PHYWE
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Student microscopes MIC-200 Series

MIC-222, MIC-231

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Operating instructions

CE The unit complies with the corresponding EC guidelines.

Fig. 1:MIC-222 (left) und MIC-231 (right)

INHALTSVERZEICHNIS

1 INTRODUCTION

By purchasing a microscope from the MIC-200 series, you have chosen a quality microscope. The MIC-200 series microscopes are designed for use in schools and university student labs as well as and laboratories.

This instruction manual describes how to set up the microscope, how to use, clean and maintain it.

The MIC-200 microscopes differ as follows:

Model	Binocular / trinocular
MIC-222	Binocular
MIC-231	Trinocular

2 CONSTRUCTION OF THE MICROSCOPE

After completing the step "Preparing the microscope", first familiarize yourself with the mechanical, but also the optical and electrical components of your microscope. Operate each component carefully by hand and get an impression of the functionality of each adjustment option.

The names of the components are listed here and are marked in the Fig. 1 & 2.

A1) Eyepiece
A2) Revolving nosepiece for 5 objectives
A3) and A4) Mechanical stage with specimen holder
A5) Abbe condenser
A6) Iris diaphragm
A7) Condenser holder
A8) Filter holder
A9) Polarizer (optional)
A10) Binocular head
A11) Head lock screw
A12) Main body
A13) Phase contrast slide / darkfield slide slot
A14) and A15) Coaxial drive for X and Y movement of the sample holder
A16) Light intensity adjustment knob

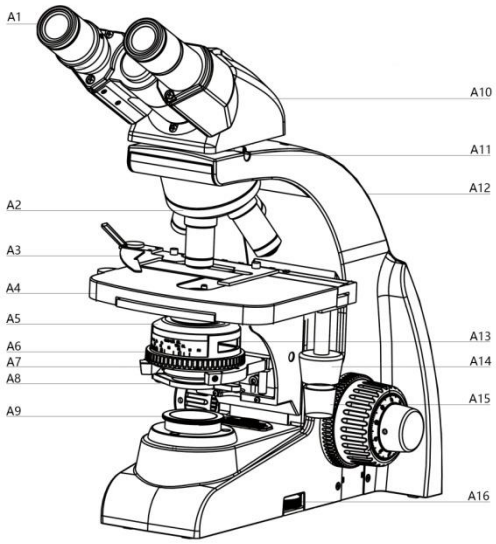


Fig. 1 MIC-222

B1) 1X C-mount (MIC-231)
B2) Trinocular observing tube
B3) Lifting handle
B4) On/off switch
B5) Fuse socket
B6) Power socket
B7) Diopter adjustment ring on left eyepiece
B8) Objectives (4x, 10x, 40x, 100x)
B9) Focusing knob of condenser
B10) Adjustment handwheel of coarse focusing mechanism
B11) and B12) Coaxial coarse and fine focusing mechanism

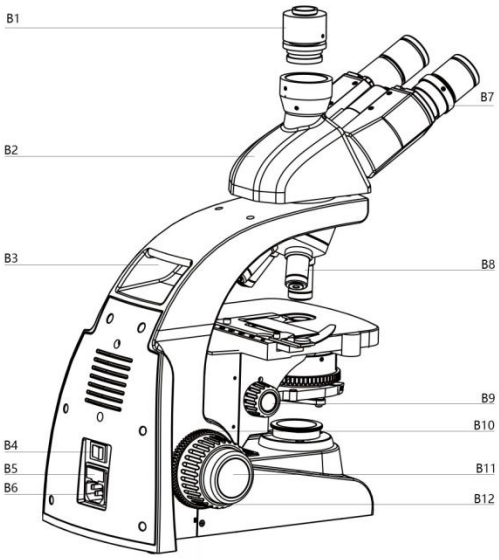


Fig. 2 MIC-231

3 PREPARING THE MICROSCOPE

Unpack the microscope and place it on a table. Take out the main body and observing tube, connect them together, and then use the attached Allen wrench to tight the observing tube lock screw.

The objectives 4x, 10x, 40x and 100x objectives are pre-assembled with this microscope.

Plug in the power plug and switch on the microscope. Now sit comfortably in front of the microscope to use it.

4 FUNCTIONS OF THE MICROSCOPE

The stand consists of observing head, base and table. You can grip the microscope by the lifting handle during transport.

Binocular or trinocular head

The head with the tubes can be rotated through 360° and is equipped with two WF10x wide-field eyepieces. These are marked with a spectacle symbol, because they are eyepieces for spectacle wearers. This enables spectacle wearers with glasses to perform microscopy without removing the spectacles.

Revolving nosepiece

The nosepiece is equipped with 4 achromatic objectives as follows:

- 4x NA 0.13
- 10x NA 0.30
- S40x NA 0.70
- S100x NA 1.25 (oil)

The objectives 40x, and 100x are equipped with springs (S) to prevent damage to the front lens and the microscope slide and cover glass).

The numerical aperture (N.A.) of the objective indicates the resolving power of the objective.

The total magnification can be easily calculated by multiplying the magnification of the eyepiece by that of the respective objective, as shown in the table:

Ocular	Objective	Magnification
10x	4x	40x
10x	10x	100x
10x	40x	400x
10x	100x	1000x

In MIC-200 series microscopes, the objectives are already attached to the nosepiece.

Check that all the objectives are firmly attached. To do this, grasp the knurled rings of the objectives with your fingers and turn them to the right. Do not use a tool to tighten them. The entire nosepiece with the 4 objectives can be turned by hand. When you rotate the nosepiece, you will notice that the objectives click into place. They do so in the correct position relative to the optical axis of the microscope.

Object table with mechanical stage

The microscope slide is placed in the specimen holder of the mechanical stage and can be moved in X and Y direction. The stage has a working area of 141 x 131 mm, the travel range is 78 x 53 mm.

Coarse and fine adjustment

The focusing mechanisms for coarse and fine adjustment are located on one axis (coaxial). On the fine adjustment knobs there is a graduation. This can be used to measure the depth of a specimen.

When the stage automatically slides down after using the microscope for some time, turn the adjustment ring on the inside of the coarse and fine adjustment knobs slightly in the direction of the arrow. The coarse adjustment knob is tightened to prevent the stage from sliding down.

Abbe condenser with iris diaphragm

Below the object stage is an Abbe condenser N.A. 1.25. The condenser can be adjusted in height by turning. This allows light to be focused on the specimen for contrast enhancement. The condenser is already pre-centered.

The iris diaphragm with filter holder is located under the condenser. The light intensity can be adjusted by changing the movable opening.

Illumination

The power-saving illumination is the reason why the microscopes of the MIC-222 model do not need to be connected to the mains all the time for operation, but can also be operated independently of the mains, as they contain a rechargeable Ni-MH battery. The illumination is a modern LED lamp with the following specifications:

- LED: 3W, brightness adjustable
- Power supply: 100V-230V

C-mount adapter for the trinocular version MIC-231

A C-mount adapter is part of the scope of delivery of the MIC-231 so that you can use each microscope camera which has a C-mount thread.

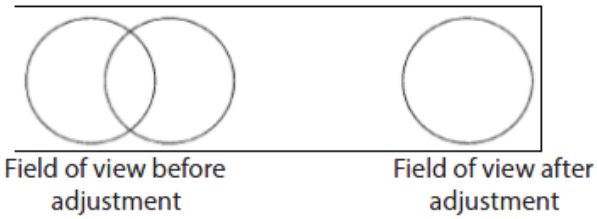
5 WORKING WITH THE MICROSCOPE

Please follow the following instructions to achieve the best results:

Adjustment of interpupillary distance and diopter distance

1. Adjusting the interpupillary distance

While looking through the eyepieces, adjust them until the left and right fields of view coincide completely.



2. Adjusting the diopter

a) While looking through the right eyepiece, rotate the coarse/fine focusing adjustment knobs to bring the specimen into focus.

b) Look through the left eyepiece and rotate only the diopter adjustment ring on the left eyepiece sleeve to bring the specimen into focus.

Adjusting the lighting

For optimal contrast and resolution, please follow these steps:

- Place a micro slide on the stage and focus with the 4x lens. The iris diaphragm is open.
- Turn the condenser to the highest position.
- Close the iris diaphragm until it is just visible at the edge of the image field.
- The microscope is now optimized for use with the 4x objective. Repeat this procedure with each additional magnification to achieve the best balance between contrast and resolution.

Attention: the <u>maximum</u> light intensity of the microscope can damage your eyes if you use it with the 4x and 10x objectives!

If you swap micro slides, start again with the 4x objective.

It is recommended to use slides of 1.0 to 1.2 mm thickness in combination with cover glasses of 0.13 mm or 0.17 mm thickness.

Battery

The MIC-222 microscope contains a 3.6V Ni-MH battery pack.

A charging indicator is located on the side of the microscope.

It is red when connected to the power supply and green when the battery is full. If the red indicator flickers, the battery is not properly connected to the circuit board.

The microscope's illumination can be powered by a battery pack for 4 to 8 hours without an external power supply.

Using the S100x oil immersion objective

Please follow the following recommendations for using S100x N.A. 1.25 oil immersion lens:

- Focus the image with the S40x lens.
- Rotate the revolving nosepiece until the S100x objective almost (not quite) clicks into place.
- Drop a small drop of immersion oil (not part of the scope of delivery, please order separately) on the center of the specimen.
- Then let the S100x objective snap into place.
- The front lens is now in contact with the immersion oil.
- View the specimen through the eyepiece and focus the image with the fine adjustment knob.
- The distance between objective lens and specimen is only 0.24mm!
- If small bubbles are visible, turn the S100x objective a few times to the left and right so that the front lens of the objective moves in the oil. This will make the bubbles disappear.
- Then turn the stage with the fine adjustment knob downwards until the front lens does not touch the oil anymore.
- Always clean the front lens of the S100x lens with a piece of lens paper moistened with a drop of xylene or alcohol.
- Now also clean the micro slide.

The S100x objective can also be used without immersion oil, i.e. dry. However, please note that in this case the resolution is much lower. Water may provide somewhat better resolution than using it dry.

Caution!

- **Never drop the xylene or alcohol directly onto the objective lens. This could cause xylene or alcohol to enter the lens and dissolve the lens fixation!**
- **Avoid oil contact with the other lenses!**

6 MAINTENANCE AND CLEANING

Always cover the microscope with a dust cover after use. Always leave the eyepieces and objective lenses mounted so that no dust can enter the inside parts of the microscope.

Cleaning the optical components

If the eyepiece lenses or the front lenses of the objectives are dirty, you can clean them by wiping a piece of lens paper over the lens surface in circular motions. If this does not help, use a drop of xylene or alcohol on the lens paper. Never put xylene or alcohol directly on the lens!

If dirt is clearly visible in the field of view, it is on the lowest lens of the eyepiece. Remove the eyepiece from the tube and clean the outside of the lens.

If dust is still visible, check whether the dust is in the eyepiece by rotating it. If so, gently remove the bottom lens from the eyepiece and clean it.

It is not necessary - and not recommended - to clean the lens surfaces inside the objectives. Sometimes the dust can be removed by high-pressure treatment with air. Otherwise, there will be no dust inside the objectives until the objectives are removed from the revolving nosepiece.

The most important step to a long lasting clean microscope optics is to use the dust cover when you are not using your microscope!

Caution! Cleaning cloths containing plastic fibers can damage the coating of the lenses!

Maintenance of the stand and mechanical components

Simply remove dust with a brush. If the stand is very dirty, the surface can be treated with a careful cleaning agent.

All moving parts such as the adjustment of the mechanical or the coarse and fine focusing mechanism contain ball bearings which are not sensitive to dust. The bearings can be relubricated with sewing machine oil if necessary.

Change the lamp and the fuse

- Switch off the power and pull the mains plug.
- Now loosen the lower cover screw of the chassis and remove the cover to replace the bulb and fuse according to the requirements of the different models.
- After replacing the bulb and fuse, the cover should be replaced and the screws tightened.

7 TECHNICAL DATA

- Infinity optical system
- Siedentopf viewing head, tubes: 30° inclined (binocular/trinocular), 360° rotatable
- WF10x/18mm eyepieces for spectacle wearers
- Eyepieces of the monocular models secured against removal
- Quintuple nosepiece with click-stop
- Achromatic objectives 4x NA 0.13, 10x NA 0.30, S40x NA 0.70, and S100x NA 1.25 (oil)
- Condenser: Abbe N.A. 1.25 with iris diaphragm
- Models with mechanical stage: area 141 x 131 mm, travel range 78 x 53 mm
- Coaxial coarse and fine focusing mechanism with graduations on the fine focusing mechanism
- Lighting: 3 W LED (colour temperature 5000 K), adjustable
- Integrated power supply unit 100...240 V, 50/60 Hz, 3W
- Fuse: F3.15A/250V
- Includes dust cover
- Dimensions (H x W x L): 39 cm x 23 cm x 28 cm
- Weight: 8.5 kg (MIC-222); 8.6 kg (MIC-231)

8 WASTE DISPOSAL

The packaging consists predominately of environmentally compatible materials because they can be recycled and should be passed on for disposal by the local recycling service.

Should you no longer require this product, do not dispose of it with the household refuse.

Please return it to the address below for proper waste disposal.

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