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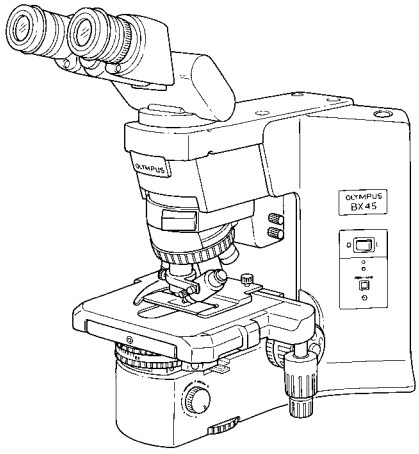


INSTRUCTIONS

BX45

ERGONOMIC MICROSCOPE

This instruction manual is for the Olympus Ergonomic Microscope Model BX45. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

This publication is printed on 100% recycled paper

AX7483

CONTENTS

Correct assembly and adjustments are critical for the microscope to exhibit its full performance. If you are going to assemble the microscope yourself, please read section 8, "ASSEMBLY" (pages 28 to 30) carefully.

IMPORTANT

This microscope employs a UIS2/UIS (Universal Infinity System) optical design, and should be used only with UIS2/UIS eyepieces, objectives and condensers for the BX2 series. (Some of the modules designed for the BX series and objectives/eyepieces for the UIS series are also usable. For details, please consult Olympus or the catalogues.) Less than optimum performance may result if inappropriate accessories are used.

⚠ SAFETY PRECAUTIONS

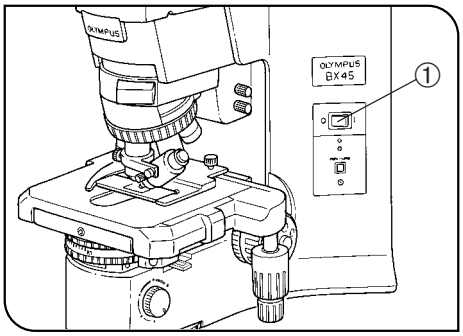


Fig. 1

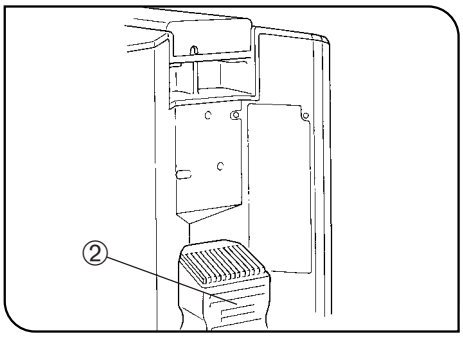


Fig. 2

1. After the equipment has been used in an observation of a specimen that is accompanied with a potential of infection, clean the parts coming in contact with the specimen to prevent infection.
   - Moving this product is accompanied with the risk of dropping the specimen. Be sure to remove the specimen before moving this product.
   - In case the specimen is damaged by erroneous operation, promptly take the infection prevention measures.
2. Install the microscope on a sturdy, level table or bench so as not to block the air vents on the underside of the base.
   Do not place the microscope on a flexible surface, as this could result in blocking the air vents and cause overheating or a fire.
3. To prevent obstruction of the natural convection-based air cooling of the microscope, make sure to leave at least 10 cm of free space between walls or other objects, and the left, right and rear sides of the microscope and the lamp socket when installing the microscope.
4. To avoid potential shock hazards and burns when replacing the light bulb, set the main switch ① to " O " (OFF) then disconnect the power cord from the wall outlet in advance. Whenever you replace the bulb during use or right after use, allow the lamp socket ② and bulb to cool before touching. (Figs 1 & 2)

Designated bulb	6V30WHAL (PHILIPS 5761)

★ The microscope also incorporate a fuse (this should be replaced by the manufacturer or authorized agent).

5. Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, product safety and performance cannot be guaranteed.
6. Always ensure that the **grounding terminal** of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded/earthed, Olympus can no longer warrant the electrical safety and performance of the equipment.
7. Never insert metallic objects into the air vents of the microscope frame as this could result in electrical shock, personal injury and equipment damage.
8. The power cord may be melt by the heat of lamp socket if the cord comes in contact with it. Distribute the power cord at an enough distance from the lamp socket.

Safety Symbols

The following symbols are found on the microscope. Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	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.
I	Indicates that the main switch is ON.
O	Indicates that the main switch is OFF.

Warnings

Warning engraving/stickers are placed at parts where special precaution is required when handling and using the microscope. Always heed the warnings.

Warning engraving position	Lamp socket (Warning against high temperature) ⚠
Warning sticker position	Microscope frame rear panel (Warning against high temperature) ⚠

Should warning stickers become soiled, peeled off, etc., contact Olympus for replacement.

1 Getting Ready

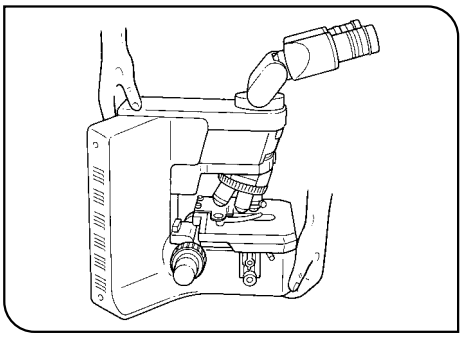


Fig. 3

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, refer to section 6, "SPECIFICATIONS".)
3. When moving the microscope, remove the specimen and modules that may drop during transport and carefully carry it with the grasping part on the rear of the arm and the base as shown in Fig. 3 (Weight: approx. 14 kg).

★**Damage to the microscope will occur if you grasp it by the stage, coarse/fine adjustment knob or binocular section of the observation tube.**

4. The BX45 can be used with only one intermediate attachment.

2 Maintenance and Storage

1. To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
   If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

⚠Since the absolute alcohol is highly flammable, it must be handled carefully.
Be sure to keep it 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 it only in a well-ventilated room.

2. Do not attempt to use organic solvents to clean the microscope components other than the glass components. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.
3. Do not disassemble any part of the microscope as this could result in malfunction or reduced performance.
4. When not using the microscope, keep it covered with a dust cover.
5. When disposing of the microscope. Check the regulations and rules of your local government and be sure to observe them.

3 Caution

If the microscope is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.
⚠ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).
★ : Indicates that failure to follow the instructions could result in damage to equipment.
◎ : Indicates commentary (for ease of operation and maintenance).

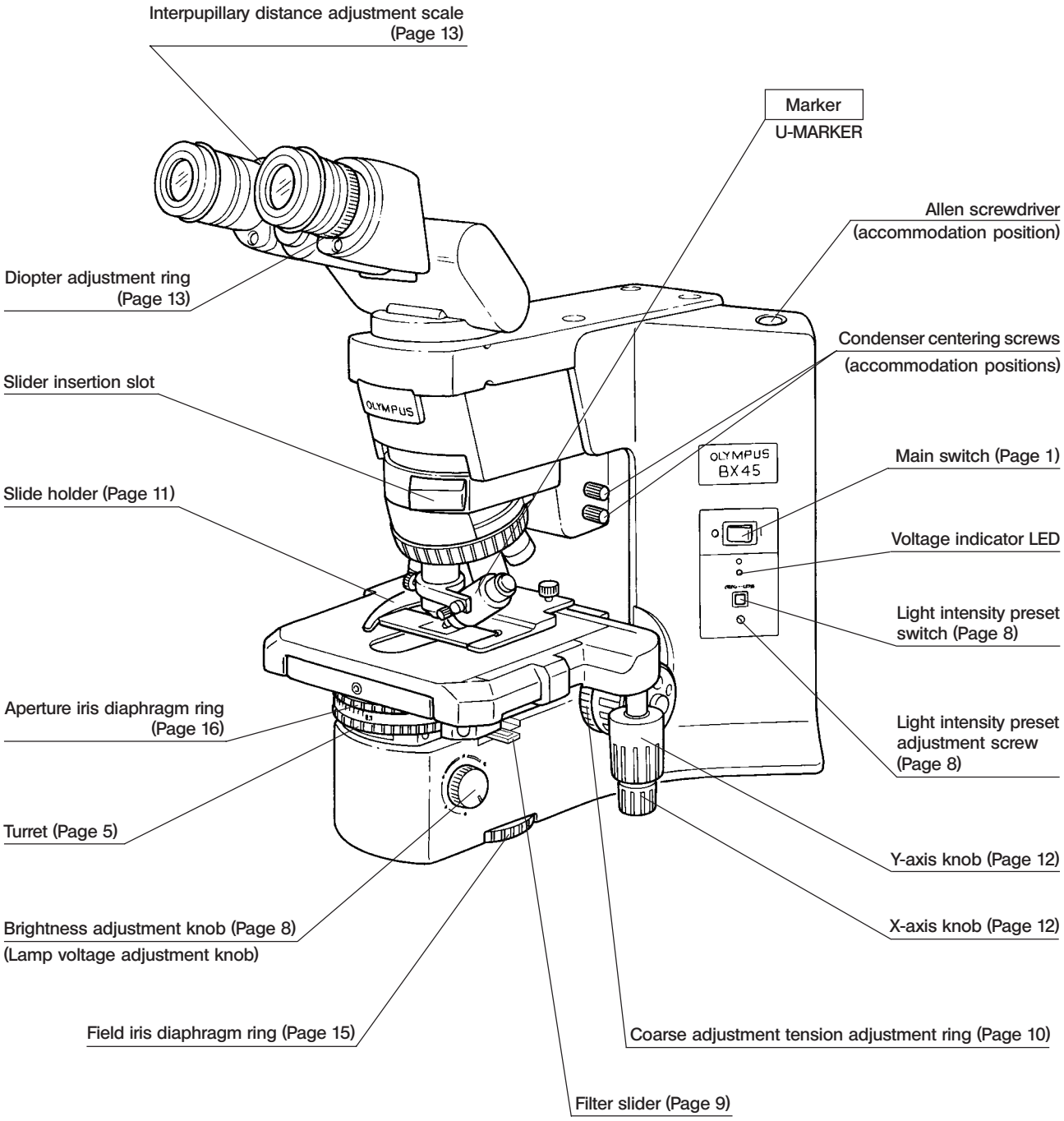
This device complies with the requirements of directive 98/79/EC concerning in vitro diagnostic medical devices. CE marking means the conformity to the directive.

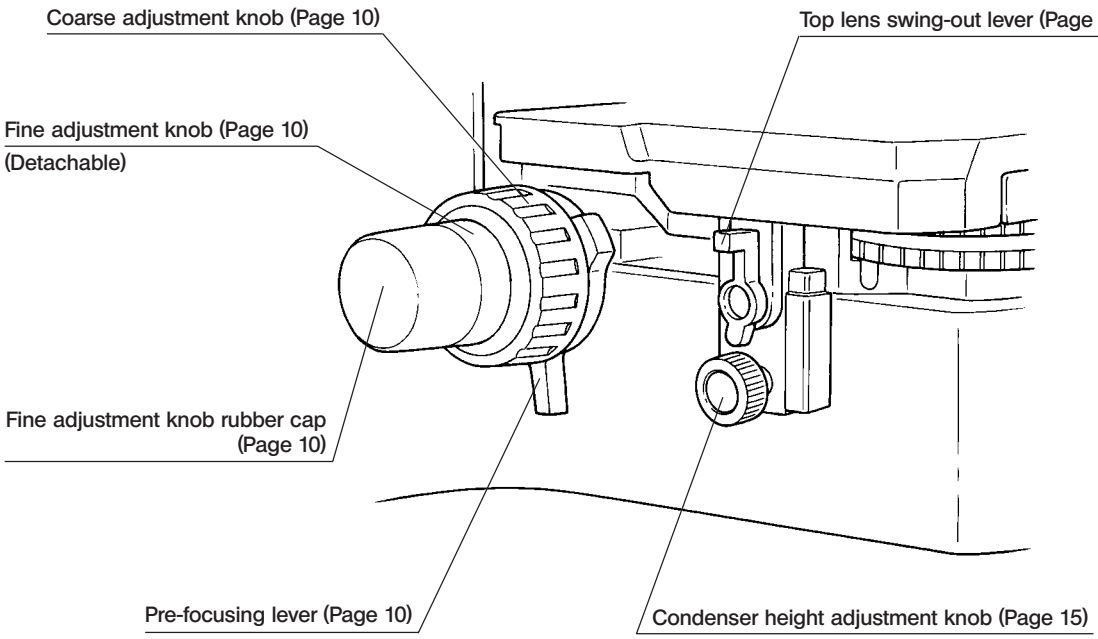
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

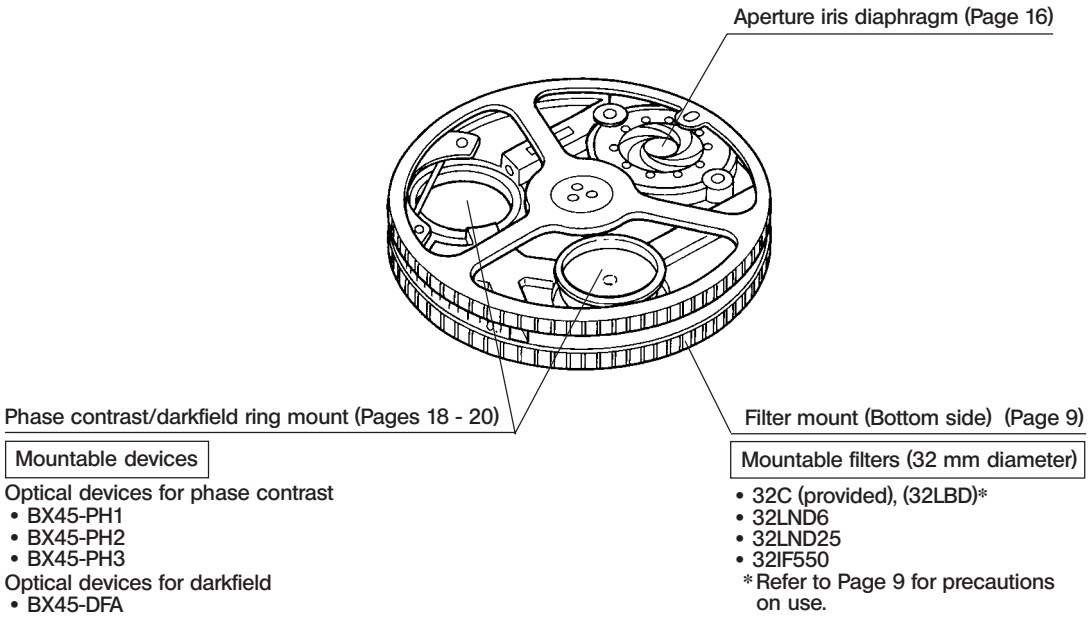
1 NOMENCLATURE

◎If you have not yet assembled the microscope, read section 8, “ASSEMBLY” (pages 28 to 30).





Turret View when disassembled from the microscope frame.



Mountable devices

Optical devices for phase contrast
- BX45-PH1
- BX45-PH2
- BX45-PH3

Optical devices for darkfield
- BX45-DFA

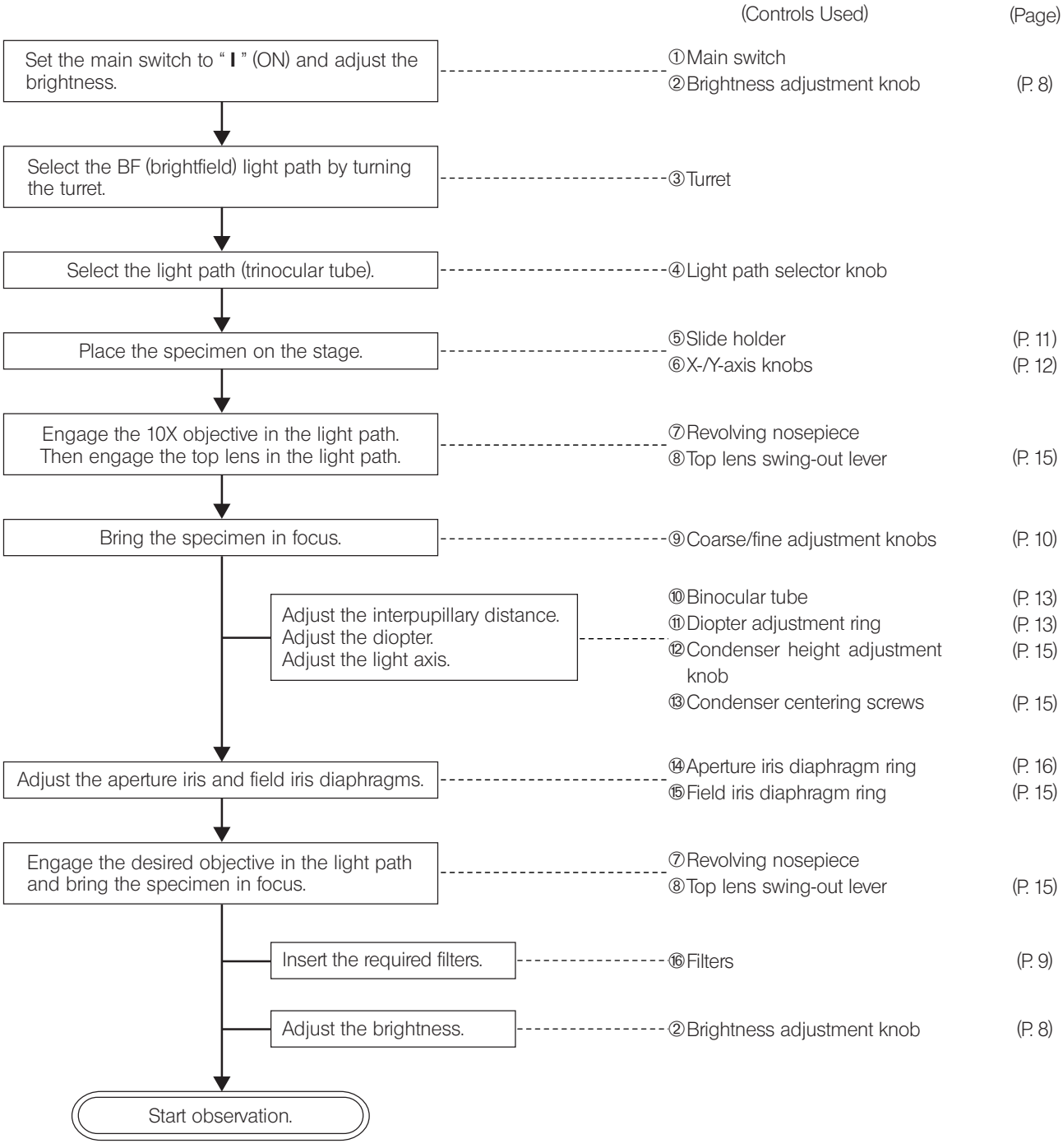
Mountable filters (32 mm diameter)

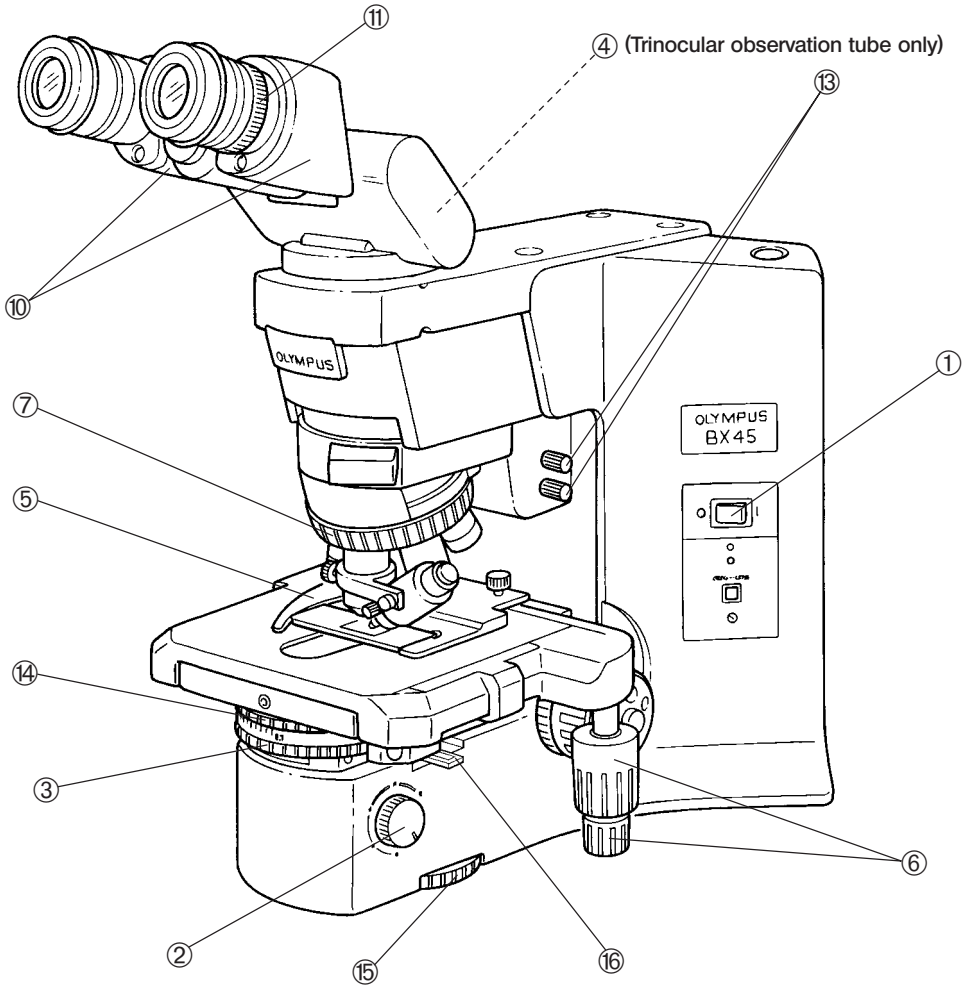
- 32C (provided), (32LBD)*
- 32LND6
- 32LND25
- 32IF550

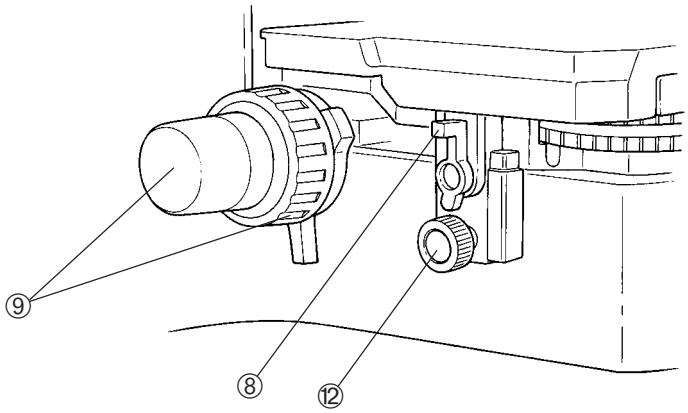
*Refer to Page 9 for precautions on use.

2 TRANSMITTED LIGHT BRIGHTFIELD OBSERVATION PROCEDURE

◎As the phase contrast, darkfield and simplified polarized light observations using transmitted light requires preparation using optical devices such as an analyzer or polarizer, they will additionally be detailed in section 4, "OBSERVATION".







© Copy the observation procedure pages on separate sheets and post it near your microscope.

3 USING THE CONTROLS

3-1 Base

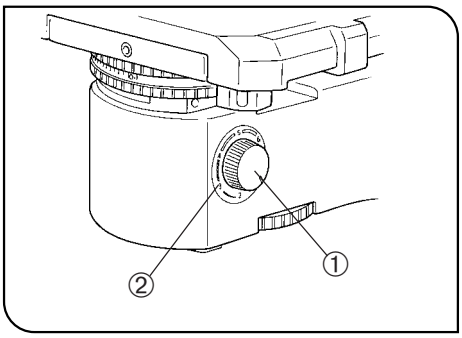


Fig. 4

1 Voltage Indication (Fig. 4)

1. Turn the brightness adjustment knob ① clockwise to increase the voltage and make illumination brighter.
2. The numerals ② around the knob indicate the approximate voltage.

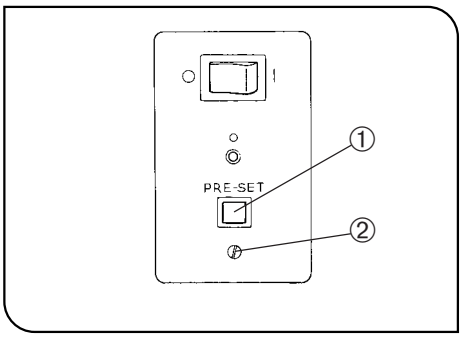


Fig. 5

2 Using the Light Intensity Preset Switch (Fig. 5)

◎The light intensity preset switch ① makes it possible to limit the light intensity to a preselected level regardless of the position of the brightness adjustment knob. The light intensity preset switch has been set to about 4 V at the factory.

1. Press the light intensity preset switch ① to the ON position. (The face of the switch lights when it is ON.)
2. Using a small flat-blade screwdriver, turn the preset adjustment screw ② to obtain the required light intensity. Turning the screw clockwise increases brightness.
3. When the light intensity preset switch is set to OFF, the brightness returns to the level set by the brightness adjustment knob.

◎While the light intensity preset switch is ON, turning the brightness adjustment knob does not affect brightness.

3 Using the Filters (Figs. 6 - 8)

◎You can place a filter in the light path with either method. (Only the 32C daylight filter is provided with the microscope.)

- Place a 32 mm diameter filter on the filter slider and engage it in the light path. (Page 9)
- Insert up to three 32 mm diameter filters on the bottom side of the turret and turn to engage the filters in the light path. (Page 9)

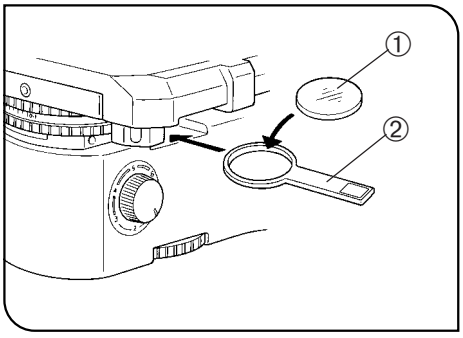


Fig. 6

Mounting a Single Filter (Fig. 6)

One of the filters listed below can be engaged in the light path by inserting the filter ① in the filter slider ② and engaging the filter slider in the light path.

Usable Filters	Applications
32LND6	For light brightness control, transmittance 6%
32LND25	For light brightness control, transmittance 25%
32C (provided), 32LBD	For daylight/color balancing
32IF550	For B&W contrast (Green)

Using the Turret (Fig. 7)

◎The top and bottom parts of the turret are integrated. Therefore, the filters to be mounted in the bottom part are determined by the aperture iris diaphragm positioning and optical devices inserted in the upper part.

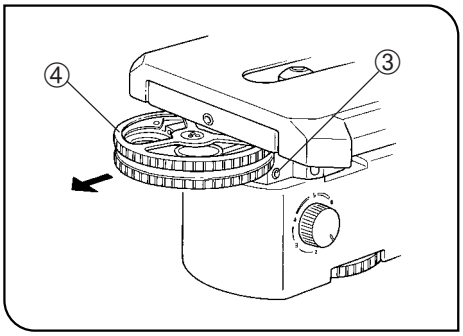


Fig. 7

(Examples)	• Aperture iris	: 32C, ND, (32LBD)
	• Phase contrast (PH)	: 32IF550
	• Darkfield (DFA)	: None.

1. Loosen the turret clamping screw ③ using the Allen screwdriver, and pull out the turret ④.
2. Place the turret upside down and remove the filter clamping ring ⑤ by pushing its knob section.
3. Place the required filters and set the clamping ring ⑤ to the original position by engaging it with three hooks ⑥. (Fig. 8)

◎When an interference filter (32LBD or 32IF550) is used, flare or ghost may be observed. The flare or ghost may be reduced by inserting the interference filter in the filter slider and placing the ND filter in the turret.

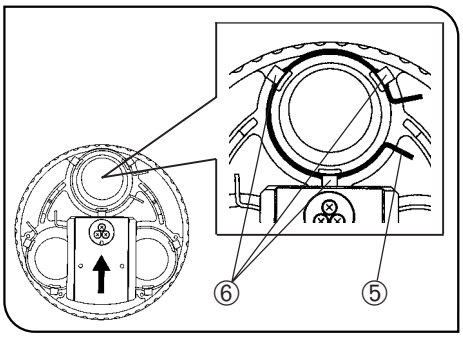


Fig. 8

3-2 Focusing Block

★The stage of this microscope is set at a low position. Take care not to let your hand interfere with the stage when operating the coarse adjustment knob.

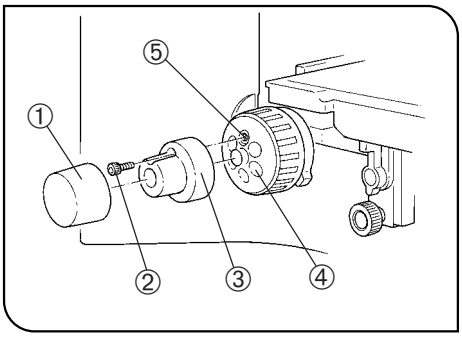


Fig. 9

1 Replacing the Fine Adjustment Knob (Fig. 9)

★The fine adjustment knob is attached to the right side when the microscope is shipped from the factory.

◎The fine adjustment knob is designed detachable to prevent interference with hand during manipulation of the X- and Y-axis knobs.
Usually attach the knob on the opposite side to the X- and Y-axis knobs.

1. Pull and remove the rubber cap ① from the fine adjustment knob.
2. Using the Allen screwdriver, loosen the clamping screw ② and remove the fine adjustment knob ③.
3. Remove the seal from the fine adjustment knob screw hole on the other side and attach the knob by reversing the removal procedure.
4. Attach a provided seal on the screw hole ⑤ of the fine adjustment dial ④, from which the fine adjustment knob has been removed.

◎The fine adjustment dial ④ can be operated with your fingertip or finger surface at the same time as manipulating the X- and Y-axis knobs.

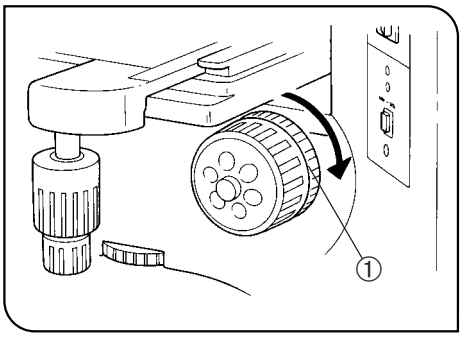


Fig. 10

2 Adjusting the Coarse Adjustment Knob Tension (Fig. 10)

★Adjust the coarse adjustment knob tension using the tension adjustment ring.

The coarse adjustment knob tension is preadjusted for easy use. However, if desired, you can change the tension using the tension adjustment ring ①. Turning the ring in the direction of the arrow increases tension, and vice versa.

The tension is too low if the objective drops by itself or focus is quickly lost after adjustment with the fine adjustment knob. In this case, turn the ring in the direction of the arrow to increase tension.

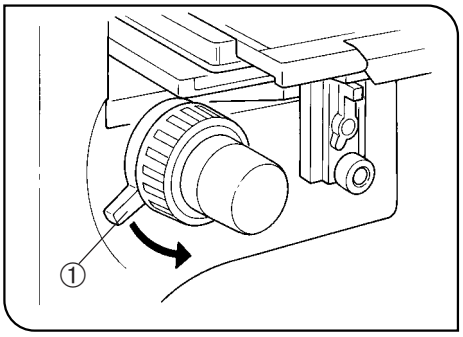


Fig. 11

3 Pre-focusing Lever (Fig. 11)

◎The pre-focusing lever ensures that the objective does not come in contact with the specimen and simplifies focusing.
After focusing on the specimen with the coarse adjustment knob, turn this lever ① in the direction of the arrow and lock; the lower limit on coarse adjustment movement is set at the locked position.
After changing a specimen, refocusing is easily accomplished by rotating the coarse adjustment knob to reach the pre-focused position, then making fine adjustments with the fine adjustment knob.

◎The objective's vertical movement activated by the fine adjustment knob is not locked.

3-3 Stage

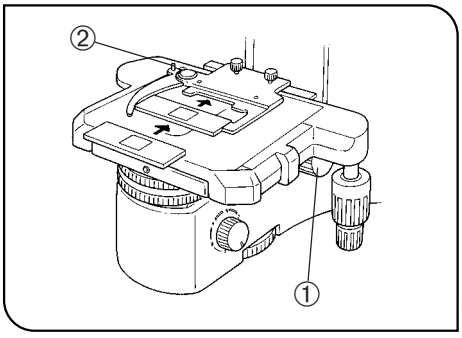


Fig. 12

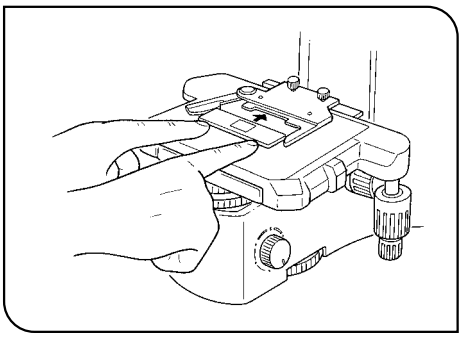


Fig. 13

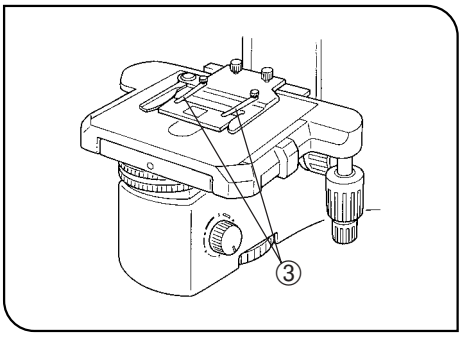


Fig. 14

1 Placing the Specimen

★ **The dimensions of the slide glass should be 26 x 76 mm with thickness of 0.9 to 1.4 mm, and the cover glass should have thickness of 0.17 mm.**

★ **When observing very large specimens, remove the slide holder and place the specimen directly on the stage.**

Microscopy with Double-Slide Holder (Fig. 12)

1. Turn the coarse adjustment knob ① to raise the objective.
2. Open the spring-loaded curved finger ② on the slide holder and place one or two specimen slides on the stage from the front.
3. After placing the sides as far as they will go, gently release the curved finger.

Microscopy with Single-Slide Holder (Fig. 13)

The specimen side can easily be placed by sliding it into the slide holder from the front.

Using an Oil Immersion Objective

Adsorption of immersion oil can cause the specimen to drift. In such cases, it is recommended to use the optional BH2-SCB-3 specimen clip ③ for oil immersion objectives. (Fig. 14)

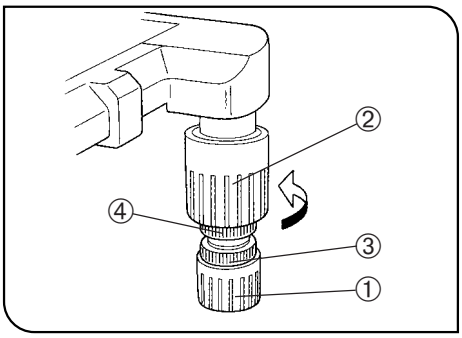


Fig. 15

2 Adjusting the X- and Y-Axis Knob Tension (Fig. 15)

1. Hold the X-axis knob ① and slide up the Y-axis knob ② up to expose the adjustment knobs.
2. Turning the X-axis adjustment knob ③ or Y-axis adjustment knob ④ clockwise (in the direction of the arrow) increases the tension and counterclockwise decreases it.

★**If the tension is adjusted to tight, a creaking sound may be heard during stage travel, and the stage stopping accuracy may be imperiled.**

CAUTION **After long hours of use, the stage guide may be deviated and the stage travel range may be decreased. However, this is not malfunction and can be corrected easily as described below.**

[Treatment]

Horizontal direction: Hold the specimen holder and move the stage guide to the left and right so that it hits the stoppers.

Vertical direction: Hold the upper stage and move it to the front and rear so that it hits the stoppers.

Rubber Caps for X- and Y-Axis Knobs (Optional)

◎When the X- and Y-axis knobs are fitted with the rubber caps, the knobs can be adjusted without slipping and fine adjustment is possible by holding the knobs with a very light force. The rubber caps also reduce fatigue after long hours of operation.
The U-SHGT thick type (thickness 5 mm) and U-SHG thin type (thickness 2 mm) rubber caps are available.

To attach the rubber caps:

First fit the larger knob rubber to the Y-axis (upper) knob from below it, then fit the smaller knob rubber to the X-axis (lower) knob from below it.

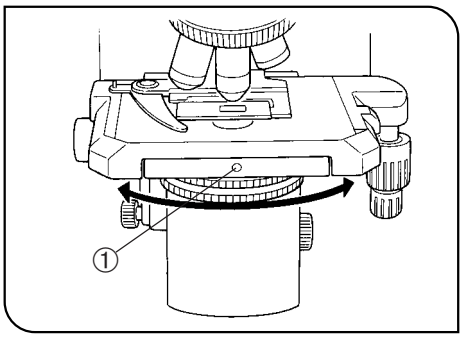


Fig. 16

3 Rotating the Stage (Fig. 16)

1. Using the Allen screwdriver, slightly loosen the stage clamping screw ①.
2. The stage can be rotated both clockwise and counterclockwise.

★**A click may be heard and felt during rotation. However, this is due to the construction of the substage and does not indicate a malfunction.**

◎The angle of rotation varies depending on the X- and Y-axis knobs.

	Angle of Rotation	
	Clockwise	Counterclockwise
Right hand knobs	230°	20°
Left hand knobs	20°	230°

3-4 Observation Tube

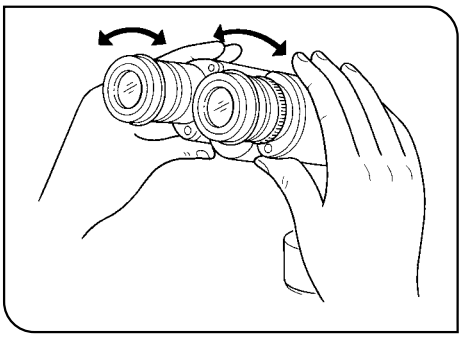


Fig. 17

1 Adjusting the Interpupillar Distance (Fig. 17)

While looking through the eyepieces, adjust for 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.

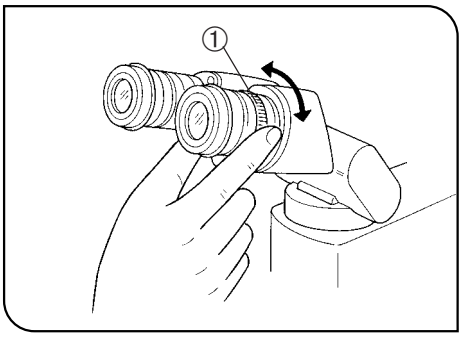


Fig. 18

2 Adjusting the Diopter (Fig. 18)

1. Looking through the eyepiece without the diopter adjustment ring, rotate the coarse and fine adjustment knobs to bring the specimen into focus.
2. Looking through the eyepiece with the diopter adjustment ring, turn only the diopter adjustment ring ① to focus on the specimen.

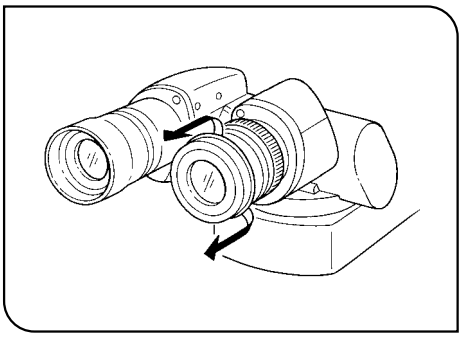


Fig. 19

3 Using the Eye Shades (Fig. 19)

When Wearing Eyeglasses

Use with the eye shades in the normal, folded-down position. This will prevent the eyeglasses from being scratched.

When Not Wearing Eyeglasses

Extend the folded eye shades in the direction of the arrow to prevent extraneous light from entering between the eyepieces and eyes.

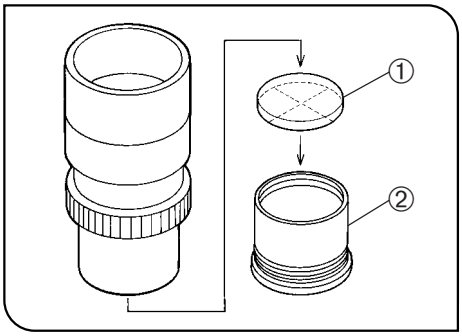


Fig. 20

4 Using Eyepiece Micrometer Disks (Fig. 20)

When the WHN10X-H (or WHN10X) eyepieces are used, an eyepiece micrometer disk can be inserted in one of them. When the eyepiece does not have a diopter adjustment mechanism, however, it is hard to focus on the micrometer disk if the operator has poor eyesight. Should that be the case, adjust the focus with eyeglasses on.

Use an eyepiece micrometer disk with a diameter of ϕ24 mm and thickness of 1.5 mm.

Following Fig. 11, turn the built-in micrometer-mounting frame ② counterclockwise to remove it from the eyepiece and place a micrometer disk.

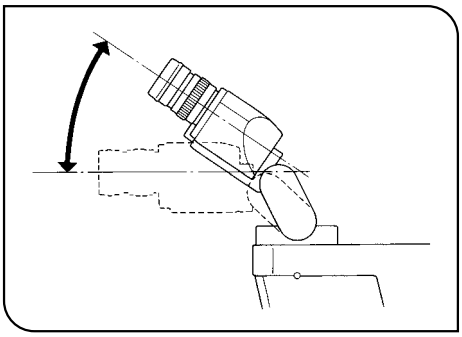


Fig. 21

5 Adjusting the Tilt (with the U-TBI3) (Fig. 21)

◎Adjust the height and tilt of the observation tube to obtain the most comfortable viewing position.

Holding the binocular section with both hands, raise or lower it to the desired position.

★Never attempt to force the binocular section past the upper or lower stop position. Applying excessive force could destroy the limiting mechanism.

★When the U-TBI3 is used, part of the peripheries of the field of view may become dark as the aperture iris diaphragm is stopped down to approximately the minimum aperture.

★When the U-TBI3 widefield tilting binocular is used in combination with a U-EPA2 intermediate attachment, the light in the peripheral sections of the field may be dark.

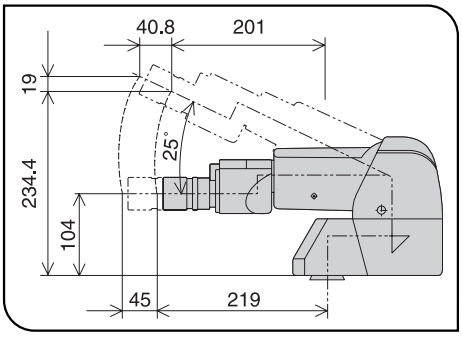


Fig. 22

With the U-ETBI/U-TTBI (Fig. 22)

The U-ETBI and U-TTBI are ergonomic observation tubes with normal field, capable of the tilting adjustment as well as the adjustment of the eyepiece position toward the front and rear (by 45 mm). The U-ETBI is the erect image model and the U-TTBI is the inverted image model, and both models are of the same size.

3-5 Condenser

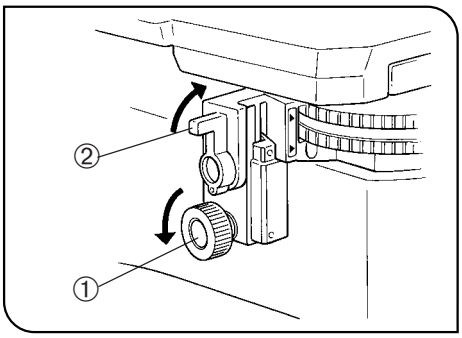


Fig. 23

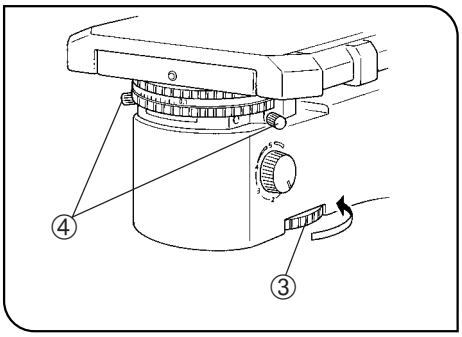


Fig. 24

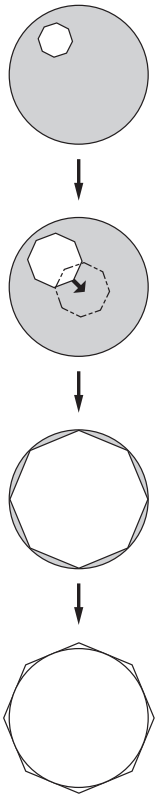


Fig. 25

1 Centering the Condenser (Figs. 23 - 25)

1. Turn the condenser height adjustment knob ① to raise the condenser to its upper limit, then use the top lens swing-out lever ② move the top lens into the light path.
2. Focus on the specimen using the 10X objective.
3. Rotate the field iris diaphragm ring ③ in the direction of the arrow so that the diaphragm image comes inside the field of view.
4. Manipulate the condenser height adjustment knob ① to focus on the diaphragm image.
5. Insert the two condenser centering screws ④ into the condenser centering thread holes (below the ◀ marking) and turn the screws to move the iris diaphragm image to the center of the field of view.
6. Gradually open the field iris diaphragm. The condenser is properly centered if the iris image is centered and inscribed in the field of view.
7. During actual use, open the field diaphragm slightly until its image circumscribes the field of view.

◎After completing the condenser centration, store the centering screws in the accommodation positions on the right side of the microscope frame (page 4) so as not to lose them.

Effects of Field Iris Diaphragm (Fig. 25)

The field iris diaphragm restricts the diameter of the beam of light entering the objective and thus excludes extraneous light, improving image contrast. The diameter of the field iris should e adjusted for objective power to the extent that it just circumscribes the field of view. (See “Compatibility of Objectives and Condensers” on the next page.)

◎With the 100X objective, the field iris diaphragm image cannot be observed unless the iris diaphragm is minimized. With the 4X objective, maximize the iris diaphragm to observe it.

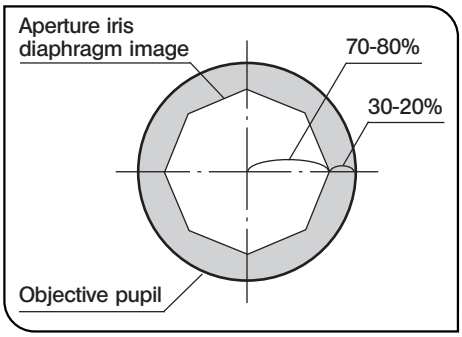


Fig. 26

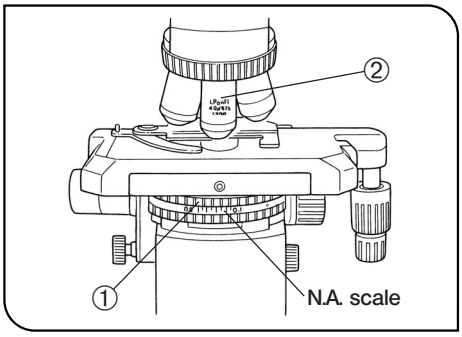


Fig. 27

Aperture Iris Diaphragm (Figs. 26 & 27)

- The aperture iris diaphragm determines the numerical aperture of the illumination system. Matching the numerical aperture of the illumination system with that of the objective provides better image resolution and contrast, and also increases the depth of focus.
- Since the contrast of microscope specimens is ordinarily low, setting the condenser aperture iris diaphragm to between 70% and 80% of the N.A. of the objective in use is usually recommended. If necessary, adjust the ratio by removing the eyepiece and looking into the eyepiece sleeve while adjusting the aperture iris diaphragm ring ① until the image shown in Fig. 26 is seen.

◎Using the numerical aperture scale:

Set the condenser numerical aperture scale to about 80% of the NA value ② of the respective objective. (Fig. 27)

Example: With the UPlanFLN40X (NA 0.75), set the scale to 0.75 x 0.8 = 0.6.

2 Compatibility of Objectives and Condensers

Objective Magnification	BX45 Condenser
1.25X - 4X*	Applicable by swing the top lens out.
4X -60X	Applicable by engaging the top lens in the light path.
100X	

* When using a 4X or lower-power objective, fully open the condenser aperture iris diaphragm and use the field iris diaphragm in the base as aperture diaphragm. With the 1.25X to 2X objectives, the peripheral sections of the field of view may be dark but observation is still possible.

◎If you want objectives for cytological observation, please purchase the PlanN10XCY and PlanN series objectives or the PlanFLN10XCY and UPlanFLN series objectives.

3-6 Immersion Objectives

★Be sure to use the provided Olympus Immersion oil.

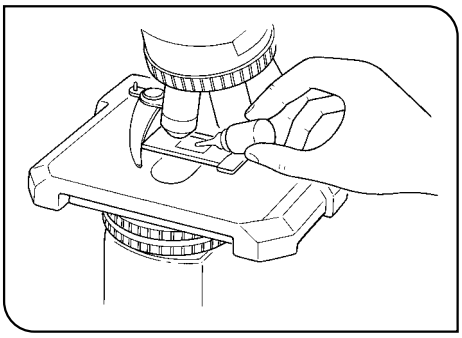


Fig. 28

1 Using Immersion Objectives (Fig. 28)

1. Focus on the specimen with objectives in the order of lower-power to higher-power ones.
2. Before engaging the immersion objective, place a drop of provided immersion oil onto the specimen at the area to be observed.
3. Turn the revolving nosepiece to engage the immersion objective, then focus using the fine adjustment knob.

★Since air bubbles in the oil will affect the image quality, make sure that the oil is free of bubbles.

a. To check for bubbles, remove the eyepiece and fully open the field and aperture iris diaphragms, then look at the exit pupil of the objective inside the observation tube. (The pupil should appear round and bright.)

b. To remove bubbles, turn the revolving nosepiece to repeatedly defocus and refocus the oil immersion objective.

★With this condenser, do not use immersion oil in the space between the top lens and specimen.

4. After use, remove immersion oil from the objective front lens by wiping with gauze slightly moistened with absolute alcohol.

⚠Caution in use of immersion oil

If immersion oil enters your eyes or contacts with your skin, immediately take the following treatment.

Eyes: Rinse with fresh water (for 15 minutes or more).

Skin: Rinse with water and soap.

If the appearance of the eyes or skin is altered or pain persists, immediately see your doctor.

3-7 Objectives with Correction Collar

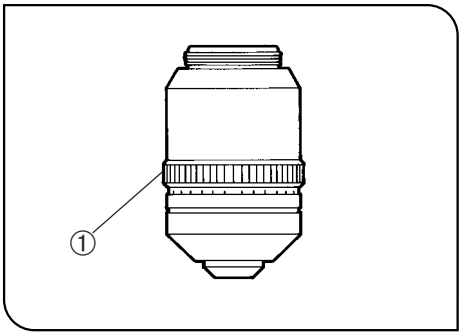


Fig. 29

◎If the cover glass thickness is not 0.17 mm, the objectives cannot manifest their performances. If a correction collar equipped objective is used in this case, the difference in thickness can be compensated for by adjusting the collar.

Adjustment Procedure

- If the cover glass thickness is known, set the correction collar ① to that value. (Fig. 29)
- If the cover glass thickness is unknown, adjust the correction collar ① and fine adjustment knob alternately until the positioning with the highest resolution is obtained.

★Be careful not to touch the correction collar ① when turning the revolving nosepiece.

3-8 Marker (U-MARKER)

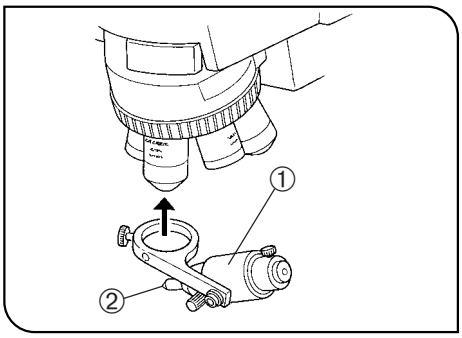


Fig. 30

◎Mounting the marker ① on a 10X objective allows you to mark the desired positions with a simple, one-touch operation.
Marking can be controlled by either the left or right hand, depending on how the marker is installed.
(For details, refer to the Instruction Manual.)

◎If you want objectives for cytological observation, please purchase the PlanN10XCY and PlanN series objectives or the PlanFLN10XCY and UPlanFLN series objectives.

◎When 10X and 40X objectives are switched alternately for observation, brightness adjustment after switching the objectives becomes unnecessary if the PlanN10XCY or PlanFLN10XCY (ND filter built-in type) is used because the same observation brightness is achieved at 10X and 40X. However, with high-contrast specimens, ghosting is likely to occur due to the characteristeics of the ND filter.

★**To prevent the pen tip of the marker from drying up, always attach the exclusive cap ② on the pen tip whenever it is not used.**

4 OBSERVATION METHODS

◎This chapter describes the observation methods other than the transmitted light brightfield observation.

4-1 Transmitted Light Phase Contrast Observation

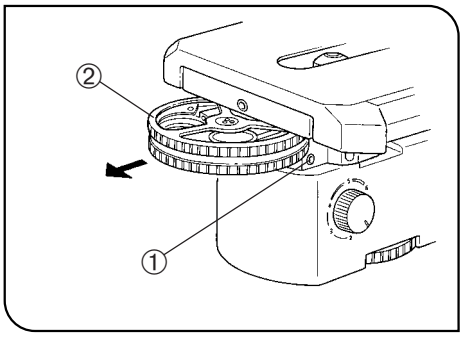


Fig. 31

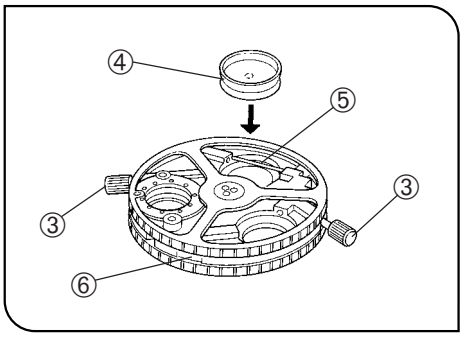


Fig. 32

1 Mounting the Optical Device (PH Ring) (Figs. 31 & 32)

1. Loosen the turret clamping screw ① with the Allen screwdriver, and pull out the turret ②.
2. Insert the two centering screws ③ (common use with the condenser centration) into the optical device centering thread holes and turn the centering screws counterclockwise.
3. Insert the optical device into the mount hole by applying pressure onto the plate spring ⑤ with the PH ring ④.
4. Turn the centering knobs ③ clockwise for an optimum tightness for stabilizing the optical device.
5. Attach the seal provided with the optical device to the sealing position ⑥.
6. If you want to insert a PH ring in another hole, perform steps 2 to 5 above.
7. Remove the centering knobs ③ and place the turret in the original position.
(Insert the turret in the direction of the arrow on the dovetail.)

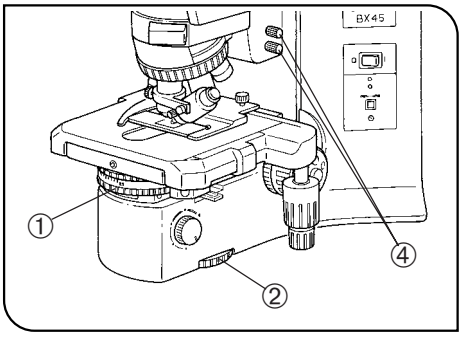


Fig. 33

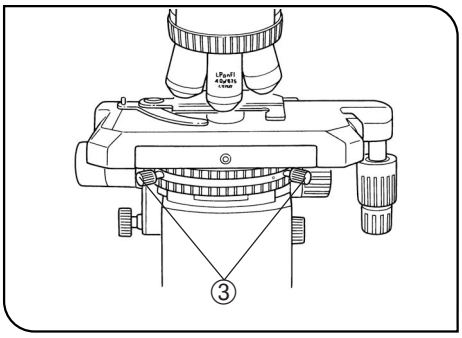


Fig. 34

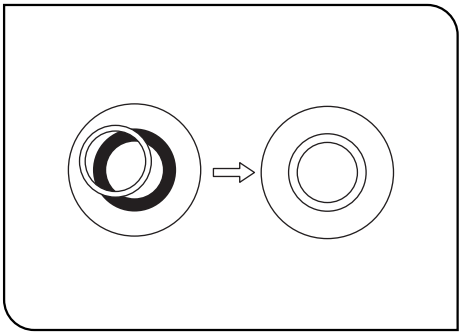


Fig. 35

2 Observation Procedure (Figs. 33 - 35)

★**Disengage the analyzer and polarizer from the light path, and replace the objective with a Ph objective.**

1. Engage the Ph objective in the light path.
2. Turn the turret ① to engage the suitable PH ring for the Ph objective in the light path.

UIS2 Series

PH Ring	Applicable Ph Objectives
BX45-PH1	PlanCN10XPh, PlanCN20X, PlanN10XPh, PlanN20XPh, UPlanFLN4XPh, UPlanFLN10XPh
BX45-PH2	PlanCN40XPh, PlanN40XPh, UPlanFLN40XPh
BX45-PH3	PlanC100XOPh, PlanN100XOPh, UPlanFLN60XOPh, UPlanFLN100XOPh

UIS Series

PH Ring	Applicable Ph Objectives
BX45-PH1	Ach10-XPh, Ach20XPh, Plan10XPh, Plan20XPh, UPlanFl10XPh, UPlanFl20XPh, UPlanApo10XPh
BX45-PH2	Ach40XPh, Plan40XPh, UPlanFl40XPh, UPlanApo20XPh
BX45-PH3	Ach100XOPh, Plan100XOPh, UPlanFl100XOPh, UPlanApo40XOPh, UPlanApo100XOlPh, PlanApo60XOPh

3. Adjust the field iris diaphragm ② so that circumscribes the field of view.
4. Place the specimen on the stage and focus on the specimen.
5. Remove one of the eyepieces and replace it with the U-CT30 centering telescope.
6. Turn the upper part of the U-CT30 centering telescope to focus on both the bright ring (ring slit) and darker ring (phaseline of the objective).
7. Insert the two centering screws ③ into the optical device centering thread holes (above the ◀ markings) and adjust centering of the PH ring so that the bright ring overlaps the dark ring in the field. (Fig. 34)

★**If more than one PH ring slit image is displayed, center the brightest PH ring slit image.**

★**Be sure to remove the centering knobs when it is required to turn the turret.**

8. Repeat steps 6 and 7 above for each objective with different power.
9. Remove the U-CT30 centering telescope and replace it with the eyepieces.
   Store the centering screws in the accommodation positions ④ on the right side of microscope frame so as not to lose them. (Fig. 33)

4-2 Transmitted Light Darkfield Observation

1 Mounting the Optical Device (DF Ring)

◎The optical device (DF ring) can be mounted in the same way as the optical device (PH ring). Please see page 18.

2 Observation Procedure

★Disengage the polarizer and analyzer from the light path.

1. Turn the turret (① in Fig. 33) to engage the BX45-DFA in the light path.
2. Engage an applicable objective in the light path.

UIS2 Series

DF Ring	Applicable Objectives*
BX45-DFA	PlanCN10X, PlanCN20X, PlanCN40X, PlanN10X, PlanN20X, PlanN40X, PlanN50XOI, UPlanFLN10X, UPlanFLN20X, UPlanFLN60XOI, UPlanFLN100XOI, UPlanSApo10X

UIS Series

DF Ring	Applicable Objectives*
BX45-DFA	Ach10X, Ach20X, Ach40X, Plan10X, Plan20X, Plan40X, Plan50XOI, UPlanFl10X, UPlanFl20X, UPlanFl100XOI3, UPlanApo10X, UPlanApo20X, UPlanApo100XOI3

* Objectives with magnification of 10X or more and NA or 0.7 or less can be used.
  Objectives equipped with iris diaphragm can also be used if their NA can be reduced to no more than 0.7.

3. Place the specimen on the stage and focus on the specimen.
4. Remove the eyepieces, look into the eyepiece sleeves to locate the objective pupil, and turn the optical device centering screw holes (above the ◀ markings) to center the DF ring so that no light exits through the objective pupil.
5. Attach the eyepiece again, observe the darkfield image, and repeat centering to obtain the best possible darkfield effects.
6. Adjust the condenser height to obtain uniform darkfield illumination across the upper and lower halves of the condenser image.
7. Open the field iris so that regular illumination is obtained.

⚠When switching the darkfield observation objective or the observation mode between darkfield and another method, be sure to keep your eyes away from the eyepiece.

When you switch the objective or turret between the darkfield and other positions while looking into the eyepiece. Otherwise, the direct light may enter your eyes.

4-3 Transmitted Light Simple Polarization Observation

◎Polarized light observation requires the U-ANT analyzer (or any module incorporating an analyzer) and the BX45-PO polarizer.

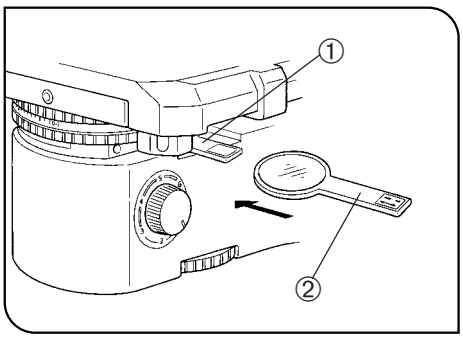


Fig. 36

1 Mounting the BX-45PO Polarizer (Fig. 36)

1. Pull out the filter slider ①.
2. Insert the BX45-PO polarizer ② into the hole all the way until stopped.

◎The polarizer levers should extend in the lateral direction. This position is the Cross-Nikol (dark) position.

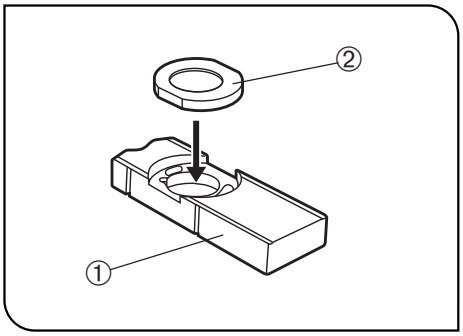


Fig. 37

2 Mounting the U-ANT Analyzer (Fig. 37)

1. Remove the rubber cap on the slider inlet on the upper part of revolving nosepiece.
2. Hold the U-ANT analyzer ② so that the side with indications faces up, then align index markings and drop the analyzer into the dummy slider ① which is provided with the BX45-PO. (The analyzer will be clamped by a magnet.)
3. Place the dummy slider with the U-ANT analyzer ①, push the dummy slider fully in to engage the analyzer in the light path.

◎The analyzer can be disengaged from the light path by pulling the dummy slider by one step.

3 Observation Procedure

1. Turn the turret (① in Fig. 33) to select BF of the transmitted brightfield observation light path.
2. Engage the objective in the light path.

★When a Ph objective is used, the contrast may be weakened.

3. Turn the polarizer lever slightly so that the field becomes darkest (Cross Nikol position).
4. Place a specimen and focus on it.
5. Adjust the field iris diaphragm so that it circumscribes the field of view.
6. The contrast may be increased by adjusting the aperture iris diaphragm.

5 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the unit 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 Olympus representative for assistance.

Problem	Cause	Remedy	Page
1. Optical System			
a) Bulb does not light.	Bulb is burned out.	Replace bulb.	29
	Power cord is unplugged.	Plug power cord into the power outlet.	30
b) Bulb operates, but field of view remains dark.	Aperture and field iris diaphragms are not opened wide enough.	Adjust them to proper sizes.	15/16
c) Field of view is obscured or not evenly illuminated.	Revolving nosepiece is not correctly engaged.	Make sure that the revolving nosepiece clicks properly into place.	—
	Condenser top lens is not set correctly.	Swing out the top lens.	16
	Condenser is not properly centered.	Center the condenser.	15
	Turret is set in an intermediate position.	Set turret to a click position.	19
	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm until it circumscribes the field.	15
	Bulb is not mounted correctly.	Push the pins of halogen bulb all the way until the stop position.	29
d) Dirt or dust is visible in the field of view.	Dirt/dust on the eyepieces.	Clean thoroughly.	3
	Dirt or dust on condenser top lens, turret upper surface covering glass		
	Dirt/dust on the specimen.		
e) Visibility is poor. • Image is not poor. • Contrast is poor. • Details are indistinct. • Image glares.	A non-UIS2/UIS objective is used.	Use only UIS2/UIS series objectives with this microscope.	27
	Aperture iris diaphragm is stopped down too far.	Open aperture iris diaphragm.	16
	Correction collar on correction collar equipped objective is not properly adjusted.	While focusing, turn the correction collar to find the best position.	17
	Front lens of objective is dirty.	Clean objective.	3
	Immersion oil is not being used with an oil immersion objective.	Use immersion oil.	17
	Immersion oil contains bubbles.	Remove the bubbles.	17
	Recommended immersion oil is not used.	Use the provided immersion oil.	17
	Dirt/dust on specimen.	Clean it.	3
	Dirt/dust on condenser top lens, turret or upper surface covering glass.		
	Inappropriate object side or cover glass thickness.	Replace with glass of recommended thickness.	11

Problem	Cause	Remedy	Page
f) One side of image is blurred.	Objective is not correctly engaged in light path.	Make sure that revolving nosepiece clicks into place correctly.	—
	Stage is not correctly mounted.	Re-attach it.	—
	Specimen is not correctly mounted on stage.	Place specimen correctly on to of stage and secure it with slide holder.	11
g) Image appears to waver.	Objective is not correctly engaged in light path.	Make sure that revolving nosepiece clicks into place correctly.	—
	Condenser is not properly centered.	Center the condenser.	15
h) Field of view becomes only slightly brighter when the voltage is raised.	Condenser is not properly centered.	Center the condenser.	15
	Condenser is lowered too far.	Adjust the condenser height position.	15
2. Electrical System			
a) Bulb intermittently lights and goes out.	Bulb is nearly burned out.	Replace bulb.	29
	A connector is not properly connected.	Check all connectors.	29/30
b) Bulb burns out almost immediately.	Wrong type of bulb is being used.	Use correct bulb type.	29
c) Brightness does not change when you turn the Light intensity Install bulb.adjustment knob.	Light intensity preset switch is set to ON.	Press switch to OFF.	8
	Bulb is not installed.	Install bulb.	29
	Bulb is burned out.	Replace bulb.	29
	Lamp socket is not connected.	Connect lamp socket correctly.	29
3. Coarse/Fine Adjustment			
a) Coarse adjustment knob is hard to turn.	Tension adjustment ring is tightened excessively.	Loose ring.	10
	You are trying to raise stage without coarse adjustment knob while pre-focusing lever is kept locked.	Unlock pre-focusing lever.	10
b) Objective drifts down by itself or focus is lost during observation.	Tension adjustment ring is too loose.	Tighten ring.	10
c) Coarse adjustment will not go all the way down. (Objective will not lower.)	Pre-focusing lever is locked at an upper position.	Unlock pre-focusing lever.	10
d) Objective makes contact with specimen before focus is obtained.	Specimen is mounted upside down.	Mount specimen correctly.	—
4. Observation Tube			
a) Field of view of one eye does not match that of the other.	Interpupillary distance is incorrect.	Adjust interpupillary distance.	13
	Incorrect diopter adjustment.	Adjust diopter.	13
	Different eyepieces are used on left and right.	Change on eyepiece to match the other so that both sides are the same type.	—

Problem	Cause	Remedy	Page
a) Field of view of one eye does not match that of the other.	Your view is not accustomed to microscope observation.	Upon looking into eyepieces, try looking at overall field before concentrating on specimen range. You may also find it helpful to look up and into distance for a moment before looking back into microscope.	—
5. Stage			
a) Image shifts when you touch stage.	Stage is not properly mounted.	Clamp stage.	12
b) Specimen stops midway on the X-axis traverse.	Specimen is not correctly positioned.	Place specimen correctly.	11
c) X- and Y-axis knobs are too tight or too loose.	Tension of X- and Y-axis knobs is too high or too low.	Adjust tension.	12
d) Stroke has reduced.	Stage guide is deviated.	Correct deviation as described in treatment on page 12.	12
6. Marker			
a) Marking is impossible.	Pen has run out of ink.	Replace pen with a new one.	—
	Incorrect stroke adjustment.	Re-adjust stroke.	—
	Pen tip is dry.	Wipe pen tip with a piece of tissue paper and try writing.	—
b) Slide glass detaches when marking is executed.	Incorrect stroke adjustment.	Re-adjust stroke.	—
c) Marker pen life is short.	Pen tip is dry.	Cap pen tip after each use.	—

6 SPECIFICATIONS

Item	Specification			
1. Optical system	UIS2/UIS (Universal Infinity System) optical system (featuring infinity correction)			
2. Illumination	Built-in transmitted Koehler illumination 6V 30W halogen bulb (pre-centered) 6V30WHAL (PHILIPS 5761) (Average life time: Approximately 100 hr. when used as directed) Light intensity voltage range: 2 V or less to 5.9 V DC (continuous) Light intensity preset button (voltage adjustment range: 2 V or less to 5.9 V DC) Rated voltage: 100-120/220-240 V ∿, 0.8/0.4 A, 50/60 Hz Power consumption: 45 W			
3. Focusing	Removing nosepiece movement by roller guide (rack & pinion) Stroke per rotation: 0.1 mm (fine), 17.8 mm (coarse) Full stroke range: 15 mm Lower coarse adjustment limit stopper Tension adjustment on coarse focus adjustment knob.			
4. Revolving nosepiece	5-position revolving nosepiece, fixed (with a slider inlet)			
5. Observation tube	Type	U-BI30-2	U-TBI3	U-ETBI (U-TTBI)
		Widefield binocular	Widefield, tilting binocular	Widefield, erect (inverted), tilting binocular
	Field No.	22		
	Tube inclination	30°	5°-35° continuous	0°-25° continuous
	Interpupillary distance adjustment	50 mm to 76 mm		
6. Stage	Type	U-SVRC	U-SVLC	
		Common-axis knobs on bottom right.	Common-axis knobs on bottom left.	
		Rectangular ceramic-coated, wire-driven stage		
	Size	156 mm (D) x 191 mm (W)		
	Movement mechanism	X- and Y-axis knob with adjustable tension. Movement range: 52 mm in vertical (Y) direction, 76 mm in horizontal (X) direction.		
	Specimen holders (single slide holder)	U-HLS4 U-HLST4	U-HRS4 U-HRST4	
	Specimen holders (double slide holder)	U-HLD4 U-HLDT4	U-HRD4 U-HRDT4	
7. Condenser	Type	Universal condenser, fixed		
	N.A.	0.1 to 0.9		
	Aperture iris diaphragm	With numerical aperture scale		
	Turret	1 stage (2 optical devices can be mounted on the upper part and 3 filters can be mounted on the bottom part.)		

Item	Specification	
7. Condenser	Objective range and applicable objective powers	• Transmitted brightfield: 1.25X to 100X • Transmitted PH: 10X to 100X • Transmitted darkfield: Any objective with NA of no more than 0.7. • Transmitted polarized: 2X to 100X (NOTE: When using a 1.25X to 4X objective, swing out the top lens.) The NA in widefield observation is 22 in any mode.
8. Operating environment	• Indoor use. • Altitude: Max. 2000 meters • Ambient temperature: 5° to 40°C (41° to 104° F) • Maximum relative humidity: 80% for temperatures up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F), to 50% relative humidity at 40°C (104°F). • Supply voltage fluctuations; Not to exceed ±10% of the normal voltage. • Pollution degree: 2 (in accordance with IEC60664) • Installation/Overvoltage category: II (in accordance with IEC60664)	

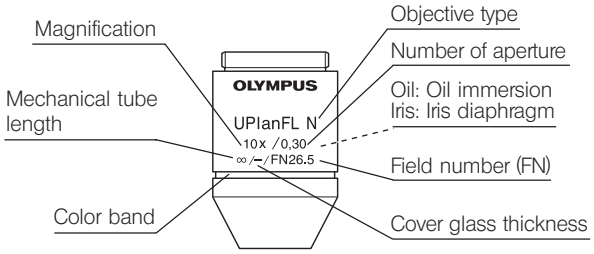
7 OPTICAL CHARACTERISTICS

— UIS series objectives not listed here can also be combined with this microscope. —

The following table shows the optical characteristics of combinations of eyepieces and objectives. The figure on the right shows the performance data engraved on the objectives.

NOTE

Refer to the latest catalogue or consult your local Olympus representative for the updated information on the eyepieces and objectives that can be combined with this microscope.



Objective \ Optical character		Magnification	N.A.	W.D. (mm)	Cover glass thickness	Resolution (μm)	Eyepiece WHN10X (FN22) Total mag.	Depth of focus (μm)	Field of view	Remark
UIS2 Series	PlanN-P Plan Achromat for polarized light (FN22)	4X	0.1	18.5	–	3.40	40X	180.0	5.5	
	AchN-P Achromat for polarized light (FN22)	10X	0.25	6.0	–	1.30	100X	28.0	2.2	
		20X	0.4	3.0	0.17	0.84	200X	9.3	1.1	
		40X	0.65	0.45	0.17	0.52	400X	2.0	0.55	
		100XO	1.25	0.13	–	0.27	1000X	0.69	0.22	
	PlanN Plan Achromat (FN22)	2X	0.06	5.8	–	5.59	20X	560.1	11.0	
		4X	0.1	18.5	–	3.36	40X	175.0	5.5	
		10X	0.25	10.6	–	1.34	100X	28.0	2.2	
		10XCY	0.25	10.6	–	1.34	100X	28.0	2.2	ND filter
		20X	0.4	1.2	0.17	0.84	200X	9.27	1.1	
		40X	0.65	0.6	0.17	0.52	400X	3.04	0.55	
		50XOI	0.5-0.9	0.2	0.17	0.37	500X	1.7	0.44	Oil immersion/Iris
		100XO	1.25	0.15	–	0.27	1000X	0.69	0.22	Oil immersion
	UPlanFLN Plan Semi Apochromat (FN26.5)	4X	0.13	17.0	–	2.58	40X	127.2	5.5	
		10X	0.3	10.0	–	1.12	100X	22.4	2.2	
		20X	0.5	2.1	0.17	0.67	200X	7.0	1.1	
		40X	0.75	0.51	0.17	0.45	400X	2.52	0.55	
		40XO	1.3	0.2	0.17	0.26	400X	1.27	0.55	Oil immersion
		60X	0.9	0.2	0.17	0.37	600X	1.5	0.37	Correction collar
		60XOI	0.65-1.25	0.12	0.17	0.27	600X	0.98	0.37	Oil immersion/Iris
		100XO	1.30	0.2	0.17	0.26	1000X	0.66	0.22	Oil immersion
		100XOI	0.6-1.30	0.2	0.17	0.26	1000X	0.66	0.22	Oil immersion/Iris
	PlanFLN Plan Semi-Apochromat (FN26.5)	10XCY	0.30	10.0	–	1.12	100X	22.0	2.2	ND filter
	UPlanSApo Plan Apochromat (FN26.5)	4X	0.16	13.0	–	2.10	40X	99.6	5.5	
		10X	0.4	3.1	0.17	0.84	100X	15.9	2.2	
		20X	0.75	0.6	0.17	0.45	200X	4.29	1.1	
		40X	0.9	0.18	0.17	0.37	400X	2.0	0.55	Correction collar
		60XW	1.2	0.28	0.17	0.28	600X	1.03	0.37	Water immersion
		60XO	1.35	0.15	0.17	0.25	600X	0.89	0.37	Oil immersion
		100XO	1.4	0.13	0.17	0.24	1000X	0.59	0.22	Oil immersion
	PlanApoN Plan Apochromat (FN26.5)	1.25X	0.04	5.0	–	8.39	12.5X	1326.8	17.6	
		2X	0.08	6.2	–	4.19	20X	398.3	11.0	
		60XO	1.42	0.15	0.17	0.24	600X	0.83	0.37	Oil immersion

Objective \ Optical character		Magnification	N.A.	W.D. (mm)	Cover glass thickness	Resolution (μm)	Eyepiece WHN10X (FN22)/WHC10X (FN20) Total mag.	Depth of focus (μm)	Field of view	Remark
UIS Series	AchC Achromat (FN20)	4X	0.10	28.90	–	3.4	40X	175.0	5.0	
		10X	0.25	6.30	–	1.34	100X	28.0	2.0	
		40X	0.65	0.62	0.17	0.52	400X	3.0	0.5	
		100XO	1.30	0.20	0.17	0.26	1000X	0.66	0.2	Oil immersion

(Note) The AchC series objectives must be combined with the WHC10X.

8 ASSEMBLY

8-1 Assembly Diagram

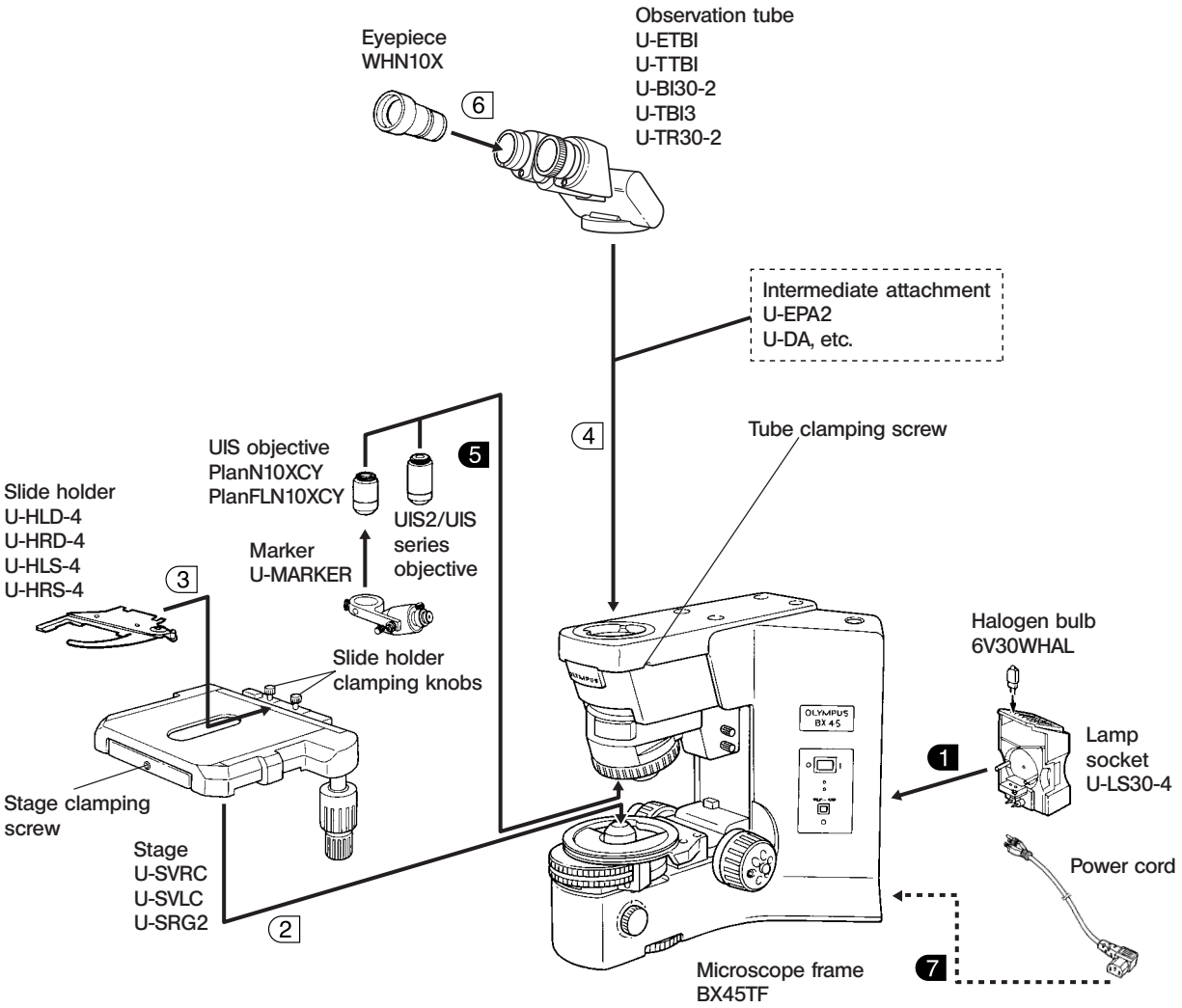
The diagram below shows the sequence of assembly of the various modules. The numbers indicate the order of assembly.

The module numbers shown in the following diagram are merely the typical examples. For the modules with which the module numbers are not given, please consult your Olympus representative or the catalogues.

★ **When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.**

Assembly steps enclosed in ■ will be detailed on the subsequent pages.

◎All assembly operations are possible by using the Allen screwdriver ( ) provided with the microscope.



8-2 Detailed Assembly Procedures

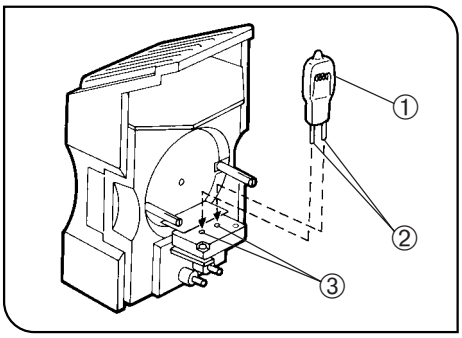


Fig. 38

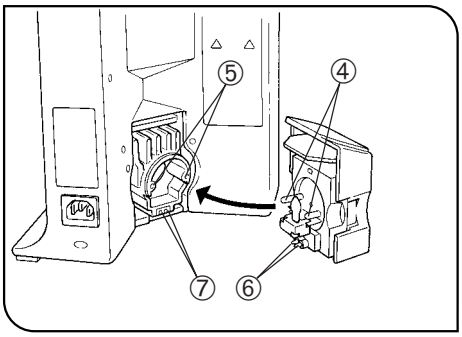


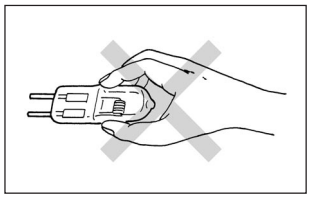
Fig. 39

1 Installing the Bulb (Figs. 38 & 39)

Use only the designated bulb 6V30WHAL (PHILIPS 5761).

1. Holding the bulb ① with gloves or a piece of gauze, insert the bulb pins ② straight and fully into the pin holes ③ on the lamp socket.

★ **To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.**



2. Aligning the guide pins ④ with the guide pin holes ⑤ at the rear of the microscope frame, and the plug ⑥ with the socket ⑦, gently push the lamp socket all the way into place.

⚠Caution for Bulb Replacement During Use or Right After Use

The bulb and the lamp socket are areas near these will be extremely hot during and right after use.
Set the main switch to " O " (OFF), disconnect the 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.

5 Attaching the Objectives

Screw in the objectives into the holes of revolving nosepiece by beginning with the lowest-power objective toward higher-power objectives.

◎If you want to observe images of 10X and 40X objectives alternately, attach them side by side.

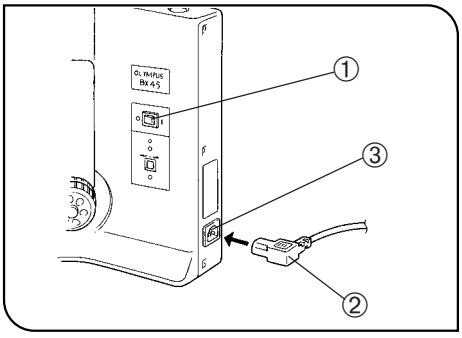


Fig. 40

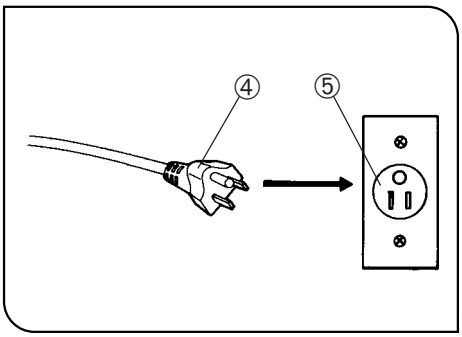


Fig. 41

7 Attaching the Power Cord (Figs. 40 & 41)

⚠**The power cord is vulnerable when bent or twisted. Never subject it to excessive force.**

⚠**Make sure that the main switch ① is set to " O " (OFF) before connecting the power cord.**

⚠**Always use the power cord provided by Olympus. IF no power cord is provided with the microscope,** please select the proper power cord by referring to section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual.

1. Connect the power cord plug ② to the AC receptacle ③

⚠**The power cord should be connected to a grounded, 3-conductor power outlet. If the power outlet is not grounded properly, Olympus can no longer warrant the electrical safety performance of the equipment.**

2. Plug the power cord plug ④ into the wall outlet ⑤.

⚠**If the power cord comes in contact with the lamp socket or the surroundings, the cord may melt down, causing electric shock hazards. Be sure to distribute the power cord at enough distance from the lamp socket.**

PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to " Specifications " and " Certified Cord " below:

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL-APEX / MITI	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		U.S.A.	UL	
Ireland	NSAI				

Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	‹HAR›	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	‹VDE›	‹HAR›	30	10	10
Union Technique de l´Electricite´ (UTE)	USE	‹HAR›	30	10	30
Instituto Italiano del Marchio di Qualita´ (IMQ)	IEMMEQU	‹HAR›	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	‹HAR›	10	10	30
N.V. KEMA	KEMA-KEUR	‹HAR›	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	‹HAR›	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	‹ÖVE›	‹HAR›	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	‹DEMKO›	‹HAR›	30	10	30
National Standards Authority of Ireland (NSAI)	‹NSAI›	‹HAR›	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	‹HAR›	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	‹UNED›	‹HAR›	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	‹HAR›	30	30	70
Instituto Portages da Qualidade (IPQ)	np	‹HAR›	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	‹HAR›	10	30	90
Elektriska Inspektoratet	SETI	‹HAR›	10	30	90

Underwriters Laboratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

MEMO

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