

MT-60 Series Manual



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Construction of the microscope

The names of the several parts are listed below and are indicated in the picture:

- | | | | |
|----|---------------------------------|----|---------------------------------|
| A) | Microscope head | N) | Slide protection handle |
| B) | Eyepieces | O) | Height adjustment condenser |
| C) | Diopter adjustment | I) | Kohler iris diaphragm |
| D) | Nosepiece | J) | Collector lens |
| E) | Objectives | K) | iCare sensor |
| F) | Stage with X-Y mechanical stage | L) | Light intensity adjustment knob |
| G) | X-Y stage controls | M) | Coaxial coarse adjustment |
| H) | Condenser with iris diaphragm | | |
| I) | Kohler iris diaphragm | | |
| J) | Collector lens | | |



Preparing the MT-60 Series microscope for use

Your microscope is a delicate product, please handle it with care.

Carefully remove the items from their packing and place them on a flat, firm surface. Please do not expose the microscope to direct sun light, high temperatures, damp, dust or acute shake. Please make sure the worktable is flat and horizontal.

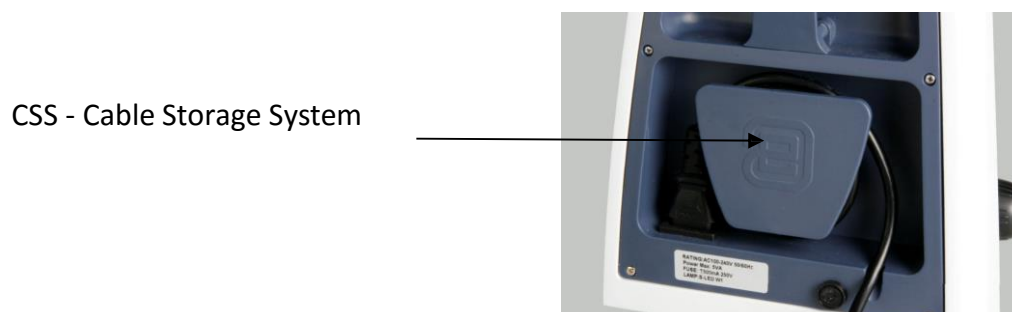
When moving the microscope, use the left hand to hold the transport handle at the backside of the microscope and with the right hand the bottom of the microscope.



Caution! Holding the stage focusing knob will damage the microscope.

microscope with the stage, the

Insert the power cord in the backside of the microscope and use the cable storage CSS - Cable Storage System – to store the cable after use



Caution! If the bacterial solution or water splatters over the stage, objective or head, pull out the power cord immediately and dry the microscope.

For safety reasons, make sure the power switch is turned off and remove the plug before replacing the led unit or fuse

Assembling Steps

Meiji Techno America Microscopes will always try to keep the number of assembly steps for their customers as low as possible but in some cases there are some steps to be taken. The steps mentioned below are often not necessary but described for your convenience nonetheless.

Mounting the objectives

1. Rotate the coarse focusing knob to lower the stage to the lowest position.
2. Install the objectives into the objective nosepiece from the lowest magnification to the highest in a clockwise direction from the rear side of the microscope. When using the microscope, start using the low magnification objective (4X or 10X) to search for specimen and focus, and then continue with high magnification objective to observe.

The microscope head

The standard MT-60 Series series configuration is supplied with the head assembled. However, if your order contains the fluorescence it should be mounted first. The dovetail on the bottom side of these parts fits into the slot on the top side of the other parts.

Placing the eye pieces

1. Remove the cover of eyepiece tube.
2. Insert the eyepiece into the eyepiece tube

The eyeshades

Each eyepiece has its rubber eyeshade. This prevents damage to the lens, and prevents stray light. The eyeshade can simply be slipped over the eyepiece.

Connecting the power cord

The MT-60 Series series microscopes supported a wide range of operating voltages: 100 to 240V. Please use a grounded power connection.

1. Make sure the power switch is off before connecting.
2. Insert the connector of power cord into the MT-60 Series power socket, and make sure it connects well.
3. Insert the other connector into the mains socket, and make sure it connects well.

Don't use bend or twist the power cord, it will get damaged. Using the special cord supplied by Meiji Techno America. If it's lost or damaged, choose one with the same specifications.

Operation:

Setting up the illumination

1. Connect the MT-60 Series microscope to a mains power source and turn on the main power switch on.
2. Adjusting the light adjustment knob until the illumination is comfortable for observation.

Place the specimen slide

1. Push the arm of the specimen holder backwards.
2. Release the arm slowly clamping the slide with the cover glass facing up.
3. Rotating the X and Y-axis knob will move the specimen to the center for alignment with the center of the objective.

Focusing and slide protection

1. Select the objective 4x to the optical path.
2. Rotate the position screw to top, observe the right eyepiece with right eye. Rotate the coarse focusing knob until the image appears.
3. Rotate the fine focusing knob for detailed focusing
4. When focused with S100x objective, lock the slide protection handle. The slide protection handle protects the slide by limiting the travel of the table. This way the objectives will not touch or break your slides.

Adjusting the focusing tension

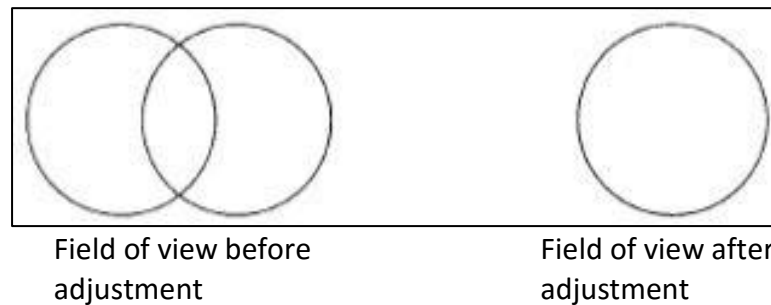
The MT-60 Series series microscope focusing knobs can be adjusted for tension. You can set it from light to heavy according your own preference. Please note that when the specimen leaves the focus plane after focusing or the stage declines itself, the tension should be set higher. To tighten the focusing arm (more heavy), rotate the tension adjustment ring according to the arrowhead pointed; to loosen it, please turn it in the reverse direction.

The interpupillary distance

Using a binocular (or trinocular) tube is less tiring for the eyes than the use of a monocular tube. In order to obtain a smooth “compound” image, one should go through the below steps.

The correct interpupillary distance is reached when one round image is seen in the field of view (see image below). This distance can be set by either pulling the tubes towards each other or pulling them from each other. This distance is different for each observer and thus should be set individually. When more users are working with the microscope it is recommended to remember your interpupillary distance for a quick set up during new microscopy sessions. The MT-60 Series's

swiveling eyepiece tube can be rotated 360°. You can select corresponding eye point height according to your own preference.



The correct eye point

The eye point is the distance from the eyepiece to the user's pupil. To obtain the correct eye point, move the eyes towards the eyepieces until a sharp image is reached at a full field of view.

Adjusting the diopter

Using a binocular (or trinocular) tube is less tiring for the eyes than the use of a monocular tube. In order to obtain the right interpupillary setting, one should go through the below steps.

- Turn the diopter adjustment ring of the left eyepiece tube until the scale shows the same reading as on the indicator.
- Close the right eye and focus the left tube by means of the coarse- and fine adjustment knobs
- Close the left eye and focus the right tube with the diopter adjustment ring.

This procedure should be followed by each individual user. When more users are working with the MT-60 Series microscope it is recommended to remember your diopter setting for a quick set up during new microscopy sessions.

Abbe condenser

Beneath the object stage an Abbe condenser N.A. 12.5 is mounted. The condenser can be adjusted in height by means of a rack and pinion movement and knob. With this one can focus the light on the specimen by which the contrast can be optimized. The condenser is factory pre-centered. If needed the following procedure can be followed to center the condensor.

1. Move the condenser to the highest position.
2. Select the 10x objective to the light path and focus the specimen.
3. Rotate the field diaphragm adjustment ring to put the field diaphragm to the smallest position.
4. Rotate the condenser up-down knob, and adjusting the image to be clearest.
5. Adjusting the center adjustment screw and put the image to the center of the field of view.
6. Open the field diaphragm gradually. If the image is in the center all the time and inscribed to the field of view, it shows condenser has been centered correctly.

The field (Köhler) diaphragm

By limiting the diameter of the beam entering the condenser, the field diaphragm can prevent other light and strengthen the image contrast. When the image is just on the edge of the field of view, the objective can show the best performance and obtain the clearest image. The diaphragm is factory pre-centered.

Adjusting the Aperture Diaphragm

1. The aperture diaphragm is used to select the numerical aperture of the illumination. When the N.A. of illumination is matching with the N.A. of the objective, the highest possible resolution, dept of field and contrast are obtained.
2. When contrast is low, rotate the diaphragm adjustment ring to 70%-80% of the N.A. of objective this will improve the contrast of the image. The diaphragm is factory pre-centered.

Use of the S100x oil-immersion objective

The Meiji Techno America MT-60 Series range microscopes are equipped with an S100x N.A.

1.25 oil immersion objective. Please follow these instructions for using this objective:

1. Remove the dust protection from the revolving nosepiece to mount the S100x objective.
2. Focus the image with the S40x objective.
3. Turn the revolving nosepiece so the S100x objective almost reaches the click-stop.
4. Put a small drop of immersion oil on the centre of the slide (always use Meiji Techno America Immersion oil).
5. Now turn the S100x objective so that you feel the click stop.
6. The front lens is in contact with the immersion oil.
7. Look through the eyepiece and focus the image with the fine adjustment knobs.
8. The distance between the lens of the objective and the slide is very small !
9. In case there are small bubbles visible turn the S100x objective a couple of times left/right so that the front of the objective moves in the oil and the bubbles will disappear.
10. After using the S100x objective turn the table with the fine adjustment knobs downwards until the front lens doesn't touch the oil any longer.
11. Always clean the front lens of the S100x objective with a piece of lens paper that is moistened with a drop of isopropanol. We recommend using Meiji Techno America lens paper isopropanol.
12. Clean the slide after use as well.

Using the MT-60 Series accessories

Using the Phase Contrast Slider

1. Keep the phase contrast slider face up (text up); insert it from left to right into the condenser slider socket as the direction of the arrow pointed.
2. Each slider has 3 positions, 2 phase contrast positions and in the center of the slide the bright field position for normal use without phase contrast. Each phase contrast objective used has to be matched with the phase contrast ring on the slider. For example: when the 10x phase contrast objective is used the slider should be positions to match the 10 phase diaphragm).

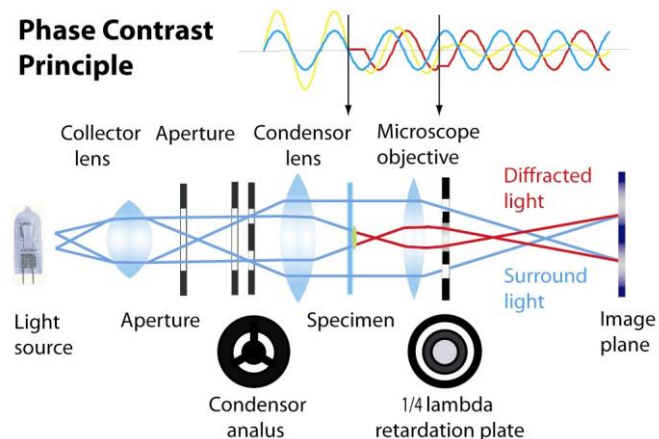
Note: the phase diaphragms in the sliders are pre-centered do not need to be adjusted in operation.

Mounting and operation of the Meiji Techno America Zernike phase contrast condenser set

Use of phase contrast with the MT-60 Series microscope

The phase contrast method was designed in 1934 by the Dutchman Frits Zernike to observe very thin or transparent objects. This technique uses the fact that light travelling through tissue undergoes a phase shift due to diffraction.

By recombining the phase shifted light with the background light, a contrasted image appears in the eyepiece



Using the Zernike phase contrast set.

Any MT-60 Series model with a Zernike phase contrast set comes with the condensor and objectives already mounted and centered on your microscope. If you suspect misalignment or want to check the alignment please see the next point for "centering the phase rings".

The height of condensor can be adjusted in height by means of a rack and pinion movement. In this way the light beam is concentrated in the specimen for an optimum resolution.

Centering the phase rings

Take following steps in order to centre the phase rings:

- For centering of the 10x phase objective, turn the condenser disc in such a way that the corresponding phase ring is in place under the condenser.
- Place the centering telescope in the eyepiece tube, and focus the phase ring of the objective by means of the adjustable eye lens.
- Now focus the centering ring of the condenser by means of the coarse and fine adjustment knobs.
- At last, center the phase ring beneath the condenser disc with the phase contrast adjusting levers, until the two rings visible in the eyepiece are in one centric line.
- Repeat each step for all objectives.



Not centered



Centered properly

Maintenance and cleaning

Always place the dustcover over your MT-60 Series microscope after use. Keep the eyepiece and objectives always mounted on the microscope to avoid dust entering the instrument.

Cleaning the optics

When the eyepiece lens or front lens of the 10x or S40x objective are dirty they can be cleaned by wiping a piece of lens paper over the surface (circular movements). When this does not help put a drop of isopropanol on the lens paper

When dirt is clearly visible in the field of view it resides on the lowest lens of the eyepiece.

Clean the outside of the lens.

In case there is still dust visible please check if the dust is in the eyepiece by turning it.

If this is the case remove the lowest lens carefully from the eyepiece and clean it.

Meiji Techno America strongly recommends using Meiji Techno America cleaning accessories for your MT-60 Series microscope

It is not necessary – and not recommended – to clean the lens surfaces at the inner side of the objectives. Sometimes dust can be removed with high pressured air. There will never be dust in the objectives if the objectives are not removed from the revolving nosepiece.

Caution

Cleaning cloths containing plastic fibres can damage the coating of the lenses!

Maintenance of the stand

Dust can be removed with a brush. In case the stand or table is really dirty the surface can be cleaned with a non-aggressive cleaning product.

All moving parts like the height adjustment or the coaxial coarse and fine adjustment contain ball bearings that are not dust sensitive. With a drop of sewing-machine oil the bearing can be lubricated.

Replacing the fuse

Always remove the mains cable from the microscope and turn the main switch off before replacing the fuse. Then screw off the fuse cap from the fuse base with screwdriver. Install a new fuse (specification of the fuse: 250V, 150 mA).

When in doubt always contact your local Meiji Techno America distribut