

# Instructions

# BX43

## System 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 5.

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

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 “10 Assembly” (Page 35) carefully.

- Introduction ..... 1**
- 1 Module nomenclature ..... 5**
- 2 Controls ..... 6**
- 3 Flow of observation ..... 9**
- 4 Simplified observation procedure..... 11**
  - 4-1 Basic operation (until observation of specimen)..... 11
  - 4-2 Microscope adjustments (how to improve the observed image) ..... 12
    - 1** Adjusting the interpupillary distance ..... 12
    - 2** Adjusting the diopter..... 12
    - 3** Adjusting the centering..... 13
    - 4** Adjusting the contrast..... 13
- 5 Using the controls..... 14**
  - 5-1 Base..... 14
    - 1** Adjusting the brightness..... 14
    - 2** Setting the LIM brightness..... 14
    - 3** Using the filters (halogen bulb operation only)..... 15
  - 5-2 Focusing block..... 17
    - 1** Focusing controls..... 17
    - 2** Adjusting the focus..... 17
    - 3** Replacing the fine adjustment knob..... 18
    - 4** Adjusting the coarse adjustment knob tension ..... 18
    - 5** Pre-focusing lever..... 18
  - 5-3 Stage..... 19
    - 1** Placing the specimen ..... 19
    - 2** Using the auxiliary slide holder ..... 20
    - 3** Adjusting the X- and Y-Axis knob tension..... 21

4	Rotating the stage.....	22
5	Adjusting the stage height.....	22
5-4	Observation tube.....	23
1	Adjusting the diopter.....	23
2	Using the eye shades.....	23
3	Mounting the eyepiece micrometer disk.....	24
4	Selecting the light path of the trinocular tube.....	24
5	Adjusting the tilt.....	25
6	Using eyepieces incorporating a micrometer.....	26
5-5	Condenser .....	26
1	Compatibility of objectives and condensers.....	26
5-6	Immersion objectives.....	27
1	Using immersion objectives.....	27
5-7	Objectives with correction collar .....	27
6	Camera recording.....	28
1	System chart.....	28
2	Selecting the camera adapter magnification .....	28
7	Troubleshooting guide.....	29
8	Specifications.....	32
9	Optical characteristics (UIS2 series) .....	34
10	Assembly .....	35
10-1	Assembly diagram .....	35
10-2	Detailed assembly procedures.....	36
11	Preventive inspection sheet for illumination devices.....	44
■	Proper selection of the power supply cord .....	45
12	Request to issue the Safety Confirmation.....	47

# 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)
-----------------	-------------------------

**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 44.

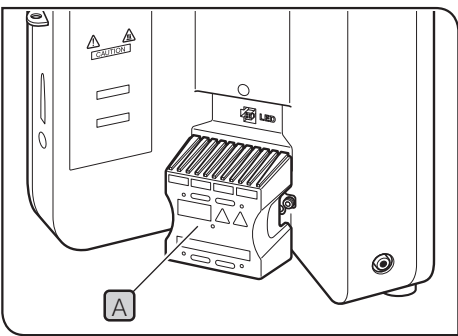


Fig.1



### 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.
I	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)

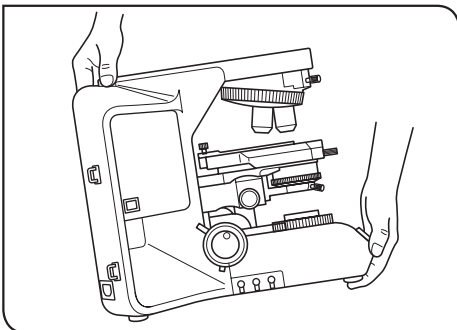


Fig.2

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 3.
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 Fig2.

**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 18 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.

**NOTE** :Indicates a potential situation which, if not avoided, may result in failure of this product.

**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.

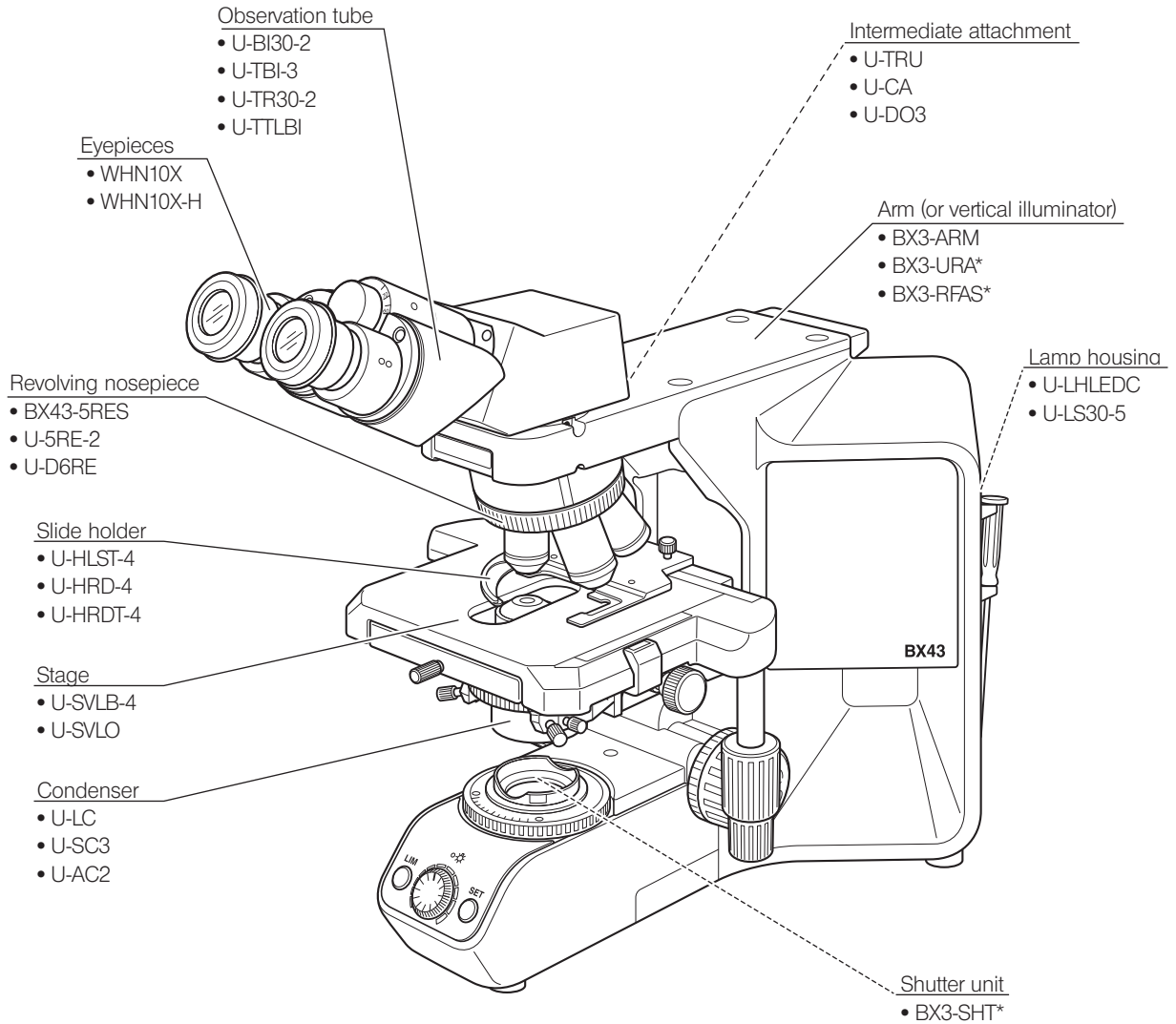
The electromagnetic environment should be evaluated prior to operation of this product.

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

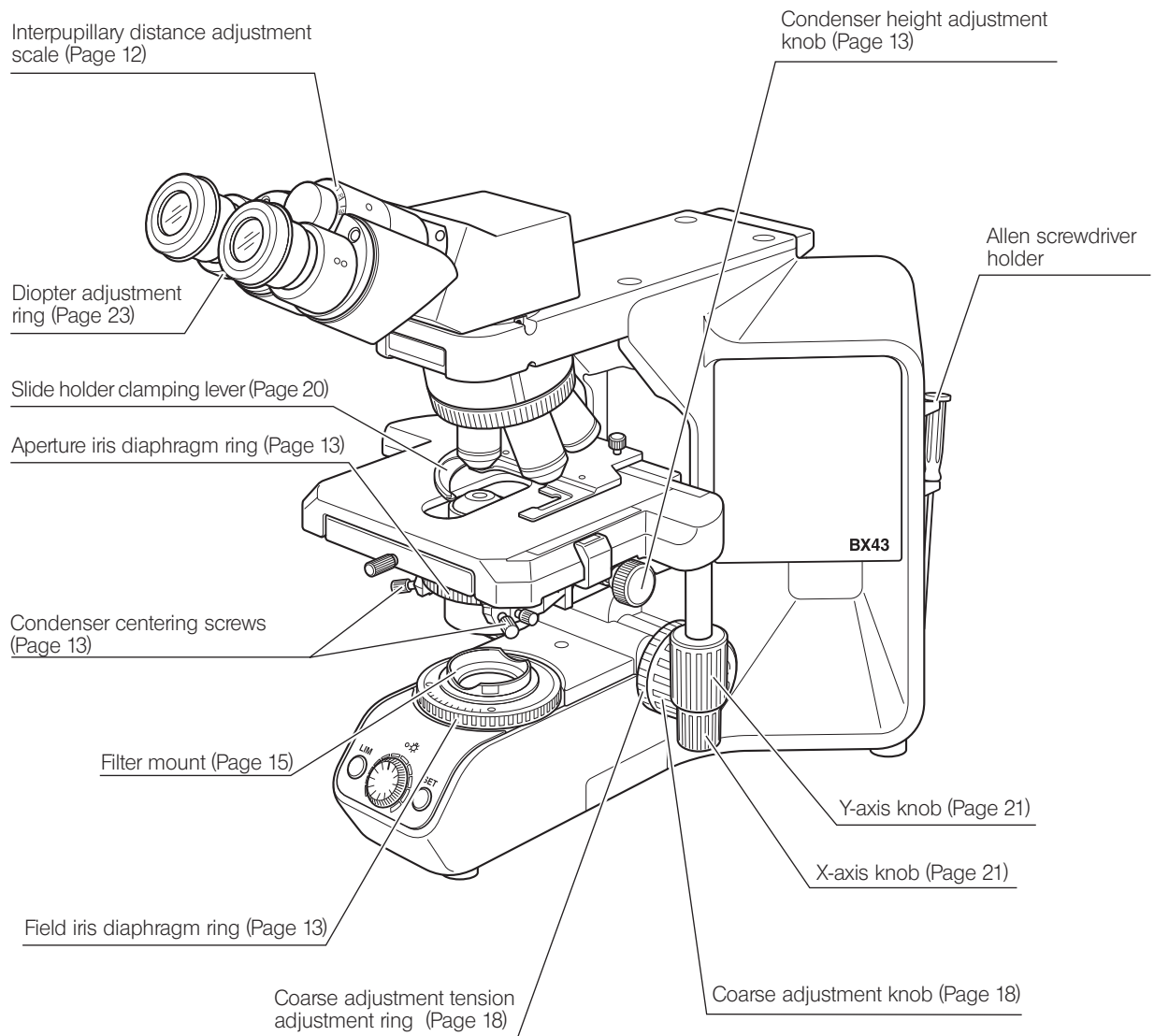
TIP

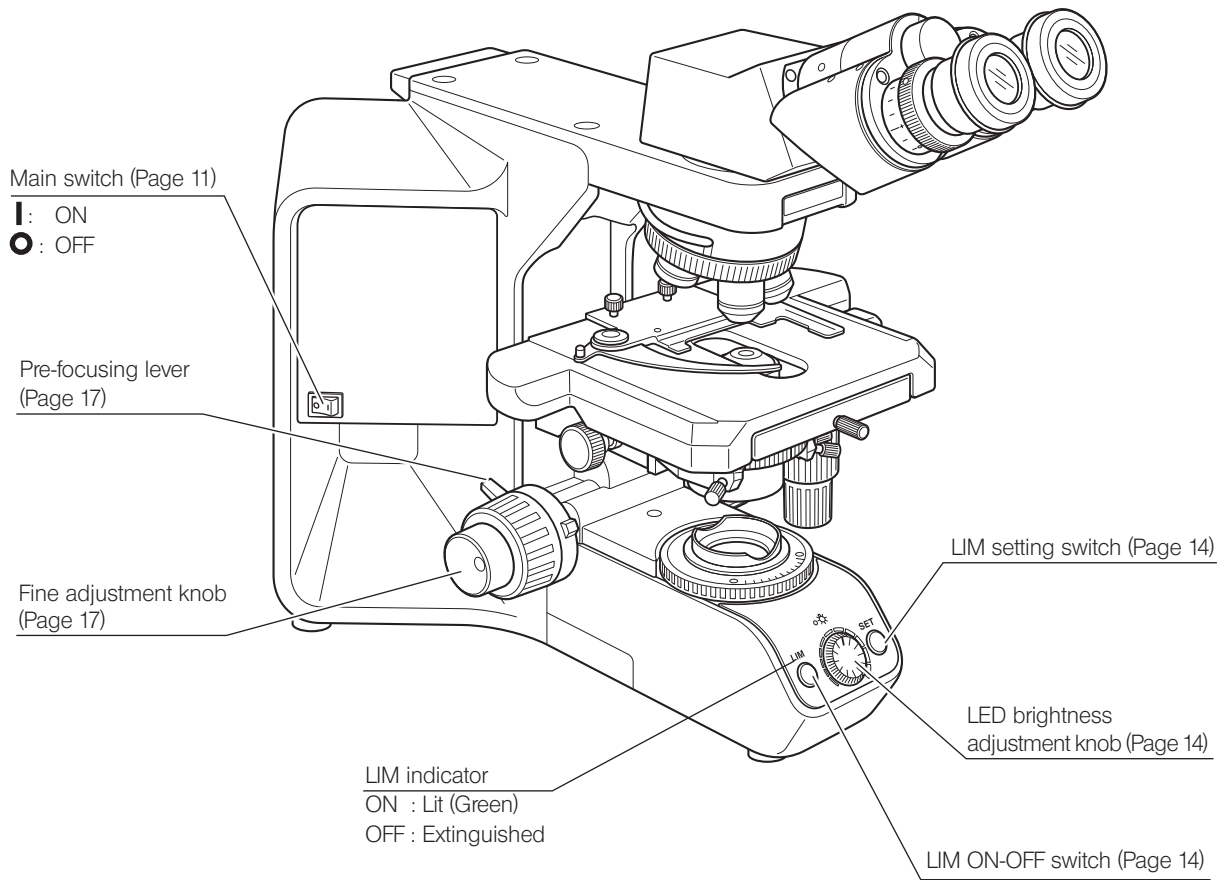
The modules mentioned below show only the typical product names. As there are some products that are not mentioned but also applicable to this microscope, check the latest catalogues or consult us. For the products marked " \* ", also read their instruction manuals.



# 2 Controls

**TIP** If you have not yet assembled the microscope, see “10 Assembly” on page 35.

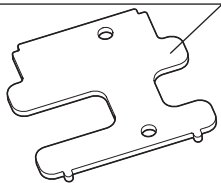




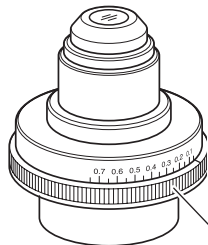
**Low magnification condenser  
U-LC**

**Swing-out condenser  
U-SC3**

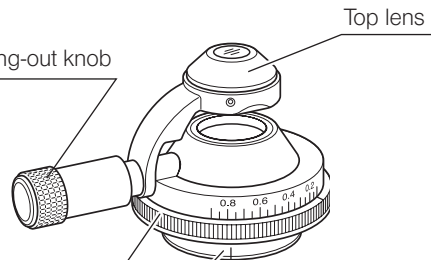
Auxiliary lens mounting tool  
(for BX53)



Auxiliary lens for U-LC



Top lens swing-out knob



Top lens

Aperture iris diaphragm ring  
(Page 13)

Condenser mount dovetail

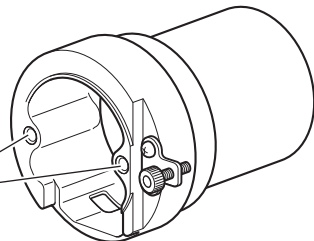
\* The auxiliary lens is mounted on the LED lamp housing (U-LHLEDC) or LS30 adapter (U-LS30ADP) when the U-LC is used, see page 36.

« Modules for halogen lamp operation »

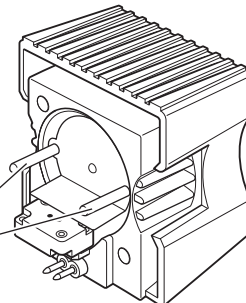
**LS30 Adapter  
U-LS30ADP**

**Halogen lamp socket  
U-LS30-5**

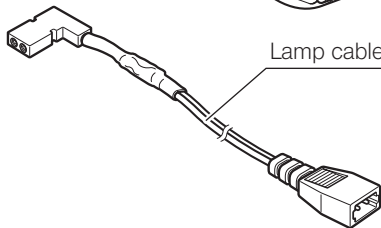
Guide pin holes



Guide pins



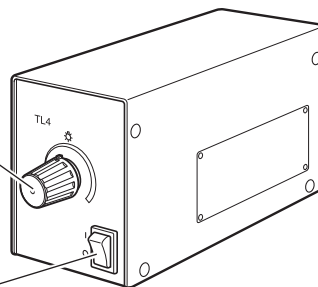
Lamp cable



**Power supply unit  
TL4**

Lamp socket connector

Brightness control knob

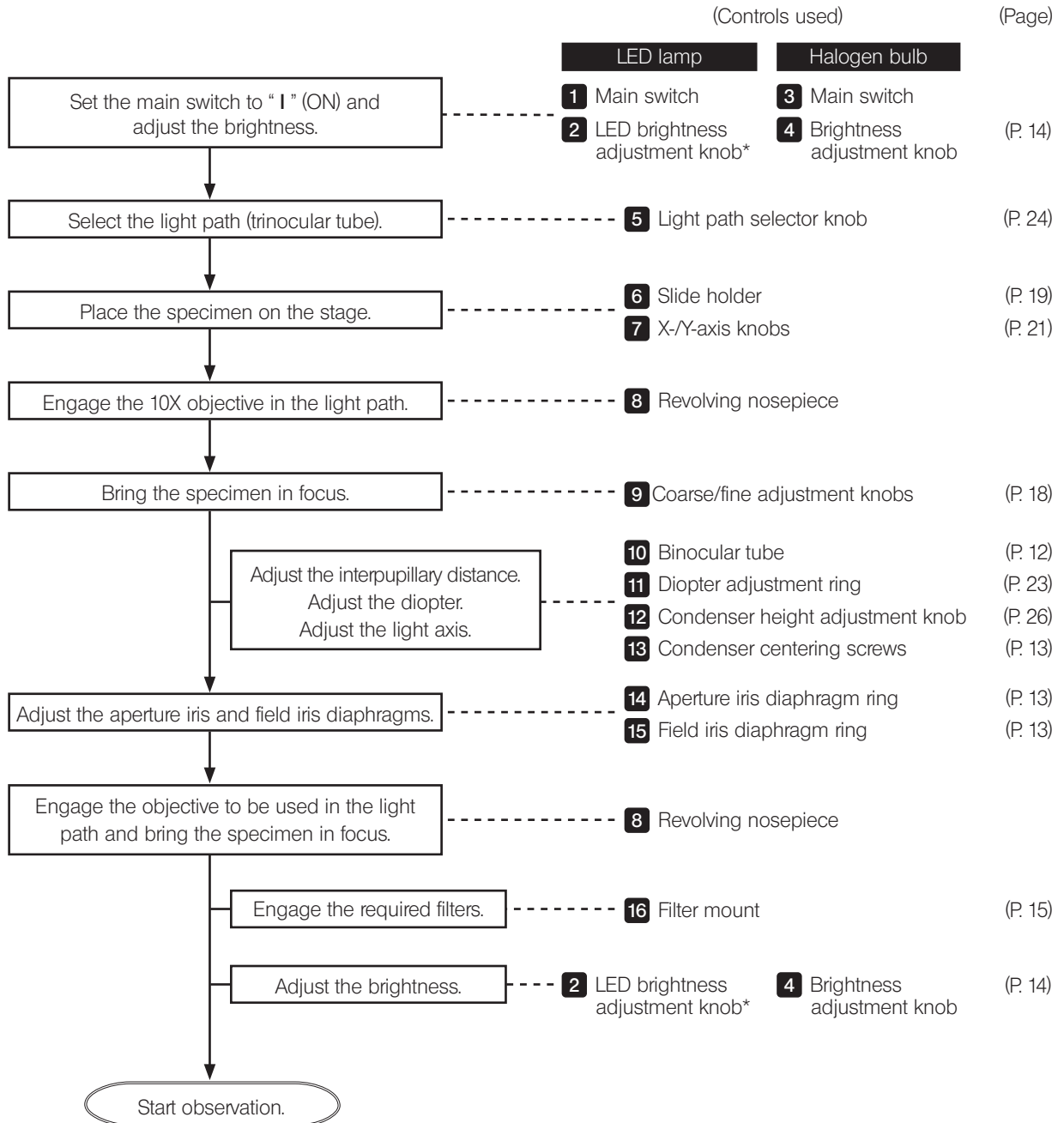


Main switch

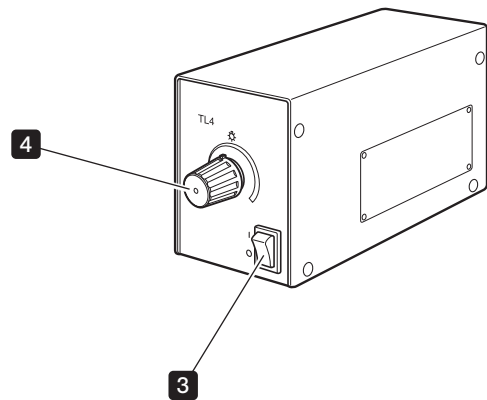
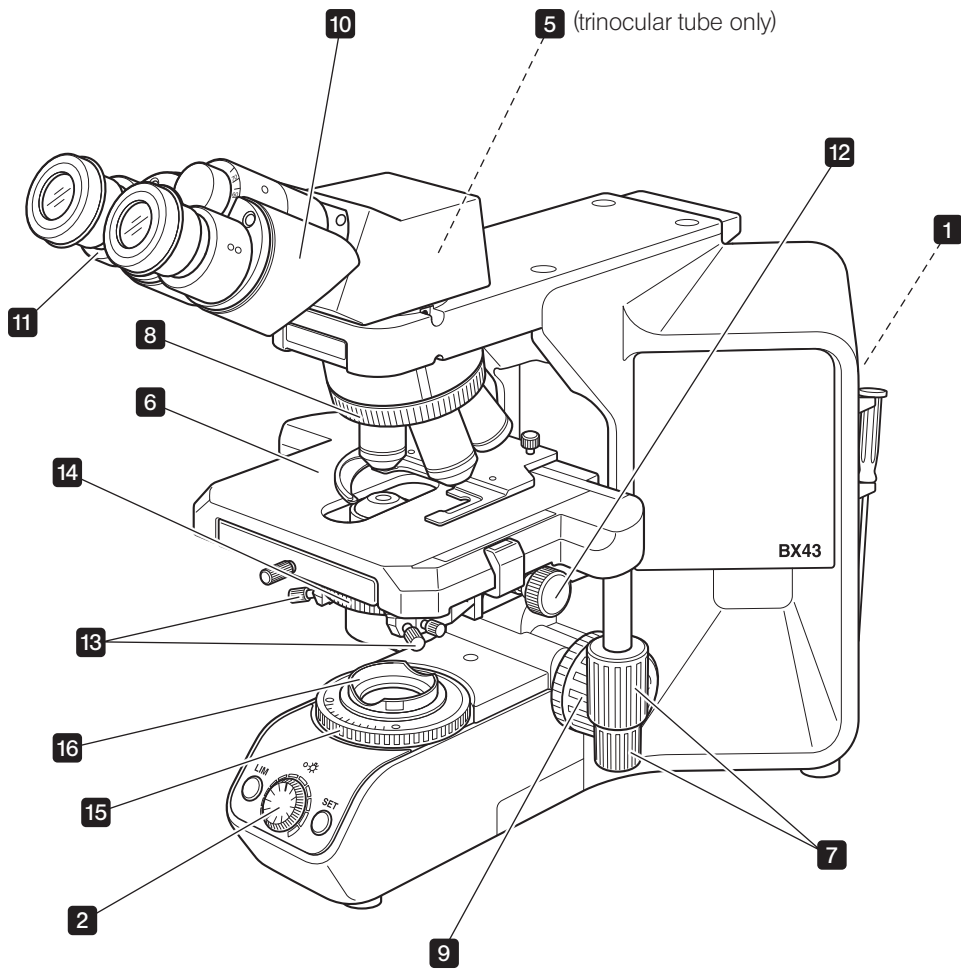
I: ON ●: OFF

# 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 LBD filter in the filter mount on the base (or in the U-FC filter cassette).



\* The LED brightness adjustment knob is defeated when the LIM is set (see page 14).



**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.

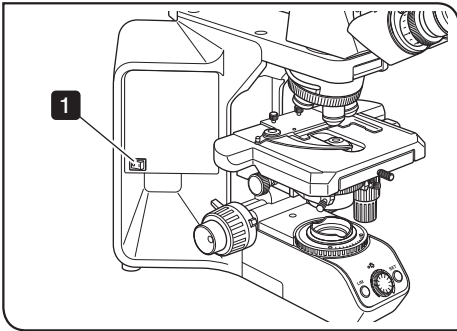


Fig.3

- 1** Press the main switch of the microscope frame to “I” (ON).

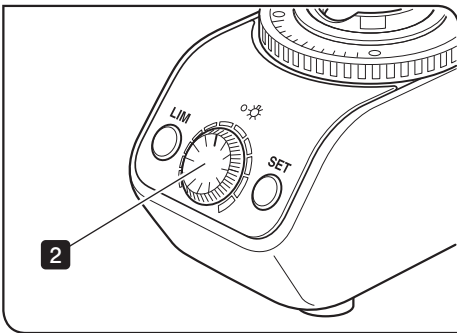


Fig.4

- 2** Rotate the knob to adjust the lamp brightness. (Details: Page 14)

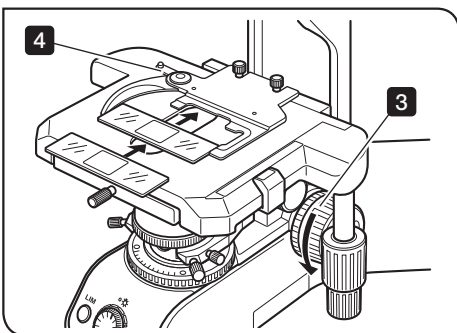


Fig.5

- 3** Rotate the knob to lower the stage. (Details: Page 17)
- 4** Open the clamping lever of the slide holder and place the specimen slide. (Details: Page 19)

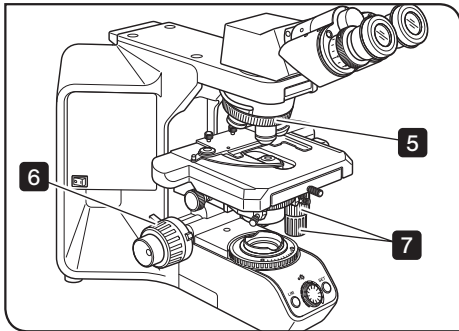


Fig.6

- 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 17)
- 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.

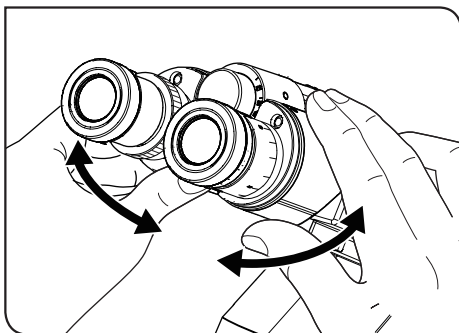


Fig.7

### 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.

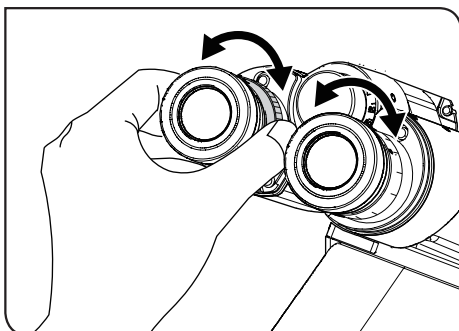


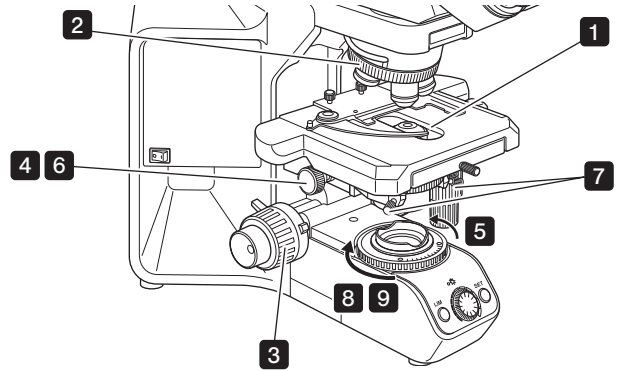
Fig.8

### 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 23.

### 3 Adjusting the centering

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



- TIP**
- Be careful not to rotate the condenser clamping screw, located behind the centering knobs, by mistake.
  - When using a condenser with top lens such as the U-SC3, engage the top lens in the light path before proceeding to the centering adjustment.

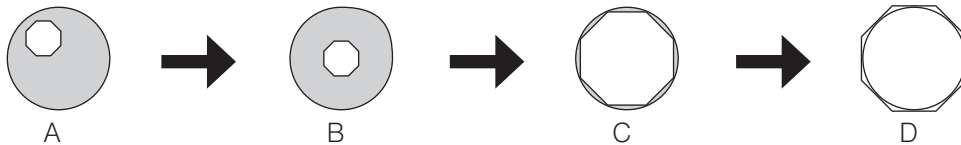
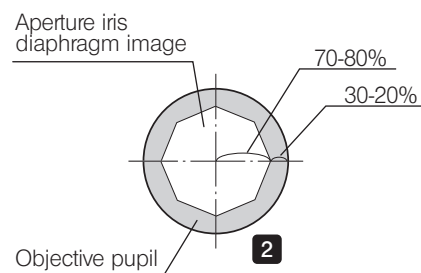
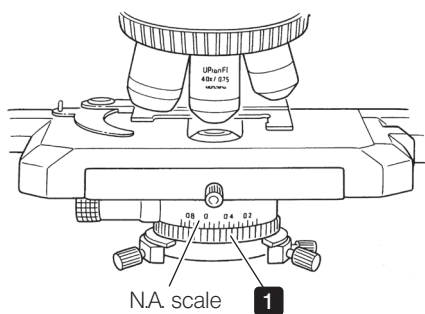


Fig.9 Movement of field Iris diaphragm image

### 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

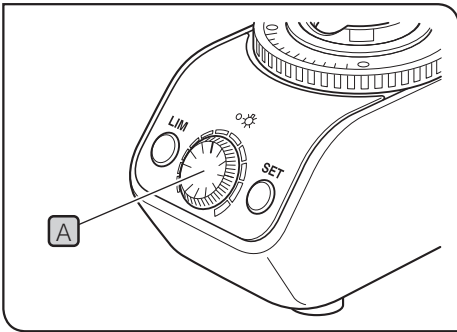


Fig.10

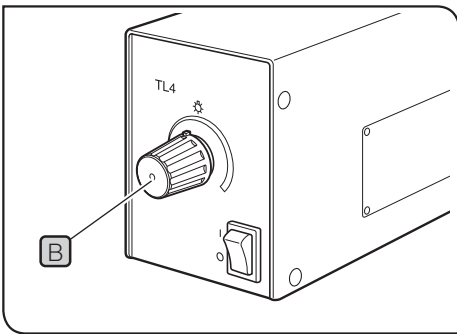


Fig.11

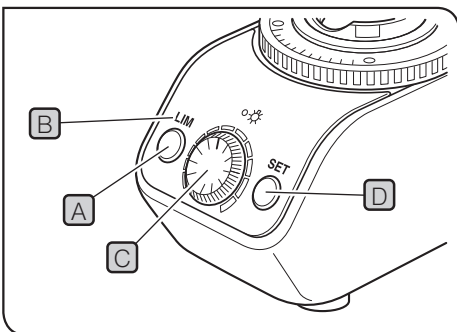


Fig.12

### 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.

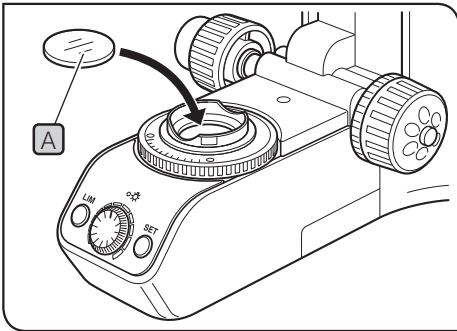


Fig.13

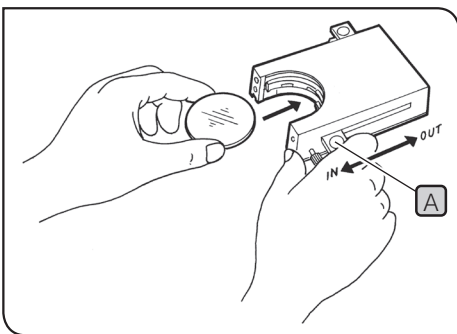


Fig.14

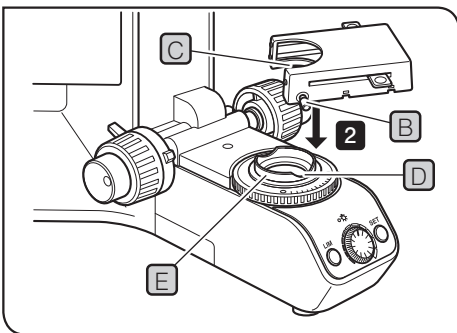


Fig.15

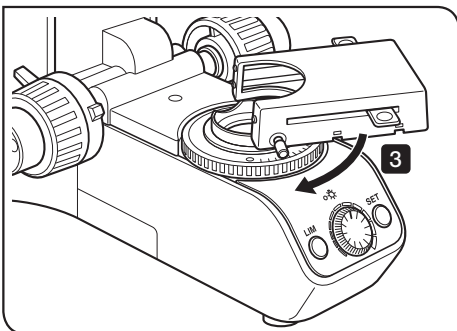


Fig.16

**3 Using the filters (halogen bulb operation only) (Figs.13 to 17)**

- TIP** You can place a filter in the light path with either method.
- Place a filter on the filter mount on the base and engage in the light path. (Fig.13)
  - Insert a filter in the U-FC filter cassette, attach it on the filter mount and engage it in the light path by sliding the filter level. (Fig.14)

**Mounting a single filter (Fig.13)**

A filter with a diameter of  $\varnothing 45$  mm can be placed on the filter **A** mount on the base. If you need to place multiple filters, please purchase the U-FC filter cassette.

- NOTE** Even when a filter cassette is used, a filter with thickness of no more than 3 mm can still be placed on the filter mount.

**Using the filter cassette (Figs.14 to 16)**

Loading Filters into filter vassette

- TIP**
- The filter cassette accommodates filters with a diameter of  $\varnothing 45$  mm and thickness of 2.7 mm or less.
  - The filter cassette has two filter levels on the right side and one on the left side.

- 1 Move all filter levers to the OUT position except for the one belonging to the slot into which the filter is to be inserted.
- 2 Slide lever **A** to the IN position. Make sure that it clicks securely into place. (Fig.14)
- 3 Holding the lever in the position shown in Fig.14, put the filter into the cassette by inserting it in the direction indicated by the arrow.
- 4 Insert the other two filters in the same manner.

Mounting the filter cassette

- 1 Fully loosen the filter cassette clamping screw **B**. (Fig.15)
- 2 Align the key **C** on the bottom surface of the filter cassette with the positioning slot **D** on the filter mount, then snap the filter cassette into place from above.
- 3 Rotate the filter cassette to align its sides with the base. (Fig.16)
- 4 Align the clamping screw **B** with the positioning hole **E** on the filter mount, then tighten the screw to fasten the filter cassette.

- NOTE** When the filter cassette is installed, the condenser may hit it when the stage is lowered. Therefore, exercise caution when lowering the stage with the filter cassette installed.

Using the filter cassette (Fig.17)

Usable Filters	Applications	
45-LBD-IF*	Color balancing filter	
45-ND6, 45-ND25	Neutral density filter	
45G-530, 43IF550-W45*	Green	B&W contrast filters
45O-560	Orange	

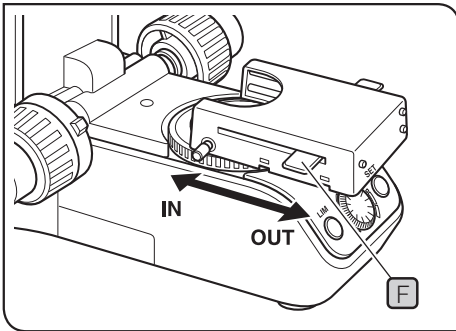


Fig.17

Up to three of the above filters can be loaded in the filter cassette. Moving the levers **F** on the left and right sides of the cassette to the IN position brings the corresponding filter into the light path.

\* When an IF (interference) type filter is used, flare and ghost may be observed. These phenomena may be reduced by adding ND filter(s) to the IF filter.

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

What is LBD filter?

The LBD filter converts the reddish color of halogen bulb light into daylight. Using the LBD filter makes it possible to observe specimens in natural color tones.

## 5-2 Focusing block

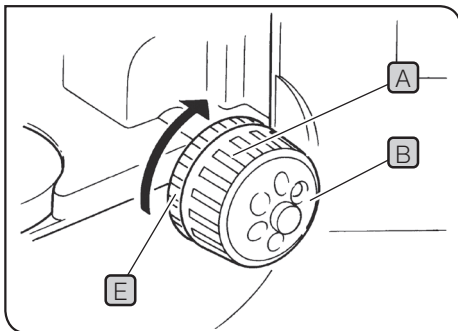


Fig.18

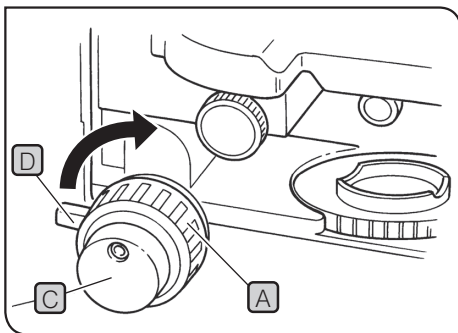


Fig.19

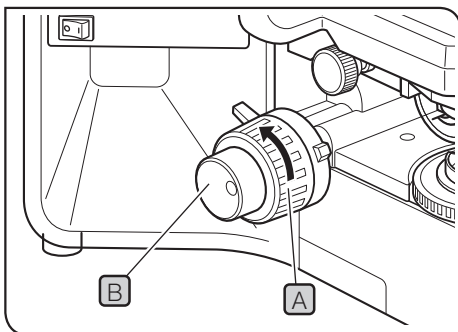


Fig.20

### 1 Focusing controls

(Figs.18 & 19)

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.

### 2 Adjusting the focus

(Fig.20)

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).

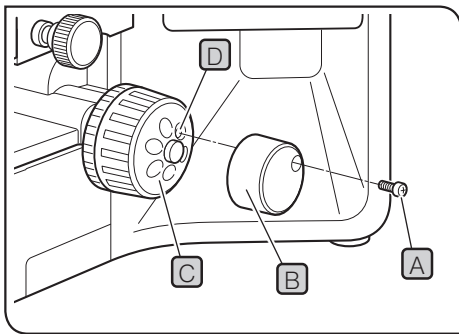


Fig.21

### 3 Replacing the fine adjustment knob (Fig.21)

- NOTE** The fine adjustment knob has been attached on the right 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 knob on the opposite side to the X- and Y-axis knobs.
- 1** Using the Allen screwdriver, loosen the clamping screw **A** and remove the fine adjustment knob **B**.
  - 2** Remove the seal from the fine adjustment knob screw hole on the other side and attach the knob by reversing the removal procedure.
  - 3** Attach a provided seal on the screw hole **D** of the removed fine adjustment knob **C**.
- TIP** The fine adjustment dial **C** can be operated with your fingertip or finger surface at the same time as manipulating the X- and Y-axis knobs.

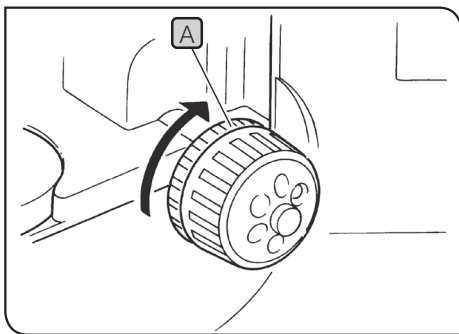


Fig.22

### 4 Adjusting the coarse adjustment knob tension (Fig.22)

- NOTE** 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 Fig.22 in the direction of the arrow to increase tension.

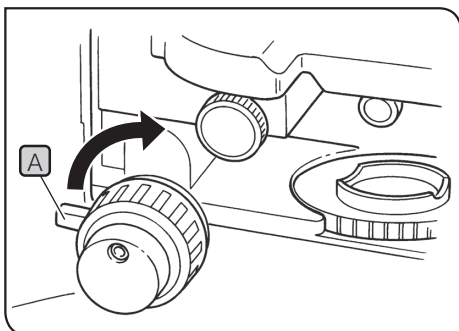


Fig.23

### 5 Pre-focusing lever (Fig.23)

- TIP** • 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 upper 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.
- Stage movement with the fine adjustment knob is not locked.
- NOTE** When the pre-focusing lever is locked, a coarse movement stroke is reduced due to the microscope's mechanism, causing the stage not to be able to be lowered to the lower limit. To lower the stage to the lower limit, release the pre-focusing lever.

5-3 Stage

**1** Placing the specimen (Figs.24 & 25-A & 25-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.
  - The maximum weight of an object such as a specimen to be placed on the stage is 0.8 kg (including the slide holder).
  - When an other company's stage is going to be attached, make sure that its weight does not exceed 4 kg.

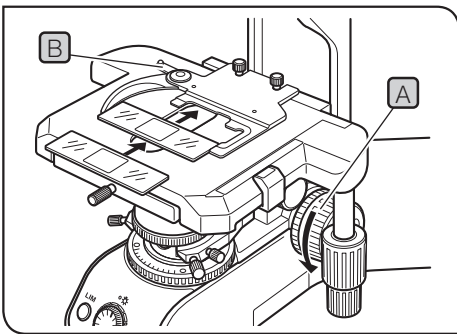


Fig.24

Microscopy with Double-Slide Holder (Fig.24)

- 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.

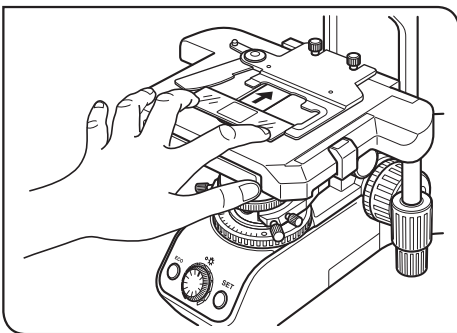


Fig.25-A

Microscopy with Single-Slide Holder (Fig.25-A)

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

Examining a whole specimen

Use one of the thin slide holders listed below that cause less interference with the objectives\*.

U-HRD-4, U-HLD-4, U-HLS-4

\* The applicable objectives are ones with 40X or less magnification (except Apo series).

Using an Oil Immersion Condenser

Use the optional U-SVRO (right-hand knob) or USVLO (left-hand knob) slotted stage which prevents close contact between the specimen and stage.

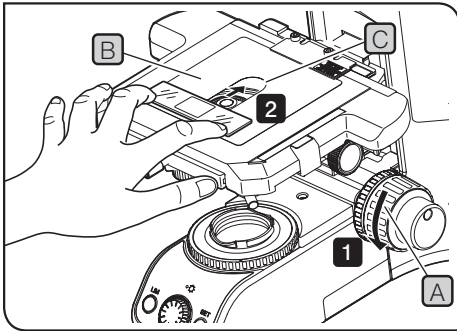


Fig.25-B

When using the specimen hold plate (CX3-SHP)

For attaching procedures, see "Attaching specimen hold plate" (page 39).

- 1 Rotate the coarse focusing knob (A) to lower the stage sufficiently.
- 2 Place the specimen on the resin sheet (B).

**NOTE** • 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.

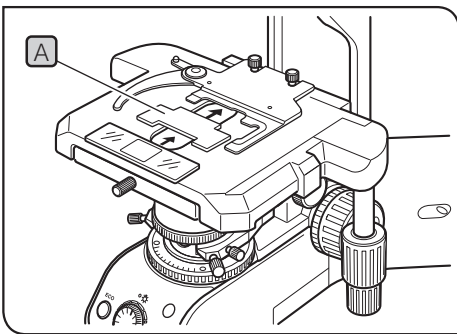


Fig.26

## 2 Using the auxiliary slide holder

(Fig.26)

Applicable revolving nosepieces:  
U-D7RE/U-D7RES/U-P6RE/U-D6BDRE/U-P5BDRE

**TIP**

When a biological slide glass specimen is placed on the U-HLDT4/U-HRDT4 two-slide holder (thick type), the slide holder may interfere with the objective when the following conditions are combined;

- The objective in use has a short WD (Working Distance);
- The specimen being observed is the specimen placed on the rear side of the slide holder, and;
- The stage is in a rotated position.

If the slide holder contacts the objective, set the provided auxiliary slide holder (A) as shown in the figure and observe only the specimen on the front side of the slide holder.

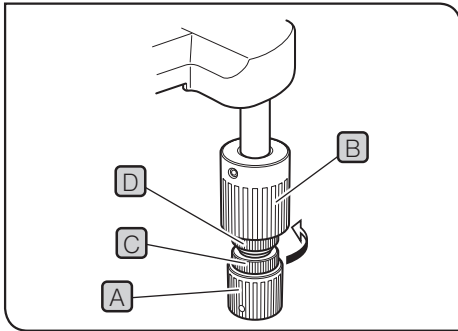


Fig.27

**3 Adjusting the X- and Y-Axis knob tension (Fig.27)**

- 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.

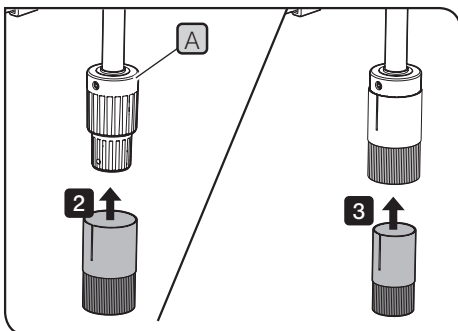


Fig.27A

**Stage knob extension adapter (BX3-SHEA) (Fig.27A)**

**TIP** Fitting this extension adapter to the X-axis / Y-axis knob of the stage allows the knob operation at the lower position and reduces the fatigue on the arm caused by long hours of operation.

Attaching procedure

- 1** Rotate the coarse focusing knob to raise the stage holder to the upper limit.
- 2** The stage knob extension adapter must be attached in the proper order. First, while pressing the **A** portion of the Y-axis (upper) knob, fit the larger stage knob extension adapter to the Y-axis (upper) knob from below.
- 3** Then, fit the smaller stage knob extension adapter to the X-axis (lower) knob from below.

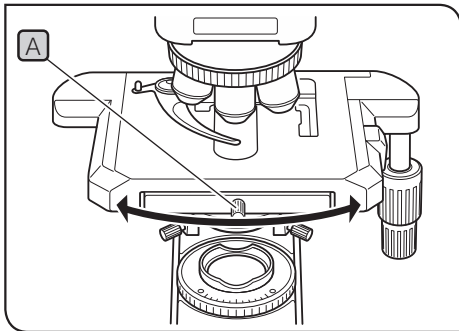


Fig.28

#### 4 Rotating the stage (Fig.28)

- 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**.

**NOTE** 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	239°	20°
Left hand knobs	20°	239°

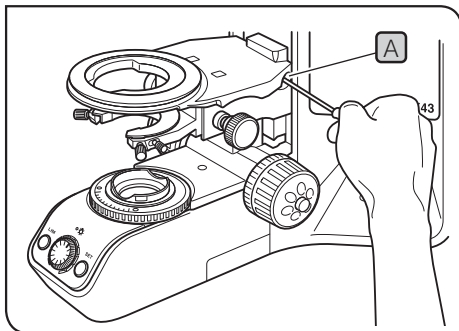


Fig.29

#### 5 Adjusting the stage height (Figs.29 & 30)

**TIP** By lowering the position of the substage, the microscope will accommodate specimens with maximum height of 35 mm. This is useful when observing metallurgical specimens and other thick objects.

- 1 Lower the stage to the lower limit, then remove the stage from the microscope.
- 2 Using the Allen screwdriver, loosen the substage bracket clamping screw **A** and remove the substage.
- 3 Turn the coarse adjustment knob and raise the focusing block **C** to where the stopper screw **B** on the arm becomes visible.
- 4 Using the Allen screwdriver, loosen and remove the upper stopper screw **B**.
- 5 Reattach substage bracket and stage.

**TIP** Store the removed stopper screw **B** in a safe place so that it will not be lost, if needed again.

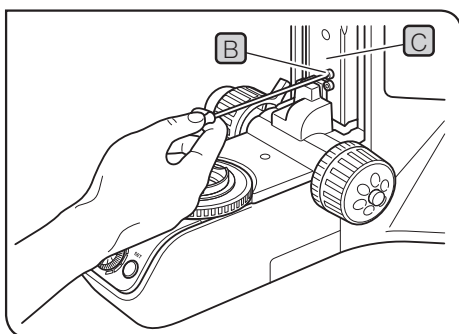


Fig.30

5-4 Observation tube

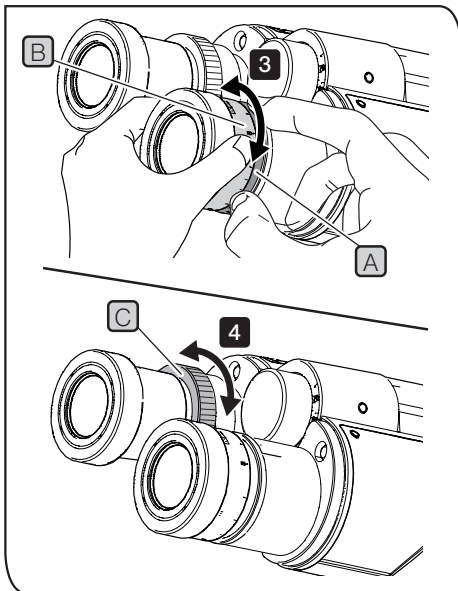


Fig.31

**1 Adjusting the diopter (Fig.31)**

- 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.

**NOTE** Do not use an immersion objective or an objective with correction collar.

- 3 Engage a low-power objective (10X or so) in the light path, use your hand to hold the base of the eyepiece (A), and rotate only the diopter adjustment ring (B) 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 (C) 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.

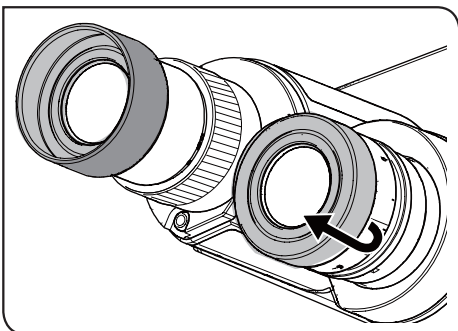


Fig.32

**2 Using the eye shades (Fig.32)**

**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.

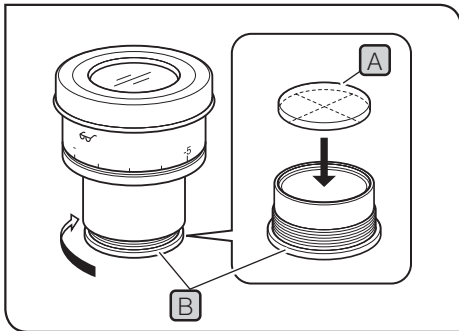


Fig.33

### 3 Mounting the eyepiece micrometer disk (Fig.33)

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.33, 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.

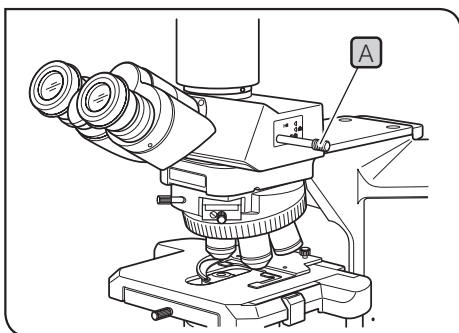


Fig.34

### 4 Selecting the light path of the trinocular tube (Fig.34)

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	100% for camera
U-TR30NIR*	100% for binocular eyepieces	50% for binocular eyepieces, 50% 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.

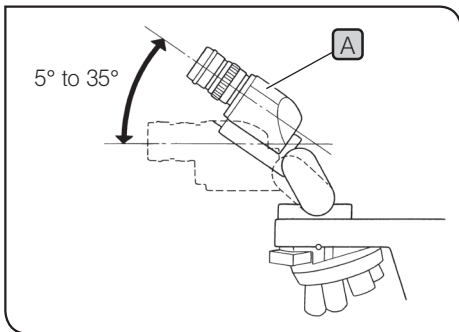


Fig.35

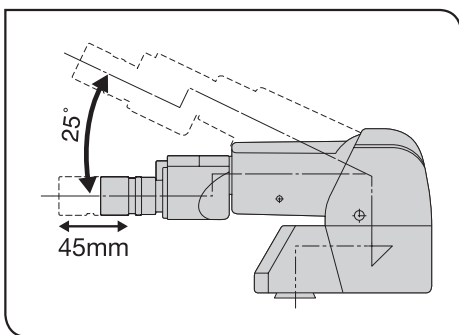


Fig.36

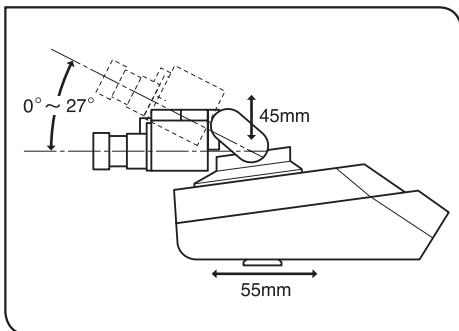


Fig.37

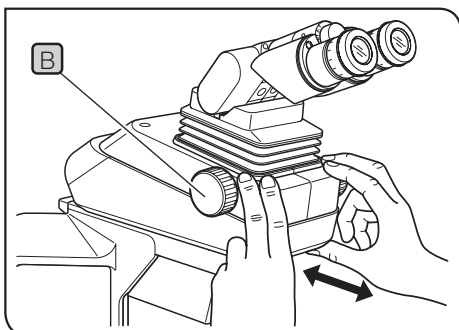


Fig.38

## 5 Adjusting the tilt

(Fig.35 to 38)

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

U-TBI-3	5° to 35°
U-TBI-CLJ	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 (Fig.35)

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

**NOTE** 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-CLJ 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.36)

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.37)

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)

**TIP**

- When adjusting front-rear position of the observation tube, hold the base of the observation tube as shown in Fig.38.
- 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**.

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

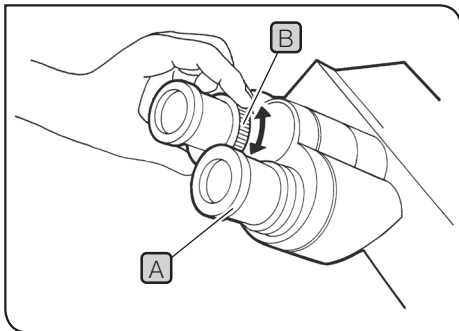


Fig.39

## 6 Using eyepieces incorporating a micrometer (Fig.39)

**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. (Fig.39)
- 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 13.

### 1 Compatibility of objectives and condensers

Objective magnification	Condenser				
	Low magnification U-LC	Abbe U-AC2	Achromat/aplanat U-AAC	Swing-out U-SC3	Ultralow magnification U-ULC-2
1.25X	Applicable (FN22)**	Applicable (FN22)	Applicable (FN26.5)	Applicable (FN 22)	Applicable (FN26.5)
2X				Applicable by moving top lens out of the light path* (FN 26.5)	
4X		Applicable (FN26.5)		Engage top lens in light path (FN 26.5)	
10-60X		Applicable (FN26.5)		Engage top lens in light path (FN 26.5)	
100X		Applicable (FN26.5)		Engage top lens in light path (FN 26.5)	

\* When using the U-SC3 swing-out condenser together with a 1.25X to 4X 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 surroundings of the field of view may become dark.

**TIP** To obtain better illumination in camera recording using a 1.25X to 4X objective, use of the U-ULC-2 is recommended.

\*\* When the U-LC is used with an objective with an NA of 1.0 or more, the NA of the lighting becomes insufficient.

**TIP** When the U-LC is used, it is required to attach the auxiliary lens. (Page 36)

## 5-6 Immersion objectives

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

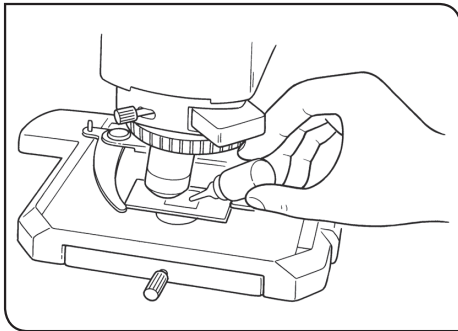


Fig.40

### 1 Using immersion objectives (Fig.40)

- 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.

**NOTE** 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.

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

## 5-7 Objectives with correction collar

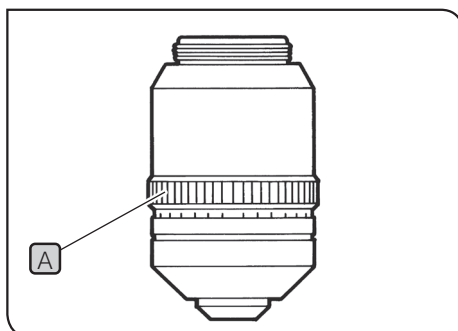


Fig.41

**TIP** If the thickness scale setting of the objective with collection collar does not match the cover glass thickness, the objective cannot manifest the full performance. To prevent this, be sure to perform the following adjustment when using an objective with collection collar.

**Adjustment Procedure**

- If the cover glass thickness is known, set the correction collar **A** to that scale value. (Fig.41)
- If the cover glass thickness is unknown, adjust the correction collar **A** and fine adjustment knob alternately until the positioning with the highest contrast is obtained.

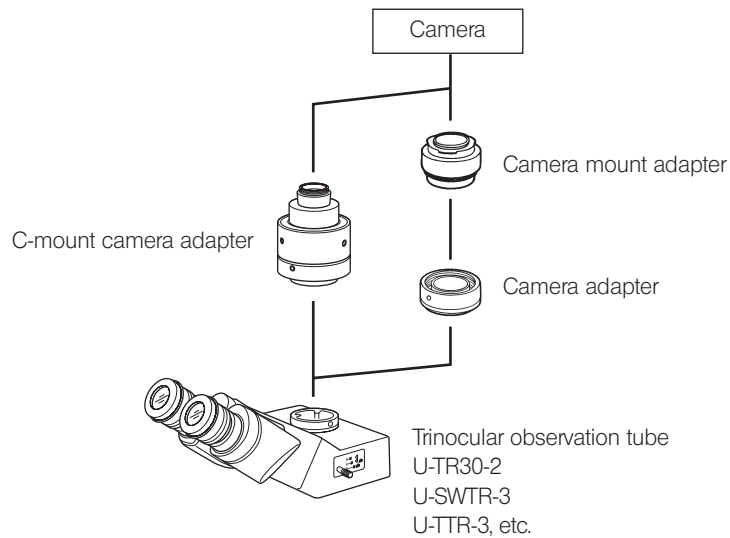
**TIP** Be careful not to touch the correction collar **A** when turning the revolving nosepiece.

# 6 Camera recording

TIP

- Use a trinocular observation tube such as the U-TTR-3 when recording images with camera. 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.

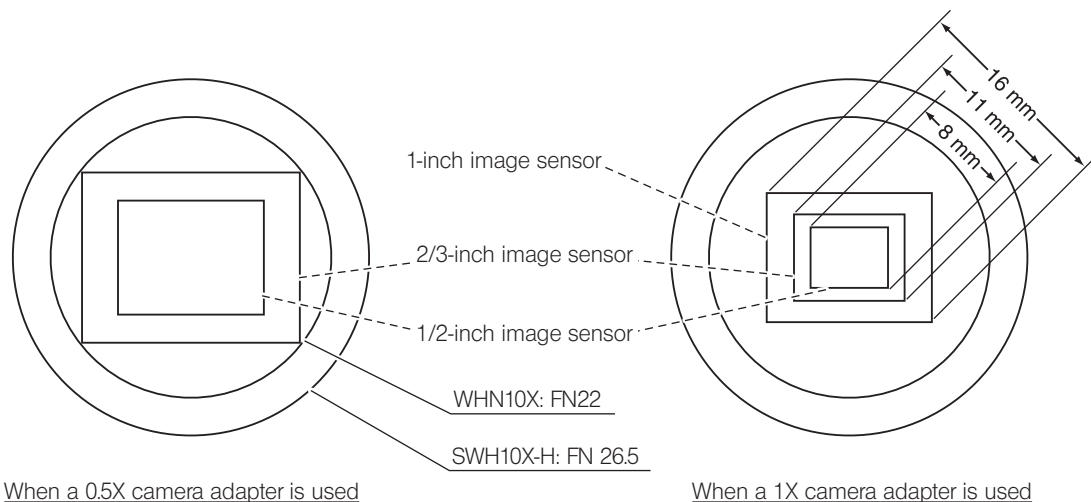
## 1 System chart



## 2 Selecting the camera adapter magnification




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

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



# 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).	11
	Common	Power cord is unplugged.	Plug power cord into the power outlet.	43
	Common	Connectors are connected improperly.	Connect connectors securely.	43
	Halogen	Bulb is not attached.	Attach a halogen bulb.	37
	Halogen	Bulb is burned out.	Replace bulb.	37
	Halogen	The TL4 is not ON.	Set the main switch of the TL4 to " I " (ON).	8
Bulb is blown immediately.	Halogen	The bulb is not a designated one.	Replace bulb with a designated one.	37
Field of view is dark.	LED	LIM setting is inappropriate.	Set LIM again.	14
	Common	Aperture and field iris diaphragms are not opened wide enough.	Adjust them to proper sizes.	13, 13
	Common	Light path selector knob is set to the  position.	Set the knob to the  or  position.	24
	Common	Condenser is not properly centered.	Center the condenser.	13
	Common	Condenser height is too low.	Adjust correctly.	42
	Halogen	ND filter is engaged.	Disengage the ND filters.	15
Brightness cannot be varied.	LED	LIM is ON.	Switch the LIM function OFF.	14
	Halogen	LED brightness adjustment knob is rotated.	Use the brightness adjustment knob of the TL4.	8
	Common	Condenser is not properly centered.	Center the condenser.	13
	Common	Condenser height is too low.	Adjust correctly.	42
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.	24
	Common	Objective is not correctly engaged.	Make sure that the revolving nosepiece clicks properly into place.	-
	Common	Revolving nosepiece is not attached properly.	Push the slide dovetail all the way until it is stopped.	42
	Common	Condenser is not attached properly.	Re-attach it .	42
	Common	An objective that falls outside of the condenser's illumination range is used.	Use the objective with the specified magnification.	26
	Common	Condenser is not properly centered.	Center the condenser.	13
	Common	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm to an optimum size.	13
	Halogen	Bulb is not mounted correctly.	Push the pins of halogen bulb all the way until the stop position.	37

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.	34
	Common	Condenser height is too low.	Adjust correctly.	42
	Common	Aperture iris diaphragm is not opened enough.	Open aperture iris diaphragm.	13
	Common	Revolving nosepiece is not attached properly.	Push the slide dovetail all the way until it is stopped.	42
	Common	Correction collar on correction collar-equipped objective is not properly adjusted.	While focusing, turn the correction collar to find the best position.	27
	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.	27
	Common	Immersion oil contains bubbles.	Remove the bubbles.	27
	Common	Recommended immersion oil is not used.	Use an our designated immersion oil.	27
	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.	-
	Common	Revolving nosepiece is not attached properly.	Push the slide dovetail all the way until it is stopped.	42
	Common	Specimen is mounted upside down.	Mount specimen correctly.	-
Image appears to waver.	Common	Revolving nosepiece is not attached properly.	Push the slide dovetail all the way until it is stopped.	42
	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.	13
Coarse adjustment knob is hard to turn.	Common	Tension adjustment ring is tightened excessively.	Loose ring.	18
	Common	You are trying to raise stage without coarse adjustment knob while pre-focusing lever is kept locked.	Unlock pre-focusing lever.	18
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.	18
Coarse adjustment will not go all the way up.	Common	Pre-focusing lever is locked at a low position.	Unlock pre-focusing lever.	18

Problem	Lamp	Cause	Remedy	Page
Coarse adjustment will not go all the way down.	Common	Condenser holder is too low.	Raise condenser holder.	42
Objective makes contact with specimen before focus is obtained.	Common	Specimen is mounted upside down.	Mount specimen correctly.	-
Field of view of one eye does not match that of the other.	Common	Interpupillary distance is incorrect.	Adjust interpupillary distance.	12
	Common	Diopter adjustment is incorrect.	Adjust diopter.	23
	Common	Different eyepieces are used on left and right.	Change one eyepiece to match the other so that both sides are the same type.	41
	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.	20
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.	21
Stroke has reduced.	Common	Stage guide is deviated.	Correct deviation as described.	21

# 8 Specifications

Item	Specification				
1. Optical system	UIS2 (UIS) optical system (featuring infinity correction)				
2. Illumination	Built-in transmitted Koehler illumination FN (Field Number): 26.5 (super-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 \$ , 0.85/0.45 A, 50/60 Hz. Power consumption: 45 W				
3. Focusing mechanism	Stage up-down movement by roller guide (rack & pinion) Stroke per rotation: 0.1 mm (fine), 15 mm (coarse) Full stroke range: 25 mm Upper coarse adjustment limit stopper Tension adjustment on coarse focus adjustment knob.				
4. Revolving nosepiece	Type	BX43-5RES		U-D6RE	
		Coded 5 position nosepiece for BX43		Universal 6-position revolving nosepiece	
	Attachable module	Transmitted light DIC slider Transmitted light analyzer			
5. Observation tube	Type	U-BI30-2	U-TBI-3/ U-TBI-CLI	U-TR30-2	U-SWTR-3
		Widefield binocular	Widefield, tilting binocular	Widefield, trinocular	Super- widefield, trinocular
	Field No.	22			26.5
	Tube inclination	30°	5°-35° (continuously variable)	30°	
	Interpupillary distance adjustment	50mm-76mm			
	Light path selection	Not available		3 steps: ① Binocular 100% ② Bi 20%, Cam 80% ③ Camera 100%	
6. BX stage	Type	U-SVRB-4		U-SVLB-4	
		Coaxial knobs on bottom right.		Coaxial 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.			
	Slide holder (single-slide holder)	U-HLST-4 (Thick type) U-HLS-4 (Thin type)			
	Slide holder (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)	
7. Condenser	Type	U-LC	U-AC2	U-SC3	U-AAC
		Low magnification	Abbe	Swing-out	Achromat/ Aplanat
	Max. NA.	0.75	1.10	0.9	1.40
Applicable objective powers	2X - 60X (Widefield: FN 22)	4X (Widefield: FN 22) 10X - 100X (Super widefield: FN 26.5)	1.25X (Widefield: FN 22) 2X - 100X (Super widefield: FN 26.5)	10X - 100X (Super widefield: FN 26.5)	

Item	Specification
8. 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>
9. Transport/ Storage environment	Temperature: Min. -25°C, Max. 65°C Humidity: Min. 0%, Max. 90%
10. 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

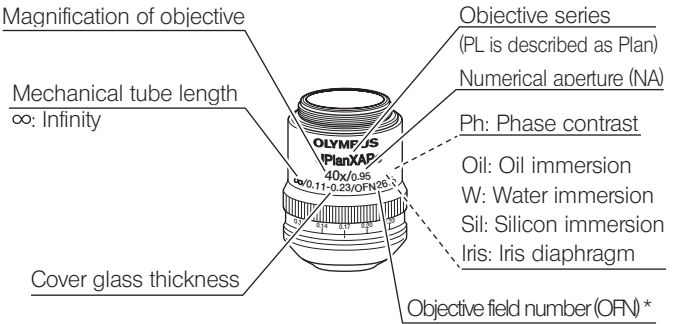
# 9 Optical characteristics (UIS2 series)

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	170	-	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	130	-	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	125X	0.04	5.0	-	125X	176
		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 Assembly

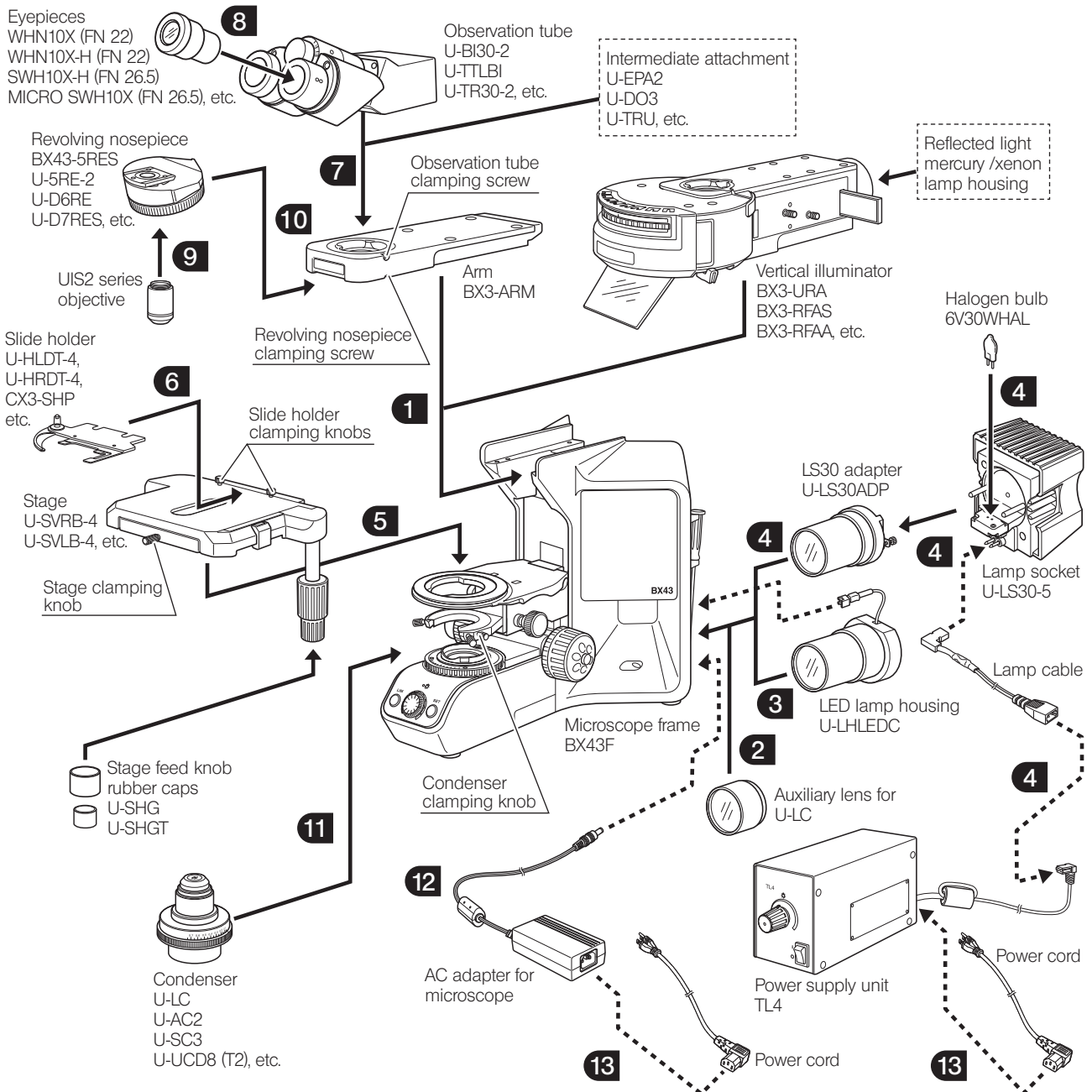
## 10-1 Assembly diagram

The diagram below shows the sequence of assembly of the various modules. The numbers indicate the order of assembly. Assembly steps enclosed in **■** will be detailed on the subsequent pages.

The model numbers shown in the following diagram are merely the typical examples. For the modules with which the model numbers are not given, please consult us or the catalogues.

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

**TIP** Most assembly operations are possible by using the Allen screwdriver (  ) provided with the microscope. However, the assembly of the reflected light illuminator requires the use of the provided Allen wrench (  ) for clamping the internal screws (to ensure the performance, we recommend that you ask us to assemble or remove this module).



## 10-2 Detailed assembly procedures

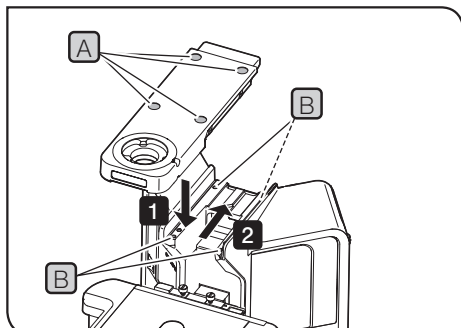



Fig.42

### 1 Attaching and detaching the standard arm part (Fig.42)

To detach the standard arm part, perform the procedure described below in reverse order. To attach the reflected light illuminator, perform the procedure described below.

Use the dedicated Allen wrench (  ) provided with the reflected light illuminator for attaching the standard arm part or the reflected light illuminator.

- 1 Place the standard arm on the arm mount of the microscope frame. (At that time, screw holes **A** (4 positions) of the standard arm slightly come to the front side of screw holes **B** (4 positions) of the microscope frame.)
- 2 Slide the standard arm backward until it stops. (The screw holes **A** of the standard arm are aligned with screw holes **B** of the microscope frame.)
- 3 Insert the clamping screw in the screw hole **A** (4 positions) and secure it lightly using the dedicated Allen wrench. (Such that the standard arm rattles when you touch it)
- 4 While pushing the standard arm toward right-back, tighten the clamping screws **A** (4 positions) to secure the standard arm firmly.
- 5 Peel off the backing paper of the cap (4 positions) provided with the standard arm and attach them at the **A** position.

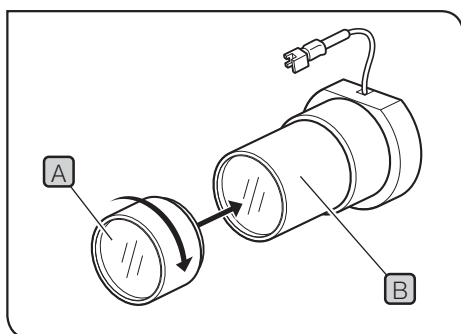


Fig.43

### 2 Attaching the auxiliary lens for the U-LC condenser (Fig.43)

**TIP** When a condenser other than the U-LC is to be used, remove the auxiliary lens.

Attach the auxiliary lens only when the U-LC is to be used.

- 1 Attach the auxiliary lens **A** provided with the condenser into the tip of the LED lamp housing (U-LHLEDC) **B** or LS30 adapter (U-LS30ADP) by screwing the lens in the direction of the arrow.

**NOTE** Be careful not to touch the lens with your finger.

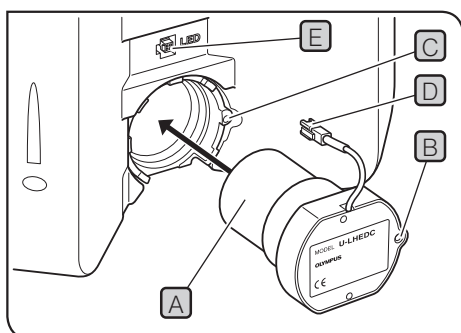


Fig.44

### 3 Attaching the LED lamp housing (Fig.44)

- 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.

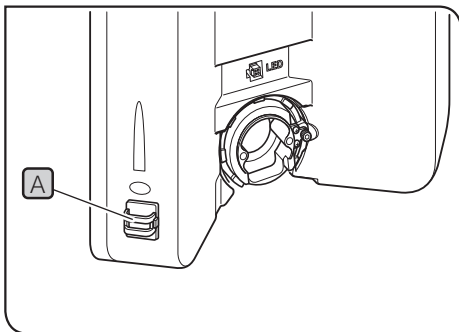


Fig.45

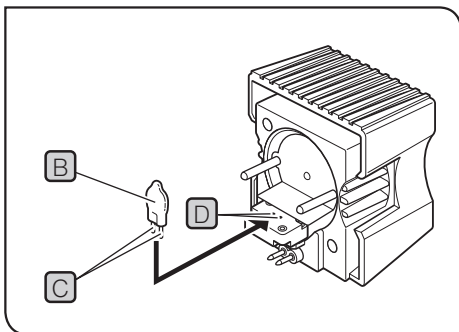


Fig.46

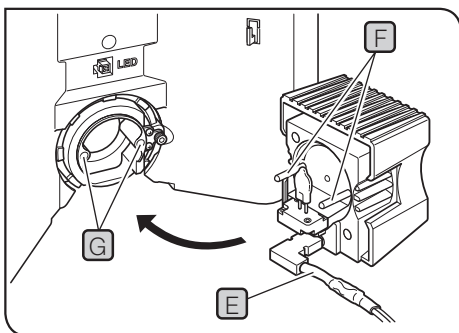


Fig.47

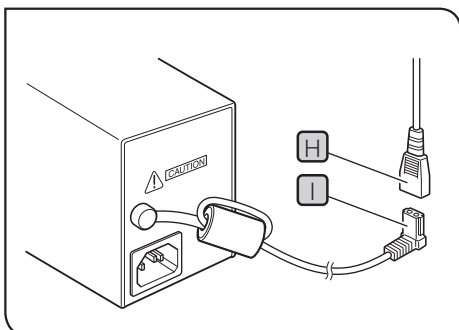


Fig.48

**4 Attaching the halogen lamp socket (Fig.45 to 48)**

Installing the U-LS30ADP LS30 adapter (Fig.45)

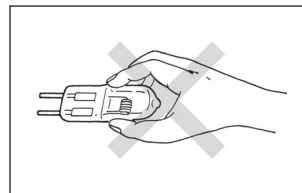
- 1 Peel off the backing of double-side adhesive tape on the cable holder **A** and attach the holder on the specified position.
- 2 Attach the adapter in the same way as **1** and **2** in the LED lamp housing attaching procedure described above.

Installing the halogen bulb (Fig.46)

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.

**NOTE** 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 Insert the lamp cable **E** in the direction shown in Fig.47.
- 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.

**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 "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.

- 4 Pass the lamp cable through the cable holder **A**. (Fig.45)

Connecting the lamp cable (Fig.48)

Connect the cable connector **H** to the connector **I** of the TL4 power supply unit.

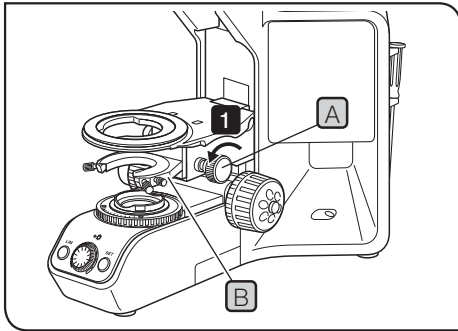


Fig.49

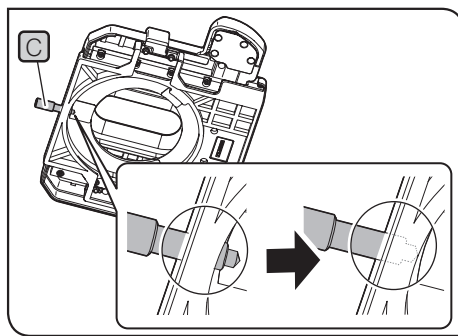


Fig.50

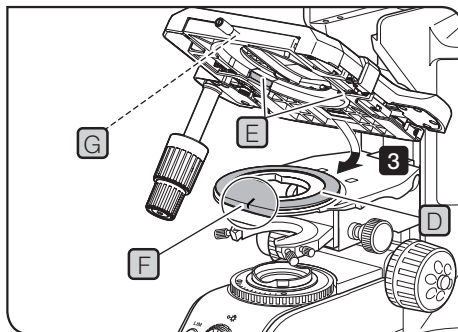


Fig.51

This picture shows the procedure to attach the mechanical stages with left-hand control (U-SVLB-4). The same procedure also applies when attaching other stages.

## 5 Attaching the stage (Fig.49 to 51)

**NOTE** When replacing the stage from the assembled microscope, remove the objective together with the revolving nosepiece in advance.

**1** Rotate the condenser height adjustment knob **A** to lower the condenser holder **B** to the lower limit.

**2** While looking at the backside of the stage, loosen the stage clamping screw **C** until the tip of the stage clamping screw is hidden (until there is no feeling of protrusion when touched by fingers).

**3** Align the two protrusions **E** inside the circular aperture on the bottom of the stage with the dovetail **D** of the stage holder first. Then, align the tip of the stage clamping screw **G** with the groove **F** on the front side and fit the stage from above.

**4** Tighten the stage clamping screw **C** to secure the stage.

**NOTE** In order to prevent the stage knob from interfering with the knobs of the focusing section, following cautions are required depending on the stage to be combined.

Oil rectangular stage with right-hand (left-hand) control	Attach the fine focusing knob of the focusing section at the opposite positions of the stage knob.
Mechanical stages with right-hand (left-hand) control	

**TIP** The optional stage knob rubber U-SHG (thin type) and U-SHGT (thick type) can be attached to the stage knob.

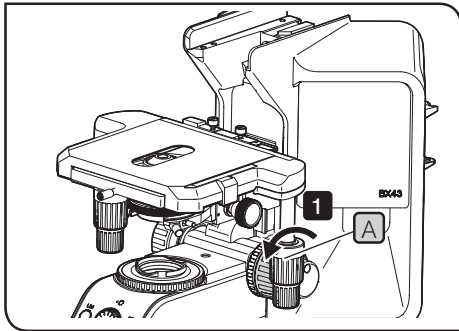


Fig.52

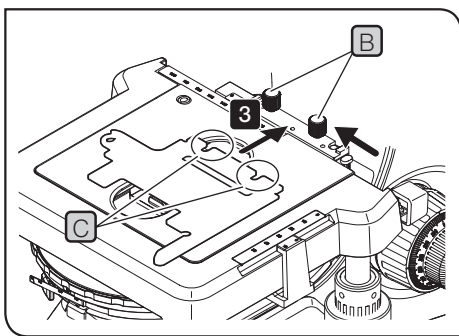


Fig.53

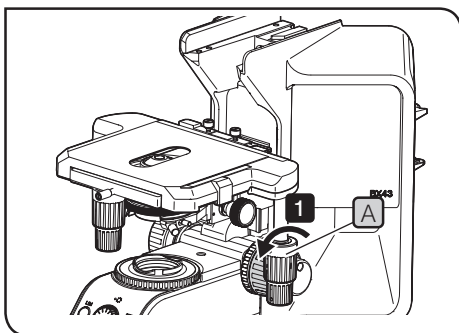


Fig.54

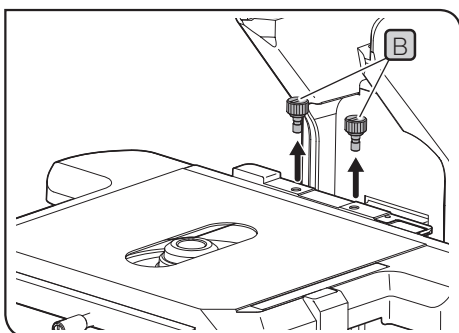


Fig.55

**6 Attaching the specimen holder (Fig.52 to 57)**

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

When using the regular specimen holder (Fig.52, 53)

- 1** Rotate the coarse focusing knob **A** to lower the stage sufficiently.
- 2** Loosen the specimen holder fixing knob **B** (2 pcs.) of the stage plate. (Fig.49 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 **B** by inserting a coin into the groove of the specimen holder fixing knob **B** and rotating it in counterclockwise direction.

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

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

When using the specimen hold plate (CX3-SHP) (Fig.54, 55, 56, 57)

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

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

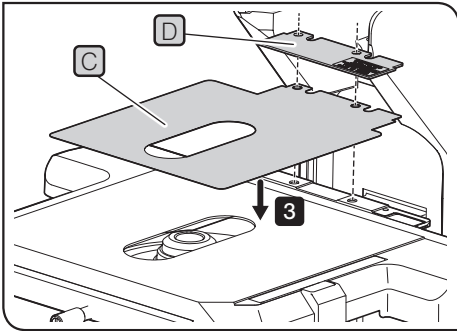


Fig.56

- 3** Place the metal plate **D** over the resin sheet (one sheet only) **C** 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 **C**.

- 4** Tighten the clamping screw **E** 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.

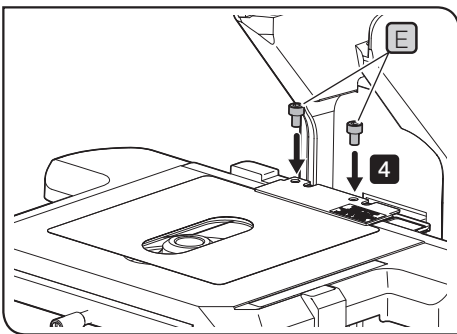


Fig.57

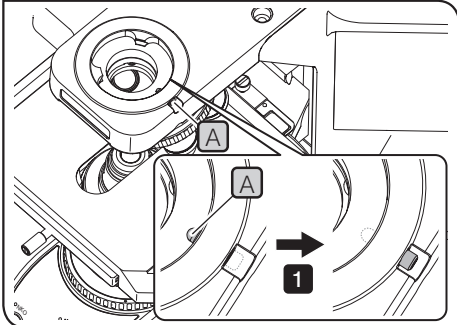


Fig.58

## 7 Attaching the observation tube (Fig.58 to 60)

**NOTE** If the eyepieces are attached to the observation tube, remove the eyepieces before attaching the observation tube.

- 1** Loosen the clamping screw **A** of the standard arm (BX3-ARM) until clamping screw is hidden looking from above (until there is no feeling of protrusion when touched by fingers).

- 2** Insert the circular dovetail **B** of the observation tube under the protrusions **C** (2 positions) on the mount of the standard arm.

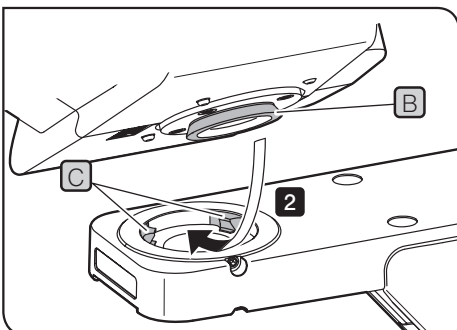


Fig.59

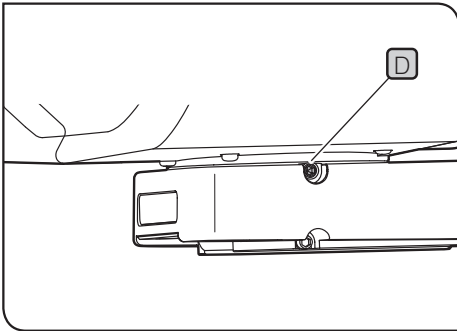


Fig.60

- 3 Adjust the direction of the observation tube so that the value of the interpupillary distance adjustment scale on the observation tube faces to the front, and tighten the clamping screw **D** of the standard arm to secure it using the dedicated Allen screwdriver provided with the microscope frame.

**NOTE** If the observation tube moves when you attempt to rotate it, the observation tube is not fixed properly. Tighten the clamping screw again.

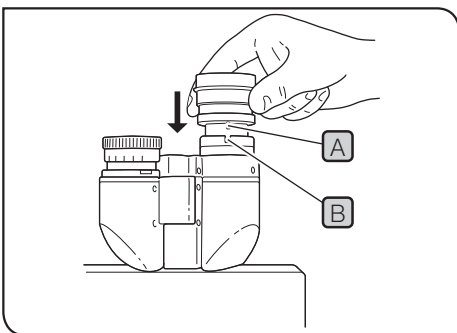


Fig.61

**8 Attaching the eyepieces** (Fig.61)

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

**NOTE**

- 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, 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.
- The super-widefield trinocular observation tube is equipped with a positioning notch on both the left and right eyepiece sleeves. Make sure that the positioning pins on both eyepieces fits into the respective notches.

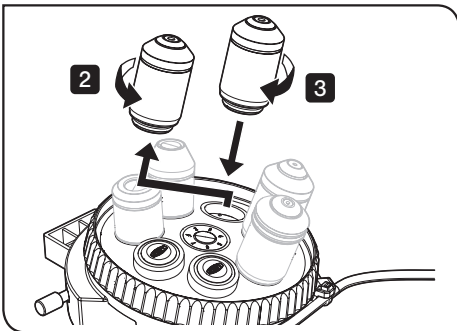


Fig.62

**9 Removing and attaching the objective** (Fig.62)

- 1 Place the revolving nosepiece on the desk with the objectives facing up.
- 2 Rotate the objective in the arrow direction to remove the objective from the revolving nosepiece.
- 3 Screw the objective to be attached into the screw hole of the revolving nosepiece by rotating it in the arrow direction and secure it firmly.

**NOTE**

- Attach the objectives in the order from the lower magnification from the mount hole 1 of the revolving nosepiece.
- For the corded nosepiece, attach the objectives to the mount hole that corresponds to the LIM brightness setting.

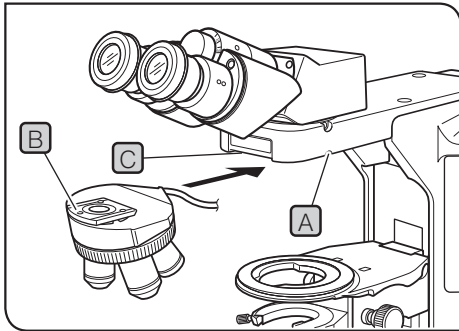


Fig.63

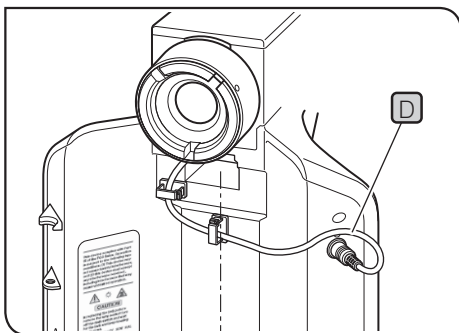


Fig.64

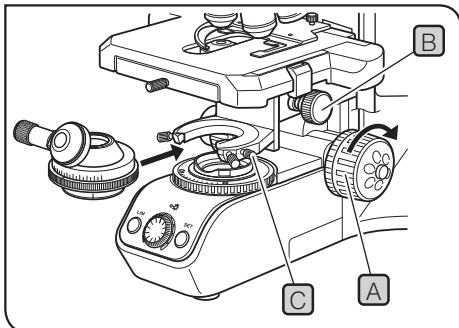


Fig.65

## 10 Attaching the revolving nosepiece (Fig.63 & 64)

- 1 Rotate the coarse adjustment knob to lower the stage.
- 2 Loosen the revolving nosepiece clamping screw **A** slightly. Do not loosen it too much because doing so makes it impossible to attach the revolving nosepiece.
- 3 Hold the revolving nosepiece so that the mount dovetail **D** is horizontal and insert it all the way into the dovetail groove of the microscope arm **C**.
- 4 Tighten the revolving nosepiece clamping screw **A**.

**TIP** When attaching or detaching a revolving nosepiece with a cable, be sure to disconnect the cable from the revolving nosepiece in advance.

Use only coded 5 position nosepiece for BX43 (BX43-5RES)

- TIP**
- Distribute its cable **D** toward the rear panel by passing it below the arm, and connect the cable to the connector on the rear panel (Fig.64).
  - As shown in Fig.56, connect to the connector by letting the cable into the cable holder (attached with BX43-5RES) attached to the rear panel.

## 11 Attaching the condenser (Fig.65)

- 1 Turn the coarse adjustment knob **A** to raise the stage to its upper limit.
- 2 Turn the condenser height adjustment knob **B** to lower the condenser holder to its lowest position.
- 3 Fully loosen the condenser clamping knob **C**.
- 4 Position the condenser so that the aperture scale is located in front. Gently slide the condenser along the dovetail all the way until it is stopped.

**TIP** When attaching a swing-out condenser with a positioning pin at the back such as the U-SC3, attach by aligning the positioning pin with the groove in the condenser sleeve.

**NOTE** When attaching a condenser with swing-out top lens, swing out the top lens out of the way before inserting the condenser.

- 5 Tighten the condenser clamping knob **C** and gently raise the condenser holder to its highest position.

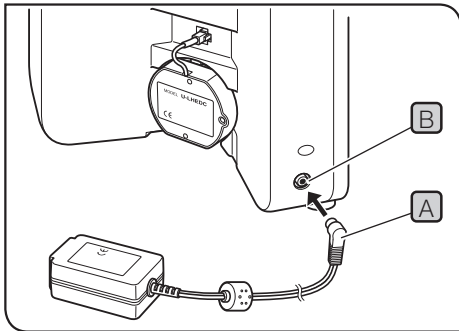


Fig.66

**12 Attaching the AC adapter** (Fig.66)

- NOTE**
- 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.

- 1 Insert the connector **A** of the AC adapter firmly into the connector **B** on the microscope. (Fig.66)

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

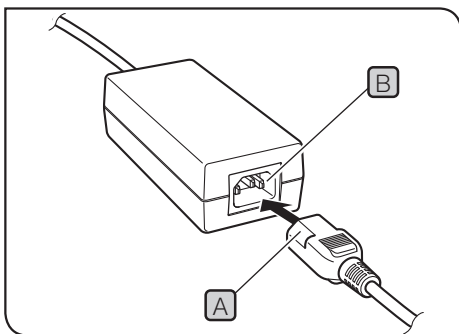


Fig.67

**13 Attaching the power cord** (Fig.67 to 69)

- NOTE** 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.67)

- 1 Insert the connector **A** of the power cord firmly into the input connector **B** of the AC adapter.

- NOTE** 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.69)

- NOTE** 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.

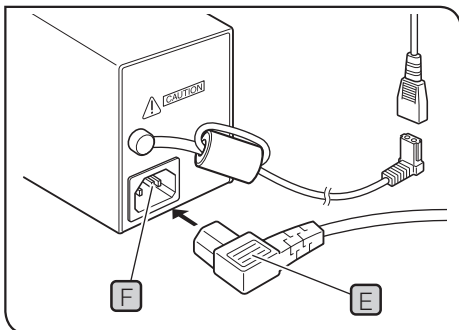


Fig.68

Operation using the TL4 power supply unit (Fig.68)

- 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.

- 2 Plug the power cord plug **G** into the wall outlet **H**. (Fig.69)

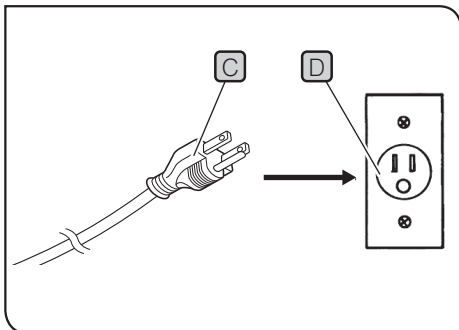


Fig.69

# 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.	

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Service Center



<https://evidentscientific.com/support>

Official website



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