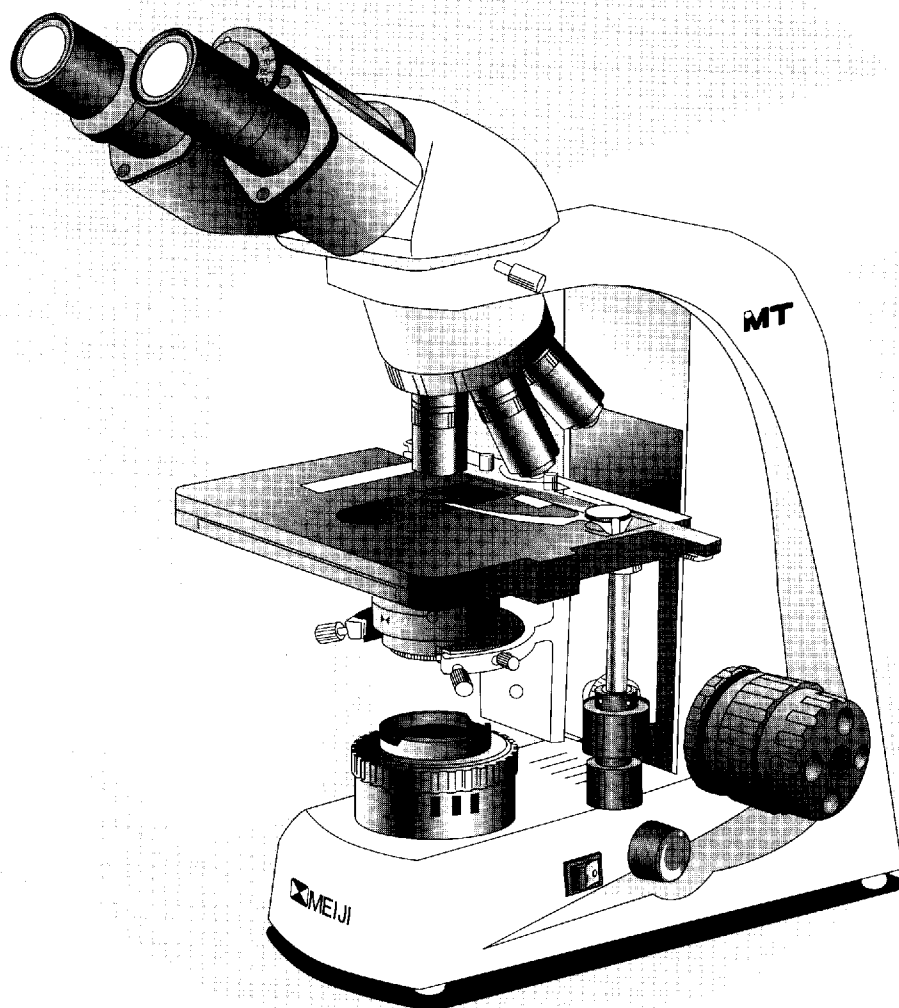




# MT4000 Series

## Biological Microscope Instruction Manual



MEIJI TECHNO CO., LTD.

JAPAN

# MT4000 Series

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# Biological Microscope

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## MT4000 Series Biological Microscope

### 1. Introduction

Meiji Techno's MT4000 Series biological microscopes have a modern compact design. Easy operation is achieved through ergonomic placement of controls makes them ideal for use in education and laboratories.

The MT4000 Series is well suited for a wide variety of routine biological work and high resolution video microscopy.

The MT4000 Series deliver crisp, distortion-free, high resolution images in multiple modes of operation. Contrast methods available include: Brightfield and Phase Contrast.

Meiji Techno supplies a variety of accessories including simple polarizing set, contrast filters, eyepiece and stage micrometers and camera adapters to fit most imaging platforms.

### 1.1 Microscope Features

- Computer Aided Design
- All New and Improved Planachromat and S.Plan Phase Objectives
- Slim Compact Footprint
- All New Infinity Corrected Optical System
- Abbe Condenser with NA 1.25 with Iris in Dovetail Mount
- Low Positioned Ergonomic Coaxial Coarse and Fine Focus Controls
- Smooth Operating Ergonomic Reverse Facing Quintuple Nosepiece
- Ceramic Coated Scratch Resistant Flat Top Stage, left or right-handed
- Brightfield and Phase Contrast Observation Modes Available
- LED Illuminated or Halogen Illuminated models available
- Siedentopf-type Binocular and Trinocular Viewing Heads
- Widefield High Eyepoint Compensating Eyepieces (KHW10X, F.N.20)
- Automatic Voltage Sensing Power Supply with detachable power cord
- Wide Range of Filters and Accessories

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## 1.2 General Safety Guidelines

Meiji Techno products are designed for safe operation under normal operating conditions. The instrument and accessories described in this manual have been built and tested according to industry safety standards for electronic laboratory instruments. Incorrect usage or non-conformance to operating instructions can cause personal injury or damage to equipment or property.

Keep this manual near your instrument for easy reference.

## 1.3 Intended Product Use

*Product Disclaimer:* This product is designed and intended for use only as a biological microscope system. Modifying this instrument in any way for use in any situation other than the original and intended product design will automatically void the warranty. In no event shall Meiji Techno be liable to any person or entity for any incidental, indirect or consequential damages, arising out of or in connection with the use or performance of a modified or altered product.

## 1.4 Handling the Microscope



### **DO NOT OPERATE UNLESS THE UNIT IS PROPERLY GROUNDED!**

Use only the specified power cord in a well grounded outlet. Do not use in an ungrounded power outlet or in cases where there is a break in the ground conductor or other damage to electrical wiring.

Only fuses of the specified type and rating are to be used as replacements. Switch off the power and disconnect the power cord before replacing fuses. Use of a non-compliant fuse may result in electrical shock or severe damage your equipment. Do not replace the bulb for at least 10 minutes after the unit has been turned off or injury may result.

## 1.5 Warranty Statement

Modifying the instrument in any way or unauthorized attempts to disassemble or use the instrument for applications other than its intended design will automatically void the warranty.

Meiji Techno warrants this product against defects in material and/or workmanship for the life of the

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instrument from the date of the original purchase to the original purchaser. Meiji Techno will repair or replace, at its option, any instrument which under normal conditions of use and service proves to be defective in material or workmanship. No charge will be made for labor or materials with respect to defects covered by this warranty, provided all repair work is done by Meiji Techno.

This warranty does not cover expenses incurred in the removal or reinstallation of any instrument or instruments, whether or not proven defective. Replacement or repairs furnished under this warranty are subject to the same terms and conditions of the original warranty. This warranty supersedes any other warranty and is subject to the following terms and conditions:

## **WARRANTY**

Warranty of Meiji Techno's product extends to the original purchaser of the product and is not transferable.

## **WARRANTY DURATION**

Meiji Techno warrants this product against defects in material and/or workmanship for the life of the instrument from the date of original purchase to the original purchaser. The electrical warranty is 90 days.

## **OWNER'S REGISTRATION CARD**

Return of the owner's registration card by the original purchaser within ten (10) days after the original purchase is a condition precedent to coverage under this warranty. Meiji Techno will at its option accept written proof of purchase from the original owner in lieu of a product registration card.

## **EXCLUSIONS AND LIMITATIONS**

Specifically excluded from this warranty are failures caused by abuse, neglect, misuse, improper operation, normal wear, accident, improper maintenance or modifications of ANY type. This warranty does not cover repair or replacement where normal use has exhausted the life of a part or instrument. All mechanical devices need periodic parts replacement and service to perform well. Service life of an instrument is dependent upon the care it receives and the conditions under which it has to operate. In no event shall Meiji Techno be liable for incidental or consequential damages.

## **SERVICE**

To obtain service under this warranty, please contact Meiji Techno directly or authorized dealer and ask for the Product Service Department. State the nature of the problem, model and serial number of the instrument, date of purchase and location and name of the distributor the instrument was purchased from. After verification of warranty registration, Meiji Techno or dealer will issue a return authorization number. Customer may then return the product postage prepaid and insured to the authorized repair facility.

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In most instances, requests for warranty service will be performed in a prompt and routine manner and merchandise will be returned in a reasonable period of time or at Meiji Techno's convenience. In some cases, requests for warranty service are received which are not justified. In these cases, Meiji Techno will provide an explanation for non-warranty action.

## **WARRANTY TERMS**

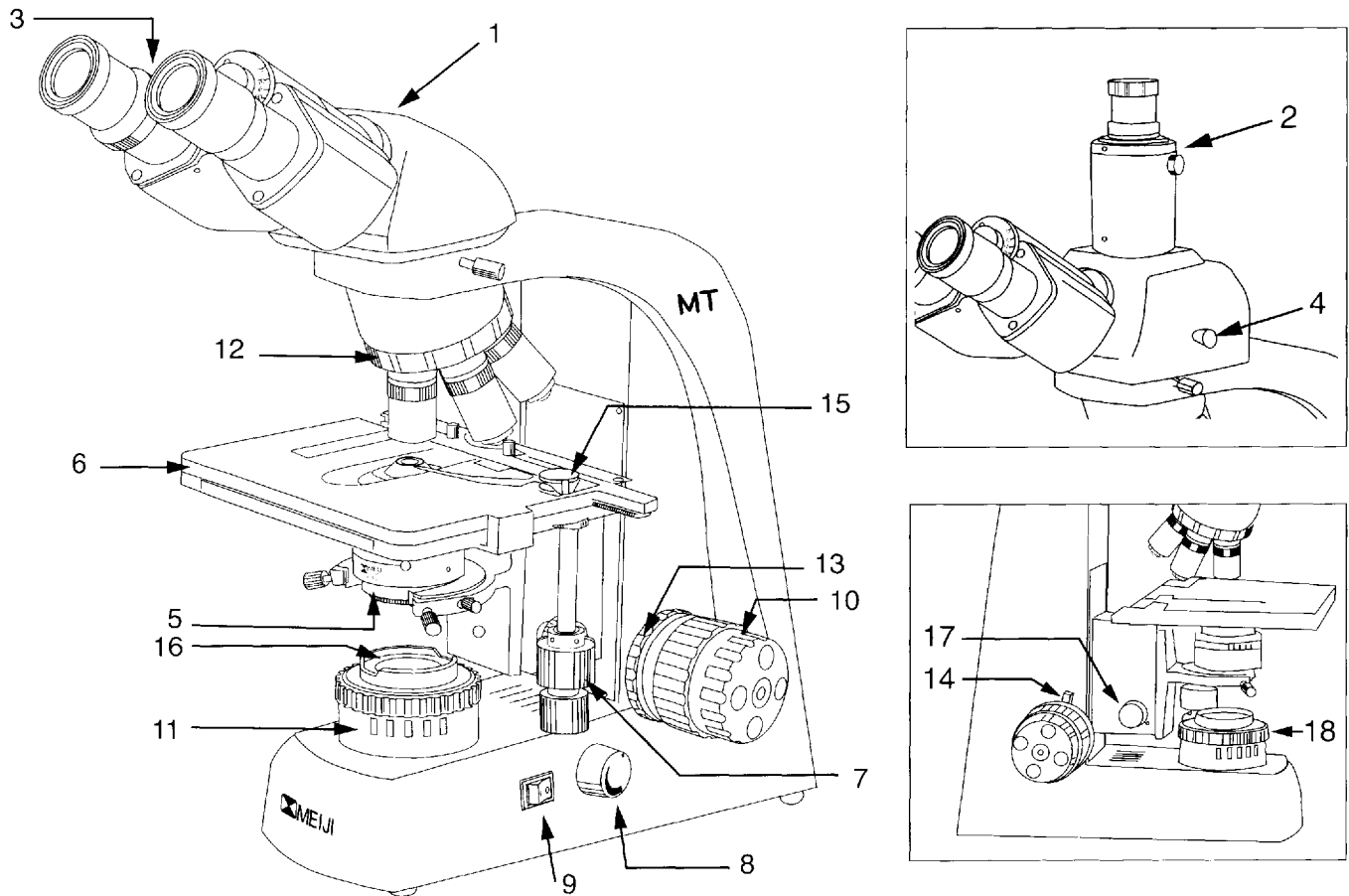
The terms of this warranty may not be varied by any person, whether or not purporting to represent or act on behalf of Meiji Techno. The limited lifetime warranty provided is in lieu of any and all warranties, expressed or implied, whether for merchantability or fitness for a particular purpose or otherwise. Liability for consequential damages under any, and all warranties are excluded to the extent exclusions are permitted by law. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. This warranty sets forth the customer's exclusive remedy, with respect to defective products. This limited warranty shall become null and void in the event of a violation of the provisions of this limited warranty.

# Biological Microscope

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## 2.0 The Microscope and its Components

The image below designates the main components of the MT4000 Series Brightfield Microscope.



- |   |  |
|---|--|
| 1. Siedentopf Binocular Head                                  | 10. Low Positioned Ergonomic Coaxial Coarse and Fine Focusing Controls |
| 2. Siedentopf Trinocular Head with integrated male "C" mount. | 11. Integrated Illuminator   |
| 3. Eyepieces 10X standard F.N.20 (15X and 20X are optional)   | 12. Ergonomic Quintuple Nosepiece with Plan Objectives                 |
| 4. Beamsplitter for Camera Port (Trinocular model only)       | 13. Focus Tension Adjustment (use a 2.5mm allen wrench to adjust)      |
| 5. Abbe NA 1.25 Condenser                                     | 14. Adjustable Safety Stop for Stage Height Limit                      |
| 6. Ceramic Coated Flat Top stage                              | 15. Slide Holder / Finger Assembly                                     |
| 7. Drop Down Coaxial Stage Controls                           | 16. Filter Tray Above Illuminator                                      |
| 8. Low Positioned Variable Brightness Control                 | 17. Condenser Rack Height Adjustment Knob                              |
| 9. Power Switch   | 18. Field Iris   |

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## 2.1 Installation Site

The microscope should be operated in a room with as little dust as practically possible. Keep your instrument away from solvents, chemical fumes and excessive humidity. Also try to avoid big swings in ambient temperature, direct sunlight and vibration as they can affect measurements and instrument performance.

### Operating Ambient Conditions

Temperature: 10 - 36°C (50 - 96.8°F)  
Relative Humidity: 0 - 80% up to 30°C (86°F)

## 2.2 Unpacking

Please check your packing slip to insure that all materials are present. Keep the packing materials in a safe place for the purpose of storage and transporting the microscope and its accessories.

### ! ATTENTION

Avoid touching the surface of optical components such as lenses, filters and glass surfaces. Even very small traces of perspiration or finger oils can corrode the surfaces of optics in a short period of time.

## 2.3 Microscope Set Up

- As a first step, remove all components from the shipping container and remove the packing materials. Save the containers and packing in a dry location.
- Place the microscope frame on a stable work surface.
- Loosen the clamp screw on the microscope limb and then install the prism house of the viewing head (Fig.1) and mount the binocular head to the prism house (Fig.2) by tightening the set screw. Re-tighten the clamp screw while the head is in the correct position as shown.

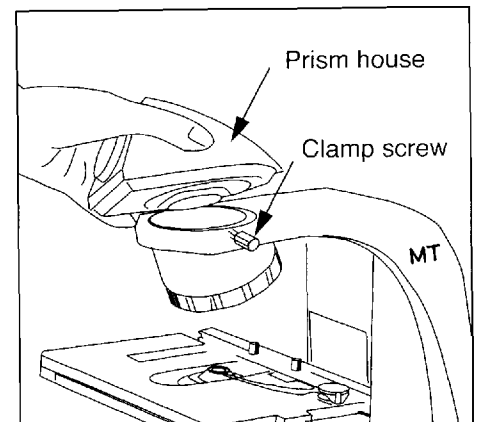


Figure 1

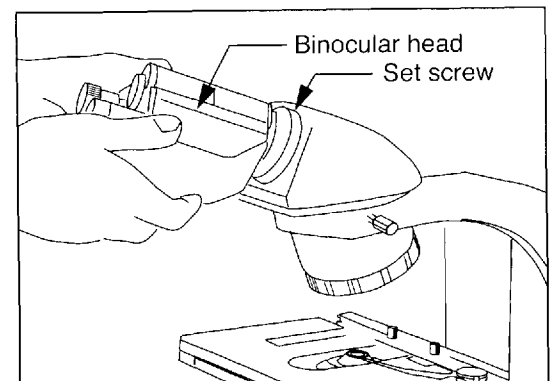


Figure 2



# Biological Microscope

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- Install the two eyepieces (MA407) by sliding them into the head. **The eyepieces for MT4000 Series are a DIN and JIS standard 23.2mm diameter.** (Fig.3)
- Remove the objectives from their objective cases while being careful not to touch any part of the optics. Then, screw each objective into a nosepiece opening. Install them incrementally or in order of power (e.g. 4, 10, 40, and 100) as shown at right. (Fig.4)
- Plug the power cord into the microscope and the other end into a grounded outlet. (Fig.5)

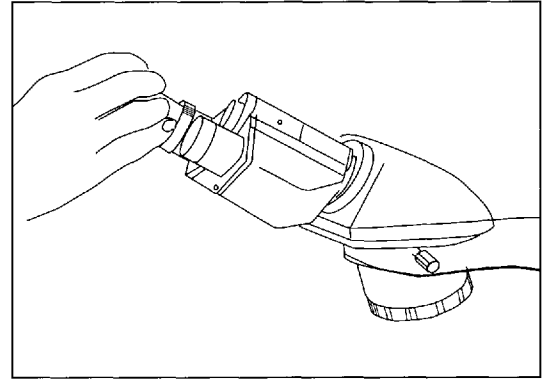


Figure 3

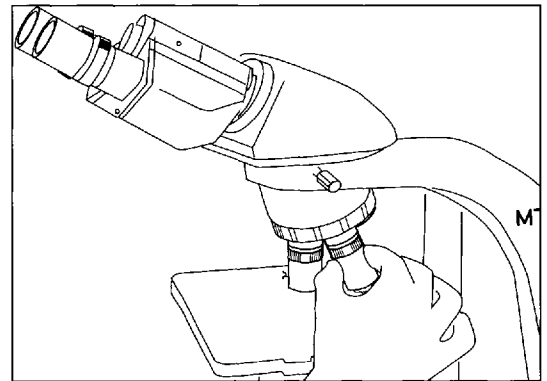


Figure 4

Your MT4000 has a voltage sensing power supply so it can be used with any voltage from any country in the world from 100 volts to 240 volts AC with the proper cordset.

## **CAUTION**

**The mains power cord should only be plugged into a known grounded outlet.** Contact your facilities technician if you are unsure of your mains outlet status. A simple outlet tester can be used to verify correct outlet polarity and the presence of a ground circuit.

If no other accessories are going to be installed, the instrument is now ready for use.

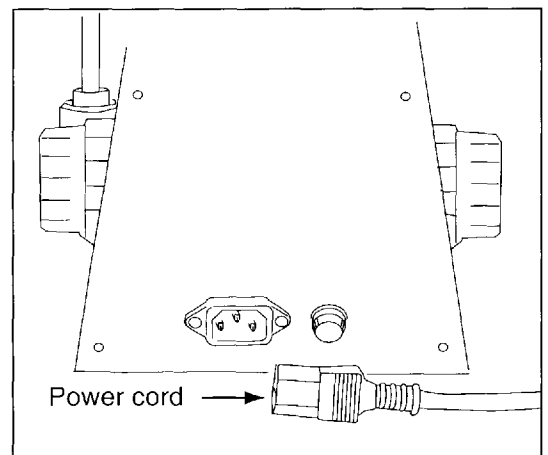


Figure 5

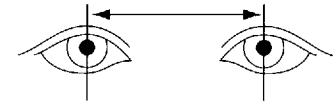
# MT4000 Series

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## 2.4 Adjusting Interpupillary Distance

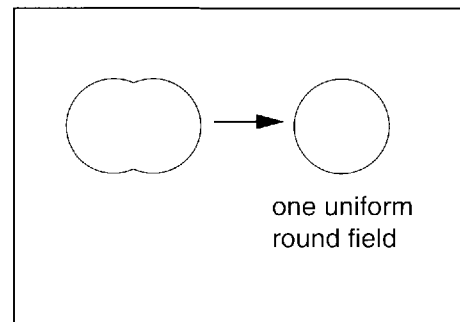
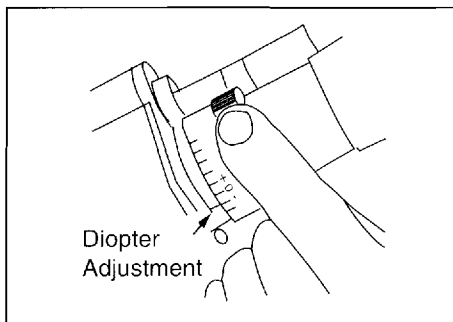
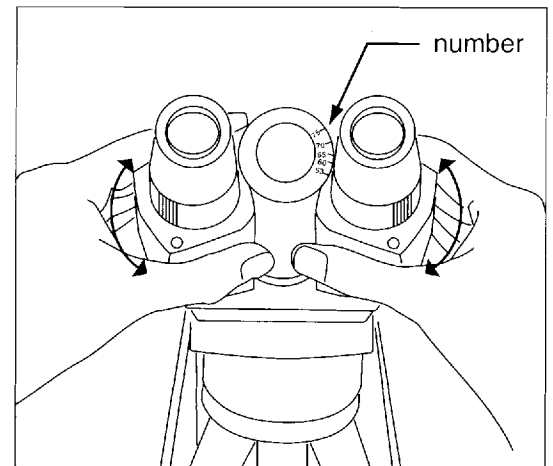
The Interpupillary Distance is essentially the distance between your two pupils expressed in millimeters. When set correctly, one will see one uniform round field of view or FOV. The adjustment is made by simply pulling apart or pushing together the eyetubes until a uniform round field is achieved. Make note of the number marked on the viewing head so you can repeat the setting later.

interpupillary distance



When you place a specimen on the stage, get it into focus with the right eye while your left eye is closed. Once the right side is in focus by using the fine focus knob on the microscope, open your left eye and use the diopter on the left eyetube to bring the left side in focus.

Once this is done, the microscope is adjusted to this user. Other users will have different IP's and different focusing abilities.



## 3.0 Operation

Once the microscope has been setup in its working location with all of the components correctly installed, it is ready for use.

Your MT4000 is a precision instrument designed to last a lifetime. Always handle your microscope with care and avoid abrupt motion, vibration and shock.

Do not install any bulb in your instrument other than ones designated by Meiji Techno:

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<b>MA326</b>	6V 30W Halogen	For Integrated Illuminator MT4200H, MT4300H, MT4210H, MT4310H
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Always disconnect the power cord from the back of the microscope when not being used, or when cleaning your instrument or when making any repairs.

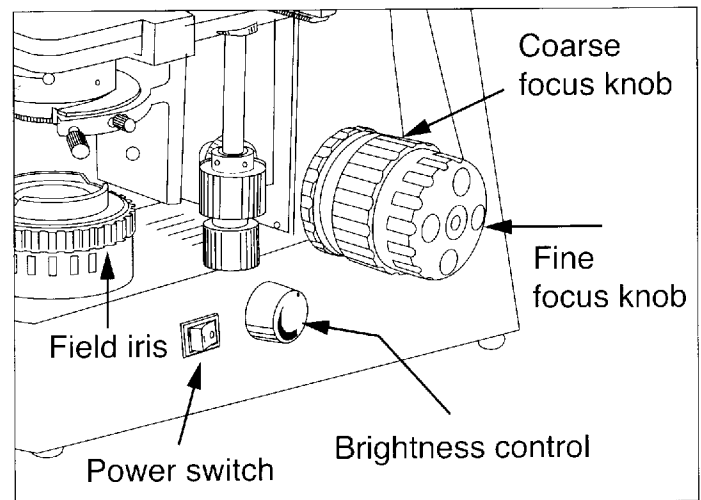
## **CAUTION**

### **Avoid Dismantling**

Never attempt to dismantle the instrument. This will void your warranty and could possibly lead to the instrument no longer performing accurately.

## **3.1 Basic Set Up For Transmitted Light - Brightfield**

1. Turn on the microscope power switch which is located as shown at right. Adjusting the brightness desired is done with the variable brightness control knob shown above.
2. We recommend that you initially use a specimen that has areas of high and low contrast. Place that specimen on the stage.
3. Select a lower power "scanning" objective like the 4X or the 10X to find the area of interest on the specimen quickly. Be sure the objective "clicks" into place when you rotate the objective nosepiece.



4. By using the coarse and fine focus knobs shown above, adjust your specimen into focus.

The microscope is now adjusted for this user. Focusing eyetubes allows us to compensate for users that wear corrective eye lenses.

If you wear glasses, you may want to remove the rubber eyeguards so they are not in the way.

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## 3.2 ADJUSTING FOR KOEHLER ILLUMINATION

**Koehler illumination is a procedure for setting up and adjusting your microscope to achieve the best possible combination of contrast and resolution.**

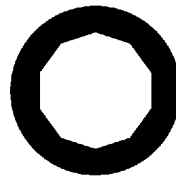
1. Turn on the microscope illuminator and place the specimen slide you wish to examine on the microscope stage. Rotate the 10X objective into position and focus on image of your specimen.
2. Move the sub-stage condenser up to its top position using the rack and pinion focusing control.
3. Check to make sure that both the field iris (on the lamp house) and the aperture iris (in the sub-stage condenser) are fully open. Rotate the field iris control ring until the edge of the field iris is just visible at the outer edge of the field of view.
4. Using the rack and pinion focus control, raise or lower the sub-stage condenser until the edge of the field iris comes into sharp focus.
5. If the image of the field iris appears to be off-center in relation to your field of view, then it will be necessary to align the field iris so that it is centered in the field of view. Rotating the substage condenser centering screws in either direction allows you to move the image of the field iris until it is concentric with the field of view.



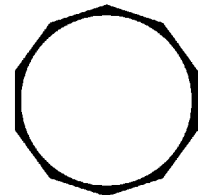
Field of view  
before Condenser  
alignment



Field of view  
after Condenser  
alignment



Field iris  
partially closed



Field iris  
fully open

6. With the image of the field iris centered and focused as sharply as possible, open the field iris diaphragm until the image of the edge of the iris diaphragm is just outside of the field of view.
7. Remove one of the eyepieces and look into the eyetube. Observe the disc of light coming from the back image plane of the objective. Close down the aperture iris using the aperture iris lever located on the side of the sub-stage condenser until approximately two thirds of the disc of light you are observing remains visible. Replace the eyepiece.

The microscope is now adjusted for koehler illumination for use with the 10X objective. This Procedure should be followed for each objective to guarantee critical illumination.

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## Possible Brightfield Mode Operational Problems

If normal adjustments are not getting the results you expect, check to see if these conditions exist:

- Incorrect condenser / objective combination being used
- Incorrect components inadvertently installed
- Dirty or smudged optics

## MT4000 Series Planachromat Brightfield Objectives

The following are the Plan objectives that are standard for the MT4000 Series Brightfield Models:

Brightfield Objectives - Planachromat - Infinity Corrected - F = 200mm	
MA965	Planachromat 4X objective, NA: 0.10, WD = 15.3mm (included)
MA966	Planachromat 10X objective, NA: 0.25, WD = 7.3mm (included)
MA968	Planachromat 40X objective, NA: 0.65, WD = 0.5mm (included)
MA970	Planachromat 100X oil objective, NA: 1.25, WD = 0.14mm (included)

## 3.3 Transmitted Light Operation - Phase Contrast

Phase contrast is a very useful technique for high-contrast images of unstained or transparent specimens mounted on glass slides. Phase Contrast models feature a powerful 30W halogen lamp for extra bright phase contrast image relief. The MT4000 Series Phase Contrast Models come standard with 4X Plan objective, 10X and 40X S.Plan Phase objectives.

1. Install the phase contrast objectives into the nosepiece and install the Zernike Phase Condenser in place of the standard Abbe Condenser by lowering the condenser rack and loosening the clampscrew shown at right and then sliding out the condenser. (Fig.1)

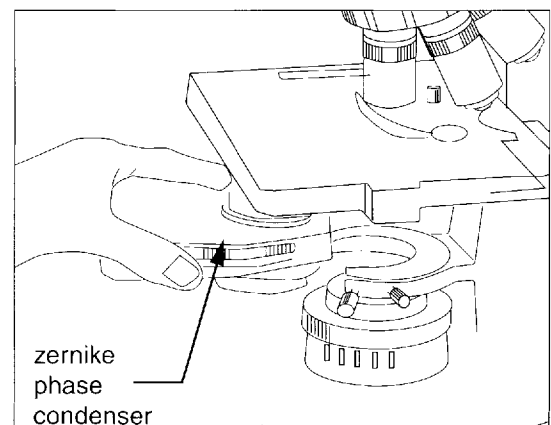


Figure 1

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2. Remove the right hand eyepiece and insert the provided centering telescope. (Fig.2) Then, rotate the 10x objective into place along with the corresponding 10X-20X condenser annulus.
3. Focus the centering telescope while looking through it until the light and dark rings seen are in sharp focus.
4. If the annuli are not centered as shown in Figure 3, rotate the knurled annuli adjustment rings on the bottom of the Zernike phase condenser with your fingers to adjust the phase condenser annulus with each phase objective as shown at right. (Fig.4)
5. Repeat the process for the rest of the positions being sure to match the annulus to the right objective.
6. Remove the centering telescope and re-install the eyepiece.

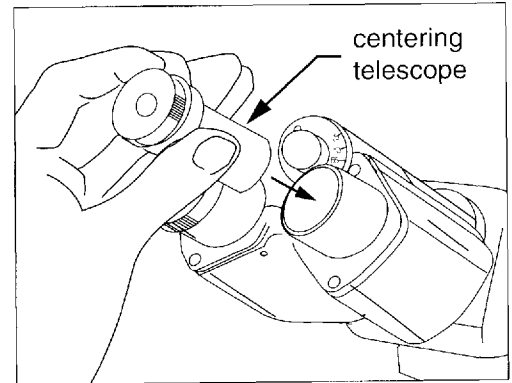


Figure 2

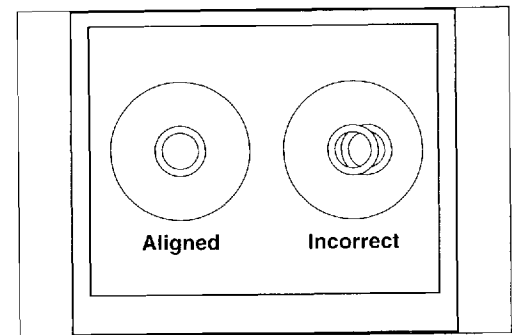


Figure 3

The microscope is now properly set for phase contrast observation mode.

- Phase images will photograph and appear their best when the green interference filter 546nm (MA861/05) is placed into the light path since achromatic objectives are spherically corrected for green light and the human eye picks up the green wavelength spectrum best.

## Possible Phase Contrast Mode Operational Problems

If normal adjustments are not getting the results you expect, check these:

- Wrong phase annulus being used.
- Phase annulus not centered correctly.
- Wrong condenser installed.
- Halos around the outlines of details are optical artifacts which may obscure details of your specimen. This is a known limitation of phase contrast microscopy.
- Since phase annuli limit the numerical aperture of the optical system, image resolution may suffer somewhat.
- If the specimen being observed is too thick, phase shifting will distort the image details.

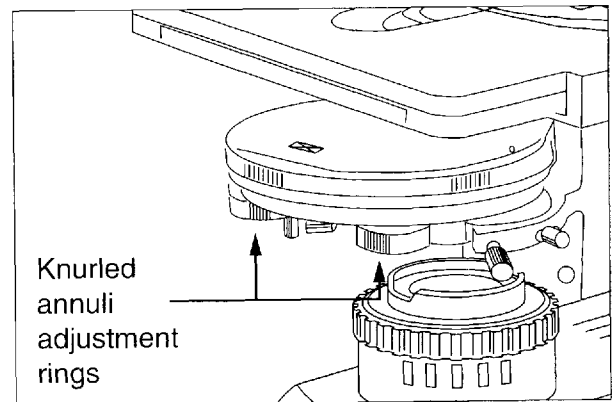


Figure 4

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## MT4000 Series Phase Contrast Objectives

The following are the objectives that are standard for the MT4000 Series Phase Contrast Models:

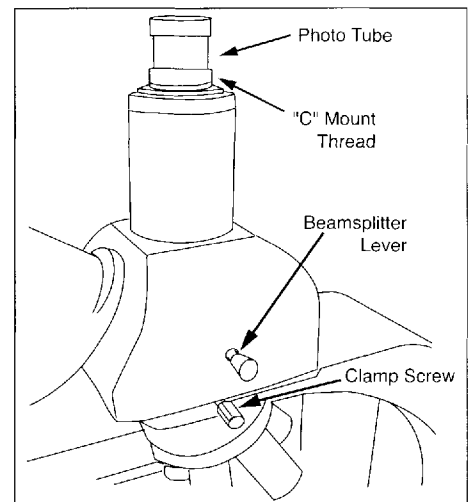
Phase Contrast Objectives - S. Planachromat - Infinity Corrected - F = 200mm	
<b>MA930</b>	S. Plan Phase 10X objective, NA: 0.25, WD = 7.3mm, (included )
<b>MA931</b>	S. Plan Phase 20X objective, NA: 0.40, WD = 5.1mm, (included )
<b>MA932</b>	S. Plan Phase 40X objective, NA: 0.65, WD = 0.72mm, (included )
<b>MA933</b>	S. Plan Phase 100X objective, NA: 1.25, WD = 0.14mm, (included )

## 3.4 Photomicrography with 35mm SLR and Digital SLR Cameras

The MT4300L, MT4300H, MT4310L and MT4310H microscopes have a trinocular tube with integrated male "C" mount on top of the head for photomicroscopy.

However, in order to secure a 35mm SLR camera body to this microscope, an optional camera attachment tube (MA150/50 or MA150/60) will need to be used with the corresponding T2 Adapter Ring that matches the camera to be used.

The table below shows the different cameras and adapter rings that can be used:



### T2 Camera Adapter Rings

<b>T2-1</b>	Canon
<b>T2-2</b>	Minolta
<b>T2-3</b>	Pentax K
<b>T2-4</b>	Pentax S (threaded)
<b>T2-5</b>	Nikon
<b>T2-6</b>	Olympus
<b>T2-7</b>	Contax, Yashica
<b>T2-8</b>	Konica
<b>T2-9</b>	Canon EOS
<b>T2-10</b>	Minolta Alpha / Maxim 2000

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## Photo eyepieces

In addition, a photo eyepiece will be needed to make an image for the camera. The table below shows the different photo eyepieces that are available:

<b>MA512</b>	2.5X Photo eyepiece
<b>MA508</b>	5X Photo eyepiece
<b>MA500</b>	3.3 Photo eyepiece

## Photo/Video Attachment

MA958 Photo/Video Attachment with sliding 80/20 beam splitter for attaching video or digital camera to MT series when MA957/05 Ergonomic head is used.

## 3.5 Photomicrography with Digital Still Cameras

In order to mount a consumer grade digital camera to MT4300L, MT4300H, MT4310L or MT4310H microscopes, an optional camera adapter will be needed. The table below shows the different cameras that can be used and their corresponding adapter part number:

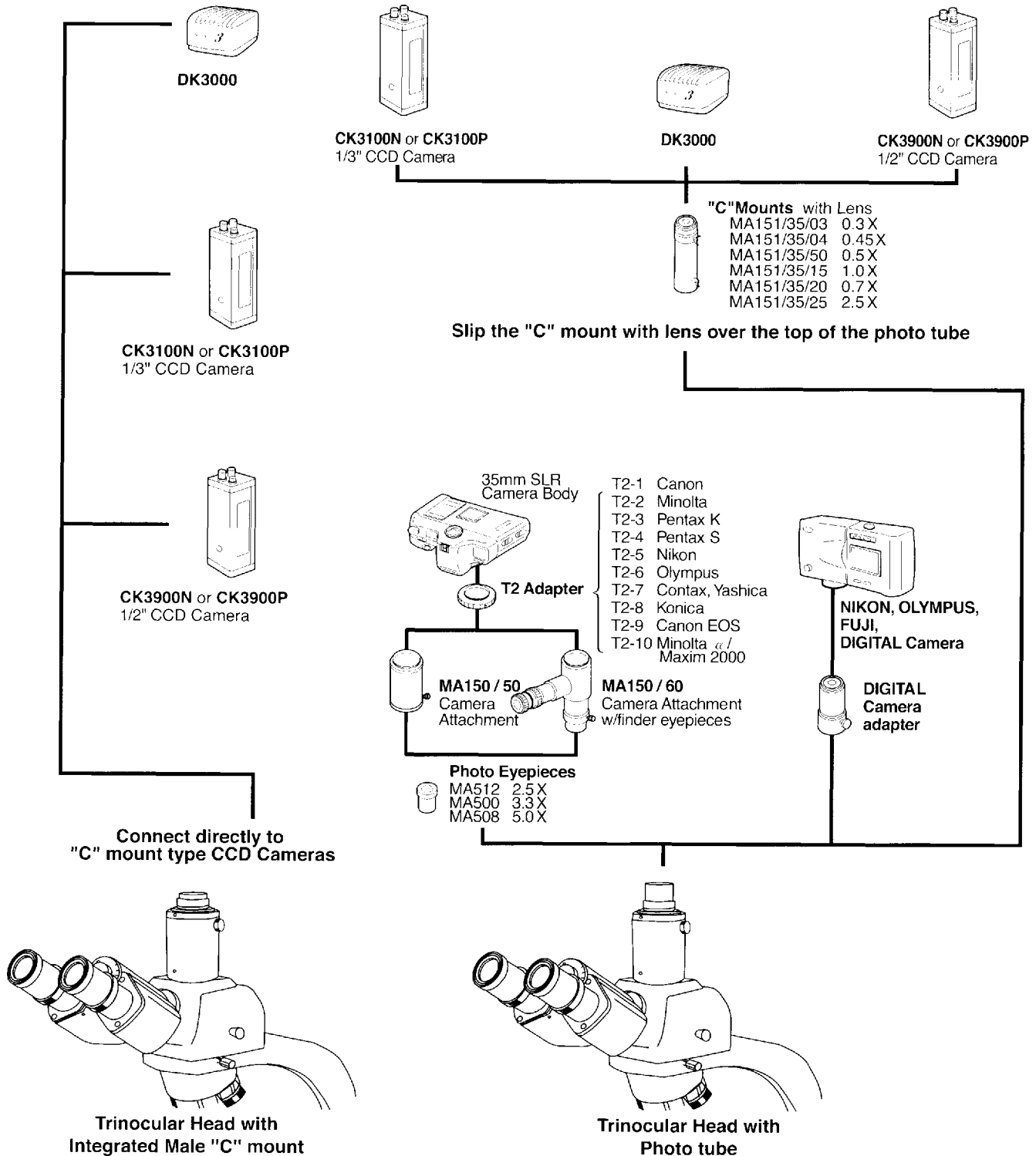
<b>Digital Camera Adapter Chart</b>	Canon Powershot G1, G2	Canon Powershot G3, G5	Canon Powershot G6	Nikon Coolpix 800, 900, 900S, 950, 990, 995 & 4500	Nikon Coolpix 5000
<b>MT4000, MT5000, MT6000, MT7000, MT7500, MT8000, MT8500, MT9000 Series Microscopes</b>	MA151/30/43	MA151/30/41	MA151/30/31	MA151/30/51	MA151/30/71
Nikon Coolpix 4300, 885	Olympus Camedia C-2000, C-2020, C-3000, C-3030, C-3040, C-3100, C-4040, C-4100, C-5050	Olympus Camedia C-700, C-720, C-730, C-740, C-750, C-755, C-760, C-765, C-770	Olympus Camedia C-5060, C-7070	Fuji Finepix S602, 4900Z, 6900Z, S5000, S7000	Sony S70, S75, S85, CD300, CD400, CD500
MA151/30/57	MA151/30/61	MA151/30/63	MA151/30/65	MA151/30/81	MA151/30/91



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## Video Microscopy



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## 3.6 Connecting a Video or Other Camera that has a "C" type mount

In order to attach a camera that employs a standard "C" type camera mount to the MT4300L, MT4300H, MT4310L and MT4310H microscopes, one can use the integrated male "C" mount by unscrewing and removing the chrome tube.

To change the magnification seen by the camera, an optional "C-Mount" camera attachment can be used on top of the trinocular port of the microscope:

Optional "C" Mounts With Lenses - For all Meiji Trinocular Microscopes	
MA151/35/03	"C" Mount Adapter with 0.3X lens (Slips over existing photo tube)
MA151/35/04	"C" Mount Adapter with 0.45X lens (Slips over existing photo tube)
MA151/35/50	"C" Mount Adapter with 0.5X lens (Slips over existing photo tube)
MA151/35/15	"C" Mount Adapter with 1.0X lens (Slips over existing photo tube)
MA151/35/20	"C" Mount Adapter with 0.7X lens (Slips over existing photo tube)
MA151/35/25	"C" Mount Adapter with 2.5X lens (Slips over existing photo tube)

## 4.0 Maintenance and Cleaning

### **WARNING**

- Disconnect the power cord on your equipment prior to performing cleaning, maintenance or repair.
- Keep electrical components away from moisture or humidity.
- In warm humid climates, take special care to prevent your equipment from exposure to fungal growth by using desiccant in an airtight storage container or by other means.
- Clean the microscope after each use. Keeping your microscope clean will insure its proper operation over its lifetime.

# Biological Microscope

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## Dust Protection

Be sure to use the supplied dust cover with your microscope after each work session.

## Cleaning

Dust, fibers and other debris can cause your field of view to get obstructed so keeping your microscope clean will help the overall quality of your work.

## Cleaning of Painted Surfaces

Use a soft brush or lint-free cotton cloth to remove dust and loose particles. Tough dirt can be removed with water and a mild detergent.

**⚠ CAUTION** NEVER USE ACETONE OR OTHER HARSH CHEMICALS.

Painted or plastic surfaces should not be tarnished or etched with cleaning agents that are too powerful.

To clean painted surfaces, use a moistened lint-free cotton cloth with mild soapy water.

## Cleaning the Stage

Use a soft brush or lint-free cotton cloth to remove dust and loose particles.

DO NOT USE ACETONE OR OTHER HARSH CHEMICALS.

Use a moistened lint-free cotton cloth with a solution of mild soapy water.

## Cleaning of Glass Surfaces

Use a soft brush or lint-free cotton cloth to remove dust and loose particles.

For tough dirt, use a soft lint-free cotton cloth moistened with distilled water.

If that fails, try using medical or reagent grade isopropyl alcohol.

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## Cleaning the Objectives



Objectives should NEVER be disassembled for cleaning or for any other reason! We do not advise cleaning the inside surfaces of objectives or eyepieces.

Use a soft brush, bellows brush or a soft lint-free cotton cloth to remove dust and loose particles.

For tough dirt, use a soft lint-free cotton cloth moistened with distilled water.

If that fails, carefully try using medical or reagent grade isopropyl alcohol.

Wipe lenses immediately. Over time, water and solvents can dissolve optical cements that hold optics together so NEVER soak objectives with ANY type of fluid.

## 5.0 Troubleshooting

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Meiji Techno products are manufactured exclusively in Japan under ISO9001 manufacturing standards. However, if you ever have any difficulty with any Meiji product, feel free to contact us at:

Our technical staff is trained to assist you on mechanical or electrical issues you may have.

## Operational Issues

Please refer to the previous "Operations" chapters which coincide with the observation mode that you are

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using. The most common operational problems include the improper positioning of contrast accessories, the improper adjustment of phase annuli or the incorrect condenser installed. If you are unable to obtain the desired image from the microscope, please refer to the corresponding chapters of this manual under the proper operation mode: brightfield, phase contrast, etc.

## Electrical Problems

Electrical problems can include:

- The lamp on the microscope is not working.
- No voltage is present.

Check the following probable causes:

- Check that all power cords are properly connected to the right spots.
- Make sure power is actually present at the wall outlet.
- Check to see if the fuse is blown.

## 5.1 Replacing the mains fuse on the microscope



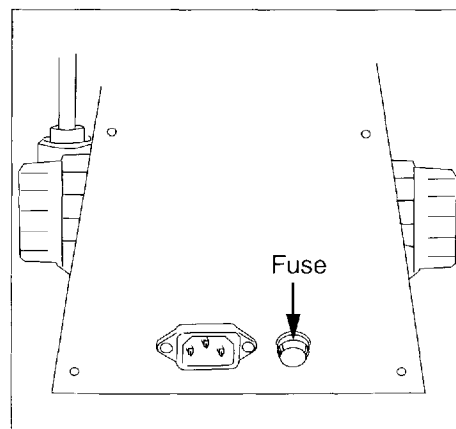
**ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.**

### Location of Mains Fuse

The mains fuse of all MT Series Microscopes is located on the back panel of the microscope as shown.

### Instructions to replace the mains fuse:

- Turn the power switch to the off position.
- Unplug the microscope from the wall outlet.
- Loosen the fuse cap from the fuse holder.
- Remove the blown fuse from the fuse cap.
- Replace the fuse with the CORRECT type and rating which is:



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## 30W Halogen Systems

MA327 3 Amp, 250V, 5 X 20mm

## LED Illuminated Models

MA929 0.5 Amp, 250V, 5 X 20mm

- Reinstall the fuse holder with the new fuse in place.

 **DANGER**

**NEVER USE REPLACEMENT FUSES OF A DIFFERENT RATING.**

## 5.2 Integrated Transmitted Light does not work

- Make sure your mains outlet indeed has power.
- Make sure the plug from the lamp is firmly plugged into the correct socket on the rear panel.
- Check to see if the mains fuse has blown.
- Check to see if the halogen lamp has blown.

LED Illuminated models should not experience bulb failure very often. Please contact your dealer or Meiji directly for service.

## 5.3 Replacing the 6V 30W Halogen Light

 **CAUTION**

**ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.**

Do not touch the glass envelope of the lamp during installation. Keep the protective sleeve or bag of the lamp during installation and remove it right after installation.

 **HOT!**

**LAMP AND SURROUNDING AREA MAY BE HOT TO THE TOUCH.**

- Switch off the microscope.
- Disconnect the power cord.

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- Wait until the bulb has cooled sufficiently.
- Lay the scope on it's side on top of a towel or blanket
- Remove the bottom illuminator cover screw and lift the cover to remove.
- Replace the defective lamp.
- Place a new lamp into the socket while avoiding touching the glass. Notice the bulb is wrapped in plastic. Use it to avoid touching the glass envelope during installation.
- Be sure the bulb is pushed in as far as possible thereby positively aligning the filament in the illuminator.
- Reinstall the lamp cover door.
- Reconnect the power cord and switch on the microscope to verify proper illuminator operation.

## 6.0 Storage

- Protect your microscope from dust after each use by covering your instrument with the protective dust cover that came with your microscope.
- Store your microscope in a cabinet that has a stable temperature and low humidity.
- If you live in an area that has high humidity, consider storing your microscope in a sealed container along with a desiccant such as silica gel.
- It is also recommended that the objective and eyepieces be stored in a separate air tight container with desiccant.

## 7.0 Packing and Transport

- Whenever the microscope is going to be moved, ship or transport the microscope and the accessories in its original packing.
- It is advisable to keep a copy of all necessary information: copy of the original invoice, the instruction manual, etc. included with the microscope when shipping.

## 8.0 Accessories and Replacements Parts

Part numbers and product descriptions for accessories and parts for MT4000 Series Microscopes can be found listed below. Accessories and replacement parts for all Meiji Techno products are available through our dealer network.

# MT4000 Series

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Feel free to contact us a call so we may direct you to the closest authorized Meiji Techno Dealer in your area.

Call us toll free (800) 832-0060 Monday through Friday 9am - 5pm PST.

## MT4000 Series Components & Accessories

Viewing Heads	
Part Number	Description
MA815/05	Siedentopf type binocular head, 30° inclined, 23.2mm I.D. eyetubes (included with MT4200L, MT4200H, MT4210L, MT4210H)
MA816/05	Siedentopf type trinocular head, 30° inclined, 23.2mm I.D. eyetubes (included with MT4300L, MT4300H, MT4310L, MT4310H)
MA957/05	Ergonomic head, inclination adjustable vertically from 10° to 50°
Eyepieces	
Part Number	Description
MA407	KHW10X Widefield High Eyepoint Compensating Eyepiece, FN20 (standard) (accepts 21mm reticle)
MA408	HWF15X Widefield High Eyepoint eyepiece, F.N.12.2 (optional) (no reticle mount)
MA409	HWF20X Widefield High Eyepoint eyepiece, F.N.9 (optional) (no reticle mount)
MA413	HWF10X-F Widefield High Eyepoint focusing, F.N.20 (optional) (accepts 19mm reticle)
MA406	HWF10X Widefield High Eyepoint , F.N.18 (optional) (accepts 19mm reticle)
Brightfield Objectives - Planachromat - Infinity Corrected - F = 200mm	
MA965	Planachromat 4X objective, NA: 0.10, WD = 15.9mm (standard on MT4200L, MT4300L, MT4200H, MT4300H)
MA966	Planachromat 10X objective, NA: 0.25, WD = 7.3 (standard on MT4200L, MT4300L, MT4200H, MT4300H)
MA967	Planachromat 20X objective, NA: 0.40, WD = 5.1mm (optional)
MA968	Planachromat 40X objective, NA: 0.65, WD = 0.5mm (standard on MT4200L, MT4300L, MT4200H, MT4300H)
MA970	Planachromat 100X oil objective, NA: 1.25 = 0.14mm (standard on MT4200L, MT4300L, MT4200H, MT4300H)
Phase Contrast Objectives - S.Plan Phase - Infinity Corrected - F = 200mm	
MA930	S.Plan Phase 10X objective, NA: 0.25, WD = 15.9mm,(standard on MT4210H, MT4310H, MT4210L, MT4310L)
MA931	S.Plan Phase 20X objective, NA: 0.40, WD = 9.1mm (standard on MT4210H, MT4310H, MT4210L, MT4310L)
MA932	S.Plan Phase 40X objective, NA: 0.65, WD = 0.72mm (standard on MT4210H, MT4310H, MT4210L, MT4310L)
MA933	S.Plan Phase 100X oil objective, NA: 1.25, WD = 0.14mm, (standard on MT4210H, MT4310H, MT4210L, MT4310L)



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Filters	
<b>MA861/05</b>	Green interference filter in 40mm unmounted, 546nm (included in phase models)
<b>MA856/05</b>	Blue filter, LB100, in 40mm unmounted (included in halogen models)
<b>MA857/05</b>	Green filter, G533, in 40mm unmounted, 533nm (optional)
<b>MA858/05</b>	ND25 Neutral density filter, in 40mm unmounted ( transmission: 25%)(optional)
Miscellaneous Parts & Accessories	
<b>MA917R</b>	Ceramic coated flat top stage right-handed with drop down coaxial controls
<b>MA917L</b>	Ceramic coated flat top stage left-handed with drop down coaxial controls
<b>MA598</b>	Replacement Finger Assembly for MA917R & MA917L Stages
<b>MA809/10</b>	Replacement 115V AC Power cord with plug (USA)
<b>MA809/20</b>	Replacement 220V AC Power cord with plug (Eurocord)
<b>MA809/30</b>	Replacement 220V AC Power cord with plug (UK)
<b>MA910</b>	Abbe Condenser, NA 1.25 with iris diaphragm in dovetail mount (included)
<b>MA913</b>	Zernike Phase Condenser, NA 1.25 with iris diaphragm in dovetail mount (included in phase contrast models)
<b>MA915</b>	Polarizing set for MT Series Models
<b>MA458</b>	Centering Telescope for phase contrast, O.D.= 23.2mm (included in phase models)
<b>MA284</b>	Cross-Line Reticle, 21mm diameter
<b>MA255</b>	10mm divided into 100 parts, 25mm diameter
<b>MA256</b>	5mm divided into 100 parts, 25mm diameter
<b>MA283/05</b>	10mm square divided into 400 parts, 0.5mm square, 25mm diameter
<b>MA285</b>	Stage Micrometer, 1mm divided into 100 parts, 0.01mm
<b>MA286</b>	Stage Micrometer, 0.04" divided into 40 parts, 0.001"
<b>MA200</b>	Eyeshield for MA407 KHW10X Eyepiece (pair included)
<b>MA326</b>	Replacement Lamp, 6V 30W halogen
<b>MA327</b>	Replacement Fuse, 3A for Halogen models
<b>MA929</b>	Replacement Fuse, 0.5A for LED Illuminated models
<b>MA701</b>	Dust Cover for MT4000

# MT4000 Series

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## 9.0 Technical Descriptions

### Specifications

Power Source	100-230V 50/60Hz
Bulb	<ul style="list-style-type: none"><li>•MA326 Halogen bulb 6V 30W (Philips code : 5761), 3100°K at max. intensity</li><li>•LED/SPI 3W LED bulb (LUMILEDS LXHL-LW3C with connector cable)</li></ul>
Bulb Life	<ul style="list-style-type: none"><li>•100 hours average for halogen bulb</li><li>•20,000 hours average for LED bulb</li></ul>
Light Control Method	Voltage control
Normal Environmental Conditions	<ul style="list-style-type: none"><li>•Indoor use</li><li>•Altitude up to 2,000 m</li><li>•MAINS supply voltage fluctuations up to <math>\pm 10\%</math> of the nominal voltage</li><li>•Temperature : +10 to 36°C (50 to 96.8°F)</li><li>•Relative Humidity : 0 to 80% up to 30°C (86°F)</li><li>•Transient overvoltages typically present on the MAINS supply. Note: The normal level of transient overvoltages is impulse withstand (overvoltage) category II of IEC 60364-4-443.</li><li>•Applicable RATED POLLUTION degree</li></ul>

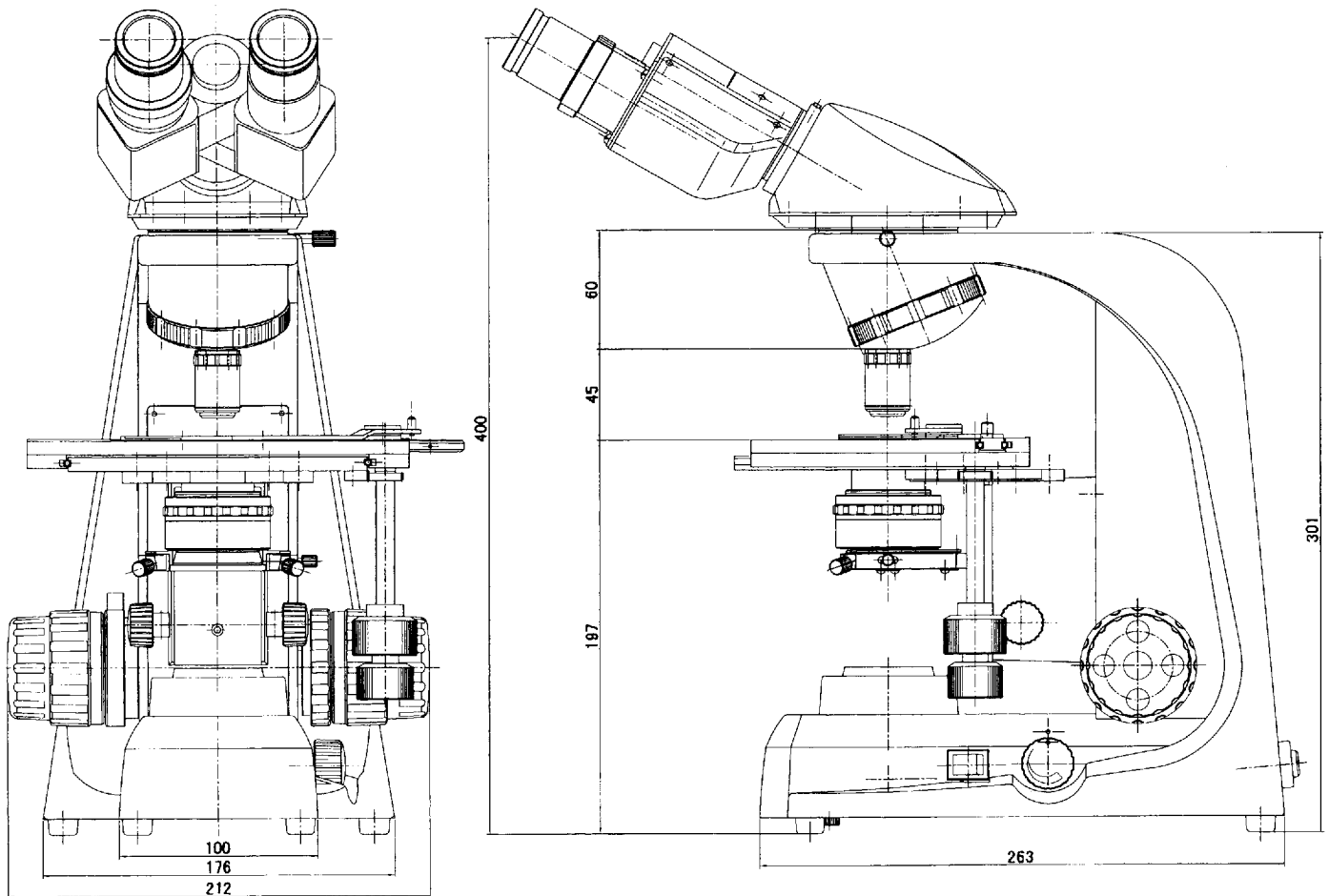
### Filters and Applications

<u>Filter</u>	<u>Application</u>
ND25	Neutral Filter or ND Filter. Grey filters or neutral density filters are used to attenuate all frequencies of light equally resulting in preservation of color temperature. The ND25 filter would indicate a reduction of light transmission by 75 percent or a passage of light of 25 percent.
LB100	Color Temperature Blue Filter. Suppresses red wavelengths in fluorescence applications. Provides a mired shift of 100.
G533	Green Filter 533nm. Provides contrast enhancement of complimentary colors of blue and red on black & white or tungsten-balanced color transparency films.

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## 10.0 Physical Dimensions



### Weight & Dimension :

Binocular head type 390mm (D) x 410mm (H) x 212mm (W), 8.0kg

Trinocular head type 390mm (D) x 465mm (H) x 212mm (W), 8.7kg



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