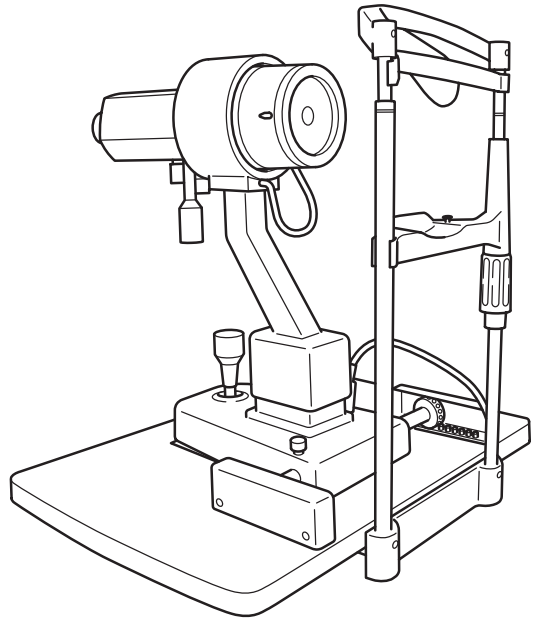




INSTRUCTION MANUAL
OPHTHALMOMETER

OM-4

INTRODUCTION

Thank you for purchasing the TOPCON OM-4 Ophthalmometer.

This instrument is used for the measurement of the radius of curvature of the cornea and measurement of contact lenses.

This OM-4 has the following features:

- Smooth operation
 - Robustness and durability
-

This Instruction Manual covers an overview of the basic operation, troubleshooting, checking, maintenance and cleaning of the OM-4 Ophthalmometer.

To get the best results from this instrument, read "Displays for Safe Use" and "Safety Cautions".

Keep this Instruction Manual close the instrument for future reference.

[Warning]

To avoid injury to the patient's eye and nose, pay particular attention while operating the instrument body.
(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

To prevent fingers from being caught in between, beware of the moving parts while operating the main body.

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 (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 environmental conditions are appropriate.
 - (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

Temperature : -20°C ~ 50°C

Humidity : 10% ~ 95%

CHECKPOINTS FOR MAINTENANCE

1. Regularly maintain and check the instrument and its parts.
2. When using the instrument after a prolonged period of inactivity, confirm normal and safe operation beforehand.
3. Keep the objective lens free from finger prints and dust.
4. When not in use, protect the instrument with the dust cover.
5. If the objective lens is stained, clean it following the "Cleaning" instructions listed in this Instruction Manual.

DISPLAYS FOR SAFE USE

In order to ensure the safe use of the product and to prevent harm to the operator and others, or damage to property, a number of important warnings are placed on the product and inserted in the instruction manual.

It is recommended that all users understand the meaning of the following displays and icons before reading the "Safety Cautions" text.

DISPLAYS

DISPLAY	MEANING
 WARNING	Ignoring or disregarding this display may lead to death or serious injury.
 CAUTION	Ignoring or disregarding this display may lead to personal injury or physical damage.
• Injury refers to cuts, bruises, sprains, fractures, burns, electric shocks, etc. • Physical damage refers to damage to buildings, equipment or furniture.	

ICONS

ICON	MEANING
	This indicates Prohibition. Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.
	This indicates Mandatory Action. Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.
	This icon indicates Hazard Alerting (Warning). Specific content is expressed with words or an icon either inserted in the icon itself or located next to the icon.

SAFETY CAUTIONS

 **CAUTION**

Icon	Prevention item	Page
	This instrument has been tested (with 120V) and found to comply with IEC60601-1-2: 2001. This instrument radiates radio frequency energy within standard parameters 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 change the outlet. Please consult the dealer from whom you purchased the instrument for any additional questions. (for U.S.A. and Canada)	—

MAINTENANCE

USER MAINTENANCE

To maintain the safety and performance of the instrument, never attempt to do maintenance of items other than those specified here unless done by an authorized service engineer. For details about maintenance, read the chapter entitled "Maintenance" in this manual.

REPLACING THE ILLUMINATION LAMP

The illumination bulb can be replaced if necessary. For specific instructions, see page 32.

REPLACING THE FUSES

Fuses on the primary side can be replaced if necessary. For specific instructions, see page 31.

ESCAPE CLAUSES

- TOPCON shall not take any responsibility for damage due to fire, earthquakes, actions by a third party or other accidents, or the negligence and misuse of the user and use under unusual conditions.
- TOPCON shall not take any responsibility for damage derived from the inability to use this equipment, such as a loss of business profit and suspension of business.
- TOPCON shall not take any responsibility for damage caused by operations other than those 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 INDICATIONS AND POSITIONS

To ensure safety, warning labels are placed on the instrument body.

Use the instrument according to these warning instructions. If any of the following labels are missing, contact your dealer or TOPCON (see the back cover for contact information).

CAUTION



- To prevent electric shock, switch off the power supply and remove the power cable before replacing the bulb.
Afin d'éviter tout choc électrique, coupez le contact et débranchez le câble d'alimentation avant de remplacer l'ampoule.
- To avoid burns, do not touch the bulb immediately after switching the instrument off.
Afin d'éviter toute brûlure, prenez garde à la température élevée de l'ampoule lorsque le remplacement de celle-ci se fait immédiatement après avoir coupé l'alimentation électrique.

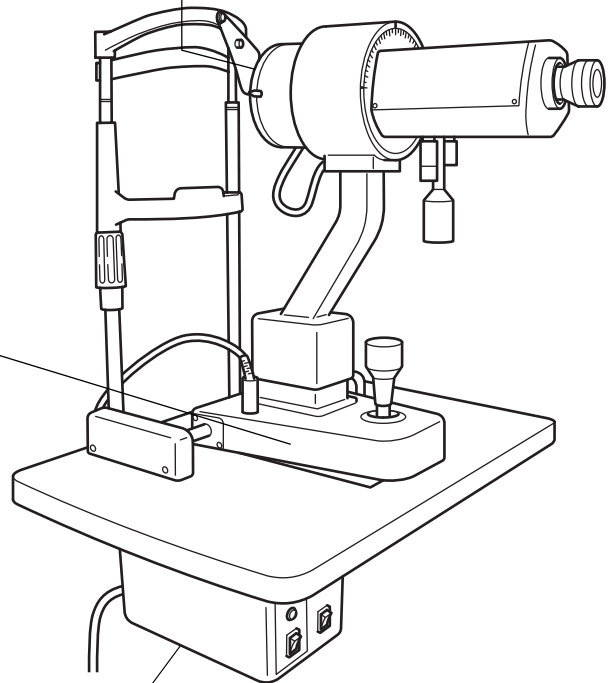
CAUTION



When operating the base unit, note the following:

Pendant la manipulation de la base de l'instrument, veuillez prendre les précautions suivantes;

- To prevent fingers from being caught in between, be aware of moving parts.
Prenez garde aux pièces mobiles afin d'éviter de coincer les doigts.
- Keep a safe distance from the patient's face to prevent injuries to the nose and eyes.
Gardez une distance de travail appropriée afin d'éviter le contact avec les yeux et le nez du patient.



CAUTION



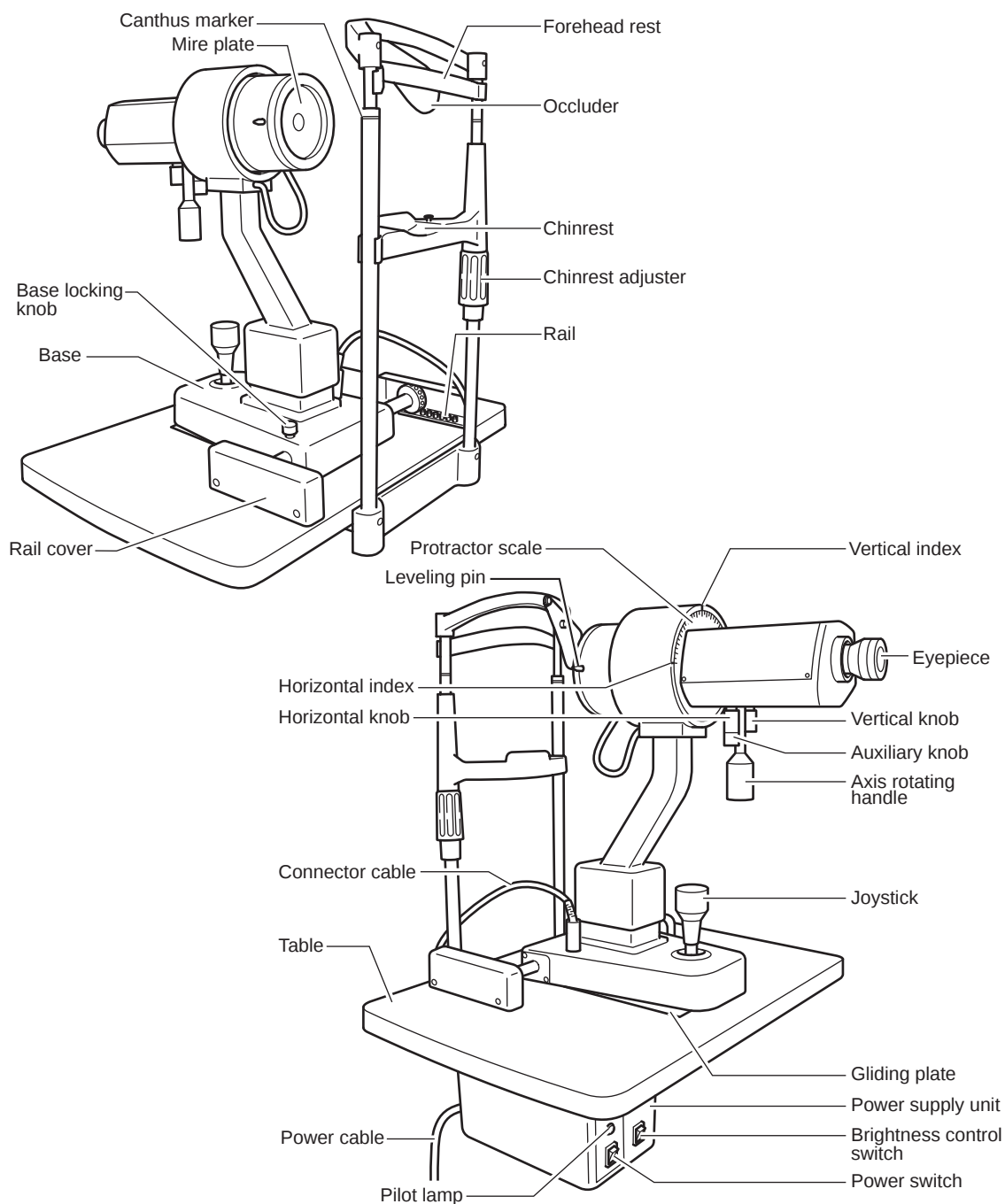
- To prevent electric shock, turn off the power switch and remove the power cable before replacing fuses.
Afin d'éviter tout choc électrique, coupez le contact et débranchez le câble d'alimentation avant de remplacer les fusibles.
- Use the specified fuse.
Utilisez des fusibles de même type et de même valeur.

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CONFIGURATION

NAMES OF MAIN BODY COMPONENTS

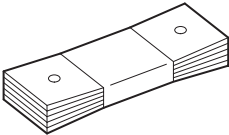
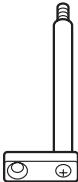
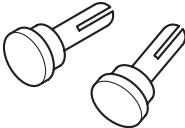
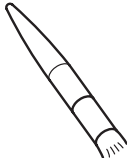
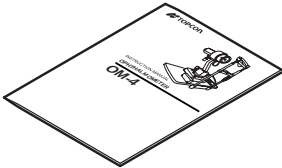
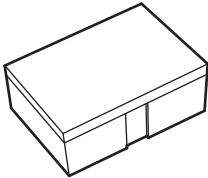
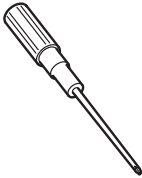
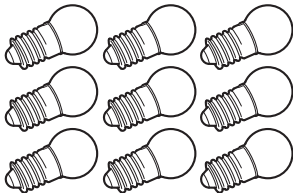


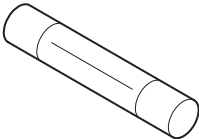
CONFIGURATION OF PARTS IN CONTACT WITH PATIENT

Forehead rest : Polyamide resin
Chinrest : Polyamide resin

STANDARD ACCESSORIES

Make sure that all the following standard accessories are included.
Figures in parentheses are the quantities.

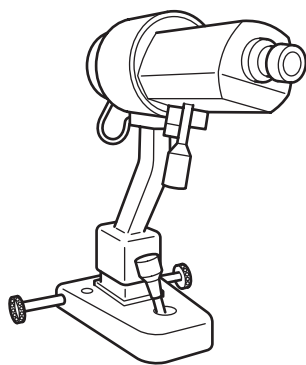
Chinrest paper (1) 	Column (1) 
Test ball (R7.50) (1) 	Spare chinrest paper pin (2) 
Contact lens holder (1) 	Brush (1) 
Dust cover (1) 	Instruction manual (1) 
Accessory box (1) 	Phillips screwdriver (1) 
Spanner (not supplied with the table for ophthalmic stand) (1) 	Spare lamp (9) 

Spare fuse F1, F2 : T1A 250V (100, 120V) (2) : T0.5A 250V (220, 240V) F3 : F6A 250V (for Europe, U.S.A. and Canada) (1) 	Silicone cloth (1) 
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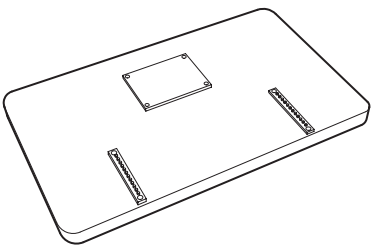
COMPONENTS

COMPONENTS

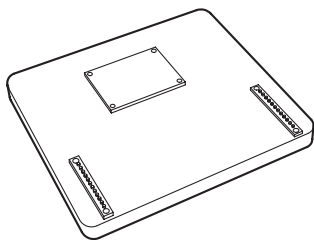
(1) Main unit



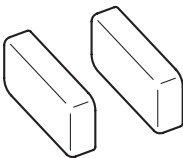
(2) Instrument type table (w/power supply)



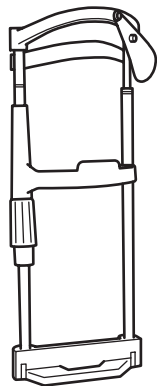
(2) Unit type table (w/power supply)



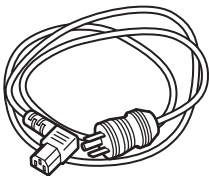
(3) Rail cover



(4) Chinrest unit



(5) Power cable



Article name	Q'ty
(1) Main unit	1
(2) Instrument type table (w/power supply)	1
(2) Unit type table (w/power supply)	1
(3) Rail cover	2
(4) Chinrest unit	1
(5) Power cable	1

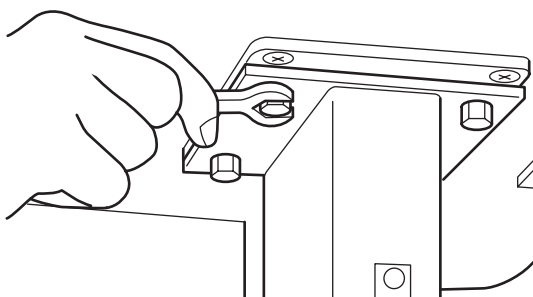
ASSEMBLY PROCEDURE

ASSEMBLY PROCEDURE

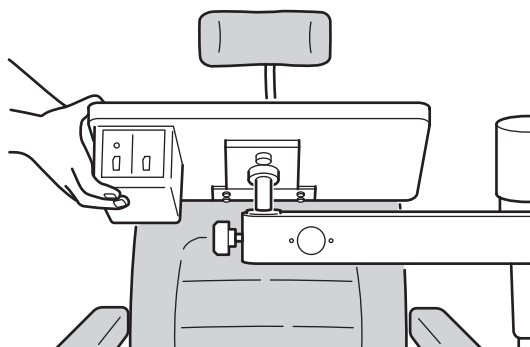
Please check the primary voltage that the instrument is set to.

(1) Installing the table

- (a) Unscrew the four attachment bolts on the bottom side of the instrument's table. These bolts are only screwed into their screw holes temporarily and can be unscrewed very easily. Use them to fix the table on top of the elevating mechanism of the adjustable instrument table.

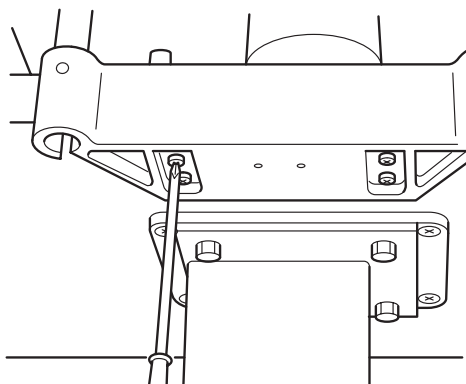


- (b) Install the ophthalmic stand. Simply insert the pole protruding from the bottom surface of the table into the socket on the lower instrument arm and tighten the fixing screw.



(2) Attachment of the chinrest unit section

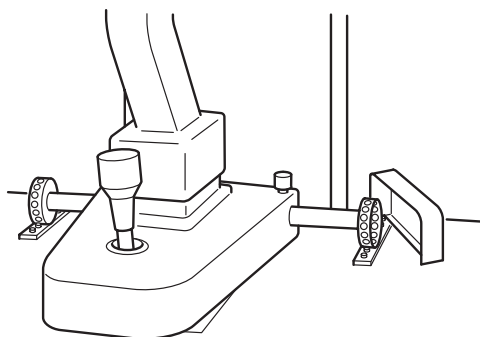
Unscrew the four attachment screws which are temporarily screwed into the attachment mount of the chinrest unit section. Then, fix the section to the mount with these four screws.



(3) Setting up the base

Simply place the base section (with measuring head) on top of the table, with outrigger rollers aligned on top of the toothed rails.

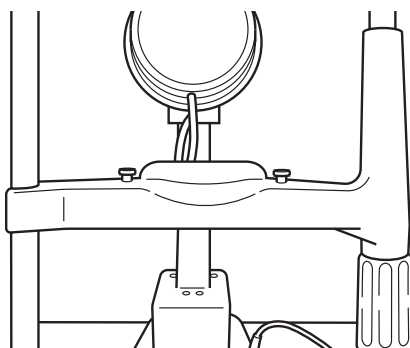
Next, insert the rail covers in place over the rails, by inserting the flange of the cover into the slight opening between the rail and table surface.



(4) Affixing the chinrest paper

Pull the chinrest paper pins out of the chinrest, by pushing them up from below. Next, place a suitable quantity of papers on the chinrest and affix them in place with the two chinrest paper pins.

Tear off one tissue paper after each patient and leave a new one in place for the next patient.

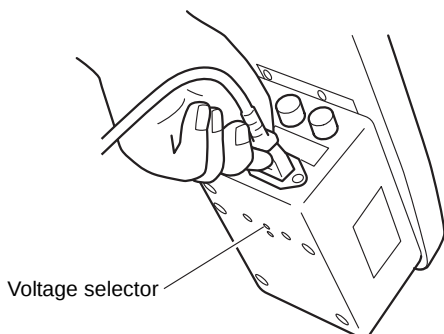


(5) Connecting the electrical cables

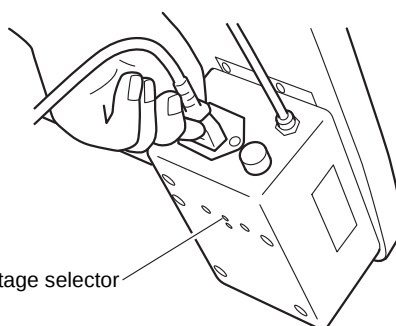
Turn off the power switch.

Then, connect the power cable and connector cable to the room receptacle and secure the respective connectors.

* Check the setting on the voltage selector (except for the U.S.A. and Canada).

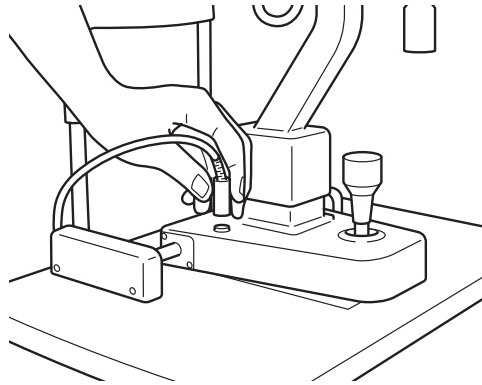


Voltage selector



Voltage selector

[for Europe]



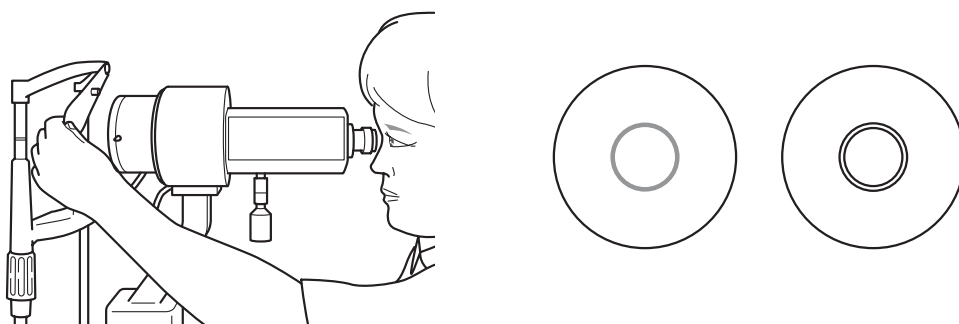
(6) Checking the light

Turn on the power switch. Make sure that the pilot lamp is lit and the scale of the mire plate is illuminated.

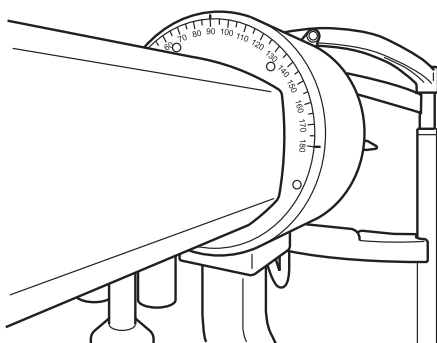
OPERATION PROCEDURES

PREPARATION

- (1) Use a room which is dimly lit. Total darkness is not recommended, as you will be unable to perform the required adjustments.
If a special room cannot be prepared, use a room without direct sunlight and cover the windows with dark thick curtains.
Furthermore, locate the instrument so that the patient does not face the window.
- (2) Connect the power cable to the outlet, if it has not been connected yet.
- (3) Turn on the power switch and check whether the pilot lamp is lit.
- (4) Set the brightness control switch to the "N" position.
- (5) Adjust the instrument to the observer's eye. First, draw out the eyepiece as far as possible, by turning it counterclockwise to its limit.
Next, place a piece of white paper before the mire plate at the position of the patient's eye, as shown below, and a blurred black circle image will be seen, as shown below. Turn the eyepiece slowly in the clockwise direction until the circle image is seen distinctly as a double circle.



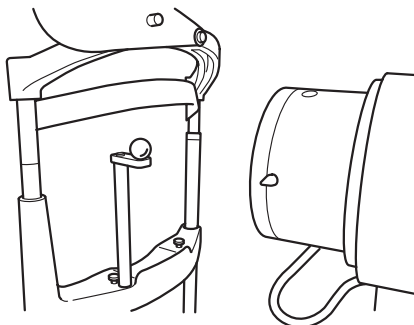
- (6) Set 0° or 180° of the protractor scale to the black-colored horizontal index.



PRACTICE MEASUREMENTS WITH THE TEST BALL

(1) Attachment of the column

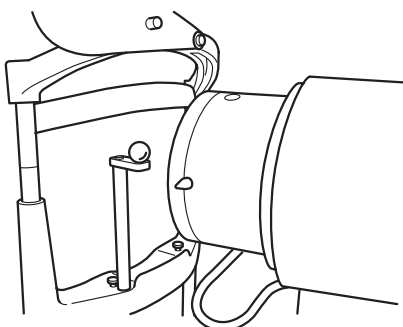
Set up the column in the opening available on the chinrest. Then, place the test ball on top of the column.



(2) Position the instrument correctly before the test ball.

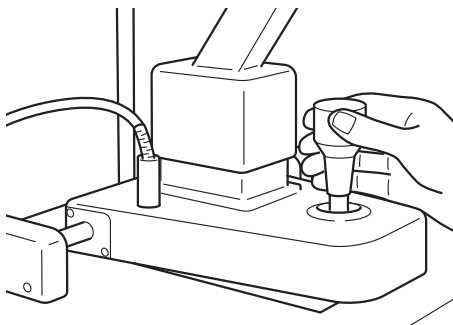
Adjust the chinrest adjuster to fit the test ball to the canthus marker of the chinrest. Position the observer's eye so that it is located along the extension of a line running through the leveling pin and black-colored horizontal index. Next, use the joystick to position the test ball on the same line of sight.

This operation will position the test ball and instrument (measuring head) at the correct height.

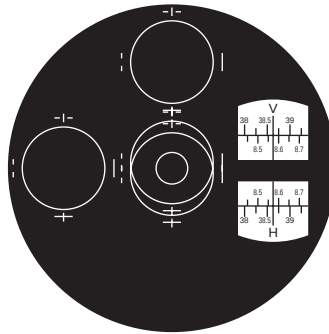


Operate the main body by holding the joystick lightly. The following procedures can be performed with the joystick:

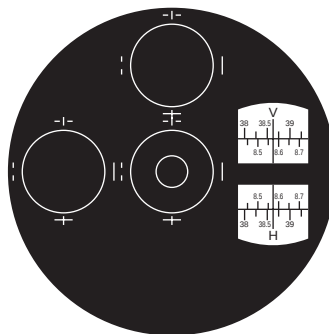
- Elevation control of the instrument (Rotate the joystick.)
- Rough horizontal positioning of the instrument (Slide the main body while holding the joystick.)
- Accurate horizontal positioning of the instrument (Tilt the joystick.)



Next, use the joystick to position the measuring head in front of the test ball while looking into the eyepiece, so that the mire images show up in the field of view. The mire image in the center of the field of view will be seen as a double image as shown below, when the instrument is not positioned at the correct distance to the test ball.

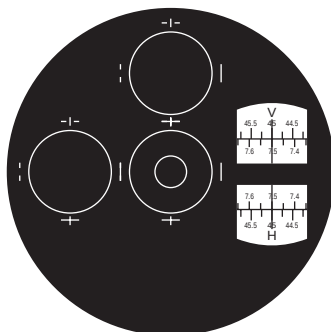


The instrument will be set to the correct distance when the double images in the center of the field of view are unified into a single image by adjusting the joystick. The unified image should be located approximately in the center of the field of view at this time. But, if it is not, use the joystick to center it properly so that it is concentric with the double images in the center of the field of view.



(3) Measurement

Three mire images, as shown above, should be seen in the eyepiece at this time, and the horizontal knob and vertical knob should be turned to unify the "I" mark of the left mire image with the "I" mark of the center mire image, and the "—" mark of the top mire image with the "—" mark of the center image, which will be the result of the measurement, to be read as follows:



Reading of the vertical scale: 7.50mm (45.0 dptr)

Reading of the horizontal scale: 7.50mm (45.0 dptr)

When the readings of the horizontal and vertical scales are identical, it will not be necessary to determine the axis. The test ball is supplied for the purpose of practicing measurements as well as for checking the accuracy of the instrument which should be undertaken from time to time.

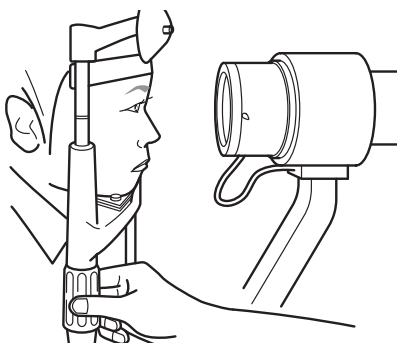
The horizontal knob, vertical knob and axis rotating handle can be manipulated with one hand after a little practice. Operations will be even simpler. In this case, if the auxiliary knob is attached to the horizontal knob, in the case of a right-handed person, and to the vertical knob, in the case of a left-handed person, it will make operations much easier.

MEASUREMENT OF THE RADIUS OF CURVATURE OF THE CORNEA

(1) Positioning the patient

Place a suitable quantity of papers on the chinrest and fix them in place, with the two chinrest paper pins, as in step (4) of "ASSEMBLY PROCEDURE" (see pg. 12).

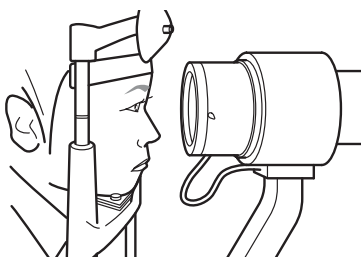
Have the patient sit in a relaxed position in front of the instrument. Next, move the adjustable instrument table up or down (ex. AIT-10B, an optional accessory) to adjust the patient's eye height point outline according to the canthus marker of the chinrest. Adjust the chinrest adjuster accordingly. Instruct the patient to place his/her chin on the chinrest and his/her forehead against the forehead rest.



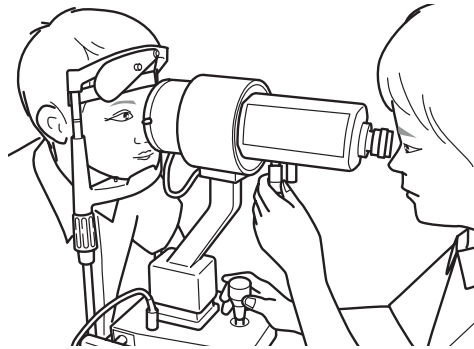
(2) Positioning the instrument in front of the patient

The same operations undertaken for positioning the instrument before the test ball should be undertaken now, not for the test ball but for the patient's eye.

In other words, position the observer's eye so that the leveling pin, black-colored horizontal index and patient's eye are all on the same line of sight, using the joystick if necessary, for this purpose.



Next, cover the other eye with the occluder so the patient can not see with it. Once the height of the instrument and patient's eye have been properly adjusted in the above manner, use the joystick to produce the mire images.



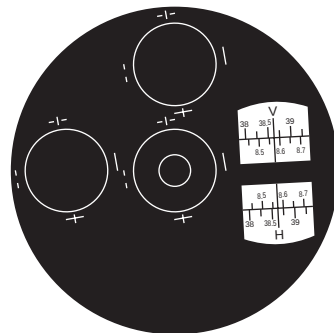
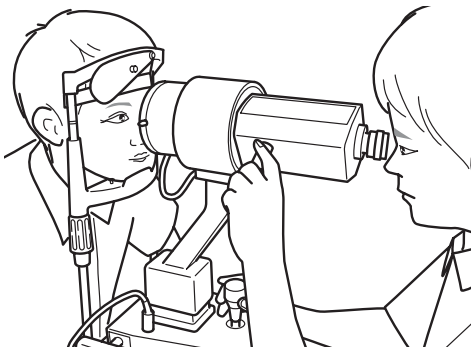
In case the image is dark and hard to see, turn the brightness control switch to the "H" position. However, do not make the image too bright, as it will not only tire the patient but also will shorten the lamp life.

For the purpose of making measurements easier and for obtaining accurate results, the patient should be warned against moving his/her face. The patient should look at the pupil image reflected in the reflection mirror directly in front, without shifting the eye. The instrument will be set to the correct distance when the double images, in the center of field of view, are unified into a single image by turning the joystick.

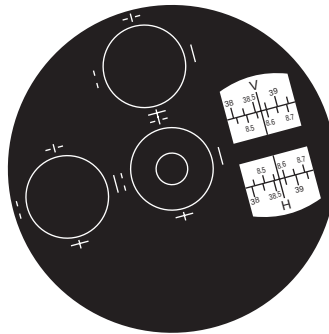
(3) Measurements

(a) When there is corneal astigmatism

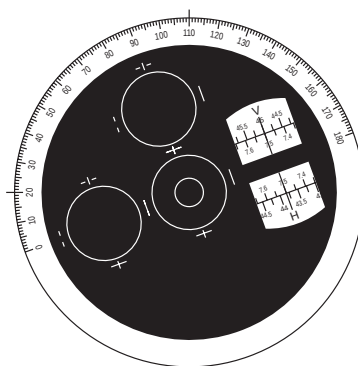
Turn the axis rotating handle, when corneal astigmatism exists. The "+" mark of the top mire image and the "-" mark of the center mire image will be seen in the displaced positions.



Turn the axis rotating handle and rotate the measuring head until the displacement in the marks is eliminated. (This will result in fitting the measuring head to the axis of the corneal astigmatism.)



Unify the "I" mark of the left mire image with the "I" mark of the center mire image and the "+" mark of the top mire image with the "+" mark of the center mire image, at this angle, with the horizontal and vertical knobs, which shows how simple and fast one-position measurement is.



Read the measurement results. In the case of the above figure, the vertical scale indicates the radius of curvature of the cornea, 7.50mm (refractive power of the cornea is 45.0 dptr) and the axis is 110° (read off the vertical index).

The horizontal scale shows that the radius of curvature of the cornea is 7.70mm (corneal refractive power is 43.8 dptr) and the axis is 200° (the axis of the horizontal scale is read off the horizontal index).

(b) When corneal astigmatism does not exist:

If corneal astigmatism does not exist, there will be no displacement in the marks, even when the measuring head is rotated. Therefore, measurement will be the same as when measuring the test ball. (See Step (3) of "PRACTICE MEASUREMENTS WITH THE TEST BALL" on pg. 16.)

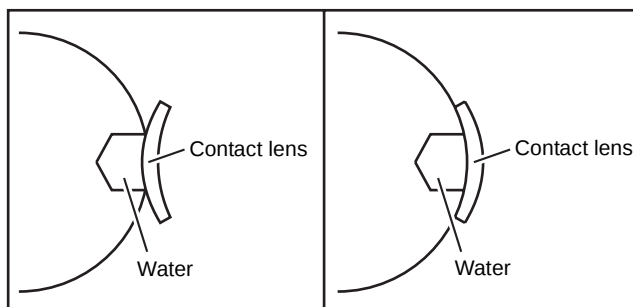
The measurement results are the value along the circumference of the corneal surface of 2.3mm to 4.9mm diameters (at 5.5mm to 12mm radius of curvature of the cornea).

MEASUREMENT OF CONTACT LENSES

(1) Attachment of the column

Set up the column in the opening available on the chinrest as in (1) of "PRACTICE MEASUREMENTS WITH THE TEST BALL".

Next, fill the hole in the contact lens holder with water and softly press the contact lens, that is to be measured, against this section, with the face of the lens to be measured facing the outside.



The above left figure shows the measurement of the radius of curvature of the concave surface, while the above right figure shows that of the convex surface. The contact lens will not fall from the holder, even when it is turned upside down, because water fills the holder's depression to maintain surface tension. The contact lens holder, with the contact lens, should be placed softly on the column, as shown below.



(2) Correct position of the instrument to the contact lens

The operation undertaken here is the same as that explained in (2) of "PRACTICE MEASUREMENTS WITH THE TEST BALL" on pg. 15, and should be followed according to those instructions.

(3) Measurement

Measurement should be made in the same manner explained in (3) of "PRACTICE MEASUREMENTS WITH THE TEST BALL".

However, compensation will be required in the measurement results for the radius of curvature of the concave face. Therefore, refer to "Compensation Table for the Radius of Curvature of the Concave Face" which is supplied with the instrument.

The compensation required, for example, is 0.02mm in the case of a 8.00mm radius of curvature. Therefore, the compensation table should be utilized when the precision required necessitates its use.

BEFORE REQUESTING SERVICE

If something is wrong with the instrument, please check the following points before contacting your authorized distributor for repair.

Illumination lamp does not light up.

- (1) Check whether the power cable and connector cable are properly connected.
- (2) Check fuses.

If some of the wires become dark because of burned out bulb, please see "REPLACING THE ILLUMINATION LAMP" on pg. 32 in the "MAINTENANCE" section of the manual.

FEATURES

INTERNAL READING SCALES

The millimeter scales for the radius of curvature (bottom figures) and the diopter scales for the corneal refractive power (top figures) of both horizontal (H) and vertical (V) axes, are seen in the field of view, together with the mire images, during the measurement.

WIDE RANGE OF MEASUREMENTS

The range of measurements is extremely wide, with the millimeter scale covering 5.5 to 12.0mm and the diopter scale covering 60 to 28 diopters.

HIGHLY PRECISE MEASUREMENTS

Mire images are very sharp and easy to coincide, producing the measurement results with the minimum of individual variations.

SPEEDY, ACCURATE FOCUSING ADJUSTMENTS

Focusing adjustments are quick but very accurate, because they only require coincidence of double images without individual variations.

SPEEDY ONE-POSITION MEASUREMENT

While measuring one of the principal meridians with the TOPCON Ophthalmometer, the other principal meridian is automatically measured at the same time. Therefore, it is not necessary to measure both principal meridians separately, in the case of corneal astigmatism. This makes measurement quicker than the Two-Position method and also more accurate.

SUPERIOR HANDLING EASE

The horizontal and vertical knobs, as well as the axis rotating handle, are located for simple operational ease. They allow for one-hand operation of the auxiliary knob which increases handling ease for both right-handed and left-handed persons. In addition, there is an improved joystick which can adjust not only elevation control of the instrument but also horizontal positioning of the instrument.

EVALUATION OF UNUSUAL CORNEA IN IRREGULAR ASTIGMATISM

Evaluation is possible by simply checking the shape of mire image.

AUTOMATIC INSTRUMENT TABLE

Specifications

AIT-15

- Dimensions510(W)×450(D)mm
- Table height.....600~820mm
- Table size490×500mm
- Weight.....approx. 23kg
- Power consumption270VA (100-120V, 220-240V)

AIT-16

- Dimensions525(W)×490(D)mm
- Table height.....660~880mm
- Table size490×500mm
- Weight.....approx. 23kg
- Source voltage230V AC, 50/60Hz (for Europe)
120V AC, 50/60Hz (for U.S.A. and Canada)
220/240V AC, 50/60Hz (for the other area)
- Power consumption220VA (100-120V, 220-240V)
- Short-time operation2min

SPECIFICATIONS

MEASURING HEAD	
Type	Sutcliffe type
Magnification	20×
Eyepiece adjustment range	0 to ±5 dptr
Measuring range	
Corneal radius of curvature	5.5 to 12mm
Minimum reading	0.01mm
Corneal refractive power	60 to 28 dptr
Minimum reading	0.125 dptr
Axis corneal astigmatism	0 to 180°
Scale reading system	Internal reading radius of curvature and refractive power scales; external reading protractor scale.
Lamp	6V-3W (8 each)
BASE	
Longitudinal base travel	90mm
Lateral base travel	100mm
Fine cross-slide base adjustments	15mm
Vertical travel of measuring head	30mm
Vertical travel of chinrest	80mm
POWER UNIT	
(Except for U.S.A. and Canada) Primary	AC 100/120/220/240V; Adjustable with voltage selector
(For U.S.A. and Canada) Primary	AC 120V
(All areas) Frequency Secondary Power consumption	50/60Hz AC 6V and 7.5V; adjustable with switch 30VA
DIMENSIONS AND WEIGHT	
Unit model	440mm × 350mm 16kg
Table model	550mm × 370mm 16kg

Subject to change in design and/or specifications without advance notice.

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.

Guidance and manufacturer's declaration - electromagnetic emissions		
The OM-4 is intended for use in the electromagnetic environment specified below. The customer or the user of the OM-4 should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The OM-4 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. The OM-4 is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class A	
Harmonic emissions IEC61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC61000-3-3	Complies	

Guidance and manufacturer's declaration - electromagnetic immunity			
The OM-4 is intended for use in the electromagnetic environment specified below. The customer or the user of the OM-4 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 or the OM-4 requires continued operation during power mains interruptions, it is recommended that the OM-4 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 OM-4 is intended for use in the electromagnetic environment specified below. The customer or the user of the OM-4 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 OM-4, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P} \quad 80\text{MHz to } 800\text{MHz}$ $d = 2.3 \sqrt{P} \quad 800\text{MHz to } 2.5\text{GHz}$ 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 OM-4 is used exceeds the applicable RF compliance level above, the OM-4 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the OM-4. b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.			

Recommended separation distance between portable and mobile RF communications equipment and the OM-4			
The OM-4 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the OM-4 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the OM-4 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 meters (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.			

SYSTEM CLASSIFICATION

- Type of protection against electric shocks: Type B applied part
Type B applied part is the applied part complying with the specified requirements of the Standard IEC 60601-1 to provide protection against electric shock, particularly regarding allowable LEAKAGE CURRENT.
- Type of protection against electric shocks: Class I equipment
Class I equipment does not depend on basic insulation only for protection against electric shocks. It can also be earthed; therefore, the metal parts with which one comes into contact do not become conductive if the basic insulation fails.
- The mode of operation: continuous operation equipment
- Degree of protection against ingress of water: IP×0
OM-4 is the ordinary instrument (enclosed instrument without protection against ingress of water)
- Methods of sterilization or disinfection recommended by the manufacture: OM-4 does not have any part to be sterilized or disinfected.
- Not AP or APG equipment

PURPOSE OF USE

This instrument is used to measure the radius of curvature of the cornea. It displays the corneal refractive power according to the above measurement result. It is also used to measure the base curve of contact lens.

OPERATION PRINCIPLE

Projects the measurement index to the cornea and measures the radius of curvature of the cornea according to the corneal reflected image.

SHAPE OF PLUG

Country	Voltage/frequency	Shape of plug
Mexico	110V/50Hz	Type C&E
Argentina	220V/60Hz	Type A
Peru	220V/60Hz	Type A
Venezuela	110V/50Hz	Type C&E
Bolivia & Paraguay	220V/60Hz	Type A (Most common) Type H (Infrequently)
Chile	220V/60Hz	Type A
Colombia	110V/50Hz	Type C
Brazil	220V/60Hz 127V/60Hz	Type A Type C
Ecuador	110V/50Hz	Type C&E
USA	120V/60Hz	Type A (Hospital Grade)
Canada	120V/60Hz	Type A (Hospital Grade)

SYMBOL

Symbol	IEC Publication	Description	Description (French)
	60417-5032	Alternating Current	Courant alternatif
	60348	Attention, consult accompanying documents	Attention, consulter les documents d'accompagnement
	60417-5008	Off (power: disconnection from the mains)	Éteint (courant: coupure avec le secteur)
	60417-5007	On (power: connection of the mains)	Allumé (courant: raccordement sur le secteur)
	60878-02-02	Type B applied part	Partie appliquée du Type B

MAINTENANCE

DAILY CARE

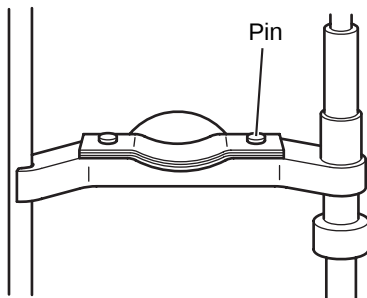
- * Remove dust from the instrument except the lenses and prisms, using a dry soft cloth at regular intervals.
- * This instrument may be adversely affected by dust. Apply the dust cover when not in use.

REPLACING THE FUSE

- * First, turn the power switch OFF, and remove the power cable from the outlet.
- * With a Phillips screwdriver, turn the center of the fuse holder at the back of the power unit. The fuse will come out.
- * Replace it with a new fuse and then tighten the center of the fuse holder.
- * Always use the same type of fuse as indicated in the holder:
F1, F2: T1A 250V (100,120V)
 : T0.5A 250V (220,240V)
F3 : F6A 250V (for Europe, U.S.A. and Canada)

REPLACING THE CHINREST PAPER

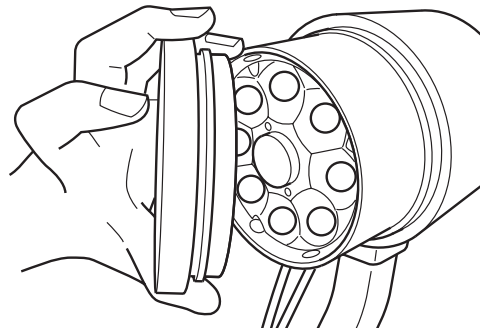
If the chinrest paper supply is depleted, remove the pins from the chinrest, place the new package of paper on the chinrest and replace the two locating pins.



REPLACING THE ILLUMINATION LAMP

This mire plate and lamp will be hot if the lamp burns out while the instrument is in use. Let them cool down and then replace the lamp in the following manner:

- (1) After switching off the instrument, disconnect the power cable.
- (2) Unscrew the leveling pin until loose. Do not remove completely.
- (3) Pull out the mire plate to expose the lamp. Unscrew and remove burned out bulb.
- (4) Insert the new bulb and screw it down until securely attached.
- (5) Replace the mire plate. The mire plate is notched. Fit the notched section with an alignment pin inside the instrument. Push it in fully and then screw in the leveling pin which will secure the mire plate.
- (6) Connect the power cable. Turn on the power switch and check if the illumination lamps light up.



CLEANING

(1) Cleaning the lens and mirror

If any dust settles on the lens or mirror, remove it as follows:

Use the cleaning brush, which is included in the standard accessories, to remove the dust. In case any dust still remains, wipe it off using a soft cotton cloth moistened with a little alcohol.

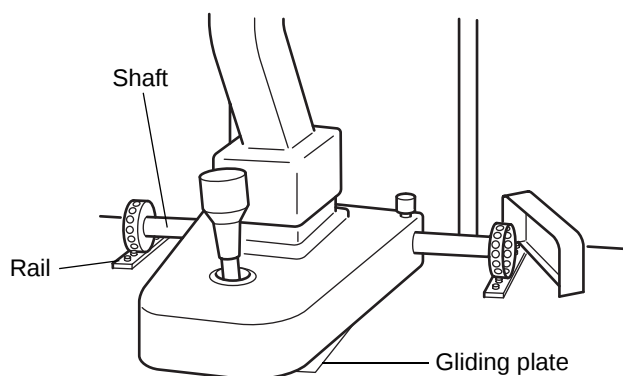
Never use your finger or any hard object to clean the lens or mirror.

(2) Cleaning the gliding plate, base rail and shaft

If the gliding plate or cross-slide rail and shaft are dirty, an unsmooth vertical or horizontal movement of the cross-slide results. Clean them with a dry cloth.

(3) Cleaning the plastic parts

To clean the plastic parts, such as chinrest and forehead rest, use only a cloth moistened with a solution of neutral detergent and water to wipe off the accumulated dust. Avoid using other types of cleansers.

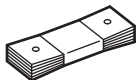


(4) Cleaning applied parts

Wipe the forehead rest and chinrest with a cloth moistened with a tepid solution of neutral detergent for kitchenware

ORDERING SUPPLIES

To order the following replacement parts, be sure to specify the product name, part number and quantity required.

Product name	Part number	Appearance
Lamp	40120 1008	
Chinrest paper	40310 4082	
Fuse F1, F2: T1A 250V (100, 120V) : T0.5A 250V (220, 240V) F3 : F6A 250V (for Europe, U.S.A. and Canada)	44635 6003 44635 6004 44630 6776	

When contacting us, please have the following information at hand re your unit:

- Machine type: OM-4
- Manufacturing No. (Displayed on the rating plate on the left of the base.)
- Period of Usage (i. e. the purchase date).
- Description of Problem (as detailed as possible).

OPHTHALMOMETER OM-4

INSTRUCTION MANUAL

The 2005 version (2005.11-100TH ③)

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OPHTHALMOMETER

OM-4

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