

INSTRUCTION MANUAL  
**AUTO KERATO-REFRACTOMETER**

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***KR-8000***

Thank you for purchasing the TOPCON Auto Kerato-Refractometer KR-8000.

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This instrument features the following:

- Measures the refractory power of eye and the corneal curvature with simple operations.
  - The minimum measurable pupil diameter is now smaller and thus the measuring range is extended.
  - The auto start function facilitates quick measurements under the optimal condition.
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This Instruction Manual describes the TOPCON Auto Kerato-Refractometer KR-8000, including outline, basic operations, troubleshooting, checking, maintenance and cleaning.

To get the best use of the instrument, read Safety Displays and Safety Cautions. Keep this Manual at hand for future reference.

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## **PRECAUTIONS**



- As this instrument is a precision equipment, be sure to use and store it in a place controlled under normal living temperature and humidity conditions, and avoid direct exposure to the sunlight.
  - To ensure smooth operation, install the instrument on a level floor free of vibrations. Also, do not put things on the instrument.
  - Connect all cables properly before using.
  - Use the power at a rated voltage.
  - When not in use, switch off the power source and apply the measuring lens cap and dust cover.
  - For accurate measurement results, take care to keep the examination window clean and free of fingerprints, spots and dust.
-

# SAFETY DISPLAYS







In order to encourage the safe use of the instrument and to avoid danger to the operator and others as well as damage to properties, warnings are described in the Instruction Manual and marked on the instrument body.

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


## DISPLAYS








Display	Meaning
 <b>WARNING</b>	Improper handling or ignoring this display may lead to the danger of death or serious injury.
 <b>CAUTION</b>	Improper handling or ignoring this display may cause personal injury or physical damage.
<ul style="list-style-type: none"><li>• Injury means hurt, burn, electric shock, etc.</li><li>• Physical damage means extensive damage that may involve building, peripheral equipment and furniture.</li></ul>	

## ICONS

Icon	Meaning
	This icon indicates an action to be avoided. Specific contents are shown with words or illustration close to the  icon.
	This icon indicates Mandatory Action. Specific contents are shown with words or illustration close to the  icon.
	This icon indicates Hazard Alert (Warning). Specific contents are shown with words or illustration close to the  icon.






# SAFETY CAUTIONS

 **WARNINGS**

Icon	Meaning	Page
	To avoid electrical shock, do not open the instrument. Refer all servicing to only qualified personnel.	68
	To avoid electric shocks, do not remove covers from bottom and top surfaces, TV monitor, measuring unit, etc.	68
	To prevent shock hazard, do not allow water or other foreign matter to enter the instrument.	—
	To avoid fire and electric shocks in case of tumbling, do not place a cup or vessel containing water/fluid on the instrument.	—
	To avoid electric shocks, do not insert objects metals through vent holes or gaps or contain them inside the ma-	—
	Electrical shock may cause burns or possible fire. Turn the main power switch OFF and UNPLUG the power cord before replacing fuse. Replace only with fuses of the correct rating.	72
	Should any anomaly, such as smoke, occur, immediately switch OFF the power source and unplug the power cable. Continued use ignoring the condition may cause fire. Ask your dealer for repair.	—

# SAFETY CAUTIONS

## CAUTIONS

Icon	Meaning	Page
	To avoid potential injury, hold the instrument in the proper position.	14
	To avoid electric shocks, do not handle the power plug with wet fingers.	15
	To avoid potential injury, keep your fingers away from the chinrest.	49
	To avoid potential injury and/or damage to the instrument, do not drop the instrument.	14
	When moving the instrument, be sure to hold it at the bottom surface with two persons. Carrying by one person may cause a backache or injury by falling parts. Also, holding areas other than the bottom surface may cause pinching fingers between parts and injury by falling parts as well as damage to the instrument.	14

## USAGE AND MAINTENANCE

Usage:

- Since the Auto Refractometer is an electric equipment for medical purposes, the operation should be supervised by a well-experienced doctor.

### USER MAINTENANCE:

To maintain the safety and performance of the equipment, never attempt to do maintenance and except for the items specified here. For details, follow the instructions.

Fuse change:

For details, see "Fuse change" on page 72.

Cleaning of examination window:

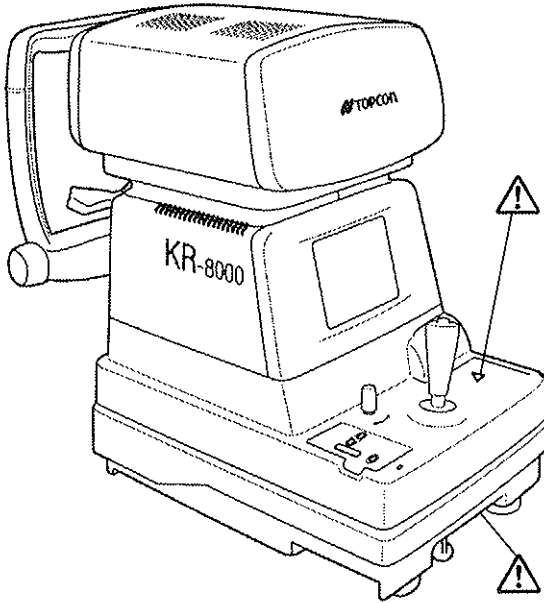
For details, see "Cleaning" on page 70.

## ESCAPE CLAUSES

- TOPCON shall not take any responsibility for damage due to fire, earthquakes, actions by third persons and other accidents, or the negligence and misuse of the user and use under unusual conditions.
- TOPCON shall not take any responsibility for damage derived from the use or unavailability of this equipment, such as a loss of business profit and suspension of business.
- TOPCON shall not take any responsibility for damage caused by usage other than that described in this Instruction Manual.
- TOPCON shall not take any responsibility for the result of diagnosis using this equipment.

# WARNING INDICATIONS AND POSITIONS

To secure safety, this equipment provides warnings. Correctly use the equipment following these warning instructions. If any of the following marking labels are missing, please contact your dealer or TOPCON to the address stated on the back cover.

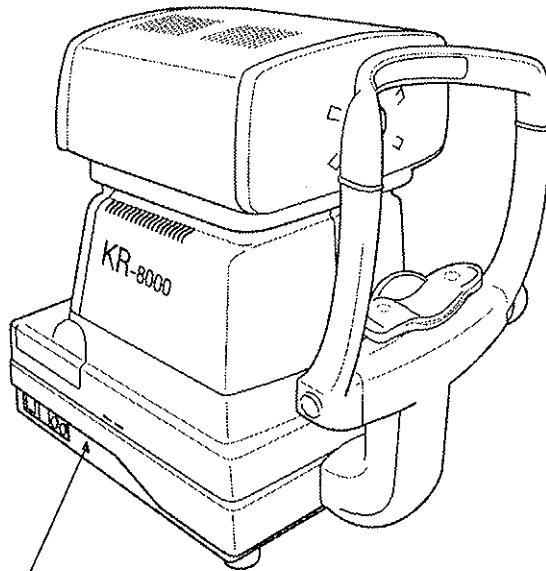


**CAUTION**

- To avoid potential injury during operation, do not touch the patient's eyes or nose with the instrument.

**CAUTION**

- To avoid electrical shock, do not open the instrument. Refer all servicing to only qualified personnel.



**WARNING**

- Electrical shock may cause burns or possible fire. Turn the main power switch OFF and UNPLUG the power cord before replacing fuses. Replace only with fuses of the correct rating.

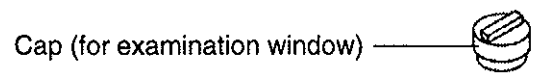
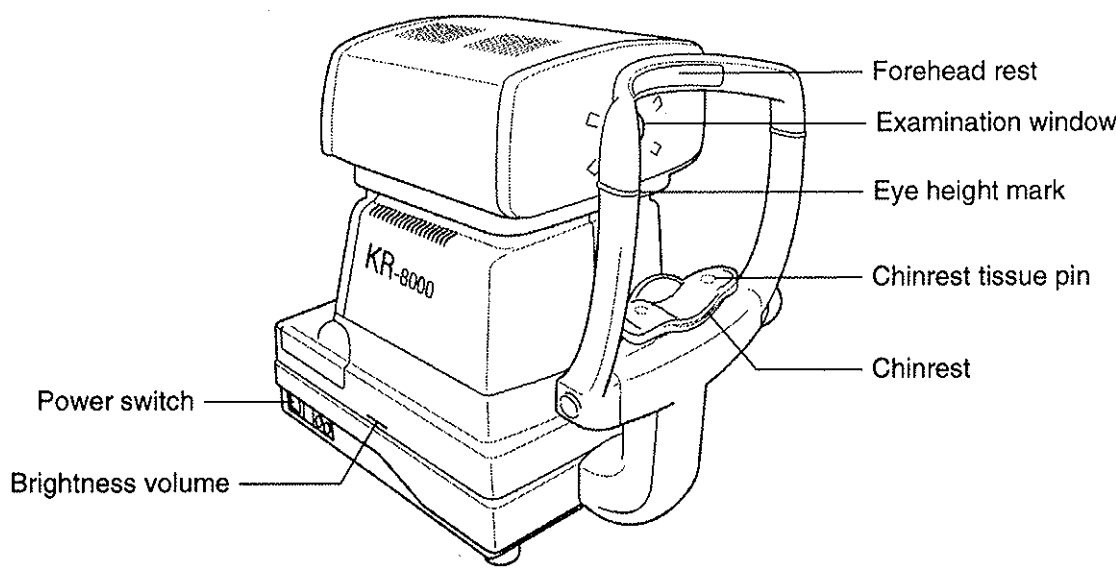
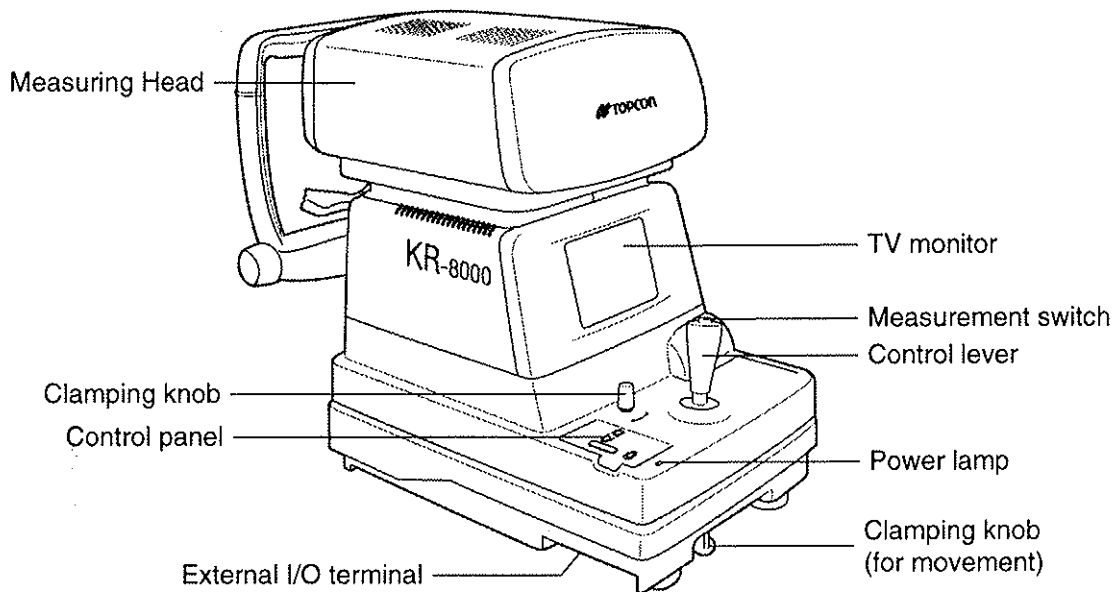
# CONTENTS

Introduction	1		
Safety Displays	2		
Safety Cautions	3		
Usage and Maintenance	5		
Escape Clauses	5		
Warning Indications and Positions	6		
<b>Component Names</b>			
Main body components	8		
Control panel components	9		
Monitor screen	10		
Printer output	11		
Standard accessories	13		
<b>Preparations</b>			
Installation	14		
Connecting power cable	15		
Connecting external I/O terminals	15		
Initial settings	16		
Initial set screen	17		
No. setting	21		
Printout	25		
Custom-print settings	29		
On-line (data communication)	35		
Menu setting	38		
Printer paper setting	43		
Resetting from power save status	48		
<b>Basic Operations</b>			
Preparation before measurement	49		
Measurement under auto start mode	51		
Measurement under manual mode	56		
Erasing measurement values	58		
		<b>Individual Operations</b>	
		Print-out of measurement values	59
		Measurement of cornea diameter	61
		Measurement of hard contact lens	65
		Input/output using RS232C	66
		<b>Troubleshooting</b>	
		Trouble-shooting operations	67
		<b>Reference</b>	
		Optional accessories	69
		Specifications	69
		<b>Maintenance</b>	
		Daily checkups	70
		Maintenance	73

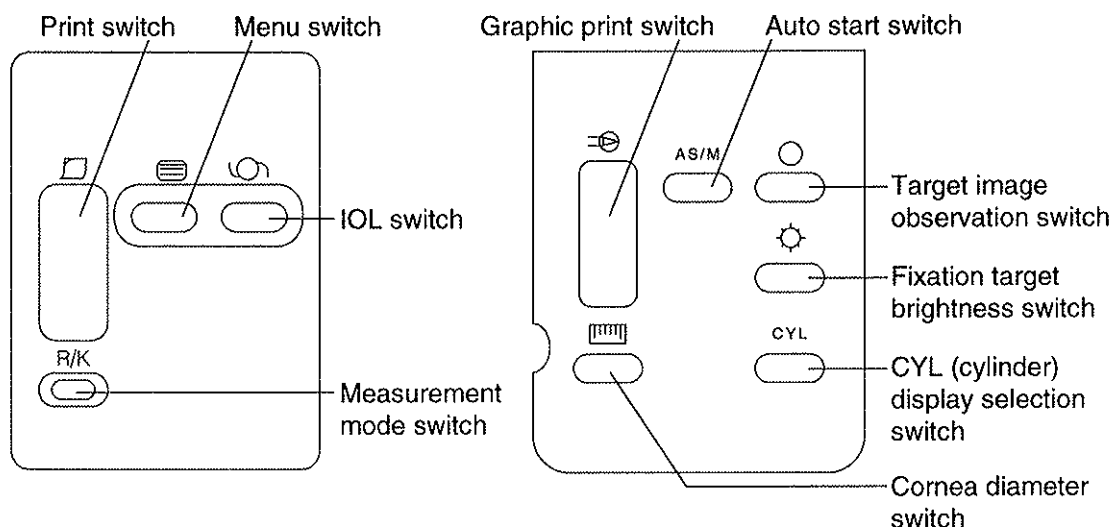


# COMPONENT NAMES

## MAIN BODY COMPONENTS



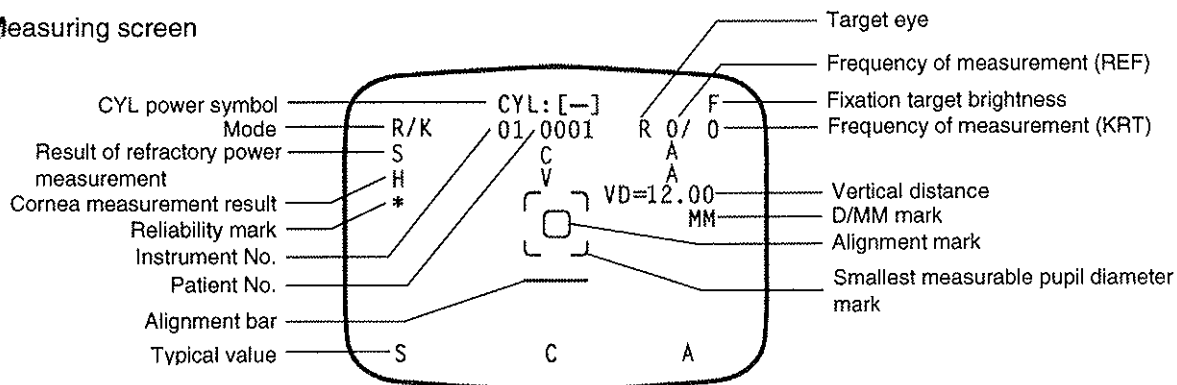
## CONTROL PANEL COMPONENTS



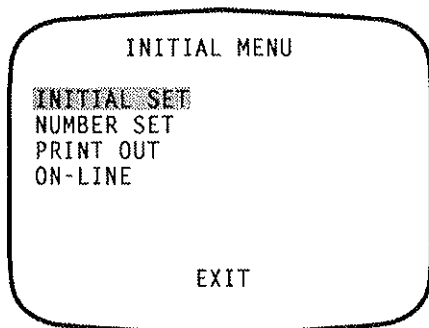
- Print switch ..... Prints out the measurement result. When there is no measurement value, press the switch to feed paper.
- Menu switch..... Displays the menu screen.
- IOL switch..... Press the switch to try measurement when errors are likely, for example, eyes with IOL.
- Graphic print switch..... Prints out graphically the state of refraction.
- Target image switch ..... Allows the operator to observe the stored target image on the monitor screen.
- Fixation target brightness switch .... Changes the brightness of fixation target.
- CYL display selection switch ..... Changes the CYL display.
- Measurement mode switch ..... Changes the measurement mode.
- Auto start switch ..... Switch between auto start and manual mode.
- Cornea diameter switch..... Measures the cornea diameter.

# MONITOR SCREEN

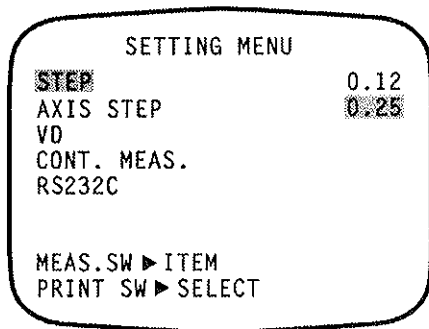
## Measuring screen



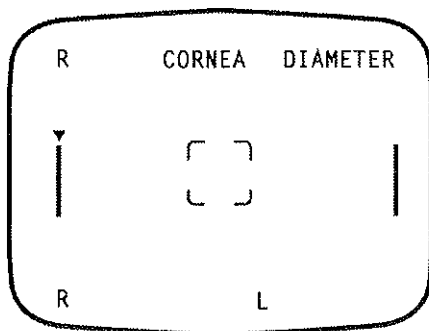
## Initial setting screen



## Menu setting screen




## Cornea diameter measurement screen



# PRINTER OUTPUT

<R/K> mode

		Bar code
	* KR 010602 *	Work ID No.
Instrument No.	NAME	
	1998 07 01 AM 10:00	
	NO:0001	Patient No.
	01	Instrument No.
	VD : 12.00	VD (vertical distance)
	CYL : (-)	Cylindrical power mark
	<R> S C A	Right eye measurements
	-0.25 -0.75 88	Measurement Results of 5 right eye measurements (recordable up to 10 measurements)
	-0.25 -0.75 90	
	-0.25 -0.75 92	
	-0.25 -0.75 94	
	-0.25 -0.75 93	
	* -0.25 -0.75 92	Typical value of right eye (The * mark is displayed when 3 or more measurements are done.)
	S. E. -0.75	Equivalent spherical power of right eye
	<L> S C A	
	(+0.25 -0.75 83)	The ( ) mark is added when measurement values are not fully reliable.
	+0.25 -0.75 84	
	I7+0.25	The I mark is displayed at IOL mode. If the reliability is low and values of C and A cannot be determined, ** marks are given to pertaining columns.
	I1+0.25 ** **	
	I4+0.25 -0.75 85	
	* +0.25 -0.75 85	
	S. E. -0.00	
	PD = 65mm	PD value
	KRT. DATA	
	<R> D MM A	
	H 45.00 7.50 32	Measured value of horizontal corneal curvature
	V 44.75 7.53 122	Measured value of vertical corneal curvature
	AVE 44.87 7.52	Average value
	CYL -0.25 122	Corneal astigmatic power
	CORNEA DIA : 12.00	Cornea diameter
	<L> D MM A	
	H 44.87 7.52 4	
	V 45.25 7.46 94	
	AVE 45.00 7.49	
	CYL -0.37 4	
	TOPCON	

ALL mode (example)



When measurement is done under the IOL mode, a reliability factor is printed out following the I mark.

The reliability factor is formed with integers 1 to 9 in increasing order of reliability.

Additionally, if the reliability is high enough, the reliability factor is not shown in the printout.

<REF> mode

<KRT>mode

```

NAME
1998 07 01 AM 07:59
NO:0102
01
VD : 12.00
CYL : (-)
<R> S C A
+0.00 -0.75 102
+0.00 -0.50 102
+0.00 -0.75 101
+0.00 -0.75 102
+0.00 -1.00 105
* +0.00 -0.75 102
<L> S C A
-0.00 -0.25 129
-0.25 -0.50 110
+0.00 -0.75 97
-0.25 -0.75 95
-0.00 -0.75 92
* -0.00 -0.75 95
PD=6.4mm
TOPCON
    
```

Patient No.  
 Instrument No.  
 VD (vertical distance)  
 Cylindrical power mark  
 Results of 5 refractory power measurements of right eye (recordable up to 10 measurements)  
 Typical value of right eye  
 Results of 5 refractory power measurements of left eye (recordable up to 10 measurements)  
 Typical value of left eye  
 PD (pupil distance)

```

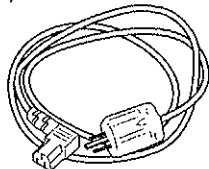
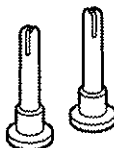
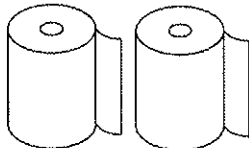
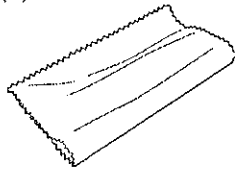


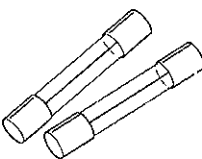
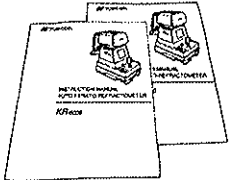
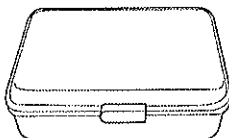
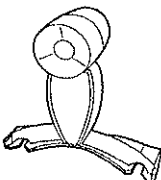
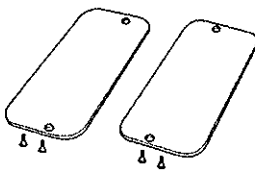

NAME
1998 07 01 AM 07:59
NO:0100
01
KRT. DATA
<R> D MM A
H 45.00 7.50 32
V 44.75 7.53 122
AVE 44.87 7.52
CYL -0.25 122
CORNEA DIA : 12.00
-----
-1- D MM A
H 45.00 7.51 32
V 44.87 7.53 122
AVE 44.87 7.52
CYL -0.12 122
-2- D MM A
H 45.00 7.51 35
V 44.87 7.53 125
AVE 44.87 7.52
CYL -0.12 125
-3- D MM A
H 45.00 7.51 29
V 44.87 7.53 119
AVE 44.87 7.52
CYL -0.12 119
-4- D MM A
H 44.87 7.51 37
V 44.75 7.53 127
AVE 44.87 7.52
CYL -0.12 127
-5- D MM A
H 45.00 7.50 23
V 44.87 7.53 113
AVE 44.87 7.51
CYL -0.12 113
<L> D MM A
H 44.87 7.52 4
V 45.25 7.46 94
AVE 45.00 7.49
CYL -0.37 4
CORNEA DIA. : 12.00
-----
-1- D MM A
H 44.87 7.51 10
V 45.12 7.48 100
AVE 45.00 7.50
CYL -0.25 10
-2- * D MM A
H 44.87 7.52 3
V 45.12 7.48 93
AVE 45.00 7.50
CYL -0.25 3
-3- D MM A
H 44.87 7.52 5
V 45.25 7.45 95
AVE 45.12 7.49
CYL -0.37 5
-4- D MM A
H 44.87 7.51 3
V 45.25 7.45 93
AVE 45.12 7.48
CYL -0.37 3
-5- D MM A
H 44.87 7.51 4
V 45.25 7.45 94
AVE 45.12 7.48
CYL -0.37 4
TOPCON
    
```

Typical measured value of right eye corneal curvature  
 Measured value of right eye cornea (mm)  
 Results of 5 right eye corneal curvature measurements of right eye, average value and astigmatic power of cornea (recordable up to 10 measurements each for right / left eye)  
 Measured value of left eye

Reliability mark  
 (displayed when reliability is low)




## STANDARD ACCESSORIES

The following are standard accessories. Make sure that all these items are included (quantity).

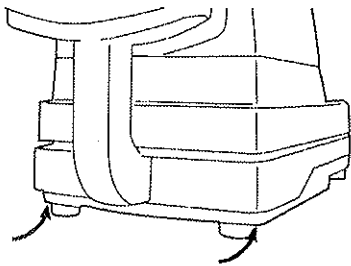
<p>Power cable (1)</p> 	<p>Chinrest pin (2)</p> 
<p>Printer paper (2)</p> 	<p>Silicon cloth (1)</p> 
<p>Chinrest tissue (1)</p> 	<p>Dust cover (1)</p> 
<p>Fuse (2)</p> 	<p>Instruction manuals: unpacking and assembling (1 each)</p> 
<p>Accessory box (1)</p> 	<p>Model eye (1)</p> 
<p>Rail cover (2)</p> 	<p>Screwdriver (1)</p> 

# PREPARATIONS

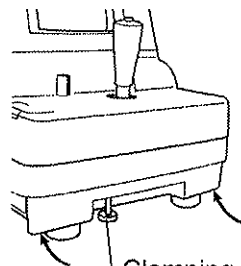
## INSTALLATION

 <b>CAUTION</b>	Before moving the instrument, fasten the clamping knob at the bottom surface to stop movements. Negligence of this may cause injury by falling parts.
 <b>CAUTION</b>	When moving the instrument, be sure to hold it at the bottom surface with two persons. Carrying by one person may cause a backache or injury by falling parts. Also, holding areas other than the bottom surface may pinch fingers between parts and injury by falling parts as well as damage to the instrument.
 <b>CAUTION</b>	To prevent injury due to tumbling of the instrument body and falling parts, avoid a slope and unstable floor for installation.

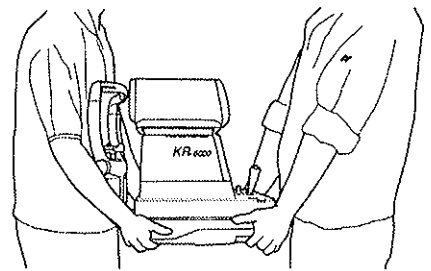
- 1** Fasten the clamping knob.
- 2** Firmly hold the instrument at the specified position and place it on the automatic instrument table.  
For the automatic instrument table, see "Optional accessories" on page 69.



Holding positions

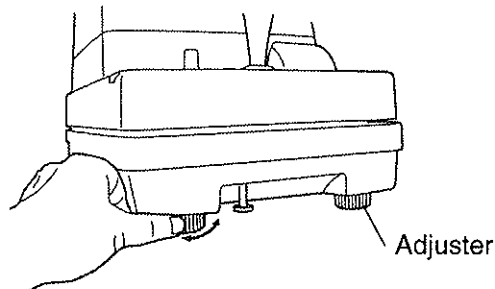


Clamping knob



Holding the instrument

- 3** After installation, loosen the clamping knob. Now the main body can be moved.
- 4** If the instrument is not fully level, do fine adjustments by rotating 4 adjusters. Do not unscrew adjusters more than 1cm.



Adjuster

## CONNECTING POWER CABLE



### WARNING

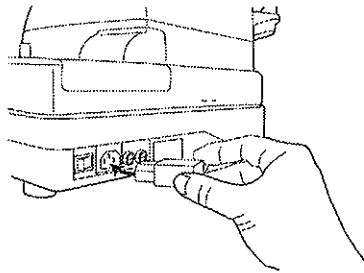
Be sure to connect the power plug to an AC 3-pin receptacle equipped with grounding. Connection with receptacle without grounding may cause fire and electric shocks in



### CAUTION

To avoid electric shocks, do not handle the power plug with wet fingers.

- 1 Make sure that the power switch of the main body is off.
- 2 Plug the power cable to the main body.



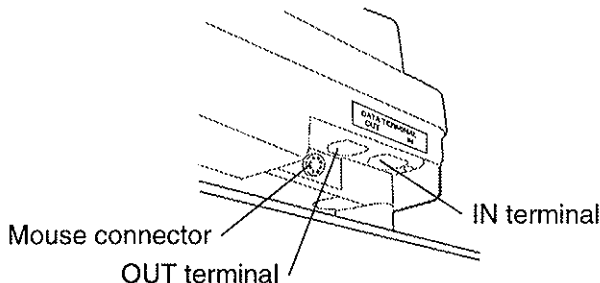
- 3 Plug the power cable to a grounded 3-pin AC receptacle.

## CONNECTING EXTERNAL I/O TERMINALS

### RS232C OUT

This machine may be connected with a PC (personal computer) using RS232C.

- 1 Connect the connection cable to the RS232C OUT terminal of the main body.
- 2 Connect the other end of the connection cable to the PC.



### RS232C IN

Also, this machine may be connected with a bar code reader using RS232C.

- 1 Connect the connection cable to the RS232C IN terminal of the main body.
- 2 Connect the other end of the connection cable to the external device.



## INITIAL SETTINGS

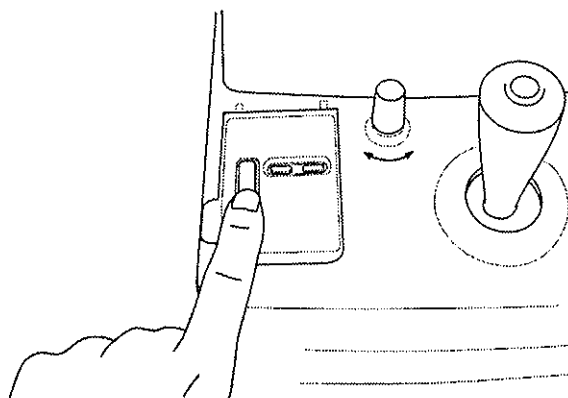
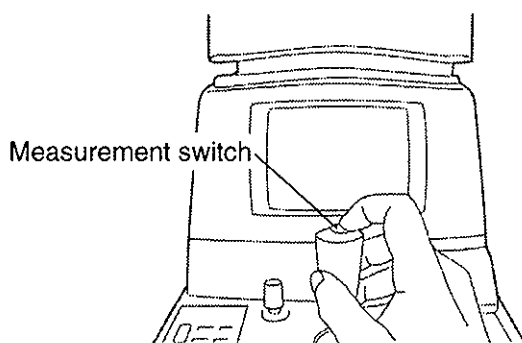
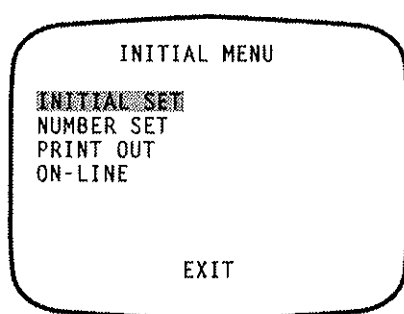
In the initial setting, settings such as patient No., instrument No., refractory power shift, RS232C, auto print, etc. can be done.

### Preparation for initial setting

- 1 Make sure of the connection of power cable.  
For connection, see "Connecting power cable" on page 15.
- 2 While pressing **MENU SWITCH** of the control panel, press on the **POWER SWITCH**.  
Hold the **MENU SWITCH** till the buzzer sounds. The POWER lamp lights and the initial menu screen is displayed.

### Returning to the measurement screen

- 1 Press the **MEASUREMENT SWITCH** switch and move the cursor to "EXIT".
- 2 Press the **PRINT SWITCH**. (EXIT OK is displayed.)
- 3 Press the **PRINT SWITCH** again. (The measurement screen is returned and the set items are printed out.)



## INITIAL SET SCREEN

In the INITIAL SET screen, buzzer sound, refractory power shift, display of typical value in monitor screen and date can be changed.

- 1 In the "INITIAL MENU SCREEN", make sure that the cursor is on "INITIAL SET", and then press the **PRINT SWITCH**. The monitor screen is changed to the INITIAL SET SCREEN.

INITIAL SET	
BUZZER	YES
DPTR SHIFT	+0.37
AVERAGE DISP.	NO
DATE	01.JUN.1998
INIT AUTO	YES
C.D.MEMORY	NO
EXIT	

### MEMO

- Close the "INITIAL SET SCREEN" and call the "INITIAL MENU SCREEN".
- Move the cursor to "EXIT".
- Press the **PRINT SWITCH**.

### MEMO

To return to the previous item in the screen:

While pressing the **PRINT SWITCH**, press the **MEASUREMENT SWITCH**.

### Buzzer sound setting

The buzzer sound can be set. Before shipment, it is set to (YES) so that the buzzer sounds.

- 1 In the "INITIAL MENU SCREEN", choose "INITIAL SET" and get the "INITIAL SET SCREEN".

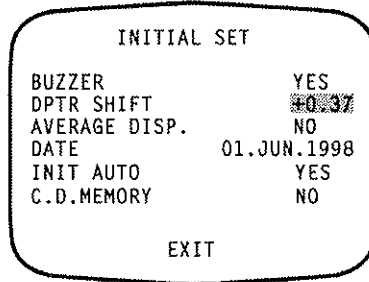
INITIAL SET	
BUZZER	YES
DPTR SHIFT	+0.37
AVERAGE DISP.	NO
DATE	01.JUN.1998
INIT AUTO	YES
C.D.MEMORY	NO
EXIT	

- 2 Press the **PRINT SWITCH**, and choose "YES" (buzzer sound) or "NO" (no buzzer sound) of "BUZZER".
- 3 Setting is done by pressing the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

## Shifting refractory power

The refractory power (S value) can be shifted. Before shipment, it is set to +0.37.

- 1 In the "INITIAL MENU SCREEN", choose "INITIAL SET" and get the "INITIAL SET" screen.

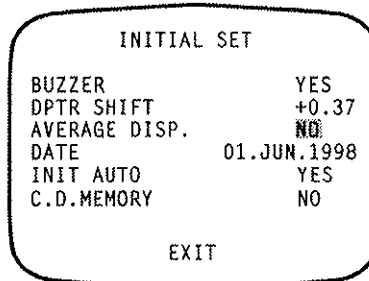


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "DPTR SHIFT".
- 3 Pressing the **MENU SWITCH** increases the value.  
Pressing the **IOL SWITCH** decreases the value.  
Values can be set at 0.12D steps between -1.00D and +1.00D.
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

## Monitor screen display of typical value

The typical value can be displayed in the monitor screen. Before shipment, it is set to "NO" (no display).

- 1 In the "INITIAL MENU SCREEN", choose "INITIAL SET" and get the "INITIAL SET SCREEN".



- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "AVERAGE DISP".
- 3 Press the **PRINT SWITCH** and choose "YES" (display in measuring screen) or "NO" (no display in measuring screen).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Changing date display

The date format of printout can be changed. Before shipment, it is set to "01.JUN.1998".

- 1 In the "INITIAL MENU SCREEN", choose "INITIAL SET" and get the "INITIAL SET SCREEN".

INITIAL SET	
BUZZER	YES
DPTR SHIFT	+0.37
AVERAGE DISP.	NO
DATE	01.JUN.1998
INIT AUTO	YES
C.D.MEMORY	NO
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "DATE".

- 3 Press the **PRINT SWITCH** and choose:

1998.06.01;  
JUN. 01. 1998; or  
01. JUN. 1998.

- 4 Press the **MEASUREMENT SWITCH**, and the cursor returns to "EXIT".

### Manual start after power ON

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to INIT AUTO.

INITIAL SET	
BUZZER	YES
DPTR SHIFT	+0.37
AVERAGE DISP.	NO
DATE	01.JUN.1998
INIT AUTO	YES
C.D.MEMORY	NO
EXIT	

- 2 Press the **PRINT SWITCH** and choose NO.

- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.

## Changing the cornea diameter measurement method

The method of cornea diameter measurement can be chosen between the measurement using the actual image or the static image. Before shipment, the setting is NO (measurement using actual image).

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to C.D MEMORY.

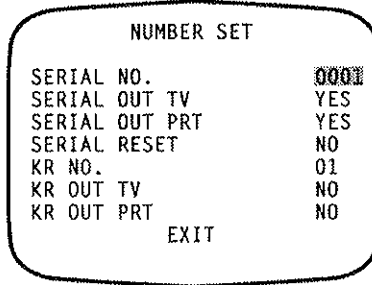
INITIAL SET	
BUZZER	YES
DPTR SHIFT	+0.37
AVERAGE DISP.	NO
DATE	01.JUN.1998
INIT AUTO	YES
C.D.MEMORY	<del>NO</del>
EXIT	

- 2 Press the **PRINT SWITCH** and choose "YES" (measurement using static image) or "NO" (measurement using actual image).
- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.
- 4 Press the **MEASUREMENT SWITCH**, and the cursor returns to the first item (BUZZER).

## NO. SETTING

In the NUMBER SET screen, patient No. setting, monitor screen display of patient No., printing patient No., resetting of patient No., instrument No. setting, monitor screen display of instrument No. and printing instrument No. can be changed.

- 1 In the "INITIAL MENU SCREEN", press the **MEASUREMENT SWITCH** and move the cursor to "NUMBER SET"
- 2 Press the **PRINT SWITCH**, and the monitor screen is changed to the "NUMBER SET SCREEN".



### MEMO

- Close the "NUMBER SET SCREEN" and call the "INITIAL MENU SCREEN".
- Move the cursor to "EXIT".
- Press the **PRINT SWITCH**.

### MEMO

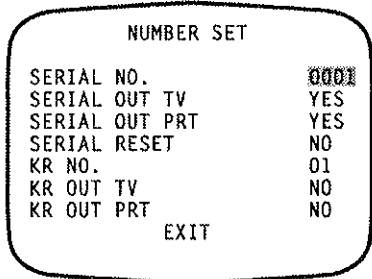
To return to the previous item in the screen:

- While pressing the **PRINT SWITCH**, press the **MEASUREMENT SWITCH**.

## Setting patient No.

The patient No. can be set between 0 and 9999. Before shipment, it is set to "0001".

- 1 In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".



- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "SERIAL NO".
- 3 Pressing the **MENU SWITCH** increases the value.  
Pressing the **IOL SWITCH** decreases the value.
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

**Monitor screen display of patient No.**

The patient No. can be displayed in the monitor screen. Before shipment, it is set to (YES).

- 1** In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	<del>YES</del>
SERIAL OUT PRT	YES
SERIAL RESET	NO
KR NO.	01
KR OUT TV	NO
KR OUT PRT	NO
EXIT	

- 2** Press the **MEASUREMENT SWITCH** and move the cursor to "SERIAL OUT TV".
- 3** Press the **PRINT SWITCH** and choose "YES" (display in menu screen) or "NO" (no display in menu screen).
- 4** Press the **MEASUREMENT SWITCH** , and the cursor goes to the next item.

**Printing patient No.**

The patient No. can be printed out. Before shipment, it is set to [YES] (printout).

- 1** In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	YES
SERIAL OUT PRT	<del>YES</del>
SERIAL RESET	NO
KR NO.	01
KR OUT TV	NO
KR OUT PRT	NO
EXIT	

- 2** Press the **MEASUREMENT SWITCH** and move the cursor to "SERIAL OUT PRT".
- 3** Press the **PRINT SWITCH** and choose "YES" (printout) or "NO" (no printout).
- 4** Press the **MEASUREMENT SWITCH** , and the cursor goes to the next item.

### Resetting patient No.

The patient No. can be reset by switching on the power source. Before shipment, it is set to "NO" (no reset).

- 1 In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	YES
SERIAL OUT PRT	YES
SERIAL RESET	NO
KR NO.	01
KR OUT TV	NO
KR OUT PRT	NO
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "SERIAL RESET".
- 3 Press the **PRINT SWITCH** and choose "YES" (rest) or "NO" (no reset).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Setting instrument No.

The instrument No. can be set between 0 and 99. Before shipment, it is set to "01".

- 1 In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	YES
SERIAL OUT PRT	YES
SERIAL RESET	NO
KR NO.	01
KR OUT TV	NO
KR OUT PRT	NO
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KR NO.".
- 3 Pressing the **MENU SWITCH** increases the value.  
Pressing the **IOL SWITCH** decreases the value.
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.



### Monitor screen display of instrument No.

The instrument No. can be displayed in the monitor screen. Before shipment, it is set to "NO" (no display).

- 1 In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	YES
SERIAL OUT PRT	YES
SERIAL RESET	NO
KR NO.	01
KR OUT TV	<del>NO</del>
KR OUT PRT	NO
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KR OUT TV".
- 3 Press the **PRINT SWITCH** and choose "YES" (display in menu screen) or "NO" (no display in menu screen).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Printing instrument No.

The instrument No. can be printed out. Before shipment, it is set to (NO) [no printout].

- 1 In the "INITIAL MENU SCREEN", choose "NUMBER SET" and get the "NUMBER SET SCREEN".

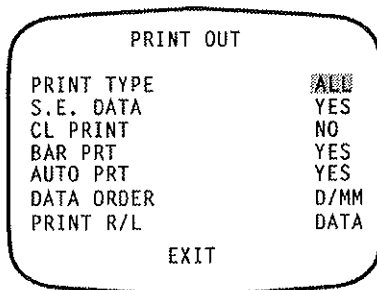
NUMBER SET	
SERIAL NO.	0001
SERIAL OUT TV	YES
SERIAL OUT PRT	YES
SERIAL RESET	NO
KR NO.	01
KR OUT TV	NO
KR OUT PRT	<del>NO</del>
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KR OUT PRT".
- 3 Press the **PRINT SWITCH** and choose "YES" (printout) or "NO" (no printout).
- 4 Press the **MEASUREMENT SWITCH** the cursor goes to the next item.

## PRINTOUT

In the PRINT OUT screen, printout format, printing equivalent spherical power, printing computer lensmeter data, and printing bar code can be changed.

- 1 In the "INITIAL MENU SCREEN", press the **MEASUREMENT SWITCH** and move the cursor to "PRINT OUT".
- 2 Press the **PRINT SWITCH**, and the monitor screen is changed to the "PRINT OUT SCREEN".



### MEMO

- Close the "PRINT OUT SCREEN" and call the "INITIAL MENU SCREEN".
- Move the cursor to "EXIT".
- Press the **PRINT SWITCH**.

### MEMO

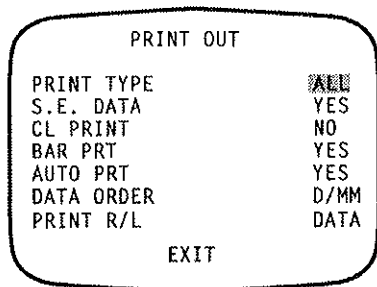
To return to the previous item in the screen:

While pressing the **PRINT SWITCH**, press the **MEASUREMENT SWITCH**.

## Printout format

The printout format can be set. Before shipment, it is set to "ALL" (print out all data).

- 1 In the "INITIAL MENU SCREEN", choose "PRINT OUT" and get the "PRINT OUT SCREEN".

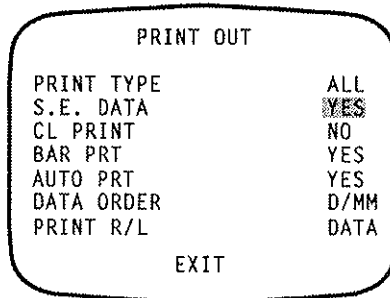


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "PRINT TYPE".
- 3 Press the **PRINT SWITCH** and choose:
  - ALL (print out all data);
  - AVE (print out date, settings and typical value of refractory power only);
  - SIM (print out typical value only); or
  - CSTM (select the settings by each item). → Page 29 } Page 26
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Printing equivalent spherical power

The equivalent spherical power can be printed. Before shipment, it is set to "YES" (printout).

- 1 In the "INITIAL MENU SCREEN", choose "PRINT OUT" and get the "PRINT OUT SCREEN".

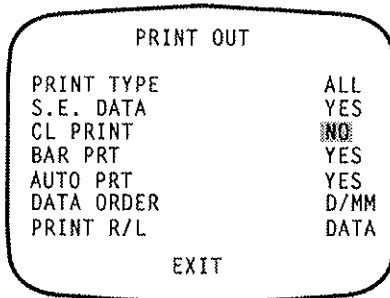


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "S.E.DATA".
- 3 Press the **PRINT SWITCH** and choose "YES" (printout) or "NO" (no printout).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Printing computer lensmeter data

Computer lensmeter data can be printed. Before shipment, it is set to "NO" (no printout).

- 1 In the "INITIAL MENU SCREEN", choose "PRINT OUT" and get the "PRINT OUT SCREEN".



- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "CL PRINT".
- 3 Press the **PRINT SWITCH** and choose "YES" (printout) or "NO" (no printout).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

## Printing bar code

The bar code can be printed out. Before shipment, it is set to "NO" (no printout).

- 1 In the "INITIAL MENU SCREEN", choose "PRINT OUT" and get the "PRINT OUT SCREEN".

PRINT OUT	
PRINT TYPE	ALL
S.E. DATA	YES
CL PRINT	NO
BAR PRT	YES
AUTO PRT	YES
DATA ORDER	D/MM
PRINT R/L	DATA
EXIT	

- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "BAR PRT".
- 3 Press the **PRINT SWITCH** and choose "YES" (printout) or "NO" (no printout).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

## Auto print after finishing auto start measurement

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to AUTO PRT.

PRINT OUT	
PRINT TYPE	ALL
S.E. DATA	YES
CL PRINT	NO
BAR PRT	YES
AUTO PRT	YES
DATA ORDER	D/MM
PRINT R/L	DATA
EXIT	

- 2 Press the **PRINT SWITCH** and choose "YES" (auto printout) or "NO" (no auto printout).
- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.

Changing the printout display order

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to DATA ORDER. The printout display order of cornea refractory power and curvature can be changed. Before shipment, the setting is DATA ORDER D/MM.

PRINT OUT	
PRINT TYPE	ALL
S.E. DATA	YES
CL PRINT	NO
BAR PRT	YES
AUTO PRT	YES
DATA ORDER	<b>D/MM</b>
PRINT R/L	DATA
EXIT	

- 2 Press the **PRINT SWITCH** and choose D/MM or MM/D.
- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.

Changing the printout display order

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to "PRINT R/L".

PRINT OUT	
PRINT TYPE	ALL
S.E. DATA	YES
CL PRINT	NO
BAR PRT	YES
AUTO PRT	YES
DATA ORDER	D/MM
PRINT R/L	<b>DATA</b>
EXIT	

- 2 Press the **PRINT SWITCH** and choose DATA (separate printout for REF/KRT), or R/L (printout of right eye and left eye in this order, irrespective of REF/KRT)
- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.

## CUSTOM-PRINT SETTINGS

This machine provides the ability to select the items to be printed, called the custom print function. On the custom-print screen, the details of the following items can be changed individually: refraction measurement values, cornea measurement values, corneal astigmatism and axial angles, PD values, the name, date, VD values, cylindricity mark and the TOPCON mark On/Off.

- 1 On the "PRINT OUT SCREEN", press the **MENU SWITCH** and move the cursor to "PRINT TYPE".
- 2 Press the **PRINT SWITCH**, select "CSTM" and press the **IOL SWITCH**. The monitor screen changes to the "CSTM SCREEN".

PRINT OUT(CSTM)	
REF DATA	ALL
KRT DATA	AVE
KRT AVE	YES
KRT CYL	YES
PD DATA	YES
NAME	YES
DATE	YES
VD	YES
CYL	YES
TOPCON	YES
EXIT	

### MEMO

To exit this screen

- Move the cursor to "EXIT", then press the **PRINT SWITCH**.

Close the "PRINT OUT (CSTM) SCREEN" and call the "PRINT OUT SCREEN".

- Move the cursor to "EXIT".
- Press the **PRINT SWITCH**.

### MEMO

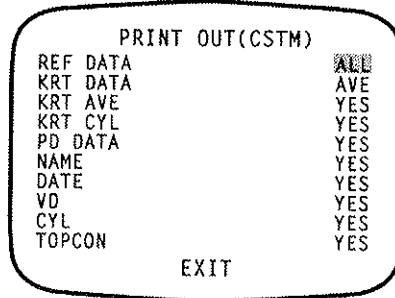
Returning to the previous item in the screen

- Hold the **PRINT SWITCH** down and press the **MEASUREMENT SWITCH**.

### Changing the print type of refraction measurement values

The print type of refraction measurement values may be changed. Before shipment it is set to "ALL" (print all data).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOI SWITCH** and get the "CSTM SCREEN".

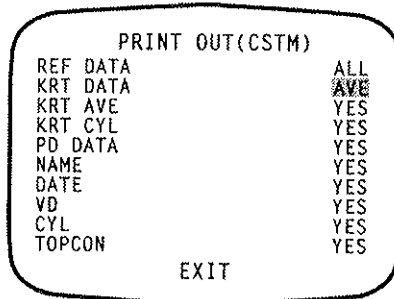


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "REF DATA".
- 3 Press the **PRINT SWITCH** and select ALL (Print all data), or AVE (Print typical values only)
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Changing the print type of cornea measurement values

The print type of cornea measurement values may be changed. Before shipment it is set to "AVE" (print typical values only).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOI SWITCH** and get the "CSTM SCREEN".

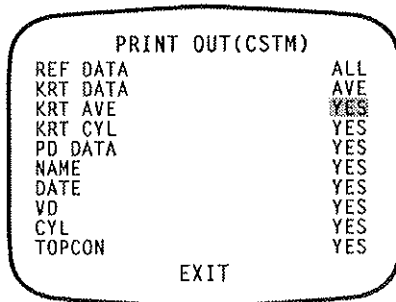


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KRT DATA".
- 3 Press the **PRINT SWITCH** and select ALL (Print all data), or AVE (Print typical values only)
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing average values of cornea measurements

Average values of cornea measurements may be printed out. Before shipment it is set to "YES" (print average values).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

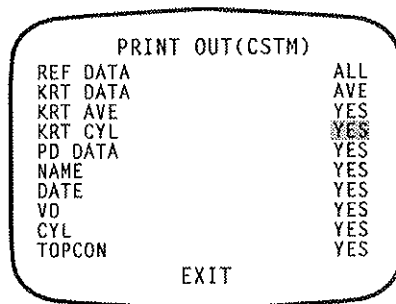


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KRT AVE".
- 3 Press the **PRINT SWITCH** and select "YES" (print average values), or "NO" (do not print average values).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing corneal astigmatism and axial angles

Corneal astigmatism and axial angles may be printed out. Before shipment it is set to "YES" (print corneal astigmatism and axial angles).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".



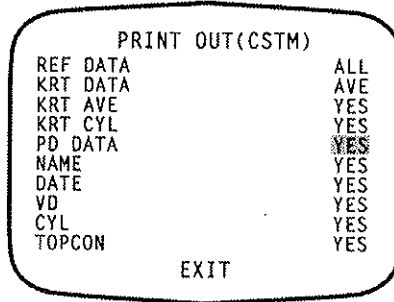
- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "KRT CYL".
- 3 Press the **PRINT SWITCH** and select "YES" (print corneal astigmatism and axial angles), or "NO" (do not print corneal astigmatism and axial angles).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.



### Printing PD values

PD values may be printed out. Before shipment it is set to "YES" (print PD values).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

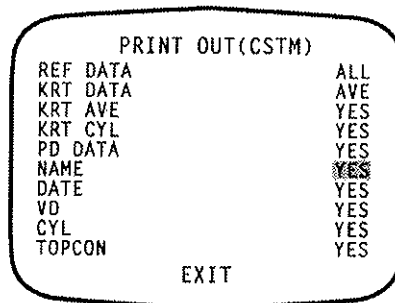


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "PD DATA".
- 3 Press the **PRINT SWITCH** and select "YES" (print PD values), or "NO" (do not print PD values).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing names

The name may be printed out. Before shipment it is set to "YES" (print names).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

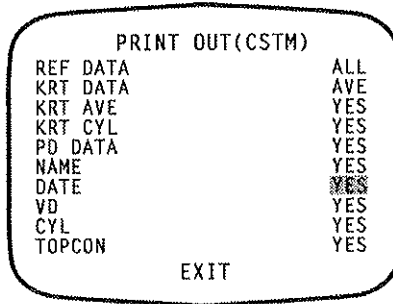


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "NAME".
- 3 Press the **PRINT SWITCH** and select "YES" (print names), or "NO" (do not print names).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing the date

The date may be printed out. Before shipment it is set to "YES" (print date).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

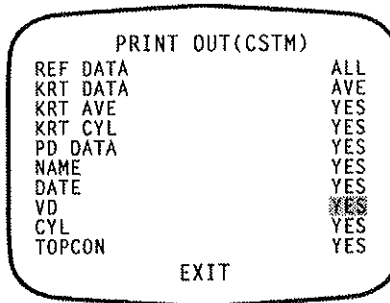


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "DATE".
- 3 Press the **PRINT SWITCH** and select "YES" (print date), or "NO" (do not print date).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing VD values

VD values may be printed out. Before shipment it is set to "YES" (print VD values).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

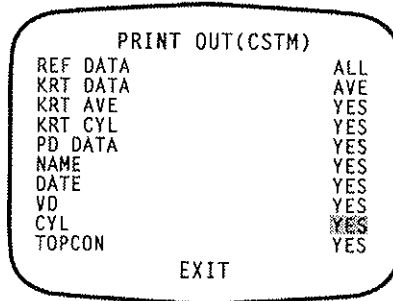


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "VD".
- 3 Press the **PRINT SWITCH** and select "YES" (print VD values), or "NO" (do not print VD values).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing the cylindricity mark

The cylindricity mark may be printed out. Before shipment it is set to "YES" (print cylindricity mark).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

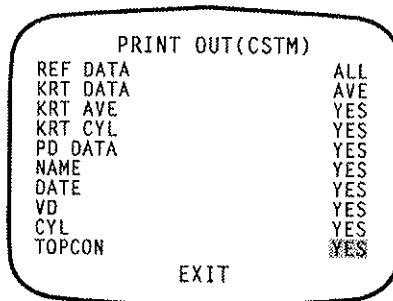


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "CYL".
- 3 Press the **PRINT SWITCH** and select "YES" (print cylindricity mark), or "NO" (do not print cylindricity mark).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

### Printing the TOPCON mark

The TOPCON mark may be printed out. Before shipment it is set to "YES" (print TOPCON mark).

- 1 On the "PRINT OUT SCREEN", move the cursor to "PRINT TYPE", and with "CSTM" selected, press the **IOL SWITCH** and get the "CSTM SCREEN".

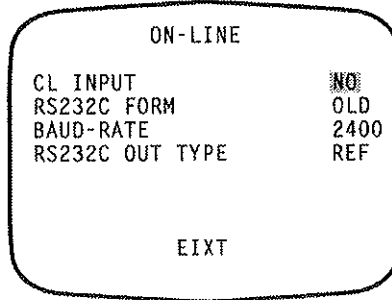


- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "TOPCON".
- 3 Press the **PRINT SWITCH** and select "YES" (print TOPCON mark), or "NO" (do not print TOPCON mark).
- 4 Press the **MEASUREMENT SWITCH**. The cursor moves to the next item.

## ON-LINE (DATA COMMUNICATION)

In the ON-LINE screen, computer lensmeter data receiving format, communication format and communication speed can be changed.

- 1 In the "INITIAL MENU SCREEN", press the **MEASUREMENT SWITCH** and move the cursor to "ON-LINE".
- 2 Press the **PRINT SWITCH**, and the monitor screen is changed to the "ON-LINE SCREEN".



MEMO

- Close the "ON-LINE SCREEN" and call the "INITIAL MENU SCREEN".
- Move the cursor to "EXIT".
- Press the **PRINT SWITCH**.

MEMO

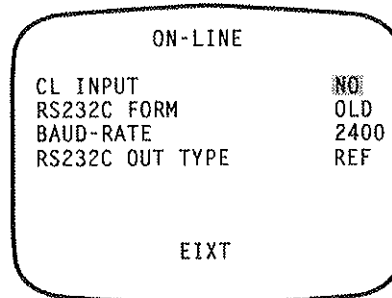
To return to the previous item in the screen:

- While pressing the **PRINT SWITCH**, press the **MEASUREMENT SWITCH**.

### Computer lensmeter data receiving format

The RS232C format for receiving computer lensmeter data can be set. Before shipment, it is set to "NO" (no receiving).

- 1 In the "INITIAL MENU SCREEN", choose "ON-LINE" and get the "ON-LINE SCREEN".

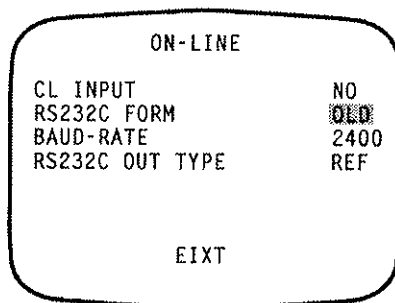


- 2** Press the **MEASUREMENT SWITCH** and move the cursor to "CL INPUT".
- 3** Press the **PRINT SWITCH** and choose:
  - NO (no receiving);
  - OLD (OLD RS232C format);
  - NEW (NEW RS232C format);
  - STD1 (STD1 RS232C format);
  - R-ID (receives patient No. via RS232C input port for processing as real ID); or
  - W-ID (receives patient No. via RS232C input port for processing as work ID).
- 4** Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Setting RS232C communication format

The RS232C communication format can be set. Before shipment, it is set to "OLD" (old TOPCON format).

- 1** In the "INITIAL MENU SCREEN", choose "ON-LINE" and get the "ON-LINE SCREEN".

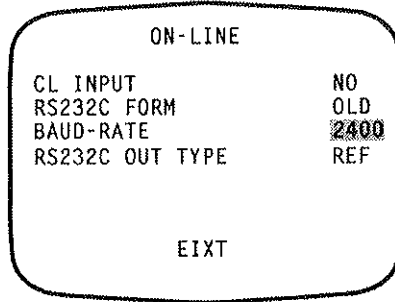


- 2** Press the **MEASUREMENT SWITCH** and move the cursor to "RS232C FORM".
- 3** Press the **PRINT SWITCH** and choose:
  - OLD (OLD RS232C format);
  - NEW (NEW RS232C format);
  - STD1 (TOPCON STD1 format);
  - ALL (tool mode);
  - CM1 (custom specification);
  - CM2 (custom specification);
  - CM3 (custom specification);
  - CM4 (custom specification); or
  - CM5 (custom specification).
- 4** Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.

### Setting RS232C communication speed

The RS232C communication speed can be set. Before shipment, it is set to "2400" (baud rate 2400).

- 1 In the "INITIAL MENU SCREEN", choose "ON-LINE" and get the "ON-LINE SCREEN".



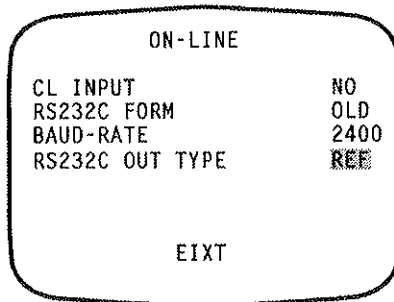
- 2 Press the **MEASUREMENT SWITCH** and move the cursor to "BAUD-RATE".
- 3 Press the **PRINT SWITCH** and choose:  
2400 (baud rate 2400); or  
9600 (baud rate 9600).
- 4 Press the **MEASUREMENT SWITCH**, and the cursor goes to the next item.



For inquiries about the RS232C communication format, please contact your dealer or Topcon at the address stated on the back cover.

### Selecting RS232C output data

- 1 Press the **MEASUREMENT SWITCH** and bring the cursor to RS232C OUT TYPE.



- 2 Press the **PRINT SWITCH** and choose  
REF (data of refractometer only)  
KRT (data of keratometer only), or  
ALL (data of both refractometer and keratometer)
- 3 Press the **MEASUREMENT SWITCH** for setting; the cursor moves to the next item.

## MENU SETTING

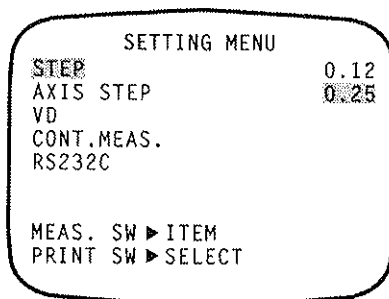
In menu setting, data step, contact/glasses, continuous measurement, RS232C, date and time can be set.

### Preparation for menu setting

- 1 Make sure of the connection of power cable.  
For connection, see "Connecting power cable" on page 15.
- 2 Press "ON" the power switch.

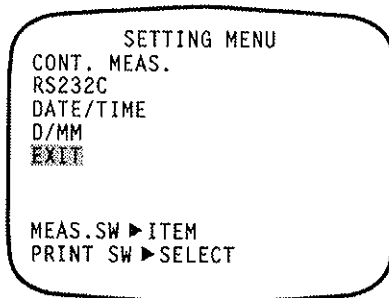
### Displaying MENU screen

- 1 Make sure of the measurement screen.
- 2 Press the **MENU SWITCH** of the control panel.  
Make sure of the "SETTING MENU SCREEN".



### Returning to the measurement screen

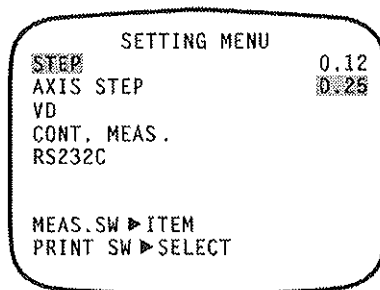
- 1 Press the **MEASUREMENT SWITCH**, invert "EXIT", and press **PRINT SWITCH**.



## Setting STEP

The measurement step can be selected from 0.12, 0.25. Before shipment, it is set to "0.25".

- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN". "STEP" is inverted, and measurement steps are displayed on the right with the set step inverted.
- 2 Press the **PRINT SWITCH** and invert the desired measurement step.

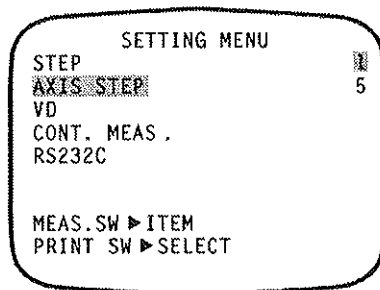


- 3 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (AXIS) is inverted.

## Setting AXIS STEP

The axial angle step can be selected from 1 and 5. Before shipment, it is set to "1".

- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN". "STEP" is inverted, and measurement steps are displayed on the right with the set step inverted.
- 2 Press the **MEASUREMENT SWITCH** and invert "AXIS".  
AXIS figures are displayed on the right.
- 3 Press the **PRINT SWITCH** and invert the desired "AXIS" figure.



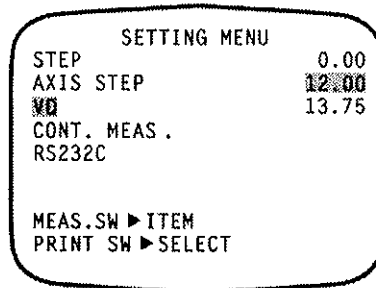
- 4 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (VD) flashes.



## Setting VD

In VD setting, contact (0) or glasses (12mm or 13.75mm) can be selected. Before shipment, it is set to glasses (12mm).

- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN". "STEP" is inverted, and measurement step is displayed on the right.
- 2 Press the **MEASUREMENT SWITCH** and invert "VD".  
VD figures are displayed on the right.
- 3 Press the **PRINT SWITCH** and invert the desired "VD" figure.

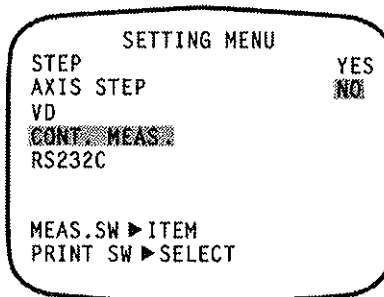


- 4 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (CONT.MEAS.) flashes.

## Setting CONT.MEAS.

Continuous measurement can be set. Before shipment, it is set to "NO" (normal measurement).

- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN". "STEP" is inverted, and measurement step is displayed on the right.
- 2 Press the **MEASUREMENT SWITCH** and invert "CONT.MEAS.". "YES" and "NO" are displayed on the right.
- 3 Press the **PRINT SWITCH** and invert "YES" for continuous measurement.

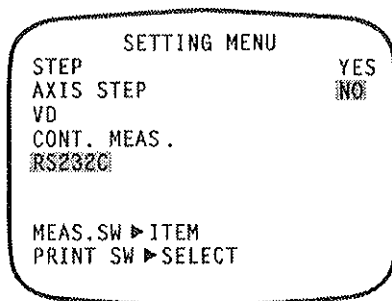


- 4 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (RS232C) flashes.

### Setting RS232C

The RS232C output can be set. Before shipment, it is set to "NO" (no output).

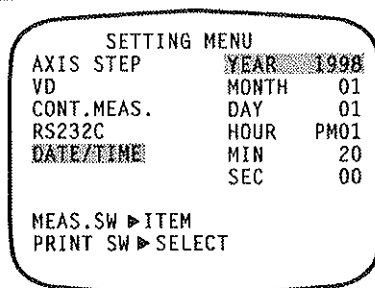
- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN". "STEP" is inverted, and measurement step is displayed on the right.
- 2 Press the **MEASUREMENT SWITCH** and invert "RS232C".  
"YES" and "NO" are displayed on the right.
- 3 Press the **PRINT SWITCH** and invert "YES" for RS232C output.



- 4 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (ADD) flashes.

### Setting date/time

- 1 Press the **MENU SWITCH** of the control panel and get the "SETTING MENU SCREEN".  
"STEP" is inverted, and measurement step is displayed on the right.
- 2 Press the **MEASUREMENT SWITCH** and invert "DATE/TIME".  
The date/time is displayed on the right.
- 3 Press the **PRINT SWITCH** and invert the desired item.  
Change figures by pressing the **MENU SWITCH** (increase) or **IOL SWITCH** (decrease).

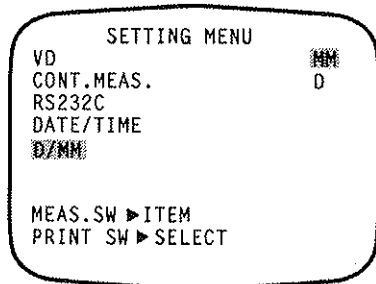


- 4 Press the **MEASUREMENT SWITCH**. Setting is done, and the next item (D/MM) flashes.

## Setting D/MM

The unit of cornea measurement result displayed on the monitor screen can be selected from D (refractive power) or MM (curvature). Before shipment, the setting is MM (curvature).

- 1 Press the **MENU SWITCH** and get the menu screen. The STEP cursor is inverted and the measurement step is displayed on the right.

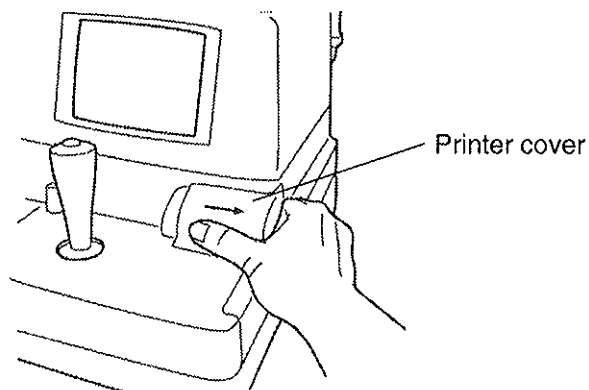


- 2 Press the **MEASUREMENT SWITCH** and invert "D/MM".
- 3 Press the **MEASUREMENT SWITCH** and invert the unit of measurement result to be set.
- 4 Press the **MEASUREMENT SWITCH** for setting; the next item (EXIT) is inverted.

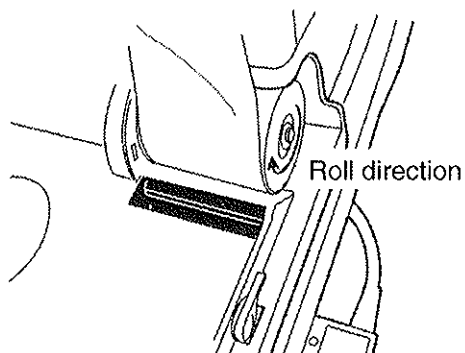
## PRINTER PAPER SETTING

### Auto setting

- 1 While pressing the thumb to the surface, slide off the printer cover.



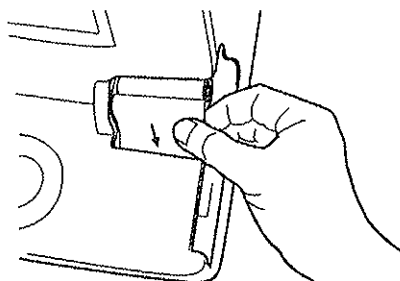
- 2 Set the paper into the shaft support, taking care of the roll direction of paper. Pull out the paper top 7-8cm forward.



#### NOTE:

- Note that printing cannot be done if the paper back faces up by setting the roll in opposite direction.

- 3 Insert the paper straight along the paper guide.

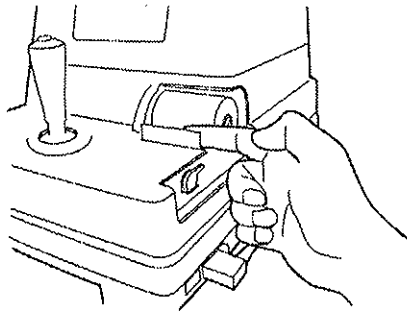


- 4** While pressing the paper to the printer, press the **PRINT SWITCH** continuously until it is inserted deep enough and fed forward.

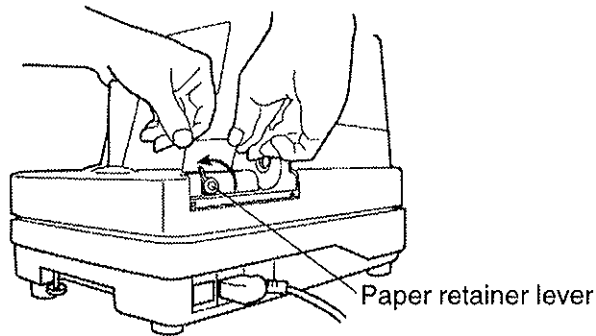
**NOTE:**

- Please insert the paper deep enough into the printer. Otherwise the paper may not come out. At this time "PAPER SET" will be displayed on the monitor.

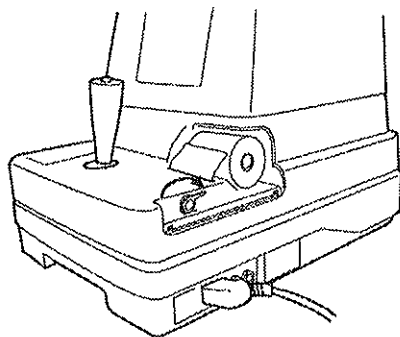
- 5** When the paper top protrudes about 1cm from the printer, release the **PRINT SWITCH**. Be sure to hold the paper top so that it is not caught in the main paper roll.



- 6** Rotate the paper retainer lever to the level position, as illustrated, and draw out the paper 2-3cm so that it can come out straight from the outlet.

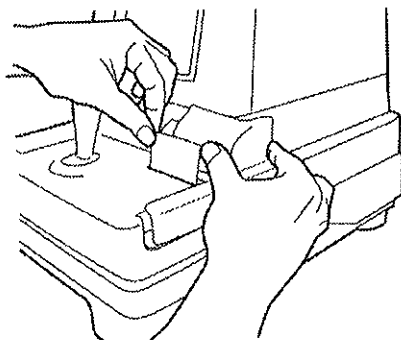


- 7** Reset the paper retainer lever to the original upright position.



**MEMO** Paper is not fed unless the paper retainer lever is at the level position.

- 8** After making sure that the paper comes out, attach the printer cover.

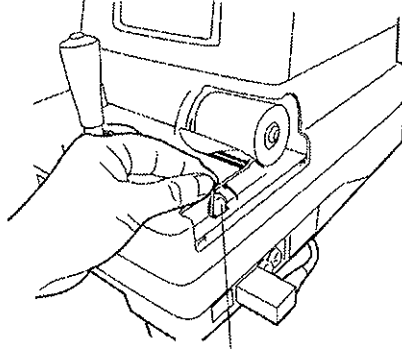


**MEMO** Please insert the printer cover until it clicks.

**MEMO** A 58mm wide paper roll (example: TF50KS-E2C (Nippon Paper Co.) is recommended.  
Other paper rolls may cause unnecessarily large printing noise or unclear printing.

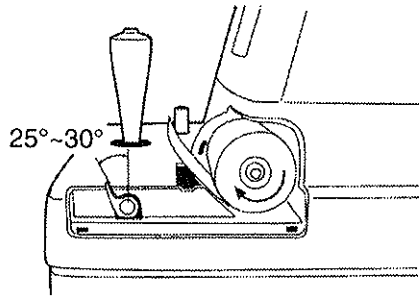
## Manual setting

- 1** While pressing the thumb to the surface, slide off the printer cover.
- 2** Set the paper into the shaft support, taking care of the roll direction of paper. Pull out the paper top 7-8cm forward.
- 3** Rotate the paper retainer lever in the arrow direction/

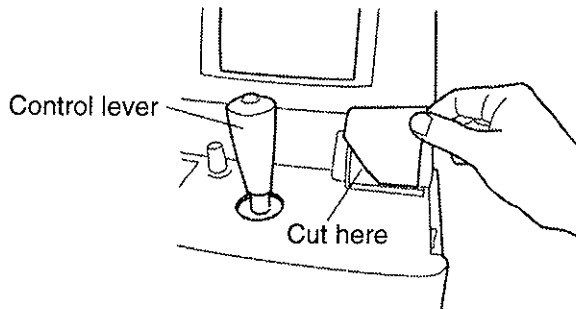


Paper retainer lever

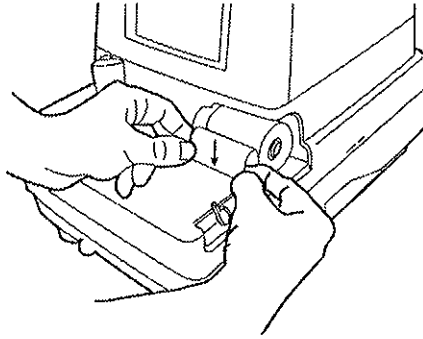
- 4** Set the paper retainer lever at the illustrated position where it becomes a little heavier.



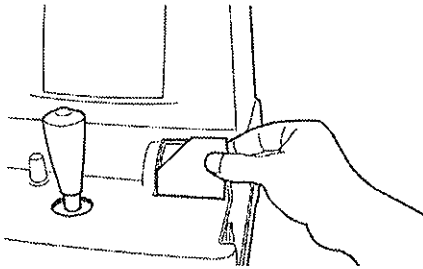
- 5** Cut the paper about 2cm from the control lever side, as illustrated.



- 6** Insert the paper into the printer straight along the paper guide.



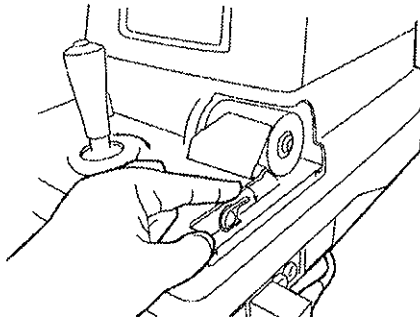
- 7** Insert the paper further until the paper top comes out from the outlet.



**MEMO**

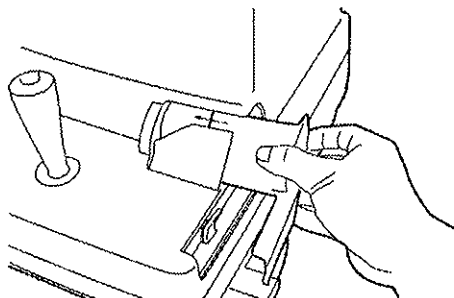
If the paper retainer lever is not set to the proper position or if the paper is not cut on the control lever side, the paper does not go smoothly into the printer.

- 8** Align the paper so that it comes out straight and then lower the paper retainer lever to the level position.



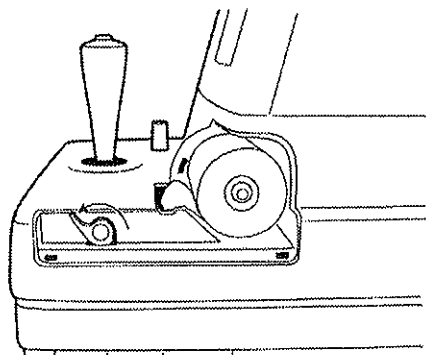


- 9** Attach the printer cover so that the paper comes outside.



**MEMO** Please insert the printer cover until it clicks.

**MEMO** The paper retainer lever can be set in 2 steps. If a paper jam occurs, fully rotate the paper retainer lever to the illustrated position, and remove the stuffed paper pieces from the printer.



## RESETTING FROM POWER SAVE STATUS

This instrument adopts the power save system for saving electric power. Namely, when the main body is not in operation, power supply to the monitor and CCD camera is stopped. Under the power-save condition, only the POWER lamp of control panel lights and the monitor screen is off.

- 1** Press the **MEASUREMENT SWITCH**.

In a few seconds, the TV monitor is displayed and measurement is enabled.

# BASIC OPERATIONS

## PREPARATION BEFORE MEASUREMENT

### Applying power source

- 1** Make sure of the connection of power cable.  
For connection, see "Connecting power cable" on page 15.
- 2** Press on the **POWER SWITCH**.
- 3** Confirm that the title screen is displayed and then the MEASUREMENT screen is displayed in a few seconds.

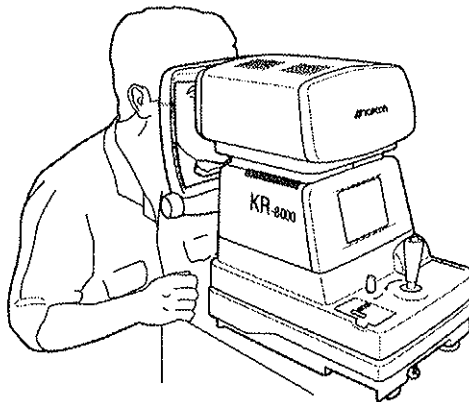
### Positioning the patient



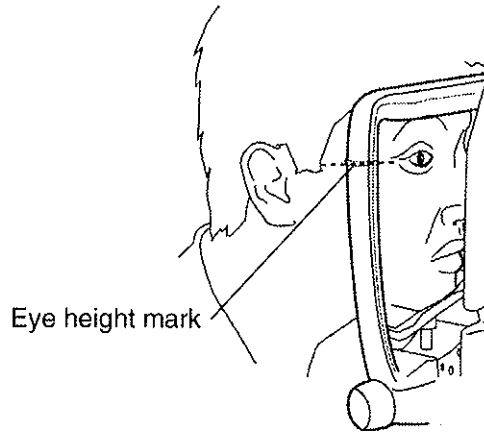
#### CAUTION

To avoid injury, do not insert fingers under the chinrest.  
\*Be sure to instruct the patient about this.

- 1** Make sure of the measurement screen.
- 2** Let the patient sit in front of the instrument.
- 3** Adjust the automatic instrument table or the chair height so that the patient can sit on the chair with comfort.
- 4** Place the patient's chin on the chinrest and let his forehead touch the forehead rest.



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



## MEASUREMENT UNDER AUTO START MODE

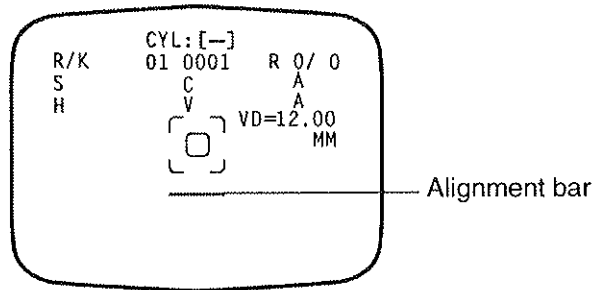
### MEMO

- Adjust the height of automatic instrument table so that the patient can sit on the chair with comfort to obtain correct measurement values.

### Positioning the patient

In the initial status after power on, the mode is set to the auto start.

- 1** Make sure of the measurement screen.
- 2** Press **AUTO START SWITCH** on the control panel and display the alignment bar in the monitor screen.



### Setting the measurement mode

This instrument can change the measurement mode R/K (REF-KRT continuous measurement, KRT, REF).

In the initial status after power on, the measurement mode is R/K.

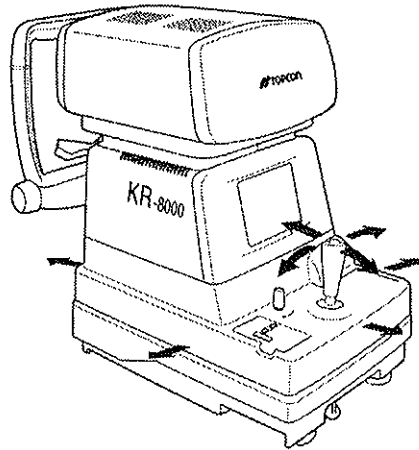
- 1** Make sure of the measurement screen.
- 2** Press **MEASUREMENT MODE SWITCH** of the control panel and set the measurement mode.

Collimation and measurement (Adjusting the patient's eye to auto refractometer)  
Alignment operations are done with the control lever.

**MEMO**

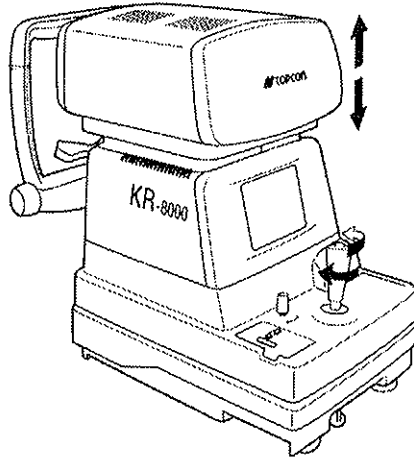
Movement operations of the main body using the control lever.

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



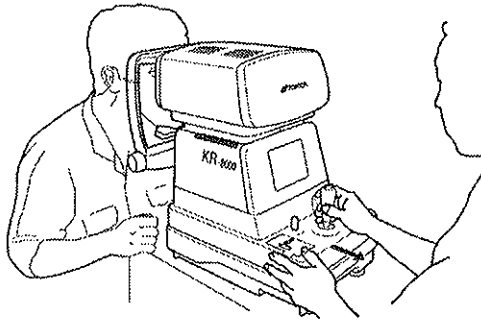
Operating the control lever  
(for lateral adjustment)

- The main body position can be fine-adjusted vertically by turning the control level right (up) and left (down).

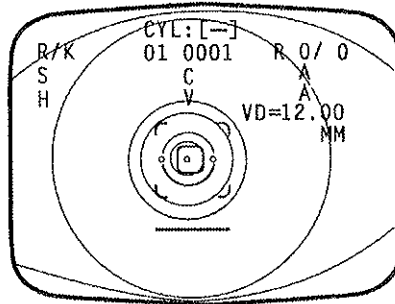


Operating the control lever  
(for up/down adjustment)

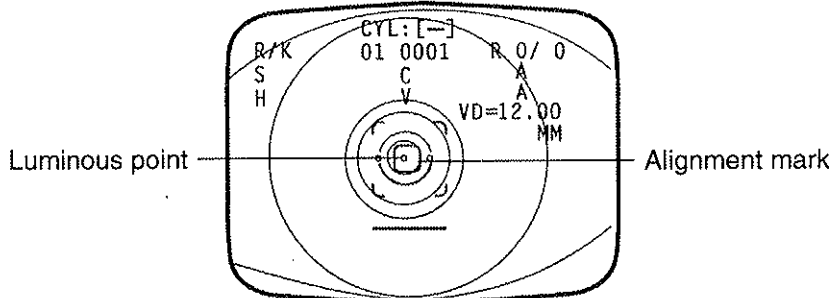
- 1 Hold the control lever and move the main body to the operator side.



- 2 Operate the control lever laterally and vertically to obtain the target eye in the center of monitor screen.

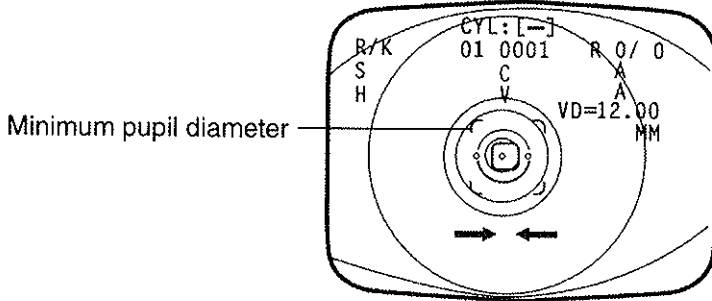


- 3 While moving the main body toward the patient, focus the target eye. A vague, reflected luminous point for alignment appears on the cornea.



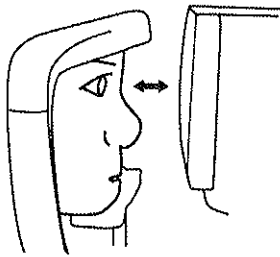
- 4 Fine-adjust the main body position in all directions so that the luminous point comes within the alignment mark.

- 5** Keeping the luminous point within the alignment mark, slowly move the main body toward the patient.  
When the main body approaches the target eye, the alignment bar of the monitor screen changes to arrows.

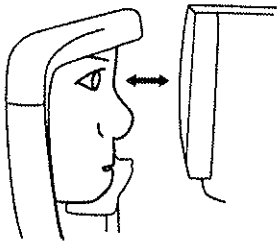
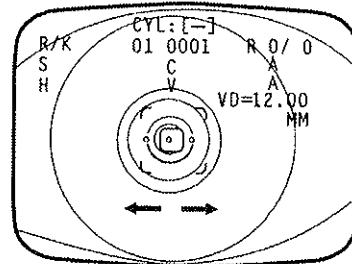


**MEMO** Take care so that eyelashes and eyelid do not come into the minimum pupil diameter mark as they may disturb measurement.

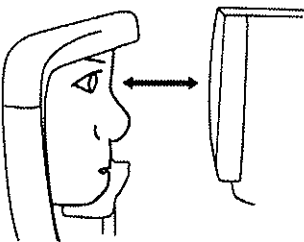
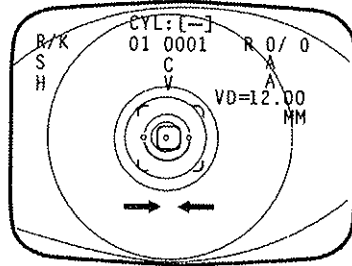
**MEMO** If the instrument is too close to the alignment reference position, " $\leftarrow \rightarrow$ " is displayed on the monitor screen, and if too far, " $\rightarrow \leftarrow$ " is displayed.



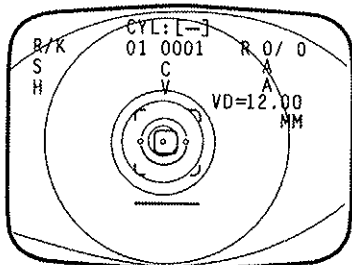
Too close



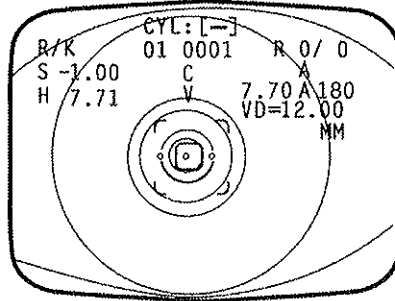
Too far



Positioning is incorrect at all.



- 6** After the alignment bar is displayed, move the main body slowly towards the patient. Measurement is done and the measurement value is displayed on the monitor screen.



**MEMO**

- To stop auto start  
Press the **MEASUREMENT SWITCH**, and release it after hearing the buzzer sounds twice. Auto measurement is stopped. To return to auto measurement, press the **AUTO SWITCH** again.  
After stopping the measurement, the measurement result is printed out by pressing the **PRINT SWITCH**.

**MEMO**

- To automatically print the measurement result (available at auto start mode only)  
If YES is selected for auto print in the initial setting, press the **MEASUREMENT SWITCH** after right and left measurements are finished. The buzzer sounds twice, and the measurement result is printed out automatically.

**MEMO**

- If measurement is not possible under auto start mode (this may occur when the cornea condition is not good), measure under manual start mode.

**Displaying measurement values**

Data of the latest measurement are displayed on the monitor screen.

Figures only: Measurement was done correctly.

Figures+\*: The reliability of measurement is low.

ERROR: Measurement was not done correctly.

**MEMO**

For messages on the monitor screen, see "Messages given during measurement" on page 67.



## MEASUREMENT UNDER MANUAL MODE

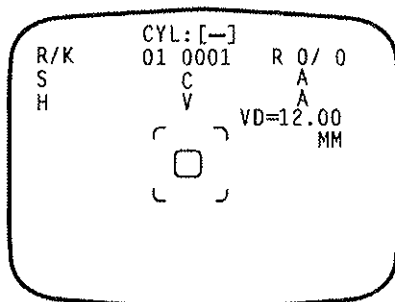
### MEMO

- Adjust the height of automatic instrument table so that the patient can sit on the chair comfortably to obtain accurate measurement values.

### Setting the picturing mode

In the initial status after power on, the mode is set to the auto start.

- 1** Check of the measurement screen.
- 2** Press **AUTO START SWITCH** on the control panel and erase the alignment bar from the monitor screen.

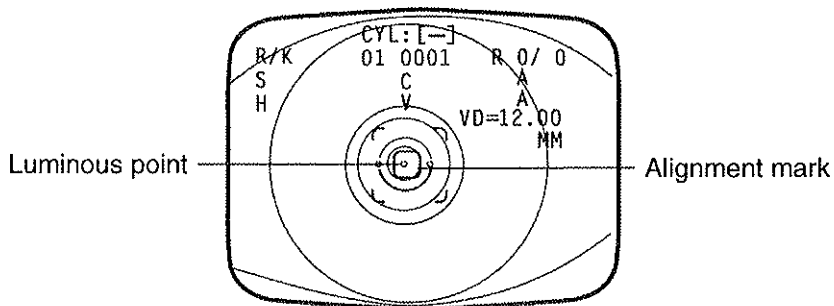


### Collimation and measurement

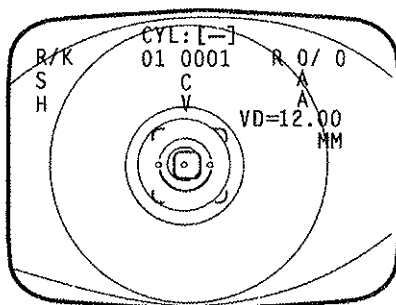
Alignment operations are done with the control lever.

For the adjustment of main body using the control lever, see MEMO on page 52.

- 1 Operate the control lever laterally and vertically so as to obtain the target eye in the center of monitor screen.



- 2 While moving the main body toward the patient, focus the target eye. A vague, reflected luminous point for alignment appears on the cornea. Focus the target eye to make the luminous point minimum.
- 3 Fine-adjust the main body position in all directions so that the luminous point comes within the alignment mark.



- 4 When the luminous point becomes the minimum within the alignment mark, press the **MEASUREMENT SWITCH**.

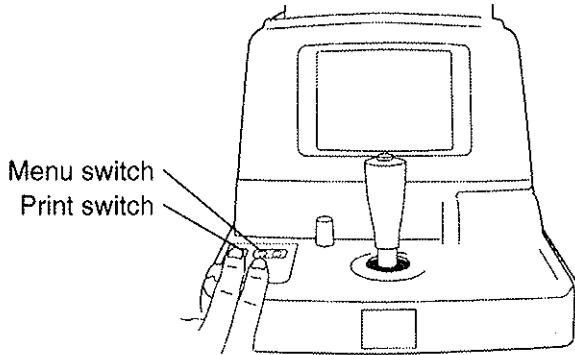
#### MEMO

Even when collimation is improper, measurement is done by pressing the **MEASUREMENT SWITCH**, but to secure high-precision values, do collimation properly.

- 6 Measurement is done and measurement values are displayed.

## ERASING MEASUREMENT VALUES

- 1 While pressing the **MENU SWITCH** of the control panel, press the **PRINT SWITCH**. All measurement values, both right and left eyes are cleared, and the system returns to the initial status after power on.



# INDIVIDUAL OPERATIONS

## PRINT-OUT OF MEASUREMENT VALUES

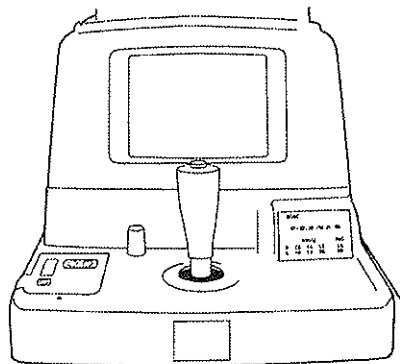
### MEMO

- To avoid paper jam in the printer, do not feed the paper if it is partly cut/torn or wrinkled.
- To avoid discoloring the printing paper (particularly the recording area) during storage, use a polypropylene holder and not one containing plasticizer (PVC, etc.).
- To avoid discoloring the printing paper (particularly the recording area) after pasting, use water soluble glue and not one containing solvent.
- Since the printer paper is heat sensitive, it is not suitable for recording for a long period. If necessary to keep records for long, we recommend to take copies separately.

This instrument is equipped with a built-in printer to print out measurement values.

- 1** Confirm the measurement screen.
- 2** Press the **PRINT SWITCH** of the control panel.

Measurement values of the monitor screen are printed out. After printing, the values are erased automatically from the monitor screen.



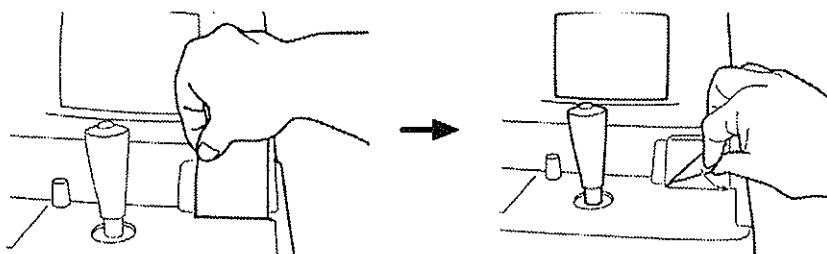
### MEMO

The "ERR" mark is not printed. Also, printing is not done if there is no measurement value. When a red line appears in the printer paper, replace it with new one. For details about the replacement of printer paper, see "Printer paper setting" on page 43. Additionally, a 58mm wide paper roll (example: TF50KS-E2C (Nippon Paper Co.)) is recommended.

### MEMO

If "PRINTER HEAD UP" is displayed, lower the paper retainer lever and press the **PRINT SWITCH** again.

- 3** To cut the paper, hold the top left corner and pull it diagonally, as illustrated.



**MEMO**

- Irregular cutting may cause paper jam. Cut the paper cleanly.

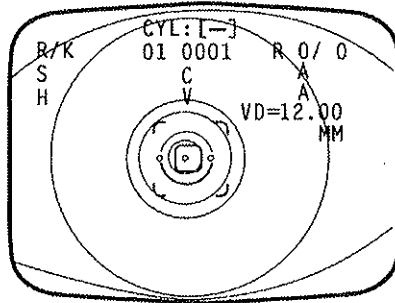
## MEASUREMENT OF CORNEA DIAMETER

For the measurement of cornea diameter, "C.D.MEMORY YES" (measurement of static image) or "C.D.MEMORY NO" (measurement of dynamic image) can be selected in the initial setting.

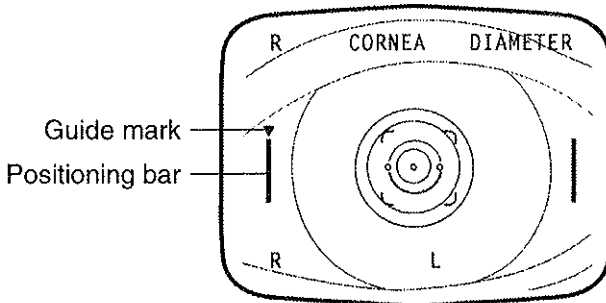
For changing settings, see "Changing the cornea diameter measurement method" on page 20.

Measuring the dynamic image

**1** Focus the target eye.

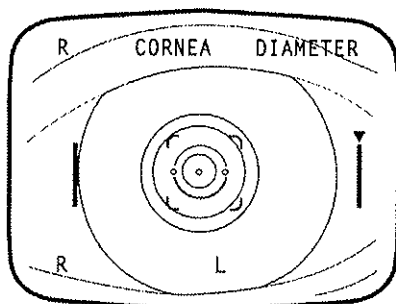


**2** Press the **CORNEA DIAMETER SWITCH**.



**3** Observe of the cornea diameter screen.

- 4** Bring the left positioning bar to the left end of iris by pressing the **AUTO START SWITCH** (for moving left) and **TARGET IMAGE SWITCH** (for moving right).

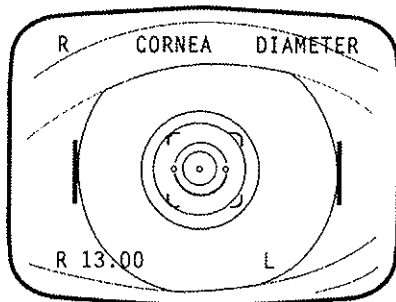


- 5** Press the **MEASUREMENT SWITCH**.
- 6** The guide mark moves right.
- 7** Bring the right positioning bar to the right end of iris by pressing the **AUTO START SWITCH** (for moving left) and **TARGET IMAGE SWITCH** (for moving right).

**MEMO**

If it is necessary to move the left positioning bar again, press the **MEASUREMENT MODE SWITCH**. When the **MEASUREMENT MODE SWITCH** is pressed further, right and left positioning bars return to the initial positions.

- 8** Press the **MEASUREMENT SWITCH**.
- 9** The cornea diameter is displayed.



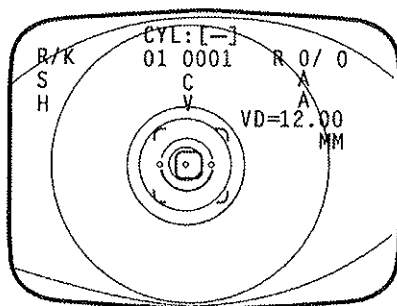
- 10** Press the **MEASUREMENT SWITCH**. The measurement mode of left eye sets in. Measure also the right eye in like manner.
- 11** After displaying data for both eyes, press the **MEASUREMENT SWITCH** to return to the measurement screen.

**MEMO**

- To get out of the mode during measurement, press the **PRINT SWITCH**.
- When the measurement result is necessary for one eye only, do the measurement and then press the **PRINT SWITCH** and get out of the mode.
- Under the REF mode, the measurement of cornea diameter cannot be done.

**Measuring the static image**

- 1** Focus the target eye.



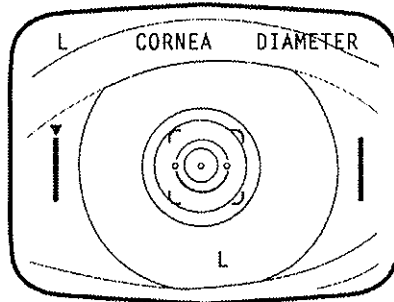
- 2** Press the **CORNEA DIAMETER SWITCH**.
- 3** Make sure of the cornea diameter screen.
- 4** Press the **MEASUREMENT SWITCH**. The image of right eye is stored and the memory counter of screen changes to "1".

**MEMO**

When the **MEASUREMENT SWITCH** is pressed repeatedly, the memory counter remains as is "1", but the latest image is stored.



- 5** Store the image of left eye in like manner.



(Measuring the left eye only)

- 6** Press the **CORNEA DIAMETER SWITCH**.
- 7** Make sure of the cornea diameter screen.
- 8** Bring the left positioning bar to the left end of iris by pressing the **AUTO START SWITCH** (for moving left) and **TARGET IMAGE SWITCH** (for moving right).

**MEMO**

If it is necessary to move the left positioning bar again, press the **MEASUREMENT MODE SWITCH**. When the **MEASUREMENT MODE SWITCH** is pressed further, right and left positioning bars return to the initial positions.

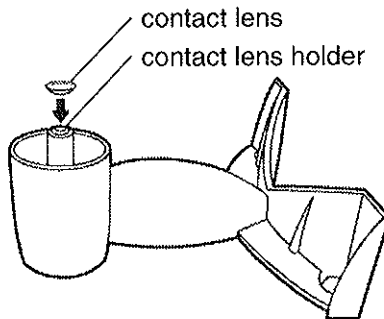
- 9** Press the **MEASUREMENT SWITCH**. The cornea diameter is displayed.
- 10** Press the **MEASUREMENT SWITCH**. The measurement mode of left eye sets in.  
Measure also the left eye in like manner.

**MEMO**

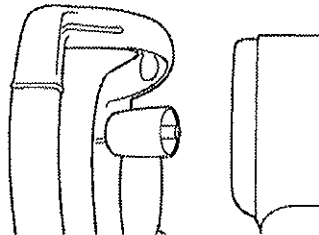
- When the image of only one eye is necessary, press the **CORNEA DIAMETER SWITCH** after storing the image.
- When images of both eyes are stored, the left/right eye screen can be switched by pressing the **CORNEA DIAMETER MEASUREMENT SWITCH**.

## MEASUREMENT OF HARD CONTACT LENS

- 1** Make sure the unit is in the corneal curvature measurement (R/K or KRT) mode. If not, choose the R/K or KRT mode by the **MEASUREMENT MODE SWITCH**.
- 2** Fill the concave part at the top of contact lens holder of model eye with water, and paste the contact lens.
  - The contact lens adheres by surface tension.
  - Take care not to allow bubbles in between.
  - Also take care and keep the measured lens surface free of water drops.



- 3** Insert the model eye into chinrest tissue pins.



- 4** Do measurement in like manner as the corneal curvature measurement.
  - \* When measuring the base (concave) curve of contact lens, the axial angle is reversed from the normal (convex) corneal curvature measurement.

## INPUT/OUTPUT USING RS232C

### Output using RS232C

This instrument can output data to PC and the like via the RS232C interface.

- 1** Make sure of the connection to RS232C OUT.  
For connection, see "Connecting external I/O terminals" on page 15.
- 2** Make sure of data communication settings.  
For data communication settings, see "On-line (data communication)" on page 35.
- 3** Do measurements.
- 4** Press the PRINT SWITCH of the control panel.

When output is completed, "RS232C DATA OUT" is displayed in the monitor screen.

### Input using RS232C

This instrument can input ID numbers from a bar code reader and the like via the RS232C interface.

- 1** Make sure of the connection of RS232C OUT.  
For connection, see "Connecting external I/O terminals" on page 15.
- 2** Make sure of data communication settings.  
For data communication settings, see "On-line (data communication)" on page 35.
- 3** Confirm the measurement screen.
- 4** Input ID numbers from the external device.  
The inputted ID numbers are displayed in the monitor screen.


# TROUBLESHOOTING


## TROUBLE-SHOOTING OPERATIONS

Messages given during measurement

"OVER-SPH"	Spherical power exceeds +22D or -25D.
"OVER-CYL"	Cylindrical power exceeds $\pm 8D$ .
"OVER-R"	Indicates that the corneal curvature exceeds 5.00-10.00mm.
"NO TARGET"	This indicates there is no target eye or the eye image is too dark.
"AGAIN"	There is a difference of more than 5D from the previous measurement value.
"NO CENTER"	There is no target eye center.
"PAPER END"	Paper is used up.
"PRINT HEAD UP"	The paper retainer lever is up.
"PRINT"	Printing is under way.
"ERROR"	Is displayed when the patient's eye blinks or moves during measurement. If this appears when proper measurement is done with the model eye, something is wrong in the instrument: Ask our serviceman.

## Trouble-shooting operations

 <b>WARNING</b>	To avoid electric shocks, do not attempt overhauling, rebuilding or repairs. Ask your dealer for repair.
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 <b>WARNING</b>	To avoid electric shocks, do not remove covers from bottom and top surfaces, TV monitor, measuring unit, etc.
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If a trouble is suspected, check conditions following the check list shown below. If the disposition according to the given instructions does not improve the condition, or if there is no relevant check item in the list, contact your dealer or TOPCON to the address stated on the back cover.

### CHECK LIST

Trouble	Condition	Check	Page
TV monitor does not work.	Pilot lamp does not light either.	Is power cable unplugged?	15
		Is power cable connected to the instrument?	15
	Fuse blows when POWER switch is pressed on.	Call our serviceman.	72
TV monitor is hard to see.	Image contrast is not good.	Adjust "CONT" volume.	71
	Picture is dark.	Adjust "BRIGHT" volume.	71
Something is wrong with control lever (or another movable part).		Do not move it forcibly but call our serviceman.	52
Printing is not done.	Paper comes out without printing.	Is paper roll direction correct?	43
	Paper does not come out.	Is "PAPER END" displayed on TV monitor? If so, Replenish printer paper.	43

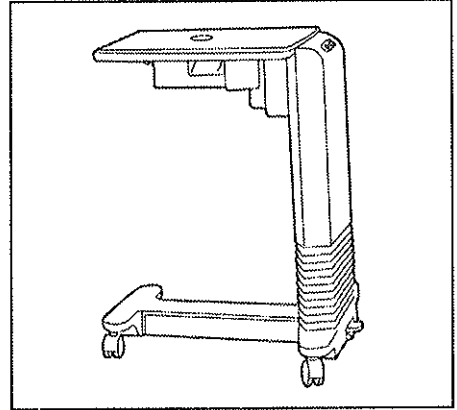
# REFERENCE

## OPTIONAL ACCESSORIES

- Automatic instrument table AIT-20  
The table height can readily be adjusted to facilitate measurement.

### Specifications

- Dimensions .....530(W)x540(D)x650(H)mm
- Table height .....655~845mm
- Table size.....450x500mm
- Weight.....approx. 30kg
- Power consumption....270VA (100V)
- RS232C on-line cable
- Automatic instrument table AIT-11



## SPECIFICATIONS

Measuring range	Hyperopia: 0 to +22D    0.25D step display (switchable to 0.12D step display) Myopia: 0 to -25D    0.25D step display (switchable to 0.12D step display) Astigmatism: 0 to 8D    0.25D step display (switchable to 0.12D step display) Axial angle: 0 to 180°    1° step display (switchable to 5° step display)
Minimum pupil diameter measurable	2.0φmm
Target fixation	Auto fog system
Measurement data display	TV monitor screen
Measurement data recording	Built-in printer (Data of 10 measurements of right and left eyes)
Corneal curvature measurement Measuring range	Radius of corneal curvature: 5.00~10.00, 0.01mm step display Corneal refractory power: 67.50~33.75D 0.25D step display (switchable to 0.12D step display) (corneal refractive index = 1.3375) Corneal astigmatic power: 0~10D (+ or -) Corneal astigmatic axial angle: 0~180° 1° step display (switchable to 5° step display)
Display of measurement value Recording of measurement value	Display in monitor screen Built-in printer (recordable up to 10 measurements each for right/left eye) (R/K mode: printing of typical values only)
Collimation	TV monitor screen
TV Monitor	5"
PD measurement	85mm measuring range max., 1mm display unit
External output terminal	RS232C
Power source/power consumption	AC 100, 120, 220 and 240V, 50/60Hz, 75VA
Operating temperature	10-40°C
Main body travel	back & forth: 40mm, sides: 86mm, up & down: 30mm
Chinrest travel	60mm (up & down)
Dimensions	275(W)x475(D)x450(H)mm
Weight	19kg

\*For product improvements, these specifications are subject to change without notice.

# MAINTENANCE

## DAILY CHECKUPS

### Checking the measuring accuracy

- Measure the attached model eye and check the accuracy at regular intervals.

### Cleaning the instrument

- Dust on examination window ..... Blow off dust by a blower.
- Fingerprints and oil spots on ..... Blow off dust by a blower and wipe the surface examination window lightly with a camera lens cleaner using clean gauze.
- Dirty instrument cover ..... Wipe the surface with the attached silicon cloth or a dry soft cloth. Never use solvents or a chemical duster.

### Daily maintenance

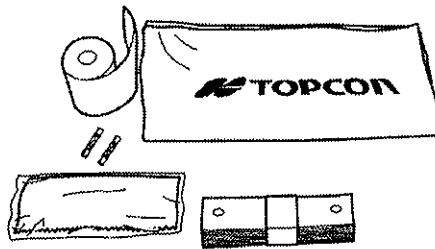
- Daily maintenance
- For this instrument, dust may cause errors. When not in use, apply the measuring lens cap and dust cover.
- When not in use, turn off the POWER switch.

### Ordering consumable items

- When ordering consumable items, tell the product name, product code and quantity to your dealer or TOPCON to the address stated on the back cover.

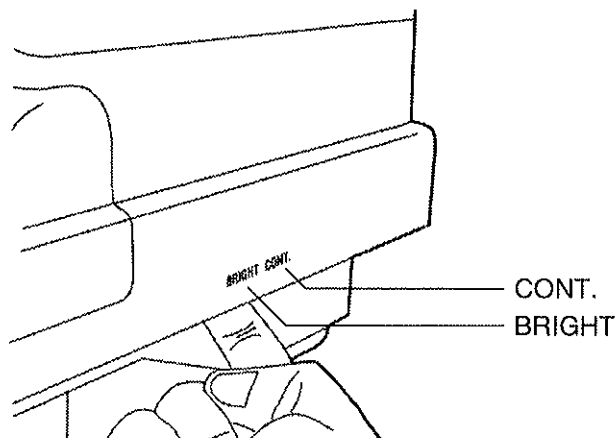
Product name	Product code
Chinrest tissue	40310 4082
Silicon cloth	31087 2007
Dust cover	42360 9002

Product name	Product code
Printer paper	44800 4001
Fuse 250V-1.5A-M	42364 5313



### Adjusting the monitor screen

- Though this instrument is properly adjusted before shipment, sometimes screen adjustment is required due to vibrations during transportation.
- To adjust contrast and brightness, turn volumes fully clockwise, viewed from the operator side, and then adjust each properly.

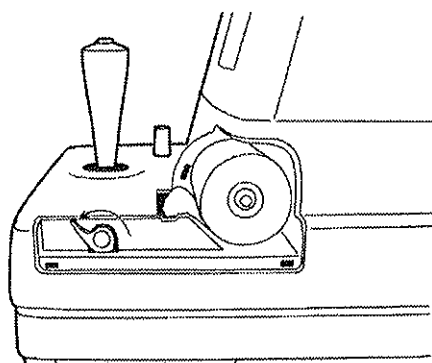


### Printer paper jam

#### MEMO

- If the printer paper is jammed in the printer, printing cannot be done, and continued use may cause troubles.

- 1** Remove the printer cover, and take out the jammed paper pieces with the paper retainer lever fully released.
- 2** The paper retainer lever can be set in 2 steps. If a paper jam occurs, fully rotate the paper retainer lever to the illustrated position.





## Fuse change



### WARNING

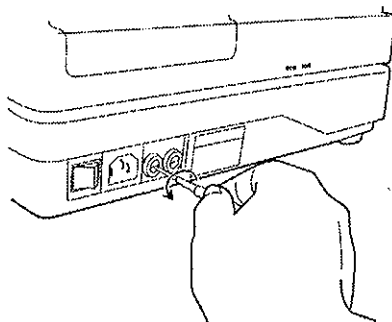
To avoid electric shocks during fuse change, be sure to unplug the power cable before removing the fuse lid. Also, do not plug the power cable leaving the fuse box open.



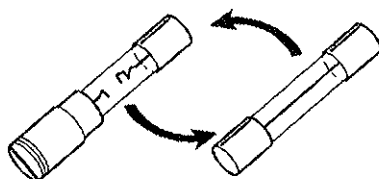
### WARNING

Always use the attached fuse (125V, 3A). Using any other type may cause troubles and fire.

- 1 Make sure that the power switch of the main body is off and the power cable is off.
- 2 Remove the fuse holder by rotating it counterclockwise by a screwdriver.

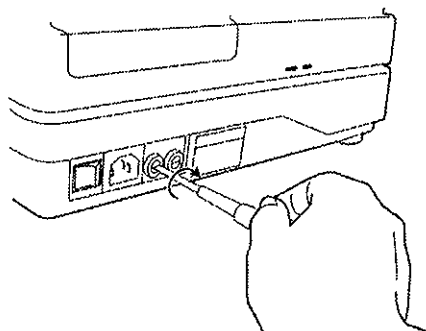


- 3 Replace the fuse with the attached one.



Changing the fuse

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



## MAINTENANCE

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### ④ Cleaning the dust cover

**MEMO**

- Avoid cleaning plastic parts with solvents. Benzine, thinner, ether and gasoline may cause discoloring and decomposition.

- 1** If the dust cover, control panel, etc. get soiled, wipe the surface with dry cloth.
- 2** If the dust cover is noticeably stained, wipe the surface with a cloth which is moistened in a tepid water solution of neutral detergent for food and then squeezed out.

## AUTO KERATO-REFRACTOMETER

# KR-8000

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### TOPCON OMNI SYSTEMS, INC.

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