OLYMPUS®

INSTRUCTIONS

IX2-DICD

DIC CONDENSER

This instruction manual is for the Olympus DIC Condenser Model IX2-DICD. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this equipment, we recommend that you study this manual thoroughly before operating the system. Retain this instruction manual in an easily accessible place near the work desk for future reference.

AX7359

CONTENTS

IMPORTANT

- This product is a slim, single type condenser that can be combined with a top lens matching the desired observation (dry, oil-immersed or water-immersed).
- The water-immersed top lens (IX2-TLW) features an NA of 0.9, WD or 3.7 mm and manipulator access angle of 40°. In high-resolution DIC (Differential Interference Contrast) observation, these features allow injection operation to be performed simultaneously.

1 Getting Ready

1. This manual pertains only to the DIC condenser. Please also read the instruction manual for the IX2 series (IX81/IX71/IX51) or IX series (IX70/IX50) microscope to understand the comprehensive operating instructions of the microscope system.
2. The DIC condenser is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
3. Be careful not to leave dirt or fingerprints on the lens components.
4. The stopper mechanisms provided for the functions indicate the limits of motion. Never attempt to go beyond a stopper by applying excessive force.
5. When the PlanApoN60X, UPlanSApo60XO, PlanApo60XO3 and U-DICTHC are combined, (using the U-DIC60HC or U-DPO60HC DIC prism), color irregularities may be noticeable with certain specimens. Due to this, it is recommended to use a photo lens (PE3.3X or with a higher magnification) in photomicrography.
6. Do not tighten the clamping screws of the DIC prism and slider too much.

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. Never attempt to disassemble any part of the equipment, for this may degrade the performance.

3 Caution

If the condenser 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 system as outlined in this instruction manual.

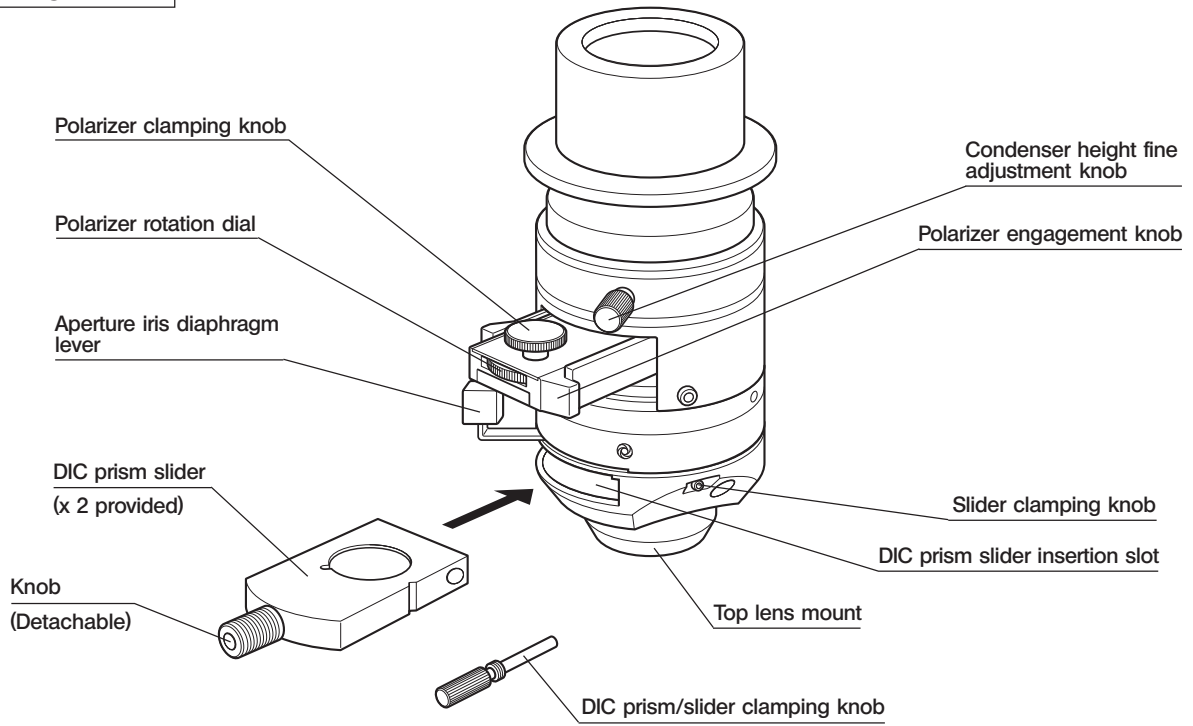
The following symbols are used to set off text in this instruction manual.

⚠ : 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).

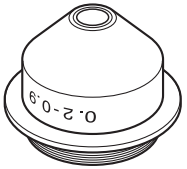
DIC Condenser
IX2-DICD



Dry Top Lens
U-TLD

Oil-Immersed Top Lens
U-TLO

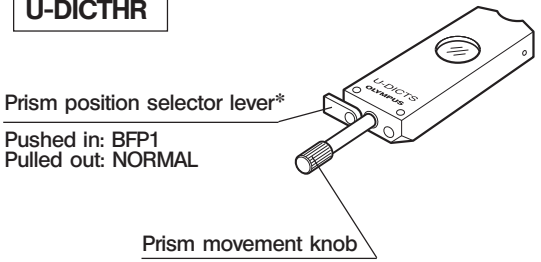
Water-Immersed Top Lens
IX2-TLW



DIC Prism

See the applicable objective list (pages 7 to 12).

DIC Slider
U-DICT
U-DICTS
U-DICTHC
U-DICTHR



* This lever is not provided for the U-DICT.

2 ASSEMBLY

2-1 Attaching the Top Lens

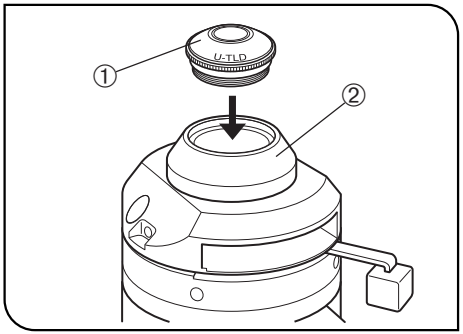


Fig. 1

◎According to the desired observation, attach the dry (U-TLD), oil-immersed (U-TLO) or water-immersed (IX2-TLW) top lens to the DIC condenser.

1. The U-TLD or U-TLO top lens ① can be attached by screwing it clockwise into the top lens mount ②.
2. To attach the IX2-TLW top lens, turn the top lens mount ② counterclockwise to remove it and screw in the top lens into the position of the top lens mount.

Precautions on Oil-Immersed Top Lens

★When a slide glass with thickness of 1.2 mm or more is used, the field iris diaphragm image may not be observed.

★Use an objective with 20X or higher power.

2-2 Attaching the DIC Prism

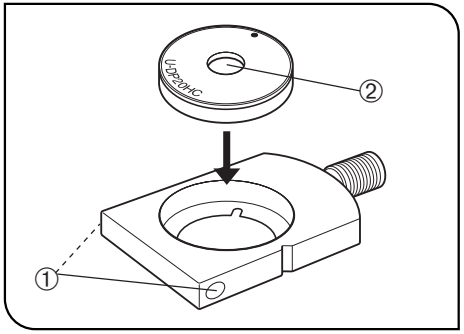


Fig. 2

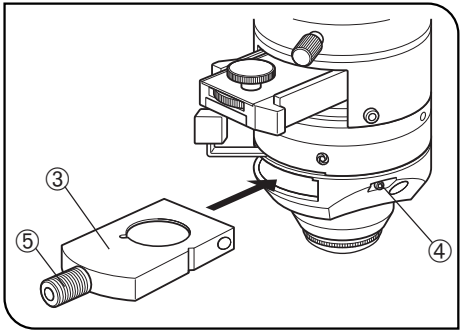


Fig. 3

◎In the DIC prism slider, mount the DIC prism matching the objective, DIC slider and top lens in use. (For the combination list, see pages 7 to 12.)

Procedure (Figs. 2 & 3)

★To ensure the optical performance, do not tighten the clamping screws ① and ④ too much.

1. Loosen the two clamping screws ① by inserting the DIC prism/slider clamping knob provided with the DIC condenser into each of them.
2. Align the positioning pin of the DIC prism ② with the groove on the slider, drop the DIC prism into the slider and tighten the two clamping screws ①.
3. Turn the DIC prism slider ③ by 180° and insert it into the condenser. Tighten the slider clamping screw ④ using the DIC prism/slider clamping knob.

◎If the knob ⑤ on the DIC slider comes in the way, remove the knob by turning it counterclockwise.

UIS2 Series

■ Combinations of Objectives, DIC Sliders, Top Lenses and DIC Prisms

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

DIC Slider		U-DICT		U-DICTS (Shift type)	
Top Lens		U-TLD/IX2-TLW	U-TLO	U-TLD/IX2-TLW	U-TLO
UPlanFLN	10X2	U-DIC10	—	U-DIC10	—
	20X	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	40XO	—	—	U-DIC40	U-ODIC40
	60X 60XOI	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60
	100XO2 100XOI2	U-DIC100	U-ODIC100	U-DIC100	U-ODIC100
UPlanSApo	10X2	U-DIC10	—	U-DIC10	—
	20X 20XO	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X2	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	60XO	—	—	U-DIC60	U-ODIC60
	60XW	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60
	100XO	U-DIC100	U-ODIC100	U-DIC100	U-ODIC100
PlanApoN	60XO	—	—	U-DIC60	U-ODIC60
LUCPlanFLN	20X	U-DIC20	U-ODIC20	U-DIC20	U-ODIC20
	40X	U-DIC40	U-ODIC40	U-DIC40	U-ODIC40
	60X	U-DIC60	U-ODIC60	U-DIC60	U-ODIC60

DIC Slider		U-DICTHC (High Contrast type)	U-DICTHR (High Resolution type)	
Top Lens		U-TLD/IX2-TLW	U-TLD/IX2-TLW	U-TLO
UPlanFLN	10X2	U-DIC10HC	U-DIC10HR	—
	20X	U-DIC20HC	U-DIC20HR	—
	40X	U-DIC40HC	U-DIC40HR	—
	40XO	U-DIC40HC	U-DIC40HR	—
	60X 60XOI	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	100XO2 100XOI2	U-DIC100HC	U-DIC100HR	U-ODIC100HR
UPlanSApo	10X	U-DIC10HC	U-DIC10HR	—
	20X 20XO	U-DIC20HC	U-DIC20HR	—
	40X2	U-DIC40HC	U-DIC40HR	—
	60XO	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	60XW	U-DIC60HC	U-DIC60HR	U-ODIC60HR
	100XO	U-DIC100HC	U-DIC100HR	U-ODIC100HR
PlanApoN	60XO	U-DIC60HC	U-DIC60HR	U-ODIC60HR
LUCPlanFLN	20X	U-DIC20HC	U-DIC20HR	—
	40X	U-DIC40HC	U-DIC40HR	—
	60X	U-DIC60HC	U-DIC60HR	U-ODIC60HR

UIS Series * Usable regardless of the model number (3, 2 or none)

■ Combinations of Objectives, DIC Sliders, Top Lenses and DIC Prisms

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

DIC Slider		U-DICT		U-DICTS (Shift type)	
Top Lens		U-TLD/IX2-TLW	U-TLO	U-TLD/IX2-TLW	U-TLO
UPlanFl	10X	U-DP10	—	U-DP10	—
	20X	U-DP20	U-ODP20	U-DP20	U-ODP20
	40X	U-DP40	U-ODP40	U-DP40	U-ODP40
	60XOI3*	U-DPO60S	U-ODPO60S	U-DPO60S	U-ODPO60S
	100XO3* 100XOI3*	U-DP100	U-ODP100	U-DP100	U-ODP100
UPlanApo	10X 10XO	U-DP10	—	U-DP10	—
	20X 20XO3*	U-DPA20	U-ODPA20	U-DPA20	U-ODPA20
	40X	U-DPA40	—	U-DPA40	—
	40XOI3*	—	—	U-ODPO40S	U-ODPO40S
	60X	U-DPA60	—	U-DPA60	—
	100XOI3*	U-DP100	U-ODP100	U-DP100	U-ODP100
PlanApo	60XO3*	—	—	U-DPO60S	U-ODPO60S

DIC Slider		U-DICT		U-DICTS (Shift type)	
Top Lens		U-TLD/IX2-TLW	U-TLO	U-TLD/IX2-TLW	U-TLO
UPlanApo	10XW3*	U-DP10	–	U-DP10	–
	60XW3* 60XW3/IR*	U-DPO60S	U-ODPO60S	U-DPO60S	U-ODPO60S
UApo	20X3/340* 20XW3/340*	–	–	–	–
	40X3/340*	U-DPA40	–	U-DPA40	–
	40XW3/340* 40XOI3/340*	–	–	U-DPO40S	U-ODPO40S

DIC Slider		U-DICTHC (High Contrast type)	U-DICTHR (High Resolution type)	
Top Lens		U-TLD/IX2-TLW	U-TLD/IX2-TLW	U-TLO
UPlanFl	10X	–	U-DP10HR	–
	20X	U-DP20HC	U-DP20HR	–
	40X	U-DP40HC	U-DP40HR	–
	60XOI3*	U-DPO60HC	U-DPO60HR	U-ODPO60HR
	100XO3* 100XOI3*	U-DP100HC	U-DP100HR	U-ODP100HR
UPlanApo	10X 10XO	–	U-DP10HR	–
	20X 20XO3*	–	U-DPA20HR	–
	40X	–	U-DPA40HR	–
	40XOI3*	–	–	–
	60X	–	–	–
	100XOI3*	U-DP100HC	U-DP100HR	U-ODP100HR
PlanApo	60XO3*	U-DPO60HC	U-DPO60HR	U-ODPO60HR
UPlanApo	10XW3*	–	U-DP10HR	–
	60XW3* 60XW3/IR*	U-DPO60HC	U-DPO60HR	U-ODPO60HR

DIC Slider		U-DICTHC (High Contrast type)	U-DICTHR (High Resolution type)	
Top Lens		U-TLD/IX2-TLW	U-TLD/IX2-TLW	U-TLO
UApo	20X3/340* 20XW3/340*	—	—	—
	40X3/340*	—	U-DPA40HR	—
	40XW3/340* 20XOI3/340*	—	—	—

2-3 Attaching the DIC Condenser

◎Attach the DIC condenser by referring to the instruction manual for the IX2 series (IX81, IX71, IX51) or IX series (IX70, IX50) microscope frame.

2-4 Centering the DIC Condenser

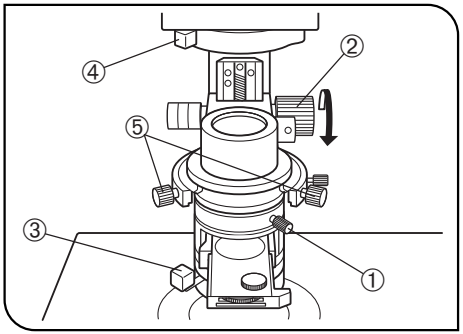
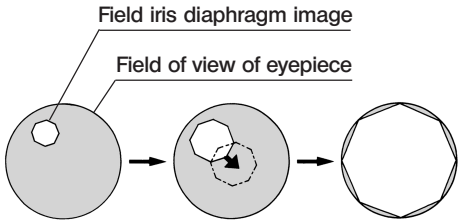


Fig. 4



◎Disengage the analyzer, polarizer, DIC slider and DIC prism from the light path to obtain the brightfield observation light path.

1. Turn the condenser height fine adjustment knob ① counterclockwise to loosen it, then push it fully to the right to raise the condenser to the higher limit of fine adjustment.
2. Turn the condenser height adjustment knob ② in the direction of the arrow to lower the condenser to the lowest limit.
3. Set the aperture iris diaphragm lever ③ to open (→ ○).
4. Set the field iris diaphragm lever ④ to open (→ ○).
5. Use a 10X objective and bring the specimen into focus.
6. Stop down the field iris diaphragm lever until the field iris diaphragm image comes inside the field of view.
7. Gently push the condenser height fine adjustment knob ① to the left to bring the field iris diaphragm image into focus. When it is focused, turn the knob clockwise and fix it there.
8. While gradually opening the field iris diaphragm, turn the condenser-centering knob ⑤ on the condenser holder so that the field iris diaphragm image comes at the center of the field of view of the eyepiece.
9. Gradually open the field iris diaphragm until its image inscribes the field of view. Now the DIC condenser is centered.

◎In actual observation, open the field iris diaphragm until its image circumscribes the field of view.

3 OBSERVATION METHODS

3-1 Brightfield Observation

◎Objectives with 10X or higher power can be used (20X or higher power is required when the U-TLO top lens is used). With the U-TLD or IX2-TLW is used in combination with the 100X objective, the NA may be slightly insufficient, but this is not serious enough to cause trouble in ordinary observations.

1. Disengage the analyzer, polarizer, DIC slider and DIC prism from the light path.
2. Engage a 10X objective in the light path and bring the specimen into focus.
3. Increase the objective power step by step and bring the specimen into focus every time; repeat this until the target magnification is reached.
4. Adjust the field iris diaphragm so that it circumscribes the field of view.
5. Adjust the aperture iris diaphragm properly.

3-2 DIC Observation

◎If a plastic petri dish is used, the DIC effect cannot be obtained due to the polarization characteristic of the plastic material. Be sure to use a glass petri dish.

◎The DIC observation requires the DIC prism and analyzer in addition to the IX2-DICD DIC condenser.

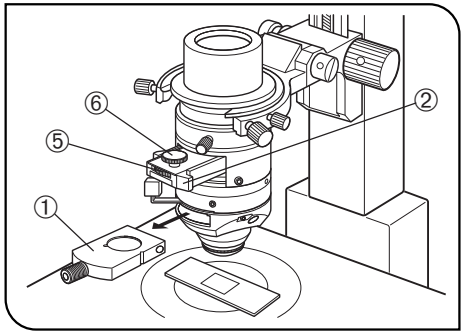


Fig. 5

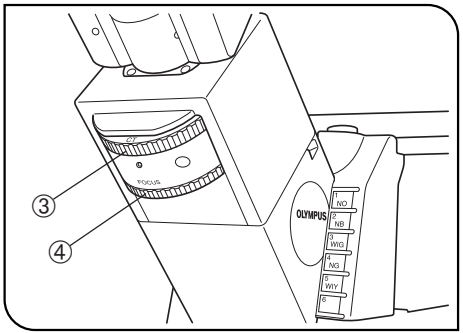


Fig. 6

1 Cross-Nicol Adjustment (Figs. 5 and 7)

1. Engage the IX2-AN analyzer and DIC slider in the light path. (Refer to the instruction manual for the IX2 series or IX series microscope frame.)
2. Remove the DIC prism slider ①.
3. Push in the polarizer engagement knob ② to engage the polarizer in the light path.
4. Engage the 10X objective in the light path, place an optimum specimen for brightfield observation on the stage, bring the specimen into approximate focus and remove the specimen out of the light path.
5. When the U-BI90CT binocular observation tube is used, rotate the CT turret ③ to position "CT" to engage the CT lens in the light path. (Fig. 6)
   When the U-BI90 or U-TBI90 binocular observation tube or U-TR30H trinocular observation tube is used, remove an eyepiece and attach the U-CT30 centering telescope.
6. Rotate the focusing ring ④ (or, with the centering telescope, rotate the knurled section) to bring the objective's exit pupil into focus. (Fig. 6)

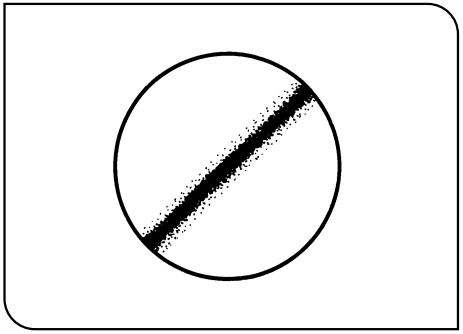


Fig. 7

7. Rotate the prism movement knob of the DIC slider in the clockwise direction all the way 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. (Fig. 7)
8. While observing the objective's exit pupil, rotate the polarizer rotation dial ⑤ on the polarizer unit until the black interference stripe becomes darkest. This is the position for using the polarizer. (Figs. 5 & 7)

◎If two black interference stripes are observed, rotate the polarizer by about 90° so that only one black interference stripe is visible.

◎The "cross-Nicol" position is located near the 0° position indication.

9. After determining the position, tighten the polarizer-clamping knob ⑥ so that the polarizer will not rotate.

2 Observation Procedure

1. Mount the DIC prism matching the objective to be used in the DIC prism slider, then insert this into the light path.
2. Engage the objective to be used in the light path.

◎Only when an objective for which the use of the BFP1 position is specified (see pages 7 to 11) is used, push in the prism position selector lever of the DIC slider to the BFP1 position.

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. Stop down the aperture iris diaphragm to enhance the contrast.
6. Rotate the prism movement knob of the DIC slider to select the interference color that can provide the optimum contrast in accordance with the specimen.

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

- 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. (U-DICT only)
- 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.

4 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the equipment may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed.

Problem	Cause	Remedy	Page
a. The brightfield image glares and has poor resolution.	The aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.	14
b. The interference color is not observed in DIC observation.	The polarizer is not engaged in the light path.	Engage the polarizer in the light path.	15-16
	The analyzer is not engaged in the light path.	Engage the analyzer in the light path.	
	The DIC slider is not engaged in the light path.	Engage the DIC slider in the light path.	
	The polarizer and analyzer are not set to the cross-Nicol position.	Adjust the polarizer again.	
c. The interference color in DIC observation is observed but the color is irregular.	The condenser height is adjusted improperly.	Center the condenser.	13
	A wrong DIC prism is engaged in the light path.	Use a DIC prism matching the objective.	7-12
	A wrong objective is in use.	Refer to the combination list on pages 7 and 12 and select the optimum objective.	

5 SPECIFICATIONS

Item	Specifications		
	Dry Top Lens (U-TLD)	Oil-Immersed Top Lens (U-TLO)	Water-Immersed Top Lens (IX2-TLW)
Applicable microscopes	IX2 series (IX81, IX71, IX51) or IX series (IX70, IX50)		
Applicable microscopy	Transmitted light (brightfield observation, DIC observation)		
Type	Achromat Aplanat (Top lens replacement system)		
Number of aperture (NA)	0.9	1.4 (oil immersed)	0.9
Applicable slide glass thickness	0.9 to 1.4 mm	0.9 to 1.2 mm	–
Working distance	1.5 mm (with slide glass thickness of 1.2 mm)	0.63 mm (with slide glass thickness of 1.2 mm)	3.7 mm
Illumination field	3 mm dia.	1.5 mm dia.	2.2 mm dia.
Focal distance	13.47 mm	8.8 mm	13.53 mm
Slider	Polarizer (360° rotation), DIC prism slider attachable		
Aperture iris diaphragm	2.8 to 22 mm dia.		
Installation	Round dovetail plus clamping screws		
Dimensions	62(W) x 88(D) x 132(H) mm (without top lens)		
Weight	660 grams		

OLYMPUS®

OLYMPUS CORPORATION
Shinjuku Monolith, 3-1, Nishi Shinjuku 2-chome, Shinjuku-ku, Tokyo, Japan

EC REP **OLYMPUS EUROPA HOLDING GMBH**
Wendenstraße 14-18, 20097 Hamburg, Germany

OLYMPUS AMERICA INC.
3500 Corporate Parkway, P.O. Box 610, Center Valley, PA 18034-0610, U.S.A.

OLYMPUS SURGICAL & INDUSTRIAL AMERICA INC.
One Corporate Drive, Orangeburg, NY 10962, U.S.A.

OLYMPUS SINGAPORE PTE LTD.
491B River Valley Road, #12-01/04 Valley Point Office Tower, Singapore 248373

OLYMPUS AUSTRALIA PTY. LTD.
31 Gilby Road, Mount Waverley, VIC., 3149, Australia

OLYMPUS LATIN AMERICA, INC.
5301 Blue Lagoon Drive, Suite 290 Miami, FL 33126, U.S.A.

01/10