

MP400 SERIES

Laboratory Microscopes

PRODUCT MANUAL

Models: MP402 | MP402SP | MP402PL | MP403 | MP403SP | MP403PL

Binocular and Trinocular Laboratory Microscopes

For Academic, Clinical, and Research Laboratory Applications



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1. Product Overview

This manual covers the MP400 Series laboratory microscopes — precision optical instruments engineered for reliable, high-resolution imaging of biological specimens in academic, clinical, and research laboratory environments. The MP400 Series is offered in two head configurations: binocular (MP402 models) and trinocular (MP403 models), each available in three infinity corrected optical options — Standard Achromat, Semi-Plan, and Plan Achromat objectives.

Intended Use

MP400 Series microscopes are designed for brightfield observation of prepared and living specimens, including histological sections, cytological smears, microbiological cultures, and hematological samples. They are suitable for use in clinical laboratories, academic teaching environments, and general research settings.

Series Overview

The MP402 Series features Binocular Siedentopf head. The MP403 Series extends this platform with a trinocular head, enabling simultaneous visual observation and digital imaging via an attached camera (optional, not included with the model). Within each configuration, three objective grades are offered to match application requirements from routine teaching to advanced research imaging.

2. Model Comparison

The following table provides a side-by-side comparison of all models in the MP400 Series to assist in selecting the appropriate instrument for your application.

Model	Head Type	Infinity Objectives (4X,10X,40X,400X)	Eye Pieces	Total Magnification Range	Camera Port
MP402	Binocular	Achromat	10x/20mm (2)	40X – 1000X	No
MP402SP	Binocular	Semi-Plan	10x/20mm (2)	40X – 1000X	No
MP402PL	Binocular	Plan Achromat	10x/20mm (2)	40X – 1000X	No
MP403	Trinocular	Achromat	10x/20mm (2)	40X – 1000X	Yes
MP403SP	Trinocular	Semi-Plan	10x/20mm (2)	40X – 1000X	Yes
MP403PL	Trinocular	Plan Achromat	10x/20mm (2)	40X – 1000X	Yes

3. Technical Specifications

The following specifications apply across all MP400 Series models unless otherwise noted. Individual model variants differ in head type and objective optical grade as listed above.

Series	MP400 Series Microscope
Category	Laboratory
Head	Binocular (Seidentopf) Trinocular (Seidentopf)
Head Inclination	30°
Head Rotation	360°
IPD Range	48–75 mm
Eyepiece	WF 10×
Field of View (FOV)	20 mm
Infinity Objectives	Achromat Semi-Plan Plan Achromat
Objective Set	4×, 10×, 40×, 100×
Infinity Corrected	Yes
Nosepiece	5-position reverse nosepiece with positive click-stop engagement for precise parfocality and consistent image alignment, designed to enhance ergonomic comfort during extended use.
Magnification Range	40× – 1000×
Stage	Integrated rackless mechanical stage with dual slide holder for a smooth, low-profile design, maximizing working space and simplifying slide handling.
Stage Size	140 × 135 mm
Stage Travel	75 × 35 mm
Focus Range	26 mm
Focus Resolution	2 µm
Illumination	LED
Coaxial Focus	Yes
Dimensions (W×D×H)	15.35 × 11.02 × 17.71 in / 390 × 280 × 450 mm
Weight	14 lbs / 6.5 kg

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4. Safety Information

Read all safety instructions before operating any MP400 Series instrument. Failure to follow these instructions may result in instrument damage, specimen contamination, or personal injury.

General Safety Precautions

- Do not operate the instrument in environments with direct sunlight, excessive heat, high humidity, or corrosive atmospheres.
- Position the instrument on a stable, level, vibration-free surface. Leave a minimum of 10 cm clearance on all sides for ventilation.
- Do not exceed the rated input voltage. Verify local supply voltage matches the specification on the instrument label before connecting power.
- If an unexpected situation occurs during operation, immediately disconnect the power adapter.
- Do not disassemble or modify the instrument. Refer all service to qualified personnel.
- Disconnect power before cleaning or performing maintenance.
- Do not touch optical surfaces (lenses, eyepieces, objectives, condenser) with bare hands. Handle only by non-optical surfaces.
- Remove filters, slides, and stage accessories before transporting the instrument.
- When carrying the instrument, always support it with both hands — one at the body handle and one at the base.

Biological Safety

- Handle all biological samples in accordance with institutional biosafety protocols and applicable regulations and standards.
- When working with infectious or hazardous materials, always use appropriate personal protective equipment (PPE).
- Following oil immersion observation, clean all components that contacted immersion oil immediately to prevent contamination and lens damage.
- Decontaminate instrument surfaces after exposure to biohazardous materials following your facility's standard operating procedures.

Safety Symbols

Symbol	Meaning
 HOT SURFACE	Surface may become hot during extended operation. Do not touch lamp housing while instrument is on or immediately after use.
 READ MANUAL	Read the operation manual carefully before use. Improper use may result in personal injury or instrument damage.
 ELECTRIC SHOCK	Risk of electric shock. Do not open the housing. Refer servicing to qualified personnel only.
I / ON	Main power switch position: ON
O / OFF	Main power switch position: OFF

5. Installation and Setup

5.1 Unpacking

Carefully remove the instrument from its packaging. Inspect for any shipping damage before proceeding. Retain the original packaging materials for future transport or storage. Verify that all components listed in the packing slip are present.

5.2 Environmental Requirements

- Operating temperature: 15°C to 40°C
- Maximum relative humidity: 80%, non-condensing
- Place on a stable, vibration-free, level surface with adequate clearance on all sides
- Avoid locations with direct sunlight, dust, corrosive gases, or significant vibration
- In high-humidity environments, a desiccant or dehumidifying unit is recommended to prevent fungal growth on optical components

5.3 Power Connection

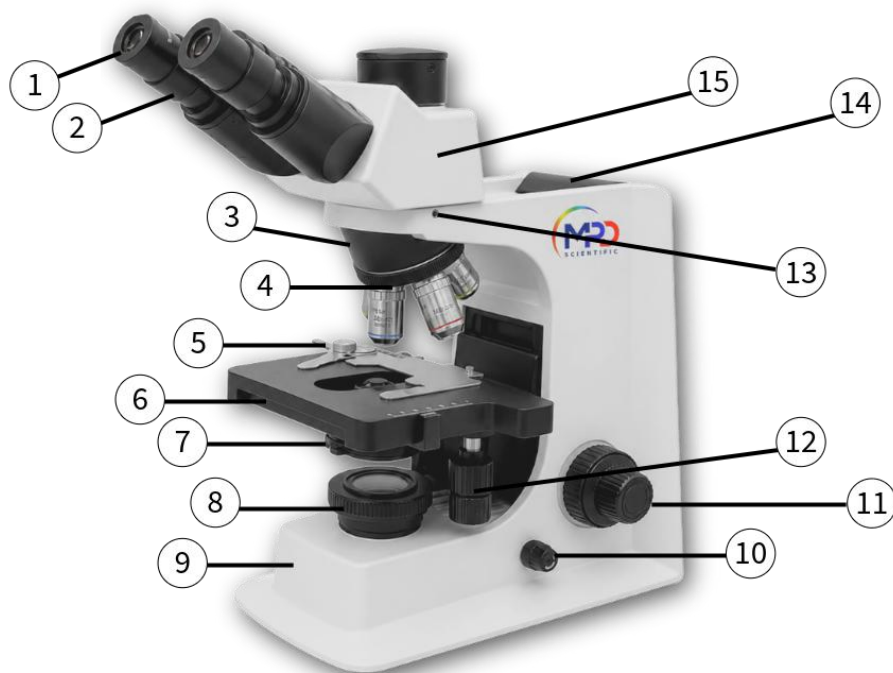
Before connecting power, verify that your local supply voltage matches the specification label on the instrument. The MP400 Series accepts a wide input voltage range (AC 100–240V, 50/60 Hz). The power adapter provides DC output to the LED illumination system.

Never operate the instrument on a supply voltage outside the specified range. If voltage cannot be confirmed, do not connect the instrument and contact MPD Scientific technical support.

5.4 Component Installation

Follow these steps in order when assembling the instrument for first use:

1. Clean the work surface before beginning assembly.
2. Loosen the head setting screw (13), rotate the binocular or trinocular head to the working position, and tighten the setting screw.
3. Remove the dust covers from the eyepiece tubes.
4. Insert the eyepieces (WF 10×) into the tubes. Do not touch the eyepiece lenses with bare hands.
5. For trinocular models (MP403 series): connect the C-mount adapter and attach your CCD/CMOS camera or SLR camera adapter to the trinocular port. Install the camera software on your workstation before connecting.
6. Connect the power adapter to the instrument and to a suitable outlet. Do not power on yet.



- | | |
|----------------------------|------------------------------------|
| 1. Eyepiece | 11. Right Coarse & Fine Focus Knob |
| 2. Diopter Adjustment Ring | 12. Mechanical Stage Moving Knob |
| 3. Nosepiece | 13. Head Thumb Screw |
| 4. Objective | 14. Body Handle |
| 5. Clamp Handle | 15. Trinocular Head |
| 6. Mechanical Stage | |
| 7. Condenser | |
| 8. Light Collector | |
| 9. Main Body | |
| 10. Potentiometer | |

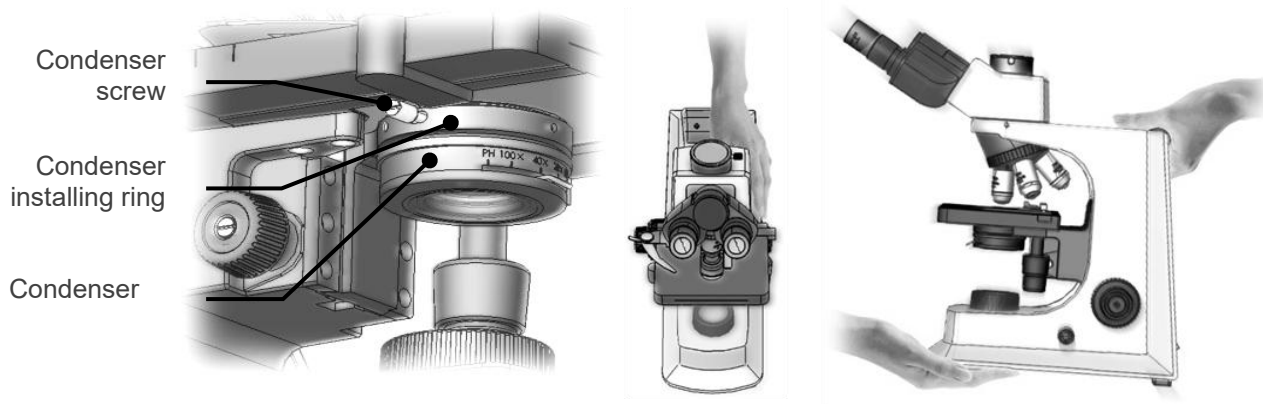
6. Operation

6.1 Brightfield Standard Operating Procedure

Follow this sequence for routine brightfield microscopy:

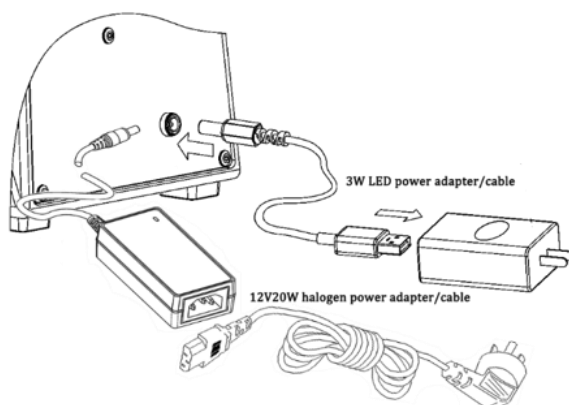
7. Turn on the power switch and adjust the LED brightness using the rotary potentiometer.
8. Place the specimen slide on the mechanical stage. Open the stage clamp, insert the slide, and close the clamp. Use the stage knobs to position the specimen in the optical path.
9. Rotate the nosepiece to engage the 4× objective. Do not force objectives directly — always rotate the nosepiece to click objectives into position.
10. Use the coarse focusing knobs to bring the specimen into approximate focus, then use the fine focusing knobs for precise focus adjustment.
11. Adjust the interpupillary distance by spreading or closing the eyepiece tubes until the two fields merge into a single circular field.
12. Adjust the diopter ring on the eyetube to equalize focus between both eyes.

13. Adjust the condenser height and aperture diaphragm lever for optimal image brightness and contrast. The recommended aperture diaphragm setting is 70–80% of the objective's numerical aperture.
14. To change objectives, rotate the nosepiece to the desired objective. Refocus as needed. For the 40× objective, verify the cover glass is facing upward. For the 100× oil immersion objective, apply immersion oil before engaging the objective.



6.2 Illumination Adjustment

The LED illumination system provides stable, adjustable white light for brightfield observation. Rotate potentiometer to increase or decrease brightness. The LED operates at low voltage via the supplied power adapter. Do not attempt to replace the LED module — contact your dealer or MPD Scientific if replacement is required.



6.3 Condenser and Aperture Diaphragm

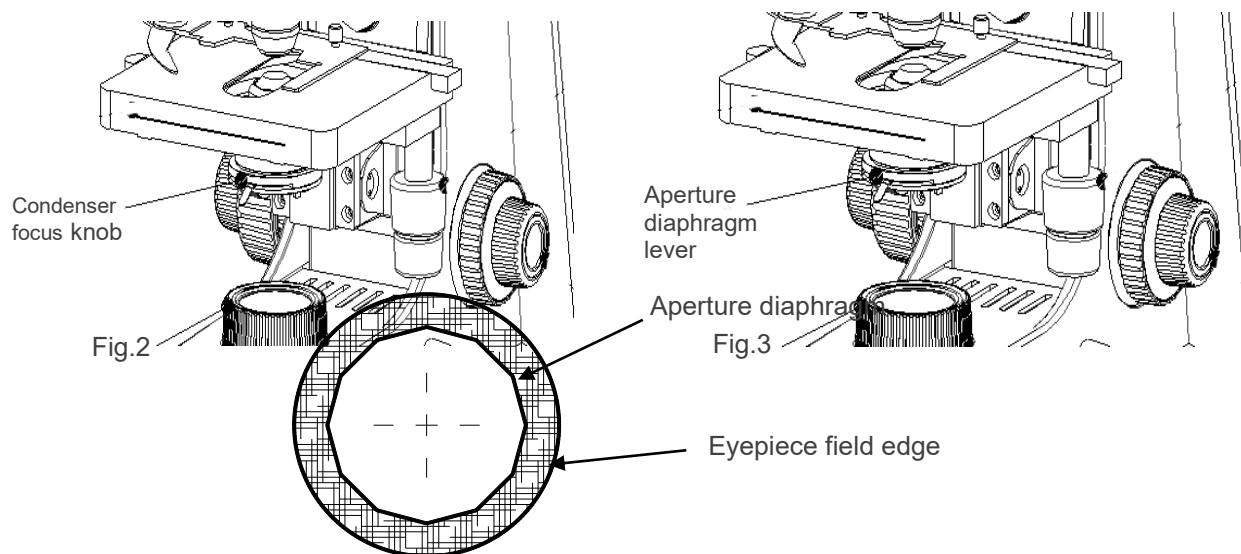
The Abbe condenser (N.A. 1.25) collects and focuses illumination onto the specimen plane. Adjust the condenser height using focusing knob to optimize illumination uniformity. The aperture diaphragm controls the cone of light entering the objective.

- Opening the aperture diaphragm increases brightness and resolution but reduces contrast and depth of field.
- Closing the aperture diaphragm increases contrast and depth of field but reduces brightness and resolution.
- If the aperture diaphragm is too small, double-image artifacts may appear.
- For most specimens, set the aperture to 70–80% of the objective numerical aperture for the best balance of resolution and contrast.
- To verify aperture setting: remove an eyepiece and observe the back focal plane of the objective directly to view the illuminated aperture.

6.4 Focusing System

The coaxial coarse and fine focusing knobs are located bilaterally on the instrument arm for ergonomic two-hand operation.

- Coarse focusing knob: for rapid large-range focus adjustments. Coarse stroke range is 26 mm.
- Fine focusing knob: for precision adjustment. Fine division resolution is 2 μm .
- Do not force the left and right coarse focusing knobs in opposite directions simultaneously — this will damage the focusing mechanism.

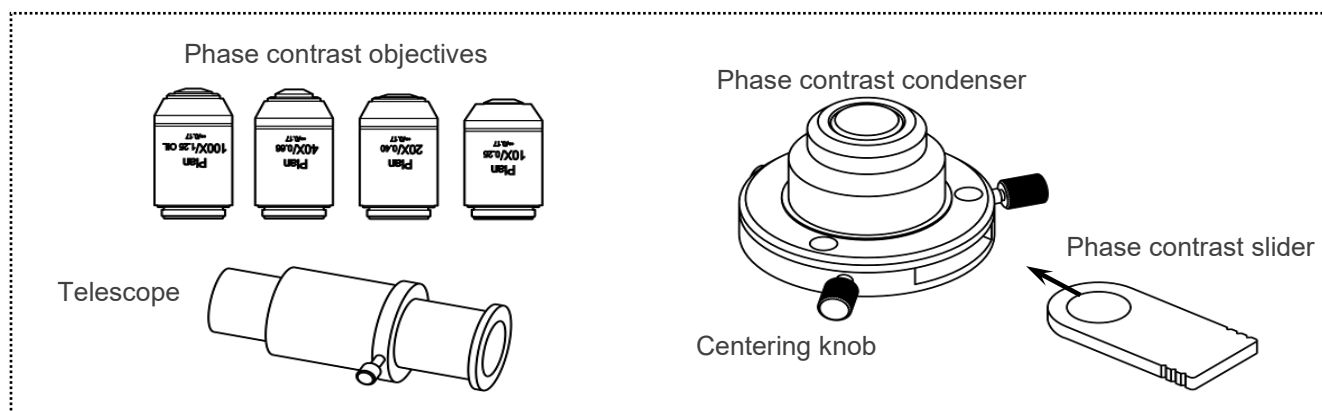


- If the stage drifts downward after extended use, adjust the tension ring on the focusing knob assembly: rotate clockwise to increase tension, counterclockwise to reduce tension.

6.5 Optional Accessories and Techniques

Phase Contrast Observation

The optional independent phase contrast unit includes phase contrast objectives (10 $\times$ /20 $\times$ /40 $\times$ /100 $\times$), a centering telescope, independent condenser, green filter, and phase contrast sliders. Insert the phase contrast slider into the condenser slot and engage the corresponding objective. Verify that the 'TOP' marking on the slider faces upward. Use the centering telescope and centering knobs to overlap the bright and dark rings in the back focal plane before observation.



Simple Polarizing Observation

The optional polarizing unit consists of an analyzer and polarizer. Remove the observation head, insert the analyzer into the main body, reinstall the head, and place the polarizer on the collector. Rotate the polarizer 360°

with the specimen removed until maximum extinction (darkest field) is achieved. Then place the specimen for qualitative anisotropy assessment.

Darkfield Observation

The optional darkfield condenser enables observation of specimens below the resolution limit as bright features against a dark background. This technique is particularly effective for specimens with low contrast and high refractive index differences. Replace the standard Abbe condenser with the darkfield condenser following the condenser installation procedure in Section 5.4.

Digital and SLR Camera Imaging (MP403 Series)

Trinocular models (MP403 series) include a dedicated camera port. Connect the camera via C-mount adapter. Install the camera acquisition software on your workstation before connecting. First achieve a sharp image through the eyepieces, then capture the image via the camera interface. If the digital image is not sharp, adjust camera focusing using C-mount focusing control.

7. Filters

Optional color filters (blue, green, and yellow) are available for the MP400 Series. Filters are placed in the filter holder of the condenser or on the collector tray below the condenser.

- Blue filters reduce glare and enhance contrast for unstained or lightly stained specimens.
- Green filters improve contrast for specimens stained with hematoxylin and eosin (H&E) and similar stains.
- Yellow filters are used for specific fluorescent or contrast enhancement applications.

Always remove filters before transporting the instrument to prevent damage. After use, remove and store filters to prevent accumulation of dust and contaminants on filter surfaces.

8. Maintenance and Care

8.1 Routine Cleaning

Disconnect the instrument from power before cleaning. Wipe exterior non-optical surfaces with a soft cloth or lens tissue moistened with neutral laboratory detergent or 70% isopropanol. Do not allow liquids to enter the lamp housing or electrical components. Do not use abrasive cleaners, strong solvents, or bleach on plastic or painted surfaces. Do not use organic solvents (Alcohol, Ether, or their mixtures) on painted metal or plastic housings. Use a soft cloth with mild detergent only.

8.2 Optical Surface Cleaning

- Never touch optical surfaces with bare hands. Fingerprint contamination degrades image quality and is difficult to fully remove.
- Remove loose dust from lenses using a clean, soft brush or a bulb blower before any wet cleaning.
- For stubborn contamination or fingerprints, clean lens surfaces using lens paper and specifically formulated lens cleaning solution.
- After oil immersion observation, remove immersion oil immediately using lens paper and a small amount of the ethanol/ether mixture. Residual oil will harden and permanently damage objective optical coatings.

8.3 Decontamination

For decontamination of stage, clips, and other surfaces following biohazard exposure, apply a suitable disinfectant in accordance with your facility's biosafety protocols. Allow adequate contact time before wiping clean with a damp cloth. Ensure no residue remains on mechanical or optical surfaces before resuming use.

8.4 LED Light Source

The LED illumination system is designed for extended service life and does not require routine replacement under normal operating conditions. After continuous operation exceeding 10 hours, it is recommended to power off the instrument for at least 30 minutes to prevent heat accumulation. If the LED fails, do not attempt self-repair. Contact your authorized dealer or MPD Scientific technical support.

8.5 Storage

When not in use for extended periods, clean the instrument thoroughly and place the dust cover over the microscope. Disconnect from power and store in a clean, dry environment within the specified operating temperature and humidity ranges. Use original packaging materials or a suitable protective case for long-term storage or transport.

8.6 Inspection

Periodically inspect the instrument for signs of optical surface degradation, mechanical wear, unusual noise during focusing, or stage movement irregularities. If any abnormality is observed, discontinue use and contact MPD Scientific or your authorized service representative.

9. Troubleshooting

In the event of an issue with your MP400 Series microscope, consult the following guide. If the issue is not resolved by the recommended remedies, contact MPD Scientific technical support.

Symptom	Probable Cause	Corrective Action
Power on but no illumination	Power adapter not connected	Reconnect adapter to instrument and outlet
	LED module failed	Contact dealer or MPD Scientific for LED replacement
	Blown fuse	Replace fuse per instrument specification
Illumination flickering or unstable	Loose adapter connection	Reseat power adapter connector
	LED module failure	Contact MPD Scientific technical support
Insufficient or uneven field brightness	Brightness control not at adequate level	Increase potentiometer (K) setting
	Objective not fully engaged in nosepiece	Rotate nosepiece until objective clicks into position
	Aperture diaphragm too small	Open aperture diaphragm (lever D)
	Dust or contamination on optics	Clean objectives, eyepieces, condenser, and collector
	Condenser positioned too low	Raise condenser to upper position using knob (L)
Image not in focus or lacking contrast	Cover glass thickness incorrect	Use cover glass of 0.17 mm thickness (No. 1.5)
	Specimen inverted (cover glass facing down)	Flip slide so cover glass faces upward
	Objective front lens contaminated with oil	Clean objective front lens with lens tissue and ether/ethanol
	Immersion oil not applied (100× objective)	Apply appropriate immersion oil to cover glass before use
	Air bubbles in immersion oil	Remove objective, clean, reapply oil without bubbles
	Aperture diaphragm not properly set	Adjust aperture to 70–80% of objective N.A.

Symptom	Probable Cause	Corrective Action
One side of image darker than other	Objective not centered in optical path	Engage objective fully in nosepiece click-stop
	Slide not flat on stage	Secure slide firmly with stage clamp (C)
Objective contacts specimen on objective change	Cover glass facing down	Flip slide so cover glass faces upward
	Cover glass too thick	Use standard 0.17 mm cover glass
Binocular fields not superimposed	Interpupillary distance not set correctly	Adjust IPD by spreading or closing eyepiece tubes
Eye strain during prolonged use	Diopter not calibrated for user	Readjust diopter ring (A) on dominant-eye eyepiece
Stage drifts downward	Coarse focus tension too low	Tighten tension adjustment ring (R) clockwise

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