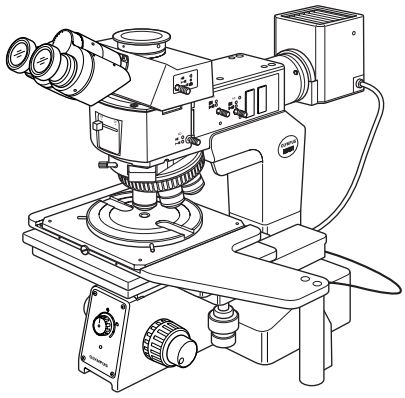
OLYMPUS®



INSTRUCTIONS

MX51

INDUSTRIAL MICROSCOPE

This instruction manual is for the Olympus Industrial Microscope Model MX51.To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.

CONTENTS

Correct assembly and adjustments are indispensable for the microscope to manifest its full performance. If you want to assemble the microscope by yourself, see Chapter 10, "ASSEMBLY" (pages 33 to 45).
For the modules for which separate instruction manuals are provided, also refer to the assembly description in their manuals.

IMPORTANT – Be sure to read this section for safe use of the equipment. – 1-6

1 NOMENCLATURE 7

2 CONTROLS 8-12

3 SUMMARY OF REFLECTED LIGHT BRIGHTFIELD/DARKFIELD OBSERVATION PROCEDURES 13-14

4 USING THE CONTROLS 15-20

4-1 Frame 15-16

1 Adjusting the Illumination Brightness
2 Adjusting the Focusing
3 Adjusting the Coarse Adjustment Knob Tension
4 Pre-focusing Lever
5 Attaching/Detaching the Fine Adjustment Knob

4-2 Reflected Light Illuminator BX-RLA2/BX-KMA 16-17

1 Selecting the Observation Light Path
2 Controlling the Field Iris Diaphragm (FS)
3 Controlling the Aperture Iris Diaphragm (AS)
4 Using Filters

4-3 Stage 18

1 Moving the MX-SIC6R2 Stage
2 Moving the U-SIC4R2/SIC4L2 Stage

4-4 Observation Tube 19-20

1 Adjusting the Interpupillary Distance
2 Adjusting the Diopter
3 Using the Eye Shades
4 Using the Eyepiece Micrometer Disk
5 Selecting the Light Path of Trinocular Observation Tube
6 Adjusting the Tilt

5 PHOTOMICROGRAPHY 21

6 OBSERVATION 22-26

6-1 Reflected Light Brightfield/Darkfield Observation 22
6-2 Reflected Light Differential Interference Contrast (DIC) Observation 23-24
6-3 Reflected Light Simplified Polarized Light Observation 25
6-4 Reflected Light Infrared (IR) Light Observation 25
6-5 Transmitted Light Brightfield Observation 26

7 SPECIFICATIONS 27

8 OPTICAL CHARACTERSTICS «UIS2 (UIS) Series» 28-30

9 TROUBLESHOOTING GUIDE 31-32

10 ASSEMBLY 33-45

10-1 Assembly Diagram 33-34
10-2 Detailed Assembly Procedures (Including Mercury Burner Centering) 35-45

11 SPARE PART LIST 46

■ **PROPER SELECTION OF THE POWER SUPPLY CORD** 47-48

IMPORTANT

This microscope employs a UIS2 (UIS) (Universal Infinity System) optical design, and should be used only with UIS2 (UIS) eyepieces, objectives, observation tubes, etc. Less-than-optimal performance may result if inappropriate accessories are used.

⚠ SAFETY PRECAUTIONS

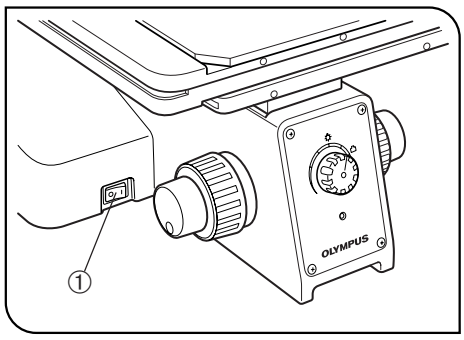


Fig. 1

1. Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment. Lay out the power cord at a sufficient distance from the sources of heat such as the power supply unit/light source and lamp housing to avoid contact with these heat sources.
2. To avoid potential shock hazard, always set the main switch ① to " O " (OFF) and disconnect the power cord before replacing the light source bulb/burner.

◎Always use the lamp bulb or burner supplied by Olympus.

Bulb/Burner	Model	Average Life
Halogen bulb	• 6V30WHAL-L (Long life type) (HOSOBUCHI G4 20H CF-6)	2000 hrs.
	• 6V30WHAL (High-intensity type) (PHILIPS 5761)	100 hrs.
	• 12V100WHAL-L (Long life type) (PHILIPS 7724)	2000 hrs.
	• 12V100HAL (High-intensity type) (PHILIPS 7023)	50 hrs.
Mercury burner	• USH-103OL (USHIO)	300 hrs.
	• HBO103W/2 (OSRAM)	300 hrs.
Xenon burner	UXL-75XB-A (USHIO)	200 hrs.
Halogen bulb for light guide light source	JCR12V-100WB (USHIO)	1000 hrs.

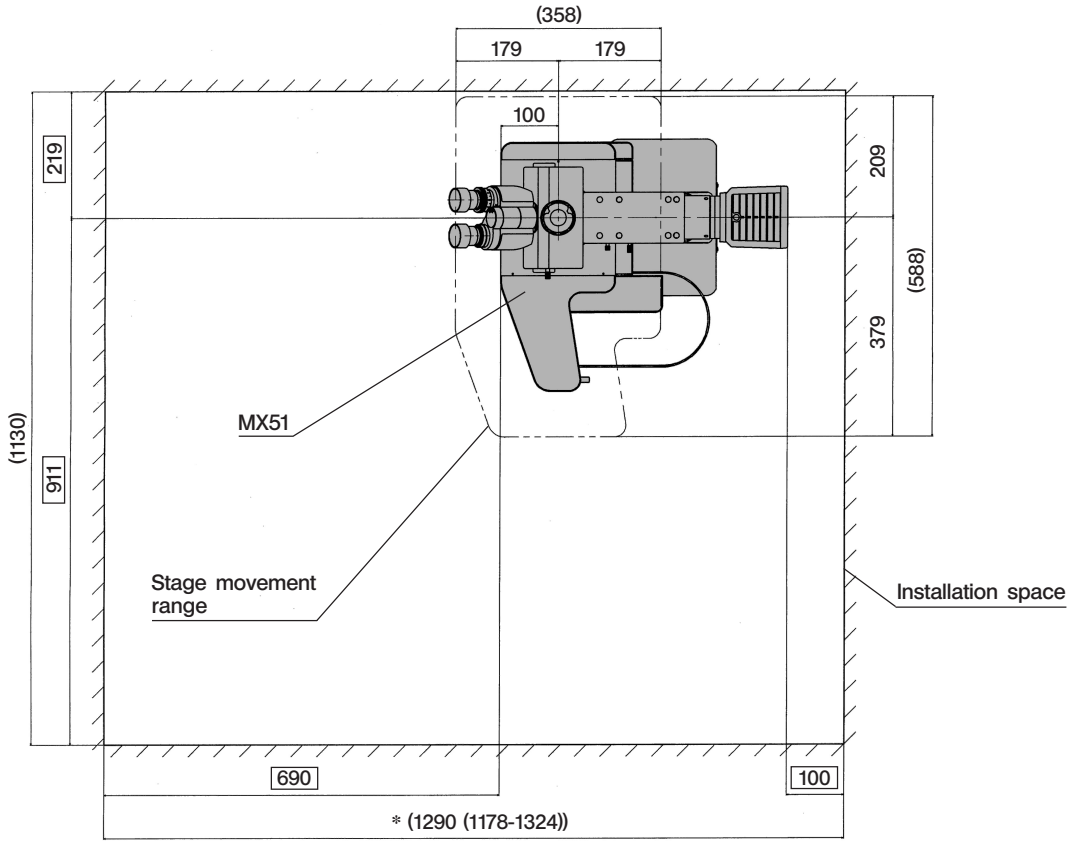
3. Do not light the mercury or xenon burner while it is not mounted on the microscope because the UV rays in their light are harmful to your eyes. The used mercury burner should be disposed of as an industrial waste. If you cannot dispose of it properly, contact Olympus.
4. The eye point height cannot be adjusted with the standard observation tube (U-TR30-2) for this microscope. With this model, prepare the microscope table that can provide an eye point height between 1220 and 13370 mm (SEMI S8-1103) from the floor surface.

5. The desktop surface on which the microscope system is installed should be almost horizontal with a tilting angle of less than 1° (to prevent spontaneous displacement of the stage) and rigid.
   (The weight of the microscope system with standard module combination is about 26 kg (57.3 lbs).)
◎Although this microscope is designed with excellent vibration resistance, its maximum performance can be achieved when an anti-vibration bench is used.)
6. The lamp housing surface at the rear of the microscope frame will become very hot during operation. When installing the microscope, ensure that there are ample free spaces (of more than 100 mm) around and in particular above and below the lamp housing. Also, the power cord and other cables should be laid out at distances from the microscope because contact with them may result in their fusion and an electric shock due to it.
7. To avoid a potential shock hazard, make sure that the power cord is safely **grounded/earthed**.
8. To allow each microscope manifest its full performance, reserve an installation space having the minimum dimensions described below before assembly and installation of the microscope. (Sizes in □)

◎The dimensions of the area enclosed in alternate long and two short dashes lines indicate the stage movement range. The dimensions marked * are variable depending on the lamp housing used.
◎When maintenance is required, a larger work space can be prepared by changing the observation tube orientation or moving the stage.
◎The following installation space is set according to the SEMI standard guidelines (SEMI S8-1103). It is recommended that you set the optimum installation space for each customer by referring to the following installation space data as well as the appearance of the system, eye point height, etc.

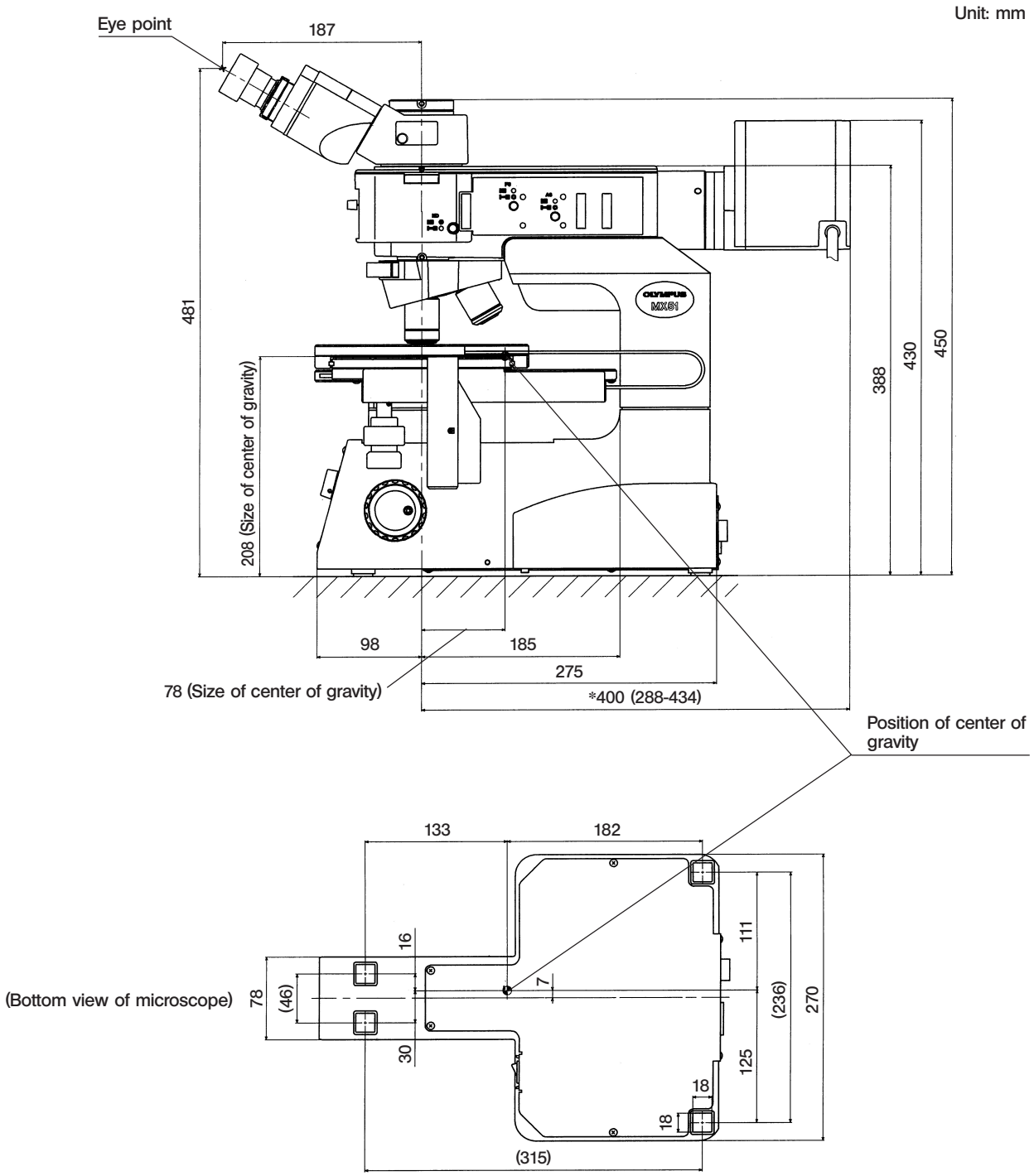
Installation space

Unit: mm



External view, eye point and center of gravity

Unit: mm



(Note) The center of gravity is an approximate position when the microscope is equipped with the standard module combination for transmitted light observation. Note that the position is variable depending on the weight of specimen, position of the stage and other modules used.

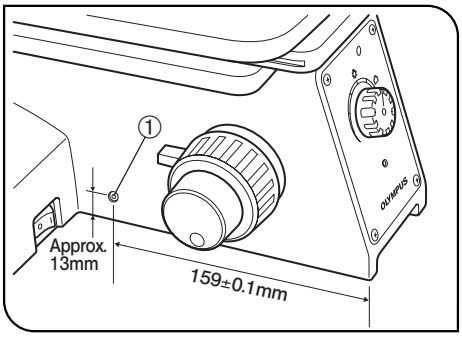


Fig. 2

9. To prevent toppling of the microscope system, keep the total height of the microscope below 1 meter (3.3 ft) when attachments (including Olympus optional modules and the CCD camera prepared by the customer) are mounted.
10. The microscope has two screw holes (M5, depth 7 mm) for prevention of toppling (in the case of an earthquake or microscope imbalance) on the side panel ①. Clamp the microscope using L-shaped clamps and these screw holes as required.

▲When clamping the microscope using L-shaped clamps prepared by the customer, be sure to use steel bolts (strength category 12.9) with as long as possible threaded sections (6 mm or more is recommended).

Safety Symbols

The following symbols are found on the microscope. Study the meaning of the symbols and always use the equipment in the safest possible manner.

Symbol	Explanation
⚠	Indicates that the surface becomes hot, and should not be touched with bare hands.
⚠	Before use, carefully read the instruction manual. Improper use could result in personal injury to the user and/or damage to the equipment.
I	Indicates that the main switch is ON.
O	Indicates that the main switch is OFF.

Caution indications

Caution indications are affixed at parts where special precaution is required when handling and using the microscope. Always heed the cautions.

Caution indication positions	Lamp housing/power supply unit [High temperature caution]	⚠
	Light guide light source (LG-PS2) [High temperature caution]	⚠

1 Getting Ready

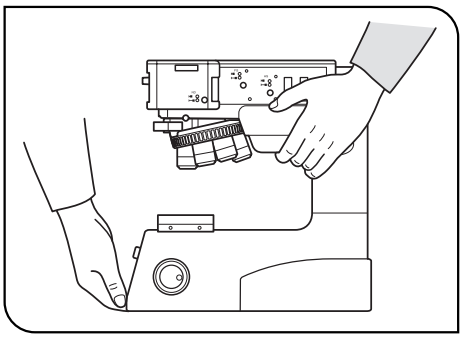


Fig. 3

1. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, refer to Chapter 7, "SPECIFICATIONS" on page 27.)
2. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impacts.
   When moving the microscope, detach the observation tube, stage and lamp housing to reduce the total system weight. Two persons are needed to carry the microscope; one should hold the base section and the other person should hold the arm section. (Fig. 3) (The microscope frame weight is about 11 kg (24.3 lbs).)

★**Do not change the position of the microscope by sliding it on the desktop surface; otherwise, the rubber feet will be damaged.**

3. Be sure to attach the transport clamping plate(s) to the stage before transporting it.

2 Maintenance and Storage

1. To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
   If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

▲**Since the absolute alcohol is highly flammable, it must be handled carefully.**
Be sure to keep it away from open flames or potential sources of electrical sparks — for example, electrical equipment that is being switched on or off. Also remember to always use it only in a well-ventilated room.

2. If any part of the equipment (other than glass components) gets dirty, with it with a clean cloth.
   If the party is extremely dirty, do not attempt to use organic solvents to clean it; instead, use a soft, lint-free cloth slightly moistened with a diluted neutral detergent.
3. Never disassemble any part other than instructed of the microscope. This could result in malfunctions or reduced performance.
4. When not using the microscope, keep it covered with a dust cover. Make sure the lamp housing is cool before covering the microscope.
5. When disposing of the microscope, check the ordinances and rules of your local authority and follow them.

3 Applicable Standards

1. This device is in compliance with or certified by the following standards.
2. Although this device is designed for use in industrial environments, their full performances may not be manifested if it is not operated properly. Be sure to handle it properly as instructed in this manual.

This device is designed for use in industrial environments (Class A devices). Using it in a residential environment may affect other equipment in the environment.

CE marking

This device complies with the requirements of both directive 89/336/EEC concerning electromagnetic compatibility and directive 73/23/EEC concerning low voltage. The CE marking indicates compliance with the above directives.

FCC

This device has been subjected to the compliance evaluation of the following FCC regulation:

• FCC Part 15, Subpart B: Radio Frequency Equipment (Commercial and industrial areas)

NOTE: This equipment 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 equipment is operated in a commercial environment. This equipment 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 equipment 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 equipment.

SEMI

This device has been subjected to the compliance evaluations of the following guidelines under the S8 Standard.

• S2-0703: Safety Guidelines for Semiconductor Manufacturing Equipment

• S8-1103: Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment

4 Caution

If the microscope is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

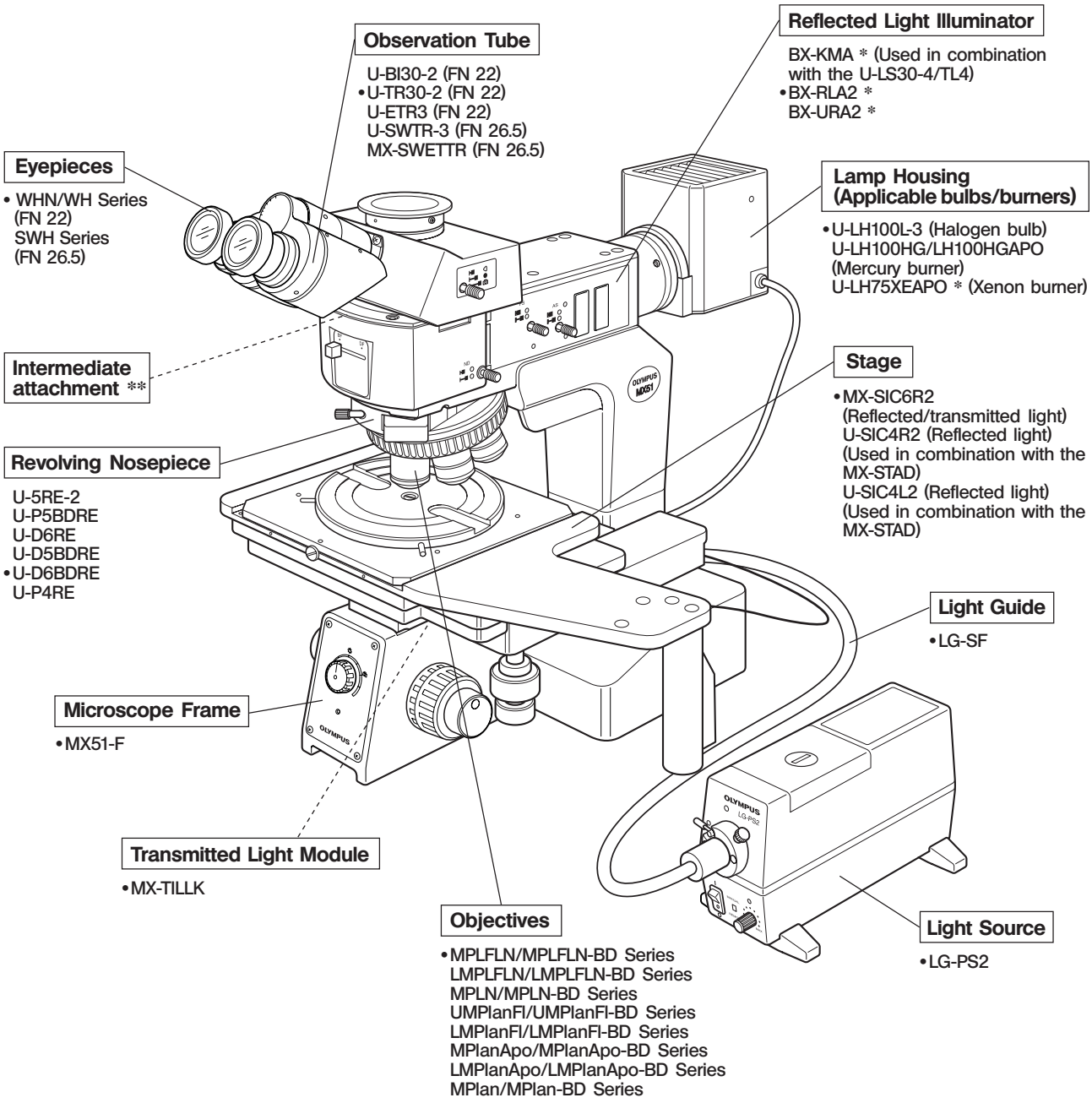
▲: Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

★ : Indicates that failure to follow the instructions could result in damage to equipment.

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

1 NOMENCLATURE

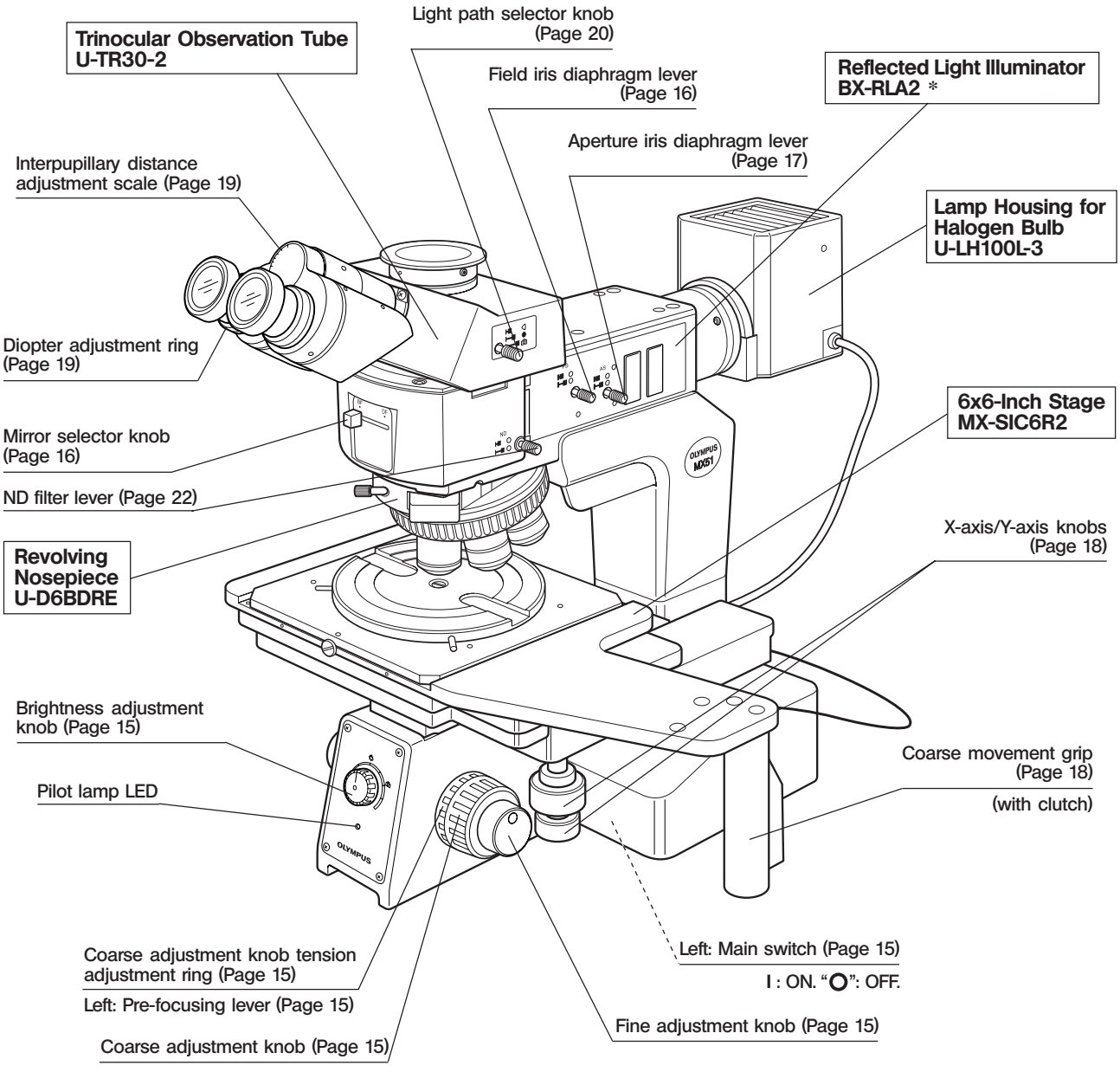
◎The illustration shows the MX51 composed of modules marked •.
The modules shown below are examples of those used in a typical system. Certain modules are usable even when they are not mentioned below. For these modules, refer to the latest catalogues or contact Olympus.
For the modules marked *, refer to their instruction manuals.



** Only one intermediate attachment can be used:
U-EPA2 *
U-CA/ECA *
U-DP *
U-TRU *

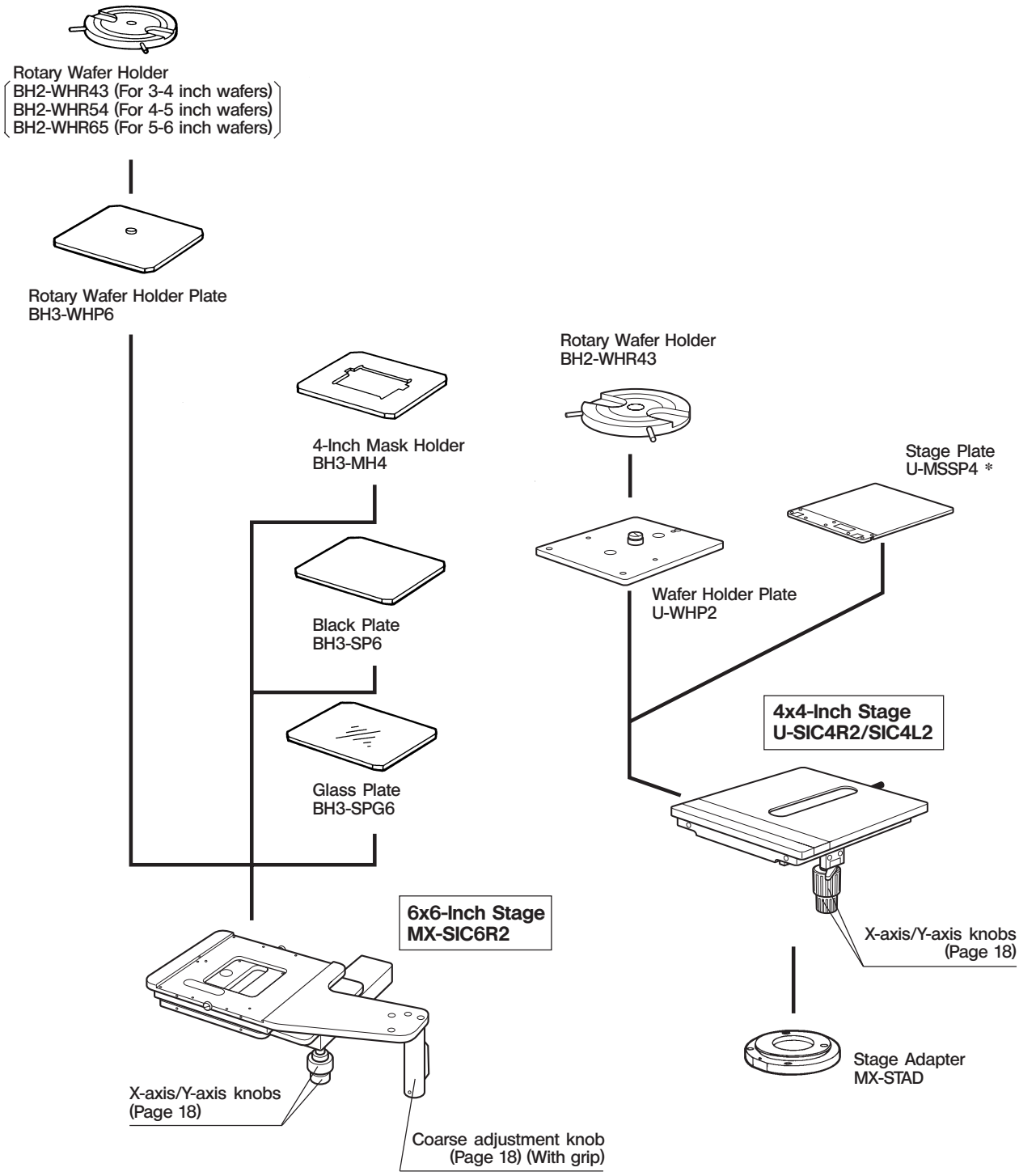
2 CONTROLS

◎If the microscope has not been assembled yet, refer to Chapter 10. "ASSEMBLY" (pages 33 to 45) first.
The following illustration shows the modules of the model names enclosed inside ▭. For other ancillary modules, read the subsequent pages.



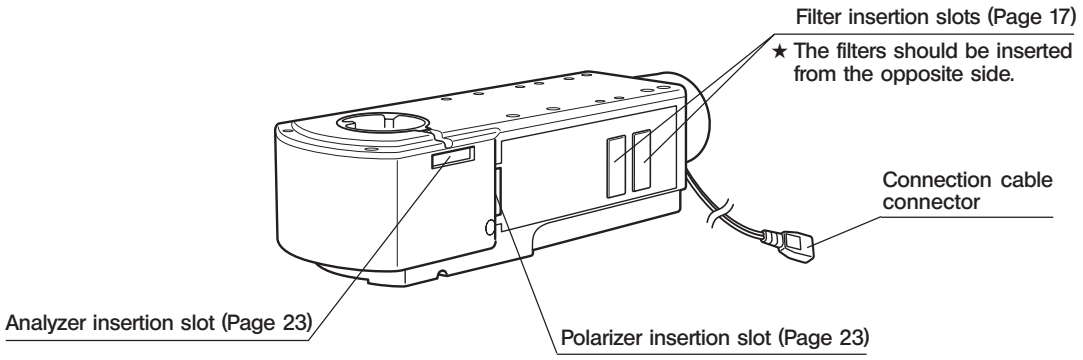
* For details on the BX-RLA2, refer to its instruction manual.

Stage and Holder System



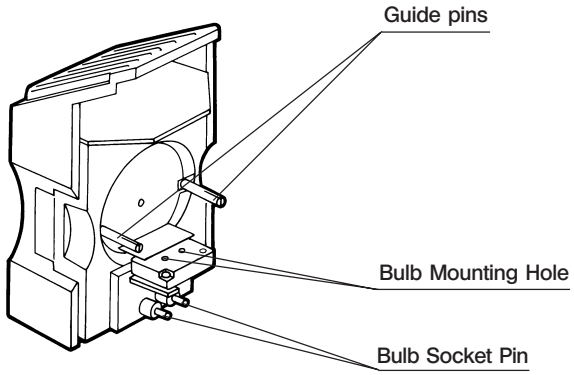
* The U-MSSP4 stage plate come with two bend prevention pins attached at the factory before shipment. Be sure to remove these pins before installation.

Reflected Light Illuminator BX-KMA



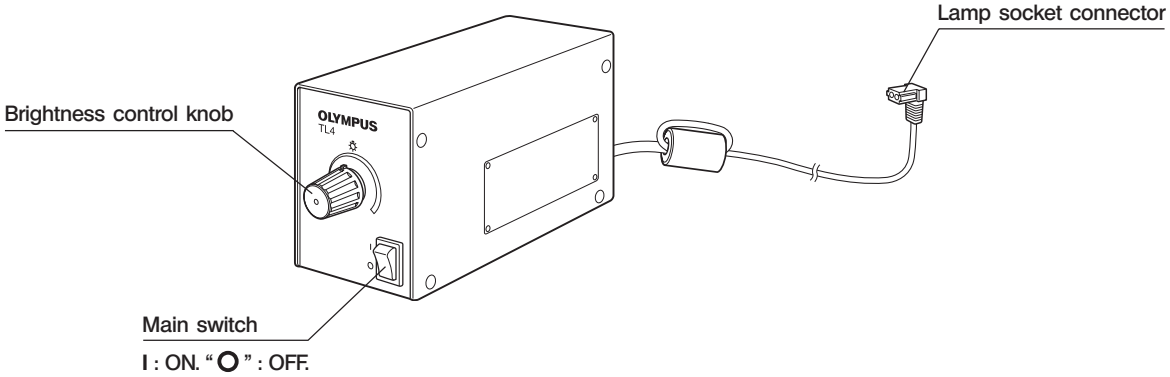
Lamp Socket U-LS30-4

◎The applicable halogen bulbs are the 6V30WHAL-L/6V30WHAL.

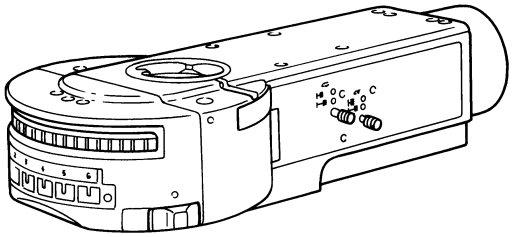


Power Supply TL4

◎ For details, refer to the instruction manual.



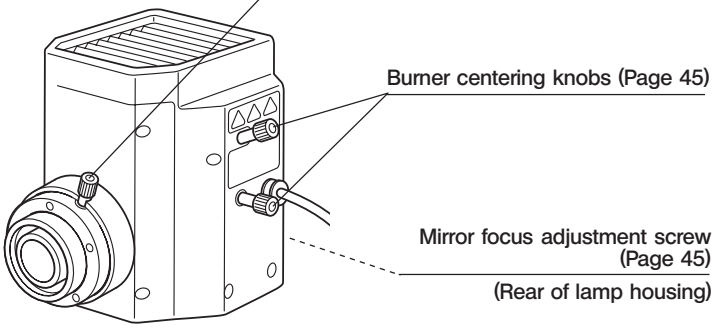
Universal Reflected Light Illuminator BX-URA2



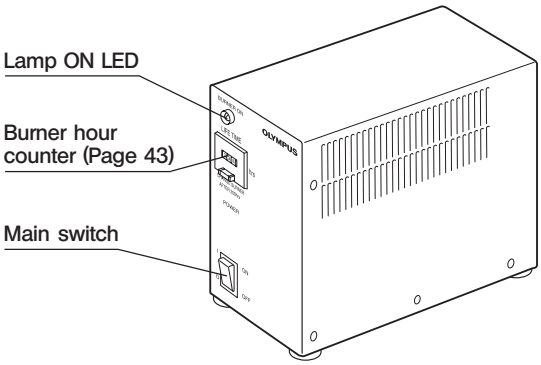
◎This illuminator allows the system to be used as a reflected light fluorescent light observation system as well as the reflected light brightfield/darkfield observations. For details, refer to the instruction manual for the BX-URA2.

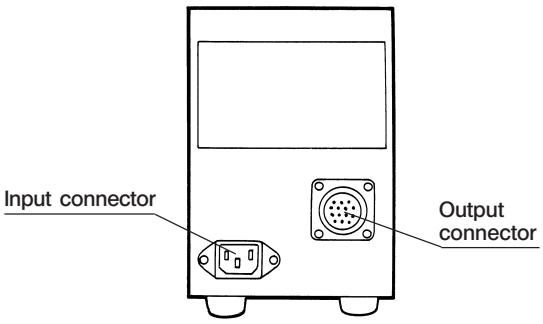
High-Intensity Light Sources

Lamp Housing for Mercury Burner U-LH100HG U-LH100HGAPO



Power Supply Unit for 100 W Mercury Burner

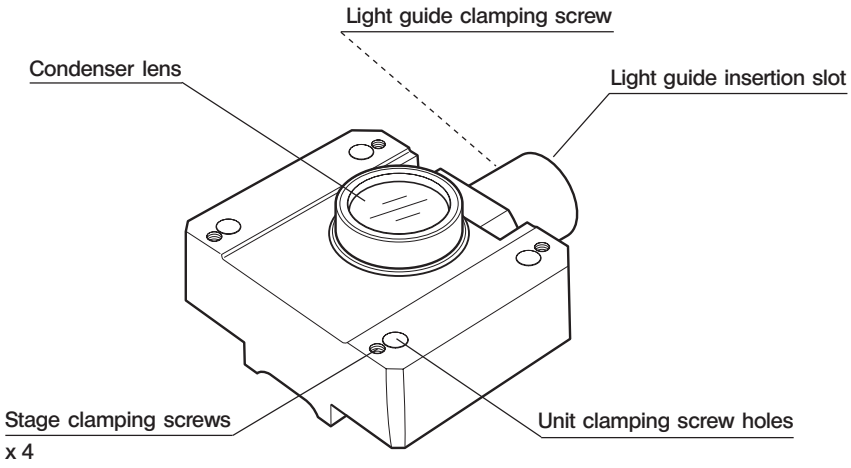




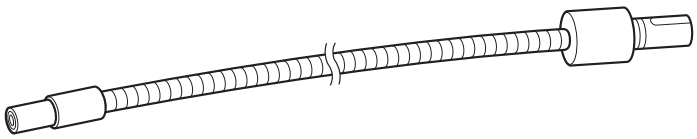
Lamp Housing for Xenon Burner U-LH75XEAPO Power Supply Unit for 75 W Xenon Burner

◎For details, refer to the instruction manual.

Transmitted Light Module
MX-TILLK

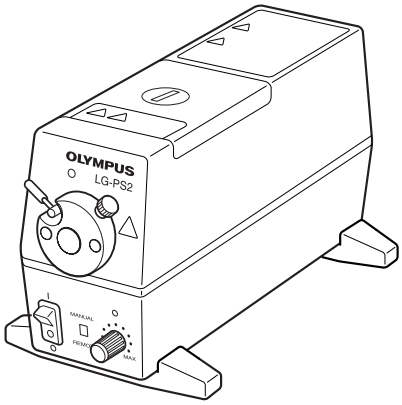


Light Guide
LG-SF



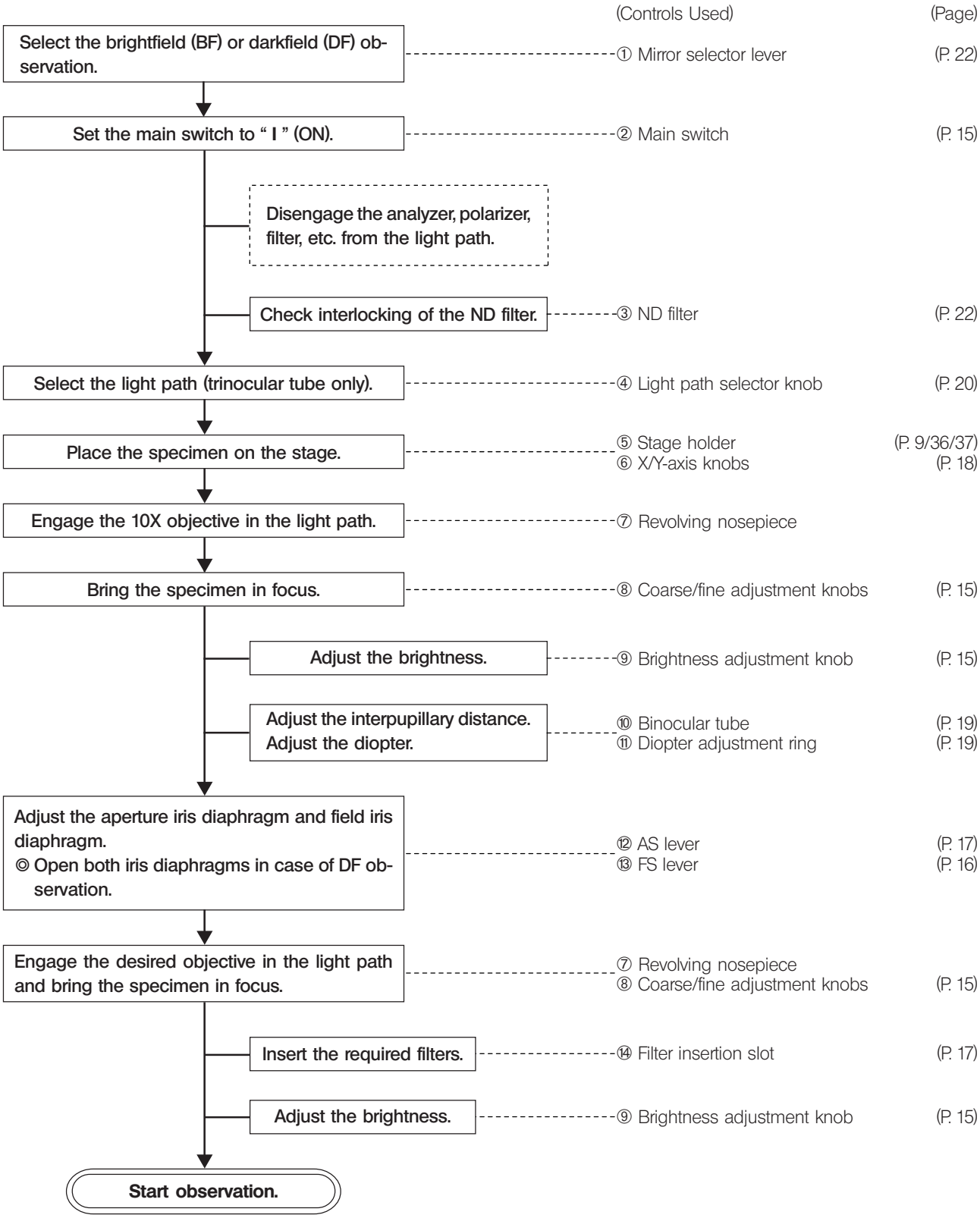
Light Source
LG-PS2

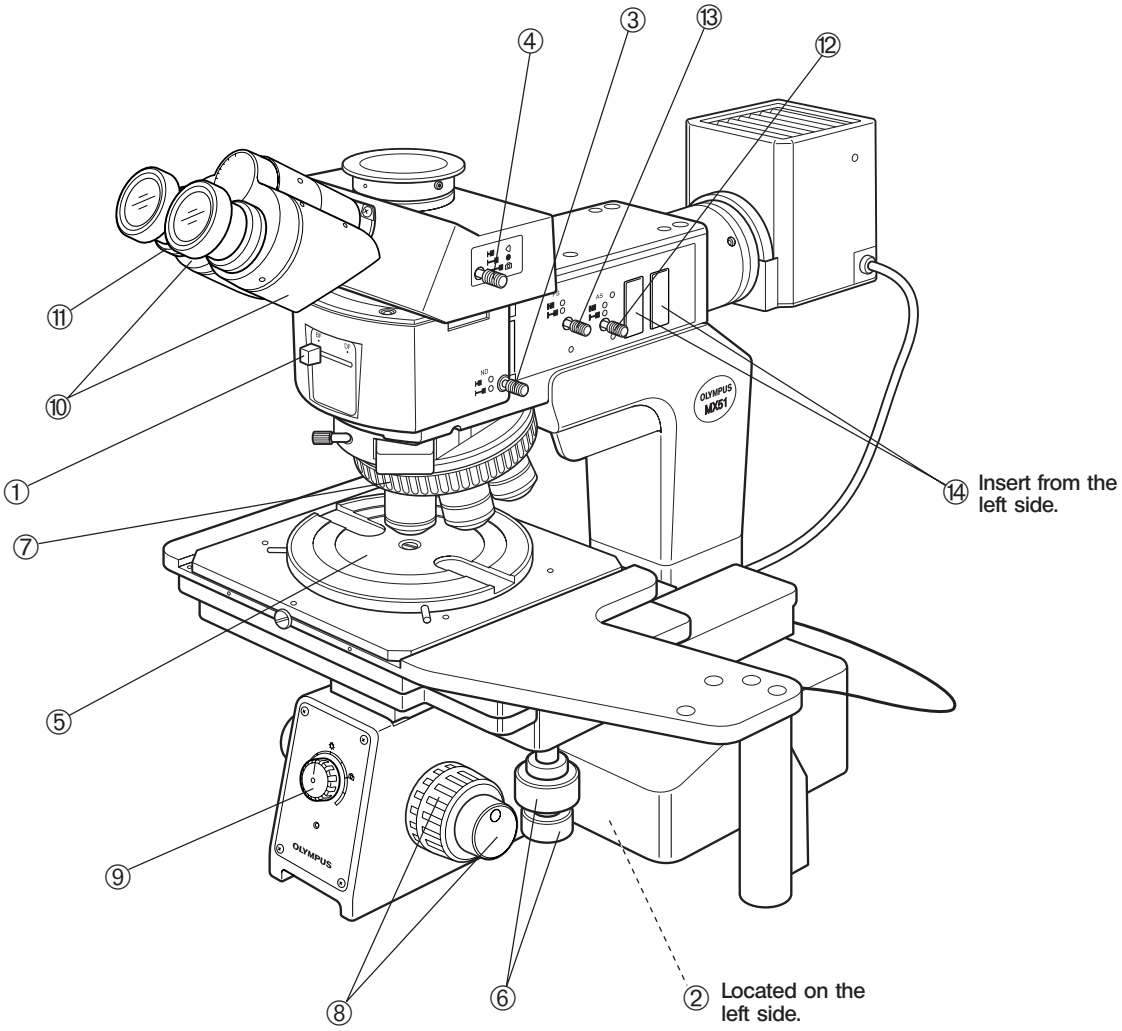
◎For details, refer to the instruction manual.



3 SUMMARY OF REFLECTED LIGHT BRIGHTFIELD/ DARKFIELD OBSERVATION PROCEDURES

◎This chapter outlines the operational procedure when the microscope is used for reflected light brightfield and darkfield observation. Other observation procedures such as differential interference contrast (DIC) observation are explained in separate sections later in this manual.
(Note) The BX-KMA reflected light illuminator cannot be used in the reflected light darkfield observation.





◎Make a photocopy of this chapter and post it near the microscope for quick reference.

4 USING THE CONTROLS

4-1 Frame

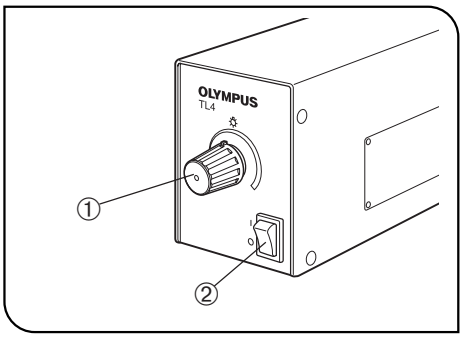


Fig. 4

1 Adjusting the Illumination Brightness (Figs. 4 & 5)

Power Supply TL4

1. Confirm that the brightness control knob ① is set to the MIN (low Voltage) position, and set the main switch ② of the power supply to " I " (ON).
2. Turning the knob ① toward MAX (high Voltage) increases the light intensity and increases the illumination brightness.

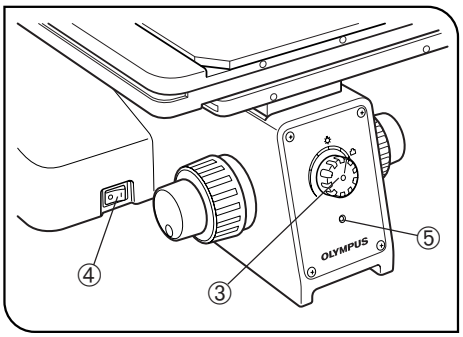


Fig. 5

Power Supply Built Into the Microscope

1. Turn the Brightness adjustment knob ③ fully counterclockwise to the low Brightness position, and then set the main switch ④ to " I " (ON). Confirm that the pilot lamp LED ⑤ lights up.
2. When the Brightness adjustment knob is turned clockwise to the high Brightness position, the light intensity increases.

◎During photomicrography (in the 📷 position), the Brightness adjustment knob cannot be used to adjust the light intensity without altering the color temperature of the light, too. Consequently, use ND filters to adjust the light intensity during photomicrography.

2 Adjusting the Focus (Fig. 6)

When turning the coarse adjustment knob ① and fine adjustment knob ② in the direction of the arrow, the stage is raised (the specimen is advanced toward the objective).

3 Adjusting the Coarse Adjustment Knob Tension (Fig. 6)

The coarse adjustment knob tension is pre-adjusted for easy use. However, if desired, you can change the tension using the tension adjustment ring ③. Turning the ring in the direction of the arrow increases tension, and vice versa.

★The tension is too low if the stage drops by itself or focus is quickly lost after adjustment with the fine adjustment knob. In this case, turn the ring in the direction of the arrow to increase tension.

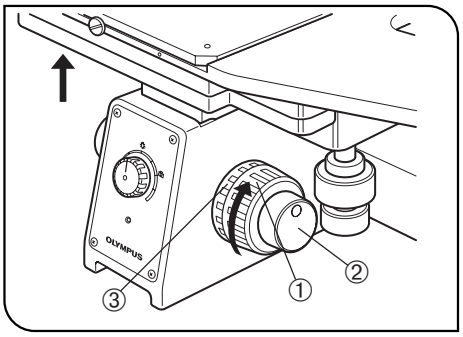


Fig. 6

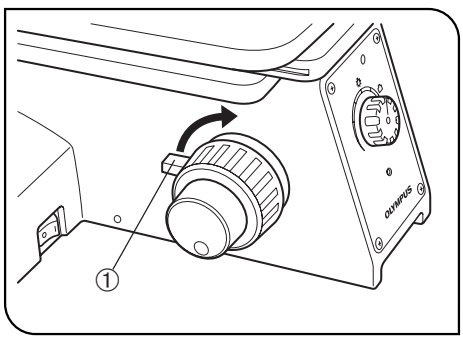


Fig. 7

4 Pre-focusing Lever (Fig. 7)

The pre-focusing lever ① ensures that the objective does not come in contact with the specimen and simplifies focusing. After focusing on the specimen with the coarse adjustment knob, turn this lever ① in the direction of the arrow and lock there to set an upper limit on the coarse stage movement.

★Stage movement with the fine adjustment knob is not affected by the pre-focusing lever.

◎After changing specimens, refocusing is easily accomplished y turning the coarse adjustment knob to reach the pre-focusing position, then making fine adjustment with the fine adjustment knob.

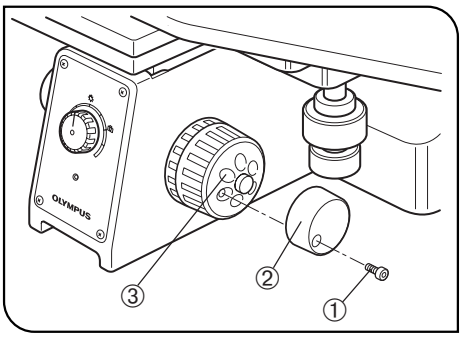


Fig. 8

5 Attaching/Detaching the Fine Adjustment Knob (Fig. 8)

◎The fine adjustment knob is designed detachable to prevent it from interfering with your hand during operation of the X-axis/Y-axis knobs.

1. Loosen the clamping screw ① using an Allen screwdriver and remove the fine adjustment knob ②.
2. The fine adjustment dial ③ can be operated with your fingertip or finger surface to allow you the fine focus adjustment at the same time as manipulation of the X-axis/Y-axis knobs.

4-2 Reflected Light Illuminator BX-RLA2/BX-KMA

◎Since the BX-RLA2 is provided with a dedicated instruction manual, the following description pertains only to the frequently used operations. Note that only the description of the filters is applicable to the BX-KMA.
If you use a reflected light illuminator other than those mentioned above, refer to its instruction manual.

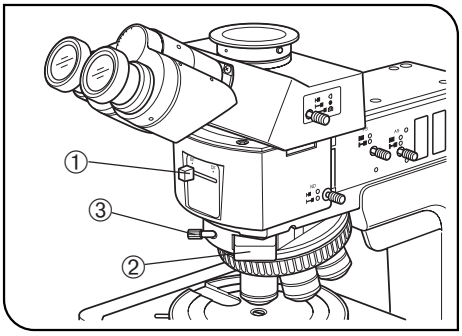


Fig. 9

1 Selecting the Observation Light Path (Fig. 9)

Slide the mirror selector knob ① to the position of the mirror used for the desired observation mode.

BF : Reflected light brightfield observation
DF : Reflected light darkfield observation

★Slide the mirror selector knob until it stops at the stopper position. If it is left in an intermediate position, observation will not be possible.

Effect of Dummy Slider

The dummy slider ② has been mounted in the DIC revolving nosepiece before it is shipped the factory. When using a DIC prism, loosen the clamping screw ③ and replace the dummy slider. In other cases, however, the dummy slider must be pushed into the light path to prevent flare.

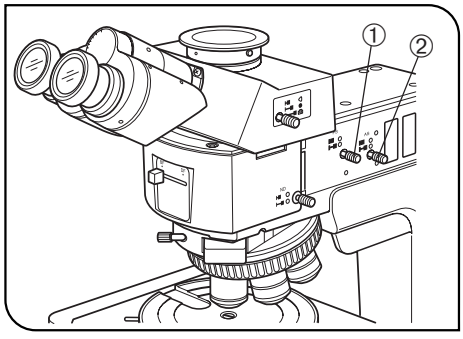


Fig. 10

2 Controlling the Field Iris Diaphragm (FS) (Fig. 10)

◎Adjust centering of the field iris diaphragm before proceeding to the following.

●**Reflected light brightfield observation:**
The illumination field should be adjusted to obtain images with good contrast.
Using the field iris diaphragm lever ① on the vertical light illuminator, stop down the field iris diaphragm at the position where the specimen is in focus, until immediately before the field iris image circumscribes the field of view to block extra light.

●**Reflected light darkfield observation:**
Push in the field iris diaphragm ① to the fully open position.

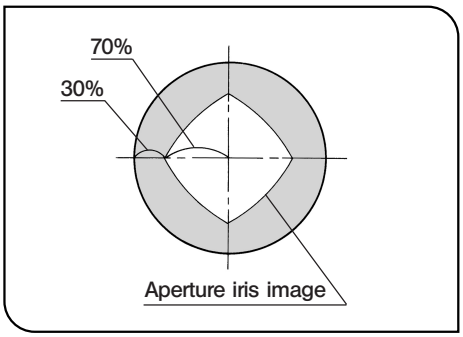


Fig. 11

3 Controlling the Aperture Iris Diaphragm (AS) (Figs. 10 & 11)

◎The aperture iris diaphragm is used to adjust the aperture number of the illumination system. Matching the aperture number of the illumination system with that of the objective in use offers an image with optimum contrast and also increases the focal depth of image. But note that this adjustment may decrease the resolution and brightness. In general, adjusting the aperture iris to 70% to 80% of the objective can provide a well-balanced image.

◎Adjust centering of the aperture iris diaphragm before proceeding to the following.

●**Reflected light brightfield observation:**

In general, remove the eyepieces, and then while looking into the eyepiece sleeves, pull out the aperture iris diaphragm lever ② to stop down to 70 to 80% of the numerical aperture of the objective to obtain good images. (Fig. 11)

●**Reflected light darkfield observation:**

Push in the aperture iris diaphragm lever ② to the fully open position.

◎Depending on the specimen, an image with good contrast and a minimum of flare may sometimes be obtained by keeping the aperture iris diaphragm stopped down a little. Please experiment with this to see if it works with a particular specimen.

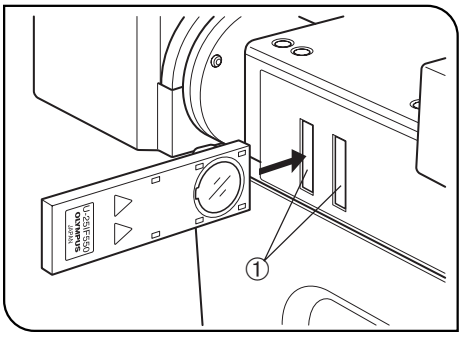


Fig. 12

4 Using the Filters (Fig.12)

◎Engage the optimum filter sliders for the purpose of observation in the two filter insertion slots ①. Be sure to start insertion with the left slot. The first click position is the idle position and the second click engages the filter in the light path.

Usable Filters	Applications
U-25LBD-IF (Color temperature conversion filter)	Turns the illumination light into daylight. Used in general observations and color photography.
U-25IF550 (Green filter)	Enhanced contrast in monochrome observation. Used in monochrome photography.
U-25Y48 (Yellow filter)	Contrast filter for observation of semiconductor wafers.
U-25ND50-2 (Light intensity adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 50%)
U-25ND25-2 (Light intensity adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 25%)
U-25ND6-2 (Light intensity adjustment filter)	Adjusts the brightness of the light source. (Transmittance: 6%)
U-25FR (Frost filter)	Reduces irregularity in the illumination field, but also reduces the brightness.
U-25L42 (UV cut filter)	Cuts ultraviolet rays. Used to prevent the polarizer from being burned by a high-intensity light source.

4-3 Stage

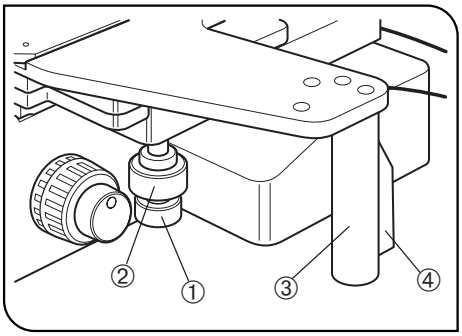


Fig. 13

1 Moving the MX-SIC6R2 Stage (Fig. 13)

Rotate the X-axis knob ① and Y-axis knob ② below right of the stage to move the stage.
The stage movement stroke in the X-axis direction is about 37 mm per turn of the knob and that in the Y-axis direction is about 50 mm per turn of the knob.

Using the Grip Clutch

By fully depressing the clutch ④ of the grip ③, the X-axis and Y-axis knobs can be coupled out.
When the grip clutch is firmly depressed by your hand, you can move the stage greatly and freely at your will.

CAUTION **The clutch should be fully depressed. Neglecting this will cause the X-axis and Y-axis knobs to rotate abruptly and result in damage.**

Clutch and Belt Stickiness

If the stage is not moved for a long time, the clutch and the belt will stick together and the clutch function will not work smoothly.
In this case, hold the X-axis and Y-axis knobs by hand to prevent them from rotating. Then fully depress the grip clutch and move the stage back and forth, left and right to remove the stickiness and get the clutch function to work again.

Adjusting the Levelness of Holder Plate

The levelness of the stage travel (movement) and the top surface of the wafer holder have been adjusted at the factory. If finer adjustment is required, contact Olympus.

Maximum loads of stage including the holders:

2 kg (4.4 lbs.)

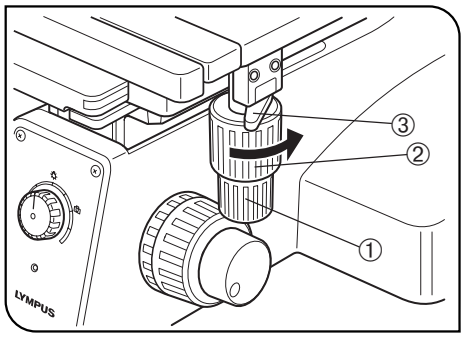


Fig. 14

2 Moving the U-SIC4R2/SIC4L2 Stage (Fig. 14)

Rotate the X-axis knob ① and Y-axis knob ② to move the stage.
The stage movement stroke in the X-axis direction is about 26 mm per turn of the knob and that in the Y-axis direction is about 42 mm per turn of the knob.

Using the Y-Axis Lock Lever

1. When the Y-axis lock lever ③ is locked by setting the lever in the direction of the arrow, the Y-axis movement is locked, making it possible to scan only in the X-axis direction.
2. To release the lock, return the lever to the original position.

Maximum load of stages:

• Reflected light stage plate U-MSSP4: 1kg.

4-4 Observation Tube

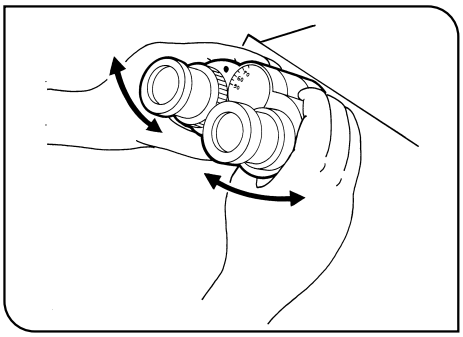


Fig. 15

1 Adjusting the Interpupillary Distance (Fig. 15)

While looking through the eyepieces, adjust for binocular vision until the left and right fields of view coincide completely. The index dots " • " indicates the interpupillary distance. (Fig. 15)

◎Note your interpupillary distance so that it can be quickly adjusted.

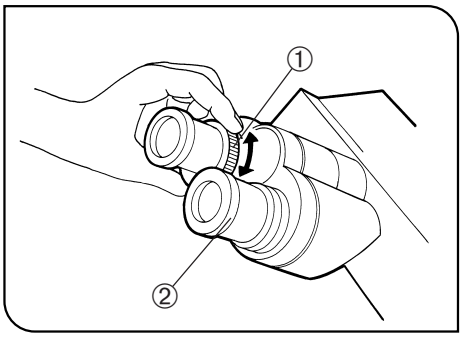


Fig. 16

2 Adjusting the Diopter (Figs. 16 to 18)

When Using the Widefield Observation Tube (FN 22)

1. Looking through the right eyepiece with your right eye, turn the coarse and fine adjustment knobs to bring the specimen into focus.
2. Looking through the left eyepiece with your left eye, turn only the diopter adjustment ring ① to focus on the specimen. (Fig. 16)

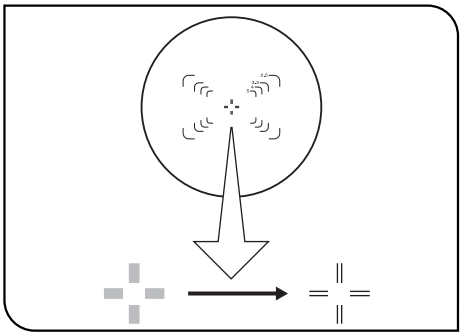


Fig. 17

When Using a Finder Eyepiece

1. Looking through the right eyepiece with your right eye, turn the top of eyepiece ② until you see two distinct sets of reticules in the field of view. (Figs. 16 & 17)
2. Looking through the right eyepiece, rotate the coarse and fine adjustment knobs to bring the specimen and reticules into simultaneous focus. (Fig. 17)
3. Looking through the left eyepiece with your left eye, turn the diopter adjustment ring ① to bring the specimen into focus. (Fig. 16)

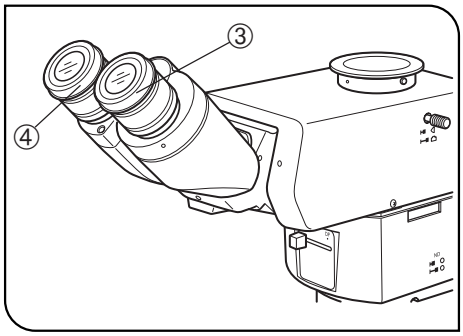


Fig. 18

When Using the Super-Wide field Observation Tube (FN 26.5)

◎The super-widefield observation tube refers to the U-SWTR-3 or MX-SWETTR.

1. Looking through the right finder eyepiece with your right eye, turn the top of the eyepiece ③ until you see two distinct sets of reticules and a clearly defined double cross-lines in the field of view (Figs. 17 & 18)
2. Looking through the right eyepiece, rotate the coarse and fine adjustment knobs to bring the specimen and reticules into simultaneous focus.
3. Looking through the left eyepiece with your left eye, turn the top of the eyepiece ④ to bring the specimen into focus. (Fig. 18)

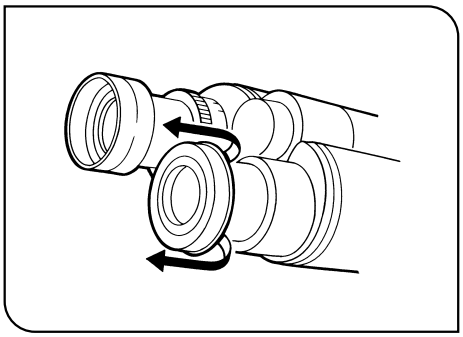


Fig. 19

3 Using the Eye Shades (Fig. 19)

When wearing eyeglasses

Use with the eyeshades in their normal folded-down position. This will prevent the eyeglasses from contacting and scratching the eyepieces.

When not wearing eyeglasses

Extended the folder eye shades in the direction of the arrow to prevent extraneous light from entering between the eyepieces and eyes.

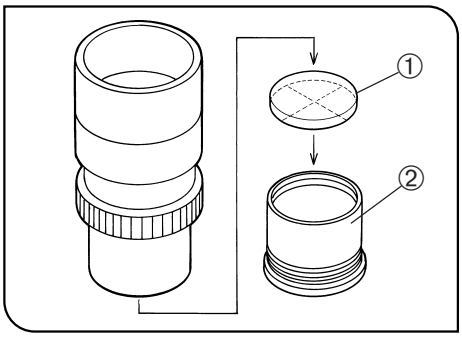


Fig. 20

4 Using the Eyepiece Micrometer Disk (Fig. 20)

Eyepiece micrometer disk can be inserted into WHN10X-H (or WHN10X) eyepiece.
However, if the eyepiece does not have the helicoid adjustment facility and your eyesight is poor, you may have difficulties in focusing on the eyepiece micrometer disk. In this case, it is recommended to look into the eyepiece through your eyeglasses.
Use ϕ24 mm dia., 1.5 mm thick micrometer disk.
Following Fig. 20, turn the built-in micrometer mounting frame ② counterclockwise to remove it from the eyepiece, and place a micrometer disk ① into the mounting frame so that the surface with indication faces down.
Re-attach the micrometer mounting frame in the original position.

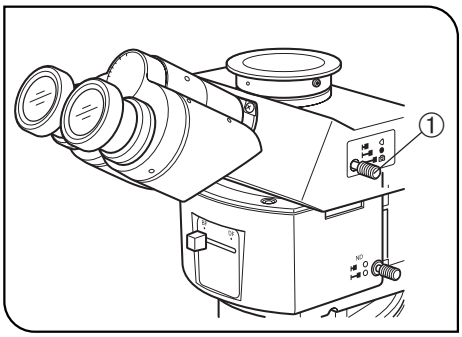


Fig. 21

5 Selecting the Light Path of the Trinocular Observation Tube (Fig. 21)

Slide the light path selector knob ① to select the desired light path.

Trinocular Tube	Light Path Selector Position		
	Pushed In	Intermediate	Pulled Out
U-TR30-2	Binocular 100%	Binocular 20% TV, photo 80%	TV, photo 100%
U-SWTR-3			
U-ETR3	Binocular 100%		TV, photo 100%
MX-SWETTR			

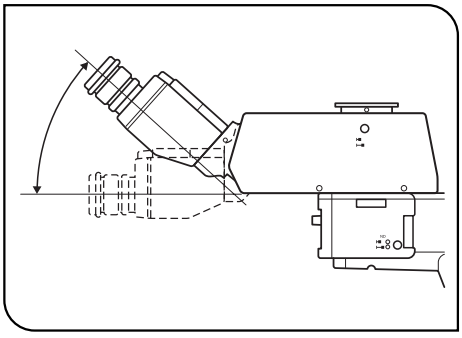


Fig. 22

6 Adjusting the Tilt (Fig.22)

◎Adjust the height and tilt of the eyepieces on the binocular observation tube to obtain the most comfortable viewing position.
Holding the binocular section with both hands, raise or lower it to the desired position.

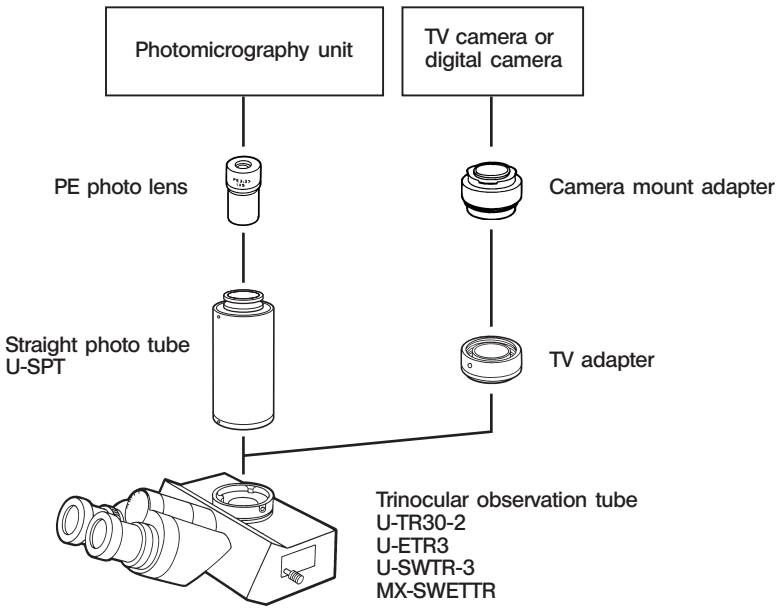
- MX-SWETTR: 0° to 42°

★**Never attempt to force the binocular section past the upper or lower stop position. Adjust the tilt gently, as applying excessive force could destroy the limiting mechanism.**

5 PHOTOMICROGRAPHY

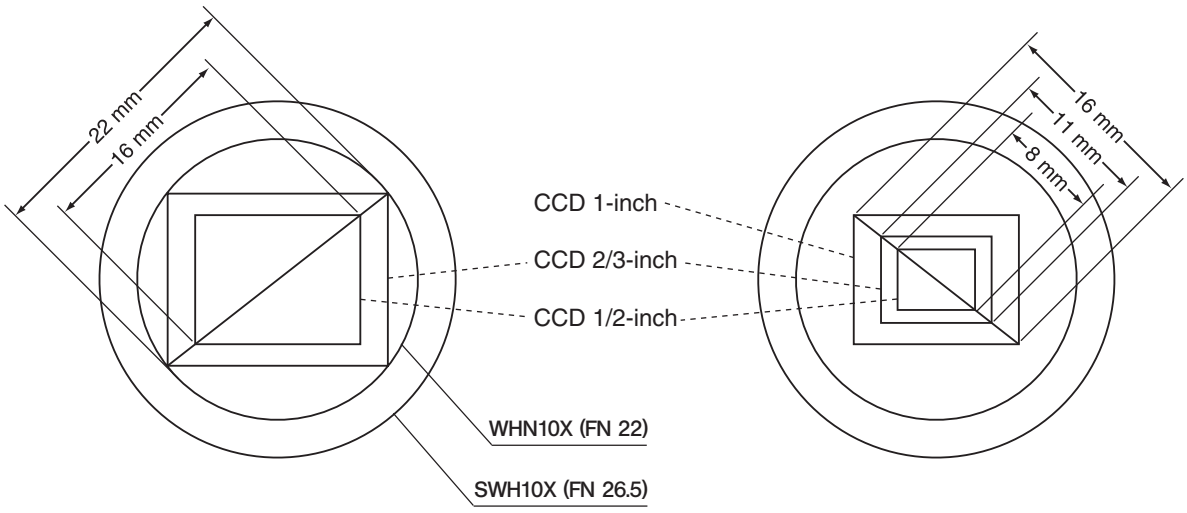
◎Use a trinocular observation tube, such as the U-TR30-2 or U-SWTR-3, when recording photographs, video images or digital camera images of microscope images.
The trinocular tube accepts the U-SPT straight photo tube or a TV adapter (certain TV adapters necessitate a camera mount adapter).
For details, refer to the instruction manuals for these accessories.

1 Photomicrography System Chart



2 Selecting the TV Adapter Magnification

The magnification of the TV adapter is determined by the size of the CCD used in the TV camera or digital camera.
The following illustrations show the image pickup areas of the 0.5X and 1X TV adapters when the WHN10X eyepieces (FN 22) and the SWH10X eyepieces (FN 26.5) are used.



When a 0.5X TV adapter is used

When a 1X TV adapter is used

6 OBSERVATION

◎The dummy slider in the DIC prism insertion slot is effective for preventing flare in observations other than the DIC observation. It is therefore recommended to leave it mounted in any observation method.

NOTE **The operating procedure is variable depending on the reflected light illuminator in use. The following description pertains only to the basic operating procedures for the BX-RLA2 and BX-URA2. For details, also refer to the instruction manual for the illuminator.**

6-1 Reflected Light Brightfield/Darkfield Observation

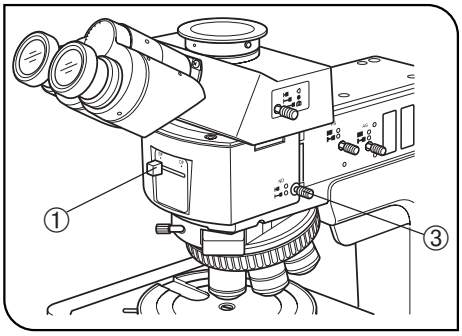


Fig. 23

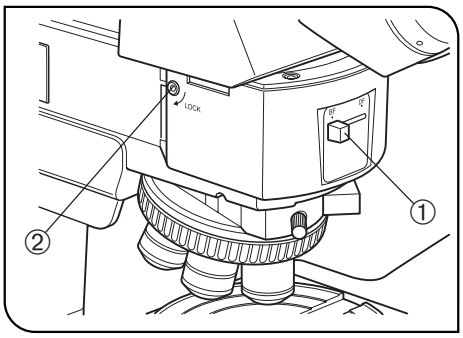


Fig. 24

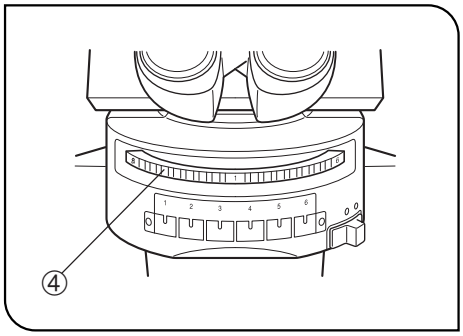


Fig. 25

1 Selecting the Observation Light Path (Figs. 23 to 25)

BX-RLA2

Slide the mirror selector knob ① to the position of the mirror unit for the desired observation mode.

BF: Reflected light brightfield observation (Adjust the aperture iris diaphragm and field iris diaphragm as required.)

DF: Reflected light darkfield observation (Set the aperture iris diaphragm and field iris diaphragm to the open positions.)

★Slide the mirror selector knob until it stops at the stopper position.

« Using the ND Filter Lever »

◎When the brightfield (BF) light path is selected with the mirror selector knob ①, the ND filter is engaged in the light path by an interlock mechanism to reduce glare during switching from the darkfield (DF) to the brightfield (BF). (Fig. 24)

How to Release the Interlock

◎The ND filter has been interlocked with the mirror selector knob before shipment from the factory.

◎If the brightness is insufficient during brightfield or DIC observation, the interlocking of the ND filter can be released as described below.

1. After selecting the BF light path, insert the Allen screwdriver into the hole ② on the left side of the reflected light illuminator and loosen the screw coupling the ND filter.
2. Pull the ND filter lever ③ (Fig. 23) to disengage the ND filter from the light path, pull out the lever.

BX-URA2

Rotate the turret ④ to the position to select the mirror unit (BF or DF) for the desired observation mode.

	Inscription	Mirror Unit	Field Iris	Aperture Iris
Reflected light brightfield	BF	U-MBF3	Adjust as required.	
Reflected light darkfield	DF	U-MDF3	Must be open.	

6-2 Reflected Light Differential Interference Contrast (DIC) Observation

★ The performance of polarizer may deteriorate when it has been exposed to light for a long period (about continuous 2000 hours). If this happens, replace the polarizer.
★ When performing sensitive color observation using the U-DICRH DIC slider, combine the U-POTP3 polarizer.
★ When using the high-intensity light source, be sure to use the U-25L42 filter for prevention of the polarizer burn.

1 Selecting the Observation Light Path

BX-RLA2

Select the reflected light brightfield observation (BF) light path.

BX-URA2

	Inscription	Mirror Unit	Note
Reflected light Nomarski DIC	BF	U-MBF3	
	DIC	U-MDIC3	Analyzer/polarizer built in

◎When the DIC mirror unit (U-MDIC3) is available in the turret, engage the DIC mirror unit in the light path. The built-in analyzer and polarizer have been set for the cross-Nikol condition so they need not be adjusted.

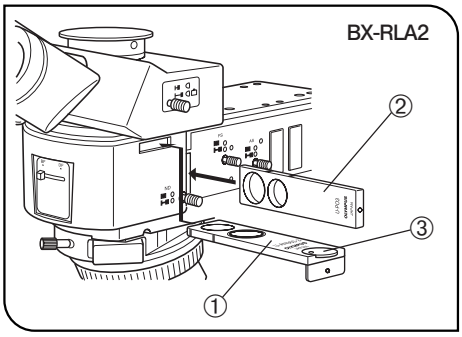


Fig. 26

2 Setting the Analyzer and Polarizer (Fig.26)

★ In the cross-Nikol adjustment, do not engage the DIC slider (U-DICR, U-DICRH or U-DICRHC) in the light path.
1. Bring the specimen in approximate focus using the 10X or 20X objective.
2. Engage the analyzer ① and polarizer ② in the light path.
3. Rotate the analyzer rotating dial ③ to find the position where the field of view is darkest.

◎An approximate cross-Nicol position can be obtained by setting the index on the dial ③ on the outer side, away from the microscope. Fine-adjust the dial by rotating it near this position to find the position where the field of view is darkest.

★ Although the U-AN analyzer is also usable, the accurate cross-Nicol position cannot be obtained because it is not provided with the analyzer rotation mechanism.

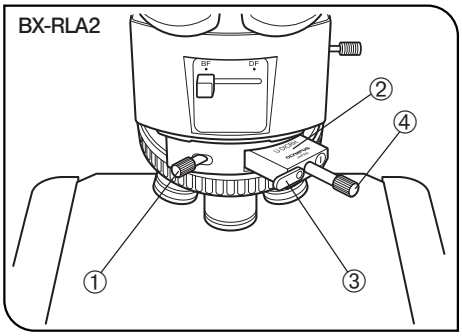


Fig. 27

3 Setting the DIC Slider (Fig. 27)

1. Loosen the mounting knob ① on the front of the DIC revolving nosepiece, insert the DIC slider ② so that the surface with indication faces up, and clamp by tightening the mounting knob.
2. With the U-DICR interference slider, set the slide lever ③ according to the objective in use.

Lever ③ position	Applicable Objectives	
Pushed in	UIS2	MPLFLN/MPLFLN-BD series
	UIS	UMPlanFI/UMPlanFI-BD series MPlanApo20X, 100X MPlanApo100XBD
Pulled out	UIS2	LMPLFLN/LMPLFLN-BD series
	UIS	LMPlanFI/LMPlanFI-BD series LMPlanApo/LMPlanApo-BD series

3. With the U-DICRH or U-DICRHC slider that does not have the slide lever, the applicable objectives are as follows.

DIC Slider	Applicable Objectives	
U-DICRH	UIS2	MPLFLN/MPLFLN-BD series
	UIS	UMPlanFI/UMPlanFI-BD series MPlanFI-BD series MPlanApo20X, 100X
U-DICRHC	UIS2	LMPLFLN/LMPLFLN-BD series
	UIS	LMPlanFI/LMPlanFI-BD series LMPlanApo/LMPlanApo-BD series

4 Observation Method

1. Stop down the field iris diaphragm, and then move the stage up or down to focus on the iris. The specimen is brought into focus at the same time.
2. Adjust the field iris diaphragm so that it circumscribes the field of view.
3. Stopping down the aperture iris diaphragm may increase the contrast somewhat.

U-DICR **U-DICRHC**

1. Rotate the prism control knob ④ of the DIC slider to adjust the background color contrast. (Fig. 27)
2. Rotating the prism control knob of the DIC slider will continuously change the interference color of the background from gray to magenta (-100 to 600 nm), so you can achieve the interference color with the best contrast according to the specimen.

- If the background color is gray, a three-dimensional looking image with maximum contrast can be obtained.
- If the background color is magenta, even a minor optical retardation can be observed as a color change.

U-DICRH

1. Rotate the prism control knob ① of the DIC slider to adjust the background color contrast. (Fig. 27)
2. Rotating the prism control knob of the DIC slider will continuously change the interference color of the background from -100 to +100 nm, so you can achieve the retardation with the best contrast according to the specimen.

- If the background color is gray, a three-dimensional looking image with maximum contrast can be obtained.
- If the background color is magenta, even a minor optical retardation can be observed as a color change.
  To select the magenta sensitive color as the background color, use the U-POTP3 polarizer and insert it so that the indication "λ" can be seen from the front.

★ **Care should be taken to keep the specimen surface clean, as even a small amount of contamination on the surface may show up due to the exceptionally high sensitivity of the DIC method.**

◎As the detection sensitivity is directional, it is recommended to use a rotary wafer holder or rotate the specimen during observation.

◎Stopping down the aperture iris diaphragm may increase the contrast somewhat.

6-3 Reflected Light Simplified Polarized Light Observation

★ **The performance of polarizer may deteriorate when it has been exposed to light for a long period (about continuous 2000 hours). If this happens, replace the polarizer.**

★ **When using the high-intensity light source, be sure to use the U-25L42 filter to prevent the polarizer burn.**

1. Set the analyzer and polarizer, and perform the cross-Nikol adjustment.
2. Place the specimen on the stage and adjust the focus by moving the stage up or down. Now simplified polarized light observation can be started.

◎Adjust the field iris diaphragm so that it circumscribes the field of view.

◎Stopping down the aperture iris diaphragm may increase the contrast somewhat.

6-4 Reflected Light Infrared (IR) Light Observation

◎The vertical illuminator compatible with the IR observation is only the BX-RLA2.

◎Prepare a TV camera that matches the frequency of the IR light used.
(⚠The IR light is harmful to your eyes. Be sure to observe the IR images on the TV monitor.)

◎To improve the IR observation effect, use as many IR-dedicated modules as possible (such as the lamp housing, objective, observation tube and TV adapter). For the IR-dedicated modules, contact Olympus.

Notes on the Use of IR Light

1. The IR light transmits a large quantity of heat on the specimen surface. Take sufficient care when observing a specimen that is weak against heat.
2. When using the U-POIR reflected light polarizer, engage the U-25ND6-2 reflected light ND filter or the U-BP1100IR/BP1200IR band-pass filter for reflected IR light in the light path to prevent the polarizer burn.
3. Release the ND filter interlocking of the BX-RLA2 vertical illuminator during IR observation.
4. With the U-TR30IR trinocular observation tube, the middle position of the 3-step light path selector is the position for the shutter.

6-5 Transmitted Light Brightfield Observation

◎This adjustment requires the MX-TILLK transmitted light unit,MX-SIC6R2 stage (for reflected and transmitted light), BH3-SPG6 glass plate, LG-SF light guide and LG-PS2 light source.

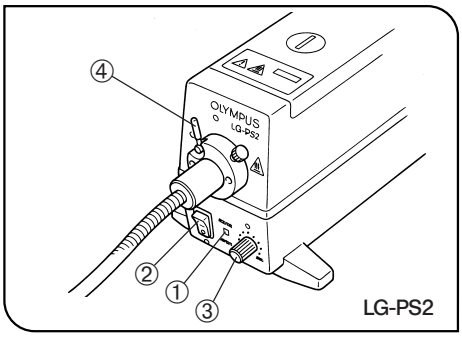


Fig. 28

1 Adjusting the Transmitted Light Illumination (Fig. 28)

1. Set the manual/remote switch ① of the light source to MANUAL.
2. Set the main switch ② to " I " (ON). The ventilation fan will start running. Now adjust the brightness by turning the brightness control knob ③, clockwise to increase the brightness or counterclockwise to decrease it.

★**Turn the aperture iris diaphragm lever ④ counterclockwise to open the aperture iris diaphragm.**

◎The aperture iris diaphragm lever ④ can be used to adjust the aperture iris diaphragm. But do not stop down the aperture iris diaphragm too much, as this may make illumination unevenness noticeable.

◎When using a filter, mount the filter dedicated for the LG-PS2 (diameter 30.5 mm) on the light source.

⚠**Set the switch to " O " (OFF) for turning the light off. As the inside of the light source is very hot even after it has been turned off, leave it for a while until it cools down sufficiently.**

2 Selecting the Observation Light Path

1. Select the reflected light darkfield observation (DF) light path. (The DF light path eliminates the half-mirror from the transmitted light illumination path so that the transmitted light can be utilized by 100%.)
2. The applicable objective magnifications are 5X to 50X. When the 20X or higher-power objective is used, however, the image may be a little dark due to insufficiency in the NA.
3. The thickness of the transmitted light specimen should be no more than 2 mm (provided that a 6 mm thick glass plate is used).
4. The area in which the transmitted light illumination is available is 100 x 100 mm.

7 SPECIFICATIONS

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Optical system</td><td colspan="5">UIS2 (UIS) (Universal Infinity System) optics</td></tr>
<tr><td rowspan="4">Illumination system</td><td colspan="5">Add-on type to the reflected light illumination microscope frame.</td></tr>
<tr><td>BX-KMA
Darkfield Reflected
Light Illuminator</td><td colspan="2">BX-RLA2
Brightfield/darkfield
reflected light illuminator</td><td colspan="2">BX-URA2
Universal reflected
light fluorescence illuminator</td></tr>
<tr><td>–</td><td colspan="2">Observation light path selection:
BF • DF slide switch.</td><td colspan="2">Observation light path selection:
Turret selection of mirror unit (max. 6 units)</td></tr>
<tr><td>Available observations:
① Reflected light brightfield
② Reflected light Nomarski DIC
③ Reflected light simplified polarized light</td><td colspan="2">Available observations:
① Reflected light brightfield
② Reflected light darkfield
③ Reflected light DIC
④ Reflected light simplified polarized light
⑤ Reflected light infrared observation
⑥Transmitted light brightfield</td><td colspan="2">Available observations:
① Reflected light brightfield
② Reflected light darkfield
③ Reflected light DIC
④ Reflected light simplified polarized light
⑤ Reflected light fluorescent light
⑥ Transmitted light brightfield</td></tr>
<tr><td colspan="2">Lamp socket: U-LS30-4
Power supply: TL4</td><td colspan="3">Lamp housing for halogen bulb: U-LH100L-3. (Power supplied from the built-in power supply of the MX51.)
High-intensity light source: Lamp housing for mercury/xenon burner mountable (together with a dedicated power supply).</td></tr>
<tr><td>Electrical system</td><td colspan="2">–</td><td colspan="3">Rated input voltage: 100-120/220-240 V ∿, 1.8/0.8 A, 50/60 Hz
Provided with continuously variable brightness adjustment knob</td></tr>
<tr><td>Focusing mechanism</td><td colspan="5">Two-guide rack & pinion system.
Coarse/fine coaxial adjustment knobs: Stroke 32 mm. (Distance from the stage surface to focal plane: 2 mm above and 30 mm below) (Note) The distance should be 15 mm below in the transmitted light brightfield observation.
Fine adjustment knob stroke per rotation: 0.1 mm (1 μm per scale)
Tension adjustment of coarse adjustment knob.
Pre-focusing stopper for setting the upper limit.</td></tr>
<tr><td>Revolving nosepiece</td><td colspan="5">U-5RE-2, U-6RE, U-P4RE
U-D5BDRE, U-D6BDRE, U-P5BDRE (DIC slider insertion types)</td></tr>
<tr><td rowspan="4">Observation tube</td><td>U-BI30-2
Widefield
binocular</td><td>U-TR30-2
Widefield
trinocular</td><td>U-ETR3
Widefield
erected trinocular</td><td>U-SWTR-3
Super-widefield
trinocular</td><td>MX-SWETTR
Super-widefield
erected tilting
trinocular</td></tr>
<tr><td colspan="3">FN 22</td><td colspan="2">FN 26.5</td></tr>
<tr><td colspan="4">Tube tilting angle: Fixed</td><td>Tilting angle 0° to 42°</td></tr>
<tr><td colspan="5">Interpupillary adjustment range: 50 to 76 mm</td></tr>
<tr><td rowspan="2">Stage</td><td colspan="3">U-SIC4R2/SIC4L2
4x4-inch stage with coaxial knobs on the bottom right (left).</td><td colspan="2">MX-SIC6R2
6x6-inch stage with coaxial knobs on the bottom right.</td></tr>
<tr><td colspan="3">Drive method: Rack & pinion drive.
Stroke: 100Y x 105X mm
Y-axis lock mechanism: Fixing in Y-axis direction using a lock lever.</td><td colspan="2">Drive method: Rack & pinion drive.
Stroke: 158Y x 158X mm
Clutch mechanism: Clutching and release using two clutch plates (grip clutch)
Holder hole size: 200+0.2/0 x 200+0.2/0 mm.
Transmitted illumination field: 100 x 100 mm.</td></tr>
<tr><td>Dimensions and weight</td><td colspan="5">Approx. 430 (W) x 495 (H) x 591 (D) mm.
Approx. 26 kg (57.3 lbs) (Frame only: Approx. 11kg (24.3 lbs)).</td></tr>
<tr><td>Operating Environment</td><td colspan="5">• Indoor use.
• Altitude: Max. 2000 meters.
• Ambient temperature:10° to 35°C (50° to 95° F).
• Relative humidity: 80% for temperatures up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F) to 50% relative humidity at 40°C (104°F).
• Supply voltage fluctuations: ±10%.
• Pollution degree: 2 (in accordance with IEC60664).
• Installation (overvoltage) category: II (in accordance with IEC60664)</td></tr>
</table>

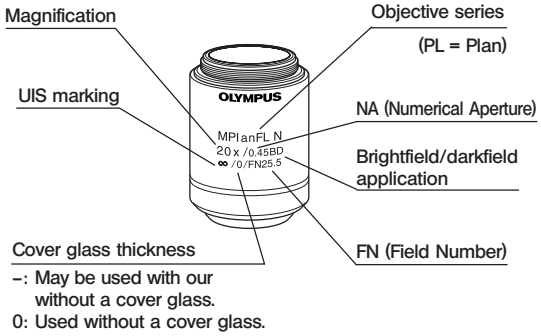
8 OPTICAL CHARACTERISTICS «UIS2 (UIS) Series»

– The UIS series objectives that are not mentioned below can also be mounted on this microscope. –

The table below shows the optical characteristics of different eyepiece and objective combinations. Objective specifications are marked on the objective (as shown in the diagram on the right).

NOTE

Refer to the latest catalogue or consult Olympus for the updated information on the eyepieces and objectives that can be combined with this unit.



	Series / Optical characteristics	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (µm)	Eyepieces: WHN10X (FN22) Total mag.	WHN10X (FN22) Depth of focus (µm)	WHN10X (FN22) Field of view (mm)	SWH10X (FN26.5) Total mag.	SWH10X (FN26.5) Depth of focus (µm)	SWH10X (FN26.5) Field of view (mm)
UIS2 series	MPLN Plan Achromat (FN22)	MPlanN	5X	0.10	20.0	–	3.36	50X	98	4.4			
			10X	0.25	10.6	–	1.34	100X	18	2.2			
			20X	0.40	1.3	0	0.84	200X	6.1	1.1	–	–	–
			50X	0.75	0.38	0	0.45	500X	1.4	0.44			
			100X	0.90	0.21	0	0.37	1000X	0.73	0.22			
	MPLN-BD Brightfield/ darkfield Plan Achromat (FN22)	MPlanN-BD	5X	0.10	12.0	–	3.36	50X	98	4.4			
			10X	0.25	6.5	–	1.34	100X	18	2.2			
			20X	0.40	1.3	0	0.84	200X	6.1	1.1	–	–	–
			50X	0.75	0.38	0	0.45	500X	1.4	0.44			
			100X	0.90	0.21	0	0.37	1000X	0.73	0.22			
	MPLFLN Plan Semi-Apochromat (FN26.5) *1.25X:FN22	MPlanFLN	1.25X	0.04	3.5	–	8.39	12.5X	870	17.6	–	–	–
			2.5X	0.08	10.7	–	4.19	25X	220	8.8	25X	220	10.6
			5X	0.15	20.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.30	11.0	–	1.12	100X	15	2.2	100X	15	2.65
			20X	0.45	3.1	0	0.75	200X	5.2	1.1	200X	5.2	1.33
			50X	0.80	1.0	0	0.42	500X	1.3	0.44	500X	1.3	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	MPLFLN-BD Brightfield/ darkfield Plan Semi-Apochromat (FN26.5)	MPlanFLN-BD	5X	0.15	12.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.30	6.5	–	1.12	100X	15	2.2	100X	15	2.65
			20X	0.45	3.0	0	0.75	200X	5.2	1.1	200X	5.2	1.33
			50X	0.80	1.0	0	0.42	500X	1.3	0.44	500X	1.3	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
			150X	0.90	1.0	0	0.37	1500X	0.6	0.15	1500X	0.6	0.18
	MPLFLN-BDP Reflected Polarized Light Plan Semi-Apochromat (FN26.5)	MPlanFLN-BDP	5X	0.15	12.0	–	2.24	50X	59	4.4	50X	59	5.3
			10X	0.25	6.5	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	3.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.75	1.0	0	0.45	500X	1.4	0.44	500X	1.4	0.53
			100X	0.90	1.0	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	LMPLFLN Long-WD Plan Semi-Apochromat (FN26.5)	LMPlanFLN	5X	0.13	22.5	–	2.58	50X	70	4.4	50X	70	5.3
			10X	0.25	21.0	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	12.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.50	10.6	0	0.67	500X	2.5	0.44	500X	2.5	0.53
			100X	0.80	3.4	0	0.42	1000X	0.87	0.22	1000X	0.87	0.27
	LMPLFLN-BD Brightfield/darkfield long-WD Plan Semi-Apochromat (FN26.5)	LMPlanFLN-BD	5X	0.13	15.0	–	2.58	50X	70	4.4	50X	70	5.3
			10X	0.25	10.0	–	1.34	100X	18	2.2	100X	18	2.65
			20X	0.40	12.0	0	0.84	200X	6.1	1.1	200X	6.1	1.33
			50X	0.50	10.6	0	0.67	500X	2.5	0.44	500X	2.5	0.53
			100X	0.80	3.3	0	0.42	1000X	0.87	0.22	1000X	0.87	0.27

Note) When an MPLN-BD series objective is used in darkfield observation with a xenon light source, the peripheral area may be obscured with certain specimens.

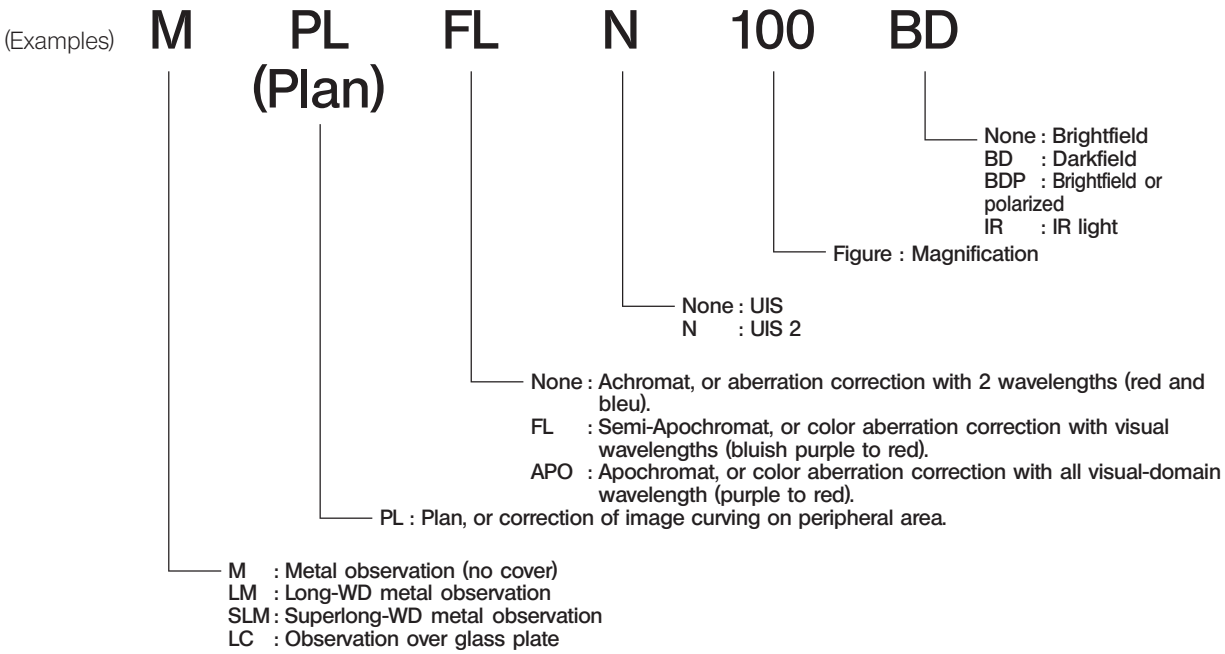
	Optical characteristics / Series	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (μm)	Eyepieces					
								WHN10X (FN22)			SWH10X (FN26.5)		
								Total mag.	Depth of focus (μm)	Field of view (mm)	Total mag.	Depth of focus (μm)	Field of view (mm)
UIS series	MPlanApo Plan Apochromat	MPlanApo	20X	0.60	0.9	0	0.56	200X	3.68	1.1	200X	3.68	1.33
			50X	0.95	0.3	0	0.35	500X	1.04	0.44	500X	1.04	0.53
			100X	0.95	0.35	0	0.35	1000X	0.67	0.22	1000X	0.67	0.27
	MPlanApo-BD Brightfield/darkfield Plan Apochromat	MPlanApo-BD	100X	0.90	0.31	0	0.37	1000X	0.73	0.22	1000X	0.73	0.27
	SLMPlan Superlong-WD Plan Achromat (FN26.5)	SLMPlan	20X	0.35	21.0	0	0.96	200X	7.2	1.1	200X	7.2	1.33
			50X	0.45	15.0	0	0.75	500X	2.9	0.44	500X	2.9	0.53

Objectives for LCD Panel

	Optical characteristics / Series	Marking	Magnification	N.A.	W.D. (mm)	Cover glass thickness (mm)	Resolution (μm)	Eyepieces					
								WHN10X (FN22)			SWH10X (FN26.5)		
								Total mag.	Depth of focus (μm)	Field of view (mm)	Total mag.	Depth of focus (μm)	Field of view (mm)
UIS2 series	LCPLFLN Long-WD Plan Semi-Apochromat (FN26.5)	LCPlanFLN*	20XLCD	0.45	7.4-8.3	0-1.2	0.75	200X	5.2	1.1	200X	5.2	1.33
			50XLCD	0.70	2.2-3	0-1.2	0.48	500X	1.6	0.44	500X	1.6	0.53
			100XLCD	0.85	0.9-1.2	0-0.7	0.39	1000X	0.79	0.22	1000X	0.79	0.27

*Equipped with the glass thickness compensation ring.

Significance of Objective Name



Glossary of Terms Used in the Optical Characteristics Table

Working distance (WD) : The distance from the top of specimen and the front lens of objective.

Number of aperture (NA) : Important figure determining the objective characteristics (resolution, focal depth and brightness).
Resolution ..... Increases in proportion with the NA.
Focal depth ..... Decreases in proportion with the NA.
Brightness ..... Proportional with the square of NA (comparison under the same magnification).

Resolution : The limit that an objective can identify the images of two points that are close to each other, expressed as the distance between the two points on the specimen.

Depth of focus : The maximum depth of the specimen at which the entire specimen can be brought into focus simultaneously. This value increases when the aperture iris diaphragm is narrowed and decreases when the objective NA is increased.

Field number : The diameter of the image area that can be observed through the eyepieces, expressed in mm.

9 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the microscope may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact Olympus for assistance.

★ **Possible causes marked " * " at the top are not applicable to the BX-KMA.**

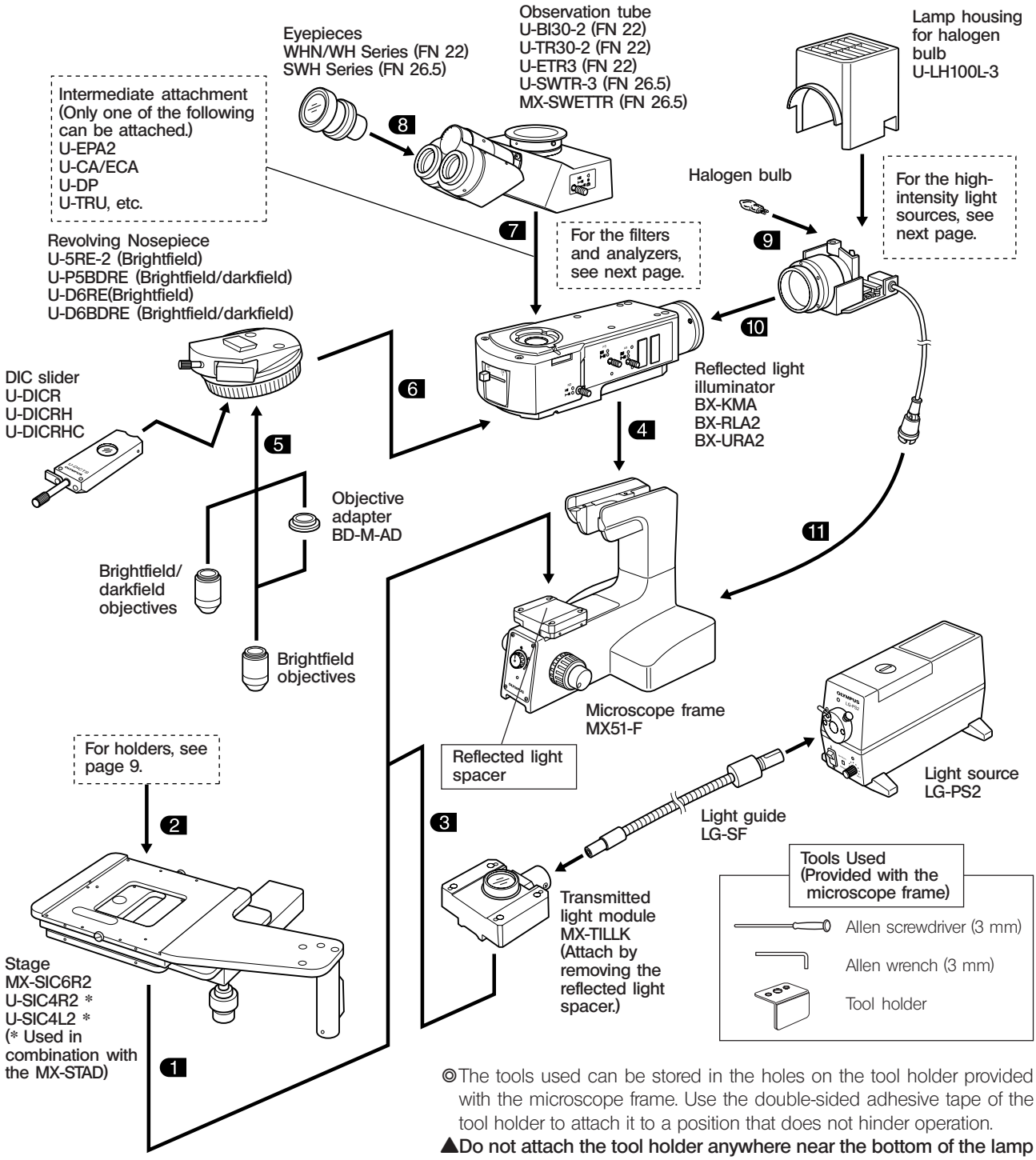
Trouble	Cause	Remedy	Page
1. Optical System			
a) Although the illumination is on, the field of view is dark or invisible.	The bulb is burned out.	Replace it.	39,40,42
	*The field iris diaphragm is opened insufficiently.	Open the field iris diaphragm.	16
	*The aperture iris diaphragm is stopped down while the light path is set to that containing a darkfield mirror or mirror unit turret. (Reflected light brightfield/ darkfield observation)	Fully open the aperture iris diaphragm.	17
	The light path selector knob on the trinocular tube is stopped at the middle position.	Set the knob to position 📷 or 👁.	20
	*The observation light path is set improperly with the mirror selector knob or mirror unit turret.	Set the mirror selector knob or mirror unit turret properly.	22
b) Field of view is obscured, or field of view is not evenly illuminated.	*The mercury or xenon burner is not centered.	Adjust centering correctly.	45
	The filter, analyzer or polarizer is not correctly inserted.	Insert or remove the filter, polarizer or analyzer completely into or from the light path.	17,23
	The light path selector knob on the trinocular tube is stopped at the middle position.	Set the knob properly.	20
	*The observation light path is set improperly with the mirror selector knob or mirror unit turret.	Set the mirror selector knob or mirror unit turret properly.	22
c) Dirt or dust is visible in the field of view.	Dirt/dust on the bulb/burner surface.	Clean thoroughly.	5
	Dirt/dust on the specimen.		
	Dirt/dust on the objective front lens.		
	Dirt/dust on the eyepiece.		
	Dirt/dust on the top lens of condenser.		
d) The image shows diffraction.	*The aperture iris diaphragm is stopped down too far.	Open the aperture iris diaphragm.	17
e) Visibility is poor. Image is not sharp. Contrast is poor.	The objective is not correctly engaged in the light path.	Make sure that revolving nosepiece clicks into place correctly.	–
	The condenser or the front lens of objective is dirty.	Clean thoroughly.	5
	You are using a non-designated objective or eyepieces.	Use the specified UIS2 (UIS) objective or eyepieces.	28,29

Trouble	Cause	Remedy	Page
f) Part of image is blurred. The image seems to waver.	The specimen is not mounted horizontally.	Re-mount the specimen and holders.	36,37
	The objective is not correctly engaged in the light path.	Make sure that revolving nosepiece clicks into place correctly.	–
2. DIC Observation			
a) No interference color.	The analyzer and polarizer are not engaged. Another filter is engaged.	Engage the analyzer and polarizer in the light path. Disengage another filter from the light path.	17,23
b) Interference color appears but is uneven or contrast is low.	Proper objectives suitable for DIC observation are not used.	Use proper objectives.	24
3. Observation Tube			
Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.	19
	Incorrect diopter adjustment.	Adjust the diopter.	19
	Different eyepieces are used on the left and right.	Change one eyepiece to match the other so that both sides are the same.	–
4. Stage			
The image shifts when you touch the stage.	The stage and holders are not properly mounted.	Champ the stage and holders.	35,36
5. Coarse/Fine Adjustment Knobs			
a) The coarse adjustment knob is hard to turn.	The coarse adjustment knob rotation tension adjustment ring is over-tightened.	Loosen the ring.	15
b) The stage drifts down by itself or focus is lost during observation.	The coarse adjustment knob rotation tension adjustment ring is too loose.	Tighten the ring.	15
c) Coarse adjustment will not go all the way up.	The pre-focusing lever is keeping the stage down.	Unlock the pre-focusing lever.	15
6. Electrical System			
a) The lamp intermediately lights and goes out.	The bulb is nearly burned out.	Replace the bulb.	39,40,42
	Improper cord connection.	Connect cords and plugs correctly.	39,41,44

10-1 Assembly Diagram

◎The diagram below shows all of the various modules that can be mounted. Select only the modules to be used for the assembly.
The assembly of modules enclosed in ■ are detailed in Section 10-2. For the modules without numbers, refer to their instruction manuals.

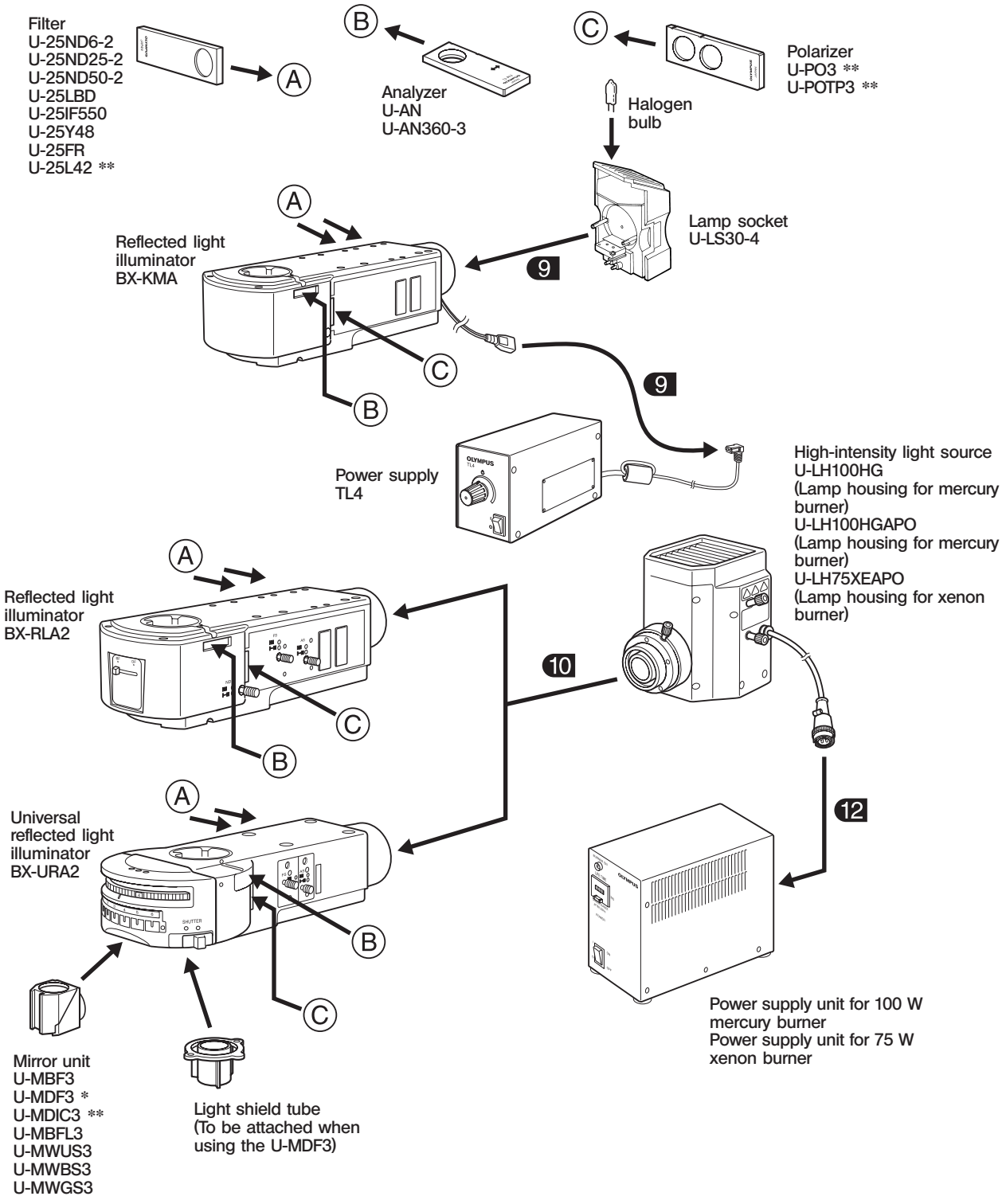
★**When assembling the equipment, make sure that all parts are free of dust and dirt and avoid scratching any parts or touching glass surfaces.**



◎The tools used can be stored in the holes on the tool holder provided with the microscope frame. Use the double-sided adhesive tape of the tool holder to attach it to a position that does not hinder operation.

▲**Do not attach the tool holder anywhere near the bottom of the lamp housing since it generates high-temperature heat.**

Reflected Light Illuminator/High-Intensity Light Source



* When using the U-MDF3 mirror unit, the U-RCV conversion lens is also required.

** When using the U-MDIC3 mirror unit or a polarizer (U-PO3 or U-POTP3), the U-25L42 filter is required to prevent deterioration of the polarizer due to a high-intensity light source other than the halogen bulb.

10-2 Detailed Assembly Procedures (Including Mercury Burner Centering)

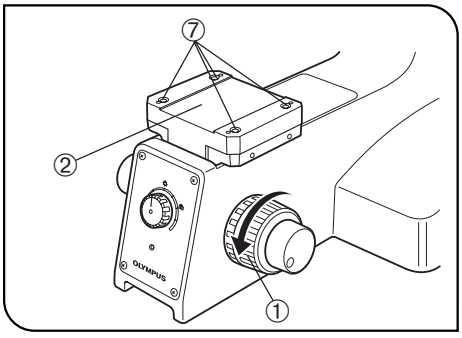


Fig. 29

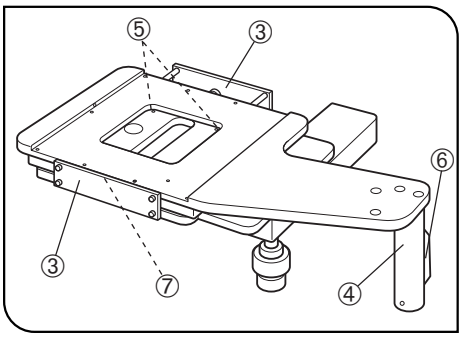


Fig. 30

1 Attaching the Stage (Figs. 29 to 32)

★ Remove the revolving nosepiece when attaching the stage. Use the provided Allen wrench (3 mm) to clamp the stage.

★ Remove the two transport protection sheets from the gaps on the stage of the MX-SIC6R2.

MX-SIC6R2

1. Turn the coarse adjustment knob ① in the direction of the arrow to lower the reflected light spacer ② to the lower limit. (Fig. 29)
2. Using the Allen wrench, remove all the screws (x 8) from the transport clamping plates ③ (x 2) of the stage.
   The screws removed in this step will be used later in clamping the stage.

▲To prevent the upper and middle stages from drifting, be sure to attach the stages while holding them so that they are not tilted.

3. Place the stage gently on the reflected light spacer ② so that the coarse adjustment grip ④ of the stage is located on the right side of the stage.
4. Grip the clutch ⑥ of the coarse adjustment grip and move the upper stage all the way frontward so that the mounting holes ⑤ of the lower stage are visible.
   Align the mounting holes ⑤ on the rear with the screw holes ⑦, insert clamping screws through them and tighten the screws temporarily using the Allen wrench.
5. Move the upper stage toward the rear, tighten the front clamping screws temporarily, then adjust the stage position and then tighten the screws firmly.
6. Screw the holder stopper screw (provided with the stage) into the screw hole ⑦ on the bottom of the front transport clamping plate ③.

★ The clutch and belt may stick together and prevent smooth operation of the release function if the stage has not been moved for a long time. If this phenomenon occurs, take the remedial action described in page 18.

Caution Before Transporting the Stage

Before transporting the stage, be sure to attach the transport clamping plates and package the stage carefully. Do not transport the stage when it is attached to the microscope frame or inadequately packaged. Otherwise, the stage will be damaged.

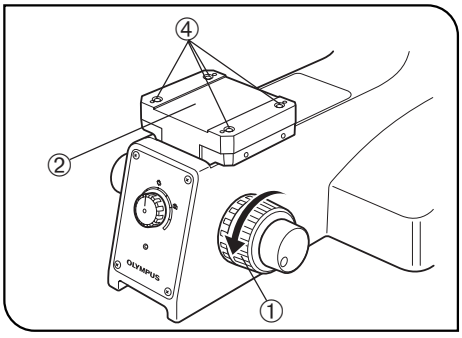


Fig. 31

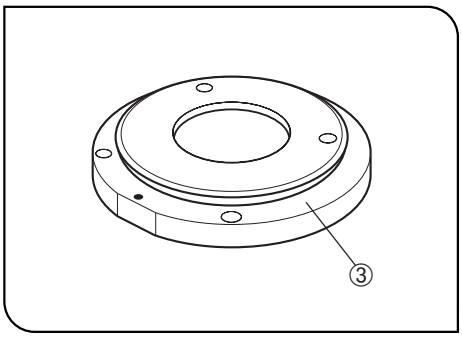


Fig. 32

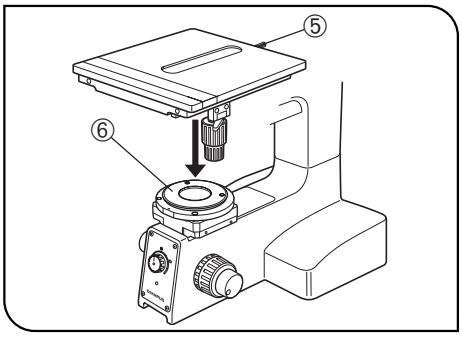


Fig. 33

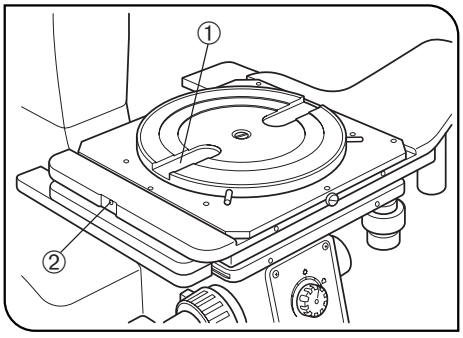


Fig. 34

U-SIC4R2/SIC4L2

1. Turn the coarse adjustment knob ① in the direction of the arrow to lower the reflected light spacer ② to the lower limit. (Fig. 31)
2. Place the stage adapter ③ on the reflected light spacer so that index mark • on the stage adapter comes on the front, and align the screw holes on the stage adapter with those ④ on the reflected light spacer.
3. Insert the four provided screws into the screw holes and tighten firmly using the Allen wrench.
4. Fully loosen the clamping screw ⑤ of the U-SIC4R2/L2. (Fig. 33)
5. Fit the stage into the round dovetail ⑥ of the stage adapter from above, and tighten the clamping screw ⑤.

★**The stage can also be mounted in the 180° opposite orientation.**

6. To mount a plate, loosen the two clamping knobs of the plate and insert it into the mount dovetail of the stage from the side, and tighten the clamping knobs.

★**Do not tighten the clamping knobs too firmly, for this lifts and tilts the stage.**

2 Attaching the Holders (Figs. 34 & 35)

★**Attach a holder in the direction so that the notch on the holder's side faces left. The adjustment of the levelness is performed in this direction. Before attaching the holder, slightly loosen the holder clamping screw ② on the left side of the stage using a flat-blade precision screwdriver.**

Attaching the Wafer Holder (Fig. 34)

1. Insert the wafer holder plate ① into the stage, one edge first.
2. Push the wafer holder plate from above to make sure that it sits correctly with no tilt.
3. Tighten the clamping screw ②.

★**The levelness of the holder is adjusted by the heights of the three screws on the back side of the stage. Do not push positions near the holder, for this may tilt the holder.**

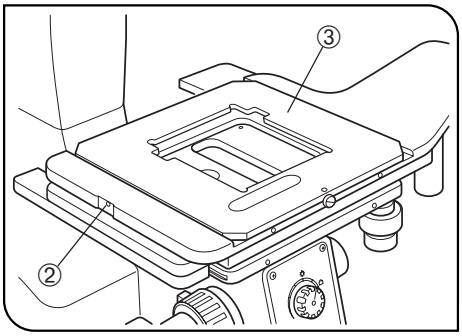


Fig. 35

Attaching the Mask Holder (Fig. 35)

1. Carefully place the mask holder ③ on the stage surface, making sure that it sits correctly with no tilt.
2. Tighten clamping screw ②.

Attaching the Black Plate or Glass Plate

Carefully place the plate on the stage surface, and tighten the clamping screw ②.

★ **When attaching the glass plate, do not tighten the clamping screw excessively as the glass plate may break. Tighten to the extent that the glass plate does not rattle noticeably when attached.**

Maximum load of stage

Less than 2 kg including holders.

3 Attaching the Transmitted Light Module MX-TILLK (Fig. 29)

◎The reflected light spacer ② (Fig. 29) should be removed from the microscope to attach the MX-TILLK.

1. Remove the four screws clamping the reflected light spacer, and place the MX-TILLK in its place so that the light guide insertion slot comes on the rear.
2. Apply the MX-TILLK against the deep and right directions to position it correctly.
3. Clamp the MX-TILLK using the four screws removed above.

◎For how to mount the LG-PS2 light source and LG-SF light guide, see the instruction manual provided with the LG-PS2.

4. Insert the LG-SF on the output side into the light guide insertion slot on the MX-TILLK and tighten the clamping screw lightly with the Allen screwdriver.

★ **Excessive tightening of the clamping screw causes damage to the light guide.**

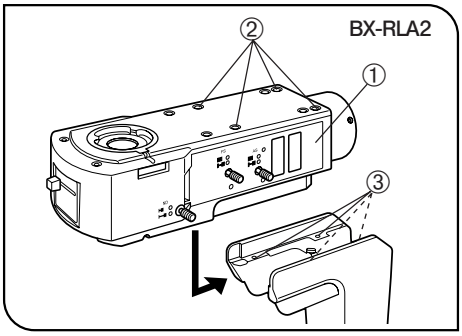


Fig. 36

4 Attaching the Reflected Light Illuminator (Fig. 36)

◎The procedure is identical for the BX-RLA2, BX-KMA and BX-URA2.

◎Use the exclusive Allen wrench ( ) provided with the illuminator for attaching.

◎Remove the caps of the clamping screws ② using a pair of tweezers, etc.

1. Place the reflected light illuminator ① on the microscope. In the beginning, do not place the illuminator by aligning its screws ② with screw holes ③ on the microscope, but displace the illuminator slightly toward the front.
2. Firmly push the illuminator toward the rear, to the correct attaching position.
3. While applying the illuminator to the rear, tighten the four screws ② firmly by turning them clockwise using the exclusive Allen wrench.
4. Attach the caps of the clamping screws ② in the original positions.

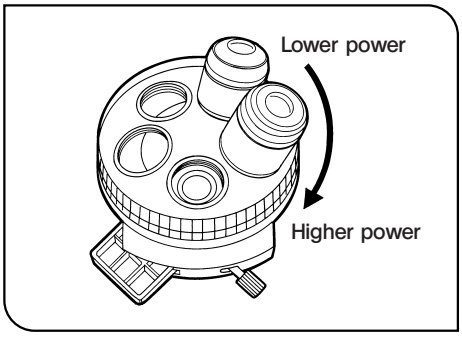


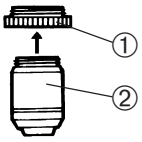
Fig. 37

5 Attaching the Objectives (Fig. 37)

★**Always use UIS2 (UIS) objectives (see pages 28 & 29).**

◎To facilitate switching between magnifications, it is recommended to arrange the objectives so that their magnifications increase in the clockwise order.

◎When mounting brightfield objectives on a brightfield/darkfield revolving nosepiece, it is required to screw the BD-M-AD darkfield objective adapter ① into every objective position and then screw in each brightfield objective ② in each adapter.



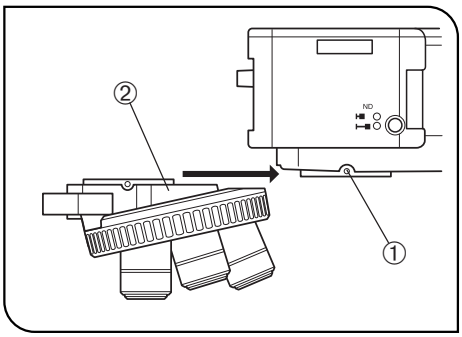


Fig. 38

6 Attaching the Revolving Nosepiece (Fig. 38)

1. Turn the coarse adjustment knob to lower the stage.
2. Using the Allen screwdriver, slightly loosen the revolving nosepiece clamping screw ① on the reflected light illuminator. The revolving nosepiece will not attach if the screw is loosened too much.
3. Insert the revolving nosepiece ② into the revolving nosepiece mount dovetail from the front, all the way until the stop position.
4. Tighten the revolving nosepiece clamping screw ①.

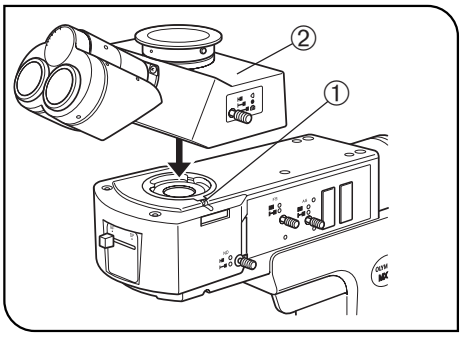


Fig. 39

7 Attaching the Observation Tube (Fig. 39)

1. Using the Allen screwdriver, fully loosen the observation tube clamping screw ① on the reflected light illuminator.
2. Fit the round dovetail on the bottom of the observation tube into the observation tube mount of the reflected light illuminator, and orient the tube toward the front.
3. Tighten the observation tube clamping screw.

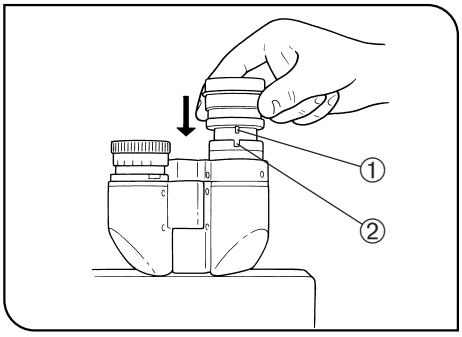


Fig. 40

8 Attaching the Eyepieces (Fig. 40)

Fit and insert gently an eyepiece into each eyepiece sleeve.

★**When using the U-BI30-2 binocular observation tube, an eyepiece incorporating the eyepiece micrometer disk cannot be used.**

★**When using a finder eyepiece or an eyepiece with micrometer disk, insert into the right eyepiece sleeve.**
Insert the eyepiece so that its positioning pin ① fits into the groove ② at the bottom of the eyepiece sleeve.

★**The super-widefield observation tube has the eyepiece positioning grooves. Be sure to fit the positioning pins into the grooves when mounting the eyepieces.**

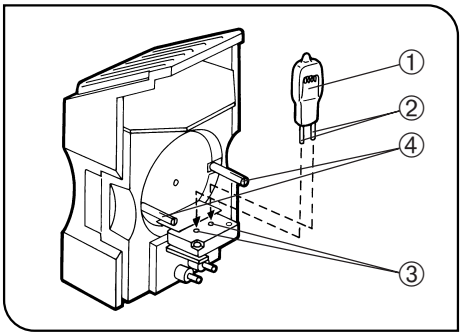


Fig. 41

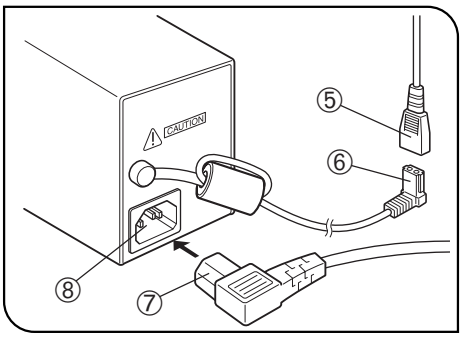


Fig. 42

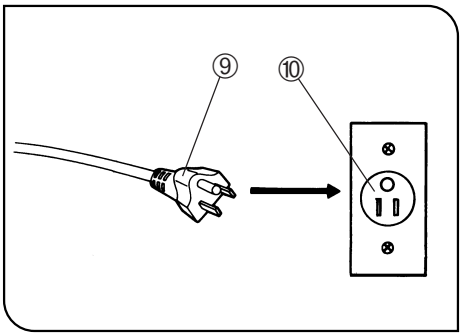


Fig. 43

9 Attaching the Halogen Bulb (Figs. 41 to 46)

6 V, 30 W Halogen Bulb

◎The applicable halogen bulbs are the 6V30WHAL-L long-life bulb (HOSOBUCHI G4 20H CF-6) and the 6V30WHAL high-intensity bulb (PHILIPS 5761).

▲Do not touch the bulb directly with bare hand. If fingerprints are attached on it, wipe thoroughly with a soft cloth to prevent the service life from dropping and the bulb from cracking.

1. Hold the halogen bulb ① by means of a piece of gauze so as not to touch it directly, and insert the pins ② all the way into the pin holes ③ on the lamp socket.

★Push in the bulb gently, for using an excessive force may damage it.

▲Bulb replacement during use or right after use

The bulb, lamp housing and areas near these will be extremely hot during and right after use.

After setting the main switch to "O" (OFF) and unplugging the power cord from the power outlet, allow the old bulb and lamp socket to cool before replacing the bulb with a new one of the designated type.

2. Insert the guide pins ④ of the lamp socket gently into the guide holes on the BX-KMA reflected light illuminator.
3. Connect the lamp socket cable and power cord.

▲Cables and cords are vulnerable to bend or twist. Do not apply excessive force to them.

▲Make sure that the main switch of the power supply unit is set to "O" (OFF) before connecting cords and cables.

• Connect the plug ⑤ of the lamp socket cable to the connector ⑥.

▲Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment.

• Connect the connector ⑦ of the power cord to the connector ⑧.
• Connect the power cord plug ⑨ to the AC receptacle ⑩.

▲Connect the provided power cord correctly and ensure that the grounding terminal of the power supply and that of the 3-conductor wall outlet are properly connected. If the equipment is not ground/earthed, Olympus can no longer warrant the electrical safety performance of the equipment.

▲Lay out the cables and power cord at a sufficient distance from the sources of heat such as the lamp socket and power supply unit to avoid contact with these heat sources. Otherwise, the cable or cord may melt and cause an electric shock.

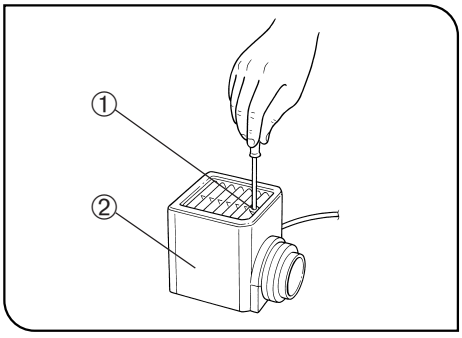


Fig. 44

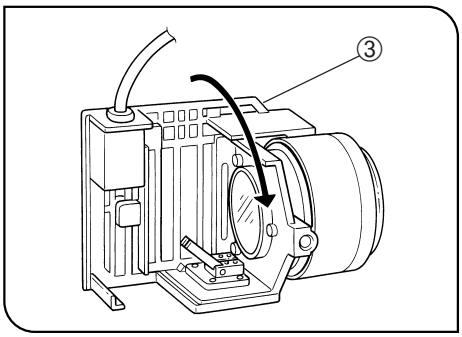


Fig. 45

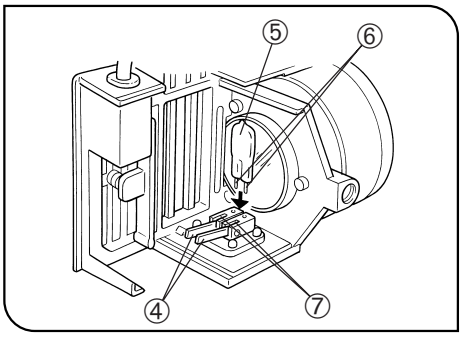


Fig. 46

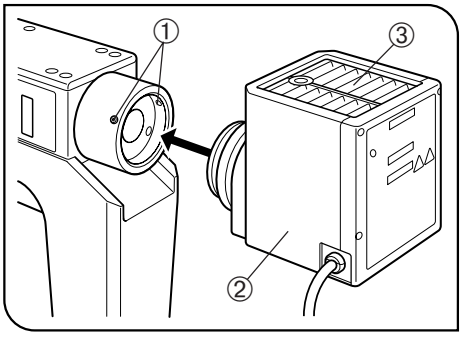
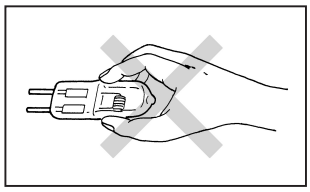


Fig. 47

12 V, 100 W Halogen Bulb

◎The applicable halogen bulbs are the 12V100WHAL-L long-life bulb (PHILIPS 7724) and the 12V100WHAL high-intensity bulb (PHILIPS 7023).

1. Using the Allen screwdriver, fully loosen the clamping screw ① on the top of the lamp housing.
2. Lift the lamp housing ② to remove.
3. Tilt the lamp socket ③ by 90° in the direction of the arrow.
4. While holding down the lamp clamping lever ④, hold the halogen bulb ⑤ by means of a piece of gauze, and insert the pins ⑥ all the way into the pin holes ⑦.
   Return the lamp clamping lever to the original position to clamp the bulb.



▲Do not touch the bulb directly with bare hand. If fingerprints are attached on it, wipe thoroughly with a soft cloth to prevent the service life from dropping and the bulb from cracking.

5. Fit the lamp housing from above and tighten the clamping screw ① while pushing down the screw by force. (Fig. 44)´

▲Bulb replacement during use or right after use

The bulb, lamp housing and areas near these will be extremely hot during and right after use.
After setting the main switch to "O" (OFF) and unplugging the power cord from the power outlet, allow the old bulb and lamp socket to cool before replacing the bulb with a new one of the designated type.

10 Attaching the Lamp Housing for Halogen Bulb (Fig. 47)

1. Using the Allen screwdriver, loosen the two lamp housing clamping screws ① on the rear of the illuminator.
2. Insert the lamp housing ② and tighten the clamping screws ①.

★Do not tighten the screws too much to prevent the lamp housing mount from being deformed.

▲Attach the lamp housing so that the heat radiating fins ③ face upward. To prevent a fire hazard, reserve ample spaces above, below and on the rear of the lamp housing.

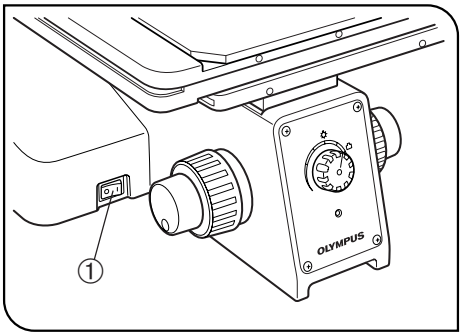


Fig. 48

11 Connecting the Lamp Housing Cord and Power Cord (Figs. 48 to 51)

▲Cables and cords are vulnerable to bend or twist. Do not apply excessive force to them.

▲Make sure that the main switch ① is set to "O" (OFF) before connecting the lamp housing cord and power cord. (Fig. 48)

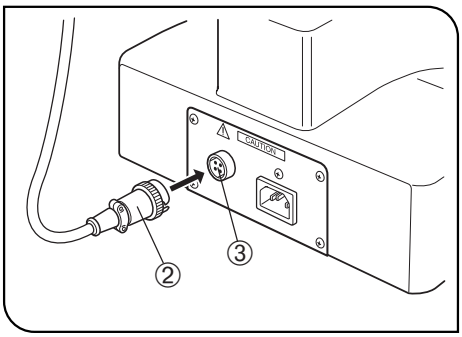


Fig. 49

1. Connect the plug ② of the lamp housing cord to the connector ③ on the rear of the microscope base. (Fig. 49)

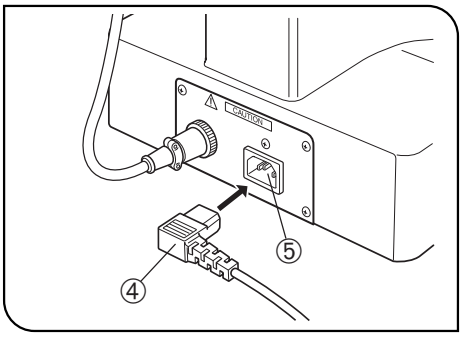


Fig. 50

▲Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment.

2. Connect the connector ④ of the power cord to the connector ⑤. (Fig. 50)
3. Connect the power cord plug ⑥ to the AC receptacle ⑦. (Fig. 51)

▲The power cord has three pins, and the round pin is the grounding pin. Connecting this plug to a grouned/earthed 3-conductor wall outlet grounds the equipment. If the equipment is not grouned/earthed, Olympus can no longer warrant the electrical safety performance of the equipment.

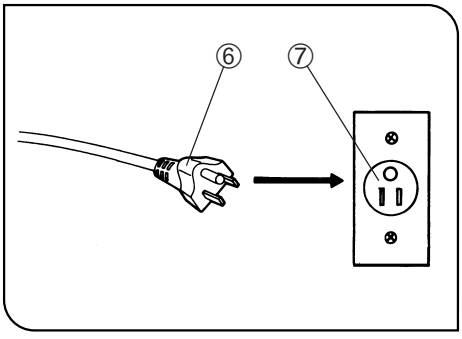


Fig. 51

12 Attaching the Mercury Burner (Figs. 52 to 57)

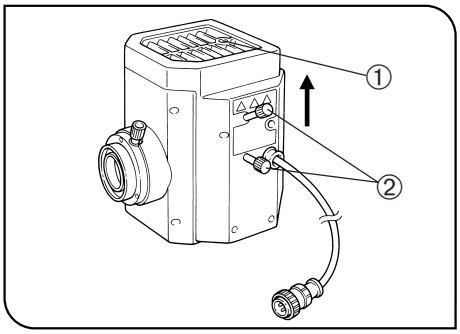


Fig. 52

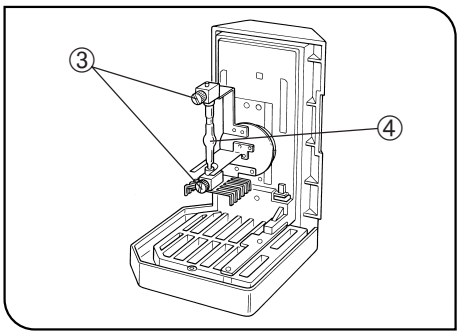


Fig. 53

◎For the xenon burner, attach the burner, reset the hour counter and connect the cables as described in the manual provided with the light source in use.

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

★**To prevent malfunction, do not hold the lamp housing by the centering knobs ②.**

3. Place the socket section upside down as shown in Fig. 53.

◎The lamp housing is equipped with the holder for transportation in the factory shipment condition or with an old burner when the burner is replaced. Remove the holder or old burner by loosening the two burner holding screws ③.

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

★**Be sure to use the USH-103OL (USHIO) or the HBO103W/2 (OSRAM) mercury burner.**

▲**Be careful and avoid leaving fingerprints or contaminants on the mercury burner. Otherwise, there is a danger of explosion due to distortion of glass caused by the stains. If the burner is contaminated, clean it by wiping gently with gauze slightly moistened with absolute alcohol.**

5. Attach the socket section with burner to the original position and tighten the socket clamping screw ①.

★**Align the external edges of the lamp housing with those on the socket section, and push the lamp housing straight downward.**

▲**Attach the lamp housing so that the heat radiating fins face upward. To prevent a fire hazard, reserve ample spaces above, below and on the rear of the lamp housing.**

▲**Do not light the mercury burner while it is not mounted on 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 if this is sensitive to UV rays.**

6. Attach the lamp housing the same way as the lamp housing for halogen bulb (see page 40).

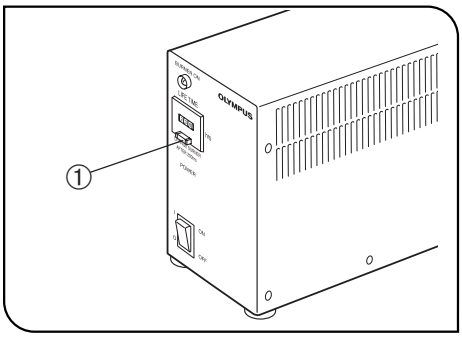


Fig. 54

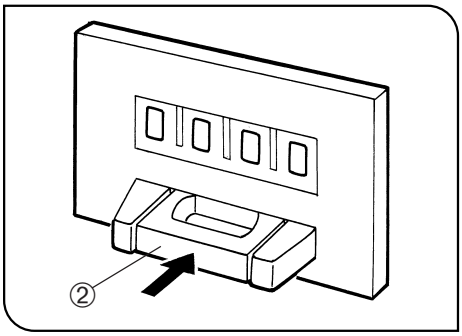


Fig. 55

Resetting the Burner Hour Counter

1. Press the center section ① of the reset switch ② on the front panel to reset the counter reading to "000.0".

◎The hour counter shows elapsed time in hours. The service life of a mercury burner is 300 hours. For safety's sake, replace the burner when the hour counter reads "300.0" .

⚠Mercury Burner Replacement

1. The service life of the mercury burner is 300 hours. In order not to impair the safety of the equipment, replace the burner when it has been used for 300 hours (USH-103OL, HBO103W/2). The burner may crack if used beyond the specified life time.
   When the end of the burner's service life is near, flickering is likely to increase. It is therefore recommended to replace the burner according to the purpose of observation.
   * This value assumes light cycles composed of 2 hours of lighting and 30 minutes of extinction (with the USH-103OL). Do not turn it on and off at a shorter cycle than the above, for this will shorten the service life of the burner.
2. Before replacing the burner, wait at least 10 minutes, or until the burner and lamp housing have cooled down, after turning the burner off. Before removing the burner, confirm that the main switch is "O" (OFF) and unplug the connecting cord from the output connector of the power supply.
   Refer to page 42 for details on replacement procedure.
3. After replacing the burner, reset the hour counter to "000.0" as outlined above.

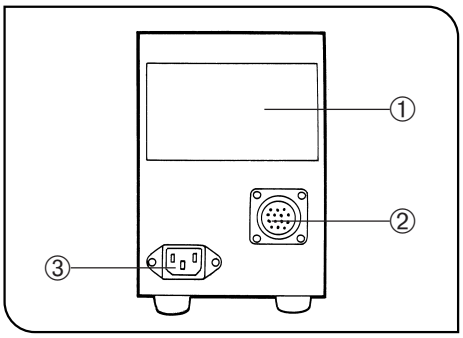


Fig. 56

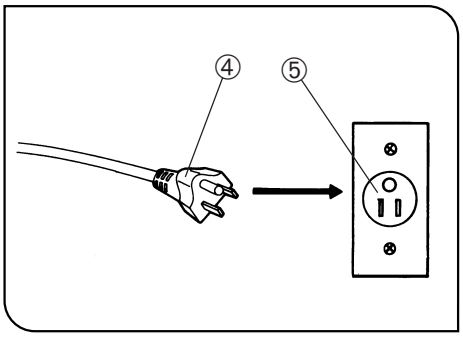


Fig. 57

Setting Up the Power Supply Unit for Mercury Burner

CAUTION **This operation should be performed after completing the attachment of the lamp housing.**

▲Cables and cords are vulnerable to bend or twist. Do not apply excessive force to them.

▲Make sure that the main switch is set to "O" (OFF) before connecting cords and cables.

▲Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment.

1. Make sure that the voltage and frequency of the input power are within the ranges indicated on the name plate ①.
   (The 100 V type unit can be powered from a voltage range between 100 and 120 V and frequency range between 50 and 60 Hz. The 200 V type unit can be powered from a voltage range between 220 and 240 V and frequency range between 50 and 60 Hz.)
2. Plug the connection cord to the connector ② on the power supply unit.
3. Attach the power cord to the power input connector ③ of the power supply unit, and plug the power plug ④ of the power cord into the wall power outlet ⑤.

▲Always ensure that the grounding terminal is safety grouned/earthed. If the equipment is not grounded/earthed, Olympus can no longer warrant the electrical safety performance of the equipment.

13 Centering the Mercury Burner

Turning the Burner On

Set the main switch of the power supply unit for mercury burner to "|" (ON). The arc will stabilize in 3 to 5 minutes after the burner is ignited.

★A discharge-type mercury burner may not turn on by the first try due to the characteristics of the burner. If a burner does not turn on, set the main switch to "O" (OFF), wait for 5 to 10 seconds and set the main switch to "|" (ON) again.

★To avoid shortening the service life of the burner, do not turn a burner off in less than 15 minutes after turning it on.

★When turning on a mercury burner that has been turned off, wait for about 10 minutes after it is turned off, because it cannot be turned on unless the mercury vapor in the burner has cooled down and liquefied.

★If the lamp housing is opened while the burner is on, the power supply stops to ensure safety. In this case, set the main switch to "O" (OFF) and wait for more than 10 minutes before retrying to turn it on again. Do not open the lamp housing unless it has cooled down sufficiently.

★When resetting the burner hour counter, press and hold the reset button until the reading becomes "000.0".

Centering the Burner

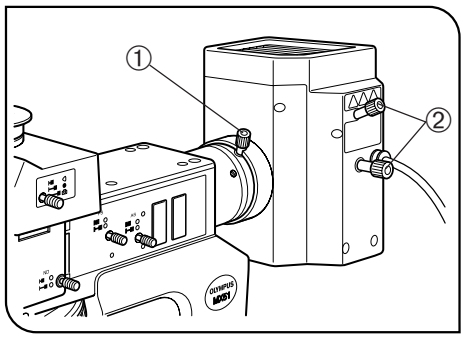
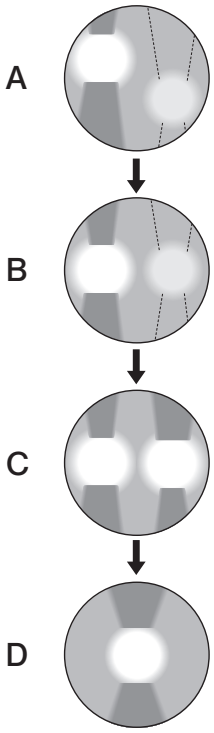


Fig. 58



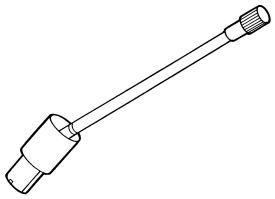
◎Set the main switch to " | " (ON) and wait until the arc image stabilizes (for 3 to 5 minutes after ignition) before proceeding to the centering.

1. Remove an objective to make an idle position on the revolving nosepiece and engage that position in the light path.
2. Select the BF light path using the light path selector knob.
3. Place a piece of white paper or similar object on the stage as the specimen, and move the stage approximately to the focus plane of the objective.
4. Open the aperture iris diaphragm.
5. Rotate the collector lens focus adjustment knob ① to project the arc image on the white paper. (Fig. A)
   If the arc image is not projected, rotate the burner centering knob ②.
6. Rotate the lamp centering knob ② to move the arc image on the center of the right (left) half of the field of view. (Fig. B)
7. Fit the tip of the Allen screwdriver into the mirror focus adjustment screw ③ (Fig. 59) on the rear of the lamp housing, and rotate the screw to focus on the mirror arc image. (Fig. C)
8. Rotate the lamp centering knob ② so that the arc image and mirror arc image are overlapped. (Fig. D)

◎During observation, rotate the collector lens focus adjustment knob ① as required to render the observed field of view uniform.

◎It is not required to center the mercury burner further until the next time it is replaced.

◎If the collector lens focus adjustment knob ① is located to far to be manipulated, fit the U-CLA extension handle (optional) shown below into the knob ① and manipulate them together.



Precise Centering of the Mirror

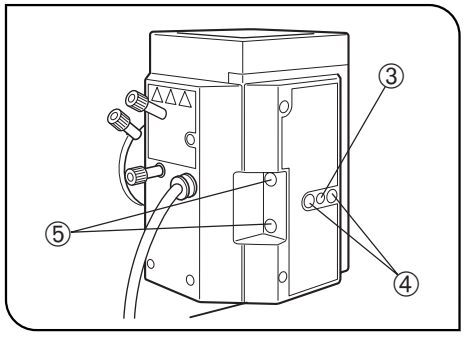


Fig. 59

◎The position of the mirror has been adjusted and locked before shipment. Only if you want more precise adjustment of the mirror position, proceed to the following steps immediately after the procedure in the previous paragraphs.
Note that, once the following steps are completed, it is no longer possible to restore the mirror position in the factory shipped condition.

1. Using a pair of tweezers, etc., peel off the two blind stickers ④ on the rear of the lamp housing.
2. Fit the Allen screwdriver into each of the screws hidden below the sticker and loosen them. Loosening the two screws releases the locking of the mirror.
3. Peel off other two blind stickers ⑤ to expose the mirror centering holes.
4. Insert the Allen screwdriver into the screw in each mirror centering hole and adjust the centering of the mirror arc image.

11 SPARE PART LISTS

Light source bulbs/burners

Bulb/Burner	Model	Average Life
Halogen bulb	• 6V30WHAL-L (Long life type) (HOSOBUCHI G4 20H CF-6)	2000 hrs.
	• 6V30WHAL (High-intensity type) (PHILIPS 5761)	100 hrs.
	• 12V100WHAL-L (Long life type) (PHILIPS 7724)	2000 hrs.
	• 12V100HAL (High-intensity type) (PHILIPS 7023)	50 hrs.
Mercury burner	• USH-103OL (USHIO)	300 hrs.
	• HBO103W/2 (OSRAM)	300 hrs.
Xenon burner	• UXL-75XB-A (USHIO)	200 hrs.
Halogen bulb for light guide light source	• JCR12V-100WB (USHIO)	1000 hrs.

PROPER SELECTION OF THE POWER SUPPLY CORD

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

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

Specifications

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

Table 1 Certified Cord

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

Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL-APEX / MITI	
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		U.S.A.	UL	
Ireland	NSAI				

Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

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

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