

# Instructions

# CKX53

## Culture Microscope



### Notes

To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of the microscope, we recommend that you study this manual thoroughly before operating the microscope, and always keep this manual reachable when operating the microscope.

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

**FCC Supplier's Declaration of Conformity**

Hereby declares that the product

Product name: Optical Microscope

Model Number: CKX53SF

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107 and Section 15.109

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party Name: Evident Scientific, Inc.

Address: 48 Woerd Ave Waltham, MA 02453, USA

Phone Number: 781-419-3900

**For Korea only**

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

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## Introduction

### Configuration of instruction manuals

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

The following instruction manuals are prepared for this product.

Instruction manuals	Main contents
CKX53 (this document)	Operation procedures of the microscope, etc.
Mercury power supply unit U-RFL-T	Power supply unit of mercury lamp housing
LED and LDP light source U-LGPS	LED and LDP light source

## 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.

## 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 this product according to the instruction manual.

The following symbols are used in this instruction manual.

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

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

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

### **CAUTION - Prevention of infection -**

If you observe specimens which have potentiality of infection, please comply with following items to prevent from infection.

- **Wear protective equipment such as gloves, etc.**  
Wear protective equipment such as gloves, etc. to prevent the specimens from touching your skin directly. When you maintain the product which may have contacted the specimens, wear protective equipment such as gloves, etc., or clean the product before operation.
- **Follow the procedures described in chapter "Handling Precautions".**  
Follow the procedures described in chapter "Handling Precautions" (page 5) prior to using the units of this product. Otherwise, the stability of this product will be lost and the dropped sample will cause the possibility of infection.
- **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, be sure to follow the regulations and rules of your local government.
- **Follow the laboratory biosafety guidelines issued by WHO.**  
In addition, refer to the laboratory biosafety guidelines issued by WHO. This microscope is assumed to be used with the biosafety level 3 or lower.

### **CAUTION - Installation of the product -**

**Install this product on a sturdy, level table or bench.**

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



**⚠ CAUTION - Electric safety -****Always use the AC adapter, the power cord and other cables provided by us.**

If other AC adapters, power cords, or cables are 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 can not be assured.

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

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

**Do not touch the AC adapter, the power cord, or other cables or switches with wet hands.**

If you touch them with wet hands, you may get an electric shock.

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

In case of emergency, remove 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 remove the power cord quickly.

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

**⚠ CAUTION - Illumination light (LED illumination light) for bright field observation / phase contrast observation -****Do not look directly at the light from LED for a long time.**

This product uses LED as a light source for the bright field observation and the phase contrast observation. This LED is basically eye-safe. However, do not look directly at the light from LED for a long time, since it may cause damage to your eyes.

**⚠ CAUTION - Illumination light for fluorescence observation -**

**Do not look directly at the light coming out from the objective and the reflected light from the specimen.**

**Attach the cap to the screw hole of the revolving nosepiece where the objective is not attached.**

**Engage the umbra shield (ambient light shielding plate) (see page 9) in the light path.**

Be careful about the light emitted during the fluorescence observation, since not only visible light but also light of invisible wavelengths (such as ultraviolet and infrared) may be emitted depending on the illumination methods.

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

Do not expose your skin to the light, since you may get burned.

**Do not allow flammable gas or liquid to get close to the light coming out from the objective.**


Do not allow flammable gas or liquid to get close to the light, since it may cause fire.


## CAUTION - Mercury lamp housing -

**Keep the AC adapter, the power cord and other cables well away from the mercury lamp housing.**

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

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

**Set the main switch to  (OFF) when replacing the mercury burner.**

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

Applicable burner :	USH-1030L (Made by Ushio Inc.)
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**Secure sufficient space around the mercury lamp housing.**







The top surface of the mercury lamp housing on the back of the microscope gets very hot. When attaching the mercury lamp housing to the microscope, secure sufficient space around the mercury lamp housing, particularly around the top surface and the bottom surface. Do not put any object on the top surface of the mercury lamp housing.

The product lifetime of the mercury lamp housing (not mercury burner) is 8 years or 20,000 illumination hours, whichever occurs first, as a guideline. For details, see the preventive inspection sheet for illumination devices on page 46.

## 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 high voltage (1kV or more). Take special care to prevent electric shock.
	Indicates that the surface becomes hot, and should not be touched with bare hands. It may cause burns.
	Indicates a non-specific general hazard. Follow the description given after this symbol or in the instruction manual.
	Indicates the main switch of push button type. (Push button type is the type of switch that ON or OFF is selected each time it is pressed.)
	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.)
	Indicates that the seesaw type main switch is OFF.

### Caution labels

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

Caution display position	· Mercury lamp housing U-LH100HG	[ High voltage ] 	[ High temperature ] 
	· Power supply unit U-RFL-T	[ High voltage ] 	-

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

## Handling Precautions

### Units of this product

For units attachable to this product, see page 7.

- NOTE**
- Do not use a light source other than those recommended by us.
  - The product in combination with other separately available camera may become unstable. Take the measures to prevent the product from tipping over.
  - The use of the product in combination with other separately available items not only creates the risk of abnormal operation, but it also may damage the product.

### Installation of this product

For conditions of operating environments of this product, see page 31.

- NOTE**
- When moving this microscope, follow the cautions described on page 10.
  - Do not use this product in areas where it may be subjected to direct sunlight, high temperature and/or humidity, dust or vibrations.
  - Secure the space of 10cm or more around the power supply unit to release the heat.

### Handling of this product

- NOTE**
- This product is a precision instrument. Handle it with care and avoid subjecting it to a sudden or severe impact.
  - The stopper attached to this product may be damaged if excessive force is applied.
  - Never disassemble any part of the product. Otherwise, failure could be caused.

## Maintenance and Storage

### Maintenance

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 organic solvents other than alcohol because they may deteriorate the coated surface or plastic parts.

### Decontamination

1. With this microscope, the irradiation of the general germicidal lamp installed on the safety cabinet or the clean bench is available.

**NOTE** • The irradiation of the general germicidal lamp may change the appearance of the microscope, e.g. slight discoloration or elimination of shiny coat, etc.

• When sterilizing with ultraviolet rays, remove the standard stage center plate in advance. If the standard stage center plate is exposed to the ultraviolet rays, it may be discolored to yellow.

2. If the culture liquid is attached to the units, moisten a piece of cleaning paper with alcohol aqueous solution of approx. 70% concentration and wipe it. If the culture liquid enters the units, remove the units and clean, and sterilize them. (For procedures to remove the units, see the chapter "7 Assembly".)

If the culture liquid enters the area where you cannot reach even though the units are removed and, therefore, you cannot clean and sterilize, contact us for assistance.

### Storage / Disposal

1. After using this product, turn OFF the main switches of the microscope frame CKX53SF, power supply for mercury burner U-RFL-T or LED and LDP light source U-LGPS, wait until this product is cooled down sufficiently, and keep it covered with a dust cover during storage.
2. Before disposing of this product, be sure to follow the regulations and rules of your local government. Contact us for any questions.

### Mercury burner

1. If the hour counter of the power supply unit shows 300 hours, set the main switch to ○ (OFF) for safety purpose, wait 10 minutes or more and replace the burner. (See page 41.)

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

#### In case that the mercury burner explodes

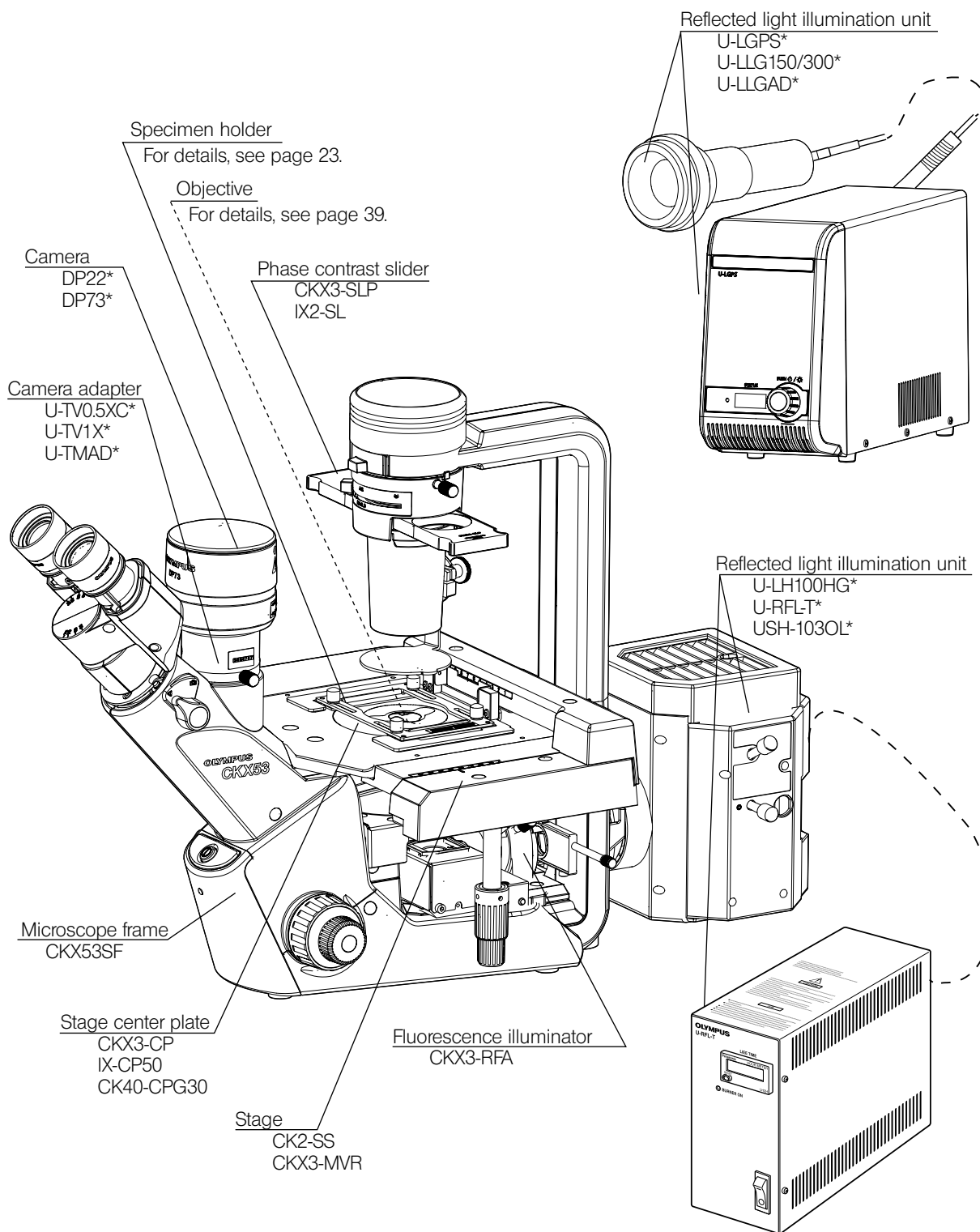
Follow the procedures below in case that the mercury burner explodes.

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

# 1 Nomenclature of units

TIP

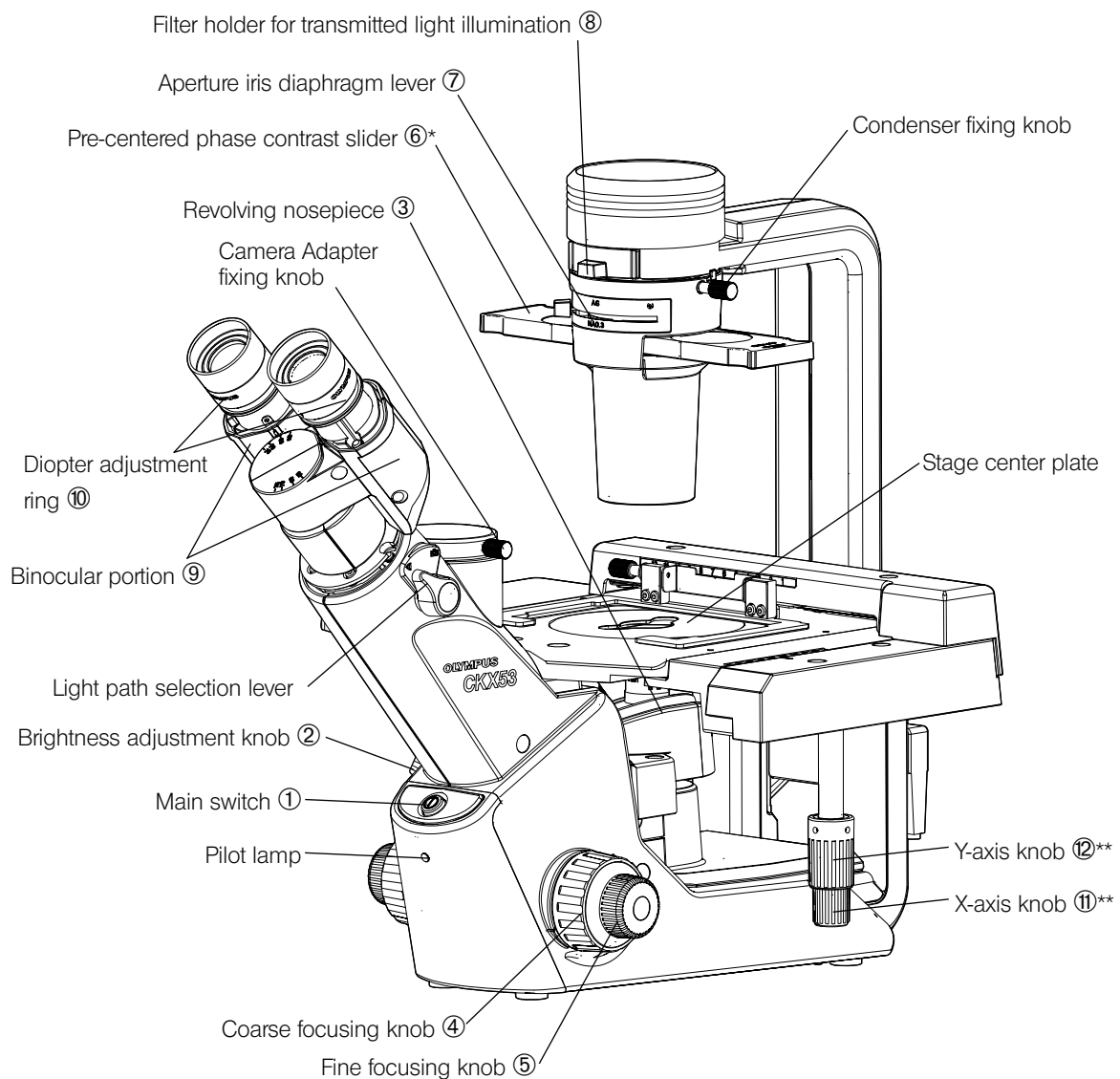
- Units described below are units composing the CKX53 system including options.
- There are other combinable units available. Please see latest brochures or ask us.  
For the units marked with \*, refer to a separate set of instruction manuals.



CKX53SF is categorized as optical microscope, other units are categorized as optical microscope accessory.

## 2 Nomenclature of main operating portions

### 2-1 Bright field set / Phase contrast entry set / Phase contrast standard set



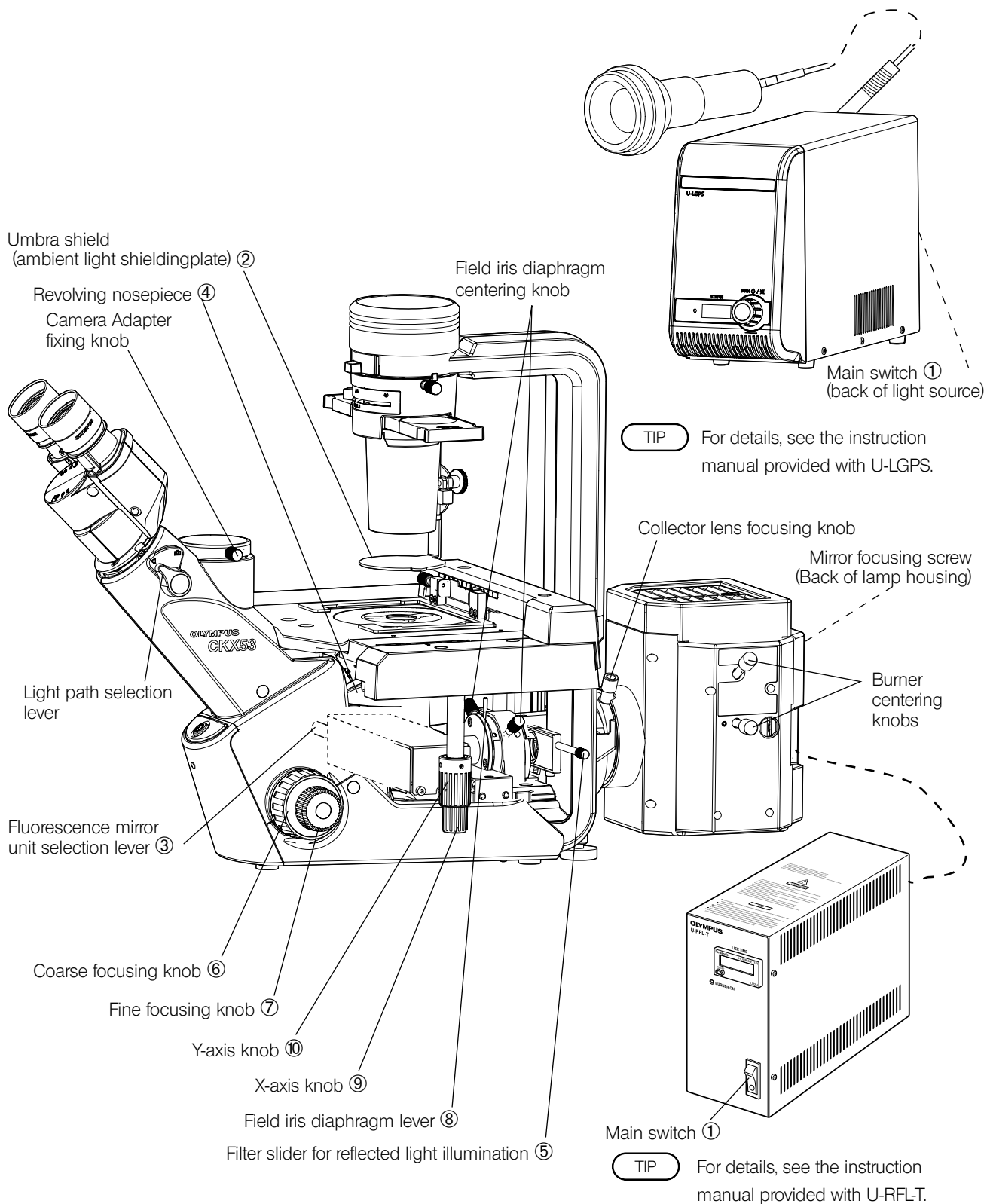
TIP

The numbers assigned to operating portions indicate operating portions described in "9-1 Summary of procedures of bright field observation / phase contrast observation" (page 47).

\* : Not included in the Bright field set.

\*\* : Not included in the Bright field set and Phase contrast entry set.

2-2 Fluorescence set

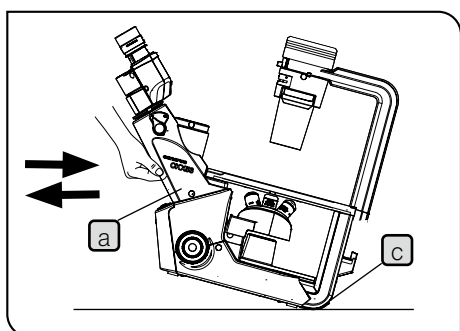
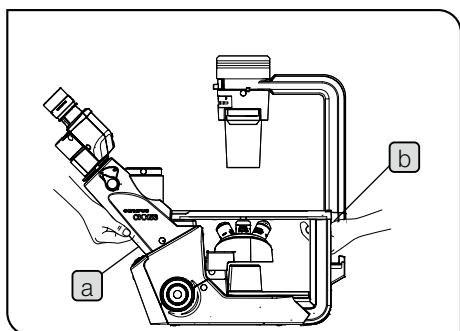


TIP The numbers assigned to operating portions indicate operating portions described in "9-2 Summary of fluorescence observation procedures" (page 48).

# 3 Observation procedures

## 3-1 Preparation of observation

### 1 Moving the microscope



- 1 When carrying this microscope to a different location, remove all cables and units in advance.
- 2 When using the Fluorescence set, remove the mercury lamp housing U-LH100HG or the liquid light guide adapter U-LLGAD from the fluorescence illuminator CKX3-RFA.
- 3 Hold the lower area **a** of the binocular portion and the hand grip **b** at the bottom of the column or hold the column and install this microscope at the predefined location.

**NOTE** • Do not hold the stage or the focusing knob. The microscope may be damaged.

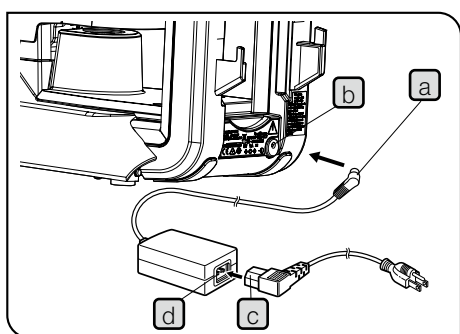
• Do not carry the microscope leaving the specimen on the stage.

**TIP** Useful information  
When using the Bright field set or the Phase contrast entry set and Phase contrast standard set, you can move the microscope by raising the base portion (front) **a** and sliding the back side **c** of the microscope frame CKX53S.

### 2 Attaching AC adapter and power cord

**NOTE** • Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force.

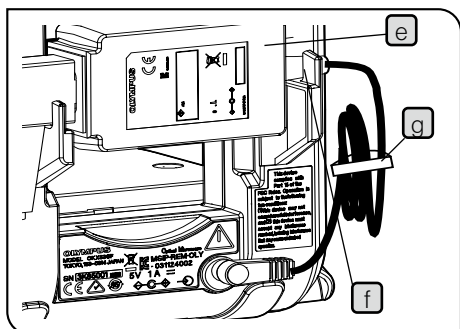
• When using the Fluorescence set, the power cord for illumination must be attached. For details, see the instruction manual provided with the power supply unit for mercury burner U-RFL-T or the LED and LDP light source U-LGPS.



- 1 Insert the connector portion **a** of the AC adapter to the connector **b** of the microscope frame CKX53SF.
- 2 Insert the connector portion **c** of the power cord to the connector **d** of the AC adapter.
- 3 Connect the power cord's plug to the power outlet.

**NOTE** • Connect the ground terminal of the power cord and that of the power outlet.





**TIP** Useful information  
The AC adapter **e** can be hung on the hook **f** on the back of the microscope frame CKX53SF.

Bundling the AC adapter cord **g** with the provided tie wrap clears the space on the back of the microscope frame.

**TIP** When using the Fluorescence set, the AC adapter cannot be hung on the hook.

### 3 Cleaning and sterilizing around the stage

Refer to **Decontamination** (page 6).

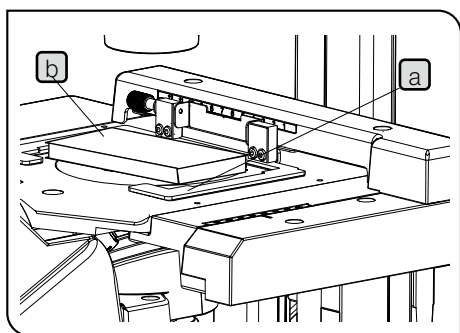
## 3-2 Procedures to place specimens

### 1 Placing the container on the stage

**1** Place the container directly on the plain stage.

Or put the container on the specimen holder and place it on the plain stage.

### 2 When using the optional stage unit



**Specimen holder and mechanical stage CKX3-MVR**

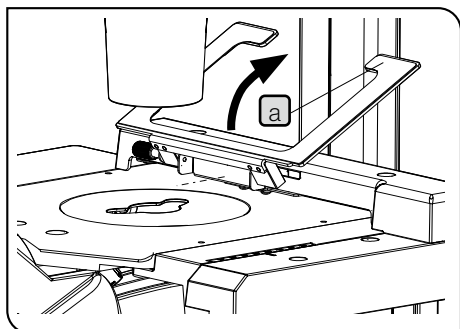
**1** Place the container on the specimen holder (option).

**TIP** For containers and specimen holders corresponding to containers, see page 23.

**2** Place the specimen holder (option) on the stage.

**TIP** • When using the mechanical stage CKX3-MVR (option), place the specimen holder (option) **b** so that it fits within the holder portion **a**.

• When using the micro plate, the micro plate can be placed directly on the holder portion **a**.



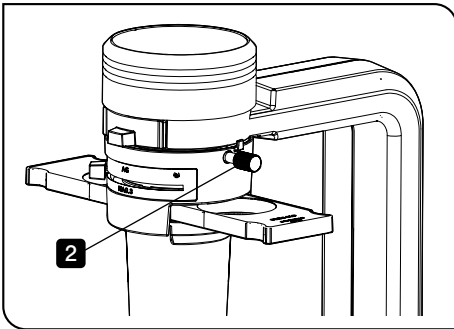
**Holder portion of the mechanical stage CKX3-MVR**

The holder portion **a** of the mechanical stage can be escaped from the stage top as shown in the picture.

In case that the holder portion **a** is not necessary, such as when placing the large container on the stage, etc., escape the holder portion.

The holder portion **a** is detachable. For procedures to attach/detach the holder portion, see page 39.

### 3 When using the high container (Procedures to attach / detach the condenser portion)



- 1 Hold the condenser portion with one hand.
- 2 Loosen the condenser fixing knob with the other hand to remove it.

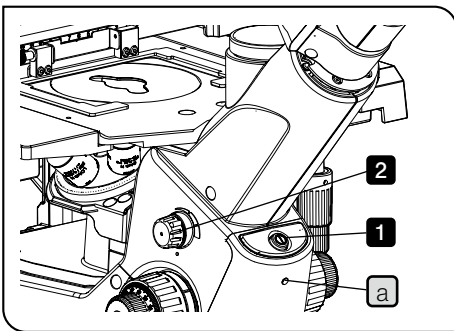
**NOTE** Place the removed condenser portion on the level surface or place it with the lens surface facing up in order not to scratch the lens.

**TIP** • You can use the high container for observation by removing the condenser portion. However, the phase contrast observation is not available. Confirm the visibility of the observed image before using.

• For procedures to attach the condenser portion, see page 33.

## 3-3 Observation methods (Bright field observation / Phase contrast observation)

### 1 Turning ON the light source (LED)

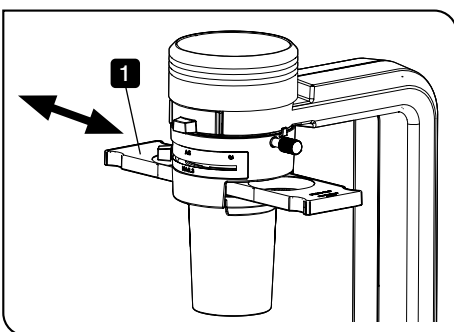


- 1 Press the main switch of the microscope frame CKX53SF.

**TIP** When the light source (LED) is turned ON, the pilot lamp **a** lights.

- 2 Rotate the brightness adjustment knob to adjust the brightness not so dazzling.

### 2 Changing between bright field observation and phase contrast observation (Phase contrast entry set / Phase contrast standard set / Fluorescence set)



When performing the phase contrast observation

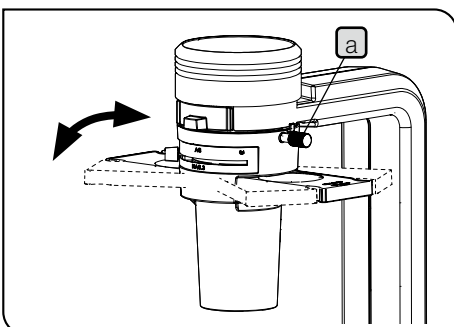
- 1 Slide the pre-centered phase contrast slider CKX3-SLP and engage the phase contrast ring placed at the center of the slider in the light path.

**TIP** • The pre-centered phase contrast slider is provided with the Phase contrast entry set, the Phase contrast standard set, and the Fluorescence set.

• When using the iPC series phase contrast objective, it is not necessary to change the phase contrast ring even though you change the objective. (See page 30.)

#### Useful information

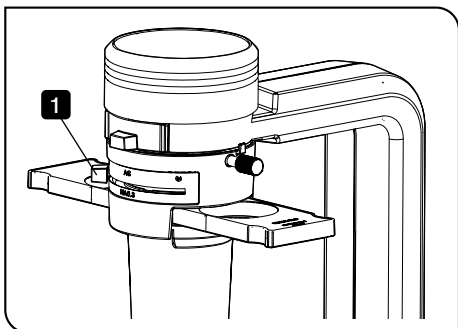
Loosening the condenser fixing knob **a** to rotate the condenser portion allows you to change the direction of the pre-centered phase contrast slider within the range of  $\pm 30^\circ$ . Select the direction easy to observe.



When performing the bright field observation

- 1 Slide the pre-centered phase contrast slider CKX3-SLP and engage the empty hole of the slider in the light path.

### 3 Adjusting the aperture iris diaphragm



- 1** Rotate the aperture iris diaphragm lever to adjust the aperture iris diaphragm.

○ : indicates the opening direction

⊗ : indicates the closing direction

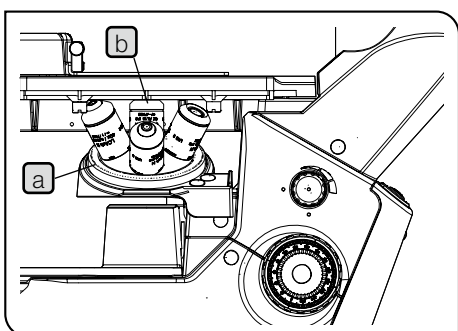
**TIP**

- For the phase contrast observation, set the aperture iris diaphragm lever to the open side (○).

• Useful information

If you cannot get the sufficient contrast in the phase contrast observation, you may be able to get the high contrast image by narrowing down (adjust to closing direction) the aperture iris diaphragm in the bright field observation depending on containers or specimens.

### 4 Selecting the objective

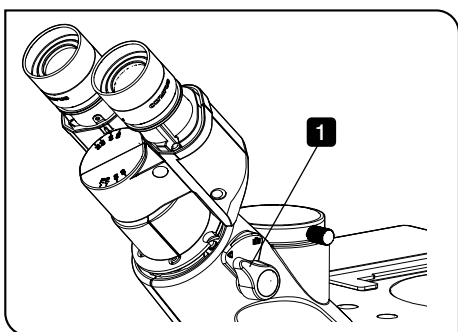


- 1** Rotate the revolving nosepiece **a** to engage the objective **b** with the magnification to be used for observation in the light path.

**NOTE**

If the focal point of the specimen is higher than the stage surface, the objective **b** may collide with the stage center plate or the plain stage when the revolving nosepiece **a** is rotated. In this case, use the objective with a long W.D.(working distance) or the stage center plate with a large aperture.

### 5 Changing between the visual light path and the camera light path

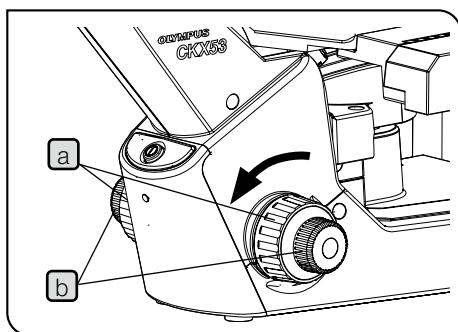


- 1** Set the light path selection lever to the visual light path (◀).

◀ : Visual light path 100% / Camera light path 0%

▶ : Visual light path 0% / Visual light path 100%

## 6 Focusing on the specimen



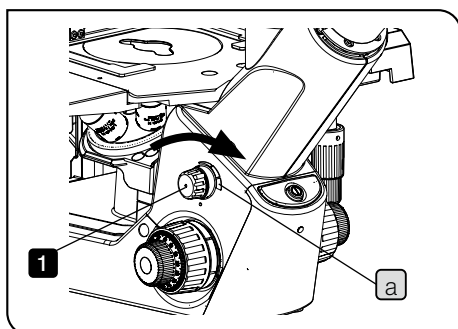
- 1 Rotate the coarse focusing knob **a** or the fine focusing knob **b** to bring the specimen into focus.

Rotation direction of coarse focusing knob and fine focusing knob

Rotating either knob in the front direction (arrow direction) raises the objective and rotating it in the opposite direction lowers the objective.

**NOTE** When focusing, be careful not to crash the objective with the specimen.

## 7 Adjusting the brightness



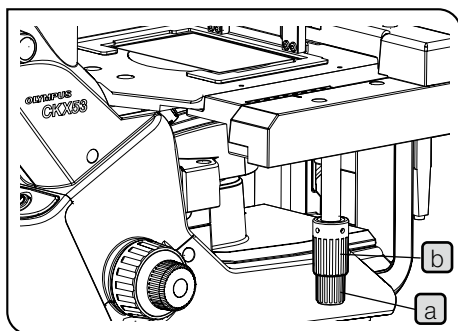
- 1 Rotate the brightness adjustment knob to adjust the brightness.

Rotation direction of the brightness adjustment knob

Rotating the brightness adjustment knob in the front direction (arrow direction) makes the brightness brighter and rotating it in the opposite direction makes it darker.

**TIP** The indicator **a** shown around the brightness adjustment knob indicates that the larger the width is, the brighter the brightness becomes.

## 8 Moving the specimen



Move the specimen by holding the container directly with your hand or using the knob of the mechanical stage.

Mechanical stage CKX3-MVR

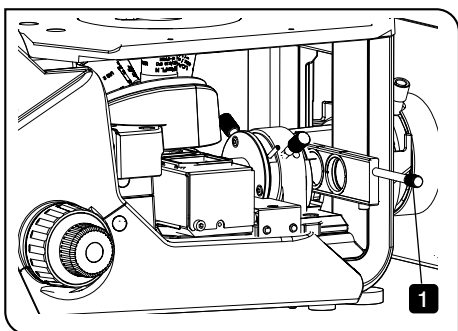
- 1 Rotate the X-axis knob **a** and the Y-axis knob **b** to move the specimen to a desired position.

**TIP** The scale displayed on the mechanical stage CKX3-MVR corresponds to the hole address for the 96-hole micro plate.

### 3-4 Observation method (Fluorescence observation)

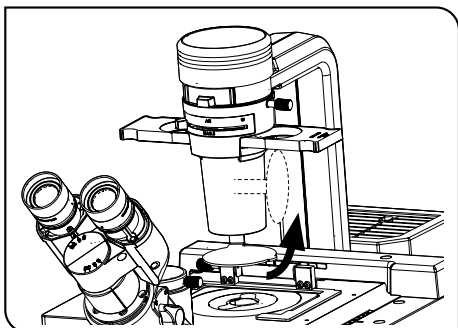
**CAUTION** For safety when performing the fluorescence observation, be sure to follow cautions described in "CAUTION - Illumination light for fluorescence observation -"(page 3) and "CAUTION - Mercury lamp housing -"(page 4).

#### 1 Inserting the shutter for reflected light illumination (Fluorescence set)



**1** Hold and slide the knob of the filter slider for reflected light illumination and engage the shutter of the slider in the light path.

#### 2 Inserting the umbra shield (ambient light shielding plate) (Fluorescence set)



Reducing the noise caused by the ambient light acquires the clear fluorescent image.

**1** Rotate the umbra shield and engage it in the light path.

#### 3 Turning ON the light source (mercury burner) (Fluorescence set)

**1** Turn ON the main switch. The illumination light will stop flickering and stabilize in 5 to 10 minutes after ignition.

**NOTE** • Do not turn ON or OFF the main switch at short interval since it affects a life of the burner. If you pause the observation for a short time, try not to turn OFF the main switch.

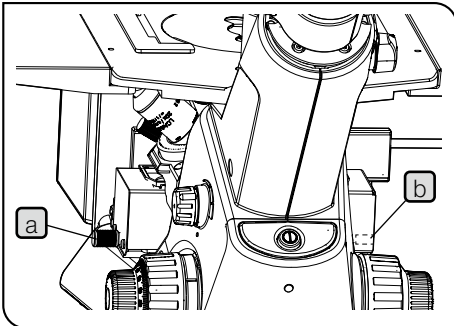
• The mercury burner cannot be reignited until the mercury vapor has cooled down and liquefied. Turn ON the main switch after 10 minutes.

**TIP** • For details, refer to the instruction manual for each power supply unit.

• The discharge type mercury burner may not be ignited from the beginning on rare occasions due to its characteristics. If it is not ignited, turn OFF the main switch and turn ON again after 5 to 10 seconds.

• Keep pressing the reset button of the hour counter until it shows "0.0" for sure.

#### 4 Inserting the fluorescence mirror unit (Fluorescence set)



- 1 Hold and slide the fluorescence mirror unit selection lever **a** of the fluorescence illuminator CKX3-RFA and engage the fluorescence mirror unit to be used for observation in the light path.

**TIP** • When adjusting the field iris diaphragm (see page 21), engage the B-excitation fluorescence mirror unit in the light path.

- The selection lever **a** can be attached on opposite side of the fluorescence mirror unit slider. Remove the selection lever **a** from the fluorescence mirror unit slider by loosening it. Then, tighten the selection lever into the screw hole **b** on opposite side to secure it.

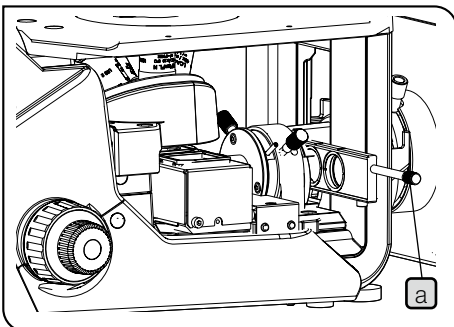
#### 5 Changing between the visual light path and the camera light path

Refer to page 13.

#### 6 Selecting the objective

Refer to page 13.

#### 7 Opening the shutter for reflected light illumination (Fluorescence set)



- 1 Hold and slide the knob **a** of the filter slider for reflected light illumination and engage the empty hole of the slider in the light path.
- 2 To adjust the brightness, hold and slide the knob **a** of the filter slider for reflected light illumination and engage the hole where the attenuator filter is attached in the light path.

**TIP** • Changing the combination of the attenuator filter changes the transmittance of the excitation light. For procedures to change the combination, see page 37.

- The discoloring of specimens can be slowed down by reducing the intensity of the excitation light by using the attenuator filter. Utilize the attenuator filter as far as the observation is not affected.

#### LED and LDP light source U-LGPS

The brightness can be adjusted with the illumination system. For details, see the instruction manual of the LED and LDP light source U-LGPS.

- 3 When the observation is not performed, hold the knob **a** of the filter slider for reflected light illumination and engage the shutter for reflected light illumination of the slider in the light path.

**TIP** The fluorescent discoloring of specimens can be slowed down by reducing the time to irradiate specimens.

#### 8 Focusing on the specimen

Refer to page 14.

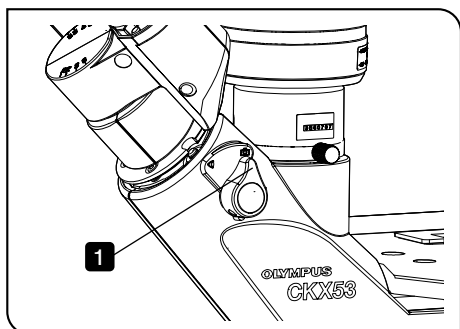
#### 9 Moving the specimen

Refer to page 14.

### 3-5 Recording with the camera

The observed image can be acquired by attaching the camera adapter and the camera to the camera port of the microscope frame CKX53SF.

#### 1 Changing between the visual light path and the camera light path



**1** Rotate the light path selection lever to select the camera light path (☒).

☒ : Visual light path 0% / Visual light path 100%

☑ : Visual light path 100% / Camera light path 0%

**TIP** If you select the camera light path, you cannot observe with the eyepieces.

#### 2 Focusing on the specimen

Refer to page 14.

If the focusing of the image through the camera does not match with that of the image observed through the eyepieces, perform the parfocality adjustment.

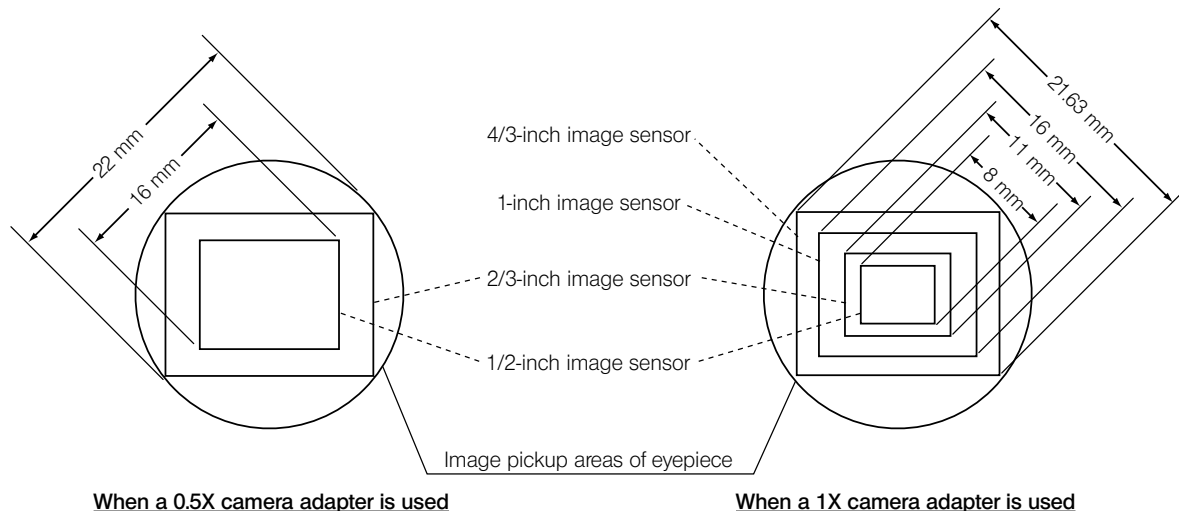
For the parfocality adjustment method, refer to the instruction manual for the camera adapter in use.

#### 3 Acquiring the image

**1** Acquire the observed image.

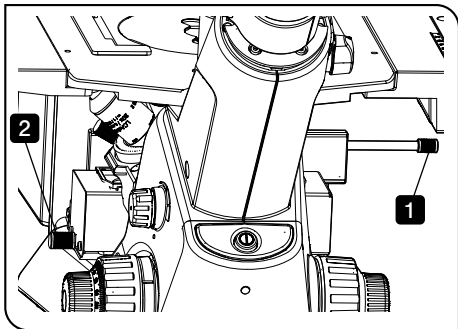
**TIP** • For the image acquisition method, refer to the instruction manual for the camera in use.

• The image acquisition area is determined by the size of the image sensor used in the camera and the magnification of the camera adapter. The following illustrations show the image acquisition areas of camera adapters compared with observation area by the eyepieces (field number 22).



## 3-6 Cleaning up

### 1 Cleaning up the fluorescence illuminator (Fluorescence set)



- 1 Hold and slide the knob of the filter slider for reflected light illumination and engage the shutter of the slider in the light path.
- 2 Hold and slide the selection lever of the fluorescence mirror unit slider and engage the fluorescence mirror unit placed at the center of the slider in the light path.

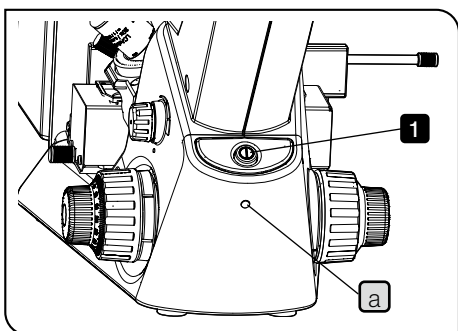
**TIP** Operating the step **2** prevents the fluorescence mirror unit from attaching dust.

### 2 Turning OFF the light source (mercury burner) (Fluorescence set)

- 1 Turn OFF the main switch of the power supply unit.

**TIP** For details, refer to instruction manuals for each power supply unit.

### 3 Turning OFF the light source (LED) (Bright field set / Phase contrast entry set / Phase contrast standard set)



- 1 Press the switch of the microscope frame CKX53SF.  
When the light source (LED) is turned OFF, the pilot lamp **a** turns OFF.

### 4 Removing the AC adapter and the power cord

Refer to page 10.

### 5 Cleaning up the microscope

When carrying the microscope to the different location, refer to page 10.

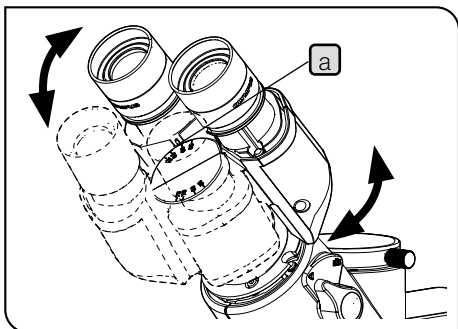


# 4 For advanced observation

## 4-1 Adjusting the binocular portion

**NOTE** • When operating the binocular portion, adjust the operation force level so that the microscope frame CKX53SF does not move.

### 1 Adjusting the interpupillary distance

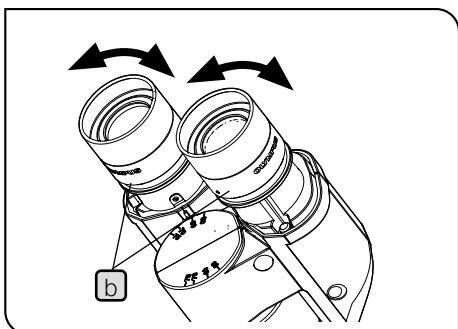


**1** While looking through the eyepieces, move the binocular portion until the left and right fields of view coincide completely.

**TIP** • The number shown by the indicator (protrusion **a**) of the left side (or right side) eyepiece sleeve is the interpupillary distance.

- The following information is useful for observation.
  - Note your interpupillary distance so that it can be easily adjusted next time.
  - You can adjust your interpupillary distance by moving the binocular portion either to upper or lower side. Select the upper side or the lower side according to your observation posture.

### 2 Adjusting the diopter



This operation corrects the difference between the left and right visions of the observer.

**1** Set the scales of diopter adjustment rings **b** of right and left sides to "0".

**2** Engage a low magnification objective (e.g. 10X) in the light path and rotate coarse/fine focusing knobs to bring the specimen into focus.

**3** Change to the high magnification objective (e.g. 40X) and rotate coarse/fine focusing knobs to bring the specimen into focus.

**4** Change to the low magnification objective (e.g. 10X). While looking into the right eyepiece with your right eye, rotate the right diopter adjustment ring **b** to bring the specimen into focus. In the same manner, while looking into the left eyepiece with your left eye, rotate the left diopter adjustment ring **b** to bring the specimen into focus.

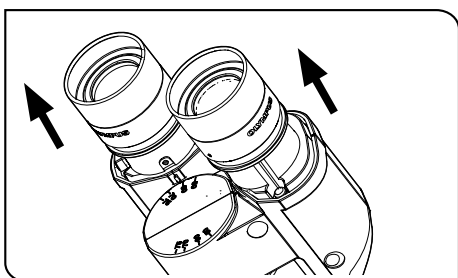
**NOTE** In this case, do not touch the coarse/fine focusing knobs.

**5** Change to the high magnification objective (e.g. 40X) and rotate coarse/fine focusing knobs to bring the specimen into focus.

**6** Change to the low magnification objective (e.g. 10X) and confirm that the specimen is brought into focus with the right and left eyepieces.

**7** If the specimen is not brought into focus, repeat steps from **4** to **6** to adjust again.

### 3 Using the eye shades



**When wearing eyeglasses**

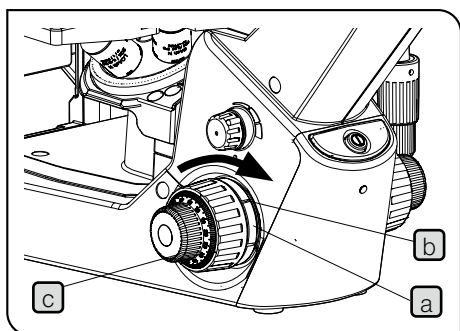
Use the eye shades in the normal, folded-down position.

**When not wearing eyeglasses**

Extend the folded eye shades in the arrow direction.

The observation becomes comfortable since it prevents the unnecessary light from entering between the eyepieces and eyes.

## 4-2 Adjusting the tension of the coarse focusing knob



- 1 The tension of the coarse focusing knob can be adjusted. Insert the tip of a large flat-blade screwdriver into the groove **b** on the tension adjustment ring **a** and rotate the ring. Rotating the coarse focusing knob in the arrow direction shown in the picture increases the tension and rotating it in the opposite direction decreases the tension respectively.

**NOTE** Never apply the excessive force for rotating the tension adjustment ring **a** in the arrow direction shown in the picture. The ring may be damaged.

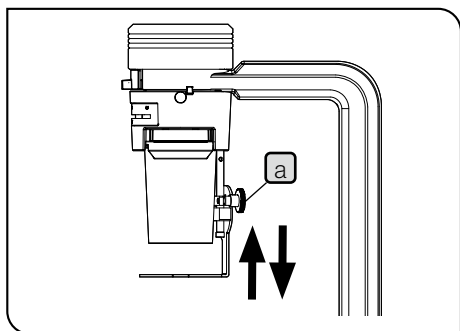
- 2 If the revolving nosepiece descends by its own weight or the focus obtained with the fine focusing knob **c** is lost soon, the tension is set too loose. In this case, turn the tension adjustment ring **a** in the arrow direction to increase the tension of the coarse focusing knob.

## 4-3 Operating procedures of the transmitted light illumination filter (option)

More effective observation and image acquisition can be made by using filters matching to the purposes.  
For procedures to attach the filter to the microscope frame CKX53SF, see page 41.

Filter	Specifications	Intended use
43IF550W45	Monochrome contrast filter (green)	<ul style="list-style-type: none"> <li>• This filter is used by attaching to the filter holder for transmitted light illumination.</li> <li>• The contrast becomes higher.</li> </ul>
45-ND25	Filter for light intensity adjustment (Transmittance: 25 %)	<ul style="list-style-type: none"> <li>• By attaching this filter to the pre-centered phase contrast slider CKX3-SLP, the changes in the brightness can be reduced when changing from the phase contrast observation to the bright field observation.</li> </ul>

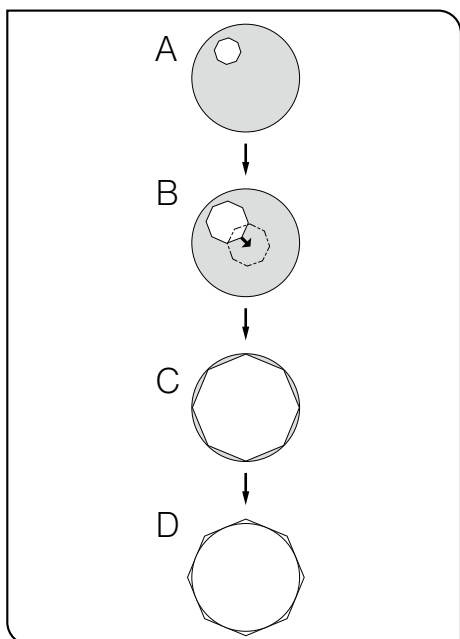
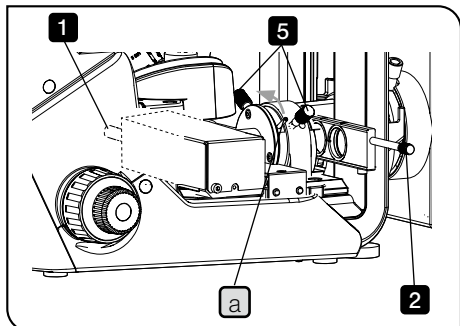
## 4-4 Adjusting the umbra shield (ambient light shielding plate) position (Fluorescence set)



You can adjust the space between the stage and the umbra shield. Adjust the space according to the size of the container to be placed on the stage, if necessary.

- 1 Loosen the umbra shield knob **a**. Then, move the umbra shield along with the umbra shield column to adjust the position.
- 2 Decide the height of the umbra shield and tighten the umbra shield knob **a**.

### 4-5 Adjusting the field iris diaphragm in fluorescence observation (Fluorescence set)



- 1** Hold and slide the selection lever of the fluorescence mirror unit slider and engage the B-excitation fluorescence mirror unit in the light path.
- 2** Hold and slide the knob of the filter slider for reflected light illumination and engage the empty hole of the slider in the light path.
- 3** Engage the 10X objective in the light path, place the specimen on the stage and bring the specimen into focus approximately.

**TIP** If the specimen is dark, the center of the mercury burner may be displaced. In this case, perform the centering of the mercury burner first. (See page 43.)

- 4** Rotate the field iris diaphragm lever **a** in the arrow direction gradually and confirm the field iris diaphragm position. (A in the picture)
- 5** Rotate the field iris diaphragm centering knobs individually and adjust so that the image of the field iris diaphragm comes to the center of the field. (B in the picture)
- 6** Rotate the field iris diaphragm lever **a** in the direction opposite to the arrow direction and open the field iris diaphragm until its image inscribes the field of view. If the eccentricity is found after this, try centering again. (C in the picture)
- 7** Then, rotate the field iris diaphragm lever **a** in the direction opposite to the arrow direction furthermore, and open the field iris diaphragm until its image circumscribes the field of view. (D in the picture)

#### Effects of field iris diaphragm

- The contrast of the image becomes higher.
- The discoloring of the specimen outside of the field of view being observed.

### 4-6 Observing with the objective with correction collar (option)

If the thickness of the cover glass is not matched with the thickness scale of the objective with correction collar, the objective cannot exhibit its performance. When using the objective with correction collar, adjust the correction collar.

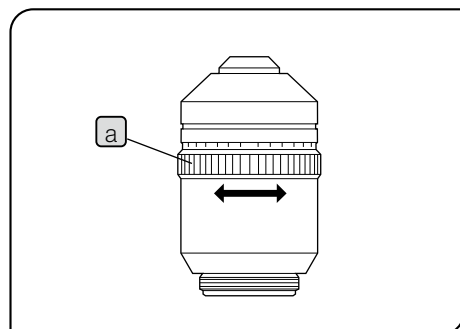
Objective with correction collar
LUCPLFLN20XPH
LUCPLFLN40XPH

#### Adjustment method

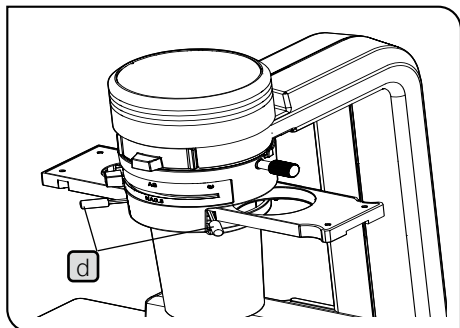
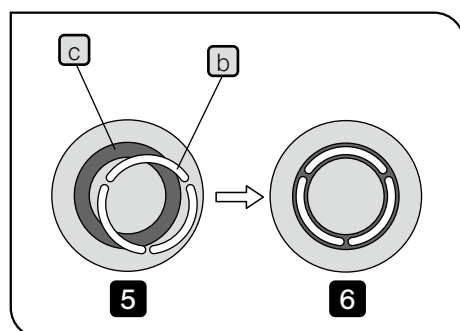
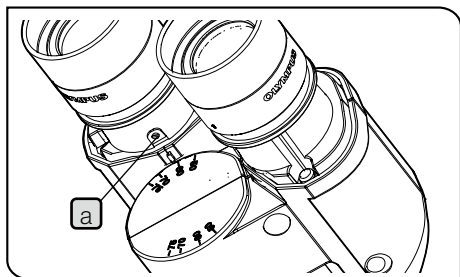
If the thickness of the cover glass is known, rotate the correction collar **a** to match the scale with the thickness of the cover glass.

If the thickness of the cover glass is not known, operate the correction collar **a** and the fine focusing knob alternately to search the best contrast position.

**NOTE** While rotating the revolving nosepiece, do not touch the correction collar **a**.



## 4-7 Centering of the centering phase contrast slider IX2-SL (option)



When performing the phase contrast observation using the PHL phase contrast ring of the centering phase contrast slider IX2-SL or the PH1 phase contrast ring IX2-SLPH1, the centering of the phase contrast ring must be performed. (The centering of the PH2 phase contrast ring IX2-SLPH2 is not necessary.)

TIP

- The centering of the pre-centered phase contrast slider CKX3-SLP is not necessary.
- With the phase contrast observation, the aperture iris diaphragm must be opened.

- 1 Engage the phase contrast objective in the light path and bring the specimen into focus.
- 2 Loosen the eyepiece clamping screw (a) with the small flat blade screwdriver and remove the eyepiece.
- 3 Engage the centering telescope U-CT30-2 in the light path.
- 4 Slide the centering phase contrast slider IX2-SL and engage the phase contrast ring suitable for the objective in the light path.

TIP

For procedures to attach the phase contrast ring to the centering phase contrast slider, see page 40.

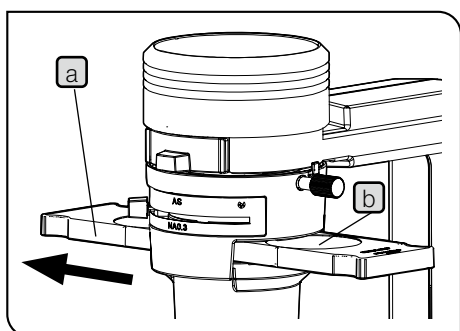
- 5 Rotate the knurled portion of the centering telescope to focus on the phase contrast ring slit image (b).
- 6 Insert the centering knobs (d) to the centering screw holes (2 positions) of the centering phase contrast slider. Tighten or loosen them to adjust so that the phase contrast ring slit image (b) overlaps with the phase plate image (c) of the objective.

TIP

Adjust the centering by each objective magnification.

- 7 Remove the centering telescope.
- 8 Engage the eyepiece in the light path, and tighten the eyepiece clamping screw (a) using the small flat blade screwdriver to secure the eyepiece.

## 4-8 Operating procedures of PLN2X and CKX3-SLPAS (option)



Combining the AS ring for 2X CKX3-SLPAS with the objective PLN2X enables to acquire a high contrast image in a wide field of view.

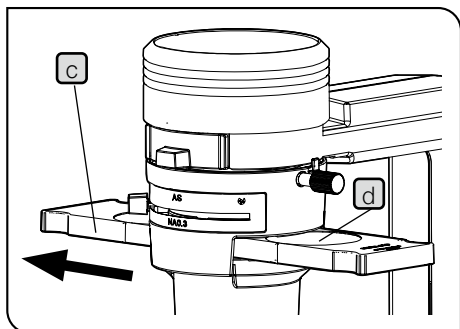
- 1 Slide the pre-centered phase contrast slider CKX3-SLP (a) and engage the AS ring for 2X CKX3-SLPAS (b) attached to the slider in the light path.

TIP

For procedures to attach the AS ring for 2X CKX3-SLPAS (b) to the pre-centered phase contrast slider CKX3-SLP (a), see page 40.

- 2 Rotate the revolving nosepiece to engage the objective PLN2X in the light path.

### 4-9 Operating procedures of CKX3-SLPIC (option)



Combining the IC ring slit CKX3-SLPIC with the objective (PLCN10X or CACHN10XIPC) enables to perform the IC observation.

The IC observation is featured that the contrast of the observed image is reversed depending on the focal point of the specimen.

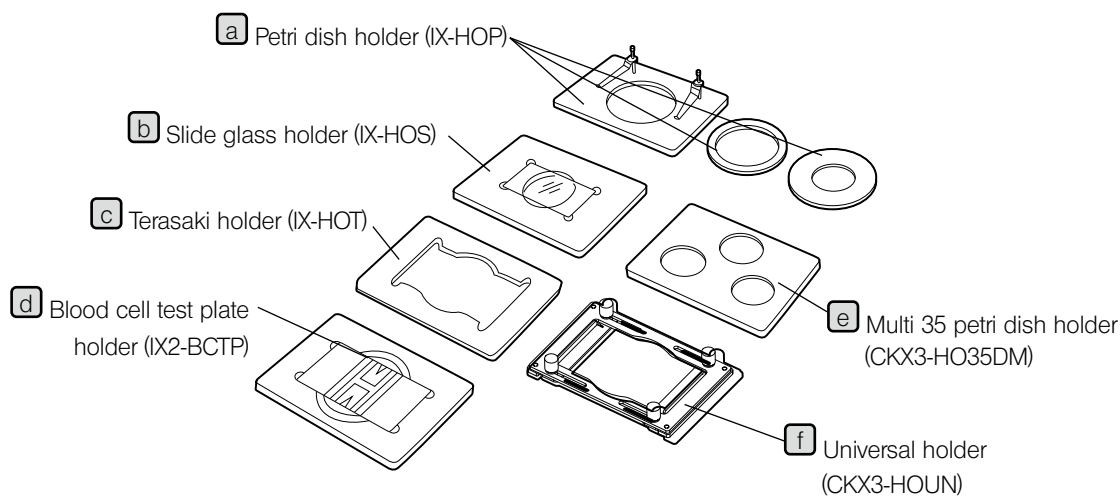
- 1 Slide the pre-centered phase contrast slider CKX3-SLP (c) and engage the IC ring slit CKX3-SLPIC (d) attached to the slider in the light path.

**TIP** For procedures to attach the IC ring slit CKX3-SLPIC (d) to the pre-centered phase contrast slider CKX3-SLP (c), see page 40.

- 2 Rotate the revolving nosepiece to engage the objective (PLCN10X or CACHN10XIPC) in the light path.

### 4-10 Selecting procedures of the specimen holder (option)

Various specimen holders are prepared as options for holding different types of containers.



The following table shows the specimen holders corresponding to various containers.

Container type	Specimen holder					
	(a)	(b)	(c)	(d)	(e)	(f)
Petri dish 35 mm	○	-	-	-	○	○
Petri dish 60 mm	○	○	-	-	-	○
Slide glass	-	○	-	-	-	○
Slide chamber	-	○	-	-	-	○
Blood cell test plate	-	-	-	○	-	○
Terasaki plate	-	-	○	-	-	○
Cell culture flask 25 cm <sup>2</sup>	-	-	-	-	-	○

**TIP** The container size differs depending on each container maker. For the size of the container holding portion of the specimen holder, see page 30.

## 4-11 Selecting procedures of the fluorescence mirror unit (including options)

### 1 Selecting the fluorescence mirror unit (Fluorescence set)

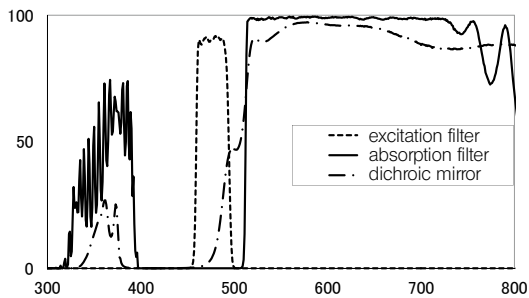
1 Referring to the followings, select the fluorescence mirror unit to be used for observation.

TIP

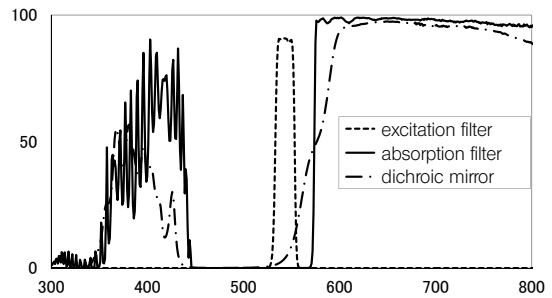
- The fluorescence illuminator CKX3-RFA contains the B-excitation fluorescence mirror unit and the G-excitation fluorescence mirror unit as a standard mirror unit.
- In addition to the B-excitation or the G-excitation fluorescence mirror units, optional mirror units are also prepared.
- If you use an optional mirror unit, be sure to remove the empty mirror unit for bright field observation or the B-excitation or the G-excitation fluorescence mirror units in advance.
- For procedures to attach/detach the fluorescence mirror unit to/from the fluorescence mirror unit slider, see page 34.

### 2 Spectral characteristics of the filter of the fluorescence mirror unit (Fluorescence set)

B-excitation



G-excitation



# 5 Troubleshooting

Depending on how you use, the performance of the microscope may not be exhibited properly. 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.

## 5-1 Bright field observation / Phase contrast observation

Problem	Cause	Remedy	Page
1. The LED illumination is not turned ON.	The AC adapter or the power cord of the microscope frame CKX53SF is not connected firmly.	Connect it firmly.	10
	The main switch of the microscope frame CKX53SF is not turned ON.	Press the main switch to turn ON the pilot lamp.	12
	The light intensity is set to the minimum.	Rotate the brightness adjustment knob to adjust the brightness.	14
2. Even though the LED illumination is turned ON, the field of view is dark.	The brightness is not adjusted correctly.	Rotate the brightness adjustment knob to adjust the brightness.	14
	The objective is not correctly engaged in the light path.	Engage the objective in the light path correctly.	13
	The attenuator filter is engaged in the light path.	Remove the attenuator filter from the filter folder for transmitted light illumination.	41
		Engage the empty hole of the pre-centered phase contrast slider in the light path.	12
	The aperture iris diaphragm is narrowed down too much.	Open the aperture iris diaphragm.	13
	The phase contrast ring is engaged in the light path.	During the bright field observation, engage the empty hole of the pre-centered phase contrast slider in the light path.	12
	The umbra shield (ambient light shielding plate) is engaged in the light path.	Remove the umbra shield from the light path.	15
3. The image is poor. · The contrast of the image is low. · The resolution of the image is poor. · The image blurs.	The container is fogged.	Eliminate the fog.	-
	The objective or the filter is dirty.	Clean the objective or the filter.	5
	The correction collar of the objective with correction collar is not adjusted.	Adjust the correction collar of the objective with correction collar according to the thickness of the container or the depth of the specimen you want to observe.	21
	The appropriate objective is not being used.	Change to the UIS2 series objectives suitable for the observation method.	30
	The phase contrast slider is not correctly engaged in the light path.	Match the phase contrast slider correctly with the light path position.	12
	The centering of the phase contrast ring slit is not performed. (in case of IX2-SL)	Perform the centering correctly.	22
	The phase contrast ring is not suitable for the objective. (in case of IX2-SL)	Use the phase contrast ring suitable for the objective.	40
	4. A part of the field of view is not visible or is dark. Or, the brightness of the field of view is not even.	The phase contrast slider is not correctly engaged in the light path.	Match the phase contrast slider correctly with the light path position.
The filter holder for transmitted light illumination is not correctly engaged in the light path.		Match the filter holder for transmitted light illumination correctly with the light path position.	41
The objective is not correctly engaged in the light path.		Engage the objective in the light path correctly.	13

## 5-2 Fluorescence observation

Problem	Cause	Remedy	Page
1. Even though the main switch is set to <b>I</b> (ON), the mercury burner does not ignite.	The power cord or connectors are not connected firmly.	Connect the power cord or connectors firmly.	-
	The mercury burner is not attached.	Attach a mercury burner.	41
	The safety device in the mercury lamp housing is active.	Set up the socket part of the lamp housing correctly.	41
	The auto ignition is malfunctioning.	Set the main switch of the power supply unit to <b>O</b> (OFF), and set it to <b>I</b> (ON) again. (ON / OFF can be repeated.)	-
2. The mercury burner lights up. However, the image of the specimen cannot be obtained through the eyepiece, or it is dark.	The objective is not correctly engaged in the light path.	Engage the objective in the light path correctly.	16
	The fluorescence mirror unit is not properly engaged in the light path.	Engage the fluorescence mirror unit in the light path correctly.	16
	The shutter for reflected light illumination or the attenuator filter is engaged in the light path.	Engage the empty hole of the filter slider for reflected light illumination in the light path.	16
	The fluorescence mirror unit in use does not match the specimen.	Use the fluorescence mirror unit matching the specimen.	24
3. The mercury burner flickers or it is dark.	Not enough time has passed after igniting the mercury burner.	Wait for 10 minutes or more after ignition.	15
	The mercury burner has reached the end of its life.	If the hour counter indicates 300 hours or more, replace the mercury burner.	41
4. The image is poor. · The contrast of the image is low. · The resolution of the image is poor. · The image blurs.	The container is fogged.	Eliminate the fog.	-
	The objective or the filter is dirty.	Clean the objective or the filter.	5
	The field iris diaphragm is not adjusted appropriately.	Adjust the field iris diaphragm until its image circumscribes the field of view.	21
	The umbra shield (ambient light shielding plate) is not engaged in the light path.	Engage the umbra shield in the light path.	15
	The appropriate objective is not being used.	Change to UIS2 series objectives suitable for the observation method.	30
	The correction collar of the objective with correction collar is not adjusted.	Adjust the correction collar of the objective with correction collar according to the thickness of the container or the depth of the specimen you want to observe.	21
	The combination of the fluorescence mirror unit and the objective is not correct.	Select the correct combination.	30
5. A part of the field of view is not visible or is dark. Or, the brightness of the field of view is not even.	The fluorescence mirror unit is not properly engaged in the light path.	Engage the fluorescence mirror unit in the light path correctly.	16
	The direction of the filter slider for reflected light illumination which is inserted to the fluorescence illuminator is not correct.	Set the direction of the filter slider for reflected light illumination correctly.	37
	The filter slider for reflected light illumination is not correctly engaged in the light path.	Engage the empty hole of the filter slider for reflected light illumination in the light path.	16
	The centering of the mercury burner is not performed.	Adjust the centering of the mercury burner.	43
	The focal point of the collector lens is shifted.	Adjust it to the correct position.	44
	The objective is not correctly engaged in the light path.	Engage the objective in the light path correctly.	16



### 5-3 Common in all observation methods

Problem	Cause	Remedy	Page
1. Dust or dirt is visible in the field of view.	Dust or dirt is left on the eyepieces.	Clean the eyepieces.	5
	Dust or dirt is left on the optical element.	Clean the optical element.	5
	Dust or dirt is left on the specimen.	Clean the optical element. Clean the specimen, or replace it with a clean specimen.	-
2. One side of the field of view blurs.	The specimen is tilted on the stage.	Set the specimen correctly on the stage. When using the mechanical stage CKX3-MVR, place the specimen on the holder portion correctly.	11
	The stage center plate is not placed at the correct position or it is tilted.	Attach the stage center plate at the correct position.	33
	The accuracy of the bottom surface of the culture container is poor.	Use a highly accurate culture container.	-
3. Fields of view of two eyes do not coincide.	The interpupillary distance is not adjusted correctly.	Adjust the interpupillary distance correctly.	19
	The difference in diopter of two eyes is not compensated.	Adjust the diopter correctly.	19
4. The objective interferes the stage center plate or the mechanical stage CKX3-MVR.	The stage center plate is not placed at the correct position or it is tilted.	Attach the stage center plate at the correct position.	33
	The focal point of the specimen is higher than the stage surface due to the shape of the container.	Use the objective with a long W.D. or the stage center plate with a large aperture.	-
5. The mechanical stage CKX3-MVR does not work smoothly.	The fixing knob is loosened.	Tighten the fixing knob firmly.	38
	The specimen is heavy.	Place the light specimen on the stage and confirm the movement of the mechanical stage CKX3-MVR.	11
6. The holder portion stops in the middle when the X-axis knob is rotated.	The position relation between the wire in the mechanical stage CKX3-MVR and the holder portion is not correct.	Hold the holder portion and move it slowly to the end of the direction where the knob stops in the middle. If this problem is not solved, move the center of the holder portion to the center of stage center plate roughly. And then while holding the X-axis knob with your hand, move only the holder portion to the end of the direction where the knob stops in the middle. (This operation enables to slip the wire.) Repeat this operation until the holder portion reaches the end by rotating the X-axis knob.	14
7. It is defocused during observation.	The tension of the coarse focusing knob is not adjusted appropriately.	Adjust the tension of the coarse focusing knob to heavier according to the observation.	20
8. The rotation of the coarse focusing knob is too heavy.	The tension of the coarse focusing knob is not adjusted appropriately.	Adjust the tension of the coarse focusing knob to lighter according to the observation.	20

#### Repair request

If you cannot solve the problems even though taking actions described in "5 Troubleshooting", please contact us for assistance. At that time, please tell them the following information as well.

- Product name and abbreviation (Ex. : microscope frame CKX53SF)
- Product number
- Phenomena

# 6 Specifications

## 6-1 Sets with CKX53

Item		Specifications			
		Bright Field Set	Phase Contrast Entry Set	Phase Contrast Standard Set	Fluorescence Set
Optical system		UIS2 optical system			
Applicable observation method		Bright field	Bright field, Phase contrast		Bright field, Phase contrast, Fluorescence
Dimensions (D x W x H)		504 mm x 200 mm x 454 mm	504 mm x 355 mm x 454 mm	667 mm x 355 mm x 454 mm	
Other major dimensions		Stage surface height: 195 mm Eye point height: 391 mm or 348 mm (※) ※ Upper side or lower side of interpupillary distance 62 mm			
Weight		6.9 kg	7.1 kg	8.4 kg	12.5 kg (Excluding U-RFL-T)
Microscope frame CKX53SF	Focusing portion	Mechanism	Revolving nosepiece vertical movement mechanism using the coarse and fine focusing knobs		
		Movable range	20 mm (Focal point: up to 18.5 mm from the plain stage top surface)		
		Movement distance	Fine focusing knob: 0.3 mm / rotation Coarse focusing knob: 36.8 mm / rotation		
	Revolving nosepiece		4 positions		
	Tube portion	Type	Trinocular tube		
		Interpupillary distance adjustment range	48 mm - 75 mm		
		Eyepiece tilt angle	45 °		
		Light path split ratio	Visual light path 0% / Camera light path 100%, Visual light path 100% / Camera light path 0%		
		Camera port	Camera adapter interface		
	Eyepiece	Magnification	10X		
		Field number	22		
	Transmitted light illumination	Light source	LED light source		
		Color temperature	4000 K		
	Condenser portion	Maximum numeral aperture (NA)	0.3		
		Applicable objective magnification	2X, 4X, 10X, 20X and 40X		
		Working distance (W.D.)	72 mm		
		Aperture stop (AS)	Diaphragm blade, manual open / close mechanism		
		Detachable mechanism	Detachable by users; specimen maximum height when the condenser is removed: 190 mm		
		Filter holder	Provided (supports up to filter thickness 6 mm)		
		Phase contrast slider slot	The insertion direction can be adjusted by the range of ±30 degrees to right or left sides.		
	Plain stage	Surface size to place specimens	252 mm (D) x 200 mm (W) (Front side from the optical axis:119 mm)		
		Placeable specimen weight	5 kg or less		
		Stage center plate	Various types of stage center plates are combinable. The transparent resin stage center plate is provided as a standard.		

Item		Specifications			
		Bright Field Set	Phase Contrast Entry Set	Phase Contrast Standard Set	Fluorescence Set
	Others	AC adapter holder (on the back of microscope frame) Transport hand grip (on the back of microscope frame) Desktop sliding pad			
	Accessories	Cable holder : 2 pieces			
	Power supply rated input and output	Frame portion	Rated input : 5 V 1 A $\text{---}$ Power consumption : 4 W		
		AC adapter	Rated input : 100-240 V $\sim$ 50-60 Hz 0.4 A Rated output : 5 V $\text{---}$ 2.5 A		
Auxiliary stage CK2-SS	Dimensions	Options	180 mm (D) x 70 mm (W)		
Mechanical stage CKX3-MVR	Movable range	Options		110 mm (X) x 74 mm (Y)	
	Movement distance			36 mm / rotation	
	Operation knob			XY coaxial knob placed on right side of the plain stage	
	Scale			Displays 96-hole wafer position	
	Holder			Micro plate holder equipped with the escape function	
Pre-centered phase contrast slider CKX3-SLP	Ring slit	Options	iPC aperture common in 4X,10X, 20X and 40X		
	Empty hole	Options	$\varnothing$ 45 mm : 2 pieces		
Fluorescence illuminator CKX3-RFA	Fluorescence mirror unit slider	Number of selectable positions	3 positions		
		Applicable excitation wavelengths	B- and G-excitation are provided as standards and various excitation wavelengths are selectable.		
	Filter slider	Number of selectable positions	3 positions		
		Dark filter	Filters with transmittance of 6% and 25% are provided. (Selectable exclusively)		
		Shutter	Provided as a standard		
	Illumination field stop (FS)			Opening / closing and centering adjustment are available.	
Umbra shield (ambient light shielding plate)			The fluorescence observation is available under the general room light by closing the umbra shield.		
100 W mercury lamp housing U-LH100HG	Applicable burner			USH-103OL	
	Burner capacity			100 W	
	Burner service life			300 hours	
Power supply for mercury burner U-RFL-T	Rated input			100-240 VAC 50 / 60 Hz 1.60 A	
Objective		PLCN4X PLCN10X	UPLFLN4XIPC CACHN10XIPC LCACHN20XIPC	UPLFLN4XIPC CACHN10XIPC LCACHN20XIPC LCACHN40XIPC	

## 6-2 Objective

Objective	NA	W.D.	Phase contrast (applicable ring)	IC (Inversion contrast)	Fluorescence		
					Bexcitation	Gexcitation	Uexcitation
PLN2X	0.06	5.8	-	-	-	-	-
PLCN4X	0.1	18.5	-	-	-	-	-
PLCN10X	0.25	10.6	-	○	-	-	-
UPLFLN4XIPC	0.13	16.4	Provided with CKX3-SLP	-	○	○	○
CACHN10XIPC	0.25	8.8	Provided with CKX3-SLP	○	○	○	-
LCACHN20XIPC	0.4	3.2	Provided with CKX3-SLP	-	○	○	-
LCACHN40XIPC	0.55	2.2	Provided with CKX3-SLP	-	○	○	-
UPLFLN4XPH	0.13	17	Provided with IX2-SL	-	○	○	○
UPLFLN10X2PH	0.3	10	IX2-SLPH1	-	○	○	○
LUCPLFLN20XPH	0.45	6.6 - 7.8	IX2-SLPH1	-	○	○	○
LUCPLFLN40XPH	0.6	3 - 4.2	IX2-SLPH2	-	○	○	○

## 6-3 Optional units

Item		Specifications	
Phase contrast slider • Applicable units	Slit for IC observation CKX3-SLPIC	Applicable objective	PLCN10X, CACHN10XIPC
		Applicable slider	CKX3-SLP, IX2-SL
	AS ring for 2X CKX3-SLPAS	Applicable objective	PLN2X
		Applicable slider	CKX3-SLP, IX2-SL
	Centering phase contrast slider IX2-SL	Ring slit	Centering adjustment type PHL aperture (provided with centering adjusting tools)
		Holes for inserting the option phase contrast ring	Hole for inserting the centering adjustment type IX2- SLPH1, IX2-SLPH2 Ø45 mm empty hole
	PH1 phase contrast ring IX2-SLPH1	Applicable objective	UPLFLN10X2PH, LUCPLFLN20XPH
		Applicable slider	IX2-SL
	PH2 phase contrast ring IX2-SLPH2	Applicable objective	LUCPLFLN40XPH
		Applicable slider	IX2-SL

Item		Specifications	
Specimen holder	Dimensions	128 mm x 86 mm	
	Dimension of container holding portion ( ) indicates a hole size.	a) Petri dish holder IX-HOP	Ø38 (Ø30 mm) Ø54 (Ø48 mm) Ø65 mm (Ø58 mm) ※ Use by overlaying 3 plates.
		b) Slide glass holder IX-HOS	76.6x26.6 mm (Ø48 mm) Ø54 (Ø48 mm)
		c) Terasaki plate holder IX-HOT	81.5x56 mm (88x46 mm) Ø65 mm (Ø58 mm)
		d) Blood cell test plate holder IX2-BCTP	77x35 mm (Ø58 mm) Ø65 mm (Ø58 mm)
		e) Multi 35 petri dish holder CKX3-HO35DM	Ø38.5 (Ø30 mm)
		f) Universal holder CKX3-HOUN	37 - 96 x 57 mm (17 - 76 x 57 mm (center area: Ø66 mm))
Fluorescence light source	LED and LDP light source U-LGPS	Rated input	AC 100-120V / 220-240V 50Hz / 60Hz
		Liquid light guide	U-LLG150 (length: 1.5 m) U-LLG300 (length: 3 m)
		Light guide adapter	U-LLGAD

## 6-4 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 fluctuations: ±10 %
- Pollution degree 2 (in compliance with IEC60664-1)
- Installation category (overvoltage) II (in compliance with IEC60664-1)

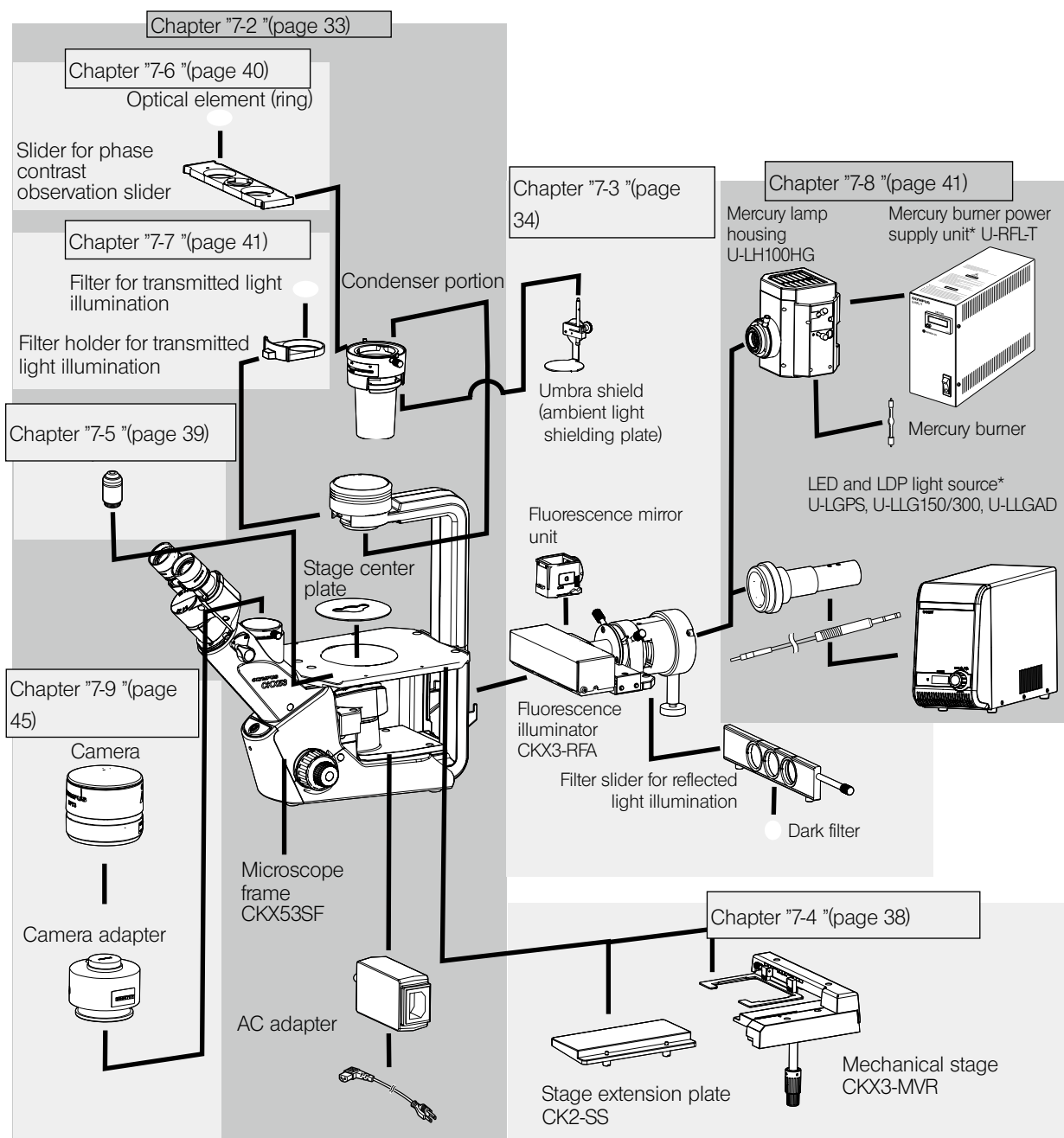
# 7 Assembly

## 7-1 Assembly diagram

The following diagram shows the units before assembly. The chapters describing the procedure to attach each unit are shown in frames with dotted lines.

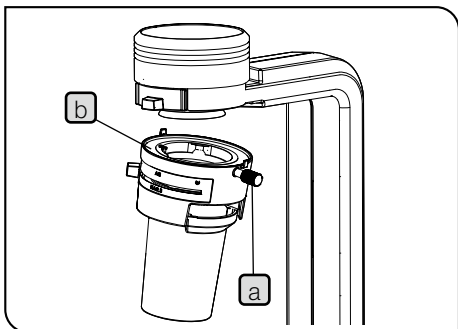
**NOTE** Before assembly, remove dust and dirt from the attaching portions of each unit and assemble carefully so as not to scratch units.

**TIP** For assembly, use the Allen wrench provided with the microscope.  
For the units marked with \*, refer to the separate set of the instruction manuals.



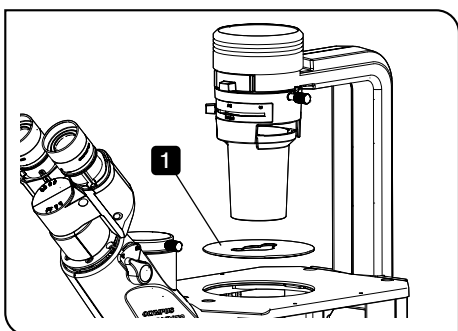
## 7-2 Assembly of the microscope frame CKX53SF

### 1 Attaching the condenser portion



- 1 Loosen the condenser fixing knob **a** to the extent that it does not fall off.
- 2 Hold the condenser diagonally, contact the attaching portion on the top surface **b** of the condenser to the round dovetail portion on the bottom of the column and fit it.
- 3 Rotate the condenser and set the condenser fixing knob **a** at the right side position approximately. Then, tighten the condenser fixing knob **a** to secure it.

### 2 Attaching the stage center plate



- 1 Fit the standard stage center plate into the plain stage in the direction as shown in the picture.

**TIP**

- In addition to the standard stage center plate, you can attach the glass stage plate with  $\varnothing$  30 mm hole CK40-CPG30 (option), the stage center plate with  $\varnothing$  50 mm hole IX-CP50 (option) and the metal stage insert plate CKX3-CP (option).

- When attaching the glass stage plate with  $\varnothing$  30 mm hole CK40-CPG30, fit it into the plain stage so that the texts CK40-CPG30 described on the glass stage plate are readable from the top.

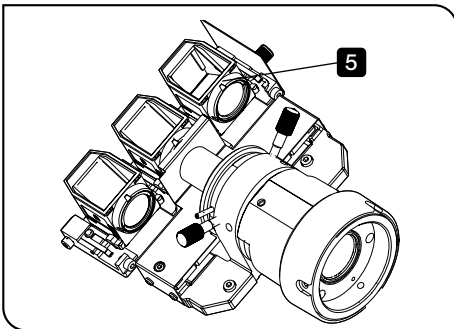
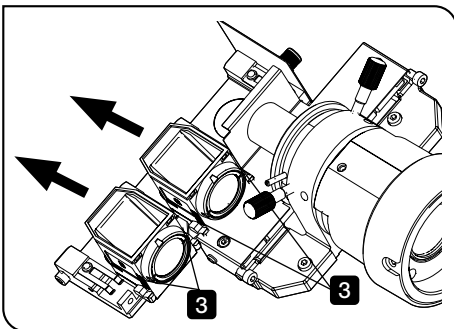
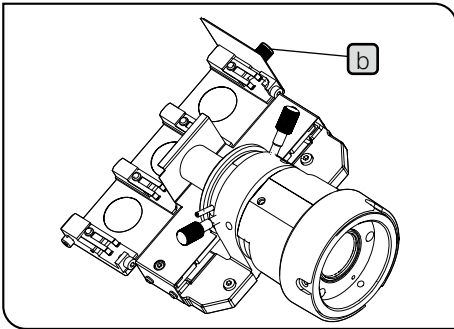
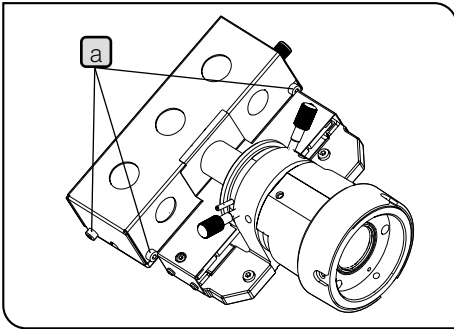
### 3 Attaching the AC adapter and the power cord

**NOTE** Attach the AC adapter and the power cord after completing the assembly of all units used for observation.

**TIP** For procedures to attach the AC adapter and the power cord, see page 10.

## 7-3 Assembly of the fluorescence illuminator CKX3-RFA (Fluorescence set)

### 1 Attaching the fluorescence mirror unit



#### CAUTION

• When attaching or detaching the fluorescence mirror unit, set the main switch of the light source for reflected light illumination to **○** (OFF) in advance.

• Be sure to attach the empty mirror unit for bright field observation.

#### TIP

• The Fluorescence set includes the B-excitation fluorescence mirror unit, the G-excitation fluorescence mirror unit and the empty mirror unit for bright field observation.

• Each fluorescence mirror unit can be attached to any of three positions on the fluorescence mirror unit slider.

**1** Loosen the cover clamping screws (3 positions) **a** of the fluorescence mirror unit slider using the Allen wrench and remove them.

**2** Push in the fluorescence mirror unit slider knob **b**, and engage the fluorescence mirror unit attaching position on the knob side in the light path.

**3** Hold the side of the fluorescence mirror unit and push it in the arrow direction until the fluorescence mirror unit touches the end.

#### TIP

In this case, attach the fluorescence mirror unit at 2 positions as shown in the picture.

#### NOTE

**Do not touch optical elements such as mirror or filter. If fingerprints or dirt are attached to the optical elements, wipe them by referring to page 5.**

**4** Pull the fluorescence mirror unit slider knob **b**, and engage the fluorescence mirror unit placed at the center in the light path.

**5** Attach the fluorescence mirror unit to the center of the fluorescence mirror unit slider according to step **3**.

**6** Put the fluorescence mirror unit slider cover to the original position and tighten the clamping screws (3 positions) **a** removed in step **1** using the Allen wrench.

#### CAUTION

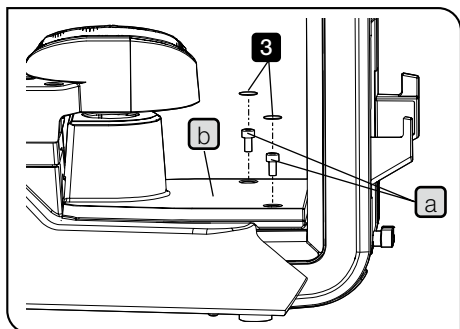
**Be sure to secure the fluorescence mirror unit slider cover firmly using the clamping screws **a**. If the fluorescence mirror unit slider cover comes off, the illumination light leaks, which is very dangerous.**

#### TIP

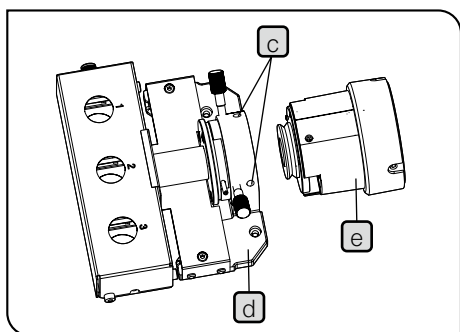
When removing the fluorescence mirror unit, follow the procedures opposite to those of attaching.



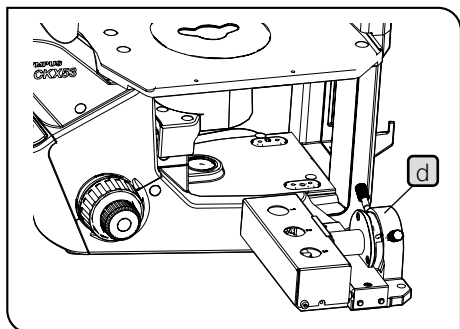
## 2 Attaching the fluorescence illuminator CKX3-RFA



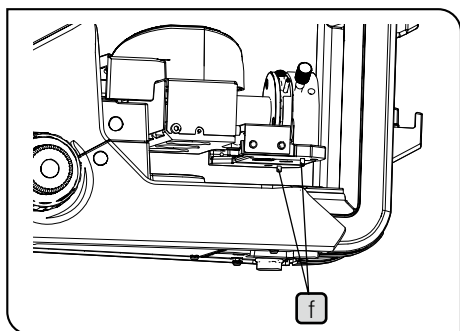
- 1 Remove the objective from the revolving nosepiece.
- 2 Rotate the coarse focusing knob and place the revolving nosepiece at the upper limit position.
- 3 Peel off the stickers (2 positions) from the dust cover surface of the microscope frame CKX53SF.
- 4 Loosen the dust cover clamping screws (2 positions) **a** of the microscope frame using the Allen wrench and remove the dust cover **b**.



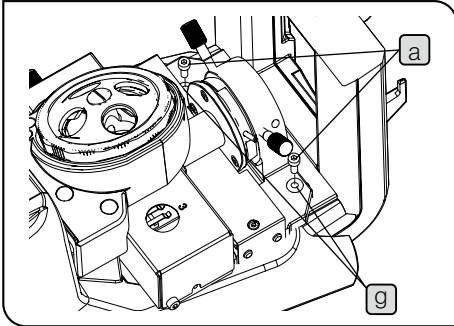
- 5 Loosen the setting screws (2 positions) **c** of the illuminator using the Allen wrench, and separate the fluorescence illuminator CKX3-RFA to 2 parts: frame side part **d** and light source side part **e**.



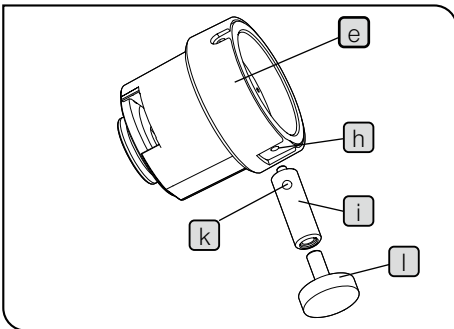
- 6 Insert the frame side part **d** under the stage from the side of the microscope frame.



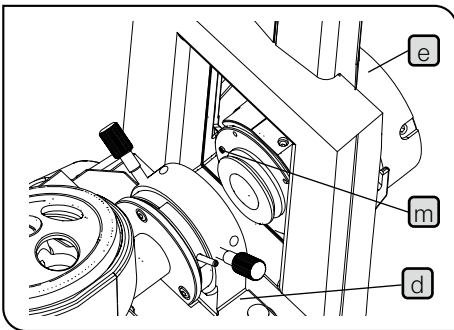
- 7 Insert the pins (2 positions) **f** at the bottom of the frame side part into the holes of the microscope frame.



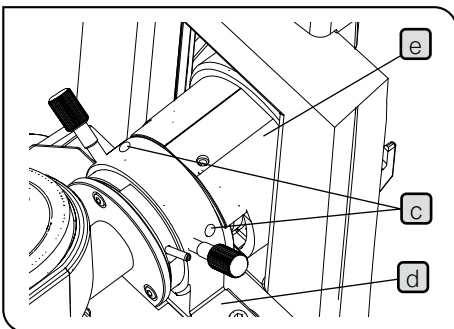
- 8** Insert the screws **a** which secured the dust cover into the holes (2 positions) **g** of the frame side part, and tighten them with the Allen wrench to secure to the microscope frame.



- 9** Detach the the filter slider for reflected light illumination from the light source side part **e**. For procedures to detach it, see page 37.
- 10** Attach the column portion **i** of support pillar for fluorescence illuminator by screwing into the screw hole **h** of the light source side part.
- 11** Insert the Allen wrench into the hole **k** of the column portion **i**, and tighten column portion **i** to secure to the light source side part.



- 12** Screw the adjuster portion **l** of support pillar for fluorescence illuminator into the screw hole of the column portion **i** until the screw becomes slightly visible.
- 13** After the light source side part **e** is inserted under the stage from the back of the microscope frame, insert the pins **m** of the light source

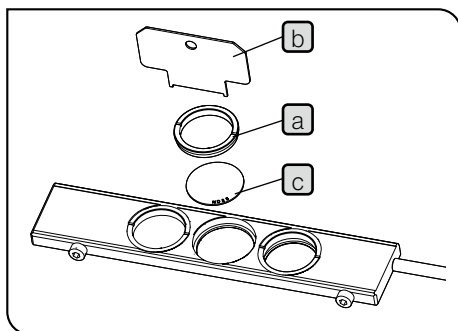


- side part to the groove of the frame side part **d**.
- 14** Tighten the setting screws (2 positions) **c** of the illuminator using the Allen wrench, and combine the frame side part **d** with the light source side part **e**.
- 15** Rotate the adjuster portion **l** so that the bottom surface of the adjuster portion contacts the desk top surface.
- 16** Attach the filter slider for reflected light illumination to the light source side part **e**. For procedures to attach it, see page 37.

### 3 Changing the combination of the attenuator filter for reflected light illumination

2 different characteristics attenuator filters are attached to the center hole of the filter slider for reflected light illumination. The transmittance is approx. 6%.

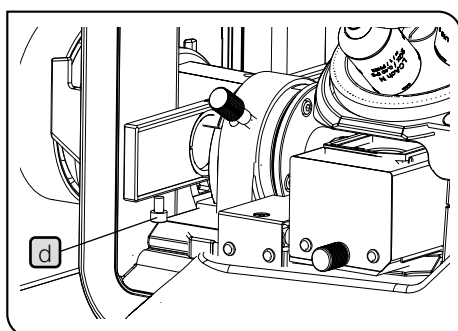
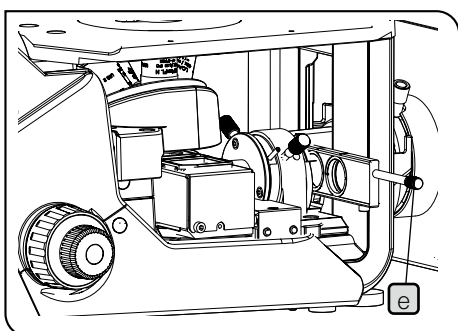
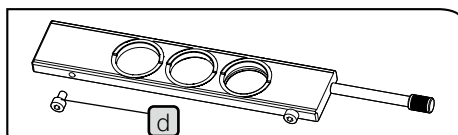
In the following procedures, the transmittance becomes approx. 25%.



- 1 Fit the screwdriver **b** for filter fixing ring provided with the illuminator into the groove of the filter fixing ring **a** placed on the filter slider for reflected light illumination, and rotate the screwdriver to remove the ring.
- 2 Among 2 attenuator filters, remove the attenuator filter **c** ("ND25" is printed up) placed at the upper side.
- 3 Attach the filter fixing ring **a** to the filter slider for reflected light illumination and use the screwdriver **b** to secure the filter left on the filter slider for reflected light illumination.

- NOTE**
- Do not use the removed attenuator filter **c** alone. The performance may be deteriorated.
  - If you want to attach the removed attenuator filter **c** back to the previous position, be sure to place the attenuator filter **c** on the attenuator filter which was used alone. At this time, face the surface where "ND25" is printed up.
  - Do not use attenuator filters other than those provided and those (option) recommended by us.

### 4 Attaching the filter slider for reflected light illumination



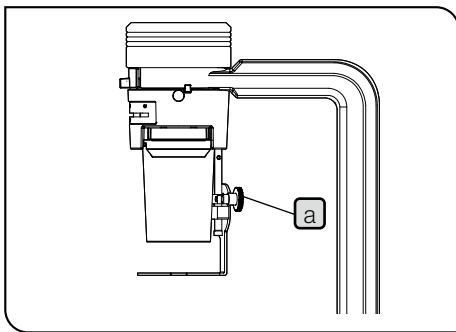
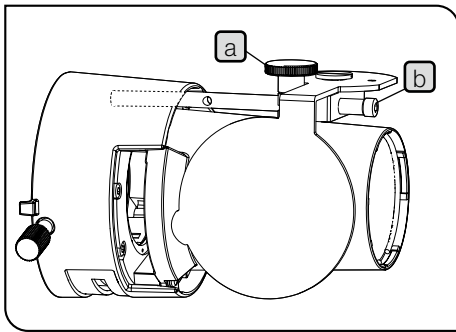
- 1 Remove the stopper **d** fixed to the filter slider for reflected light illumination using the Allen screwdriver.
- 2 Hold the knob **e** of the filter slider for reflected light illumination with the screw hole where the stopper **d** is attached facing down, and insert the filter slider for reflected light illumination to the fluorescence illuminator from the direction shown in the picture.

- NOTE** Be sure to attach the filter slider for reflected light illumination in the correct direction.

- 3 Attach the stopper **d** to the filter slider for reflected light illumination using the Allen screwdriver.

- TIP** When removing the filter slider for reflected light illumination, follow the procedures opposite to those of attaching.

## 5 Attaching the umbra shield (ambient light shielding plate)



**1** Remove the condenser portion from the microscope frame CKX53SF.

**TIP** For procedures to remove the condenser portion, see page 33.

**2** Loosen the umbra shield knob **a**.

**3** Insert the tip of the umbra shield column into the screw hole of the condenser portion, and insert the Allen screwdriver in the hole of the column **b** to tighten it and secure the column.

**TIP** While the umbra shield knob **a** is loosened, hold the umbra shield with one hand and rotate the Allen screwdriver.

**4** Attach the condenser portion to the microscope frame CKX53SF.

**5** Set the umbra shield to the closed status. Then, move the umbra shield along with the umbra shield column to adjust the height.

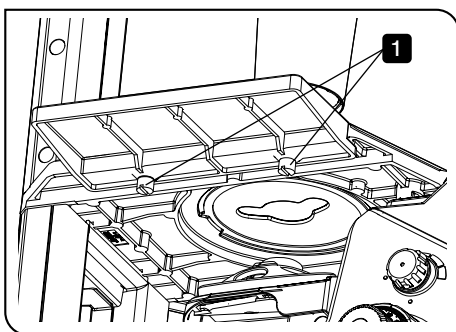
**6** Decide the height and tighten the umbra shield knob **a** firmly.

**TIP** The lower the position of the umbra shield is, the more the ambient light can be blocked. Adjust the height according to the height of the container, etc.

## 7-4 Assembling the stage (Phase contrast standard set / Fluorescence set)

If you use the camera, the camera cables must be wired before assembling the stage. For details, see page 45.

### 1 Attaching the sub stage CK2-SS

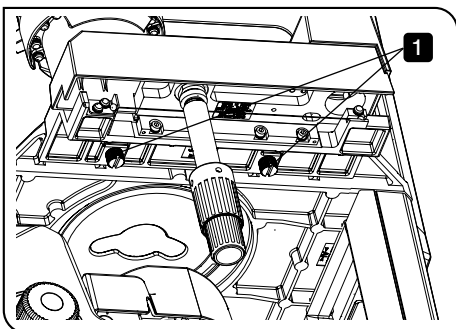


Attaching the sub stage CK2-SS to the plain stage makes the stage surface larger.

**1** Tighten the attaching knobs (2 pcs.) to secure the sub stage at the bottom of the right side surface or the left side surface of the plain stage.

**TIP** When using the mechanical stage CKX3-MVR, the sub stage can be attached only to the left side surface of the plain stage.

## 2 Attaching the mechanical stage CKX3-MVR

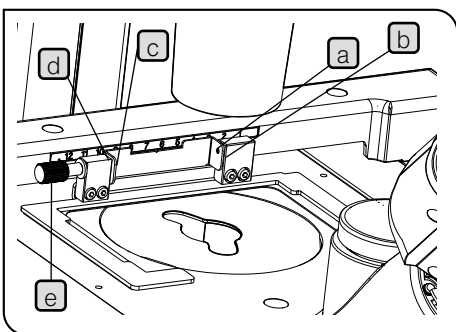


**TIP** When using the mechanical stage CKX3-MVR, we recommend you to use it in combination with the sub stage CK2-SS to exhibit its full performance

### Attaching the frame portion

Attaching the mechanical stage CKX3-MVR to the plain stage allows you to move the container on the stage using the knob of the mechanical stage.

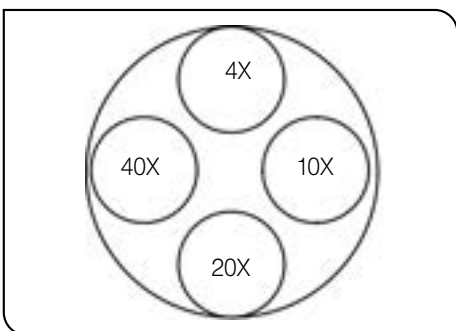
- 1 Tighten the attaching knobs (2 pcs.) to secure the mechanical stage frame portion at the bottom of the right side surface of the plain stage.



### Attaching the holder portion

- 2 Push the one side **a** of the holder portion to the rotation portion **b** of the mechanical stage CKX3-MVR.
- 3 Match the other side **c** of the holder portion with the rotation portion **d** of the mechanical stage, and combine them with the knob screw **e**.

## 7-5 Attaching the objectives



- TIP**
- For objectives provided with each set, see page 29.
  - For specifications of objectives including options, see page 30.
  - It is recommended to attach the objectives as shown in the picture where the revolving nosepiece is viewed from above.

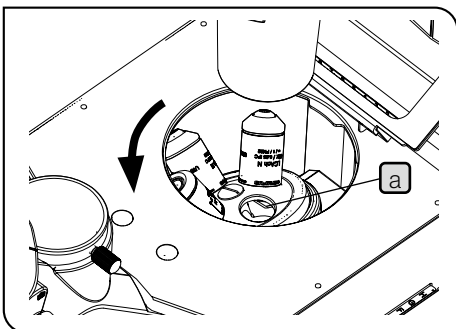
- 1 Remove the stage center plate and attach the objectives to the revolving nosepiece.

**TIP** Rotate the revolving nosepiece counterclockwise (arrow direction) with the left hand, and attach the objectives in the order from the lower magnification to the higher magnification to place the objectives at recommended positions.

**NOTE** In the inverted microscope, since front lenses of objectives face upward, dust or dirt may easily be attached to lenses. Attach the caps to screw holes **a** of the revolving nosepiece where no objectives are attached.

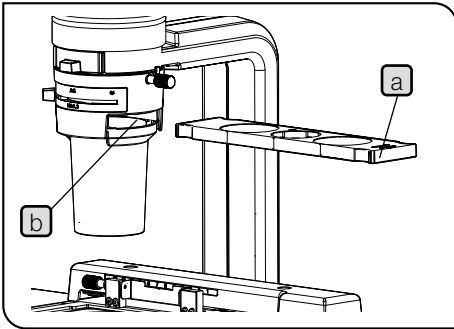
- 2 After all objectives are attached, fit the stage center plate into the stage.

**TIP** When removing the objectives, follow the procedures opposite to those of attaching.



## 7-6 Attaching the phase contrast slider (Phase contrast entry set / Phase contrast standard set)

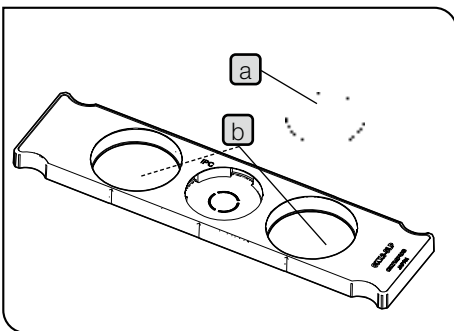
### 1 Attaching the pre-centered phase contrast slider CKX3-SLP



- 1 Set the pre-centered phase contrast slider CKX3-SLP **a** with the surface where the texts are described facing up, and insert it in the pre-centered phase contrast slider hole **b** of the condenser portion.

**TIP** Attach the centering phase contrast slider IX2-SL according to the same procedures.

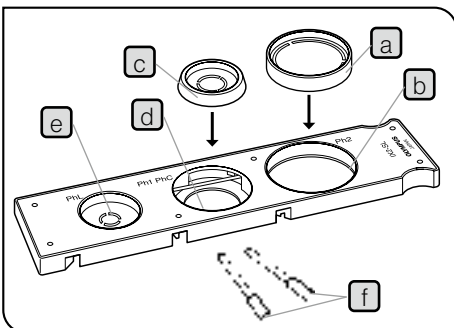
### 2 Attaching the optical element (ring) (option)



- 1 Set the display surface of the optical element (ring) **a** facing up and insert it in the empty hole **b** of the pre-centered phase contrast slider CKX3-SLP.

**TIP** The optical element (ring) **a** can be attached to either one of empty holes **b** on both sides of the pre-centered phase contrast slider

### 3 Attaching the phase contrast ring (option)

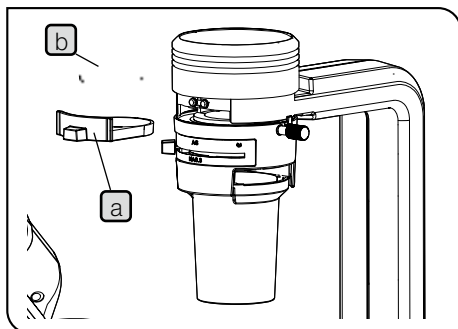


**TIP** In case of the centering phase contrast slider IX2-SL, the phase contrast ring to be used for the phase contrast observation differs depending on the magnification of the objectives. For details, see page 22.

- 1 Set the direction of the PH2 phase contrast ring IX2-SLPH2 **a** so that the texts described are readable from above, and insert it to the empty hole **b** of the centering phase contrast slider.
- 2 Set the direction of the PH1 phase contrast ring IX2-SLPH1 **c** so that the texts described are readable from the above, and insert it to the empty hole **d** of the centering phase contrast slider.

**TIP** For the PHL phase contrast ring **e** and the PH1 phase contrast ring **c** which are combined with the centering phase contrast slider, the centering of the phase contrast ring must be performed using the provided centering knobs (2 pcs) **f**. For details, see page 22.

## 7-7 Attaching the filter slider for transmitted light illumination

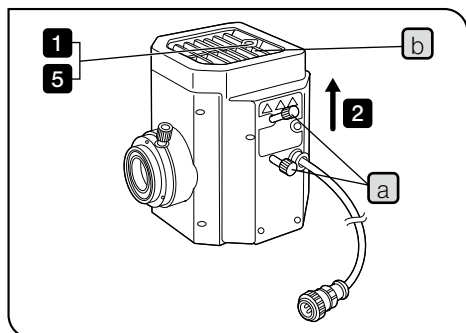


- 1 Take out the filter holder for transmitted light illumination (a), and insert the necessary filter (b).

## 7-8 Attaching the light source for reflected light illumination (Fluorescence set)

### 1 Attaching the mercury burner

**CAUTION** When replacing the mercury burner, set the main switch to **○ (OFF)** and wait until the mercury lamp housing and the burner are sufficiently cooled down.

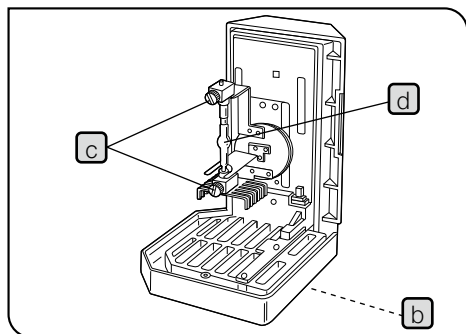


- 1 Loosen the socket part clamping screw using the Allen screwdriver.
- 2 Hold the upper section of the lamp housing and pull it upward to remove the socket part.

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

- 3 Place the socket part so that the radiation fin (b) faces down.

**TIP** The socket part is equipped with either one of the followings:  
 - Dummy burner for transportation (at a time of shipping from factory)  
 - Old burner (to be replaced)  
 Remove the dummy burner or the old burner by loosening the burner clamping screws (c) (2 pcs.).



- 4 Attach the + (positive) pole of the specified mercury burner (d) to the fixed mount on the upper side, then the - (negative) pole to the mount on the lower side.

**NOTE** • Be sure to use the USH-103OL burner.

- Be careful and avoid leaving fingerprints or stains on the mercury burner. Otherwise, there is a danger of explosion due to distortion of glass caused by the stains. If fingerprints or stains are attached to the burner, clean it by wiping gently with a piece of cleaning paper slightly moistened with absolute alcohol.

- 5 Attach the socket part with the burner to the original position and tighten the clamping screw.

**CAUTION**

- Align the external edges of the lamp housing with those on the socket part, and push the lamp housing straight downward.
- Attach the lamp housing on the lamp housing attaching position of the microscope so that the heat radiating fins face upward, and secure the sufficient space around the top surface, lower surface and the back surface. If the sufficient space is not secured, fire may be caused.
- Do not light the mercury burner when the lamp housing is not attached to the microscope because the UV rays in its light are harmful to your eyes.
- The UV rays in the light of the mercury burner may damage the specimen which is sensitive to UV rays.

Burner service life

USH-103OL: 300 hours

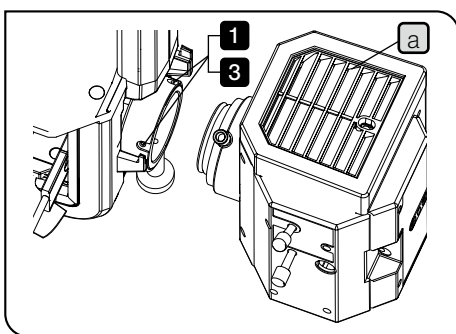
This value assumes the light cycles composed of 2 hours of lighting and 30 minutes of extinction. Do not turn it on and off at a shorter cycle than the above, because this will seriously shorten the service life of the burner.

**After replacing the burner, reset the hour counter of the power supply unit to "0.0." For details, refer to the instruction manual for the power supply unit.**

**TIP**

When removing the mercury burner, follow the procedures opposite to those of attaching.

## 2 Attaching the mercury lamp housing U-LH100HG



**CAUTION**

When attaching or detaching the mercury burner, set the main switch to **○** (OFF) and wait until the mercury lamp housing and the burner are sufficiently cooled down.

- 1** Loosen the clamping screws (2 pcs.) of the lamp housing using the Allen screwdriver.

**NOTE**

Do not loosen the clamping screws excessively. Otherwise, it may fall off.

- 2** Insert the lamp housing with the radiation fin **a** facing up as shown in the picture, and push it until it touches the end.

- 3** Tighten the clamping screws (2 pcs.) using the Allen screwdriver.

**TIP**

When removing the mercury lamp housing U-LH100HG, follow the procedures opposite to those of attaching.

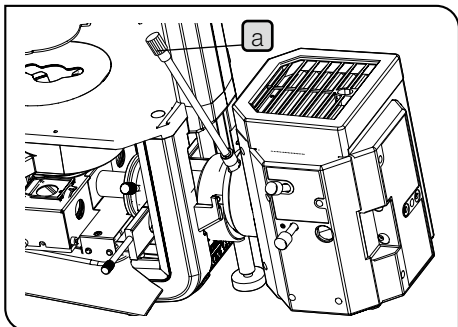
## 3 Attaching the LED and LDP light source U-LGPS

For procedures to attach the LED and LDP light source U-LGPS to the microscope frame CKX53SF, see the instruction manual provided with the LED and LDP light source U-LGPS.



4

## Centering the mercury burner (only when combined with the mercury lamp housing U-LH100HG )



The mercury burner emits the light by means of discharge produced when a current is supplied across the poles. If the positions of the poles were moved for example during replacement of the burner, the brightness of the light would be uneven. If this happens, it is necessary to adjust the positions of the poles. This operation is called the centering of the mercury burner.

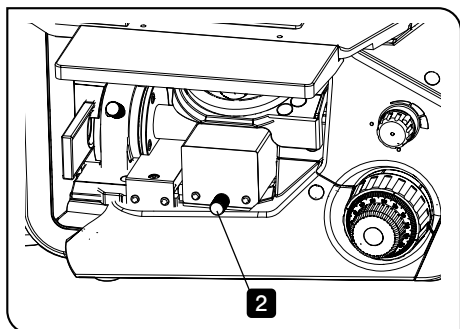
The mercury burner centering is not required every time before observation, but is recommended after the burner has been replaced or when the brightness of the observation image is uneven.

If the collector lens focusing knob of the lamp housing is hard to operate due to the location behind the microscope, use the extension handle U-CLA **a** (option) by inserting it on the knob.

TIP

Set the main switch of the power supply for mercury burner to ON.

Wait for 5 to 10 minutes until the arc image is stabilized before proceeding with the mercury burner centering.

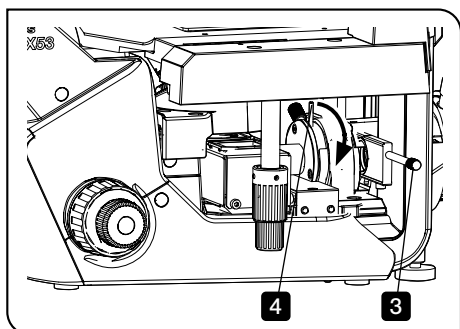


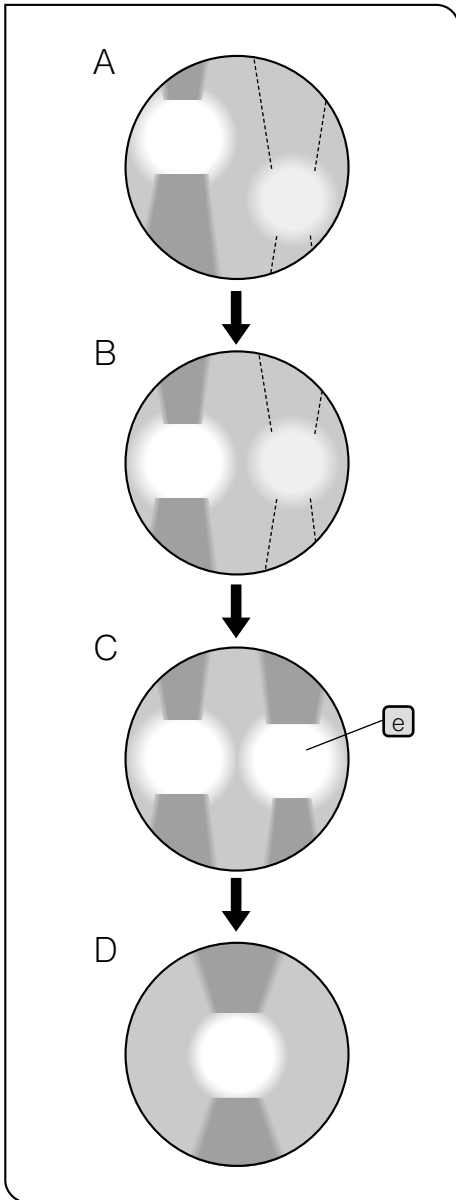
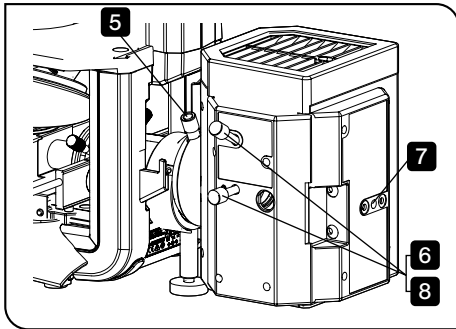
**1** Remove the cap (or objective) of the revolving nosepiece and engage that screw hole in the light path.

**2** Hold the selection lever of the fluorescence mirror unit and engage the B-excitation fluorescence mirror unit attached to the fluorescence mirror unit slider in the light path.

**3** Rotate the field iris diaphragm lever in the direction shown in the picture and open the iris diaphragm.

**4** Place thin white paper such as copy paper, etc. on the stage top surface, engage the empty hole of the filter slider for reflected light illumination in the light path and expose the paper surface to light.





- 5** Turn the collector lens focusing knob to project the arc image on the white paper placed on the stage. (A in the picture)  
If the arc image is not projected, turn the burner centering knobs.
- 6** Turn the burner centering knobs to bring the arc image on the center of the right (left) half of the field. (B in the picture)
- 7** Insert the Allen screwdriver in the mirror focusing screw on the rear of the mercury lamp housing and turn it to bring the mirror arc image e into focus. (C in the picture)
- 8** Turn the burner centering knobs to overlay the arc image with the mirror arc image. (D in the picture)

**TIP** During observation, turn and adjust the collector lens focusing knob so that the brightness of the observation field becomes uniform.

## 7-9 Attaching the camera

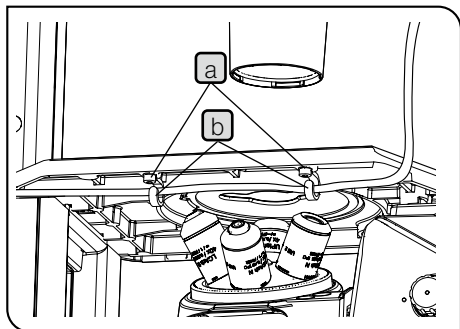
### 1 Attaching the camera adapter

**TIP** Refer to the instruction manual for the camera adapter in use.

### 2 Attaching the camera

**TIP** Refer to the instruction manual for the camera adapter in use.

### 3 Wiring the camera cable



The cable wiring needs the clamping screw (2 pcs.) **a** provided with the microscope frame CKX53SF and the cable holder (2 pcs.) **b**

- 1 Put the clamping screw **a** through the hole of the cable holder **b** and secure it at the screw hole of the plain stage using the Allen wrench.

**TIP** Secure the clamping screw so that the cable holder **b** is hidden below the plain stage.

- 2 Place the camera cable between the cable holder **b**.

When using the mechanical stage CKX3-MVR / Sub stage CK2-SS

Remove the fixing knob attached to each stage and put the fixing knob through the hole of the cable holder. Then, attach clamping knobs to each stage again and attach each stage to the plain stage.

**TIP** For procedures to attach the stage to the plain stage, see page 38.

### 4 Adjusting parfocality of the camera adapter

- 1 Adjust the parfocality of the camera adapter and the eyepiece to match the focusing of the image observed through the eyepieces with that of the image through the camera.

**TIP** For the parfocality adjustment method, refer to the instruction manual for the camera adapter in use.

# 8

## Preventive inspection sheet for illumination devices (Fluorescence set)

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

If you have any questions, please contact us.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase of the illumination device, or the total using time exceeds 20,000 hours of use.				
2. Light flickers when you move a lamp cable or illumination devices.				
3. Lamp cable is unusually hot to the touch.				
4. Burning or smoke odor.				
5. Signs of deformation, backlash, or looseness, etc. when you assemble/ disassemble the illumination device. (I.e. it is hard to open/ close the lid during lamp-replacement.)				
6. Illumination device has become deformed, cracked or tarnished in any way.				
7. Lamp cables or wiring parts have become deformed, cracked or tarnished in any way.				
8. Frequent repairs to similar devices put into use at the same time as the unit being checked.				

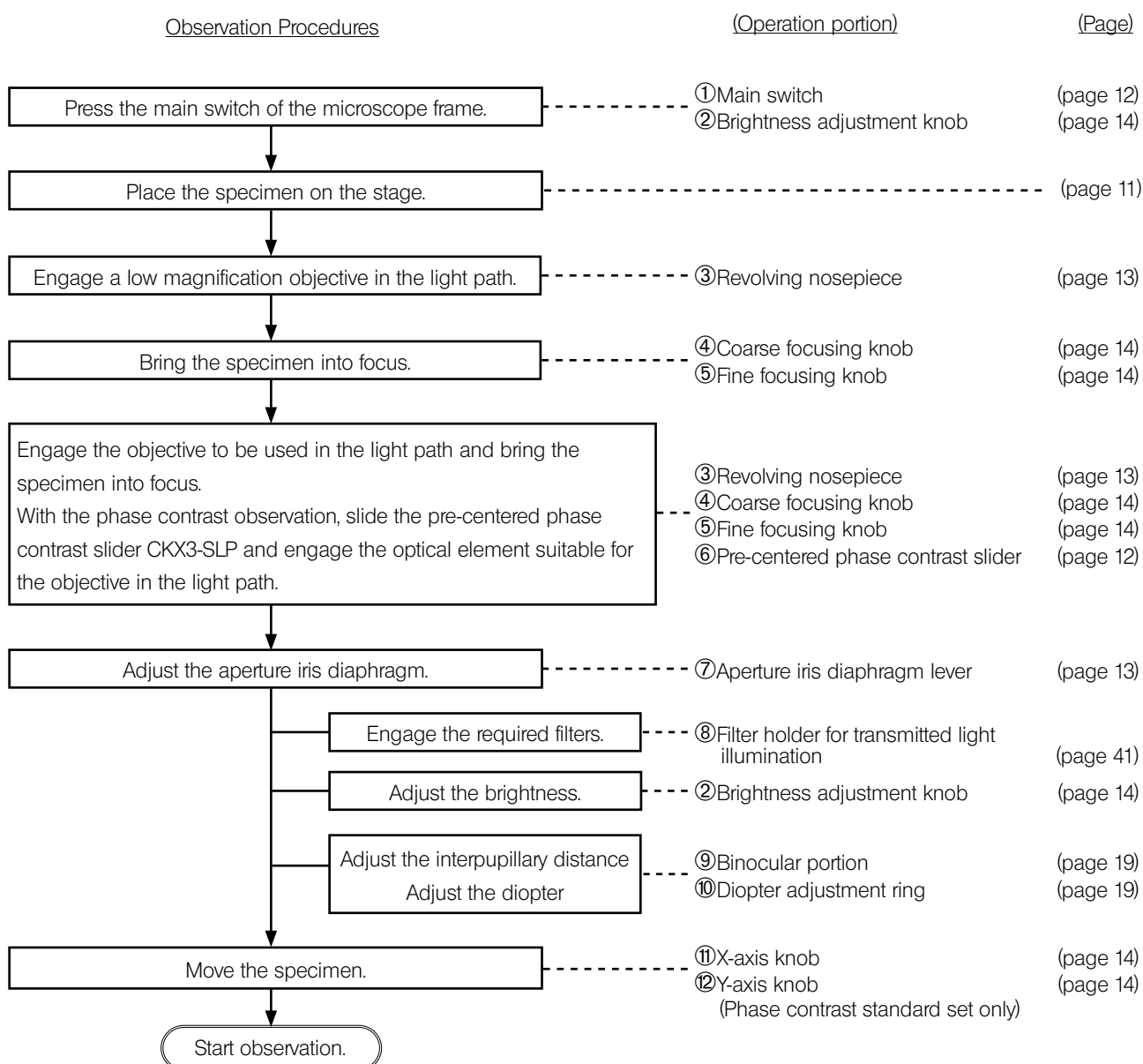
※ If the spaces are not enough for check , copy this sheet.

# 9 Appendix

## 9-1 Summary of procedures of bright field observation / phase contrast observation

### Preparation

- Attach the objectives suitable for observation methods.
- Attach the pre-centered phase contrast slider CKX3-SLP (for phase contrast observation).

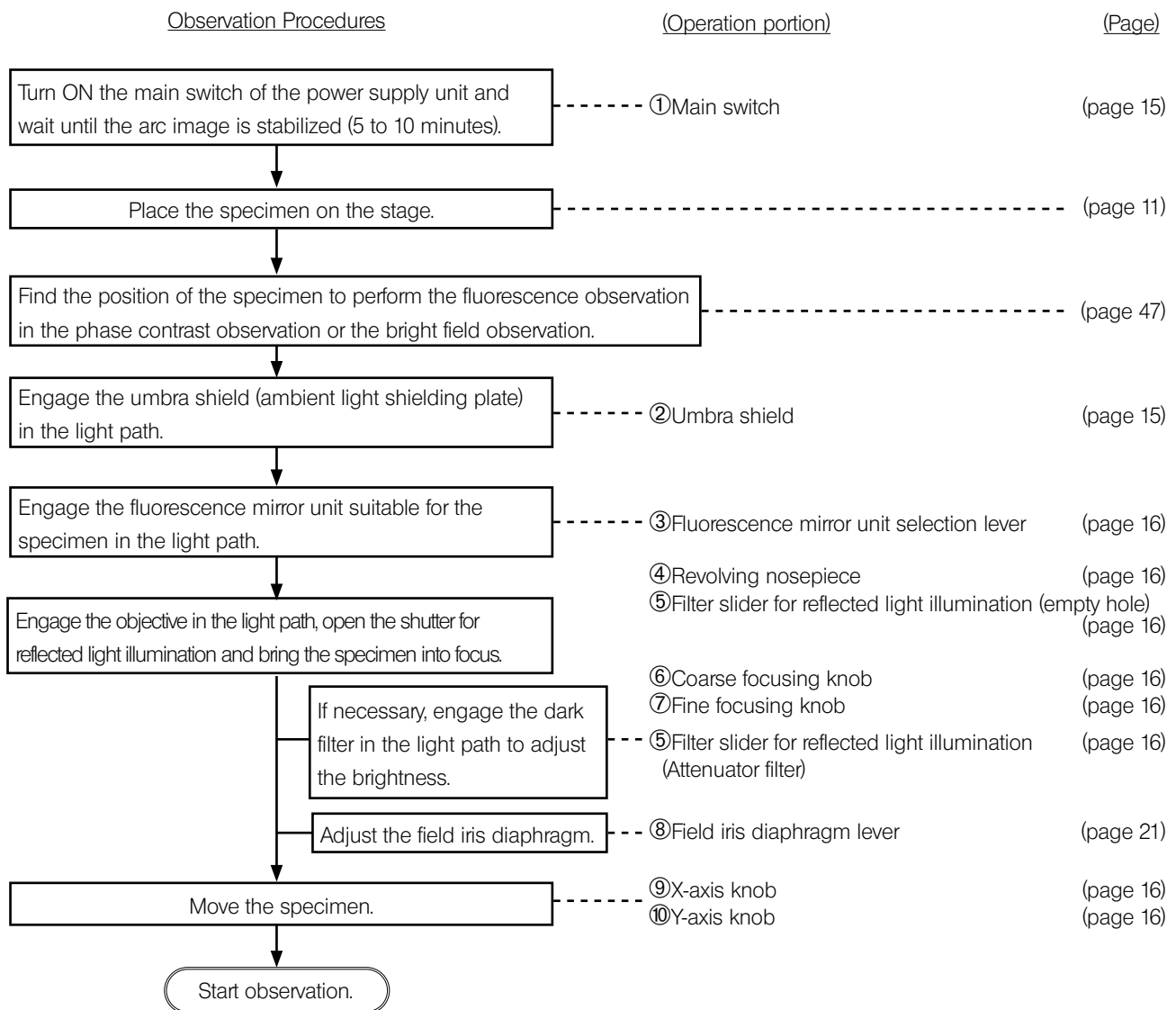


**TIP** The numbers assigned to operating portions indicate operating portions described in "2-1 Bright field set / Phase contrast entry set / Phase contrast standard set" (page 8).

## 9-2 Summary of fluorescence observation procedures

### Preparation

- Attach the objectives suitable for observation methods.
- Centering of the mercury burner (when using the mercury lamp housing U-LH100HG)



**When performing the fluorescence observation, be sure to engage the umbra shield in the light path.**

**TIP**

- If you take a short break during observation, engage the shutter for reflected light illumination of ⑤ filter slider for reflected light illumination in the light path
- The numbers assigned to operating portions indicate operating portions described in "2-2 Fluorescence set" (page 9).

## ■ Proper selection of the power cord

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




















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

### Specifications

Voltage rating	125 VAC (for 100-120 VAC area) or, 250 VAC (for 220-240 VAC 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 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 cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.

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

**Table 2 HAR flexible cord**

Approval organizations and cordage harmonization marking methods

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

Underwriters Laboratories Inc. (UL)  
Canadian Standards Association (CSA)

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



# Memo

# Memo



Manufactured by



**Evident Corporation**

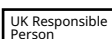
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Official website



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