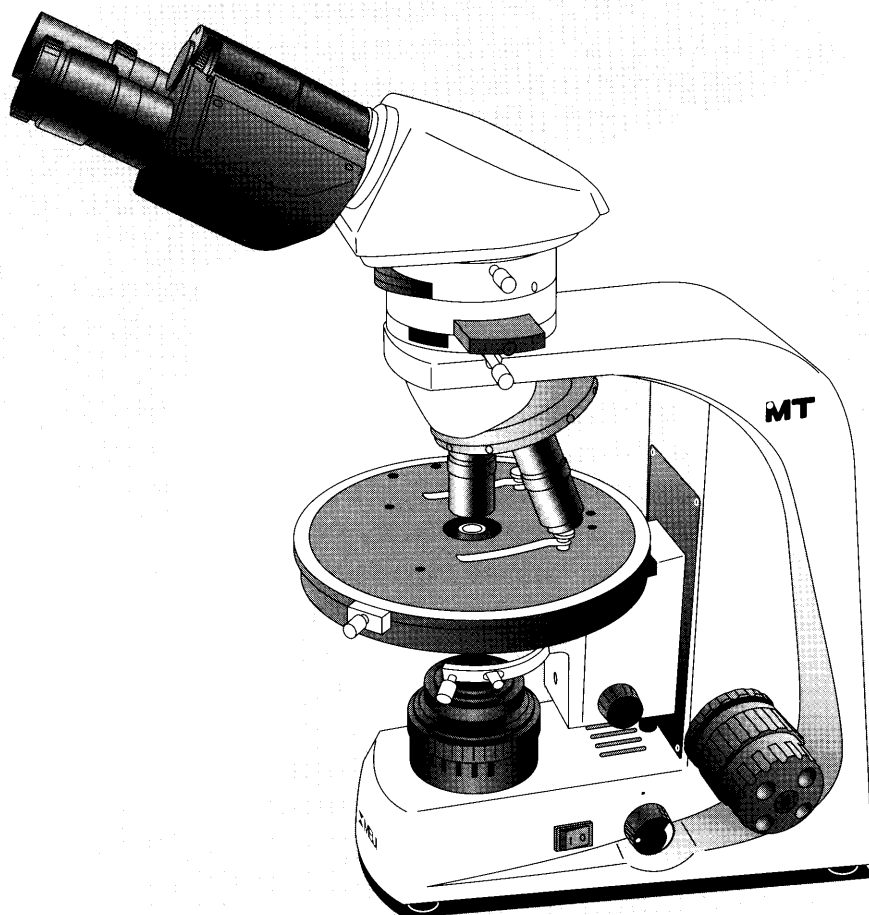




MT9000 Series

Polarizing Microscope Instruction Manual



MEIJI TECHNO CO.,LTD.

JAPAN

MT9000 Series

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MT9000 Series Polarizing Microscope

1. Introduction

The Meiji Techno MT9000 Series Polarizing Microscopes are used in research, industry and training in many scientific fields such as:

- Environmental research - analysis of materials, dust and fibers
- Medicine and Biology – determining composition of calculi, sediments and bio-crystallates
- Forensics – identification of trace elements and materials such as explosives
- Materials Analysis – metal, ceramics, building materials, etc
- Geology – minerals, petrography, etc
- Chemistry – Quality Control of in-process or end products, compounds, pharmaceuticals

Modern compact design and ergonomic placement of controls to be versatile, modular microscopes systems which makes the MT9000 Series ideal for use in research, production and quality control.

The MT9000 Series Microscopes delivers crisp, distortion-free, high resolution images in polarized light. Some of the standard polarization features include:

- Bertrand Lens and swing-in, swing-out polarizer/analyzer provide ease of use for both orthoscopic and conoscopic observations
- A rotating, swing-in swing-out polarizer indexed at every 90 degrees for easy polar orientation
- Easy to use DIN standard full wave and quarter wave compensators
- Precision 175mm ceramic coated rotating stage with 360 degree graduations and vernier dial for accurate measurements
- Focus stop with spring loaded objectives prevents crashing and slide damage
- Centerable Strain Free Abbe condenser in dovetail mount
- Powerful 30W Halogen illumination with Koehler field diaphragm on transmitted and incident illuminators
- Automatic voltage sensing power supplies provide regulated and even brightness for high-resolution video or photomicroscopy applications

Meiji Techno supplies a variety of accessories including filters, micrometers and camera adapters.

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1.1 General Safety Guidelines Microscope Features at a glance

- Computer Aided Designed Frame and Optics
- All New and Improved Plan Strain Free Objectives
- Slim Compact Footprint
- Infinity Corrected Optical System
- Powerful 6V 30W Transmitted Koehler Illuminator (All Models)
- Powerful 6V 30W Incident Koehler Illuminator (Models MT9420 & MT9430)
- Low Positioned Ergonomic Coaxial Coarse and Fine Focus Controls
- Smooth Operating Reverse Facing Quadruple Nosepiece
- Precision Ceramic Coated 175mm rotating stage with optional attachable mechanical stage and optional attachable point counting stage available
- Factory set focus stop along with spring loaded objectives prevent specimen damage or slide breakage.
- Siedentopf-type Binocular or Trinocular Viewing Heads with integrated reticle angle compensation system
- Widefield High Eyepoint Eyepieces (KHW10XF-CP & KHW10X F.N.20)
- Automatic Voltage Sensing Power Supplies with detachable cordsets
- Wide Range of Compensators, Filters and Accessories

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 light 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.

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1.4 Product Safety Information- Handling the Microscope



DO NOT OPERATE UNLESS THE UNIT IS PROPERLY GROUNDED!

Use only the specified power cord in a well grounded socket. Do not use in an ungrounded power receptacle or in cases where there is a break in the ground conductor or damage to the 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 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 one year.

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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 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 will issue a return authorization number. Customer may then return the product postage prepaid and insured to the authorized repair facility.

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

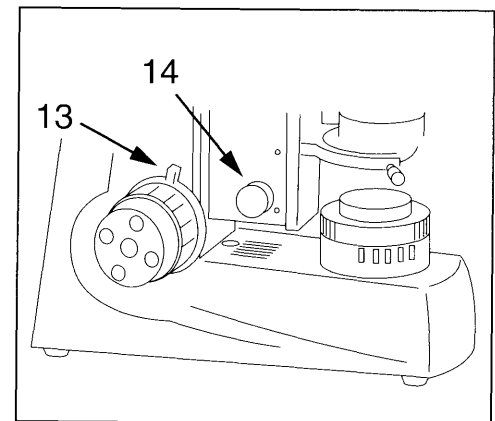
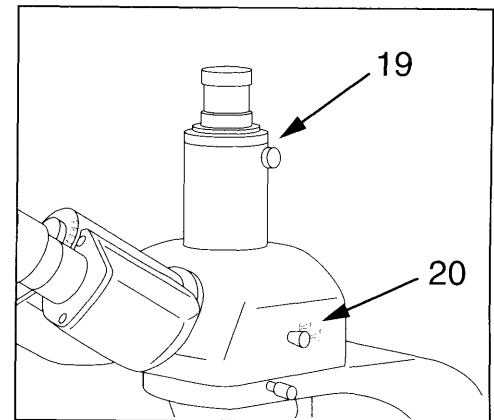
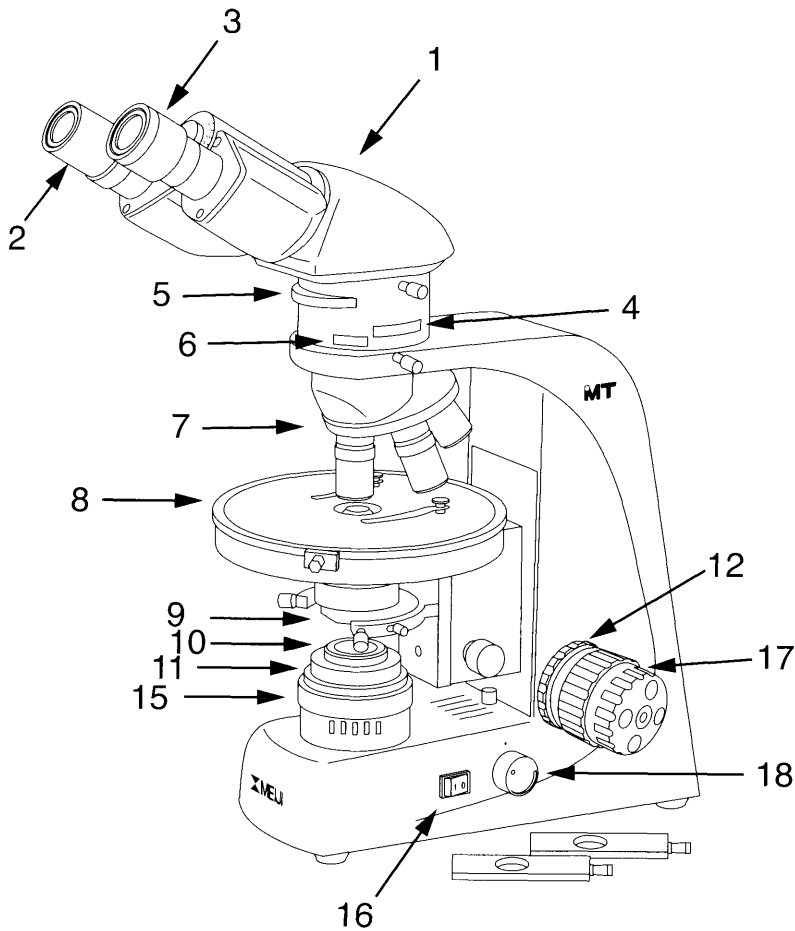
The terms of this warranty may not be varied by any person, whether or not purporting to represent or act on behalf of Meiji Techno. The limited lifetime warranty provided is in lieu of any and all warranties, expressed or implied, whether for merchantability or fitness for a particular purpose or otherwise. 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.

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2.0 Microscope Main Components

The image below designates the main components of the MT9000 Series Polarizing Microscopes.



1. Siedentopf Binocular Head
2. Eyepiece KHW10X, F.N.20
3. Eyepiece KHW10X-F with cross-line and guide pin
4. Analyzer in slider mount
5. Rotatable Bertrand Lens (fixed)
6. Compensator Slot
7. Ergonomic reversed centerable nosepiece
8. Ceramic coated rotatable stage
9. Strain free Abbe 1.25 condenser with built-in Iris diaphragm
10. Rotatable swing-out polarizer
11. Filter tray for 29.8mm blue filter, swing out the polarizer to open filter slot
12. Focus tension adjustment, turn the knurled ring counter-clockwise to tighten the tension
13. Adjustable safety knob, turn lever clockwise to lock the stage height
14. Condenser rack height adjustment knob
15. Field Iris
16. Power switch
17. Low positioned ergonomic coaxial coarse and fine focusing control
18. Low positioned variable brightness control
19. Trinocular head with integrated male C mount
20. Beam splitter for camera port

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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 a copy for your records so that you have the proper information when ordering more equipment, ordering replacement parts or accessories or when calling for technical support. Please make sure that no small pieces or parts are left in the packing material. 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.

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2.3 Microscope Set Up MT9200 & MT9300

- As a first step, remove all components from the shipping container and remove the packing materials and place the microscope frame on a stable work surface. Place the analyzer-Bertrand lens module onto the frame and tighten the clamp screw to secure the module. (Fig.1) Next, place the binocular head (MA952) or trinocular head (MA953) on the top of the analyzer-Bertrand lens module and tighten the clamp screw while the head is in the correct position as shown right. (Fig.2)
- Install the Siedentopf head with the 2mm allen wrench supplied being careful to align the notch in the head with the set screw. (Fig.3) Next, install the MA407CP focusing eyepiece by sliding it into the slotted right eyetube and install the other eyepiece (MA407) into the left eyetube. The rubber eyeshields can also be installed on top of each eyepiece. **The eyepieces for MT9000 Series are a DIN standard 23.2mm diameter.**
- Remove the objectives from their objective cases while being careful not to touch any part of the optics. Strain free objectives are marked with the letter "POL" in red and are very sensitive and are susceptible to pressure or impacts. They should only be handled by the knurled collar. Gently screw the 10X objective into the "fixed" opening of the nosepiece (the opening that does NOT have centering screws). (Fig.4) Install the rest of the objectives incrementally in order of power (e.g. 4X, 40X, 60X, etc).
- Plug the power cord into the microscope and the other end into a grounded outlet. (Fig.5)

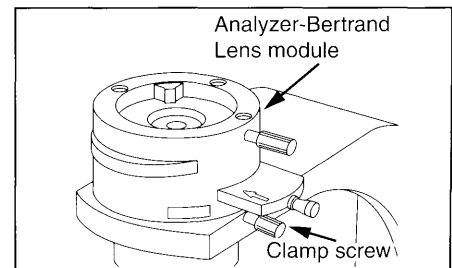


Figure 1

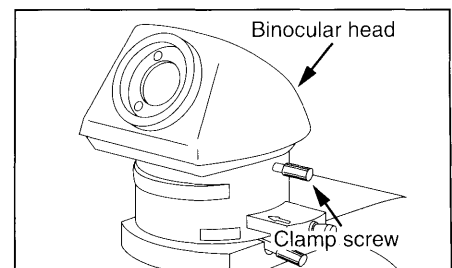


Figure 2

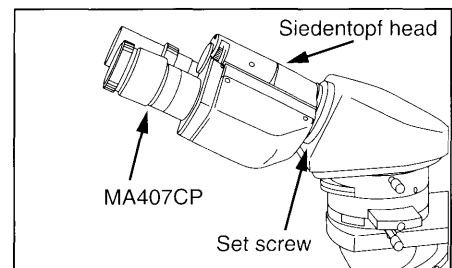


Figure 3

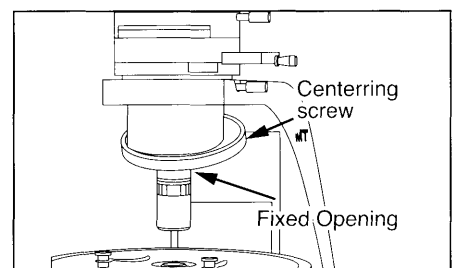


Figure 4

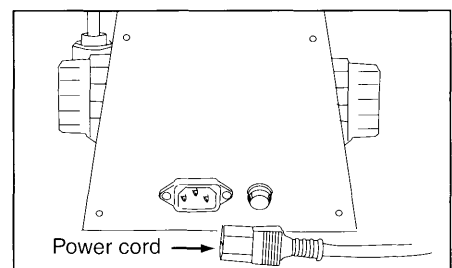


Figure 5

Your MT9000 & MT9400 Series Microscope and standalone power supply have automatic voltage sensing so they can be used with any voltage from any country in the world from 100 volts to 260 volts AC with the proper cordset.

CAUTION

The mains power cord should only be plugged into a known grounded outlet. A simple outlet tester can be used to verify correct outlet polarity and the presence of a grounded circuit. If no other accessories are going to be installed, the instrument is now ready for use.

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2.4 Microscope Set Up MT9420 & MT9430

- As a first step, remove all components from the shipping container and remove the packing materials and place the microscope frame on a stable work surface..
- Models MT9420 and MT9430 have a vertical illuminator (MA955) which is installed on top of the microscope frame first.(Fig.6)
Next, mount the Analyzer-Bertrand Lens module on the vertical Illuminator, place the binocular head (MA952) or trinocular head (MA953) onto the top of the Analyzer-Bertrand lens module (if installed) and re-tighten the clamp screw while the head is in the correct position as shown right.(Fig.7)
- Install the Siedentopf head with the 2mm allen wrench supplied being careful to align the notch in the head with the set screw. Next, install the MA407CP focusing eyepiece by sliding it into the slotted right eyetube and install the other eyepiece (MA407) into the left eyetube. The rubber eyeshields can also be installed on top of each eyepiece. **The eyepieces for MT9000 Series are a DIN standard 23.2mm diameter.**
- Remove the objectives from their objective cases while being careful not to touch any part of the optics. Strain free objectives are marked with the letter "POL" in red and are very sensitive and are susceptible to pressure or impacts. They should only be handled by the knurled collar. Gently screw the 10X objective into the "fixed" opening of the nosepiece (the opening that does NOT have centering screws). Install the rest of the objectives incrementally in order of power (e.g. 20X, 40X, 60X, etc) .(Fig.4)
- Plug the cord from the vertical illuminator into the back of the standalone power supply (MA927/05)(Fig.9) and plug the power cordset into the microscope and the other end into a grounded outlet.(Fig.5)

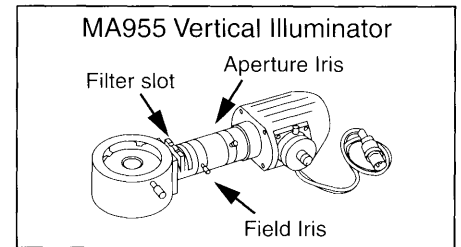


Figure 6

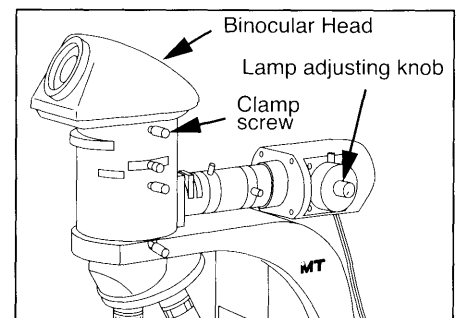


Figure 7

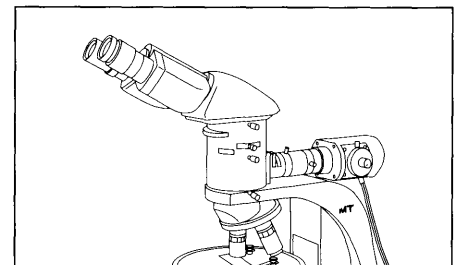


Figure 8

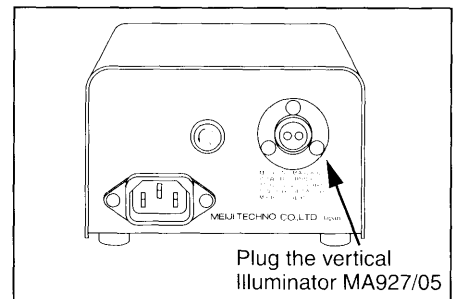


Figure 9

Your MT9000 or MT9400 Series Microscope and standalone power supply have automatic voltage sensing so they can be used with any voltage from any country in the world from 100 volts to 260 volts AC with the proper cordset.

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CAUTION

The mains power cord should only be plugged into a known grounded outlet. A simple outlet tester can be used to verify correct outlet polarity and the presence of a grounded circuit. If no other accessories are going to be installed, the instrument is now ready for use.

2.5 Adjusting Interpupillary Distance & Integrated Reticle Orientation

MT9000 and MT9400 series models come with Siedentopf Binocular or Trinocular viewing heads with integrated reticle angle compensation system. This system ensures that the reticle remains square in the eyepiece even when interpupillary distance is changed.

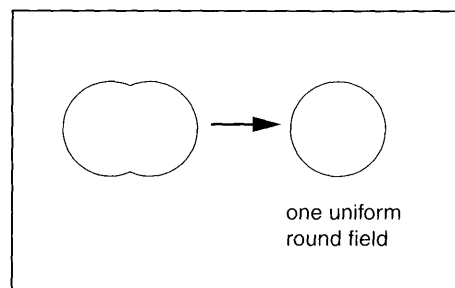
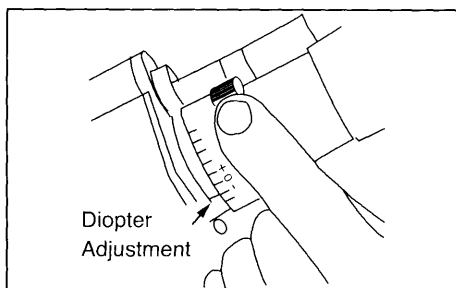
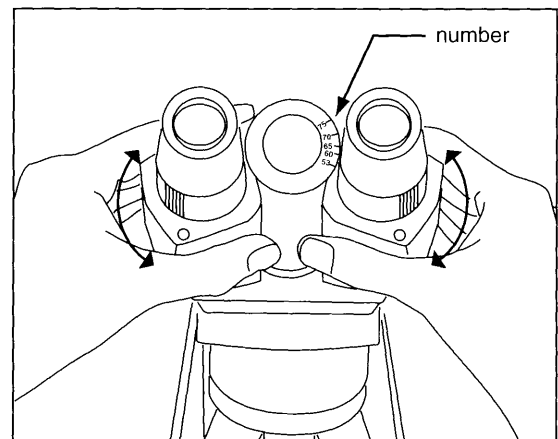
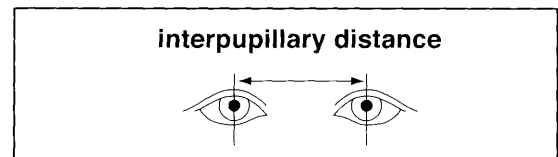
Adjusting Interpupillary Distance

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.

Next, place a specimen on the stage and 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.

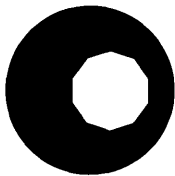
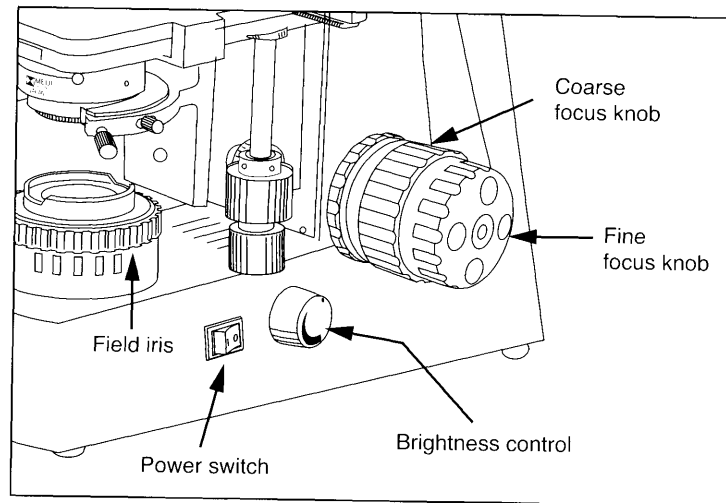


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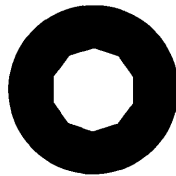
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2.6 Achieving Koehler Illumination

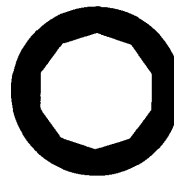
- Turn on the microscope Power switch and set the illumination to a comfortable level.
- Establish one field of view by adjusting the inter-pupillary distance of the Siedentopf viewing head.
- Make sure that the Bertrand Lens, analyzer and any other sliders are clear of the optical path and that the iris diaphragm on the condenser is all the way open.
- Rack up the condenser to its highest position or until the top element of the condenser is approximately 1mm below the bottom of the slide.
- Place a familiar specimen on the stage. Using the 10X objective, bring the specimen into focus.
- While viewing the specimen close down the field diaphragm just enough so that the inner edge of the iris leaves are visible as shown in figure "A"
- Use the condenser focusing knob to slightly lower the condenser to bring the edge of the iris leaves into sharp focus as shown in figure "B"
- By using the two condenser centering screws, adjust the iris opening so it is centered in the middle of the field of view as shown in figure "C"
- Open up the field diaphragm so that it just clears the edge of the field of view as shown in figure "D".



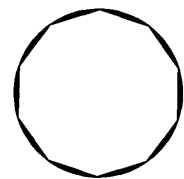
"A"



"B"



"C"



D

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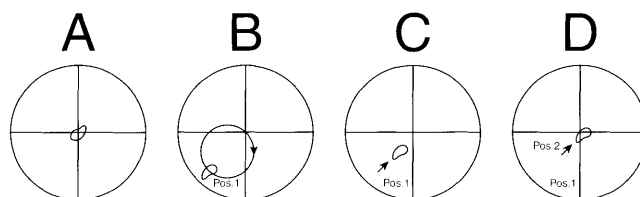
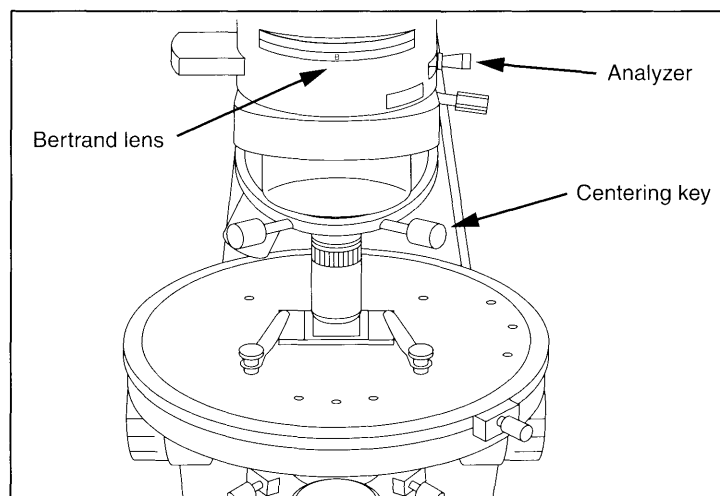
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2.7 Centering the Objectives

When objectives are not centered, specimens may leave the field of view when rotating the stage. Perform the steps below if objectives are not centered properly:

1. Before starting, make sure that the 10X objective is installed in the fixed hole of the nosepiece. This is the position that does NOT have centering screws. All objectives will be adjusted against the 10X position.
2. Make sure the Bertrand Lens, the analyzer and any other sliders are clear of the optical path and the iris on the illuminator is open all the way.
3. Use a small grain or some type of target and place it in the center of the field of view with the 10X objective and bring it into focus as shown below in "A".
4. Center the target by rotating the stage and evaluating how centered the target appears.
5. Once the target is centered, move to the next highest objective and insert the centering keys into the nosepiece for that position.
6. Bring the specimen again into focus and note its position in the field of view.
7. Rotate the stage until the target moves farthest away from the crossline at the as shown below in "D"(Position 1).
8. Adjust the centering screws on the nosepiece until the target is midway between Position 1 and the crossline as shown in "D".
9. Rotate the stage and evaluate centricity. One may need to repeat this procedure until the target stays in the center of the crossline when the stage is rotated ("D").

Repeat these steps for all other objectives in the nosepiece. To maintain centering, it is important that objectives be handled very gently and only touched on the knurled portion when changing objectives.



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3.0 Operation

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

Your MT9000 is a precision instrument designed to last a lifetime. Always handle your microscope with care and avoid abrupt motion, vibration and shock.

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

MA326	6V 30W Halogen	For All Integrated Illuminators MT9200, MT9300, MT9420 & MT9430
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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 Transmitted Light Operation – Brightfield

Transmitted light operation requires the installation of transmitted light objectives. The part numbers for transmitted light objectives appear at the end of this section.

- First, set your interpupillary distance on the microscope eyetubes by pulling them apart or pushing them closer together to fit your eyes. When set correctly, one will see one uniform round or “fused” field of view. Make note of the distance when adjusted to your liking so you can later repeat the setting.
- Turn on the microscope power switch. Adjusting the transmitted light brightness is done with the variable brightness control knob on the body of the microscope.

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- Make sure the field iris diaphragm on the vertical illuminator is opened all the way to start.
- We recommend that you initially use an easily recognizable flat specimen. Place that specimen on the stage.
- 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 turn the objective nosepiece..
- By using the coarse and fine focus knobs shown above, adjust your specimen into focus with your left eye closed (looking only through the right eyetube). With the specimen in focus, close the right eye you just used and open the left. If the specimen is out of focus for the left eye, adjust the diopter on the eyetube until the focus is correct. 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.

Note: The aperture iris diaphragm located on the vertical illuminator can be "stopped down" or closed somewhat to give the observation of your specimen more or less contrast or resolving power. Stopping down the iris diaphragm decreases resolution and brightness but increases image contrast and depth of focus.

Possible Brightfield Mode Operational Problems

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

- Incorrect components inadvertently installed, i.e. incident light mode using transmitted light objectives and vice versa
- Components not mounted correctly
- Dirty, smudged or roughly handled optics

MT9000 Series Plan Strain Free Incident Light Objectives

Brightfield Objectives Transmitted – Strain Free Plan - Infinity Corrected - F = 200mm	
MA935	Strain Free Plan 4X objective, NA: 0.10, WD = 15.3(included)
MA936	Strain Free Plan 10X objective, NA: 0.25, WD = 7.3 (included)
MA937	Strain Free Plan 20X, objective, NA: 0.73, WD = 5.0mm (optional)
MA938	Strain Free Plan 40X objective, NA: 0.65, WD = 0.72mm (included)
MA939	Strain Free Plan 60X objective, NA: 0.85, WD = 0.2mm (optional)
MA940	Strain Free Plan 100X objective oil, NA: 1.25, WD = 0.14mm (optional)

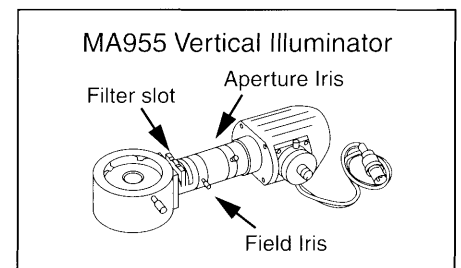
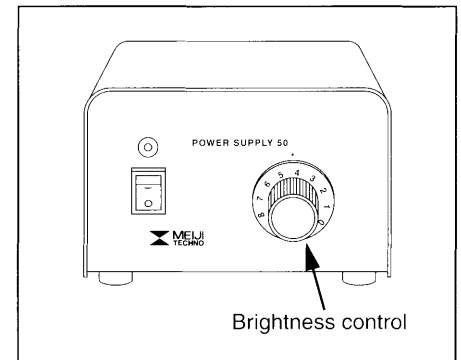
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3.2 Incident Light Operation – Brightfield

Incident light operation requires the installation of incident light objectives. The list of part numbers for incident light objectives appears at the end of this section.

- First, set your interpupillary distance on the microscope eyetubes by push or pulling them apart or pushing them closer to fit your eyes. When set correctly, you will see one uniform round or “fused” field of view. Make note of the distance setting when adjusted to your liking so you can later repeat the setting.
- Adjusting the brightness is done with the variable brightness control knob on the vertical illuminator power supply shown at right.
- Make sure the field iris diaphragm on the vertical illuminator is opened all the way to start.
- We recommend that you initially use an easily recognizable flat specimen. Place that specimen on the stage.
- 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 turn the objective nosepiece..



- By using the coarse and fine focus knobs shown above, adjust your specimen into focus with your left eye closed (looking only through the right eyetube). With the specimen in focus, close the right eye you just used and open the left. If the specimen is out of focus for the left eye, adjust the diopter on the eyetube until the focus is correct.

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.

Note: The aperture iris diaphragm located on the vertical illuminator can be "stopped down" or closed somewhat to give the observation of your specimen more or less contrast or resolving power. Stopping down the iris diaphragm decreases resolution and brightness but increases image contrast and depth of focus.

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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 components inadvertently installed, i.e. incident light mode using transmitted light objectives and vice versa
- Components not mounted correctly
- Dirty, smudged or roughly handled optics

MT9000 Series Plan Strain Free Incident Light Objectives

Brightfield Objectives Transmitted – Strain Free Plan - Infinity Corrected - F = 200mm	
MA935	Strain Free Plan 4X objective, NA: 0.10, WD = 15.3 (Included)
MA936	Strain Free Plan 10X objective, NA: 0.25, WD = 7.3 (Included)
MA947	Strain Free Plan 20X objective, NA: 0.40, WD = 5.2mm (Optional) for non cover slip
MA948	Strain Free Plan 40X objective, NA: 0.65, WD = 0.81mm (Optional) for non cover slip

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3.3 The Bertrand Lens – Conoscopic Observation

An “Interference Figure” is a phenomena which details what a specimen produces at the rear focal plane of a transmitted light lens system. This colorful figure is used for material diagnosis and identification.

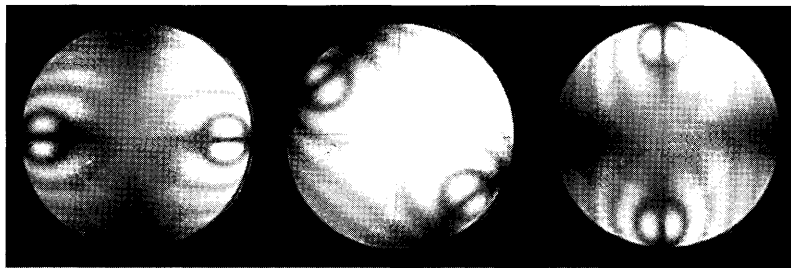
Interference Figures are achieved with certain specimens like crystals which field of view becomes extinct when viewed under crossed polars.

To perform conoscopic observation:

- Place your specimen on the stage, usually a prepared slide.
- Engage the 40x objective by rotating the nosepiece into that position.
- Bring your specimen into focus.
- Turn up the transmitted light illuminator up all the way to its brightest setting.

Note: Objectives should be centered otherwise specimen detail may move out of the field of view when turning the stage.

- Engage the analyzer which is the only slider below the viewing head and swing in the polarizer which is located just above the transmitted light illuminator.
- While looking into the eyetubes, remove the specimen and rotate the polarizer and find the point in which the field becomes “extinct” or darkened and then re-position your specimen.
- Engage the Bertrand lens by rotating the wheel directly below the viewing head from “O” to “B” setting printed on the wheel.
- Immediately, one should observe some type of interference figure somewhat similar to what is shown below.
- Rotate the stage to observe the movement and coloration of the isochromes and isogyres which are the colored and blackened figures you observe.



Conoscopic cannot be observed under vertical illumination

Polarizing Microscope

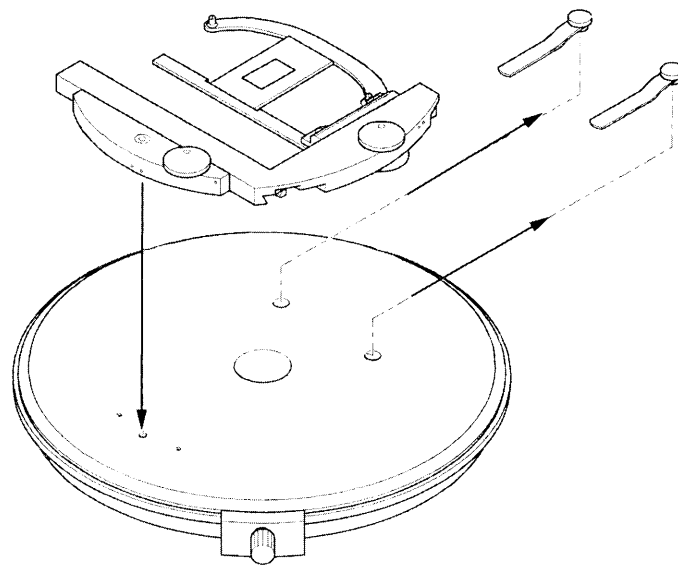
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3.4 Attaching optional mechanical or point counting stages

The stage clips that come with the microscope will need to be removed prior to installation of optional stages.

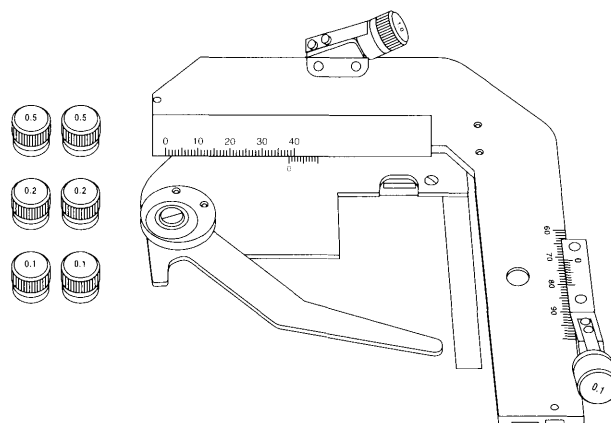
Each clip simply lifts out of the hole in the stage.

The mechanical or point counting stages are attached to the threaded holes pre-drilled into the stage as shown below:



MA299 Mechanical stage

Be sure to store the removed stage clips. If the pair are lost, they can be replaced. The part number is MA946.



MA945 Point counting stage

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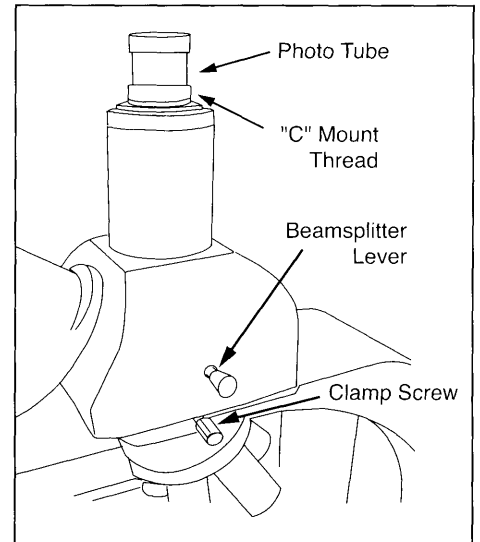
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3.5 Photomicrography with 35mm SLR and Digital SLR Cameras

Model MT9300 and MT9430 microscopes have a trinocular tube with integrated male "C" mount on top of the head for photomicroscopy.

In order to secure a 35mm SLR camera body to these microscopes, 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

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

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:

Photo eyepieces

MA512	2.5X Photo eyepiece
MA508	5X Photo eyepiece
MA500	3.3X Photo eyepiece

Polarizing Microscope

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3.6 Photomicrography with Digital Still Cameras

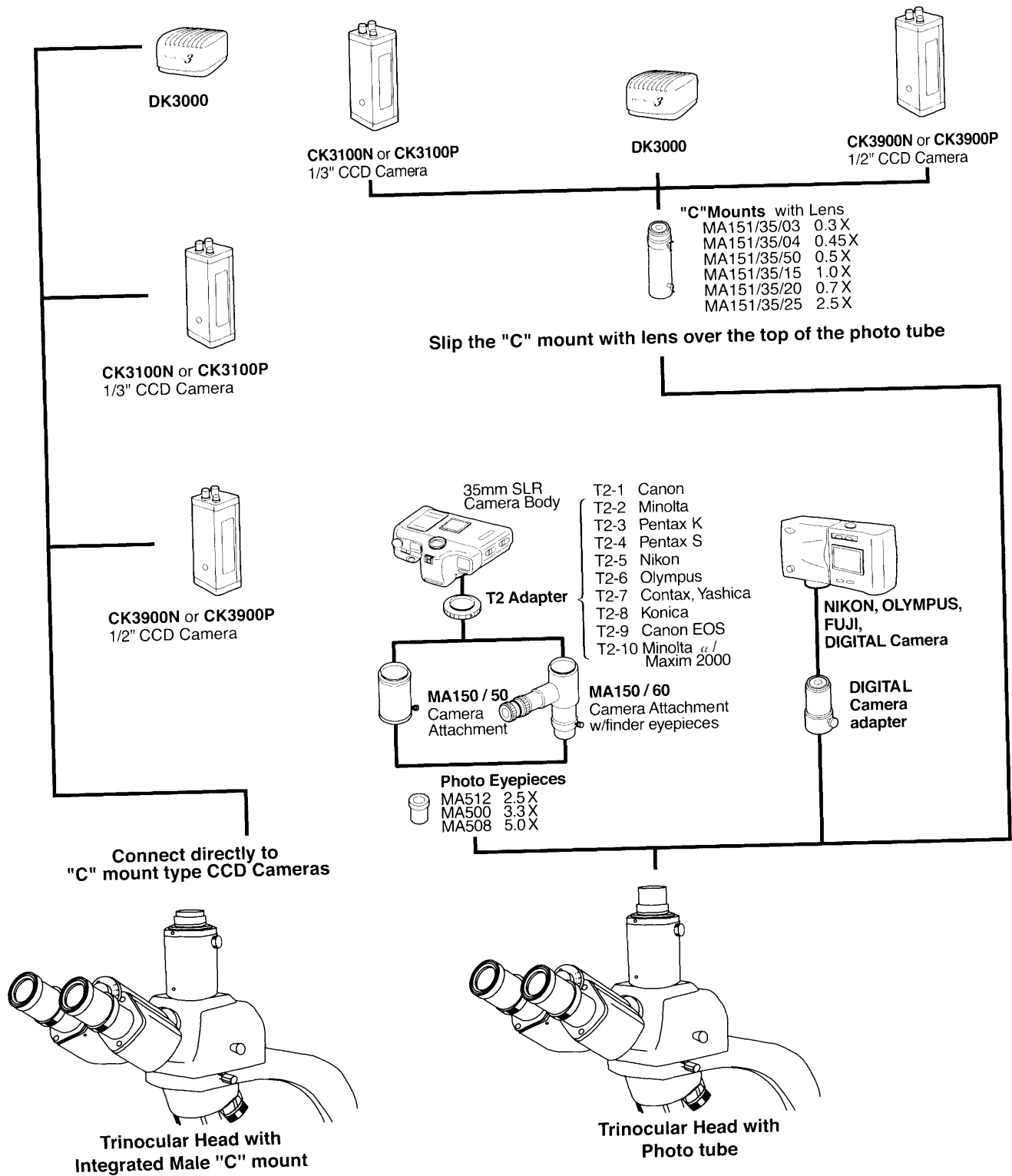
In order to mount a consumer grade digital camera to the microscope, an optional camera adapter will be needed. The table below shows the different cameras that can be used and their corresponding adapter part number:

Digital Camera Model	All Meiji Trinocular Tube Models (23.2mm ID, 25.2mm OD)	Eyetubes TM Series ML Series (23.2mm ID, 27.2mm OD Eyetubes)	"C" Mount Thread (25.4mm) (attaches to male c-mount thread)	Eyetubes EM Series (30.5mm ID, 34.0mm OD Eyetubes)	Eyetubes RZ Series MT Series TC Series IM Series (30.0mm ID, 34.0mm OD Eyetubes)
Canon Powershot A610, A620 A630, A640	MA151/30/73	MA151/30/73	MA151/40/72	MA151/45/72	MA151/50/72
Canon Powershot A700, A700 IS	MA151/30/75	MA151/30/75	MA151/40/74	MA151/45/74	MA151/50/74
Canon Powershot G1, G2	MA151/30/43	MA151/30/43	MA151/40/42	MA151/45/42	MA151/40/42
Canon Powershot G3, G5	MA151/30/41	MA151/30/41	MA151/40/40	MA151/45/40	MA151/50/40
Canon Powershot G6	MA151/30/31	MA151/30/31	MA151/40/30	MA151/45/30	MA151/50/30
Canon Powershot G7	MA151/30/21	MA151/30/21	MA151/40/20	MA151/45/20	MA151/50/20
Fuji Finepix S602, 4900Z, 6900Z, S20Pro, S7000	MA151/30/81	MA151/30/81	MA151/40/80	MA151/45/80	MA151/50/80
Nikon Coolpix 800, 900, 950, 990, 995, 4500	MA151/30/50	MA151/30/51	MA151/40/50	MA151/45/50	MA151/55/50-
Nikon Coolpix 5000	MA151/30/70	MA151/30/71	MA151/40/70	MA151/45/70	
Nikon Coolpix 5400	MA151/30/53	MA151/30/53	MA151/40/52	MA151/45/52	MA151/50/52
Olympus Camedia C-2000, C-2020, C-3000, C-3030, C-3040, C-3100, C-4040, C-4100, C-5050	MA151/30/61	MA151/30/61	MA151/40/60	MA151/45/60	
Olympus Camedia C-700, C-720, C-730, C-740, C-750, C-755, C-760, C-765, C-770, SP500UZ	MA151/30/63	MA151/30/63	MA151/40/62	MA151/45/62	MA151/50/62
Olympus Camedia C-5060 C-7070	MA151/30/65	MA151/30/63	MA151/40/64	MA151/45/64	

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Video Microscopy



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3.7 Connecting a Video or Other Camera that has a “C” mount

In order to attach a camera that employs a standard “C” mount to the MT9300 or MT9430 microscope, 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 WITH LENS can be used between of the trinocular port of the microscope and the camera:

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

- 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.

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.

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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.

Cleaning the Objectives

 **DANGER**

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

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:

MEIJI TECHNO CO., LTD. 322-1, Chikumazawa, Miyoshi machi, Iruma-gun Saitama 354-0043, Japan	Phone:	049-259-0111
	Fax:	049-259-0113
	E-mail:	meiji@meijitechno.co.jp
	Web:	http://www.meijitechno.co.jp

Meiji Techno America 3010 Olcott Street Santa Clara, CA 95054-3207	Phone:	800.832.0060
	Fax:	408.970.5054
	E-mail:	technicalsupport@meijitechno.com
	Web:	http://www.meijitechno.com

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

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Operational Issues

Please refer to the previous “Operations” chapters which coincide with the observation mode that you are using. The most common operational problems include the improper positioning of contrast accessories, the improper adjustment or the incorrect parts 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, 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 there is a fuse blown.

5.1 Replacing the mains fuse on the microscope



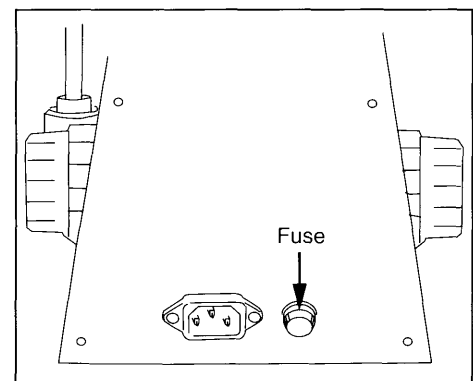
ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.

Location of Mains Fuse

The mains fuse of the 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:



30W Halogen Systems

MA327 3 Amp, 250V, 5 X 20mm

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



NEVER USE REPLACEMENT FUSES OF A DIFFERENT RATING.

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5.2 Transmitted or Incident Light does not work

1. Make sure your mains outlet indeed has power.
2. Check to see if the mains fuse has blown.
3. Check to see if the lamp has blown.

5.3 Replacing Transmitted 6V 30W Halogen Lamp

CAUTION ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.

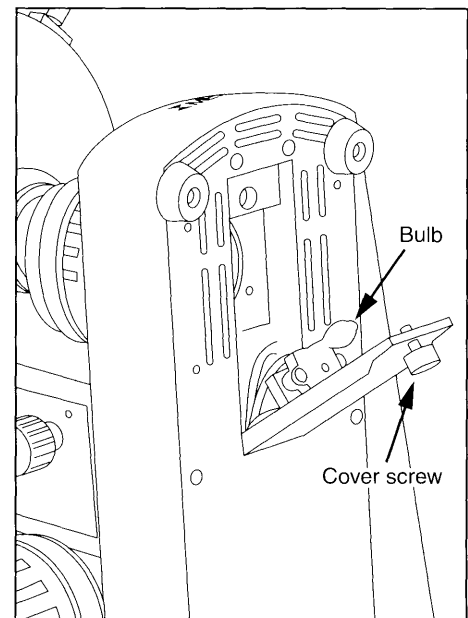
Do not install any bulb in your instrument other than ones designated by Meiji Techno:

MA326	6V 30W Halogen	For All Integrated Illuminators MT9200, MT9300, MT9420 & MT9430
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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 LAMP HOUSING MAY BE HOT TO THE TOUCH.

- Switch off the microscope.
- Disconnect the power cord.
- Wait until the housing and bulb have cooled sufficiently.
- Remove the illuminator cover screws 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 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.



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5.4 Replacing the Incident 6V 30W Halogen Lamp

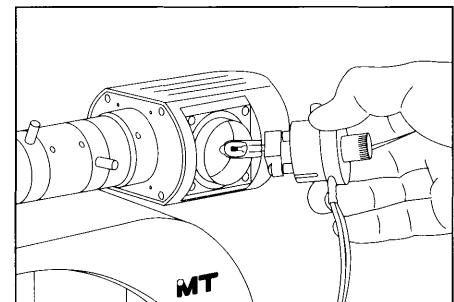
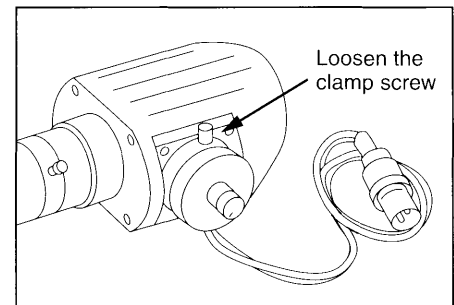
CAUTION ALWAYS DISCONNECT YOUR EQUIPMENT BEFORE DOING ANY REPAIR.

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

MA326	6V 30W Halogen	For All Integrated Illuminators MT9200, MT9300, MT9420 & MT9430
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HOT! LAMP AND LAMP HOUSING MAY BE HOT TO TOUCH.

- Switch off the microscope.
- Disconnect the power cord.
- Wait until the housing and bulb have cooled sufficiently.
- Loosen the clamp screw and direct the backing plate so it can be removed from the housing.
- Remove the defective lamp.
- Place a new lamp into the socket while avoiding touching the glass. Notice the bulb is wrapped in plastic. Use the bag to avoid touching the glass envelope during installation.
- Be sure the bulb is pushed in as far as possible thereby assuring the alignment of the filament in the illuminator.
- Reinstall the lamp cover door.
- Reconnect the power cord and switch on the microscope to align the filament and to verify proper illuminator operation.



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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 such as small bags of silica gel.

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 operations manual, etc. included with the microscope when shipping.

8.0 Accessories and Replacements Parts

Part numbers and product descriptions for accessories and parts for MT9000 Series Microscopes can also be found online. Accessories and replacement parts are available through our dealer network. Call us toll free (800) 832-0060 Monday through Friday 9am – 5pm PST and we can refer you to a dealer.

MT9000 Series Components & Accessories

Viewing Heads	
Part Number	Description
MA952	Siedentopf type binocular head, 30° inclined, 23.2mm I.D. eyetubes with integrated reticle angle compensation (included with MT9200 & MT9420)
MA953	Siedentopf type trinocular head, 30° inclined, 23.2mm I.D. eyetubes with integrated reticle angle compensation (included with MT9300 & MT9430)
Eyepieces	
Part Number	Description
MA407	DIN KHW10X Super Widefield High Eyepoint eyepiece, F.N.20 (standard) (accepts 21mm reticle)
MA407CP	DIN KHW10X-F Super Widefield High Eyepoint focusing, F.N.20 (standard) cross-line included

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Polarized Objectives Transmitted - Strain Free Plan - Infinity Corrected - F = 200mm	
MA935	Strain Free Plan 4X objective, NA: 0.10, WD = 15.3mm (included)
MA936	Strain Free Plan 10X objective, NA: 0.25, WD = 7.3mm (included)
MA937	Strain Free Plan 20X objective, NA: 0.73, WD = 5.0mm (included)
MA938	Strain Free Plan 40XS objective, NA: 0.65 = 0.72mm (optional)
MA939	Strain Free Plan 60XS objective, NA: 0.85 = 0.2mm (optional)
MA940	Strain Free Plan 100XS oil objective, NA: 1.25 = 0.14mm (optional)
Polarized Objectives Incident Light - Strain Free Plan - Infinity Corrected - F = 200mm	
MA935	Strain Free Plan 4X objective, NA: 0.10, WD = 15.3mm (included)
MA936	Strain Free Plan 10X objective, NA: 0.25, WD = 7.3mm (included)
MA947	Strain Free Plan 20X objective, NA: 0.40, WD = 5.2mm (optional) for non cover slip
MA948	Strain Free Plan 40XS objective, NA: 0.65 = 0.81mm (optional) for non cover slip
Pol Accessories	
MA954	Strain Free Abbe condenser NA 1.25 with iris in dovetail mount (included)
MA469/05	1/4 wave test plate in DIN sliding mount (included)
MA470/05	First Order Red Plate in DIN sliding mount (included)
MA471/05	Analyzer in-mount (included)
MA654/05	Quartz Wedge, 6 order, un-graduated (optional)
MA654/05N	Quartz Wedge, 6 order, graduated (optional)
Miscellaneous Parts & Accessories	
MA299	Attachable mechanical stage (optional)
MA945	Attachable Point Counting mechanical stage (optional)
MA946	Stage Clips (pair included)
MA809/10	Replacement 115V AC Power cord with plug (USA)
MA809/20	Replacement 220V AC Power cord with plug (Eurocord)
MA809/30	Replacement 220V AC Power cord with plug (UK)
MA292	Stage Micrometer, 1mm divided into 100 parts, 0.01mm
MA200	Eyeshield for MA407 KHW10XCP Eyepiece (optional)
MA326	Replacement Lamp, 6V 30W halogen
MA327	Replacement Fuse, 3A for all Halogen models
MA905	Interference Color Chart (Included)
MA701	Dust Cover for MT9200, MT9300, MT9420 & MT9430 (included)
MA955	Vertical 30W Koehler Halogen Illuminator (included with MT9420 & MT9430)
MA927/05	Standalone power supply for MA955 (included with MT9420 & MT9430)

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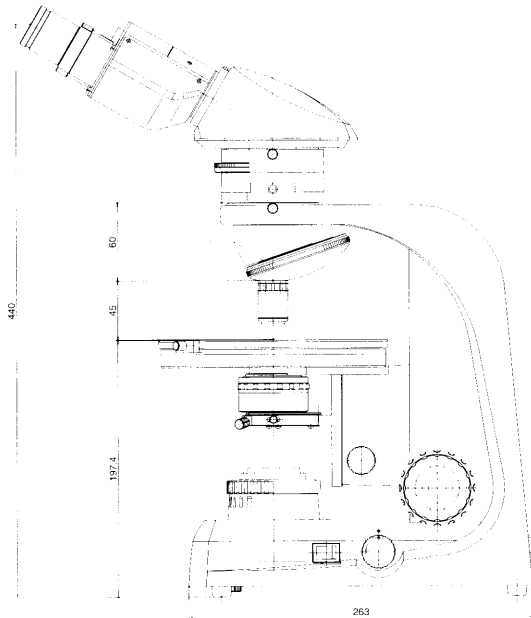
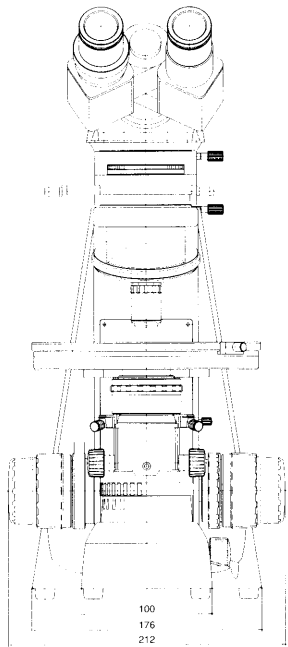
9.0 Technical Descriptions

Specifications

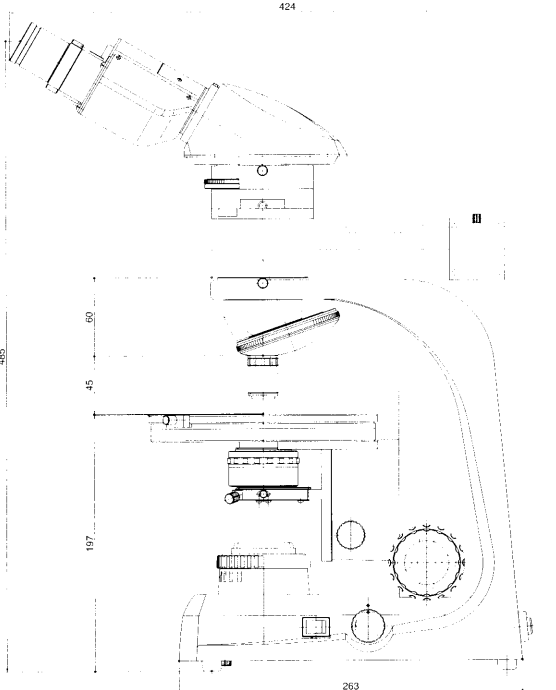
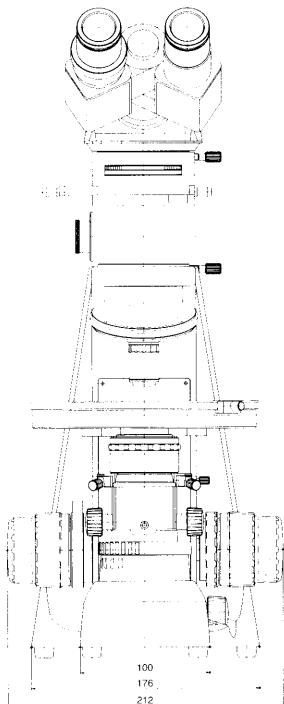
Power Source	100-230V 50/60Hz
Bulb	• MA326 Halogen bulb 6V 30W (Philips code : 5761), 3100°K at max. intensity
Bulb Life	• 100 hours average for halogen bulb
Light Control Method	Voltage control
Normal Environmental Conditions	<ul style="list-style-type: none"> • Indoor use • Altitude up to 2,000 m • MAINS supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage • Temperature : +10 to 36°C (50 to 96.8°F) • Relative Humidity : 0 to 80% up to 30°C (86°F) • 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. • Applicable RATED POLLUTION degree

Filters and Applications

<u>Filter</u>	<u>Application</u>
1/4Wavelength test plate	The quarter-wave test plate is made from a birefringent crystal that produces a phase-shift of one-quarter cycle between the elements of light passing through it. The quarter-wave wave plate can be used to convert linearly polarized light to circularly polarized light.
Quartz Wedge	A quartz wedge is a semi-quantitative compensator made from quartz that is cut with an elongated wedge angle. Quartz wedges are commonly employed for qualitative retardation measurements of petrographic specimens (rock and mineral thin sections) and other birefringent materials whose retardation value falls within the wedge limits.
First Order Red Compensating Plate aka "Sensitive Tint" or "Gypsum Plate"	First Order Red (Full Wave) Compensating Plates are used with polarized light microscopes in determining the properties of birefringent materials. The compensator covers 1 order, approximately 550nm.
Bertrand Lens	The Bertrand Lens is found immediately below the viewing head. It can only be used with the 40X objective and when engaged, convergent light is used to observe what is called an "Interference Figure".



MT9200



MT9420

Weight & Dimension :

- MT9200 : 212mm (W) x 390mm (D) x 456mm (H), 9.06kg
- MT9300 : 212mm (W) x 390mm (D) x 510mm (H), 9.75kg
- MT9420 : 212mm (W) x 424mm (D) x 501mm (H), 11.19kg
- MT9430 : 212mm (W) x 424mm (D) x 555mm (H), 11.88kg



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