OLYMPUS®

USER'S MANUAL
[HARDWARE]

FLUOVIEW
FV10i-LIV

Confocal Laser Scanning Biological Microscope

Note

- This instruction manual is for the Olympus Confocal Laser Scanning Microscope Model FLUOVIEW FV10i-LIV.
  To ensure the safety, obtain optimum performance and familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. For safety, we also recommend that you read attached USER'S MANUAL [SAFETY] together with this manual.
- For the operating procedures for observation and acquisition, please also read separate volume [Simplified Operation Manual] and the Online Help of the software.
- Retain this instruction manual in an easily accessible place near the work desk for future reference.

AX8017 [TYPE 3]

CONTENTS

IMPORTANT

⚠ For safety precautions, please refer to attached USER'S MANUAL [SAFETY].

1 Getting Ready

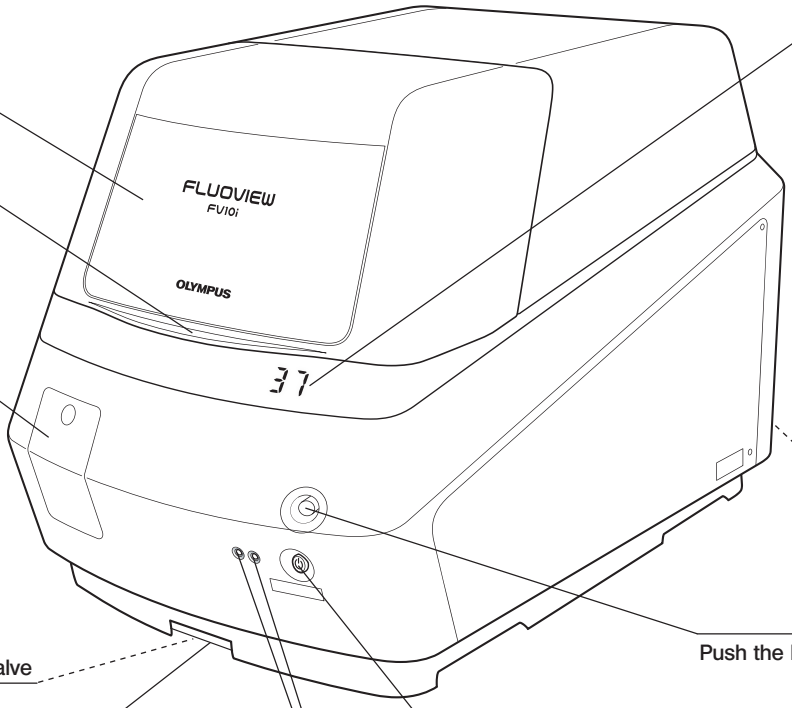
1. Always use ultrapure water with the incubator and water tank.
2. Four forms of specimen (containers) can be used including a ϕ35 mm glass-bottom dish, slide glass (76 mm x 26 mm), cover glass chamber (8 compartments) and well slide (8 compartments). The standard thickness of the cover glass is 0.17 mm, but the range from 0.13 to 0.21 mm is acceptable.
3. After starting up the system, reserve a warm-up period of about 3 hours (When the use environment temperature is 25°C) until the internal temperature of the incubator stabilizes. When the setting of the internal temperature of the incubator is not necessary, hold the main switched pressed (for 3 seconds), and the system can be used right away.
4. The operating period warranted for the LD light source is the shorter period of 2000 hours or one (1) year after the delivery inspection.
5. Depending on the fluctuation of the temperature in the usage environment, a drift may occur in the X, Y or Z direction.
6. Do not apply strong impact to the equipment.
7. Install this product on the flat (Tilt : less than 2°) and durable table.
8. Reserve clearances of 15 cm or more in front of the air inlet and outlet.
9. Be sure to clean or replace as required the filter connected to the water tank that stores the ultrapure water supplied to the objective front.
10. Refill the ultrapure water to be supplied to the objective front whenever the display shows the warning message.
11. When a specimen holder for ϕ35 mm dish is used and the number of specimens is 1 or 2, be sure to place dummy specimens in the unused specimen positions.
12. If water drops are left on the inner side of the top cover of the ϕ35 mm glass-bottom dish, the quality of the transmitted image may be degraded.
13. When a high-power objective is switched to a low-power objective, the image quality may be degraded if water is attached at the bottom side of the specimen.
14. The Z-stack image can be obtained only in the direction from the position distant to the specimen toward the position closer to it.
15. When the equipment is not to be used for a long period (more than 2 weeks), be sure to drain ultrapure water from the tank for the ultrapure water supplied to the objective front.
16. If the inside of the water pump is dried, the failure may occur in the product performances. Refill the water tank with water at least once a year (P. 8, 11) and drain water from the water pump (P. 9).
17. Long-period oscillations (20 Hz or less) may affect the image quality.
18. Oscillations may be noticeable during zooming. This is due to the fan of the incubator and can be reduced by increasing the Karman integration count.
19. When disposing of the microscope, be sure to observe the regulations or rules of your local government.

2 Caution

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

1 SYSTEM AND MAIN CONTROLS

Main Unit: FV10C-W3



Incubator temperature indicator
- Blinks during warm-up.
- "- -" is displayed when the temperature setting is OFF.

Cover

Close lever

Water tank cover

Water tank for immersed objective (Approx. 200 ml) is built in.

CO_2 inlet port

Cover lock buttons

Push the botton to open the cover.

Water stop valve

Water tray

Sub-switch

When setting the sub-switch to ON
- Press it shortly to start up the main unit with the heater ON.
- Press and hold it until a short beep is generated (about 3 seconds) to start up the main unit with the heater OFF.

Sub-switch OFF
- Press and hold for 3 sec.

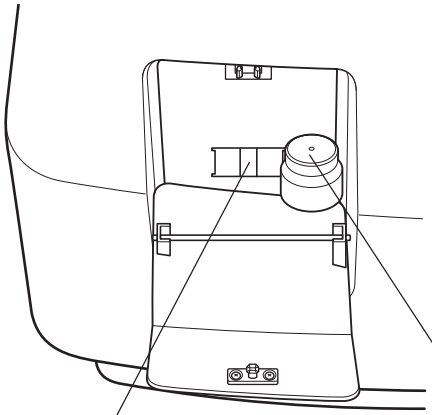
Status LEDs

◎Status LEDs when both the main and sub switches are ON.

LEDs		Laser	Software
Left	Right		
Green blinking	Orange lighting	Initializing	
Green lighting	Orange lighting	Standby	Not run
Green lighting	Orange blinking	Standby	Running

- The left LED lights in red when the main switch is set to "O" (ON).
- Both the left LED (green) and right LED (orange) blink when the cover is open.

View when the water tank cover is opened



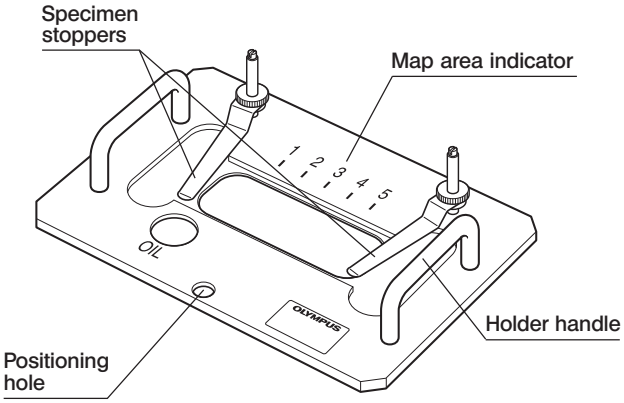
Water inlet

With a cap and filter.

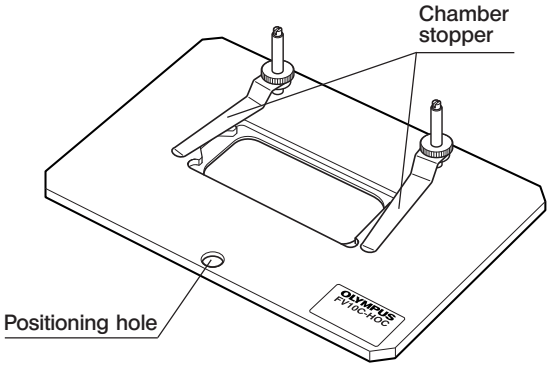
Water level window

Specimen Holders

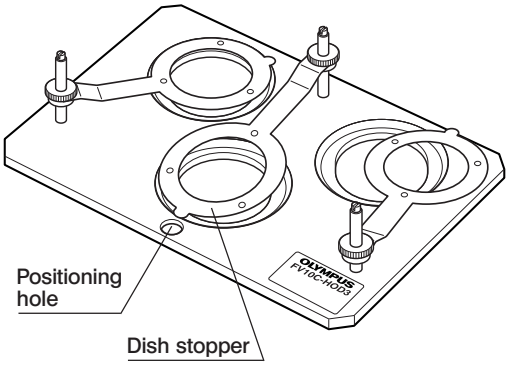
1. Specimen holder for slide glass: FV10C-HOS-2



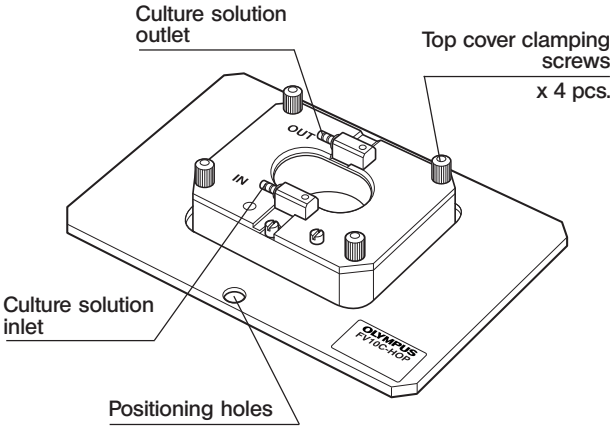
2. Specimen holder for chamber: FV10C-HOC



3. Specimen holder for ϕ35 mm dish: FV10C-HOD3



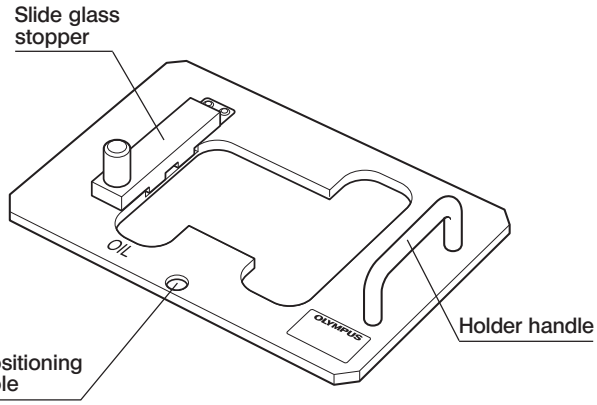
4. Specimen holder for culture pod: FV10C-HOP



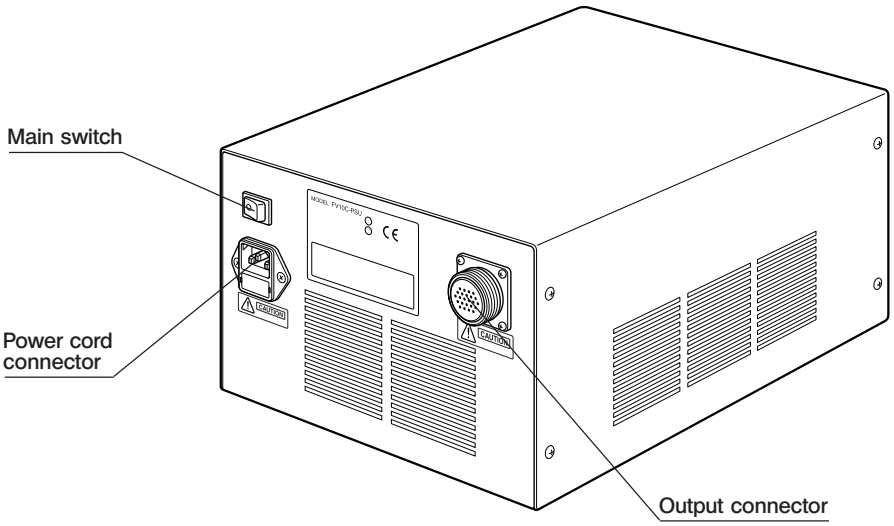
CAUTION

To keep the internal temperature and humidity of the incubator stable, be sure to place dummy specimens in the unused specimen positions when the number of specimens used is 1 or 2.

5. Specimen holder for well slide: FV10C-HOW

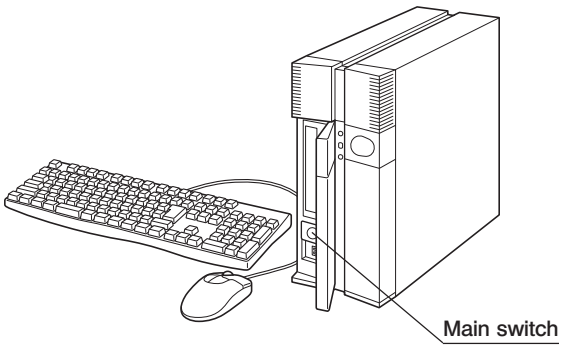


Power Supply Unit: FV10C-PSU



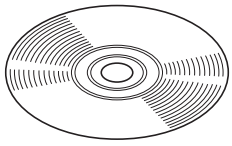
Controller: FV10C-CU

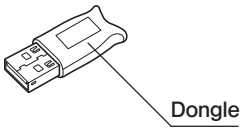
◎The software is pre-installed.



◎The display is not provided. Please prepare a WUXGA (1920 x 1200 pixels) display.

Software: FV10i-SW

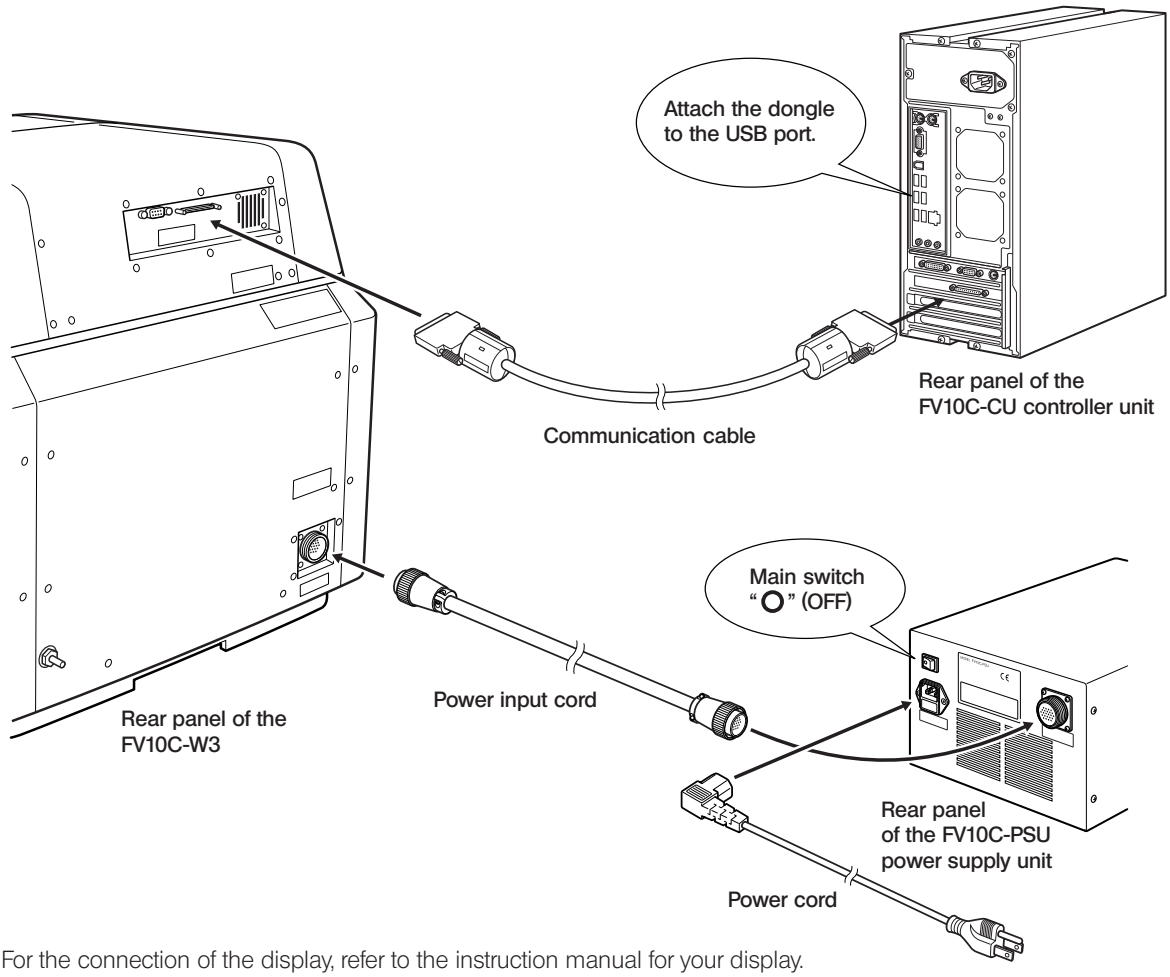




2 ASSEMBLY

1 Connecting the Cables

CAUTION Be sure to set the main switches of the power supply unit and controller to "O" (OFF) before connecting the cables.



◎For the connection of the display, refer to the instruction manual for your display.

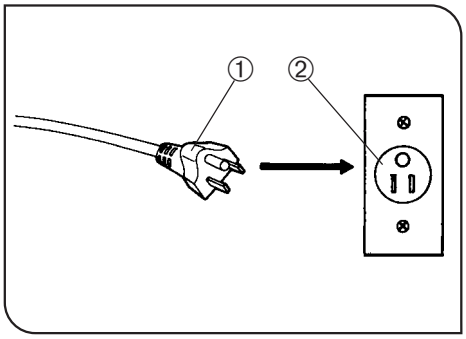


Fig. 1

CAUTION
- Cables and cords are vulnerable to bend or twist. Do not apply excessive force to them.
- Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment.

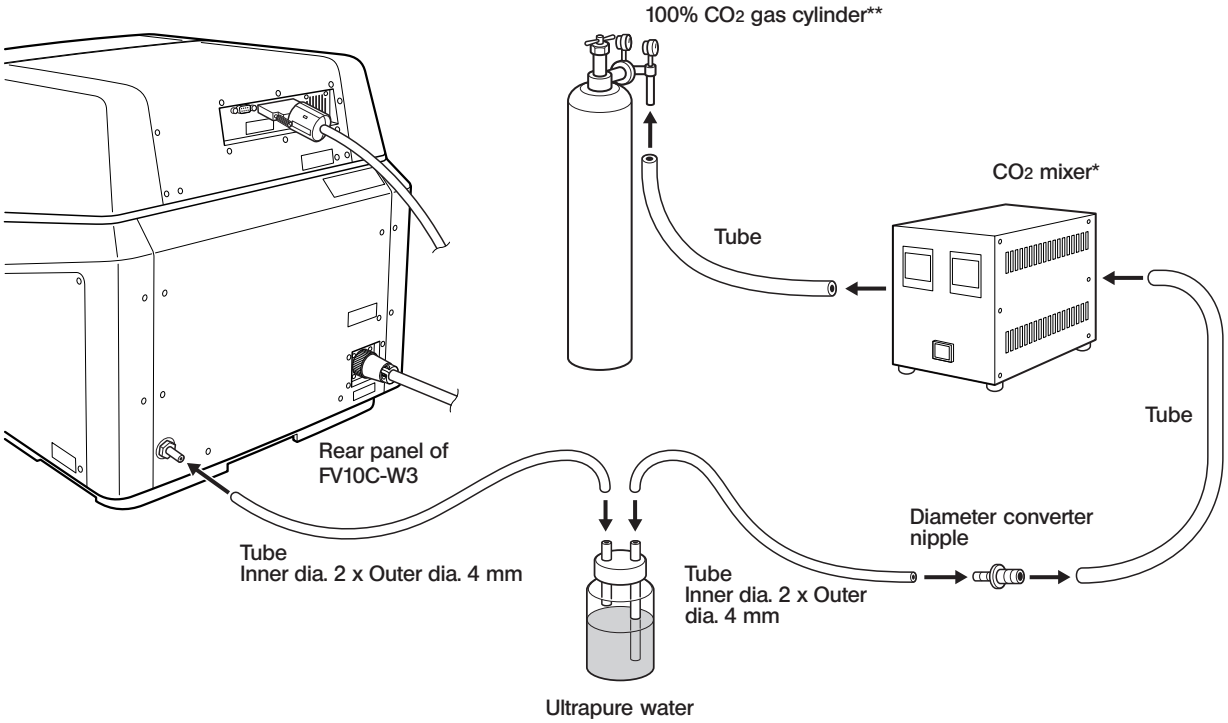
1. Insert the connector of the power cord to the connector on the power supply unit.

CAUTION Always ensure that the grounding terminal is safety grounded/earthed. If the equipment is not grounded/earthed, Olympus can no longer warrant the electrical safety performance of the equipment.

2. Insert the power cord plug ① into the wall power outlet ②.

2 Connecting the Tubes

CAUTION **The tubes, CO_2 gas cylinder and CO_2 mixer are not included in the FV10i-LIV package. Please purchase these accessories separately.**



◎As the CO_2 concentration is reduced due to the incubator structure, please supply 6% CO_2 gas. It will be turned into 5% CO_2 gas inside the incubator.

* Recommended CO_2 mixer output flow: 150 ml/min. of 6% CO_2 gas.

**When a 6% CO_2 gas cylinder is used, connect a flow meter in place of the CO_2 mixer.

Connecting the culture perfusion tubes to the culture pod

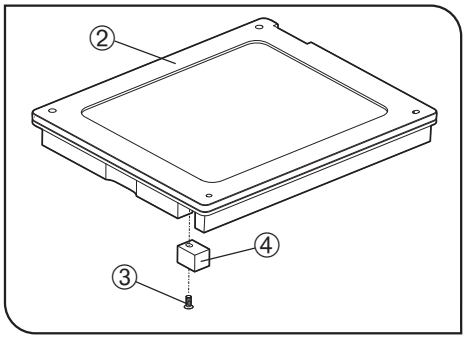


Fig. 2

1. Remove the cap ① provided on the left side of main body (Fig. 3). Use the allen wrench included in the product. Loosen the stopper screw from inside and remove the cap by bringing the stopper in horizontal position.
2. Remove the cover ② of the incubator.
3. Remove the screw ③ by the allen wrench and remove the cap ④ provided on the side of the cover (Fig. 2).
4. Connect the tubes to culture pod as illustrated in the Fig. 3.
◎Connect the tube on the side of the peristaltic pump to OUT.
Connect the tube on the side of culture solution to IN.
5. Place the cover on the incubator. Use the space for the cap ④ to take out the tubes.

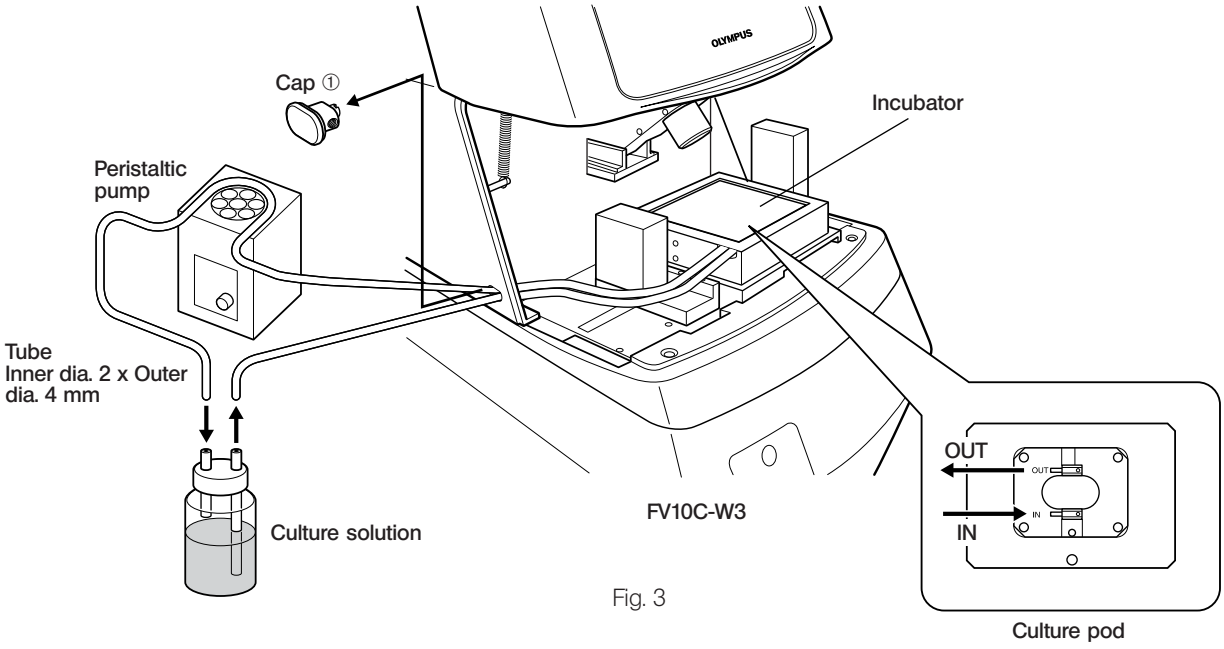
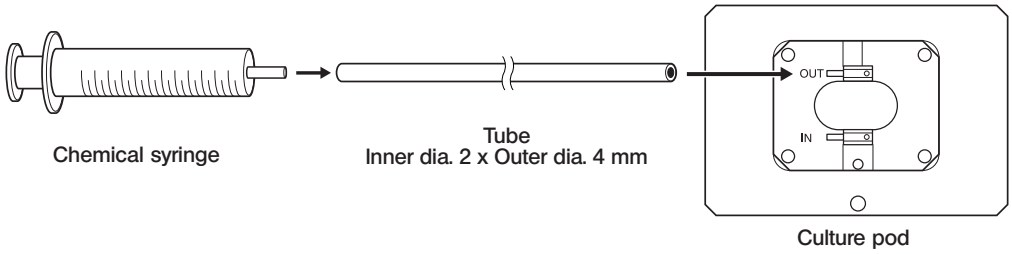


Fig. 3

Connecting the chemical stimulation tube to the culture pod

CAUTION Be sure to connect to the OUT side make the amount of the culture solution 2 ml in order to prevent bubble production in the culture solution.



3 Preparation Before Placing the Specimen

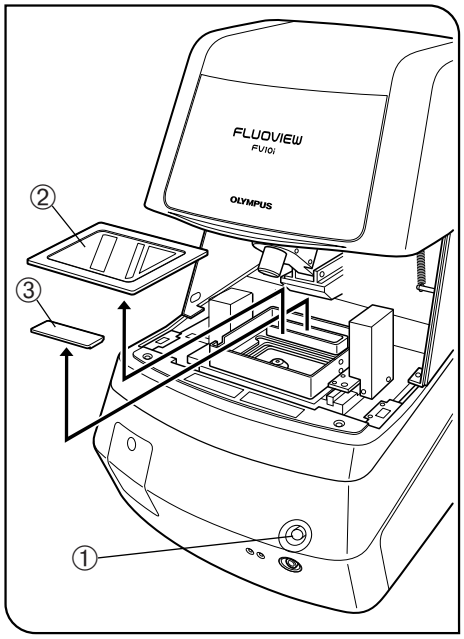


Fig. 4

Water Injection in the Incubator (Fig. 4)

◎Water injection is not necessary when the internal temperature of the incubator is not set (OFF).

1. Push and hold the cover button ①, and lift the cover.
2. Remove the cover ② from the incubator.
3. Take out the rubber CO_2 feed tube holder ③ from the water reservoir and pour ultrapure water until it fills about 70% of the water reservoir.
4. Re-place the rubber CO_2 feed tube holder to that the extremity of the tube is immersed underwater.
5. The cover of the incubator is to be placed after having placed the specimen.

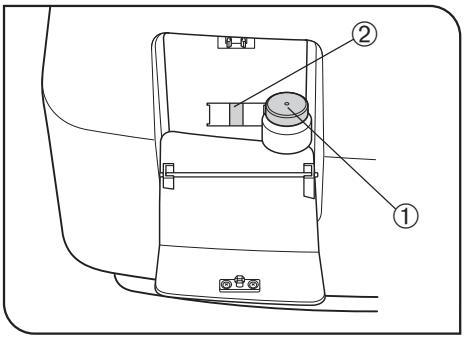


Fig. 5

Water Injection in the Objective Water Tank (Fig. 5)

◎Confirm that the drain cock is closed before filling water. Please refer to "Refilling Water in the Objective Water Tank" in P.11 for the detail information of the drain cock.

1. Push the dented portion of the water tank cover to open it.
2. Remove the cap from the water inlet ① and pour ultrapure water gently (so that the filter can pass the water).
3. Fill the water tank while observing the water level window ②.
   The water level is not visible until the water approaches the full capacity of 200 ml.

◎Be sure to fill the water tank completely when the time-lapse operation is to be performed.
The amount of water injected into the objective tip is 0.1 ml per time. When the tank is full, water injection is possible for about 2,000 times.

◎The water inlet has a filter inserted in the way. If the water feed is extremely slow, take out the filter and clean* or change it.

* Clean the filter frame with ultrapure water after taking it out and reversing it.

Draining of Water Pump (Fig. 6)

The water pump for the objective lens contains water to prevent dryness. At the first startup of FV10i-LIV, or after emptying and refilling the objective water tank with water, drain water from the water pump according to the procedures below.

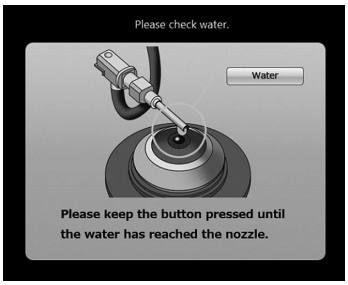


Fig. 6

1. Open the body cover and remove the sample holder.
2. Start Software and Logon.
3. Click on the Water button. Water feeding starts and the color of the button changes to red.
4. Wait for the color of the Water button to return automatically to gray.
   5 minutes later, water feeding stops and the color of the button returns automatically to gray.
5. Return the sample holder and the body cover back to the original position.

4 Placing the Specimen (Figs. 7 to 9)

CAUTION

- **If you attempt to place the specimen directly on the specimen holder installed in the main unit, it may drop inside the main unit.**
  Be sure to take out the specimen holder and place the specimen on it outside the main unit.
- **If the sample falls within the device, pick up the sample with the tweezers made of bamboo or plastic, or the stick wrapped by the adhesive tape.**
  If you open the cover, the temperature within the incubator drops. When you replace samples, etc., do so quickly. After you open the cover, wait for a while to stabilize the temperature within the incubator.
  (When the use environment temperature is 25°C and the cover open time is less than 3 minutes, wait for approx.30 minutes.)

NOTE Place a dummy specimen until the internal temperature of the incubator rises to the optimum temperature (35 to 37°C).
When the specimen holder for ϕ35 mm dish is used, place dummy specimens in all of the three positions.
Without specimens placed, the internal temperature of the incubator may become unstable.

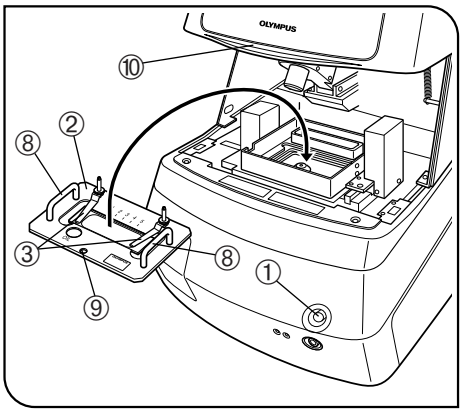


Fig. 7

1. Push and hold the cover buttons ①, and lift the cover.
2. Remove the cover of the incubator.
3. Place the specimen.

◎ When using a culture pod, it is necessary to remove its top cover, set the ϕ35 mm dish and connect the tubes (see page 7).

Specimen other than well slide/culture pod specimen

- Place the specimen in the specified specimen holder ② and fix the specimen with the specimen stopper ③ (Fig. 7).
  A slide glass specimen should be placed with the cover glass facing downward.

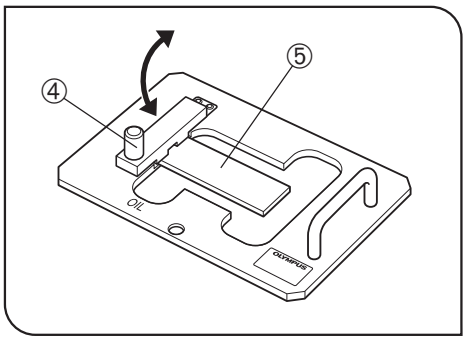


Fig. 8

Well slide specimen (Fig. 8)

Remove media chamber from the slide and cover glass on top surface. Shield it with proper method.
Place the slide with cover glass facing downward for imaging.

- Loosen the knob ④ of the slide glass stopper and lift it.
- Place the well slide ⑤ along the left edge, lower the slide glass stopper and tighten the knob ④.

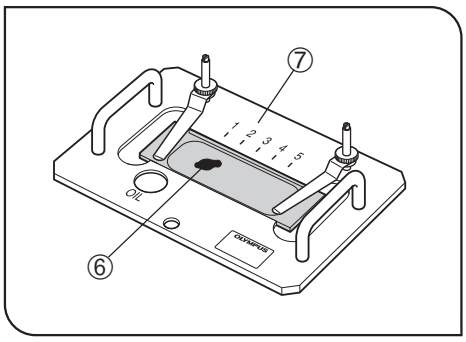


Fig. 9

◎When using the specimen holder for slide glass, memorize the map area indicator number ⑦ aligned with the position of the observation target ⑥ and use the same position in later observation/acquisition (Fig. 9).

4. Hold the specimen holder ② horizontally by the holder handle ⑧ or pillars of the specimen stoppers and place the specimen holder on the specimen holder mount so that the positioning hole ⑨ of the specimen holder comes on the front (Fig. 7).
5. Re-place the cover of the incubator.
6. Push down the close lever ⑩ and confirm that a click sound is generated (Fig. 7).

◎If the cover is not closed completely, the internal temperature of the incubator may become unstable and the laser beam will not be output, making observation impossible.

3 ROUTINE MAINTENANCE

1 Cleaning the Objective

◎Clean the object front after completing observation and acquisition.

1. Remove the specimen holder and wipe water attached to the object front using a piece of cleaning paper or clean cloth.
2. If the object front is stained, moisten the cleaning paper or cloth with commercially available absolute alcohol.

2 Refilling/Draining Water in the Incubator

- Check the amount of water in the incubator at proper timing, for example when replacing the specimen, and refill water as required.
- After completing observation/acquisition, take out the rubber tube from the water reservoir of the incubator without stopping the CO_2 feed (in order to drain water from inside the rubber tube).
  After this, drain water from the water reservoir.

3 Refilling Water in the Objective Water Tank

- Check the water level of the water tank periodically through the water level window, and refill water as required.
- The display shows an alarm when the water amount gets insufficient.

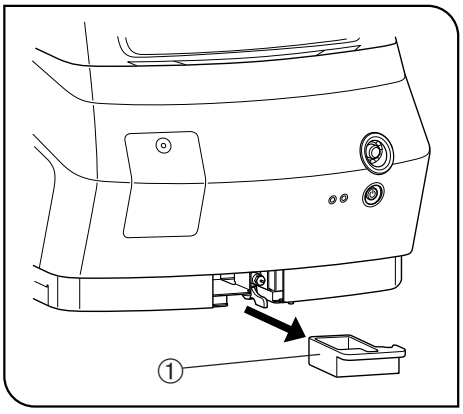


Fig. 10

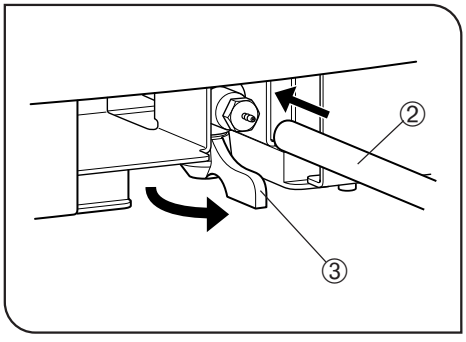


Fig. 11

Draining Water from the Water Tank (Figs. 10 & 11)

◎When the system is not to be used for more than two weeks, drain the water because the water quality would degrade.

◎For safety in transportation, shut down the software and turn the sub-switch of the main unit to OFF.

1. Slide out the water tray ①.
2. Attach the drain tube ② at the drain outlet.
3. Prepare the relatively large bucket, and place it so that water from the drain tube enters into the bucket.
4. Twist the drain cock ③ to start draining.
5. When draining is finished, return the drain cock ③ to the original position.
6. Remove the drain tube ② and return the water tray ① to the original position.

CAUTION **Be sure to use the drain tube provided by Olympus.**

4 Draining Water from the Water Tray (Fig. 10)

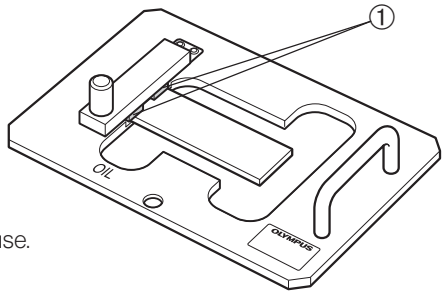
- The water tray ① pools excess water in the main unit. Slide out the tray periodically and drain water from it.

5 Disinfection and Sterilization

◎If a hazardous specimen is attached to or splashed in the specimen holder or the incubator, immediately disinfect or sterilize it.
Do not leave the attached substance, for it will harden and become hard to remove.

Disinfection

- Applicable position: Inside the incubatorand on various specimen holders. (excluding the rubber part ① of the FV10C-HOW).
- Procedure: Moisten a clean cloth with disinfecting alcohol and wipe with it.
  Do not rub the name plate with a strong force to prevent it from being peeled off.



Sterilization

- Applicable position: Cover on the culture pod.
- Procedure: Use autoclaving (high-pressure steam sterilization) at 121°C for 20 minutes.
  After sterilization, dry the specimen holder before reuse.

PROPER SELECTION OF THE POWER SUPPLY CORD

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

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

Specifications

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

Table 1 Certified Cord

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

Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL Japan / METI	
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´Electricite´ (UTE)	USE	‹HAR›	30	10	30
Instituto Italiano del Marchio di Qualita´ (IMQ)	IEMMEQU	‹HAR›	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	‹HAR›	10	10	30
N.V. KEMA	KEMA-KEUR	‹HAR›	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	‹HAR›	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	‹ÖVE›	‹HAR›	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	‹DEMKO›	‹HAR›	30	10	30
National Standards Authority of Ireland (NSAI)	‹NSAI›	‹HAR›	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO	‹HAR›	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	‹UNED›	‹HAR›	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	‹HAR›	30	30	70
Instituto Portages da Qualidade (IPQ)	np	‹HAR›	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	‹HAR›	10	30	90
Elektriska Inspektoratet	SETI	‹HAR›	10	30	90

Underwriters Laboratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

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Printed in Japan on June 01, 2011 M 002–04