

OLYMPUS®

INSTRUCTIONS

INDUSTRIAL VIDEOSCOPE

IPLEX LX series **IPLEX LT series**

IV8420L1	IV8420L2
IV8435L1	IV8435L2
IV8620L1	IV8620L2
IV8635L1	IV8635L2
IV88100L1	IV88100L2

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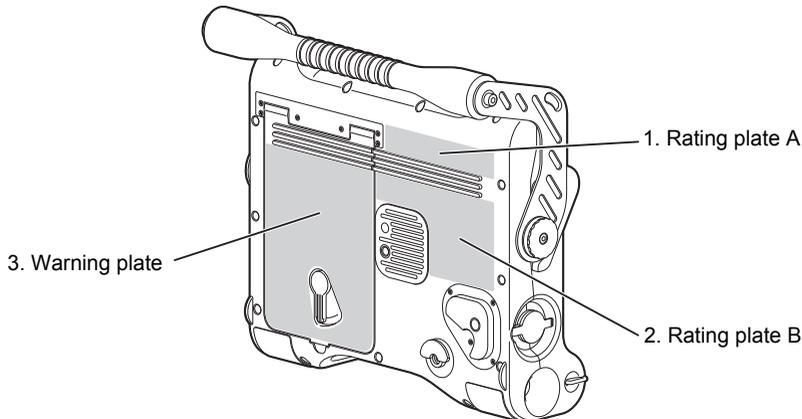
For 8.5-mm type insertion tube 157

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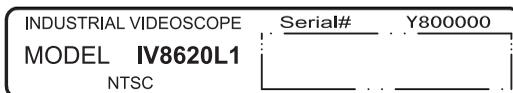
System chart..... 158

Warning and Rating Plates

Safety-related labels and symbols are attached to the instrument at the locations shown below. Rating plate varies in each model. Please refer to the Specifications, Chap 10. If labels or symbols are missing or illegible, please contact Olympus.



■ 1. Rating plate A



■ 2. Rating plate B

OLYMPUS CORPORATION TOKYO 163-0914, JAPAN MADE IN JAPAN	INPUT	
	AC Adapter 12V --- 11W Battery 10.8V --- 11W	

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

KCC-REM
-OLY-182
209002

■ 3. Warning plate

⚠ CAUTION

- READ THE INSTRUCTION MANUAL THOROUGHLY BEFORE USE.
- FOR THE OPERATING ENVIRONMENT, BE SURE TO OBSERVE THE WARNINGS AND CAUTIONS GIVEN IN THE INSTRUCTION MANUAL.
- NEVER OPERATE THE UNIT IN THE PRESENCE OF INFLAMMABLE GASES.
- NEVER USE BATTERY AND AC ADAPTER EXCEPT THAT DESIGNATED BY OLYMPUS.
- ALL REPAIRS SHOULD BE MADE BY AUTHORIZED OLYMPUS SERVICE PERSONNEL ONLY.
- RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTION.

⚠ 注意

- 取扱説明書を熟読の上、ご使用ください。
- 使用環境につきましては、取扱説明書に記載されている注意事項を守ってご使用ください。
- 可燃性雰囲気中では、使用しないでください。
- 当社指定以外のバッテリー及びACアダプターは、使用しないでください。
- 当社指定の修理員以外の修理は絶対に行わないでください。
- 不適切なタイプの電池に交換すると爆発の危険があります。使用済のバッテリーは、取扱説明書に従って処理してください。



The diagram consists of two parts. On the left, a circular icon contains a flame symbol above a battery symbol, indicating a fire hazard. On the right, a large rounded rectangle represents the warning plate, with a battery symbol and a plus sign at the bottom, and a curved arrow pointing to the right, indicating the direction of the warning plate.

Important Information - Please Read Before Use

Intended use

This instrument has been designed to be used with IPLEX LX/LT series and ancillary equipment for observation and examination of the insides of a machinery, equipment or building that cannot be observed directly from the outside. Do not use this instrument for any purpose other than its intended use, particularly for observation or examination of the inside of a human or animal body cavity.

Instruction manual

This instruction manual contains essential information on using this instrument safely and effectively. Before use, thoroughly review this manual and the manuals of all equipment which will be used during the procedure and use the equipment as instructed.

Keep this and all related instruction manuals in a safe, accessible location.

If you have any questions about any information in this manual, please contact Olympus.

Combined ancillary equipment

Refer to the “System chart” page 158 in the Appendix to confirm that this instrument is compatible with the ancillary equipment being used. Using incompatible equipment can result in malfunction and/or equipment damage.

Repair and modification

This instrument does not contain any user serviceable parts. Do not disassemble, modify or attempt to repair. User injury and/or equipment damage can result.

Signal words

The following signal words are used throughout this manual.



- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION**

- Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices or potential equipment damage.

**NOTE**

- Indicates additional helpful information.
-

Dangers, warnings and cautions

Follow the dangers, warnings and cautions described below when handling this instrument. The information is to be supplemented by the dangers, warnings and cautions given in each chapter.

**DANGER**

- Never use this instrument in observation inside the human and animal cavity. The human body or animal may be injured.

**WARNING**

- Never use this instrument in a flammable atmosphere. Otherwise, an explosion or fire may result.
- Do not use the instrument in an environment filled with fine particles such as metal dust.
- With the exception of the insertion tubes, this instrument and its case are not designed to be waterproof. Except for the insertion tube, never use or store the instrument in any location where it might be submerged in water. An electric shock may result.
- Never use this instrument on a piece of electrical equipment being energized. Since the exterior finish of the insertion tube is electroconductive, an electric shock may occur if it is brought in contact with an active part.
- Always turn the LIGHT button (☼) OFF when the instrument is not in use. Otherwise the light emitted from the insertion tube may heat a nearby object and cause fire ignition.
- The distal end of the insertion tube may become hot due to the illumination light or the internal heating caused by electrical parts. Do not forget to turn off the light source before attaching or detaching the optical adapter. ☼ Touching the distal end immediately after having turned off the light source may cause burn on your skin.
- Do not allow the light emitted from the insertion tube's distal end to enter your eye directly. Otherwise, an eye injury may result.
- Should any abnormality be detected during angulation operation, do not continue the angulation operation by force. Otherwise, the insertion tube or examination target may be damaged.

-
- Do not subject the LCD surface to impact or strong pressure. Doing so could shatter the LCD screen and cause personal injury.
 - Do not rub the LCD with hard or sharp objects. This can crack or scratch the LCD panel.
 - Do not allow a metallic object or a fluid such as water enter the battery compartment or the battery terminals. Should any foreign object enter the instrument, remove the battery and the AC adapter from the IPLEX LX/LT (main unit) and immediately contact Olympus.
 - Do not touch the connectors directly by hand. Otherwise, a malfunction or electric shock may result.
 - Do not allow metallic or foreign objects to enter the device through connectors or any other openings. Otherwise, a malfunction or electric shock may result.
 - In case an irregularity such as smoke, abnormal odor or abnormal noise is detected, immediately stop using the equipment even when it looks operable, and do not turn it ON again.
 - When transporting this equipment, turn off the power and remove the battery. It is extremely dangerous to transport this equipment while it is on, as this can lead to unexpected accidents.



CAUTION

-
- Never use the IPLEX LX/LT without an optical adapter fitted.
 - A message instructing you to clean the electrodes will display when there is an electrode malfunction caused by foreign objects in between the optical adapter and the insertion tube distal end. In this case, immediately stop operation, gently remove the insertion tube and follow the instructions on page 138 under "Error messages".
 - The image quality may be deteriorated in high temperature.
 - Inserting the insertion tube into an observation object that is hotter than the operating temperature may damage the equipment. The LX series has a temperature alarm function that sounds an alarm and displays a warning message. If this happens, immediately remove the insertion tube from the observation object. Continuing operation may damage or reduce the performance of the equipment.
 - Do not insert the insertion tube in a machine that is running, as this may result in the insertion tube and/or machine damage. Also do not run the machine while the insertion tube is inserted in it.
 - The minimum bending radius of the insertion tube is 20 mm for the 4 mm type, 30 mm for the 6 mm type and 50 mm for the 8.5 mm type. Bending at less than the minimum bending radius may result in damage to the insertion tube.
 - The optical adapter is not waterproof by itself. When water gets into the joint area between the insertion tube and optical adapter, malfunction or instrument damage may occur. Check if the O-ring is correctly attached and if no crack exists on its surface. Before attaching or detaching the optical adapter, check the joint area between the insertion tube and optical adapter if no water droplets are present.
 - Do not bring the insertion tube in contact with a liquid other than water, saline, machine oil and light oil. It may damage the instrument.
 - Do not cover the instrument with a plastic bag or other object during use. If the inside of the instrument cannot be cooled, the instrument damage may result.
 - Do not use this instrument where it is exposed to direct sunlight.

-
- The LCD monitor may not display data normally when the instrument is used in an environment where temperatures are below 0 °C. Use the instrument after using a heater to bring the area to room temperature.
 - Bringing the instrument indoor from cold atmosphere subjecting it to sudden temperature change can cause condensation to form inside the instrument. Using the instrument while condensation is formed creates the risk of malfunction. Wait until the instrument reaches the same temperature as the room before using it.
 - Never use the instrument in areas where strong radiation is present.
 - Do not remove the USB Flash Drive while playing back or recording still images and movies or while doing initial stereo adapter settings. Otherwise, the data recorded in the USB Flash Drive may be destroyed.
 - Take care not to have your feet caught by a cord including the power cord or insertion tube.
 - Do not pull the cable of the insertion tube, control unit or other equipment with a strong force. Otherwise, the insertion tube or cable may be damaged or the instrument may topple down or drop. Also, if the operator is using the shoulder strap, it may cause them to fall over.
 - Do not pull main unit while holding the insertion tube, control unit or other cables.
 - Do not operate the [ANGLE] joystick of the control unit with intensity while the [ANGLE LOCK] lever is pulled, otherwise it may cause malfunction.
 - If the USB connector or other connectors become wet, wipe them dry. Also, if any foreign matter gets into a connector, remove it.
 - Accidentally dropping the IPLEX LX/LT (main unit) while cables or other device is attached to a connector can damage the connector or the item that is attached to it.
 - Never connect any other USB device or USB cable to the USB connector except for the USB Flash Drive provided as standard or USB Flash Drive recommended by Olympus.
 - Make sure that the battery cover, video connector cap, and AC adapter connector cap are closed securely during storage or whenever connectors are not being used.
 - Do not open the battery cover, video connector cap, AC adapter connector cap with wet hands, or under damp or dusty environment.
 - Never subject the IPLEX LX/LT unit to strong impact.
 - The USB connector and the battery terminal on the main unit may get hot. Be careful to not touch them when inserting or removing USB Flash Drive or the battery.



NOTE

- The images recorded with instrument can be displayed on a computer, etc., but it is not possible to play back images recorded with an image recording device such as a digital camera or a computer on the IPLEX LX/LT series instrument.
 - Windows Media Player is either registered trademarks or trademarks of Microsoft Inc. in the U.S. and/or other countries.
-

Handling of the battery

Follow the dangers, warnings and cautions described below when handling the battery. Otherwise, battery fluid leak, excessive heat generation, smoke, battery burst, electric shock and/or burns may result.



DANGER

- In case of Li-ion operation, be sure to use the battery and battery charger designated for IPLEX LX/LT series.
- Before use, thoroughly review the instruction manuals for the battery and battery charger to fully understand the information contained in them, and observe their instructions during use.
- Do not install and use the battery by reversing the polarity. If the battery cannot be installed properly in the instrument, do not attempt to insert it by force.
- Do not allow connectors to become shorted.
- Do not attempt to apply solder directly on a terminal. Otherwise, a hazardous situation such as destruction of the terminal safety valve or scattering of battery fluid may result.
- Do not interconnect the electrodes of the battery through a metallic object or carry nor store the battery together with a metallic object.
- Do not connect the battery directly to a power outlet or the cigar lighter of an automobile.
- Do not throw the battery in fire or heat the battery. Doing so creates the risk of explosion.
- Penetration of battery fluid in an eye may result in loss of eyesight. Should this occur, rinse eyes thoroughly with clean water and immediately have a physician's treatment.
- Do not attempt to open or modify the battery. Doing so creates the risk of explosion or fire.
- Do not immerse the battery in fresh or sea water, nor moisten the battery.
- Do not recharge the battery near a fire or under direct sunlight. Doing so creates the risk of explosion or fire.
- Do not pierce the battery or subject it to strong impacts or load. Doing so creates the risk of explosion or fire.
- Never drop or throw the battery, or subject it to strong impact.
- Place the equipment in a stable location to remove the battery. If the equipment is unstable, the battery may fall out, which can lead to explosion and fire.



WARNING

- Do not use a battery that is not recommended for IPLEX LX/LT series.
- Do not attempt to recharge a battery that is not designated for IPLEX LX/LT series.
- If the battery charger cannot complete battery charging in the specified recharging time, stop trying to recharge the battery.
- Do not use a battery if it presents an irregularity such as fluid leak, discoloration, deformation or abnormal condition. Immediately request servicing.
- If the battery fluid attaches to your skin or clothes, immediately rinse with clean water such as tap water. Otherwise, a skin injury may result. Contact a physician for treatment if necessary.
- Do not deform the battery compartment or put a foreign object in it.

-
- Do not cover the battery charger and battery with clothes or cushion during recharging. Also avoid any situation in which the covering of the battery charger and battery by such objects is expectable.



CAUTION

- Do not soak the battery in or moisten it with water including rainwater and seawater.
- Do not leave the battery in a place subject to moisture, water leak or extremely high or low temperatures.
- Do not touch the battery terminals with a wet hand.
- Be sure to recharge the battery before using them for the first time after purchase or after they have not been used for a long period.
- When the battery is not to be used for a long period, be sure to remove them from the IPLEX LX/LT (main unit). Otherwise, battery fluid leak and heat build-up may result in a fire or injury.
- Do not use or leave the battery in a place with high temperature, for example under direct sunlight, in a closed automobile under the sun or in front of heating equipment.
- The battery is hot after long hours of operation of IPLEX LX/LT series. Do not take out the battery immediately after use, as this may result in burning your hand.
- Do not leave the battery in the reach of children.
- When replacing the battery, do not repeatedly remove and load the battery rapidly. Doing so may make it impossible to turn on power.



NOTE

- Use the battery correctly, as incorrect use may result in fluid leak, excessive heat generation and/or damage. When replacing the battery, install them correctly by observing the insertion direction.
 - In general, the battery performance drops as the ambient temperature drops. Note that the battery performance degraded due to low temperatures recovers when the temperature rises to a normal level.
 - Contamination of battery electrodes with sweat or oil will cause contact failures. When the battery is dirty, wipe it clean with a dry cloth before use.
 - The IPLEX LX/LT series can be operated continuously on battery power for 120 minutes for the 4-mm and 6-mm types and 100 minutes for the 8.5-mm type (when using a new fully charged battery). When long hours of battery-powered operation are expected, it is recommended to prepare charged batteries as spares.
 - The battery is designated as a recyclable product. When discontinuing the use of the battery, be sure to have it recycled in compliance with your local regulations.
 - Recommended temperature range for Li-ion battery operation.

Discharge (when using the instrument)	: 0 °C to 40 °C
Recharging	: 0 °C to 40 °C
Storage	: -20 °C to +50 °C

Using the battery under a temperature outside the above temperature range will result in degradation of the performance and service life. When storing the battery, be sure to remove it from the IPLEX LX/LT (main unit).
 - The battery is a consumable item.
 - The battery cannot be charged using the equipment. For information on charging the battery, refer to the manual that came with the battery charger.
-

Product configurations of the IPLEX LX/LT series

The IPLEX LX/LT series includes a main unit, control unit, and an insertion tube as shown in the table below.

The simplified specifications of the insertion tubes are shown below. For detailed specifications of the individual models, see “Chapter 10 Specifications” (page 146).

IPLEX LX/LT series model names		Max. insertion tube outer diameter	Insertion tube length
LX	IV8420L1	φ 4.0 mm	2m
	IV8435L1		3.5m
	IV8620L1	φ 6.0 mm	2m
	IV8635L1		3.5m
	IV88100L1	φ 8.5mm	10m
LT	IV8420L2	φ 4.0 mm	2m
	IV8435L2		3.5m
	IV8620L2	φ 6.0 mm	2m
	IV8635L2		3.5m
	IV88100L2	φ 8.5mm	10m

Refer to the “System chart” in the Appendix for the IPLEX LX/LT and optional equipment configurations.

Expanded functions of the IPLEX LX/LT series

The IPLEX LX/LT series functions can be expanded.

- IPLEX LT → IPLEX LX
- IPLEX LX → IPLEX LX (Stereo measurement function)

Contact Olympus for details.

Chapter 1 Checking the package contents

1.1 Checking the package contents

Match all items in the package with the components shown on “IPLEX LX/LT series package contents” below. If any item is damaged, a component is missing or you have any questions, do not use the instrument, but immediately contact Olympus.

■ IPLEX LX/LT series package contents

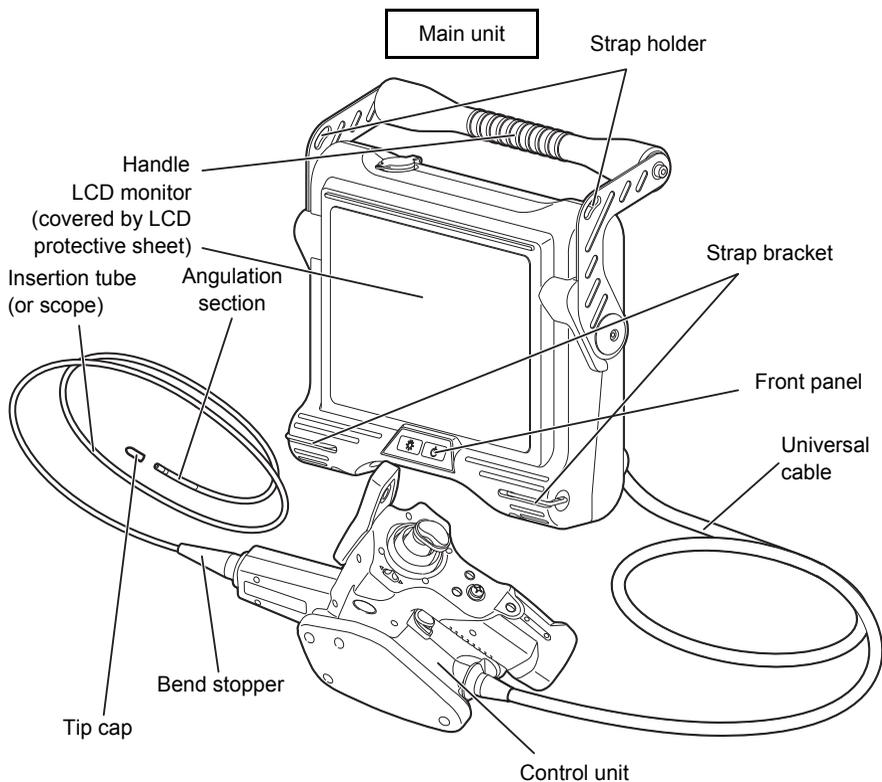
Name	Count
IPLEX LX or LT (main unit)	1
USB flash drive for recording images	1
AC adapter	1
AC power cord	1*
3P-2P adapter	1
Optical adapter case	1
IPLEX LX/LT Utility Disc (IPLEX VIEWER PLUS)	1
Shoulder strap	1
Optical adapter case holder	1
Lens cleaning kit (cleaning fluid, cotton swab, brush)	1
Tip cap (4-mm type, 6-mm type or 8.5-mm type)	1
Stopper	1
Insertion tube wrap belt (4-mm, 6-mm and 8.5-mm types)	1
LCD protection sheet (Stuck to the LCD monitor)	1

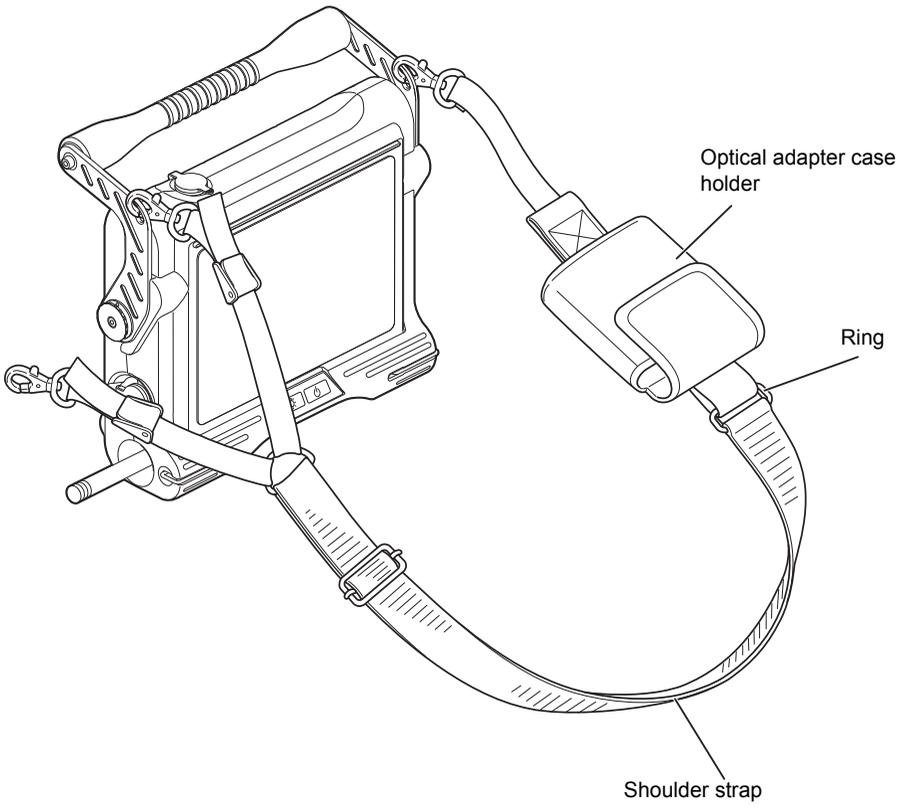
Name		Count
Instruction Manual	IPLEX LX/LT series (This booklet)	1
	IPLEX LX/LT Operation manual	1
	AC adapter	1
	IPLEX LX/LT utility disc	1
	Software license agreement	1
	LCD protective sheet	1
Carrying case		1

* For a PAL configuration set, 2 power cables, each with a different plug type, are provided.

Chapter 2 Instrument nomenclature and functions

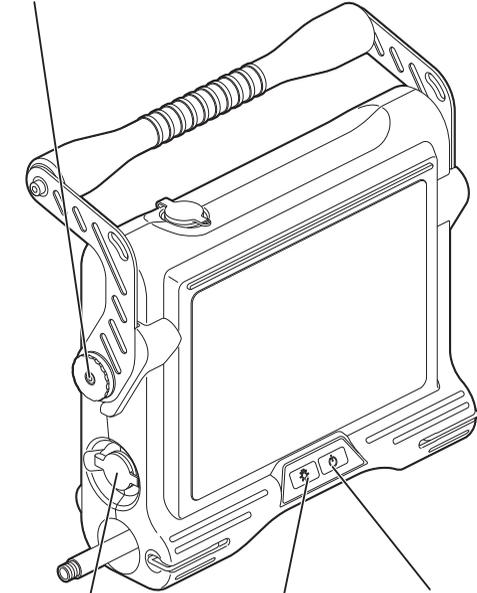
2.1 System nomenclature





2.2 Main unit nomenclature and functions

Control unit holder



AC adapter
connector cap

LIGHT button (☀)

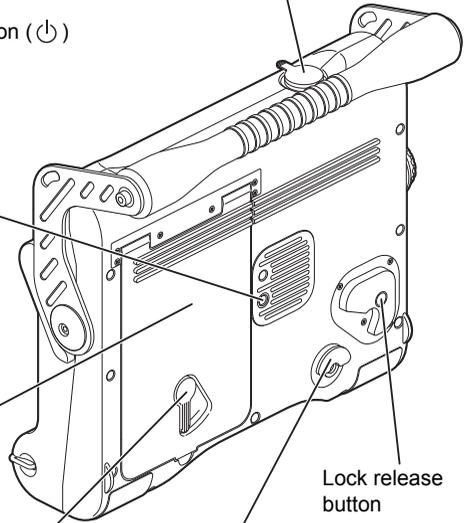
Power button (⏻)

Video connector cap

Tripod screw hole

Battery cover

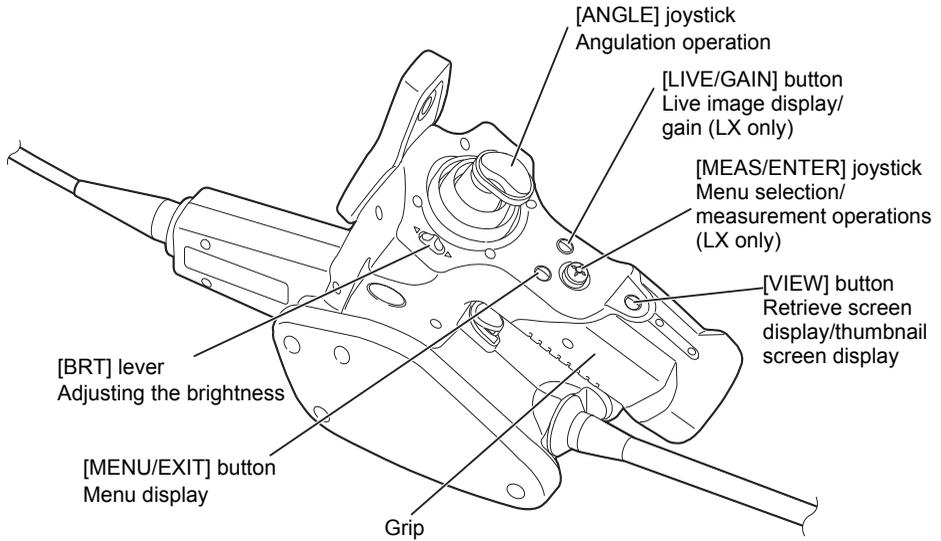
Lock release lever

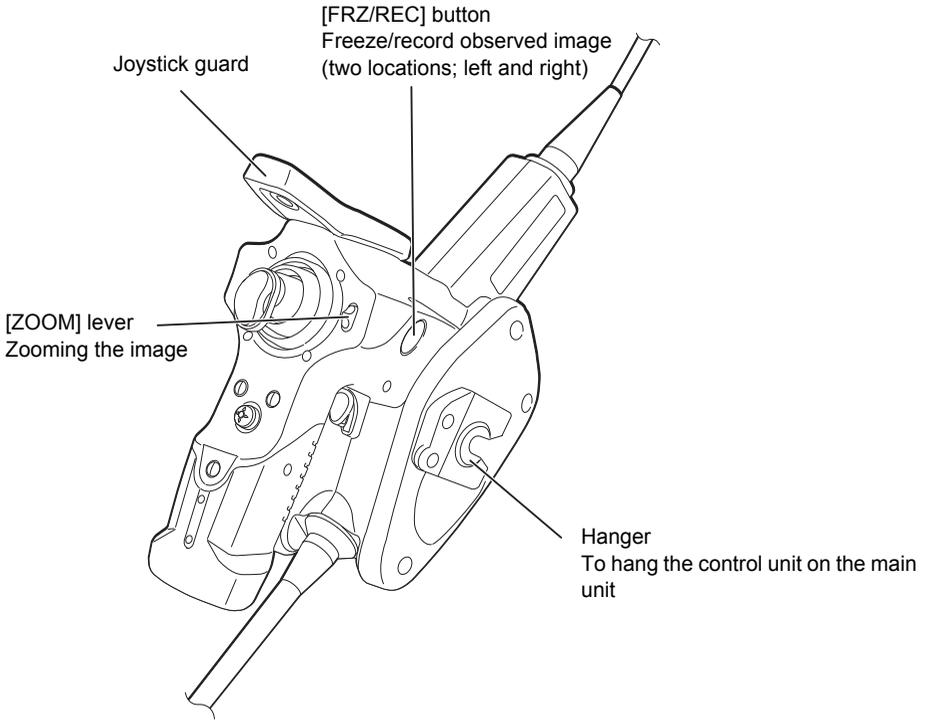


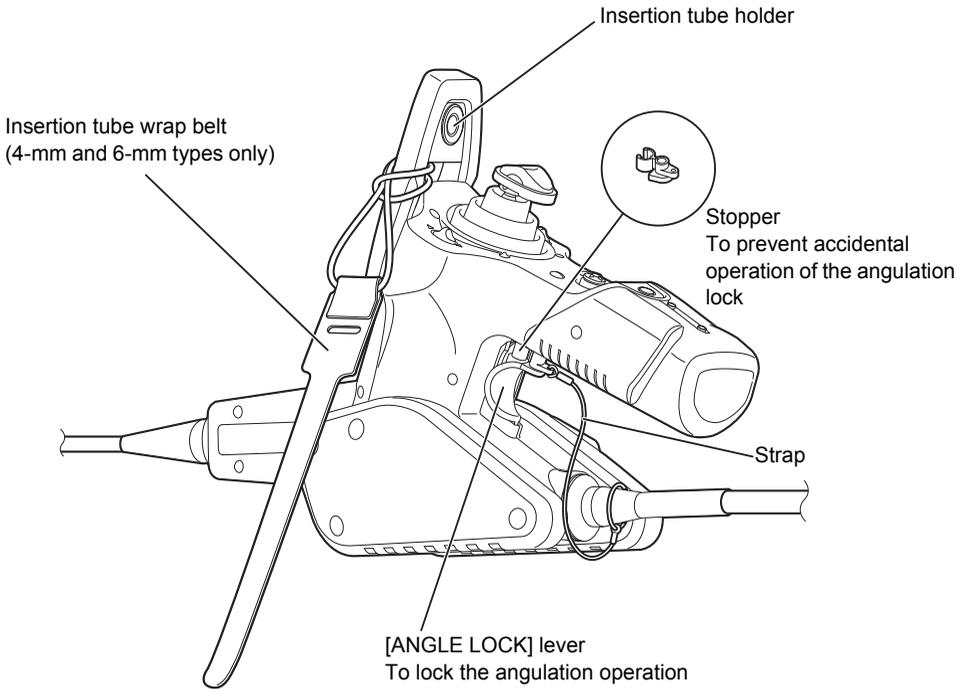
Lock release
button

Scope handset holder

2.3 Control unit nomenclature and functions





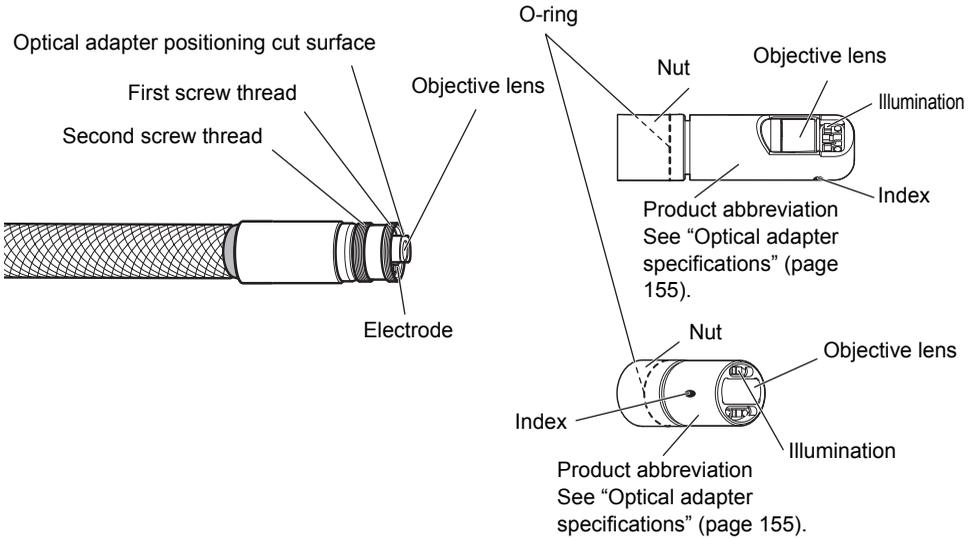


NOTE

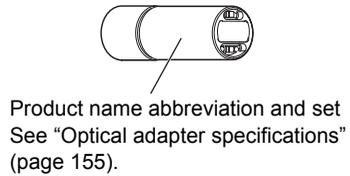
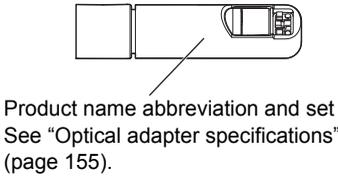
- The insertion tube can temporarily be fixed on the control unit by inserting it into the insertion tube holder hole.
-

2.4 Optical adapter nomenclature and functions

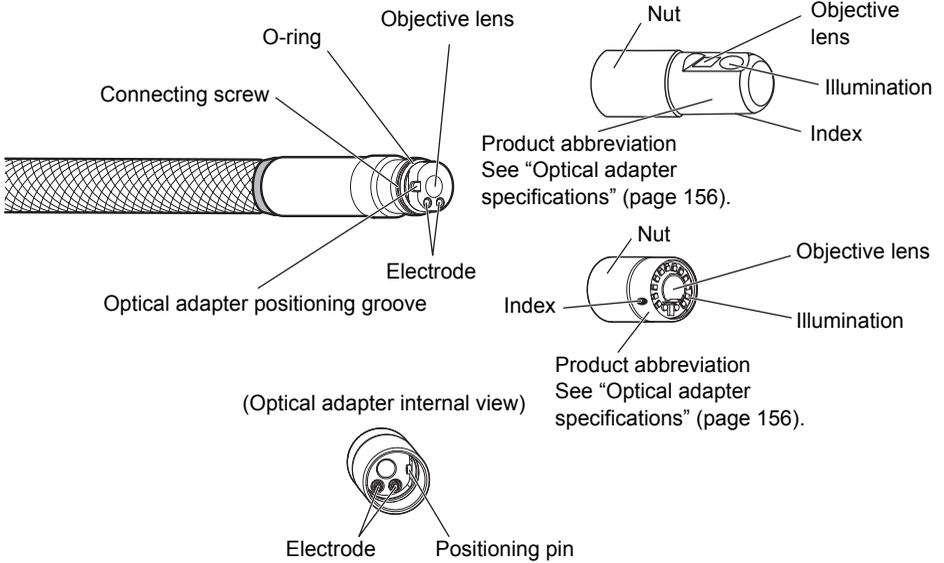
■ For 4-mm type



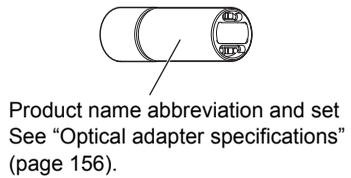
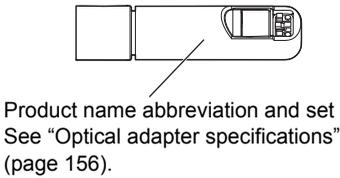
Stereo optical adapter



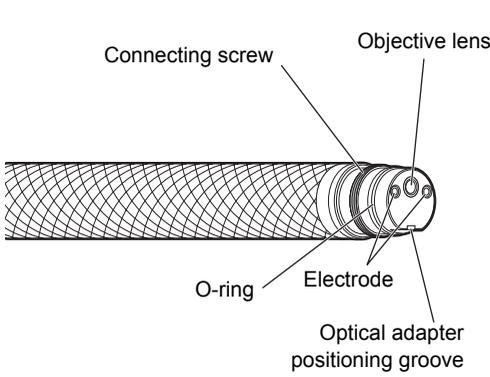
■ For 6-mm type



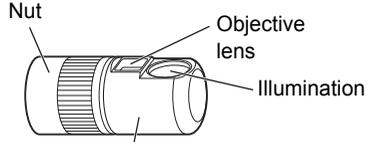
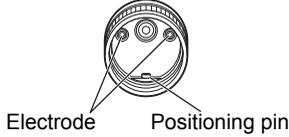
Stereo optical adapter



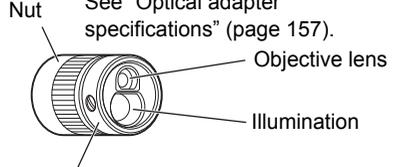
■ For 8.5-mm type



(Optical adapter internal view)

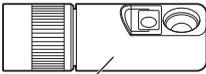


Product abbreviation
See "Optical adapter specifications" (page 157).

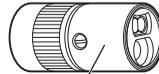


Product abbreviation
See "Optical adapter specifications" (page 157).

Stereo optical adapter



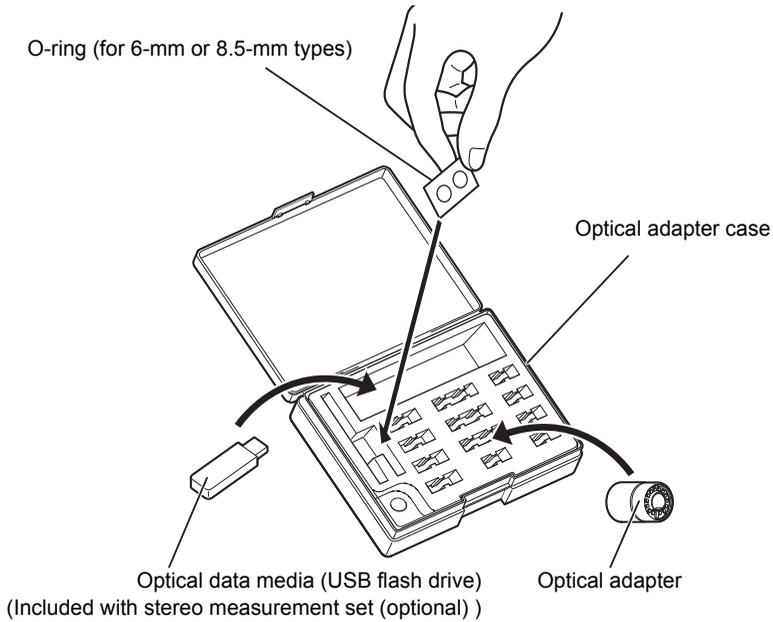
Product name abbreviation and set
See "Optical adapter specifications"
(page 157).



Product name abbreviation and set
See "Optical adapter specifications"
(page 157).

Storage in the optical adapter case

Store the optical adapter, O-ring (for the 6-mm or 8.5-mm types), optical data media (USB flash drive) (included with stereo measurement set (optional)) in the optical adapter case provided with this product.



Chapter 3 Preparation and inspection before observation



CAUTION

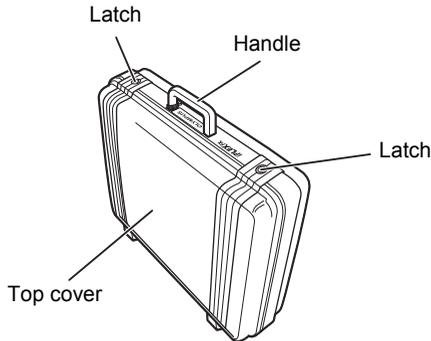
- Be sure to finish the preparation and inspection work described below before use. If any irregularity is suspected, do not use the instrument but see “Chapter 9 Troubleshooting” (page 137) to solve the problem. If irregularity is still suspected, contact Olympus. Damage or irregularity may compromise the correct functioning of the instrument and may result in more severe damage to the examined subject.
 - Inspections are not only required before use, but should be conducted periodically.
-

3.1 Transportation of the case



CAUTION

- Before transporting the case, inspect the exterior parts handles and latch of the case for irregularities such as damage and loosening.
 - Use only the designated case. Failure to do so may cause damage or malfunction of the insertion tube and/or main unit.
-



■ When using the handle

1

Ensure that the latch is closed firmly before lifting the case.



CAUTION

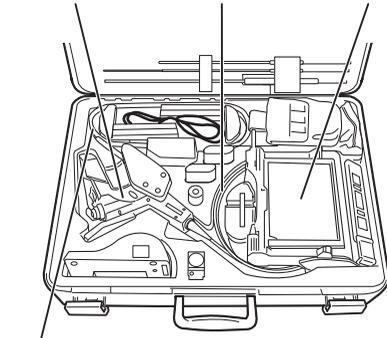
- Never move the equipment around by the insertion tube or cables.
 - If the latch is not completely closed, the top cover may open accidentally when the case is lifted.
 - Do not kick the case or move it with your feet.
-

■ Taking the instrument out of the case

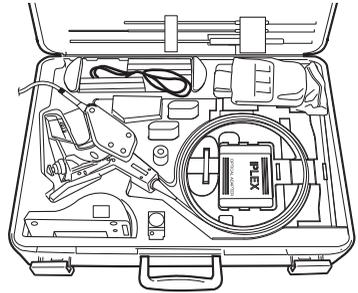
For 4-mm and 6-mm types

Remove the equipment in the order of: Main unit → Insertion tube → Control unit.

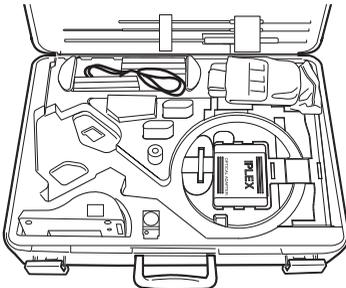
Control unit Insertion tube Main unit



Universal cable



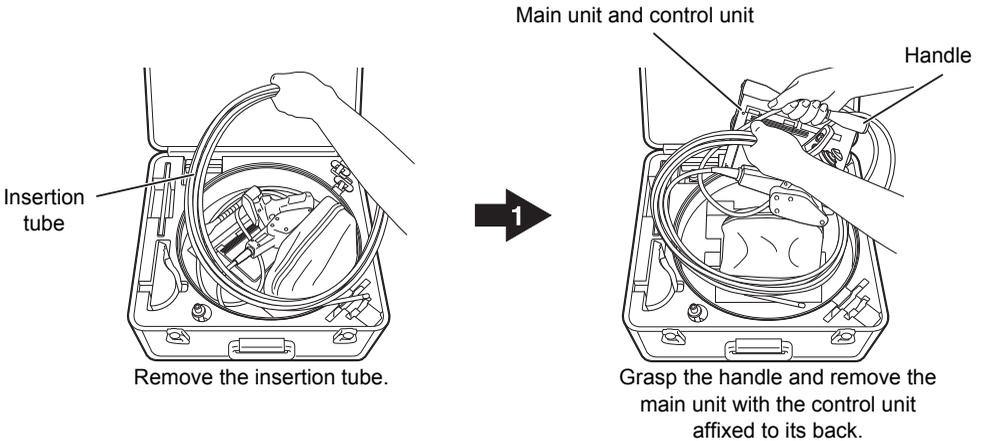
Remove the main unit.



Remove the control unit and insertion tube.

For 8.5-mm type

Remove the equipment in the order of: Insertion tube → Main unit and control unit.



WARNING

- Fully open the top cover when removing the main unit from the case. If the cover is not fully open, it can close unexpectedly and pinch your hand or cables.
 - Never use the main unit while it is accommodated inside the case. If the top cover of the case is left open, it may close unexpectedly and pinch your hand or a cable.
-



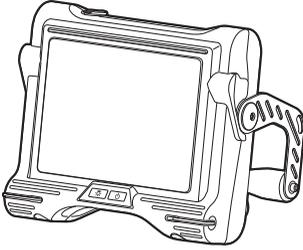
CAUTION

- Place the case on a level surface so it is stable.
 - To open the top cover of the case, release the latch on the front of the case.
 - Do not pull the insertion tube with excessive force when taking it out of the cushioned slot. Otherwise, the insertion tube may be damaged.
 - When taking the control unit or main unit out of the case, never hold them by the insertion tube or universal cable. It may damage the instrument.
 - Check if the insertion tube, battery cover, video connector cap and adapter connector cap are kept clean. Wipe off with a clean, soft cloth if dirt or a foreign substance is attached.
 - Check the insertion tube, battery cover, video connector cap and adapter connector cap if cuts or gaps are not available.
-

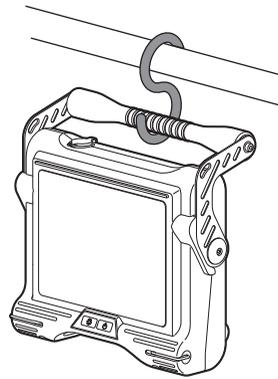
3.2 Setting up the main unit

- 1 The main unit can be used in any one of the three setup configurations shown below.

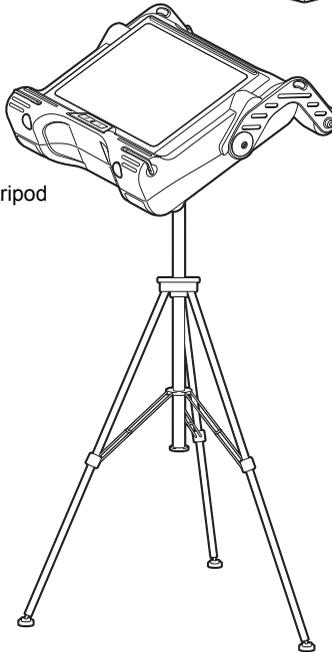
Use the handle as a stand



Hang it from the handle



Put it on a tripod

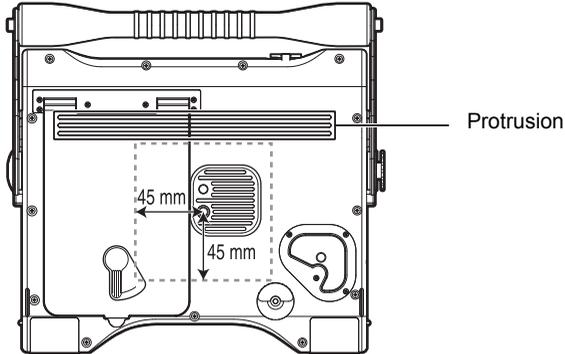


CAUTION

- Place the main unit on a level surface so it is stable. The main unit can tip over if it is not stable.
- Do not place the main unit in overhead location. Doing so may result in the main unit falling and being damaged.

Chapter 3 Preparation and inspection before observation

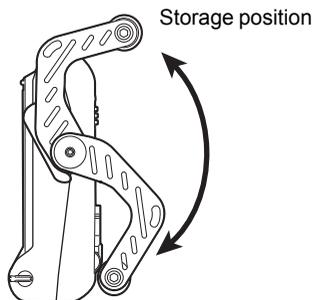
- When suspending the main unit while using it, hook the handle someplace that can support its weight and where there is no danger of it falling.
- When mounting the tripod to the main unit, install it so the tripod platform does not run up on the protrusion on the rear of the main unit. Affixing the tripod with the platform installed at an angle can cause the main unit to fall off. You can use a platform with a size that is less than 45 mm from the center of the tripod screw.



- Setup the tripod on level ground. Setting the tripod up on a slope or uneven ground is dangerous because it may fall over.
 - Be careful not to accidentally move the lock release lever on the battery cover and open it when handling the main unit.
-

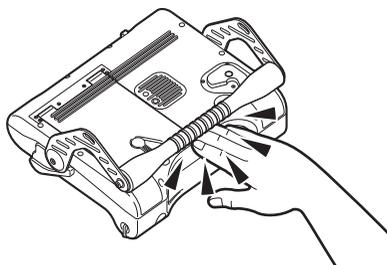
■ Using the handle

The handle can be lowered from its storage position and freely adjusted within the range shown in the illustration below. When using the handle as a stand, you can adjust the angle for easy viewing.



CAUTION

- Take care not to pinch your hand or other objects when moving the handle.



3.3 Preparing the power supply



WARNING

- Do not bend, pull, twist, crush or apply excessive force to the power cord of the AC adapter. Otherwise, a break in the power cord wires may cause a fire or electric shock.
- Ensure that the power cord is normal before connecting it. Using a power cord with irregularities may result in an electric shock.
- Be careful not to injure yourself when replacing the battery.

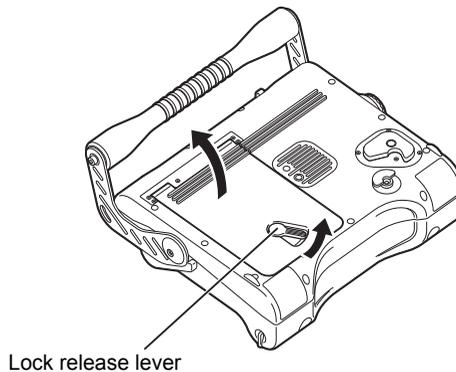


CAUTION

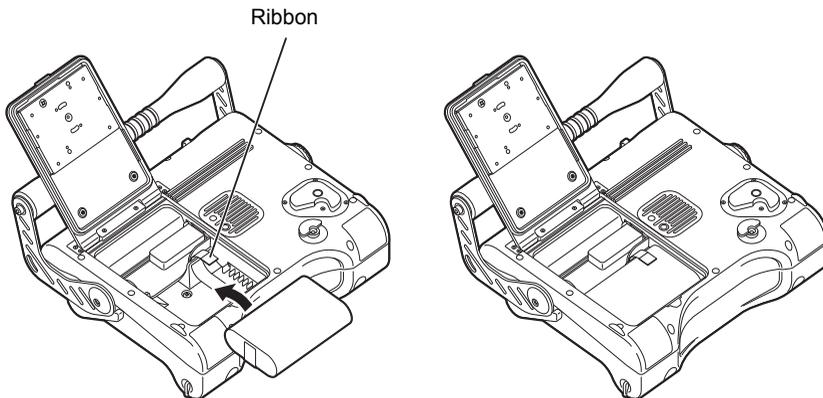
- Be careful not to accidentally drop the battery during replacement.
 - Before using the battery, read the dangers, warnings and cautions in “Handling of the battery” under “Important Information - Please Read Before Use” on (page 7).
 - The battery indicator flashes when a battery is continuously used under low-voltage conditions. In such case immediately turn off the power of the main unit or connect the AC adapter. If continuously used without any action the power will be automatically turned off which may cause malfunction.
 - Do not remove AC adapter or battery while the system is running. It may cause malfunction.
-

■ Supplying power from the battery

- 1** Check to make sure that main unit power is turned off.
- 2** Return the handle to its storage position.
- 3** Move the lock release lever on the battery cover as shown in the figure below to open the battery cover.

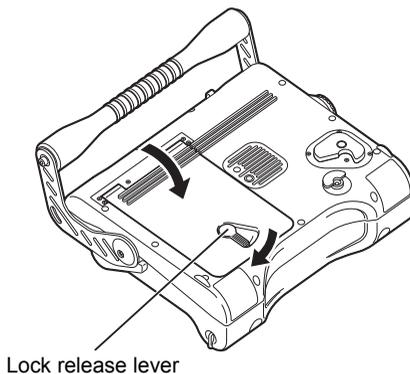


- 4** Insert the battery so that the ribbon passes under it. This is so you can pull the ribbon to remove the battery.

**CAUTION**

- When loading the battery, check to make sure the main unit's battery contacts and the battery terminals are positioned correctly.
- Never try to force the battery if it does not slide in easily. Check to make sure that the battery is positioned correctly and that there is no problem with its terminals. Trying to force the battery in may cause malfunction.

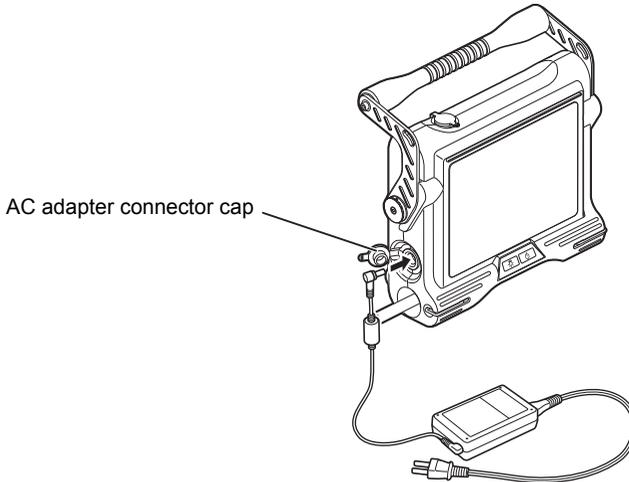
- 5** Close the battery cover and move the lock release lever on the battery cover as shown in the figure below to lock it.

**NOTE**

- If you are having trouble locking the battery cover, press on the cover while moving the lock release lever.

■ Supplying power from the AC adapter

- 1** Open the AC adapter connector cap.
- 2** Connect the AC adapter to the AC adapter connector on the main unit.



- 3** Ensure that the AC power cord is connected securely to the AC inlet of the AC power adapter.
- 4** Plug the AC power cord securely into a power outlet.



WARNING

- Inspect the power cord before use and check for any signs of damage. Using a power cord with irregularities may result in an electric shock.
- Power cord is rated for 100 - 120 V (50/60 Hz) AC. Connecting it to an outlet with a different rating may cause a fire or electric shock.
- Never use an AC adapter other than the designated AC adapter. Otherwise, malfunction of the instrument or unexpected damage may result.
- The AC adapter is not water resistant. Never use it in the rain or in any location where it can become wet. Water creates the risk of electric shock.



NOTE

- For information about how to connect the AC adapter, see the AC adapter's instruction manual.
-

3.4 Inspecting the insertion tube



CAUTION

- Be sure to hold the insertion tube by a position on the rear of the angulation section. Otherwise, the angulation section may be damaged.

■ Inspecting the external appearance of the insertion tube

- 1** Check visually that the external finish of the complete length of the insertion tube and universal cable are free of irregularities such as deformation.
- 2** Check that the external covering material of the insertion tube, other than the angulation section, is not loose.



CAUTION

- If the insertion tube is deformed, you may not be able to withdraw it from the observation object.
- If the external material of the insertion tube is cut, take care against injury during inspection.

■ Inspecting the insertion tube distal end

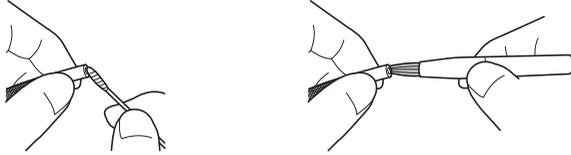


WARNING

- The distal end of the insertion tube may become hot due to the illumination light or the internal heating caused by electrical parts. Do not forget to turn off the light source before attaching or detaching the optical adapter. ☼ Touching the distal end immediately after having turned off light source may cause burn on your skin.

- 1** Make sure that power is turned off.
- 2** Remove the tip cap from the insertion tube distal end. For 6-mm and 8.5-mm type insertion tubes, make sure that the O-ring on the insertion tube's distal end does not detach after removing the tip cap (see “Inspecting the O-ring” (page 33)).

- 3** Check that there is no dirt or water on the objective lens and the electrodes of the insertion tube distal end. If dust or water is present, wipe them clean with a soft piece of gauze, a cotton swab, or a sweep them off with a brush, grasping at hard part of distal end. The best results may be obtained using the lens cleaning fluid provided in the lens cleaning kit.



CAUTION

- Using the objective lens or the electrodes of the insertion tube distal end while dirt or water is present may cause damage to the optical adapter or the insertion tube distal end.
-

- 4** Use the brush provided in the cleaning kit to wipe off any dirt found in the positioning groove, the positioning cut surface or screws on the insertion tube's distal end. Note that insufficient cleaning can result in a loss of waterproofing between the optical adapter and the insertion tube's distal end.

- 5** Check that the distal end of the insertion tube is not deformed, loose or unusual wear on the connecting screw.



CAUTION

- Never use the distal end of the insertion tube if any part is loose. Otherwise, the loose part may fall into the inspection object.
 - The angulation section is composed of precision parts. Do not pull the distal end of the insertion tube, do not grasp/bend with a strong force. Otherwise, the parts in the angulation section may be damaged.
-

■ Inspecting the O-ring

Inspect the O-ring for cuts or gaps.



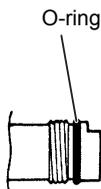
CAUTION

- If the O-ring is positioned incorrectly or chaps exist on its surface, water can get into the joint area between the insertion tube and optical adapter which may cause malfunction or damage. In some cases, the illumination does not light.

For 6-mm and 8.5-mm types

The O-ring on the 6-mm and 8.5-mm types are on the distal end of the insertion tube.

On the 6-mm and 8.5-mm types, the area beneath the O-ring is yellow, which is visible if the O-ring is not in correct position.

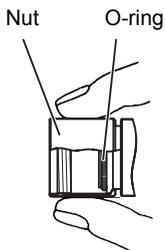


CAUTION

- On the 6-mm and 8.5-types, if the O-ring is cut, nicked or shows any abnormality, put silicon grease on the spare O-ring provided with the optical adapter and replace the abnormal O-ring. You should periodically replace the O-ring.

4-mm type

The O-ring on the 4-mm type is in the optical adapter.

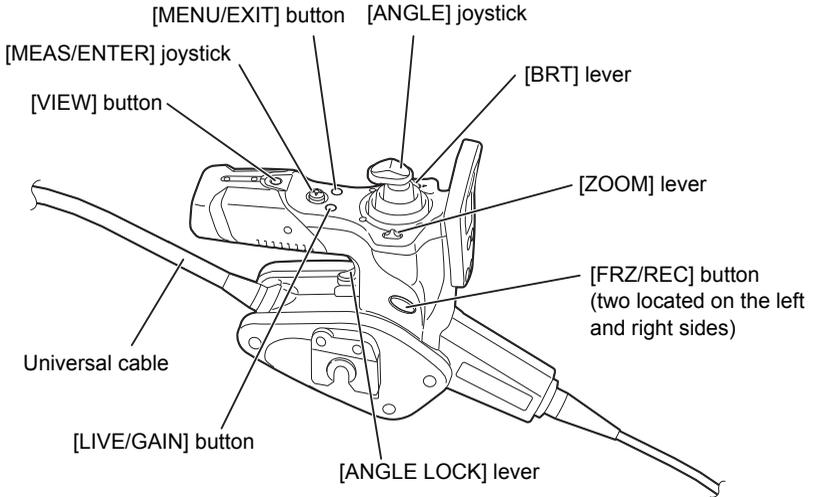


CAUTION

- Since user inspection of the 4 mm type is difficult you should have it inspected periodically by Olympus.

3.5 Inspecting the control unit and the universal cable

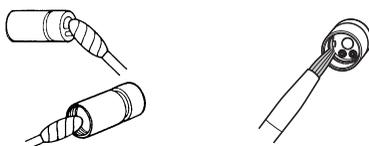
- 1** Check for irregularities such as damage or deformation to the external material, buttons, joysticks, and levers.
- 2** Ensure that the universal cable is free of irregularities such as cuts and buckling.



3.6 Inspecting the optical adapter

■ Inspecting the optical adapter optics and connecting screw threads

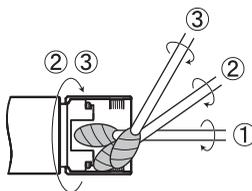
- 1** Check that there is no dirt or water on the inner and outer of the objective lens and the electrodes. If dust or water is present, wipe them clean with a soft piece of gauze, a cotton swab, or a sweep them off with a brush. In case of cleaning during the optical adapter attaching to the distal end of the insertion tube, hold the hard part of the distal end. The best results may be obtained using the lens cleaning fluid provided in the lens cleaning kit.



CAUTION

- Using the optical adapter electrodes while dirt or water is present may cause damage to the optical adapter or the insertion tube distal end.
- Failure to clean electrodes properly can result in illumination failure.

- 2** Make sure that there are no deformities or foreign objects in the threads of the screws of the optical adapter. Moisten a cotton swab with cleaning fluid and continue cleaning until doing so leaves no dirt on the cotton swab. Clean in the order shown in the diagrams, (1), (2), (3). Spin the cotton swab while cleaning. Also, for thorough cleaning, turn the optical adapter while doing (2) and (3).





CAUTION

- Note that insufficient cleaning can result in a loss of waterproofing between the optical adapter and the insertion tube's distal end.
 - Cleaning should be done periodically in order to maintain water resistance.
-

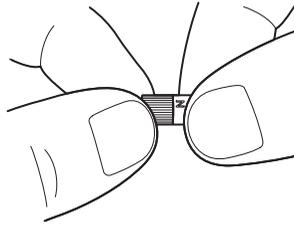
■ Inspecting the parts of the optical adapter

Check that the parts of the optical adapter are not loose.



CAUTION

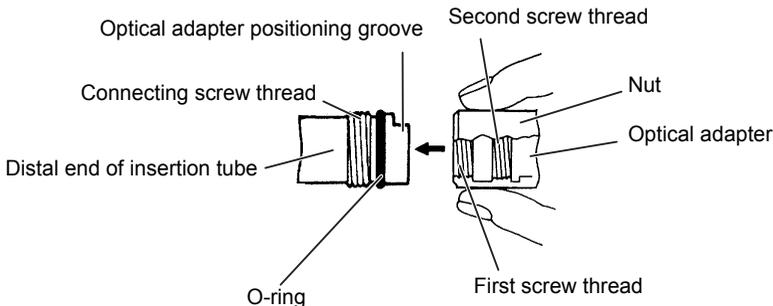
- Never use it if any parts are loose. Otherwise, the loose part may fall into the inspection object.
-

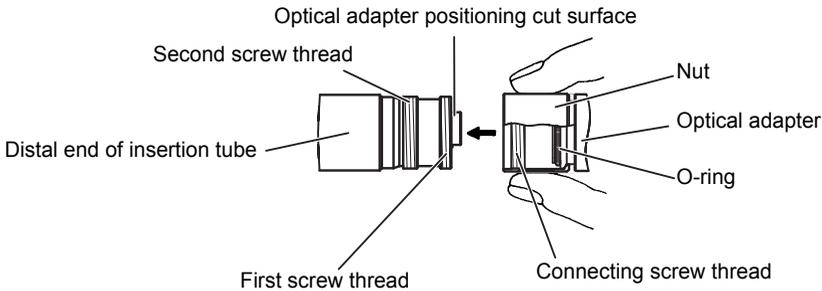


■ Attaching and detaching the optical adapter

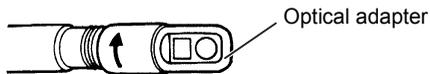
- 1** Positioning the optical adapter with the distal end of the insertion tube so they are directly opposite each other, carefully insert the optical adapter into the distal end of the insertion tube.

6-mm and 8.5-mm types

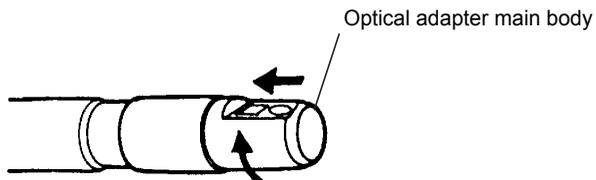


4-mm type

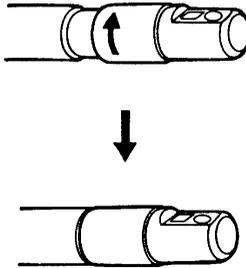
- 2** Turn the optical adapter nut clockwise until the first screw thread passes over the connecting screw thread.



- 3** Once past the first screw thread, turn the entire main body of the optical adapter clockwise while pushing gently until it fits into the positioning cut surface on the insertion tube's distal end and can be turned no further.



- 4** Turn the nut of the optical adapter clockwise until the second screw thread is screwed onto the connecting screw thread. Tighten the nut until it is stops.



- 5** To remove the optical adapter, repeat these steps in reverse order.



CAUTION

- If you cannot mount or remove the optical adapter because the nut will not turn, stop using it and contact Olympus.
- The optical adapter is a precise instrument using glass components in the optical system. Do not drop it or hit it against hard surfaces.
- Before attaching or detaching the optical adapter, check the joint area between the insertion tube and optical adapter if no water droplets or foreign objects are present.
- Attach the optical adapter and make sure it engages as far as it will go.



NOTE

- The optical adapter is designed for safety with a double-screw construction to prevent it from falling off.
-

When a live screen is displayed (4-mm, 6-mm and LX only)

- 1** If an optical adapter is attached while a live screen is displayed, the system will recognize the optical adapter type automatically and display its name.

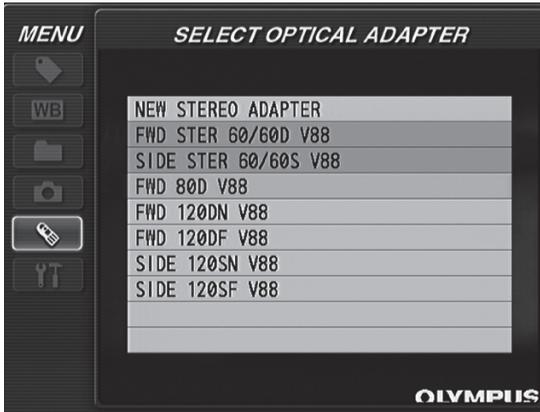
**NOTE**

- For the stereo optical adapter, the optical adapter confirmation screen or the initial stereo adapter settings screen is displayed (see "Checking the stereo optical adapter" (page 105)).

- 2** Make sure that the name of the optical adapter is correct.
- 3** The on-screen optical adapter name will disappear when the optical adapter is removed.

When a live screen is displayed (8.5-mm type and LX only)

- 1** When the live screen is displayed, a list of all the optical adapters is displayed when an optical adapter is attached.



- 2** Use the [MEAS/ENTER] joystick to select an optical adapter to use.



NOTE

- For an LX without the stereo measuring function, the stereo optical adapters appear in the list but cannot be selected. The stereo optical adapters can only be used on an LX that has the stereo measuring function.
-

3.7 Inspecting the LCD monitor

■ Inspecting the external appearance

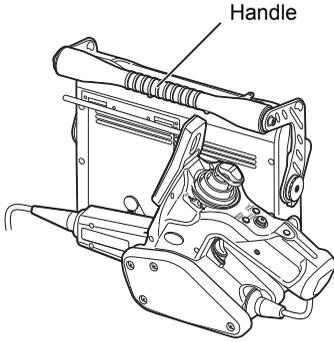
- 1** Check that the LCD monitor is free of irregularities such as cracks on the screen.

**NOTE**

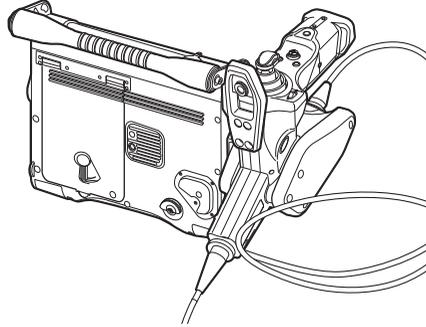
- The LCD panel is fabricated based on precision technologies. The LCD panel may contain pixels that do not light (visible as black dots) or light permanently (visible as bright dots), but this is not a defect or malfunction of the product.
 - To clean the LCD monitor if it is dirty or has fingerprints on it, see “Cleaning the LCD monitor” (page 130).
-

3.8 Mounting of the control unit on the main unit

The control unit can be attached to the main unit as desired. It can be attached to the main unit for carrying and left attached to the main unit during observation.

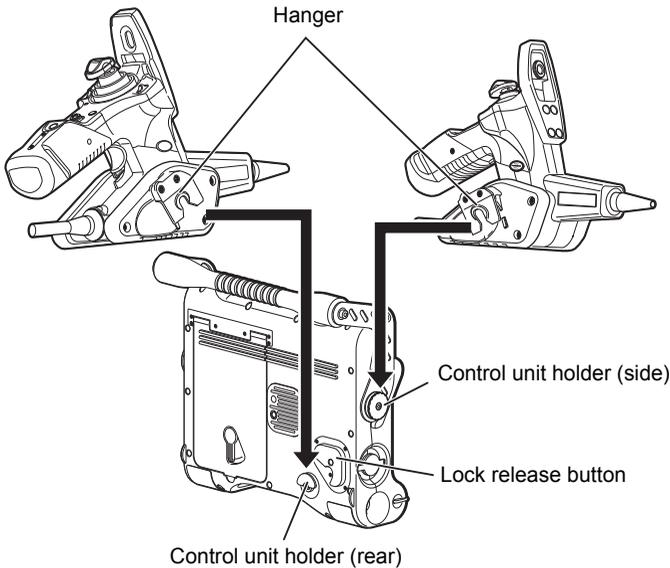


Back attachment: For transport

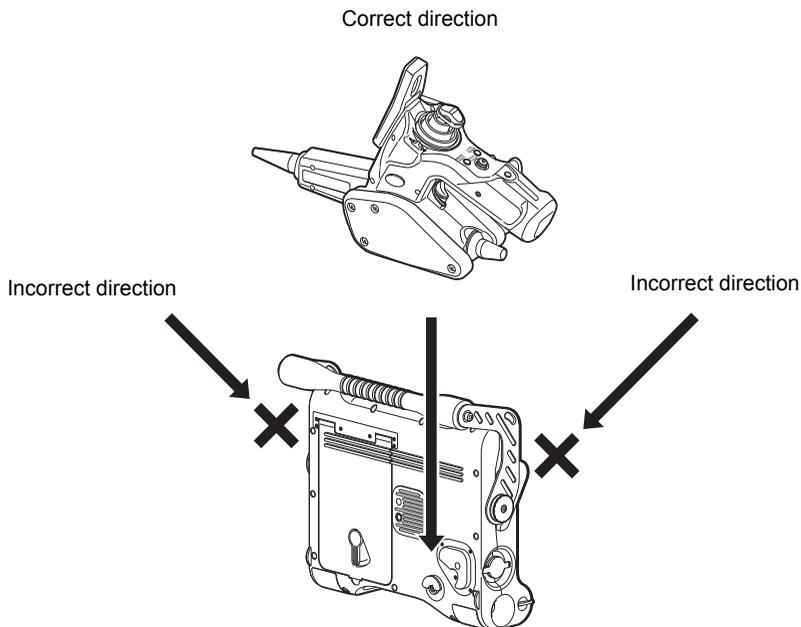


Side attachment: For observation

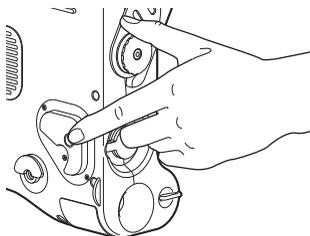
- 1** Insert the hanger on the side of the control unit straight into the control unit holder on the side or the back of the main unit. The hanger may not fit correctly at an angle into the control unit holder, be sure to put it straight into the control unit holder.



- 2** When attaching the control unit to the back of the main unit, check that it is positioned as shown in the figure below before attachment. Then, check that the control unit is firmly attached. Attaching it with excessive force in the wrong direction can cause the control unit to fall off and cause an accident. This also may damage the main unit.



- 3** Push in the hanger until you feel a click. If it is not inserted completely it may come off too easily.
- 4** When detaching the control unit from the main unit, pull the control unit straight upward from the main unit. When the control unit is affixed to the back of the main unit, hold down the center of the lock release button as you pull upwards.





CAUTION

- Hold the handle of the main unit when transporting the main unit with the control unit affixed to the back. The main unit may fall or the excessive force to the main unit may damage connections if you lift it by the control unit.
 - Take care not to tilt or swing the main unit when carrying it with the control unit attached. Doing so can cause the control unit to fall off and cause unforeseen accidents or personal injury.
 - When transporting it with the control unit and main unit affixed to each other, take care so the universal cable and insertion tube do not come into direct contact with the ground. A dangling universal cable or insertion tube can become entangled with your feet causing you to fall, which may cause personal injury, damage to this equipment, and malfunction.
 - When putting down the main unit while the control unit is attached to it, always place it on its side or base. Otherwise, the control unit and/or insertion tube may be damaged.
 - Do not use excessive force or twist the control unit when it is attached to the main unit. Doing so may damage the hanger.
-

3.9 Attaching and detaching the strap

When you want to hang the IPLEX LX/LT (main unit) from your shoulder, attach the shoulder strap. Be careful not to use a shoulder strap other than those designated by Olympus and supplied with the IPLEX LX/LT unit.



WARNING

- Never attempt to carry an object other than the IPLEX LX/LT (main unit) using the shoulder strap. Otherwise, the strap may be damaged and cause the IPLEX LX/LT (main unit) to drop.
- Be sure to check that the shoulder strap is free of irregularities such as frayed fibers and damaged metal parts before use.
- Do not use the shoulder strap in a manner that is subjected to an excessive load by, for example, swinging the IPLEX LX/LT (main unit) or placing a heavy object on the instrument.
- When using the shoulder strap, be careful not to hit the IPLEX LX/LT (main unit) against other objects.
- When using the shoulder strap, be careful not to bring it in direct contact with your skin. Otherwise, there will be a risk of low-temperature burns on your skin due to the heat of the instrument may result.

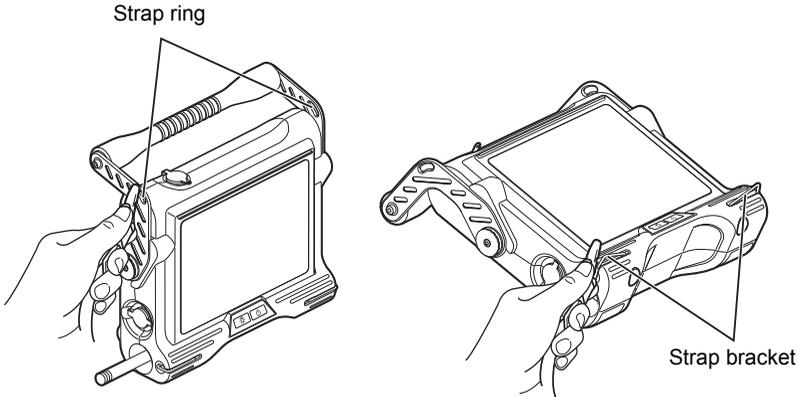


CAUTION

- Be careful to not drop the IPLEX LX/LT (main unit) when attaching or removing the shoulder strap.
 - Do not put the main unit into the carrying case with the shoulder strap attached. Doing so may damage the LCD monitor or the shoulder strap.
 - Do not store the IPLEX LX/LT (main unit) by hanging it from something. Otherwise, the strap may be damaged.
 - Check to make sure that the shoulder strap hooks are fixed securely to the main unit. If they are not, the main unit can drop when picked by the shoulder strap.
-

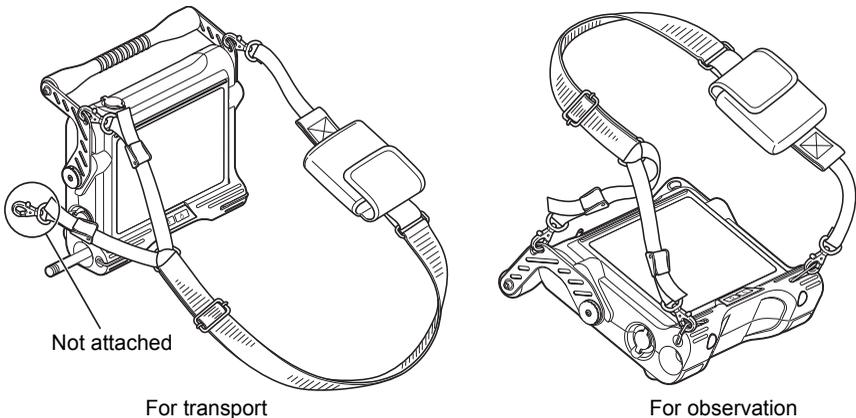
■ Attaching the strap

- 1** While pressing the shoulder strap hook lever, attach the hook to a main unit strap ring or the strap bracket.

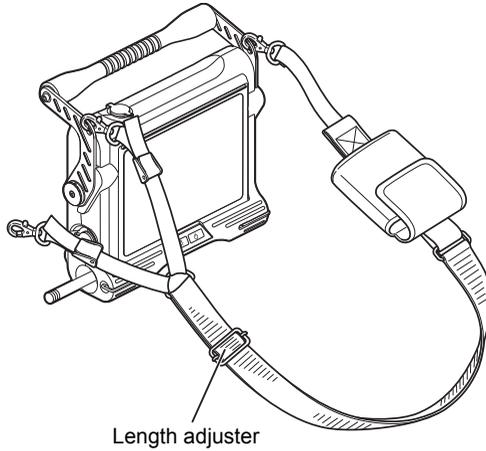


Two strap rings are provided for attaching the strap when transporting the main unit. Attach the strap to the two strap brackets and to one of the strap rings to do observations.

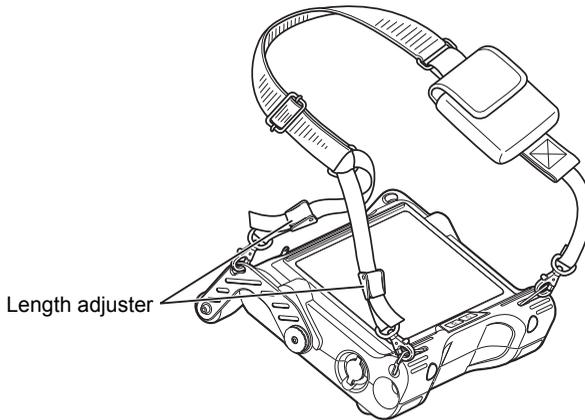
During observation, attach the shoulder strap so that the side with the two connections is on the left side of the main unit, as shown in the figure below. The two connections can also be attached to the right side of the main unit. However, this will be unbalanced and operation may be difficult when the control unit is attached to the side of the main unit.



2 Adjust the length of the shoulder strap using its length adjuster.



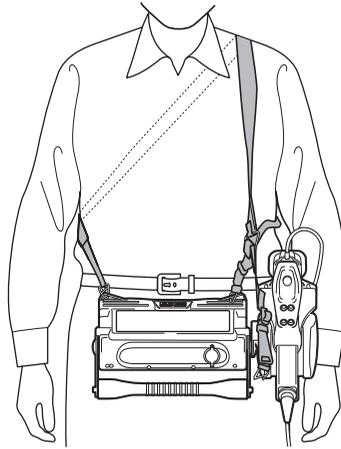
3 Use the length adjusters shown below to adjust the angle for easy viewing during observations.



- 4** Use the shoulder strap to hang the IPLEX LX/LT (main unit) from your shoulder.

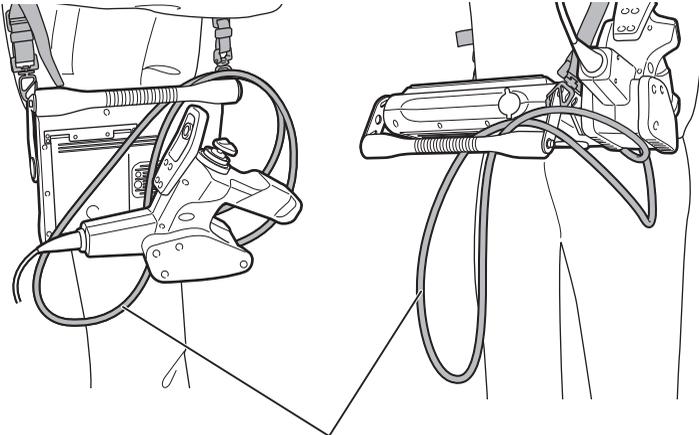


For transport



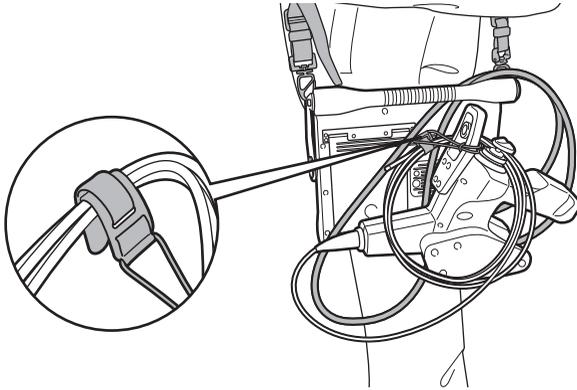
For observation

- 5** While walking with the control unit attached to the main unit (back, left side), insert the slack of the universal cable between the handle and the main unit. If the universal cable is dangling while you are walking, you may trip on it or have an accident.

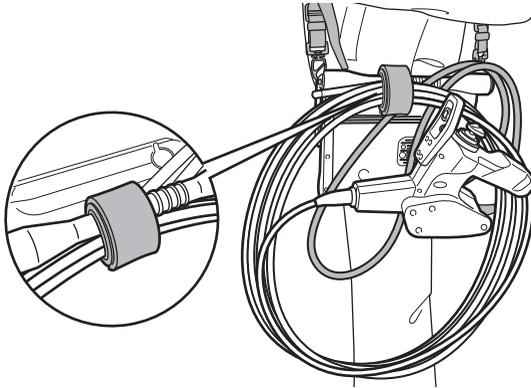


Universal cable

- 6** You can use the insertion tube wrap belt on the control unit to secure the insertion tube. (For 4-mm and 6-mm types)



You can use the insertion tube wrap belt on the handle to secure the insertion tube. (For 8.5-mm type)



CAUTION

- For the 8.5-mm type, do not loop the insertion tube and hang it on the control unit's joystick guard. Always attach it to the handle of the of the main unit with the insertion tube wrap belt.

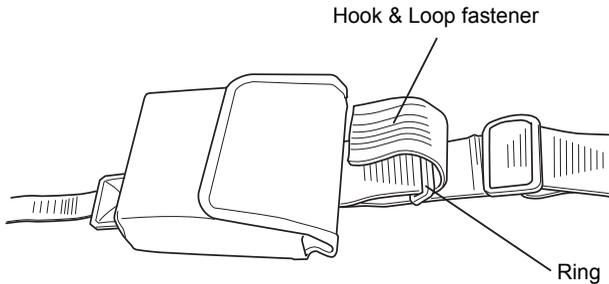
■ Removing the strap

To remove the strap, press the hook lever of the shoulder strap as you unhook the strap from the main unit strap ring or strap bracket.

3.10 Attaching and detaching the optical adapter case holder

■ Attaching the optical adapter case holder

- 1** Pass the Hook & Loop fastener of the optical adapter case holder through the ring on the shoulder strap.
- 2** Fold the Hook & Loop fastener over to fasten it as shown in the diagram.



■ Removing the optical adapter case holder

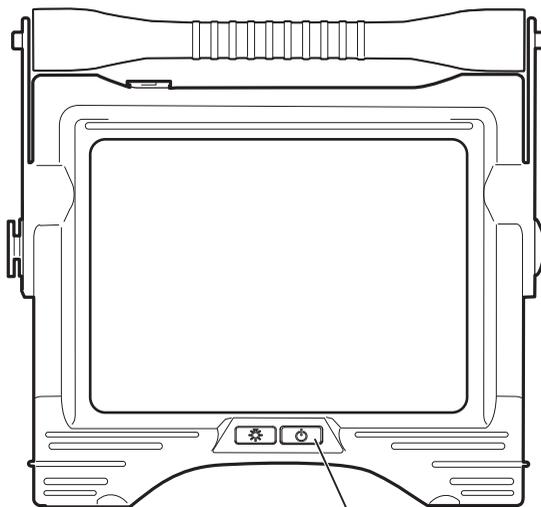
To remove the optical adapter case holder, pull apart the Hook & Loop fastener and remove it from the ring.

Chapter 4 Basic operations

4.1 Turning on the power

■ Turning the power on

- 1** Hold down the main unit's power button (⏻) for at least two seconds and confirm that the power turns on.



Power button (⏻)

Turning off the power

Press and hold the power button (⏻) on the main unit for 2 seconds.



NOTE

- The power turns off about 3 seconds after pressing the power button (⏻).
-

■ Checking the LCD monitor image

- 1** Ensure that the LCD monitor displays the observation image.
- 2** Make sure there are no dark patches or dirt in the image. If you find any irregularities, go back to “3.4 Inspecting the insertion tube” (page 31) and “3.6 Inspecting the optical adapter” (page 35) to check it again.



NOTE

- The screen displays and menu operations are enabled approximately 40 seconds after the power button (⏻) is pressed.
- When the language setting is changed, the time taken until the screen display functions, such as menu selection, may be longer than before. This is not a malfunction.
- When using the stereo optical adapter, the position of the left and right images may be misaligned in some direction or at an angle depending on the assembly of the optical adapter and the insertion tube, but this is not a malfunction.
- The displayed title is the title that was entered on the Live screen the last time the system was used.

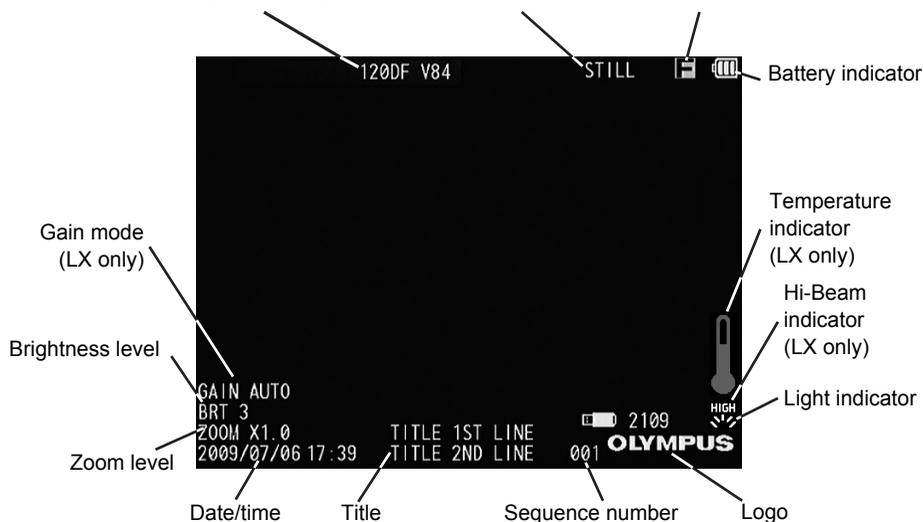
■ Indicator display

Optical adapter name

(4-mm, 6-mm, and 8.5 type LXs only)

Recording/playback indicator

Freeze indicator



■ Display language setting

Select the language to be used for menus and other display text before using the system for the first time. For more information, see “Language selection” (page 87).

■ Date and time settings

Set the current date and time before using the system for the first time. For more information, see “Setting the date and time” (page 85).

■ Checking the optical adapter (4-mm and 6-mm type LXs only)

If an optical adapter is attached while a live screen is displayed, the system will recognize the optical adapter type automatically. Check to make sure that the correct optical adapter is connected. (See “When a live screen is displayed (4-mm, 6-mm and LX only)” page 39)



CAUTION

- The types of optical adapters are displayed. If it is incorrect, reattach the optical adapter.

■ Checking the illumination lighting



WARNING

- The illumination emitted from the insertion tube distal end may heat and ignite a nearby object. Be sure to set the illumination light turn off the LIGHT button (☼) on the front panel of the main unit when not using the instrument.
- Do not allow the light emitted from the insertion tube’s distal end enter your eye directly. Otherwise, an eye injury may result.
- If the illumination light on the distal end of the insertion tube does not light even if you push the LIGHT button (☼) on the front panel, the optical adapter may not be attached correctly. The optical adapter may fall off the insertion tube if used in this condition. Reattach the optical adapter securely according to “Inspecting the parts of the optical adapter” (page 36).

1

Securely attach the optical adaptor to the insertion tube.

See “Inspecting the optical adapter” (page 35) for the procedure to attach it.

2

Confirm that the light indicator is shown on the screen. If it is not, press the LIGHT button (☼) on the front panel to make it appear.

3 Verify the light is emitted from the insertion tube to ensure that the light source is turned on.

Use optical adapters that have a green index with this device. The devices may not operate at optimum performance when using an optical adapter with a black index.

4 Increase the intensity of the illumination (LX only)

To increase the illumination intensity, hold down the LIGHT button (☀) for at least two seconds (long push) while illumination is turned on.

Confirm that the light emitted by the insertion tube is increased and that the Hi-Beam indicator is on the indicator display.



CAUTION

- Inserting the insertion tube into an observation object that is hotter than the operating temperature may damage the equipment. The LX series has a temperature alarm function that sounds an alarm and displays a warning message. If this happens, immediately remove the insertion tube from the observation object. Continuing operation may damage or reduce the performance of the equipment.
 - If the distal end of the insertion tube or the inside of the main unit gets too hot while the light is set to high, the insertion tube automatically returns the light to normal (LX only).
 - Immediately after pressing and holding the LIGHT button (☀) the Hi-Beam indicator may flash, but this is not a malfunction. The indicator stops flashing after a short time and stays lit (LX only).
-

5 Decrease the intensity of the illumination (LX only)

To decrease the illumination intensity, press the LIGHT button (☀) once while the illumination intensity is high (high-beam indicator is on).

Check that the amount of light has returned to normal, and that the Hi-Beam indicator on the display has disappeared.

■ White balance adjustment

Adjust the white balance of the insertion tube as required by following the procedure described in “Live screen/frozen screen menu display and functions” in “WHITE BALANCE” (page 76).

Adjust the white balance after replacing the optical adapter.

■ Checking the angulation functions

1 Straighten the insertion tube.

2 Manipulate the [ANGLE] joystick slowly and ensure that the angulation section moves smoothly.

**CAUTION**

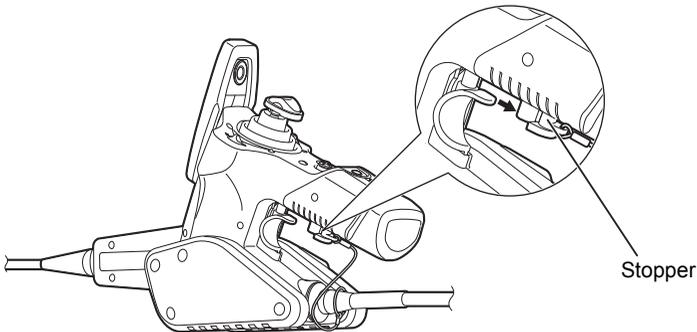
- Repair is required if the joystick shaft is bent or if the knob comes off. Contact Olympus.

**NOTE**

- The angulation movement is interlocked with the angle and direction of the [ANGLE] joystick movements.

■ Checking the angulation lock

- 1** Remove the stopper.



- 2** While the [ANGLE LOCK] lever is pulled out and locked, confirm that angulation remains locked even when you remove your finger from the [ANGLE] joystick.
- 3** Confirm that the [ANGLE LOCK] lever unlocks when you press it down again.
- 4** If you are unable to operate the angulation lock, it means that a stopper is installed. The stopper keeps the [ANGLE LOCK] lever from being raised inadvertently.



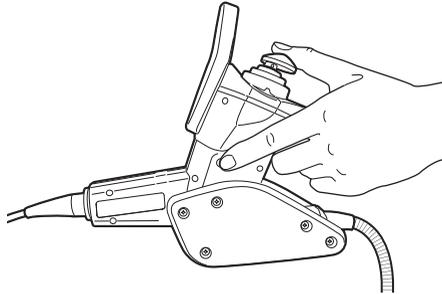
CAUTION

- The [ANGLE] joystick may allow to control the articulation portion of insertion tube precisely while the [ANGLE LOCK] lever is pulled.
However, if the angle lock is on, do not do extreme angle operations.
Doing angle operations while the angle lock is on may cause an overload malfunction.
 - While the angle is locked by pull up the [ANGLE LOCK] lever, the “LOCK” label shows up on the [ANGLE LOCK] lever. If the operation of articulation getting heavier during operation, please check the “LOCK” label is shown or not. If the “LOCK” is shown, by pull down the [ANGLE LOCK] lever to release the [ANGLE LOCK] status which will then get back to normal mode.
 - Take care not to lose the stopper.
-

4.2 Inserting the insertion tube

■ Holding the control unit and insertion tube

- 1** In general, the [ANGLE] joystick of the control unit is manipulated with the thumb of the hand holding the grip of the control unit.



- 2** Other buttons are also to be manipulated with the fingers of the hand holding the grip of the control unit.
- 3** Hold the insertion tube with the other hand to which the control unit is being held.

■ Inserting the insertion tube

While observing the monitor screen, carefully check the insertion direction as you slowly insert the insertion tube into the object being observed. Perform the angulation operation as required during insertion. Be careful not to apply excessive pushing force, twisting or tension to the insertion tube.



WARNING

- The optical adapters have a safe double-screw installation design. However, if an optical adaptor starts to come off the distal end while inside the object being observed, the illumination turns off and the image loses focus. In this case, immediately stop the inspection, carefully withdraw the insertion tube and secure the optical adapter as described in “Inspecting the parts of the optical adapter” (page 36).
- Be sure to turn the illumination light on during insertion into the object being examined. The illumination light does not light if the optical adapter is not correctly attached to the distal end of the insertion tube.
- Read and understand the contents of “Important Information - Please Read Before Use” (page 3) before using the insertion tube. In case of any questions, contact Olympus.



CAUTION

- The message shown below may display when the illumination goes off and the observed image becomes dark during an inspection. This indicates that there is problem with the electrodes caused by foreign matter in between the optical adapter and the insertion tube distal end. In this case, immediately stop operation, gently remove the insertion tube and follow the instructions on page 138 under “Error messages”. If present, it may cause damage to the optical adapter or the insertion tube distal end.



- Using the system under any conditions other than those specified in “Operating Environment” in “Chapter 10 Specifications” (page 146) in the instruction manual may cause unexpected accidents that may damage the insertion tube.
- The amount of screen noise may increase under high ambient temperatures.

- If any irregularities are found with the insertion tube operation or other things during the insertion tube insertion, do not insert the insertion tube any further. If this happens, (release the angulation lock if it is locked) remove your finger from the [ANGLE] joystick, return the angulation section to center position and slowly remove the insertion tube.
- In case of LX 4mm/6mm models, a yellow temperature indicator is displayed when ambient temperature is about 80 °C to warn you that it is approaching the upper limit. However, as of LX 8.5mm models the same indicator will be displayed when ambient temperature reaches about 60 °C.
- In the case of the LX, whenever the red temperature indicator and a temperature warning message appears along with an audible warning alarm, immediately withdraw the insertion tube from the object of observation. Continued use risks damage to the insertion tube and the optical adapter, resulting in malfunction and reduced illumination.



■ Angulation operation

- 1** The insertion tube should be angulated as required for guidance or observation. See “Checking the angulation functions” (page 54) for details about angulation operation.

NOTE

- Increasing the insertion tube looping amount (bending amount) decreases the maximum angulation angle limit of the angulation section. Keep the insertion tube as straight as possible to get the best operations from the instrument.
- Angulation tends to be difficult to achieve under low temperatures.
- Do not withdraw the insertion tube while its angulation is locked or while your finger is on the [ANGLE] joystick. Doing so can damage the insertion tube and/or object being observed.
- Should any abnormality be detected during an angulation operation, do not try and force the angulation operation to continue. Doing so can damage the insertion tube or object being observed.

4.3 Withdrawing the insertion tube



WARNING

- The distal end of the insertion tube becomes hot just after use in high-temperature atmospheres. Do not touch it directly to avoid burns.

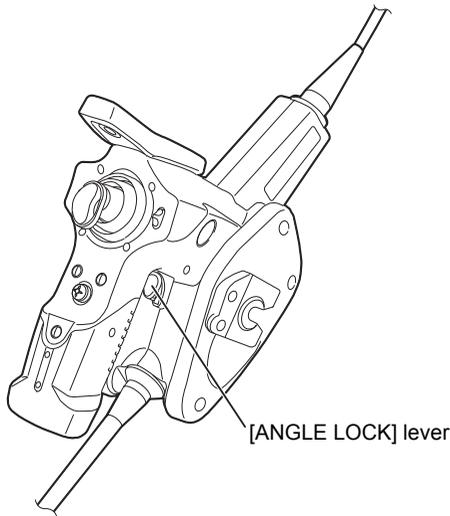


CAUTION

- Do not withdraw the insertion tube while its angulation is locked or while your finger is placed on the [ANGLE] joystick. Otherwise, the insertion tube and/or observation target may be damaged.
 - If the insertion tube is caught by something during withdrawal, turn the control unit gently while continuing the withdrawal. Do not use excessive force to avoid damaging the insertion tube or the object you are inspecting.
-

■ Releasing the angulation lock

If the angulation lock is activated, press the [ANGLE/LOCK] lever to release it.



■ Withdrawing the insertion tube

Remove your finger from the [ANGLE] joystick and carefully observe as you withdraw the insertion tube.

4.4 Adjusting the image

■ Still image (freeze)



CAUTION

- Do not insert and withdraw the insertion tube when the image is frozen.

- 1** Press the [FRZ/REC] button on the side of the control unit to freeze the observed image. The LCD monitor displays the freeze indicator (F) on the top right of the screen.



NOTE

- If the [FRZ/REC] button is held depressed for more than 2 seconds, image recording will be initiated.

- 2** When the observation image is frozen, press the [FRZ/REC] button again or the [LIVE/GAIN] button to return to a live image.
- 3** When an image containing quick action is frozen, the frozen image may be blurred.

■ Zoom

- 1** While a live image is displayed, tilt the control unit [ZOOM] lever toward [T] to zoom (magnify) the observation image three steps. The zoom level will be displayed for about 3 seconds on the monitor screen. While the zoomed image is displayed, the LCD monitor displays “ZOOM” to indicate that image zooming is activated.
- 2** To return to the original image size, tilt the [ZOOM] lever toward [W].



NOTE

- Images are zoomed in by means of “electronic zooming”. As a result, the image may become slightly coarse when the zooming ratio is increased.

■ Adjusting the brightness

1 GAIN mode switching (LX only)

Press the [LIVE/GAIN] button on the control unit while the live image is displayed. This switches the image's GAIN mode. When this operation is performed, the monitor screen shows the GAIN mode for about 3 seconds.

Switch the GAIN mode if the image is noisy or there is a dark area and you want to make the image brighter.

The following four GAIN modes are available.

Mode	Description
AUTO	The mode used to automatically change dynamic range when BRT is interlocked. Note that this mode may be accompanied with increased noise depending on the BRT setting.
WiDER1	The mode to use when a brighter image than is possible in "AUTO" is desired. Note that this mode may be accompanied with increased noise under certain observation conditions.
WiDER2	The mode to use when a brighter image than is possible in "WiDER1" is required. "WiDER2" further expands the dynamic range so that dark positions can be observed. But the noise may increase under certain observation conditions.

2 Automatic brightness adjustment with the [BRT] lever

While the live image is displayed, tilt the [BRT] lever on the control unit toward [▲] to brighten the overall image or toward [▼] to darken it. When the image brightness is adjusted, the LCD monitor displays the level indicator for about 3 seconds.

Use the [BRT] lever when you want to change the overall brightness of the image.

When using the stereo measurement adapter on the LX, the gain mode cannot be switched.

■ Monochrome boost

While a live image is displayed, you can switch to high-sensitivity image display by pressing the [BRT] lever towards [▲] until [BRT] (brightness) reaches its maximum setting (Level 8). The live image becomes monochrome during the gain boost display. This function is effective when it is required to observe the image under high brightness than the standard, for example when the subject is very dark. Note that the image noise may increase under certain observation conditions.

When using the stereo measurement adapter on the LX, the monochrome boost function cannot be used.



NOTE

- The live image is displayed in monochrome when the monochrome boost function is activated.

4.5 Recording the image

■ Image recording preparation

The USB flash drive for recording images should always be formatted on the main unit. See “Format USB Flash Drive” (page 96) for the operating procedure.



CAUTION

- If the USB Flash Drive is removed during image recording, the data in the recording media may be destroyed. Never attempt to remove the USB Flash Drive while recording images.

The following table shows the size of a single image and the approximate numbers of images recordable on the USB flash drive for recording images.

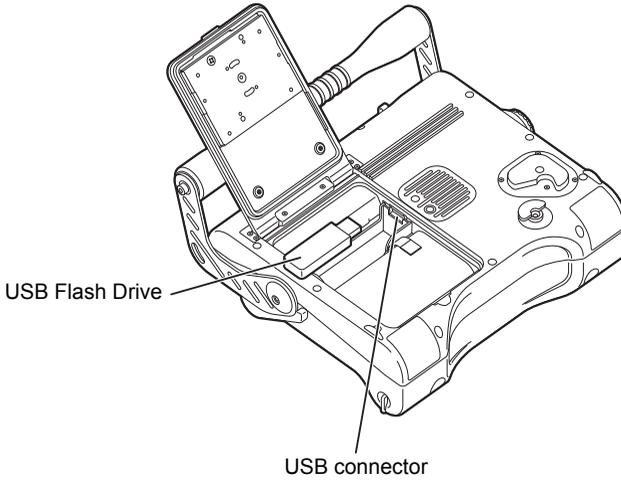
1GB USB flash drive for recording images capacity estimate

Recording format	Size of a single image	Images per 1 GB memory
Still image	Approx. 300 KB	Approx. 3400 images
Moving image (per sec.)	Approx. 500 KB	Approx. 30 min.

The setups related to image recording must be set up using “Menu operations”. See “Chapter 5 Menu operations and functions” (page 73) for details about menu operations. See “RECORD” (page 76) for the various settings related to image recording.

1 Insert a USB Flash Drive

Connect the USB flash drive for recording images provided as standard to the main unit's USB connector.

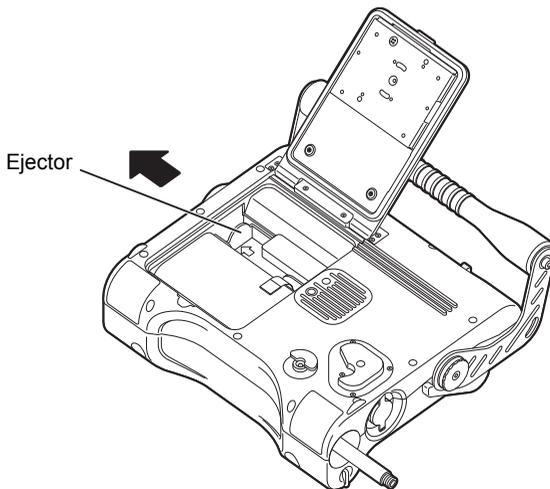


CAUTION

- If the USB connector is wet, wait until it is thoroughly dry before connecting the USB Flash Drive.
 - If there is foreign matter inside the USB connector, remove all of it before connecting the USB Flash Drive.
 - Never connect any other USB device to the USB connector except for the USB Flash Drive provided as standard or USB Flash Drive recommended by Olympus.
-

NOTE

- To remove the USB Flash Drive, slide the ejector in the direction indicated by the arrow and then pull out the card.



2 Setup of the image recording format

To record the date, time, title, logo, measurement results, and other on-screen information onto the image being recorded, press the control unit's [MENU/EXIT] button while a live screen is displayed to display the menu. Select "RECORD" - "PRINT SCREEN ON/OFF" and set "ON" (page 76).

NOTE

- When the stereo optical adapter is attached, recording a still image while "ON" is selected for the "PRINT SCREEN ON/OFF" setting records a still image on which the date, time, title logo, measurement results, and other on-screen information is recorded and a still image on which it is not recorded.
 - When an optical adapter other than the stereo optical adapter is attached, recording a still image while "ON" is selected for the "PRINT SCREEN ON/OFF" setting records only a still image on which the date, time, title logo, and other on-screen information is recorded. Replaying a still image that has the date, time, title, and other information recorded on it may result in overlapping of some text. This is not a malfunction.
-

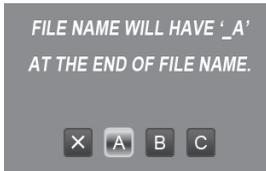
3 Note on the filenames

- a. A file named IV0?????.*** is created in the USB flash drive for recording images when an image is recorded.
- b. The “?????” indicates a 5 digit serial number in the file name “IV0?????”. The file number is a number between 00001 and 99999. When an image is recorded, the filename is assigned a file number one larger than the file with the largest file number already in the USB flash drive for recording images. For example, assuming that a USB flash drive for recording images includes image files with file numbers IV000001 and IV000003, recording an image creates a file named IV000004.
- c. “***” is the filename extension. Performing the image recording operation creates an image file with the filename extension .JPG. When a moving image is recorded, a moving image file with the same filename as the image file but with extension .AVI is created together with the image file.
- d. File names can be changed to any applicable name (up to 30 alphanumeric characters and symbols).



NOTE

- You can add “A”, “B”, or “C” to the end of the name of image files by using the settings on the menu. Use this function to categorize image files.



■ Recording a still image



NOTE

- Still images can be recorded on either the USB flash drive for recording images provided as standard or a USB flash drive recommended by Olympus. (Contact Olympus about USB flash drives.)

Press the [FRZ/REC] button (briefly) on the control unit to freeze the image. While the frozen image is displayed, press the [FRZ/REC] button again for at least two seconds to record the still image in the USB Flash Drive. The screen shows “STILL” during recording of a still image, the screen goes black for a moment and then the frozen image is displayed.



Number of
images that can
be recorded

■ Recording a moving image

NOTE

- Moving images can be recorded on either the USB flash drive for recording images provided as standard or a USB flash drive recommended by Olympus. (Contact Olympus about USB flash drives.)

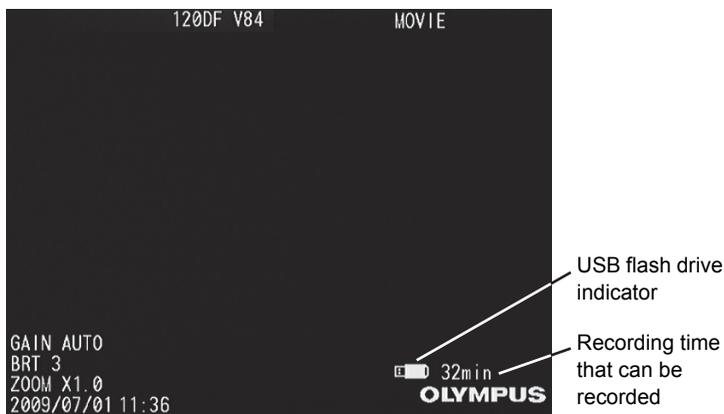
1 Press the [FRZ/REC] button for at least two seconds (long push) while a live image is displayed.

The movie image recording confirmation window appears after completion of still image recording.



2 Select "YES" and press the [MEAS/ENTER] joystick.

Moving image recording starts. The USB flash drive indicator flashes on the screen while recording moving images.



3 To stop recording moving images press the [FRZ/REC] button.

When recording a moving image is complete, the flashing USB flash drive indicator disappears from the screen.



NOTE

- Never attempt to insert or remove the USB Flash Drive while recording a movie. If the recording card or USB Flash Drive is removed while recording a movie, movie recording may stop and display error message.
- Recording stops when the file is 4 GB or if it exceeds the memory capacity. A blank 1-GB USB Flash Drive provides about 30 minutes of recording time. To stop recording, press the [FRZ/REC] button or the [VIEW] button.
- If you select "NO" in the moving image confirmation window, only the still image is recorded but the moving image is not recorded.

4 Appending a moving image (LX Only)

You can append newly a moving image to the last moving image. Press the [FRZ/REC] button for at least two seconds (long push) while a live image is displayed. When the moving image confirmation window shown below is displayed, select "CONTINUE" to append the newly moving image at the end of the last recorded movie.

"CONTINUE" is not displayed when the USB memory is removed or the [VIEW] button is pressed. The appended movie is recorded with the same conditions as the previously recorded movie.



4.6 Replaying the image

■ Quick replay of most recent image

Press the [VIEW] button in the live screen to display the most recently recorded image in full screen (the retrieve screen).

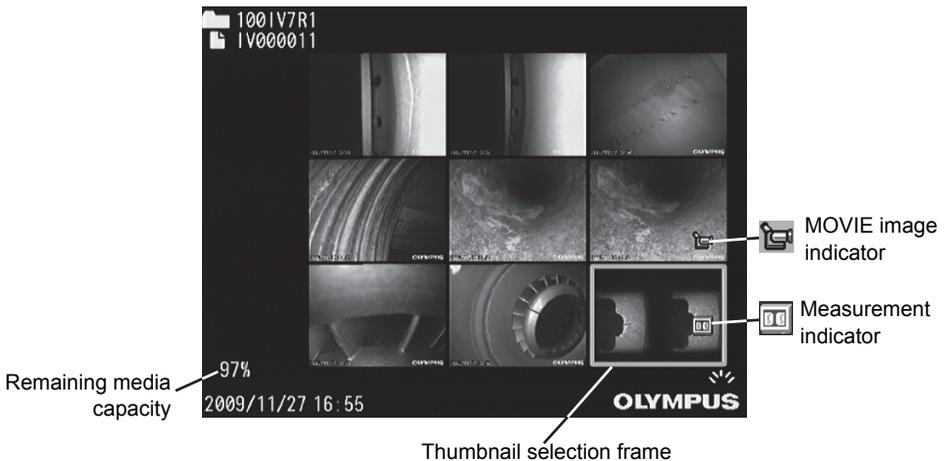
■ Displaying the thumbnail screen and selecting the image to be replayed

The example describes displaying images recorded on a USB flash drive for recording images.

1 Insert the USB flash drive for recording images that contains the image to be displayed in the USB connector.

2 Press the [VIEW] button for at least 2 seconds to open the thumbnail screen.

The thumbnail screen shows the capacity of the USB flash drive for recording images that is available in % (see “Remaining media capacity” below). The MOVIE indicator is displayed for moving images, the measurement indicator is displayed for images with stereo measurement results (see below).



3 Move the thumbnail selection frame with the [MEAS/ENTER] joystick to select the desired thumbnail image.

If more than nine movies are recorded in the USB flash drive for recording images and the thumbnail selection frame is on the top (bottom) thumbnail which is the first (last) image in the USB flash drive for recording images, tilting the [MEAS/ENTER] joystick up (down) moves the thumbnail selection frame to the last (first) image in the USB flash drive for recording images.

4 Image playback (retrieve)

After selecting the desired image with the thumbnail selection frame, press the [MEAS/ENTER] joystick to retrieve the selected image. (Retrieve image)
When the selected image is a moving image, the thumbnail screen is displayed automatically after the movie is finished playing.
A file name is displayed at the upper left of the retrieve screen.

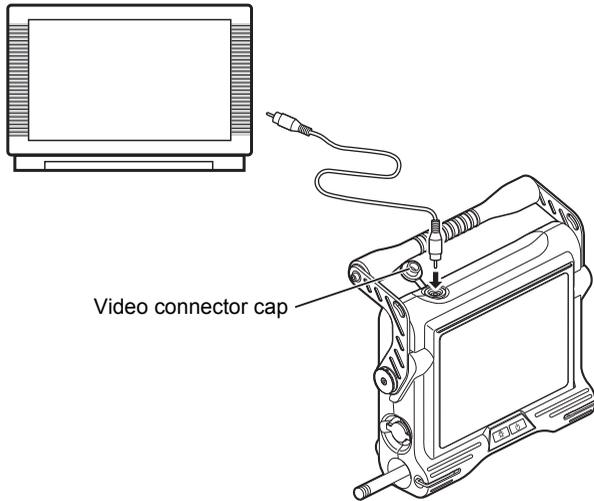
■ Slide retrieval

- During the retrieval of a still image or moving image, the retrieved image can be switched with the [MEAS/ENTER] joystick.
- Tilt the [MEAS/ENTER] joystick to the right to scroll images in order of their file names. The images in the USB flash drive for recording images scroll in a loop from the first to the last and then the first is displayed again.
- Tilt the [MEAS/ENTER] joystick to the left to scroll images in reverse order of their file names. The images in the USB flash drive for recording images scroll in a loop from the last to the first and then the last is displayed again.

4.7 Displaying a live image on an external monitor

The video output connector of the main unit enables connection of a commercially available video cable with RCA pin plug for output of images to a monitor. Only live images can be output.

Open the video connector cap to connect a video cable with RCA pin plug to the main unit.



CAUTION

- Recorded images cannot be output through the video output connector. Menus and other information, and audio cannot be output to the monitor.
-

Chapter 5 Menu operations and functions

The [MENU/EXIT] button on the control unit makes it possible to display a menu and perform settings and control of various functions.

5.1 Operating menu

■ Menu operations

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** Tilt the [MEAS/ENTER] joystick up, down, left or right to select the menu to open.
- 3** Press the [MEAS/ENTER] joystick to execute the selected menu function.
- 4** Press the [LIVE/GAIN] button to turn off the menu and return to the observation screen.

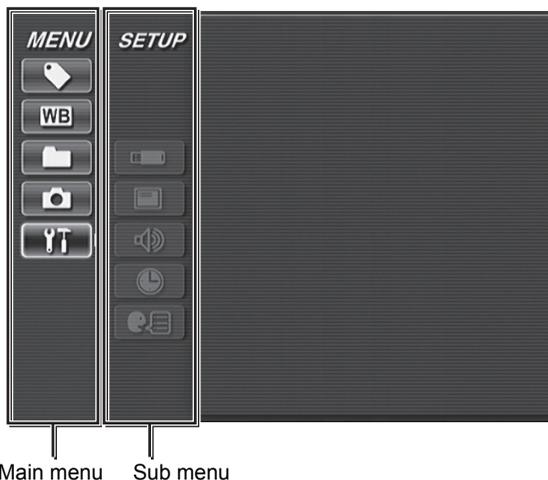
Press the [MENU/EXIT] button while the main menu is displayed to return to the observation screen.

Press the [MENU/EXIT] button while the submenu is displayed to return to the main menu.

■ Example of operations

The following description on the setting takes the “SETUP” menu as an example.

- 1 Press the [MENU/EXIT] button to display the menu screen.

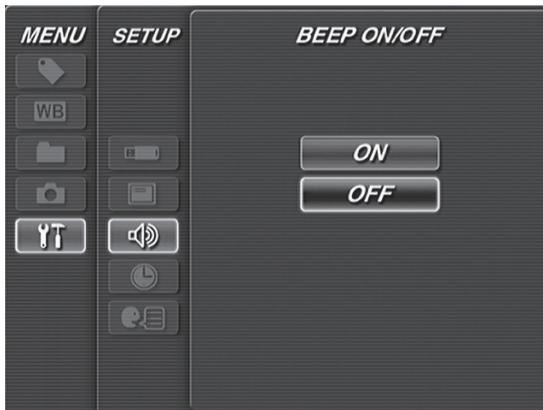


- 2 Tilt the [MEAS/ENTER] joystick up or down to select **YT**, then press the [MEAS/ENTER] joystick.
The "SETUP" menu is displayed.



- 3** Tilt the [MEAS/ENTER] joystick up or down to select , then press the [MEAS/ENTER] joystick.

The “BEEP ON/OFF” window is selected.



- 4** Tilt the [MEAS/ENTER] joystick up or down to select “ON” or “OFF”, then press the [MEAS/ENTER] joystick.

Now the operation is complete. If you press the [MENU/EXIT] button, you can return to the main menu and perform other menu settings. To terminate the menu setting operation, press the [MENU/EXIT] button again. If the [LIVE/GAIN] button is pressed instead, the menu will disappear and the observation screen will appear.

5.2 Using the live screen/frozen screen

■ Live screen/frozen screen menu display and functions

The menu on the live screen/frozen screen can be used for the following settings.

Main menu	Sub menu	Description of function	Initial status
TITLE INPUT 	-	Title input operation. See "Inputting the title" (page 79) for details about operations.	-
WHITE BALANCE 	-	Sets the white balance characteristics of the system. After changing the optical adapter, capture an image of a white object at a distance of about 50 to 60mm, such as a piece of paper. Select "EXECUTE" to set the white balance. White balance cannot be selected while the image is frozen.	-
CHANGE FOLDER 	-	Set up a folder for recording and playing back still and moving images.	100IV7R1
RECORD 	ADD FILE MARK 	Sets whether or not the "_A", "_B", or "_C" mark is added to the end of a file name. ON: Must confirm whether or not to add a mark to the end of a file name each time a still or moving image is recorded. OFF: Mark is not added to the end of a file name.	OFF
	PRINT SCREEN ON/OFF 	Sets whether the graphic display, such as date, time, title, logo display, measurement results, and other on-screen information on the image, is recorded together with the still image and the moving image. ON: Overwrites. OFF: Does not overwrite.	OFF

Main menu	Sub menu	Description of function	Initial status
RECORD 	REC BUTTON FUNCTION 	Sets the operations for the [FRZ/REC] button. Pressing and holding the [FRZ/REC] button does the following operations. <When "STILL+MOVIE" is selected> Live screen : Records still and moving images. Frozen screen : Records still image only. <When "STILL ONLY" is selected> Live screen : Records still image only. Frozen screen : Records still image only.	STILL+ MOVIE
	NEGATIVE/ POSITIVE (LX Only) 	You can switch the live image display between Negative and Positive.  NOTE You can not switch the live image to negative when stereo measurement optical tip adapter is attached. ON :Enable Pressing the [MEAS/ENTER] joystick on the Live screen allows you to switch over between the negative display and positive display of the live image. OFF :Disable.	OFF
SELECT OPTICAL ADAPTER (For 8.5-mm type LX only) 	-	Select an 8.5-mm type optical adapter. Do the initial settings for the 8.5-mm type stereo optical adapter.	-
SELECT PDF FILE (LX only) 	-	You can select a PDF file. See "Displaying PDF File (LX Only)" (page 97) for details about operations.	-

Main menu	Sub menu	Description of function	Initial status
SETUP 	MEDIA FORMAT 	Use the procedure below to format USB Flash Drive.	-
	SCREEN DISPLAY 	Sets the display at the bottom line on the screen. ALL : Displays date, time, title, OLYMPUS logo, optical adapter name, zoom level, and brightness level. DATE/TIME/LOGO: Displays date, time, title, and OLYMPUS logo. DATE/TIME : Displays date, time and title. OFF : Nothing is displayed.	DATE/ TIME/ LOGO
	BEEP ON/ OFF 	Specifies whether beep tones sound from the built-in speakers. ON: Beep tones sound. OFF: Beep tones do not sound.	ON
	DATE TIME 	Set the date and time. See "Setting the date and time" (page 85) for details about operations.	-
	LANGUAGE 	Switches the menu display language. Japanese or other languages can be selected. See "Language selection" (page 87) for details about operations.	ENGLISH

■ Inputting the title

A title can be displayed in the live screen/frozen screen. The displayed title can be recorded together with the image. The recorded title of the image can also be modified.



NOTE

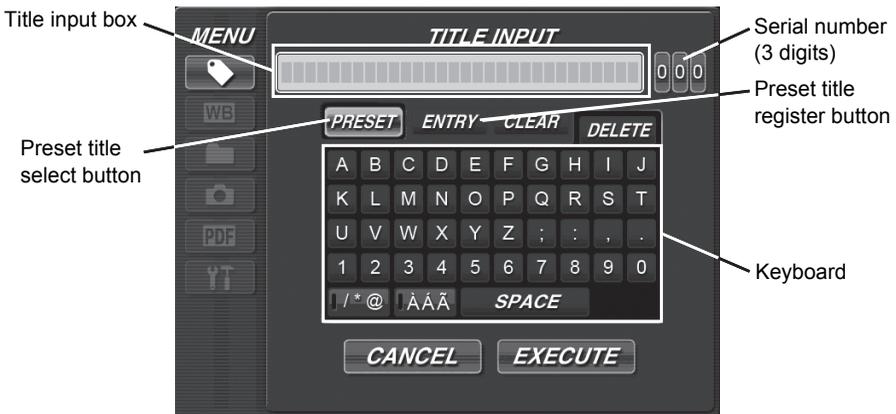
- You can input up to 30 characters for titles.
- You can register text and then access and input them (preset title function).
- You can input the alphabet, Western European letters (with umlauts and other diacritic marks), numbers, and symbols.
- If the language is set to Japanese, you can input single-byte katakana.

Displaying the title input window

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** Select from the main menu and press the [MEAS/ENTER] joystick.

The title input window is displayed.

The currently set title is displayed in the title input box.



Title input operations

There are two ways to input titles, as follows.

- Input text from the on-screen keyboard
- Select a preset title

Input text from the on-screen keyboard

1 Select an input mode. Select "/ * @" or "ÀÁÃ" and press the [MEAS/ENTER] joystick.

- “/ * @”: The alphabet/symbol mode changes each time the [MEAS/ENTER] joystick is pressed. The [/ * @] indicator is displayed during symbol text mode input.
- “ÀÁÃ”: The alphabet/European Text mode changes each time the [MEAS/ENTER] joystick is pressed. The "ÀÁÃ" indicator is displayed during European character mode input.

2 Select the text button assigned to the letter you want to input and press the [MEAS/ENTER] joystick.

The character you select appears in the title input box.

3 Edit the work if necessary.

- To delete text, specify the text area and press the [MEAS/ENTER] joystick while “DELETE” button is selected.
- To delete all text, select “CLEAR” and press the [MEAS/ENTER] joystick.
- To insert text, put the cursor inside the title box where you want to insert text and then repeat steps 1 and 2.
- To insert a space, put the cursor where you want to insert space and press [MEAS/ENTER] joystick.

4 Repeat steps 1 through 3 to complete inputting a title.

Select a preset title

Use the following procedure to select a pre-registered text and input it into a title. See “Registering a text as a preset title” (page 82) for information about registering preset titles.

1 Select “PRESET” and press the [MEAS/ENTER] joystick.

A list of preset titles is displayed.



To cancel input using preset title selection, tilt the [MEAS/ENTER] joystick to the left, select “x”, and then press the [MEAS/ENTER] joystick.

2 Select the preset title you want from the list and then press the [MEAS/ENTER] joystick.

The preset title you selected is displayed in the input box and the preset title list closes.



NOTE

- The preset title list has two pages. To toggle between the pages, select the top title in the preset title list and then tilt the [MEAS/ENTER] joystick up, or the bottom title in the list and then tilt the joystick down.

3 Repeat steps 1 and 2 to complete inputting a title.

Serial number input operation

- 1** Tilt the [MEAS/ENTER] joystick up, down, left or right to select the desired position in the 3 digits serial number field.
- 2** With the serial number field selected, press the [MEAS/ENTER] joystick to enter each figure of the 3 digits serial number.
- 3** After inputting the serial number, select “ENTRY” and press the [MEAS/ENTER] joystick.

The title input window closes and the input serial number is shown in the title display area. By inputting serial numbers, the serial numbers are updated automatically every time an image is recorded (i.e. every time the [FRZ/REC] button is pressed for at least two seconds).



NOTE

- If all the digits in the serial number are blank, “_ _ _”, then a serial number is not displayed on screen. Also, in this situation, serial numbers are not updated when images are recorded.
-

Setting the completed title

- 1** After inputting the title, select “ENTRY” and press the [MEAS/ENTER] joystick.

The title input window closes and the input title is shown in the title display area.

Registering a text as a preset title

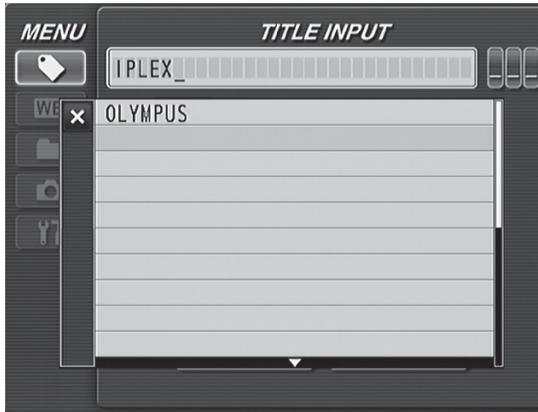
If you register commonly used words to favorites, you can access these words when you are inputting titles. You can register a maximum of 20 words to preset titles.

- 1** Input the word you want to register to preset titles in the title input box.

For more information on how to input text, see “Title input operations” (page 80).

2 Select “ENTRY” and press the [MEAS/ENTER] joystick.

A list of preset titles is displayed.



To cancel preset title registration, tilt the [MEAS/ENTER] joystick to the left, select “x”, and then press the [MEAS/ENTER] joystick.

3 Select the preset title list page where you want to register the text. There are two pages to the list, each of which can contain up to 10 titles. To toggle between the pages, select the top title in the preset title list and then tilt the [MEAS/ENTER] joystick up, or the bottom title in the list and then tilt the joystick down.

4 Select the line to register the word to and press the [MEAS/ENTER] joystick.

The word input to the title input box is registered to preset titles.
Repeat steps 1 through 4 to register up to 20 words.



CAUTION

- The registered word overwrites the specified line. Be careful to not mistakenly delete necessary words.

5 When you are finished registering a title, tilt the [MEAS/ENTER] joystick to the left, select “x”, and then press the [MEAS/ENTER] joystick.

The preset title list closes.



NOTE

- You can delete words registered to preset titles by not inputting any word to the title input box and then doing step 4.

■ Switchover between Negative and Positive of Observation Image (LX Only)

Enable the negative-positive switchover function

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** On the main menu select  icon and push the [MEAS/ENTER] joystick.
A "Record" menu will be displayed.
- 3** Move the [MEAS/ENTER] joystick up and down to select the  icon and press the [MEAS/ENTER] joystick.
A [NEGATIVE/POSITIVE] window will be displayed.
- 4** Move the [MEAS/ENTER] joystick up and down to select "ON" and press the [MEAS/ENTER] joystick.
The setting has been completed. Pressing the [LIVE/GAIN] button closes the menu and an observation image will be displayed.

Switch over between negative and positive of the observation image

- 1** Pressing the [MEAS/ENTER] joystick on the Live screen allows you to switch over between the negative display and positive display of the observation image.



NOTE

- You can not use this function in measurement.
-

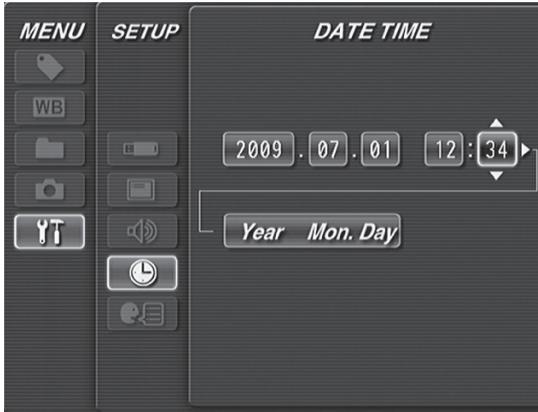
■ Setting the date and time

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** Tilt the [MEAS/ENTER] joystick up or down to select , then press the [MEAS/ENTER] joystick.
The "SETUP" menu is displayed.
- 3** Tilt the [MEAS/ENTER] joystick up or down to select , then press the [MEAS/ENTER] joystick.
The "DATE TIME" window is displayed.



- 4** Tilt the [MEAS/ENTER] joystick to the left or right to select the item to adjust (Year. Mon. Day. Hour:Min).
- 5** Tilt the [MEAS/ENTER] joystick up or down to select a number, then press the [MEAS/ENTER] joystick.

- 6** To change the date format, select the minutes digits and then tilt the [MEAS/ENTER] joystick to the right to select “Year Mon. Day”.



- 7** Tilt the [MEAS/ENTER] joystick up or down to select a date format and then press the [MEAS/ENTER] joystick.

■ Language selection

Sets the menu display language.
You can select from available languages.

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** Tilt the [MEAS/ENTER] joystick up or down to select , then press the [MEAS/ENTER] joystick.
The “SETUP” menu is displayed.
- 3** Tilt the [MEAS/ENTER] joystick up or down to select , then press the [MEAS/ENTER] joystick.
The “LANGUAGE” window is displayed.



- 4** Tilt the [MEAS/ENTER] joystick to select a language and press the [MEAS/ENTER] joystick.
The main menu closes and “Working” is displayed. The menus are displayed in the selected language when “Working” disappears.

5.3 Using the thumbnail screen/retrieve screen

■ Thumbnail/retrieve screen menu display and functions

The menu displayed on the thumbnail/retrieve screen can be used for the following settings.

Menu	Description of function	Initial status
DELETE 	Images recorded on a USB flash drive for recording images can be deleted. See "Delete image" (page 89) for details about operations.	-
CHANGE FOLDER (Thumbnail screen only) 	Set up a folder for recording and playing back still and moving images. See "Setting up a folder" (page 91) for details about operations.	100IV7R1
COPY FILE (Thumbnail screen only) 	Copy images recorded on a USB flash drive for recording images to a different folder. See "Copying images in the thumbnail screen" (page 92) for details about operations.	-
MOVE FILE (Thumbnail screen only) 	Move images recorded on a USB flash drive for recording images to a different folder. See "Moving images in the thumbnail screen" (page 94) for details about operations.	-
RENAME FILE (Thumbnail screen only) 	Edit the name of the image file recorded on the USB flash drive for recording images. See "Changing image file names" (page 95) for details about operations.	-

Menu	Description of function	Initial status
MEDIA FORMAT (Thumbnail screen only) 	Use the procedure below to format USB flash drive. See "Format USB Flash Drive" (page 96) for details about operations.	-

■ Delete image

Images can be deleted from a USB flash drive for recording images.



CAUTION

- If the USB Flash Drive is removed during the image deletion process, the data in the USB Flash Drive may be destroyed. Never attempt to remove the USB Flash Drive while deleting images.

Deleting images in the thumbnail screen

1 In the thumbnail screen, tilt the [MEAS/ENTER] joystick to select the image to be deleted by moving the thumbnail selection frame.

To delete multiple images, mark the images you want to delete in the following procedure.

- (1) Select the images to delete with the [MEAS/ENTER] joystick.
- (2) Press the [BRT▲] button to mark the selected images.
"✓" is displayed.
- (3) Repeat steps (1) and (2) to mark all the images to delete.
- (4) If you mark an image that you do not want to delete, press the [BRTp] button again while the image is selected to remove the mark.
- (5) Press the [BRT▼] button to mark all the thumbnail images.
- (6) You can clear the mark from marked images by pressing the [BRT▼] button.

2 After selecting the image you want to delete, press the [MENU/EXIT] button to display the menu.

- 3** Select  and press the [MEAS/ENTER] joystick.

The “DELETE” window is displayed.



- 4** Select “EXECUTE” and press the [MEAS/ENTER] joystick to delete the selected image.

When multiple images are being deleted, the total number of images being deleted and the number of images already deleted is displayed.

Deleting images in the retrieve screen

- 1** Press the [MENU/EXIT] button while a still image is displayed to display the menu.

- 2** Select  and press the [MEAS/ENTER] joystick.

The “DELETE” window is displayed.



- 3** Select “EXECUTE” and press the [MEAS/ENTER] joystick to delete the retrieved image.

■ Setting up a folder

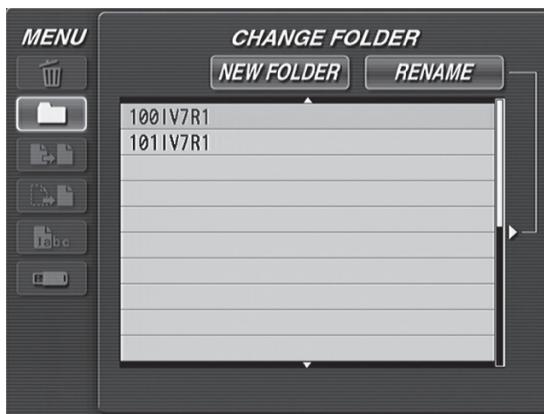
Set up a folder for recording and playing back still and moving images. You can use an existing folder or create a new one.

The folder for recording and playing back still and moving images is created in the DCIM folder in the root folder in the USB flash drive for recording images.

- 1** Press the [MENU/EXIT] button to display the menu.

- 2** Select  and press the [MEAS/ENTER] joystick.

A list of the folders that are in the DCIM folder is displayed.



- 3** Select the folder from which to record/playback a still or moving image and press the [MEAS/ENTER] joystick.



NOTE

- Select the existing folder and press the [MEAS/ENTER] joystick to select the folders inside the existing folder.

- 4** To change the name of the selected folder, select “RENAME” and press the [MEAS/ENTER] joystick.

An input window, similar to the one for inputting titles, opens and you can change the name of the folder.

5 To create a new folder, select “Create new” and press the [MEAS/ENTER] joystick.

An input window, similar to the one for inputting titles, opens and you can name the new folder.



NOTE

- For details about inputting folder names, see “Title input operations” (page 80).
 - You can use alphanumeric characters and symbols for folder names. You cannot use kana. Some symbols are unavailable for folder names also.
-

■ Copy images/Move images

Images saved in a USB flash drive for recording images can be copied or moved to another folder within a USB flash drive for recording images.



CAUTION

- If the USB Flash Drive is removed while images are being moved or copied, the data in the USB Flash Drive may be destroyed. Never attempt to remove the USB Flash Drive while moving or copying images.
-

Copying images in the thumbnail screen

1 In the thumbnail screen, tilt the [MEAS/ENTER] joystick to select the image to be copied by moving the thumbnail selection frame.

To copy multiple images, mark the images you want to copy in the following procedure.

- (1) Select the images to copy with the [MEAS/ENTER] joystick.
- (2) Press the [BRT▲] button to mark the selected images.
“✓” is displayed.
- (3) Repeat steps (1) and (2) to mark all the images to copy.
- (4) If you mark an image that you do not want to copy, press the [BRT▲] button again while the image is selected to remove the mark.
- (5) Press the [BRT▼] button to mark all the thumbnail images.
- (6) You can clear the mark from marked images by pressing the [BRT▼] button.

2 After selecting the image you want to copy, press the [MENU/EXIT] button to display the menu.

3 Select and press the [MEAS/ENTER] joystick.

A list of the folders that are in the DCIM folder is displayed.



4 Select the destination folder and press the [MEAS/ENTER] joystick.

The image selected in step 1 is copied to the folder.

5 To create a new destination folder, select “NEW FOLDER” in step 4 and press the [MEAS/ENTER] joystick.

An input window, similar to the one for inputting titles, opens and you can name the new folder.



NOTE

- For details about inputting folder names, see “Title input operations” (page 80).
- You can use alphanumeric characters and symbols for folder names. You cannot use kana. Some symbols are unavailable for folder names also.

Moving images in the thumbnail screen

- 1 In the thumbnail screen, tilt the [MEAS/ENTER] joystick to select the image to be moved by moving the thumbnail selection frame.**

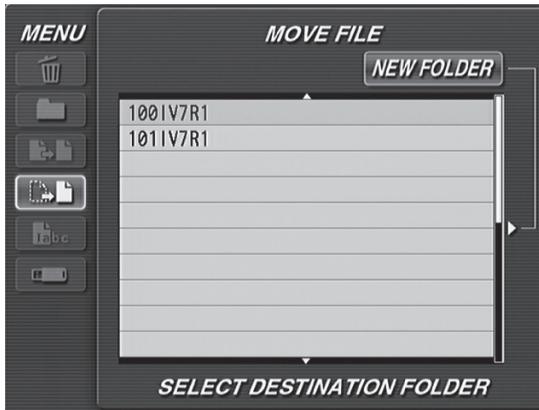
To copy multiple images, mark the images you want to move in the following procedure.

- (1) Select the images to move with the [MEAS/ENTER] joystick.
- (2) Press the [BRT▲] button to mark the selected images.
“✓” is displayed.
- (3) Repeat steps (1) and (2) to mark all the images to move.
- (4) If you mark an image that you do not want to move, press the [BRT▲] button again while the image is selected to remove the mark.
- (5) Press the [BRT▼] button to mark all the thumbnail images.
- (6) You can clear the mark from marked images by pressing the [BRT▼] button.

- 2 After selecting the image you want to move, press the [MENU/EXIT] button to display the menu.**

- 3 Select  and press the [MEAS/ENTER] joystick.**

A list of the folders that are in the DCIM folder is displayed.



- 4 Select the destination folder and press the [MEAS/ENTER] joystick.**

The image selected in step 1 is moved to the destination folder and the image is deleted from the original folder.

- 5 To create a new destination folder, select “NEW FOLDER” in step 4 and press the [MEAS/ENTER] joystick.**

An input window, similar to the one for inputting titles, opens and you can name the new folder.

**NOTE**

- For details about inputting folder names, see “Title input operations” (page 80).
- You can use alphanumeric characters and symbols for folder names. You cannot use kana. Some symbols are unavailable for folder names also.

■ Changing image file names

You can change the names of image files in the thumbnail screen.

- 1** In the thumbnail screen, tilt the [MEAS/ENTER] joystick to move to the selection frame and select a thumbnail.
- 2** After selecting an image, press the [MENU/EXIT] button to display the menu.
- 3** Select  and press the [MEAS/ENTER] joystick.

An input window, similar to the one for inputting titles, opens and you can change the name of the image file.

**NOTE**

- For details about inputting file names, see “Title input operations” (page 80).
- You can use alphanumeric characters and symbols for file names. You cannot use kana. Some symbols are unavailable for file names also.

■ Format USB Flash Drive

Use the procedure below to format USB Flash Drive. Executing the format operation will delete all data currently in USB Flash Drive.



CAUTION

- Never remove the USB Flash Drive during formatting.
 - Do not format the optical data media (USB flash drive). If it is done, the initial stereo adapter settings cannot be set again.
-

- 1** Display the thumbnail screen.
- 2** Press the [MENU/EXIT] button to display the menu.
- 3** Select  and press the [MEAS/ENTER] joystick.
The “MEDIA FORMAT” window is displayed.



- 4** Select “EXECUTE” and press the [MEAS/ENTER] joystick to start formatting.
 - Depending on the capacity and type of USB Flash Drive used, the formatting operation can last for several seconds to minutes.
 - The display may not show “100%” remaining capacity for the media.

5.4 Displaying PDF File (LX Only)

You can display a PDF file on the Live or Freeze screen.



NOTE

- You cannot display a PDF file that contains movies, including a 3D image.

Prepare a PDF file

- 1** Create folder named "PDF" in a USB Flash Drive connected to your computer and copy PDF files you want to display into the folder.
- 2** Connect the USB Flash Drive to the USB port of the main unit.



NOTE

- Use alphanumeric characters or symbols to name the PDF file. Otherwise, you are not able to display the PDF file.

Display a PDF file

- 1** Press the [MENU/EXIT] button to display the menu screen.
- 2** On the main menu select  icon and push the [MEAS/ENTER] joystick.

The PDF files in the "PDF" folder will be listed.



- 3** Select the PDF file you want to display and push the [MEAS/ENTER] joystick.

The PDF file will be displayed.



NOTE

- Pressing the [VIEW] button (held down for a short time) allows you to switch over between the PDF file and the Live or Freeze screen. When the switchover between the PDF file and the Live or Freeze screen is enabled, **PDF** indicator is displayed on the upper right of the Live or Freeze screen.
- If fonts are not embedded in PDF file, characters other than alphanumeric and symbols will be displayed as space.

Working with a PDF file

On the menu on which the PDF file is displayed, you can work with that PDF file as shown below.

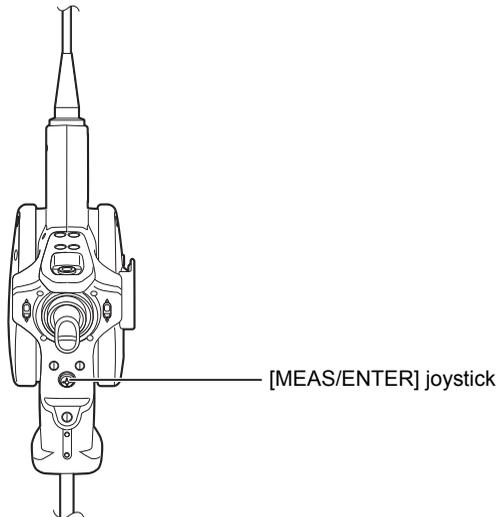
PDF main menu	PDF submenu	Functional description	Default
MOVEPDF DOCUMENT 		Displays the top page.	Displays the top page.
		Displays the previous page. Tilting the [BRT] lever toward [▲] gives you the same effect.	
		Displays the next page. Tilting the [BRT] lever toward [▼] gives you the same effect.	
		Displays the last page.	
		Displays your desired page.	
ZOOM PDF DOCUMENT 		Displays the whole page.	Displays the page horizon-wise.
		Displays the page to fit width.	

PDF main menu	PDF submenu	Functional description	Default
ZOOM PDF DOCUMENT 		Displays the page to fit height.	Displays the page horizon-wise.
		Zooms in the page. Tilting the [ZOOM] lever toward [T] gives you the same effect.	
		Zooms out the page. Tilting the [ZOOM] lever toward [W] gives you the same effect.	
ROTATE PDF DOCUMENT 		Rotates the page counterclockwise. Other pages will be displayed after rotated.	Displays as defined in the PDF file.
		Rotates the page clockwise. Other pages will be displayed after rotated. Pressing the [MEAS/ENTER] joystick gives you the same effect.	
DISPLAY PDF INFORMATION 	-	Allows you to display or hide the PDF file name, number of displayed pages/total pages, positional settings (vertical/horizontal), and scroll bar on the PDF screen. ON: Display OFF: Hide	OFF
SPLIT SCREEN ON/OFF 	-	Allows you to split and display both PDF screen and Live or Freeze screen. However, the split mode will be terminated when you start up a spot ranging or stereo measurement. You can switch over between the PDF screen and the Live or Freeze screen by pressing the [VIEW] button (held down for a short time). ON: Splits the display. OFF: Do not split the display.	OFF

Chapter 6 Measurement procedures (LX only)

The stereo optical adapter (optional) and the function expansion (optional) IPLEX LX (stereo measurement function) are needed to do stereo measurements.

The optical adapter must be set in advance to do measurements. With a live image or a recorded image displayed, press the [MEAS/ENTER] joystick on the control unit. This causes the measurement to be done according to the selected optical adapter. To move the cursor during measurement, tilt the [MEAS/ENTER] joystick in the desired direction.



NOTE

- For details about error messages that may appear during measurement, see “List of error messages displayed while measuring” (page 144).
-

6.1 Measuring from three dimensional (3D) coordinates (stereo measurement)

The 3D coordinates of each specified point are calculated by applying the principles of triangulation to a set of images obtained using two objective lenses that are set in parallax. Measurements are done based on these coordinates.

■ Measurement accuracy



CAUTION

- As this measurement method uses image processing technology, the measurement accuracy is affected by the quality of the image used. Image quality varies depending on the surface conditions of the object and image capturing conditions such as the brightness. Due to this, Olympus cannot guarantee the accuracy of the results obtained with this measurement method. We recommend that users identify the measurement accuracy through experiments. To obtain more correct results, it is recommended to perform measurements using more than one set of images captured from different viewpoints.
-

A pair of corresponding points (same location) in two images on the left and right must be identified to do stereo measurements. This operation is referred to as matching. The software is capable of automated matching. However, since it employs image processing, it may be unable to obtain the correct corresponding point if a similar shape exists in the proximity of the point indicated in the image. After completion of measurement, always be sure to check the positions of the pointers in the left and right images and confirm that they indicate the same point on the object as the corresponding points. The measured value loses reliability if the corresponding point is erroneous. In this case, change the viewpoints (by moving the distal end of the insertion tube) and perform the measurement again. However, matching cannot be done for some images. For example, if the surface is reflective, such as a clean stainless steel pipe. With such an object, try changing the viewpoints (by moving the distal end of the insertion tube) to make the measurement. This may sometimes make correct measurement possible. The object distance measurement calculates the distance between the distal end of the optical adapter and the subject in a live, frozen or stereo measurement image. As the measurement is affected if the image of the object is blurred, move the distal end of the insertion tube slowly. When the object distance measurement is applied to a live image, the displayed measurement value is measured from a few frames before the current image. Consequently, if stereo measurement is activated while performing object distance measurement, the object distance measurement value may differ from the stereo measurement result of the distance between the distal end of the insertion tube and the indicated point.

■ Flow of stereo measurement

1 Preparation for stereo measurement

Prepare for measurement by the following procedure described in “Attaching the stereo optical adapter” (page 104) and “Checking the stereo optical adapter” (page 105).



2 Measurement value check

Check the measurement value before inspection by the following procedure described in “Measurement value check” (page 115).



3 Execution of stereo measurement

Capture the object image and apply measurement.



4 Measurement value check

After completing inspection, check the measurement value after examination by the following procedure described in “Measurement value check” (page 115).



CAUTION

- If the inspection values vary considerably before and after the inspection, a possible cause may be a loosening of the optical adapter during inspection. As the measurement result is not reliable in this case, capture the object image again.
-

If the optical adapter is loose, make sure that the O-ring has not been detached. If the O-ring is detached, attach the spare O-ring correctly. See “Inspecting the O-ring” (page 33) for information on how to attach the O-ring.

■ Attaching the stereo optical adapter

See also “3.6 Inspecting the optical adapter” (page 35) for more information on attaching stereo optical adapters.

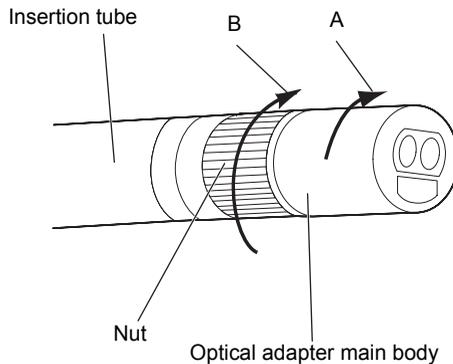
- 1** Make sure that the O-ring in the insertion tube distal end or in the optical adapter is properly attached.



NOTE

- See “Inspecting the O-ring” (page 33) for information on how to check the O-ring.

- 2** Attach the adapter so that there is no movement of the adapter main body. Rotate the optical adapter in the direction of the arrow **A** shown in the figure. Keep the adapter rotated completely and turn the nut of the optical adapter in the direction of the arrow **B** shown in the figure until it is tight.



CAUTION

- Tools or excessive hand force should not be used to secure the tip adapter to the distal end.
- Whether or not the adapter rattles or is loose when it is attached, if it is not firmly attached by rotating in the direction of arrow **A** completely, the measurement accuracy deteriorates.
- After installation of the optical adapter, if the distal end of the insertion tube is handled by grasping the optical adapter, it may turn in the opposite direction of arrow **A** in the figure even when the nut is tightened securely. This could result in lowered measurement accuracy. When handling the distal end of the insertion tube, do not hold it by the optical adapter, always grasp the insertion tube. However, do not hold it by the angulation section.
- When the distal end of the insertion tube is subjected to a large extraneous force or vibration, the optical adapter installation may be jolted, loosened or turned. Even if you leave the optical adapter attached to the insertion tube, always check the installation condition before inserting the insertion tube into the subject.

- Dirt on the surface of the lens of the adapter affects the measurement accuracy. Check captured images to confirm that there is no dirt before using the adapter in an actual measurement.

■ Checking the stereo optical adapter

For 4-mm and 6-mm types

- 1** The following confirmation screen is displayed when the live screen is displayed if a stereo optical adapter is attached.



This screen shows the set numbers and adapter names of the stereo optical adapters registered that are the same type as the stereo optical adapter that is connected.

- 2** Check the name and set numbers of the stereo optical adapter, select "OK" and press the [MEAS/ENTER] joystick.

- If a stereo optical adapter that is the same type as the stereo optical adapter that is connected has not been registered, you need to register the stereo optical adapter by executing "NEW STEREO ADAPTER". See "Using a new stereo optical adapter (NEW STEREO ADAPTER)" (page 108) for details about operations.

- 3** The following message is displayed when the stereo optical adapter is removed.

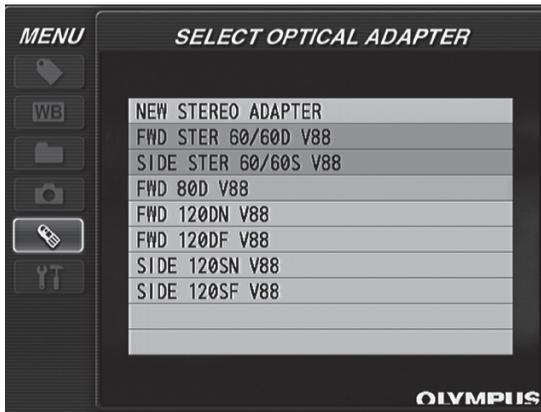


CAUTION

- The above message does not appear when the optical adapter is attached except in the live screen.
-

For 8.5-mm type

- 1** The optical adapters list shown below is displayed when the live screen is displayed if a stereo optical adapter is attached.



- Stereo optical adapters that have not been entered are highlighted in gray.

- 2** Select the optical adapter to be used and press the [MEAS/ENTER] joystick.

- If no stereo optical adapters are entered, it is necessary to execute "NEW STEREO ADAPTER" and enter a new stereo optical adapter. See "Using a new stereo optical adapter (NEW STEREO ADAPTER)" (page 108) for details about operations.

- 3** The following message is displayed when the stereo optical adapter is removed.





CAUTION

- The above message does not appear when the optical adapter is attached except in the live screen.
-

■ Using a new stereo optical adapter (NEW STEREO ADAPTER)

To use a new stereo optical adapter for stereo measurements, you need to register the stereo optical adapter in advance by executing “NEW STEREO ADAPTER”.



CAUTION

- When a new stereo optical adapter is purchased, if the insertion tube is repaired, or anything else that changes the combination of the stereo optical adapter and the insertion tube, it is required to execute the “NEW STEREO ADAPTER” setup.



NOTE

- The “NEW STEREO ADAPTER” setup consists of creating the environment data, which is the measurement parameters specific to the combination of a specific stereo optical adapter and specific insertion tube, based on the optical data that is the information specific to each stereo optical adapter model (this data is provided with the Stereo Measurement Set) and on the white image that is the information on the combination of the stereo optical adapter and insertion tube.
 - The environment data that is created is stored in the internal memory of the main unit.
-

For 4-mm and 6-mm types

1

Attach the new stereo optical adapter to the distal end of the insertion tube while the live screen is displayed.

2 Press the [MEAS/ENTER] joystick.



3 Insert an optical data media (USB memory) into the USB connector.

If the USB memory for recording images is inserted, the message shown below is displayed. Remove the USB memory for recording images and insert an optical data media.



Select "OK" and then press the [MEAS/ENTER] joystick. The new stereo optical adapter's name and set number are displayed.

4 Make sure that the adapter name and the set number for the new stereo optical adapter are correct and then select "OK" and press the [MEAS/ENTER] joystick.

5 Check that the stereo optical adapter is securely attached, select “OK”, and then press the [MEAS/ENTER] joystick.

See “Attaching the stereo optical adapter” (page 104) for the attachment procedure.



CAUTION

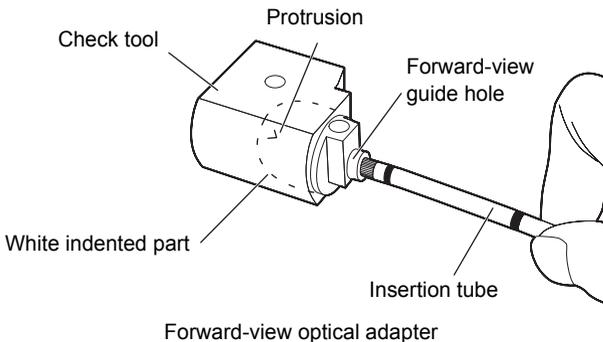
- If the stereo optical adapter is not installed properly, it will not be possible to get correct measurement results.

6 Adjust the brightness of a white image.

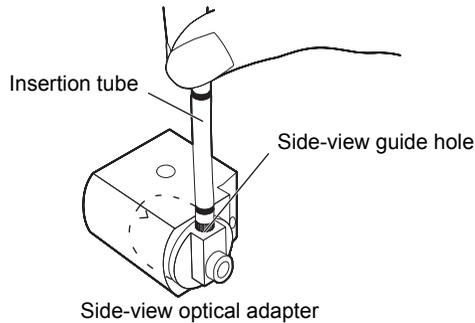
Use the check tool provided with the stereo measurement set to capture a white image.

The orientation of the insertion tube in the white indented part is different depending on whether the optical adapter is a direct view type or side view type.

- For forward-view optical adapter
Insert the distal end of the insertion tube into the forward-view guide directly oriented towards the protrusion in the white indented part.



- For side-view optical adapter
Insert the distal end of the insertion tube into the side view guide directly oriented towards the protrusion in the white indented part.



7 After inserting the insertion tube distal end into the guide hole to the end, rotate the check tool so that the protrusion in the middle of the white indented part comes into the center of the visual field.

8 When the insertion tube is set in the check tool, press the [FRZ/REC] button to freeze the white image.

When capturing the white image, hold the insertion tube by a position behind the angulation section so that no force is applied to the optical adapter and angulation section.



CAUTION

- Applying excessive force to the optical adapter when capturing a white image may reduce measurement accuracy.

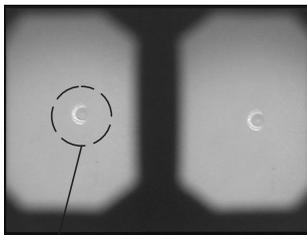


NOTE

- Capturing a white image

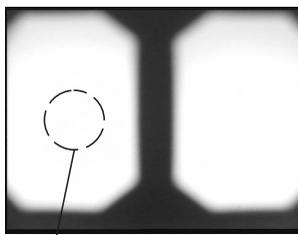
The white image affects measurement accuracy so it is necessary to adjust the brightness to the appropriate level as shown below.

Insufficient illumination



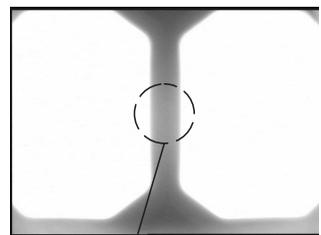
Protrusion

Optimum



Bright enough that the protrusion cannot be seen

Excessive illumination



Too bright

- If dirt is on the white indented part of the check tool, it may not be able to capture an adequate white image. In this case, remove the guide, which is the part with the holes for the forward-view and side-view guides for optical adapter, from the white indented part and clean out the dirt.

The guide can be removed by turning it counterclockwise. Use a gauze cloth with soapy water to wipe off the dirt. To reattach the guide, repeat these steps in reverse order.

9 The optical data for the new stereo optical adapter is stored in the main unit's internal memory when the white image has been captured successfully. Then the "NEW STEREO ADAPTER" is completed.

The following message is displayed. Remove the optical data media (USB memory) from the USB connector and then select "OK" and press the [MEAS/ENTER] joystick.



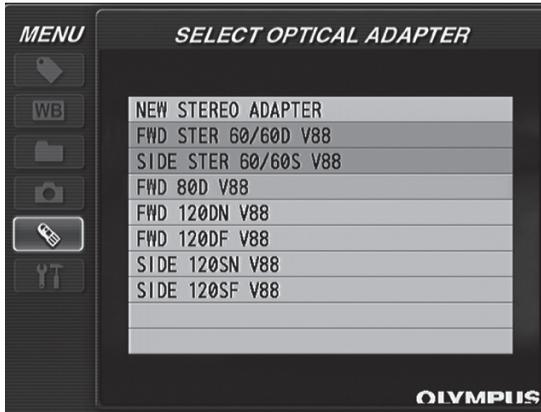
10 Keep the optical data media (USB memory) in the optical adapter case so it does not get lost.

NOTE

- After a new stereo setup is completed, a file with the name "IV7CALIB\FREEZE.JPG" is created on the optical data media (USB memory). Removing this file does not affect operation.
-

For 8.5-mm type

- 1** Attach the new stereo optical adapter to the distal end of the insertion tube while the live screen is displayed. Or select "SELECT OPTICAL ADAPTER" on the menu screen.



- 2** Select "NEW STEREO ADAPTER" and press the [MEAS/ENTER] joystick.
- 3** Select the stereo optical adapter to do initial settings for and press the [MEAS/ENTER] joystick.
- 4** Do steps 3 to 10 in the "NEW STEREO ADAPTER" for the 4-mm and 6-mm types (page 108).

Messages displayed during NEW STEREO ADAPTER

Step	Description
-	Execute NEW STEREO ADAPTER.
STEP1	Open the battery cover, insert an optical data media.
STEP2	Confirm the adapter name and set number.
STEP2A	Overwrite the data that has already been registered.
STEP3	Tighten the adapter firmly in arrow direction. Adapter unsteady or loose degrades measurement accuracy. Do not use tools.
STEP4	After locating the small mark to the center, adjust for uniform brightness with BRT button and push FREEZE button.
STEP5	Remove the optical data media.



NOTE

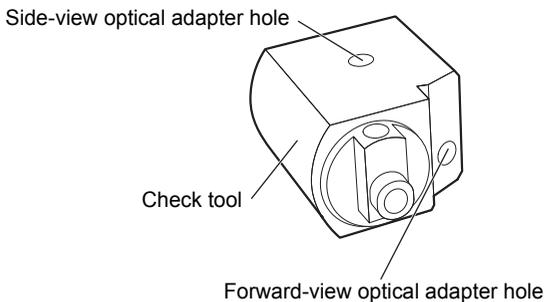
- The messages of “STEP2A” will be displayed only if overwrite is required.
-

■ Measurement value check

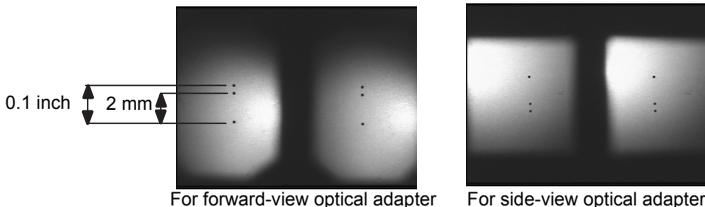
The accuracy of stereo measurement will be reduced by loose attachment of the optical adapter or dirt on the lens components. Routinely perform a check of measurements before and after the actual testing and confirm that the measurement values do not vary considerably.

Checking the measurement values

- 1** Insert the insertion tube distal end into the optical adapter hole of the check tool (included with the Stereo Measurement Set) to the end.



- 2** Turn the check tool so that you see an image similar to the one shown in the figure below.



- 3** Perform the distance mode stereo measurement (see page 119) to measure a known distance of 2 mm or 0.1 inch between two indices.
- 4** Confirm that the measurement accuracy is within $\pm 10\%$ and write down the measurement result.
- 5** Perform the above test measurements before and after the actual inspection to confirm that the obtained values are almost identical.



CAUTION

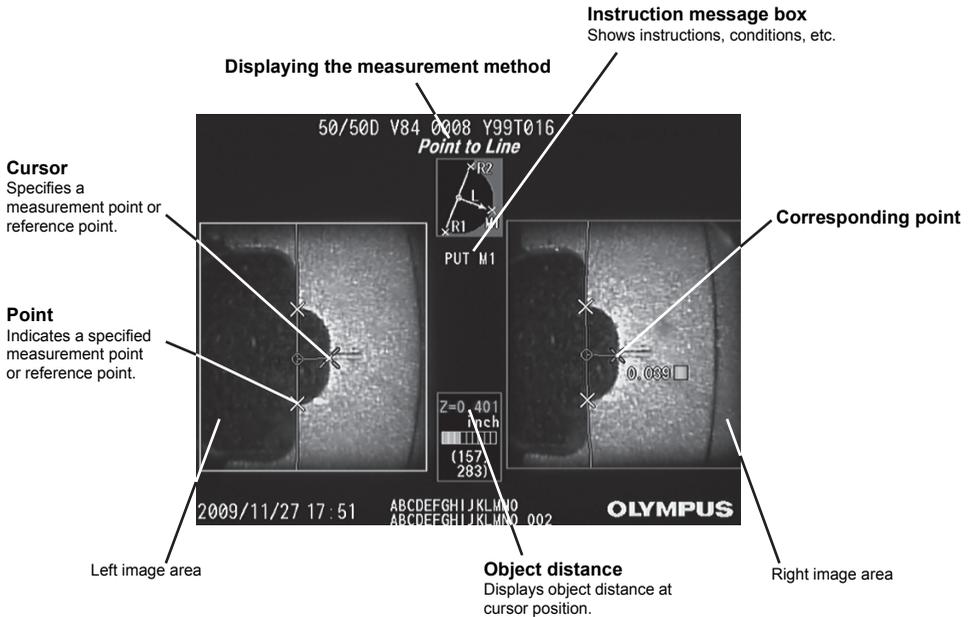
- The measurement values are not reliable if the above values differ from each other considerably. In this case, check that the adapter is not loose and the lens components are not dirty and, if required, execute “Using a new stereo optical adapter (NEW STEREO ADAPTER)” (page 108) and retry capturing the measurement images.
-

■ Notes for capturing measurement images

- (1) **The highlighted part of bright images tend to look textureless. As matching is difficult with these kinds of images, adjust the BRIGHTNESS level to darken the image (see “Adjusting the brightness” (page 62)).**
- (2) **As the illumination comes from one side of the field of view, some objects produce shadows depending on their shapes. Since measurement of shadow tends to result in errors, rotate the insertion tube to remove the shadow before capturing and measuring images.**
- (3) **If the area you want to measure has glare, rotate the insertion tube to remove the highlight from the area you want to measure and then capture an image for measuring.**
- (4) **Utilize spot ranging for measuring object distance, capturing the image close to an object and gaining high measurement accuracy (see “Spot ranging” (page 124)). Generally the closer object distance is, the more accurate measurement becomes.**

■ Stereo measurement screen

Explanation of the stereo measurement screen

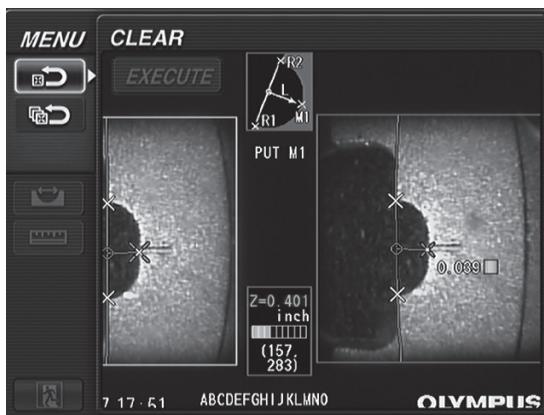


List of messages displayed in the instruction message box

Message	Description
PUT M##	Specify measurement point number ## in the left image area.
PUT R##	Specify reference point number ## in the left image area.

Menu display and functions of stereo measurement images

Pressing the [MENU/EXIT] button in the measurement screen

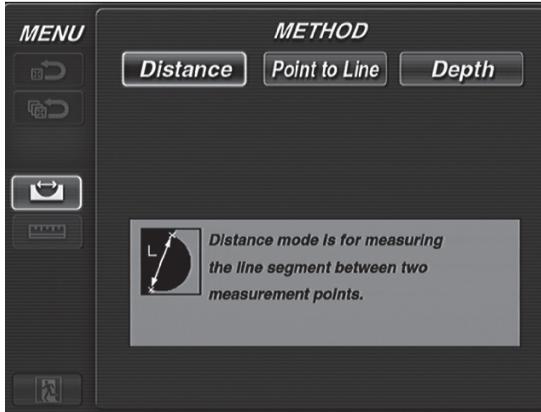


Menu	Description of function
<p>CLEAR</p> 	<p>Clears the measurement point or reference point specified immediately before.</p>
<p>ALL CLEAR</p> 	<p>Clears all specified measurement point or reference point.</p>
<p>METHOD</p> 	<p>Selects a measurement method. See “Selecting a measurement method” (page 119) for details about operations.</p>
<p>UNIT</p> 	<p>Selects the units of the measurement result from “mm” or “inch”.</p>
<p>EXIT MEASUREMENT</p> 	<p>Exits the stereo measurements, and the display returns to the screen before measurement starts.</p>

■ Stereo measurement procedures

Selecting a measurement method

The measurement method selection screen is displayed immediately after executing stereo measurement, or if “METHOD” is selected in the stereo measurement menu screen.

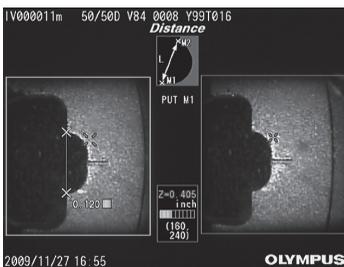


Measurement method selection screen

The following three measurement methods are available.

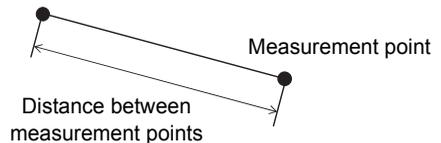
Distance

This mode allows for measuring the distance between measurement points. Place the cursor on each extremity of the object you want to measure and press the [MEAS/ENTER] joystick to specify the measurement points.



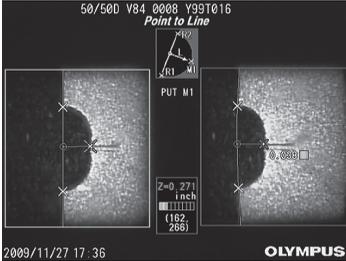
Distance

Measurement point

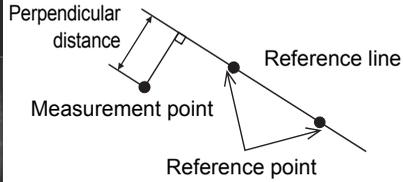


Point to line

This mode allows for measuring the distance from a measurement point to the reference line defined by two reference points.

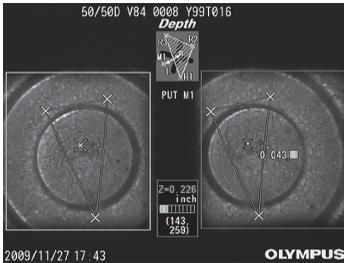


Point to line

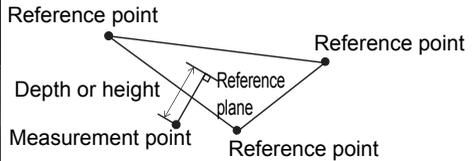


Depth

This mode allows for measuring the distance from a measurement point to the reference plane defined by three reference points. It indicates depth and height. Height is indicated by a positive value and depth is indicated by a negative value.

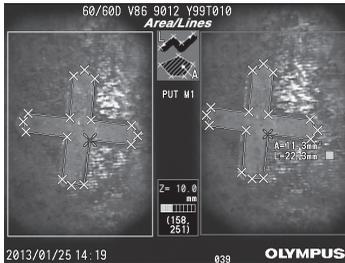


Depth

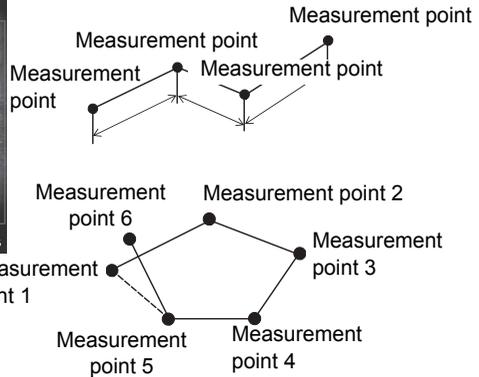


Area/Lines

This mode allows for measuring the total length of multiple lines, each of which is specified by two or more measurement points. When the specification of the last measurement point causes the first-drawn line and last-drawn line to intersect, the area of the figure closed by the lines will be measured. Note that the measured area does not represent the precise area of the measurement target but is only an approximate value obtained by dividing the figure into triangles. Up to 20 measurement points can be specified per measurement session.



Area/Lines



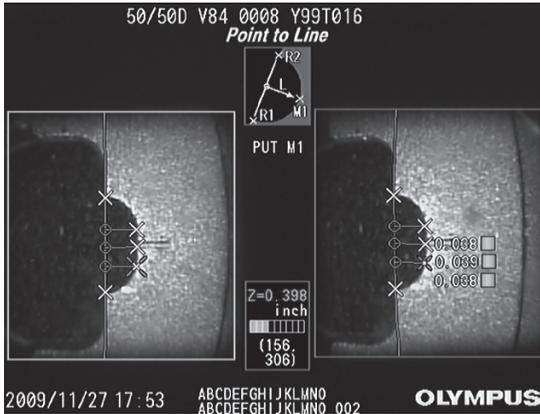
Specifying and moving the measurement points

To move the cursor, tilt the [MEAS/ENTER] joystick in the desired direction. Then, press the [MEAS/ENTER] joystick to specify the required number of measurement points for each measurement method in the left image area on the left side of the screen.

The measurement results and the object distance measured at the cursor (distance between the distal end of the adapter and the subject) are displayed. In addition, the measurement result displaying “- - - mm”, indicates that the correct reference point was not automatically acquired.

Displaying the measurement results

The three most recent measurement results are displayed. The object distance mark (■) (see "page 125" (3 Displaying the measurement results)) indicates the object distance of measurement point. This is displayed to the right side of the measured value.



Re-specifying a measurement point

Select "CLEAR" in the stereo measurement menu to delete measurement points specified by mistake.

Re-specifying all measurement points

If you want to restart the measurement point specification in an image from the beginning, select "ALL CLEAR" in the stereo measurement menu.

Matching confirmation and distance display

When matching completes, the relevant corresponding point is displayed in the right image area. Confirm that it corresponds to the position specified in the left image area. At this time, the distance from the insertion tube distal end to the specified measurement point is also displayed as "Z= ___". The background changes yellow when the distance to the measurement point is over 15 mm or red when it exceeds 30 mm. The distance range up to 15 mm is the recommended measuring range and 30 mm is the maximum measurable range.

In case auto matching is not smooth

Read "Notes for capturing measurement images" (page 116) and "In case accuracy cannot be achieved" (page 123).

Recording the measurement result

The image with the measurement result is recorded by pressing the [FRZ/REC] button for at least two seconds (long push) when the measurement result is displayed.

Exiting from measurement

Press the [LIVE/GAIN] button to display the exit measurement screen and then select “OK” to exit measurement. Select “CANCEL” to return to the stereo measurement screen.

Select “EXIT” in the stereo measurement menu to exit measuring and return to the screen before measurement is activated.



Exit measurement confirmation window

■ In case accuracy cannot be achieved

- (1) Bring the insertion tube as close as possible to the object so that the screen is filled with the object.
- (2) Measure the length so that it is parallel with the screen whenever possible. While the resolution of measuring is high when the measuring direction is parallel with the screen, it gets low when measuring direction becomes closer to depthwise. Therefore, the measurement can be made more accurate by measuring a parallel object to the screen.
- (3) Change the point of view and capture an image again if the objects have similar patterns around measurement points have few surface characteristics or if the image is blurry or reflective.
- (4) Check that the optical adapter is attached properly to the insertion tube.
- (5) Check that there is no dirt between the optical adapter and insertion tube, and attach the optical adapter again.
- (6) If the accuracy still cannot be improved, execute “NEW STEREO ADAPTER” again (see page 108).



NOTE

- Check the measured values before and after doing any measurements. (See "Measurement value check" (page 115))

■ Spot ranging

The spot ranging function calculates the distance between the distal end of the optical adapter and the subject. In live images move the distal end of the insertion tube slowly because vibration makes it impossible to calculate measurements.

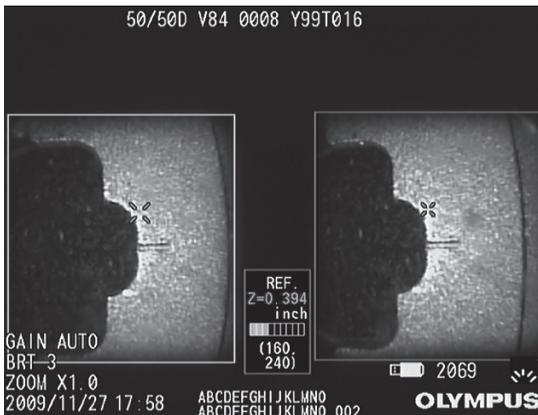
1 Selecting the optical adapter

Before executing the object distance measurement, select the stereo optical adapter to be used by referring to "Checking the stereo optical adapter" (page 105).

2 Executing object distance measurement

To perform the object distance measurement, display the live or frozen image to be measured and tilt the [ZOOM] lever toward [W]. The object distance measurement is displayed.

Tilt the [ZOOM] lever on the control unit towards [T] to exit the object distance measurement function.



CAUTION

- Object distance measurement cannot be done when recording moving images.

3 Displaying the measurement results

Measure the object distance at the position of the cursor in the left image. The object distance indicator shows the distance between the distal end of the optical adapter and the subject by nine levels.

Up to 15 mm: ■■■■ ←green

Up to 30 mm: ■■■■ ■■■■ ←yellow

30 mm and higher: ■■■■ ■■■■ ■■■■ ←red

4 Moving the cursor

To move the cursor, tilt the [MEAS/ENTER] joystick in the desired direction.

Chapter 7 Operations on a computer

7.1 Using recorded images on a computer

You can use bundled IPLEX VIEWER PLUS to access images recorded with IPLEX LX/LT on a computer.

Use a computer to read directly from the USB Flash Drive where the images you want to read are recorded.

■ Reading images with a computer

For details about how to open IPLEX LX/LT images with IPLEX VIEWER PLUS, see the IPLEX VIEWER PLUS instruction manual.



CAUTION

- Connect only USB Flash Drive to the main unit's USB connector. Do not connect any other USB device or use a USB cable to connect to a computer. Doing so may cause malfunction.
-

Chapter 8 Storage and maintenance

8.1 Remaining battery power

When operating IPLEX LX/LT with the battery, the LCD monitor displays the remaining battery power on the top right of the screen. A guideline to remaining battery capacity is shown as follows.

(1)		Remaining battery power about 50%.
(2)		Remaining battery power about 25% to 50%.
(3)		Remaining battery power about 5% to 25%.
(4)		Remaining battery power about 2% to 5%.
(5)		Remaining battery power about 1% to 2%. This indicator flashes. Replace with a battery that has been charged with the charger.



CAUTION

- Do not record or delete images and do not format USB Flash Drive if warning number (4) shown above is displayed. If the power runs out during these operations the data could be corrupted.
- If a warning message mentioned above (5) is displayed due to the lowering of battery power voltage, immediately turn off the power of the main unit or connect the AC adapter. If continuously used without any action the power will be automatically turned off which may cause malfunction.



NOTE

- The remaining battery power can also be checked on the [POWER INDICATOR] of the battery itself. (However, the remaining battery power shown on the LCD monitor is different.) For details, refer to the instruction manual of your battery.
- The remaining battery power is not displayed during the AC adapter-powered operation.
- When long hours of battery-powered operation are expected or when using the instrument in cold weather, it is recommended to prepare charged batteries as spares.
- When the battery operation time becomes extremely short, it is recommended to replace the battery with a new battery.
- The main unit is not provided with charging capability. To charge the battery, use the optional external battery charger.
- The battery cannot be charged using the equipment. For information on charging the battery, refer to the manual that came with the battery charger.

8.2 Replacing the battery



DANGER

- Before opening the battery cover, press the power button (⏻) to turn off the power. Not doing so may cause an electric shock.



WARNING

- Be careful not to injure yourself when replacing the battery.
- Never use a battery other than the one designated by Olympus. Otherwise, failure of the instrument may not only lead to a malfunction but also a fire.
- Be careful not to leave any foreign objects in the battery compartment when replacing the battery. Otherwise, a fire or malfunction may result.

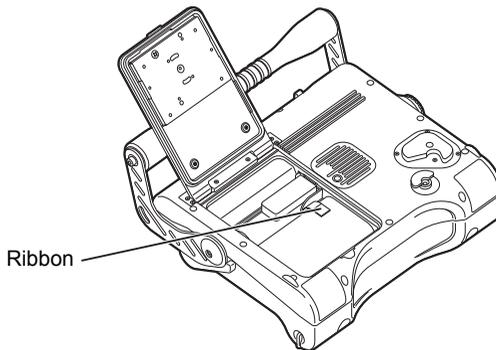


CAUTION

- Be careful not to accidentally drop the battery during replacement.
-

■ Replacing the battery

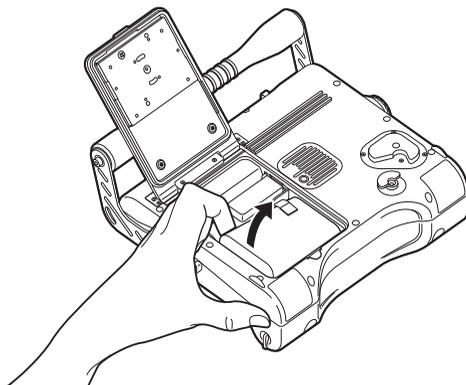
- 1** Press the power button (⏻) on the main unit to turn off the power.
- 2** Slide the battery cover lock release lever and open the battery cover.
- 3** Pull the ribbon and the battery will come out.





NOTE

- If you are having trouble removing the battery, hook it with your finger to remove it.



-
- 4** See “Supplying power from the battery” (page 28) for information about putting in a new battery.

8.3 Cleaning

■ Cleaning the insertion tube



CAUTION

- Clean the insertion tube immediately after withdrawing the insertion tube. If you leave it uncleaned, the equipment may be stained or corroded.
 - Do not use a hard cloth or hard brush for cleaning the insertion tube. Otherwise, the equipment may be damaged.
 - Do not clean the optical adapter under running water. Otherwise, the equipment may be damaged.
-

- 1 Use a clean, soft cloth to wipe any dirt or other foreign object off of the insertion tube.**
- 2 If a liquid such as wastewater or machine oil is attached to the insertion tube, first wipe it with a soft cloth or cotton, and wash well using a neutral detergent solution and pieces of gauze. Then wipe it with a piece of soft gauze moistened with clean water, wipe off the moisture well and dry.**
- 3 Inspect and clean the distal end of the insertion tube and the optical adapter according to “3.4 Inspecting the insertion tube” (page 31) and “3.6 Inspecting the optical adapter” (page 35).**

■ Cleaning the LCD monitor

If the LCD monitor is dirty or has fingerprints on it, wipe it with a soft cloth dampened with clean water. Then, lightly wipe it with a clean dry cloth.



CAUTION

- Never use a chemically treated cloth or strong detergent, such as benzine or alcohol. Doing so may damage the surface of the LCD monitor.
 - Do not use a cloth that is hard, dirty, or has foreign matter on it. Doing so may damage the surface of the LCD monitor.
-

■ Cleaning the main unit and control unit

If the main unit is dirty, wipe it with a soft cloth dampened with clean water. Then, lightly wipe it with a clean dry cloth. Also thoroughly wipe all dirt, water, and other foreign matter from the interior of the battery cover, video connector cap, AC adapter connector cap, and the locations where the insertion tube connects to the main unit.



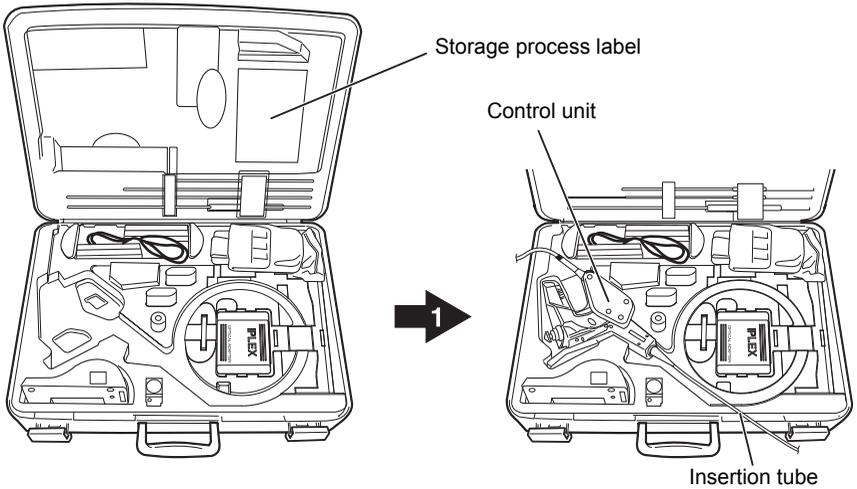
CAUTION

- Do not clean the equipment under running water. Otherwise, the equipment may be damaged.
-

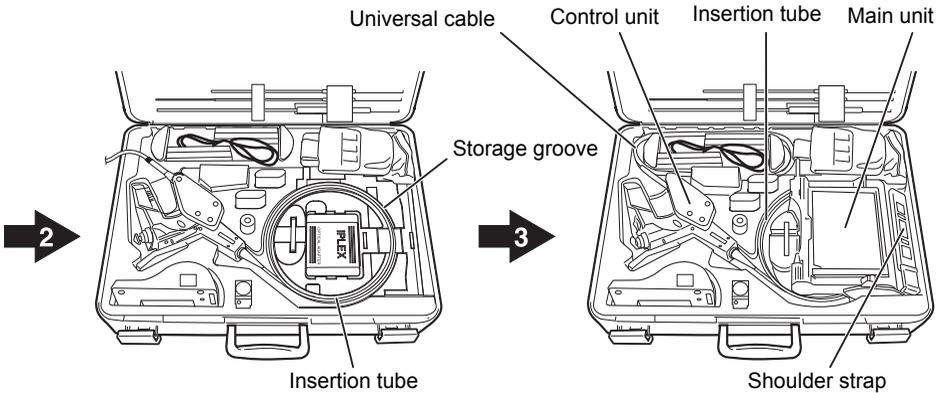
8.4 Repacking the case

For 4-mm and 6-mm types

Repack the equipment in the order of: Control unit → Insertion tube → Main unit.



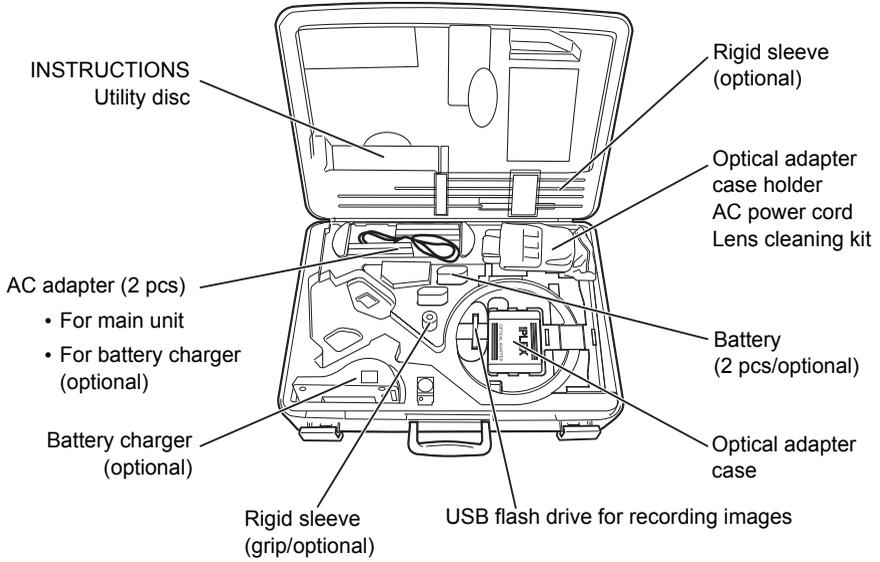
Stow the control unit first.



Wind the insertion tube into the storage groove.

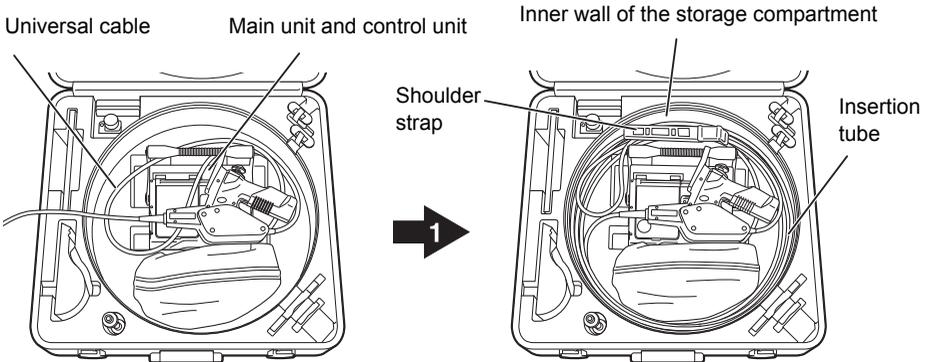
Stow the main unit on top of the insertion tube.
Next, wind and stow the universal cable.
Last, stow the shoulder strap.

Stow accessories as illustrated below. (For 4-mm and 6-mm types)



For 8.5-mm type

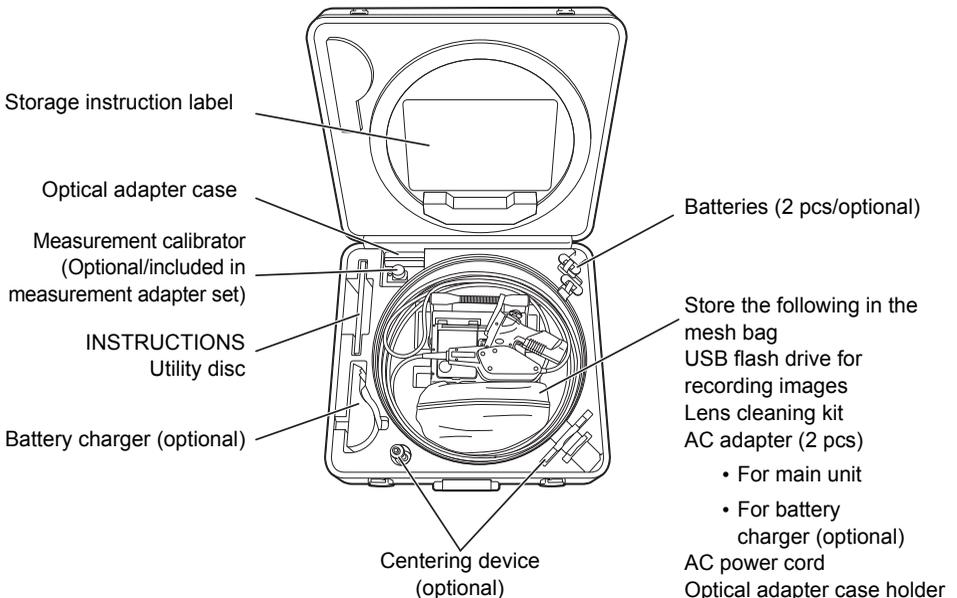
Repack the equipment in the order of: Main unit and control unit → Insertion tube.



Stow the main unit with the control unit being mounted on its back.
Position the main unit and the universal cable as shown in the diagram.

Wind the insertion tube in a loop alongside of the inner wall of the storage compartment and stow the shoulder strap.
Check if the control unit is mounted on the main unit, and then close the lid.

Stow accessories as illustrated below. (For 8.5-mm type)



**WARNING**

- Before storing the main unit in the case, be sure to remove the battery and turn the main unit off. Otherwise, the equipment may overheat and cause a fire.

**CAUTION**

- Stow the control unit, insertion tube, and main unit in the correct order. If they are not stored in the correct order, the insertion tube may be damaged.
- Let the distal end of the insertion tube cool before stowing it in the case.
- Do not apply excessive force when stowing the insertion tube into the cushioned slot. Otherwise, the insertion tube may be damaged.
- Make sure to remove twist from the insertion tube when storing it.
- Make sure that the case's latch is locked properly. If it is locked improperly, the top cover may open during transport.
- When closing the top cover, be careful that your hand, the strap, insertion tube or cables are not pinched.
- When returning the main unit to its case, open the case in a stable place before repacking the equipment.
- Use only the designated case. Failure to do so may cause damage or malfunction of the insertion tube and/or main unit.

**NOTE**

- Refer to the storage process label on the inside of the top cover of the carrying case for the storage procedure.
-

■ Locking the case

The top cover of the case may open if the case is hit while being moved. Use the provided key to lock the case during transport.

**CAUTION**

- Lock the case at both of the two locations.
-

8.5 Storage precautions

Store the equipment under normal room temperature and humidity conditions.



DANGER

- Do not bend, stretch, twist or crush cables with excessive force. Otherwise, a break in a cable may result in a fire or electric shock hazard.



CAUTION

- Do not store the equipment in a place subject to high temperature, high humidity, excessive dust or fine particles, direct sunlight or radioactive emissions. Doing so could damage the equipment.
- The performance of some kind of electric parts will be deteriorated by the gas including the halide contained in the insecticide, the herbicide, and the gas extinguishant, etc. Do not store the equipment in a place subject to the gas including halide. Doing so could damage the equipment.
- Do not handle the equipment roughly or hit it against other objects when storing it. Doing so may cause a malfunction.

-
- 1 Press the power button (⏻) to turn off the power and remove the battery and the AC adapter from the main unit.**
 - 2 Store the equipment on a level surface in a clean, dry and stable place.**

Chapter 9 Troubleshooting



DANGER

- Never use the instrument if there is any abnormality. Otherwise, the instrument may malfunction and the user may also be injured fatally, critically or seriously.
-

Inspect the equipment as described in “Chapter 3 Preparation and inspection before observation” (page 22), do not use the equipment if there are any obvious malfunctions. Contact Olympus for repairs. Should the slightest irregularity be suspected, do not use the instrument and see “9.1 Troubleshooting guide” (page 138). If the problem cannot be resolved by the described remedial action, stop using the instrument and send it to Olympus for repair.

Olympus does not repair disposable accessory parts. In the case of malfunction, contact Olympus to purchase a replacement.

9.1 Troubleshooting guide

■ Error messages

Problem	Display	Possible cause	Remedy
Image cannot be recorded or retrieved.	NO RECORDING MEDIA.	The USB Flash Drive is not inserted.	Insert a USB Flash Drive to use and restart operation.
	RECORDING MEDIA FULL.	The USB Flash Drive is full.	Delete unneeded data to free up space or replace with new USB Flash Drive.
	THIS IMAGE CANNOT BE RETRIEVED.	The image has not been recorded with the IPLEX LX/LT.	Only images recorded with the IPLEX LX/LT can be retrieved.
	RECORDING MEDIA ERROR. PLEASE FORMAT THE RECORDING MEDIA.	The format of the USB Flash Drive is not recognized.	Format the USB Flash Drive with the IPLEX LX/LT.
	IMAGER ERROR. PLEASE TURN OFF THE POWER.	The self-check function is activated and prompts termination of operation.	Stop inspection and turn the instrument off, then on again.
An error message appears when a USB Flash Drive is connected.	OVER CURRENT (USB). PLEASE TURN OFF THE POWER.	The USB Flash Drive being used is not recommended for this system.	Stop inspection and turn the instrument off, then on again. Use a recommended USB Flash Drive.
		A USB device other than a USB Flash Drive is connected.	Disconnect all USB devices except the USB Flash Drive.
The optical adapter is attached improperly.	UNKNOWN OPTICAL ADAPTER.	The optical adapter type cannot be recognized.	Stop inspection and re-attach the optical adapter. (See "3.6 Inspecting the optical adapter" (page 35).)
	OPTICAL ADAPTER HAS BEEN DETACHED.	The optical adapter has detached.	

Problem	Display	Possible cause	Remedy
A message appears while using the high beam during inspection. (LX only)	ILLUMINATION MODE CAN NOT BE SWITCHED TO HIGH BEAM.	The distal end of the insertion tube is too hot so the high beam cannot be used.	Cool the distal end of the insertion tube to use the high beam.
	ILLUMINATION MODE RETURNED TO NORMAL.	The distal end of the insertion tube is too hot, triggering the self-check function.	
	HIGH TEMPERATURE (MAIN UNIT). PLEASE TURN OFF THE POWER.	The inside of the main unit is too hot, triggering the self-check function.	
A message appears when increasing the light emitted (to use high beam). (LX only)	ILLUMINATION MODE CAN NOT BE SWITCHED TO HIGH BEAM.	The distal end of the insertion tube is too hot.	Cool the distal end of the insertion tube to use the high beam.
A message appears (and an alarm sounds) when the insertion tube is inserted into a high-temperature observation object. (LX only)	HIGH TEMPERATURE (DISTAL END). PLEASE IMMEDIATELY PULL OUT THE SCOPE.	The message prompts you to stop inspection because the self-check function was triggered.	Immediately pull the insertion tube out of the observation object. (Note) This message will appear before the atmospheric temperature of the distal end of the insertion tube reaches the maximum operating ambient temperature.
Message displayed when using battery.	LOW BATTERY. PLEASE CONNECT THE AC ADAPTER OR TURN OFF THE POWER.	The battery voltage dropped.	Stop operations such as recording images, copying, deleting, or formatting a USB flash drive, and replace the battery immediately. Or, attach the AC adapter.
The image cannot be adjusted.	IMAGE CAPTURE ERROR. PLEASE TURN OFF THE POWER.	Self-check triggers during use and displays a message.	Stop inspection and turn the instrument off, then on again.

Problem	Display	Possible cause	Remedy
Self-check triggers during use and displays a message (and an alarm sounds).	HIGH TEMPERATURE (MAIN UNIT). PLEASE TURN OFF THE POWER.	The message prompts you to stop operations because the inside of the main unit was too hot and triggered the self-check function.	Terminate inspection, allow the instrument to cool down, and then turn power back on again.
Operation load for articulation is getting heavier.	OVER CURRENT (ARTICULATION MOTOR). PLEASE TURN OFF THE POWER.	The insertion tube is overloaded and the self-check function was triggered to prompt termination of inspection.	Extend the insertion tube as much as possible to reduce the loop amount, and turn power back on without operating the [ANGLE] joystick.
Self-check triggers during use and displays a message.	OVER CURRENT (ADAPTER). PLEASE TURN OFF THE POWER AND CLEAN THE ELECTRODE.	An abnormality was detected in the tip electrode of the insertion tube.	Immediately withdraw the insertion tube from the object of observation and turn the power off. Clean the insertion tube tip and optical adapter electrodes, and then reinstall the optical adapter (See “3.4 Inspecting the insertion tube” (page 31) and “3.6 Inspecting the optical adapter” (page 35).)

■ General troubles during operation

Problem	Possible cause	Remedy
The illumination does not light.	The LIGHT button (☀) is not on.	Turn on the LIGHT button (☀).
	The optical adapter is attached improperly.	Attach the optical adapter properly.
	Electrodes on the optical adapter or the insertion tube distal end are dirty.	Wipe them with a clean piece of gauze or cotton swab. See “Inspecting the insertion tube distal end” (page 31) and “Inspecting the optical adapter optics and connecting screw threads” (page 35).
	The LEDs on the distal end of the optical adapter are inoperable.	Replace the optical adapter.
The illumination is dim.	The optical adapter tip is dirty.	Wipe them with a clean piece of gauze or cotton swab.
	Extended use under high ambient temperatures causes decreased light emissions.	Replace the optical adapter.
The optical adapter cannot be attached to the insertion tube.	A foreign object is stuck to the screws.	Wipe them with a clean piece of gauze or cotton swab.
	The optical adapter in use is not a designated optical adapter for this system.	Use a designated optical adapter.
	You are not using the proper installation procedure.	Redo it correctly (See “Attaching and detaching the optical adapter” (page 36).)
The optical adapter cannot be removed from the insertion tube.	The nut of the optical adapter is rotated in the wrong direction.	Redo it correctly (See “Attaching and detaching the optical adapter” (page 36).)
The system cannot be turned on.	The AC adapter or the battery is not connected.	Connect the AC adapter or the battery correctly. (See “3.3 Preparing the power supply” (page 28).)
	The [POWER] button is not set to on.	Set the power button (⏻) of the main unit to on.
	A non-designated AC adapter or battery is connected.	Use the designated AC adapter or battery.

Problem	Possible cause	Remedy
The system cannot be turned off.	The main unit is damaged.	Remove the AC adapter or the battery from the main unit to turn off the power.
The image is not sharp.	The object lens on the scope distal end or the optical adapter is dirty.	Wipe them with a clean piece of gauze or cotton swab.
	The optical adapter is attached improperly.	Attach the optical adapter properly.
	The external monitor is adjusted incorrectly.	Correctly adjust the external monitor.
The image brightness is not optimum.	The automatic brightness control is set erroneously.	Perform the [BRT] lever operation to configure the proper setting.
	The object lens on the insertion tube distal end or the optical adapter is dirty or the illumination on the optical adapter distal end is dirty.	Wipe them with a clean piece of gauze or cotton swab.
	The external monitor is adjusted incorrectly.	Correctly adjust the external monitor.
	The optical adapter is old.	Replace the optical adapter.
Color reproduction is poor.	The white balance is set improperly.	Re-adjust the white balance.
The image is noisy.	The automatic brightness control is set erroneously.	Perform the [BRT] lever operation to configure the proper setting.
Angulation cannot be returned to its original attitude.	The angulation lock is set.	Lift the [ANGLE LOCK] lever to release the angulation lock.
Angulation cannot be locked.	A stopper is installed.	Remove the stopper and then operate the [ANGLE LOCK] lever.
Operation load for articulation is getting heavier.	Angle lock function may effect.	Pulling down the [ANGLE LOCK] lever.
Control unit is emitting loud noise or vibrating violently.	The insertion tube is overloaded.	Remove your finger from the [ANGLE] joystick and then extend the insertion tube as much as possible to reduce the loop amount.
The beep can not be heard.	"BEEP ON/OFF" in the "SETUP" menu is set to "OFF".	Set "BEEP ON/OFF" in the "SETUP" menu to "ON".

Problem	Possible cause	Remedy
All the functions stopped during motion image recording.	A USB flash drive for recording images other than the one provided or one that is not recommended by Olympus was used.	Remove the AC adapter or the battery from the main unit to turn off the power. Use the USB flash drive for recording images provided as standard or one recommended by Olympus.
See "In case accuracy cannot be achieved" (page 123) for details about operations.		

■ List of error messages displayed while measuring

ERROR#	Content
501	Insert the correct optical data media.
502	Insert the correct optical data media.
503	Insert the correct optical data media.
504	Insert the correct optical data media.
505	System error.
506	Not a proper white image.
507	System error.
508	System error.
701	No measurement available.
703	No measurement available.
704	No measurement available.
705	No measurement available.
707	No measurement available.
708	No measurement available.
709	No measurement available.
711	No measurement available.

9.2 Returning the instrument for repair

**WARNING**

- Olympus is not liable for any injury or damage which occurs as a result of repairs attempted by non-Olympus personnel.

**CAUTION**

- Olympus will not repair an instrument contaminated by noxious substances.

Before returning the instrument for repair, contact Olympus. Include a detailed description of the malfunction and the conditions under which it occurs when returning the instrument.

Malfunctions that occur during the warranty period are done at no charge according to the warranty agreement. Be sure to attach the warranty agreement when returning the instrument for repairs. Repair will be charged if the warranty agreement is not attached. The freight fees are paid by the user even if repairs are done free of charge.

Chapter 10 Specifications

10.1 Operating environment

Operating temperatures	Insertion tube	In air: IV84,86 series : -25 to 100°C (LX) : -25 to 80°C (LT) IV88 series : -25 to 80°C (LX, LT) In water: 10 to 30°C
	Other parts than above	In air: -10 to 40°C (Battery-powered operation) 0 to 40°C (AC adapter-powered operation)
Operating atmospheric pressure	Insertion tube	In air: 1013 hPa Underwater: IV84,86 series : 1013 to 1368 hPa IV88 series : 1013 to 2026 hPa
	Other parts than above	In air: 1013 hPa
Operating environment humidity	All parts	15 to 90% (Relative humidity)
Liquid resistance	Insertion tube	No trouble when exposed to machine oil, light oil or 5% saline solution.
	Other parts than above	
Waterproofing	Insertion tube	Waterproof construction. Can be used underwater with the optical adapter attached. However, stereo measurement cannot be done underwater.
	Other parts than above	Rain-proof construction. Do not use this instrument underwater. However, it is not rain-proof when the battery cover and others are open.



CAUTION

- Meeting operating environment specifications does not constitute any guarantee against damage to or malfunction of this equipment.

10.2 Other specifications

Optical system	Field of view	Can be changed according to the optical adapter.
	Direction of view	Variable for direct viewing or side viewing depending on the optical adapter.
	Depth of field	Refer to specifications for depth of field for optical adapter.
	Illumination	2-stage LED illumination system (LX only)
Distal end	Outer diameter	IV84 series: ϕ 4.0 mm IV86 series: ϕ 6.0 mm IV88 series: ϕ 8.5 mm
	Distal end rigid section length	See the distal end rigid section length specification of the optical adapter in use.
	Angulation	IV8420L1/L2, IV8435L1/L2: 130° IV8620L1/L2: 150° IV8635L1/L2: 130° IV88100L1/L2: 115° UP, DOWN, RIGHT and LEFT each direction. The insertion tube is straight.
Flexible section	Flexibility	IV84 series: Fixed hard tube from the distal end of the insertion tube to the control unit. IV86 series: TF tube with flexibility gradually increasing toward the distal end.
	Outer diameter	IV84 series: ϕ 4.0 mm IV86 series: ϕ 6.0 mm IV88 series: ϕ 8.5 mm
	Index lines	An orange line is drawn at the position of 500 mm from the distal end of the insertion tube. White lines are drawn at every 1000 mm from the distal end of the insertion tube. The number of white lines is increased at every 1000 mm (1 line at 1000 mm, 2 lines at 2000 mm).
Total length		IV8420L1/L2: 2 m/IV8435L1/L2: 3.5 m IV8620L1/L2: 2 m/IV8635L1/L2: 3.5 m IV88100L1/L2: 10m

Chapter 10 Specifications

Control unit	Angulation	Power assisted angulation.
	Function of buttons	ZOOM (T/W) lever 3-step zoom magnification switching
		BRT (▲/▼) lever <In the live screen> Brightness changes in UP/DOWN format. If the gain mode is "AUTO", the WIDER changes accordingly. (LX only) <BRT ▲ lever in the thumbnail screen> Selects multiple images to delete.
		ANGLE joystick Used to control the angulation.
		MEAS/ENTER joystick Used for menu selections and measurements.
		MENU/EXIT button Toggles the menu display on and off.
		LIVE/GAIN button Returns to the live screen from the menu screen. Switches the gain mode in the live screen. (LX only)
		FRZ/REC button Freezing function and recording function done by one button. Short push opens freeze screen. Long push activates recording function.
		VIEW button Short push displays most recent image on retrieve screen. Long push opens thumbnail screen.
		ANGLE LOCK lever Mechanically locks and maintains angulation.
Dimensions	311 (W) x 93 (D) x 192 (H) mm (without insertion tube and cable)	
Weight	Approx. 750 g (without insertion tube and universal cable)	
Total weight of all components		IV8420L1/L2, IV8620L1/L2: 2.7 kg (with battery) IV8435L1/L2, IV8635L1/L2: 2.9 kg (with battery) IV88100L1/L2: 3.9 kg (including batteries)

Setup configuration		Three setup configurations are supported. <ul style="list-style-type: none"> • Use the handle as a stand • Hang it from the handle • Put it on a tripod
Portability		Can be fitted to body with a shoulder strap.
Holding of control unit		Provided with a hook for locking of the control unit.
LCD panel		6.5 inch TFT full-color low reflective-coating type
Function of buttons		Power button (): Turns power ON/OFF LIGHT button (): Short push turns illumination ON/OFF. Long push increases light emission. (LX only)
Scope screen		Full screen
Bright adjustment		8 steps each (step 8 is the monochrome boost mode).
Freeze frame (still image display)		Automatically selects frame freeze when there is little motion in the screen or field freeze when there is a lot of motion in the screen. However, it is always frame freeze when using the stereo optical adapter.
Zoom		Three steps digital zoom
White balance		White balance can be readjusted by selecting white balance in the menu. It is a simple operation adjusted by capturing an image of a white object.
Input/Output connector	Video signal outputs	One video signal output (For external devices) Composite (VBS) video output (for live image) One RCA jack output
	USB connector	A connector, USB 2.0 compatible
Power supply	Battery	Specified battery can be inserted and removed from the battery slot. Only the specified battery is permitted: Specified battery (Lithium Ion) Model name: Manufactured by INSPIRED ENERGY NC2040NO29 or NC2040OL24 Nominal voltage: 10.8V DC Battery powered operating time: 4-mm and 6-mm types: 120 minutes or longer (based on using a new battery) 8.5-mm type: 100 minutes or longer (based on using a new battery) For details, refer to the instruction manual of your battery.
	AC adapter	Designated AC adapter can be connected to AC adapter connector. Rated input voltage: 100 V to 240 V Supply frequency: 50/60 Hz Output voltage: 12 V For details, refer to the instruction manual of AC adapter.
Operating voltage range		7.5 to 12.6 V (Battery-powered operation) 11.4 to 12.6 V (AC adapter-powered operation)

Chapter 10 Specifications

Power consumption		4-mm and 6-mm types: MAX 11 W 8.5-mm type: MAX 14 W
Dimensions		239 (W) x 99 (D) x 215 (H) mm
Still image recording	Resolution	NTSC: H640 x V480 (Pixel) PAL: H768 x V576 (Pixel)
	Recording format	Files are stored as compressed JPEG format (Exif 2 compliant).
	Character superimpose	The date, time, title and OLYMPUS logo displayed on the screen can be superimposed on the image. When the stereo optical adapter is attached, a superimposed image and an image that is not superimposed are both recorded.
Still image retrieval	Restrictions	Images recorded on IPLEX LX/LT can be retrieved.
Moving image recording	Resolution	H640 x V480 (Pixel)
	Recording format	AVI MPEG-4 formats. Compression rate fixed. Can be played on the Windows Media Player. (Provided that the Windows Media Player Ver.7 or later and Direct X7.1 or later are installed)
	Character superimpose	The date, time, title and OLYMPUS logo displayed on the screen can be superimposed on the image.
	Recording time	Depending on the USB Flash Drive capacity and subject.
	Restrictions	Moving image playback guaranteed only when one of the recommended USB Flash Drive is used.
Moving image playback	Restrictions	Images recorded on IPLEX LX/LT can be retrieved.
Thumbnail display		Thumbnails of images recorded on USB Flash Drive provided as standard or USB Flash Drive recommended by Olympus can be displayed. To display thumbnails, press the [VIEW] button on the control unit.
Retrieved image display		Images recorded on USB Flash Drive provided as standard or USB Flash Drive recommended by Olympus can be displayed. To retrieve images, display thumbnails and press the [MEAS/ENTER] joystick on the control unit.
Image file operations	Title input	Images can be titled with the menu operation on the control unit. Each title is composed of up to 30 letters and is accompanied by a 3-digit serial number.
	Delete	Images recorded on the USB Flash Drive can be deleted. Use the BRT ▲ lever to select multiple images.
Beep tone settings		Beep tone output can be turned on or off by menu operation.

Measurement function (Expanded function LX only)	Measurement types		Stereo measurement: When a stereo optical adapter is used. Spot ranging: When a stereo optical adapter is used.
	measurement method	Distance	Distance between two points indicated on the screen.
		Area/Lines	<ul style="list-style-type: none"> Total length of lines connecting multiple points (max. 20 points) indicated on the screen. Area of a closed figure formed by indicating multiple points.
		Point to line	Distance from a point to a line (reference line) that is defined by indicating two points on the screen.
		Depth	Distance from a point to a plane that is defined by indicating three points on the screen.
	Displaying the measurement results		<ul style="list-style-type: none"> Normally, displays measurement results for the measurement point indicated by the cursor. Up to 3 measurement results can be displayed.
	Spot ranging		<ul style="list-style-type: none"> Spot ranging indicates approximate value of the distance from the tip of the scope to the object on screen specified by cursor. The distance is indicated via numerical value and color-coded bar.
	Recording		<ul style="list-style-type: none"> It is possible to record up to 3 groups of measurement results on the measurement screen. When measurement results exist, pressing and holding the [FRZ/REC] button on the remote controller records the image together with the measurement results.
Restrictions		<ul style="list-style-type: none"> The object distance measurement result is not recorded. The stereo optical adapter can be used by registering it as a new stereo adapter setup. Recommended measurement range for stereo measurement up to 15 mm Possible measurement range up to 30 mm One measurement environment each can be entered for forward view and side view. 	

■ Carrying case specifications

Equipment stored in carrying case	Insertion tube, Control unit, Main unit	Stowed in storage space.
	Optical adapter and optical data media (USB flash drive)	Placed in optical adapter case and then stowed in storage space under the main unit.
	Other items	<ul style="list-style-type: none"> • Shoulder strap x1 • Optical adapter case (with holder) x1 • Battery x 2 • Battery charger x1 • AC adapter (including power cables) x2 • INSTRUCTIONS • Lens cleaning kit • Utility disc • USB flash drive for recording images • Rigid sleeve
Dimensions weight	Dimensions	600 (W) x 133 (D) x 426.5 (H) mm 23.62 (W) x 5.16 (D) x 16.79 (H) inch
	Weight	4-mm and 6-mm types: Approximately 3.0 kg (7.7 kg with all accessories stowed) 8.5-mm type: Approximately 5.8 kg (11.6 kg with all accessories stowed)

■ External application standard

<p>EMC Information</p>	<p>This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.</p> <ul style="list-style-type: none"> • Emission Class A, applied to industrial environment requirements. • Immunity Applied to industrial environment requirements. <p>Some interference may occur if this product is used in domestic location.</p>
<p>FCC and IC Information</p>	<p>This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.</p> <p>This Class A digital apparatus complies with Canadian ICES-003.</p> <p>Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.</p>
<p>WEEE Directive</p> 	<p>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.</p> <p>Refer to your local Olympus distributor for return and/or collection systems available in your country.</p>
<p>Chinese RoHS Directive</p> 	<p>This mark indicates the environmental protection use period applicable to electronic information products sold in China in accordance with the "Management Methods for Controlling Pollution by Electronic Information Products" of February 28, 2006 and the "Requirements Concerning Pollution Control Markings for Electronic Information Products."</p> <p>(Caution)</p> <p>During the environmental protection use period harmful substances will not be emitted when used under proper conditions. However, it does not guarantee functional performance of the product during the said period.</p>

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10.3 Optical adapter specifications

■ For insertion tube 4-mm type

When the optical adapter is mounted on the insertion tube.

		AT120D/ NF-IV84	AT120D/ FF-IV84	AT120S/ NF-IV84	AT120S/ FF-IV84	AT50D/ 50D-IV84	AT50S/ 50S-IV84
Product abbreviation		120DN V84	120DF V84	120SN V84	120SF V84	50/50D V84	50/50S V84
Character color		Red	Green	Red	Green	Blue	Blue
Optical system	Field of view	120°	120°	120°	120°	50°/50°	50°/50°
	Direction of view	Forward	Forward	Side	Side	Forward/ forward	Side/side
	Depth of field *1	4 to 190 mm	25 to ∞ mm	1 to 20 mm	6 to ∞ mm	5 to ∞ mm	4 to ∞ mm
Distal end	Outer diameter *2	φ 4.0 mm	φ 4.0 mm				
	Rigid distal end length *3	19.7 mm	19.6 mm	22.2 mm	22.2 mm	25.0 mm	28.8 mm



NOTE

*1 Indicates the range within which the image can be viewed clearly.

*2 The adapter can be inserted into a φ 4.0 mm hole when it is mounted on the insertion tube.

*3 Indicates the length of the rigid portion at the insertion tube's distal end when mounted.

■ For insertion tube 6-mm type

When the optical adapter is mounted on the insertion tube.

		AT40D-IV86	AT80D/ NF-IV86	AT80D/ FF-IV86	AT120D/ NF-IV86	AT120D/ FF-IV86
Product abbreviation		40D V86	80DN V86	80DF V86	120DN V86	120DF V86
Character color		Black	Red	Green	Red	Green
Optical system	Field of view	40°	80°	80°	120°	120°
	Direction of view	Forward	Forward	Forward	Forward	Forward
	Depth of field *1	200 to ∞ mm	8 to ∞ mm	35 to ∞ mm	4 to 190 mm	25 to ∞ mm
Distal end	Outer diameter *2	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm
	Rigid distal end length *3	19.8mm	19.8mm	19.8 mm	19.8mm	19.8 mm

		AT80S-IV86	AT120S/ NF-IV86	AT120S/ FF-IV86	AT60D/ 60D-IV86	AT60S/ 60S-IV86
Product abbreviation		80S V86	120SN V86	120SF V86	60/60D V86	60/60S V86
Character color		Black	Red	Green	Blue	Blue
Optical system	Field of view	80°	120°	120°	60°/60°	60°/60°
	Direction of view	Side	Side	Side	Forward/ forward	Side/side
	Depth of field *1	18 to ∞ mm	1 to 25 mm	5 to ∞ mm	5 to ∞ mm	4 to ∞ mm
Distal end	Outer diameter *2	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm	φ 6.0 mm
	Rigid distal end length *3	25.2 mm	25.2 mm	25.2 mm	25.9 mm	32.2 mm



NOTE

*1 Indicates the range within which the image can be viewed clearly.

*2 The adapter can be inserted into a φ 6.0 mm hole when it is mounted on the insertion tube.

*3 Indicates the length of the rigid portion at the insertion tube's distal end when mounted.

■ For 8.5-mm type insertion tube

When the optical adapter is mounted on the insertion tube.

		AT80D/ FF-IV88	AT120D/ NF-IV88	AT120D/ FF-IV88	AT120S/ NF-IV88	AT120S/ FF-IV88
Product abbreviation		80DF V88	120DN V88	120DF V88	120SN V88	120SF V88
Character color		Green	Red	Green	Red	Green
Optical system	Field of view	80°	120°	120°	120°	120°
	Direction of view	Forward	Forward	Forward	Side	Side
	Depth of field *1	35 to ∞ mm	4 to 190 mm	25 to ∞ mm	1 to 25 mm	5 to ∞ mm
Distal end	Outer diameter *2	φ 8.5mm	φ 8.5mm	φ 8.5mm	φ 8.5mm	φ 8.5mm
	Rigid distal end length *3	22.9 mm	22.9 mm	22.9 mm	29.5 mm	29.5 mm

		AT60D/ 60D-IV88	AT60S/ 60S-IV88
Product abbreviation		60/60D V88	60/60S V88
Character color		Blue	Blue
Optical system	Field of view	60°/60°	60°/60°
	Direction of view	Forward/ forward	Side/side
	Depth of field *1	5 to ∞ mm	4 to ∞ mm
Distal end	Outer diameter *2	φ 8.5mm	φ 8.5mm
	Rigid distal end length *3	28.9 mm	36.5 mm



NOTE

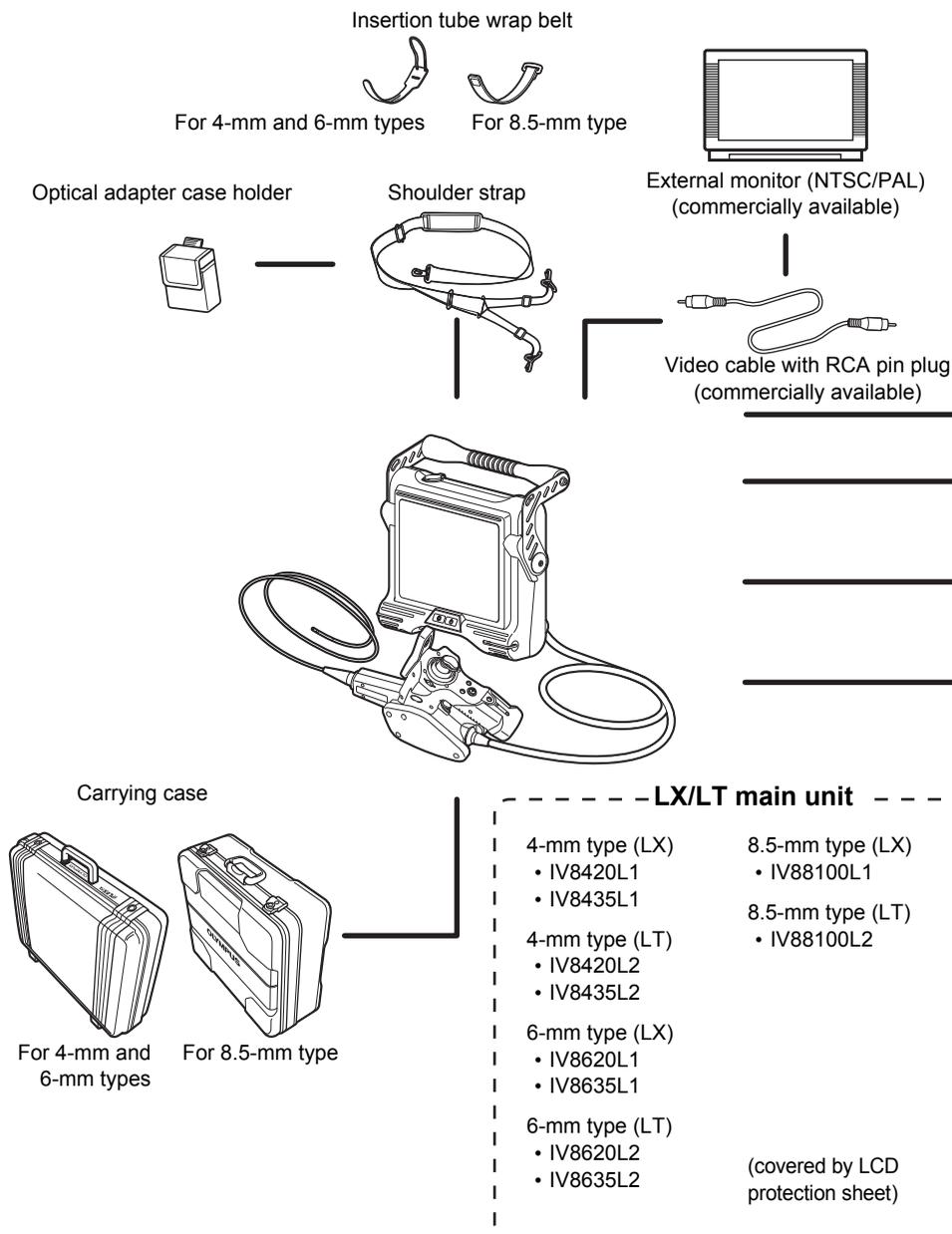
*1Indicates the range within which the image can be viewed clearly.

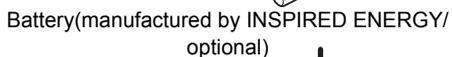
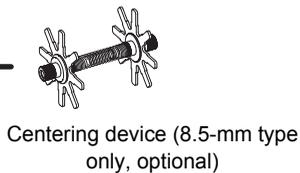
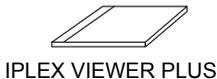
*2The adapter can be inserted into a φ 8.5 mm hole when it is mounted on the insertion tube.

*3Indicates the length of the rigid portion at the insertion tube's distal end when mounted.

Appendix

System chart





Optical adapter/Rigid sleeve

Optical adapter (optional)



4-mm type

- AT120D/ NF-IV84
- AT120D/ FF-IV84
- AT120S/ NF-IV84
- AT120S/ FF-IV84
- AT50D/50D-IV84
- AT50S/50S-IV84

6-mm type

- AT40D-IV86
- AT80D/ NF-IV86
- AT80D/ FF-IV86
- AT120D/ NF-IV86
- AT120D/ FF-IV86
- AT80S-IV86
- AT120S/ NF-IV86
- AT120S/ FF-IV86
- AT60D/60D-IV86
- AT60S/60S-IV86

8.5-mm type

- AT80D/FF-IV88
- AT120D/NF-IV88
- AT120D/FF-IV88
- AT120S/NF-IV88
- AT120S/FF-IV88
- AT60D/60D-IV88
- AT60S/60S-IV88

Rigid sleeve (optional)



4-mm type

- MAJ-1737 (for IV84X3)

6-mm type

- MAJ-1253 (for IV86X3)

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