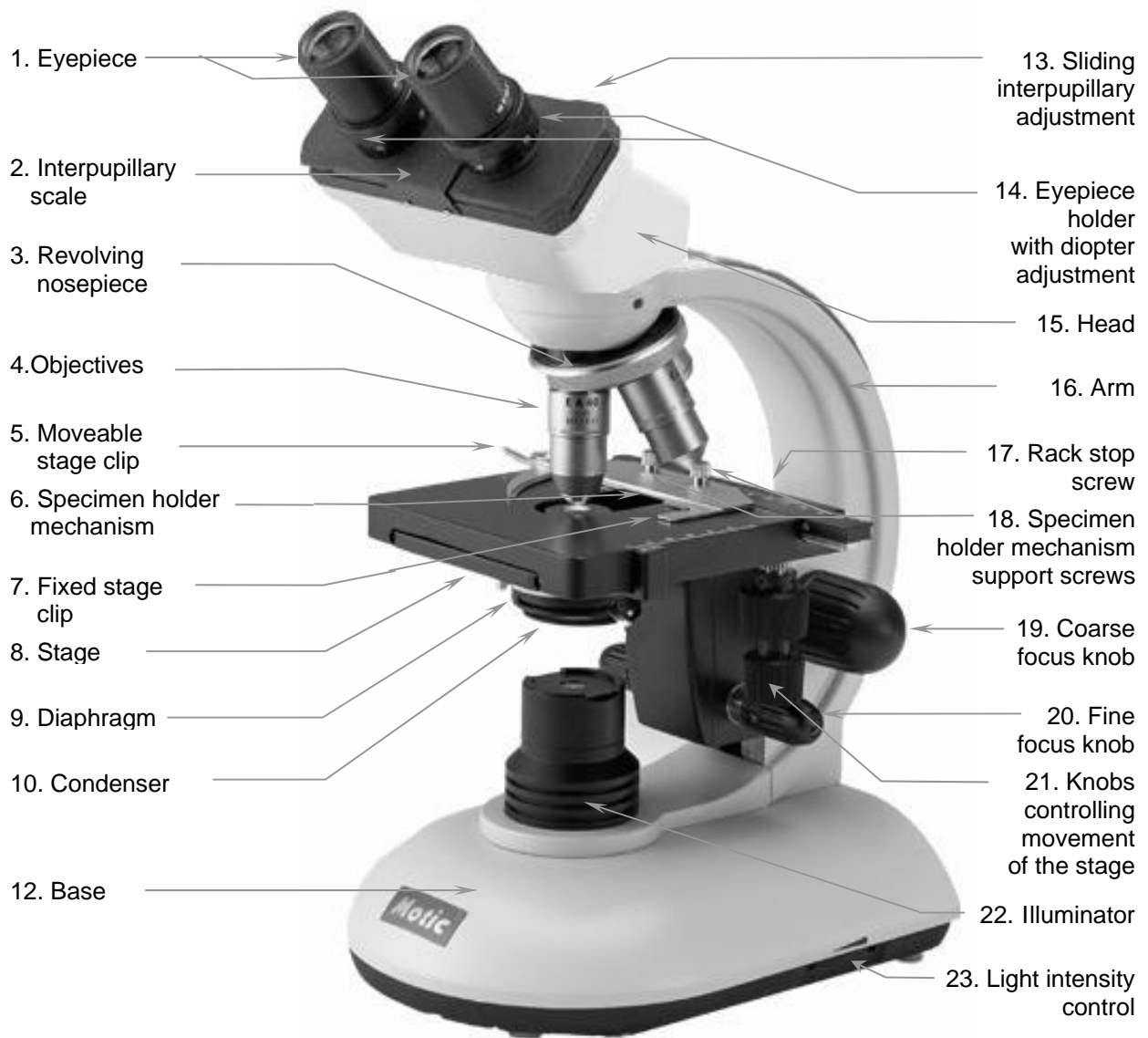


Motic[®] Microscopes

Instruction Manual

18/28 LED Series



1820

Introduction

Thank you for your purchase of a Motic microscope. Motic microscopes are precision instruments, subjected to meticulous examination in order to reach you in perfect condition. Their design combines easy management and optimum functioning with minimum maintenance.

The information contained in this manual is likely to go beyond what the average user needs to know to use the microscope, however, it is provided to answer any queries that may arise.

Your new microscope combines high performance features, with an excellent degree of optical resolution and clarity of image. It incorporates a mechanical stage which provides a travel range of 75mm x 35mm in X and Y directions with a graduation of up to 0.1 mm, thus permitting the perfect positioning of the specimen. Also included are objectives located on a ball bearing nosepiece allowing movement in both directions; a precision coarse and fine focusing system; a moveable Abbe condenser with a numerical aperture of 1.25 N.A. and a built-in 20mA, 3,5V, 70mW LED variable light source.

The 1801/2801 models, in contrast to the rest of the series, incorporate a fixed stage and a fixed N.A 0.65 condenser.

These instructions should be read carefully before operating the microscope. They will permit you to use your new microscope to its fullest capabilities. Terminology used to describe components and controls can be found in the diagram on page 2.

These instructions are based on the assembly and use of the 1820 model (Binocular) with additional notes applying specifically to other models in the series.

Unpacking

All components of the microscope have been carefully packed to ensure they reach you in perfect condition. We recommend that you do not discard any packing containers in case you need to return the microscope, store it for long periods of time; or should it become necessary to transport it to a technical service for any repair, or maintenance procedure.

The box should contain the following components, depending on the model:

- 1801/2801 (Monocular): A microscope assembled with a monocular head, an eyepiece, a fixed stage, 0.65 A.N. condenser and three objectives. Additional components are: a blue filter, a dust cover, and two hexagonal keys measuring 2mm and 0.85mm.
- 1802/2802 (Monocular): A microscope assembled with a monocular head, eyepiece, mechanical stage, 1.25 A.N. Abbe condenser and three objectives. Additional components are: a specimen holder mechanism, a blue filter, a dust cover, and two hexagonal keys measuring 2mm and 0.85mm.
- 1820/2820 (Binocular): A microscope assembled with a binocular head, two eyepieces, a mechanical stage, a 1.25 A.N. Abbe condenser and three objectives. Additional components are: a specimen holder mechanism, a blue filter, a dust cover, and a hexagonal key measuring 2mm.

Remove, and handle the microscope and all its components with extreme care.

Avoid touching the lenses of the optical elements and keep clear of contact with dust, water or other contaminating agents, as they could stain, or damage the lens surface and affect the quality of the image.

- A. Place the microscope in an upright position on a flat, stable and clean surface.
- B. Remove the rest of the components from the box.

Description of Components

1. Head (15). Available in monocular or binocular, according to the model, and rotating 360° to avoid the necessity of moving the microscope, should another user wish to use it.
2. Eyepiece (1). The group of lenses closest to the eye, magnifying the image formed by the objectives. In the monocular models, the eyepiece contains a pointer to single out any particular element of the sample to another user.
3. Eyepiece tube with diopter adjustment (14). Permits the user to adjust the focus for different levels of vision.
4. Revolving nosepiece (3). The revolving action permits the user to change the degree of magnification, the correct positioning of the objectives is marked by a “click” in the optical path.
5. Objectives (4). The group of lenses closest to the sample, or microscopic specimen forming the primary magnified image.
6. Stage (8). Platform of the microscope where the specimen is placed. In models 1801/2801 the specimen slide is held in place by specimen holder clips. In other models, a mechanical stage replaces the clips, and permits precise, mechanical manipulation of the specimen slide.
7. Condenser (10). Optimises illumination for enhanced resolution and image contrast.
8. Focusing Knobs (19-20). Situated on both sides of the arm of the microscope, the larger, or coarse focusing knob initially brings the specimen into focus, and the smaller, fine focusing knob permits a precise adjustment of the image. The 18 series has separate control knobs, while the 28 series has the two coaxial.
9. Illumination (22-23). These models are provided with a 20mA, 3,5V, 70mW LED bulb, which is pre-focused, and can be regulated in intensity. Main supply 220-240V (CE).

Assembly

All the steps described for the assembly of the microscope must be undertaken with extreme care, and without forcing the placement of the distinct parts and elements of the microscope.

- A. Specimen holder mechanism (6): Rotate the coarse focusing knob (19) to move the stage (8) to its lowest position. Remove the two knurled screws (18) of the specimen holder mechanism. Place the mechanism on the stage with the moveable clip lever facing outwards (5), and making sure that the holes of the mechanism, and the knurled locking screws coincide, screw down firmly.
 - In models 1801/2801, this step can be omitted, as specimen holder clips come pre-assembled.

Warning: Before connecting the microscope to an electrical source, always check that the voltage coincides with that of the microscope.

Operation

A. Starting Up.

1. Before using the microscope, adjust the light intensity control (23) to minimum position. This should be repeated every time the microscope is switched on or off to prolong the use of the bulb.
2. Press switch to position ON. (Fig. 1)
3. Rotate light intensity dial until the image is illuminated.
4. Light intensity should be adjusted in accordance with the objective used, or the type of specimen examined.



On/Off Switch

Fig. 1

B. Interpupillary Adjustment. (Only in binocular models)

1. Look through the eyepiece (1) and adjust the distance between the eyepiece tubes (14) by grasping the head (15), by its four gripped corners (13), and moving inwards or outwards.
2. When a full field of view is observed through both lenses, and images blend into one, the interpupillary distance is correct for the user's eyes. Take note of the index reading marked in the interpupillary scale (2) for the following step.
3. Adjust the diopter scales (14) situated on both eyepiece tubes until the reading of both scales coincides with the value of the interpupillary distance scale. This step is necessary to maintain the parfocality of the objectives.
4. Variation in interpupillary distance, necessitates the readjustment of the diopter scales.

C. Focusing the microscope.

1. Revolve the nosepiece (3) to place the objective 4X (4) in the optical path, checking that it is clicked into place.
 2. Turn the coarse focusing knob (19) until the stage (8) is set to its lowest position.
 3. Place the microscopic specimen slide on the stage, making sure that the cover slip is raised.
- Swing out the moveable stage clip (5) on the mechanical specimen holder (6), support the specimen slide against the fixed stage clip (7) and gently release the moveable clip until the preparation is well fixed into place.
 - In the models 1801/2801: Raise the specimen holder clips by putting downward pressure on the back part, slide the specimen slide under the clips, and release pressure so that the slide is well fixed into place.
4. Insure that the specimen to be examined is in the optical path. To do so, adjust the knobs controlling the X/Y movement of the stage (21). In the models 1801/2801 the specimen must be moved manually.
 5. Looking through the eyepiece (1), adjust the coarse focus knob until the specimen appears in focus.
 6. Readjust the focus with the fine focus knob (20) until the image appears in sharp focus.

D. Adjusting the diopter for difference in eyesight (Only in binocular models).

1. Using only the right eye, peer into the right-hand eyepiece (1) and adjust the fine focus (20).
2. Then using only the left eye, peer into the left-hand eyepiece and adjust the focus by turning the diopter adjustment (14) on the left eyepiece tube, until a sharp image is obtained. Do not adjust the focus with the fine focus knob.

E. Adjusting the aperture of the diaphragm.

The diaphragm (9) should not be used to regulate the light intensity. Its function is to obtain a high resolution of the specimen and to provide contrast in the image. Smaller apertures will deliver higher contrast to image, although closing the aperture too much will reduce resolution. The best method to obtain the correct aperture of the diaphragm is to experiment. Suggested apertures for each objective are as follows:

OBJECTIVE	APERTURE OF IRIS
4X	From fully closed to 1/8 open.
10X	From 1/8 to 1/4
40X	From 1/4 to 1/2
100X (optional)	From 1/2 to 3/4

F. Changing magnification.

1. Position the objective 10X (4) in the optical path.
2. This microscope has already been parfocalised, although it is possible that small differences exist between the objectives. It may then be necessary to adjust the focus slightly with the fine focus knob (20).
3. When changing to the 40X and 100X objectives (optional), it must be done with great care, making sure that the objectives do not scratch with the specimen slide causing damage to the front lens.
4. In order to obtain maximum resolution of the 100X (optional), it is necessary to apply immersion oil between the cover slip of the slide and the front lens of the objective.
 - a. Only a very small amount of immersion oil is needed, a drop should be enough.
 - b. If air bubbles appear they can be removed by gently rotating the nosepiece back and forth.
 - c. When viewing is complete, all parts that have come into contact with the oil must be cleaned using a soft cotton cloth, lightly dampened with Xilene. If the 100X objective is not cleaned, the oil will dry, and it will not be possible to see through it; permanent damage could also occur.

NB. Immersion oil must ONLY be used with the 100X objective, as it is the only one specially prepared for it. If any other objective comes into contact with the oil, it must be cleaned immediately.

Maintenance

WARNING: FOR YOUR OWN SAFETY, SWITCH OFF AND DISCONNECT THE MICROSCOPE FROM ANY ELECTRICAL SOURCE BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE TO AVOID THE RISK OF ELECTROCUTION.

IF THE MICROSCOPE REQUIRES ANY MAINTENANCE OR REPAIR NOT APPEARING IN THIS MANUAL, CONSULT YOUR DISTRIBUTOR.

A. Optical maintenance.

Do not attempt to disassemble any optical component.

Prior to cleaning any of the lens surfaces, remove dust particles using a fine brush, specifically for cleaning lenses. Alternatively, use low pressure compressed air, available in shops selling photography equipment.

1. Cleaning the eyepiece.
 - a. Do not remove eyepiece (1) from eyepiece tube (14).
 - b. Clean only the outer surface, misting the lens with breath.
 - c. Dry by wiping with lens paper in circular movements, from centre, outwards. Do not wipe lenses when dry, as they are easy to scratch.
2. Cleaning the objectives.
 - a. Do not remove the objectives from the microscope.
 - b. Only clean the outer surface, dampening a soft cotton cloth slightly with Xilene then drying the lens with the same cloth.
3. Cleaning the condenser.
 - a. Clean only the top lens surface using either of the above methods, as for the eyepiece, or the objectives.
4. Cleaning the illuminator lens.
 - a. Use any of the above methods, as for eyepiece, or the objectives.

B. Electrical Maintenance.

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1. Changing the bulb.

- a. Lift up the stage using the focusing knobs.
- b. Unscrew the screws indicated. (Fig. 2)
- c. Take out the top part of the illuminator carefully without damage the bulb, the condenser or the illuminator.
- d. With care take out of the bulb and pull outwards to disconnect it from the socket.
- e. Do not touch the new bulb with bare hands. Use a clean cloth to insert the bulb pins into the socket.
- f. If the bulb is touched with bare hands, it must be cleaned, as the transmission of light could be affected.
- g. Put on again the top part of the illuminator and tight the screws.



Fig. 2

C. Mechanical maintenance

1. Adjusting the tension of the coarse focus knob.

The collar to adjust coarse focus tension (Fig.3) is situated between the coarse focus knob (19) and the arm (16). Coarse focus tension is adjusted by the factory. The optimum point of tension is that which permits the lightest movement of the coarse focusing knob possible, without the stage sinking from its own weight.

- a. To adjust tension, first loosen the slotted set screw in the collar hole with a 2mm hexagonal key.
- b. To tighten the tension of the coarse focus knob, turn the collar anti-clockwise; or to loosen it, turn clockwise.
- c. Tighten the hexagonal screw.

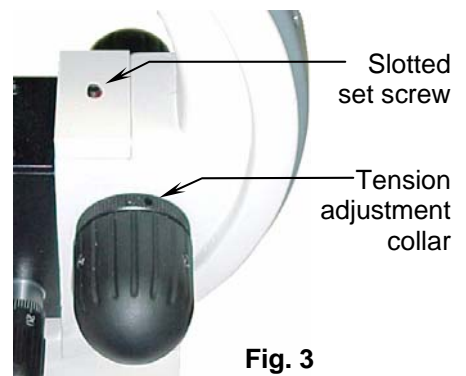


Fig. 3

2. Adjusting the rack stop.

40X and 100X(optional) objectives (4) use a retractable security system to avoid damage to the specimen slide or to the front of the lens, should the two come into contact. Additionally, as a security measure, the microscope includes a rack stop screw (17) that regulates the upward movement of the stage. The rack stop screw comes pre-adjusted by the factory for standard slides with a 0.17mm thick cover slip. However, for observing other types of slides or for using polarising equipment (optional), adjustment may be necessary.

- a. Loosen the rack stop screw (Fig. 3) with the 2mm key.
- b. For the 18 series: With the fine focus adjustment (20) at mid-range, focus on specimen slide, using only the coarse focus knob (19), firstly with the 4X objective, then with the 10X.
- c. For the 28 series. Focus on specimen slide using only the coarse focus knob, firstly with the 4X objective, then with the 10X.
- d. Rotate the rack stop screw until tight enough to prevent the stage (8) rising further.

Troubleshooting

ELECTRICAL PROBLEMS

PROBLEM	CAUSE	SOLUTION
The bulb does not work	Bulb burned out. Wrong bulb.	Replace bulb. Replace by the correct bulb.
The bulb flickers	The bulb is not inserted correctly in the socket.	Insert it correctly.

IMAGE QUALITY

PROBLEM	CAUSE	SOLUTION
No image.	Nosepiece badly positioned. Image too bright.	Turn, until it clicks into position. Reduce light intensity.
Poor resolution.	Objective lens dirty. Eyepiece lens dirty. Specimen slide upside down. Cover slip on specimen slides wrong thickness. Light too bright. Condenser dirty.	Clean objective. Clean eyepiece. Place slide with slip facing up. Use 0.17mm thick cover slip. Reduce light intensity or adjust diaphragm aperture. Clean condenser.
Spots in field of view.	Dirty eyepiece. Dirty slide. Dirty condenser.	Clean eyepiece. Clean slide. Clean condenser.
Uneven illumination of field	Nosepiece not properly positioned. Diaphragm not properly positioned.	Turn until clicks into position. Adjust accordingly.

MECHANICAL PROBLEMS

PROBLEM	CAUSE	SOLUTION
Does not stay in focus.	The stage drops down.	Adjust coarse focus tension.
Does not stay in focus.	The rack stop of the ascending movement of the stage is badly adjusted.	Readjust rack stop screw.

Moving the microscope

- If possible, avoid moving the microscope.
- Carry the microscope in both hands. One hand should hold the microscope arm (16), and the other should support it under the base (12).
- Maintain the microscope in a vertical position.

Repair

If the microscope needs repairing, or revision by authorised personnel, we would recommend that it be stored in its polystyrene box and returned to the distributor. Attach a note with a description of the problem, or details of the required revision.

Warranty

All MOTIC microscopes are warranted against any manufacturing defect for a 5 year period. Damage occurring by any unauthorised repair work, or occurring through misuse or modification of the microscope will not be included under the conditions of the warranty. Bulbs and fuses are not under warranty.

The warranty service is provided by MOTIC, or its authorised distributors. Defective products will be repaired free of charge when returned to MOTIC, or one of its distributors. Transport costs will be covered by the purchaser.

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