

# Instructions

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# BX53M

## System Microscope

This instruction manual is for the system microscope model BX53M.

To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this system, we recommend that you study this manual thoroughly before operating this system, and always keep this manual at hand when operating this system. Retain this instruction manual in an easily accessible place near the work desk for future reference.

For details of products included in the configuration of this system, see page 9.

Optical Microscope and Accessory

This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.

- Emission            Class A
- Immunity            Industrial electromagnetic environment

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

Some interference may occur if this product is used in residential environments.



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 Evident 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.

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# Introduction

This microscope employs the UIS2 (UIS) optical systems. If you use eyepiece, objective, observation tube or condenser, etc. together with this microscope, be sure that they apply to the UIS2 (UIS) optical system series. Using inappropriate units restricts the performance.  
(There are units usable with the BX series. Contact Evident or refer to the latest version of catalogs.)

## Configuration of instruction manuals

Read all the instruction manuals provided with the units you purchased.

The following instruction manuals are prepared for the units to be used with this system.

Instruction manuals	Main contents
BX53M system microscope (this instruction manual)	Reflected light brightfield observation, reflected light darkfield observation, reflected light simple polarization observation, reflected light differential interference contrast observation, reflected light fluorescence observation, reflected light infrared observation, transmitted light brightfield observation and transmitted light simple polarization observation
BX53/53M-P polarizing microscope	Transmitted light polarization observation
BX3M-CB/CBFM Control box/FM Control box	Control box (BX3M-CB)
U-LGPS LED and LDP light source	Connection of the light guide illumination system with the liquid light guide, etc.
U-RFLT power supply for mercury burner / U-RX-T power supply for xenon burner	Connection of the mercury lamp housing with the power supply
TH4 halogen lamp power supply unit	Connection of the halogen lamp housing with the power supply

## Label of the immersion oil

Read the label of the immersion oil you purchased.

Immersion oil	Major contents
IMMOIL-8CC IMMOIL-500CC IMMOIL-F30CC	Contains the cautions and handling methods of the immersion oil.

## Intended use

This product has been designed to observe magnified images of specimens in industrial applications. Appropriate specimens can include semiconductors, electrical components, molded articles, or mechanical parts. Industrial applications include observation, inspection or measurements. Do not use this product for any purpose other than its intended use.

# Safety precautions

If the product is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the product may also be damaged. Always use the product according to this instruction manual.

The following symbols are used in this instruction manual.

**⚠ CAUTION** : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**NOTE** : Indicates a potentially hazardous situation which, if not avoided, may result in damage to the product or other property.

**TIP** : Indicates the useful knowledge or information for use.

## ⚠ CAUTION - Installation of the product -

### Install the microscope on a sturdy, level table or bench.

If you install the microscope on an unstable table or a tilted table, the microscope may drop and you may get injured.

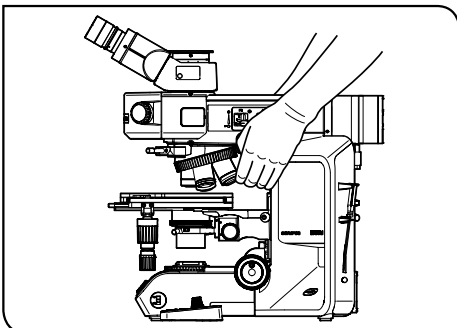
### Prevent the microscope from overturning.

The microscope becomes unstable if the height of the microscope is increased by the accessories mounted on it. In this case, as this microscope may be overturned, take the actions to prevent the microscope from overturning. In particular, if following units are combined, the microscope may be overturned even by the tilt of 10° or less.

- Height adapter (BX3M-ARMAD)
- Super widefield erect image tilting trinocular observation tube (U-SWETTR-5)
- Tilting trinocular tube (U-TTR-2)
- Intermediate attachment (U-DP, U-DP1XC, U-ECA, U-CA, U-EPA2, U-CPA, U-OPA, U-TRU, U-KPA)

For measures to prevent overturning, see "Attaching the overturning prevention plate" (page 92).

## ⚠ CAUTION - Carrying the microscope



### Hold the arm of the microscope.

When moving the microscope, hold the arm. (Approx. 15 kg)  
Holding the stage, lamp housing or observation tube, etc., may damage the microscope.

### Remove the sample and the eyepiece.

When carrying the microscope, be sure to remove the sample and the eyepieces to prevent them from dropping.  
Also, remove units attached. If you carry the microscope attached with units, the danger to drop the microscope will be increased due to the heavier weight.

### Do not slide on the top surface of the table.

Do not move the microscope by sliding on the top surface of the table.  
The rubber legs may be damaged.

**⚠ CAUTION - Electric safety -****Always use the power cord provided by Evident.**

If the proper AC adapter, the power cord and other cables are not used, the electric safety and the EMC (Electro-Magnetic Compatibility) performance of the product cannot be assured. If no power cord is provided, please select the proper power cord by referring to the section "Proper selection of the power cord" at the end of this instruction manual.

**Always connect the ground terminal.**

Connect the ground terminal of the power cord and that of the power outlet. If the product is not grounded, our intended electric safety and EMC performance of the product can not be assured.

**Do not use the product in close proximity to the sources of strong electromagnetic radiation.**

Proper operation may be interfered. The electromagnetic environment should be evaluated prior to operation of the product.

**Remove the power cord in case of emergency.**

In case of emergency, be sure to unplug the power cord from the power cord connector on the product or from the wall power outlet.

Install the product at the location where you can reach the power cord connector or the wall power outlet at hand to remove the power cord quickly.

**⚠ CAUTION - Protection for electric shock -****Keep the power cord and cables sufficiently away from the lamp housing.**

If the power cord and cables contact a hot area of the lamp housing, they could melt and cause electric shock.

**Do not insert any tools or metal fragments in the air vents of the product.**

Doing so could cause electric shock, ignition or failure of the product.

**Do not touch the product with a wet hand.**

In particular, if you touch the main switch of the power unit or the power cord with a wet hand, electric shock, ignition or failure of the product may be caused.

## **⚠ CAUTION - LED (light emitting diode) -**

### **Do not look directly at the light from the LED light source for a long time.**

The LED built in this product is basically eye-safe. However, do not look directly at the light from the LED lamp house for a long time, since it may cause damage to your eyes.

If the laws or regulations for workers health and safety have been established, follow them when using the microscope.

### **Do not look directly at the light coming out from the objective or the specular reflection light from the specimen.**

Do not look directly at the light coming out from the objective for a long time, since it may cause damage to your eyes.

### **Do not expose your skin to the light coming out from the objective for a long time.**

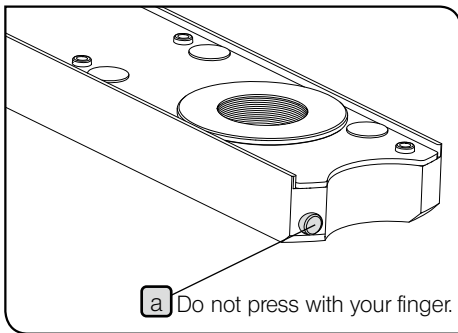
If your skin is exposed to the light coming out from the objective for a long time, you may get burned.

### **Do not press the micro switch of the MIX slider for reflected light observation (U-MIXR) with your finger.**

If you press the micro switch **a** of the MIX slider for reflected light observation with your finger, the MIX slider for reflected light observation may emit the light.

### **Do not insert the MIX slider for reflected light observation (U-MIXR) upside down.**

Do not insert the MIX slider for reflected light observation upside down. Otherwise, the light coming out from the MIX slider for reflected light observation enters your eyes through the eyepiece and your eyes may be damaged.



## **⚠ CAUTION - Protection for injury -**

### **Do not pull the cable with an excessive force.**

If you pull the cable connected to the control box (BX3M-CB) with an excessive force, the control box may drop and your hands may be pinched.

### **Be careful not to drop the glass plate.**

If you are using the glass plate, be careful not to drop the glass plate. If the glass plate drops and is broken, you may get injured by the broken pieces.

**⚠ CAUTION - Halogen lamp housing / Mercury lamp housing -**

**Confirm that the lamp is attached properly and cords are connected properly.**

**Remove the power cord from the product when replacing the lamp.**

To avoid electric shock hazards and burns when replacing the lamp, set the main switch of the power supply for the light source to **○(OFF)**, then remove the power cord from the product in advance. When you replace the lamp immediately after use of the microscope, wait until the lamp housing and the lamp are sufficiently cooled down.

Applicable lamp	<b>[For U-LH100L3, U-LH100IR]</b> 12V100WHAL-L (made by PHILIPS Co. 7724) 12V100WHAL (made by PHILIPS Co. 7023)
	<b>[For U-LH100HGAPO, U-LH100HG]</b> USH-103OL (made by Ushio Inc.)

**Secure the sufficient space around the lamp housing.**

The surface of the lamp housing on the back of the microscope gets very hot. Therefore, when installing the microscope, secure the sufficient space around the lamp housing, particularly on the top surface. After the microscope is installed, check that the space below the lamp housing is sufficiently secured.

**Do not attach the lamp housing to the mounting hole of the light source for transmitted light illumination.**




Do not attach the halogen lamp housing to the mounting hole of the light source for transmitted light illumination by mistake. Otherwise, the cover on the back of the microscope frame gets very hot and you may get burned.

The lifetime of the lamp housing (not lamp) is 8 years or 20,000 illumination hours, whichever occurs first, as a guideline. For details, see "9 Preventive inspection sheet for illumination devices" on page 121.

## CAUTION - Safety symbols -










The following symbols are placed on this product.

Study the meaning of the symbols and always use the product in the safest possible manner.

Symbol	Meaning
	Indicates a non-specific general hazard. Follow the description given after this symbol or in the instruction manual.
	Indicates that the surface becomes hot, and should not be touched with bare hands. It may cause burns.
	Indicates high voltage. Take special care to prevent electric shock.
I	Indicates that the main switch is ON.
○	Indicates that the main switch is OFF.

### Caution labels

The cautions are displayed on the portions which require special cautions during use and operation. Be sure to follow these instructions.

Caution label position	Reflected light illuminator for BF/DF (BX3M-RLA-S)	{High temperature}	
	Coded universal reflected light illuminator (BX3M-URAS-S)	{High temperature}	
	Shutter for coded universal reflected light illuminator (BX3M-URAS-S)	{High temperature}	
	DF converter (U-RCV)	{High temperature}	
	100 W halogen lamp housing for IR (U-LH100IR)	{High temperature}	
	100 W halogen lamp housing (U-LH100L-3)	{High temperature}	
	100 W mercury lamp housing (U-LH100HG) / 100 W mercury apo lamp housing (U-LH100HGAPO)	{High temperature}	
		{Electric shock}	
	LED and LDP light source (U-LGPS)	{High temperature}	
		{Electric shock}	
	Power supply (TH4-100) / Power supply (TH4-200)	{High temperature}	
{Electric shock}			
ND filter (U-25ND50-2) / ND filter (U-25ND25-2) / ND filter (U-25ND6-2) / Frost filter (U-25FR) / Interference contrast filter (U-25IF550) / L42 filter (U-25L42) / Light balancing filter (U-25LBD) / Yellow filter (U-25Y48) / Empty slider (U-25) / Light balancing amber filter (U-25LBA)	{High temperature}		

When caution labels are dirty or peeled off, contact Evident for replacement or inquiries.



## Handling Precautions

- NOTE** • This microscope is a precision instrument. Handle it with care and avoid subjecting it to a sudden or severe impact.
- Never disassemble any part of the product. Otherwise, failure could be caused.
  - Do not use this product in areas where it may be subjected to direct sunlight, high temperature and/or humidity, dust or vibrations.  
(For conditions of operating environments of this product, see "6 Specifications" on page 84.)
  - Before attaching or detaching the units other than the MIX slider for reflected light observation (U-MIXR), set the main switch of the microscope to **○(OFF)**.

## Maintenance and Storage

1. Do not leave stains or fingerprints on the lenses or filters. If they get dirty, blow away dust with a commercially available blower and gently wipe the lens or filter with a piece of cleaning paper (or clean gauze).  
Only when cleaning fingerprints and oil stains, slightly moisten a piece of cleaning paper with commercially available absolute alcohol and wipe them off with it.



**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, the electrical equipment that is switched on and off may cause the ignition of a fire. Also, always use absolute alcohol only in a well-ventilated room.

2. Wipe the portions other than lens with a dry soft cloth. If the dirt cannot be removed by dry-wiping, moisten a soft cloth with diluted neutral detergent and wipe the dirty surface with it.

**NOTE** Do not use the organic solvents because they may deteriorate the coated surface or plastic parts.

3. After using the product, be sure to set the main switch to **○(OFF)**, wait until the lamp housing is cooled down sufficiently, and keep it covered with a dust cover during storage.
4. Before disposing of this product, be sure to follow the regulations and rules of your local government. Contact Evident for any questions.
5. If the hour counter of the power supply shows 300 hours, set the main switch to **○(OFF)** for safety purpose, wait 10 minutes or more and replace the lamp. (See page 110.)

**NOTE** The mercury burner contains high-pressure gas in the tube. If you keep using the mercury burner exceeding its lifetime significantly, the distortion accumulates in the glass tube to cause the explosion in rare cases.

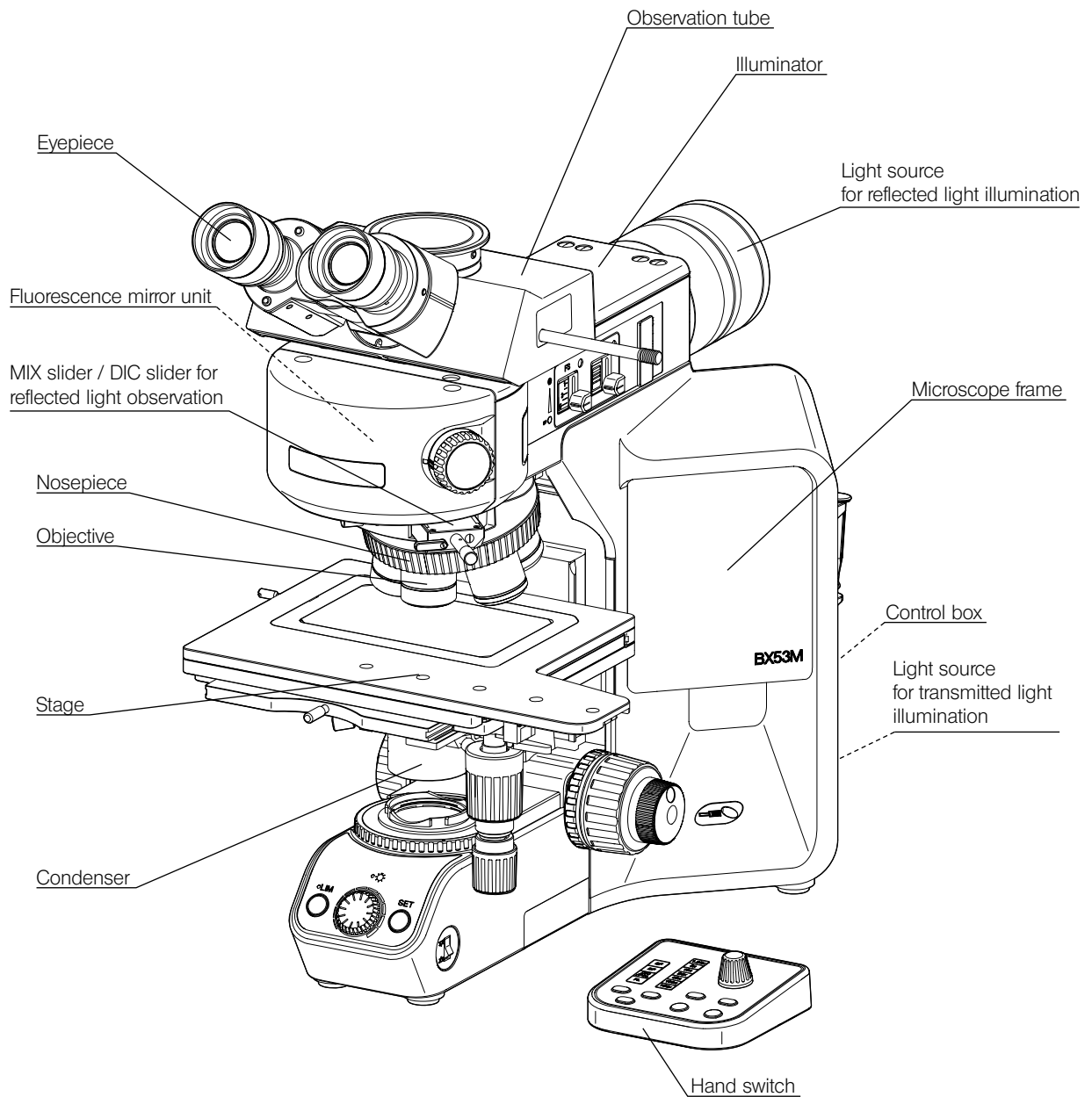
In case that the mercury burner explodes

Follow the procedures below in case that the mercury burner explodes.

- Unplug the power cord from the outlet. Leave the place and ventilate for at least 30 minutes.
  - After the burner and the lamp housing have cooled down, collect the remaining mercury with packing tape, paper or dropper, etc.
  - Seal the collected mercury and tools used completely in a nonmetallic container, and ask the waste disposer to dispose of them.
  - If there is any possibility that you have inhaled mercury steam, consult the doctor immediately and follow his/her instructions.
6. The used mercury burner must be disposed of as the industrial waste. If you cannot dispose of it by yourself properly, contact Evident for assistance.

# 1 Nomenclature of units

The diagram shown in this section shows the major units only. For units combinable to this product, see "2 List of combinable units" (page 9).



# 2 List of combinable units

● : Combination available (including units with restrictions)

× : Combination prohibited

— : Unnecessary for observation

Units		Observation method	Reflected light						Transmitted light			
			Brightfield	Darkfield	Brightfield/darkfield simultaneously	Simple polarization	Differential interference contrast	Fluorescence	Infrared	Brightfield	Simple polarization	Polarization
Microscope frame	BX53MRF-S	●	●	●	●	●	●	●	●	×	×	×
	BX53MTRF-S	●	●	●	●	●	●	●	●	●	●	●
Observation tube	U-BI30-2	●	●	●	●	●	●	●	×	●	●	●
	U-TBI-3	●	●	●	●	●	●	●	×	●	●	●
	U-TR30-2	●	●	●	●	●	●	●	×	●	●	●
	U-TR30IR	●	×	×	×	×	×	●	●	×	×	×
	U-ETR-4	●	●	●	●	●	●	●	×	●	●	●
	U-TTR-2	●	●	●	●	●	●	●	×	●	●	●
	U-SWTR-3	●	●	●	●	●	●	●	×	●	●	●
	U-SWETTR-5	●	●	●	●	●	●	●	×	●	●	●
	U-TLU	●	●	●	●	●	●	●	×	●	●	●
	U-TLUIR	●	×	×	×	×	×	●	●	×	×	×
Intermediate attachment	U-DP	●	●	●	●	●	●	●	●	●	●	●
	U-DP1XC	●	●	●	●	●	●	●	●	●	●	●
	U-ECA	●	●	●	●	●	●	●	×	●	●	●
	U-CA	●	●	●	●	●	●	●	×	●	●	●
	U-EPA2	●	●	●	●	●	●	●	●	●	●	●
	U-CPA	●	●	●	●	●	●	●	×	●	●	●
	U-OPA	●	●	●	●	●	●	●	×	●	●	●
	U-TRU	●	●	●	●	●	●	●	×	●	●	●
Illuminator	BX3M-KMA-S	●	×	●	●	●	●	×	×	●	●	×
	BX3M-RLA-S	●	●	●	●	●	●	×	●	●	●	●
	BX3M-RLAS-S	●	●	●	●	●	●	×	×	●	●	●
	BX3M-URAS-S	●	●	●	●	●	●	●	●	●	●	●
Illuminator Option	U-RCV	●	●	●	●	●	●	●	×	—	—	—
	U-LLGAD	●	●	●	●	●	●	●	×	—	—	—
Light source for reflected light illumination	BX3M-LEDR	●	●	●	●	●	●	×	×	—	—	—
	U-LH100HGAP0	●	●	●	●	●	●	●	×	—	—	—
	U-LH100HG	●	●	●	●	●	●	●	×	—	—	—
	U-LH100L-3	●	●	●	●	●	●	×	×	—	—	—
	U-LH100IR	●	×	×	×	×	×	×	●	—	—	—
	U-LGPS	●	●	●	●	●	●	●	×	—	—	—
Light source for transmitted light illumination	BX3M-LEDT	—	—	—	—	—	—	—	●	●	●	
Power supply	U-RFLT	●	●	●	●	●	●	●	×	—	—	—
	TH4-100	●	●	●	●	●	●	×	●	—	—	—
	TH4-200	●	●	●	●	●	●	×	●	—	—	—

For details of polarization observation, refer to the instruction manual provided with the unit.

BX53MRF-S and BX53MTRF-S are categorized as optical microscope, other products are categorized as optical microscope accessory.

● : Combination available (including units with restrictions)

× : Combination prohibited

— : Unnecessary for observation

Units		Observation method	Reflected light						Transmitted light			
			Brightfield	Darkfield	Brightfield/darkfield simultaneously	Simple polarization	Differential interference contrast	Fluorescence	Infrared	Brightfield	Simple polarization	Polarization
Light sources	U-LLG150	●	●	●	●	●	●	●	×	—	—	—
	U-LLG300	●	●	●	●	●	●	●	×	—	—	—
	U-RMT	●	●	●	●	●	×	●	—	—	—	—
Nosepiece	U-P4RE	●	×	×	●	●	●	●	●	●	●	●
	U-P5BDRE	●	●	●	●	●	●	●	●	●	●	●
	U-P6RE	●	×	×	●	●	●	●	●	●	●	●
	U-5RE-2	●	×	×	●	×	●	●	●	●	●	×
	U-D6RE	●	×	×	●	●	●	●	●	●	●	×
	U-D6RE-ESD-2	●	×	×	●	●	●	●	●	●	●	×
	U-D7RE	●	×	×	●	●	●	●	●	●	●	×
	U-5BDRE	●	●	×	●	×	●	●	●	●	●	×
	U-D5BDRE	●	●	●	●	●	●	●	●	●	●	×
	U-D6BDRE	●	●	●	●	●	●	●	●	●	●	×
	U-5RES-ESD	●	×	×	●	×	●	●	●	●	●	×
	U-D5BDRES-ESD	●	●	●	●	●	●	●	●	●	●	×
	U-D6RES	●	×	×	●	●	●	●	●	●	●	×
	U-D6BDRES-S	●	●	●	●	●	●	●	●	●	●	×
	U-D7RES	●	×	×	●	●	●	●	●	●	●	×
	U-D5BDREMC	●	●	●	●	●	●	●	●	●	●	×
	U-D6REMC	●	×	×	●	●	●	●	●	●	●	×
	U-D6BDREMC	●	●	●	●	●	●	●	●	●	●	×
	BX3M-RMCBL	●	●	●	●	●	●	●	●	●	●	×
	BD-M-AD	●	●	×	●	●	●	●	●	●	●	●
Stage	U-SRG2	●	●	●	●	●	●	●	●	●	●	×
	U-SRP	●	●	●	●	●	●	●	●	●	●	●
	U-FMP	●	●	●	●	●	●	●	●	●	●	●
	U-SP	●	●	●	●	●	●	●	●	●	●	×
	U-SVRM	●	●	●	●	●	●	●	●	●	●	×
	U-SVLM	●	●	●	●	●	●	●	●	●	●	×
	U-SIC4R2	●	●	●	●	●	●	●	●	●	●	×
	U-SIC4L2	●	●	●	●	●	●	●	●	●	●	×
	U-SIC64	●	●	●	●	●	●	●	●	●	●	×

● : Combination available (including units with restrictions)

× : Combination prohibited

— : Unnecessary for observation

Units		Observation method	Reflected light						Transmitted light			
			Brightfield	Darkfield	Brightfield/darkfield simultaneously	Simple polarization	Differential interference contrast	Fluorescence	Infrared	Brightfield	Simple polarization	Polarization
Stage Option	U-SHG	●	●	●	●	●	●	●	●	●	●	×
	U-SHGT	●	●	●	●	●	●	●	●	●	●	×
	U-HRD-4	●	●	●	●	●	●	●	●	●	●	×
	U-HRDT-4	●	●	●	●	●	●	●	●	●	●	×
	U-HLD-4	●	●	●	●	●	●	●	●	●	●	×
	U-HLDT-4	●	●	●	●	●	●	●	●	●	●	×
	U-MSSP	●	●	●	●	●	●	●	●	×	×	×
	U-WHP2	●	●	●	●	●	●	●	●	×	×	×
	U-MSSPG	●	●	●	●	●	●	●	●	●	●	×
	U-MSSP4	●	●	●	●	●	●	●	●	×	×	×
	U-WHP64	●	●	●	●	●	●	●	●	×	×	×
	U-SPG64	●	●	●	●	●	●	●	●	●	●	×
	U-SP64	●	●	●	●	●	●	●	●	×	×	×
	BH2-WHR43	●	●	●	●	●	●	●	●	×	×	×
	BH2-WHR54	●	●	●	●	●	●	●	●	×	×	×
BH2-WHR65	●	●	●	●	●	●	●	●	×	×	×	
Condenser	U-AC2	—	—	—	—	—	—	—	—	●	×	×
	U-SC3	—	—	—	—	—	—	—	—	●	×	×
	U-POC-2	—	—	—	—	—	—	—	—	●	●	●
	U-LWCD	—	—	—	—	—	—	—	—	●	×	×
Slider for reflected light illumination	U-25ND6	●	●	●	●	●	●	●	●	—	—	—
	U-25ND25	●	●	●	●	●	●	●	●	—	—	—
	U-25ND50	●	●	●	●	●	●	●	●	—	—	—
	U-25LBD	●	●	●	●	●	×	×	×	—	—	—
	U-25IF550	●	●	●	●	●	×	×	×	—	—	—
	U-25L42	●	●	●	●	●	×	×	×	—	—	—
	U-25FR	●	●	●	●	●	×	×	×	—	—	—
	U-25Y48	●	●	●	●	●	×	×	×	—	—	—
	U-25LBA	●	●	●	●	●	×	×	×	—	—	—
	U-BP1200IR	×	×	×	×	×	×	×	●	—	—	—
	U-BP1100IR	×	×	×	×	×	×	×	●	—	—	—
U-25	●	●	●	●	●	●	●	●	—	—	—	
Slider for differential interference contrast	U-DICR	×	×	×	×	×	●	×	×	×	×	×
	U-DICRH	×	×	×	×	×	●	×	×	×	×	×
	U-DICRHC	×	×	×	×	×	●	×	×	×	×	×



● : Combination available (including units with restrictions)

× : Combination prohibited

— : Unnecessary for observation

Units / Observation method		Reflected light							Transmitted light		
		Brightfield	Darkfield	Brightfield/ darkfield simultaneously	Simple polariza- tion	Differential interfer- ence contrast	Fluores- cence	Infrared	Brightfield	Simple polariza- tion	Polariza- tion
MIX slider for reflected light observation	U-MIXR	—	×	●	—	×	×	—	—	—	×
	U-MIXRCBL	—	×	●	—	×	×	—	—	—	×
Polarizing element	U-POT	—	—	—	—	—	—	—	×	●	×
	U-AN-2	×	×	×	●	●	×	×	×	●	×
	U-AN360-3	×	×	×	●	●	×	×	×	●	×
	U-PO3	×	×	×	●	●	×	×	—	—	—
	U-POTP3	×	×	×	●	●	×	×	—	—	—
	U-AN360IR	×	×	×	●	×	×	●	×	×	×
	U-POIR	×	×	×	●	×	×	●	—	—	—
	U-AN360P	×	×	×	●	●	×	×	×	●	●
Compensator	U-TAD	×	×	×	×	×	×	×	×	×	●
	U-TP530	×	×	×	×	×	×	×	×	×	●
	U-TP137	×	×	×	×	×	×	×	×	×	●
	U-CSE	×	×	×	×	×	×	×	×	×	●
	U-CBE	×	×	×	×	×	×	×	×	×	●
	U-CTB	×	×	×	×	×	×	×	×	×	●
	U-CWE2	×	×	×	×	×	×	×	×	×	●
	U-CBR1	×	×	×	×	×	×	×	×	×	●
	U-CBR2	×	×	×	×	×	×	×	×	×	●
Filter slider	43IF550-W45	—	—	—	—	—	—	—	●	●	●
	45-IF546	—	—	—	—	—	—	—	●	●	●
Mirror unit	U-FF	—	—	—	—	—	●	—	—	—	—
	U-FBF	●	×	●	●	●	×	●	—	—	—
	U-FDF	×	●	×	×	×	×	×	—	—	—
	U-FBFL	●	×	●	●	●	×	×	—	—	—
	U-FWBS	×	×	×	×	×	●	×	—	—	—
	U-FWGS	×	×	×	×	×	●	×	—	—	—
	U-FWUS	×	×	×	×	×	●	×	—	—	—
	U-FDICR	×	×	×	●	●	×	×	—	—	—

● : Combination available (including units with restrictions)

× : Combination prohibited

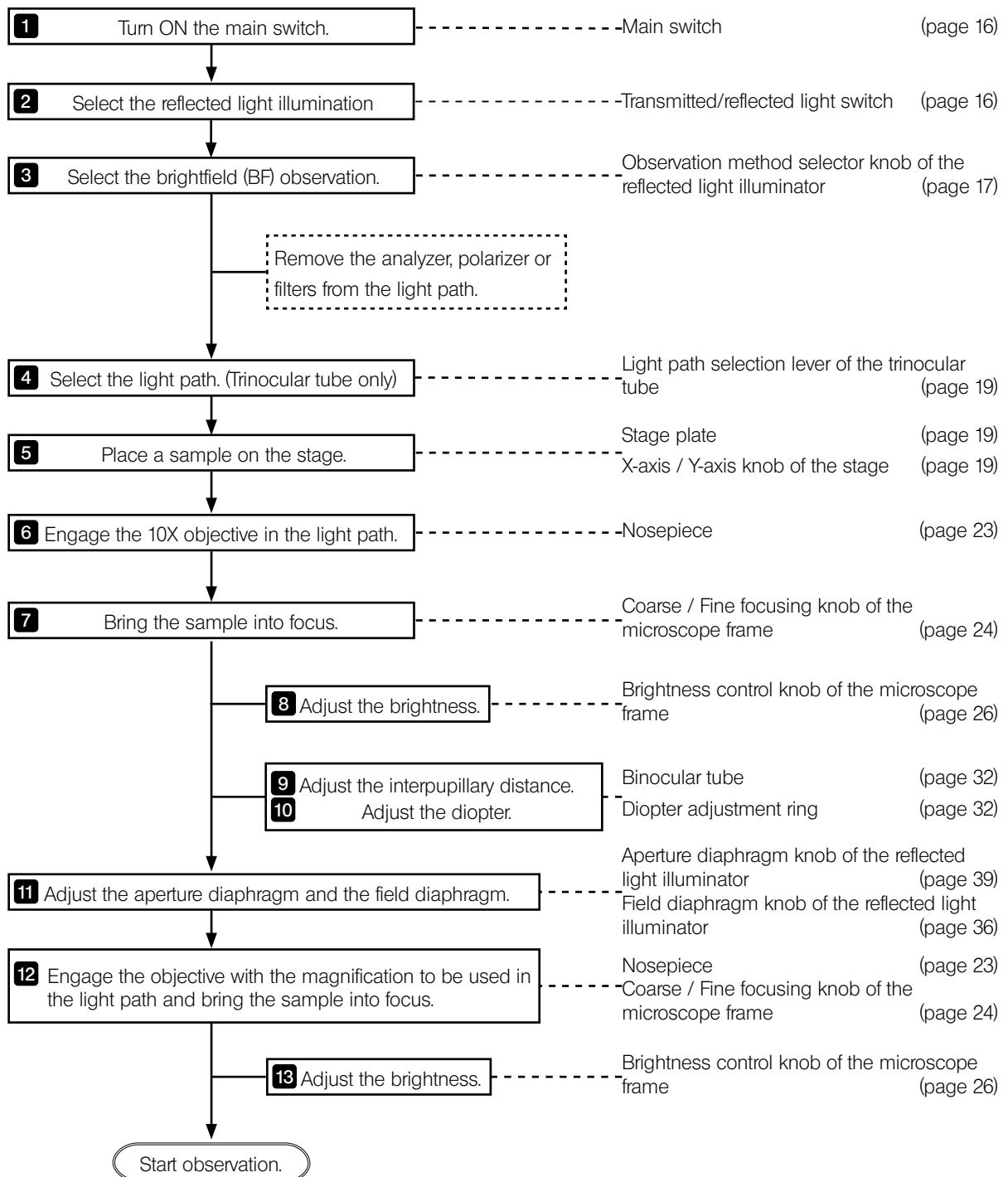
— : Unnecessary for observation

Units \ Observation method		Reflected light							Transmitted light		
		Brightfield	Darkfield	Brightfield/darkfield simultaneously	Simple polarization	Differential interference contrast	Fluorescence	Infrared	Brightfield	Simple polarization	Polarization
Camera adapter	U-TV0.25XC	●	●	●	●	●	●	×	●	●	●
	U-TV0.35XC-2	●	●	●	●	●	●	×	●	●	●
	U-TV0.5XC-3	●	●	●	●	●	●	×	●	●	●
	U-TV0.63XC	●	●	●	●	●	●	×	●	●	●
	U-TV1XC	●	●	●	●	●	●	●	●	●	●
	U-TV1X-2	●	●	●	●	●	●	●	●	●	●
	U-CMAD3	●	●	●	●	●	●	●	●	●	●
Hand switch	BX3M-HS	●	●	●	●	●	●	●	●	●	●
	U-HSEXP	●	●	●	●	●	●	●	●	●	●
	BX3M-HSRE	●	●	●	●	●	●	●	●	●	●
	TH4-HS	●	●	●	●	●	●	●	●	●	●
Control box	BX3M-CB	●	●	●	●	●	●	●	●	●	●
Eyepiece	WHN10X	●	●	●	●	●	●	—	●	●	●
	WHN10X-H	●	●	●	●	●	●	—	●	●	●
	CROSSWHN10X	●	●	●	●	●	●	—	●	●	●
	SWH10X-H	●	●	●	●	●	●	—	●	●	●
Objective	Refer to "7 Optical performance list «UIS2 series»" (page 87).										
Other optional units	U-FC	—	—	—	—	—	—	—	●	×	×
	BX3-ARM	×	×	×	×	×	×	×	●	●	●
	BX3M-ARMAD	●	●	●	●	●	●	●	—	—	—
	U-PJ (orientation plate)	—	—	—	—	—	—	—	—	—	●
	DSX-CALS-HR	●	—	—	—	—	—	—	●	—	—

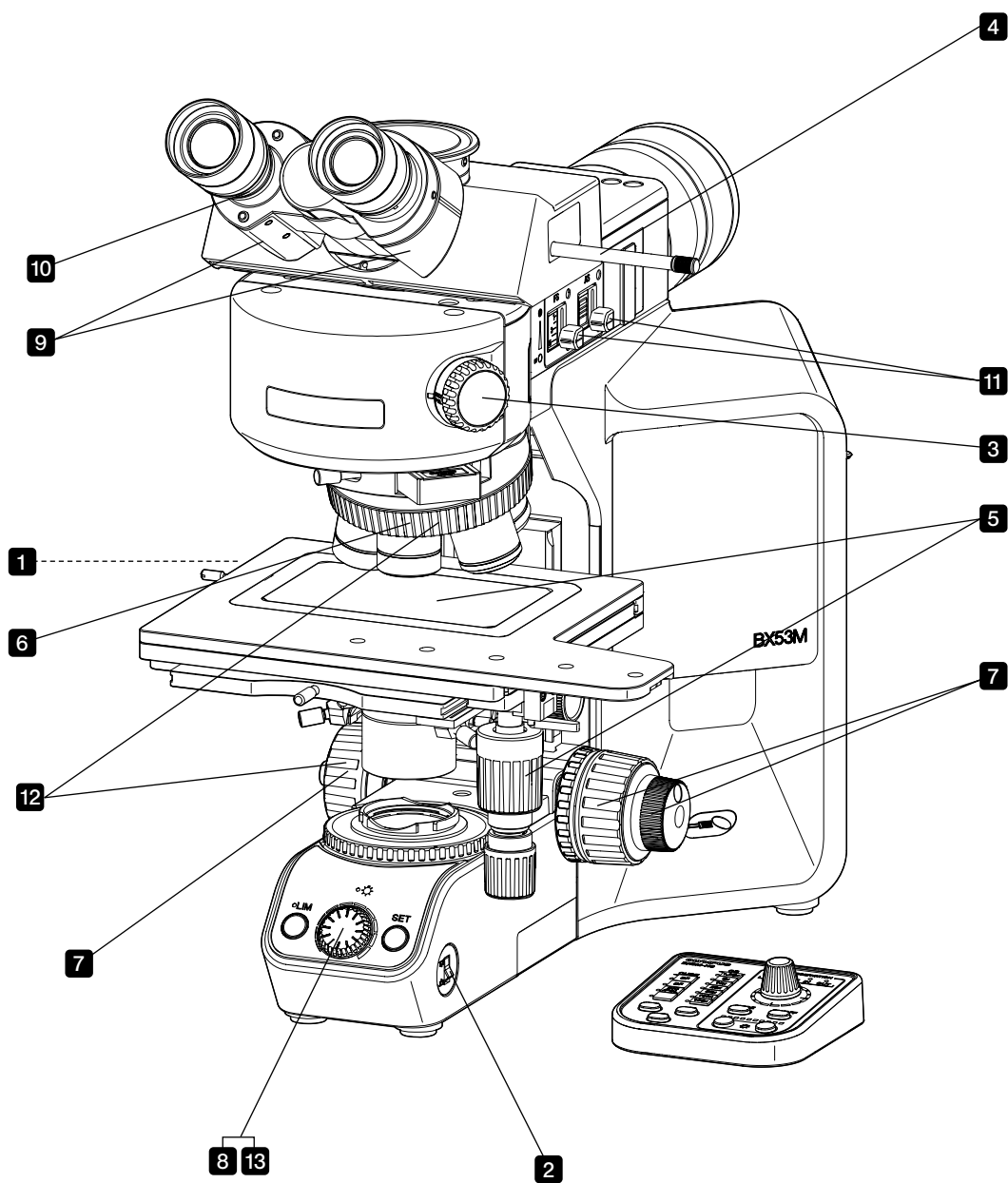
# 3 Basic operations of the microscope (brightfield observation)

This section describes the operating procedures of the reflected light brightfield observation and the transmitted light brightfield observation, which is the basis of observation methods. The reflected light simple polarization observation and the reflected light differential interference contrast observation, etc. are described in "4 Various observation methods".

## 3-1 Reflected light brightfield observation procedures

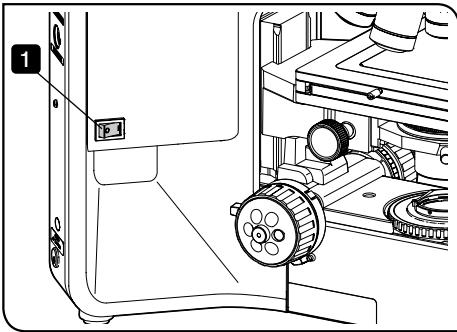






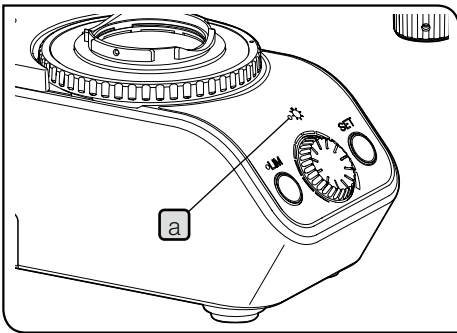
**TIP** Make a copy of this observation method guide. Place it near the microscope so that you use it when operating the microscope.

### 3-2 Turning ON the main switch



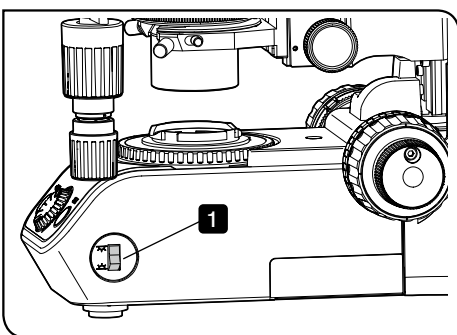
- 1** Set the main switch of the microscope frame to **I** (ON). When the power is ON, the pilot indicator **a** turns ON. In addition, the beep sound is heard once if the control box (BX3M-CB) is combined.
- 2** If following units are combined, set the main switch of respective unit to **I** (ON).

Combinable units	Unit to set to ON
Mercury lamp housing	Main switch of the power supply for mercury burner (U-RFL-T)
Light source	LED and LDP light source (U-LGPS)
Halogen lamp housing	Main switch of the halogen lamp power supply unit (TH4)



For details, refer to the instruction manual provided with the respective unit.

### 3-3 Selecting the illumination



#### 1 Changing between the reflected light illumination and the transmitted light illumination

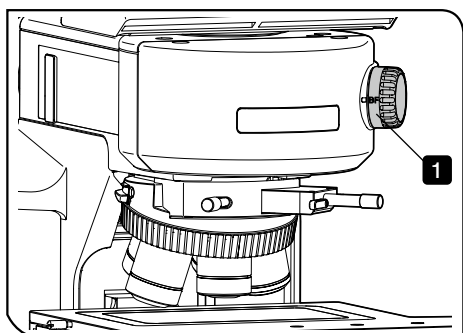
This function is available only with the microscope frame (BX53MTRF-S).

Changing between ON and OFF of the reflected LED lamp housing and the transmitted LED lamp housing allows you to select the reflected light illumination or the transmitted light illumination.

- 1** Select the LED lamp housing lighted using the transmitted/reflected light switch.

Display	Function
	The LED lamp housing on the reflected light illumination side turns ON.
	The LED lamp housing on the transmitted light illumination side turns ON.

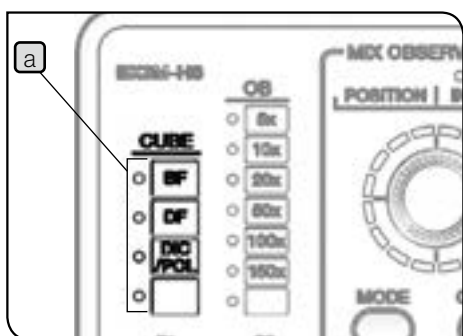
### 3-4 Selecting the observation method



#### 1 When BX3M-RLAS-S is combined

- 1 Select the observation method with the observation method selector knob.

Display	Function
BF	The brightfield observation is selected.
DF	The darkfield observation is selected.
DIC/PO	The differential interference contrast observation or the polarization observation is selected.

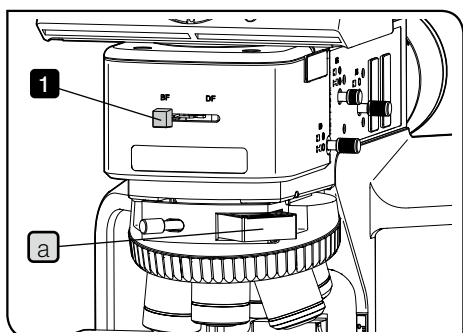


#### When the hand switch is combined

The lighting of the CUBE indicator **a** of the hand switch (BX3M-HS) is changed according to the selection of the observation method selector knob.

#### 2 When BX3M-KMA-S is combined

The reflected LED light illuminator for BF (BX3M-KMA-S) is available only for the brightfield observation. The other observation methods cannot be selected.



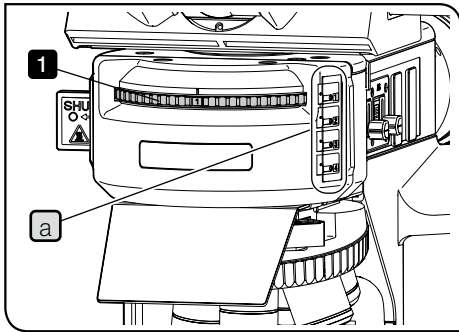
#### 3 When BX3M-RLA-S is combined

- 1 Select the observation method using the brightfield/darkfield selector knob.

Display	Function
BF	The brightfield observation is selected.
DF	The darkfield observation is selected.

**NOTE** • Slide the brightfield/darkfield selector knob to the stopper position completely.

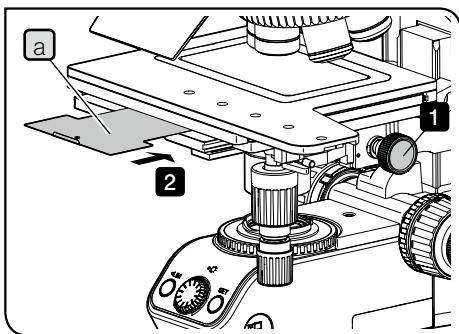
- The dummy slider **a** is attached to the nosepiece as a factory default. Be sure to keep this dummy slider inserted to prevent flares before use.



#### 4 When BX3M-URAS-S is combined

- 1 Turn the turret to select the observation method.  
You can check which No. selects which observation method by the inscription pocket **a**. Note that the indicator sheet should be inserted properly in the inscription pocket when attaching the mirror unit.

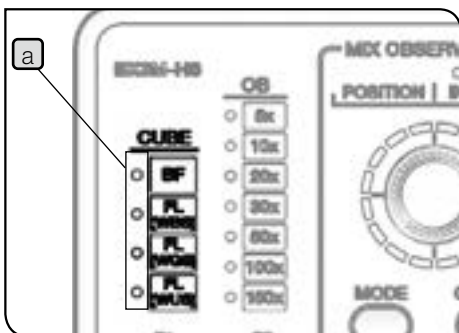
Indicator sheet	Function
BF	Brightfield observation
BFL	Brightfield observation (Use when the mercury lamp housing is combined.)
DF	Darkfield observation
DIC/PO	Differential interference contrast observation / Polarization observation
FL(WBS)	Fluorescence observation with B excitation
FL(WGS)	Fluorescence observation with G excitation
FL(WUS)	Fluorescence observation with U excitation



#### When performing the fluorescence observation

**NOTE** If you perform the fluorescence observation with the microscope frame (BX53MTRF-S), attach the provided light shield sheet to prevent the in-house fluorescence caused by the transmitted light illumination optical system.

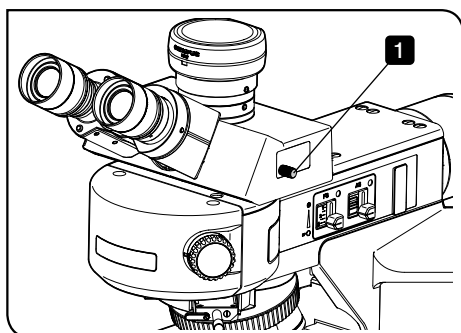
- 1 Turn the condenser height adjustment knob to lower the condenser sufficiently.
- 2 Insert the light shield sheet **a** into the space of the stage.



#### When the hand switch is combined

The lighting of the CUBE indicator **a** of the hand switch (BX3M-HS) is changed according to the selection of the turret.

### 3-5 Changing between the eyepiece light path and the camera light path



You can select the light path for observing with the eyepiece or the light path for observing with the display, etc. through the camera.

- Slide the light path selection lever of the trinocular tube to select the light path.

Trinocular tube	Light path selection lever position		
	Pressed in	Middle	Pulled out
U-TR30-2	Eyepiece 100%	Eyepiece 20% Camera 80%	Camera 100%
U-SWTR-3			
U-TR30IR	Eyepiece 100%	Eyepiece 0% Camera 0% (Shutter)	Camera 100%
U-TTR-2	Eyepiece 50% Camera 50%	Eyepiece 100%	Camera 100%
U-ETR-4	Eyepiece 100%	/	Camera 100%
U-SWETR			
U-SWETTR-5	Eyepiece 100%	/	Eyepiece 20% Camera 80%

### 3-6 Placing a sample on the stage

#### 1 Placing a sample

**TIP** The maximum load weight when the stage plate is combined with the stage with coaxial knobs on the bottom right (left) (U-SVRM/U-SVLM) is described as follows:

- Combination with U-MSSP : 500 g

**TIP** The maximum load weight when the stage plate is combined with the 4x4 inch stage (U-SIC4R2/U-SIC4L2) is described as follows:

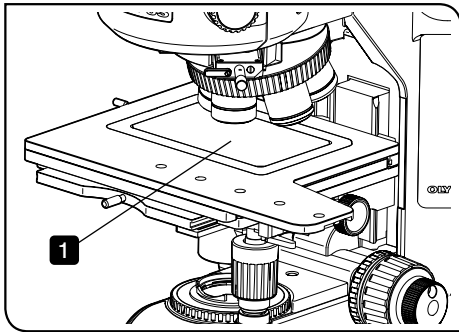
- Combination with U-MSSP4\*1 : 1 kg
- Combination with U-MSSPG : 500 g

\*1 If the stage plate is removed, the sample with the maximum weight of 1.5 kg can be placed on the stage directly.

**TIP** The maximum load weight when the right hand control 150 mm x 100 mm stage (U-SIC64) is combined with the microscope is described as follows:

- U-SIC64 : 3 kg
- Combination with U-SIC64 and U-SPG64 : 500 g

**NOTE** If the sample exceeding the specified weight is placed on the stage, the feeling of stage movement will be worsened or the stage will be worn.



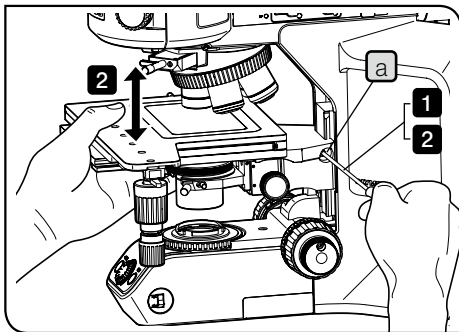
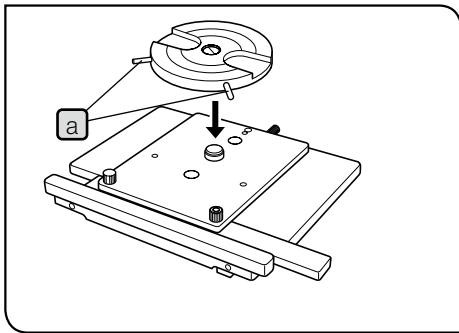
**1** Place the sample on the stage plate or the holder plate before observation.

**TIP** • If the sample is not flat and/or parallel, the reflected light does not return to the objective and you cannot perform the observation.

• If you observe the large-size sample, remove the stage plate and place the sample on the stage directly.

• When using the wafer holder plate, turn the wafer holder using the knob **a**.

• When using the glass holder plate, you can observe with the transmitted light illumination. The BX53MTRF-S system is required for the observation with the transmitted light illumination.



## 2 Adjusting the stage height

**TIP** The thick samples or metal samples can be observed with following methods.

• Lower the stage holder mounting position:

The sample with the height up to 65 mm can be observed. (Note, if the right hand control 150 mm x 100 mm stage (U-SIC64) is combined, the sample height is up to 63 mm.) For procedures to lower the the stage holder mounting position, see "Removing the stopper of the stage holder" (page 93)

• Attach the height adapter (BX3M-ARMAD) to the microscope frame:

The sample with the height up to 105 mm can be observed.

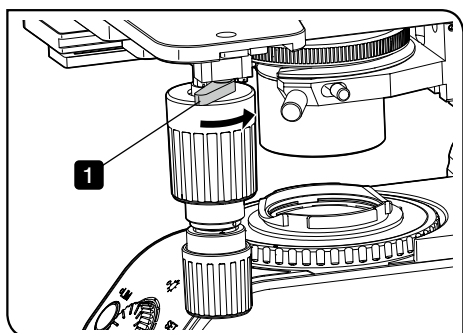
(Note, if the right hand control 150 mm x 100 mm stage (U-SIC64) is combined, the sample height is up to 103 mm.)

### CAUTION

If the clamping screw **a** of the stage holder is loosened, the stage falls. Be sure to hold the stage firmly while loosening the clamping screw.

**1** Hold the stage surely and loosen the clamping screw **a** of the stage holder with the Allen screwdriver.

**2** Move the stage up and down to find the desired position and tighten the calming screw **a** at the desired postilion.

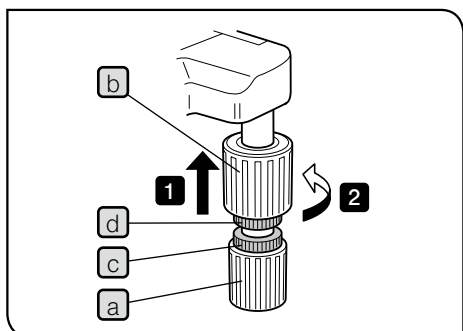


### 3 Using the Y-axis lock

The Y-axis lock is the function available only with the stages U-SIC64 and U-SIC4R2/SIC4L2.

- 1 If you lock the Y-axis lock lever in the arrow direction, the stage movement in Y-axis direction (front and back) is locked and you can move the stage only in the X-axis direction (right to left).

**NOTE** To cancel the lock, return the lock lever to the original position completely.  
If the lock lever is unlocked insufficiently, the lever may be worn to cause the problem that the lock does not work or the wear powder may be generated.



### 4 Adjusting the tension of the X-axis knob and the Y-axis knob

The tension adjustment is a mechanism available only with the stages U-SVRM/SVLM and U-SIC64.

- 1 Hold the X-axis knob **a** and when you raise the Y-axis knob **b**, the adjustment knobs **c** and **d** appear.
- 2 Turning the X-axis adjustment knob **c** or the Y-axis adjustment knob **d** in the arrow direction increases the tension and rotating in the opposite direction decreases the tension.

**NOTE** • If you increase the tension too tight, the stage squeaks when moving or the stage does not stop accurately.

- Due to the long hour operation, the stage guide may shift and the movable area becomes smaller in rare cases, but this is not a failure. This phenomena can be solved easily by the following remedies.

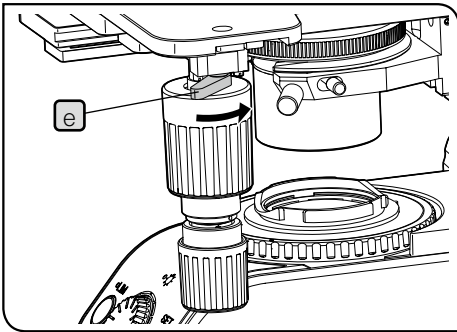
[Remedy]

X-axis direction (right and left) :

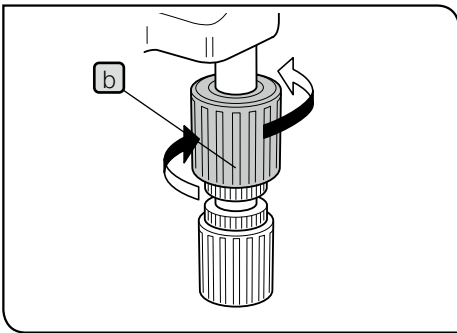
Hold the stage plate mounting section and move it right and left until it touches the stopper.

Y-axis direction (front and back) :

Hold the upper stage and move front and back until it touches the stopper.



**TIP** If it is too tight to raise the Y-axis knob **b** in **1**, lock the stage movement with the Y-axis lock lever **e** once, and turn the Y-axis knob **b** to raise the Y-axis knob.



**Stage knob rubber (option)**

**TIP** Fitting this knob rubber to the X-axis knob and/or Y-axis knob of the stage U-SVRM/SVLM and/or U-SIC64 prevents knobs from slipping and allows the fine stage operation only by holding it lightly. Also, the fatigue caused by the long-hour operation can be reduced.

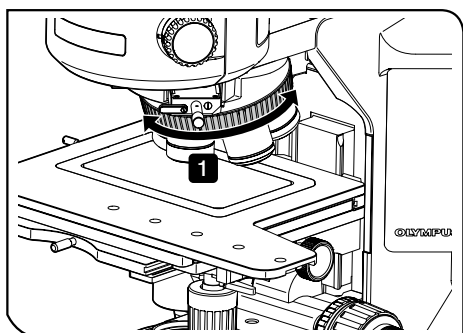
There are 2 types of knob rubbers: U-SHGT (thick type: 5 mm) and U-SHG (thin type: 2 mm).

Procedures to attach the knob rubber

Fit the larger part to the Y-axis (upper side) knob from below first and then, fit the smaller part the X-axis (lower side) knob from below.



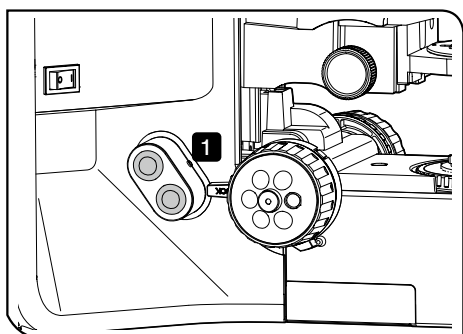
### 3-7 Selecting the objective



**NOTE** When selecting the objective, be careful not to collide with the sample.

When the manual or coded nosepiece is combined

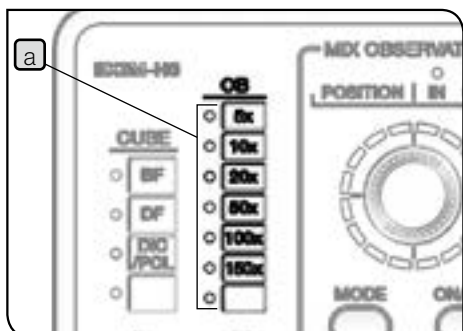
**1** Turn the nosepiece to select the objective.



When the motorized nosepiece is combined

**1** Press the button of the hand switch for motorized nosepiece (BX3M-HSRE) to select the objective.

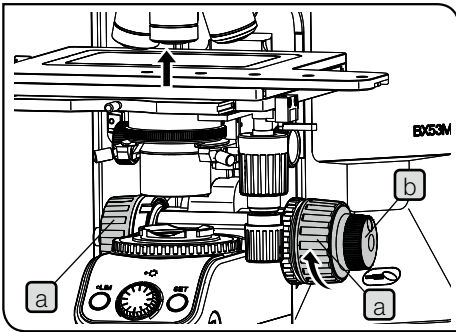
**TIP** The nosepiece rotation direction specified by pressing the button can be changed by setting the dip switch on the side of the control box (BX3M-CB). For details, see "Attaching the control box" (page 98).  
Before setting the dip switch, set the main switch to **OFF**.



When the motorized or coded nosepiece and the hand switch are combined

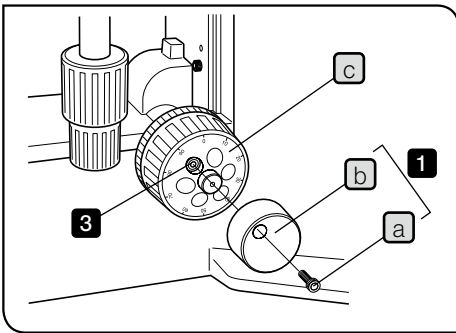
The lighting of the OB indicator **a** of the hand switch (BX3M-HS) is changed according to the selection of the objective.

## 3-8 Focusing



### 1 Moving the stage vertically

Turn the coarse focusing knob **a** and the fine focusing knob **b** in the arrow direction to move the stage upward. (The sample approaches the objective.)



### 2 Replacing the fine focusing knob

**NOTE** The fine focusing knob is attached on the right side as a factory default.

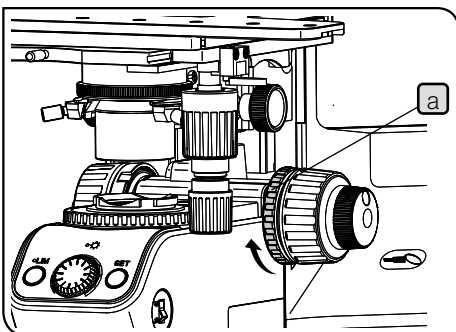
**TIP** The fine focusing knob is a detachable type in order to prevent the interference between the fine focusing knob and your hands while operating the X-axis knob or the Y-axis knob. Normally, attach the fine focusing knob on the opposite side of the X-axis knob or the Y-axis knob.

**1** Loosen the clamping screw **a** with the Allen screwdriver to remove the fine focusing knob **b**.

**2** Remove the screw hole sticker of the fine adjustment dial on the opposite side, and attach the fine focusing knob **b** in the reverse procedure of removing.

**3** Attach the provided sticker to the screw hole of the fine adjustment dial of the side where the fine focusing knob **b** was removed.

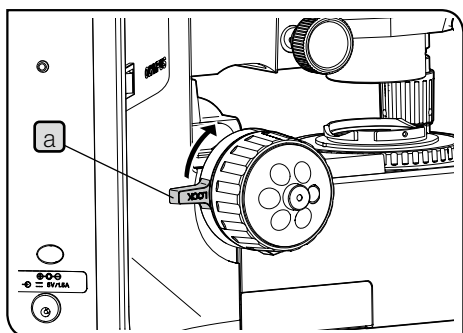
**TIP** The fine adjustment dial **c** is used for the fine operation with the finger tip or ball of a finger.



### 3 Adjusting the tension of the coarse focusing knob

**NOTE** Be sure to use the tension adjustment ring **a** for adjusting the tension of the coarse focusing knob.

The tension of the coarse focusing knob is adjusted to the easy-to-use tension, but if you want to change the tension, turn the tension adjustment ring **a** in the arrow direction to increase the tension and turn in the opposite direction to decrease the tension. If the stage descends by its own weight or the focus obtained with the fine focusing knob is lost soon, the tension is set too loose. In this case, turn the tension adjustment ring **a** in the arrow direction to increase the tension.



#### 4 Setting the movement limit with the coarse focusing knob

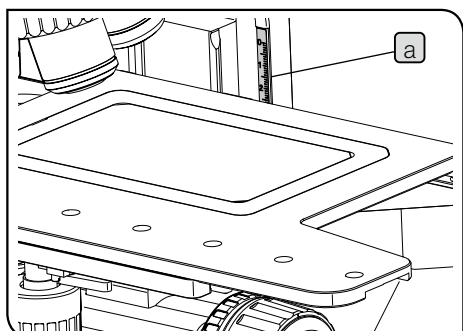
This function prevents the collision between the sample and the objective and also simplifies the focusing.

After the sample is brought into focus by the coarse focusing knob, if you turn the pre-focusing lever **a** in the arrow direction to lock it, the upper limit of the coarse focusing knob is set at the locked position.

In case you focus again after replacing the sample, the sample can be brought into focus approximately by raising the coarse focusing knob to the stop position. Then, adjust finely using the fine focusing knob.

Note, the stage movement is not locked by the fine focusing knob.

**NOTE** If the pre-focusing lever is locked, the stage is not lowered to the lower limit.



#### 5 Method to find the approximate focal point easily

When the sample thickness is not known

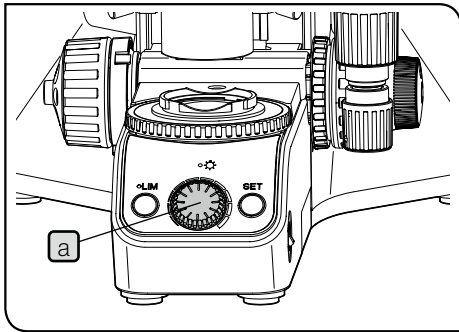
- 1 Turn the coarse focusing knob to lower the stage to the lower limit.
- 2 Move the stage so that the center of the stage comes to the front of the scale **a**.
- 3 Place the sample on the center of the stage.
- 4 Turn the coarse focusing knob to raise the stage so that the top surface of the sample comes to 0 mm of the scale **a** when looking at the sample horizontally.
- 5 Move the desired area of the sample under the objective.

When the sample thickness is known

- 1 Place the sample on the stage.
- 2 Turn the coarse focusing knob to move the stage so that the top surface of the stage comes to the "Sample thickness" position of the scale **a**.

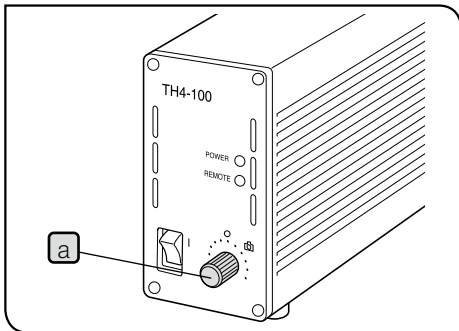
**NOTE** If the height adapter (BX3M-ARMAD) is combined, the scale is not available.

## 3-9 Adjusting the brightness



### 1 When the LED lamp housing is combined

Turn the brightness control knob of the microscope frame **a** clockwise to increase the brightness of the illumination.



### 2 When the halogen lamp housing is combined

Turn the brightness control knob **a** of the halogen lamp power supply unit (TH4) to MAX (high voltage side) to increase the brightness of the illumination.

For details of the halogen lamp power supply unit (TH4), refer to the instruction manual provided with the unit.

### 3 When the mercury lamp housing is combined

Engage the ND filter in the light path and adjust the transmittance of the illumination light. For details, see "3-14 Inserting the reflected light illumination filter" (page 42).

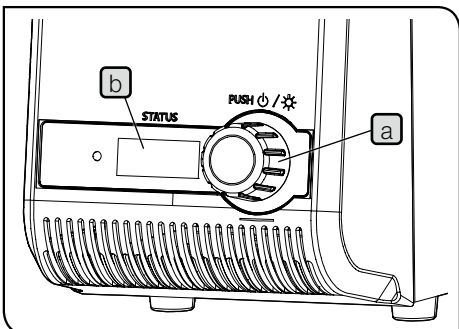
### 4 When the light source is combined

1 Rotate the light intensity adjustment dial **a** to adjust the light intensity.

TIP

- Rotating the light intensity adjustment dial **a** allows you to change the numerical characters (Min: 010, Max: 100) on the counter **b** in increments of 5.
- The larger the numerical characters on the counter **b** become, the brighter the lamp becomes.

For details of the LED and LDP light source (U-LGPS), refer to the instruction manual provided with the unit.



## 5 Using the LIM/SET switch

This function is available when the unit is combined in the following combination state.

- LED lamp housing, motorized or coded nosepiece and coded reflected light illuminator\*1
- LED lamp housing and motorized or coded nosepiece
- LED lamp housing and coded reflected light illuminator\*1

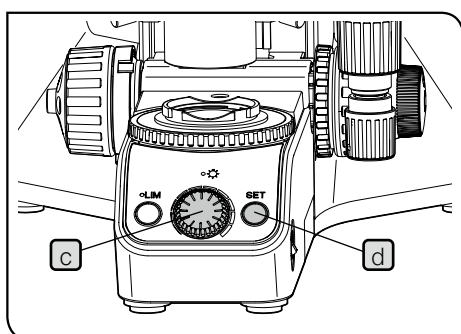
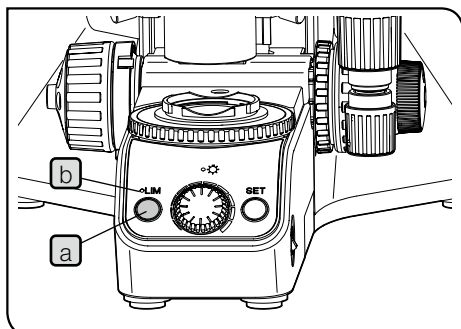
\*1 There are two types of the coded reflected light illuminator: BX3M-FLAS-S and BX3M-URAS-S.

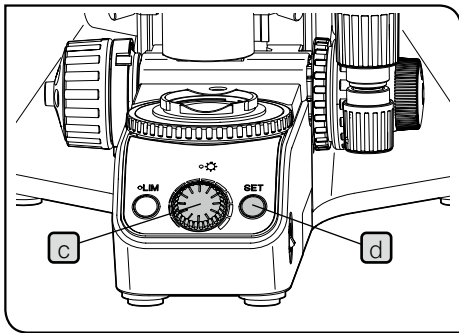
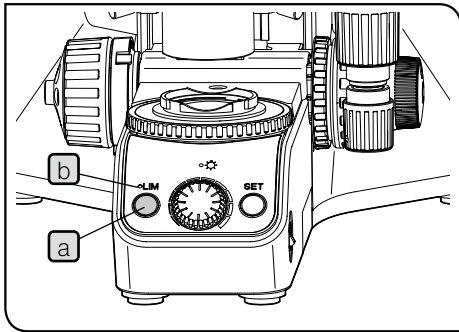
### What is LIM function?

LIM stands for "Light Intensity Manager". By storing the arbitrary brightness per each objective or observation method in advance, this function sets the stored brightness automatically when the objective or the observation method is selected.

### Procedure to store the brightness

- 1 Press the LIM switch **a** to set the "Store" mode. (The LIM indicator **b** is OFF)
- 2 Select the brightfield observation method. For procedures to select the observation method, see "3-4 Selecting the observation method" (page 17).
- 3 Engage the objective with low magnification in the light path and bring the sample into focus.
- 4 Turn the brightness control knob **c** to set the appropriate brightness easy to see.
- 5 Press the SET switch **d** to store the current brightness in the memory of this system.
- 6 Change the objective and perform **4** and **5**. Store the appropriate brightness for all objectives which are attached.
- 7 Change the observation method and perform **3** and **6**. Store the appropriate brightness for all observation methods which can be set.





Procedure to replay the brightness

- 1 Press the LIM switch **a** to set the "Replay" mode. (The LIM indicator **b** is ON.)
- 2 When the desired objective or the observation method is selected, the stored brightness is set automatically.

Example of the stored brightness

When you press the SET switch **d** when units are combined and set as follows, the brightness corresponding to ● or ■ in the tables will be stored.

Combination example 1

Unit	Setting
Reflected LED lamp housing (BX3M-LEDR) Transmitted LED lamp housing (BX3M-LEDT)	Reflected light illumination
Coded reflected LED light illuminator for BF/DF/PO (BX3M-RLAS-S)	DF
Coded quintuple revolving nosepiece for BF/DF with slider slot for DIC (U-D5BDRES-ESD)	20X
Objective 5X(1 hole), 10X(2 holes), 20X(3 holes), 50X(4 holes), 100X(5 holes)	

Example of stored brightness 1

Observation method Objective	Reflected light illumination				Transmitted light illumination
	CUBE1	CUBE2	CUBE3	...	
OB1					
OB2					
OB3		●			
⋮					

Combination example 2

Unit	Setting
Reflected LED lamp housing (BX3M-LEDR) Transmitted LED lamp housing (BX3M-LEDT)	Reflected light illumination
Reflected light illuminator for BF/DF (BX3M-RLA-S)	-
Coded quintuple revolving nosepiece for BF/DF with slider slot for DIC (U-D5BDRES-ESD)	20X
Objective 5X(1 hole), 10X(2 holes), 20X(3 holes), 50X(4 holes), 100X(5 holes)	

Example of stored brightness 2

Observation method Objective	Reflected light illumination				Transmitted light illumination
	CUBE1	CUBE2	CUBE3	...	
OB1					
OB2					
OB3	Same brightness				
⋮					

Combination example 4

Unit	Setting
Reflected LED lamp housing (BX3M-LEDR) Transmitted LED lamp housing (BX3M-LEDT)	Transmitted light illumination
Coded reflected LED light illuminator for BF/DF/PO (BX3M-RLAS-S)	BF
Coded quintuple revolving nosepiece for BF/DF with slider slot for DIC (U-D5BDRES-ESD)	20X
Objective 5X(1 hole), 10X(2 holes), 20X(3 holes), 50X(4 holes), 100X(5 holes)	

Example of stored brightness 4

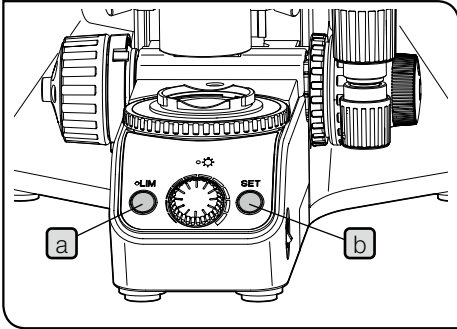
Observation method Objective	Reflected light illumination				Transmitted light illumination
	CUBE1	CUBE2	CUBE3	...	
OB1					
OB2					
OB3					●
⋮					

Combination example 3

Unit	Setting
Reflected LED lamp housing (BX3M-LEDR) Transmitted LED lamp housing (BX3M-LEDT)	Reflected light illumination
Coded reflected LED light illuminator for BF/DF/PO (BX3M-RLAS-S)	DF
Quintuple revolving nosepiece (U-5RE-2)	-
Objective 5X(1 hole), 10X(2 holes), 20X(3 holes), 50X(4 holes), 100X(5 holes)	

Example of stored brightness 3

Observation method Objective	Reflected light illumination				Transmitted light illumination
	CUBE1	CUBE2	CUBE3	...	
OB1					
OB2		Same brightness			
OB3					
⋮					



Restoring the stored brightness (LIM function) to the factory default setting

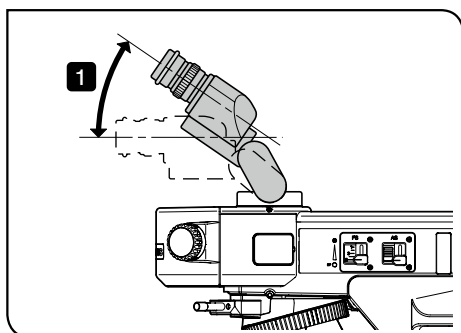
- 1 Set the main switch of the microscope frame to **○** (OFF).
- 2 If the control box is combined, remove it.
- 3 Set the main switch of the microscope frame to **I** (ON) while pressing both the LIM switch **a** and the SET switch **b**. Keep pressing the LIM switch **a** and the SET switch **b**. After 5 seconds, the stored brightness returns to the factory default setting.

**TIP** If you release the LIM switch and the SET switch within 5 seconds, the stored brightness (LIM function) does not return to the factory default setting and the microscope starts normally.

- 4 Set the main switch of the microscope frame to **○** (OFF). If the control box is combined, attach it again.  
For procedures to attach the control box, see "Attaching the control box" (page 98).



### 3-10 Adjusting the observation tube



#### 1 Tilting adjustment

This function is available when U-TBI-3, U-TTR-2 or U-SWETTR-5 is combined.

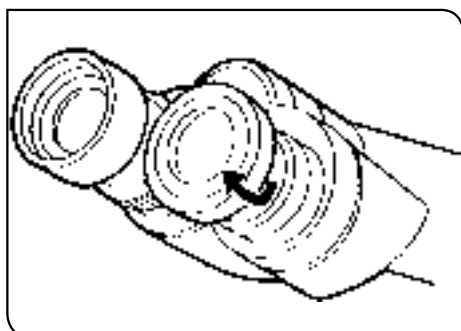
You can adjust the observation tube to the easy-to-see height and angle so that you can observe with a comfortable posture.

Observation tube	Adjustable angle
U-TBI-3	5° to 35°
U-TTR-2	5° to 35°
U-SWETTR-5	0° to 35°

1 Hold the binocular and move it vertically to set to the desired position.

**NOTE** • Be careful, if you apply the excessive force to the binocular from the upper or lower limit stop position, the product may be damaged.

- The intermediate attachment is not available with U-TBI-3.
- If you observe scratches or dirt on the mirror surface in the darkfield observation with U-TBI-3, ghosts may appear in some cases.



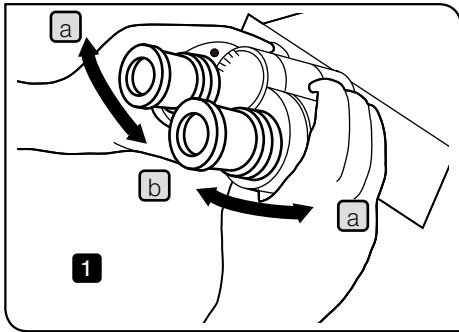
#### 2 Using the eye shades

When wearing eyeglasses

Use the eye shades in the folded-down position.

When not wearing eyeglasses

Extend the folded eye shades in the direction of the arrow. Observation becomes comfortable, since it prevents extraneous light from entering between the eyepieces and eyes.

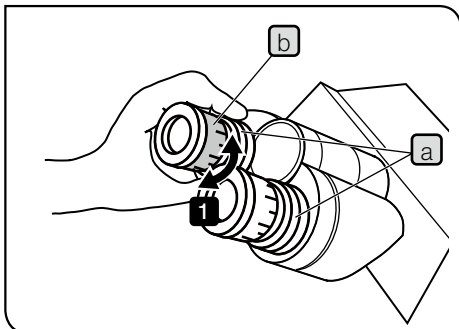


### 3 Adjusting the interpupillary distance

The adjustment of the interpupillary distance is to adjust the distance between two eyepieces to fit to the distance between your two eyes. By doing so, you can see the single microscope image so that the fatigue of your eyes during observation can be reduced.

- 1 While setting the right and left eyepieces in parallel, move the binocular in the **a** or **b** direction until the right and left fields of view coincide completely. The number shown by the indicator (•) of the left side eyepiece sleeve is the interpupillary distance.

**TIP** Remember your interpupillary distance so that you can adjust it easily in the next observation.

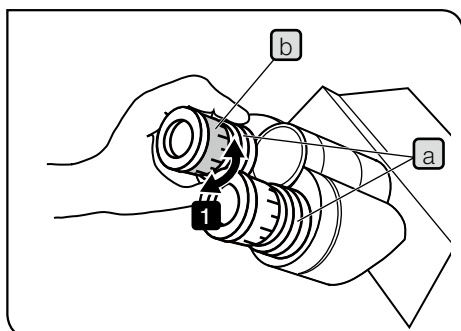


### 4 Adjusting the diopter

Adjust the diopter according to right and left eyes of the observer.

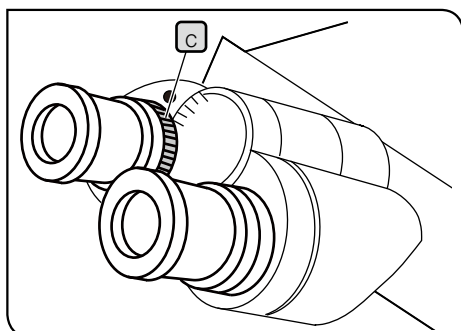
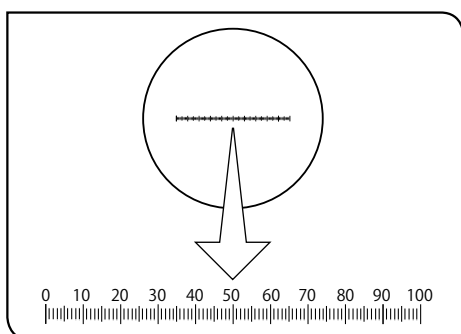
When the eyepiece is not equipped with the eyepiece micrometer

- 1 While pressing the lower part **a** of the eyepiece, turn the diopter adjustment ring **b** to set the index to "0". Perform this operation for right and left eyepieces.
- 2 Adjust the interpupillary distance.
- 3 Place the sample.
- 4 Engage the 10X objective in the light path and turn the coarse/fine focusing knobs to bring the sample into focus.
- 5 Change to the 50X objective or higher and turn coarse/fine focusing knobs to bring the sample into focus.
- 6 Change to the 10X objective. While looking into the left eyepiece with your left eye, turn the diopter adjustment ring **b** to bring the sample into focus. In the same manner, while looking into the right eyepiece with your right eye, turn the diopter adjustment ring to bring the sample into focus.
- 7 Change to the 50X objective or higher again and turn coarse/fine focusing knobs to bring the sample into focus.
- 8 Change to the 10X objective and confirm that the sample is brought into focus with the right and left eyepieces.
- 9 If the sample is not brought into focus, bring the sample into focus in the same manner as **6** and repeat from **7** to **9** again.



When the eyepiece is equipped with the eyepiece micrometer

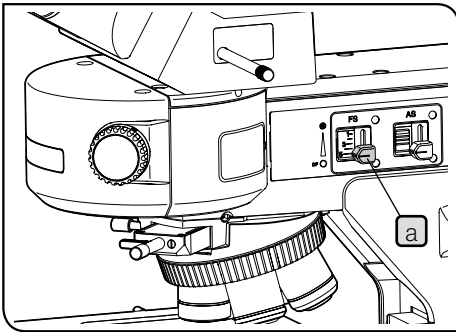
- 1** While looking into the eyepiece equipped with the eyepiece micrometer, turn the diopter adjustment ring **b** to adjust so that the scales or lines of the eyepiece micrometer in the field of view are clearly visible. If you turn the diopter adjustment ring **b**, keep pressing the lower part **a** of the eyepiece.
- 2** Place the sample.
- 3** Engage the 10X objective in the light path. While looking into the eyepiece equipped with the eyepiece micrometer, turn the coarse/fine focusing knobs to bring the sample into focus.
- 4** Turn the diopter adjustment ring **b** of the eyepiece not equipped with the eyepiece micrometer to bring the sample into focus.



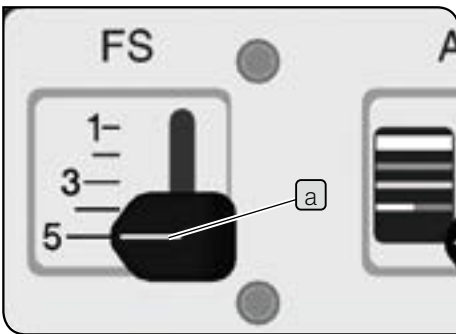
When the observation tube is equipped with the interpupillary distance adjustment ring **c**

Perform the same operation as described above. However, since the eyepiece is not equipped with the diopter adjustment ring **b**, use the interpupillary distance adjustment ring **c** of the observation tube.

### 3-11 Adjusting the field diaphragm of the reflected light illumination



The picture shows BX3M-RLAS-S.  
The same operation parts are also provided to BX3M-URAS-S.



#### 1 Using the field diaphragm (FS)

When BX3M-RLAS-S or BX3M-URAS-S is combined

- 1 Move the field diaphragm knob **a** of the reflected light illuminator vertically to adjust the field diaphragm.

	Field diaphragm knob position			
	5		3	1
Field diaphragm	Open to maximum	←————→		Close to minimum

#### Scale of the field diaphragm knob

When using the units described in the following tables, aligning the position of the field diaphragm knob **a** with the number shown in the table enables to increase the contrast of the observation image. Narrowing down the field diaphragm increases the contrast furthermore and prevents the flares. Note, always set to 5 for the darkfield observation.

⟨When observing the image with eyepiece⟩

	Observation tube	
	U-SWTR-3 U-SWETTR-5 (Field number: 26.5)	Others (Field number: 22)
Field diaphragm knob position	4	3

⟨When acquiring the image with camera⟩

Set the field diaphragm knob position according to the combination of the image sensor size and the camera adapter as shown in the table below. Note, the image sensor size of DP22/DP73 is 1/1.8 inch and the image sensor size of DP27 is 2/3 inch.

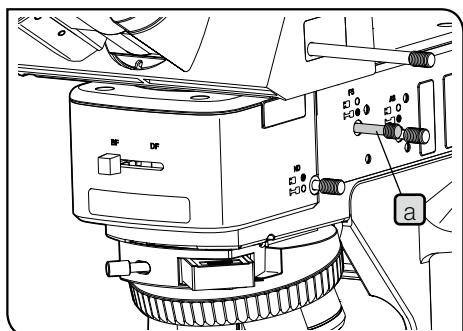
When BX3M-RLAS-S is combined

Image sensor size Camera adapter	1/3.2 inch	1/3 inch	1/2.5 inch } 1/2 inch	1/1.8 inch } 2/3 inch	1 inch
0.5X	2	2	3	3	5
0.63X	1	2	2	3	4
1X	1	1	1	2	3

When BX3M-URAS-S is combined

Image sensor size Camera adapter	1/3.2 inch } 1/3 inch	1/2.5 inch } 1/2 inch	1/1.8 inch } 2/3 inch	1 inch
0.5X	2	3	3	5
0.63X	2	2	3	4
1X	2	2	2	3

- NOTE**
- If the field diaphragm is not centered, the area around the field of view may be darkened partially. For the centering of the field diaphragm, see "Centering of the field diaphragm (FS)" (page 36).
  - If observing the image with the eyepiece using the field diaphragm settings same as those when acquiring the image with the camera, the area around the field of view may be darkened partially.



When using BX3M-RLA-S

- 1 Move the field diaphragm lever **a** of the reflected light illuminator as follows to adjust the field diaphragm.

	Field diaphragm lever position	
	Pressed in	Pulled out
Field diaphragm	Open to maximum	Close to minimum

↔

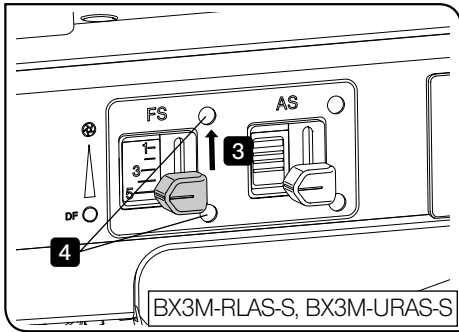
## 2 Adjusting during observation

Reflected light brightfield observation

Adjust the illuminated area in order to acquire the high contrast image.  
Narrow down the field diaphragm so that the field diaphragm image is circumscribed to the field of view depending on each objective you use, and block the unnecessary light.

Reflected light darkfield observation

Be sure to open the field diaphragm during the observation.



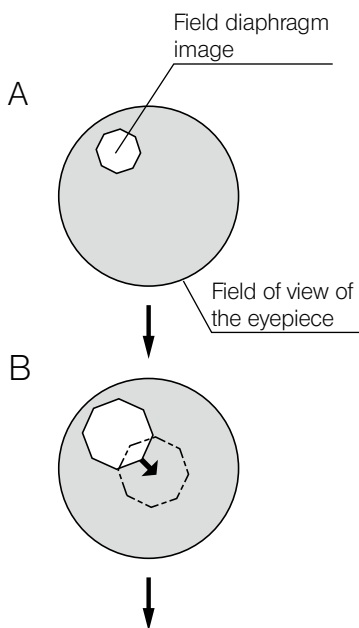
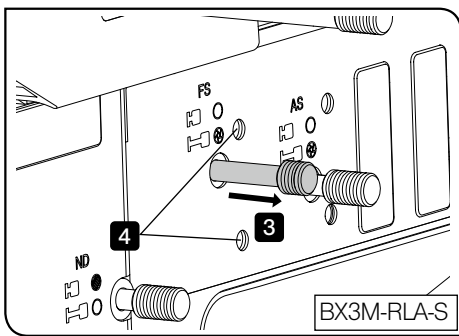
### 3 Centering of the field diaphragm (FS)

**NOTE** When centering the field diaphragm, be careful not to touch the X-axis and Y-axis of the stage with your arm.

**TIP** Use the Allen screwdriver provided with the microscope to perform the centering.

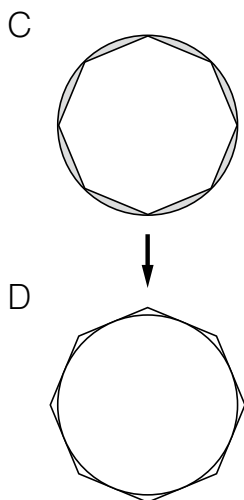
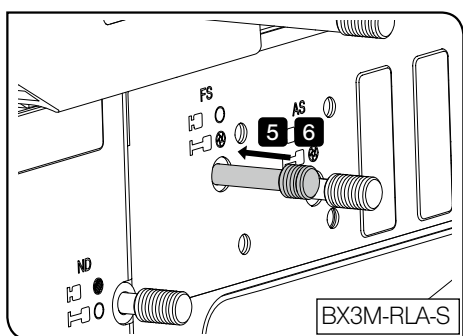
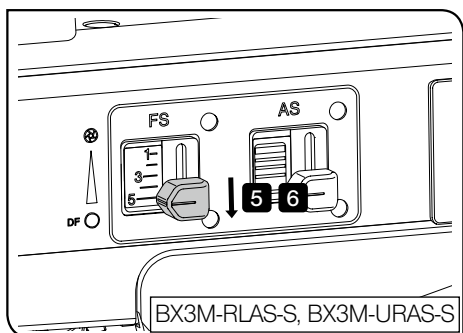
**1** Select the brightfield observation (BF). For procedures to select the observation method, see "3-4 Selecting the observation method" (page 17).

**2** Turn the nosepiece to engage the 10X objective in the light path and place the sample on the stage to bring it into focus approximately.



**3** Move the field diaphragm knob (field diaphragm lever) of the reflected light illuminator to narrow down the diameter of the field diaphragm image to the minimum approximately. (Picture A)

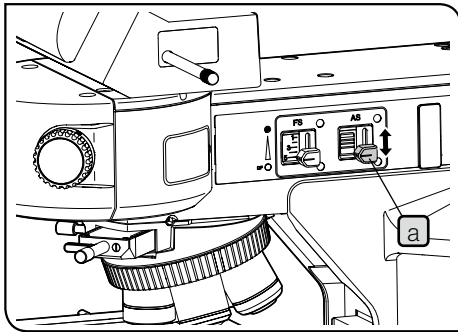
**4** Insert the Allen screwdriver in the FS centering screws (2 pcs.) of the reflected light illuminator and turn each to adjust the field diaphragm image to come to the center of the field. (Picture B)



**5** Move the field diaphragm knob (field diaphragm lever) to open the field diaphragm image until the field diaphragm image inscribes to the field of view. (Picture C) If the field diaphragm image is decentered, try centering again.

**6** Open the field diaphragm until the field diaphragm image becomes almost the same size (inscribe) as the field of view. (Picture D)

## 3-12 Adjusting the aperture diaphragm of the reflected light illumination



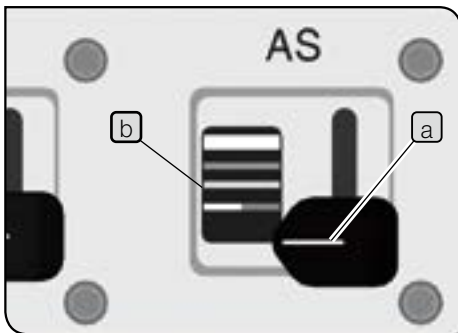
The picture shows BX3M-RLAS-S.  
The same operation parts are also provided to BX3M-URAS-S.

### 1 Using the aperture diaphragm (AS)

When BX3M-RLAS-S or BX3M-URAS-S is combined

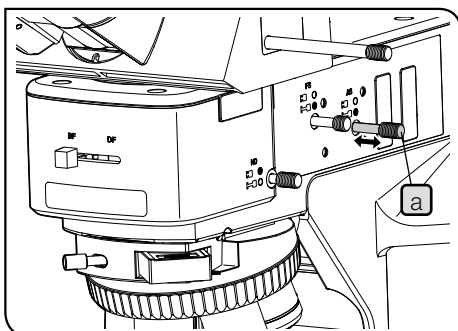
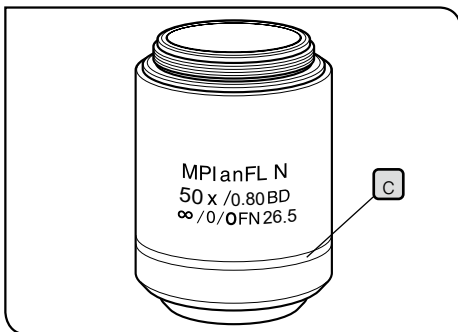
- 1 Move the aperture diaphragm knob **a** of the reflected light illuminator vertically to adjust the aperture diaphragm.

	Aperture diaphragm knob position (color bar)				
	None (Bottom end)	Red/Yellow	Green	Light blue	White
Aperture diaphragm (AS)	Open	←————→			Close



#### Scale of aperture diaphragm knob

The color (color bar) of the scale **b** corresponds to the band color **c** of the objective. Aligning the aperture diaphragm knob **a** position (color bar) with the band color of the objective engaged in the light path enables to set the aperture diaphragm appropriately. (Not available for 1.25X and 2.5X objectives)

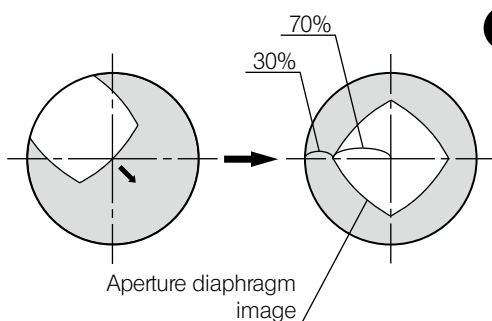


When using BX3M-RLA-S

- 1 Move the aperture diaphragm lever **a** of the reflected light illuminator as follows to adjust the aperture diaphragm.

	Aperture diaphragm lever position	
	Pressed in	Pulled out
Aperture diaphragm (AS)	Open to maximum	Close to minimum





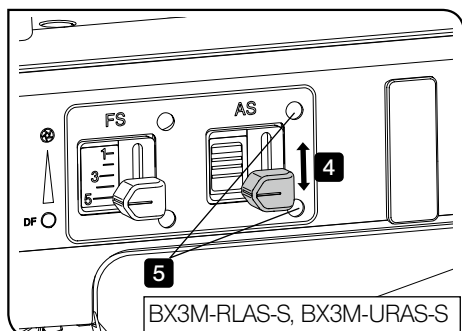
## 2 Adjusting during observation

### Reflected light brightfield observation

When using BX3M-RLA-S, narrow down the aperture diaphragm to between 70 and 80% of the numerical aperture of the objective to perform the excellent observation.

### Reflected light darkfield observation / Reflected light fluorescence observation

Open the aperture diaphragm during the observation.



## 3 Centering of the aperture diaphragm (AS)

**NOTE** When centering the aperture diaphragm, be careful not to touch the X-axis/Y-axis knob of the stage with your arm.

**TIP** Use the Allen screwdriver provided with the microscope to perform the centering.

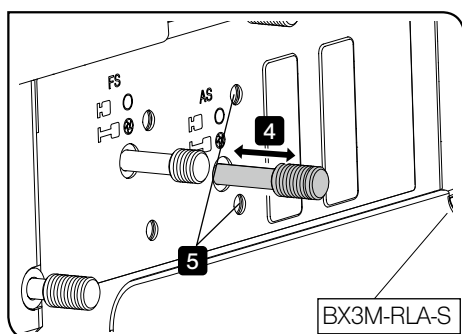
**1** Select the brightfield observation (BF). For procedures to select the observation method, see "3-4 Selecting the observation method" (page 17).

**2** Turn the nosepiece to engage the 10X objective in the light path.

**3** Attach the total reflection mirror to the stage and bring the sample into focus approximately.

**4** Pull out the eyepiece. While looking into the eyepiece sleeve, move the aperture diaphragm knob (aperture diaphragm lever) to adjust the diameter of the aperture diaphragm image to approximately 70% of the field of view.

**5** If the aperture diaphragm image is displaced from the center of the field of view, insert the Allen screwdriver to the AS centering screws (2 pcs.) of the reflected light illuminator and turn each to adjust the aperture diaphragm image to come to the center of the field of view.



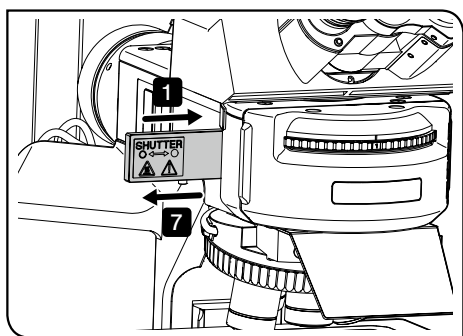
### 3-13 Centering the mercury burner

The centering of the mercury burner is necessary when U-LH100HG/U-LH100HGAP0 is combined with the system.

The mercury burner emits the light by means of discharge produced when a current is supplied across electrodes. If the electrode position is shifted to cause the light not falling on the sample appropriately due to replacing the burner, etc., the observation image becomes dark. In this case, it is necessary to adjust the positions of electrodes of the mercury burner. This operation to adjust the electrode positions is called the centering of the mercury burner.

Adjust the electrode positions by projecting the light emission across electrodes on the stage (arc image) while looking at the arc image position.

**TIP** The mercury burner centering is not required every time before observation, but is recommended after the burner is replaced or when the observation image seems dark.

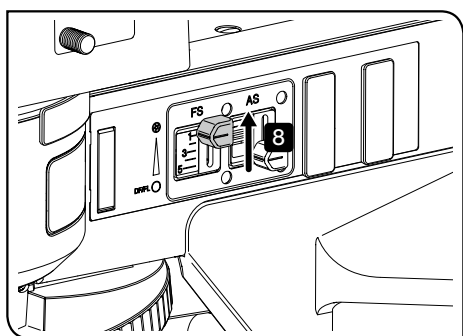


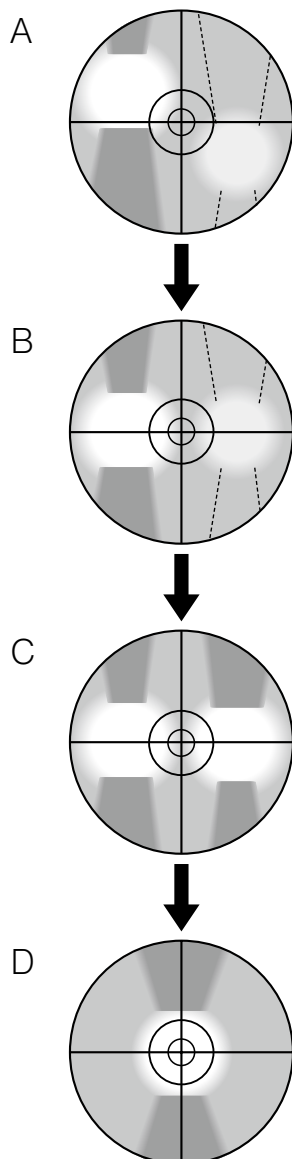
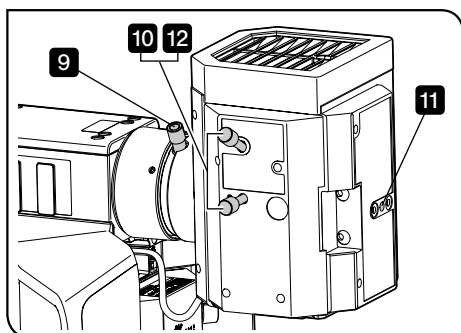
**TIP** Before performing centering, turn ON the main switch of the power supply for mercury lamp housing and wait until the illumination light does not flicker and the brightness becomes stable.

- 1 Insert the shutter until a clicking sound is heard, and engage the shutter in the light path.
- 2 Engage the fluorescence mirror unit other than that with U-excitation (U-FWUS) in the light path. If your mirror unit is with U-excitation only, use the fluorescence mirror unit with U-excitation. In this case, be sure to observe through the antiglare plate.

**NOTE** Do not open the cover on the front of BX3M-URAS-S during fluorescence observation.

- 3 Engage the 10X objective in the light path and place the centering target U-CST on the stage.
- 4 While looking into the eyepiece, bring the cross-line with a double circle into focus.
- 5 Move the stage to coincide the cross-line with the center of the field of view.
- 6 Turn the nosepiece to engage the position not attached with the objective (remove the objective cap) in the light path.
- 7 Pull out the shutter until a clicking sound is heard, and remove the shutter from the light path.
- 8 Move the field diaphragm knob to narrow down the field diaphragm.  
BX3M-URAS-S : Position "1"





**9** Turn the collector lens focusing knob to project the arc image on U-CST. (Picture A)  
If the arc image is not projected, turn the burner centering knobs.

**10** Turn the burner centering knobs to move the arc image to the center of the right (left) half of the field of view. (Picture B)

**11** Insert the Allen screwdriver in the mirror focusing screw on the back of the lamp housing and turn it to bring the mirror arc image into focus. (Picture C)

**12** Turn the burner centering knobs to overlay the arc image with the mirror arc image. (Picture D)

**TIP** During observation, turn the collector lens focusing knob to adjust the observation field to become uniform.

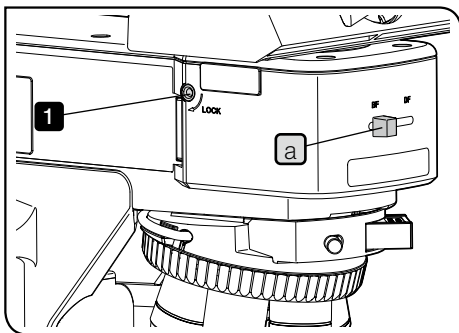
The above picture shows the image of the arc image projected to U-CST during centering the mercury burner. This image picture may differ depending on the state of the mercury lamp housing.

## 3-14 Inserting the reflected light illumination filter

### 1 Using the ND filter lever

This function is available only with BX3M-RLA-S.

The ND filter links with the selection of the observation method. Using this ND filter reduces the glare when the light path is changed from the darkfield (DF) to the brightfield (BF). Use the brightfield/darkfield selector knob **a** to select the observation method.

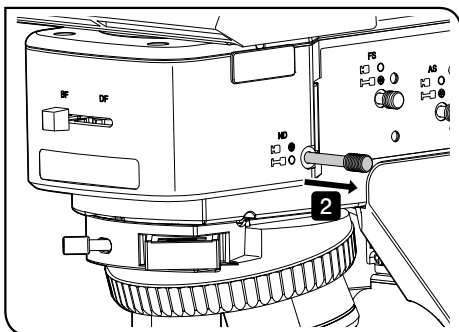


#### Canceling the link

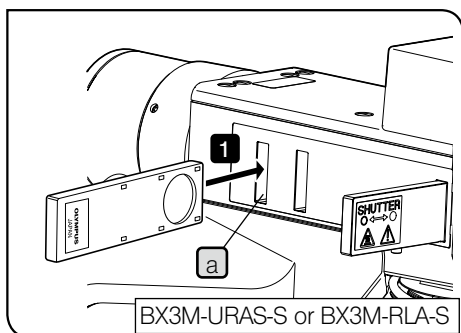
As factory default, the ND filter is linked with the selection of the observation method.

If the brightness is not sufficient when performing the brightfield observation or the DIC observation, you can cancel this link.

- 1 Insert the Allen screwdriver into the hole on the left side of the reflected light illuminator to loosen the screw that connects the ND filter sufficiently. By doing so, the ND filter lever works.

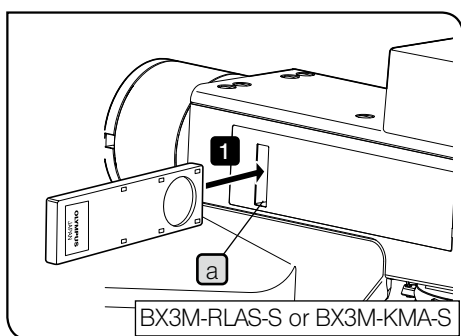


- 2 Pull out the ND filter lever and remove the ND filter from the light path.



## 2 Using the filter

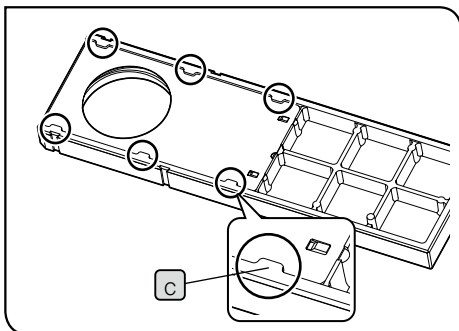
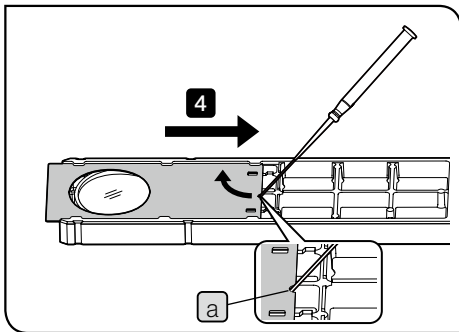
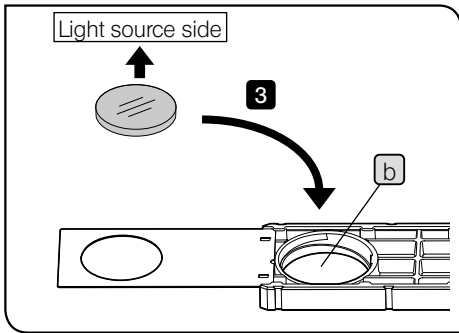
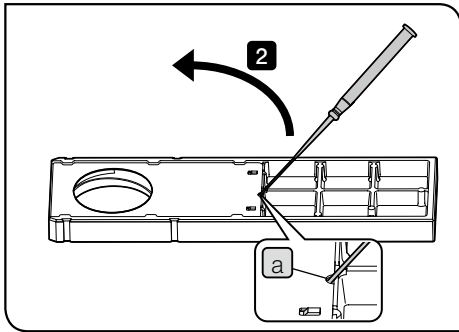
- 1 Insert the filter slider suitable for the intended observation into the filter insertion slot **a** to engage in the light path. Be sure to insert the filter slider from the left side of the reflected light illuminator. The first level (position where the clicking sound is heard first) is an empty hole. The filter is engaged in the light path at the second level (position where the clicking sound is heard next).



Filter slider position	Light path
First level (pulled out)	Empty hole
Second level (pressed in)	Filter

Filter to use	Purpose
U-25LBD (Color temperature conversion filter)	Sets the illumination light of the halogen bulb to the daylight color.
U-25LBA (Color temperature conversion filter)	Sets the illumination light of LED to the illumination color of the halogen bulb.
U-25IF550 (Green filter)	Increases the contrast of the observation image.
U-25Y48 (Yellow filter)	Contrast filter for semiconductor wafer observation
U-25ND50-2 (Light volume adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 50%)
U-25ND25-2 (Light volume adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 25%)
U-25ND6-2 (Light volume adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 6%)
U-25FR (Frost filter)	The light volume decreases, but the illumination without unevenness can be obtained.
U-25L42 (UV cut filter)	Cuts the ultraviolet ray to prevent the tarnish on the polarizer caused by the mercury lamp housing.
U-BP1100IR (Band-pass filters for IR)	Filter for IR (wavelength: 1100 nm) observation
U-BP1200IR (Band-pass filters for IR)	Filter for IR (wavelength: 1200 nm) observation
Empty slider U-25	Used by combining arbitrary filters.

**TIP** If you want to insert the filter from the right side of the reflected light illuminator, contact Evident.



#### Attaching the arbitrary filter

The arbitrary filter with the following size can be inserted to the empty slider (U-25).

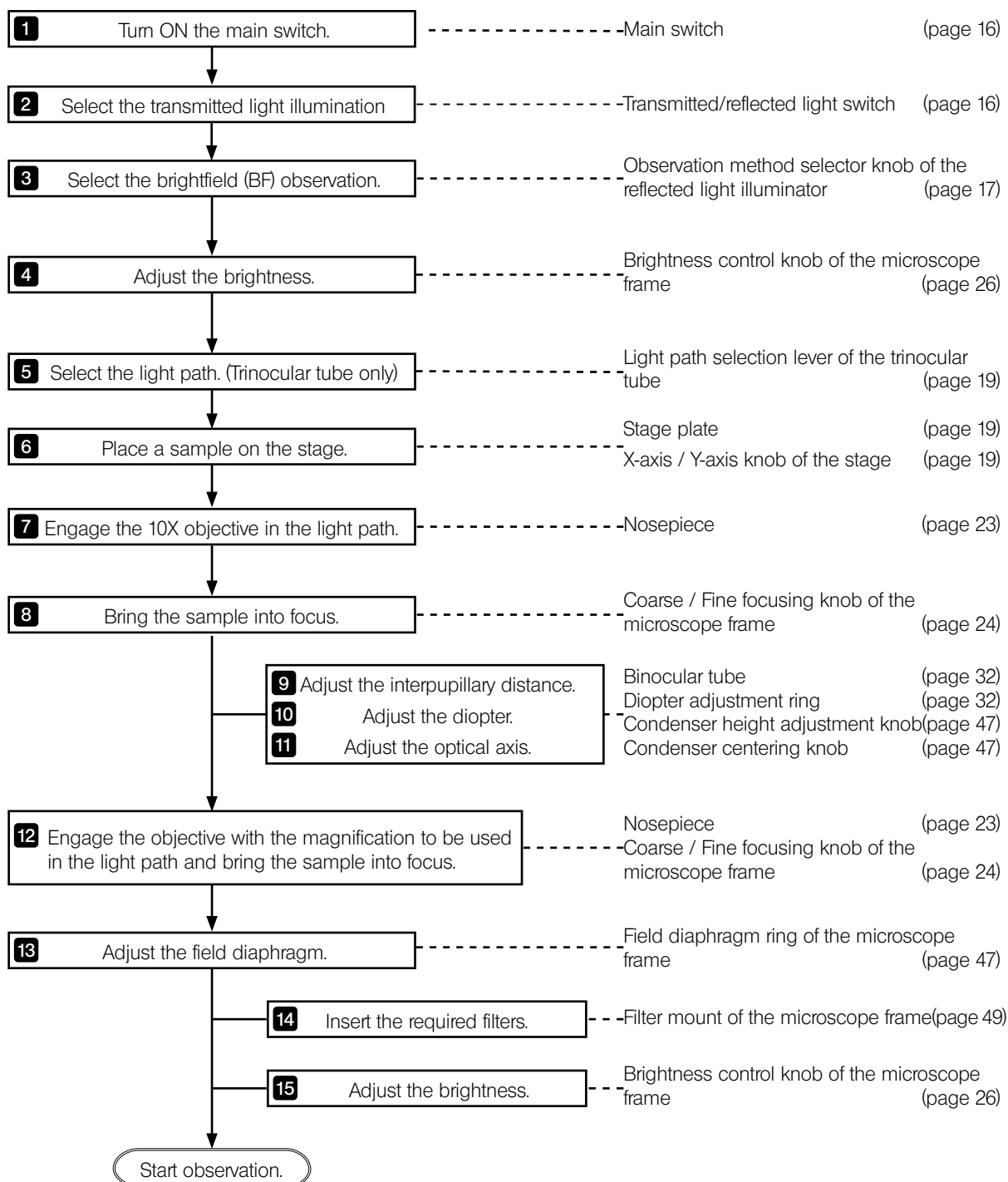
Diameter	Ø25 mm
Thickness	2.6 mm or less

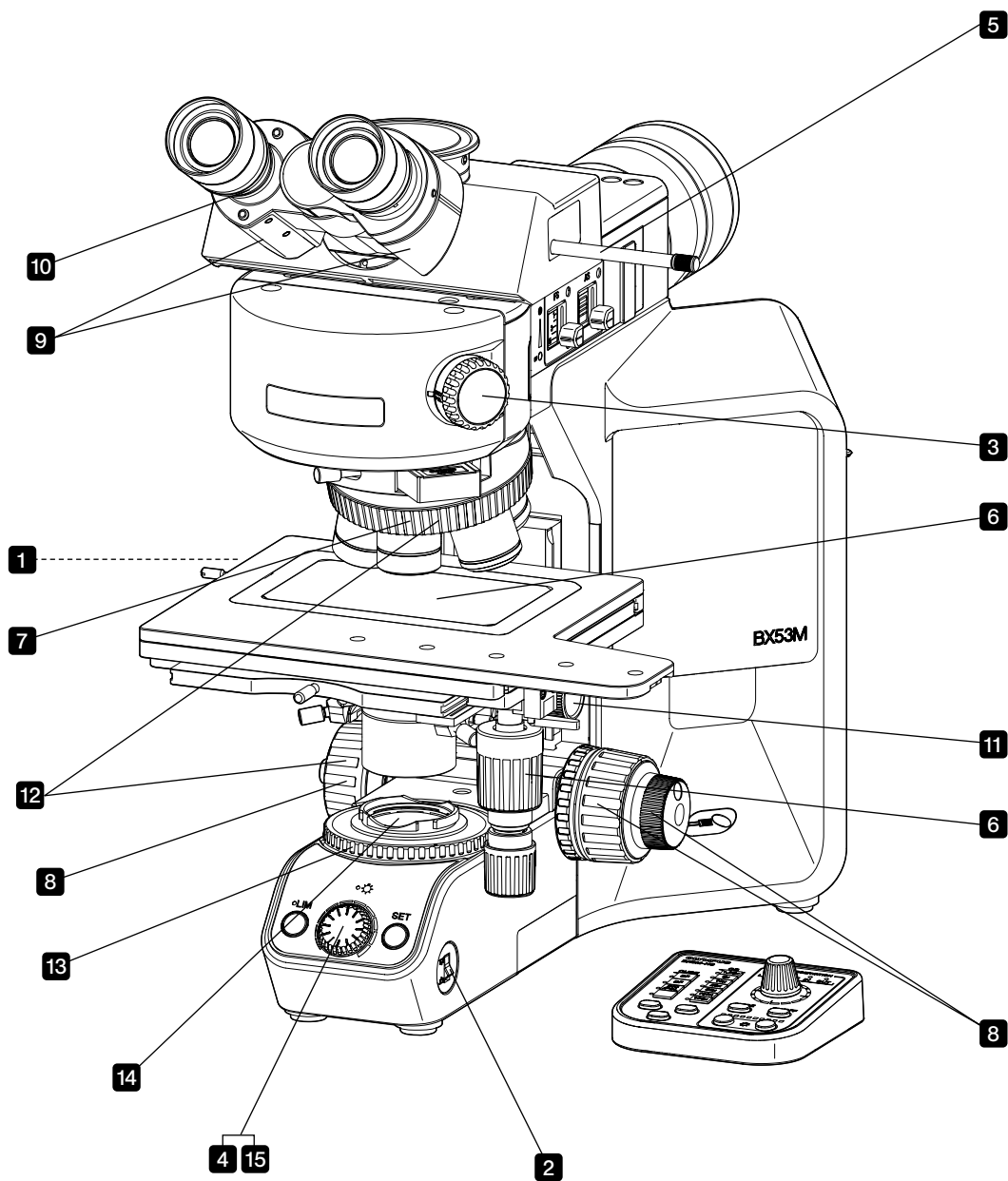
- 1** Set the display surface of the empty slider facing down and the surface attached with the cover facing up.
- 2** Insert the precision screwdriver in the notch **a** of the cover diagonally, and raise and slide the cover with the precision screwdriver to open the cover.
- 3** Insert the arbitrary filter in the filter mounting hole **b** of the slider.

**NOTE** If the orientation of the filter to use is specified, insert the filter so that the filter surface of the light source side faces up.

- 4** Insert the precision screwdriver in the notch **a** and raise and slide the cover with the precision screwdriver to return the cover to the original position. At this time, slide the cover under the tabs (6 positions) **c** until the "clap" sound is heard.

### 3-15 Transmitted light brightfield observation procedures

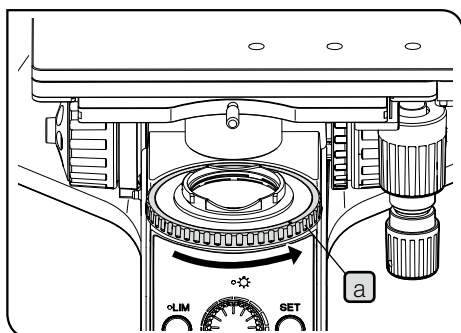




**TIP** Make a copy of this observation method guide. Place it near the microscope so that you use it when operating the microscope.



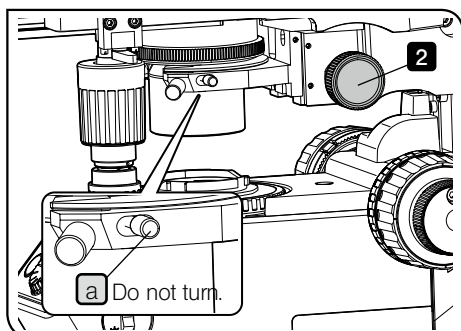
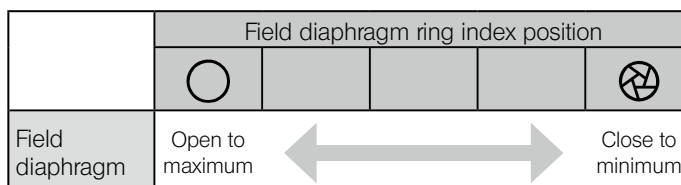
### 3-16 Adjusting the field diaphragm of the transmitted light illumination



#### 1 Using the field diaphragm (FS)

This function is available only with the microscope frame (BX53MTRF-S).

1 Turn the field diaphragm ring **a** to adjust the field diaphragm.

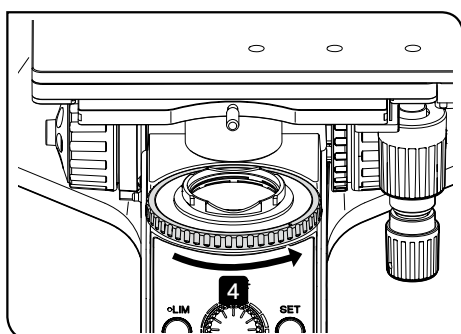


#### 2 Centering of the field diaphragm (FS)

This function is available only with the microscope frame (BX53MTRF-S).

**NOTE** • Do not turn the condenser clamping screw **a** attached to the back of the centering knob by mistake.

• If you use the condenser attached with the top lens, such as U-SC3, etc., engage the top lens in the light path and perform the centering.

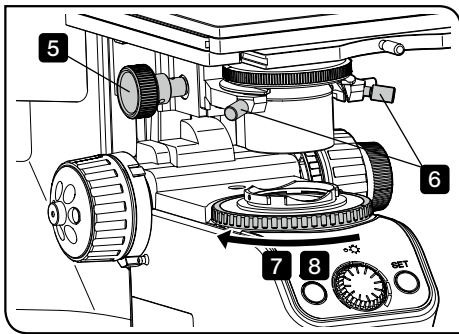


1 Select the brightfield observation (BF). For procedures to select the observation method, see "3-4 Selecting the observation method" (page 17).

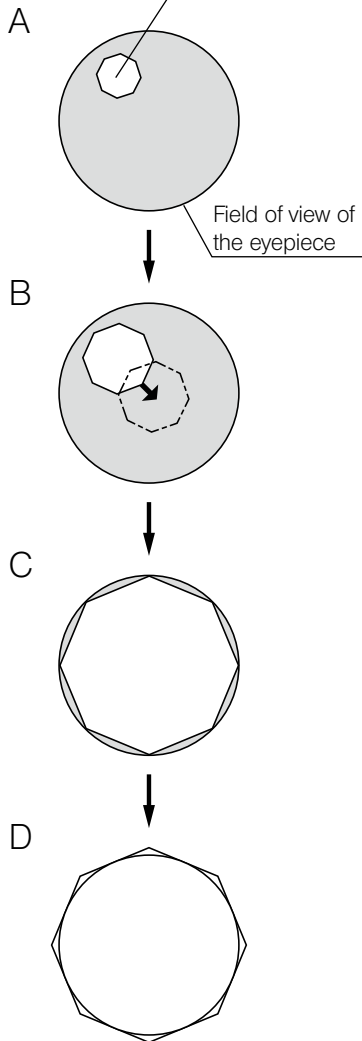
2 Turn the condenser height adjustment knob to raise the condenser to the upper limit.

3 Turn the nosepiece to engage the 10X objective in the light path and place the sample on the stage to bring it into focus approximately.

4 Turn the field diaphragm ring in the arrow direction to narrow down the field diaphragm to within the field of view.



Field diaphragm image



**5** Turn the condenser height adjustment knob to bring the field diaphragm image into focus. (Picture A)

**6** Turn the centering knobs (2 positions) to adjust the field diaphragm image to come to the center of the field. (Picture B)

**7** Turn the field diaphragm ring in the arrow direction to open the field diaphragm gradually until the field diaphragm image inscribes the field of view. (Picture C) If the field diaphragm image is decentered, try centering again.

**8** Open the field diaphragm until the field diaphragm image becomes almost the same size (inscribe) as the field of view. (Picture D)

### 3-17 Inserting the transmitted light illumination filter

This function is available only with the microscope frame (BX53MTRF-S).

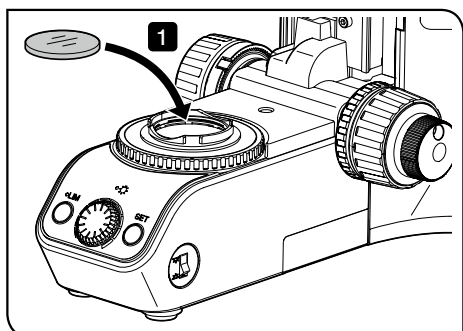
There are following methods to engage the filter in the light path:

- Insert the filter in the filter mount of the base unit of the microscope frame.
- Insert the filter in the filter cassette (U-FC) and attach the filter cassette to the filter mount.

You can insert up to three filters in the filter cassette. After the filter cassette is attached, you can slide the filter lever to change the filter to be inserted in the light path.

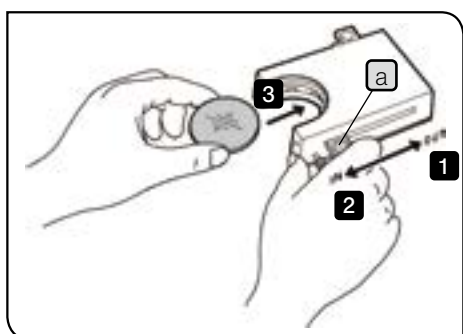
	Filter to insert	
	Size	Number of filters
Filter mount	Ø45 mm	One filter
Filter cassette	Ø45 mm Thickness: 2.7 mm or less	Three filters

**NOTE** When attaching the filter cassette, the filter with the thickness of 3 mm or less can be inserted in the filter mount.



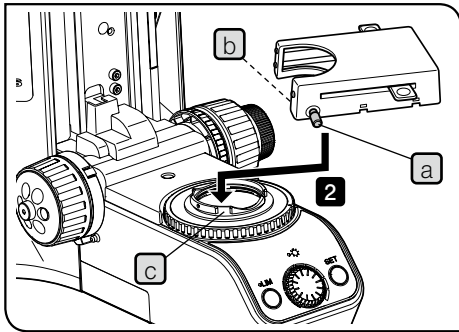
Inserting the filter in the filter mount

- 1 Insert the filter in the filter mount of the base unit of the microscope frame.



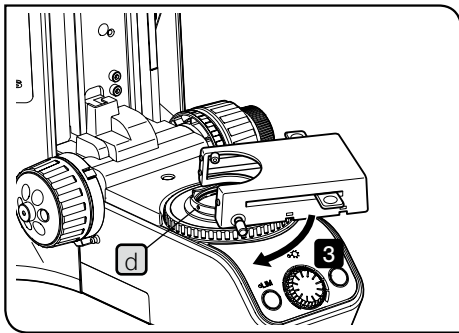
Inserting the filter in the filter cassette

- 1 There are two levers on the right side and one lever on the left side of the filter insertion part.  
Slide three levers **a** to the OUT side once.
- 2 Slide the lever **a** of the filter insertion part to the IN side and stop it at the position where the clicking sound is heard.
- 3 Push in the filter while holding the lever **a**.
- 4 Repeat **2** and **3**, and insert other two filters.



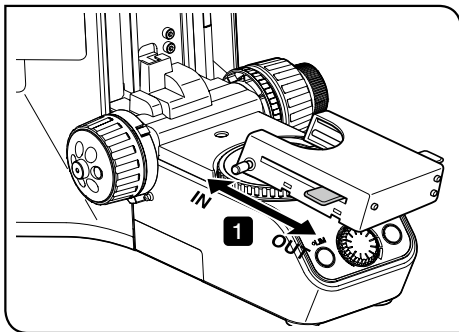
#### Attaching the filter cassette

- 1** Loosen the filter cassette clamping knob **a** sufficiently.
- 2** Align the protrusion **b** on the bottom surface of the filter cassette with the filter mount positioning groove **c**, and fit the filter cassette from the above.



- 3** Turn the filter cassette so that the filter cassette is parallel to the base unit.
- 4** Align the clamping knob **a** with the filter mount positioning hole **d**, and tighten it softly to secure the filter cassette.

**NOTE** After the filter cassette is attached, be careful that the condenser may collide with the filter cassette if the stage is lowered too much.



#### Using the filter cassette

- 1** Sliding the lever on the right and the lever on the left of the filter cassette to the IN side enables to insert the filter in the light path.

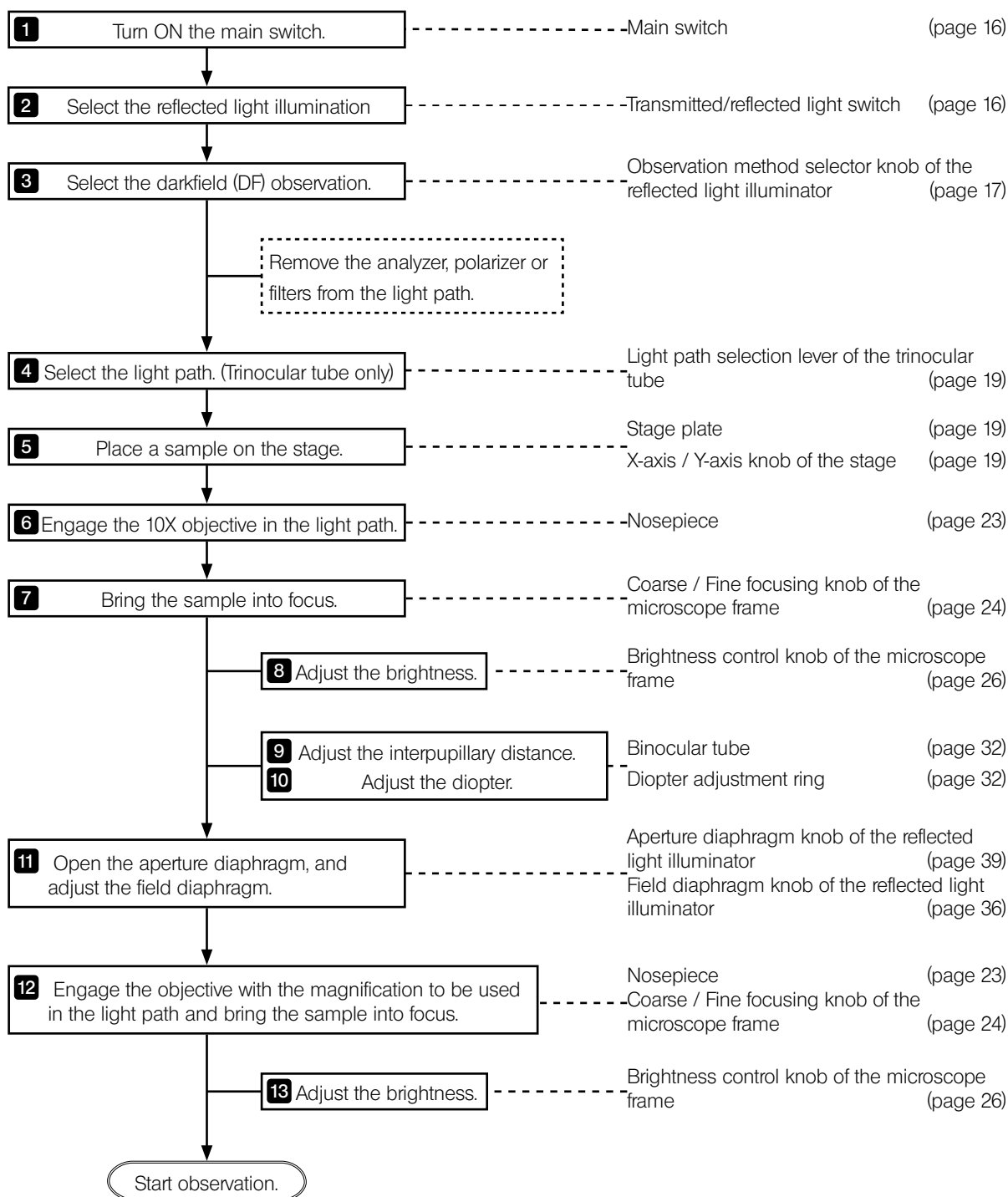
Filter to use	Purpose
43IF550-W45	Green filter Increases the contrast of the observation image.
45-IF546	Green filter Increases the contrast of the observation image during polarization observation.

**TIP** If you use the IF(Interference) filter, flares or ghosts may appear. However, if you overlay the ND filter on this filter, flares or ghosts can be reduced.

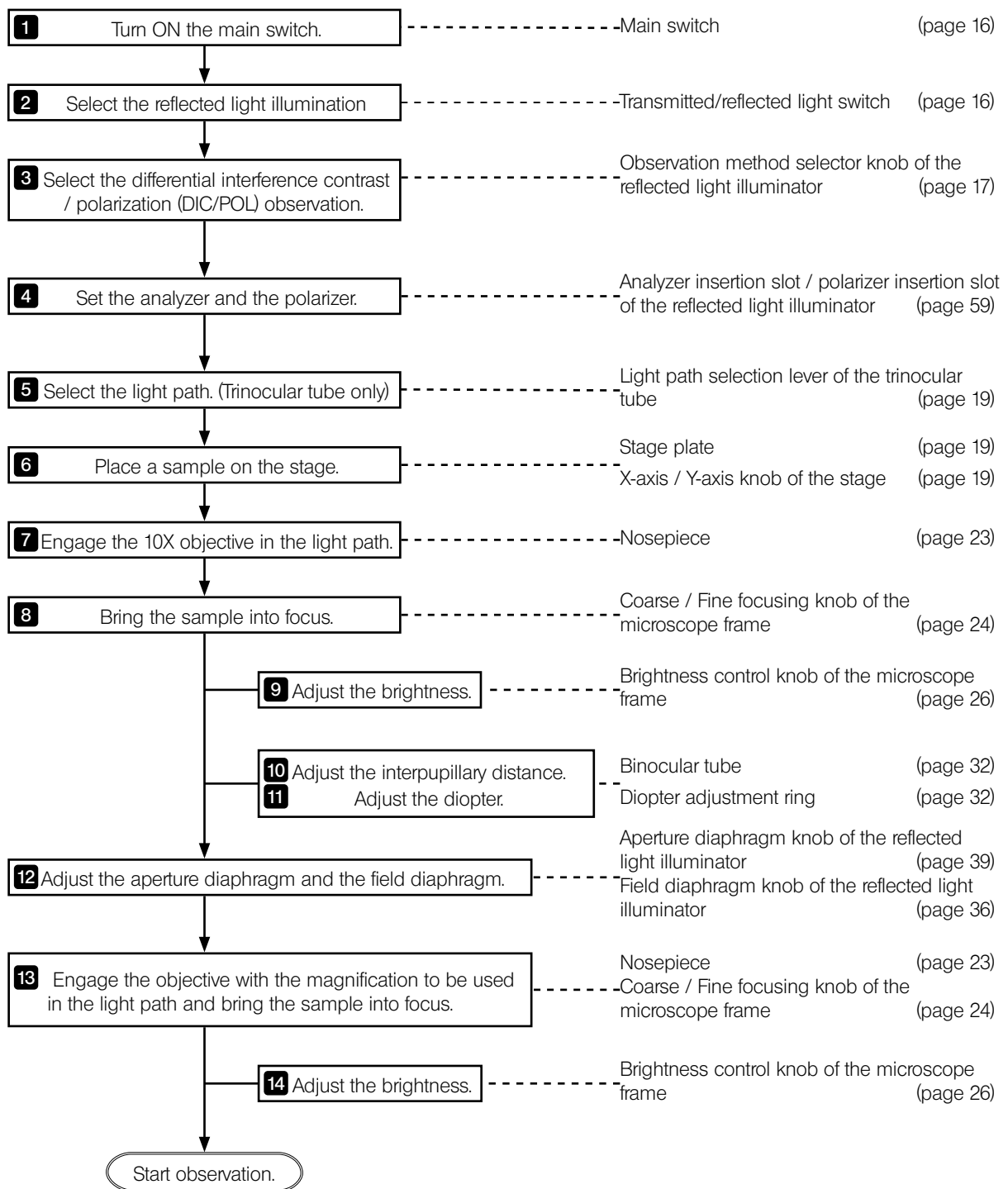
# 4 Various observation methods

This section describes the operating procedures of the observations other than the reflected brightfield observation. The operating procedures of the reflected brightfield observation are described in "3 Basic operations of the microscope (brightfield observation)".

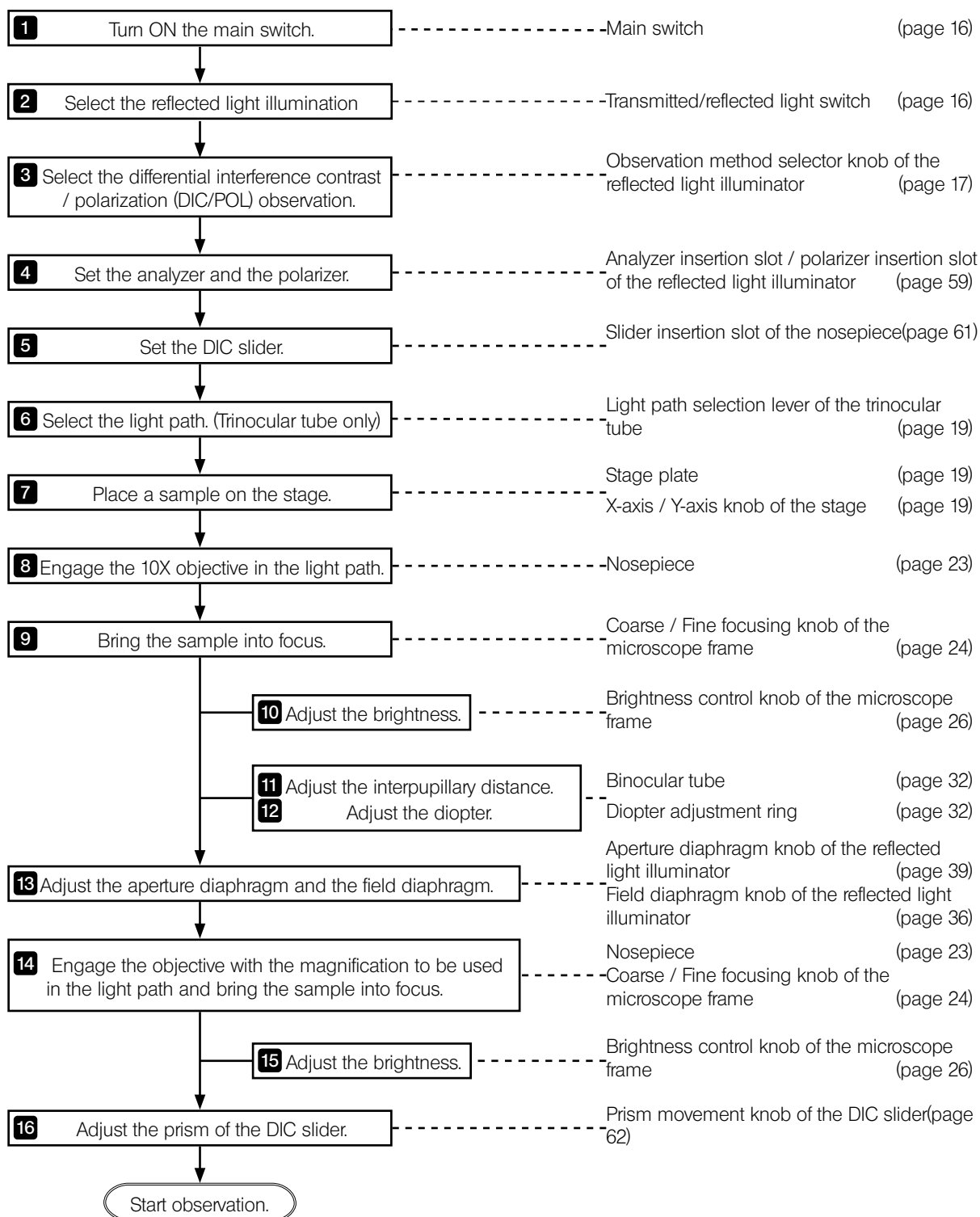
## 4-1 Reflected light darkfield observation procedures



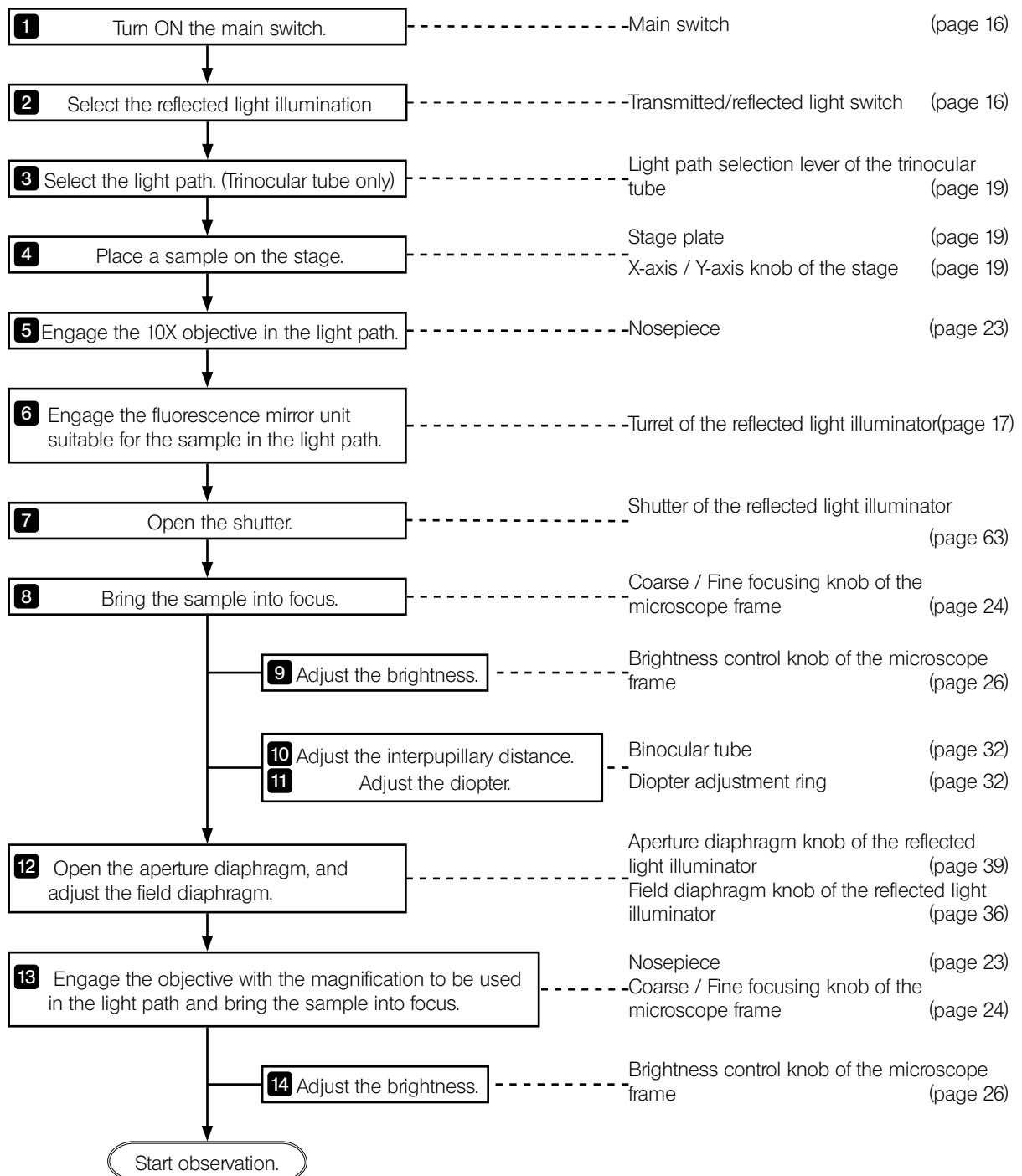
## 4-2 Reflected light simple polarization observation procedures



### 4-3 Reflected light differential interference contrast (DIC) observation procedures

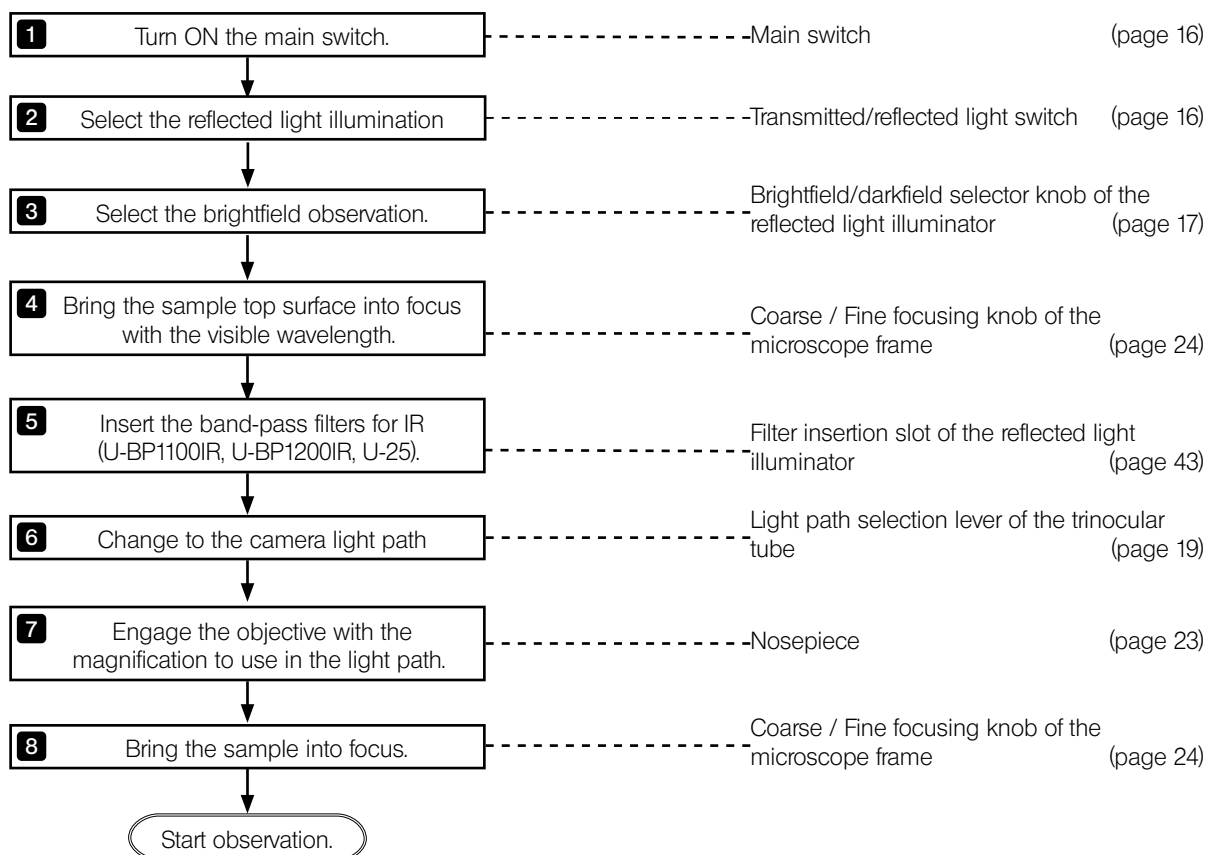


## 4-4 Reflected light fluorescence observation procedures



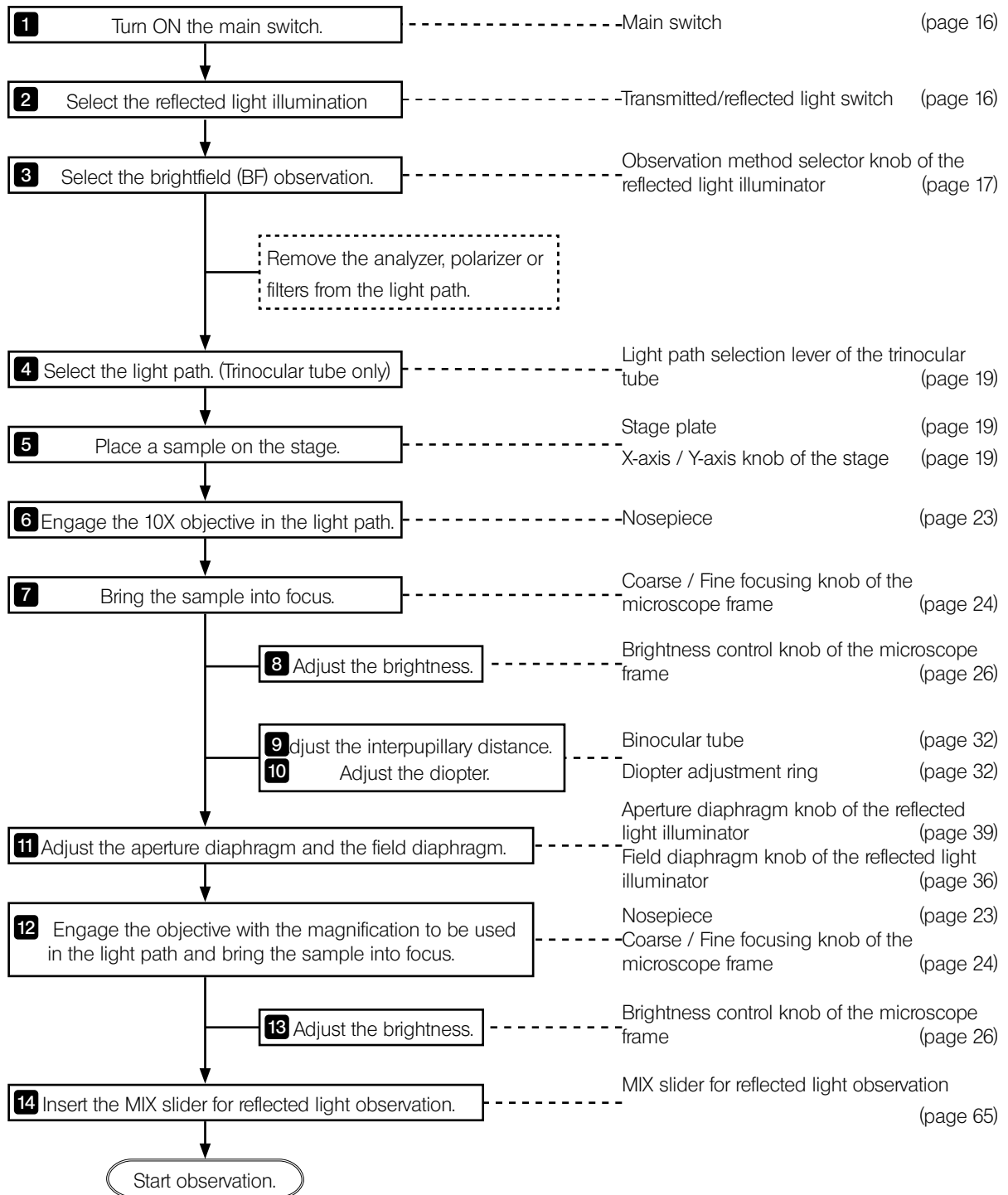


## 4-5 Reflected light infrared observation procedures

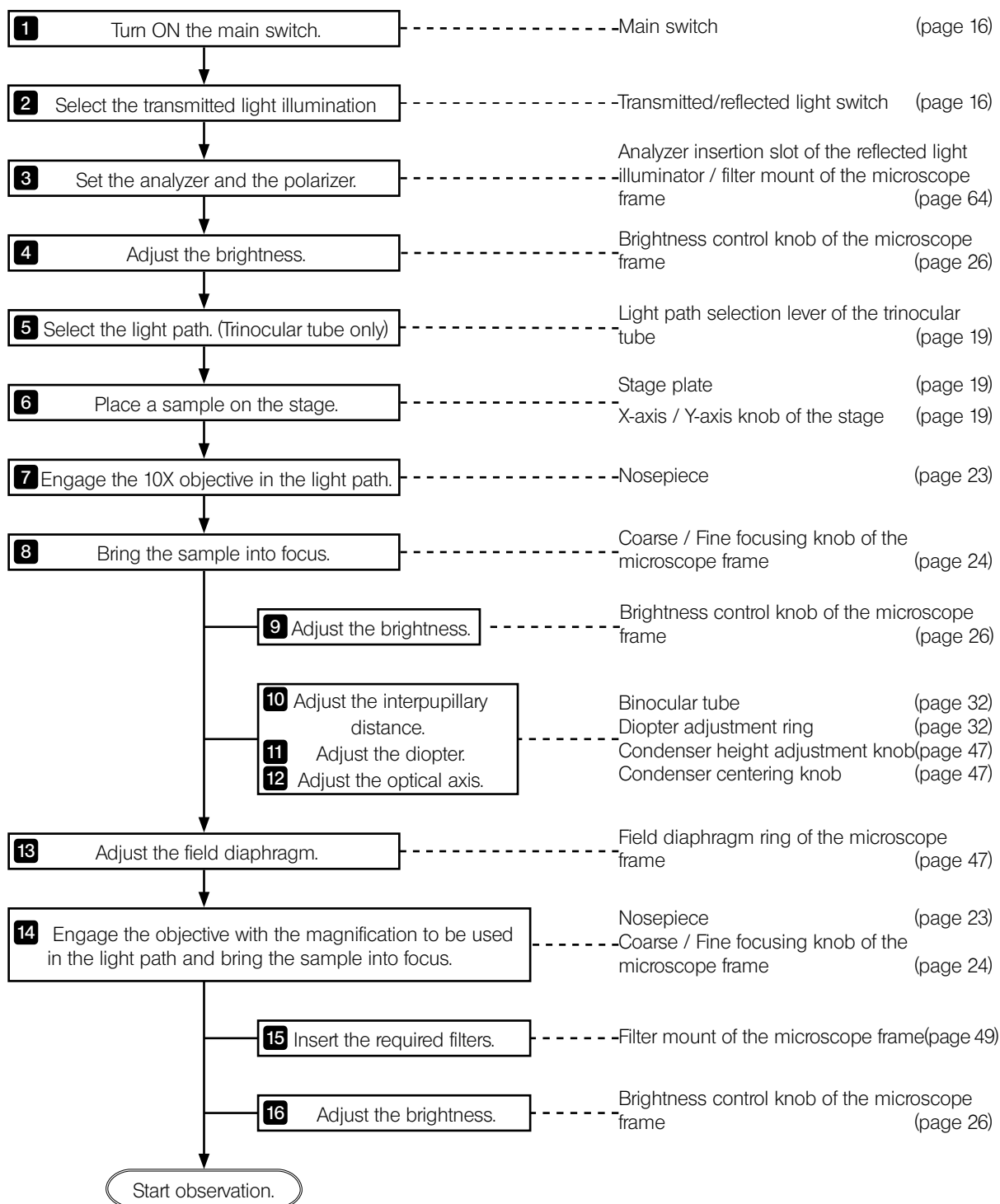


- NOTE**
- Combining the reflected polarizer slider for IR and the rotatable analyzer slider for IR (U-POIR, U-AN360IR) cuts the reflection to the sample surface to acquire the image with the higher resolution.
  - Using the correction collar mechanism of the objective reduces the aberration to acquire the bright image with the high resolution.

## 4-6 Reflected light simultaneous observation for BF/DF



### 4-7 Transmitted light simple polarization observation procedures



## 4-8 Transmitted light polarization observation procedures

For details of transmitted light polarization observation, refer to the instruction manual provided with the unit.

## 4-9 Setting the analyzer and the polarizer of the reflected light illumination

### 1 When BX3M-URAS-S, BX3M-RLA-S or BX3M-KMA-S is combined

**NOTE** • When performing the sensitive tint observation using the DIC slider (U-DICRH), combine with the polarizer (U-POTP3).

• When using the mercury lamp housing, be sure to use the L42 filter (U-25L42) to prevent the polarizer from tarnish.

- 1 If the DIC slider is engaged in the light path, remove it from the light path. For details, see "4-10 Inserting the DIC slider" (page 61).
- 2 Engage the 10X objective or 20X objective in the light path and bring the sample into focus approximately.
- 3 If the cover or the dummy slider is attached to the analyzer insertion slot **a** or the polarizer insertion slot **b**, remove it.

- 4 Insert the analyzer in the analyzer insertion slot **a**.

Analyzer insertion position	Light path
First level (pulled out)	Empty hole
Second level (pressed in)	Analyzer

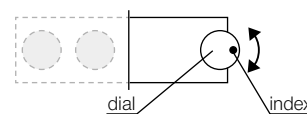
- 5 Insert the polarizer (U-PO3 or U-POTP3) in the polarizer insertion slot **b** with the display surface facing to the front side.

Polarizer insertion position	Light path
First level (pulled out)	Empty hole
Second level (pressed in)	Polarizer

- 6 Turn the analyzer rotation dial to adjust the analyzer.

Observation with crossed Nichols\*:

Set the index of the dial to the position shown in the picture on the right.



Observation without crossed Nichols\*:

Turn the dial while looking at the observation image and align it with the position where you can view the desired observation image.

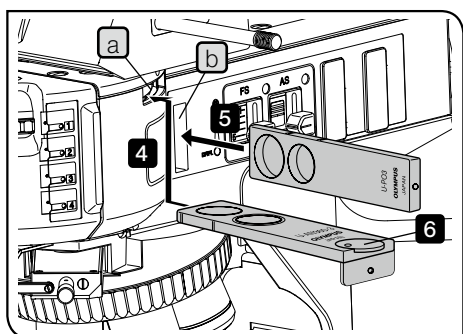
\* The crossed Nichols means the state that the field of view becomes the darkest.

**TIP** During DIC observation, the analyzer rotation dial must be set to the crossed Nichols state.

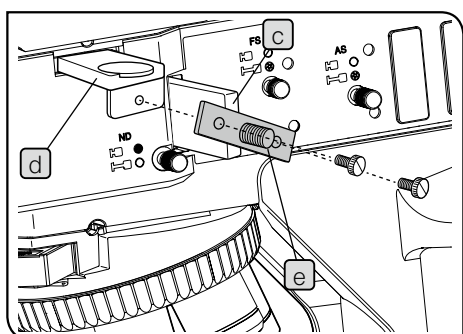
Using the connection plate (BX3M-RLA-S/BX3M-KMA-S)

Connecting the polarizer (U-PO3 or U-POTP3) **c** and the analyzer **d** to the provided connection plate **e** with the clamping knob allows you to attach or detach the polarizer and the analyzer at the same time.

**TIP** The connection plate cannot be used with BX3M-URAS-S.



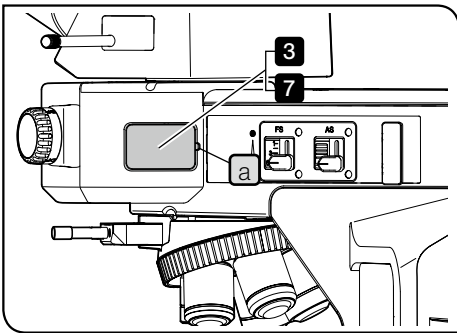
The picture shows the insertion parts of BX3M-URAS-S. The same insertion parts are also provided to BX3M-RLA-S or BX3M-KMA-S.



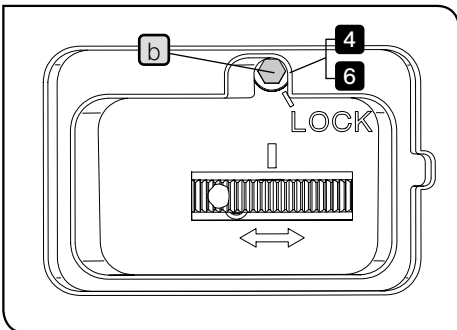
## 2 When BX3M-RLAS-S is combined

### Adjusting the analyzer finely

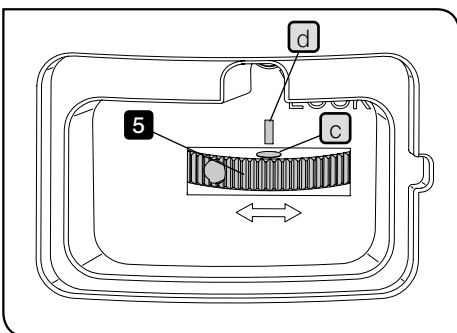
- 1 If the DIC slider is engaged in the light path, remove it from the light path. For details, see "4-10 Inserting the DIC slider" (page 61).
- 2 Engage the 10X objective or 20X objective in the light path and bring the sample into focus approximately.



- 3 Insert a stick with a fine point, such as a precision screwdriver, etc. in the notch **a** and catch the cover to remove it.



- 4 Loosen the screw **b** to unlock.



- 5 Turn the dial to adjust the analyzer.  
 Observation with crossed Nichols\*: Align the white circle index **c** of the dial with the white line **d**.  
 Observation without crossed Nichols\*: Turn the dial while looking at the observation image and align it with the position where you can view the desired observation image.

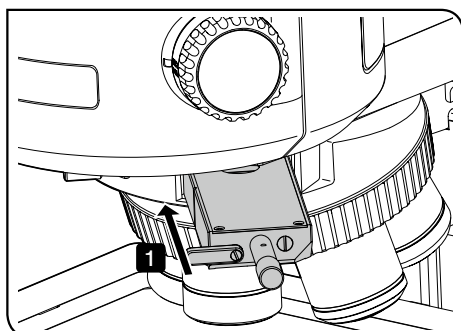
\* The crossed Nichols means the state that the field of view becomes the darkest.

**TIP** During DIC observation, the analyzer rotation dial must be set to the crossed Nichols state.

- 6 Tighten the screw **b** to lock the dial rotation.
- 7 Close the cover to return to the original state.

## 4-10 Inserting the DIC slider

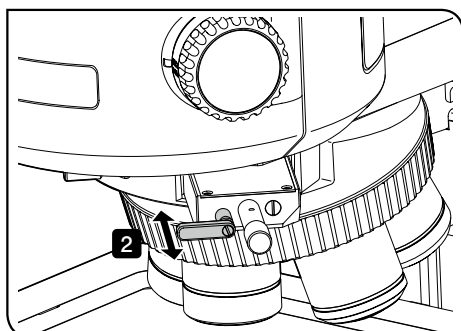
This operation is necessary when the DIC slider for reflected light observation (U-DICR, U-DICRH or U-DICRHC) is combined with the system.



### 1 Inserting the DIC slider

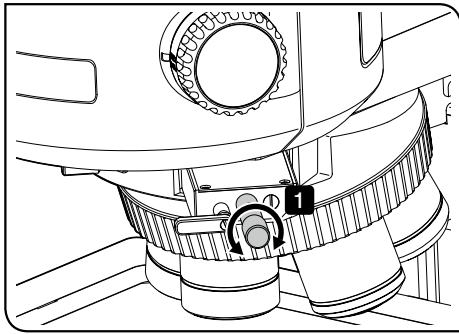
- 1 Push in the DIC slider to the second level (position where the clicking sound is heard).

DIC slider position	Light path
First level (pulled out)	OUT
Second level (pressed in)	IN



- 2 When using the DIC slider U-DICR, slide the selection lever depending on the objective to use.

Light path selection lever position	objective to use	
Pulled out	UIS2	LMPLFLN/LMPLFLN-BD series
	UIS	LMPlanFI/LMPlanFI-BD series LMPlanApo/LMPlanApo-BD series
Pressed in	UIS2	MPLFLN/MPLFLN-BD series MPLAPON series
	UIS	UMPlanFI/UMPlanFI-BD series MPlanApo20X, 100X MPlanApo100XBD



## 2 Adjusting the prism

- 1 Turn the prism movement knob of the DIC slider to select the interference color with the highest contrast according to the sample.

U-DICR : } The interference color of the background changes  
 U-DICRHC : } continuously from the gray sensitive color to the  
 magenta sensitive color (from -100 to 600 nm).  
 U-DICRH : } The interference color of the background changes  
 continuously from -100 to 100 nm.

- If you select the gray color for the background color, you can observe the three dimensional image with high contrast in the gray sensitive color with the highest sensitivity.
- If you select the magenta sensitive color for the background color, even a small phase difference can be viewed by a variation of the color.

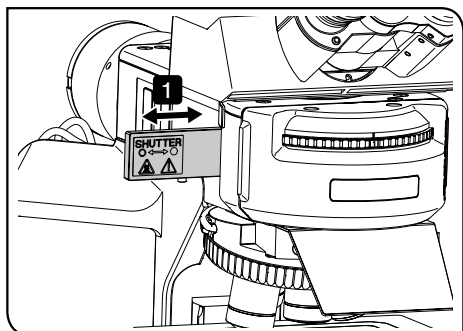
**TIP** If you want to select the magenta sensitive color for the background color when using U-DICRH, engage the polarizer U-POTP3 in the light path. For details, see "4-9 Setting the analyzer and the polarizer of the reflected light illumination" (page 59).

**NOTE** The detection sensitivity during DIC observation is very high. Be careful, particularly, for dirt or dust on the sample surface.

**TIP** The detection sensitivity is direction-oriented. If you turn the sample using the rotational stage, the contrast could be higher.



## 4-11 Opening/Closing the shutter



This operation is necessary when the coded universal reflected light illuminator (BX3M-URAS-S) is combined.

- 1** Push in the shutter to the second level (position where the clicking sound is heard).

Shutter position	Light path
First level (pulled out)	OUT
Second level (pressed in)	IN

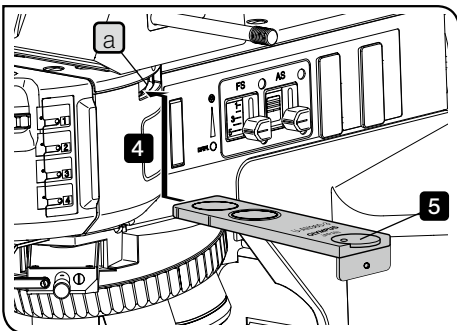
## 4-12 Setting the analyzer and the polarizer of the transmitted light illumination

### 1 Setting the analyzer and the polarizer

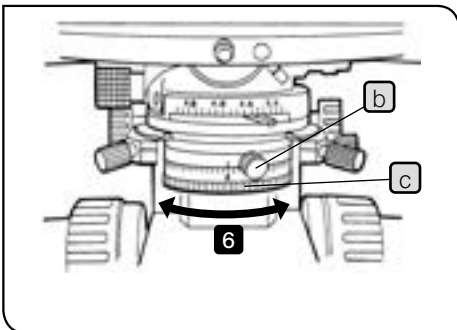
- 1 If the DIC slider is engaged in the light path, remove it from the light path. For details, see "4-10 Inserting the DIC slider" (page 61).
- 2 Engage the 10X objective or 20X objective in the light path and bring the sample into focus approximately.
- 3 If the cover or the dummy slider is attached to the analyzer insertion slot **a**, remove it.
- 4 Insert the analyzer in the analyzer insertion slot **a**.

Analyzer insertion position	Light path
First level (pulled out)	Empty hole
Second level (pressed in)	Analyzer

- 5 Turn the analyzer rotation dial to 0°.

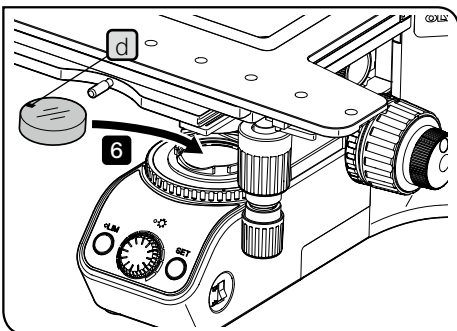


The picture shows the insertion parts of BX3M-URAS-S. The same insertion parts are also provided to BX3M-RLAS-S or BX3M-KMA-S.



When the polarizing condenser (U-POC-2) is combined

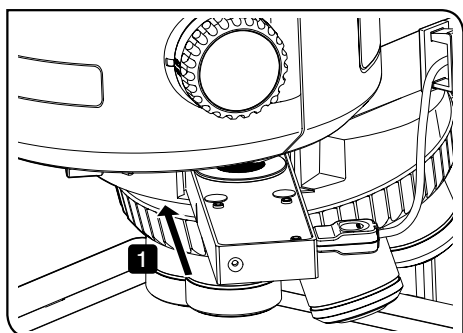
- 6 Loosen the fixing screw **b** of the polarizer and turn the polarizer rotation ring **c** to 0° temporarily. Then, turn the polarizer rotation ring **c** and tighten the clamping knob **b** at the position where the field of view becomes the darkest (crossed Nichols).



When the polarizing condenser (U-POC-2) is not combined

- 6 Insert the polarizer (U-POT) in the filter mount of the base unit of the microscope frame. Be sure to insert the polarizer so that the indicator **d** of the polarizer is viewed in horizontal orientation when looking from the front of the microscope. Then, turn the polarizer so that the field of view becomes the darkest (crossed Nichols).

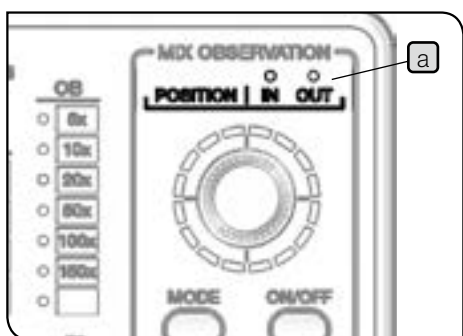
### 4-13 Inserting the MIX slider for reflected light observation



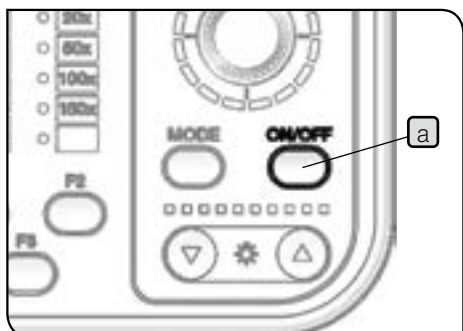
#### 1 Inserting the MIX slider for reflected light observation

- 1 Push the MIX slider for reflected light observation (U-MIXR) in the second level (position where the clicking sound is heard).

MIX slider for reflected light observation position	Light path
First level (pulled out)	OUT
Second level (pressed in)	IN



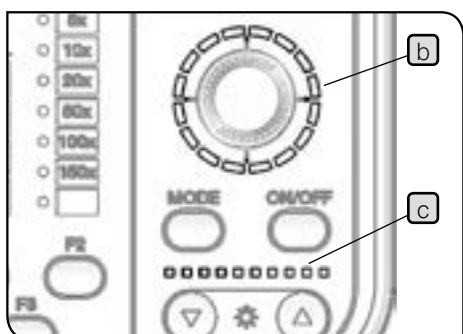
The state whether the MIX slider for reflected light observation is engaged in or removed from the light path can be checked by the POSITION indicator **a** of the hand switch (BX3M-HS).

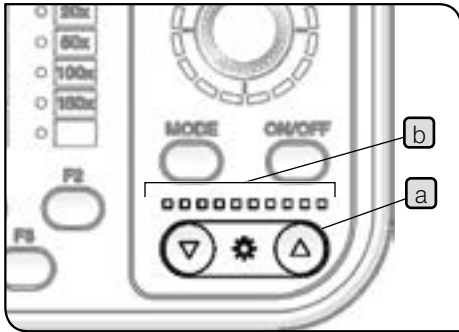


#### 2 Turning ON the illumination of the MIX slider for reflected light observation

- 1 If you press the ON/OFF button **a** of the hand switch (BX3M-HS) to set it to ON, the illumination of the MIX slider for reflected light observation (U-MIXR) turns ON.

State	Indicator ( <b>b</b> , <b>c</b> )	Function
ON	Turns ON.	The illumination turns ON.
OFF	Turns OFF.	The illumination turns OFF.





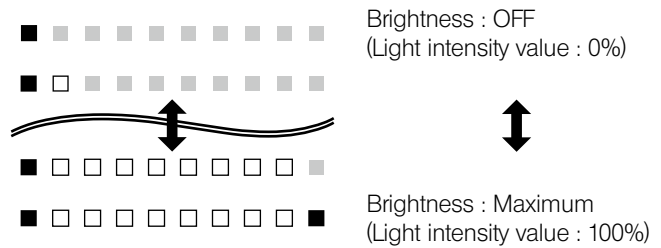
### 3 Adjusting the brightness

- 1 Press the light intensity button **a** of the hand switch (BX3M-HS) to adjust the brightness of the illumination.

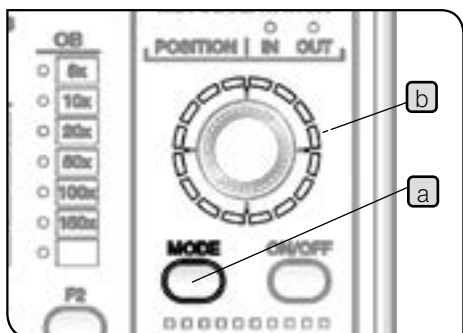
Button	Operation	Function
▼	Short press	Darken by predetermined quantity.
	Long press	Darken continuously.
▲	Short press	Brighten by predetermined quantity.
	Long press	Brighten continuously.

#### Indicator

The light intensity state can be checked by the indicator **b**.



■ : Turns ON in blue. □ : Turns ON in white. ■ : Turns OFF.



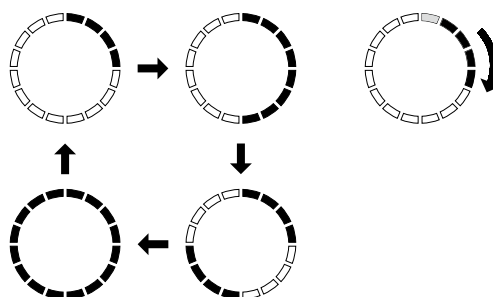
#### 4 Selecting the illumination pattern

- 1 Press the MODE button **a** of the hand switch (BX3M-HS) to select the illumination pattern. The indicator **b** turns ON according to the illumination pattern.

Operation	Function
Short press	Changes the illumination pattern.
Long press (Short press while the illumination pattern is rotating automatically)	The illumination pattern rotates automatically clockwise. (The automatic rotation stops)

Short press

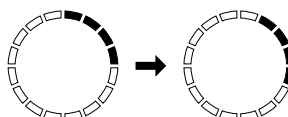
Long press



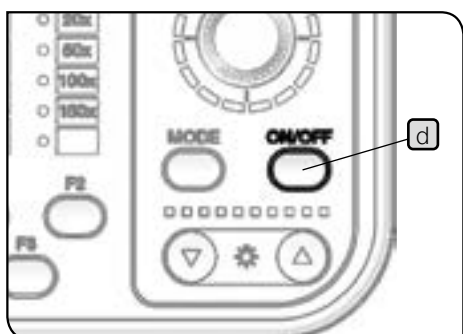
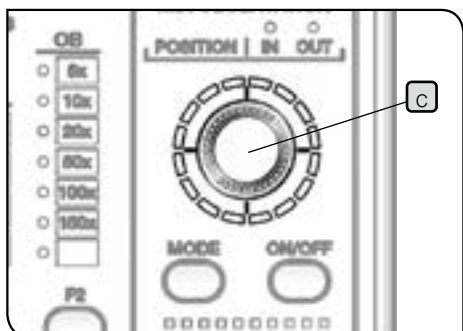
1: The illumination turns ON and the indicator turns ON in blue.

- 2 Turn the dial **c** to change the illumination position. The illumination position shifts in the rotated direction by one scale at a time.

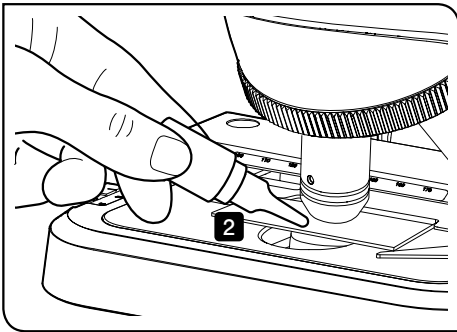
(Example of clockwise rotation)



**NOTE** While the illumination pattern is rotating automatically, you cannot operate the dial **c** and the ON/OFF button **d**.



## 4-14 Using the oil immersion objective



Apply the specified oil (immersion oil) to the tip of the oil immersion objective. Otherwise, the observation image can not be brought into focus.

**NOTE** Always use the immersion oil made by Evident. If you use the immersion oil other than those made by Evident, the correct optical performance cannot be exhibited.

**1** Change the objective in order from the low magnification to the high magnification to bring the sample into focus.

**2** Before engaging the oil immersion objective in the light path, apply a drop of the immersion oil on the observation area of the sample.

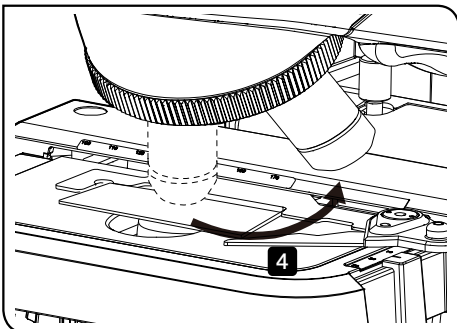
**3** Turn the nosepiece, engage the oil immersion objective in the light path and bring the sample into focus using the fine focusing knob.

**NOTE** • If bubbles are contained in the oil, the visibility of the image is deteriorated. Check that the bubbles are not contained in the oil.

• To remove bubbles, turn the nosepiece slightly and move the oil immersion objective back and forth once or twice.

**4** After use, lower the stage, turn the nosepiece 90° and remove the objective attached with the oil from the sample. Then, wipe off the immersion oil completely from the tip of the objective and the tip of the condenser lens using a piece of cleaning paper or the gauze slightly moistened with the absolute alcohol. Wipe off the immersion oil on the sample in the same way.

**NOTE** If lenses or samples are left keeping the immersion oil attached, the oil adheres and the correct observation may not be performed.



**CAUTION**





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

# 5 Troubleshooting

Depending on how you use, the performance of this microscope may not be exhibited, though they are not failure. If problems occur, please review the following list and take remedial action as needed.

If you cannot improve the phenomena after checking the entire list, please contact Evident for assistance.

## 5-1 Optical systems

Phenomena	Cause	Remedy	Page
a) The halogen bulb or the mercury burner does not light. For the LED lamp housing, see "5-2 Electrical systems" (page 72).	The lamp is burned out.	Replace with the new lamp.	107
b) The halogen bulb or the mercury burner flashes on and off.	The halogen bulb or the mercury burner is about to burn out.	Replace the halogen bulb or the mercury burner.	107
	Cables are not connected firmly.	Connect them firmly.	113
c) The halogen bulb or the mercury burner burns out quickly.	You are not using the proper halogen bulb or the mercury burner.	Replace with the proper halogen bulb or the mercury burner.	107
d) Even though the lamp lights, the field of view is dark.	The aperture diaphragm and the field diaphragm are not opened sufficiently.	Open the aperture diaphragm sufficiently, and open the field diaphragm until the field diaphragm circumscribes the field of view.	34,38,47
	The analyzer or the polarizer are in the light path.	Remove the analyzer or the polarizer from the light path.	59, 64
	Light path selection lever of the trinocular tube is at the  position.	Set the light path selection lever of the trinocular tube to the   or the  position.	19
	The observation method selector knob or lever or the turret is at the halfway position.	Select the observation method selector knob or lever or the turret surely.	17
	The shutter is engaged in the light path.	Remove the shutter from the light path.	63
e) Though the brightness control knob or the light volume adjustment dial is rotated, the illumination does not become brighter.	The halogen bulb or the mercury burner is burned out.	Replace the halogen bulb or the mercury burner.	107

Phenomena	Cause	Remedy	Page
f) The peripheral area of the field of view becomes dark. Or, the brightness of the field of view is not even.	The light path selection lever of the trinocular tube is not stopped at the correct position.	Stop the light path selection lever of the trinocular tube at the position where the clicking sound is heard.	19
	The observation method selector knob or lever or the turret is at the halfway position.	Select the observation method selector knob or lever or the turret surely.	17
	The objective is not correctly engaged in the light path.	Turn the nosepiece to the position where the clicking sound is heard and engage the objective in the light path.	23
	The nosepiece is not attached correctly.	Push in the nosepiece along the mounting dovetail until it touches the end, and secure it.	102
	The centering of the field diaphragm is not performed.	Perform the centering of the field diaphragm correctly.	36, 47
	The field diaphragm is narrowed down too much.	Open the field diaphragm sufficiently.	34, 47
	The filter is not engaged in the light path correctly.	Stop the filter at the position where the clicking sound is heard.	43
	The ND filter lever is not stopped at the correct position.	Stop the ND filter lever at the position where the clicking sound is heard.	42
	The ND filter is not linked completely.	Set the ND filter correctly whether to link or cancel.	42
	The lamp is not attached correctly.	Push in the terminal of the halogen bulb completely until it touches the end.	107
	The analyzer and the polarizer are not inserted correctly.	Engage the analyzer and the polarizer in the light path correctly.	59, 64
g) Dust or dirt is visible in the field of view.	The tip of the eyepiece or objective or the sample is dirty.	Clean them sufficiently.	7
h) The observation image glares.	The aperture diaphragm is narrowed down too much.	Adjust the aperture diaphragm according to the numerical aperture of the objective to use.	38
i) The observation image is viewed in white haziness or not visible clearly.	The objective for UIS2(UIS) series is not used.	Replace with the objective for UIS2(UIS) series.	87
	The dummy slider is not inserted in the nosepiece.	Insert the dummy slider in the nosepiece.	17
	The nosepiece is not attached correctly.	Push in the nosepiece along the mounting dovetail until it touches the end, and secure it.	102
	The objective is not correctly engaged in the light path.	Turn the nosepiece until the clicking sound is heard and engage the objective in the light path.	23
	The tip of the eyepiece or the sample is dirty.	Clean them sufficiently.	7



Phenomena	Cause	Remedy	Page
j) The one-sided blur appears in the observation image.	The nosepiece is not attached correctly.	Push in the nosepiece along the mounting dovetail until it touches the end, and secure it.	102
	The objective is not correctly engaged in the light path.	Turn the nosepiece until the clicking sound is heard and engage the objective in the light path.	23
	The sample is not parallel to the stage.	Correct the sample to parallel to the stage or change the sample.	19
	The sample exceeds the specified weight.	Replace with another sample.	19
k) The observation image shifts when defocusing.	The nosepiece is not attached correctly.	Push in the nosepiece along the mounting dovetail until it touches the end, and secure it.	102
	The objective is not correctly engaged in the light path.	Turn the nosepiece until the clicking sound is heard and engage the objective in the light path.	23
	The aperture diaphragm is narrowed down the centering is not performed yet.	Perform the centering of the aperture diaphragm.	39
	The stage is not mounted correctly.	Mount the stage correctly.	95
l) During the fluorescence observation, the background becomes brighter.	This is caused by the in-house fluorescence of the transmitted light illumination optical systems.	Insert the light shield sheet in the space of the stage.	18

## 5-2 Electrical systems

### Meaning of notations in the following tables

Number of beeps: The beep sound is heard when the control box (BX3M-CB) is combined. This is a number of this beep sound.

CB : Indicates the lighting state of the indicator of the control box (BX3M-CB).

LIM / ☀ : Indicates the lighting state of the LIM indicator on the front of the microscope frame and the pilot indicator.

HS : Indicates the lighting state of the indicator of the hand switch (BX3M-HS).




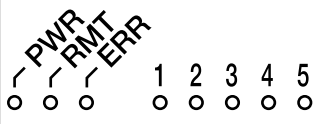

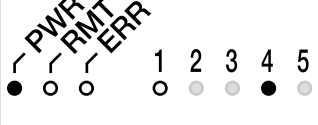



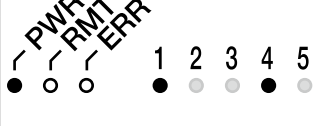

MIX : Indicates the lighting state of the indicator of the MIX slider for reflected light observation (U-MIXR).

● : Turns ON. ● : Blinks. ○ : Turns OFF. ○ : Varies depending on state.

Phenomena				
Number of beeps	CB	LIM / ☀	HS	MIX
a) Though the brightness control knob on the front of the microscope frame is turned, the brightness cannot be adjusted.				
None	-	○LIM / ○☀	-	-
None	-	○LIM / ●☀	-	-
b) The reflected light illumination or the transmitted light illumination is not selected even though the transmitted/reflected light switch is operated.				
None	-	○LIM / ○☀	-	-
None	-	○LIM / ●☀	-	-




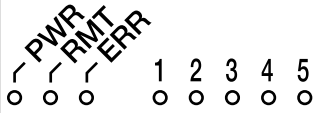

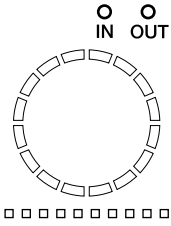
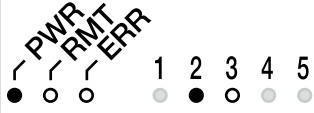

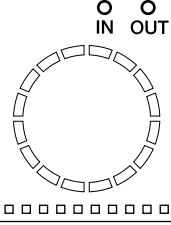
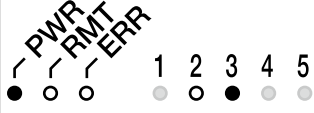

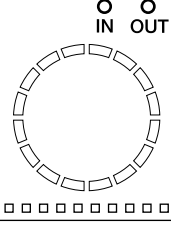
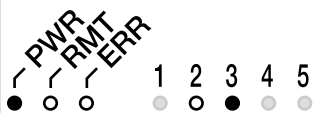

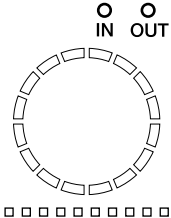
Cause	Remedy	Page
The AC adapter or the power cord is not connected.	Set the main switch to <b>○</b> (OFF) and connect the AC adapter and the power cord to the microscope frame and the control box (BX3M-CB).	16, 115
The microscope frame is damaged.	Contact Evident.	-
The setting of the switch for selecting the reflected light illumination or the transmitted light illumination is opposite to the setting of the light source you want to adjust the brightness.	Change the transmitted/reflected light switch of the microscope frame to the light source to use for observation.	16
The cable for the LED lamp housing is not connected.	Set the main switch to <b>○</b> (OFF) and connect the cable of the LED lamp housing to the connector on the back of the microscope frame.	16, 113
After the stored brightness (LIM function) is restored to the factory default setting, the power supply is not turned ON again.	Set the main switch to <b>I</b> (ON).	30
The microscope frame is damaged. Or the LED lamp housing is damaged.	Contact Evident.	-
The AC adapter or the power cord is not connected.	Set the main switch to <b>○</b> (OFF) and connect the AC adapter and the power cord to the microscope frame and the control box (BX3M-CB).	16, 115
The brightness is set to the minimum.	Turn the brightness control knob of the microscope frame to adjust the brightness of the illumination.	26
The cable of the LED lamp housing is not connected.	Set the main switch to <b>○</b> (OFF) and connect the cable of the LED lamp housing to the connector on the back of the microscope frame.	16, 113
After the stored brightness (LIM function) is restored to the factory default setting, the power supply is not turned ON again.	Set the main switch to <b>I</b> (ON).	30
The microscope frame is damaged. Or the LED lamp housing is damaged.	Contact Evident.	-

● : Turns ON. ● (with sun symbol) : Blinks. ○ : Turns OFF. ○ (with sun symbol) : Varies depending on state.

Phenomena				
Number of beeps	CB	LIM / 	HS	MIX
c) LIM is not working. (When following operations are performed, the stored brightness is not set automatically.)				
<ul style="list-style-type: none"> <li>When selecting the objective by turning the motorized nosepiece or the coded nosepiece.</li> <li>When selecting the observation method using the coded reflected light illuminator.</li> </ul>				
None	-	● LIM / 	-	-
None	-	○ LIM / 	-	-
d) The motorized nosepiece does not rotate even though pressing the button of the hand switch for motorized nosepiece (BX3M-HSRE).				
None		○ LIM / 	-	-
3 times		○ LIM / 	-	-
None		○ LIM / 	-	-
None		○ LIM / 	-	-

Cause	Remedy	Page
The cables of the LED lamp housing, motorized nosepiece, coded nosepiece or coded reflected light illuminator are not connected.	Set the main switch to <b>○</b> (OFF) and connect the cables of the LED lamp housing, motorized nosepiece, coded nosepiece and coded reflected light illuminator to the connector on the back of the microscope frame.	16, 113
The brightness of LIM is not stored.	Operate according to the procedures.	27
The LED lamp housing is damaged.	If you cannot adjust the brightness even by pressing the LIM switch on the front of the microscope frame to set to the Store mode (The LIM indicator is OFF), the LED lamp housing is damaged. Contact Evident.	27
The LIM is not set to the Replay mode.	Press the LIM switch on the front of the microscope frame to set to the Replay mode. (The LIM indicator is ON.)	27
The microscope frame is damaged.	If the LIM indicator does not light by pressing the LIM switch on the front of the microscope frame, the microscope frame is damaged. Contact Evident.	27
The control box (BX3M-CB) is not connected.	Set the main switch to <b>○</b> (OFF) and connect the control box and the AC adapter of the control box again. Then, set the main switch to <b>I</b> (ON) and confirm that the beep is heard once.	16, 98, 115
The control box (BX3M-CB) is damaged.	If the indicator on the back of the controller does not light even though the control box and the AC adapter of the control box are connected again, and also if the beep sound is not heard when the main switch is set to <b>I</b> (ON), contact Evident.	16, 98, 115
The motorized nosepiece is not connected.	Set the main switch to <b>○</b> (OFF) and connect the motorized nosepiece again.	16, 102
The motorized nosepiece or its cable is damaged.	Contact Evident.	-
The hand switch for motorized nosepiece (BX3M-HSRE) is not connected.	Set the main switch to <b>○</b> (OFF) and connect the hand switch for motorized nosepiece (BX3M-HSRE). If the indicator <sup>4</sup> on the back of the control box does not turn ON even though the hand switch for motorized nosepiece is connected, contact Evident.	16,113,98
The hand switch for motorized nosepiece (BX3M-HSRE) is damaged.	Contact Evident.	-
The hand switch for motorized nosepiece (BX3M-HSRE) or the motorized nosepiece is damaged.	Contact Evident.	-
The stored brightness (LIM function) is restored to the factory default setting while the control box (BX3M-CB) is connected. The power supply was turned ON while pressing the SET switch of the microscope frame.	Set the main switch to <b>○</b> (OFF) once and set it to <b>I</b> (ON) again.	16

● : Turns ON. ● (with sunburst) : Blinks. ○ : Turns OFF. ○ (with sunburst) : Varies depending on state.

Phenomena				
Number of beeps	CB	LIM / 	HS	MIX
e) When the button of the hand switch for motorized nosepiece (BX3M-HSRE) is pressed, the motorized nosepiece rotates, but it does not reach the specified hole.				
5 times		○ LIM / ● 	-	-
f) The MIX slider for reflected light observation (U-MIXR) cannot be controlled by operating the hand switch (BX3M-HS).				
None		○ LIM / ● 		Turns OFF
None		○ LIM / ● 		Turns ON
None		○ LIM / ● 		Turns OFF
None		○ LIM / ● 		Turns ON

Cause	Remedy	Page
The setting of the dip switch is not correct.	Set the main switch to <b>○</b> (OFF), and use the dip switch on the side of the control box (BX3M-CB) to set the number of objective mounting holes on the nosepiece.	16, 98
The motorized nosepiece did not reach the click position within the specified time. The motorized nosepiece is damaged.	Set the main switch to <b>○</b> (OFF) and check that there is no obstacle when the nosepiece rotates. If the nosepiece contacts with the obstacle, remove the obstacle. Then, set the main switch to <b>I</b> (ON). If the same phenomena still occurs, contact Evident.	16
The control box (BX3M-CB) is not connected.	Set the main switch to <b>○</b> (OFF) and connect the control box and the AC adapter of the control box again. Then, set the main switch to <b>I</b> (ON) and confirm that the beep is heard once.	16, 98 , 115
The control box (BX3M-CB) is damaged.	If the indicator on the back of the controller does not light even though the control box and the AC adapter of the control box are connected again, and also if the beep sound is not heard when the main switch is set to <b>I</b> (ON), contact Evident.	16, 98 , 115
The hand switch (BX3M-HS) is not connected.	Set the main switch to <b>○</b> (OFF) and connect the hand switch (BX3M-HS). If the indicator <sup>3</sup> on the back of the control box does not light even though the hand switch is connected, contact Evident.	16, 113
The hand switch (BX3M-HS) is damaged.	If the indicator <sup>3</sup> on the back of the control box does not light even though the hand switch (BX3M-HS) is connected, contact Evident.	113
The MIX slider for reflected light observation (U-MIXR) is not connected.	Connect the MIX slider for reflected light observation. If the indicator <sup>2</sup> on the back of the control box does not light even though the MIX slider for reflected light observation is connected, contact Evident.	103
The MIX slider for reflected light observation (U-MIXR) is damaged.	If the indicator <sup>2</sup> on the back of the control box does not light even though the MIX slider for reflected light observation is connected, contact Evident.	103
The cable for U-MIXR (U-MIXRCBL) or the extension cable for U-MIXR (U-MIXRECBL) is disconnected.	Contact Evident.	-

● : Turns ON. ● : Blinks. ○ : Turns OFF. ○ : Varies depending on state.

Phenomena				
Number of beeps	CB	LIM / ☀	HS	MIX
None		○ LIM / ● ☀		Turns ON
None		○ LIM / ● ☀		Turns ON
None		○ LIM / ● ☀		Turns ON

g) The CUBE indicator or the OB indicator does not light even though following operations were performed.

- Select the observation method using the coded reflected light illuminator.
- Select the objective by turning the motorized nosepiece or the coded nosepiece.

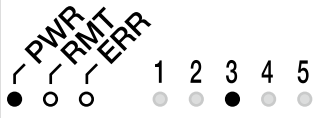
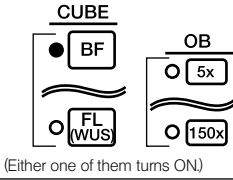
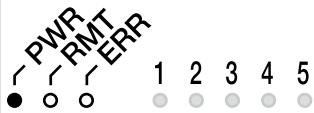

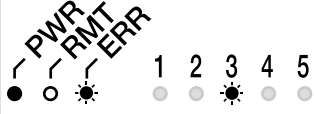
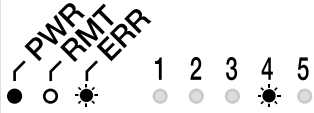
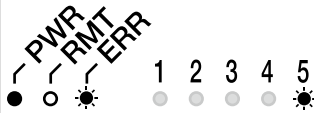

None		○ LIM / ● ☀		-
None		○ LIM / ● ☀		-
None		○ LIM / ● ☀	-	-
None		○ LIM / ● ☀		-

(Either one of them turns ON)


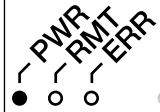





Cause	Remedy	Page
The MIX slider for reflected light observation (U-MIXR) is not engaged in the light path.	Engage the MIX slider for reflected light observation in the light path. If the POSITION indicator of the hand switch (BX3M-HS) keeps lighting OUT (IN does not light) even though the MIX slider for reflected light observation is engaged in the light path, contact Evident.	65
The illumination of the MIX slider for reflected light observation (U-MIXR) is turned OFF. Or the hand switch (BX3M-HS) is damaged.	Press the ON button of the hand switch (BX3M-HS). If the illumination does not turn ON even though the ON button is pressed, contact Evident.	65
The light intensity value of the MIX slider for reflected light observation (U-MIXR) is 0%. Or the hand switch (BX3M-HS) is damaged.	Press the light intensity button (●) of the hand switch (BX3M-HS). If the illumination does not turn ON even though the light intensity button is pressed, contact Evident.	66
The control box (BX3M-CB) is not connected.	Set the main switch to ○(OFF) and connect the control box and the AC adapter of the control box again. Then, set the main switch to I(ON) and confirm that the beep is heard once.	16, 98 , 115
The hand switch (BX3M-HS) is not connected.	Set the main switch to ○ (OFF) and connect the hand switch (BX3M-HS). If the CUBE indicator or the OB indicator does not light even though the hand switch is connected, contact Evident.	16, 113
The hand switch (BX3M-HS) is damaged.	Contact Evident.	-
The stored brightness (LIM function) is restored to the factory default setting while the control box (BX3M-CB) is connected. The power supply was turned ON while pressing the SET switch of the microscope frame.	Set the main switch to ○ (OFF) once and set it to I(ON) again.	16
The cable of the coded reflected light illuminator is not connected.	Set the main switch to ○ (OFF) and connect the cable of the coded reflected light illuminator.	16, 113

● : Turns ON. ● (with sun symbol) : Blinks. ○ : Turns OFF. ○ (with sun symbol) : Varies depending on state.

Phenomena					
Number of beeps	CB	LIM / ● (with sun symbol)	HS	MIX	
None		○ LIM / ● (with sun symbol)		-	
h) The system cannot be controlled by PC.					
None		○ LIM / ● (with sun symbol)	-	-	
i) The beep sound is heard once suddenly, and the system returns to the state that the power is ON.					
1 time		○ LIM / ● (with sun symbol)	-	-	
j) The beep sound is heard five times.					
5 times		○ LIM / ● (with sun symbol)	-	-	
5 times		○ LIM / ● (with sun symbol)	-	-	
5 times		○ LIM / ● (with sun symbol)	-	-	
5 times		○ LIM / ● (with sun symbol)	-	-	

Cause	Remedy	Page
The cable of the coded nosepiece is not connected.	Set the main switch to <b>○</b> (OFF) and connect the cable of the coded nosepiece.	16, 113
The interface cable is not connected.	Connect the interface cable.	119
The main switch is set to <b>○</b> (OFF) while the communication between PC and the microscope is in process.	Close the application software. Then, set the main switch to <b>I</b> (ON) and start the application software.	16, –
The device driver is not installed.	Install the device driver from the installation media of the application software.	–
The device is not detected properly.	Scan the device again with the Windows® device manager.	–
The USB cable is connected to the USB connector of PC for the first time.	Install the device driver in accordance with the installation wizard.	–
The communication between the control box (BX3M-CB) and PC is disconnected.	Remove the interface cable from PC and connect it again. Then, restart the application software. If the communication is still not restored, turn OFF the power supplies of the microscope and PC and turn ON again.	16, 119
The large supply voltage fluctuation, etc. occurs caused by thunder, etc. and the system was reset.	This is not a failure. If this phenomenon occurs frequently, contact Evident.	–
The communication between the control box (BX3M-CB) and the hand switch (BX3M-HS) is disconnected. The cable of the hand switch (BX3M-HS) is removed while the power is ON.	Set the main switch to <b>○</b> (OFF) once and set the main switch to <b>I</b> (ON) again. If the error occurs frequently, contact Evident.	16
The communication between the control box (BX3M-CB) and the hand switch for motorized nosepiece (BX3M-HSRE) is disconnected. The cable of the hand switch for motorized nosepiece (BX3M-HSRE) is removed while the power is ON.	Set the main switch to <b>○</b> (OFF) once and set the main switch to <b>I</b> (ON) again. If the error occurs frequently, contact Evident.	16
The communication between the control box (BX3M-CB) and the hand switch for exposure (U-HSEXP) is disconnected. The cable of the hand switch for exposure (U-HSEXP) is removed while the power is ON.	Set the main switch to <b>○</b> (OFF) once and set the main switch to <b>I</b> (ON) again. If the error occurs frequently, contact Evident.	16
The communication between the control box (BX3M-CB) and PC is disconnected.	Set the main switch to <b>○</b> (OFF) once and set the main switch to <b>I</b> (ON) again. If the error occurs frequently, contact Evident.	16

Phenomena				
Number of beeps	CB	LIM / 	HS	MIX
k) The stored brightness (LIM function) cannot be restored to the factory default setting.				
None	 	 LIM / 	-	-

### 5-3 Coarse/fine focusing

Phenomena	Cause	Remedy	Page
a) The tension of the coarse focusing knob is too tight.	The tension adjustment ring of the coarse focusing knob is tightened too firmly.	Loosen the tension adjustment ring so that the tension of the coarse focusing knob becomes the appropriate tightness.	24
	The stage is raised while the pre-focusing lever is locked.	Unlock the pre-focusing lever.	25
b) The stage descends on its own weight. Or the sample is defocused due to the slip of the coarse focusing knob.	The tension adjustment ring of the coarse focusing knob is loosened too much.	Tighten the tension adjustment ring so that the tension of the coarse focusing knob becomes the appropriate tightness.	24
c) The sample is defocused. (The stage does not rise.)	The height of the stage is adjusted too low.	Raise the stage or the raise the stage holder mounting position.	24,95,96
	The pre-focusing lever is locked at the position where the stage is placed low.	Unlock the pre-focusing lever, bring the sample into focus with the coarse focusing knob and lock the pre-focusing lever again.	24, 25

### 5-4 Observation tube

Phenomena	Cause	Remedy	Page
a) The fields of view of two eyes do not coincide.	The interpupillary distance is not adjusted correctly.	Adjust the interpupillary distance correctly.	32
	The diopter of two eyes is not compensated.	Compensate the diopter correctly.	32
	The different eyepiece is used for right and left eyes.	Use the same eyepiece for right and left eyes.	9
	The user is not used to the parallel optical axis.	The following measures may help this problem: Do not look at the image immediately after looking into the eyepiece, but look at the whole field of view or release your eyes from eyepieces and look afar once, and then look into the eyepieces.	-

Cause	Remedy	Page
The time for pressing the LIM switch and the SET switch on the front of the microscope frame is short. (5 sec. or less)	Set the main switch to <b>I</b> (ON) while pressing the LIM switch and the SET switch, and wait 5 seconds while pressing the LIM switch and the SET switch.	16, 30

## 5-5 Stage

Phenomena	Cause	Remedy	Page
a) When the stage is touched by the hand, the image moves significantly.	The stage is not secured correctly.	Secure the stage firmly.	95
b) The stage does not move in the Y-axis direction (front and back). (U-SIC4R2/SIC4L2)	The Y-axis is locked.	Unlock the Y-axis.	21
c) The tension of the X-axis and Y-axis knobs is too tight or too loose. (U-SVRM/SVLM)	The tension of the X-axis and Y-axis adjustment knobs is too tight or too loose.	Adjust the X-axis and Y-axis adjustment knobs to the appropriate tightness.	21

### Repair request

If you cannot improve the phenomena after taking the above remedies, please contact Evident for assistance. At that time, please tell them the following information as well.

- Product name and abbreviation (Example: stage with coaxial knobs on the bottom right U-SVRM)
- Product number
- Phenomena

# 6 Specifications

Configuration units		Product name	Specifications
Microscope frame	Reflected light illumination only	BX53MRF-S	Focusing unit: Vertically movable stage Movable range: 25 mm Fine focusing knob: Moving distance per one rotation: 0.1 mm Coarse focusing knob: Moving distance per one rotation: 178 mm Equipped with tension adjustment mechanism and upper limit stopper mechanism Rating: AC adapter: input: 100 - 240 V $\sim$ 50 - 60 Hz 0.4 A output: 5 V $\text{---}$ 2.5 A Microscope frame: input: $\text{---}$ 5 V / 2.5 A Maximum power consumption: BX53MTRF-S: 10.1 W, 28.1 VA BX53MRF-S: 5.8 W, 18.8 VA Dimension: 275(W) x 363(D) x 310(H) mm Weight: 78 kg
	For both reflected and transmitted light illuminations	BX53MTRF-S	
Observation tube	Binocular tube	U-BI30-2	Field number 22
		U-TBI-3	Field number 22, tilting type
	Trinocular tube	U-SWTR-3	Field number 26.5
		U-SWETTR-5	Field number 26.5, tilting type, for upright image observation
		U-TR30-2	Field number 22
		U-TR30IR	Field number 22, for infrared observation
		U-ETR-4	Field number 22, for upright image observation
		U-TTR-2	Field number 22, tilting type
Illuminator for reflected light illumination	BX3M-KMA-S	For brightfield/DIC/simple polarization observations, built-in LED light source	
	BX3M-RLA-S	For brightfield/darkfield/DIC/simple polarization/infrared observations	
	BX3M-RLAS-S	For brightfield/darkfield/DIC/simple polarization observations, coded type, built-in LED light source	
	BX3M-URAS-S	For brightfield/darkfield/simple polarization/fluorescence/infrared observations, coded type, detachable mirror unit (attachable to 4 positions)	

Configuration units		Product name	Specifications
Light source for reflected light illumination	LED lamp housing	BX3M-LEDR	White LED; Maximum current: 700 mA
	Halogen lamp housing	U-LH100L-3 U-LH100IR	Applicable bulb: 12V100WHAL-L (7724 made by PHILIPS) Average bulb lifetime: Approx. 2,000 hours (Used in accordance with rating) 12V100WHAL (7023 made by PHILIPS) Average bulb lifetime: Approx. 100 hours (Used in accordance with rating) Bulb voltage adjustment range: DC 1.0 V to 12.0 V (Changeable continuously) Power supply: TH4-100, TH4-200
	Mercury lamp housing	U-LH100HGAPO U-LH100HG	Applicable burner: USH-103OL (made by Ushio Inc.) Average burner lifetime: Approx. 300 hours (Used in accordance with rating) Power supply: U-RFLT
	Light source for light guide illumination	U-LGPS	Light guide: U-LLG150, U-LLG300 Light guide adapter: U-LLGAD
Light source for transmitted light illumination	LED lamp housing	BX3M-LEDT	White LED; Maximum current: 700 mA
Nosepiece	Manual type	U-5RE-2	5 holes
		U-D6RE	6 holes, detachable slider
		U-D6RE-ESD	6 holes, detachable slider, support ESD
		U-D7RE	7 holes, detachable slider
		U-5BDRE	5 holes, darkfield observation available
		U-D5BDRE	5 holes, darkfield observation available, detachable slider
		U-D6BDRE	6 holes, darkfield observation available, detachable slider
	Manual type (Coded type)	U-5RES-ESD	5 holes, support ESD
		U-D6RES	6 holes, detachable slider
		U-D7RES	7 holes, detachable slider
		U-D5BDRES-ESD	5 holes, darkfield observation available, detachable slider, support ESD
		U-D6BDRES-S	6 holes, darkfield observation available, detachable slider, support ESD
	Motorized type	U-D5BDREMC	5 holes, darkfield observation available, detachable slider
U-D6REMC		6 holes, detachable slider	
U-D6BDREMC		6 holes, darkfield observation available, detachable slider, support ESD	
Slider	For differential interference contrast	U-DICR	Standard type
		U-DICRH	High resolution type
		U-DICRHC	High contrast type
	For MIX	U-MIXR	Equipped with LED ring illumination, light control by hand switch

Configuration units	Product name	Specifications
Stage	U-SP	Plain stage
	U-SVRM U-SVLM	Movable range: 52(Y) x 76(X) mm Equipped with handle tension adjustment mechanism
	U-SIC4R2 U-SIC4L2	Movable range: 100(Y) x 105(X) mm Equipped with Y-axis lock mechanism
	U-SIC64	Movable range: Reflected light observation: 100(Y) x 150(X) mm Transmitted light observation: 50(Y) x 100(X) mm Equipped with handle tension adjustment mechanism Equipped with Y-axis lock mechanism
Condenser for transmitted light observation	U-AC2	Numerical aperture: 1.1 Working distance: 0.7 mm (oil immersion)
	U-SC3	Swing-out top lens Numerical aperture: 0.9 (when using the top lens) 0.171 (when swinging out the top lens) Working distance: 2 mm (when using top lens)
	U-POC-2	Swing-out top lens Numerical aperture: 0.9 (when using the top lens) 0.18 (when swinging out the top lens) Working distance : 1.3 mm (when the slide glass thickness is 1.5 mm)
	U-LWCD	Numerical aperture: 0.65 Working distance: 11.6 mm

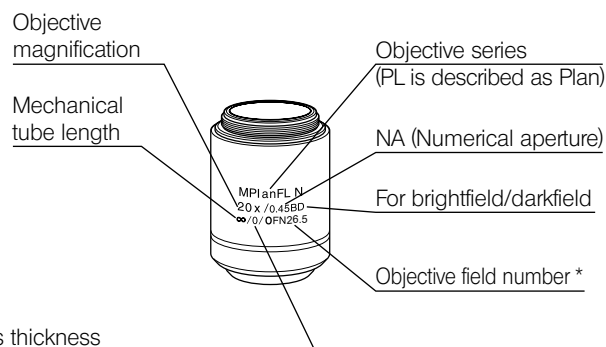
Operating environment
<ul style="list-style-type: none"> <li>• Indoor use</li> <li>• Altitude: Max. 2,000 meters</li> <li>• Ambient temperature: 5 to 40 °C (41 to 104 °F)</li> <li>• Maximum relative humidity: 80% for temperatures up to 31 °C (88 °F) (without condensation) In case of over 31 °C (88 °F), the relative humidity is decreased linearly through 70% at 34 °C (93 °F), 60% at 37 °C (99 °F), and to 50% at 40 °C (104 °F).</li> <li>• Supply voltage fluctuations: Not to exceed ±10% of the normal voltage.</li> <li>• Pollution degree 2 (in accordance with IEC60664-1)</li> <li>• Installation/Overvoltage category : II (in accordance with IEC60664-1)</li> </ul>



# 7 Optical performance list «UIS2 series»

The following table shows the combined optical performance of the eyepiece and the objective. The picture on the right shows the various performances displayed on the objective.

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



Cover glass thickness  
 - : Use either with or without the cover glass  
 0 : Use without the cover glass

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

Observation method by objective

Series name	Magnification	Bright-field	Dark-field	DIC	Polarization	Fluorescence	Infrared
MPLN Plan Achromat	5X/10X/20X/50X/100X	●					
MPLN-BD Plan Achromat for brightfield/darkfield	5X/10X/20X/50X/100X	●	●				
MPLFLN Plan Semi Apochromat	1.25X*1/2.5X*1/5X/10X/20X/40X*2/50X/100X	●		●	●	●	
MPLFLN-BD Plan Semi Apochromat BD	5X/10X/20X/50X/100X/150X	●	●	●	●	●	
MPLFLN-BDP Plan Semi Apochromat for reflected light polarization	5X/10X/20X/50X/100X	●	●	●	●	●	
LMPLFLN Long working distance Plan Semi Apochromat	5X/10X/20X/50X/100X	●		●	●	●	
LMPLFLN-BD Long working distance Plan Semi Apochromat for brightfield/darkfield	5X/10X/20X/50X/100X	●	●	●	●	●	
SLMPLN Long working distance Plan Achromat	20X/50X/100X	●					
PLAPON Plan Apochromat	1.25X/2X	●					
MPLAPON Plan Apochromat	50X/100X	●		●	●		
	100XO2	●			●		
LCPLN-IR Plan Achromat for observation through glass	20X/50X/100X	●					●
LCPLFLN-LCD Long working distance Plan Semi Apochromat	20X/50X/100X	●		●			
PLN-P Polarization Plan Achromat	4X	●			●	●	
ACHN-P Polarization Achromat	10X/20X/40X	●			●	●	
	100XO	●			●	●	
UPLFLN-P Plan Semi Apochromat for polarization	4X	●			●	●	
	10X/20X/40X/	●		●	●	●	
	100XO	●		●	●	●	

\*1 For reflected light brightfield observation

\*2 Not available for reflected light DIC observation.

Basic information by objective

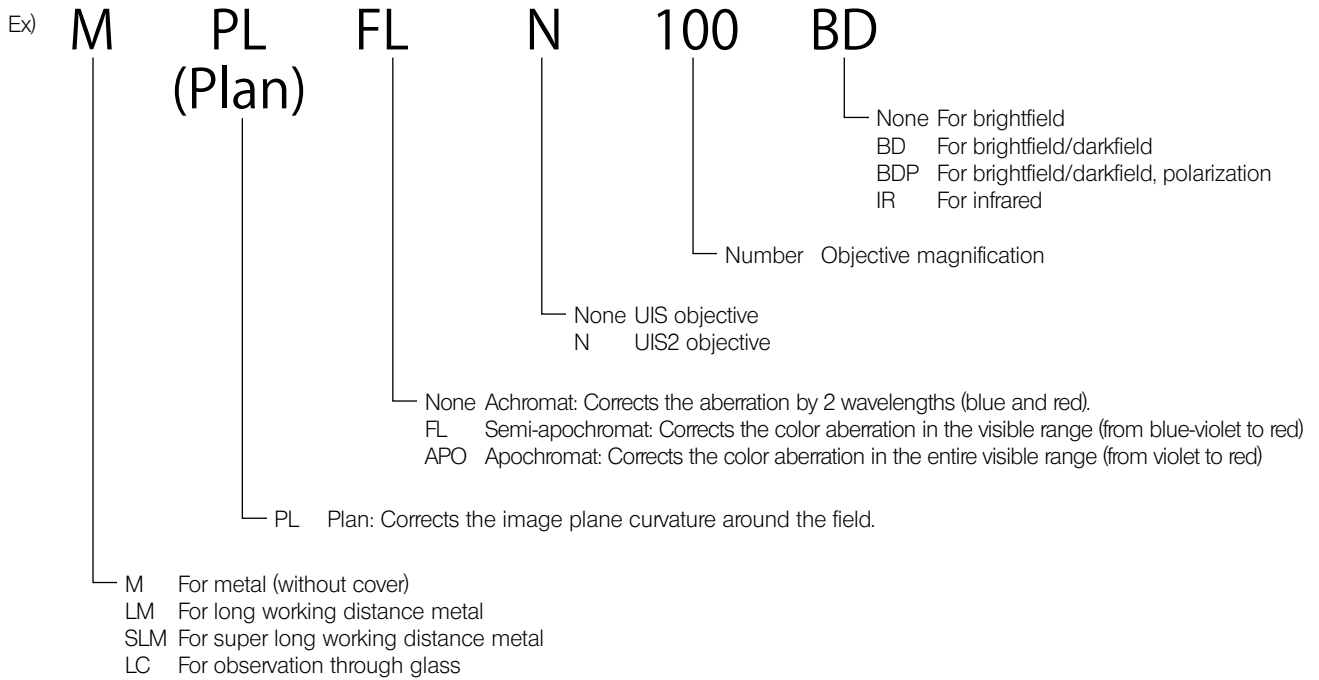
Optical performance		Magnification	Numerical aperture	Working distance (mm)	Cover glass thickness (mm)	Eyepiece				
						WHN10X(FN22)		SWH10X(FN26.5)		
						Series name	Notation	Total magnification	Actual field of view (mm)	Total magnification
UIS series	MPLN Plan Achromat (OFN22) *	MPlanN	5X	0.10	20.0	-	50X	4.4	-	-
			10X	0.25	10.6	-	100X	2.2		
			20X	0.40	1.3	0	200X	1.1		
			50X	0.75	0.38	0	500X	0.44		
			100X	0.90	0.21	0	1000X	0.22		
	MPLN-BD Plan Achromat for brightfield/darkfield (OFN22) *	MPlanN-BD	5X	0.10	12.0	-	50X	4.4	-	-
			10X	0.25	6.5	-	100X	2.2		
			20X	0.40	1.3	0	200X	1.1		
			50X	0.75	0.38	0	500X	0.44		
			100X	0.90	0.21	0	1000X	0.22		
	MPLFLN Plan Semi Apochromat (OFN26.5) * *OFN22 only for 1.25X	MPlanFLN	1.25X	0.04	3.5	-	12.5X	176	-	-
			2.5X	0.08	10.7	-	25X	8.8	25X	10.6
			5X	0.15	20.0	-	50X	4.4	50X	5.3
			10X	0.30	11.0	-	100X	2.2	100X	2.65
			20X	0.45	3.1	0	200X	1.1	200X	1.33
			40X	0.75	0.63	0	400X	0.55	400X	0.67
			50X	0.80	1.0	0	500X	0.44	500X	0.53
			100X	0.90	1.0	0	1000X	0.22	1000X	0.27
	MPLFLN-BD Plan Semi Apochromat for brightfield/darkfield (OFN26.5) *	MPlanFLN-BD	5X	0.15	12.0	-	50X	4.4	50X	5.3
			10X	0.30	6.5	-	100X	2.2	100X	2.65
			20X	0.45	3.0	0	200X	1.1	200X	1.33
			50X	0.80	1.0	0	500X	0.44	500X	0.53
			100X	0.90	1.0	0	1000X	0.22	1000X	0.27
	MPLFLN-BDP Plan Semi Apochromat for reflected light polarization (OFN26.5) *	MPlanFLN-BDP	5X	0.15	12.0	-	50X	4.4	50X	5.3
			10X	0.25	6.5	-	100X	2.2	100X	2.65
			20X	0.40	3.0	0	200X	1.1	200X	1.33
			50X	0.75	1.0	0	500X	0.44	500X	0.53
	LMPLFLN Long working distance Plan Semi Apochromat (OFN26.5) *	LMPlanFLN	5X	0.13	22.5	-	50X	4.4	50X	5.3
10X			0.25	21.0	-	100X	2.2	100X	2.65	
20X			0.40	12.0	0	200X	1.1	200X	1.33	
50X			0.50	10.6	0	500X	0.44	500X	0.53	
100X			0.80	3.4	0	1000X	0.22	1000X	0.27	
LMPLFLN-BD Long working distance Plan Semi Apochromat for brightfield/darkfield (OFN26.5) *	LMPlanFLN-BD	5X	0.13	15.0	-	50X	4.4	50X	5.3	
		10X	0.25	10.0	-	100X	2.2	100X	2.65	
		20X	0.40	12.0	0	200X	1.1	200X	1.33	
		50X	0.50	10.6	0	500X	0.44	500X	0.53	
		100X	0.80	3.3	0	1000X	0.22	1000X	0.27	

Optical performance Series name      Notation		Magnification	Numerical aperture	Working distance (mm)	Cover glass thickness (mm)	Eyepiece				
						WHN10X(FN22)		SWH10X(FN26.5)		
						Total magnification	Actual field of view (mm)	Total magnification	Actual field of view (mm)	
UIS series	SLMPLN Long working distance Plan Achromat (OFN26.5) *	SLMPlanN	20X	0.25	25.0	0	200X	1.1	200X	1.33
			50X	0.35	18.0	0	500X	0.44	500X	0.53
			100X	0.60	7.5	0	1000X	0.22	1000X	0.27
	PLAPON Plan Apochromat	PlanApoN	1.25X	0.04	5.0	-	12.5X	176	12.5	21.2
			2X	0.08	6.2	-	20X	11	20X	13.25
	MPLAPON Plan Apochromat	MPlanApoN	50X	0.95	0.35	0	500X	0.44	500X	0.53
			100X	0.95	0.35	0	1000X	0.22	1000X	0.27
			100XO2*1	1.45	0.1	0	1000X	0.22	1000X	0.27
	LMPLN-IR Long working distance Plan Achromat (OFN22) *	LMPlanN	5X	0.1	23	0	50X	4.4	50X	5.3
			10X	0.3	18	0	100X	2.2	100X	2.65
	LCPLN-IR Plan Achromat for observation through glass (OFN22) *	LCPlanN*2	20X	0.45	8.3	0-1.2	200X	1.1	200X	1.33
			50X	0.65	4.5	0-1.2	500X	0.44	500X	0.53
			100X	0.85	1.2	0-0.7	1000X	0.22	1000X	0.27
	LCPLFLN-LCD Long working distance Plan Semi Apochromat (OFN26.5) *	LCPlanFLN*2	20X	0.45	7.4-8.3	0-1.2	200X	1.1	200X	1.33
			50X	0.70	2.2-3	0-1.2	500X	0.44	500X	0.53
			100X	0.85	0.9-1.2	0-0.7	1000X	0.22	1000X	0.27
	PLN-P Polarization Plan Achromat (OFN22) *	PlanN	4X	0.10	18.5	-	40X	5.5	-	-
	ACHN-P Polarization Achromat (OFN22) *	AchN	10X	0.25	6.0	-	100X	2.2	-	-
			20X	0.40	3.0	0.17	200X	1.1	-	-
			40X	0.65	0.45	0.17	400X	0.55	-	-
100XO*1			1.25	0.13	0.17	1000X	0.22	-	-	
UPLFLN-P Plan Semi Apochromat for polarization (OFN26.5) *	UPlanFLN	4X	0.13	17.0	-	40X	5.5	-	-	
		10X	0.3	10.0	-	100X	2.2	-	-	
		20X	0.5	2.1	0.17	200X	1.1	-	-	
		40X	0.75	0.51	0.17	400X	0.55	-	-	
		100XO*1	1.3	0.20	0.17	1000X	0.22	-	-	

\*1 Oil immersion objective

\*2 Equipped with the correction collar available for aberration correction according to the silicon thickness or the glass thickness.

Abbreviations used for objective



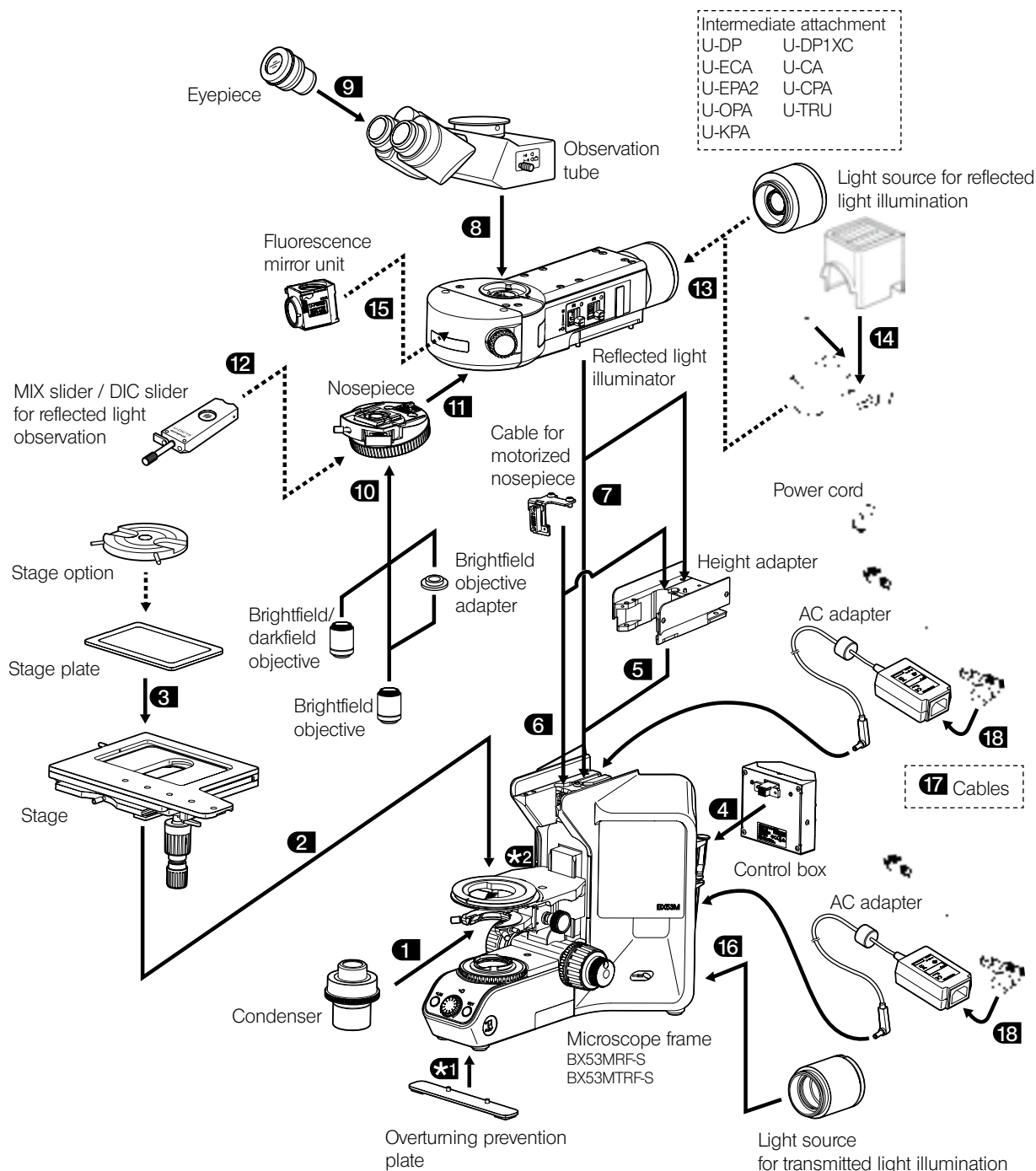
Glossary in optical performance table

- Working distance: Distance between the tip of the objective and the focal position
- Numerical aperture: Important value that determines the performances (resolution, focal depth and brightness) of the objective
  - Resolution • • • Increases in proportion to the numerical aperture.
  - Focal depth • • • Decreases in proportion to the numerical aperture.
  - Brightness • • • Increases in proportion to the square of the numerical aperture. (comparing with the same magnification)
- Resolution: Indicates the limit where the objective can identify two approaching images using the distance between 2 points on the sample surface.
- Focal depth: Indicates the sample depth focused at the same time. The depth increases when the aperture diaphragm is narrowed down and decreases when the numerical aperture of the objective becomes larger.
- Field number: Indicates the diameter of the image area visible by the eyepiece in mm.
- Actual field: Indicates the diameter of the field area on the sample surface in mm.

# 8 Assembly

## 8-1 Assembly diagram

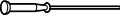


The numbers in the following diagram represent the order to attach each unit.  
 The units shown in the following diagram are typical examples. For combination of units, contact Evident or refer to the latest catalogs. (In order to ensure the performance, ask Evident to attach/detach the units.)



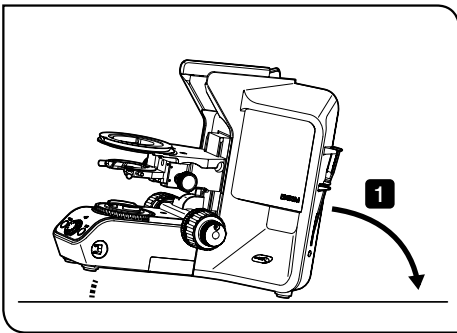
→ : Can be combined.  
 →→ : May not be combined depending on units.

For the polarization observation, refer to the instruction manual provided with the unit.

## 8-2 Assembly procedures

Assemble the units using the Allen screwdriver (opposite side: 3 mm ) and the Allen wrench (opposite side: 4 mm  or 3 mm ) provided with the microscope. Use the Allen screwdriver if not specified.

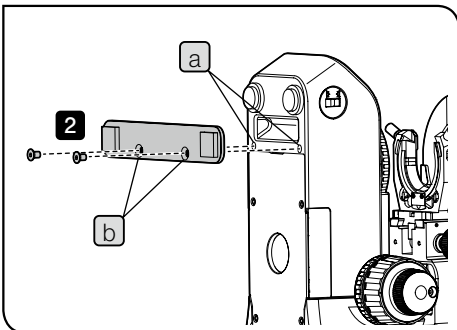
**NOTE** Before attaching units, remove dust and dirt from the attaching area and attach units carefully so as not to scratch them.



### \*1 Attaching the overturning prevention plate

If the height of the microscope is increased by the accessories combined, there is a risk that the microscope may overturn. To prevent the microscope from overturning, the overturning prevention plate must be attached.

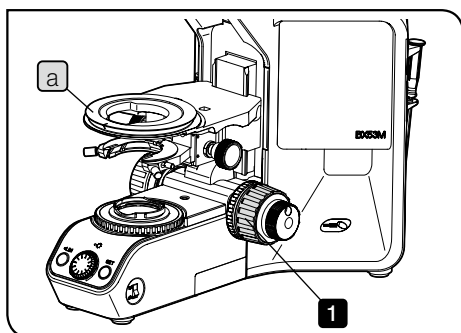
**1** Tilt the microscope frame so that the back of the microscope frame faces down.



**2** Align the screw holes **a** (2 positions) on the bottom of the microscope frame with the mounting holes **b** (2 positions) of the overturning prevention plate, and tighten the provided screws to secure the overturning prevention plate.

If you lost the overturning prevention plate, contact Evident and purchase the following parts.

- Overturning prevention plate (Parts No. AW3640)
- Clamping screw for overturning prevention (Parts No. JA5284)

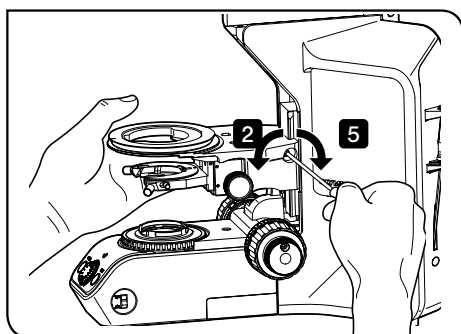


**\*2 Removing the stopper of the stage holder**

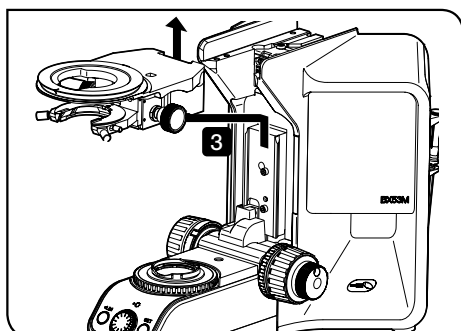
The stage holder mounting position can be lowered by removing the stopper of the stage holder.

**NOTE** Remove the stopper of the stage holder before attaching the stage and the condenser.

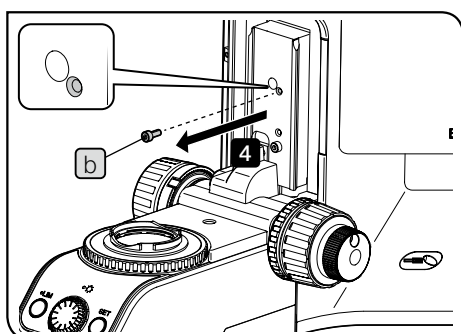
**1** Turn the coarse focusing knob to lower the stage holder **a** sufficiently.



**2** While holding the stage holder, loosen the clamping screw of the stage holder.

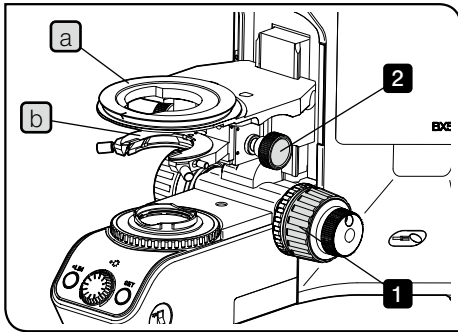


**3** Remove the stage holder.



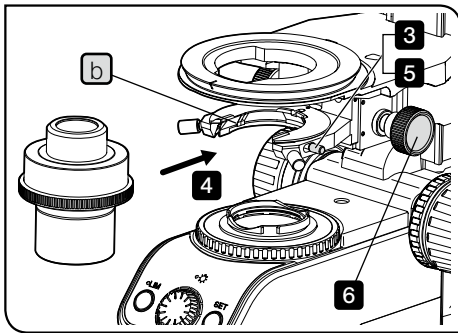
**4** Loosen the screw **b** of the stopper to remove it. Retain the removed screw not to lose it.

**5** Attach the stage holder and tighten the clamping screw at the arbitrary height.



## 1 Attaching the condenser

- 1 Turn the coarse focusing knob to raise the stage holder **a** to the upper limit.
- 2 Turn the condenser height adjustment knob to lower the condenser holder **b** sufficiently.



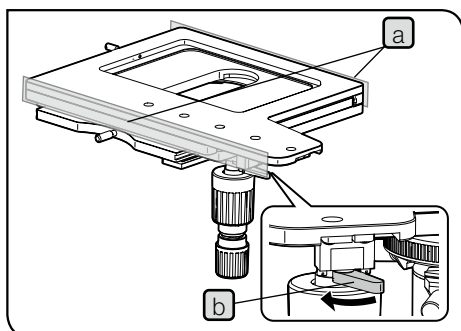
- 3 Loosen the condenser clamping knob sufficiently.
- 4 Insert the condenser along the dovetail of the condenser holder **b** from the front side and push it until it touches the end.

**NOTE** • When using the condenser attached with positioning pin on the back, attach it by pushing in the groove of the condenser holder.

• Before attaching the condenser attached with swing-out top lens, swing out the top lens.

- 5 Tighten the condenser clamping screw.
- 6 Turn the condenser height adjustment knob to raise the condenser holder to the upper limit.

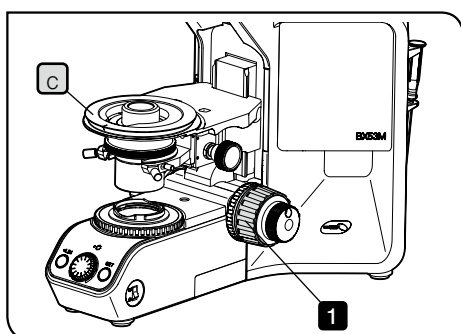




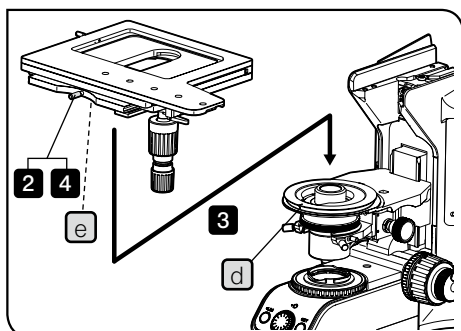
## 2 Attaching the stage

**NOTE** The movable area of the right hand control 150 mm x 100 mm stage (U-SIC64) is fixed by factory default. Perform followings before attaching the stage.

- Remove the tape on the side of the stage **a**.
- Move the Y-axis lock lever **b** in the arrow direction to unlock the lever.



**1** Turn the coarse focusing knob to lower the stage holder **c** sufficiently.



**2** Loosen the stage clamping screw.

**3** Align the stage positioning pin **e** with the groove **d** on the front of the stage holder and fit the stage from above.

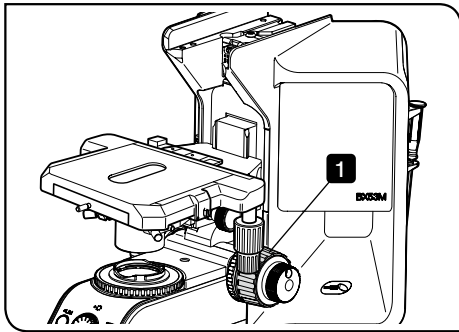
**4** Tighten the stage clamping screw to secure the stage.

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

4x4 inch stage (U-SIC4R2/U-SIC4L2)	Attach the stage so that the knob comes to the front.
Stage with coaxial knobs on the bottom right (left) (U-SVRM/U-SVLM)	Attach the fine focusing knob of the focusing section at the opposite positions of the stage knob.

This picture shows the procedure to attach the right hand control 150 mm x 100 mm stage (U-SIC64). The same procedure also applies when attaching other stages.

**NOTE** When replacing the stage, remove the objective together with the nosepiece in advance.



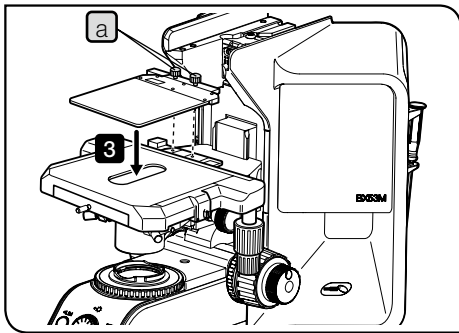
### 3 Attaching the stage plate / holder plate

#### Attaching U-HRD, U-HRDT, U-HLD, U-HLDT or U-MSSP

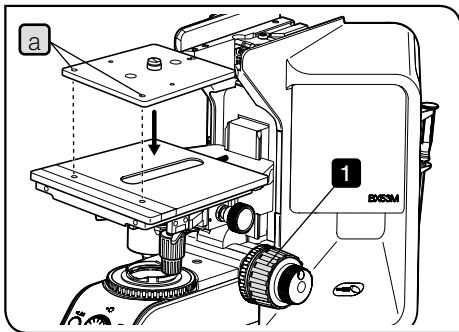
Following units can be attached to the stage with coaxial knobs on the bottom right (U-SVRM) and the stage with coaxial knobs on the bottom left (U-SVLM).

- Right-hand thin specimen holder (U-HRD)
- Right-hand thick specimen holder (U-HRDT)
- Left-hand thin specimen holder (U-HLD)
- Left-hand thick specimen holder (U-HLDT)
- Stage plate for use with U-SVRM (U-MSSP)

**NOTE** The bend prevention pins (2 pcs.) are attached to the stage plate (U-MSSP) as factory defaults. Remove them before attaching the plate.



- 1 Turn the coarse focusing knob to lower the stage sufficiently.
- 2 Loosen the screw **a** (2 positions) of the stage plate.
- 3 Combine the stage plate or the holder plate to the stage, and tighten the screws **a** (2 positions).



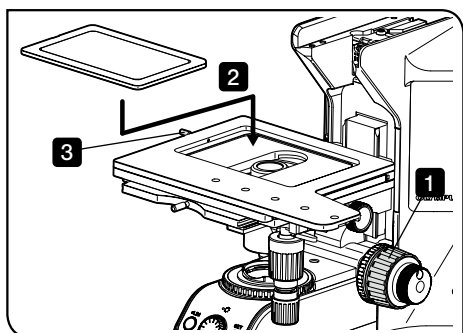
#### Attaching U-WHP2, U-MSSPG or U-MSSP4

Following units can be attached to the 4x4 inch stage (U-SIC4R2/U-SIC4L2).

- Wafer holder (U-WHP2)
- Stage glass plate for use with U-SIC4R/L2 (U-MSSPG)
- Stage plate for use with U-SIC4R/L2 (U-MSSP4)

**NOTE** The bend prevention pins (2 pcs.) are attached to the stage plate (U-MSSP4) and the stage glass plate (U-MSSPG) as factory defaults. Remove them before attaching the plate.

- 1 Turn the coarse focusing knob to lower the stage sufficiently.
- 2 Combine the stage plate or the holder plate to the stage, and tighten the screws **a** (2 positions).

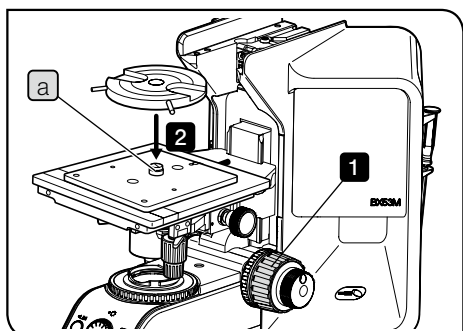


Attaching U-WHP64, U-SPG64 or U-SP64

Following units can be attached to the right hand control 150 mm x 100 mm stage (U-SIC64).

- Wafer holder plate (U-WHP64)
- Stage glass plate (U-SPG64)
- Stage plate (U-SP64)

- 1** Turn the coarse focusing knob to lower the stage sufficiently.
- 2** Fit the stage plate or the holder plate in the concave area in the center of the stage.
- 3** Tighten the clamping knob on the left side of the stage to secure the stage plate.



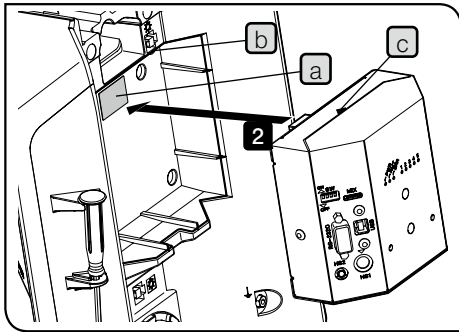
Attaching BH2-WHR43, BH2-WHR54 or BH2-WHR65

Following units can be attached to the wafer holder (U-WHP2) and the wafer holder plate (U-WHP64).

- Rotary wafer holder (BH2-WHR43)
- Rotary wafer holder (BH2-WHR54)
- Rotary wafer holder (BH2-WHR65)

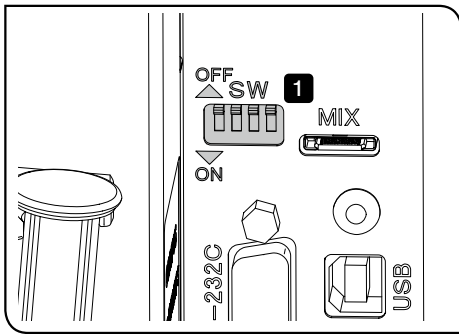
- 1** Turn the coarse focusing knob to lower the stage sufficiently.
- 2** Place the wafer holder on the wafer holder plate.

**TIP** When attaching the rotary wafer holder (BH2-WHR65) to the wafer holder plate (U-WHP64), remove the axis part **a** of the wafer holder plate using the commercially-available flathead screwdriver and put it in the screw hole on the front side.



#### 4 Attaching the control box

- 1 Remove the sticker (a) of the connector on the back of the microscope frame.
- 2 Insert the control box (BX3M-CB) by aligning with the attaching section (b) on the back of the microscope frame. And push in the control box until the ▲ mark (c) is hidden in the attaching section (b).



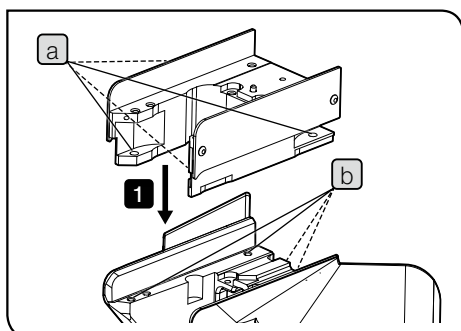
#### Setting the dip switch

This setting is necessary when combining the motorized nosepiece or the hand switch for motorized nosepiece (BX3M-HSRE) to the microscope.


- 1 Set the dip switch on the side of the control box (BX3M-CB).

: Factory default setting

Function/Unit					Setting
	1	2	3	4	
Beep	OFF				The beep sound is heard.
	ON				The beep sound is not heard.
Motorized nosepiece		OFF			5 holes
		ON			6 holes
Hand switch for motorized nosepiece (BX3M-HSRE)			OFF		When the right button is pressed, the nosepiece rotates counterclockwise.
			ON		When the right button is pressed, the nosepiece rotates clockwise.
Reserved by maker				OFF	This switch should be always kept OFF.
				ON	



## 5 Attaching the height adapter

Use the dedicated Allen wrench (  ) provided with the height adapter to attach the height adapter.

- 1** Align the mounting screw holes **a** (4 positions) of the height adapter with the mounting screw holes **b** of the microscope frame, and insert the provided mounting screws **c** (4 positions).
- 2** Depending on the case **A** or **B** described below (differs depending on the objective you use), while pushing the height adapter to the microscope frame, tighten the mounting screws **c** (4 positions) to secure the height adapter.

**A** When the following objective is not used:

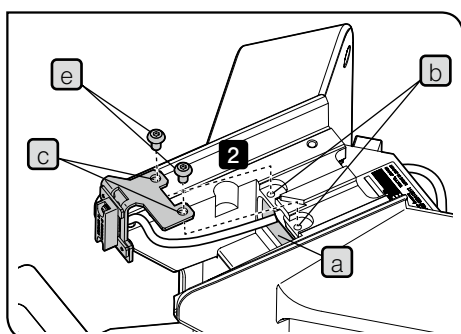
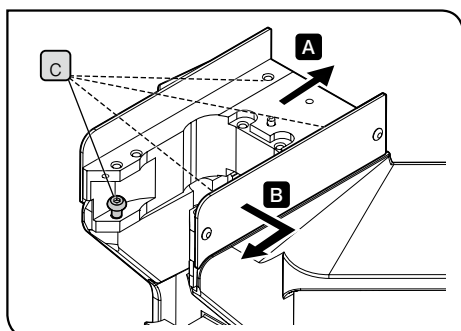
Push the height adapter to the back side.

**B** When the following objective is used:

Push the height adapter to the front right side.

Applicable objectives:

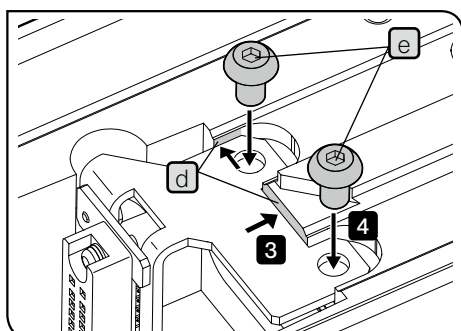
MPLN50XBD, MPLN100XBD,  
MPLFLN50XBD, MPLFLN100XBD, MPLFLN150XBD,  
MPLFLN50XBDP, MPLFLN100XBDP



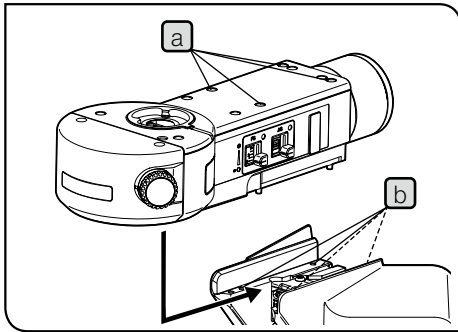
## 6 Attaching the cable for motorized nosepiece

The cable for the motorized nosepiece (BX3M-RMCBL) must be attached when combining the motorized nosepiece to the microscope.

- 1** Put the cable for the motorized nosepiece through the cable hole **a** on the top of the microscope frame and put it out to the back of the microscope frame.
- 2** Align the mounting holes **c** (2 positions) of the cable for the motorized nosepiece with the screw holes **b** (2 positions) on the top of the microscope frame.
- 3** While pushing the metal plate of the cable for the motorized nosepiece to **d** positions (2 positions), tighten the provided screw **e** to secure the metal plate.
- 4** Connect the cable that comes out to the back of the microscope frame in **1** to the connector of the control box (BX3M-CB). For details, see Cable connections (page 113).




This picture shows the procedure to attach the cable for motorized nosepiece to the microscope frame. The same procedure applies when attaching it to the height adapter.



This picture shows the procedure to attach BX3M-RLAS-S. The same procedure applies when attaching other reflected light illuminators.

This picture shows the procedure to attach the reflected light illuminator to the microscope frame. The same procedure applies when attaching it to the height adapter.

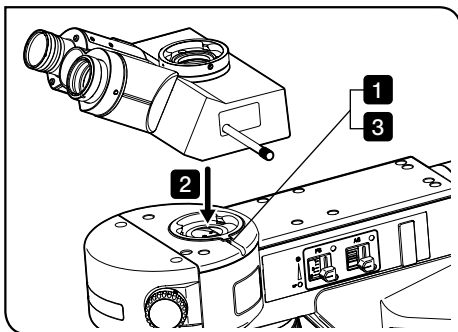
## 7 Attaching the reflected light illuminator

Use the dedicated Allen wrench (  ) provided with the reflected light illuminator to attach the reflected light illuminator.

- 1 Without aligning the mounting screws **a** (4 positions) of the reflected light illuminator with the mounting screw holes **b** of the microscope frame at first, place the reflected light illuminator on the slightly front position.
- 2 Then, push the reflected light illuminator backward to the end. This is the correct attaching position.
- 3 While pushing the reflected light illuminator backward to the end, tighten the mounting screws **a** (4 positions) using the dedicated Allen wrench to secure the illuminator.
- 4 Attach the caps (4 positions) of the mounting screws provided with the reflected light illuminator to the **a** position.

**NOTE** The cable comes out from the back of the coded reflected light illuminator (BX3M-RLAS-S, BX3M-URAS-S). Be careful not to put the cable between the illuminator and the microscope frame.

**TIP** Use the tweezers, etc when removing the caps of the screws attached to the reflected light illuminator.



This picture shows the procedure to attach the trinocular tube (U-TR30-2). The same procedure applies when attaching other observation tubes.

## 8 Attaching the observation tube

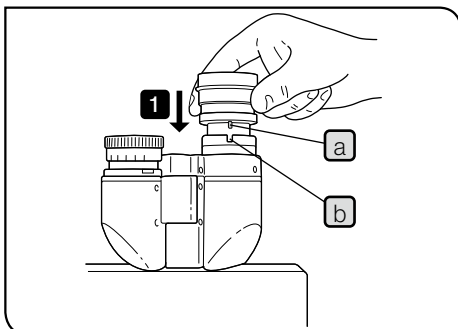
- 1 Loosen the observation tube clamping screw of the observation tube attaching portion using the Allen screwdriver.
- 2 Fit the circular dovetail of the observation tube into the observation tube attaching portion so that the scale numbers of the interpupillary distance displayed on the observation tube face to the front.
- 3 Tighten the observation tube clamping screw to secure the observation tube.

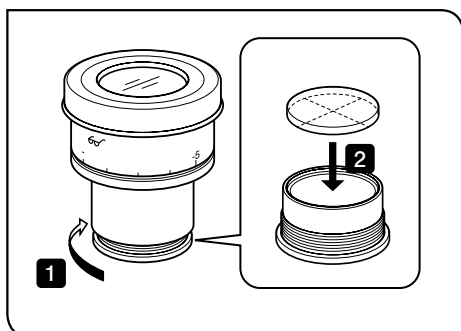
## 9 Attaching the eyepiece

- 1 Insert the eyepiece until it touches the eyepiece sleeve.

**NOTE** • When using the eyepiece equipped with the micrometer, insert the eyepiece into the right eyepiece sleeve. In this case, attach the eyepiece so that the eyepiece positioning pin **a** enters the groove **b** below the eyepiece sleeve.

• The super widefield observation tube is equipped with positioning grooves on both eyepiece sleeves. Be sure to attach the eyepieces by aligning both eyepiece positioning pins with the grooves.





Attaching the eyepiece micrometer

The eyepiece micrometer can be attached to WHN10x-H.  
Purchase the micrometer with the size Ø24 mm and thickness 1.5 mm.

- 1 Remove the built-in micrometer frame from the eyepiece by rotating it in the arrow direction.

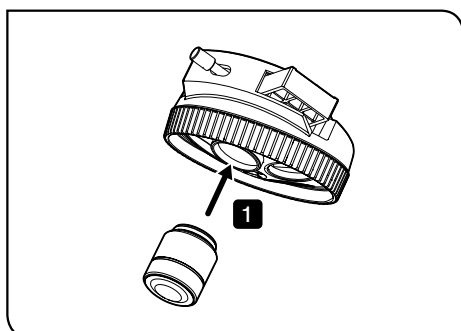
**TIP** Depending on the case, the micrometer frame may be tightened too firmly and it cannot be rotated. If you grab the micrometer frame too firmly, it will be deformed and cannot be turned furthermore. Grab around the micrometer frame lightly with the equal force to turn it or push it to the rubber sheet placed on the desk and turn to remove it.

- 2 Insert the micrometer into the micrometer frame with the display surface of the micrometer facing down.

- 3 Put the micrometer frame back to the eyepiece.

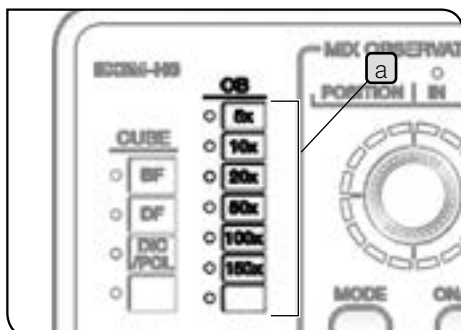
**NOTE** • Be careful not to touch the lens with your fingers during working.

• Do not tighten the micrometer frame with excessive force.



10 Attaching the objective

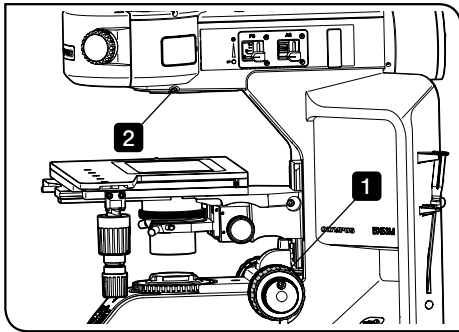
- 1 Attach the objectives by screwing them into the nosepiece mounting holes.



When the motorized or coded nosepiece and the hand switch are combined

Attach the magnet sheet corresponding to the objectives attached in **1** to the OB indicator display pocket **a** of the hand switch (BX3M-HS).

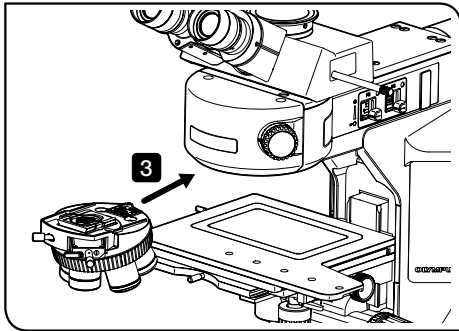
The magnet sheet is provided with the hand switch (BX3M-HS).



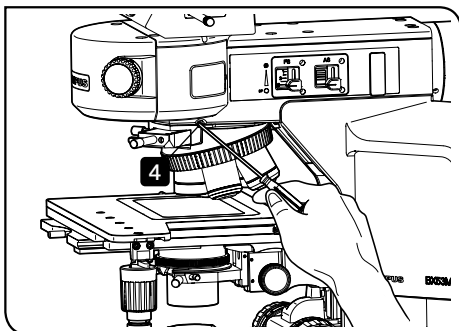
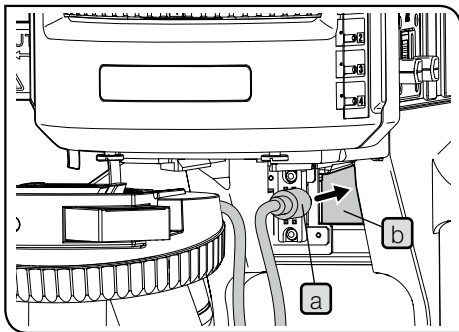
## 11 Attaching the nosepiece

- 1 Turn the coarse focusing knob to lower the stage sufficiently.
- 2 Loosen the nosepiece clamping screw using the Allen screwdriver.

**NOTE** Be careful, if the clamping screw is loosened too much, it may be come off.



- 3 Insert the nosepiece from the front side along the nosepiece mounting dovetail of the reflected light illuminator, and push it until it touches the end. When attaching the coded nosepiece, put the cable **a** for the nosepiece through the cable hole **b** on the top of the microscope frame, and put it out to the back of the microscope frame.



- 4 Hold the Allen screwdriver between the pointing finger and the thumb, and tighten the nosepiece clamping screw to secure the nosepiece.



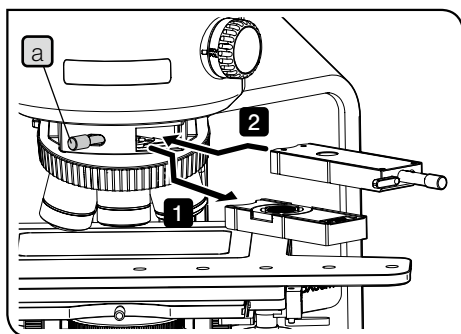
Attaching the coded nosepiece

- 5 Connect the cable that comes out to the back of the microscope frame in 3 to the connector of the control box (BX3M-CB). For details, see "Cable connections" (page 113).

- NOTE**
- When attaching or detaching the nosepiece attached with the cable, be sure to remove the cable from the connector in advance.
  - If you want to change the nosepiece to the motorized nosepiece when using the system combined with the manual nosepiece, remove the reflected light illuminator together when removing the manual nosepiece. In order to combine the motorized nosepiece, the cable for motorized nosepiece (BX3M-RMCBL) must be attached before attaching the reflected light illuminator. For details, see "Attaching the cable for motorized nosepiece" (page 99).

Attaching the motorized nosepiece

- 5 Set the number of objective mounting holes of the nosepiece using the dip switch on the side of the control box (BX3M-CB). For details, see "Attaching the control box" (page 98).



12 Attaching the MIX slider / DIC slider for reflected light observation

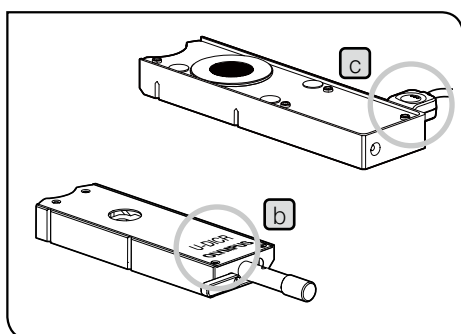
- 1 Loosen the mounting knob a on the front of the nosepiece and pull out the dummy slider.
- 2 Insert the DIC slider for reflected light observation or the MIX slider for reflected light observation into the slider insertion slot of the nosepiece by paying attention to the orientation of the slider, and stop inserting at the first level (when the clicking sound is heard at first).

Orientation of the slider when inserting

DIC slider for reflected light observation: Set the display surface facing up. b

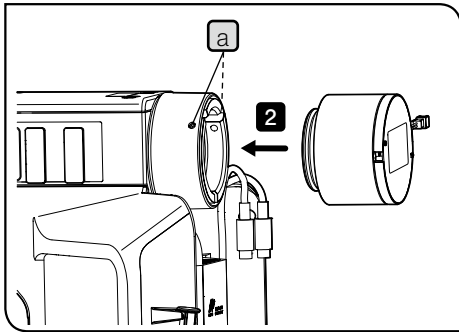
MIX slider for reflected light observation: Set the connector to the right side. c

- 3 Tighten the mounting knob a to secure the slider.



When the MIX slider for reflected light observation is attached

- 4 Connect the cable to the connector of the control box (BX3M-CB). For details, see Cable connections (page 113).



This picture shows the procedure to attach the reflected LED lamp housing (BX3M-LEDR). The same procedure applies when attaching other light sources.

## 13 Attaching the light source for reflected light illumination

The light source for reflected light illumination must be attached when the reflected light illuminator (BX3M-URAS-S or BX3M-RLA-S) is combined with the microscope.

If you want to attach the reflected LED lamp housing, the mercury lamp housing (during darkfield observation), and the double lamp housing adapter (U-DULHA) when BX3M-URAS-S is combined, the DF converter (U-RCV) must be attached.

- 1 Loosen the mounting screws **a** (2 positions) of the reflected light illuminator using the Allen screwdriver.

**NOTE** Be careful, if the mounting screw is loosened too much, it may be come off.

- 2 Insert the light source for reflected light illumination or the liquid light guide adapter into the light source mounting hole of the reflected light illuminator until it touches the end.

**NOTE** • When attaching the reflected LED lamp housing (BX3M-LEDR), attach it so that the cable for the reflected LED lamp housing comes to the right side when looking from the back of the microscope frame.

- When attaching the halogen lamp housing or the mercury lamp housing, attach it so that the radiation fin faces up.



**CAUTION** Do not light the mercury burner when the lamp housing is not attached to the microscope because the UV rays in its light are harmful to your eyes.

- 3 Tighten the mounting screws **a** (2 positions) of the reflected light illuminator using the Allen screwdriver.

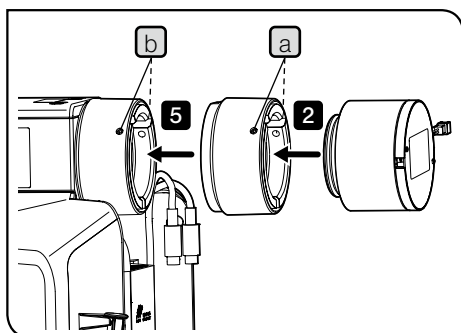
- 4 If the reflected LED lamp housing is attached, connect the cable to the connector on the back of the microscope frame. For details, see "Cable connections" (page 113).

If the halogen lamp housing is attached, connect the cable to the power supply (TH4).

If the mercury lamp housing is attached, connect the cable to the power supply (U-RFL-T).

For connections of following units, refer to the instruction manual provided with the respective unit.

- Cable connection of the halogen lamp housing
- Cable connection of the mercury lamp housing
- Connection of the LED and LDP light source (U-LGPS) and the liquid light guide, etc.



This picture shows the procedure to attach the reflected LED lamp housing (BX3M-LEDR). The same procedure applies when attaching the mercury lamp housing.

Attaching the reflected LED lamp housing or the mercury lamp housing (during darkfield observation) to BX3M-URAS-S

- 1 Loosen the mounting screws **a** (2 positions) of the DF converter (U-RCV) using the Allen screwdriver.

**NOTE** Be careful, if the mounting screw is loosened too much, it may be come off.

- 2 Insert the light source for reflected light illumination into the light source mounting hole of the DF converter until it touches the end.

- 3 Tighten the mounting screws **a** (2 positions) of the DF converter using the Allen screwdriver.

- 4 Loosen the mounting screws **b** (2 positions) of the reflected light illuminator using the Allen screwdriver.

- 5 Insert the light source for reflected light illumination attached with the DF converter into the light source mounting hole of the reflected light illuminator until it touches the end.

**NOTE** • When attaching the reflected LED lamp housing (BX3M-LEDR), attach it so that the cable for the reflected LED lamp housing comes to the right side when looking from the back of the microscope frame.

• When attaching the mercury lamp housing, attach it so that the radiation fin faces up.

- 6 Tighten the mounting screws **b** (2 positions) of the reflected light illuminator using the Allen screwdriver.

- 7 If the reflected LED lamp housing is attached, connect the cable to the connector on the back of the microscope frame. For details, see "Cable connections" (page 113).

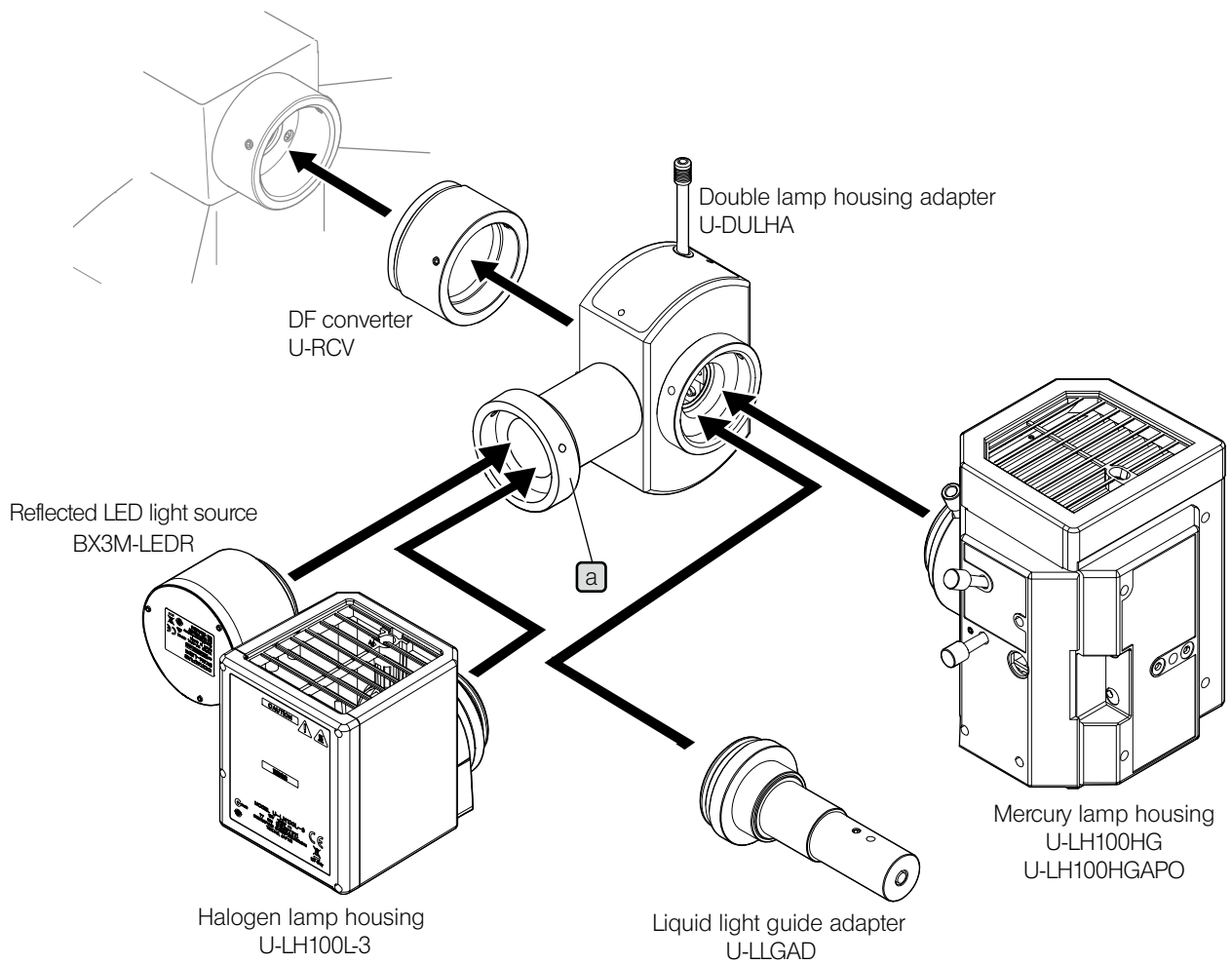
If the mercury lamp housing is attached, connect the cable to the power supply (U-RFL-T).

For the cable connection of the mercury lamp housing, refer to the instruction manual provided with the unit.

Attaching two lamp housings

**NOTE** • The attachable lamp housings or adapters are restricted in combinations, orders and directions. Attach them as shown in the picture below.

• Attach the double lamp housing adapter (U-DULHA) so that the **a** part shown in the following picture comes to the left side horizontally when facing to the back side of the microscope frame.

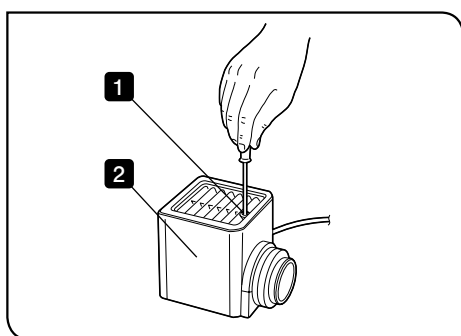


## 14 Attaching the lamp

**NOTE** When replacing the lamp, set the main switch of the power supply to **○** (OFF) and wait until the lamp housing and the lamp are sufficiently cooled down.

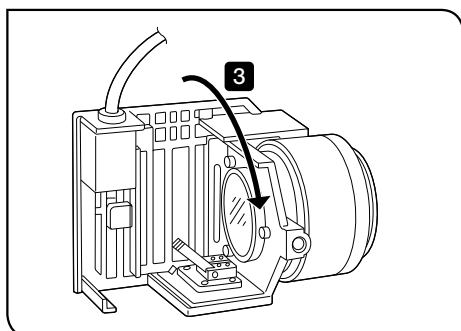
### Attaching the halogen bulb

Applicable bulb	12V100WHAL-L (made by PHILIPS Co. 77241) 12V100WHAL (made by PHILIPS Co. 7023)
-----------------	---



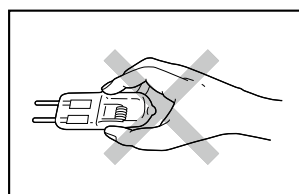
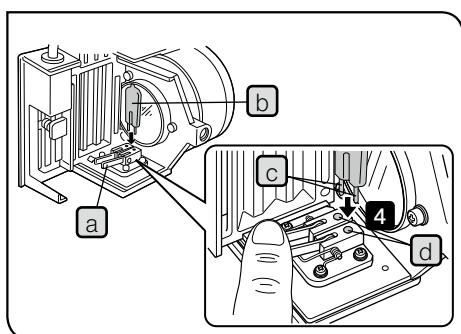
**1** Loosen the clamping screw on the top of the lamp housing using the Allen screwdriver.

**2** Raise the lamp housing and remove it.

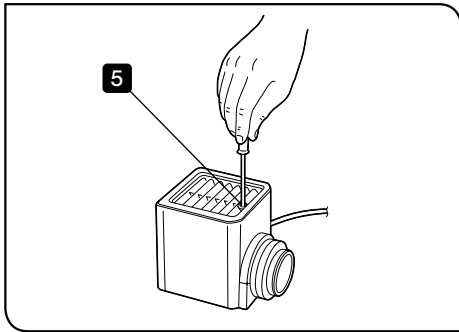


**3** Tilt the lamp socket in the arrow direction by 90°.

**4** While pressing down the bulb fixing lever **a**, hold the halogen bulb **b** wrapped with gauze, etc. and insert the terminal **c** until it touches the pin position **d**. Place the bulb fixing lever **a** carefully to the original position to secure the bulb.



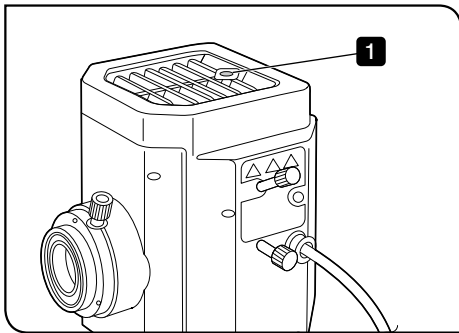
**NOTE** Be careful not to touch the bulb directly with your hand and avoid leaving fingerprints or stains on the lamp. Otherwise, the bulb may be exploded due to glass distortion caused by the stains. If fingerprints or stains are attached to the bulb, clean it by wiping gently with a piece of cleaning paper slightly moistened with absolute alcohol.



- 5** Fit the halogen lamp housing from the above and while pressing down the fixing screw, tighten it with the Allen screwdriver.

**CAUTION**

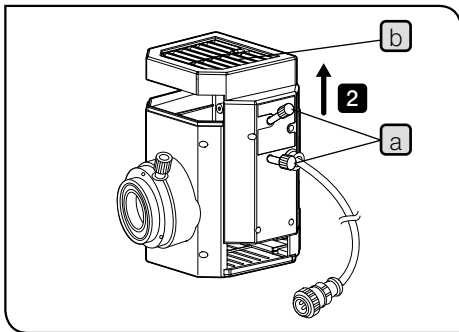
**Cautions when replacing the bulb during observation:**  
 The bulb, the lamp housing and areas around the lamp housing are extremely hot during and right after use. Set the main switch to **○(OFF)** and disconnect the power cord. Wait until the bulb, the lamp housing and areas around the lamp housing are sufficiently cooled down and replace the old bulb with the applicable bulb.



Attaching the mercury burner

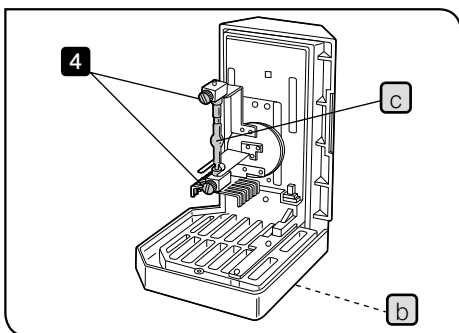
Applicable burner	USH-103OL (made by Ushio Inc.)
-------------------	--------------------------------

- 1** Loosen the clamping screw on the top of the lamp housing using the Allen screwdriver.



- 2** Hold the upper section of the lamp housing and pull it upward to remove the socket part.

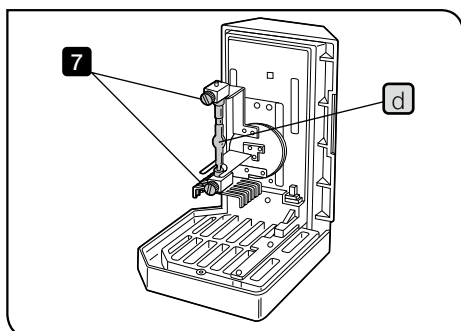
**NOTE** To prevent malfunctions, do not hold the lamp housing by the centering knobs **a**.



- 3** Place the socket part so that the radiation fin **b** faces down.
- 4** Loosen the lamp clamping screws (2 pcs.) of the socket part.
- 5** Hold the mercury burner **c** attached and remove the lower side from the mount first and then remove the upper side.

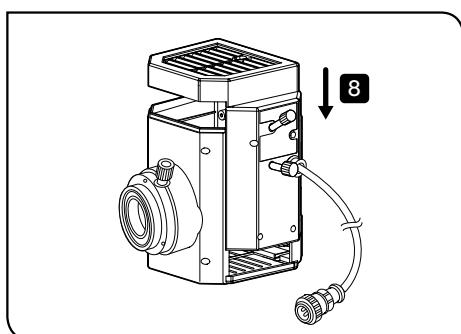
**TIP** The socket part is attached with either one of followings:

- Dummy burner for transportation (factory default)
- Old burner (to be replaced)

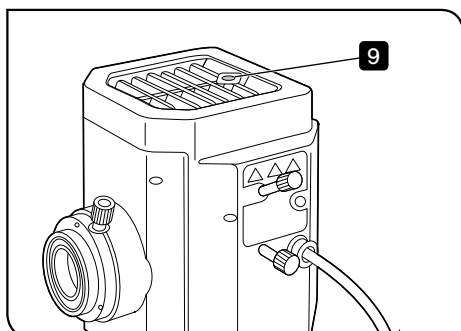


- 6** Hold the new mercury burner wrapped with gauze, etc. and attach the + (positive) pole of the mercury burner **d** to the fixed mount on the upper side, then attach the - (negative) pole to the mount on the lower side.

**NOTE** Be careful not to touch the burner directly with your hand and avoid leaving fingerprints or stains on the lamp. Otherwise, the burner may be exploded due to the glass distortion caused by the stains. If fingerprints or stains are attached to the burner, clean it by wiping gently with a piece of cleaning paper slightly moistened with absolute alcohol.



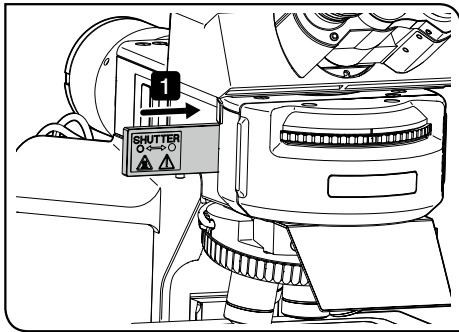
- 7** Tighten the burner clamping screws (2 pcs.) of the socket part.
- 8** Align the external surfaces of the lamp housing with those on the socket part, push the lamp housing straight downward and place the socket part to the original position.



- 9** Tighten the clamping screw using the Allen screwdriver.
- 10** Set the life counter of the power supply for mercury burner (U-RFL-T) to "0.0". For details, refer to the instruction manual provided with the unit.

Lamp service life

USH-1030L: 300 hours  
 This value assumes the light cycles composed of 2 hours of lighting and 30 minutes of extinction. Turning ON and OFF with the cycle shorter than this will seriously shorten the service life of the lamp.

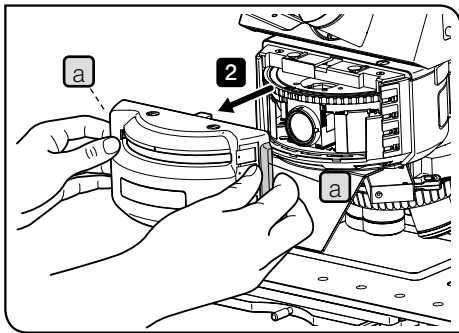


## 15 Attaching the fluorescence mirror unit

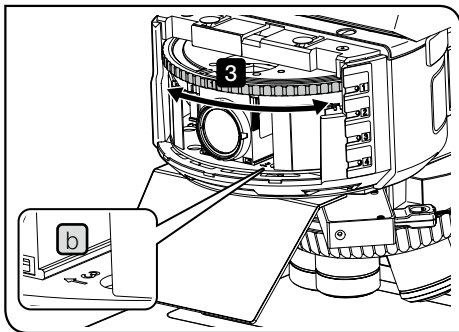
The fluorescence mirror unit must be attached when the coded universal reflected light illuminator (BX3M-URAS-S) is combined with the microscope.

**NOTE** When attaching the fluorescence mirror unit, be sure to engage the shutter in the light path for safety purpose.

**1** Engage the shutter in the light path.

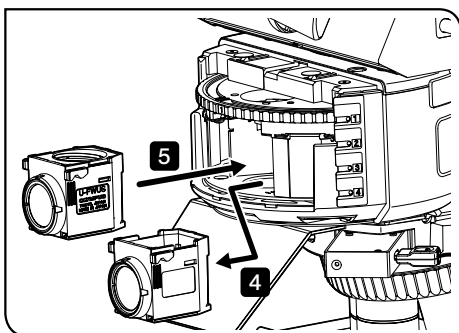


**2** Hold the both sides of the cover **a** on the front of the illuminator lightly and pull it to the front side.



**3** Turn the turret until the position number **b** of the fluorescence mirror unit to be replaced comes to the front side, and stop it when the clicking sound is heard.

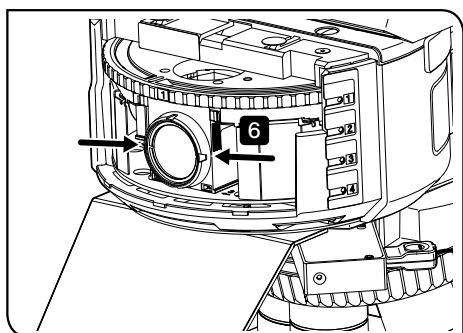
**CAUTION** Be careful not to allow your fingers being caught.



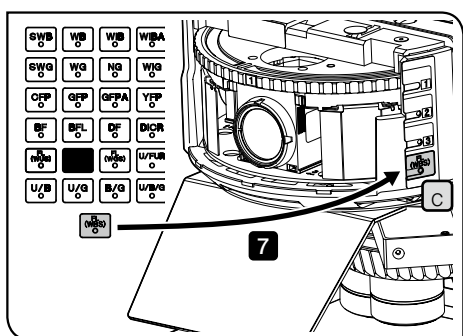
**4** Hold the side of the fluorescence mirror unit to be replaced, and pull it to the front side to remove it.

**5** Insert the new fluorescence mirror unit in the position where the old fluorescence mirror unit was removed until it touches the end.

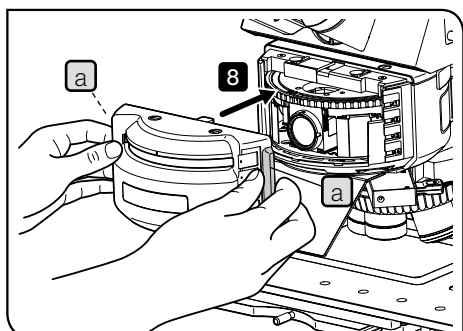




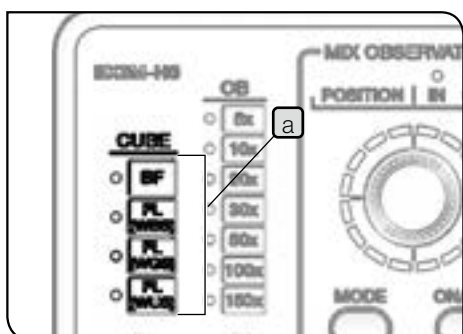
**6** Hold the both sides of the inserted fluorescence mirror unit between the thumb and the pointing finger, and swing it from side to side lightly to confirm that the fluorescence mirror unit is secured firmly. Without this operation, the fluorescence mirror unit may be attached being tilted.



**7** Insert the indicator sheet corresponding to the fluorescence mirror unit which was inserted in **5** in the inscription pocket **c**. The indicator sheet is provided with BX3M-URAS-S.

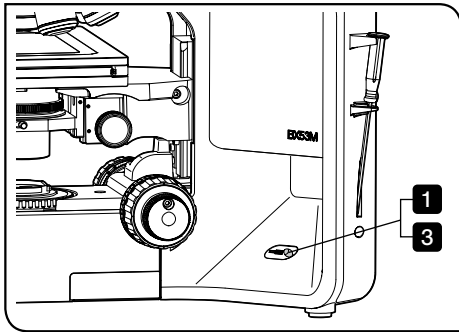


**8** Hold the knob **a** of the cover and close the cover.



When the hand switch is combined

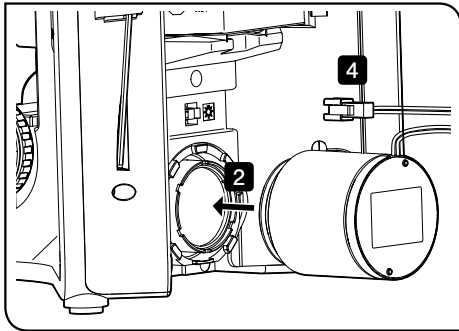
Attach the magnet sheet corresponding to the fluorescence mirror unit which was inserted in **5** to the CUBE indicator display pocket **a** of the hand switch (BX3M-HS). The magnet sheet is provided with the hand switch (BX3M-HS).



## 16 Attaching the light source for transmitted light illumination

- 1 Loosen the mounting screw on the right side of the microscope frame using the Allen screwdriver.

**NOTE** Be careful, if the mounting screw is loosened too much, it may be come off.

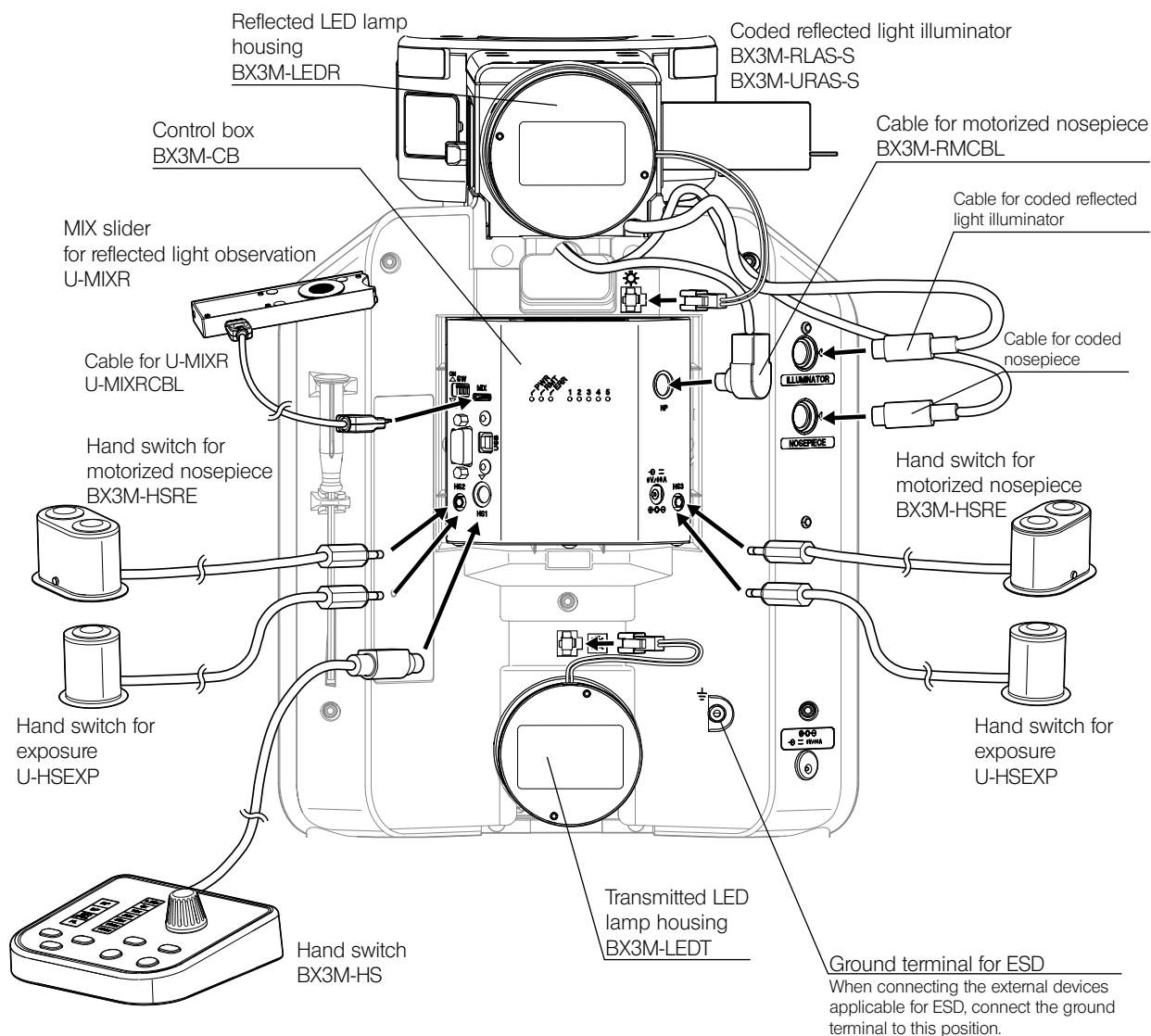


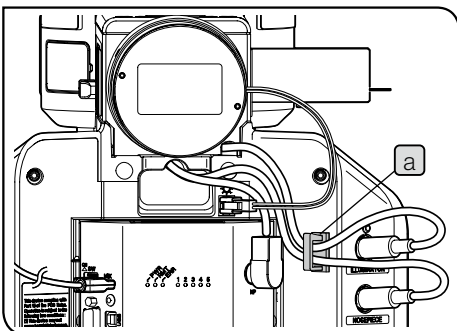
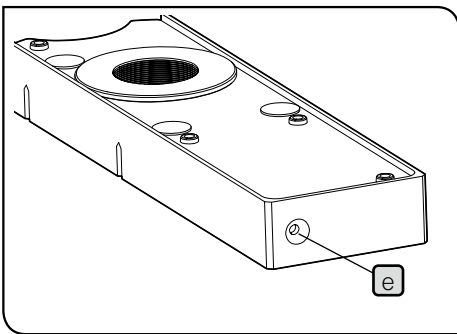
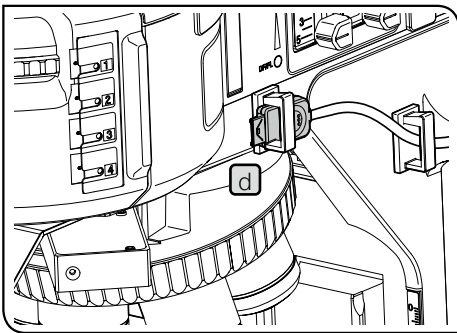
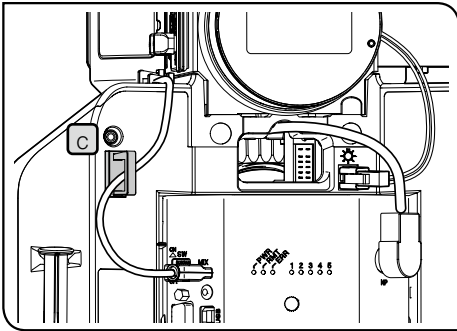
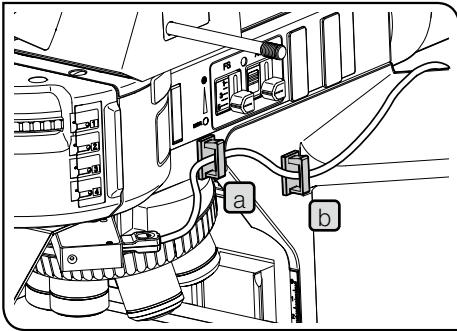
- 2 Insert the transmitted LED lamp housing in the light source mounting hole until it touches the end.
- 3 Tighten the mounting screw using the Allen screwdriver.
- 4 Connect the cable for the transmitted LED lamp housing to the connector on the back of the microscope frame. For details, see Cable connections (page 113).

**17** Cable connections

**NOTE** • Before connecting or disconnecting cables, set the main switch to **○(OFF)** and unplug the power cord from the outlet.

- This product contains the motorized parts. For the safety purpose, connect the power cord plug last.
- Cables are vulnerable when bent or twisted. Never subject them to excessive force.
- Be sure to connect only cables specified by Evident to the connectors. Connect the connectors in the correct orientation paying attention to the shape of the connector. If the connector is attached with clamping screws, be sure to tighten them.





Layout of the cable for U-MIXR

- 1 Attach the cable holder at 2 positions (a, b) on the right side and 1 position (c) on the back of the microscope respectively.

**TIP** The cable holders are provided with the cable for U-MIXR (U-MIXRCBL).

- 2 Open the cable holders (a, b) and (c), put the cable for MIX slider for reflected light observation (U-MIXR) into the cable holders, and close the cable holders.

The cable holders (3 pcs.) are provided with the cable for U-MIXR (U-MIXRCBL).

**TIP** If you disconnect the connector from the MIX slider for reflected light observation, store the cable in the cable holder as shown in (d).  
When the connector is disconnected, the indicator (e) of the MIX slider for reflected light observation turns OFF.

Indicator of MIX slider for reflected light observation	
When the connector is connected	Turns ON
When the connector is not connected	Turns OFF

Layout of the cable for coded reflected light illuminator and the cable for coded nosepiece

- 1 Attach the cable holder at 1 position (a) on the right side of the back of the microscope.

- 2 Open the cable holder (a), insert the cable for coded reflected light illuminator and the cable for coded nosepiece into the cable holder, and close the cable holder.

## 18 Connecting the AC adapter and the power cord

With this system, the AC adapter and the power cord must be connected to 2 locations: microscope frame and control box (BX3M-CB).

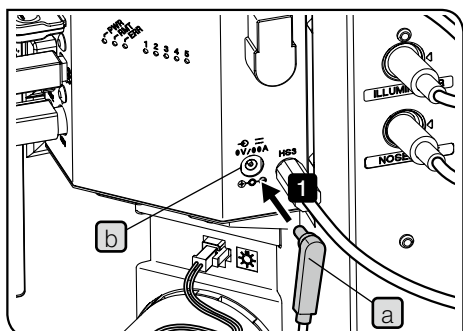
### CAUTION

- Always use the power cord provided by Evident. If the proper power cords are not used, the electric safety and the EMC (Electro-Magnetic Compatibility) performance of the product can not be assured. 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.
- Set the main switch of the microscope frame to **○** (OFF) and connect the power cord.
- Connect the power cord plug to the grounded triplex outlet. If the outlet is not grounded, the electric safety performance intended by Evident cannot be assured.
- If the power cords contact a hot area of products such as a lamp housing, etc., they could melt and cause electric shock. Be sure to place the power cords sufficiently apart from the hot area of the product.

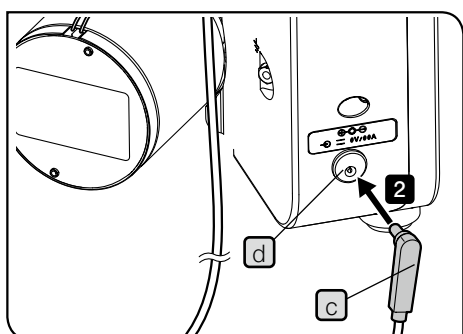
### NOTE

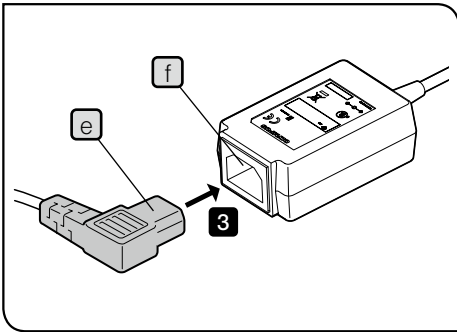
- Cables are vulnerable when bent or twisted. Never subject them to excessive force.
- When inserting or removing the AC adapter plug, hold the **a** and **c** parts and insert straightly.

- 1** Insert the AC adapter plug **a** firmly in the AC adapter jack **b** of the control box (BX3M-CB).

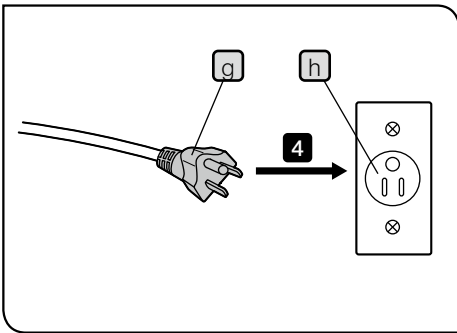


- 2** Insert the different AC adapter plug **c** firmly in the AC adapter jack **d** of the microscope frame.





- 3** Insert the power cord connector **e** in the connector **f** of the AC adapter. (Perform this operation for both the AC adapter connected to the control box and the AC adapter connected to the microscope frame.)



- 4** Connect the power cord plug **g** to the power outlet **h**. (Perform this operation for both power cords of the AC adapter connected to the control box and the AC adapter connected to the microscope frame.)

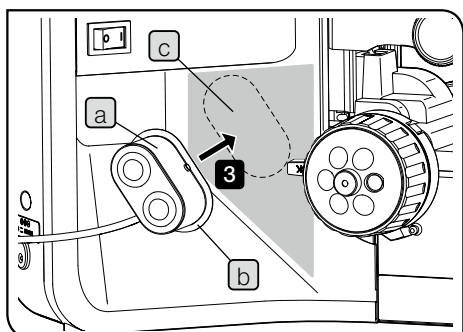
If the mercury lamp housing or the halogen lamp housing is combined with the system, AC adapters and power cords must be connected to the power supplies.  
 If the light source is combined with the system, AC adapters and power cords must be connected to the light sources.  
 For details, refer to the instruction manual provided with the respective unit.

## 19 Attaching the hand switch

This system can be attached with following three types of the hand switch.

- Hand switch (BX3M-HS) (Use by place on the table.)
- Hand switch for motorized nosepiece (BX3M-HSRE) (Use by placing on the table or attaching to the microscope frame.)
- Hand switch for exposure (U-HSEXP) (Use by placing on the table or attaching to the microscope frame.)

- 1 Connect the cable for the hand switch to the connector of the control box (BX3M-CB). For details, see "Cable connections" (page 113).



This picture shows the procedure to attach the hand switch for motorized nosepiece (BX3M-HSRE). The same procedure applies when attaching the hand switch for exposure (U-HSEXP).

### Attaching to the microscope frame (BX3M-HSRE or U-HSEXP)

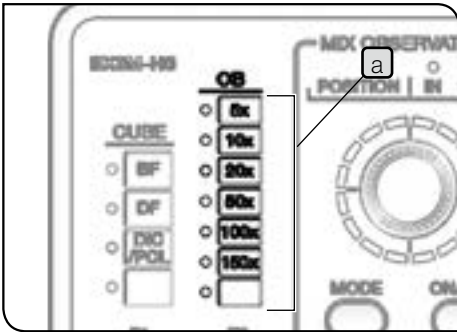
The hand switch for motorized nosepiece and the hand switch for exposure are attached with a magnet. By attaching the iron circular plate to the microscope frame, the hand switches can be secured to the circular plates.

- 1 Attach the circular plate (b) to the magnet at the bottom of the hand switch (a). Do not remove the paper from the adhesive surface of the circular plate until the attaching position is determined.
- 2 Determine the attaching position (c) (■ part) around the left or right coarse focusing knob, where you can easily operate the hand switch.  
Be careful, if the attaching position is too close to the coarse focusing knob, it may collide with the pre-focusing lever.
- 3 Wipe the expected attaching position with the absolute alcohol. Remove the paper from the adhesive surface of the circular plate, and push the hand switch to the microscope frame to adhere it.

**NOTE** The hand switch for motorized nosepiece and the hand switch for exposure are attached with the magnet. Keep the objects susceptible to magnetism away from the hand switches.

**TIP** If the cables of the hand switch interfere the operation, bundle the cables with the provided Velcro.

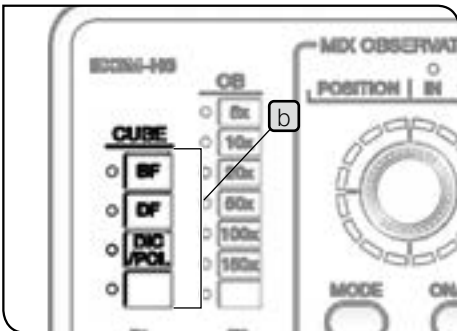
## 20 Attaching the magnet sheet



Attach the magnet sheet corresponding to the units attached to **a** and **b** of the display pocket of the hand switch (BX3M-HS).

When the motorized or coded nosepiece is combined

Attach the magnet sheet corresponding to the objectives attached to the OB indicator display pocket **a** of the hand switch.



When the coded reflected light illuminator (BX3M-RLAS-S) is combined

Attach the magnet sheet to the CUBE indicator display pocket **b** of the hand switch as shown in the picture.

When the coded reflected light illuminator (BX3M-URAS-S) is combined

Attach the magnet sheet corresponding to the mirror units attached to the CUBE indicator display pocket **b** of the hand switch.

The magnet sheet is provided with the hand switch (BX3M-HS).



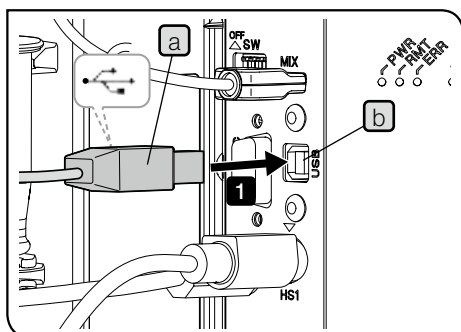
## 8-3 Connection with PC

To control this system from PC, the PC must be connected to the control box (BX3M-CB) on the back of the microscope with the interface cable (USB cable or RS-232C cable). In addition, the application software to control this system must be installed on PC.

### 1 Connecting the interface cable

**CAUTION** • Always use the USB cables and RS-232C cable interface cables provided by Evident. If you use the commercially available USB 2.0 cables or hubs, the system operations cannot be ensured.

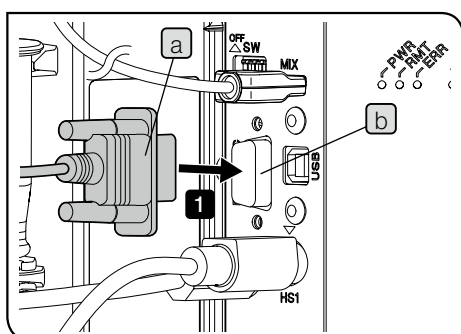
- NOTE** • Be sure to connect cables when the main switch of the microscope and the power supply of PC are turned OFF.
- Cables are vulnerable when bent or twisted. Never subject them to excessive force.
  - Connect the cables in the correct orientation paying attention to the shape of the connector.
  - You cannot connect the PC and the control box (BX3M-CB) using both the USB cable and the RS-232C cable.



#### Connecting the USB cable

- 1 Connect the USB cable connector **a** to the connector **b** of the control box (BX3M-CB).
- 2 Connect the other connector of the USB cable to the USB 2.0 connector of PC.

**NOTE** Some PCs are equipped with both USB 2.0 and USB 3.0 connectors. Be sure to connect the USB cable to the USB 2.0 connector. If it is connected to the USB 3.0 connector, the operations are not ensured. (For some USB 3.0 connectors, the color of the terminal part is blue or "SS" is printed on.)



#### Connecting the RS-232C cable

- 1 Connect the RS-232C cable connector **a** to the connector **b** of the control box (BX3M-CB).
- 2 Connect the other connector of the RS-232C cable to the RS-232C connector of PC.

## 2 Start procedures /Exit procedures

### Start procedures

- 1 Turn ON the power of PC and log on Windows®. Wait until the desktop appears.
- 2 Set the main switch of the microscope frame to **I** (ON).
- 3 Start the application software.

### Exit procedures

- 1 Exit from the application software.
- 2 Shutdown Windows®.
- 3 Set the main switch of the microscope frame to **O** (OFF).

# 9 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 (✓), immediately stop using the product and request inspection to Evident or replace with new illumination device(s).
- If you detect an abnormality other than those listed below or Evident products other than illumination devices, also stop using the product and request inspection to Evident.
- The repair, replacement and inspection that passed the warranty period are paid-services.

If you have any questions, please contact Evident.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase of the illumination device, or the total using time exceeds 20,000 hours of use.				
2. Lamp does not light sometimes even though the main switch is turned ON. (Only when using the halogen bulb)				
3. Dirt or substances are attached around the main switch.				
4. The light flickers if you move a lamp cable or illumination devices.				
5. Lamp cable is unusually hot to the touch.				
6. Burning or smoke odor.				
7. The light still flickers even though the lamp is replaced. (Only when using the halogen bulb)				
8. 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.)				
9. Lamp connection terminals have become discolored or tarnished, or the colors of the right and left terminals are different. (Only when using the halogen bulb)				
10. Illumination device/ housing has become deformed, cracked or tarnished in any way.				
11. Lamp cables or wiring parts have become deformed, cracked or tarnished in any way.				
12. 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.

# 10 Proper selection of the power supply cord

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




















**Caution : In case you use a non-approved power supply cord for Evident products, Evident can no longer warrant the electrical safety of the product.**

## 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

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