

OLYMPUS[®]

User's Manual

FLUOVIEW FVMPE-RS

Multi Photon Laser Scanning Microscope

Notice

Thank you for your purchase of Olympus microscope at this time.
Retain this manual in an easily accessible place near a system for future reference.

Optical Microscope and Accessory

- Research use only -

AX8334

IMPORTANT

This is a User's Manual for Multi Photon Laser Scanning Microscope FVMPE-RS in FLUOVIEW Series.

CAUTION

FVMPE-RS is a CLASS 4 laser product.

The procedures for using this system are classified as follows:

- Operation
"Operation" means all performance described in the user's manuals in this system.
CLASS 4 laser light is only emitted from the objective lens during the actual execution.
- Maintenance
"Maintenance" means adjustment or other procedures performed by customers to maintain that this system functions properly.
- Service
"Service" means any adjustment or repair performed by Olympus service personnel or technical personnel who are provided the service training according to the service manual provided by Olympus.
The performance has influence on the feature of this system, and there is a risk that unintended CLASS 4 laser light is emitted.

In order to maintain the full performance of this system and ensure your safety, be sure to read this user's manual, and the operating instructions for the laser unit and light source unit before use.

For this unit, other than the manuals and instructions, above there is also an on-screen manual ("Online Help") embedded in the software. For details of FV30S-SW and the touch panel controller, refer to Online Help.

Reproduction, copying or duplication of a part or all of this software and manual is prohibited.



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Registered Trademarks

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Caution

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

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

CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or serious injuries such as blindness, etc., or damage to the equipment or other property. It may also be used to alert against unsafe practices.

© : Indicates commentary (for ease of operation and maintenance).

Safety Manual

On this volume

This volume describes warnings and cautions for your safety use of this system. Before use, be sure to observe all the warnings and cautions.



In case this system is used in other methods than those described in this manual, the safety cannot be insured and a system failure may occur. Use this system in accordance with this manual.

This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.

- Emission Class A, applied to industrial environment requirements.

- Immunity Applied to industrial environment requirements.

Some interference may occur if this product is used in domestic location.



In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to your local Olympus distributor in EU for return and/or collection systems available in your country.

Research Use Only

This product does not conform to FCC Part15 Class A.

This product is for biological research use, and it is categorized as a FCC Part15 Class A exempt device.

CALIFORNIA USA ONLY


The touch panel controller of this product uses a Lithium Battery which contains Perchlorate Material -special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate.

For Korea only

A급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주의하시기 바라 며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

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1 Safety caution

1-1 Transportation and modification of this system

- CAUTION** · Our engineer exercises assembling and setup of this system. If this system is moved or modified (disassembly or remodeling) by a person who is not our engineer, the optical system may go out of order. Therefore, refrain from moving by you. When this system should be moved, contact our local sales office. In an event that this system is moved by you and, if for any reason a problem related to laser safety occurred due to malfunction or breakage of this system, please be warned that our company holds no responsibility.
- This system meet standards for product safety, laser safety and the like under circumstances that they are setup by servicemen authorized by our company.
In case any combination change or modification is done on this system once setup and/or any usage that differs from those described in instruction manual and or safety manual is done, it would stray from the state that meet standards for system safety, laser safety and the like. In such a case, it is responsible for customers to comply with those requirements with respect to safety, laser safety and the like once again.

1-2 Waste of system

- CAUTION** · The used mercury lamp in this system must be disposed of as industrial waste. If you cannot dispose of it properly, please contact Olympus.
- In order to replace the lithium coin battery built in the touch panel controller in this system, please contact our sales office in your local area.
 - Disposal of this product
The GaAsP-PMT equipped in the FV30-AGAPD contains arsenic (As) and its compounds.
At the time of disposing of this product, consign it to the authorized industrial waste disposer or follow the local rule of industrial waste. When you use this product in an other country and dispose it of there, follow the rule of industrial waste there.
 - Disposal of the laser
Refer to the instruction manual of the laser.

1-3 Handling precautions

- CAUTION** · Also, refer to the part related to safety in manuals of surrounding units. However, if the following units are used in this system, the manuals provided with those units are not effective. See this manual about usage of those units.
- U-HGLGPS
 - U-AW
- If this system malfunctions or goes out of order, discontinue use. Shutdown Windows, exit the system according to the procedures described on page 13 of [Operation / Maintenance Manual] and ask for support from your sales and service dealer listed in the User's Manual and other documents or the distributor where you purchased this system without delay. If this system is continuously used in such a state, it may cause injury to users, failure of this system, or output of erroneous image data.
 - Use each unit in accordance with specifications and environmental conditions described in this manual. Do not use each unit in any other method as it is dangerous.

1 Mechanical (heat) precaution

- CAUTION** · If this system is taken apart, such that covers or units are removed with tools, or cords are plugged/unplugged, etc., the product performance and the safety cannot be ensured. Never disassemble the parts which are not instructed to do so.
- Handle the movable parts, e.g. connectors or covers, etc. of connection parts with care, and avoid subjecting them to severe force or impact. Otherwise, it may cause a failure.
 - This is not a waterproof system. Do not splash or spill water or other liquid on this system. If water or other liquid enters this system, discontinue use, exit the system according to the procedures described on page 13 of [Operation / Maintenance Manual] and ask for support from your sales and service dealer listed in the User's Manual and other documents or the distributor where you purchased this system without delay. If this system continues to be used in such a state, it may cause electric shock or other hazards and result in injuries of users, failures of this system, or output of erroneous image data.
 - This system is a precision instrument. Handle it with care and avoid subjecting it to a sudden or severe impact.
 - Cooling fans are provided at the rear panel of each power unit. Cooling fans are provided at the rear panel of the control unit. Leave a space of 10 cm or more at the ventilation opening respectively. (The temperature inside of the power units may rise to cause malfunctions or failure.)
 - Do not permit tools or metal fragments to get into the opening of slits or so of each unit. Doing so could cause failure of this system or electric shock to the user.
 - If any foreign matter, such as an accessory tool or a small piece of metal, enters this system through the vent hole or other openings, it may cause an electric shock and/or failure of this system. Discontinue use, exit the system according to the procedures described on page 13 of [Operation / Maintenance Manual] and ask for support from your sales and service dealer listed in the User's Manual and other documents or the distributor where you purchased this system without delay.
 - Do not put any substance on top of the product or cover the product with a cloth, etc. during operation.
 - When you store this system, put the dust cover over it to protect from dust.

- CAUTION**
- Under the dark environment, it may be hard to see this system clearly. Be careful not to come into contact with this system when you pass by.
 - If the objective lens contacts the specimen, both of them may be damaged.
 - Regarding Z direction move, besides mechanical limitation of microscope, a limit can separately be programmed in software within mechanical limitation.
If a software limit is set to the position where objective lens or specimen comes close each other, for example, the damage of specimen that occurs by a contact with an objective lens may be prevented.
For details of the software limit, refer to Online Help of FV30S-SW.
 - To replace consumables falls under the category of service work.
 - Do not put your fingers or objects in the motorized area. You may be injured by pinching your fingers or the device may be damaged.

2 Electrical precaution

- CAUTION**
- If the power cord touches on a lamp house, the cord may melt and cause electric shock. When installing the lamp house, keep it far away from the power cord.
 - Product lifetime of illumination devices is 8 years or 20,000 illumination hours, whichever occurs first, as a guideline. For details, see the Inspection Sheet on page 88 of [Operation / Maintenance Manual].
 - Connect this system to ground correctly. Otherwise, Olympus can not warrant the electrical safety and performance of this system.
 - In case that the fuse of an unit blows out, please contact our sales office in your local area for replacement.
 - Always connect the power cord correctly and ensure that the grounding terminal of the device and that of the wall outlet are properly connected. If the device is not grounded, our intended electric safety and EMC performance of the device can not be assured.
 - Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER CORD" at the end of the safety manual. If the proper power cord is not used, the safety and EMC performance of the device can not be assured.
 - Our engineer connects the power cord and other connector cables. Do not disconnect them.
 - In case of emergency, unplug the power cord to stop supplying the power. For FV30-PSU, FV30-LCU, FV30-LCUMP, BX63L-CBH, or U-HGLGPS be sure to secure the space for reaching the power cord connector or the outlet so that you can unplug the power cord immediately in case of emergency.
 - When using the power strip, avoid it from getting dusty.
 - Do not use the mercury lamp exceeding its life time. For procedures to confirm the accumulated lighting time of the mercury lamp, refer to [Operations/Maintenance] on page 36.
 - The mercury burner seals high-pressure gas inside. If it continues to be used after the service life has expired, the glass tube may eventually explode due to accumulated distortion.
 - In case that the mercury burner explodes, follow the procedures below.
 - Unplug the power cord from the outlet. Leave the place and ventilate for at least 30 minutes.
 - After the mercury burner and the lamp house have cooled down, collect the remaining mercury with packing tape, paper or dropper, etc.
 - Seal the collected mercury and tools used completely in a nonmetallic container, and ask the waste disposer to dispose of them.
 - Should you have inhaled mercury steam, consult the doctor immediately and follow his/her instructions.

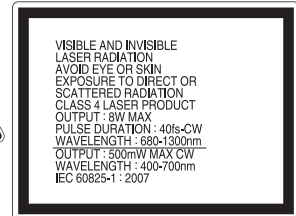
3 Laser precaution

This system is specified as a laser product of the class as shown below, depending upon the laser to be combined.

(1) Laser combination

CLASS 4(IEC60825-1:2007)

(1)



This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007

Laser products of Class 4 are products that can only be used under control of laser safety officer.

Assign a laser safety officer and ensure safety in accordance with the instruction given by the assigned laser safety officer.

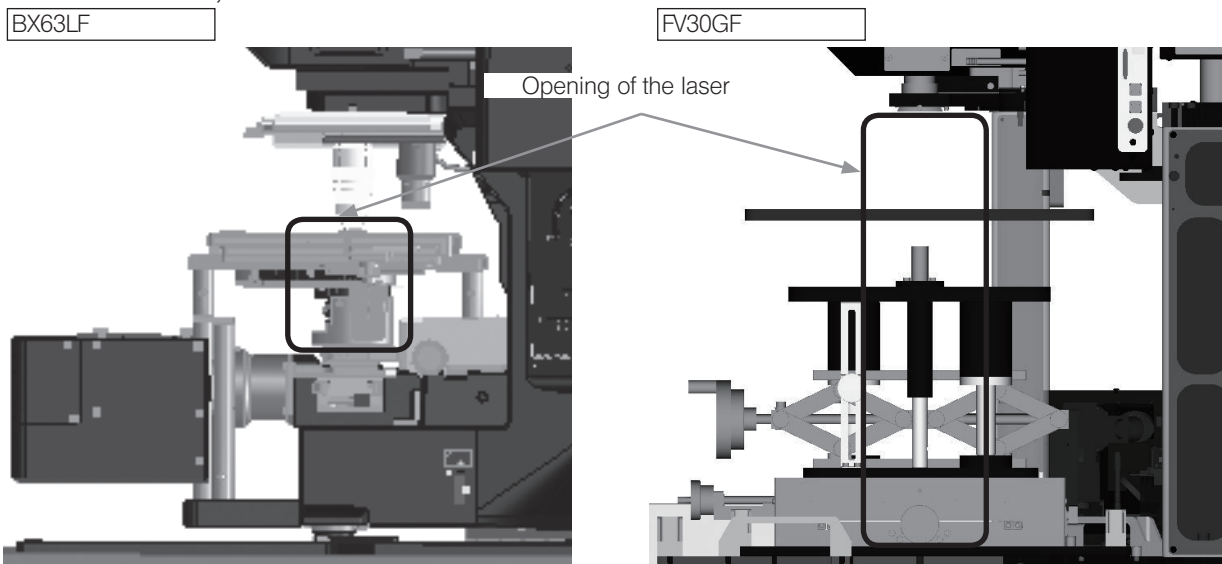
In "IEC 60825-1, Safety of laser products - Part 1: Equipment classification and requirements" and "IEC/TR 60825-14, Safety of laser products - Part 14: A user's guide", it requires safety preventive measures for users of laser products. Before using, read IEC 60825-1 and IEC/TR 60825-14 of the latest edition carefully and then, use the products after enforcing adequate measures.

Unless the safety measures indicated in IEC 60825-1 and IEC/TR 60825-14 are provided, our company cannot insure safety of the product since it may cause exposure of dangerous laser emission.

CAUTION Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- ⊙ If any help is required, contact our local sales office.
- ⊙ The wavelength and the power of the VIS laser of CW are described on the label. They are ensured only when FV30-SIMMP and FV30-COMB4 are attached.

CAUTION NOHD (nominal ocular hazard distance) is defined as approximately 50 cm from the tip of the objective lens. Do not come close to the opening of the laser while the laser is radiated. For definition of NOHD, refer to "IEC60825-1".



CAUTION

- Make sure that no empty hole exists on nosepiece.
When using the coded slide nosepiece (BX63L-DSLNP), always attach the objective lens to the hole on the front. If you do not attach a nosepiece on the back hole, be sure to attach a dedicated metal cap.
When using the nosepieces other than coded slide nosepiece (BX63L-DSLNP), be sure to attach a dedicated metal cap to the holes which does not attached the nosepieces on.
- While the service work of this system takes place, do not enter the room in which this system is installed.
- Do not expose your hand or finger to the laser beam output from the objective mount hole, objective tip or condenser lens, or your skin may be damaged. Also, never attempt to output the laser beam outside this system by inserting a mirror or a similar object in the light path. Otherwise, the laser beam may enter your eyes, which is extremely hazardous.
- If the white LED of the emission indicator is turned ON, the laser may possibly be emitted from the tip of the objective lens.
- Place the specimen horizontally on the stage or insert plate. If the specimen inclines, the laser beam may reflect around the microscope, which is extremely hazardous.
- Do not touch the specimen while the laser is emitted. It is very hazardous, since reflection angle of the laser is changed.
- Do not bend or pull the optical fiber cable with an excessive force or step on it. If the optical fiber cable is damaged, the laser light may leak outside it and cause an extremely hazardous situation. Should such an event occur, immediately turn off the laser power and contact your local Olympus representative.

Precautions to laser

CAUTION

- Laser of this system is of class 4. If you look at a beam or scattered light directly, your eye may be damaged. Alternatively, serious hazard to your skin or fire hazard may occur.
- Do not expose your eyes or skin directly to a laser beam or scattered light. When using laser, observe and exercise all safety measures described in this manual.
- When using this system, wear protective eyewear and make it certain that no damage occurs to your eyes. However, even if you wear protective eyewear, never look at a laser directly (front vision). The protective eyewear will not stand to direct laser emission.
- Visible laser is of class 3B. Do not stare at a visible laser or do not look at optical instrument directly.

Eye damage

- CAUTION** Invisible laser emitted from this system focuses on retina of the eyeball.
- If the laser enters into your eyes, the retina may be damaged to result in blindness, etc.
 - Get the protective eyewear matching class and wavelength of the laser of this system.
 - Protective eyewear for IR pulse laser to be used on this system can not be used for other laser system of different wavelength. In reverse, protective eyewear for other laser system can not be used on this system. It will cause eye damage. Be sure to use the protective eyewear suited to this system.
 - Protective eyewear for IR pulse laser does not accept visible laser beam. Prepare a protective eyewear for visible laser separately.

Hazard of explosion/fire

- CAUTION**
- Do not use any flammable gas that is ignited by laser or volatile gas. Besides, do not use any other flammable substance or gas-producing substance.
 - Do not put any combustibles near the opening of the laser. Alternatively, fire hazard may occur by laser.

Burns

- CAUTION** Burns may occur if laser is mistakenly emitted to human body. Be sure to wear a protective suit. Use a protective suit of nonflammable cloth.

Reflected light

- CAUTION** Do not install substances that reflect, e.g. glass, metal or shiny plastic, etc. near the opening of the laser. Reflected light may cause injuries such as burns and blindness and also damage to this system.

Smoke produced by laser

- CAUTION** Smoke that may appear by applying the laser to substance may include toxic substance. Remove the smoke produced by the laser with the equipment such as smoke-extraction measure so that the user should not breathe the smoke.

1-4 Necessary Actions

OLYMPUS would like to take this opportunity to ask the customer to establish a system to ensure laser safety in line with the customer's facility. The items necessary for ensuring laser safety are listed below.

1 Appointing a laser safety officer

Please take actions to ensure laser safety with a laser safety officer at the center of such activities.

1 Duties of the laser safety officer

Maintain safety by considering combination of the following content:

- Planning and implementing measures for preventing damages due to laser light
- Setting and managing laser controlled area
- Managing key and so on which starts laser equipment
- Inspecting and maintaining laser equipment, and preserving record of them
- Inspecting and maintaining protection tool, and observing if it is being used properly
- Conducting labor hygiene education and preserving record of it
- Other items necessary for preventing damages due to laser light

2 Details of the safety education and training

It is requested for the laser safety officer to conduct safety education and training for all of the persons who are to use laser equipment. Such training should include the following:

- Characteristics of laser light and its dangers
- Principles and structures of laser equipment
- How to use laser equipment
- Performance of safety and protective equipment, and how to use them
- Measures to be taken in an emergency and evacuation procedures

CAUTION Power module for laser system of class 3B or class 4 is controlled with key. Laser safety officer should keep the key and exercise safety precaution in a way that any unauthorized person cannot control the laser system.

2 Laser controlled areas (warning signs and off-limits)

The area where a laser beam of class 3B or above is emitted is defined as laser control area. Define the room where this system is set up as laser control area.

Place a warning sign near to each of the laser controlled areas that includes the following information:



- The name of the laser officer
- Descriptions of the dangers of laser radiation, and cautions about handling
- A sign indicating the installation of laser equipment

- CAUTION**
- Be sure to use the remote interlock connector when you install the door interlock in the laser controlled area.
 - FV30-PSU is equipped with the external interlock connector (current rating: 140mA, voltage rating: DC 24V). If you want to connect the interlock switch to this connector, please be sure to turn FV30-PSU main switch [O](OFF) and remove the short-circuit metal of the connector prior to connecting.



PSU Rear Panel

- © When you return the laser emission to be available after activation of a remote interlock, unlock the remote interlock at first, after that turn the start key OFF on the front of FV30-PSU and turn the start key ON again.
- © For use of the interlock connector of the IR pulse laser, refer to the materials provided by COHERENT or Spectra-Physics.

3 Preparing and wearing preventive eye glasses and protective clothes

In Laser Hazard Area, it is essentially required to wear eye protector and protective clothing. For this reason, in case a microscope should be operated, or a specimen should be set, wear the eye protector.

1 Using protective glasses



Get the protective glasses matching class and wavelength of the laser of this system. In addition, do not look at laser light directly even when wearing protective glasses.

Laser wavelength of this system

	Wavelength nm	OD value
Visible laser	405, 458, 588	3 or more
IR laser	690 - 1300	4 or more

2 Wearing protective clothes

If any work should be done in Laser Hazard Area, wear protective clothing of flame retardant material.

4 Ophthalmologic examination

The persons who use class 4 laser equipment or class 3B laser equipment are requested to have ophthalmologic examinations.

When laser light enters a person's eye, the person must get an ophthalmologic examination immediately.

1-5 Safety functions of this system

This system is provided with the safety measures corresponding to the specifications required for class 4 laser products.

CAUTION These safety functions are ensured in the state in which OLYMPUS delivers the microscope. Do not attempt to disassemble the microscope or the laser unit.

1 Operation management using a key

These products are provided with a key to activate the power supply and electronic control unit (FV30-PSU). When the unit is not in use, the key must be removed and must be kept and managed by the laser safety officer.

2 Radiation-indicating unit (light)

When laser light is emitted from the object lens, the LED of the emission indicator is turned on. When the LED is turned on, use the utmost caution in utilizing this product.

☉ For details of the radiation-indicating unit, refer to [Operation/Maintenance] (page 7).

3 Shutting and attenuating the beam

These products are provided with a built-in shutter to prevent the laser light from entering the eye.

4 Beam stop

This product is designed so that laser light is not inadvertently leaked into the microscope part or the introductory optical system.

- ☉ The laser light emitted from the objective lens is terminated with the transmittance detector (FV30-TD), transmitted lided (FV10-TLID), Z stage for gantry frame (FV30-GFZST), or gantry frame (FV30GF).
- ☉ A cover is placed over the entire introductory optical system.
- ☉ A metal cap is attached to each of the unoccupied holes of the nosepiece of the microscope to prevent the laser light from coming out through the hole.

1-6 Appendix








1 Reference material

- ☉ IEC60825-1 "Safety of laser products - Part 1: Equipment classification and requirements"
- ☉ IEC/TR60825-14 "Safety of laser products - Part 14: A user's guide"
- ☉ Food and Drug Administration "PERFORMANCE STANDARDS FOR LIGHT-EMITTING PRODUCTS"

2 Warning labels

Safety symbols

The following symbols are found on this system. Study the meaning of the symbols, and always use this system in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands. Otherwise burns may result.
	Before use, carefully read the user's manual. Improper handling could result in injury to the user and/or damage to the equipment.
	Indicates that care is required against your finger or hand being caught.
	Indicates high voltage. Take special care to prevent electric shock.
	Indicates that the laser beam is applied. Take special care in handling.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

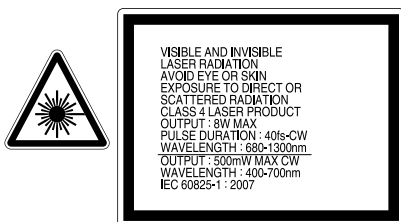
CAUTION For replacement of soiled or peeling warning labels, please contact our local sales office.

2-1 Laser safety warning labels

1 Warning labels

Type of labels attached to a laser system may be different, depending upon laser combination in your possession.

(1)

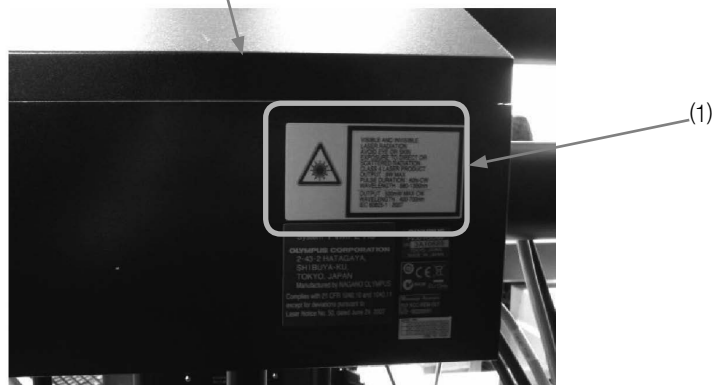


Location attached

- FV30-HSUMP



Hybrid scanning unit for MPE (FV30-HSUMP)



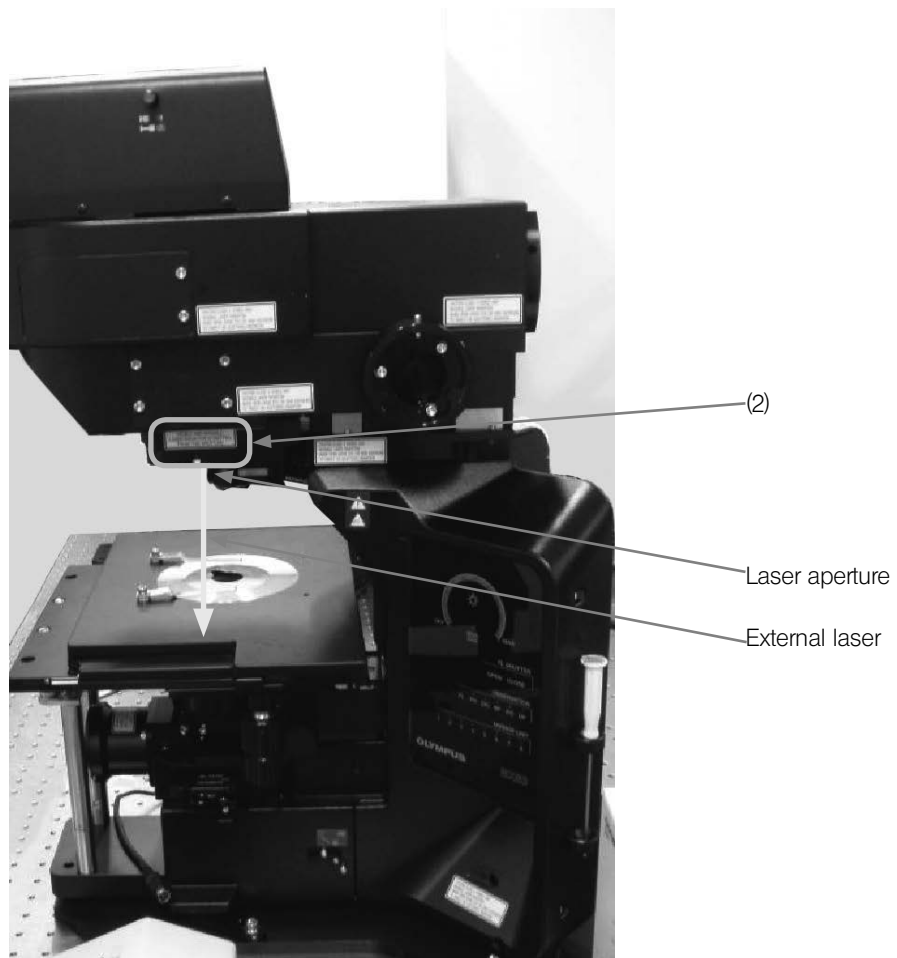
2 Aperture label

(2)

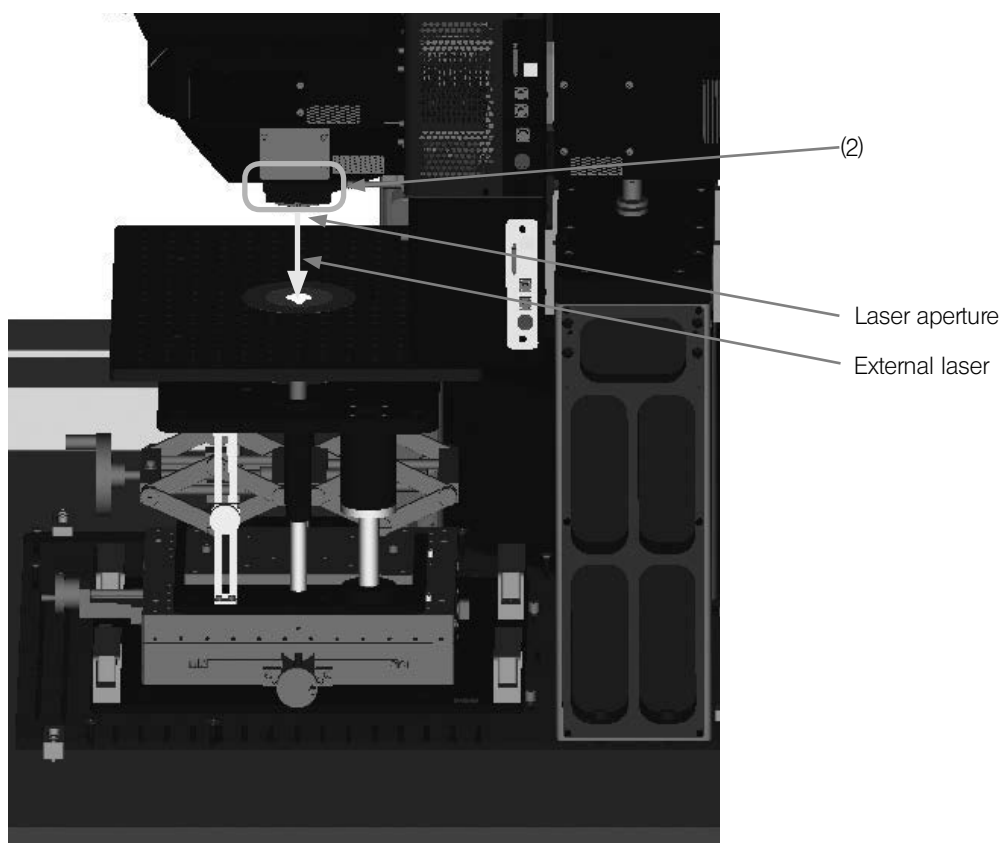
AVOID EXPOSURE-
VISIBLE AND INVISIBLE
LASER RADIATION IS EMITTED
FROM THIS APERTURE

Laser emits from the place where the above label exists and the arrow indicates.

· BX63LF



FV30GF



3 Protective housing labels

(a)

CAUTION-CLASS 4 VISIBLE AND
INVISIBLE LASER RADIATION
WHEN OPEN AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION

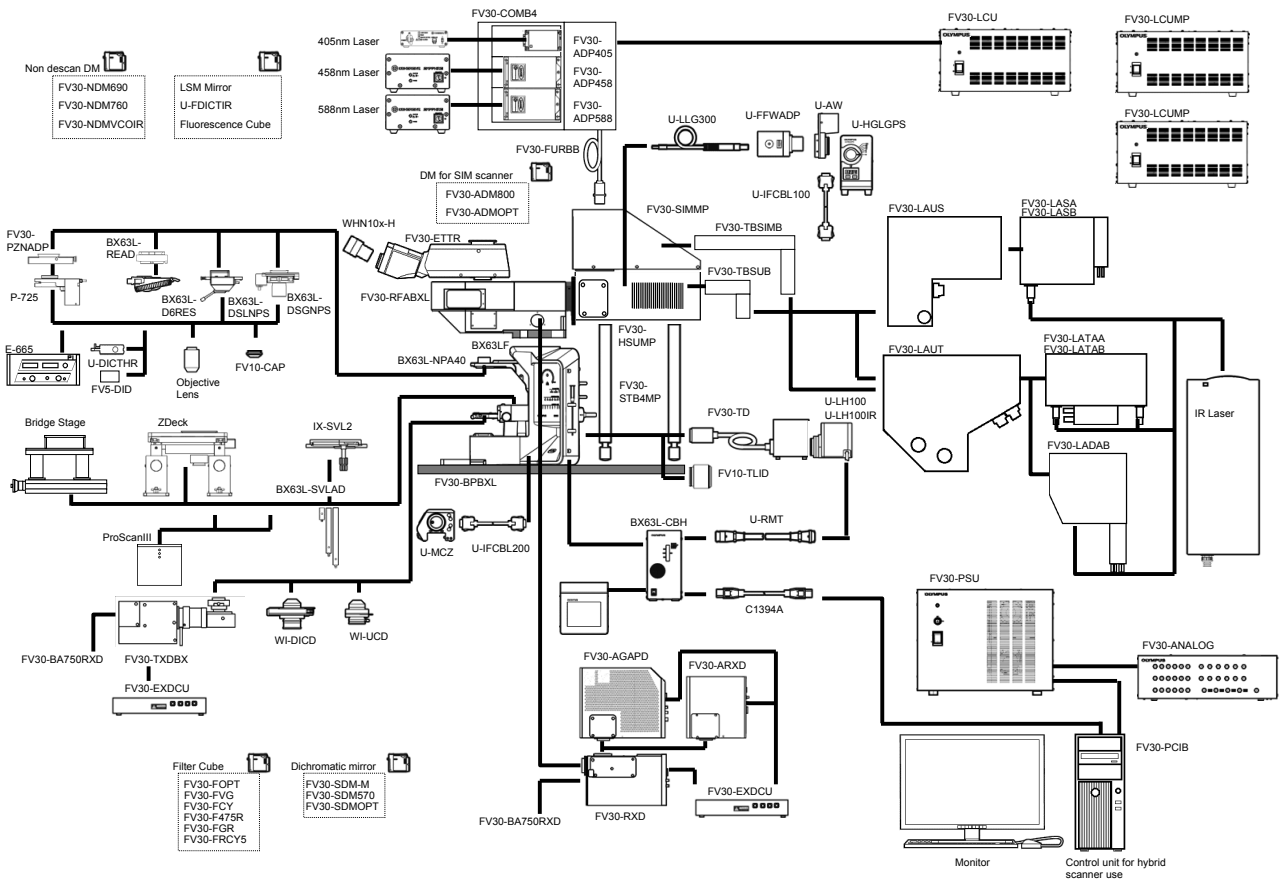
(b)

CAUTION-CLASS 3B LASER RADIATION
WHEN OPEN
AVOID EXPOSURE TO THE BEAM

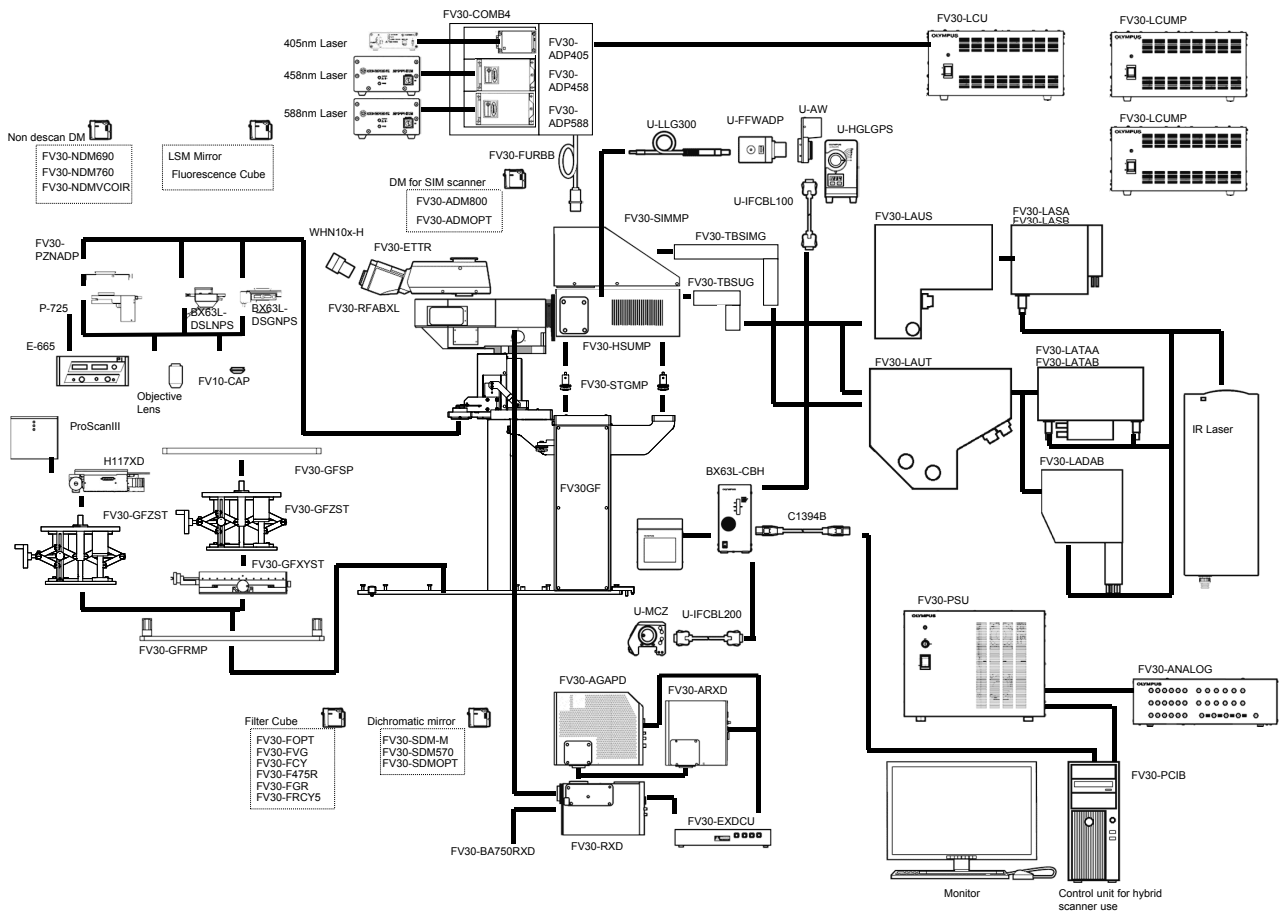
© As labels are attached to many places, the label positions are shown per unit later in this section.

Product unit name

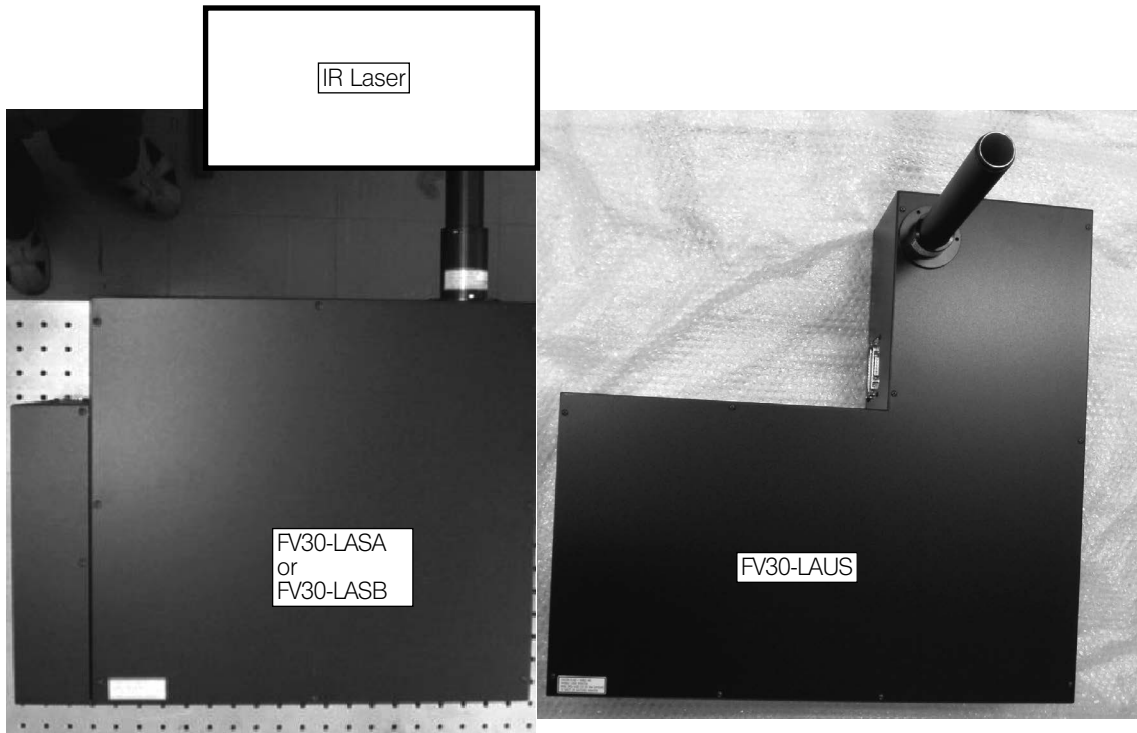
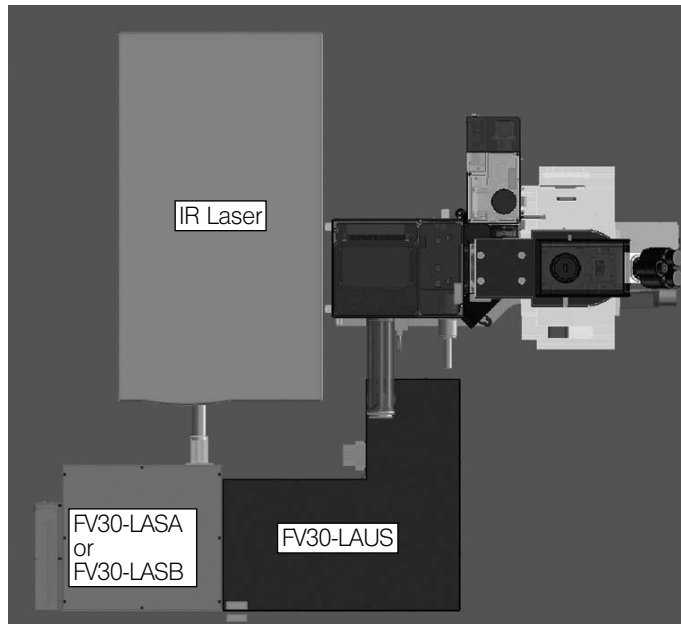
BX63LF

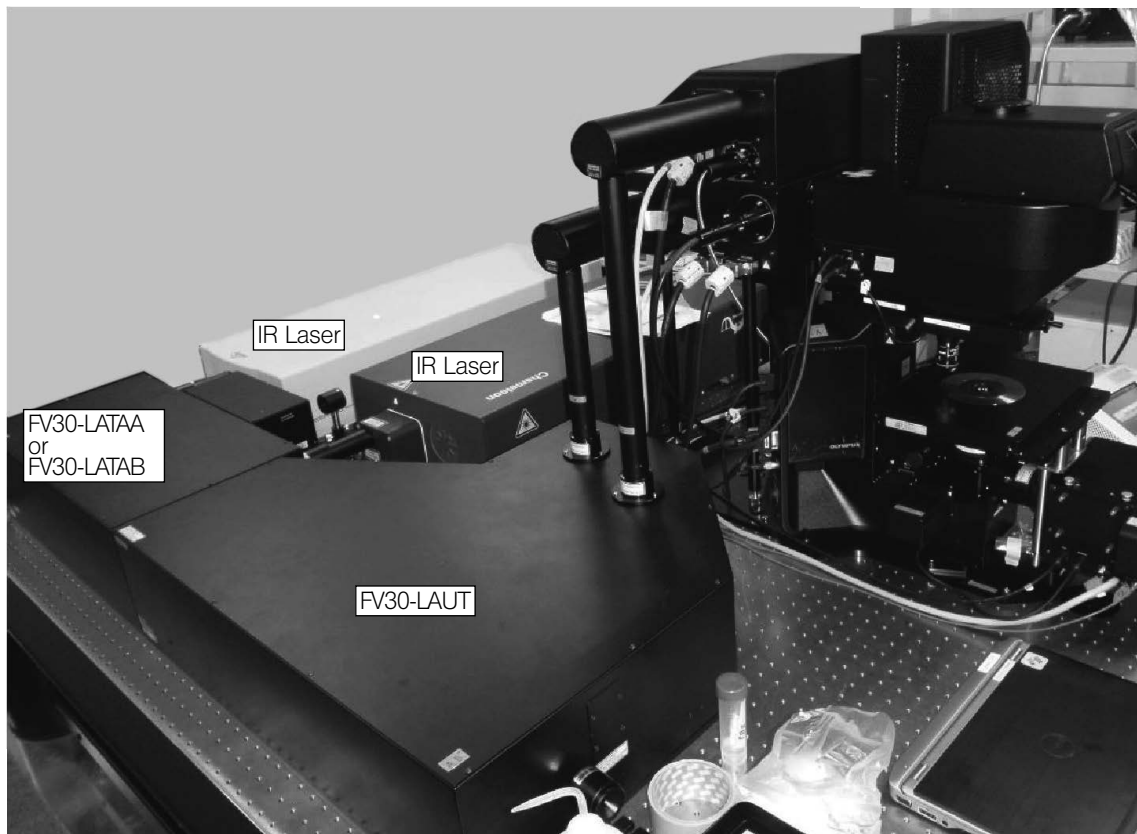
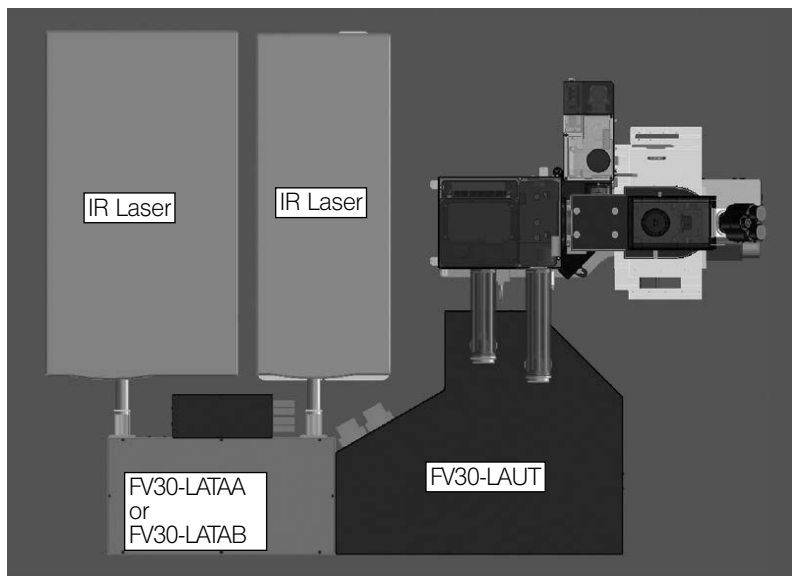


FV30GF

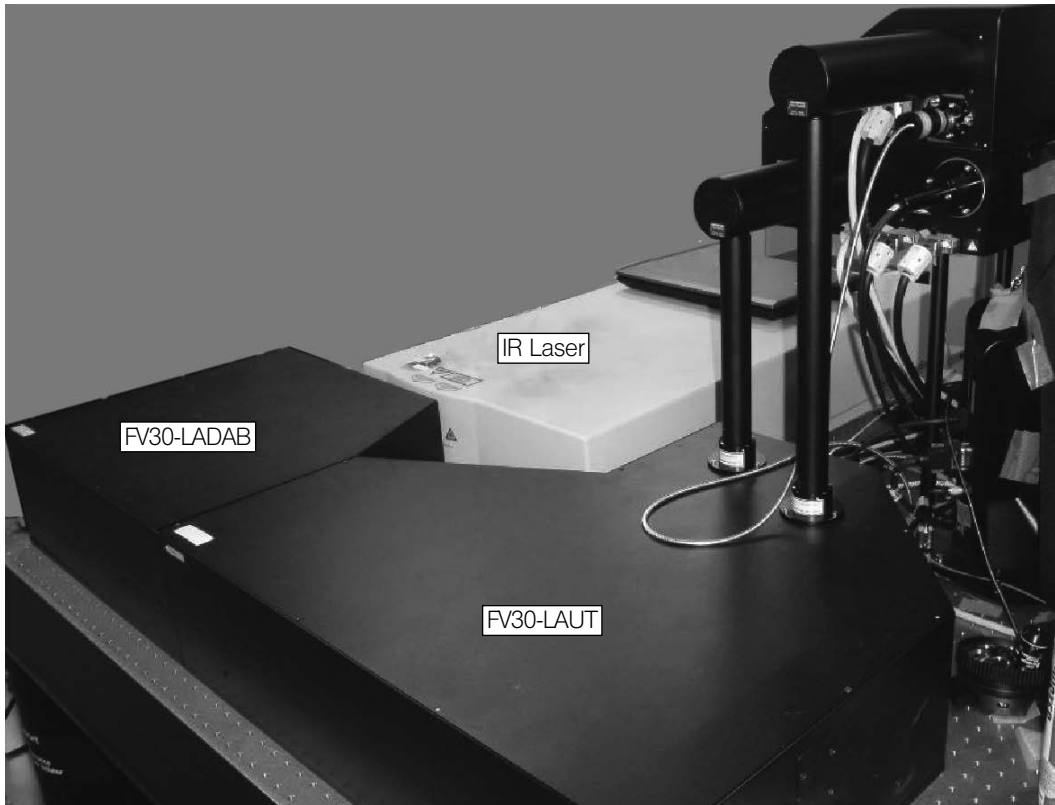
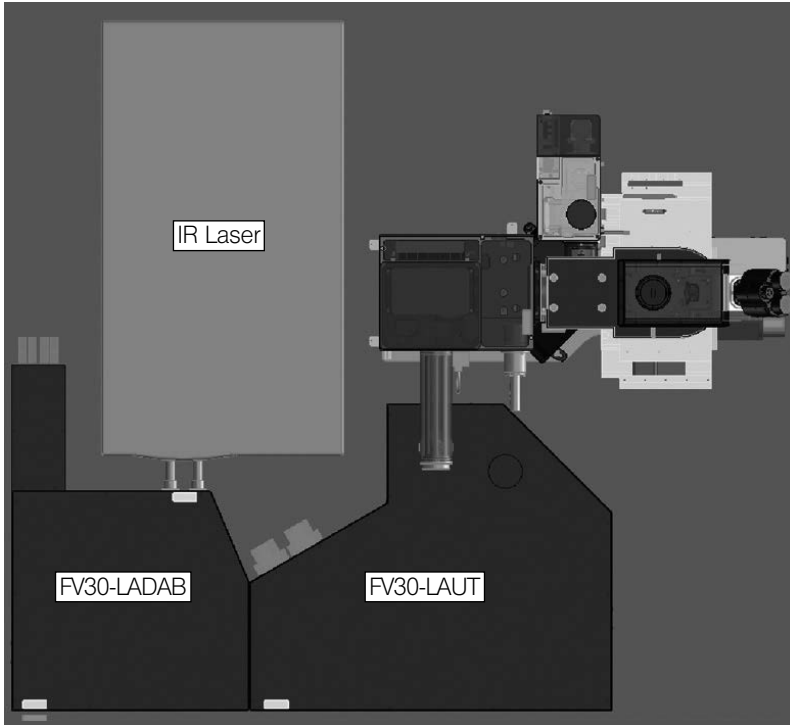


One laser system

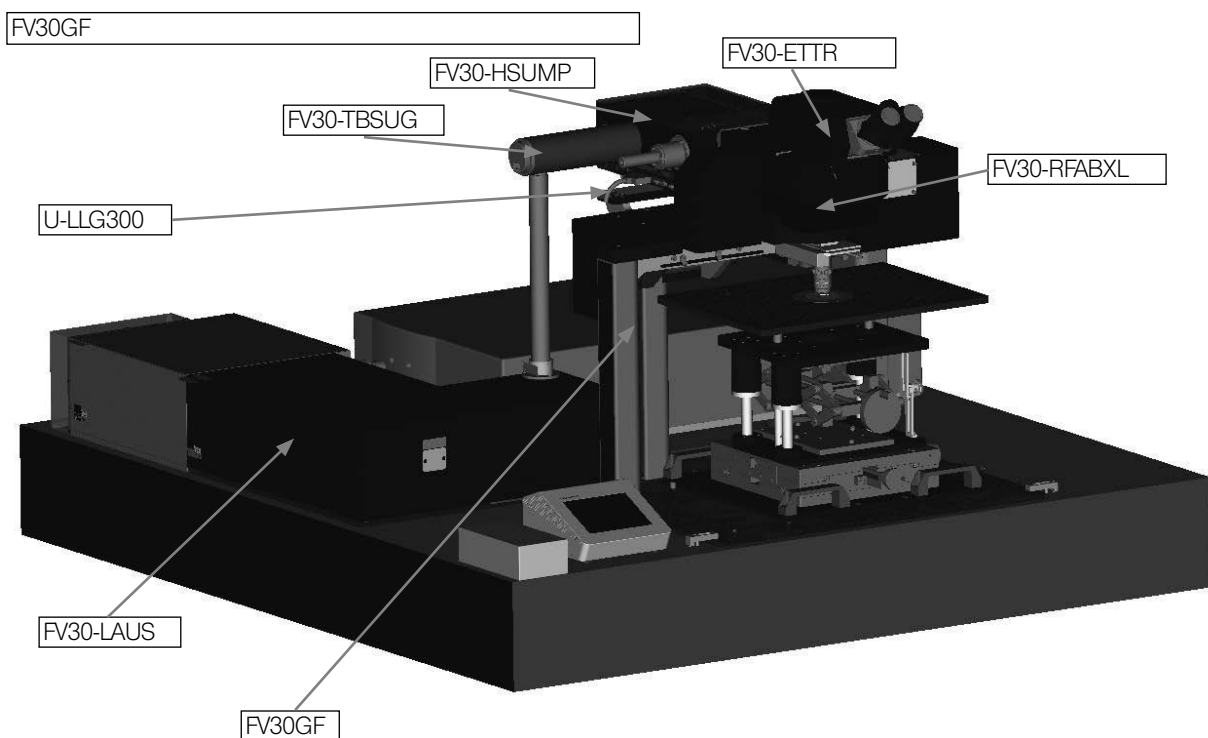
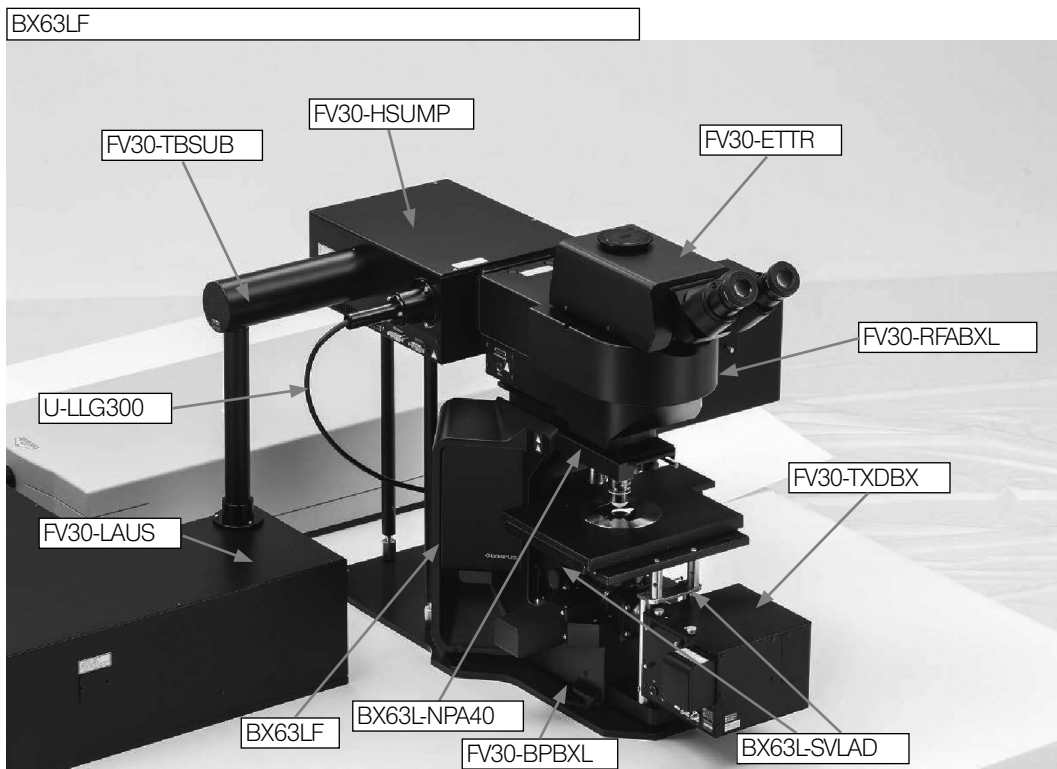


Twin laser system

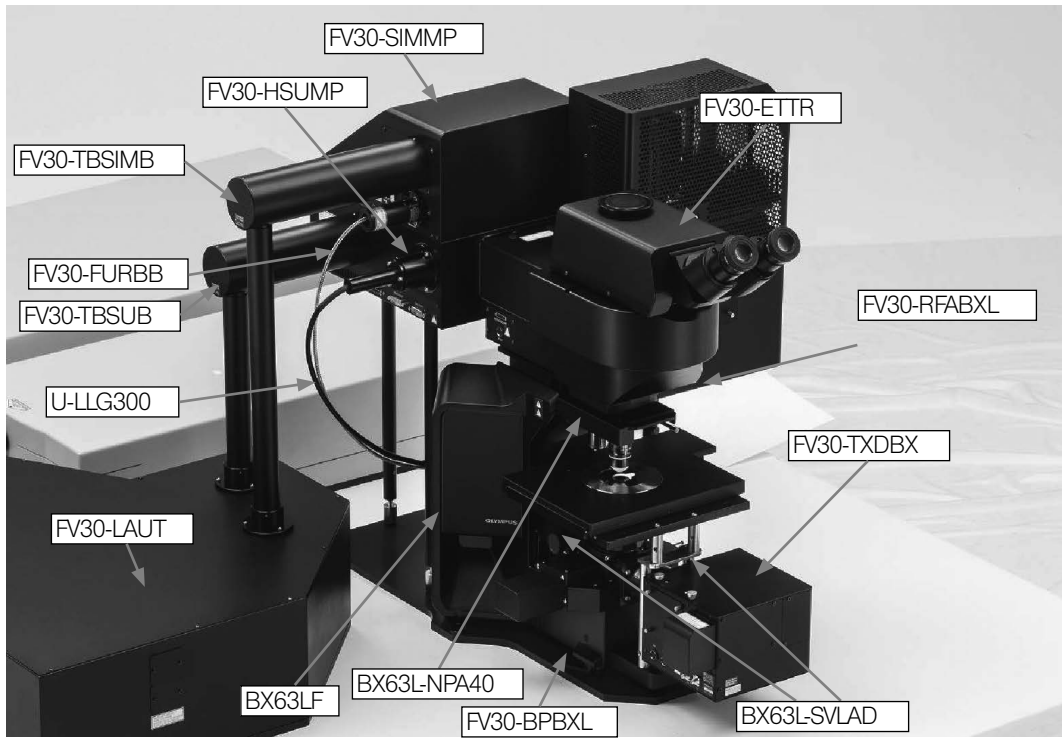
Dual lines system



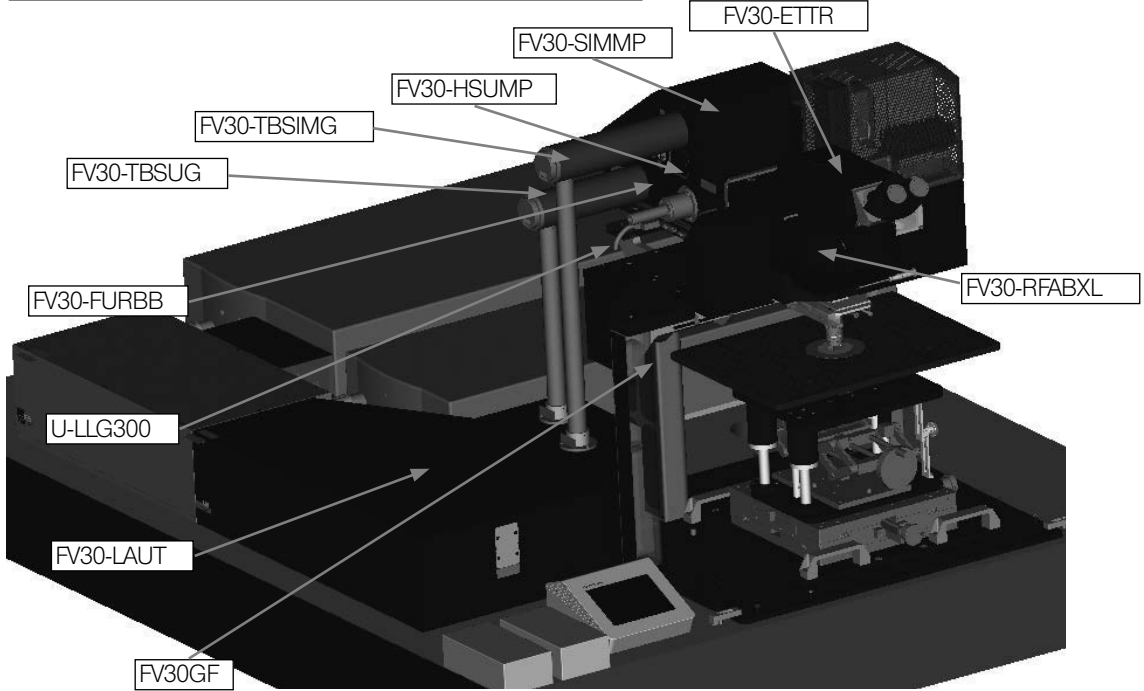
Microscope and scan unit



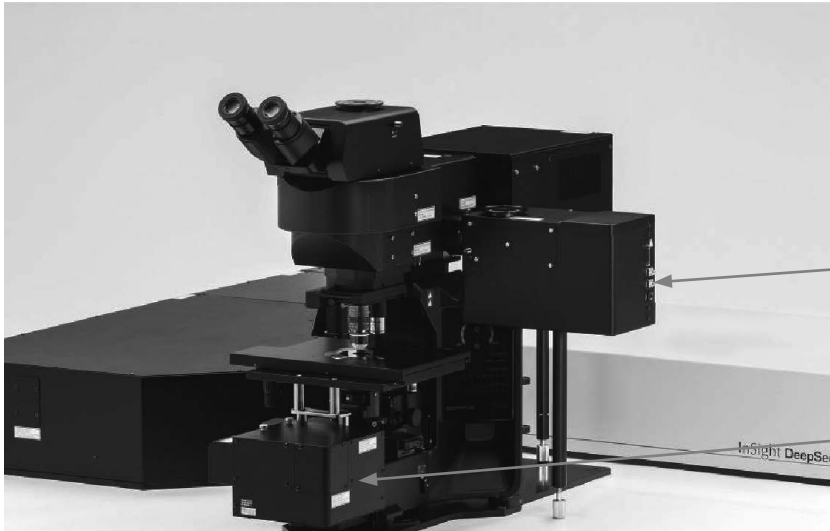
BX63LF



FV30GF

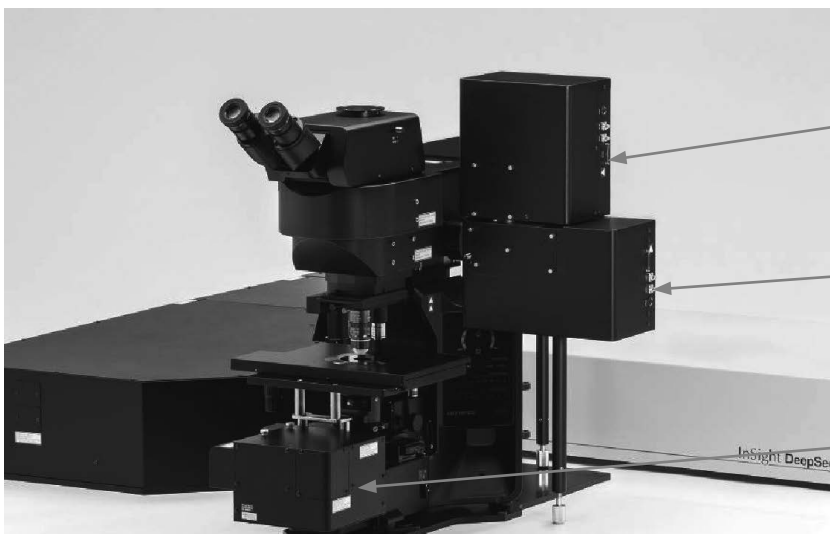


Detector



FV30-RXD

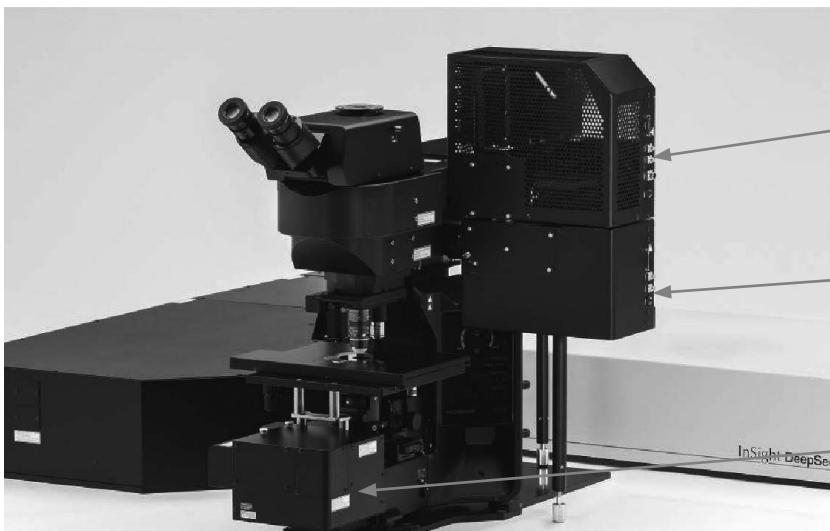
FV30-TXDBX



FV30-ARXD

FV30-RXD

FV30-TXDBX



FV30-AGAPD

FV30-RXD

FV30-TXDBX

Detail view

FV30-HSUMP



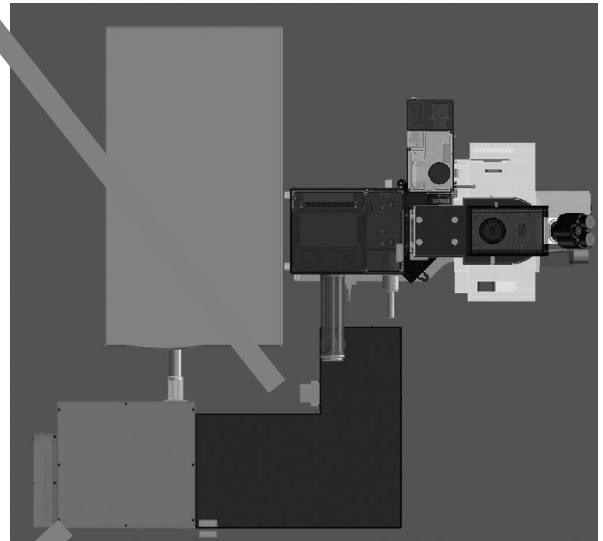
· FV30-SIMMP



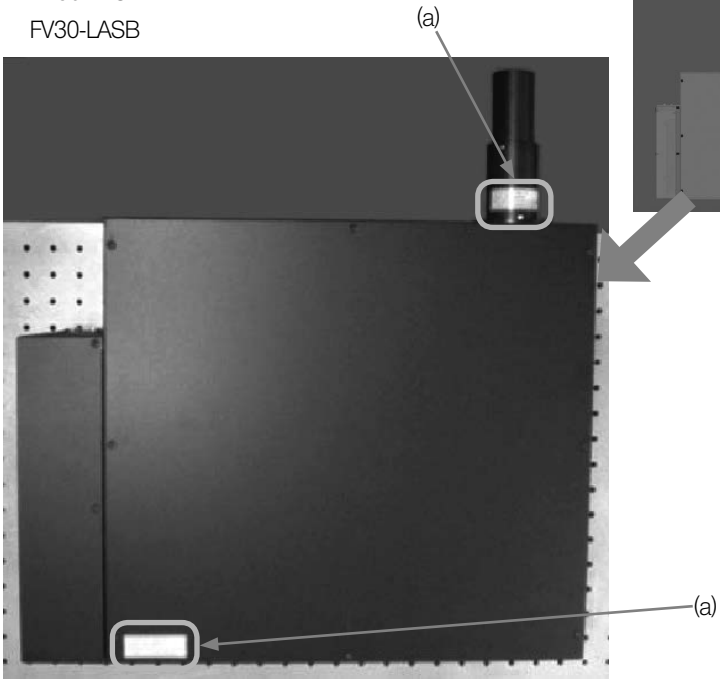
FV30-LAUS



One laser system



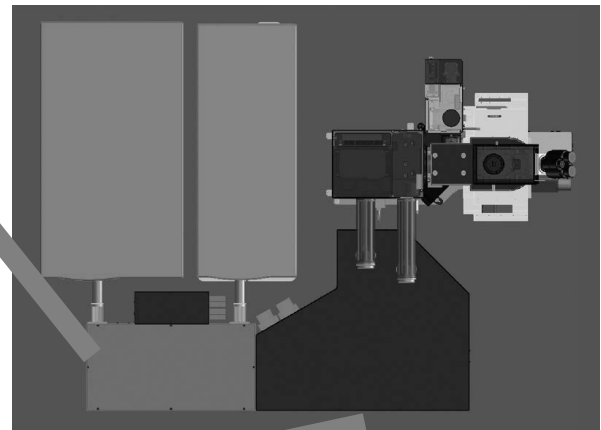
FV30-LASA
FV30-LASB



FV30-LATAA
FV30-LATAB



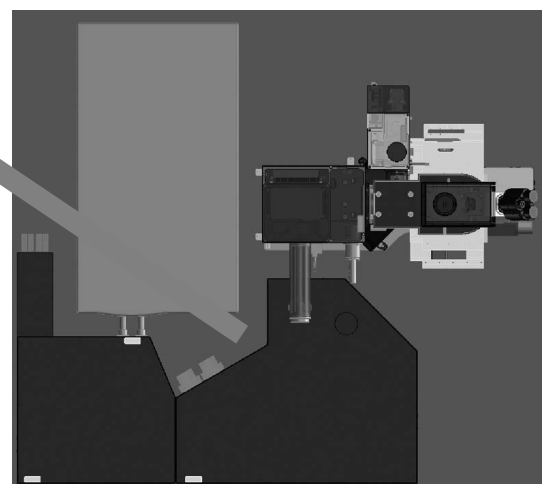
Twin laser system



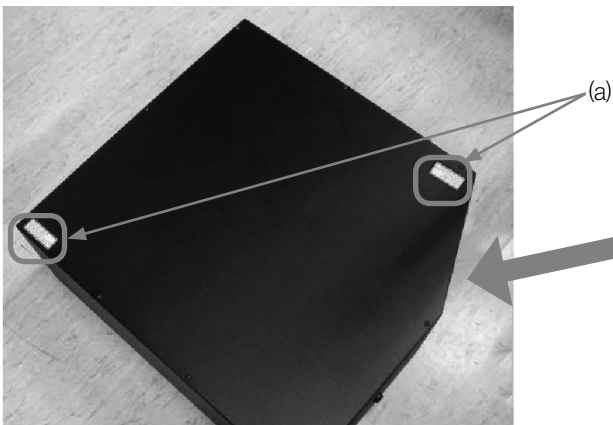
FV30-LAUT



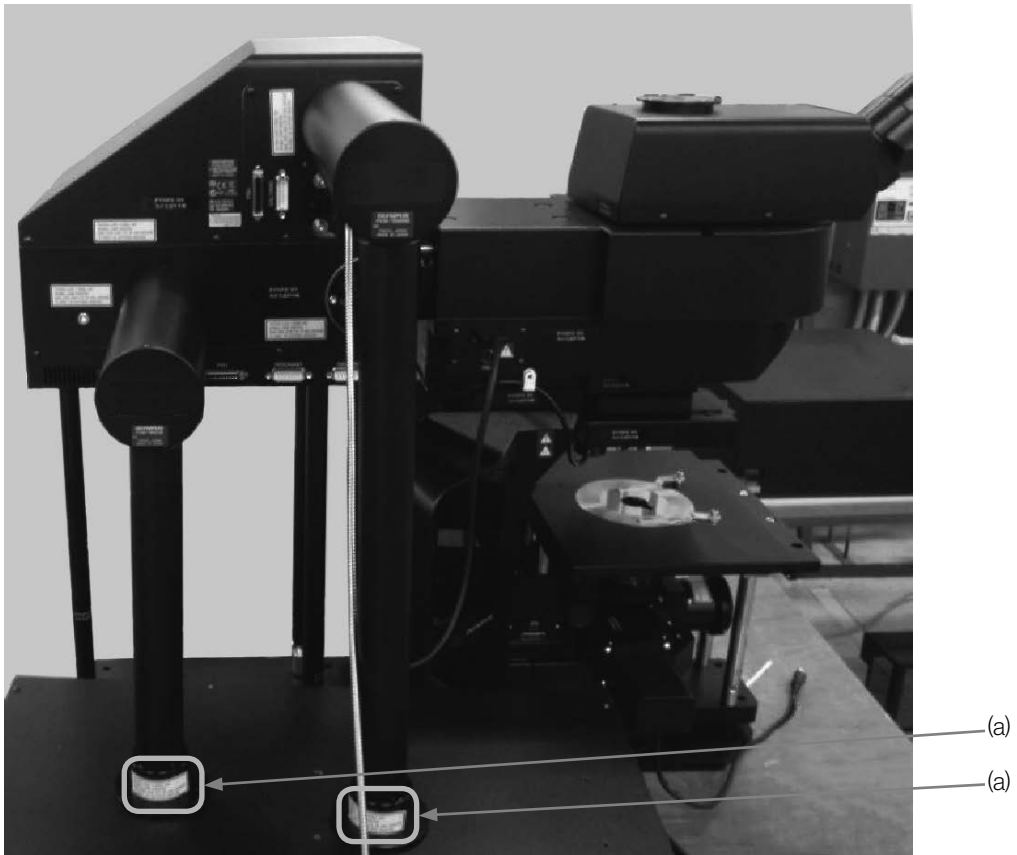
Dual lines system



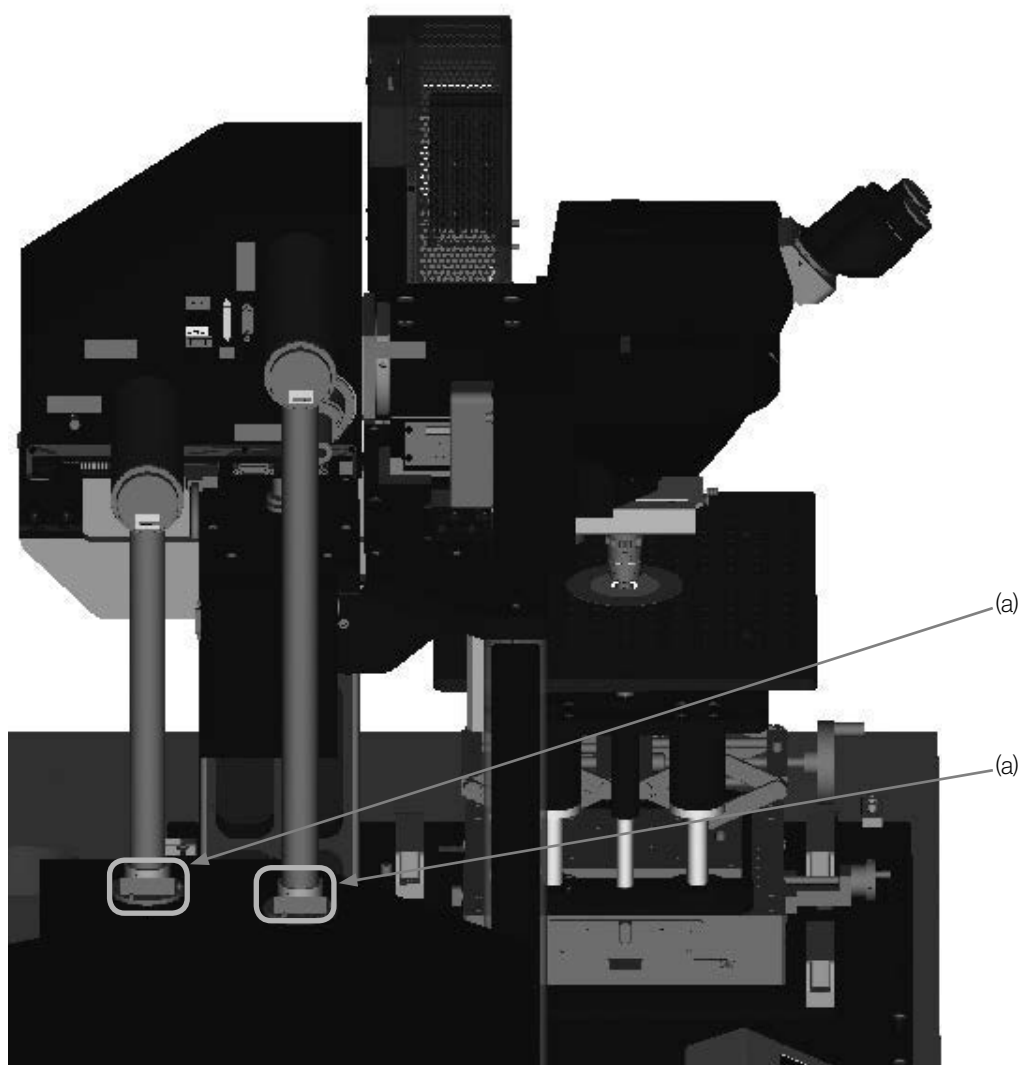
FV30-LADAB



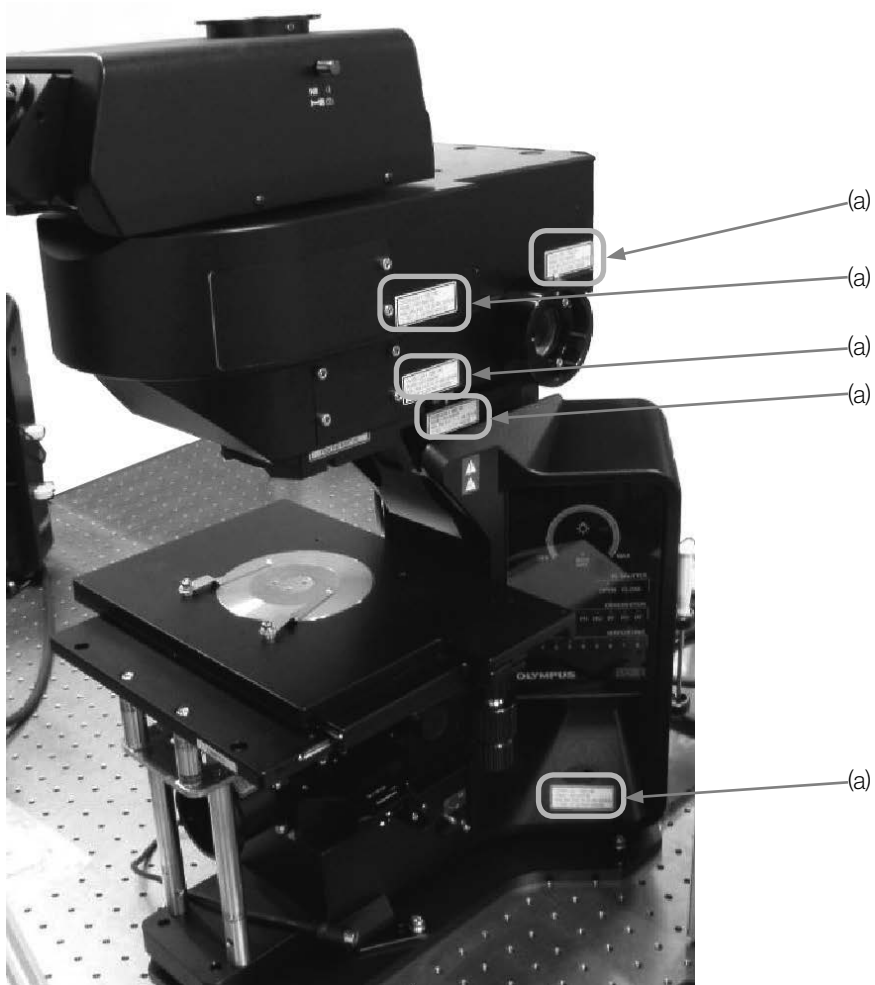
- FV30-TBSUB
- FV30-TBSIMB



FV30-TBSUG
FV30-TBSIMG

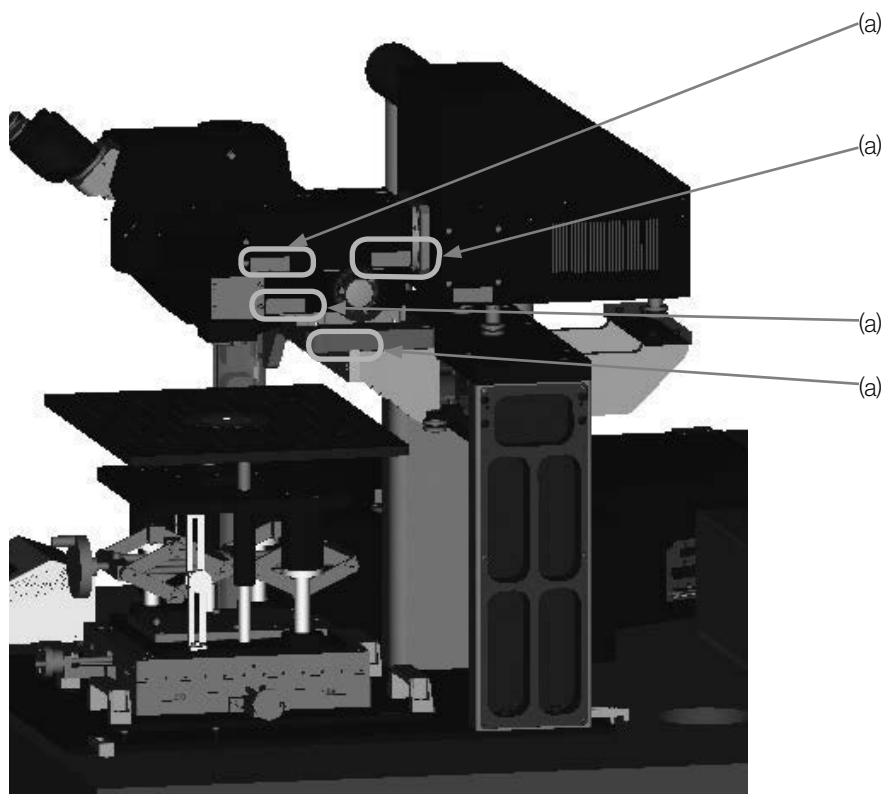


· FV30-RFABXL
BX63LF

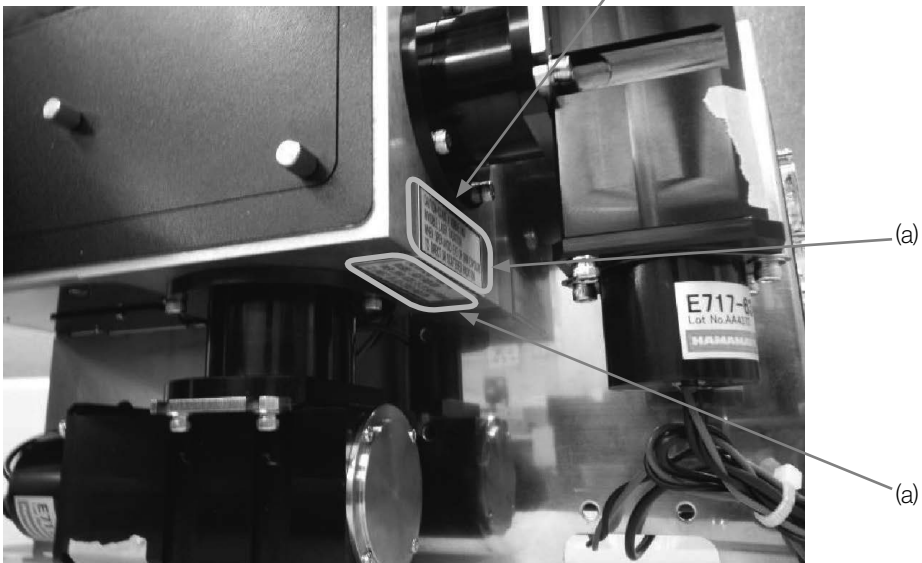
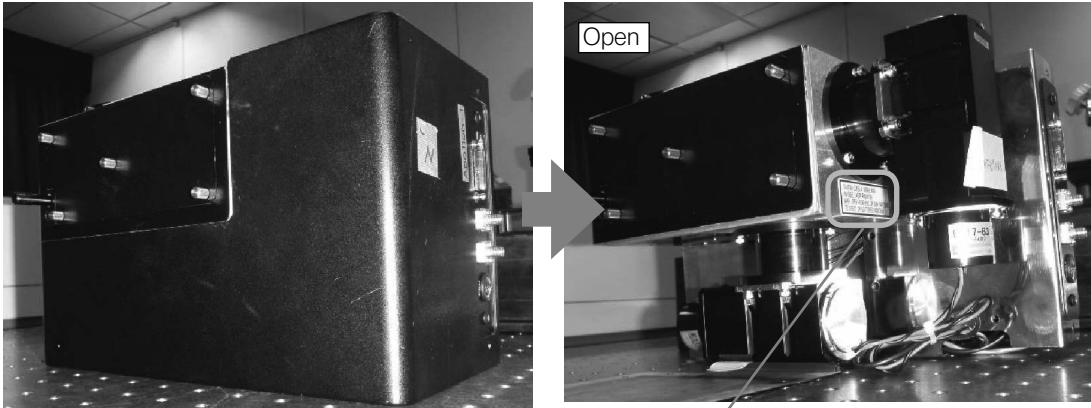


· FV30-RFABXL

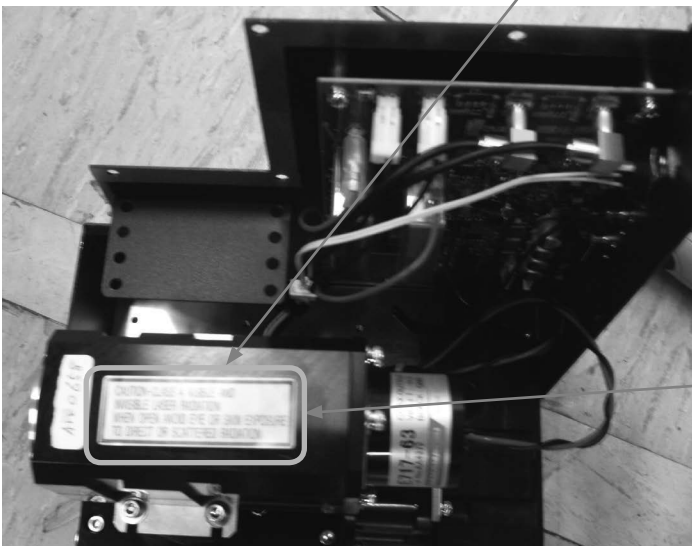
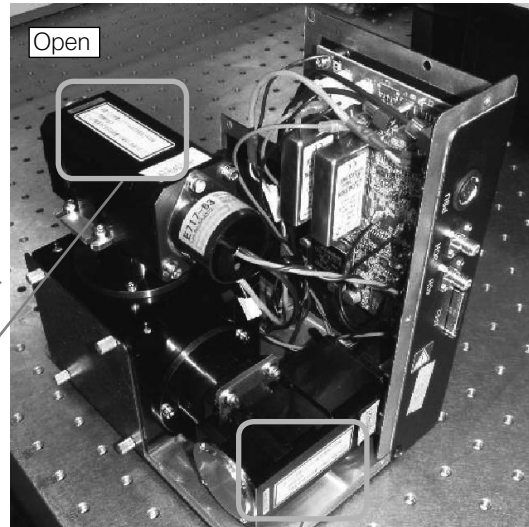
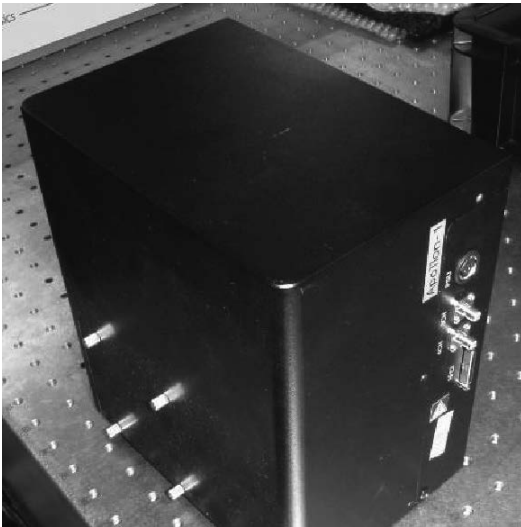
FV30GF



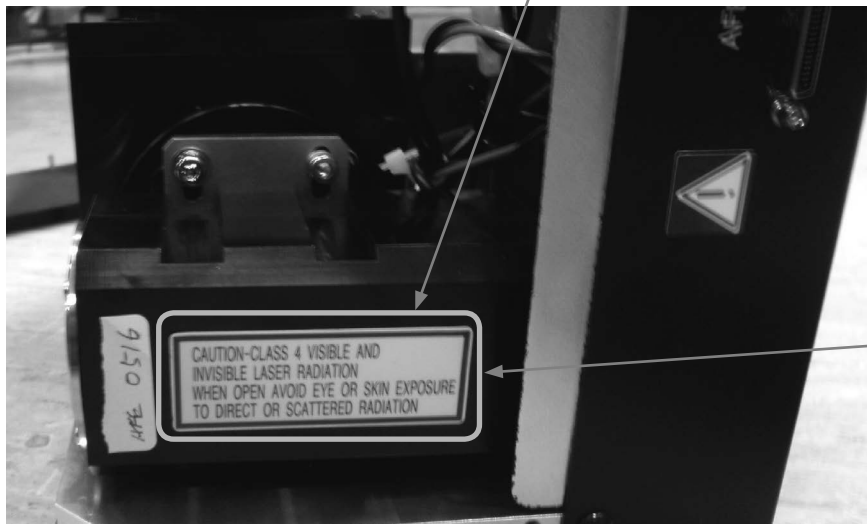
FV30-RXD



FV30-ARXD

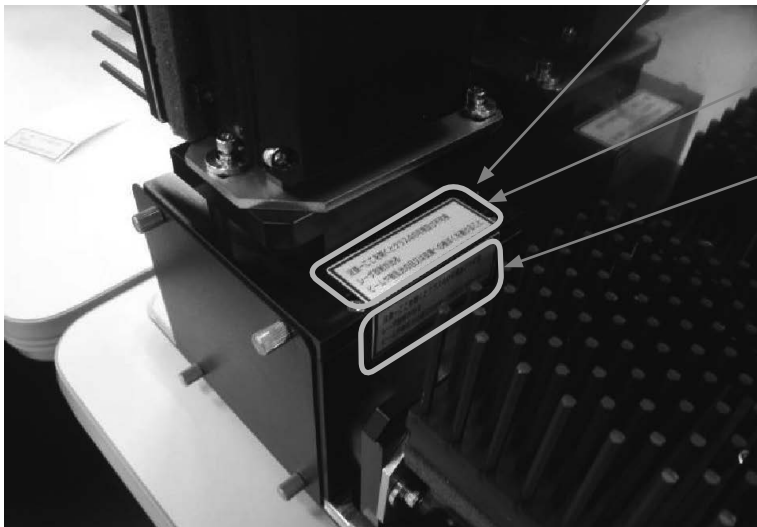
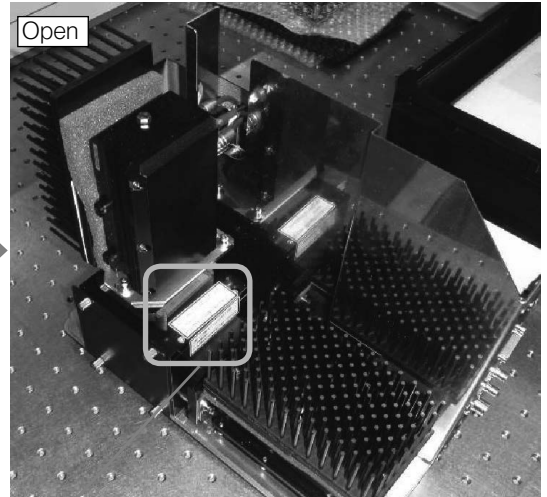
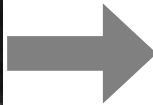


(a)



(a)

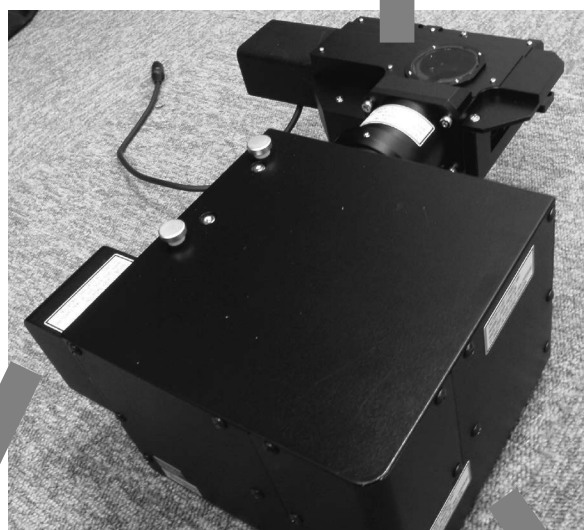
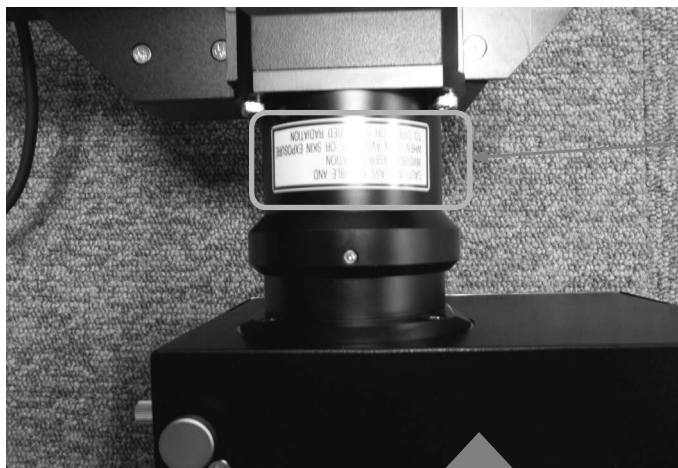
FV30-AGAPD



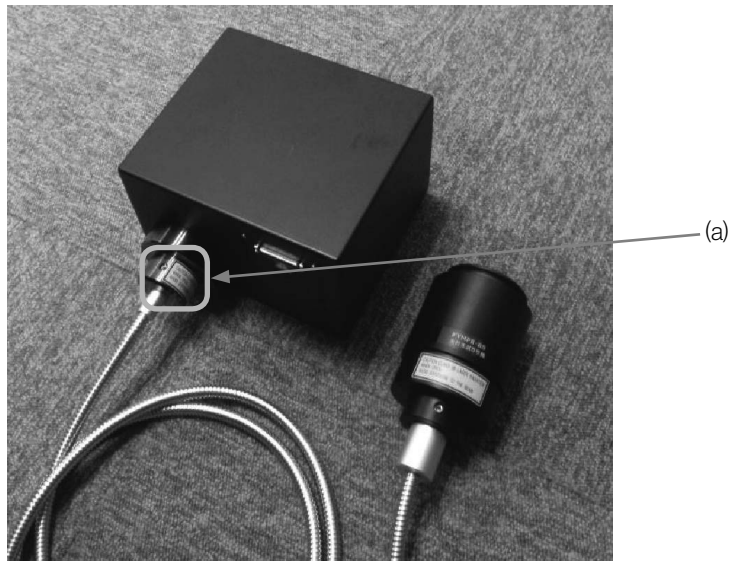
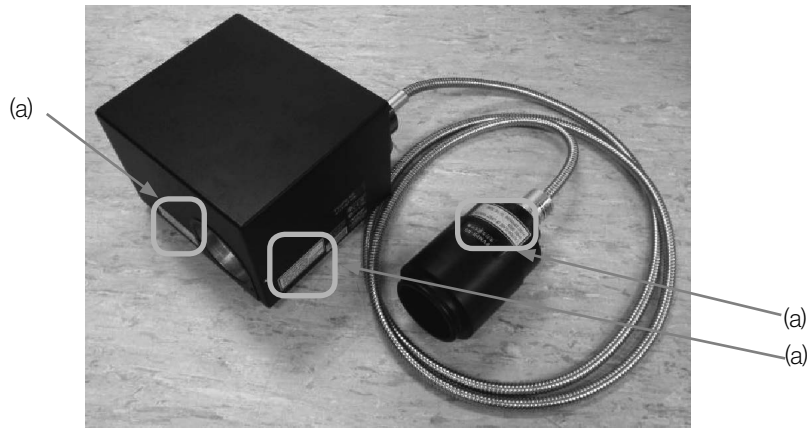
(a)

(a)

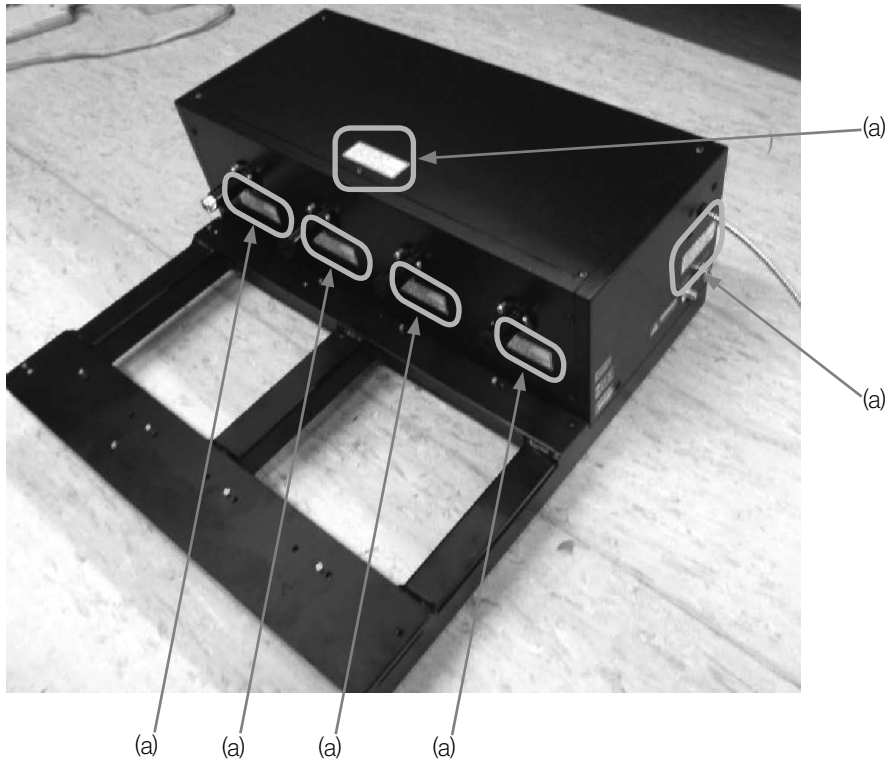
FV30-TXDBX



FV30-TD



- FV30-COMB4



- FV30-ADP405
- FV30-ADP458
- FV30-ADP588



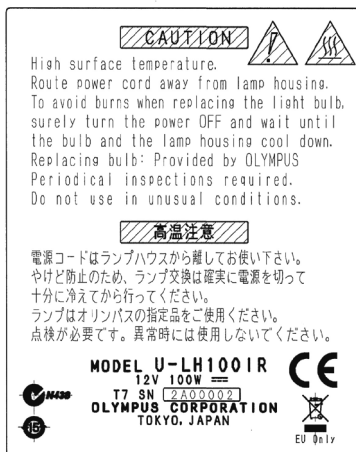
· FV30-FURBB



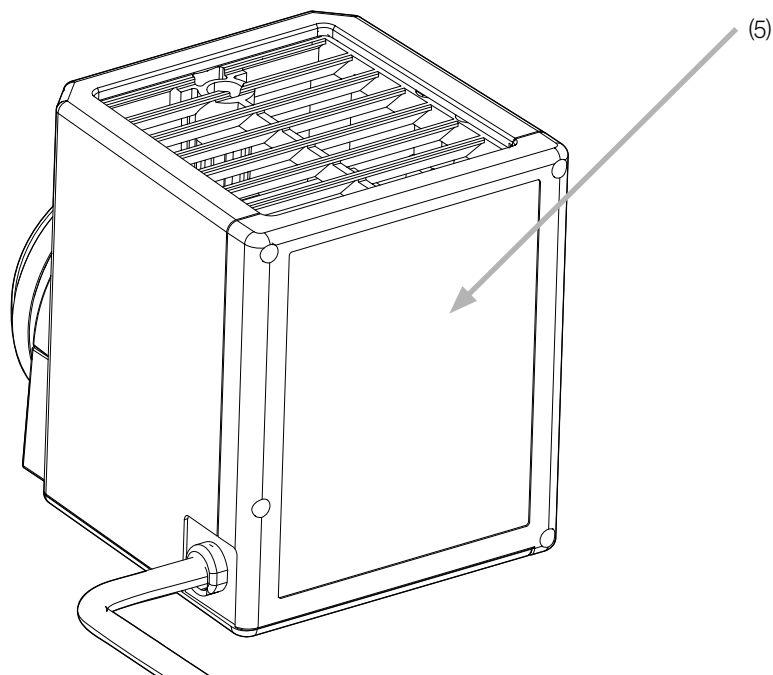
(b)

2-2 Heat safety warning label

(5)



U-LH100IR



(6)

CAUTION 

High surface temperature.
Route power cord away from lamp housing.
To avoid burns when replacing the light bulb, surely turn the power OFF and wait until the bulb and the lamp housing cool down.
Replacing bulb: Provided by OLYMPUS
Periodical inspections required.
Do not use in unusual conditions.

高温注意

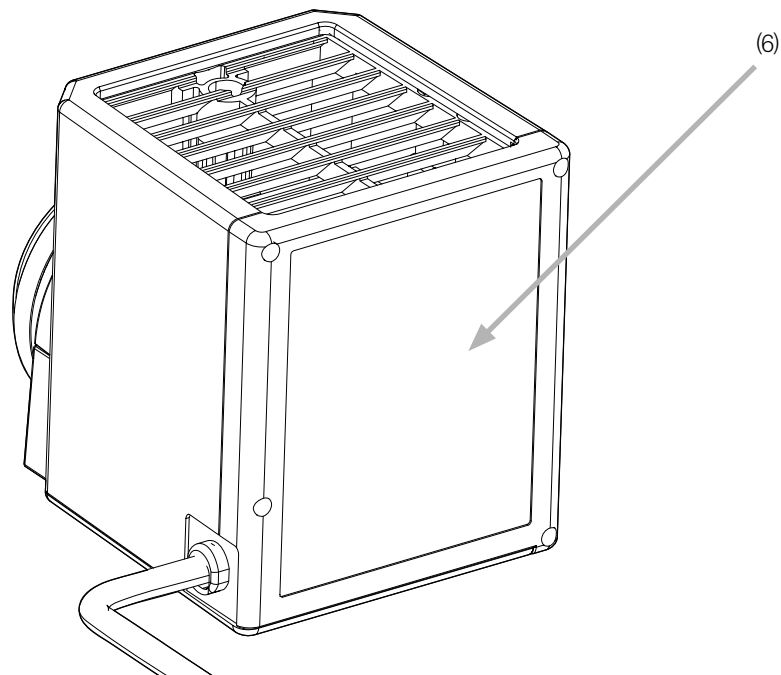
電源コードはランプハウスから離してお使い下さい。
やけど防止のため、ランプ交換は確実に電源を切って十分に冷えてから行ってください。
ランプはオリンパスの指定品をご使用ください。
点検が必要です。異常時には使用しないでください。

MODEL U-LH100-3
12V 100W

 17 SN
OLYMPUS CORPORATION
TOKYO, JAPAN

 
EU Only

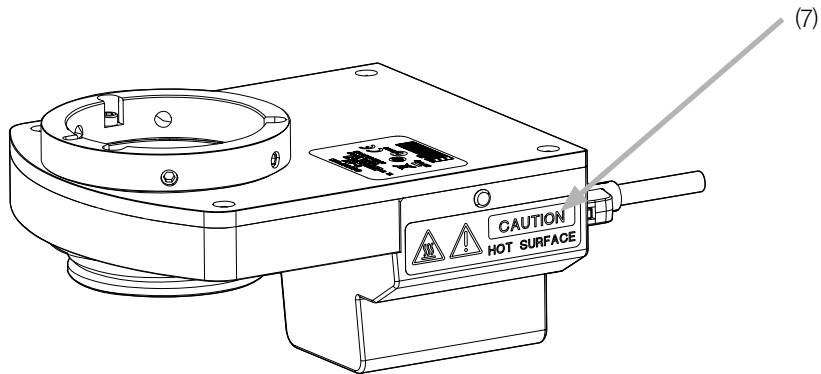
U-LH100



(7)



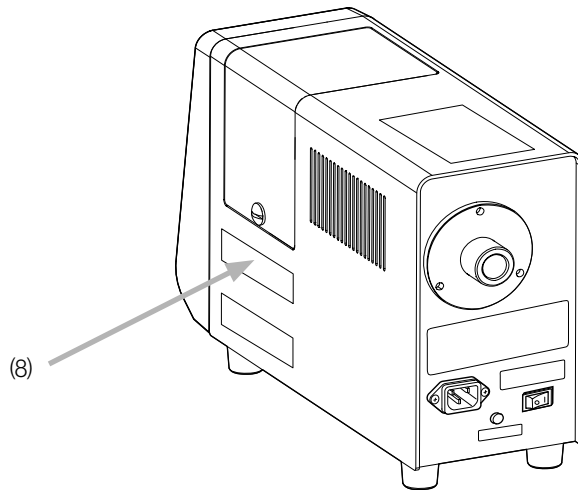
U-AW



(8)

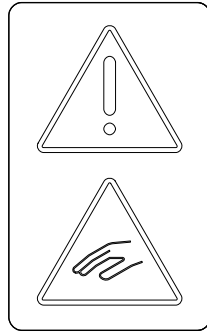
	高温注意 ランプ交換は、電源を切った後、十分に冷えてから行ってください。
	CAUTION HOT Turn the power off and wait until cooled down well before changing the lamp.

U-HGLGPS

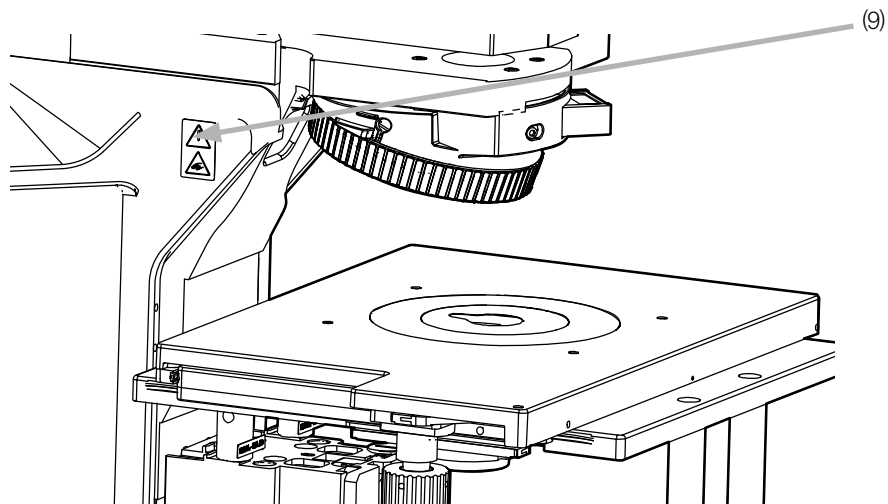
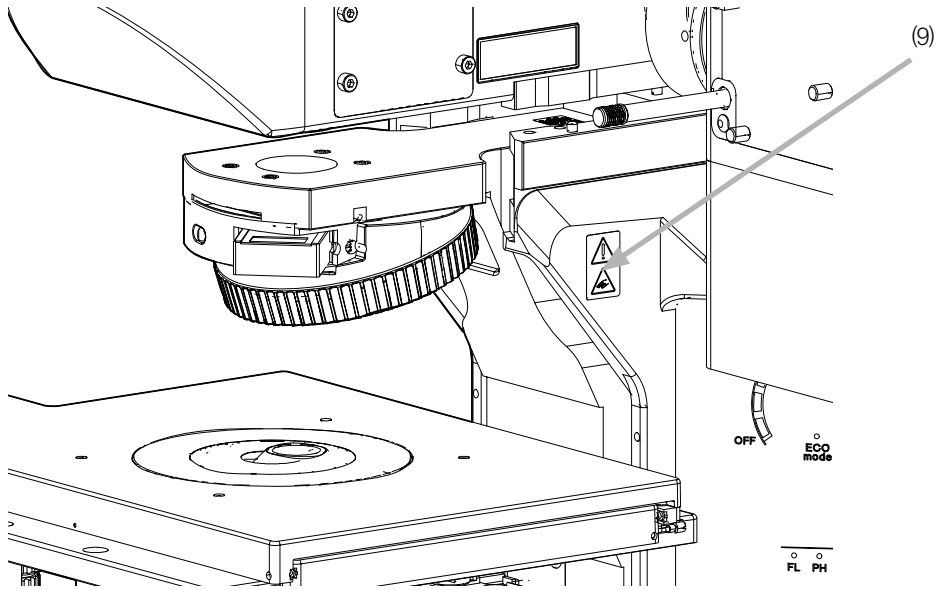


2-3 Finger safety warning label

(9)



BX63LF



Though protection bin labels are attached to other places than the places indicated in this manual, the said labels are intended for our service personnel.

CAUTION In case the warning label is blurred or peeled off and, if it should be replaced or if you need help, contact our local sales office immediately.

3 Specifications

3-1 Specifications of units

- Dimensions and weights

Unit		Specifications
FV30-COMB4	Dimensions (mm)	400 (Depth) X 402 (Width) X 200 (Height)
	Weight	12.4 kg
BX63LF	Dimensions (mm)	Microscope frame: 294.4 (Depth) X 413.2 (Width) X 347.5 (Height) Touch panel controller: 211 (Depth) X 190 (Width) X 105 (Height)
	Weight	Microscope frame: 11 kg Touch panel controller: 2.4 kg
FV30GF	Dimensions (mm)	702 (Depth) X 840 (Width) X 637.3 (Height)
	Weight	46 kg
FV30-GFSP	Dimensions (mm)	490 (Depth) X 360 (Width) X 12 (Height)
	Weight	6.5 kg
FV30-GFYST	Dimensions (mm)	300 (Depth) X 300 (Width) X 40 (Height)
	Weight	17 kg
FV30-GFZST	Dimensions (mm)	300 (Depth) X 300 (Width) X 332.8 (Height)
	Weight	14 kg
FV30-GFRMP	Dimensions (mm)	430 (Depth) X 417.5 (Width) X 10 (Height)
	Weight	5 kg
FV10-TLID	Dimensions (mm)	Ø 73.2 X 66 (Height)
	Weight	0.5 kg
BX63L-CBH	Dimensions (mm)	294.5 (Depth) X 100 (Width) X 214 (Height)
	Weight	4.2 kg
U-MCZ	Dimensions (mm)	110.5 (Depth) X 203.1 (Width) X 97.2 (Height)
	Weight	2.1 kg
BX63L-NPA40	Dimensions (mm)	Nosepiece arm unit: 186.5 (Depth) X 83 (Width) X 218.3 (Height) Condenser rising unit: 66 (Depth) X 71 (Width) X 48 (Height) Illuminator rising unit: 143 (Depth) X 88 (Width) X 44 (Height) FVCOVER unit: 114.5 (Depth) X 112 (Width) X 19.5 (Height)
	Weight	2.44 kg
BX63L-D6RES	Dimensions (mm)	139.6 (Depth) X 107 (Width) X 48.2 (Height)
	Weight	0.68 kg
BX63L-READ	Dimensions (mm)	Ø 60 X 22.8 (Height)
	Weight	0.1 kg
BX63L-DSGNPS	Dimensions (mm)	110.2 (Depth) X 90 (Width) X 81.8 (Height)
	Weight	0.43 kg
BX63L-DSLNP	Dimensions (mm)	164 (Depth) X 97 (Width) X 58 (Height)
	Weight	0.61 kg
U-FDICTIR	Dimensions (mm)	45.5 (Depth) X 41.6 (Width) X 39 (Height)
	Weight	0.025 kg
U-AW	Dimensions (mm)	147.5 (Depth) X 119 (Width) X 77.5 (Height)
	Weight	1.1 kg

Unit		Specifications
BX63L-SVLAD	Dimensions (mm)	Long pillar unit: Ø 16 X 200.4 (Height) Middle pillar unit: Ø 16 X 160.4 (Height) Short pillar unit: Ø 16 X 46 (Height)
	Weight	Long pillar unit: 0.3 kg Middle pillar unit: 0.23 kg Short pillar unit: 0.04 kg
XLPLN25XWMP2	Dimensions (mm)	Ø 35.5 X 72.9 (Height)
	Weight	0.28 kg
XLPLN25XSMP2	Dimensions (mm)	Ø 35.5 X 75 (Height)
	Weight	0.454 kg
XLSLPLN25XSMP2	Dimensions (mm)	Ø 39 X 75 (Height)
	Weight	0.5 kg
FV30-PZNADP	Dimensions (mm)	55 (Depth) X 121 (Width) X 15.7 (Height)
	Weight	0.65 kg
FV30-PCIB	Dimensions (mm)	224 (Depth) X 127 (Width) X 22 (Height)
	Weight	0.185 kg
FV30-PSU	Dimensions (mm)	510 (Depth) X 426 (Width) X 332 (Height)
	Weight	19.7 kg
FV30-ANALOG	Dimensions (mm)	258.2 (Depth) X 426 (Width) X 137.9 (Height)
	Weight	5.6 kg
FV30-RFABXL	Dimensions (mm)	380 (Depth) X 188 (Width) X 156 (Height)
	Weight	8.1 kg
FV30-ETTR	Dimensions (mm)	340 (Depth) X 150 (Width) X 103 (Height)
	Weight	4.3 kg
FV30-STB4MP	Dimensions (mm)	Connection flange unit: 90 (Depth) X 130 (Width) X 23.8 (Height) Stand unit: Ø 20 X 409 ± 10 (Height)
	Weight	1.5 kg
FV30-BPBXL	Dimensions (mm)	697.7 (Depth) X 284 (Width) X 10 (Height)
	Weight	4.2 kg
FV30-HSUMP	Dimensions (mm)	535 (Depth) X 370 (Width) X 125 (Height)
	Weight	9.77 kg
FV30-SIMMP	Dimensions (mm)	320 (Depth) X 240 (Width) X 153 (Height)
	Weight	4.8 kg
FV30-TD	Dimensions (mm)	Transmitted detector unit: 148.6 (Depth) X 170 (Width) X 124 (Height) Collimating lens unit: Ø 68 X 112 (Height) Light guide unit: 2000 ± 20
	Weight	4.02 kg
FV30-RXD	Dimensions (mm)	130 (Depth) X 272 (Width) X 171 (Height)
	Weight	5.32 kg
FV30-ARXD	Dimensions (mm)	130 (Depth) X 190 (Width) X 212 (Height)
	Weight	3.26 kg
FV30-AGAPD	Dimensions (mm)	134 (Depth) X 247 (Width) X 212 (Height)
	Weight	5.5 kg

Unit		Specifications
FV30-TXDBX	Dimensions (mm)	333 (Depth) X 288 (Width) X 133 (Height)
	Weight	5.2 kg
FV30-LCU	Dimensions (mm)	510 (Depth) X 426 (Width) X 194 (Height)
	Weight	14 kg
FV30-FURBB	Dimensions (mm)	Coupling lens unit: Ø 24 X 63.5 (Length) Fiber unit: Ø 5.8 X 3000 (Length) Collimating lens unit: Ø 47 X 118 (Length)
	Weight	0.46 kg
FV30-ADM800	Dimensions (mm)	38.5 (Depth) X 51 (Width) X 42 (Height)
	Weight	0.05 kg
FV30-ADMOPT	Dimensions (mm)	38.5 (Depth) X 51 (Width) X 42 (Height)
	Weight	0.045 kg
FV30-NDM690	Dimensions (mm)	38.5 (Depth) X 51 (Width) X 42 (Height)
	Weight	0.05 kg
FV30-NDM760	Dimensions (mm)	38.5 (Depth) X 51 (Width) X 42 (Height)
	Weight	0.05 kg
FV30-NDMVCOIR	Dimensions (mm)	38.5 (Depth) X 51 (Width) X 42 (Height)
	Weight	0.05 kg
FV30-BA750RXD	Dimensions (mm)	13 (Depth) X 63.2 (Width) X 39 (Height)
	Weight	0.025 kg
FV30-BA750TXD	Dimensions (mm)	20 (Depth) X 64 (Width) X 44 (Height)
	Weight	0.065 kg
FV30-DIC900	Dimensions (mm)	IR polarizer unit: 50 (Depth) X 73.75 (Width) X 14.3 (Height) Filter unit: 36 (Depth) X 86.3 (Width) X 12.5 (Height)
	Weight	0.06 kg
FV30-SDM-M	Dimensions (mm)	45.5 (Depth) X 37 (Width) X 54.7 (Height)
	Weight	0.085 kg
FV30-SDM570	Dimensions (mm)	45.5 (Depth) X 37 (Width) X 54.7 (Height)
	Weight	0.085 kg
FV30-SDMOPT	Dimensions (mm)	45.5 (Depth) X 37 (Width) X 54.7 (Height)
	Weight	0.080 kg
FV30-FVG	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.11 kg
FV30-FCY	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.11 kg
FV30-F475R	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.11 kg
FV30-FGR	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.11 kg
FV30-FRCY5	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.11 kg
FV30-FOPT	Dimensions (mm)	51.5 (Depth) X 43 (Width) X 43 (Height)
	Weight	0.1 kg

Unit		Specifications
FV30-LAUS	Dimensions (mm)	580 (Depth) X 565 (Width) X 180 (Height)
	Weight	15.5 kg
FV30-LAUT	Dimensions (mm)	750 (Depth) X 635 (Width) X 180 (Height)
	Weight	30.5 kg
FV30-LCUMP	Dimensions (mm)	510 (Depth) X 426 (Width) X 195 (Height)
	Weight	13.6 kg
FV30-LASA	Dimensions (mm)	457 (Depth) X 355 (Width) X 180 (Height)
	Weight	13 kg
FV30-LASB	Dimensions (mm)	457 (Depth) X 355 (Width) X 180 (Height)
	Weight	13 kg
FV30-LATAA	Dimensions (mm)	595 (Depth) X 416 (Width) X 180 (Height)
	Weight	20 kg
FV30-LATAB	Dimension (mm)	595(Depth) X 416 (Width) X 180 (Height)
	Weight	20 kg
FV30-LADAB	Dimensions (mm)	492 (Depth) X 717 (Width) X 180 Height)
	Weight	21 kg
FV30-TBSUB	Dimensions (mm)	70 (Depth) X 249 (Width) X 343 (Height)
	Weight	1.2 kg
FV30-TBSUG	Dimensions (mm)	69 (Depth) X 250 (Width) X 443 (Height)
	Weight	1.3 kg
FV30-TBSIMB	Dimensions (mm)	70 (Depth) X 299 (Width) X 487 (Height)
	Weight	1.5 kg
FV30-TBSIMG	Dimensions (mm)	69 (Depth) X 250 (Width) X 587 (Height)
	Weight	1.6 kg
FV30-EXDCU	Dimensions (mm)	244 (Depth) X 135 (Width) X 43 (Height)
	Weight	0.94 kg
FV30-ADP405	Dimensions (mm)	Adapter for laser: 185 (Depth) X 70 (Width) X 146 (Height) Alignment: 70 (Depth) X 70 (Width) X 100 (Height)
	Weight	Adapter for laser: 1.06 kg Alignment: 0.34 kg
FV30-ADP458	Dimensions (mm)	Adapter for laser: 185 (Depth) X 70 (Width) X 146 (Height) Alignment: 70 (Depth) X 70 (Width) X 100 (Height)
	Weight	Adapter for laser: 1.06 kg Alignment: 0.34 kg
FV30-ADP588	Dimensions (mm)	Adapter for laser: 185 (Depth) X 70 (Width) X 146 (Height) Alignment: 70 (Depth) X 70 (Width) X 100 (Height)
	Weight	Adapter for laser: 1.06 kg Alignment: 0.34 kg

- FVMPE-RS Power supply rating

Item	Name	Rating
FV30-PSU	Power supply and electronic control unit	AC 100-120 V/220-240 V 5.0 A/2.3 A 50/60 Hz
FV30-LCU	Laser control unit	AC 100-120 V/220-240 V 1.2 A/0.63 A 50/60 Hz
FV30-LCUMP	MPE laser control unit	AC 100-120 V/220-240 V 1.5 A/0.76 A 50/60 Hz
BX63L-CBH	Control box	AC 100-120 V/220-240 V 4.6 A/2.8 A 50/60 Hz
FV30GF	Gantry frame	AC 100-240 V 1.7 A 50/60 Hz (Rating of the touch panel controller)
BX63LF	BX63 frame for laser use	AC 100-240 V 1.7 A 50/60 Hz (Rating of the touch panel controller)
FV30-CUHMP	Control unit for hybrid scanner use	Refer to the specifications sheet provided with the FV30-CUHMP.
U-HGLGPS	Light source	AC 100-240 V 2.0 A 50/60 Hz

© For products not listed above, refer to the instruction manual provided with the product.

Item	Specifications
Laser radiation from the system	IR laser
	Visible laser
Operating environment	<ul style="list-style-type: none"> Wavelength: 680 to 1300 nm Maximum power: 8 W Pulse amplitude 40 fs to continuous wave Beam divergence angle (full angle): 0.2 to 2.25 rad (through the objective lens)
	<ul style="list-style-type: none"> Wavelength: 400 to 700 nm Maximum power: 500 mW Pulse amplitude continuous wave Beam divergence angle (full angle): 0.2 to 2.25 rad (through the objective lens)
Operating environment	<ul style="list-style-type: none"> Indoor use Altitude: Max. 2,000 meters Ambient temperature: 20 to 25 °C Fluctuation range ± 1 °C Relative humidity: 30 to 75 % Supply voltage fluctuations: Not to exceed ± 10 % of the normal voltage. Pollution degree: 2 (in accordance with IEC60664-1) Installation/Overvoltage category: II (in accordance with IEC60664-1)

CAUTION To extend the service life of this system, avoid using it in the following environments.

- In a place with excessive dust or dirt
Dust and dirt taken in the oscillator may lead to failure. Clean this system and peripherals periodically to avoid accumulation of dust.
- In a place where the temperature is low or high, or where the humidity is high
This includes, for example, a place that is near a water tap, hot-water heater, room humidifier, heater, stove and a place subject to water drops.
- In a place where humidity changes suddenly
When a cold room is heated quickly, moisture may condense on the equipment and could irreparably damage the optics.
- In a place subject to direct sunlight
- Outdoors
- In a place where a flammable gas is produced
- In a place with excessive vibrations
- On an unstable surface of floor or platform

3-2 Specifications of compatible lasers

- Visible laser

Unit		Specifications
OBIS 405 nm LX 50 mW laser system	Information to describe	Head output 50 mW liner polarization, 405 nm, continuous wave Beam divergence: 1.0 mrad
	Dimensions (mm)	Head: 70 (Depth) X 40 (Width) X 38 (Height) Power supply: 68 (Depth) X 105 (Width) X 36 (Height)
	Weight	Head: 0.2 kg Power supply: 0.3 kg
Sapphire 458-20 USB CDRH laser system	Information to describe	Head output 20 mW liner polarization, 458 nm, continuous wave Beam divergence: 1.2 mrad
	Dimensions (mm)	Head: 125 (Depth) X 70 (Width) X 34 (Height) Power supply: 196 (Depth) X 164 (Width) X 100 (Height)
	Weight	Head: 0.4 kg Power supply: 2 kg
Sapphire 588-20 USB CDRH laser system	Information to describe	Head output 20 mW liner polarization, 588 nm, continuous wave Beam divergence: 1.2 mrad
	Dimensions (mm)	Head: 125 (Depth) X 70 (Width) X 34 (Height) Power supply: 196 (Depth) X 164 (Width) X 100 (Height)
	Weight	Head: 0.4kg Power supply: 2 kg

- IR pulse laser

Unit	Wavelength
MAITAI HPDS-OL	690-1040 nm
MAITAI eHP-HPDS	690-1040 nm
InSight DS-OL	680-1300 nm
InSight DS Dual-OL	680-1300 nm , 1040 nm
Chameleon VisionI Olympus	690-1040 nm
Chameleon VisionII Olympus	680-1080 nm
Chameleon Vision S Olympus	690-1050 nm

© For detail specifications of the IR pulse laser, refer to the materials provided by COHERENT or Spectra-Physics.

© There are items which must be confirmed before starting or exiting the IR pulse laser. For details, refer to "2-5 Actions before the planned power outage or not in use for a long time" in "Operation / Maintenance Manual".

⊙ The table below shows the tolerance of the laser entering each port.

	FV30-HSUMP	FV30-SIMMP	
	IR port	IR port	Vis port
Applicable wavelength	700-1300 nm	700-1100 nm	400-650 nm
Tolerable power density	764 W/cm ² Converted to average power • Average power; 3 W x 2 • Pulse width; 40 fsec or more • Frequency; 80 ± 2 MHz • Beam diameter; Ø1 mm or more	382 W/cm ² Converted to average power • Average power; 3 W x 1 • Pulse width; 40 fsec or more • Frequency; 80 ± 2 MHz • Beam diameter; Ø1 mm or more	6.4 W/cm ² • Average Power; 50mW x 1 (CW) • Beam diameter; Ø1 mm or more
Applicable beam shape	Diameter; Ø1.50 - 4.2 mm Wavefront; IRI 300 mm or more Value on the pupil conjugated surface in the scan mirror, which is 131.5 mm apart from the edge surface of FV30-LPADP.	Diameter; Ø1.50 - 4.2 mm Wavefront; IRI 300 mm or more Value on the pupil conjugated surface in the scan mirror, which is 131.5 mm apart from the edge surface of FV30-LPADP.	Diameter; Ø1.50 - 4.2 mm Wavefront; IRI 300 mm or more Value on the pupil conjugated surface in the scan mirror, which is 194.5 mm apart from the edge surface of FV30-LPADP.
Incident position accuracy	Shift: 1 mm or less against the Ø8 hole of FV30-LPADP Tilt: 90 ± 0.6° against the surface to which FV30-LPADP is pushed.		

⊙ The tolerable power density is the value when the incident position accuracy is satisfied.

⊙ If you observe the direct beam of the laser with the transmitted detector (TD) when specifications mentioned in the table above are satisfied, you will get the concentric uneven image in which the center area is brighter and the area farther from the center becomes darker.

⊙ If you increase the laser power when the unevenness is displaced from the center, the laser may be radiated to the stopper area of the scan mirror, etc. and the system may be damaged. Therefore unless the unevenness is in the center, set the laser power to 1% or less of the tolerable power density mentioned above.

CAUTION

Do not use lasers which are not satisfied with above mentioned specifications. If they enter into this system, it may result in injury or damage to the system.

⊙ It is strongly recommended that customer selected laser(s) satisfy the requirements of 21CFR Part 1040.10 and IEC60825-1. Refer to the ANSI Z136.1 for safe use of lasers for guidance or the IEC TR 60825-14 User's Guide on using Class 4 lasers.

■ Proper selection of the power supply cord

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to “Specifications” and “Certified Cord” below;

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC(for 100-120V AC area) or , 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of the agencies listed in Table 1. In case you are unable to buy locally the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.




















Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA,	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		U.S.A.	UL	
Ireland	NSAI				

Table 2 HAR flexible cord

Approval organizations and cordage harmonization marking methods

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	<HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	<VDE>	<HAR>	30	10	10
Union Technique de l'Electricité (UTE)	USE	<HAR>	30	30	10
Instituto Italiano del Marchio di Qualita' (IMQ)	IEMMEQU	<HAR>	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	<HAR>	10	10	30
N.V. KEMA	KEMA-KEUR	<HAR>	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	<HAR>	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	<ÖVE>	<HAR>	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	<DEMKO>	<HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI>	<HAR>	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	<HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNED>	<HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	<HAR>	30	30	70
Instituto Portages da Qualidade (IPQ)	I np I	<HAR>	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	<HAR>	10	30	90
Elektriska Inspektoratet	SETI	<HAR>	10	30	90

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

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

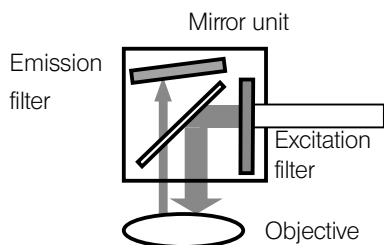
Operation / Maintenance Manual

Precautions and notes for glare prevention

== When excitation filter is removed from the fluorescence mirror unit ==

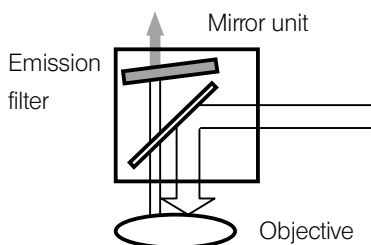
When the excitation filter is removed from the fluorescence mirror unit and attached on the excitation filter slider or excitation filter wheel on the side of the white lamp, **very glaring light (*1) may enter the eyepieces** in the following cases.

- ① When the illumination light from the white light lamp (*2) is input **without passing through an excitation filter**.
- ② When the illumination light from the white light lamp is input through **an excitation filter that does not match the mirror unit type**.



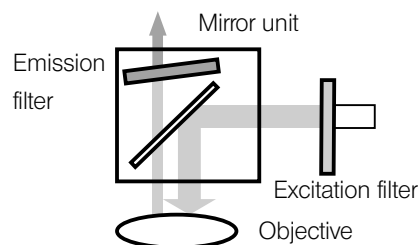
Ordinary mirror unit

Light transmitted through the excitation filter is blocked completely by the emission filter.



Case of ① above

Among the white light, only the light transmitted through the emission filter enters the observation light path.



Case of ② above

Light transmitted through the excitation filter is sometimes blocked incompletely by the emission filter.

To avoid this problem, be sure to observe the following points.

- CAUTION** · Before switching the mirror unit and excitation filter, be sure to close the shutter to shield the light of the white light lamp.
- Before opening the shutter to shield the light of the white light lamp, be sure to check the position index of the mirror unit to confirm that it matches the type of the excitation filter engaged in the illumination light path.

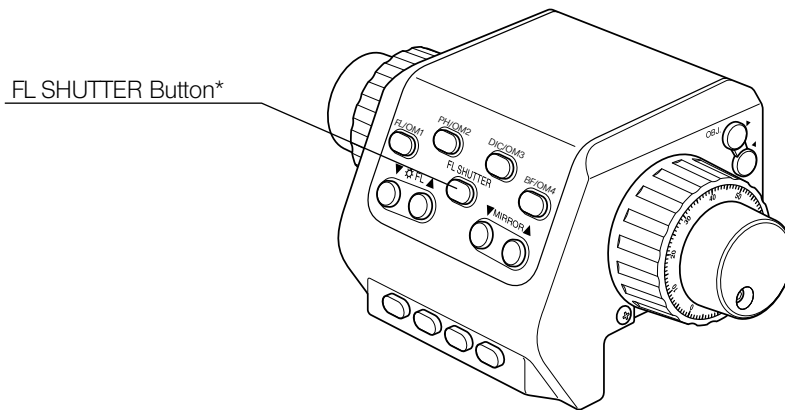
(*1) The light will not injure your eyes even if it enters your eyes. However, be sure to stop observation through the eyepieces, and engage the mirror unit and the excitation filter of appropriate combination in the light path to restart observation.

(*2) The white light lamp refers to all lamps for reflected light illumination including mercury and xenon burners.

- CAUTION** · Never use the above-mentioned mirror units ① and ② for the LSM observation.

Opening and closing of the shutter to shield the light of the white light lamp

By pushing the FL SHUTTER button on the attached controller, U-MCZ, you can switch between irradiation and blocking of the illumination light.



* The FL SHUTTER button opens/closes the reflected shutter only.

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1 System outline

1-1 Features of FVMPE-RS

- It is possible to perform high-speed observation using the resonant scanner.
- High definition can be achieved using the galvanometer scanner.
- It is possible to generate automatically a beam most suitable to the objective lens and laser wavelength, providing high efficiency and resolution imaging.
- The output pulse width of the objective lens is minimized by optimal pulse dispersion correction, thereby improving excitation efficiency, and making it possible to reduce damage to specimens and observe specimens at lower laser power.
- A high-sensitivity desiccated external NDD is installed near the objective lens, thus eliminating the need to use a confocal aperture and making it possible effectively detect even scattered fluorescence.
- Since the IR cut filter with high visible light transmission is installed on the detector side, the imaging with good S/N ratio is available.
- A high-speed shutter system with AOM (Acoustic-Optical Modulator) has been adopted, making it possible to reduce damage to specimens during observation.
- By using transmitted external NDD, it is possible not only to observe transmitted fluorescence but also to detect fluorescence and SHG light simultaneously.
- A high fluorescence detection ability and a high resolution in the deep part of the specimen are obtained by using the FVMPE-RS exclusive use objective lens equipped with high NA, wide field, and the spherical aberration correction function.

1-2 Features of each system

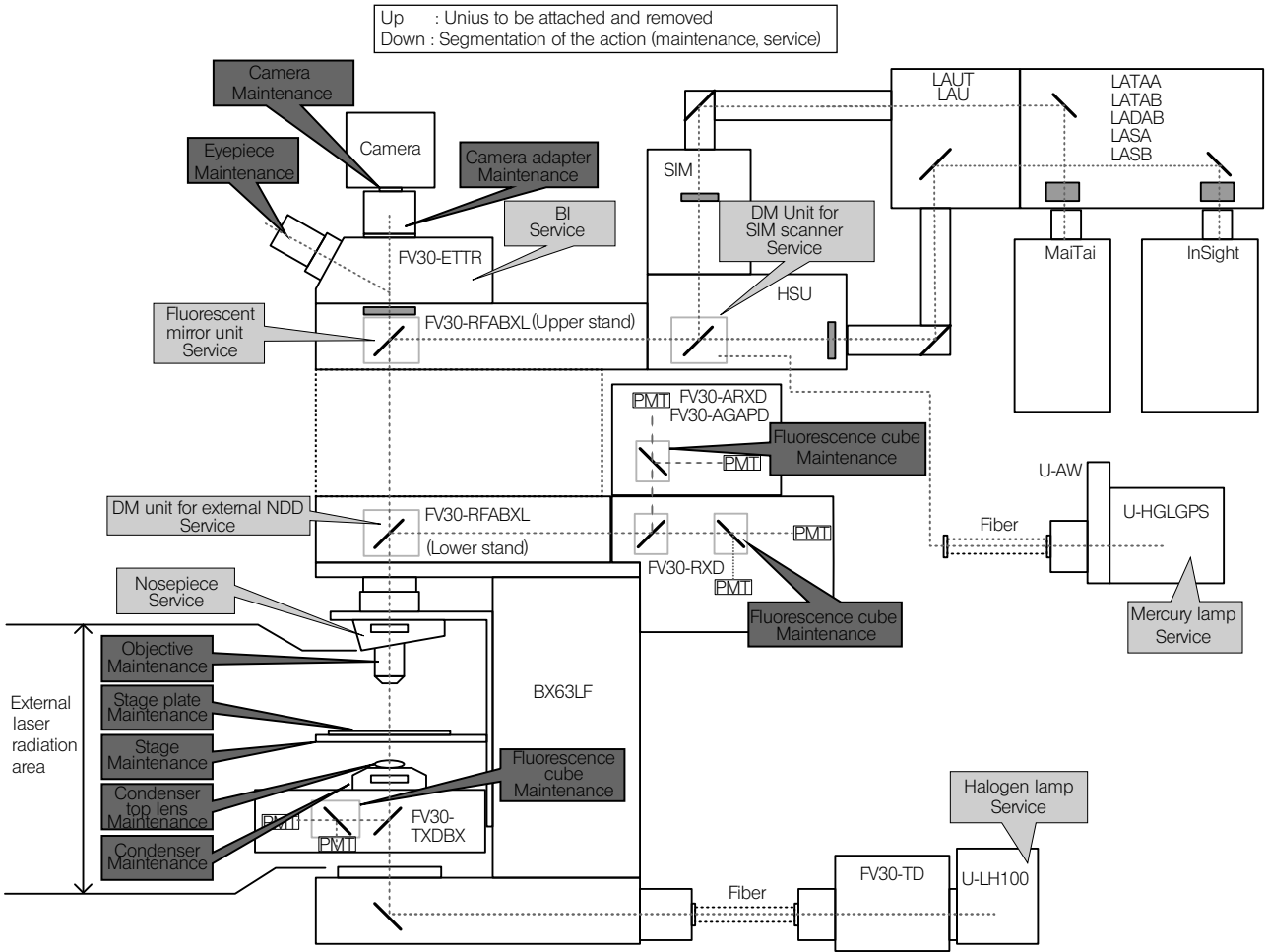
1 External NDD (Non-Descanned Detector) unit

The following four types of units are available depending on the combination of detection channels:

Combination units	Number of detection channels	Application
FV30-RXD	2	Multi-photon-excited reflected fluorescence observation
FV30-RXD, FV30-ARXD	4	Multi-photon-excited fluorescence observation
FV30-RXD, FV30-AGAPD	4	Multi-photon-excited fluorescence high-sensitivity observation
FV30-TD	1	Transmitted observation (Transmitted halogen lamp light source)
FV30-TXDBX	2	Multi-photon-excited transmitted fluorescence observation SHG/THG observation

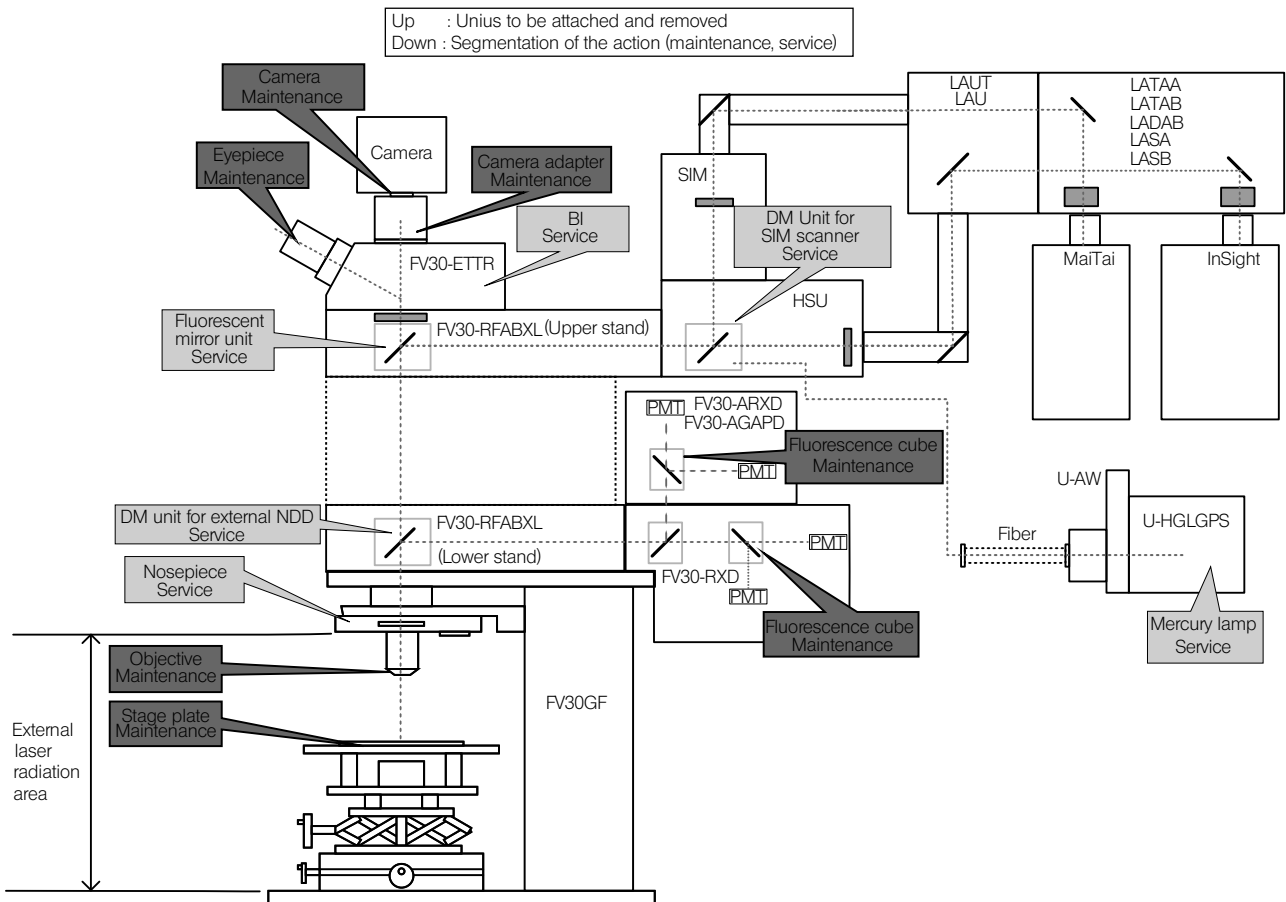
1-3 Allowable work area when attaching/removing units

BX63LF



- CAUTION** · There are maintenance works in the necessary laser opening area during LSM observation. Be sure to stop radiating the laser before working in this area.
- Olympus service personnel, or technical personnel who received service training, will carry out with the attachment to and removal segmented as service, in accordance with the FVMPE-RS Service Manual. Personnel other than those described above are not allowed to conduct the service work.

FV30GF

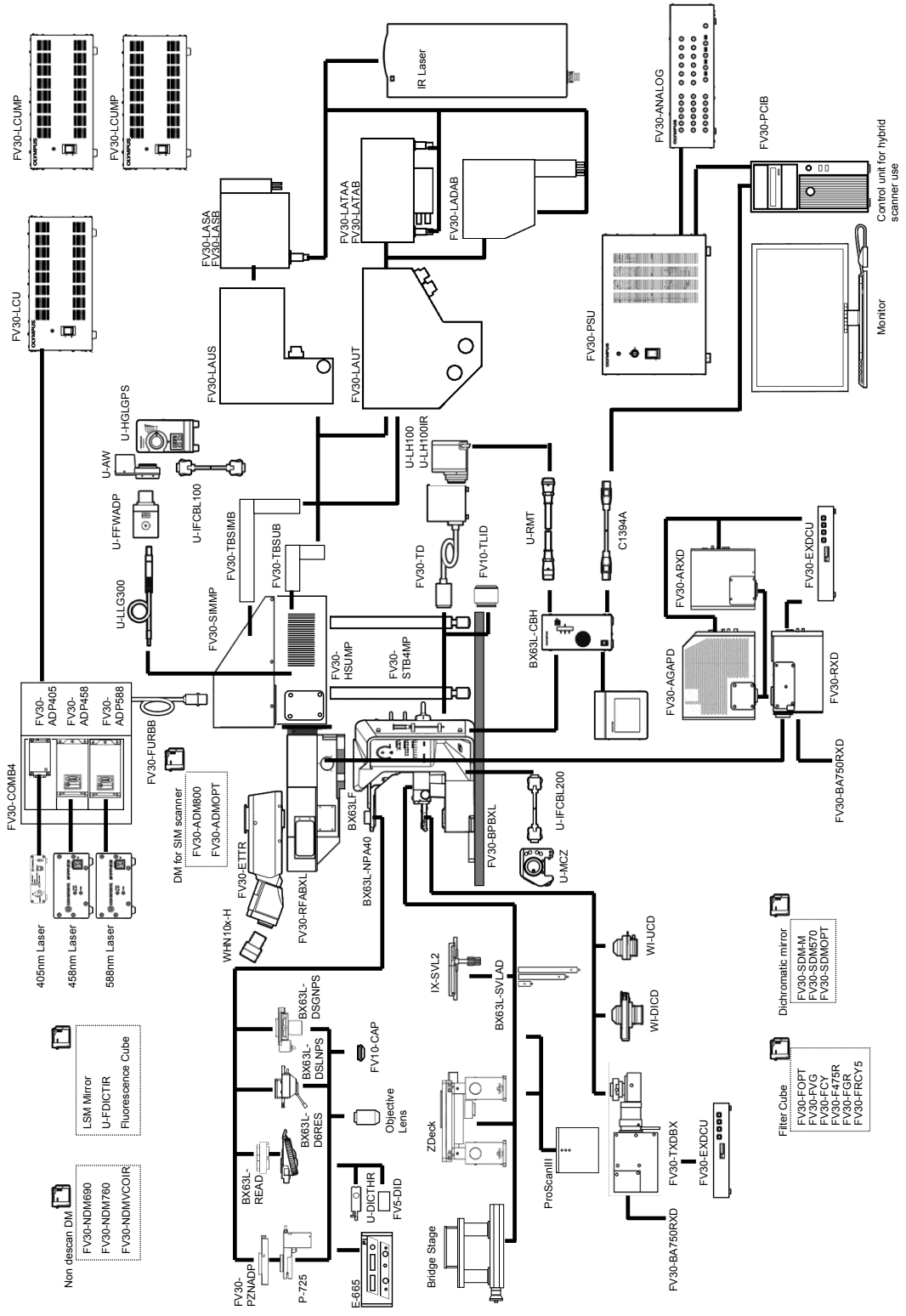


- CAUTION** · There are maintenance works in the necessary laser opening area during LSM observation. Be sure to stop radiating the laser before working in this area.
- Olympus service personnel, or technical personnel who received service training, will carry out with the attachment to and removal segmented as service, in accordance with the FVMPE-RS Service Manual. Personnel other than those described above are not allowed to conduct the service work.

1-4 System configuration

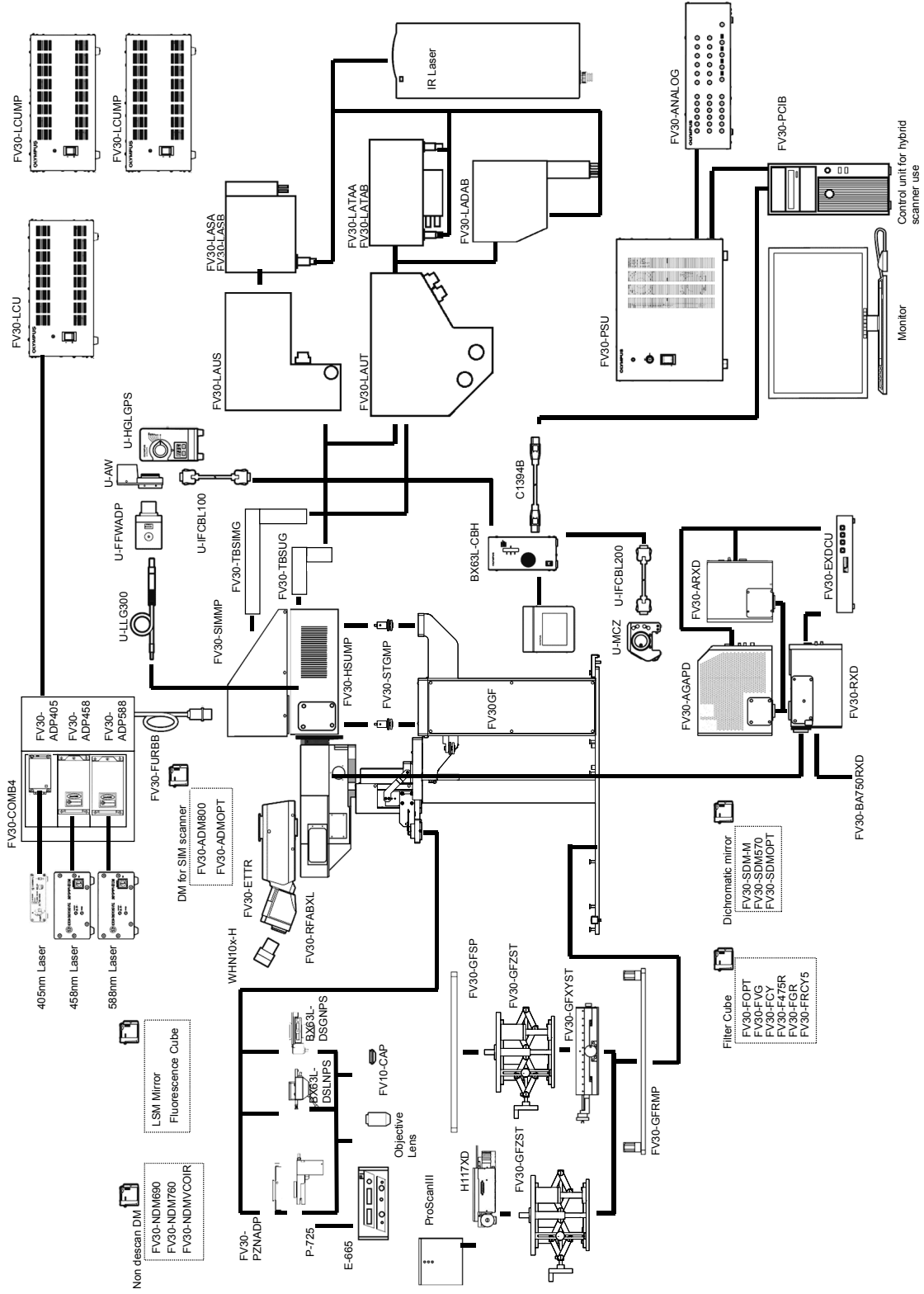
1 System diagram

BX63LF



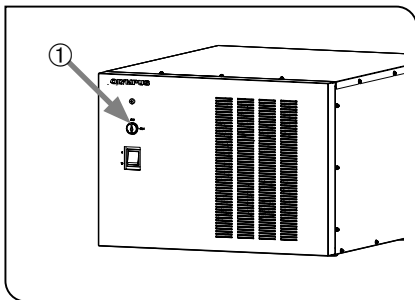
© When additional microscope units are required to this system, an Olympus service engineer will perform the installation.

FV30GF



1-5 Confirmation when working with FVMPE-RS

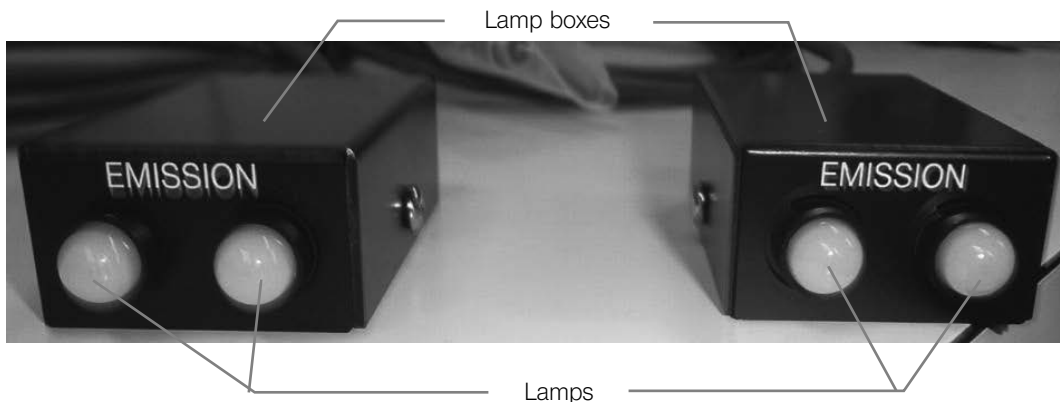
1 Key operation



The power supply and electronic control unit (FV30-PSU) has a start key ①. Before starting maintenance work, turn the key OFF and remove it.

2 Checking the emission indicator

There are 2 pairs of lamp boxes connected to the power supply and electric control unit (FV30-PSU). When the lamp is ON, the laser is ready to be emitted.



◎ One of a pair of lamp boxes is installed within 2 m from the tip of the objective, and the other is installed within 2 m from the monitor for FV30S-SW.

CAUTION Before starting the maintenance work, be sure to confirm that the lamps are turned OFF.

- Before or during the maintenance work, always confirm whether the lamps are turned ON or OFF.
- If some lamps are turned ON and some lamps are turned OFF among four lamps, stop using the system and contact Olympus.
- Do not remove the cable of the lamp box or hide the lamp box by covering the lamp box, etc. Doing so falls under the remodeling, and is not in conformance with Laser Safety Standards.

◎ Always keep the emission indicator in view from the user even if the units prepared by customers except this system are installed and so on.

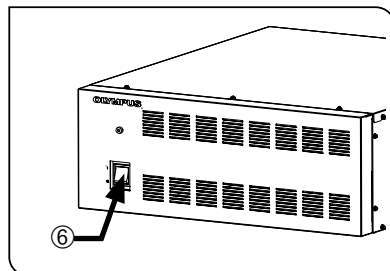
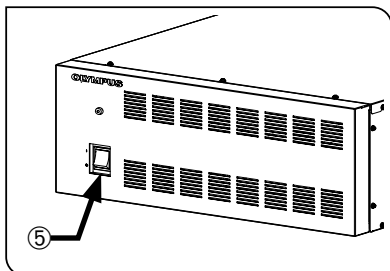
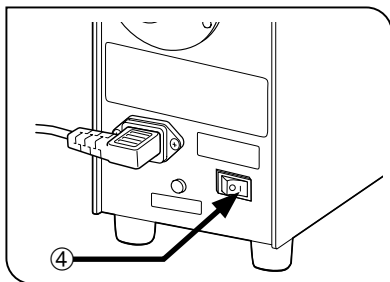
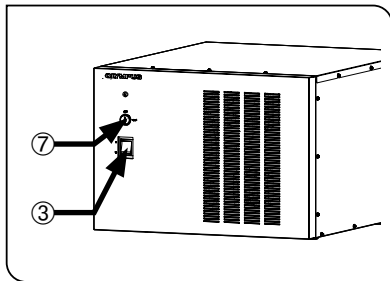
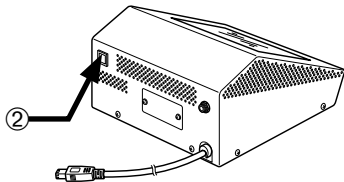
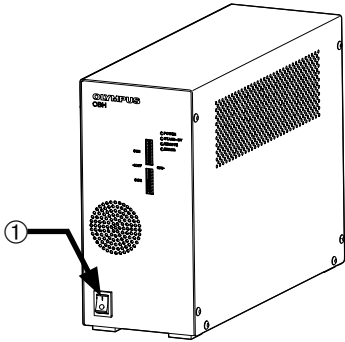
2 Precautions for use

- CAUTION** · The IR pulse laser used for multiphoton excitation is a high-power invisible laser that corresponds to CLASS 4, making even its scattered light dangerous. Care is required when handling this system, even though it is structurally designed so the power of emitted light is equivalent to CLASS 1 or lower, except light emitted from the objective lens. Therefore, please wear laser protective glasses when using this system.
- During laser-scanning, a laser is emitted from the objective lens or part of the nosepiece on which the objective lens is mounted.
 - Cover the hole on the nosepiece with the dedicated metal cap when the objective lens is not mounted on the nosepiece, since a high-power laser is emitted from this hole.
 - The dedicated metal cap is not prepared for the hole near the selection lever of the coded slide nosepiece (BX63L-DSLNP). When using the coded slide nosepiece (BX63L-DSLNP), always attach the objective lens to this hole.
 - Never place a highly reflective object under the objective lens or look directly at the tip of the objective lens.
 - A laser could be emitted from the attaching portions of the transmitted external NDD unit (FV30-TXDBX) and the BX63L frame for laser (BX63LF). Therefore, make sure that the transmitted external NDD unit is firmly secured.
 - The external NDD unit has extremely high light-receiving sensitivity; therefore, it may deteriorate due to ambient light from room illumination or a monitor. When using the external NDD unit, keep the area around the microscope dark.
Before illuminating the area around the microscope, uncheck all [CH] check boxes located on [PMT Setting] tab of the FV30S-SW software to turn off the external NDD unit.
 - The GaAsP-PMT in FV30-AGAPD has extremely high light-receiving sensitivity. Therefore, it deteriorates if subjected to not only high fluorescent light but also ambient light as room illuminator or a monitor, etc. So the GaAsP-PMT is a consumable item. (Refer to page 38 for details.)
 - In case of darkening the area around the microscope, be careful not to catch on cables, or colliding with the desk.
 - For details on how to turn on/off the laser unit, refer to the instruction manual for each laser unit. For details of items you want to refer to, confirm descriptions on page 14 in this manual.

- CAUTION** · The controller (PC) data may be destroyed by accident. Be sure to back up the controller (PC) data as required.
- Olympus cannot assume liabilities for any auxiliary damage, including compensation for loss of controller (PC) data, resulting from use of or inability to use this product.
 - The controller (PC) used with this system has already been set up with Microsoft Windows. This operating system should be backed up and the backup retained carefully by the user. (Olympus does not provide backup support.)
For details on the controller (PC) and Microsoft Windows, also refer to the manuals provided with them.
 - Quality assurance for this system is provided at ex-factory basis.
Be advised that any operating failure or disordered function due to Environment Setting Change (BIOS change) or installation of other software by user is not covered by the warranty.
 - When the remaining available hard disk space becomes small, the data processing rate may drop drastically or errors may tend to occur. To prevent this, delete unnecessary data files frequently. For the data file deletion procedure, refer to the manuals provided with Microsoft Windows. Free space of hard disk should be at least of 1Gbyte.
 - Disable the screen saver (by setting it to None) before use. With this software, the screen saver has already been set to "None" in advance.
 - Never delete the folder or modify its name, which created in the hard disk of the controller (PC) in advance, or the software would not be starting up.
 - Never activate other softwares while this software is running, or it might cause malfunction of this software.
 - Please do not connect the USB unit which is not provided by us to controller (PC) to be used. Connecting the USB unit which is not provided by us may cause a malfunction.
 - When connecting the controller (PC) to the network, install the antivirus software.
 - If the antivirus software has been installed in the controller (PC) to be used, an unexpected problem, e.g. missing image, may occur. Prior to using this system, disconnect the controller (PC) network connection to stop the antivirus software.

3 Turning on/off the power and starting/exiting from the software

3-1 Turning the power on (Operation)



Ⓢ Be sure to follow the order to turn ON the power described in Step 2 and Step 3.

1. Set the power switches of the controller (PC) and the monitor to I (ON).
2. Set the main switch 1 of BX63L-CBH to I (ON).
3. Set the main switch 2 of the touch panel controller to I (ON).

4. Set the power switches of the following other units in this system to I (ON).

- Power supply and electronic control unit FV30-PSU③
- Light guide illumination system U-HGLGPS④
- Laser control unit FV30-LCU⑤
- MPE laser control unit FV30-LCUMP⑥

Ⓢ The order to turn ON the power in Step 4 does not matter.

5. Set the start key ⑦ of the power supply and the electric control unit (FV30-PSU) to I (ON).

5. Start the visible-light laser.

- CAUTION** · For details on how to turn on/off the visible-light laser unit, refer to the instruction manual for each laser unit.
- Other than turning on or off the visible-light laser unit, do not change any settings even if they are listed in the instruction manual.

6. Logon windows with your own user ID.

- Ⓢ If you have not yet registered your user ID, logon with the factory default ID.

Factory default ID : olympus

Password : olympus

- CAUTION** Be sure to keep running the powers of following units of the IR pulse laser around the clock. When you turn ON the power again after the power is turned OFF due to the planned power outage or not in use for a long time, follow the procedures described in "3-4 Actions before the planned power outage or not in use for a long time".

- IR pulse laser frame
- Cooling unit
- Dryer (Chameleon Vision Series only)

3-2 Starting the software (Operation)

CAUTION · Turn ON the microscope and power supply units. If the laser control software made by Spectra-Physics has been started, exit it before starting this software.

- The external NDD unit has extremely high light-receiving sensitivity; therefore, it may deteriorate if it subjected to ambient light from room illumination or a monitor. When using the external NDD unit, keep the area around the microscope dark.

Before illuminating the area around the microscope, uncheck all [CH] check boxes located on [PMT Setting] tab of the FV30S-SW software to turn off the external NDD unit.

1. Before starting the FV30S-SW software, turn off the room light to keep the area around the microscope dark.
2. Start the FV30S-SW software.
3. Double-click the [FV30S-SW] icon on the desktop.



[FV30S-SW] icon

4. Depending on option units purchased, the stage setting dialog box appears. Set the followings and click the OK button.
 - Selection whether or not to control the XY stage by the software
 - Stage type
 - Selection whether or not to perform the Z direction centering
 - Piezo nosepiece type

⌚ It takes 20 to 30 seconds after the OK button is clicked till the software starts up.

5. Select [Configuration] in the [Tools] menu of the FV30S-SW software. Turn ON the emission of the IR pulse laser in the [Configuration] dialog box displayed.

⌚ For details, refer to FV30S-SW Online Help.

CAUTION In order to ensure the output stability of the laser beam, turn ON the emission of the IR pulse laser and warm-up for 30 minutes or longer before use.

3-3 Completing the observation with this system (Operation)

1. Uncheck the checkbox of the laser on the FV30S-SW software to stop emitting the laser first, and exit the FV30S-SW software.
 - Ⓞ Before exiting the software, you can select ON/OFF (stop oscillation) of the emission of the IR Pulse laser in the [Configuration] dialog box selected in the [Tools] menu.

After completing the observation, if you start the next observation within a short time period (approximately 2 to 3 hours), you can exit the system with keeping the emission turned ON.

In other cases, be sure to turn OFF the emission before exiting the software.
 - Ⓞ For details, refer to FV30S-SW Online Help.

CAUTION Be sure to keep running the powers of following units of the IR pulse laser around the clock. When you turn OFF the power due to the planned power outage or not in use for a long time, follow the procedures described in "3-4 Actions before the planned power outage or not in use for a long time".

- IR pulse laser frame
- Cooling unit
- Dryer (Chameleon Vision Series only)

2. Turn off the visible laser.

CAUTION For details on how to turn on/off the visible-light laser unit, refer to the instruction manual for each laser unit.

- Do not change any settings other than turning on or off the visible-light laser unit even though they are described in the instruction manual.

3. Set the power switches of the following units of this system to O (OFF).

- Ⓞ The order to turn off following units is in no particular order.
 - Power supply and electric control unit FV30-PSU
 - Light guide illumination system U-HGLGPS
 - Laser control unit FV30-LCU
 - MPE laser control unit FV30-LCUMP

4. Turn off the units of which the order to be turned off is specified.

- 1) Tap the [OFF] button displayed on the screen of the touch panel controller and set the main switch of the touch panel controller to O (OFF).
- 2) Set the main switch of the BX63L-CBH to O (OFF).

- 5 Set the power switches of the controller (PC) and the monitor to O (OFF).

3-4 Actions before the planned power outage or not in use for a long time

This section describes the procedures to turn OFF the power of the IR pulse laser and turning it ON again. In case of the planned power outage, the power of the system and the powers of the following units of the IR pulse laser must be turned OFF.

- IR pulse laser frame
- Cooling unit
- Dryer (Chameleon Vision Series only)

1 Turning OFF the power of the IR pulse laser

CAUTION Be sure to exit the FV30S-SW software before turning OFF the power. For procedures to exit the software, refer to "3-3 Completing the observation with this system (Operation)".

When using Chameleon Vision Series

Turn OFF the power of the laser by using the operation panel of the power supply of the laser. For details, refer to the materials provided by COHERENT.

When using MAITAI DS Series and InSight DS Series

Start the laser control software made by Spectra-Physics and turn OFF the power of the laser. For details, refer to the materials provided by Spectra-Physics.

2 Turning ON the power of the IR pulse laser

CAUTION Be sure to turn ON the power of the IR pulse laser before starting the FV30S-SW software.

When using Chameleon Vision Series

Turn ON the power of the laser according to the materials provided by COHERENT.

When the power is turned ON, the followings must be confirmed for setting "DISPERSION CURVE". For confirmation procedures, refer to the materials provided by COHERENT. (Note1)

	Chameleon Vision Series
Confirmation of "DISPERSION CURVE"	Confirm that "Olympus2" is set by using the operation panel of the laser power supply.

When using MAITAI DS Series and InSight DS Series

When the power is turned ON, the followings must be reset or confirmed by using the laser control software made by Spectra-Physics. For setting and confirmation procedures, refer to the materials provided by Spectra-Physics. (Note1)

When using MAITAI DS Series, following COM ports must be selected:

Laser for Main scanner: COM2, Laser for SIM scanner: COM4

	MAITAI DS Series	InSight DS Series
Resetting/Confirmation of "Objective Table"	Reset "Itemplate" to "100XA0.01OL2" by using Hand Held Controller.	Start the laser control software made by Spectra-Physics and confirm that "100XA0.01OL2" is set on the Objective screen.

(Note1) Olympus has confirmed the descriptions in the materials after following versions.
 MAITAI DS Series : 90038200Rev.B
 Insight DS Series : 90044047Rev.A
 Chameleon Vision Series : 1086757RevAD.

CAUTION When the settings and confirmation are completed, exit the laser control software made by Spectra-Physics.

4 How to operate each part

CAUTION From "4-1 Objective lens (Operation/Maintenance)" to "4-5 Observation tube (Operation)" in this chapter, the maintenance works are included in necessary laser opening area during LSM observation. Be sure to stop radiating the laser before starting relevant maintenance works.

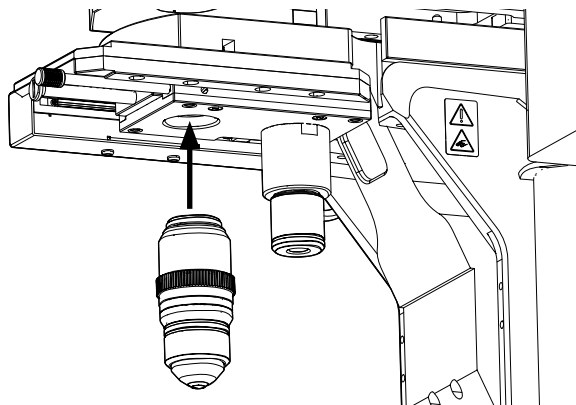
4-1 Objective lens (Operation/Maintenance)

- CAUTION**
- Be sure to confirm the laser emission status before starting to work. Refer to page 7 for details. Working with objective lenses is dangerous due to the opening area of the laser.
 - Attaching or removing the nosepiece to or from the microscope falls under the category of service work. When attaching or removing an objective to or from the nosepiece, keep the nosepiece attached to the microscope.
 - When attaching or removing an objective to or from the nosepiece, make sure that the laser does not emit.
 - When attaching or removing an objective, make sure that the hole on the nosepiece is not placed in the light path.

1 Removing and mounting the objectives (Maintenance)

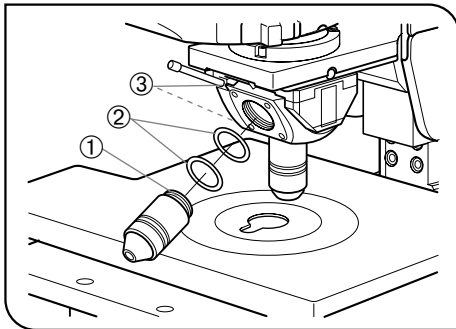
- 1) Remove the objective lens attached to the nose piece.
 - 2) Attach the new objective lens.
- ⊙ Coded 6-position Nosepiece (BX63L-D6RES): It is convenient to attach the objective lenses from the lower magnification to the higher magnification in the nosepiece index order.
 - ⊙ Coded swing nosepiece (BX63L-DSGNPS): It is convenient to attach the higher magnification lens to the nosepiece index No.1 and the lower magnification lens to the nosepiece index No.2.
 - ⊙ Coded slide nosepiece (BX63L-DSLNPS): Attach the objective lens with parfocal distance 75 mm to the nosepiece index No.1, and the objective lens with parfocal distance 45 mm to the nosepiece index No.2.

- CAUTION**
- Handle the objectives carefully, and screw them in fully until they stop when attaching the objectives.
 - Keep the removed objectives in the dedicated case.
 - Put the metal caps in the screw holes where no objective is mounted.
 - The dedicated metal cap is not prepared for the hole near the selection lever of the coded slide nosepiece (BX63L-DSLNPS). When using the coded slide nosepiece (BX63L-DSLNPS), always attach the objective lens to this hole.
 - It is dangerous to remove the objectives, the metal caps, as this causes irradiation of laser beams that are parallel, not diffused.



2 Adjusting the objectives (BX63L-DSGNPS only) (Maintenance)

⊙ Perform the parfocal adjustment and the centering adjustment of two objectives to be used.



Parfocal adjustment procedures

1 Check the difference in Z positions when bringing the specimen into focus with the objective on the front side and when with the objective on the back side by using the touch panel controller.

⊙ The difference in Z positions displayed on the touch panel controller is the parfocal difference.

2 Remove the objective with the larger Z position value from FV30-DSGNPS, and attach it again by placing the necessary washer ② to the screw part ①.

⊙ Nine washers with three kinds of thickness (10, 30 and 50 μm), three per kind, are provided with the microscope.

⊙ The parfocality may not be adjusted fully depending on objective types.

Centering adjustment procedures

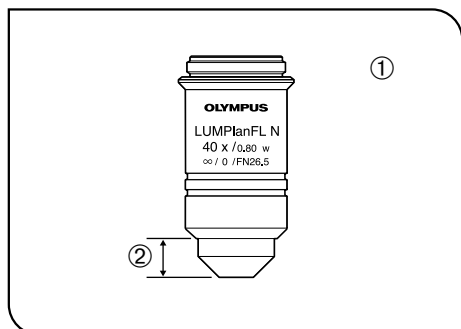
⊙ The centering mechanism works only with the hole on the front side.

1 Bring the specimen into focus with the objective lens on the back side, and move the target in the specimen to the center.

2 Change the objective lens to the one on the front side.

3 Insert the centering knob provided with BX63L-DSGNPS into the screw hole ③ and rotate it to move the target to the center.

⊙ Be sure not to lose the centering knob.



3 Using immersion objectives (Operation)

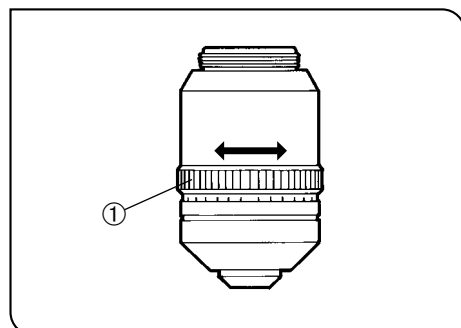
- ⊙ Using the immersion objectives to immerse the tip of the objectives in a medium of the specimens allows you to observe the cultured tissue specimens which are often very thin.
- ⊙ Recommended immersion objectives:
 - Water immersion objectives
 - LUMPLFLN40XW
 - LUMPLFLN60XW
 - LUMFLN60XW
 - XLPLN25XWMP2
 - SCALEVIEW immersion objectives
 - XLPLN25XSMP2
 - XLSPLN25XSMP2

- ⊙ The electrically insulated area and immersion depth of the objective ① are shown by the range of ②.
- ⊙ Do not immerse the entire objective, for this will cause malfunction. After every immersed use, be sure to clean the front lens with neutral detergent.

4 Objectives with correction collar (Operation)

- ⊙ If the cover glass thickness does not match the thickness scale of an objective with correction collar, the objective cannot manifest its performance. When using a correction collar equipped objective, perform the following adjustment as required.

Adjustment procedure



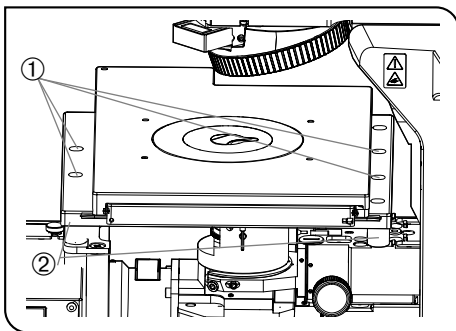
- 1 If the cover glass thickness is known, set the correction collar ① to the value on the scale.
 - 2 If the cover glass thickness is unknown, adjust the correction collar ① and turn the fine adjustment knob in U-MCZ alternately until the positioning with the highest contrast is obtained.
- ⊙ Be careful not to touch the correction collar ① when turning the nosepiece.
 - ⊙ For adjusting the correction collar of the following objective lens, refer to the instruction manual provided with the respective objective lens.

XLPLN25XWMP2
 XLPLN25XSMP2
 XLSPLN25XSMP2

4-2 Stages (Operation/Maintenance)

CAUTION Be sure to confirm the laser emission status before starting to work. Refer to page 7 for details. Working with the stage area is dangerous due to the opening area of the laser.

- If you want to use other stage holders than those provided with this system, be sure not to use the stage holders which reflect the light or are flammable.



1 How to install the stage (Maintenance)

BX63LF

- 1 Align the mounting holes ① of the IX-SVL2 with the mounting screw holes of the BX63L-SVLAD ②, and clamp the stage by tightening the hex-socket screws with the Allen wrench provided with the microscope frame.

⊙ Install the stage so that the stage handle is placed on the left side of the microscope.

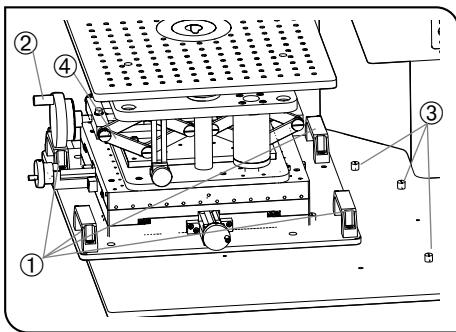
FV30GF

- CAUTION** · When carrying the stage, be sure to hold the knob ① (upper picture on next page) of the gate frame microscope exclusive removable plate (FV30-GFRMP) by two people.
- When attaching or removing the stage, rotate the Z transfer knob ② (upper picture on next page) to lower the gate frame microscope exclusive Z stage (FV30-GFZST) to the lowest limit.
 - Inside of the gate frame microscope exclusive Z stage (FV30-GFZST), there is an area (upper picture on next page) which becomes narrower along with the vertical movement of the gate frame microscope exclusive Z stage (FV30-GFZST). Be careful not to pinch your fingers.
 - When attaching or removing the stage, remove the objective lens from the revolving nosepiece in advance.
 - When attaching or removing the stage, be careful not to touch the system which has already been setup with your body or the stage.

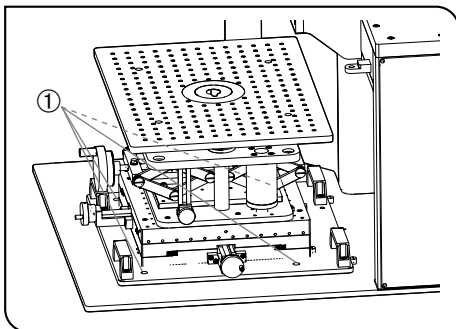
- CAUTION** · When removing the removable plate for gantry frame (FV30-GFRMP), the opening of the laser is from the objective to base plate of FV30GF, and the laser beam is terminated by base plate of FV30GF. In this case, be careful for following points.
- Do not insert any body part, hands or head etc., or items carelessly in the opening of the laser.
 - Do not put any combustibles on the base plate of FV30GF. Alternatively, fire hazard may occur by laser.
 - Do not install substances that reflect, e.g. glass, metal or shiny plastic, etc. on the base plate of FV30GF. Reflected light may cause injuries such as burns and blindness and also damage to this system.

- CAUTION** · When attaching the sample clamping tools, etc. prepared by users by removing the removable plate for gantry frame (FV30-GFRMP), be careful for following points.
- Do not use any flammable gas that is ignited by laser or volatile gas. If the laser enters into your eyes, the retina may be damaged to result in blindness, etc.
 - Do not put any combustibles near the opening of the laser. Alternatively, fire hazard may occur by laser.
 - Do not install substances that reflect, e.g. glass, metal or shiny plastic, etc. near the opening of the laser. Reflected light may cause injuries such as burns and blindness and also damage to this system.

- ⊙ The picture shows that following three units are configured on the removable plate for gantry frame (FV30-GFRMP).
 - Plain stage for gantry frame (FV30-GFSP)
 - Z stage for gantry frame (FV30-GFZST)
 - XY stage for gantry frame (FV30-GFXYST)
- ⊙ Even though the different stage is configured on the gate frame microscope exclusive removable plate (FV30-GFRMP), the same procedures apply when attaching or removing the stage.

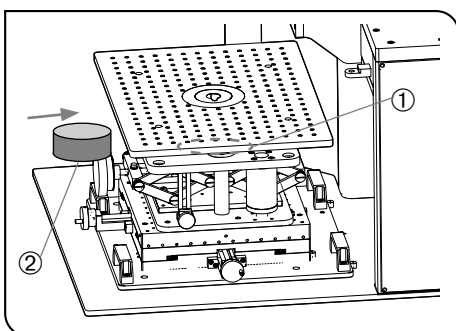


- 1** Position the removable plate for gantry frame (FV30-GFRMP) by pushing it completely to the pin^③ (3 positions) of the gantry frame (FV30GF).



- 2** Put the hexagon socket head cap screws through the hole^① (4 positions) of the removable plate for gantry frame (FV30-GFRMP) and tighten them to the screw holes of the gantry frame (FV30GF).

- ⊙ The Allen wrench to be used for tightening hexagon socket head cap screws (M6) must be prepared by the customer.

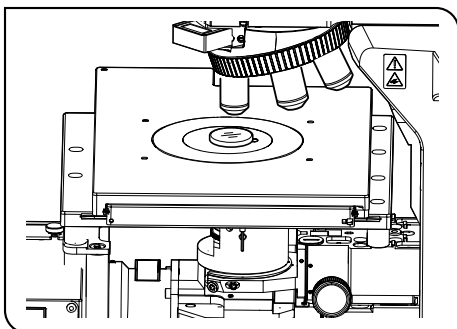


- 3** Insert the TD blindfold mechanical lid (FV10-TLID)^② into the hole^① in the center of the Z stage for gantry frame (FV30-GFZST) so that the concave surface faces up.

- CAUTION** · Be sure to install the transmitted lidded (FV10-TLID).
- The laser beam emitted from the objective is terminated by the transmitted lidded (FV10-TLID) to avoid the careless beam leakage.

2 Placing the specimen (Operation)

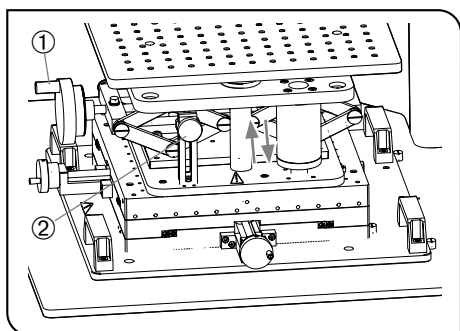
BX63LF



- 1 Place the specimen on the center of the stage.

⊙ The optional stage center plate (IX-CP50) makes it possible to observe a wide range of a big petri dish, etc. (Central hole diameter: $\phi 50$ mm)

FV30GF



- 1 Place the specimen on the center of the stage.
- 2 Rotate the Z knob ① of the Z stage for gantry frame (FV30-GFZST) to raise the stage and bring the specimen into nearly focus.

⊙ The stage upper limit position can be set by loosening the screw ② of the upper limit stopper of the gate frame microscope exclusive Z stage (FV30-GFZST) to slide the upper limit stopper along the guide and tightening the screw ② at your desired position.

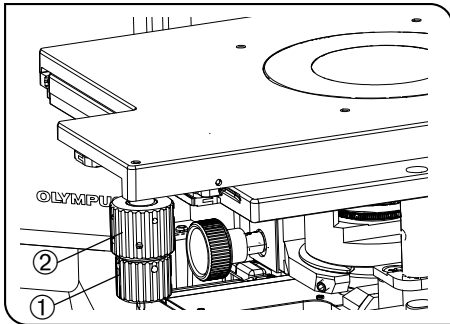
⊙ When the gate frame microscope exclusive Z stage (FV30-GFZST) reaches the upper limit position set by the upper limit stopper, do not rotate the Z knob ① of the Z stage any more.

⊙ When you do not set the stage upper limit at your desired position using the upper limit stopper, slide the stage upper limit to the upper limit position of the guide and tighten the screw ②.

CAUTION · Do not put your fingers below the stage.
Your fingers may be pinched with the movable unit to cause injury.

3 Moving the specimen (Operation)

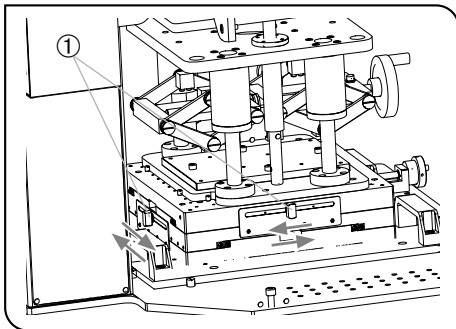
BX63LF



- 1 The specimen can be moved by turning the X-axis knob ① and Y-axis knob ②.

The movement strokes are 50 mm (X-axis) x 43 mm (Y-axis).

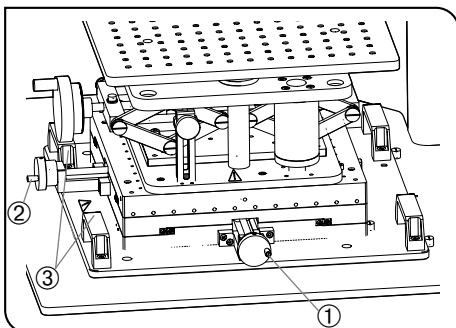
FV30GF



- 1 Loosen the screws ① placed at 2 positions on the XY stage for gantry frame (FV30-GFXYST).

⊙ When the screws ① reach the end of the guide, that position becomes the limit position of the movement in the vertical or horizontal position.

⊙ By tightening the screws ①, the stage position can be secured in vertical or horizontal direction.



- 2 The specimen can be moved by turning the X-axis knob ① and Y-axis knob ②.

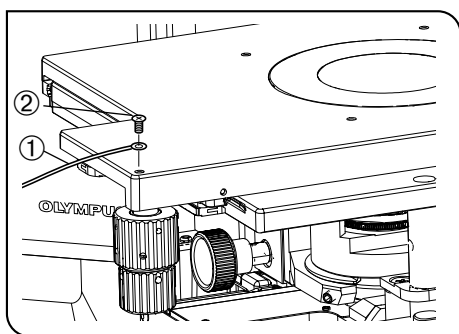
⊙ When the screws that are loosened in procedure 1 reach the end of the guide, never attempt to turn the knobs any more.

CAUTION · When rotating the Y-axis knob ②, be careful not to pinch your fingers the movable parts of the XY stage for gantry frame (FV30-GFXYST) and the knob ③ of the removable plate for gantry frame (FV30-GFRMP).

4 Setting the grounding (Maintenance)

BX63LF only

- ⊙ In case of electrical physiological experiment, etc., the specimen can be grounded from the stage.
- ⊙ Set the grounding together with setting the grounding of the microscope BX63LF described on page 25.



- 1 Prepare a grounding wire ① and M4 screw ② and attach grounding.

CAUTION

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

5 Adjusting the X-axis/Y-axis knob rotation tension (Operation)

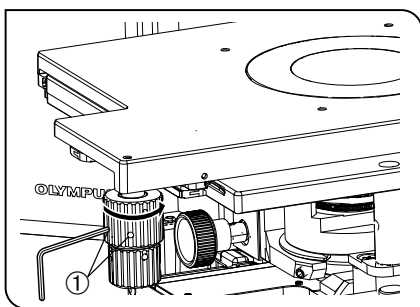
BX63LF only

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

- 1 Loosen the 2 set screws ① of a knob using the provided Allen wrench, hold the stage so that it will not move, then turn the knob to adjust the tension. Turning it in the direction of the arrow increases the tension and turning in the opposite direction decreases the tension.

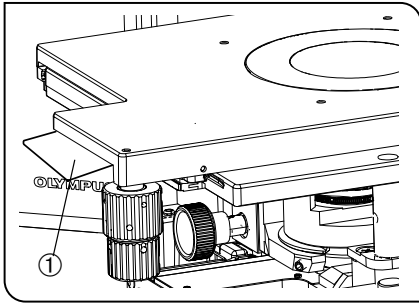
- 2 After adjustment, tighten the set screws firmly.

- ⊙ If the tension of a knob is too heavy or too light, skipping or returning of the image may occur during the stage movement.



6 Using the light shielding sheet (Operation)

BX63LF only



Ⓞ During fluorescence observation using a low-magnification objective, the fluorescence image may be deteriorated due to light reflected from the condenser or the surroundings. In this case, use the light shielding sheet.

1 Lower the condenser to the lower limit position using the condenser height adjustment knob.

2 Insert the light shield sheet ① all the way into the gap between the upper and lower stages on the side of the stage (IX-SVL2).

Ⓞ If the condenser is lowered insufficiently, the sheet cannot be inserted into the normal position and the light shielding effect cannot be obtained.

4-3 Microscope BX63LF (Operation/Maintenance)

CAUTION Be sure to confirm the laser emission status before starting to work. Refer to page 7 for details. Working with the microscope (BX63LF) is dangerous due to the opening area of the laser.

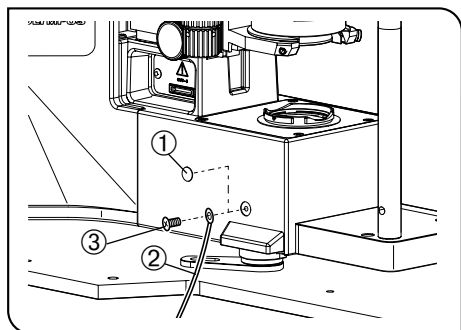
1 Using the Filters (Maintenance) (BX63LF only)

A filter with a diameter of 45 mm can be inserted in the filter turret attached to the microscope BX63LF base.

CAUTION

- When performing the visual observation with the lamp house U-LH100IR, be sure to engage the IR cut filter in the light path.
- The infrared light is harmful to eyes. If you use the system to perform IR-DIC observation, avoid visual observation as much as possible and observe with the TV monitor.

2 Setting the grounding (Maintenance) (BX63LF only)

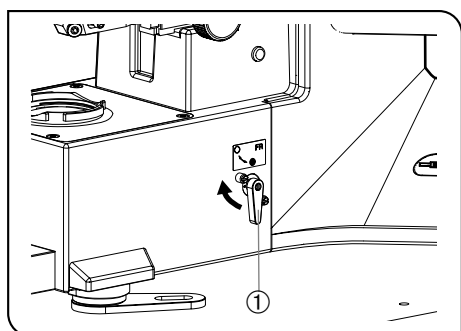


Ⓞ In case of electrical physiological experiment, etc., the specimen can be grounded from the microscope BX63LF.

Ⓞ Set the grounding together with setting the grounding of the stage described on page 23.

- 1 Remove the seal ① on the left side of the microscope BX63LF.
- 2 Prepare a grounding wire ② and M4 screw ③ and attach grounding.

3 Using the Frost Filter Insertion/Removal Lever (Operation)

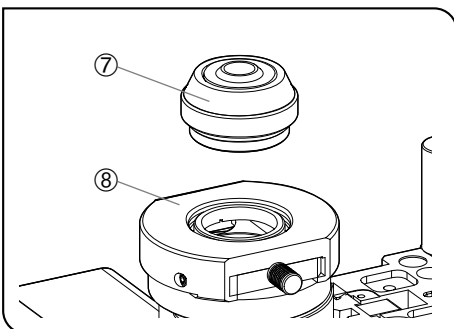
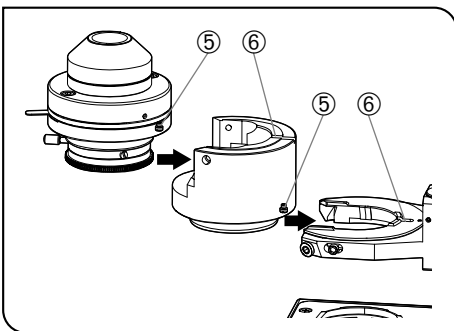
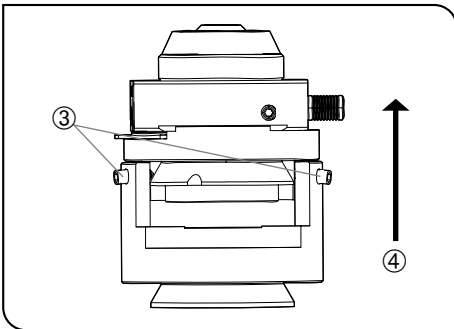
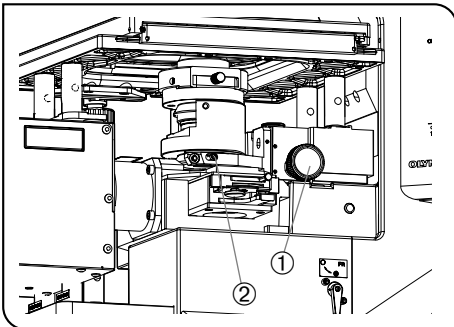


Ⓞ Low observation light can be brightened by turning the frost filter insertion/removal lever ① which controls the built-in frost filter, in the direction of the arrow. However, although the brightness is increased, irregularity in lighting may also increase.

4-4 Condenser (Operation/Maintenance)

CAUTION Be sure to confirm the laser emission status before starting to work. Refer to page 7 for details. Working with the condenser is dangerous due to the opening area of the laser.

1 Mounting and removing the condenser (Maintenance)



Ⓞ Same procedures apply when mounting or removing either the condenser provided with FV30-TXDBX, WI-UCD or WI-DICD.

1) Rotate the condenser height adjustment knob ① to lower the condenser holder sufficiently.

Ⓞ When using WI-UCD or WI-DICD, lower the condenser to the lower limit stopper.

Ⓞ When using FV30-TXDBX, be careful so that the condenser holder does not in contact with FV30-TXDBX.

2) Loosen the fixing screw ② on the right-hand side of the condenser holder, using the hexagonal screwdriver.

3) Pull out the condenser adapter along the mount dovetail of the condenser holder.

Ⓞ When using FV30-TXDBX, be careful so that the condenser adapter does not in contact with FV30-TXDBX.

4) Loosen the condenser fixing screw ③ with the provided tool.

5) Pull out the condenser in the light axis direction ④.

Ⓞ The condenser can be removed by following the reverse procedure for mounting it.

Ⓞ To fit the condenser into the mount dovetail on the condenser holder, horizontally push the condenser adapter until the positioning pin ⑤ is engaged with the positioning groove ⑥.

This procedure also applies when attaching the condenser to the condenser adapter.

Ⓞ In the condenser provided with FV30-TXDBX, the oil top lens can be replaced with the dry top lens. Rotate the top lens part ⑦ counterclockwise to remove it from the condenser ⑧. When attaching the top lens part, screw in the top lens part clockwise to fix it to the condenser.

2 With the WI-UCD condenser (Maintenance)

☉ There are three types of compatible condensers: WI-UCD, WI-DICD and condenser provided with FV30-TXDBX.

List of DIC System Combinations

DIC prism for nosepiece	Objectives	DIC prism for condenser		
		Condenser provided with FV30-TXDBX		WI-UCD WI-DICD
		Oil top lens	Dry top lens	
• BX63L-DSLNP5: Built in the nosepiece	XLPLN25XWMP2**	WI-EVADIC25HR	U-DIC25HR	WI-DIC25HR
	XLPLN25XSVMP2**	WI-EVADIC25HR	U-DIC25HR	WI-DIC25HR
• BX63L-DSGNP5: Built in the nosepiece	XLSLPLN25XSVMP2**	WI-EVADIC25HR	U-DIC25HR	WI-DIC25HR
	LUMPLFLN40XW	U-DIC40*	U-DIC40HR	WI-DIC40HR
	LUMPLFLN60XW	U-DIC60	U-DIC60HR	WI-DIC60HR
• BX63L-D6RES***: U-DICTHR	LUMFLN60XW	U-DIC60	U-DIC60HR	WI-DIC60HR
	UPLSPA030XS	U-DIC60HC	-	-
	UPLSPA060XS	U-DIC60	U-DIC60HR	WI-DIC60HR
	UPLSAPO60XW	U-DIC60	U-DIC60HR	WI-DIC60HR
	XLUMPLFLN20XW**	WI-EVADIC20HR	U-DIC20HR	WI-DICXLU20HR

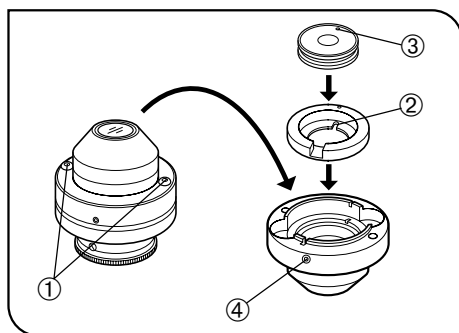
* The center of the uneven brightness may be slightly displaced from the center of the view field.

** The nosepiece where the XL objective can be used is BX63L-DSLNP5 only.

*** The condenser which can be used in combination with BX63L-D6RES is WI-UCD only.

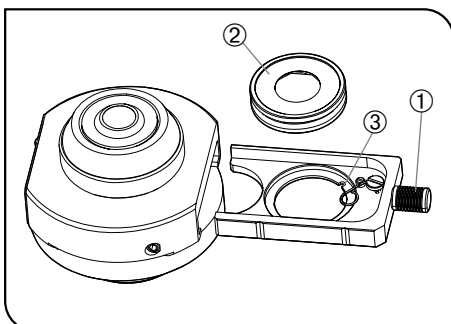
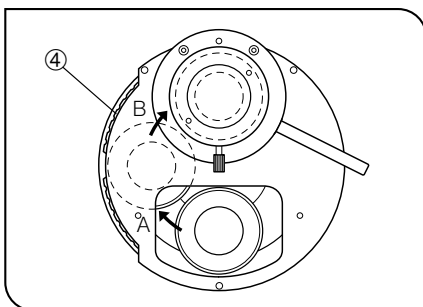
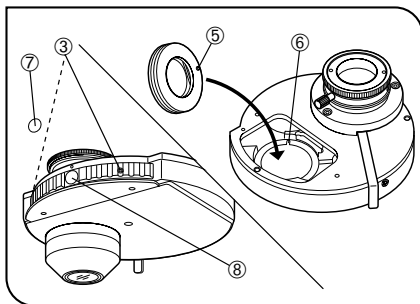
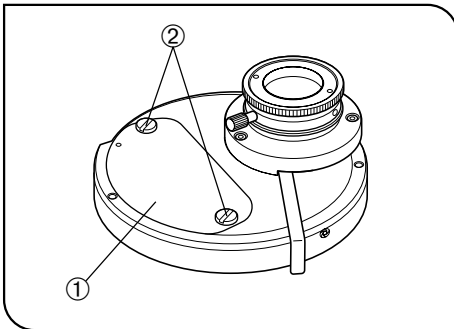
If WI-UCD is used in combination with BX63L-D6RES, remove the quarter-wave plate.

With the WI-DICD condenser



☉ The WI-DICD should be attached after completing the polarizer position.

- 1** Remove the WI-DICD condenser from the microscope frame.
 - 2** Remove the clamping screw ① (2 pcs.) using the Allen screwdriver provided with the system. Then, place the top of the condenser upside down.
 - 3** When the DIC prism for use with the objective in use is a small DIC prism, drop it in by aligning the positioning groove ② on the adapter located on the inner side with the pin ③ of the prism. When the DIC prism for use with the objective is a large DIC prism, remove the adapter and drop in the DIC prism.
- ☉ Retain the adapter for future possible use.
- 4** Tighten the clamping screws ④ with the knob provided with the condenser.
 - 5** Tighten the clamping screw ① (2 pcs.) with the Allen screwdriver provided with the system.
 - 6** Attach the condenser on the microscope again.



With the WI-UCD condenser

⊙ When selecting the bright field (BF) light path using the WI-UCD, leave one DIC prism (large) mount position empty.

- 1** Remove the WI-UCD condenser from the microscope frame.
- 2** Remove the condenser cover ① by loosening the retaining screws ② using a coin, etc.
- 3** Attach the suitable DIC prism for the objective in use as described below.

Using the dedicated knob provided with the condenser, loosen the two DIC prism clamping screws ③ until the stop of the rotation.

Rotate the turret ④ by 90° counterclockwise, and drop in the DIC prism by aligning its positioning pin ⑤ with the positioning groove 6 in the hole of the turret ④.

⊙ Be careful not to touch the prism inside the frame.

A. Rotate the turret ④ by 90° clockwise and tighten the two DIC prism clamping screws ③ uniformly using the dedicated knob provided with the condenser.

⊙ Do not tighten the screws too much, or the prism frame may be deformed.

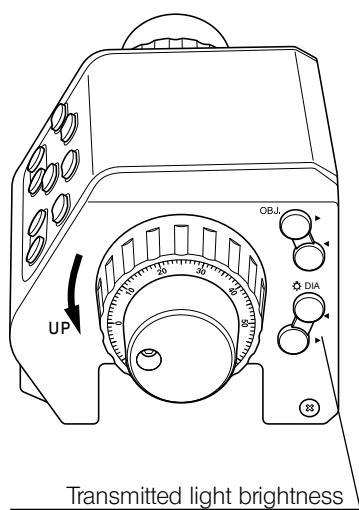
B. Rotate the turret ④ by 90° clockwise, and attach the index sticker ⑦ provided with the DIC prism onto the side ⑧ of the condenser turret ④ so that the index sticker is upside down.

- 4** After attaching all of the required DIC prisms, attach the cover ① and tighten the retaining screws ②.
- 5** Attach the condenser back onto the microscope frame.

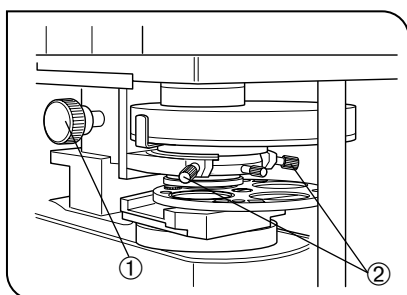
With the condenser provided with FV30-TXDBX.

- 1** Pull the DIC prism IN/OUT knob ① of the condenser, and then pull out the DIC prism frame to remove it.
 - 2** Install the DIC prism ② to the DIC prism frame.
- ⊙ Align the positioning pin of the DIC prism with the U-shaped groove ③ of the DIC prism frame.
- 3** Insert the DIC prism frame into the condenser.

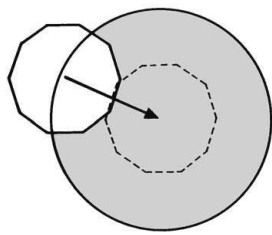
3 Centering the condenser (Operation)



Transmitted light brightness control buttons ▲▼
Adjusts the halogen bulb brightness.



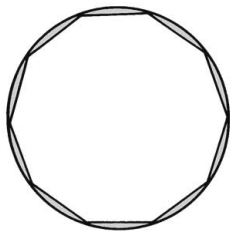
1. Set the specimen onto the stage.
2. Set the observation optical path of the microscope to [BI 100% (eyepiece 100%)].
3. Set the fluorescent mirror unit cassette position to [Blank]
4. Open the aperture diaphragm.
5. Adjust the illumination brightness by pushing the two transmitted light brightness control buttons
6. Focus on the specimen. Adjust the focus roughly by rotating the U-MCZ coarse adjustment knob, and then finely adjust the focus by rotating the fine adjustment handle.
7. Open the field iris diaphragm using the touch panel controller.
Ⓞ For adjusting the field iris diaphragm, refer to Online Help of the touch panel controller.
8. Focus on the specimen using the 10X objective.
9. Close the field iris diaphragm using the touch panel controller so that the diaphragm image comes inside the field of view.
10. Manipulate the condenser height adjustment knob ① to focus on the diaphragm image.
11. Bring the image of the field diaphragm to the center of the eyepiece by rotating the condenser centering screws ② (two pieces) on the condenser holder with the included jig.



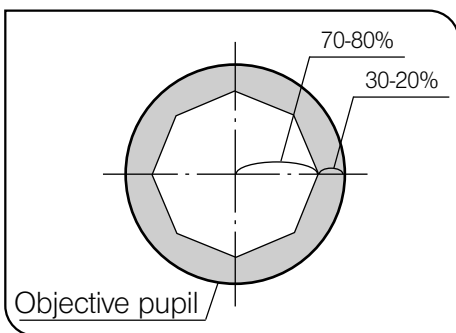
12. Gradually open the field iris diaphragm. The condenser is properly centered if the iris image is centered and inscribed in the field of view.

CAUTION

Before starting the LSM observation, be sure to open the field diaphragm and the aperture diaphragm completely.



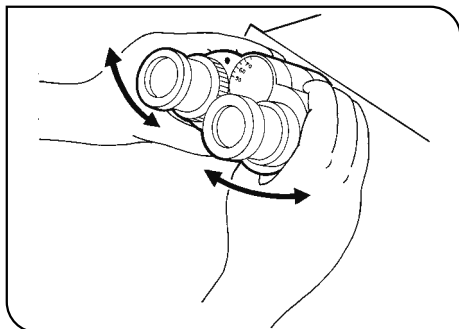
4 Using the aperture iris diaphragm (Operation)



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

4-5 Observation tube (Operation)

1 Adjusting the interpupillary distance



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

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

2 Adjusting the diopter

- ⊙ The diopter adjustment makes it possible to reduce the specimen focusing error even after the objective is switched. As the diopter varies between individuals, the diopter adjustment is required for each person.

- ⊙ The eyepiece with diopter adjustment ring should always be inserted into the observation tube without the diopter adjustment ring.

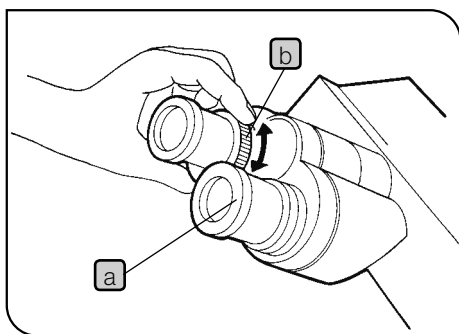
- 1 Set the diopter adjustment rings on both sides to scale "0".
- 2 Engage a high-power objective (e.g. 40X) in the light path, look into the right eyepiece with your right eye, and bring the sample into focus using the FOCUS button/slider of the touch panel controller.

- ⊙ Do not use an immersion objective.

- 3 Engage a low-power objective (e.g. 10X) in the light path, rotate only the right diopter adjustment ring **a** to bring the sample into focus. At this time do not touch the FOCUS button/slider.

- 4 Looking into the left eyepiece with your left eye, rotate only the left diopter adjustment ring **b** to bring the sample into focus.

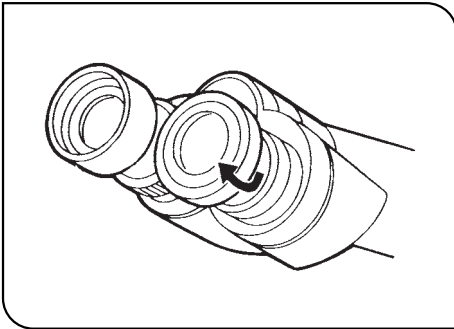
- ⊙ The above procedure adjusts the diopter with reference to the right eye, but it is also possible to adjust with reference to the left eye. In this case, read the above procedure by inverting "right" and "left."



Using an eyepiece including a micrometer disk

- 1 Looking through the eyepiece with micrometer disk, turn the diopter adjustment ring **b** so that the micrometer in the field of view is sharply visible.
- 2 Looking through the eyepiece with micrometer disk, focus on the sample using the FOCUS buttons/slider of the touch panel controller so that both the micrometer and sample are sharply visible.
- 3 Looking through the other eyepiece, turn only the diopter adjustment ring **a** to focus on the sample.

3 Using the eye shades



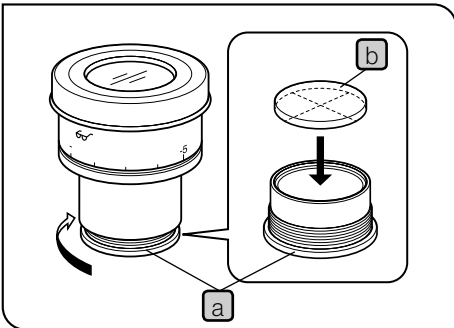
When wearing eyeglasses

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

When not wearing eyeglasses

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

4 Mounting the eyepiece micrometerdisk

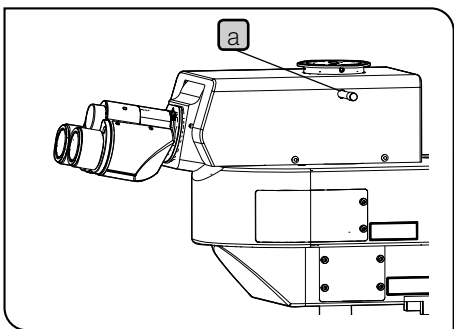


When the WHN10X-H eyepieces are used, an eyepiece micrometer disk can be mounted. Use 24 mm dia. x 1.5 mm thick micrometer disks.

Turn the built-in micrometer-mounting frame **a** to the arrow direction (see figure) to remove it from the eyepiece and place a micrometer disk **b** into the mounting frame so that the surface with the model indication faces downward.

- ⊙ The micrometer-mounting frame may be too tight for certain micrometer disks. In this case, turn the frame by holding the circumference with a light, uniform force or by applying the frame against a rubber sheet. Do not grasp the frame with a strong force, as this may deform the frame and make it harder to remove it. Re-attach the micrometer mounting frame in the original position.
- ⊙ Be careful not to touch the lens or micrometer surface with your finger.

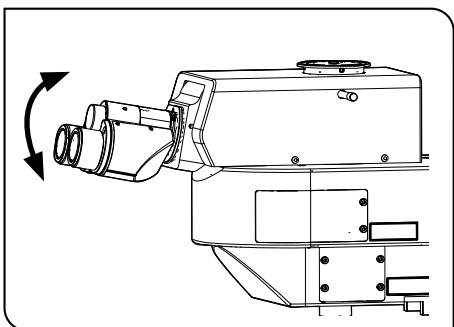
5 Selecting the light path of the trinocular tube



Slide the light path selector knob **a** to select the desired light path.

Light path selector knob position (FV30-ETTR)	
Pushed in	Pulled out
Observation 100%	Camera 100%

6 Adjusting the tilt



- ⊙ Adjust the height and tilt of the eyepieces to obtain the most comfortable viewing position.

Holding the binocular section with both hands, adjust it to the desired position.

FV30-ETTR: 0°–42°

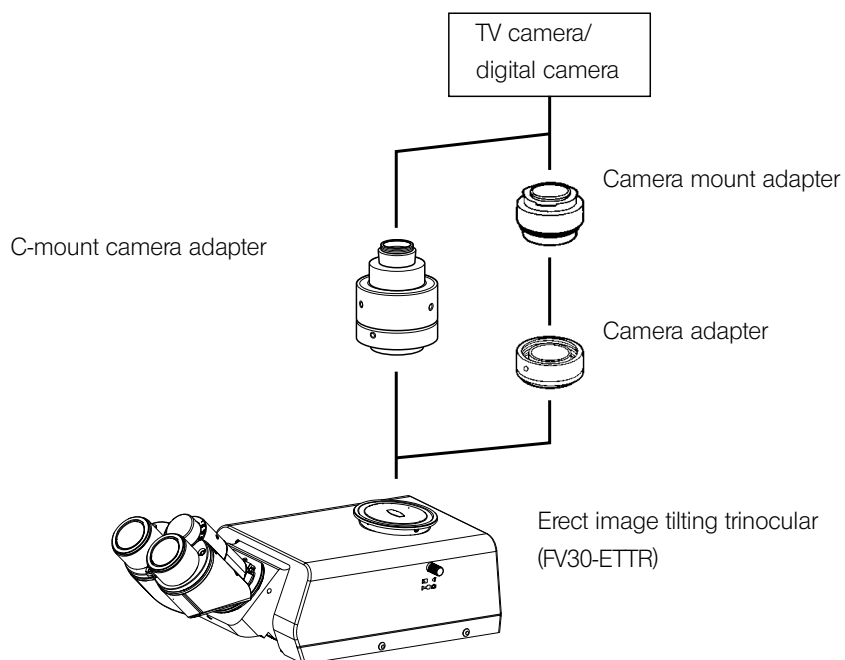
- ⊙ Never attempt to force the binocular section past the upper or lower stop position. Applying excessive force could destroy the limiting mechanism.

4-6 Mounting the camera (Maintenance)

1 Mounting a camera

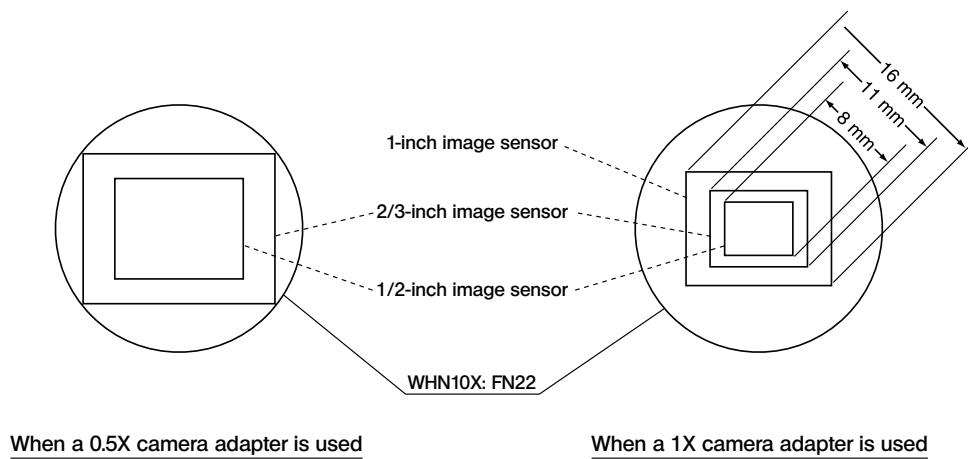
- ◎ Use the port of Erect image tilting trinocular (FV30-ETTR) when shooting a video or digital camera picture of the microscope images.
The trinocular tube accepts a camera adapter (certain camera adapters necessitate a camera mount adapter). For details, refer to the instruction manuals for these accessories.
- ◎ Be sure to adjust the parfocality before using a camera adapter. Otherwise, focusing of the camera image will not match that of the image observed through eyepieces. For the parfocality adjustment method, refer to the instruction manual for the camera adapter in use.

1 System chart

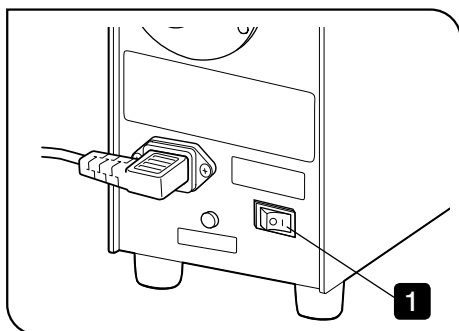


2 Selecting the camera adapter magnification

The image pickup area is determined by the size of the image sensor used in the TV camera or digital camera and the magnification of the camera adapter. The following illustrations show the image pickup areas of camera adapters when the WHN10X eyepieces with a FN of 22 are used.

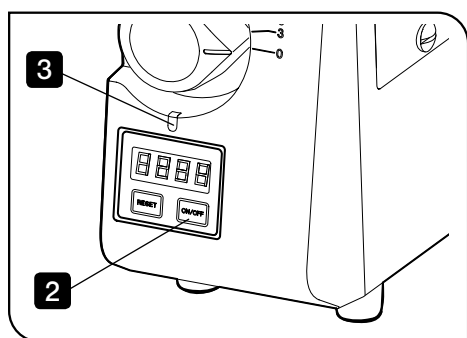


4-7 Mercury lamp (for U-HGLGPS) (Operation)



1 Turning on the lamp

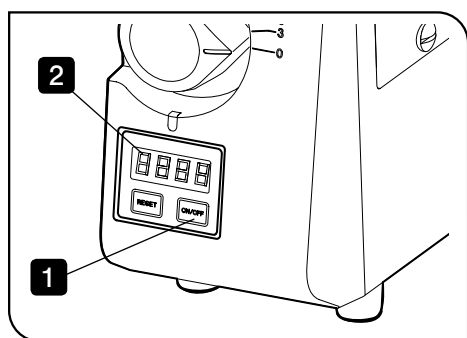
- 1 Turn " I " (ON) the power switch on the back side of the light source unit. The software version appears in the counter, and then (after approximately 3 seconds), the accumulated lighting time of the lamp appears. When the accumulated lighting time of the lamp appears, each switch can be operated.



- 2 Press the lamp switch in front of the light source unit.
- 3 The lighting display LED is turned on in blue. If the lamp is not turned on, the lighting display LED is turned on in red. In this case, refer to page 37.

⊙ The light volume of the lamp stabilizes approximately 90 seconds after being turned on. If you want to stabilize the light volume more stably, wait approximately 5 minutes after having it turned on.

⊙ In case the lamp switch is pressed for a period time to turn off the lamp within 2 minutes after the lamp was turned on, the lighting display LED is turned on in blue and starts blinking. The lamp is turned off 2 minutes after it was turned on, and light display LED stops blinking.

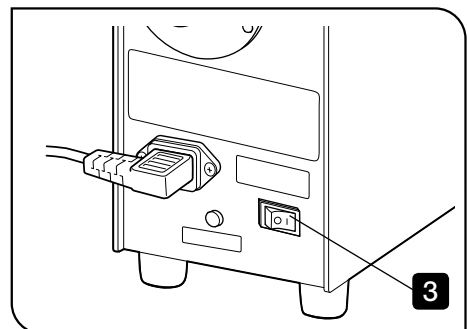


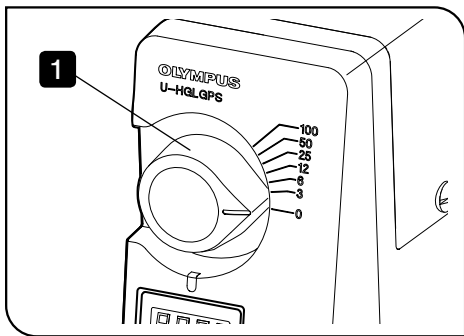
2 Turning off the lamp

- 1 Press the lamp switch in front of the light source unit for a period of time (0.5 seconds) to turn off the lamp.
- 2 After the lamp is turned off, the countdown of the cooling time (300 seconds) is displayed in the counter. Any operations by the buttons are locked until the indication of the countdown becomes "0".
- 3 Turn O (OFF) the power switch of the light source after the indication of the countdown became "0".

⊙ As the lamp is heated immediately after turning it off, it is hard to turn on the lamp again. If you want to turn on the lamp again, wait for approximately 10 minutes after having it turned off. If the lamp is turned on while heated, the lifetime of the lamp may be shortened.

⊙ The fan of the light source stops working automatically 60 seconds after the lamp switch has been pressed for a period time (approx. 0.5 seconds).

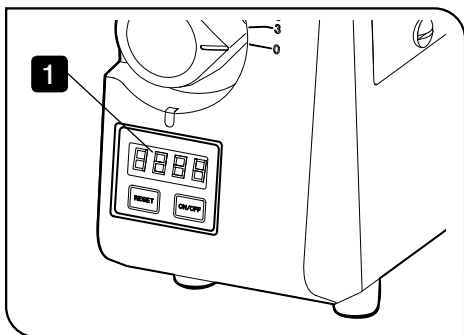




3 Adjustment of the brightness

- 1 Rotate the light volume adjustment dial to adjust the light volume. The light volume can be adjusted in 7 levels. Each numerical number indicates the percentage (0-100%) of each light volume where the maximum light volume is 100%.

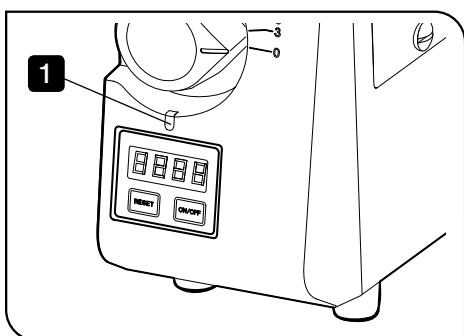
⦿ Rotate the light volume adjustment dial slowly by each level.



4 Counter display

- 1 When the power switch is turned ON, the accumulated lighting time of the lamp appears in the counter. For details, refer to below table.

Operation	Counter display
Immediately after the power switch is turned ON.	The software version appears. (For 3 seconds)
When the lamp is in stand-by status (3 seconds after the power switch is turned ON).	The accumulated lighting time of the lamp appears. (Unit: 1 hour)
When the lamp is turned OFF (when the lamp switch is pressed for a period of time). (Approx. 0.5 seconds)	The countdown of the cooling time (300 seconds) appears. (Unit: 1 second)
When end of the lifetime of the lamp is coming closer.	When the accumulated lighting time of the lamp exceeds 1900 hours, it blinks every second while the lamp is being turned on.
When the display is disabled by abnormal EEPROM data.	Err is displayed.



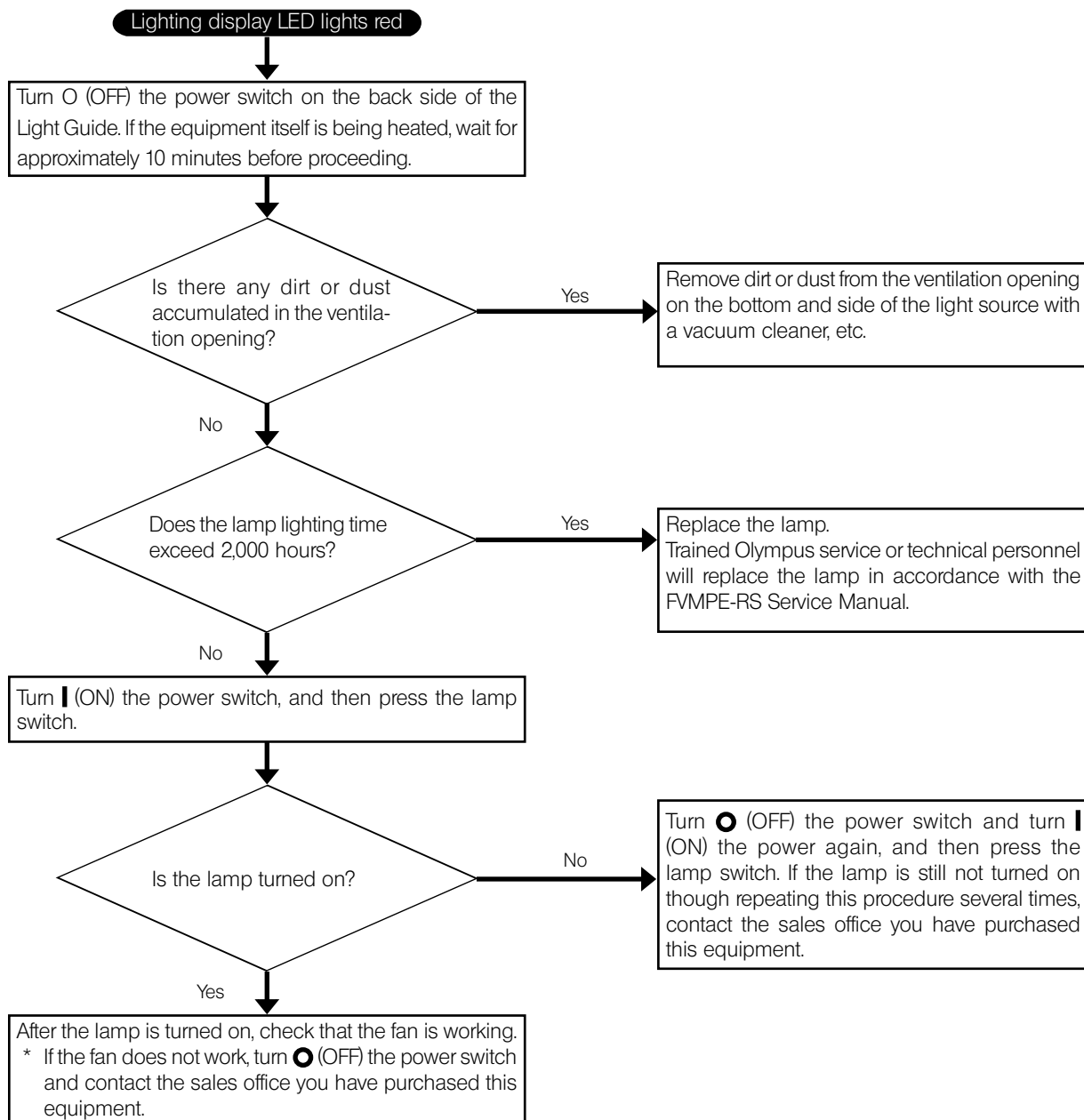
5 Lighting display LED

- 1 The lamp status appears in the lighting display LED. For details, refer to below table.

Conditions of the lamp	Lighting display LED
When the lamp is in stand-by status.	It is turned off.
When the lamp switch is pressed and the lamp is turned ON properly.	It lights blue.
Though the lamp switch is pressed, the lamp is not turned ON.	It lights red.
When the lamp is turned off.	It is turned off.
When the lamp switch is pressed for a period of time (approx. 0.5 seconds) within 2 minutes after the lamp was turned on	It lights blue and blinks. (The light display LED is turned off, when the light is turned off 2 minutes after it was turned on.)
When the lamp is turned off abnormally while the lamp is being turned on.	It lights red.
When the temperature of the body is raised abnormally due to the deterioration of the cooling status.	It lights red.

If the lighting display LED lights red

If the equipment does not work properly, e.g. the lamp is not turned on, etc., the lighting display LED lights red. Follow the procedures described below.



5 How to assemble each NDD unit

This chapter describes assembly procedures for each type of external NDD unit. Please read the chapter for the external NDD unit you intend to use.

4-1: External NDD unit for reflected light fluorescence observation page 39

4-2: External NDD unit for transmitted fluorescence observation page 47

	Channel	External NDD unit
Reflected light fluorescence observation	[RXD]	FV30-RXD
	[RXD]	FV30-RXD, FV30-ARXD
	[RXD]	FV30-RXD, FV30-AGAPD
Transmitted fluorescence observation	[TXD]	FV30-TXDBX

- CAUTION** · The external NDD unit has extremely high light-receiving sensitivity; therefore, it may deteriorate due to ambient light from room lighting or a monitor. When using the external NDD unit, keep the area around the microscope dark. Before illuminating the area around the microscope, uncheck all [CH] check boxes located on [PMT Setting] tab of the FV30S-SW software to turn off the external NDD unit.
- The NDD and GaAsP-PMT also deteriorate light due to ordinary fluorescent observation. Adjust HV and laser to observe so that brightness in image is not saturated as much as possible.
 - The GaAsP-PMT is a consumable item. So it is not guaranteed. After using GaAsP-PMT for a certain amount of time, it will be difficult to observe clearly because of dark image, etc. At this time, the GaAsP-PMT must be replaced with a new one (paid) or adjusted by the Olympus service personnel. This operation, replacement and adjustment, is paid for, even if it will happen within a year from the delivery.

The GaAsP-PMT equipped in the FV30-AGAPD contains arsenic (As). At the time of discarding it, take necessary actions by yourself based on the industrial waste management law or consign it to the authorized industrial waste disposer. When you use this product in an other country and dispose it of there, follow the rule of industrial waste there.

5-1 External NDD unit (reflected right) (Maintenance)

1 Unit structures

	For 2-channel (FV30-RXD)	For 4-channel (FV30-RXD, FV30-ARXD)	For 4-channel (FV30-RXD, FV30-AGAPD)
①	(N/A)	IN/OUT selector knob for Spectral DM	IN/OUT selector knob for Spectral DM or Mirror
②	IR cut filter****	IR cut filter****	IR cut filter****
③	(N/A)	Spectral DM**	Spectral DM** or 100% reflecting mirror***
④	Fluorescence cube*	Fluorescence cube*	Fluorescence cube*
⑤	PMT channel 1 [RXD1]	PMT channel 1 [RXD1]	PMT channel 1 [RXD1]
⑥	PMT channel 2 [RXD2]	PMT channel 2 [RXD2]	PMT channel 2 [RXD2]
⑦	(N/A)	Fluorescence cube*	Fluorescence cube*
⑧	(N/A)	PMT channel 3 [RXD3]	GaAsP-PMT channel 3 [RXD3G]
⑨	(N/A)	PMT channel 4 [RXD4]	GaAsP-PMT channel 4 [RXD4G]

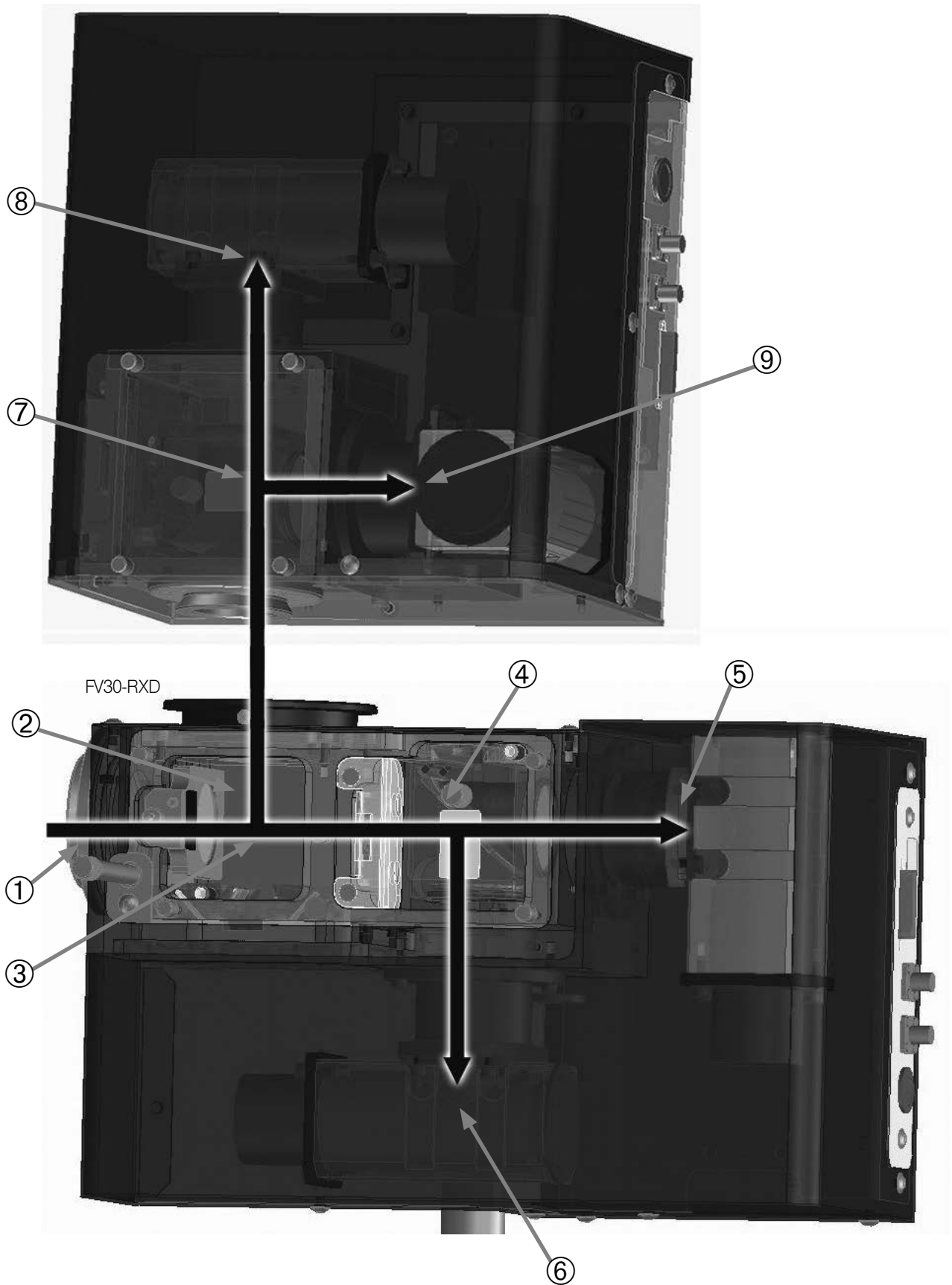
** The following fluorescence cubes can be mounted/removed.
FV30-FVG, FV30-FCY, FV30-F475R, FV30-FGR, FV30-FRCY5, FV30-FOPT

** The following spectral DM cubes can be mounted/removed.
FV30-SDM570, FV30-SDMOPT

*** The following 100% reflective mirror cubes can be mounted/removed.
FV30-SDM-M

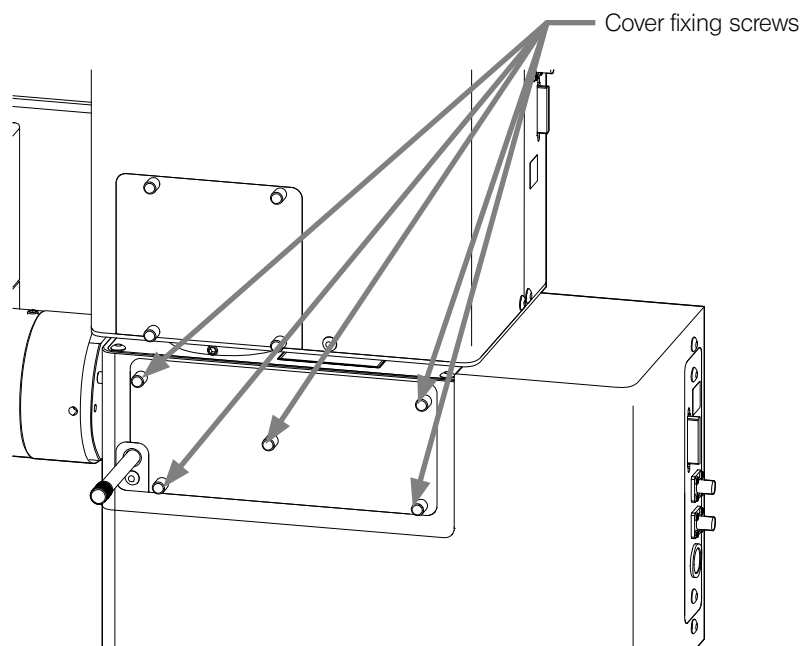
**** The following IR cut filters can be mounted/removed.
FV30-BA750RXD, BA685RXD (installed to FV30-RXD on delivery)

FV30-ARXD or FV30-AGAPD



2 Attaching and removing the cover (FV30-RXD)

1. Remove the cover of the external NDD unit by loosening and removing the fixing screws (five locations) securing the cover.

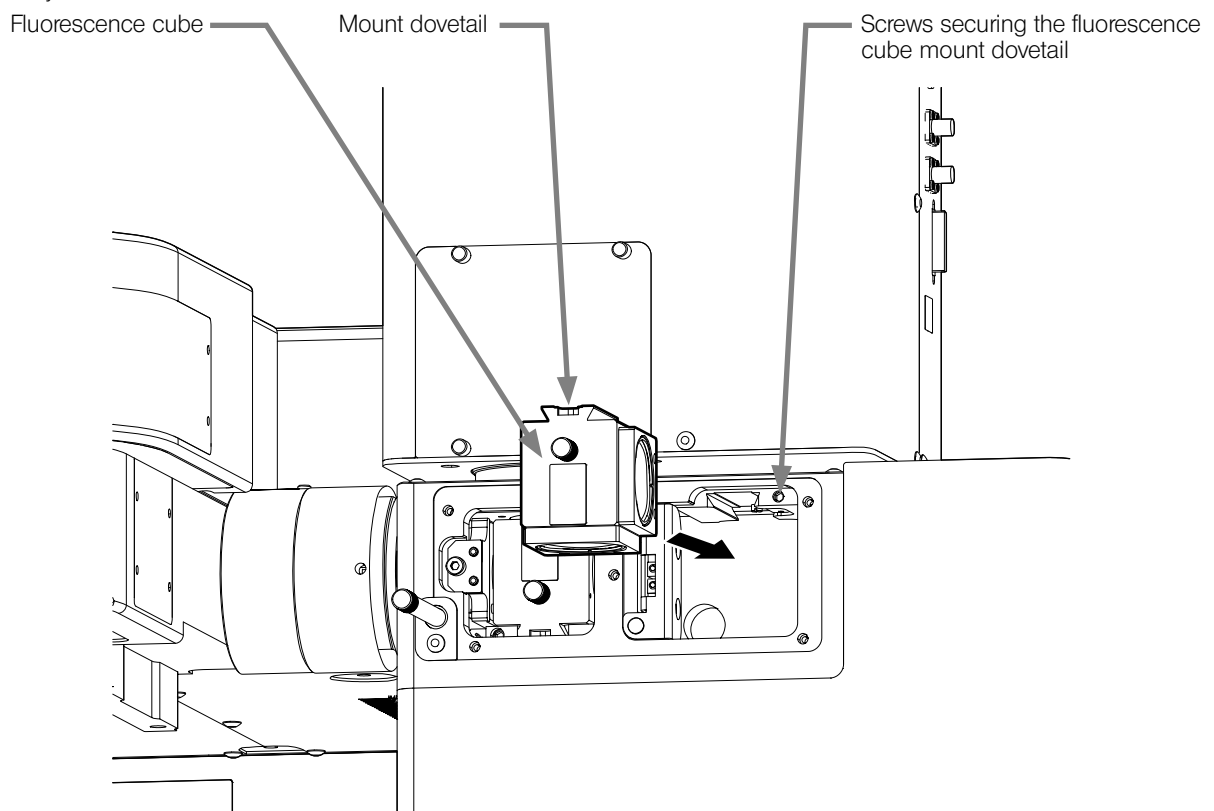


2. After attaching or removing the part, reposition the cover and secure it by tightening the cover fixing screws.

CAUTION When the cover is removed, the interlock switch works to block the laser beam. When observing a specimen, be sure to secure the cover firmly.

3**Attaching and removing the fluorescence cube (FV30-RXD)**

1. Loosen the screws securing the fluorescence cube mount dovetail on the external NDD unit using the Allen screwdriver provided with the system, and remove the fluorescence cube by pulling it out.
2. Securely insert the mount dovetail of the fluorescence cube into the mounting frame of the external NDD unit until it meets the end of the frame.
Tighten the screws securing the fluorescence cube mount dovetail using the Allen screwdriver provided with the system.

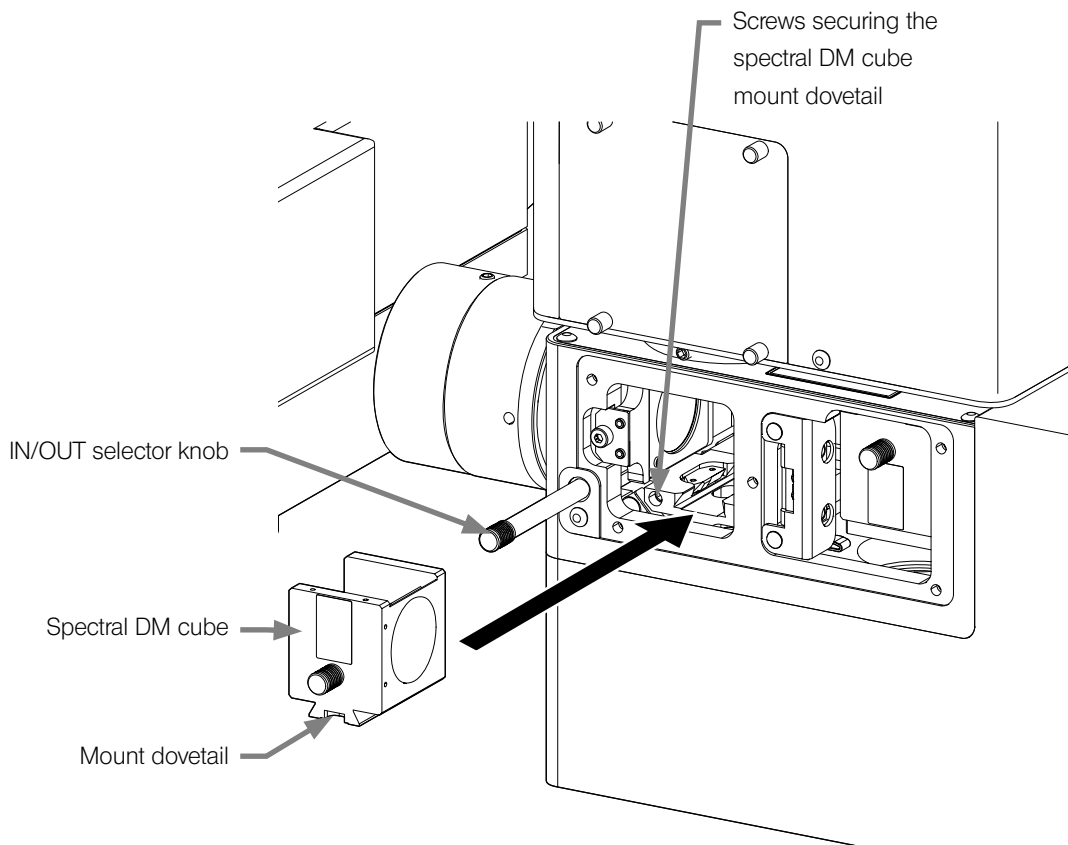


4 Attaching and removing the spectral DM cube (FV30-RXD)

⊙ When attaching/removing the spectral DM cube, pull the IN/OUT selector knob and hold it to prevent the DM securing table from moving.

1. Loosen the screws securing the spectral DM cube mount dovetail on the external NDD unit using the Allen screwdriver provided with the system, and remove the spectral DM cube by pulling it out.
2. Securely insert the mount dovetail of the spectral DM cube into the mounting frame of the external NDD unit until it meets the end of the frame.

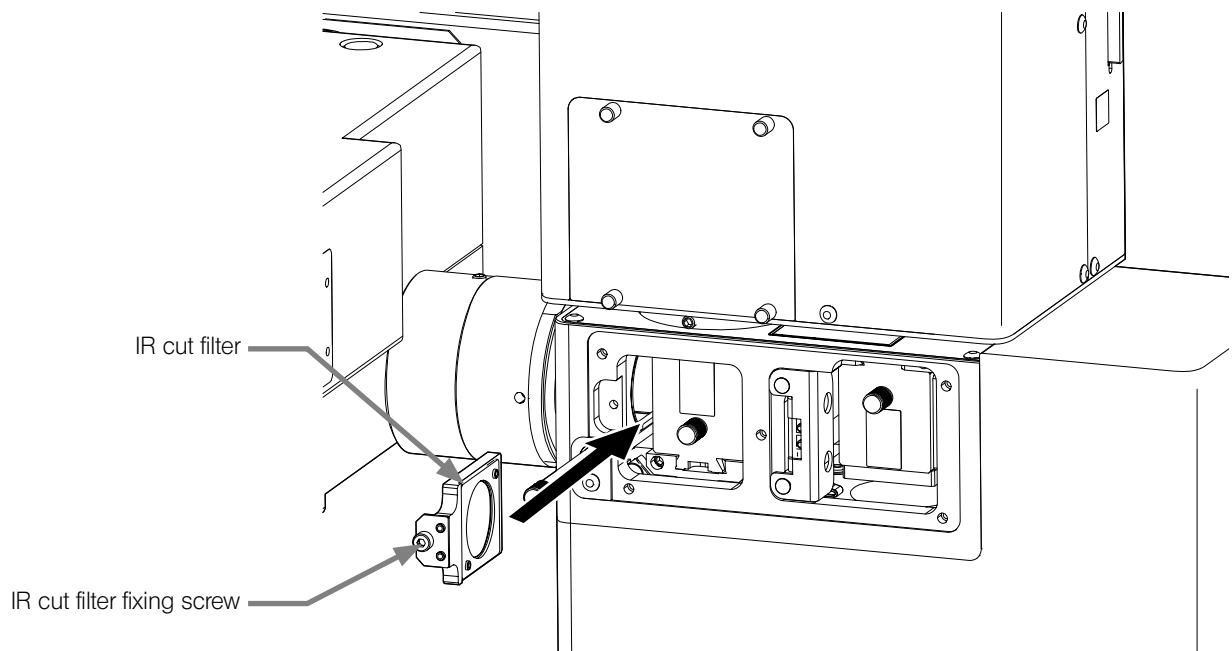
Tighten the screws securing the spectral DM cube mount dovetail using the Allen screwdriver provided with the system.



5**Attaching and removing the IR cut filter (FV30-RXD)**

© The IR cut filter (BA685RXD) is installed on delivery.

1. Loosen the screw (one location) securing the IR cut filter on the external NDD unit using the Allen screwdriver provided with the system, and remove the IR cut filter.

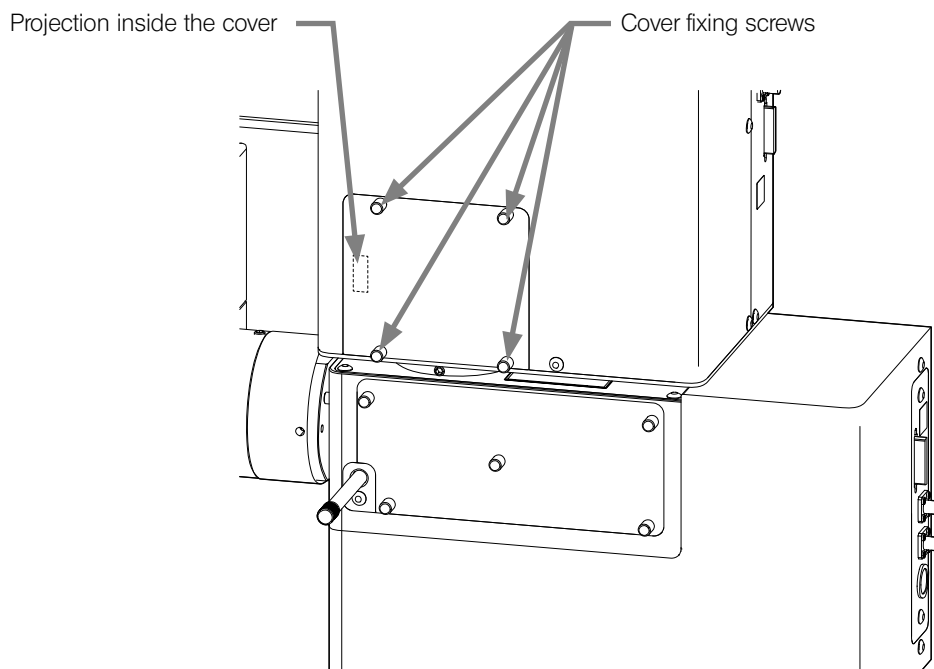


2. Place a new IR cut filter into the external NDD unit frame.
Tighten the screw securing the IR cut filter using the Allen screwdriver provided with the system.

© Attach the IR cut filter with pushing it to the left side wall.

6 Attaching and removing the cover (FV30-ARXD, FV30-AGAPD)

1. Remove the cover of the external NDD unit by loosening and removing the fixing screws (four locations) securing the cover.



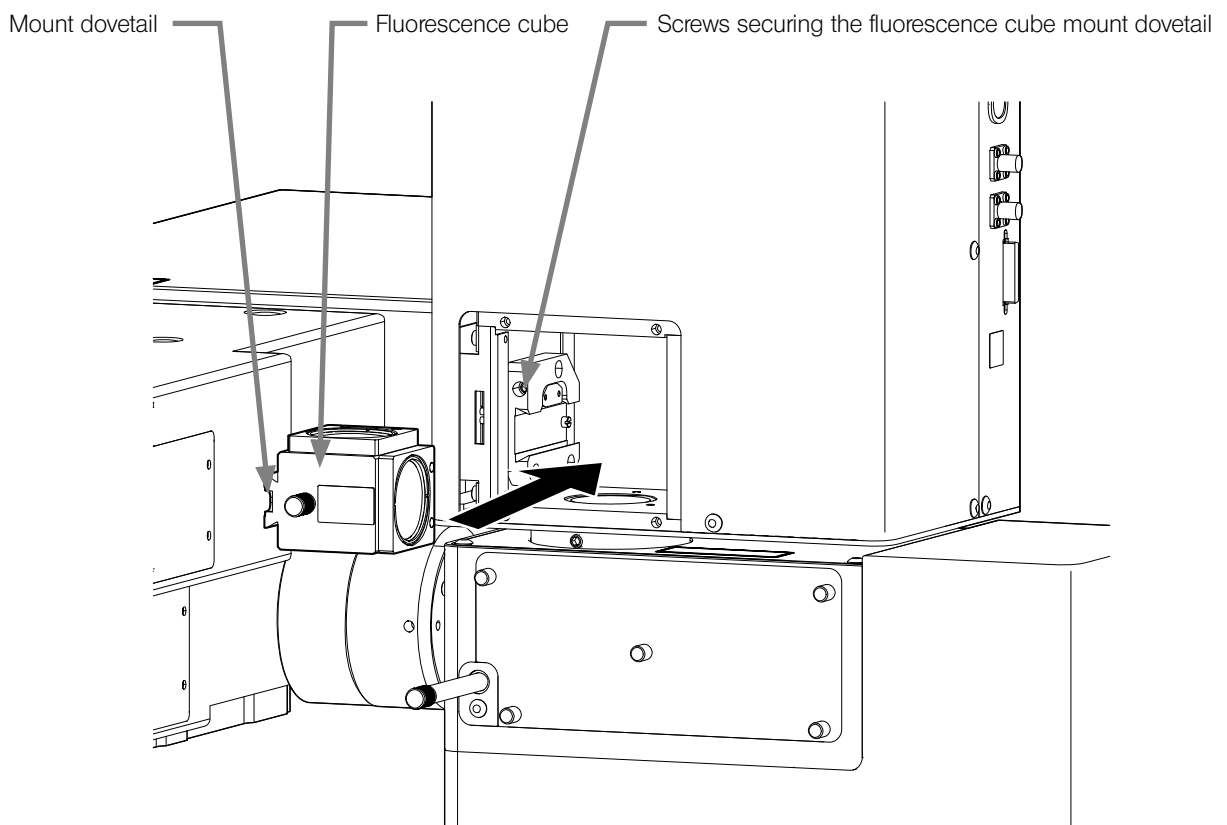
- © The picture above shows the attaching/removing of the cover for FV30-ARXD.
(Same procedures apply to FV30-AGAPD when attaching/removing the cover.)

2. After attaching or removing the part, reposition the cover and secure it by tightening the cover fixing screws.

CAUTION When the cover is removed, the interlock switch works to block the laser beam. Before starting observation, make sure to secure the cover firmly.
When attaching the cover, make sure that the projection inside the cover is positioned as shown in the picture. And, make sure to secure the cover firmly before starting observation.

7**Attaching and removing the fluorescence cube (FV30-ARXD, FV30-AGAPD)**

1. Loosen the screws securing the fluorescence cube mount dovetail on the external NDD unit using the Allen screwdriver provided with the system, and remove the fluorescence cube by pulling it out.
2. Securely insert the mount dovetail of the fluorescence cube into the mounting frame of the external NDD unit until it meets the end of the frame.
Tighten the screws securing the fluorescence cube mount dovetail using the Allen screwdriver provided with the system.



© The picture above shows the attaching/removing of the fluorescence cube for FV30-AGAPD.
(Same procedures apply to FV30-ARXD when attaching/removing the fluorescence cube.)

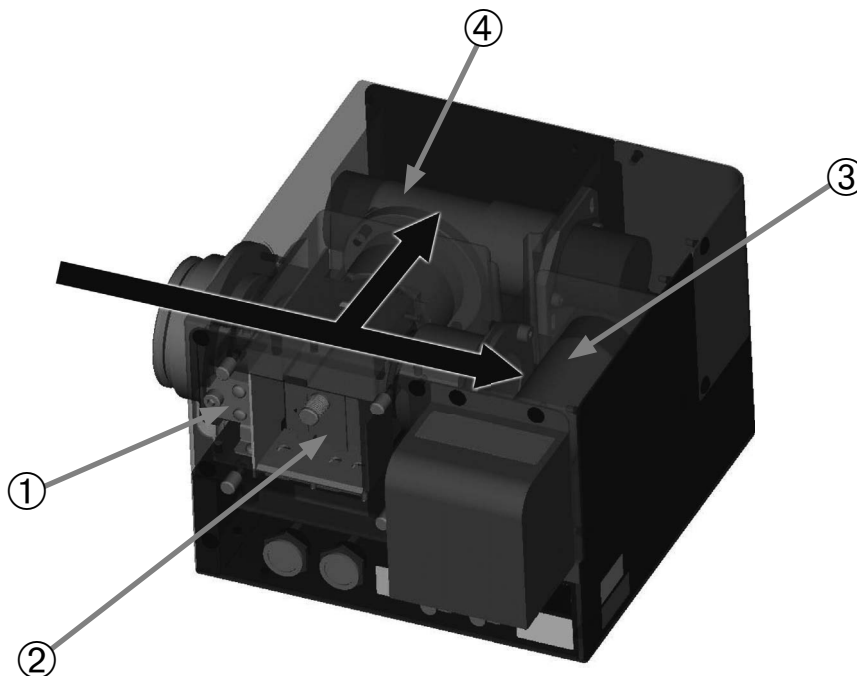
5-2 External NDD unit (Transmitted light) (Maintenance) (BX63LF only)

1 Unit structures (FV30-TXDBX)

	For 2-channel (FV30-TXDBX)
①	IR cut filters**
②	Fluorescence cubes*
③	PMT channel 1 [TXD1]
④	PMT channel 2 [TXD2]

* The following fluorescence cubes can be mounted/removed.
FV30-FVG, FV30-FCY, FV30-F475R, FV30-FGR, FV30-FRCY5, FV30-FOPT

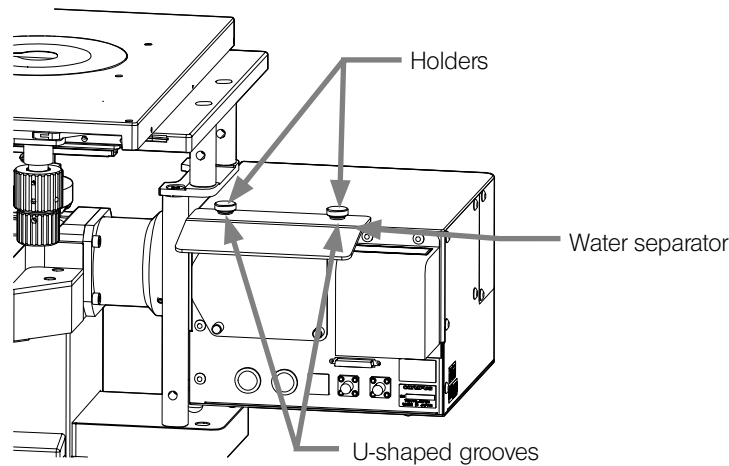
** The following IR cut filters can be mounted/removed.
FV30-BA750TXD, BA685TXD (installed to FV30-TXDBX on delivery)



2 Removing and installing the water separator (FV30-TXDBX)

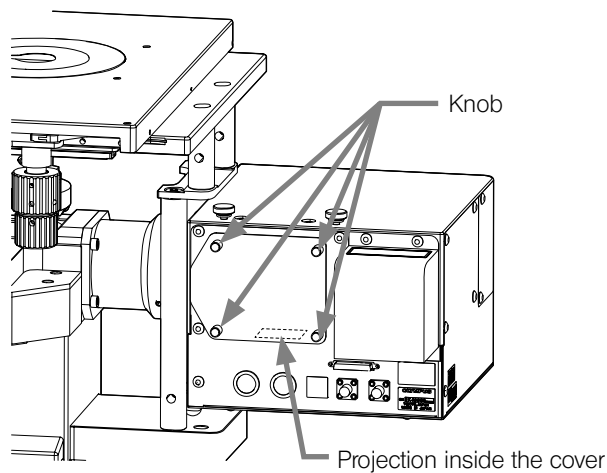
1. Pull the water separator secured to the top surface of the external NDD unit with the two holders horizontally to the left in order to remove it.

To reinstall the water separator, align the two U-shaped grooves with the two holders on the top surface of the external NDD unit, and then push the water separator down.



3 Removing and installing the cover (FV30-TXDBX)

1. Loosen the knobs (4 positions) of the NDD unit and remove the cover.



2. After removing and installing the parts, reinstall the cover and tighten the cover fixing screws to secure the cover in place.

CAUTION

Ensure that the cover is firmly secured before starting observation.

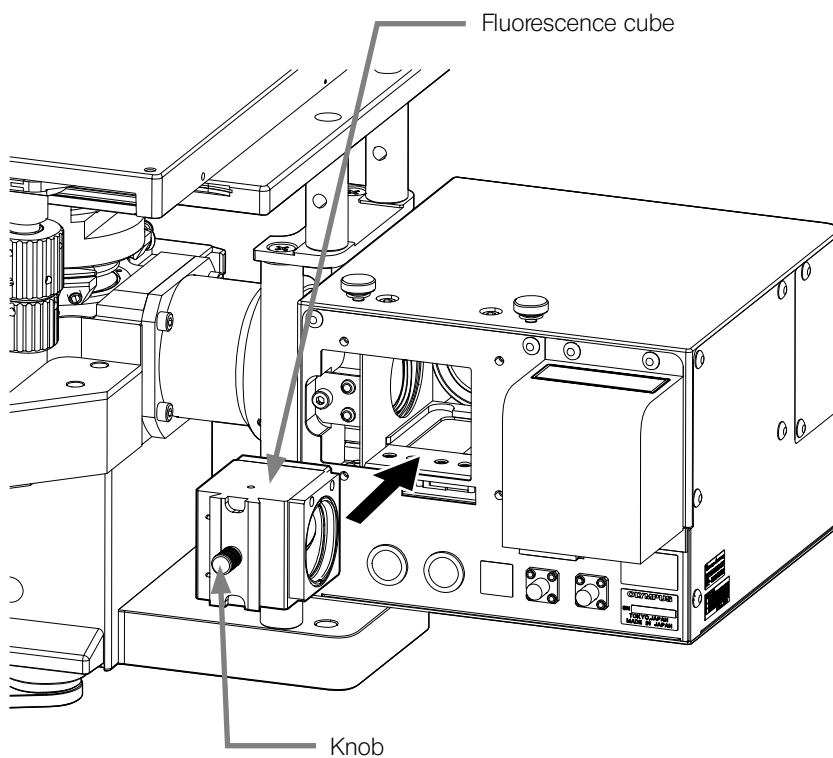
With the cover removed, the interlock switch is actuated and laser light is blocked. Before starting observation, ensure that the cover is firmly secured. When installing the cover, make sure that the protrusion within the cover is positioned at the dotted line as shown in the picture. And also ensure that the cover is firmly secured before starting observation.

4 Removing and installing the fluorescence cube (FV30-TXDBX)

⊙ The following fluorescence cubes can be mounted/removed.

FV30-FVG, FV30-FCY, FV30-F475R, FV30-FGR, FV30-FRCY5, FV30-FOPT

1. Hold the knob of the fluorescence cube and remove the fluorescence cube by pulling it out from the NDD unit.
2. Hold the knob of the fluorescence cube, insert it to the mounting opening of the NDD unit and push in to the end completely.



⊙ Tighten the knob to the screw hole at the bottom of the mount dovetail.

⊙ Attaching the cover will secure the fluorescence cube.

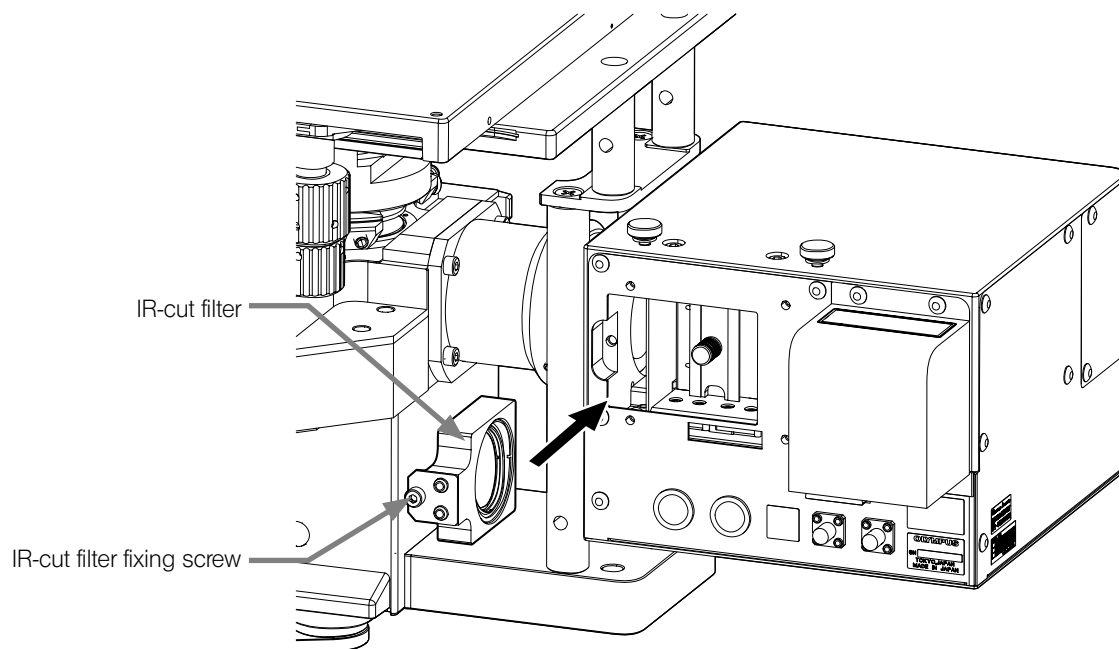
5**Removing and installing the IR-cut filter (FV30-TXDBX)**

- ◎ The following IR cut filters can be mounted/removed.
FV30-BA750TXD, BA685TXD (installed to FV30-TXDBX on delivery)

- 1. Loosen the screw (one location) securing the IR cut filter on the external NDD unit using the Allen screwdriver provided with the system, and remove the IR cut filter.

- 2. Install another IR-cut filter at the original position in the external NDD unit.
Tighten the screw securing the IR cut filter using the Allen screwdriver provided with the system.

- ◎ Attach the IR cut filter with pushing it to the left side wall.



5-3 Assembling the fluorescence cube and the spectral DM cube (Maintenance)

It is possible to create a spectral mirror unit with wavelength characteristics, according to the needs of the customer by using a commercially available dichroic mirror and emission filter.

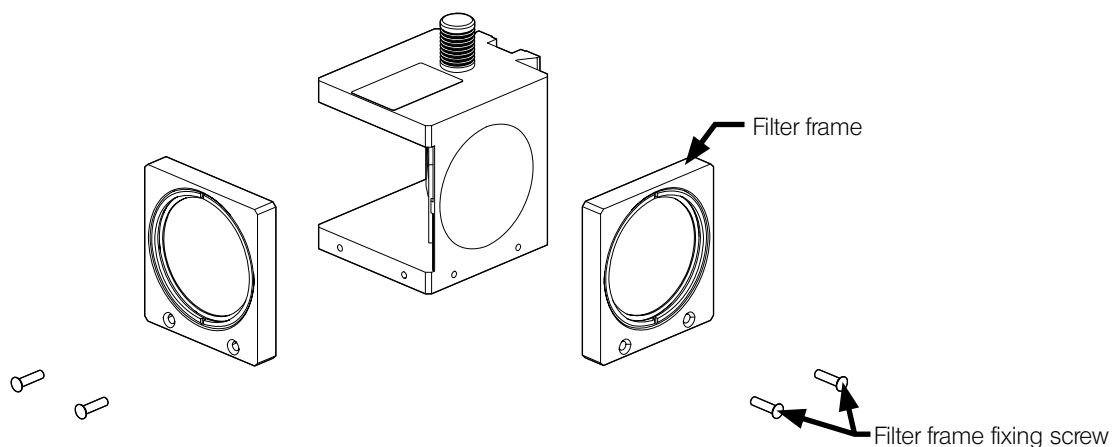
	Unit name	External NDD units used
Fluorescence cube	FV30-FOPT	FV30-RXD, FV30-ARXD, FV30-AGAPD FV30-TXDBX
Spectral DM Cube	FV30-SDMOPT	FV30-RXD

1 Fluorescence cube (FV30-FOPT)

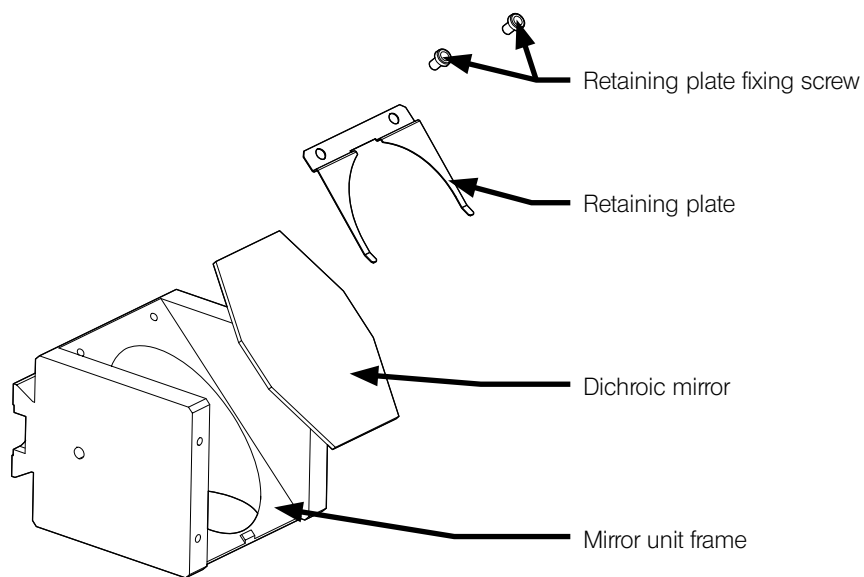
Dimensions of optical parts

	FV30-FOPT
Emission filter	Diameter $\varnothing 31.7 - \varnothing 32.0$ mm Thickness 4 mm or less
Dichroic mirror	Long side 43.7 - 43.9 mm Short side 31.7 - 31.9 mm Thickness 1 mm

1. Loosen the screws securing the filter frames (two screws per frame) of the fluorescence cube by using a commercially available precision screwdriver, and then remove the two filter frames.

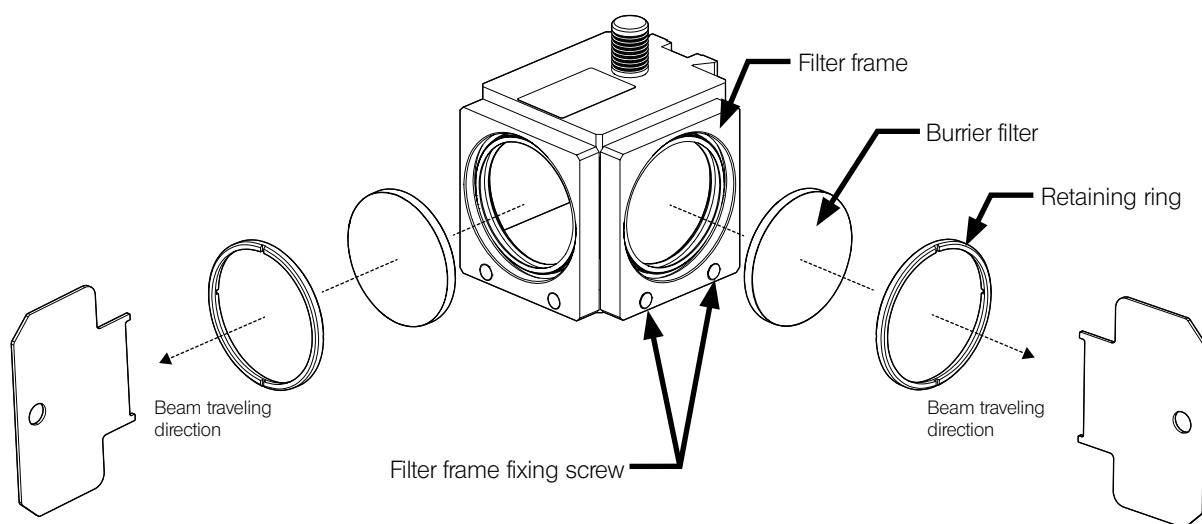


2. Loosen the screws securing the retaining plates (two screws per plate) of the fluorescence cube by using a commercially available precision screwdriver in order to remove the plates. Set a dichroic mirror in the mirror unit frame with the interference film surface facing outward (refer to the reference below). Reinstall the retaining plates and tighten the retaining plate fixing screws to secure the plates in place.



- Ⓢ Be careful not to soil the dichroic mirror surface with sebum, etc. or scratch it with tools, etc.
- Ⓢ Installing the dichroic mirror in the wrong direction will adversely affect optical performance. For Olympus dichroic mirrors, a corner of the interference film surface is marked with a marker. For other commercially available dichroic mirrors, refer to the instruction manuals.

3. Install the two filter frames to the fluorescence cube frame and tighten the filter frame fixing screws to secure the frames in place.
4. Loosen the retaining ring installed in the position where a emission filter is to be installed by using the provided retaining ring screwdriver to remove it.
Insert the emission filter in the filter frame with the beam incoming surface facing to the fluorescence cube.
Tighten the retaining ring by using the provided retaining ring screwdriver.

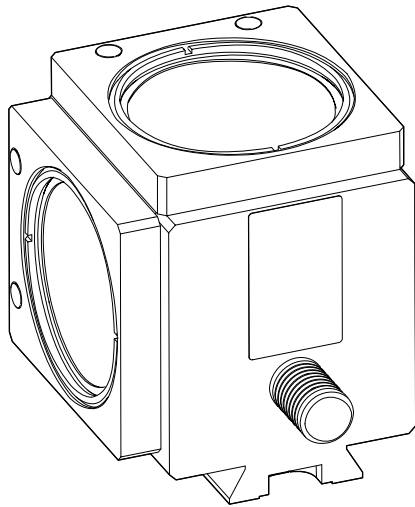


- ⊙ Be careful not to soil the emission filter surface with sebum, etc. or scratch it with tools, etc.
- ⊙ Installing the emission filter in the wrong direction will adversely affect optical performance.
Place the Olympus emission filter with the arrow (↘) on the side of the filter facing to the fluorescence cube.
For other commercially available emission filters, refer to the instruction manuals.

5. Secure the knob to the fluorescence cube.

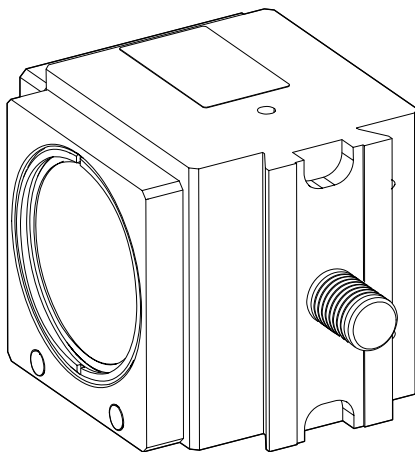
When installing to the NDD unit (reflected) (FV30-RXD, FV30-ARXD or FV30-AGAPD)

Tighten the knob to the screw hole on the surface where the seal describing the product name is attached.



When installing to the NDD unit (transmitted) (FV30-TXDBX)

Tighten the knob to the screw hole at the bottom of the mount dovetail.



2 Spectral DM cube (FV30-SDMOPT)

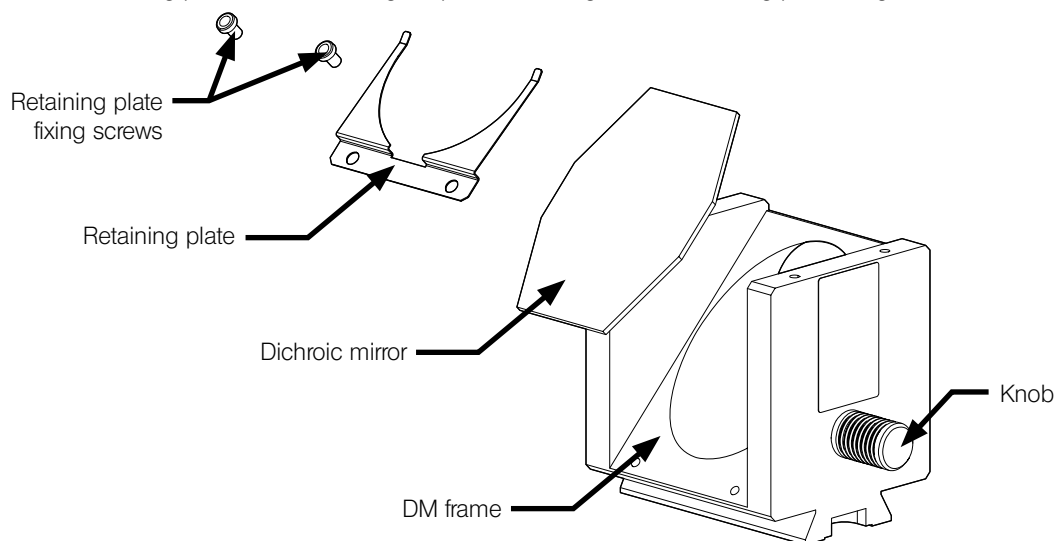
Dimensions of optical parts

	FV30-SDMOPT
Dichroic mirror	Long side 43.7 - 43.9 mm Short side 31.7 - 31.9 mm Thickness 1 mm

1. Loosen the retaining plate fixing screws (2 positions per each holder) of the DM cube with a commercially available precision screwdriver, and remove the retaining plate.

Place a dichroic mirror in the mirror unit frame with the interference film surface facing outward (refer to the NOTE below).

Place the retaining plate back to the original position and tighten the retaining plate fixing screws to secure it in place.



- Ⓢ Be careful not to soil the dichroic mirror surface dirty with sebum, etc. or scratch it with tools, etc.
- Ⓢ Installing the dichroic mirror in the wrong direction will adversely affect optical performance. For Olympus dichroic mirrors, a corner of the interference film surface is marked with a marker. For other commercially available dichroic mirrors, refer to the instruction manuals of commercially available dichroic mirrors.

2. Secure the knob to the DM cube.

5-4 Fluorescent mirror unit and DM unit (Maintenance)

- ◎ It is possible to create a fluorescent mirror unit, or DM unit for SIM scanner unit with wavelength characteristics, according to the needs of the customer by using a commercially available dichroic mirror.

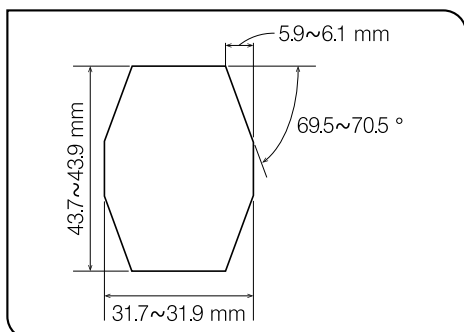
CAUTION Attaching or removing the fluorescent mirror unit or DM unit for SIM scanner to or from this system falls under the category of service work.
Olympus service personnel, or technical personnel who received service training, will carry out with their attachment to and removal from this system, in accordance with the FVMPE-RS Service Manual.

	Optical unit name	Unit on which the created optical unit is mounted
Fluorescent mirror unit	IX3-FFXL	FV30-RFABXL
DM unit for SIM scanner	FV30-ADMOPT	FV30-HSUMP

1 Fluorescence mirror unit (IX3-FFXL)

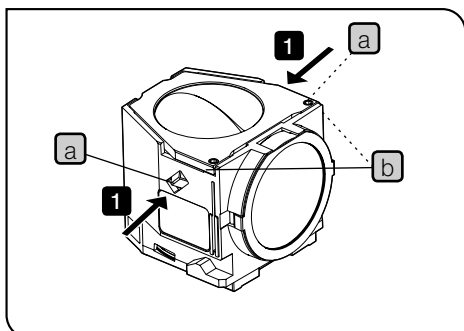
- ◎ You can also assemble original fluorescence mirror units by fitting a commercially available emission filter, excitation filter or dichroic mirror in the dummy mirror unit frame IX3-FFXL.

- CAUTION** · When assembling original fluorescence mirror units, be careful that if filters are combined improperly, the UV light could enter into your eyes through the eyepieces.
· Never use your original mirror units for the LSM observation.



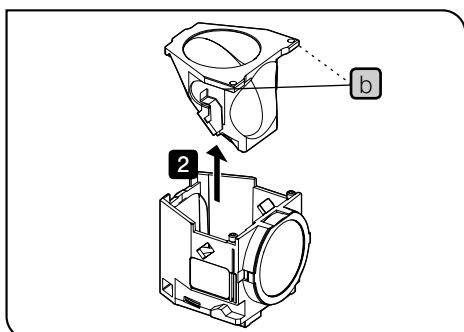
Dimensions of optical parts

	IX3-FFXL
Emission filter	Diameter $\varnothing 31.8 - \varnothing 31.9$ mm Thickness 3.1 mm
Excitation filter	Diameter $\varnothing 31.8 - \varnothing 31.9$ mm Thickness 5.2 - 5.8 mm
Dichroic mirror	Long side (See the picture on the left.) Short side (See the picture on the left.) Thickness 0.95 - 1.05 mm

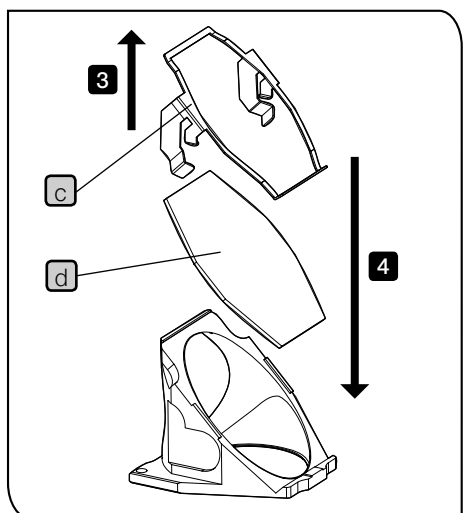


Creating a fluorescence mirror unit

- 1 Push in the nail **a** of the fluorescence mirror unit by using pointed objects such as tweezers, etc.



- 2 Hold the dichroic mirror casing **b** of the fluorescence mirror unit and pull it out.

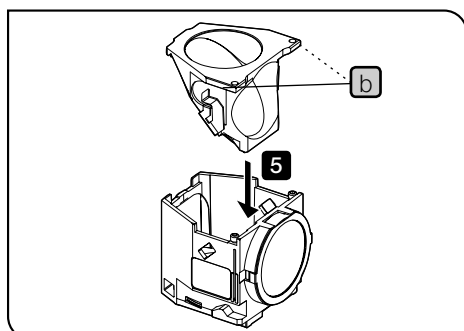


- 3 Remove the dichroic mirror fixing spring **c** from the dichroic mirror casing.

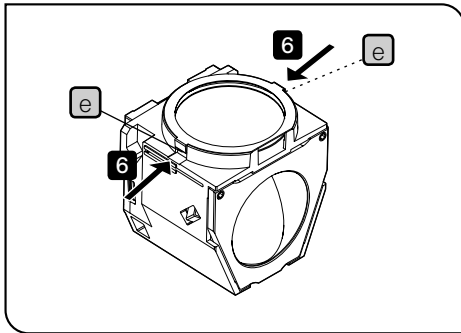
- 4 Place the dichroic mirror **d** on the dichroic mirror frame by facing the reflection surface down (toward the dichroic mirror frame), and fix it with the dichroic mirror fixing spring **c**.

Ⓞ If you are using an Olympus dichroic mirror, the reflection surface is the surface without a marker at the edge of the dichroic mirror. Be sure to mount the dichroic mirror by facing the surface with the marker up (toward the fixing spring).

Ⓞ If you use a dichroic mirror made by other companies, mount the dichroic mirror by facing the reflection surface down.

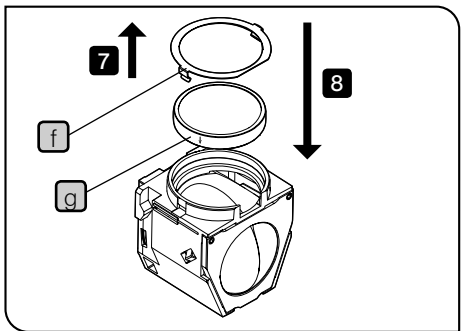


- 5 Push the dichroic mirror casing into the fluorescence mirror unit. Push the **b** area with your fingers from the above to make sure that it is not rattling.

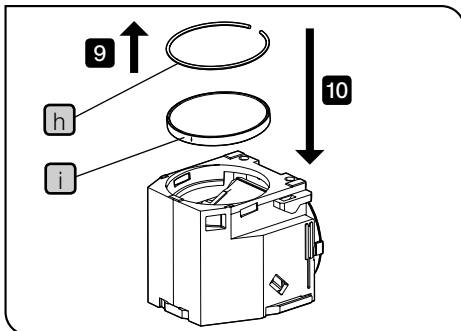


Attaching the excitation filter

- 6** Push in the nails **e** of the excitation filter fixing frame by using pointed objects such as tweezers, etc.



- 7** Remove the excitation filter fixing frame **f**.
- 8** Place the excitation filter **g** on the fluorescence unit and fix it with the excitation filter fixing frame **f**.
- ⊙ If you are using an Olympus excitation filter, place the filter so that an arrow mark (↓) on the side faces the mirror unit.
 - ⊙ If you are using an excitation filters made by other companies, follow the instruction manual provided with the excitation filter.



Attaching the emission filter

- 9** Remove the C ring **h** by using pointed objects such as tweezers, etc.
- 10** Attach the emission filter **i** to the fluorescent mirror unit, and secure it by pushing the filter with the C ring **h**. Make sure that the filter is not rattling.
- ⊙ If you are using an Olympus emission filter, place the filter so that the arrow mark (↓) on the side faces the mirror unit.
 - ⊙ If you are using the emission filters made by other companies, follow the instruction manual provided with the emission filter.

2 DM Unit for the SIM Scanner (FV30-ADMOPT)

Dimensions of optical parts

	FV30-ADMOPT
Dichroic mirror	Long side 50 mm Short side 35.9 - 36.0 mm Thickness 1 mm Reflective surface accuracy after coating 5λ or less ($\lambda=632.8$ nm)

- ⊙ The work (action) to secure the dichroic mirror to the DM unit for SIM scanner and the work (action) to register the data for correcting the scanner to this system against the dimensional accuracy variation which are in the dichroic mirror and the DM unit for SIM scanner, are supported by the Olympus service personnel.
- ⊙ If you use this instrument without registering the correction data, the problems, e.g. the image position is not matched, the resolution is deteriorated, etc. will occur, and the performance cannot be guaranteed.
- ⊙ Do not remove the dichroic mirror which was secured once from the DM unit for SIM scanner.

6 Visual observation / observation using a camera

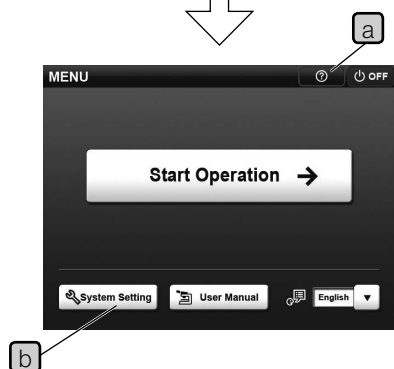
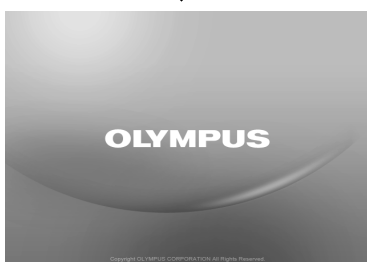
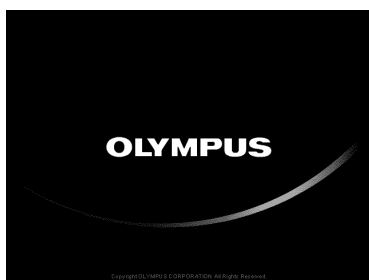
6-1 Touch panel controller (Operation/Maintenance)



1 Basic operations of touch panel controller (Operation/Maintenance)

- 1** The touch panel controller can be operated by directly touching the displayed button with your fingertip.
 - Ⓞ The touch panel controller uses a static capacitance type touch panel and may not react if it is touched by a finger wearing a rubber or vinyl glove. So use a touch pen for a static capacitance type touch panel.
- 2** The selected button turns blue to indicate that it is selected.
- 3** For the differences in the touch methods (tap, drag and hold), refer to Online Help of the touch panel controller.
For displaying Online Help, refer to page 65.

2 Starting the touch panel controller (Operation/Maintenance)



1 After setting the main switch of the touch panel controller to I (ON), the black startup display is displayed (for about 20 seconds), and then the blue startup display appears.

Ⓞ The order to turn ON the power switches of this system is defined. Refer to page 10 for details.

Ⓞ When the main switches of the BX63L-CBH and touch panel controller are already "I" (ON) and the touch panel controller is in the standby mode, the display starts with the blue display.

2 Touch the Online Help button **a** with your fingertip. First read the following descriptions to understand how to operate the touch panel controller.

- Basic Touch Panel Operations
- How to use this Online Help

The function description is to be referenced as required after starting the actual operation.

Ⓞ When the touch panel controller is used for the first time,

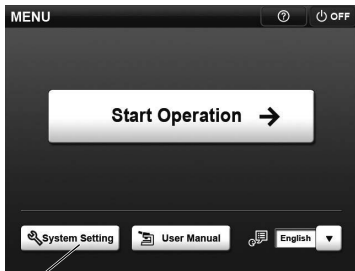
Start Operation cannot be selected unless **System Setting** **b** has been completed.

3 System setting (Maintenance)

The system setup is required when using the system for the first time or after replacing a unit connected to the microscope.

Ⓞ The microscope cannot be controlled unless the unit setting and optical setting are completed. Be sure to set them.

- 1 Tap the **System Setting** button. The [System Setting] display appears on the touch panel screen.



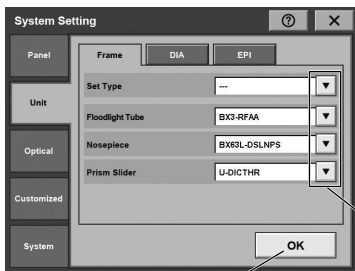
Unit setting

This tab is used to set the units connected to the BX63LF.

- 2 Tap the [Unit] tab in the [System Setting] display to open the [Unit] display.



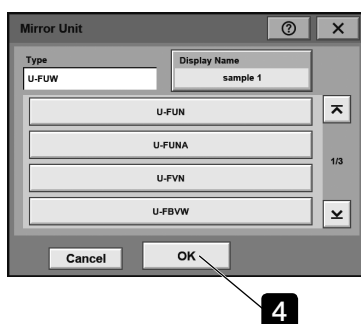
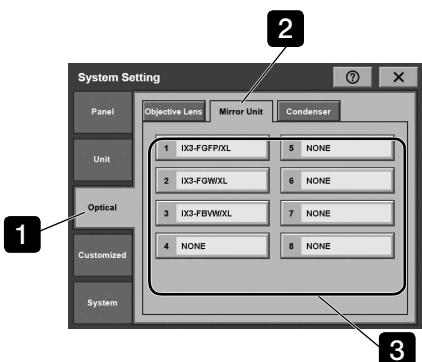
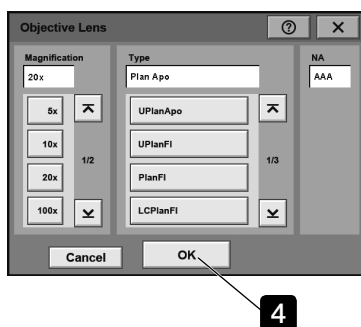
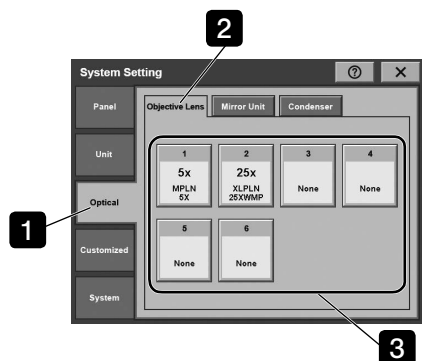
- 3 Set the units connected to the BX63LF. When the marking for the desired module is tapped, the unit names are displayed. Select the units used in the module and tap them.



- 4 Tap the **OK** button to save the setting. If you want to set another item, tap the tab for the desired setting. If you want to exit the system setting, tap the [X] marking to close the [System Setting] screen.

Optical setting

This tab is used to set the optical system (objectives, mirror units and condenser).

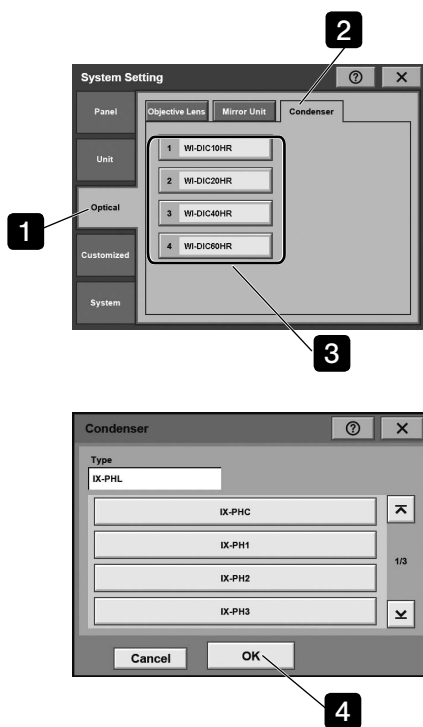


Objective setting

- 1** Tap the [Optical] tab in the [System Setting] display to open the [Optical] display.
- 2** Tap the [Objective Lens] tab in the [Optical] display.
- 3** Register the objective actually mounted on the BX63LF for each nosepiece position. Tap one of the nosepiece position numbers in use to open the [Objective Lens] screen for the position.
- 4** Select the magnification and type of the objective and tap the OK button to register them.
- 5** Register the magnifications and types of the objectives in other nosepiece positions by repeating the above for each. No setting is required for the unused nosepiece positions.
- 6** If you want to set another item, tap the tab for the desired setting. If you want to exit the system setting, tap the [X] marking to close the [System Setting] screen.

Mirror unit setting

- 1** Tap the [Optical] tab in the [System Setting] display to open the [Optical] display.
- 2** Tap the [Mirror Unit] tab in the [Optical] display.
- 3** Register the mirror unit actually mounted on the BX63LF for each mirror unit number. Tap one of the mirror unit numbers in use to open the [Mirror Unit] screen for the number.
- 4** Select the type of the mirror unit and tap the OK button to register the type.
- 5** Register the types of mirror units in other mirror unit numbers by repeating the above for each. No setting is required for the unused mirror unit numbers.
- 6** If you want to set another item, tap the tab for the desired setting. If you want to exit the system setting, tap the [X] marking to close the [System Setting] screen.



Condenser setting

- 1** Tap the [Optical] tab in the [System Setting] display to open the [Optical] display.
- 2** Tap the [Condenser] tab in the [Optical] display.
- 3** Register the optical element actually mounted on the condenser for each condenser turret position number. Tap one of the turret position numbers in use to open the [Condenser] screen for the number.
- 4** Select the type of the optical element and tap the OK button to register the type.
- 5** Register the types of optical elements in other turret numbers by repeating the above for each. No setting is required for the unused turret position numbers.
- 6** If you want to set another item, tap the tab for the desired setting. If you want to exit the system setting, tap the [X] marking to close the [System Setting] screen.

Other settings

The system setting provides the focus setting. Set it as required. For the detailed setting methods, refer to the Online Help for the touch panel controller.

4 Selecting the mode (Operation)



- 1 Tap [Start Operation] in the [MENU] screen to display the following screen.

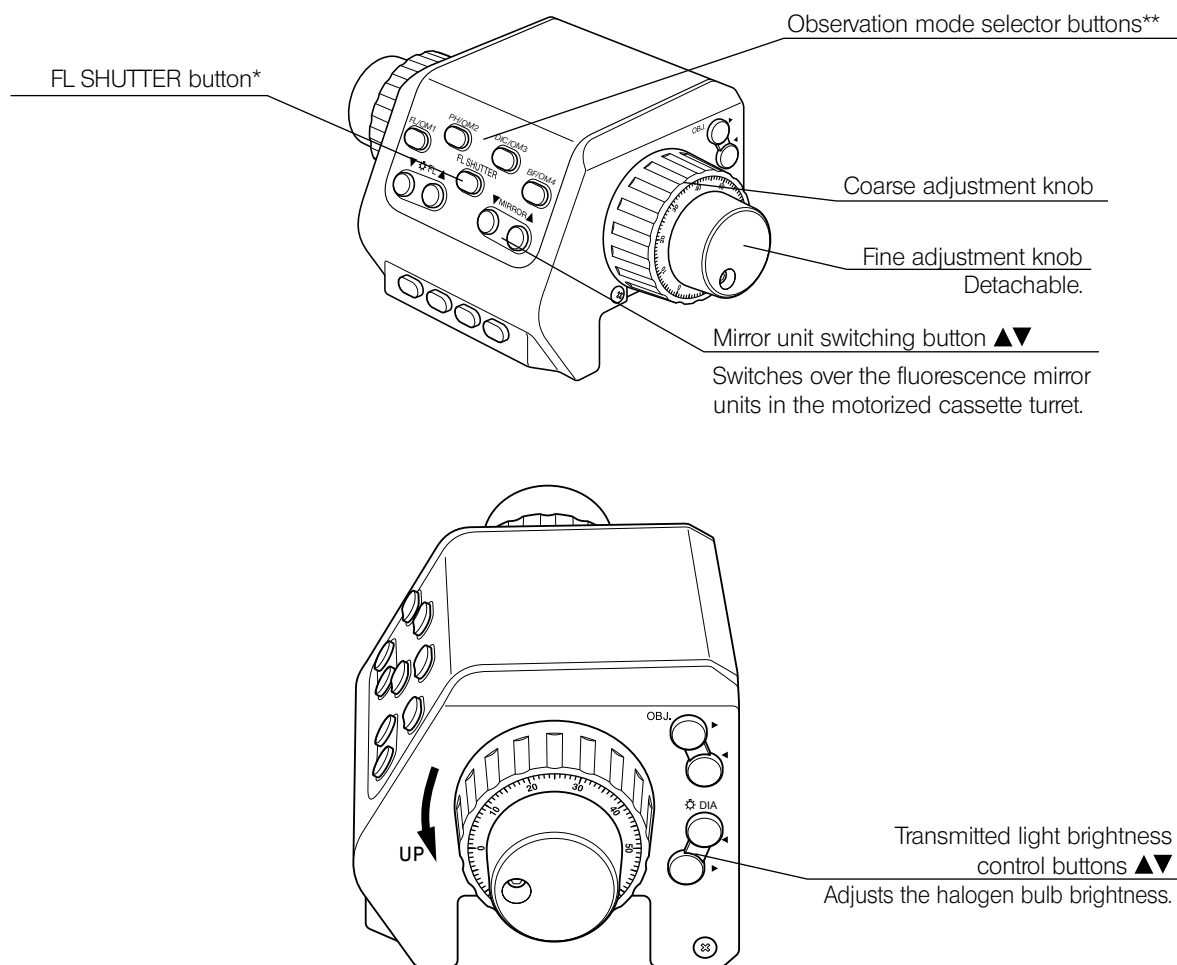
Ⓞ For detailed operating methods of the touch panel controller during observation, refer to Online Help for the touch panel controller.

Ⓞ To display the Online Help, tap Online Help button on the touch panel.



6-2 Controller U-MCZ (Operation)

1 Module nomenclature



* The FL SHUTTER button opens and closes the shutter for the reflected light illumination only.

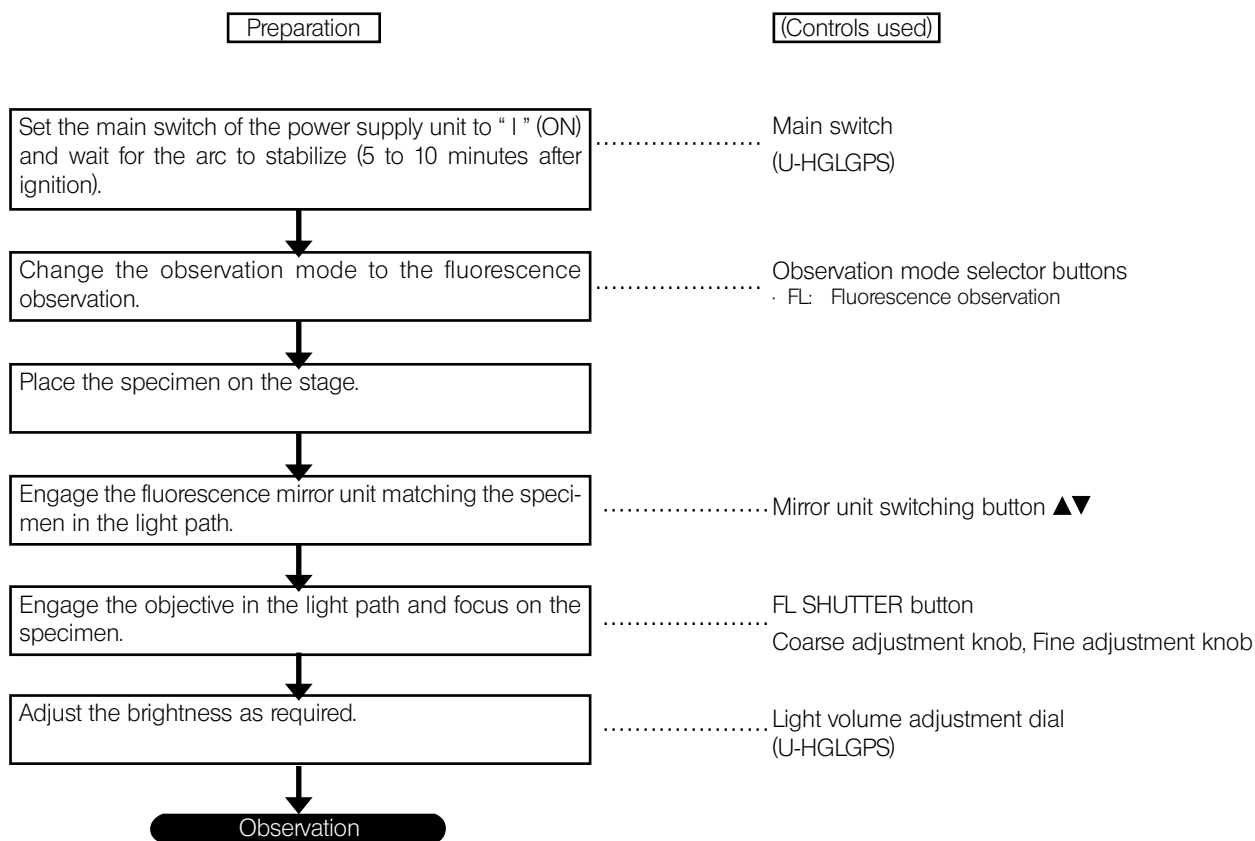
**Among 4 observation mode selection buttons, the FL button and the DIC button are enabled in conjunction with FV30S-SW. If [Ocular] is selected in [Ocular Tool] window on FV30S-SW, the selection between the transmitted observation or reflected observation can be performed either by U-MCZ or FV30S-SW.

	U-MCZ	FV30S-SW
Transmitted light observation	DIC button	DIA button
Reflected light observation	FL button	EPI button

6-3 Fluorescence observation (Reflected light) (Operation)

1 Reflected fluorescence observation procedure

- ⊙ Operation parts names are displayed on the controller U-MCZ.
- ⊙ For operations by the touch panel controller, refer to Online Help of the touch panel controller.



- ⊙ Engage the shutter if you interrupt observation for a short time.FL SHUTTER button

2

General precautions for observation

1. Make sure that the power cord and connecting cables are plugged in securely.
2. If you perform only transmitted phase contrast or transmitted DIC observations, leave one position on the turret empty. This allows for transmission of white light and reproduction of original colors.
 - ◎ This care is not required when the U-FDICT transmitted DIC mirror unit with built-in analyzer is used.
3. Always use Olympus immersion oil for oil immersion objectives.
4. If you use an objective with correction collar, you can correct contrast degradation due to variation in cover glass thickness by adjusting the correction collar.

Correction procedure

If the cover glass thickness is known, match the correction collar to the cover glass thickness using the collar scale provided. If the thickness is not known, turn the correction collar and adjust the fine adjustment knob to where the image contrast is best.

5. Engage the shutter if you interrupt observation for a short time.
6. Color fading of specimens. This system features high excitation light intensity to ensure bright observation of dark fluorescence specimens. In consequence, after long period of observations using high-power objectives, the colors of specimens will fade quicker than usual, causing the view (contrast) of fluorescent images to deteriorate. In such a case, slightly reduce the excitation light intensity to slow color fading down and improve the fluorescence images. To reduce the excitation light intensity, use the shutter to limit the exposure of specimen to more than necessary light. Commercially-marketed color fading protection agent (DABCO, etc.) can also delay fading of specimen colors. The use of fading protection agent is recommended especially when you perform high-magnification observations frequently.

◎ Remember that the fading protection agents cannot be used with certain kinds of specimens.

3 Selecting the fluorescent mirror unit cassette

Selecting the position

- U-MCZ
See page 66.
- Touch panel controller.
Refer to Online Help for the touch panel controller.
- FV30S-SW
Refer to Online Help for FV30S-SW.

Observation method	Position
LSM observation	LSM
Reflected light fluorescence observation by mercury lamp	Fluorescent mirror unit for each excitation wavelength
Transmission brightfield observation by halogen lamp	Hole
Transmitted light Differential Interference Contrast (DIC) observation by halogen lamp	IX3-FDICT

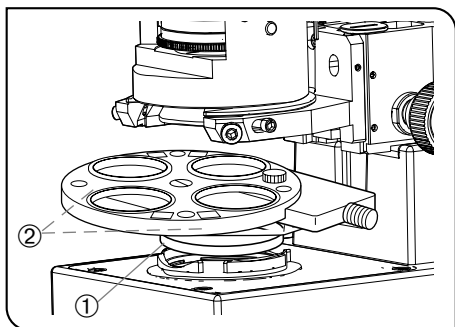
Opening and closing of the shutter

- U-MCZ
See page 66.
- Touch panel controller.
Refer to Online Help for the touch panel controller.
- FV30S-SW
Refer to Online Help for FV30S-SW.

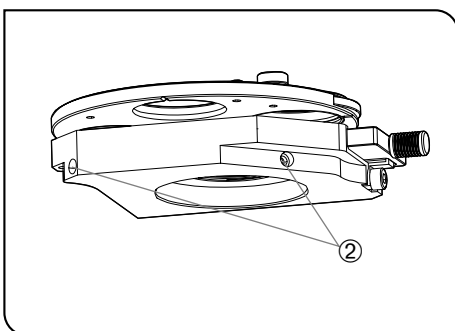
6-4 Preparing transmitted observation (Maintenance) (BX63LF only)

1 Attaching the polarizer (Maintenance)

⊙ If FV30-TXDBX is combined with the system, the filter turret cannot be combined.



- 1 Drop in the filter frame reinforcing ring ① provided with BX63LF into the filter holder on the microscope frame.
- 2 Loosen filter turret clamping screws ② using the provided Allen wrench.
- 3 Fit the filter turret on the filter holder and tighten the clamping screws ② lightly to a degree at which the filter turret will not rotate.

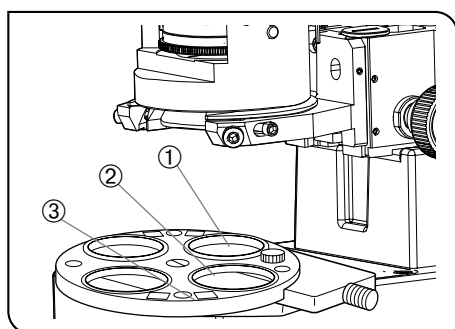


2 Attaching the polarizer (Maintenance)

⊙ The performance of a polarizer deteriorates after it has been subjected to light for a long period (about 500 hours of continuous use). Replace the polarizer when it has been used for a long period. Drop the polarizer into the filter insertion position with a push ring ① or ②, and clamp with the push ring.

⊙ It is recommended to insert the polarizer in insertion position ①. This is because the polarizer rotation clamping knob ③ comes on the front of the microscope when the insertion position ① is engaged in the light path.

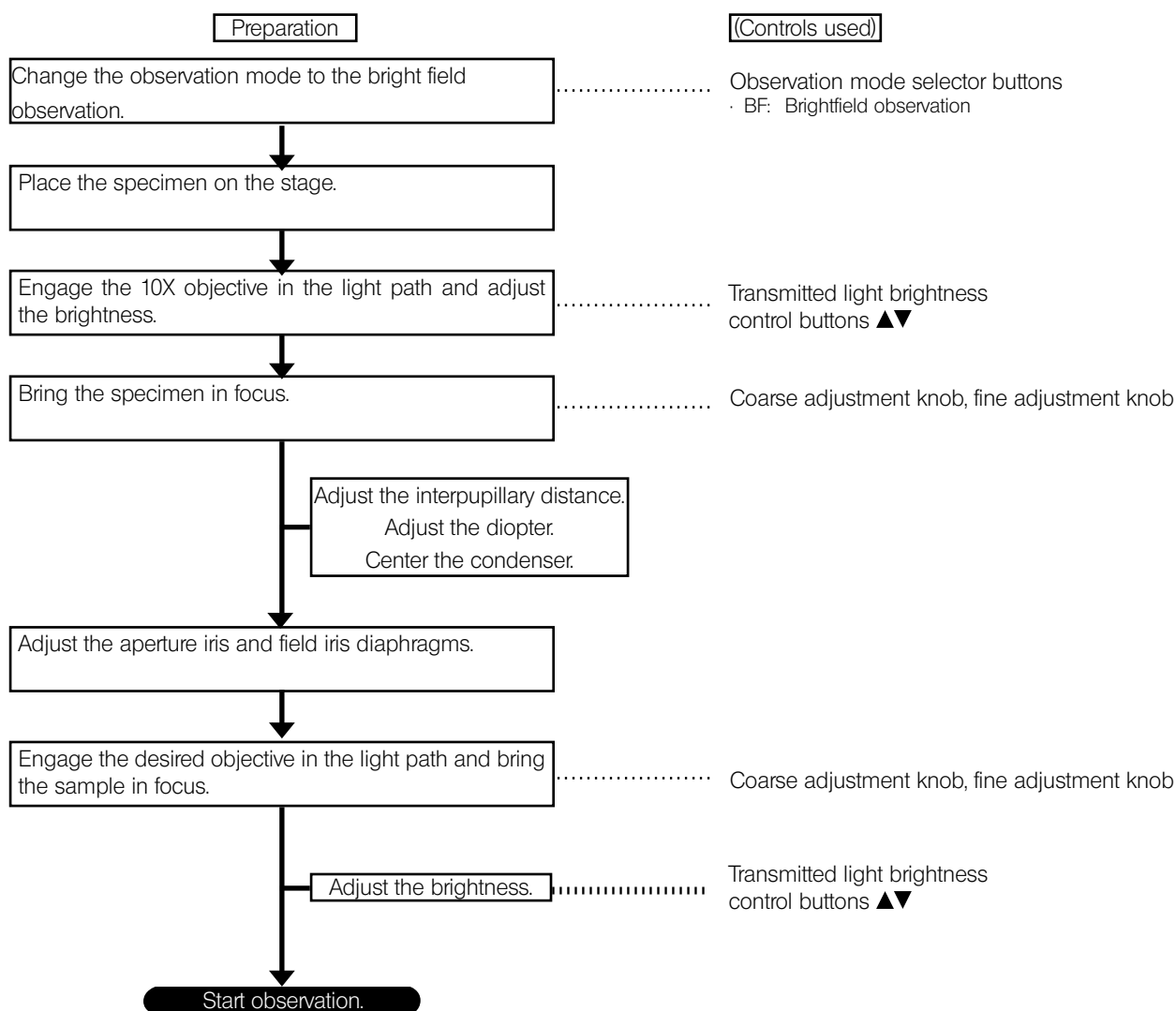
⊙ When the 32PO polarizer is used, adjustment is easier than with the 32POIR since images are brighter with the 32PO. Besides, removal of the IR filter (32BP775 or 32IR900) makes images brighter during adjustment although infrared light observation is to be performed.



6-5 Transmitted brightfield observation (Operation) (BX63LF only)

1 Flow of brightfield observation

- ⊙ Operation parts names are displayed on the controller U-MCZ.
- ⊙ For operations by the touch panel controller, refer to Online Help of the touch panel controller.



- ⊙ For adjusting the interpupillary distance or the diopter, see page 31.
- ⊙ For centering the condenser, see page 29.
- ⊙ For adjusting the aperture stop, see page 30.
- ⊙ For adjusting the field stop, refer to Online Help for the touch panel controller.

6-6 Differential interference contrast (DIC) observation (Operation/Maintenance)

CAUTION Attaching or removing the transmitted light DIC filter unit to or from the illuminator falls under the category of service works. Olympus service personnel or engineers who received the service training carry out the services in accordance with "FVMPE-RS Service Manual".

- Ⓢ The normal optical performance of DIC observation cannot be achieved if a plastic petri dish is used.
- Ⓢ A polarizer, an analyzer, and DIC prisms (for condenser and nosepiece) are required for DIC observation.

CAUTION When the U-LH100IR Lamp Housing is used, be sure to perform following works to protect your eyes from infrared light.

- Ⓢ Insert the IR cut filter (light blue) provided with the microscope (BX63LF) into the filter slider then push it in to engage it.

CAUTION Infrared light may damage your eyes. When performing IR-DIC observation, avoid visual observation as much as possible and use a display monitor, etc. When visually observing a specimen, be sure to insert an IR-cut filter into the optical path.

1 Adjusting the polarizer position (Maintenance)

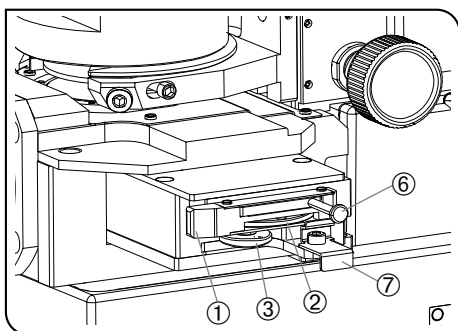
- Ⓢ This adjustment is possible without removing the DIC prism (for nose-piece). However, it is not possible if a DIC prism for condenser is engaged in the light path. Remove or disengage the DIC prism for condenser as described below.

Condenser provided with FV30-TXDBX: Pull out the DIC prism IN/OUT knob and remove the DIC prism from the light path.

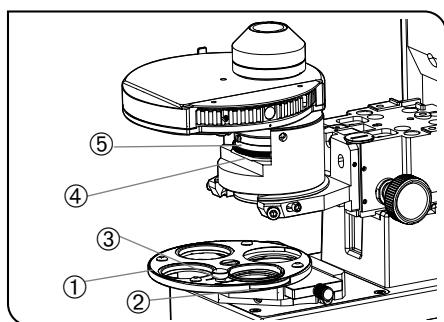
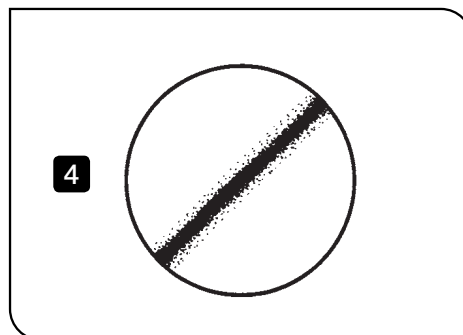
WI-DICD: Remove the DIC prism from condenser.

WI-UCD: Rotate the turret to engage a position without DIC prism.

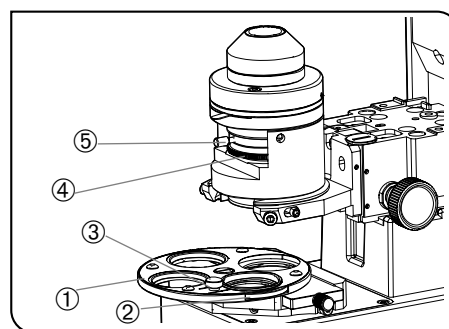
- 1** Remove the condenser from the microscope.
- 2** Remove an objective and engage the hole without the objective in the light path.
- 3** Engage the polarizer ① and analyzer in the light path and turn the transmitted light on.
- 4** Remove the eyepiece from the eyepiece sleeve, look into the sleeve, turn the polarizer rotation dial ② so that the black interference stripe is darkest, and tighten the clamping polarizer knob ③.
 - ⊙ The interference stripe is not visible clearly if the field iris is focused insufficiently
- 5** Engage an objective (as low-magnification as possible) in the light path, attach the condenser and bring the specimen surface into focus.
 - ⊙ The interference stripe is less clearly visible when the specimen is thick. In this case, it is recommended to bring a scratch or like on the bottom of the petri dish to facilitate the subsequent adjustment operation.
 - ⊙ With the WI-DICD, do not attach the DIC prism. With the WI-UCD, engage a position without DIC prism in the light path. With the condenser provided with FV30-TXDBX, remove the DIC prism from the light path.
- 6** If the condenser has not been centered yet, center it.
See page 29



(Condenser provided with FV30-TXDBX)



(WI-UCD)



(WI-DICD)

- ⊙ The numbers shown in each picture indicate the numbers of operation parts described in this document.

☉ With WI-UCD or WI-DICD, follow the procedures described below.

- 7** Turn the quarter-wave plate rotation ring ④ so that the black interference stripe seen at the center of the eyepiece sleeve's field of view, then tighten the clamping knob ⑤. Ignore the short interference stripes in the surroundings in this adjustment.

Now the adjustment is complete.

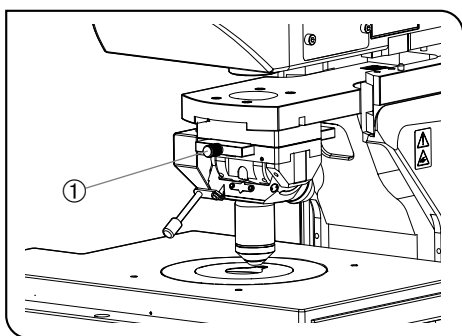
- Attach the eyepiece and objective again to the microscope frame.
- With the WI-DICD, mount the DIC prism.
- When an IR cut filter is used, remove it and mount the required filter.

☉ With the condenser provided with FV30-TXDBX, the quarter-wave plate ⑥ and the IR filter ⑦ can be inserted/removed.

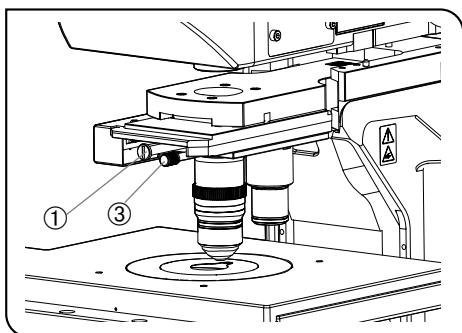
For DIC observation, engage the quarter-wave plate ⑥ in the light path.

For IR-DIC observation, engage the IR filter ⑦ in the light path.

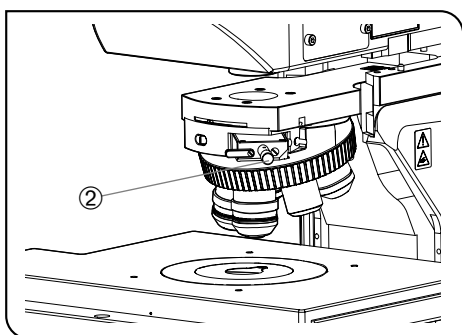
2 Observation method (Operation)



(BX63L-DSGNPS)



(BX63L-DSLNP)



(BX63L-D6RES)

- 1 Engage the objective to be used in the light path.
- 2 Engage the DIC prism of the nosepiece in the light path.
If you are using BX63L-DSGNPS or BX63L-DSLNP, push in the DIC prism IN/OUT knob ①.
If you are using BX63L-D6RES, push in the slider.

⊙ If you are using BX63-DSLNP, move the DIC prism IN/OUT knob while holding the objective selector knob ③ to prevent the objective from moving.

- 3 Insert the DIC prism and polarizer into the illumination optical path.
If you are using the condenser provided with FV30-TXDBX, engage the quarter-wave plate in the light path.

⊙ For the operation part when using the condenser provided with FV30-TXDBX, WI-DICD or WI-UCD, refer to page 73.

⊙ With WI-UCD, rotate the turret to insert the DIC prism suitable for the objective lens into the light path.

⊙ When performing IR-DIC observation, insert the IR filter into the illumination light path.

- 4 Place the specimen on the stage and bring the specimen into focus.

⊙ The contrast may be improved by stopping down the aperture iris diaphragm to an optimum aperture.

- 5 Adjust the contrast of the observed image.

When using BX63L-DSGNPS or BX63L-DSLNP

Rotate the polarizer rotation dial to adjust the contrast. After the contrast is adjusted, fix it with the polarizer rotation dial clamping knob.

⊙ For positions of the polarizer rotation dial and the polarizer rotation dial clamping knob, see page 73.

When using BX63L-D6RES

Rotate the retardation knob ② to adjust the contrast.

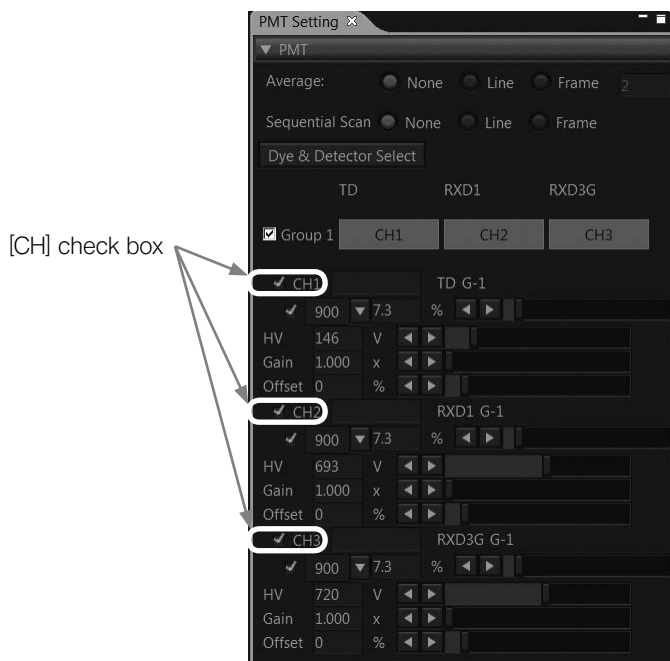
CAUTION

Infrared light may damage your eyes. When performing IR-DIC observation, avoid visual observation where possible and use a display monitor, etc. When visually observing a specimen, be sure to insert an IR-cut filter into the optical path.

7 LSM observation (Operation)

- Ⓞ For details, refer to the Online Help for FV30S-SW.
- Ⓞ When using this system, we recommend turning the indoor lighting low in order to reduce external disturbance light on observations.
(The indoor lighting particularly affects the differential interference observation images.)
- Ⓞ Do not apply cool air to this system from the air conditioner or so. This system may be unstable.
- Ⓞ Do not bend or extend the optical fiber excessively, or do not step on it. The performance may be deteriorated significantly.
- Ⓞ Be careful that, if something is put on top of the laser source unit, the source unit may be overheated, causing the protection circuit activated to stop the laser oscillation.

CAUTION Precautions when using an external NDD unit (RXD/TXD/GaAsP)
In case image acquisition is not done, uncheck all [CH] check boxes located on [PMT Setting] tab of the FV30S-SW software.
If the check box is checked and left “as is” in a bright room, the PMT may be deteriorated.



8 Signal connection with external device

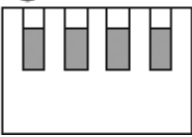
With the external device detecting unit FV30-ANALOG, this system is able to transmit and receive electric signals to and from external devices.

8-1 Features of FV30-ANALOG

- Capable of receiving electric signals transmitted from external devices as an image equivalent to that acquired via four channels
- Capable of processing a variety of electric signals, such as action potentials, current, temperature, pressure and flow rate, depending on the type of external device
- Since the intensity data of the specimen and the electric signal transmitted from the external devices can be treated as a data of the same time axis, the correlation between the light stimulation and the electrophysiological reaction associated with the light stimulation can be analyzed, and also the high synchronous data can be acquired easily in the application which observes the fluorescence variation with applying the electric stimulation.
- Capable of transmitting scan timing signals (e.g., scan start, horizontal/vertical synchronization, sampling clock) to external devices
- Allowing the user to select from six different levels of measurement range depending on the signal output value of the external device
- Trigger inputs and outputs can be controlled by synchronizing them with operations of this system.

8-2 Specifications of FV30-ANALOG

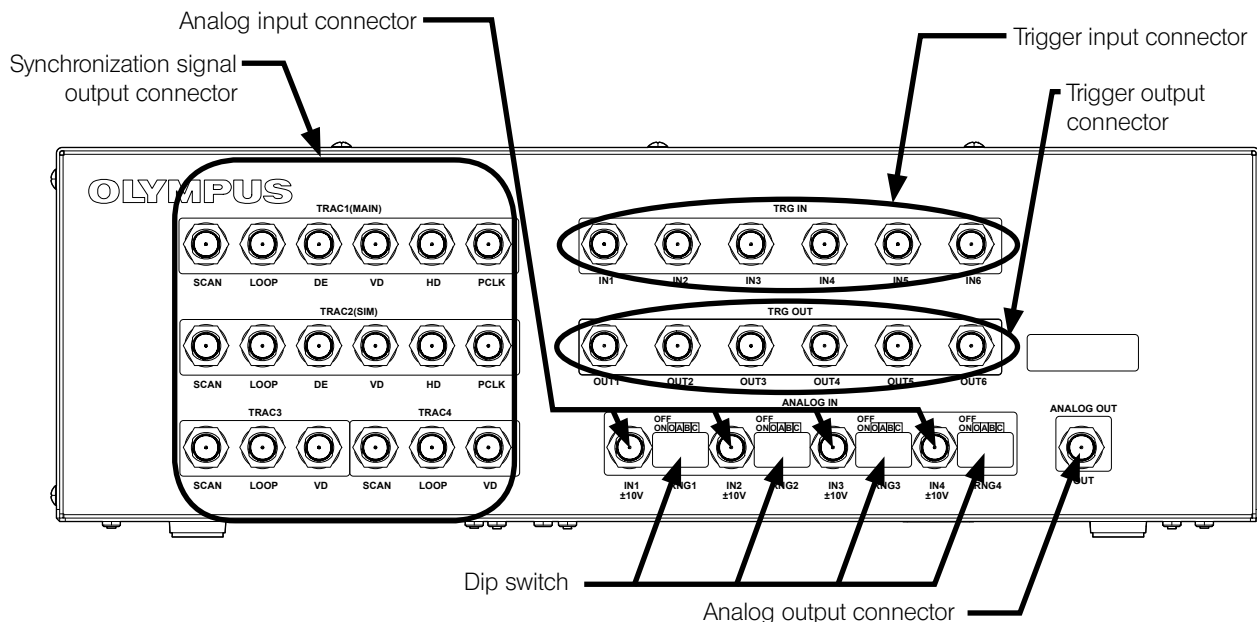
Items	Specifications
Analogue voltage input	<p>Input voltage range and gradation</p> <p>1) -10V to +10V One gradation = 4.88 mV 2) 0 V to +10V One gradation = 2.44 mV 3) -5V to +5V One gradation = 2.44 mV 4) 0V to +5V One gradation = 1.22 mV 5) -1V to +1V One gradation = 0.49 mV 6) 0V to +1V One gradation = 0.25 mV</p> <p>Select the input voltage range from these six levels using the DIP switch.</p> <p>Input impedance: Approximately 10 kΩ</p> <p>Maximum input voltage range: - 10 V to + 10 V</p> <p>Signal ground To be connected to the chassis ground.</p> <p>“1” is used as a standard. The voltage per each gradation shown on the left is a standard value when the gradation is 4096.</p> <p>Do not add signals exceeding the input voltage range described on the left.</p>

Items	Specifications																																														
Analog voltage Sampling specifications	Sampling rate Galvano scan mode: 1 Msps Resonant scan mode: 3.3 Msps This information will be a data for acquiring the latest sampling value at each pixel timing in each scan mode.																																														
Dip switch for changing the analog voltage input range	<div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p style="text-align: center;">O F S</p> <p style="text-align: center;">A B C</p>  </div> <div> <p>The input range settings by the dip switch are shown below.</p> <table border="1" data-bbox="497 878 1182 1131"> <thead> <tr> <th>Input mode</th> <th>SW OFS</th> <th>SW A</th> <th>SW B</th> <th>SW C</th> </tr> </thead> <tbody> <tr> <td>-10 — +10V</td> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>0 — +10V</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>-5 — +5V</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>0 — +5V</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>-1 — +1V</td> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>0 — +1V</td> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>ON</td> </tr> </tbody> </table> <p>Do not perform the switch settings other than those described above. This unit may malfunction.</p> </div> </div>	Input mode	SW OFS	SW A	SW B	SW C	-10 — +10V	OFF	ON	OFF	OFF	0 — +10V	ON	ON	OFF	OFF	-5 — +5V	OFF	OFF	ON	OFF	0 — +5V	ON	OFF	ON	OFF	-1 — +1V	OFF	OFF	OFF	ON	0 — +1V	ON	OFF	OFF	ON											
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0 — +5V	ON	OFF	ON	OFF																																											
-1 — +1V	OFF	OFF	OFF	ON																																											
0 — +1V	ON	OFF	OFF	ON																																											
Synchronization signal output specifications	<p>Output channel number: 18ch</p> <table border="1" data-bbox="491 1326 1279 1612"> <thead> <tr> <th rowspan="2">Nomenclature</th> <th rowspan="2">Content</th> <th>TRAC1 (MAIN)</th> <th>TRAC2 (SIM)</th> <th>TRAC3</th> <th>TRAC4</th> </tr> <tr> <th>Observation side</th> <th>Stimulus side</th> <th>Option</th> <th>Option</th> </tr> </thead> <tbody> <tr> <td>SCAN</td> <td>Scan in progress</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>LOOP</td> <td>Repeat processing in progress</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>DE</td> <td>Effective pixels</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td>VD</td> <td>Vertical synchronization</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> </tr> <tr> <td>HD</td> <td>Horizontal synchronization</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> <tr> <td>PCLK</td> <td>Pixel clock</td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;"><input type="radio"/></td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> </tbody> </table> <p>Refer to 7-4 Synchronization signal output timing specifications for details of synchronization signals. As TRAC3 and 4 are optional outputs, they cannot be used with this system.</p> <p><u>Output signal level</u></p> <p>TTL signal level</p> <p style="margin-left: 40px;">Output voltage L: 0.4V or lower Output voltage H: 2.7V or higher</p>	Nomenclature	Content	TRAC1 (MAIN)	TRAC2 (SIM)	TRAC3	TRAC4	Observation side	Stimulus side	Option	Option	SCAN	Scan in progress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LOOP	Repeat processing in progress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	DE	Effective pixels	<input type="radio"/>	<input type="radio"/>	-	-	VD	Vertical synchronization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	HD	Horizontal synchronization	<input type="radio"/>	<input type="radio"/>	-	-	PCLK	Pixel clock	<input type="radio"/>	<input type="radio"/>	-	-
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VD	Vertical synchronization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																										
HD	Horizontal synchronization	<input type="radio"/>	<input type="radio"/>	-	-																																										
PCLK	Pixel clock	<input type="radio"/>	<input type="radio"/>	-	-																																										

Items	Specifications
	<p data-bbox="496 490 647 519"><u>Signal ground</u></p> <p data-bbox="496 535 898 564">To be connected to the chassis ground.</p> <p data-bbox="496 602 999 631"><u>Connection of this output to external mechanism</u></p> <p data-bbox="496 647 1433 714">In order to prevent the system from malfunctions such as noises, etc., use the Schmitt trigger type input IC for the logic IC, etc. to which this signal is inputted.</p> <p data-bbox="496 752 1209 781"><u>Input impedance of the external mechanism connected to this output</u></p> <p data-bbox="496 797 643 826">10 kΩ or more</p> <p data-bbox="587 871 1406 938">Ⓞ If giving a higher priority on the accuracy of this signal, shorten the BNC cable used for connection as much as possible.</p> <p data-bbox="496 960 1439 1016">CAUTION Do not short circuit the output or add the signals from outside. This unit may be damaged.</p>
Trigger input specifications	<p data-bbox="496 1025 770 1055">Input channel number: 6ch</p> <p data-bbox="496 1093 675 1122"><u>Input signal level</u></p> <p data-bbox="496 1137 651 1167">TTL signal level</p> <p data-bbox="555 1173 922 1202">Input voltage L: 0.8 V or lower</p> <p data-bbox="555 1209 932 1238">Input voltage H: 2.0 V or higher</p> <p data-bbox="496 1276 699 1305"><u>Input voltage range</u></p> <p data-bbox="496 1321 667 1350">- 0.5 V to + 5.5 V</p> <p data-bbox="496 1388 678 1417"><u>Input impedance</u></p> <p data-bbox="496 1433 898 1462">Pull up to 5 V with approximately 3.3 kΩ</p> <p data-bbox="496 1500 671 1529"><u>Signal ground</u></p> <p data-bbox="496 1545 898 1574">To be connected to the chassis ground.</p> <p data-bbox="496 1612 1214 1641"><u>Output impedance of the external mechanism connected to this input</u></p> <p data-bbox="496 1657 547 1686">75 Ω</p>

Items	Specifications
Trigger output specifications	<p data-bbox="491 488 1161 551">Output channel number: 6 ch Since OUT6 is a reserved port, it cannot be used with this system.</p> <p data-bbox="491 589 691 618">Output signal level</p> <p data-bbox="491 633 651 663">TTL signal level</p> <p data-bbox="555 674 922 703">Output voltage L: 0.4 V or lower</p> <p data-bbox="555 712 930 741">Output voltage H: 2.7 V or higher</p> <p data-bbox="491 779 671 808">Signal ground</p> <p data-bbox="491 819 898 848">To be connected to the chassis ground.</p> <p data-bbox="491 887 999 916">Connection of this output to external mechanism</p> <p data-bbox="491 927 1433 990">In order to prevent the system from malfunctions such as noises, etc., use the Schmitt trigger type input IC for the logic IC, etc. to which this signal is inputted.</p> <p data-bbox="491 1037 1209 1066">Input impedance of the external mechanism connected to this output</p> <p data-bbox="491 1077 643 1106">10 kΩ or more</p> <p data-bbox="504 1151 1441 1207">CAUTION Do not short circuit the output or add the signals from outside. This unit may be damaged.</p>

8-3 Setting procedure

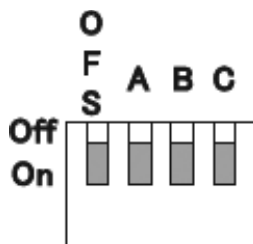


- CAUTION** · Make sure that the analog voltage output of the external devices connected to the analog output is within the range between -10V and +10V. If it is not, use an attenuator. Adding the signal exceeding the input voltage range described above will damage FV30-ANALOG.
- Be sure to turn off FV30-ANALOG and external devices before starting this procedure. When turning on the power, turn on the external devices first. And then turn on FV30-ANALOG. Before switching off the power, turn OFF the power of FV30-ANALOG first and then turn OFF the power of the external devices.
 - The power of FV30-ANALOG is automatically turned OFF when the system power (FV30-PSU) is turned OFF.

1 Setting analog input range from external devices

Ⓞ The power of FV30-ANALOG is automatically turned OFF when the system power (FV30-PSU) is turned OFF.

1. Set the analog input range after turning OFF the powers of FV30-ANALOG and external devices.
2. Remove dip switch seals (RNG 1 to 4) on FV30-ANALOG.
3. Use a fine-tip tool such as tweezers to turn the DIP switches to ON or OFF according to the analog voltage output value of the external device.



Input mode	SW OFS	SW A	SW B	SW C
-10 — +10V	OFF	ON	OFF	OFF
0 — +10V	ON	ON	OFF	OFF
-5 — +5V	OFF	OFF	ON	OFF
0 — +5V	ON	OFF	ON	OFF
-1 — +1V	OFF	OFF	OFF	ON
0 — +1V	ON	OFF	OFF	ON

CAUTION Do not use this unit with the combinations other than those described above. This unit may malfunction.

4. Reinstall the switch seals.

2 Connection

1. Set the analog input range after turning OFF the powers of FV30-ANALOG and external devices.
 - ⦿ The power of FV30-ANALOG is automatically turned OFF when the system power (FV30-PSU) is turned OFF.
2. The cables used for connection must meet following specifications.
 - Characteristic impedance 75 Ω
 - Cable length Maximum length: 3 m

3 Acquiring analog voltage input signal

- The analog signal can be acquired by selecting Current Detector on FV30S-SW as a channel for acquiring the data.
- ⦿ Refer to FV30S-SW Online Help for details.

8-4 Specifications of synchronizing signal output timing

1 Synchronizing Signal Type

There are 6 types of synchronizing signals outputted from FV30-ANALOG.

SCAN

This signal indicates that the scan is being performed. This is a TTL signal where Scanning = H level and Being stopped = L level.

The initial status when the power is turned ON is L level.

LOOP

This signal indicates a repetitive cycle timing in the series scan. The output timing differs depending on the scan mode. Refer to LOOP Signal Output Timing for details.

The initial status when the power is turned ON is L level.

VD

This signal indicates a vertical synchronizing signal. This is a TTL signal where Enabled period = L level and Disabled period = H level.

The initial status when the power is turned ON is H level.

HD

This signal indicates a horizontal synchronizing signal. This is a TTL signal where Enabled period = L level and Disabled period = H level.

The initial status when the power is turned ON is H level.

DE

This signal indicates a data enable signal. This is a TTL signal which becomes L level during the period when both VD signals and HD signals are enabled. (Equivalent to the logical sum (OR) of VD signals and HD signals.)

The initial status when the power is turned ON is H level.

PCLK

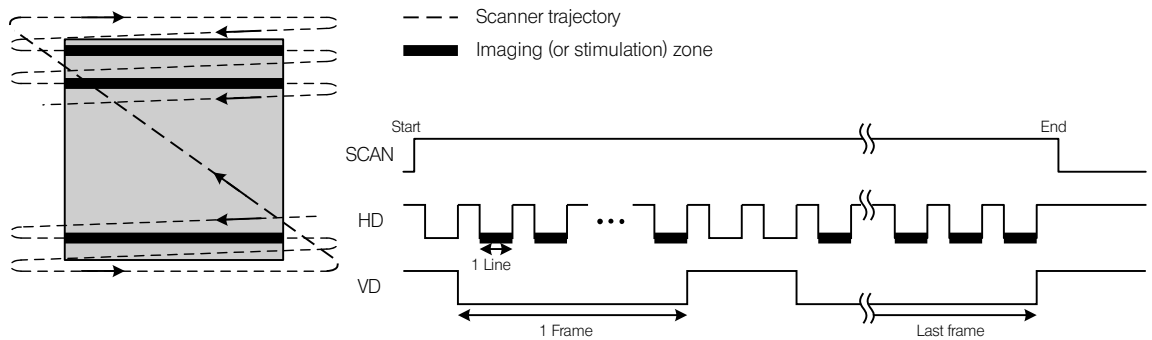
This signal indicates a pixel clock signal. The clock frequency corresponding to the scan speed specified by the application software is outputted.

In the initial status when the power is turned ON, the 500 kHz clock signal is outputted.

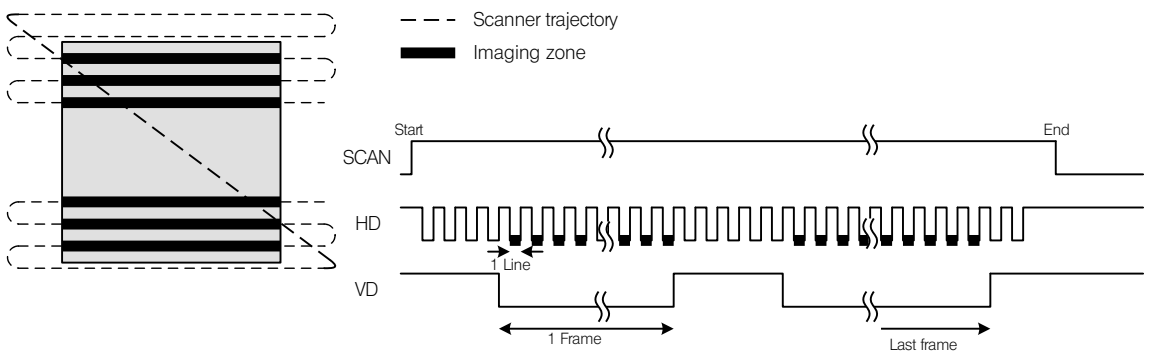
2 Synchronizing Signal Output Timing by Scan Mode

The relation between the scan operation and the synchronizing signal output in each mode is illustrated below.

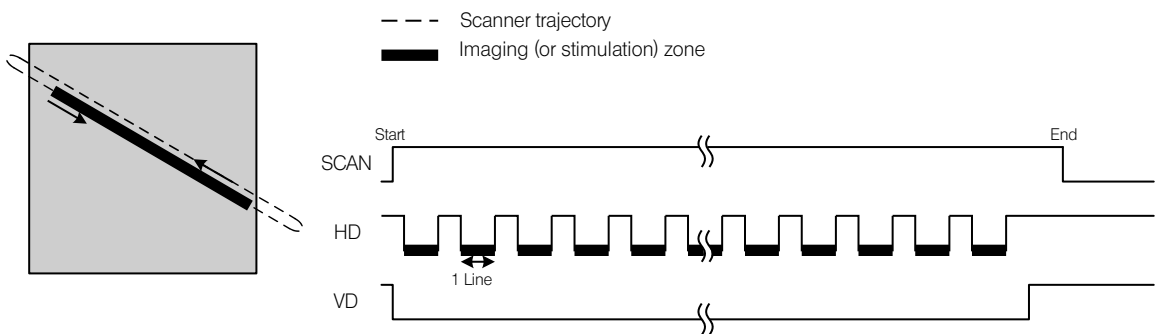
XY(Region) scan



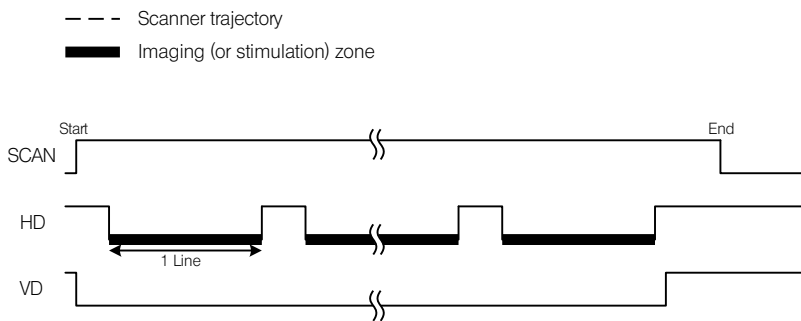
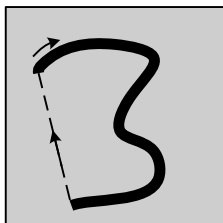
Resonant XY scan



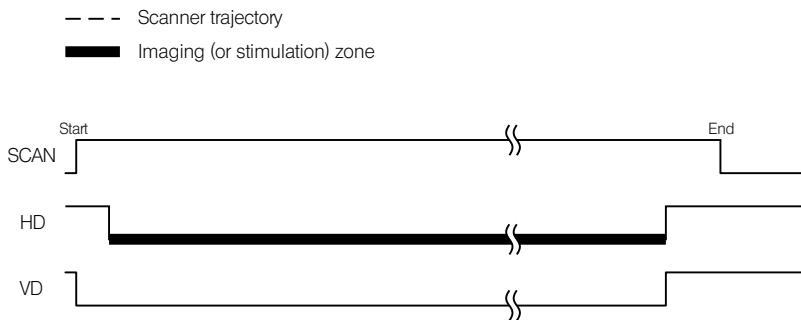
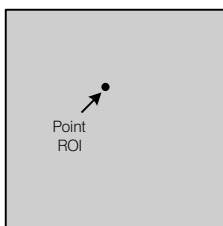
Line scan



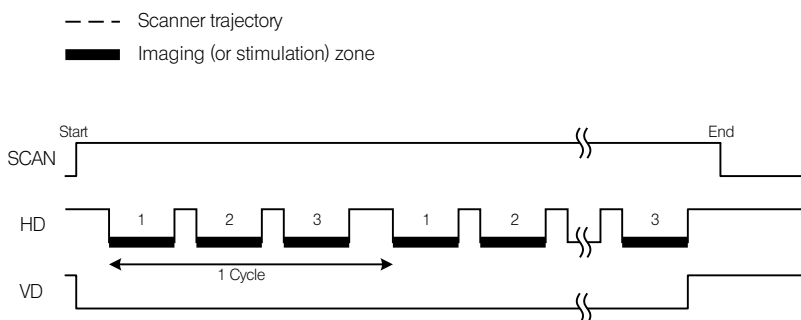
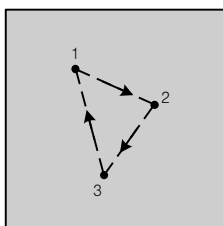
Free line scan



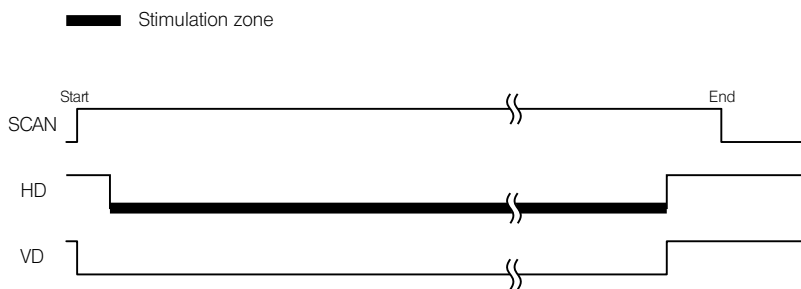
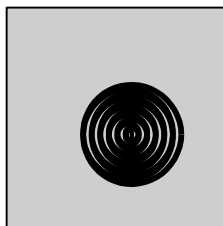
Point scan



Multi point scan



Tornado scan

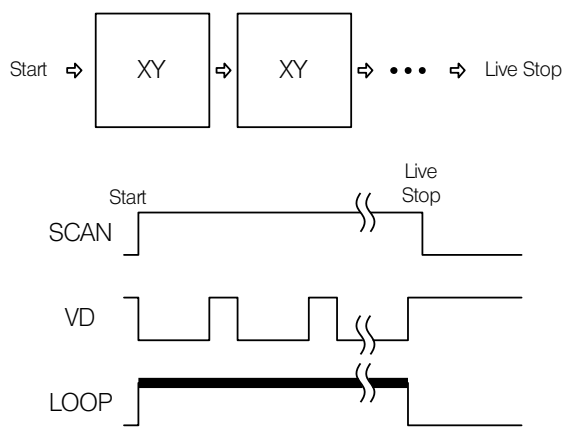


3 LOOP Signal Output Timing

The LOOP signal output timing in each series scan is illustrated below with operation examples.

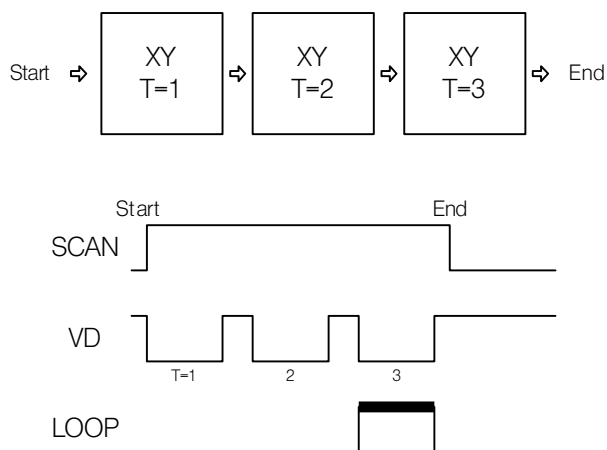
Live scan

Note that the waveshape of Live scan in Line-Z is same as that in Line ZT illustrated below

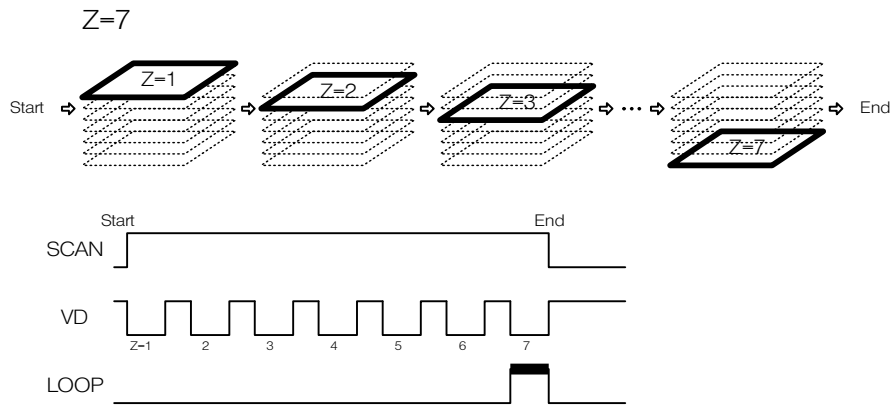


XYT scan

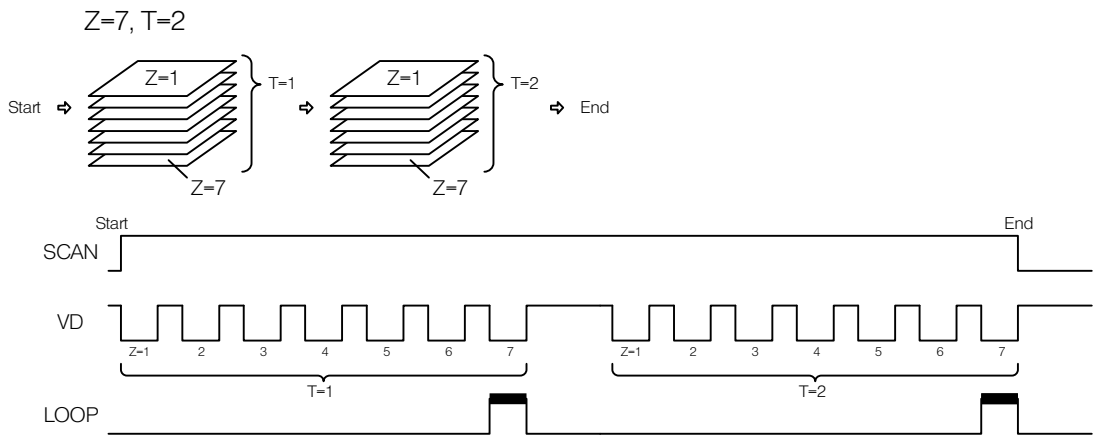
T=3



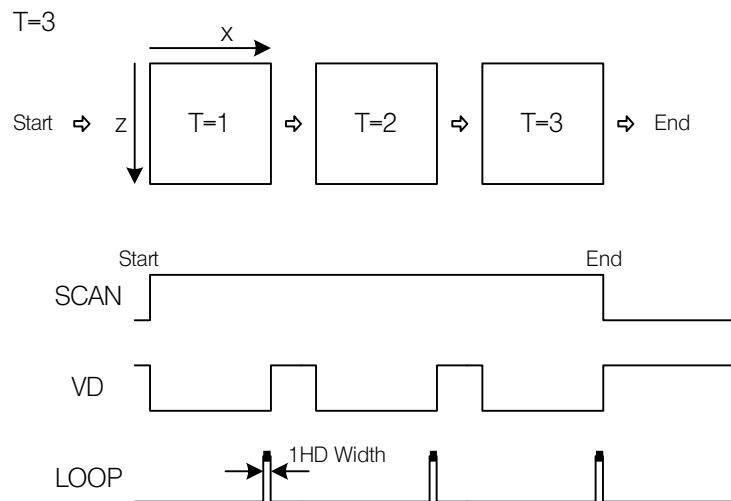
XYZ scan



XYZT scan



Line ZT scan



- We recommend performing “Preventive Inspections” periodically (every time you replace lamps and at least once every 6 months).
- The table below identifies the check items to be observed. Put (X) if not applicable or (✓) if applicable.
- If there are any check marks (✓) noted, **immediately stop use of the product** and seek service or replacement for the illumination device(s) for prevention.
- If you detect an abnormality other than that listed below with your illumination device or other Olympus product, request inspection from your Olympus distributor.
- Note that the service, replacement and detailed inspections are charged after expiration of the warranty period.

If you have any questions, please contact your Olympus distributor.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase or exceeds 20,000 hours of use.				
2. Lamp does not light sometimes even though the power is on. (Except discharge burners* ¹)				
3. Light flickers when you move a lamp cable or illumination devices.				
4. Lamp cable is unusually hot to the touch.				
5. Burning or smoke odor.				
6. Light still flickers after new lamp replacement. (Except discharge burners* ¹)				
7. Signs of deformation, backlash, or looseness, etc. when you assemble/ disassemble the illumination device. (I.e. it is hard to open/ close the lid during lamp-replacement.)				
8. Connection terminals or a lamp installation terminal have become discolored or tarnished on the right or left side. (Except discharge burners* ¹)				
9. Illumination device/ housing has become deformed, cracked or tarnished in any way.				
10. Lamp cables or wiring parts have become deformed, cracked or tarnished in any way.				
11. Frequent repairs to similar devices put into use at the same time as the unit being checked.				

If the spaces are not enough for check , copy this sheet.

*¹ Discharge burners: Mercury burner / xenon burner / metal halide burner

10 Care and storage (Maintenance)

- Never leave stains or fingerprints on the top of lenses and filters. Should a glass component be stained, simply blow dirt away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze). If a lens is stained with fingerprints or oil smudges, wipe it gently with gauze slightly moistened with commercially available absolute alcohol.
- Since the absolute alcohol is highly flammable, it must be handled carefully. Be sure to keep it away from open flames or potential sources of electrical sparks – for example, electrical equipment that is being switched on or off. Also remember to always use it only in a well-ventilated room.
- To clean a part, wipe with a soft cloth moistened with a little drop of diluted neutral detergent. Do not use organic solvents that will deteriorate the surface coating and plastic parts.
- In case dirt such as blood or body fluid adheres to this system, soak a piece of soft cloth into diluted mild detergent and use the sterile cloth to wipe out this system for prevention of infection and, after removing all the dirt visible, wipe it out for 15 seconds or more, using Ethanol for disinfection. Meanwhile, make it certain that the power of this system is turned off at disinfection. Disinfection method described in this manual does not insure the disinfection level. However, the Ethanol for disinfection is a disinfectant solution that is sorted as mild level disinfectant solution. In case microbes that cannot be disinfected with use of Ethanol or 70V/V% Isopropanol are used, contamination or carryover by objective lens may occur and; in such a case, the user is requested to use his or her own judgment whether the applicable is appropriate or not.
- In case maintenance operation is performed on this system which was contacted by the specimen with possible infection, wear the protective equipments such as gloves, or clean this system before starting maintenance operation.
- In high-humidity environment, condensation may occur in this system. So follow the environmental condition not only in use but also in storage for a long term.
In addition, there is a desiccant agent in the FV30-AGAPD to prevent the appearance of condensation. If you want the replacement, please contact your local Olympus sales office. (charged)

11 Troubleshooting guide (Operation/Maintenance)

Depending on usage, this system may not deliver the expected performance despite not being at fault. Should any problem occur, refer to the following list to take the appropriate corrective action.

If a problem persists, contact your local Olympus sales office.

11-1 LSM observation

Problem	Cause	Remedy
1. Laser light is not emitted from the tip of the objective lens.	The laser unit is not turned on.	Turn on the laser unit. Ensure that the emission key is on.
	The key switch is turned on immediately after turning on the power of the laser unit.	If the key switch is turned on immediately after turning on the power of the laser unit, the laser may not be oscillated. For the time required before turning on the key switch after turning on the power, refer to the instruction manual provided with the laser.
	The laser wavelength is not selected.	Check the appropriate laser wavelength.
	The objective lens is not inserted into the optical path.	Insert the objective lens into the optical path. For a manual nosepiece, stop the objective lens in the click position.
	The laser light is weak.	Increase the laser intensity.
	The properties of the combined DM cube unit for the SIM scanner or OPD (non-confocal point detector) are not appropriate for the selected laser wavelength.	Insert the combined DM cube unit appropriate for the selected laser wavelength into the optical path.
	Since an object is placed on the laser light source, the sufficient laser light is not emitted.	Remove the object from the laser light source and restart the laser that is not emitted.
2. The fluorescence image is not displayed.	The selected excitation dichroic mirror is not appropriate for the observed fluorescence wavelength and excitation laser wavelength.	Insert the excitation dichroic mirror appropriate for the observed fluorescence wavelength and excitation laser wavelength into the optical path.
	The selected spectral dichroic mirror and absorption filter are not appropriate for the observed fluorescence wavelength.	Insert the spectral dichroic mirror and absorption filter appropriate for the observed fluorescence into the optical path.
	The selected excitation wavelength is not appropriate for the fluorescent staining method.	Select the laser wavelength appropriate for the fluorescent staining method.
	The focus is not properly adjusted.	Adjust the focus.
	The HV value for the detection channel is too low.	Increase the HV value.
	The OFFSET value is too large.	Decrease the OFFSET value.
	The detector for the channel to be detected is not selected.	Select the detector.

Problem	Cause	Remedy
3. The transmitted light image is not displayed.	The channel for transmitted light observation is not selected.	Select the channel for transmitted light detection.
	The transmitted light illumination filter, etc. for the microscope is inserted into the optical path.	Remove the filter from the optical path.
	The HV value for the transmitted light detection channel is too low.	Increase the HV value.
	The OFFSET value for the transmitted light detection channel is too large.	Decrease the OFFSET value.
4. The image is disturbed.	There is too much vibration at the location where this system is installed.	Consult with your local Olympus sales office.
	External light such as that from a fluorescent lamp is detected.	Darken the room before acquiring the image.
5. Reflected light (laser light) appears in the fluorescence image.	The set absorption filter is improper, or no absorption filter is set.	Set an absorption filter that can block the excitation laser wavelength.
	No absorption filter that blocks laser light emitted from the SIM scanner is selected, or for spectral detection, the selected acquisition wavelength range is not appropriate.	Insert an absorption filter that blocks the laser wavelength emitted from the SIM scanner into the optical path.
6. The fluorescence image is not clearly visible.	The front lens of the objective lens is dirty.	Wipe the front lens of the objective lens with gauze.
	When using an objective lens with a correction collar, the correction collar is not adjusted properly.	Adjust the correction collar.
	The thickness of the cover glass is not appropriate.	Use cover glass that is 0.17-mm thick.

Problem	Cause	Remedy
7. The fluorescence image is dark and contains much noise.	The PMT becomes depleted.	Replacing the GaAsP-PMT with a new one (paid) is needed, please contact your local Olympus sales office. It is a consumable product.
	The laser light is weak.	Increase the laser intensity.
	The selected excitation wavelength is not appropriate for the fluorescent staining method.	Select the laser wavelength appropriate for the fluorescent staining method.
	The selected excitation dichroic mirror is not appropriate for the observed fluorescence wavelength and excitation laser wavelength.	Insert the excitation dichroic mirror appropriate for the observed fluorescence wavelength and excitation laser wavelength into the optical path.
	The selected spectral dichroic mirror and absorption filter are not appropriate for the observed fluorescence wavelength.	Insert the spectral dichroic mirror and absorption filter appropriate for the observed fluorescence into the optical path.
	The scanning speed is too fast.	Set the scanning speed to a lower level.
	The HV value is too high.	Decrease the HV value and increase the Gain value, or decrease the scanning speed and the HV value.
	The wavelength width of the acquisition wavelength range is too small.	Increase the wavelength width of the acquisition wavelength range.
	Lightly stained	Select the optimal fluorescence staining method.
8. The image is irregularly blurred. The brightness is uneven.	The specimen or stage is installed at an angle.	Properly set the specimen or stage.
9. The image blurs.	The focus is not properly adjusted.	Adjust the focus by visual observation.
10. Flare is observed.	The specimen is overly stained.	Stain the specimen properly or increase the OFFSET amount.
11. Visual fluorescence observation is impossible.	The optical path selector inside the scanner is not set as a visual observation optical path.	Insert the selector into the optical path for visual observation.
	The shutter for the mercury burner is closed.	Open the mercury burner shutter.
	The mercury burner power supply unit is not turned on.	Turn on the mercury burner power supply unit.
	The mirror unit with a dichroic mirror is not set in the illuminator turret.	Insert the mirror unit with a dichroic mirror into the optical path.
12. Laser light for the SIM scanner is not emitted.	The properties of the combined DM cube unit for the SIM scanner are not appropriate for the emitted laser wavelength.	Insert the combined DM cube unit appropriate for the laser wavelength into the optical path.
	The combined DM cube unit for the SIM scanner is not inserted into the optical path.	Insert the combined DM cube unit into the optical path.

11-2 Visual observation

Problem	Cause	Remedy
a) The halogen bulb does not light.	Power cord of the BX63L-CBH is unplugged.	Plug the power cord into a power outlet.
	Main switch of the BX63L-CBH is not " I " ON.	Set the main switch to " I " (ON).
	Bulb is burnt out.	Replace the bulb.
b) The bulb lights but the field of view is dark.	Lamp voltage is too low.	Increase the light intensity to an optimum voltage.
	Condenser is not well positioned.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.
	Light path selector knob is set for camera	Change the light path.
	Too many filters are used.	Reduce the number of filters to the minimum required.
	Stage center plate is engaged in the light path.	Move the stage and place the specimen again.
	Field iris diaphragm is not opened wide enough.	Open the field iris diaphragm sufficiently.
c) Field of view is obscured or not evenly illuminated.	An objective that falls outside the condenser's illumination range is used.	Use a condenser that matches the objective.
	Condenser is not well positioned.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.
	Field iris diaphragm is stopped down too far.	Open the field iris diaphragm sufficiently.
	A filter is stopped in an intermediate position.	Set the filter at the appropriate position.
d) Dirt or dust is visible in the field of view.	Dirt/dust on the specimen.	Clean thoroughly.
	Dirt/dust on the eyepieces.	
	Dirt/dust on a mirror unit.	
	Dirt/dust on the optical element.	
	Condenser is not correctly positioned and the frost filter Ø45 mm (45FR) or filter is focused.	Adjust the condenser height until the field iris diaphragm image is formed in the specimen plane.

Problem	Cause	Remedy
e) Image glares.	Condenser is raised too high.	Lower to the proper position.
	Aperture iris diaphragm is stopped down too far.	Open the aperture iris diaphragm.
f) The error occurs when starting this system.	The power supply units were turned ON in a different order.	Turn OFF all power supply units and turn ON the power supply units in a correct order. For the order to turn on the power supply units, see page 10.
g) Visibility of observed image is poor. <ul style="list-style-type: none"> • Image is not sharp. • Contrast is poor. • Details are poorly visible. 	Objective in use is not designed for UIS2 series.	Replace with an objective designed for UIS2 optics.
	Correction collar on the objective equipped with correction collar is not adjusted.	Adjust the correction collar to acquire the best contrast.
	Front lens of the objective is dirty.	Clean the objective.
	The immersion oil appropriate with an oil immersion objective is not used.	Use Olympus immersion oil with the oil immersion objective, Olympus silicone oil with the silicone immersion objective and water with the water immersion objective.
	Immersion oil contains bubbles.	Remove bubbles.
	Inappropriate slide or cover glass thickness.	Replace with glass of appropriate thickness.
	Glass components (condenser, objective, eyepieces, culture vessels, etc.) are dirty.	Clean thoroughly.
	Ring slit and phase plate are not centered.	Center them correctly.
	A plastic culture vessel is used.	Replace the plastic culture vessel with a glass vessel.
h) A part or one side of the field of view is blurred.	Specimen is tilted with respect to the stage.	Place the specimen correctly on the stage and secure it with the stage clip.
i) Field of view of one eye does not match that of the other.	The interpupillary distance is incorrect.	Adjust the interpupillary distance.
	Incorrect diopter adjustment.	Adjust the diopter.
	You are not accustomed to parallel optical axis.	When looking into the eyepieces, do not stare at image from the beginning but see the overall field of view. It is sometimes recommended to turn your eyes away from the eyepieces, look far off and look into the eyepieces again.

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