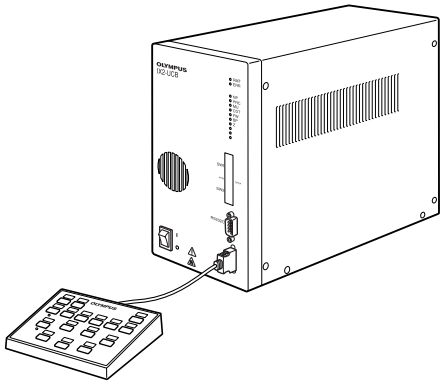


# INSTRUCTIONS

# IX2-UCB
# U-HSTR2

## CONTROL BOX FOR IX2
## HAND SWITCH

Optical Microscope Accessory

This instruction manual is for the Olympus Control Box model IX2-UCB and Hand Switch model U-HSTR2, both for use with the IX2/GX motorized microscope. To ensure safety, optimum performance and familiarize yourself fully with the use of the motorized microscope, we recommend that you study this manual thoroughly before operating the system. Retain this instruction manual in an easily accessible place near the work desk for future reference.

AX6444

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

- Immunity Applied to industrial and basic environment requirements.

In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.
Refer to your local Olympus distributor in EU for return and/or collection systems available in your country.

**NOTE**: This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Operation of this product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**FCC WARNING**: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

## For Korea only

B급 기기 (가정용 방송통신기자재)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

# CONTENTS

# *IMPORTANT*

| |
|---|
| The IX2-UCB (Type 2) control box is the basic module for controlling the drive functions of the IX2 microscope with motorized specification. It also incorporates the power supply for the microscope. It can be combined with one of the Type 2 microscope frames: IX81S1F-2, IX81S8F-2 and IX81F-2.<br>Motorized operation from the U-HSTR2 hand switch or a PC is possible. Besides, the functions of the buttons can be set as desired by using the IX2-BSW software (Ver. 01.03 or later).<br>The IX2-BSW software (Ver. 01.03) is compatible with Windows 2000 and Windows Me. For details, see the IX2-BSW's help file. |
| When your GX Series motorized system uses the IX2-UCB (Type 2) control box and U-HSTR2 hand switch, read this "Important" section and "GX Series Motorized System" section on pages 11 to 16. |
| Please do not use this control unit with BX2 series components. |

## ⚠ SAFETY PRECAUTIONS

1. Before connecting cables, be sure to set the main switch of the IX2-UCB control box to "O" (OFF)".
2. Make sure to **ground** the equipment for safety and for maintaining the electrical safety performance.
3. When installing the control box, leave spaces of more than 10 cm around it. (Note that the control box also has a ventilation air inlet on the front panel).
4. Never insert a metallic object, etc. into the air vent of the control box. Otherwise, electric shock or malfunction may result. Also be careful not to allow the provided small articles, including the push ring driver and Allen wrench, enter the air vents of the associated module used together with the control box.
5. Distribute the power cord and other cables away from the lamp housing and its surroundings. Otherwise, the cord or cable coating may melt by heat and cause an electric shock hazard.

### Safety Symbols

The following symbols are found on the unit. Study the meaning of the symbols and always use the equipment in the safest possible manner.

| Symbol | Explanation |
|---|---|
| ⚠ | Before use, carefully read the instruction manual. Improper use could result in personal injury to the user and/or damage to the equipment. |
| I | Indicates that the main switch is ON. |
| O | Indicates that the main switch is OFF. |
| ☼ | Indicates the illumination, which is limited only to a 12 V, 100 W halogen bulb with this system. |
| ⚠ | Bottom surface is hot, and should not be touched with bare hands. |

## 1 Getting Ready

1. The control box and hand switch are precision equipment. Handle them carefully by avoiding any shock or impact, and also connect each cable gently.
2. Do not use the equipment under a direct sunlight, in a place under high temperature and humidity or in a place subject to vibrations. (For the operating environmental condition, see chapter 3, “SPECIFICATIONS” on page 7.)
3. While the main switch of the IX2-UCB control box is set to “ **I** ” (ON), do not replace any module, plug or unplug any cable or switch the light path manually to prevent malfunction.
4. Never disassemble any part of the unit as this could result in mafunctions or reduced performance.

## 2 Caution

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

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

⚠ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

★ : Indicates that failure to follow the instructions could result in damage to equipment.

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

## 3 Intended use

This instrument has been designed to be used to observe magnified images of specimens in routine and research applications.

Do not use this instrument for any purpose other than its intended use.

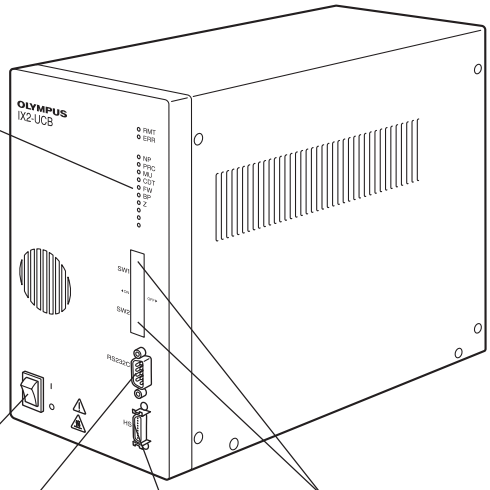
# 1 NOMENCLATURE

⚠ Make sure to connect the Olympus-specified module to each connector.
The PC in use should meet the IEC60950 requirements.
If any non-specified equipment is used, Olympus cannot guarantee any performance of the system.

## Control Box IX2-UCB-2

Indicator LEDs
- RMT: Lights at the time of remote control (in orange).
- ERR: Blinks in case of an error (in red).

Lights during attachment (in green)/blinks during operation.
- NP: 6-position motorized revolving nosepiece
- PRC: Motorized light path selector
- MU: Either the IX2-RFACA or U-FWR
- CDT: Either the IX2-LWUCDA or U-FWR
- FW: Either the U-FWO or U-FWR
- BP: IX2-TVRAC
- Z: U-ZPCB
- Spare

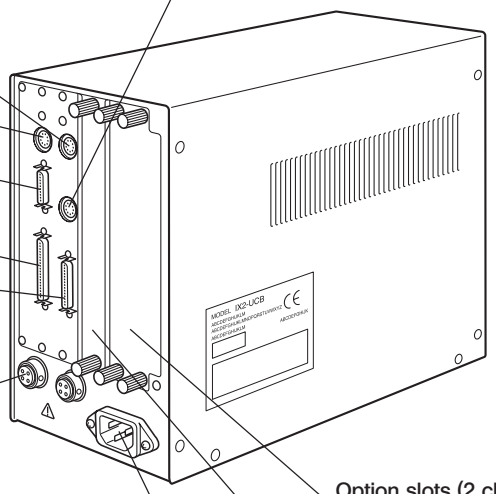



Main switch ( I : ON, O : OFF)

DIP switches
Used for selection of operation settings. (p.6)

RS232C connector (9-pin male)
PC connector

U-HSTR2 (Hand Switch) connector




LWUCDA/FW2 connector

RFACA/FW1 connector

FW3 connector

MAIN 1 connector

MAIN 2 connector

MAIN 3 connector

100 W halogen lamp housing connector
(Note) The connector on the right cannot be used.

Option slots (2 ch)

Option slot
Z board can be installed.

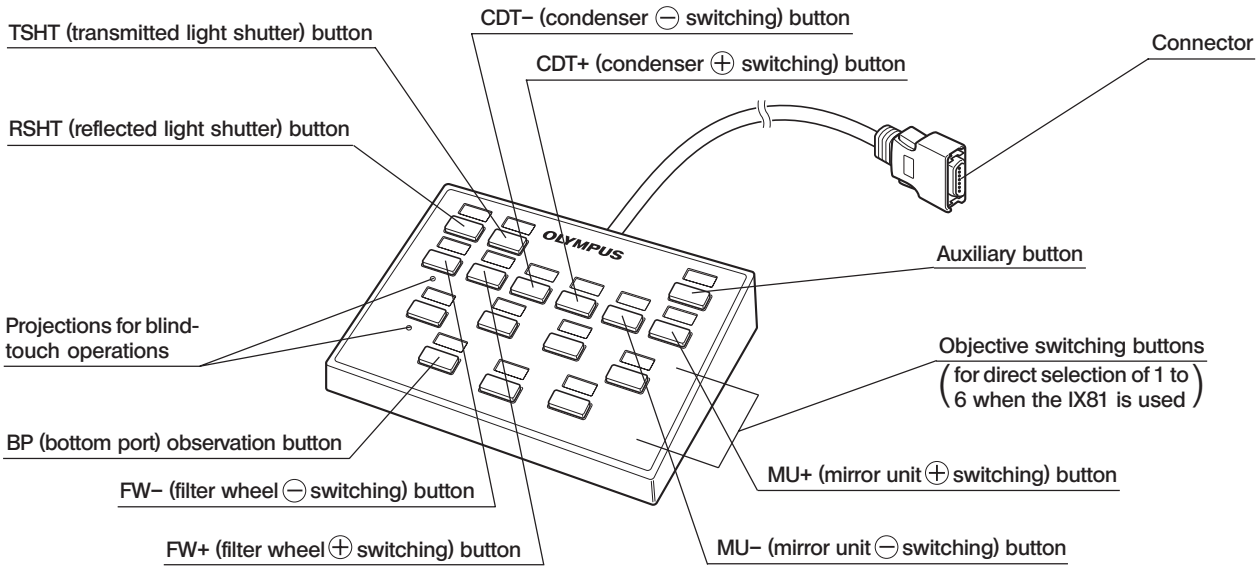
Power cord connector

## Hand Switch U-HSTR2

◎The button functions shown below are the functions in stand-alone mode or the initial functions set at the moment the system is started after having installed the IX2-BSW software (Ver. 01.03 or later) in the PC.
The button functions can be modified as desired by using the software.

◎Above each button, attach the indication sticker corresponding to the function set for the button. When you use the buttons with their initial settings, simply attach the indication stickers as shown in the following figure.

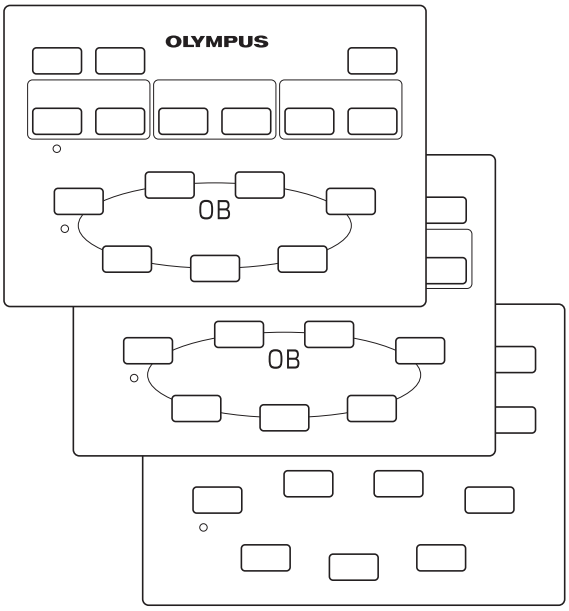
◎The current position can be identified by the lighting of the positions where the indication stickers are attached (objective in use/TSHT/RSHT/BP).



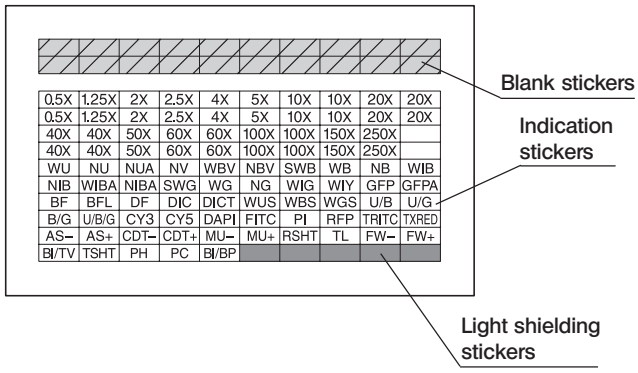

### Meanings of the ⊖ and ⊕ buttons

Each press of the ⊖ or ⊕ button changes the position number in the decremental direction (1 → 6 → 5 → 4 → 3 → 2 → 1) or in the incremental direction (1 → 2 → 3 → 4 → 5 → 6 → 1) respectively.

**Grouping Panel Sheets (3 types)**




**Indication Stickers**




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0.5X | 1.25X | 2X | 2.5X | 4X | 5X | 10X | 10X | 20X | 20X |
| 0.5X | 1.25X | 2X | 2.5X | 4X | 5X | 10X | 10X | 20X | 20X |
| 40X | 40X | 50X | 60X | 60X | 100X | 100X | 150X | 250X | |
| 40X | 40X | 50X | 60X | 60X | 100X | 100X | 150X | 250X | |
| WU | NU | NUA | NV | WBV | NBV | SWB | WB | NB | WIB |
| NIB | WIBA | NIBA | SWG | WG | NG | WIG | WIY | GFP | GFPA |
| BF | BFL | DF | DIC | DICT | WUS | WBS | WGS | U/B | U/G |
| B/G | U/B/G | CY3 | CY5 | DAPI | FITC | PI | RFP | TRITC | TXRED |
| AS– | AS+ | CDT– | CDT+ | MU– | MU+ | RSHT | TL | FW– | FW+ |
| BI/TV | TSHT | PH | PC | BI/BP | | | | | |

# 2 OPERATION

## 2-1 Control Box IX2-UCB-2

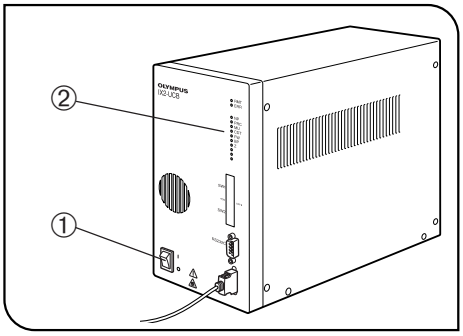



Fig. 1

### 1 Turning Power On (Fig. 1)

**⚠ Ensure that the modules to be used are connected properly. (P. 9)**

1. Set the main switch ① to " I " (ON).
2. Ensure that the LED indicators ② corresponding to the connected modules are lit.

### 2 Functions of Indicator LEDs (Fig. 1)

1. RMT: Lights only at the time of remote control.
2. ERR: Blinks in case of an error. At this time, the associated indicators blink as described below.
3. NP to Z: Each indicator lights when the corresponding module is installed.

## 2-2 Hand Switch U-HSTR2

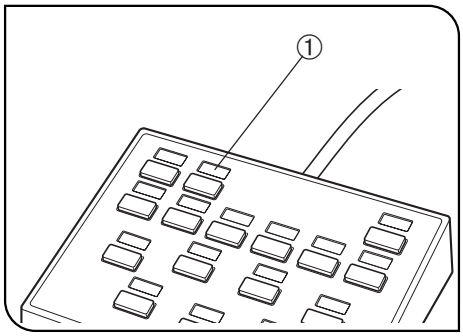



Fig. 2

### 1 Attaching Indication Stickers (Fig. 2)

1. Attach each piece of the provided function indication stickers onto the dented area ① above the button where the corresponding function is set.
2. The indication stickers are given weak adhesive force intentionally so that they can be removed and re-attached easily.
3. The indication stickers include two types of stickers carrying no indication on them.

- Light shield sticker: Attach to the dented area above a button with no function set.
- Blank sticker: Create a custom indication sticker by writing the function name with oily ink and attach to the dented area above the required button.
  Also usable for substitution of light shield stickers when they have run out.

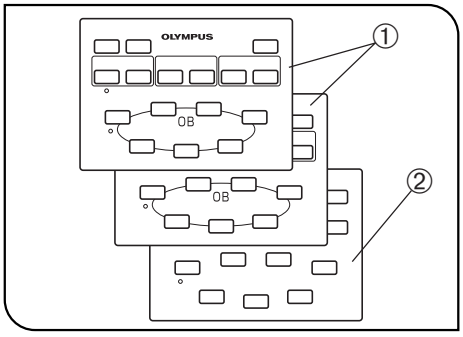



Fig. 3

### 2 Grouping Panel Sheet (Fig. 3)

Two sheets showing the function groups of buttons with enclosing lines ① and a blank sheet ② are provided. Select and use the sheet that is most convenient.
The blank sheet can be used by drawing desired grouping lines with oily ink pen.

◎Sheet ① (the topmost sheet) has been designed for use in stand-alone mode or when you use the buttons with their initial settings.

## 2-3 Operation Selection of the DIP Switches

◎The allocated functions of the DIP switches are shown in the table below.

★Make sure the main switch is set to "○" (OFF) before setting the DIP switches. The unit detects the new settings only when the power is switched on, making those settings effective.

| DIP Switch | Switch Position | | | | | | | | Function | Detail |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| SW1 (upper row) | OFF | | | | | | | | Buzzer prohibited | Activates buzzer. |
| | ON | | | | | | | | | Does not activate buzzer. |
| | | OFF | | | | | | | Reserved for manufacturer | Fixed at OFF. |
| | | | OFF | | | | | | | |
| | | | | OFF | | | | | | |
| | | | | | OFF | | | | | |
| | | | | | | OFF | | | | |
| | | | | | | | OFF | | Initialization prohibited when power is switched on | Initializes. |
| | | | | | | | ON | | | Does not initialize. |
| | | | | | | | | OFF | Reserved for manufacturer | Fixed at OFF. |
| SW2 (lower row) | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | Reserved for manufacturer | All fixed at OFF. |

◎The shaded sections show factory settings (all set at OFF).

Regarding the RS232C Cable

★Be sure to use a commercially available RS232C straight cable. (Use of other cables may cause malfunction.) Use a D-Sub 9P (female)–D-Sub 9P (female) connector. Be sure to set the main switches of the control box and PC to "○" (OFF) before connecting the RS232C cable.

Setting of U-ZPCB etc.

★When combining the U-ZPCB or other focus control boards, set the following dip switches on the board to ON and insert to the control box;

- S3-No.4
- S4-No.5

Be sure to set the main switches of the control box to "○" (OFF) before inserting the board.

# 3 SPECIFICATIONS

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td colspan="2">Control Box IX2-UCB-2</td></tr>
<tr><td>Power supply rating</td><td>Input rating: 100 to 120/220 to 240 V ∿ , 50/60 Hz, 3.5/1.5 A</td></tr>
<tr><td>LED indicators</td><td>• RMT (Remote) LED • ERR (Error) LED<br>• Module installation check LED x 10, (Spare x 3)</td></tr>
<tr><td>Option slots</td><td>Power capacity (single slot)
<table>
<tr><td></td><td>Per board</td><td>Total of 3 slots</td></tr>
<tr><td>+5 V</td><td>1 A max.</td><td>2 A max.</td></tr>
<tr><td>+15 V</td><td>1 A</td><td>1 A (normal) + 1 A (motor load 20% duty)</td></tr>
<tr><td>+24 V</td><td>1 A max</td><td>2 A max.</td></tr>
</table></td></tr>
<tr><td>Dimensions & weight</td><td>125(W) x 216(H) x 310(D) mm, approx. 5 kg (11 lb.)</td></tr>
<tr><td colspan="2">Hand Switch U-HSTR2</td></tr>
<tr><td>Button functions</td><td>Connects to the IX2-UCB-2 for use in the control of following operations. Also operable from a PC (which meets the IEC60950).<br><u>Stand-alone mode or initial settings at the start of PC</u><br>• FW–/FW+/CDT–/CDT+/MU–/MU+ buttons<br>• RSHT/TSHT/BP buttons<br>• Objective direct selection buttons (1 to 6)</td></tr>
<tr><td>Dimensions & weight</td><td>147 (W) x 32 (H) x 108 (D) mm., approx. 0.37 kg (0.81 lb.)</td></tr>
<tr><td>Operating environment</td><td>• Indoor use.<br>• Altitude: Max. 2000 m.<br>• Ambient temperature: 10 to 35°C.<br>• Maximum relative humidity: 80% (up to 31°C). The maximum humidity decreases linearly at above 31°C, through 70% (at 34°C), 60% (at 37°C) to 50% (at 40°C).<br>• Supply voltage fluctuation: ±10%.<br>• Pollution degree: 2 (in accordance with IEC60664).<br>• Overvoltage category: II (in accordance with IEC60664).</td></tr>
</table>

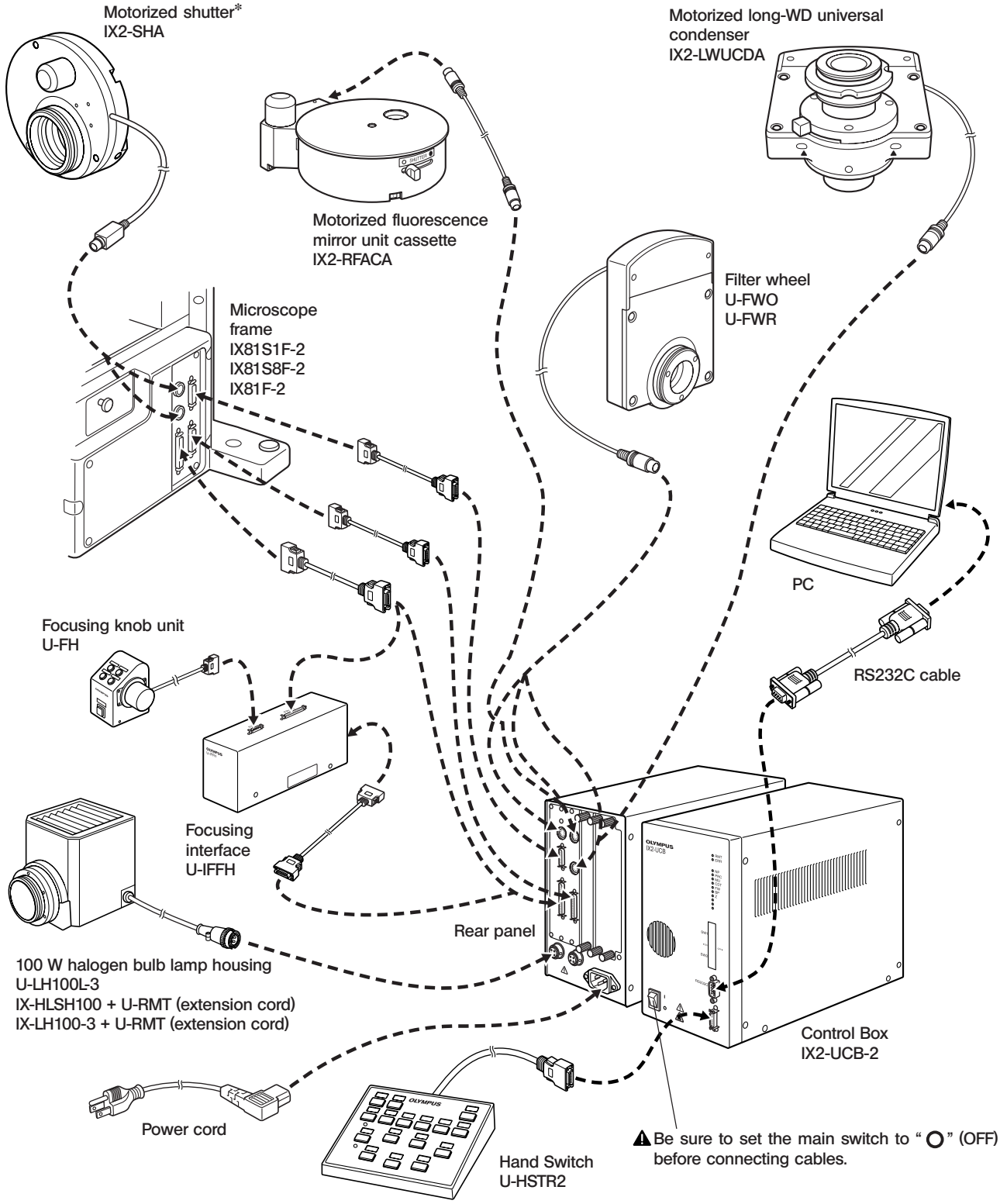
# 4 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the microscope may be adversely affected by factors other than defects. If a problem occurs, please review the following list and take remedial action as appropriate. If you cannot solve the problem after checking the entire list, please contact your local Olympus representative for assistance.

| Problem | Cause | Remedy | Page |
|---|---|---|---|
| a) ERR (Error) indicator blinks. | Module corresponding to the indicator blinking simultaneously with ERR is not connected properly. | Connect the motorized module of the simultaneously blinking indicator properly. | 9 |
| b) Power cannot be turned on by setting the main switch to " **I** " (ON). | Power cord is unplugged. | Connect the power cord properly. | 10 |
| c) Communication through RS232C is impossible. | The RS232C cable in use is wrong. | Use the specified RS232C cable. | 6 |
| | The RS232C cable is not connected properly. | Connect it properly. | 9 |
| d) The Hand Switch buttons do not work or the indicators do not light. | The hand switch is not connected properly. | Connect it properly. | 10 |
| | The IX2-BSW (Ver. 01.03 or later) is not logged in. | Log it in. | – |
| e) A motorized module does not work or its indicator does not light. | The motorized module is not connected properly. | Connect it properly. | 9 |
| f ) The lamp will not light. | The lamp housing connector is not connected properly. | Connect it properly. | 9 |
| | The lamp housing is plugged into the right-side connector. | Plug it into the left-side connector. | 9 |
| | The lamp on-off switch of microscope is set to OFF. | Set it to ON. | – |
| | The lamp is blown. | Replace the lamp. | – |
| g) The objectives do not escape when they are switched. | The on-board DIP switches on the U-ZPCB Z-board are not set correctly. | Set them correctly by referring to the instruction manual for the IX81. | – |
| | They do not escape in stand-alone mode. | Install IX2-BSW (Ver. 01. 03 or later) and start it up. | – |
| h) The rotation direction of the focus adjustment knob and the movement of the objectives do not agree with each other. | The on-board DIP switches on the U-ZPCB Z-board are not set correctly. | Set them correctly by referring to the instruction manual for the IX81. | – |

# 5 ASSEMBLY

## 5-1 Assembly Diagram




*Plug the IX2-SHA into the SHA1 (top) connector when it has been mounted in the transmitted illumination light path, and plug it into the SHA2 (bottom) connector when it has been mounted in the reflected illumination light path.

## 5-2 Detailed Assembly Procedures

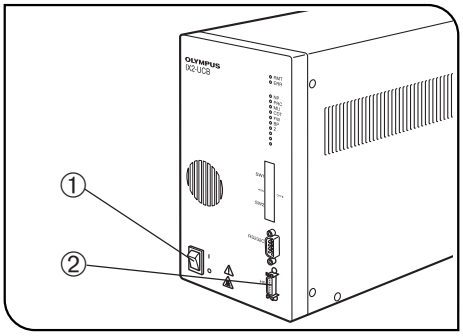



Fig. 4

⚠ Make sure that the main switch ① of the control box to " O " (OFF) before connecting the cable of the Hand Switch (and other modules) and the power cord. (Fig. 4)

⚠ The power cord and connection cables are sensitive to bending or twisting. Do not apply excessive force to them.

### 1 Connecting the Hand Switch Cable (Fig. 4)

Align the connector of the Hand Switch with the HS connector ② on the front panel of the Control Box and plug in firmly.

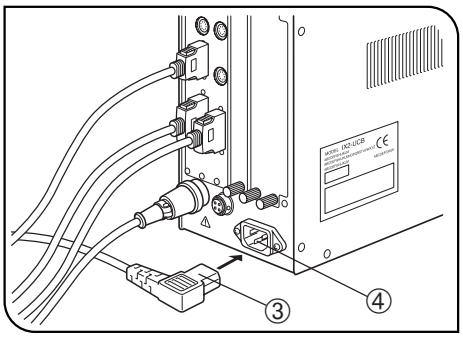



Fig. 5

### 2 Connecting the Power Cord (Figs. 5 & 6)

⚠ Always use the power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, product's safety performance cannot be guaranteed.

1. Insert the connector ④ of the power cord into the power cord connector ③.

⚠ Connect the other end of the power cord to a power outlet with 3 conductors including the grounding line. If the power outlet is not grounded properly, the electrical safety performance intended by Olympus cannot be guaranteed.

2. Insert the plug ⑤ on the other end of the power cord into the power outlet ⑥.

⚠ Distribute the power cord at a distance from the lamp housing. If the power cord comes in contact with a hot part around the lamp housing, the cord may be melted, causing an electric shock hazard.

3. Bundle the connection cables using the Velcro (5 pieces) provided with the microscope frame.

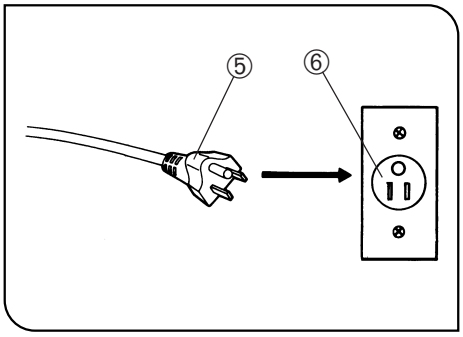



Fig. 6

# GX SERIES MOTORIZED SYSTEM

For the motorized modules that can be mounted on the system, see Chapter 1, "MOTORIZED SYSTEM DIAGRAM" on page 12 Using an unsuitable module hinders the system from manifesting its full performance.
Combination of the IX2-UCB-2 control box and U-HSTR2 hand switch are required to control the motorized modules.

**Configuration of Instruction Manuals**

The instruction manuals for the motorized modules are provided separately as shown in the following table. This instruction manual from this page on pertains to the instructions of the GX-RTUA motorized mirror unit turret and the features specific to the system using it.

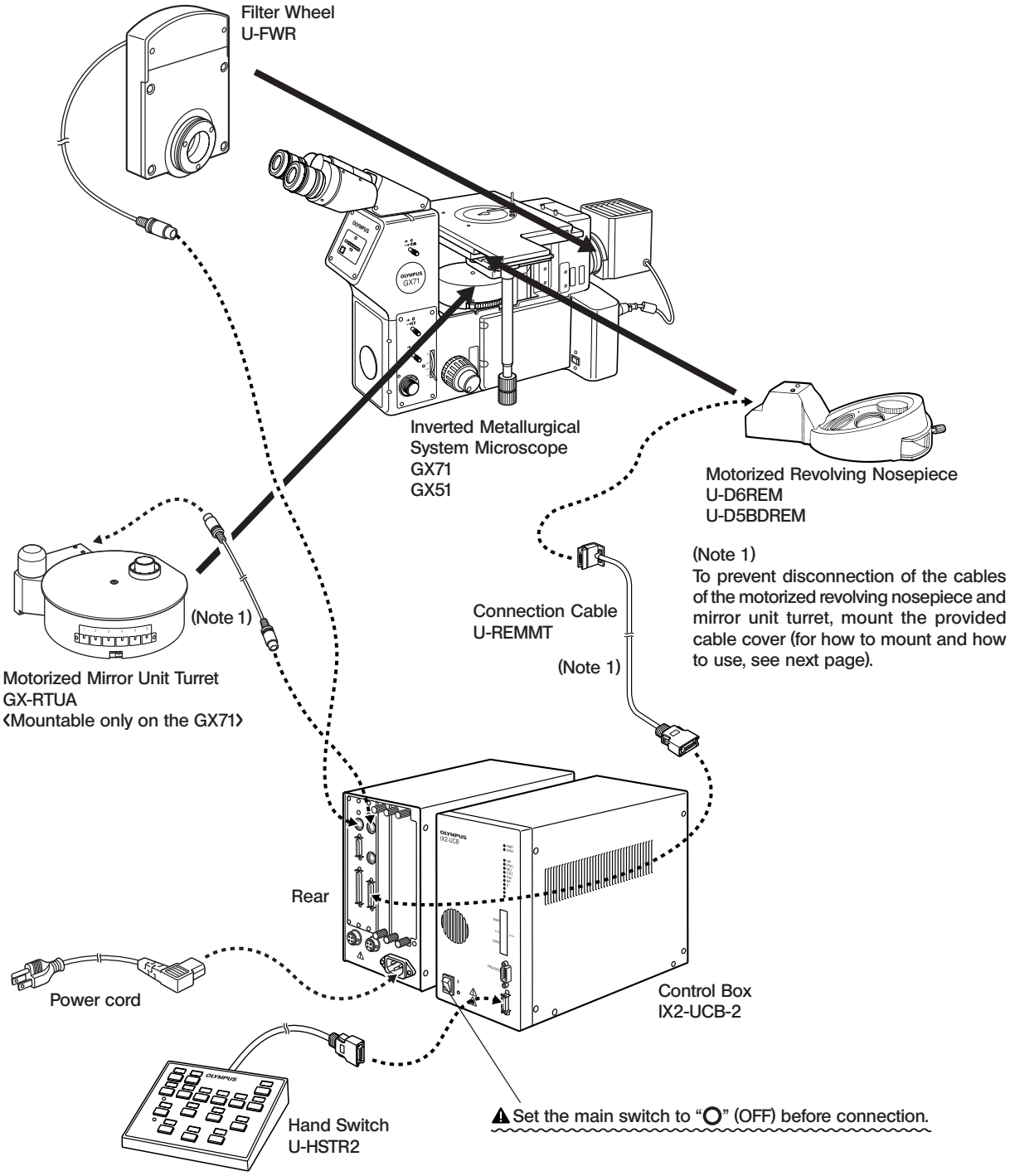
| Manual Name | Main Contents |
|---|---|
| IX2-UCB/U-HSTR2<br>Control Box/Hand Switch | Functions of the control box (including power supply) and hand switch in combination with the IX2 Series are described in the first half. Operations with the original assembly of the GX71/GX51 motorized system are described in the second half. |
| U-FWT/FWR/FWO<br>Motorized Filter Wheels | Functions of the motorized filter wheels (only the U-FWR is usable with this system) are described. |

**NOTE** **If your GX71 or GX51 is provided with the manual entitled "GX71/GX51 Motorized System", please discard it because it has errors.**

# 1 MOTORIZED SYSTEM DIAGRAM

⚠ Be sure to connect the Olympus-specified module to each connector. If other module than specified is connected, Olympus can no longer warrant the performance of the system.

⚠ Be sure to distribute the cables away from the lamp housing and the surroundings (particularly, take special care to the filter wheel). If a cable comes in contact with them, it may melt and electric shock may result.



## Attaching and Using the Cable Cover (Figs. 7 to 9)

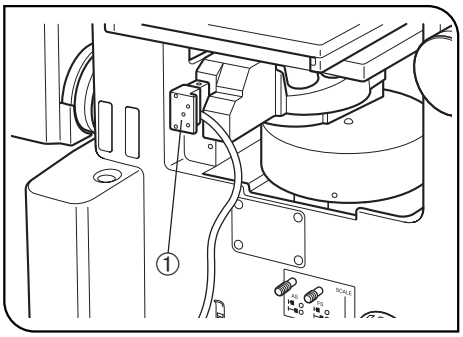



Fig. 7

1. Connect the connector ① of the motorized revolving nosepiece connection cable.

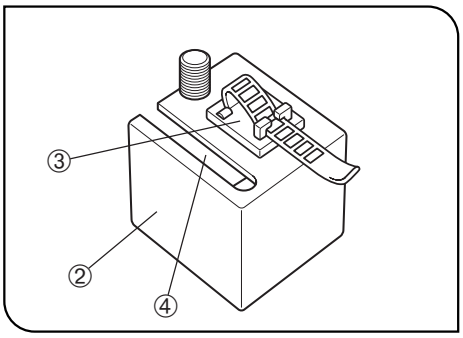



Fig. 8

2. Attach the cord clamp ③, provided with the GX71/GX51, to the bottom of the cable cover ② by adhesion.
3. Pass the motorized revolving nosepiece cable through the slot ④ on the cable cover and fit the cable cover around the revolving nosepiece connector.

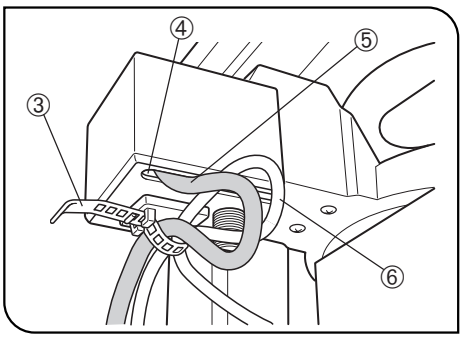



Fig. 9

4. Clamp the cable cover by lightly tightening the two clamping knobs on the bottom and left side panel.

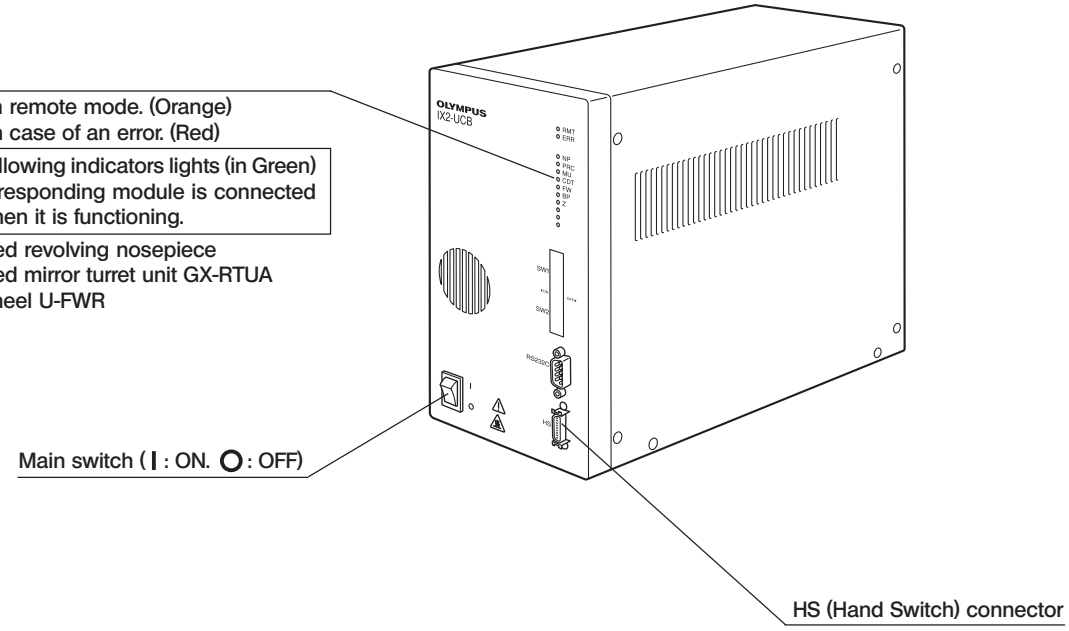
★ **Do not tighten the knobs too much, for this will damage the revolving nosepiece connector.**

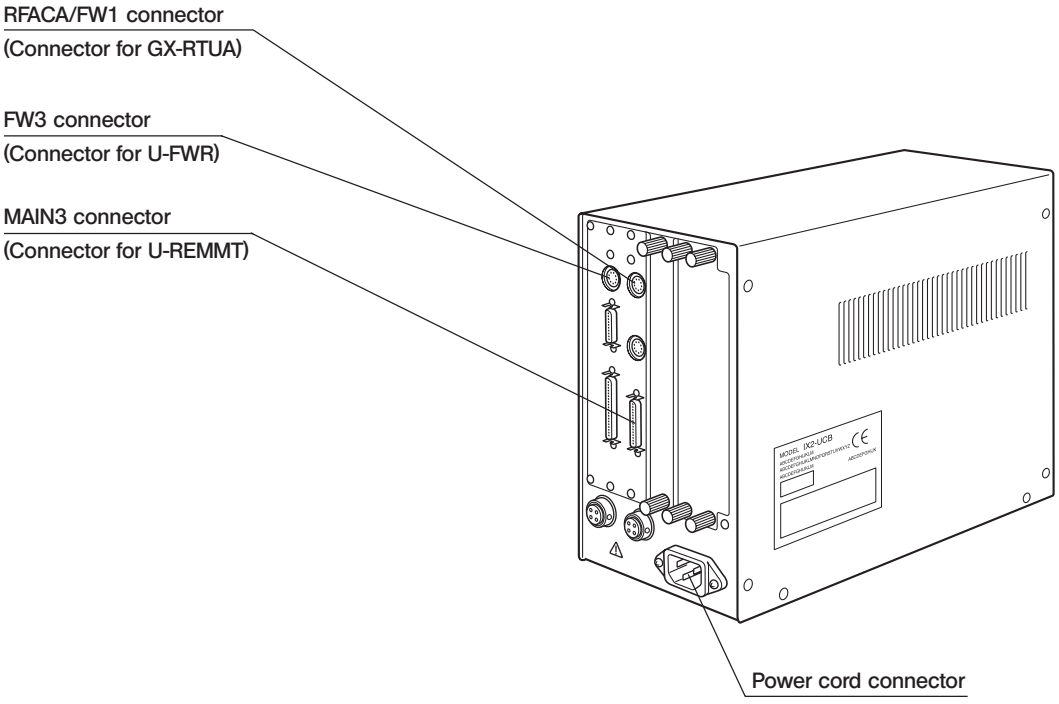
5. Pass the revolving nosepiece cable ⑤ and mirror unit turret cable ⑥ through the cord clamp ③ and clamp the cables by reserving certain slacks on them.

# 2 NOMENCLATURE

**CAUTION** ◎The functions of the IX2-UCB-2 control box and U-HSTR2 hand switch described in the following pertain only to those available when this system configuration is used. The GX71/GX51 motorized system does not use the controls that are not described below.

## Control Box IX2-UCB-2

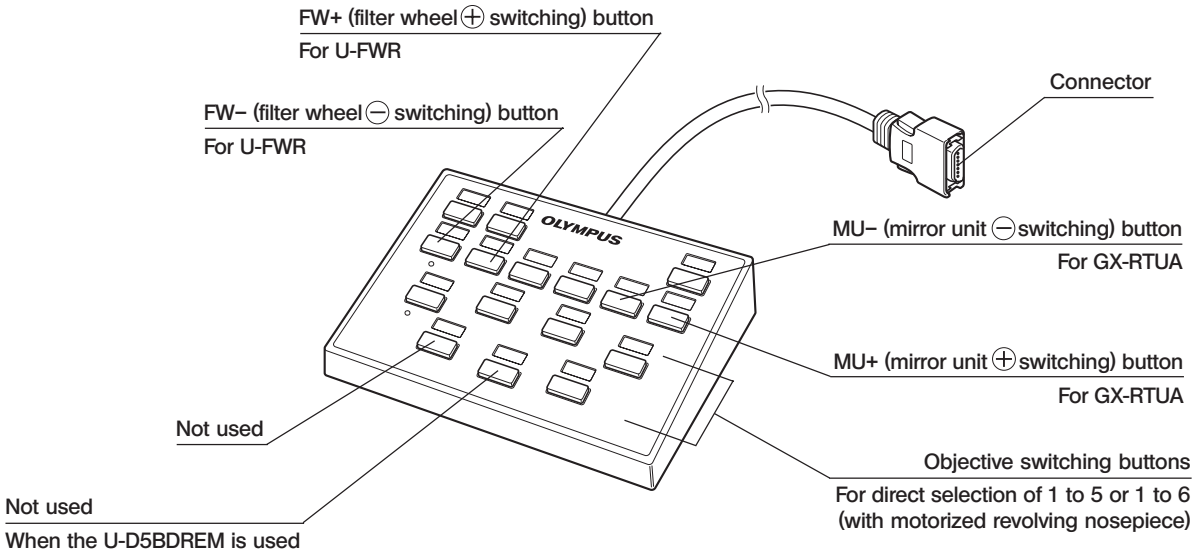


## Hand Switch U-HSTR2

◎As this system configuration does not use a PC, the functions of the hand switch buttons become as shown below when the cable is connected. (Stand-alone mode)

◎See page 5 for how to attach the indicator stickers and how to use the grouping panel sheets.

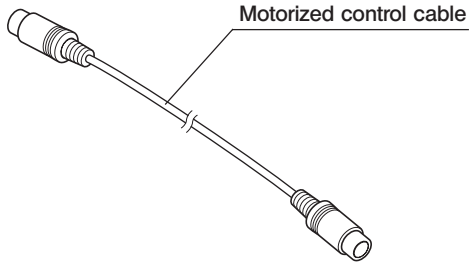


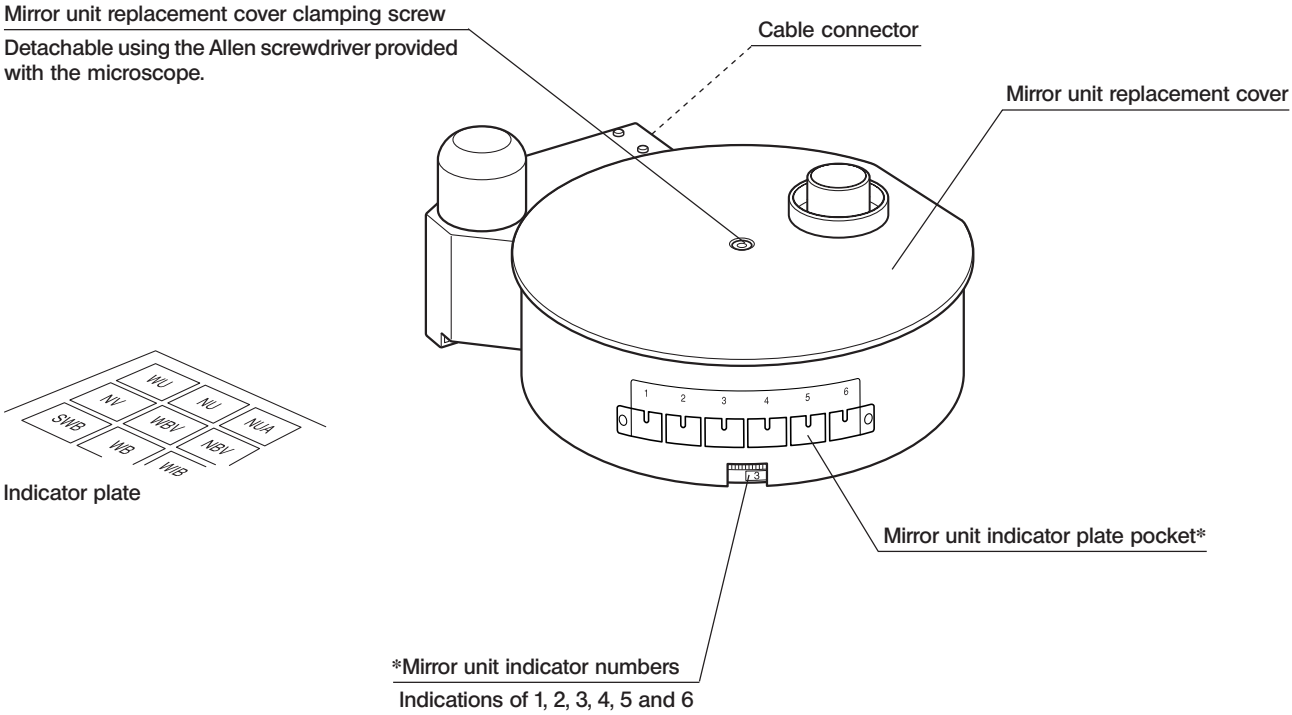

### Meanings of the ⊖ and ⊕ buttons

Each press of the ⊖ or ⊕ button changes the position number in the decremental direction (1 → 6 → 5 → 4 → 3 → 2 → 1) or in the incremental direction (1 → 2 → 3 → 4 → 5 → 6 → 1) respectively.

**Motorized Mirror Unit Turret GX-RTUA**

(Note 1) The applicable microscope is only the GX71.
(Note 2) Replace the manual mirror unit turret, provided as standard with the GX71, with the motorized mirror unit turret.
(Note 3) Remove the mirror units from the manual mirror unit turret and put them in the motorized mirror unit turret.




* Place the indicator plate of the mounted mirror unit's number in the indicator plate pocket with the corresponding number.

## PROPER SELECTION OF THE POWER SUPPLY CORD

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

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

### Specifications

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

### Table 1 Certified Cord

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

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

## Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

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

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

## *MEMO*

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