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A15.1019

Polarizing Microscope,
Reflect & Transmit Light

Instruction Manual



To ensure the safety and obtain satisfactory performance, please study this instruction manual thoroughly before start to use the instrument.

CONTENTS

CONTENTS	1
USER NOTIECE	2
1、NOMENCLATURE	4
2、ASSEMBLY.....	5
2-1.Assembly Diagram	5
2-2.Detailed Assembly Procedure.....	6
3、USING THE CONTROLS.....	9
4、POLARIZED LIGHT OBSERVATION	11
5、SPECIFICATIONS.....	13

USER NOTICE

I .Safety Precautions

1. Carefully open the box, avoid the accessories, like lens, dropping to ground and being damaged.
2. Do keep the instrument out of direct sunlight, high temperature or humidity, dusty and easy shaking environment. Make sure the stage is smooth, horizontal and firm enough.
3. When moving the instrument, please use two hands to grip with the two sides of the microscope body.
4. When running, the lamp house and nearby parts will be very hot. Please ensure there is enough cooling room for them.
5. Make sure the instrument is earthed, to avoid lighting strike.
6. For safety, be sure the main switch is in "O"(off) state before replace the halogen lamp or the fuse, then cut off the power, and do the operation after the lamp bulb and the lamp house completely cool (designated bulb:. **24V/100W halogen lamp**)
7. Use the factory supplied power cord, please.

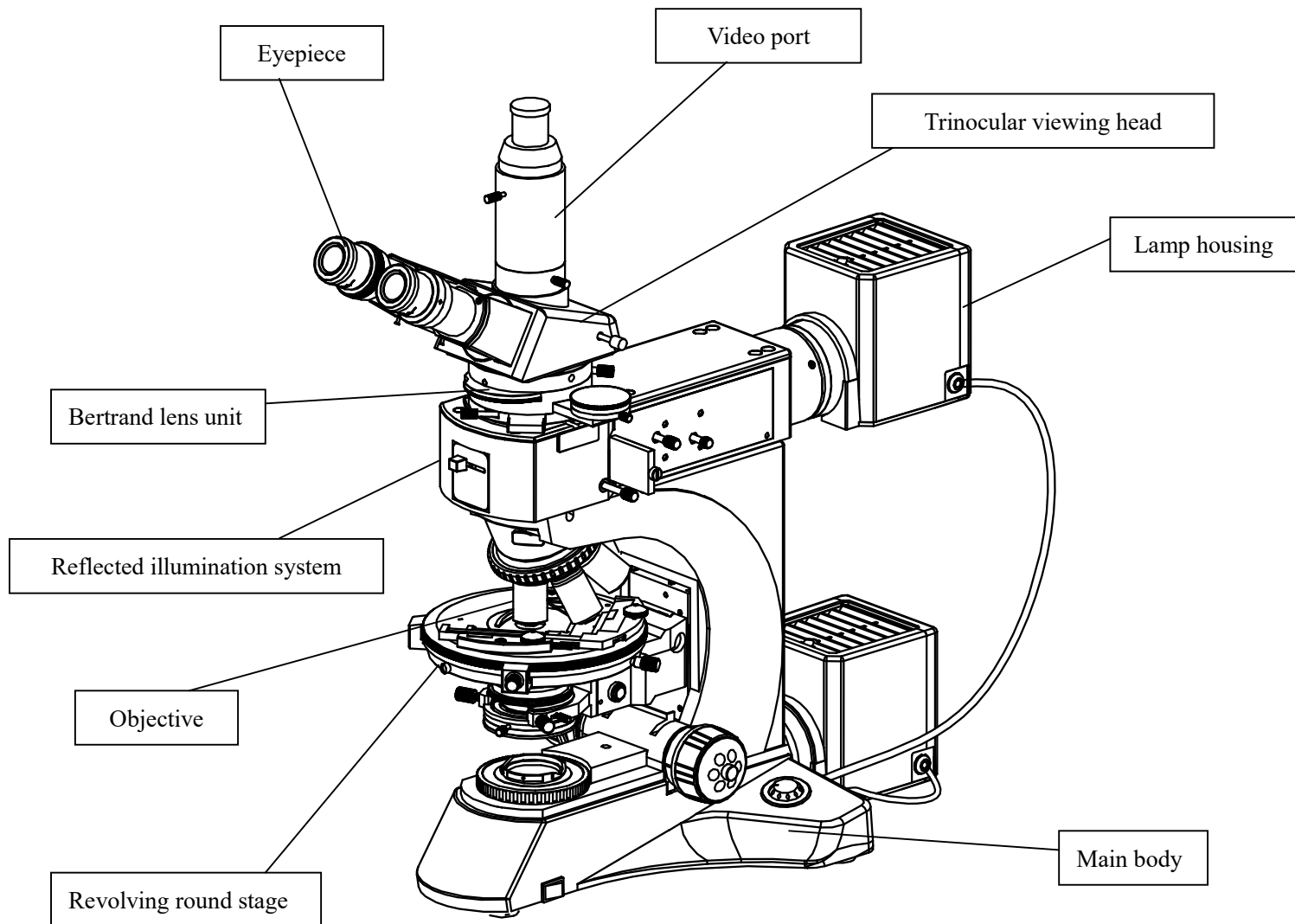
II. Maintenance

1. All the lenses have been well checked and adjusted. It is forbidden to disassemble them yourself.
2. The nosepiece and coarse/fine focus unit have a compact and precise frame, so please don't disassemble them as possible as you can.
3. Keep the instrument clean, wipe dust regularly, and be attention to avoid contaminating the optical elements especially.
4. The contaminations on the prism, as finger mark and oil, could be gently wiped with a piece of soft cloth or tissue paper, gauze which has been immersed in pure alcohol or xylene. **(Note that the alcohol and the xylene are all burned easily, do not let them near the fire, and use them in a drafty room as possible as you can.)**
5. Don't use organic solvent to wipe the non-optical elements, when you need to clean, use the soft detergent, please.
6. When using, if the microscope is splash by liquid, cut off the power at once, and

wipe up the moisture.

7. Do not disassemble any parts of the microscope. That will affect the function or decline the performance of the microscope.
8. Place the instrument in a cool, dry position. After using the microscope, remember to cover it with dust helmet. Do wait for the lamp house cooling completely before cover.

1. NOMENCLATURE

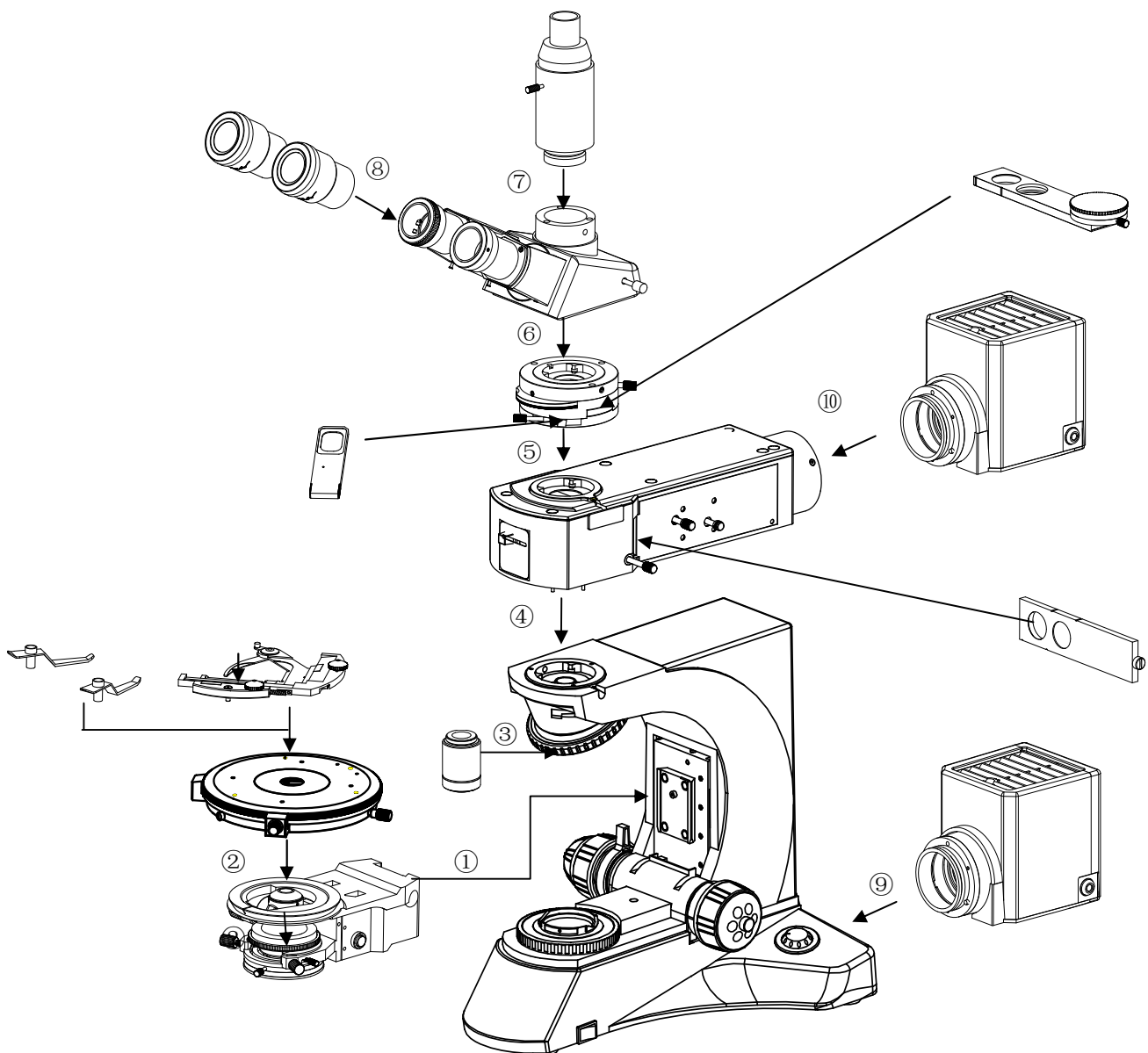


2.Assembly

2-1 Assembly Diagram

The diagram below shows how to assemble the various components. The numbers indicate the order of assembly.

- ★ When assembling the components, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.
- ★ Keeping the hexagon- spanner well, when change the spare parts, you will use it.



2-2 Detailed Assembly Procedure

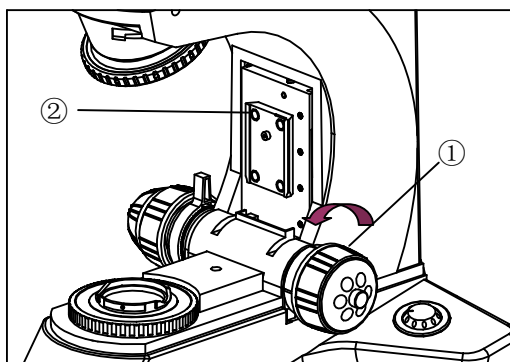


Fig.1

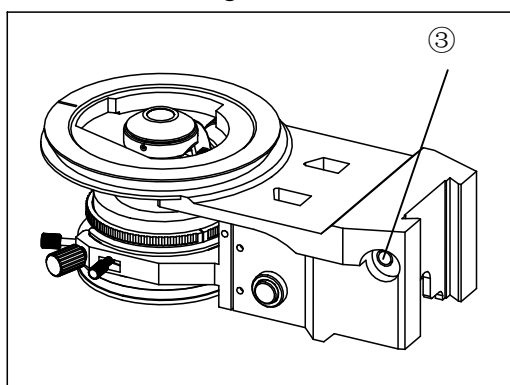


Fig.2

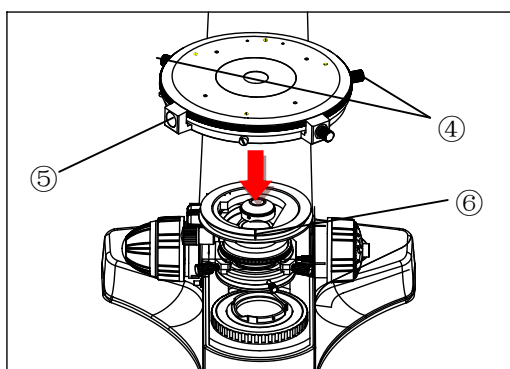


Fig.3

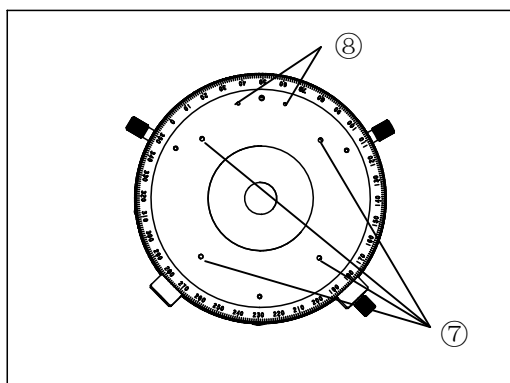


Fig.4

2-2-1 Installing the Polarizing Stage Support Device

1. Before installing the device, be sure to adjust the coarse focus knob①. Make the guide board② (see figure 1) down to the lowest position, so you can install the mechanical stage support device easily.
2. Hold on the mechanical stage support device (figure 2), place it from the top of the guide board (figure 1), and let the device (figure2) falling free until it reach the limit position. Use the hexagon wrench screw down the locking block ③ to make the stage support device and the guide board fixed together.

2-2-2 Mounting Revolving Round Stage

1. Loosen the centering knobs④.
2. Position the stage with the venire scale ⑤ in front, and carefully lower the stage onto the round dovetail on the stage bracket⑥ with the positioning pin on the stage aligned with the groove on the front of the stage bracket, then loosely tighten the centering knobs④. Turn the stage to check it is mounted properly, finally tighten the centering knob.

★ Mounting Stage Clips

Insert the stage clips securely into any two holes⑦ on the stage top surface.

★ Mounting Polarizing Ruler

Insert the positioning pins on the underside of the ruler into the positioning holes⑧ on the stage surface, using the Allen screwdriver provided with the microscope

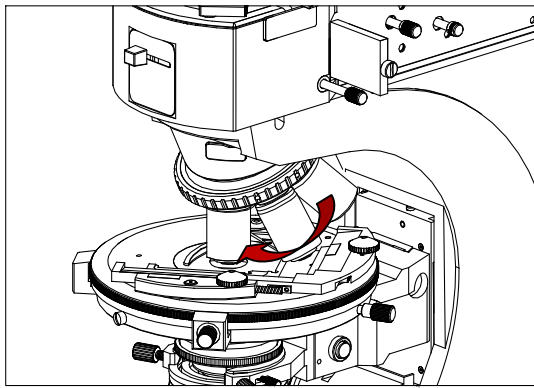


Fig.5

2-2-3 Installing the Objective

1. Adjusting the coarse focus knob until the support device of the mechanical stage reach its low limit position.
2. Insert the 10X objective into the primary hole (which without centering holes on its sides) on the nosepiece, then push the nosepiece clockwise and install other objectives by the sequence of low to high magnification (figure 5).

★ Installing objective in this way will make the change of magnification to be easier while in using.

★ Clean the objective regularly as it is very sensitive to dust.

★ When operating, use 10 × magnification objective to search specimen and focus firstly, then replace with higher magnification objective if necessary.

★ When replacing the objective, slowly turning the nosepiece until you hear “clicked”, that means the objective enter the required position--the light path center.

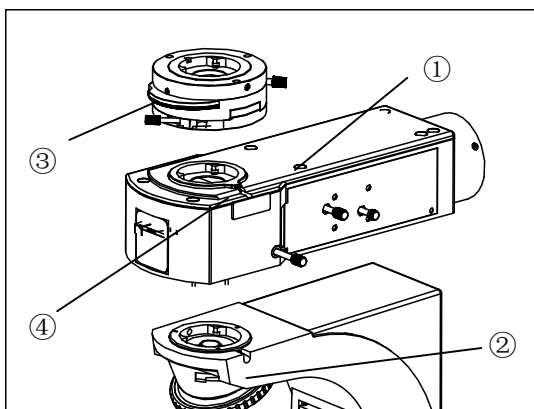


Fig.6

2-2-4 Mounting reflected illumination system (Fig.6)

1. Mount the Illumination System① into the round dovetail on the head of the microscope body properly and use the Allen screw driver to tighten the set screw② to fix it.

2-2-5 Mounting Bertrand lens unit (Fig.6)

1. Mount the Bertrand lens unit③ into the round dovetail on the reflection Illumination System①t properly and use the Allen screw driver to tighten the set screw④ to fix it.

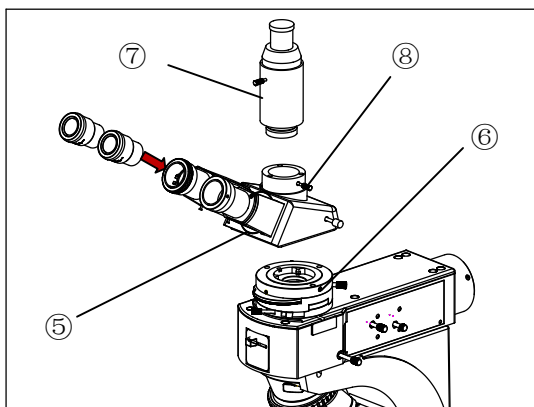


Fig.7

2-2-6 Mounting trinocular viewing head (Fig.7)

1. Mount the trinocular viewing head⑤ onto the illumination system properly and use the Allen screw driver to tighten the bolt⑥ to fix it.

2-2-7 Installing the Video Port (Fig.7)

Insert the video port ⑦ into the trinocular viewing head, then screw down the bolt⑧ to fix it.

2-2-8 Installing the Eyepiece (Fig.7)

Insert the eyepiece into the eyepiece tube until they are against each other.

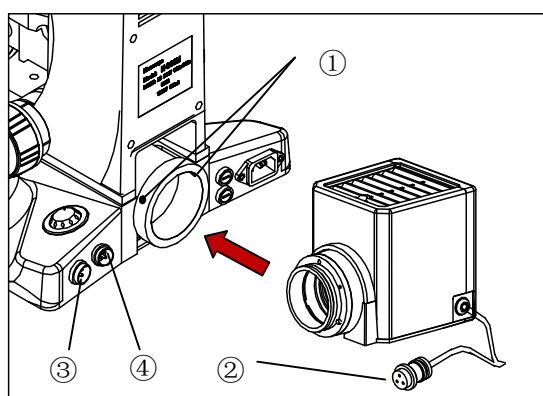


Fig.8

2-2-9 Installing the lamp house

1. Push the lamp house into the illumination kits (Fig. 8) gently until they are against each other, turn to a proper position and then screw down the bolt① to fix it.
 2. Insert the power plug② into the power jack of the microscope③/④, and screw down the bolt to fix it.
- For transmitted light illumination, the power jack③ is used. For reflected light illumination, the power jack④ is used.

2-2-10 Mounting Polarizer and Analyzer

1. Insert the polarizer⑤ into its slot with the silkscreen surface toward the front and make it in the light path center.
2. push the analyzer⑥ into its slot.

NOTE: the polarizer and analyzer are engaged when pushed in to the second click-stop position. To disengaged the polarizer and analyzer, and to place the empty hole in the light path, pull the analyzer out to the first click-stop.

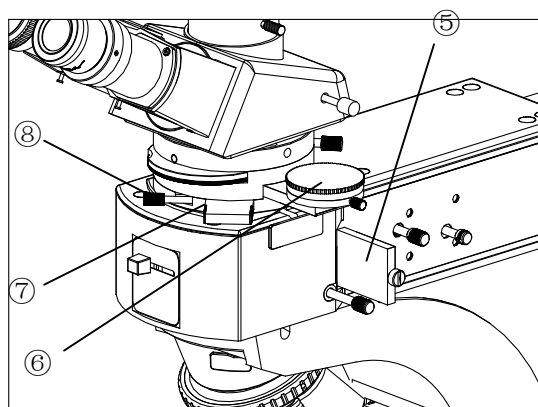
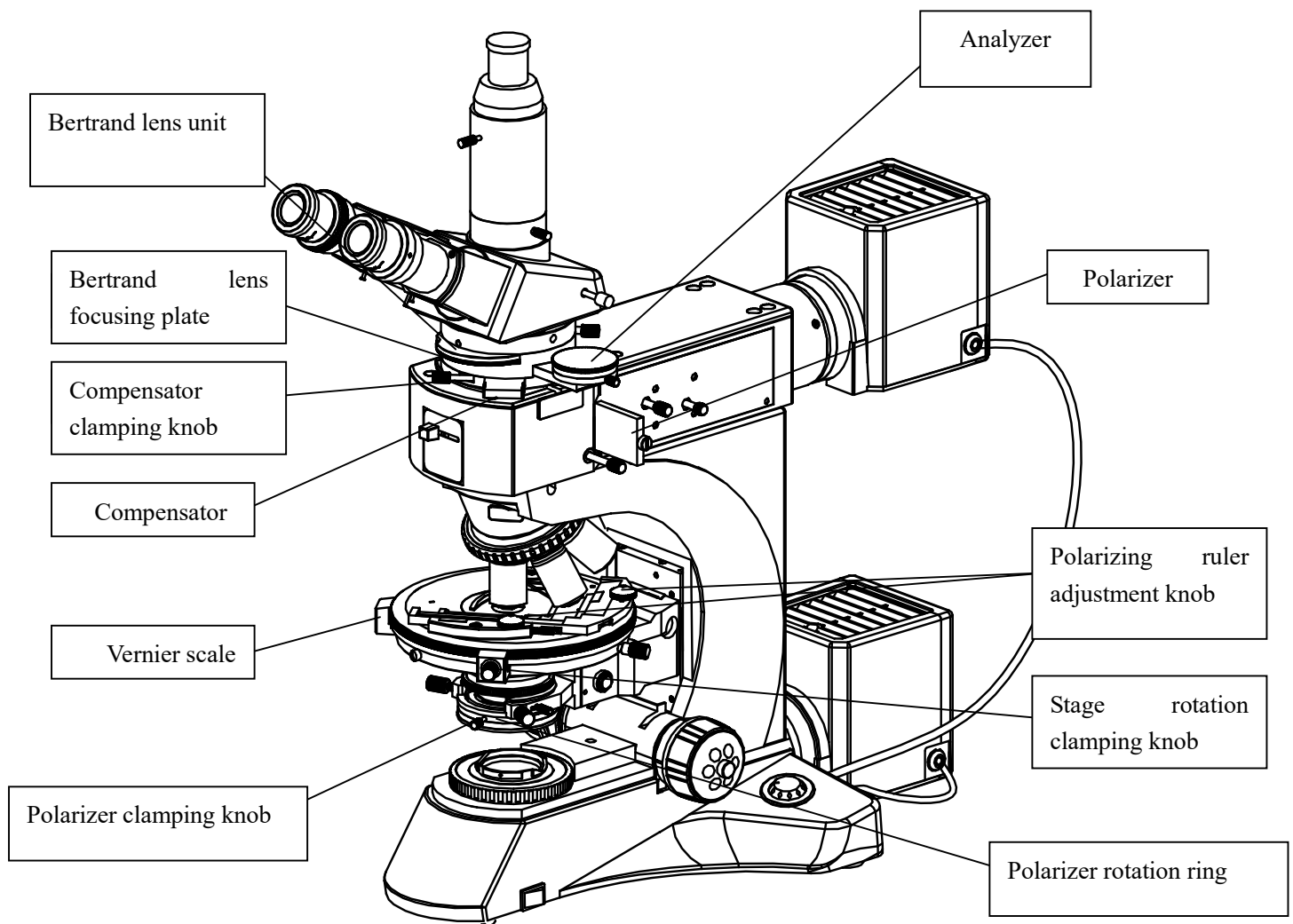


Fig.9

2-2-11 Mounting Test Plate Compensator

1. Insert the optical compensator⑦ into the test plate adapter, and securely tighten the clamping knob⑧, as shown in fig.9.

3. USING THE CONTROLS



Using controls

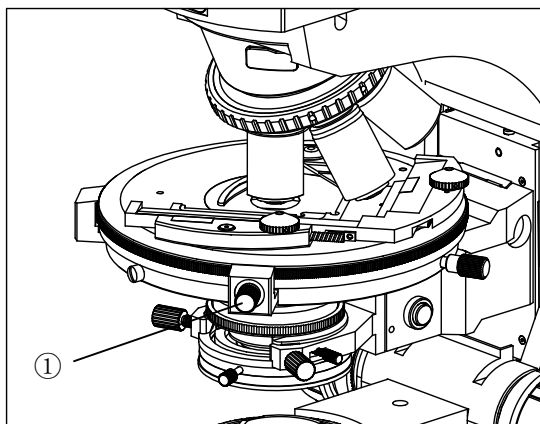


Fig.10

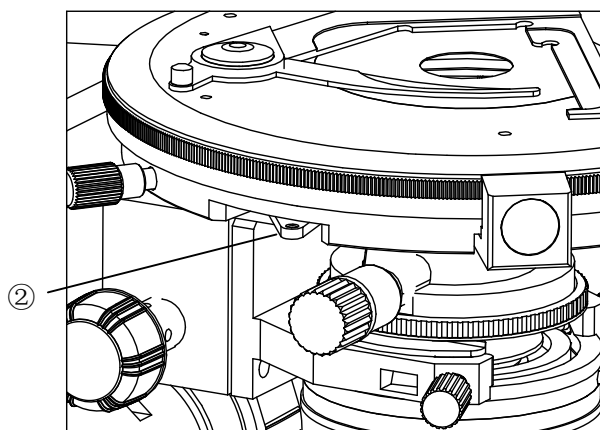


Fig.11

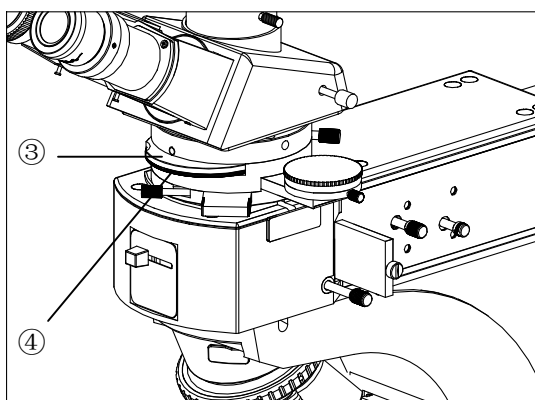


Fig.12

3-2-1 Stage Rotation

When the stage rotation clamping knob ① is loosened, the stage can be rotated horizontally through 360°.

3-2-2 Using 45° Click Stop Lever

When the 45° click stop lever ② is moved toward the observer, and the stage is moved from this position to the first click-stop position, the specimen is moved 45° to its diagonal position. To release the 45° click stop function, push back the lever.

3-2-3 Using the Bertrand Lens

By revolving the Bertrand lens dial ③, the Bertrand lens can be selected. At the “O” position, the lens is removed from the light path. At the “B” position, the lens is engaged.

3-2-4 Focusing the Bertrand Lens

During conoscopic observation, to focus the conoscopic image, turn the Bertrand lens focusing ring ④ slightly until a clear interference image is obtained in the eyepiece.

4. Polarized Light Observation

4-1 Adjustments before observation

4-1-1 Focus

Use the 10×objective to focus. To avoid the objective touch with the specimen, you should raise the mechanical stage and let the specimen close to the objective, then slowly separating them to focus. The operator can converse turn the coarse focus knob to get the specimen down ,and search images in the 10×ocular simultaneously, then use the fine knob to focus. At this moment, you can replace other magnification objectives safely, and focus without the risk of destroying the specimen.

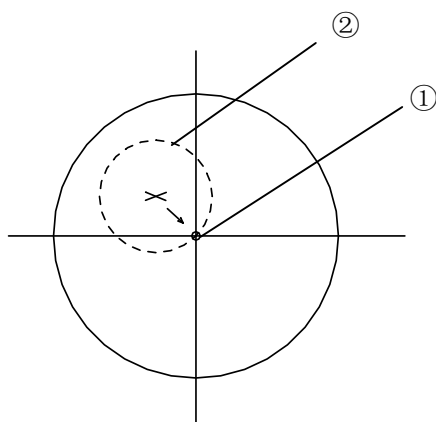


Fig.13

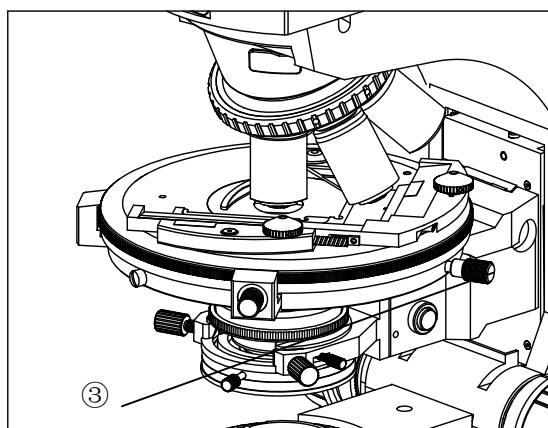


Fig.14

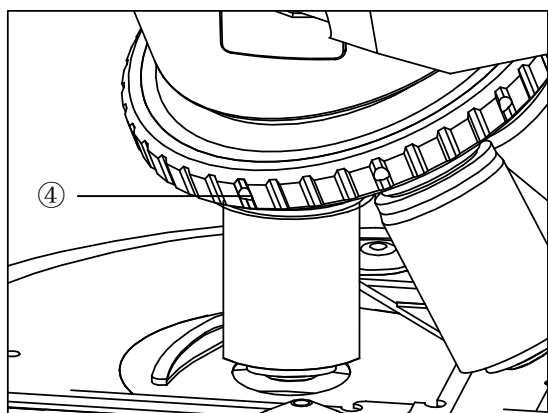


Fig.15

The tension of the coarse focusing knob has been adjusted before leaving factory. If it is too loose, for example, the stage decline slightly due to self-weight, the tension adjustment collar can be adjusted.

4-1-2 Adjusting the optical axis (Fig.13)

The revolving nosepiece is centerable. Before leaving the factory, the optical axis of the objective and the center of stage has been adjusted coaxial, please do not adjust them unless necessary.

★ Make sure the 10X objective is inserted into the primary hole on the centerable revolving nosepiece.

Perform the following adjustments if the optical axial and the center of stage is not coaxial.

1. Focus on the specimen by 10x objective and look for an easily recognizable detail① in the field. Move this detail in the center of the eyepiece cross lines.
2. When the stage is rotated, the detail moves in circle ②. Manipulate the two stage centering knobs③to coincide the imaginary center of the circle circumscribed by the detail with the intersection of the eyepiece cross lines.

3. Moving the specimen only, move a new specimen detail into the cross line center.
 4. Repeat steps 2 and 3 several times until the center of the stage rotation is in the center of the cross lines, i.e., when rotating the stage, the specimen stays in the center of the cross lines.
- This concludes centering of the optical axis for the 10X objective, which will act as the reference objective. Now, center the other objectives with the centerable nosepiece by engaging the objectives into the light path one after another.(each objective has 2 centering screw④on the nosepiece.

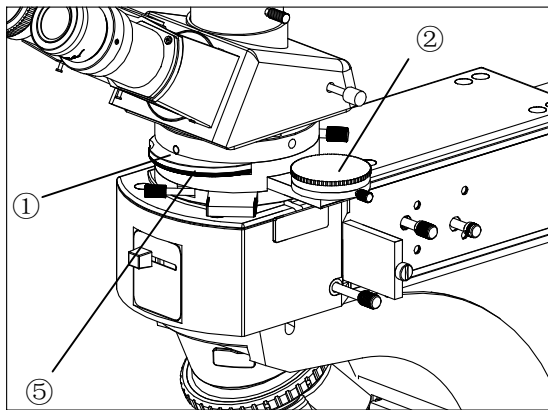


Fig.16

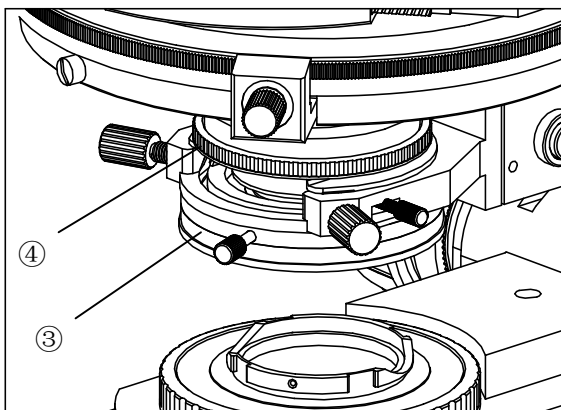


Fig. 17

4-2 Orthoscopic Observation

Orthoscopic observation is available for 4X~ 100X objectives.

- (1) Revolve the Bertrand lens dial① to “O” position to remove the Bertrand lens from optical path.
- (2) Swing out the top lens of the condenser.
- (3) For reflected illumination system, the polarizer is fixed and the analyzer can be 360° rotatable. Rotate the analyzer② until complete extinction is obtained.
- (4) For transmitted illumination system, the polarizer can be 360° rotatable, turn it until complete extinction is obtained.
- (5) place the specimen for orthoscopic observation.
- (6) insert test plates for further observation test and study.

4-3 Conoscopic Observation

Use 20X to 100X objectives.

- (1) Engage the polarizer and analyzer for extinction position
- (2) Swing the condenser top lens into the light path.
- (3) revolve the Bertrand lens dial①to “B” position to engage the lens into the light path.
- (4) open the aperture iris diaphragm④ to largest size.
- (5) revolve the focusing dial⑤ of the Bertrand lens to focus on the conoscopic image.

Note: If the periphery of the conoscopic image is dark, move the condenser vertically to find the position where the periphery is brightest.

5. Technical Specifications

1. Main specifications

1.system: Infinite system

2.polarized objective (plan)

Magnification	Numerical aperture (NA)	Thickness of cover slip(mm)	Working distance (mm)	Work type	illumination
5×	0.12	-	15.4	dry	T/R
10×	0.25	-	10	dry	T/R
20×	0.40	-	5.1	dry	T/R
40×	0.65	0.17	0.35	dry	For transmitted light
100×	1.25	0.17	0.13	oil	For transmitted light
50×	0.75	0		dry	For reflected light
100×	0.8	0		dry	For reflected light

3. Eyepiece with reticule

Category	Magnification	Field of view (mm)
Plan eyepiece	10×	Φ22
Crisscross eyepiece	10×	Φ22
Eyepiece with scale of crosshair	10×	Φ22
eyepiece with gridding	10×	Φ22

4. Total magnification

eyepiece	10×	10×	10×	10×	10×	10×
objective	5×	10×	20×	40×	50×	100×
Total magnification	50×	100×	200×	400×	500×	1000×

5. Rotatable stage: Diameterφ170mm, 360°scale。 Minimum reading 6'by means of vernier scale

6. Coaxial Coarse and Fine Focusing System,
Sensitivity and Graduation of Fine Focus: 0.001mm
Focusing movement range: 32mm

7. Polarizer: can be swung out

8. Analyzer:0°-360°rotatable

9. Bertrand lens: can be removed from optical path

10. Test plate compensator: 1/4λ test plate,λtest plate as well as quartz wedge test plate, inserted at 45 degree

11. Condenser: NA=0.9/0.25 top lens swing-out type

12. Illumination system: Koehler Illumination, halogen lamp 24V100W for reflected and transmittion light, brightness adjustable

2. Configuration Table

item	Specifications	TRF	RF	M
Main Body	Main frame	●	●	●
	Rotatable stage	●	●	●
	polarized ruler	○	○	○
	Condenser bracket	●	●	●
Viewing system	Trinocular tube	●	●	●
Polarizing attachment	polarizer	●	●	●
	Analyzer 0°-360°rotatable	●	●	●
	Bertrand lens: removable	●	●	●
nosepiece	Centerable quintuple	●	●	●
Test plate compensator	λ test plate (first-order red)	●	●	●
	$1/4\lambda$ test plate	●	●	●
	Quartz wedge test plate	●	●	●
	Empty test plate	●	●	●
filter	ND25、ND6	○	○	○
fitler	Blue,yellow, green,frosted	●	●	●
illumination	24V100W halogen lamp	●	●	●
	Spare lamp	●	●	●
eyepiece	10×plan eyepiece	●/2	●/2	●/2
	10× Crisscross eyepiece	●	●	●
	10× eyepiece with scale of crosshair	●	●	●
	10× mesh eyepiece	●	●	●
Strain-free objective	Plan 5×	●	●	●
	Plan 10×	●	●	●
	Plan 20×	●	●	●
	Plan 40×	●	/	●
	Plan 100× (oil)	●	/	●
	Plan 50×	●	●	/
	Plan 100×	●	●	/
condenser	Swing-out type condenser NA=0.9/0.25	●	●	●

User manual	•	•	•
COC	•	•	•
Packing list	•	•	•
Package	•	•	•