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## PREFACE

Thank you for purchasing our 202/402 Microscope. Please read this manual carefully for the sake of your best use.

## GENERAL REQUIREMENTS FOR SAFETY

Please read carefully about the following precautions to avoid unexpected personal injury as well as the product being damaged and other possible dangers.

# PRECAUTIONS

- 1. Do not use this instrument in the environment that is prone to fire and to blast or where there is much dust and high temperature. Be sure to to keep it clean and dry.
- 2. Check that all the wires are correctly and firmly connected before use. Ensure that the instrument is well grounded.
- 3. Please pay attention to all the rating of the electrical connecting terminal.
- 4. Please only use the fuse according to the specifications and rated stipulated by our product.
- 5. Use the power cable supplied with this instrument.
- 6. Don't touch the surface of the lens and prism with hand or hard objects.
- 7. Turn off the main power first before replacing the main bulb and fuse.
- 8. To prevent the instrument from tilting over to floor, it should be placed on the floor where the inclination angle is less than 10".
- 9. Turn off the power and cover the instrument with dustproof cover when it is not in use.
- 10. In case there is any trouble, refer to the trouble-shooting guide. If it still doesn't work, contact our Service Department.

# 202-402 Beamsplitter



microscope beam split-port and wedge the orientation bolt of the beam split-port into the orientation groove of the CCD adapter [B3]. (There are three grooves on the plane. Select one according to your needs.) Screw down the screw flange [B2] on the top of the adapter.

- (5) 10.5.5 Screw off the lens and screw flange of the CCD [B8] and keep them well. Screw the CCD connector [B6] into the CCD lens and tighten it.
- (6) 10.5.6 Screw down the CCD with the CCD adapter [B3].
- (7) 10.5.7 Connect the power plug to the appointed adapter [B3].
- (8) 10.5.8 Connect one end of the video frequency wire to the CCD signal fan-out. The other end should be connected to the Video In port of the monitor or video camera. Switch on the power after all have been done. Observe the image on the monitor and rotate the focus-adjusting ring [B4] to make the image clear. Pay attention to the orientation of the image. Rotate the CCD out by the inches until the image's orientation is right, if it is declining. Screw down the screw flange [B5] to lock it.
- (9) 10.5.9 Fix the geminate ocular drawtubes to the beam splitter
  [B1] and screw the inner hexagonal tightening bolt [A3] by the 2mm inner hexagram screw drive. (Fig. 6)

**ATTENTION:** After the above assembly, the dynamic balance of the second arm should be adjusted. Deploy the second horizontally, and drag the microscope up and down, and then compare the resistance between upward movement and downward movement. If the resistance of upward movement is greater, rotate the balance adjustment knob [10] counter-clockwise. If the resistance of downward movement is greater, then rotate the balance adjustment knob clockwise. Do this repeatedly until the resistance of both movements are equivalent. The the small arm may stay steady in any position of  $\pm 20^{\circ}$  relative to horizontal line.

**ATTENTION:** Every time before adjusting the balance adjustment knob [10], the second arm should be pushed to the utmost peak in order to decrease the resistance against the rotation adjustment of the balance adjustment knob.

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- [A1] Straight Binocular Head
- [A3] inner hexagonal tightening bolt
- [B2] screw flange [B3] CCD adapter
- [B5] screw flange [B6] CCD connector
- [B9] dust-proof cover

- [A4] objective
- [B1] beam splitter
- [B4] focus adjusting ring
- [B7] dust-proof cover
- [B8] CCD

- [B10] dust-proof cover [A2] Inclined Binocular Head
  - 10.2 Objectives, F175mm/F250mm/F300mm/F350mm/F400mm Unscrew the objective [A4] under the microscope and fix the special objec-
- tive [A4]. The magnification is as 2.5/1.43/1.25/0.83/0.71/0.63 times as before. The size of visual field is as 0.4/0.7/0.8/1.2/1.4/1.6 times as before. (Fig. 5)

10.3 10x ocular

Pull out the 12.5x ocular from the geminate ocular drawtubes and insert the 10x ocular. The magnification is as 0.8 times before. The size of visual field is as times as before.

- 10.4 Beam splitter, CCD adapter
  - (1) 10.5.1 Unscrew the inner hexagonal tightening bolt [A3] by the 2mm inner hexagram screw drive.
  - (2) 10.5.2 Fix the beam splitter [B1] in the microscope.
  - (3) 10.5.3 Select one beam split-port in the left or right side of the beam splitter as the position of the CCD adapter [B3]. Unscrew the dust-proof cover [B10] on the beam split-port and keep it well.
  - (4) 10.5.4 Take out the CCD adapter [B3] and screw off the dust-proof cover [B7] [B9]. Fix the CCD adapter [B3] into the



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### 7 Responsibility

We may provide the circuit diagram, electric component list and other details of the equipment at the request of customers to meet their need for repairing.

If any information, service or consultation is needed, please contact us directly or with our authorized agents.

## 8 Transportation, Storage and Rejection

During the transportation, take care to protect it from wetness, upside down and violent vibration. The relative humidity should be 10% to 90%, environmental temperature -10°C to +40°C and atmospheric pressure 500hPa to 1060hPa.

This equipment should be stored in well-ventilated room without corrosive gas where the relative humidity should be 10% to 90% and environmental temperature  $-10^{\circ}$ C to  $+40^{\circ}$ C. If the assembled equipment needs to be moved or transported a short distance, please lock all the movable parts (refer to 5.4). The inclination angle should be less than 10°. If long distance transportation is required, please repack in original packages.

9 Spare parts and tools of the instrument

1.	Medical halogen bulb with cool reflection (15v 150w)	1
2.	T type AC250 2A; T type AC125 4A fuse tube	4/each
3.	6mm inner hexagonal wrench	1
4.	10mm inner hexagonal wrench	1
5.	P54M bulb socket	2

- 10 Assembly of the optional accessories (additional order)
  - 10.1 Straight Binocular Head

Unscrew the inner hexagonal tightening bolt [A3] by the 2mm inner hexagonal screw drive. Take down the 45° for Inclined Binocular head drawtubes [A2] and fix the erect geminate ocular drawtubes [A1]. Then screw down the inner hexagonal tightening bolt [A3] by the 2mm inner hexagram screw drive. (Fig. 5)

### 1. FEATURES AND SPECIFICATIONS

#### 1.1 Features

The 202/402 Operating Microscope is a portable microscope. Its small and portable machine body makes it highly agile.

The microscope is a single binocular one, with three magnification steps, offering sharp image and large field of vision. A cold light source is used in the illumination system, which is harmless to the tissue of the eye. With quality halogen bulbs, PHILIPS and OSRAM, being used, the illumination is bright and even. An intensifying red-reflex module is added.

A spring balance system is designed for the arm so that the microscope can move upwards and downwards stopping at any desired position. The adjusting functions of the equipment include magnification, focusing and inclination, while focusing can also be controlled by the foot switch.

The environment requirements for using this equipment is temperature +10°C to +40°C, relative humidity 30% to 75%, atmospheric pressure 50hPa to 1060hPa.

1.2 Specifications

(1)	Parameter of micro Focus length of obj Eyepieces	scope ective	f=250mm 12.5 x /16B	
	magnification & vis	ual fields		
Objective focus	Total Magnification	Visual field (mm)	Illumination field (mm)	
	5X	47		
250	8X	32	50	
	13X	21		
(2)	Working distance		240mm	
(3)	Parameter of Binoc	ular tube		
Inclined binocular tubes Diopter adjustment range			45°	
			±6D	
	Pupil distance rang	е	50mm – 70mm	
	Height of eyecups			
(4)				
Maximum intensity			3000Lx or up	
(5)	Parameter of Positi			
Maximum stretching radius of arm Vertical movement range			1250mm	
			700mm – 1100mm	

(from floor to front surface of big objective)

(6)	Parameter of Electric			
	Input voltage	AC220V±10%/50Hz ±1% or		
		AC110V ± 10%/50hZ ± 1%		
	Input power	120VA		
	Fuse	T type AC250V 2A		
		T type AC125V 4A		
		(For example, 51S-013H,		
		51S-025L)		
	Bulb	15V/150W (Medical halogen		
		lamp bulb with cold reflection)		
	Electrical safety	Conform to standard IEC601-1		
		Type 1, Class B		

## TABLE 1 TROUBLE SHOOTING GUIDE

Trouble	Trouble Possible Cause		
	The cable isn't connected correctly with the power socket.	Connect the power cable correctly.	
	The position of the light adjusting knob is wrong after switching on power switches.	Adjust the light- adjusting knob.	
Illumination doesn't light	The bulb plug doesn't connect correctly with its socket.	Take out bulb, scrape oxide. Then reinstall, screw the locking bolt firmly.	
	The bulb has burnt (The mains exceed voltage rating).	Replace new bulb (stabilize the voltage rating).	
	The fuse has blown	Change the fuse.	
The foot switch does not work.	The plug of foot switch is not well con- nected with the socket under the power controlling box. The two connectors on the second arm are not well connected.		
The light enert is too	The bulb socket is not plugged correctly.	Plug it in correctly.	
dark or not even	The fiber optics are not inserted to the end,	Insert it to the end.	

# 6.4 Ordering consumable parts

	Name	Specification	Suggested Type
YZ20P5 Operation	Medical halogen bulb with cool reflection	AC15V/150W	HLX64634 EFR
Microscope	Fuse	T type AC250 2A T type AC125 4A	51S-025L, 51S-013H (HOLLYLAND CO., LTD)

can be cleaned off with mirror-cleaning paper or a drop of liquid solvent (1:1 mixture of Ethyl Alcohol and water), then blow it carefully. Be careful to prevent the solvent from infitrating the edges of the lens.

- (4) The outer surface of the equipment may be cleaned with a wet cloth. The remaining stains can be cleaned off with the mixture of 50% C2H5OH and 50% H2O (distilled). Please do not use a corrosive cleaning agent.
- (5) Eyecups should be cleaned with water. Place them on the eyepieces after drying.
- (6) All sterilization caps should be autoclave sterilized. Suggested conditions are as follows: 120°C, time: 20 minutes; or temperature: 134°C, time: 5 minutes.
- (7) The accessories not in use should be put in a closed box with desiccant.
- 6.3 Trouble-shooting guide

In case there is any trouble, please refer to the table on the next page. If the problem still exists, please contact our Service Department at (800) 489-2282.

## THE NAME AND USE OF COMPONENTS



- 1. Caster Move and support the equipment.
- 2. Foot control switch Used to control the focusing functions of microscope.
- 3. Floor stand Used to support and fix stand pillar.
- 4. Stand pillar
- 5. Fuse Two (1.25A/2.5A) are used to power supply.
- 6. Light-adjusting knob Used for continuous adjustment of illumination intensity.
- 7. Power supply switch Used to switch on or switch off power supply.
- Spare bulb module In case the working bulb burns out during an operation, the spare lamp module may be inserted so as to ensure the operation to be continued smoothly.
- 9. Bulb module
- 10. Balance adjusting knob
- 11. 7-pin plug/socket (manual focus without it)
- 12. Fixing nut This nut lets microscope suspend on the small horizontal arm. Though there is protective melt [24], you must check whether this nut is tightened or not.
- 13. Star fixation knob (with sterilized cap) Fix the revolving angle of the suspended spindle of microscope.
- 14. Star fixation knob (with sterilized cap) Lock the microscope and make it not revolve
- at up and down plane.
- 15. Diopter adjusting ring Adjust ocular diopter by rotating this ring. The range of adjustment is ±6D.
- 16. Eyecups Adjust exit-pupil distance. Its height is 18mm and it may be taken off o rolled down.
- 17. Manipulating handle (with sterilized cap) For rough focusing, move the microscope
- up and down or right or left.
- Magnification knob (with sterilized cap) Three magnification steps are provided. With different objectives the magnification factor of each step differs. Rotate the knob to change the magnification.
- 19. Dustproof cover of big objective It can be disinfected after being screwed off.
- 20. Fixing block circle Fix the manipulating handle so that it will not loosen.
- 21. Button To adjust the angle of the handle, you should press the button and rotate the manipulating handle [17].
- 22. Focusing knob (Electric focus without this knob.) Rotate this knob to adjust the fine focus.
- 23. Star locking handwheel (sterile cover) Loosen this handwheel and the lens can be dragged in plane X,Y, Z.
- 24. Secure pin Avoid the microscope dropping when the fixing nut loosens while unloading it or suspending it.
- 25. Fiber optic Leads the light beam from bulbs to the operating position.
- 26. Star fixation knob (with sterilized cap) Lock the second arm by tightening it firmly so as to prevent the microscope from turning.
- 27. Star fixation knob Lock the first arm by tightening it firmly as to prevent the

operation.



6.1.2 Replacing the fuse

Remove the fuse holder under the power controlling box. Replace it with a new fuse, then fasten the cover.

CAUTION: Only use fuses of the same type, specification and rated value. To be safe, please disconnect power from the mains outlet before removing the lower cover and replace the fuse.

6.2 Cleaning and sterilization

- (1) All equipment has been fully checked before delivery, ensuring its proper performance. However, proper maintenance is necessary. It should not be disassembled by unskilled or unqualified technicians. Otherwise, the equipment may be damaged and the performance may be affected. It is advised by the manufacturer that the equipment takes regular maintenance at three month intervals or according to the specific condition.
- (2) To avoid damage to the equipment, do not place the equipment in a dusty, moist or corrosive environment.
- (3) Do not assemble lenses yourself. If there is dust stains on the lens, blow them with a blowball or brush them with a dust pen. Greasy or water stains  $_9$

- (7) Eyecup [16] adjustment. The eyecup [16] can reduce the observing disturbance coming from the foreign light. The height is limited to 18mm. If a doctor wearing glasses makes the operation, the eyecup will need to be rolled down, that is turn the rubber over the ocular tube.
- (8) Diopter adjustment. The adjustment range of the diopter adjusting ring [15] of the ocular is ±6D, with 1D for each division. Rotate the diopter adjusting ring, match the value on the scale of the diopter adjusting ring with the diopter of the surgeon. If the surgeon wears glasses, align "0" position on the diopter adjusting ring to the white line mark on the ocular tube because glasses have corrected the surgeon's vision.
- (9) Pupil distance adjustment. While adjusting the pupillary distance, you can observe while rotating, until both eyes see properly, visual fields coincide and stereoscopic effect obtained. If the pupillary distance of the surgeon is known, adjust directly to this value indicated on the surface of the PD adjusting rod.

\* The above steps should be done before surgeon's personal sterilization.

Move the microscope upwards. Put the sterilization caps at the following places: Star fixation knob [13], [14], [23], [26], [33] • Manipulating handle [17] Magnification knob [18] • Focusing knob [22]
 \*Disposable sterile cover may be used to cover the microscope at the surgeon's choice. After that, move the microscope to position the light spot on the center of the

surgical site.

### 5.3 Movement and storage after use

- (1) Put off all of the sterilized cap an knob and sterilize them for the next use.
- (2) Draw the microscope back to the nearest position to the stand. Fasten every star knob firmly so as to fix the arm and the microscope.
- (3) Disconnect power wire and foot switch plug, store in a suitable place.
- (4) Loosen the brake of the caster [1] before moving.
- (5) Grasp the power control box firmly with two hands in order to move the equipment slowly and carefully, meanwhile avoid bumping and leaning.
- (6) Replace burnt bulb if any for the next use. Refer to method 6.1.1.1.

# 6 MAINTENANCE

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6.1 Replacing the consumable parts.

CAUTION: Replaced parts are treated as ordinary industrial rubbish.

- 6.1.1 Replacing the bulbs
- (1) The lamp house is equipped with a spare bulb module [8]. In case the bulb burns out during operation, you only need to turn off power and pull out the bulb module [9] (Fig. 7) then insert the spare bulb module [8] to the same direction as being pulled out. After that, switch power on and continue

microscope from turning.

- 28. 5-pin plug/socket (manual focus without it) Connect the foot switch.
- 29. Star fixation knob Tighten it in order to lock the light source box to make it not revolve when moving or storing.
- 30. Inner hexagonal tightening bolt Lock the stand pillar and the light source box.
- 31. 110/220V selecting switch
- 32. Power plug Input power supply
- 33. Star fixation knob (with sterilized cap) Tighten it in order to lock the little arm and make the microscope not move vertically.

# ASSEMBLY

This equipment may be installed either by the user with reference to the manual or by the servicemen sent by the manufacturer or authorized representatives when facing real difficulties.

This equipment is packed in two packages. Please open the packages in the direction indicated by the mark on the packages. Take out all the parts and assemble them according to the following procedures:



3.1 Assembly of stand pillar

- (1) Please take out the floor stand [3] from the package, lay it on the ground.
- (2) Take out the stand pillar [4], turn out the inner hexagonal bolt and gasket of its end, insert it into the hole of the floor stand [3], and then turn the stand pillar [4] to make the column groove lock into pin on the base, re-assemble in order with 10mm hexagonal wrench (Fig. 2).

### 3.2 Assembly of light source box

Take out the light source box while not loosening the tightening bolt of the star knob [33] in order to avoid the second arm rebounding and harm people, set the bottom of the light source box into the stand pillar [4] and insert the inner hexagonal tightening bolt [30] into the groove of the end of stand pillar [4] and fasten it firmly with 6mm hexagonal wrench (Fig. 2).

#### 3.3 Assembly of microscope

- (1) First check the tightening bolt of star knob [13], make sure that the end of the bolt does not protrude out of the hole surface.
- (2) Remove the fixing nut [12]. Pull out the secure pin [24] with one hand, hold the connecting part of microscope with another hand. Insert the shaft into the hole of the arm from the bottom to top. Then release the secure pin [24], it will spring back to the groove on the shaft. Finally, fasten the fixing nut [12] (Fig. 2).
- 3.4 Assembly of manipulating handle

Insert the manipulating handle [17] into the holes on the two sides of the microscope holder respectively. The proper handle position should be down to an angle of 40° (as shown in Fig. 1).

3.5 Assembly of fiber optics

- (1) Remove the fiber optics protective cover.
- (2) Insert one end of the fiber optics [25] into the side of the light source box and insert another end into the hole behind the microscope (Fig. 2).

## 4. PREPARATION FOR USE

(1) Check whether the main voltage, frequency complies with what is required by

the equipment. If not, do not start it.

CAUTION: Set the input voltage at 110V. When it is 220V, please switch the selecting switch [31] to the 220 block and change the fuse [5] as type AC1.25 or 2.5A fuse tube we supplied.

- (2) Check the grounding of power supply. Make sure the equipment has a good ground-wire connection.
- (3) The equipment comes with a three-core power cable. Please select matched power socket.

according with IEC227 standard to ensure that the equipment is well grounded.

- (4) When the power switch [7] on the power controlling box is pressed "ON" position, power is on. When pressed at "OFF" position, power is off. The switch should always be "OFF" before the power wire is connected with power socket.
- (5) Insert the plug of the power wire of the equipment into the mains' outlet (It must be well grounded).
- (6) Switch on the power. Check whether the illumination system works properly.
- (7) After checking, please turn off power switch on power controlling box and disconnect the power plug and cover the equipment with dust cover.

## 5. USE OF INSTRUMENT

- 5.1 Installation and adjustment before the use
- (1) Sterilize the manipulating handles and sterilizable caps in advance.
- (2) Move the second arm to a horizontal position. Adjust the height, ensure that the objective is about 250mm from the surgical site.
- (3) Switch on power supply, check the bulbs. If any bulb burns out, replace it immediately.
- CAUTION: Burnt bulbs must be replaced before and operation to ensure that the operation may be performed without interruption. BULBS MAY BE HOT!

### 5.2 Adjustment during use

- (1) First move the equipment to a proper position and apply the brake to prevent the equipment from moving easily. Connect the power plug with power socket [32] on the microscope.
- (2) Place the foot switch [2] to a suitable position. Connect the 5-pin plug of the foot switch with the socket under the power controlling box.
- (3) Insert the plug of power cable under the power controlling box into the mains outlet. Then switch on the power switch [7].
- (4) Move the fine focusing drag to the starting position, where the fine focusing indicator points to the central point of the drive, by using the foot switch [2] or the focusing knob.
- (5) Illumination intensity adjustment. Rotate the light adjusting knob [6] on the power controlling box clockwise to increase intensity, counterclockwise to reduce the intensity. Adjust it until intensity is satisfactory.
- (6) Rough focusing. Loosen the star fixation knob [33], hold the handle [17] to move the microscope upwards or downwards to position the light spot on the surgical site and adjust the focus until the image is clear with 8x magnification. Manipulating method refers to 5.1(2). Rotate the focusing knob while manual focusing.