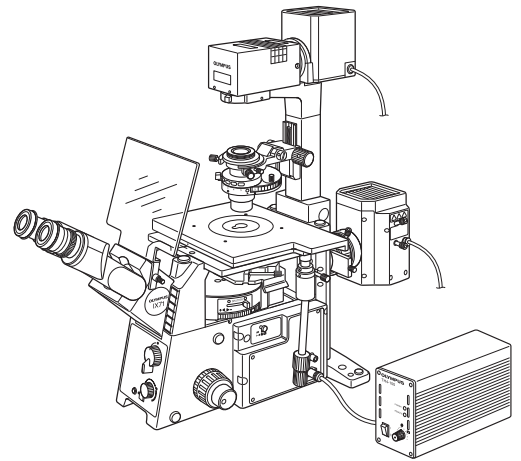


OLYMPUS[®]



INSTRUCTIONS

IX71/IX51

INVERTED RESEARCH MICROSCOPE/ INVERTED BASIC MICROSCOPE

This instruction manual is for the Olympus Inverted Microscopes Models IX71 and IX51. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of the microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.



A X 7 3 1 9

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Correct assembly and adjustments are critical for the microscope to exhibit its full performance. If you are going to assemble the microscope yourself, please read Chapter 9, "ASSEMBLY" (pages 55 to 65) carefully. For the modules provided with instruction manuals, also read the assembly procedures in their instruction manuals.

IMPORTANT – Be sure to read this section for safe use of the equipment. – 1-4

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This device complies with the requirements of directive 98/79/EC concerning in vitro diagnostic medical devices. CE marking means the conformity to the directive.

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.

IMPORTANT

This microscope employs a UIS2/UIS (Universal Infinity System) optical design, and should be used with modules designed for the IX2 or BX2 series (as well as some of the modules designed for the Olympus IX or BX series).

For the applicable modules, please consult Olympus or the latest catalogues. Less than optimum performance may result if inappropriate module combinations are used.

If you want to use one or more motorized modules, you should prepare the IX2-UCB control box, U-HSTR2 hand switch, a PC and the IX2-BSW (Ver. 01.03) software (which runs on Windows 2000 or Windows Me).

Configuration of Instruction Manuals

Since these microscopes are expandable to a variety of systems, separate instruction manuals are prepared so that the user has to read only the manuals according to the user's own system.

Manual Name	Main Contents
IX71/IX51	Observation procedures including transmitted light brightfield, phase contrast and DIC observations
Fluorescence System for IX2	Reflected light fluorescence observation
IX2-GCP	Glass Center Plate
IX2-MLWCD	Mid-Long Working Distance Condenser
IX2-DICD	DIC Condenser
U-FWT/FWR/FWO	Motorized filter wheels (The U-FWT cannot be used with these microscopes.)
IX2-UCB/U-HSTR2	Functions of the Control Box (incorporating the power supply) and Hand Switch
IX2 Software for PC (CD-ROM) IX2-BSW (Ver. 01.03 or later)	Methods of PC control of microscope functions

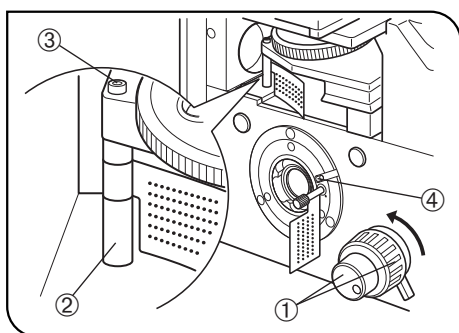
Precautions When Unpacking the Microscope

Fig. 1

Releasing the Transport Lock of the Revolving Nosepiece

★ Never attempt to rotate the coarse or fine adjustment knob ① without removing the clamping rod. Otherwise, the focusing mechanism may be damaged.

1. Loosen the screw ③ of the clamping rod ② using the Allen screwdriver provided with the microscope frame.
 2. Rotate the coarse and fine adjustment knobs ① in the direction of the arrow and remove the clamping rod ②.
 3. Attach the provided seal (10 mm dia, black) on the hole made after removing the transport lock knob to prevent penetration of dust through the hole.
- Ⓞ Retain the clamping rod ② and screw ③ carefully because they will be used again the next time the microscope is transported.

Releasing the Transport Lock of the Light Path Selector

★ Never attempt to operate the light path selector without removing the transport lock knob ④. Otherwise, the light path selector mechanism may be damaged.

- Rotate the knob counterclockwise to remove it.
 - To prevent penetration of dust through the hole made after removing the transport lock knob, stop the hole by attaching the provided seal (10 mm dia, black).
- Ⓞ Retain the knob carefully because it will be used again the next time the microscope is transported.

Stage (IX2-SFR, IX-MVR)

- Before transporting the stage, fix the flexible knobs with pieces of adhesive tape so that they will not move.

! SAFETY PRECAUTIONS

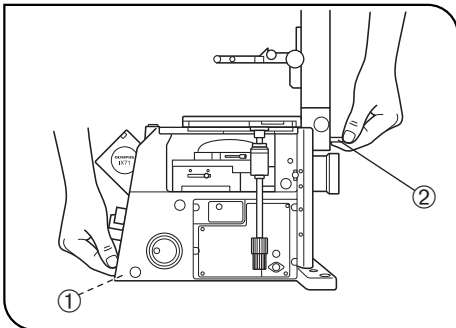


Fig. 2

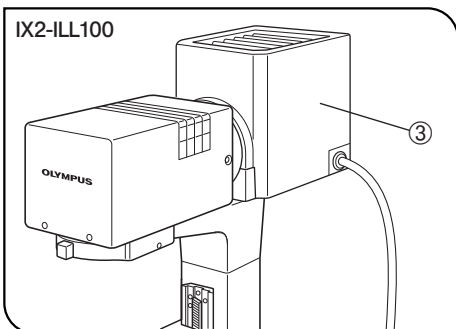


Fig. 3

1. After the equipment has been used in an observation of a specimen that is accompanied with a potential of infection, clean the parts coming in contact with the specimen to prevent infection.
 - Moving this product is accompanied with the risk of dropping the specimen. Be sure to remove the specimen before moving this product.
 - In case the specimen is damaged by erroneous operation, promptly take the infection prevention measures.

2. The microscope is provided with a simplified waterproof mechanism. Therefore, if culture liquid or water is spilt on the stage, revolving nosepiece or microscope frame, damage to the equipment or an electrical shock may result. Immediately wipe the liquid or water off if it is spilt on them.

3. When moving the microscope, remove the observation tube, condenser and reflected light mercury lamp housing, then carefully carry the microscope frame by the base (front edge) ① and the grasping part on the illumination column ② as shown in Fig. 2. (Weight: approx. 20 kg)

Also be sure to remove the specimen since it may fall.

When moving the microscope for a long distance, it is also recommended to disconnect all cables from the equipment.

When transporting it, also engage the transport lock mechanisms and package it sufficiently.

Also be careful against slipping of hands during carrying.

- ★ **Damage to the microscope will occur if you grasp it by other parts including the stage, coarse/fine adjustment knobs, etc.**

4. The microscope is not covered by warranty in terms of laser safety. The user should assume liabilities for any consequence of user modification including introduction of the use of laser beam.

5. The surfaces of the lamp housing will become extremely hot during operation. When installing the microscope, make sure to allow ample free space (10 cm or more) around and in particular above the lamp housing.

6. When installing the microscope, route the power cord away from the lamp housing. Should the power cord come in contact with the hot lamp housing, the power cord could melt and cause electric shock.

7. To avoid potential shock hazards and burns when replacing the light bulb, set the main switch to "○" (OFF) then disconnect the power cord from the wall outlet in advance. Whenever you replace the bulb during use or right after use, allow the lamp housing ③ and bulb to cool before touching. (Fig. 3)

Designated halogen bulb (Illumination column: IX2-ILL100)	12V100WHAL (PHILIPS 7724) Bulb life: 2000 hours of rated operation
Designated halogen bulb (Illumination column: IX2-ILL30)	6V30WHAL (PHILIPS 5761) Bulb life: 100 hours of rated operation





8. Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, product safety performance cannot be warranted.

9. Always ensure that the grounding terminal of the microscope and that of the wall outlet are properly connected. If the equipment is not grounded, Olympus can no longer warrant the electrical safety performance of the equipment.

10. Never insert metallic objects into the air vents of the microscope frame as this could result in electrical shock, personal injury and equipment damage.


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.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

Warnings

Warning engravings are placed at parts where special precaution is required when handling and using the microscope. Always heed the warnings.

Warning engraving position	Lamp housing (U-LH100L-3, U-LH100-3, IX-HLSH100, U-LS30-3)	(High Temperature warning)	
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1 Getting Ready

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For operating conditions, see Chapter 8, "SPECIFICATIONS" on page 54).
3. An intermediate attachment with a thickness of up to 60 mm can be mounted between the microscope frame and binocular observation tube (U-BI90CT, U-BI90).
 - If the U-BI90 is used together with an intermediate attachment, the image may be cut off or obscured.
4. The oil-proof cap can only be mounted on a UIS Series 3 objective. Note that this does not change the optical performance. (For applicable objectives, see page 30.)
5. Restrictions in brightfield, phase contrast and DIC observations
 - When the U-BI90CT is used together with the optional 2X magnification changer built into the microscope frame, the brightness in the peripheral area of the field may become insufficient. (The insufficiency in brightness can be improved by extending the light path length using the U-EPA2 eye-point adjuster.)
 - With the combination of U-TR30H + U-FWO, the full optical performance may not be able to be manifested with the objectives listed in ① below and it is not possible to use the objectives listed in ② below. (This also applies to objectives other than Series 3 objectives.)

UIS2 Series

- ① UPlanSApo4X, 10X2, UPlanFLN4X, 10X2, 20X, CPlanFLN10X, LUCPlanFLN20X, UPlanSApo100XO
 ② PlanN40X, PlanApoN60XO

UIS Series

- ① UPlanApo4X, 10X, UPlanFI4X, 10X and 20X, CPlanFI10X, LCPlanFI20X, UPlanApo100XOI3
 ② Plan40X, UPlanApo40XOI3/340, PlanApo60XO3

6. Restrictions in TV observation

①The following combinations are not permitted in consideration of the optical performance.

- IX2-SPT + PE4X + U-PMTVC on the side port
- IX2-SPT + PE5X + U-PMTV1X on the side port (With the IX71, this is applicable only when the magnification changer is set to 1X.)
- U-TV0.35XC + 2X magnification changer (optional)
- U-TV0.35XC + DP50 (optional 2X magnification changer on the side port)

②The following combination may deteriorate the optical performance a little.

- U-TV0.35XC + DP50 (UPlanSApo/UPlanApo4X or 10X on the side port) (With the IX71, this is applicable only when the magnification changer is set to 1X.)

7. Restrictions in fluorescence observation

- With combination of IX2-SHA + U-FWR (x 2) + U-LH100HGAP0, objectives UPlanSApo/UPlanApo40X, UPlanFLN/UPlanFI20X, UPlanFLN100XO/100XOI, UPlanFI100XO3, PlanAPoN60XO and PlanApo60XO3 cannot be used due to a problem in the optical performance. (This also applies to objectives other than Series 3 objectives.)

8. Other

- The U-TRU or U-TVAC cannot be mounted on the side port.
- When a large module is attached to the U-TR30H straight photo tube, it will be difficult to confirm the specimen.
- Only either the lower back port or left side port can be used.

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. Be sure to clean the oil immersion objective after use. Leaving immersion oil on it will degrade its performance.

3. Do not attempt to use organic solvents to clean the non-optical components of microscope. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.

4. Never attempt to disassemble any part of the microscope.

5. When not using the microscope, make sure to set the main switch to “○” (OFF), confirm that the lamp housing is cool enough and cover the microscope with the provided dust cover.

3 Caution

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

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

▲ : 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).

4 Intended use

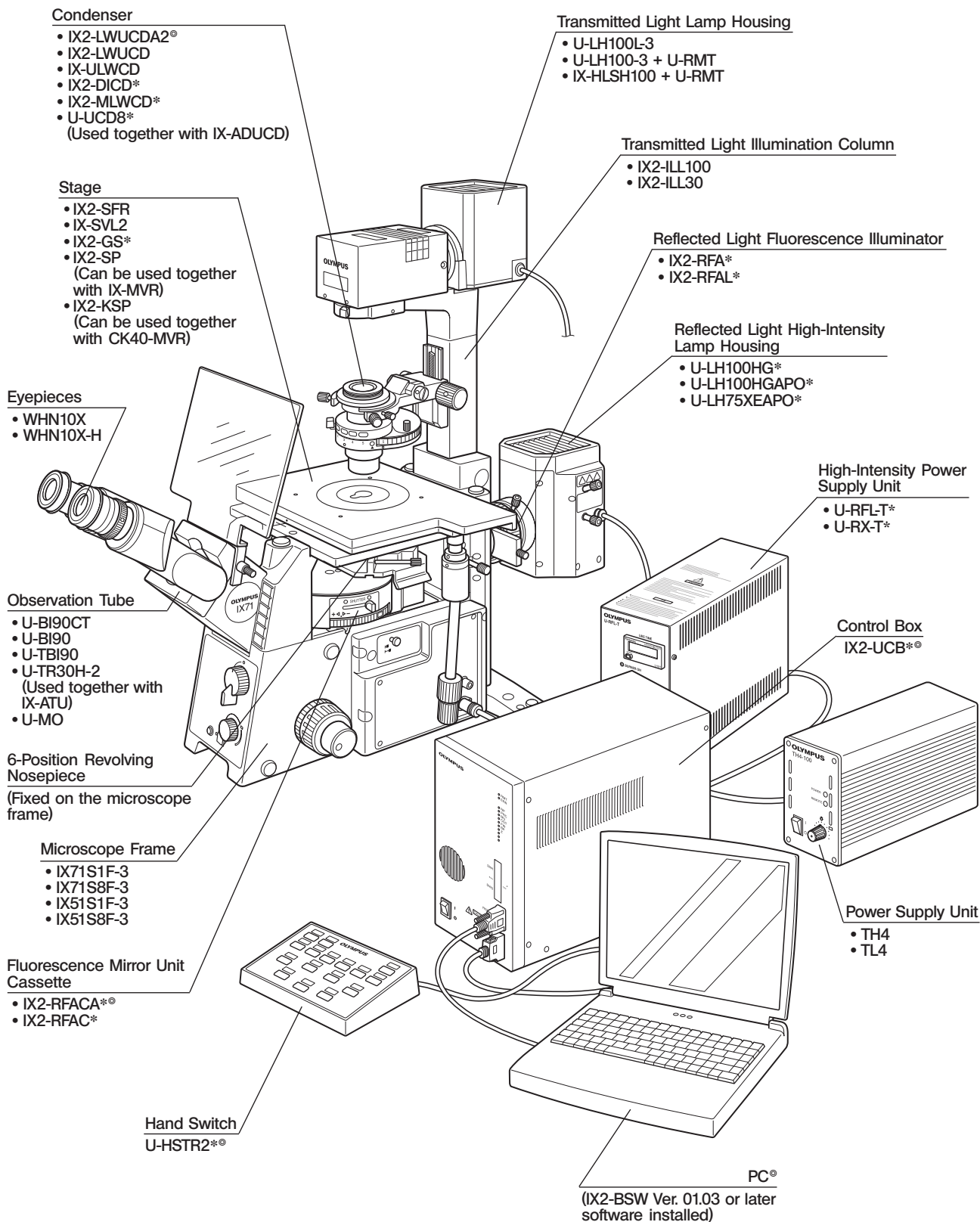
This instrument has been designed to be used to observe magnified images of specimens in routine and research applications.

Do not use this instrument for any purpose other than its intended use.

1 MODULE NOMENCLATURE

© The modules shown below are only the representative modules. As there are other modules which can be combined with the microscope but are not shown below, please also refer to the latest Olympus catalogues or your dealer. For the modules marked *, refer to their separate instruction manuals.

Modules marked ® are motorized modules, which should be used in combination with the IX2-UCB, a PC, etc.

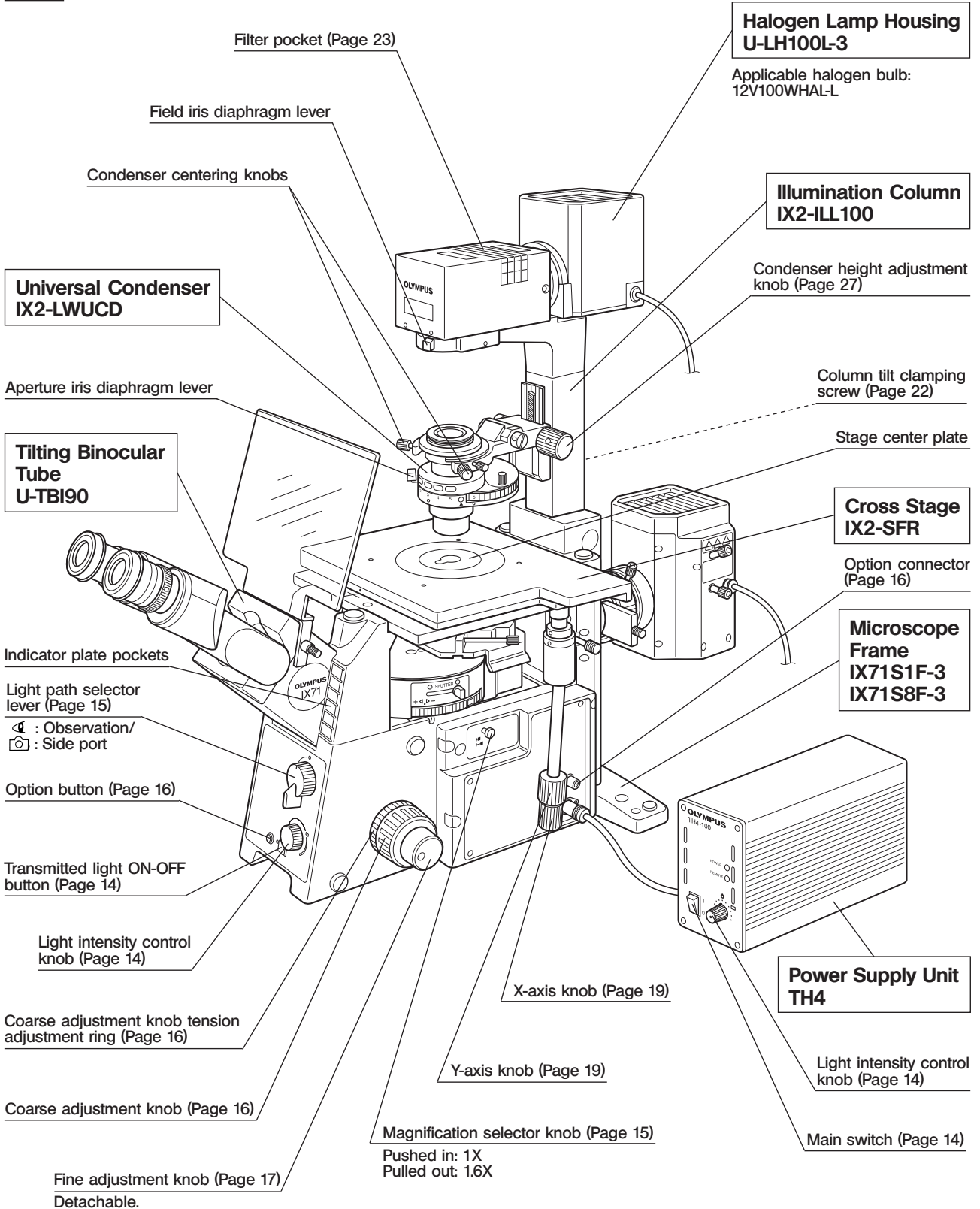


2 CONTROLS

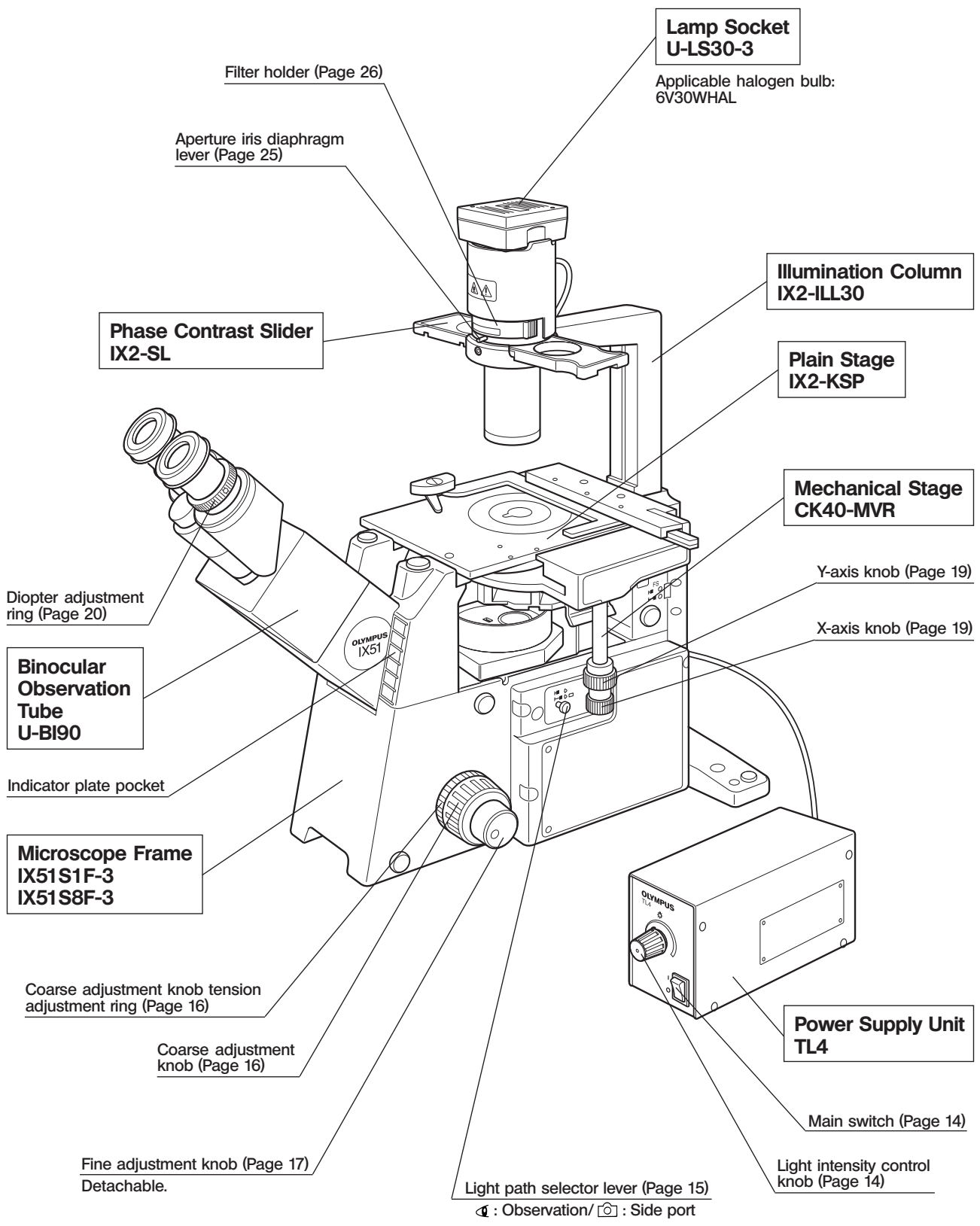
© If you have not yet assembled the microscope, read Chapter 9, "ASSEMBLY" (pages 55 to 65).

- The illustration shows the system composed of modules enclosed in IX71.

IX71



IX51



Left Side View of Microscope Frame

IX71

Allen screwdriver
storage position (Rear panel)

Allen wrench and optical
element centering knob (x 2)
storage position (Rear panel)

**Eyepieces
WHN10X/WHN10X-H**

**Binocular Observation Tube
U-BI90CT**

Diopter adjustment
ring (Page 20)

Interpupillary distance
adjustment scale
(Page 20)

CT turret (Page 21)

Focus ring (Page 21)

Coarse adjustment knob (Page 16)

Pre-focusing lever (Page 17)

Side port

Transport lock knob
★Be sure to remove this before use.

Fine adjustment knob (Page 17)

Detachable.

IX51

Allen screwdriver
storage position (Rear panel)

Allen wrench and optical
element centering knob (x 2)
storage position (Rear panel)

**Eyepieces
WHN10X/WHN10X-H**

**Binocular Observation Tube
U-BI90CT**

Diopter adjustment
ring (Page 20)

Interpupillary distance
adjustment scale
(Page 20)

CT turret (Page 21)

Focus ring (Page 21)

Coarse adjustment knob (Page 16)

Pre-focusing lever (Page 17)

Side port

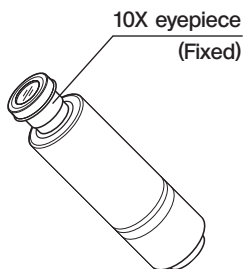
Transport lock knob
★Be sure to remove this before use.

Fine adjustment knob (Page 17)

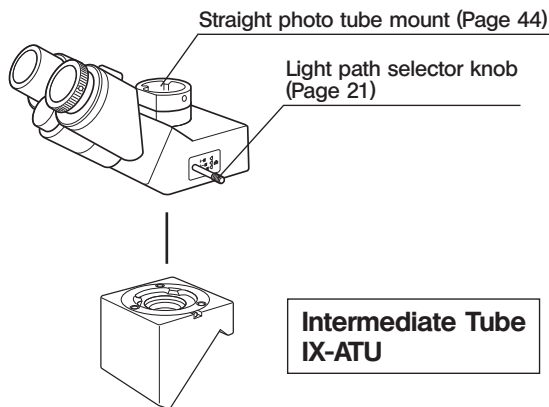
Detachable.

Other Modules

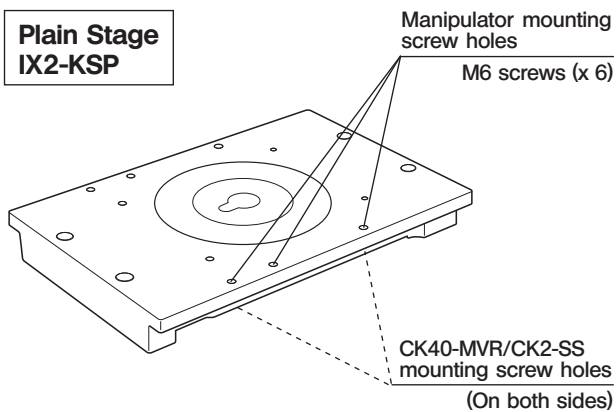
**Monocular Tube
U-MO**



**Trinocular Observation Tube H
U-TR30H-2**

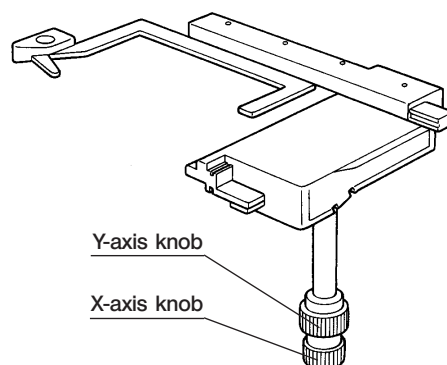


**Plain Stage
IX2-KSP**

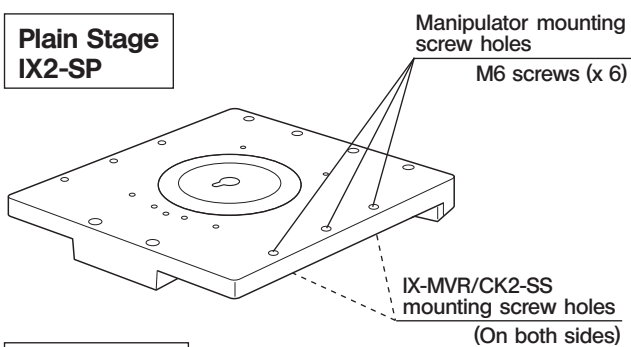


**Mechanical Stage
CK40-MVR**

© Can be mounted on the IX2-KSP.

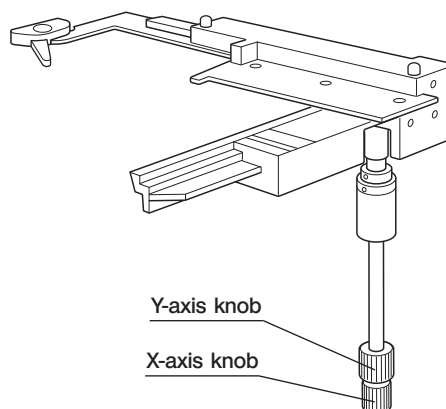


**Plain Stage
IX2-SP**

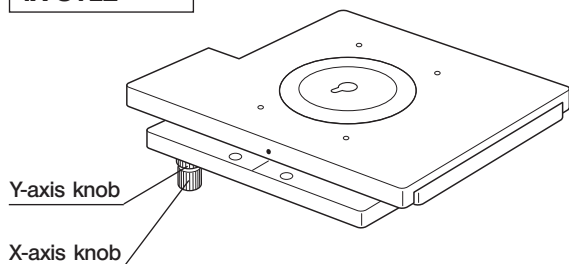


**Mechanical Stage
IX-MVR**

© Can be mounted on the IX2-SP.

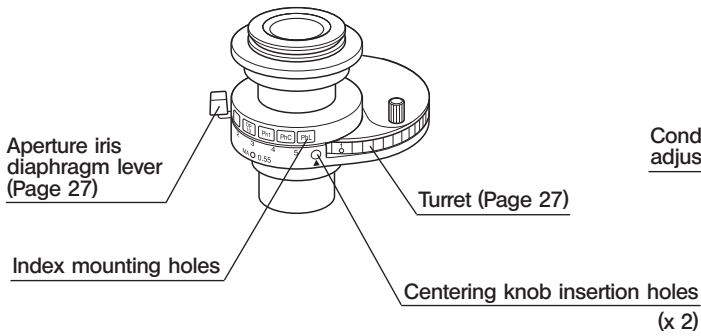


**Cross Stage
IX-SVL2**

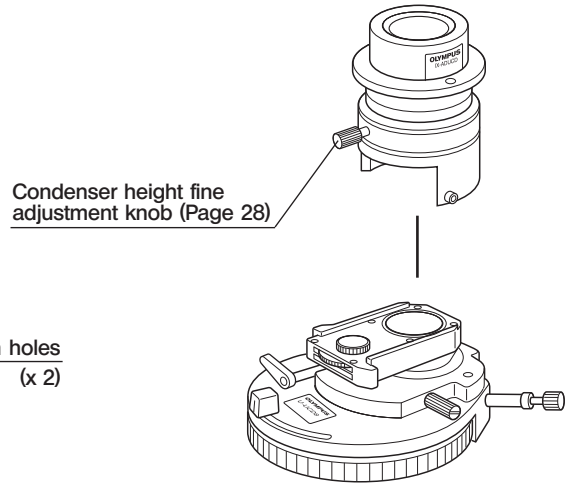


**Long WD Universal Condenser
IX2-LWUCD**

© This is a manually controlled condenser.

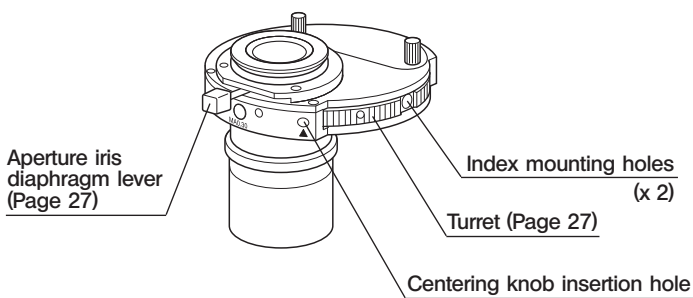


**UCD Adapter
IX-ADUCD**



**ULWCD Condenser
IX-ULWCD**

© This is a manually controlled condenser.

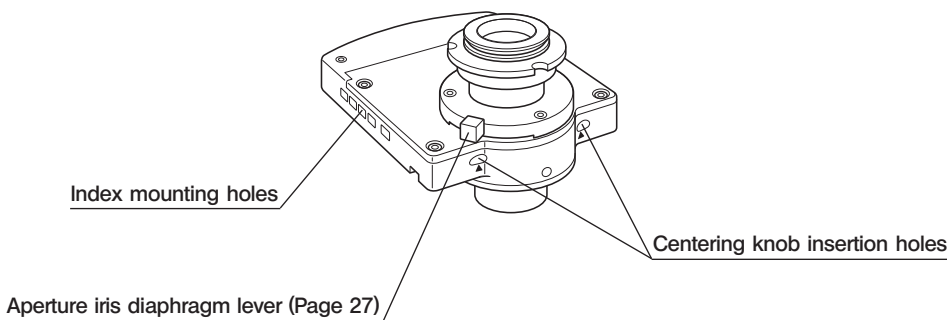


**Universal Condenser
U-UCD8**

© This is a manually controlled condenser. Refer to the separate instruction manual for details.

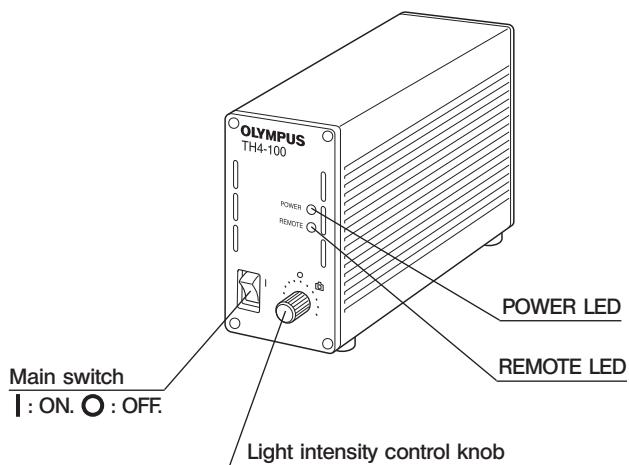
**Motorized Long WD Universal Condenser
IX2-LWUCDA2**

© This is a motorized condenser.



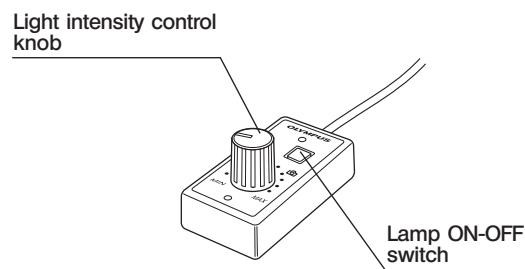
Power Supply Unit TH4

©The applicable halogen bulb is the 12V100WHAL-L.
For details, refer to the separate instruction manual.



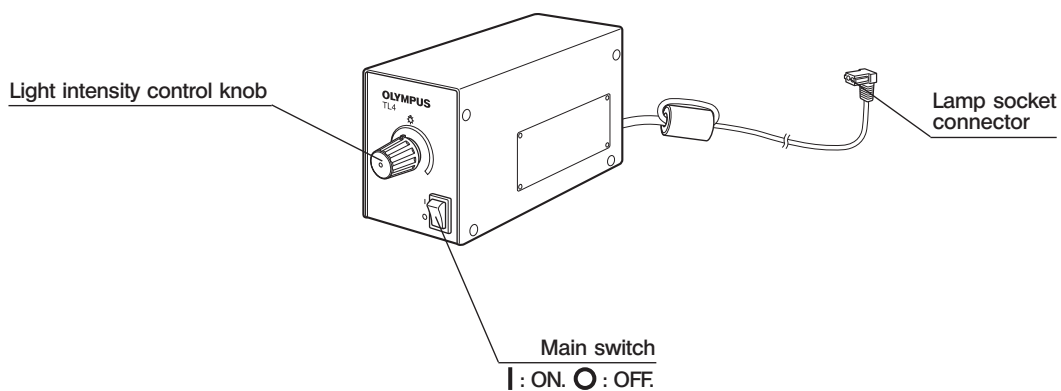
Hand Switch TH4-HS

©The IX71 does not need this module because its functions are incorporated in the microscope frame.



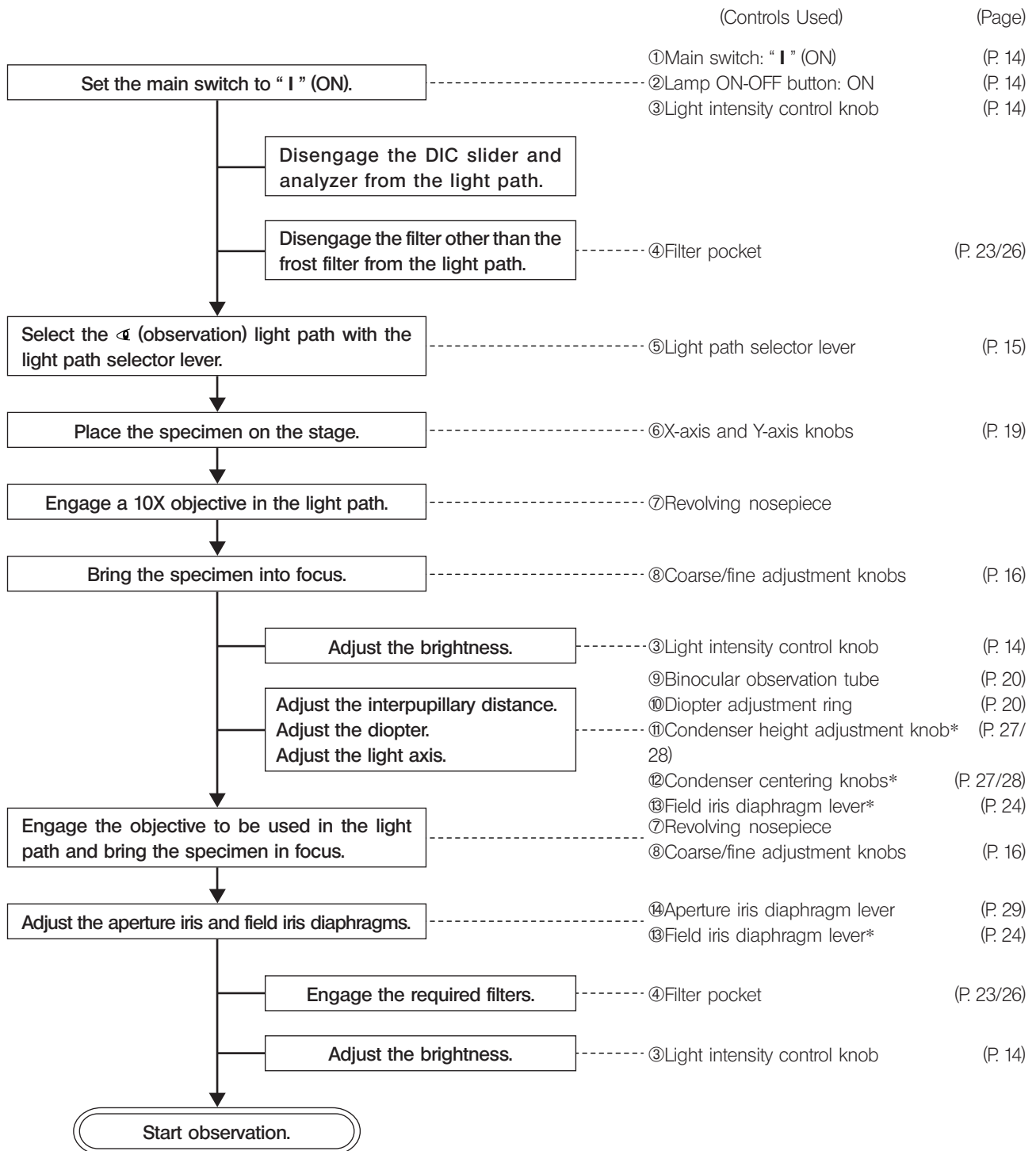
Power Supply Unit TL4

©The applicable halogen bulb is the 6V30WHAL.

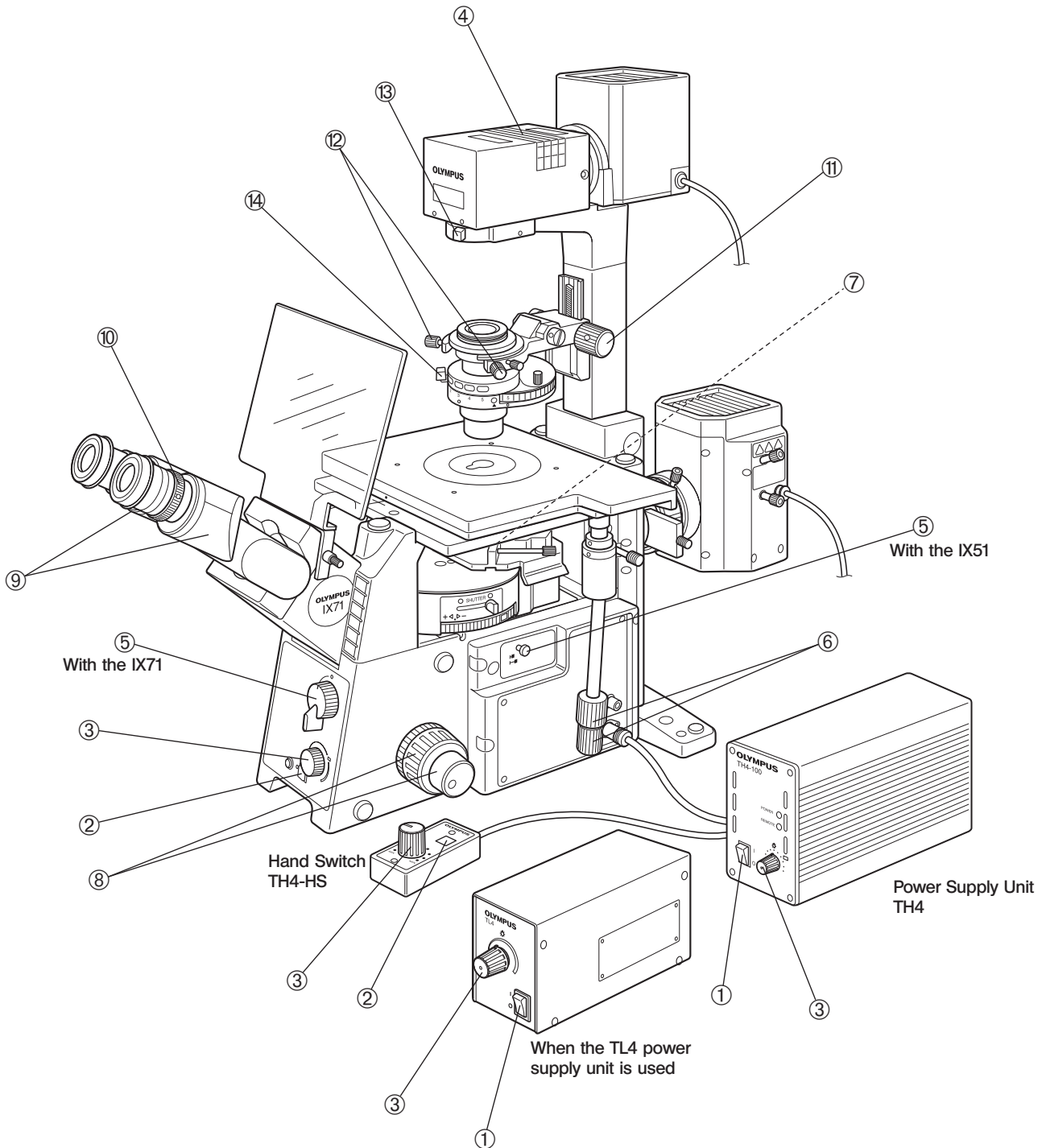


3 TRANSMITTED LIGHT BRIGHTFIELD OBSERVATION PROCEDURE

©The following flow shows the operating procedure for the transmitted light brightfield observation which is the basic observation method of this microscope. The operating procedures for phase contrast observation and DIC observation will be described separately in Chapter 5, "OTHER OBSERVATION METHODS" on page 32. For the fluorescence observation, refer to the separate instruction manual entitled "Manual/Motorized Reflected Fluorescence System".



* This operation is not required when the IX2-ILL30 illumination column is used.



© Make a photocopy of the observation procedure pages and post it near your microscope.

4 USING THE CONTROLS

4-1 Power Supply Unit and Microscope Frame

◎ The power supply unit to be used is variable depending on the illumination column in use.

- IX2-ILL100: TH4 power supply unit.
- IX2-ILL30: TL4 power supply unit.

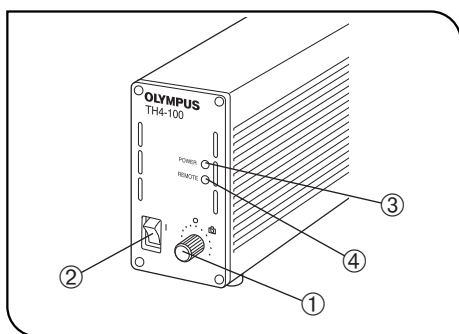


Fig. 4

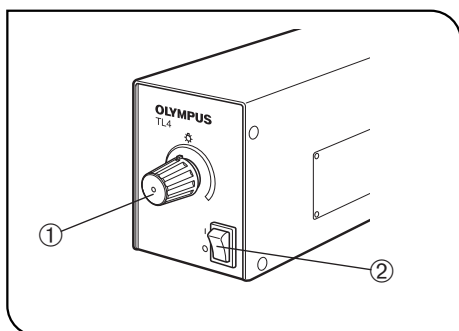


Fig. 5

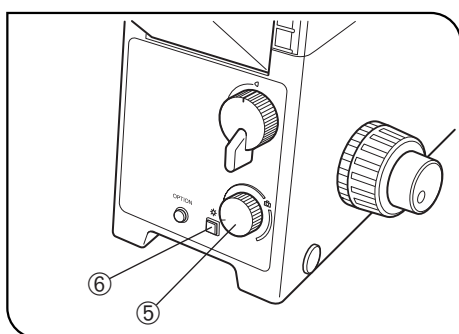



Fig. 6


1 Turning Power On, Adjusting the Brightness


(Figs. 4 & 5)

1. Make sure that the light intensity control knob ① is in the MIN (minimum intensity) position and set the main switch ② to "I" (ON). (The POWER LED ③ lights up.)

2. Rotate the knob ① toward MAX (maximum intensity) to increase the intensity and the illumination brightness.

◎ With the TH4, the position (approx. 9 V) marked  indicates the position where the daylight illumination suitable for photomicrography is obtained when the 45LBD filter is engaged in the light path.

The position marked  of the IX71 and TH4-HS also has the identical function.

With the TL4, the position marked  is not provided and even the maximum light intensity (6 V) may sometimes be unsuitable for photomicrography.

With the IX71 Frame (Fig. 6)

◎ If the TH4 connection cable provided with the microscope frame is connected to the TH4 (the REMOTE LED ④ lights in this case), the light intensity control knob ① on the power supply unit is defeated and only the light intensity control knob ⑤ on the front of the microscope frame is available.

1. Press the transmitted light ON-OFF button ⑥ (so that the button is illuminated) and adjust the brightness with the light intensity control knob ⑤.

2. To turn the lamp OFF, set the transmitted light ON-OFF button ⑥ to OFF.

★ The microscope frame is in standby mode when the REMOTE LED ④ is lit. Power of about 2.5 W is consumed in this period.

When the microscope system is not be used for a long period, set the main switch ② to "O" (OFF).

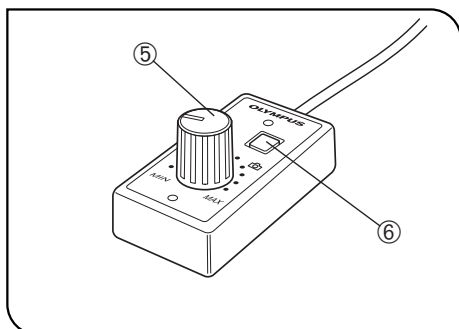


Fig. 7

When the TH4-HS Hand Switch is Used (Fig. 7)

- ⊙ The illumination brightness can be adjusted from the hand switch in the same way as on the IX71 microscope frame. The hand switch is provided with double-sided adhesive tape, so it can be adhered to an easy-to-use position.

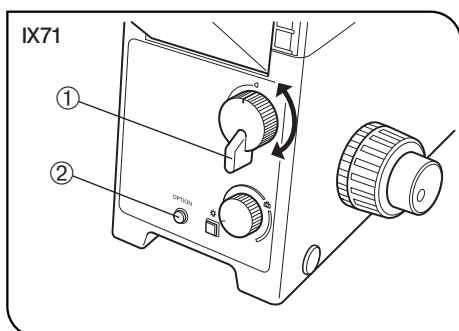


Fig. 8

2 Light Path Selection

(Figs. 8 & 9)

- ⊙ The light path selector allows for light path switching between the observation (◀) and side port (◻) paths.
 - ◀ : Observation 100% light path.
 - ◻ : Side port 100% light path (with the IX71S1F-2/IX51S1F-2 frame)
Side port light path 80%/Observation 20% light path (with the IX71S8F-2/IX51S8F-2)
- ⊙ The light path to the lower back port can also be set by the manufacturer's part replacement operation. (IX2-LBPC)

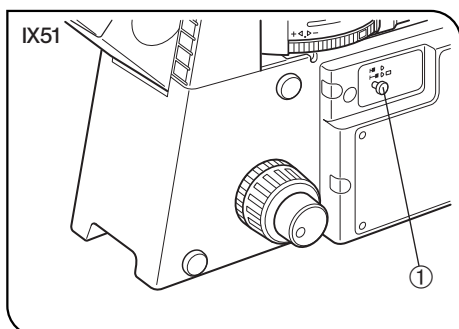


Fig. 9

3 Magnification Change (IX71 Only)

(Fig. 10)

- When the magnification selector knob ① is pulled out, the magnification will be 1.6X. When the knob is pushed in, the magnification will be 1X.
- ⊙ The 1X→1.6X magnification changer lens can be replaced with a 1X→2X magnification changer lens (IX2-CA2) by the manufacturer operation.

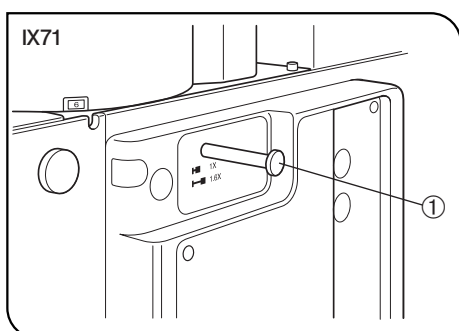


Fig. 10

4 Frame Clamping Plate

Ⓞ This is the module for clamping the microscope frame onto an anti-vibration platform. The applicable anti-vibration platforms are the following four models

- 25 mm pitch and 50 mm pitch anti-vibration platforms.
- 1-inch pitch and 2-inch pitch anti-vibration platforms.

For the assembly procedure, see item **10** on page 65.

5 Option Button (IX71 Only)

(Fig. 8)

Ⓞ Pressing the option button ② makes it possible to release or close an external shutter (UNIBLITZ, etc.) To do this, the external shutter be connected to the right side of the frame using a commercially available BNC cable.

★ When the option button is not used, leave the cap attached to it.

4-2 Focusing Block

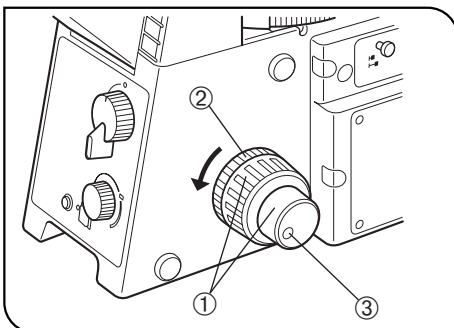


Fig. 11

1 Rotation Direction of the Coarse/ Fine Adjustment Knobs

(Fig. 11)

Ⓞ Rotating the coarse or fine focus adjustment knob ① toward the front (in the direction of the arrow) raises the objective and toward the rear (opposite direction) lowers the objective.

2 Adjusting the Coarse Adjustment Knob Tension

(Fig. 11)

★ Always use the rotation tension adjustment ring ② to control the rotation tension of the coarse adjustment knob.

The tension of the coarse adjustment knob has been pre-adjusted to optimum tension, but this can be changed as required. Turn the rotation tension adjustment ring ② in the direction of the arrow to decrease the knob's tension and in the opposite direction to increase it.

If the objective lowers by its own weight or the focusing obtained with the fine adjustment knob is lost soon, the tension is set too low. In this case, turn the rotation tension adjustment ring in the opposite direction to the arrow to increase the tension.

3 Detaching the Fine Adjustment Knob (Fig. 11)

⊙ The fine adjustment knob is designed detachable in order to prevent interference between the knob and the operator's hand manipulating the X- and Y-axis knobs.

- Loosen the clamping screw ③ using the Allen screwdriver and remove the fine adjustment knob.

After detaching, the seat of the fine adjustment knob is hollowed to facilitate manipulation with the thick of a finger.

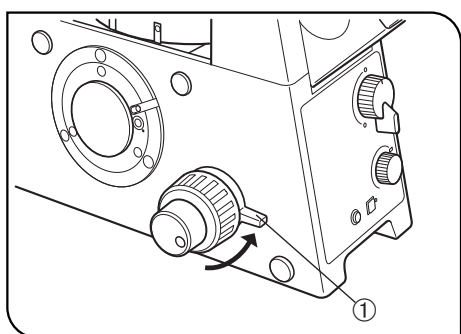


Fig. 12

4 Pre-focusing Lever (Fig. 12)

⊙ The pre-focusing lever prevents collision between the specimen and objective and simplifies the focusing operation.

After bringing the specimen into approximate focus with the coarse adjustment knob, turn the pre-focusing lever ① in the direction of the arrow to lock it. Hereafter, the upper limit of the coarse adjustment will be limited at the position where the lever is locked.

When bringing a specimen in focus, approximate focus can be obtained by simply raising the coarse adjustment to the stop position so all you have to do more is control the fine adjustment knob.

⊙ The stage up/down movement using the fine adjustment knob is not limited.

- ★ **When the pre-focusing lever is locked, the coarse adjustment stroke is limited by the mechanism and it cannot reach the previous lower limit. If you want to control the coarse adjustment knob to the previous lower limit, unlock the pre-focusing lever.**

4-3 Stage

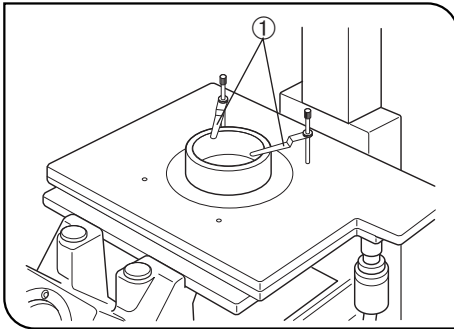


Fig. 13

1 Placing the Specimen

(Figs. 13 to 16)

With the IX2-SFR or IX-SVL2 Stage

(Fig. 13)

Place the specimen on the center of the stage.

- Ⓞ In the case of a slide glass specimen, place the specimen with the cover glass facing down.
- Ⓞ If the specimen is prone to slide on the stage, attach the stage clips (IX-SCL) ① and clamp the specimen down with the clips.

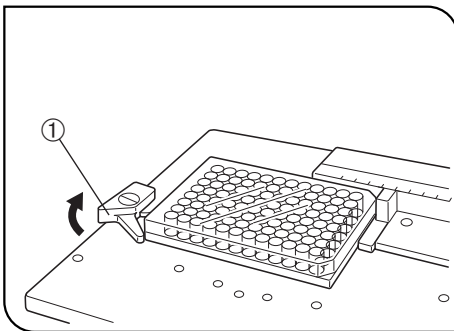


Fig. 14

With the IX-MVR Mechanical Stage + IX2-SP Stage

(Figs. 14 & 15)

Ⓞ 96-well or 24-well microtiter plates, etc. are held in place by the specimen holder.

Microtiter plates with dimensions of max. 136 mm x 92 mm can be accommodated in this way.

1. Open the spring-loaded finger of the specimen holder ① and slide the microtiter plate into the holder frame. Gently release the curved finger to clamp. (Fig. 14)

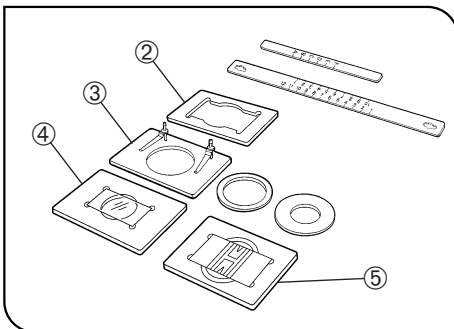


Fig. 15

Ⓞ To secure other vessels than microtiter plates, various optional holders are available. A Terasaki plate holder ② is available for holding Terasaki plates (72-well, or 60-well). When using this, it is necessary to replace the stage scales with those provided with the plate holder. Petri dish holder ③ is available for 35 mm, 54 mm and 65 mm diameter petri dishes, and a slide glass holder ④ is available for holding slide glass, and the IX2-BCTP* ⑤ is available for a blood cell test plate holder. (Fig. 15)

* A blood cell test plate or other calculating chamber for bacteria and eosinophil with mounting section dimensions corresponding to $H 77^{+0.3}_0 \times V 35^{+0.3}_0 \times D 2 \text{ mm}$ can be used. A 60 mm diameter petri dish can also be used.

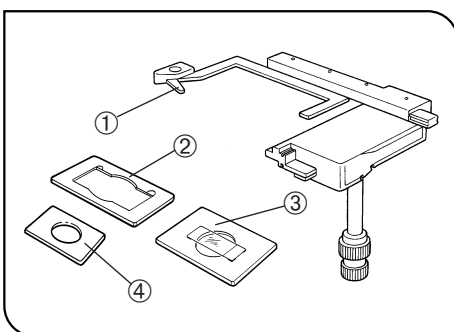


Fig. 16

With the CK40-MVR Mechanical Stage + IX2-KSP Stage

(Fig. 16)

1. 96-well or 24-well microtiter plates can be held directly in place by widening the specimen holder ①.
 2. To secure other vessels than microtiter plates, use one of the following holders provided with the mechanical stage.
 - Terasaki plate holder ② (AB4488): For test plate, 35 mm diameter petri dish holder ④ or 65 mm diameter petri dish
 - Slide glass holder ③ (AB4489): For slide glass or 54 mm petri dish
- Ⓞ The IX2-BCTP blood cell test plate holder (Fig. 15 ⑤) can also be used.

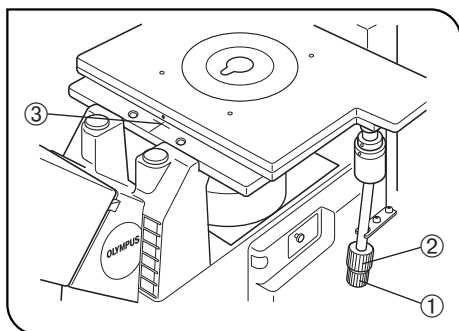


Fig. 17

2 Moving the Specimen (Fig. 17)

(Fig. 17)

With the IX2-SFR or IX-SVL2 Stage

To move the specimen to a desired position, rotate the X-axis knob ① and Y-axis knob ②.

- Ⓞ When the index mark on the upper stage is aligned with the index line ③ provided on the substages, the center of the stage center plate aperture is almost in the center of the optical axis. Use this as a guideline when moving the specimen.

The travel area is 50 mm (X-axis) x 50 mm (Y-axis).

- Ⓞ If, after observing a specimen with an objective with short WD (0.5 mm or less), the revolving nosepiece is rotated to change the objective, the objective may interfere with the center plate. When using objectives with short WD or immersion objectives frequently by avoiding interference, it is recommended to attach the optional IX-CP50 center plate with a center aperture diameter of 50 mm.

- Ⓞ The travel area of the IX-SVL2 stage is 50 mm (X-axis) x 43 mm (Y-axis).

With the IX-MVR or CK40-MVR Mechanical Stage

Specimens are moved in the same manner as outlined above.

- Ⓞ The stage travel area is 130 mm (X-axis) x 85 mm (Y-axis) with the IX-MVR or 120 mm (X-axis) x 78 mm (Y-axis) with the CK40-MVR.

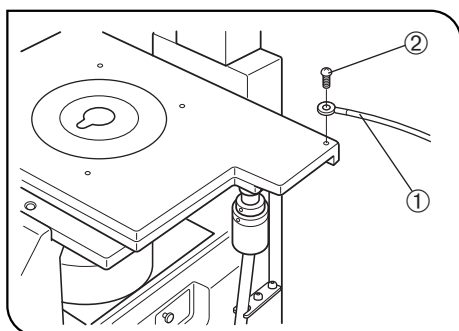


Fig. 18

3 Connecting the Grounding Wire (Fig. 18)

(Fig. 18)

With the IX2-SFR or IX-SVL2 Stage

- Ⓞ A grounding wire can be attached to the stage for electrophysiological experiments, etc.

Prepare a grounding wire ① and one M4 screw ② and attach the grounding wire as shown in Fig. 18.

- ★ The screw hole may sometimes be stuck by paint, etc. In such a case, screw in the M4 screw a few times to expose the metallic thread inside the screw hole and improve the contact before attaching the grounding wire firmly.

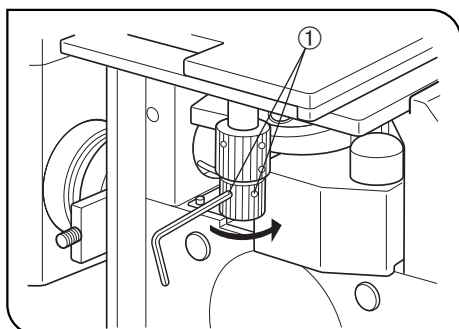


Fig. 19

4 Adjusting the X-Axis/Y-Axis Knob Rotation Tension (Fig. 19)

(Fig. 19)

With the IX-SVL2 Stage

- Ⓞ The tension of the X-axis and Y-axis knobs can be adjusted independently.

1. Loosen the two setscrews ① of a knob using the provided Allen wrench, hold the stage so that it will not move, then rotate the knob to adjust the tension. Rotating it in the direction of the arrow increases the tension and rotating in the opposite direction decreases the tension.
2. After adjustment, tighten the setscrews firmly.

- ★ If the tension of a knob is too tight or too loose, skipping or returning of image may occur during the stage movement.

4-4 Observation Tube

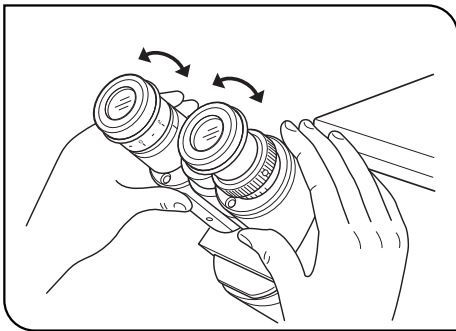


Fig. 20

1 Adjusting the Interpupillary Distance (Fig. 20)

While looking through the eyepieces, adjust the binocular vision until the left and right fields of view coincide completely. The index dot • indicates the interpupillary distance.

Ⓞ Note your interpupillary distance so that it can be quickly duplicated.

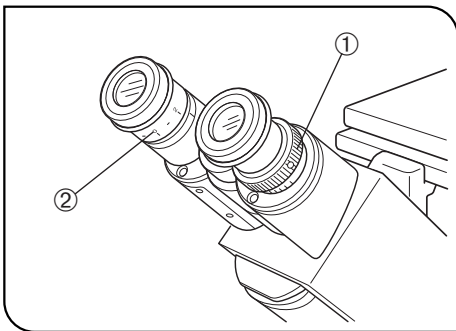


Fig. 21

2 Adjusting the Diopter (Figs. 21 & 22)

Ⓞ The diopter adjustment accuracy can be improved by using an objective with as high power as possible.

1. While looking through the right eyepiece, rotate the diopter adjustment ring ① on the right eyepiece sleeve until the peripheral area of the field of view is clearly visible. (Fig. 21)

Ⓞ The diopter can also be adjusted using the eyepiece micrometer disks.

2. While looking through the right eyepiece, rotate the coarse/fine adjustment knobs to bring the specimen into focus.

3. Look through the left eyepiece and rotate only the diopter adjustment ring ② on the left eyepiece to bring the specimen into focus. (Fig. 21)

★ When rotating the diopter adjustment ring of an eyepiece, hold the lower part of the eyepiece with the other hand.

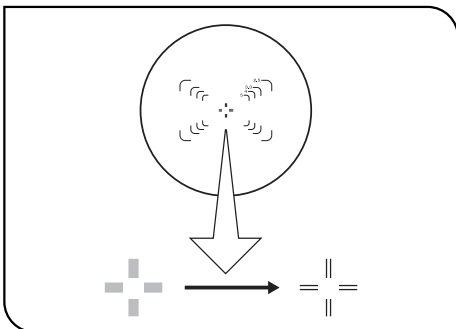


Fig. 22

Operation When Using Finder Eyepieces (U-TR30H-2 Trinocular Tube Only)

Ⓞ Note that the finder eyepieces cannot be attached to the eyepiece sleeves of a binocular observation tube.

1. Looking through the left eyepiece with your left eye, rotate the top of the eyepiece ② until a clearly defined double crosslines can be seen in the field of view. (Figs. 21 & 22)

2. Looking through the left eyepiece, adjust the coarse/fine adjustment knobs to bring the specimen and double crosslines into simultaneous focus.

3. Looking through the right eyepiece with your right eye, rotate only the diopter adjustment ring ① to bring the specimen into focus.

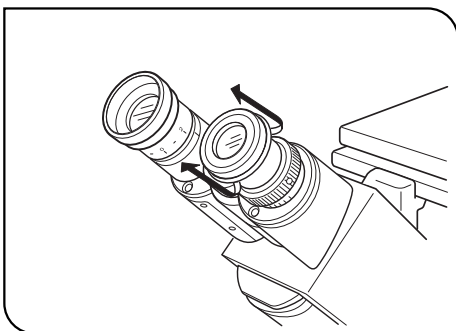


Fig. 23

3 Using the Eye Shades (Fig. 23)

When Wearing Eyeglasses

Use with the eye shades in the normal, folded-down position. This will prevent the eyeglasses from being scratched.

When Not Wearing Eyeglasses

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

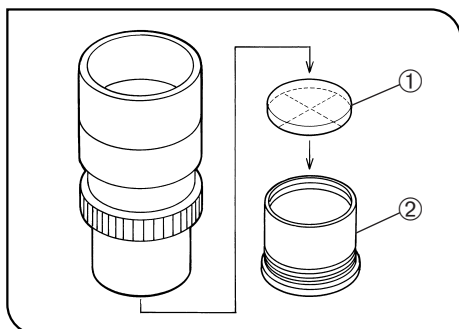


Fig. 24

4 Using Eyepiece Micrometer Disks (Fig. 24)

Eyepiece micrometer disks can be inserted into the WHN10X-H (or WHN10X) eyepieces.

Use 24 mm dia. x 1.5 mm micrometer disks.

Following Fig. 24, turn the built-in micrometer mounting frame ② counter-clockwise to remove it from the eyepiece and place a micrometer disk ① into the mounting frame so that the surface with the model indication faces downward.

Re-attach the micrometer mounting frame in the original position.

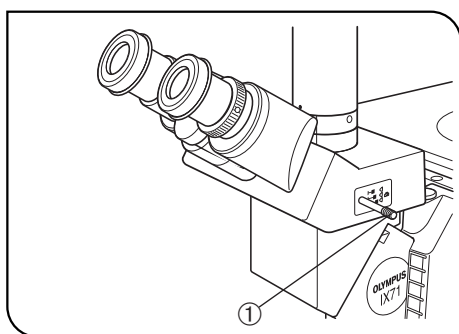





Fig. 25

5 Selecting the Light Path of Observation Tube (U-TR30H-2 Only) (Fig. 25)

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

Ⓞ Usually, set the selector knob to the middle position. With dark specimens, push the knob in. If additional light is needed for TV observation or photomicrography, pull the knob out.

Light Path Selector Position	Symbol	Light Path Ratio	Application
Pushed in		Binocular 100%	Observation of dark specimens
Middle		Binocular 20% TV/photo 80%	Observation of bright specimens, photomicrography, TV observation
Pulled out		TV/photo 100%	Photomicrography, TV observation

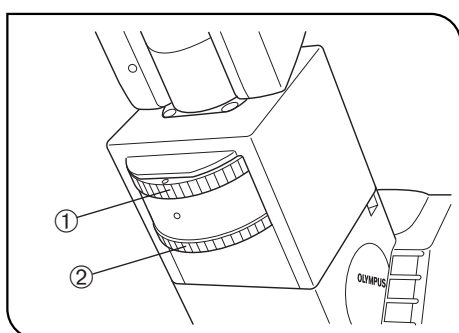


Fig. 26

6 Using the CT Turret (U-BI90CT Only) (Fig. 26)

1. To use the CT turret ① rotate the knurled ring with a finger to select the setting corresponding to the indication (O-CT-O-S). (Set the magnification selector knob on the IX71 microscope frame to 1X.)

Turret Indication	Application
O (2 positions)	Nothing is engaged in the light path (Normal observation)
CT	The CT (Centering Telescope) lens is engaged in the light path and the objective exit pupil can be observed. Used when centering the ring slit in phase contrast observation or adjusting the aperture iris diaphragm.
S	Shield plate is engaged in the light path to block extraneous light from entering through the eyepieces. Used in photomicrography to prevent extraneous light from affecting the exposure.

2. To bring the exit pupil image of the objective into focus when using the CT lens, rotate the focus ring ② to adjust.

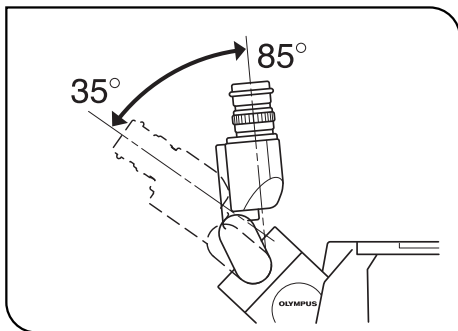


Fig. 27

7 Adjusting the Tilt (U-TBI90 Only) (Fig. 27)

- ⊙ Adjust the height and tilt of the observation tube to obtain the most comfortable viewing position.
Holding the binocular section with both hands, raise or lower it to the desired position.
- ★ **Never attempt to force the binocular section past the upper or lower stop position. Applying excessive force could destroy the limiting mechanism.**
- ⊙ Intermediate attachments cannot be used with this observation tube because they make the surrounding light insufficient.

4-5 Illumination Column IX2-ILL100

- ⊙ The objectives that can be used in combination with various condenser models are as follows.
 - IX2-LWUCDA2, IX2-LWUCD or IX-ULWCD: 2.5X or more.
 - U-UCD8 (plus IX-ADUCD): 20X or more when the U-TLO top lens is used, or 10X or more when the U-TLD is used.
 In addition, the IX2-DICD or IX2-MLWCD can also be used. (Refer to their separate instruction manuals.)

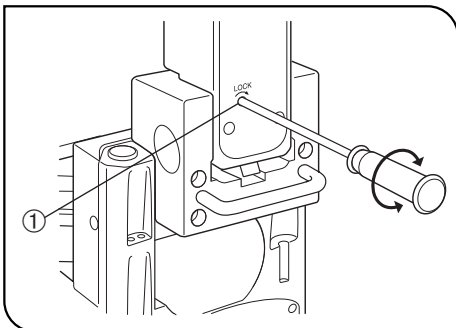


Fig. 28

1 Tilting the Illumination Column (Fig. 28)

- ⊙ When replacing large specimens, placing a micromanipulator or replacing a patch clamp electrode, working space can be created by tilting the illumination column.
- ⊙ Even with the illumination column tilted, the specimen surface will be illuminated, which is convenient for rough confirmation of the specimen location or initial positioning when placing the specimen.
- 1. Using the Allen screwdriver, loosen the column tilt clamping screw ① by turning it approximately 11 turns in the direction of the arrow.
- 2. Holding the illuminator attachment's upper front side, slowly tilt the illumination column backward. Vibrations should be avoided. Accordingly, always support the illumination column with a hand and tilt slowly and gently. To return the column to its original position, reverse this procedure.
- ▲ **When tilting the illumination column upwards or downwards, make sure not to catch your fingers in the hinge joint.**
- ★ **The tilt clamping screw should normally be tightened during use. If the microscope is used while the screw is loosened, make sure that the illumination column does not accidentally tilt during use.**
- ▲ **When moving or transporting the microscope, always do so with the tilt clamping screw tightened.**
- ★ **If a heavy module such as a high-intensity lamp housing is installed, always use the microscope with the tilt clamping screw tightened.**

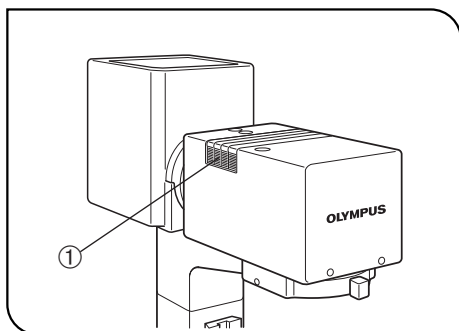


Fig. 29

2 Mounting the Filters

(Figs. 29 to 31)

⊙ 45 mm diameter, maximum 6 mm thick filters can be mounted. Various filters, such as the provided frost filter, color temperature conversion filter (LBD), green interference filter (IF550) and ND filter can be mounted.

1. Place a finger on the milled section ① of the filter holder and lift it. (Fig. 29)

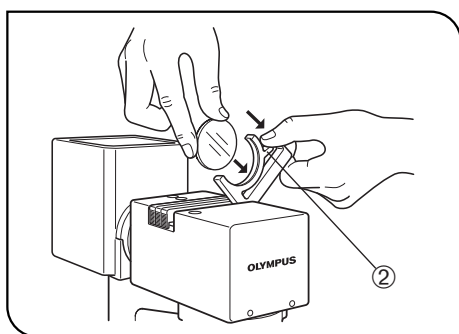


Fig. 30

2. While holding the mounting lever ② of the filter holder, insert a filter.

(Fig. 30)

★ Hold the filter by its edge to avoid leaving fingerprints or smudges on the filter surfaces.

▲ After the illumination has been ignited, the filter will be very hot. Be sure to set the main switch to “○” (OFF) and allow the filter holder and filters to cool down before replacing filters.

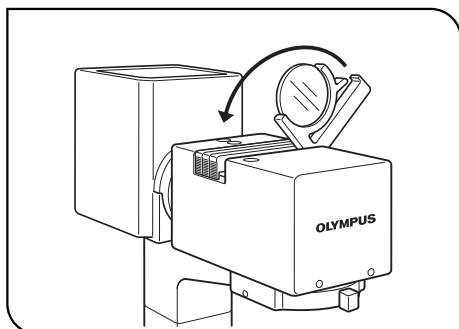


Fig. 31

3. Engage each filter in the light path by moving the filter holder in the direction of the arrow. (Fig. 31)

★ Unless maximum intensity is required, always leave the frost filter engaged in the light path.

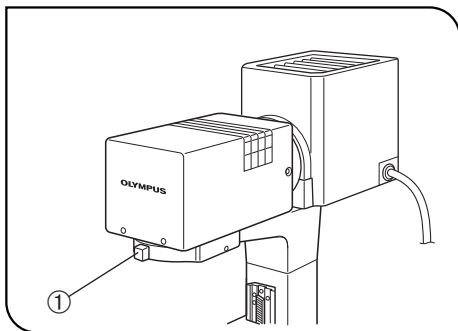


Fig. 32

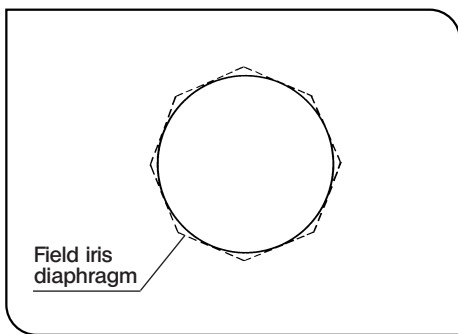


Fig. 33

3 Using the Field Iris Diaphragm (Figs. 32 & 33)

- ⊙ The field iris diaphragm is used to adjust the diameter of the illumination beam in accordance with the objective in use. Adjust the diaphragm so the field of view is circumscribed by the field iris diaphragm to exclude stray light and improve the contrast of images.
 - ⊙ To limit specimen damage or fading when observing living cells or fluorescent specimens, it is effective to stop down the field iris diaphragm.
1. Move the field iris diaphragm lever ① to the left or right to close or open the diaphragm.
 - : Direction for opening the diaphragm
 - ⊗ : Direction for closing the diaphragm

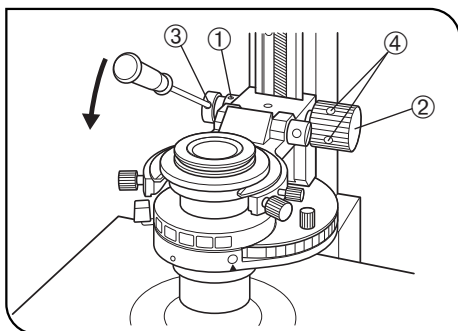


Fig. 34

4 Adjusting the Condenser Height Adjustment Knob Tension (Fig. 34)

1. Loosen the two knob clamping screws ① on the left adjustment knob using the Allen screwdriver. When the handle ② has been moved to the left, restore it in the position as shown in Fig. 34.
2. Insert the Allen screwdriver into the hole ③ on the condenser height adjustment knob ② and, while holding the knob, turn the screwdriver in the direction of the arrow to increase the rotation tension of the knob or in the opposite direction to decrease the tension.
3. After adjustment, tighten the two clamping screws ① securely.

Changing the Knob Position

- ⊙ The condenser height adjustment knob ② is detachable and can be attached to the other side of the microscope.
- Loosen the two knob clamping screws ④ using the Allen screwdriver, remove the knob and attach it to the other side. If the knob is not necessary, retain it in a safe place.

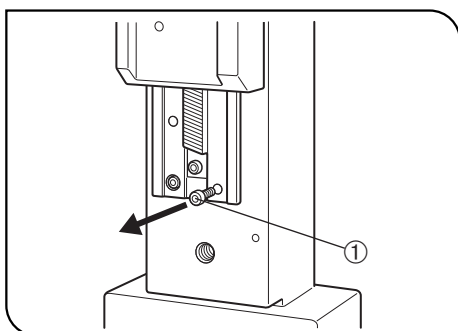


Fig. 35

5 Mounting the Manipulator (Fig. 35)

- ★ Remove the condenser lower limit stopper ① to prevent interference before mounting the manipulator mounting adapter (ON2-99D, ON-IXP, etc.) on the lower part of the column.

4-6 Illumination Column IX2-ILL30

Ⓞ This illumination column is provided with a condenser as standard. The applicable objectives range from 4X to 40X objectives. The field iris diaphragm is fixed.

It is not equipped with a condenser holder so no condenser can be attached to this illumination column.

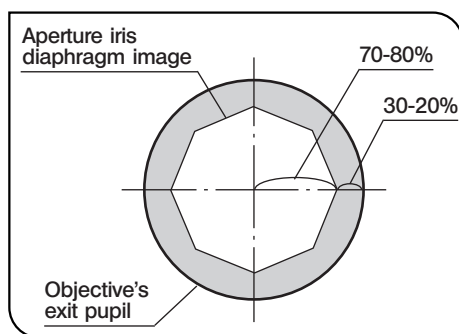


Fig. 36

1 Using the Aperture Iris Diaphragm (Figs. 36 & 37)

Ⓞ The aperture iris diaphragm adjusts the numerical aperture of the illumination system in brightfield observation. It determines the focal depth, contrast and resolution according to purpose.

- To check the aperture iris diaphragm, remove an eyepiece (and attach the U-CT30 if this is available) and look into the eyepiece sleeve. The aperture iris diaphragm can be seen as shown in Fig. 36. Its aperture can be adjusted by rotating the aperture iris diaphragm lever ①.

Ⓞ When the U-BI90CT binocular tube is used, the aperture iris diaphragm can be viewed by setting the turret to position "CT".

- In general, with dyed specimens, optimum observation is possible by controlling the aperture iris diaphragm to between 70% and 80% of the aperture number of the objective. With culture specimens that are not dyed, adjust the aperture iris diaphragm lever by rotating it in the direction of Ⓞ as required.

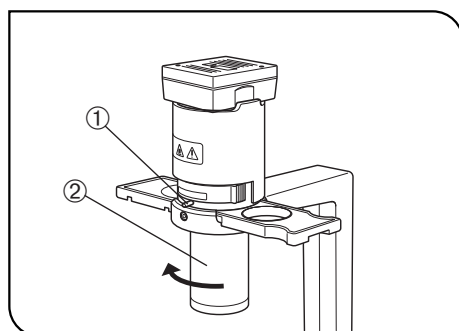


Fig. 37

2 Removing the Condenser Lens (Fig. 37)

Ⓞ The working distance can be increased by removing the condenser ② by rotating its bottom part in the clockwise direction when it is seen from above. However, the illumination becomes inappropriate. Use this method as a simplified method when using only large culture vessels.

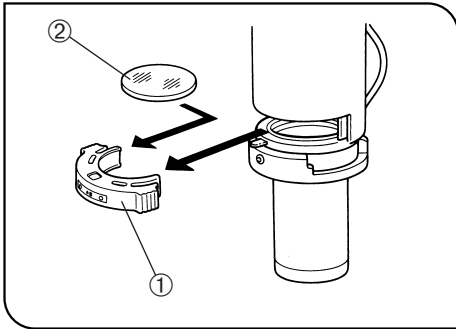


Fig. 38

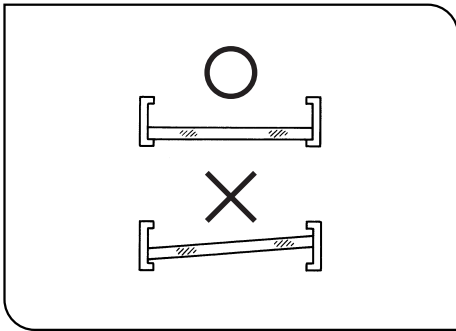


Fig. 39

3 Mounting the Filters

(Figs. 38 & 39)

- ⊙ Wait until the filters have cooled down enough before replacing a filter. Take out the filter holder ① and insert the required filter ②.
- ★ Insert the filter so that it comes at the bottom without tilting, as shown in Fig. 39. If the filter is tilted or not inserted to the bottom, it may drop from the filter holder.
- ⊙ More than one filter can be stacked in the filter holder, provided that the total thickness of filters does not exceed 11 mm.

4 Using the Filters

(Fig. 38)

- ⊙ Using appropriate filters according to the purposes allows you to observe and photograph specimens more effectively. Particularly, the use of the 45LBD filter is recommended in observation and photomicrography because it renders more neutral colors.
- ⊙ More than one filter with a diameter of 45 mm can be stacked in the filter holder ①.

Filter	Application
43IF550-W45	Monochrome contrast filter (Green)
45ND6, 45ND25	Light intensity adjustment filter (Transmittance 6% and 25%)
45LBD	Color temperature conversion filter (For observation and photomicrography)

4-7 Condenser

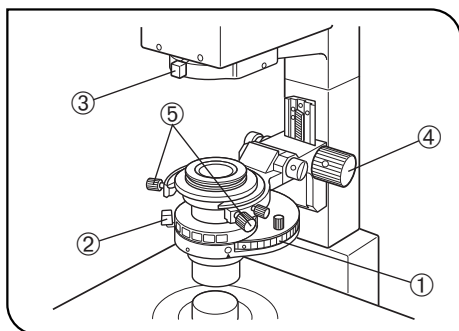


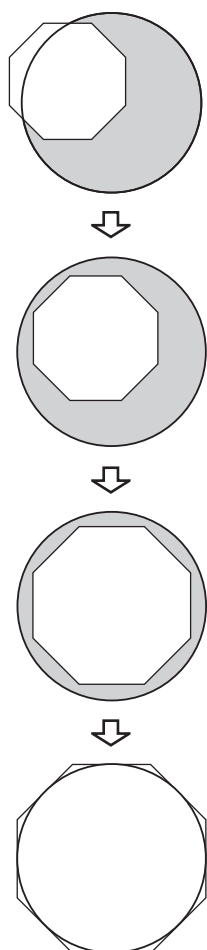
Fig. 40

1 Centering the Condenser

(Fig. 40)

With the IX2-LWUCD/IX2-LWUCDA2 Universal Condenser or IX-ULWCD Condenser

1. Rotate the turret ① (either manually or electrically) to select the "BF" brightfield observation (with no optical element engaged in the light path).
 2. Slide the aperture iris diaphragm lever ② to open the diaphragm.
 3. Slide the field iris diaphragm lever ③ to the fully open position (⊗ → ○).
 4. Engage the 10X objective and bring the specimen into focus.
 5. Using the field iris diaphragm lever, stop down the field iris diaphragm until its image is just inside the field of view.
 6. Rotate the condenser height adjustment knob ④ to bring the field iris diaphragm image into focus.
 7. While gradually opening the field iris diaphragm, rotate the condenser centering knobs ⑤ on the condenser holder to adjust so that the field iris diaphragm image is centered in the field of view of the eyepieces.
 8. To check centration, open the field iris diaphragm until its image inscribed the field of view. Now the condenser is centered.
- ⊗ In actual observation, open the field iris diaphragm until its image circumscribes the field of view.
- ★ When the IX2-ULWCD condenser is combined with a 40X or higher-power objective, the field iris diaphragm cannot be seen in the field of view.
- ★ When the IX2-LWUCDA2 or IX2-LWUCD condenser is combined with a 100X objective, the field iris diaphragm cannot be seen in the field of view.



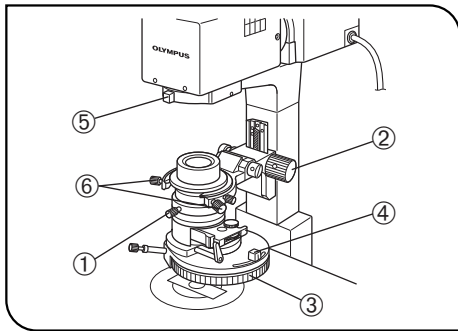


Fig. 41

With the U-UCD8 Universal Condenser

(Fig. 41)

★ For operation of the U-UCD8, refer to the instruction manual provided with it.

Since this condenser is used upside down, it may drop when the optical element is subject to a shock. Be careful particularly when flipping up the condenser holder.

1. Rotate the condenser height fine adjustment knob ① counterclockwise to loosen it, then push the knob all the way toward the rear.
 2. Rotate the condenser height adjustment knob ② in the direction of the arrow to lower the condenser to its lowest position.
 3. Rotate the turret ③ to select the "BF" brightfield observation (with no optical element engaged in the light path).
 4. Slide the aperture iris diaphragm lever ④ to open the diaphragm.
 5. Slide the field iris diaphragm lever ⑤ to the fully open position (⊗ → ○).
 6. Engage the 10X objective and bring the specimen into focus.
 7. Using the field iris diaphragm lever, stop down the field iris diaphragm until its image is just inside the field of view.
 8. Slowly slide the condenser height fine adjustment knob ① toward the front to bring the field iris diaphragm image into focus. When focusing is obtained, rotate the knob clockwise to clamp it.
 9. While gradually opening the field iris diaphragm, rotate the condenser holder's condenser centering knobs ⑥ to adjust so that the field iris diaphragm image is centered in the field of view of the eyepieces.
 10. To check centration, open the field iris diaphragm until its image is inscribed in the field of view. Now the condenser is centered.
- ⊗ In actual observation, open the field iris diaphragm until its image circumscribes the field of view.
- ⊙ When replacing the specimen or applying oil, use the condenser height adjustment knob to first raise the condenser and then lower it to its lowest position. If this is done, it should be unnecessary to adjust the condenser centration and focusing again.

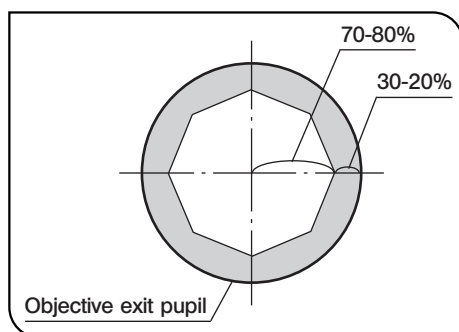


Fig. 42

2 Using the Aperture Iris Diaphragm (Fig. 42)

- ⊙ In general, the potential resolving power of an objective is fully utilized if the diaphragm is stopped down to correspond with the numerical aperture (NA) of the objective.
- ⊙ Depending on the specimen, image contrast or focal depth in observation or photomicrography may be improved by keeping the aperture iris diaphragm stopped down a little.
In general, a good image is obtained if the diaphragm is stopped down to between 70% and 80% of the NA of the objective. Stop further down for less contrasty specimens.
- ⊙ To check the position of the perimeter of the aperture iris diaphragm, remove the eyepieces and look into the eyepiece sleeves to view the aperture iris diaphragm image and the objective's exit pupil.
- ⊙ When using the U-BI90CT binocular observation tube, the aperture iris diaphragm can be observed by setting the turret to position "CT" or using the U-CT30 centering telescope.

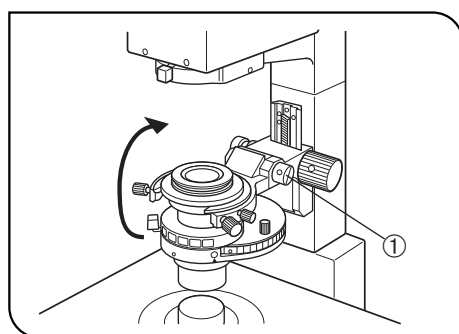


Fig. 43

3 Flipping Up the Condenser Holder (Fig. 43)

- ⊙ To create working space and facilitate specimen replacement, micromanipulator positioning or mounting an objective from the side of the stage, flip up the condenser holder.
 1. Placing a hand against the bottom of the condenser holder, press it upwards.
 2. The tension of the flipping-up operation can be adjusted by turning the adjustment screw ① using a coin.
- ★ Adjust the tension so that the flipped-up condenser will not drop down by itself.
- ★ When returning a flipped-up condenser to its original position, do so gently and slowly. Optimum illumination performance cannot be obtained if the condenser is not positioned correctly.

4-8 Objectives

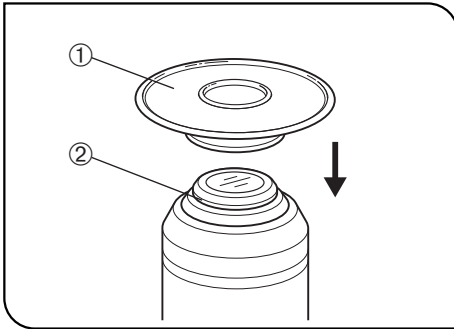


Fig. 44

1 Oil-Proof Cap (UIS Series only)

(Fig. 44)

◎By mounting the oil-proof cap (Type C1 or Type C2) on the tip of the applicable objective, you can prevent penetration of immersion oil or water into the objective. This will enable the objective to achieve its original performance, so be sure to always mount the cap.

How to mount

Make sure which type, C1 or C2, should be used for the objective in use by referring to the table below. Then fit the appropriate oil-proof cap ① into the mounting groove ② securely.

■ Applicable Objectives

Oil-proof cap	Objective (Series 3)	Remark	Oil-proof cap	Objective (Series 3)	Remark
C1	UPlanFI100XO3	Provided with microscope frame. C1: 1 piece C2: 2 pieces	C1	UApo20X3/340	1 piece is provided with each objective.
	" 100XO3Ph			" 40X3/340	
	" 100XO3P			" 40XOI3/340	
C2	UPlanFI60XOI3	" 20XW3/340			
	" 60XOI3Ph	" 40XW3/340			
	" 100XO3	UPlanApo10XW3			
	UPlanApo20XO3	" 10XO3			
	" 40XOI3	" 60XW3			
" 40XOI3Ph	" 60XW3/IR				
" 100XOI3					
" 100XOI3Ph					
PlanApo60XO3					
" 60XO3Ph					
" 100XO3					

Caution in cleaning

When wiping off immersion oil or water attached to the oil-proof cap, do not press the card hard. Otherwise, the tip of the objective will retract due to the buffer spring mechanism, causing the cap to come off and oil or water to penetrate into the objective. Take care not to push the cap when wiping it.

2 Adjusting the Correction Collar

1. Correction is possible according to the vessel bottom thickness. (See page 53,54 when the correction collar objective is used.)
When the thickness of the vessel bottom is known, match the scale reading of the correction collar to the thickness of the vessel in use.
2. How to find the optimum position based on image resolution and contrast:
 - If the thickness of the vessel bottom is unknown, the optimum position for the correction collar can be obtained by judging the image resolution and contrast. When a satisfactory image is not obtained after focusing, rotate the correction collar to the left and right, refocus each time and compare the images. Then rotate the collar in the direction yielding a better image, and rotate the correction collar to the left and right, refocus each time and compare the images. Repeat this cycle until the position with the optimum image is found.

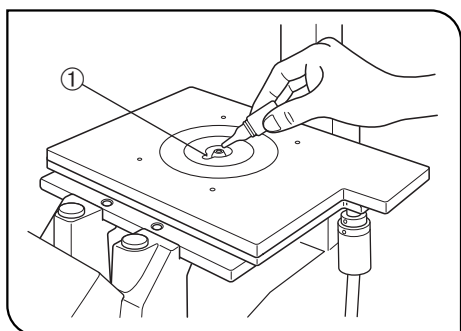


Fig. 45

3 Using Immersion Objectives

(Fig. 45)

★ **Always use immersion oil supplied by Olympus.**

⊙ If the objective in use can accommodate the oil-proof cap, be sure to mount the cap.

1. Using a low-power objective, bring the specimen into focus.
2. Rotate the revolving nosepiece to engage the oil immersion objective.
3. Remove the specimen and move the stage insert cut-out ① close to the objective front lens. Apply a drop of the provided immersion oil to the objective front lens. Place the specimen and rotate the fine adjustment knob to bring the specimen into focus.

★ **Use as little oil as possible. Also remove the oil immediately after use.**

★ **If the oil contains air bubbles, the image will be degraded. Make sure the oil is free of air bubbles.**

- a) To check for air bubbles, remove the eyepieces, completely open the field iris diaphragm and aperture iris diaphragm, and look at the objective exit pupil (looking like a bright circle) in the observation tube. Any air bubbles can be seen in this way.
 - b) To remove air bubbles, slightly rock the revolving nosepiece manually to engage and disengage the oil immersion objective once or twice.
4. After use, remove immersion oil from the objective front lens by wiping with gauze slightly moistened with absolute alcohol.

⊙ The same procedure is applicable when using a water-immersion objective.

▲ **Caution on using the immersion oil:**

If immersion oil comes into contact with your eye or skin, immediately take the following action.

For eye: Rinse with clean water (for more than 15 minutes).

For skin: Wash with soap and water.

If the appearance of the eye or skin changes or pain continues, immediately consult your doctor.

5 OTHER OBSERVATION METHODS

5-1 Phase Contrast Observation (Using the IX2-ILL100 Column)

⊙ A phase contrast objective, phase contrast optical element and the U-CT30 centering telescope (which is not required when the U-BI90CT binocular observation tube is used) are required for phase contrast observation.

⊙ If a DIC slider, analyzer and/or polarizer are engaged in the light path, disengage them.

1 Phase Contrast Optical Elements and Applicable Objectives

With the IX2-LWUCD or IX2-LWUCDA2 Condenser

UIS2 Series

Optical Element	Indication	Applicable Objectives
IX-PHL (small)	PhL	UPlanFLN4XPh
IX-PHC (small)	PhC	CPlanN10XPh, LCAchN20XPh, CPlanFLN10XPh
IX-PH1 (small)	Ph1	UPlanFLN10X2Ph, UPlanFLN20XPh, LUCPlanFLN20XPh
IX-PH2 (small)	Ph2	UPlanFLN40XPh, LUCPlanFLN40XPh, LUCPlanFLN60XPh, LCAchN40XPh, UPlanFLN60XOIPh
IX-PH3 (large)	Ph3	UPlanFLN100XO2Ph

UIS Series

Optical Element	Indication	Applicable Objectives
IX-PHL (small)	PhL	UPlanFI4XPh
IX-PHC (small)	PhC	CPlan10XPh, LCAch20XPh, CPlanFI10XPh
IX-PH1 (small)	Ph1	UPlanFI10XPh, UPlanFI20XPh, LCPlanFI20XPh, UPlanApo10XPh
IX-PH2 (small)	Ph2	UPlanFI40XPh, LCPlanFI40XPh, LCPlanFI60XPh, UPlanApo20XPh, LCAch40XPh, LUCPlanFI40XPh, SLCPlanFI40XPh
IX-PH3 (large)	Ph3	UPlanFI100XO3Ph, UPlanApo40XO13Ph, UPlanApo100XO13Ph, PlanApo60XO3Ph

⊙ Insert the optical element (small) in the 30 mm position and the optical element (large) in the 38 mm position.

For well observation, it is recommended to use the IX-PHC to obtain the phase contrast effect in a wide range of field of view.

With the IX-ULWCD Condenser

(Note) The IX-PHCU or IX-PH1U can be attached only in the Ph1 or PhC position.
Do not remove the built-in elements.

UIS2 Series

Optical Element	Indication	Applicable Objectives
PHL (Built in)	PhL	UPlanFLN4XPh
IX-PHCU	} Ph1	CPlanN10XPh, LCACHN20XPh, CPlanFLN10XPh
IX-PH1U		UPlanFLN10X2Ph, UPlanFLN20XPh, LUCPlanFLN20XPh
PH2 (Built in)	Ph2	UPlanFLN40XPh, LUCPlanFLN40XPh, LUCPlanFLN60XPh, LCACHN40XPh, UPlanFLN60XOIPh

UIS Series

Optical Element	Indication	Applicable Objectives
PHL (Built in)	PhL	UPlanFI4XPh
IX-PHCU	} Ph1	CPlan10XPh, LCACH20XPh, CPlanFI10XPh
IX-PH1U		UPlanFI10XPh, UPlanFI20XPh, LCPlanFI20XPh, UPlanApo10XPh
PH2 (Built in)	Ph2	UPlanFI40XPh, LCPlanFI40XPh, LCPlanFI60XPh, UPlanApo20XPh, LCACH40XPh, LUCPlanFI40XPh, SLCPanFI40XPh

With the U-UCD8 Universal Condenser or IX2-MLWCD Condenser

☉Refer to their separate instruction manuals.

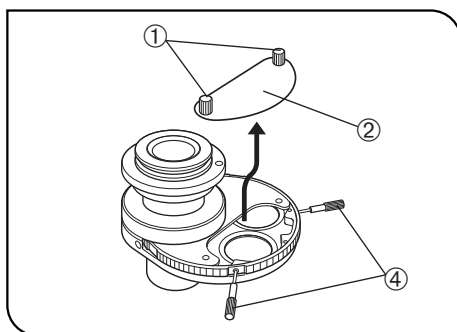


Fig. 46

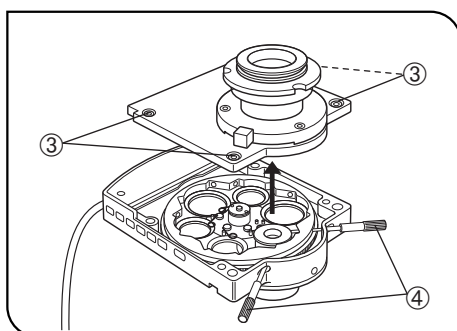


Fig. 47

2 Attaching the Phase Contrast Optical Elements

(Figs. 46 & 47)

☉For the U-UCD8, refer to the separate instruction manual.

☉Do not engage any optical element in the BF (brightfield) light path.

1. Place the condenser in the orientation as shown in Fig. 46 loosen the detaching screws ① and remove the cover ②.

With the IX2-LWUCDA2 motorized condenser, remove the four clamping screws ③ using the Allen screwdriver and remove the top cover. (Fig. 47)

2. Rotate the turret so that the number of the next optical element to be inserted in the uncovered position is visible. (When the IX2-LWUCDA2 is used, turret rotation is motorized.)

3. Loosen the optical element position centering screws using the optical element centering knobs ④. (Figs. 46 & 47)

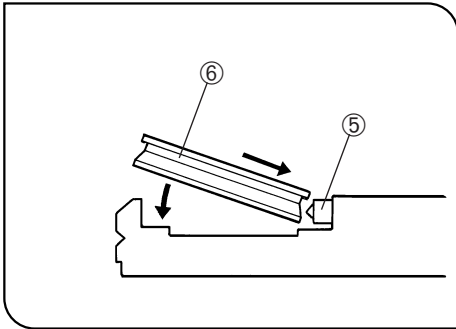


Fig. 48

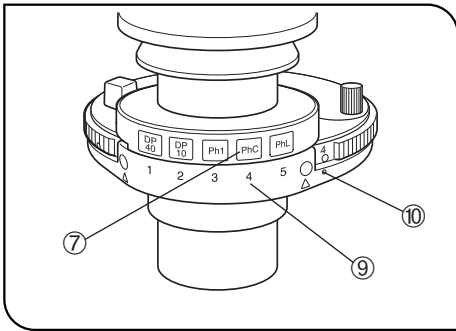


Fig. 49

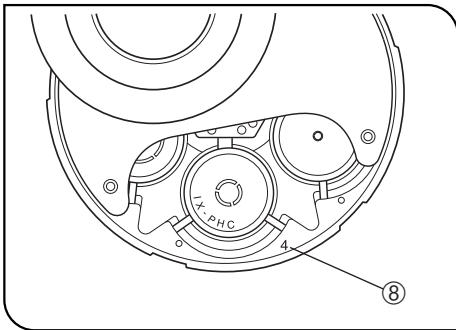


Fig. 50

4. Hold a phase contrast ring and, while pushing the spring ⑤ inside the turret with the edge of the phase contrast ring ⑥, insert the ring completely in the turret position until the ring frame contacts the bottom of the position.

(Fig. 48)

★ Be careful not to apply pressure to the ring slit inside the frame.

5. Rotate the optical element centering knobs clockwise to tighten the centering screws lightly.

★ If the optical element centering knobs are mounted, the turret is unable to be rotated.

★ Do not tighten the optical element centering knobs too much, for this may deform the frames of the optical elements.

6. Place the index ⑦ provided with each optical element in the index insertion hole having the same number ⑧ as the number of the position ⑧ in which the corresponding optical element is mounted. (Figs. 49 & 50)

Ⓞ Note that the IX-ULWCD does not have the index.

Ⓞ The optical element with the number indicated by marking • ⑩ is engaged in the light path. (Fig. 49)

Ⓞ To remove an optical element index, use the tip of a ball-point pen or mechanical pencil.

7. When all of the required optical elements have been mounted, attach the cover and tighten the detaching screws.

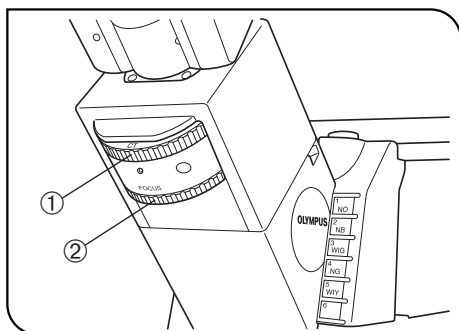


Fig. 51

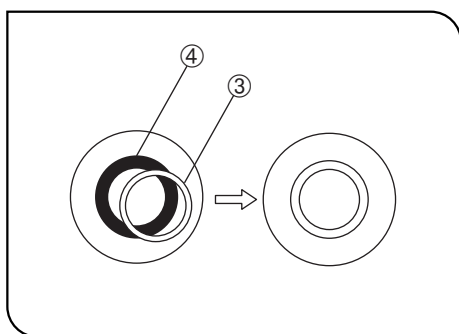


Fig. 52

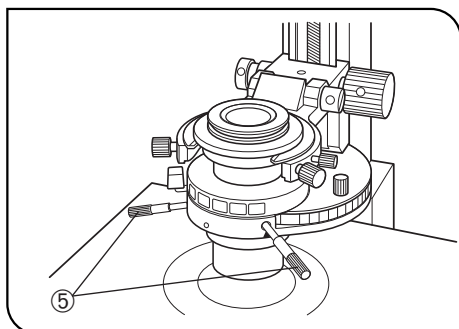


Fig. 53

3 Centering the Phase Contrast Ring Slit (Figs. 51 to 53)

⊙ Before proceeding to the following, open the aperture iris diaphragm because flare would be observed at the center when it is stopped down.

1. Engage the phase contrast objective in the light path and bring the specimen into focus.

2. When the U-BI90CT binocular observation tube is used, rotate the CT turret ① to position "CT". When the observation tube in use is other than the U-BI90CT, remove an eyepiece and attach the U-CT30 centering telescope in place. (Fig. 51)

3. Engage the ring slit of the condenser matching the phase contrast objective in the light path.

4. Rotate the focus ring ② (or the knurled section when the U-CT30 is used) to focus on the ring slit ③ and the phase plate ④ of the objective.

(Figs. 51 & 52)

5. Using the optical element centering knobs ⑤, turn the phase contrast ring slit centering screws (in positions marked ▲) so that the ring slit image overlaps with the phase plate of the objective.

⊙ A ghost of the ring slit image may be observed. In this case, overlap the brightest image with the phase plate.

⊙ If a thick specimen is moved, the ring slit image may be deviated from the phase plate and the contrast may be deteriorated. In this case, re-adjust the centering by repeating steps 1 to 5 above.

6. After completing centering, rotate the CT turret to return the turret to position "0". If the centering telescope is in use, replace it with the eyepiece.

⊙ If the vessel is not completely flat, it may become necessary to adjust the centering again to obtain the optimum contrast.

Repeat centering by beginning with the lowest-power objective and increasing the objective power in order.

7. Adjust the field iris diaphragm so that its image circumscribes the field of view and observe the phase contrast.

⊙ Engaging the green filter in the light path will improve the contrast.

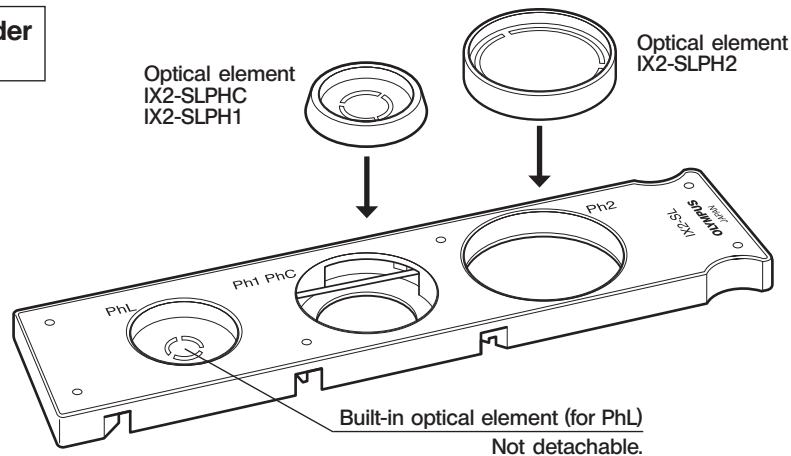
5-2 Phase Contrast Observation (Using the IX2-ILL30 Column)

Ⓞ A phase contrast slider, phase contrast objective, phase contrast optical element and the U-CT30 centering telescope (which is not required when the U-BI90CT binocular observation tube is used) are required for phase contrast observation.

Ⓞ If a DIC slider and/or analyzer are engaged in the light path, disengage them.

1 Phase Contrast Optical Elements and Applicable Objectives

Phase Contrast Slider IX2-SL



UIS2 Series

Optical Element	Applicable Objectives
PhL (Built in)	UPlanFLN4XPh
IX2-SLPH1	UPlanFLN10XPh, UPlanFLN20XPh, LUCPlanFLN20XPh
IX2-SLPHC	CPlanN10XPh, LCAch20NXPh, CPlanFLN10XPh
IX2-SLPH2	UPlanFLN40XPh, LUCPlanFLN40XPh, LUCPlanFLN60XPh, LCAch40XPh, UPlanFLN60XOIPh

UIS Series

Optical Element	Applicable Objectives
PhL (Built in)	UPlanFI4XPh
IX2-SLPH1	UPlanFI10XPh, UPlanFI20XPh, LCPlanFI20XPh, UPlanApo10XPh
IX2-SLPHC	CPlanFI10XPh, CPlan10XPh, LCAch20XPh
IX2-SLPH2	UPlanFI40XPh, LCPlanFI40XPh, LCPlanFI60XPh, UPlanApo20XPh, LCAch40XPh, LUCPlan40XPh, SLCPlanFI40XPh

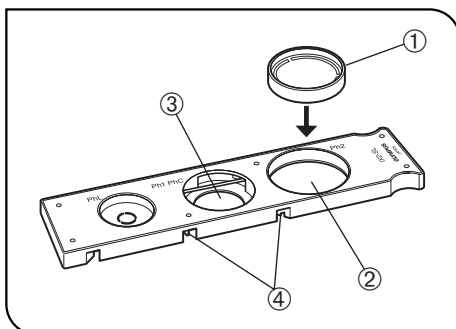


Fig. 54

2 Attaching the Optical Elements

(Fig. 54)

Ⓞ When using an objective that is not compatible with the built-in optical element, it is required to use a special optical element.

1. To insert the IX2-SLPH2 optical element, insert it in the idle position ② so that the surface with indication ① faces upwards.
2. When attaching the IX2-SLPHC or IX2-SLPH1 optical element in the center position ③, insert the provided centering knobs into the screw holes ④, loosen them, insert the optical element and tighten lightly the centering knobs again.

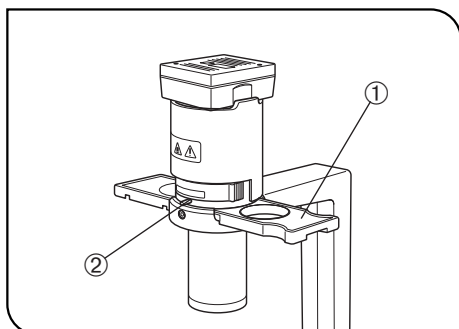


Fig. 55

3 Attaching the Phase Contrast Slider (Fig. 55)

1. Attach the phase contrast slider ① to the illumination column so that the slider's indication surface faces upwards and the finger hook position comes on the right.
2. Be sure to set the aperture iris diaphragm lever ② to the open position (O) for phase contrast observation.

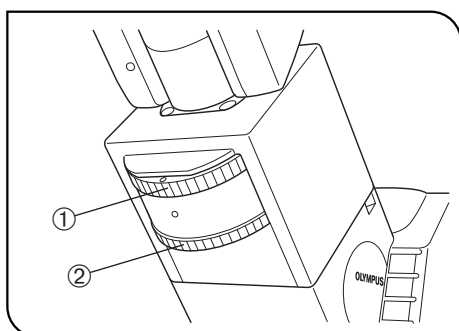


Fig. 56

4 Centering the Phase Contrast Ring Slit (Figs. 56 to 58)

- ⊙The IX2-SLPH2 optical element does not need centering.
 - ⊙Before proceeding to the following, open the aperture iris diaphragm because flare would be observed at the center when it is stopped down.
1. Engage the phase contrast objective in the light path and bring the specimen into focus.
 2. When the U-BI90CT binocular observation tube is used, rotate the CT turret ① to position "CT". When the observation tube in use is other than the U-BI90CT, remove an eyepiece and attach the U-CT30 centering telescope in place. (Fig. 56)
 3. Engage the optical element matching the phase contrast objective in the light path.
 4. Rotate the focus ring ② (or the knurled section when the U-CT30 is used) to focus on the ring slit ③ and the phase plate ④ of the objective. (Figs. 56 & 57)
 5. Using the optical element centering knobs ⑥, turn the two centering screws ⑤ of the phase contrast slider so that the ring slit image overlaps with the phase plate of the objective.
- ⊙A ghost of the ring slit image may be observed. In this case, overlap the brightest image with the phase plate.
 - ⊙If a thick specimen is moved, the ring slit image may be deviated from the phase plate and the contrast may be deteriorated. In this case, re-adjust the centering by repeating steps 1 to 5 above.
6. After completing centering, rotate the CT turret to return the turret to position "0". If the centering telescope is in use, replace it with the eyepiece.
- ⊙If the vessel is not completely flat, it may become necessary to adjust the centering again to obtain the optimum contrast.
 - Repeat centering by beginning with the lowest-power objective and increasing the objective power in order.
 - ⊙Engaging the green filter in the light path will improve the contrast.

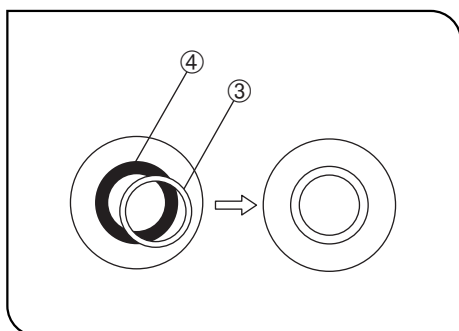


Fig. 57

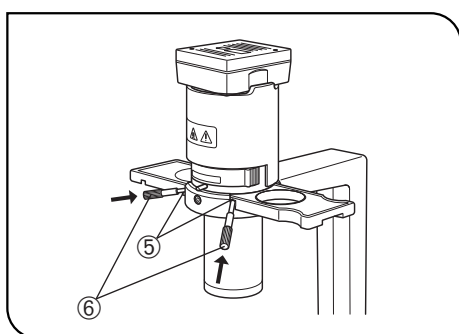


Fig. 58

5-3 Differential Interference Contrast Observation (Using the IX2-ILL100 Column)

- ⊙ If a plastic petri dish is used, the normal optical performance of DIC observation cannot be manifested due to the polarization characteristic of the petri dish. Use a glass bottom dish.
- ⊙ For simultaneous observation with reflected fluorescence observation, refer to the separate instruction manual.
- ⊙ DIC optical elements, a DIC slider, analyzer and polarizer are required for DIC observation.

1 DIC Optical Elements, Applicable Objectives and DIC Sliders

With the IX2-LWUCD or IX2-LWUCDA2 Condenser

(Note) The IX-ULWCD condenser cannot be used for DIC observation.
 ⊙ Insert a small optical element (one of the optical elements inside () in the following table) in the 30 mm position and other optical element (large) in the 38 mm position.

UIS2 Series

Applicable Objective	DIC Slider	U-DICT	U-DICTS Shift Type	U-DICTHC High Contrast Type	U-DICTHR High Resolution Type
UPlanSApo	10X2	(IX2-DIC10)	(IX2-DIC10)	—	—
	20X	(IX2-DIC20)	(IX2-DIC20)	(IX2-DIC20HC)	(IX2-DIC20HR)
	20XO				
	40X	IX2-DIC40	IX2-DIC40	IX2-DIC40HC	IX2-DIC40HR
	60XO	—	IX2-DIC60	—	—
	60XW	IX2-DIC60	IX2-DIC60	—	—
	100XO	IX2-DIC100	IX2-DIC100	—	—
PlanApoN	60XO	—	IX2-DIC60	—	—
UPlanFLN	10X2	(IX2-DIC10)	(IX2-DIC10)	—	—
	20X	(IX2-DIC20)	(IX2-DIC20)	(IX2-DIC20HC)	(IX2-DIC20HR)
	40X	IX2-DIC40	IX2-DIC40	IX2-DIC40HC	IX2-DIC40HR
	40XO	—	IX2-DIC40	IX2-DIC40HC	IX2-DIC40HR
	60X	IX2-DIC60	IX2-DIC60	—	—
	60XOI	IX2-DIC60	IX2-DIC60	—	—
	100XO2 100XOI2	IX2-DIC100	IX2-DIC100	—	—
LUCPlanFLN	20X	(IX2-DIC20)	(IX2-DIC20)	(IX2-DIC20HC)	(IX2-DIC20HR)
	40X	IX2-DIC40	IX2-DIC40	IX2-DIC40HC	IX2-DIC40HR
	60X	IX2-DIC60	IX2-DIC60	—	—

■ : To be used in the BFP1 position of the DIC slider.

UIS Series

* Usable regardless of the model number (3, 2, none).

*Applicable Objective	DIC Slider	U-DICT	U-DICTS Shift Type	U-DICTHC High Contrast Type	U-DICTHR High Resolution Type
CPlanFl	10X	(IX-DP10)	(IX-DP10)	—	—
LCPlanFl	20X	(IX-DP20)	(IX-DP20)	(IX-DP20HC)	(IX-DP20HR)
	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
	60X	IX-DP60	IX-DP60	—	—
LUCPlanFl	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
SLCPlanFl	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
UPlanFl	10X	(IX-DP10)	(IX-DP10)	—	—
	20X	—	—	—	—
	40X	—	—	—	—
	60XOI3	IX-DPO60 IX-DPO60S	IX-DPO60 IX-DPO60S	—	—
	100XO3	IX-DPO100	IX-DPO100	—	—
UPlanApo	10X 10XO3	(IX-DP10)	(IX-DP10)	—	—
	20X 20XO3	(IX-DPA20)	(IX-DPA20)	—	—
	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
	40XOI3	IX-DPAO40	IX-DPO40S	—	—
	60X	—	—	—	—
	100XOI3	IX-DPO100	IX-DPO100	—	—
PlanApo	60XO3	—	IX-DPO60S	—	—
UPlanApo	10XW3	(IX-DP10)	(IX-DP10)	—	—
	60XW3	IX-DPO60	IX-DPO60	—	—
	60XWPSF 60XW3/IR	IX-DPO60S	IX-DPO60S	—	—
UApo	20X3/340 20XW3/340	IX-DPUA20	IX-DPUA20	—	—
	40X3/340	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
	40XW3/340 40XOI3/340	IX-DPAO40	IX-DPO40S	—	—

 : To be used in the BFP1 position of the DIC slider.

With the U-UCD8, IX2-MLWCD or IX2-DICD Condenser

☉ Refer to their separate instruction manuals.

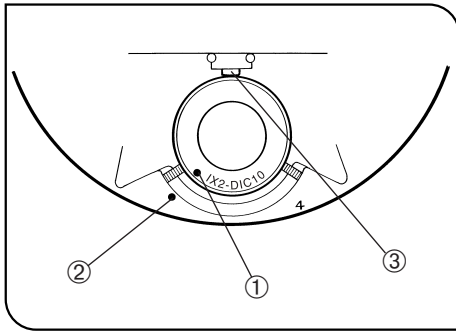


Fig. 59

2 Attaching the DIC Optical Elements (Fig. 59)

⊙ The attaching method is identical to that for the phase contrast optical elements (pages 33-34), except that the positioning pin and positioning groove should be aligned when attaching each DIC optical element.

- Align the positioning index ① on the DIC prism with the positioning index ② on a turret position and insert the DIC prism all the way into the turret position so that the DIC prism's frame hits the bottom of the position and the prism's positioning pin fits into the pin hole. When inserting, push the spring ③ inside the turret slightly sideward.

★ Be careful not to touch the DIC prism area inside the frame.

★ Do not tighten the optical element centering knobs too much, for this may deform the frame of the optical element.

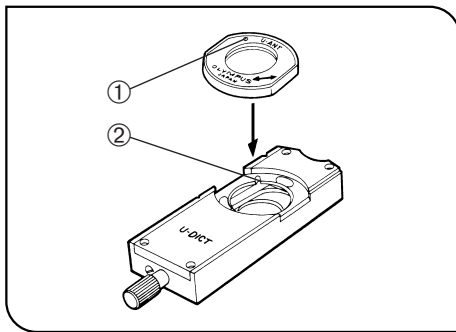


Fig. 60

3 Attaching the Analyzer and DIC Slider (Figs. 60 to 62)

With the U-DICT DIC Slider

1. Remove the dummy slider from the revolving nosepiece.
2. Align the index ① of the U-ANT analyzer and the positioning groove ② of the U-DICT DIC slider and drop the analyzer into the analyzer mount of the DIC slider. (Fig. 60)

3. Hold the U-DICT ③ so that the side with indication faces down, insert it into the revolving nosepiece, and tighten the clamping knob ④.

With the U-DICTS/U-DICTHC/U-DICTHR DIC Slider

⊙ The U-ANT analyzer cannot be mounted on these sliders. Use the IX2-AN analyzer with them.

In case of simultaneous observation with reflected fluorescence observation, the use of the IX2-AN can make the observation brighter because it does not cause drop in the excitation light from the principles.

⊙ It is also possible to use the IX2-MDICT DIC slider in place of the analyzer.

However, the U-MDICT3 that looks similar to the IX2-MDICT cannot be used because the analyzer's oscillation direction is different.

1. Hold the IX2-AN analyzer ⑤ so that the side with indication faces up, and insert the analyzer into the analyzer insertion slot ⑥ until it clicks.
2. Hold the DIC slider so that the side with indication faces down, and insert it in the same way as the U-DICT.

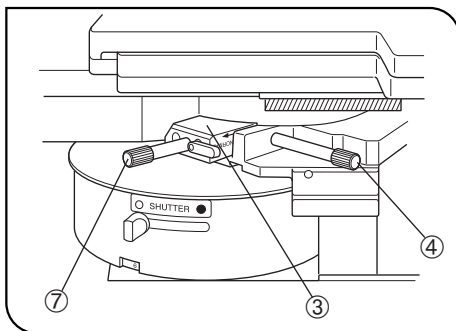


Fig. 61

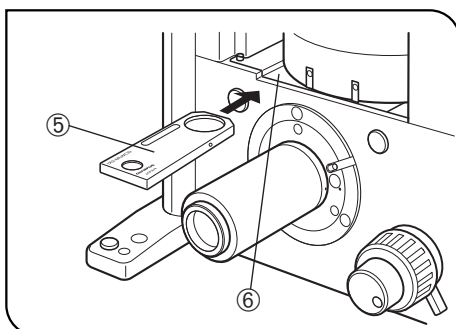


Fig. 62

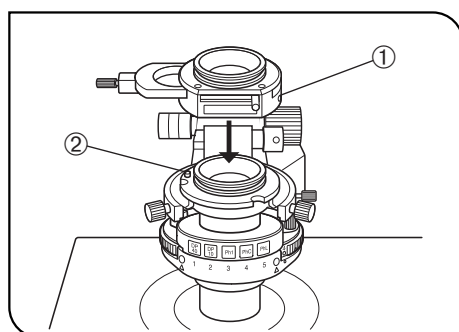


Fig. 63

4 Attaching the Polarizer (IX-LWPO) (Fig. 63)

(Fig. 63)

★The polarizer can be mounted only on the IX2-LWUCD or IX2-LWUCDA2.

◎This polarizer has been designed for being mounted on a universal condenser in case of DIC observation or simplified polarizer light observation.

1. Loosen the polarizer clamping screw ① using the Allen screwdriver.
2. Align the pin hole on the condenser with the positioning pin ② on the condenser, and insert the polarizer unit into the upper part of the condenser.
3. Tighten the polarizer clamping screw firmly.

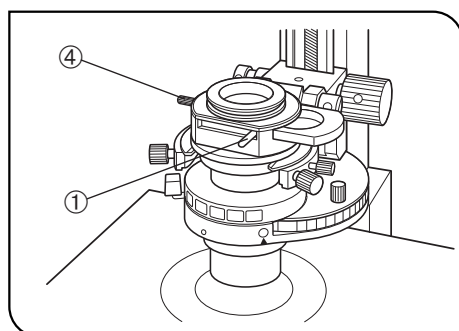


Fig. 64

5 Cross-Nicol Adjustment (Figs. 64 to 66)

(Figs. 64 to 66)

1. Rotate the condenser's turret for the BF (brightfield) light path (with no optical element engaged in the light path). (Fig. 64)
2. Slide the polarizer detaching lever ① on the IX-LWPO polarizer to engage the polarizer in the light path. (Fig. 64)
3. Engage the 10X objective in the light path, place an optimum specimen for brightfield observation on the stage, bring the specimen into approximate and remove the specimen out of the light path.
4. When the U-BI90CT binocular observation tube is used, rotate the CT turret ② to position "CT" to engage the CT lens in the light path. (Fig. 65) When the U-BI90/U-TBI90 binocular observation tube or U-TR30H-2 trinocular observation tube is used, remove an eyepiece and attach the U-CT30 centering telescope.
5. Rotate the focus ring ③ (or, with the centering telescope, rotate the knurled section) to bring the objective's exit pupil into focus. (Fig. 65)
6. Slide the prism movement knob ⑦ of the DIC slider in the clockwise direction around the axis until, the knob is stopped. A black interference stripe then a rainbow-colored interference stripe will be observed. Here, stop the knob at the position with which the black interference stripe can be seen. (Figs. 61 & 66)
7. While observing the objective's exit pupil, rotate the polarizer rotation/clamping knob ④ on the polarizer unit horizontally until the black interference stripe becomes darkest. This is the position for use of the polarizer. (Figs. 64 & 66)
8. After determining the position, clamp the polarizer rotation/clamping knob so that the polarizer will not rotate.

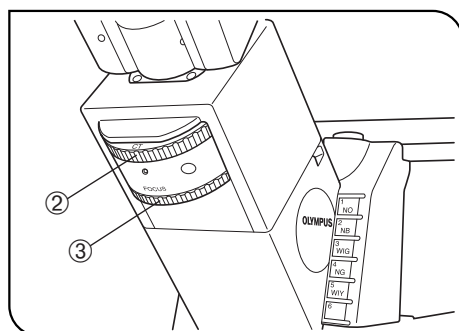


Fig. 65

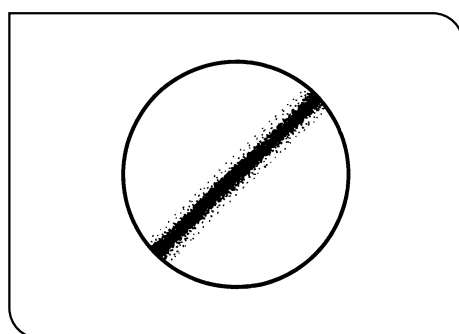


Fig. 66

6 Observation Method

1. Rotate the condenser turret to engage the suitable optical element for the objective in use in the light path.
2. Engage the objective to be used in the light path.
3. Place the specimen on the stage and bring the specimen into focus by moving the objective up or down.
4. Adjust the field iris diaphragm so that its image circumscribes the field of view.
5. Adjust the aperture iris diaphragm to enhance the contrast.
6. Move the prism movement knob of the DIC slider to select the interference color that can provide the optimum contrast in accordance with the specimen.

U-DICT: The background interference color is continuously variable from the gray sensitive color to purple sensitive color.

U-DICTS: }
U-DICTHC: } The back ground interference color is continuously variable
U-DICTHR: } from black to light gray.

- ©When in sensitive color observation using the U-UCD8, engage the U-UCDTP530 1- λ plate (sensitive color plate) in the light path.
- Setting the background color to dark enables an observation like darkfield observation.
 - Setting the background color to gray provides observation with high contrast and 3D feeling with the gray sensitive color with which the sensitivity is highest.
 - Setting the background color to gray allows very small change in phase to be observed as a change in color.
 - There is a directional characteristic with the detection sensitivity because of the configuration of the DIC prism. As a result, the contrast may sometimes be improved by rotating the specimen on the stage.
- ★ For simultaneous observation with reflected fluorescence observation, refer to the instruction manual entitled “Reflected Fluorescence System”.

5-4 Simplified Polarized Light Observation (Using the IX2-ILL 100 Column)

©An analyzer and polarizer are required for simplified polarized light observation. The applicable condenser is the IX2-LWUCD or IX2-LWUCDA2. When the IX-ULWCD is used, the simplified polarized light observation is not available.

1 Attaching the Analyzer and Polarizer

©Use the same procedure as that for attaching the analyzer and polarizer for DIC observation (see pages 40-41).

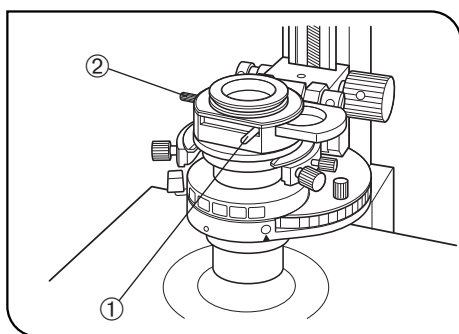


Fig. 67

2 Observation Method

(Fig. 67)

1. Rotate the turret to select the "BF" brightfield observation (with no optical element engaged in the light path).
2. Slide the polarizer detaching lever ① on the IX-LWPO polarizer unit to engage the polarizer in the light path. (Fig. 67)
3. Attach the objective to be used to the revolving nosepiece and rotate it to engage the objective in the light path.
4. Slide the polarizer rotation/clamping knob ② on the polarizer unit horizontally in the counterclockwise direction around the axis until the position with which the field of view is darkest. (Fig. 67)
5. Clamp the polarizer rotation/clamping knob so that the polarizer will not rotate.
6. Place a specimen on the stage and bring the specimen into focus. Now the specimen can be observed with simplified polarized light observation.
7. Adjust the field iris diaphragm so that its image circumscribes the field of view.
8. Adjust the aperture iris diaphragm to enhance the contrast.

5-5 Reflected Light Fluorescence Observation (See Separate Manual)

©Refer to the separate instruction manual.

6 PHOTOMICROGRAPHY AND TV OBSERVATION

6-1 Photomicrography

◎ Use the U-TR30H-2 trinocular observation tube or the side port for photomicrography.

Photomicrography can be performed using the PM-10, PM-20 or PM-30 photomicrographic system.

For how to use the photomicrographic system, refer to the instruction manual of the photomicrographic system in use.

The following descriptions are the procedures related to this microscope.

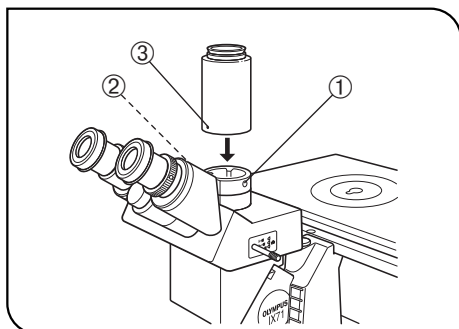


Fig. 68

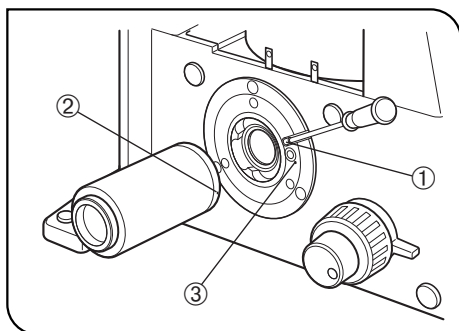


Fig. 69

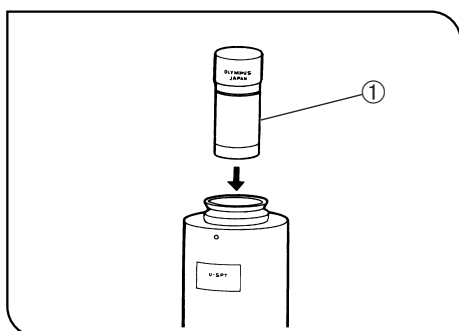


Fig. 70

1 Attaching the Straight Photo Tube (IX2-SPT/IX-SPT)

(Figs. 68 & 69)

When the U-TR30H-2 Trinocular Observation Tube is Used (In Combination with the IX-SPT) (Fig. 68)

★ The U-SPT straight photo tube cannot be mounted.

1. Using the Allen screwdriver, loosen the clamping screw ① on the photo port of the trinocular observation tube and remove the cap.
2. Align red index ② on the front of the photo port of the trinocular observation tube with red index ③ on the IX-SPT straight photo tube, then fit the circular dovetail of the straight photo tube into the photo port of the trinocular observation tube.
3. Tighten the clamping screw ① firmly.

When the Side Port is Used (In Combination with the IX2-SPT)(Fig. 69)

1. Loosen the side port clamping screw ① of the microscope frame using the Allen screwdriver, and remove the cap.
2. Align index ② on the IX2-SPT straight photo tube with the positioning index ③ on the side port and fit the straight photo tube.
3. Tighten the clamping screw ① firmly.

★ When the side port is not used, attach the cap for protecting it from dust.

2 Attaching the Photo Eyepiece (Fig. 70)

(Fig. 70)

Use only a PE photo eyepiece for photomicrography.

Insert the PE photo eyepiece ① into the photomicrographic system mount on the straight photo tube.

◎ The IX2-SPT or IX-SPT is equipped with a plunger for use in preventing movement of the PE photo eyepiece. Be sure to push in the plunger.

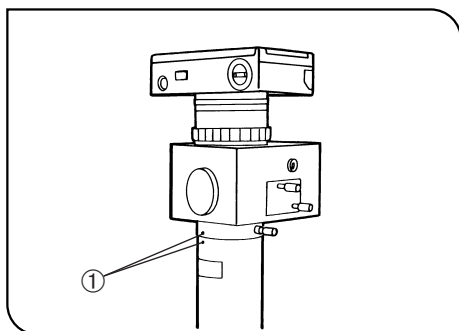


Fig. 71

3 Attaching the Photomicrographic System (Fig. 71)

- Attach the photomicrographic system directly onto the photomicrographic system mount on the straight photo tube.
- Align indices • ① on the straight photo tube and photomicrographic system and clamp.
- The photomicrographic system can also be mounted on the side port in the same way as above.

4 Switching to the Photomicrography Light Path

See the description in "Observation Tube" on page 21.

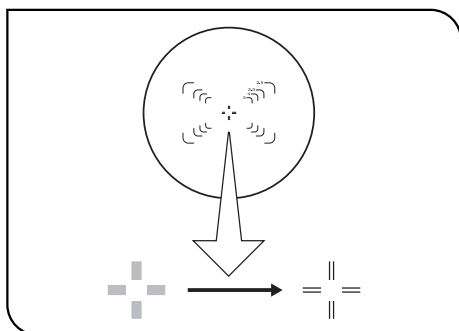


Fig. 72

5 Adjusting the Focus (Figs. 72 & 73)

☉ Focus adjustment for photomicrography is performed by attaching optimum finder eyepieces for each film size onto the binocular section of a trinocular observation tube or through the viewfinder of the photomicrographic system.

If the photomicrographic system is attached on the side port, focusing is impossible because the parfocality with the finder eyepieces is not adjusted. In this case, adjust focusing directly through the viewfinder of the photomicrographic system. If the viewfinder is hard to view, it is recommended to use the optional U-FTV V-shaped focusing telescope ①.

★ **Note that finder eyepieces cannot be attached to the U-BI90CT and U-BI90 binocular observation tubes.**

☉ The finder eyepieces show four photo masks. The numbers given to the masks correspond to the magnifications of the photo eyepiece. (Fig. 72)

1. Adjust the diopter of the eyepieces and focus on the photo masks in advance. Focus so that the double crosslines are sharply visible as two distinct lines. (Fig. 72)

2. Bring the specimen into focus using the coarse/fine adjustment knobs. As the reticles of photo masks and the film plane are optically in precise alignment, adjust focusing so that both the double crosslines and specimen are sharply visible.

☉ Because of the great depths of focus of 4X objectives, use an optional U-FT focusing telescope for accurate focusing using these low-power objectives.

☉ If the viewfinder of the photomicrographic system mounted on the side port is hard to view, it is recommended to use the optional U-FTV V-shaped focusing telescope ①. (Fig. 73)

Using the U-FTV

- Rotate the diopter correction ring of the viewfinder to the +2 index position.
- Slide the top portion of the U-FTV ① up or down until the photo masks are brought into focus. (Fig. 73)

« Photographic Magnification »

- 35 mm photo magnification = Objective magnification x PE photo eyepiece x Magnification change value
- Large format camera back magnification = 35 mm photo magnification x 3

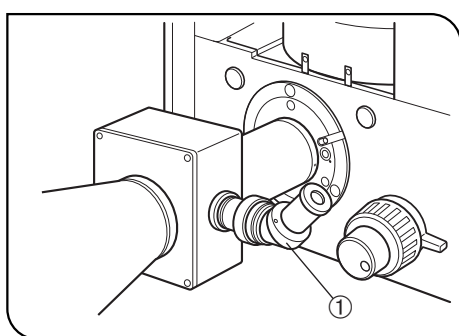


Fig. 73

6 Adjusting the Illumination

Correct illumination is more crucial for photomicrography than for observation because flawless pictures cannot be obtained unless the illuminating light is properly adjusted. To avoid uneven illumination, especially with high contrast films, adjust the illuminating light by carefully following the observation procedure.

7 Influence of Radial Heat of Illumination

Even at optimum illumination setting for observation and photomicrography, the illuminating light will generate considerable radiant heat, which may damage living specimens.

In case of DIC observation, special caution should be exercised in the following points.

- Reduce light intensity for observation as low as possible.
- Use additional heat barrier filters for observation.
- For time-lapse photography, synchronize the on/off of the light bulb with the exposure.

8 Setting the Filter and Lamp Intensity

Set the lamp intensity and filters in accordance with the film to be used.

Film	Filter	Light Intensity Control Button
Daylight color film	45LBD-IF	Camera symbol position
Tungsten type color film	45LBT	Camera symbol position
B&W film	43IF550-W45	Other position than camera symbol position

★ To match your preference in color rendition, make test exposures for determining the lamp intensity.

◎ When the IF550 filter is not used for color photography of phase contrast images, a neutral color is obtained by combining LBD filters and setting the lamp light intensity at around the lower limit of the camera symbol.

6-2 TV Observation

◎The following five methods are available for TV observation.

1. Attaching the video camera onto the side port
2. Attaching the video camera to the U-TR30H-2 trinocular observation tube H
3. Attaching the video camera to the U-MO monocular tube
4. Attaching the video camera onto the IX2-LBPC C-mount for lower back port (To be installed by the manufacturer)
5. Attaching the video camera onto the IX2-TVR bottom TV port unit (To be installed by the manufacturer)

1 Attaching the Camera on the Side Port

◎The side port provides primary observation images that are brighter and higher in resolution than those obtained with the trinocular observation tube H.

- Compatibility with various mounts from different manufacturers can be obtained by using the IX2-SPT straight photo tube + TV system for the BX series or by using a TV adapter for the BX series. However, this does not apply to the U-TVAC and U-DPT.
- For the installation of the IX2-SPT, see page 44.
- For the TV adapter systems for the BX series, refer to the instruction manual for the TV adapter to be used.

2 Attaching the Camera on the Trinocular Observation Tube H

(Fig. 74)

- Compatibility with various mounts from different manufacturers can be obtained by attaching the IX-SPT straight photo tube on the U-TR30H-2 trinocular observation tube H and adding a TV adapter system for the BX series.
- A C-mount or F-mount video camera can be attached by attaching the U-CMT C-mount adapter or U-FMT F-mount adapter onto the IX-TVAD TV adapter.

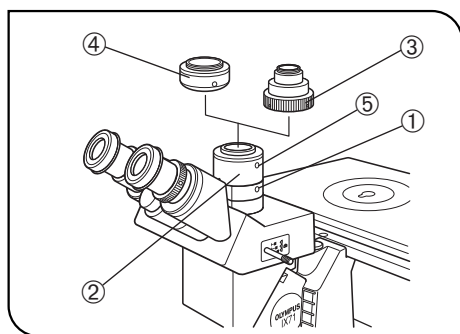


Fig. 74

Installation and Parfocal Adjustment of IX-TVAD TV Camera

1. Using the Allen screwdriver, loosen the clamping screw ① on the trinocular observation tube H.
2. Fit the IX-TVAD TV adapter ② into the straight photo tube and tighten the clamping screw ①. (Fig. 74)
3. Firmly screw the U-CMT C-mount adapter ③ or U-FMT F-mount adapter ④ into the IX-TVAD TV adapter ②. (Fig. 74)
4. Attach a compatible TV camera on the U-CMT or U-FMT.

« Parfocality Adjustment Between Observation Image and Monitor Image »

1. Adjust the eyepiece to bring the specimen into focus.
2. Lightly loosen the clamping screws ① and ⑤. (Fig. 74)
3. While observing the monitor image and holding the U-CMT ③ or U-FMT ④ stationary, rotate the IX-TVAD ②. Tighten the clamping screws ① and ⑤ when the monitor image is in focus. (Fig. 74)

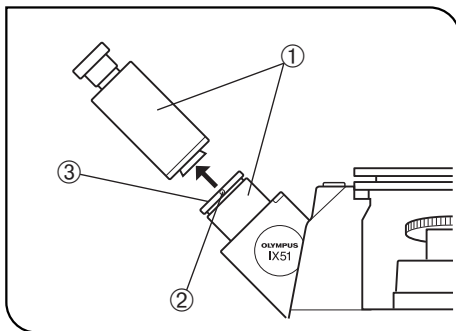


Fig. 75

3 Attaching the Camera on the Monocular Tube (Fig. 75)

1. Using the Allen screwdriver provided with the microscope frame, loosen the clamping screw ② on the intermediate section of the U-MO monocular tube ① and remove the top section.
 2. Attach the IX2-SPT straight photo tube + TV system for BX series or the TV adapter for BX series on the mount ③ and tighten the clamping screw ②.
- Ⓞ For how to use the TV system for BX series, refer to the separate instruction manual.

4 Attaching the Camera on the Lower Back Port

- Ⓞ A C-mount video camera can be used by ordering the manufacturer to install and adjust the IX2-LBPC C-mount for lower back port. Installing the TV camera in this way allows you to use the space in front of the microscope efficiently.
- The size of the video camera is limited to 57 mm in the up or bottom direction.
- Ⓞ Two kinds of back port prisms are available. Select either prism:
- IX2-PRLBP8: Back 80 % & Observation 20%, or Observation 100%
 - IX2-PRLBP1: Back 100% or Observation 100%

5 Attaching the Camera on the Bottom TV Port (IX2-TVR)

- Ⓞ A C-mount video camera (used together with the U-FMT) or F-mount video camera (used together with the U-FMT) can be used by ordering the manufacturer to install and adjust the IX2-TVR TV port unit for bottom panel.
- Even after modification, the binocular 100% observation or TV 100% observation are possible by setting the light path selector lever.

6 TV Observation

1. Adjusting the microscope frame
Turn on the light source and perform all the required adjustments for observation.
 2. Adjusting the video camera and monitor
Perform the required adjustments such as the white balance and color adjustments.
- ★ **The center of the field of view of eyepiece may not match the center of the monitor screen. This is due to the adjustment mechanism of the video camera's imaging plane and cannot be corrected.**
3. Perfocality adjustment between the observed image and monitor image
In accordance with the adjustment method of each TV adapter, adjust for simultaneous focusing of the observed image and monitor image.

« TV Observation Magnification »

TV observation magnification
= Objective magnification x TV adapter lens magnification x TV monitor size/Video camera's image pickup device size

7 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 your local Olympus representative for assistance.

Problem	Cause	Remedy	Page
1. Optical System			
a) The bulb does not light.	Power cord of the power supply unit is unplugged.	Plug the power cord into a power outlet.	64
	Main switch of the power supply unit is not ON.	Set the main switch to "I" (ON).	14
	Lamp ON/OFF switch on the IX71 frame or the TH4-HS hand switch is not ON.	Set the Lamp ON/OFF switch to ON.	14/15
	Bulb is burnt out.	Replace the bulb.	56/57
b) The bulb lights but the field of view is dark.	Lamp voltage is too low.	Increase the light intensity to an optimum voltage.	14
	Condenser is not well positioned.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.	27/28
	Condenser is not centered.	Center the condenser so that the field iris diaphragm image is centered in the field of view.	27/28
	Revolving nosepiece is not in a click position.	Make sure that the revolving nosepiece clicks properly into place.	-
	Light path selector knob is set for the side port light path.	Set the knob to the binocular eyepiece light path position or increase the light intensity.	15
	Too many filters are used.	Reduce the number of filters to the minimum required.	23/26
	Stage center plate is engaged in the light path.	Move the stage and place the specimen again.	19
	Field iris diaphragm is not opened wide enough.	Open the field iris diaphragm sufficiently.	24
	Light path selector knob of the trinocular tube is pulled out.	Set the knob at the middle or pushed-in position.	21
Turret of the U-BI9CT is set to position "S".	Rotate the turret to position "0".	21	
c) Field of view is obscured or not evenly illuminated.	Light path selector knob of the trinocular tube is set to an intermediate position.	Set the light path selector button to a click position according to the purpose.	21
	An objective that falls outside the condenser's illumination range is used.	Use a condenser that matches the objective.	22
	Field iris diaphragm is not properly centered.	Center the field iris diaphragm correctly.	27/28
	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm sufficiently.	24
	Light path selector knob is in an intermediate position.	Engage the knob all the way in or at a click stop according to the observation method.	21

Problem	Cause	Remedy	Page
c) (Contd.)	Magnification selector knob is in an intermediate position.	Engage the knob all the way in or at a click stop according to the observation method.	15
	Revolving nosepiece or magnification selector knob is in an intermediate position.	Engage the revolving nosepiece or knob at a click stop.	15
	Condenser turret is set in an intermediate position.	Engage the condenser turret at a click stop.	-
	A filter is stopped in an intermediate position.	Set the filter at the appropriate position.	23/26
	The frost filter is not engaged.	Engage the frost filter.	23/26
d) Dirt or dust is visible in the field of view.	Dirt/dust on the specimen.	Clean thoroughly.	4
	Dirt/dust on the eyepieces.		
	Dirt/dust on a mirror unit.		
	Dirt/dust on the optical element.		
	Condenser is not correctly positioned and the frosted filter or filter is focused.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.	27/28
e) Image glares.	Condenser is raised too high.	Lower to the proper position.	27/28
	Aperture iris diaphragm is stopped down too far.	Open the aperture iris diaphragm.	25/29
f) Visibility of observed image is poor. • Image is not sharp. • Contrast is poor. • Details are poorly visible.	Objective in use is not designed for UIS2/UIS series.	Replace with an objective designed for UIS2/UIS optics.	53,54
	Correction collar on the objective equipped with correction collar is not adjusted.	While focusing, rotate the correction collar to find the best position.	31
	Front lens of the objective is dirty.	Clean the objective.	4
	Immersion oil is not being used with an oil immersion objective.	Use immersion oil.	31
	Immersion oil contains bubbles.	Remove bubbles.	31
	Inappropriate slide or cover glass thickness.	Replace with glass of appropriate thickness.	-
	Dirt/dust on glass components (condenser, objective, eyepieces, culture vessels, etc.)	Clean thoroughly.	4
	Ring slit and phase plate are not centered.	Center them correctly.	35/37
Poor contrast during DIC observation.	Replace the plastic culture vessel with a glass vessel.	38/39	

Problem	Cause	Remedy	Page
g) Image is blurred.	Objective is engaged incorrectly in the light path.	Make sure that revolving nosepiece clicks into place correctly.	-
	Specimen is tilted with respect to the stage.	Place the specimen correctly on the stage and secure it with the specimen holder.	18
h) Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.	20
	Incorrect diopter adjustment.	Adjust the diopter.	20
	You are not accustomed to parallel optical axis.	When looking into eyepieces, do not stare at image from the beginning but see the overall field of view. It is sometimes recommended to turn your eyes away from the eyepieces, look far off and look into the eyepieces again.	-
i) The coarse/fine adjustment knobs will not rotate easily or at all.	The transport lock is not released.	Release the transport lock.	1
	The rotation tension adjustment ring is too tight.	Loosen the ring optimally.	16
	The pre-focusing lever is locked.	Unlock the pre-focusing lever.	17
j) The revolving nosepiece lowers by its own weight or defocusing occurs due to slipping of fine adjustment.	The rotation tension adjustment ring is too loose.	Tighten the ring optimally.	16
k) The coarse focus adjustment cannot move the objective above a certain level.	The pre-focusing lever limits the lower limit.	Unlock the pre-focusing lever.	17

8 SPECIFICATIONS

Module		Specification
Microscope Frames	IX71S8F-3 IX71S1F-3 IX51S8F-3 IX51S1F-3 *The IX51 series does not use an intermediate magnification changer.	Light path selection (with shockless mechanism) — S8F-3: Binocular 100% or Binocular 20%/Side port 80% — S1F-3: Binocular 100%/Side port 100% Intermediate magnification changer: 1X ↔ 1.6X* Side port magnification: 1X (perfect aberration correction) Focusing up/down stroke: 9 mm (7 mm above focusing position plus 2 mm below focusing position) 6-position revolving nosepiece (DIC slider attachable)
	IX2-ILL100	Column for installing the lamp housing for 100 W halogen bulb, precentered. With 30° tilting mechanism. Variety of condenser can be attached.
Illumination Columns	IX2-ILL30	Column for installing the U-LS30-3 lamp socket for 6 V, 30 W halogen bulb. Precentered. Provided with a condenser (NA 0.3, WD 72 mm)
	U-BI90CT	Binocular tube with 45° tilting angle. Built-in CT, diopter adjustment on one eyepiece possible. Eye point switchable in 2 steps of 400 and 430 mm.
Observation Tube	U-BI90	Binocular tube with 45° tilting angle. Diopter adjustment on one eyepiece possible. Eye point switchable in 2 steps of 400 and 430 mm.
	U-TBI90	Binocular tube with 35° to 85° tilting angle. Diopter adjustment on one eyepiece possible. Eye point 406 to 471 mm.
	U-TR30H-2	Trinocular tube with 30° tilting angle. Can be installed by means of the IX-ATU intermediate tube. Eye point 434 mm.
	U-MO	Monocular tube with 45° tilting angle. 10X eyepiece fixed.
	IX2-LWUCDA2, IX2-LWUCD	NA 0.55, WD 27 mm. Motorized turret with 6 positions or manual turret with 5 positions.
Condensers	IX-ULWCD	NA 0.3, WD 73 mm. Manual turret with 4 positions.
	U-UCD8	Dry: NA 0.9, WD 1.5 mm. Oil immersed: NA 1.4, WD 0.6 mm.
	IX2-SFR	Coaxial flexible knobs on the bottom right position. Movement range 50 mm (X) x 50 mm (Y). Center plate diameter 110 mm.
Stages	IX-SVL2	Coaxial knobs on the bottom left position. Movement range 50 mm (X) x 43 mm (Y). Center plate diameter 110 mm.
	IX2-SP, IX-MVR	Size 232 mm (X) x 240 mm (Y). Coaxial flexible knobs on the bottom side. Movement range 130 mm (X) x 85 mm (Y). Center plate diameter 110 mm.
	IX2-KSP, CK40-MVR	Size 160 mm (X) x 240 mm (Y). Coaxial knobs on the bottom. Movement range 120 mm (X) x 78 mm (Y). Center plate diameter 110 mm.
	WHN10X	Field number 22.
Eyepieces	WHN10X-H	Field number 22, with diopter adjustment helicoid.
	35WHN10X	Field number 22, with 35 mm film photo mask and diopter adjustment helicoid.

■ List of Objectives (UIS2/UIS Series)

– The UIS series objectives that are not listed below can also be used in combination with this microscope. –

Objectives		Specifications			
UIS2 Series	Plan achromat for phase contrast observation	CPlanN10XPh CPlanFLN10XPh LCAchN20XPh LCAchN40XPh	NA 0.25, NA 0.3, NA 0.4, NA 0.55,	WD 10.0 mm, WD 9.5 mm, WD 3.2 mm, WD 2.2 mm,	ring slit IX-PHC or PHCU ring slit IX-PHC or PHCU ring slit IX-PHC or PHCU ring slit IX-PH2
	Semi-apochromat for phase contrast observation	UPlanFLN4XPh UPlanFLN10XPh UPlanFLN20XPh UPlanFLN40XPh UPlanFLN60XOIPh UPlanFLN100XOPh LUCPlanFLN20XPh LUCPlanFLN40XPh LUCPlanFLN60XPh	NA 0.13, NA 0.3, NA 0.5, NA 0.75, NA 1.25-0.65, NA 1.3, NA 0.45, NA 0.6, NA 0.7,	WD 170 mm, WD 10.0 mm, WD 2.1 mm, WD 0.51 mm, WD 0.2 mm, WD 0.2 mm, WD 6.6-78 mm, WD 3.0-4.2 mm, WD 1.5-2.2 mm,	ring slit IX-PHL ring slit IX-Ph1 or PH1U ring slit IX-Ph1 or PH1U ring slit IX-PH2 ring slit IX-PH2 ring slit IX-PH3 ring slit IX-PH1 or PH1U, with correction collar ring slit IX-PH2, with correction collar ring slit IX-PH2, with correction collar
	Plan semi-apochromat for DIC and brightfield observation	UPlanFLN4X UPlanFLN10X2 UPlanFLN20X UPlanFLN40X UPlanFLN40XO UPlanFLN60X UPlanFLN60XOI UPlanFLN100XO2 UPlanFLN100XOI2	NA 0.13, NA 0.3, NA 0.5, NA 0.75, NA 1.3, NA 0.9, NA 1.25-0.65, NA 1.3, NA 1.3-0.6,	WD 170 mm WD 10.0 mm WD 2.1 mm WD 0.51 mm WD 0.2 mm, with correction collar WD 0.2 mm WD 0.12 mm, with iris diaphragm WD 0.2 mm WD 0.2 mm, with iris diaphragm	
	Plan semi-apochromat for DIC and fluorescence observation	LUCPlanFLN20X LUCPlanFLN40X LUCPlanFLN60X	NA 0.45, NA 0.6, NA 0.7,	WD 6.6-78 mm, with correction collar WD 2.7-4.0 mm, with correction collar WD 1.5-2.2 mm, with correction collar	
	Apochromat for reflected fluorescence observation	UPlanSApo4X UPlanSApo10X2 UPlanSApo20X UPlanSApo20XO UPlanSApo40X2 UPlanSApo60XO UPlanSApo100XO	NA 0.16, NA 0.4, NA 0.75, NA 0.85, NA 0.95, NA 1.35, NA 1.4,	WD 13.0 mm WD 3.1 mm WD 0.6 mm WD 0.17 mm WD 0.18 mm WD 0.15 mm, with correction collar WD 0.13 mm	
	For high-resolution DIC (and brightfield) observation	UPlanFLN60XOI UPlanFLN100XO2 UPlanFLN100XOI2 PlanApoN60XO PlanApoN60XO ^{TIRFM} UPlanSApo60XO UPlanSApo100XO	NA 1.25-0.65, NA 1.3, NA 1.3-0.6, NA 1.42, NA 1.45, NA 1.35, NA 1.4,	WD 0.12 mm, with iris diaphragm WD 0.2 mm WD 0.2 mm, with iris diaphragm WD 0.15 mm WD 0.15 mm WD 0.15 mm WD 0.13 mm	
	Water-immersion objectives	UPlanSApo60XW	NA 1.2,	WD 0.28 mm, with correction collar	

Objectives			Specifications	
UIS Series	For phase contrast observation	SLCPlanFI40XPh	NA 0.55,	WD 7.7 mm, ring slit IX-PH2, with correction collar
	For DIC and brightfield observation	SLCPlanFI40X	NA 0.55,	WD 7.7 mm, with correction collar
	For reflected fluorescence ^{Fura 2} observation	UApo20X3/340	NA 0.75,	WD 0.55 mm, with oil-proof cap
		UApo40X3/340	NA 0.9,	WD 0.2 mm, with oil-proof cap
UApo40XOI3/340		NA 1.35,	WD 0.1 mm, with iris diaphragm and oil-proof cap	
Water-immersion objectives	UApo20XW3/340	NA 0.7,	WD 0.4 mm, with oil-proof cap	
	UApo40XW3/340	NA 1.15,	WD 0.26 mm, with correction collar and oil-proof cap	
	UPlanApo10XW3	NA 0.4,	WD 0.5 mm, with oil-proof cap	

Module	Specification
Operating environment	<ul style="list-style-type: none"> • Indoor use • Altitude: Max. 2000 m • Ambient temperature: 5° to 40°C (41° to 104°F) • Maximum relative humidity: 80% for temperatures up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F), to 50% relative humidity at 40°C (104°F) • Supply voltage fluctuations: ±10% • Pollution degree: 2 (in accordance with IEC60664) • Installation (overvoltage) category: II (in accordance with IEC60664)

9 ASSEMBLY



9-1 Assembly Diagram

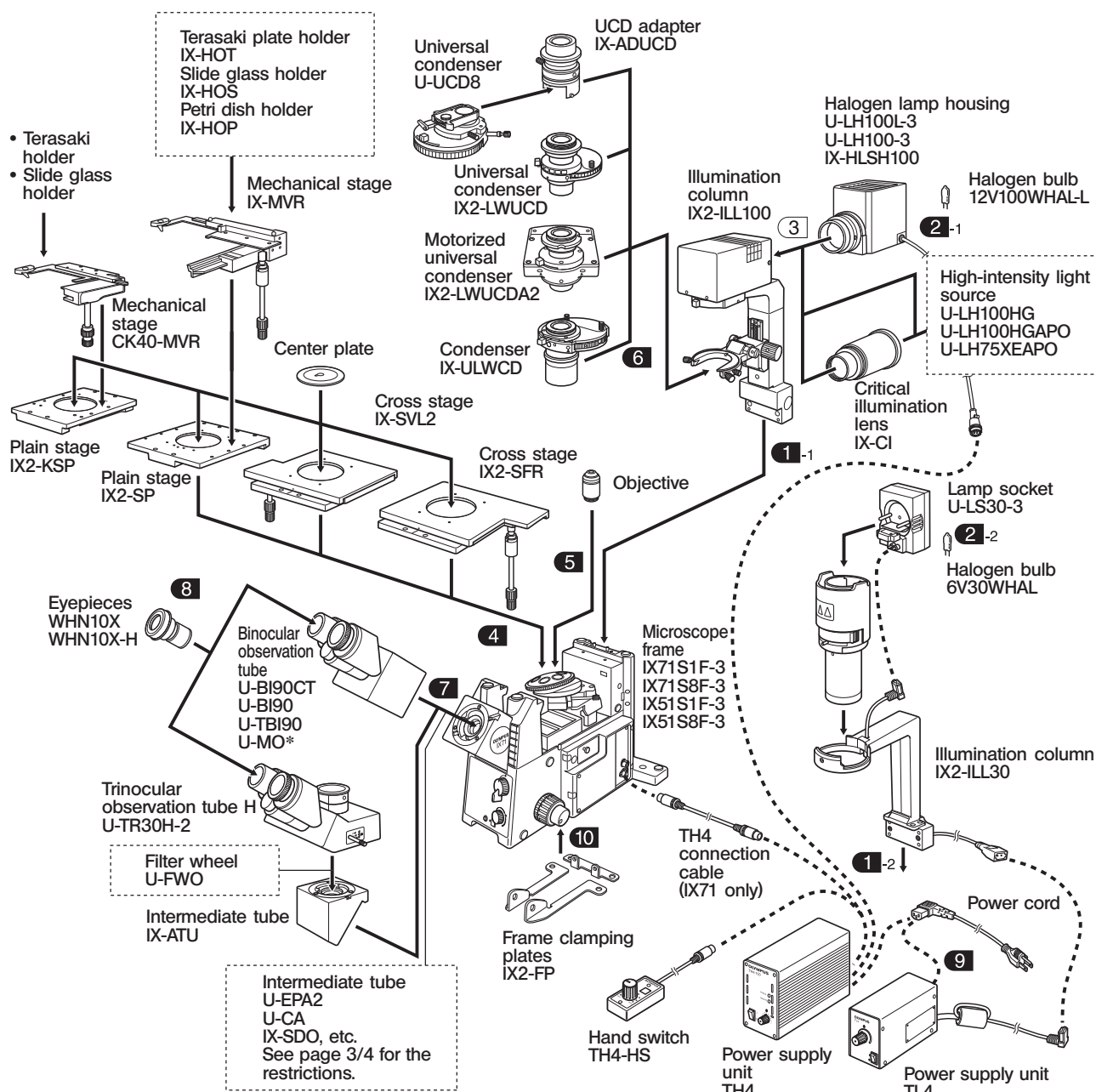
The diagram below shows the sequence of assembly of the modules. The numbers indicate the order of assembly.

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

★When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces. Also be sure to release the transport lock of the revolving nosepiece and light path selector by removing the screws before use (see page 1).

Assembly steps enclosed in **■** will be detailed on the subsequent pages.

◎All assembly operations are possible by using the Allen screwdriver (with across flats of 3 mm, ) and Allen wrench (width across flats of 4 mm, ) provided with the microscope. For assembly of the reflected fluorescence system modules and other modules that are not described in this manual, refer to their separate instruction manuals.



* 10X eyepiece fixed type monocular observation tube.

9-2 Detailed Assembly Procedures

System Using the IX2-ILL100 Illumination Column

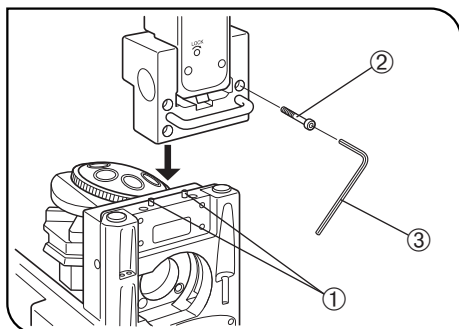


Fig. 76

1 Mounting the Illumination Column (Fig. 76)

1. Aligning the two guide holes on the illumination column with the two protruding positioning pins ① on the microscope frame, gently fit the column onto the microscope frame from the above.
2. While holding the illumination column with one hand, insert the four provided Allen screws ② into the screw holes. Then tighten the screws with the provided Allen wrench ③.

★ Do not tighten the screws with the illumination column inclined. Doing so may damage the screw sections.

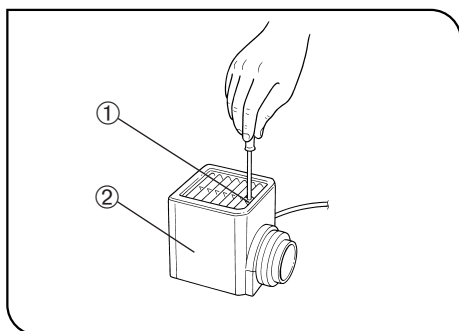


Fig. 77

2 Attaching the Halogen Bulb (Figs. 77 to 79)

◎ The applicable lamp bulb model is the 12V100WHAL-L (PHILIPS 7724) halogen bulb.

1. Fully loosen the clamping screw ① at the top of the lamp housing using the Allen screwdriver provided with the microscope frame.
2. Lift up the lamp housing ② to remove it.
3. Tilt the bulb socket ③ by 90° in the direction of the arrow.
4. While pushing down the bulb clamping lever ④ down, hold the halogen bulb ⑤ with gloves or a piece of gauze, insert the bulb pins ⑥ straight and fully into the pin sections ⑦ on the lamp socket.

Then return the lamp clamping lever gently back to the original position to clamp the bulb.

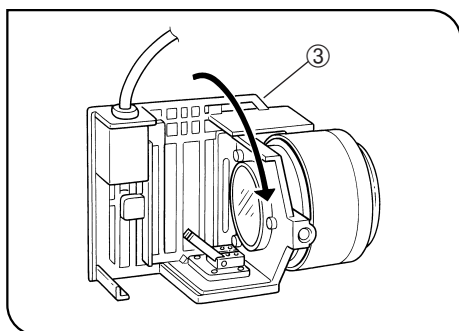
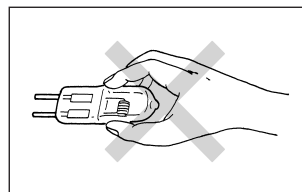


Fig. 78



▲ To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.

5. Fit the lamp housing from up and tighten the clamping screw ① by applying downward pressure. (Fig. 77)

▲ Caution for Bulb Replacement During or Right After Use

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

Set the main switch to "O" (OFF), disconnect the power cord from the wall outlet, then allow the old bulb and lamp housing to cool before replacing the bulb with a new of the designated type.

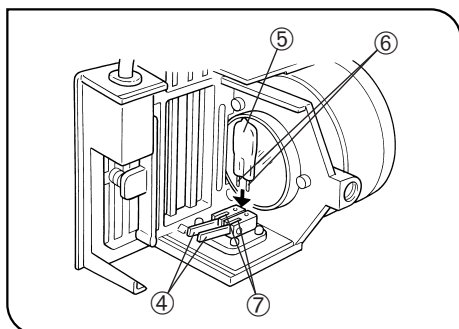


Fig. 79

System Using the IX2-ILL30 Illumination Column

1 Mounting the Illumination Column (Fig. 76 on the previous page)

◎The IX2-ILL30 illumination column can be attached in the same manner as the IX2-ILL100.

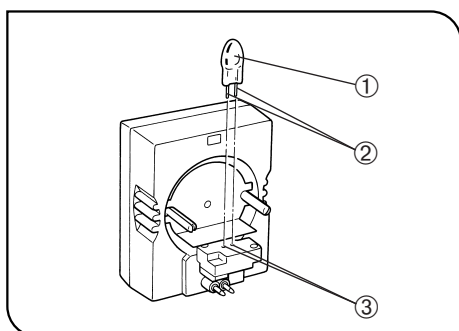


Fig. 80

2 Attaching the Halogen Bulb (Figs. 80 to 82)

◎The applicable lamp bulb model is the 6V30W/3841 (PHILIPS 5761) high-intensity halogen bulb.

▲Do not touch the halogen bulb directly. If it is stained with fingerprints, etc., wipe off completely with a soft cloth in order to prevent shortening of the bulb life or cracking of the bulb.

1. Hold the halogen bulb ① with gloves or a piece of gauze, insert the bulb pins ② straight and fully into the pin holes ③ on the lamp socket.

★Push in gently. If an excessive force is applied or the bulb is twisted, the bulb may be damaged.

▲Caution for Bulb Replacement During or Right After Use

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

Set the main switch to "O" (OFF), disconnect the power cord from the wall outlet, then allow the old bulb and lamp socket to cool before replacing the bulb with a new of the designated type.

Attaching the Condenser (Fig. 81)

1. Align the index groove ② on the condenser ① with the dent section ③ of the illumination column and fit the condenser ①.

2. Rotate the condenser ① by 90° clockwise so that characters "AS" ④ on the filter holder surface faces the front, then attach and tighten firmly the provided clamping screw ⑤ using the Allen wrench provided with the microscope frame.

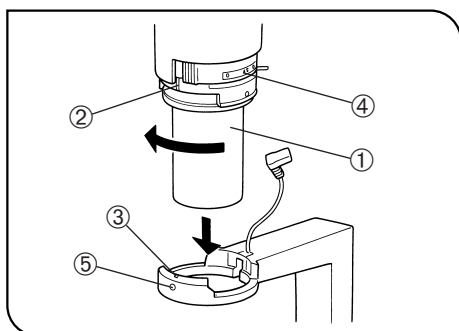


Fig. 81

Attaching the Lamp Socket (Fig. 82)

• Insert the plug ① into the socket ②, then push the guide pins ③ gently into the guide holes ④ on the condenser.

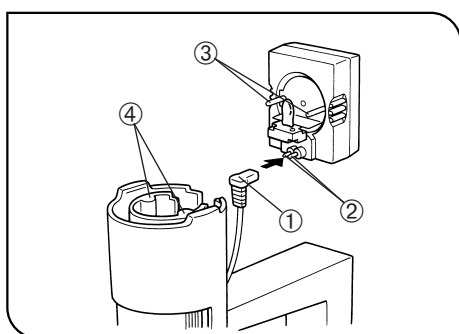


Fig. 82

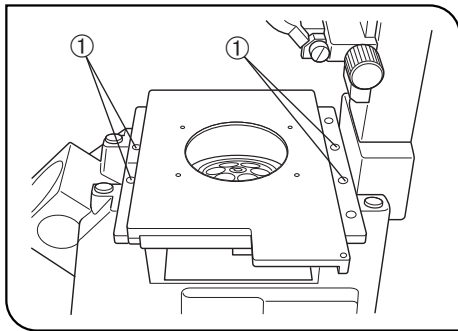


Fig. 83

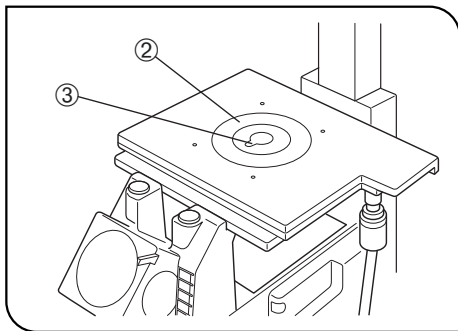


Fig. 84

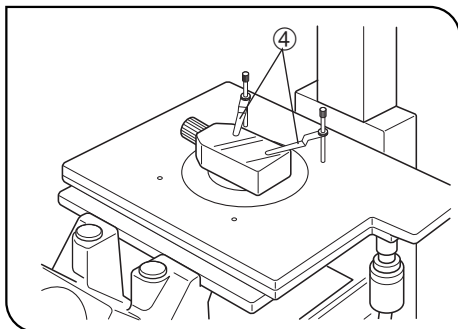


Fig. 85

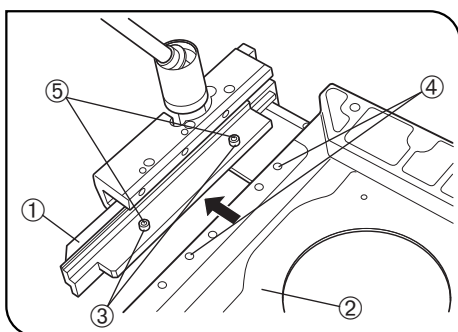


Fig. 86

4 Attaching the Stage

(Figs. 83 to 85)

Ⓞ The following stage mounting procedures are commonly applicable to the IX2-SFR, IX-SVL2, IX2-SP and IX2-KSP.

Ⓞ When mounting the IX-MVR or CK40-MVR mechanical stage, first attach it the specified plain stage in advance (see the description on the bottom of this page).

1. Gently place the stage on the microscope frame by aligning the stage mounting holes with the threaded holes on the frame.
2. Insert the four provided Allen screws into the mounting holes ①. Tighten the screws using the provided Allen wrench. (Fig. 83)
3. Fit the stage center plate ② into the stage. (Fig. 84)

★ **The stage center plate is designed very thin so that the objective will not hit it when the revolving nosepiece is rotated. Do not subject the stage center plate to impact or excessive force, as this may deform it.**

Ⓞ To facilitate confirmation of the objective front lens position and application of oil for oil immersion objectives, rotate the stage center plate so that the keyhole ③ will be facing the front. (Fig. 84)

4. Screw the IX-SCL stage clips ④ into the threaded holes provided on the stage top surface. (Fig. 85)

Ⓞ The IX2-SFR stage can be mounted by reversing the front and rear to implement a stage with knobs on the right position. In this case, however, the left fine adjustment knob comes in the way of the stage operation so it may be necessary to remove the left fine adjustment knob by removing the clamping screw using the Allen screwdriver. The positioning bracket provided with the stage should not be attached in this case.

Mechanical Stage (IX-MVR or CK40-MVR)

(Figs. 86 to 88)

« Attaching Procedure »

1. Invert the mechanical stage upside down ① Also invert the IX2-SP or IX2-KSP plain stage ② and place it on top of the inverted mechanical stage. (Fig. 86)
2. Align the two mounting holes ③ on the mechanical stage with the mounting holes ④ on the plain stage. Insert the two clamping screws ⑤ and tighten using the Allen screwdriver.

★ **The mechanical stage may also be attached to the left side of the plain stage. However, this will interfere with the operation of the stage travel knobs, focusing knobs and the revolving nosepiece. To avoid this, always attach the mechanical stage on the right side of the plain stage.**

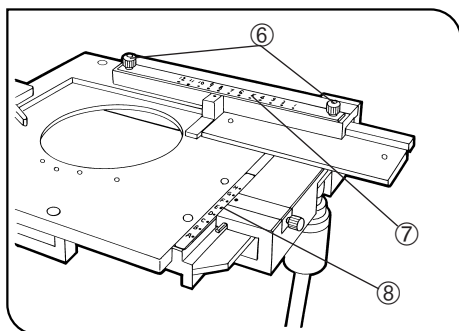


Fig. 87

« Attaching the Scales »

Ⓞ The IX-MVR mechanical stage is provided with the scales for use with a 96-well microtiter plate.

1. Loosen the two clamping knobs ⑥ at the top of the stage's X-axis guide. Positioning the scale numerals correctly, plate the X-axis scale ⑦ on the guide. Then tighten the clamping knobs. (Fig. 87)
2. Positioning the scale numerals correctly, place the Y-axis scale ⑧ on the top of the stage's Y-axis guide. The scale will be held in place magnetically. (Fig. 87)

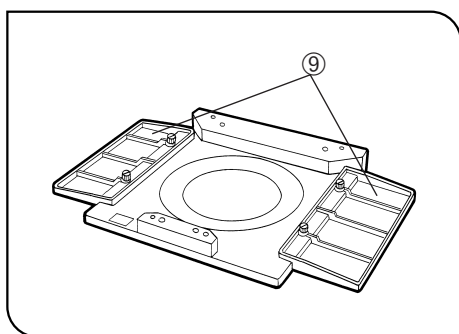


Fig. 88

« Attaching the CK2-SS Substages »

- These plates can be attached in the same way as outlined in "Mechanical Stage" above.

Ⓞ When the mechanical stage is not used, substages ⑨ can be attached at both sides of the plain stage. (Fig. 88)

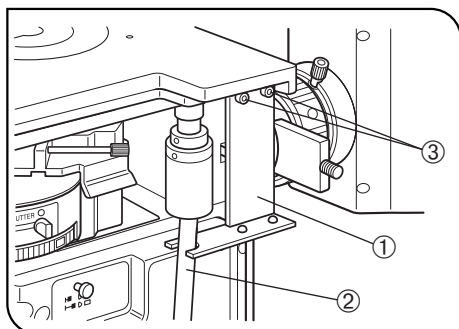


Fig. 89

« Attaching the Positioning Bracket »

Ⓞ A flexible stalk for the coaxial X-axis and Y-axis knobs is employed with the IX2-SFR stage and IX-MVR mechanical stage. These stages are provided with a positioning bracket that allows the tilt of the stalk to be adjusted to suit the observer's preference.

Stage (IX2-SFR)

(Figs. 89 & 90)

1. Insert the stalk ② of the flexible X-axis/Y-axis knobs into the U-shaped notch on the positioning bracket ①. (Fig. 89)
2. Using the Allen screwdriver, tighten the clamping screw ③ of the bracket lightly to the stage. (Fig. 89)
3. Align the stage's center alignment index line ④ with the edge ⑤ of the upper stage. (Fig. 90)
4. Slide the positioning bracket to and fro in order to determine the most convenient stalk angle.
5. Tighten the bracket's clamping screw firmly.

Mechanical Stage (IX-MVR)

- This is attached in the same manner as outlined in "Stage (IX2-SFR)" above. The mechanical stage, however, is not provided with a stage center alignment index line. Instead, rotate the Y-axis knob to the D or E position on the Y-axis scale to bring the stage into the center.

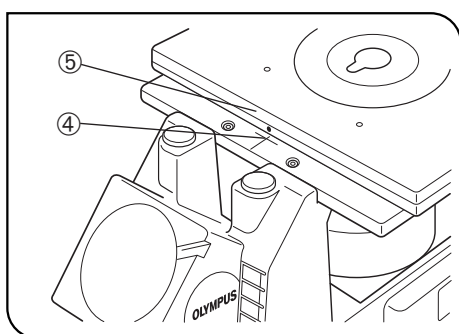


Fig. 90

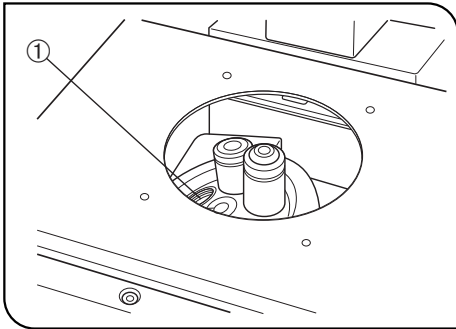


Fig. 91

5 Attaching the Objectives (Fig. 91)

Remove the stage center plate and attach the objectives to the revolving nosepiece through the hole on the stage left by the plate.

⊙ Attach the objectives in such a manner that the magnification increases from low to higher powers in the clockwise direction.

★ In the inverted microscope, the front lens of the objectives faces upward, and is more exposed to contamination than the objectives of upright microscopes. Therefore, if there are empty positions in the nosepiece, attach the dust caps ① provided. (Fig. 91)

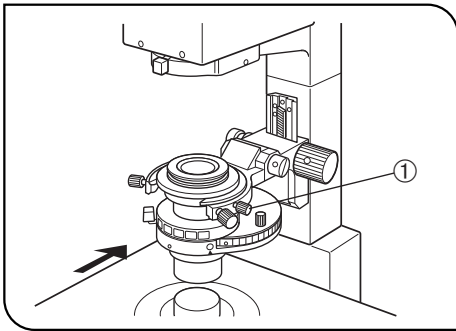


Fig. 92

6 Attaching the Condenser (With the IX2-ILL100 Column Only) (Figs. 92 & 93)

1. Loosen the condenser clamping screw ①.

2. Fit the condenser into the mount dovetail on the condenser holder, and push in the condenser until its positioning pin fits into the positioning groove on the mount dovetail.

With the IX2-LWUCDA2 motorized condenser, attach in a tilted position as shown in Fig. 93.

3. Tighten the condenser clamping screw ①.

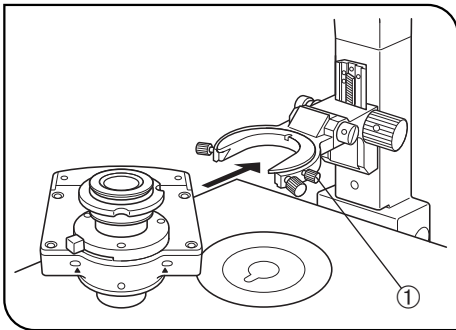


Fig. 93

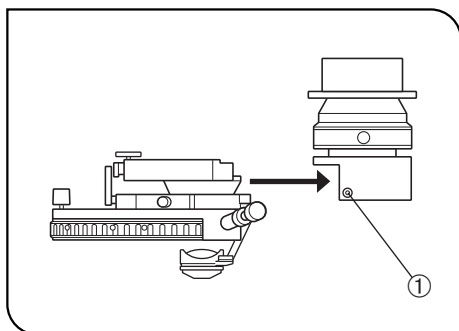


Fig. 94

Universal Condenser (U-UCD8)

(Figs. 94 & 95)

« Attaching onto the UCD Adapter »

1. Using the Allen screwdriver, loosen the two setscrews ① on the IX-ADUCD UCD adapter. (Fig. 94)
2. Push in the U-UCD8 universal condenser horizontally into the adapter until the condenser's positioning pin fits into the positioning groove on the mount dovetail.
3. Tighten the two setscrews ① using the Allen screwdriver. (Fig. 94)

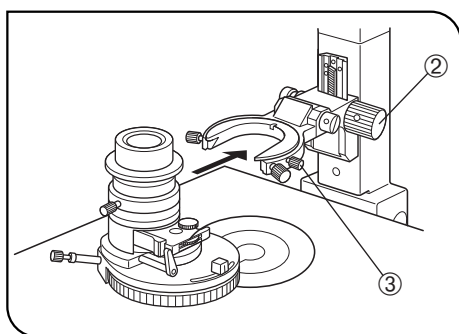


Fig. 95

« Attaching onto the Illumination Column »

1. Rotate the condenser height adjustment knob ② to raise the condenser to the upper limit position. (Fig. 95)
2. Loosen the condenser clamping knob ③. (Fig. 95)
3. Insert the mount of the UCD adapter into the mount dovetail of the condenser holder (the condenser turret should be positioned on the right hand side). Push the UCD adapter horizontally into the condenser holder until the condenser's positioning pin fits into the positioning groove on the mount dovetail.
4. Tighten the condenser clamping knob ③. (Fig. 95)

« Optical Element Indices »

The optical element indices on the U-UCD-8 are not visible because it is used upside down. Make your own reminder such as a list of the optical elements inserted in the turret.

With the U-UCD8 (T2), however, the inserted optical elements can be identified using the provided number stickers/indication plates.

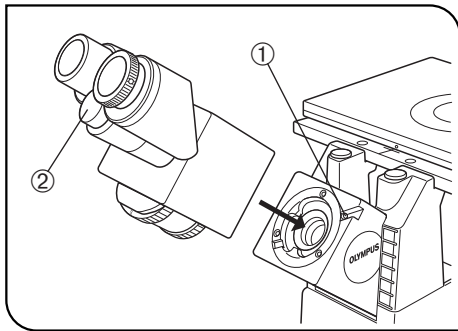


Fig. 96

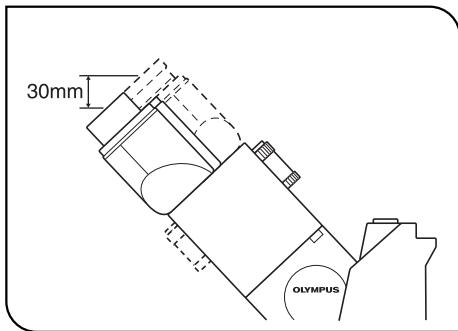


Fig. 97

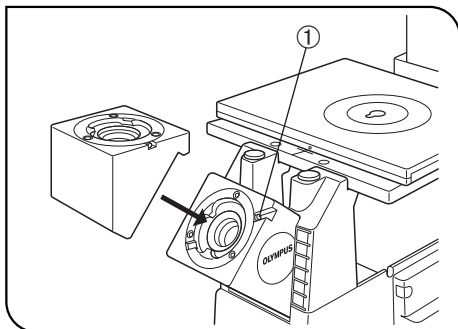


Fig. 98

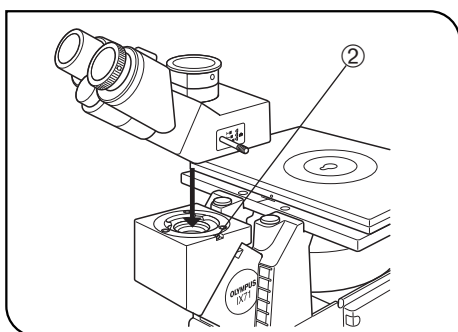


Fig. 99

7 Attaching the Observation Tube (Figs. 96 to 99)

U-BI90CT, U-BI90 or U-TBI90 Binocular Tube (U-MO Monocular Tube) (Figs. 96 & 97)

1. Using the Allen screwdriver, loosen the observation tube clamping screw ① on the observation tube mount. (Fig. 96)
 2. Attach the circular dovetail mount of the observation tube into the observation tube mount, placing the observation tube so that the interpupillary distance scale numbers ② are seen right side up. Then tighten the clamping screw to clamp the observation tube.
- Ⓞ Normally, the distance from the surface of the desk to the eye point is approximately 430 mm. If it is desirable to lower the eye point position, the observation tube (provided it is other than the U-TBI90) may be detached, turned 180° and then attached on the observation tube mount again. This lowers the eye point height by approximately 30 mm. (Fig. 97)

U-TR30H-2 Tube (Figs. 98 & 99)

- Ⓞ First mount the IX-ATU intermediate tube.
1. Using the Allen screwdriver, loosen the observation tube clamping screw ① on the observation tube mount. (Fig. 98)
 2. Insert the circular dovetail mount of the intermediate tube into the observation mount so that its upper surface is flush with the microscope frame. Tighten the observation tube clamping screw ① to clamp the intermediate tube.
3. Using the Allen screwdriver, loosen the observation tube clamping screw ② on the intermediate tube's observation tube mount. (Fig. 99)
 4. Insert the circular dovetail mount of the observation tube into the intermediate tube's observation tube mount so that the binocular eyepiece sleeves face toward the front. Then tighten the observation tube clamping screw ② firmly. (Fig. 99)

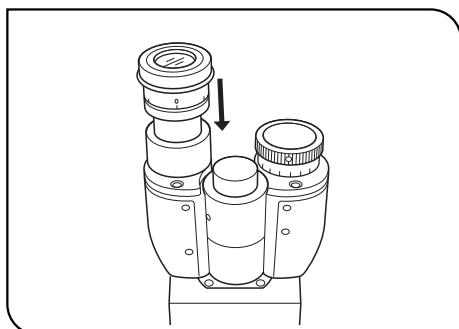


Fig. 100

8 Attaching the Eyepieces

(Fig. 100)

1. Remove the eyepieces' dust caps.
2. Insert the WHN10X-H eyepiece with helicoid into the eyepiece sleeve without helicoid (shown on the left in the figure).
3. Insert the WHN10X eyepiece without helicoid into the eyepiece sleeve with helicoid (shown on the right in the figure).

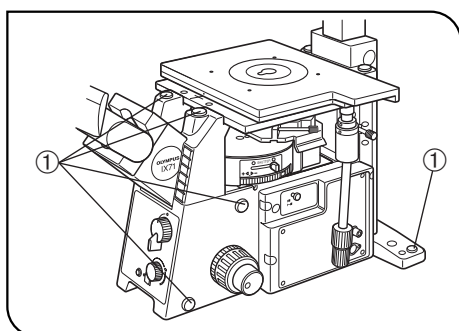


Fig. 101

Using the Accessory Mounting Holes

(Fig. 101)

- Ⓞ Twelve threaded holes ① are provided on the microscope frame for mounting accessories such as a micromanipulator. These holes are covered with plastic dust caps. To remove a cap, insert the tip of a flat-blade screwdriver sideways into the space between the cap and the frame.
- ★ The applicable screws are M6 screws. The screws can be inserted into the microscope frame up to a depth of 10 mm. Select the screw length in accordance with this.

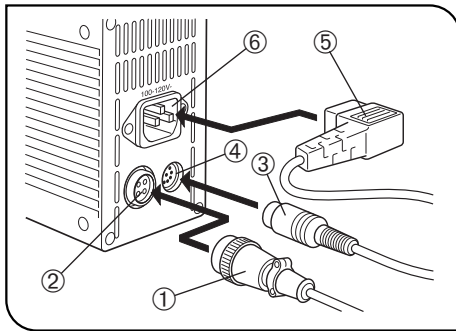


Fig. 102

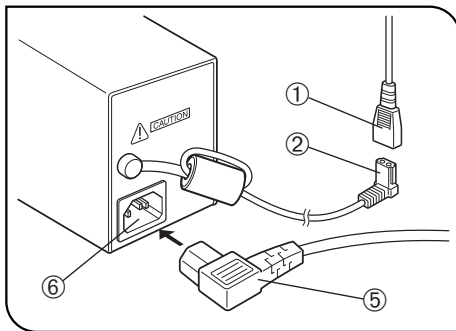


Fig. 103

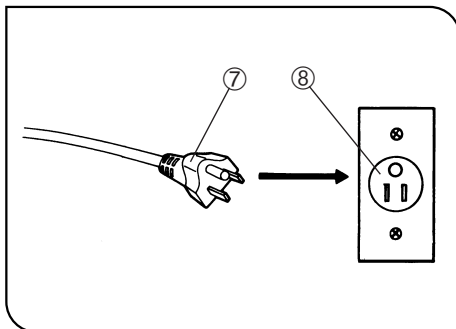


Fig. 104

9 Connecting the Cables

(Figs. 102 to 104)

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

▲ Make sure that the main switch of the power supply is set to “O” (OFF) before connecting cables.

1. Connect the plug ① of the lamp housing or illumination column to connector ② firmly.
2. Connect the hand switch plug or TH4 connection cable ③ to connector ④. With the IX71 frame, connect the other end of the TH4 connection cable to the right side of the IX71 frame.

▲ Always use the AC power adapter and power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section “PROPER SELECTION OF THE POWER SUPPLY CORD” at the end of this instruction manual.

3. Connect the power cord connector ⑤ to connector ⑥ firmly.
4. Connect the power cord plug ⑦ to a wall outlet ⑧.

▲ Be sure to supply power from a grounded, 3-conductor power outlet using the proper power cord. If the power outlet is not grounded properly, Olympus can no longer warrant the electrical safety performance of the equipment.

▲ If the power cord or a connection cable comes in contact with the lamp housing or surrounding equipment, the cord or cable may melt and result in shock hazard. To prevent this, distribute the cords and cables apart from the lamp housing.

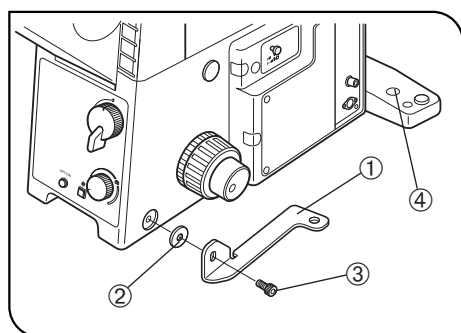
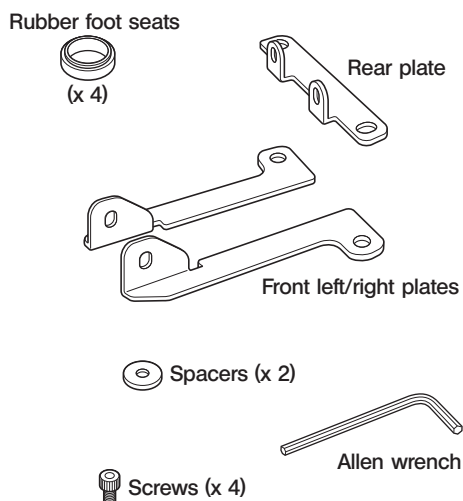


Fig. 105

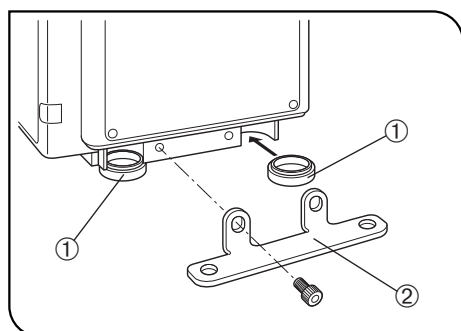


Fig. 106

10 Using the Frame Clamping Plates (IX2-FP) (Figs. 105 & 106)

⊙The microscope frame clamping method is variable depending on whether the frame stabilizing feet on the rear of the frame are used or removed for system expansion.

★The microscope frame should be inclined to attach the frame clamping plates. Therefore, it is required to remove the specimen and petri dish that are not clamped onto the frame before proceeding.

Clamping Using Stabilizing Feet

⊙This procedure does not use the rear plate but uses the stabilizing feet clamping holes.

1. Tilt the microscope frame slightly and insert the four rubber foot seats into the rubber foot sections. This will disable the cushions of the rubber feet.
- ⊙This step is not required when you will not use the rubber feet.
2. Using the Allen wrench, temporarily attach the provided screws ③ together with the spacers ② to the left and right plates ① (on both sides).
3. Remove the seals ④ covering the stabilizing feet positions to expose the clamping holes.

CAUTION When using a 25 mm or 50 mm pitch anti-vibration platform, the clamping screw on the right plate interferes with the right side panel of the microscope frame. So first clamp the screw temporarily to see it does not interfere.

4. Align the four clamping holes on the clamping plates with the threaded holes on the anti-vibration platform, and clamp temporarily with the screws provided with the anti-vibration platform.
5. Apply the left or right plate ① to the anti-vibration platform, tighten the screws ③ firmly, and then tighten the screws of the anti-vibration platform tightly. Also repeat this for the other plate.

Clamping by Removing the Stabilizing Feet

1. Using the provided Allen wrench, remove the three screws clamping the stabilizing feet from the bottom.
2. Insert two of the rubber foot seats ① into the rubber foot insertion sections on the rear of the microscope frame.
Perform insertion in the rubber foot sections on the front as described above.
3. Clamp the rear plate ② directly, without using the spacer.
Now clamp the microscope frame on the anti-vibration platform as described above.

■ 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		USA.	UL	
Ireland	NSAI				

Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comité Électrotechnique Belge (CEBEC)	CEBEC	⟨HAR⟩	10	30	10
VDE Verband der Elektrotechnik Elektronik Informationstechnik e.V.	⟨VDE⟩	⟨HAR⟩	30	10	10
Union Technique de l'Électricité (UTE)	USE	⟨HAR⟩	30	10	30
Istituto Italiano del Marchio di Qualità (IMQ)	IEMMEQU	⟨HAR⟩	10	30	50
British Approvals Service for Cables (BASEC)	BASEC	⟨HAR⟩	10	10	30
N.V. KEMA	KEMA-KEUR	⟨HAR⟩	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalten	SEMKO	⟨HAR⟩	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	⟨ÖVE⟩	⟨HAR⟩	30	10	50
Danmarks Elektriske Materielkontrol (DEMKO)	⟨DEMKO⟩	⟨HAR⟩	30	10	30
National Standards Authority of Ireland (NSAI)	⟨NSAI⟩	⟨HAR⟩	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	⟨HAR⟩	10	10	70
Asociación Electrotécnica Española (AEE)	⟨UNED⟩	⟨HAR⟩	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	⟨HAR⟩	30	30	70
Instituto Português da Qualidade (IPQ)	np	⟨HAR⟩	10	10	90
Schweizerischer Elektrotechnischer Verein (SEV)	SEV	⟨HAR⟩	10	30	90
Elektriska Inspektoratet	SETI	⟨HAR⟩	10	30	90

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

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

10 LAMP HOUSING INSPECTION SHEET

- Study the instruction manual for the lamp housing before inspection.
- For safe use of the lamp housing, we recommend performing the following inspection periodically (every time you replace the lamp bulb and at least every 6 months).
- The table below identifies the check items to be observed. Put (X) if not applicable or (√) if applicable.
- If there is any (√) mark noted, immediately stop use of the product, and contact Olympus for detailed inspections or replace the lamp housing.
- If you detect an abnormality other than that listed below or with other Olympus product, also stop the use of the product and contact Olympus for detailed inspections.
- Note that the service, replacement and detailed inspections are charged after expiration of the warranty period.

If you have any questions, please contact Olympus.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase or the total power ON time has exceeded 20,000 hours.				
2. Lamp does not light sometimes even though the main switch is set to on. (Except discharge burners*1.)				
3. Illumination flickers when you move the lamp cable or lamp housing.				
4. Lamp cable is unusually hot to the touch.				
5. Scorching or burning odor is produced during use.				
6. Illumination still flickers after replacement with a new lamp bulb. (Except discharge burners*1.)				
7. Deformation, backlash, or looseness, etc. when you assemble the lamp housing. (Impossibility of removing the top section of lamp housing when you attempt to replace the lamp bulb, etc.)				
8. Extreme discoloration of the lamp housing connection terminal or lamp socket. Uneven discoloration of the left and right sections of these parts. (Except discharge burners*1.)				
9. Discoloration, deformation or cracking of the lamp housing.				
10. Melting, crack, deformation or solidification of the lamp cable or a wiring part.				
11. Increased frequency of servicing compared to similar devices put into use at the same time as the lamp housing.				

* When the Check Result columns become insufficient, copy this sheet.

*1 Discharge burners: Mercury burner / Xenon burner / Metall halide burner

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