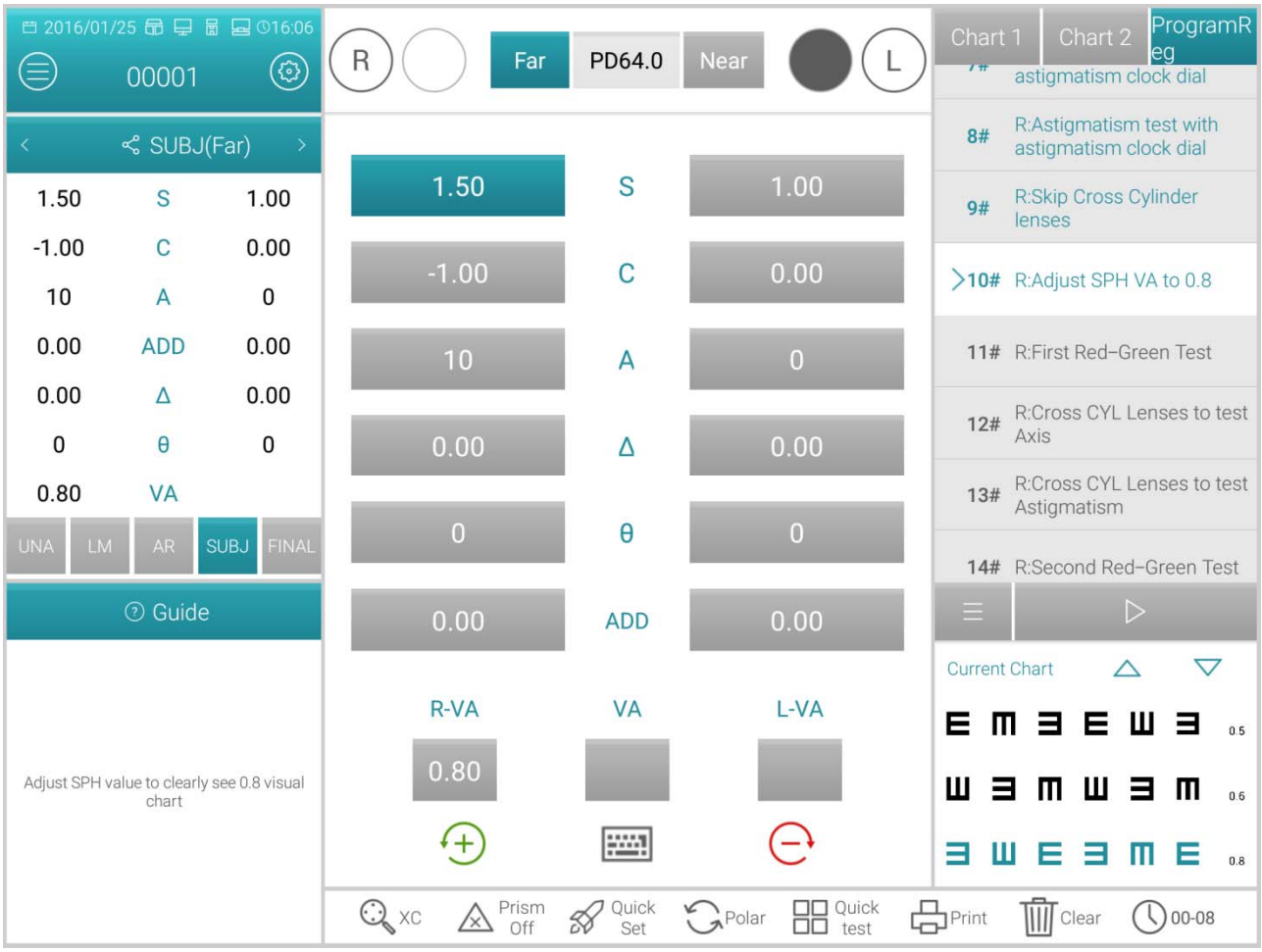


9. Press ▷ message prompts: skip crisscross cylinder test?

When the cylindrical power is 0, message “skip crisscross cylinder test?” prompts.

Select “Yes”, skip to step 14. Select “No”, skip to step 10.

10. Press ▷ and call in 0.8 sighting mark, take -0.25D sphere as increment to gradually adjust the spherical power until the patient sees the sighting mark clearly.



11. Press ▷ to correct right eye spherical power with red and green sighting mark (first-time red and green test).

Sphere +0.50D is automatically added to blur the vision. Call in red and green sighting marks.

1）Ask the patient: the letters in the red and green side of the sighting mark, which side looks more distinct?

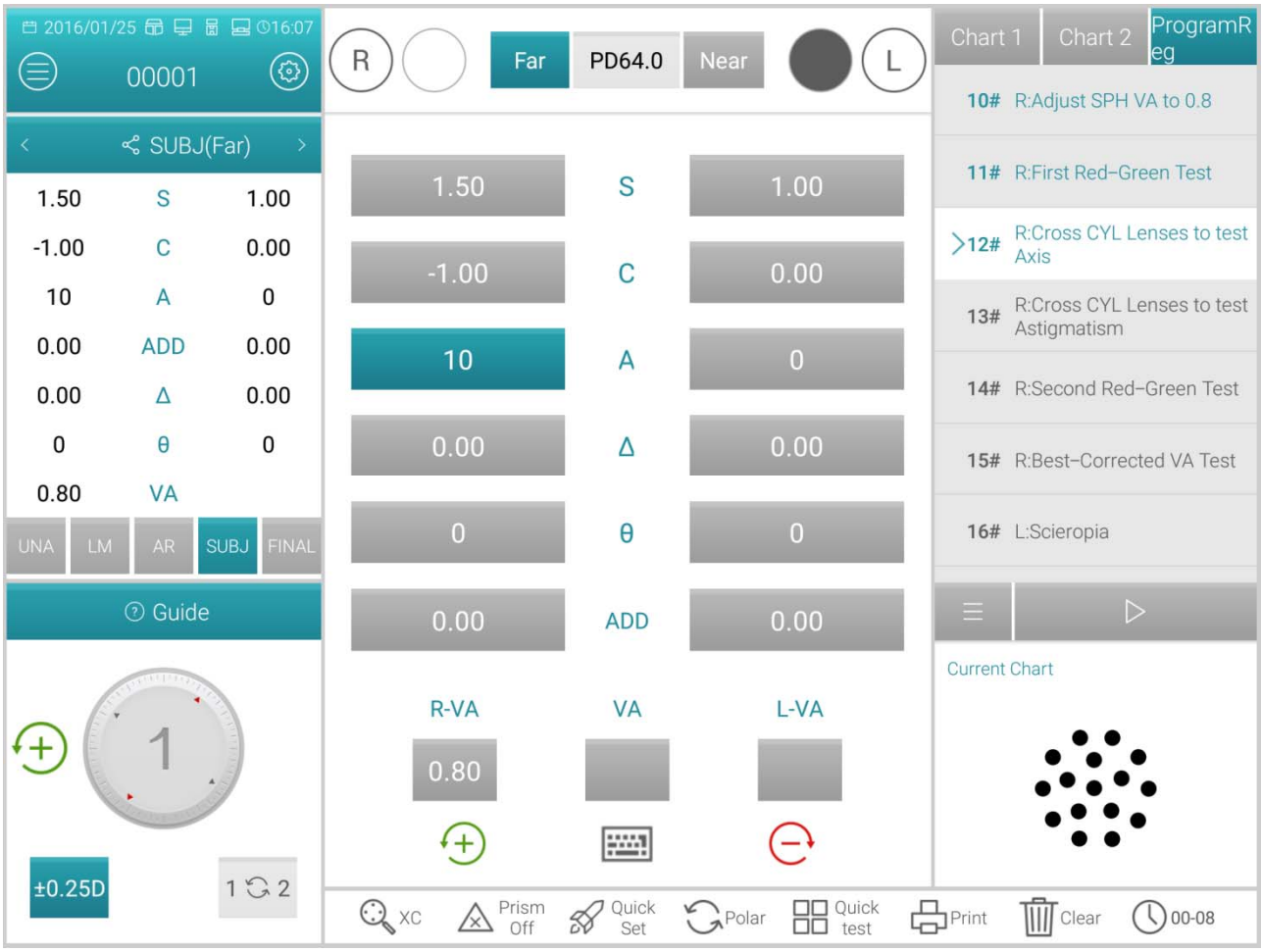
If the letter in the red side looks more distinct: press “-” to increase -0.25D spherical power;

If the letter in the green side looks more distinct: press “+” to decrease -0.25D spherical power;

Repeat above steps until the definition of letters in the red side look the same as the definition of letters in the green side.

Attention: when the definitions of letters in the red and green side can be adjusted consistent, make the letter in the red side more distinct.

12. Press ▷ to make the crisscross cylinder accurately test the astigmatic axis of the right eye.



1）Call in speckle sighting mark and ±0.25D crisscross cylinder.

2）Reverse side 1 and side 2 of the crisscross cylinder, ask the patient: which side is more distinct?

When the side 1 is more distinct: enlarge the axis;

When the side 2 is more distinct: reduce the axis.

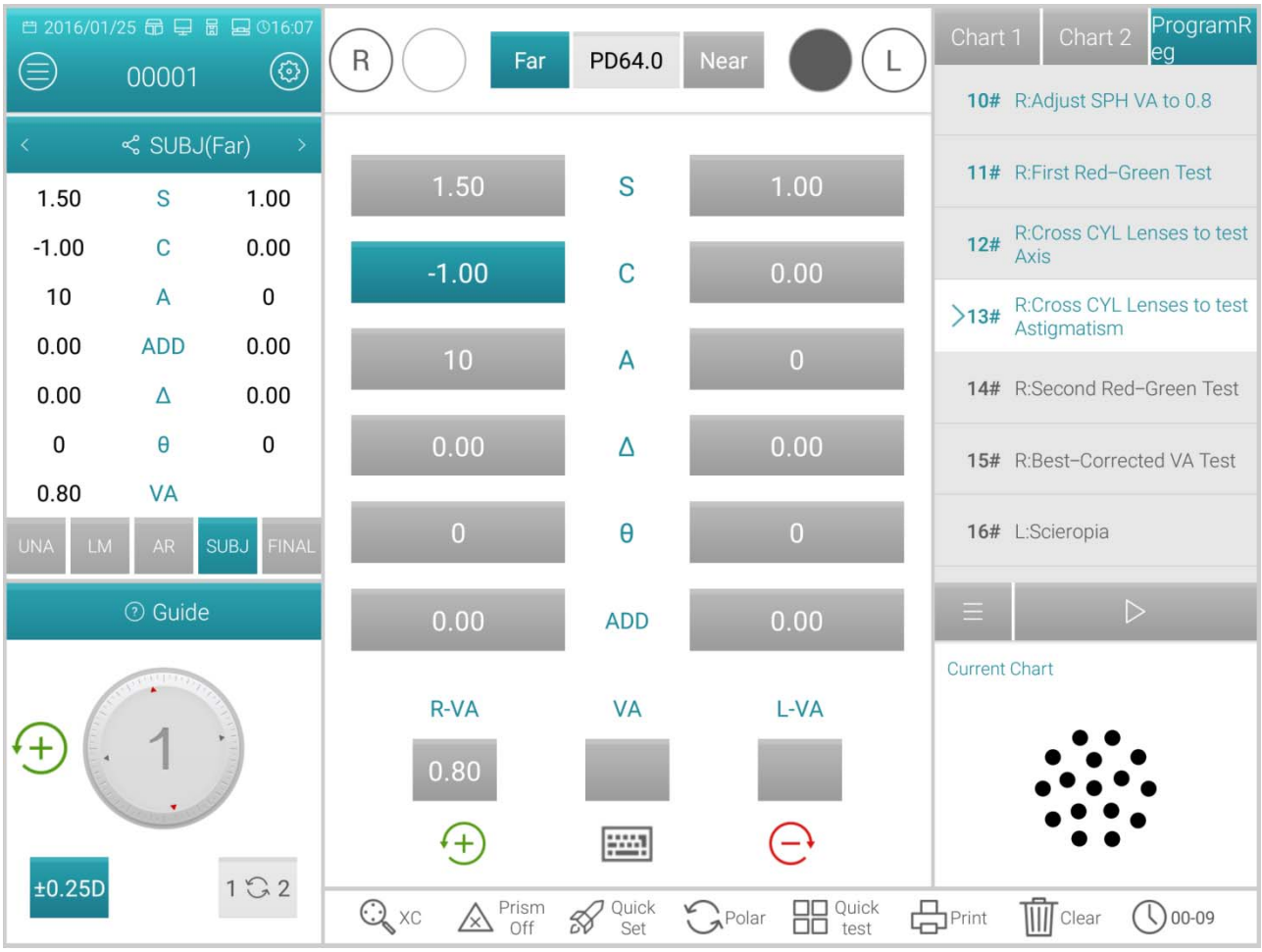
3）Repeat above steps until the definitions of side 1 and 2 look the same.

4）Click

key，shift to 0.5XC.

5）Click the key again, shift to automatic mode(Slit Prism).

13. Press ▷ to make the crisscross cylinder accurately test the astigmatic power of the right eye.



1）Reverse side 1 and side 2 of the crisscross cylinder, ask the patient: which side is more distinct?

When the side 1 is more distinct: enlarge the astigmatic power;

When the side 2 is more distinct: reduce the astigmatic power.

Repeat above steps until the definitions of side 1 and 2 look the same.

14. Press ▷ to correct right eye spherical power with red and green sighting mark (second-time red and green test).

1）Sphere +0.50D is automatically added to blur the vision. Call in red and green sighting marks.

2）Ask the patient: the letters in the red and green side of the sighting mark, which side looks more distinct?

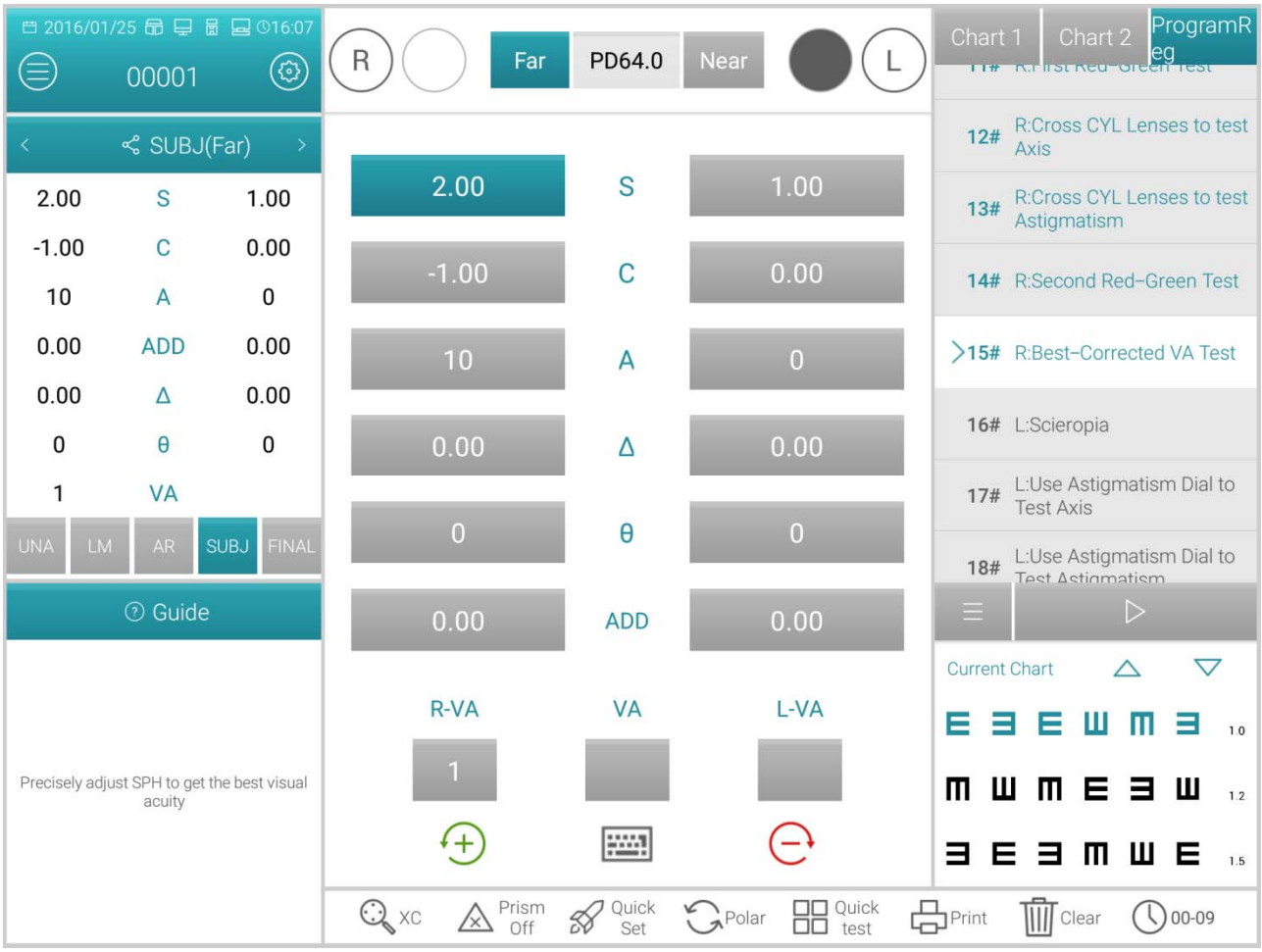
If the letter in the red side looks more distinct: press “-” to increase -0.25D spherical power;

If the letter in the green side looks more distinct: press “+” to decrease -0.25D spherical power;

3）Repeat above steps until the definition of letters in the red side look the same as the definition of letters in the green side.

Attention: when the definitions of letters in the red and green side can be adjusted consistent, make the letter in the red side more distinct.

15. Press ▷ to accurately adjust the spherical power to get the best vision of the right eye.

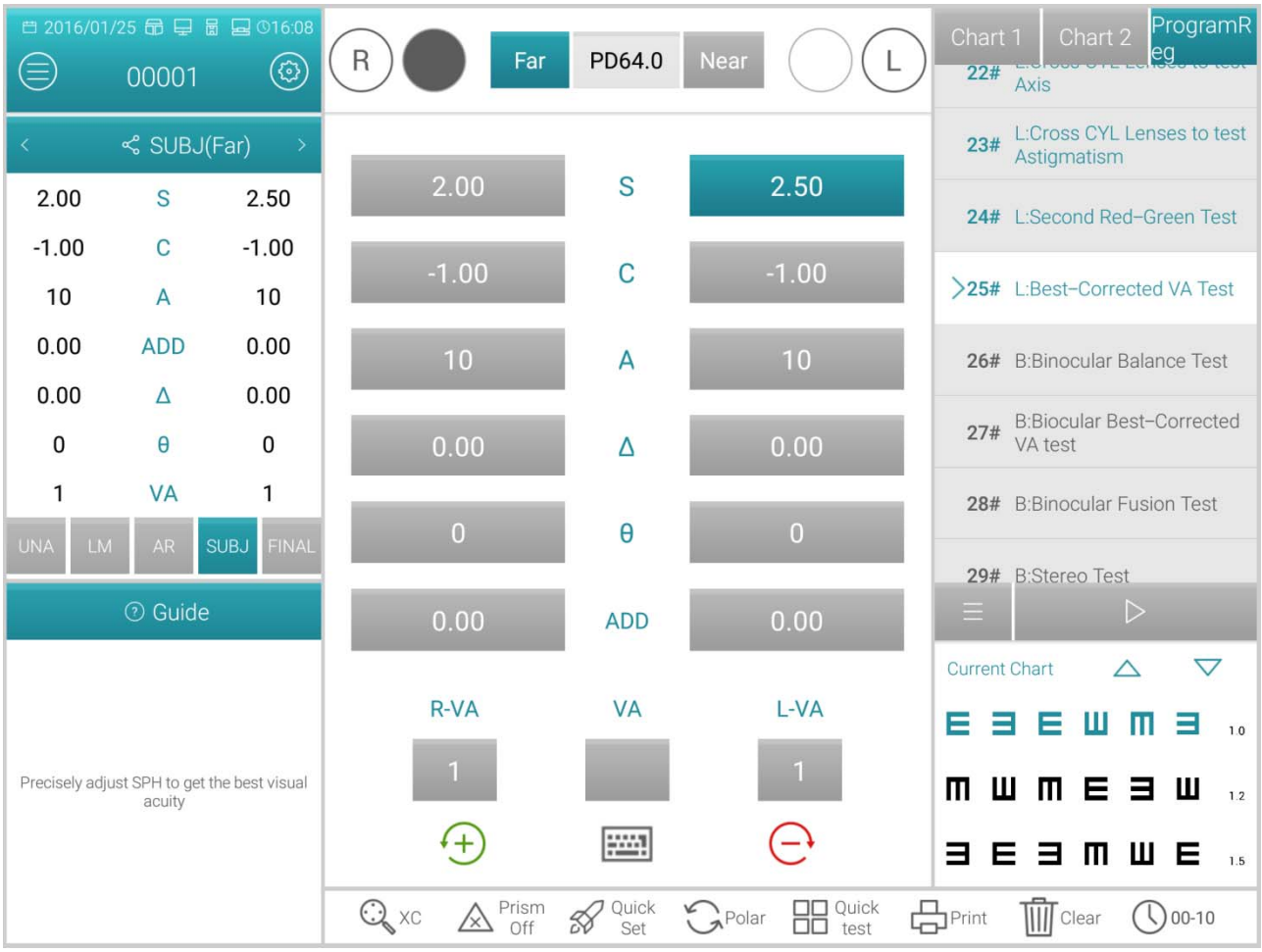


Call in 1.0 sighting mark. Adjust spherical power, and ask the patient to keep eyes on the sighting mark. Ask the patient when the sighting mark looks more distinct.

Take the lowest spherical power when the 1.0 sighting mark is clearly seen as the best vision of the right eye sphere.

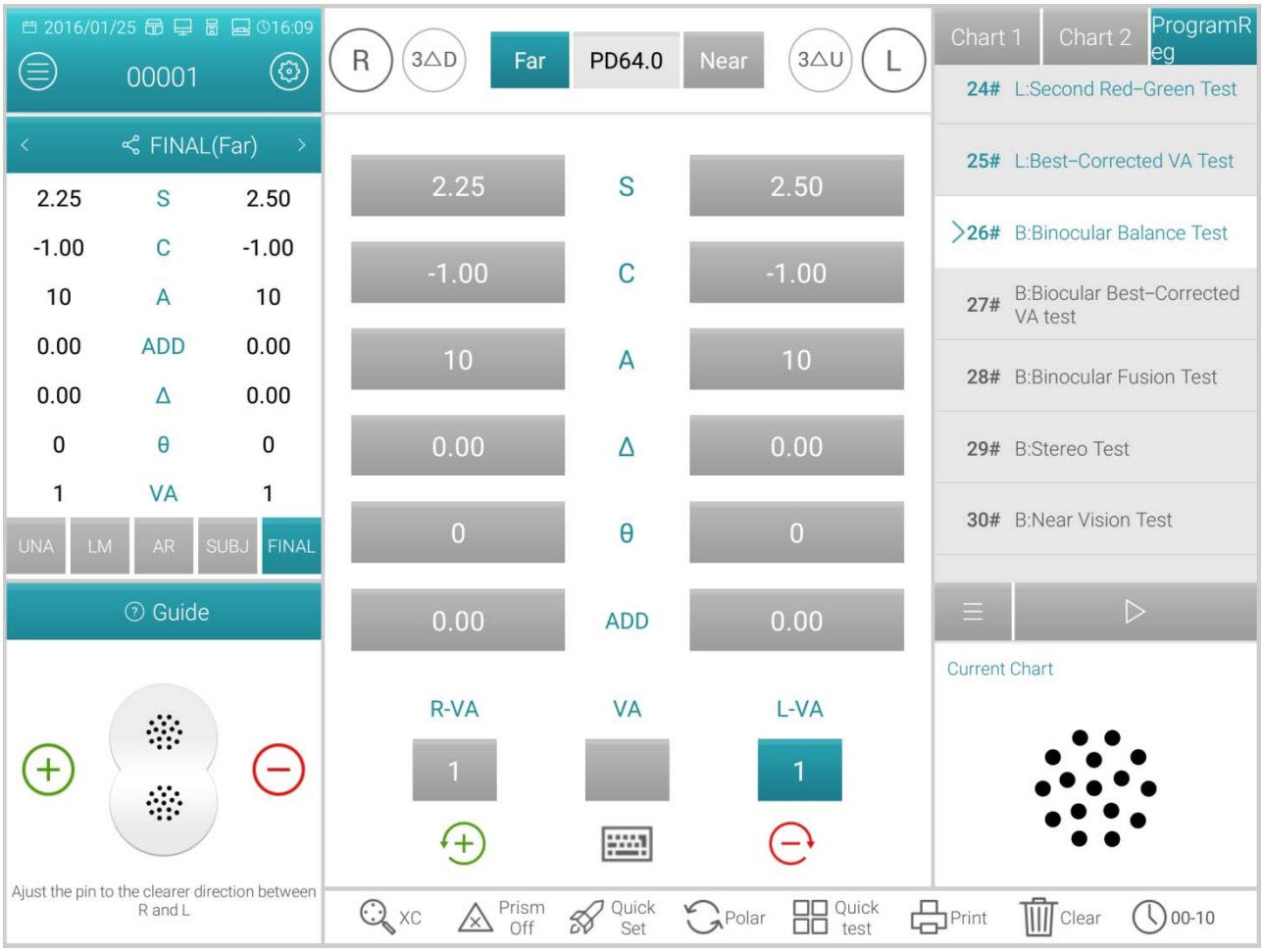
So far, the SUBJ test for the right eye is finished.

16～25. Press ▷ to test the best vision of the left eye according to above step 6~15.



So far, the SUBJ test for the left eye is finished.

26. Press ▷ to begin binocular equilibrium test (FINAL test)



1）Open R and L testing windows. Call in Speckle sighting mark, and 3△ face-down prism for right eye and 3△ face-up prism for left eye.

2）Ask the patients keep two eyes on the sighting mark and compare the definitions of upper and lower sighting marks.

If the upper sighting mark is more distinct than the lower sighting mark: press “+” to reduce -0.25D spherical power for the right eye;

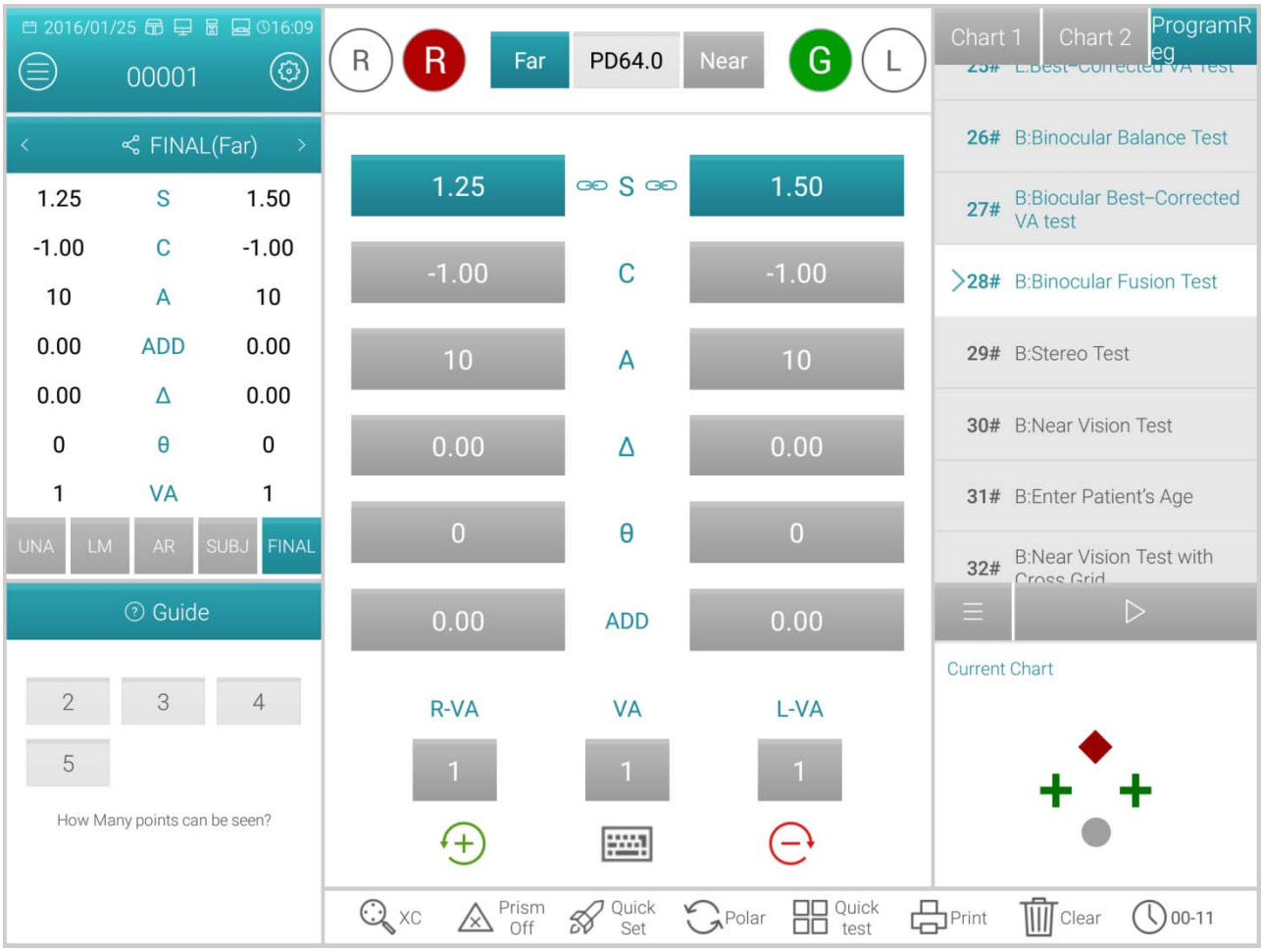
If the lower sighting mark is more distinct than the upper sighting mark: press “+” to reduce -0.25D spherical power for the left eye

3）Repeat above steps until the definitions of two sighting marks look the same.

27. Binocular best vision correction

Reduce the spherical powers of two eyes by -1.00D synchronically, remove the prism in the binocular testing window, call in 1.0 sighting mark; enlarge the spherical powers of two eyes by -0.25D synchronically until the 1.0 sighting mark is clearly seen by two eyes.

28. Press ▷ to begin Worth 4 dots test.



1）Call in red optical filter in R testing window and green optical filter in L testing window, and Worth 4 dots sighting mark.

2）Confirm which points the patient can see clearly.

3）Input the Worth 4 dots testing result.

29. Press ▷ to begin stereopsis testing.

1）Call in red optical filter in R testing window and green optical filter in L testing window, and stereo sighting mark.

2）Confirm if the patient can see four straight lines with stereo clearly.

3）Input the stereoscopic parallax testing result.

30. Press ▷ message “near vision test?” prompts.

Select “Yes”, skip to step 31.

Select “No”, skip to step 34, the test is finished.

31. Input patient age

1）Call ±0.50D fixed crisscross prism in the binocular testing window.

2）Input the patient's age. Shift long-distance degree to correction degree.

32. Press ▷ to test additional degree

1）Lower down the short-distance vision rod and place the visual chart in necessary working distance (generally 400mm).

2）Select the crisscross matrix sighting mark on the short-distance visual chart.

3）Ask the patient: the horizontal line or the vertical line, which is more distinct? Or the horizontal line and the vertical line look the same?

If the horizontal line and the vertical line look the same: there is no need to carry out near vision test and change the additional degree.

If the horizontal line is more distinct than the vertical line: increase two eyes by +0.25D additional degree synchronically until the horizontal line looks as distinct as the vertical line.

33. Press ▷ to carry out near vision test.

1）Remove ±0.50D fixed crisscross cylinder.

2）Select short-distance visual chart to test the vision.

3）Make the patient see the sighting mark clearly to reach ideal vision value.

34. Press ▷ to finish the test.

5.5 Binocular Functional Testing Method

5.5.1 Crisscross matrix test (presbyopia)

Test purpose: to test the spherical power.

Test sighting mark: crisscross matric sighting mark

Assistant lens: binocular ±0.50D fixed crisscross cylinder

1. Binocular distant vision test is finished, add distant vision degree in the testing window.

2. Add binocular ±0.50D fixed crisscross cylinder.

3. Lower down the short-distance vision rod and place the visual chart in necessary working distance (generally 400mm).

4. Select the crisscross matrix sighting mark on the short-distance visual chart.

5. Ask the patient: the horizontal line or the vertical line, which is more distinct? Or the horizontal line and the vertical line look the same?

If the horizontal line and the vertical line look the same: there is no need to carry out near vision test and wear presbyopia glasses.

If the horizontal line is more distinct than the vertical line: increase two eyes by +0.25D additional degree synchronically until the horizontal line looks as distinct as the vertical line.

6. Remove ±0.50D fixed crisscross cylinder.

7. Select short-distance visual chart to test the vision and slightly adjust the sphere to make the patient see the sighting mark clearly to reach ideal vision value.

5.5.2 Cross test (heterophoria)

Test purpose: To test heterophoria

Test sighting mark: Cross sighting mark

Assistant lens: Binocular rotatory prime

Right eye red optical filter, left eye green optical filter (red and green cross sighting mark)

Binocular circular polarized optical filter (polarized cross sighting mark)

1. Call in cross sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Esophoria	Increase BO prismatic power until it turns into a cross
	Exophoria	Increase BI prismatic power until it turns into a cross
	Left eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in left eye until it turns into a cross
	Right eye hyperphoria	Increase BU prismatic power in left eye and BD prismatic power in right eye until it turns into a cross
	Esophoria + right eye hyperphoria	Correct the horizontal heterophoria according to esophoria method and correct the vertical heterophoria according to right eye heperphpria until it turns into a cross.
	Esophoria + left eye hypophoria	Correct the horizontal heterophoria according to esophoria method and correct the vertical heterophoria according to left eye heperphpria until it turns into a cross.
	Exophoria + right eye hyperphoria	Correct the horizontal heterophoria according to exophoria method and correct the vertical heterophoria according to right eye heperphpria until it turns into a cross.
	Exophoria + left eye hyperphoria	Correct the horizontal heterophoria according to exophoria method and correct the vertical heterophoria according to right eye heperphpria until it turns into a cross.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.3 Cross fixation vision test (heterophoria)

Test purpose: to test heterophoria

Test sighting mark: cross fixation sighting mark

Assistant lens: Binocular rotatory prime

Right eye red optical filter, left eye green optical filter (red and green cross fixation sighting mark)

Binocular circular polarized optical filter (polarized cross fixation sighting mark)

1. Call in cross fixation sighting mark.

2.Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Esophoria	Increase BO prismatic power until it turns into a cross
	Exophoria	Increase BI prismatic power until it turns into a cross
	Left eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in left eye until it turns into a cross
	Right eye hyperphoria	Increase BU prismatic power in left eye and BD prismatic power in right eye until it turns into a cross
	Esophoria + right eye hyperphoria	Correct the horizontal heterophoria according to esophoria method and correct the vertical heterophoria according to right eye heperphpria until it turns into a cross.
	Esophoria + left eye hypophoria	Correct the horizontal heterophoria according to esophoria method and correct the vertical heterophoria according to left eye heperphpria until it turns into a cross.
	Exophoria + right eye hyperphoria	Correct the horizontal heterophoria according to exophoria method and correct the vertical heterophoria

		according to right eye heperphpria until it turns into a cross.
	Exophoria + left eye hyperphoria	Correct the horizontal heterophoria according to exophoria method and correct the vertical heterophoria according to right eye heperphpria until it turns into a cross.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.4 Cross ring test (heterophoria)

Test purpose: to test heterophoria

Test sighting mark: cross ring sighting mark

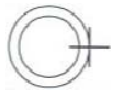
Assistant lens: Binocular rotatory prime

Right eye red optical filter, left eye green optical filter (red and green cross ring sighting mark)

Binocular circular polarized optical filter (polarized cross ring sighting mark)

1. Call in cross ring sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Esophoria	Increase BO prismatic power until it the cross goes in the center of the circle.
	Exophoria	Increase BI prismatic power until it the cross goes in the center of the circle.
	Left eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in left eye until it the cross goes in the center of the circle.
	Right eye hyperphoria	Increase BU prismatic power in left eye and BD prismatic power in right eye until it the cross goes in the center of the circle.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.5 Horizontal coincidence test (horizontal image inequality and horizontal heterophoria)

Test purpose: to test horizontal image inequality and horizontal heterophoria

Test sighting mark: horizontal coincidence sighting mark

Assistant lens: Binocular rotatory prime

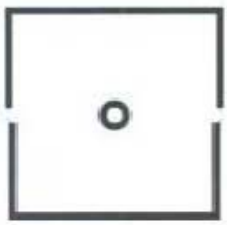
Right eye red optical filter, left eye green optical filter (red and green horizontal coincidence sighting mark)

Binocular circular polarized optical filter (polarized horizontal coincidence sighting mark)

1. Call in horizontal coincidence sighting mark.
2. Ask the patient about the sighting mark he sees and test according his answers.

2.1 Horizontal image inequality

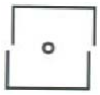
If the sizes of the upper and lower frames are equivalent, there is no horizontal image inequality; if the sizes of the upper and lower frames are inequivalent, there is horizontal imag



As shown in right figure: about 3.5 image inequality.

The straight line width of the sighting mark amounts to 3.5% image inequality.

Horizontal heterophoria

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Esophoria	Increase BO prismatic power until it the upper frame aligns at the lower frame.
	Exophoria	Increase BI prismatic power until it the upper frame aligns at the lower frame.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.6 Vertical coincidence test (vertical image inequality and vertical heterophoria)

Test purpose: to test vertical image inequality and vertical heterophoria

Test sighting mark: vertical coincidence sighting mark

Assistant lens: Binocular rotatory prime

Right eye red optical filter, left eye green optical filter (red and green vertical coincidence sighting mark)

Binocular circular polarized optical filter (polarized vertical coincidence sighting mark)

1. Call in vertical coincidence sighting mark.

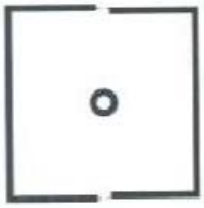
2. Ask the patient about the sighting mark he sees and test according his answers.

2.1 Vertical image inequality

If the sizes of the upper and lower frames are equivalent, there is no vertical image inequality; if the sizes of the upper and lower frames are not equivalent, there is vertical image inequality.

As shown in right figure: about 3.5 image inequality.

The straight line width of the sighting mark amounts to 3.5% image inequality.



2.2 Vertical heterophoria

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Right eye hyperphoria	Increase BU prismatic power in left eye and BD prismatic power in right eye until it the left frame aligns at the right frame.
	Left eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in left eye until it the left frame aligns at the right frame.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.7 Horizontal Maddox rod test (horizontal heterphoria)

Test purpose: to test horizontal heterophoria

Test sighting mark: Maddox rod sighting mark

Assistant lens: right eye horizontal Maddox rod, left eye rotatory prism

1. Call in Maddox rod sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Esophoria	Increase BO prismatic power for left eye until the white point coincides with the straight line.
	Exophoria	Increase BI prismatic power for left eye until the white point coincides with the straight line.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.8 Horizontal Maddox rod test (horizontal heterphoria)

Test purpose: to test horizontal heterophoria

Test sighting mark: Maddox rod sighting mark

Assistant lens: right eye horizontal Maddox rod, left eye rotatory prism

1. Call in Maddox rod sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No heterophoria	Align eye position, no need for correction.
	Left eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in right eye until the white point coincides with the straight line.
	Right eye hyperphoria	Increase BU prismatic power in right eye and BD prismatic power in left eye until the white point coincides with the straight line.

Note: When adding prismatic power, only add one eye's prismatic power instead of two eyes' prismatic powers.

5.5.9 Clock test (rotatory heterophoria)

Test purpose: to test rotatory heterophoria

Test sighting mark: clock sighting mark

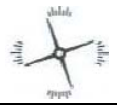
Assistant lens: Binocular rotatory prime

Right eye red optical filter, left eye green optical filter (red and green clock sighting mark)

Binocular circular polarized optical filter (polarized clock sighting mark)

1.Call in clock sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Sighting mark shape	Diagnosis	Correction
	No rotatory heterophoria	Align eye position, no need for correction.
	Idiopathic rotatory heterophoria	Functional rotatory heterophoria, can't be corrected with glasses
	Optical rotatory heterophoria	It might be caused by oblique astigmatism of human eyes or oblique cylinder of glasses. Make appropriate adjustment of cylindrical axil and power.

5.5.10 Worth 4 dot test

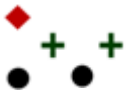
Test purpose: to test binocular fusion, suppression and dominant eye.

Test sighting mark: Worth 4 dots sighting mark

Assistant lens: Right eye red optical filter, left eye green optical filter

1. Call in Worth 4 dots sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Dot number	Sighting mark shape	Description	Diagnosis
4		Red squares and round dots, green crosses	Two eyes have fusion function Right eye is dominant eye
4		Red squares, green crosses and round dots	Two eyes have fusion function Left eye is dominant eye
3		Green squares and round dots	Right eye suppression
2		Red squares and round dots	Left eye suppression
5		Five points are seen at the same time	Diplopia
5	Flicker alternately	Two red points and three green points flicker alternately	Alternate suppression

3. Input the testing results.

5.5.11 Stereopsis

Test purpose: to test stereopsis

Test sighting mark: stereo sighting mark

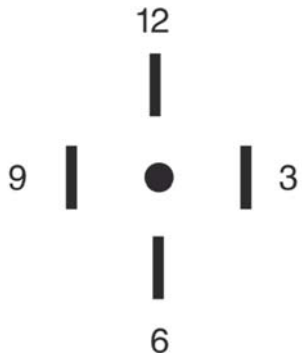
Assistant lens: Right eye red optical filter, left eye green optical filter (red and green stereo sighting mark)

Binocular circular polarized optical filter (polarized stereo sighting mark)

1. Call in stereo sighting mark.

2. Ask the patient about the sighting mark he sees and test according his answers.

Marks in normal eyes during test: figure 12, 3, 6, 9 and the central round point are at the same plane, and four short lines protrude outwards; the distances from the short line aside figure 12, 3, 6 and 9 to the eye are seemly shortened, and the short line aside figure 9 is the nearest.



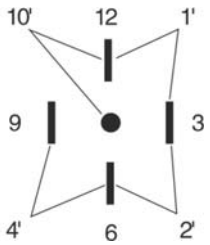
The stereoscopic parallaxes of all line are as follows:

The stereoscopic parallax between the short line aside figure 12 and the central round point is 10′;

The stereoscopic parallax between the short line aside figure 12 and figure 3 is 1′;

The stereoscopic parallax between the short line aside figure 3 and figure 6 is 2′;

The stereoscopic parallax between the short line aside figure 6 and figure 9 is 4′.



3. Input the testing results.

5.5.12 Divergence test

Test purpose: to test the eyes' congregation capability

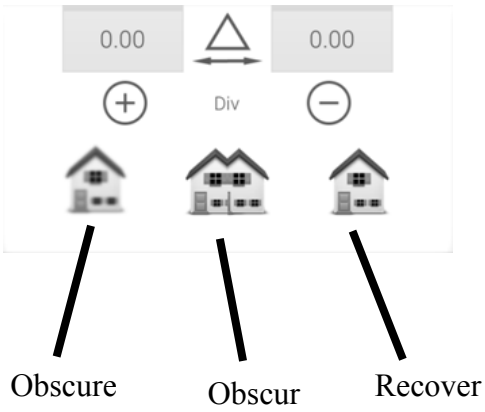
Test sighting mark: the column sighting marks in the visual chart

Assistant lens: binocular rotatory prism

Make sure the "Congregation and divergence test" parameter is set "On".

1.Under prism mode，presss

2. Press"Div"to enter divergence test.



3. Call in the sighting marks and display column sighting marks.

4. Increase BI prismatic power of two eyes until the sighting mark becomes obscure. Press the obscure icon, and it is highlighted, then save the prismatic power of the obscure point.

5. Increase BI prismatic power of two eyes until the sighting mark splits into two. Press the split icon, and it is highlighted, then save the prismatic power of the split point.

6. Increase BI prismatic power of two eyes until the sighting mark recovers as one. Press the recover icon, and it is highlighted, then save the prismatic power of the recover point.

5.5.13 Congregation test

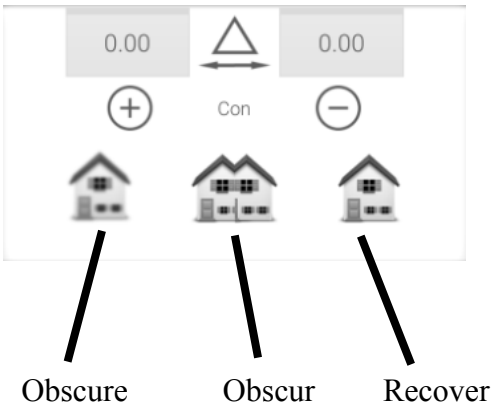
Test purpose: to test the eyes' congregation capability

Test sighting mark: the column sighting marks in the visual chart

Assistant lens: binocular rotatory prism

Make sure the "Congregation and divergence test" parameter is set "On".

1 Press "Con" to enter divergence test.



2.Call in the sighting marks and display column sighting mark

3. Increase BO prismatic power of two eyes until the sighting mark becomes obscure. Press the obscure icon, and it is highlighted, then save the prismatic power of the obscure point.

4. Increase BO prismatic power of two eyes until the sighting mark splits into two. Press the split icon, and it is highlighted, then save the prismatic power of the split point.

5. Increase BO prismatic power of two eyes until the sighting mark recovers as one. Press the recover icon, and it is highlighted, then save the prismatic power of the recover point.

5.5.14 Near –point congregation (NPC) test

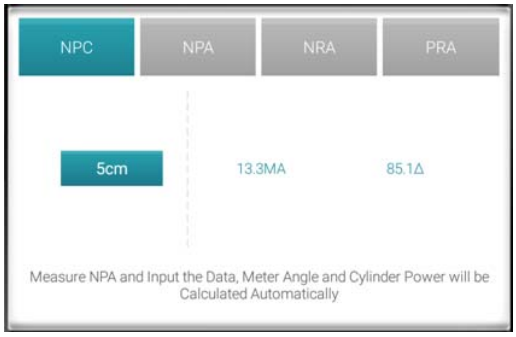
No vision tester is needed in the test. If the patient wears glasses, do not take them off.

Test purpose: to test split point

Test sighting mark: cross fixation sighting mark, or nib that can easily cause diplopia.

1. Press Quick test choose “Near Point”

2 NPC, NPA, NRA, PRA showing simultaneously, to shift to short-distance mode.



3. Put the nib in the right front of the patient and make the patient keep eyes on the nib.

4. Move the nib gradually to approach to the patient's eyes: when the patient sees the nib becomes two from one, stop moving the nib.

5. Measure the distance from the nib to the nose root of the patient.

6. Input the distance (in cm) into the input frame, the meter angle and prismatic power will be calculated automatically.

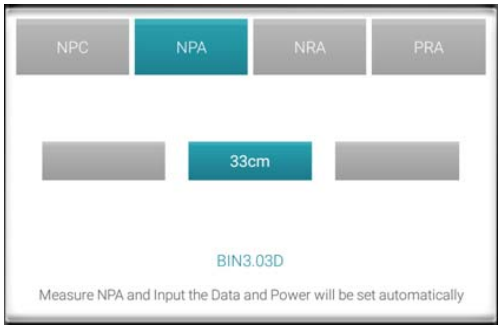
5.5.15 Near –point adjustment (NPA) test

Test purpose: to test near-point adjustment

Test sighting mark: Letter sighting mark of short-distance visual chart.

Confirmation before test: Set "SPH distant vision → near vision" to SPH+ADD.

1. Press Quick test ,choose "Near Point", NPC, NPA, NRA, PRA showing simultaneously, to shift to short-distance mode.



2. Press "NPA" to open binocular testing window.

3. Place the visual chart in the distance of 40cm, make sure the patient see clearly the letter sighting mark with best vision.

3. Move the visual chart gradually to approach to the patient's eyes: when the sighting mark becomes obscure, stop moving the visual chart.

4. Measure the distance from the visual chart to the nose root of the patient.

5. Input the distance (in cm) into the input frame, the near-point adjustment value will be calculated automatically.

5.5.16 Negative-relative adjustment (NRA) test

Test purpose: to test the negative-relative adjustment when the two eyes congregate in specified working distance

Test sighting mark: column sighting marks in short-distance visual chart

Confirmation before test: Set “SPH distant vision → near vision” to SPH+ADD.

1. Press Quick test , choose “Near Point”, NPC, NPA, NRA, PRA showing simultaneously, to shift to short-distance mode.

2. Press “NPA” to open binocular testing window.

3. Place the visual chart in the distance of 40cm, make sure the patient see clearly the column sighting marks.

4. Press “+” and “-” to gradually adjust the spherical power until the sighting mark becomes obscure. Press the obscure icon, and it is highlighted, then save the prismatic power of the obscure point.

5. Press “+” and “-” to gradually adjust the spherical power until the sighting mark becomes distinct again. Press the recover icon, and it is highlighted, then save the prismatic power of the recover point.

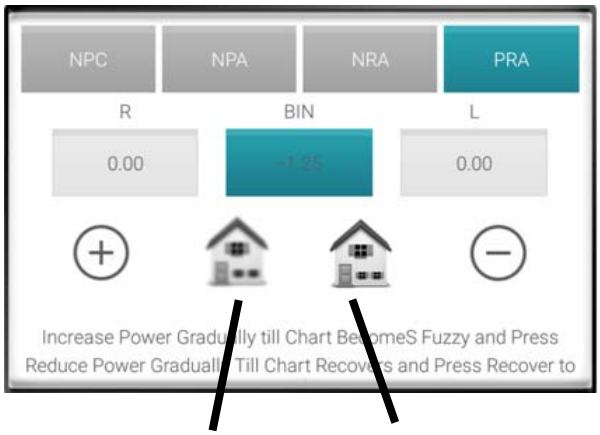
5.5.17 Positive-relative adjustment (PRA) test

Test purpose: to test the positive-relative adjustment when the two eyes congregate in specified working distance

Test sighting mark: row sighting marks in short-distance visual chart

Confirmation before test: Set “SPH distant vision → near vision” to SPH+ADD.

1. Press Quick test , choose “Near Point”, NPC, NPA, NRA, PRA showing simultaneously, to shift to short-distance mode.



Obscur Recover

2. Press “NPA” to open binocular testing window.

3. Place the visual chart in the distance of 40cm, make sure the patient see clearly the row sighting marks.

4. Press “+” and “-” to gradually adjust the spherical power until the sighting mark becomes obscure. Press the obscure icon, and it is highlighted, then save the prismatic power of the obscure point.

5. Press “+” and “-” to gradually adjust the spherical power until the sighting mark becomes distinct again. Press the recover icon, and it is highlighted, then save the prismatic power of the recover point.

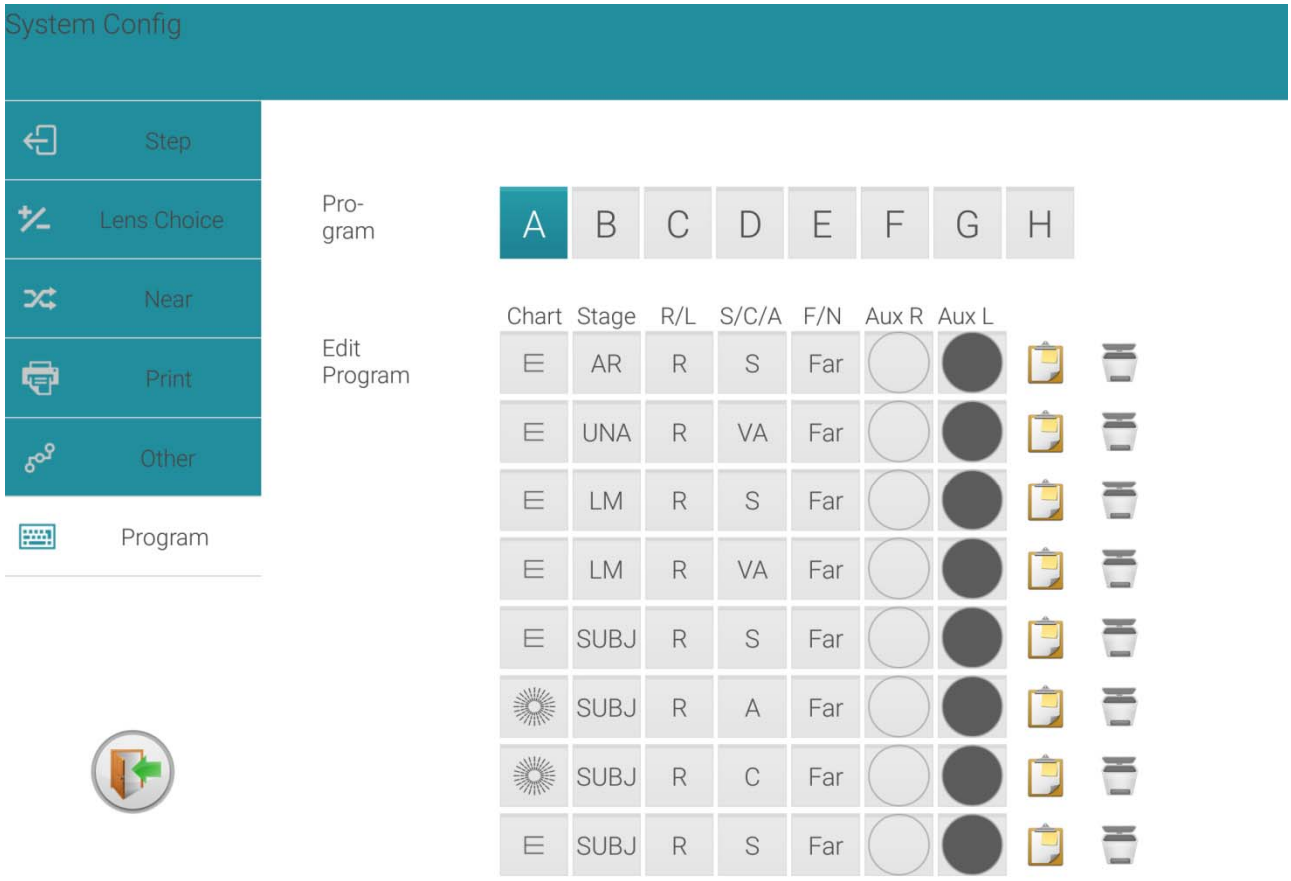
5.6 Customer Self-programming

The device has standard optometry procedure A as factory default setting. There are four optometry procedures can be programmed by the customer.

5.6.1 Self-programming

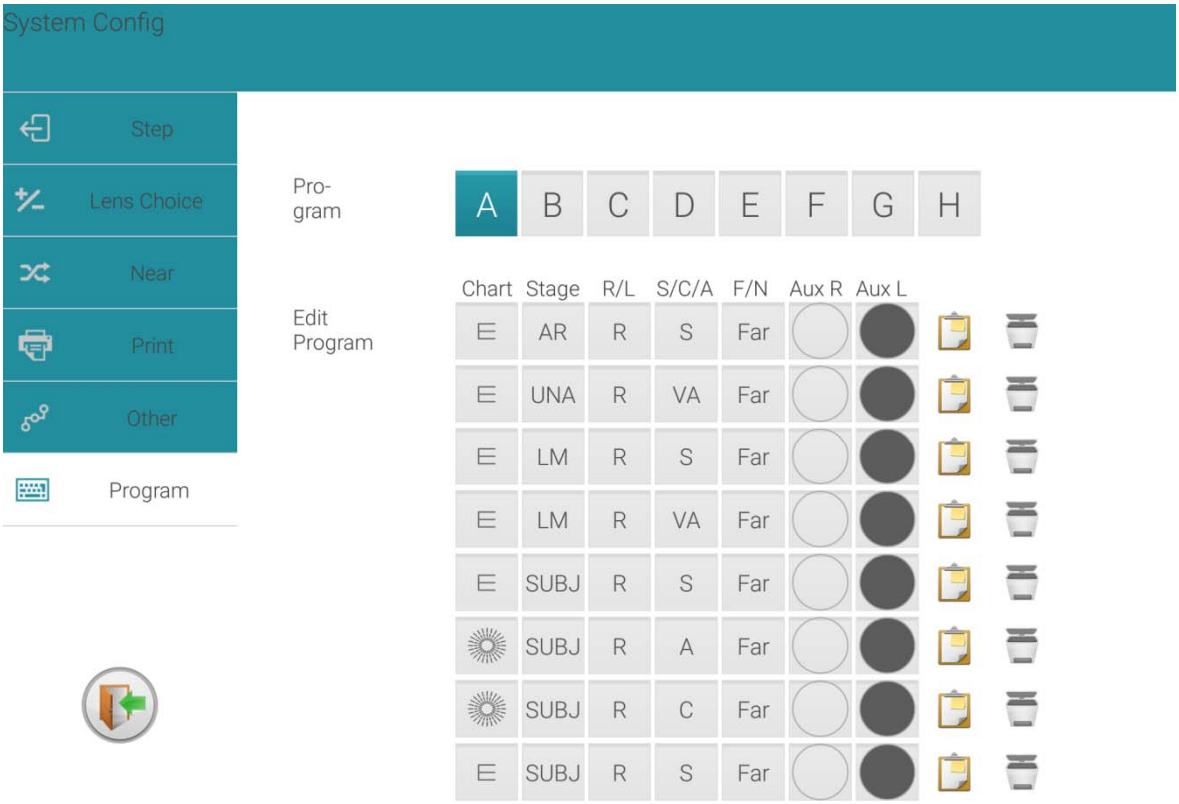
1. Press in the main interface to enter system parameter setup interface.

2. Select “Program” to enter self-programming interface.

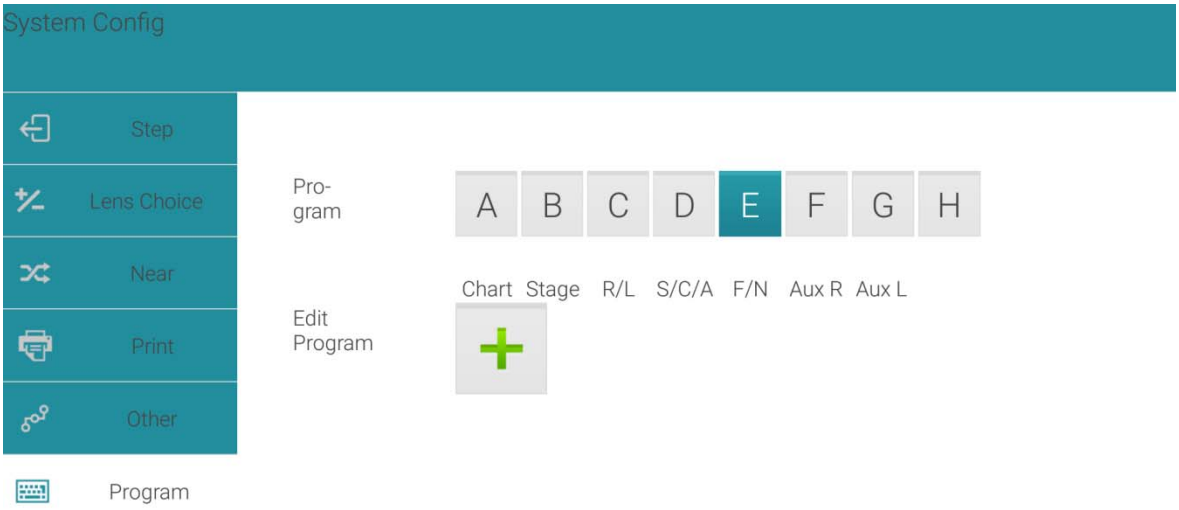


3. Program

1)A B C D are recommended vision test steps, users can also add or delete as needed.



2)E F G H are empty status, users can customize all the steps by themselves.

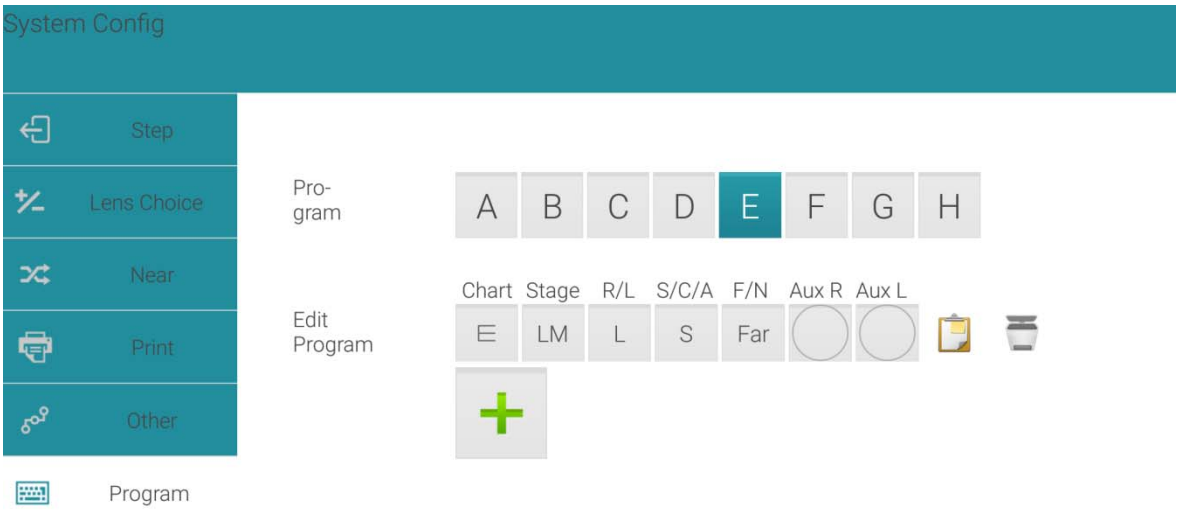


3)Keys Introduction

Edit Key: Click it to enter program customizing interface

Clear Key: Click it to delete this step.

Add Key: Click it to add one step automatically.

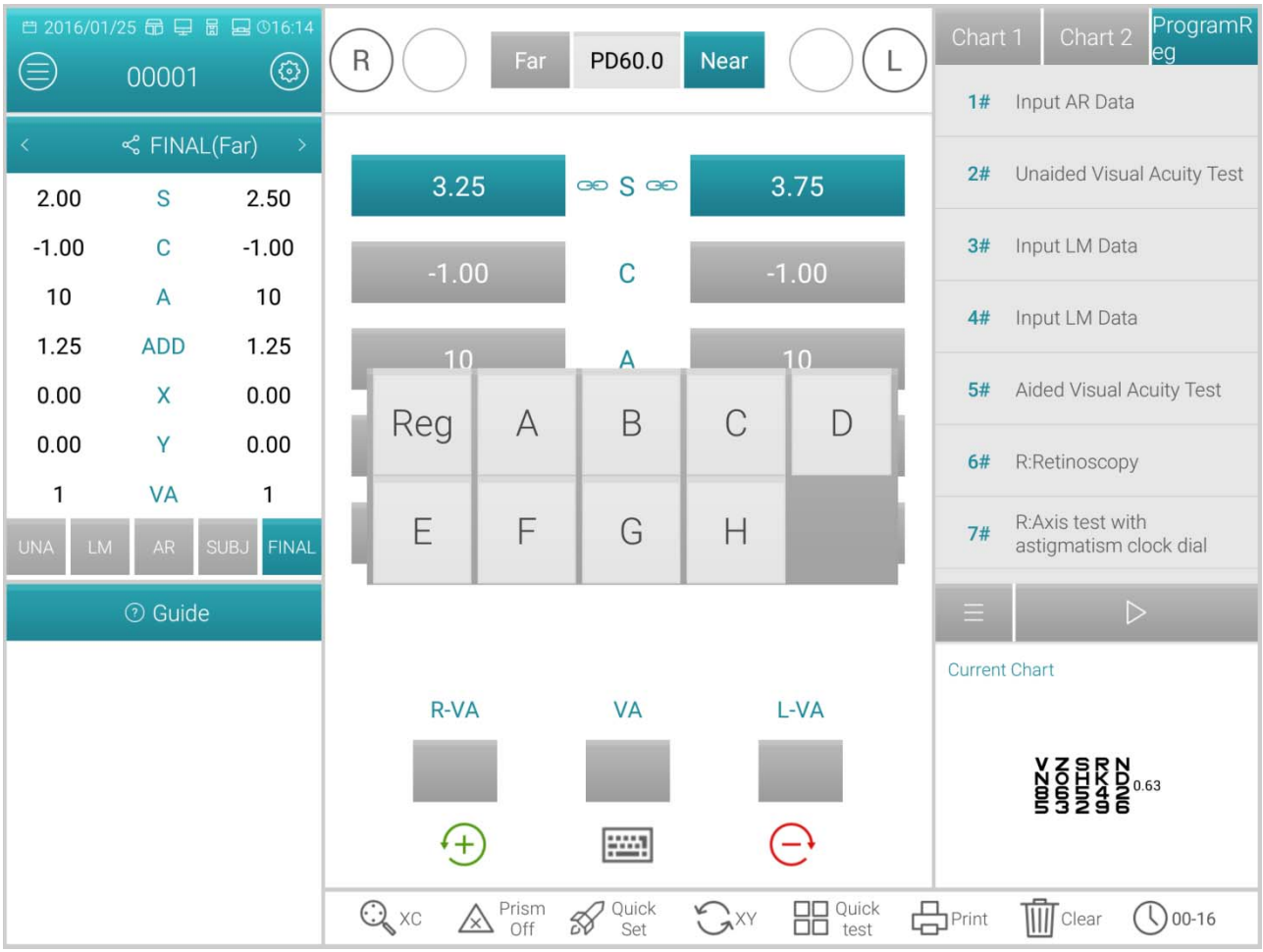


4）Click key to enter program customizing interface

5）Headline can be input into the Program E box. According to user's need, Editting the vision test program and then click OK key to save the setting.

5.6.2 Run Customized Program

1）Go back to Measurement Interface. Click key to popup the program choice box



2）Choose “Program E”.

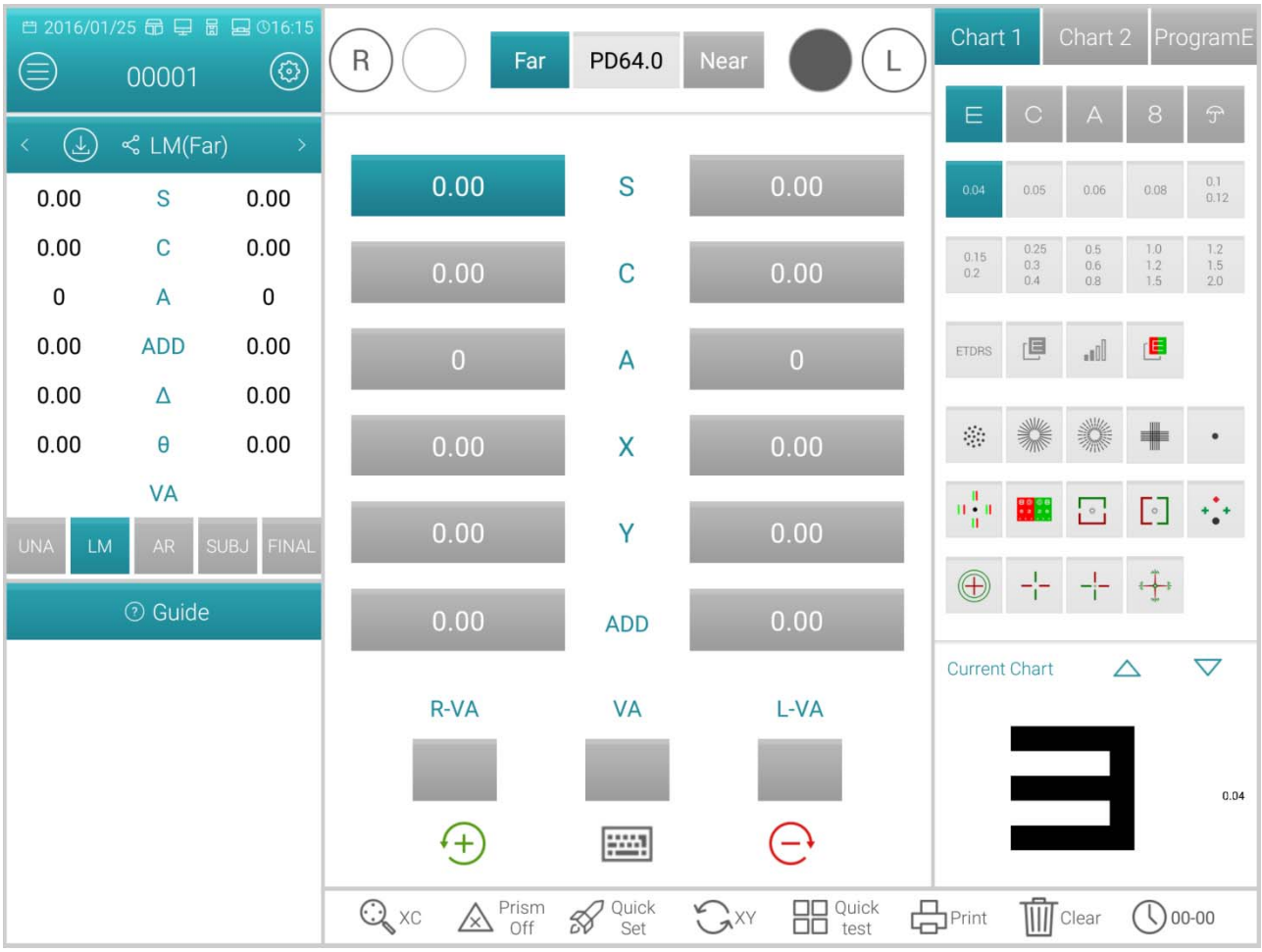
3）Click key to start to run customized program.

5.7 Communication

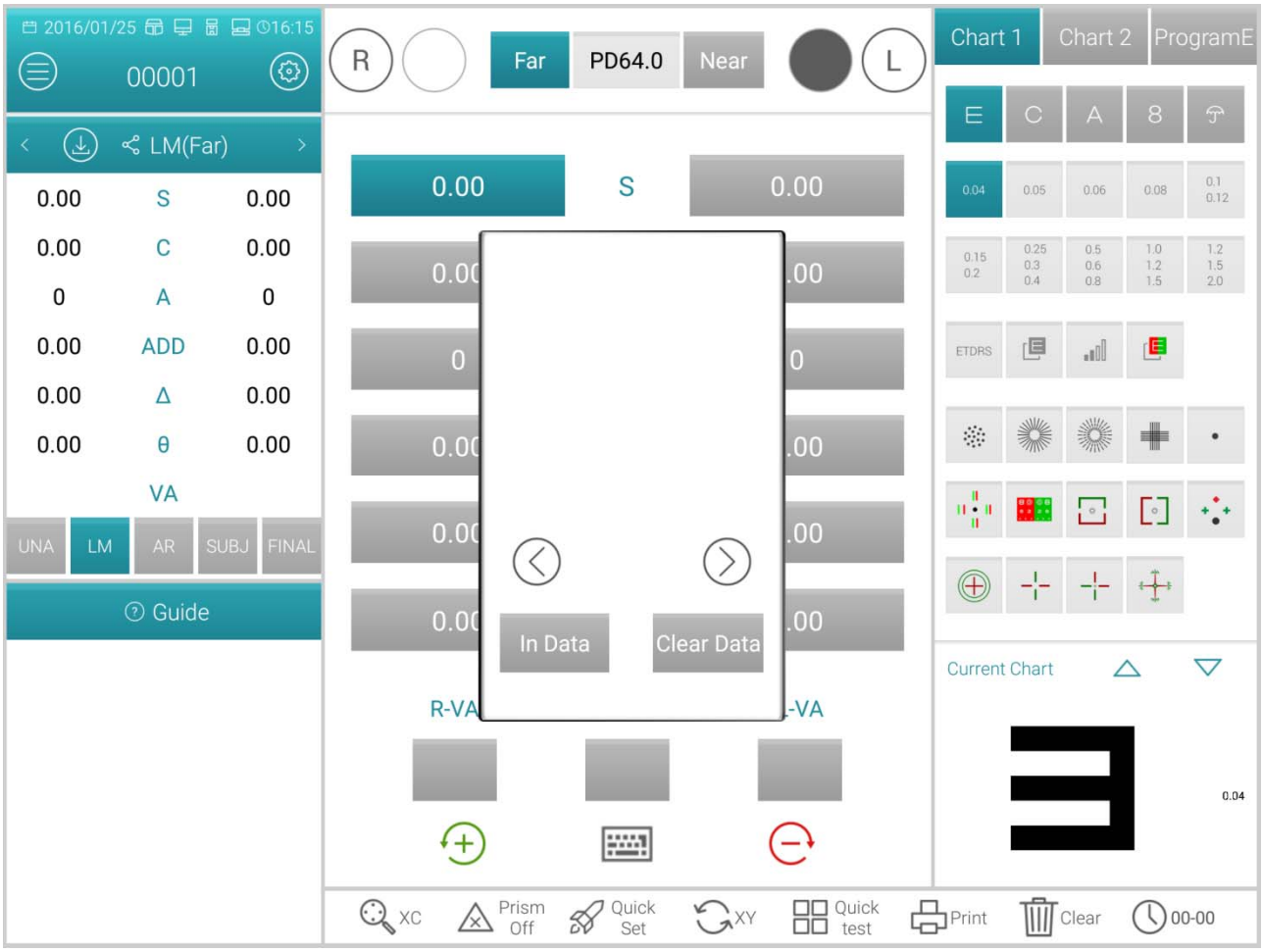
5.7.1 Communication with Lensmeter CCQ-800

1) Use special communication cable to connect CCQ-800 to the R232 port of the print box.

2) Click LM key

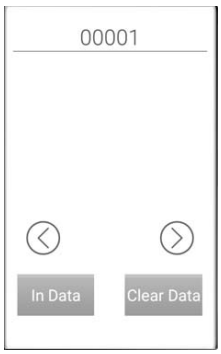


3) Click key to popup input box



4) Use CCQ-800 lensmeter to test lens data and convey the date to YPA-2100

5）Click key .



6) Choose “No00001”.

7) Click In Data key to complete data import.

5.8 Pre-set ADD

Relationship table between pre-set additional degree ADD and patient age (only applies to this product)

Age	Pre-set ADD degree（m^{-1}）
45 at oldest	0.75
50 at oldest	1.25
55 at oldest	1.50
60 at oldest	1.75
65 at oldest	2.00
Older than 65	2.25
N/A	Un-pre-set ADD degree

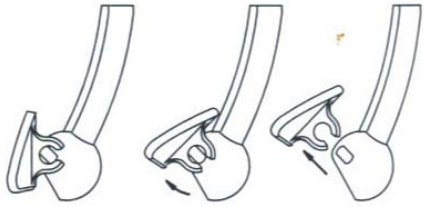
6.Troubleshooting

In the event of device trouble, please check the device as per below chart to obtain guidance. If the trouble is not shot, please contact with Chongqing Yeasn Science & Technology Co., Ltd. Maintenance Department or the authorized dealer.

Trouble	Reasons	Solutions	Remark
The device doesn't start	The power line is not correctly connected to the socket	Connect the power line correctly	
The printer doesn't exit paper	Printing papers are used out	Replace printing papers	
The printer doesn't print results	Printing papers are installed in opposite direction.	Adjust the direction of printing papers	

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 Clean the forehead baseplate

Clean the forehead baseplate before every optical test.

1）Take off the forehead baseplate

Tilt the forehead baseplate forward as shown in right figure: drag in a certain direction and take off the baseplate.

2）Clean the forehead baseplate

Wipe the forehead baseplate with clean and soft cloth. For intractable stains, please dip the clean soft cloth in mild detergent to scrub the stains away and then wipe it with dry soft cloth.

3）Restore the forehead baseplate to original position

Insert it into the device in a certain direction

7.2 Clean the nose baseplate

Clean the nose baseplate before every optical test.

1）Take off the nose baseplate from the vision tester host.

The nose baseplate is fixed on the vision tester host with magnetic steel, so it can be easily taken off.

2）Clean the nose baseplate.

Wipe the nose baseplate with clean and soft cloth. For intractable stains, please dip the clean soft cloth in mild detergent to scrub the stains away and then wipe it with dry soft cloth.

3）Restore the nose baseplate to original position

7.3 Clean the testing window

If there are dirt, oil stain, finger print or dust on the testing window, it may affect the testing accuracy.

1）For the dust: blow it away with blowing balloon with brush.

2）For dirt, oil stain and finger print: wipe it with clean and soft cloth.

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

Attention: Wipe the testing window gently when cleaning it. Otherwise, it may scratch the testing window glass.

7.4 Clean external parts

When the external parts, such as the enclosure or panel, get dirty, please wipe them gently with clean and soft cloth.

For intractable stains, please dip the clean soft cloth in mild detergent to scrub the stains away and then wipe it with dry soft cloth.

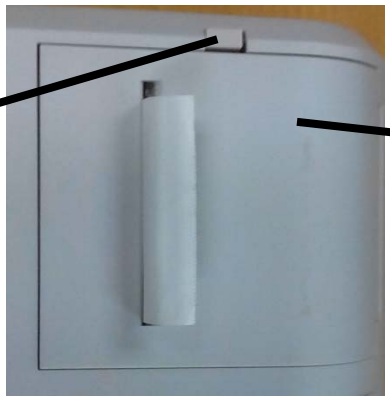
8.Maintenance and Care

8.1 Replace printing papers

When a red line occurs aside the printing paper, please stop using the printer and replace printing papers.

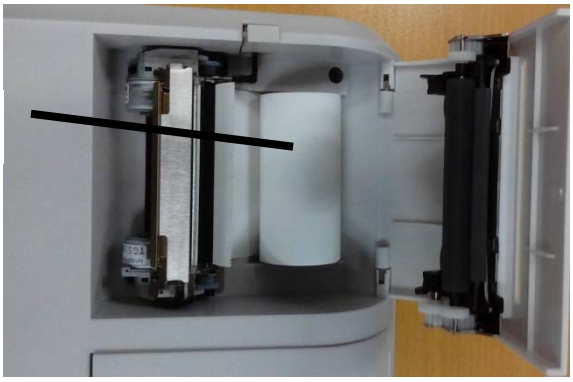
Replacing steps are as follows:

1)Press the printing bin button to open the printer cover.



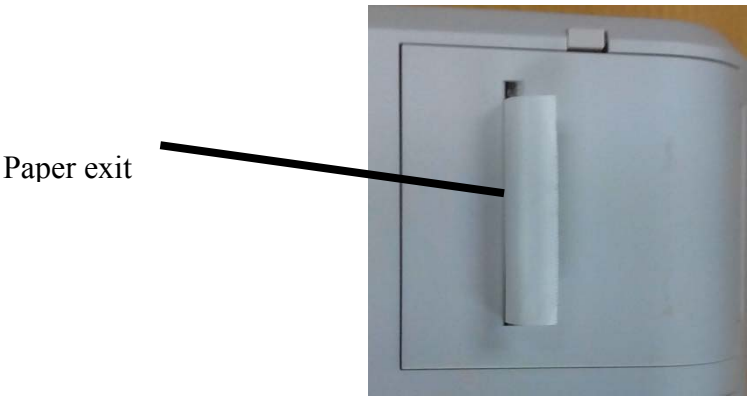
2)Take out the left paper and put in the new printing paper.

Attention: Pay attention to the paper roll's direction. If the paper roll is installed reversely, the printer won't print any data.



3)Put the printing paper through the paper exit and then close the printing cover.

Attention: Pay attention to the paper roll's direction. Do not print when there is no printing paper or pull the printing paper effortlessly, otherwise it may shorten the printer's service life.



Press the print cover, be sure the "Printing bin key" is to the pop-up state, otherwise it will not be able to print.

8.2 Repairable and replaceable parts, such as printing base and power adapter, etc., provided by the company can only be used; other unauthorized parts may reduce the minimum safety of the device.

8.3 The fuse of the device is included in the power adapter; if damaged, please replace it with the power adapter provided by the company with fuse type of T3.15A/250V.

8.4 Do not disassemble or repair the device arbitrarily when a failure occurs, please contact with local dealer or manufacturer.

8.5 The company is committed to providing users with necessary circuit diagrams, part list and other relevant materials as needed.

9. Environmental Conditions and Service Life

1、Environmental conditions for normal operation

Environment temperature: 10℃~35℃

Relative humidity: 30%~80% (no condensation)

Atmospheric pressure: 800hPa~1060hPa

Indoor conditions: clean and without direct high light.

2、Environmental conditions for transportation and storage

Environment temperature: -10℃~+55℃

Relative humidity: 10%~85% (no condensation)

Atmospheric pressure: 700hPa~1060hPa

3、Service life

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

10.Environmental Protection

Please recycle or properly dispose of the used batteries and other wastes to protect the environment; please package the device at the end of life to the company, or handle it in accordance with local provisions related to environmental protection.

11.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.

12.Symbol Description

The applied part of the device is Type B

Attention! Please refer to accompanying documents.

Refer to instruction manual/ booklet

Manufacture date

MFG. DATE Manufacture date

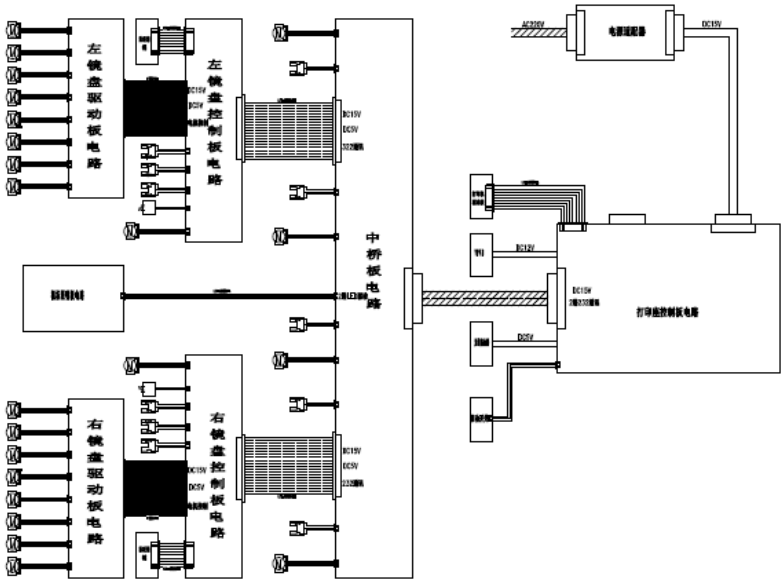
Manufacturer

European certificate of conformity

Correct Disposal of This Product (Waste Electrical & Electronic Equipment) Statement: Contact the local authorities to determine the proper method of disposal of potentially bio-hazardous parts and Accessories.

Product serial number

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.Electromagnetic Compatibility

<table>
<tr><td colspan="3">Guidance and Manufacturer’s Declaration – Electromagnetic Emissions
This device is intended for use in the electromagnetic environment specified below. The customer or the user of the devices should assure that the device is used in such an environment.</td></tr>
<tr><td>Emissions test</td><td>Compliance</td><td>Electromagnetic environment - guidance</td></tr>
<tr><td>RF emissions
GB 4824（CISPR 11）</td><td>Group 1</td><td>The device uses RF energy only for its internal function. Therefore, its RF emissions are very low and not likely to cause interference in nearby electronic equipment.</td></tr>
<tr><td>RF emissions
GB 4824（CISPR 11）</td><td>Class B</td><td rowspan="3">The device is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage network that supplies building used for domestic purposes.</td></tr>
<tr><td>Harmonic emissions
GB 17625.1</td><td>Class A</td></tr>
<tr><td>Voltage Fluctuations/Flicker
GB 17625.2
（IEC 61000-3-3）</td><td>Complies</td></tr>
</table>

Guidance and Manufacturer's Declaration – Electromagnetic Immunity This device is intended for use in the electromagnetic environment specified below. The customer or the user of the devices should assure that the device is used in such an environment.			
Immunity test	IEC60601 Test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge（ESD） GB/T 17626.2 （IEC61000-4-2）	±6kV Contact ±8kV Air	±6kV Contact ±8kV Air	Floor should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst GB/T 17626.4 （IEC61000-4-4）	±2kV for power supply lines ±1kV for input/ output lines	±2kV for power supply lines ±1kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge GB/T 17626.5 （IEC61000-4-5）	±1kV line to line ±2kV line to earth ±1kV line to line ±2kV lien to earth	±1kV line to line ±2kV line to earth	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 GB/T 17626.11 （IEC61000-4-11）	<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 device requires continued operation during power mains interruptions, it is recommended that the device be powered from an uninterruptible power source.
Power frequency magnetic field （50/60Hz） GB/T 17626.8 （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 AC mains voltage prior to application of the test level.			

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Immunity test	IEC60601 Test level	Compliance level	Electromagnetic environment - guidance
Conducted RF GB/T 17626.6 （IEC61000-4-6） Radiated RF GB/T 17626.3 （IEC61000-4-3）	3 V (effective value) 150kHz - 80MHz 3 V/m 80MHZ - 2.5GHZ	3 V 3V (effective value) 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the device, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance d =1.2 150kHz-80MHz d =1.2 80MHz-800MHz d =2.3 800MHz-2.5GHz Where: P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer; D is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey [a] should be less than the compliance level in each frequency range [b]. Interference may occur in the vicinity of equipment marked with the following symbol.
Note 1: At 80MHz and 800MHz, the higher frequency range applies. Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection 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 filed strength in the location in which the device is used exceeds the applicable RF compliance level above, the device should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the device. [b] Over the frequency range 150 KHz to 80MHz, field strengths should be less than 10V/m.			

Recommended separation distances between portable and mobile RF communications equipment and the device

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

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter/m		
	150kHz - 80MHz d = 1.2	80MHz - 800MHz d = 1.2	800MHz - 2.5GHz d = 2.3
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 meters (m) can be determined 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 80MHz and 800MHz, 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.