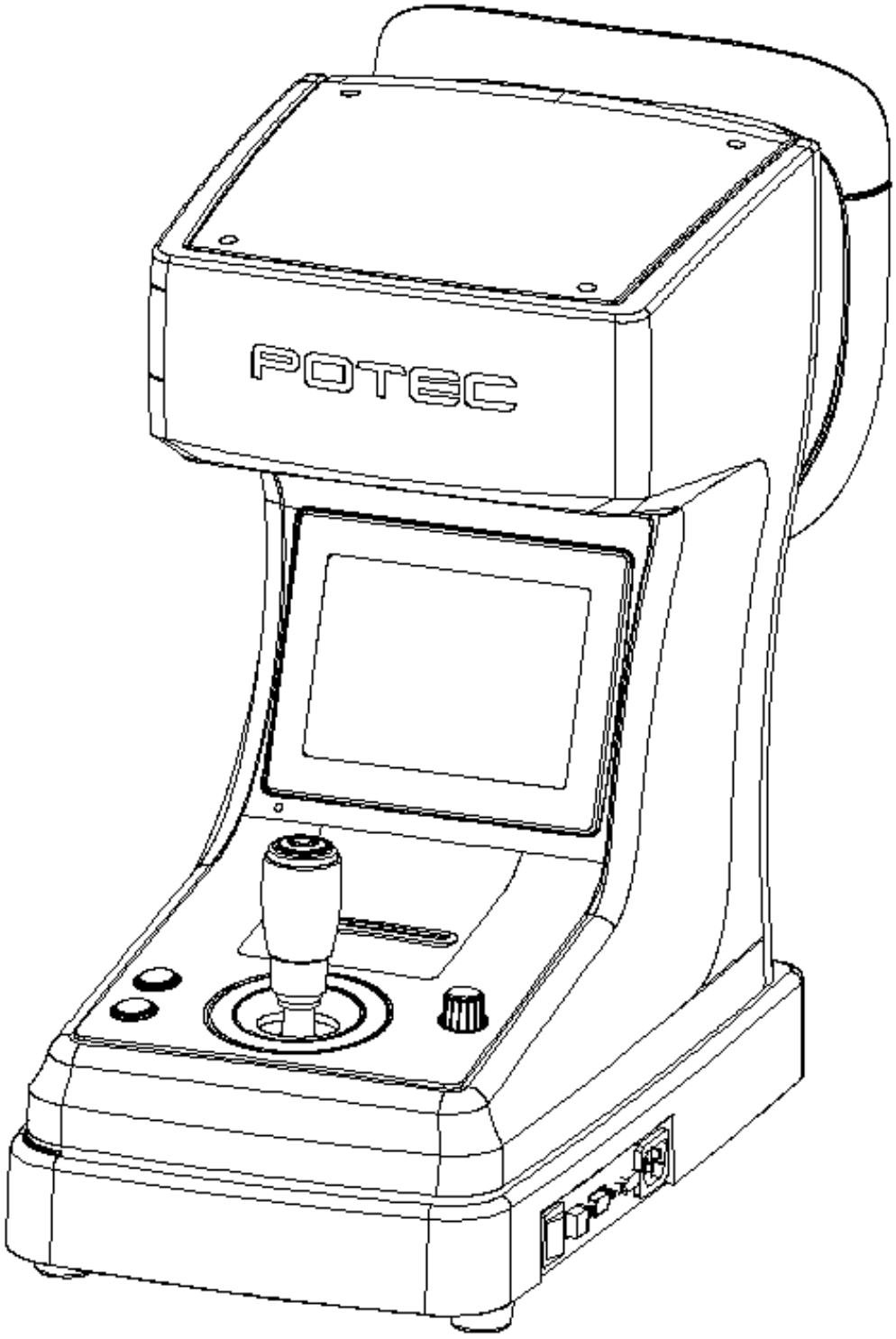
POTEC OPERATION MANUAL

AUTO REF-KERATOMETER PRK-6000



Revision v1.5 www.potec.biz

(2020.01) Before using the instrument, be sure to read this manual thoroughly.

IMPORTANT NOTICE

This product may malfunction due to electromagnetic waves caused by portable personal telephones, transceivers, radio-controlled toys, etc. Be sure to avoid having objects such as, which affect this product, brought near the product.

The information in this publication has been carefully checked and is believed to be entirely accurate at the time of publication. POTEC assumes no responsibility, however, for possible errors or omissions, or for any consequences resulting from the use of the information contained herein.

Upon Request, circuit diagrams, component part lists, descriptions, calibration instructions, or other information will be provided to assist service personnel to repair parts of the equipment that are designated by POTEC as repairable by service personnel.

POTEC reserves the right to make changes in its products or product specifications at any time and without prior notice, and is not required to update this documentation to reflect such changes.

40-4, Techno 2-ro, Yuseong-gu, Daejeon, 34015 Korea

SAFETY INFORMATION

Accessory equipment connected to the analog and digital interfaces must be certificated according to the respective IEC standards (e.g. IEC 60950-1 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore all configurations shall comply with the system standard EN 60601-1:2006, Clause 16. Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of the system standard IEC 60601-1:2005, Clause 16. If in doubt, consult the technical service department or your local representative.

For U.S.A

Do not make any changes or modifications to the equipment unless otherwise specified in the manual.
If such changes or modifications should be made, you could be required to stop operation of the equipment.

For EU Countries

The following mark, the name & address of the EU Representative shows compliance of the instrument with **Directive 93/42/EEC**.

CE
0044

EU Representative:
Medical Device Safety Service GmbH
Schiffgraben 41, D-30175 Hannover, Germany

Symbols marked on the Instrument

Symbol	Description
	TYPE **B** EQUIPMENT
~	Alternating current
	Protective earth (ground)
	Refer to operating instructions
O	Off (power: disconnect to the mains)
I	On (power: connection to the mains)
	Do not place your hand or fingers between the stage and base. Also ensure that the examinee does not place his/her hand or fingers there either. Otherwise, hand or fingers may be hurt.
	Disposal of your old appliance ● When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC. ● All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities. ● The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health. ● For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product

General Safety Information

If you see any warnings or cautions printed on the warning labels, follow the safety instructions in this manual. Ignoring such cautions or warnings while handling the product may result in injury or accident. Be sure to read and fully understand the manual before using this product.
Keep this manual in easy-to-access place.

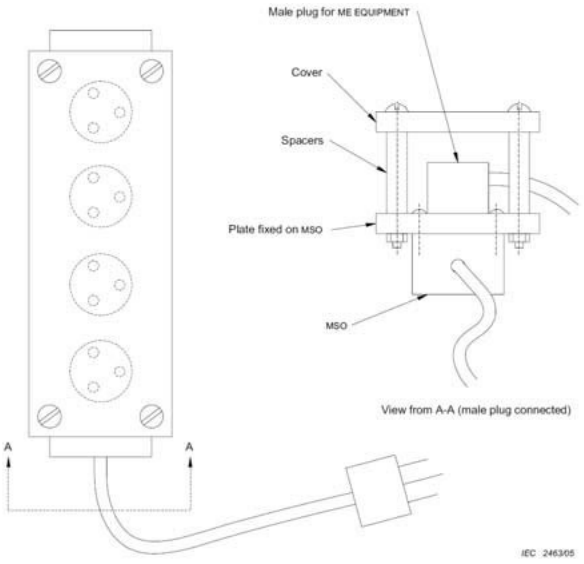
Meaning of Caution Sign

Caution Sign	Description
WARNING	This indicates a potentially hazardous situation which could results in death or serious injury to you or others.
CAUTION	This indicates hazardous situations which may result in minor injury to you or others, or may result in machine damage.

NOTE	This is used to emphasize essential information. Be sure to read this information to avoid incorrect operation.

WARNING	Only operate the instrument with the power supply indicated on the rating plate. Otherwise, it may result in fire or electric shock.
WARNING	Be sure to turn OFF the power switch before connecting or disconnecting the cables. Also, do not handle them with wet hands. Otherwise, you may get an electric shock that may result in death or serious injury.
WARNING	Never disassemble or modify this instrument because it may result in fire or electric shock. Also, since this instrument incorporates high-voltage parts and other hazardous parts, touching them may cause death or serious injury.
WARNING	Should any of the following occur, immediately turn OFF the power switch, unplug the power cable from the AC outlet, and contact the dealer or the agent who/where you purchase this instrument. ● When there is smoke, strange odor or abnormal sound. ● When liquid has been spilled into the instrument or a metal object has entered through an opening. ● When the product has been dropped or its housing damaged.
WARNING	To avoid the risk of electric shock, this equipment must only be connected to supply mains with protective earth.
CAUTION	This instrument is shipped with a grounding type power cable. To reduce the risk of electric shock, always plug the cable into a grounded power outlet.
CAUTION	Ensure that the examinee has not placed his/her hand or fingers under the chin rest. Otherwise, hand or fingers may be hurt.
CAUTION	Wipe the forehead rest with ethanol or glutaraldehyde solution to disinfect it each time a different examinee uses it, in order to prevent infection.
CAUTION	Change the chin rest paper each time the examinee changes in order to keep the chin rest clean.
CAUTION	Do not place your hand or fingers between the stage and base. Also ensure that the examinee does not place his/her hand or fingers there either. Otherwise, hand or fingers may be hurt.
CAUTION	Do not use the device simultaneously with other electronic equipment to avoid electromagnetic interference with the operation of the device.
CAUTION	Do not use the device near, on, or under other electronic equipment to avoid electromagnetic interference with the operation of the device.
CAUTION	Do not use the device in the same room with other equipment such as life-support equipment, other equipment that has major affects on the life of patient an results of treatment , or other measurement or treatment equipment that involve small electric current.

CAUTION	Do not use the device simultaneously with portable and mobile radio frequency communication systems because it may have an adverse effect on operation of the device.
CAUTION	Do not use cables and accessories that are not specified for the device because that may increase the emission of electromagnetic waves from the device or the system and decrease the immunity of the device to electromagnetic disturbance.

CAUTION	Do not position the equipment to make it difficult to operate the disconnection device. (Appliance coupler or separable plug)
CAUTION	Do not placed the multiple socket-outlet for PRK-6000 system on the floor in order to prevent liquid penetration and damage to the product.
CAUTION	PRK-6000 system shall not be connected with additional multiple socket-outlets or extension cords in addition to a designated single multiple socket-outlet.
CAUTION	Maximum permissible load of each socket-outlet used for the PRK-6000 system, shall not be less than 100VA.
CAUTION	If non-medical electrical equipments (e.g. Video monitor, IT equipment, etc.) that are connected with the PRK-6000 are, directly connected to the wall socket-outlets, high touch current may flow since the earth continuity is not ensured.
CAUTION	Multiple socket-outlet should be a grounding-type . and complied with IEC 60884-1.
CAUTION	Connection of the plug shall be possible only by using the tool. (Refer to the figure below.) 

CONTENTS

1. Features

(1) Various Measurements Supported
Not only the usual refractometry and keratometry, but also corneal diameter and base curve of contact lens can be measured with this one instrument. Thus, measurements of eye and prescriptions for glasses and contact lenses can be made more efficiently.

(2) Wide Dioptric Measurement Range
Because the PRK-6000 covers a wide measurement range, from –25D to +22D, even an examinee with strong myopia can be measured.

(3) More Accurate Measurement
You can measure more accurately because foggy method of the eye fixation target makes the examinee's eye comfortable.

(4) Pupil Distance(PD) can be measured.

(5) Customized Specifications
You can change the order of measurement modes, delete unnecessary modes, and/or change order for printing results.

(6) Easy Connection with Other Equipments
This instrument is designed to connect other equipments using RS-232 or USB communication..

(7) External VGA Monitor Display Supported
You can connect VGA monitor for the external display

2. Notes for Using the Instrument

(1) Do not hit or drop the instrument. The instrument may be damaged if it receives a strong impact. The impact can damage the function of this instrument. Handle with care.

(2) Exposure to the direct sunlight or too bright indoor lights can influence on the result of accurate measurement.

(3) If you want to connect this with other equipments, consult the dealer.

(4) Sudden heating of the room in cold areas will cause condensation on the protective glass in the measurement window and on optical parts inside the instrument. In this case, wait until condensation disappears before performing measurement.

(5) Keep clean the objective glass of the examinee side. If it is stained with other substance, it may effect on error or inaccurate measurements.

(6) Don’t press the “TOUCH BUTTON” on LCD monitor by nail or sharp object. It may make scratch on the surface of LCD.

(7) Disconnect the power supply and consult the dealer in case there is smoke, strange odor or noise on working.

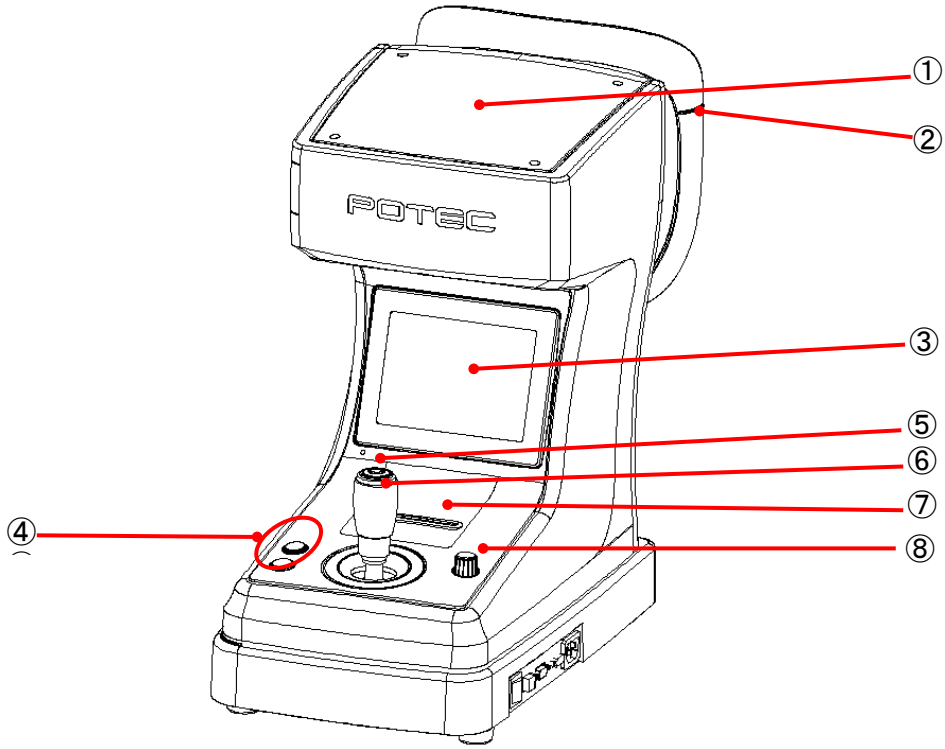
(8) Don’t use organic solution such as alcohol, thinner, benzene, etc. to clean the surface of this instrument. It may damage the instrument.

(9) When moving this PRK-6000, fix the stage by using stage holding knob, always check if the power supply is off, and then lift the bottom of the unit with both hands.

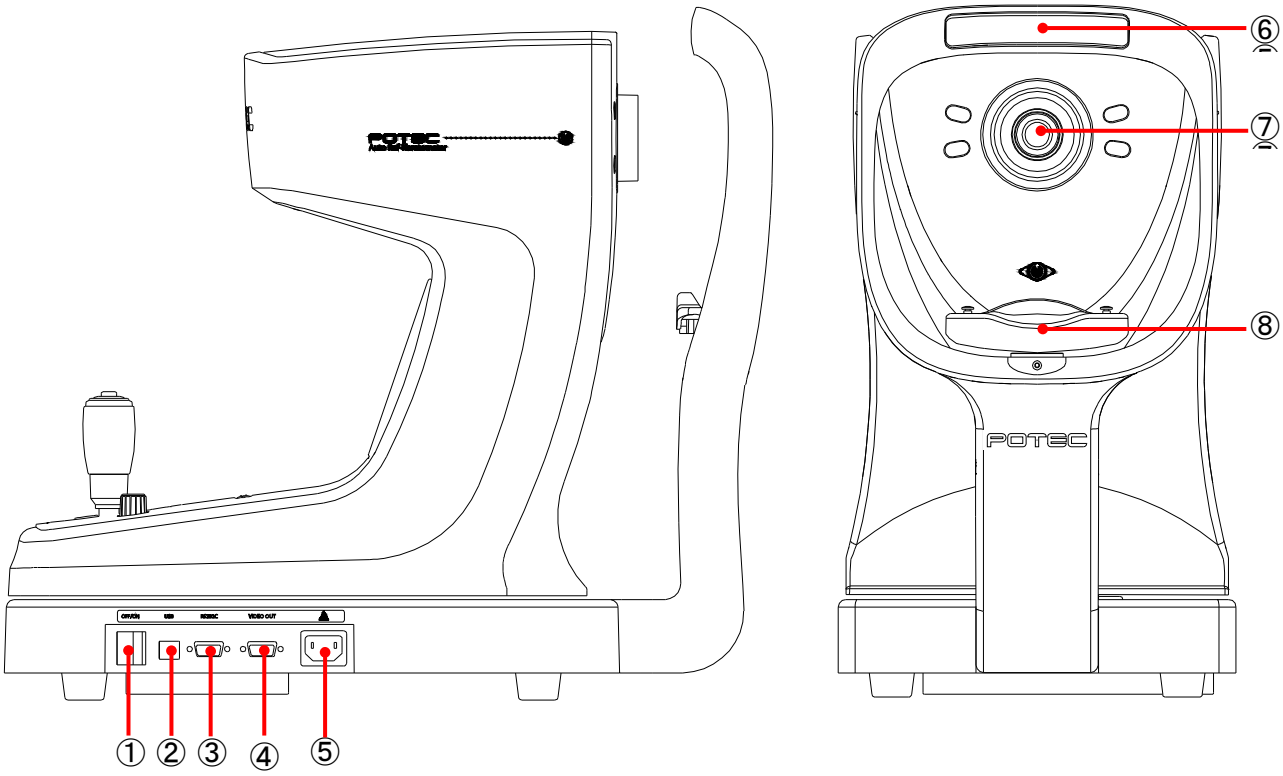
(10) If you leave PRK-6000 without using for certain period, disconnect the power supply and protect the unit with dust cover.

3. Description

3.1 Main Unit



Name	Function
① Measurement Head	Unit that performs measurement.
② Height Adjustment mark	Align the height of the examinee's eye with this mark by adjusting the height of chin rest.
③ Monitor	Monitor that displays Measurement and SET Modes displays.
④ Chinrest adjuster	Align the height of chin rest up and down.
⑤ Measurement button	Press this button for measurement.
⑥ Operation Lever	Use this lever for alignment and focusing.
⑦ Printer	Print the measured result.
⑧ Stage Holding Knob	Holds the movement of stage (sliding table).



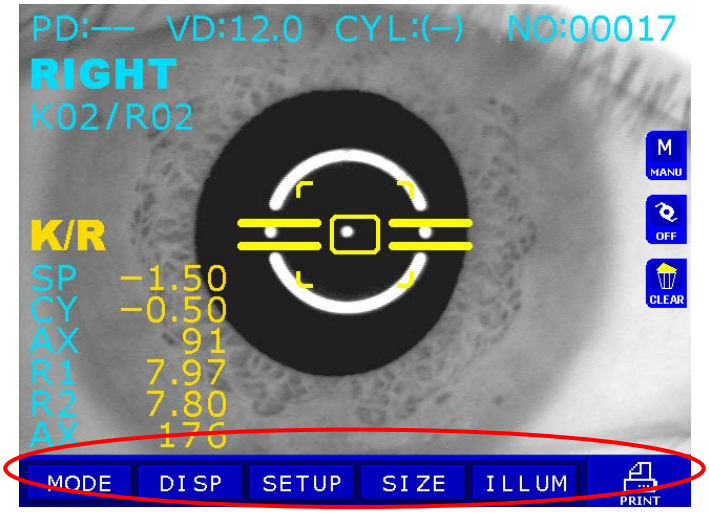
① Power switch	Switch for turning power ON and OFF.
② USB	USB connector for other instruments.
③ RS-232	RS-232 connector for other instruments.
④ Video Output	Connector for the VGA monitor cable
⑤ Power supply connector	Connector for the power supply cable.
⑥ Forehead Rest rubber	Place the examinee's forehead against this rest.
⑦ Measurement window	Window for the examinee to look into for measurement.
⑧ Chin Rest	Place the examinee's chin on this rest

If you want to connect the input / output signal ports and other devices that must meet IEC standards (IEC60950 IT equipment, IEC60601 medical equipment)
If in doubt should contact POTEC or your authorized distributor.

NOTE	The materials composed of the parts that contact the patient during measurement are as follows. Do as much as possible to avoid contact. - Forehead rest: Silicon rubber

3.2 Operation Panel

CHINREST ▲/▼



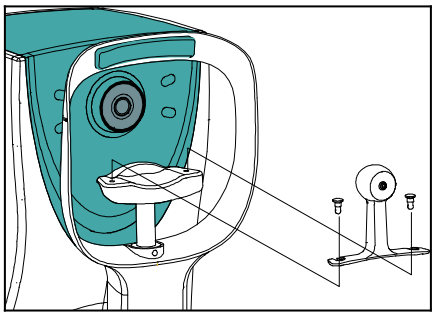
Touch Button (virtual button by monitor & touch screen)

CHINREST ▲/▼	These switches are for rasing/lowering the chin rest. Press "▲" switch in order to raise and "▼" switch to lower the chin rest.
MODE	(Touch Button) Press this button in order to change measurement mode.
DISP	(Touch Button) Press this button in order to enter DISPLAY Mode, where you can see measurement data stored in memory..
SETUP	(Touch Button) Press this button in order to enter SETUP Mode, where you change all the settings about measurements, printouts etc.
SIZE	(Touch Button) Press this button in order to enter SIZE Mode, where you can measure the diameter of cornea, etc.
ILLUM	(Touch Button) Press this button in order to enter RET (Retroillumination) Mode, where you can observe the image obtained by retroillumination.
PRINT	(Touch Button) Press this button in order to print or transfer the measurement.
M MANU A AUTO	(Touch Button) Press this button in order to start manual or automatic measurement.
OFF ON	(Touch Button) Press this button when the examinee's eye is difficult to measure due to cataract or examinee with intraocular lens (IOL).
CLEAR CLEAR	(Touch Button) Press this button to clear all stored data in memory.

4. Practicing through Model Eye

Practice measurement by using the accessory Test Model Eye before doing the actual measurement.

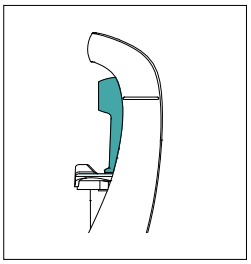
(1) Turn ON the power
Turn ON the **power switch** of the instrument.



(2) Attach the model eye
Remove the chin rest paper and align the holes on the base of the model eye with the holes on the chin rest. And insert pins.

(3) Release stage lock
Turn the stage holding knob in counterclockwise direction to release the stage lock.

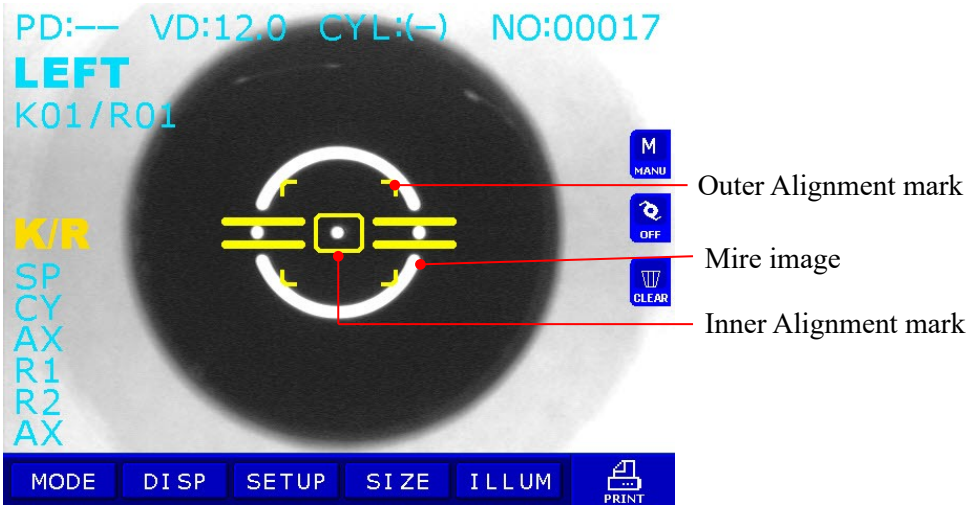
(4) Adjust height of Test Model Eye
Adjust the height of the chin rest by pressing "**CHINREST ▲/▼**" so that the Test Model Eye is aligned with the "Height Adjustment mark" on the face rest.



(5) Enter K/R or REF Mode.
If neither "K/R" nor "REF" is displayed on the monitor, press **MODE button** until either one is displayed.

(6) Please select measurement step to 0.12D
For more details, kindly see "6.4 SETUP mode"

(7) Adjust the position and focus on the model eye



Looking at the monitor, incline the **operation lever** toward the model eye until a bright dot appears near the **Inner Alignment Mark**. Place the **Bright Dot** in the center of Inner Alignment Mark. If position cannot be adjusted just by inclining the operation lever, slide the lever in the direction required.
Focus on the model eye by inclining the operation lever forward and backward so that the Mire Ring image is displayed clearly on the monitor.

(8) Measurement

- Manual measurement
  - (a) Adjust the position and focus on the model eye like the procedure (6).
  - (b) Press the Measurement button. At this point, if measurement is failed with messages like **ERROR**, repeat the procedure (a) and press the Measurement button again.
  - (c) Check whether diopter value is measured or not. Diopter value is recorded in the bottom area of the model eye. If you are not satisfied with the measured value, measure in the same way and check again.

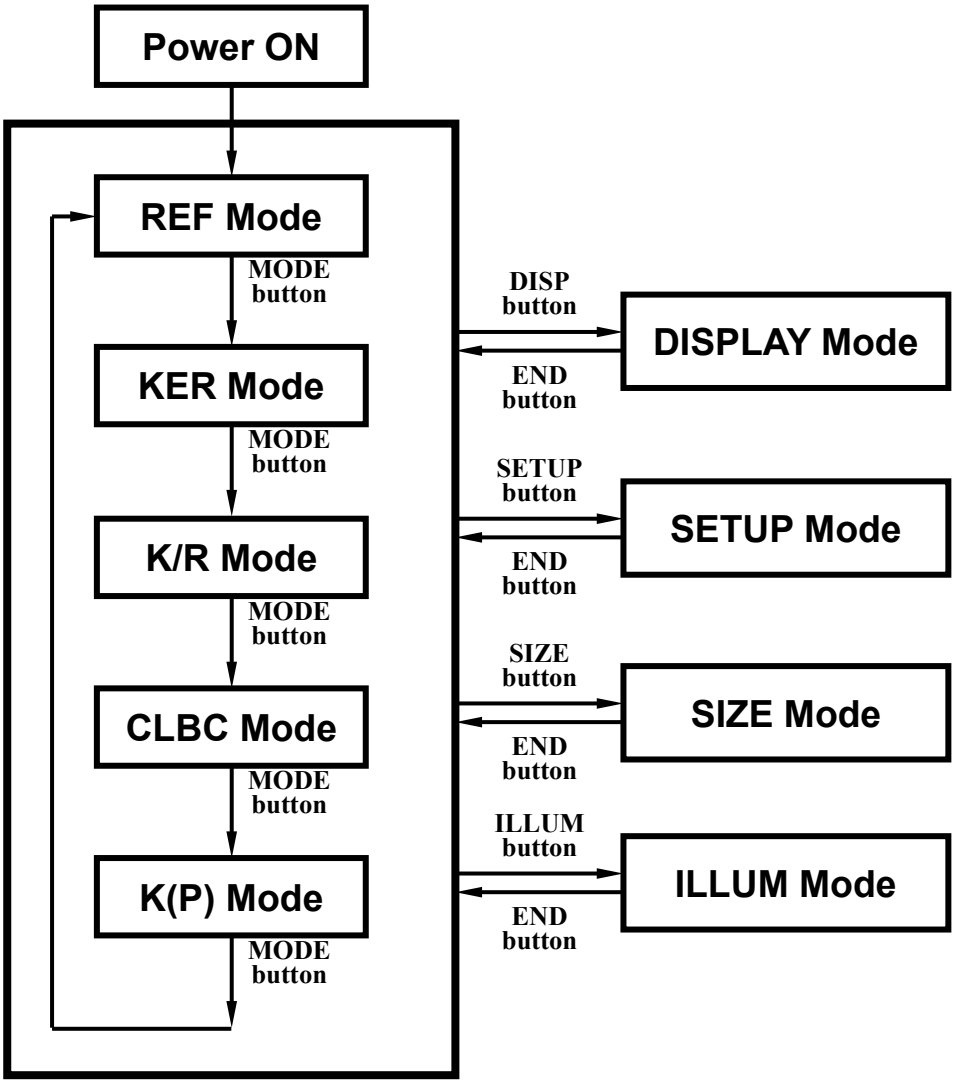
- Automatic measurement

  Continuous measurement starts automatically and will be performed 3 times or 5 times. (See 6.4 (4) Customize Measuring Modes, AutoStart, etc.)
  - (a) Press the AUTO button on the operation panel.
  - (b) Adjust the position and focus on the model eye like the procedure (6) at previous page.
  - (c) When the Bright Dot enters the Inner Alignment Mark and model eye is in focus properly, measurement starts automatically.
  - (d) Execute the procedures (c) of manual measurement.

5. Measurement

WARNING	Should any of the following occur, immediately turn OFF the power switch, unplug the power cable from the AC outlet, and contact the dealer or the agent who/where you purchase this instrument. ● When there is smoke, strange odor or abnormal sound. ● When liquid has been spilled into the instrument or a metal object has entered through an opening. ● When the product has been dropped or its housing damaged.

Relation between buttons and modes.

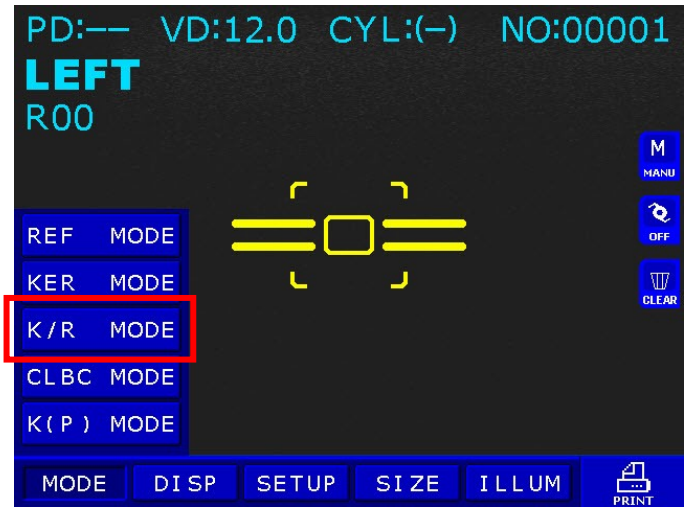


NOTE: IOL button will be enabled at K/R mode and REF mode only. If IOL button is pressed, IOL measurement will be performed and pressed again to render the basic measurement.

5.1 Continuous Keratometry & Refractometry [K/R Mode]

In the K/R mode, refractometry is automatically performed after keratometry.

(1) Enter K/R Mode
Press **MODE button** ⇨ Press **K/R MODE button**



(2) Adjust height of examinee's eye.

CAUTION	Ensure that the examinee has not placed his/her hand or fingers under the chin rest. Otherwise, hand or fingers may be hurt.
CAUTION	Wipe the forehead rest with ethanol or glutaraldehyde solution to disinfect it each time a different examinee uses it, in order to prevent infection.
CAUTION	Change the chin rest paper each time the examinee changes in order to keep the chin rest clean.

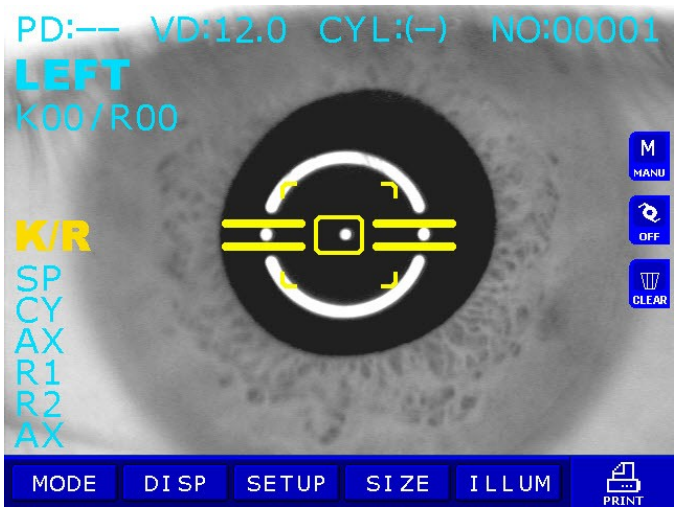
Have the examinee sit and place his/her chin and forehead against the chin rest and forehead rest.

Adjust the height of the chin by pressing "**CHINREST ▲/▼**" so that the eye of the examinee is aligned with the height adjustment mark on the face rest.

(3) Perform alignment and Focusing

CAUTION	Do not place your hand or fingers between the stage and base. Also ensure that the examinee does not place his/her hand or fingers there either. Otherwise, hand or fingers may be hurt.

Slide the operation lever to the left so that the right eye of the examinee is displayed on the monitor.
Ask the examinee to look at the red roof in the center of the scene (eye fixation target).
Looking at the monitor, check that image of the mire ring is not obscured by the upper eyelid. If it is covering the ring, instruct the examinee to keep his/her eye opened wide until measurement ends. Or help them open the eye wider by lifting up his/her upper eyelid lightly with your fingers.
Looking at the monitor, incline the operation lever to right or left, and turn the operation lever so the pupil is concentric with the inner alignment mark. If the pupil is large, align it with the outer alignment mark.
Focus on the mire image by inclining the operation lever forward and backward.



NOTES:

① **Slide stage to the forward/backward and right/left if you are unsatisfied with the operation lever control.**

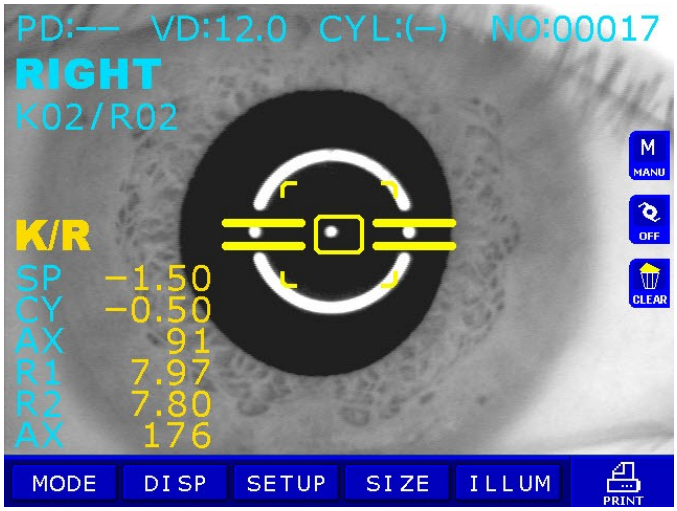
② **If the alignment marks and the pupil are not concentric, instruct the examinee to look at the red roof at the center of the picture. Otherwise, measurement error may occur due to aberration.**

(4) Measurement

Press the Measurement button.

Measurement will be continuously performed when the Measurement button is kept pressed.

- The newest measured results will be displayed on the monitor.
- In case of the continuous measurement, the result of previous measurement will be displayed.
- If you change setting at PAGE1 of SETUP Mode, you can select the vertex distance.
- If you change setting at PAGE1 of SETUP Mode, you can change display format of CYL value.
- When measured results are displayed, changing at PAGE1 of SETUP Mode renders each cornea measured result of **R1/R2/AX → K1/K2/AX → AR/CY/AX** displayed in turn.



NOTES:

① **There can be error if the Outer Alignment Mark and the pupil is eccentric.**

② **There may be some aberration to the measurement value due to the eccentricity or inclination of lens, or deformation of cornea after surgery.**

③ **Reliability of the measurement with IOL switch turned ON may be low.**

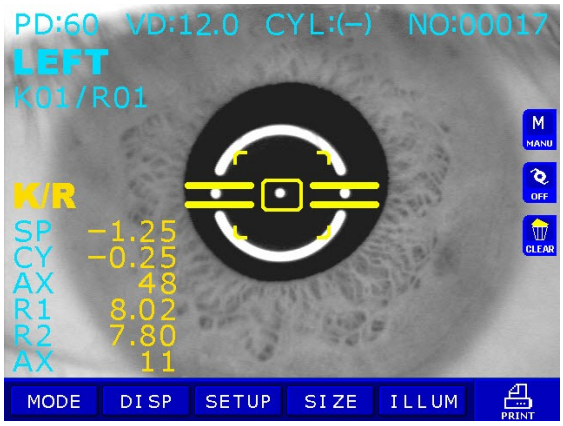
(5) Repeated measurement

Measurement could be repeatedly performed if necessary.

- The newest result will be displayed on the monitor whenever measured.
- Maximum of 10 newest data items for both right and left eyes will be stored in memory except error data. And those data can be showed in the DISPLAY mode window.

(6) Measure the Other Eye.

Slide the stage to the right side and measure the left eye.



- After both eyes are measured, pupil distance(PD) will be displayed on the monitor.
- If stage is slid to the right eye again without pressing the PRINT button, the last measurement will be displayed. And when measurement button is pressed, the new value will be added to them.

NOTES: Safety information about infrared light radiation for measurement

As light sources for measurement, this instrument adapted two type of infrared LED. It was chosen to satisfy the amount of energy exiting from the instrument never exceed the limit value recommended by the international standard ISO 15004. This condition is satisfied even when the instrument is operating at maximum light intensity and maximum aperture! (Maximum intensity is the highest brightness the instrument is capable of delivering, including the highest brightness achievable if overvoltage is provided)

Detailed radiation information at normal usage of this instrument is like bellows.

① Keratometry @ 770nm (LED type IWL-BR30F):

- Output < 0.03 mW/cm^2

(Group 1 limit≤20mW/cm^2 for unweighted corneal and lenticular infrared radiation irradiance, EIR-CL @ wavelength of 770 to 2500nm, acc. To ISO15004-2:2007, 5.4.1.4);

② Refractometry @ 880nm (LED type HE8807SG):

- Output < 0.15 mW/cm^2

(Group 1 limit≤0.7mW/cm^2 for weighted retinal visible and infrared radiation thermal hazard, EVIR-R @ wavelength of 380 to 1400nm, acc. To ISO15004-

2:2007, 5.4.1.6 a);

(7) Print

Press the Print button.

The selected data in the SETUP mode will be printed.(See 6.4 (3) Print Format, Communication)

Lift the printing paper from one side and give it a sharp tug to tear it off after printing is completed.

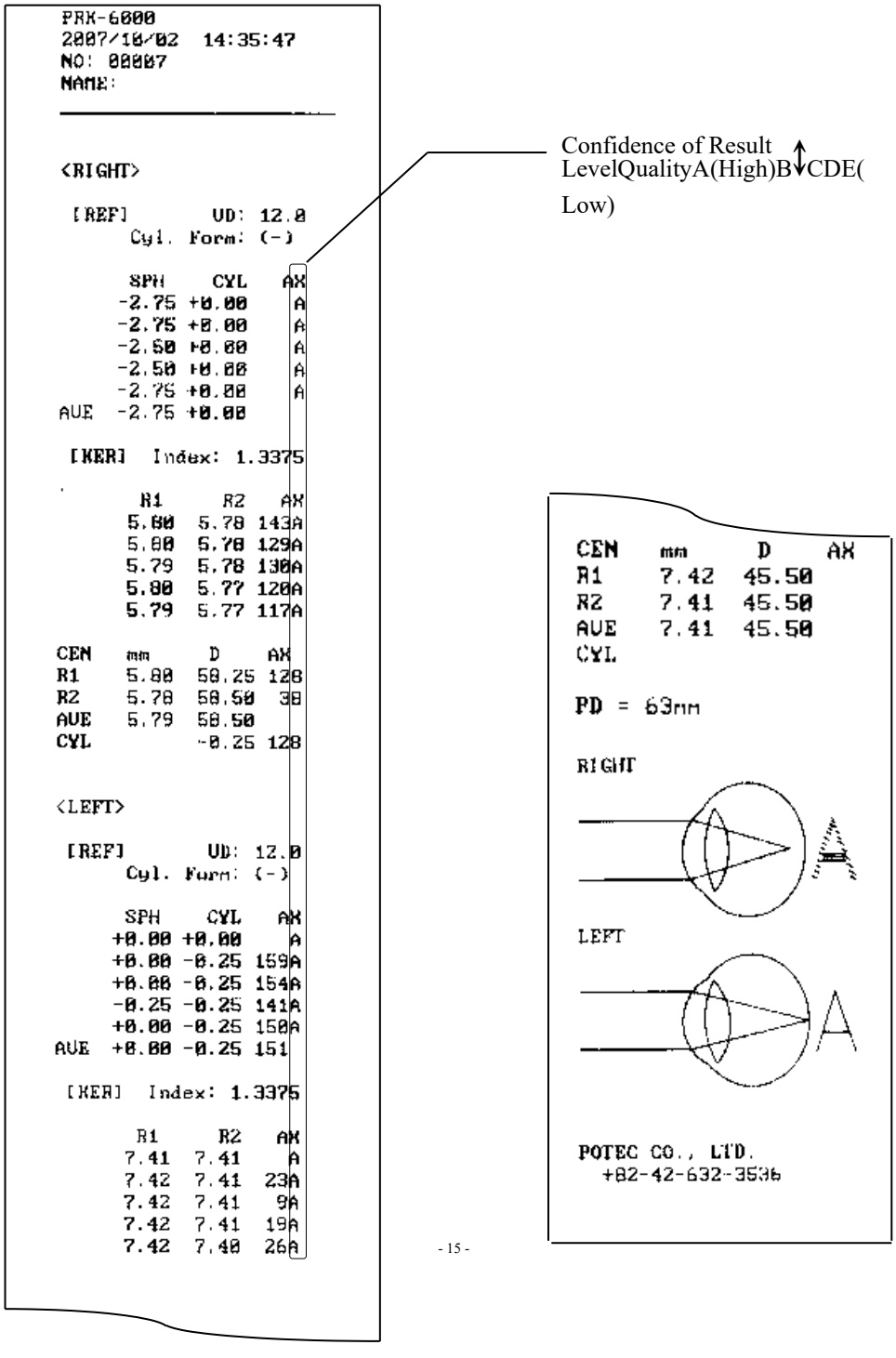
Fill the name of the examinee in the NAME box if necessary.

NOTES:

① **Results will be erased after printing/transfer is performed.**

② **It is recommended that a hard copy of the printouts be made if you wish to store it for a long time, because printouts on the thermal paper are apt to deteriorate.**

< example of printout >



5.2 Refractometry [REF Mode]

Only refractometry can be performed in the REF mode.

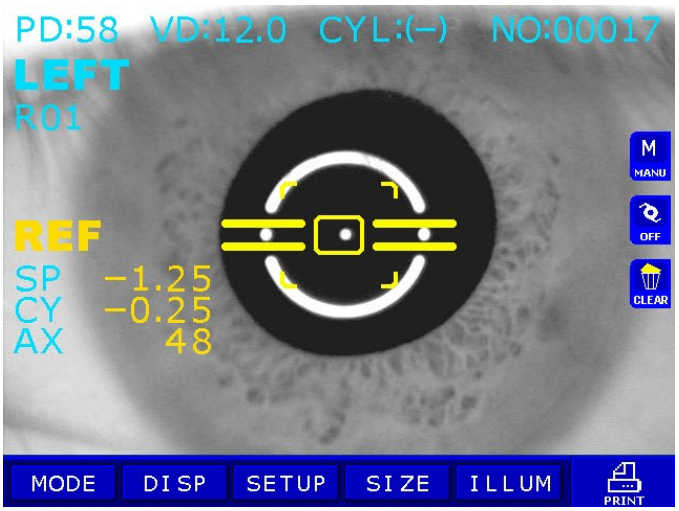
(1) Enter REF Mode
Press **MODE button** ⇨ Press **REF MODE button**

(2) Follow the same procedure (2) of the Continuous Keratometry and Refractometry [K/R Mode].

(3) Perform alignment and Focusing
Align the pupil and alignment marks, and focus on the mire image by using the operation lever.

(4) Measurement
Press the measurement button.
Measurement will be continuously performed when the measurement button is kept pressed.

- If you change setting at PAGE1 of SETUP Mode, you can select the vertex distance.
- If you change setting at PAGE1 of SETUP Mode, you can change display format of CYL value.

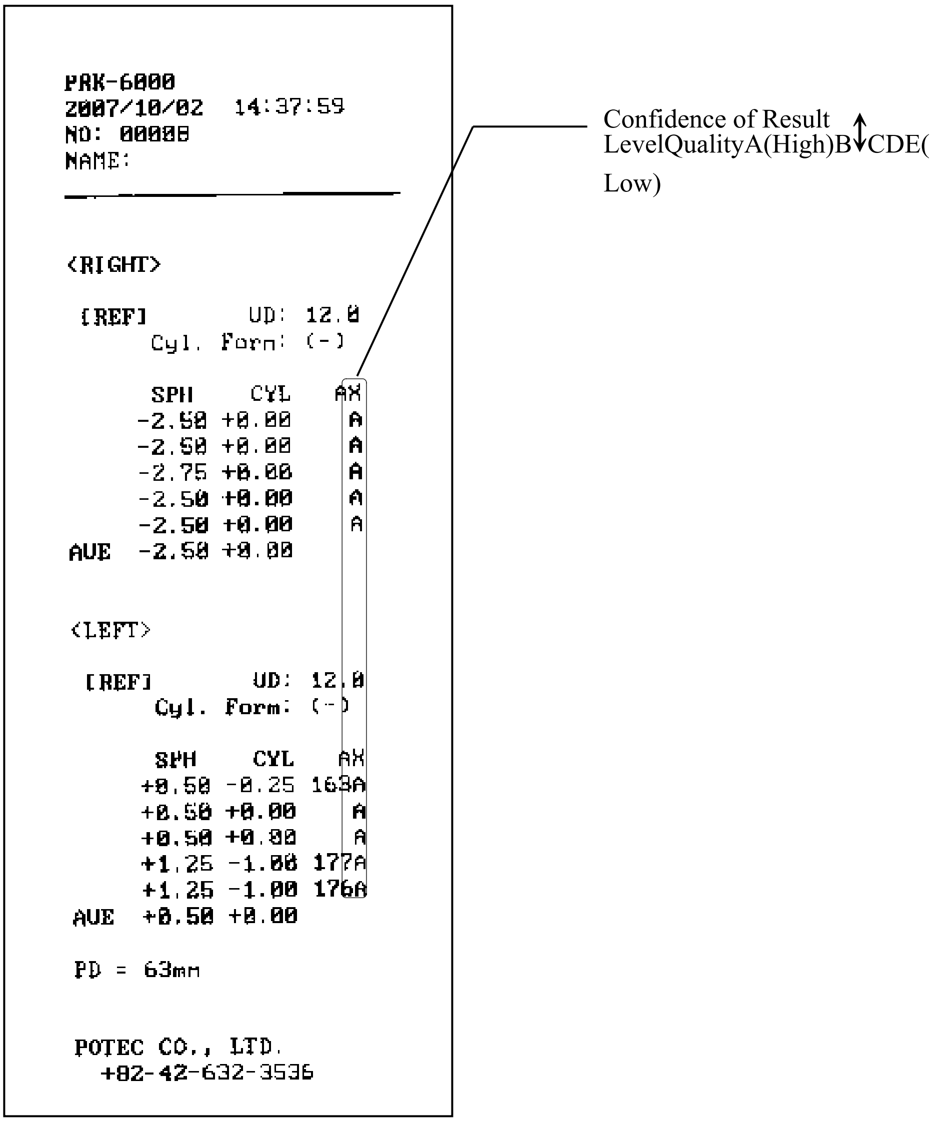


NOTES:

① **There can be error if the Outer Alignment Mark and the pupil is eccentric.**
② **There may be some aberration to the measurement value due to the eccentricity or inclination of lens, or deformation of cornea after surgery.**
③ **Reliability of the measurement with IOL switch turned ON may be low.**

(5) Follow the same procedure (5)~(7) of the Continuous Keratometry and Refractometry [K/R Mode].

< example of printout >



5.3 Keratometry [KER Mode]

Only the radius of curvature of the cornea can be measured in KER Mode.

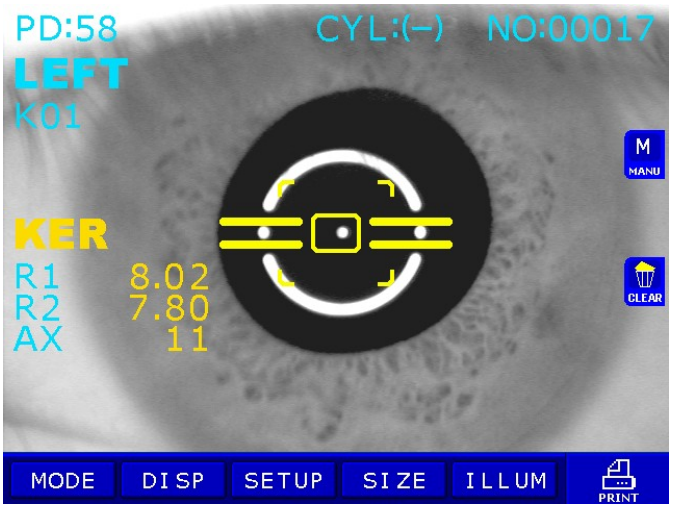
NOTES: Don't measure the base curve of contact lens in this mode.
Measurement error will occur when it is measured in KER mode.

(1) Enter KER Mode.
Press **MODE button** ⇨ Press **KER MODE button**.

(2) Follow the same procedure (2) and (3) of the Continuous Keratometry and Refractometry [K/R Mode].

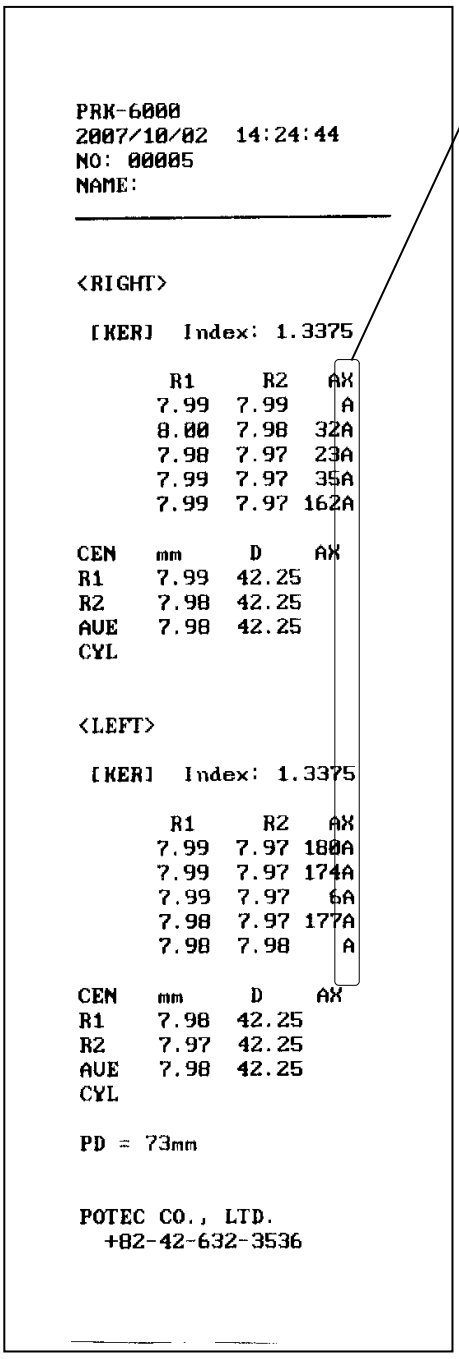
(3) Measurement
Press the Measurement button.
Measurement will be continuously performed when the Measurement button is kept pressed.

- The measured results will be displayed on the monitor.
- In case of the continuous measurement, previous measured result will be displayed.
- When measured results are displayed, changing at PAGE1 of SETUP Mode renders each cornea measured result of **R1/R2/AX → K1/K2/AX → AR/CY/AX** displayed in turn.



(4) Follow the same procedure (5)~(7) of the Continuous Keratometry and Refractometry [K/R Mode].

< example of printout >



PRK-6000
2007/10/02 14:24:44
NO: 00005
NAME:

<RIGHT>

[KER] Index: 1.3375

R1	R2	AX
7.99	7.99	A
8.00	7.98	32A
7.98	7.97	23A
7.99	7.97	35A
7.99	7.97	162A

CEN	mm	D	AX
R1	7.99	42.25	
R2	7.98	42.25	
AVE	7.98	42.25	
CYL			

<LEFT>

[KER] Index: 1.3375

R1	R2	AX
7.99	7.97	180A
7.99	7.97	174A
7.99	7.97	6A
7.98	7.97	177A
7.98	7.98	A

CEN	mm	D	AX
R1	7.98	42.25	
R2	7.97	42.25	
AVE	7.98	42.25	
CYL			

PD = 73mm

POTEC CO., LTD.
+82-42-632-3536

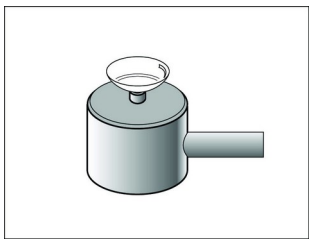
Confidence of Result LevelQualityA(High)B↕CDE(Low)

5.4 Contact Lens Base Curve Measurement [CLBC mode]

Base curve (posterior curve) of hard contact lens can he measured in the CLBC Mode.

(1) Enter CLBC Mode
Press **MODE button** ⇨ Press **CLBC MODE button**.

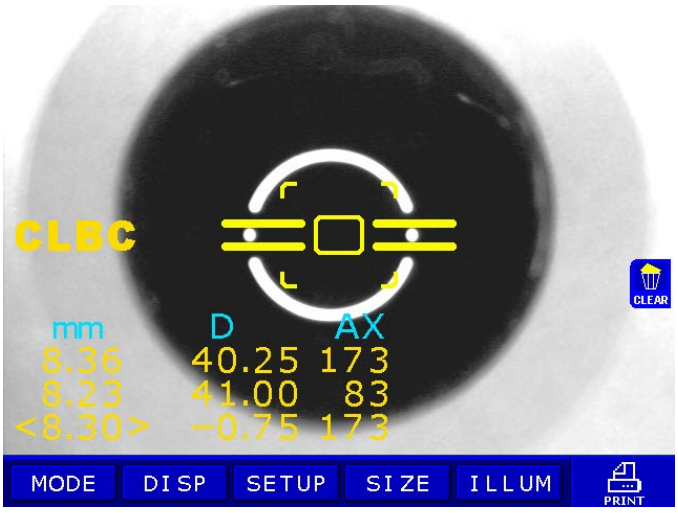
(2) Attach Contact Lens.
Put water in the concave section of contact lens holder at backside of the TEST Model Eye and place the contact lens on the holder with the concave surface facing upward. Contact lens is attached by surface tension. Take care that the contact lens is not attached inclined. Also, take care that there are no bubbles behind the contact lens.



(3) Attach the TEST Model Eye.
Remove the chin rest paper. Fix the model eye attached with contact lens using pin.
Place the contact lens to face the measurement window.

(4) Perform alignment and Focusing
Align alignment marks and mire image.
Then, focus on the mire image.

(5) Measurement
Press the Measurement button.
Measured results will be displayed on the monitor.



(6) Print
Press the PRINT button.

5.5 Peripheral Keratometry [K(P) Mode]

In K(P) Mode, peripheral corneal curvatures can be measured by having the examinee look at the peripheral eye fixation lamps. Measuring the corneal periphery will help you examine irregular astigmatism, and also determine a better fitting for a contact lens.
There are two modes for lighting the peripheral eye fixation lamps:

AUTO Mode: After measuring the center of cornea, four peripheral eye fixation lamps light automatically in turn according to the corneal astigmatism axis.

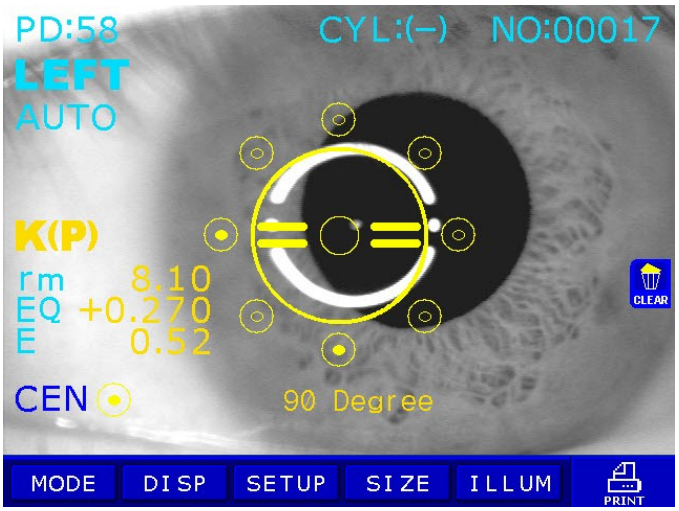
MANU Mode: Peripheral eye fixation lamp to be lit can be selected from eight positions by pressing the touch screen.

When you enter this mode after measuring the center of cornea in K/R or KER Mode, or if you measure the center first after entering this mode, you will automatically enter AUTO Mode first.

(1) Enter K(P) Mode.
Press **MODE button** ⇨ Press **K(P) MODE button**.

(2) Follow the same procedure (2) and (3) of the Continuous Keratometry and Refractometry [K/R Mode].
Have the examinee look at the lit peripheral eye fixation lamp. Blinking circle on the monitor show the lamp at the examinee's side is lit in order to make measurement. Looking at the monitor, align the mire image and alignment mark, and focus on the mire image by using the operation lever.

(3) Measurement
After ensuring that the positioning and focusing are proper, press measurement button.



[AUTO Mode]
After each measurement, the target at the position to be measured next blinks automatically on the monitor. Each time, have the examinee look at the lamp, perform alignment and focusing, and then measure.
If the center area has not been measured yet, the target on the left side of the word

"CEN" on the monitor will be blink. Have the examinee look at the red roof in the center of the scenery, and measure.
If "ERR" is displayed as a result of measuring the center, peripheral eye fixation lamp will not light until the center is measured properly.
Change to MANU Mode as required.

[MANU Mode]
You can enter MANU Mode by pressing the touch screen. As you select one from eight target positions, the position of blinking target changes. Select the target, perform alignment and focusing, and measure.

- Only the value of the last measurement will be displayed on the monitor. You cannot see any one of the previous measurements even if you select the target which has already been measured by pressing the touch screen. Enter DISPLAY Mode if you wish to see the result of measuring other parts. (See chapter 6)

NOTES:

① **Once you have entered MANU Mode, you must end the measurement, press PRINT button, and start a new measurement in order to return to AUTO Mode.**

② **Eccentricity ("E" and "EQ") will not be calculated unless the center of cornea is mesured.**

(4) Repeat the measurement as required.
Measure the same eye for a second time as required.

(5) Measure the other eye.
Measure the other eye in the same manner.

< example of printout >

```
PRK-6000
2007/04/06  14:07:17
NO: 00004
NAME:
_____________________


<RIGHT>

 [KER]  Index: 1.3375

       R1     R2   AX
     7.88   7.73  10A

CEN   mm     D    AX
R1    7.88  42.75  10
R2    7.73  43.75 100
AVE   7.80  43.25
CYL         -1.00  10


K_P   r(m)   EQ    E
0'    NAS
      8.00 +0.237  0.49
100'  TEM
      7.97 +0.120  0.36
90'   SUP
      8.14 +0.409  0.64
270'  INF
      7.93 +0.095  0.31


<LEFT>

 [KER]  Index: 1.3375

       R1     R2   AX
     7.95   7.68   6B

CEN   mm     D    AX
R1    7.95  42.50   6
R2    7.68  44.00  96
AVE   7.82  43.25
CYL         -1.50   6


K_P   r(m)   EQ    E
100'  NAS
      7.96 +0.024  0.15
0'    TEM
      8.06 +0.200  0.46
90'   SUP
      8.02 +0.090  0.31
270'  INF
      8.02 +0.236  0.49
135'  N-S
      8.11 +0.232  0.48
315'  T-I
      8.10 +0.196  0.44
45'   T-S
      7.99 +0.100  0.43
225'  N-I
      7.97 +0.016  0.13

PD = 61mm
```

Right Eye	Left Eye	Symbol
0’	180’	NAS
45’	135’	N-S
90’	90’	SUP
135’	45’	T-S
180’	0’	TEM
225’	315’	T-I
270’	270’	INF
225’	225’	N-I

lius of curvature on measured meridian

EQ: Quadrate of eccentricity on measured meridian(If the peripheral radius of curvature is larger than the center, +sign will be displayed. If it is smaller, -sign will be displayed.)

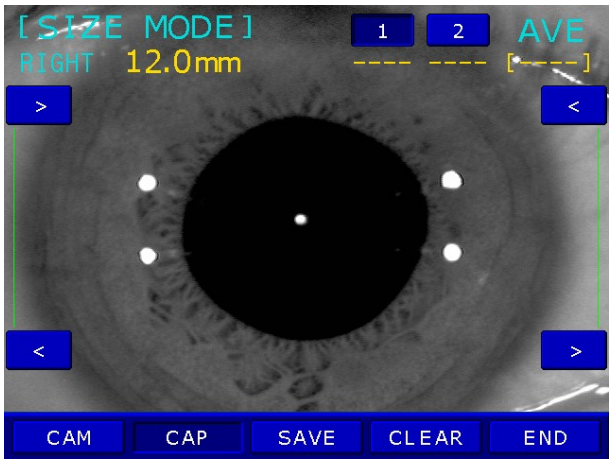
E: Eccentricity on measured meridian

6. Other Modes

6.1 Measuring Cornea Diameter [SIZE Mode]

Diameter of cornea can be measured in SIZE Mode for prescribing contact lens.
The size of pupil can also be measured to see how much it is dilated, and the size of contact lens can be measured without having the examinee remove it.

(1) Enter SIZE Mode.
Press SIZE button in the Measurement Mode. Press END button in order to go out SIZE Mode.



(2) Positioning and Focusing
Ask the examinee to look at the red roof of the eye fixation target.
Control operation lever to align the pupil between the two vertical bars

- If the diameter of contact lens is going to be measured, focus on the edge of lens.
- If the diameter of pupil is going to be measured, focus on the iris.

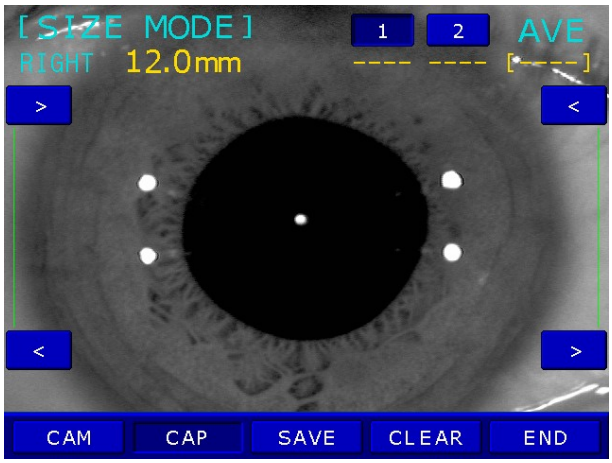
(3) Measurement

Press the measurement button to pause the window.

If the frozen image is not clear, you can unfreeze the image by pressing the MODE button.

To move the vertical bars by pressing the AUTO button or DISPLAY button.

To move two vertical bars by pressing the IOL button or ILLUM button at the same time.



End of the SIZE MODE

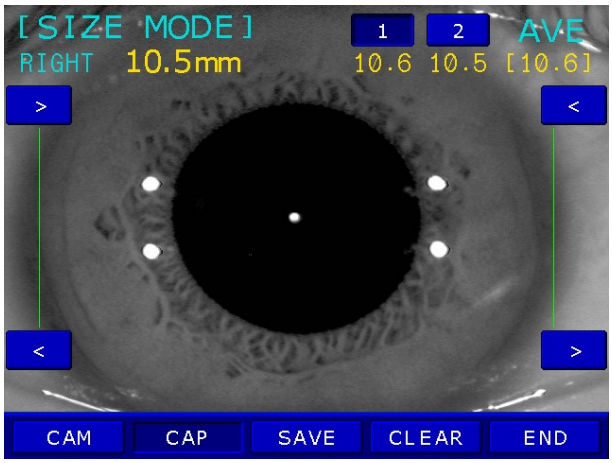
Unfreeze the image and delete the results

Save measured value

Capture image to be measured

Unfreeze the image

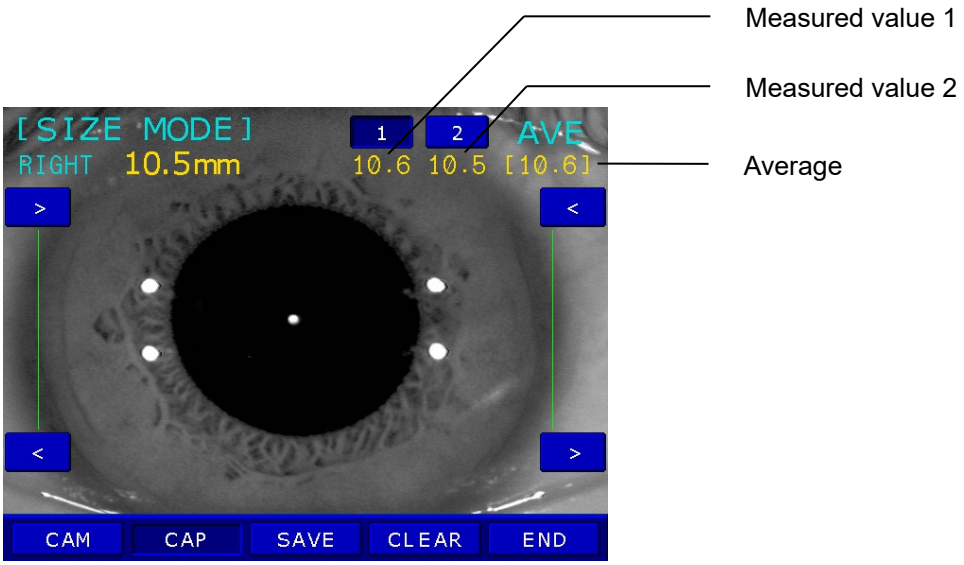
- The measured value will be displayed on the monitor.
  When you press the Measurement button, it will save the measured value, unfreeze the image and change the entry of measured value.
- Measured value is shown under “1” as well as “AVG” on top of the window.



(4) Select the Entry of measured value.
Pressing the touch button at upper side of monitor renders to select “1” or “2”. In case there are some mistakes in the previous “1” measurement, “1” can be selected again.

(5) Repeated Measurement
Repeat the measurement as required by repeating procedures (2)~(4).

- The two newest measurements will be displayed and stored.
- The average of the two newest measurement will be calculated and displayed under “AVG”.



(6) Measure the other eye
Slide the stage with holding the operation lever on the other side. And measure the other eye in the same way.

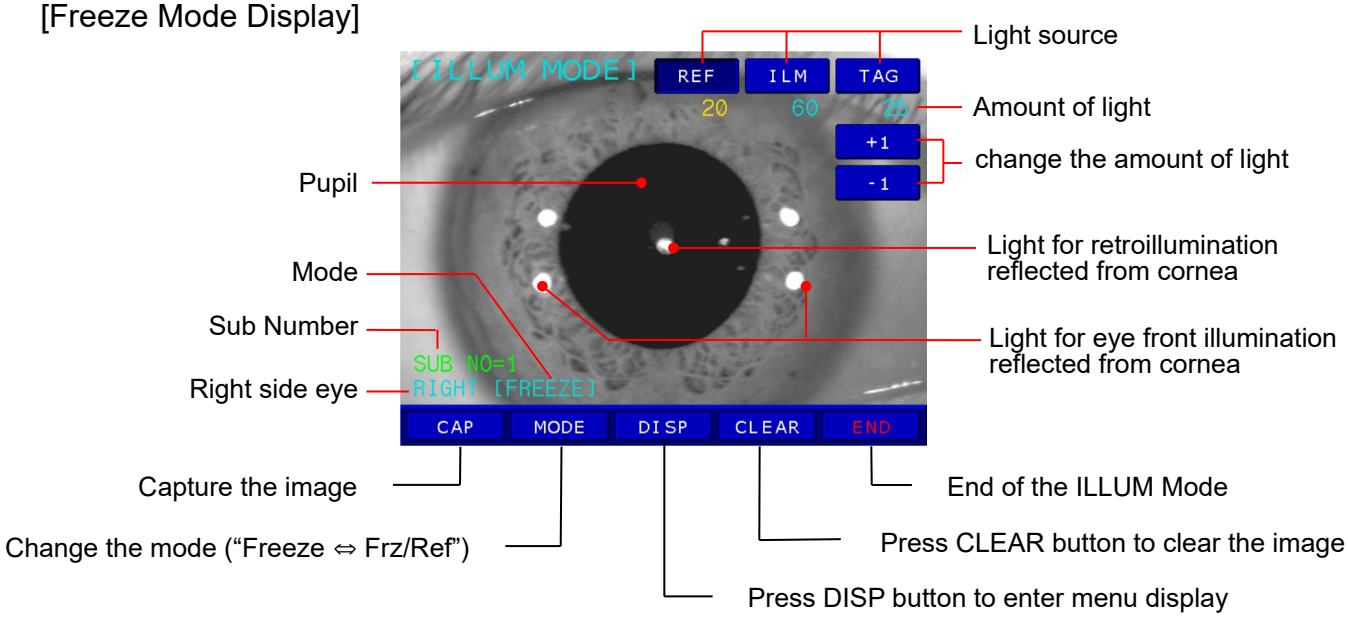
(7) Print
The result of cornea diameter will be printed as “[CORNEAL SIZE]” item.

6.2 Observe image obtained by Retroillumination [ILLUM Mode]

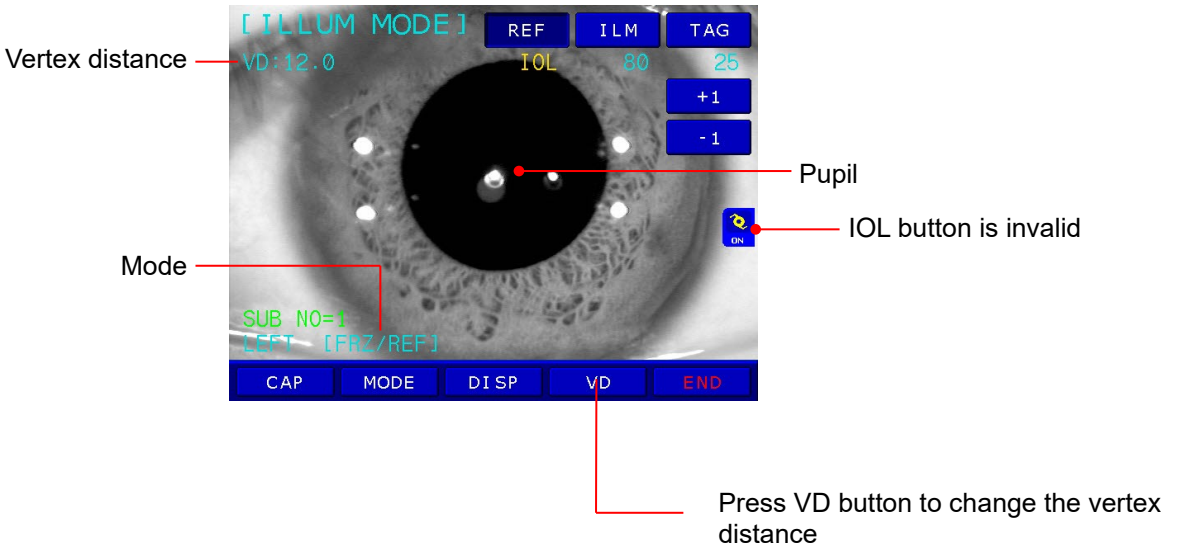
By directing a light into the pupil, you can observe the condition of cataract or scratches on contact lens on the monitor in ILLUM Mode.
Maximum of two images for each eye can be displayed and stored in one display.
You can select an image and display it in a magnified size.
You can upload an image and display it in a magnified size to a computer.

(1) Enter ILLUM mode.
Press ILLUM button in the Measurement MODE. Press END button in order to go out ILLUM mode.

[Freeze Mode Display]



[Freeze/Ref Mode Display]



(2) Ready for Observation

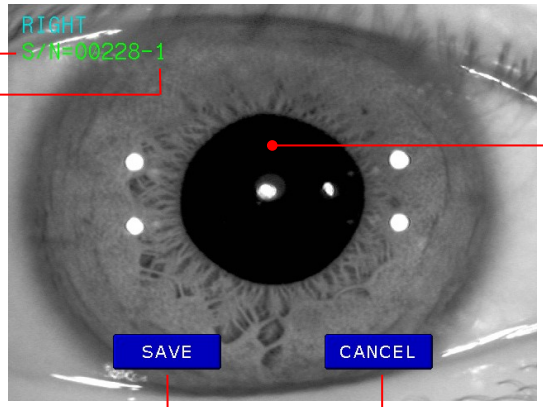
Ask the examinee to look at the red roof of the eye fixation target.

See procedure (3) of the “5.1Continuous Keratometry and Refractometry [K/R Mode]”

(3) Observation

- Adjust the amount of light of each light source so the image can be seen clearly. Press one of buttons for each light source on the upper side of display. The selected light source will be displayed in pressed button. (RED:Light source for retroillumination, ILM:Light source for illumination eye front, TAG:Light source for illuminating internal eye fixation target, Variable range:0-100 / If it is Set to 0, the light turns off)
- Position the light for retroillumination reflected from cornea to a part that is not opaque by using the operation lever. If the light is directed from the edge of the pupil, it will be easier to observe the image. Focus on the image.
- After confirming that the image is focused, press measurement button. The image will freeze.

[Freeze Mode Display]



Serial Number

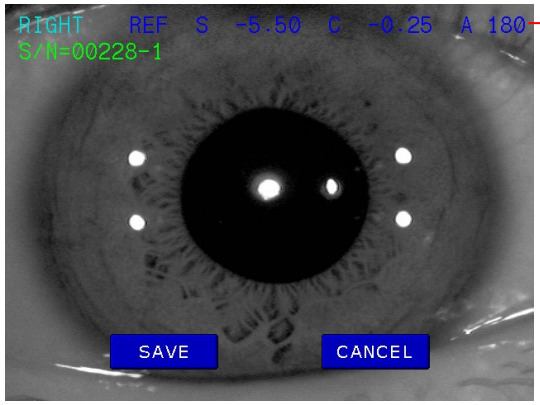
Sub Number

Pupil

Press SAVE button to store the image into memory.

Press CANCEL button not to store the image.

[Freeze/Ref Mode Display]



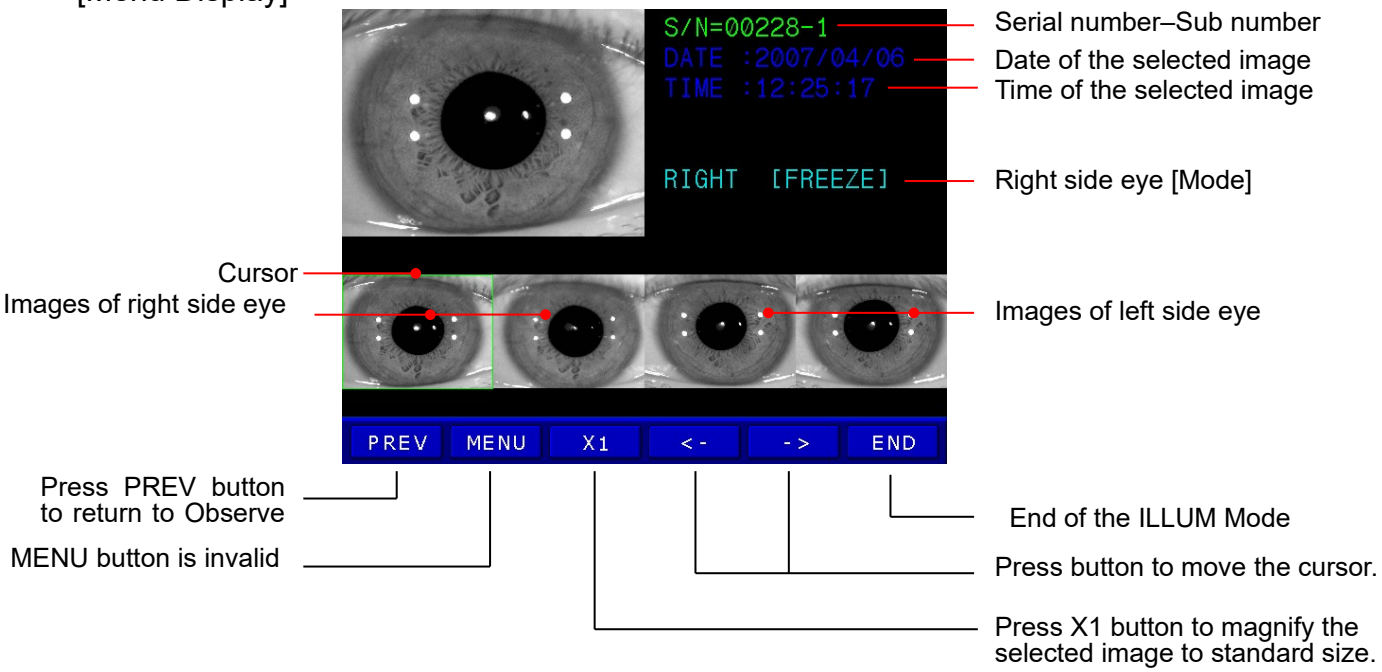
Result of refractometry

- Maximum of two images can be stored for each eye. Each image will have a sub number (01 or 02).

(4) Displaying of stored Image

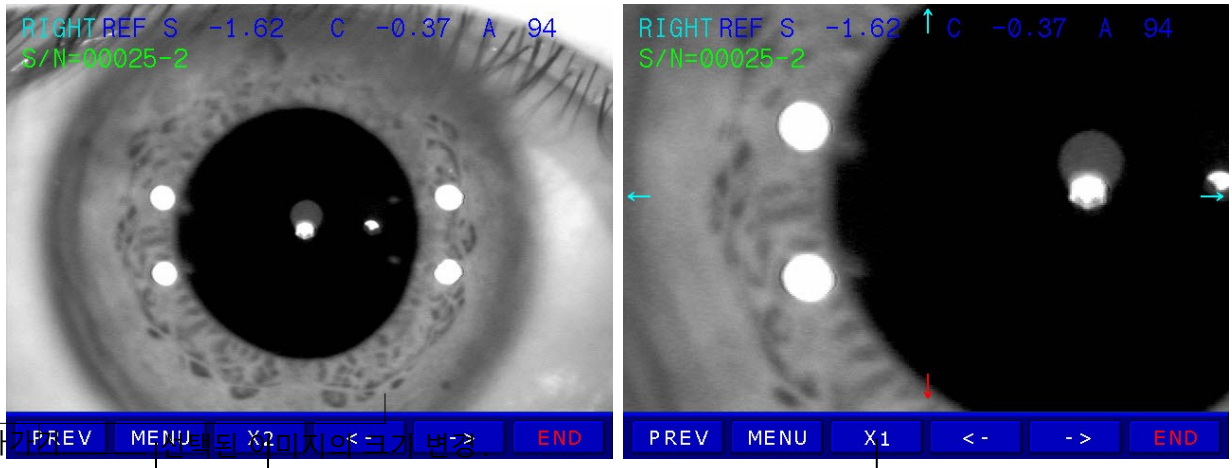
- Press DISP button in observation display. Images stored in memory will be displayed.

[Menu Display]



- Press “<-” or “->” button in menu display to select the image to be magnified with the cursor.
- Press “X1” button. Image will be display in standard size or double size.

[Standard Size Display / Double Size Display]



- Image of double size can be moved by touching four directions (“←”, “↑”, “↓”, “→”)

6.3 DISPLAY Mode

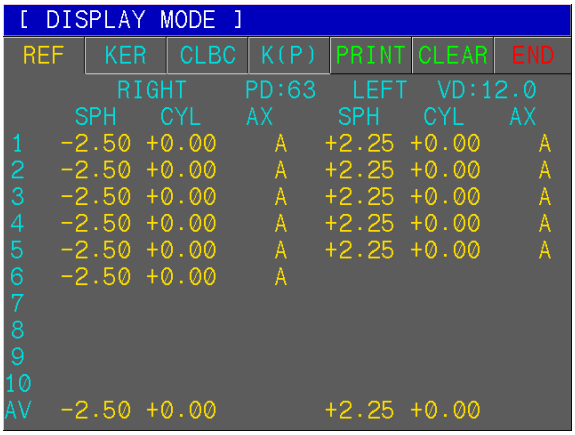
The stored data (maximum 10 data for each eye) in memory can be displayed in this mode. To enter DISPLAY Mode, press DISP button in the Measurement Mode. Press END button in order to go out SIZE Mode.

NOTES:

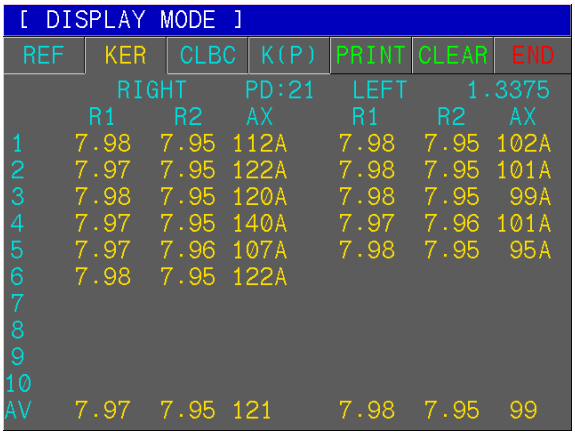
① **Press one of four tab buttons on upper side of display. Result of selected page will be displayed.**

② **Press PRINT button to print the stored data.**

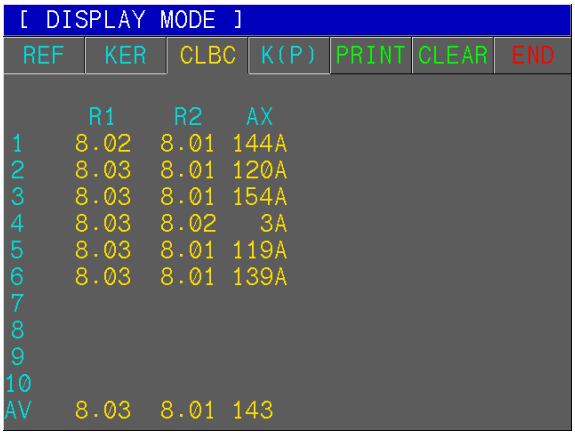
③ **Press CLEAR button to clear all stored data in memory.**



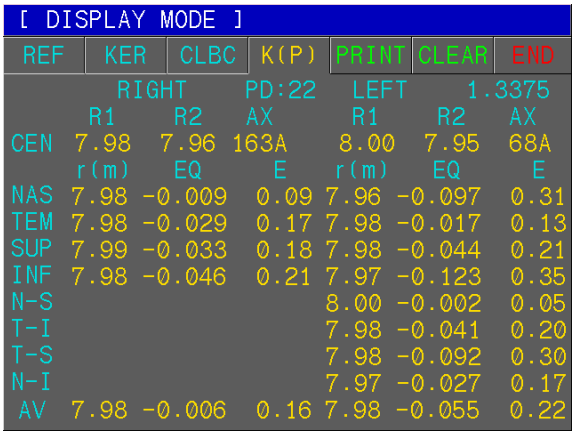
< Display for REF >



< Display for KER >



< Display for CLBC >

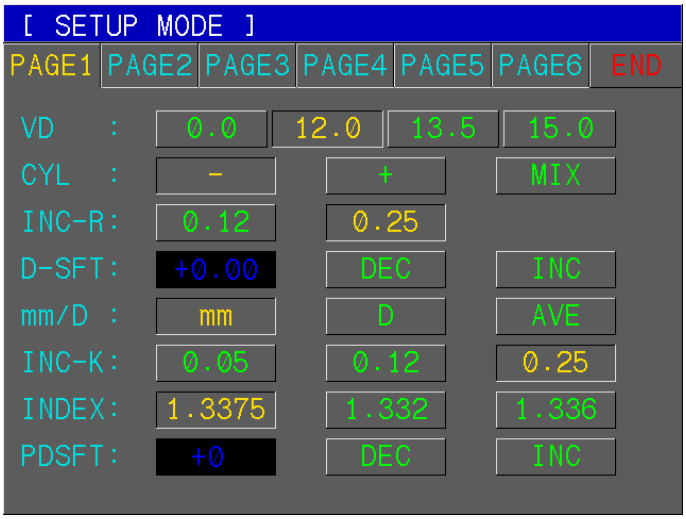


< Display for K(P) >

6.4 SETUP Mode

Change all the settings about measurements, printouts etc.
Press SETUP button in Measurement Mode. PAGE1 of SETUP Mode will be displayed.
Press END button in order to return to Measurement Mode.

(1) Refractometry / Keratometry



[How to Change the Page]
Press one of six tab buttons on the upper side of display.

[How to Change the Item]
Pressing any button on display yields the selection of related item.

[How to Change the Contents]
Press any un-pressed button on display. The selected button will be displayed in pressed button and the content will be changed.
NOTE: There are some contents to be changed in the other way. And such procedures will be instructed under the description of each item.

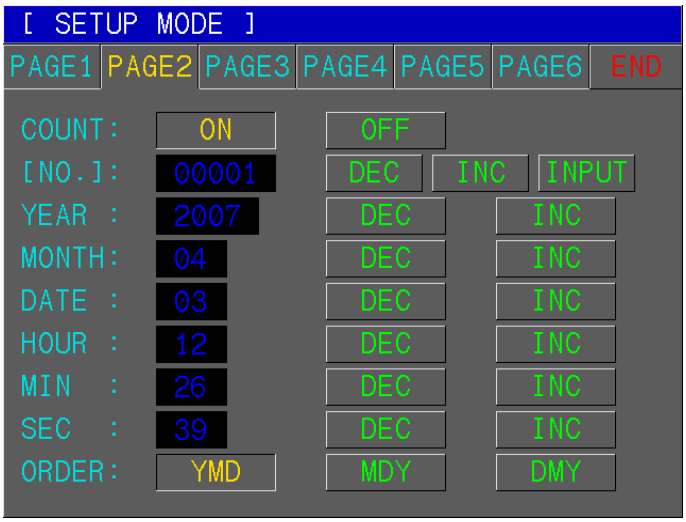
[How to Enter the Measurement Mode]
Press END button to quit the SETUP mode and enter the Measurement mode.

[Items]
VD Vertex distance
CYL Cylinder form
INC-R Increment of sphere and cylinder
D-SFT Diopter Shift of Sphere
Press INC or DEC button to change the value of sphere by 0.12.
mm/D Form of displaying result of keratometry
mm R1 ····· Radius of curvature on minimum meridian
R2 ····· Radius of curvature on maximum meridian

AX ····· Axis on maximum meridian
D K1 ····· Refractive power on minimum meridian
K2 ····· Refractive power on maximum meridian
AX ····· Axis on minimum meridian
AVG AR ·····Average radius of curvature
CY ·····Corneal astigmatism
AX ····· Axis of corneal astigmatism

INC-K Increment of corneal power and astigmatism
INDEX Corneal equivalent refractive index
PDSFT Value Shift of Pupil Distance
Press AUTO or DISPLAY button to change the value of Pupil Distance

(2) Serial Number, Time and date



[How to Change the Page]
Press one of six tab buttons on the upper side of display.

[How to Change the Item]
Pressing any button on display yields the selection of related item.

[How to Change the Contents]
Press any un-pressed button on display. The selected button will be displayed in pressed button and the content will be changed.

NOTE: There are some contents to be changed in the other way. And such procedures will be instructed under the description of each item.

[How to Enter the Measurement Mode]
Press END button to quit the SETUP mode and enter the Measurement mode.

[Items]

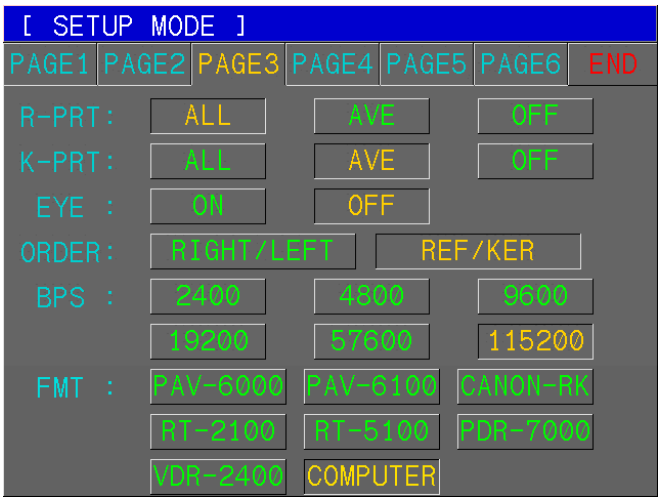
COUNT To select whether using the serial number or not.

[NO.] Setting of the serial number
Pressing DEC or INC button renders the serial number to be decreased or increased by “1”.
Pressing INPUT button enables you input number from Dialog Box.

DATE Time and date
Pressing DEC or INC button renders the related item to be decreased or increased by “1”.
2001 ~ 2099 : Year
01 ~ 12 : Month
01 ~ 31 : Day
00 ~ 23 : Hour
00 ~ 59 : Minutes

ORDER Order of displaying the date

(3) Print Format, Communication



[How to Change the Page]
Press one of six tab buttons on the upper side of display.

[How to Change the Item]
Pressing any button on display yields the selection of related item.

[How to Change the Contents]
Press any un-pressed button on display. The selected button will be displayed in pressed button and the content will be changed.

NOTE: There are some contents to be changed in the other way. And such procedures will be instructed under the description of each item.

[How to Enter the Measurement Mode]
Press END button to quit the SETUP mode and enter the Measurement mode.

[Items]

R-PRT Result of Refractometry to be printed out
- ALL: Maximum of the 10 newest measurements and an average value for each eye.
- AVE: Average values only
- OFF: Not printed.

K-PRT Result of Keratometry to be printed out
- ALL: Maximum of the 10 newest measurements and an average value for each eye.
- AVE : Average values only
- OFF: Not printed.

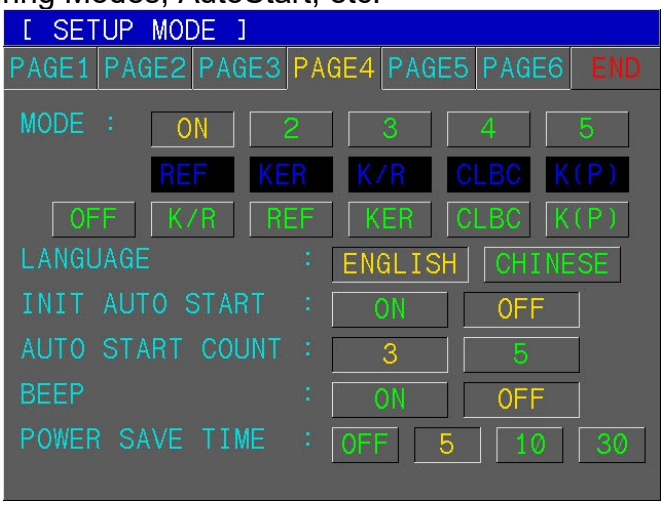
EYE ON: A sketch of eyeball and refraction diagram to the results of refractometry are printed.
OFF: Not printed.

FMT RS-232 data format
PAV-6000, PAV-6100, CANON-RK, RT-2100, RT-5100, PDR-7000, VDR-2400, **COMPUTER**

BPS RS-232 data transfer speed
2400, 4800, 9600, 19200, 57600, **115200**

(It is only possible to select the the ‘BPS’ in COMPUTER mode.)

(4) Customize Measuring Modes, AutoStart, etc.



[How to Change the Page]
Press one of six tab buttons on the upper side of display.

[How to Change the Item]
Pressing any button on display yields the selection of related item.

[How to Change the Contents]
Press any un-pressed button on display. The selected button will be displayed in pressed button and the content will be changed.

NOTE: There are some contents to be changed in the other way. And such procedures will be instructed under the description of each item.

[Items]

MODE Assigns order of Measurement Modes “REF, KER, K/R, CLBC, K(P)” and delete unnecessary modes.

1: First mode that is displayed when power is turned ON. It cannot be set to “OFF”.

2~5: Second modes and after.

- Assign First Measurement Mode and after.
- If you want to delete unnecessary modes, delete from last(5^{th}) one.

LANGUAGE: ENGLISH / CHINESE

INIT AUTO START

OFF: Manual start after power ON

ON: Automatic start after power ON

AUTO START COUNT

3: Continuous measurement starts automatically and will be performed 3 times.

5: Continuous measurement starts automatically and will be performed 5 times.

BEEP ON: Enable BEEP sound in measurement mode.

OFF: Disable BEEP sound.

POWER SAVE TIME

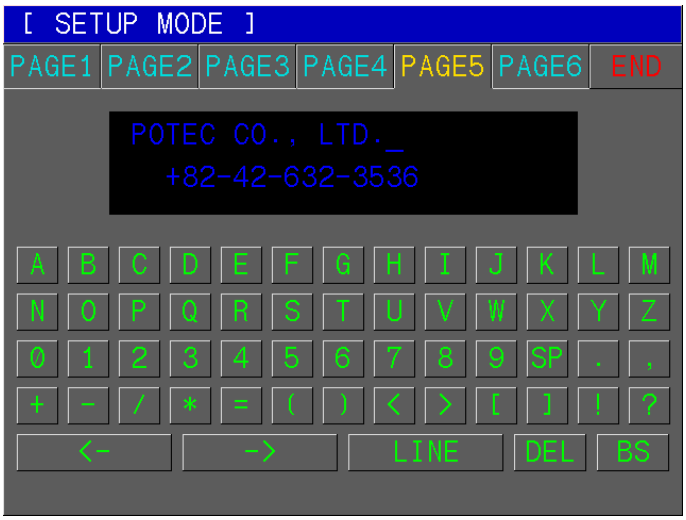
OFF: Disable Power Save Function.

5: Enter Power Save Mode if there is on operation by operator about 5 minutes.

10: Enter Power Save Mode if there is on operation by operator about 10 minutes.

30: Enter Power Save Mode if there is on operation by operator about 30 minutes.

(5) Messages for Internal Printer



Enter a message to be printed out with the results of measurement using the internal printer in this window.
You can enter a messages in 24 characters × 2 lines.

[How to Change the Page]
Press one of six tab buttons on the upper side of display.

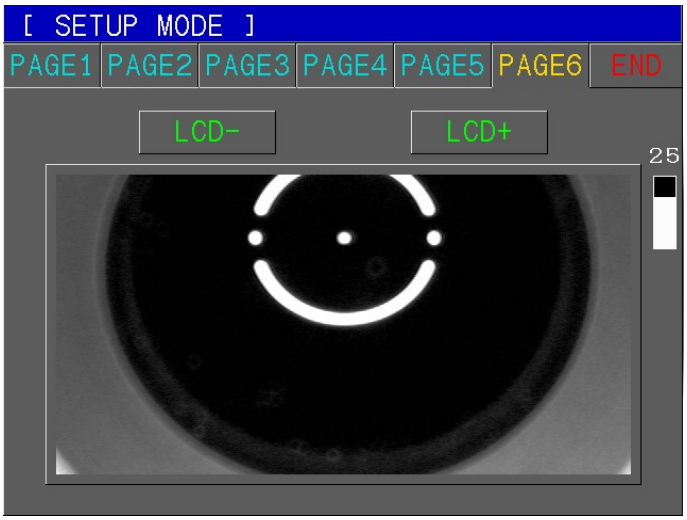
[Cursor Position]
The cursor blinking in the upper area represents the input position.
Press LINE button to change the row of the blinking cursor.
Pressing “<-” or “->” button yields the right and left change of the position of the cursor.

[Input of Messages]
Press any one of alphanumeric buttons to add character in the position of the blinking cursor.

[Deletion of Messages]
If you press the DEL button, the character of blinking cursor will be deleted.
If you press the BS button, the character in front of the blinking cursor will be deleted.

[How to Enter the Measurement Mode]
Press SIZE button to quit the SETUP mode and enter the Measurement mode.

(6) Adjust Brightness



Adjust the brightness of monitor.

[How to Change the Page]
Press one of six tab buttons on the upper side of display.

[How to adjust the monitor]
Press “LCD-” or “LCD+” button to adjust the brightness of monitor (1~35).

[How to Enter the Measurement Mode]
Press SIZE button to quit the SETUP mode and enter the Measurement mode.

6.5 Power Saving Mode

If you keep this instrument idle for about 5 minutes in the measurement mode, it will turn to the power saving mode. READY LED will be on and off in the power saving mode. Press any button to resume to the Measurement Mode.

7. Self Inspection and Maintenance

7.1 Before Calling a Service Person

Warning messages will be displayed on the monitor if some problems occur. It might be operation errors or problems of the machine.
In this case, refer the following instructions.
If the function is still not salvaged or recovered, disconnect the power supply and consult the dealer.

(1) Message When Power On.

Message	Cause	Remedy
Motor Error	Internal error	Turn OFF the power switch and turn on again after 10 seconds. If the message appears again, consult the dealer.
EEPROM Error		
EEPROM Data Error		
System Error		
Clock Error		
INVALID SETUP DATA - REF	Internal Setup Data for Refractometry is invalid.	Consult the dealer.
INVALID SETUP DATA - KER	Internal Setup Data for Keratometry is invalid.	Consult the dealer.

(2) Message On Measuring

Message	Cause	Remedy
ERROR	Alignment is improper	Measure after aligning the pupil and the Alignment Mark properly.
	Eyelid or eyelashes are covering the pupil.	Instruct the examinee to open his or her eyes wide, or lift up the eyelid lightly with your fingers and measure again
	When the pupil is smaller than the Outer Alignment Mark.	The minimum pupil diameter that can be measured is 2.0 mm. Although it is possible to measure in the bright place, don't expose examinee's eyes to the direct sunlight or too bright indoor lights to prevent the contraction of the pupil.
	When the examinee has some illness like cataract.	Observe the eye in RET Mode. If cataract is not severe, measurement can be performed in the IOL mode.
	Examinee has IOL(intra-ocular lens) implanted.	Measure in the IOL mode.
	When the Mire Image is odd shaped because of tears.	Instruct the examinee to open and close his or her eyes several times and measure again.

ERROR	When the Mire Image is not clear because the cornea is dry.	Instruct the examinee to open and close his or her eyes several times and measure again.
	Examinee has strong irregular astigmatism or corneal disease.	Impossible to measure
+ OUT	Sum of SPH and CYL of examinee's eye is over +22D.	Impossible to measure
	Radius of curvature is over 10.2mm.	
	Objective glass in the measurement window is dirty	Clean the glass
- OUT	Sum of SPH and CYL of examinee's eye is over –25D.	Impossible to measure
	Radius of curvature is under 5.0mm.	
	Objective glass in the measurement window is dirty	Clean the glass
C OUT	Astigmatism is over 10D.	Impossible to measure
	Corneal stigmatism is over 15D.	
	Objective glass in the measurement window is dirty.	Clean the glass

(3) Message On Printing

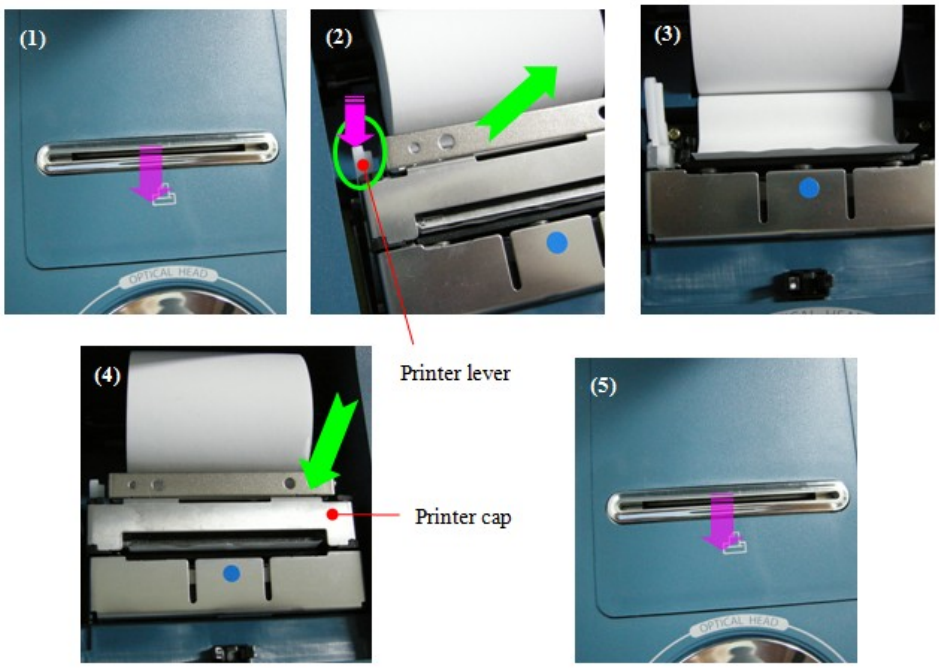
Message	Cause	Method to deal with
No Print Data	There is no measurement data	Print after measurement
PRINTER PAPER EMPTY	No printing paper	Load a roll of printing paper.

7.2 Replacement

7.2.1 Printing Paper

Replace the roll of printing paper as soon as possible if the red line appears in the paper.

(1) Open the printer cover.
(2) Remove the printer cap after pushing the printer lever, and then take ‘used paper out.
(3) Install a roll of new paper into the printer case, and then equip the printer cap.
(4) At this time, the printer detects the change of paper, and cuts the paper approximately ‘2cm’ for initializing paper settings.(It takes about 3 seconds to complete.)
(5) Remove the cutted paper, and then close the printer cover.



7.2.2 Chin Rest Paper

(1) Pull out the two pins on the chin rest.
(2) Insert the pins into the holes on the chin rest paper. More than 50 sheets of paper can be attached.
(3) Insert the pins straight into the holes on the chin rest.

7.2.3 Fuses

(1) Turn off the power.
(2) Remove the power cord from the electrical inlet
(3) Insert flatblade screwdriver into notches in the fuseholder cover.
Then turn the screwdriver countclockwise
(4) Replace the fuses and reset the fuseholder cover in its original positions
Fuse rating: T3.15A 250V

7.3 Cleaning

(1) Basically, keep this instrument clean. Don't use volatile object, thinner or benzene, etc.
(2) Polish each part with a dry cloth containing detergent solution.

7.4 When Moving the Instrument

(1) Turn OFF the power switch.
(2) Disconnect the power cable.
(3) Close the stage holding dial in the clockwise direction.
(4) Move this machine holding the lower part of the mains to keep horizontally.

7.5 Service Information

(1) Repair
If problem cannot be solved even after taking the measures indicated in section 7.1, contact POTEC representative or distributor for repair.
Please refer to the name plate and let us have the following information:
Name of the instrument: PRK-6000
Serial Number: 7-digit characters indicated on the name plate
Phenomenon: In detail

(2) Disposal of the instrument

CAUTION	This instrument incorporates a lithium battery, which may pollute the environment if the instrument is abandoned. Please ask a professional waste disposal company to handle disposal, or contact POTEC representative or distributor before disposing of the instrument.

8. Classifications and Specifications

8.1 Classifications

Classification of equipment: Class Ⅰ
Applied part of equipment: Type B Applied Part(Chinrest & Headrest)
Protection against electric shock: Class Ⅰ
Protection against harmful ingress of water: Ordinary (IPX0)
Method of sterilization: Not applicable
Stability of use in an Oxygen Rich Environment: Not suitable
Mode of operation: Continuous operation

8.2 Specifications

Refractometry	
Vertex Distance(VD)	0.0, 12.0, 13.5, 15.0 mm
Sphere Power(SPH)	-25.00 ~ +22.00 D (at the vertex distance of 12 mm) (Increments selectable between 0.12 and 0.25 D)
Cylinder Power(CYL)	0.00 ~ ±10.00 D (Increments selectable between 0.12 and 0.25 D)
Axis(AX)	1 ~ 180˚ (Increments: 1˚)
Cylinder Form	-, +, MIX
Pupil Distance(PD)	10 ~ 85 mm
Minimum Pupil Diameter	Ø 2.0 mm
Keratometry	
Radius of Curvature	5.0 ~ 10.2 mm (Increments: 0.01 mm)
Corneal Power	33.00 ~ 67.50 D (when cornea equivalent refractive index is 1.3375) (Increments selectable from 0.05, 0.12, 0.25 D)
Corneal astigmatism	0.00 ~ -15.00 D (Increments selectable from 0.05, 0.12, 0.25 D)
Axis	1 ~ 180˚ (Increments: 1˚)
Corneal Diameter	2.0 ~ 14.0 mm (Increments: 0.1 mm)
Memory of Data	10 measured value for each right and left eye
Internal Printer	Thermal line printer with Auto-Cutter function
Monitor	5.7-inch TFT LCD monitor (640 × 480 pixels, Touch-Screen function)
Environmental requirements	
Operation	Temperature: +10 to +40℃ Humidity: 30 to 85% RH Atmospheric pressure : 70 to 106 kPa
Storage and Transportation	Temperature: -10 to +55℃ Humidity: 10 to 95% RH Atmospheric pressure : 70 to 106 kPa
Power supply	AC100-240V, 50/60Hz
Power consumption	50 ~ 75VA
Size	Approximately 260(W) × 500(D) × 450(H) mm
Weight	Approximately 20kg

9. Components

PRK-6000 Main Unit	1
Operation Manual	1
Power Supply Cable	1
Test Model Eye	1
Chin Rest Paper	about 100 sheets
Printing Paper	2 rolls
Dust Cover	1

Optional Accessories

Chin rest paper	500 sheets
Printing paper	10 rolls