Motic®

STELLAR 1 SERIES

Biological Microscope

Instruction Manual

Note: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired

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MOTIC HONG KONG LIMITED

We are constantly endeavouring to improve our instruments and to adapt them to the requirements of modern research techniques and testing methods. This involves modification to the mechanical structure and optical design of our instruments.
Therefore, all descriptions and illustrations in this instruction manual, including all specifications are subject to change without notice.

MICROSCOPE TERMINOLOGY

Abbe Condenser

A two-lens sub-stage condenser located below the stage of a microscope and functions to collect light and direct it onto the object being examined. Its high numerical aperture makes it particularly suited for use with most medium- and high-magnification objectives.

Aperture, Numerical (N.A.)

The numerical aperture is an important factor determining the efficiency of the condenser and objective. It is represented by the formula: (N.A. = ηsinα), where η is the refractive index of a medium (air, water, immersion oil etc.) between the objective and the specimen or condenser, and α is half of the maximum angle at which light enters or leaves the lens from or to a focused object point on the optical axis.

Cover Glass Thickness

Transmitted light objectives are designed to image specimens that are covered by a thin cover glass (cover slip). The thickness of this small glass piece is now standardized at 0.17 mm for most applications.

Diaphragm, Condenser

A diaphragm, which controls the effective size of the condenser aperture. A synonym for the condenser illuminating aperture diaphragm.

Magnification

The number of times by which the size of the image exceeds the original object. Lateral magnification is usually meant. It is the ratio of the distance between two points in the image to the distance between the two corresponding points in the object.

Micrometer (um)

A metric unit of length measurement = $1x10^{-6}$ meters or 0.000001 meters

Nanometer (nm)

A unit of length in the metric system equal to 10^{-9} meters.

Phase–contrast (microscopy)

A form of microscopy, which converts differences in object thickness and refractive index into differences in image amplitude and intensity.

Real Viewfield

The diameter in millimetres of the object field.

$$\text{Real Viewfield} = \frac{\text{Eyepiece Field of View}}{\text{Objective Magnification}}$$

For example Stellar 1:

Eyepiece field of view = 10mm
Objective magnification = 10X
Diameter of the object field = 18/10
= 1.8mm

Diopter Adjustment

The adjustment of the eyepiece of an instrument to provide accommodation for the eyesight differences of individual observers.

Depth of Focus

The axial depth of the space on both sides of the image plane within which the image is sharp. The larger the N.A. of objective, the shallower the depth of focus.

Field of View (F.O.V.)

That part of the image field, which is imaged on the observer's retina, and hence can be viewed at any one time. The field of view number is now one of the standard markings of the eyepiece.

Filter

Filters are optical elements that selectively transmit light. It may absorb part of the spectrum, or reduce overhaul intensity or transmit only specific wavelengths.

Immersion Oil

Any liquid occupying the space between the object and microscope objective. Such a liquid is usually required by objectives of 3-mm focal length or less.

Resolving Power

A measure of an optical system's ability to produce an image which separates two points or parallel lines on the object.

Resolution

The result of displaying fine details in an image.

Total Magnification

The total magnification of a microscope is the individual magnifying power of the objective multiplied by that of the eyepiece.

Working Distance

This is the distance between the objective front lens and the top of the cover glass when the specimen is in focus. In most instances, the working distance of an objective decreases as magnification increases.

X–axis Stage Travel

The axis that is usually horizontal in a two-dimensional coordinate system. In microscopy X-axis of the specimen stages is considered that which runs left to right.

Y–axis Stage Travel

The axis that is usually vertical in a two-dimensional coordinate system. In microscopy Y-axis of the specimen stages is considered that which runs front to back.

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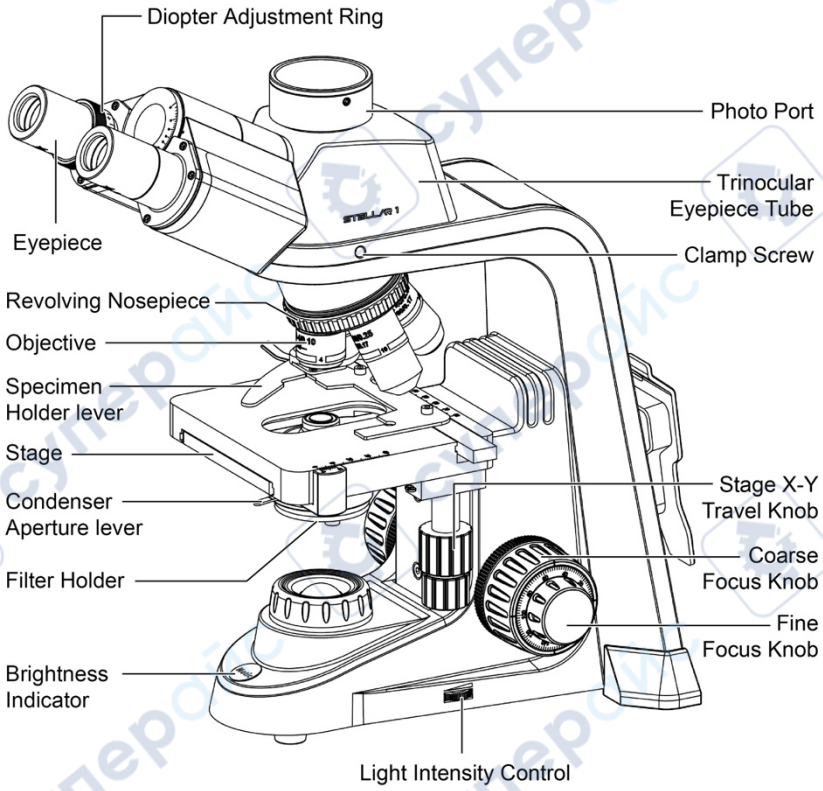
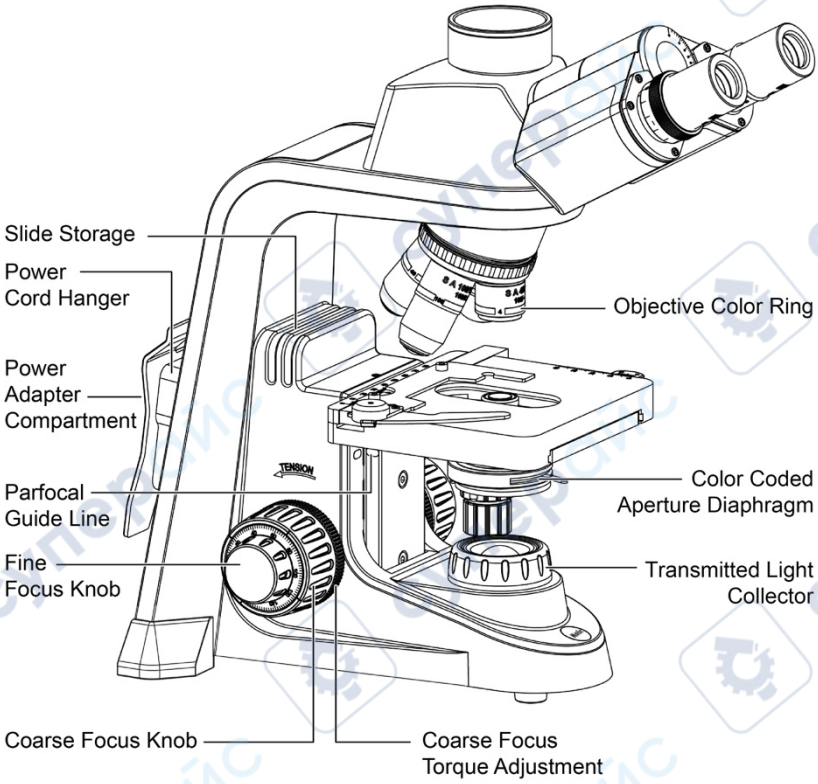
1. NOMENCLATURE



Stellar 1-T


Slide Storage
Power
Cord Hanger
Power
Adapter
Compartment
Parfocal
Guide Line
Fine
Focus Knob
Coarse Focus Knob
Coarse Focus
Torque Adjustment
Objective Color Ring
Color Coded
Aperture Diaphragm
Transmitted Light
Collector
TENSION

Stellar 1-T

2. SETTING UP THE INSTRUMENT

Avoid placing the instrument in locations exposed to direct sunlight, dust, vibration, high temperature and high humidity.

Operating environment

- Indoor use
- Altitude: Max 2000 meters
- Ambient temperature: 15°C to 35°C
- Maximum relative humidity: 75% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C
- Supply voltage fluctuations: Not to exceed ±10% of the normal voltage.
- Pollution degree: 2 (in according with IEC60664)
- Installation / Overvoltage category: 2 (in according with IEC60664)
- Air pressure of 75kPa to 106 kPa
- Avoid frost, dew, percolating water, and rain

3. ASSEMBLING THE MICROSCOPE

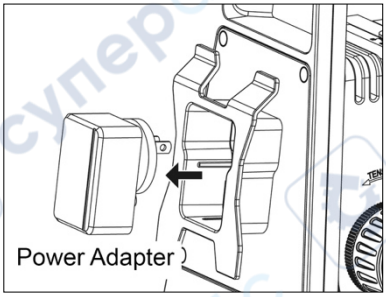
3.1 Verifying input voltage

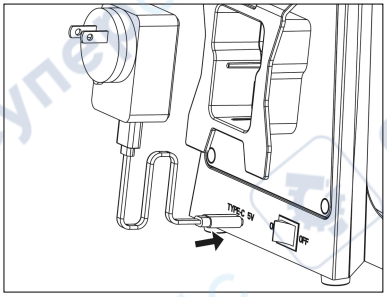
- The 5V microscope input can works with a broad range of USB power sources. However, always use the provided automatic voltage selection power adapter or own adapter, portable power device that are rated for the voltage used in your area, microscope input and that has been approved to meet local safety standards.
- In order to prevent electric shock, always turn the power switch on the power supply off before connecting the power cord.
- Electrical specifications:
    - AC adapter: 100-240V 50/60 Hz (Included)
    - Microscope Input: Type-C 5V/2A by AC adapter or portable power device (not included)

3.2 Illumination

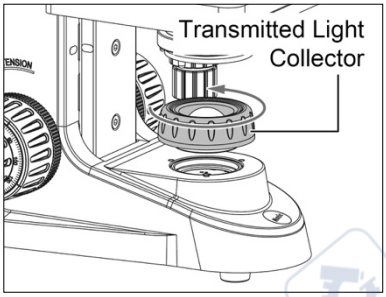
- LED illumination
  LED Illumination Specification:
  3.3V 1W, color temperature 5300K ~ 6000K

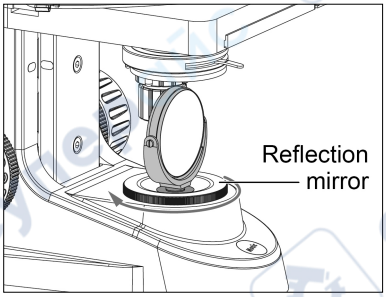
LED Power connection:
Take out power adapter from the power adapter compartment on the rear of microscope and power cord from the styrofoam packaging box.
Connect the Type-C socket of the of the power cord to the inlet on the rear of the microscope base. Plug in the other end of the cord to power adapter and connect the adapter to an AC outlet.





- Reflection mirror (Optional)
  The mirror serves to be used for microscopic observation using natural light in a location where power supply is not available.
  - For this purpose, it is necessary to remove the transmitted light collector.
  - Raise the stage up to the top position. Rotate the light collector in anti-clock direction and remove it from microscope base. Rotate the reflection mirror into the microscope base and incline the mirror until the daylight is reflected homogeneously into the light path. Please use the concave face of the mirror when natural light is not strong enough.





3.3 Mechanical stage

- Specimen holder has been attached in the stage by using the two mounting holes.
- Open the specimen holding lever of the specimen holder, set the specimen by sliding it on the stage from the front toward the rear. After setting the specimen, return the specimen holding lever gently
- Remove specimen holder for fast hand scanning of slides

3.4 Objectives

- Objectives are installed in revolving nosepiece. If necessary to reinstall, lower the stage completely, screw the objectives into the revolving nosepiece so that clockwise rotation of the nosepiece brings the next higher magnification objective into position.

3.5 Condenser

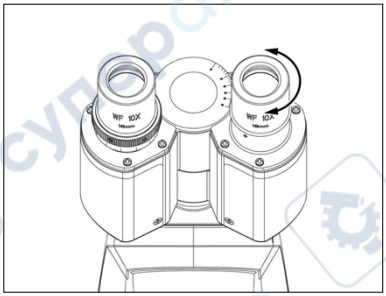
- The condenser is mounted in the stage and it is used in conjunction with the iris diaphragm. The function of the condenser is to provide full illumination to the specimen plane and to enhance the resolution and contrast of the object being viewed.

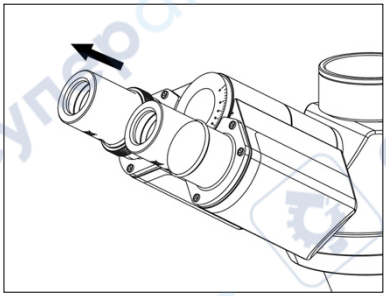
3.6 Eyepiece tube

- Eyepiece tube is preinstalled in microscope arm. If necessary to reinstall, loosen the eyepiece tube clamp screw, insert the round dovetail mount on the eyepiece tube into the round dovetail mount on the microscope arm, tighten the eyepiece tube clamp screw to secure the eyepiece tube in place.

3.7 Eyepieces

- Use the same magnification eyepieces for both the eyes.
- Insert each eyepiece completely into the eyepiece sleeve.
- Twist the eyepiece (anti-clockwise or clockwise) with 20-30 degree and put the eyepieces gently out when removing the eyepiece.



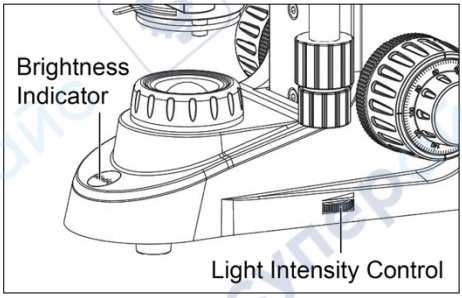


4. USAGE OF MICROSCOPE COMPONENTS

4.1 Illumination brightness adjustment

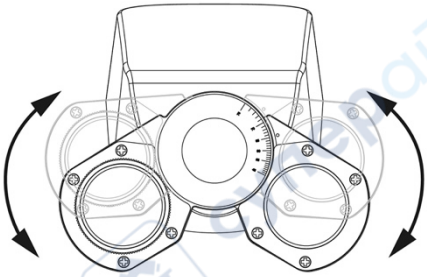
- Turn the light intensity control wheel fully clockwise to the low brightness position.
- Set the power switch on the rear of microscope to position “I” (ON)
- The brightness indicator of Motic Logo in the front of microscope base will light up.
- When the light intensity control wheel is turned anti-clockwise to high brightness position, the light intensity will increase.

Automatic power off function:
A safety and environmentally friendly feature in Stellar 1. If the brightness is unchanged for 30 minutes, the microscope illumination will automatically switch off. Turn the light intensity control wheel and the illumination will automatically recover.



4.2 Interpupillary distance adjustment

- Before adjusting the interpupillary distance, bring a specimen into focus using the 10x objective.
- Adjust the interpupillary distance so that both the right and left field of view become one.
- This adjustment will enable the user to observe the specimen with both eyes.



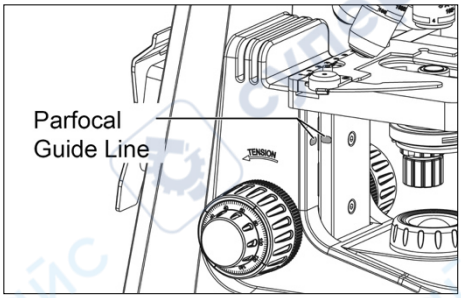
4.3 Diopter adjustment

- Diopter adjustment compensates for the differences in vision between the left and right eyes. In addition to making observation through both eyes easier, this adjustment also reduces the extent to which focusing is lost when the objective magnification is changed. In particular, this occurs when a low magnification objective is used.
- The left eyepiece tube has a diopter ring to compensate for slight differences in the focusing of each eye.
- Set the diopter to “0” position and turn the nosepiece to 10x magnification.
- Using the right eye only and viewing through the right-hand eyepiece, adjust the focus with the microscope coarse or fine adjustment until the image of the specimen is at its sharpest.
- Using the left eye only and viewing through the left-hand eyepiece, turn the diopter ring to correct focus for left eye until the specimen image is at its sharpest.
- Change the magnification to higher magnification to verify the result and if necessary repeat the procedure to match the sharpness for the higher magnification.
- Keep this diopter position for all magnification/lenses. The diopter position for each user can be recorded from the scale, so it can be easily reset.

4.4 Coarse and fine focusing

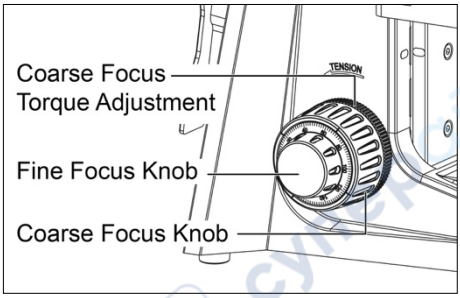
- Focusing is carried out with the coarse and fine focus knobs at the left and right of the microscope stand.
- The direction of vertical movement of the stage corresponds to the turning direction of the focus knobs.
- One rotation of the fine focus knob moves the stage 0.34mm. The graduation on the fine focus knob is 3.4 microns.

Never attempt either of the following actions, since doing so will damage the focusing mechanism:
Rotate the left and right knob while holding the other.
Turning the coarse and fine focus knobs further than their limit.



4.5 Use of Parfocal guide line

- The parfocal guide lines are in the stage holder and microscope body to assist in quick image plane location.
- Rotate the coarse focus knob to move the stage up and down to align the parfocal lines. You will see the image of specimen when the parfocal lines are aligned.
- Adjust the fine focus knob slightly until the image is at its sharpest.



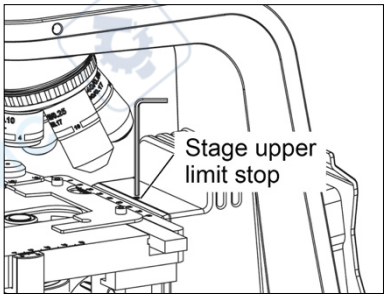
4.6 Coarse focus torque adjustment

- To increase the torque, turn the torque adjustment ring located behind the left-hand coarse focus knob in the direction indicated by the arrow.
- To reduce the torque, turn the ring in the direction opposite to that indicated by the arrow.

4.7 Stage upper limit stop adjustment

(Upper Stage Limit is preset at the factory; please only adjust if necessary)

- The Stage Upper Limit stop marks the stage position at which the specimen is in focus i.e. by restricting the movement of the coarse focus knob.
- With the specimen in focus, turn the stage upper limit stop clockwise by the provided hexagon wrench until it reaches the stop.
- When the stage upper limit stop is in position, the stage cannot be raised from that position. However, the fine focus knob can move the stage regardless of the limit but will only lower the stage.
- Lower the stage by coarse focus knob.

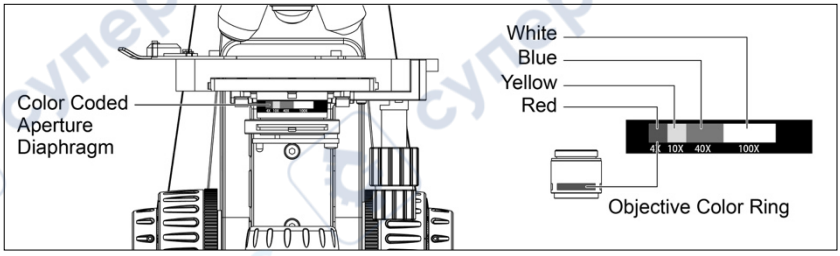


4.8 Use of condenser aperture diaphragm

- Critical illumination relies on using the sub-stage condenser to produce a focused image of the homogeneous light source in the plane of the specimen in order to achieve an even illumination condition over the entire field of view.
- The condenser aperture diaphragm is provided for adjusting the numerical aperture (N.A.) of the illuminating system of the microscope, it decides the resolution of the image, contrast, depth of focus and brightness.
- Turning down the diaphragm will lower the resolution and brightness but increase the contrast and depth of focus.
- An image with appropriate contrast in most cases can be obtained with an aperture diaphragm closed down to 2/3 of the maximum value.

Color Coded Condenser Aperture Diaphragm

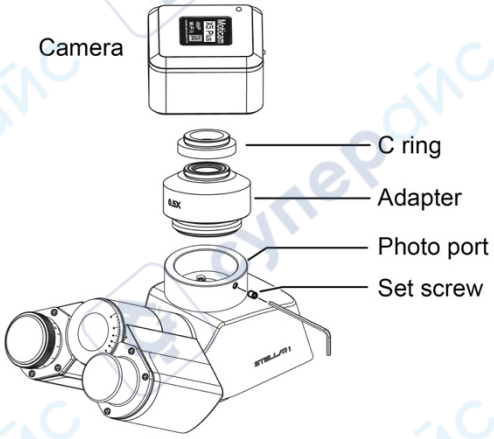
- The aperture diaphragm is coded in color ranges to quickly locate aperture diaphragm of by matching objective color ring.
- Turn the aperture diaphragm to the corresponding range of the objective color ring. For example, red range for 4x.
- Adjust the aperture diaphragm slightly to get the sharpest image according to specimens.



5. PHOTOMICROGRAPHIC PROCEDURE

Use of standard C-mount adapter

- Screw the adapter onto the camera.
- Loosen the set screw of photo port by the provided hexagon wrench and remove the dustproof cap.
- Insert the camera and adapter into the opening of the photo port and tighten the set screw.



- To ensure vibration free operation, set the microscope on a sturdy vibration free table or a bench with a vibration proof device.
- For the same total magnification, select a combination of the highest possible objective magnification and lowest possible projection lens magnification to achieve the utmost image definition and contrast.
- Select a blue filter for routine application. An additional colour-compensating filter can also be used depending on the colour rendition.
- A change of depth of focus, contrast and resolution of image is attainable with an aperture setting that is 2/3 of the objective N.A.
- For specific photomicrographic procedures, refer to the manual of the specific camera being used.

6. USING OIL IMMERSION OBJECTIVES

- Oil immersion objectives are labelled with the additional engraving “Oil” and are to be immersed in oil between the specimen and the front of the objective.
- The immersion oil supplied by Motic is synthetic, non-fluorescing and non-resining oil, with a refractive index of 1.515.
- Normally, cover glass must be used with oil immersion objectives with a few exceptions. Deviations from thickness are not important as a layer of immersion oil acts as compensation above the cover glass.
- The small bottle of oil supplied with every immersion objective facilitates application of the oil to the cover slip.
- Remove any air bubbles in the nozzle of the oil container before use.
- Immersion oil must be used sparingly. After the examination, the oil should be wiped off the objective with a lens cleaning tissue and the residual film removed with soft cloth moistened with petroleum benzene or absolute alcohol.
- Locate the field of interest with a lower magnification objective. Swing the objective out of the light path, and add one drop of immersion oil over the site of the specimen. Swing in the oil immersion objective. There should be a small column of oil from the cover slip to the objective lens. Use the fine focus to make the image sharp.
- Freedom from air bubbles must be ensured. To check for air bubbles, remove an eyepiece, fully open the field and aperture diaphragms, and look at the exit pupil of the objective within the eyepiece tube. Air bubbles are recognized by presence of a surrounding black ring. Bubbles may often be dislodged by moving the slide to and fro or by slightly rocking the revolving nosepiece back and forth. If not successful in clearing the bubbles then the oil must be wiped off and replaced with a fresh drop.

7. MAINTENANCE AND STORAGE

A. Do not disassemble

1. Disassembly may significantly effect the performance of the instrument, and may result in electric shock or injury and will void the terms of the warranty.
2. Never attempt to dismantle any parts other than described in this manual. If you notice any malfunction, contact your nearest Motic representative.

B. Cleaning the microscope

1. Lenses and filters

- To clean lens surfaces or filters, first remove dust using an air blower. If dust still persists, use a soft/clean brush or gauze.
- A soft gauze or lens tissue lightly moistened with the mixture of alcohol and ether (alcohol and ether in the ratio of 3:7) should be used to remove grease or fingerprints.
- Use only a mixture of alcohol and ether (ratio : alcohol : 3 and ether : 7) to remove immersion oil from objective lenses.
- Because the mixture of alcohol and ether (ratio : alcohol : 3 and ether : 7) is highly flammable, be careful handling around open flame.
- Do not use same area of gauze or lens tissue to wipe more than once.

2. Cleaning of painted or plastic components

- Do not use organic solvents (thinners, alcohol, ether, etc.). Doing so could result in discolouration or in the peeling of paint.
- For stubborn dirt, moisten a piece of gauze with diluted detergent and wipe clean.
- For plastic components, only moisten a piece of gauze with water and wipe clean.

C. Disinfecting the microscope

- Follow the standard procedures for your laboratory.

D. When not in use

- When not in use, cover the instrument with vinyl dust cover and store in a place low in humidity where mould is not likely to form.
- Store the objectives, eyepieces and filters in a container or desiccator with drying agent.
- Proper handling of the microscope will ensure years of trouble free service.
- If repair becomes necessary, please contact your Motic agency or our Technical Service direct.

Note:

- If equipment is used in a manner not specified by the manufacturer, the warranty may be void.
- To avoid getting wet, do not use the microscope near water.

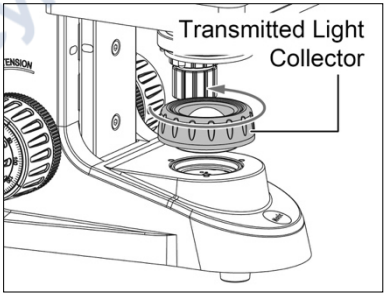
E. Bulb replacement

The lamp and the lamphouse become very hot during and after a period of operation.

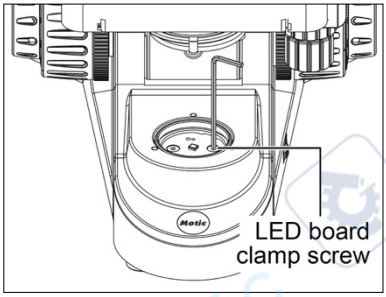
Risk of burn – Do not touch the lamp during or immediately after period of operation.

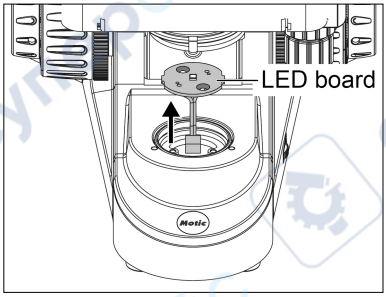
Make sure the lamp has cooled sufficiently before attempting to replace the lamp.

1. Raise the stage up to the top position. Rotate the light collector in anticlock direction and remove it from microscope base.



2. Loosen LED board clamp screws using hexagon wrench (included), take out LED board.





3. Disconnect the LED connection cables from the power supply socket and remove the LED board.
4. Install the new LED.

- Take out a qualified LED board and reverse action steps as above. When installing the LED board, do not touch the glass surface of the bulb with bare fingers. If the surface is contaminated, wipe it clean using lens tissue.

F. Microscope Storage

- Power adapter storage

Insert the power adapter into power adapter compartment on the rear of microscope when it is not in use.

- Power cord storage

When it's not in use, insert the USB end of the power cord into power adapter through the hole at the bottom of power cord hanger, then wrap the cord in the power cord hanger on the rear of microscope.

- Microscope storage

Adjust the interpupillary distance to maximum and set the binocular tubes in horizontal position. Turn the eyepiece tube backward to save the storage room.

Storage environment:
Permissible environment temperature: +10 ~ +40°C
Permissible relative humidity: Below 31°C, max. humidity is 80%; at 40°C, linearly decreases to 50%

8. TROUBLESHOOTING TABLE

As you use your microscope, you may occasionally experience a problem. The troubleshooting table below contains the majority of frequently encountered problems and the possible causes.

Optical

Problem	Possible Cause
Vignetting or uneven brightness in the field of view or field of view only partially visible	Lamp not installed properly
	Condenser not mounted correctly
	Condenser is set too low
	Aperture diaphragm closed too far
	Revolving nosepiece not clicked into position
	Filter not in placed in properly
Blur image or dirt in the field of view	Aperture diaphragm closed too far
	Dust or dirt on specimen surface
	Dust or dirt on field lens, filter, condenser or eyepiece
	No cover glass
	Too thick or thin cover glass
	Immersion oil not used with oil immersion lens
	Air bubbles in immersion oil
	Specified immersion oil not used
	Immersion oil on dry objective
	Greasy residue on eye lens
	Incorrect illumination
Uneven focus	Specimen holder not fixed securely on stage
	Specimen not secured in position
	Specimen tilted on stage surface

Image tinged yellow	Lamp voltage is set too low
	Blue filter is not being used
Focusing is not possible with high magnification objectives	Slide is upside down
	Cover glass is too thick
High magnification objectives strike the specimen when changing over from low to high magnification	Slide is upside down
	Cover glass is too thick
	Eyepiece diopter not adjusted
Insufficient parfocality of objectives	Eyepiece diopter not adjusted
No cohesion of binocular image	Magnification or field of view of left and right eyepieces differ
	Interpupillary distance not adjusted
	Eyepiece diopter not adjusted
Eye strain or fatigue	Interpupillary distance not adjusted
	Diopter adjustment not made
	Field of view of left and right eyepiece differ
	Inadequate illumination

Electrical

Problem	**Possible Cause**
Lamp does not light	Power supply not plugged in
	Auto power off function is on. Touch the intensity control to restore illumination.
	Lamp burnt out
Inadequate brightness	Specified lamp not being used
Lamp blows out immediately	Specified lamp not being used
Lamp flickers	Connectors are not securely connected
	Lamp near end of service life

9. QUALITY WARRANTY

Our microscope are manufactured to meet ISO 9001 standards.
Motic warranties are as follows:

- 8 Year Warranty for Microscope Mechanical Parts: Microscopes come with a 8 year warranty against mechanical manufacturing defects. Does not cover normal wear, routine maintenance, add-on accessories, damage resulting from repair by unauthorized parties, accident, alteration, shipping, misuse or abuse is not covered.
- 1 Year Warranty for Electrical and Video components. Does not cover light bulbs, batteries, fuses, or electrical cords.

All warranties start from the original date of purchase. Motic provides the repair or replacement of warrantied parts for free, including labor, during the warranty period. Proof of original purchase is required. Buyers are responsible for shipping to and from our warehouse for warranty services. The warranty does not cover damages resulting from normal wear and tear, abuse, or unauthorized repairs.

Please visit www.motic.com for online download of instruction manuals and relevant software.

For more information or to submit a repair request, please contact our Customer Support department.