KERN OCO-2

Operating Manual

Inverted System Microscopes

Content

1. Introduction

Dear friend, thank you for using the inverted biological microscope made by our company. It is our great honor to have you as our subscriber. In order to give you timely knowledge of how to use the product, we have especially written this manual. Efforts have been made to ensure thoroughness in contents, and brevity in style. It is our hope that you can get the basics about the product such as its configurations, the ways to operate it, fault clearance, and maintenance. A thorough and careful reading of the manual is strongly advised for your better use of the product.

The biological microscopes use the UCIS infinity-corrected optical system which has been developed by our company independently. This system, equipped with the infinity long-working distance flat-field achromatic objectives, ultra long-working distance condenser and phase contrast device also developed independently by our company, can be used for 22 ultra long-distance and ultra wide-view observation. Inverted in structure, hence serving best the observations of the living body in the culture dish, it is a high precision instrument essential to cell cultivation，tissue cultivation, and gene studies. It is also extensively used in water quality appraisal，food inspection，and chemical reactive precipitation and crystal structure analysis. The microscopes are used in many practical areas as well, such as bio-medical science, preventive medication, environmental engineering, food processing, pharmaceutical chemical engineering, agriculture, forestry, education, research, etc.

This inverted microscope has a huge upgrading potential. To meet the demand of pilot science and technology, the microscope is composed of modularized accessories, making upgrading and reconfiguration easily possible. It can take on various parts for different purposes, such as the fluorescence observation system, the phase contrast observation system, the polarization observation system, etc. and it has interfaces for special devises required by modern high-tech fields, such as diaphragm clamp, thermostat shield, thermostat specimen stage. To ensure yourself timely post-sales service (online consultation, telephone consultation, house calls for repairs), please make timely registration of your working unit and the product. (Please refer to the post-service receipt for detailed information.)

2. Safety Symbols

The microscope has the following symbols. Make sure you have good understanding of their meanings. Please use the microscope in safe ways as suggested.

Symbol meaning	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual, improper use could result in personal injury to the user and/or damage to the equipment.

3. Meaning of the text symbols.

Caution： Negligence of the warnings in the manual may cause Physical harm or mechanic damage (the objects nearby may also be affected).

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A reminding notice (for easy operation and maintenance)

4. Precautions When Unpacking the Microscope

4-1 Releasing the Transport Lock of the Revolving Nosepiece

Never attempt to rotate the coarse or fine adjustment knob without removing the clamping rod. Otherwise, the focusing mechanism may be damaged.

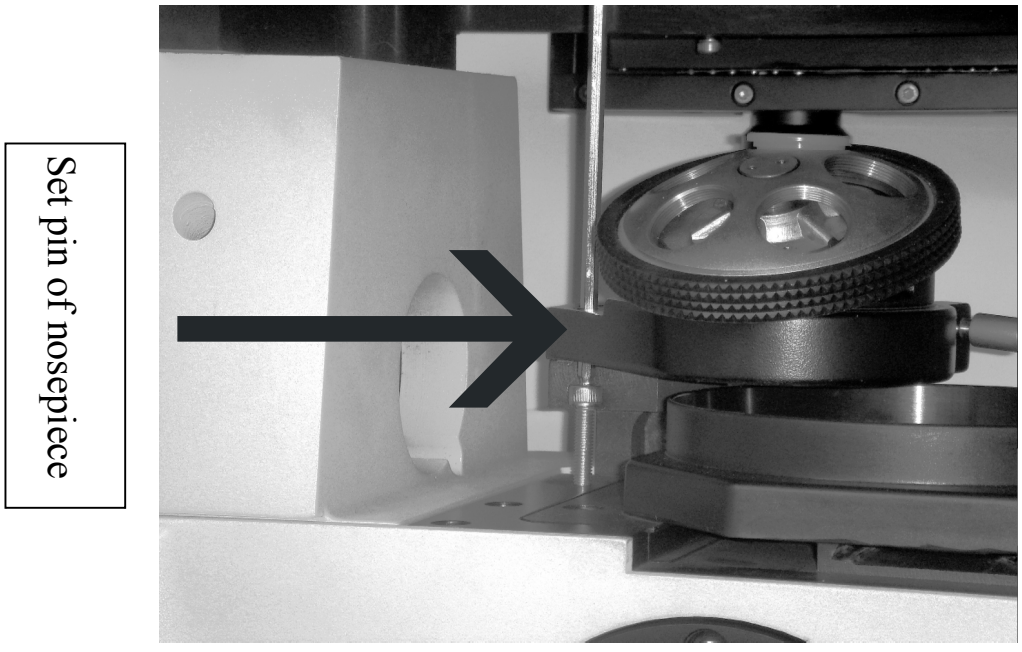
(1) Loosen he screw of the clamping rod using the Allen screwdriver provided with the microscope frame.

(2) Rotate the coarse and fine adjustment knobs in the direction of the arrow and remove the clamping rod.

Retain the clamping rod and screw carefully because they will be used again the next time the microscope is transported.

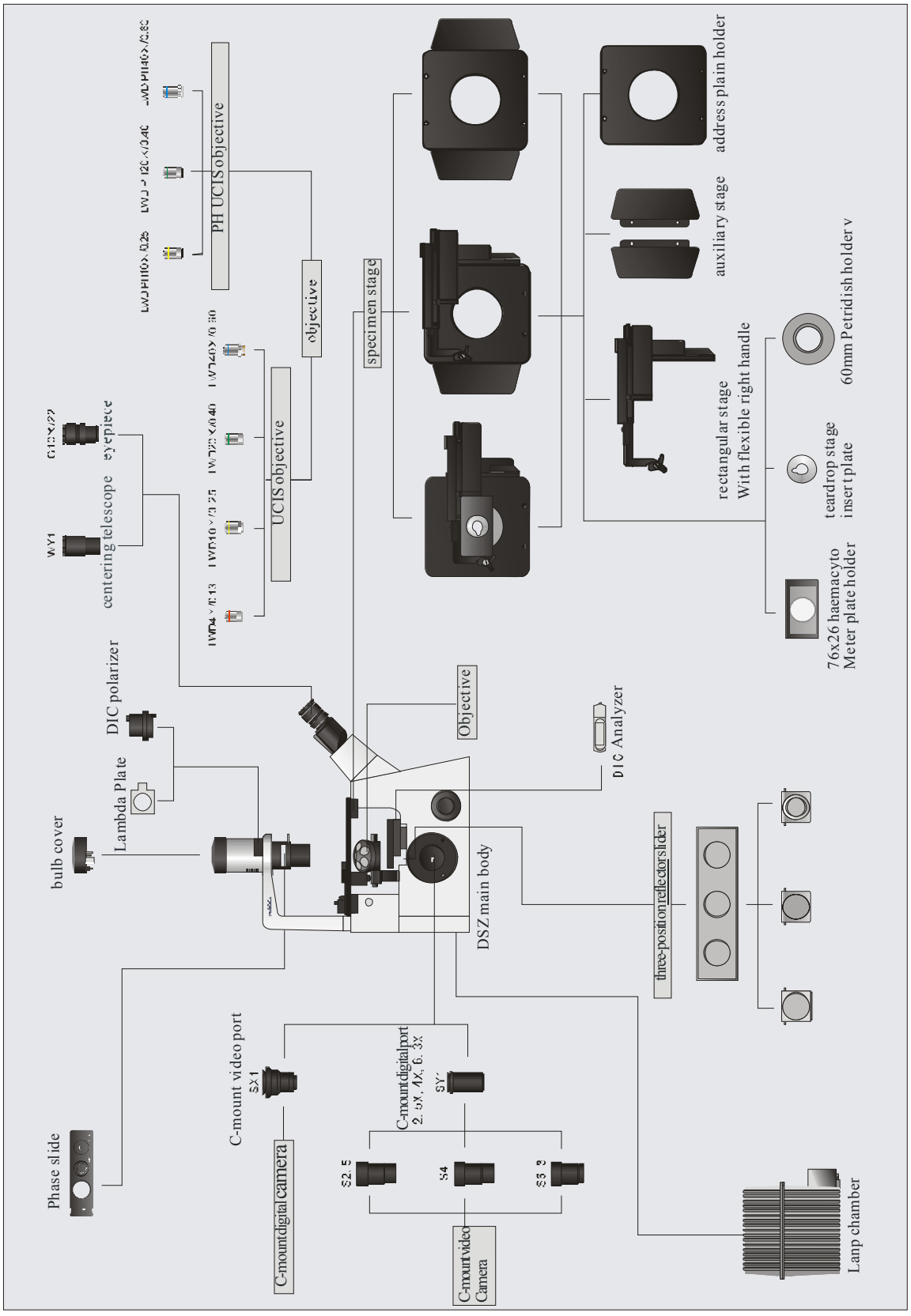
4-2 Stage

Before transporting the stage, fix the flexible knobs with pieces of adhesive tape so that they will not move.



5. Module Nomenclature See diagram 1

(Diagram



6. Preparation for use

6-1

Please refer to diagram 1 on page 3 about the names of the following items.

6-1 Attaching the Eyepieces

6-1-1 Remove the eyepieces' dust caps.

6-1-2 Insert G10X eyepiece into the eyepiece sleeve.

⚠6-2 Attaching the Objectives

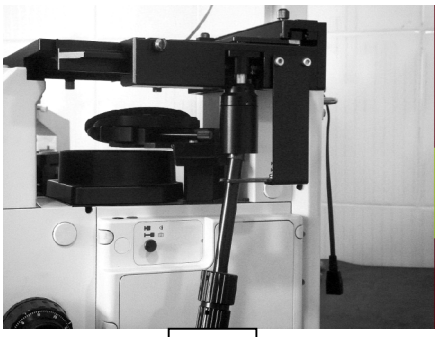
6-2

6-2-1 Remove the stage center plate and attach the objectives to the revolving nosepiece through the hole on the stage left by the plate.

6-2-2 Attaching the objectives in such a manner that the magnification increase from low to higher powers in the clockwise direction.

6-2-3 In the inverted microscope, the front lens of the objectives faces upward, and is more exposed to contamination than the objectives of upright microscopes. Therefore, if there are empty positions

6-3 Attaching the fixator of the universal handwheel

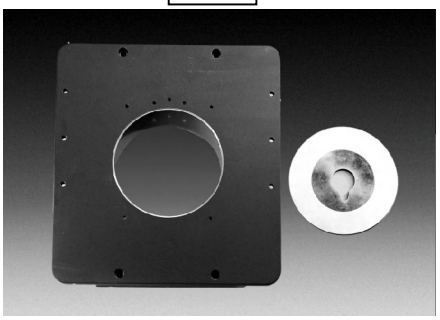


6-3

6-3-1 This is an optional part which can be attached according to your demand.

6-3-2 Joint the fixator to the stage with hexagonal screws on , and to the connecting-rod of the

⚠6-4 Attaching the Stage



6-4

6-4-1 Gently place the stage on the microscope frame by aligning the stage mounting holes with the threaded holes on the frame.

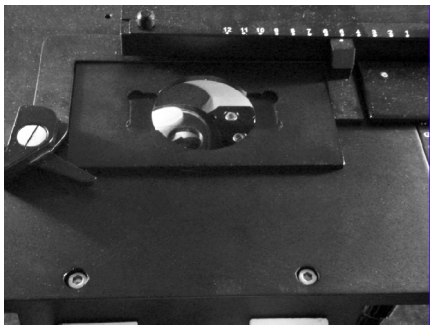
6-4-2 Insert the provided Allen screws into the mounting holes. Tighten the screws using the provided Allen wrench.

6-4-3 The stage is designed very thin so that the objective will not hit it when the revolving nosepiece is rotated. Do not subject the stage centeplage to impact or excessive force, as this may deform it.

6-5 Attaching the Holder for 76mm * 76mm slice

6-5-1 This part is used for the observation of the76mm * 76mm slice.

6-5-2 Open the spring clip of the rectangular stage with flexible right handle, slide the holder into its right position (Be sure that the rectangular groove facing up), loose the clip gently, and finally put the Slice in place.



6-5

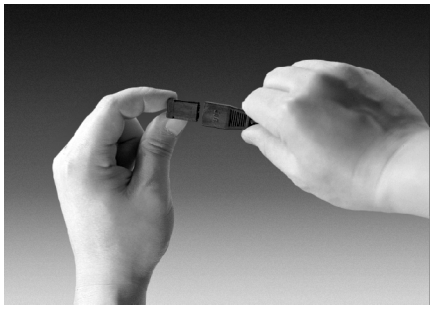
6-6 Connecting the Cables

6-6-1Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force.

6-6-2 Make sure that the main switch of the power supply is set to "O"(OFF) before connecting cables.

(1) Connect the plug of the lamp housing or illumination column to connector firmly.

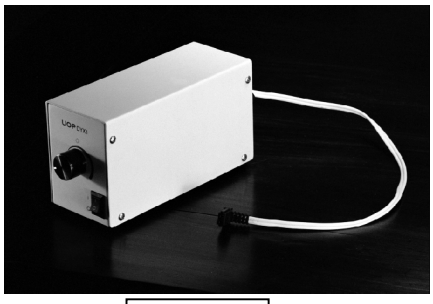
(2) Connect the manual controller.



6-6-1

6-6-3 Be sure to supply power from a grounded, 3-conductor power outlet using the proper cord is provided. If the power outlet is not grounded properly, we can no longer warrant the electrical safety performance of the equipment.

6-6-4 If the power cord or a connection cable comes in contact with the lamp housing or surrounding equipment, the cord or cable may melt and result in shock hazard. To prevent this, distribute the cords and cables apart from the lamp housing.



6-6-2

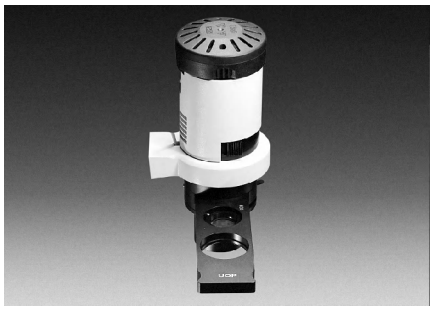
6-7 Attaching the Phase Contrast Optical Slider

6-7-1 This is an optional part for the observation of phase contrast.

6-7-2 The phase contrast slide can be removed when no relevant observation is conducted.

6-7-3 Attach the phase contrast slider to the illumination column so that the slider's indication surface faces upwards and the finger hook position comes on the right.

6-7-4 The phase contrast slide should be matched with the objectives during the observation.



6-7

6-8 Attaching the Filters

6-8-1 Select the proper filter according to your need.

6-8-2 While holding the mounting lever of the filter holder, insert a filter.

(1) Hold the filter by its edge to avoid leaving fingerprints or smudges on the filter surfaces.

(2) After the illumination has been ignited, the filter will be very hot. Be sure to set the main switch to "O"(OFF) and allow the filter holder and filters to cool down before replacing filters.

6-8-3 Engage each filter in the light path by moving the filter holder in the direction of the arrow.

6-8

6-9 Attaching the Photomicrographic System

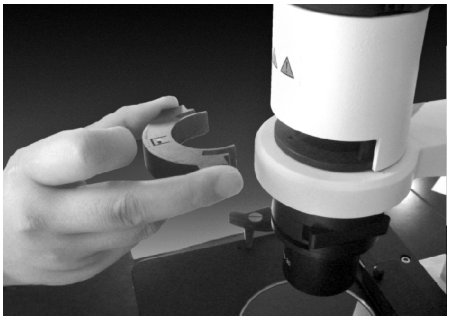
6-9-1 This is an optional part for the photomicrograph.

6-9-2 Using the Allen screwdriver, loosen the clamping screw and remove the cap.

6-9-3 Align the index of the straight photo tube with the positioning index on the side port and fit the straight photo tube.

6-9-4 Tighten the clamping screw firmly.

6-9-5 When the side port is not used, attach the cap for protecting it from dust.



6-9

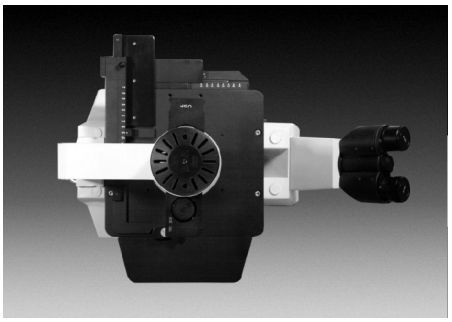
6-10 Attaching the TV Observation System

6-10-1 This is an optional part for TV observation.

6-10-2 Attaching the photographic eyepiece and adaptor on the side port.

6-10-3 Connect the CCD camera with screw thread to get images that art brighter and higher in resolution.

6-10-4 For the TV adaptor systems, refer to the instruction manual for the TV adaptor to be used.



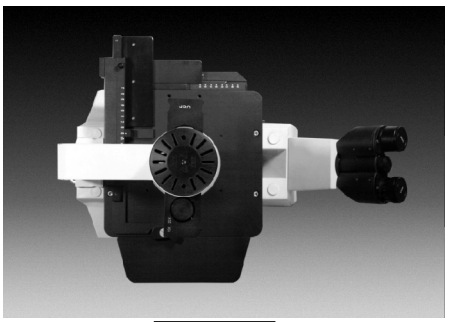
6-10

7. Preparations for the use of special devices

7-1 Attaching the fluorescence device of inverted microscope. (Please refer to the specifications for installation of Fluorescence device.)

7-2 Attaching the polarization device of inverted microscope. (Please refer to the specifications for installation of polarization device.)

7-3 Attaching the patch clamp, thermostatic cover and the thermostatic stage.



7-3

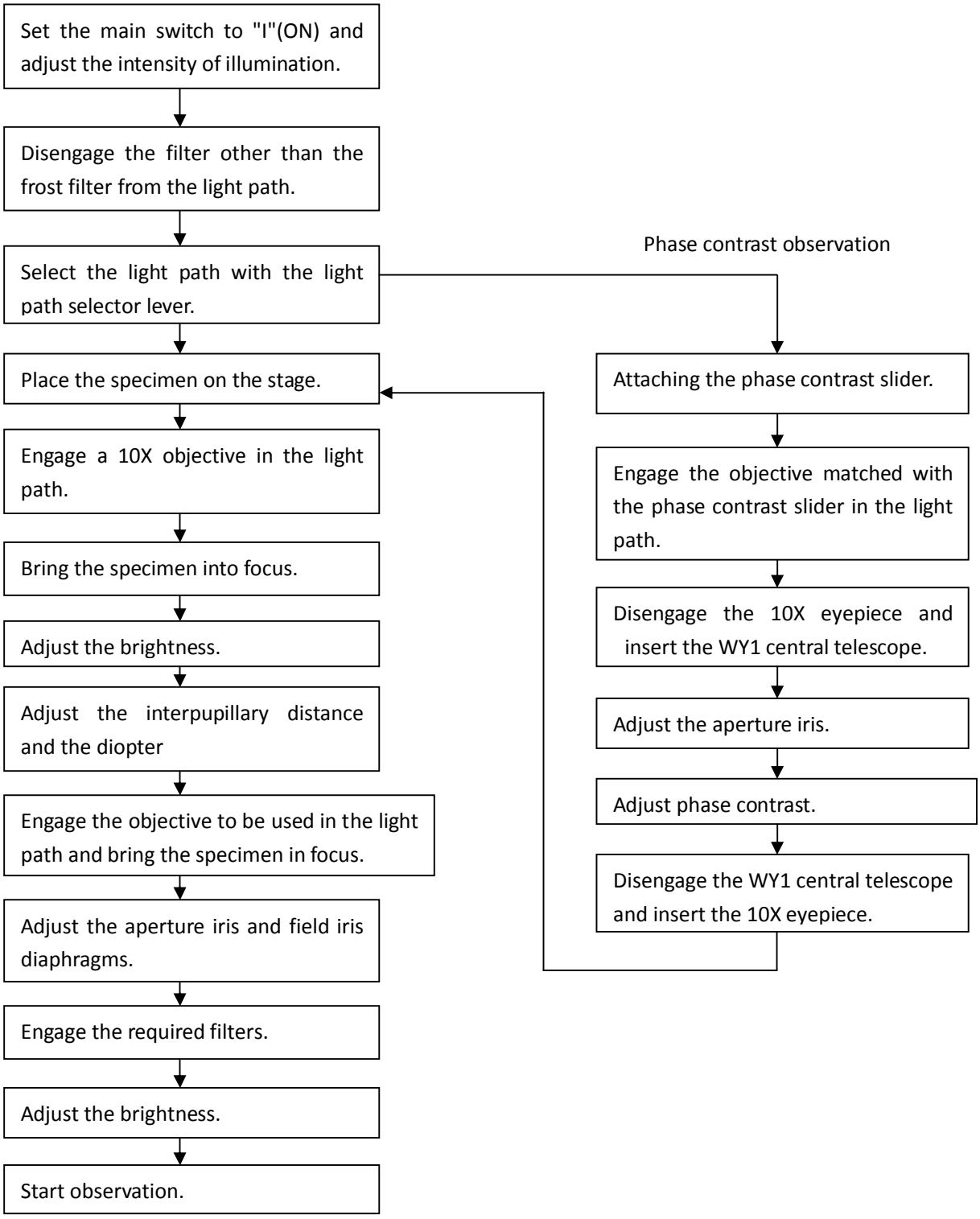
7-3-1 Remove the cover of the 4 positions, and link the patch clamp, thermostatic cover, and the thermostatic stage to the microscope with the special screws provided by our company.

7-3-2 For detailed information, please refer to the specifications about patch clamp, thermostatic cover, and the thermostatic stage.

8. Operations

8-1 The procedure of transmitted light bright field observation and phase contrast observation, please refer to diagram 2 in page 08. For more detail information, please refer to 8-2 and 8-3.

Transmitted light brightfield observation



⚠ 8-2 The details of transmitted light brightfield observation procedure

8-2-1 Set the main switch to "I"(ON) and adjust the intensity of illumination.

A. Make sure that the light intensity control knob is in the MIN(minimum intensity)position and set the main switch to "I"(ON).

B. Rotate the knob toward MAX(maximum intensity)to increase the intensity and the illumination brightness.

C. When the microscope system is not be used for a long period,set the main switch to "O"(OFF).

8-2-1

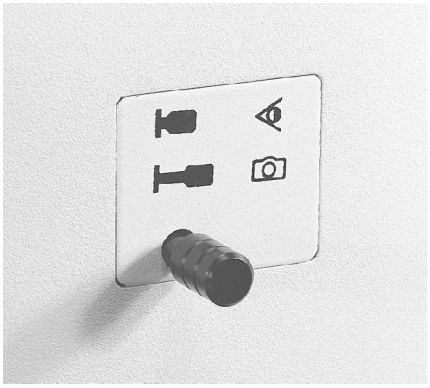
8-2-2 Disengage the filter other than the frost filter From the light path. (Please refer to 6-8.)

8-2-3 Select the light path with the light path selector lever. The light path selector lever allows for light path switching between the observation and side port paths.

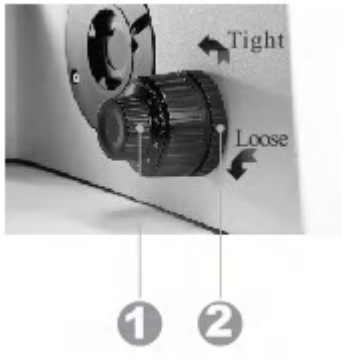
8-2-4 Place the specimen on the stage.

8-2-5 Engage a 10Xobjective in the light path.

8-2-6 Bring the specimen into focus.



8-2-3



(1) Rotation Direction of the Coarse/Fine Adjustment Knobs

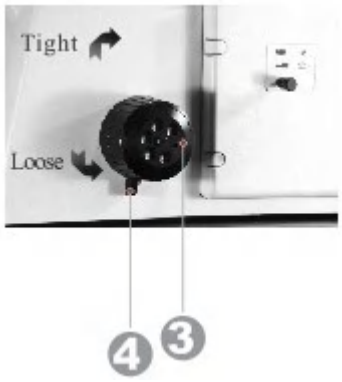
Rotating the coarse or fine adjustment knob toward the front(in the direction of the arrow) raises the objective and toward the rear(opposite direction)lowers the objective.

(2) Adjusting the Coarse Adjustment Knob Tension

Always use the rotation tension adjustment ring to control the rotation tension of the coarse adjustment knob.

The tension of coarse adjustment knob has been pre-adjusted to optimum tension, but this can be changed as required. Turn the rotation tension adjustment ring in the direction of the arrow to increase the knob's tension and in the opposite direction to decrease it.

If the objective lowers by its own weight or the focusing obtained with the fine adjustment knob is lost soon, the tension is set too low. In this case, turn the rotation tension adjustment ring in the opposite direction to the arrow to increase the tension.



(3) Detaching the Fine Adjustment Knob

The fine adjustment knob is designed detachable in order to prevent interference between the knob and the operator's hand manipulating the X- and Y- axis knobs.

Loosen the clamping screw using the Allen screwdriver and remove the fine adjustment knob.

After detaching, the seat of the fine adjustment knob is hollowed to facilitate manipulation with the thick of a finger.

(4) Pre-focusing Lever

The pre-focusing lever prevents collision between the specimen and objective and simplifies the focusing operation.

After bring the specimen into approximate focus with the coarse adjustment knob, turn the pre-focusing lever in the direction of the arrow to lock it. Hereafter, the upper limit of the coarse adjustment will be limited at the position where the lever is locked.

When bringing a specimen in focus, approximate focus can be obtained by simply raising the coarse adjustment to the stop position so all you have to do more is control the fine adjustment knob. The stage up/down movement using the fine adjustment knob is not limited.

When the pre-focusing lever is locked, the coarse adjustment stroke is limited by the mechanism and it cannot reach the previous lower limit. If you want to control the coarse adjustment knob to the previous lower limit, unlock the pre-focusing lever.

⚠8-2-7 Adjust the brightness. (Please refer to 8-2-1)

8-2-8 Adjust the interpupillary distance.

While looking through the eyepieces, adjust the binocular vision until the left and right fields of view coincide completely. The index dot indicates the interpupillary
Distance.

Note your interpupillary distance so that it can be quickly duplicated.

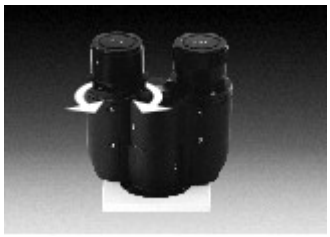
8-2-8

8-2-9 Adjust the Diopter

The diopter adjustment accuracy can be improved by using an objective with as high power as possible.

(1)While looking through the left eyepiece, rotate the diopter adjustment ring on the left eyepiece to bring the specimen into focus.

(2)Looking through the right eyepiece, adjust the coarse/fine adjustment knobs to bring the specimen to bring the specimen into focus.



8-2-9

8-2-10 Engage the objective to be used in the light path and bring the specimen in focus.

⚠8-2-11 Adjust the aperture iris.

8-2-12 Insert the filters(Please refer to 6.8)

8-2-13 Adjust the brightness

8-2-14 Start observation

8-3 Observation of phase contrast

8-3-1 Set the main switch to "I"(ON)(Please refer to 8.2.1)

8-3-2 Disengage the filter other than frost filter from the light path.

8-3-3 Select the light path with the light path selector lever.

8-3-4 Attach the phase contrast slider.

8-3-5 Engage the objective matched with the phase contrast slider in the light path.

8-3-6 Disengage the 10X eyepiece and insert the WY1 central telescope.

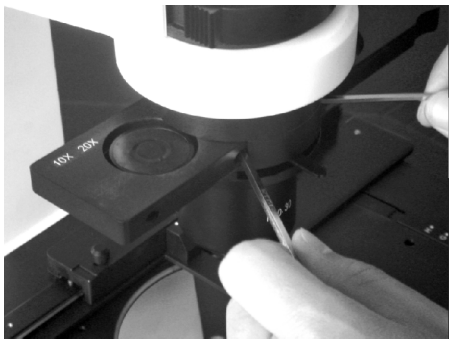
8-3-7 Adjust the aperture iris.

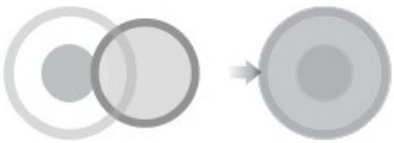
8-3-8 Adjust the phase contrast.

Using the optical element centering knobs, turn the two centering screws of the phase contrast slider so that the ring slit image overlaps with the phase plate of the objective.

phase slide

8-3-9 Disengage the WY1 central telescope and insert the 10X eyepiece.





8-3-8

8-3-10 Place the specimen on the stage.

8-3-11 Bring the specimen into focus.

8-3-12 Adjust the brightness.

8-3-13 Adjust the interpupillary distance and diopter.

8-3-14 Engage the objective to be used in the light path and bring the specimen in focus.

8-3-15 Adjust the aperture iris and field iris diaphragms.

8-3-16 Engage the required filters.

8-3-17 Adjust the brightness.

8-3-18 Start observation.

9. Troubleshooting Guide

Under certain conditions, performance of the microscope may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed.

If you cannot solve the problem after checking the entire list, please contact your local representative for assistance.

Problem	Cause	Remedy
1.Optical System		
a) The bulb does not light.	Power cord of the power supply unit is unplugged.	Plug in the power cord.
	Main switch of the power supply unit is not ON.	Switch the main power switch to “I”(on).
	The bulb is burnt out.	Replace the bulb
b) The bulb lights but the field of view is dark.	The voltage is too low	Increase light intensity.
	Revolving nosepiece is not in a click position.	Make sure that the revolvong nosepiece clicks properly into place.
	Light path selector knob is set for the side port light path.	Set the knob to the binocular eyepiece light path position.
	Too many filters are used.	Reduce the filters to the minimum required.
	The stage central plate is engaged in the optical path.	Move the stage and place the specimen again.
c) Field of view is obscured or not evenly illuminated.	Light path selector knob is set to an intermediate position.	Set the light path selector button to a click position according to the purpose.
	Revolving nosepiece is in an intermediate position.	Engage the revolving nosepiece at a click stop.
	A filter is stooped in an intermediate position.	Set the filter at the appropriate position.
	The frost filter is not engaged.	Engage the frosted glass.
d) The image glares.	Aperture iris diaphragm is stopped down too far.	Adjust the aperture iris diaphragm.
f) Visibility of the image is poor: Image is not sharp. Contrast is poor. Details are poorly visible.	The front lens of the objective is dirty.	Clean the objective.
	Inappropriate slide or cover glass thickness.	Change the slide for one with suitable thickness.
	The optical parts are covered with dust.	Clean them all.
	Ring slit and phase plate are not centered.	Center then correctly.

Problem	Cause	Remedy
f) Visibility of the image is poor: Image is not sharp. Contrast is poor. Details are poorly visible.	Poor contrast during observation.	Replace the plastic culture vessel with a glass vessel.
g) The image is blurred.	Objective is engaged incorrectly in the light path.	Make sure that revolving nosepiece clicks into place correctly.
	Specimen is tilted with respect to the stage.	Place the specimen correctly on the stage and secure it with the specimen holder.
h) Field of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.
	Incorrect diopter adjustment.	Adjust the diopter.
i)The coarse/fine adjustment knobs will not rotate easily or at all.	The transport lock is not released	Remove the transport lock.
	The rotation tension adjusting ring is too tight.	Loosen it moderately.
	The pre-focusing lever is locked.	Unlock it.
j) The revolving nosepiece lowers by its own weight or defocusing occurs due to slipping of fine adjustment.	The tension adjustment ring is too loose.	Tighten the ring optimally.
The coarse focus adjustment cannot move the objective above a certain level.	The pre-focusing lever limits the lower limit.	Unlock the pre-focusing lever.

Notice:

⚠1 Attaching the Halogen Bulb

(1) Do not touch the halogen bulb directly. If it is stained with fingerprints,etc.,wipe off completely with a soft cloth in order to prevent shortening of the bulb life of cracking of the bulb.

Hold the halogen bulb with gloves or a piece of gauze, insert the bulb pins straight and fully into the pin holes on the lamp socket.

Push in gently. If an excessive force is applied or the bulb is twisted, the bulb may be damaged.

(2) Caution for bulb replacement during or right after use.

The bulb, lamp socket and areas near these will be extremely hot during and right after use.

Set the main switch to "O"(OFF), disconnect the

(1)

(2)

power cord from the wall outlet, then allow the old bulb and lamp socket to cool before replacing the bulb with a new of the designated type.

2 Attaching the Lamp Socket

Insert the plug into the socket, then push the guide pins gently into the guide holes.

10. Maintenance of the microscope

⚠1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether(75%) and alcohol(25%)

To clean the extremity of an immersion objective, use neutral detergent. Do not use the ether/alcohol mixture for cleaning , for these will deform the electrically insulated section of the extremity.

Since solvents such as ether and alcohol are highly flammable, they must be handled carefully.Be sure to keep these chemical away from open flames or potential sources of electrical sparks - for example, electrical equipment that is being switched on or off. Also remember to always use these chemical only in a well-ventilated room.

2. Be sure to clean the oil immersion objective after use. Leaving immersion oil on it will degrades its performance.

3. Do not attempt to disassemble any part of the microscope.

4. When not using the microscope, make sure to set the main switch to "O"(OFF), confirm that the lamp housing is cool enough and cover the microscope with the provided dust cover.