ACCU-SCOPE®

EXI-1000

Microscope Instructions

This instruction manual is intended for the EXI-1000 research inverted biological microscope. To ensure safe operation, obtain the best performance of the instrument and make you fully familiar with the use of this microscope, we suggest that you read this manual thoroughly and carefully before operating the microscope, and retain the manual for easy reference.

Contents

Notice

Safety Symbols

	Disregarding instructions marked with this symbol may lead to burn.
 **WARNING**	Disregarding instructions marked with this symbol may lead to serious injury or death.
 **CAUTION**	Disregarding instructions marked with this symbol may lead to injury or property damage.
—	The main power switch is on.
○	The main power switch is off.

Safety Precautions

1. Avoid placing the microscope in areas with direct sunlight, high temperature or humidity, dust, and strong vibrations. Ensure that the workbench is flat, level, and sturdy. Vibration dampening is recommended.
2. When moving the microscope, grip the transport handle tightly and maintain a gap between the microscope and the workbench before moving it.
3. If biological solution or water splashes onto the stage, objective lens, or observation tube, the power cord should be immediately unplugged and the solution or water wiped dry to ensure the microscope is dry. Otherwise, there is a possibility of damaging the instrument.
4. When working, the microscope may become very hot. It is necessary to ensure that there is sufficient heat dissipation space around the microscope, otherwise it will lead to heat accumulation and damage to the instrument.
5. Before turning on the power supply to the microscope, ensure that the correct power source is connected. When replacing the light bulb, the power should be cut off and wait for the lamp chamber to completely cool down before proceeding.
6. Connect the power cord and the connecting wires of each electronic control component correctly, ensure that the equipment is grounded to minimize damage in the event of a lightning strike.
7. Use the dedicated power cables provided by our company.
8. Do not disassemble any part of the microscope as this will affect its functionality or reduce its performance.
9. Stains on the lens, such as fingerprints and grease, can be wiped off with a small amount of ether

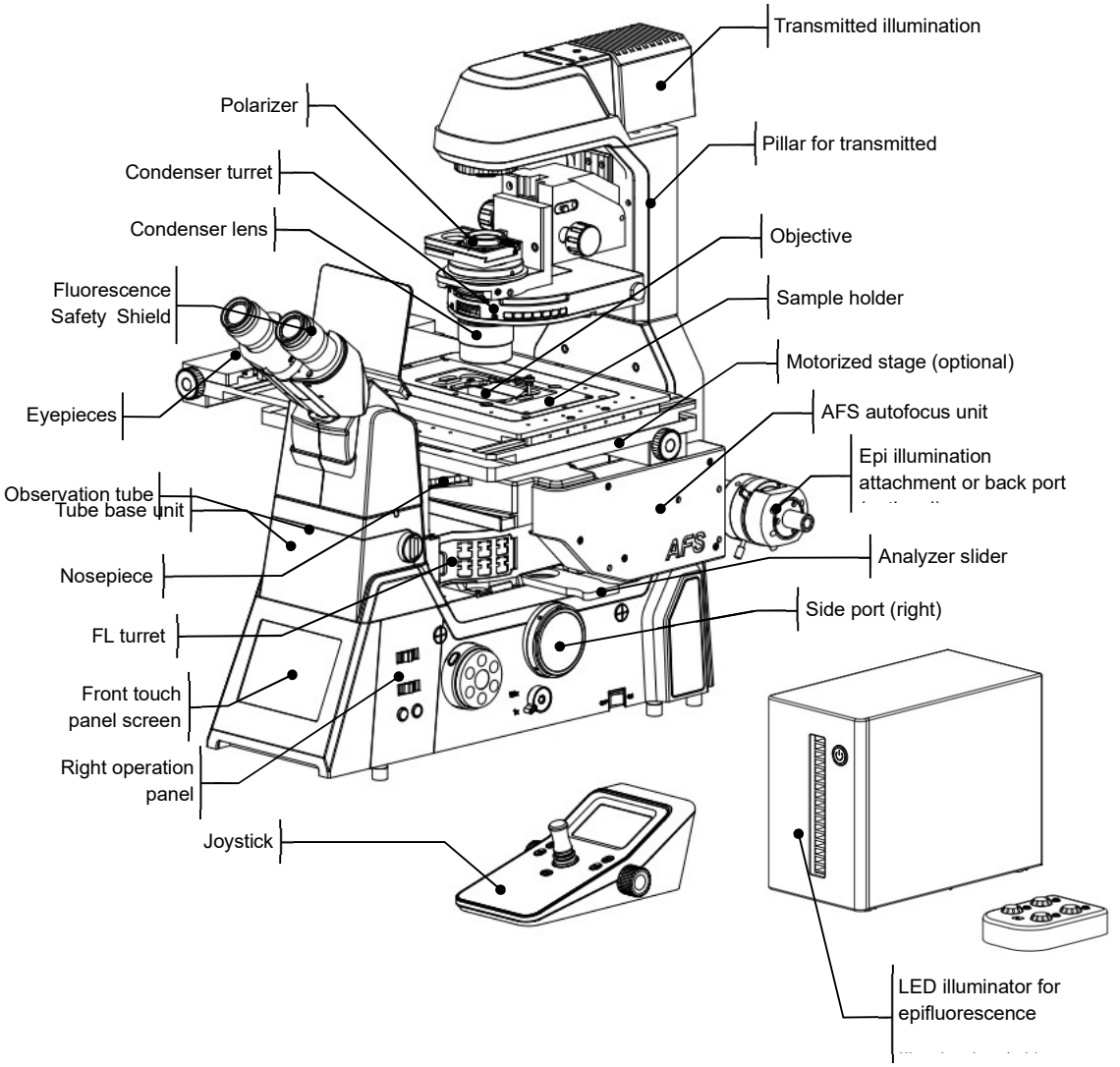
(70%) and alcohol (30%) mixed solution dipped in lens paper.

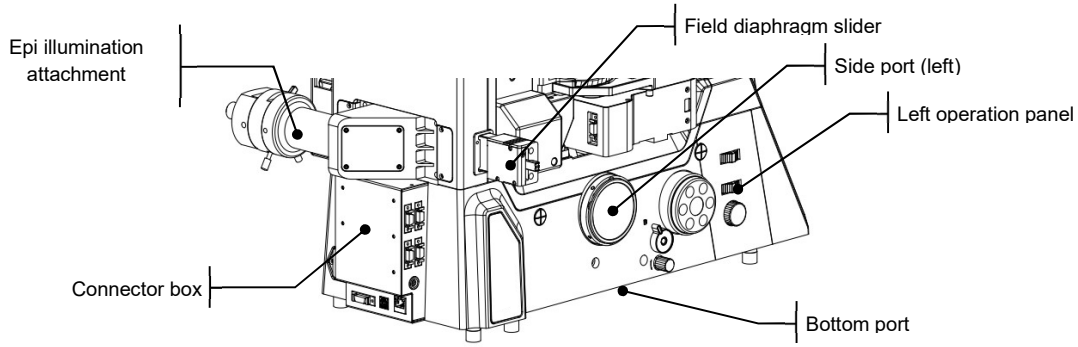
★ Because solvents such as ether and alcohol are highly flammable, please do not operate the power switch of various electrical equipment during use, and do not approach open flames. Please ensure indoor ventilation.

10. Do not use organic solvents to wipe non-optical parts of the microscope. To clean, use a lint free soft cloth dipped in a small amount of neutral detergent to wipe.
11. If the objective lens is not installed, be sure to cover the hole in the nosepiece with a dust plug to prevent dust and splashed liquid from entering the system.
12. When not using a microscope, it should be covered with a dust cover. Before putting on the dust cover, be sure to wait for the lamp chamber to cool down sufficiently.
13. The inspection and replacement of parts for this product must be carried out by our company and its designated agents, and accessories must be provided.

1. Names and Functions of Each Part

1.1. Basic Microscope Configuration





1.2. Terminology and Function

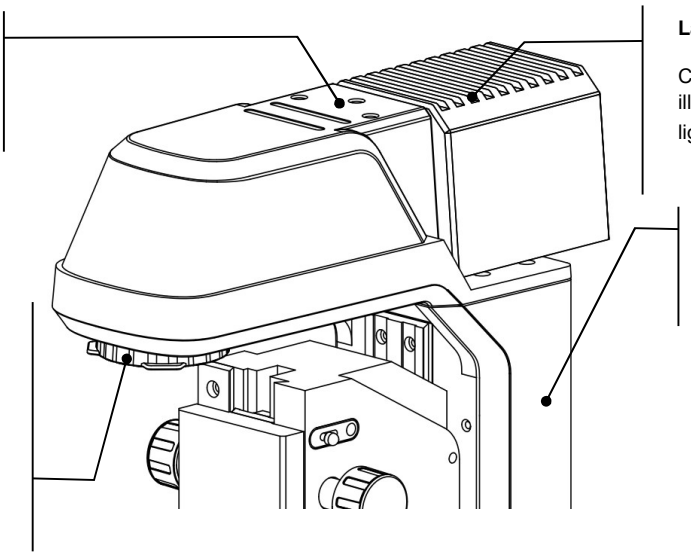
Fixed filter slot

Up to 2 filters can be inserted.

Diascopic/Transmitted Light Field diaphragm (F.S.) dial

● Turn right: Open the field diaphragm.

● Turn left: Close the field diaphragm.



Lamphouse

Control this lamphouse by the dia-illumination ON/OFF button and the light control volume. (☛3.3.1)

Tilting pillar

(☛3.3.3)

Transmitted illumination components

1.2.1. Condenser Unit and DIC Polarizer (optional)

Polarizer

- Change dia-illumination to polarized

Aperture diaphragm open/close lever

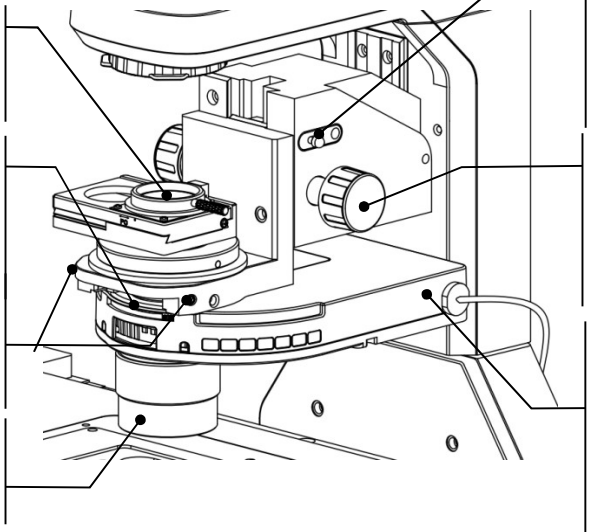
- Tum right (clockwise): Open the aperture.

Condenser centering screw

- Adjust the position of the condenser

Condenser lens

(☛3.4)



Condenser unit

Condenser limiting rod

- Set the lower limit for the condenser's vertical move.
- Tighten the clamp: Set the lower limit at the current position.

Condenser focus knob (both sides)

- Move the condenser vertically
- Tum backward: The condenser moves up.

Motorized condenser turret

- Change the condenser modules by the condenser changing switch.
- Turn the switch towards the rear: Clockwise changing modules.
- Turn the switch towards the front: Counterclockwise changing modules.

DIC Polarizer (optional)

The DIC polarizer is connected to the condenser unit when DIC observation is being used. (☛3.5.1)

Empty hole

Positioning part

Use this part to fix rotational part of zero position.

Polarizer slider

Use this slider to switch between the polarizing plate and the hollow hole.

Polarizing plate

Polarizer rotation lever

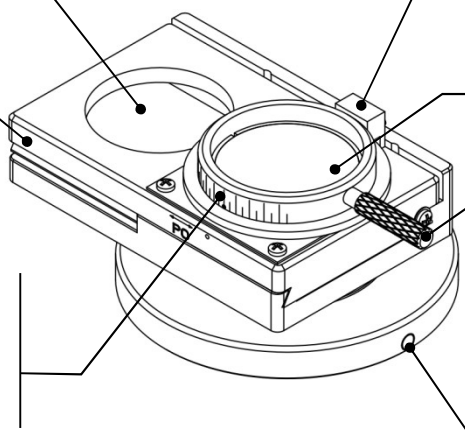
Use this lever to turn the polarizing plate. Azimuth of the polarizer can be checked by the scale and guide mark.

Angle mark

This mark indicates the angle of prism.

Clamp screw

Use this screw to clamp the polarizer to the mount.



DIC Polarizer

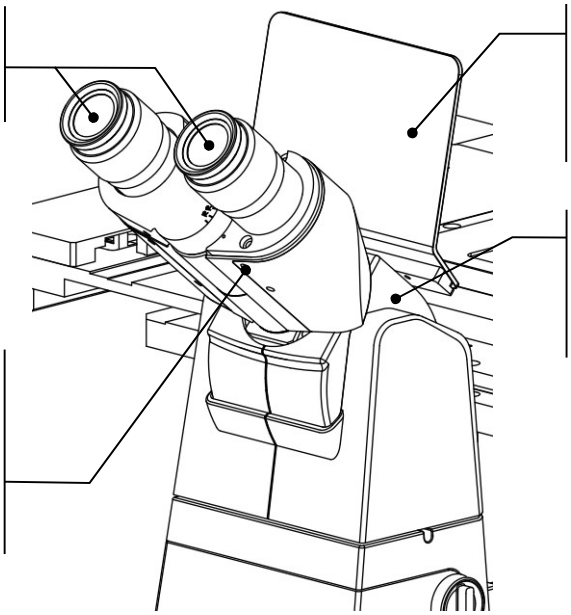
1.2.2. Observation Tube and Eyepiece

Eyepiece

Diopter can be adjusted according to the observer's eyesight.

Binocular part

The distance between the eyepieces can be adjusted according to the interpupillary distance of the user.(☛3.6.3)



UV light shielding plate

This plate prevents ultraviolet light or strong light emitted from the objective from entering your eyes.

Angle adjustment mechanism

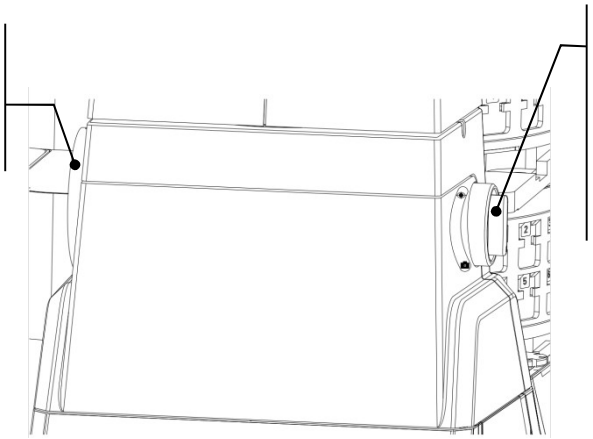
The angle of the binocular part can be adjusted in the range of 15 to 45 degrees.

Observation tube and eyepiece

1.2.3. Observation Tube Base Unit

Tube base unit side port

Camera accessories can be installed for camera to observe sample.



Tube base optical path changing knob

(Eye): Eyepiece observation

(Camera): Side port of observation tube

Observation tube base unit

Tube base unit side port

● When installing a camera to the side port of the observation head base, a C-mount camera adapter is required.

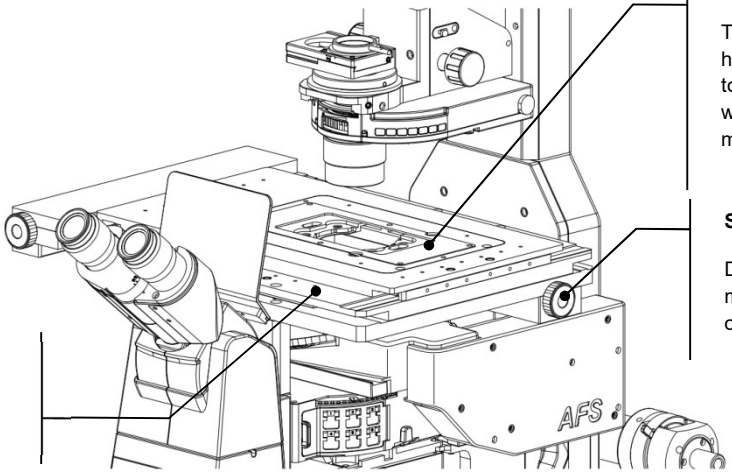
1.2.4. Motorized Stage (optional)

Sample holder

The user can mount a specimen holder suitable for the specimen to be used. This figure shows when a universal holder for the motorized stage is mounted.

Stage knob

Do not use it when the microscope is turned on. It is only used for debugging.



Motorized stage

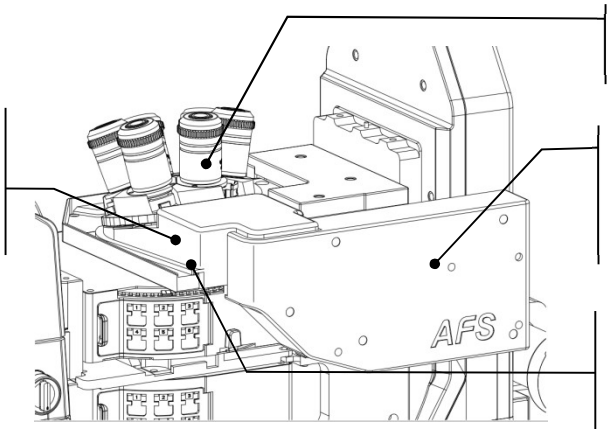
Use the joystick to move the motorized stage

Motorized stage

1.2.5. Nosepiece

Motorized nosepiece

Required objective can be changed by the objective changing switch on the front touch screen.



Objective

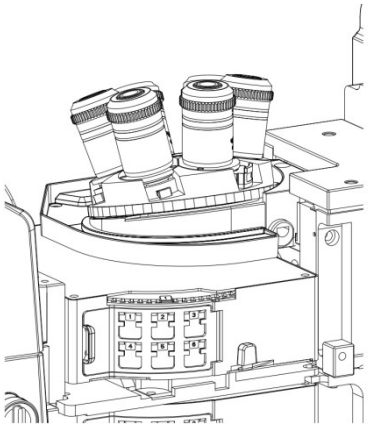
Autofocus unit (optional)

AFS on/off is switched by the AFS button.

Water tray

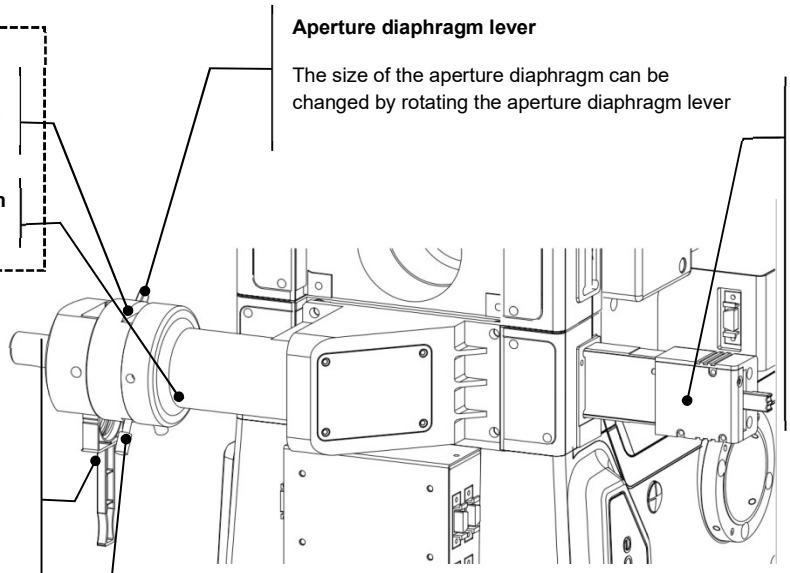
Prevents any liquid spilled from the specimen from penetrating into the system. A silicone liquid drainage tube is supplied.

Nosepiece (sextuple AFS nosepiece)



Motorized nosepiece

1.2.6. EPI Illumination Attachment

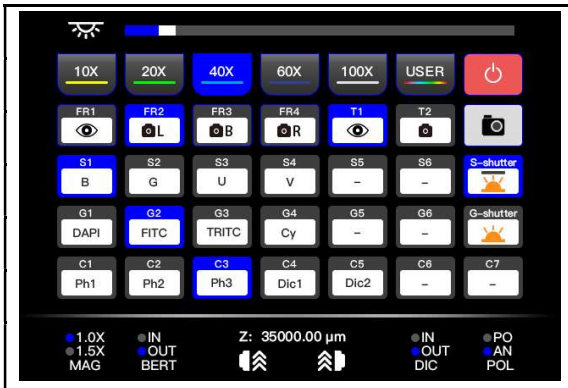


EPI illumination attachment

1.3. Microscope Control Unit

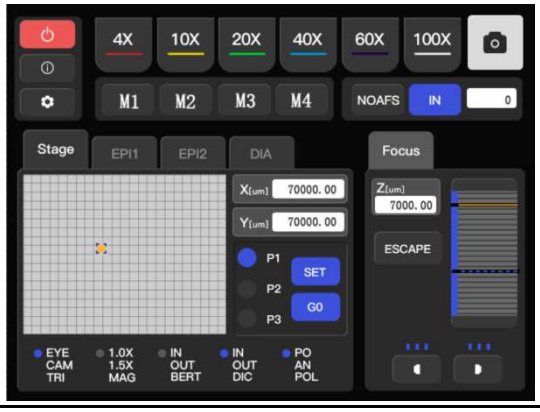
1.3.1. Front Touch Screen

Manual frame touch screen interface



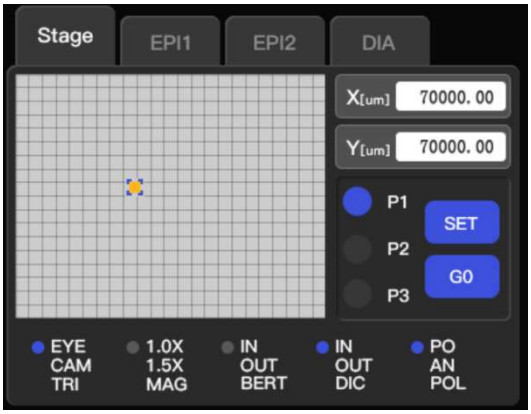
Display upper illumination brightness			Display lower illumination brightness	
Display the current objective state (sextuple)				User mode
Frame optical path status		Observation tube base optical path status		Camera button
The first layer fluorescence turret displays the current status of the fluorescence module				First layer shutter status
The second layer fluorescence turret displays the current status of the fluorescence module				Second layer shutter status
The condenser turret displays the current status of the condenser module				
Frame magnification	Bertrand lens	Z-axis position and Focusing knob gear	Analyzer slider	DIC polarizer

Motorized frame touch screen interface



Screen switch	Objective control		Camera button
About Settings	Customize		AFS function
Control interface includes control functions of modules such as motorized stage, FL turret, condenser turret and illumination lamphouse		Z-axis position control	

Motorized stage control module



Motorized stage	First layer fluorescence turret	Second layer fluorescence turret	Illumination lamphouse and condenser	
Simulation stage: the yellow dot indicates that the current coordinate is based on the relative position of the whole stroke, and blue circle indicates the selected point			Current coordinate of X axis	
			Current coordinate of Y axis	
			Select P1 point	Set point
			Unselected P2 point Unselected P3	Move to point
Observation tube base optical path	Frame magnification	Bertrand lens	Analyzer slider	DIC polarizer

Fluorescent turret control module

Motorized stage	**First layer fluorescence turret**	**Second layer fluorescence turret**	**Illumination lamphouse & condenser turret**	
Eyepiece port	**Reflected illumination brightness percentage**		**Fluorescent turret shutter switch**	
Left side port	**Brightness decreases by 10%**	**Brightness decreases by 1%**	**Brightness increased by 1%**	**Brightness increased by 10%**
Right side port + Eyepiece port	**The blue highlight indicates the fluorescence turret cube position**			
Right side port				

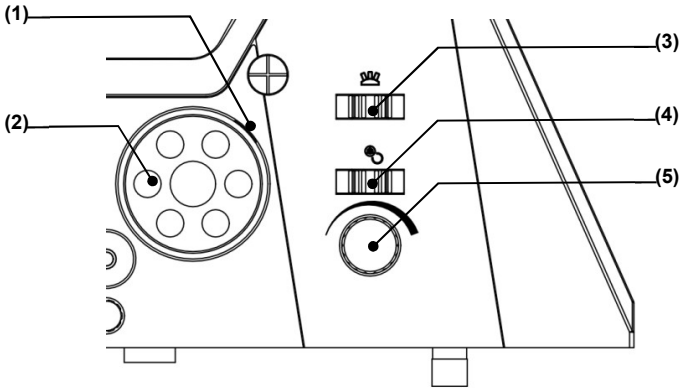
Condenser turret control module

Motorized stage	**First layer fluorescence turret**	**Second layer fluorescence turret**	**Illumination lamphouse & condenser turret**	
Eyepiece port	**Diascopic/Transmitted illumination brightness percentage**			
Left side port	**Brightness decreases by 10%**	**Brightness decreases by 1%**	**Brightness increased by 1%**	**Brightness increased by 10%**
Right side port + Eyepiece port	**The blue highlight indicates the fluorescence turret cube position**			
Right side port				

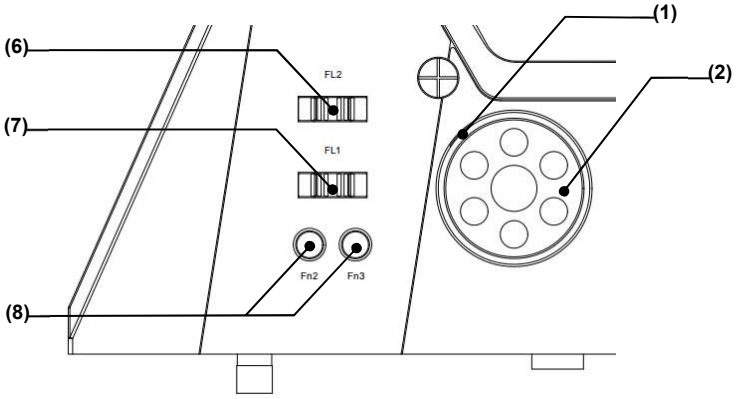
Focus control module

Focus				
Z-axis coordinate	**Solid yellow line represents current Z-axis coordinate; Blue dotted line indicates preset escape from Z-axis coordinate**			
Escape				
Left focusing knob gear	**Right focusing knob gear**			

1.3.2. Operation Controls



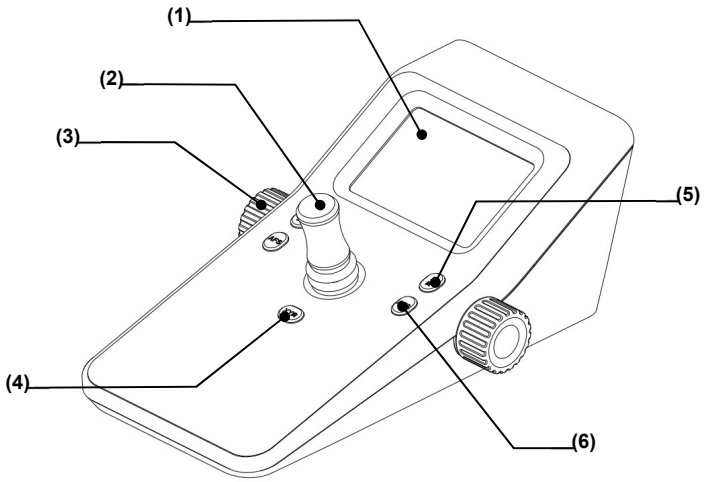
Left-side operation panel



Right-side operation panel

No.	Name	Function
(1)	Z-axis speed control button	Press this button to adjust the speed of Z-axis lifting, with three speeds available. (☛3.10.1)
(2)	Focusing knob	Rotate the knob to control the focusing mechanism and move objectives in the vertical direction (Turning the knob forward can move the objectives upwards, rotate backwards to move the objectives downwards). (☛3.10.1)
(3)	Objective changing switch	Objectives on nosepiece can be changed in sequence by moving this switch to both sides.
(4)	Condenser turret changing switch	Condenser turret can be changed in sequence by moving this switch to both sides. (☛3.4.4)
(5)	Illumination control knob	This knob can be used to turn on/off the Illumination lamphouse and adjust the brightness of the transmitted Illumination lamphouse. (☛3.3.1)
(6)	The first layer fluorescence turret changing switch	The fluorescence modules on fluorescence turret can be changed in sequence by moving this switch to both sides. Press the switch to turn on/off the shutter in the fluorescence turret. (☛3.11.1)
(7)	The second layer fluorescence turret changing switch	The fluorescence modules on fluorescence turret can be changed in sequence by moving this switch to both sides. Press the switch to turn on/off the shutter in the fluorescence turret. (☛3.11.1)
(8)	Function button	The function buttons can be assigned to the required functions and press each button to activate the assigned functions.

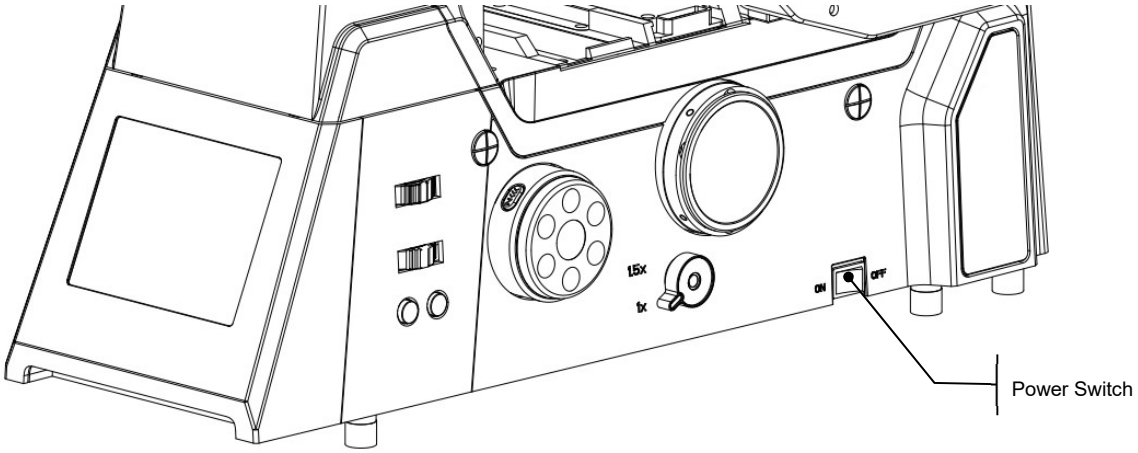
1.3.3. Joystick (optional)



Joystick

No.	Name	Function
(1)	LCD Touch Screen	Display the current status of the frame and perform control operations.
(2)	Joystick	Using a joystick to move an electric loading platform. (☛3.8.2)
(3)	Focusing knob (both sides)	Rotate focusing knob to control focusing mechanism and move objectives in the vertical direction (Turning the focusing knob forward can move the objectives upwards, rotate backwards to move the objectives downwards). (☛3.10.1)
(4)	XY axis speed control button	Pressing this button can adjust the speed of the motorized stage's translation in the XY direction, with three speeds available (☛3.8.2)
(5)	Z-axis speed control button	Press this button to adjust the speed of Z-axis lifting, with three speeds available。(☛3.10.1)
(6)	AFS switch	This switch can be used to turn on/off the AFS function.

1.3.4. Power Switch



2. Operating the Microscope

2.1. Diascopic/Transmitted Brightfield (BF) Microscopy

1 Configure the basic state.

1-1: Turn on the power to the system.
- Power switch (☛3.1)

1-2: Place the 10x objective into the optical path
- Objective changing switch (☛3.9.1)

1-3: Switch the optical path to the required observation port.
- Optical path changing button (☛3.2.1)
- Tube base optical path changing knob (☛3.7.1)

1-4: Configure the following optical elements to the basic state.
- Turn the magnification switch knob to 1x (☛3.2.2)
- The condenser turret changing switch (Set empty position) (☛3.4.4)

1-5: Remove unnecessary optical elements from the optical path.
- Bertrand lens (☛3.2.3)
- Polarizer (☛3.5.1)
- Analyzer (☛3.5.2)
- DIC prism (☛3.9.2)
- Fluorescence modules (☛3.11.1)

2 Place a sample and focus on it.

2-1: Close the shutter of the FL turret.
- The FL turret shutter (☛3.11.2)

2-2: Switch the optical path to the required observation port.
- Dia-illumination ON/OFF button (☛3.3.1)
- Dia-illumination control knob (☛3.3.1)

2-3: Open the dia field diaphragm completely.

- Field diaphragm wheel (☛3.3.2)

2-4: Open the dia aperture diaphragm completely.

- Aperture diaphragm open/close lever (☛3.4.3)

2-5: Place the sample on the stage.

- Motorized stage (☛3.8.1)

2-6: Move the required part of the sample into the center of the field of view.

- Joystick (☛3.8.2)

2-7: Move the condenser to the lower limit.

- Condenser focus knob (☛3.4.1)

2-8: Focus on the sample.

- Focus knob (☛3.10.1)

2-9: Adjust the diopters and the interpupillary distance.

- Eyepiece and Binocular part (☛3.6)

3 Center the condenser.

3-1: Turn the field diaphragm knob until the diascopic field diaphragm image becomes visible in the field of view

- Field diaphragm dial (☛3.3.2)

3-2: Focus on the diascopic field diaphragm image.

- Condenser focus knob (☛3.4.1)

3-3: Change the condenser lower limit position.

- Condenser limit lever (☛3.4.1)

3-4: Move the dia field diaphragm image to the center of the field of view; Adjust the size of the field diaphragm image to align the image with the circumference of the field of view.

- Field of view (☛3.4.2)
- Field diaphragm dial (☛3.3.2)

3-5: For a precise adjustment, change the objective to a higher magnification objective and repeat the procedure from Step 3-1 to Step 3-4.

- Motorized stage (☛3.8.1)

4 Change the objective and observe the sample.

4-1: Change the objective to the objective with the desired magnification.

- Objective changing switch (☛3.9.1)

4-2: Place the Bertrand lens into the optical path and focus on the back focal plane of the objective.

- Bertrand lens changing switch (☛3.2.3)
- Bertrand lens focus knob (☛3.2.3)

4-3: Adjust the size of the dia aperture diaphragm to 70-80% of the size of the numerical aperture of the objective.

- Aperture diaphragm open/close lever (☛3.4.3)

4-4: Remove the Bertrand lens from the optical path.

- Bertrand lens changing switch (☛3.2.3)

4-5: Adjust the size of the dia field diaphragm image and move it to the center of the field of view.

- Condenser centering screw (☛3.4.2)
- Field diaphragm wheel (☛3.3.2)

4-6: Move the stage and turn the focus knobs to observe the sample.

- Joystick (☛3.8.2)
- Focus knob (☛3.10.1)

4-7: To maintain the focus, press the AFS button.

- AFS button

2.2. Diascopic Phase Contrast (PH) Microscopy

1 Change the objective and observe the sample.

1-1: Perform Steps 1-3 in chapter 2.1 Diascopic Brightfield (BF) Microscopy

Microscope configuration

In addition to the configuration required for diascopic/transmitted BF Microscopy, phase contrast objectives are matched to phase contrast annuli in the condenser.

Place the phase contrast objective (with phase contrast ring) and condenser phase contrast annulus into the light path. Constructive and destructive interference is creating, generating contrast in otherwise colorless (unstained) samples and useful for microscopic observation.

2 Set up for PH microscopy and adjust the PH diaphragm.

2-1: Change to a PH contrast objective. The required phase ring enters the light path.
- Objective changing switch (☛3.9.1)

2-2: Focus on the sample.
- Focus knob (☛3.10.1)

2-3: Place the condenser PH annulus into the optical path. Select the condenser PH annulus having the same PH code (matches) the objective.
- Condenser changing switch (☛3.4.4)

2-4: Place the Bertrand lens into the optical path.
- Bertrand lens in/out dial (☛3.2.3)

2-5: Focus on the PH annulus image.
- Bertrand lens focus knob (☛3.2.3)

2-6: Overlay the PH annulus image onto the image of the objective phase ring.
- Condenser centering screw (☛3.4.2)

2-7: Remove the Bertrand lens from the optical path.

● Bertrand lens in/out dial (☛3.2.3)

2-8: Focus on the sample.

● Focus knob (☛3.10.1)

2-9: Adjust the diopters and the interpupillary distance.

● Eyepiece and Binocular part (☛3.6)

3 Perform PH microscopy.

3-1: Open the dia aperture diaphragm completely.

● Aperture diaphragm open/close lever (☛3.4.3)

3-2: Adjust the size of the dia field diaphragm image.

● Field diaphragm dial (☛3.3.2)

3-3: Move the stage and focus to observe the sample.

● Joystick (☛3.8.2)

● Focus knob (☛3.10.1)

3-4: To maintain the focus, press the AFS button.

● AFS button

3-5: When using another objective, repeat the procedure from step 2.

2.3. DIC Microscopy (optional)

1 Focus on the sample with BF microscopy.

1-1: Confirm that the sample vessel is available for observation with DIC microscopy.

● **P**lastic vessels ARE NOT SUITABLE for DIC microscopy.

1-2: Perform Steps 1-3 in chapter 2.1 Diascopic Bright-Field (BF) Microscopy.

Microscope configuration

The combination of polarizer and DIC prism can impart light and dark highlights to colorless transparent samples, creating a three-dimensional impression, and used for microscope observation.

In addition to the configuration required for diascopic BF microscopy, polarizer, analyzer, condenser DIC prism, DIC-ready objective and objective DIC prism are also used.

2 Set up for DIC microscopy and adjust the orientation of the polarizer.

2-1: Change the objective to the objective for DIC microscopy.
- Objective changing switch (☛3.9.1)

2-2: Focus on the sample.
- Focus knob (☛3.10.1)

2-3: Move the field of view to the portion of the specimen where no object is visible.
- Joystick (☛3.8.2)

2-4: Place the Bertrand lens into the optical path.
- Bertrand lens in/out dial (☛3.2.3)

2-5: Place the analyzer into the optical path.
- Analyzer slider (☛3.5.1)

2-6: Place the polarizer into the optical path. Turn the lever to turn the polarizer to zero.
- Polarizer (☛3.5.2)

2-7: Focus on the back focal plane of the objective.
- Bertrand lens focus knob (☛3.2.3)

2-8: Adjust the polarizer position. Loosen the clamp screw of the polarizer, turn the entire polarizer until a dark cross appears. Tighten the clamp screw.
- Polarizer (☛3.5.2)

2-9: Remove the Bertrand lens from the optical path.
- Bertrand lens in/out dial (☛3.2.3)

3 Perform DIC microscopy.

3-1: Place the condenser DIC prism and the objective DIC prism in the optical path. Use the condenser DIC prism that matches the objective DIC prism.

- Condenser changing switch (☛3.4.4)
- DIC prism in/out slot (☛3.9.2)

3-2: Focus on the sample.

- Focus knob (☛3.10.1)

3-3: Place the Bertrand lens into the optical path.

- Bertrand lens in/out dial (☛3.2.3)
- Bertrand lens focus knob (☛3.2.3)

3-4: Adjust the size of the dia aperture diaphragm to 70-80% of the size of the numerical aperture of the objective.

- Aperture diaphragm open/close lever (☛3.4.3)

3-5: Remove the Bertrand lens from the optical path.

- Bertrand lens in/out dial (☛3.2.3)

3-6: Adjust the size of the dia field diaphragm image.

- Field diaphragm wheel (☛3.3.2)

3-7: Move the stage and turn the focus knobs to focus on and observe the sample.

- Joystick (☛3.8.2)
- Focus knob (☛3.10.1)

3-8: To maintain the focus, press the AFS button.

- AFS button

2.4. Epi-Fluorescence Microscopy

1 Configure the basic state.

1-1: Confirm that the sample vessel is available for observation with DIC microscopy.
- Power switch (☛3.1)

1-2: Place the 10x objective into the optical path.
- Objective changing switch (☛3.9.1)

1-3: Switch the optical path to the required observation port.
- Optical path changing button (☛3.2.1)
- Tube base optical path changing knob (☛3.7.1)

1-4: Configure the following optical elements to the basic state.
- Turn the magnification switch knob to 1 × (☛3.2.2)

1-3: Remove unnecessary optical elements from the optical path.
- Bertrand lens (☛3.2.3)
- Polarizer (☛3.5.1)
- Analyzer (☛3.5.2)
- DIC prism (☛3.9.2)

Microscope configuration

In epi-fluorescence microscopy, the light source is changed to a reflected light illuminator, and a fluorescence module (filter cube with filters) is selected by the operator and moved into the light path.

2 Change to epi-illumination, place and focus on a sample.

2-1: To prevent the transmitted illumination LED from emitting auto-fluorescence during epi-illumination, close the dia-illumination shutter.
- Condenser changing switch (☛3.4.4)

2-2: Move the desired filter cube for the sample into the optical path.
- Filter cube changing switch (☛3.11.1)

2-3: Open the epi aperture diaphragm completely.

● Aperture diaphragm open/close lever (☛3.12.1)

2-4: Insert the field diaphragm slider into the optical path and open the epi field diaphragm completely.

● Field diaphragm slider (☛3.12.3)

2-5: Place the sample onto the stage.

● Motorized stage (☛3.8.1)

2-6: Open the shutter of the FL turret.

● The FL turret shutter (☛3.11.2)

2-7: Turn on the epi illumination and adjust the brightness.

● Illuminator for epi-illumination (☛3.13)

2-8: Move the required part of the sample into the center of the field of view.

● Joystick (☛3.8.2)

2-9: Focus on the sample.

● Focus knob (☛3.10.1)

2-10: Adjust the diopters and the interpupillary distance.

● Eyepiece and Binocular part (☛3.6)

3 Adjust the epi-fluorescence field diaphragm.

3-1: Move the epi-fluorescence field diaphragm image to the center of the field of view.

● Field diaphragm centering screw (☛3.12.3)

3-2: Adjust the size of the epi-fluorescence field diaphragm image to closely match the size of the field of view. The field diaphragm should be opened until it is just outside the field of view. When imaging, the field diaphragm can be closed until it is just outside the area being imaged.

● Field diaphragm open/close lever (☛3.12.3)

3-3: For a precise adjustment, change the objective to a higher magnification objective and repeat the procedure from Step 3-1 to Step 3-2.

4 Perform epi-fluorescence microscopy.

4-1: Change the objective to the objective with the desired magnification.

- Objective changing switch (☛3.9.1)

4-2: Adjust the size of the epi field diaphragm image and move it to the center of the field of view.

- Field diaphragm open/close lever (☛3.12.3)
- Field diaphragm centering screw (☛3.12.3)

4-3: Move the stage and turn the focus knobs to focus on and observe the sample.

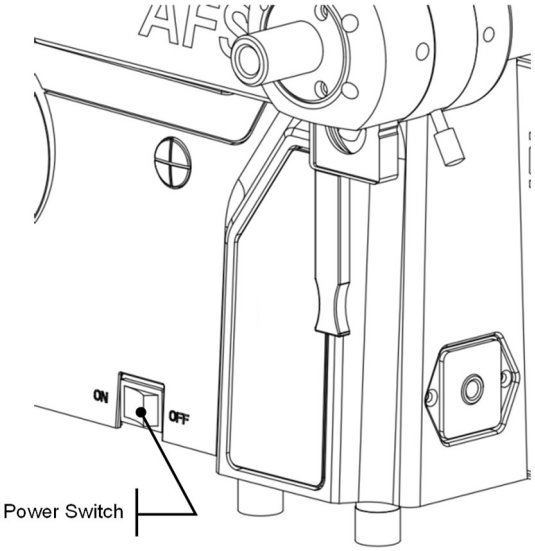
- Joystick (☛3.8.2)
- Focus knob (☛3.10.1)

4-4: To maintain the focus, press the AFS button.

- AFS button

3. Using and Adjusting the Microscope

3.1. Turn on the Power



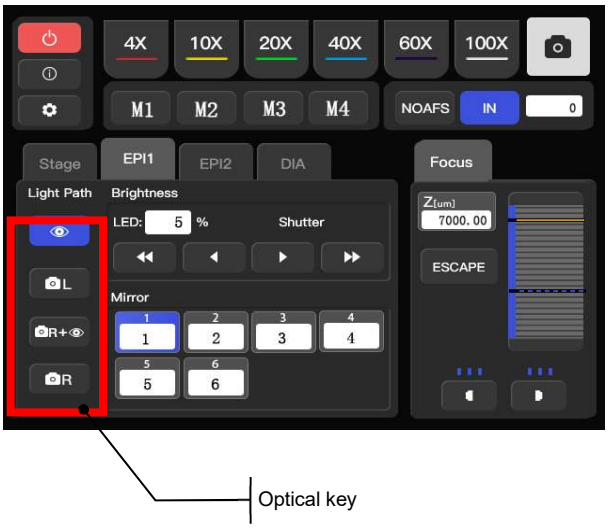
1. After connecting the power adapter, flip the main switch on the side of the frame to the "ON" position. The LCD screen on the front of the frame will light up.
2. The frame enters the initialization state:
   a. The nosepiece moves down to the lower limit
   b. Motorized stage moved to initial position, then move to the starting position
   c. The nosepiece is moved from the lower limit position to the initial position
   d. The status of each component is indicated by the indicator status of the frame or the LCD。
3. Turn on the computer and launch the corresponding control software.

★ The next step must be performed after the initialization is complete; otherwise, an error will occur.

3.2. Optical Path Switching

3.2.1. Changing the Output Port

The optical image output port can be switched by clicking the optical path button on the front touch screen of the frame.



- **Operation**

Optical Key	Light Path & Quantity
	100% observation tube
L	100% left side port
R +	80% right port, 20% observation tube
R	100% right side port

- **Display**

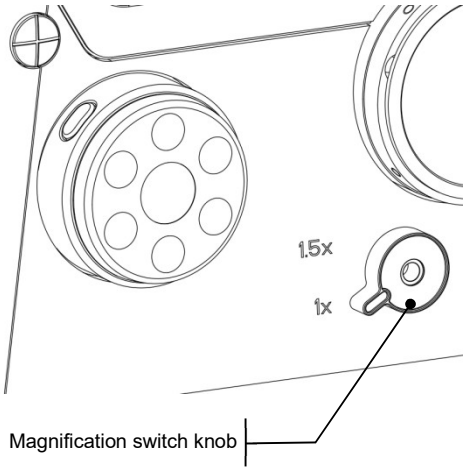
The current optical path is highlighted in blue by the optical path button on the front touch screen. Text messages can also be displayed on the joystick touch screen interface.

- **Output port description**

Output port	Description
Observation tube viewing port	An optical output port for viewing microscopic images through the binocular tube
Side port (Left/Right)	Optical output ports on both sides of the microscope frame. Port can connect camera, confocal head, photometer sensor, and select the corresponding connector when connecting.
Rear port (Select)	When the microscope is equipped with a fluorescence turret, the connected port can output optical images. The double layer fluorescence turret configuration utilizes a riser adapter, and multi-band observation can be performed simultaneously with two cameras.

3.2.2. Changing the Frame Magnification

By turning the magnification switching knob on the frame right side, the frame magnification can be switched between 1x and 1.5x. This is added magnification to the objective and eyepiece magnification. 1x is no added magnification.



- **Operation**

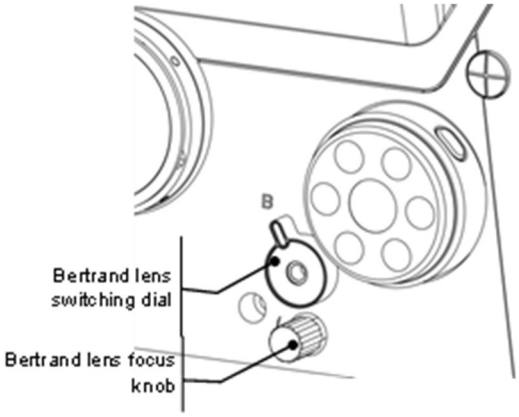
Switch Knob Indicates Scale	Frame Magnification
Knob lever points to 1x	1x
Knob lever points to 1.5x	1.5x

- **Display**

The frame magnification status is displayed on the front touch screen, or can be confirmed by switching the knob to point to 1x.

3.2.3. Bertrand lens switching and focus

A Bertrand lens is installed inside the microscope frame, and its movement and focusing can be controlled by the knob on the left side of the frame.



- **Operation**

Bertrand Lens Switching Dial Position	Bertrand Lens
Turn the knob to point to B	Bertrand lens is moved into the optical path
Turn the knob to point to the empty position	Bertrand lens is removed from the optical path

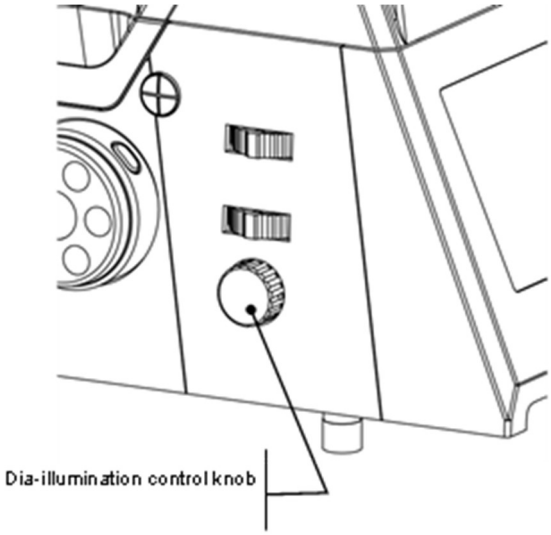
- **Display**

The position of the Bertrand lens (in/out) is displayed on the front LCD touch screen, and confirmed by position of the Bertrand switching knob, and also can be displayed on the touch screen of the joystick.

3.3. Adjusting the Diascopic (Transmitted) Field Diaphragm

3.3.1. Using Diascopic Illumination

Diascopic illumination intensity can be controlled using the dia-illumination control knob on the left side of the frame.



- **Operation**

Turn On/Off Dia-Illumination

Dia-illumination Control Knob	Dia-Illumination
Depress knob	Toggles dia-illumination on or off

Adjust Brightness of Dia-Illumination

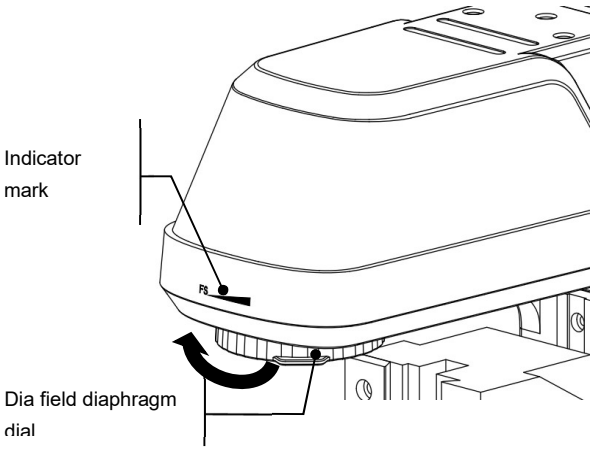
Dia-illumination Control Knob	Dia-Illumination
Rotate clockwise	Brightness increases
Rotate counterclockwise	Brightness decreases

- **Display**

The switching status and brightness percentage of the dia-illumination are displayed on the front LCD touch screen and on the touch screen of the joystick.

3.3.2. Adjusting the Diascopic Field Diaphragm

The field diaphragm (sometimes called “field stop” or “FS”) limits the field of view by changing the diameter of the lighting through its aperture. The diameter of the aperture is adjusted by rotating the field diaphragm dial.



- **Operation**

Turn On/Off Dia-Illumination

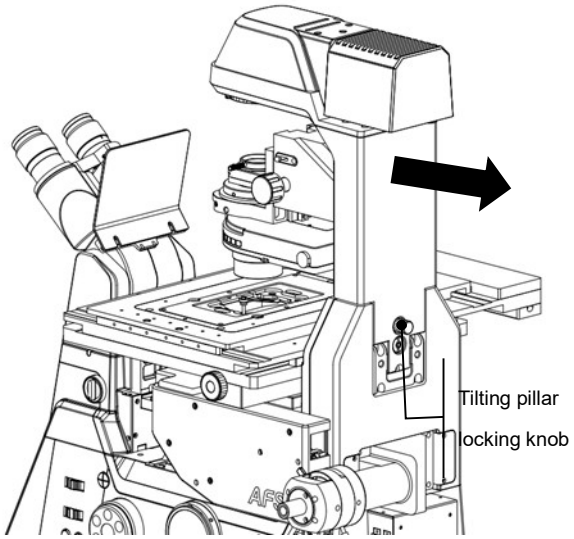
Field Diaphragm Dial	Field Diaphragm
Rotate left	Closes the aperture
Rotate right	Opens the aperture

- **Display**

An indicator mark above the field diaphragm dial shows the direction to rotate the diaphragm dial to open or close the aperture.

3.3.3. Using the tilting illumination pillar

When using a larger sample, the illumination pillar can be tilted back to increase space to access the stage and the sample. The tilting of the pillar can be adjusted by turning the locking knob on the back.



- **Operation**

Pillar Locking Screw	Pillar
Loosen the screw	The pillar can be tilted back at an angle
Tighten the screw when pillar is in upright position	Locks the pillar in the upright position

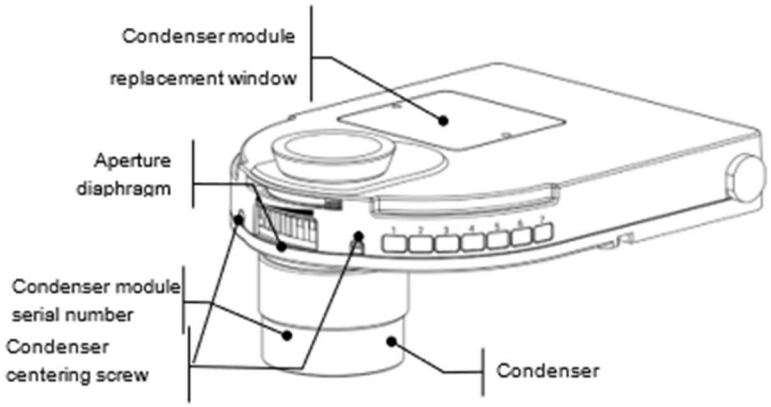
Warning

- When tilting or returning the pillar back to vertical, avoid pinching your hands or fingers. Keep hands and fingers away from the hinge area.
- Loose screws may cause the pillar to fall off during tilting. Ensure the four mounting screws that hold the pillar to the frame are secure. Also ensure the LED lamphouse is secure.
- Do not touch the illumination lamphouse while it is powered on. It may be hot.

3.4. Using the condenser

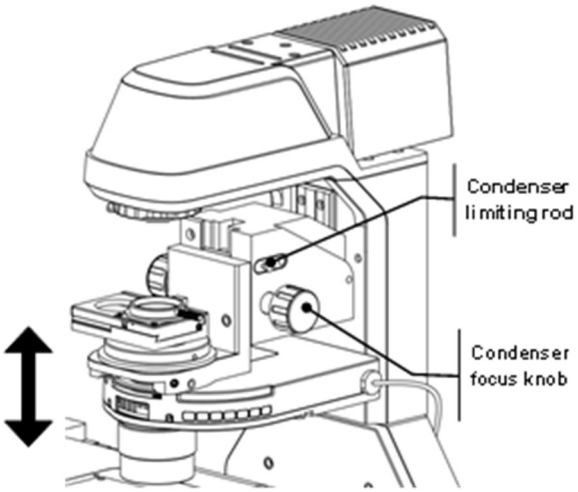
This microscope features a 7-position motorized condenser.

- Up to 7 condenser modules can be installed in the condenser, and different viewing modes can be selected by rotating the condenser turret.
- The condenser is replaceable should the operator's application require a different NA or contrast method not supported by the standard condenser.



3.4.1. Focusing the condenser

For proper diascopic illumination adjustment, the condenser can be moved up or down using the condenser focus knob. The ideal condenser focus position is when the field diaphragm (field stop or FS) is in focus in the field of view with a sample. The condenser lower limit can also be adjusted to adapt to different working distances of the condenser.



- **Operation**

Focus the condenser

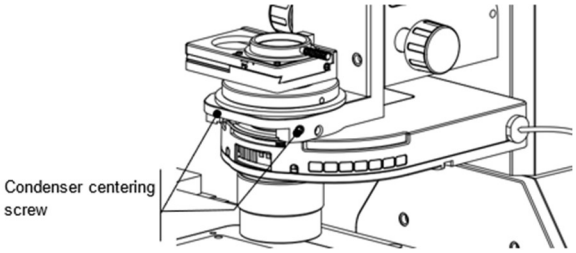
Condenser Focus Knob	Condenser
Rotate clockwise	The condenser rises
Rotate counterclockwise	The condenser lowers

Condenser lower limit adjustment

Condenser Limiting Rod	Condenser
Push the rod towards back of microscope	Higher lower limit
Pull the rod towards front of microscope	Normal lower limit

3.4.2. Centering the condenser

For even illumination and optimal contrast, it is important that the condenser be centered in the optical path between the transmitted LED light source, the sample and the objectives. Use a 3mm hex wrench to turn the two condenser adjusting screws to adjust the condenser position so that the field diaphragm image is in the center of the field of view. The field diaphragm will need to be closed slightly so that it is visible in the field of view. Taking turns, turn the centering screws until the field diaphragm is centered in the field of view, then open the field diaphragm until it is just outside of the field of view.

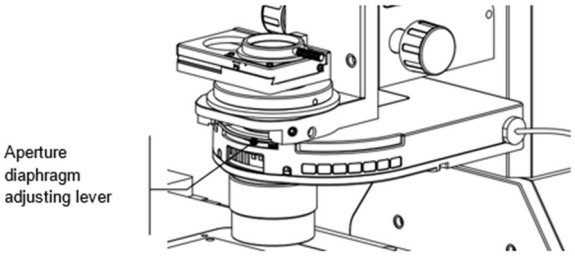


- **Operation**

Condenser Centering Screw	Condenser Position
Rotate clockwise	The condenser moves backwards
Rotate counterclockwise	The condenser moves forwards

3.4.3. Adjusting the aperture

The condenser aperture status provides a balance of contrast and resolution. The diaphragm diameter can be adjusted by the aperture diaphragm adjusting lever located on the front of the condenser. Using the Bertrand lens in the light path, adjust the size of the condenser aperture to 70%-80% open. This approximates the NA of the objective that is currently in the light path



- **Operation**

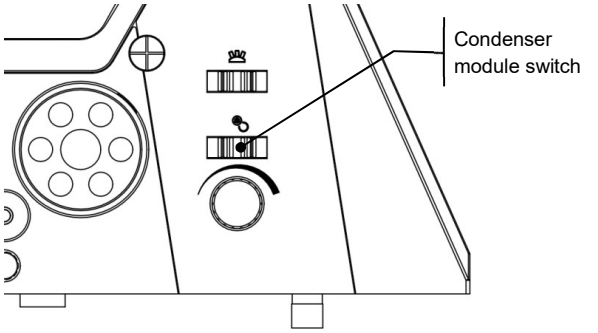
Aperture Diaphragm Adjusting Lever	Aperture Diaphragm
Move right	Aperture opens
Move left	Aperture closes

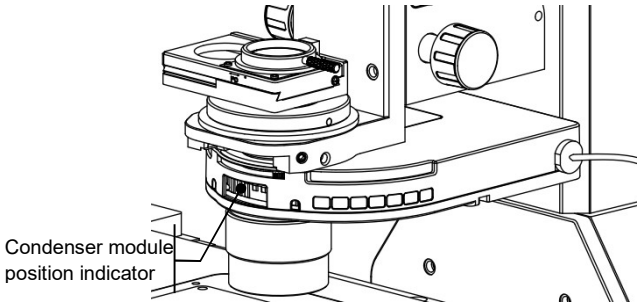
- **Display**

An indicator mark can be found just above the aperture diaphragm lever.

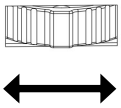
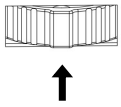
3.4.4. Changing the Condenser Module

The condenser module is switched through the condenser module on the left side of the frame.(It Can also be switched through the front touch screen)





- **Operation**

Condenser module switch wheel	Condenser turret
Flip the switch sideways 	Push the switch to the rear, and the module switches clockwise Pull the switch forward to switch the module counterclockwise
Press the switch 	Press the switch to make the mask module enter the optical path Press the switch to enable the previous module to enter the optical path

- **Display**

The condenser module is displayed on the touch screen that operates the joystick.

The Condenser module serial number mark identifies the type of module in the optical path.

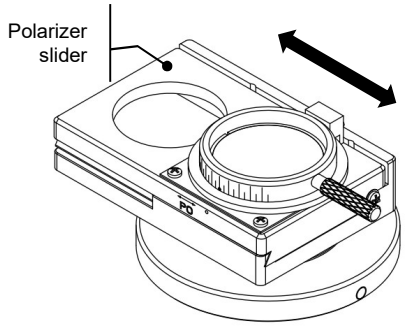
The current module can be confirmed through the touch screen in front of the frame.

■ Installable Condenser Modules

Module name	Observation mode	Remark
ND	Bright-Field	Neutral density filter
Ph1	PH	Use with 10x/20x phase contrast objectives
Ph2	PH	Use with 40x phase contrast objective
DIC1	DIC	Use with 10x objective
DIC2	DIC	Use with 20x/40x/60x objectives

3.5. Using the Polarizer and Analyzer

3.5.1. Using the Polarizer



Insert and remove polarizer

The polarizer is equipped with a slide plate for switching between the polarizer and the empty hole, and the polarizer can be moved into the optical path to change the illumination mode from diascopic illumination to polarization illumination.

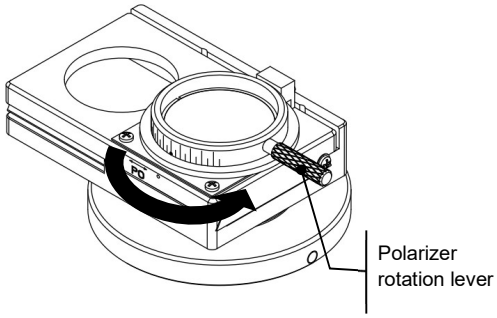
- **Operation**

Polarizer slider	Polarizer
Move the slider to the left	Polarizer enters the optical path
Move the slider to the right	Hollow hole enters the optical path

- **Display**

After the polarizer enters the optical path, it will be displayed on the interface of the front touch screen.

After the polarizer enters the optical path, it will be displayed on the touch screen of the joystick.

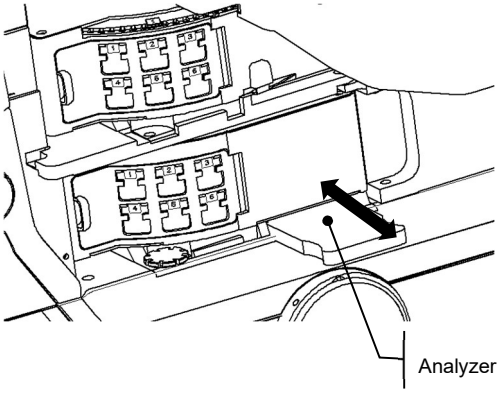


Adjusting the direction of the polarizer

The polarization direction of the polarizer can be adjusted by rotating the polarizer lever.

- **Operation**

Polarizer rotation lever	Polarizer
Rotate the lever	Changes polarization orientation

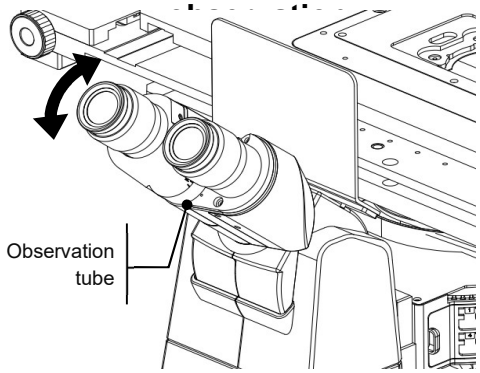


3.5.2. Using the Analyzer

The analyzer slide is inserted from the right side of the microscope frame

Analyzer slider	Analyzer
Push the slider in to the second slot	The analyzer enters the optical path
Pull the slider out to the first slot	The analyzer is removed from the optical path

3.6. Using Observation Tube and Eyepiece



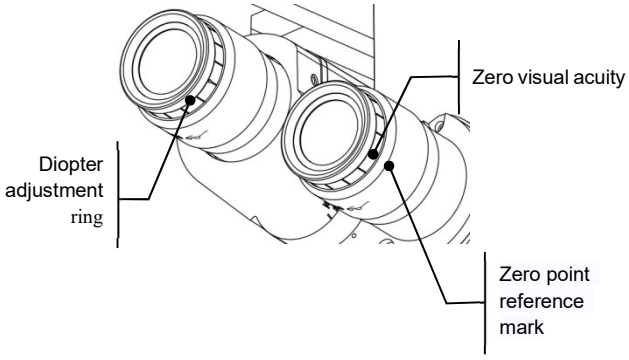
3.6.1. Adjusting the Observation Tube Angle

The Angle of observation tube can be adjusted from 15° to 40°

- **Operation**

Observation tube	Observation tube Angle
Turn the tube up	Eyepiece up (Max.40°)
Turn the tube down	The orientation of the eyepiece is close to the horizontal plane (Minimum 15°)

★ Determine the desired location based on personal observation comfort.

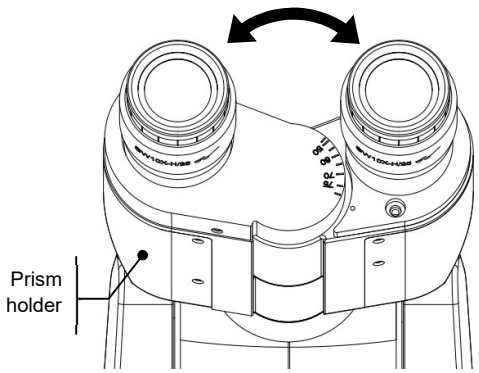


3.6.2. Adjusting the Diopter

Rotate the eyepiece diopter ring to adjust the individual eyepiece focus according to the observer's vision.

- **Operation**

Diopter adjustment ring	Diopter
Clockwise rotation	Diopter enlargement
Counterclockwise rotation	Diopter reduction



3.6.3. Adjusting the Interpupillary Distance

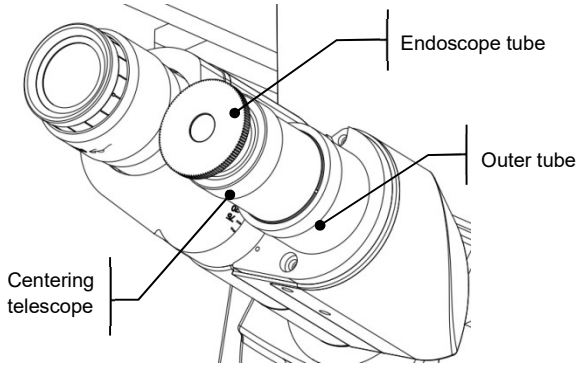
Interpupillary distance range 47mm ~ 78mm

- **Operation**

When binocular observation, adjusting the interpupillary distance until the left and right fields of view are combined into one and the observation is comfortable.

★ The viewing tube is equipped with pupil distance scale.

Remember your interpupillary distance for fast and easy adjustments in the future on any microscope.



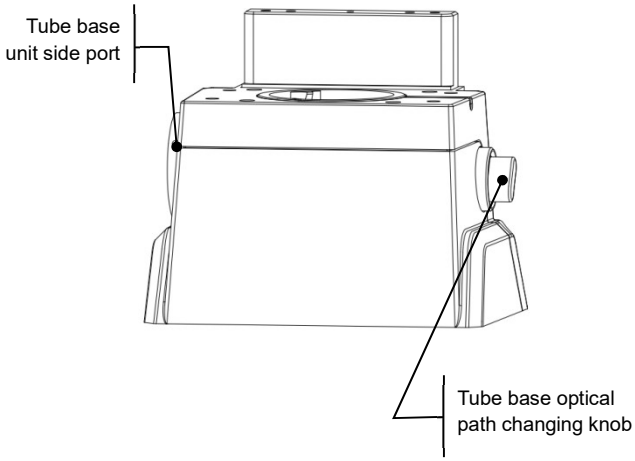
3.6.4. Using Centering Telescope

The centering telescope is used to adjust the aperture stop size, confirm whether the oil immersion has formed bubbles, for adjusting the orientation of the polarizer, and adjusting the position of the phase ring.

- **Operation**

Remove one of the binoculars and install the centering telescope. If the focus position needs to be adjusted, it can be adjusted by turning the endoscopic tube while holding the outer tube of the telescope in alignment.

3.7. Using Observation Tube Base Unit



3.7.1. Change Observation Tube Base optical path

The optical path changing knob can be used to change the optical path between the eyepiece and the side port.

- **Operation**

Changing knob indicator scale	Observation port
👁	Eyepiece observation port
📷	Tube base unit side port

- **Display**

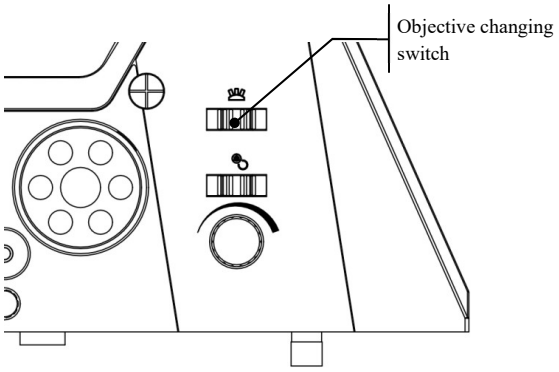
● The current light path can be confirmed by switching the direction of the knob.

● The current light path status of the observation tube base is displayed on the front touch screen.

3.8. Using the Motorized Stage

Please consult with the instructions that came with your motorized stage.

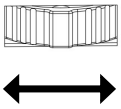
3.9. Using Objective Nosepiece



3.9.1. Change Objective

The objective can be changed using the Objective Nosepiece switch wheel on the left side of the frame (or through the front touch screen)

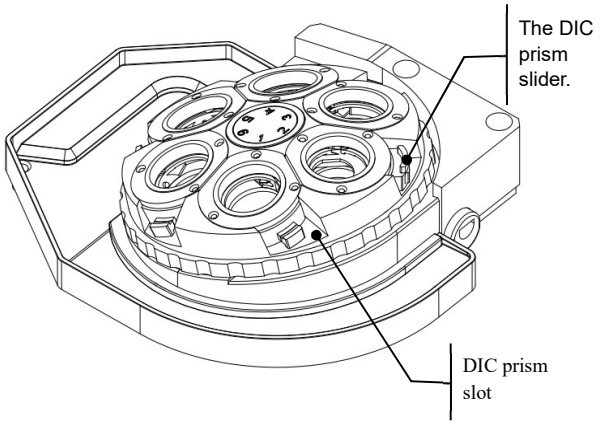
- **Operation**

Objective changing switch	Nosepiece
Lateral push/pull switch 	Pushing the switch backwards rotates the nosepiece clockwise to the next objective.
	Pulling the switch forward rotates nosepiece counterclockwise to the next objective.

- **Display**

● The current objective information is displayed on the front touch screen.

● The current objective information is displayed on the touch screen of the joystick.



3.9.2. Placing the DIC prism in Optical Path

When observing with a DIC microscope, insert the DIC prism slider into the DIC prism slot of the objective nosepiece

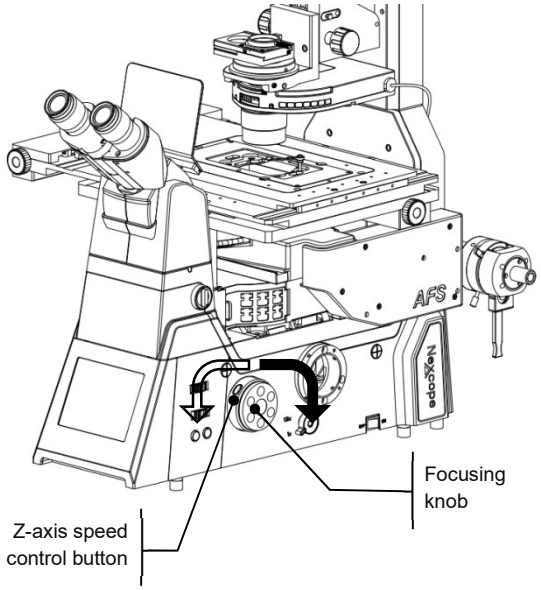
- **Operation**

The DIC prism slider	DIC prism
Press in to limit position	DIC prism enters optical path
Pull out the slider	DIC prism is removed from optical path

- **Display**

- After the DIC prism enters the optical path, it will be displayed on the interface of the front touch screen.
- After the DIC prism enters the optical path, it will be displayed on the touch screen of the joystick.

3.10. Using the Focusing Mechanism



3.10.1. Sample Focusing

Rotate the focusing knob on either side of the microscope frame to move the objective up and down to focus on the sample.

- **Operation**

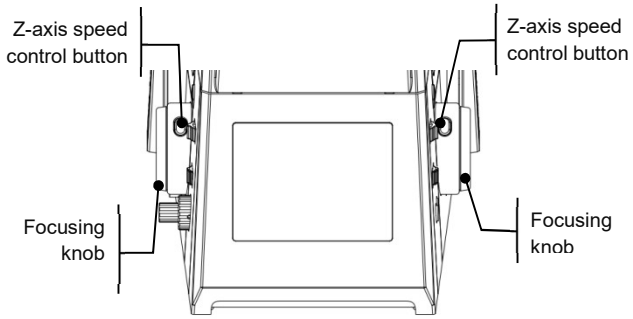
Rotating Focusing knob

Rotating Focusing knob	Focusing mechanism
Rotate the knob in the direction of the black arrow	The focusing mechanism moves downwards
Rotate the knob in the direction of the white arrow	The focusing mechanism moves upwards

Using Z-axis speed control button

Press this button to adjust the speed of Z-axis lifting, which has three levels of speed.

Display indicator	Speed gear	Precision
^	1 gear	2μm/turn
^^	2 gear	40μm/turn
^^^	3 gear	200μm/turn

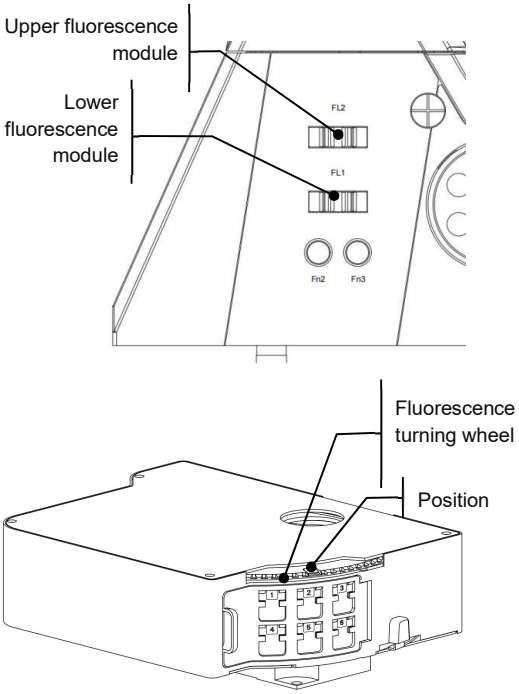


- **Display**

- The current Z-axis coordinates of the focusing mechanism are displayed on the front touch screen and on the LCD screen operating the joystick.
- The speed at which the focus wheel and focus knob turn is displayed on the front LCD screen.

3.11. Using the Fluorescence Turret

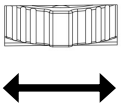
3.11.1. Change Fluorescence Modules



- **Operation**

Motorized Fluorescence Turret

The upper and lower fluorescence modules can be changed using the changing switch on the right operation panel of the microscope frame.

Fluorescence module changing switch	Fluorescence turret
Lateral push switch 	Push the switch backwards to rotate the fluorescence turret counterclockwise Pull the switch forward to rotate the fluorescence turret clockwise

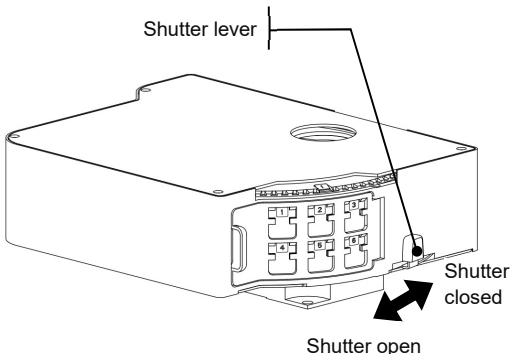
Manual Fluorescence Turret

Rotate the fluorescence wheel clockwise or counterclockwise until the detent clicks into place, indicating that a position is in the light path.

Display

- The current fluorescence turret hole position is displayed on the touch screen of the joystick
- The current hole position of the manual fluorescence wheel can be identified by the position label.
- The current fluorescence turret hole position is displayed on the front touch screen

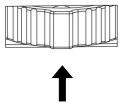
3.11.2. Using the Fluorescence Turret Shutter



- **Operation**

Motorized fluorescence turret

The fluorescence turret shutter can be opened or closed using the upper and lower fluorescence module changing switch on the right operation panel of the microscope frame.

Fluorescence module changing switch	Fluorescence turret shutter
Press the switch	
	Turn on / off the status switch

Manual fluorescence turret

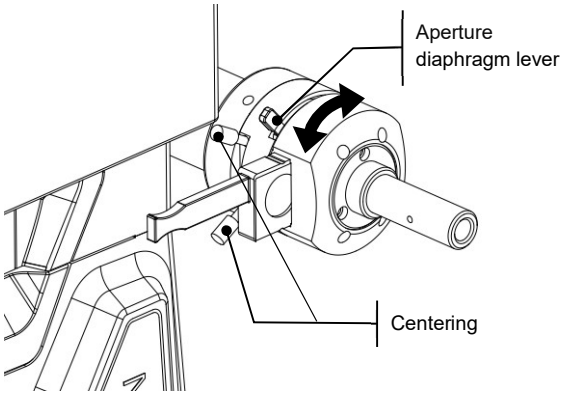
The fluorescence turret shutter can be opened/closed by moving the shutter lever.

- **Display**

- The current status of the fluorescence turret is displayed on the front touch screen.
- The status of the manual fluorescence turret shutter can be judged by the length of the lever extension.

3.12. Using the Epi Illumination Attachment

3.12.1. Adjusting Aperture Diaphragm



In reflective fluorescence lighting systems, use the aperture diaphragm to adjust image brightness and sharpness.

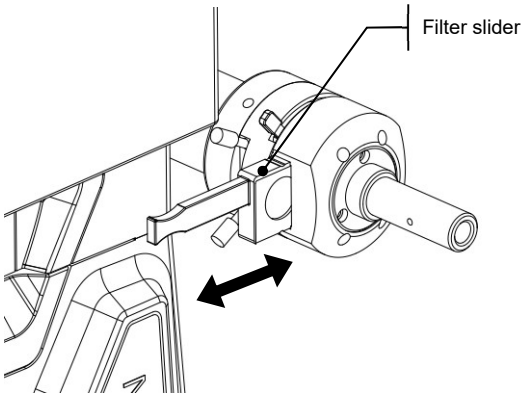
The epi illumination attachment is equipped with an aperture diaphragm lever and centering screw for the user to adjust the aperture diaphragm.

- **Operation**

Aperture diaphragm lever	Aperture diaphragm
Turn up	The diaphragm diameter increases
Turn down	The diaphragm diameter decreases

- The smaller the aperture, the higher the resolution, but the darker the specimen image. The larger the aperture, the brighter the image, but image sharpness declines.
- The size of the aperture stop is reduced to equal the objective pupil diameter, which can maintain specimen clarity in the image.

3.12.2. Using the Filter Slider



The epi illumination attachment is equipped with a filter slider for up to 2 filters with a diameter of 25 mm and a maximum thickness of 5 mm.

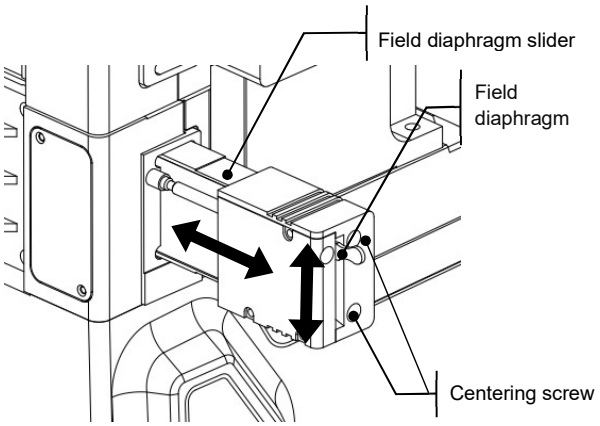
- **Operation**

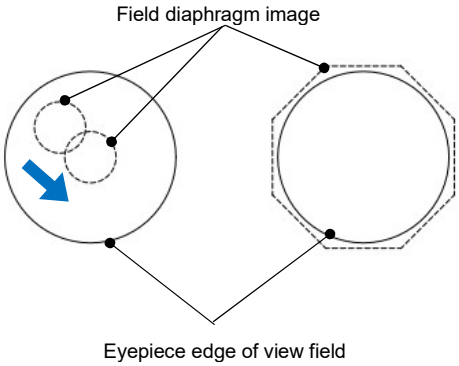
Filter slider	Filter
Push the slider into the first position	The front side filter (without handle side) enters the optical path
Push the board into the second position	The rear filter enters the optical path

- **Display**

It can be determined whether a filter is inserted by the position of the filter insert board

3.12.3. Using Field Diaphragm Slider





Insert and remove the field diaphragm

The field diaphragm is used to limit the illumination range. The field diaphragm can be inserted or removed from the optical path by inserting or removing the field of view diaphragm insert.

- **Operation**

Field diaphragm slider	Field diaphragm
Push in until it snaps into place	The field diaphragm enters the path
Pull out to limit	The field stop moves out of the path

Adjusting field diaphragm size

The field diaphragm size is changed by adjusting the handle of the field diaphragm insert plate.

- **Operation**

Field diaphragm lever	Field diaphragm
Push up	The diaphragm diameter increases
Push down	The diaphragm diameter decreases

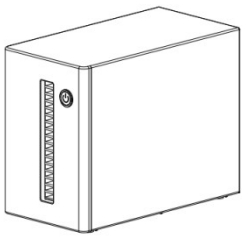
Field diaphragm position (Centering Adjustment)

- **Operation**

1. Focus the specimen under epi brightfield illumination;
2. Push in the field diaphragm handle to reduce the diaphragm diameter;
3. Use the hex wrench to turn the centering screw to move the image of the field diaphragm to the center of the field of view;
4. Pull the field of view diaphragm handle to increase the diaphragm diameter to the same size as the field of view;
5. Unscrew the adjusting screw to move the center of the field diaphragm image to the center of the field of view again.

3.13. Operation of Epi Illumination Light Source

3.13.1. Operation of Epi Illumination Light Source



NOTE: Refer to the instructions that came with the fluorescence light source that you purchased. The instructions below provide a general overview for operating an LED epi illumination light source.

LED epi illumination light source is equipped with built-in LED illuminators for each excitation wavelength. The LED illuminator can be turned on/off and its brightness adjusted to obtain specific wavelengths and intensities of illumination.

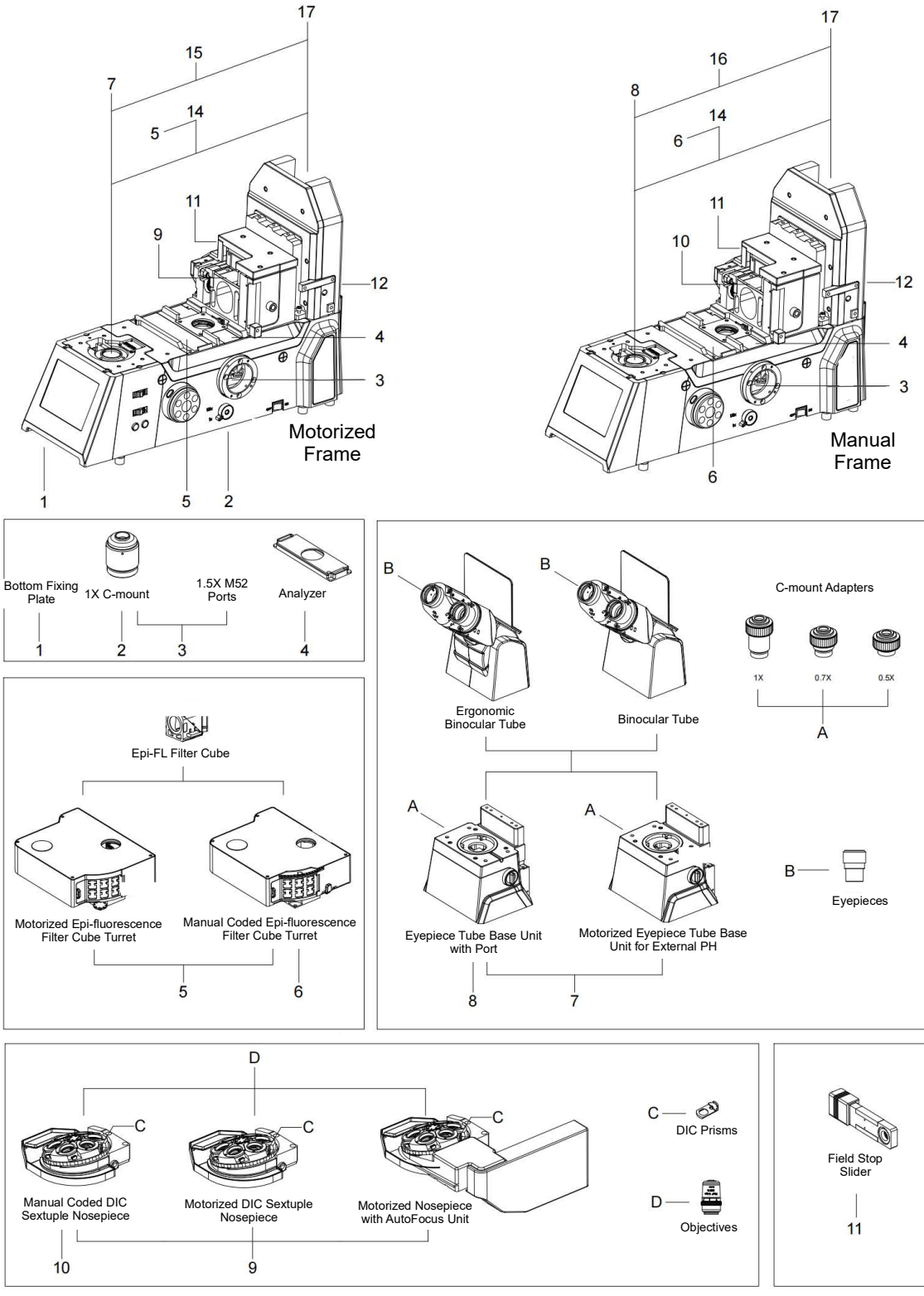
- **Operation**

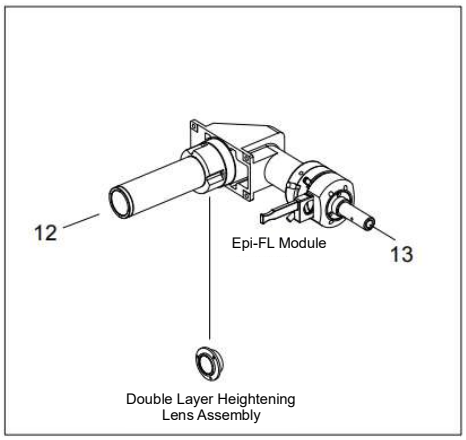
Each button switch must be set and assigned.

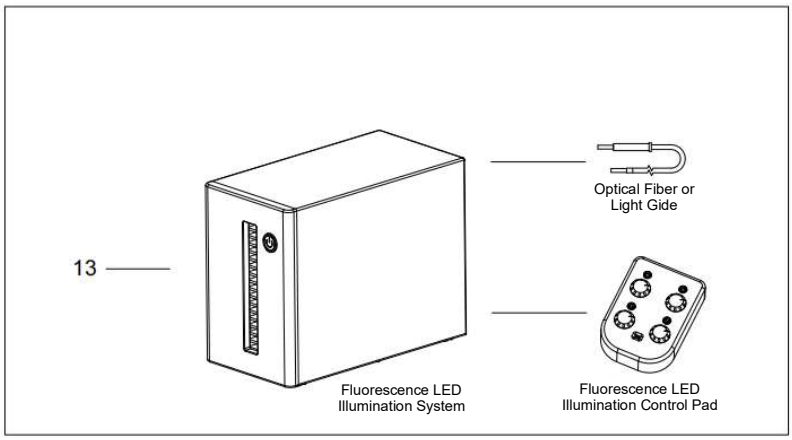
Function button	LED epi illumination light source
The operation assigns a button to the desired function	Specific wavelength LED illuminator lights up
The operation assigns a button to the desired function	Adjust the brightness of each wavelength LED illuminator

4. Diagrams

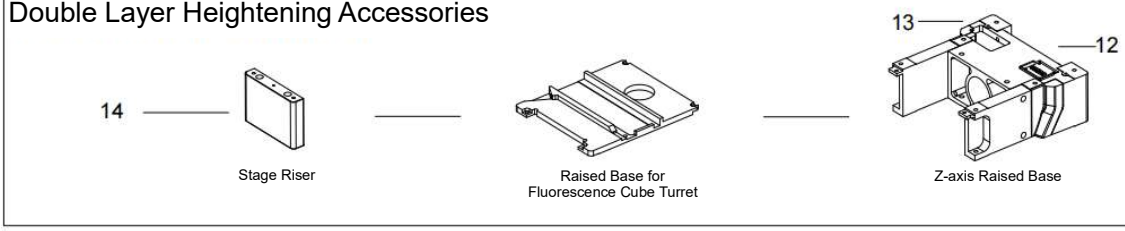
4.1. System Diagram

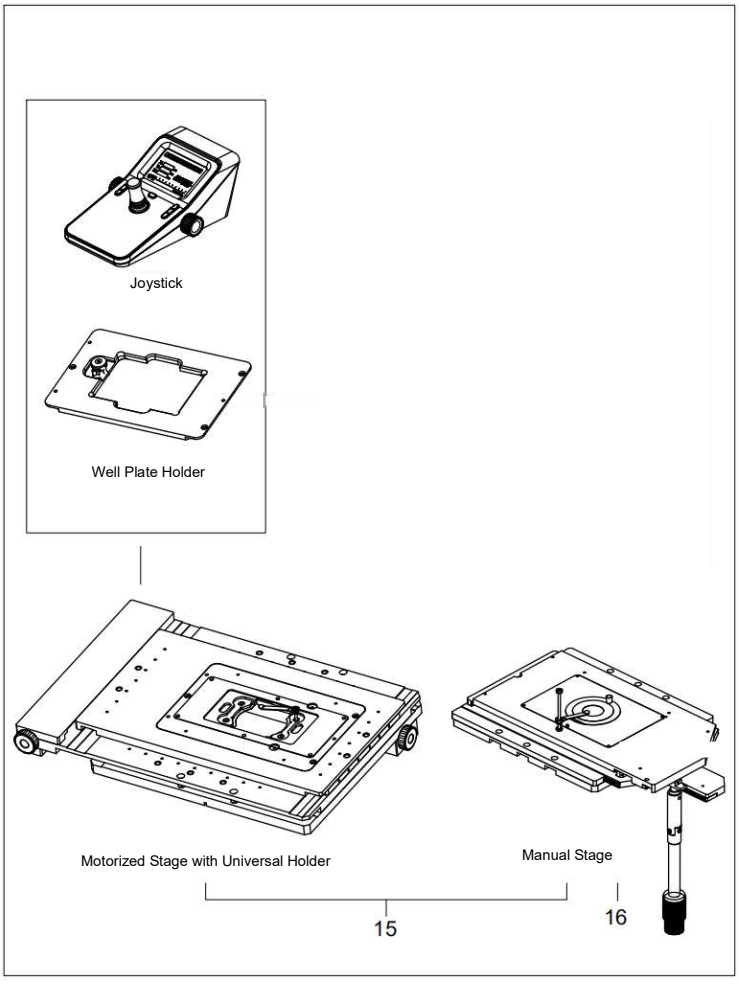


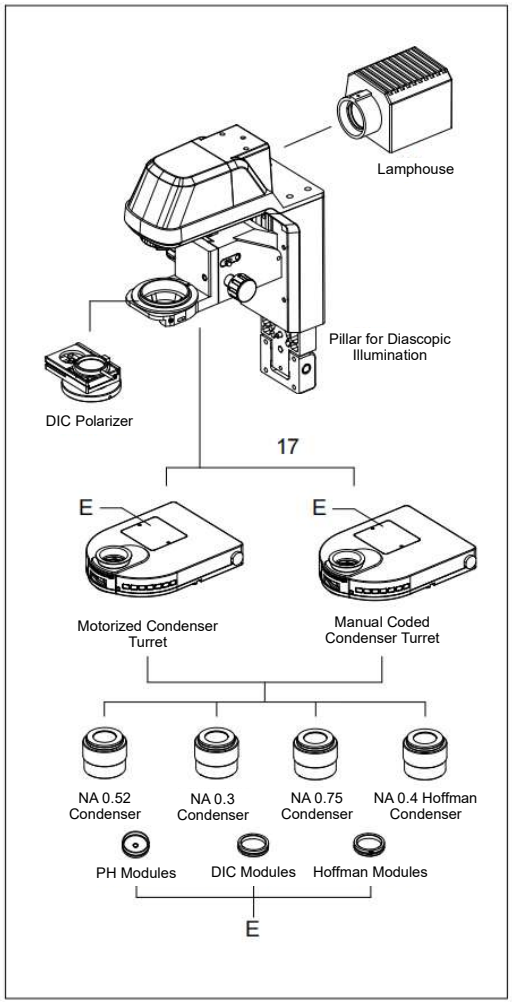




Double Layer Heightening Accessories

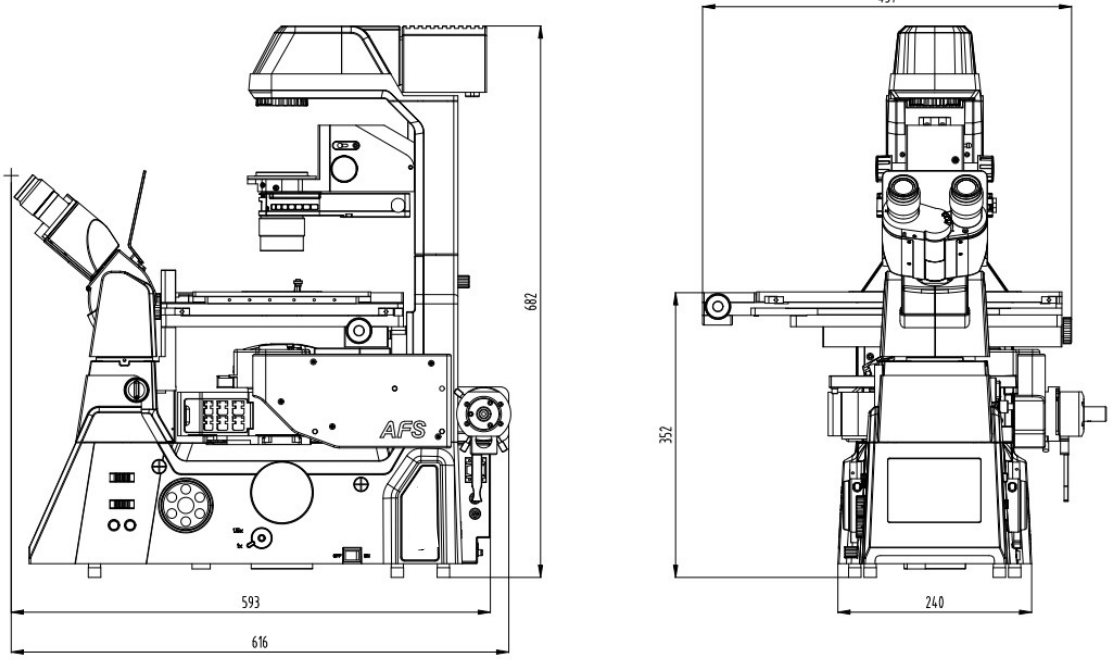




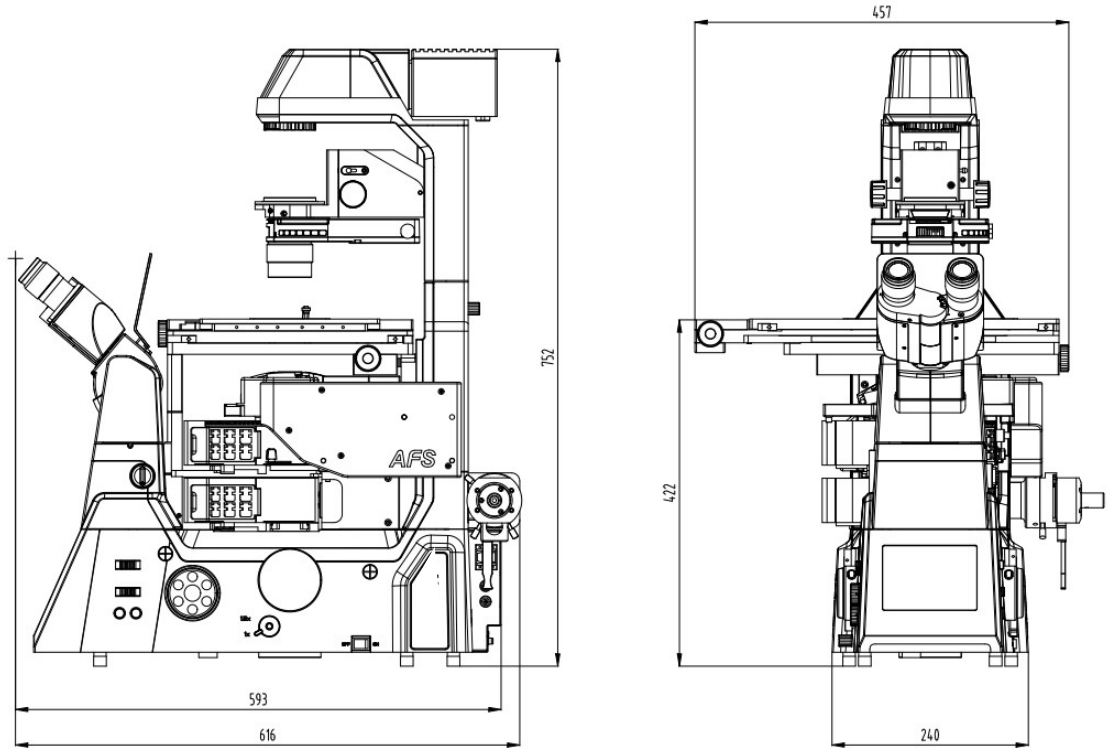


4.2. Dimensional Diagram

EXI-1000 – 1 Layer (Unit = mm)



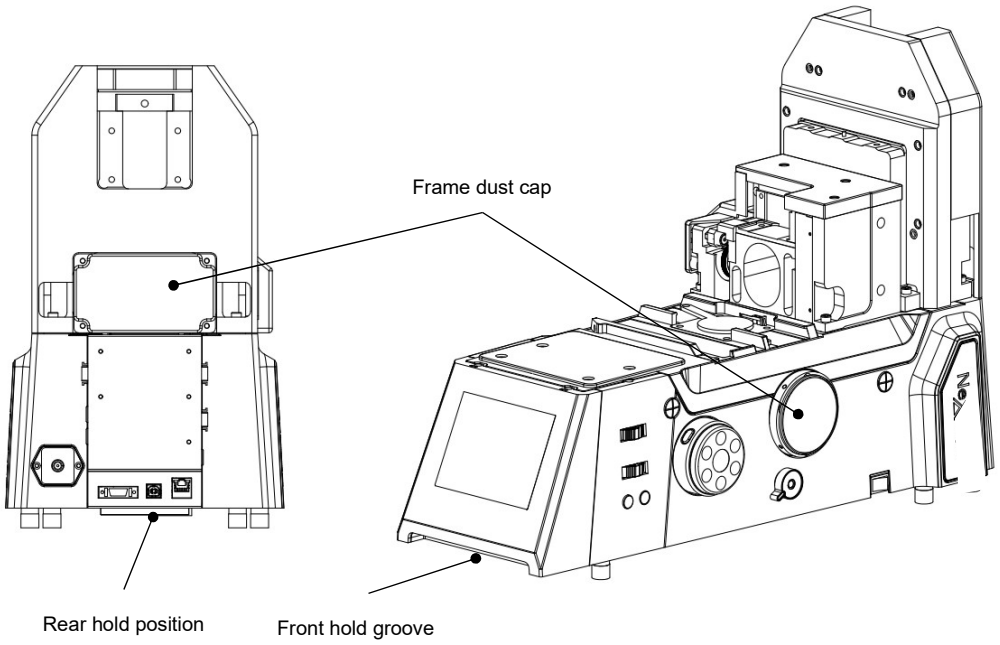
EXI-1000 – 2 Layers (Unit = mm)



5. Installation

■ Preparation work before installing and operating the microscope

Remove the packaging of the main frame, parts and accessories, including the frame (base), binocular part, observation tube base, eyepiece, objective, condenser, bending arm, nosepiece, lamphouse, fluorescence turret, etc.



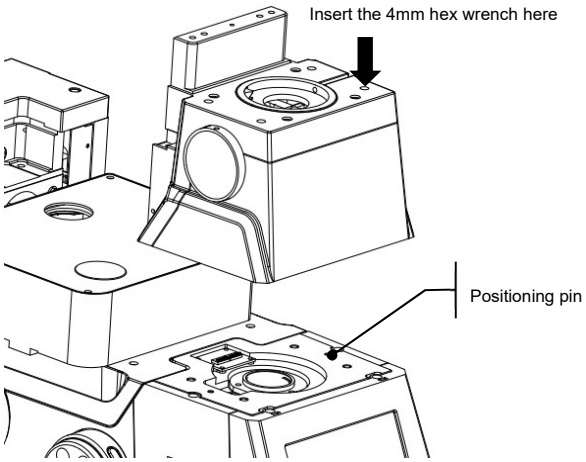
5.1. Installing the Microscope Frame

1. Choose installation location.
2. For specific installation location information, please refer to "Article 1" under "Safety Precautions" at the beginning of this manual.
3. Remove the microscope mainframe from the packaging box and install it in the appropriate position.
4. Remove the dust cover, mirror paper, and non-marking tape from the frame.
5. Use a 3mm hex wrench to remove the lifting rail fixing tool.

★ Due to the heavy weight of this product, at least two people are required to perform the installation work. When lifting the main base of the microscope, please firmly grasp the grip groove at the front and the grip position at the back, and grip the base tightly.

★ Do not hold the fixing tool on the side of the lifting rail when removing the main unit from the packaging box.

5.2. Installing Observation Tube Base



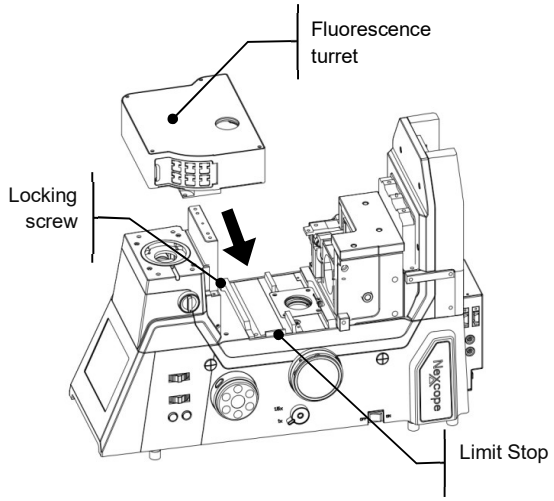
1. Place the observation tube base into the front end of the microscope mainframe (base), while keeping the tilting observation tube installation position of the observation tube base forward.

★ The bottom of the observation tube base is equipped with two positioning holes to align with the positioning pins of the microscope frame, and the observation tube base is installed.

2. Insert the hex wrench into the observation tube base from above, and use a 4mm hex wrench to tighten the four M5 hex screws embedded in the base to secure the observation tube base.

5.3. Install the Fluorescence Turret

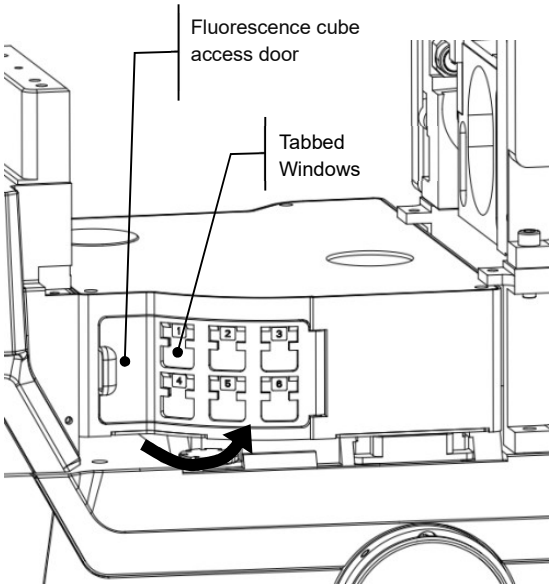
5.3.1. Installing the Fluorescence Turret

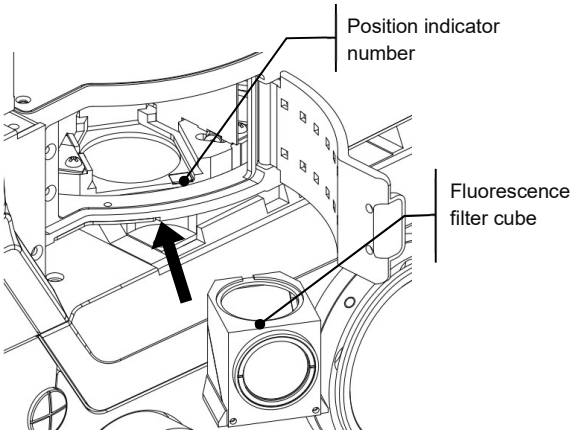


1. Move the fluorescence dial from the left side of the microscope frame to the right along the groove on the frame until it is close to the limit stop.

2. Use a 3mm hex wrench to tighten the locking screw on the left side of the microscope mainframe. The screwdriver must be angled at about 45° to engage the locking screw on the left side of the observation tube and below the fluorescence turret.

5.3.2. Installing the Fluorescence Filter Cubes





1. Open the fluorescence cube access door in the fluorescence turret, confirm the installation hole position of the fluorescence module that needs to be added or replaced, and then manually rotate the turret so that the hole position marked with the corresponding indicator number faces the opening position of the flip cover.

2. Open the fluorescence cube access door in the fluorescence turret, confirm the installation hole position of the fluorescence module that needs to be added or replaced, and then manually rotate the turret so that the hole position marked with the corresponding indicator number faces the opening position of the flip cover.

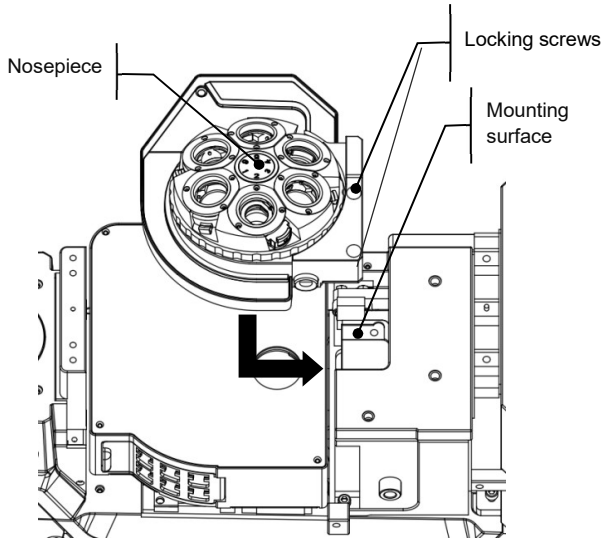
3. Take out the required fluorescence filter cube from the packaging box, then insert the fluorescence cube into the dovetail groove of the fluorescence turret in the direction shown in the figure, and push it to the innermost position.

4. Place the fluorescence filter cube label into the label window on the access door corresponding to the indicator number identification.

5. Repeat steps 1 and 3 to insert all required fluorescence cubes.

6. Close the access door of the fluorescence turret.

5.4. Installing the Nosepiece

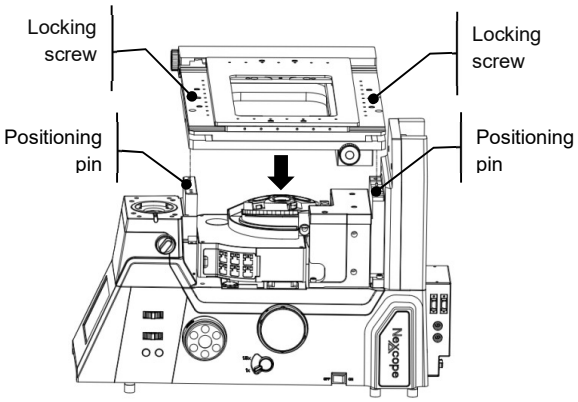


1. Place the mounting surface of the nosepiece on the lifting rail mounting surface in the direction shown in the diagram, and then press the nosepiece from the front to the right rear of the microscope frame until it reaches the limit position (the mounting surfaces in both directions are attached).

2. Use a 4mm hex wrench to tighten the two fixed screws inside the nosepiece.

5.5. Installing the Stage

5.5.1. Installing the Stage



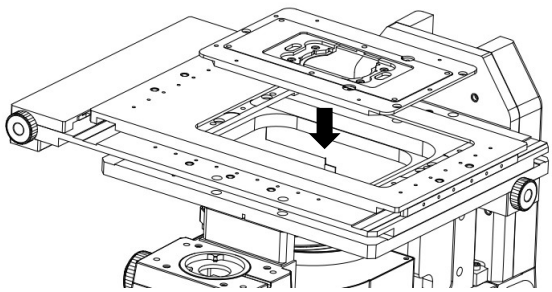
NOTE: These are general directions for the factory-supplied stages. Follow the instructions that came with the stage you purchased.

1. Place the stage on the stage of the observation tube base and the stage of the microscope frame.

★ The positioning pin is located on the carrier pedestal of the observation tube base and the microscope frame. Align the positioning hole and positioning pin of the stage。

2. Use a 4mm hex wrench to tighten the four locking screws inside the stage and secure the stage.

5.5.2. Installing a Specimen Holder

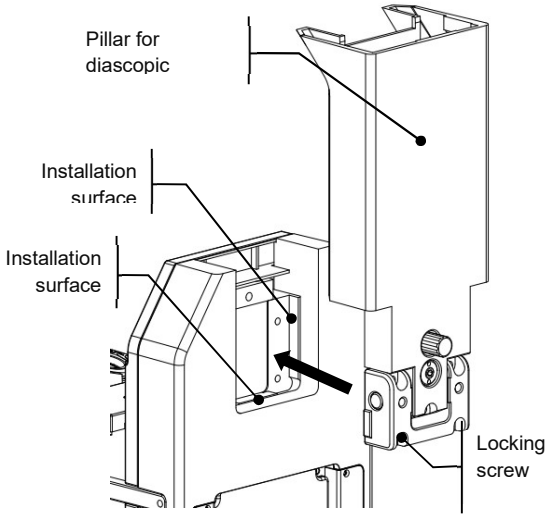


1. Simply place the universal holder onto the stage in the direction shown in the diagram. Suitable for specimens such as glass slides and holders of various sizes for culture dishes. Two stage clamps are provided.

2. The universal holder is attracted to the stage by a magnet. After the objective contacts the specimen holder, the holder can float upwards to minimize damage to the objective.

5.6. Installing the Pillar and Lamphouse for Diascopic Illumination

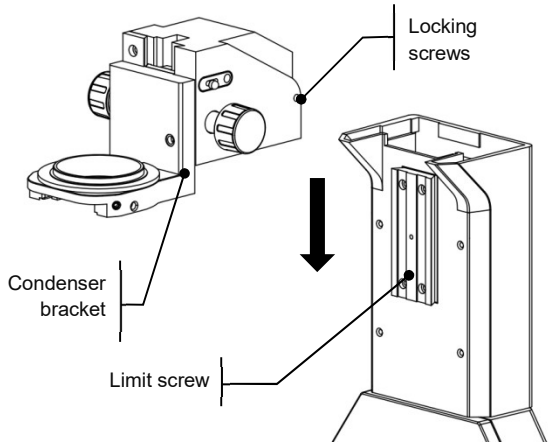
5.6.1. Installing the Pillar for Diascopic Illumination



1. Place the installation surface of the lighting bending arm on the installation surface of the microscope frame in the direction shown in the diagram (both installation surfaces are attached as shown in the diagram).

2. Use a 4mm hex wrench to tighten the four locking screws (included in the packaging) to secure the pillar to the frame.

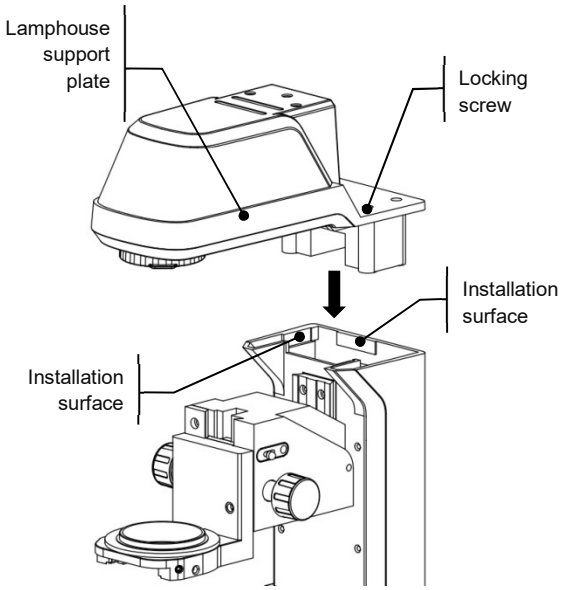
5.6.2. Installing the Condenser Bracket



1. Install the condenser bracket onto the dovetail block of the pillar in the direction of the arrow shown in the diagram, until it reaches the limit screw below the dovetail block.

2. Use a 2mm hex wrench to tighten the locking screw on the right side.

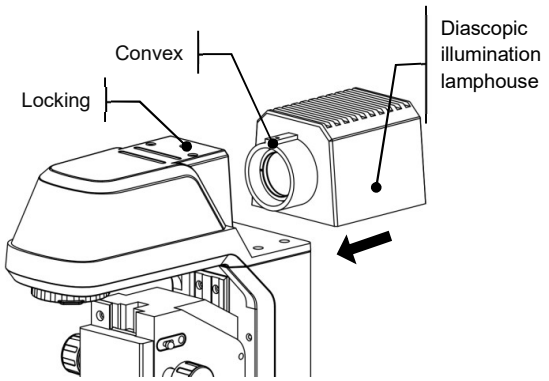
5.6.3. Installing the Observation Support Plate



1. Place the lamphouse support plate onto the pillar in the direction shown in the diagram, and attach the installation surface behind and on the left side of the observation support plate to the two installation contact surfaces shown in the diagram.

2. Use a 3mm hex wrench to tighten the four locking screws.

5.6.4. Installing the Lamphouse for Diascopic Illumination

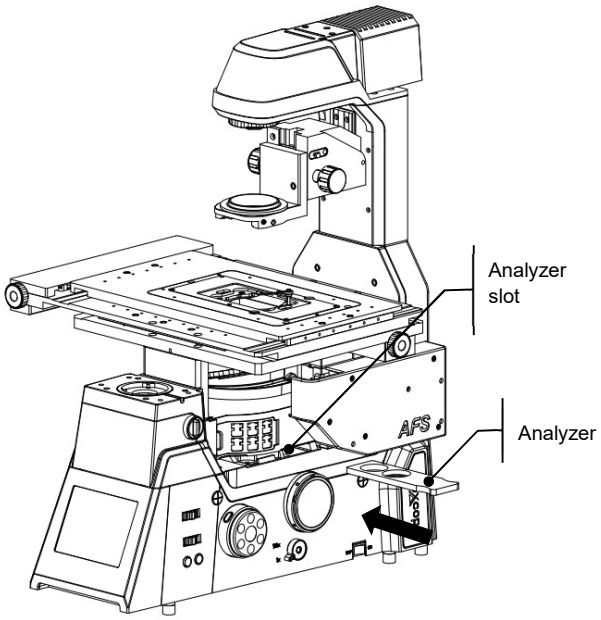


1. Align the convex key above the lamphouse cylinder with the groove behind the lamphouse support plate and insert the lamphouse in the direction shown.

2. Insert a 2mm hex wrench from the top of the observation support plate, tighten the locking screws, and secure the lamphouse.

5.7. Installing the Analyzer and Polarizer

5.7.1. Installing Analyzer

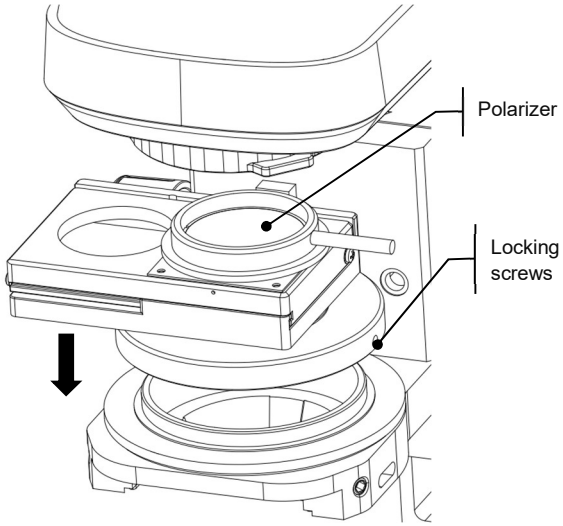


1. Remove the dust-proof slide from the analyzer slot in the microscope frame.

2. Insert the analyzer slider from the right side of the microscope frame in the direction shown, and move the slider to the second detent position to make the analyzer enter the optical path; Moving the slider back to the first detent position removes the analyzer from the optical path, leaving the empty hole in the slider in the optical path.

★ Analyzer/polarizer sliders can be inserted from both sides of the microscope frame.

5.7.2. Installing the Polarizer

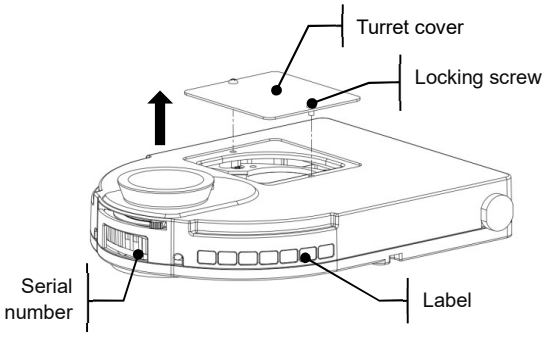


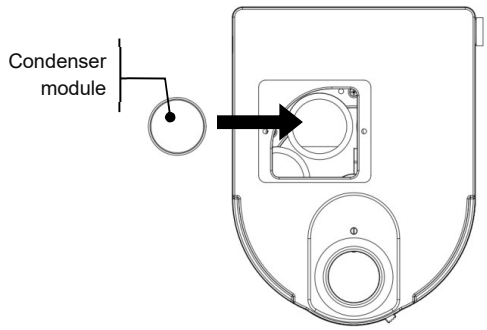
1. Place the polarizer on the condenser base and adjust the orientation, refer to Chapter 2.3, to form orthogonal polarization.

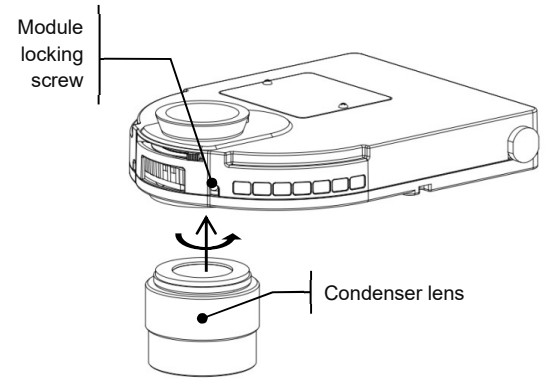
2. Use a 2mm hex wrench to tighten the support screws.

5.8. Installing the Condenser

5.8.1. Installing the Condenser Modules







NOTE: Condenser modules are typically pre-installed prior to shipping the microscope.

1. Use a 2mm hex wrench to loosen the two turret cover locking screws and remove the cover from the top of the condenser turret.

2. Place the condenser module into the corresponding hole of the turret (up to seven modules can be installed).

★ Two different sizes of condenser modules are available: 37mm diameter module and 39mm diameter module. Install each module in the appropriate position to accommodate that module size.

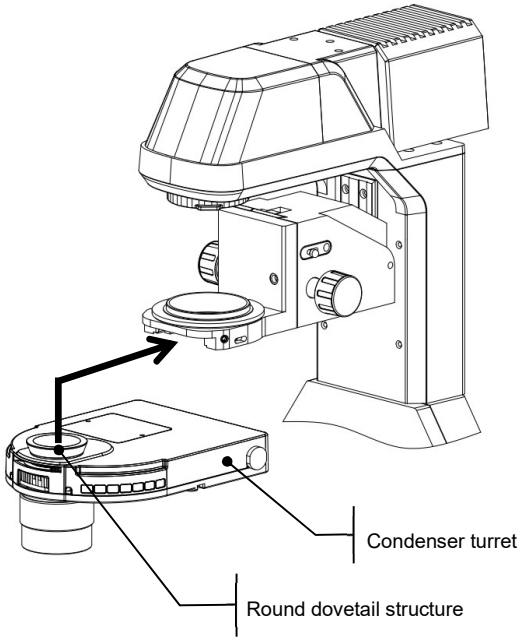
★ Insert the module into the module seat so that as you rotate the dial clockwise (viewed from above), the value of the phase contrast ratio displayed on the module increases.

3. Attach the label of the installed module to the condenser turret. The serial number of the label position is the same as that of the turret hole.

4. Use a 2mm hex wrench to tighten two screws to secure the turret cover.

5. Screw the condenser lens into the bottom of the turret.

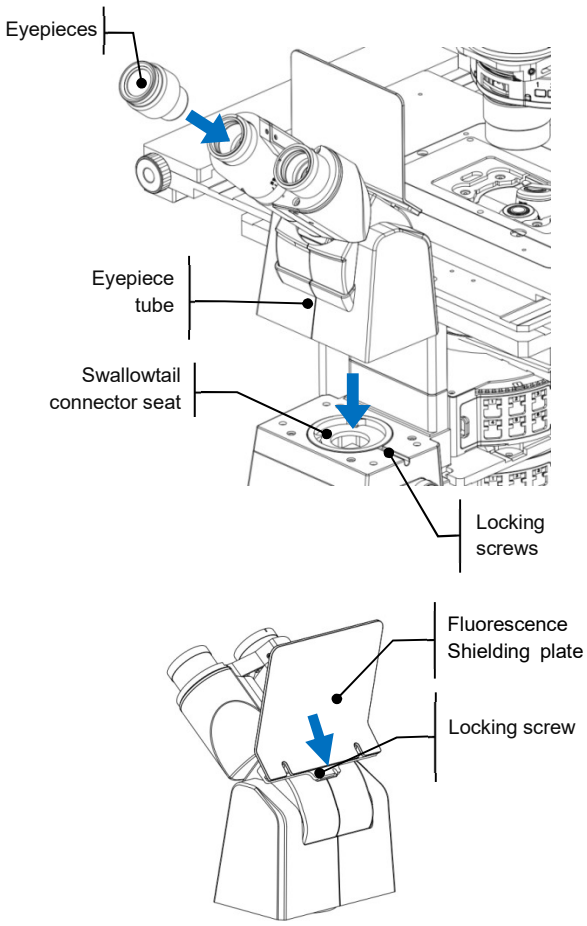
5.8.2. Installing the Condenser



1. Insert the round dovetail structure of the condenser turret into the bottom of the condenser bracket.

2. Use a 2mm hex wrench to tighten the condenser locking screw and fix the dovetail seat to complete the installation.

5.9. Installing the Observation Tube and Eyepieces



Installing the observation tube

1. Remove the dust cover from the observation tube dovetail, insert the observation tube into the dovetail connection seat of the observation tube base in the direction of the arrow shown in the diagram.
2. Use a 3mm hex wrench to tighten the support screw and secure the observation tube.

Installing the eyepieces

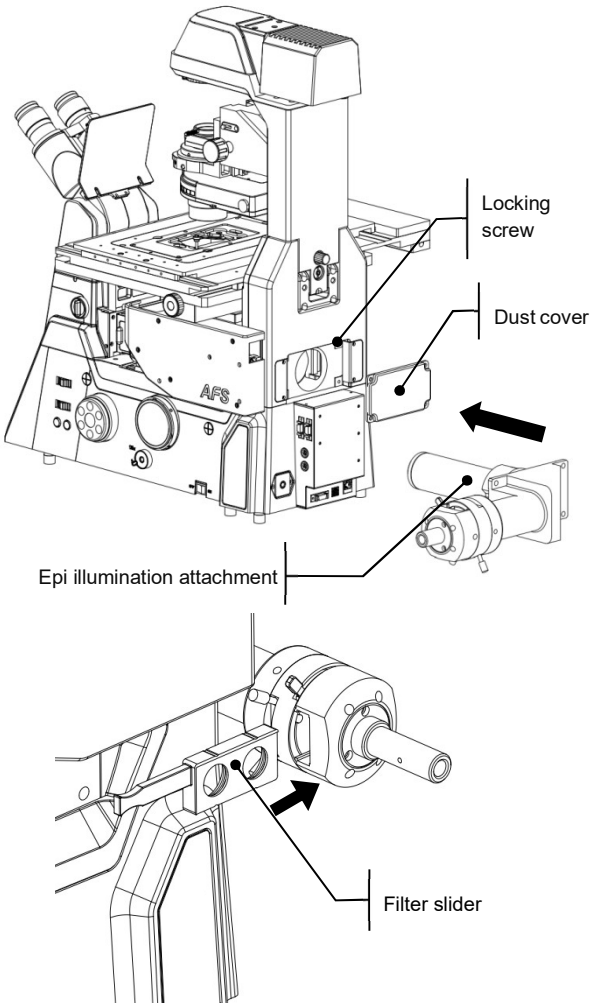
1. Remove the dust cover from the observation tube and insert the eyepiece into the observation tube in the direction of the arrow as shown in the diagram until it touches the surface.

Installing the Fluorescence Shielding plate

1. Use a 2.5mm hex wrench to tighten the two locking screws included in the package and secure the fluorescence shielding plate behind the observation tube.

5.10. Installing the Epi Illumination Attachment

5.10.1. Installing the Epi Illumination Attachment

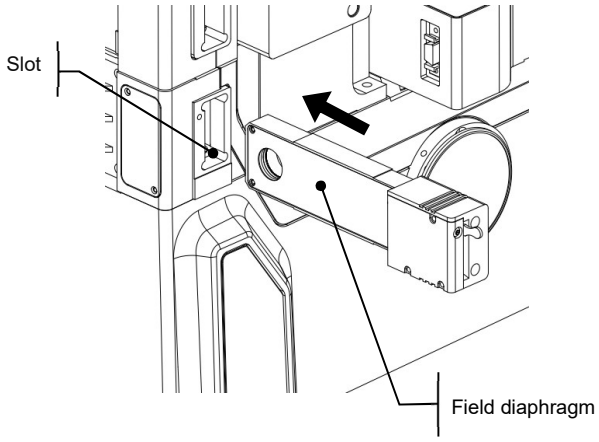


1. Use a 4mm hex wrench to loosen and remove the four M5 hex cylindrical head screws from the dust cover at the rear of the main engine to remove the cover.

2. Insert the epi illumination attachment into the round hole at the back of the frame, and use a 4mm hex wrench to tighten the four screws in the package to secure the epi illumination attachment into the main frame of the microscope.

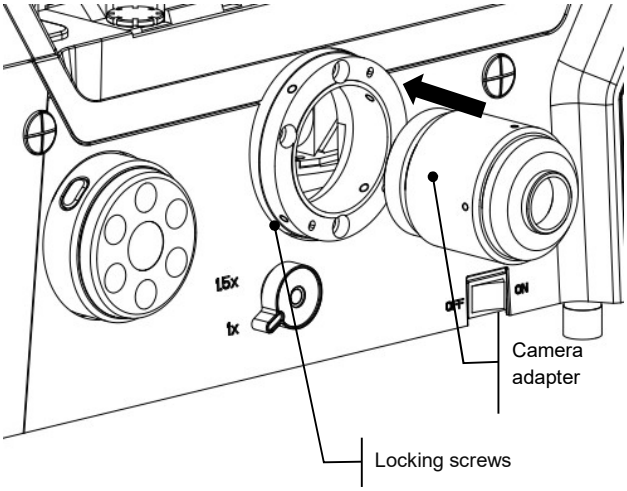
3. Insert the filter slider into the epi illumination attachment as shown. Note the orientation of the slider handle and the detents on the slider.

5.10.2. Install the Field Diaphragm Slider (Field Stop)



1. Remove the dust cover on the field stop slot at the rear of the microscope body.
2. Insert the field diaphragm slider into the slot in the direction indicated
3. Use a 2mm hex wrench to tighten the locking screws to secure the slider housing into the microscope frame.

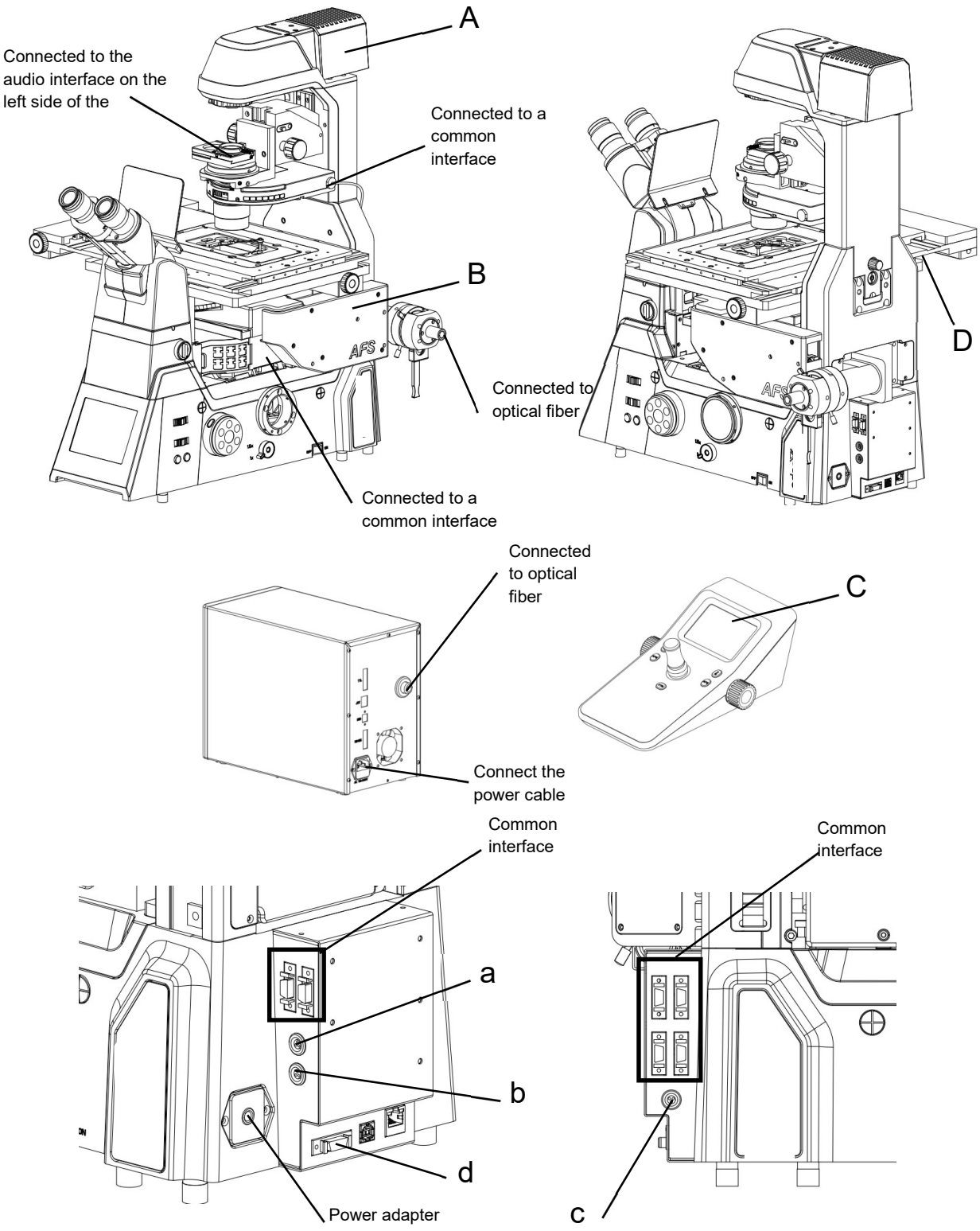
5.11. Installing a Camera Adapter



1. Use a 2mm hex wrench to loosen the four locking screws on the microscope frame side port and remove the dust cover on the side port.
2. Insert a camera C-mount adapter into the side port and use a 2mm hex wrench to tighten the four locking screws to secure the camera adapter.

★ It is recommended to first attach the C-mount camera adapter to the camera before installing the camera adapter to the side port.

5.12. Wire Connections



6. Troubleshooting

6.1. Optical part

Issue	Reason	Solution
Unable to see image	The dia illumination lamphouse is not turned on	Press down light knob to turn on the upper light source
	The epi illumination lamphouse is not enabled	☐ Turn on the power; ☐ Ensure that optical fiber interfaces are properly installed and securely supported; ☐ Make sure the lamphouse side door is closed and locked.
	Bertrand lens in the optical path	Remove the Bertrand lens from the optical path
	The aperture is not in place	Correctly open the field diaphragm and aperture diaphragm
	The condenser turret hole position is incorrect	Turn the turret to position the condenser in the correct position
	The frame optical path is not in the required optical path	Adjust the beam splitter to the correct position
	The observation tube base beam splitter is not in the required optical path	Rotate and cut to the correct optical path position
	The fluorescence turret is not in the required light path	Switch the hole position to the correct position
	Fluorescent shutter not opened	Open the fluorescence shutter
	The objective is not in the optical path	Rotate the nosepiece to allow the objective to enter the optical path
	Inaccurate specimen position	Move the specimen position to enter the optical path
	Inappropriate pupillary distance position	Adjust the pupillary distance correctly
	The eyepiece diopter is wrong	Adjust the diopter correctly
Restricted field of view	The objective converter is not in position	Turn the objective converter to the positioning position
	Analyzer and Polarizer detection are not in position	Fully pushed in
	The phase board is not in position	Push the phase contrast slide to position
	The field diaphragm is not in position	Adjust the field diaphragm correctly
	The camera is not properly connected	Verify that the camera is properly connected
Seeing dirt or dust in the field of view	There is dirt/dust on the sample	Clean sample
	There is dirt/dust in the optical path	Clean eyepieces, objectives, condensers, relay mirrors, cameras.
Image ghosting	The aperture diaphragm is too small	Open the aperture diaphragm

Issue	Reason	Solution
Poor image quality	Sample/Nosepiece issues	☐ Confirm the orientation of the specimen cover glass surface; ☐ Verify that the cover glass thickness is appropriate; ☐ If there is uneven blurring or inaccurate focusing due to platform movement, confirm whether the specimen is tilted.
	Nosepiece/Objective issues	☐ Check for bubbles between the specimen and the objective. ☐ Remove the DIC prism from the light path. ☐ Correct adjustment of the objective correction ring. ☐ Use appropriate immersion solution. ☐ Clean objective end.
	Condenser issues	☐ Adjust the height of the condenser. ☐ Centering the condenser to center the field stop.
	Environmental issues	☐ Verify that there is no ambient light (such as display light) entering the image. ☐ Separate the light path, correctly select the light path and eliminate the influence of ambient light.
Poor phase contrast effect	The condenser hole position does not match the optical path objective	Switch objective or dial
	The turret phase contrast module is not aligned with the objective phase contrast ring	Adjust the position of the two rings using Bertrand lens
	When you look at the edge of the petri dish, the phase contrast ring and the halo are deflected from each other	Move the petri dish until the phase contrast effect is obtained
Inaccurate focusing occurs when using a high magnification objective	The objective nosepiece did not turn into the light path correctly	Ensure that the objective nosepiece is rotated to the positioning position
	The sample was not properly placed on the platform	Place the sample correctly on the stage
One side of the field of view (up, down, left and right) is out of focus. Image flow (i.e. asymmetric defocusing of the image when the focus is moved)	Specimen tilt	Ensure that the specimen is not tilted
	The dia illumination bracket is tilted	Confirm that the lighting bracket is in place
	The objective does not enter the optical path or is not properly installed	Ensure that the objective lens enters the optical path and that the objective lens thread is properly installed
Poor DIC effect	The condenser is not in DIC position	Turn the condenser position to the DIC hole
	The DIC slider is not in place in the nosepiece	Insert the DIC slider into place
	The DIC combination is incorrect	Verify that the combination of DIC prism and DIC module on the objective side is correct
	Using plastic containers or container covers	Do not use plastic containers or container covers
	Using inappropriate glass slides and cover slips	Use non-distorting slides and cover slides that are free of dust or dirt

Issue	Reason	Solution
Poor fluorescence	The shutter is not open	Press the TL key to make sure the gate is open
	The dia illumination pillar is not tilted back	Tilt the dia illumination pillar back
	There is ambient light entering the image	Block or turn off ambient light
	Fluorescence cubes do not match sample	Confirm the fluorescence cube matches fluorophore(s) in sample
	Inappropriate objective	Select the correct objective lens for observation
	Inappropriate slide or cover slide material	Use low fluorescence slides and cover slides
	Excessive excitation light	Reduce excitation light intensity and enhance camera sensitivity
AFS (AutoFocus) is not working	Objective not supported	Replace with AFS-supported objective
	Inappropriate thickness of cover glass	Replace the sample with a suitable cover glass thickness

6.2. Structural electrical part

Issue	Reason	Solution
Z-axis (focusing) cannot be used	The Z-axis is in the escape position	LCD screen controls release of escape position
Initialization did not perform	Loose or improperly connected connecting wires	Check the connections
Noise is generated during power-on	The connecting wire is not connected correctly	Check the connections
Malfunction of joystick operation	Not connected to the frame	Confirm that the joystick is connected to the frame
	Data cable damaged	Replace the data cable
The lights flicker unpredictably	The light bulb is damaged	Replace the bulb
	Poor wire connection	Check the wire connection
The Z-axis cannot continue to move up after reaching a certain position	Temporary upper limit set	Cancel the temporary upper limit
Fluorescence controller cannot be used	The switch is not turned on	Turn on the controller switch
The key control of the motorized turret cannot be switched	Switching frequency too fast	Reduce the switching frequency, confirm the completion of the previous instruction, and implement the next instruction.

7. Maintenance

1. Use gauze to gently wipe glass components. If you need to remove fingerprints and oily residue, slightly dampen the gauze first with a mixture of alcohol and diethyl ether (3:7) or dimethylbenzene before wiping.

   ★ Diethyl ether and alcohol are both extremely flammable. DO NOT get them near open flames or any electrical components such as power switches. Always use these chemicals in well ventilated rooms.

2. Do not use organic solvents to wipe any non-optical components. If you want to clean these components, use a soft, dust-free cloth, moisten with a neutral cleaner in water, and wipe.

3. If the microscope is wet by liquid during operation, immediately turn off the power supply before cleaning up the liquid.

4. Do not disassemble any microscope components. This will immediately void any warranty and the performance and function of the microscope may be affected.

5. If not filling every position on the nosepiece with an objective, ensure that dust covers are installed in the unoccupied positions to prevent dust from entering the microscope body and collecting on other optics and components.

6. Cover the microscope with a dust cover when not in use. Wait until the lamp house cool before covering the microscope with the dust cover.

7. Any repair or replacement of components of this product should be executed by our company or an authorized ACCU-SCOPE service provider.