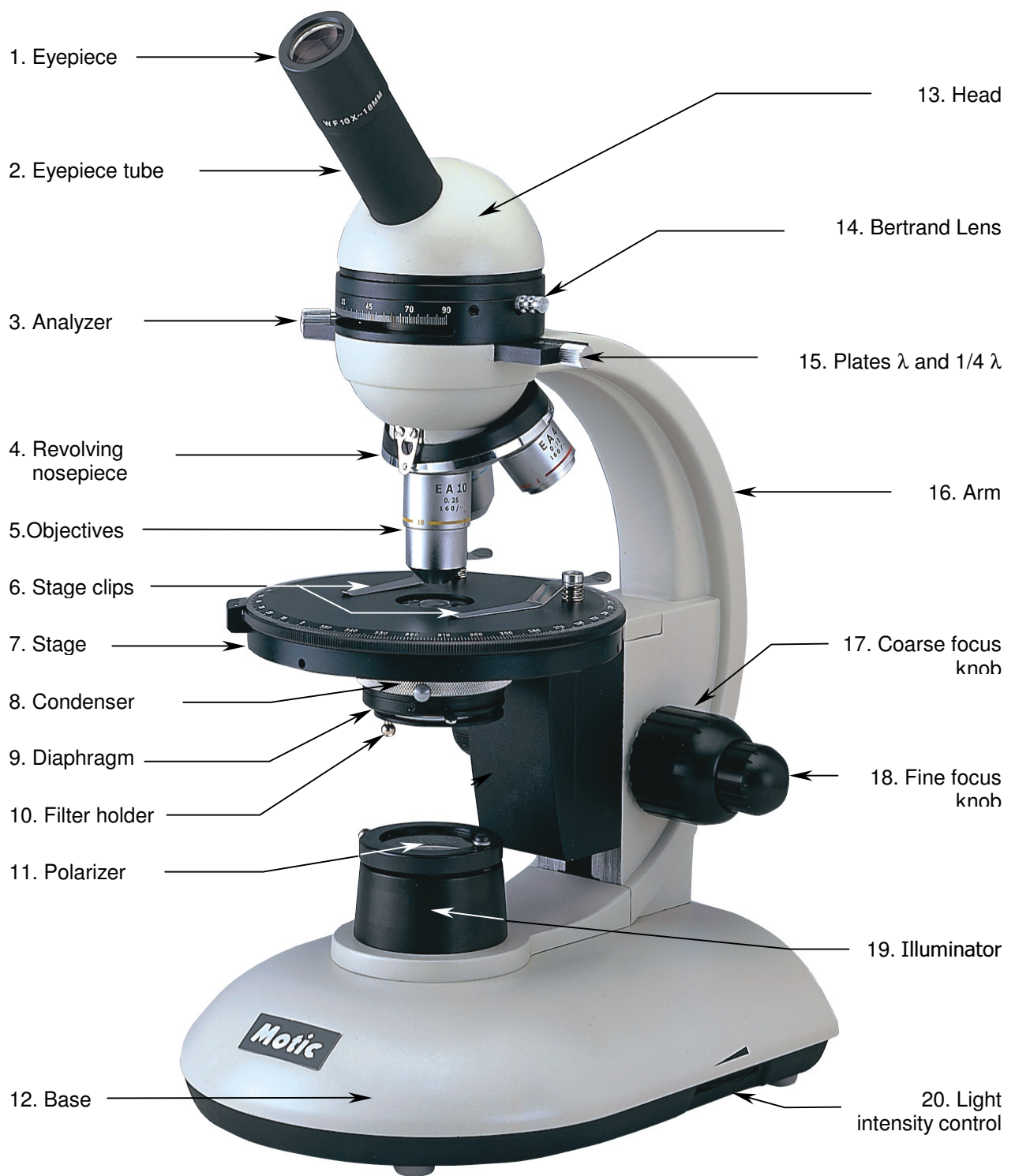


**Motic<sup>®</sup> Microscopes**

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*Instruction Manual*

*PM Series*



PM-2805

## **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 circular rotating stage with a 1° graduation, that permits the exact positioning of the sample. 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 12V/ 20W halogen variable light source.

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 PM-2805 model with additional notes applying specifically to the PM-1805 model.**

## **Unpacking**

All components of the microscope have been carefully packed to make sure they reach you in perfect condition. We recommend that you do not discard any packing containers in case you need to return the microscope or 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:

- PM-1805: A microscope mounted with a monocular head, eyepiece, circular stage, 1,25 A.N. condenser, three objectives, a polarizer integrated into the illuminator and an analyser. Also included is a blue filter, a protective cover and two 2mm and 0.85mm hexagonal keys.
- PM-2805: A microscope with a monocular head with an analyser, a Bertrand lens and some integrated plates  $\lambda$  and  $1/4 \lambda$ , eyepiece, circular stage, 1,25 A.N. condenser, three objectives, a polarizer integrated into the illuminator. Also included is a blue filter, a protective cover and two 2mm and 0.85mm hexagonal keys.

**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 a vertical position on a flat, clean and stable surface.
- B. Extract the rest of the components from the box.

## **Description of components**

1. Head (13). Monocular and 360° rotating so that another user can observe without the necessity of moving the microscope.
2. Eyepiece (1). The group of lenses closest to the eye, they magnify the image formed by the objectives. In monocular models, the eyepiece contains a pointer to signal any particular aspect of a sample to another user.
3. Revolving nosepiece (4). Magnification can be changed by rotating the nosepiece. An indicator in the optical path indicates the correct positioning of the objective.
4. Objectives (5). The group of lenses closest to the sample or microscopic slide. They form the first image.
5. Stage (7). Surface where the slide is placed. The stage is circular and can be turned 360°, stage clips are also provided.
6. Condenser (8). Optimises the illumination to obtain a high level of resolution and image contrast.
7. Focus knobs (17-18). Situated on both sides of the microscope arm, the bigger, coarse focus knob, permits a first approximate focus, and the smaller, fine focus knob, permits a precise adjustment of focus.  
In the model PM-1805 The knobs are separate, and on the model PM-2805 they are coaxial.
8. Illumination (19-20). These models include 12V and 20W Halogen bulb, pre-centred and can be regulated in intensity.

## **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.**

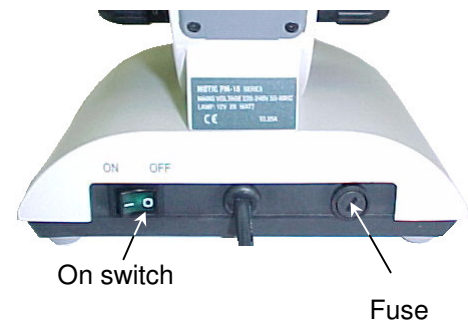
- A. Filter: This filter should be used if the illumination on the field of vision appears yellowed. Place the blue filter in the filter holder (11) situated under the condenser (10), open the filter holder by pulling out horizontally. Make sure that the filter is placed correctly, and close the filter holder.
- B. Analyser: Only for the PM-1805. Connect the analyser to the eyepiece (1). In the PM-2805 the analyser is already installed in the head.

**Warning:** Before connecting the microscope to a power source, ensure that the voltage coincides with that of the microscope.

## Operation

### A. Starting up.

1. Before using the microscope, adjust the intensity of the light (20) to its minimum. This must be done each time the microscope is turned on or off to prolong the life of the bulb.
2. Press the power switch, to ON position. (Fig. 1)
3. Turn light intensity control until the image is lit up.
4. Light intensity should be adjusted according to the objective used or the type of preparation observed.



**Fig. 1**

### B. Focussing the microscope.

1. Turn the revolving nosepiece (4) and place the 4X objective (5) in the optical path, making sure that it has been correctly clicked securely into place.
2. Turn the coarse focus knob (17) until the stage (7) is as low down as possible.
3. Place the microscopic slide on the stage, making sure that the cover slip is facing upwards.
4. Raise the stage clips by pressing down on the back end, place slide under clips, releasing pressure so the slide is secured into place.
5. Ensure that the sample on the slide is in the optical eye.
6. Looking through the eyepiece (1), turn the coarse focus knob until the slide appears in focus.
7. Readjust the focus with the fine focus knob (18) until the image appears completely sharp.

### C. Adjusting the aperture of the diaphragm.

The diaphragm aperture (9) should not be used as a light intensity control. Its function is to obtain the best possible resolution of the sample in proportion with high image contrast. The smaller the aperture, the better the image contrast, although if closed, too much resolution will not be correct. The best approach is to experiment. Suggested apertures are as follows:

OBJECTIVE	IRIS APERTURE
4X	Totally closed to 1/8 open.
10X	From 1/8 to 1/4
40X	From 1/4 to 1/2
100X	From 1/2 to 3/4

D. Changing the magnification.

1. Position the 10X objective (5) in the optical path.
2. This microscope has already been parfocalised, although it is possible that there are small differences between the objectives. In this case, the focus should be readjusted with the fine focus knob (18).
3. When changing between objectives 40X y 100X (optional) do so with great care, ensuring that the objectives do not rub against the slide and damage the lens front.
4. To obtain maximum resolution with the 100X objective (optional), it is necessary to apply immersion oil between the cover slip and the front lens of the objective.
  - a. Only use a tiny amount of immersion oil, a drop should be enough.
  - b. If air bubbles appear, they can be eliminated by rotating the nosepiece slightly, and then repositioning it.
  - c. After observing, all parts that have come into contact with immersion oil must be cleaned. Use a soft cotton cloth, lightly dampened with Xylene. If the 100X objective is not cleaned, the oil will dry on the lens front, and block the view. This could also damage the lens.

**NB: Immersion oil must ONLY be used with the 100X objective. If it comes into contact with any other objective, it must be cleaned immediately.**

E. Critical illumination on bright field.

It is the optimum degree of illumination that perfectly proportions the group of elements used for illumination, basically the condenser. To achieve critical illumination, an object on the illuminator must be brought into focus.

1. Move the polarizer (11) from the illumination field.
2. In the case of the PM-1805, remove the analyser.
3. Focus on a slide with the 10X objective (5).
4. Place a flat object on the illuminator (19). The object must be one that allows light to pass through, for example, a slide.
5. Without letting go of the slide, bring it into focus, moving the condenser (8) by turning the collar with the other hand.
6. When critical illumination has been achieved, the slide can be removed from the illuminator. If anything irregular appears in the field of view, an optical element of the illuminator appears in focus for example, move the condenser slightly so it is out of focus. This should give you the best illumination possible, and that closest to critical illumination.

#### F. Polarized illumination.

Light moves by vibrating on an infinite number of plains. The purpose of the polarizer is to provide the light so that it moves in a single direction, on parallel plains. A secondary polarizer, known as the analyser is situated above the objectives, "crossing" the primary polarizer: that is to say, placed at a 90° angle to the emitted light of the primary polarizer, and so "blocking" the light's path: what is called the position of light extinction. Through the eyepiece the field of view then appears dark. Observation through a polarizing microscope is called orthoscopic observation. Polarized light is mainly used for the observation of mineral samples, although it can also be used to observe textiles, plastics, paper and some biological specimens.

1. The polarizer (11) must be placed over the illumination field (19).
2. Without any slide placed on the stage, place the analyzer (3) into 90° position. For the PM-1805 place the analyzer onto the eyepiece and turn it until the field of view becomes dark.

For different observing techniques with polarising light,

### **Maintenance**

**WARNING:** FOR YOUR SECURITY, SWITCH OFF AND REMOVE PLUG FROM POWER SOURCE OUTLET BEFORE MAINTAINING YOUR MICROSCOPE, TO AVOID SHOCK OR FIRE HAZARD.

CONSULT YOUR DISTRIBUTOR IF YOUR MICROSCOPE REQUIRES ANY MAINTENANCE OR REPARATION PROCEDURE NOT COVERED IN THIS INSTRUCTION MANUAL.

#### A. Optical Maintenance

1. Do not attempt to remove any optical component.
2. Before cleaning any lens, remove surface traces of dust using a fine brush, especially for lenses, or with low pressure . Both can be obtained in any photography shop.
3. Cleaning the eyepiece
  - a. Do not remove the eyepiece (1) from the eyepiece tube. (2).
  - b. Only clean the lens surface, misting the lens with breath.
  - c. Afterwards, dry the lens with special lens paper in circular movements, from center out to the exterior of the lens. Do not wipe the lenses when dry, as they can be easily scratched.
4. Cleaning the objectives.
  - a. Do not remove the objectives (5) from the microscope.
  - b. Only clean the surface area. Use a soft cotton cloth dampened with Xylene. Dry the lens using the same cloth.
5. Cleaning the condenser. (8)
  - a. Only clean the top lens surface of the condenser using any of the methods mentioned above for cleaning the eyepieces or objectives.

6. Cleaning the illuminator lens. (19)

- a. Only clean the top lens of the illuminator using any of the methods mentioned above for cleaning the eyepieces or objectives.

B. Electrical maintenance

**WARNING:** FOR YOUR SECURITY, SWITCH OFF AND REMOVE PLUG FROM POWER SOURCE OUTLET BEFORE MAINTAINING YOUR MICROSCOPE, TO AVOID SHOCK OR FIRE HAZARD.

1. Changing the bulb.

- a. Place the microscope on its side with extreme care, especially with the eyepiece (1).
- b. Completely unscrew the 5 screws indicated (Fig. 2).
- c. Open the cap on the base.
- d. With a cloth, carefully pull the bulb straight out of the socket.
- e. Do not touch the replacement bulb with hands. Use a clean cloth and insert the pins of the bulb into the socket.
- f. If the bulb has been accidentally touched, clean it as this could affect the transmission of light and the duration of the bulb.
- g. Close the cap, and screw down firmly.

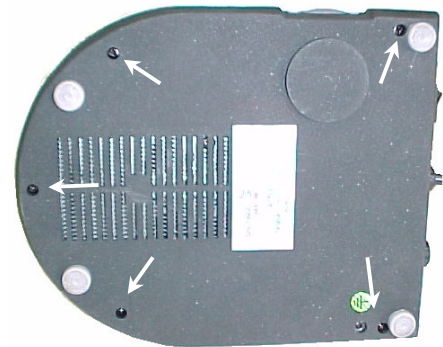


Fig. 2

2. Changing the fuse.

- a. With a flat screwdriver, press lightly on the slot on the fuse cap (Fig. 1) and 1/4 turn in the direction of the arrow indicated.
- b. Release pressure and the fuse cap should be able to be removed easily. Remove it completely.
- c. Remove the fuse by pulling it out, and insert the new one. Ensure that a 0.5 amp fuse is being used.
- d. Replace the fuse cap.
- e. Repeat step (a.) this time 1/4 in the opposite direction of the arrow indicated. The cap should be well closed.

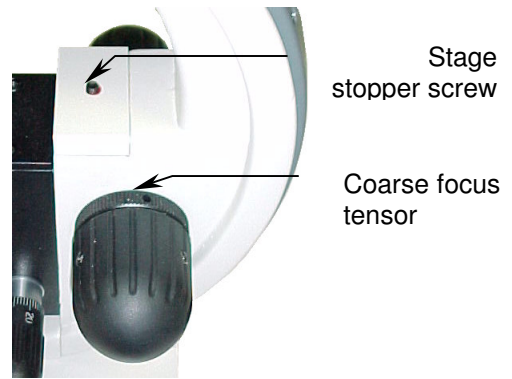
C. Mechanical maintenance.

1. Adjusting the tension of the coarse focus control.

The tension adjustment control (Fig. 3) is located between the coarse focus knob (19) and the arm (16). The coarse focus now comes pre-adjusted by the manufacturer. The ideal tension point is that which permits coarse focus knob to move as loosely as possible, without the stage (8) moving down on its own.



- a. To adjust tension, first loosen the screw located in the orifice of the collar with the 2mm hexagonal key.
- b. To increase focus knob tension, turn collar clockwise, to loosen, turn anti clockwise.
- c. Tighten hexagonal screw.



**Fig. 3**

## 2. Adjusting stage stopper.

The 40X and 100X (optional) objectives incorporate security measure in that the lens tip retracts to avoid damage to the front of the lens should it come into contact with the slide. An additional measure of security consists of an adjustable stopper on the ascending movement of the stage. The stopper comes pre-adjusted by the manufacturer for standard slides with cover slips 0.17mm thick. For observing other types of samples, however, it may become necessary to readjust the stage stopper.

- a. Loosen the stage stopper screw (Fig. 3) with a 2mm hexagonal key.
- b. For the PM-1805, with the fine focus knob (18) mid run, focus on the sample using only the coarse focus knob (17) with firstly the 4X objective (5), and 10X objective. For the PM-2805, focus using the coarse focus and the fine focus, with firstly the 4X objective, and 10X objective
- c. Tighten the stage stopper screw until firm enough for the stage (7) is supported, and cannot ascend further.

## Troubleshooter

### ELECTRICAL

PROBLEM	CAUSE	SOLUCIÓN
Bulb does not work.	Plug outlet does not work  Cable not connected Bulb burned out. Fuse blown. Wrong bulb.	Repair by a qualified specialised technician. Connect cable. Replace bulb. Replace fuse. Replace by the correct bulb.
Bulb burns out in short time.	Voltage too high.	Reduce light intensity to a minimum before turning the microscope on or off.
Bulb burns out immediately.	Wrong bulb.	Replace with the correct bulb.
Bulb flickers.	The bulb is not correctly inserted into the socket. Bulb about to burn out. Fuse holder not locked into proper position.. Loose connection at plug outlet.	Insert correctly.  Replace bulb. Close correctly. Repair by a qualified specialised technician.
Fuse blows in short time.	Wrong fuse.	Replace with the appropriate fuse.
Fuse blows immediately.	Short circuit	Repair by a qualified technician.

### IMAGE QUALITY

PROBLEM	CAUSE	SOLUCIÓN
No image.	Nosepiece not positioned properly. Image too bright.	Turn until clicks into place. Reduce the intensity of the light.
Poor resolution.	Dirty objective. Dirty eyepiece. Slide upside down.  Wrong cover slip used with slide. Light too bright.  Dirty condenser.	Clean objective. Clean eyepiece. Replace the slide with the cover slip facing upwards. Use 0.17mm thick cover slips. Reduce light intensity or adjust the diaphragm aperture. Clean condenser.
Spots in field of view	Dirty eyepiece. Dirty slide. Dirty condenser.	Clean eyepiece. Clean preparation. Clean condenser.
Uneven illumination of field.	Nosepiece not positioned properly. Diaphragm aperture not sufficiently open.	Turn until clicks into place. Adjust appropriately.

### MECHANICAL

PROBLEM	CAUSE	SOLUCIÓN
Does not stay in focus.	The stage is sliding down on its own.	Adjust the tension of the coarse focus knob.
Does not focus.	The stopper on the ascending movement of the stage needs adjusting.	Readjust the stopper.

### **Moving the microscope**

- Avoid moving the microscope if possible.
- Carry the microscope in both hands, with one hand holding the arm (16), and the other supporting the base (12).
- Keep the microscope in an upright position.

### **Repairs**

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 without charge when returned to MOTIC, or one of its distributors. Transport costs will be covered by the purchaser.

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