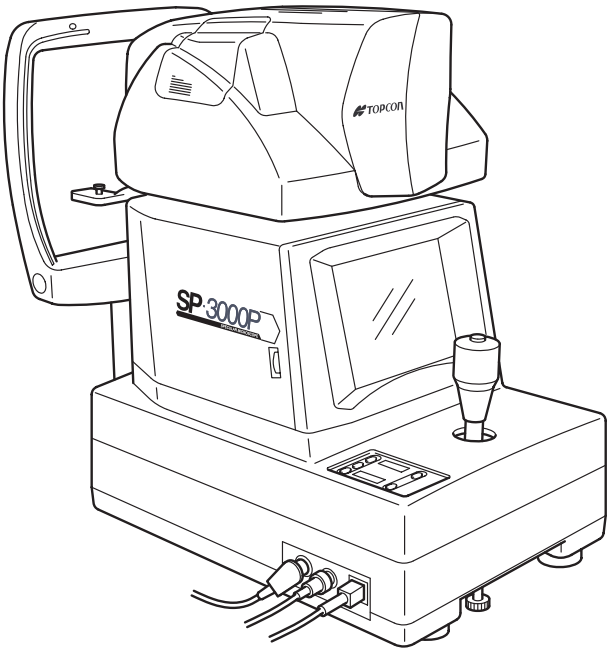
TOPCON



INSTRUCTION MANUAL

SPECULAR MICROSCOPE

SP-3000P

INTRODUCTION

Thank you for purchasing the TOPCON SP-3000P Specular Microscope.

This instrument is used to photograph and evaluate the corneal endothelium.

This instrument has the following features:

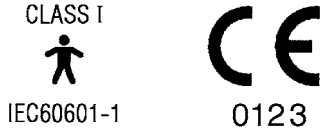
- Photography of the corneal endothelium and the measurement of the corneal thickness can be performed at the same time.
- The auto-alignment function ensures quick and easy centering and measurement.
- Simplified cell analysis enables the user to easily understand the rough value of the cell density.

This manual outlines the SP-3000P Specular Microscope, its operating procedures, trouble shooting, maintenance and cleaning.
Before using this instrument, carefully read the "DISPLAY FOR SAFE USE" and the "SAFETY CAUTIONS" to familiarize yourself with the features of the SP-3000P Specular Microscope and to ensure that you operate it efficiently and safely.
Always keep this instruction manual at hand.

[Warning]

Care should be taken not to hit the patient's eye or nose with the instrument during operation.
(The patient may be injured.)

This symbol is applicable for EU member countries only.
To avoid potential negative consequences for the environment and possibly human health, this instrument should be disposed of (i) for EU member countries - in accordance with WEEE (Directive on Waste Electrical and Electronic Equipment), or (ii) for all other countries, in accordance with local disposal and recycling laws.



CAUTIONS FOR USE

Basic caution

When moving the chinrest up and down, be careful not to catch the patient's hand.
The patient may be injured.
To avoid electric shock, do not open the instrument.
Request service from an authorized Topcon distributor.
Electric shock may cause burns or a possible fire. Turn the power switch OFF and unplug the power cord before replacing the fuses.
Replace only with fuses of the correct rating.

Disposal

Dispose of the instrument according to local disposal and recycling laws.

ENVIRONMENTAL CONDITIONS FOR USE

Temperature : 10°C ~ 40°C
Humidity : 30% ~ 75% (without dew condensation)
Air pressure : 700hPa ~ 1060hPa

STORAGE, USAGE PERIOD AND OTHERS

1. Environmental conditions for installation (without package)
   Temperature : 10°C ~ 40°C
   Humidity : 30% ~ 75% (without dew condensation)
   Air pressure : 700hPa ~ 1060hPa
2. When storing the instrument, ensure that the following conditions are met:
   (1) The instrument should not be splashed with water.
   (2) Store the instrument where air pressure, temperature, humidity, ventilation, sunlight, dust, salty/ sulfurous air, etc. do not give any negative side effect.
   (3) Do not store or transport the instrument on a slope or uneven surface or in an area where it is subject to vibrations or instability.
   (4) Do not store the instrument where chemicals are stored or gas is generated.
3. Usage period
   8 years from delivery providing regular maintenance is performed (according to the self-certification [Topcon data])

ENVIRONMENTAL CONDITIONS FOR PACKAGING IN TRANSPORTATION / STORAGE

Temperature : -20°C ~ 50°C
Humidity : 10% ~ 95%

CHECKPOINTS FOR MAINTENANCE

1. Periodically inspect the instrument and its parts.
2. Before using the instrument after a long period of inactivity, make sure that it operates safely and normally.
3. Be careful not to stain the photography window with fingerprints or dirt. This may affect picture quality.
4. If the photography window is stained, clean it according to the "CLEANING THE PHOTOGRAPHY WINDOW" instructions on P. 74 in this manual.

DISPLAY FOR SAFE USE

To encourage safe and proper use and to prevent danger to the operator and others or potential damage to property, important cautionary messages are placed on the instrument body and inserted in the instruction manual.
We suggest that everyone using the instrument understands the meaning of the following displays, icons and text before reading the "SAFETY CAUTIONS" and observe all listed instructions.

DISPLAYS

Display	Meaning
⚠ **WARNING**	Incorrect handling by ignoring this display may lead to a risk of death or serious injury.
⚠ **CAUTION**	Incorrect handling by ignoring this display may lead to personal injury or physical damage.

- Injury refers to cuts, bruises, burns, electric shock, etc. which do not require hospitalization or extended medical treatment.
- Physical damage refers to extensive damage to the building, nearby equipment and/or surrounding furniture.

ICONS

Icon	Meaning
⃠	Prohibition: Specific content is expressed with words or a picture near the ⃠ icon.
●	Mandatory Action: Specific content is expressed with words or a picture near the ● icon.
△	Caution: Specific content is expressed with words or a picture near the △ icon.

SAFETY CAUTIONS

⚠ WARNING

Icon	Prevention item	Page
	To avoid fire and electric shock in case of leakage, be sure to use a power supply equipped with a 3-plug AC receptacle for proper grounding.	16
	Electric shock may cause burns or a possible fire. Turn the power switch OFF and unplug the power cord before replacing the fuses. Replace only with fuses of the correct rating.	71

⚠ CAUTION

Icon	Prevention Item	Page
	To avoid injury and/or damage to the instrument, hold the instrument in the specified position. Be careful not to shake or move the instrument suddenly.	15
	When carrying the instrument, be careful not to drop or tip it over. Be careful to prevent your hand from being pinched by the instrument. If not, you may be injured.	15
	To avoid electric shock, do not handle the plugs with wet fingers.	16
	To avoid injury, do not let the patient put his/her hand under the chinrest.	34
	Don't put your hand under the measuring head. * Instruct the patient properly. When the measuring head is lowered, it may injure you by pinching your hand.	37
	To avoid injury during operation, be careful not to hit the patient's eye or nose with the instrument.	36, 41 45
	Before handling the chinrest manually in the case of a malfunction, remove the power cord from the instrument. If not, your finger may be pinched and injured by a wrong operation.	58
	To avoid damage to the instrument or electric shock, turn the power switch OFF and unplug the power cord before replacing the xenon lamp. Do not use any other types of xenon lamps except those specified in this manual.	69

Icon	Prevention Item	Page
	To avoid damage to the instrument or electric shock, turn the power switch OFF and unplug the power cord before maintenance.	73
	To avoid electric shock, do not open the instrument. Request service from an authorized Topcon distributor.	—
	This instrument has been tested (with 120V/230V) and found to comply with IEC60601-1-2: 2001. This instrument radiates radio frequency energy within standard and may affect other devices in the vicinity. If you have discovered that turning on/off the instrument affects other devices, we recommend you change its position, keep a proper distance from other devices, or plug it into a different outlet. Please consult your authorized dealer if you have any additional questions.	—

USAGE AND MAINTENANCE

USAGE

Usage
- The SP-3000P Specular Microscope is an electronic instrument for medical use. Use this instrument under a doctor's guidance.

USER MAINTENANCE

To ensure the safety and performance of the instrument, all maintenance work, unless specified in this manual, shall be conducted by trained service personnel. The following maintenance tasks may be done by the user.

For details, see the appropriate part of this manual.

Replacing the fuse

The fuse in the instrument body may be replaced by the user. For details, refer to P.71.

Replacing the xenon lamp

The xenon lamp for photography may be replaced by the user. For details, refer to P.69.

Cleaning the photography window

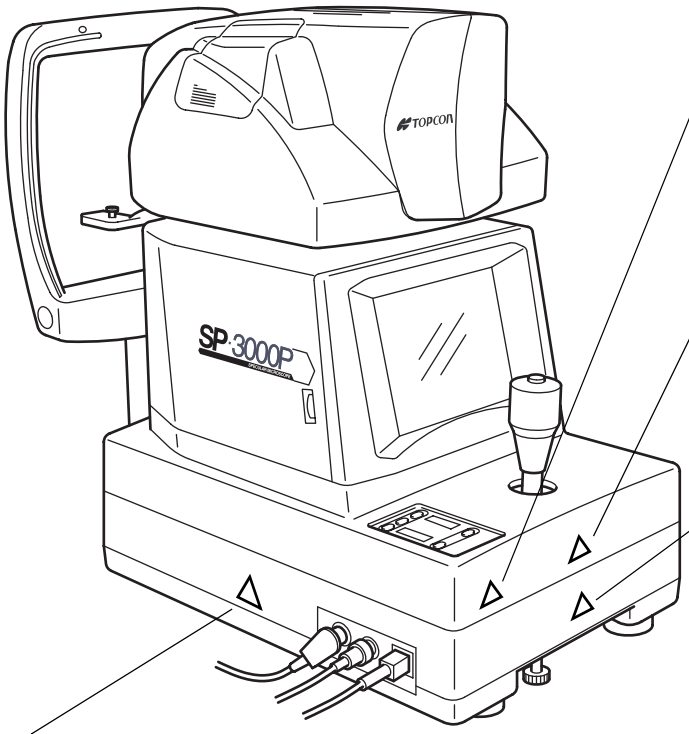
The lens surface and glass surface of the photography window may be cleaned by the user. For details, refer to P.74.

ESCAPE CLAUSE

- TOPCON shall not take any responsibility for damage due to fire, earthquakes, actions by third persons and other accidents, or damage due to negligence and misuse by the user and any use under unusual conditions.
- TOPCON shall not take any responsibility for damage derived from inability to properly use this instrument, such as loss of business profit and suspension of business.
- TOPCON shall not take any responsibility for damage caused from using this instrument in a manner other than that described in this instruction manual.
- Diagnoses made shall be the responsibility of the pertaining doctors and TOPCON shall not take any responsibility for the results of such diagnoses.

WARNING DISPLAYS AND POSITIONS

To ensure safety, the instrument provides warning displays.
Use the instrument correctly by observing the display instructions. If any of the following display labels are missing, contact your dealer or TOPCON at the address on the back cover.

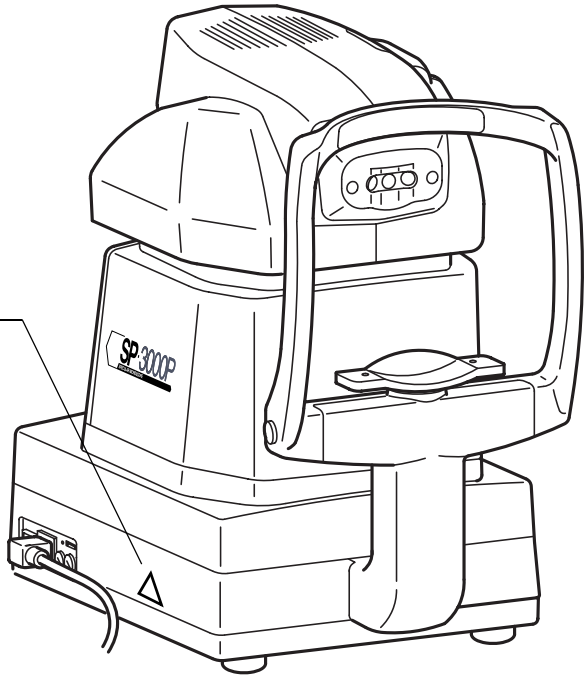


CAUTION
To avoid injury, be careful not to pinch the patient's hand when operating the chinrest up/down switches.

CAUTION
To avoid injury during operation, be careful not to hit the patient's eye or nose with the instrument.

NOTICE
When the room temperature is 10°C or less, turn on the power 30 minutes before using the instrument to maintain the detection accuracy.

CAUTION
To avoid electric shock, do not open the instrument. Request service from an authorized Topcon distributor.

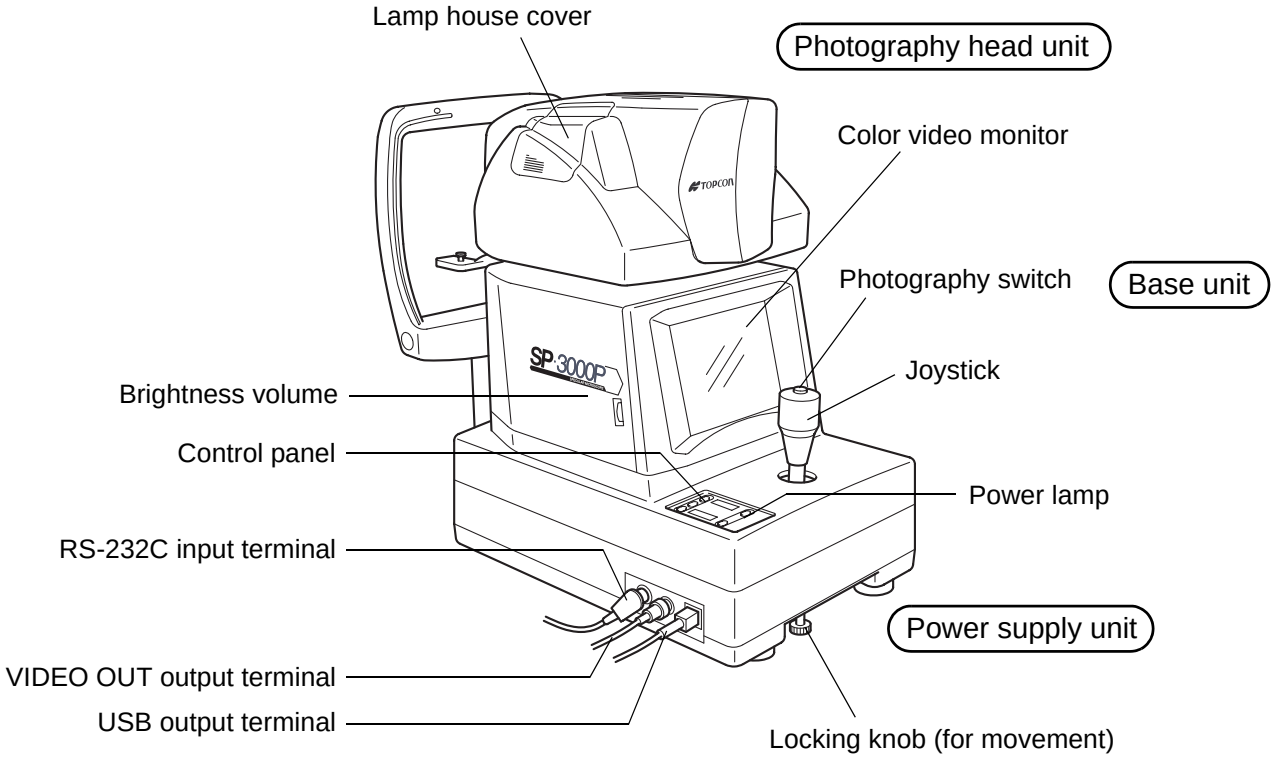


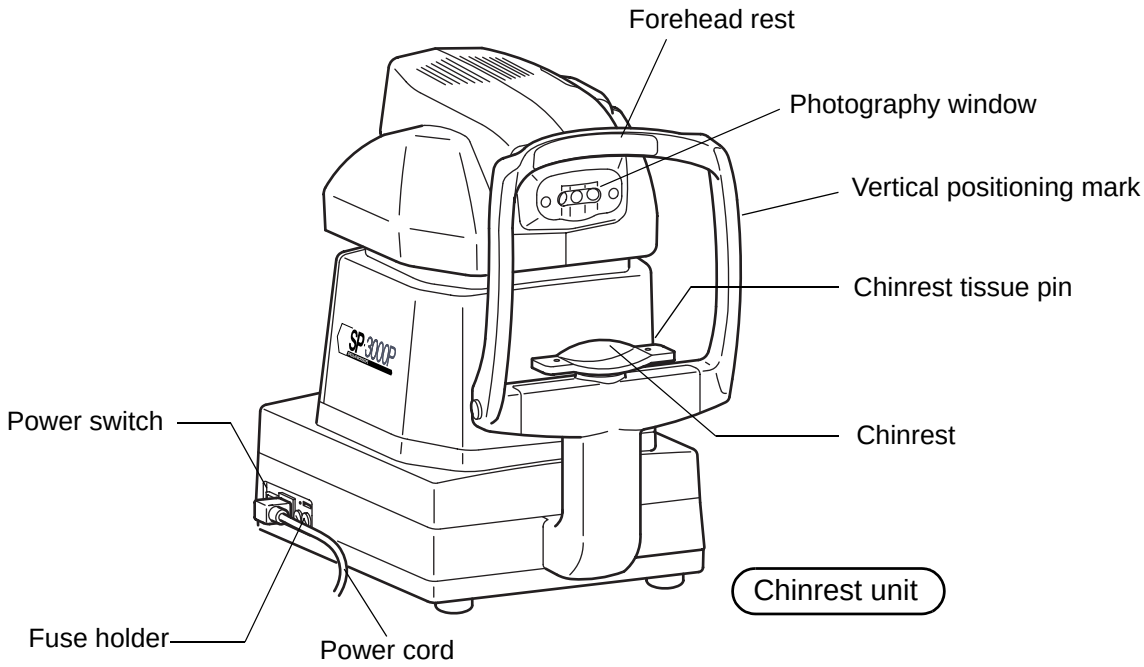
WARNING
Electric shock may cause burns or a possible fire. Turn the power switch OFF and unplug the power cord before replacing the fuses. Replace only with fuses of the correct rating.

CONTENTS

NOMENCLATURE

MAIN COMPONENT NAMES



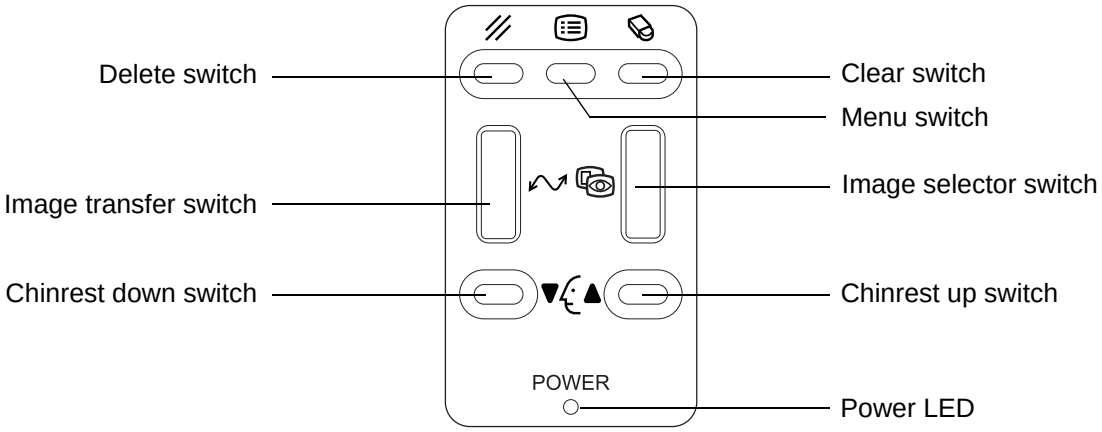


COMPOSITION OF PARTS WHICH CONTACT THE HUMAN BODY

Forehead rest : Silicone rubber

Chinrest : Acrylonitrile butadiene styrene resin

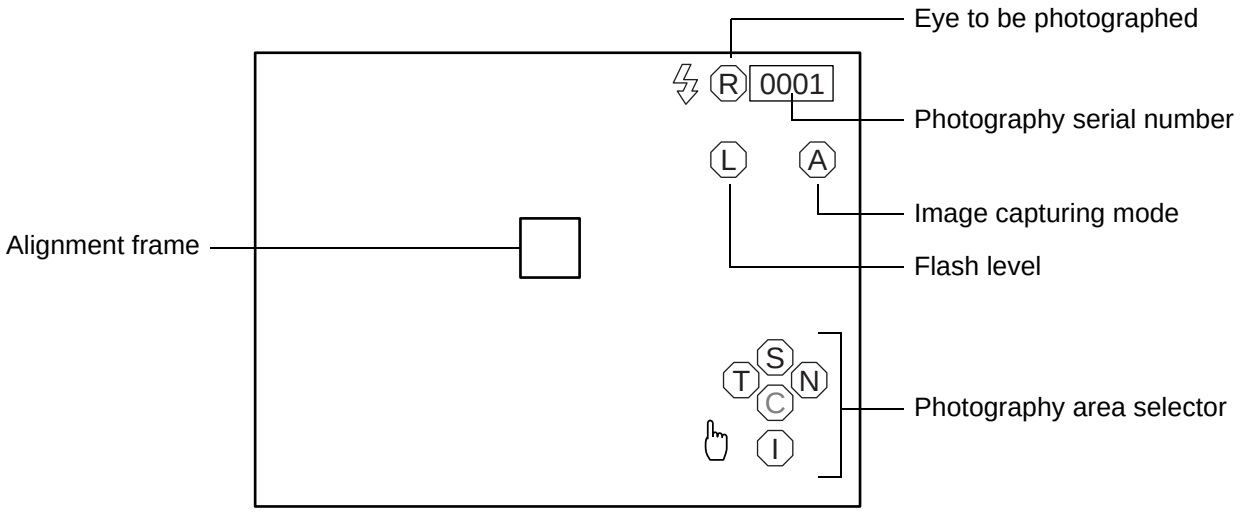
CONTROL PANEL



Delete switch : Deletes the image being displayed.
Menu switch : Displays the menu.
Clear switch : Deletes all the images in the memory.
Image transfer switch : Transfers the image data through USB.
Image selector switch : Switches the display from the image display to the eye observation display and vice versa.
Chinrest down switch : Moves (▼) the chinrest down.
Chinrest up switch : Moves (▲) the chinrest up.

MONITOR SCREEN

Eye observation display



Corneal endothelium display

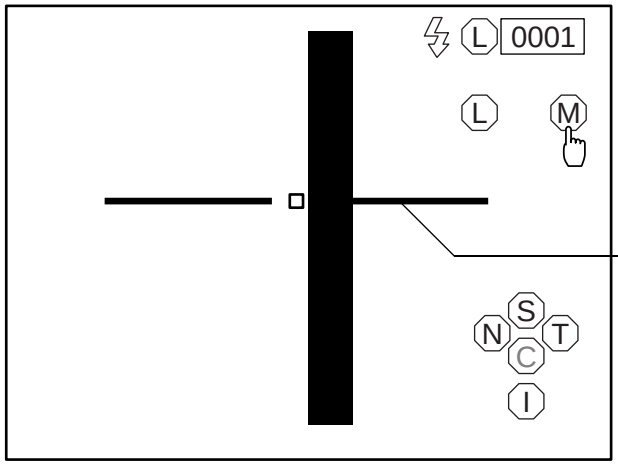


Image display

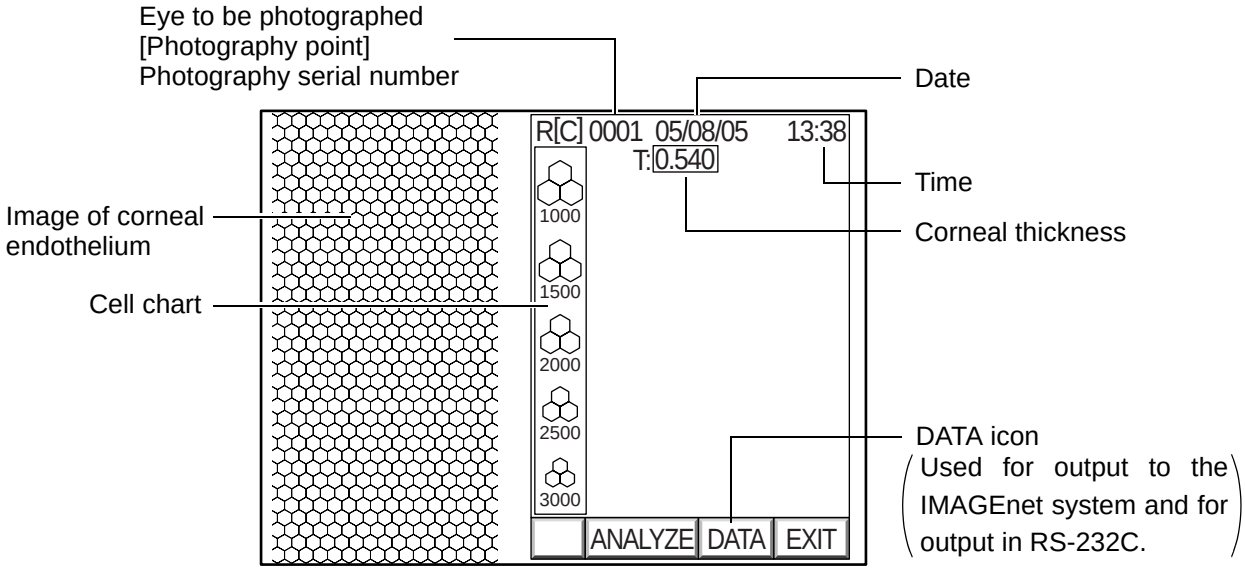
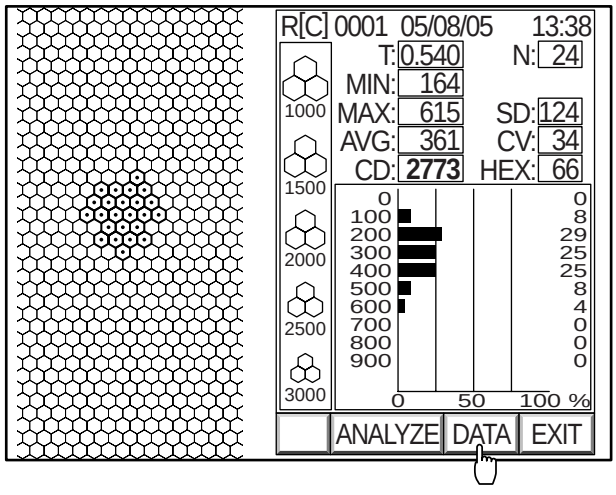
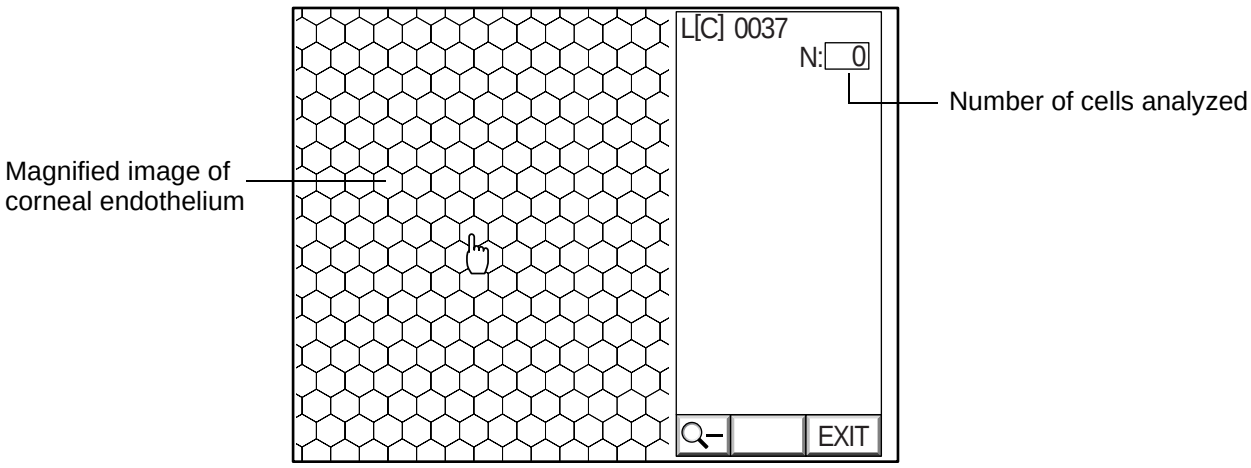


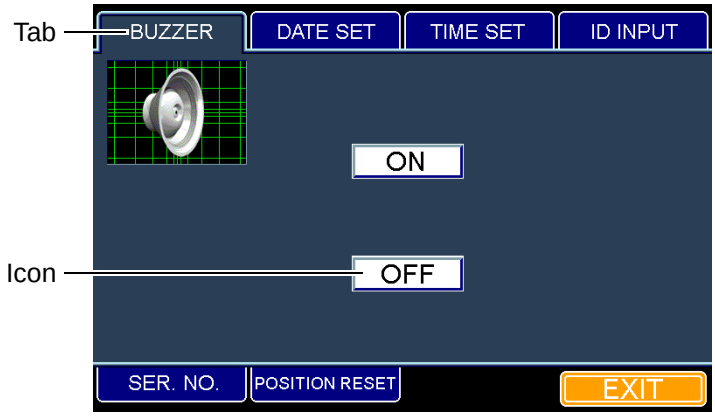
Image display with analytic values



Simplified cell count mode display



Menu display



Notation of mouse operation

This instruction manual is described according to the following notation rule.

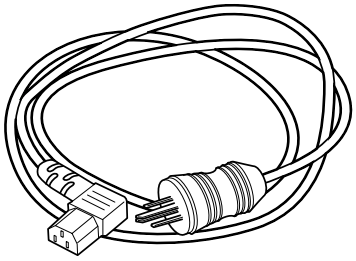
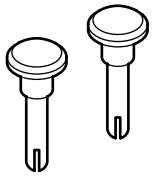
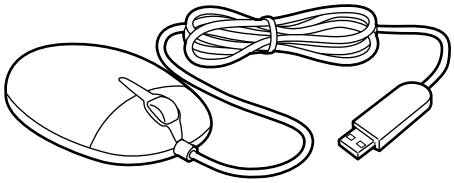
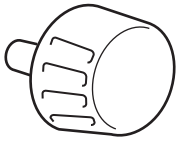
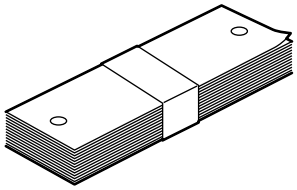
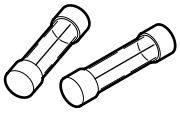
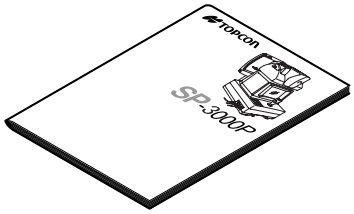
Notation

Click: Press the left button on the mouse and release it at once.

- This instrument is made on the assumption that the right-handed mouse is used. So, the left button which is clicked by the right forefinger should be the primary button.

STANDARD ACCESSORIES

Upon unpacking, make sure that all the following standard accessories are included. Figures in ( ) are the quantities.

Power cord (1) 	Chinrest tissue pin (2) 
Mouse (1) 	Emergency chinrest knob (1) 
Chinrest tissue (2) 	Dust cover (1) 
Fuse (2) 	Instruction manual (1) 

PREPARATONS BEFORE USE

INSTALLING THE INSTRUMENT

⚠CAUTION	To avoid injury and/or damage to the instrument, hold the instrument in the specified position and be careful not to shake or move it suddenly.

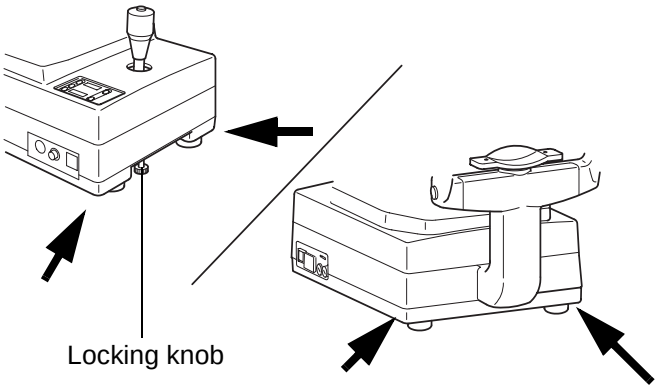
⚠CAUTION	When carrying the instrument, be careful not to drop or tip it over. Be careful to prevent your hand from being pinched by the instrument. If not, you may be injured.

1 Tighten the locking knob.

2 Firmly hold the instrument at the specified positions and install it on the instrument table.
For the instrument table, refer to "OPTIONAL ACCESSORIES" on P.75.

3 After installation, loosen the locking knob completely.
This allows the instrument to move.

Use the leveling knobs on the instrument's feet to prevent drifting of the instrument.



Place to be held

Proper way to hold the instrument

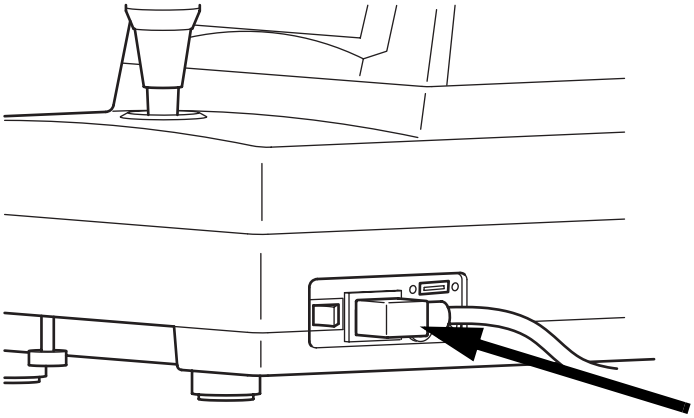
4 Fine level adjusting can be performed at each foot. Maintain the length within 1cm.

CONNECTING THE POWER CORD

⚠WARNING	To avoid fire and electric shock in case of leakage, be sure to use a power supply equipped with a 3-plug AC receptacle for proper grounding.
⚠CAUTION	To avoid electric shock, do not handle the plugs with wet fingers.

1 Make sure that the (POWER) switch of the instrument is OFF (◯).

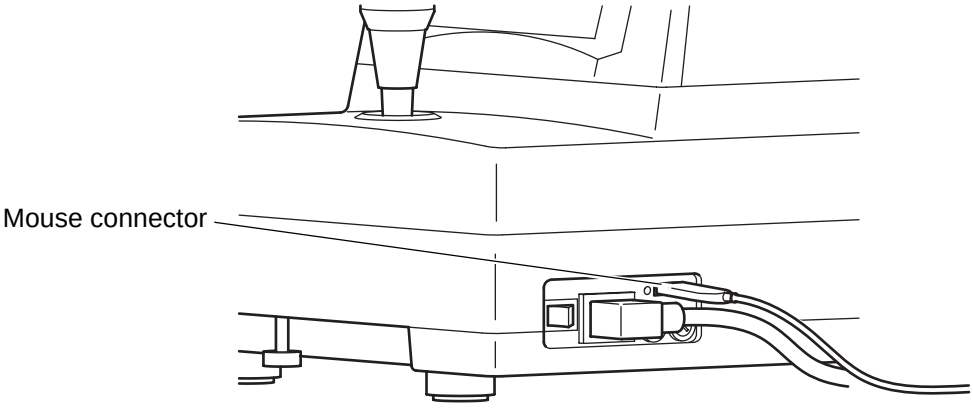
2 Attach the power cord to the instrument body.



3 Plug the power cord into a grounded outlet of the commercial power supply.

CONNECTING THE MOUSE

1 Insert the mouse plug into the mouse connector on the instrument body.



CONNECTING THE EXTERNAL INPUT/OUTPUT TERMINAL

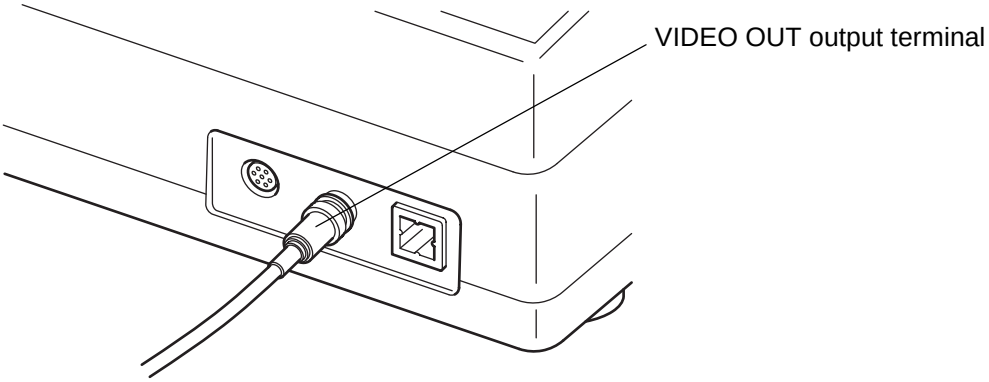
Image output

This instrument can be connected to an image processing unit of the EIA (NTSC) signal method.

1 Connect one end of the connection cord to the VIDEO OUT terminal on the instrument.

2 Connect the other end to the image processing unit.

The VIDEO OUT of the instrument has a BNC terminal. If necessary, use a connection cable and a conversion plug commercially available.



IMAGEnet

This instrument can be connected to an IMAGEnet system by the two connecting methods.

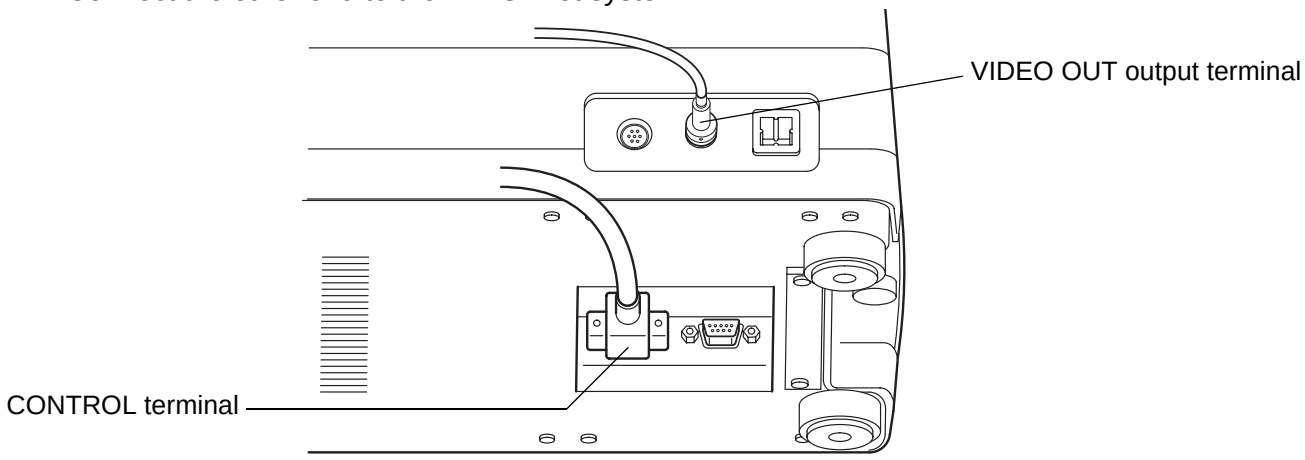
Connecting method 1 : When using the CONTROL terminal

1 Connect one end of the connection cord to the VIDEO OUT output terminal.

2 Connect the other end to the IMAGEnet system.

3 Connect one end of the IMAGEnet cord to the CONTROL (IMAGEnet) terminal on the instrument.

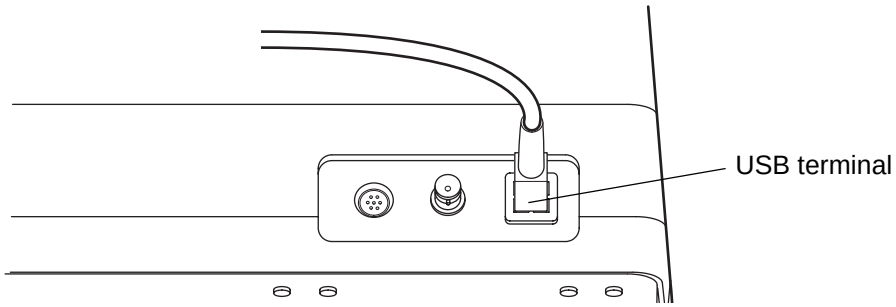
4 Connect the other end to the IMAGEnet system.



Connecting method 2 : When using the USB output terminal

1 Connect the connection cord to the USB output terminal of the instrument.

2 Connect the other end of the connection cord to the IMAGEnet system.



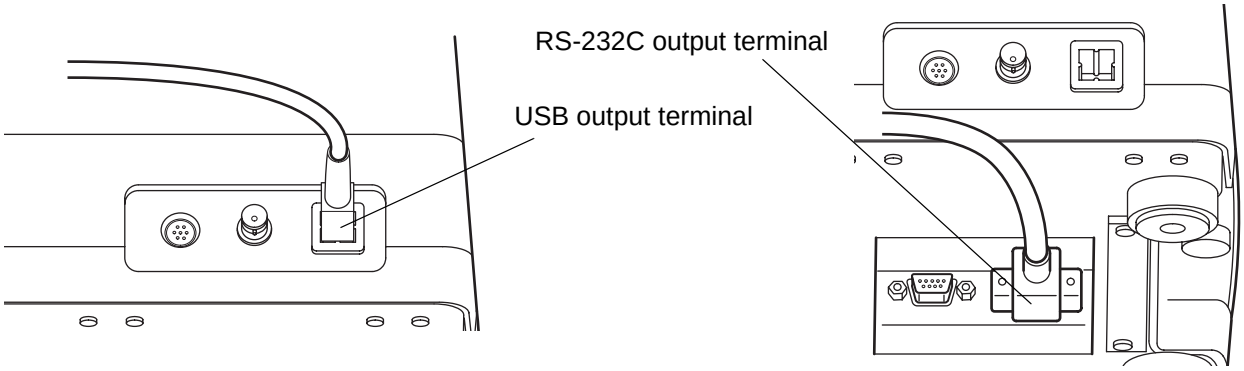
- The connection cord for IMAGEnet is an IMAGEnet optional accessory. Prepare this cord prior to connection. For details on the IMAGEnet system, contact your dealer (on the back cover).
- Do not insert or remove the USB cable while the power of the instrument is ON.
- Sometimes the connection is not done properly because of the characteristics of the USB hardware. Use the USB cable specified by TOPCON.
- When you use a hub, use the USB hub with power supply.

Data output

This instrument can also be connected to a personal computer, etc. via RS-232C or USB.

1 Connect the connection cord to the output terminal of the instrument.

2 Connect the other end to a personal computer, etc.

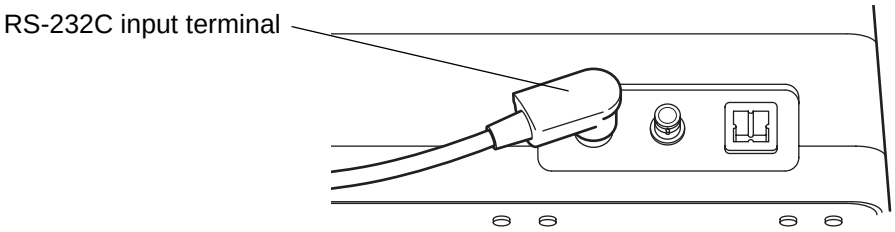


Data input

This instrument can be connected to a bar code reader, etc. via RS-232C.

1 Connect the connection cord to the RS-232C input terminal on the instrument.

2 Connect the other end to an external device, etc.



For assistance in connecting this instrument, contact your authorized Topcon distributor listed on the back cover.

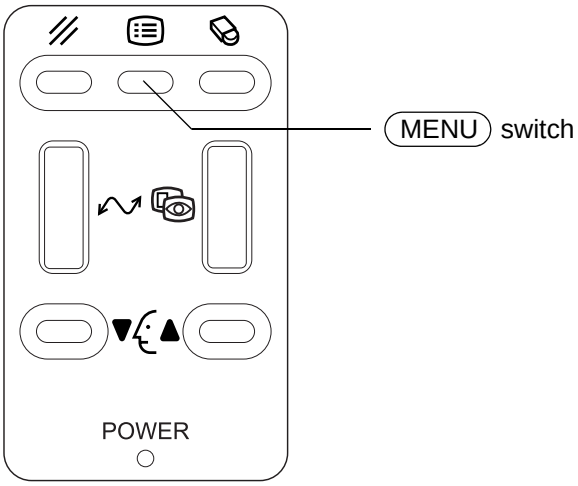
DEFAULT SETTING

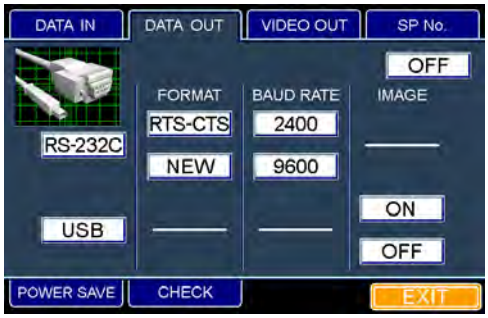
In default setting, it is possible to set the DATA input/output, the power saving time and the video OUT output, and to check the operation.

Preparation for "default setting"

1 Make sure that the power cord is connected properly.
Refer to "CONNECTING THE POWER CORD" on P.16.

2 Turn on the (POWER) switch by pressing the (MENU) switch on the control panel.





"DATA OUT" dialog box

Keep pressing the switches until the buzzer sounds. The "POWER" lamp is lit and the "DATA OUT" dialog box is displayed.

Returning to the eye observation display

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

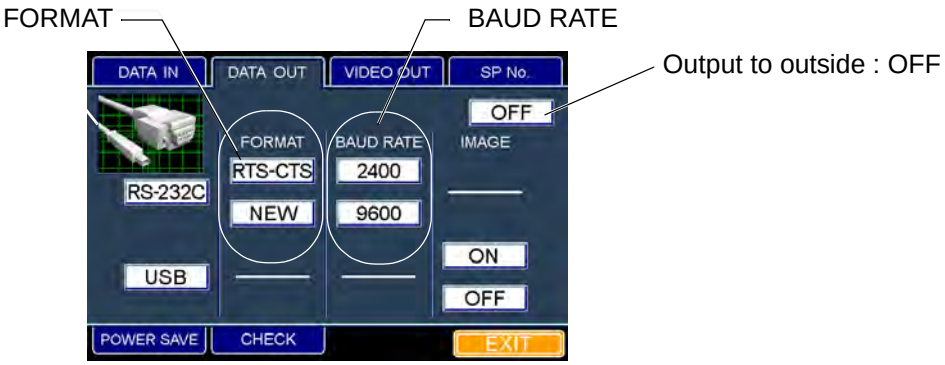
2 The title display appears and then the eye observation display appears.

Setting the DATA output

You can set the data output method through the data terminal.
The set icon is outlined in yellow. "OFF" (No output) is set when shipped.

1 Fit the mouse pointer to the "DATA OUT" tab in the upper section and click it.

2 The "DATA OUT" dialog box appears.



"DATA OUT" dialog box

3 When you want to set the data output, fit the mouse pointer to the "RS-232C" or "USB" icon and click it.

When you do not want to output the data to outside, fit the mouse pointer to the "OFF" icon and click it.

4 When you want to set the output format of data, fit the mouse pointer to the "RTS-CTS" or "NEW" icon of the "FORMAT" column and click it.

It is not possible to set the output format when "USB" or "OFF" is selected on the "DATA OUT" dialog box.

Output format	Transmission method
RTS-CTS	RTS-CTS control
NEW	TOPCON NEW format

Relation between the output format and transmission method

5 When you want to set the transfer speed of data, fit the mouse pointer to the "2400" or "9600" icon of the "BAUD RATE" column and click it.

BAUD RATE	Communication speed
2400	2400bps
9600	9600bps

Relation between BAUD RATE and the communication speed

It is not possible to set this when "USB" or "OFF" is selected on the "DATA OUT" dialog box.

"DATA OUT" dialog box

6 When you want to add the image data output to the USB output format, fit the mouse pointer to the "ON" icon of the "IMAGE" column and click it.
When you do not want to output the image data, fit the mouse pointer to the "OFF" icon of the "IMAGE" column and click it.

It is not possible to set this when "RS-232C" or "OFF" is selected on the "DATA OUT" dialog box.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The title display appears and then the eye observation display appears.

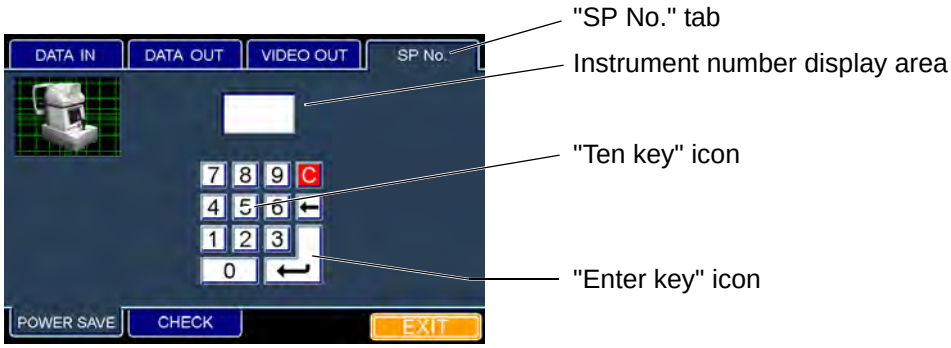
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.

Setting the instrument number

You can set the instrument number.
"01" is set when shipped.

1 Fit the mouse pointer to the "SP No." tab in the upper section and click it.

2 The "SP No." dialog box appears.



"SP No." dialog box

3 When you want to set the instrument number, fit the mouse pointer to any ten key and click it. You can set the number in the range of 01 ~ 99.

4 When your desired instrument number is displayed by entering the numerals, fit the mouse pointer to the "Enter key" icon and click it. The number is set.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The title display appears and the eye observation display appears.

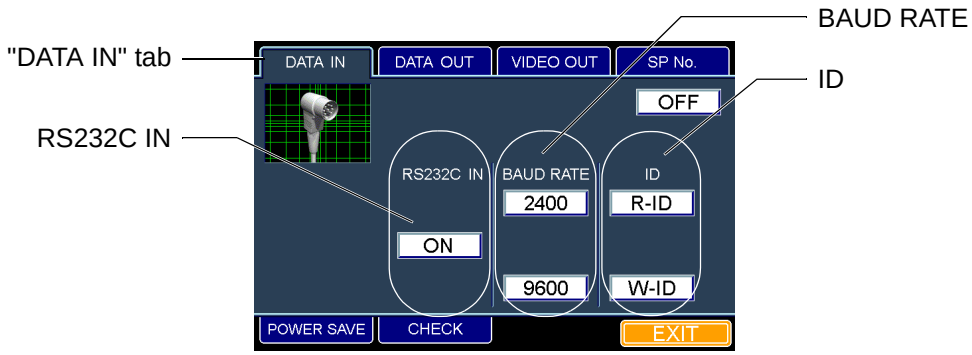
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.
- When you select other tabs without clicking the "Enter key" icon after entering the instrument number, the entered instrument number is canceled.

Setting the DATA input

You can set the data input from the outside through the RS-232C input terminal.
The set icon is outlined in yellow. "OFF" (No input) is set when shipped.

1 Fit the mouse pointer to the "DATA IN" tab in the upper section and click it

2 The "DATA IN" dialog box appears.



"DATA IN" dialog box

3 When you want to perform the RS-232C input, fit the mouse pointer to the "ON" icon of the "RS232C IN" column and click it.

When you do not want to perform the RS-232C input, fit the mouse pointer to the "OFF" icon and click it.

4 When you want to set the transfer speed of RS232C, fit the mouse pointer to the "2400" or "9600" icon of the "BAUD RATE" column and click it.

BAUD RATE	Communication speed
2400	2400bps
9600	9600bps

Relation between BAUD RATE and the communication speed

It is not possible to set this when "OFF" is selected on the "DATA IN" dialog box.

5 When you want to set ID, fit the mouse pointer to the "R-ID" or "W-ID" icon of the "ID" column and click it.

ID	Communication input contents
R-ID	Enter the ID number of the patient.
W-ID	Enter a tentative ID number of a new patient, etc.

Relation between ID and the communication input contents

It is not possible to set this when "OFF" is selected on the "DATA IN" dialog box.

6 The set icon is outlined in yellow.

How to finish setting

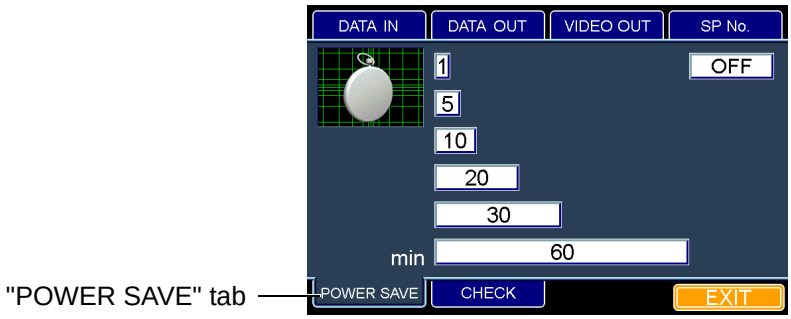
1. Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.
2. The title display appears and then the eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

Setting the power saving time

You can set the time of "Power save", which is adopted as the power saving function.
"10min" (10 minutes) is set when shipped.

1. Fit the mouse pointer to the "POWER SAVE" tab in the lower section and click it.
2. The "POWER SAVE" dialog box appears.



"POWER SAVE" dialog box

3. When you want to set the power saving time, fit the mouse pointer to one of the "1" to "60" icons and click it.
   When you do not want to use the power saving function, fit the mouse pointer to the "OFF" icon and click it.
4. The set icon is outlined in yellow.

How to finish setting

1. Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.
2. The title display appears and then the eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

Operation check

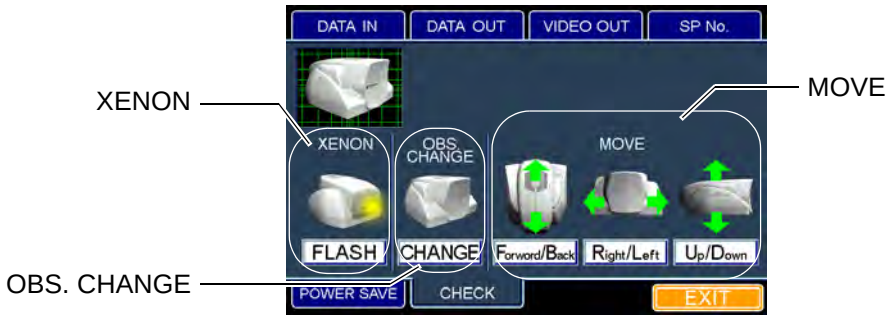
You can check each operating procedure for this instrument.

When there is something wrong with the instrument, perform self-check for the following items.

If the result of self-check is NG, contact TOPCON at the address listed on the back cover of this manual.

1 Fit the mouse pointer to the "CHECK" tab in the lower section and click it.

2 The "CHECK" dialog box appears.



"CHECK" dialog box

3 Fit the mouse pointer to an item to be checked and click its icon.

Check item	Checking method
FLASH	Visually check if the flash lamp is lit.
CHANGE	Check by sound if the light path selector solenoid operates.
Forward/Back MOVE	Visually check if the head operates forward and backward.
Right/Left MOVE	Visually check if the head operates right and left.
Up/Down MOVE	Visually check if the head operates up and down.

Check item and checking method

4 The set icon is outlined in yellow.

5 Checking operation starts.

How to finish setting

1 Move the mouse to fit the mouse pointer the "EXIT" icon and click it.

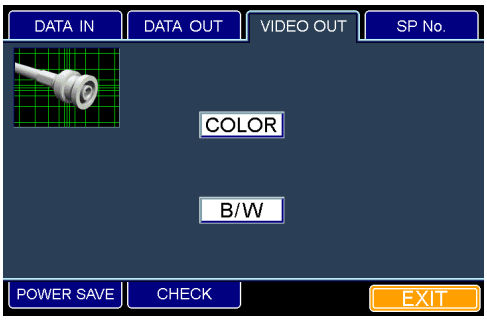
2 The eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

Setting the video OUT output

You can set the image color to be sent from the VIDEO OUT output terminal.
The set icon is outlined in yellow. "COLOR" is set when shipped.

1. Fit the mouse pointer to the "VIDEO OUT" tab in the upper section and click it.
2. The "VIDEO OUT" dialog box appears.



"VIDEO OUT" dialog box

3. When you want to set the image color, fit the mouse pointer to the "COLOR" or "B/W" icon and click it.
   If you want to output a color image, click the "COLOR" icon.
   If you want to output a monochrome image, click the "B/W" icon.
4. The set icon is outlined in yellow.

How to finish setting

1. Move the mouse to fit the mouse pointer to the "EXIT" tab and click it.
2. The eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

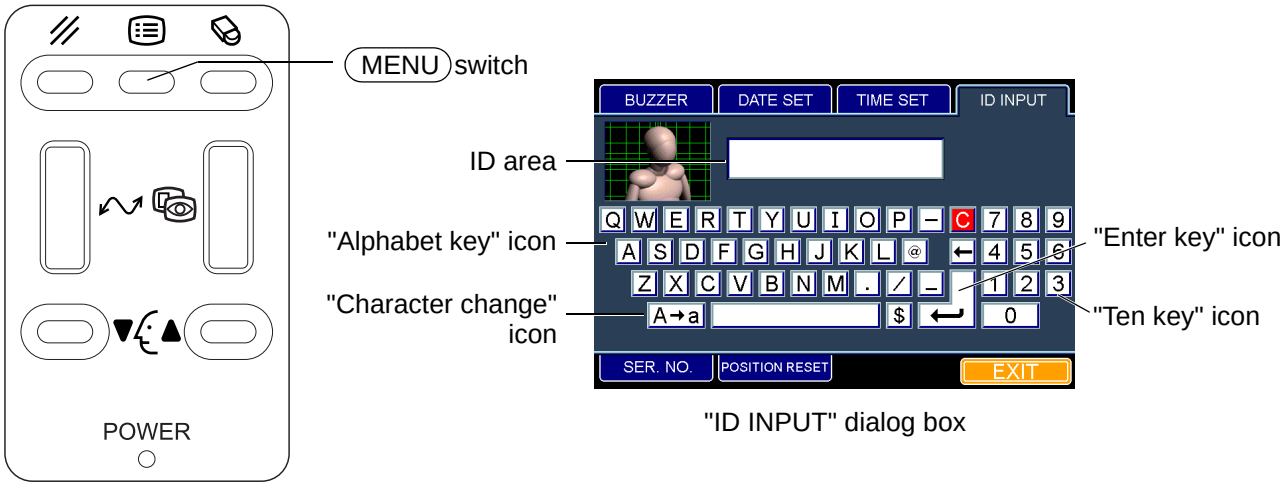
A VARIETY OF SETTINGS

Press the MENU switch on the control panel, and the dialog box will be displayed. It is possible to set the ID number, the photography serial number, the buzzer sound, the date, the time and the original point resetting for each shot.

Setting the ID number

You can set the patient ID number that is indicated on the eye observation display and on the image display.

1 Press the MENU switch on the control panel. The "ID INPUT" dialog box appears.



"ID INPUT" dialog box

2 Fit the mouse pointer to the desired character among the "Alphabet key" icons or among the "Ten key" icons and click it.

3 The inputted character is displayed on "ID area".

4 When the desired number is displayed by entering characters continuously, fit the mouse pointer to the "Enter key" icon and click it. The ID number can be set.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

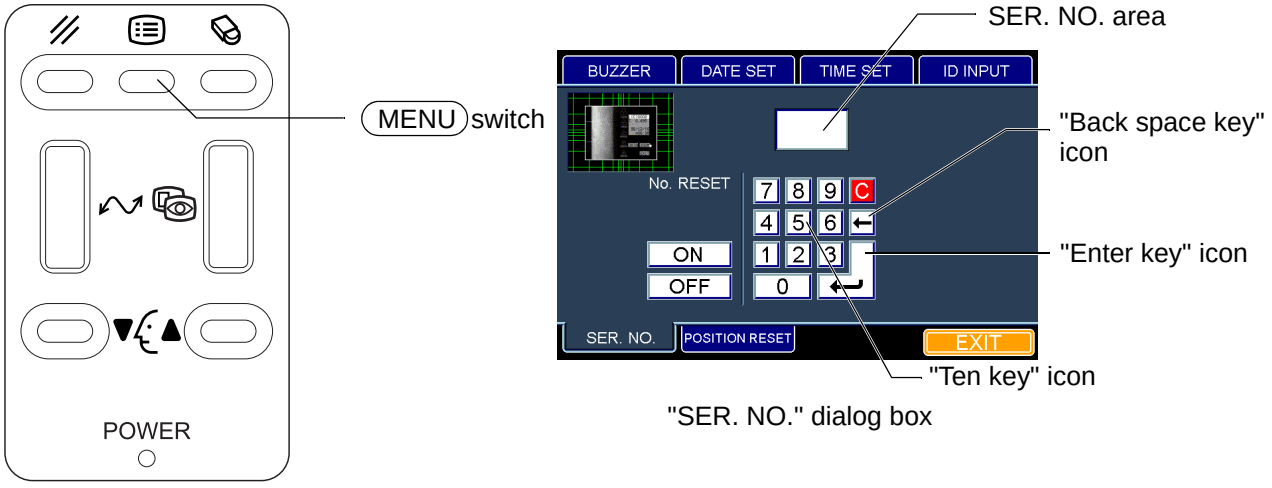
- The capital letter and small letter can be changed to each other by clicking the "Character change" icon.
- The character before the cursor can be deleted by clicking the " ← key" icon.
- All the entered characters can be deleted by clicking "C" among the "Ten key" icons.
- It is possible to enter the characters up to 13 digits in the ID area.
- When you select other tabs without clicking the "Enter key" icon after entering the ID number, the entered ID number is canceld.
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.
- When you turn off the power of the instrument, the ID number is cleared.

Setting the photography serial number

You can affix the desired serial number to the photography/measurement result.

1 Press the (MENU) switch on the control panel. The "ID INPUT" dialog box appears.

2 Fit the mouse pointer to the "SER. NO." tab and click it. The "SER. NO." dialog box appears.



"SER. NO." dialog box

3 Fit the mouse pointer to the desired numeral among the "Ten key" icons and click it.

4 The entered numeral is displayed on the "SER. NO." area.

5 When the desired number is displayed by entering numerals continuously, fit the mouse pointer to the "Enter key" icon and click it. The SER. NO. can be set.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

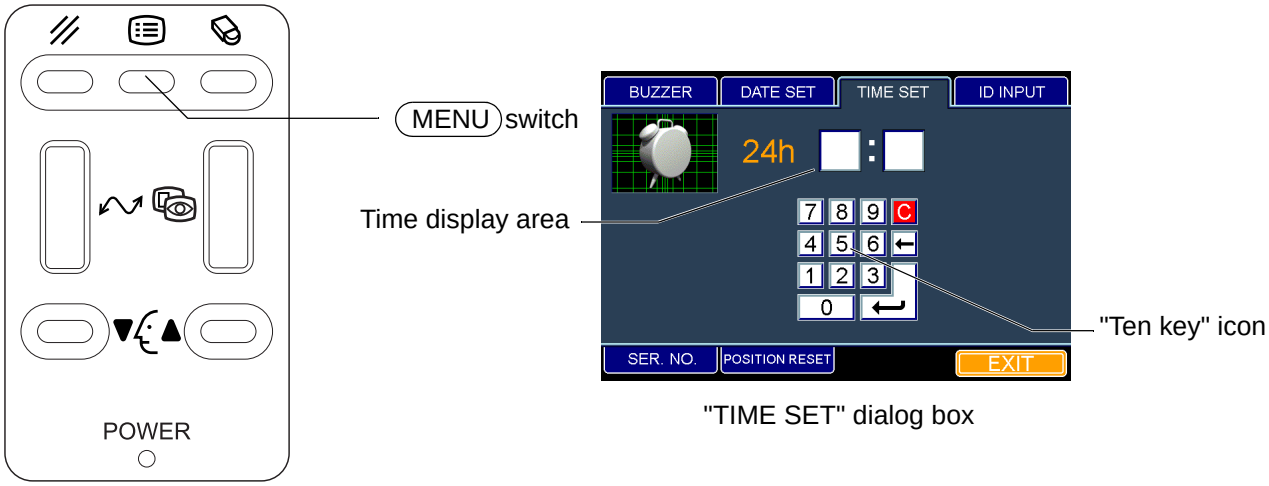
- It is possible to enter the numerals 0001 ~ 9999 in the SER. NO. area.
- When you select other tabs without clicking the "Enter key" icon after entering SER. NO., the entered SER. No. is canceled.
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.
- The numeral before the cursor can be deleted by clicking the "← key" icon.
- All the entered numerals can be deleted by clicking "C" among the "Ten key" icons.
- When you want to reset SER. NO. by turning on/off the power, click the "ON" icon on the "SER. NO." dialog box. When you do not want to reset it, click the "OFF" icon.

Setting the time

It is possible to set "Hour" and "Minute" which are indicated on the image display.

1 Press the (MENU) switch on the control panel. The "ID INPUT" dialog box appears.

2 Fit the mouse pointer to the "TIME SET" tab and click it. The "TIME SET" dialog box appears.



"TIME SET" dialog box

3 Fit the mouse pointer to the time display area and click it.

4 Fit the mouse pointer to a numeral among the "Ten key" icons and click it.

5 The entered numeral is displayed on the time display area.

6 When the desired time is displayed by entering numerals continuously, fit the mouse pointer to the "Enter key" icon and click it. The time can be set.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

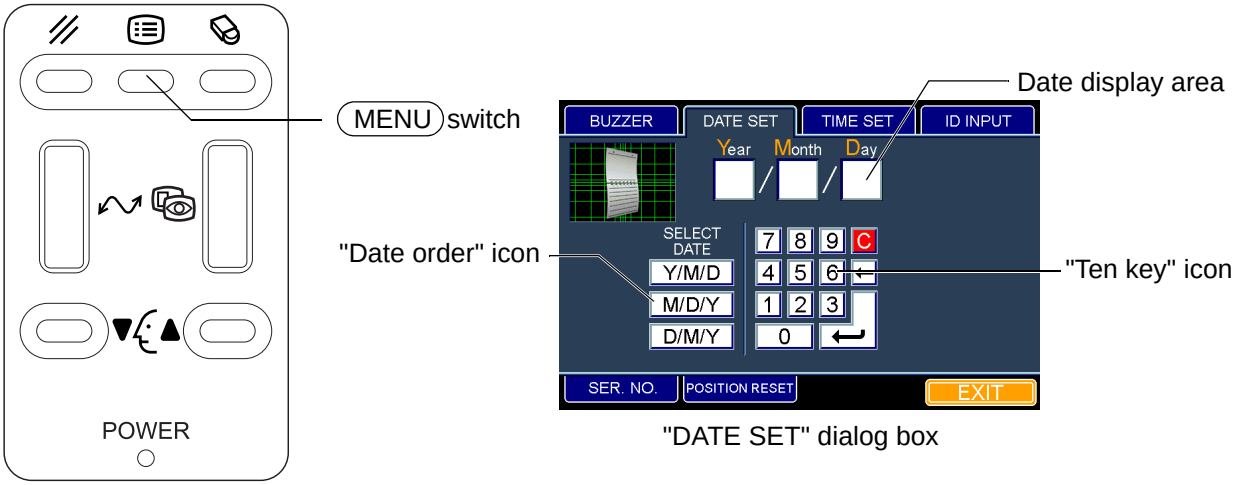
- When you select other tabs without clicking the "Enter key" icon after entering time, the entered time is canceled.
- The numeral before the cursor can be deleted by clicking the " ← key" icon.
- All the entered numerals can be deleted by clicking "C" among the "Ten key" icons.
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.

Setting the date

It is possible to set the date which is displayed on the image display.

1 Press the (MENU) switch on the control panel. The "ID INPUT" dialog box is displayed.

2 Fit the mouse pointer to the "DATE SET" tab and click it. The "DATE SET" dialog box appears.



"DATE SET" dialog box

3 Fit the mouse pointer to the "Date order" icon and click it.

4 Fit the mouse pointer to a numeral among the "Ten key" icons and click it.

5 The entered numeral is displayed in the date display area.

6 When the desired date is displayed by entering numerals continuously, fit the mouse pointer to the "Enter key" icon and click it. The date can be set.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

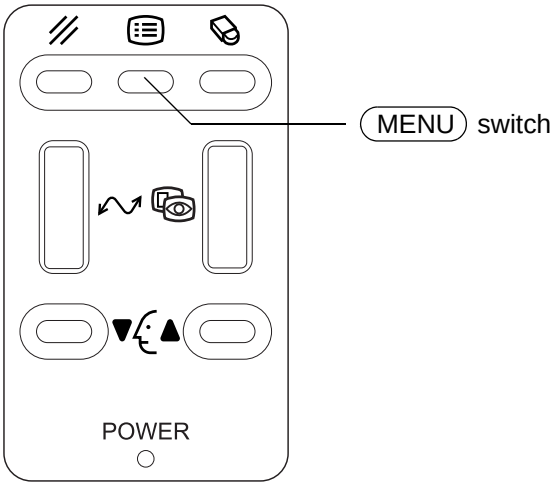
- When you select other tabs without clicking the "Enter key" icon after entering date, the entered date is canceled.
- The numeral before the cursor can be deleted by clicking the " ← key" icon.
- All the entered numerals can be deleted by clicking "C" among the "Ten key" icons.
- When you want to set any other item, fit the mouse pointer to the desired tab and click it.

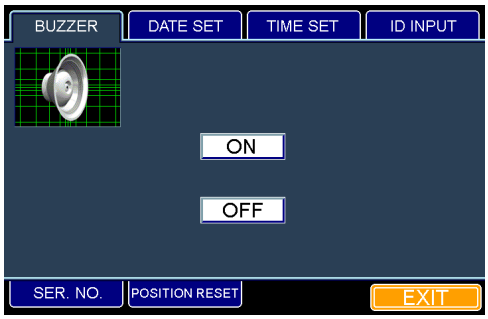
Setting the buzzer

Once the buzzer is set, an alarm will sound when the instrument is too close to the patient's eye. The set icon is outlined in yellow. "OFF" is set when shipped.

1 Press the (MENU) switch on the control panel. The "ID INPUT" dialog box appears.

2 Fit the mouse pointer to the "BUZZER" tab and click it. The "BUZZER" dialog box appears.





"BUZZER" dialog box

3 When you set the buzzer, fit the mouse pointer to the "ON" or "OFF" icon and click it.
If you want to use the buzzer, click the "ON" icon.
If you do not want to use the buzzer, click the "OFF" icon.

4 The set icon is outlined in yellow.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

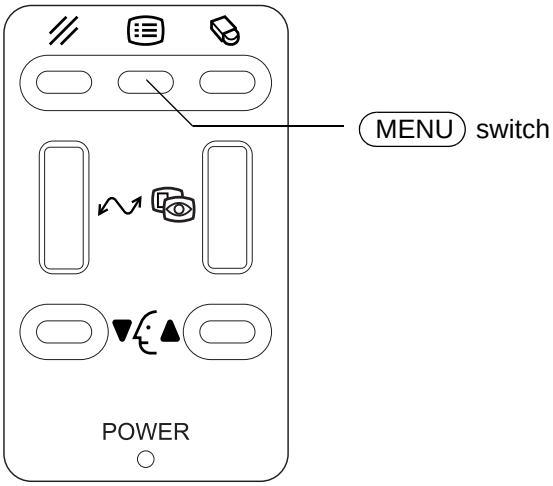
Setting the "original point resetting for each shot"

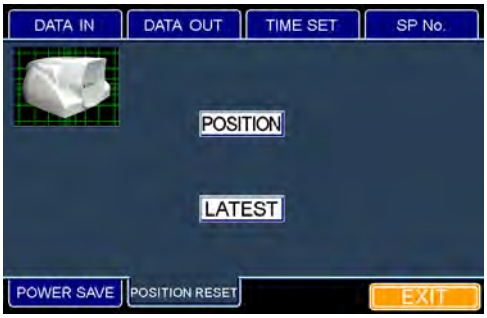
Each time a picture is taken, the instrument is reset to the original point in the longitudinal and lateral directions.

The set icon is outlined in yellow. "ON" is set when shipped.

1 Press the (MENU) switch on the control panel. The "ID INPUT" dialog box appears.

2 Fit the mouse pointer to the "POSITION RESET" tab and click it. The "POSITION RESET" dialog box appears.





"POSITION RESET" dialog box

3 When you set the "original point resetting in the longitudinal and lateral directions", fit the mouse pointer to the "ON" or "OFF" icon and click it.

If you want to reset the instrument to the original point in the longitudinal and lateral directions, click the "ON" icon.

If you do not want to reset the instrument as mentioned above, click the "OFF" icon.

4 The set icon is outlined in yellow.

How to finish setting

1 Move the mouse to fit the mouse pointer to the "EXIT" icon and click it.

2 The eye observation display appears.

When you want to set any other item, fit the mouse pointer to the desired tab and click it.

RESET FROM POWER SAVE STATUS

This instrument features a power saving function. If the instrument is not operated within the set time, it enters into power saving mode. The power supply stops for the monitor, the CCD camera and the photography light source.
The "POWER" lamp blinks on the control panel during the Power Save status.

1 To reset the instrument from the power saving status, press the (Photography) switch on the joy-stick. After a few seconds, the color video monitor is reset and photography is possible.

"10 minutes" is set as the Power Save time when shipped. If you want to change the set time, refer to "Setting the power saving time" on P.24.

The images captured before power saving is activated are stored in the memory so you can access them.

BASIC OPERATION

PREPARATION BEFORE PHOTOGRAPHY

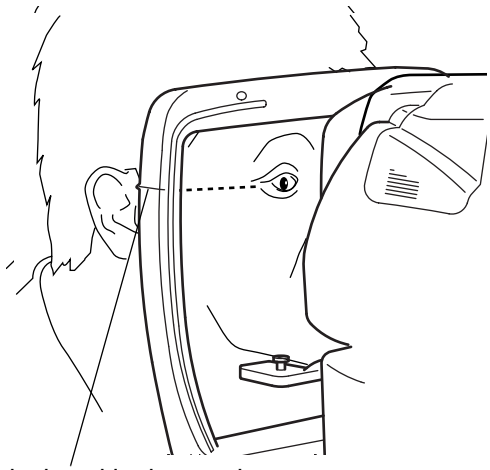
Turning on the power

1. Make sure that the power cord is connected properly.
   For details on the connection, refer to "CONNECTING THE POWER CORD" on P.16.
2. Turn on the (POWER) switch.
   After the power is ON, the measuring head moves laterally and longitudinally and then stops at the initial position.
3. Make sure that the title display appears and then the eye observation display appears.
4. Make sure that the photography window is not dirty.

Positioning the patient

⚠CAUTION	To avoid injury, do not let the patient put his/her hand under the chinrest.
NOTICE	Adjust the height of the instrument table so that the patient is in a comfortable position. If the patient is not comfortable, it may be impossible to take a picture of the endothelium. Do not take a picture while the patient is holding his/her breath or is nervous. It may be impossible to take a picture of the endothelium if the patient is in this condition.

1. Sit the patient down in front of the instrument.
2. Adjust the height of the instrument table or the chair so that the patient can place his/her chin on the chinrest in a comfortable manner.
3. Let the patient place his/her chin on the chinrest and his/her forehead on the forehead rest.
4. There is a vertical positioning mark on the chinrest support. Press the ▲ and ▼ switches on the control panel to adjust the chinrest height so that the corners of the patient's eyes are positioned next to this mark.


Vertical positioning mark

The chinrest moves up and down only while pressing the ▲ and ▼ switches.
If the chinrest does not move even when you are pressing the ▲ and ▼ switches, the instrument is malfunctioning. Turn off the (POWER) switch, remove the power cord and contact your dealer or TOPCON at the address on the back cover.
The chinrest can be operated manually in an emergency. For manual operation, refer to "OPERATING THE CHINREST MANUALLY IN THE CASE OF A MALFUNCTION" on P.58.

PHOTOGRAPHY IN AUTO MODE

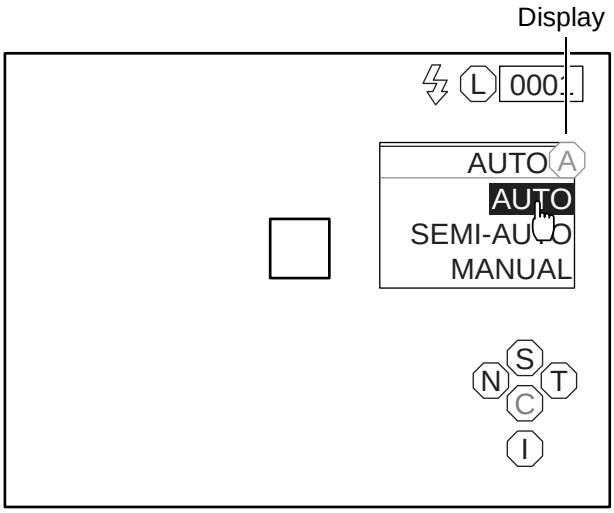
Setting the photography mode

In the initial state when the power is turned on, "AUTO" is set for the photography mode.

1 Check the eye observation display.

2 Click the photography mode display on the screen with the mouse.

3 The selection menu is displayed. Click "AUTO".



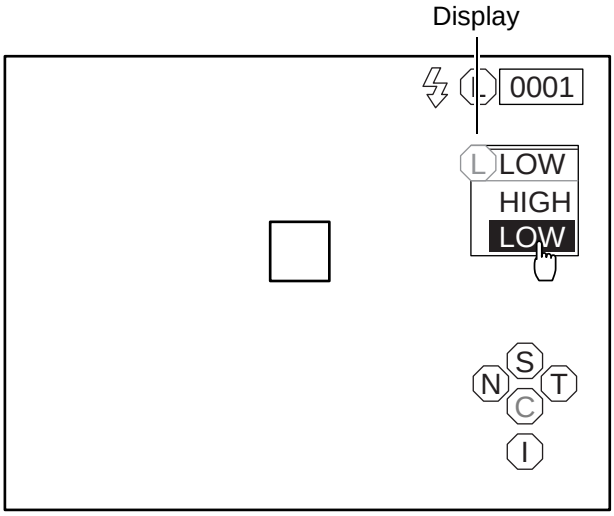
Setting the flash level

You can change the flash level by 2 steps, "HIGH" and "LOW". "LOW" is normally used. If the images are too dark due to the condition of the patient's eye, etc., set the level to "HIGH".
When "HIGH" is set, you can get the maximum radiance.
When "LOW" is set, the radiance is 2/3 of "HIGH".
When the power is turned on, "LOW" is the default for the flash level.

1 Check the eye observation display.

2 Click the flash level display on the screen with the mouse.

3 The selection menu is displayed. Click "LOW" or "HIGH".

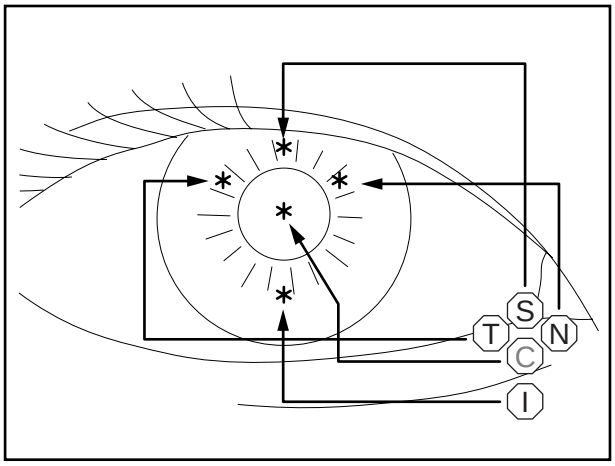


Setting the photography points

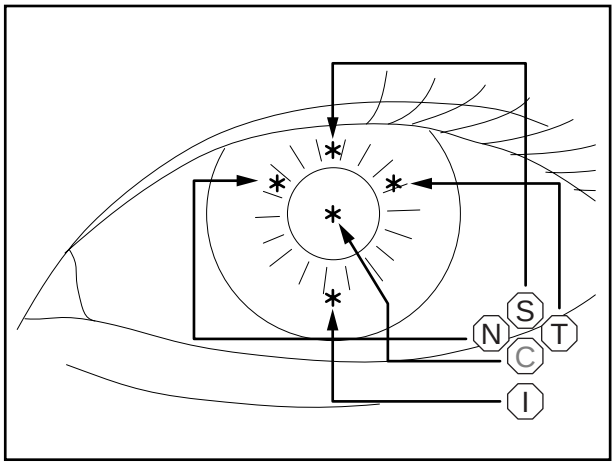
You can take a picture not only at the center of cornea but also at 4 places in the peripheral area of the cornea.

1 Check the eye observation display.

2 Click the photography point changing icon corresponding to the desired photography point.
The fixation target corresponding to the photography point blinks.
C : Center
S : Superior
I : Interior
N : Nasal
T : Temporal



Correspondence between the photography point (*) and icon (Right eye)



Correspondence between the photography point (*) and icon (Left eye)

Alignment and photography

⚠CAUTION	To avoid injury during operation, be careful not to hit the patient's eye or nose with the instrument.
NOTICE	When fixation is made against the peripheral fixation target, instruct the patient to turn only his/her eye to the target while he/she is facing the front. If not, the image cannot be obtained in a correct position.

Alignment and measurement

The alignment operation should be done by using the joystick.

How to move the instrument by the joystick

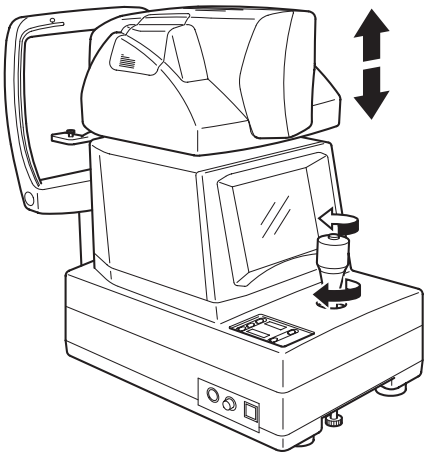
- The longitudinal or lateral fine movement should be done by inclining the joystick in the appropriate direction.

Joystick operation
(longitudinal or lateral)

⚠CAUTION	Don't put your hand under the measuring head. * Instruct the patient properly. When the measuring head is lowered, it may injure you by pinching your hand.

NOTICE	When the (POWER) switch is turned on, the measuring head moves up and down until it reaches the initial position. Don't turn the joystick until the measuring head is set in the initial position to avoid an operation miss.

- Turn the joystick clockwise, and the measuring head moves up. Turn the joystick counterclockwise, and it moves down.



Joystick operation
(vertical)

- Turn the joystick slowly, and the measuring head moves finely. Turn the joystick rapidly, and it moves roughly.
- When the measuring head reaches the upper limit of the vertical movement range, "UP LIMIT" is displayed on the video monitor screen. When it reaches the lower limit, "LOW LIMIT" is displayed.

Example: Photographing the right segment of the cornea center

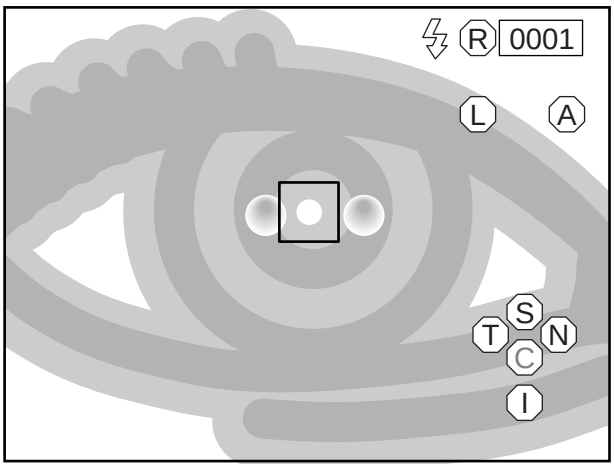
1 Hold the joystick and pull the instrument to the inspector side all the way.

2 Move the instrument laterally or vertically with the joystick to display the right anterior eye segment on the monitor screen.
The anterior eye segment is seen dimly.

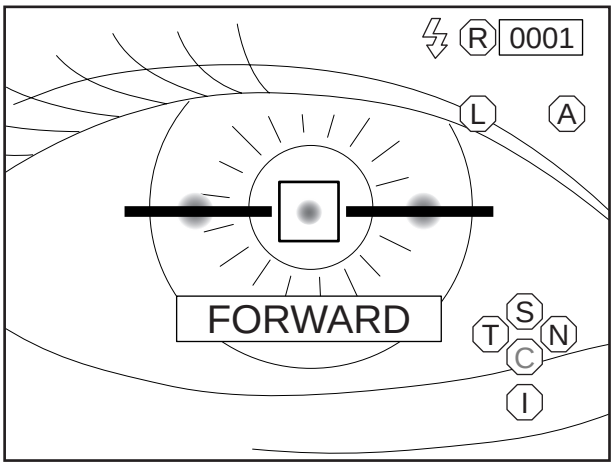
3 Instruct the patient to keep looking at the blinking light.

4 Push the instrument slowly toward the patient.

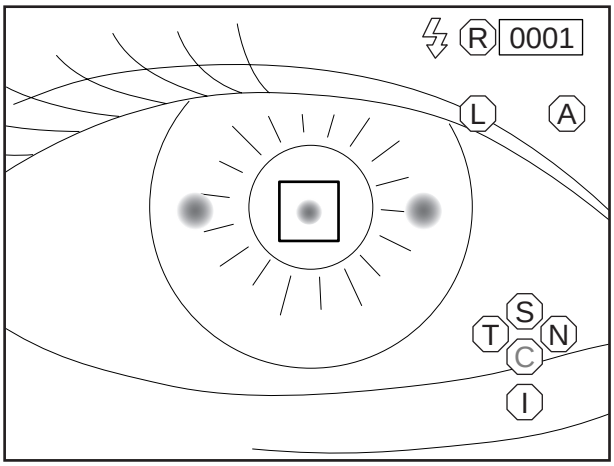
5 Set the bright spot within the automatic alignment area.
Automatic alignment is performed in lateral and vertical directions and the alignment dot is seen.



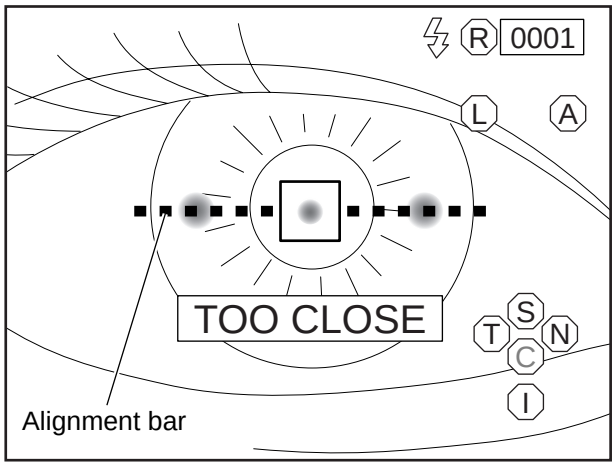
6 Push the instrument further toward the patient.
When the instrument approaches the eye, the alignment bar and "FORWARD" appear on the monitor screen.



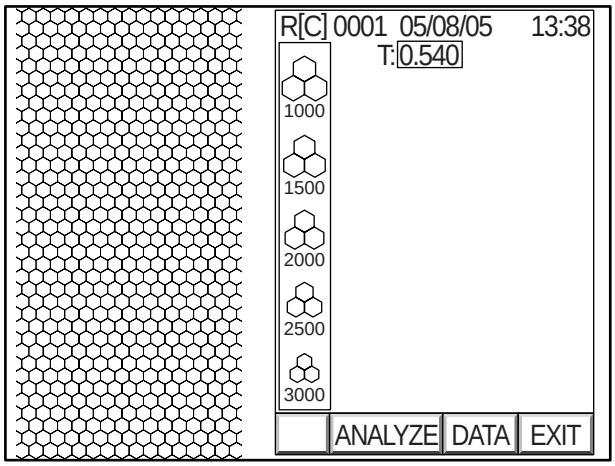
7 After the alignment bar is displayed, push the instrument toward the patient a little.
Automatic alignment starts. After alignment and photography are automatically performed , the image is displayed on the monitor.



Don't operate the instrument with the joystick during automatic alignment since it will interfere with automatic alignment.



During automatic alignment



Image

8 Press the (Image selector) switch on the control panel or click "EXIT" on the screen. The eye observation display appears again and the instrument is ready for the next photograph.

9 After using, turn off the (POWER) switch on the power supply unit.

10 Remove the power plug from the outlet.

When the corneal condition is poor, photography may not be possible. In such a case, take a picture in the manual mode. For details, refer to "PHOTOGRAPHY IN MANUAL MODE" on P.44.

PHOTOGRAPHY IN SEMI-AUTO MODE

NOTICE	Adjust the height of the instrument table so that the patient is in a comfortable position. If the patient is not comfortable, it may be impossible to take a picture of the endothelium. Do not take a picture while the patient is holding his/her breath or is nervous. It may be impossible to take a picture of the endothelium if the patient is in this condition.

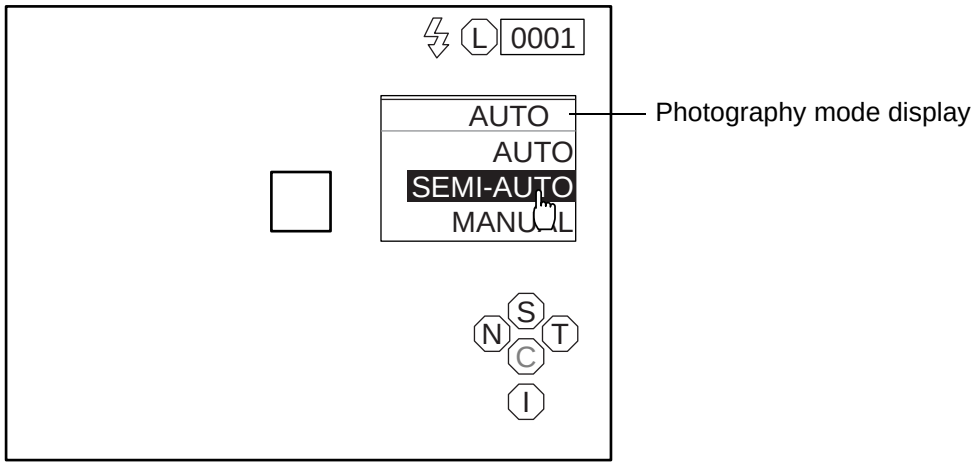
Setting the photography mode

In the initial state when the power is turned on, "AUTO" is set for the photography mode.

1 Check the eye observation display.

2 Click the photography mode display on the screen with the mouse.

3 The selection menu is displayed. Click "SEMI_AUTO".



Setting the flash level

Refer to "PHOTOGRAPHY IN AUTO MODE" on P.35.

Setting the photography points

Refer to "Setting the photography points" on P.36.

Alignment and photography

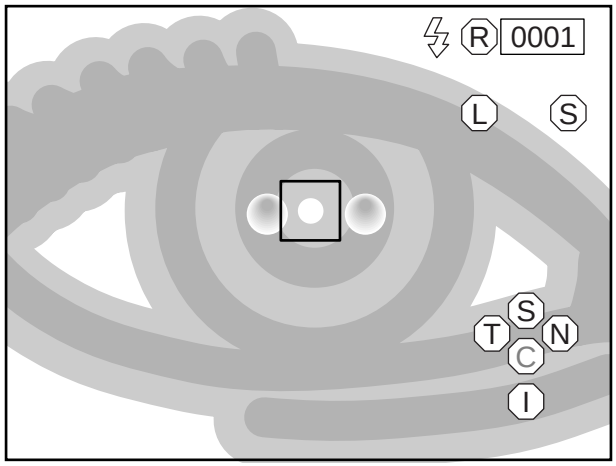
⚠**CAUTION**	To avoid injury during operation, be careful not to hit the patient's eye or nose with the instrument.
NOTICE	When fixation is made against the peripheral fixation target, instruct the patient to turn only his/her eye to the target while he/she is facing the front. If not, the image cannot be obtained in a correct position.

The alignment operation should be conducted through the use of the joystick.
For adjusting the instrument finely with the joystick, refer to "Alignment and measurement" on P.37.

Example: Photographing the right segment of the cornea center

1 Hold the joystick and pull the instrument to the inspector side all the way.

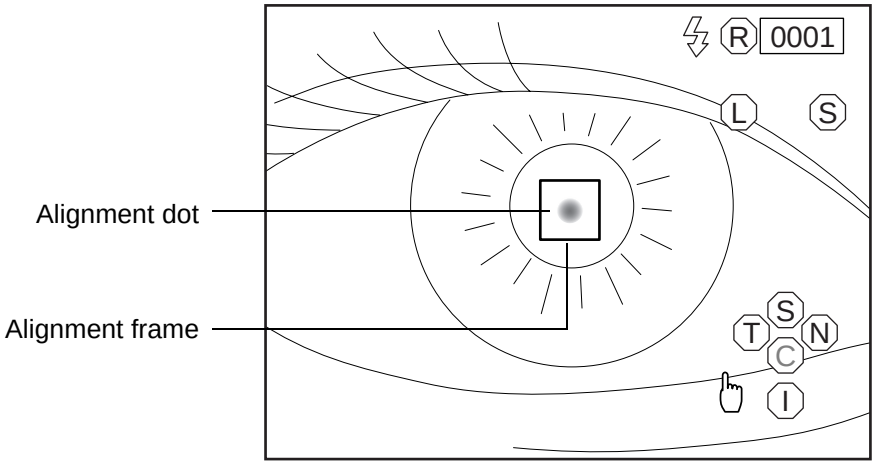
2 Move the instrument laterally or vertically with the joystick to display the right anterior eye segment on the center of the monitor screen. The anterior eye segment is seen dimly.



3 Instruct the patient to keep looking at the blinking light.

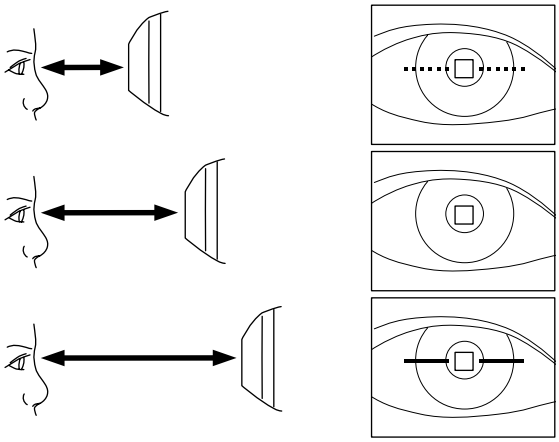
4 Push the instrument toward the patient a little.
A dim alignment dot, which is reflected on the pupil, appears.

5 Move the instrument laterally or vertically so that the alignment dot, which is reflected on the pupil, may be within the alignment frame on the monitor screen.

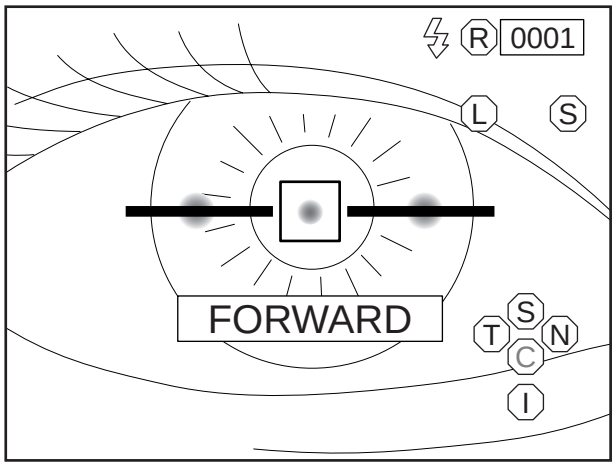


6 While keeping the alignment dot within the alignment frame, push the instrument toward the patient a little bit at a time. When the instrument approaches the anterior eye segment to some extent, the longitudinal alignment bar appears on the screen.

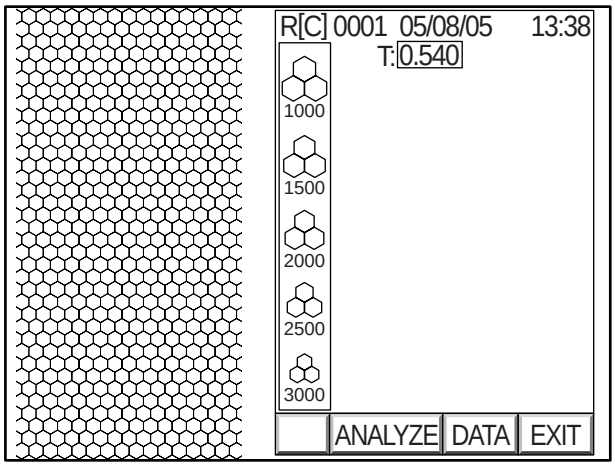
The longitudinal alignment bar is displayed with a dotted line when the instrument is close to the anterior eye segment. It is displayed with a solid line when the instrument is far from the anterior eye segment. In both cases, the reference is the alignment position in the longitudinal directions. As the instrument approaches the alignment position, the longitudinal alignment bar grows shorter gradually.



7 Move the instrument longitudinally with the longitudinal alignment bar as a reference.
When the alignment bar is shorter, the instrument takes a picture automatically.



Observation display just before photography



Image

8 Press the (Image selector) switch on the control panel or click "EXIT" on the screen.
The eye observation display appears again and the instrument is ready for the next photograph.

9 After using, turn off the (POWER) switch on the power supply unit.

10 Remove the power plug from the outlet.

When the corneal condition is poor, automatic photography may be impossible. In such a case, take a picture in the manual mode. For details, refer to "PHOTOGRAPHY IN MANUAL MODE" on P.44.

PHOTOGRAPHY IN MANUAL MODE

NOTICE	Adjust the height of the instrument table so that the patient is in a comfortable position. If the patient is not comfortable, it may be impossible to take a picture of the endothelium. Do not take a picture while the patient is holding his/her breath or is nervous. It may be impossible to take a picture of the endothelium if the patient is in this condition.

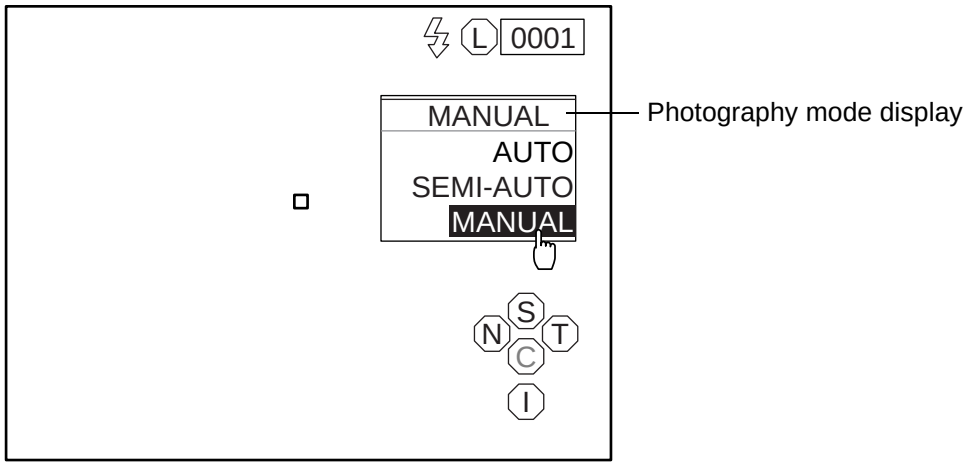
Setting the photography mode

In the initial state when the power is turned on, "AUTO" is set for the photography mode.

1 Check the eye observation display.

2 Click the photography mode display on the screen with the mouse.

3 The selection menu is displayed. Click "MANUAL".



Setting the flash level

Refer to "PHOTOGRAPHY IN AUTO MODE" on P.35.

Setting the photography points

Refer to "Setting the photography points" on P.36.

Alignment and photography

⚠CAUTION	To avoid injury during operation, be careful not to hit the patient's eye or nose with the instrument.
NOTICE	When fixation is made against the peripheral fixation target, instruct the patient to turn only his/her eye to the target while he/she is facing the front. If not, the image cannot be obtained in a correct position.

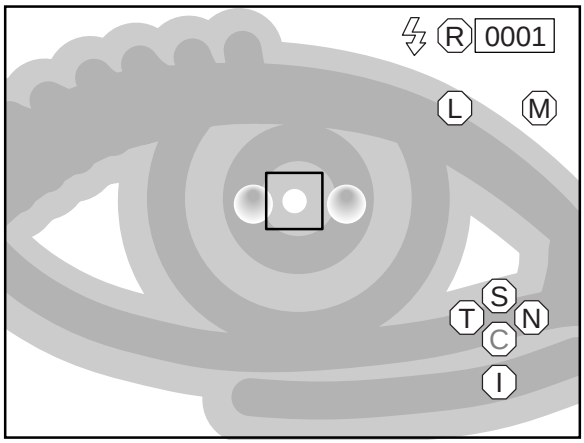
The alignment operation should be conducted through the use of the joystick.

For adjusting the instrument finely with the joystick, refer to "Alignment and measurement" on P.37.

Example: Photographing the right segment of the cornea center

1 Hold the joystick and pull the instrument to the inspector side all the way.

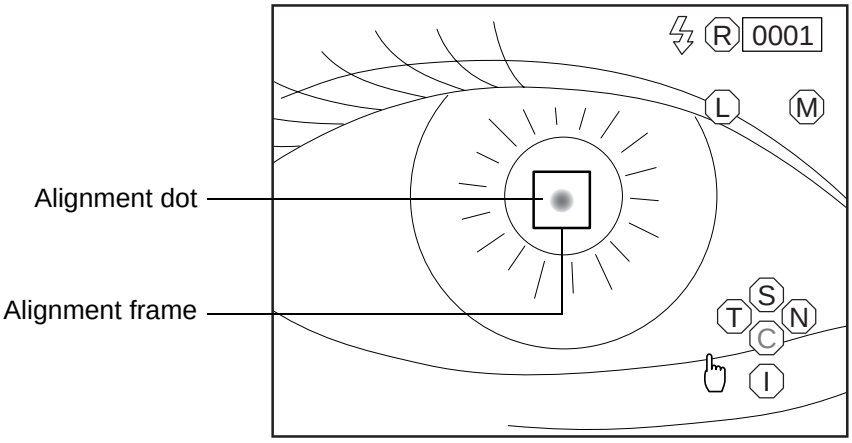
2 Move the instrument laterally or vertically with the joystick to display the right anterior eye segment on the center of the monitor screen. The anterior eye segment is seen dimly.



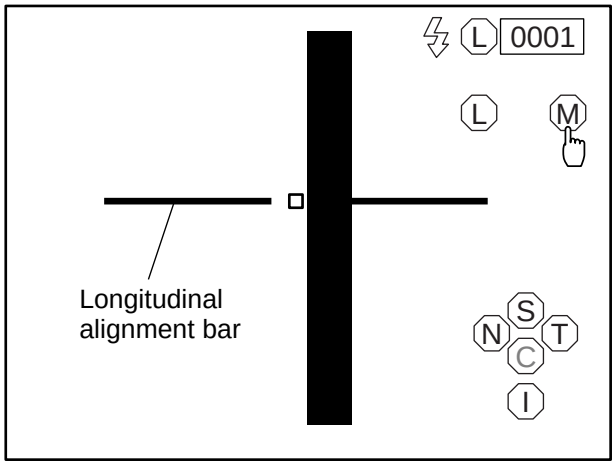
3 Instruct the patient to keep looking at the blinking light.

4 Push the instrument toward the patient a little.
A dim alignment dot, which is reflected on the pupil, appears.

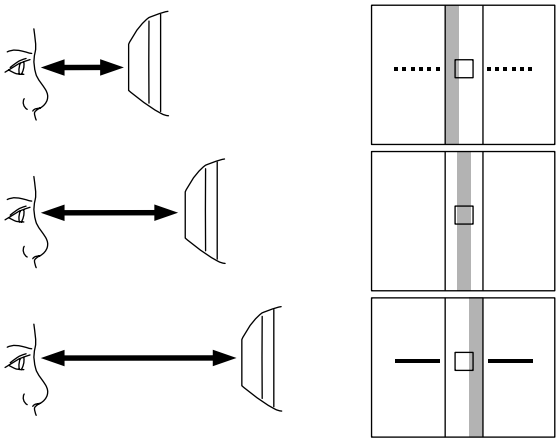
5 Move the instrument laterally or vertically so that the alignment dot, which is reflected on the pupil, is within the alignment frame on the monitor screen.



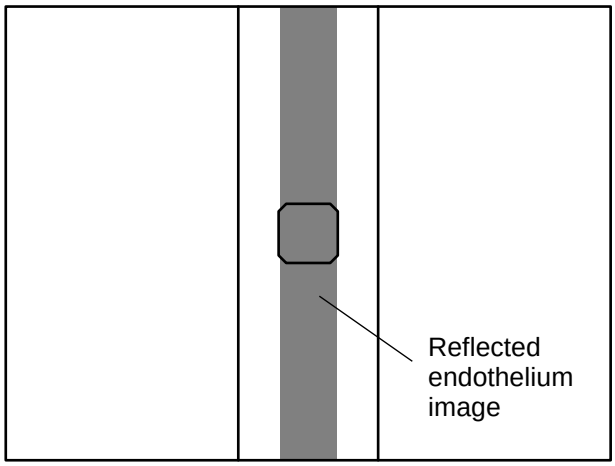
6 While keeping the alignment dot within the alignment frame, push the instrument toward the patient a little bit at a time. When the instrument approaches the anterior eye segment to some extent, the image switches to the endothelium observation display and the longitudinal alignment bar appears on the screen.



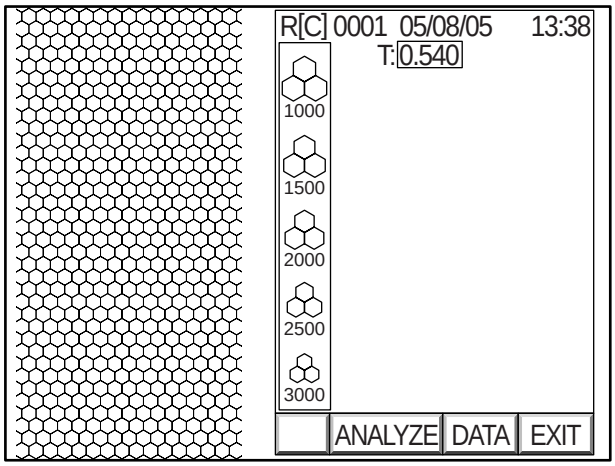
The longitudinal alignment bar is displayed with a dotted line when the instrument is close to the anterior eye segment. It is displayed with a solid line when the instrument is far from the anterior eye segment. In both cases, the reference is the alignment position in the longitudinal directions. As the instrument comes near the alignment position, the longitudinal alignment bar grows shorter gradually.



7 Move the instrument longitudinally with the longitudinal alignment bar as a reference so that the reflected endothelium image is positioned in the center of the "□" mark on the screen, and then press the (Photography) switch on the joystick.
The image display appears.



Endothelium observation display just before photography



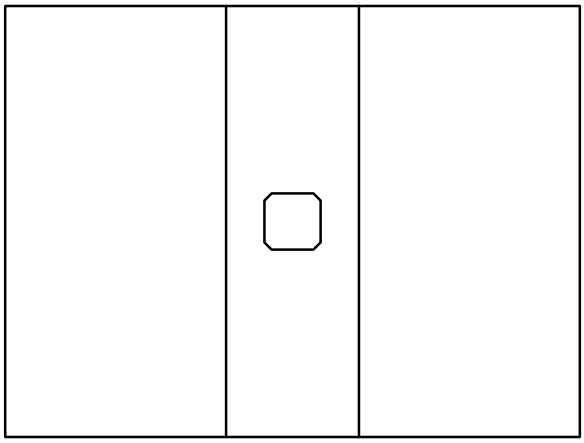
Image

8 Press the (Image selector) switch on the control panel or click "EXIT" on the screen.
The eye observation display appears again and the instrument is ready for the next photograph.

When the corneal condition is poor, the endothelium observation display may not appear. In such a case, it is possible to take a picture according to the procedure listed below.

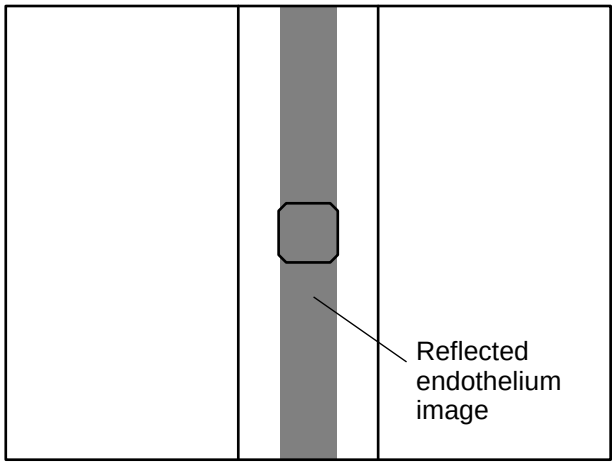
1 Move the reflected image of the alignment dot into the alignment frame. Operate the instrument so that the reflected image of the alignment dot is a circle.

2 Press the (Photography) switch on the joystick.
The image switches to the endothelium observation display on the screen.

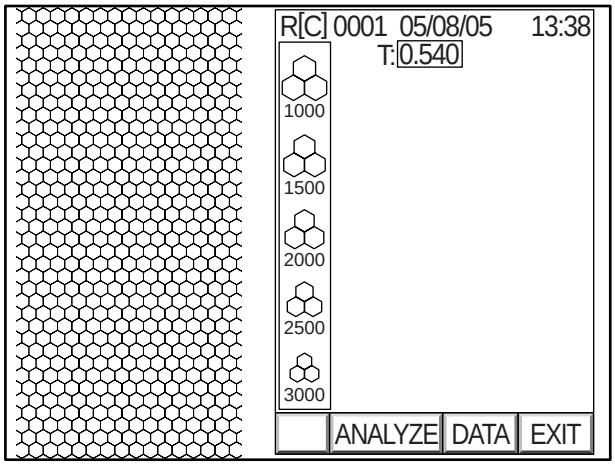


Endothelium observation display

3 Move the instrument longitudinally so that the reflected endothelium image is positioned in the center of the " □ " mark on the screen, and then press the (Photography) switch on the joystick.
The image display appears.



Endothelium observation display just before photography



Image

4 Press the (Image selector) switch on the control panel or click "EXIT" on the screen.
The eye observation display appears again and the instrument is ready for the next photograph.

5 After using, turn off the (POWER) switch on the power supply unit.

6 Remove the power plug from the outlet.

DISPLAY AND DELETION OF IMAGES

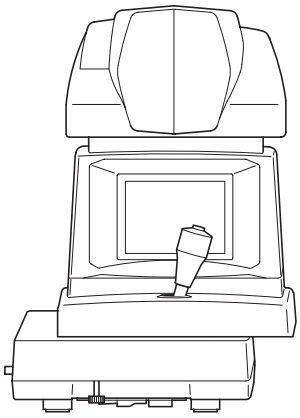
When the instrument takes a picture, the image display automatically appears.

This instrument enables the photography results for each of right and left eyes to be stored in the memory automatically by five displays only for the center of the right or left eye, by one display for each photography point or by five displays at random. It is also possible to access the photography result display in the memory and indicate the previous results by pressing the (Photography) switch.

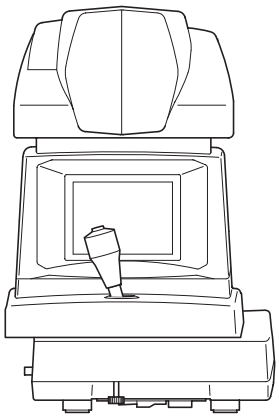
- The contents of the memory are updated whenever the instrument takes a picture.
- The contents of the memory are erased when the power of the instrument is turned off.
- Press the (Delete) switch, and the photography result display on the screen is deleted.
- Press the (Clear) switch, and "Clear image?" appears on the screen. Click the "CONTINUE" icon, and the photography result display is deleted.

Switching the image display and the eye observation display

1 Move the instrument laterally to change the eye observation displays of the right and left eyes to each other.



Instrument position where the screen switches to a display of the left eye

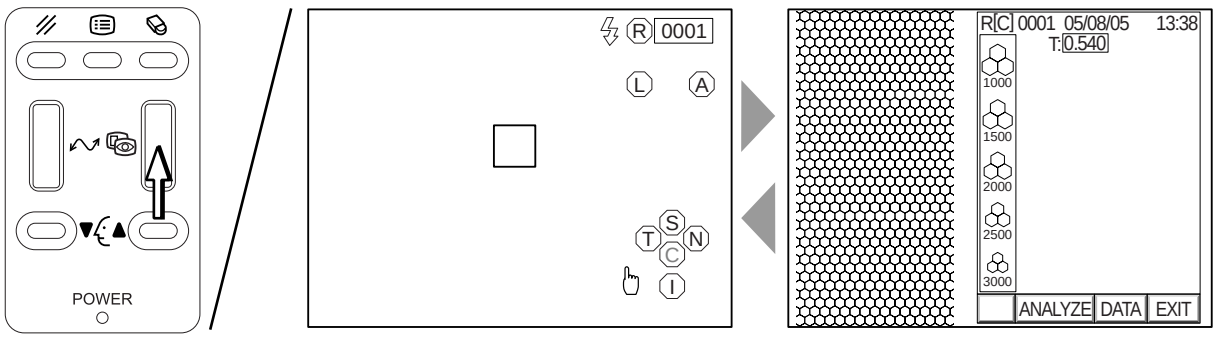


Instrument position where the screen switches to a display of the right eye

2 Make sure that the eye observation display or the image display appears on the screen.

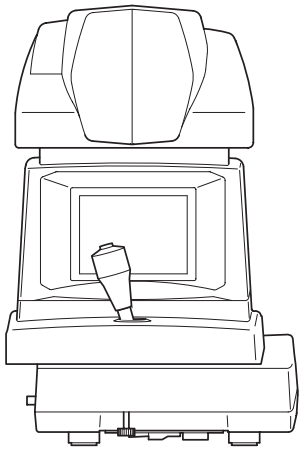
3 Press the (Image selector) switch on the control panel to switch the display.
The stored image display appears.

When you press the (Image selector) switch, the eye observation display and the image display change from one to the other. Unless there is an image in memory, the eye observation display does not change to the image display.



Selecting the image of the right or left eye

1 Move the instrument laterally to select the image of the right or left eye.
The image stored in the memory is displayed and the photographed eye display is changed to "L" or "R".



Instrument position where the display changes to the right eye

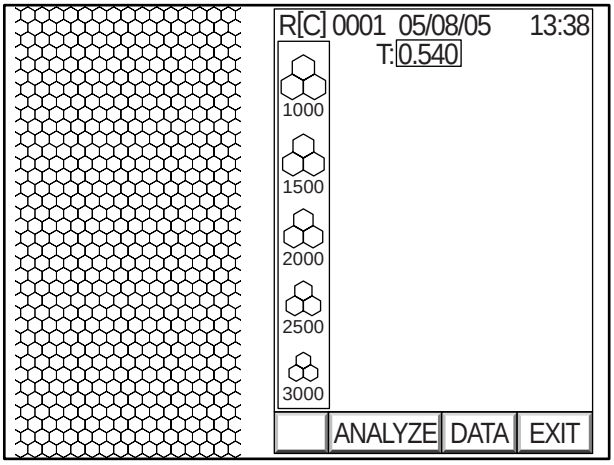
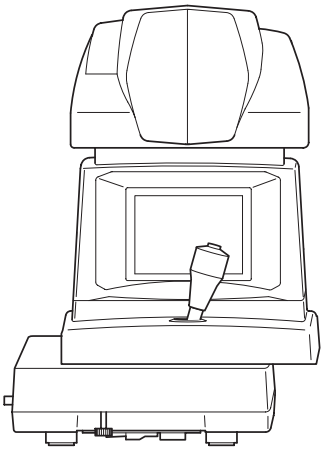


Image for the right eye



Instrument position where the display changes to the left eye

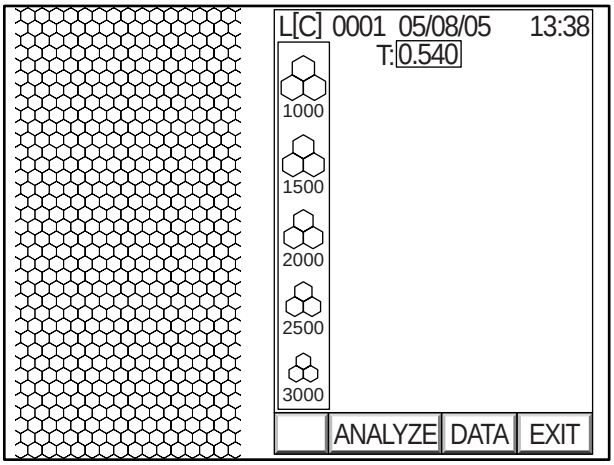


Image for the left eye

OPERATION BY OBJECTS

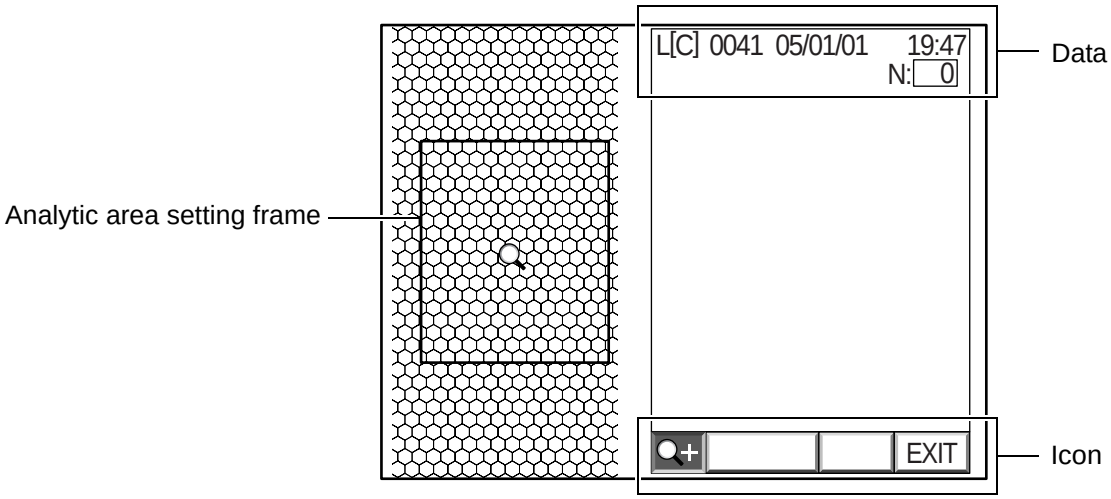
SIMPLIFIED CELL ANALYSIS

This instrument shows only the rough analytic value. The analytic accuracy should be regarded as only a reference.

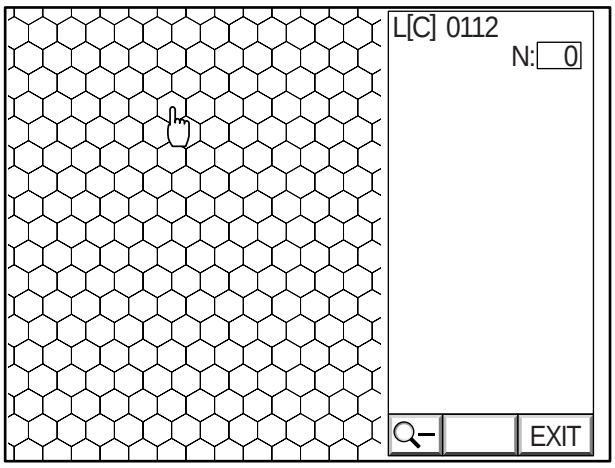
If you need more accurate analysis, use IMAGEnet or the corneal endothelium analysis application system.

1 Access the image display.

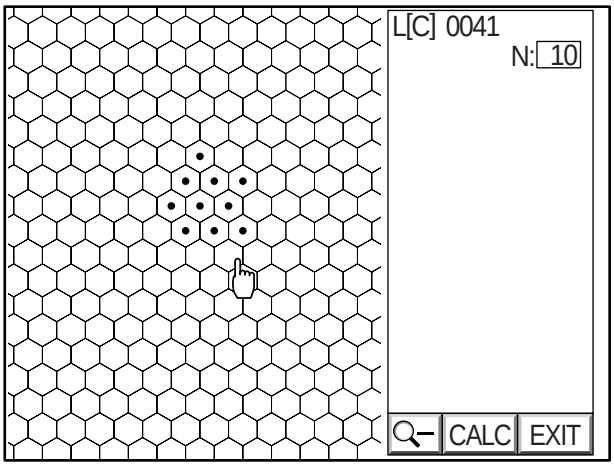
2 Click the "ANALYZE" icon on the screen.
An analytic area setting frame is displayed on the screen.



3 Move the analystic area setting frame to desirable area.
Click the center of the cells within the specified area with the mouse.

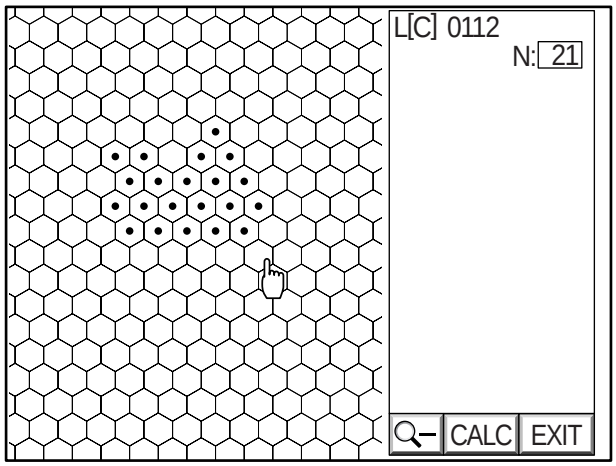


Shifting the zoom area setting frame



Zoom display

4 Click at least 10 cells by following the procedure listed in Step 3.

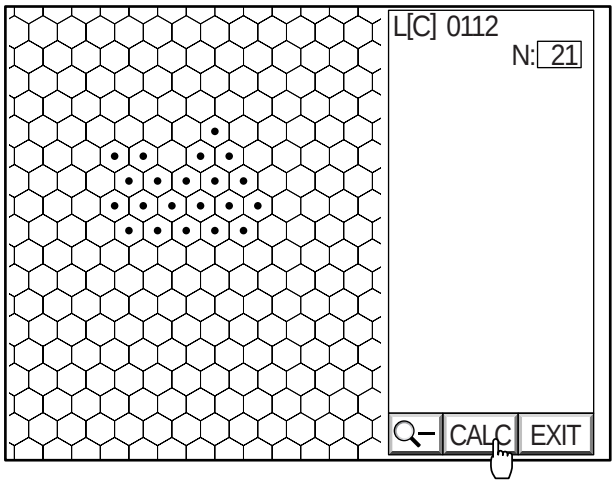


When the selected cells are completely clicked

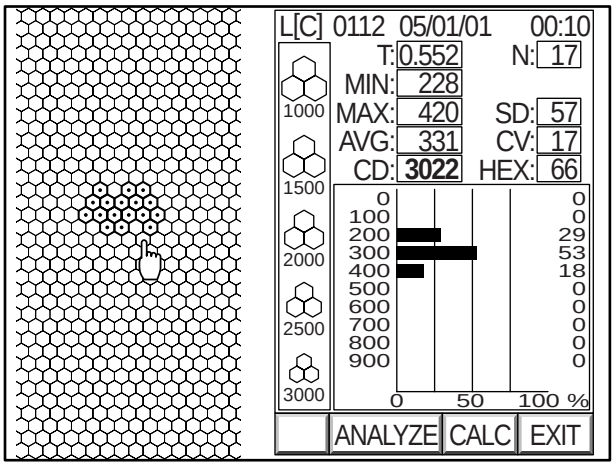
If you make an error while clicking, click the failure cell with the right button of the mouse. The operation can be canceled.

5 Click the "CALC" icon on the screen.
The analytic result is displayed.

T : Corneal thickness
MIN : Minimum cell area
MAX : Maximum cell area
AVG : Average cell area
CD : Cell density
N : Number of cells analyzed
SD : Standard deviation
CV : Coefficient of variation
HEX : Frequency of hexagon cells



Clicking the "CALC" icon

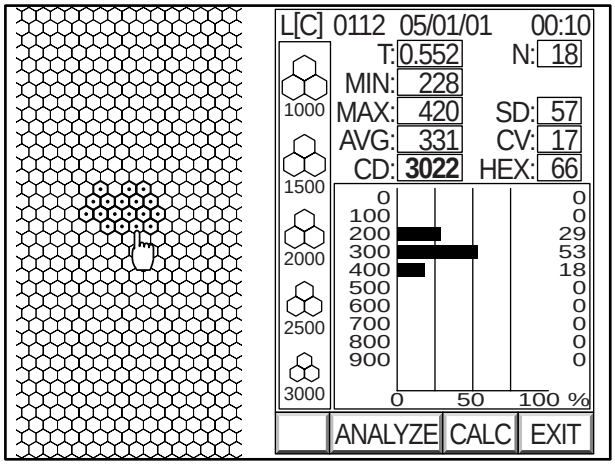


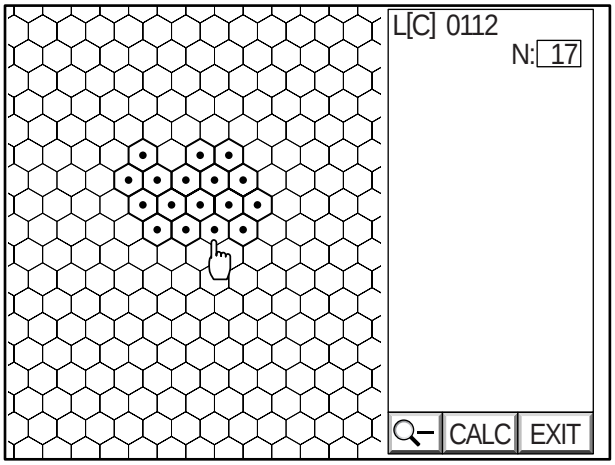
Analytic result display

When you click the "EXIT" icon on the screen with the mouse while clicking the cell, the image display appears again.

6 Check the detected cell wall.

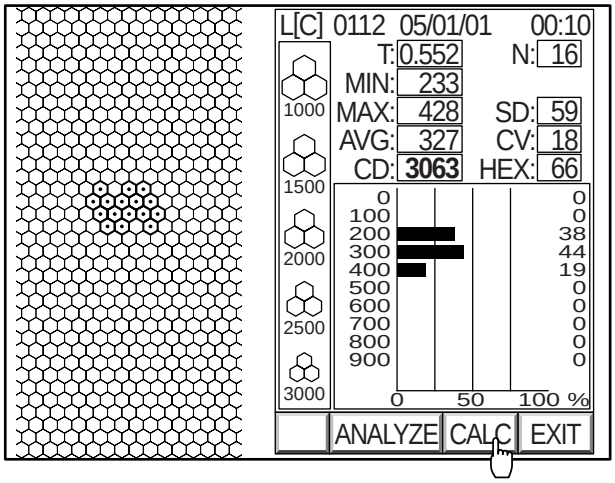
Click the right button of the mouse for the wrongly detected cell mark and remove it from the samples. Click the "ANALYZE" icon, and the cells are magnified. Even in the magnified condition, you can remove the wrongly detected cell mark.



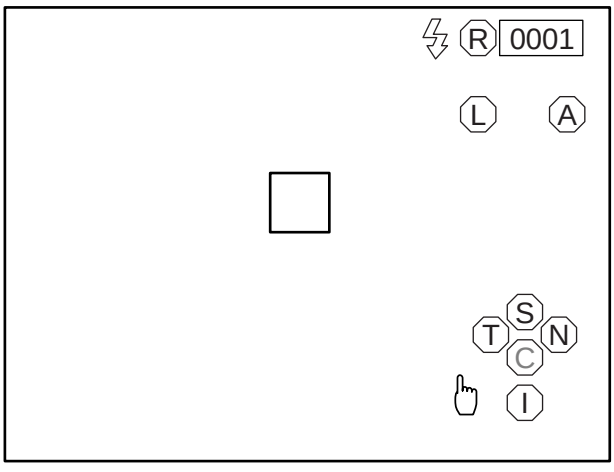


If there is a wrongly detected cell, the color of the clicked point is changed.

7 Click the "CALC" icon once more and perform analysis. You can get the results without the wrongly detected cell.



8 Click "EXIT" on the screen. The eye observation display appears again.

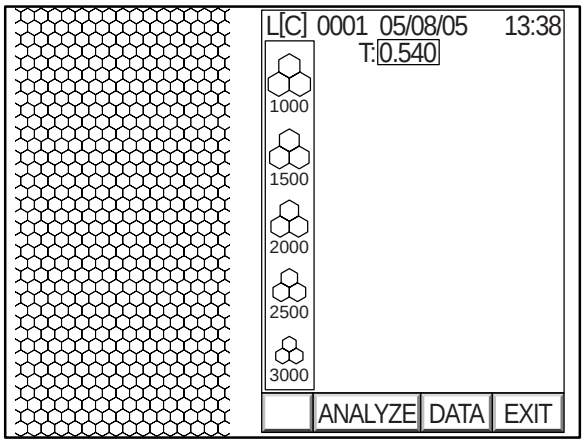


OUTPUT TO THE IMAGEnet system

1 Check the connection to the IMAGEnet system.
For details on the connection, refer to "CONNECTING THE EXTERNAL INPUT/OUTPUT TERMINAL" on P.17.

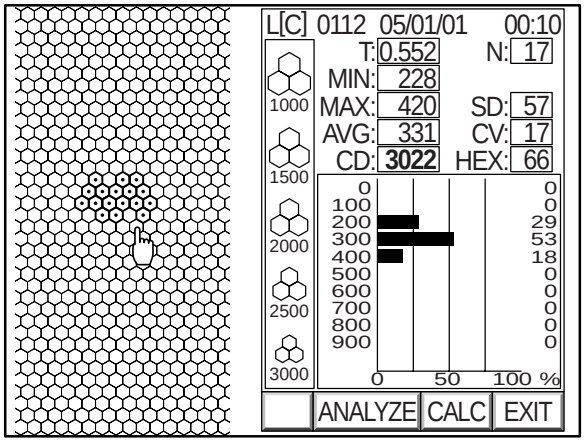
2 Access the image display.

3 Click "DATA" on the screen or press the (Image transfer) switch to output the image display.
The image is automatically transferred into the IMAGEnet system.



Output from the image display

4 Press the (Image transfer) switch to output the image display with analytic values. The image is automatically transferred into the IMAGEnet system.



Output from the image display with analytic values

OUTPUT TO THE IMAGE PROCESSING UNIT

This instrument can output an image signal to an image processing unit adopting the EIA (NTSC) signal system.

1 Since the image signal is outputted at all times, only the connection with an image processing unit is required to complete this function.
For details on the connection, refer to "CONNECTING THE EXTERNAL INPUT/OUTPUT TERMINAL" on P.17

2 Select "color" or "monochrome" for the image color.
For details on the setting, refer to "Setting the video OUT output" on P.26.

INPUT/OUTPUT THROUGH RS-232C

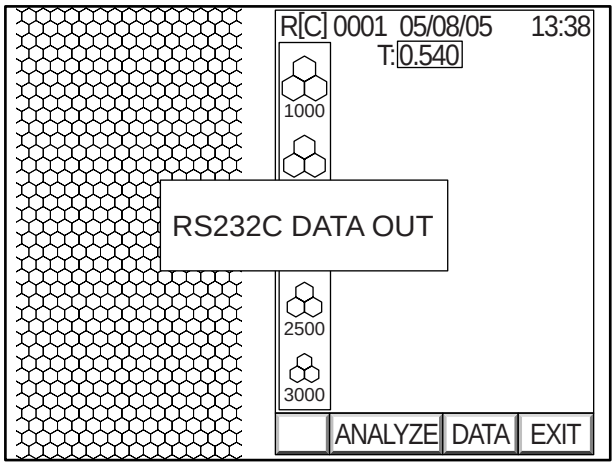
Output through RS-232C

This instrument can output data to a personal computer, etc. through RS-232C.

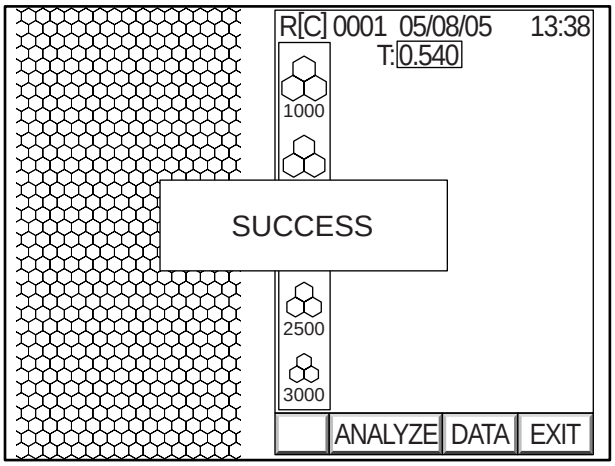
1 Check the connection to RS-232C.
For details on the connection, refer to "CONNECTING THE EXTERNAL INPUT/OUTPUT TERMINAL" on P.17.

2 Check the setting of the RS-232C output.
For details on setting the RS-232C output, refer to "DEFAULT SETTING" on P.19.

3 To output the image display, click "DATA" on the screen or press the (Image transfer) switch.
"RS232C DATA OUT" is displayed on the screen and the data output is completed.

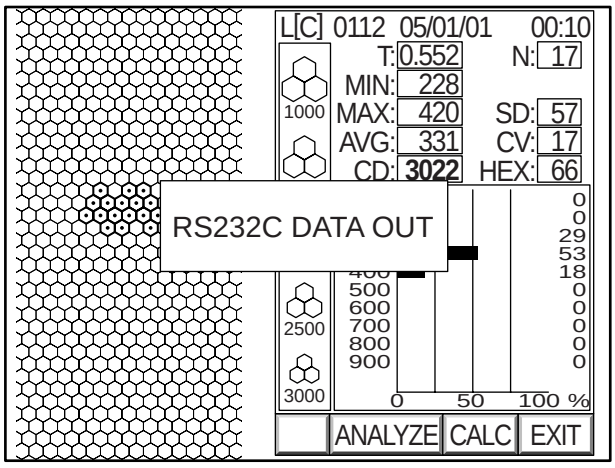


Clicking "DATA" on the image display

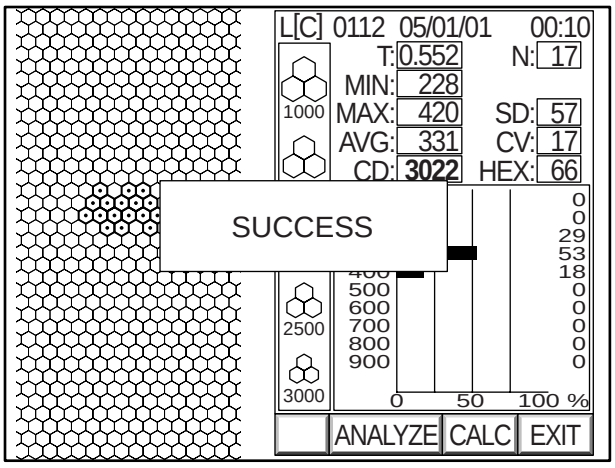


Output status display

4 To output the image display with analytic values, press the (Image transfer) switch.
"RS232C DATA OUT" is displayed on the screen and the data output is completed.



Press the (Image transfer) switch



Output status of the data with analytic values

When an image with analytic values is outputted, the analytic values are also outputted as data.

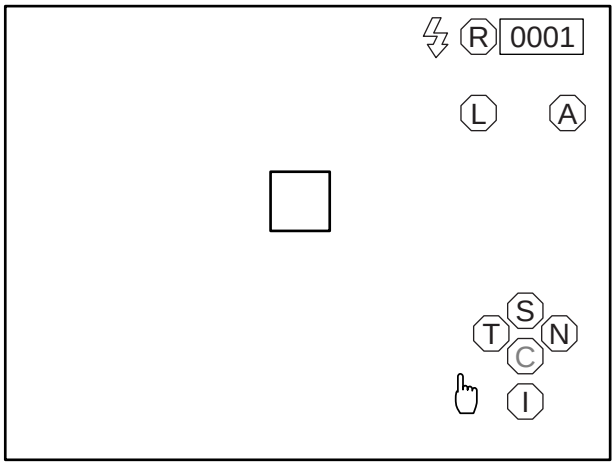
Input through RS-232C

This instrument can input the ID number through RS-232C by connecting with a bar code reader, etc.

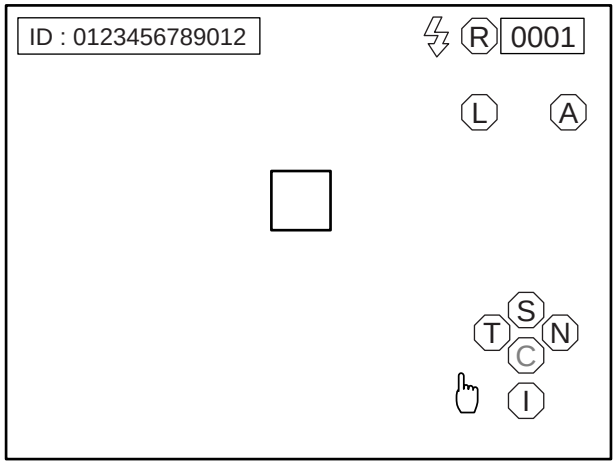
1 Check the connection to RS-232C.
For details on the connection, refer to "CONNECTING THE EXTERNAL INPUT/OUTPUT TERMINAL" on P.17.

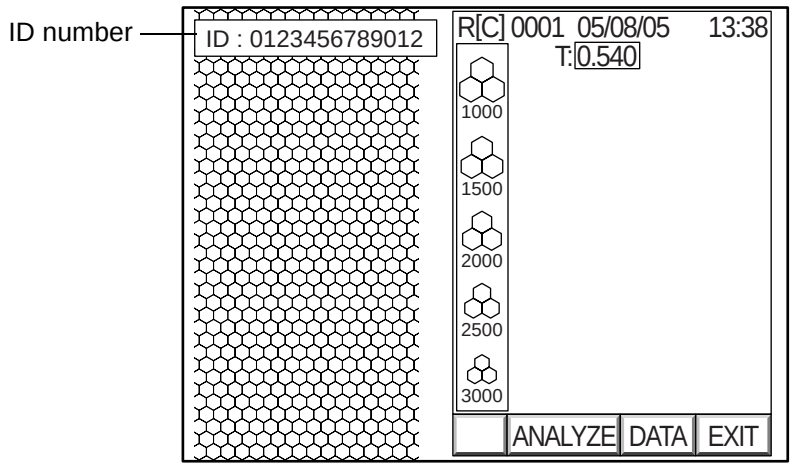
2 Check the setting of the RS-232C input.
For details on setting the RS-232C input, refer to "DEFAULT SETTING" on P.19.

3 Access the observation display.

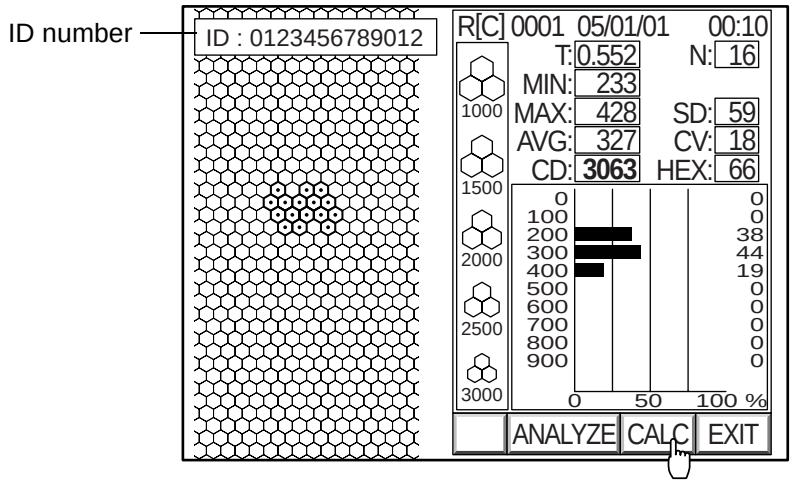


4 Enter an ID number from the external device.
The entered ID number is displayed on the screen.





ID number input status display



ID number input status display

TROUBLE SHOOTING

TROUBLE SHOOTING GUIDE

If there seems to be a malfunction, first check the cause by following the steps on the check list shown below. If the problem cannot be resolved or the malfunction seems to be caused by something other than the items listed below, contact TOPCON at the address on the back cover.

Problem	Example of possible causes	Measures	Reference page
Nothing is displayed on the monitor.	The power cord plug has come out of the outlet.	Securely insert the plug into the outlet.	16
	The power cord has come out of the instrument.	Attach the power cord to the instrument.	16
	The Power Save condition is selected.	Reset the instrument to the normal condition.	33
	The fuse has blown out.	Replace the fuse with a new one.	71
The monitor is difficult to view.	The screen adjustment is not correct.	Adjust the monitor screen by turning the brightness volume.	69
The photography image is not clear.	The lens of the photography window is dirty.	Clean the lens.	74
Photographing is impossible in the AUTO mode.	The MANUAL mode is selected.	Select the AUTO mode.	35
	The lens of the photography window is dirty.	Clean the lens.	74
	The patient's eye condition is poor.	Take a picture in the MANUAL mode.	44
An error message flickers on the screen.	The lamp house cover comes off.	Set the lamp house cover.	69
No image is displayed.	The xenon lamp is dead.	Replace the xenon lamp with a new one.	69
The instrument does not move.	The locking knob is tightened.	Loosen the locking knob sufficiently.	15

OPERATING THE CHINREST MANUALLY IN THE CASE OF A MALFUNCTION

⚠CAUTION	Before handling the chinrest manually in the case of a malfunction, remove the power cord from the instrument. If not, your finger may be pinched and injured by a wrong operation.

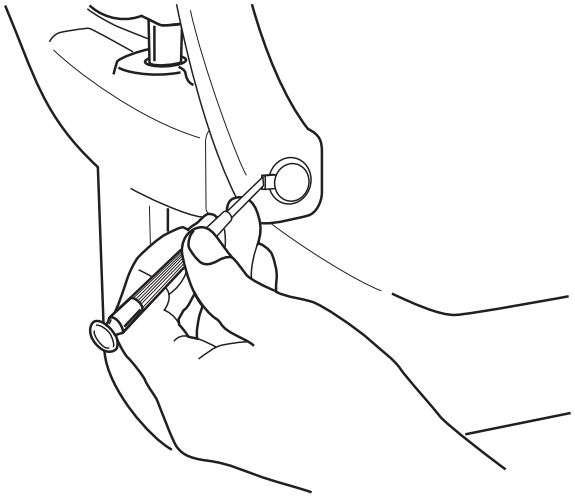
If the chinrest malfunctions, you can operate it manually.

Operate the chinrest manually only in an emergency.

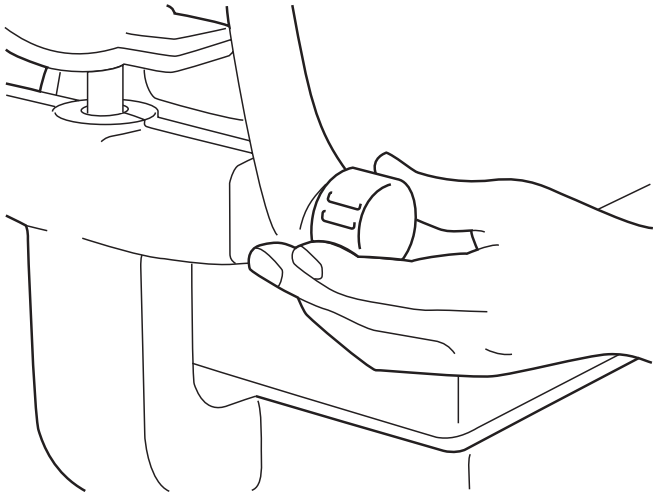
Inform your dealer or TOPCON (at the address on the back cover) of the malfunction at once.

1 Turn off the (POWER) switch and unplug the power cord from the outlet.

2 Remove the left cover (as viewed from the inspector side) with a screwdriver, etc.



3 Insert the emergency chinrest knob into the hole by turning it. Make sure that the emergency chinrest knob is put into the hole properly.



4 Turn the emergency chinrest knob, and the chinrest moves up and down.

SPECIFICATIONS & PERFORMANCE

SPECIFICATIONS

Photography magnification	165× (on the color video monitor)
Photography slit width	0.25mm (on the object)
Photography image memory	5 displays for each of right and left eyes

* Subject to change in specifications and appearance without advance notice for future improvement.

ELECTROMAGNETIC COMPATIBILITY

This product conforms to the EMC Standard(IEC 60601-1-2:2001).

a) MEDICAL ELECTRICAL EQUIPMENT needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided in the ACCOMPANYING DOCUMENTS.

b) Portable and mobile RF communications equipment can affect MEDICAL ELECTRICAL EQUIPMENT.

c) The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the manufacturer of the EQUIPMENT or SYSTEM as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the EQUIPMENT or SYSTEM.

d) The EQUIPMENT or SYSTEM should not be used adjacent to or stacked with other equipment. IF adjacent or stacked use is necessary, the EQUIPMENT or SYSTEM should be observed to verify normal operation in the configuration in which it will be used.

e) The use of the ACCESSORY, transducer or cable with EQUIPMENT and SYSTEMS other than those specified may result in increased EMISSION or decreased IMMUNITY of the EQUIPMENT or SYSTEM.

Item	Article code	Model No.	Length(m)
VIDEO OUT CABLE(BNC)	-	-	3.0
RS-232C CROSSING CABLE(shielded)	-	-	3.0
USB CABLE (USB 2.0)	419030201	-	3.0
USB MOUSE	419032700		0.65
CABLE VS200-SP	445102700	-	3.0

Guidance and manufacturer's declaration - electromagnetic emissions		
The SP-3000P is intended for use in the electromagnetic environment specified below. The customer or the user of the SP-3000P should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR 11	Group 1	The SP-3000P uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The SP-3000P is suitable for use in all establishments, excluding domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC61000-3-2	Does not comply.	
Voltage fluctuations/ flicker emissions IEC61000-3-3	Does not comply.	

Guidance and manufacturer's declaration - electromagnetic immunity			
The SP-3000P is intended for use in the electromagnetic environment specified below. The customer or the user of the SP-3000P should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and Voltage variations on power supply input lines IEC 61000-4-11	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	<5% U_t (>95% dip in U_t) for 0.5 cycle 40% U_t (60% dip in U_t) for 5 cycles 70% U_t (30% dip in U_t) for 25 cycles <5% U_t (>95% dip in U_t) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the SP-3000P requires continued operation during power mains interruptions, it is recommended that the SP-3000P be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_t is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacturer's declaration - electromagnetic immunity			
The SP-3000P is intended for use in the electromagnetic environment specified below. The customer or the user of the SP-3000P should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment- guidance**
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	3 Vrms 150kHz to 80MHz 3 V/m 80MHz to 2.5GHz	3 V 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the SP-3000P, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2\sqrt{P}$ $d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, [a] should be less than the compliance level in each frequency range. [b] Interference may occur in the vicinity of equipment marked with the following symbol: 
NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies. NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.			
[a] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the SP-3000P is used exceeds the applicable RF compliance level above, the SP-3000P should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the SP-3000P. [b] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V_1] V/m.			

Recommended separation distance between portable and mobile RF communications equipment and the SP-3000P

The SP-3000P is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the SP-3000P can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the SP-3000P as recommended below, according to the maximum output power of the communications equipment.

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

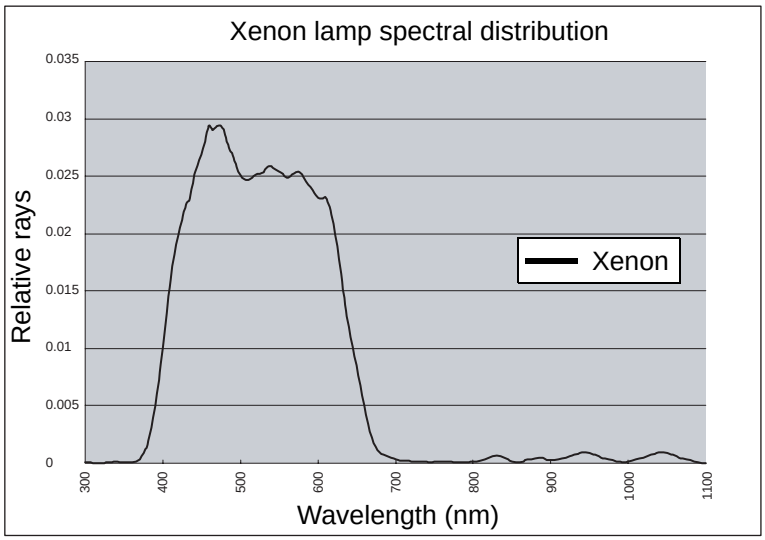
For transmitters rated at a maximum output power not listed above, the recommended separation distance *d* in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter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

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

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

Information about the optical radiation hazard for the user

Relative spectral output of this instrument



Photochemical light source radiance of this instrument

L_A (without crystalline lens) : 3894 mW/(cm^2·sr)

L_B (with crystalline lens) : 3051 mW/(cm^2·sr)

Meaning of L_A and L_B

- The radiance L_B/L_A means the radiance given to retina. If large radiance exists, it is probable that there is radiant flux, which will cause a photochemical hazard. L_B is the value for the eye with crystalline lens. L_A is the value with the weighted spectrum for the eye without crystalline lens (which is not substituted with the UV-cut lens) and the baby's eye. The above-mentioned radiance is the value obtained when the ophthalmic optical equipment is used with maximum strength and maximum diameter. When L_B or L_A is 80mW/(cm^2·sr) or more, it is probable that a photochemical hazard will be caused for the mydriatic eye.
- Retina irradiation quantity is the product of the radiance and the irradiation time. For example, the recommended irradiation limit is the retina irradiation quantity calculated when an optical equipment irradiates the eye of its pupil diameter 8mm with radiance of 80mW/(cm^2·sr) for 3 minutes. If the radiance is reduced to 40mW/(cm^2·sr), 6 minutes are required to reach the recommended irradiation limit. The recommended irradiation quantity is based on the calculation mentioned in the "Limits of chemical materials and medicines" document (edition of 1995-1996) of ACCIH (the industrial health specialists council of U. S. A.).
  1. This instrument performs flash photography with a xenon lamp. Its lighting time is very short, 3 msec. When calculation is done with the recommended irradiation limit (80mW/(cm^2·sr) for 3 minutes), the irradiation quantity on the eye fundus is 2376mJ/cm^2. The irradiation quantity of this instrument is approx. 2mJ/cm^2. This is a very low value compared with the recommended irradiation limit. So the risk for the photochemical light source radiance is very low in this instrument.
  2. In this instrument, an acute optical radiation hazard has not been recognized. It is recommended to limit the strength of beam, which is emitted into the patient's eye, to the minimum level required for photography. Risk is increased regarding babies, the persons having the eyes without crystalline lens or the persons with ocular pathology. If one person, who has taken an inspection, receives the irradiation from the visible light source through the same instrument or other ophthalmic optical instrument within 24 hours since the last inspection, risk will be increased.

ELECTRIC RATING

Source voltage : AC100V-240V, 50Hz/60Hz
Power input : 65VA for normal use, 190VA at its maximum

SYSTEM CLASSIFICATION

- Types of protection against electric shocks:
  This instrument is classified as Class I equipment.
  Class I equipment does not depend only on basic insulation for protection against electric shocks, but also provides a means of connection to a protective grounding system so that metal parts that come into contact do not become conductive while the basic insulation is in failure.
- Grade of protection against electric shocks:
  This instrument is classified as Type B equipment.
  Type B equipment provides a specified grade of protection to prevent electric shocks, particularly for reliability against current leaks, measuring current and protective earth current (in case of Class I equipment).
- Degree of protection against harmful ingress of water: IPx0
  The SP-3000P has no protection against ingress of water. (The degree of protection against harmful ingress of water defined in IEC 60529 is IPx0.)
- Classification according to the method(s) of sterilization or disinfection recommended by the manufacturer: not applicable.
  The SP-3000P has no part to be sterilized or disinfected.
- Classification according to the degree of safety of application in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide: Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.
  The SP-3000P should be used in environments where no flammable anesthetics and/or flammable gases are present.
- Classification according to the mode of operation: Continuous operation.
  Continuous operation is the operation under normal load for an unlimited period, without the specified limits of temperature being exceeded.

DIMENSIONS AND WEIGHT

Dimensions : 275mm (W) × 507mm (D) × 446~474mm (H)
Weight : 22kg

PURPOSE OF USE

Used to photograph and record the corneal endothelium as an electronic image.

OPERATION PRINCIPLE

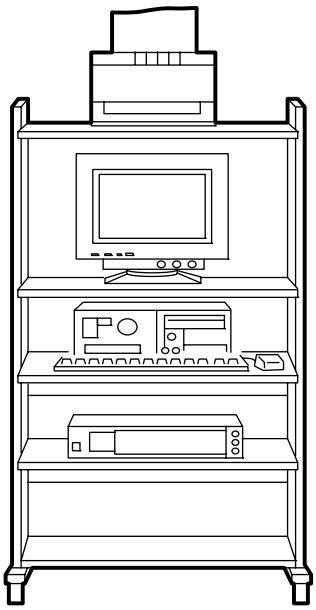
This instrument takes a picture of the corneal endothelium by the slit light projected diagonally onto the patient's eye. It measures the corneal thickness by the slit light reflected from the cornea surface and the corneal endothelium.

The instrument detects the image reflected from the cornea by the alignment system, performs positioning automatically and starts measurement automatically.

RELATED PRODUCT

IMAGEnet system

The IMAGEnet system enables the image of the endothelium photographed by this instrument to be easily and quickly compiled into a file and analyzed. The contents of analysis include the cell average area, maximum/minimum area, coefficient of variation, standard deviation, number of cells per unit area, histogram, frequency of hexagon cells, etc.



RS-232C COMMUNICATION SPECIFICATIONS

Connector type

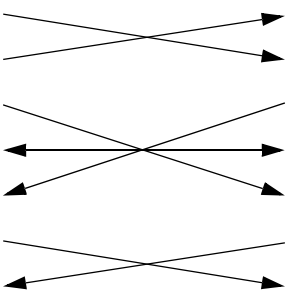
Dsub-9-pin connector (based on EIA RS-232C)

The connector on the instrument is DE-9S-N (made by Japan Aircraft Electronics).

Input terminal PIN layout

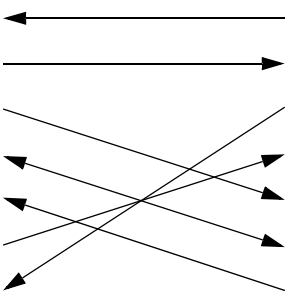
For the 9-pin to 9-pin connection

Code	Name	SP-3000P side	Sender/receiver's side
RD (RXD)	Received data	2	2
SD (TXD)	Sent data	3	3
ER (DTR)	Data Terminal Ready	4	4
SG (GND)	Signal Grounding	5	5
DR (DSR)	Data Set Ready	6	6
RS (RTS)	Request to Send	7	7
CS (STS)	Clear to Send	8	8



For the 9-pin to 25-pin connection

Code	Name	SP-3000P side	Sender/receiver's side
RD (RXD)	Received data	2	2
SD (TXD)	Sent data	3	3
ER (DTR)	Data Terminal Ready	4	4
SG (GND)	Signal Grounding	5	5
DR (DSR)	Data Set Ready	6	6
RS (RTS)	Request to Send	7	7
CS (CTS)	Clear to Send	8	20



Transmission mode

RTS-CTS control

Synchronous system	Asynchronous
Baud rate	2400/9600bps
Start bit	1 bit
Stop bit	1 bit
Data length	8 bit
Parity	None
Operating code	ASCII code

TOPCON NEW format control

Synchronous system	Asynchronous
Baud rate	2400/9600bps
Start bit	1 bit
Stop bit	2 bit
Data length	7 bit
Parity	EVEN
Operating code	ASCII code

Contents of transmission data

Model name/model number	: 15 bytes	Minimum cell area data	: 9 bytes
Equipment number	: 2 bytes	Maximum cell area data	: 9 bytes
ROM version	: 10 bytes	Average cell area data	: 9 bytes
ID number	: 13 bytes	Standard deviation data	: 9 bytes
Work ID number	: 13 bytes	Coefficient of variation	: 9 bytes
Instrument work ID number	: 4 bytes	Cell density data	: 9 bytes
Date	: 19 bytes	Hexagon cell frequency	: 9 bytes
Measured eye (R & L)/measuring point	: 4 bytes	Device magnification	: 12 bytes
Corneal thickness data	: 9 bytes	Analytic status	: 9 bytes
Number of cells analyzed	: 9 bytes		

Transmission format

(Example)

@	CR																							
S	P	-	3	0	0	0	P	_	_	_	_	_	_	_	0	1	1	.	0	0	A	_	_	_	_	_	CR
_	_	_	_	_	_	_	_	_	0	0	0	1	CR														
_	_	_	_	_	_	_	1	0	2	0	3	0	CR														
0	0	0	1	CR																							
*	CR																										
2	0	0	5	/	1	2	/	3	1	_	2	3	:	5	9	:	5	9	CR							
L	[	C	]	CR																							
T	_	_	0	.	5	0	0	_	CR																		
N	_	_	_	_	_	1	0	_	CR																		
M	I	N	[	_	1	0	0	]	CR																		
M	A	X	[	_	4	0	0	]	CR																		
A	V	G	[	_	2	5	0	]	CR																		
S	D	_	[	_	2	0	0	]	CR																		
C	V	_	[	_	_	5	0	]	CR																		
C	D	_	[	4	0	0	0	]	CR																		
H	E	X	[	_	0	0	0	]	CR																		
D	M	_	1	.	0	0	0	0	0	0	_	CR															
S	T	A	T	U	S	_	0	_	CR																		
*	CR																										
EOT																											

Contents of received data

ID data, etc. : 15 bytes

Receiving format

(Example)

SOH													
_	_	_	_	_	_	_	_	1	2	3	4	5	
EOT													

MAINTENANCE AND INSPECTION

MAINTAINING ACCURACY

Photography window

When the lens of the photography window is dirty, the monitor screen may be hard to view or a clear image may not be obtained. Make sure that the photography window is not dirty before using the instrument. If the photography window is dirty, clean it.

Adjusting the monitor screen

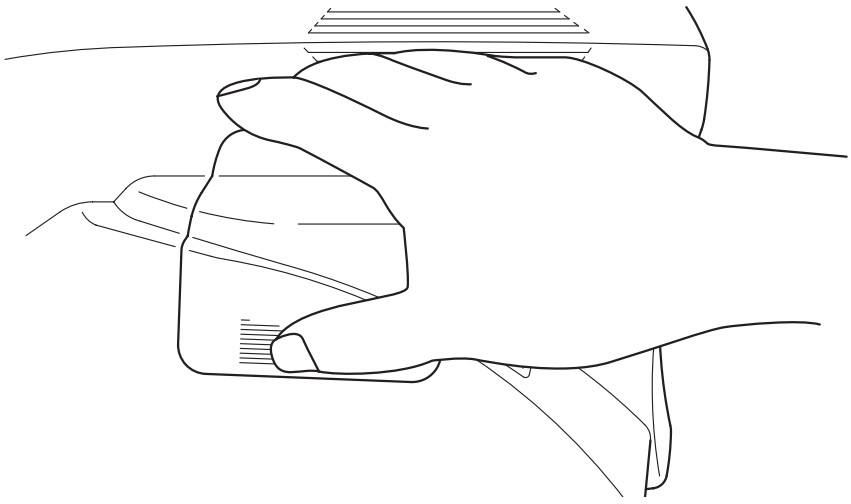
For this instrument, the optimum screen adjustment is made prior to shipping. However, screen adjustment may be necessary due to vibrations during transportation.
Adjust luminance by turning the brightness volume.

Replacing the xenon lamp

⚠CAUTION	To avoid damage to the instrument or electric shock, turn the power switch OFF and unplug the power cord before replacing the xenon lamp. Do not use any other types of xenon lamp except the type that is specified in this manual.

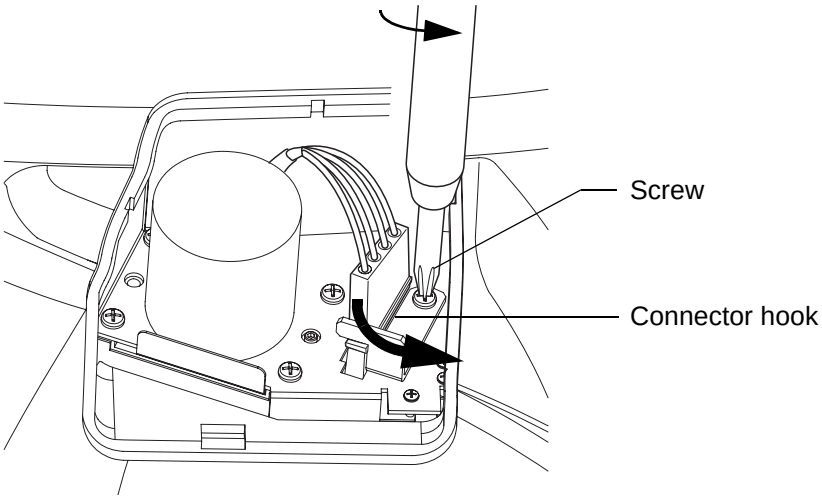
1 Make sure that the power of the instrument is turned OFF and that the power cord is removed from the outlet.

2 Remove the lamp house cover.



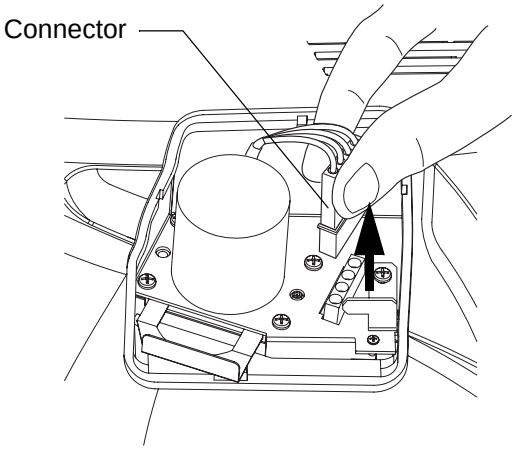
There is a slotted section (striped section) on the side of the lamp house cover. While pushing this section with your finger tip, pull the lamp house cover up and remove it.

3 Loosen the connector hook screw with a Phillips screwdriver. Then, turn the connector hook.

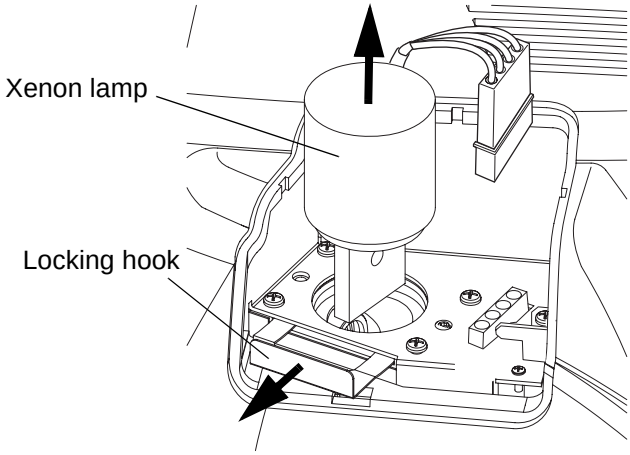


4 Remove the connector from the xenon lamp.

5 Pull the locking hook toward you and remove the xenon lamp.



Removing the connector



Removing the xenon lamp

6 Mount a new xenon lamp and then push the locking hook until the lamp is locked.

When a xenon lamp is mounted, turn the xenon lamp a little at a time while pushing the locking hook into it. This will cause the xenon lamp to be mounted smoothly.

7 Set the connector.

8 Push the connector hook and affix it with the screw.

9 Mount the lamp house cover.

Replacing the fuse

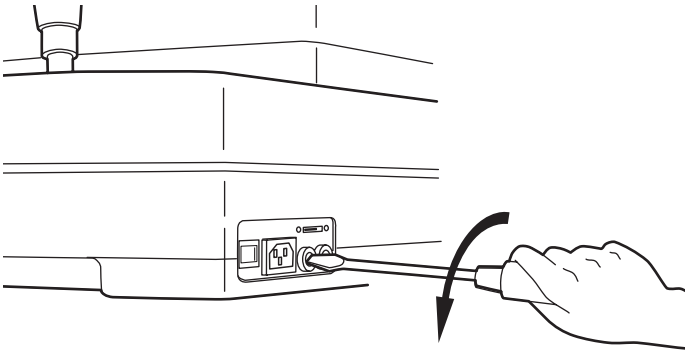
⚠WARNING	Electric shock may cause burns or a possible fire. Turn the power switch OFF and unplug the power cord before replacing the fuses. Replace only with fuses of the correct rating.

1 Make sure that the power of the instrument is turned OFF and that the power cord is removed from the outlet.

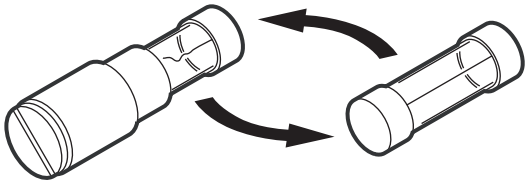
2 Turn the fuse holder counterclockwise while pushing it with a slotted screwdriver. The fuse holder comes off.

3 Replace the fuse with a fuse whose capacity is the same as specified.

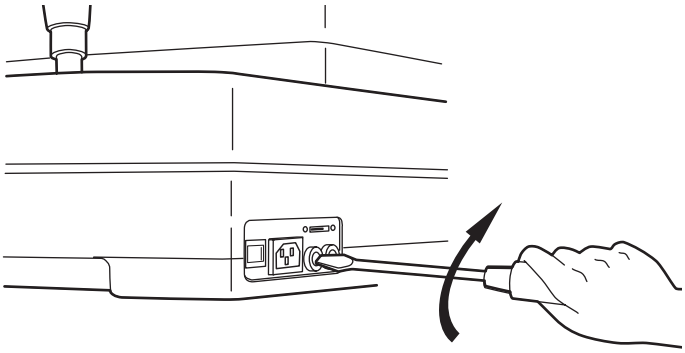
4 Turn the fuse holder clockwise while pushing it with a slotted screwdriver. The fuse holder is mounted.



Removing the fuse holder



Replacing the fuse



Mounting the fuse holder

MAINTENANCE AND INSPECTION

Daily maintenance

This instrument is easily affected by dust. When not in operation, apply the dust cover to it.

Ordering consumables

When ordering consumables, contact TOPCON at the address listed on the back cover of this manual. Please inform TOPCON of the product name, code and quantity.

Product name	Code
Chinrest tissue	403104083
Dust cover	423609002

Product name	Code
Xenon lamp	419037901
Fuse T 4A 125A	T24000097A

Maintenance and inspection by the dealer

Item	Inspection interval	Description
Cleaning of each unit	Once in 12 months	• Clean the external unit. • Clean the optical system.
Operation check	Once in 12 months	• Check the operation of the instrument. • Check the switches.
Accuracy check	Once in 12 months	• Check the corneal endothelium analysis function (by special tools). • Check the corneal thickness calculation function (by special tools).

MAINTENANCE

CLEANING THE DUST COVER, CONTROL PANEL, MONITOR SCREEN, ETC.

⚠CAUTION	To avoid damage to the instrument or electric shock, turn the power switch OFF and unplug the power cord before maintenance.
NOTICE	To avoid damage to the instrument or electric shock, do not spray or splash the instrument with liquid.
NOTICE	Avoid spraying a cleaner directly onto the instrument. In such a case, detergent or any other fluid may permeate through the vent hole, etc. which can cause mechanical problems with the instrument.
NOTICE	When not in use, turn off the power switch.
NOTICE	Never wipe the plastic parts of the instrument with volatile solvents. Wiping them with benzine, thinner, ether, gasoline, etc. may cause discoloration and/or deterioration.

1 If the dust cover, control panel and monitor screen are dirty, wipe them with a dry cloth.

2 If the dust cover is badly stained, prepare a solution by mixing a neutral detergent for kitchenware with tepid water. Moisten a cloth with the aforementioned solution and wring it thoroughly. Then, wipe the dust cover with the cloth.

CLEANING THE PARTS WHICH COME INTO CONTACT WITH THE PATIENT

- Stain on forehead rest or chinrest
  Prepare a solution by mixing a neutral detergent for kitchenware with tepid water. Moisten a cloth with the aforementioned solution and wring it thoroughly. Then, wipe the forehead rest and chinrest with the cloth.

CLEANING THE PHOTOGRAPHY WINDOW

Wiping up stains

NOTICE	Don't wipe the photography window using a commercial tissue, etc. This may make the photography window dirtier. Don't wipe the photography window using gauze held with tweezers. This may damage the surface of the lens or glass.

1 Prepare a lens cleaner.

2 Using a blower, blow off any dust from the surface of the lens or glass.

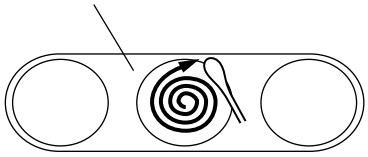
3 Moisten an applicator with the lens cleaner.

4 Lightly wipe the lens from its center point toward the outside in a swirl, using the applicator.

5 If all the stains cannot be removed, repeat this procedure a few times.

6 If the stains are still hard to remove, contact your dealer or the TOPCON sales department.

How to move the applicator



How to wipe the lens or glass

REFERENCE MATERIAL

OPTIONAL ACCESSORIES

Instrument table AIT-16

The instrument height can be changed freely, making it easy to take a picture.

Specifications

- Size : 525 (W) × 480 (D) × 665 (H) mm
- Table height : 665 ~ 885mm
- Table size : 500 (W) × 490 (D)mm

Other optional accessories

- Instrument table AIT-15

Symbols on the outer surface of the instrument

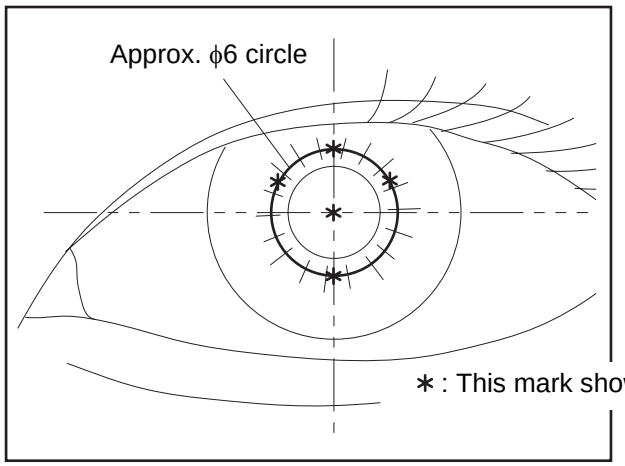
Symbol	IEC	Description
	60417-5032	Alternation current
	60417-5008	OFF (power: disconnected from the main power supply)
	60417-5007	ON (power: connected to the main power supply)
	60878-02-02	Type B applied part

TERMINOLOGY

DESCRIPTION OF TERMS

- Corneal thickness
  The distance between the corneal surface and the corneal back surface.

- Corneal peripheral area
  The 4 places which are approximately ϕ6 from the corneal center among the photography points on this instrument.



- Click
  An operating function designed to put the mouse cursor (shaped like a finger) on top of the icon. Press the mouse button and then release it quickly.

When you contact us, please advise us of the following data:

- Model name: SP-3000P
- Serial No.: This is described on the rating nameplate on the right side of the power supply unit.
- Period of use: Please inform us of the purchase date of this instrument.
- State of malfunction: Please inform us of this data with as much detail as possible.

SPECULAR MICROSCOPE

SP-3000P

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