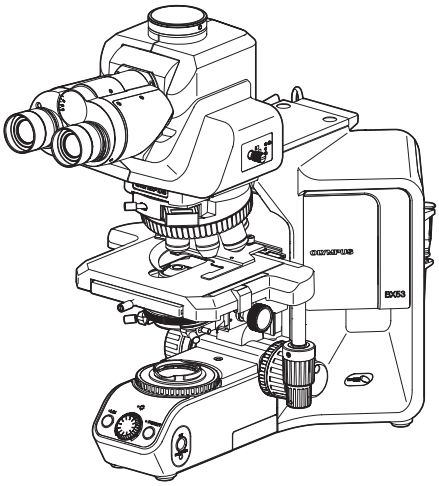


Instructions

BX53

System Microscope

With LED light source

To ensure safety, obtain optimum performance and to familiarize yourself fully with the use of this product, we recommend that you study this manual thoroughly before operating this product, and always keep this manual reachable when operating this product.
For details of products included in the configuration of this microscope, see page 7.

Optical Microscope and Accessory

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

Contents

Introduction

This microscope employs the UIS2 optical systems. If you use an eyepiece, objective or condenser, etc. together with this microscope, be sure to use those of UIS2 (or UIS) optical system series.
For details of usable units, contact us or refer to the latest version of catalogs.

Configuration of instruction manuals

Read all the instruction manuals supplied with the units you purchased.
The following instruction manuals are prepared for the units to be used with this product.

Instruction manuals	Main contents
BX53 system microscope (this instruction manual)	Transmitted light brightfield observation
Motorized reflected fluorescence system	Reflected fluorescence observation method using motorized fluorescence illuminator
Reflected fluorescence system	Reflected fluorescence observation method using manual fluorescence illuminator and coded fluorescence illuminator
Coded function system	Information readout and external transmission from the coded fluorescence illuminator and coded nosepiece
U-IFRES Interface for coded nosepiece	Simultaneous operation of the light manager function of the microscope and the information readout function of the revolving nosepiece to the digital camera and imaging software
BX3-MDO18R / BX3-MDOE Discussion attachment	Operation and assembly of discussion attachments
BX3-CBM Control box	Operation of the control box and hand switch, and connection procedures of the control box with each unit
BX3-SHT Shutter unit	Operation of shutter unit
U-UCD8 Universal condenser	Differential interference contrast observation and phase contrast observation
U-UCD8A Motorized universal condenser	Differential interference contrast observation and phase contrast observation
U-PCD2 Phase contrast condenser	Phase contrast observation

Label of immersion oil

Read the label of the immersion oil you purchased.

Immersion oil	Main contents
IMMOIL-8CC IMMOIL-500CC IMMOIL-F30CC	Cautions and handling procedures of the immersion oil

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 and/or may cause problems.

TIP : Indicates the useful knowledge or information for use.

⚠ CAUTION - Prevention of infection -

Wear the protective equipment such as gloves, etc.

When you observe specimens which are potentially infectious, wear protective equipment such as gloves, etc. to prevent the specimens from touching your skin directly.
When you touch the product which may have contacted the specimens which are potentially infectious, wear protective equipment such as gloves, etc., or clean the product before operation.

After observation, clean the portions where specimens contacted directly.

Remove the specimen when moving the product.

When moving this product, be sure to remove the specimen first, since it is in danger of dropping and spattering.

In case the specimen is damaged, promptly take the infection prevention measures.

When disposing of the product, follow the regulations and rules of your local government.

When disposing of the product which contacted the specimens which have potentiality of infection, follow the regulations and rules of your local government.

⚠ CAUTION - Installation of the product -

Install the product on a sturdy, level table or bench.

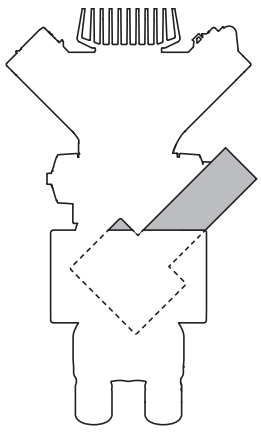
For safety in particular, do not place a mat, etc. under the product.

Do not allow the height of the microscope to be more than 1 m.

To prevent the microscope from overturning, do not combine accessories that make the height of the microscope more than 1 m from the top surface of the desk.

Do not allow the total weight of the microscope to be heavier than 18 kg.

To prevent the microscope from overturning, when attaching the arm, illuminator, intermediate attachment, observation tube or camera to the upper area of the microscope frame, do not allow the total weight of the microscope to be heavier than 18 kg.



Prevent the microscope from overturning.

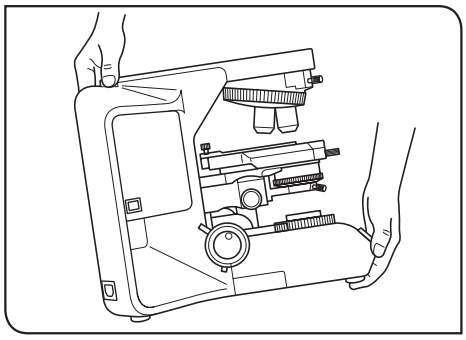
The microscope becomes unstable if combinations from ① to ③ listed below are satisfied at the same time. Be sure to attach the camera port of the intermediate attachment diagonally backward at 45 degrees from the observer's perspective to prevent the microscope from overturning.

① The observation tube is a trinocular tube: either U-TTBI, U-ETBI or U-TTLBI.

② The intermediate attachment is either U-TRUS or U-DP.

③ A camera heavier than 0.4 kg is attached to the intermediate attachment described in 2.

⚠ CAUTION - Carrying the microscope -



Hold the handheld portion of the microscope and the front portion of the base.

When carrying the microscope, hold the handheld portion on the rear of the arm and the front portion of the base. Holding the slippery portion makes it hard to keep hold of the microscope and holding the stage, coarse and fine focusing knobs, lower portion of the power cover (black) on the rear of the microscope, etc. may damage the microscope.

Remove specimens and various units.

When carrying the microscope, be sure to remove the specimens and eyepieces to prevent them from dropping.
Also, remove units attached. If you carry the microscope with units attached, the weight is increased as well as the risk of dropping the microscope.

Do not slide on the top surface of the table.

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

If you need to pack this product in order to ship it to a distant location, etc., contact us.

⚠ CAUTION - Electric safety -

Always use the power cord provided by us.

If the proper AC adapter and the power cord 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 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 cannot 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.

Disconnect the power cord in case of emergency.

In case of emergency, disconnect the power cord from the power cord connector on the product or from the power outlet. Install the product at a location where you can reach the power cord connector or the power outlet at hand to disconnect the power cord quickly.

⚠ CAUTION - Prevention of electric shock -

Keep the power cord and cables well 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.

Never insert any tools or metal fragments in the air vents of the product.
It could cause electric shock or failure of the product.

Do not touch the product with wet hands.
In particular, if you touch the main switch of the power unit or the power cord with wet hands, electric shock, ignition or failure of the product may be caused.

⚠ CAUTION - Prevention of fire -

Do not repair, disassemble or remodel.
Never repair, disassemble or remodel this product. Otherwise, fire may result. The repair work must not be carried out except those authorized by us.

If you need repairs, contact us for assistance.

⚠ CAUTION - LED (light emitting diode) -

Do not look directly at the light from the LED unit for a long time.
If you feel that the light from LED unit is too bright during observation, adjust the light intensity using the brightness control knob before continuing the observation. The LED built in this product is basically eye-safe in normal operation. However, do not look directly at the light from the LED unit for a long time feeling that the light is too bright, since it may cause damage to your eyes.

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

Do not expose your skin to the light coming out from the condenser for a long time.
Do not expose your skin to the light coming out from the condenser for a long time, since your skin may be inflamed.

⚠ 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.
I	Indicates that the seesaw type main switch is ON. (Seesaw type is the type of switch that ON or OFF is selected by pressing it to ON or OFF side.)
O	Indicates that the seesaw type main switch is OFF.

Label position and instruction

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

Label	Label position	Instructions in instruction manual	Page
⚠	Right side on the rear of microscope frame	Caution - Electric safety	3
⚠	Left side on the rear of microscope frame	Caution - Prevention of electric shock	4

When the labels are dirty or peeled off, contact us for replacement or inquiries.

Handling Precautions

NOTE **• This product 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 may result.

• Do not use the product in areas where it may be subjected to direct sunlight, high temperature and/or humidity, dust or vibrations.
(For conditions of operating environments, see "8 Specifications" on page 47.)

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 this product, set the main switch of the microscope to O (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.

Intended use

This product has been designed to be used to observe magnified images of specimens in various routine work and research applications.
This includes the observation of living cells or of specimen taken from tissues to gain physiological or morphological information at hospitals or laboratories. Typical field of applications are genetics, human blood and tissue examination, neurology, pharmacology and cellular biology.
Do not use this instrument for any purpose other than its intended use.

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

This product complies with the emission and immunity requirements described in IEC61326 series.
This product is designed for use in a professional healthcare facility environment. It is likely to perform incorrectly if used in a home healthcare facility environment. If it is suspected that performance is affected by electromagnetic interference, correct operation may be restored by increasing the distance between this product and the source of the interference.
The electromagnetic environment should be evaluated prior to operation of this product.
Do not use this product in close proximity to the sources of strong electromagnetic radiation to prevent interference with the proper operation.

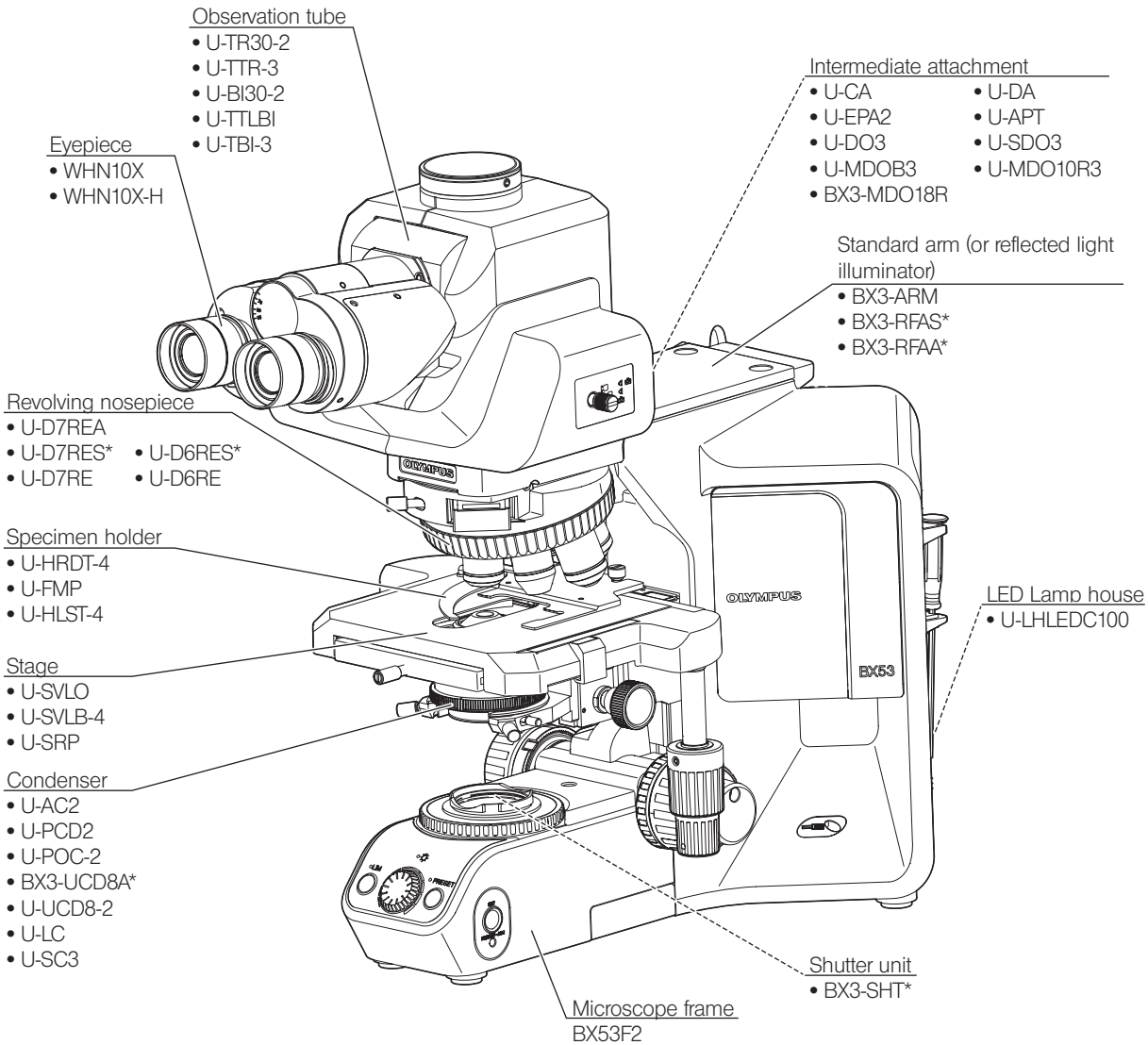
[Only for combination with BX3-CBM]

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

Emissions exceeding the level required by aforementioned standards may occur if this product is electrically connected to other equipment.
This product complies with the emission and immunity requirements described in IEC61326 series.
This product is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.
This product is designed for use in a professional healthcare facility environment. It is likely to perform incorrectly if used in a home healthcare facility environment. If it is suspected that performance is affected by electromagnetic interference, correct operation may be restored by increasing the distance between this product and the source of the interference.
The electromagnetic environment should be evaluated prior to operation of this product.
Do not use this product in close proximity to sources of strong electromagnetic radiation to prevent interference with the proper operation.

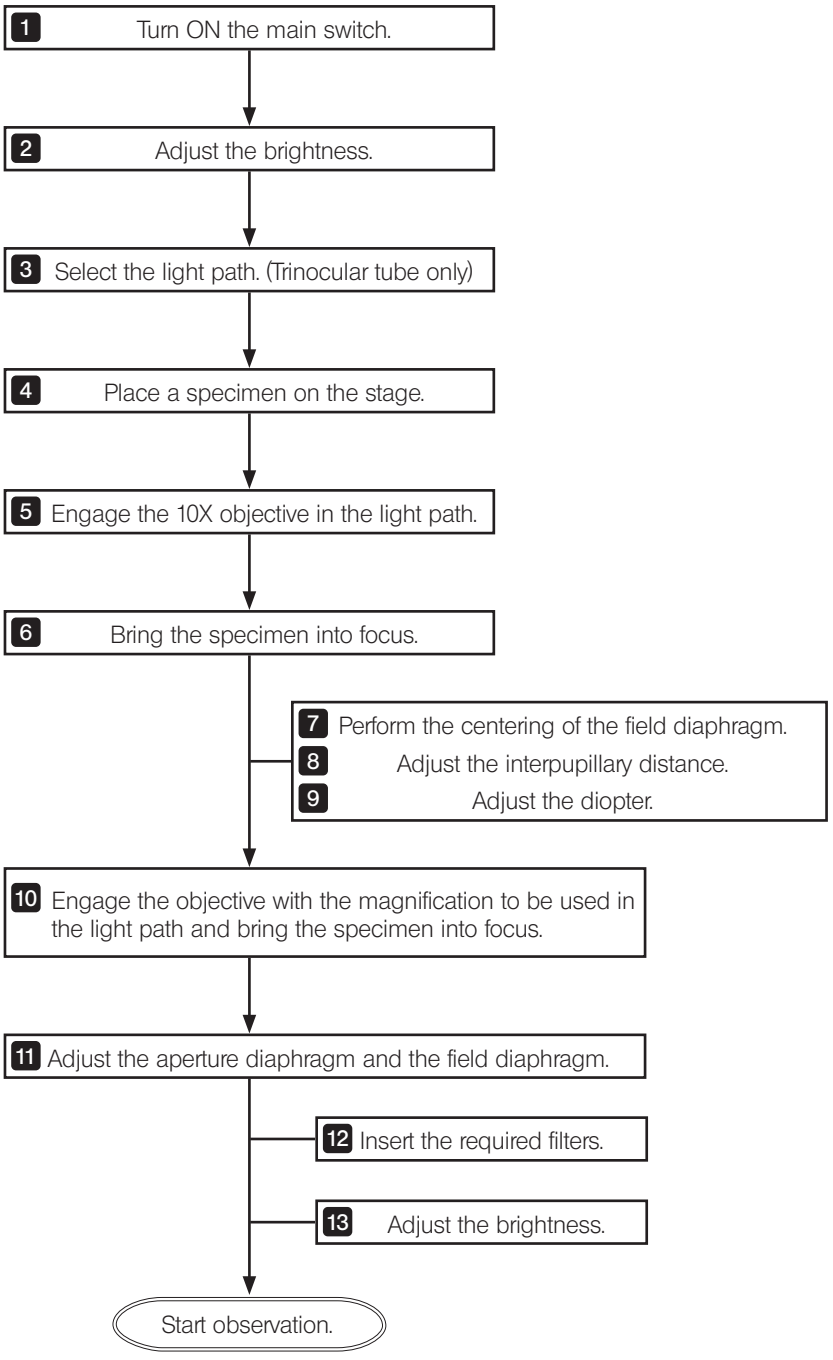
1 Nomenclature of units

The following figure shows the main units only. For other units combinable with the microscope, contact us or refer to the latest catalogs.
For units marked "*", refer to the instruction manuals provided separately.

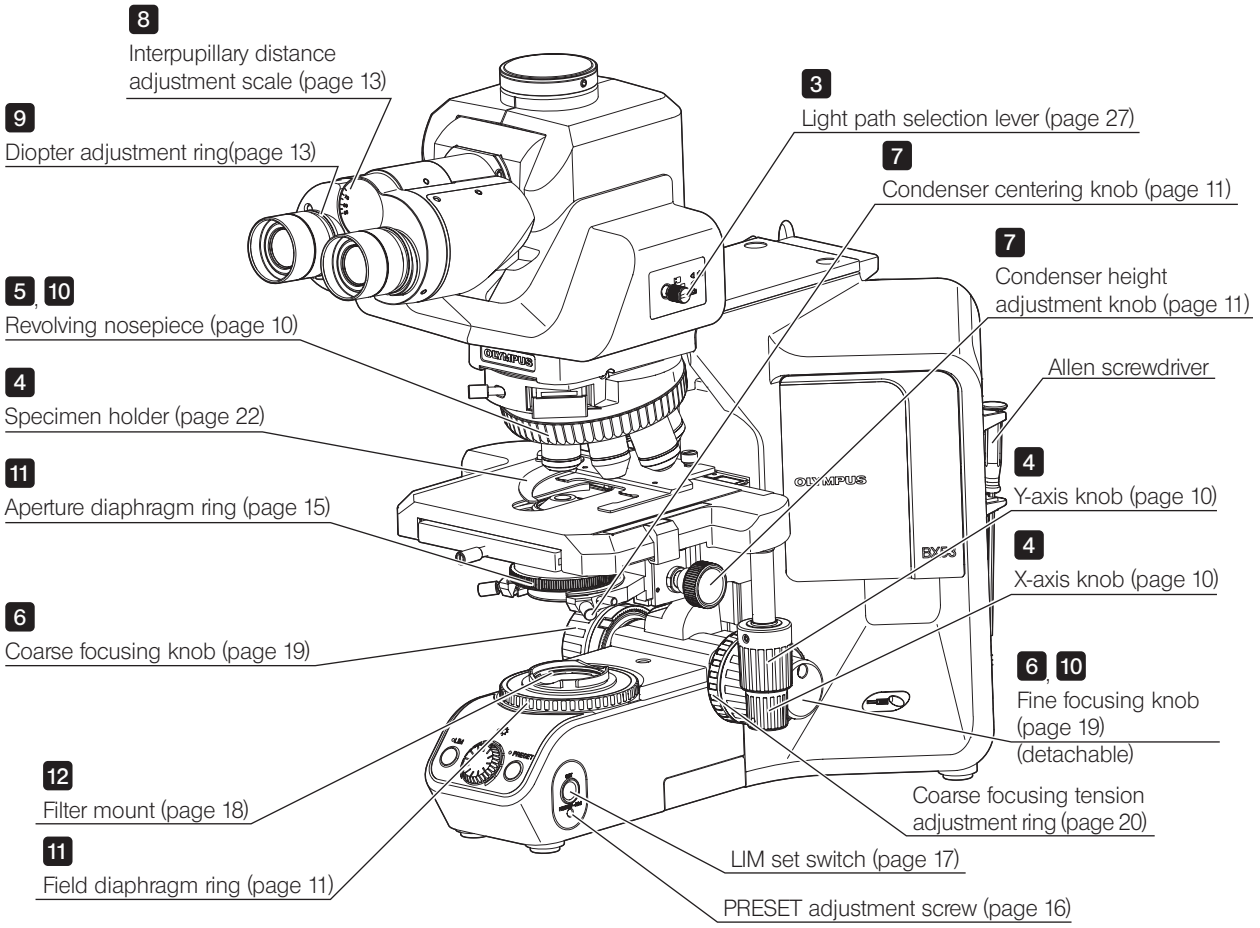


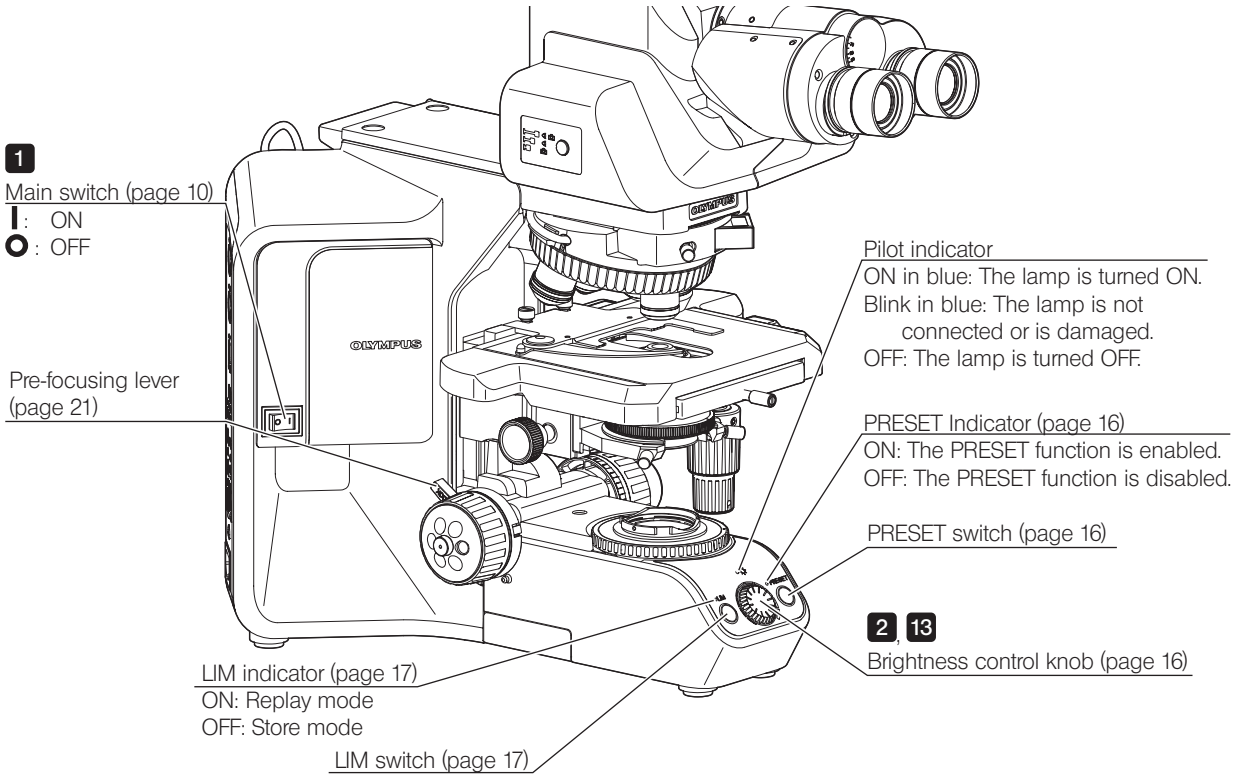
We classify BX53F2 as an optical microscope and other units as optical microscope accessories.

2 Transmitted light brightfield observation procedures



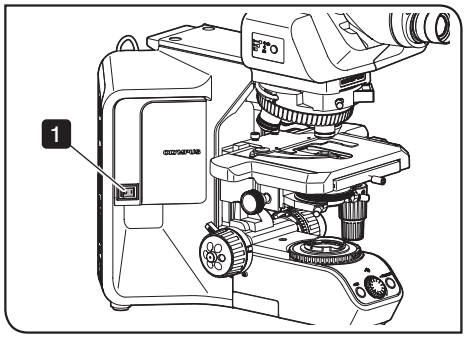
TIP Make a copy of this observation procedure and place it near the microscope so that you use it when operating the microscope.


8
Interpupillary distance adjustment scale (page 13)
9
Diopter adjustment ring(page 13)
5, 10
Revolving nosepiece (page 10)
4
Specimen holder (page 22)
11
Aperture diaphragm ring (page 15)
6
Coarse focusing knob (page 19)
12
Filter mount (page 18)
11
Field diaphragm ring (page 11)
3
Light path selection lever (page 27)
7
Condenser centering knob (page 11)
7
Condenser height adjustment knob (page 11)
Allen screwdriver
4
Y-axis knob (page 10)
4
X-axis knob (page 10)
6, 10
Fine focusing knob (page 19) (detachable)
Coarse focusing tension adjustment ring (page 20)
LIM set switch (page 17)
PRESET adjustment screw (page 16)

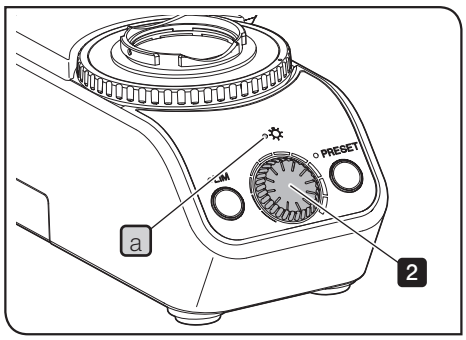

1
Main switch (page 10)
I : ON
O : OFF
Pre-focusing lever (page 21)
Pilot indicator
ON in blue: The lamp is turned ON.
Blink in blue: The lamp is not connected or is damaged.
OFF: The lamp is turned OFF.
PRESET Indicator (page 16)
ON: The PRESET function is enabled.
OFF: The PRESET function is disabled.
PRESET switch (page 16)
2, 13
Brightness control knob (page 16)
LIM indicator (page 17)
ON: Replay mode
OFF: Store mode
LIM switch (page 17)

2-1 Basic operation (Up to observation of specimen)

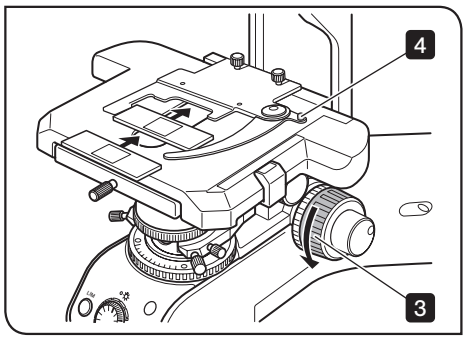
This section describes the basic operations of the microscope up to the observation of a specimen. For operating procedures of each operation unit in detail, see the corresponding page.



1 Turn the main switch of the microscope frame to ❙ (ON). When the power is ON, there is one beep and the pilot indicator [a] turns ON.

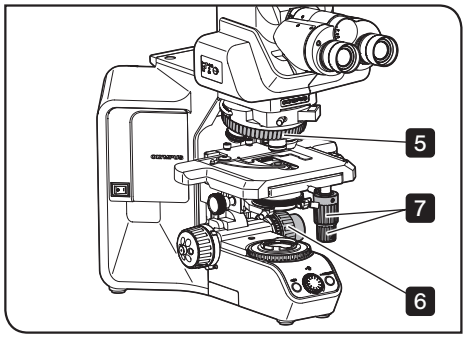


2 Rotate the brightness control knob to set the appropriate brightness. (Details: page 16)



3 Rotate the coarse and fine focusing knobs toward the front to lower the stage. (Details: page 19)

4 Open the specimen holding lever of the specimen holder and place the specimen under it. (Details: page 22)



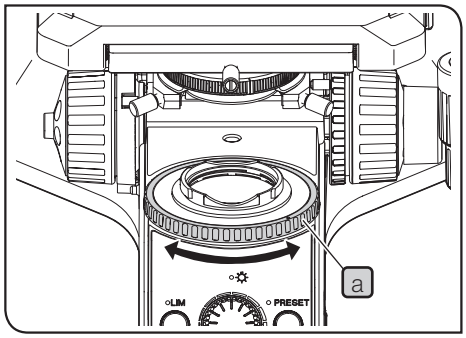
5 Rotate the revolving nosepiece to engage the 10X objective in the light path.

6 Rotate the coarse and fine focusing knobs to bring the specimen into focus. (Details: page 19)

7 Rotate the X-axis and Y-axis knobs to adjust the observation position.

Now you can observe the magnified image of the specimen. To improve the observation furthermore, see "2-2 Microscope adjustment" described on the next page.

2-2 Microscope adjustment

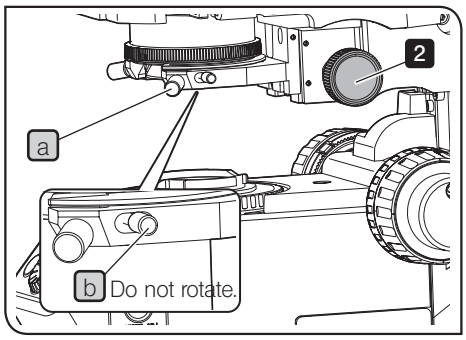


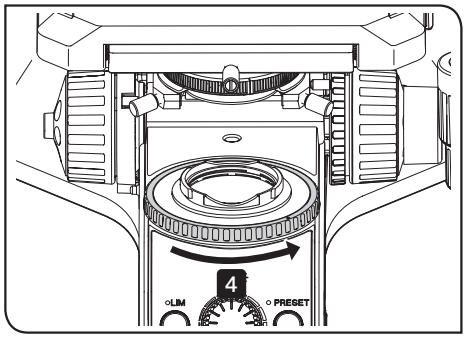
1 Adjusting the field diaphragm (FS)

Using the field diaphragm (FS)

1 Rotate the field diaphragm ring [a] to adjust the field diaphragm.

	Field diaphragm ring index position				
Field diaphragm	Open to maximum	←			Close to minimum →





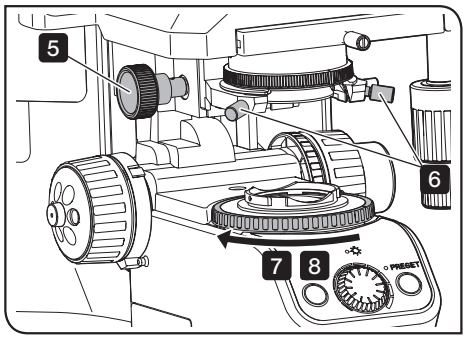
Centering the field diaphragm (FS)

NOTE
- **Be careful not to rotate the condenser fixing knob [b] in the back of the centering knob [a] by mistake.**
- **If you use the swing-out type condenser, such as U-SC3, etc., engage the top lens in the light path and perform the centering.**

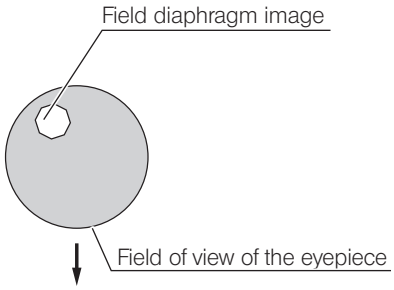
2 Rotate the condenser height adjustment knob to raise the condenser to the upper limit.

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

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

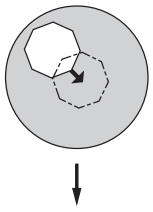


A



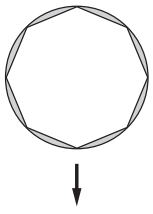
5 Rotate the condenser height adjustment knob to bring the field diaphragm image into focus. (Picture A)

B



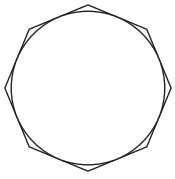
6 Rotate the centering knobs (2 positions) to adjust the field diaphragm image to come to the center of the field of view. (Picture B)

C



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

D

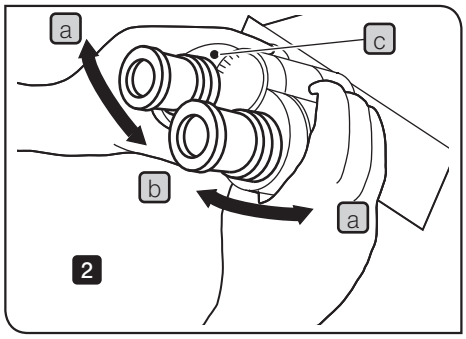


8 Open the field diaphragm until the field diaphragm image becomes almost the same size (circumscribed) as the field of view. (Picture D)

2 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 Align the right and left eyepieces horizontally.

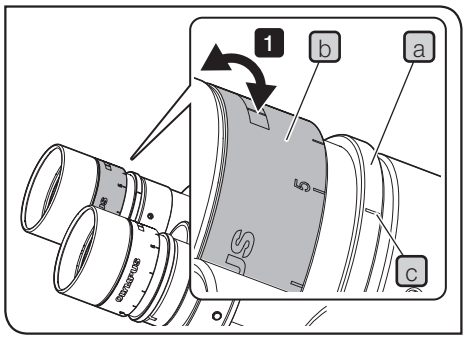


2 While looking through the eyepieces, move the binocular section either in a or b direction until the right and left fields of view coincide completely. The value shown by the index c on binocular section represents your interpupillary distance.

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

3 Adjusting the diopter

The adjustment of the diopter is to correct the difference in the diopter by each observer.



When the eyepiece is not equipped with the eyepiece micrometer

1 While pressing the lower part a of the eyepiece, rotate the diopter adjustment ring b to set the index c to "0". Perform this operation for right and left eyepieces.

2 Adjust the interpupillary distance.

3 Place the specimen.

4 Engage the 10X objective in the light path and rotate the coarse and fine focusing knobs to bring the specimen into focus.

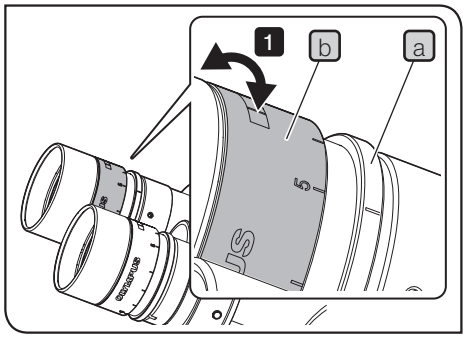
5 Change to the 40X or higher objective, and rotate the coarse and fine focusing knobs to bring the specimen into focus.

6 Change to the 10X objective. While looking through the left eyepiece with your left eye, rotate the diopter adjustment ring b to bring the specimen into focus. In the same manner, while looking through the right eyepiece with your right eye, rotate the diopter adjustment ring to bring the specimen into focus.

7 Change to the 40X or higher objective again, and rotate the coarse and fine focusing knobs to bring the specimen into focus.

8 Change to the 10X objective, and while looking through the right and left eyepieces, check that the specimen is in focus.

9 If the specimen is not in focus, repeat from 6 to 8 again.

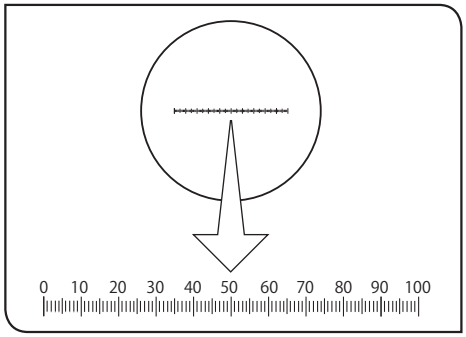


When the eyepiece is equipped with the eyepiece micrometer

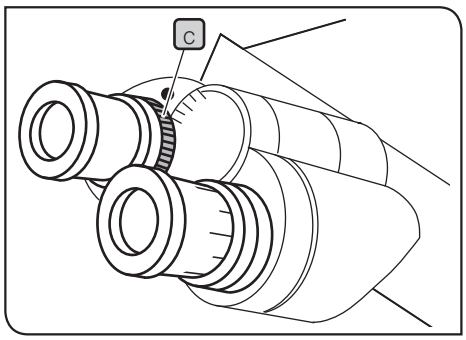
1 While looking through the eyepiece equipped with the eyepiece micrometer, rotate the diopter adjustment ring b to adjust so that the scales or lines of the eyepiece micrometer in the field of view are clearly visible. When you rotate the diopter adjustment ring b keep pressing the lower part a of the eyepiece.

2 Place the specimen.

3 Engage the 10X objective in the light path. While looking through the eyepiece equipped with the eyepiece micrometer, rotate the coarse and fine focusing knobs to bring the specimen into focus.

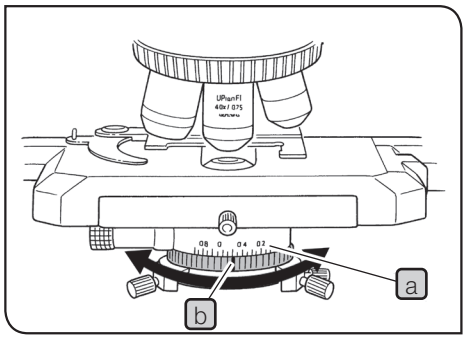


4 While looking through the eyepiece which is not equipped with the eyepiece micrometer, rotate the diopter adjustment ring b to bring the specimen into focus.



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

Perform the same operation as described above.
Be sure to use the interpupillary distance adjustment ring c of the observation tube instead of the diopter adjustment ring b of the eyepiece described above.

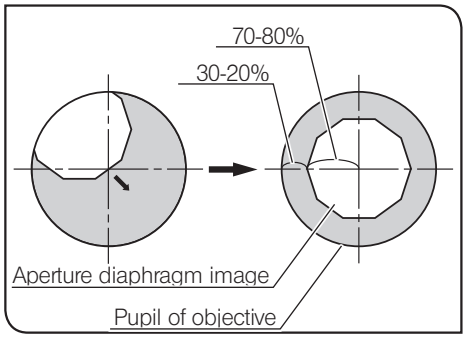


4 Adjusting the aperture diaphragm (AS)

Using the aperture diaphragm (AS)

When the aperture diaphragm ring is equipped with the scale a

1. Rotate the aperture diaphragm ring to set the index b to 70% of the numerical aperture of the objective
2. While looking at the observed image, rotate the aperture diaphragm ring and finely adjust it to obtain the desired contrast.

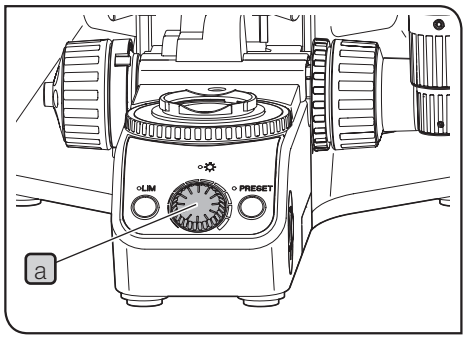


When the aperture diaphragm ring is not equipped with the scale

1. When you remove the eyepieces and look into the observation tube, you can see the aperture diaphragm image. Rotate the aperture diaphragm ring to adjust it so that the aperture diaphragm image becomes approximately 70% of the diameter of the pupil of the objective. (as shown in the picture on the left)
2. Place the eyepieces back to the observation tube, and while looking at the observed image, rotate the aperture diaphragm ring and finely adjust it to obtain the desired image.

3 Operation procedures of each part

3-1 Transmitted light illumination adjustment part

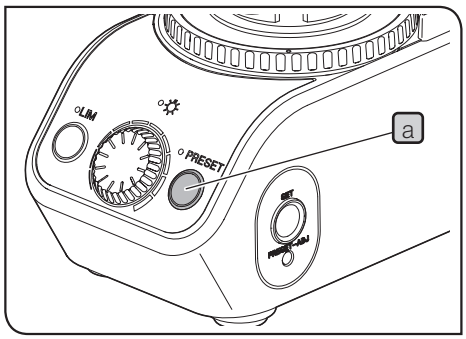


1 Adjusting the brightness

Rotate the brightness control knob [a] of the microscope frame clockwise to increase the brightness of the lamp.

2 Using the PRESET switch

PRESET is a function to set to the PRESET (pre-stored) brightness automatically regardless of the position of the brightness control knob. As factory default, the brightness is set to the one suitable for the observation with the 10X objective.
Use the PRESET switch to enable or disable PRESET.

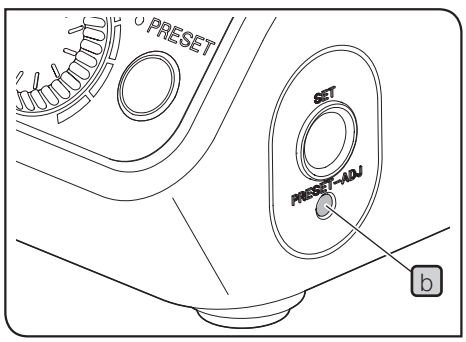


Selecting Enable or Disable of PRESET

1 Press the PRESET switch [a] to enable or disable PRESET.

PRESET	PRESET indicator status	Lamp brightness
Enable	Turns ON	PRESET brightness
Disable	Turns OFF	Brightness of brightness control knob position

TIP When PRESET is enabled, the brightness of the lamp does not change even though the brightness control knob is rotated.



Adjusting the PRESET brightness

1 Press the PRESET switch [a] to enable PRESET.

2 Using a small flat-blade screwdriver, rotate the PRESET adjustment screw [b] to obtain the required brightness. Rotating the screw clockwise increases the brightness.

3 When you finish adjustment, press the PRESET switch [a] to disable PRESET.

3 Using the LIM and LIM set switches

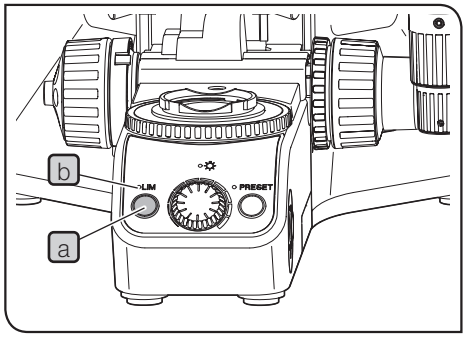
This function is available when the LED light source is combined with the motorized or coded nosepiece.

What is LIM function?

LIM stands for "Light Intensity Manager". For each objective whose arbitrary brightness was stored in advance, this function sets the stored brightness automatically when the objective is selected.

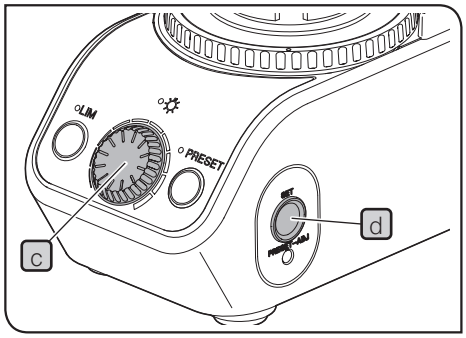
LIM switch	LIM indicator status	LIM set switch status
Enable	ON (Replay mode)	Disable
Disable	OFF (Store mode)	Enable

TIP If the PRESET indicator is ON, the LIM function is not available.

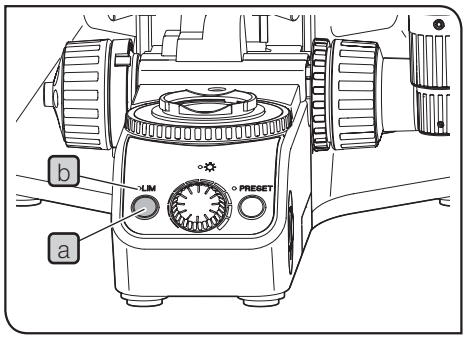


Procedure to store the brightness

1. Press the LIM switch [a] to set the "Store" mode. (The LIM indicator [b] is OFF.)
2. Engage the objective with low magnification in the light path and bring the specimen into focus.



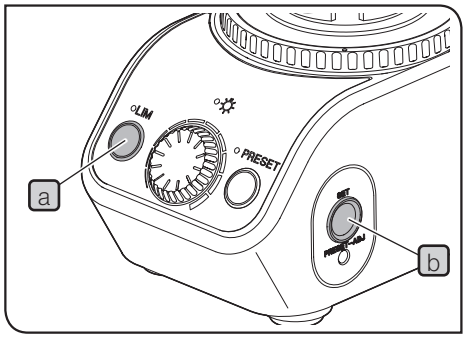
3. Rotate the brightness control knob [c] to set the appropriate brightness easy to see.
4. Press the LIM set switch [d] to store the current brightness in the microscope. When the current brightness is stored in the microscope, there is one beep.
5. Select the objective and perform 3 and 4. Store the appropriate brightness for all objectives which are attached.



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 objective is selected, the stored brightness is set automatically.



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

1 Set the main switch of the microscope frame to O (OFF).

2 While pressing both the LIM switch [a] and the LIM set switch [b], set the main switch of the microscope frame to I (ON). Keep pressing the LIM switch [a] and the LIM set switch [b]. After 5 seconds, the stored brightness returns to the factory default setting.

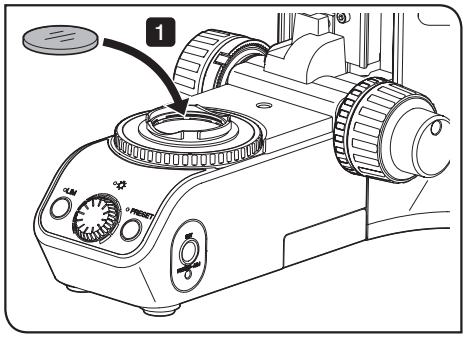
TIP If you release the LIM switch and the LIM set switch within 5 seconds, the stored brightness (LIM function) does not return to the factory default setting.

3 Set the main switch of the microscope frame to O (OFF).

4 Using the filter

To insert the filter into the light path, place the filter on the filter mount of the transmitted light illumination adjustment part. You can place the filter with the size of Ø45 mm on the filter mount.

TIP **When attaching the shutter unit (BX3-SHT), the filter with the total thickness of 3 mm or less can be placed in the filter mount.**

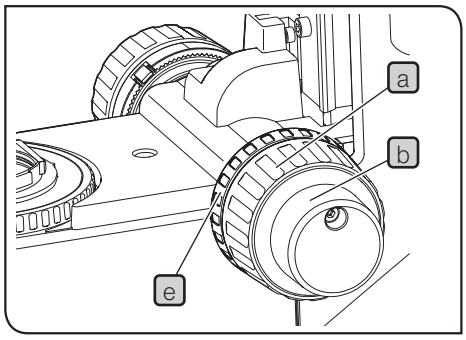


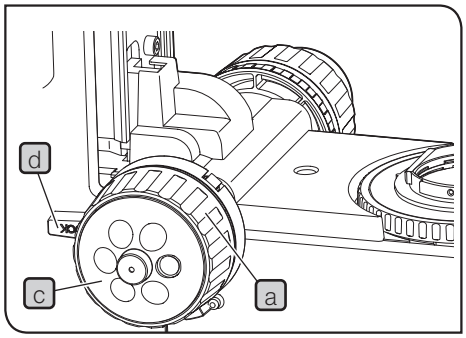
1 Place the filter in the filter mount of the base of the microscope frame.

Filter to use

Filter to use	Purpose	
43IF550-W45	Green filter Increases the contrast of the observed image during phase contrast observation.	
45-ND6, 45-ND25	Filter for light intensity adjustment	
45G-530	Green	Filter for contrast enhancement during monochrome image acquisition
45O-560	Orange	

3-2 Focusing unit

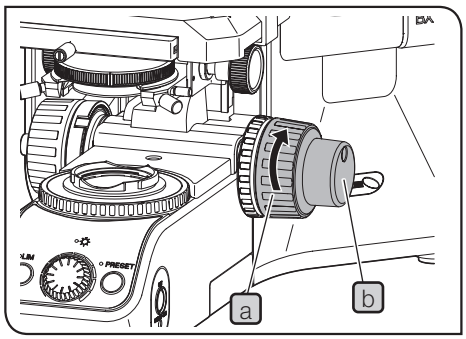




1 List of focusing units

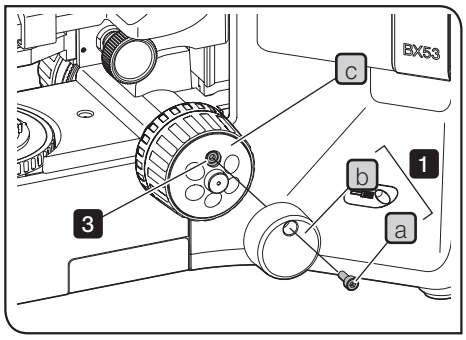
The focusing unit consists of the operation units listed below. The following table shows the names and functions of the operation units.

	Name	Function
a	Coarse focusing knob	Rotates to move the focal position significantly.
b	Fine focusing knob	Rotates to finely adjust the focal position. This knob can be attached to the fine adjustment dial on either left or right side. (As a factory default, it is attached to the right side.)
c	Fine adjustment dial	Rotates to finely adjust the focal position.
d	Pre-focusing lever	Sets the upper limit of the stage position. (to prevent the collision between the specimen and objective or simplify the focusing)
e	Coarse focusing tension adjustment ring	Adjusts the tension required to rotate the coarse focusing knob.



2 Focusing on the specimen

1. Rotate the coarse focusing knob a in arrow direction to move the objective to the specimen as close as possible.
2. While observing the specimen through the eyepieces, slowly rotate the coarse focusing knob a in the direction opposite to the arrow direction to lower the stage.
3. When the specimen comes into view, rotate the fine focusing knob b to bring the specimen into focus precisely.



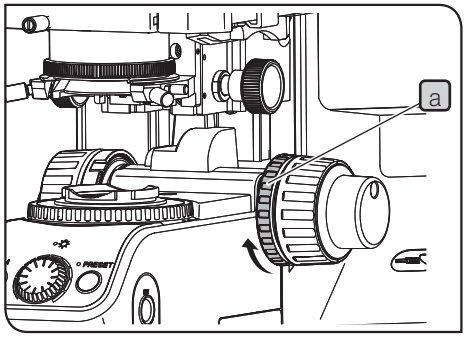
3 Replacing the fine focusing knob

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

NOTE **The fine focusing knob is designed to be detachable. Normally, attach the fine focusing knob on the opposite side of the X-axis /Y-axis knob of the stage. This prevents your hand from contacting the fine focusing knob when operating the X-axis /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.

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



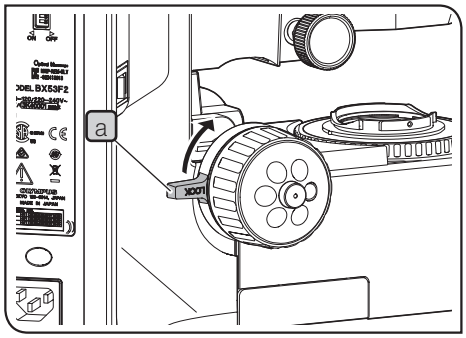
4 Adjusting the tension of the coarse focusing knob

The tension of the coarse focusing knob is pre-adjusted for easy use, but if you wish, you can change the tension. Rotating the coarse focusing tension adjustment ring [a] in the arrow direction increases the tension and in the opposite direction decreases the tension.

TIP If the stage descends by its own weight or the focus obtained with the fine focusing knob is lost soon, the coarse focusing tension adjustment ring is set too loose.
In this case, rotate the coarse focusing tension adjustment ring [a] in the arrow direction to increase the tension.

5 Using the pre-focusing lever

Using the pre-focusing lever controls the vertical movement of the stage no further than the arbitrary position when rotating the pre-focusing lever.
With this function, the approximate focal position can be reproduced or the collision between the stage and the objective can be prevented.
Note, even though the pre-focusing lever is used, the vertical movement of the stage is not restricted with the fine focusing knob.



Setting the upper limit of coarse adjustment

1 Bring the specimen into focus.

2 Rotate the pre-focusing lever a in the arrow direction to set to LOCK. The current stage position is set to the upper limit when rotating the coarse focusing knob.

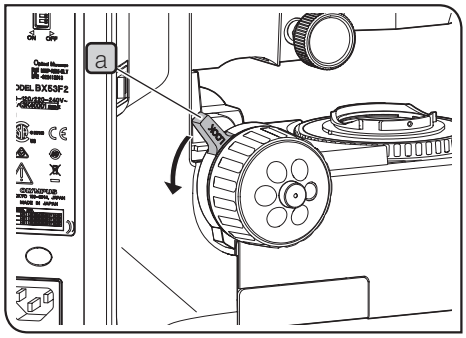
Focusing on the specimen in LOCK status

1 Rotate the coarse focusing knob to lower the stage position and place the different specimen on the stage.

2 Rotate the coarse focusing knob to lower the stage and when the stage touches the upper limit, stop rotating the coarse focusing knob.

TIP If the thickness of the specimen is almost the same, the specimen is in focus approximately at the upper limit position.

3 Rotate the fine focusing knob to bring the specimen into focus.



Canceling LOCK

1 Rotate the pre-focusing lever a in the arrow direction to cancel LOCK.

NOTE **When the pre-focusing lever is set to the LOCK position, the stage is not lowered to the lower limit. To lower the stage to the lower limit, cancel LOCK.**

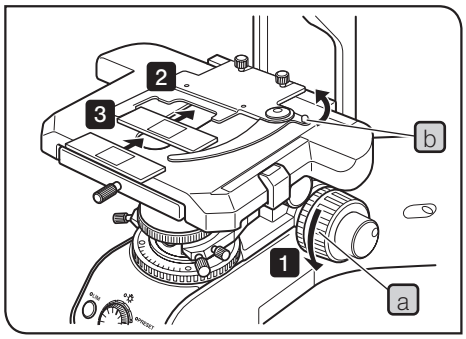
3-3 Stage

1 Placing the specimen

If you use a slide glass, be sure to use a slide glass of the following size.

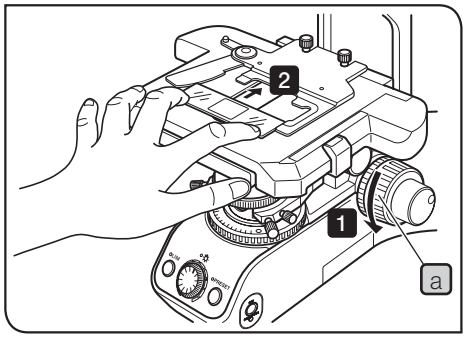
	Slide glass
Size	26 x 76 mm
Thickness	0.9 to 1.2 mm

TIP
- When observing a specimen larger than above, remove the specimen holder and place the specimen directly on the stage.
- The maximum weight of an object such as a specimen to be placed on the stage is 0.8 kg (including specimen holder).
- If an other company's stage is to be attached, make sure that its weight should not exceed 4 kg (including specimen).



When using the specimen holder for observing two slide glasses

1. Rotate the coarse focusing knob [a] to lower the stage.
2. Press the knob [b] backward (arrow direction) to open the specimen holding lever, and slide the specimen from front to back on the stage to place it.
3. After placing the first specimen until it touches the end, place the second specimen so that it touches the first specimen.
4. After placing the specimens, return the specimen holding lever gently.



When using the specimen holder for observing one slide glass

1. Rotate the coarse focusing knob [a] to lower the stage.
2. Place the specimen by sliding it into the specimen holder from the front.

When observing the edge of the slide glass

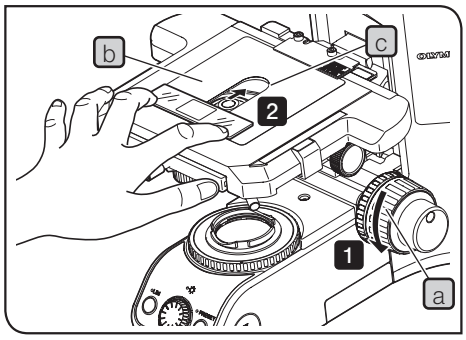
When using the objective with a short WD (working distance), use the following thin specimen holder.

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

* Applicable objective: 40X or less (excluding Apo series)

When using the oil immersion condenser

Use the optional U-SVRO (right-hand knob) or U-SVLO (left-hand knob) stage with the groove to prevent the close contact between the specimen and the stage.



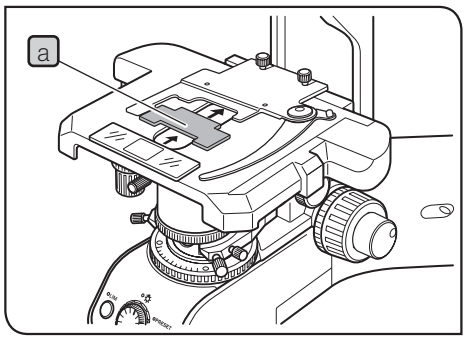
When using the specimen hold plate (CX3-SHP)

For attaching procedures, see "Attaching the specimen holder" (page 59).

1 Rotate the coarse focusing knob a to lower the stage sufficiently.

2 Place the specimen on the resin sheet b.

NOTE
- **As the outside of the aperture c of the resin sheet is not illuminated by the light from the condenser, the specimen cannot be observed.**
  Be careful when operating the X-axis knob, the aperture of the stage may be shifted from the aperture of the resin sheet and the hole may be covered.
- **If the specimen hold plate is used in combination with the oil immersion objective or oil condenser, problems such as the specimen is defocused or stuck to the specimen hold plate, etc. may occur.**



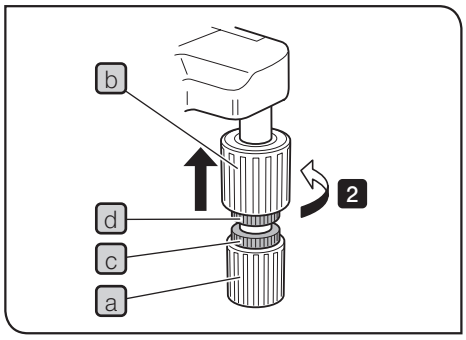
2 Using the auxiliary specimen holder

This unit can be used when the following revolving nosepiece is combined.
U-D7RES, U-D7REA, U-D7RE or U-P6RE

When a biological slide glass specimen is placed on the specimen holder for observing two slide glasses (thick type) U-HLDT-4 / U-HRDT-4, the specimen holder may interfere with the objective when the following conditions are combined:

- The objective in use has a short WD (Working Distance).
- The specimen being observed is placed on the back side.
- The stage is rotating.

If the specimen holder interferes with the objective, place the auxiliary specimen holder a as shown in the picture, and place the specimen on the front side and observe it.



3 Adjusting the tension of X-axis / Y-axis knob

1 Hold the X-axis knob [a] and when you raise the Y-axis knob [b], the adjustment knobs [c] and [d] appear.

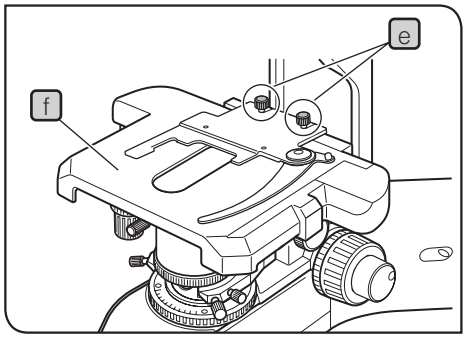
2 Rotating the X-axis adjustment knob [c] or the Y-axis adjustment knob [d] in the arrow direction increases the tension and rotating in the opposite direction decreases the tension.

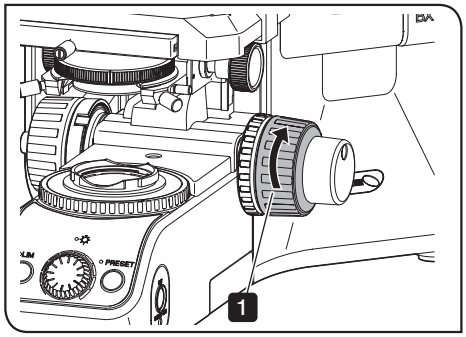
NOTE
- **If you increase the tension too tight, the stage may move unevenly or not stop accurately.**
- **Due to long hours of operation, the stage guide may shift and the movement range becomes smaller in rare cases, but this is not a failure. This problem can be solved easily by the following remedies.**

[Remedy]

X-axis direction (right and left): Hold the specimen holder fixing knob [e] and move it right and left until it touches the stopper.

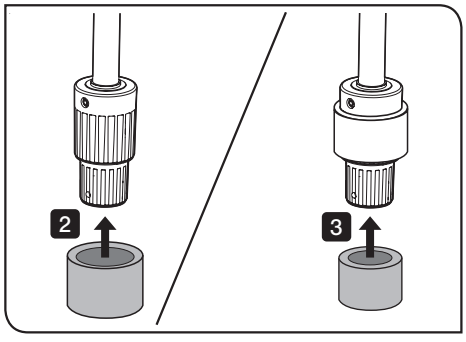
Y-axis direction (front and back): Hold the upper stage [f] and move front and back until it touches the stopper.





Stage knob rubber (option)

TIP Fitting this knob rubber to the X-axis / Y-axis knob of the stage prevents the knob from slipping and allows the fine stage operation only by holding it lightly. Also, the fatigue caused by long hours of operation can be reduced.
There are 2 types of knob rubbers: U-SHGT (thick type: 5 mm) and U-SHG (thin type: 2 mm).

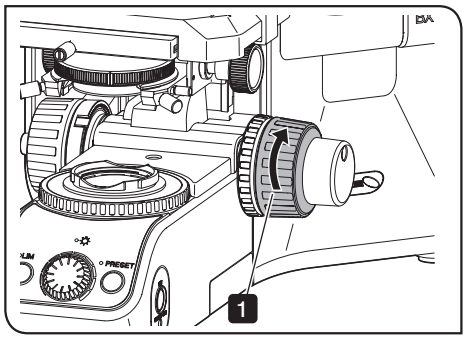


Attaching procedure

1 Rotate the coarse focusing knob to raise the stage holder to the upper limit.

2 The stage knob rubber must be attached in the proper order. First, fit the larger stage knob rubber to the Y-axis (upper side) knob from below.

3 Then, fit the smaller stage knob rubber to the X-axis (lower side) knob from below.

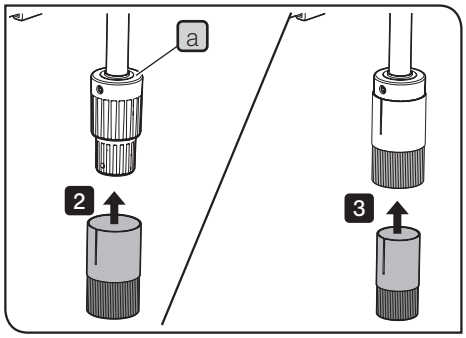


Stage knob extension adapter (BX3-SHEA)

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

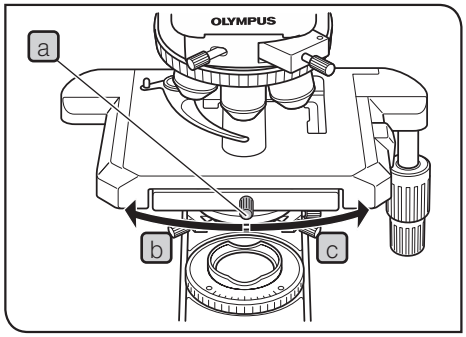
Attaching procedure

1 Rotate the coarse focusing knob to raise the stage holder to the upper limit.



2 The stage knob extension adapter must be attached in the proper order. First, while pressing the [a] portion of the Y-axis (upper side) knob, fit the larger stage knob extension adapter to the Y-axis (upper side) knob from below.

3 Then, fit the smaller stage knob extension adapter to the X-axis (lower side) knob from below.



4 Rotating the stage

1 Slightly loosen the stage clamping screw [a].

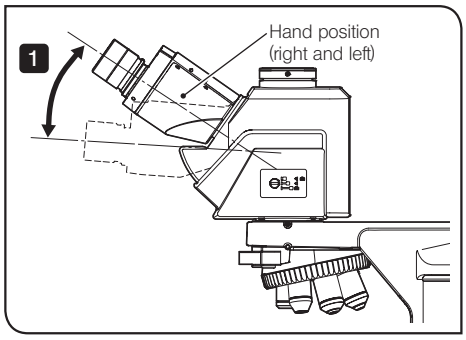
2 The stage can be rotated both clockwise and counterclockwise by holding the stage clamping screw [a].

NOTE **A click sound may be heard during rotation, but this sound is due to the nature of the structure of the stage holder and does not indicate a malfunction.**

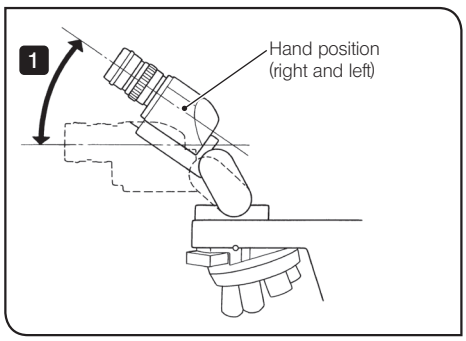
The rotatable angle of the stage varies as follows depending on the right hand knob or the left hand knob.

	Rotation direction and rotatable angle of stage	
	Clockwise ([b])	Counterclockwise ([c])
Right hand knob	239°	20°
Left hand knob	20°	239°

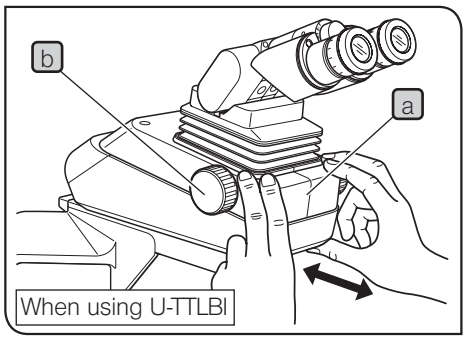
3-4 Observation tube

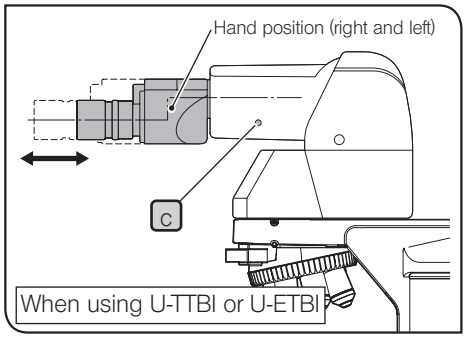


The picture shows the hand position when adjusting the tilt of U-TTR-3. (same for other observation tubes)



The picture shows the hand position when adjusting the tilt of U-TBI-3. (same for other observation tubes)





1 Adjusting the tilt

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

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

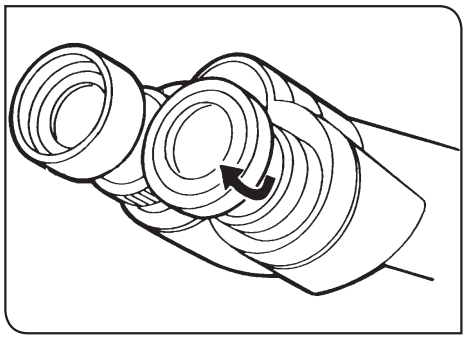
Observation tube	Eyepiece adjustment range		
	Angle	Height	Front/Back
U-SWETTR-5	0° to 35°		
U-TTR-3	5° to 35°		
U-TBI-3	5° to 35°		
U-TTBI	0° to 25°		Front/back: 45 mm
U-ETBI	0° to 25°		Front/back: 45 mm
U-TTLBI	0° to 27°	Up/down: 45 mm	Front/back: 55 mm

1 Holding the binocular section with both hands, move up and down to set to the easy-to-see position.

NOTE
- **Be careful, if you apply the excessive force to the binocular from the upper or lower limit stop position, the system may be damaged.**
- **When storing the microscope, keep the eyepieces raised up in order to prevent the eyepieces from falling.**

TIP
- To adjust the front/back position of the observation tube when using U-TTLBI, hold the base [a] of the observation tube.
- To adjust the up/down position of the observation tube when using U-TTLBI, rotate the dial [b].
- To adjust the front/back position of the eyepiece when using U-TTBI or U-ETBI, loosen the fixing knob [c], hold the binocular section with both hands and adjust to the position easy to observe. After adjustment, tighten the fixing knob [c].

The intermediate attachments combinable with U-TTBI and U-TTLBI are limited. If you use an intermediate attachment, contact us.



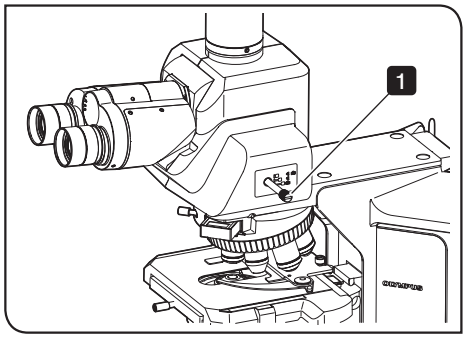
2 Using the eye shades

When wearing eyeglasses

Use the eye shades in the folded-down position.

When not wearing eyeglasses

Raising the folded-down eyeshades in the arrow direction prevents the unnecessary light from entering between eyepieces and eyes.



3 Selecting 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.

1 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 position	Pulled out
U-SWETTR-5	Eyepiece 100%		Eyepiece 20% Camera 80%
U-SWTR-3	Eyepiece 100%	Eyepiece 20% Camera 80%	Camera 100%
U-ETR-4	Eyepiece 100%		Camera 100%
U-TR30NIR	Eyepiece 100%	Eyepiece 50% Camera 50%	Camera 100%
U-TR30-2	Eyepiece 100%	Eyepiece 20% Camera 80%	Camera 100%
U-TTR-3*	Eyepiece 50% Camera 50%	Eyepiece 100%	Camera 100%

* The light path selection lever of U-TTR-3 is replaceable and can be attached to the other side.

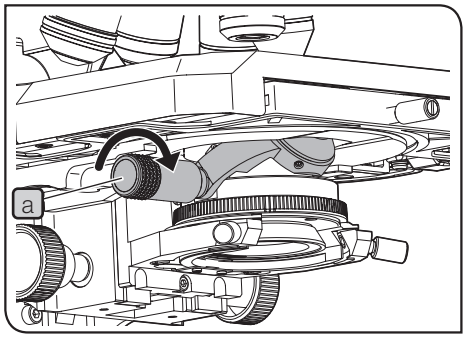
1. Put the edge of a coin in the groove on the tip of the light path selection lever and rotate the coin counterclockwise to remove the light path selection lever.
2. Remove the cap from the other side (side to attach the lever).
3. Insert the end of the light path selection lever into the hole to attach the light path selection lever. Put the edge of a coin in the groove and rotate the coin clockwise to attach the light path selection lever.
4. Attach the removed cap to the opposite side (side where the lever was removed).

3-5 Condenser

For the centering of the condenser, see "Centering the field diaphragm (FS)" (page 11).

1 Swinging-out the top lens of the condenser

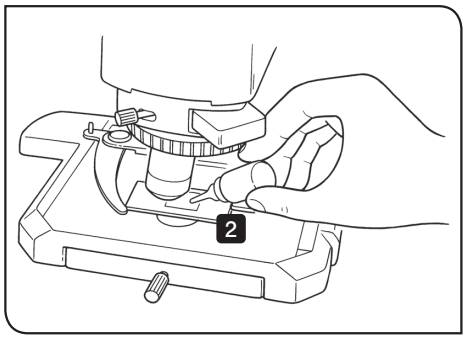
When using the swing-out type condenser for observation using the 1.25X to 4X objective, swing-out the top lens of the condenser, fully open the aperture diaphragm and use the field diaphragm in the base as an aperture diaphragm. With the 1.25X objective, the periphery of the field of view may become dark even though the top lens is swung out.



The picture shows U-SC3.

1 Rotate the knob [a] in the arrow direction to swing-out the top lens.

3-6 Oil immersion objective



1 Using the oil immersion objective

Apply the specified oil (immersion oil) to the tip of the oil immersion objective. Otherwise, the image is not viewed clearly.

NOTE **Always use the immersion oil made by us. Using immersion oil which is not provided by us cannot deliver the intended optical performance.**

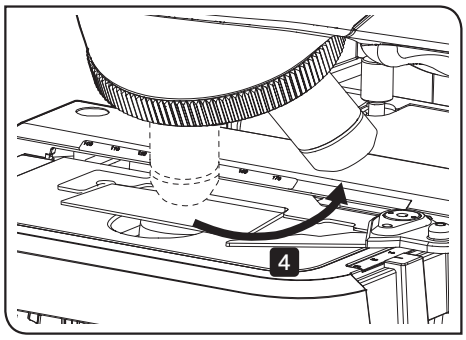
1 Change the objective in order from the low magnification to the high magnification to bring the specimen into focus.

2 Apply the immersion oil on the observation position of the specimen before engaging the oil immersion objective into the light path.

3 Rotate the revolving nosepiece to engage the oil immersion objective in the light path, and rotate the fine focusing knob to bring the specimen into focus.

NOTE **If the immersion oil contains air bubbles, the image will be degraded. Make sure that the oil is free of air bubbles. To remove bubbles, rotate the revolving nosepiece slightly to move the oil immersion objective back and forth a few times.**

TIP
- If the condenser engraving shows a numerical aperture (NA) of 1.0 or higher, the number applies only when oil is applied between the slide glass and the top surface of the condenser. When oil is not present, the NA is about 0.9.
- When applying the oil between the slide glass and the top surfac of the condenser, apply a drop of oil on the top surface of the condenser first and then place the slide glass.



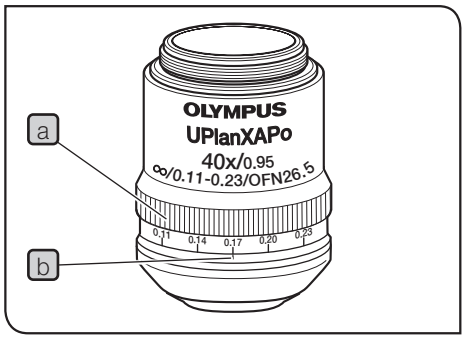
4 After use, lower the stage and rotate the revolving nosepiece, and remove the objective attached with oil from the specimen.

5 Wipe off the immersion oil thoroughly from the tip of the objective and the tip of the condenser lens with the cleaning paper or the gauze slightly moistened with absolute alcohol. Wipe off the immersion oil from the specimen in the same procedures.

NOTE **If you leave the immersion oil without wiping it off, the immersion oil may adhere to the specimen and cause incorrect observation.**

⚠CAUTION **Follow the cautions indicated on the label of the immersion oil.**

3-7 Objective with correction collar



This function is available when the objective equipped is combined with the correction collar.

The cover glass thickness must be matched with the scale value of the correction collar to deliver the full performance of the objective.

When the cover glass thickness is known

Rotate the correction collar a to match the scale value of the cover glass with the index b.

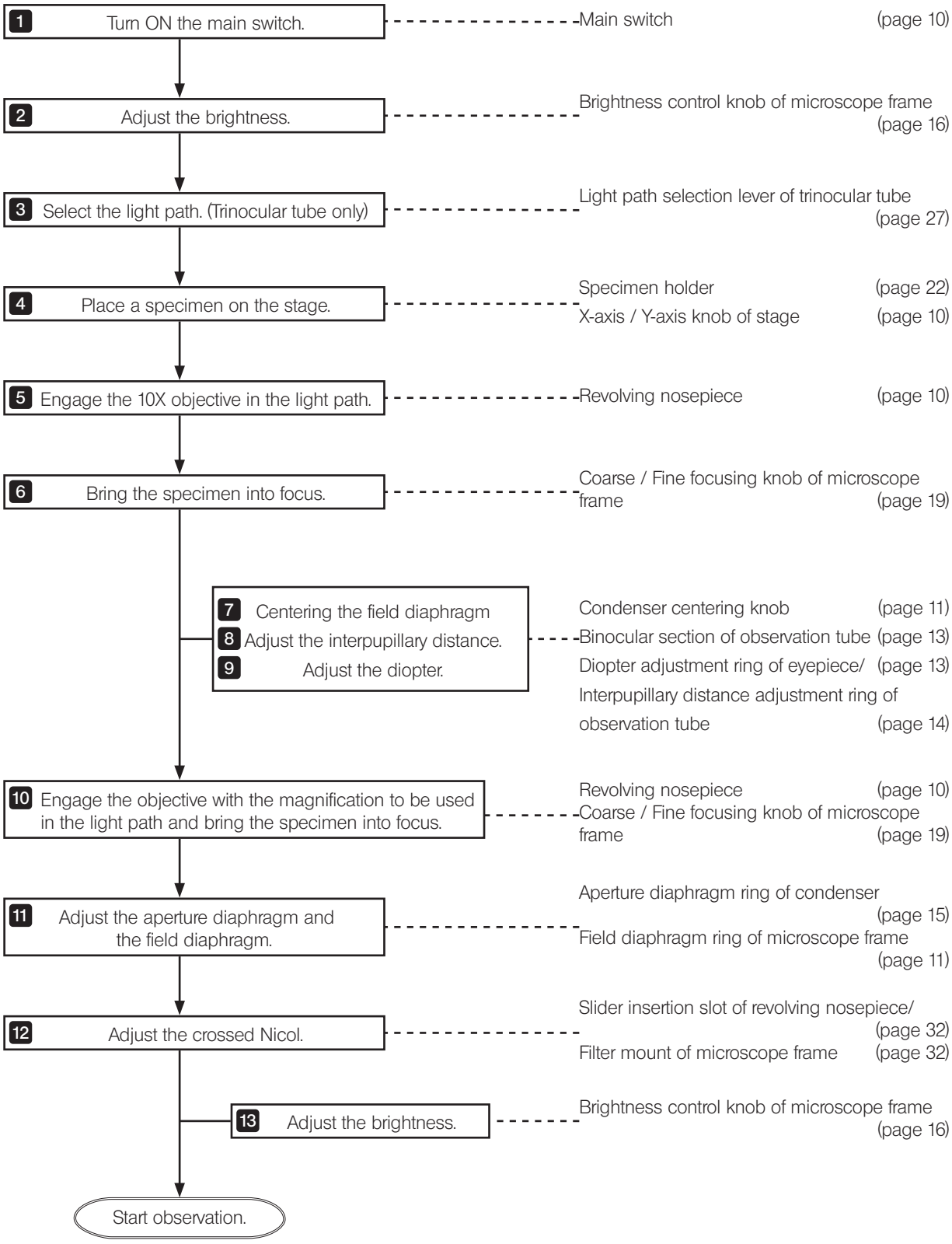
When the cover glass thickness is unknown

Move the correction collar a and the fine focusing knob alternately until the position with the highest contrast of the observed image is obtained.

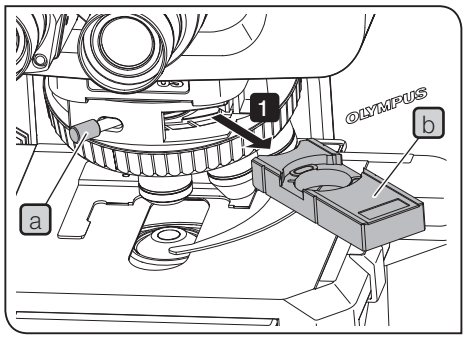
NOTE **Be careful not to touch the correction collar when rotating the revolving nosepiece.**

4 Observation procedures other than transmitted light brightfield observation

4-1 Simple polarization observation procedures



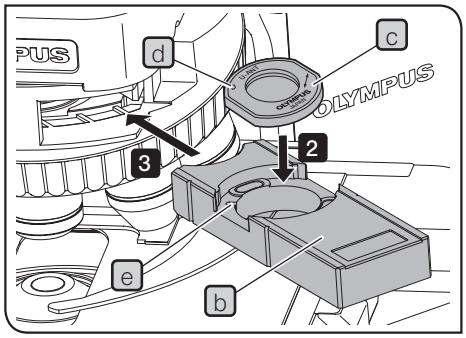
4-2 Adjusting the crossed Nicol



1 Setting the analyzer

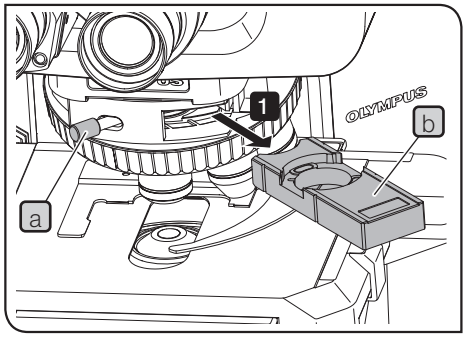
Using the analyzer for transmitted light (U-ANT)

1 Loosen the fixing knob [a] of the revolving nosepiece to remove the dummy slider [b].



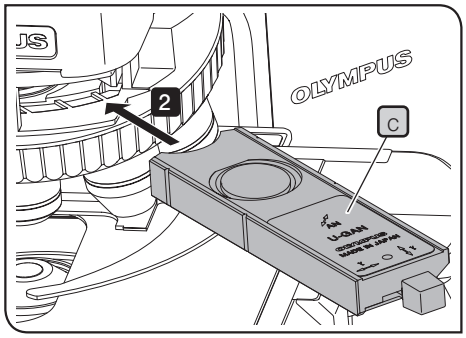
2 Face the display surface of the analyzer for transmitted light [c] up, align the index [d] with the groove [e] of the mount of the dummy slider [b] and fit the analyzer for transmitted light into the mount of the dummy slider [b]. (It is secured by magnet.)

3 Insert the dummy slider [b] into the slider insertion slot of the revolving nosepiece and tighten the clamping knob [a] to secure it.



Using the analyzer for urate crystals observation (U-GAN)

1 Loosen the fixing knob [a] of the revolving nosepiece to remove the slider or the dummy slider [b] that is inserted.



2 Insert the analyzer for urate crystals observation into the slider insertion slot of the revolving nosepiece facing the display surface [c] up and tighten the clamping knob [a] to secure it.

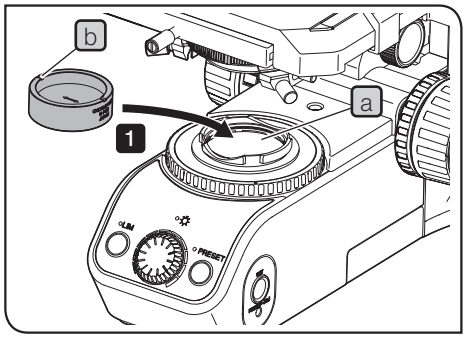
2 Setting the polarizer

When the condenser equipped with a polarizer is attached

1 Engage the polarizer built in the condenser in the light path.

The following types of condensers are equipped with polarizers.

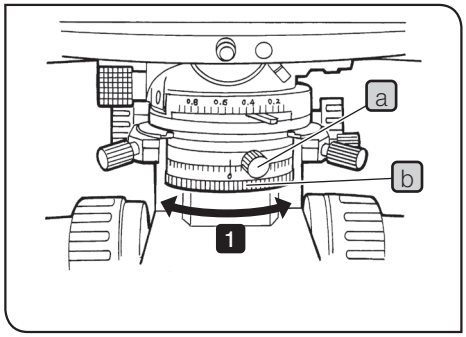
- Universal condenser (U-UCD8-2)
- Motorized universal condenser (BX3-UCD8A)
- Polarizing condenser (U-POC-2)



When the condenser equipped with a polarizer is not attached

1 Insert the polarizer (U-POT) into the filter mount (window lens a) of the base of the microscope frame facing the indexes (grooves) b of the polarizer up. At this time, be sure to insert the polarizer so that the indexes (grooves) of the polarizer are placed horizontally when viewed from the front of the microscope.

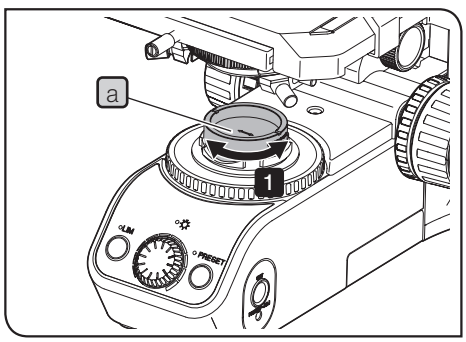
NOTE **If it is difficult to attach the polarizer due to the narrow space between the base of the microscope frame and the stage, rotate the coarse focusing knob to raise the stage.**



3 Adjusting the crossed Nicol

When the condenser equipped with a polarizer is attached

1 Loosen the clamping screw a of the polarizer and rotate the polarizer rotation ring b to set it to 0° temporarily. Then, rotate the polarizer rotation ring b and tighten the clamping screw a at the position where the field of view becomes the darkest (crossed Nichol).



When the condenser equipped with a polarizer is not attached

1 While looking through eyepieces, rotate the polarizer (U-POT) a with your hand so that the field of view becomes the darkest (crossed Nichol).

4-3 Fluorescence observation procedures

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

4-4 Phase contrast observation procedures

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

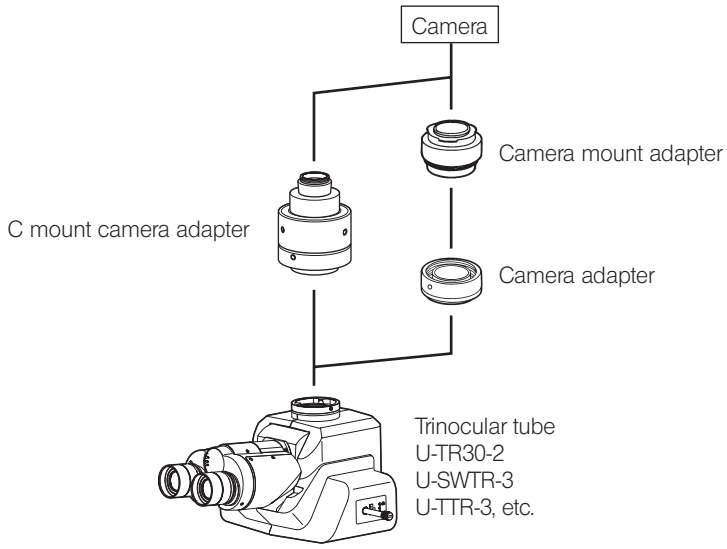
4-5 Differential interference contrast observation procedures

For details of the differential interference contrast observation, refer to the instruction manual provided with the unit.

5 Image acquisition

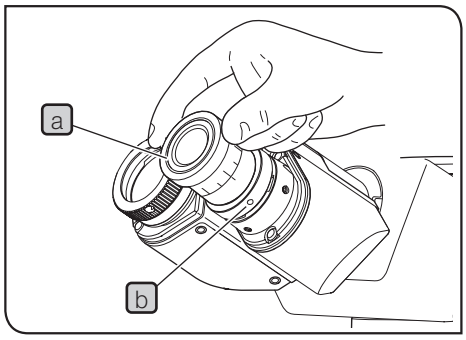
Attaching the camera adapter and the microscope digital camera to the trinocular tube allows you to acquire the observed image. The image acquisition range is determined by the size of the image sensor used in the camera and the magnification of the camera adapter.
For details, refer to the instruction manual for the camera and the camera adapter.

NOTE **When using the camera adapter, be sure to adjust the parfocality of the camera adapter and eyepieces. Otherwise, the focusing of the image through eyepieces will not match with that of the image acquired by the camera.**
For procedures to adjust the parfocality, refer to the instruction manual of the respective camera adapter.



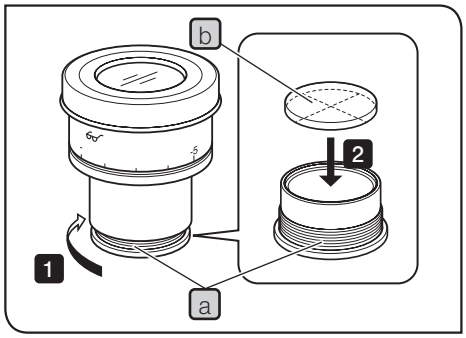
6 Replacement of the eyepiece and the objective

6-1 Removing and attaching the eyepiece



1 Removing the eyepiece

1 Pull out the eyepiece [a] from the eyepiece sleeve [b].



2 Attaching the eyepiece micrometer

You can use the eyepiece micrometer to check the size of the observed image or the center position of the observation field of view, etc. For the eyepiece micrometer types attachable to your eyepiece, contact us.

Attachable eyepiece micrometer
Size
Ø24 mm Thickness: 1.5 mm

1 Hold the eyepiece frame, and rotate the built-in reticle holder [a] in the arrow direction to remove it.

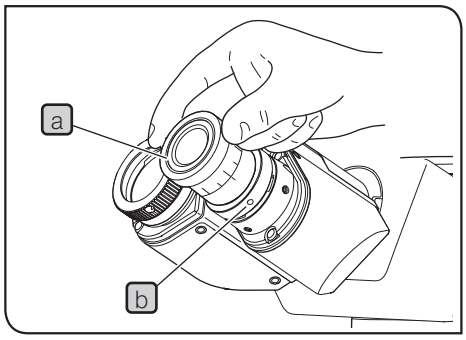
TIP Depending on the case, the reticle holder may be tightened too firmly and it cannot be rotated. If you grab the reticle holder too firmly, it will be deformed and cannot be rotated furthermore. Grab around the reticle holder lightly with equal force to rotate or push it to the rubber sheet placed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

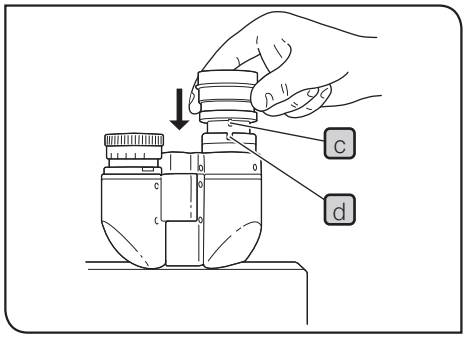
2 Insert the eyepiece micrometer [b] in the removed reticle holder [a] with the display surface of the eyepiece micrometer facing down.

3 Screw in the reticle holder [a] to the bottom of the eyepiece.

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

• Do not tighten the reticle holder with excess force.





3 Attaching the eyepiece

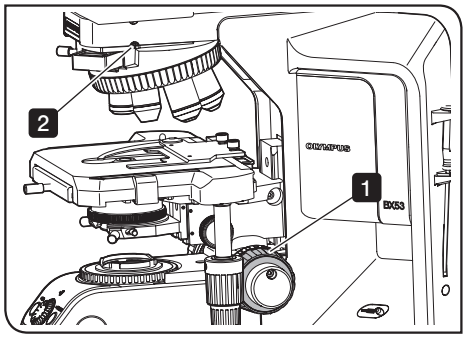
1 Insert the eyepiece [a] into the eyepiece sleeve [b] until it touches the end.

NOTE
- As the binocular tube does not have a positioning groove, it cannot be used with an eyepiece equipped with a positioning pin.
- 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 [c] enters the groove [d] below the eyepiece sleeve.
- The super widefield eyepiece (SWH10X-H) has a positioning pin. Attach it by inserting the positioning pin to the positioning groove of the eyepiece sleeve.

6-2 Replacing the objective

When replacing the objective, remove the revolving nosepiece from the standard arm (or fluorescence illuminator) before replacing the objective.
If you attach the objective without removing the revolving nosepiece, the objective will be screwed upward (direction opposite to gravity). So, it will be difficult to screw the objective fully into the revolving nosepiece to secure firmly. Also, since the screw hole is not visible, you may screw in the objective while the screw is not engaged properly, which may damage the screw.

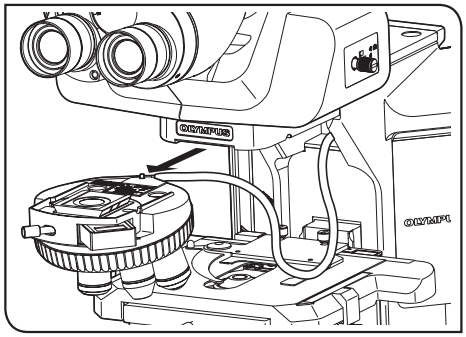
NOTE **When attaching or detaching the coded nosepiece or motorized nosepiece, be sure to remove the cable from the connector in advance. Also, if cables are fixed by the cable holder, remove the cable from the cable holder.**



1 Removing the revolving nosepiece

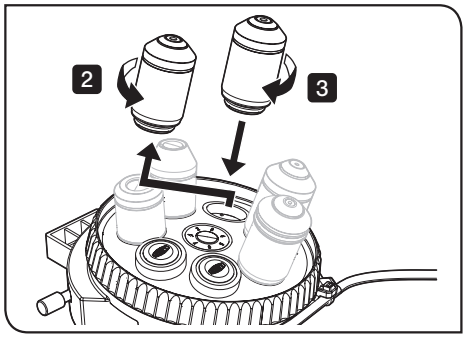
1. Rotate the coarse focusing knob to lower the stage sufficiently.
2. Loosen the revolving nosepiece clamping screw using an Allen screwdriver.

NOTE **If the clamping screw is loosened too much, the revolving nosepiece is caught with the clamping screw and it cannot be removed. And, if the clamping screw is loosened furthermore, the clamping screw may come off.**



3. Pull out the revolving nosepiece from the standard arm (or fluorescence illuminator) toward the front side.

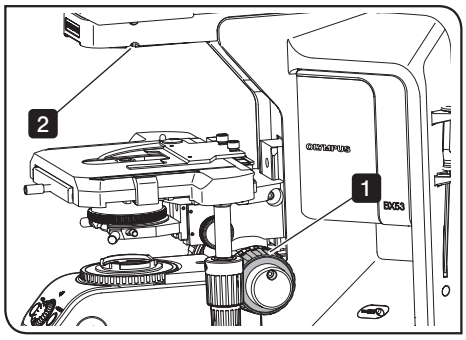
NOTE
- **The revolving nosepiece attached with objectives becomes heavier. It is recommended to put a soft cloth on the stage before removing the revolving nosepiece so that the objectives won't collide with the stage due to its own weight and get damaged.**
- **When using the coded nosepiece or motorized nosepiece, be careful not to allow cables to be stretched too much or get caught in other objects.**



2 Removing and attaching the objective

TIP The numbers are given to the screw holes of the coded revolving nosepiece or motorized revolving nosepiece. The screw hole numbers are displayed in the center of the revolving nosepiece.

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



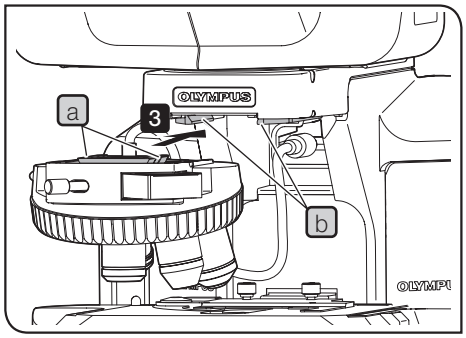
3 Attaching the revolving nosepiece

1 Rotate the coarse focusing knob to lower the stage sufficiently.

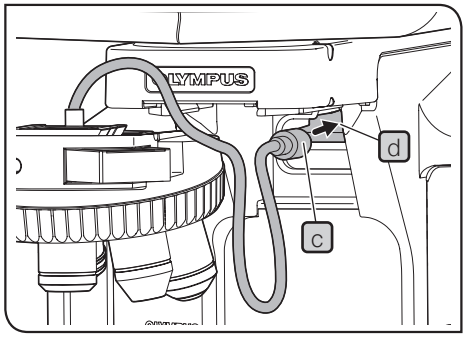
2 Loosen the revolving nosepiece clamping screw using an Allen screwdriver.

NOTE **If the clamping screw is loosened too much, the revolving nosepiece is caught with the clamping screw and it cannot be attached. And, if the clamping screw is loosened further, the clamping screw may come off.**

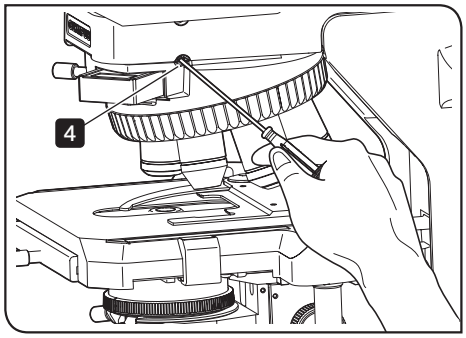
If 1 and 2 in "Removing the revolving nosepiece" (page 38) are performed, 1 and 2 are not necessary.



3 Aligning the slide dovetail a of the revolving nosepiece along the nosepiece mount dovetail b of the standard arm (or fluorescence illuminator), insert the revolving nosepiece from the front side and push it until it touches the end. When attaching the coded nosepiece or motorized nosepiece, put the cable c for the revolving nosepiece through the cable hole d on the top of the microscope frame, and put it out to the back of the microscope frame.



NOTE **If the revolving nosepiece is pushed in while the cable is slackened, the cable may be caught between the microscope frame and the revolving nosepiece. When pushing in the revolving nosepiece, if the cable is slackened in the middle, pull out the cable from the back of the microscope frame each time.**



4 Pushing the revolving nosepiece in the attaching direction with your left hand, hold the Allen screwdriver between the pointing finger and the thumb and tighten the revolving nosepiece clamping screw to secure the revolving nosepiece.

5 Connect the cable coming out of the back of the microscope frame in 3 to either one of following units.

Attaching the coded nosepiece

- Microscope frame (BX53F2)
- Interface for coded nosepiece (U-IFRES)

Attaching the motorized nosepiece

- Control box (BX3-CBM)

For procedures to connect to BX53F2 in detail, see “Connecting cables” (page 64). For procedures to connect to U-IFRES or BX3-CBM in detail, refer to the instruction manual provided with the respective unit.

MEMO

7 Troubleshooting

If problems occur, please review the following list and take remedial action as needed.
If you cannot solve the problem after checking the entire list, please contact us for assistance.

7-1 Optical systems

Problem	Cause	Remedy	Page
a) The light source does not turn ON.	The cable is disconnected.	Connect the cable completely.	64
	The power cord is unplugged.	Connect the power cord to a power outlet securely.	65
b) Even though the light source turns ON, the field of view is still 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.	11, 15
	The condenser is lowered too much.	Adjust the condenser position.	55
	The 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 position.	27
	The shutter of the shutter unit (BX3-SHT) is closed.	Open the shutter of the shutter unit (BX3-SHT).	–
c) The peripheral area of the observation 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.	27
	The objective is not engaged in the light path properly.	Rotate the revolving nosepiece until it clicks to engage the objective in the light path.	10
	The condenser is not attached correctly.	Push in the condenser along the dovetail of the condenser holder until it touches the end, and secure it.	55
	The revolving nosepiece is not attached correctly.	Push in the revolving nosepiece along the mount dovetail until it touches the end, and secure it.	39
	The centering of the field diaphragm is not performed.	Perform the centering of the field diaphragm correctly.	11
	The field diaphragm is narrowed down too far.	Open the field diaphragm sufficiently.	11
	The following parts are dirty. • Eyepiece • Tip of objective • Top surface of condenser • Window lens • Specimen	Clean them sufficiently.	5
d) Dust or stains are visible in the observation field of view.	The following parts are dirty. • Eyepiece • Tip of objective • Top surface of condenser • Window lens • Specimen	Clean them sufficiently.	5

Problem	Cause	Remedy	Page
e) The observed image glares.	The aperture diaphragm is narrowed down too far.	Adjust the aperture diaphragm according to the numerical aperture of the objective to use.	15, 50
	The condenser is lowered too much.	Adjust the condenser position.	55
f) The observed image is blurred in white or unclear.	The objective for UIS2(UIS) series is not used.	Replace with the objective for UIS2(UIS) series.	38, 50
	The revolving nosepiece is not attached correctly.	Push in the revolving nosepiece along the mount dovetail until it touches the end, and secure it.	39
	The objective is not engaged in the light path properly.	Rotate the revolving nosepiece until it clicks to engage the objective in the light path.	10
	The following parts are dirty. • Eyepiece • Tip of objective • Top surface of condenser • Window lens • Specimen	Clean them sufficiently.	5
	The immersion oil is not used with an oil immersion objective.	Use the immersion oil.	29
	The immersion oil contains bubbles.	Remove the air bubbles.	29
	The specified immersion oil is not used.	Use the immersion oil provided by us.	29
	The objective which is not matched with the cover glass thickness of the specimen is used.	Use the objective matched with the cover glass thickness of the specimen.	22
	The specimen is placed on the stage upside down.	Place the specimen on the stage in the correct orientation.	22
	The correction collar of the objective equipped with correction collar is not adjusted.	Adjust the correction collar of the objective equipped with correction collar.	30
	The immersion oil is attached to the tip of the non-oil immersion objective.	Clean the tip of the objective thoroughly.	5
	The immersion oil on the specimen is not wiped off after observation with the oil immersion objective.	Wipe off the immersion oil on the specimen.	29

Problem	Cause	Remedy	Page
g) One side of the observed image is blurred.	The revolving nosepiece is not attached correctly.	Push in the revolving nosepiece along the mount dovetail until it touches the end, and secure it.	39
	The stage is not mounted correctly.	Mount the stage correctly.	57
	The objective is not engaged in the light path properly.	Rotate the revolving nosepiece until it clicks to engage the objective in the light path.	10
	The specimen is not placed on the stage properly.	Place the specimen on the stage properly and secure it using the specimen holder.	22
h) The specimen is not in focus.	The specimen is placed on the stage upside down.	Place the specimen on the stage in the correct orientation.	22
	The immersion oil is attached to the tip of the non-oil immersion objective.	Clean the tip of the objective thoroughly.	5
	The immersion oil on the specimen is not wiped off after observation using the oil immersion objective.	Wipe off the immersion oil on the specimen.	29
i) The observed image shifts when defocusing.	The nosepiece is not attached correctly.	Push in the revolving nosepiece along the mount dovetail until it touches the end, and secure it.	39
	The objective is not engaged in the light path properly.	Rotate the revolving nosepiece until it clicks to engage the objective in the light path.	10
	The aperture diaphragm is narrowed down and the centering is not performed yet.	Perform the centering of the aperture diaphragm.	15
	The stage is not mounted correctly.	Mount the stage correctly.	57
j) Though the brightness control knob is rotated, the field of view does not become bright enough.	The aperture diaphragm is narrowed down and the centering is not performed yet.	Perform the centering of the aperture diaphragm.	15
	The shutter of the shutter unit (BX3-SHT) is closed.	Open the shutter of the shutter unit (BX3-SHT).	–
k) The observed image looks bluish.	The color temperature of the LED light source is high.	Engage the LBA filter in the light path.	62
l) The observed image looks reddish.	The LBA filter is engaged in the light path.	Remove the LBA filter from the light path.	62

7-2 Electrical systems

Problem	Cause	Remedy	Page
a) The pilot indicator does not turn ON.	The cable is disconnected.	Connect the cable completely.	64
	The power cord is unplugged.	Connect the power cord to a power outlet securely.	65
b) A beep is heard five times and the pilot indicator blinks.	The U-LHLEDC100 is damaged, or the cable for U-LHLEDC100 is not connected.	Connect the cable for U-LHLEDC100 completely.	64
c) The light source turns ON and OFF.	Cables are not connected completely.	Connect the cables completely.	64
d) Even though the brightness control knob is rotated, the brightness does not change.	PRESET is enabled.	Press the PRESET switch to disable PRESET.	16

7-3 Coarse/fine focusing

Problem	Cause	Remedy	Page
a) The tension of the coarse focusing knob is too tight.	The coarse focusing tension adjustment ring of the coarse focusing knob is tightened too firmly.	Loosen the coarse focusing tension adjustment ring so that the tension of the coarse focusing knob becomes the appropriate tightness.	20
	The stage is to be raised while the pre-focusing lever is set to LOCK.	Cancel LOCK of the pre-focusing lever.	21
b) The stage descends on its own weight. Or the specimen is defocused due to the slip of the coarse focusing knob.	The coarse focusing tension adjustment ring of the coarse focusing knob is loosened too much.	Tighten the coarse focusing tension adjustment ring so that the tension of the coarse focusing knob becomes the appropriate tightness.	20
c) The specimen is not in focus. (The stage does not rise.)	The height of the stage is adjusted too low.	Raise the stage or the raise the stage holder mount position.	19, 53
	The pre-focusing lever is set to LOCK at the position where the stage is placed low.	Cancel LOCK of the pre-focusing lever, bring the specimen into focus with the coarse focusing knob and lock the pre-focusing lever again.	21
d) The stage cannot be lowered.	The condenser is lowered too much.	Adjust the condenser position.	55
f) The objective collides with the specimen before the specimen comes into focus.	The specimen is placed on the stage upside down.	Place the specimen on the stage in the correct orientation.	22

7-4 Observation tube

Problem	Cause	Remedy	Page
a) The fields of view of two eyes do not coincide.	The interpupillary distance is not adjusted correctly.	Adjust it correctly.	13
	The difference in diopter of two eyes is not corrected properly.	Correct it properly.	13
	Different eyepieces are used for right side and left side.	Use the same eyepiece for right side and left side.	37
	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 look away from the eyepieces and look afar once, and then look into the eyepieces.	–

7-5 Stage

Problem	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.	57
b) The movement in X-axis direction (right and left) stops in the middle.	The specimen is not placed properly.	Place the specimen properly.	22
c) The tension of the X-axis and Y-axis knobs is too tight or too loose.	The tightness of the X-axis and Y-axis adjustment knobs is not adjusted appropriately.	Adjust the X-axis and Y-axis adjustment knobs to the appropriate tightness.	24
d) The movement range becomes smaller.	The stage guide shifts.	Correct it according to Remedy.	24

Repair request

If you cannot improve the problem after taking the above remedies, please contact us for assistance.

At that time, please tell them the following information as well.

- Product name and abbreviation (Example: Swing-out condenser U-SC3)
- Product number
- Problem

8 Specifications

Item	Specifications					
Optical system	UIS2(UIS) optical system (infinity correction)					
Illumination system	Kohler illumination optical system High intensity and high color rendering LED (Average life time: Approximately 50,000 h in rated use) LED current adjustment range: 0 mA to 680 mA (continuously variable) Equipped with Light Manager function Equipped with PRESET switch (The preset current can be set to the arbitrary position within the adjustment range.) Rating : 100–120/220–240 V ～ 0.5/0.3 A 50/60 Hz Power consumption: 24 W					
Focusing mechanism	Stage height movement by roller guide (rack & pinion) Movement distance per rotation of fine focusing knob: 0.1 mm Movement distance per rotation of coarse focusing knob: 17.8 mm Movable range: 25 mm Coarse focusing upper limit stopper function Coarse focusing knob: Tension adjustment function					
Revolving nosepiece	Product name	U-D7REA	U-D7RES / U-D6RES	U-D7RE / U-D6RE	U-P6RE / U-P4RE	U-5RE-2
	Model type	7 position motorized nosepiece (operable by hand)	Manual coded nosepiece	Manual revolving nosepiece	Manual centering revolving nosepiece	5 position revolving nosepiece
	Attachable unit	DIC prism slider Transmitted light analyzer				None
Observation tube	Product name	U-BI30-2	U-TBI-3 / U-TBIL-3-CLI	U-TR30-2 U-TR30NIR	U-TTR-3	U-TTBI
	Model type	Widefield binocular tube	Widefield tilting binocular tube	Widefield trinocular tube	Widefield tilting trinocular tube	Widefield tilt & telescopic binocular tube
	Field number	22	22	22	22 26.5 *	22
	Tube tilting angle	30°	5° to 35° (Changeable continuously)	30°	5° to 35° (Changeable continuously)	0° to 25° (Changeable continuously)
	Interpupillary distance adjustable range	50 mm to 76 mm				
	Light path selection	None		3 level selection: (1) Eyepiece 100% (2) U-TR30NIR: Eyepiece 50%, Camera 50% U-TR30-2: Eyepiece 20%, Camera 80% (3) Camera 100%	3 level selection: (1) Camera 100% (2) Eyepiece 100% (3) Eyepiece 50%, Camera 50%	None

* When the intermediate attachment is not combined.

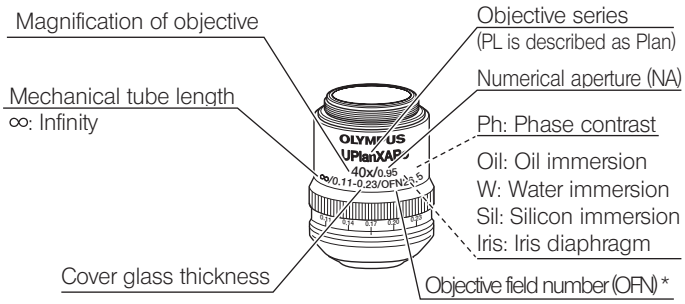
Item	Specifications					
Observation tube	Product name	U-TTLBI	U-SWTR-3	U-ETBI	U-ETR-4	U-SWETTR-5
	Model type	Widefield tilt & telescopic lift binocular tube	Super widefield trinocular tube	Widefield upright tilt & telescopic binocular tube	Widefield upright trinocular tube	Super widefield upright tilting trinocular tube
	Field number	22	26.5	22	22	26.5
	Tube tilting angle	0° to 27° (Changeable continuously)	30°	0° to 25° (Changeable continuously)	30°	0° to 25° (Changeable continuously)
	Interpupillary distance adjustable range	50 mm to 76 mm				
	Light path selection	None	3 level selection: (1) Eyepiece 100% (2) Eyepiece 20%, Camera 80% (3) Camera 100%	None	2 level selection: (1) Eyepiece 100% (2) Camera 100%	2 level selection: (1) Eyepiece 100% (2) Eyepiece 20%, Camera 80%
Stage	Product name	U-SVRB-4	U-SVLB-4	U-SVRO	U-SVLO	
	Model type	Coaxial knob on bottom right	Coaxial knob on bottom left	Coaxial knob on bottom right	Coaxial knob on bottom left	
		Stage surface : Rectangular ceramic-coating		Stage surface : With rectangular concavities for oil immersion		
		Wire-driven stage (The knob length is adjustable with the optional unit.)				
	Cross movement mechanism	X- and Y-axis knobs with adjustable tension Movement range: 52 mm in vertical (Y) direction, 76 mm in horizontal (X) direction				
	Specimen holder (for observing one slide glass)	U-HLST-4 (thick specimen holder) U-HLS-4 (thin specimen holder)				
	Specimen holder (for observing two slide glasses)	U-HLDT-4 (left-open, thick specimen holder) U-HLD-4 (left-open, thin specimen holder)	U-HRDT-4 (right-open, thick specimen holder) U-HRD-4 (right-open, thin specimen holder)	U-HLDT-4 (left-open, thick specimen holder) U-HLD-4 (left-open, thin specimen holder)	U-HRDT-4 (right-open, thick specimen holder) U-HRD-4 (right-open, thin specimen holder)	
	Product name	U-SRG2	U-SRP	U-SP		
	Model type	External knurling	External knurling	–		
		Mating rotatable stage with centering function	Bearing rotatable stage with centering function	Fixed stage		
	Cross movement mechanism	Using optional unit (U-FMP) Movement range: Rotation in 360 degrees		None		
	Specimen holder (for observing one slide glass)	Fixed with the provided stage clip				
	Specimen holder (for observing two slide glasses)	–				

Item	Specifications				
Condenser	Product name	BX3-UCD8A	U-UCD8-2	U-AAC	U-SC3
	Model type	• Achromat / Aplanat • Motorized swing-out	• Achromat / Aplanat • Swing-out	Achromat / Aplanat	Swing-out
	N.A.	1.4 (when using U-TLO), 0.9 (when using U-TLD)		1.4	0.9
	Aperture diaphragm	Motorized open/ close system	With aperture diaphragm scale		
	Recommended magnification of objective	1.25X to 100X (Super widefield: FN26.5)	1.25X to 100X (Super widefield: FN26.5)	10X to 100X (Super widefield: FN26.5)	1.25X (Widefield: FN22) 2X to 100X (Super widefield: FN26.5)
	Product name	U-AC2	U-LC	U-ULC-2	U-POC-2
	Model type	Abbe	Low magnification	Super low magnification	• Swing-out • For polarization
	N.A.	1.10	0.75	0.16	0.9
	Aperture diaphragm	With aperture diaphragm scale			
	Recommended magnification of objective	4X (Widefield: FN22) 10X to 100X (Super widefield: FN26.5)	2X to 60X (Widefield: FN22)	1.25X to 4X (Super widefield: FN26.5)	4X to 100X (Super widefield: FN26.5)
	Product name	U-PCD2	U-DCD	U-DCW	
	Model type	• Abbe • Phase contrast, darkfield	Darkfield	Darkfield	
	N.A.	1.10	0.92 to 0.8	1.4 to 1.2	
	Aperture diaphragm	With aperture diaphragm scale	No aperture diaphragm		
	Recommended magnification of objective	10X to 100X (Super widefield: FN26.5)	10X to 40X (Super widefield: FN26.5)	20X (Widefield: FN22) to 100X (Super widefield: FN26.5)	
Operating environment	• Indoor use • Altitude: Max. 2000 meters • Ambient temperature: 5 to 40 °C (41 to 104 °F) • Humidity: Max. 80% (31 °C or less) (without condensation) In case of over 31 °C (88 °F), the humidity in operating environment is decreased linearly through 70% at 34 °C (93 °F), 60% at 37 °C (99 °F), and to 50% at 40 °C (104 °F). • Supply voltage fluctuation: ±10% • Pollution degree: 2 (in accordance with IEC60664-1) • Installation/Overvoltage category: Ⅱ (in accordance with IEC60664-1)				
Storage environments	• Ambient temperature: -25 to 65 °C (-13 to 149 °F) • Humidity: 0% to 90% (without condensation)				

9 Optical performance list «UIS2 series»

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

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



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

Series name / Notation / Optical performance	Numerical aperture	Working distance (mm)	Cover glass thickness (mm)	Eyepiece WHN10X(FN22) Total magnification	Eyepiece WHN10X(FN22) Actual field of view (mm)
PLN Plan Achromat (OFN 22) * / PlanN 2X	0.06	5.8	–	20X	11.0
PlanN 4X	0.10	18.5	–	40X	5.5
PlanN 10X	0.25	10.6	–	100X	2.2
PlanN 10X Ph	0.25	10.6	–	100X	2.2
PlanN 20X	0.40	1.2	0.17	200X	1.1
PlanN 20X Ph	0.40	1.2	0.17	200X	1.1
PlanN 40X	0.65	0.6	0.17	400X	0.55
PlanN 40X Ph	0.65	0.6	0.17	400X	0.55
PlanN 50X Oil Iris	0.5-0.9	0.2	0.17	500X	0.44
PlanN 100X Oil	1.25	0.15	–	1000X	0.22
PlanN 100X Oil Ph	1.25	0.15	–	1000X	0.22
LPLN Long working distance Plan Achromat (OFN 22) * / LPlanN 40X	0.60	3.4-4.1	0-1	400X	0.55
UPLFLN Plan Semi Apochromat (OFN 26.5) * / UPlanFLN 4X	0.13	17.0	–	40X	5.5
UPlanFLN 10X	0.30	10.0	–	100X	2.2
UPlanFLN 10X Ph	0.30	10.0	–	100X	2.2
UPlanFLN 20X	0.50	2.1	0.17	200X	1.1
UPlanFLN 20X Ph	0.50	2.1	0.17	200X	1.1
UPlanFLN 40X	0.75	0.51	0.17	400X	0.55
UPlanFLN 40X Ph	0.75	0.51	0.17	400X	0.55
UPlanFLN 60X	0.90	0.2	0.11-0.23	600X	0.37
UPlanFLN 60X Oil Iris	0.65-1.25	0.12	0.17	600X	0.37
UPlanFLN 60X Oil Iris Ph	0.65-1.25	0.12	0.17	600X	0.37
UPlanFLN 100X Oil	1.30	0.2	0.17	1000X	0.22
UPlanFLN 100X Oil Ph	1.30	0.2	0.17	1000X	0.22
UPlanFLN 100X Oil Iris	0.6-1.3	0.2	0.17	1000X	0.22

Series name / Notation / Optical performance		Numerical aperture	Working distance (mm)	Cover glass thickness (mm)	Eyepiece WHN10X(FN22) Total magnification	Eyepiece WHN10X(FN22) Actual field of view (mm)
UPLXAPO Plan Apochromat (OFN 26.5) *	UPlanXApo					
	4X	0.16	13.0	–	40X	5.5
	10X	0.40	3.1	0.17	100X	2.2
	20X	0.80	0.6	0.17	200X	1.1
	40X	0.95	0.18	0.11-0.23	400X	0.55
	40X Oil	1.40	0.13	0.17	400X	0.55
	60X W	1.2	0.28	0.13-0.21	600X	0.37
	60X Oil	1.42	0.15	0.17	600X	0.37
	60X Oph	1.42	0.15	0.17	600X	0.37
	100X Oil	1.45	0.13	0.17	1000X	0.22
	100X Oph	1.45	0.13	0.17	1000X	0.22
PLAPON Plan Apochromat (OFN 26.5) *	PlanApoN					
	1.25X	0.04	5.0	–	12.5X	17.6
	2X	0.08	6.2	–	20X	11
	60X OSC2	1.4	0.12	0.17	600X	0.37
MPLFLN Plan Semi Apochromat (OFN 26.5) *	MPlanFLN					
	40X	0.75	0.63	0	400X	0.55
UAPON 340 Apochromat (OFN 22) *	UApoN340					
	20X W	0.70	0.35	0.17	200X	1.1
	40X W	1.15	0.25	0.13-0.25	400X	0.55
	40X Oil	1.35	0.1	0.17	400X	0.55
MPLAPON UIS2 Objectives for Biology (OFN26.5)*	MPlanApoN					
	100X O2	1.45	0.10	0	1000X	0.22

Glossary in optical performance table

Working distance: Distance between the tip of the objective and the top surface of the cover glass.

Numerical aperture: Important value that determines the performances (resolution, focal depth and brightness) of the objective.

Resolution Increases in proportion to the numerical aperture.
Indicates the limit where the objective can identify two approaching images using the distance between 2 points on the specimen surface.

Focal depth Decreases in proportion to the numerical aperture.
Indicates the specimen 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.

Brightness.....Increases in proportion to the square of the numerical aperture. (comparing with the same magnification)

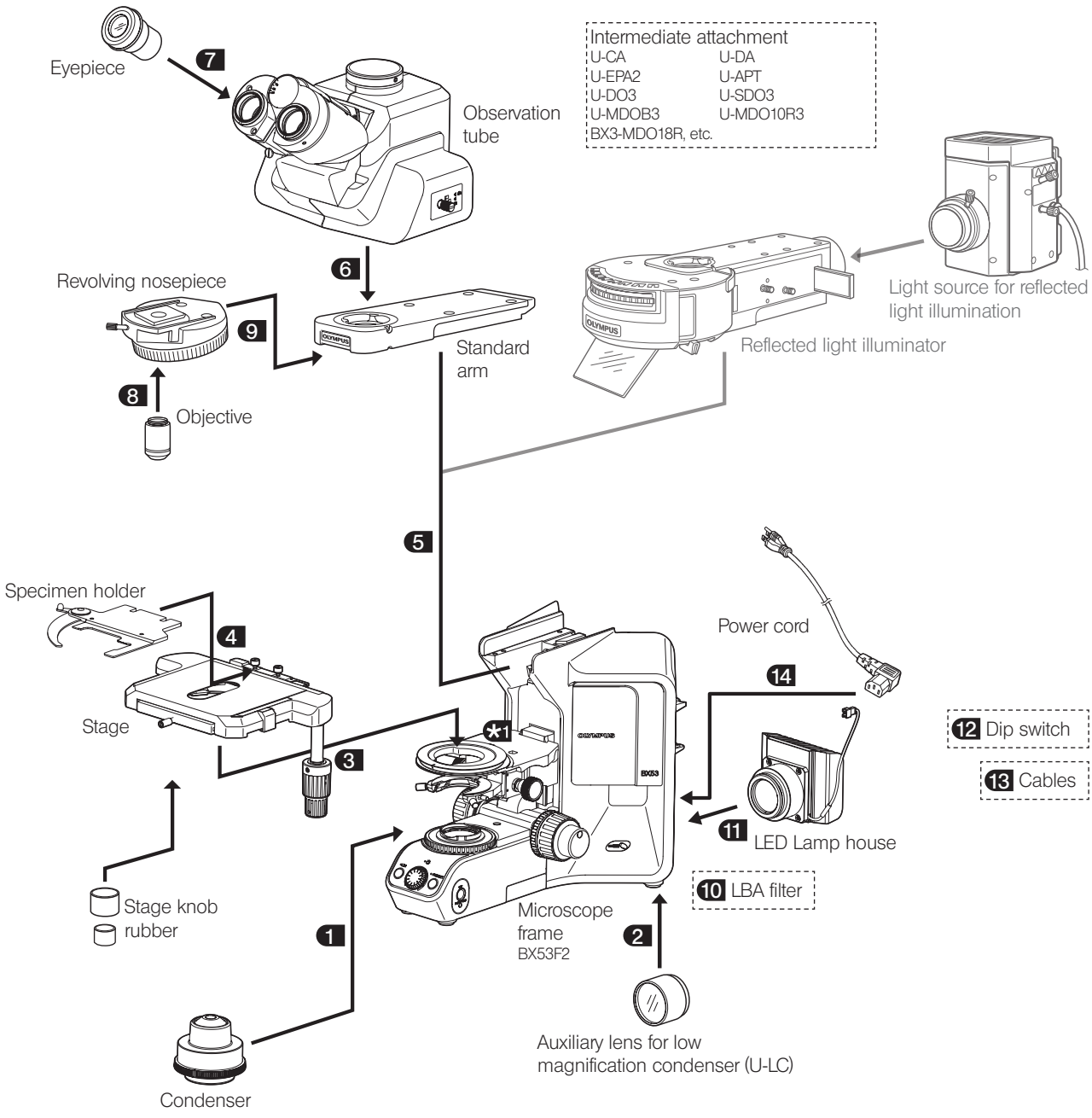
Actual field: Indicates the diameter of the field area of the specimen surface in mm.
Actual field = Field number of eyepiece / Magnification of objective

10 Assembly

10-1 Assembly diagram

The numbers in the following diagram represent the order to attach each unit.
The units shown in the following diagram are typical units. For units which are not described below, contact us or refer to the latest catalogs.

In order to deliver our intended performance, we recommend you to ask us to assemble the microscope.

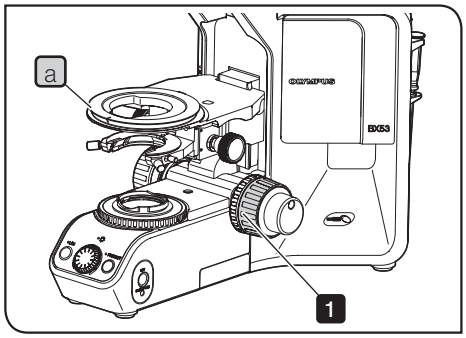


For procedures to assemble the reflected light illuminator and the light source for reflected light illumination, refer to the instruction manual provided with the unit.

10-2 Assembly procedures

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

NOTE **Before assembling the microscope, remove dust and dirt from the mount of each unit and assemble carefully so as not to scratch them.**

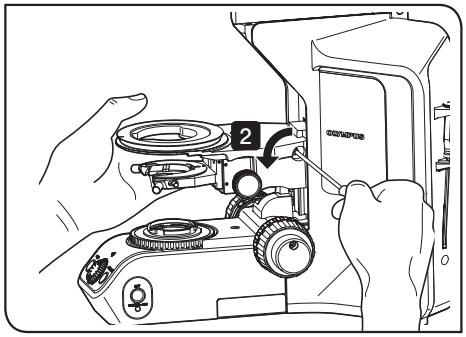


✱1 Removing the stopper of the stage holder

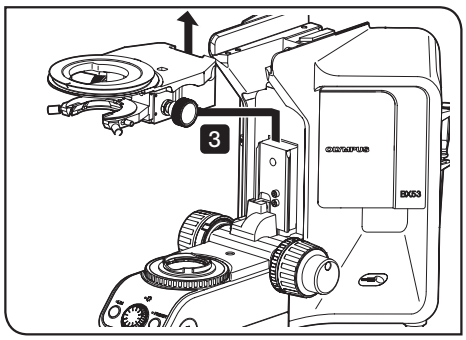
The stage holder mounting position can be lowered by removing the stopper of the stage holder.

NOTE **Be sure to remove the stopper of the stage holder before attaching the stage and the condenser.**

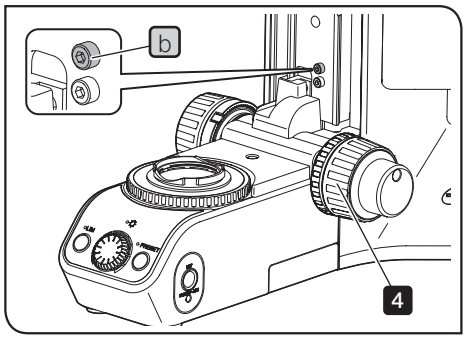
1 Rotate the coarse focusing knob to lower the stage holder a sufficiently.



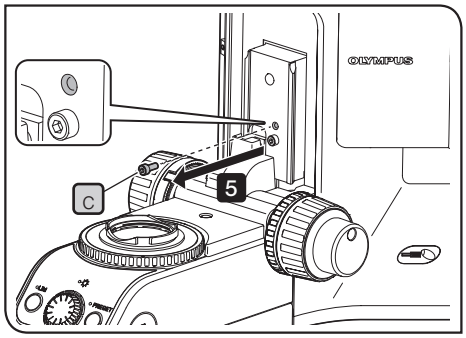
2 Holding the stage, loosen the clamping screw of the stage holder.



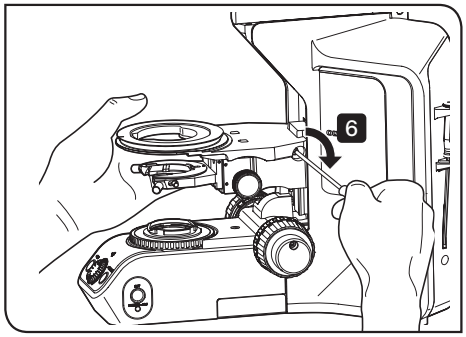
3 Remove the stage holder.



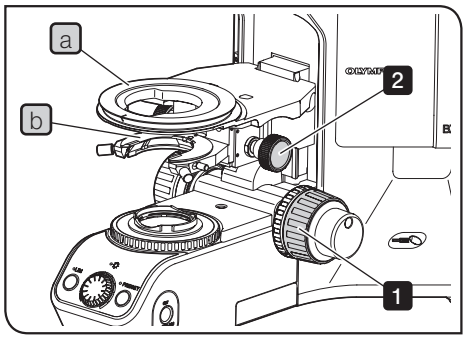
4 Rotate the coarse focusing knob to raise the focusing unit until the stopper screw [b] of the arm is visible.



5 Loosen the stopper screw [c] and remove it. Retain the removed screw in a safe place.



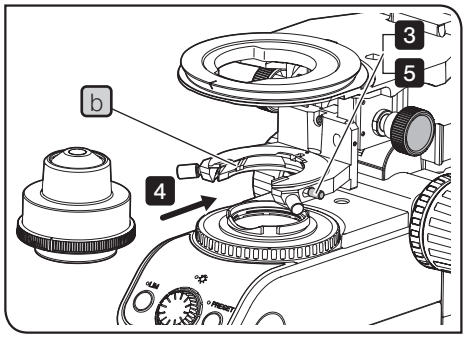
6 Attach the stage holder, push it to the stopper screw at the bottom and tighten the clamping screw.



1 Attaching the condenser

1 Rotate the coarse focusing knob to raise the stage holder [a] to the upper limit.

2 Rotate the condenser height adjustment knob to lower the condenser holder [b] sufficiently.

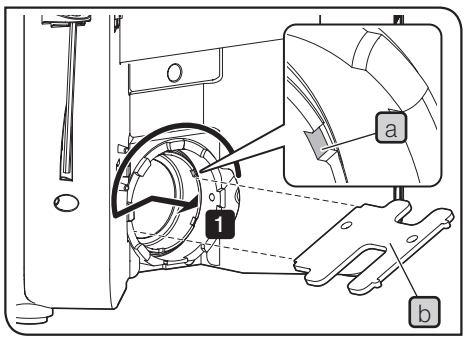


3 Loosen the condenser clamping knob sufficiently.

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.**
- **When attaching the swing-out type condenser, swing out the top lens before attaching it.**

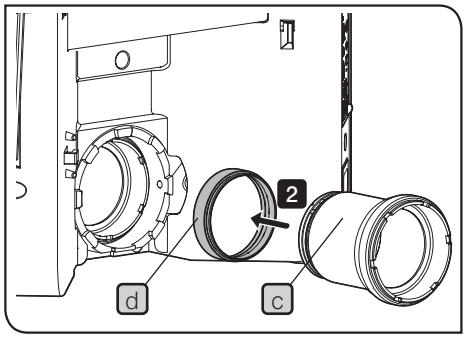
5 Tighten the condenser clamping screw.



2 Attaching the auxiliary lens to the condenser U-LC

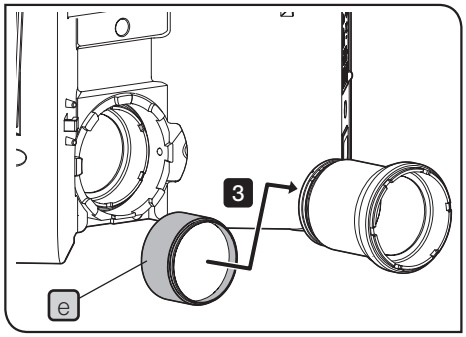
When the low magnification condenser (U-LC) is combined with the microscope, the auxiliary lens must be attached. The auxiliary lens is provided with the low magnification condenser (U-LC).

1 Fit the mounting tool [b] (provided with U-LC) into the groove [a] on the lamp adapter on the back of the microscope frame, and rotate the tool counterclockwise to remove the lamp adapter [c].

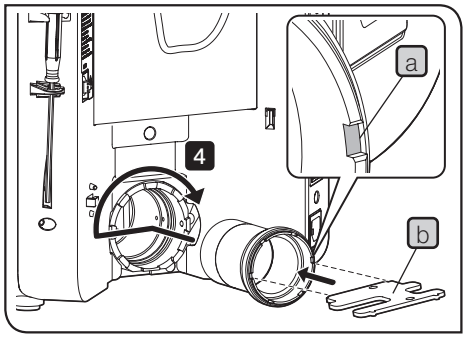


2 Rotate the tip portion [d] with your hand to remove it from the lamp adapter [c].

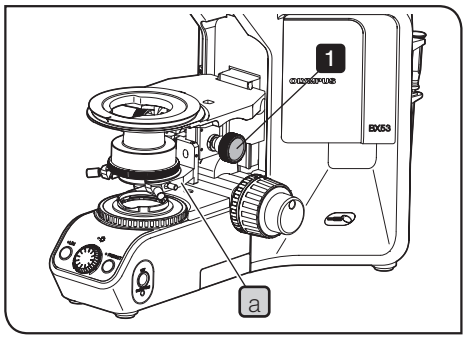
NOTE **Retain the removed tip portion [d] in a safe place because it is necessary when the auxiliary lens is removed.**



3 Screw the auxiliary lens [e] onto the end of the lamp adapter.



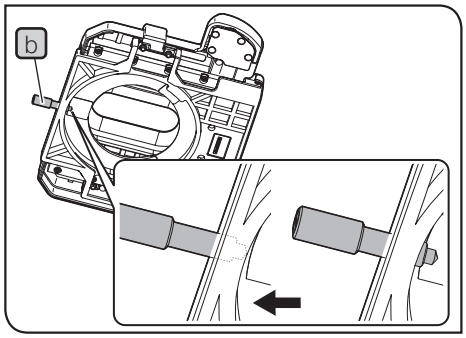
4 Place the lamp adapter attached with the auxiliary lens back to the original position. Fit the mounting tool [b] into the groove [a] on the lamp adapter and rotate the tool counterclockwise to secure the lamp adapter.



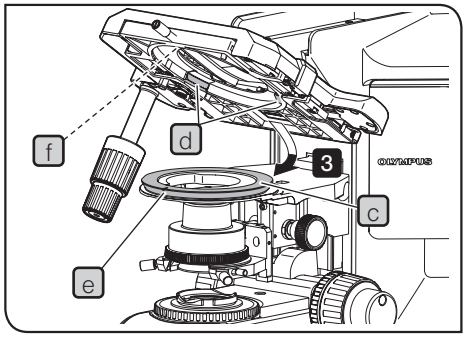
3 Attaching the stage

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

1 Rotate the condenser height adjustment knob to lower the condenser holder [a] to the lower limit.



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



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

3 Align the two protrusions [d] inside the circular aperture on the bottom of the stage with the dovetail [c] of the stage holder first. Then, align the stage positioning pin [f] with the groove [e] on the front side and fit the stage from above.

4 Tighten the stage clamping screw [b] to secure the stage.

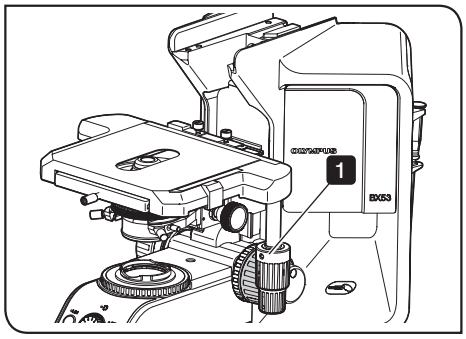
NOTE **In order to prevent the stage knob from interfering with the knobs of the focusing section, following cautions are required depending on the stage to be combined.**

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

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

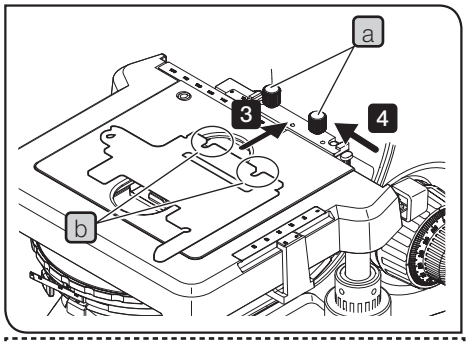
4 Attaching the specimen holder

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



When using the regular specimen holder

1 Rotate the coarse focusing knob to lower the stage sufficiently.



The picture shows the procedures to attach the specimen holder for observing two slide glasses (U-HRDT-4).

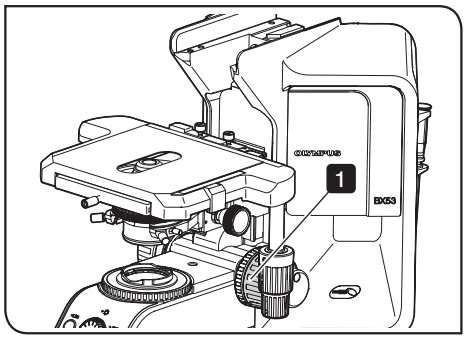
2 Loosen the specimen holder fixing knob [a] (2 pcs.) of the stage plate.

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

3 Insert the U-shape groove [b] of the specimen holder in the specimen holder fixing knob [a].

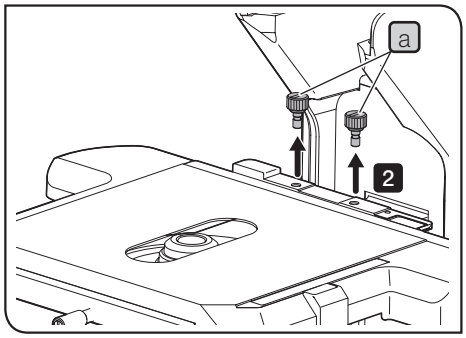
4 While pushing the specimen holder toward the arrow direction, tighten the specimen holder fixing knob [a] (2 pcs.).

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



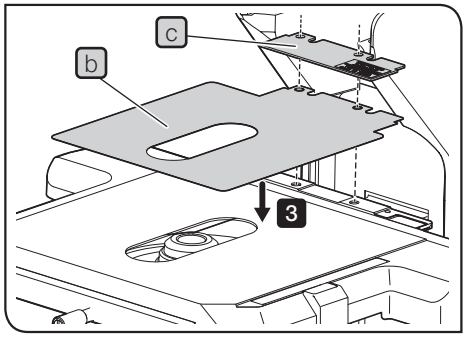
When using the specimen hold plate (CX3-SHP)

1 Rotate the coarse focusing knob to lower the stage sufficiently.



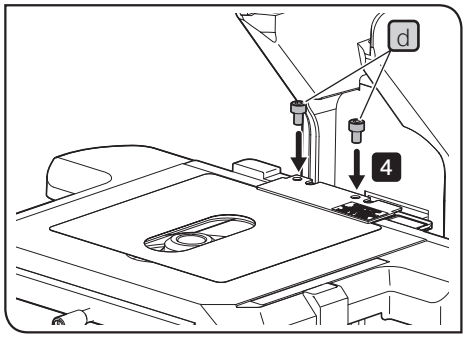
2 Loosen the specimen holder fixing knob [a] (2 pcs.) of the stage plate to remove them.

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



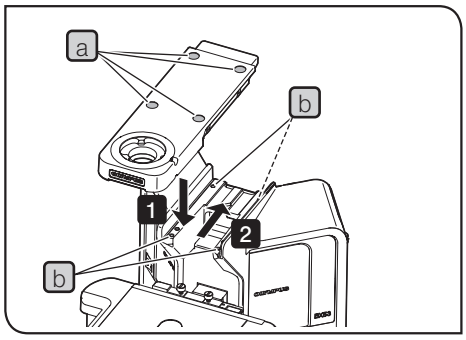
3 Place the metal plate [c] over the resin sheet (one sheet only) [b] by matching the hole positions of the metal plate with the hole positions of the resin sheet. Match the hole of the overlapped parts with the hole position of the stage plate and place the overlapped parts on the stage plate.

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



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

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

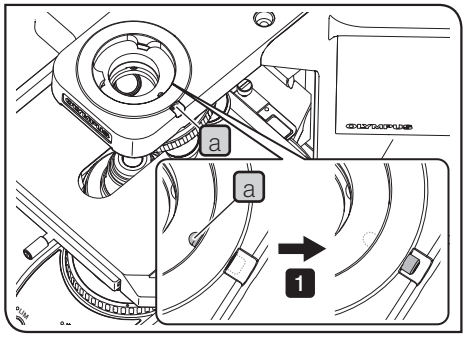


5 Attaching the standard arm

Use the dedicated Allen wrench ( ) provided with the standard arm for attaching the standard arm (BX3-ARM).

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

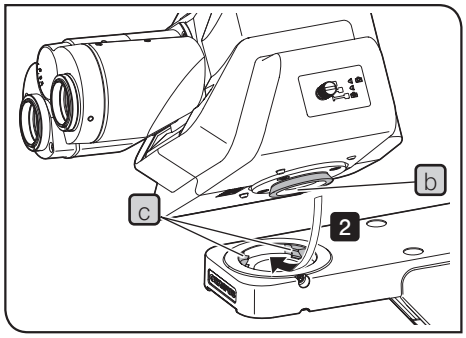
The same procedure applies to attach the reflected light illuminator.



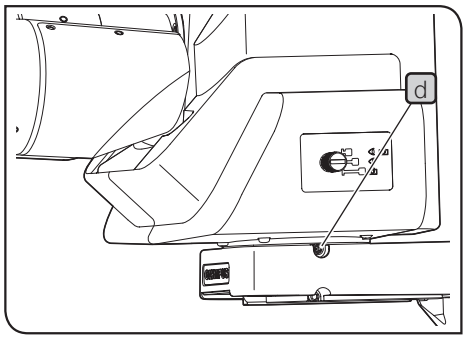
6 Attaching the observation tube

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

1. Loosen the clamping screw [a] of the standard arm (BX3-ARM) until clamping screw is hidden looking from above (until there is no feeling of protrusion when touched by fingers).
2. Insert the circular dovetail [b] of the observation tube under the protrusions [c] (2 positions) on the mount of the standard arm.



This picture shows the procedure to attach the trinocular tube (U-TTR-3). The same procedure applies when attaching other observation tubes.



3 Adjust the direction of the observation tube so that the value of the interpupillary distance adjustment scale on the observation tube faces to the front, and tighten the clamping screw d of the standard arm to secure it.

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

7 Attaching the eyepiece

For attaching procedures, see "6-1 Removing and attaching the eyepiece" (page 36).

8 Attaching the objective

For attaching procedures, see "6-2 Replacing the objective" (page 38).

9 Attaching the revolving nosepiece

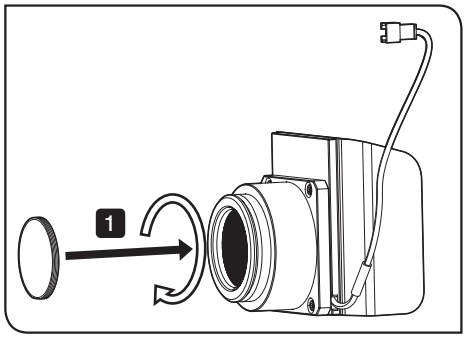
For attaching procedures, see "6-2 Replacing the objective" (page 38).

10 Attaching the LBA filter

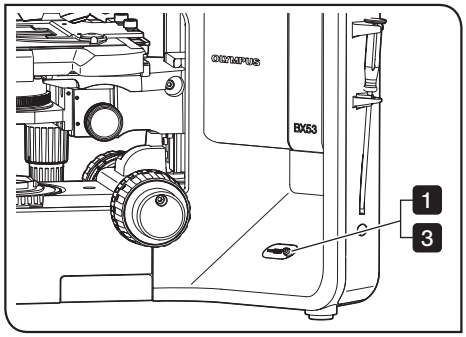
Up to three LBA filters (46S-LBA4) or filters with the screw of the following size can be attached to the LED Lamp house (U-LHLEDC100).

Attachable filter

Size	Number of filters
M46 x 0.75	Three filters

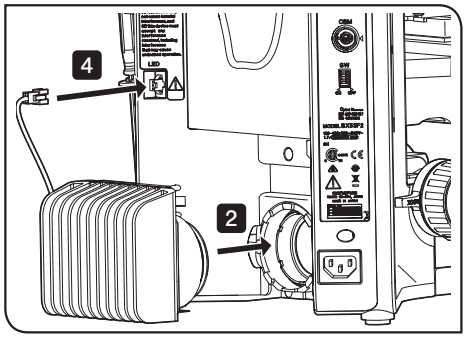


1 Rotating the LBA filter in the arrow direction as shown in the picture, insert it in the LED Lamp house (U-LHLEDC100).



11 Attaching the light source for transmitted light illumination

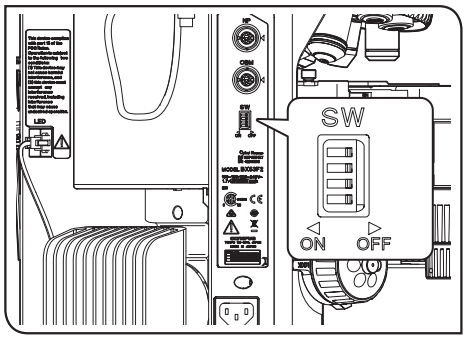
1 Loosen the mounting screw on the right side of the microscope frame using an Allen screwdriver.



2 Insert the LED lamp house (U-LHLEDC100) in the light source mount hole until it touches the end.

3 Tighten the mounting screw using the Allen screwdriver.

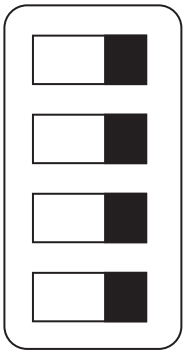
4 Connect the cable for the LED Lamp house to the connector on the back of the microscope frame. For details, see "Connecting cables" (page 64).



12 Setting the dip switch

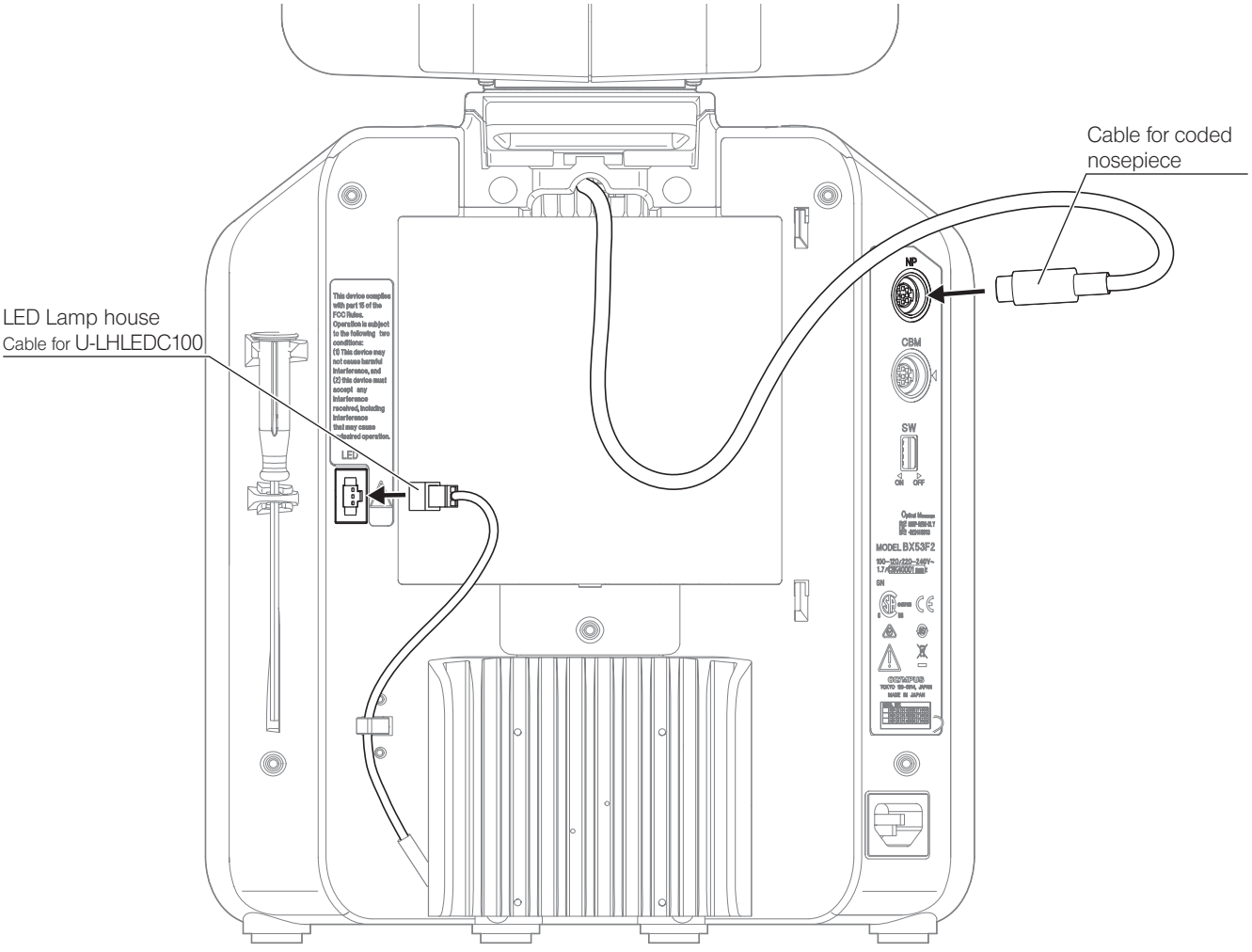
When the power of the microscope is turned ON, the beep sound is heard. With the dip switch on the back of the microscope frame, you can select not to allow this beep sound heard.

: Factory default setting

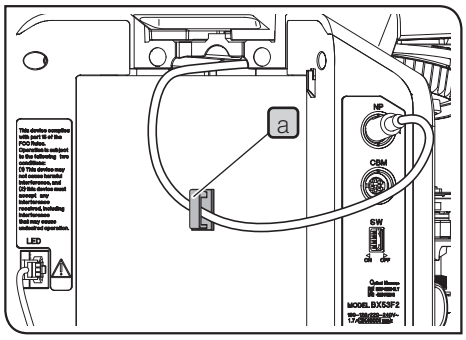
	Function/Unit	ON/OFF		Setting
	Beep		OFF	The beep sound is heard.
		ON		The beep sound is not heard.
	Reserved by maker		OFF	This switch is always kept OFF.
		ON		
	Reserved by maker		OFF	This switch is always kept OFF.
		ON		
	Reserved by maker		OFF	This switch is always kept OFF.
		ON		

13 Connecting cables

NOTE
- Before connecting or disconnecting cables, set the main switch to O(OFF) and unplug the power cord from the outlet.
- This product contains the motorized parts. For safety purposes, 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 us to the connectors.
  Connect the connectors in the correct orientation paying attention to the shape of the connector.



When reading the information of the coded nosepiece from external units when the coded nosepiece is combined, the interface for coded nosepiece (U-IFRES) and control box for coded function (U-CBS) should be attached and cables should be connected. For procedures to attach them and connect cables, refer to the respective instruction manuals.



Layout of the cable for coded nosepiece

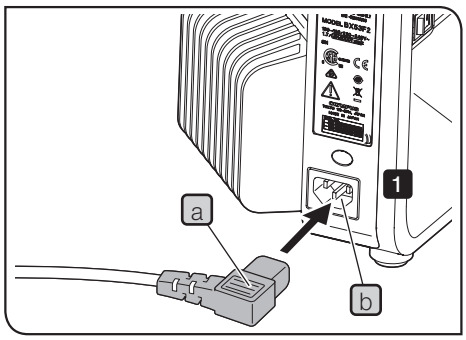
1 Attach the cable holder on the back of the microscope (a position).

2 Open the cable holder a, put the cable for coded nosepiece between the cable holder and close the cable holder.

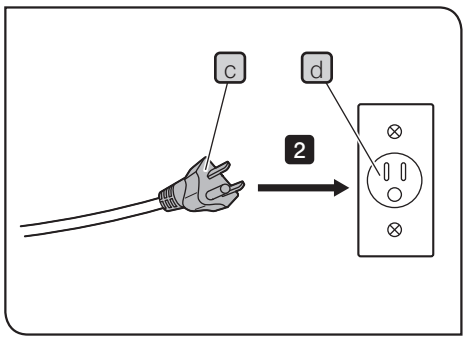
14 Connecting the power cord

CAUTION
- Always use the power cord provided by us. 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.
- Connect the power cord plug to the grounded triplex outlet. If the outlet is not grounded, the electric safety performance intended by us cannot be assured.

NOTE
- Set the main switch of the microscope frame to O (OFF) and connect the power cord.
- Cables are vulnerable when bent or twisted. Never subject them to excessive force.



1 Connect the connector a of the power cord to the connector b on the back of the microscope frame.



2 Connect the power cord’s plug c to the power outlet d on the wall.

■ Proper selection of the power supply cord

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

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

Specifications

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

Table 1 Certified cord

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

Country	Agency	Certification mark	Country	Agency	Certification mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		USA	UL	
Ireland	NSAI				

Table 2 HAR flexible cord

Approval organizations and cordage harmonization marking methods

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

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

11 Request to issue the Safety Confirmation

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

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

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

Identification number

Safety Confirmation when requesting repair/inspection

This safety confirmation is for asking you to fill out to ensure the health and safety of service personnel who pick up, repair, and/or inspect the products. Your cooperation would be highly appreciated.
Please note if the safety of service personnel cannot be ensured, your requests will not be accepted.
Please check the applicable checkboxes and circle the applicable items shown in parentheses.

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

Evident Corporation

Manufactured by

Evident Corporation

6666 Inatomi, Tatsuno-machi, Kamiina-gun, Nagano 399-0495, Japan

Distributed by

EC REP **Evident Europe GmbH**

Caffamacherreihe 8-10, 20355 Hamburg, Germany

Evident Scientific, Inc.

48 Woerd Ave, Waltham, MA 02453, USA

Evident Scientific Singapore PTE. LTD.

#04-04/05, 25 Ubi Rd 4, UBIX Singapore 408621

Evident Australia PTY LTD

Level 4, 97 Waterloo Road Macquarie Park NSW 2113, Australia

Service Center

https://evidentscientific.com/support

Official website

https://evidentscientific.com