

# Instructions

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# BX46

## Clinical microscope



To ensure safety, obtain optimum performance and to familiarize yourself fully with the use of this product, we recommend that you study this manual thoroughly before operating this product, and always keep this manual reachable when operating this product. For details of products included in the configuration of this microscope, see page 4.

Optical Microscope and Accessory



In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to your local distributor in EU for return and/or collection systems available in your country.

**NOTE:** This product 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 product is operated in a commercial environment. This product 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 product 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 product.

**For Korea only**

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

# Contents

<b>Introduction</b> .....	<b>1</b>
<b>1 Module nomenclature</b> .....	<b>4</b>
<b>2 Controls</b> .....	<b>5</b>
<b>3 Flow of observation</b> .....	<b>8</b>
<b>4 Simplified observation procedure</b> .....	<b>10</b>
4-1 Basic operation (until observation of specimen).....	10
4-2 Microscope adjustments (how to improve the observed image) .....	11
<b>1</b> Adjusting the interpupillary distance .....	11
<b>2</b> Adjusting the diopter.....	11
<b>3</b> Adjusting the centering.....	12
<b>4</b> Adjusting the contrast.....	12
<b>5 Using the controls</b> .....	<b>13</b>
5-1 Base.....	13
<b>1</b> Adjusting the brightness.....	13
<b>2</b> Setting the LIM brightness.....	13
<b>3</b> Using the filters.....	14
5-2 Focusing block.....	15
<b>1</b> Focusing controls.....	15
<b>2</b> Adjusting the focus.....	15
<b>3</b> Replacing the fine adjustment knob.....	16
<b>4</b> Adjusting the coarse adjustment knob tension .....	16
<b>5</b> Pre-focusing lever.....	16
5-3 Stage.....	17
<b>1</b> Placing the specimen .....	17
<b>2</b> Adjusting the X- and Y-Axis knob tension.....	18
<b>3</b> Rotating the stage.....	18

5-4 Observation tube.....	19
<b>1</b> Adjusting the diopter.....	19
<b>2</b> Using the eye shades.....	19
<b>3</b> Mounting the eyepiece micrometer disk.....	20
<b>4</b> Selecting the light path of the trinocular tube.....	20
<b>5</b> Adjusting the tilt.....	21
<b>6</b> Using eyepieces incorporating a micrometer.....	22
5-5 Condenser .....	22
<b>1</b> Compatibility of objectives and condensers.....	22
5-6 Immersion objectives.....	23
<b>1</b> Using immersion objectives.....	23
<b>6 Camera recording.....</b>	<b>24</b>
<b>1</b> System chart.....	24
<b>2</b> Selecting the camera adapter magnification .....	24
<b>7 Troubleshooting guide.....</b>	<b>25</b>
<b>8 Specifications.....</b>	<b>28</b>
<b>9 Optical characteristics (UIS2 series).....</b>	<b>30</b>
<b>10 Assembly.....</b>	<b>31</b>
10-1 Assembly diagram .....	31
10-2 Detailed assembly procedures.....	32
<b>11 Preventive inspection sheet for illumination devices.....</b>	<b>37</b>
<b>■ Proper selection of the power supply cord .....</b>	<b>38</b>
<b>12 Request to issue the Safety Confirmation.....</b>	<b>40</b>

# Introduction

## ⚠ Safety precautions (Fig.1)

1. If potentially infectious samples may be observed, use protective gloves or other protective means to prevent the skin from contacting with samples directly. After observation, be sure to clean the portion contacted with samples.
  - Moving this product is accompanied with the risk of dropping the samples. Be sure to remove the samples before moving this product.
  - In case the samples is damaged by erroneous operation, promptly take the infection prevention measures.
  - Follow the procedures described in Chapter “Getting ready” (see on page 2) prior to using the accessories of this product. Otherwise, the stability of the device will be lost and the dropped samples will cause the possibility of infection.
  - When you maintain the device which may have contacted with potentially infectious reagents, be sure to wear the protectors such as gloves, or clean the device prior to operation.
  - Before disposing of device contacted with potentially infectious samples, be sure to follow the regulations and rules of your local government.
2. Install the microscope on a sturdy, level table or bench.
3. Be careful not to tilt the microscope too much. Otherwise, the mobile parts such as the light path selector knob may move in unintended directions.
4. Always use the power cord provided by us. 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 performance cannot be warranted.
5. Always ensure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded, we can no longer warrant the electrical safety performance of the equipment.

### Operation Using the LED Lamp

— Safety Note on LED (Light Emitting Diode) —

The LED incorporated in the LED lamp housing is basically safe, but do not look at the illumination light directly for an extended period to prevent your eye from being injured.

### Operation Using the Halogen Bulb

1. To avoid potential shock hazards and burns when replacing the halogen bulb, set the main switch of the TL4 power supply unit to “○” (OFF) and allow the lamp socket **a** and bulb to cool before touching them.

Designated bulb	6V30WHAL (PHILIPS 5761)
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**CAUTION** Always use the designated lamp bulb. Using other bulb may cause malfunction.

2. If the lamp cable or power cord comes in contact with the lamp socket or its surroundings, the cable or cord may be melted by the heat, causing an electric shock or fire hazard. To prevent this, distribute the lamp cable and power cord at enough distances from the lamp socket.
3. The standard service life of the lamp socket is eight (8) years of use or 20,000 hours of total power ON period, whichever is the shorter period. For details, see “11 Preventive inspection sheet for illumination devices” on page 37.

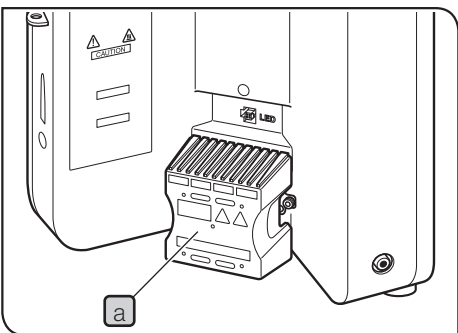


Fig.1





### Restrictions in Use

When all combinations (① to ③) below are satisfied at the same time, the microscope may fall if tilted larger than a certain degree, comparing to other combinations. Please mount the camera port of the intermediate observation tube toward diagonally backward 45° to prevent from falling.

- ① The observation tube is either the trinocular tube, U-TTBI, U-ETBI or U-TTLBI.
- ② The intermediate observation tube is either U-TRUS or U-DP.
- ③ The camera heavier than 0.4kg is mounted on the intermediate observation tube described in ②.



### 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.
	Indicates a non-specific general hazard. Follow the description given after this symbol or in instruction manual.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

### Caution engraving/label

Caution engraving and label are placed at parts where special precaution is required when handling and using the microscope. Always heed the cautions.

Caution engraving position	Halogen lamp socket [Caution against high temperature]	
Caution label position	Rear panel [Caution against high temperature]	

If a caution engraving or label is dirty or peeled off, contact us for the replacement or other inquiry.

## 1 Getting ready

(Fig.2)

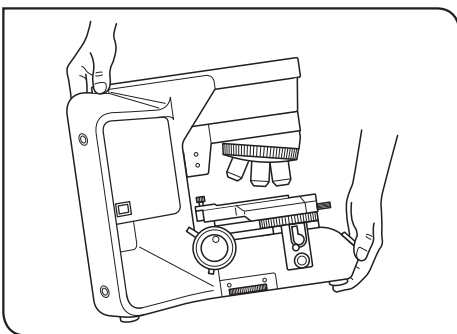


Fig.2

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact. Also note that the microscope does not have a waterproof construction.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, see "8 Specifications" on page 28.
3. When moving the microscope, remove the observation and specimen and carefully carry the microscope by holding the grasping part on the rear of the arm and the front part of the base as shown in Fig.2.

**CAUTION** To prevent damage to the microscope, never hold it by the stage or coarse/fine adjustment knob.

- Even when moving the microscope along the desktop surface, be sure to remove the specimen in advance.
  - When the microscope needs to be packaged for forwarding to a remote location, contact us.
4. When the accessories of this product are used, make sure that the system height does not exceed 1 meter. Otherwise, the stability of the device will be lost.
  5. When an arm, illuminator, intermediate attachment, observation tube and camera are to be attached to the upper part of the microscope frame, make sure that their total weight does not exceed 7 kg.
  6. Brightness of illumination light for simplified polarized light observation could be insufficient when observing specimens that have little retardation. Also brightness of illumination light for phase contrast, differential interference contrast or dark field observation could be insufficient depending on specimens observed.

## 2 Maintenance and storage

1. To clean the lenses and other glass components, simply blow dirt 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.

**CAUTION** • 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, which could cause ignition of a fire.  
Also remember to always use it only in a well-ventilated room.

- Set the main switch to “O” (OFF) and wait for the lamp housing to cool down sufficiently before proceeding to maintenance.
2. Do not 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 except for the parts that are specified to be disassembled in this manual, as this could result in malfunction or reduced performance.
  4. After using the microscope, set the main switch to “O” (OFF), (wait for the lamp socket to cool down sufficiently if the halogen bulb has been used,) and keep it covered with a dust cover during storage.
  5. Before disposing of this product, be sure to follow the regulations and rules of your local government.

## 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.

**CAUTION** :Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the equipment or other property. It may also be used to alert against unsafe practices.

**TIP** :Indicates commentary (for ease of operation and maintenance).

## 4 Intended use

This product has been designed to be used to observe magnified images of specimens in various routine work and research applications.

This includes the observation of living cells or of specimen taken from tissues to gain physiological or morphological information at hospitals or laboratories. Typical field of applications are genetics, human blood and tissue examination, neurology, pharmacology and cellular biology.

Do not use this instrument for any purpose other than its intended use.



This product complies with the requirements of Regulation (EU) 2017/746 and The Medical Device (Amendment etc.) (EU Exit) Regulation 2020 concerning in vitro diagnostic medical devices. CE marking means the conformity to the former, and UKCA marking means the conformity to the latter. This product is applied with the requirements of standard IEC/EN61326-2-6 and IEC/EN61326-1 concerning electromagnetic compatibility.

- Emission: Class A

- Immunity: Professional healthcare facility environment

Emissions exceeding the level required by aforementioned standards may occur if this product is electrically connected to other equipment.

This product complies with the emission and immunity requirements described in IEC61326 series.

This product is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

This product is designed for use in a professional healthcare facility environment. It is likely to perform incorrectly if used in a home healthcare facility environment. If it is suspected that performance is affected by electromagnetic interference, correct operation may be restored by increasing the distance between this product and the source of the interference.

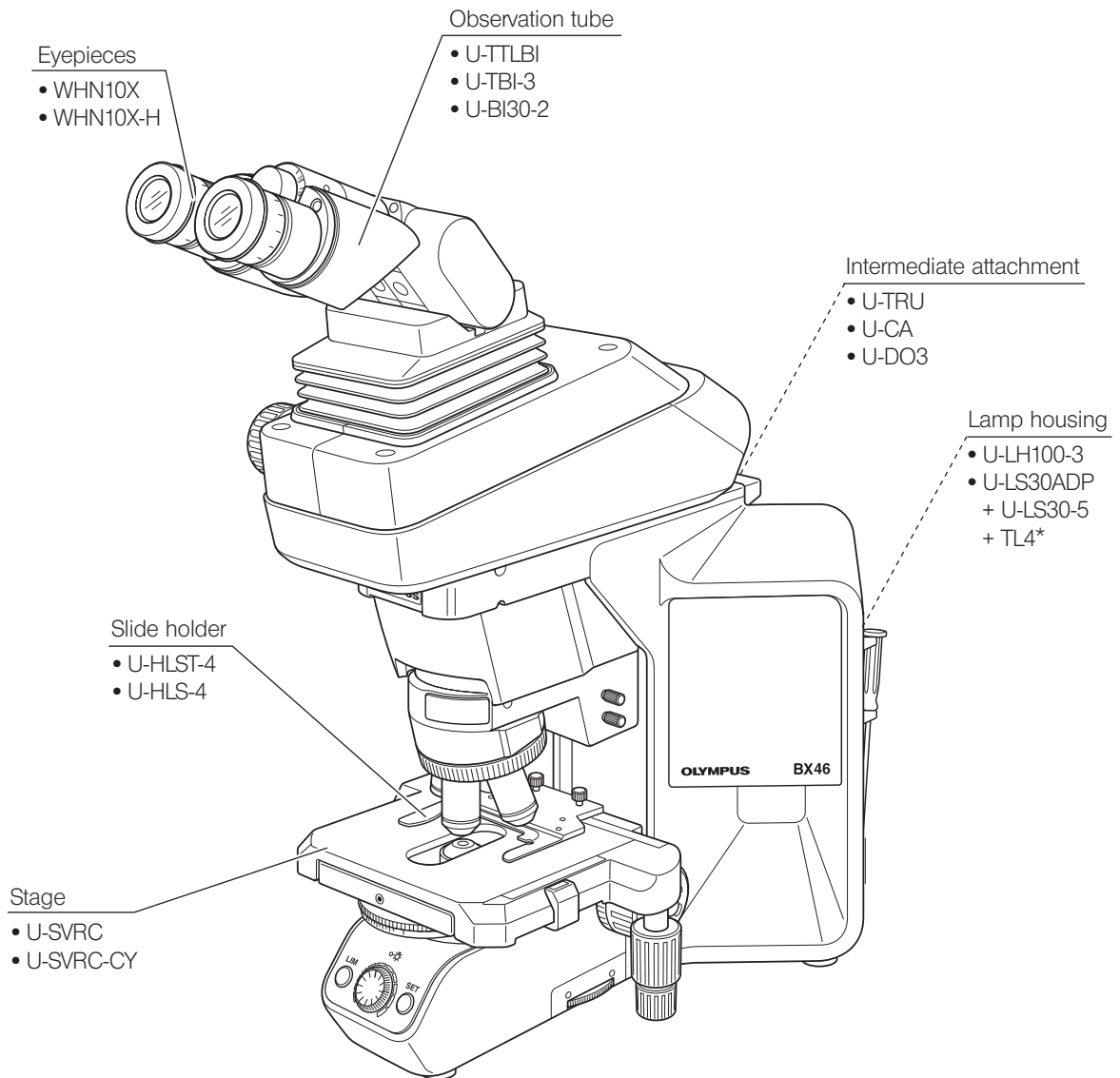
The electromagnetic environment should be evaluated prior to operation of this product.

Do not use this product in close proximity to the sources of strong electromagnetic radiation to prevent interference with the proper operation.

# 1 Module nomenclature

TIP

The modules mentioned below show only the typical product names. As there are some products that are not mentioned but also applicable to this microscope, check the latest catalogues or consult us. For the products marked “ \* ”, also read their instruction manuals.



# 2 Controls

**TIP** If you have not yet assembled the microscope, see “10 Assembly” on page 31.

Interpupillary distance adjustment scale (Page 11)

Diopter adjustment ring (Page 19)

Slide holder (Page 17)

Aperture iris diaphragm ring (Page 12)

Filter slider insertion slot

Field iris diaphragm ring (Page 12)

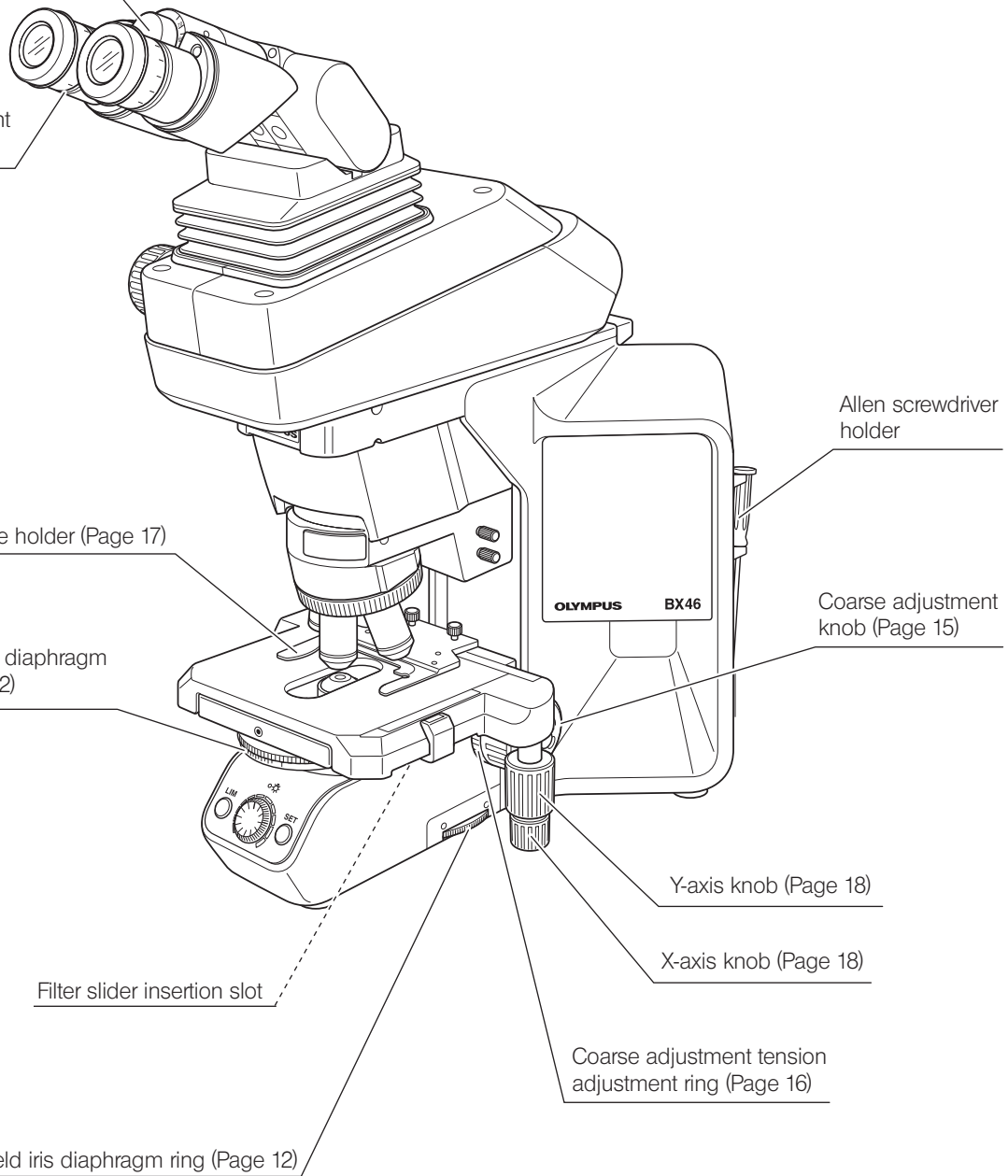
Allen screwdriver holder

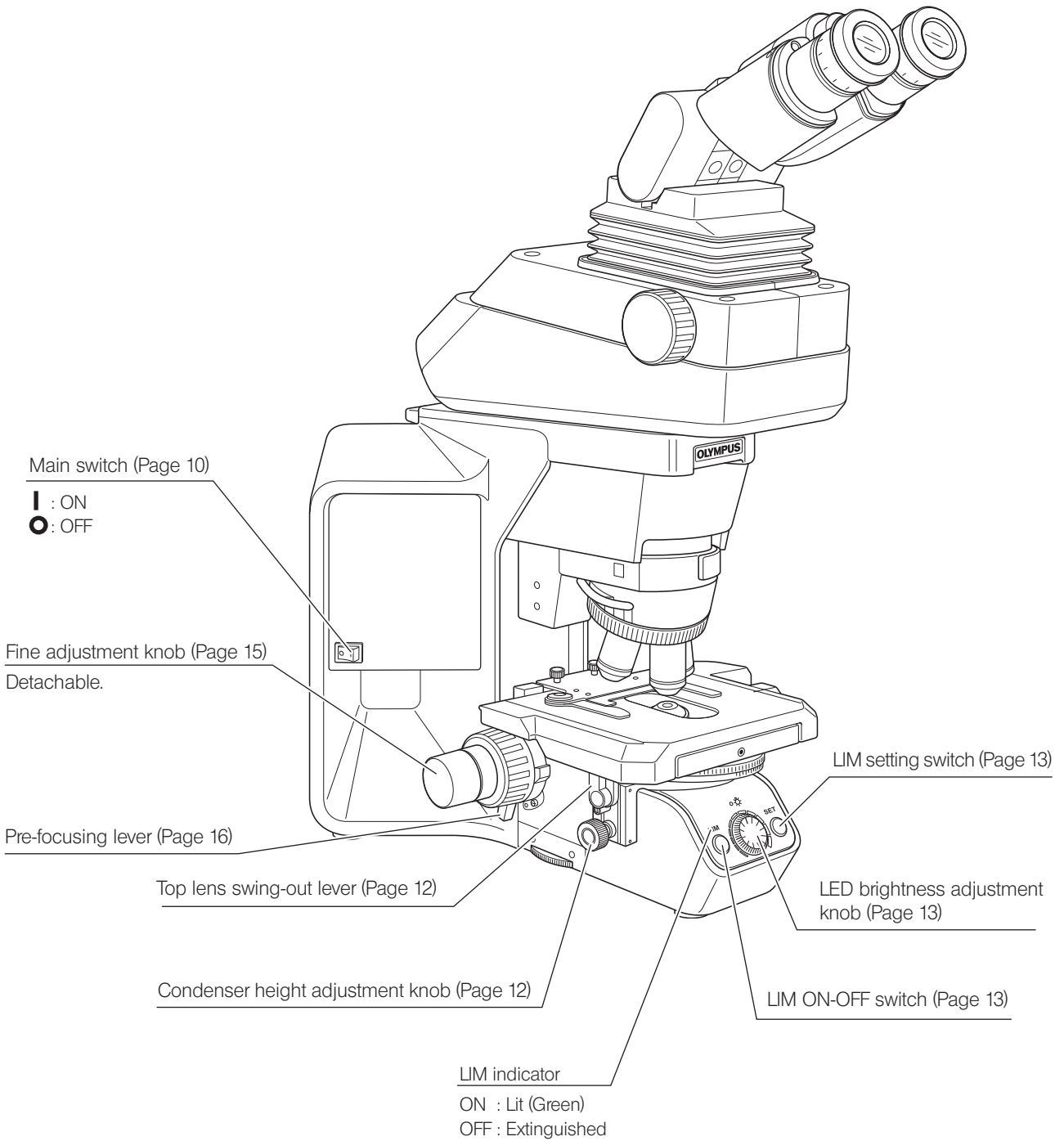
Coarse adjustment knob (Page 15)

Y-axis knob (Page 18)

X-axis knob (Page 18)

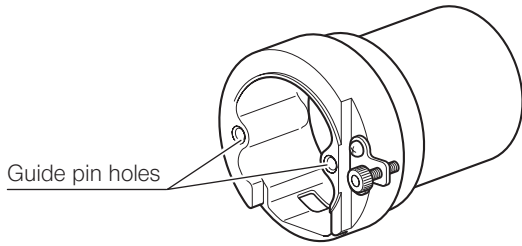
Coarse adjustment tension adjustment ring (Page 16)



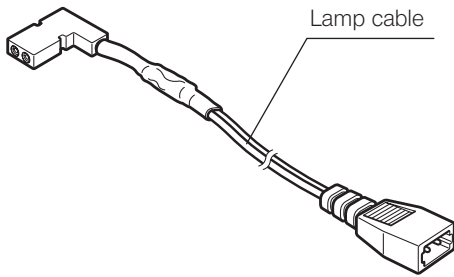
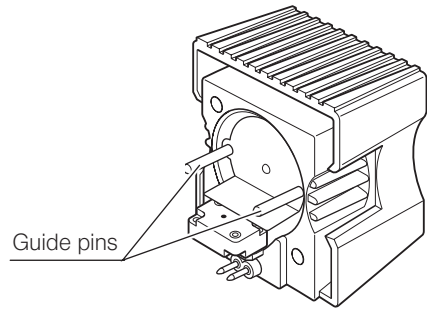


« Modules for halogen lamp operation »

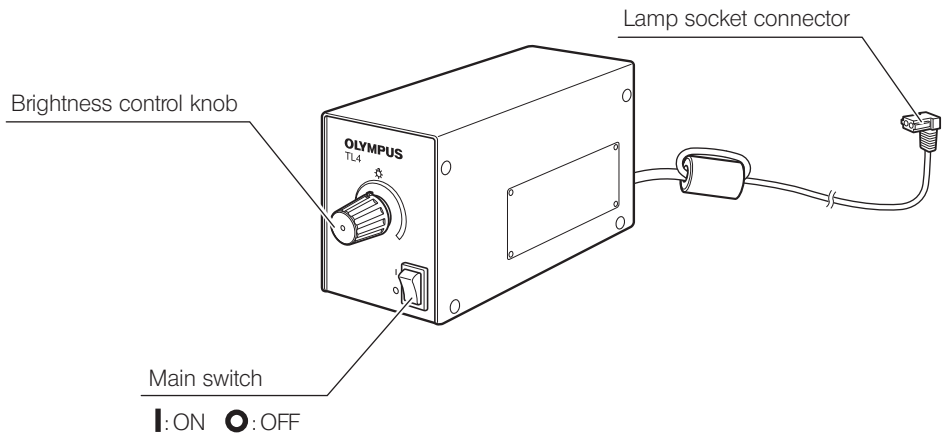
LS30 Adapter  
U-LS30ADP



Halogen lamp socket  
U-LS30-5

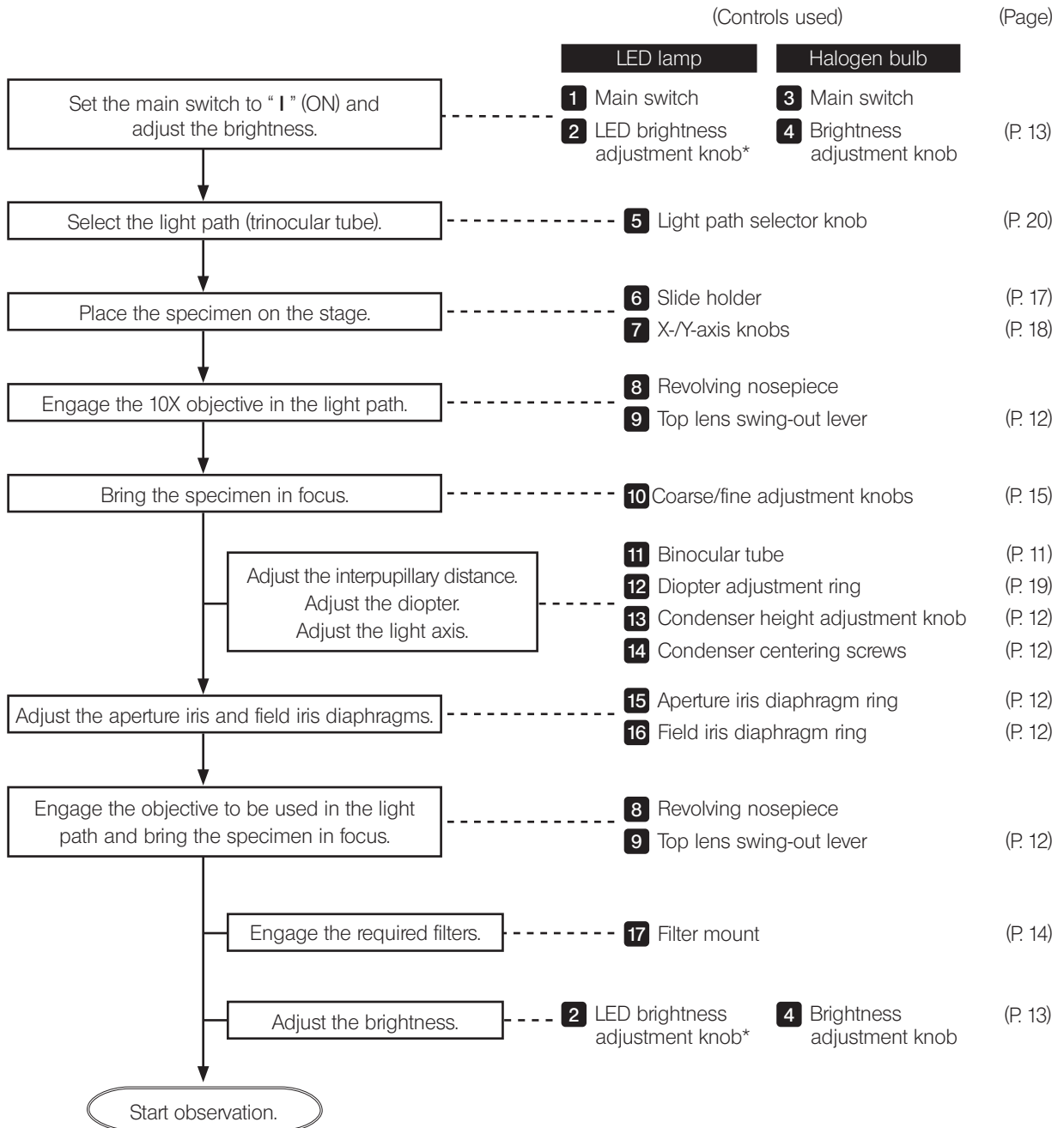


Power supply unit  
TL4

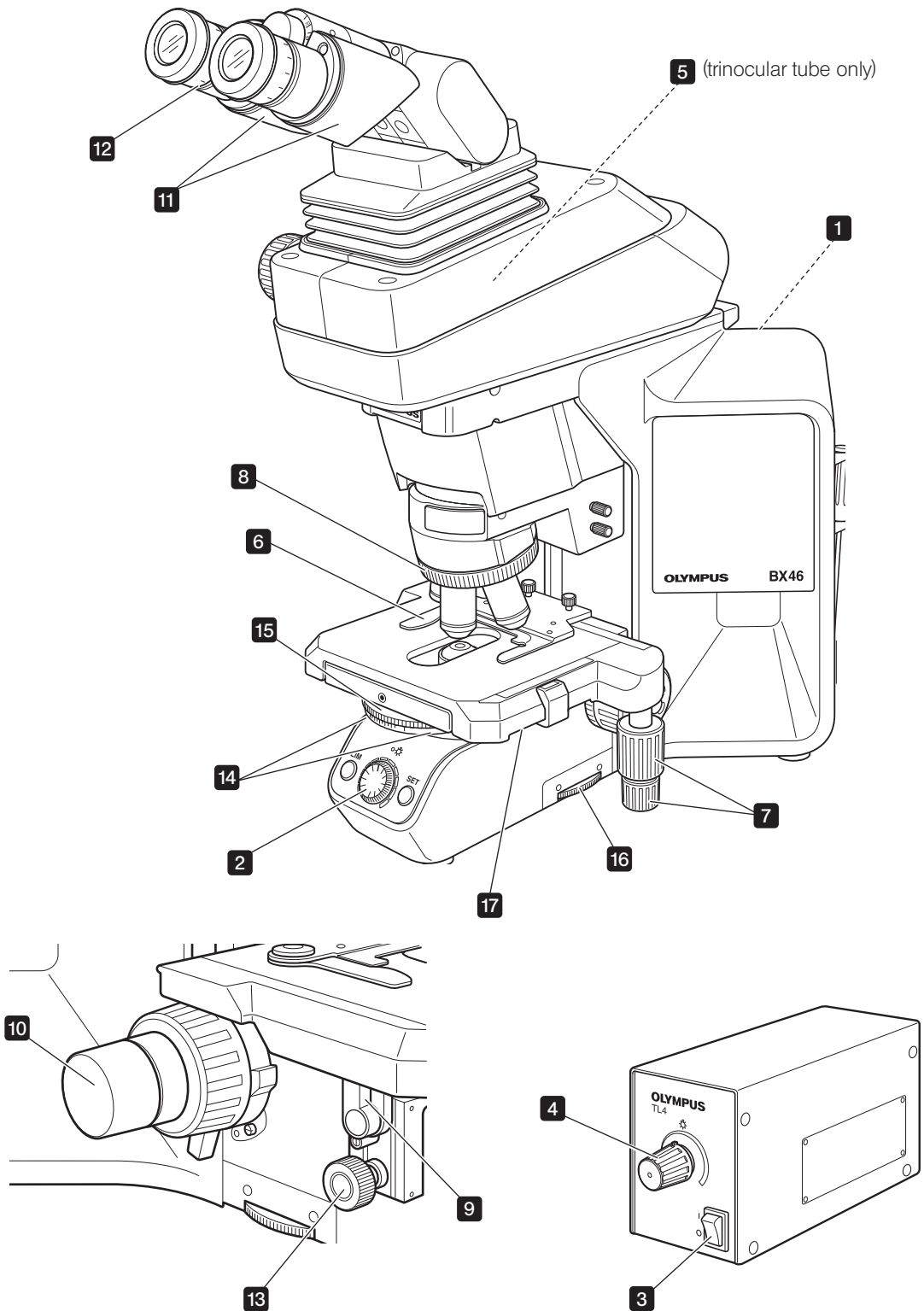


# 3 Flow of observation

- TIP**
- When the LED lamp is used and the LIM is set, the LED brightness adjustment knob is defeated.
  - When the halogen bulb is used, set the 32LBD filter in the filter slider and insert it into the insertion slot.



\* The LED brightness adjustment knob is defeated when the LIM is set (see page 13).



**TIP** Make a photocopy of the observation procedure pages and post it near your microscope.

# 4 Simplified observation procedure

## 4-1 Basic operation (until observation of specimen)

This section describes the basic operation of the microscope until the start of observation of a specimen. For the detailed operating procedure of each control, please read the description page specified below.

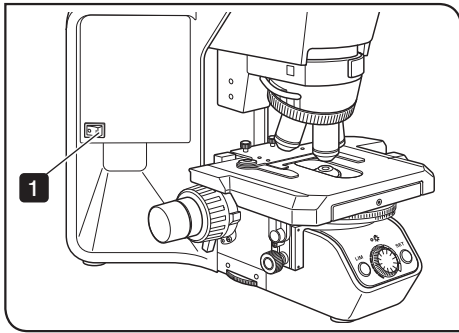


Fig.3

- 1 Press the main switch of the microscope frame to "I" (ON).

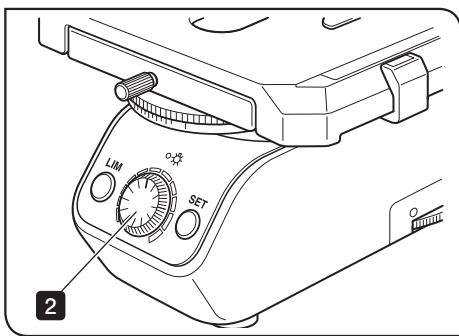


Fig.4

- 2 Rotate the knob to adjust the lamp brightness. (Details: Page 13)

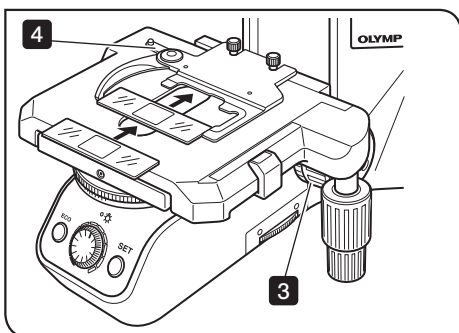


Fig.5

- 3 Rotate the knob to lower the stage. (Details: Page 15)
- 4 Open the clamping lever of the slide holder and place the specimen slide. (Details: Page 17)

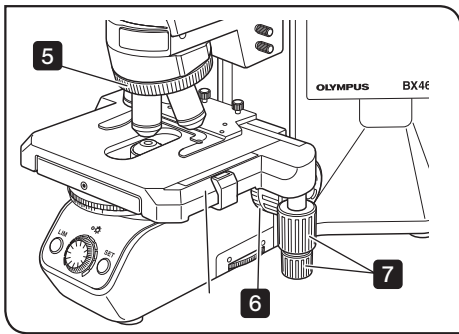


Fig.6

- 5** Rotate the revolving nosepiece to engage the 10X objective in the light path.
- 6** Rotate the coarse and fine adjustment knobs to bring the specimen in focus. (Details: Page 12)
- 7** Rotate the stage knob to adjust the observation position.

Now you can observe the magnified image of the specimen. To improve the observation further, read section "4-2 Microscope adjustments (how to improve the observed image)" below.

## 4-2 Microscope adjustments (how to improve the observed image)

Adjust the microscope as described below to improve the observed image.

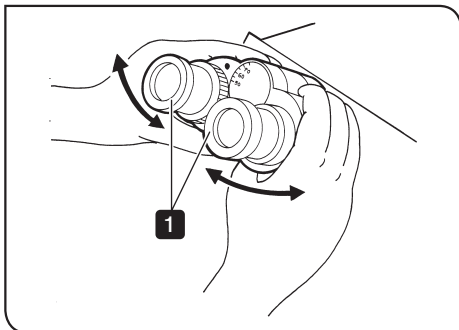


Fig.7

### 1 Adjusting the interpupillary distance

- 1** While looking through the eyepieces, adjust for binocular vision until the left and right fields of view coincide completely.

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

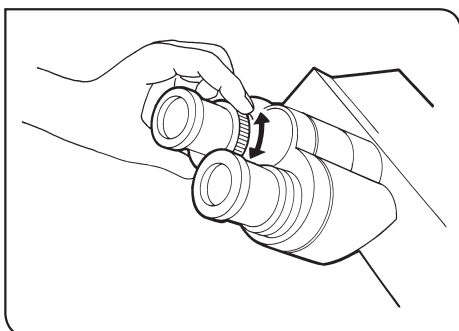


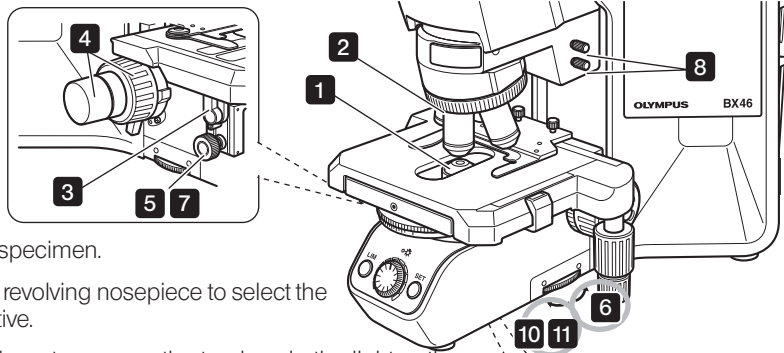
Fig.8

### 2 Adjusting the diopter

The diopter adjustment ensures parfocality from low to high magnifications and makes it possible to avoid defocusing even when the objective is switched.

For details, see page 19.

### 3 Adjusting the centering



- 1 Place the specimen.
- 2 Rotate the revolving nosepiece to select the 10X objective.
- 3 Raise the lever to engage the top lens in the light path.
- 4 Rotate the knobs to bring the specimen in focus.
- 5 Rotate the knob to raise the condenser to its upper limit.
- 6 Rotate the field iris diaphragm ring in the direction of the arrow so that the diaphragm image comes inside the field of view.
- 7 Rotate the knobs to focus on the field iris diaphragm image. (A in Fig.9)
- 8 Pull out the two condenser centering screws.
- 9 Insert the two condenser centering screws into the condenser centering thread holes and turn the two condenser centering screws to move the iris diaphragm image to the center of the field of view. (B in Fig.9)
- 10 Gradually open the field iris diaphragm until its image is inscribed in the field of view. (C in Fig.9)
- 11 Open the field diaphragm slightly until its image circumscribes the field of view slightly. (D in Fig.9)

**TIP** 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.

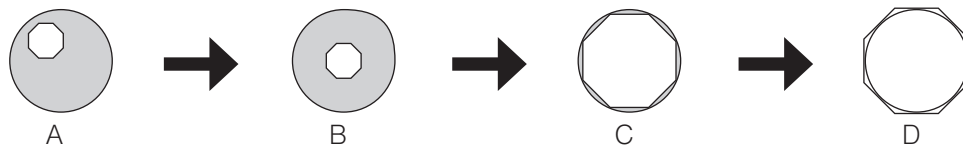
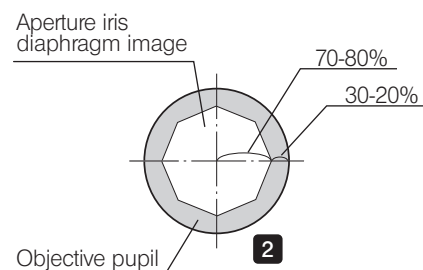
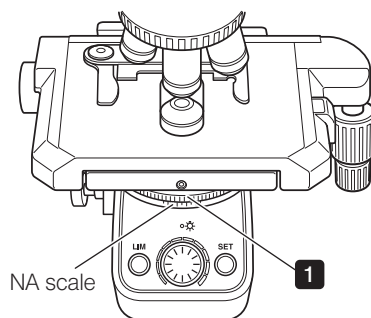


Fig.9 Movement of field Iris diaphragm image

### 4 Adjusting the contrast



- 1 Set the condenser aperture iris diaphragm ring so that the condenser NA scale position indicates 70% of the NA of the objective in use. After this, observe the image and fine adjust the aperture iris diaphragm to the desired condition.
- 2 The image of the aperture iris diaphragm can be viewed by removing the eyepieces and looking into the observation tube. Adjust so that the image looks approximately like that shown in the figure above.

# 5 Using the controls

## 5-1 Base

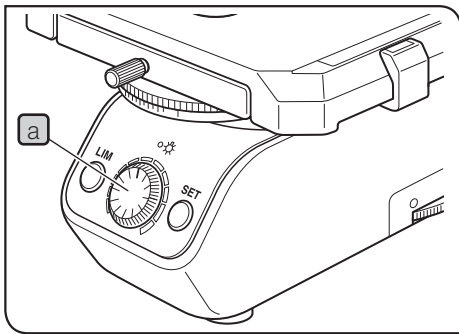


Fig.10

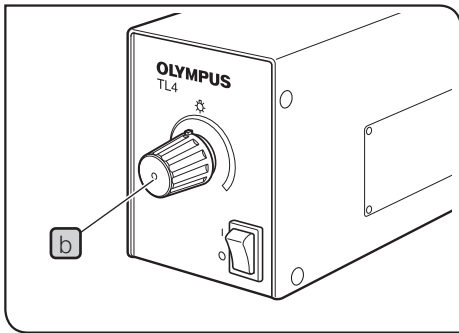


Fig.11

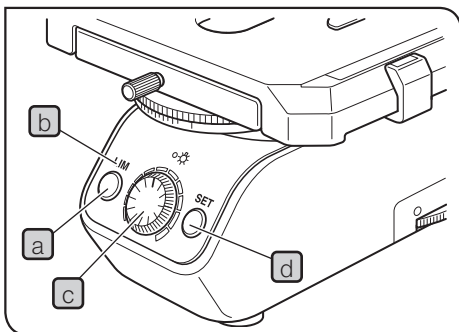


Fig.12

### 1 Adjusting the brightness (Figs.10 & 11)

- 1 When the LED lamp is used for observation, turn the LED brightness adjustment knob **a** clockwise to make illumination brighter.
- 2 When the halogen bulb is used for observation, adjust the brightness adjustment knob **b** of the TL4 power supply unit.

### 2 Setting the LIM brightness (Fig.12)

**TIP**

- LIM stands for Light Intensity Manager. It is effective when the U-LHLEDC LED lamp housing is used.
- The desired brightness can be set per objective. Once the brightness for the objectives is set, selecting an objective adjusts the LED brightness automatically provided that the LIM ON-OFF switch **a** is set to "ON" (which is indicated by the lighting of the LIM indicator **b**).

- 1 Press the LIM ON-OFF switch **a** to "OFF" (so that the LIM indicator **b** is extinguished)
- 2 Engage a low-power objective in the light path and bring the specimen in focus.
- 3 Rotate the brightness adjustment knob **c** for optimum brightness for observation.
- 4 Press the LIM setting switch **d** to enter the current brightness.
- 5 Set the optimum brightness for the mounted objectives by repeating the above for each of them.

To modify the LIM setting:

Engage the objective you want to set the new LIM setting in the light path, set the LIM ON-OFF switch to "OFF", and perform **3** and **4** above.

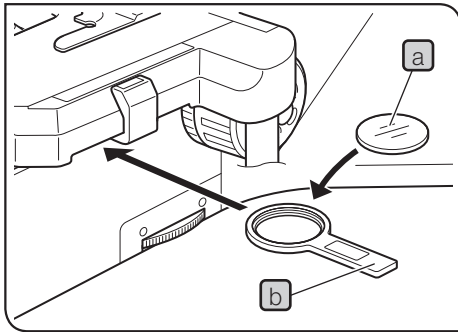


Fig.13

### 3 Using the filters

(Fig.13)

One of the filters listed below can be engaged in the light path by inserting the filter **a** in the filter slider **b** and engaging the filter slider in the light path.

Usable Filters	Applications
32LND1.5/3/6/12/25/50	For light brightness control, transmittance 1.5/3/6/12/25/50%
32LBD	For color temperature conversion
32IF550	For B&W contrast (Green)

**TIP** The LBD filter is not required when the LED lamp is used.

#### What is LBD filter?

The color of the sun at the noon of a clear day is called the daylight color, which looks white to human eyes. On the other hand, the halogen bulb used as the light source of this microscope does not emit the daylight-color light. so the LBD filter is engaged in the light path to convert the color of halogen bulb light into daylight. In general, engaging the LBD filter makes it possible to observe specimens in natural color tones.

## 5-2 Focusing block

**CAUTION** The stage of this microscope is fixed at a low height to facilitate replacement of specimens. Take care not to let your hand and fingers interfere with the stage when operating the coarse adjustment knob.

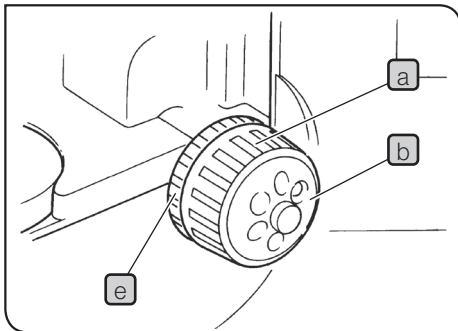


Fig.14

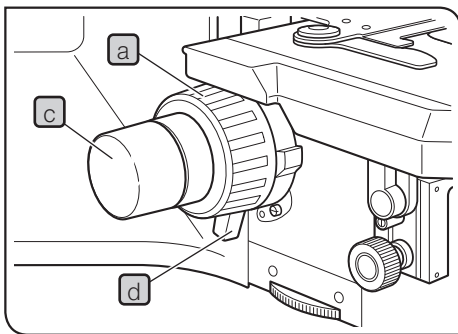


Fig.15

### 1 Focusing controls (Figs.14 & 15)

The focusing block consists of the controls listed in the following table, which also describes the functions of the controls.

No.	Name	Function
a	Coarse adjustment knob	Moves the focus position widely.
b	Fine adjustment dial	Fine adjusts the focus position.
c	Fine adjustment knob	Fine adjusts the focus position. This knob can be attached to the fine adjustment dial on either the left or right side. (When the microscope is shipped, it is attached to the right-side dial.)
d	Pre-focusing lever	Sets the lower limit of the objective position (to prevent contact between the specimen and objective).
e	Tension adjustment ring	Adjusts the force required to rotate the coarse adjustment knob.

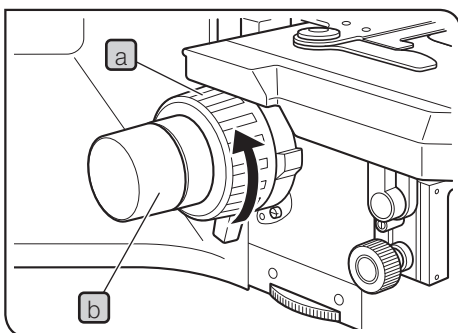


Fig.16

### 2 Adjusting the focus (Fig.16)

With both the coarse adjustment knob **a** and fine adjustment knob **b**, rotating the knob in the direction of the arrow raises the objective (lets the specimen approach the objective).

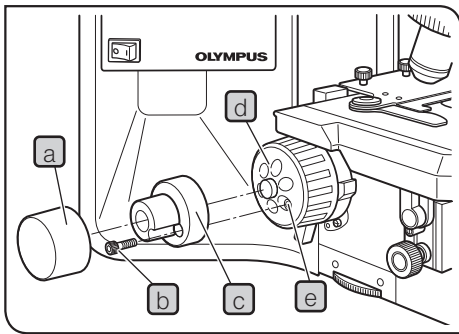


Fig.17

### 3 Replacing the fine adjustment knob (Fig.17)

**CAUTION** The fine adjustment knob has been attached on the left side at the factory.

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

- 1 Pull and remove the rubber cap **a** from the fine adjustment knob.
- 2 Using the Allen screwdriver, loosen the clamping screw **b** and remove the fine adjustment knob **c**.
- 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 **e** of the fine adjustment dial **d**, from which the fine adjustment knob has been removed.

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

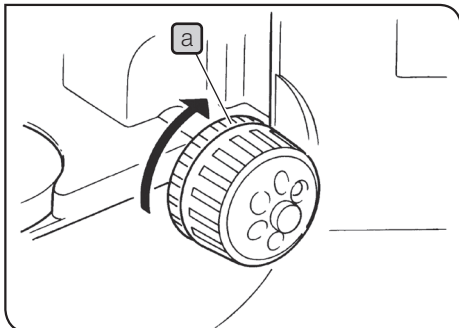


Fig.18

### 4 Adjusting the coarse adjustment knob tension (Fig.18)

**CAUTION** Adjust the coarse adjustment knob tension using the tension adjustment ring **a**.

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

The tension is too low if the stage 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.

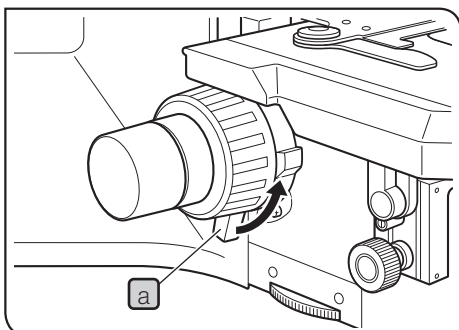


Fig.19

### 5 Pre-focusing lever (Fig.19)

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 **a** 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, approximate refocusing is easily accomplished by rotating the coarse adjustment knob to reach the pre-focused position. After this, all you have to do is make fine adjustments with the fine adjustment knob.

- TIP**
- The objective's vertical movement activated by the fine adjustment knob is not locked.
  - When the pre-focusing lever is locked, a coarse movement stroke is reduced due to the microscope's mechanism, causing the revolving nosepiece not to be able to be lowered to the lower limit. To lower the revolving nosepiece to the lower limit, release the pre-focusing lever.

## 5-3 Stage

**TIP** When the U-SP plain stage is used, place the slide specimen directly on the stage because this model does not have the slide holder.

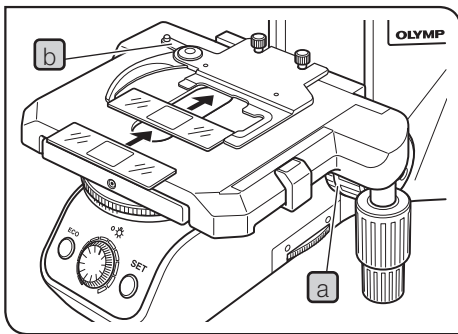


Fig.20

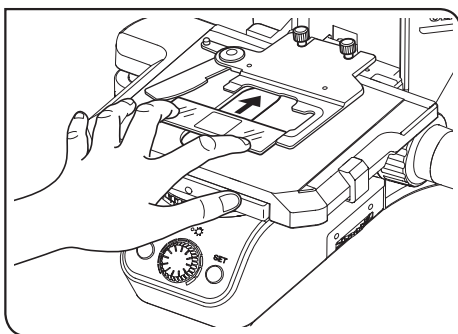


Fig.21-A

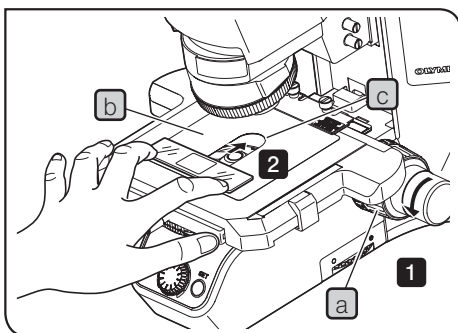


Fig.21-B

### 1 Placing the specimen (Figs.20 & 21-A & 21-B)

- TIP**
- The dimensions of the slide glass should be 26 x 76 mm with thickness of 0.9 to 1.2 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.20)

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

#### Microscopy with Single-Slide Holder (Fig.21-A)

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

#### When using the specimen hold plate (CX3-SHP) (Fig.21-B)

For attaching procedures, see "Attaching the specimen holder" (page 33).

- 1 Rotate the coarse focusing knob **a** to lower the stage sufficiently.
- 2 Place the specimen on the resin sheet **b**.

**CAUTION** • As the outside of the aperture **c** of the resin sheet is not illuminated by the light from the condenser, the specimen cannot be observed. Be careful when operating the X-axis knob, the aperture of the stage may be shifted from the aperture of the resin sheet and the hole may be covered.

- If the specimen hold plate is used in combination with the oil immersion objective or oil condenser, problems such as the specimen is defocused or stuck to the specimen hold plate, etc. may occur.

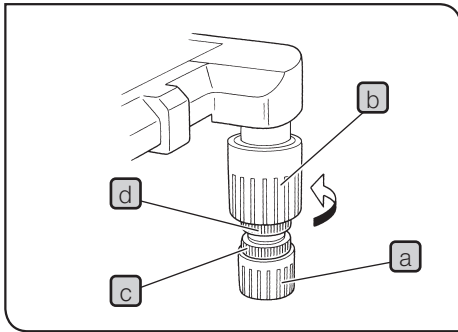


Fig.22

## 2 Adjusting the X- and Y-Axis knob tension (Fig.22)

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

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

**TIP** 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.

### Stage Feed Knob Rubber Caps (Optional)

**TIP** 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 knob 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) knob rubbers are available.

To attach the knob rubbers:

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.

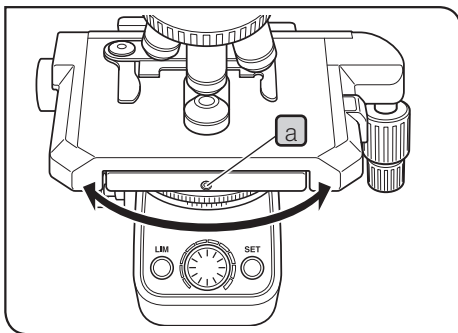


Fig.23

## 3 Rotating the stage (Fig.23)

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

**CAUTION** 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.

**TIP** The angle of rotation varies depending on the positions of the X- and Y-axis knobs.

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

## 5-4 Observation tube

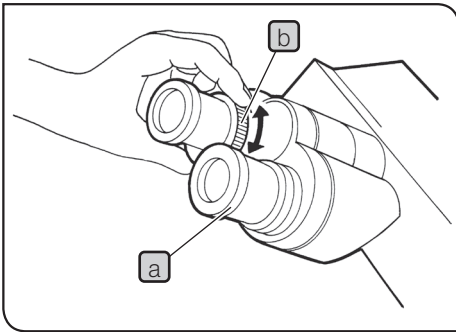


Fig.24

### 1 Adjusting the diopter (Fig.24)

- 1 Set the diopter adjustment rings on both sides to scale "0".
- 2 Engage a high-power objective (40X or so) in the light path, look into the right eyepiece with your right eye, and rotate the coarse and fine adjustment knobs to bring the specimen into focus.

**TIP** Do not use an immersion objective

- 3 Engage a low-power objective (10X or so) in the light path, rotate the right diopter adjustment ring **a** to bring the specimen into focus. Do not touch the coarse and fine adjustment knobs during the focusing.

- 4 Looking into the left eyepiece with your left eye, rotate the left diopter adjustment ring **b** to bring the specimen in focus

**TIP** • The above procedure adjusts the diopter with reference to the right eye, but it is also possible to adjust with reference to the left eye. In this case, read the above procedure by inverting "right" and "left."

- If an eyepiece equipped with a diopter adjustment ring is inserted into the side equipped with another diopter adjustment ring of the observation tube, perform the above procedure without moving the diopter adjustment ring of the observation tube from the "0" position.

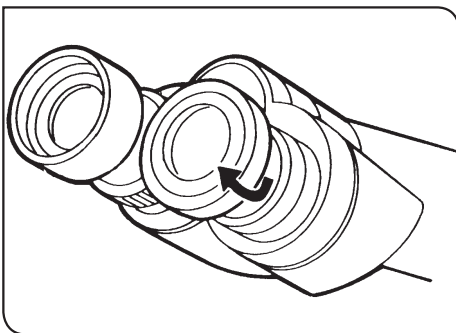


Fig.25

### 2 Using the eye shades (Fig.25)

#### 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.

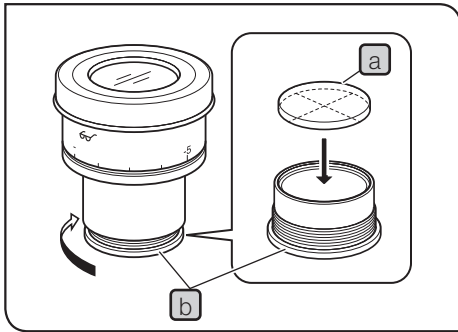


Fig.26

### 3 Mounting the eyepiece micrometer disk (Fig.26)

When the WHN10X-H eyepieces are used, an eyepiece micrometer disk can be mounted.

Use 24 mm dia. x 1.5 mm thick micrometer disks.

Following Fig.26, turn the built-in micrometer-mounting frame **b** to the arrow direction to remove it from the eyepiece and place a micrometer disk **a** into the mounting frame so that the surface with the model indication faces downward.

**TIP**

- The micrometer-mounting frame may be tight for certain micrometer disks.  
In this case, turn the frame by holding the circumference with a light, uniform force or by applying the frame against a rubber sheet. Do not grasp the frame with a strong force, as this may deform the frame and make it harder to remove it. Re-attach the micrometer mounting frame in the original position.
- Be careful not to touch the lens surface with your finger.

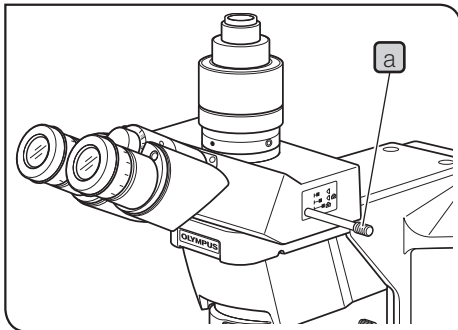


Fig.27

### 4 Selecting the light path of the trinocular tube (Fig.27)

Slide the light path selector knob **a** to select the desired light path.

Trinocular tube	Light path selector knob position		
	Pushed in	Middle position	Pulled out
U-TR30-2		20% for binocular eyepieces, 80% for camera	
U-TR30NIR*	100% for binocular eyepieces	50% for binocular eyepieces, 50% for camera	100% for camera
U-TTR-3**	50% for binocular eyepieces, 50% for camera	100% for binocular eyepieces	

\* With the infrared trinocular tube, infrared observation up to 1000 nm is possible. For details, consult us.

\*\* The light path selector knob is removable and can be attached to the other side.

1. Put the edge of a coin in the groove on the tip of the light path selector knob. Turn the coin clockwise to remove the knob.
2. Remove the cap from the other side.
3. Insert the end of the light selector knob into the hole from which the cap has been removed. Put the edge of a coin in the groove on the other end of the knob and turn the coin counterclockwise to attach the knob.
4. Close the open hole with the cap.

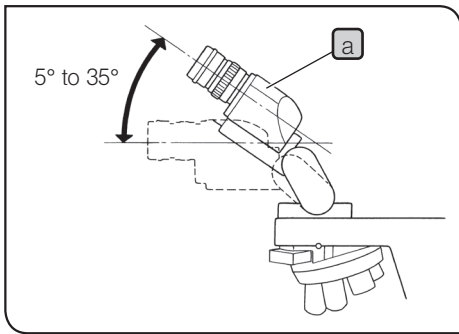


Fig.28

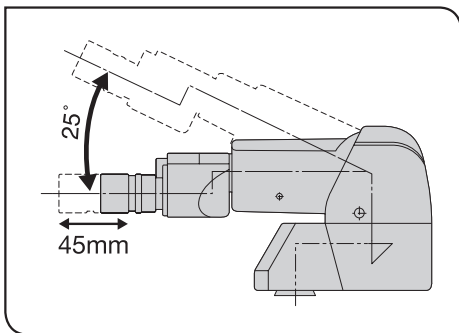


Fig.29

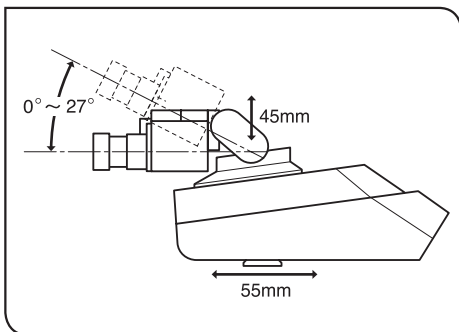


Fig.30

**5 Adjusting the tilt** (Figs.28 to 31)

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

U-TBI-3	5° to 35°
U-TBI-CLI	5° to 35°
U-ETBI	0° to 25°
U-TTBI	0° to 25°
U-TTR-3	5° to 35°
U-TTLBI	0° to 27°

With the U-TBI-3/U-TBI-CLI (Fig.28)

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

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

- TIP**
- Vignetting or ambient light insufficiency occurs in combination of U-TBI-3/U-TBI-CLI and an additional intermediate attachment.
  - If you need photography using with tilting function, please use U-TTR-3 or the combination of U-TTLBI/U-ETBI/U-TTBI and U-TRUS trinocular intermediate attachment.

With the U-ETBI/U-TTBI (Fig.29)

The U-ETBI and U-TTBI are ergonomic observation tubes with normal field, capable of the adjustments of the positioning angle (0° to 25°) as well as front-rear positioning (by 45 mm) of the eyepieces. 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.

With the U-TTLBI (Fig.30)

The U-TTLBI is a Tilting, Telescopic, Lifting binocular tube with the following adjustment capabilities.

- Eyepiece angle adjustment (0° to 27°)
- Eyepiece up-down position adjustment (45 mm)
- Observation tube front-rear position adjustment (55 mm)

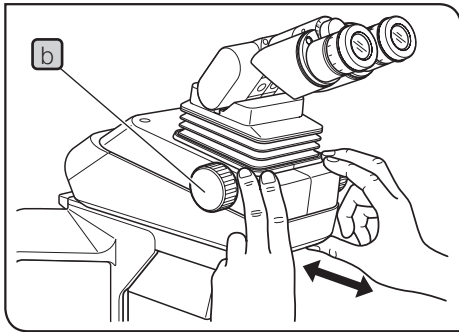


Fig.31

- TIP**
- When adjusting front-rear position of the observation tube, hold the base of the observation tube as shown in Fig.31.
  - When storing the microscope, increase the angle of the eyepieces so as to prevent the eyepieces from dropping.
  - To adjust the up-down position of the eyepiece, turn the dial **b**.

**CAUTION** The intermediate attachments that can be combined with the U-TTBI and U-TTLBI are limited. For details, please contact us.

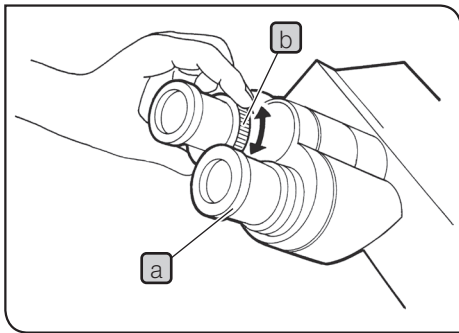


Fig.32

## 6 Using eyepieces incorporating a micrometer (Fig.32)

- TIP** When the eyepieces in use incorporate a micrometer, the accuracy of the left-right focusing adjustment (diopter adjustment) can be improved further.

- 1 Looking into the right eyepiece with your right eye, turn the top of the eyepiece **a** so that the micrometer in the field of view looks sharpest.
- 2 Looking into the right eyepiece, rotate the coarse and fine adjustment knobs to bring the specimen and micrometer (cross lines, etc.) into focus.
- 3 Looking into the left eyepiece with your left eye, rotate the diopter adjustment ring **b** to bring the specimen into focus.

## 5-5 Condenser

For how to adjust the centering of the condenser, see page 12.

### 1 Compatibility of objectives and condensers

Objective Magnification	BX45 Condenser	Field iris diaphragm	Aperture iris diaphragm
2X/4X	Applicable by swing the top lens out.	Used as the aperture iris diaphragm	Opened
10X/20X/40X	Applicable by engaging the top lens in the light path.	Field iris diaphragm	Aperture iris diaphragm

- TIP** The 1.25X to 2X objectives can also be used but the surroundings of the field of view may become dark.

## 5-6 Immersion objectives

**CAUTION** Be sure to use the provided our Immersion oil.

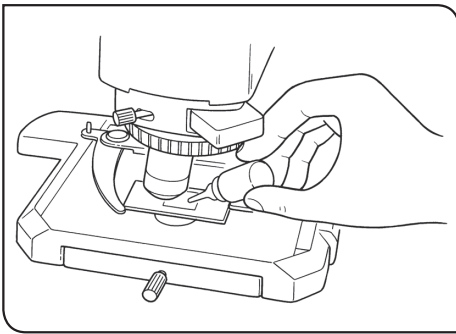


Fig.33

### 1 Using immersion objectives (Fig.33)

- 1 Focus on the specimen with objectives in the order of lower-power to higher-power ones.
- 2 Before engaging the immersion objective, apply a drop of provided immersion oil onto the specimen at the area to be observed.
  - TIP** When applying the oil between the slide glass and the top surface of the condenser, apply a drop of oil on the top surface of the condenser first and then place the slide glass.
- 3 Turn the revolving nosepiece to engage the immersion objective, then focus using the fine adjustment knob.

**CAUTION** 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 immersion objective.

**TIP** If the condenser engraving shows a numerical aperture (NA) of 1.0 or higher, the number applies only when oil is applied between the slide glass and the top surface of the condenser. When oil is not present, the NA is about 0.9.

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

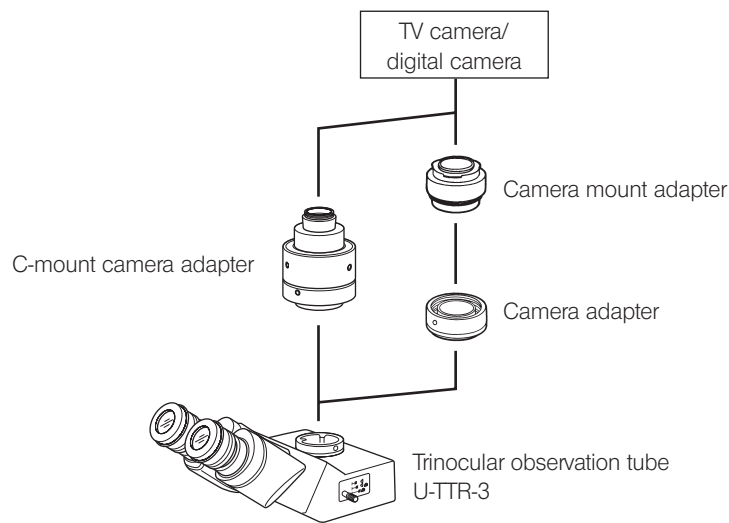
**CAUTION** Follow the cautions indicated in the label of the immersion oil.

# 6 Camera recording

TIP

- Use a trinocular observation tube such as the U-TTR-3 when recording video images or digital camera images of microscope images. The trinocular tube accepts a camera adapter (certain camera adapters necessitate a camera mount adapter).
- Be sure to adjust the parfocality before using a camera adapter. Otherwise, the focusing of the camera image will not match that of the image observed through eyepieces. For the parfocality adjustment method, refer to the instruction manual for the camera adapter in use. For details, refer to the instruction manuals for these accessories.

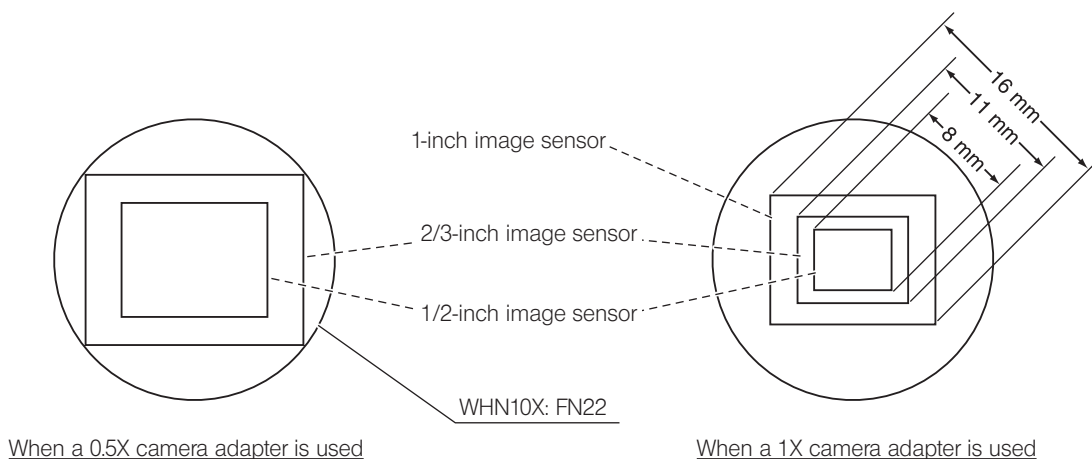
## 1 System chart



## 2 Selecting the camera adapter magnification




The image pickup area is determined by the size of the image sensor used in the TV camera or digital camera and the magnification of the camera adapter.

The following illustrations show the image pickup areas of camera adapters when the SWH10X-H eyepieces with a FN of 26.5 are used (the FN of the WHN10X eyepieces is 22).



# 7 Troubleshooting guide

Under certain conditions, performance of the system 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 us for assistance.




Problem	Lamp	Cause	Remedy	Page
Bulb does not light.	LED	Power is not ON.	Set the main switch to "I" (ON).	10
	Common	Power cord is unplugged.	Plug power cord into the power outlet.	36
	Common	Connectors are connected improperly.	Connect connectors securely.	31
	Halogen	Bulb is not attached.	Attach a halogen bulb.	32
	Halogen	Bulb is burned out.	Replace bulb.	32
	Halogen	The TL4 is not ON.	Set the main switch of the TL4 to "I" (ON).	7
Bulb is blown immediately.	Halogen	The bulb is not a designated one.	Replace bulb with a designated one.	32
Field of view is dark.	LED	LIM setting is inappropriate.	Set LIM again.	13
	Common	Aperture and field iris diaphragms are not opened wide enough.	Adjust them to proper sizes.	12, 12
	Common	Light path selector knob is set to the  position.	Set the knob to the  or  position.	20
	Common	Condenser is not properly centered.	Center the condenser.	12
	Common	Condenser height is too low.	Adjust correctly.	12
	Common	ND filter is engaged.	Disengage the ND filters.	14
Brightness cannot be varied.	LED	LIM is ON.	Switch the LIM function OFF.	13
	Halogen	LED brightness adjustment knob is rotated.	Use the brightness adjustment knob of the TL4.	7
	Common	Condenser is not properly centered.	Center the condenser.	12
	Common	Condenser height is too low.	Adjust correctly.	12
Field of view is obscured or not evenly illuminated.	Common	Light path selector knob is set in an intermediate position.	Set to the desired click position.	20
	Common	Objective is not correctly engaged.	Make sure that the revolving nosepiece clicks properly into place.	-
	Common	Condenser top lens is not switched properly.	Swing out the top lens when using a 4X or higher-power objective.	12
	Common	An objective that falls outside of the condenser's illumination range is used.	Use the objective with the specified magnification.	30
	Common	Condenser is not properly centered.	Center the condenser.	12
	Common	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm to an optimum size.	12
	Halogen	Bulb is not mounted correctly.	Push the pins of halogen bulb all the way until the stop position.	32

Problem	Lamp	Cause	Remedy	Page
Dirt or dust is visible in the field of view.	Common	Dirt/dust on the eyepieces.	Clean thoroughly.	3
	Common	Dirt or dust on condenser top lens.		
	Common	Dirt/dust on the specimen.		
Visibility is poor <ul style="list-style-type: none"> <li>• Image is not poor.</li> <li>• Contrast is poor.</li> <li>• Details are indistinct.</li> <li>• Image glares.</li> </ul>	Common	A non-UIS/UIS2 objective is used.	Use only UIS2/UIS series objectives with this microscope.	30
	Common	Condenser height is too low.	Adjust correctly.	12
	Common	Aperture iris diaphragm is not opened enough.	Open aperture iris diaphragm.	12
	Common	Front lens of objective is dirty.	Clean objective.	3
	Common	Immersion oil is not being used with an oil immersion objective.	Use immersion oil.	23
	Common	Immersion oil contains bubbles.	Remove the bubbles.	23
	Common	Recommended immersion oil is not used.	Use an our designated immersion oil.	23
	Common	Dirt/dust on specimen.	Clean it.	3
	Common	Dirt/dust on condenser top lens.		
One side of image is blurred.	Common	Objective is not correctly engaged in light path.	Make sure that revolving nosepiece clicks into place correctly.	-
	Common	Stage is not correctly mounted.	Re-attach it.	18
	Common	Specimen is mounted upside down.	Mount specimen correctly.	-
Image appears to waver.	Common	Objective is not correctly engaged in light path.	Make sure that revolving nosepiece clicks into place correctly.	-
	Common	Condenser is not properly centered.	Center the condenser.	12
Coarse adjustment knob is hard to turn.	Common	Tension adjustment ring is tightened excessively.	Loose ring.	16
	Common	You are trying to raise stage without coarse adjustment knob while pre-focusing lever is kept locked.	Unlock pre-focusing lever.	16
Image cannot be focused: <ul style="list-style-type: none"> <li>• Objective drifts down by itself.</li> <li>• Fine adjustment knob slips.</li> </ul>	Common	Tension adjustment ring is too loose.	Tighten ring.	16
Coarse adjustment will not go all the way down.	Common	Pre-focusing lever is locked at a high position.	Unlock it.	16
Objective makes contact with specimen before focus is obtained.	Common	Specimen is mounted upside down.	Mount specimen correctly.	-

Problem	Lamp	Cause	Remedy	Page
Field of view of one eye does not match that of the other.	Common	Interpupillary distance is incorrect.	Adjust interpupillary distance.	11
	Common	Diopter adjustment is incorrect.	Adjust diopter.	19
	Common	Different eyepieces are used on left and right.	Change one eyepiece to match the other so that both sides are the same type.	35
	Common	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.	-
Image shifts when you touch stage.	Common	Stage is not properly mounted.	Clamp stage.	18
X- and Y-axis knobs are too tight or too loose.	Common	Tension of X- and Y-axis knobs is too high or too low.	Adjust tension.	18
Stroke has reduced.	Common	Stage guide is deviated.	Correct deviation as described.	18

# 8 Specifications

Item	Specification			
1. Optical system	UIS2 (UIS) optical system (featuring infinity correction)			
2. Illumination	Built-in transmitted Koehler illumination FN (Field Number): 22 (widefield compatible) LED illuminator (continuously variable): U-LHLEDC <b>Optional</b> 6V 30W halogen bulb (continuously variable): 6V30WHAL (PHILIPS 5761) Power supply unit TL4: 100-120/220-240 V $\sim$ , 0.85/0.45 A, 50/60 Hz. Power consumption: 45 W			
3. Focusing mechanism	Revolving nosepiece movement by roller guide (rack & pinion) Stroke per rotation: 0.1 mm (fine), 178 mm (coarse) Full stroke range: 15 mm Higher coarse adjustment limit stopper Tension adjustment on coarse focus adjustment knob.			
4. Revolving nosepiece	5-position revolving nosepiece with information readout function (fixed on microscope frame). With U-GAN insertion slot. LIM setting possible (when the LED lamp is used)			
5. Observation tube	Type	U-BI30-2	U-TBI-3/ U-TBI-CLI	U-TTLBI
		Widefield binocular	Widefield, tilting binocular	Widefield, lift & telescopic binocular
	Field No.	22		
	Tube inclination	30°	5-35° (continuously variable)	0°-27° (continuously variable)
	Interpupillary distance adjustment	50-76 mm		
6. Stage	Type	U-SVRC/U-SVRC-CY	U-SVLC	U-SP
		Coaxial knobs on bottom right.	Coaxial knobs on bottom left.	Plain
		Rectangular, ceramic-coated, wire-driven stage		-
	Size	156 mm (D) x 191 mm (W)		150 mm (D) x 180 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.		-
7. Slide holder	Single-slide holder	U-HLST-4 (Thick type) U-HLS-4 (Thin type)		
	Double-slide holder	U-HLDT-4 (Left-opening, thick type) U-HLD-4 (Left-opening, thin type)	U-HRDT-4 (Right-opening, thick type) U-HRD-4 (Right-opening, thin type)	
8. Condenser	Type	Universal condenser (fixed on frame)		
	N.A.	0.9		
	Aperture iris diaphragm	Graduated scale provided		
	Filter	A $\phi$ 32 mm filter can be engaged in the light path (using the filter slider).		
	Observation method, applicable objective powers	Transmitted light brightfield observation, 2X - 40X widefield (FN 22). (Note) The top lens should be swung out when using the 2X or 4X objective.		

Item	Specification
9. Operating environment	<ul style="list-style-type: none"> <li>• Indoor use.</li> <li>• Altitude: Max. 2000 meters</li> <li>• Ambient temperature: 5° to 40°C (41° to 104°F)</li> <li>• 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).</li> <li>• Supply voltage fluctuations: ±10%</li> <li>• Pollution degree: 2 (in accordance with IEC60664-1)</li> <li>• Installation/Overtoltage category: II (in accordance with IEC60664-1)</li> </ul>
10. Transport / Storage environment	Temperature: Min. -25°C, Max. 65°C Humidity: Min. 0%, Max. 90%
11. Rating	Input:  5 V / 1.5 A AC adapter: Input: 100-240 V  50-60 Hz, 0.4 A    Output: 5 V  2.5 A

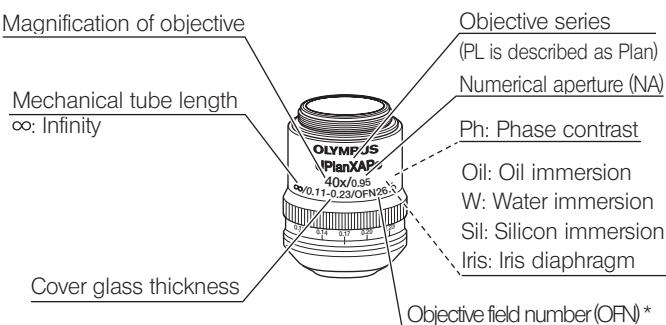
# 9 Optical characteristics (UIS2 series)

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**

There are objectives that can be used in combination with this product even though they are not listed here. Contact us for details.



\* "FN" is displayed instead of "OFN" depending on the objective.

Series name	Notation	Optical performance				Eyepiece	
		Numerical aperture	Working distance (mm)	Cover glass thickness (mm)	WHN10X(FN22)		
					Total magnification	Actual field of view (mm)	
PLN (PH) Plan Achromat (OFN 22) *	PlanN (Ph)	2X	0.06	5.8	-	20X	11.0
		4X	0.10	18.5	-	40X	5.5
		10X (Ph)	0.25	10.6	-	100X	2.2
		20X (Ph)	0.40	1.2	0.17	200X	1.1
		40X (Ph)	0.65	0.6	0.17	400X	0.55
		50X Oil Iris	0.5-0.9	0.2	0.17	500X	0.44
		100X Oil (Ph)	1.25	0.15	-	1000X	0.22
PH: Phase contrast							
LPLN Long working distance Plan Achromat (OFN 22) *	LPlanN	40X	0.60	3.4-4.1	0-1	400X	0.55
UPLFLN (PH) Plan Semi Apochromat (OFN 26.5) *	UPlanFLN (Ph)	4X	0.13	17.0	-	40X	5.5
		10X (Ph)	0.30	10.0	-	100X	2.2
		20X (Ph)	0.50	2.1	0.17	200X	1.1
		40X (Ph)	0.75	0.51	0.17	400X	0.55
		60X	0.90	0.2	0.11-0.23	600X	0.37
		60X Oil Iris (Ph)	0.65-1.25	0.12	0.17	600X	0.37
		100X Oil (Ph)	1.30	0.2	0.17	1000X	0.22
		100X Oil Iris	0.6-1.3	0.2	0.17	1000X	0.22
PH: Phase contrast							
UPLXAPO (PH) Plan Apochromat (OFN 26.5) *	UPlanXApo (Ph)	4X	0.16	13.0	-	40X	5.5
		10X	0.40	3.1	0.17	100X	2.2
		20X	0.80	0.6	0.17	200X	1.1
		40X	0.95	0.18	0.11-0.23	400X	0.55
		40X Oil	1.40	0.13	0.17	400X	0.55
		60X W	1.2	0.28	0.13-0.21	600X	0.37
		60X Oil (Ph)	1.42	0.15	0.17	600X	0.37
		100X Oil (Ph)	1.45	0.13	0.17	1000X	0.22
PH: Phase contrast							
PLAPON Plan Apochromat (OFN 26.5) *	PlanApoN	1.25X	0.04	5.0	-	12.5X	17.6
		2X	0.08	6.2	-	20X	11
UAPON Apochromat (OFN 22) *	UApoN	20X W	0.70	0.35	0.17	200X	1.1
		40X W	1.15	0.25	0.13-0.25	400X	0.55
		40X Oil	1.35	0.1	0.17	400X	0.55



## 10-2 Detailed assembly procedures

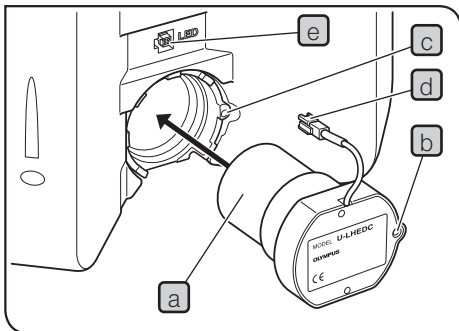


Fig.34

### 1 Attaching the LED lamp housing (Fig.34)

- 1 Fit the LED lamp housing **a** into the mount hole on the rear of the microscope by aligning the clamping screw **b** and screw hole **c**.
- 2 Using the Allen screwdriver, tighten the clamping screw **b**.
- 3 Insert the connector **d** of the lamp housing into the connector **e** on the microscope.

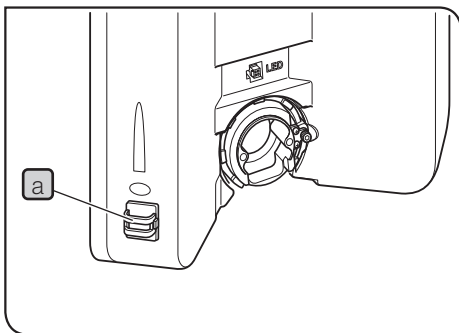


Fig.35

### 2 Attaching the halogen lamp socket (Figs.35 to 37)

Installing the U-LS30ADP LS30 adapter (Fig.35)

- 1 Peel off the backing of double-side adhesive tape on the cable holder **a** and attach the holder on the specified position.
- 2 Attach the adapter in the same way as **1** and **2** in the LED lamp housing C attaching procedure described above.

Installing the halogen bulb (Fig.36)

Use only the designated bulb 6V30W/3841 (PHILIPS 5761).

- 1 Holding the bulb **b** a piece of gauze, insert the bulb pins **c** straight and fully into the pin holes **d** on the lamp socket.

**CAUTION** 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.

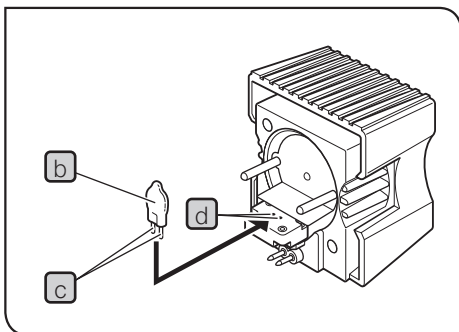
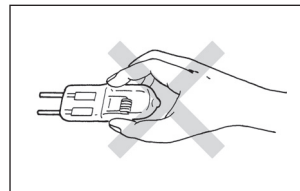


Fig.36

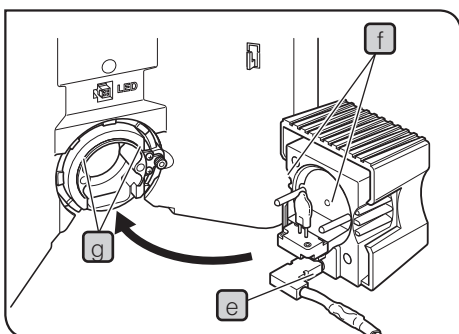


Fig.37

- 2 Insert the lamp cable **e** in the direction shown in Fig.37.
- 3 Aligning the guide pins **f** with the guide pin holes **g** at the rear of the microscope frame, gently push the lamp socket all the way into place.

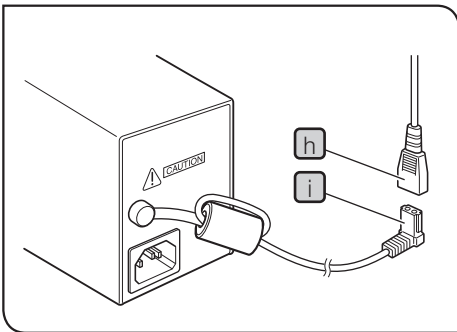


Fig.38

**CAUTION** 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 “○” (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.

- 4 Pass the lamp cable through the cable holder **a**. (Fig.35)

Connecting the lamp cable (Fig.38)

Connect the cable connector **h** to the connector **i** of the TL4 power supply unit.

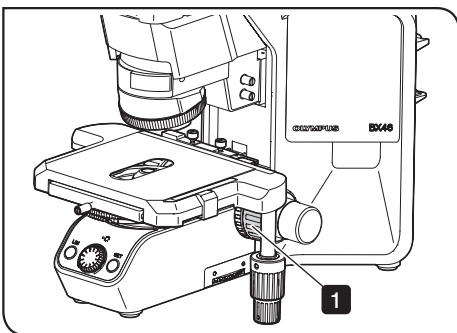


Fig.39

#### 4 Attaching the specimen holder (Figs.39 to 44)

The attaching procedures are different between the regular specimen holder and the specimen hold plate (CX3-SHP).

When using the regular specimen holder (Figs.39, 40)

- 1 Rotate the coarse focusing knob to lower the stage sufficiently.
- 2 Loosen the specimen holder fixing knob **a** (2 pcs.) of the stage plate. (Fig.40 shows the procedures to attach the specimen holder for observing two slide glasses (U-HRDT-4).)

**TIP** You can also loosen the specimen holder fixing knob **a** by inserting a coin into the groove of the specimen holder fixing knob **a** and rotating it in counterclockwise direction.

- 3 Insert the U-shape groove **b** of the specimen holder in the specimen holder fixing knob **a**.
- 4 While pushing the specimen holder toward the arrow direction, tighten the specimen holder fixing knob **a** (2 pcs.).

**TIP** You can also tighten the specimen holder fixing knob **a** by inserting a coin into the groove of the specimen holder fixing knob **a** and rotating it in clockwise direction.

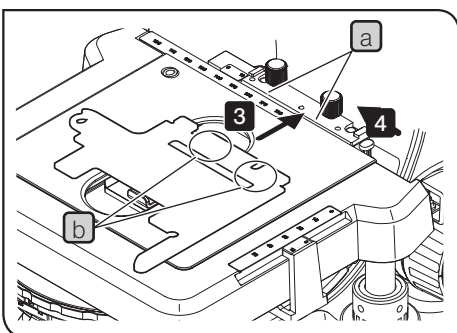


Fig.40

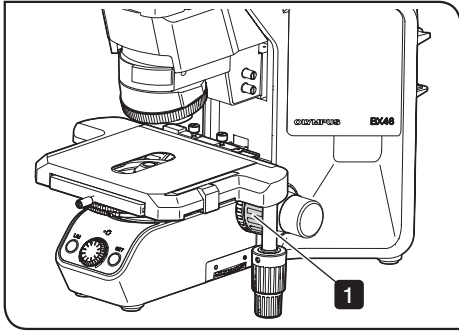


Fig.41

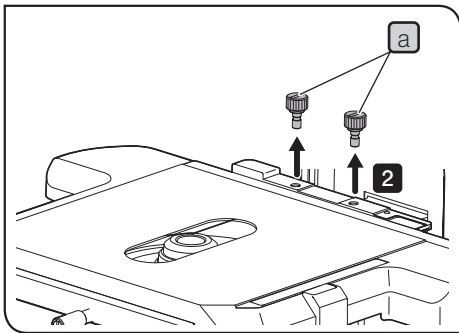


Fig.42

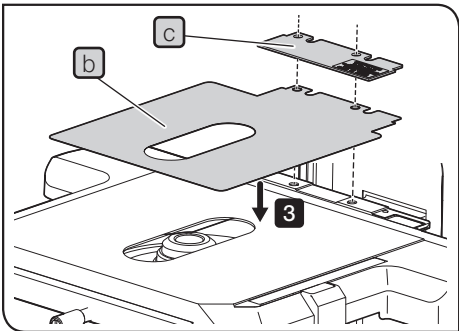


Fig.43

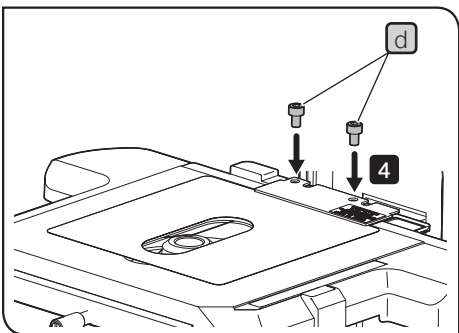


Fig.44

When using the specimen hold plate (CX3-SHP) (Figs.41, 42, 43, 44)

- 1** Rotate the coarse focusing knob to lower the stage sufficiently.
- 2** Loosen the specimen holder fixing knob **a** (2 pcs.) of the stage plate to remove them.

**TIP** You can also loosen the specimen holder fixing knob **a** by inserting a coin into the groove of the specimen holder fixing knob **a** and rotating it in counterclockwise direction.

- 3** Place the metal plate **c** over the resin sheet (one sheet only) **b** by matching the hole positions of the metal plate with the hole positions of the resin sheet. Match the hole of the overlapped parts with the hole position of the stage plate and place the overlapped parts on the stage plate.

**TIP** Before using the resin sheet, peel off the protective stickers from both sides of the resin sheet **b**.

- 4** Tighten the clamping screw **d** provided with the specimen hold plate (CX3-SHP) using the Allen screwdriver to secure the specimen hold plate.

**TIP** If the Allen screwdriver collides with the microscope frame when tightening the clamping screw, rotate the X-axis knob to move the specimen holder to the position where the Allen screwdriver does not collide with the microscope frame.

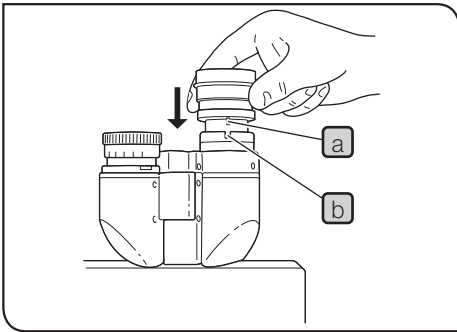


Fig.45

**6 Attaching the eyepieces (Fig.45)**

**1** Gently insert the eyepieces all the way into the eyepiece sleeves.

**CAUTION** • When using the U-BI30-2 binocular tube, eyepieces with a positioning pin cannot be attached because the U-BI30-2 does not have the positioning notch.  
 • When using an eyepiece with micrometer or cross lines, attach it to the right-hand eyepiece sleeve. When doing so, make sure that the eyepiece positioning pin **a** fits into the notch **b** on the eyepiece sleeve.

**7 Attaching the objectives**

**1** Screw in the objectives into the holes of revolving nosepiece by following the position number, beginning with the lowest-power objective toward higher-power objectives.

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

**Revolving nosepiece cable**

The revolving nosepiece cable is led out of the microscope's rear panel. Connect it to the connector on the rear panel.

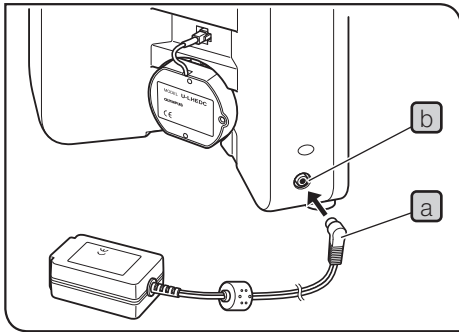


Fig.46

## 8 Attaching the AC adapter (Fig.46)

- CAUTION**
- Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force.
  - Make sure that the main switch is set to “O” (OFF) before connecting the power cord. (Fig.46)

- 1 Insert the connector **a** of the AC adapter firmly into the connector **b** on the microscope.

- CAUTION** Always use the designated AC adapter. Using a non-designated AC adapter may cause malfunction.

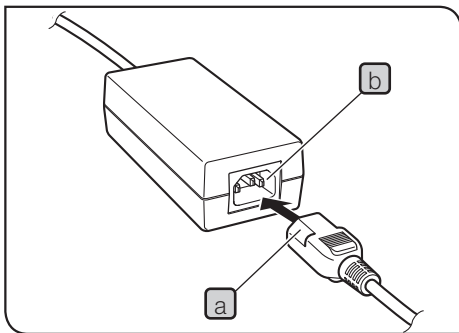


Fig.47

## 9 Attaching the power cord (Figs.47 to 49)

- CAUTION** Always use the power cord provided by us. 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.

Operation using the AC adapter (Fig.47)

- 1 Insert the connector **a** of the power cord firmly into the input connector **b** of the AC adapter. (Fig.47)

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

- 2 Plug the power cord plug **c** into the wall outlet **d**. (Fig.43)

- CAUTION** Should the power cord come in contact with the hot lamp socket, the power cord could melt and cause electric shock. Be sure to route the power cord away from the lamp socket.

Operation using the TL4 power supply unit (Fig.48)

- TIP** The following operation is not required when the LED lamp is used.

- 1 Insert the connector **e** of the power cord firmly into the input connector **f** of the TL4. (Fig.48)

- 2 Plug the power cord plug **g** into the wall outlet **h**. (Fig.49)

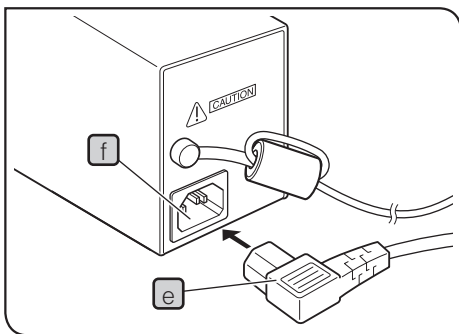


Fig.48

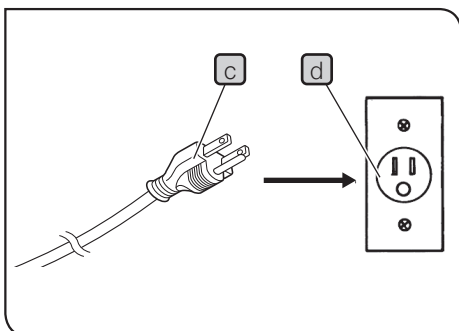


Fig.49

# 11 Preventive inspection sheet for illumination devices

- We recommend performing “Preventive Inspections” periodically (every time you replace lamps and at least once every 6 months).
- The table below identifies the check items to be observed. Put (X) if not applicable or (✓) if applicable.
- If there are any check marks (✓) noted, **immediately stop use of the product** and seek service or replacement for the illumination device(s) for prevention.
- If you detect an abnormality other than that listed below with your illumination device or other our product, request inspection from us.

If you have any questions, please contact us.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase or exceeds 20,000 hours of use.				
2. Lamp does not light sometimes even through the power is on.				
3. Light flickers when you move a lamp cable or illumination devices.				
4. Burning or smoke odor.				
5. Light still flickers after new lamp replacement.				
6. Signs of deformation, backlash, or looseness, etc. when you assemble/ disassemble the illumination device. (i.e. it is hard to open/ close the lid during lamp-replacement.)				
7. Connection terminals or a lamp installation terminal have become discolored or tarnished on the right or left side.				
8. Illumination device/ housing has become deformed, cracked or tarnished in any way.				
9. Lamp cables or wiring parts have become deformed, cracked or tarnished in any way.				
10. Frequent repairs to similar devices put into use at the same time as the unit being checked.				

\* If the spaces are not enough for check , copy this sheet.-

## ■ 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 our products, we can no longer warrant the electrical safety of the equipment.**

### Specifications

Voltage rating	125 V AC (for 100-120 V AC area) or, 250 V AC (for 220-240 V AC area)
Current rating	6 A 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 the agencies listed in Table 1. In case you are unable to buy locally 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	
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		USA	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 Materielkontroll (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)  
Canadian Standards Association (CSA)

SV, SVT, SJ or SJT, 3 X 18AWG  
SV, SVT, SJ or SJT, 3 X 18AWG

# 12 Request to issue the Safety Confirmation

**NOTE** To ensure operational safety of this product, the Safety Confirmation shown on the next page must be issued by the user when the user has this product maintained, repaired or serviced by Evident Corporation.

Since Evident is responsible for ensuring the safety of our distributors, maintenance personnel and personnel, we appreciate your cooperation in issuing the Safety Confirmation.

- The user must issue the Safety Confirmation each time this product is to be maintained, repaired or serviced by Evident.
- Copy the Safety Confirmation shown on the next page, fill it out, and submit it to Evident maintenance personnel.
- If the Safety Confirmation is not issued, we may not be able to provide maintenance, repairs or other services.
- If this product is contaminated, the user shall carry out decontamination work to the fullest extent possible prior to the arrival of our maintenance personnel.

## Safety Confirmation when requesting repair/inspection

This safety confirmation is for asking you to fill out to ensure the health and safety of service personnel who pick up, repair, and/or inspect the products. Your cooperation would be highly appreciated.

Please note if the safety of service personnel cannot be ensured, your requests will not be accepted. Please check the applicable checkboxes and circle the applicable items shown in parentheses.

Date of request	
Request details	<input type="checkbox"/> Repair ( Off-site / On-site ) <input type="checkbox"/> Inspection ( Off-site / On-site )
Product name	
Serial Number	
Biosafety level and Confirmation of disinfection/sterilization of product	<input type="checkbox"/> BSL1 <input type="checkbox"/> BSL2 <input type="checkbox"/> BSL3 <input type="checkbox"/> BSL4* <input type="checkbox"/> Not applicable <input type="checkbox"/> With my signature, I hereby confirm that this product has been disinfected/sterilized according to the disinfection/sterilization rules of our facility. <input type="checkbox"/> Disinfection/sterilization of this product has not been carried out. *We do not accept repairs/inspections of products used in the BSL4 environment.
Facility name	
Department	
Signature	
Contact details Telephone, E-mail, etc.	

Manufactured by



**Evident Corporation**

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Distributed by



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Service Center



<https://evidentscientific.com/support>

Official website



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