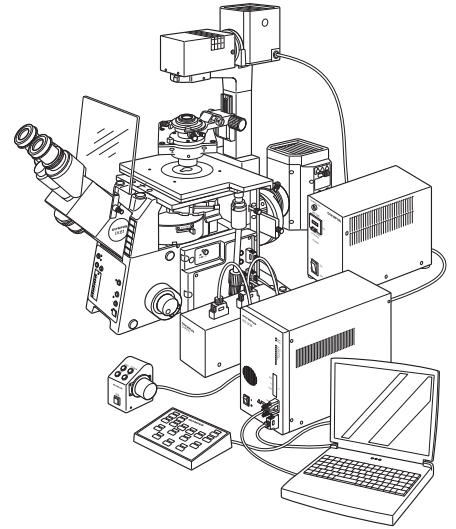


OLYMPUS®



INSTRUCTIONS

IX81

MOTORIZED INVERTED RESEARCH MICROSCOPE

This instruction manual is for the Olympus Motorized Inverted Research Microscope Model IX81. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.



A X 7 3 2 0

CONTENTS

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 49 to 58) carefully. For the modules provided with instruction manuals, also read the assembly procedures in their instruction manuals.

Note on operation in stand-alone mode

When the IX81 motorized revolving nosepiece is rotated in stand-alone mode (without a PC), automatic escape movement of an objective (prevention of interference between the objective and stage) is not performed. Therefore, when using an objective with a short working distance, let the motorized revolving nosepiece escape once before pressing the objective switching button.

IMPORTANT – Be sure to read this section for safe use of the equipment. – 1-5

1	MODULE NOMENCLATURE	6
2	CONTROLS	7-10
3	TRANSMITTED LIGHT BRIGHTFIELD OBSERVATION PROCEDURE	11-12
4	USING THE CONTROLS	13-27
4-1	Microscope Frame	13-14
	1 Voltage Indication	
	2 Light Path Selection	
	3 Magnification Change	
	4 Motorized Revolving Nosepiece	
	5 Frame Clamping Plate	
4-2	Focusing Block	15
	1 Rotation Direction of the Focusing Knob	
	2 Coarse/Fine Adjustment Switching Button	
	3 Focusing ▲▼ (UP/DOWN) buttons	
	4 Objective Escape/Return (ESC) Button	
4-3	Stage	16-17
	1 Placing the Specimen	
	2 Moving the Specimen	
	3 Connecting the Grounding Wire	
	4 Adjusting the X-Axis/Y-Axis Knob Rotation Tension	
4-4	Observation Tube	18-20
	1 Adjusting the Interpupillary Distance	
	2 Adjusting the Diopter	
	3 Using the Eye Shades	
	4 Using Eyepiece Micrometer Disks	
	5 Selecting the Light Path of Observation Tube (U-TR30H Only)	
	6 Using the CT Turret (U-BI90CT Only)	
	7 Adjusting the Tilt (U-TBI90 Only)	
4-5	Illumination Column (IX2-ILL100)	20-22
	1 Tilting the Illumination Column	
	2 Mounting Filters	
	3 Using the Field Iris Diaphragm	
	4 Adjusting the Condenser Height Adjustment Knob Tension	
	5 Caution on Attachment of the Manipulator	

4-6	Condenser	23-25
	1 Centering the Condenser 2 Using the Aperture Iris Diaphragm	
	3 Flipping Up the Condenser Holder	
4-7	Objectives	26-27
	1 Oil-Proof Cap (UIS Series only) 2 Adjusting the Correction Collar	
	3 Using Immersion Objectives	
5	OTHER OBSERVATION METHODS	28-37
5-1	Phase Contrast Observation	28-31
5-2	Differential Interference Contrast Observation	32-36
5-3	Simplified Polarized Light Observation	37
5-4	Reflected Light Fluorescence Observation (Separate Manual)	37
6	PHOTOMICROGRAPHY AND TV OBSERVATION	38-42
6-1	Photomicrography	38-40
6-2	TV Observation	41-42
7	TROUBLESHOOTING GUIDE	43-45
8	SPECIFICATIONS	46-48
9	ASSEMBLY – See this section for the replacement of the light bulb. –	49-58
	■ PROPER SELECTION OF THE POWER SUPPLY CORD	59-60
10	LAMP HOUSING INSPECTION SHEET	61

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

The IX81 microscope can be used in stand-alone mode (operated from the U-HSTR2 hand switch) or can be operated from a PC when the IX2-BSW software (Ver. 01.03, compatible with Windows 2000/Me) is installed in the PC.

CAUTION

Be sure to prepare the U-ZPCB (T2) Z-board and attach it to the IX81, and set the DIP switch (see page 50) before connecting the IX2-UCB control board to the IX81.

This microscope employs a UIS2/UIS (Universal Infinity System) optical design, and should be used only with modules designed for the IX2 or BX2 series (which belong to 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.

Configuration of Instruction Manuals

Since this microscope is 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
IX81	Observation procedures including transmitted light brightfield, phase contrast and DIC observations
IX2-UCB/U-HSTR2	Functions of the Control Box (incorporating the power supply) and Hand Switch
IX2 Software for PC (CD-ROM) *Model name IX2-BSW (Ver. 01.03 or later)	Methods of PC control of functions
Fluorescence system for IX2	Reflected light fluorescence observation
U-FWT/FWR/FWO	Motorized filter wheels (The U-FWT cannot be used with this microscope.)
IX2-MLWCD	Mid long working distance condenser
IX2-DICD	DIC condenser

Precautions When Unpacking the Microscope

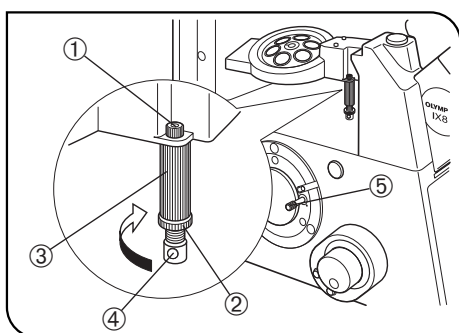


Fig. 1

Releasing the Transport Lock of the Motorized Revolving Nosepiece

★ Never attempt to turn the system on without removing the clamping rod. Otherwise, the focusing mechanism may be damaged.

1. Loosen the screw ① of the clamping rod using the Allen screwdriver provided with the microscope frame.
2. Turn the nut ② of the clamping rod in the direction of the arrow until the nut reaches the lowest height.
3. Likewise, turn the clamping rod ③ in the direction of the arrow until the rod reaches the lowest height.
4. Insert the Allen screwdriver into the hole on the clamping rod mount ④ and turn the screwdriver in the opposite direction to the dial to remove the clamping rod.
5. Attach the provided seal (10 mm dia., white) on the hole made after removing the clamping rod to prevent penetration of dust through the hole.

Ⓞ Retain the clamping rod carefully because it 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 ⑤. 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 handle with pieces of adhesive tape so that it will not move.

**SAFETY PRECAUTIONS**

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. If a foreign object is caught during motorized focusing operation, there will be an error in the focusing block and the motorized focusing operation will be suspended.

Recovery procedure

- If there is no error in motorized operation, the caught object can be removed by turning the focusing knob or focusing ▼ button.
 - If there is an error in motorized operation, the focusing knob or focusing ▼ button becomes inoperable. Disassemble the relevant modules to remove the caught object. Replace the relevant modules afterward.
 - Turn off the power and then on again. The system will restart unless there is a malfunction in the motor.
3. To activate temporary stop during focusing operation, turn the focusing knob (or dial) on the microscope frame (in either direction) or press any of the FOCUS control buttons (▼ , ▲ , F/C and ESC) (except during PC communications).

When the main switch of the IX2-UCB control box is set to " I " (ON), the focusing operation starts automatically as part of initialization (this operation consists of temporary raising and then returning to the original position of the objective).

If any of the operations mentioned above is performed, an emergency stop will also occur. In this case, set the main switch to " O " (OFF) and then " I " (ON) again.

4. When lowering the objective by pressing the focus ▼ button, be careful not to have your hand caught between the bottom of the revolving nosepiece and the microscope frame.

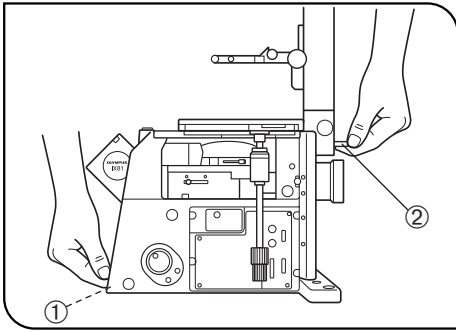


Fig. 2

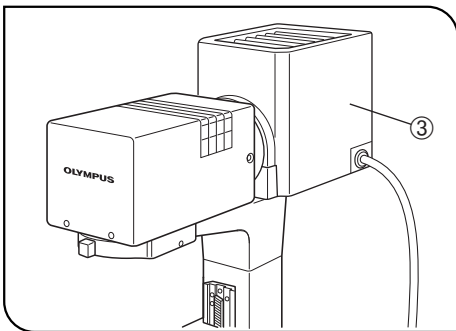


Fig. 3

5. 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.

6. When moving the microscope, remove the modules that may drop including the specimen from the microscope in advance, 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. 25 kg).

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, focusing knob, etc.**

7. 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.

8. 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.

9. 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.

10. 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 Bulb	12V100WHA-L (PHILIPS 7724)
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11. 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.






12. 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.

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

14. The standard service life of the lamp housing is 8 (eight) years of use or 20,000 hours of total power ON period, whichever is the shorter period. For details, see Inspection Sheet on page 61.



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
	When raising or lowering the motorized revolving nosepiece, be careful not to have your finger or hand caught by the mechanism.
	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) (High Temperature warning) 
	Right side panel of microscope (Warning against finger or hand catching by mechanism) 

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 48).
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-BI90CT 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 optical performance. (For applicable objectives, see page 26.)
5. Restrictions in brightfield, phase contrast and DIC observations
 - Deterioration in the optical performance will occur when the optional 2X magnification changer is installed in the U-BI90CT.
(The deterioration can be improved by adding 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 applies to objectives other than Series 3)

UIS2 Series

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

UIS Series

- ① UPlanApo4X, 10X, UPlanFI4X, 10X, 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 + 1X magnification changer + U-PMTV1X on the side port
- 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/10X + 1X magnification changer on the side port)

7. Restrictions in fluorescence observation

- With combination of IX2-SHA + U-FWR (x 2) + U-LH100HGAP0, objectives UPlanSApo40X2, UPlanApo40X, UPlanFLN/UPlanFI20X, UPlanFLN100XO2/100XOI2, UPlanFI100XO3, PlanApoN60XO and PlanApo60XO3 cannot be used due to a problem in the optical performance. (This applies to objectives other than Series 3)

8. Other

- The U-TRU or U-TVCAC 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. 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.
3. Never attempt to disassemble any part of the microscope.
4. 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).

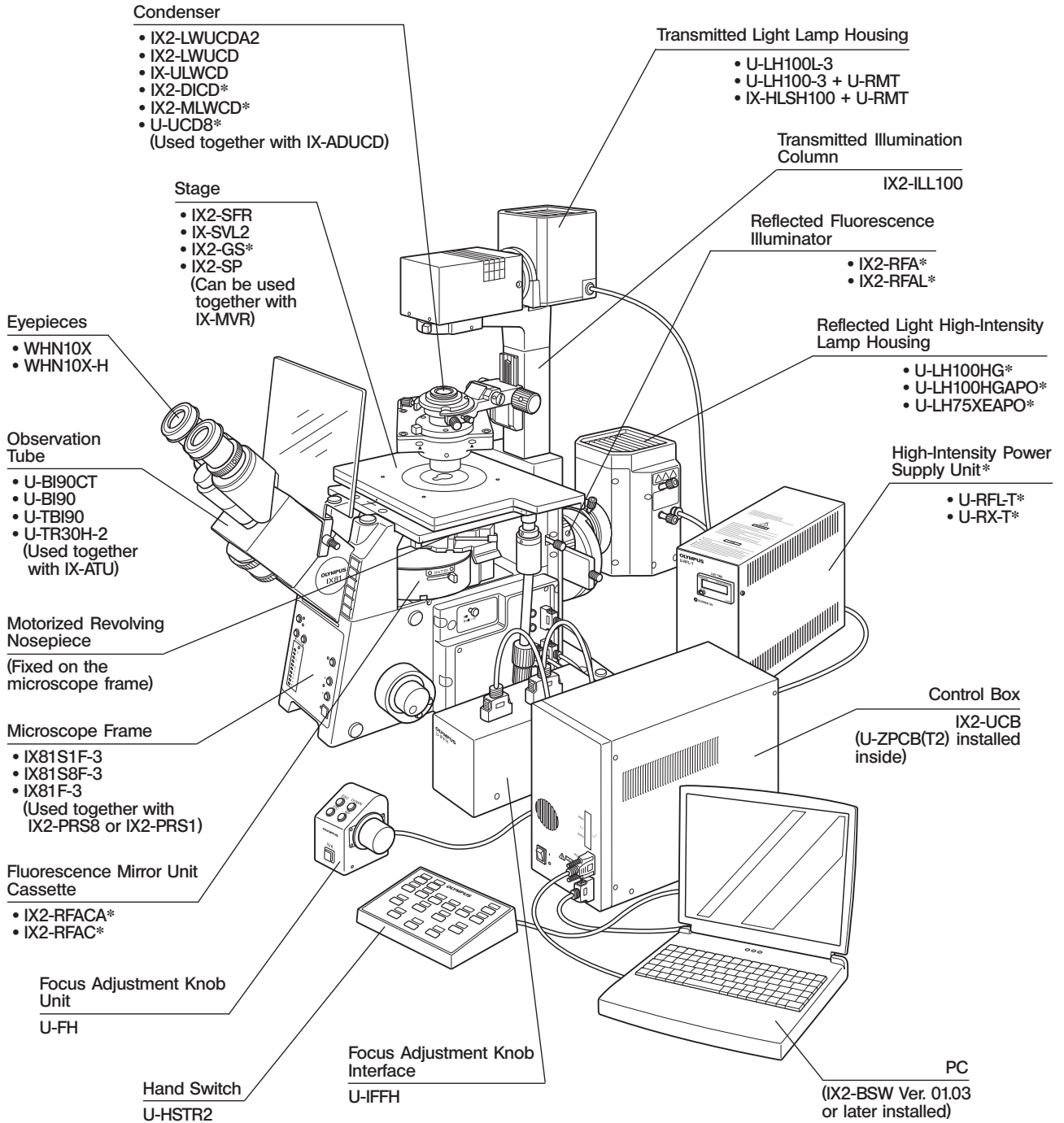
4 Intended use

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

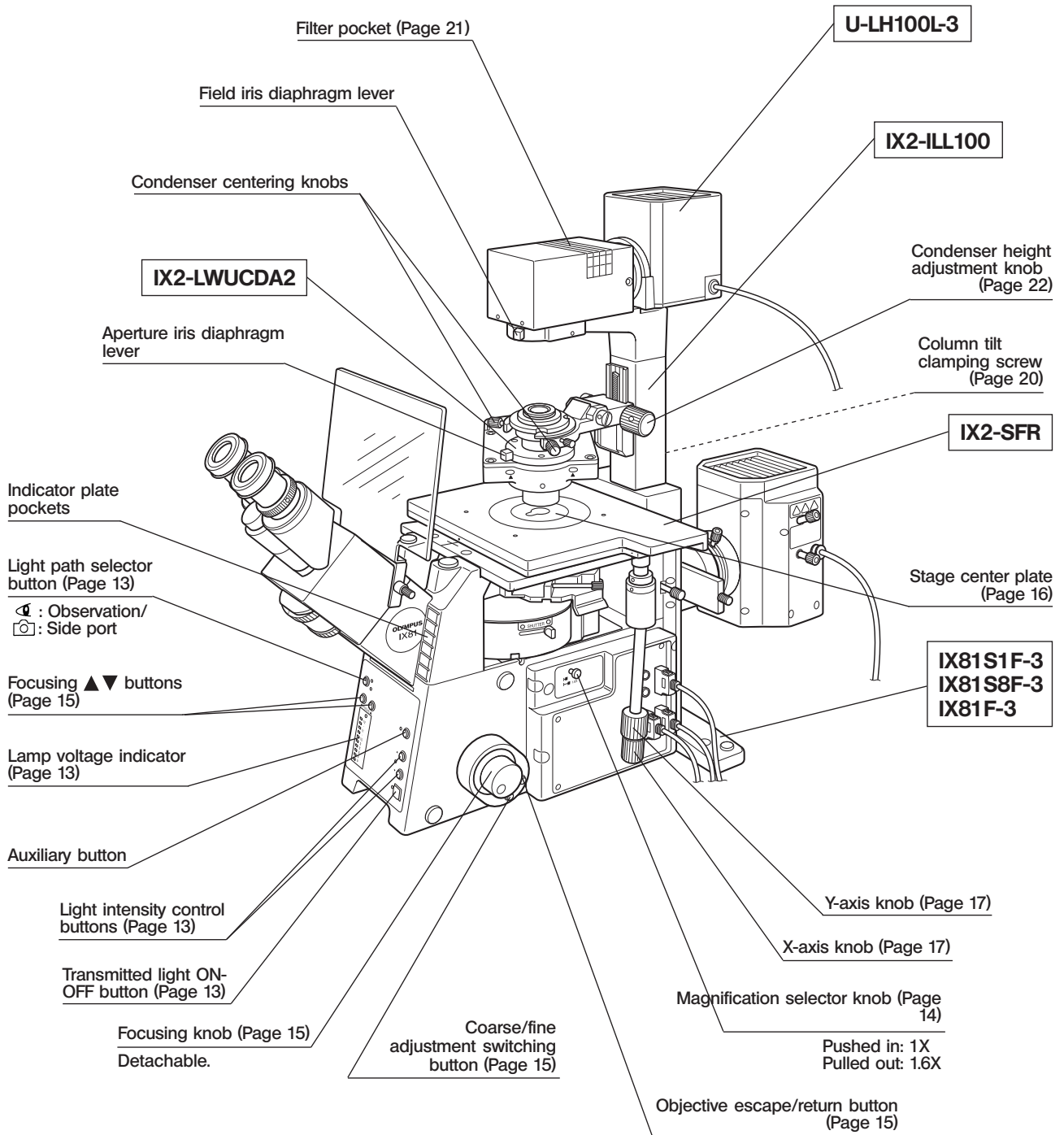
©The modules shown below are only the representative modules. As there are other modules which can be combined with the microscope but are not shown below, please also refer to the latest Olympus catalogues or your dealer. For information on the modules marked with “*”, refer to their instruction manuals.



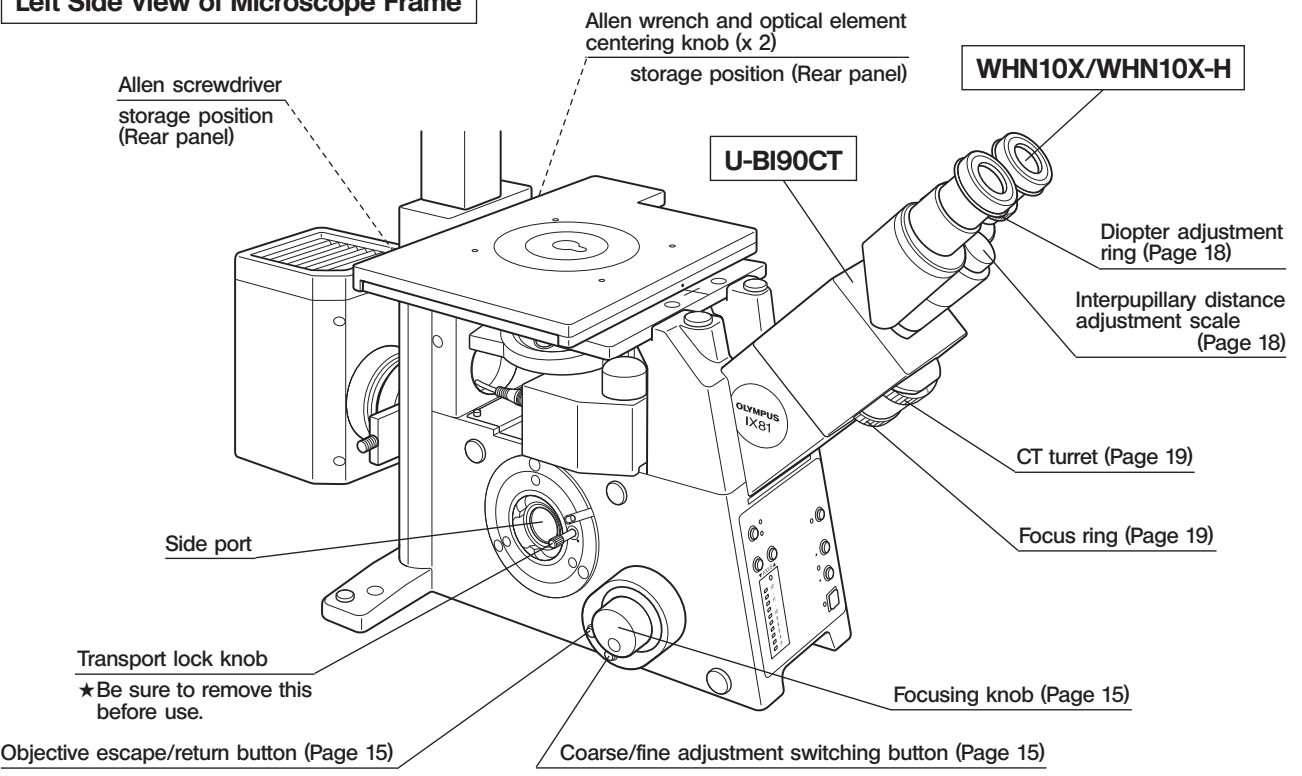
2 CONTROLS

© If you have not yet assembled the microscope, read Chapter 9, "ASSEMBLY" (pages 49 to 58).

- The illustration shows the system composed of modules enclosed in .
- For the reflected light fluorescence modules including the IX2-RFACA, IX2-RFA, U-LH100HG and IX2-UCB/U-HSTR2, refer to their separate instruction manuals.



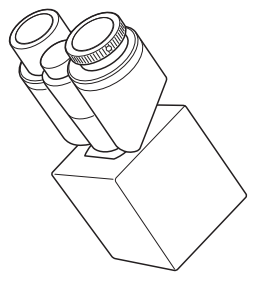
Left Side View of Microscope Frame



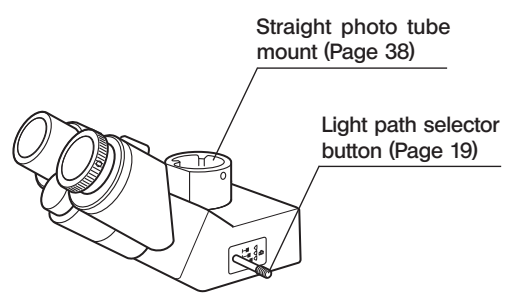
Other Modules

Binocular Observation Tube U-BI90

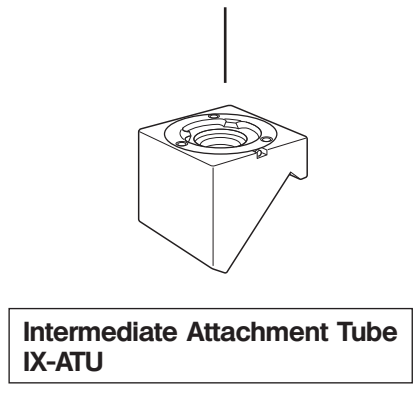
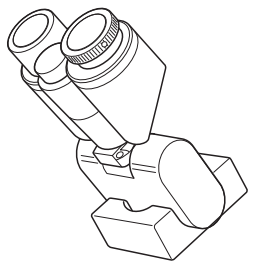
© Same as the U-BI90CT except that the U-BI90 does not have the CT turret and focus ring.



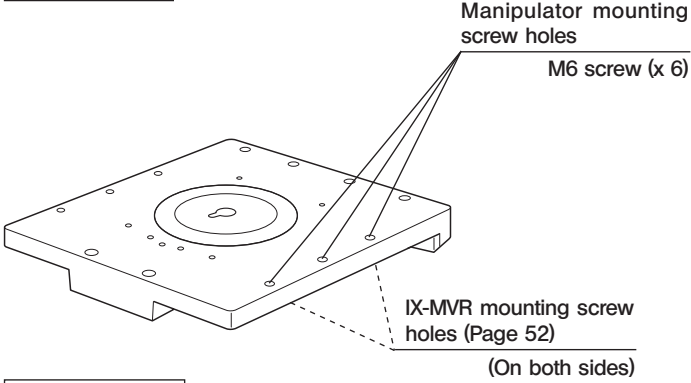
Trinocular Observation Tube H U-TR30H-2



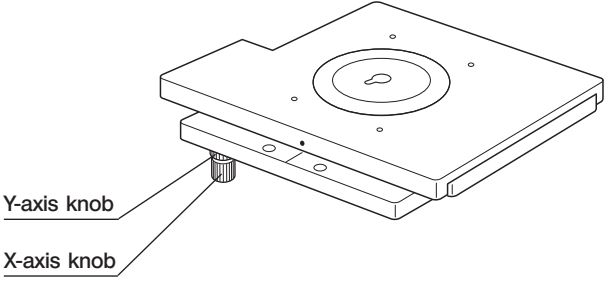
Tilting Binocular Observation Tube U-TBI90



**Plain Stage
IX2-SP**

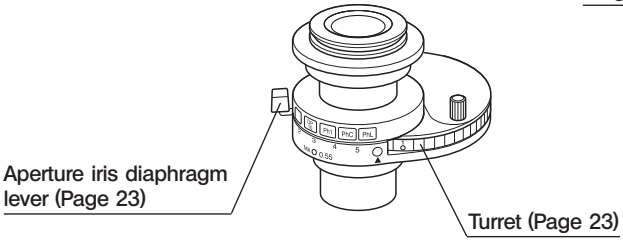


**Cross Stage
IX-SVL2**



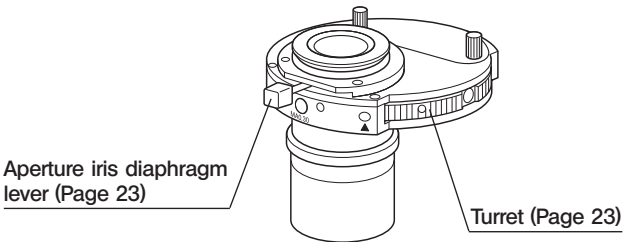
**LWD Universal Condenser
IX2-LWUCD**

© This is a manually controlled condenser.

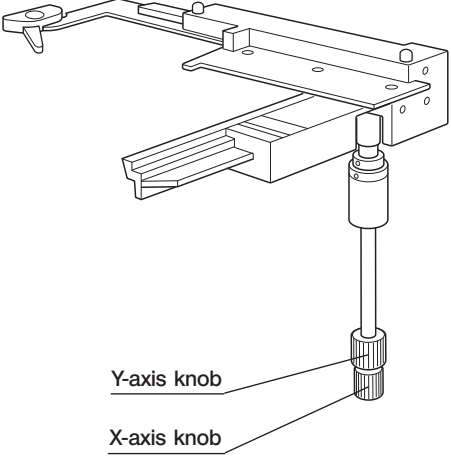


**ULWCD Condenser
IX-ULWCD**

© This condenser is manually operated.

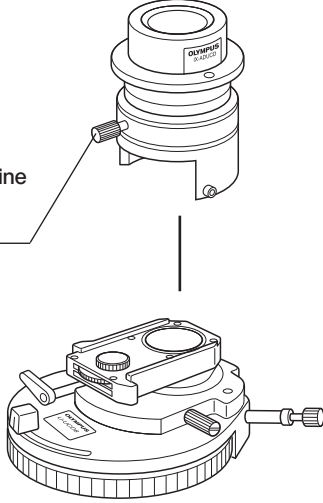


**Mechanical Stage
IX-MVR**



**UCD Adapter
IX-ADUCD**

Condenser height fine adjustment knob (Page 24)

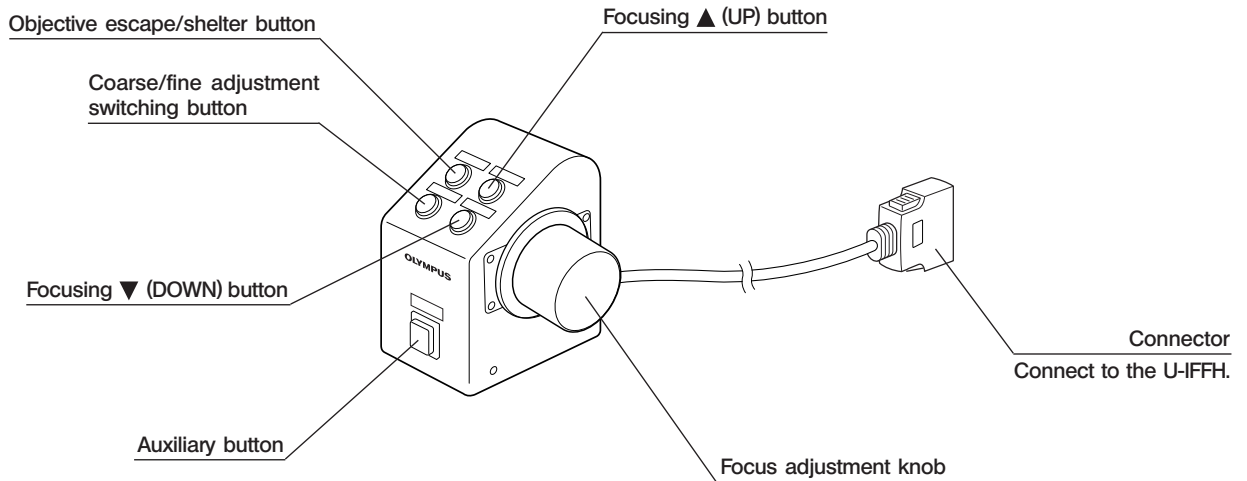


**Universal Condenser
U-UCD8**

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

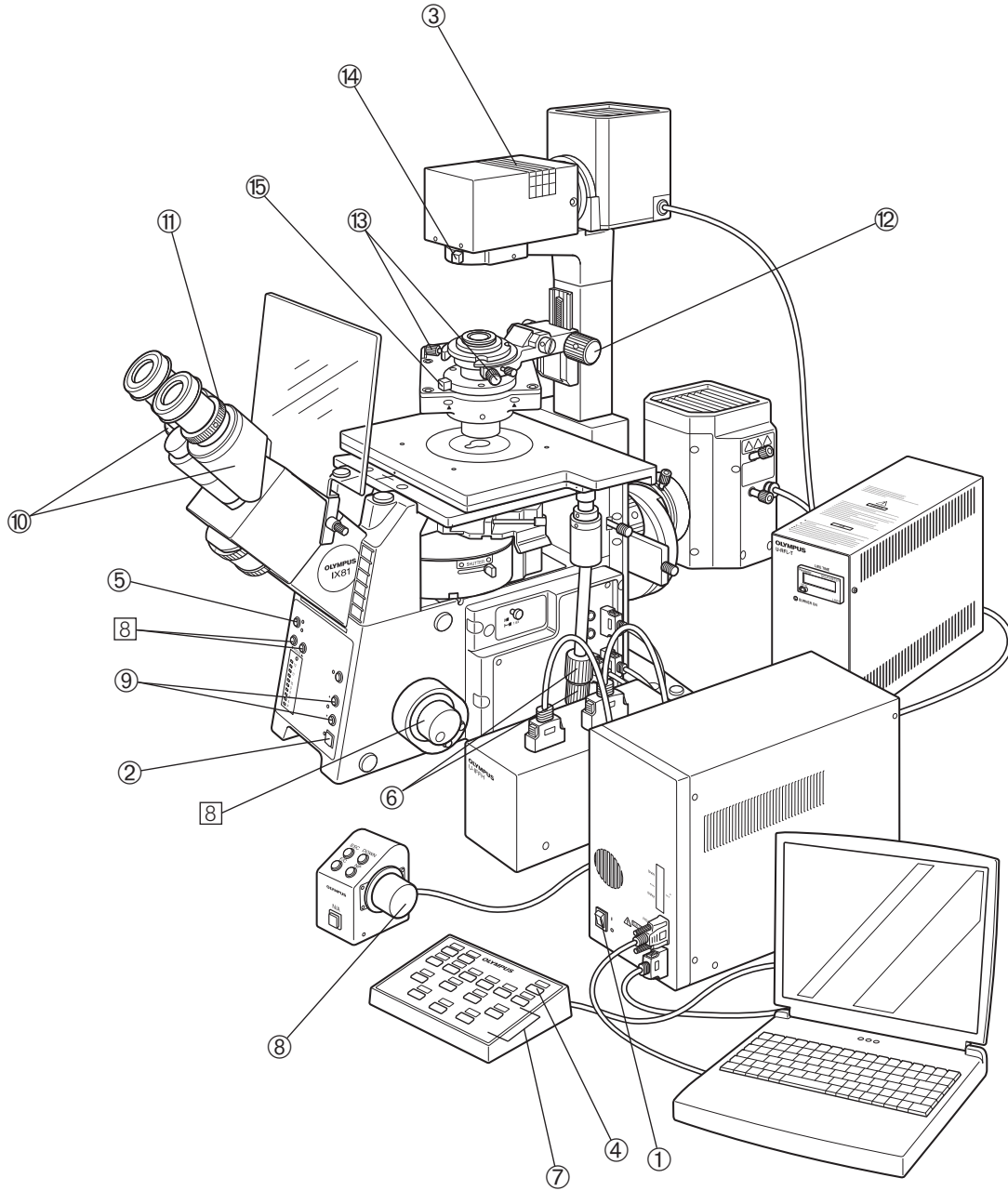
Focus Adjustment Knob Unit U-FH

The button functions shown below are the initial setups for PC control (remote operation). The button functions can also be assigned as required by the user. For the assignment, refer to the instructions for the IX2-BSW IX Software. After setting up the button functions, attach the provided stickers near the buttons. For the function abbreviations and symbols on the stickers, see the following table.



Abbreviations & Symbols	Function	Note
F/C	Fine/Coarse switching	
	Transmitted light ON/OFF	
	Set/cancel photo voltage	
FRM/FH	Microscope (frame)/U-FH switching of focus adjustment knob	
Z.EX.	Z-focusing motor ON/OFF	OFF: Electrical noise reduction
ESC	Escape/return objective	
SHUT	Shutter IN/OUT	
T.LENS	Condenser top lens IN/OUT	Not used with the IX81.
	Up/down operation for brightness adjustment, objective, etc.	The function name can be written in the blank area using an oil-ink pen.
	Left/right operation of mirror unit, filter wheel, etc.	

The button functions shown below are the initial setups at the moment the PC is started up.
Controls with numbers inside are not available when the U-FH focus adjustment knob unit is in use.



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

4 USING THE CONTROLS

4-1 Microscope Frame

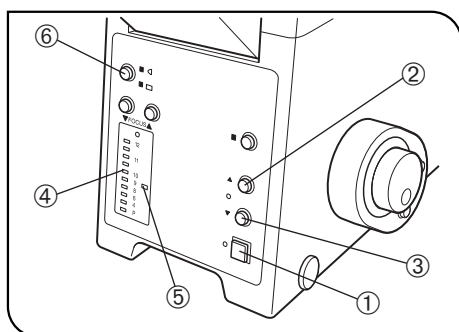


Fig. 4

1 Voltage Indication (Fig. 4)


⊙ Set the main switch of the IX2-UCB control box to “I” (ON), then press the transmitted light ON-OFF button ① to ON.

1. Press the light intensity control button ② to increase the voltage and make illumination brighter.

Pressing the button ③ makes the illumination darker.

2. The numerals to the right of the lamp voltage indicator LEDs ④ indicate the reference values of the voltages.

★ The LEDs may turn off (temporarily) when the motor is driven, but the illumination intensity does not vary even if this occurs.


3. The  marking ⑤ is the reference position indicating 9 V, which is the suitable intensity for color photography (using LBD filter).

2 Light Path Selection (Fig. 4)

⊙ The light path selector button ⑥ allows for light path switching between the observation and side port paths.

The selected light path can be confirmed with the LED on the side of the button.

 : Observation 100% light path.

 : Side port 100% light path (with the IX81S1F-2 microscope frame)
Side port light path 80%/Observation 20% light path (with the IX81S8F-2)

⊙ The light path to the lower back port can also be set by the manufacturer's part replacement operation. (IX2-LBPC)

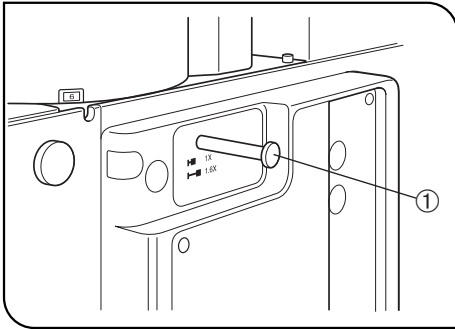


Fig. 5

3 Magnification Change

(Fig. 5)

- 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.

4 Motorized Revolving Nosepiece

- ★ When the IX81 motorized revolving nosepiece is rotated in stand-alone mode, automatic escape movement of an objective is not performed. Therefore, let the motorized revolving nosepiece escape once before turning the nosepiece.

The motorized revolving nosepiece can be rotated to switch the objective by pressing an appropriate button on the U-HSTR2 hand switch or a button assigned by the PC.

- Ⓞ When the IX2-BSW software (Ver. 01.03 or later) is started up, the revolving nosepiece escapes to avoid interference with the stage as the objective is switched, and returns to the original position after objective changing.

- ★ It is basically inhibited to attempt to rotate a motorized revolving nosepiece manually.

However, it can be moved to the front and rear by hand only when an oil immersion objective is used and bubbles are produced inside the oil.

5 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 ⑨ on page 58.

4-2 Focusing Block

◎The same effect as the focusing knob on the microscope frame can also be obtained using the U-FH focus adjustment knob unit. However, when the microscope is used stand-alone while the cable to the U-FH is connected, the control used for focus adjustment is switched automatically to the focus adjustment knob on the U-FH.

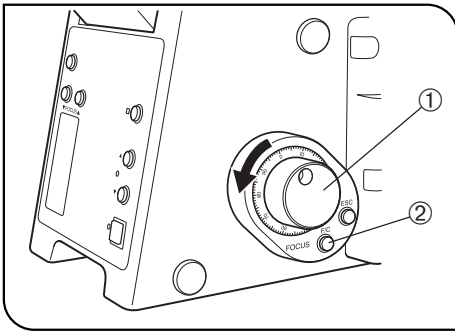


Fig. 6

1 Rotation Direction of the Focusing Knob (Fig. 6)

- Rotating the 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 Coarse/Fine Adjustment Switching Button (Fig. 6)

◎This button switches the motion of the objective controlled by the focusing knob ① between coarse and fine adjustment.

- The fine adjustment stroke is 0.5 mm per turn with the initial setting, but this can be changed using the IX2-BSW software,
- To select the desired adjustment stroke, press the coarse/fine adjustment switching button ②.

Coarse adjustment: 1 mm per turn

Fine adjustment: 0.5 mm per turn

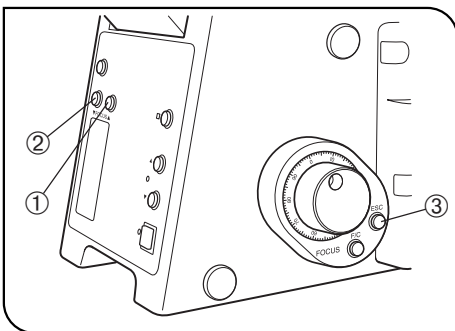


Fig. 7

3 Focusing ▲▼ (UP/DOWN) buttons (Fig. 7)

★ The focusing speed available with these buttons is coarse (3 mm/sec.) only. The focusing speed can be changed with a PC.

- The objective ascends as the focusing ▲ button ① is kept pressed and stops when the finger is released from the button.
- The objective descends when the focusing ▼ button ② is pressed.

4 Objective Escape/Return (ESC) Button (Fig. 7)

- When replacing the specimen, press the ESC button ③. The objective will lower to the lowest position. Pressing the button again returns the objective to the original height.
- When the IX2-BSW software's "STOP" button is pressed after the objective has been escaped, the return operation will be cancelled.

4-3 Stage

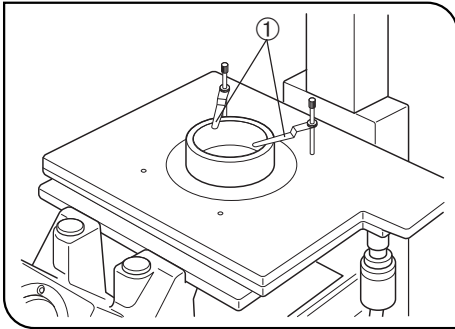


Fig. 8

1 Placing the Specimen (Figs. 8 to 10)

With the IX2-SFR or IX-SVL2 Stage (Fig. 8)

- Place the specimen on the center of the stage.
- Ⓞ In the case of a slide glass specimen, plate 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.

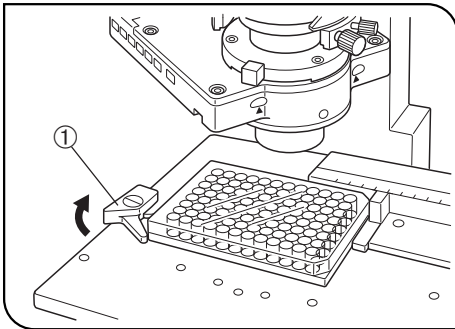


Fig. 9

With the IX-MVR Mechanical Stage + IX2-SP Stage (Figs. 9 & 10)

- Ⓞ 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. 9)

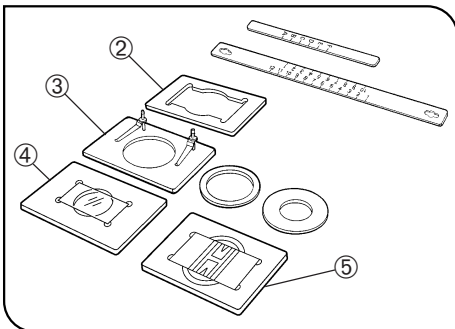


Fig. 10

- Ⓞ 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, 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, 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. 10)

* 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.

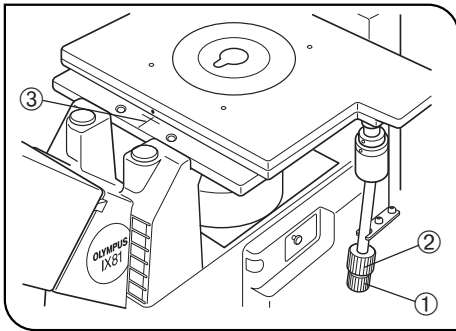


Fig. 11

2 Moving the Specimen (Fig. 11)

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 substage, 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).

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

With the IX-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).

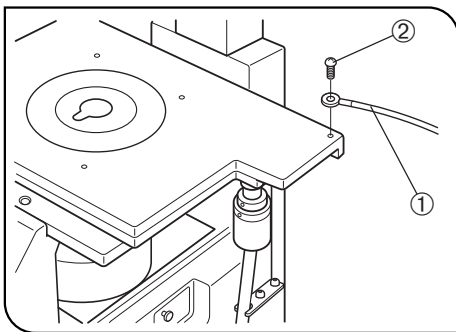


Fig. 12

3 Connecting the Grounding Wire (Fig. 12)

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. 12.

- ★ 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.

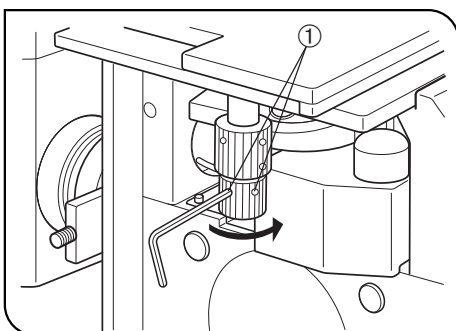


Fig. 13

4 Adjusting the X-Axis/Y-Axis Knob Rotation Tension (Fig. 13)

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

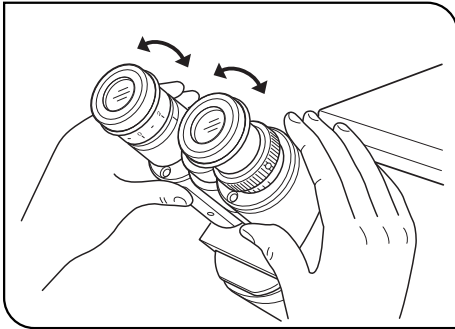


Fig. 14

1 Adjusting the Interpupillary Distance (Fig. 14)

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.

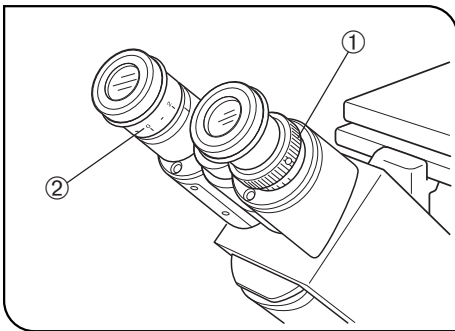


Fig. 15

2 Adjusting the Diopter (Figs. 15 & 16)

⊙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. 15)

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

2. While looking through the right eyepiece, rotate the focusing knob 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. 15)

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

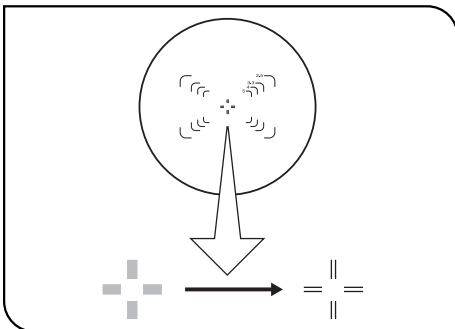


Fig. 16

Operation When Using Finder Eyepieces (with the U-TR30H-2)

⊙The finder eyepieces cannot be mounted 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. 15 & 16)

2. Looking through the left eyepiece, adjust the focusing knob 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.

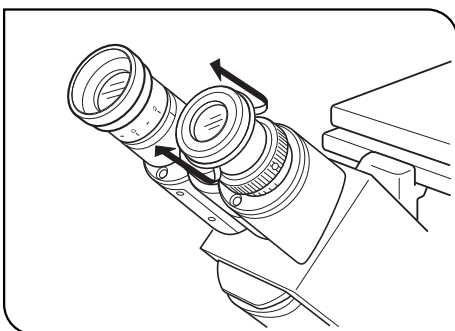


Fig. 17

3 Using the Eye Shades (Fig. 17)

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.

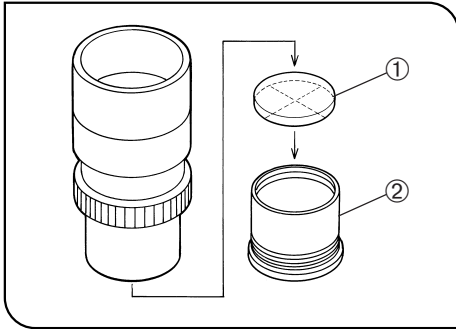


Fig. 18

4 Using Eyepiece Micrometer Disks (Fig. 18)

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. 18, 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.

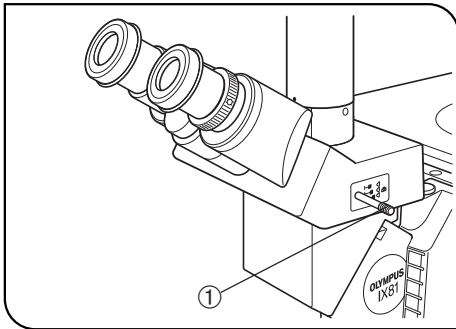


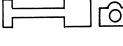


Fig. 19

5 Selecting the Light Path of Observation Tube (U-TR30H-2 Only) (Fig. 19)

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

Ⓞ Usually, set the selector knob to the intermediate 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
Intermediate		Binocular 20% TV/photo 80%	Observation of bright specimens, photomicrography, TV observation
Pulled out		TV/photo 100%	Photomicrography, TV observation

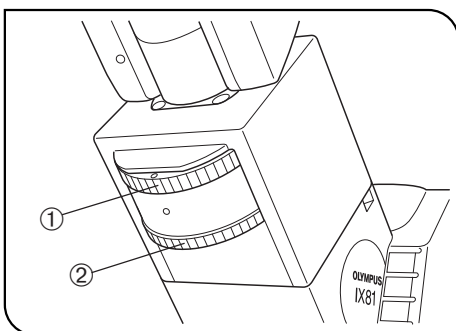


Fig. 20

6 Using the CT Turret (U-BI90CT Only) (Fig. 20)

1. To use the CT turret ①, rotate the knurled ring with a finger to select the setting corresponding to the indication (0-CT-0-S). (Set the magnification selector knob on the IX81 microscope frame to 1X.)

Turret Indication	Application
0 (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 focusing ring ② to adjust.

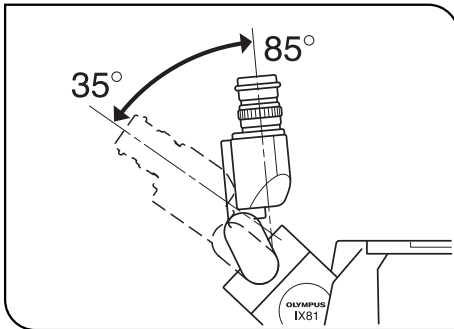


Fig. 21

7 Adjusting the Tilt (U-TBI90 Only)

(Fig. 21)

- ⊙ 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-MLWCD and IX2-DICD can also be used (see the separate instruction manuals).

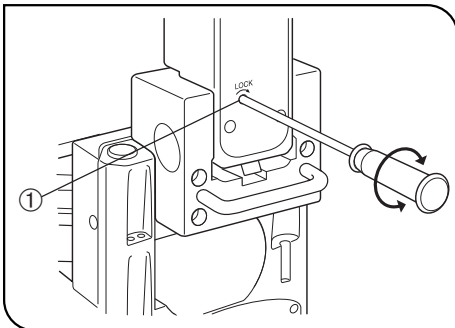


Fig. 22

1 Tilting the Illumination Column

(Fig. 22)

- ⊙ 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.**

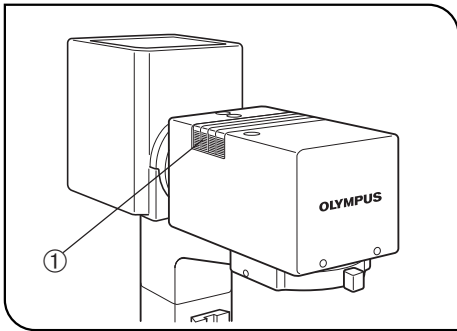


Fig. 23

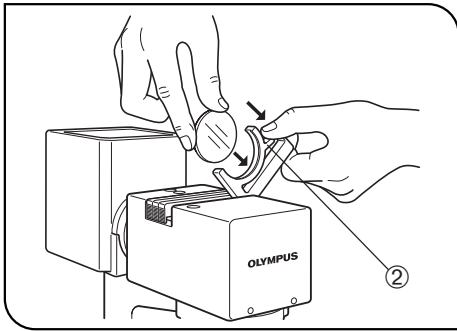


Fig. 24

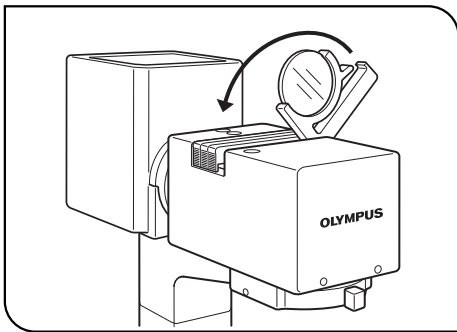


Fig. 25

2 Mounting Filters

(Figs. 23 to 25)

⊙ 45 mm diameter, maximum 6 mm thick filters can be mounted. Various filters, such as the provided frosted 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. 23)

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

(Fig. 24)

★ 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.

3. Engage each filter in the light path by moving the filter holder in the direction of the arrow. (Fig. 25)

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

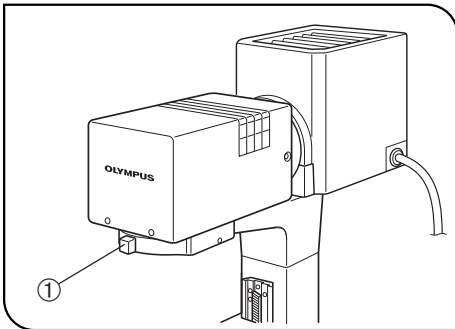


Fig. 26

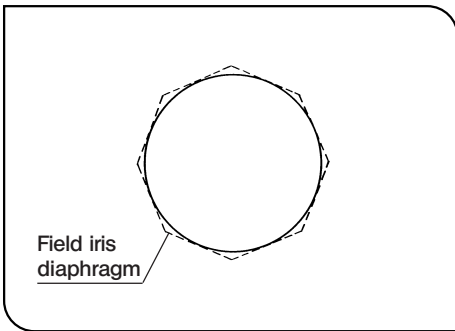


Fig. 27

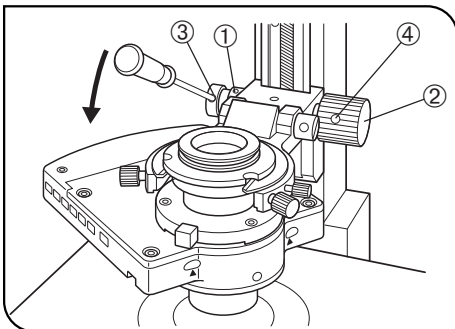


Fig. 28

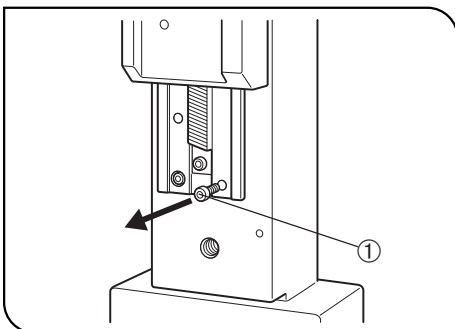


Fig. 29

3 Using the Field Iris Diaphragm (Figs. 26 & 27)

Ⓞ The field iris diaphragm lever ① 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

4 Adjusting the Condenser Height Adjustment Knob Tension (Fig. 28)

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. 28.

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.

5 Caution on Attachment of the Manipulator (Fig. 29)

★ Before the manipulator attachment adapter (ON2-99D, ON-IXP, etc.) is mounted on the base of the column, remove the condenser lower limit stopper ① since it interferes with the adapter.

4-6 Condenser

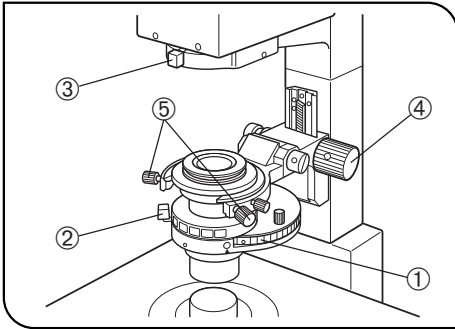
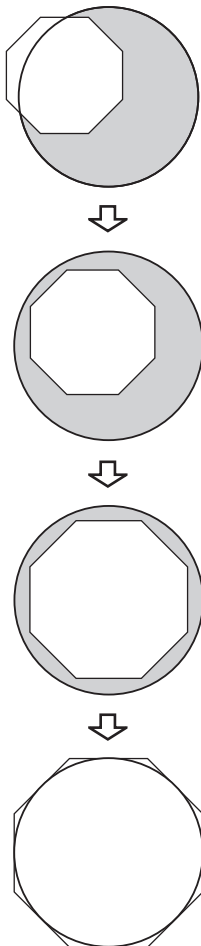


Fig. 30



1 Centering the Condenser

(Figs. 30 & 31)

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

1. Rotate the turret ① (either manually or electrically) to select the "BF" brightfield observation (with which no optical element is engaged in the light path).
 2. Move the aperture iris diaphragm lever ② to open the diaphragm.
 3. Move 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.

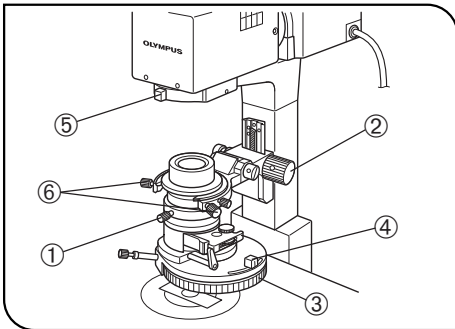


Fig. 31

With the U-UCD8 Universal Condenser

(Fig. 31)

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

This condenser is used upside down, so the optical elements may fall off if shock is applied. Use caution 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 which no optical element is engaged in the light path).
 4. Move the aperture iris diaphragm lever ④ to open the diaphragm.
 5. Move 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 move 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
 10. 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.
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 spreading immersion oil, use the condenser height adjustment knob to raise the condenser first. After finishing the procedure, lower the condenser to its lowest position. If this is done, it should be unnecessary to adjust the condenser centration and focusing again.

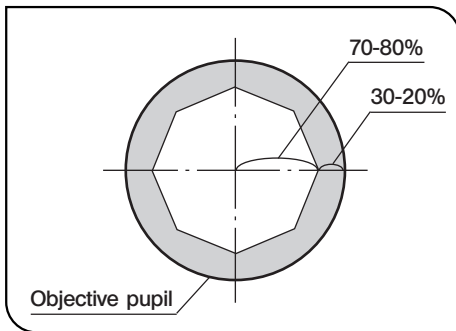


Fig. 32

2 Using the Aperture Iris Diaphragm (Fig. 32)

- ⊙ 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 N.A. 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.

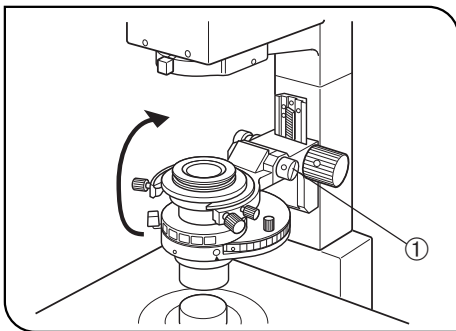


Fig. 33

3 Flipping Up the Condenser Holder (Fig. 33)

- ⊙ To create working space and facilitate specimen replacement, micromanipulator positioning or mounting an objective through the hole on the stage, flip up the condenser holder upwards.
 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.**
Unless the condenser is returned to the correct position, optimum illumination performance will not be achieved.

4-7 Objectives

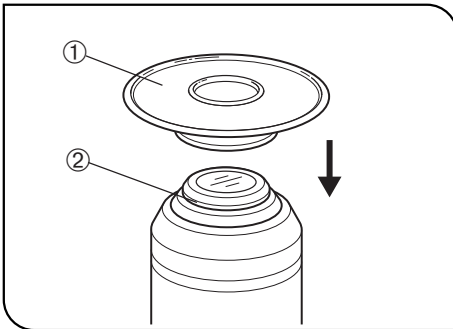


Fig. 34

1 Oil-Proof Cap (UIS Series only)

(Fig. 34)

◎ By mounting the oil-proof cap (Type C1 or 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 " 100XO3Ph " 100XO3P	Provided with microscope frame. C1: 1 piece C2: 2 pieces	C1	UApo20X3/340 " 40X3/340 " 40XOI3/340 " 20XW3/340 " 40XW3/340 UPlanApo10XW3 " Apo10XO3 " Apo60XW3 " Apo60XW3/IR	1 piece is provided with each objective.
C2	UPlanFI60XOI3 " 60XOI3Ph " 100XOI3 UPlanApo20XO3 " 40XOI3 " 40XOI3Ph " 100XOI3 " 100XOI3Ph PlanApo60XO3 " 60XO3Ph " 100XO3				

Caution when cleaning

When wiping off immersion oil or oil attached to the oil-proof cap, do not press the cap 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. The correction collar is effective with vessels with bottom thickness. (See pages 47 and 48 for the instructions on correction collar objectives.)
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 at both sides. 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.

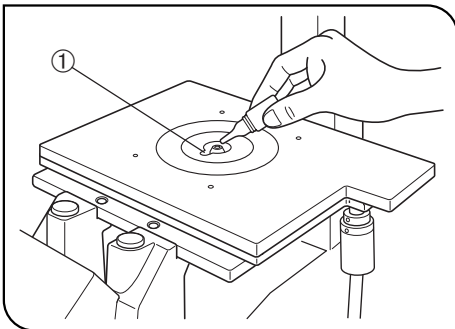


Fig. 35

3 Using Immersion Objectives

(Fig. 35)

★ **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. After gently wiping off the oil on the oil-proof cap, remove the cap. Then clean the tip of the objective and areas around it as well as the cap.**

★ **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

- ⊙ A phase contrast objective, phase contrast optical element and the U-CT30 centering telescope are required for phase contrast observation (the U-BI90CT binocular observation tube is not required).
- ⊙ If a DIC slider, analyzer or polarizer is engaged in the light path, disengage it.

1 Phase Contrast Optical Elements and Applicable Objectives

With the IX2-LWUCDA2 and IX2-LWUCD 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, UPlanFLN60XO1Ph
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, SLCPanFI40XPh
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 and PhC positions.
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, SLCPlanFI40XPh

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

☉ Refer to the provided instruction manual.

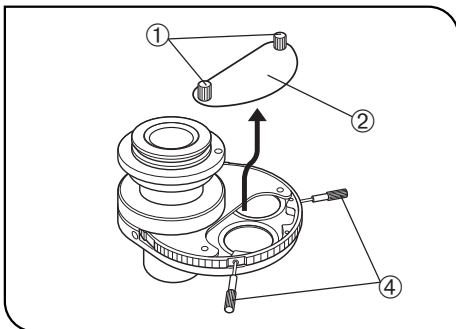


Fig. 36

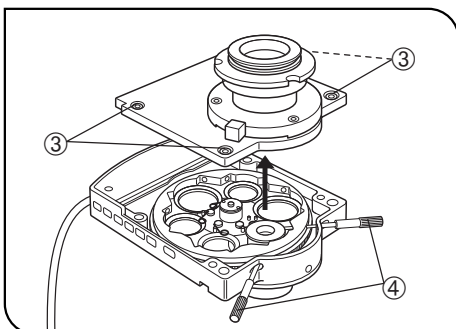


Fig. 37

2 Attaching the Phase Contrast Optical Elements

(Figs. 36 to 40)

- ☉ 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. 36, 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. 37)
- 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. 36 & 37)

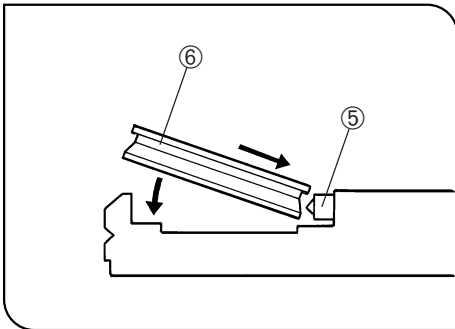


Fig. 38

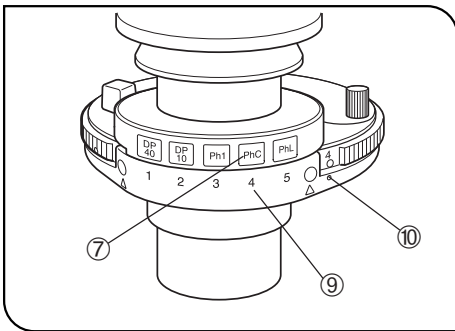


Fig. 39

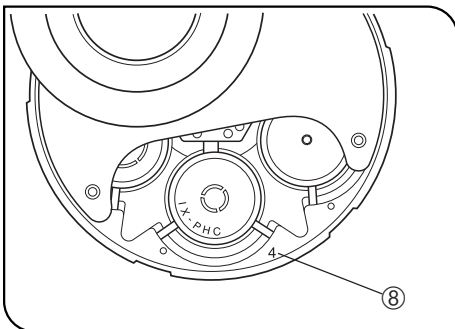


Fig. 40

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. 38)

★ **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 attached, 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 ⑨ as the number of the position ⑧ in which the corresponding optical element is mounted. (Figs. 39 & 40)

⊙ 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. 39)

⊙ To remove an optical element index, use the tip of a ballpoint pen or mechanical pencil.

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

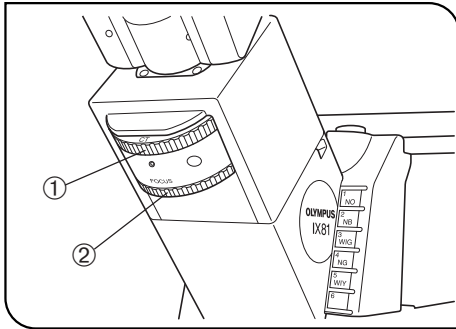


Fig. 41

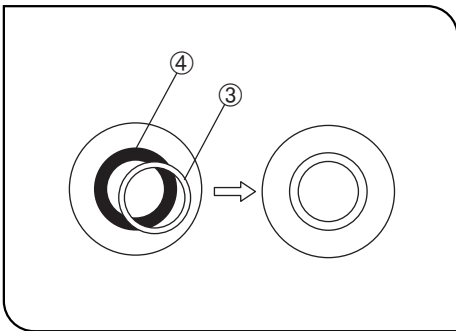


Fig. 42

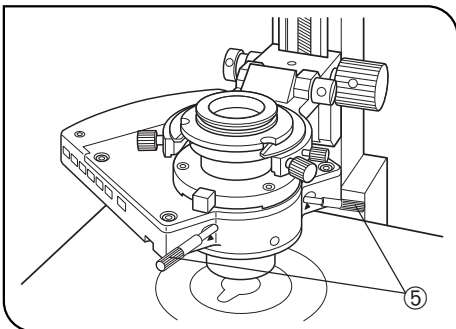


Fig. 43

3 Centering the Phase Contrast Ring Slit (Figs. 41 to 43)

⊙ 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. 41)
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. 41 & 42)

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 Differential Interference Contrast Observation

- Ⓞ 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. So use a glass petri 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 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 20XO	(IX2-DIC20)	(IX2-DIC20)	(IX2-DIC20HC)	(IX2-DIC20HR)
	40X2	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 100XO2 100XOI2	IX2-DIC60 IX2-DIC100	IX2-DIC60 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
CPlanFI	10X	(IX-DP10)	(IX-DP10)	—	—
LCPlanFI	20X	(IX-DP20)	(IX-DP20)	(IX-DP20HC)	(IX-DP20HR)
	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
	60X	IX-DP60	IX-DP60	—	—
LUCPlanFI	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
SLCPlanFI	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
UPlanFI	10X	(IX-DP10)	(IX-DP10)	—	—
	20X	—	—	—	—
	40X	—	—	—	—
	60XOI3	IX-DPO60 IX-DPO60S	IX-DPO60 IX-DPO60S	—	—
	100XO3	IX-DPO100	IX-DPO100	—	—
UPlanApo	10X	(IX-DP10)	(IX-DP10)	—	—
	10XO3	—	—	—	—
	20X	(IX-DPA20)	(IX-DPA20)	—	—
	20XO3	—	—	—	—
	40X	IX-DP40	IX-DP40	IX-DP40HC	IX-DP40HR
	40XOI3	IX-DPAO40	IX-DPO40S	—	—
PlanApo	60X	—	—	—	—
	100XOI3	IX-DPO100	IX-DPO100	—	—
UPlanApo	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	IX-DPAO40	IX-DPO40S	—	—
	40XOI3/340	—	—	—	—

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

With the U-UCD8 Universal Condenser, IX2-MLWCD Condenser & IX2-DICD Condenser

© Refer to the provided instruction manual.

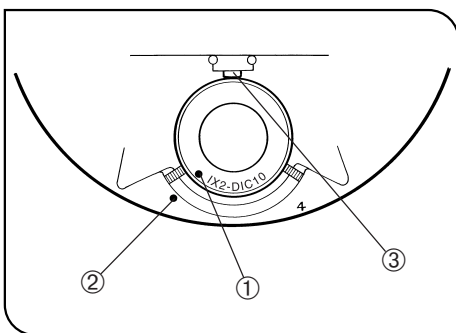


Fig. 44

2 Attaching the DIC Optical Elements (Fig. 44)

- © The attaching method is identical to that for the phase contrast optical elements (page 29 & 30), 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. (Fig. 44)
- ★ 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.

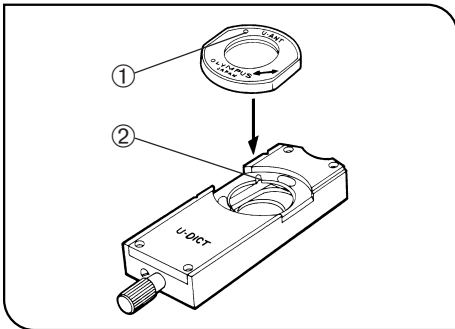


Fig. 45

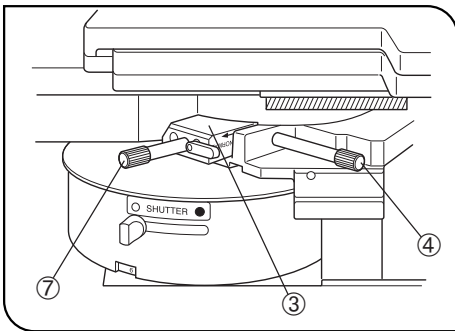


Fig. 46

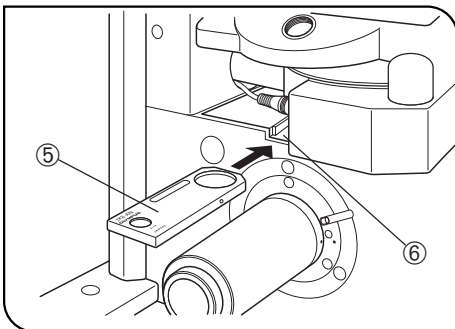


Fig. 47

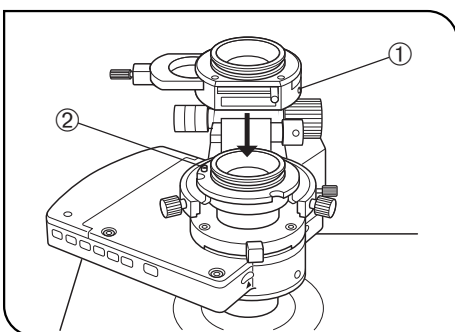


Fig. 48

3 Attaching the Analyzer and DIC Slider (Figs. 45 to 47)

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. 45)

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 mirror unit 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.

4 Attaching the Polarizer (IX-LWPO) (Fig. 48)

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

⊙ 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.

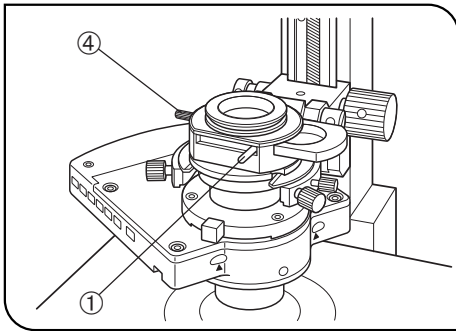


Fig. 49

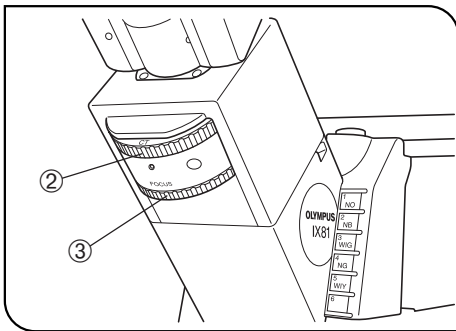


Fig. 50

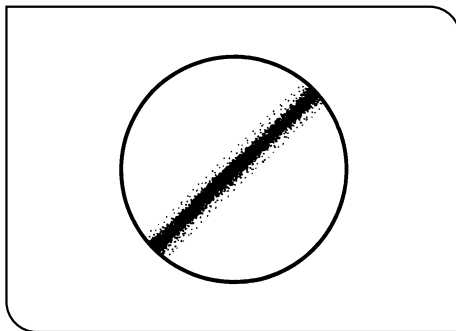


Fig. 51

5 Cross-Nicol Adjustment

(Figs. 49 to 51)

1. Rotate the condenser's turret for the BF (brightfield) light path (with no optical element engaged in the light path).
2. Move the polarizer detaching lever ① on the IX-LWPO polarizer to engage the polarizer in the light path. (Fig. 49)
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. 50) 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 focusing ring ③ (or, with the centering telescope, rotate the knurled section) to bring the objective's exit pupil into focus. (Fig. 50)
6. Move 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. 46 & 51)
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. 49 & 51)
8. After determining the position, clamp the polarizer rotation/clamping knob so that the polarizer will not rotate.

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

- ◎ With sensitive color observation using the U-UCD8, engage the U-UCDTP530 1λ 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 "Manual/Motorized Reflected Fluorescence System".

5-3 Simplified Polarized Light Observation

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

1 Attaching the Analyzer and Polarizer

©Use the same procedure as that for attaching the analyzer and polarizer for DIC observation (see page 34).

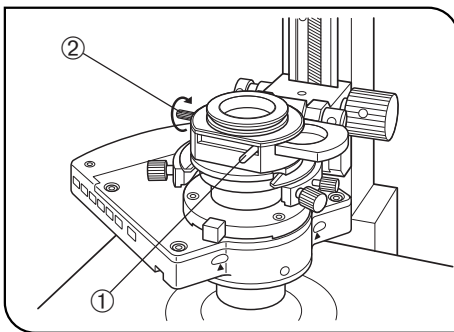


Fig. 52

2 Observation Method

(Fig. 52)

1. Rotate the turret for the BF (brightfield) light path (with no optical element engaged in the light path).
2. Move the polarizer detaching lever ① on the IX-LWPO polarizer unit to engage the polarizer in the light path. (Fig. 52)
3. Attach the objective to be used to the revolving nosepiece and rotate it to engage the objective in the light path.
4. Move 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. 52)
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.

5-4 Reflected Light Fluorescence Observation (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, see the instruction manual of the photomicrographic system in use. The following are procedures related to this microscope.

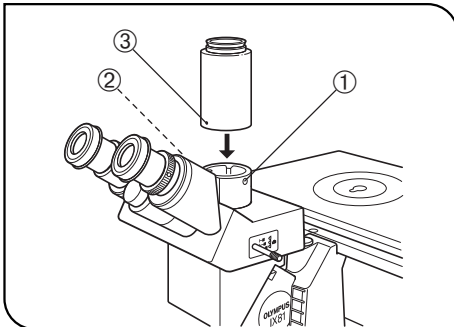


Fig. 53

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

(Figs. 53 & 54)

When the U-TR30H-2 trinocular observation tube is used (in combination with the IX-SPT) (Fig. 53)

★ 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 index ② on the front of the photo port of the trinocular observation tube with 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.

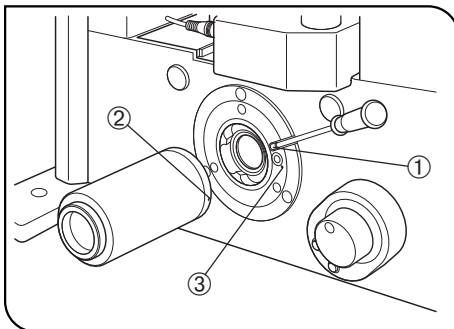


Fig. 54

When the side port is used (in combination with the IX2-SPT) (Fig. 54)

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

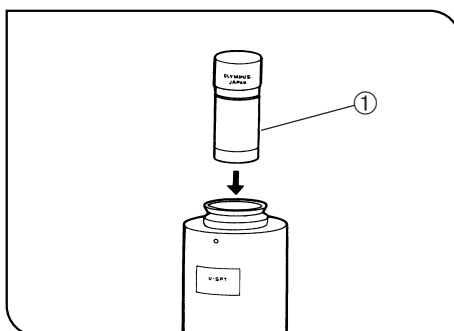


Fig. 55

2 Attaching the Photo Eyepiece

(Fig. 55)

Use only a PE photo eyepiece for photomicrography.

Insert the PE photo eyepiece ① into the photographic 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.

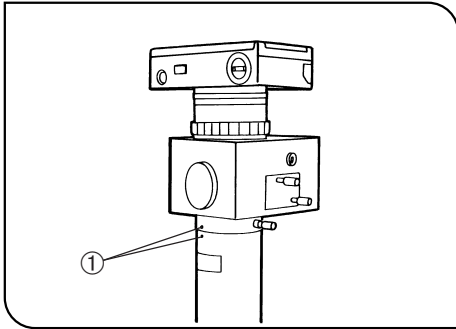


Fig. 56

3 Attaching the Photomicrographic system (Fig. 56)

- 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 19.

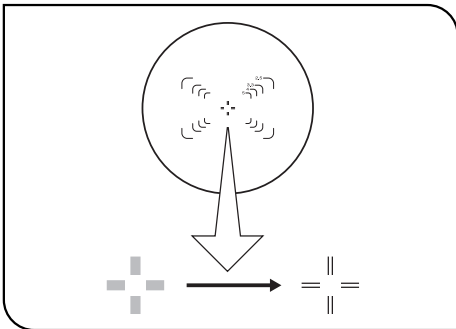


Fig. 57

5 Adjusting the Focus (Figs. 57 & 58)

☉ 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. 57)

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. 57)

2. Bring the specimen into focus using the focus adjustment knob. 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. (Fig. 58)

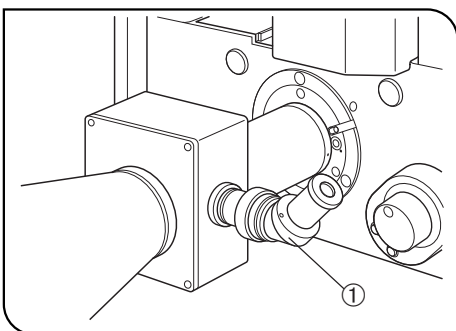


Fig. 58

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. 58)

« 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

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 four 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 onto the IX2-LBPC C-mount unit for lower back port (To be installed by the manufacturer)
4. Attaching the video camera onto the IX2-TRV/IX2-TRVAC 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 38.
- 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. 59)

- 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.

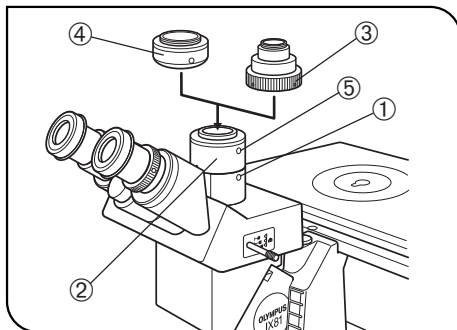


Fig. 59

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. 59)
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. 59)
4. Attach a compatible TV camera on the U-CMT or U-FMT.

« Parfocal Adjustment of 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. 59)
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. 59)

3 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%

4 Attaching the Camera on the Bottom TV Port (IX2-TVR/IX2-TVRAC)

Ⓞ A C-mount video camera (used together with the U-CMT) 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.

Only a C-mount video camera can be used with the IX2-TVRAC motorized 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.

5 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.	Powercord of the IX2-UCB is unplugged.	Plug the power cord into a power outlet.	–
	Main switch of the IX2-UCB is not ON.	Set the main switch to "I" (ON).	–
	Transmitted lamp ON/OFF switch on the IX81 frame is not ON.	Set the Lamp ON/OFF switch to ON.	13
	Bulb is burnt out.	Replace the bulb.	51
b) The bulb lights but the field of view is dark.	Lamp voltage is too low.	Increase the light intensity to an optimum voltage.	13
	Condenser is not well positioned.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.	23
	Condenser is not centered.	Center the condenser so that the field iris diaphragm image is centered in the field of view.	23
	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.	13
	Too many filters are used.	Reduce the number of filters to the minimum required.	21
	Stage center plate is engaged in the light path.	Move the stage and place the specimen again.	17
	Field iris diaphragm is not opened wide enough.	Open the field iris diaphragm sufficiently.	22
	Light path selector knob of the trinocular tube is pulled out.	Set the knob at the middle or pushed-in position.	19
Turret of the U-BI9CT is set to position "S".	Rotate the turret to position "0".	19	
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.	19
	An objective that falls outside the condenser's illumination range is used.	Use a condenser that matches the objective.	20
	Field iris diaphragm is not properly centered.	Center the field iris diaphragm correctly.	23
	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm sufficiently.	22
	Light path selector knob is in an intermediate position.	Turn the knob as far as it will go or engage it at the click stop according to the observation method.	19

Problem	Cause	Remedy	Page
c) Field of view is obscured or not evenly illuminated.	Magnification selector knob is in an intermediate position.	Turn the knob as far as it will go or engage it at the click stop according to the observation method.	14
	Revolving nosepiece or magnification selector knob is in an intermediate position.	Fully engage the revolving nosepiece or knob at a click stop.	14
	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.	21
	The frost filter is not engaged.	Engage the frost filter.	21
d) Dirt or dust is visible in the field of view.	Dirt/dust on the specimen.	Clean thoroughly.	5
	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.	23
e) Image glares.	Condenser is raised too high.	Lower to the proper position.	23
	Aperture iris diaphragm is stopped down too far.	Open the aperture iris diaphragm.	25
f) Visibility of observed image is poor. <ul style="list-style-type: none"> • 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.	47/48
	Correction collar on the objective equipped with correction collar is not adjusted.	While focusing, rotate the correction collar to find the best position.	27
	Front lens of the objective is dirty.	Clean the objective.	5
	Immersion oil is not being used with an oil immersion objective.	Use immersion oil.	27
	Immersion oil contains bubbles.	Remove bubbles.	27
	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.	5
	Ring slit and phase plate are not centered.	Center them correctly.	31
Poor contrast during DIC observation.	Replace the plastic culture vessel with a glass vessel.	32/33	

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.	16
h) Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.	18
	Incorrect diopter adjustment.	Adjust the diopter.	18
	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.	-

8 SPECIFICATIONS

Module		Specification						
Microscope Frame	IX81-S8F-3 IX81-S1F-3 IX81-F-3	<ul style="list-style-type: none"> Motorized light path selection <table border="0" style="margin-left: 20px;"> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">S8F-3:</td> <td>Side port 80% light path</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">S1F-3:</td> <td>Side port 100% light path</td> </tr> <tr> <td style="border-left: 1px solid black; padding-left: 5px;">F-3:</td> <td>Prism unit is required.</td> </tr> </table> Motorized 6-position revolving nosepiece (DIC slider attachable) Motorized focusing up/down stroke: Above focusing position: 7 mm. Below focusing position: 2 mm Side port: 1X (perfect aberration correction) Intermediate magnification changer: 1X ↔1.6X built in Selector buttons: Light path selector, coarse/fine selector (x 2), light intensity control, focusing ▲, focusing ▼, objective escape/return (x 2), lamp on-off, auxiliary 	S8F-3:	Side port 80% light path	S1F-3:	Side port 100% light path	F-3:	Prism unit is required.
	S8F-3:	Side port 80% light path						
S1F-3:	Side port 100% light path							
F-3:	Prism unit is required.							
Illumination Column	IX2-ILL100	Column for installing the lamp housing, with 30° tilting mechanism. Condenser holder can be flipped up. For 100 W halogen bulb, precentered.						
Observation Tube	U-BI90CT	Binocular tube with 45° tilting angle. Built-in CT, diopter adjustment on one eyepiece sleeve possible. Eye point switchable in 2 steps of 400 and 430						
	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						
Condenser	IX2-LWUCDA2, IX2-LWUCD	NA. 0.55, W.D. 27 mm. Motorized turret: 6 positions / Manual turret: 5 positions.						
	IX-ULWCD	NA. 0.3, W.D. 73 mm. Manual turret with 4 positions.						
	U-UCD8	Dry: NA. 0.9, W.D. 1.5 mm. Oil immersed: NA. 1.4, W.D. 0.6 mm						
Stage	IX2-SFR	Coaxial flexible knobs on the bottom right position. Movement range 50 mm (X) x 50 mm (Y). Center plate diameter 110 mm.						
	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.						
Eyepieces	WHN10X	Field number 22.						
	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 UPlanFLN10X2Ph UPlanFLN20XPh UPlanFLN40XPh UPlanFLN60XOIPh UPlanFLN100XO2Ph 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 6.6-7.8 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, WD 0.2 mm WD 0.12 mm, WD 0.2 mm WD 0.2 mm,	with correction collar with iris diaphragm with iris diaphragm
	Plan semi-apochromat for DIC and fluorescence observation	LUCPlanFLN20X LUCPlanFLN40X LUCPlanFLN60X	NA 0.45, NA 0.6, NA 0.7,	WD 6.6-7.8 mm, WD 2.7-4.0 mm, WD 1.5-2.2 mm,	with correction collar with correction collar 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, WD 0.13 mm	with correction collar
	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, WD 0.2 mm WD 0.2 mm, WD 0.15 mm WD 0.15 mm WD 0.15 mm WD 0.13 mm	with iris diaphragm with iris diaphragm
	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

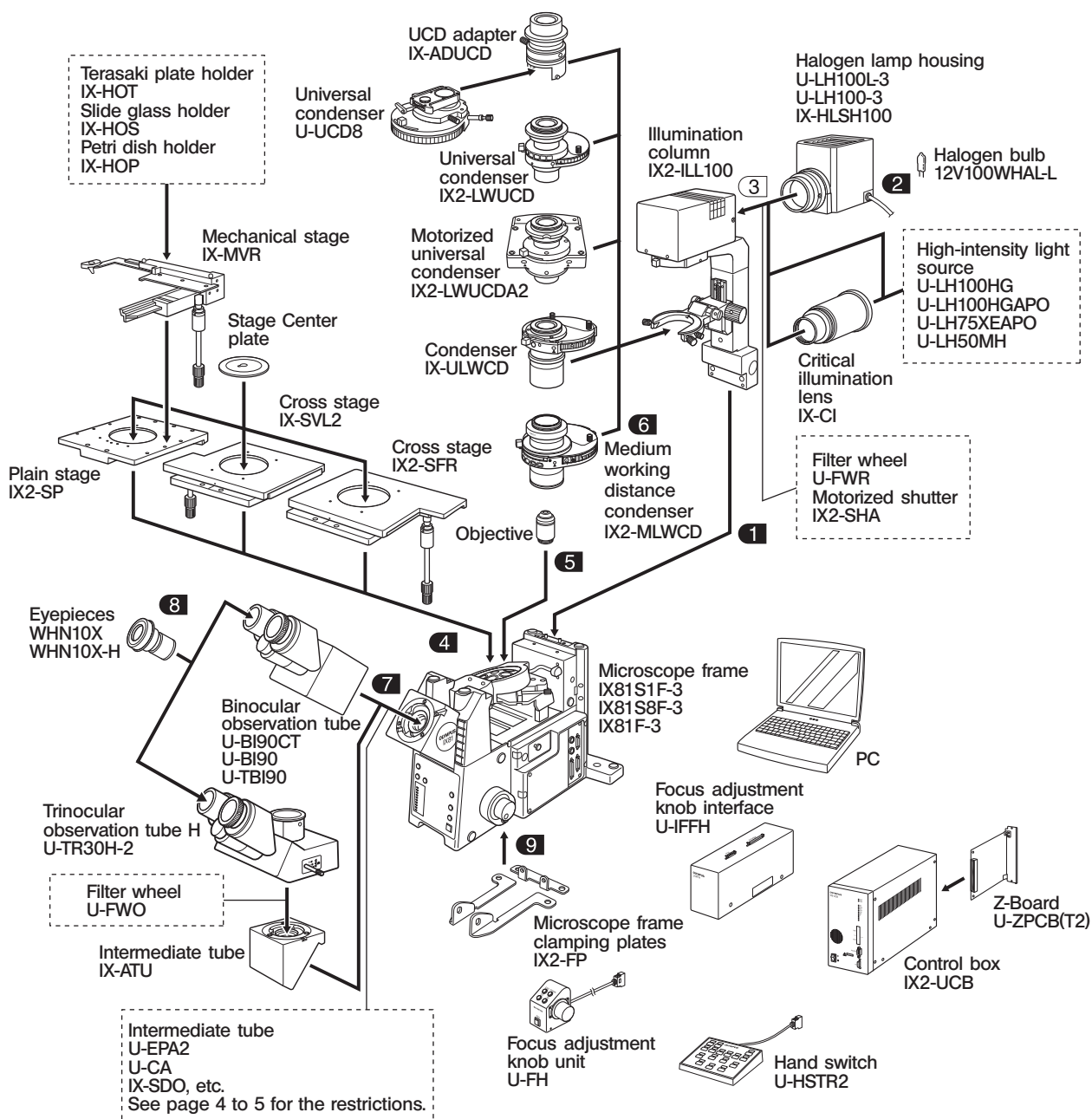
The diagram below shows the sequence of assembly of the modules. The numbers indicate the order of assembly.

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 your Olympus representative 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 pages 1 & 2).

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 and modules without descriptions, refer to the separate instruction manuals.



© For the connection of cables, refer to the instruction manual for the IX2-UCB control box.

9-2 Detailed Assembly Procedures

★ Be always sure to use the U-ZPCB(T2) Z-board.

The following phenomena will occur if the U-ZPCB is used, even though the correct setup is performed:

- The rotation direction of the focusing knob is opposite to the actual movement direction of the objectives.
- Initialization may not be possible depending on the position of the focusing block. (The microscope may not start up.)

Setting Up and Mounting the Z-Board

Ⓞ The on-board DIP switches on the Z-board have been designed for use with the BX61 or BX62 microscope at the factory (i.e. all of the S1, S2 and S3 switches at the OFF positions).

Change the setup of the DIP switches to enable the use of the Z-board with the IX81.

Changing the On-Board DIP Switch Setting

(Fig. 60)

- ★ Set all other switches than those listed below to the OFF positions.
 - **S3** Set No. 4 and No. 5 to ON.
- ★ If the setting is not correct, the objective may raise and hit the specimen during initialization.

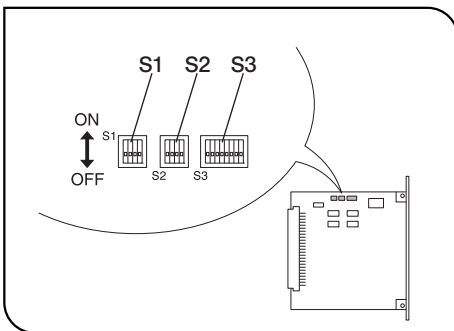


Fig. 60

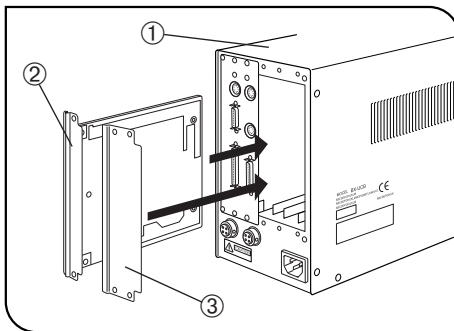


Fig. 61

Mounting the Z-Board

(Fig. 61)

CAUTION

If other control boards than the U-ZPCB(T2) (U-ZPCB, U-AFA1-CB, etc.) is installed in the IX2-UCB, be sure to remove them before proceeding.

Leaving other control boards may result in malfunction.

Ⓞ Set the main switch of the IX2-UCB control box ① to “○” (OFF) before mounting the Z board.

1. Loosen the six knobs clamping the two option slot covers on the rear of the IX2-UCB and remove the knobs and covers.
2. Align the connector of the Z-board ② with that inside the IX2-UCB and insert the board along the board rails.
Push the board all the way in until the connector is plugged in firmly.
3. Clamp the Z-board ② using the clamping knobs removed above. Attach the other cover ③ in the same way.

Ⓞ Retain the cover removed for mounting the Z board carefully.

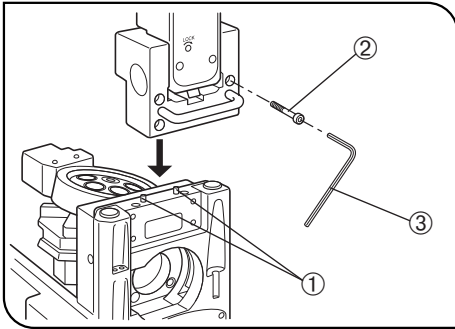


Fig. 62

1 Mounting the Illumination Column (Fig. 62)

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.

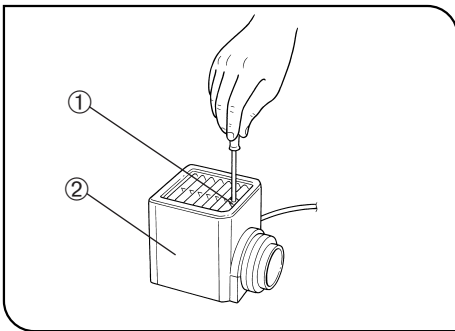


Fig. 63

2 Attaching the Halogen Bulb (Figs. 63 to 65)

Ⓞ 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 position ⑦ on the lamp socket.

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

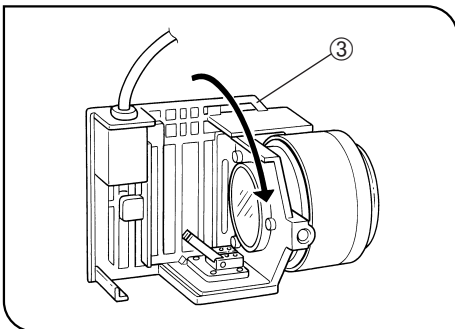
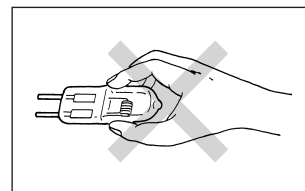


Fig. 64



▲ 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. 63)

▲ 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.

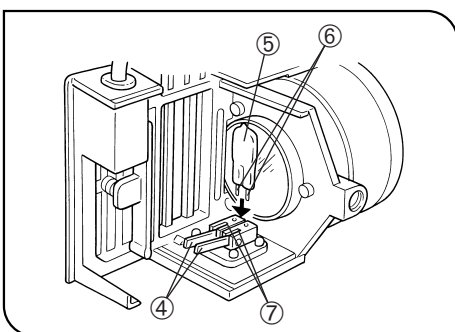


Fig. 65

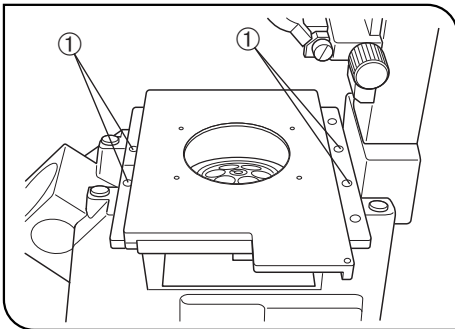


Fig. 66

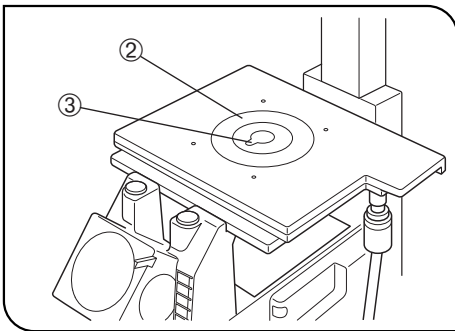


Fig. 67

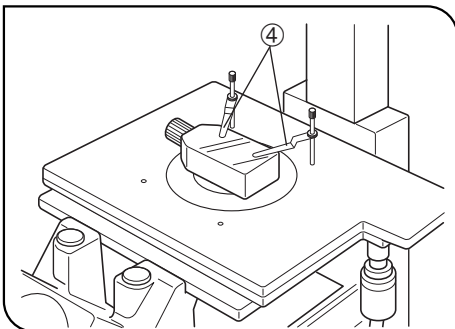


Fig. 68

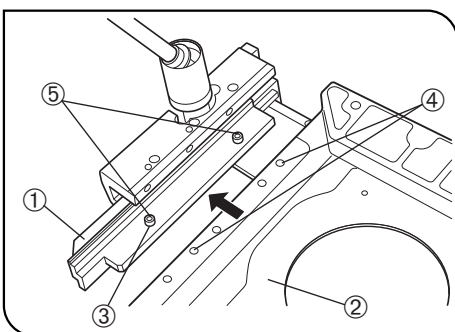


Fig. 69

4 Attaching the Stage

(Figs. 66 to 68)

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

⊙ When mounting the IX-MVR mechanical stage, first attach it to the IX2-SP 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. 66)

3. Fit the stage center plate ② into the stage. (Fig. 67)

★ **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. 67)

4. Screw the IX-SCL stage clips ④ into the threaded holes provided on the stage top surface. (Fig. 68)

⊙ 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 focusing knob comes in the way of the stage operation so it may be necessary to remove the left focusing 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)

(Figs. 69 to 71)

« Attaching Procedure »

1. Invert the mechanical stage ① upside down. Also invert the IX2-SP plain stage ② and place it on top of the inverted mechanical stage. (Fig. 69)

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.**

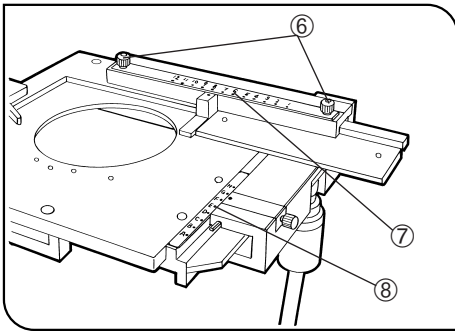


Fig. 70

« Attaching the Scales »

Ⓞ Scales for use with a 96-well microtiter plate are provided with the mechanical stage.

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. 70)
2. Positioning the scale numerals correctly, plate the Y-axis scale ⑧ on the top of the stage's Y-axis guide. The scale will be held in place magnetically. (Fig. 70)

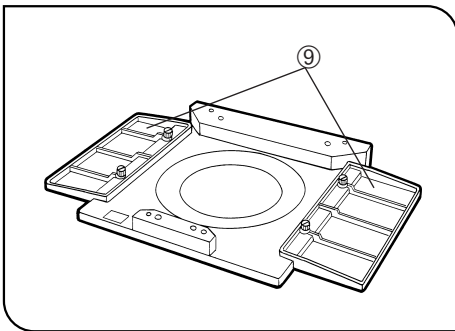


Fig. 71

« Attaching the CK2-SS Substages »

• These plates can be attached in the same way as outlined in **Mechanical Stage (IX-MVR)** above.

Ⓞ When the mechanical stage is not used, stage extender plates ⑨ can be attached at both sides of the plain stage. (Fig. 71)

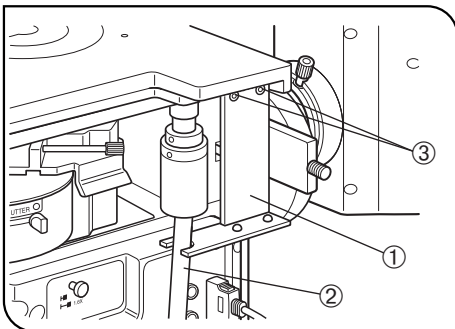


Fig. 72

« 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. 72 & 73)

1. Insert the stalk ② of the flexible X-axis/Y-axis knobs into the U-shaped notch on the positioning bracket ①.
2. Using the Allen screwdriver, tighten the clamping screw ③ of the bracket lightly to the stage.
3. Align the stage's center alignment index line ④ with the edge ⑤ of the upper stage. (Fig. 73)
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.

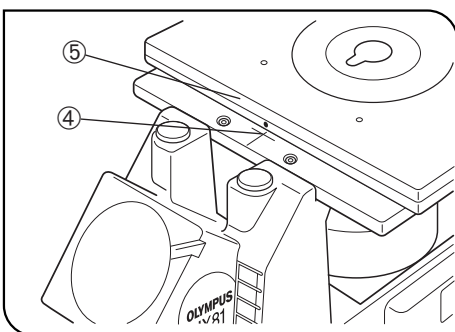


Fig. 73

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 until the position D or E on the Y-axis scale is reached to bring the stage into the center.

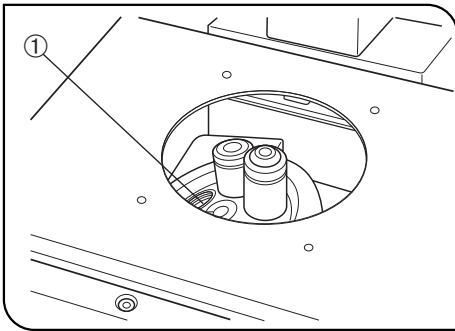


Fig. 74

5 Attaching the Objectives

(Fig. 74)

1. 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 a 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 ① in the nosepiece, attach the dust caps provided. (Fig. 74)
2. Attach the objective power indication stickers, provided with the U-HSTR2 hand switch, to the hand switch according to the objective position numbers.

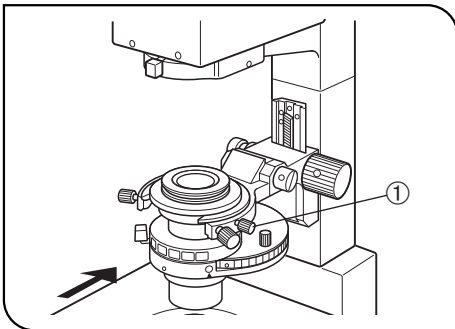
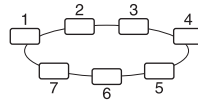


Fig. 75

6 Attaching the Condenser

(Figs. 75 & 76)

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, attaching in a tilted position as shown in Fig. 76 is the correct direction.
3. Tighten the condenser clamping screw ①.

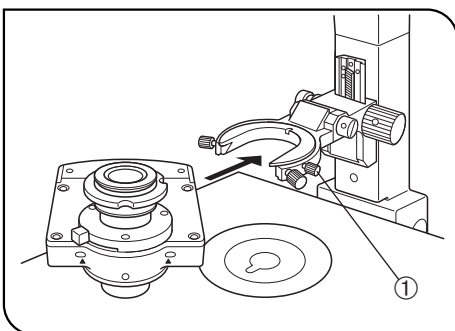


Fig. 76

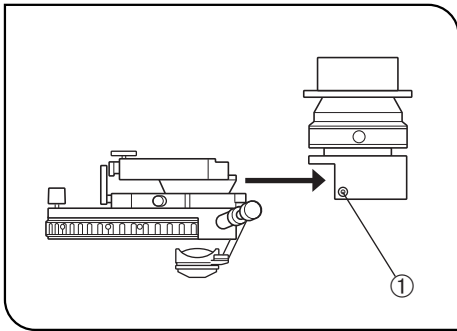


Fig. 77

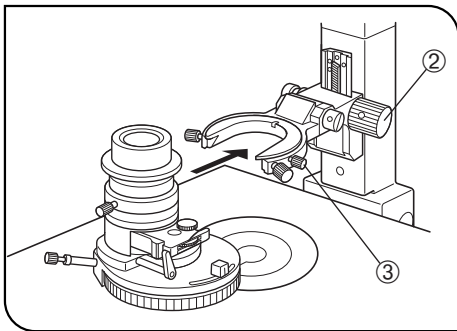


Fig. 78

Universal Condenser (U-UCD8)

(Figs. 77 & 78)

« Attaching onto the UCD Adapter »

1. Using the Allen screwdriver, loosen the two setscrews ① on the IX-ADUCD UCD adapter. (Fig. 77)
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. 77)

« Attaching onto the Illumination Column »

1. Rotate the condenser height adjustment knob ② to raise the condenser to the upper limit position. (Fig. 78)
2. Loosen the condenser clamping knob ③. (Fig. 78)
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. 78)

« Optical element indices »

The optical element indices attached on the U-UCD8 are not visible because the U-UCD8 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.

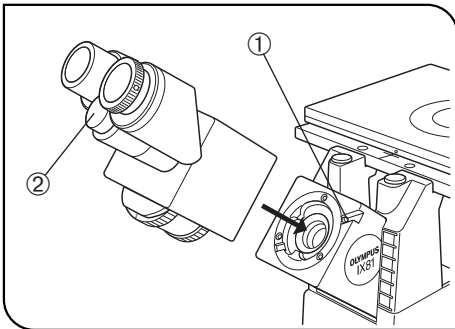


Fig. 79

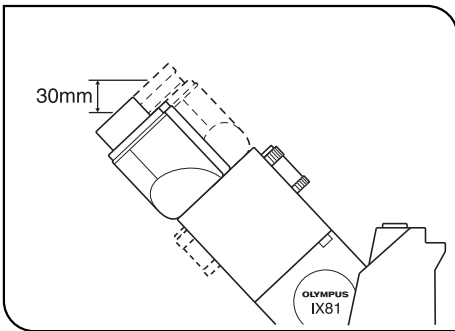


Fig. 80

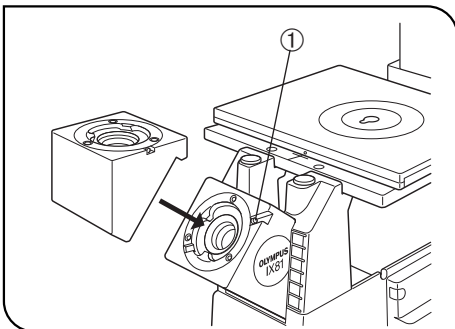


Fig. 81

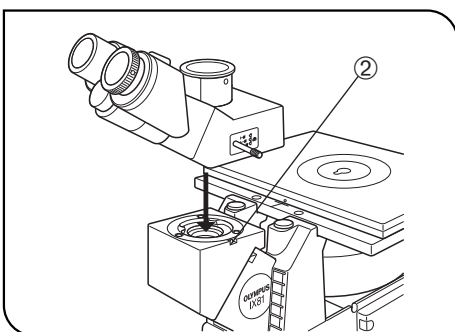


Fig. 82

7 Attaching the Observation Tube (Figs. 79 to 82)

Binocular Tube (U-BI90CT, U-BI90, U-TBI90) (Figs. 79 & 80)

1. Using the Allen screwdriver, loosen the observation tube clamping screw ① on the observation tube mount. (Fig. 79)
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. 80)

Trinocular Tube (U-TR30H-2) (Figs. 81 & 82)

Ⓞ 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. 81)
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. 82)
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. 82)

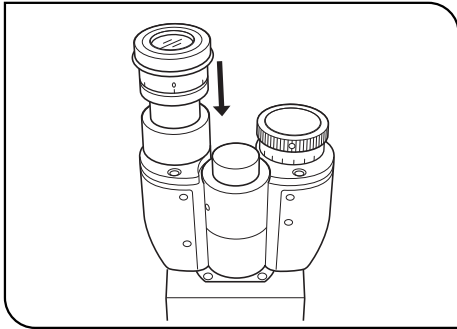


Fig. 83

8 Attaching the Eyepieces

(Fig. 83)

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).

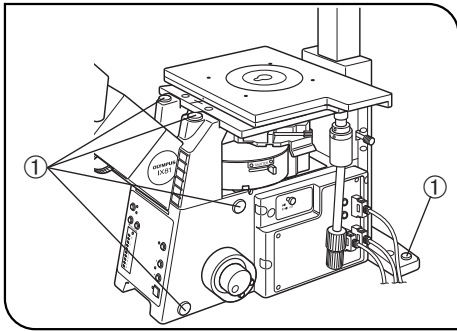


Fig. 84

Using the Accessory Mounting Holes

(Fig. 84)

⊙ 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.

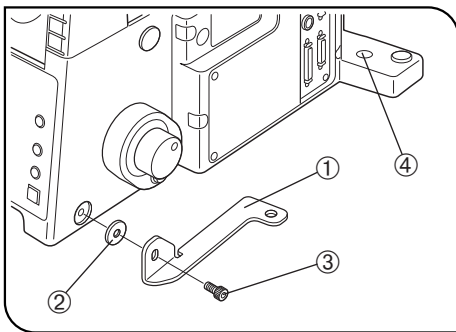
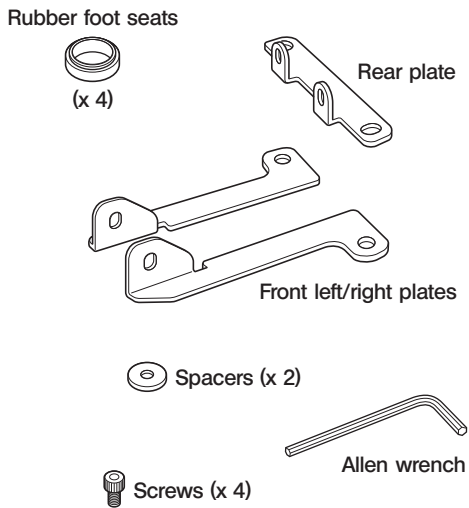


Fig. 85

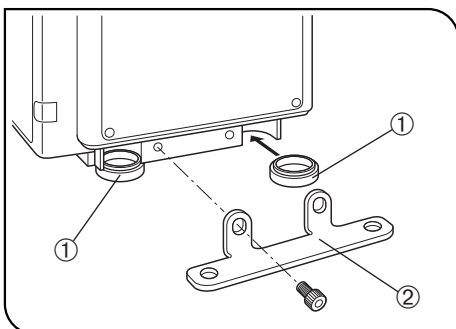


Fig. 86

9 Using the Microscope Frame Clamping Plates (IX2-FP)

(Figs. 85 & 86)

⊙ The microscope frame clamping method is variable depending on 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 two 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 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.




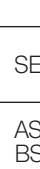















Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL-APEX / MITI	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		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
Comite Electrotechnique Belge (CEBEC)	CEBEC	<HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	<VDE>	<HAR>	30	10	10
Union Technique de l'Electricite' (UTE)	USE	<HAR>	30	10	30
Instituto Italiano del Marchio di Qualita' (IMQ)	IEMMEQU	<HAR>	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	<HAR>	10	10	30
N.V. KEMA	KEMA-KEUR	<HAR>	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	<HAR>	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	<ÖVE>	<HAR>	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	<DEMKO>	<HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI>	<HAR>	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	<HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNED>	<HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	<HAR>	30	30	70
Instituto Portages da Qualidade (IPQ)	np	<HAR>	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	<HAR>	10	30	90
Elektriska Inspektoratet	SETI	<HAR>	10	30	90

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

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

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 identified 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 consult 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.				
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.				
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 housing. Uneven discoloration of the left and right sections of these parts.				
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.

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