

# **OLYMPUS<sup>®</sup>**

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## Instruction Manual

# IX2-DSU BX-DSU

DISK SCANNING BIOLOGICAL MICROSCOPE

**Petition**

Thank you for your adoption of OLYMPUS microscope, this time.

Please read this manual carefully in order to get optimum performance of this microscope and for safety considerations.

When using microscope, please have this manual by you and keep it with care.

AX6608



Correct assembly and adjustments are critical for this system to manifest its full performance. If you are going to assemble the microscope yourself, please read section 8, "ASSEMBLY" carefully.

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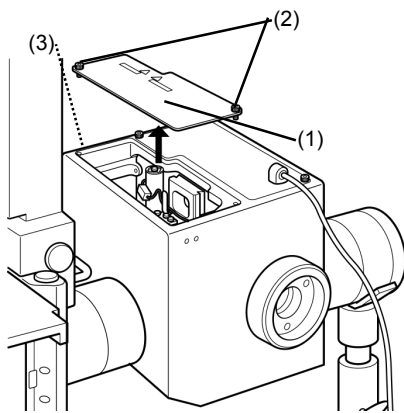
# INTRODUCTION

– Be sure to read this section for safe use of the equipment. –

## Caution

This manual – part or whole, shall not be used or reproduced without permission.

## Suggestions to unpacking

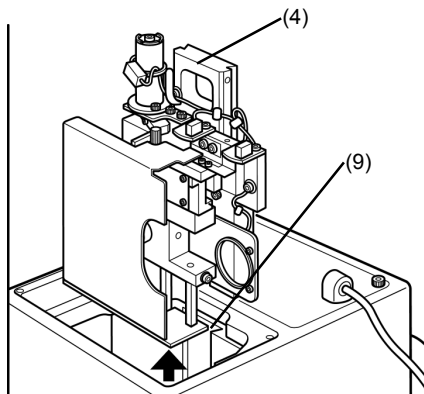


### Release of transportation lock for disk unit

#### Note

When powering up the control box without removing transportation lock knob, the disk unit may be damaged.

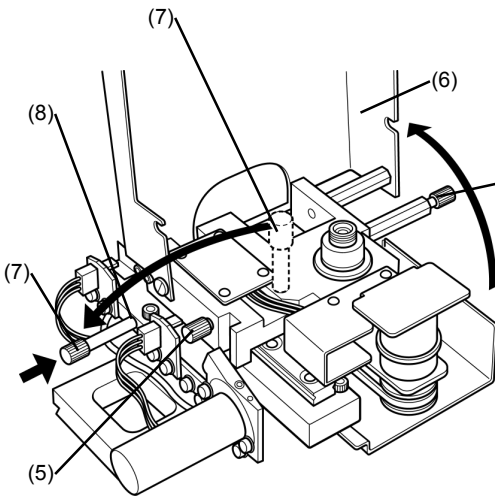
1. Loosen two fixing screws (2) of access panel (1) on top of disk box, using dedicated the Allen screwdriver that comes with microscope frame as accessory and detach the access panel (1).
2. Loosen fixing screw (3) from hole located at left side of disk box, using the Allen screwdriver and pull up the disk unit (4).



#### Note

Pull up the disk unit carefully so as not to hit it inside wall of disk box.

## INTRODUCTION



3. Loosen knob (5) of disk unit (at 2 places) and open disk protective covers (6).
4. Loosen transportation lock knob (7) and remove it from the disk unit (4).

Install the transportation lock knob you removed to the threaded hole (8) of disk unit.

### Note

**The transportation lock knob may be used for re-transportation. Keep it with care.**

When you continue to install disk, see Section 8-13 Disk installation and change.

5. Return disk protective covers (6) to original position and tighten knob (5) of disk unit (at 2 places) and fix the covers.
6. Align mount dovetail of disk unit (4) and mount dovetail (9) inside the disk box and push the disk unit from top until it hits to dead end.
7. Tighten fixing screw (3) with use of the Allen screwdriver and fix it.
8. Attach access panel (1) on top of disk box and tighten fixing screws (2) (at 2 places) and fix it.

## Safety Caution






- When you change disk, turn power of control box to OFF position and wait for one minute or more until the turn of disk is completely stopped. The disk turns very rapidly so that they may be a danger to squeeze your finger.
- When you change mirror unit for camera observation, change it after you turn the power of control box to OFF position. During the change, it may be a danger to squeeze your finger if you accidentally touch the changeover switch.
- Do not touch surface of disk with your hand. If the disk is blurred, observation image may be deteriorated.
- Do not touch lamp house mount adapter with your hand when the system is in use. As the adapter is installed near the lamp house, the surface will get high temperature.
- Do not put power cord in the vicinity of lamp house. Lamp house will be of very high temperature. If power cord touched the lamp house, the cord may be molten which would cause an electric shock.

- Do not turn the lamp ON without installing lamp house to microscope. Ultraviolet ray of lamp is hazardous to your eyes. Do not look at the light from lamp house directly.
- Do not look at excited light directly. When you use microscope, attach ultraviolet ray cutting plate and see specimen and others through ultraviolet ray cutting plate for sure.
- When you change mirror unit at front side turret and rear side turret, observe the placement to the light path in order of 1. fluorescent mirror unit and 2. reference mirror (No.1 position at each turret). If reference mirror were set in front side turret and rear side turret, strong light would be applied to the specimen and it is dangerous. (Regarding method of changeover for front and rear side turret, refer to Section 3-7 Changeover of mirror unit for visual observation (front side) and 3-10 Changeover of mirror unit for camera observation (rear side).

### Symbol for safety considerations

This system comes with the following symbols.

Understand the meaning of symbol and handle it safely.

Symbol	Meaning
	Do not touch with your hand as the surface is very hot. It may cause a burn.
	Be careful so as not to entangle your finger with disk or mirror unit for camera observation.
	Please read instruction manual definitely before you use the system. In case of erroneous handling, it may cause injury of user or damage to product.
	Main switch is ON.
	Main switch is OFF.

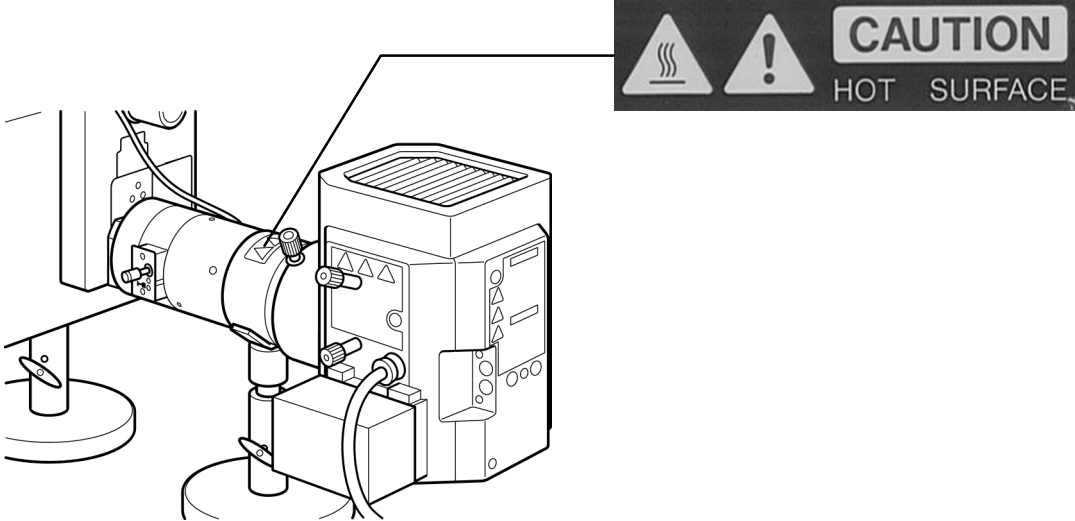
# INTRODUCTION



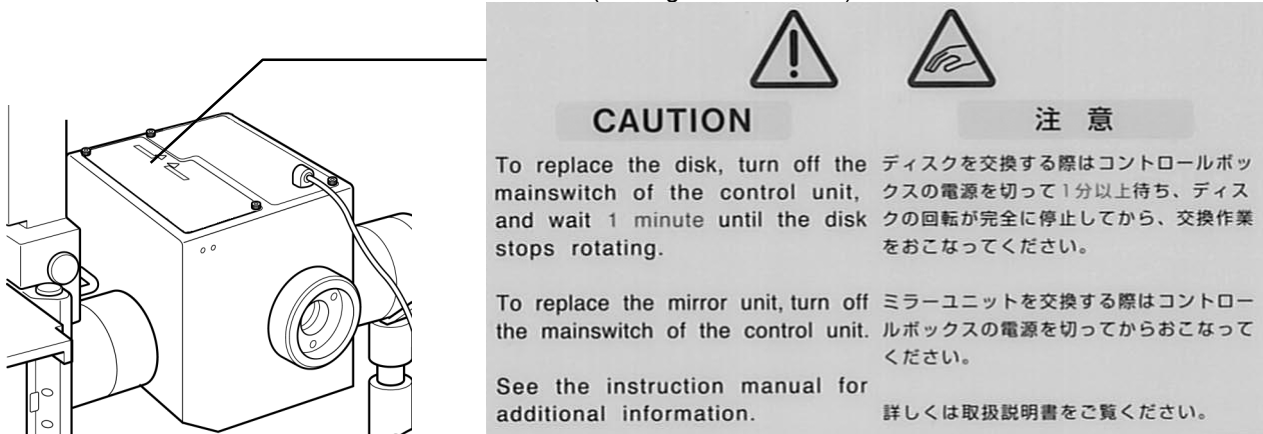
## Warning labels

Warning label is attached to the place where caution is particularly required for operation. Observe the instructions.

Lamp house mount adapter (Hot Surface caution)



Disk box (Entanglement caution)



When warning label is blurred or peeled off, contact our local sales office for change.

## When using the system

- Handle this system with care so as not to give a shock as it is a precision instrument.
- This system requires independent fluorescent mirror unit for visual and camera observation respectively. Install fluorescent mirror unit for visual observation to front side turret and install fluorescent mirror unit for camera observation to rear side turret.
- Use high performance fluorescent mirror unit (HQ type) for camera observation in order to get optimum optical performance.
- The fluorescent mirror unit – DSU-MRFPHQ – that comes with this system as accessory is for camera observation.  
Do not install it to front side turret for visual observation.
- Environment should be of room temperature at 10~35°C with relative humidity at 30~80%.
- Do not disassemble each section in vain as it may cause failure.
- Lamp house will get very hot. When installing, acquire adequate space in vicinity of lamp house (10cm or more), particularly on top.

## Cleanup and storage

- Never put dirt or fingerprint on surface of lens and filter, etc. In case of contamination, use gauze and wipe out lightly. In case that the dirt or fingerprint does not come off with gauze, then, use mixed liquid (alcohol 3: ether 7) to put in gauze and wipe out gently.



**Liquid like ether or alcohol is very inflammable. Care must be taken when you handle such liquid against fire and power switch ON-OFF procedure. Particularly, when using ether or alcohol, pay utmost attention to ventilation of the room.**

- When you clean other parts of the system, use a soft cloth dipped with diluted mild detergent to wipe each section. Do not use organic solvent as it would deteriorate plastic parts or paint.

## Caution






- If this system is used in other methods than those described in this manual, the safety is not guaranteed and it may cause a failure or damage to the system. Use this system in accordance with instruction manual.

## INTRODUCTION

### Manual conventions

This manual describes with use of the following manual conventions.

✧ Conventions of note, reference and point

Conventions	Description
	Indicates note to prevent injury of user and damage of product (including home furniture, etc.).
	Typical note is indicated with  .
	Advice or hint for reference is indicated with  .

# I. System Outline



# 1 SYSTEM OUTLINE

Attaching this system to a microscope, it comprises a confocal microscope system without laser, but with use of a white light source. It acquires a high contrast image through resolution enhanced in light axis direction very rapidly.

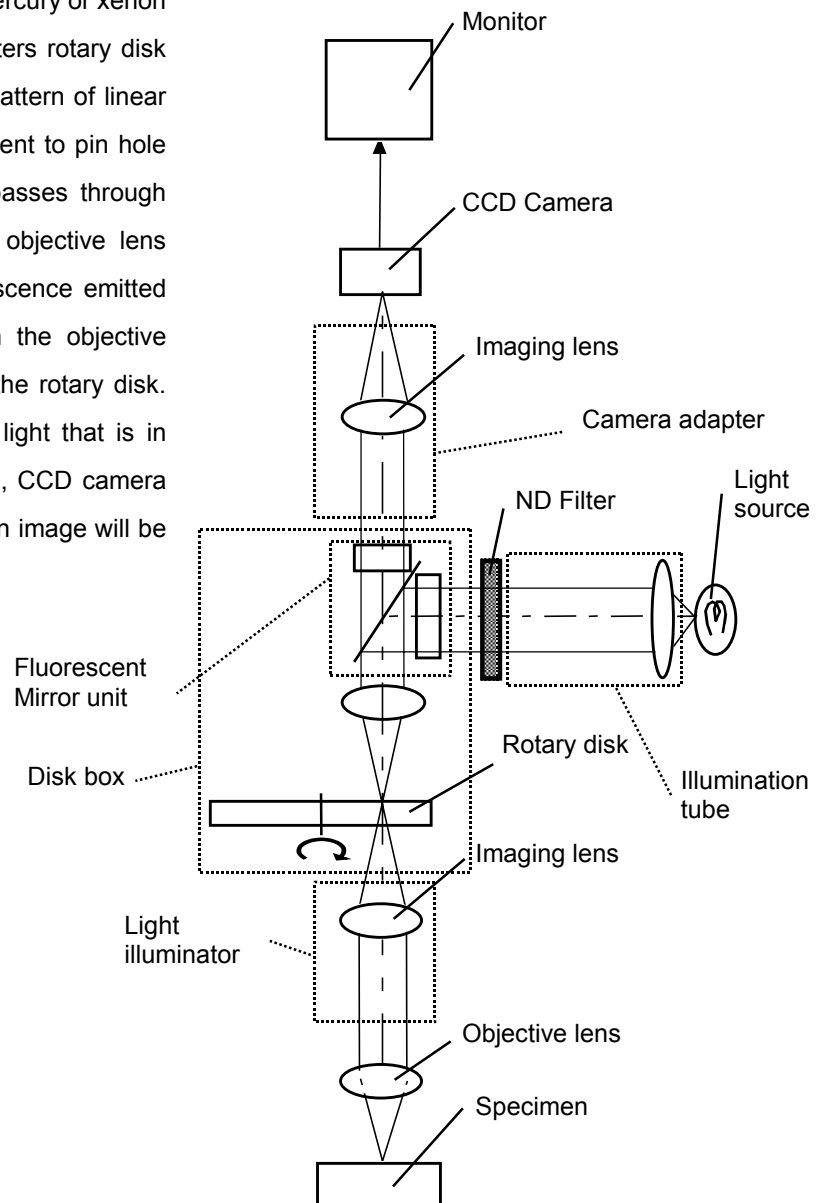
In addition, Olympus motorized microscopes IX81, BX61WI, BX61 or BX62 and their related motorized units may be controlled through a 3rd party software, which is designed for observation by CCD camera.

And the combination of such the software and the microscope may enable 3 dimensional observation, time-lapse observation and so on.

The software controls changeover of confocal/non-confocal mode, ND filter synchronized to confocal or non-confocal mode and filter cube inside the disk box in conjunction with motorized focusing control of motorized microscope and thus, by changing wavelength through Z-drive of focusing control, it acquires images for myriad observation.

## 1-1 Principle

Light emitted from light source of mercury or xenon reflects at fluorescent mirror and enters rotary disk in light path. The rotary disk has a pattern of linear lines that provides the effect equivalent to pin hole by high speed rotation. Light that passes through the pattern further passes through objective lens and goes to the specimen. Fluorescence emitted from the specimen passes through the objective lens again and forms an image on the rotary disk. Among image formed, a portion of light that is in focus will pass through the disk and, CCD camera captures the image and the specimen image will be displayed on the monitor.

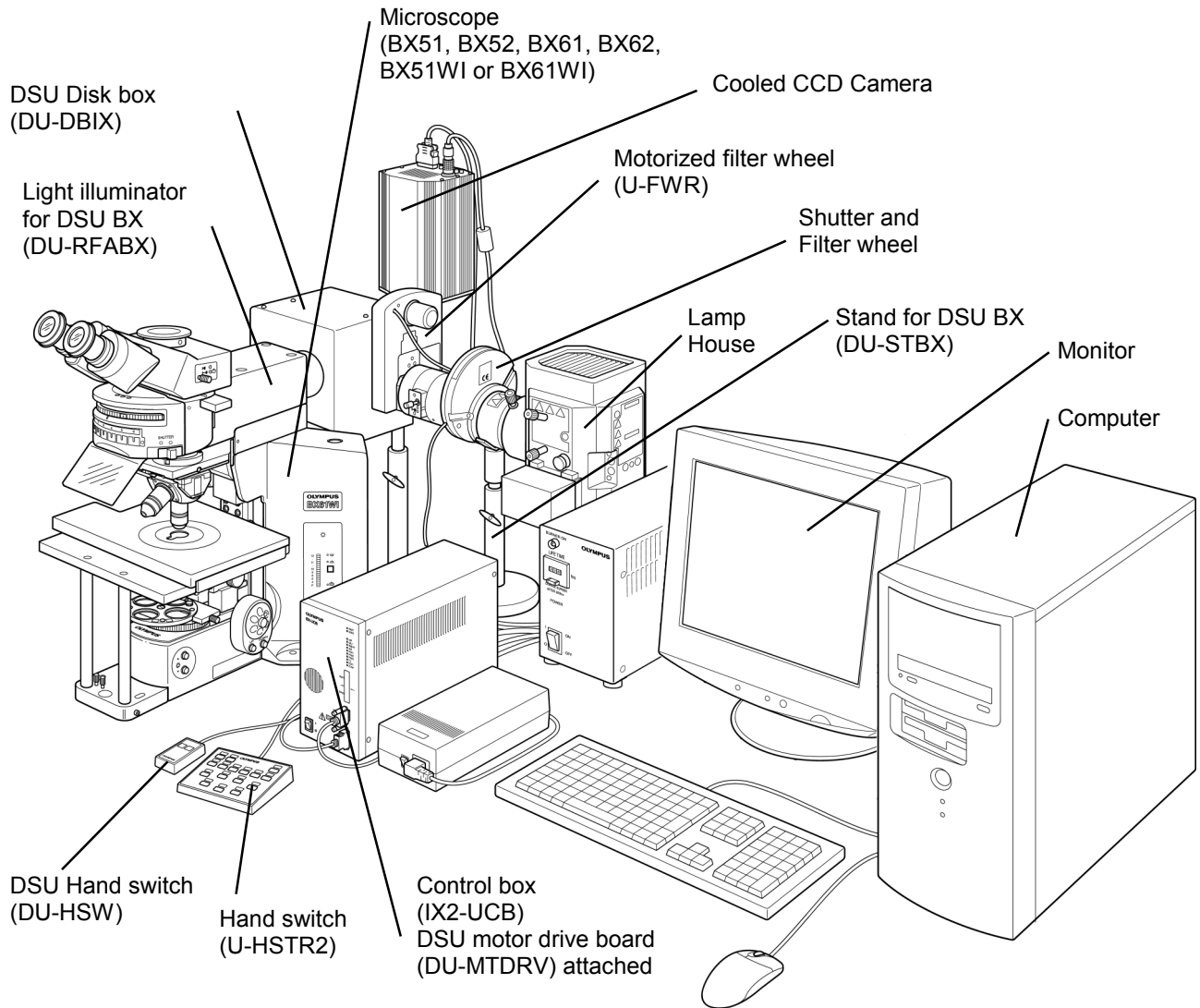


## 1-2 Features

- Confocal disk employed enables to acquire image of confocal effect.
- As while light source such as mercury or xenon is used as a light source instead of laser, excited light of various wavelengths can be used by combination of excitation filter and cube.
- In case of non-confocal observation by displacing the disk from light path, an image of deep focal point without confocal effect can be acquired. In case of confocal observation by placing the disk in light path, a sharp image of shallow focal point can be acquired. Changeover of confocal to non-confocal can be done very easily.

**1-3 System Configuration**

**1-3-1 In case of BX series**



**Figure of BX series System Configuration**

When you use this system in conjunction with microscope, you cannot integrate the following units:

Motorized condenser (U-UCD8A) and motorized reflected light fluorescence (BX-RFAA and BX-RLAA).

Motorized filter wheel (U-FWT and U-FWO)

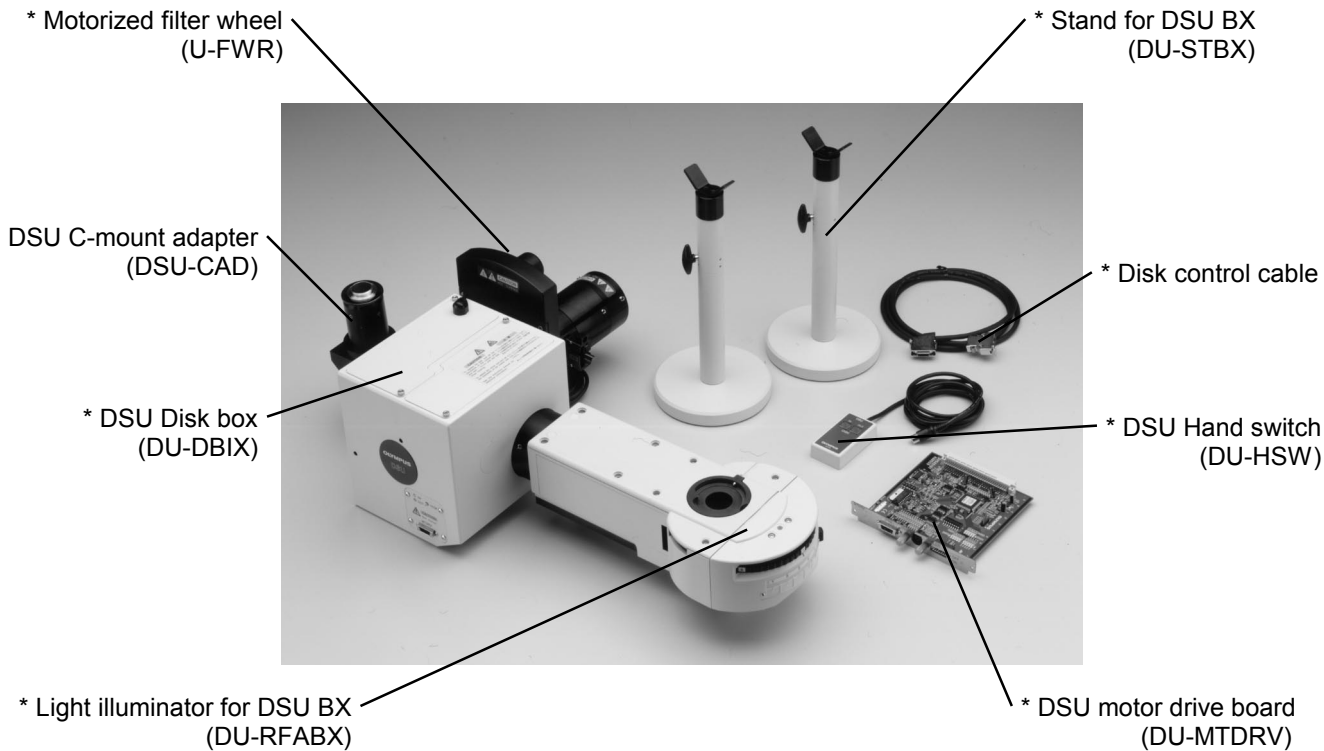
When you integrate motorized revolving nosepiece, connect control box (IX2-UCB) with use of connecting cable (U-REMMT).



Table of Instruction Manuals for Modules to be integrated

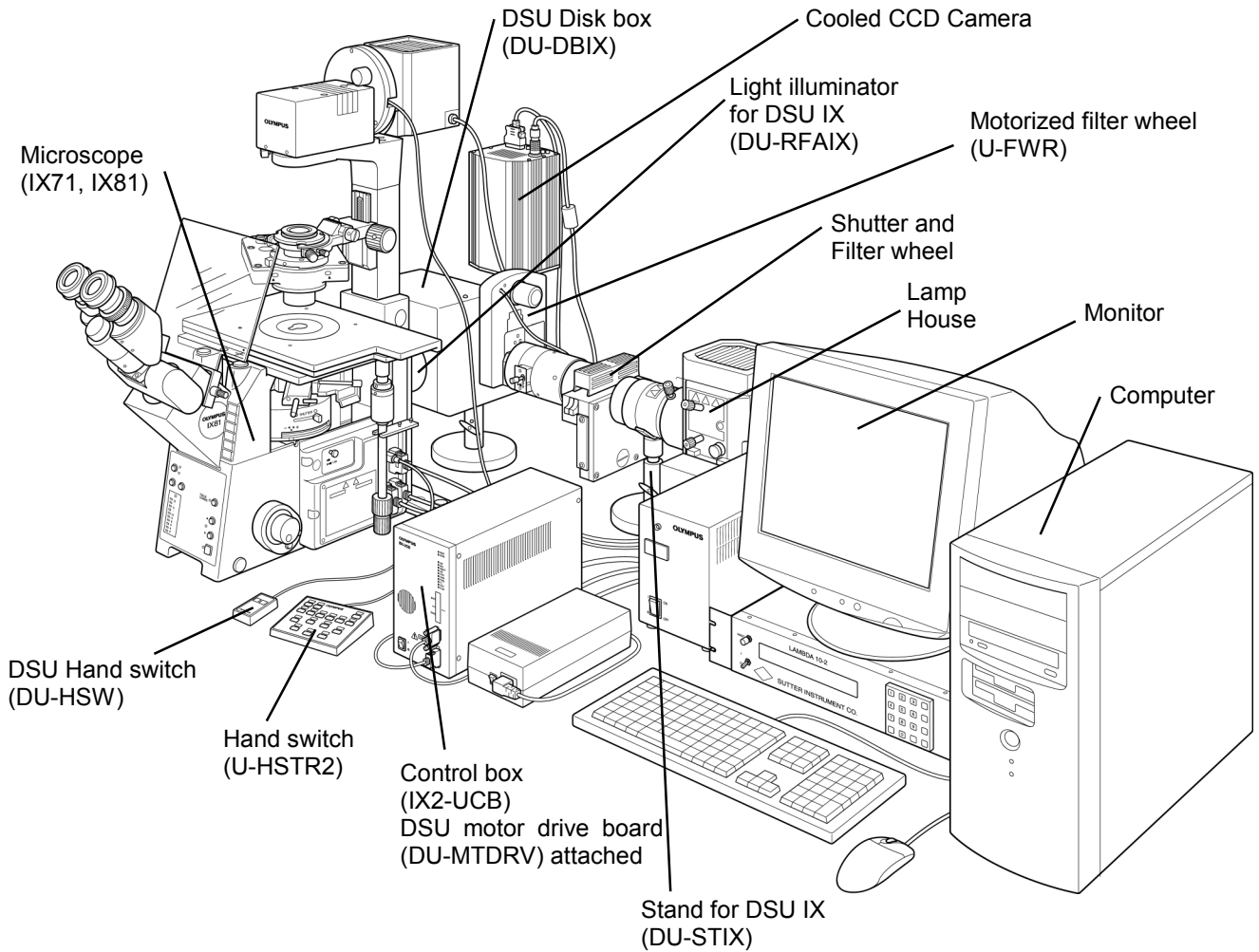
Instruction Manual	Module name
SYSTEM MICROSCOPE	BX51/BX52
MOTORIZED SYSTEM MICROSCOPE	BX61/BX62
FIXED-STAGE UPRIGHT MICROSCOPE	BX51W1
FIXED-STAGE MOTORIZED UPRIGHT MICROSCOPE	BX61W1
CONTROL BOX FOR IX2 HAND SWITCH	IX2-UCB U-HSTR2
Cooled CCD Camera	Manual for Cooled CCD Camera you may use
Computer/Monitor	Manual for computer you may use

**1-3-2 BX-DSU**



BX-DSU includes the units, which have a mark "\*" in its description on the above picture.

**1-3-3 In case of IX series**



**Figure of IX Series System Configuration**

When you use this system in conjunction with microscope (IX71 or IX81), you cannot integrate with the following units:

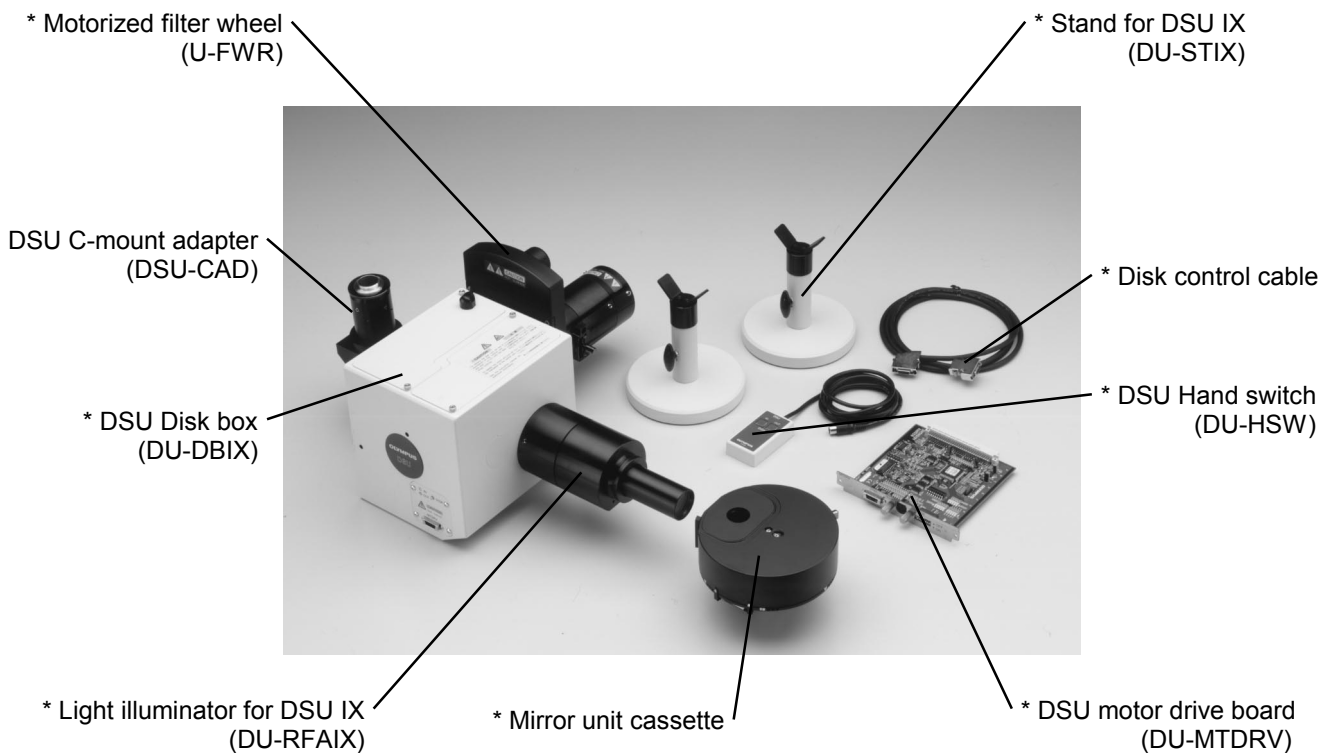
Motorized fluorescent mirror unit cassette (IX2-RFACA) and motorized filter wheel (U-FWT and U-FWO).



Table of Instruction Manuals for Modules to be integrated

Instruction Manual	Module name
INVERTED RESEARCH MICROSCOPE	IX71
MOTORIZED INVERTED RESEARCH MICROSCOPE	IX81
CONTROL BOX FOR IX2 HAND SWITCH	IX2-UCB U-HSTR2
Cooled CCD Camera	Manual for Cooled CCD Camera you may use
Computer/Monitor	Manual for computer you may use

**1-3-4 IX2-DSU**



IX2-DSU includes the units, which have a mark "\*" in its description on the above picture.

## II. DSU



# 2 SUMMARY OF OBSERVATION PROCEDURES

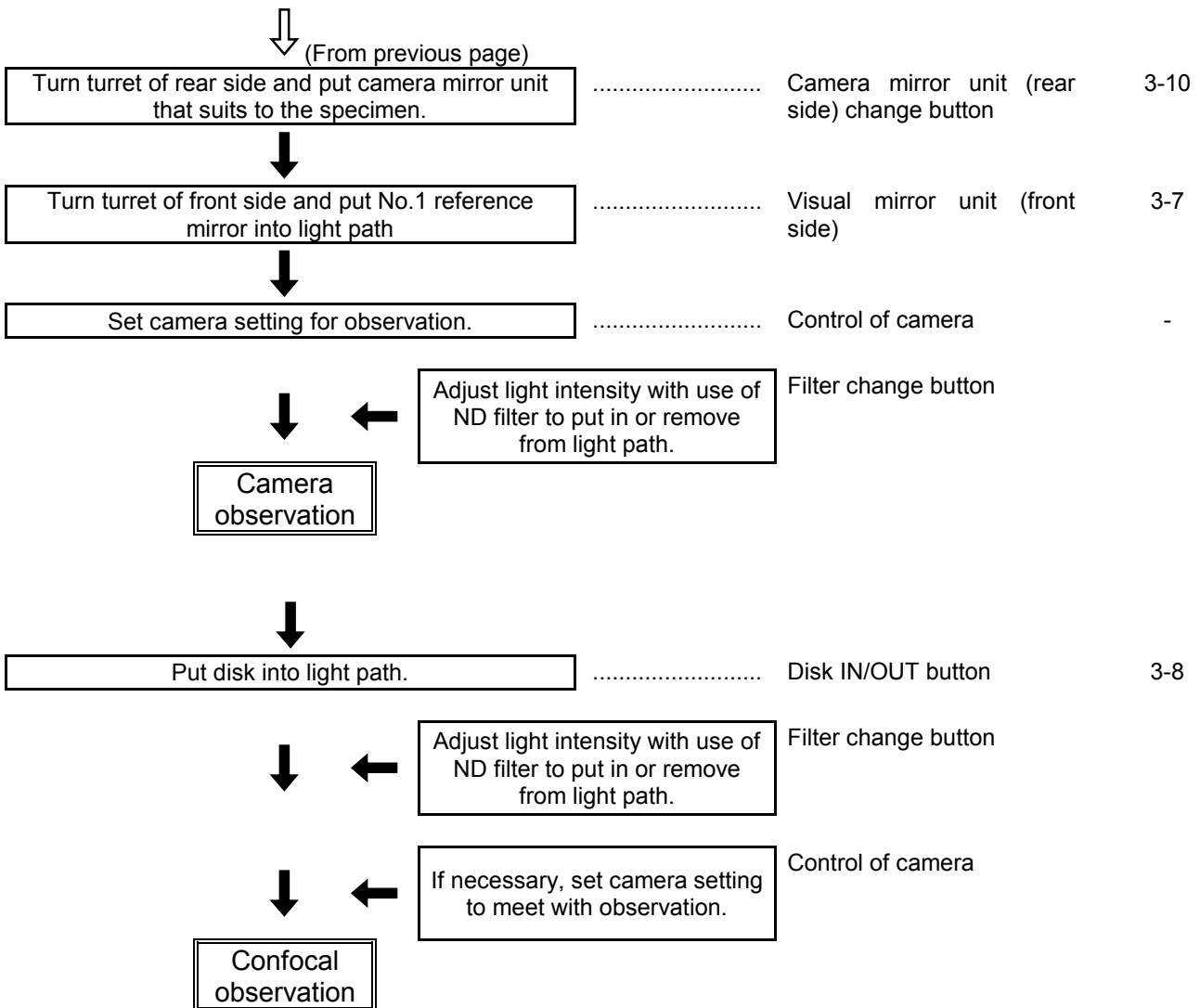
This section describes procedures for fluorescent observation by visual method followed by camera observation by confocal mode.

## Preparation

- Install fluorescent mirror unit and objective lens applicable to observation method.
- Do centering of mercury lamp or xenon lamp.
- Bring camera in focus.

Procedures	Where	Ref.
Turn power switch of each system to ON position and do initialization.	Power switch of each system	3-5
↓		
Turn power switch of lamp to ON position and wait until arc is stabilized. (5 to 10 minutes).	Main switch of lamp power	3-5
↓		
Set specimen on stage.	Lateral/Longitudinal feed handle	-
↓		
Turn turret of front side and insert visual mirror unit that fits to specimen into light path.	Visual mirror unit (front side)	3-7
↓		
Turn turret of rear side and insert No.1 reference mirror into light path	Camera mirror unit (rear side) change button	3-10
↓		
Displace disk from light path.	Disk IN/OUT button	3-8
↓		
Put objective lens in light path and open shutter to bring the specimen in focus.	Objective lens change button, revolving nosepiece, shutter open/close knob or Electric shutter or focusing handle or coarse/fine handle	3-6 3-9
↓		
Adjust light intensity with use of ND filter to put in or remove from light path.	Filter change button	3-11
↓		
Adjust entire field of view to be uniformly bright.	Collector lens focusing knob	3-12
↓		
Adjust field iris diaphragm.	Field iris diaphragm lever	3-12
↓		
Visual observation		
↓		
↓ (To next page)		

## Summary of observation procedures



**Note** During observation, use shutter for short interruption of observation.

# 3 DETAILS OF EACH OPERATION

## 3-1 General Precaution for observation

1. Verify that input voltage/frequency to be used is within the range of that described in identification plate of the system.
2. Verify that power cord as well as connecting cord is securely connected.
3. In case that transmitted light phase contrast observation or transmitted light DIC (Differential Interference Contrast) observation only is required, make one place where fluorescent mirror unit is not attached and do observation.
4. Use field iris diaphragm, squeezing it until it circumscribes to the field of view and, in case that it is out of center, adjust it with use of the Allen screwdriver.
5. Use immersion oil for objective lens of immersion type.
6. When you use objective lens of LCPlanFI series, attach a correction cap that compensates thickness of container used for objective lens that is used for observation. See instruction manual for IX2 series for kinds of correction caps available.
7. Objective lens, UPlanApo40x (cover glass thickness offset 0.11~0.23), PlanApo40x (0.11~0.23), UApo40x3/340 (0.11~0.23), UPlanApo60xW3 (0.15~0.20), LCPlanFI40x (0~2.5) and 60x (0~2.5), all come with a correction ring; can compensate deterioration of resolution due to variance of cover glass thickness.
 

<b>Correction method</b>	While turning correction ring, seek the position by adjusting focus with use of fine-tuning handle and get best possible resolution.
--------------------------	--
8. When a pause is required frequently during observation, use shutter (manual or electric shutter).  
(If mercury lamp is turned ON-OFF so frequently, it may deteriorate life of lamp).
9. Note to color deterioration on specimen  
In case that observation is done with use of objective lens of high power, color deterioration on specimen may occur earlier and contrast of fluorescent image may be deteriorated. In such case, the color deterioration may defer if intensity of excited light is lowered to a certain extent and a good fluorescent image may be acquired. Use of ND filter is recommended to lower intensity of the excited light if it does not bother the observation. Alternatively, use shutter so as not to apply light source to specimen so often than it is necessary. Moreover, it can defer the color deterioration if anti-color deterioration agent commercially available (DABCO) is used. Particularly, it is recommended that anti-color deterioration agent is used with high power observation.



**Note** Be careful that specimen of certain kind cannot use anti-color deterioration agent.

### 3-2 Selection of fluorescent mirror unit

Select fluorescent mirror unit that has excitation to meet with coloring matter.



**Note** Do not use fluorescent mirror unit in combination with brightfield of view mirror unit (U-MBF3). U-MBF3 is very bright and it may hurt your eyes. If for any reason the mix use of mirror units is required, use U-MBFL3 that ND filter is built in or insert ND filter of 3%.



**TIP** Note to excitation bandwidth  
A few sets of excitation filters combined for different bandwidth are available. Typically, a set of wide bandwidth (W) is used but, in case of the followings, the use of a separate set may be better.

- (1) In case that brightness of fluorescence is dark (B,G excitation only) → Change to super wide bandwidth (SW)  
(In case of SWB2, fluorescence that comes from substance other than fluorescent coloring matter may become stronger.)
- (2) In case fluorescence that comes from substance other than fluorescent coloring matter is strong → Change to narrow bandwidth (N)  
(Brightness of fluorescence becomes slightly darker.)



DETAILS OF EACH OPERATION / Selection of fluorescent mirror unit

Table of combination for mirror unit and dichroic mirror filter

Excitation Method	Mirror Unit	Dichroic Mirror	Excitation Filter	Barrier Filter	Fluorochrome
U	U-MWU2	DM400	BP330-385	BA420	<ul style="list-style-type: none"> <li>• Auto fluorescence observation</li> <li>• DAPI Dyeing: DNA</li> <li>• Hoechst 33258, 33342 Dyeing: Chromosome</li> </ul>
	U-MNU2		BP360-370		
V	U-MNV2	DM455	BP400-410	BA455	<ul style="list-style-type: none"> <li>• Catecholamine observation</li> <li>• serotonin observation</li> <li>• tetracycline Dyeing: Bone, Teeth</li> </ul>
BV	U-MWBV2	DM455	BP400-440	BA475	<ul style="list-style-type: none"> <li>• quinacrine, quinacrine mustard Dyeing: Chromosome</li> <li>• thioflavine S Dyeing: lymph cell</li> <li>• acriflavine Dyeing: Nucleic acid</li> <li>• CFP use</li> </ul>
	U-MNBV2		BP420-440		
	U-MCFPHQ	DM450	BP425-445	BA460-510	
B	U-MGFPHQ	DM485	BP460-480	BA495-540	<ul style="list-style-type: none"> <li>• FITC Dyeing: Fluorescent antibody test</li> <li>• acridine orange Dyeing: DNA, RNA</li> <li>• auramine Dyeing: TB bacteria</li> <li>• EGFP, S65T, RSGFP use</li> <li>• YFP use</li> </ul>
	U-MWB2	DM500	BP460-490	BA520IF	
	U-MNB2		BP470-490		
	U-MSWB2		BP420-480		
IB	U-MWIB2	DM505	BP460-490	BA510IF	
	U-MNIB2		BP470-490		
	U-MYFPHQ	DM505	BP490-500	BA515-560	
G	U-MWG2	DM570	BP510-550	BA590	<ul style="list-style-type: none"> <li>• rhodamine, TRITC Dyeing: Fluorescent antibody test</li> <li>• propidium iodide Dyeing: DNA</li> <li>• RFP use</li> </ul>
	U-MNG2		BP530-550		
	U-MSWG2		BP480-550		
IG	DSU-MRFPHQ	DM560	BP535-555	BA570-620	
	U-MWIG2	DM565	BP520-550	BA580IF	
IY	U-MWIY2	DM600	BP545-580	BA610IF	texas red Dyeing: Fluorescent antibody test

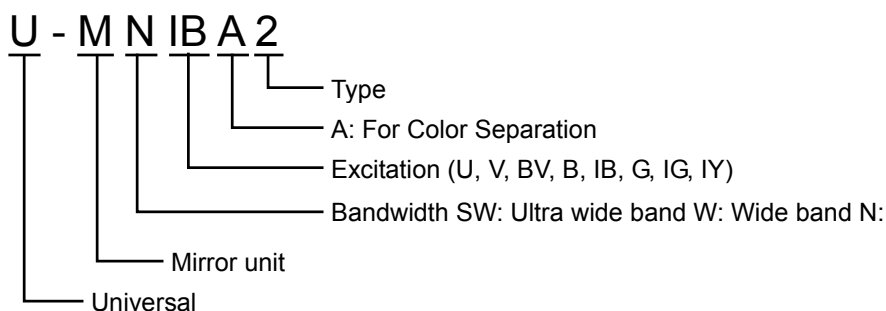
DETAILS OF EACH OPERATION / Selection of fluorescent mirror unit



Color Separation Filter Combinations

Excitation Method	Mirror Unit	Dichroic Mirror	Excitation Filter	Barrier Filter	Fluorochrome
U	U-MNUA2	DM400	BP360-370	BA420-460	Observation of U-excited coloring matter only when Dyeing U-excited coloring matter and multi-Dyeing of FITC.
IB	U-MWIBA2	DM505	BP460-490	BA510-550	Observation of B-excited coloring matter only when Dyeing B-excited coloring matter or multi-Dyeing TRITC or texas red.
	U-MNIBA2		BP470-490		

Meaning of mirror unit name (Except HQ type)



U-MGFPHQ and DSU-MRFPHQ come with this system as standard accessories.



**Note** As fluorescent mirror unit for camera observation, use HQ type.  
**DSU-MRFPHQ – accessory of this system – is dedicated for camera observation.**

**3-3 Table of Combination – Objective lens to each observation and applicable disk**

Objection lens		Reflected light fluorescence			Phase contrast	Differential interference			Applicable disk
		340	U, V, BV	B, IB, G, IY		BX2	BX2WI*	IX2	
UPlanApo	4x	△	○	○	-	-	-	-	DSU-D1 DSU-D2
	10x	△	○	○	○*	○	-	○	DSU-D1 DSU-D2
	20x	△	○	○	○*	○	-	○	DSU-D1 DSU-D2
	20xO	△	○	○	-	○	-	○	DSU-D1
	40x	△	○	○	-	○	-	○	DSU-D3
	40xOI3	△	○	○	○*	○	-	○	DSU-D1 DSU-D2
	60xW3	△	○	○	-	○	○	○	DSU-D3
	60xW/IR3	△	○	○	-	○	○	○	DSU-D3
	100xOI3	△	○	○	○*	○	○	○	DSU-D4
UPlanFI	4x	△	○	○	○*	-	-	-	DSU-D1 DSU-D2
	10x	△	○	○	○*	○	-	○	DSU-D1 DSU-D2
	20x	△	○	○	○*	○	-	-	DSU-D1 DSU-D2
	40x	△	○	○	○*	○	-	-	DSU-D3
	40xO	△	○	○	-	○	-	○	DSU-D1 DSU-D2
	60xOI3	△	○	○	-	○	○	○	DSU-D3
	100xO3	△	○	○	○*	○	○	○	DSU-D4
	100xOI3	△	○	○	-	○	○	○	DSU-D4
CPlanFI	10xPh	△	△	△	○*	-	-	○	DSU-D1
UApo	20x3/340	○	○	○	-	-	-	○	DSU-D1 DSU-D2
	40x3/340	○	○	○	-	○	-	○	DSU-D3
	40xOI3/340	○	○	○	-	○	-	○	DSU-D1 DSU-D2
	40xW3/340	△	○	○	-	○	-	○	DSU-D1 DSU-D2
PlanApo	60xO3	-	○	○	-	○	-	○	DSU-D3

DETAILS OF EACH OPERATION / Table of Combination – Objective lens to each observation and applicable

disk



Objection lens		Reflected light fluorescence			Phase contrast	Differential interference			Applicable disk
		340	U, V, BV	B, IB, G, IY		BX2	BX2WI*	IX2	
LCPlanFI	20x	–	–	○	○*	–	–	○	DSU-D3
	40x	–	△	○	○*	○	–	○	DSU-D4
	60x	–	–	○	○*	–	–	○	DSU-D4
LCAch	20x	–	△	○	○*	–	–	–	DSU-D3
	40x	–	–	○	○*	–	–	–	DSU-D4
LUMPLFL	40xW	△	○	○	–	○	○	–	DSU-D3
	40xW/IR	△	○	○	–	○	○	–	DSU-D3
	60xW	△	○	○	–	○	○	–	DSU-D4
	60xW/IR	△	○	○	–	○	○	–	DSU-D4
XLUMPLFL	20xW	△	○	○	–	–	○	–	DSU-D5

\* BX2WI can be used for differential interference contrast observation - the same combination as BX2 - provided that it uses U-UCD8.

○ : Useable combination.

△ : Useable combination but it gets dark.

○\* : For phase contrast observation, objective lens for phase contrast is required.

– : Not useable or no applicable objective lens available.

DSU-D1 : Standard, for thick specimen

DSU-D2 : Standard, for thin specimen (comes with this system as accessory)

DSU-D3 : For WI 40x

DSU-D4 : For WI Standard 60x

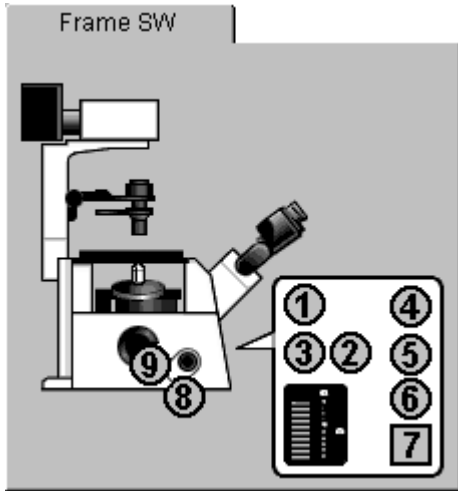
DSU-D5 : For XLUMPLFL20x only

(DSU-D1/DSU-D2 should be used according to thickness of specimen.)

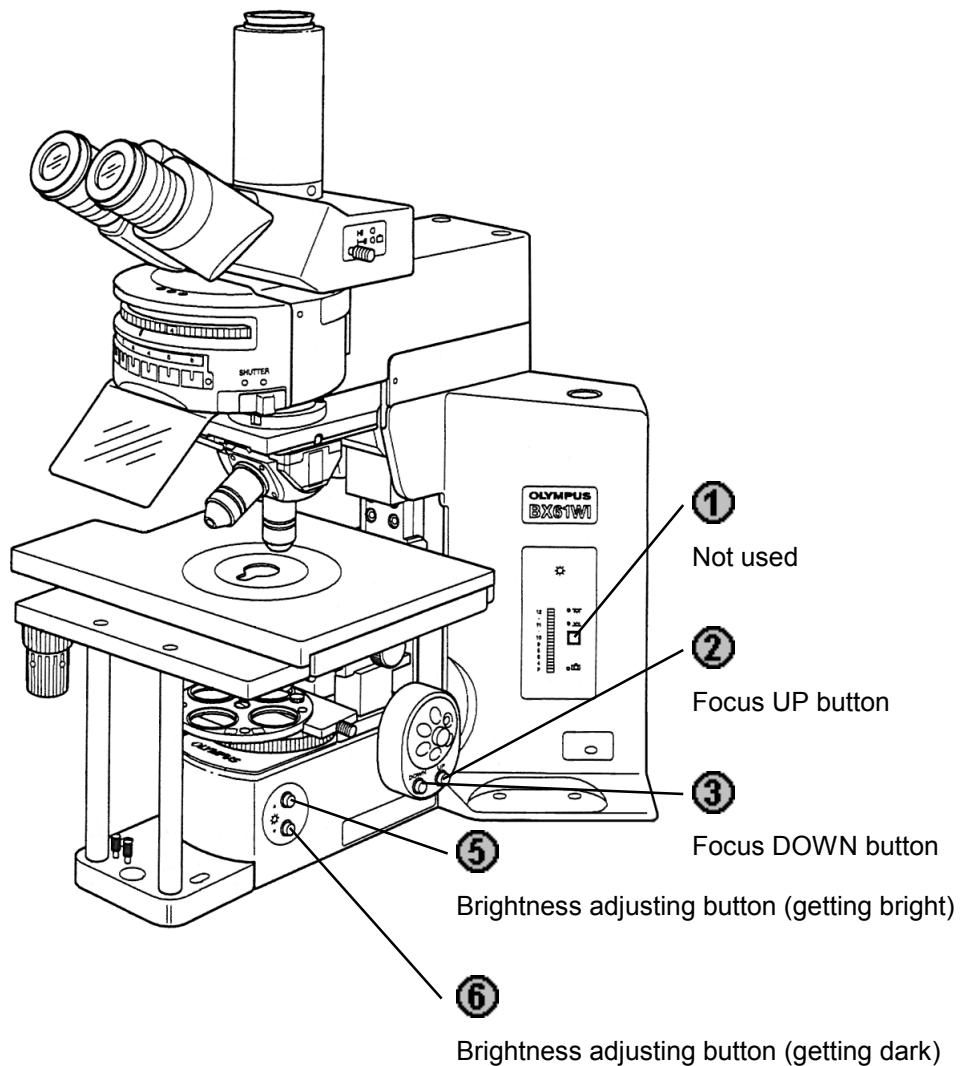


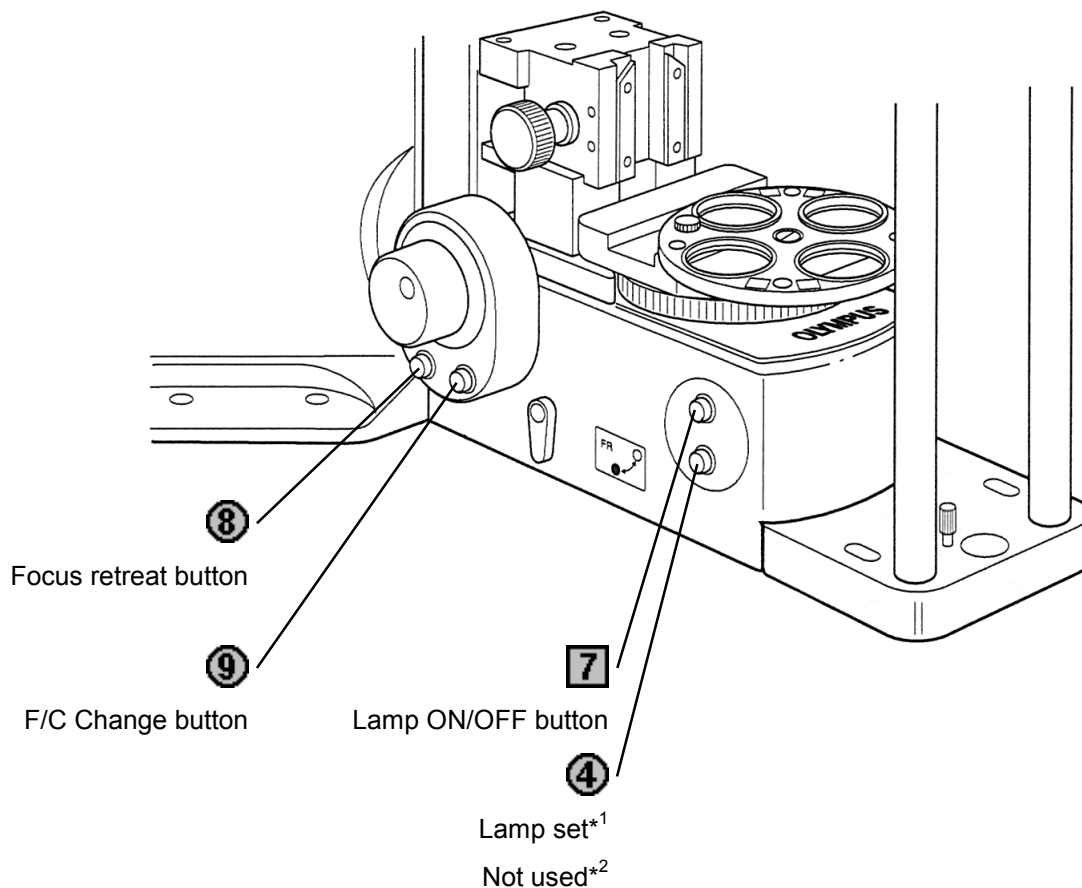
**Plastic container (petri dish or flask) is not useful for differential interference observation.**

**3-4 Assignment of operating buttons on body (BX61, BX62 or BX61WI only)**



When IX2-BSW software boots up, microscope IX and its operation buttons will be displayed on tab called [Frame SW]. When you use BX61, BX62 or BX61WI, however, microscope does not appear. Assignment of operating buttons for microscope – BX61, BX62 or BX61WI as well as operating buttons on [Frame SW] tab are as follows.





\*<sup>1</sup> In case that control box (IX2-UCB) is of type 1, the identifying plate indicates IX2-UCB.

\*<sup>2</sup> In case that control box (IX2-UCB) is of type 2, the identifying plate indicates IX2-UCB-2.

### 3-5 Powering up

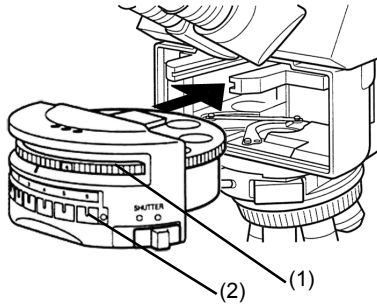
1. Switch on the control box.
2. Switch on the lamp.
3. Switch on CCD camera.

### 3-6 Focusing

Use coarse/fine handle to bring the specimen in focus. In case of motorized microscope, use focus handle unit or focus operating button on body to bring the specimen in focus.

### 3-7 Changeover of visual mirror unit (front side)

#### 3-7-1 In case of BX



Turn turret (1) located in front of light illuminator and insert mirror unit desired or reference mirror into light path. Reference mirror to insert into light path is normally put in No. 1 for use of camera observation.

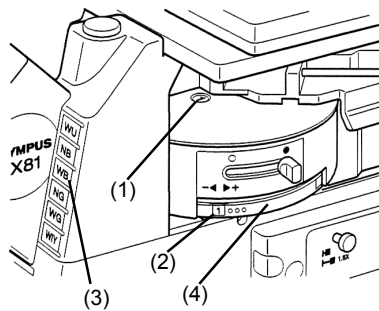
**TIP**

In case that mirror unit name is put in a pocket of identifying plate (2) of microscope frame, you can verify the name of mirror unit.

**Note**

When you insert reference mirror put in No.1 into light path, verify that rear side turret is set to fluorescent mirror unit.

#### 3-7-2 In case of IX



1. Look at mirror unit indication (1) on surface of mirror unit cassette or look at indication (2) at right side of turret and verify mirror unit number that is currently inserted into light path.

**TIP**

In case that mirror unit name is put in a pocket of identifying plate (3) of microscope frame, you can verify the name of mirror unit.

2. Turn turret (4) so as to bring number of mirror unit that is to be used in indicator of mirror unit cassette (1) or (2) and fix it at click position. Reference mirror to insert into light path is put in No. 1 for use of camera observation.

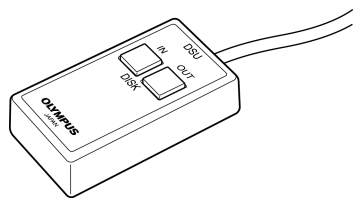
**TIP**

Turning turret in [+] direction, the number changes in order of "1→2→3→4→5→6→1", and in [-] direction, it changes in order of "1→6→5→4→3→2→1".

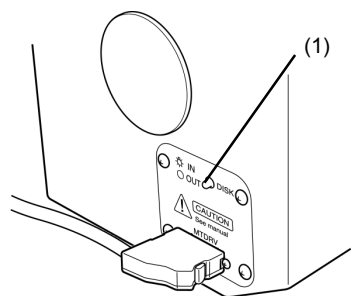
**Note**

When you insert reference mirror put in No.1 into light path, verify that rear side turret is set to fluorescent mirror unit.

### 3-8 Disk IN/OUT



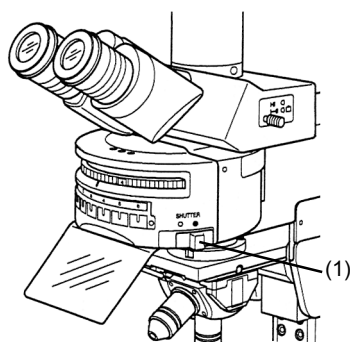
When you wish to insert disk into light path, press left IN button of DSU hand switch. Likewise, press right OUT button so that the disk would be displaced from light path.



**Note** When disk comes into light path, LED (1) located at left side of disk box would light in green and, when it is displaced from light path, the LED would go off.

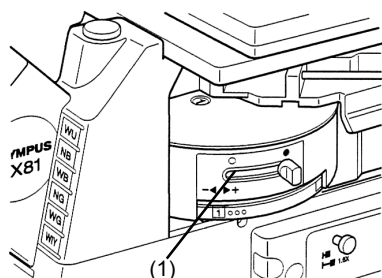
### 3-9 Shutter OPEN/CLOSE

#### 3-9-1 In case of BX



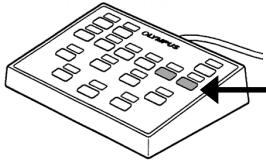
When shutter knob (1) located at right lower side of turret in front of light illuminator is moved left to mark ○ side, the shutter would open, and right to mark ● side, it would close.

#### 3-9-2 In case of IX



When shutter knob (1) located at right side of visual mirror unit is moved left to ○ side, the shutter would open, and right to ● side, it would close.

### 3-10 Changeover of camera mirror unit (rear side)



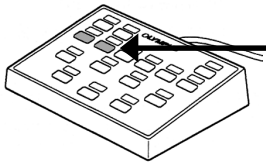
Press button on hand switch to turn the turret and insert mirror unit desired or reference mirror into light path. Reference mirror is put in No. 1.

Buttons to designate mirror unit are assigned at ex-factory as illustrated in left figure. (Two buttons, one is for clockwise turn and the other for counter-clockwise turn.)



**When you insert reference mirror put in No.1, verify that front side turret is set to fluorescent mirror unit.**

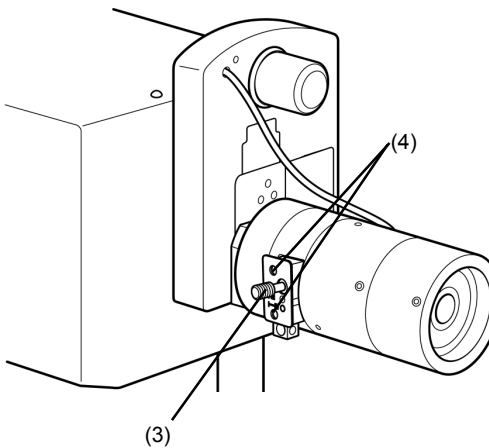
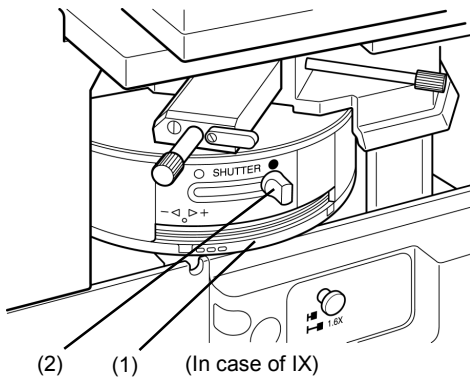
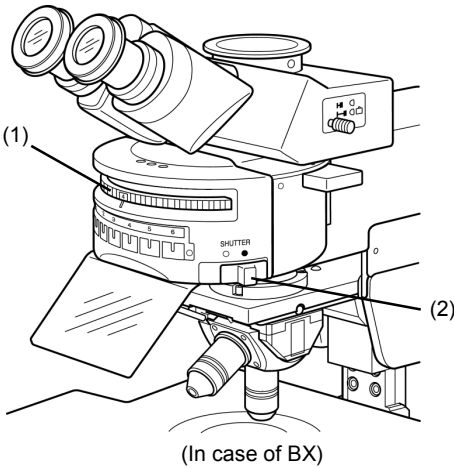
### 3-11 Filter change



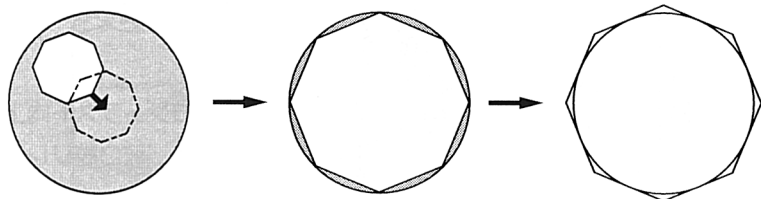
Press button on hand switch to turn filter wheel and insert ND filter desired into light path.

Buttons to turn filter wheel are assigned at ex-factory as illustrated in left figure. (Two buttons, one is for clockwise turn and the other for counter-clockwise turn.)

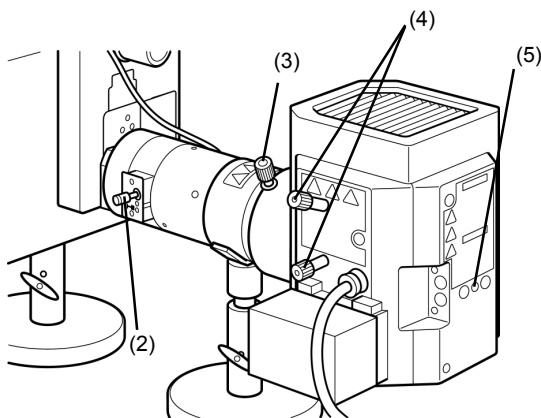
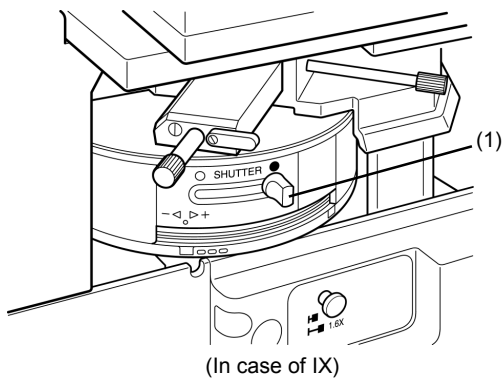
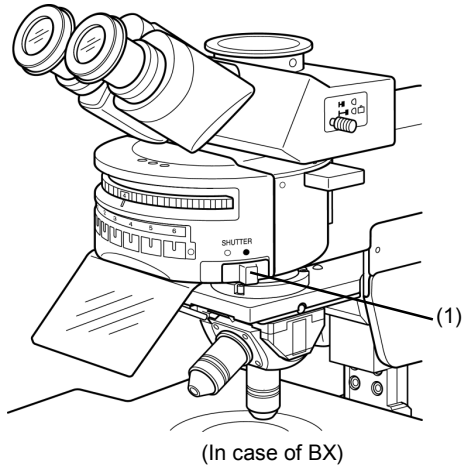
**3-12 Adjustment of field iris diaphragm**



1. Turn front side turret (1) and insert fluorescent mirror unit desired into light path.
2. Turn rear side turret and insert reference mirror of No. 1 into light path.
3. Set objective lens of 10x and set the specimen.
4. Move shutter knob (2) located at lower right side of turret to left (○ mark side) to open the shutter.
5. Use coarse/fine handle or, in case of motorized microscope, use focus handle unit or focusing button on microscope frame to bring the specimen in focus.
6. Pull out field iris diaphragm lever (3) located at side of illumination tube and squeeze it to the smallest diameter.
7. Insert the Allen screwdriver that comes as accessory into centering hole (4) of microscope frame located at side of illumination tube (2 places) and adjust the axis of field iris diaphragm image in a way that it comes in the same axis with the filed of view.
8. Push in field iris diaphragm lever (3) and open field iris diaphragm until it inscribes the field of view. In case that the axis is out of center, do centering procedure again.
9. Push in field iris diaphragm lever (3) further and make the aperture to circumscribe with field of view.



### 3-13 Lamp centering



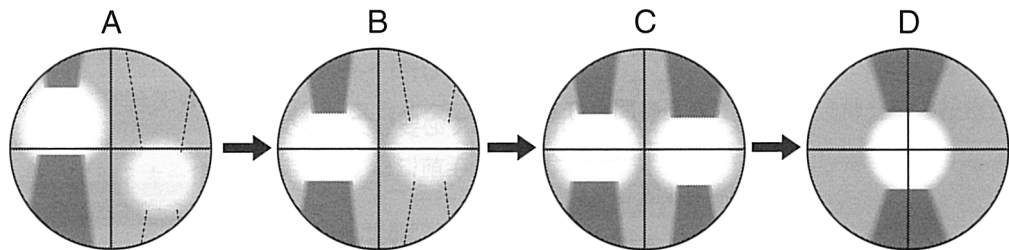
**TIP** : Lamp centering should be done after arc image of lamp is stabilized after main switch was turned ON (5 to 10 minutes later after lamp ON).  
In case that frost filter 32FR80 is used, displace it from light path.

1. Move shutter knob (1) to right (● mark side) to close the shutter.
2. Turn front side turret and insert fluorescent mirror unit of B or IB excitation for visual observation into light path.  
(In case that these mirror units are not installed, use other fluorescent mirror unit. However, in case of fluorescent mirror unit of U excitation, it is essentially required to observe through ultraviolet light cutting plate.)
3. Turn rear side turret and insert reference mirror of No.1 into light path.
4. Move shutter knob (1) to left (○ mark side) to open the shutter.
5. Put objective lens 10x into light path. Put centering target U-CST on the stage and align center of view with cross line of U-CST.
6. Turn revolving nosepiece and bring a place where the objective lens does not exist into light path (objective cap should also be displaced).
7. Pull out field iris diaphragm lever (2) (to make the view squeezed).
8. Turn collector lens focusing knob (3) to project arc image on U-CST. (A)  
In case that the image is not projected, turn lamp centering knob (4).
9. Turn lamp centering knob (4) and move arc image to center of right (or left) half view. (B)
10. Insert the Allen screwdriver into mirror focusing screw (5) located at back panel of lamp house and turns it to bring mirror arc image in focus. (C)



- Turn lamp centering knob (4) and overlap arc image and mirror arc image. (D)

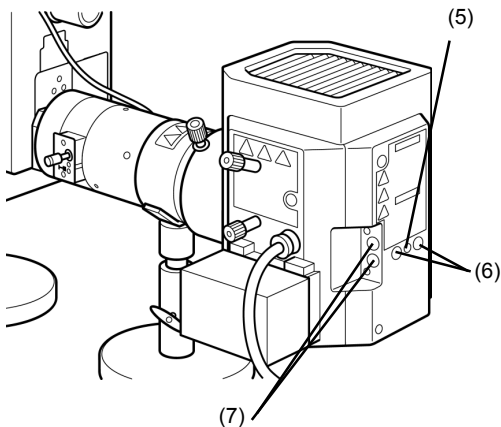
**TIP** When you feel that the collector lens focusing knob (3) is hard to turn as it is located far away, insert extension handle U-CLA (available at option) into the knob.



**TIP** Lamp centering is not required until next lamp change.

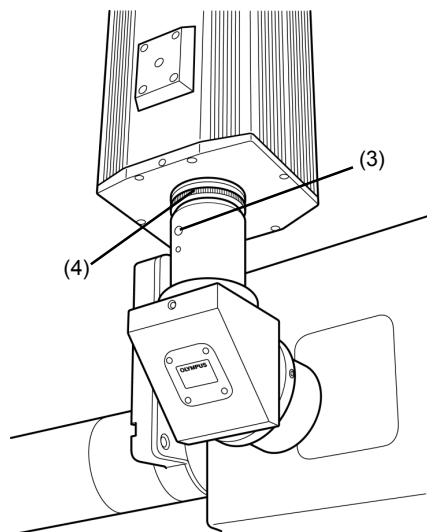
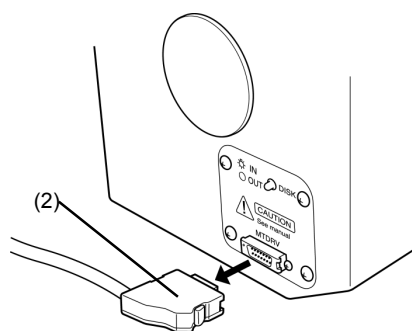
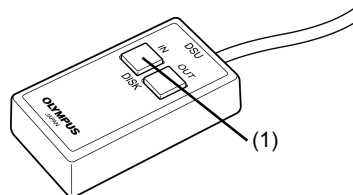
**Stringent mirror centering**

**TIP** Position of mirror is fixed after adjustment at ex-factory. When you wish to make stringent adjustment further, excersize the following procedures besides the procedures described in previous section. Meanwhile, note that, after adjustment, the state at ex-factory cannot be revived.



- Peel off blind seals (6) attached on back panel of lamp house, using tweezers (2 places).
- Loosen screws under the seals with use of the Allen screwdriver. By loosening these two screws, the lock of mirror would be released.
- Next, peel off blind seals (7) (2 places) so that mirror centering holes would appear.
- Using the Allen screwdriver, adjust centering of mirror arc image through these holes.

### 3-14 Camera focus alignment



1. Bring a live image on monitor. Put objective lens 10x into light path and displace the specimen from light path.
2. Press left IN button (1) of DSU hand switch and put the disk into light path.
3. Stop the disk turning.
  - 1) Switch off power of control box.
  - 2) Pull out disk control cable (2) from disk box.
  - 3) Switch on power of control box.
- \* **Upon completion of camera focus alignment, reverse the procedures to go back to the original state.**
4. Turn rear side turret and bring arbitrarily selected fluorescent mirror unit or empty place into light path.
5. Turn front side turret and bring reference mirror of No.1 into light path.
6. Adjust transmitting light for enabling to see the strips of disk on monitor.
7. Loosen fixing screw (3) located, using the Allen screwdriver.
8. Seeing live image on monitor, turn adjusting ring of mount adapter (4) and bring strips of disk in focus.
9. Tighten the fixing screw (3) (at least one place) located at port, using the Allen screwdriver.

### 3-15 Power shutdown

1. Switch off the lamp.
2. Switch off the control box.
3. Switch off the CCD camera.



# 4 VARIETIES OF OBSERVATION METHODS

## 4-1 Visual observation (BX)

### TIP

This system can be used for not only reflected-light fluorescent observation but also it combines transmitting bright-field observation, transmitted light phase contrast observation and transmitting differential interference observation. Particularly, for specimen that color deterioration occurs earlier, the color deterioration can be minimized by initial positioning through phase contrast observation or differential interference observation. In addition, simultaneous observation of reflected-light fluorescent combined with phase contrast observation or reflected-light fluorescent combined with differential interference observation is possible, and it enables to observe which part of cell is emitting fluorescence plainly.

### 4-1-1 Simultaneous observation of reflected-light fluorescent and phase contrast

For phase contrast observation, condenser (U-PCD2) or universal condenser (U-UCD8) dedicated for phase contrast and objective lens dedicated for phase contrast are required.

1. Put dummy mirror unit (the place where fluorescent mirror unit is not installed) into light path.
2. Set Ph indication equivalent to Ph indication of objective lens on phase contrast turret.
3. Do centering between ring slit and phase plate.
4. Put mirror unit to observe excitation desired into light path and open shutter.
5. Adjust transmitting light intensity to get optimum brightness balance for fluorescent and phase contrast and then, do the observation.

### TIP

To adjust transmitting light intensity, use ND filter or brightness adjusting button on microscope frame.

### TIP

Regarding details of phase contrast observation, see instruction manual of condenser for phase contrast or universal condenser.

#### 4-1-2 Simultaneous observation of reflected-light fluorescent and transmitting Nomarski differential interference

Transmitting Nomarski differential interference observation requires the following units.

- (1) Universal condenser (U-UCD8)
- (2) Transmitting DIC slider (U-DICT, U-DICTS, U-DICTHR or U-DICTHC)
- (3) Analyzer (U-AN or U-AN360-3)
- (4) Revolving nosepiece or motorized revolving nosepiece for DIC.

**TIP**

The analyzer (U-AN or U-AN360-3) for simultaneous observation is put in upper insertion port above the dichroic mirror in order to use reflected-light fluorescence effectively.

If analyzer (U-ANT) is put in transmitting DIC slider, the fluorescent image may get dark and, also the analyzer may be burnt.

1. Put dummy mirror unit (the place where fluorescent mirror unit is not installed) into light path.
2. Adjust polarizer of universal condenser and make it in Cross-Nicol state.
3. Insert revolving nosepiece into transmitting DIC slider.
4. Turn turret of universal condenser and select turret of Nomarski prism that meets with objective lens to be used.
5. Put the objective lens to use into light path.
6. Set specimen on stage and bring it in focus.
7. Adjust field iris diaphragm of transmitting illumination system (built-in the microscope) and aperture of universal condenser.
8. Turn prism knob of transmitting DIC slider and adjust contrast of differential interference image.
9. Put mirror unit to observe excitation desired into light path and open shutter.
10. Adjust transmitting light intensity so as to get optimum brightness for fluorescent and differential interference image.

**TIP**

Regarding details of transmitting differential interference observation, see manual of Universal condenser (U-UCD8).



**TIP**

When change of reflected-light fluorescence and transmitting Nomarski differential interference is frequently done and simultaneous observation is also required, it is recommended that high abrasion-resistant analyzer slider (U-ANH) is used instead of analyzer (U-AN).

When change of reflected-light fluorescence and transmitting Nomarski differential interference is frequently done but simultaneous observation is not required, it would be convenient if mirror unit (U-MDICT3) for differential interference is attached at front side turret, instead of using analyzer (U-AN or U-ANH).

If the fluorescent mirror unit is changed to differential interference mirror unit, the analyzer comes into light path together so that the changeover is easy.

## 4-2 Visual observation (IX)

**TIP**

This system can be used for not only reflected-light fluorescent observation but also it combines transmitting bright-field observation, transmitted light phase contrast observation and transmitting differential interference observation. Particularly, for specimen that color deterioration occurs earlier, the color deterioration can be minimized by initial positioning through phase contrast observation or differential interference observation. In addition, simultaneous observation of reflected-light fluorescent combined with phase contrast observation or reflected-light fluorescent combined with differential interference observation is possible, and it enables to observe which part of cell is emitting fluorescence plainly.

**TIP**

IX81 or IX71 provides lamp ON-OFF button. Use these buttons when you change to fluorescent observation only.

### 4-2-1 Simultaneous observation of reflected-light fluorescence and phase contrast

**TIP**

For phase contrast observation, any one of condenser IX2-LWUCDA, IX2-LWUCD, IX-ULWCD or U-UCD8 and objective lens for phase contrast are required.

1. Put dummy mirror unit (the place where fluorescent mirror unit is not installed) into light path.
2. Set Ph indication equivalent to Ph indication of objective lens on phase contrast turret.
3. Do centering between ring slit and phase plate.
4. Put mirror unit to observe excitation desired into light path and open shutter.
5. Adjust transmitting light intensity to get optimum brightness balance for fluorescent and phase contrast and then, do the observation.

**TIP**

To adjust transmitting light intensity, use ND filter or green filter. Alternatively, adjust brightness at microscope side. Moreover, be careful that, if halogen lamp were used at low voltage applied at lamp off time, the lamp is susceptible to shorten its life.

**4-2-2 Simultaneous observation of reflected-light fluorescence and differential interference (transmitting)**

Differential interference observation requires the following units.

- (1) One of condenser, IX2-LWUCDA, IX2-LWUCD or U-UCD8.
- (2) One of differential interference slider, U-DICT, U-DICTS, U-DICTHC or U-DICTHR
- (3) Analyzer, U-ANT or IX2-AN

**TIP** The analyzer IX2-AN for simultaneous observation is put in lower insertion port below the dichroic mirror in order to use reflected-light fluorescence effectively.  
If analyzer (U-ANT) is put in differential interference slider, the fluorescent image may get dark and, also the analyzer may be burnt.

1. Put dummy mirror unit (the place where fluorescent mirror unit is not installed) into light path.
2. Adjust polarizer of universal condenser and make it in Cross-Nicol state.
3. Insert revolving nosepiece into differential interference slider.
4. Turn turret of condenser and select turret of Nomarski prism that meets with objective lens to be used.
5. Put the objective lens to use into light path.
6. Set specimen on stage and bring it in focus.
7. Adjust field iris diaphragm and aperture of condenser.
8. Turn prism knob of differential interference slider and adjust contrast of differential interference image.
9. Put mirror unit to observe excitation desired into light path and open shutter.
10. Adjust transmitting light intensity so as to get optimum brightness for fluorescent and differential interference image.

**TIP** When change of reflected-light fluorescence and transmitting Nomarski differential interference is frequently done but simultaneous observation is not required, it would be convenient if mirror unit (IX2-MDICT) for differential interference is attached at front side turret, instead of using analyzer (IX2-AN). If the fluorescent mirror unit is changed to differential interference mirror unit, the analyzer comes into light path together so that the changeover is easy.

## 4-3 Camera observation (BX-IX)

**TIP**

This system provides reflected-light fluorescent observation and also, by changeover of rear side turret, it enables camera observation for transmitting bright-field observation, transmitted light phase contrast observation and transmitting differential interference observation.

### 4-3-1 Transmitting bright-field and transmitted light phase contrast observation

To execute camera observation for each transmitting, the system should be arranged for visual observation as described in previous section, 4-1 and 4-2.

1. Upon setting for visual observation, put dummy mirror unit of rear side turret (the place where fluorescent mirror unit or reference mirror is not installed) into light path.
2. Turn front side turret and put reference mirror of No.1 into light path.
3. If necessary, adjust transmitting light intensity and then, enter camera setting.

### 4-3-2 Transmitting differential interference observation

To execute differential interference camera observation, attach IX2-MDICT to rear side turret in case of BX or U-MDICT3 in case of IX.

Arrange the system for visual observation as described in previous section, 4-1 and 4-2.

1. Upon setting for visual observation, put IX2-MDICT of rear side turret into light path in case of BX or U-MDICT3 in case of IX.
2. Turn front side turret and put reference mirror of No.1 into light path.
3. If necessary, adjust transmitting light intensity and the, enter camera setting.

# 5 TROUBLESHOOTING GUIDE

Depending upon how the system is used, it may not exhibit adequate performance of the system, though it may not be a failure. When trouble occurs, exercise adequate countermeasure with reference to the following table.

In case that trouble has not been improved, please contact local Olympus representative for assistance.

Trouble	Cause	Countermeasure	Ref.
Disk does not turn. • Stripes of disk appear on the monitor. • Confocal effect cannot be acquired even if disk were put into light path.	Cable is not connected correctly.	Connect cable correctly.	8-1
	Disk unit is not correctly inserted into disk box.	Insert disk unit into correct position firmly.	8-13
	Interlock function is activated as access panel is not closed correctly.	Attach access panel firmly.	8-13
	Transport lock is left as attached.	Remove transport lock.	8-4
Camera mirror unit does not turn.	Mirror unit is about to come off the cassette.	Remove turret from mirror unit cassette and fix it to correct position firmly.	8-12
Electric filter wheel does not turn.	Cable is not connected correctly.	Connect cable correctly.	8-1
Specimen image does not appear on the monitor.	Power of camera is not turned ON.	Switch on power of camera.	3-5
	Shutter is entering light path.	Displace shutter from light path.	3-9
	Filter like that is entering light path.	Displace unnecessary substance from light path.	3-11
	Combination of visual mirror unit and camera mirror unit is incorrect.	Set visual mirror unit (front side) to reference mirror and set camera mirror unit (rear side) to mirror unit.	3-10 3-7

## TROUBLESHOOTING GUIDE



Trouble	Cause	Countermeasure	Ref
Confocal image is extremely dark.	Filter like that is entering light path.	Displace unnecessary substance from light path.	3-11
	Exposure time of camera is not correct.	Adjust to adequate time.	Instruction manual of camera used
	Range of camera brightness level is not correct.	Adjust to adequate level.	Instruction manual of camera used
	Combination of visual mirror unit and camera mirror unit is incorrect.	Put mirror unit that meets with purpose into light path.	3-7 3-10
Field of view is obscured or not evenly illuminated.	Centering of field iris diaphragm is not done.	Do centering of field iris diaphragm correctly.	3-12
	Field iris diaphragm is squeezed excessively.	Open aperture adequately.	3-12
	Centering of lamp house is not done.	Do centering of lamp house correctly.	3-13
	Visual mirror unit is positioned half way at changeover.	Put mirror unit in click position firmly in accordance with your purpose.	3-7
	Shutter is positioned half way.	Open shutter firmly.	3-9
Dust or dirt is visible in filed of view.	Mirror unit is blurred.	Clean adequately.	Cleanup and Storage of Introduction
	Disk is dirty.	Clean adequately.	Cleanup and Storage of Introduction
Confocal image is blinking.	Exposure time of camera is set to less than 200ms.	Set exposure time of camera to more than 200ms.	Instruction manual of camera used
	Vibration at installation is great.	Consult with our sales office.	—



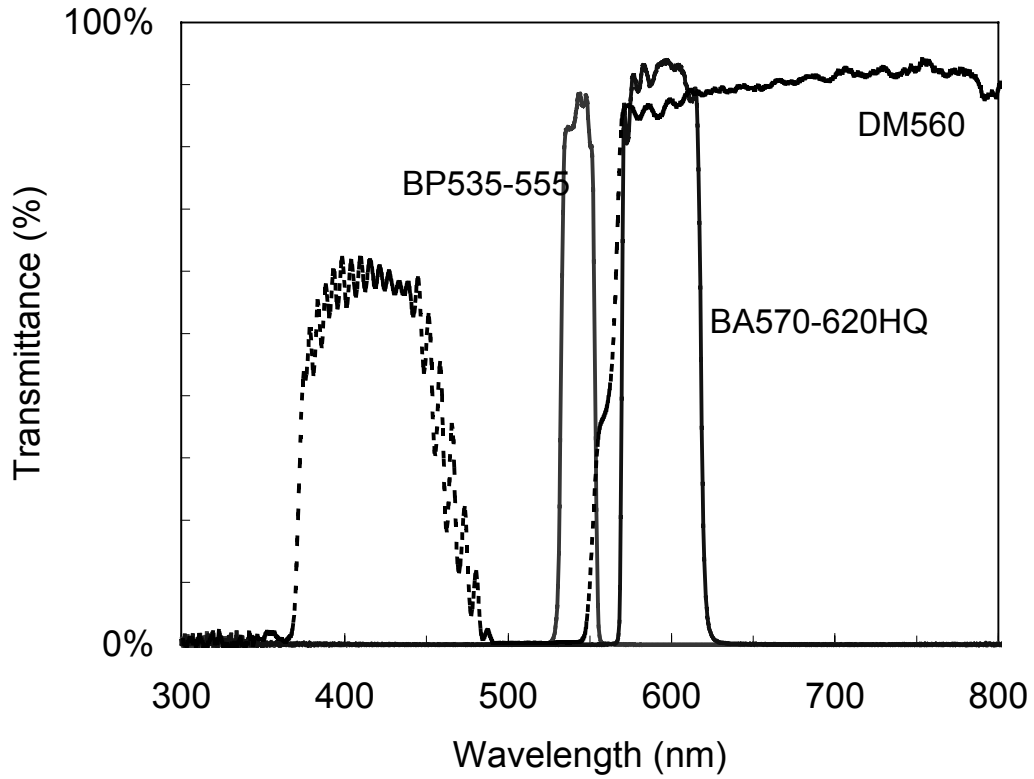
Trouble	Cause	Countermeasures	Ref.
Flare is remarkable.	Ambient light (such as fluorescent lamp) is entering light path.	Turn off fluorescent lamp or cut ambient light with use of specimen cover.	–
	Exposure time of camera is not correct.	Adjust to adequate time.	Instruction manual of camera used
	Range of camera brightness level is not correct.	Adjust to adequate level.	Instruction manual of camera used
	Non-fluorescent glass is not used.	Use non-fluorescent glass.	–
	Thickness of cover glass is not suitable.	Use cover glass of 0.17mm thick.	–
Image is not clear.	Camera focus is not correct.	Adjust camera focus.	3-14
	Correct disk is not used for objective lens.	Use suitable disk.	8-13 3-3



# 6 SPECTRAL CHARACTERISTICS OF FILTERS

RFPHQ

DSU-MRFPHQ





# 7 SPECIFICATIONS

## 7-1 BX Series

Item		Specifications
Lens barrel magnification		1x
Number of views		Visual observation side: FN22mm (In reflected illumination, peripheral light intensity may be insufficient if objective lens power is of 20x or less) Camera observation side: FN11mm
Shutter		Knob at front side turret cover. Turret coupling system
Field iris diaphragm		Field iris diaphragm built-in type (with centering function) Aperture opening: Knob push-pull method Centering: With use of the Allen screwdriver
Slider slot		AN slot: 32X7.5mm through hole, with click (dummy when not used) PO slot: 32X7.5mm through hole, with click (dummy when not used)
Disk		Belt-drive system supported by spindle DC motor Electrically driven IN/OUT system (with hand switch)
Filter		Electric filter wheel Electric 6-hole turret system 1: Empty hole 2: ND25 3: ND12 4: ND6 5: ND3 6: ND1.5
Mirror unit turret	Front turret	Manual 6-hole turret system 1-hole fixed mirror accessory (DM680)
	Rear turret	Electric 6-hole turret system 1-hole fixed mirror accessory (Reference mirror)
Stand		Height adjustable 2 units provided.
Observation methods		Camera observation 1) Incident-light fluorescent disk confocal 2) Incident-light fluorescent 3) Transmitting  Visual observation 1) Incident-light fluorescent 2) Incident-light fluorescent + Transmitting differential interference 3) Incident-light fluorescent + phase contrast 4) Transmitting
Dimensions of main unit		567mm(W)×386mm(D) ×221mm(H)
Weight		12.5kg

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

SPECIFICATIONS / IX Series

**7-2 IX Series**

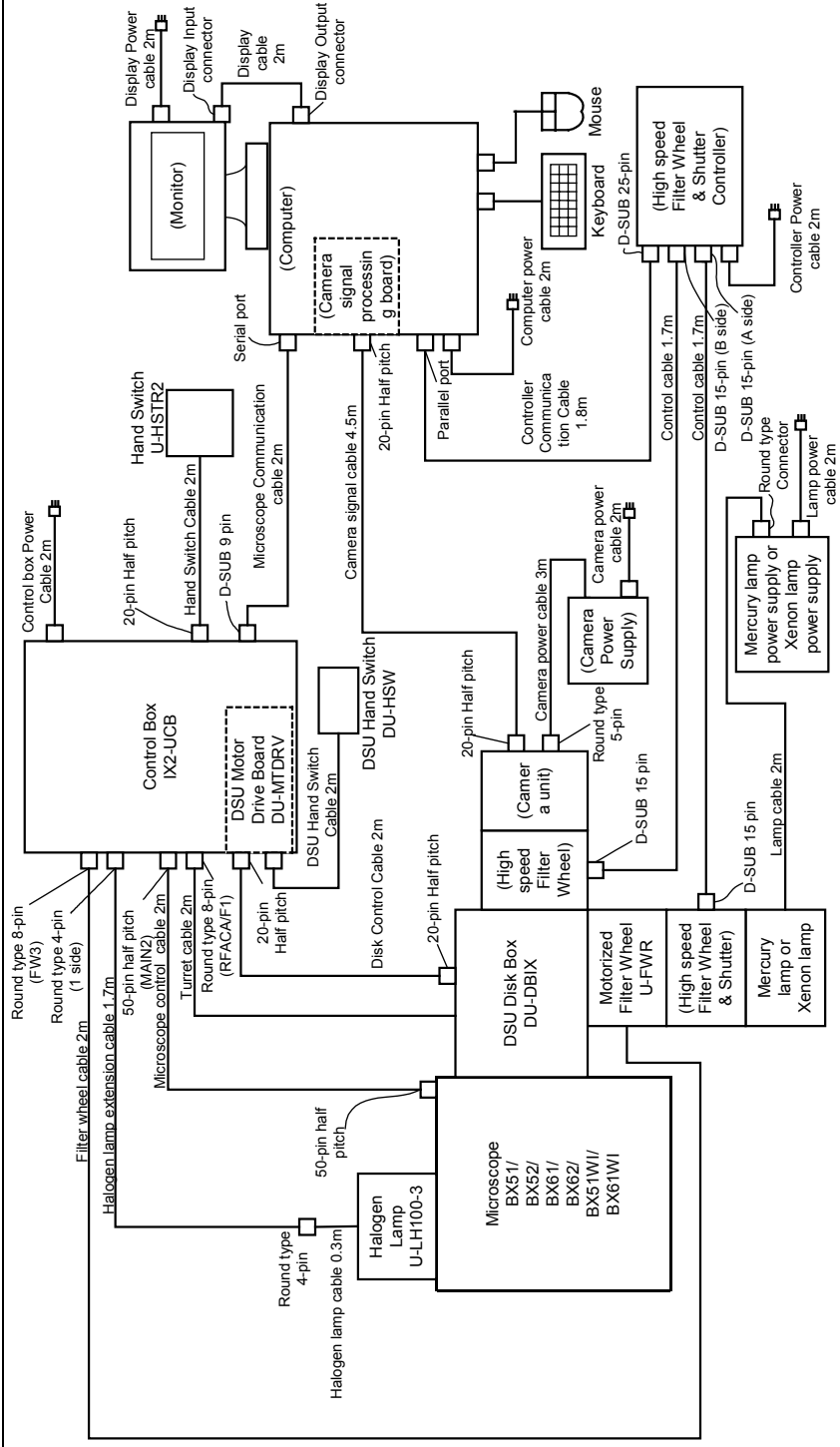
Item		Specifications
Lens-barrel magnification		1x
Number of views		Visual observation side: FN22mm (In reflected illumination, peripheral light intensity may be insufficient if objection lens is of 20x or less) Camera observation side: FN11mm
Shutter		Knob at front side turret cover.
Field iris diaphragm		Field iris diaphragm built-in type (with centering function) Aperture opening: Knob push-pull method Centering: With use of the Allen screwdriver
Disk		Belt-drive system supported by spindle DC motor Electrically driven IN/OUT system (with hand switch)
Filter		Electric filter wheel Electric 6-hole turret system 1: Empty hole 2: ND25 3: ND12 4: ND6 5: ND3 6: ND1.5
Mirror unit turret	Front turret	Manual 6-hole turret system 1-hole fixed mirror accessory (Reference mirror)
	Rear turret	Electric 6-hole turret system 1-hole fixed mirror accessory (Reference mirror)
Stand		Height adjustable 2 units provided.
Observation methods		Camera observation 1) Incident-light fluorescent disk confocal 2) Incident-light fluorescent 3) Transmitting  Visual observation 1) Incident-light fluorescent 2) Incident-light fluorescent + Transmitting differential interference 3) Incident-light fluorescent + phase contrast 4) Transmitting
Dimensions of main unit		408mm(W)×386mm(D) ×221mm(H)
Weight		10kg

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

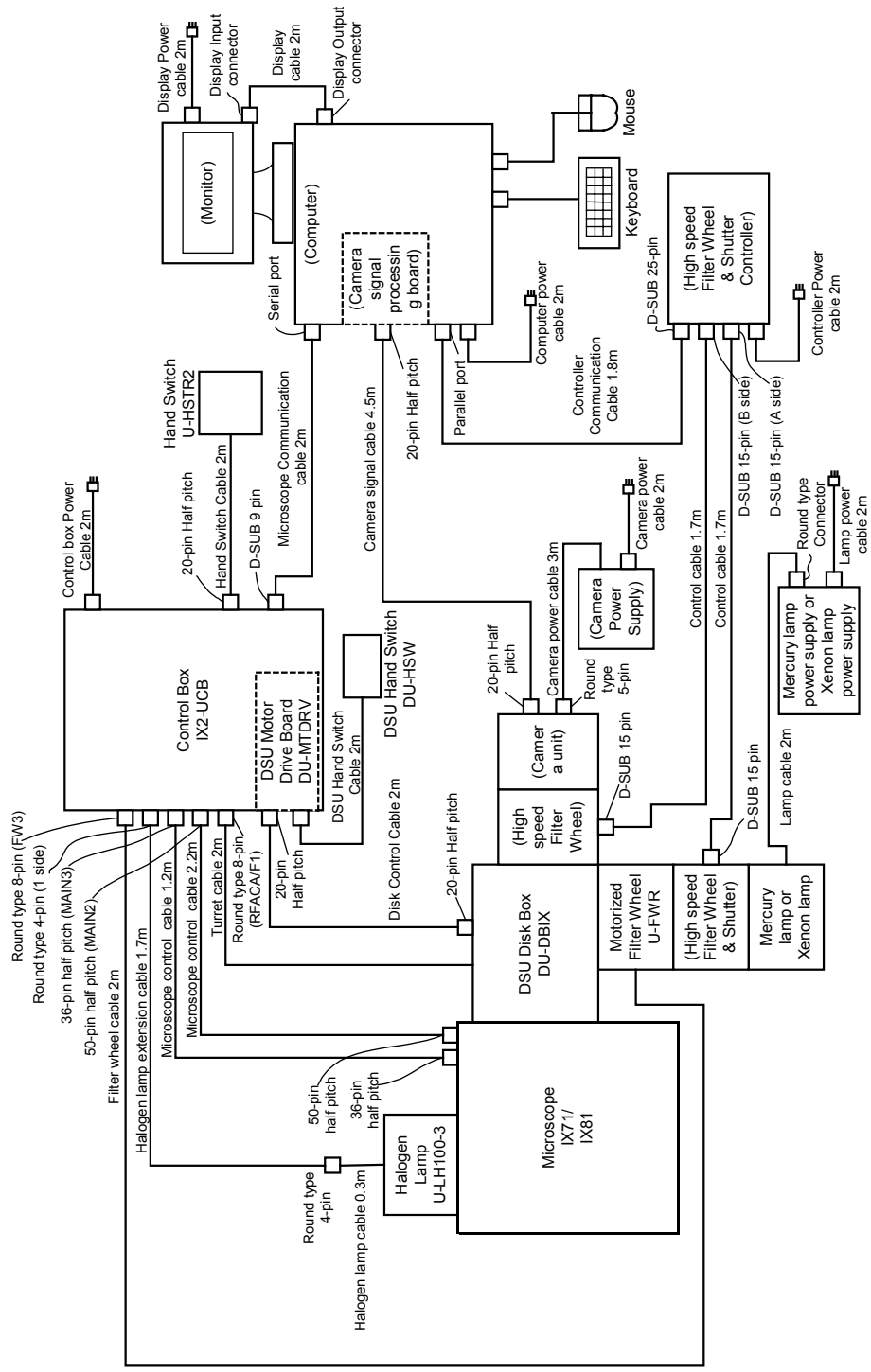
# 8 ASSEMBLY

## 8-1 System block diagram

### 8-1-1 In case of BX

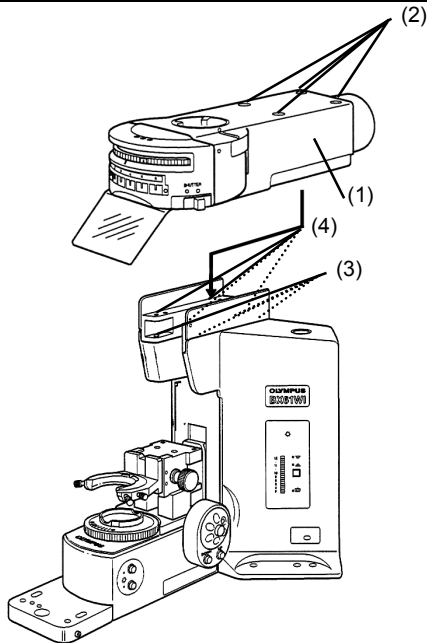


8-1-2 In case of IX

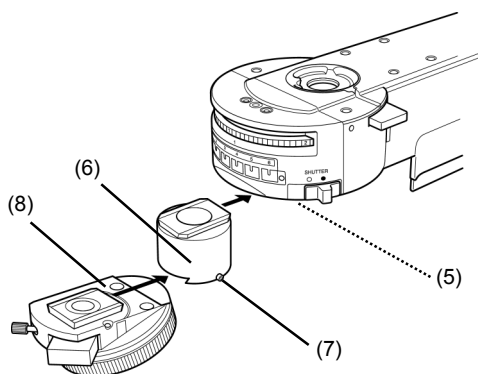


## 8-2 Installation of light illuminator

### 8-2-1 In case of BX

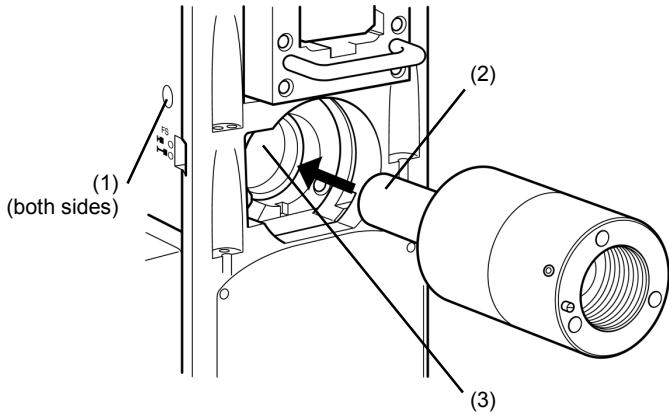


1. Remove caps of mounting screws (2) on top of light illuminator (1) with use of tweezers.
2. When using BX61, BX62, BX51 or BX52, put arm lift kit (WI-ARMAD) on the arm and fix mounting screws (3) (4 pieces) to the light illuminator firmly, using dedicated the Allen wrench that comes with kit.
3. When mounting the light illuminator, put it over slightly forward position without aligning mounting screws (2) with mounting holes (4) of microscope body.
4. Next, pressing the light illuminator towards right side and press it towards rear side so that it would be positioned in correct mounting position.
5. While pressing the light illuminator towards rear side, fix mounting screws (2) (4 pieces) to the light illuminator by turning the dedicated the Allen wrench that comes with kit in clockwise direction.
6. Attach caps of mounting screws (2) to their original positions.
7. When using BX61, BX62, BX51 or BX52, revolving nosepiece adapter (DSU-READ) must be attached as follows.



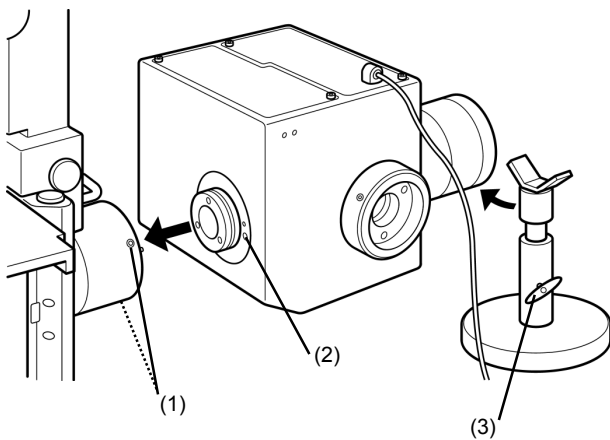
- 1) Loosen fixing screw (5) of microscope frame with use of the dedicated the Allen screwdriver.
- 2) Align revolving nosepiece adapter (6) with mount dovetail from front side of microscope frame and push it and then, tighten fixing screw (5).
- 3) Loosen fixing screw (7) located at right side of revolving nosepiece adapter, using the Allen screwdriver.
- 4) Align revolving nosepiece (8) with mount dovetail from front side of microscope frame and push it and then, tighten fixing screw (7).

### 8-2-2 In case of IX



1. Loosen fixing screws (1) (2 places) that fix light illuminator to microscope frame, using the Allen wrench.
2. Insert light illuminator (2) into mounting hole (3). Observe that pin at lower part of light illuminator is aligned with mounting hole slot.
3. Tighten fixing screws (1) for light illuminator and fix the light illuminator (2 places).

### 8-3 Installation of disk box



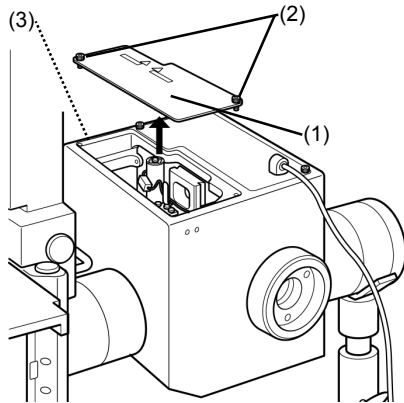
1. Loosen fixing screws (1) (2 places), using the Allen screwdriver.
2. Insert disk box (2) into light illuminator, observing pin position, and push it until it hits the dead end.
3. Tighten fixing screws (1) (2 places), using the Allen screwdriver.
4. Loosen fixing screw (3) of stand that comes as accessory and put the stand underneath the observation tube of disk box.

**Note**

**Stand should be attached for sure to prevent upside down.**

5. Extend the stand to apply fixing place to observation tube and tighten fixing screw (3).

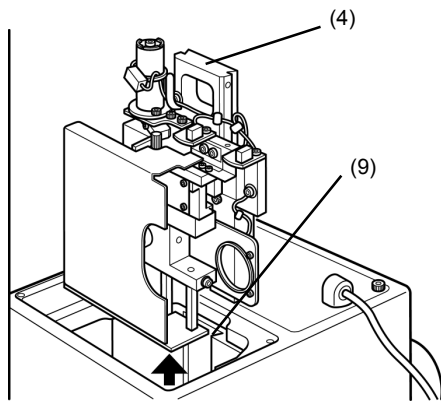
## 8-4 Removal of transportation lock



**Note**

**This work should be done before connecting cable of disk box.**

1. Loosen screws (2) (2 places) located on top of disk box to fasten at front side of access panel to microscope frame and detach the access panel (1).
2. Loosen fixing screw from hole (3) located at left side of disk box and pull the disk unit (4) upward.



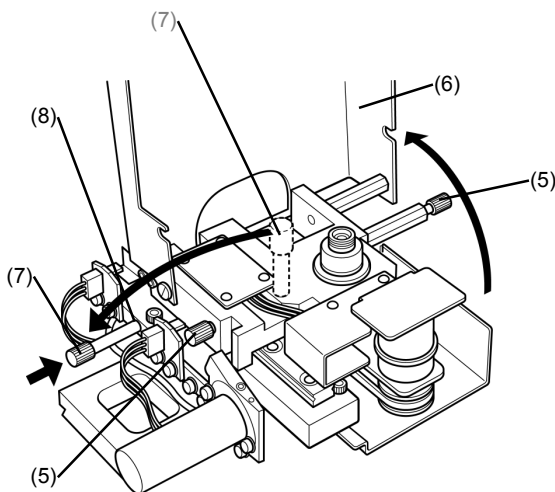
**Note**

**Pull up the disk unit carefully so as not to hit it inside wall of disk box.**

3. Loosen knobs (5) (2 places) of disk unit and open disk cover (6).
4. Loosen transportation lock knob (7) and remove it from disk unit (4). Attach the transportation lock knob you just removed to threaded hole (8) of the disk unit.

**Note**

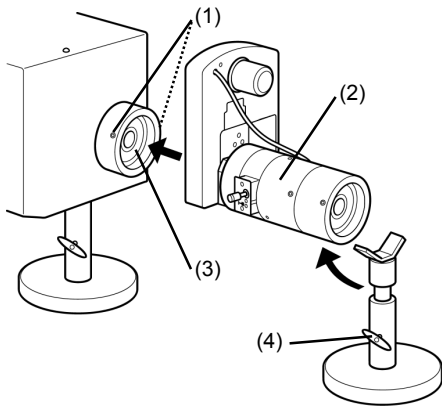
**Keep transportation lock knob with care as it may be used for transportation again.**



When you continue to install disk, see 8-13 Disk installation and change.

5. Return disk cover (6) to original position and fix it by tightening disk unit knobs (5) (2 places).
6. Align disk unit (4) with mount dovetail (9) of disk box and push it from top to dead end.
7. Tighten fixing screw (3), using the Allen screwdriver.
8. Attach access panel (1) on top of disk box and tighten fixing screws (2) (2 places).

## 8-5 Installation of illuminator



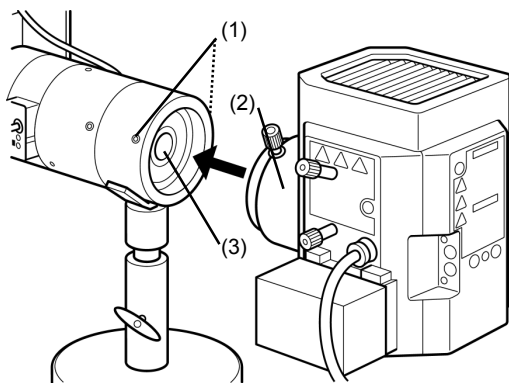
1. Loosen fixing screws (1) (2 places) that fix disk box to microscope frame, using the Allen screwdriver.
2. Insert illuminator (2) into disk box (3) and push it to the dead end. At this time, attach it in a way that FS unit faces towards observer.
3. Tighten fixing screws (1) (2 places), using the Allen screwdriver.
4. Loosen fixing screw (4) of stand and put stand that comes as accessory underneath the illuminator.

### Note

**Stand should be attached for sure to prevent upside down.**

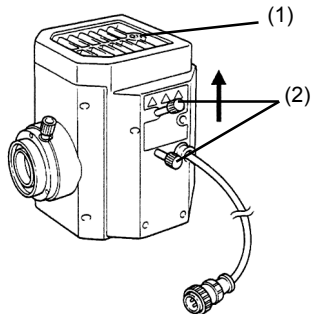
5. Extend the stand to apply fixing place to illuminator and tighten fixing screw (4).

## 8-6 Installation of lamp house



1. Loosen fixing screws of lamp house mount adapter (1) (2 places), using the Allen screwdriver.
2. Insert lamp house (2) into lamp house mount adapter of light illuminator (3) and push it to the dead end.
3. Tighten fixing screws (1) (2 places), using the Allen screwdriver.

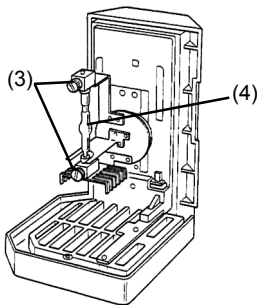
## 8-7 Installation of mercury lamp



1. Loosen socket fixing screw (1), using the Allen screwdriver.
2. Hold upper part of lamp house and pull it vertically to detach socket section.

### Note

If you hold centering knob (2), it may cause a failure.



3. Place socket section upside down as illustrated.

### TIP

At ex-factory, a support is provided for transportation. When changing lamp, old lamp is yet installed. When installing lamp newly or changing lamp, loosen fixing screws (3) (2 places) that hold the support or old lamp.

4. Install mercury lamp designated to mounting socket firmly, observing + polarity to upper base and – polarity to lower base.

### Note

Lamp to use should be USH102D (made by Ushio Electric) or HBO103W/2 (made by OSRAM).

Care must be taken so as not to attach finger mark or dirt on lamp. If the surface of lamp is contaminated, it may burst due to distortion of glass. If contaminated, use a cloth like gauze dipped in mixture of alcohol (3): ether (7) and wipe out the surface of lamp carefully.

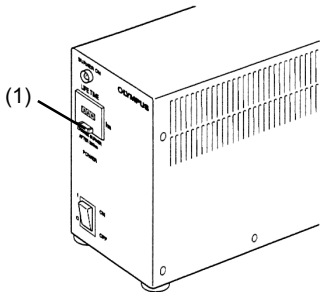
5. Return socket section that the lamp is attached to original position and tighten fixing screw (1).

### Note

Socket section must be lowered vertically, aligning lamp house outer side and socket section outer side.



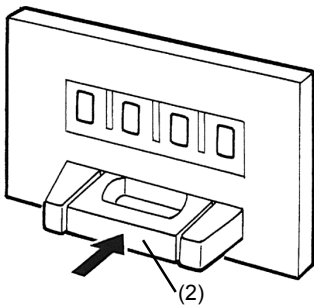
**Life meter setting**



1. Reset button (1) is located at front panel. Press center part (2) of this button and make the display to 000.0.



Display – 000.0 means time. Life of lamp – USH102D is 200 hours, while HBO103W/2 is 300 hours. When 200.0 is displayed for USH102D, replace the lamp. Likewise, when 300.0 is displayed for HBO103W/2, replace the lamp.



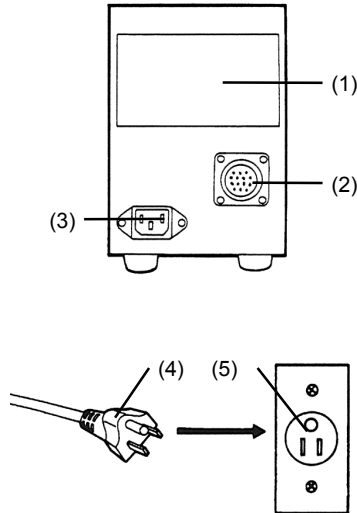
**Change of mercury lamp**

- Life of mercury lamp is either 200 or 300 hours. Lamp may burst when the life of lamp is over. When you used 200 hours (USH102D) or 300 hours (HBO103W/2), replace the lamp with new one for safety.
- For safety purpose, wait about 10 minutes after power of lamp was turned off and see if the lamp and lamp house have been duly cooled down. Then, verify that main switch is turned OFF and, after output connector is detached from lamp house, remove the lamp.

See 8-7 Installation of mercury lamp for method of change.

- Upon completion of lamp change, set life meter to 000.00 as explained above.

## 8-8 Lamp power supply setting



**Cord or cable is weak against bend or twist. Care must be taken so as not to apply excessive force.**



**When connecting power cord, turn main switch to  $\bigcirc$  mark side (OFF).**



**Use power cord that comes our accessory for sure.**

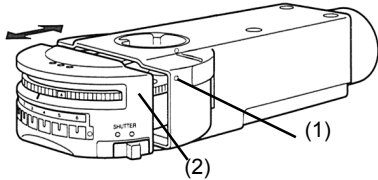
1. Verify that voltage and frequency of input power are within the range as shown in identifying plate (1).  
(The 100 V system can be used with voltages in the 100 to 120 V range and 200 V system can be used with voltages in the 220 V to 240 V range, both with frequencies of 50 or 60 Hz.)
2. Connect connecting cord to connector (2) of power supply unit.
3. Install power cord to input receptacle (3) of power supply unit and insert power plug (4) into power consent (5).



**Power cord should be connected to 3-core consent with earth terminal. When the earth of consent is not connected, the electric safety performance intended by our company may not be acquired.**

## 8-9 Installation of front side turret

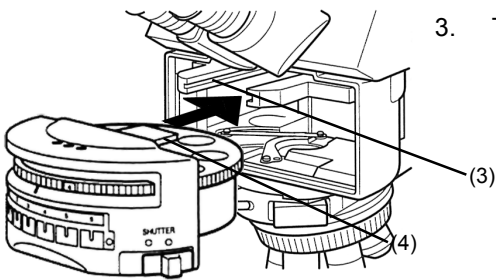
### 8-9-1 In case of BX



1. (Removal of turret). Loosen fixing screw (1) from hole (1) located at right side of light illuminator and pull out turret (2) forward.

2. (Installation of turret). Align mount dovetail (3) of light illuminator and mount dovetail (4) of turret and push the turret from front side gently until it hits to the dead end.

3. Tighten fixing screw (1), using the Allen screwdriver.

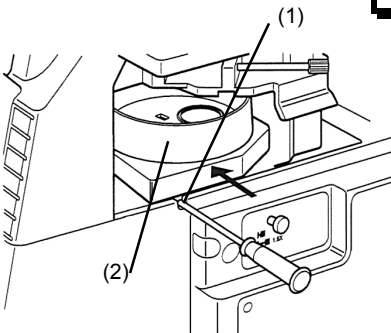


### 8-9-2 In case of IX



**When you remove cassette during operation, close option shutter for sure or turn power of light source to OFF position.**

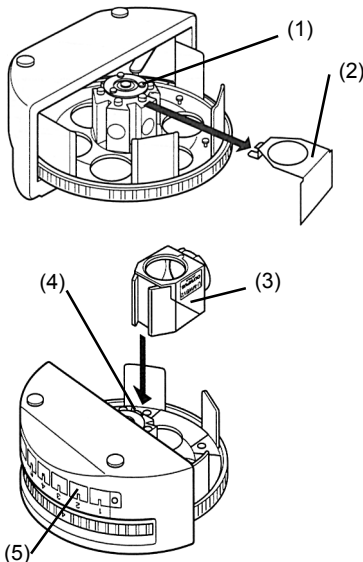
**If you remove mirror unit cassette while the shutter is open, it is dangerous as the excited light would leak.**



1. (Removal). Loosen fixing screw (1) of mount dovetail for cassette, using dedicated the Allen screwdriver and push out the cassette (2) to arrow direction.

2. (Installation). Align mount dovetail located at bottom of mirror unit cassette and insert the cassette from left side and push it until it hits to dead end.

3. Tighten fixing screw (1) of mount dovetail for cassette, using the Allen screwdriver.

**8-10 Installation of visual mirror unit (front side)****8-10-1 In case of BX**

1. Turn turret upside down and loosen fixing screw (1), using dedicated the Allen screwdriver and remove dummy mirror unit (2) (remove the dummy mirror unit only where a mirror unit is to be installed from now on).

**Note**

**When mirror units already exist inside the cassette, be careful so as not to touch dichroic mirror or excitation filter with your finger.**

**Note**

**Reference mirror of adjustment completed is attached at No.1 position. Do not change the position of this reference mirror.**

2. Insert mirror unit (3) to be used into mount dovetail (4) of mirror unit and push it until it hits to dead end and then, tighten fixing screw (1), using The Allen screwdriver.

**Note**

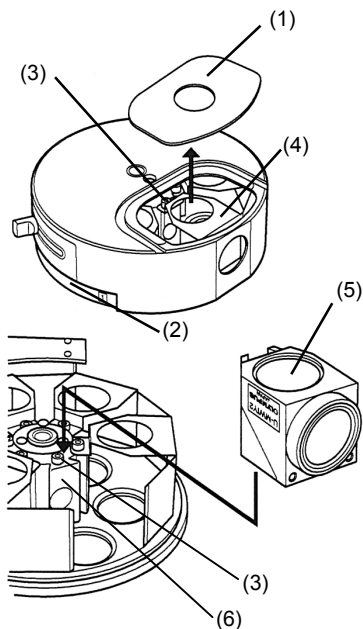
**If the fixing screw (1) is loosened, it may interfere inside turret cover and turret may not be able to turn. Tighten the fixing screw even if mirror unit does not exist.**

3. Verifying mount dovetail NO (4), insert identifying plate of mirror unit in reverse way into the same number of display pocket (5) located at front of turret.

**Note**

**In case that the identifying pocket for turret is used as indicator for name of objective lens, it cannot be used as indicator for mirror unit.**

8-10-2 In case of IX



1. Remove cover (1) that is sucked with magnet from mirror unit cassette.

**Note**

**When mirror units already exist inside the cassette, be careful so as not to touch dichroic mirror or excitation filter with your finger.**

2. Turn turret (2) of mirror unit cassette manually and align mirror unit mounting position with mirror unit mounting hole.

**Note**

**Reference mirror of adjustment completed is attached at No.1 position. Do not change the position of this reference mirror.**

3. Loosen fixing screw (3) of mirror unit mount dovetail for mirror unit cassette, using dedicated the Allen screwdriver.
4. Displace dummy mirror unit (4) little by little circumferentially and pull it towards outside of turret and detach it by pulling upward.

**Note**

**In case of reflected-light fluorescence observation, attach dummy mirror unit for sure to the place where mirror unit is not installed. In case of transmitting observation, dummy mirror unit is not required. However, the fixing screw (3) for mount dovetail should be tightened at the place where dummy mirror unit is not installed. If this fixing screw is loosened, head of screw may interfere when turret turns.**

5. Insert mirror unit (5) into mirror unit mount dovetail (6) and push it until it hits to dead end and then, tighten fixing screw (3), using dedicated the Allen screwdriver.
6. Attach turret cover (1), aligning it with well of mirror unit cover.
7. Insert identifying plate for mirror unit, corresponding to number of turret that comes into light path into display pocket of microscope frame.

**Note**

**When display pocket of microscope frame is used for indicator of objective lens, it cannot be used as indicator of mirror unit.**

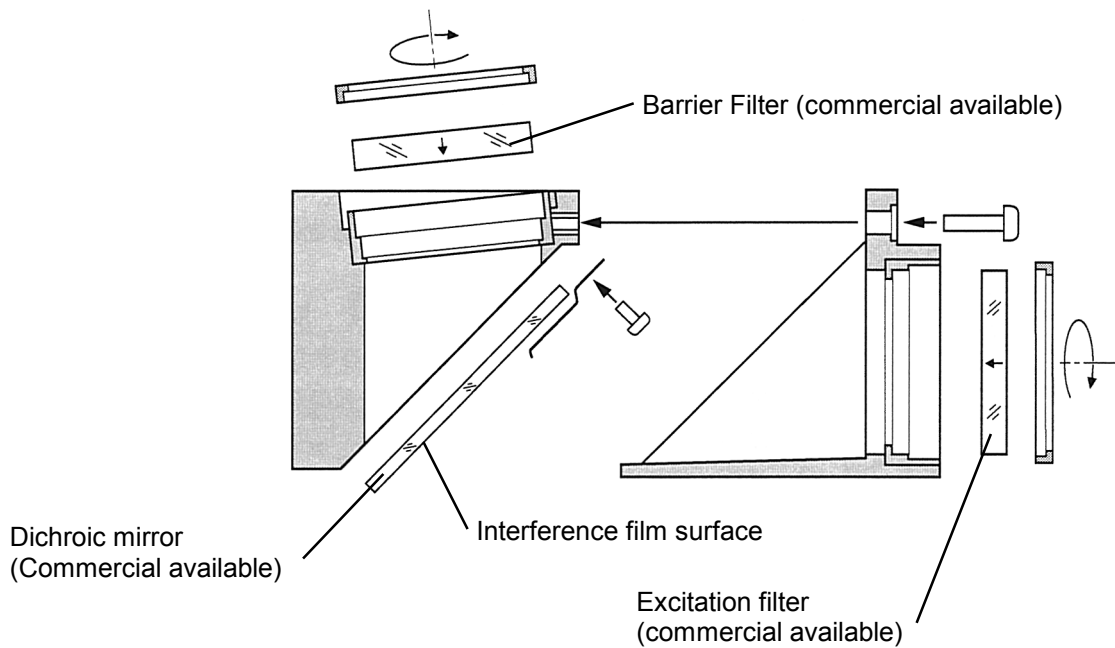


**8-10-3 Method to make optional fluorescent mirror unit**

**TIP** You can make optional fluorescent mirror unit by attaching mirror unit frame U-MF2 to commercially available barrier Filter, excitation filter or dichroic mirror.

**Dimensional conditions for optical parts**

- Barrier Filter }  $\phi 25^{+0.1}_{-0.2}$  mm Max. Height 6mm
- Excitation filter }
- Dichroic filter }  $26^{+0.1}_{-0.3} \times 38^{+0.1}_{-0.3}$  mm Thickness  $1 \pm 0.05$  mm

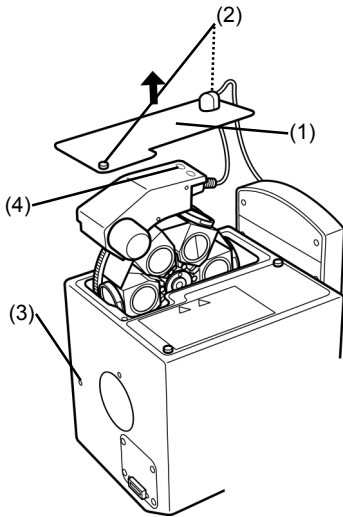


**Note** When you change dichroic mirror, be careful so as not to contaminate it with your finger print.

## 8-11 IN/OUT of rear side turret

**Note**

When you install or detach the turret, you must do the works after you turn the power of control box.



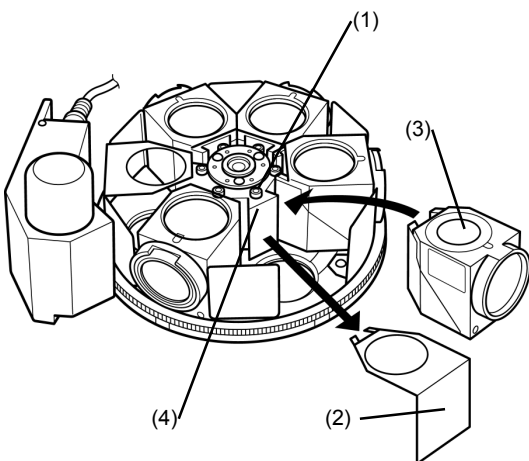
1. (Removal). Loosen screws (2) (2 places) at rear side of access panel (1) on top of disk box, using dedicated the Allen screwdriver and remove the access panel.
2. Loosen fixing screw from hole (3) located at left side of disk box, using The Allen screwdriver and hold the handle (4) of turret and pull it upward.

**Note**

Pull out the turret gently so as not to hit mirror unit with inside wall of disk box.

3. (Installation). Align mount dovetail of turret and mount dovetail of disk box and push the turret from top until it hits to dead end.
4. Tighten fixing screw (3), using the Allen screwdriver.
5. Attach access panel (1) on top of disk box and tighten fixing screws (2) (2 places), using the Allen screwdriver.

## 8-12 Installation of camera mirror unit (rear side)



1. Loosen fixing screw (1), using the Allen screwdriver and remove dummy mirror unit (2).

**Note**

When mirror units already exist inside the cassette, be careful so as not to touch dichroic mirror or excitation filter with your finger.

**Note**

Reference mirror of adjustment completed is attached at No.1 position. Do not change the position of this reference mirror.

2. Insert mirror unit (3) to be used into mount dovetail (4) of mirror unit and push it until it hits to dead end and the, tighten fixing screw (1), using the Allen screwdriver.

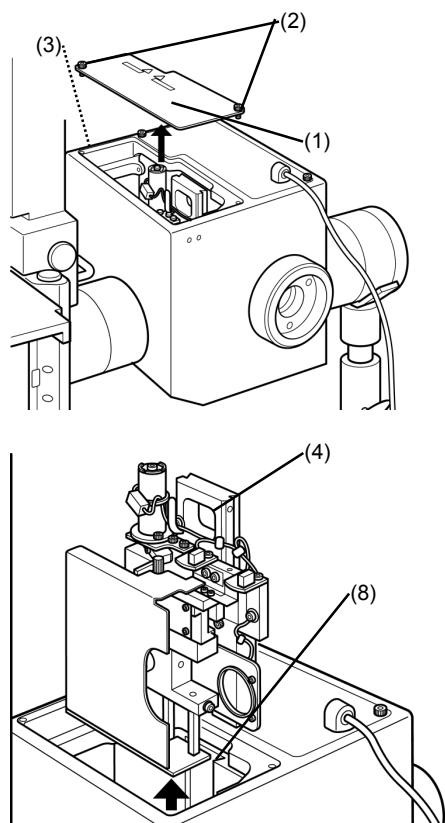
**Note**

For camera observation, use fluorescent mirror unit of HQ type.

The fluorescent mirror unit type DSU-MRFPHQ – accessory of this system – is dedicated for camera observation.

**8-13 Disk installation and change****Note**

For disk installation or change, you must do the works after you verify that the disk entered into light path and then, you turn the power of control box.

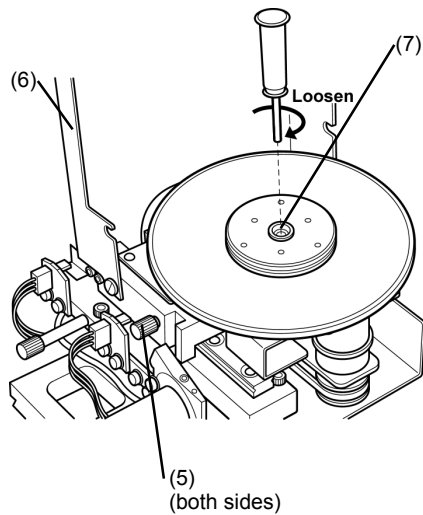


1. Loosen screws (2) (2 places) at front side of access panel (1) located on top of disk box, using the Allen screwdriver and remove the access panel.
2. Loosen fixing screw from hole (3) located at left side of disk box, using the Allen screwdriver and pull disk unit (4) upward.

**Note**

Pull out disk unit gently so as not to hit disk unit with inside wall of disk box.

3. Loosen knob of disk unit (5) (2 places) and open disk cover (6).
4. In case that transportation lock knob is attached instead of disk, remove the transportation lock knob first. (Regarding transportation lock knob, see 8-4 Removal of transportation lock.) Pressing the edge of disk, turn rotary shaft (7) in clockwise direction, using the Allen screwdriver and remove disk attached to the disk unit (4).
5. Holding edge of disk, get out the disk that you are going to install from the package without removing wrapper.



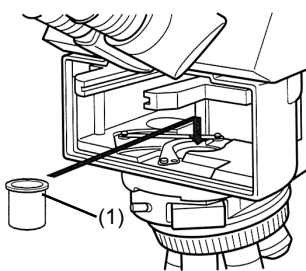
6. Set the disk, putting the side attached with name seal (dark blue side) down and, holding edge of disk, turn rotary shaft (7) in counter-clockwise direction to screw in to the end, using the Allen screwdriver. After fixing, remove the wrapper.

**Note**

**If you install disk upside down, cover (6) would not close. If you attempt to close cover (6), it would damage surface of disk. Therefore, attach the disk in correct direction.**

7. Return disk cover (6) to original position and tighten knob (5) of disk unit (2 places) and fix the cover.
8. The disk removed should be kept in the packet. Transport lock knob should be attached to the disk unit.
9. Align dovetail of disk unit (4) and dovetail of disk box (8) and push it from top to dead end.
10. Tighten fixing screw (3), using the Allen screwdriver.
11. Attach access panel (1) on top of disk box and tighten fixing screws (2) at two places, using the Allen screwdriver.

**8-14 Installation of light shielding tube (BX61, BX62, BX51 or BX52)**

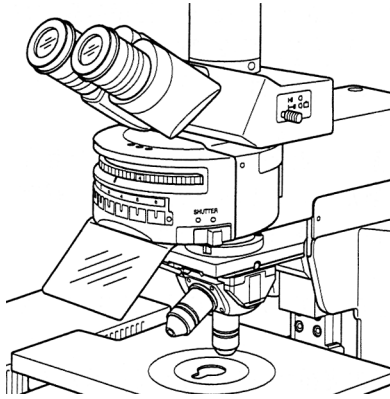


1. Remove front side turret. For removal of front side turret, see 8-9 Installation of front side turret.
2. Set light shielding tube inside the light illuminator.

## 8-15 Installation of UV-cut plate

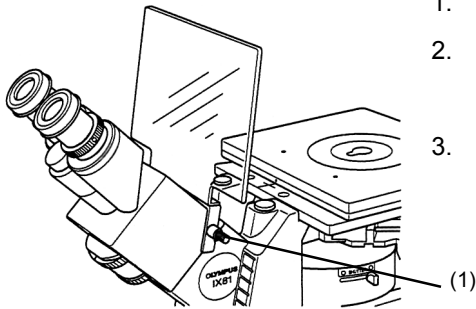
### 8-15-1 In case of BX

1. Put UV-cut plate underneath the front side mirror turret as illustrated.

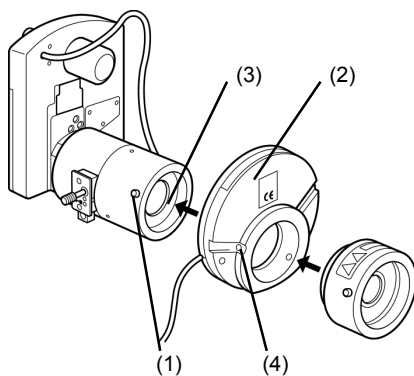


### 8-15-2 In case of IX

1. Loosen fixing knob (1) for UV-cut plate.
2. Put the UV-cut plate in receptacle of lens barrel of microscope frame as illustrated.
3. Turn fixing knob to fix firmly.



## 8-16 Installation of filter or shutter (In case of U-FWR or IX2-SHA)



1. Loosen fixing screws (1) that fix lamp house mount adapter at two places and remove the lamp house mount adapter.
2. Insert filter or shutter (2) that you are going to use into mount (3) and tighten fixing screws (1) at two places.
3. Insert lamp house mount adapter into filter wheel or shutter (2) that you are going to use and then, tighten fixing screws (4) at two places.

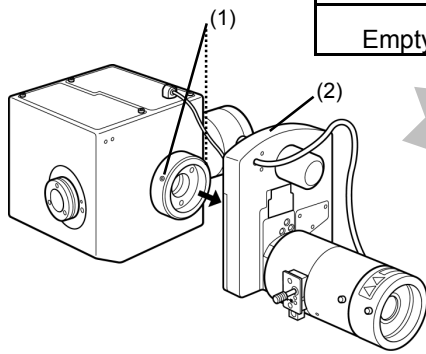
**TIP**

Installation of LAMBDA 10 and Ludl filter is the same as described above.

## 8-17 Filter IN/OUT inside motorized filter wheel

At ex-factory, filters are attached as shown in the following table. When you wish to change the setting, follow to the following procedures.

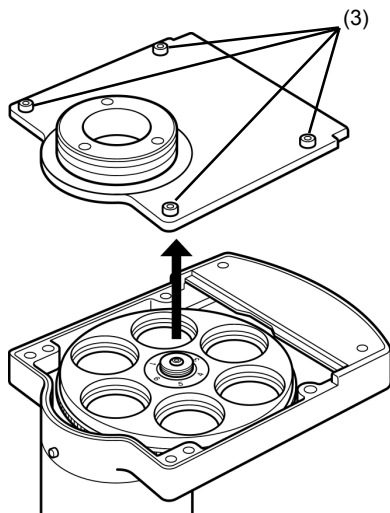
No.1	No.2	No.3	No.4	No.5	No.6
Empty	ND25	ND12	ND6	ND3	ND1.5



**Note**

**In case of installation or removal of filter, you must turn power of control box. In addition, you must remove cable from control box.**

1. Remove lamp house and filter unit of option.
2. Loosen fixing screws (1) of mount for illuminator at two places, using the Allen screwdriver and remove filter wheel (2).
3. Loosen fixing screws (3) of filter wheel cover at four places, using the Allen screwdriver and remove the cover.



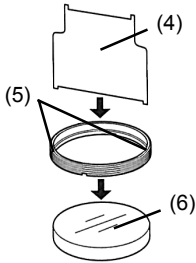
**TIP**

Filter is of 32mm diameter (25mm diameter, use conversion adapter\* ) and thickness should be up to 6mm. Direction of presser ring is shown in the following table by the thickness.

\* Conversion adapter for 25mm diameter is available at option. When you need it, contact local sales office. (AD6921 and AB9169)

Thickness of filter	Direction of presser ring	Remarks
<ul style="list-style-type: none"> <li>• 4mm or more, 6mm or less</li> <li>• U-FWCO1.25X</li> <li>• U-FW32PO</li> </ul>		<ul style="list-style-type: none"> <li>• Insert U-FWCO1.25X with 29.6mm diameter side down</li> <li>• Insert U-FW32PO into No.1 hole for sure. (Alignment pin and slot must be matched with each index).</li> </ul>
<ul style="list-style-type: none"> <li>• 4mm or less</li> <li>• Conversion adapter</li> </ul>		

(Installation method of 25mm filter to conversion adapter is the same as described above).



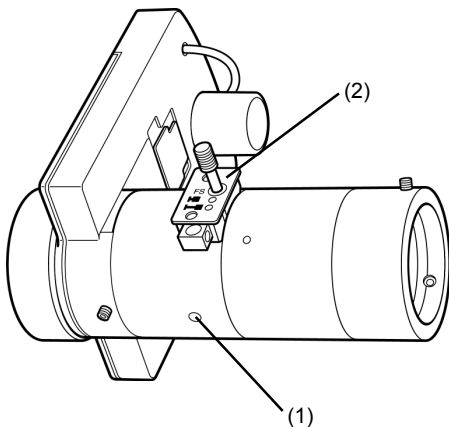
4. Insert presser ring driver (4) into slots (5) of presser ring and turn it in clockwise direction to fix the filter (6).

**TIP** When you attach filter of 25mm diameter to conversion adapter, use small side of presser ring driver (4).  
Be careful when you attach conversion adapter as the portion to insert filter is slanted by 5°.

**TIP** Arrow mark is provided on side of barrier Filter and excitation filter.  
Barrier Filter: Insertion must be matched with arrow.  
Excitation filter: Insertion must be made in reverse with arrow.

5. When you finished installation of all filters required, return the filter wheel cover to original position and fix it by tightening four fixing screws (3).
6. Insert filter wheel (2) into illuminator and tighten fixing screws (1) of mount at two places, using the Allen screwdriver.
7. Attach lamp house and optional filter unit to original position respectively.

### 8-18 Field iris diaphragm IN/OUT

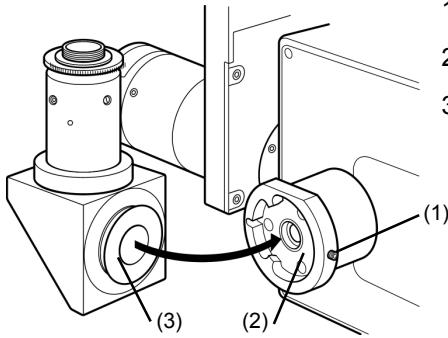


1. (Removal). Loosen fixing screw (1) located at the bottom of aperture unit, using the Allen screwdriver.
2. Hold aperture unit (2) and pull it horizontally.
3. (Installation). Reverse procedure 1 and 2.

**Note** When you tighten fixing screw (1), tighten it lightly. Do not tighten it too hard.

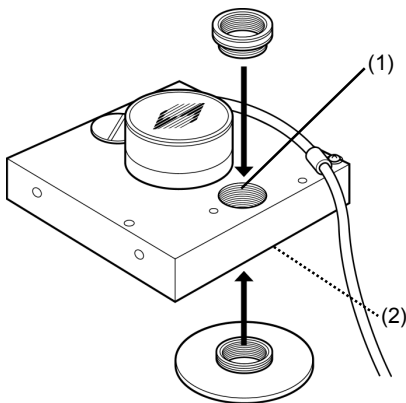
## 8-19 Installation of camera adapter and filter

### 8-19-1 In case of DSU C-mount adapter

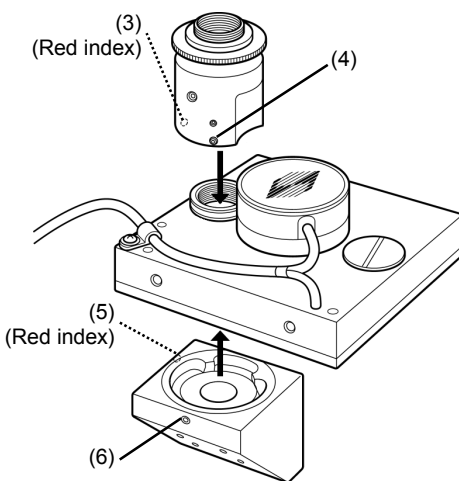


1. Loosen fixing screw (1), using the Allen screwdriver.
2. Insert C-mount adapter (3) into disk box (2).
3. Tighten fixing screw (1), using the Allen screwdriver.

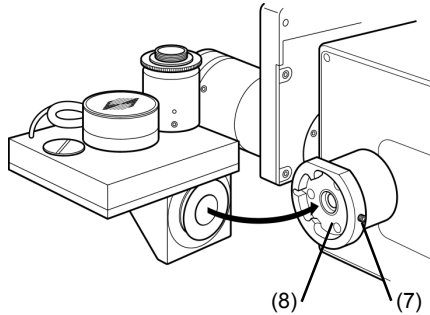
### 8-19-2 C-mount adapter for DSULAMBDA10 / C-mount adapter for Ludl



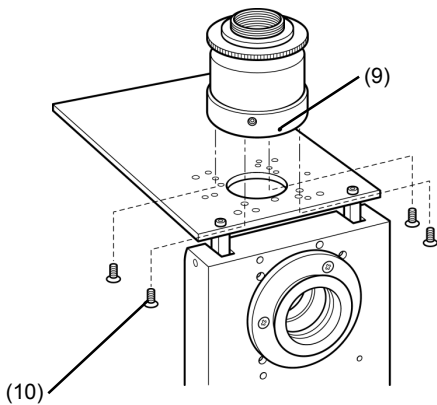
#### In case of LAMBDA10



1. Screw in the upper adapter and lower adapter by turning them into threaded holes (1) and (2) of C-mount for filter wheel and fix them firmly as illustrated.
2. Align filter wheel with red index (3) of port as illustrated and tighten screws (4) at three places, using tool that comes with the system as accessory.
3. Attach filter wheel to mirror holder in a way that red index (3) of port and red index (5) of mirror holder are aligned each other.
4. Tighten fixing screw (6), using the Allen screwdriver.

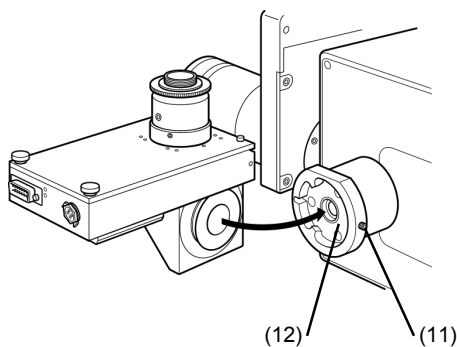


5. Loosen fixing screw (7) of disk box, using the Allen screwdriver.
6. Insert C-mount adapter that is attached with filter wheel into mount (8) of disk box.
7. Tighten fixing screw (7), using the Allen screwdriver.

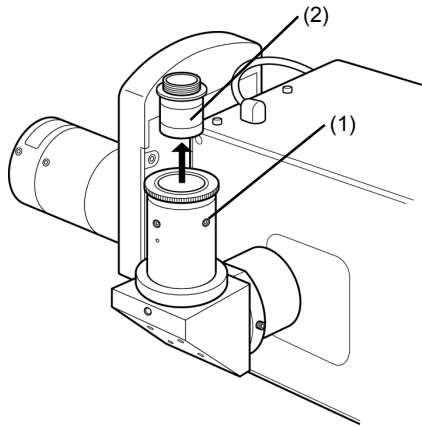


**In case of Ludl**

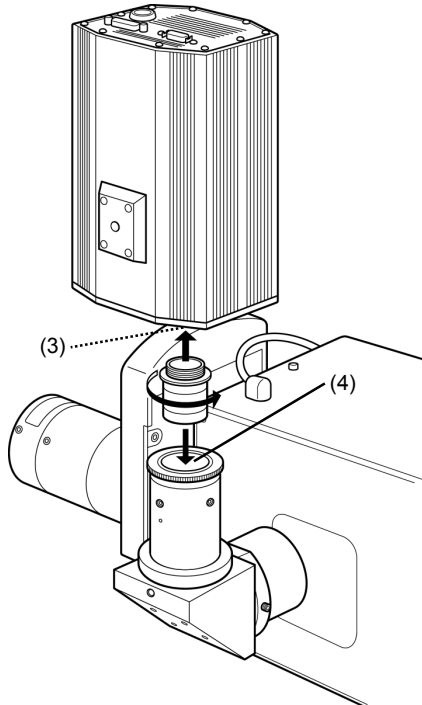
1. Open lid of filter wheel and remove adapter that is attached from the beginning, using Philips type + screwdriver.
2. Align direction with red index (9) of port as illustrated and fasten four screws (10) that come as accessories from within, using Philips type + screwdriver.
3. Assemble C-mount adapter as in the procedure 3 and 4 of LAMBDA10.
4. Loosen fixing screw (11) of disk box, using the Allen screwdriver.
5. Insert C-mount adapter that is attached with filter wheel into mount (12) of disk box.
6. Tighten fixing screw (11), using the Allen screwdriver.



## 8-20 Installation of camera



1. Loosen fixing screw (1) of port, using the Allen screwdriver that comes as accessory for microscope frame and remove C-mount adapter (2) inside the port.
2. Screw in and fix the C-mount adapter(2) that was removed to C-mount section (3) of camera firmly.
3. Insert C-mount adapter that is attached with camera into port (4) gently.
4. Tighten fixing screw (1) at least one place, using the Allen screwdriver.



## 8-21 DIP switch settings on control box (BX61, BX62 and BX61W1 only)

**Note**

DIP switch settings should be done after power of control box is turned OFF.

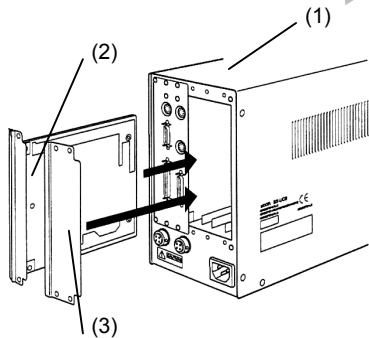
When you use BX61, BX62 or BX61W1, you must change DIP switch settings on control box. Set in accordance with the following procedures.

1. Peel off the seal in front of SW1.
2. Change DIP switch 7 to ON.
3. Attach front seal to SW1.

## 8-22 Installation of motor drive board

**Note**

You must install motor drive board after you turn power of control box to OFF.



1. Loosen four fixing knobs for two option slot covers at left side of back panel of control box (1) and remove covers and knobs.
2. Aligning direction of connector inside control box with connector (2), insert the board along with board rails.  
Push the board until connectors of motor drive board are inserted into connectors of mother board inside the control box.
3. Using knobs you removed, fix motor drive board (2).  
Likewise, attach the other cover (3).

**Note**

Slot cover section must overlap. Attach cover from left side, seen from back side.

**Note**

Keep one piece of slot cover that remained with care as it may be required for motor drive board when it is removed.

**8-23 Z board setting and installation**

**8-23-1 In case of BX61 and BX62**



**Note**

For Z board, use type U-ZPCB(T2) for sure.

In case that U-ZPCB(T2) or subsequent is not used, the following troubles may occur even if correct setting was done.

- Rotation of focusing handle and actual objective lens movement would be reversed.
- Focusing control may not be able to initialize, depending upon the position. (Microscope does not boot up).



**TIP**

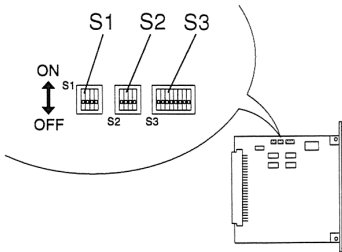
All DIP switches on Z board, S1, S2 and S3 are turned to OFF at ex-factory.

**Setting change of ONBOARD DIP SW**



**Note**

Use DIP SW set to OFF except the following DIP SW.  
Turn DIP SW that is to be changed only to **ON**.



**S2** NO.4

- Interchanges F/C change button and Stage retreat button located at left side of BX61/BX62 to Stage DOWN button and Stage UP button.

**S3** NO.1

- Automatic initializing function is turned to OFF and default remote state is set.

**S3** NO.4

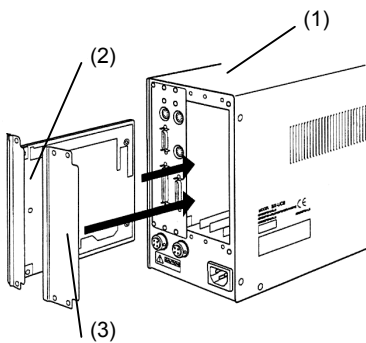
- Stroke of focusing control is changed from 15mm to 25mm.

**Z board installation**



**Note**

You must install Z board after you turn power of control box to OFF.



1. Loosen fixing knobs (6 pieces) for two slot covers at back side of control box (1) and remove covers and knobs.
2. Aligning direction of connector of control box and connector of Z board (2), insert board along with board rails. Push in until connectors are firmly connected.



- Using knobs you removed, fix Z board (2). Likewise, attach the other cover (3).



**Note**

Keep one piece of slot cover that remained with care as it may be required for Z board when it is removed.

**8-23-2 In case of BX61W1**



**Note**

For Z board, use type U-ZPCB(T2) for sure.

In case that U-ZPCB(T2) or subsequent is not used, the following troubles may occur even if correct setting was done.

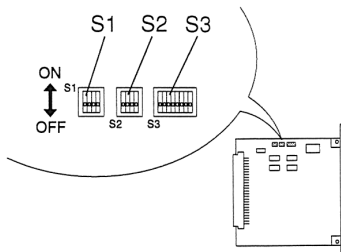
- Rotation of focusing handle and actual objective lens movement would be reversed.
- Focusing control may not be able to initialize, depending upon the position. (Microscope does not boot up).



**TIP**

All DIP switches on Z board, S1, S2 and S3 are turned to OFF at ex-factory.

**Setting change of ONBOARD DIP SW**



**Note**

Use DIP SW set to OFF except the following DIP SW.

Turn DIP SW that is to be changed only to **ON**.

**S2**

Changes NO.2 and NO.3 to ON.

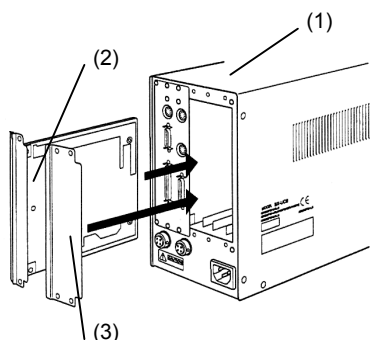
**S3**

Changes NO.2, NO.4 and NO.5 to ON.



**Note**

If DIP switches are not correctly set, objective lens comes down and hits the specimen.



Z board installation

**Note**

You must install Z board after you turn power of control box to OFF.

1. Loosen fixing knobs (6 pieces) for two slot covers at back side of control box (1) and remove covers and knobs.
2. Aligning direction of connector of control box and connector of Z board (2), insert board along with board rails. Push in until connectors are firmly connected.
3. Using knobs you removed, fix Z board (2). Likewise, attach the other cover (3).

**Note**

Keep one piece of slot cover that remained with care as it may be required for Z board when it is removed.

8-23-3 In case of IX81

**Note**

For Z board, use type U-ZPCB(T2) for sure.

In case that U-ZPCB(T2) or subsequent is not used, the following troubles may occur even if correct setting was done.

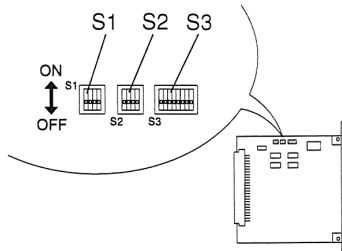
- Rotation of focusing handle and actual objective lens movement would be reversed.
- Focusing control may not be able to initialize, depending upon the position. (Microscope does not boot up).

**TIP**

All DIP switches on Z board, S1, S2 and S3 are turned to OFF at ex-factory.



Setting change of ONBOARD DIP SW

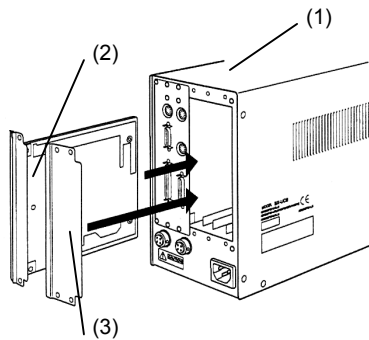


**Note** Use DIP SW set to OFF except the following DIP SW.  
Turn DIP SW that is to be changed only to **ON** .

**S3** Changes NO.4 and NO.5 to ON.

**Note** If DIP switches are not correctly set, objective lens comes down and hits the specimen.

Z board installation



**Note** You must install Z board after you turn power of control box to OFF.

1. Loosen fixing knobs (6 pieces) for two slot covers at back side of control box (1) and remove covers and knobs.
2. Aligning direction of connector of control box and connector of Z board (2), insert board along with board rails.  
Push in until connectors are firmly connected.
3. Using knobs you removed, fix Z board (2). Likewise, attach the other cover (3).

**Note** Keep one piece of slot cover that remained with care as it may be required for Z board when it is removed.





# OLYMPUS®

**OLYMPUS CORPORATION**

2-43-2, Hatagaya, Shibuya-ku, Tokyo, Japan

**OLYMPUS OPTICAL CO.(EUROPA) GMBH.**

Postfach 10 49 08, 20034, Hamburg, Germany

**OLYMPUS AMERICA INC.**

2 Corporate Center Drive, Melville, NY 11747-3157, U.S.A.

**OLYMPUS SINGAPORE PTE LTD.**

491B River Valley Road, #12-01/04 Valley Point Office Tower, Singapore 248373

**OLYMPUS OPTICAL CO. (U.K.) LTD.**

2-8 Honduras Street, London EC1Y 0TX, United Kingdom.

**OLYMPUS AUSTRALIA PTY. LTD.**

104 Ferntree Gully Road, Oakleigh, Victoria, 3166, Australia

