INSTRUCTIONS

BX3-UCD8A

MOTORIZED UNIVERSAL CONDENSER

Optical Microscope Accessory

This manual pertains only to the information related to the universal condenser. Before using this instrument together with the microscope and associated modules, make sure that you have carefully read their manuals and understand how the system should be operated together.

This product is a part of the system product which complies with the CE marking.
Please refer to the instruction manual of your system product for the safety instructions related to the CE marking.

In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.
Refer to your local our distributor in EU for return and/or collection systems available in your country.

For Korea only

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

IMPORTANT

- When the BX3-UCD8A motorized universal condenser is installed on the BX63 motorized microscope frame, the motorized operations of the condenser can be controlled from the BX3-CBH control box, the touch panel controller.
- When the BX3-UCD8A is installed on the BX53/43 manual microscope frame to which the U-CBM control box is connected, the semi-motorized operations of the condenser can be controlled from the U-HSCBM hand switch.
- Replacing the optical elements allows the condenser to be used in various transmitted light observations, making possible quick switching between the brightfield, darkfield, phase contrast, DIC and simplified polarized light observations. The condenser employs the top lens IN-OUT system so as to enable the use of objectives from low power (1.25X*) to high power (100X). It also ensures high-contrast observation when it is used in combination with a universal vertical fluorescence illuminator. When the top lens is exchanged with an oil-immersion top lens, the brightfield and DIC observations using an oil-immersion objective is also possible.

*The U-CO1.25X low-magnification conversion lens for UCD is required (to be mounted in the turret).

1 Getting Ready

1. This manual pertains only to the information related to the motorized universal condenser. Before using this instrument together with the BX63/53/43 microscope and associated modules, make sure that you have carefully read their manuals and understand how the system should be operated together.
2. This product is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
3. Be careful not leave dust or fingerprints on the lens components.
4. Do not attempt to move the motorized parts manually using an excessive force. Otherwise, they may be damaged.
5. Swing out the top lens (to the OUT position) before installing or uninstalling the condenser on or from the microscope. Be also cautious so that the condenser does not interfere with the microscope and stage.
6. Adjust the centering of the condenser before use.
   If the condenser is extremely decentered, the interference between the top lens and stage holder may make it impossible to swing out the top lens.

7. Remove the condenser from the microscope before mounting or dismounting optical elements.
8. Do not tighten the optical element centering knobs too much.
9. Do not tighten the optical element centering knobs while the optical element is not present. Otherwise, the knobs may become unable to be returned.
10. An intermediate attachment or slider may be required for certain observation modes.
11. Do not engage an optical element (small) in position 1, 2 or 3 in the light path for brightfield observation. Otherwise, the peripheral area in the field may be obscured.

2 Maintenance and Storage

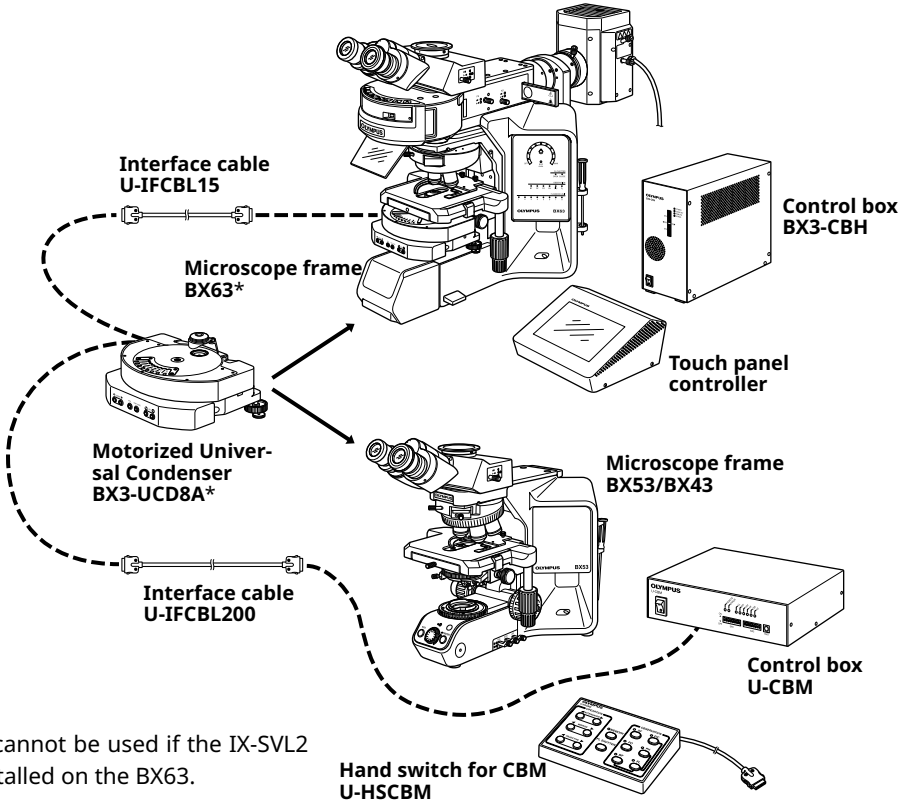
1. To clean the lenses and other glass components, simply blow dirt away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
   If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute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

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

2. Do not disassemble or modify any part of the instrument, as this could result in malfunction or reduced performance.
3. When optical elements and indices are not used, store them in their cases.
4. Before disposing of this product, be sure to follow the regulations and rules of your local government.

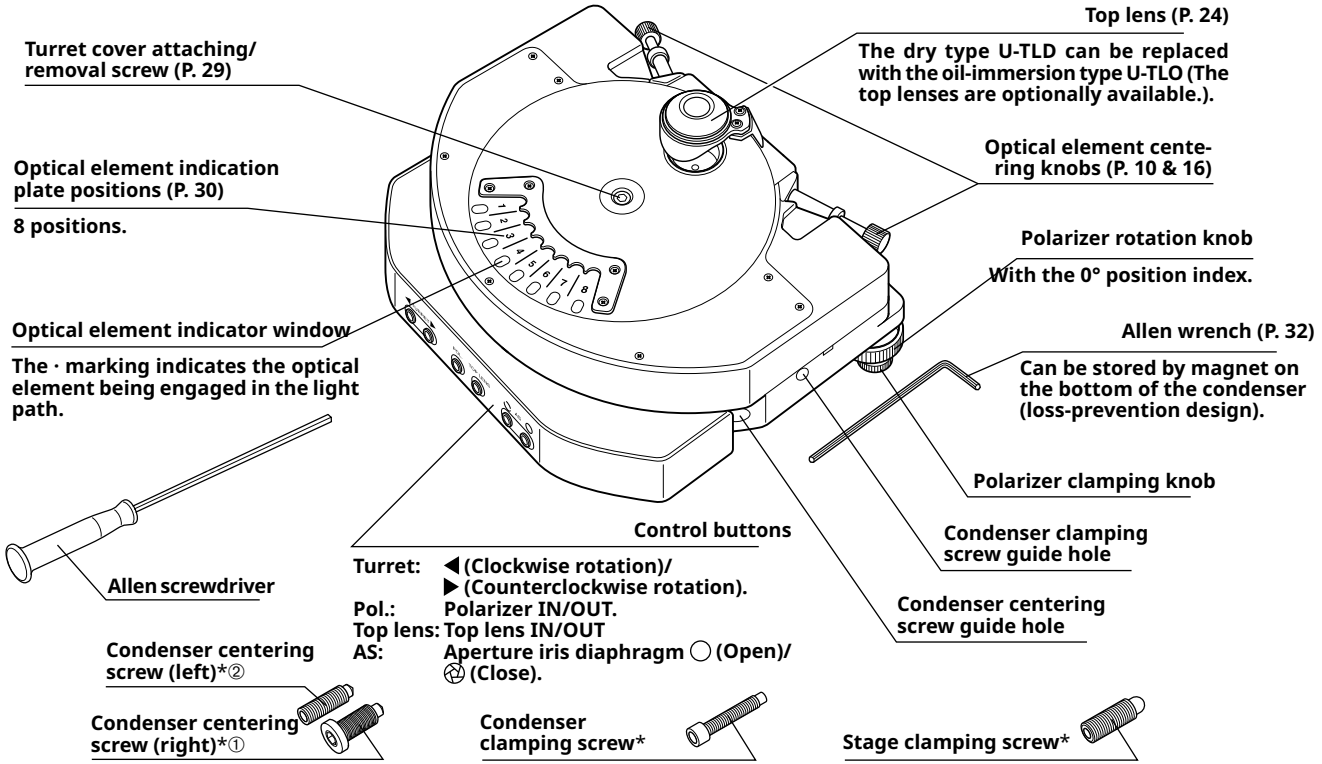
1 SYSTEM CHART

◎ For the connection of cables, refer to the instruction manual for the BX3-CBH or U-CBM control box.



*This condenser cannot be used if the IX-SVL2 cross stage is installed on the BX63.

2 NOMENCLATURE



*To improve the ease of operation, replace the centering knobs and clamping knob of the condenser holder and the clamping knob of the stage with these screws.
Mount BX3-UCD8A with one condenser centering screw (right) ① on the right side facing to the condenser and the other condenser centering screw (left) ② on the left side.

Optical elements (See pages 26 to 28 for the list of applicable objectives.)

Phase contrast ring (Small)

U-PH1S
U-PH2S
U-PH3S

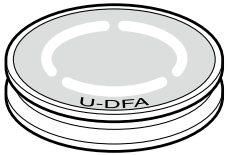
DIC prism (Small)

U-DP10S

DIC prism (Large)

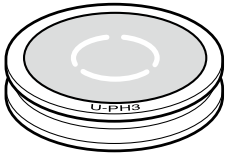
DIC prisms other than U-DP10S

Darkfield ring



U-DFA

Phase contrast ring (Large)



U-PH3

Low-magnification conversion lens for UCD

U-CO1.25X

CAUTION

- **Dummy optical elements have been mounted in the turret at the factory in order to prevent loosening of the optical element centering/clamping screws. Remove the dummy optical elements only from the positions you want to mount the desired optical elements.**
- **A commercially available ND filter (with a frame diameter of 25 mm$^{+0.3/+0.2}$) can be mounted in a dummy optical element (Large). To mount the ND filter, place it in an idle position in the turret, fit the dummy optical element (Large) and mount in the same way as an ordinary optical element.**
- **Do not use a reflective ND filter because ghost may be generated in the simplified polarized light observation.**

3 OBSERVATION PROCEDURES

3-1 Preparation

- If the top lens and optical element are not assembled, go to Chapter 6, "ASSEMBLY" (pages 24 to 35).
- Set the main switch of the BX3-CBH (or U-CBM) control box to "**I**" (ON) and make the microscope system ready for observation. For details, refer to other instruction manuals.

3-2 Brightfield Observation (BF)

■ **Applicable objective magnifications**

Magnification	1.25X	2X	4X	10X	20X	40X	60X	100X
BF	○**	○	○	○	○	○	○*	○*
	Top lens OUT			Top lens IN				

*When the top lens is the dry type U-TLD, the NA is slightly insufficient but this does not cause problem in ordinary observations.

**Mount the U-CO1.25X low-magnification conversion lens for UCD in the optical element turret and engage it in the light path. The field may be obscured by the top lens frame during super-widefield (FN 26.5) observation, but this does not cause problem in camera recording.
If the low-magnification conversion lens is not used, the brightness in the peripheral area may become insufficient.

◎ If a transmitted DIC slider (U-DICT, U-DICTS, etc.) is used, pull out the slider till the click position for disengaging it from the light path.

◎ If the reflected light analyzer (U-AN-2) is used, pull out the analyzer till the click position for disengaging it from the light path.

1. Select the BF observation light path (with no optical element engaged in the light path).
2. Rotate the revolving nosepiece to engage the desired objective in the light path.
3. When using a 2X or 4X objective, swing out the condenser top lens and open the aperture iris diaphragm.

◎ When the top lens is swung out, the field iris diaphragm of the microscope functions as the aperture iris diaphragm.

4. Place a specimen on the stage.
5. Focus on the specimen.
6. Adjust the field iris diaphragm so that its image circumscribes the field of view.
7. Adjust the aperture iris diaphragm as required.

◎ The iris image may not be visible if the slide glass is thicker than 1.2 to 1.4 mm. If you want to record images, it is recommended to use a slide glass with thickness of 0.9 to 1.2 mm whenever possible.

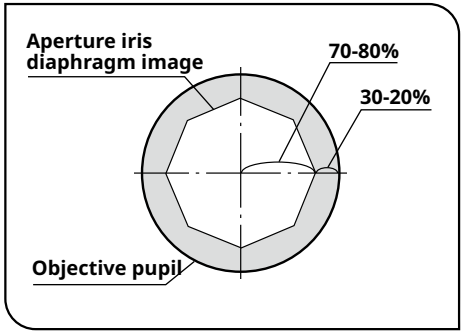


Fig. 1

Field Iris Diaphragm

- The field iris diaphragm restricts the diameter of the beam of light entering the objective and thus excludes extraneous light, improving image contrast. The diameter of the field iris should e adjusted for objective power to the extent that it just circumscribes the field of view.

Aperture Iris Diaphragm

- The aperture iris diaphragm determines the numerical aperture of the illumination system. It has an effect of adjusting the balance between image resolution and contrast. Stopping down the aperture iris diaphragm increases the depth of focus.
- As microscopic specimens are usually low in contrast, reducing the diaphragm opening to 70% or 80% of the objective's N.A. will generally provide an image of acceptable quality. To check the opening, after completing focus adjustment, remove one of the eyepiece lenses and look into the empty eyepiece sleeve. As you stop down the aperture iris diaphragm, the iris diaphragm image can be seen in the objective pupil. (Fig. 1)

3-3 Phase Contrast Observation (PH)

■ **Applicable objective magnifications**

Magnification	10X	20X	40X	60X	100X
PH	○*	○	○	○	○
	Top lens IN				

* Slight flare may be observed in the peripheral area during super-widefield (FN 26.5) observation, but this does not cause problem in image recording.

◎ If a transmitted DIC slider (U-DICT, U-DICTS, etc.) is used, pull out the slider till the click position for disengaging it from the light path.

◎ If the analyzer for reflected light (U-AN-2) is used, pull out the analyzer till the click position for disengaging it from the light path.

◎ The objective has an indication of the applicable phase contrast ring (Example: Ph1).

1. Select the turret in which the phase contrast ring matching the objective in use (U-PH1S, U-PH2S, U-PH3S, U-PH3) is mounted.
2. Mount the desired phase contrast objective on the revolving nosepiece and rotate the nosepiece to engage the objective in the light path.
3. Open the aperture iris diaphragm.

CAUTION **If the aperture iris diaphragm is stopped down, flare may be observed in the image center.**

4. Focus on the specimen.
5. Remove an eyepiece and replace it with the U-CT30 centering telescope.

CAUTION **Use the U-CT30-2 centering telescope if the observation tube is the U-TTR-3 or U-TTLBI. If the U-CT30 is used, it is impossible to focus on the phase film.**

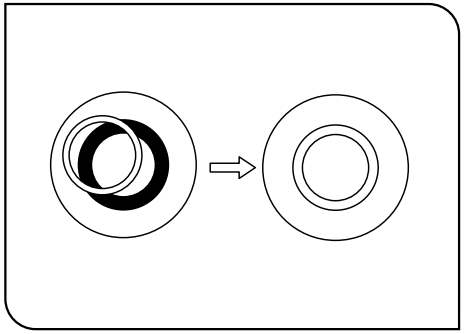


Fig. 2

6. Rotate the top of the U-CT30 centering telescope to focus on the bright ring (ring slit) and dark ring (phase film of the objective) in the field of view.
7. Push in and rotate the optical element centering knobs to adjust centering of the phase contrast ring so that the bright ring in the field overlaps with the dark ring (Fig. 2).

◎ If the centering knobs are not pushed in, the internal screws cannot be rotated.

◎ If more than one ring slit images is visible, overlap the brightest ring with the phase film.

8. Repeat steps 6 and 7 above for each phase contrast ring.
9. Remove the U-CT30 centering telescope and attach the eyepiece again.
10. Adjust the field iris diaphragm so that its image circumscribes the field of view.

◎ The contrast can be increased by engaging the 43IF550-W45 green interference filter in the light path.

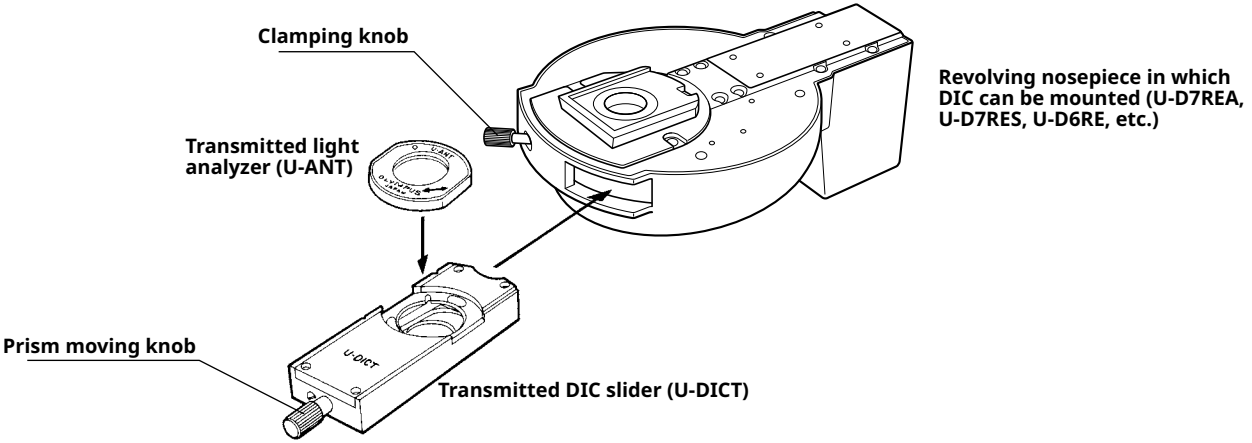
3-4 Differential Interference Contrast Observation (DIC)

■ **Applicable objective magnifications**

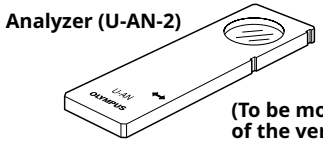
Magnification	10X	20X	40X	60X	100X
DIC	○	○	○	○	○
	Top lens IN				

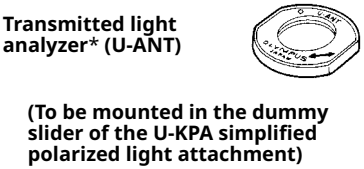
A transmitted DIC slider and an analyzer (U-ANT or U-AN-2) are required for the DIC observation.
A polarizer is also required; engage the one built into the condenser in the light path.

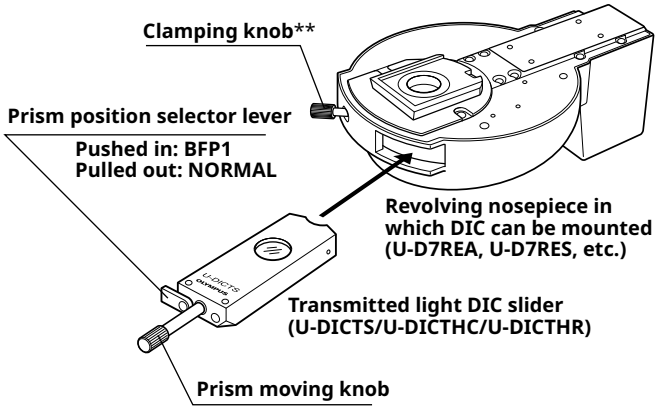
When the U-DICT slider is used



When the U-DICTS/U-DICTHC/U-DICTHR slider is used







*When the U-ANT is combined with the U-KPA, the field number becomes 22.

CAUTION **When an intermediate attachment is used, align the positions of the observation clamping screw of the microscope frame with the clamping screw of the intermediate attachment in order to set the orientation of the analyzer.**

**Tighten the clamping knob of the slider only lightly. If it is tightened too much, it is impossible to operate the prism position selector lever.

1. Adjust the polarizer in the following steps.
   a) Engage the transmitted light DIC slider in the light path and tighten the clamping knob.
   b) Engage the U-ANT or U-AN-2 analyzer in the light path.
2. Select the BF observation light path (with no optical element engaged in the light path).
3. Engage the built-in polarizer of the condenser in the light path.

When the U-DICT and U-ANT are used

a) Turn the prism moving knob of the DIC slider fully counterclockwise.
b) Engage the 10X objective in the light path, adjust approximate focus, remove an eyepiece, look into the eyepiece sleeve and find the objective pupil. (This can be facilitated when the U-CT30 centering telescope is used.)

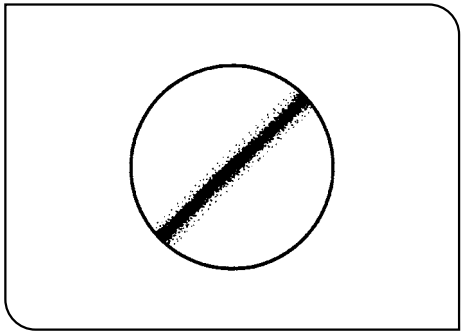


Fig. 3

c) While observing the objective pupil, loosen the polarizer clamping knob and rotate the polarizer rotation knob until a black interference stripe is visible. The position where the black interference stripe is darkest is the optimum position for using the polarizer (Fig. 3).
d) After determining the above position, tighten the clamping knob.
e) Attach the eyepiece in the original position.

When the U-DICT and U-AN-2 are used

a) Pull out the transmitted light DIC slider to disengage it from the light path.
b) Look into an eyepiece, loosen the polarizer clamping knob and rotate the polarizer rotation knob until the field of view is completely dark. This position is the optimum position for using the polarizer.

◎ Align the indices ({ and **I** markings) on the polarizer rotation knob for use as the reference indicating the dark position (0° position).

c) Tighten the clamping knob at the position where the field is darkest.
d) Push in the transmitted light DIC slider to engage it in the light path again.

4. Select the DIC prism turret according to the objective to be used.
5. Engage the desired objective in the light path.

◎ If the DIC slider is other than the UDICT, set the prism position selector lever to “BFP1” or “NORMAL” according to the objective.

Objectives for using theBFP1 position	**UPLXAPO40XO, UA-PON40XW340, UAPON-40XO340-2**

Set to the NORMAL position with all other objectives.

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

6. Focus on the specimen.
7. Adjust the field iris diaphragm so that its image circumscribes the field of view.
8. The contrast may sometimes be enhanced by stopping down the aperture iris diaphragm optimally.

9. Adjust the background color contrast using the prism moving knob of the transmitted light DIC slider as described below.

a) Rotate the prism moving knob to select the interference color that can provide the specimen image with the best contrast.

U-DICT:	The background interference color varies continuously from gray the sensitive color to the purple sensitive color.
U-DICTS: U-DICTHC: U-DICTHR:	The background interference color varies continuously from black to light gray.

・Set the background color to gray to obtain a high-contrast image with 3D feeling in the gray sensitive color with the highest sensitivity.

・Set the background color to purple sensitive color to observe even slight differences in phase as changes in color.

CAUTION **DIC observation has high detection sensitivity. Take care against contamination on the specimen surface.**

b) The detection sensitivity is sensitive to the orientation. It is recommended to use a rotary stage.

◎ For simultaneous observation with the reflected light fluorescence observation, refer to the instruction manual for the reflected light fluorescence system.

CAUTION **When the U-DICTHC (with the U-DIC60HC or U-DPO60HC DIC prism) is combined with the UPLXAPO60XO color irregularities may be noticeable with certain specimens.**

3-5 Darkfield Observation (DF)

■ **Applicable objective magnifications**

Magnification	10X	20X	40X	60X	100X
DF	○*	○**	○**	○**	○**
	Top lens IN				

*The peripheral area of the field may be obscured during super-widefield (FN 26.5) observation, but this does not cause problem in camera recording.

**Only the objectives with NA of 0.7 or less can be used. (An iris-equipped objective capable of stopping down NA to 0.7 or less can also be used.)

◎ If a transmitted light DIC slider is used, pull out the slider till the click position for disengaging it from the light path.

◎ If the reflected light analyzer (U-AN-2) is used, pull out the analyzer till the click position for disengaging it from the light path.

1. Select the DFA darkfield observation light path.
2. Mount the desired objective on the revolving nosepiece and rotate the nosepiece to engage the objective in the light path.
3. Open the aperture iris diaphragm.
4. Focus on the specimen.
5. Remove an eyepiece and look into the eyepiece sleeve to view the objective pupil. Push in and rotate the optical element centering knobs to adjust centering of the darkfield ring so that light does not leak from the objective pupil.

◎ If the centering knobs are not pushed in, the internal screws cannot be rotated.

6. Insert the eyepiece and, while observing the darkfield image, repeat the centering adjustment so that the darkfield effect is maximized.

7. Move the condenser up-down to the position where uniform darkfield illumination can be obtained.
8. Open the field iris diaphragm as far as the brightness does not become irregular.

CAUTION **Do not look into the eyepieces when switching the objective during darkfield observation or when switching the observation mode from darkfield observation to another.**

If you look into the eyepieces while switching the objective or the turret from darkfield to another observation mode, the illumination light may enter your eyes directly.

3-6 Simplified Polarized Light Observation (KPO)

■ **Applicable objective magnifications**

Magnification	2X	4X	10X	20X	40X	60X	100X
KPO*	△	○	○	○	○	○	○
	Top lens OUT		Top lens IN				

* PLAPON2X, UPLXAPO4X: If a Ph objective for phase contrast observation is used in polarized light observation, the image contrast may be poorer than in observation at other magnifications.

◎ An analyzer (U-ANT or U-AN-2) is required for the simplified polarized light observation. If the vertical fluorescence illuminator is not installed, install the transmitted analyzer (U-ANT) by referring to its instruction manual.

◎ If the vertical fluorescence illuminator is installed, Attach the reflected light analyzer (U-AN-2) by referring to the instruction manual for the vertical fluorescence illuminator.

1. Select the BF observation light path (with no optical element engaged in the light path).
2. Engage the built-in polarizer in the light path.
3. Mount the desired objective on the revolving nosepiece and rotate the nosepiece to engage the objective in the light path.
4. Look into an eyepiece, loosen the polarizer clamping knob and rotate the polarizer rotation knob until the field of view is completely dark. This position is the optimum position for using the polarizer.

◎ Align the indices (● and **I** markings) on the polarizer rotation knob for use as the reference indicating the dark position (0° position).

5. Tighten the clamping knob at the position where the field is darkest.
6. Focus on the specimen.
7. Adjust the field iris diaphragm so that its image circumscribes the field of view.
8. The contrast may sometimes be enhanced by stopping down the aperture iris diaphragm optimally.

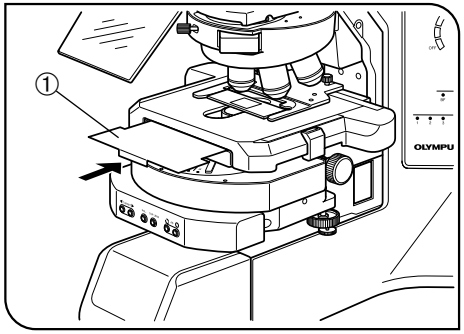


Fig. 4

General operating precautions

- If the U-excited reflected fluorescence observation is performed with the 10X or 20X objective while the condenser is set in the observation position, flare may be noticeable with certain specimens.
  If the transmitted DIC observation is not required, lower the condenser or use the light shield sheet ① provided with the vertical fluorescence illuminator. (Fig. 4).
- When the top lens is swung out, stopping down the aperture iris diaphragm may cut off the field of view (this occurs with 1.25X to 4X objectives).
- The DIC prisms for 60X and 100X objectives (U-DIC60, U-DPO60S, U-DIC100, U-DP100, etc.) have large apertures so they can also be used in brightfield observation. However, they cannot be used in polarized light observation.

4 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the unit 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 us for assistance.

Problem	Cause	Remedy	Page
a) Control buttons cannot switch the functions.	The condenser connection cable is connected improperly.	Connect it properly.	–
	The BX3-CBH or U-CBM control box is not switched on.	Set the main switch to " I " (ON).	–
	The hand switch connection cable is connected improperly.	Connect it properly.	–
	The power cord of the BX3-CBH or U-CBM control box is disconnected.	Connect it properly.	–
b) The field iris diaphragm image is invisible when a 10X to 100X objective is used.	The slide glass is too thick.	Use a slide glass with thickness of 1.4 mm or below. When an oil-immersion type top lens is used, the slide glass thickness should be 1.2 mm or less.	7,24
	The top lens is swung out.	Set the top lens to the IN condition.	–
c) Image glares and the resolution is poor in brightfield observation.	The aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.	8
	The top lens is swung out.	Set the top lens to the IN condition when using a 10X to 100X objective.	–

Problem	Cause	Remedy	Page
d) The ring slit does not match.	A wrong optical element is engaged in the light path.	Select the optical element turret matching the objective.	26
	A wrong objective is engaged.	Engage the correct objective in the light path.	26
e) The darkfield performance is poor.	The top lens is swung out.	Set the top lens to the IN condition.	–
	The aperture iris diaphragm is stopped down.	Fully open the aperture iris diaphragm.	16
	An inappropriate optical element is in the light path.	Engage the darkfield ring in the light path.	26
	The objective in use is inappropriate.	See the combination lists on pages 26 to 30.	26
	The darkfield ring is centered insufficiently.	Center the darkfield ring.	16
f) The polarization performance is poor.	The polarizer is not engaged in the light path.	Engage the polarizer in the light path.	18
	The analyzer is not engaged.	Engage the analyzer in the light path.	18
	An optical element is engaged.	Select a turret without an optical element.	–
	The aperture iris diaphragm is open.	Stop down the aperture iris diaphragm optimally.	–

Problem	Cause	Remedy	Page
g) Interference color is not visible in DIC observation.	The polarizer is not engaged in the light path.	Engage the polarizer in the light path.	13
	The analyzer is not engaged.	Engage the analyzer in the light path.	13
	The DIC prism is not engaged.	Select a turret with DIC prism.	14
	The DIC slider is not engaged.	Engage the DIC slider in the light path.	14
	The polarizer is not in the dark position (Cross-Nicol) with respect to the analyzer.	Re-adjust the polarizer.	13,14
h) Interference color is observed in DIC observation but it contains many irregularities.	The condenser height is incorrect.	Center the condenser.	34
	A wrong optical element is engaged in the light path.	Select the turret of the optical element matching the objective.	27-28
	The objective is inappropriate.	Use an optimum objective by referring to the combination lists on pages 27 to 28.	27-28

5 SPECIFICATIONS

Item	Specification	
	Dry top lens (U-TLD)	Oil-immersed top lens (U-TLO)
Applicable microscopes	BX63, BX53, BX43	
Applicable microscopy	Transmitted light (Brightfield, darkfield, phase contrast, DIC, polarizer light)	Transmitted light (Brightfield, DIC)
Type	Achromat, aplanat, motorized top lens swing-out (top lens interchangeable)	
NA (Number of Aperture)	0.9 (top lens IN)/ 0.2 (top lens OUT)	1.4 (top lens IN) oil immersed/ 0.2 (top lens OUT)
Applicable slide glass thickness	0.9 to 1.4 mm	0.9 to 1.2 mm
Working distance	1.5 mm (with 1.2 mm slide glass)	0.6 mm (with 1.2 mm slide glass)
Illuminating field diameter	3 mm (top lens IN)/ 14 mm (top lens OUT)	1.5 mm (top lens IN)/ 14 mm (top lens OUT)
Focal distance	13.5 mm (top lens IN)/ 231 mm (top lens OUT)	8.8 mm (top lens IN)/ 231 mm (top lens OUT)
Motorized turret	8 positions (Small x 3, large x 5), optical elements detachable	
Aperture iris diaphragm	2.8 to 21 mm dia.	
Mount	Round dovetail with clamping screw	
Dimensions	178(W) x 92(H) x 156(D) mm (top lens IN)	
Weight	1.5 kg	

6 ASSEMBLY

CAUTION **The motorized mechanisms will be damaged if they are moved by hand with excessive force. After connecting the condenser as described in the BX3-CBH or U-CBM control box, set the main switches to " I " (ON) and control them from the specified control module. To prevent injury, do not approach your hand or finger to the condenser when pressing a control button.**

◎ When you use microscopes other than BX63, replace the centering knobs and clamping knob of the condenser holder and the clamping knob of the stage with the screws provided with the condenser.

6-1 Attaching the Top Lens

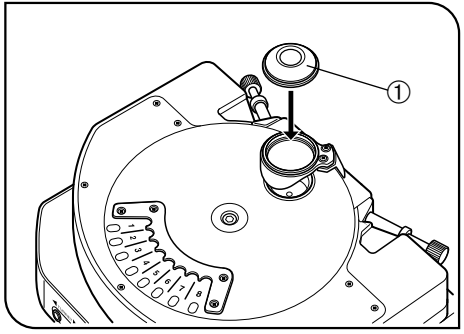


Fig. 5

◎ Attach a dry (U-TLD) or oil-immersed (U-TLO) top lens according to the observation mode to be used.

- Be careful not to apply an excessive force to the arm of the top lens. Turn the top lens ① clockwise to attach (Fig. 5).
- Do not tighten the top lens too much but turn lightly until it is stopped.

Precautions on oil-immersed top lens

CAUTION

- **Before engaging or disengaging the top lens into or from the light path, lower the condenser holder and wipe oil from the top lens. (If the condenser holder is not lowered, the top lens may interfere with the slide glass.)**
- **The field iris diaphragm image may be invisible if the slide glass thickness exceeds 1.2 mm.**
- **Use a 20X or higher-power objective.**

6-2 Mounting the Optical Elements

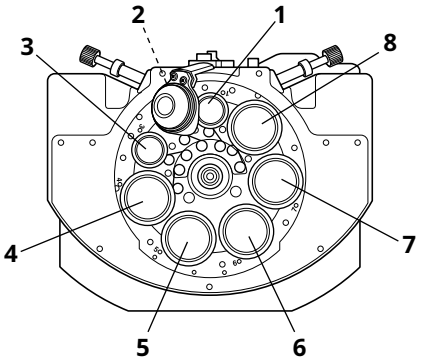


Fig. 6

1 Optical Element Mounting Positions (Fig. 6)

1, 3: The U-DIC10S or U-DP10S optical elements can be mounted. When these positions are not used, the U-PH1S, U-PH2S and/or U-PH3S can be mounted.

2: Any of the U-PH1S, U-PH2S or U-PH3S can be mounted.

4, 8: The U-DFA and/or U-PH3 can be mounted. When these positions are not used, DIC optical elements can be mounted.

5-7: As these positions do not have the centering adjustment facility, only DIC optical elements can be mounted.

4-7: The U-CO1.25X low-magnification conversion lens can be mounted.

2 Combinations of Optical Elements and Objectives Per Observation Mode

■ **Phase contrast (PH) or darkfield (DF) observation: When the U-TLD top lens is used**

Observation	Optical Element	Applicable Objectives
PH	U-PH1S	PLN10XPH, PLN20XPH, UPLFLN10X2PH, UPLFLN20XPH
	U-PH2S	PLN40XPH, UPLFLN40XPH
	U-PH3S, U-PH3	PLN100XOPH, UPLFLN60XOPH, UPLFLN100XO2PH, UPLXAPO60XOPH, UPLXAPO-100XOPH
DF	U-DFA	PLN10X, PLN20X, PLN40X, PLN50XOI, UPLFLN10X2, UPLFLN20X, UPLFLN60XOI, UPLFLN100XOI2, UPLXAPO10X

■ **DIC observation (U-DICT/U-DICTS) (Note) For the U-DICTHC/U-DICTHR, see next page.**

DIC slider		U-DICT		Shift type U-DICTS	
Top lens		U-TLD	U-TLO	U-TLD	U-TLO
UPLFLN	10X2	U-DIC10, U-DIC10S	—	U-DIC10, U-DIC10S	—
	20X	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	60X 60XOI	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60
	100XO2 100XOI2	U-DIC100	U-ODIC100	U-DIC100	U-ODIC100
UPLXAPO	10X	U-DIC10, U-DIC10S	—	U-DIC10, U-DIC10S	—
	20X	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	40XO	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	60XW	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60
	60XO	—	—	U-DIC60	U-ODIC60
	100XO	U-DIC100	U-ODIC100	U-DIC100	U-ODIC100
PLAPON60XOSC2		—	—	U-DIC60	U-ODIC60
LUCPLFLN	20X2	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X2	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	60X2	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60
UAPON	20XW340	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40XW340	—	—	U-DIC40	U-ODIC40
	40XO340-2	—	—	U-DIC40	U-ODIC40

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

■ **DIC observation (U-DICTHC/U-DICTHR)**

DIC slider		High-contrast type U-DICTHC	High-resolution type U-DICTHR	
Top lens		U-TLD	U-TLD	U-TLO (for VEC/DIC)
UPLFLN	10X2	U-DIC10HC	U-DIC10HR	—
	20X	U-DIC20HC	U-DIC20HR	—
	40X	U-DIC40HC	U-DIC40HR	—
	60X 60XOI	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	100XO2 100XOI2	U-DIC100HC	U-DIC100HR	U-ODIC100HR
UPLXAPO	10X	U-DIC10HC	U-DIC10HR	—
	20X	U-DIC20HC	U-DIC20HR	—
	40X	U-DIC40HC	U-DIC40HR	—
	40XO	U-DIC40HC	U-DIC40HR	—
	60XW	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	60XO	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	100XO	U-DIC100HC	U-DIC100HR	U-ODIC100HR
PLAPON60XOSC2		U-DIC60HC	U-DIC60HR	U-ODIC60HR
LUCPLFLN	20X2	U-DIC20HC	U-DIC20HR	—
	40X2	U-DIC40HC	U-DIC40HR	—
	60X2	U-DIC60HC	U-DIC60HR	U-ODIC60HR
UAPON	20XW340	U-DIC20HC	U-DIC20HR	—
	40XW340	U-DIC40HC	U-DIC40HR	—
	40XO340-2	U-DIC40HC	U-DIC40HR	—

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

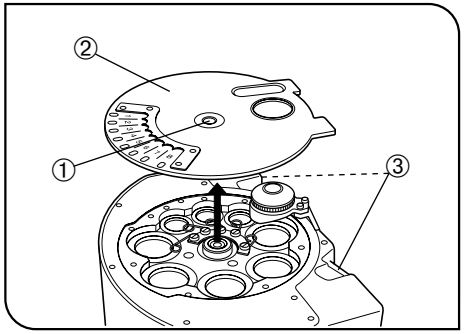


Fig. 7

3 Mounting the Phase Contrast Ring or Darkfield Ring(Figs. 7 to 9)

1. Set the top lens to the IN position with the motorized control.
2. Loosen the turret cover retaining screw ① using the provided Allen screwdriver and remove the turret cover ②.

CAUTION **Be careful not to damage the top lens and the anti-dust glass on the turret cover during its removal.**

3. Set the top lens to the OUT position with the motorized control so that the top lens does not come in the way of mounting the optical element.
4. Engage the position for mounting the ring in the light path with the motorized control, loosen the optical element centering knobs ③ by pushing in and turning them counterclockwise, and remove the dummy optical element.

CAUTION **If the turret is rotated while the centering screws are loose, the projected centering screws may come in the way.**

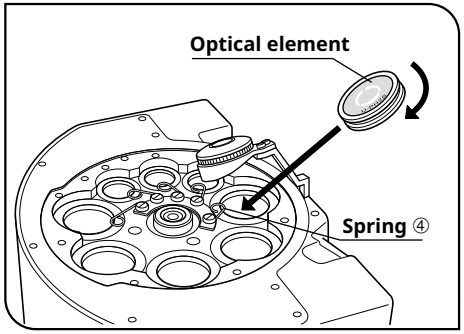


Fig. 8

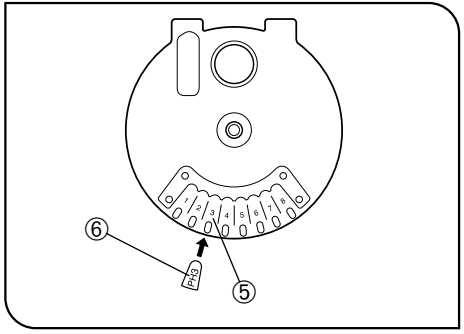


Fig. 9

5. Insert the phase contrast ring or darkfield ring into the turret position until it touches the bottom.

When inserting, push the spring ④ on the inner side of the turret lightly with the side of the ring (Fig. 8).

CAUTION **Be careful not to push the ring slit section inside the frame.**

6. Push in the optical element centering knobs and turn them clockwise to tighten lightly.

CAUTION **Do not tighten them too much, as this may deform the frame of the optical element.**

◎ The optical element indicator plate (magnet attached) is provided with the condenser.

7. Align the optical element position number and the indicator attaching position number ⑤ on the turret cover and attach the indicator plate ⑥.

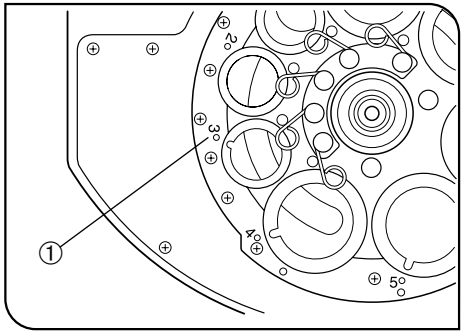


Fig. 10

4 Mounting the DIC Prism (Figs. 10 & 11)

◎ The mounting method is variable depending on whether the DIC prism is mounted in a position with centering mechanism (1, 3, 4 or 8) or in a position without (5, 6 or 7).

Mounting on position 1, 3, 4 or 8

The DIC ring can be mounted in the same way as the phase contrast ring. However, as the DIC ring has a positioning pin, it should be mounted by aligning the positioning index ① on the turret and the index on the DIC ring. After mounting, attach the indicator plate.

CAUTION **Be careful not to touch the prism inside the frame.**

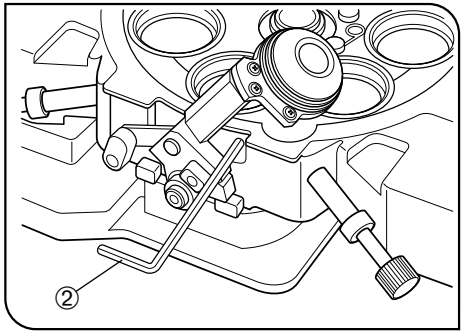


Fig. 11

Mounting on position 5, 6 or 7

◎ The DIC prism should be clamped without using the built-in optical element centering screws. Instead, use the provided Allen wrench ②.

1. Engage the position for mounting the DIC prism in the light path by the motorized control, loosen the clamping screw for the mounting position by inserting the Allen wrench ② from the rear of the condenser, and remove the dummy optical element.

CAUTION **If the turret is rotated while the clamping screw is loose, the clamping screw may come in the way.**

2. Drop in the DIC prism by aligning the positioning pin and groove, and tighten the screw using the Allen wrench. After mounting, attach the indicator plate.

5 Mounting the U-CO1.25X Low-Magnification Conversion Lens for UCD

Mount in the same way as the DIC prism mounting method for position 4, 5, 6 or 7.

After mounting all of the necessary optical elements, put the turret cover in the original position.

6-3 Installing the Condenser

Install the condenser on the condenser holder as described below. Refer also to the instruction manual for the microscope frame.

1. When the microscope frame is the BX53/BX43, detach the revolving nosepiece, and raise the stage as high as possible.
   When the frame is the BX63, the above is not necessary because the stage height is fixed.
2. Lower the condenser holder to the lowest limit.
3. Swing out the condenser top lens with the motorized control.
4. Using the Allen wrench, loosen the clamping screw of the condenser holder until it does not project above the mount dovetail surface. Do not loosen it too much as this makes installation of the condenser impossible.
5. Fit the condenser into the mount dovetail of the condenser holder and push horizontally until the positioning pin of the condenser enters the positioning groove of the mount dovetail.
6. Insert the Allen screwdriver into the condenser clamping screw guide hole on the right side of the condenser and tighten the clamping screw of the condenser holder.

◎ When uninstalling the condenser, loosen the screw by about 4 turns. If it is loosened more, the condenser would be unable to be removed.

7. Raise the condenser holder to the upper limit.

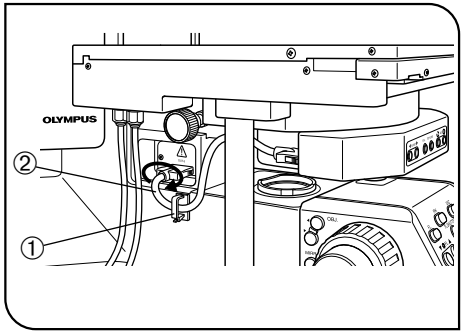


Fig. 12

Operation using BX63 (Fig.12)

8. Attach the cable holder ① to BX63.
9. Connect the interface cable ② to BX3-UCD8A.
10. Twist the interface cable ② once so that it bends toward the lower direction, and put it into the cable holder ①.
11. Connect the interface cable ② to BX63.

* Please use the cable holder attached to BX3-CBH.

6-4 Centering the Condenser

◎ The condenser centering screw on the right can be accessed by inserting the Allen screwdriver from the condenser centering screw guide hole, and that on the left can be accessed directly with the Allen screwdriver.

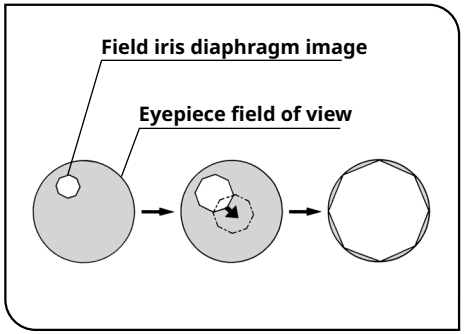


Fig. 13

Adjust centering of the condenser as described below. Refer also to the instruction manual for the microscope frame.

1. Select the BF observation light path (with no optical element engaged in the light path).
2. Set the top lens to the IN condition with the motorized control.
3. Fully open the aperture iris diaphragm with the motorized control.
4. Fully open the field iris diaphragm of the microscope frame.
5. Place the specimen on the stage, engage the 10X objective in the light path and focus on the specimen.
6. Stop down the field iris diaphragm of the microscope so that its image is visible.
7. While looking into the eyepieces, raise the condenser to almost the upper limit and adjust the focus of the field iris diaphragm image with the specimen image.
8. Open the field iris diaphragm gradually, insert the two Allen screwdrivers (one provided with the microscope frame and the other provided with the condenser) into the two condenser centering screws of the microscope, and rotate the screws to bring the field iris diaphragm image on the center of the eyepiece field of view (let the polygonal field iris diaphragm image inscribe the field of view).
9. After the adjustment, open the field iris diaphragm slightly so that it circumscribes the field of view.

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AX7935 10 Issued in June, 2025