

Motic PA53MET User Manual

Version 1.0.1

IMPORTANT NOTICE

This product may malfunction due to electromagnetic waves caused by portable personal telephone, transceivers, radio-controlled toys, etc. Be sure to avoid having the above objects, which affect the normal operation of the product, brought near the product. The information in this publication has been carefully checked and is believed to be entirely accurate at the time of publication. MOTIC assumes no responsibility, however, for possible errors or omissions, or for any consequences resulting from the use of the information contained herein.

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1. SAFETY INFORMATION

1.1 Introduction

Safety is everyone's responsibility. The safe use of this equipment is largely dependent upon the installer, user, operator, and maintainer. It is imperative that personnel study and become familiar with this entire manual before attempting to install use, clean, service or adjust this equipment and any associated accessories. It is paramount that the instructions contained in this manual are fully understood and followed to enhance safety to the patient and the user/operator. It is for this reason that the following safety notices have been placed appropriately within the text of this manual to highlight safety related information or information requiring special emphasis. All users, operators, and maintainers must be familiar with and pay particular attention to all Warnings and Cautions incorporated herein.

WARNING

“Warning” indicates the presence of a hazard that could result in severe personal injury, death or substantial property damage if ignored.

CAUTION

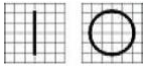
“Caution” indicates the presence of a hazard that could result in minor injury, or property damaged if ignored.

NOTE

“Note” describes information for the installation, operation, or maintenance of which is important but hazard related if ignored.

1.2 Safety Symbols PA53MET Upright Compound Microscope

The International Electro technical Commission (IEC) has established a set of symbols. The symbols are shown as below. This applies only to the instrument that has the certification symbol printed explicitly on the product label or sticker.



I and O on power switch represent ON and OFF respectively.



This symbol identifies caution, risk of danger. Ensure you understand the function of this control before using it. Control function is described in the appropriate User's or Service Manual.



This symbol identifies hot surface.



This symbol identifies the point where the system safety ground is fastened to the chassis. Protective earth connected to conductive parts of Class I equipment for safety purposes.



This symbol identifies Alternating Current.



Disposal of your old appliance

When this crossed-out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.

All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.

The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.

For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product.

1.3 Environment factors

Avoid the following environments for operation or storage:

- Where the equipment is exposed to water vapor. Don't operate an equipment with a wet hand.
For indoor use only
- Where the equipment is exposed to direct sunlight.
- Where the temperature changes extremely
Normal operating temperature range is from 10°C to 40°C, Humidity is below 85%.
Altitude is from 700 to 1060hpa
- Where it is near the heat equipment.
- Where the equipment is subject to excessive shocks or vibrations.
- Where equipment is exposed to chemical material or explosive gas.
- Pull out the power cord with holding the plug, not the cord.
To avoid risk of electric shock, this equipment must only be connected to the supply mains with protective earth.

Avoid places where the ambient temperature falls below 10°C or exceeds 40°C for normal operation, or below -10°C or exceeds 55°C for transportation and storage. Humidity should be maintained below 95% for normal operation, transportation and storage. The atmospheric pressure in operation, transportation and storage is from 700 to 1060hpa. of Altitude up to 2,000m.

1.4 Safety Precautions

This equipment has been developed and tested according to safety standards as well as national and international standards. This guarantees a very high degree of safety for this device. The legislator expects us to inform the user expressively about the safety aspects in dealing with the device. The correct handling of this equipment is imperative for its safe operation. Therefore, please read carefully all instructions before switching on this device. For more detailed information, please contact our Customer Service Department or one of our authorized representatives.

- This equipment must not be used (a) in an area that is in danger of explosions and (b) in the presence of flammable, explosive, or volatile solvent such as alcohol, benzene or similar chemicals.
- Do not put or use this device in humid rooms. Humidity should be maintained between 30 and 85% for normal operation. Do not expose the device to water splashes, dripping water, or sprayed water. Do not place containers containing fluids, liquids, or gases on top of any electrical equipment or devices.
- The equipment must be operated only by, or under direct supervision of a properly trained and qualified person.
- Modifications of this equipment may only be carried out by MOTIC's service technicians or other authorized persons.
- Customer maintenance of this equipment may only be performed as stated in the User's Manual and Service Manual. Any additional maintenance may only be performed by MOTIC's service technicians or other authorized persons.
- The manufacturer is only responsible for effects on safety, reliability, and performance of this equipment when the following requirements are fulfilled: (1) The electrical installation in the respective room corresponds to the specifications stated in this manual and (2) This equipment is used, operated, and maintained according to this manual and Service Manual.
- The manufacturer is not liable for damage caused by unauthorized tampering with the device(s). Such tampering will forfeit any rights to claim under warranty.
- This equipment may only be used together with accessories supplied by MOTIC's. If the customer makes use of other accessories, use them only if their safe usability under technical safety aspects has been proved and confirmed by MOTIC or the manufacturer of the accessory.
- Keep the User's Manual and Service Manual in a place easily accessible at all times for persons operating and maintaining the equipment.
- Do not force cable connections. If a cable does not connect easily, be sure that the connector (plug) is appropriate for the receptacle (socket). If you cause any damage to a cable connector(s) or receptacle(s), let the damage(s) be repaired by an authorized service technician.
- Please do not pull on any cable. Always hold on to the plug when disconnecting cables.

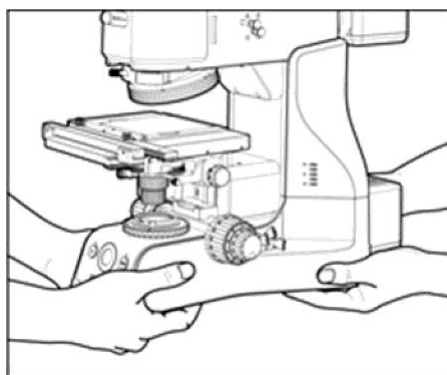
- Before every operation, visually check the equipment for exterior mechanical damage(s) and for proper function.
- Immediately turn off and unplug any equipment that gives off smoke, sparks, strange noises, or odors.
- After the equipment has been used in an observation of a specimen that is accompanied with a potential of infection, clean the parts coming in contact with the specimen to prevent infection.
- In case the specimen is damaged by erroneous operation, promptly take the infection prevention measures.
- Power Supply Cord set (international) - (Detachable) Rated 10 A, 250 V. Plug type CEE 7A/II, Connector type IEC 60320/C13, and Cord type H05W-F3G, min. 0.75 mm²,3-conductor terminating in molded-on grounding type attachment plug. <HAR> marked on the cord. Maximum 4.0 m long.
- Do not position the equipment so that it is difficult to operate the disconnecting device, (disconnecting device: power cord, appliance inlet, etc.)

CAUTION

To avoid the risk of electric shock, this equipment must only be connected to a supply main with protective earth.

The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer.

- When moving the microscope, grasp rear handle and the base with more than two peoples as shown below.



2. INTRODUCTION

2.1 Indication for use (Intended use)

This instrument has been designed to be used to observe magnified images of specimens in routine and research applications. Do not use this instrument for any purpose other than its intended use.

2.2 Classification

- Protection against electric shock: Class I
- Protection against harmful ingress of water: Ordinary, IPXO
- Mode of operation: Continuous

WARNING

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

WARNING

Class A equipment is intended for use in an industrial environment. In the documentation for the user, a statement shall be included drawing attention to the fact that there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

3. OPERATING CONDITION

- As long as the device is in its original package it can be exposed to the following environmental conditions for up to 15 weeks for shipping and storage without risk of damage:
 - A. Temperature range: from -40°C to +70°C;
 - B. Relative humidity range: below 100%;

- The device can be in the following storage conditions after unpackaged:
 - A. Temperature range: from -10°C to +55°C;
 - B. Relative humidity range: below 95%;

- The device is made to operate under the following environmental conditions:
 - A. Temperature range: from -10°C to +40°C;
 - B. Relative humidity range: below 85%;

The device neither generates nor receives electromagnetic interference when used near other equipment. Therefore, no preventive or corrective measures are required.

4. GETTING READY

- A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
- When moving the microscope, first remove the specimens, eyepieces, and filters so that they will not drop. Also remove other modules (e.g. lamp housing, stage) for decreasing system weight. Then securely grasp the microscope by the rear of arms and the base.
- Do not grasp focus adjustment knob, binocular tube, lamp housing, and stage. It may cause serious damage to the microscope.
- The desktop should be a level surface with an inclination of less than 3°. The microscope may become unstable when certain intermediate attachment and/or photography unit are mounted on it. Be careful so that the microscope does not topple down.

WARNING

The bulb, the lamp socket and areas near these will be extremely hot during and right after use. Set the main switch off, disconnect the power cord from the wall outlet, then wait until lamp housing has cooled down before moving the microscope.

5. MAINTENANCE AND STORAGE

- To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze). If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

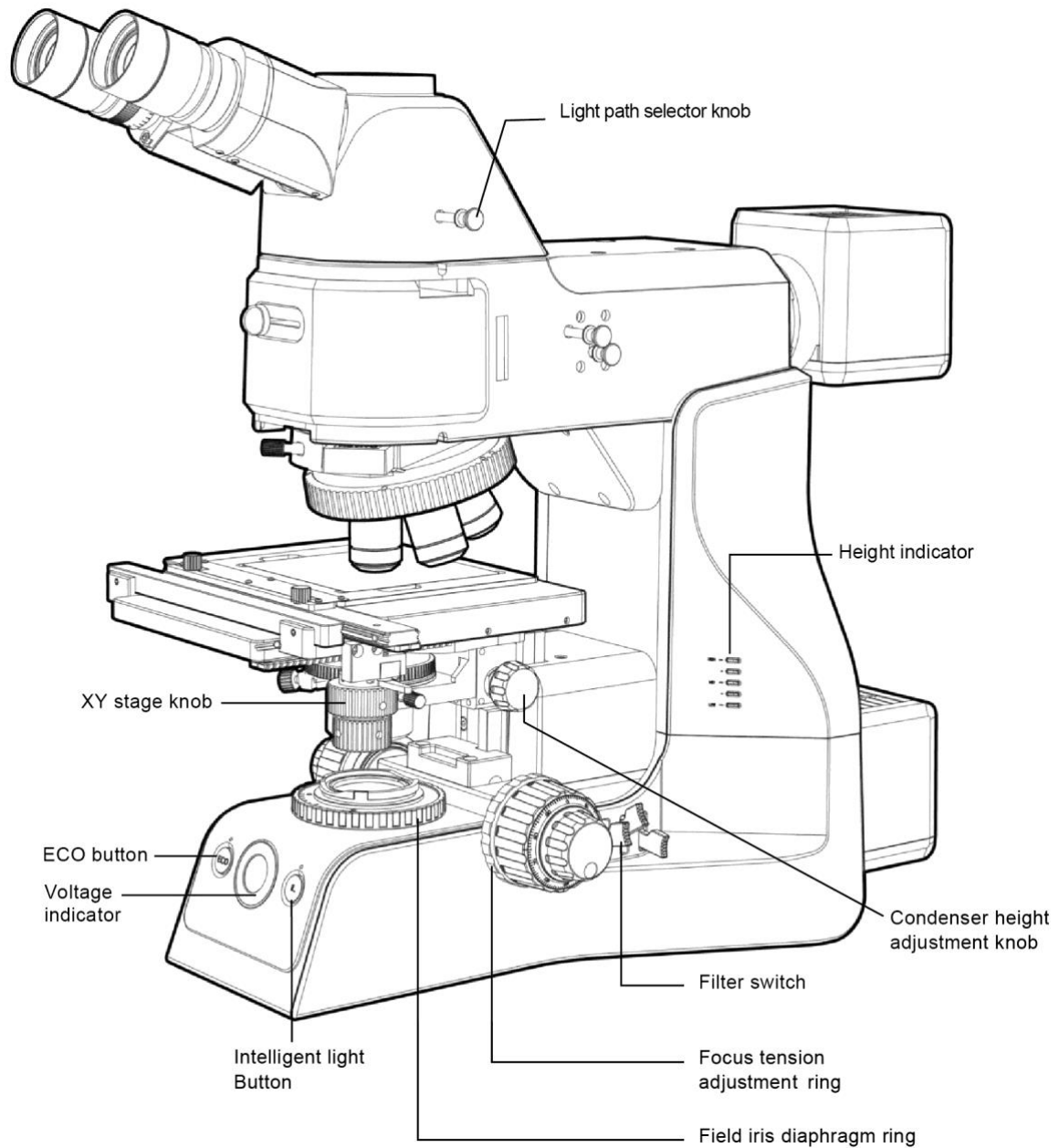
CAUTION

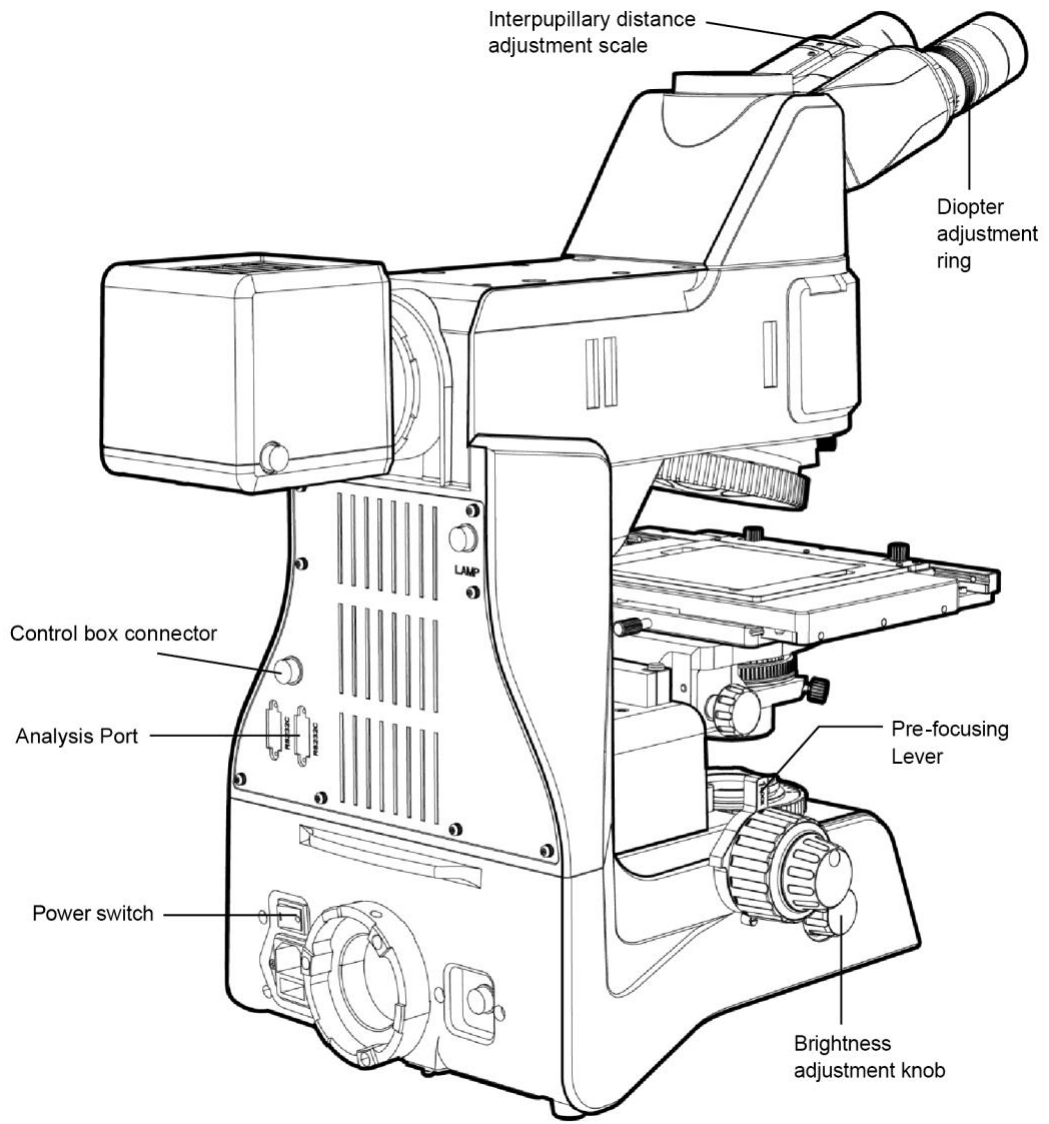
Since the absolute alcohol is highly flammable, it must be handled carefully.

Be sure to keep it away from open flames or potential sources of electrical sparks - for example, electrical equipment that is being switched on or off. Also remember to always use it only in a well-ventilated room.

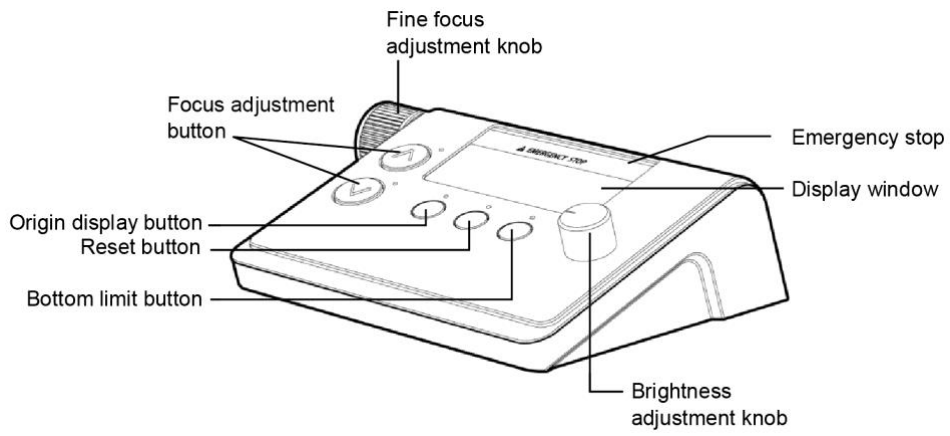
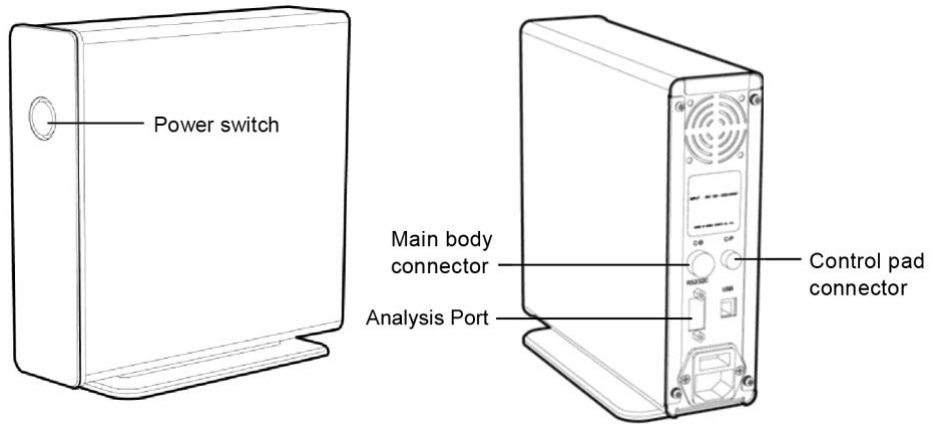
- Do not attempt to use organic solvents to clean the microscope components other than the glass components because they use plastic resin materials extensively. To clean them, use a lint-free, soft cloth slightly moistened with a diluted neutral detergent.
- Do not disassemble any part of the microscope as this could result in malfunction or reduced performance.
- When disposing of the microscope, check the regulations and rules of your local government and be sure to observe them.

6. NOMENCLATURE





(Control box and control pad are provided PA53MET-3D, PA53MET-BD-3D only.)



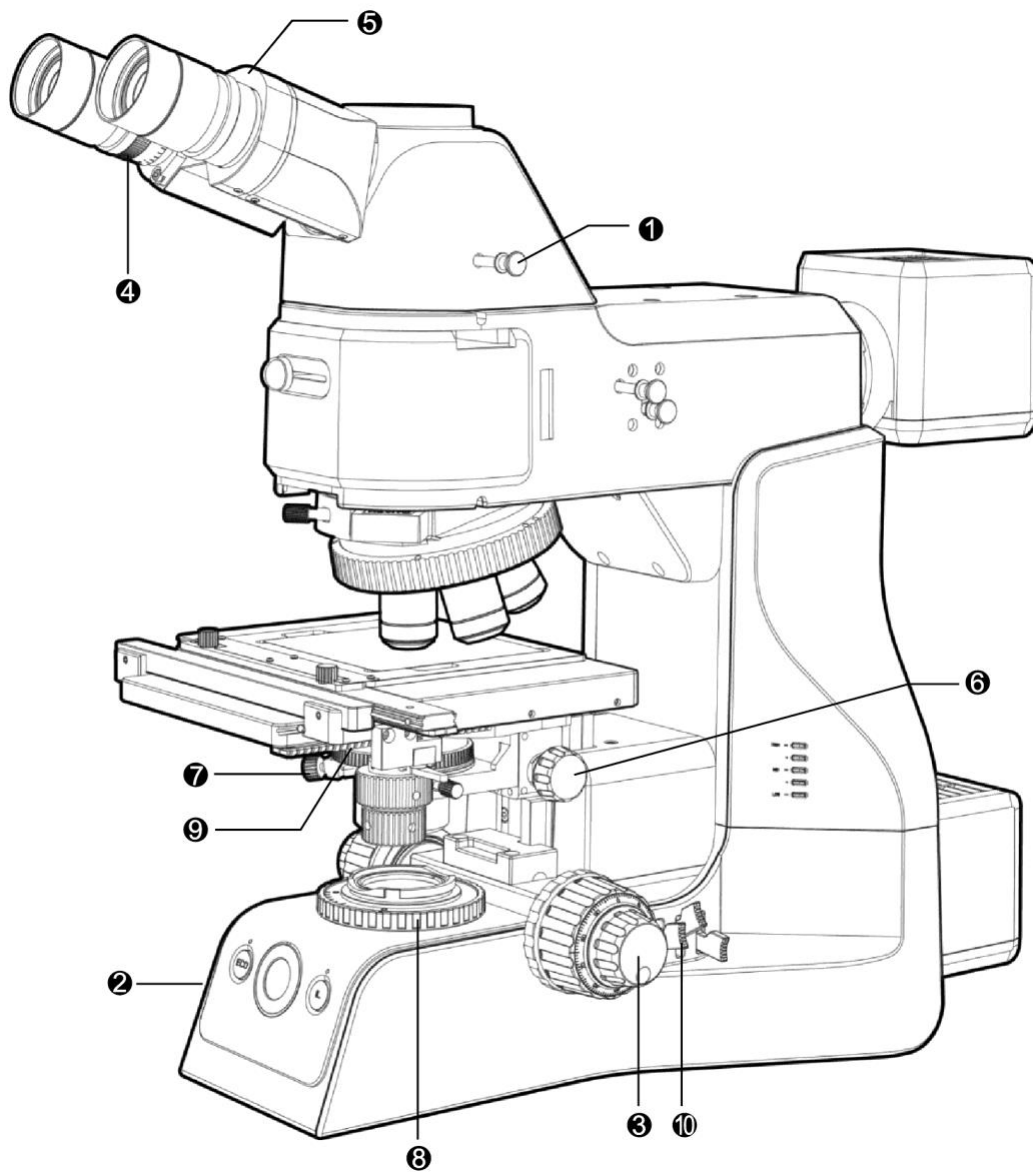
7. OBSERVATION PROCEDURE

7.1 Preparation

- If you have not assembled the microscope yet, please read “**Chapter 11. Assembly**”.
- For the reflected light observation, please refer its operation manual.

7.2 Procedure

- Set the main switch to T (ON).
- Select the light path to eye or camera. (① Light path selection knob)
- Select transmitted light illumination (② Brightness control knob)
- Place the specimen on the stage.
- Engage the 10x objective in the light path.
- Focus the specimen. (③ Coarse/fine adjustment knob)
- Adjust brightness (② Brightness control knob)
- Adjust diopter if light path selection is eye (④ Diopter adjustment ring)
- Adjust interpupillary distance if light path selection is eye (⑤ Binocular tube)
- Adjust the height and position of condenser. (⑥ Condenser height adjustment knob, ⑦ Condenser centering knob)
- Engage the desired objective in the light path and bring the specimen in focus.
- Adjust the aperture iris diaphragm and field iris diaphragm (⑧ Field iris diaphragm ring, ⑨ Aperture iris diaphragm ring)
- Insert the required filter. (⑩ Filter switch)
- Adjust the brightness. (② Brightness control knob)
- Start observation.



8. OPERATION

8.1 Base

8.1.1 Voltage Indication and Switch

- Push the brightness adjustment knob ① to switch transmitted / reflected light illumination.
- Turn the brightness adjustment knob ① counter-clockwise to increase the voltage and make illumination brighter, and vice versa.
- The indicator ② indicate the voltage.

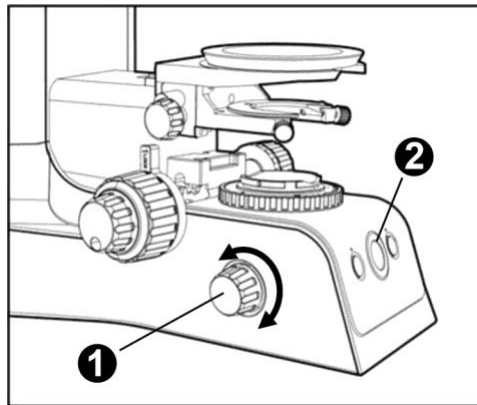


Fig.1

8.1.2 Turn ON/OFF Power saving function

- Push ECO button ① to toggle power saving function on and off.
- The ECO indicator LED ② turns on when the power saving function turns on.
- If the power saving function turns on, lamp is automatically turns off after 5 minute when there is nobody sitting in front of microscope.

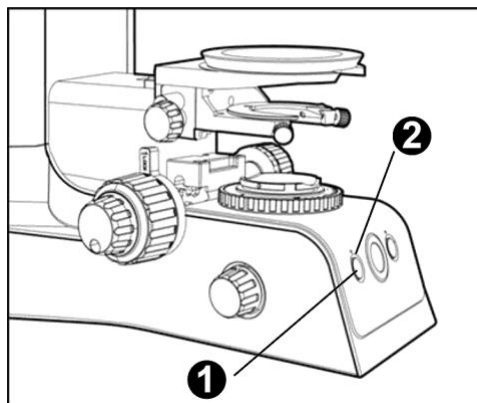


Fig.2

8.1.3 Turn ON/OFF Intelligent Light function

- Push IL button ① to toggle intelligent light function on and off.
- The IL indicator LED 1 turns on when the intelligent light function turns on.
- If the intelligent light function turns on, the brightness (lamp voltage) automatically changed preset value when the revolving nosepiece is changed.
- To set new preset brightness, press IL button long while IL indicator LED ② turns on.

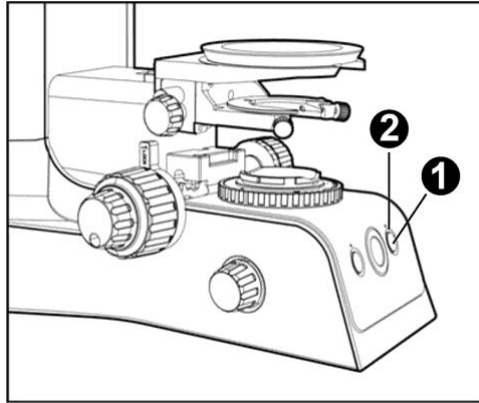


Fig. 3

8.1.4 Using the built-in Filters [PA53MET-T, PA53MET-BD-T]

- Each of filter switch can engaged into the light path by push up the switch. Push down the switch disengages the filter from light path.

	Filter Type/Purpose
1	ND6 (Neutral Density Filter for light adjustment, transmittance 6%)
2	ND25 (Neutral Density Filter for light adjustment, transmittance 25%)
3	LB (Light balancing Filter for color balancing)

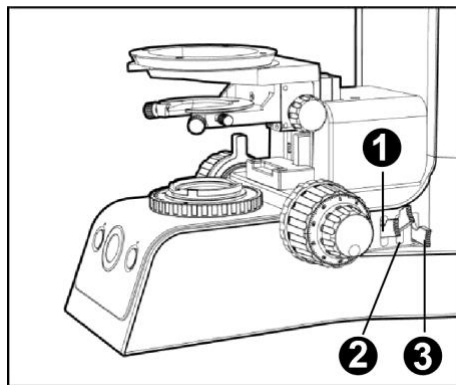


Fig. 4

8.2 Focusing Block

8.2.1 Replacing the Fine Adjustment Knob

- The fine adjustment knob is designed detachable to prevent interference with hand during manipulation of the fine adjustment knob or XY-axis knob.
- Usually attach the knob on the opposite side to the XY-axis knob.
- Using the Allen screwdriver, loosen the clamping screw ① and remove the fine adjustment knob ②.

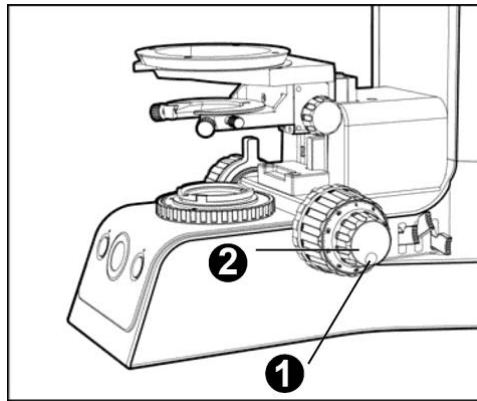


Fig. 5

8.2.2 Adjusting the Coarse Adjustment Knob Tension

- If desired, you can change the coarse adjustment tension using the tension adjustment ring ①.
- Turning the ring clockwise increase tension, and vice versa.

NOTE

If the tension is too low, the stage drops by itself and focus is quickly lost after adjustment with the fine adjustment knob.

In this case, turn the ring clockwise to increase tension.

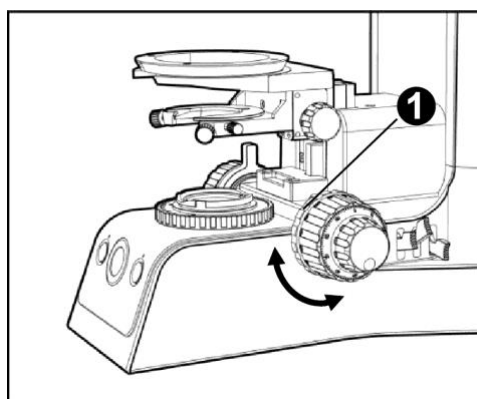


Fig. 6

8.2.3 Pre-focusing Lever

- The pre-focusing lever ① ensures that the objectives does not come in contact with the specimen and simplifies focusing.
- After focusing on the specimen with the coarse adjustment knob, turn this lever clockwise and lock. The upper limit on coarse adjustment movement is set at the locked position.
- After changing a specimen, refocusing is easily accomplished by rotating the coarse adjustment knob to reach the pre-focused position, then making fine adjustment with the fine adjustment knob.
- Turn the lever counterclockwise to unlock.

NOTE

When the pre-focusing lever is locked, a coarse movement stroke is reduced due to the microscope's mechanism, causing the stage not to be able to be lowered to the lower limit. To lower the stage to the lower limit, release the pre-focusing lever.

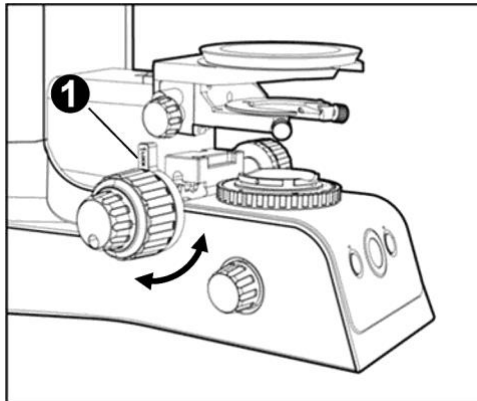


Fig. 7

8.3 Stage

8.3.1 Rotating the Stage

- Slightly loosen the stage clamping screw ①.
- The stage can be rotated both direction by the stage clamping screw.

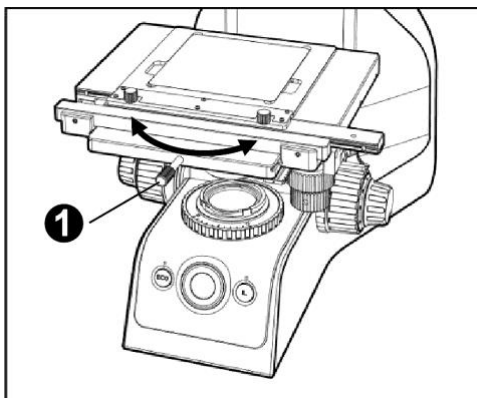


Fig.8

8.4 Observation Tube

8.4.1 Adjusting the Interpupillar Distance

- While looking through the eyepieces, adjust for binocular vision until the left and right fields of view coincide completely.
- The Index dot ① indicates the interpupillary distance.

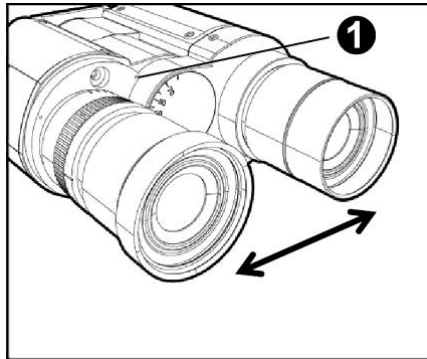


Fig. 9

8.4.2 Adjusting the Diopter

- The diopter adjustment ring is used when the eyepiece has no function of diopter adjustment.
- Looking through the right eyepiece (there is no diopter adjustment ring), rotate the coarse and fine adjustment knobs to bring the specimen into focus
- Looking through the left eyepiece (there is a diopter adjustment ring), turn only the diopter adjustment ring ① to focus on the specimens.

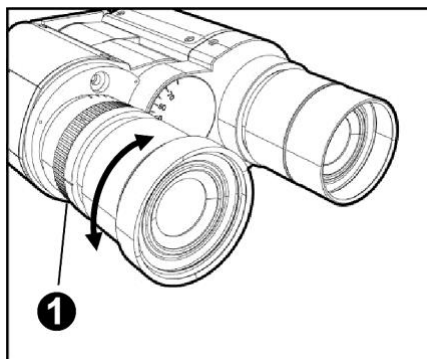


Fig. 10

8.4.3 Using the Eye Shades

- When wearing eyeglasses, use with the eyeshades ① in the normal, folded-down position. This will prevent the eyeglasses from being scratched.
- When not wearing eyeglasses, extend the folded eye shades in direction of the arrow to prevent extraneous light from entering between the eyepieces and eyes.

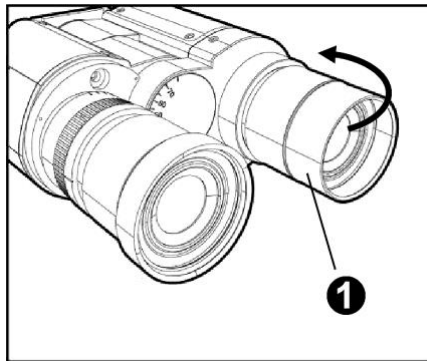




Fig. 11

8.4.4 Selecting the Light Path of the Trinocular Tube

- Slide the light path selector knob ① to select the desired light path.

Light Path Selector Knob	Indication	Light Path Ratio
Pushed-in position		Binocular 100%
Pulled-out position		TV & Photo 100%

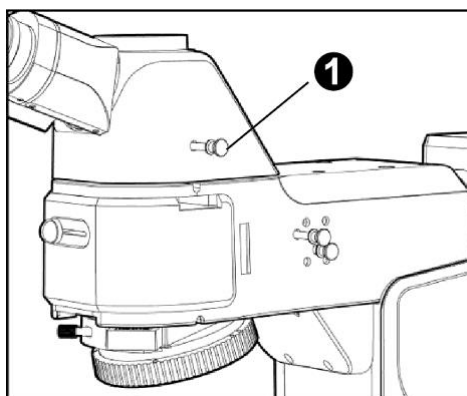


Fig. 12

8.5 Condenser [PA53MET-T, PA53MET-BD-T]

8.5.1 Centering the Condenser

- Turn the condenser height adjustment knob ① to raise the condenser to its upper limit.
- Focus on the specimen using the 10x objectives.
- Rotate the field iris diaphragm ring ② in the direction of the clockwise so that the diaphragm image comes inside the field of view.
- Manipulate the condenser height adjustment knob ① to focus on the diaphragm image.
- Turn the two condenser centering knob ③ to move the iris diaphragm image to the center of the field of view.
- Gradually open the field iris diaphragm. The condenser is properly centered if the iris image is centered and inscribed in the field of view.
- During actual use, open the field diaphragm slightly until its image circumscribes the field of view.

NOTE

The field iris diaphragm restricts the diameter of the beam of light entering the objectives and thus excludes extraneous light, improving image contrast. The diameter of the field iris should be adjusted for objective power to the extent that it just circumscribes the field of view.

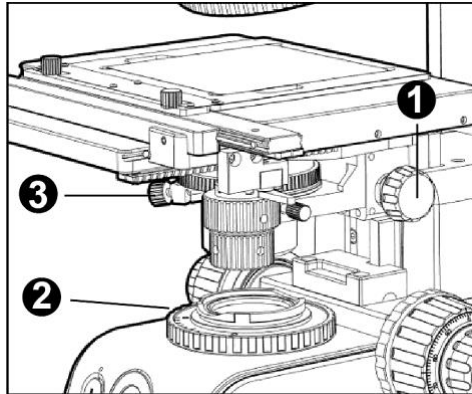


Fig. 13

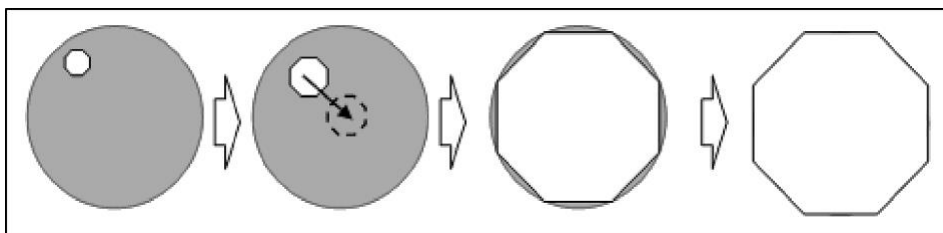


Fig. 14

8.5.2 Setting the Aperture Iris Diaphragm

- The aperture iris diaphragm determines the numerical aperture of the illumination system. It has an effect of adjusting image resolution and contrast.
- Since the contrast of microscope specimens is ordinarily low, setting the condenser aperture iris diaphragm to between 70 and 80% of the NA of the objectives in use is usually recommended.
- Remove one of the eyepieces, look into the eyepiece sleeve and adjust the aperture iris diaphragm ring ① until the image is about 70% of objective's exit pupil.
- You can use the condenser numerical aperture scale to adjust the aperture iris diaphragm.

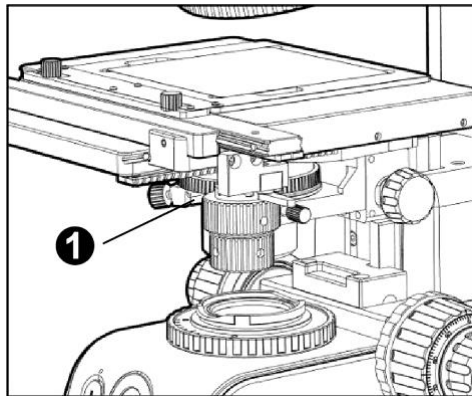


Fig. 15

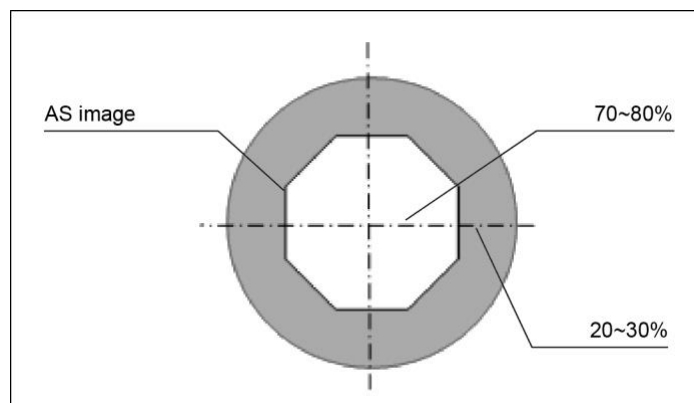


Fig. 16

8.6 Control pad [PA53MET-3D, PA53MET-BD-3D]

8.6.1 General function

- Push the focus adjustment button ① to control height of stage.
- Rotate the fine focus adjustment knob ② to control height of stage precisely.
- Push the focus adjustment knob ② to change precision of control.
- Rotate the fine focus adjustment knob ③ to change voltage of lamp.

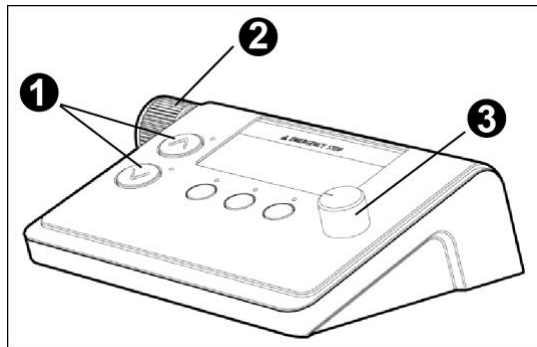


Fig. 17

8.6.2 Height display

- Height of 3D-profiler is displayed in height display window ①.
- Two type of height can be displayed;
 - a) Absolute height: height from 3D-profiler's mechanical origin,
 - b) Relative height: height from origin where user set.
- Push origin display button ② to toggle absolute height/relative height.
- Push reset button ③ to set origin of relative height.

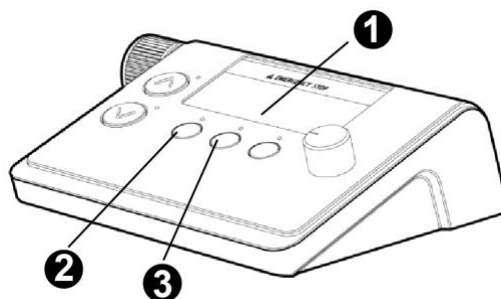


Fig.18

8.6.3 Safety function

- Push bottom limit button ① to set lower limit of 3D-profiler.
- Setting Bottom limit ensures that that the objective does not come in contact with the specimen.
- Push bottom limit button ① to unset lower limit of 3D-profiler.
- Push emergency stop button ② to stop 3D-profiler immediately. Use this button when the objectives is about to contact with the specimen.

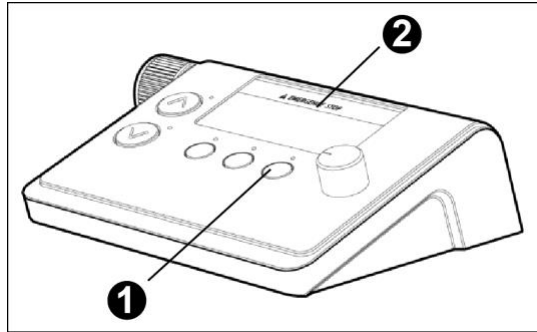
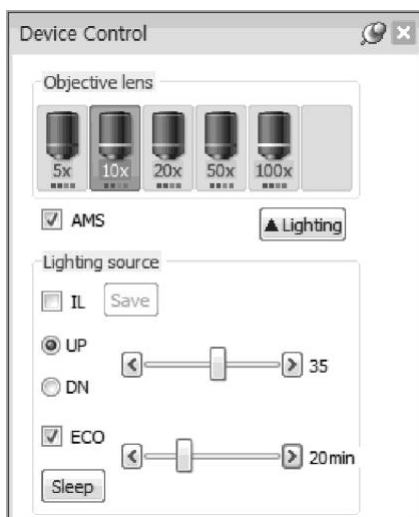


Fig. 19

8.7 Linking Motic Analysis

8.7.1 Computer Control

- Some parameter can be controlled by using Motic Analysis program.
- Run Motic Analysis program in computer.
- Select “**Microscope - MOTIC Upright**” in menu bar.
- Parameter of IL and ECO function can be changed in “**microscope control**” window.
- For the precise setting, please refer program manual.



9. TROUBLESHOOTING GUIDE

Under certain conditions, performance of the microscope may be adversely affected by factors other than defects. If problems occur, Please review the following list and take remedial action as needed. If you cannot solve the problem after checking the entire list, please contact MOTIC

9.1 Electrical system

Problem	Cause	Remedy
1. Lamp dose not light	Power cord is unplugged.	Plug power cord into the outlet
	Cable of lamp-house is not connected.	Connect the cable.
	Lamp is burned out.	Replace the lamp.
	Wrong type of lamp is used.	Use the correct lamp type.
2. Lamp flickers	Lamp is nearly burned out.	Replace lamp.
	Power cord or cable of lamp-house is not connected securely.	Connect it securely.
	Lamp is not collected securely.	Insert it securely.

9.2 Optical system

Problem	Cause	Remedy
1. Lamp lights, but field of view is dark	Lamp voltage is too low	Adjust brightness with brightness control knob.
	Light path selection knob is set to 100% camera position.	Set to 100% eyepiece position.
	Aperture and field diaphragm is stopped down too far.	Open to a suitable size.
	Condenser is not centered properly	Center the condenser.
	Nosepiece is not rotated to a click stop position.	Rotate the nosepiece to a click stop position.
2. Field of view is vignetted or not evenly illuminated	Light path selection knob is in an intermediate position.	Set to 100% eyepiece position.
	Filter selection lever is in an intermediate position.	Set it to click stop position.
	Nosepiece is not attached properly.	Push the slide dovetail until it is stopped.

	Nosepiece is not rotated to a click stop position.	Rotate the nosepiece to a click stop position.
	Condenser is not attached properly.	Re-attach it.
	Condenser is not centered properly.	Center the condenser.
	Field diaphragm is stopped down too far.	Open to a suitable size.
	Lamp is not mounted correctly.	Push the pins of lamp until the stop position.
3. Dirt or dust is visible in the field of view	Dirt or dust exists on the eyepiece.	Clean it.
	Dirt or dust exists on the condenser.	
	Dirt or dust exists on the specimen.	
4. One side of image is blurred	Nosepiece is not attached properly.	Push the slide dovetail until it is stopped.
	Nosepiece is not rotated to a click stop position.	Rotate the nosepiece to a click stop position.
	Stage is not mounted properly.	Re-attach it.
5. Contrast is poor	Objective is not suitable for the microscope.	Use the specified objective.
	Aperture diaphragm is stopped down too far.	Open to a suitable size.
	Condenser is lowered too far.	Adjust the condenser height position.
	Dirt or dust exists on the objective lens.	Clean it.
	Dirt or dust exists on the condenser.	
	Dirt or dust exists on the specimen.	

9.3 Observation Tube

Problem	Cause	Remedy
1. Field of view does not match with both eyes	Interpupillary distance is not correct.	Adjust the interpupillary distance.
	Eyepiece diopter is not adjusted.	Adjust the diopter.
	Different eyepiece is used on left and right.	Use the same type (magnification, field number) on both sides.

9.4 Stage and Focus Adjustment

Problem	Cause	Remedy
1. Coarse adjustment knob is hard to turn	Tension adjustment ring is tightened excessively.	Loosen ring.
	Focus stopper lever is locked	Unlock focus stopper lever.
2. Stage falls down by itself (Image is out-focused during observation)	Tension adjustment ring is too loose.	Tighten ring.
3. Image shifts when you touch stage	Stage is not mounted properly.	Clamp Stage.
4. Coarse adjustment will not go all the way up	Focus stopper lever is locked at a too low height.	Unlock focus stopper lever.
5. Coarse Adjustment will not go all the way down	Condenser holder is too low	Raise condenser holder.

10. SPECIFICATIONS

10.1 Body unit

	PA53MET	PA53MET-3D	PA53MET-T	PA53MET-BD	PA53MET-BD-3D	PA53MET-BD-T
Optical System	Colour Corrected Infinity Optical System (CCIS®)					
Illumination	Reflected	Reflected	Reflected / Transmitted	Reflected	Reflected	Reflected / Transmitted
Observation Tube						
Binocular (Optional)	Erect type (F.N 25), 20° inclined					
Trinocular	Erect type (F.N 25), 20° inclined, Trino Light path selection: 2-step (100:0 / 0:100)					
Eyepieces	10X (F.N 25), Diopter adjustable, Reticle optional					
Revolving Nosepiece						
Brightfield	5-position Nosepiece for Brightfield objective lens with DIC slot			/		
Brightfield/Darkfield	/			5-position Nosepiece for Brightfield, Darkfield objective lens with DIC slot		
Objectives						
Plan S-APO	5X/0.15 W.D 20mm, 10X/0.3 W.D 12mm, 20X/0.45 W.D 3mm, 50X/0.8 W.D 1mm, 100X/0.9 W.D 0.5mm (Optional)			/		
Plan S-APO BD	/			5X/0.15 W.D 20mm , 10X/0.3 W.D 12mm, 20X/0.45 W.D 3mm, 50X/0.8 W.D 1mm, 100X/0.9 W.D 0.5mm (Optional)		
LPlan S-APO (Optional)	20X/0.4 W.D 12mm, 50X/0.55 WD 8mm, 100X/0.8 W.D 3.3mm			/		
LPlan S-APO BD (Optional)	/			20X/0.4 W.D 12mm, 50X/0.55 WD 8mm, 100X/0.8 W.D 3.3mm		
Base unit - Focus	Stroke range: 29.5 mm / Coarse and Fine focusing knob.					
	Coarse: 17.7 mm/revolution / Fine: 0.1 mm/revolution (1 µm scale)					
	Upper limit stopper, Torque adjustment ring					
Base unit - Electronics	Integrated power supply for light adjustment / LED voltage indicator / IL switch and ECO switch					
3D Profile Module	No	Yes	No	No	Yes	No
Mechanism	-	High-resolution 5-phase stepping motor, Long cross-roller guide system	-	-	High-resolution 5-phase stepping motor, Long cross-roller guide system	-
Stroke Distance	-	30 mm	-	-	30 mm	-
Resolution	-	0.01µm	-	-	0.01µm	-
Repeatability	-	0.5µm	-	-	0.5µm	-
Max Speed	-	1.4 mm/sec	-	-	1.4 mm/sec	-
Dimensions	-	240(W) x 157(D) x 202.5 (H) mm	-	-	240(W) x 157(D) x 202.5 (H) mm	-
Weight	-	5 kg	-	-	5 kg	-
Load capacity	-	15 kg	-	-	15 kg	-

Reflected Illumination						
BF	Kohler illumination system / Brightfield, Normaski DIC, simple Polarized			/		
BF/DF	/			Kohler illumination system / Brightfield / Darkfield, Normaski DIC, simple Polarized		
Light source	12V 100W halogen					
Transmitted Illumination	No		Yes	No		Yes
Illumination	-		Kohler illumination system Brightfield / Built-in filters	-		Kohler illumination system Brightfield / Built-in filters
Light Source	-		12V100W halogen	-		12V100W halogen
Lamp	-		12V 100W long-life halogen bulb (Philips 7724)	-		12V 100W long-life halogen bulb (Philips 7724)
Condenser	No		Yes	No		Yes
Abbe	-		N.A 1.20	-		N.A 1.20
Long-working	-		LWCD, N.A 0.65	-		LWCD, N.A 0.65
Stage						
4x4 inch	Size 210(W) X 170(D) mm, Stroke 104(X) X 102(Y) mm, metal plate, glass plate (optional)					
Optional	6x6" stage, 6x6" stage, 8" wafer stage, 12" wafer stage					
Dimension	Approx. 246(W) x 572(D) x 514(H)					
Weight	Approx. 19kg					

10.2 3D module of PA53MET

Item	PA53MET-3D, PA53MET-BD-3D
1. mechanism	High-resolution 5-phases stepping motor Long cross-roller guide system
2. Stroke Distance	30mm
3. Resolution	0.01 μ m
4. Repeatability	0.5 μ m
5. Max Speed	1.4mm/sec
6. Dimension	240(W)x 157(D) x 202.5 (H)
7. Weight	5kg
8. Load capacity	15kg

10.3 Suitable Objectives

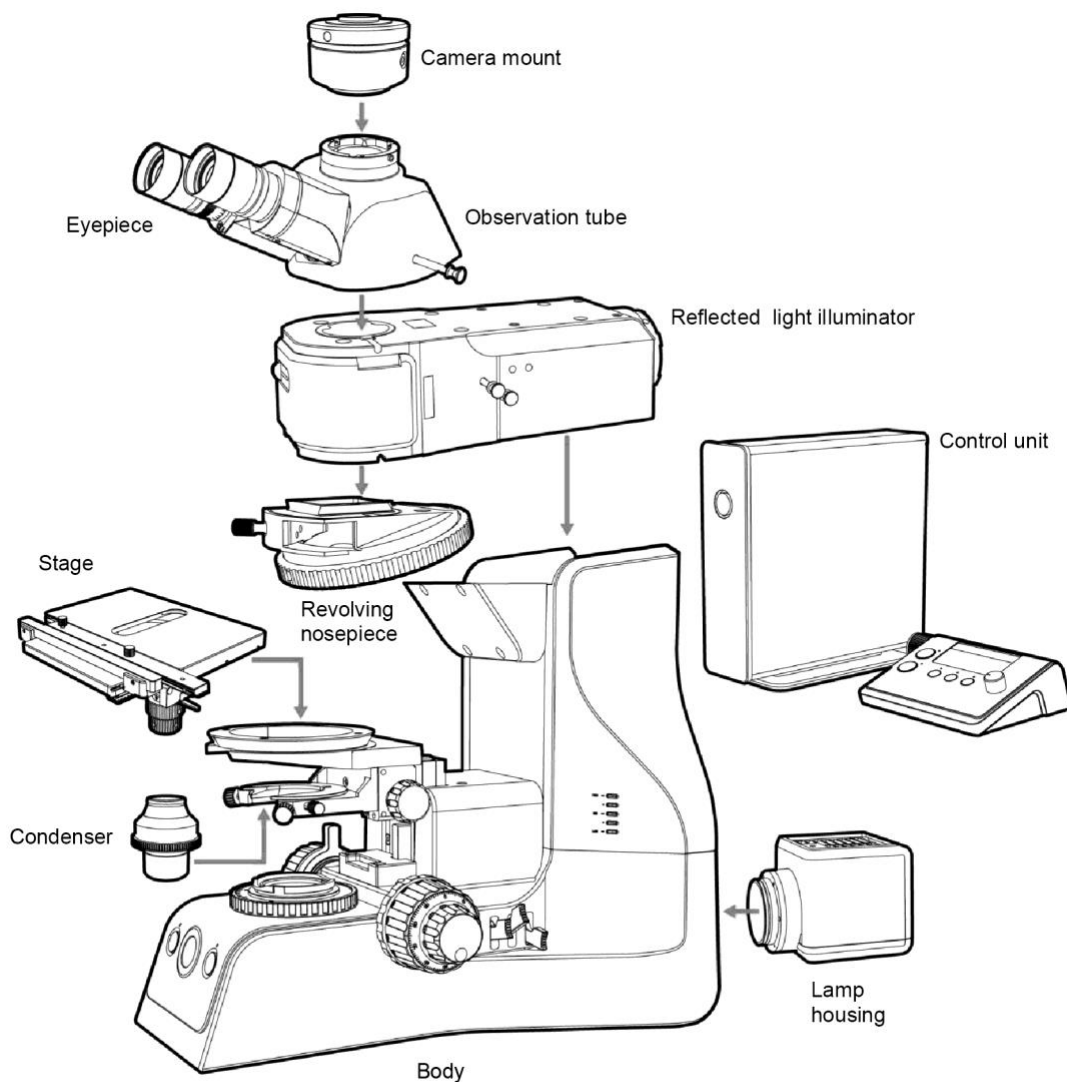
- The following list shows the optical characteristic of Plan Fluor objectives.
- Plan Fluor objective is not suitable for phase contrast, and has no iris diaphragm or correction collar.

Objective Lens	Magnification	N A	W.D (mm)	Cover glass Thickness (mm)	Field of view (mm) (Eyepiece 10x)
Plan S-Apo	5x	0.15	20	0	5
	10x	0.30	12	0	2.5
	20x	0.45	3	0	1.25
	50x	0.80	1	0	0.5
	100x	0.90	0.5	0	0.25
Plan S-Apo BD	5x	0.15	20	0	5
	10x	0.30	12	0	2.5
	20x	0.45	3	0	1.25
	50x	0.80	1	0	0.5
	100x	0.90	0.5	0	0.25
LPlan S-Apo	20x	0.40	12.0	0	1.25
	50x	0.55	8.0	0	0.5
	100x	0.80	3.3	0	0.25
LPlan S-Apo BD	20x	0.40	12.0	0	1.25
	50x	0.55	8	0	0.5
	100x	0.80	3.3	0	0.25

11. ASSEMBLY

11.1 Assembly Diagram

- The diagram below shows the sequence of assembly of the various modules.
- When assembling the microscope, make sure that all parts are free of dust and dirt, and avoid scratching any parts or touching glass surfaces.
- Most assembly operations are possible by using the Allen screwdriver provided with the microscope.



11.2 Detailed Assembly Procedures

11.2.1 Installing the Bulb

WARNING

The bulb, the lamp socket and areas near these will be extremely hot during and right after use. Set the main switch off; disconnect the power cord from the wall outlet, then wait until lamp housing has cooled down before replacing the bulb with a new of the designated type.

- Use only the designated bulb 12V100W Halogen lamp. (PHILIPS 7724)
- Fully loosen the lamp housing clamping screw ① of the lamp housing cover with provided Allen screwdriver.
- Lift the lamp housing cover ② upward to remove.
- Holding the bulb with gloves or a piece of gauze, depress the bulb clamping lever ③ and insert bulb pin fully into the pin holes ④ on the lamp socket. Gently release the bulb clamping lever to the original position to secure the bulb.
- Slide the lamp housing cover onto the housing base from the above. Tighten the clamping screw ① while pressing downward on the cover.

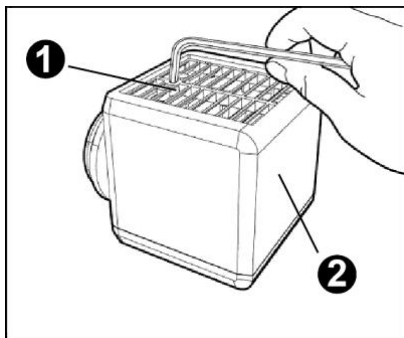


Fig. 21

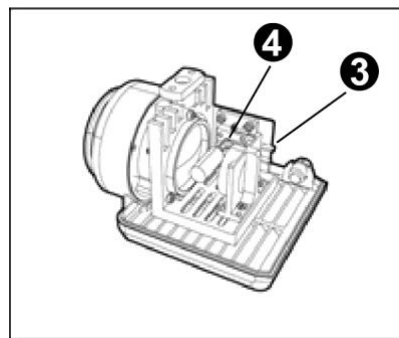


Fig. 22

CAUTION

To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.

NOTE

When you dispose the device and accessory kit, comply with related law and recycling plan. Disposal of light bulb can cause the environmental pollution.

When you dispose the packing material, comply with related law and recycling plan.

11.2.2 Attaching the Lamp housing

WARNING

The bulb, the lamp socket and areas near these will be extremely hot during and right after use. Set the main switch off; disconnect the power cord from the wall outlet, then wait until lamp housing has cooled down before removing the Lamp housing.

- Loosen the clamping screw ① with provided Allen screwdriver.
- Mount the lamp housing to the connection port ② on the rear of the illuminator and press the lamp housing as far as it goes.
- Tightened the clamping screw ① with provided Allen screwdriver.
- Plug the cable coming from the lamp housing into the lamp connector ③ on the rear of the microscope and tighten the ring of the connector to secure the connection.

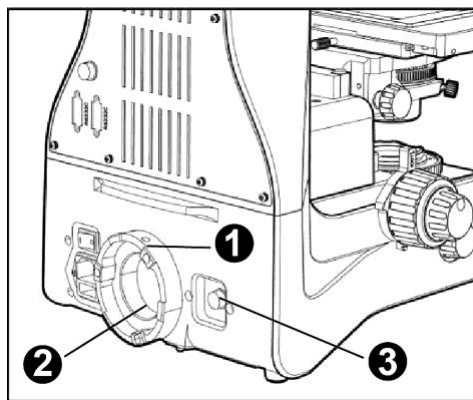


Fig. 23

11.2.3 Attaching the Condenser [PA53MET-T, PA53MET-BD-T]

- Turn the coarse adjustment knob ① to raise the stage to its upper limit.
- Turn the condenser height adjustment knob ② to lower the condenser holder to its lowest position.
- Fully loosen the condenser clamping knob ③.
- Position the condenser so that the aperture scale ④ is located in front.
- Tighten the condenser clamping knob ③ and gently raise the condenser holder to its height position.

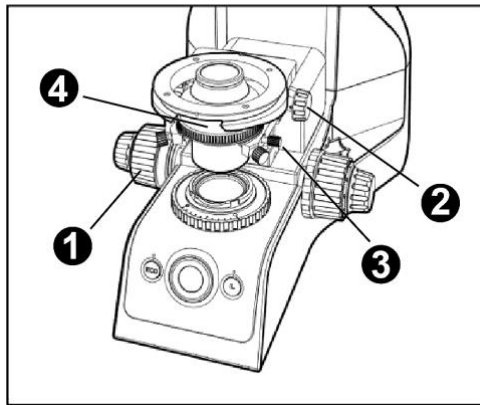


Fig. 24

11.2.4 Attaching the Stage

- Turn the coarse adjustment knob ① to lower the stage to its lower limit.
- Place the stage on the sub stage and tighten the stage clamping knob ②.

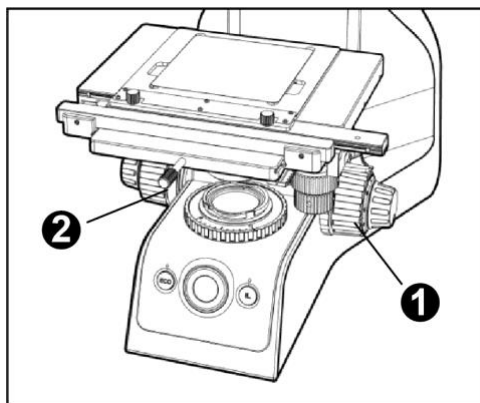


Fig. 25

11.2.5 Attaching the Observation Tube

- Fully loosen the observation tube clamp screw ① with provided Allen screwdriver.
- Place the observation tube on the top of illuminator and tighten the observation tube clamp screw ①.

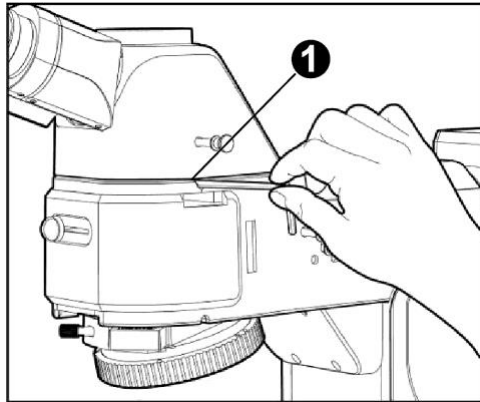


Fig. 26

11.2.6 Attaching the Eyepiece

NOTE

Attach eyepieces of the same magnification and of the same field number to the left and the right eyes. Otherwise, it is hard to observe specimens because of the difference of left and right images.

- Insert eyepiece to the eyepiece sleeve ① and press the eyepiece as far as it goes.

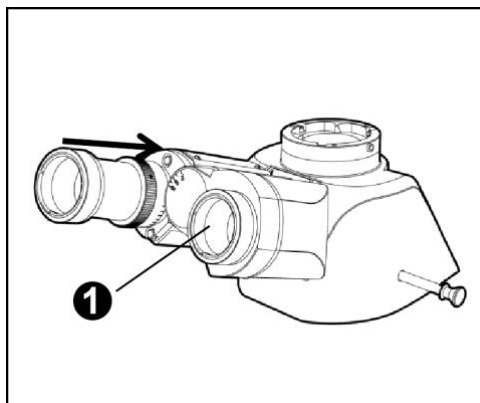


Fig. 27

11.2.7 Attaching the Control Box and Control Pad [PA53MET-3D, PA53MET-BD-3D]

- Connect controlbox connector① with provided 12pin cable and fasten it
- Connect main body connector② with another end of 12pin cable and fasten it.
- Connect controlpad connector③ with provided 6pin cable and fasten it
- Connect controlbox connector④ with another end of 12pin cable and fasten it.
- Connect Motic Analysis port ⑤ and computer with RS232C cable when using Motic Analysis program.

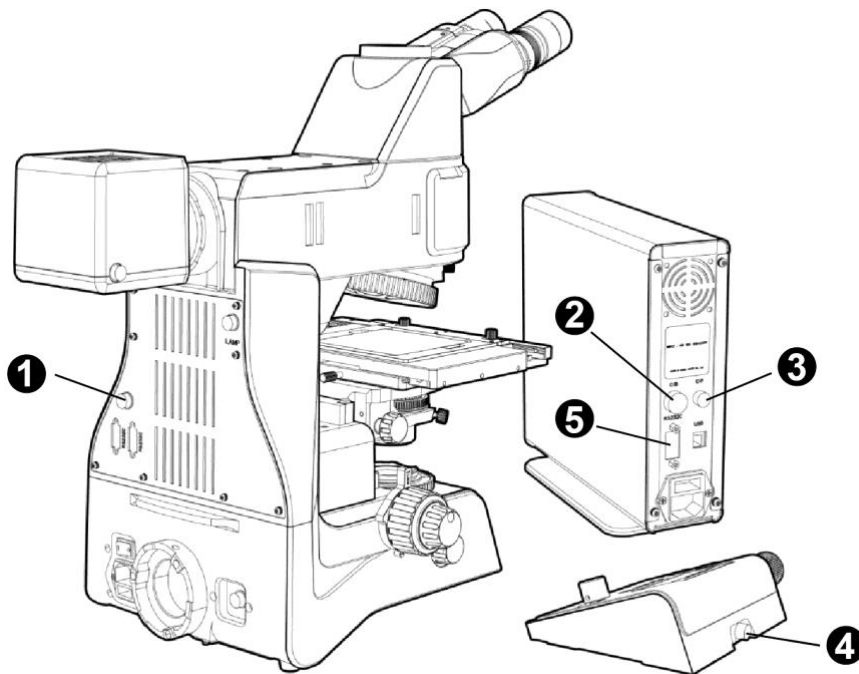


Fig. 28

11.2.8 Attaching the Computer

- Connect Motic Analysis port ① and computer with RS232C cable when using Analysis program.

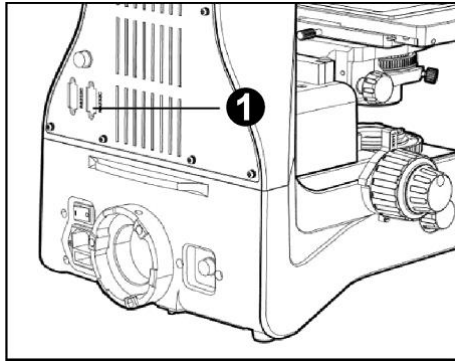


Fig. 29