ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Nikon CF Plan 20x / 0.40* at our website: ***Click HERE***

Nikon

MEASURING MICROSCOPE
MM-40/60 Series

(with metallurgical microscope)

Instructions

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

WARNING / CAUTION SYMBOLS IN THIS MANUAL

Though Nikon products are designed to provide you utmost safety during use, incorrect usage or disregard of the instructions can cause personal injury or property damage. For your safety, read the instruction manual carefully and thoroughly before usage. Do not discard this manual but keep it near the product for easy reference.
Inside this instruction manual, safety instructions are indicated with the symbols shown below. Be sure to follow the instructions marked with these symbols for your safety.

Symbol	Contents
⚠ **WARNING**	Disregarding instructions marked with this symbol may lead to death or serious injury.
⚠ **CAUTION**	Disregarding instructions marked with this symbol may lead to injury or property damage.

⚠ WARNING

1. Purpose

The measuring microscope is a precision measuring instrument. Do not use it for purposes other than measurement and observation.

2. Installation table

The measuring microscope weighs about 100kg. Install it on a solid work table for your safety and to obtain stable measurement.

- Make sure that the top surface of the table is level.
- Clean the top surface of the table before placing the measuring microscope.
- Avoid using the measuring microscope on an unsteady or bent table.

3. Moving the measuring microscope

- Dismount the stage before moving the measuring microscope.
- The center of gravity is at the supporting pillar in the rear. Take care not to tip over the measuring microscope while moving it.
- Do not hold the focusing mount, the optical head or the sheet metal cover at the rear of the base.

4. Input voltage

Before connecting the power cord, confirm that the voltage switching unit of the measuring microscope is set to match the voltage provided in your region. If not, change the setting according to the instructions on page 15. Using the microscope with incorrect voltage setting may result in malfunction, fire or electric shock.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

WARNING

5. Fuses

- Use specified fuses only. Using any other type of fuse may result in malfunction or fire. (Specified fuse: 2.5A time lag fuse x2).
- To prevent electric shock, turn the power OFF and unplug the power cord before replacing a fuse.

6. Illuminator and power supply

- The illuminators and lamps become very hot during use. Do not touch them with your bare hands. Keep inflammable items such as cloths, papers, gasoline, thinner or alcohol away from the lamps.
- To prevent electric shock, turn the power OFF and unplug the power cord before replacing a light bulb. To prevent burns, make sure that the light bulb and its surroundings have cooled off sufficiently.
- Use specified light bulbs only. Using any other type of light bulb may result in malfunction or fire.

7. Do not disassemble.

Never disassemble this instrument as this can degrade performance and cause electric shocks or other injury.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CONTENTS

WARNING/CAUTION SYMBOLS IN THIS MANUAL i

I. NOMENCLATURE AND FUNCTIONS 1

II. ASSEMBLY AND ADJUSTMENT 4

1. Assembly procedure 5
2. Centering the lamp on diascopic illuminator (for MM-60 only) 16
3. Centering the lamp on episcopic illuminator (Universal epi-illminator 10) 16
4. Centering the aperture diaphragm 18
5. Setting-out adjustment of the reticle 20
6. Using the focus knob 21

III. MEASUREMENT 23

1. Illumination 23
2. Setting the sample 23
3. Focusing 24
4. Examples of measurement 26

IV. OPTINAL ACCESSORIES 27

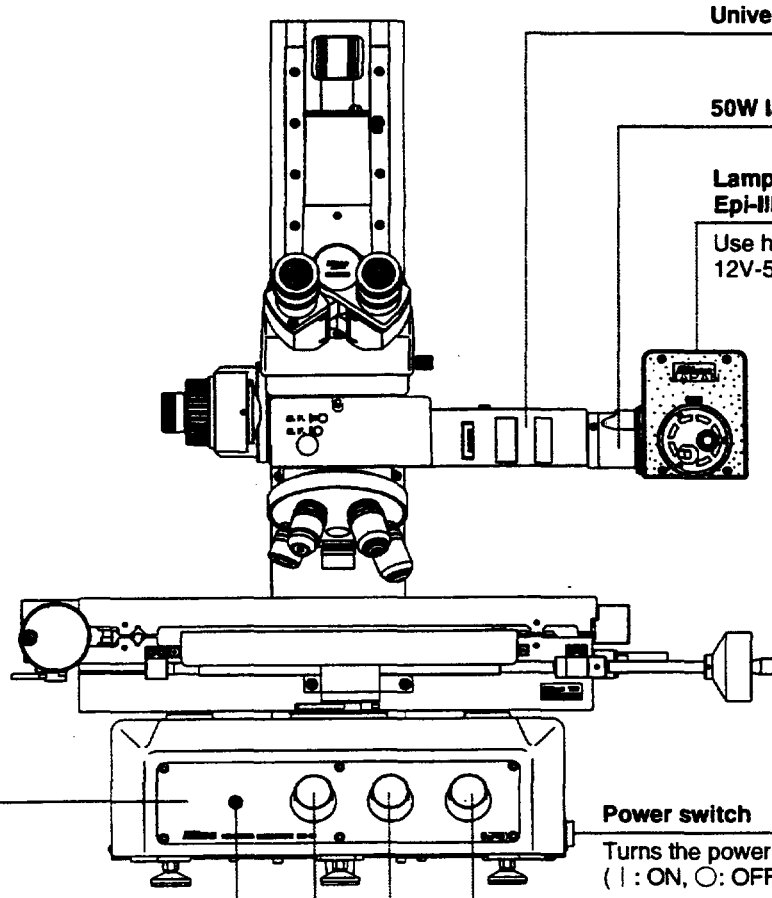
1. Eyepiece tubes 27
2. Stages 27
3. TV camera adapter 27
4. Photomicrographic attachment 28
5. Counter SC113 28

V. SPECIFICATIONS 29

VI. MAINTENANCE 31

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

I. NOMENCLATURE AND FUNCTIONS



Universal epi-illuminator 10

50W lamphouse adapter

Lamphouse for Universal Epi-Illuminator 10

Use halogen lamphouse 12V-50W.

Control panel

Power switch

Turns the power ON and OFF.
(| : ON, ○: OFF)

Pilot lamp

Indicates that the power is ON or OFF (lit: ON, off: OFF).

Brightness control dials (☼: Episcopic illumination, ☼: Diascopic illumination)

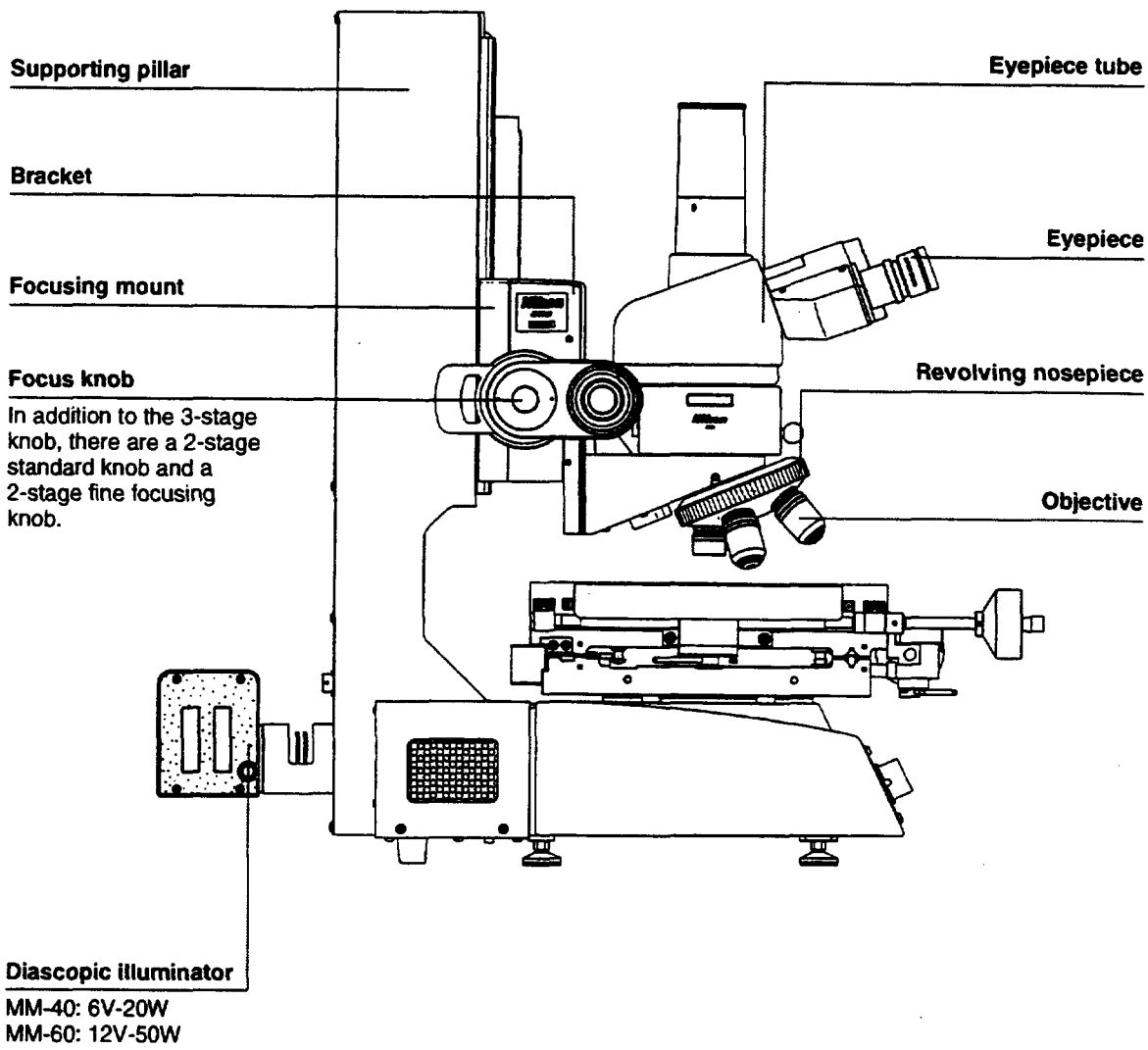
When each dial is turned clockwise, the brightness increases continuously. When a dial is turned fully counter-clockwise, the corresponding lamp goes off. Starting off with a slightly darker illumination is recommended, because it will reduce eye strain or fatigue.

Note: When the brightness control dial is set to maximum, the life of the lamp may be shortened by input voltage fluctuation (rise). To avoid this, set the dial to "8".

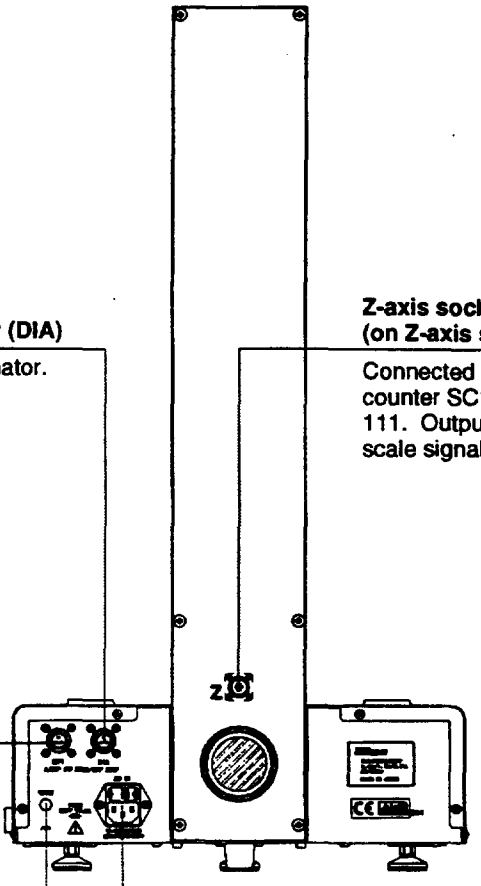
Telecentric diaphragm dial (for MM-60 only)

When measuring the diameter of a cylinder, vary the size of the diaphragm according to the diameter of the sample being measured. Otherwise, this knob should be turned fully clockwise.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Socket for diascopic illuminator (DIA)

Connected to the diascopic illuminator. Outputs the lamp voltage.

Z-axis socket
(on Z-axis scale built-in model only)

Connected to the counter unit of the counter SC113, or to "Z-IN" on the SC-111. Outputs the Z-axis (height) linear scale signal.

Socket for episcopic illuminator (EPI)

Connected to the episcopic illuminator. Outputs the lamp voltage.

CASE terminal

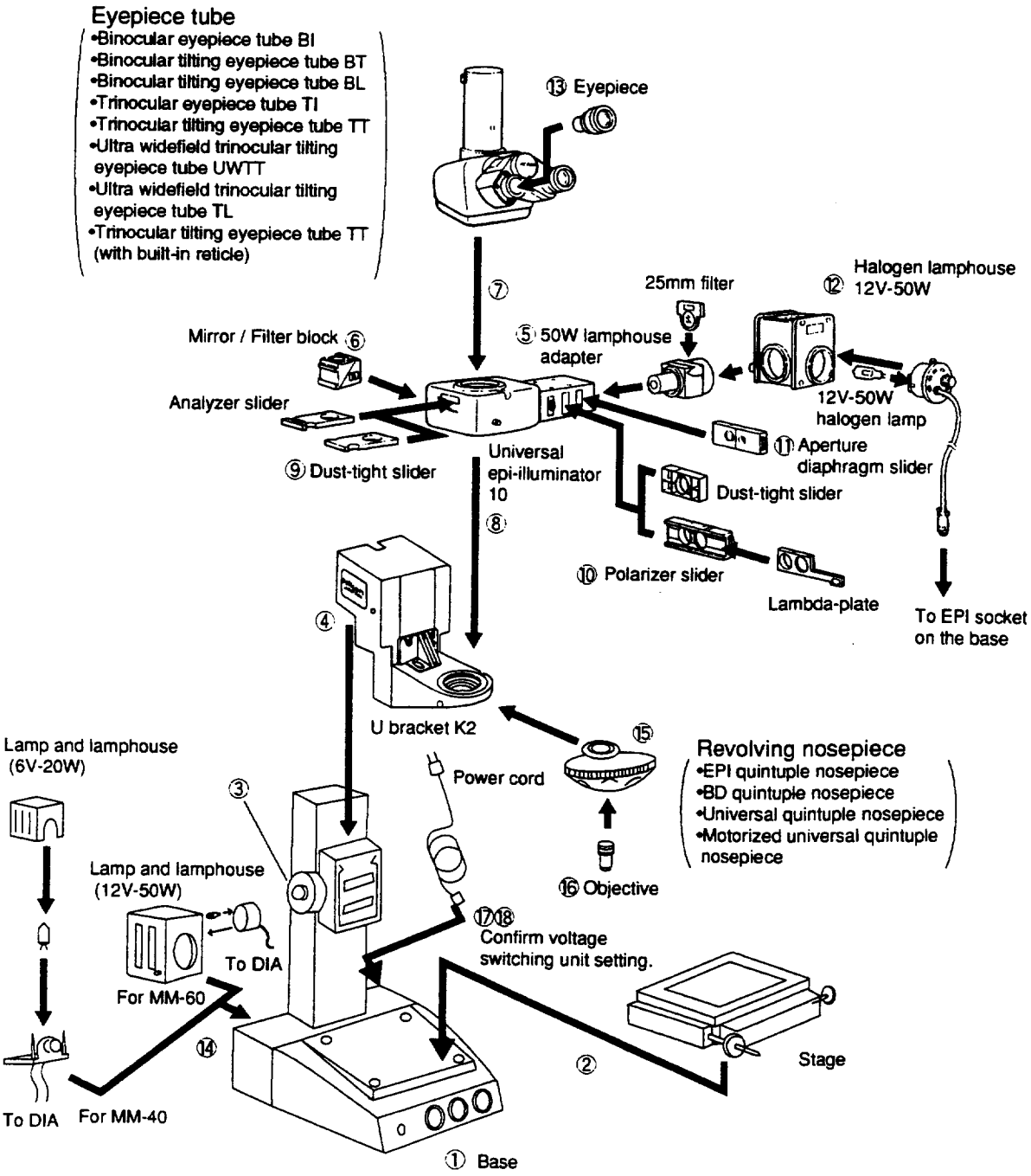
The frame ground terminal.

Power socket
(with voltage switching unit and fuse holder)

Connected to an AC power supply via the power cord. Turn the power switch OFF before connecting or disconnecting the power cord.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

II. ASSEMBLY AND ADJUSTMENT

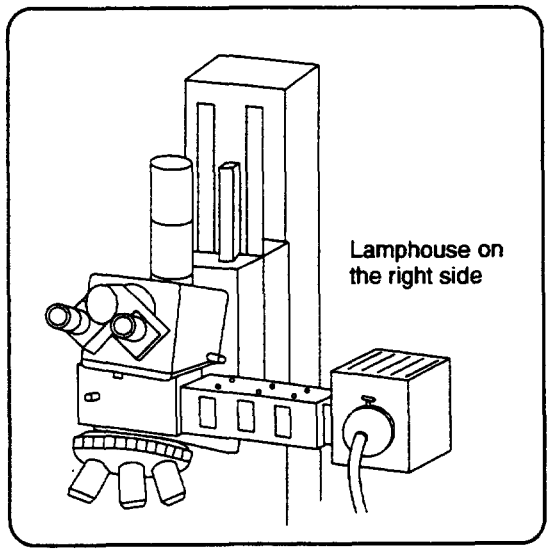


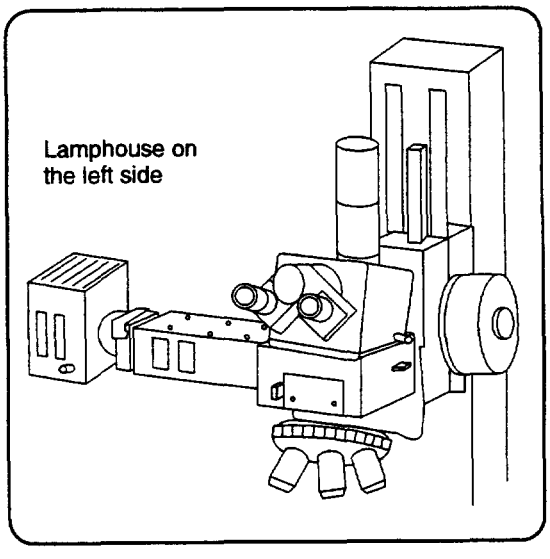
★ For assembly of the universal epi-illuminator 10, see the instructions provided with the illuminator.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

1. Assembly procedure

The lamphouse for the Universal epi-illuminator 10 can be placed on either the right side or the left side of the eyepiece tube. It may be natural to set the lamphouse on the right side because if you place the lamphouse on the left side, you must first contact your nearest Nikon representative to switch the focus knob to the other side of the pillar (because the lamphouse and the focus knob cannot stay on the same side), and second, change the mirror block changeover lever to somewhat longer one since it may be troublesome to reach the lever on the rear. The illustration on page 4 shows the order of assembly with the lamphouse for the Universal epi-illuminator 10 placed at the right side.





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(1) Base

Decide where to install, and place the base on a solid measurement table (see "⚠ WARNING" on page i and "IV. MAINTENANCE" on page 31). Adjust three leveling screws so that the auxiliary leg at the rear is just slightly off the surface, and the top surface of the base is level.

(2) Stage

Use the stage available as an option.
Read the instruction manual supplied with the stage to secure the stage on the base.

● **Note**

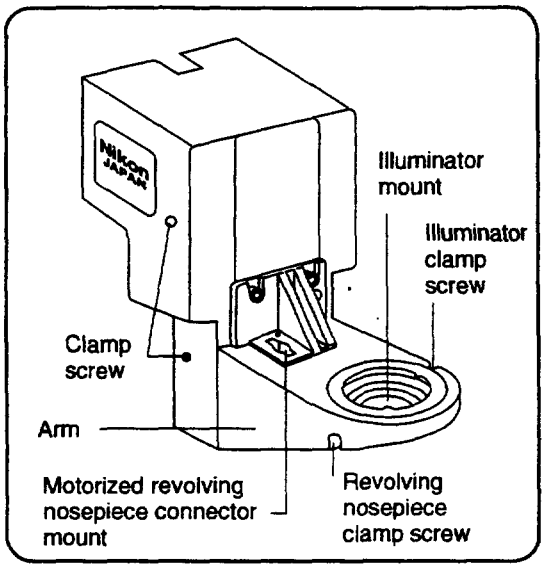
The setting-out adjustment of the stage is not necessary. Secure the stage on the base so that the mounting bolts of the stage will come at the center of the mounting holes on the base.

(3) Focus knob

Check that the focus knob is fixed to the side opposite to the side that you are planning the lamphouse for the Universal epi-illuminator 10 to be. If the focus knob and the lamphouse should come on the same side, the position of the focus knob must be changed to the opposite side of the pillar. Please contact your nearest Nikon representative.

(4) Bracket

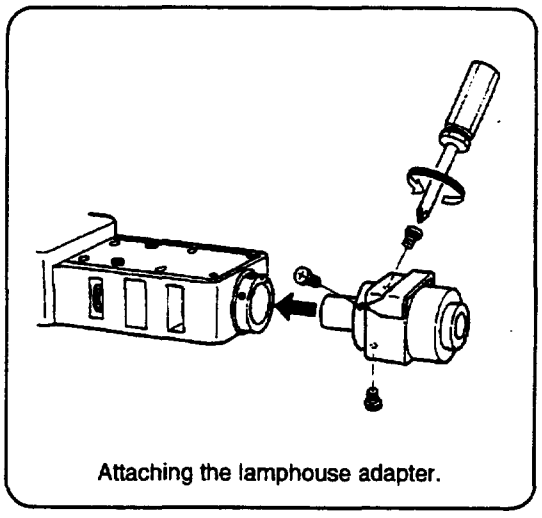
Attach the bracket to the focusing mount, locating the dovetail in the groove and sliding it down as far as it will go. Tighten the clamp screw at the left (as viewed from the front) uniformly with a hexagonal wrench.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(5) 50W lamphouse adapter

Attach the lamphouse adapter to the end of Universal epi-illuminator 10 with the fixing screws (x3) supplied together with the Universal epi-illuminator 10.



Attaching the lamphouse adapter.

(6) Mirror / Filter Blocks

Remove the lid on the left side of the Universal epi-illuminator 10 by loosening the two screws. Insert the mirror or the filter blocks in the dovetail inside. When doing this, it may be easier to screw on the mirror block changeover lever (removed from the right side of the illuminator) to the block. Two blocks can be set inside the illuminator. If you are to set the brightfield (indication: B.F.) and darkfield (indication: D.F.) mirror blocks at the same time, set the brightfield mirror block first so that it will be set on the back mount (on the second click stop). If you are to set only the brightfield mirror block, also set it on the back mount. When you finish mounting the blocks, tighten the block fixing screw at the left side of the dovetail.

If you set two blocks in the Universal epi-illuminator 10 and planning to place the lamphouse on the left side of the eyepiece tube, the mirror block changeover lever must be changed to the one available on option. Please contact your nearest Nikon representative.

● **Note**

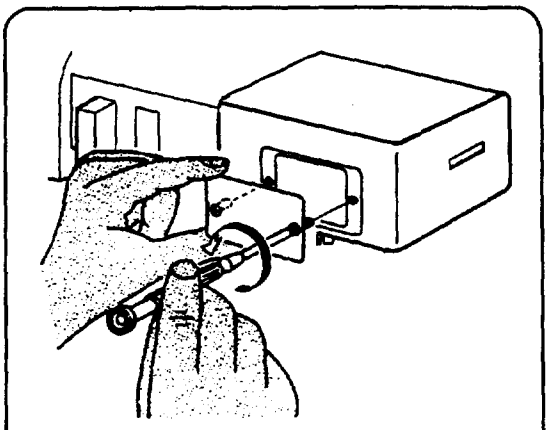
After setting the filter / mirror blocks on the illuminator, be sure to tighten the block fixing screw to avoid the blocks sliding off from their place by the movement of the block changeover lever. Do not over-tighten the block fixing screw. Only the light fastening is enough to fix the blocks in place.

The block fixing screw cannot be removed from the mount. Do not try to remove it by force.

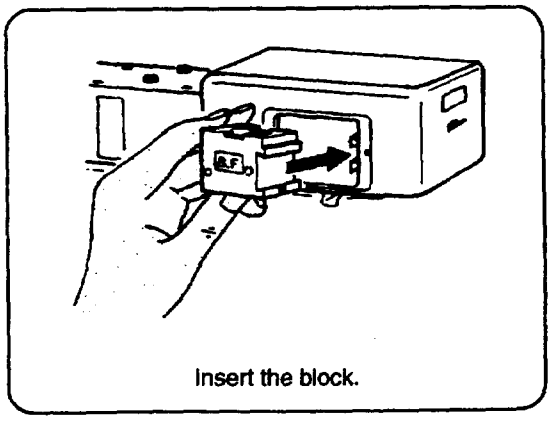
When removing the blocks, do not forget to first loosen the block fixing screw.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

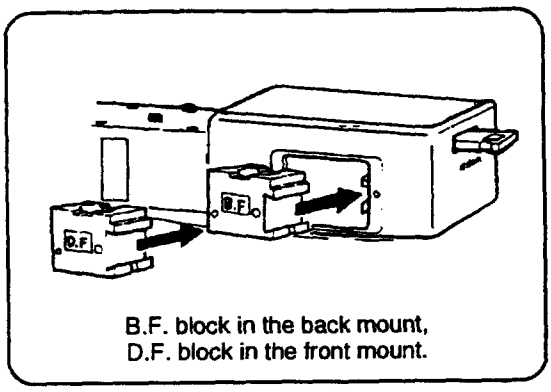
Attaching the mirror / filter blocks.



Remove the cover.



Insert the block.



B.F. block in the back mount,
D.F. block in the front mount.

(7) Eyepiece tube

Loosen the eyepiece tube clamp screw on the Universal epi-illuminator 10 with the hexagonal wrench. Attach the eyepiece tube onto the circular dovetail mount on the illuminator so that the eyepiece sleeves will face front when the illuminator is attached on the bracket. Tighten the eyepiece tube clamp to fix.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(8) Universal epi-illuminator 10 (Episcopic illuminator)

Loosen the illuminator clamp screw on the bracket with the hexagonal wrench. Attach the epi-illuminator onto the circular dovetail mount on the bracket and tighten the illuminator clamp screw.

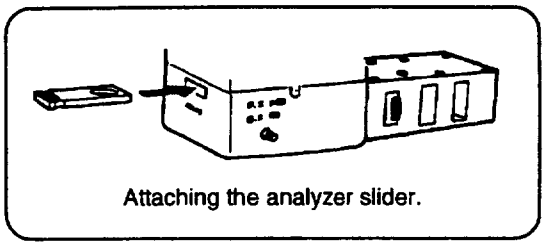
● **Note**

When removing the epi-illuminator from the bracket, support it with your hand so that it will not come off suddenly when the clamp screw is released.

When you are planning to place the lamphouse on the left side, the eyepiece tube must be fixed onto the illuminator before the illuminator is mounted on the bracket since the eyepiece tube clamp cannot be tightened after the illuminator is fixed on the bracket.

(9) Analyzer slider

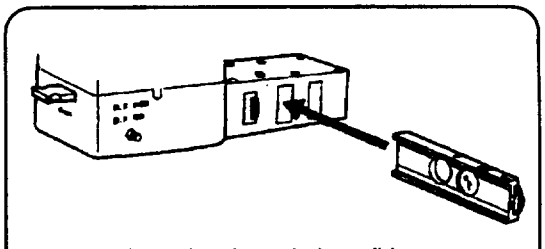
Remove the dust-tight slider on the front side of the Universal epi-illuminator 10 and insert the analyzer slider in place. Attach the dust-tight slider whenever you remove the analyzer slider.



Attaching the analyzer slider.

(10) Polarizer slider

Remove the dust-tight slider on the right side of the Universal epi-illuminator 10 and insert the polarizer slider in place. Attach the dust-tight slider whenever you remove the polarizer slider.



Attaching the polarizer slider.

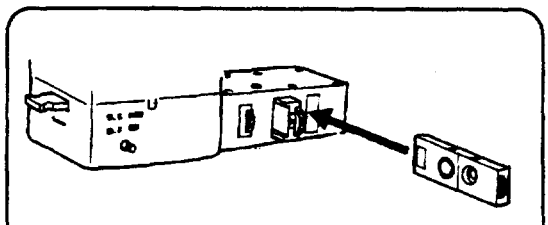
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(11) Aperture diaphragm slider

Insert the aperture diaphragm slider into the slot at the left side of the Universal epi-illuminator 10.

● **Note**

When the lamphouse are to be placed at the left side, the analyzer, the polarizer and the aperture diaphragm slider may become a little difficult to operate since their operating part will be sent to the rear.



Attaching the aperture diaphragm slider.

(12) Lamp and lamphouse for the episcopic illuminator (Universal epi-illuminator 10)

Use 12V-50W halogen lamp and Nikon halogen lamphouse 12V-50W (Model LHS-H50C-1).

● **Note**

Be sure to use the halogen lamphouse 12V-50W. The use of other lamphouse may be the cause of fire since the measuring microscope cannot supply the power to the lamphouse other than 12V-50W.

① Insert a 12V-50W halogen lamp securely into the socket.

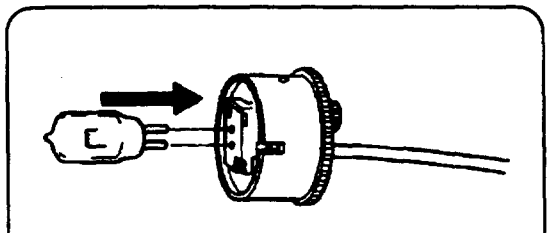
● **Note**

Do not touch the glass part of the lamp with bare hands. Use a glove or cloth.

② Insert the socket into the lamphouse, then tighten the socket sleeve clamp screw.

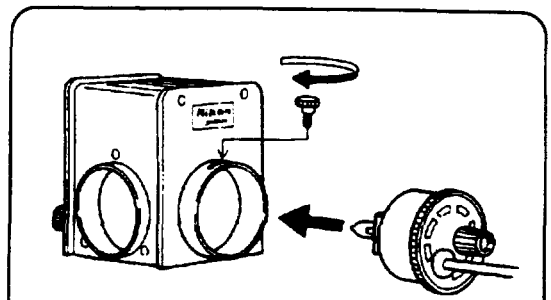
③ Insert the lamphouse to the lamphouse adapter, then tighten the clamp screw.

④ Connect the lamp cord to the "EPI" socket at the rear of the base.

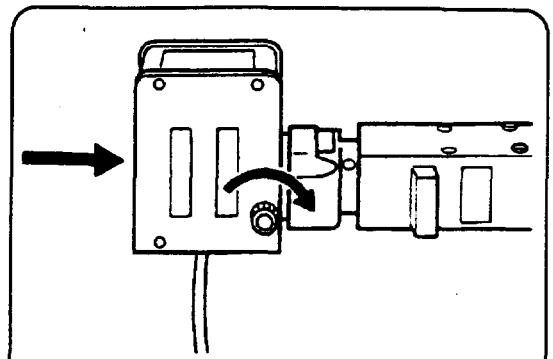


Attaching a lamp

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Attaching socket to the lamphouse



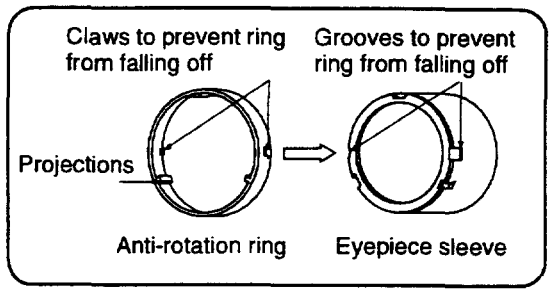
Attaching lamphouse

(13) Eyepieces

Align three grooves on the eyepiece with the three projections on the binocular eyepiece sleeve and insert.

- **Note**

  An eyepiece anti-rotation ring is attached to the eyepiece sleeve. When removing the eyepiece, be careful not to hold on to the anti-rotation ring and pulling it out together with the eyepiece. The anti-rotation ring must be removed when mounting an old type eyepiece. To reattach the anti-rotation ring, direct the two claws that prevent the ring from falling out, toward the binocular tube, then align the three projections with the three grooves on the rim of the sleeve and attach.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(14) Diascopic illuminator

For MM-60

Use 12V-50W halogen lamp and Nikon halogen lamphouse 12V-50W (Model LHS-H50C-11).

① Insert a 12V-50W halogen lamp securely into the socket.

● **Note**

Do not touch the glass part of the lamp with bare hands. Use a glove or cloth.

② Insert the socket into the lamphouse, then tighten the socket sleeve clamp screw.

③ Insert the lamphouse all the way to the thrusting end of the collector lens barrel at the rear of the base, then tighten the clamp screw.

④ Connect the lamp cord to the "DIA" socket at the rear of the base.

⑤ Facing the matted side of the lemon skin filter toward the base side, insert it into the filter groove nearest to the diascopic illuminator lamphouse. You can also drop the green filter into the filter holder.

For MM-40

Use 6V-20W halogen lamp and Nikon halogen lamphouse 6V-20W.

① Remove the lamphouse cover.

② Insert a halogen lamp (6V-20W) into the socket.

● **Note**

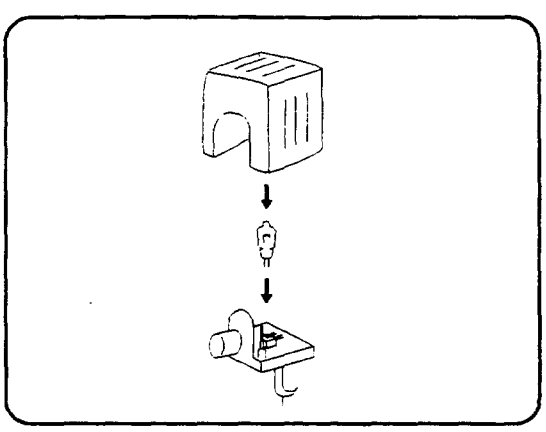
Do not touch the glass part of the lamp with bare hands. Use a glove or cloth.

③ Replace the cover aligning it with the split pins.

④ Insert the green filter into the lamphouse.

⑤ Insert the lamphouse all the way into the thrusting end of the diascopic illuminator mounting hole at the rear of the base.

⑥ Connect the lamp cord to the "DIA" socket at the rear of the base.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

(15) Revolving nosepiece

For the revolving nosepieces other than the motorized revolving nosepiece

Raise the focusing mount with the focus knob. Loosen the nosepiece clamp screw on the bracket sufficiently with the hexagonal wrench. Matching the groove on the revolving nosepiece with the pin on the circular dovetail of the bracket, fit the nosepiece to the bracket and tighten the clamp screw.

● **Note**

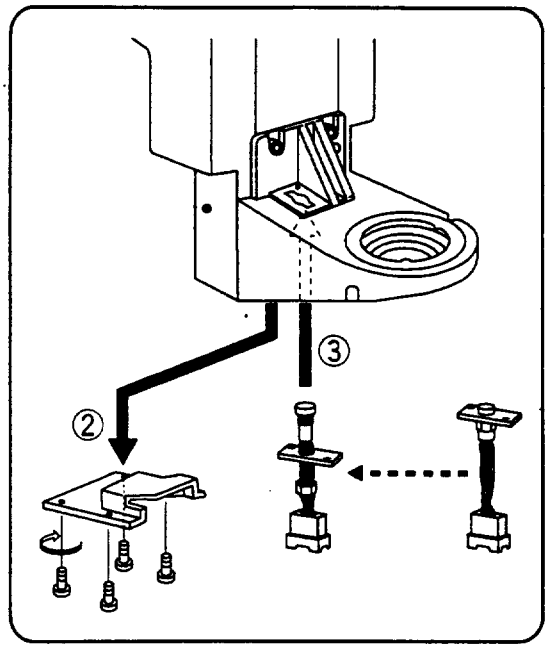
When removing the nosepiece from the bracket, first raise the focusing mount and remove the objectives. Then support the nosepiece with your hand so that it will not come off suddenly when the clamp screw is released.

For the motorized revolving nosepiece

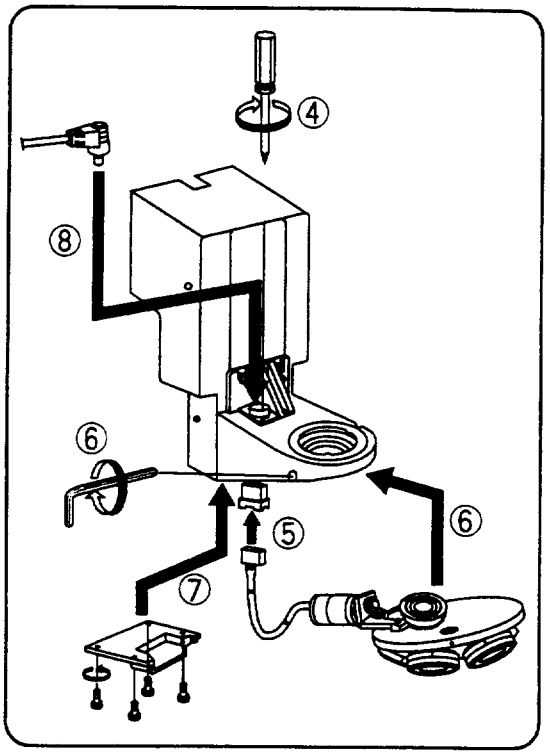
① Raise the focusing mount with the focus knob.

② Remove the cover on the bottom of the bracket by loosening the four screws (M3) with a plus screwdriver.

③ Dismantle the signal cable 2 (supplied with the motorized nosepiece controller) into three parts by loosening the ring. Pass the cable through the nosepiece connector mounting hole on the bracket.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



④ Reassemble the signal cable 2 by tightening the ring. Fix it on the nosepiece connector mount using the two screws on the mount.

⑤ Plug the connector of the motorized revolving nosepiece to the signal cable 2 installed on step ④.

⑥ Loosen the nosepiece clamp screw on the bracket sufficiently with the hexagonal wrench. Matching the groove on the revolving nosepiece with the pin on the circular dovetail of the bracket, fit the nosepiece to the bracket and tighten the clamp screw.

⑦ Push in the revolving nosepiece connector and the extra portion of the cable to the space inside the bracket. Attach the cover back to its original place but with the protruding part facing down.

⑧ Connect the signal cable 1 coming from the motorized nosepiece controller to the signal cable 2.

● **Note**

When removing the nosepiece from the bracket, raise the focusing mount and remove the objectives first. Then support the nosepiece with your hand so that it will not come off suddenly when the clamp screw is released.

When using the motorized revolving nosepiece, please also read the instruction manual supplied with the motorized revolving nosepiece.

(16) Objectives

Attach the objectives to the revolving nosepiece in such an order that their magnifying power increase when the nosepiece is turned clockwise seen from the top.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

● **Note**

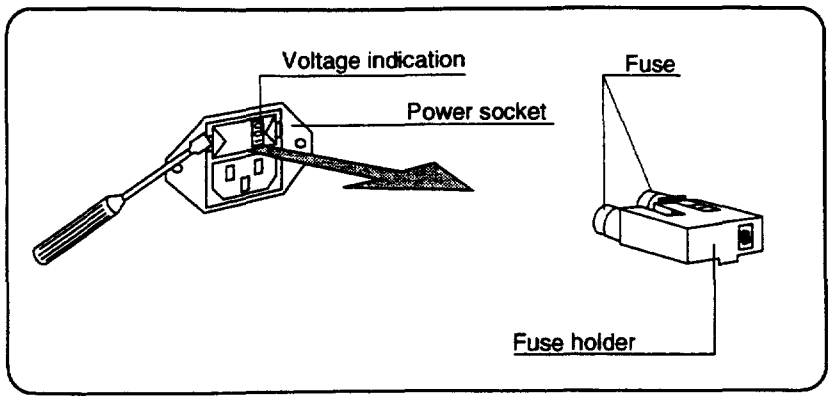
When removing the objectives from the nosepiece, first raise the focusing mount and remove the sample from the stage. Then remove the objectives using both hands (one hand supporting the objective) so that it will not come off suddenly when loosened.

(17) Setting the input voltage

If the setting of the voltage switching unit at the power socket does not match the voltage provided in your region, change the setting according to the following procedure.

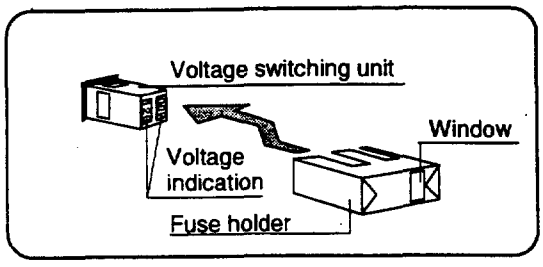
① Turn the power switch OFF, then unplug the power cord.

② Remove the fuse holder from the power socket by inserting a minus screwdriver into the notches.



③ Remove both fuses inside the holder.

④ Pull out the voltage switching unit from the fuse holder.



⑤ Attach the voltage switching unit to the fuse holder so that the voltage indication that matches the voltage provided in your region can be seen through the window on the fuse holder.

⑥ Reinstall the fuse.

⑦ Reattach the fuse holder to the power socket.

● **Note**

Using the instrument with an incorrect voltage setting may result in electric shock, fire or equipment malfunction.

Voltages that can be set: AC100V, AC120V, AC230V

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

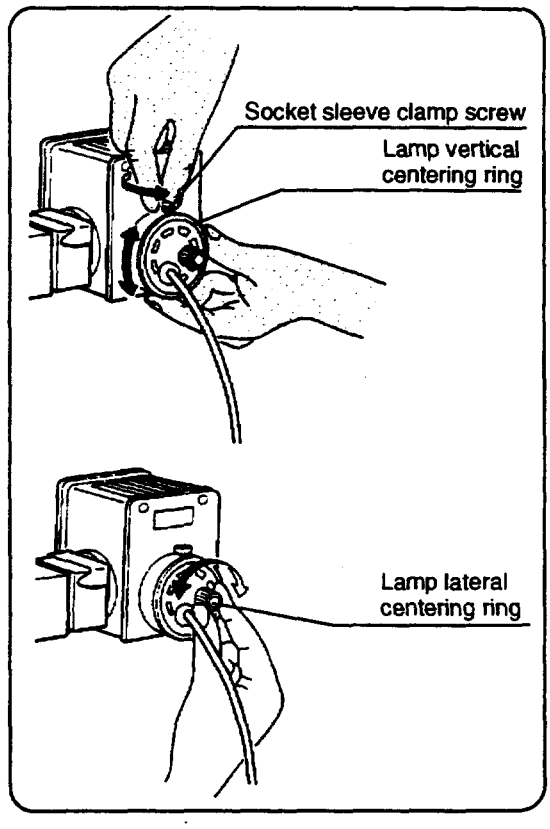
(18) Power cord

(Use the 3-terminal plug cord with ground provided with the microscope.)

Plug securely into the power socket at the rear of the base, then plug the other end into a grounded 2-pole outlet.

2. Centering the lamp on diascopic illuminator (for MM-60 only)

Place a sheet of white paper on the stage glass. Turn the lamp lateral centering screw and lamp vertical centering ring so that the light spot becomes round and of uniform intensity. (Loosen the socket sleeve clamp screw when turning the lamp vertical centering ring.)



3. Centering the lamp on episcopic illuminator (Universal epi-illuminator 10)

① Push in the mirror block changeover lever on the Universal epi-illuminator 10 to put the brightfield mirror block in the optical path.

② Turn the brightness control dial (for the episcopic illumination) to the middle position to turn on the episcopic illumination in adequate brightness.

③ Remove the polarizer, analyzer and the lambda-plate from the optical path. If you are using the universal revolving nosepiece, remove the Nomarski prism from the optical path.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

④ Insert the aperture diaphragm into the optical path, and fully open the aperture.

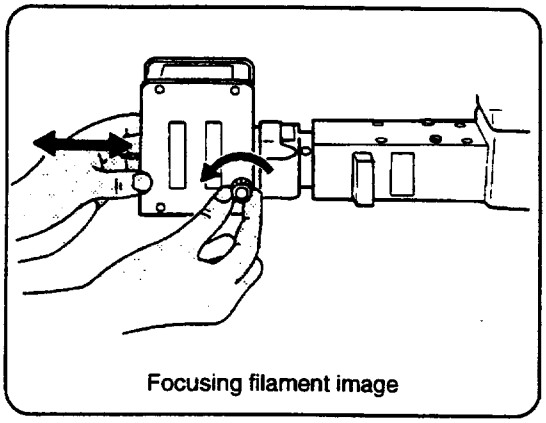
⑤ Place the sample with high reflectance on the stage, and move the 10x objective into the optical path.

⑥ Focus on the sample. For easy focusing, stop down the field diaphragm and focus on the field diaphragm image. When the field diaphragm image is in focus, so is the sample image.

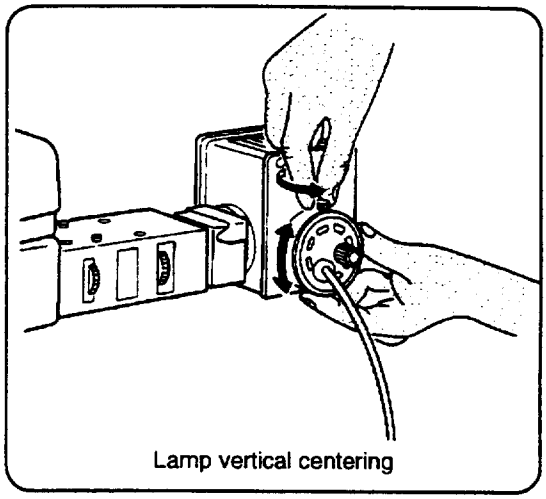
⑦ Remove one eyepiece from the eyepiece sleeve and look into the eyepiece sleeve. You can see the objective's exit pupil as a bright circle and the surface of the diffuser built inside the illuminator.

⑧ Release the lamphouse clamp screw and move the lamphouse back and forth until the filament image is focused on the diffuser surface. Tighten the lamphouse clamp screw in this position.

⑨ Release the socket sleeve clamp screw and turn the lamp vertical centering ring until the filament image is centered to the exit pupil. Tighten the socket sleeve clamp screw in this position.

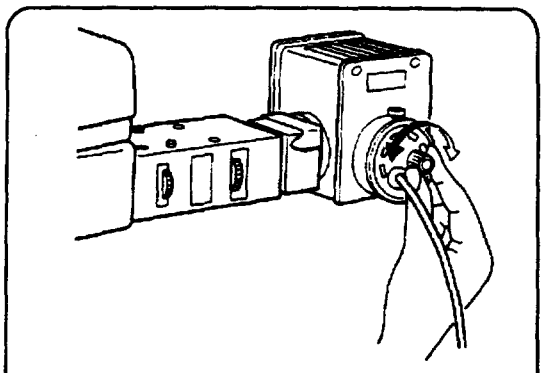


Focusing filament image

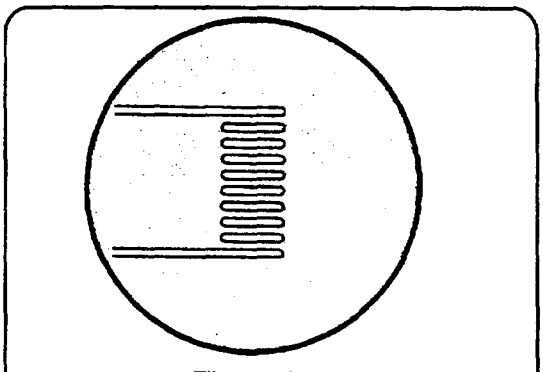


Lamp vertical centering

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Lamp horizontal centering



Filament image

4. Centering the aperture diaphragm

① Push in the mirror block changeover lever on the Universal epi-illuminator 10 to put the brightfield mirror block in the optical path.

② Turn the brightness control dial (for the episcopic illumination) to the middle position to turn on the episcopic illuminator in adequate brightness.

③ Remove the polarizer, analyzer and the lambda-plate from the optical path. If you are using the universal revolving nosepiece, remove the Nomarski prism from the optical path.

④ Insert the aperture diaphragm into the optical path, and fully open the aperture.

⑤ Place the sample with high reflectance on the stage, and move the 10x objective into the optical path.

⑥ Focus on the sample. For easy focusing, stop down the field diaphragm and focus on the field diaphragm image. When the field diaphragm image is in focus, so is the sample image.

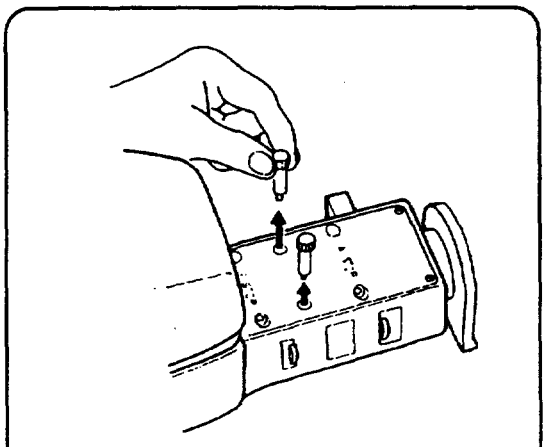
⑦ Switch the objective from 10x to 50x and focus again on the sample.

⑧ Remove one eyepiece from the eyepiece sleeve and look into the eyepiece sleeve. You can see the objective's exit pupil as a bright circle and the surface of the diffuser built inside the illuminator.

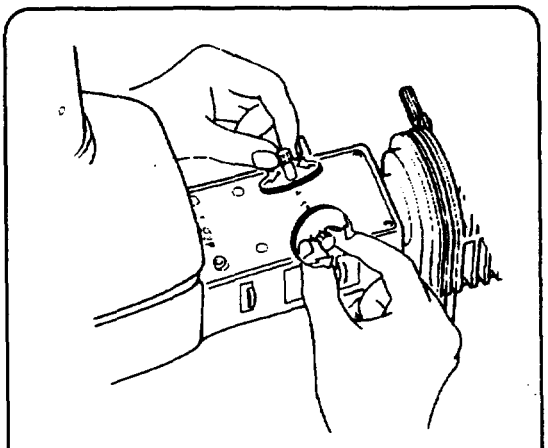
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

⑨ Stop down the aperture diaphragm to its smallest size, and the diaphragm image will appear on the exit pupil. If the center of aperture diaphragm image and the exit pupil are eccentric, center the diaphragm image by rotating the centering tools. (Centering tools are stored at the top of the Universal epi-illuminator 10. Take out the centering tool and insert them into the aperture diaphragm centering holes.)

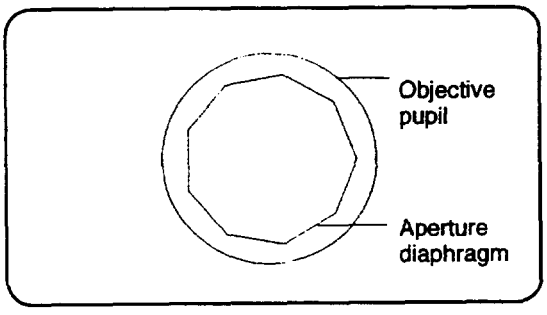
⑩ Replace the centering tools after the adjustment.



Take out the centering tools



Aperture diaphragm centering



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. Setting-out adjustment of the reticle

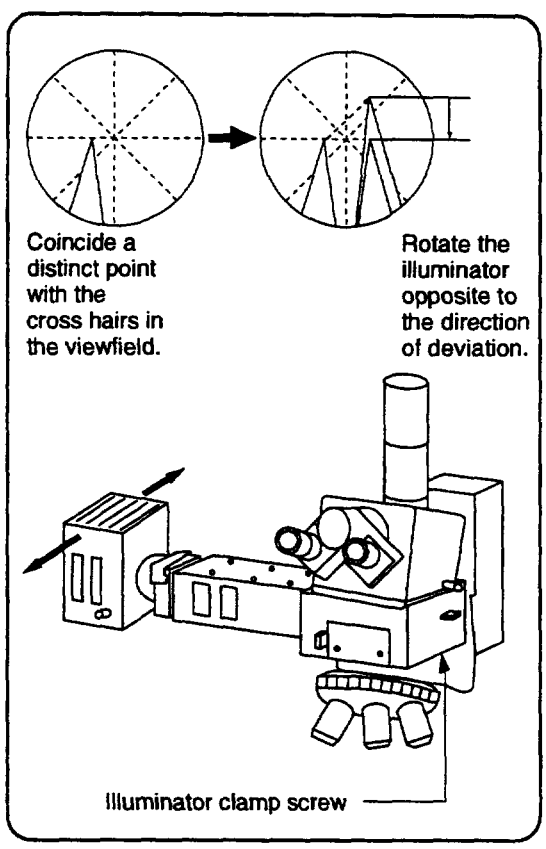
(Only when using the trinocular tilting eyepiece tube TT with built-in reticle.)

① Turn on the diascopic or episcopic illumination and focus on the sample image with the low magnification objective. Move the stage to bring a distinct point, such as an apex of the image, into coincidence with the cross hairs in the viewfield.

② Move the stage, and make sure the distinct point coincides with the cross hairs all the way. If the point deviates from the cross hairs, adjust as follows.

- Holding the Universal epi-illuminator 10 with one hand, lightly loosen the illuminator clamp screw on the bracket with the hexagonal wrench.
- Rotate the illuminator (together with the eyepiece tube) opposite to the direction the image deviated.
- Repeat the above procedure until the image point coincides with the cross hairs all the way. Adjust till a deviation is reduced to less than 0.01mm on the reticle (less than the thickness of the dotted line in the viewfield).

③ Tighten the illuminator clamp screw with the hexagonal wrench.

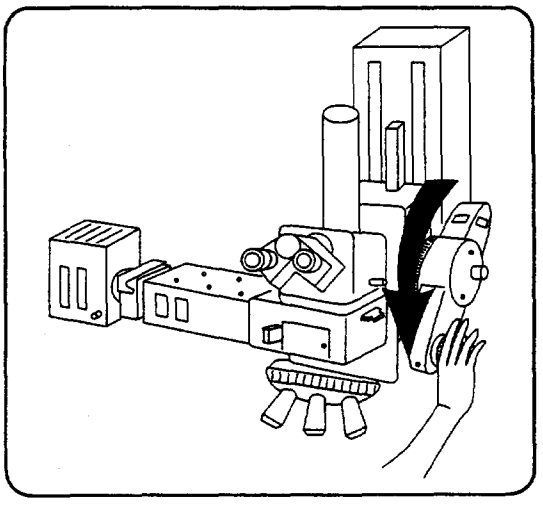


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6. Using the focus knob

3-stage coarse, intermediate and fine focus knobs

The crank-type arm is for the coarse movement of the focusing mount. One full turn of the arm moves the focusing mount about 32mm. To turn the arm, hold the intermediate focus knob or the arm itself as shown in the figure. (When the arm is turned by holding the intermediate focus knob, one full turn of the arm moves the focusing mount about 28.5mm.) Use the coarse focus arm when you want to move the focusing mount largely, but please remember that you cannot look into the eyepiece while moving the arm. For the fine focusing that follows, the coarse focus arm should be stopped at a position where you can reach the intermediate and fine focus knobs easily. You can easily find the direction of the focus plane by rocking the coarse focus arm while operating the intermediate focus knob.



The rotation torque of the coarse focus arm can be altered by loosening the set screw on the coarse torque adjustment ring and turning the ring. Do not make it too loose since the focusing mount may fall of its own weight. (The torque is already adjusted at the factory so that the focusing mount should not fall of its own weight.)

Turning the HOLD knob at the center of the arm clockwise fixes the arm in position so that it cannot be turned easily.

● **Note**

When it is not desirable to hold the arm in place, turn the knob all the way counter-clockwise.

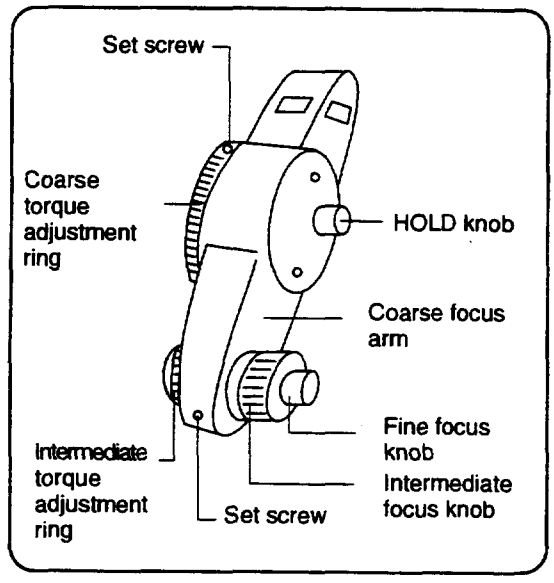
Do not rotate the arm while the arm is fixed by the HOLD knob. It will be the cause of damage.

One turn of the intermediate focus knob moves the focusing mount about 3.5mm. The torque can be adjusted by loosening the set screw on the intermediate torque adjustment ring and turning the ring.

One turn of the fine focus knob moves the focusing mount about 0.2mm. Use this to focus on a high magnification objectives.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The focus knob is attached to the right side of the pillar when shipped from the factory, but can be moved to the left side if necessary. (Consult your nearest Nikon representative).

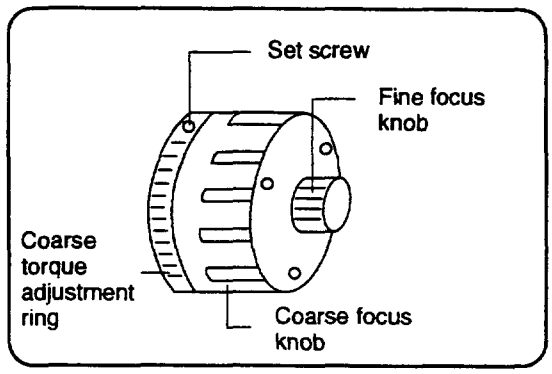


2-stage coarse and fine focus knobs

One turn of the coarse focus knob moves the focusing mount about 32mm. The rotation torque can be adjusted by loosening the set screw on the coarse torque adjustment ring and then turning the ring. Do not make it too loose since the focusing mount may fall on its own weight.

There are two types of fine focus knobs. One that is used together with the low magnification objectives (1x to 50x) moves the focusing mount about 0.5mm in one turn. The other that is used together with the higher magnification objectives (10x and up) moves the focusing mount about 0.15mm in one turn. The type of the fine focus knob is automatically chosen at the factory.

The focus knob is attached to the right side of the pillar when shipped from the factory, but can be moved to the left side if necessary. (Consult your nearest Nikon representative).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

III. MEASUREMENT

1. Illumination

Choose one of the following types of illumination depending on the sample.

Diascopic illumination

Permits observation of the contour of the sample image, visible as a black shadow.

Vertical episcopic illumination

Permits observation of the surface details of opaque samples.

Simultaneous illumination

Permits observation of the contour and surface of the sample at the same time.

Darkfield illumination (when using darkfield set)

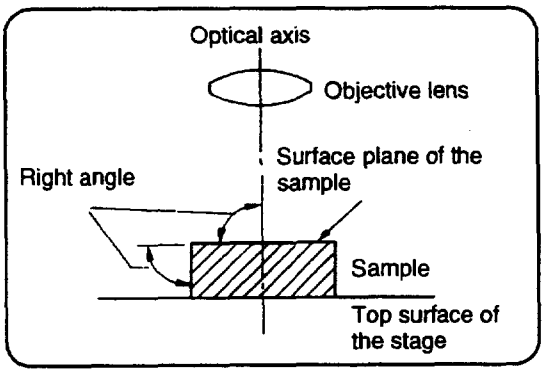
Suitable for observing the scratches on mirror-finished surfaces.

Differential interference contrast illumination (when using DIC set)

Simplified polarization illumination (when using simplified polarization set)

2. Setting the sample

Place the sample on the stage in such a position that its surface plane is perpendicular to the optical axis of the objective. If not, uniform focusing will not be obtained over the entire viewfield. Since the top surface of the stage is made perpendicular to the optical axis, the sample with parallel top and bottom surfaces can just be placed on the stage.

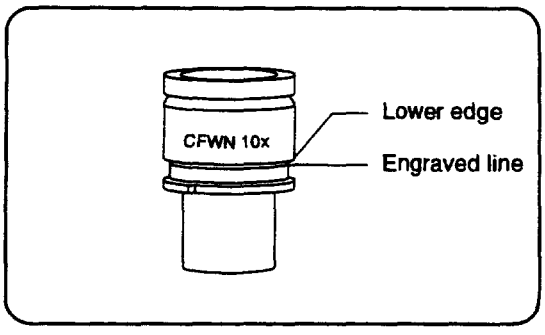


Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Focusing

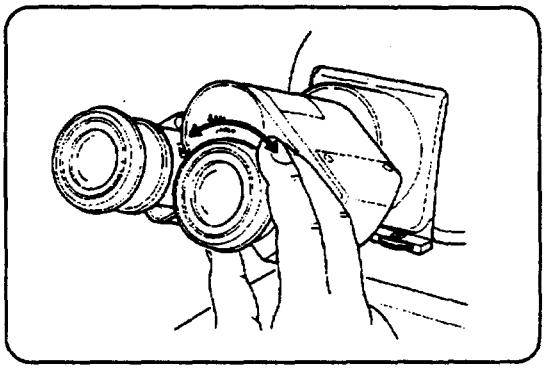
① Perform diopter adjustment (for both eyepieces)

1) Rotate the diopter adjustment ring on each eyepiece till its lower edge is aligned with the line engraved around the center shaft. This is the zero correction position.



2) Bring the 50x objective (or the objective with the magnification close to 50x) in the optical path and focus on the sample.

3) Bring the 10x objective in the optical path. Focus on the sample by rotating the diopter adjustment ring on each eyepiece, not the focus knob.

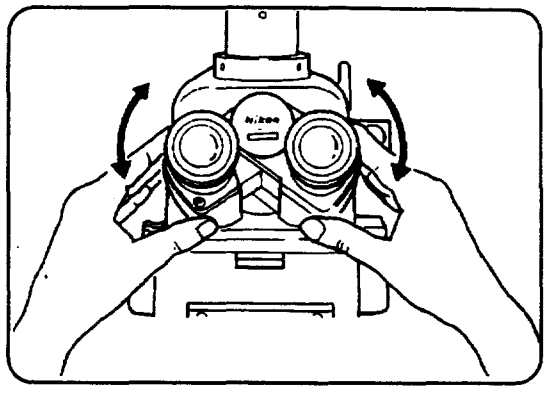


- Repeat 2) and 3) two times for the accurate adjustment.
- This operation compensates the dioptric differences between the user's eyes facilitating observation through both eyepieces. It also increases the parfocality of the objectives.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

② Adjust the interpupillary distance.
While observing the sample, adjust the interpupillary distance to make the right and left viewfields appear as one.

- This operation facilitates observation through both eyepieces.



③ Rotate the coarse focus knob and move the focusing mount vertically so that the distance between the sample and the upper thrusting end of the objective is just about the focal distance of the objective. (The focus plane of the objective is 45mm below the thrusting end of the objective.)

④ Look into the eyepiece and rotate the fine focus knob to focus precisely on the sample image.

⑤ Check for the parallax error
Looking through the eyepiece, move the eye laterally and vertically against the optical axis. If there are any relative movement between the sample image and the cross hairs, the sample image is not focused correctly (the parallax error exists). Focus again on the sample following the procedure below.
Assume that the cross hairs are stable. If the sample image moves along the eye, lower the optical head. If the sample moves against the eye, raise the optical head.

● **Note**

Higher magnification objectives have shorter working distances (W.D.). To prevent the objective tip hitting the sample, lower the optical head while observing the clearance between the objective and the sample, and focus by raising the optical head from the point slightly lower than the W.D. of the objective.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Examples of measurement

(1) Length (distance between 2 parallel edges)

(Only when using trinocular tilting eyepiece tube TT with built-in reticle or when using mask eyepiece.)

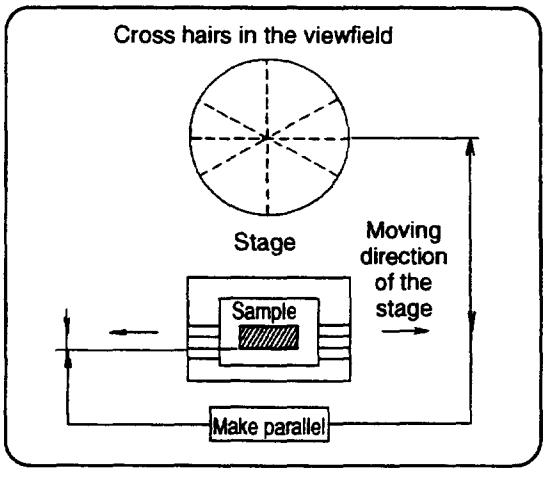
(One of the optional stages and the counter is needed.)

① Align one edge with one of the cross hairs in the viewfield.

② Press both the X-axis and Y-axis RESET switches on the counter to reset the counter indication to zero.

③ Move the stage to align the other edge of the sample with the cross hairs.

④ Read the counter indication.
Value shown on the counter = measured length.



(2) Height measurement

(Only when Z-axis scale built-in model is used.)

(Optional counter is needed.)

① Focus accurately on a part of the sample that will be the standard for the height measurement.

② Press the counter Z-axis reset switch to reset the counter indication to zero.

③ Move the stage to place the part of the sample to be measured within the viewfield and focus accurately on it.

④ Read the counter indication.
Value shown on the counter = measured height.

● **Note**

Use an objective of 20x or higher magnification. An accurate measurement cannot be made with a low magnification objective since its depth of focus will be larger than the high magnification objectives and thus the image will be focused in wider range.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

IV. OPTIONAL ACCESSORIES

1. Eyepiece tubes

Eight types of eyepiece tubes, seven of which with the upright images and six of which with the tilting function, are available. The tilting function enables the user to observe in natural posture through the adjustment of the eyepiece sleeve height.

Table 1

Eyepiece tubes	Image	Field No.	Angle of depression (Eyepieces:Vertical tube)	Light ratio	Interpupillary adjustment range
Ultra widefield trinocular tilting eyepiece tube UWTT	Erect	25	10~30°	100:0/20:80	51~80mm
Trinocular tilting eyepiece tube TT	Erect	20	10~30°	100:0/20:80	51~80mm
Trinocular tilting eyepiece tube TT with built-in reticle	Erect	20	10~30°	100:0/20:80	51~80mm
Trinocular eyepiece tube TI	Erect	20	20°	100:0/0:100	51~75mm
Binocular tilting eyepiece tube BT	Erect	20	10~30°	—	51~80mm
Binocular eyepiece tube BI	Inverted	20	30°	—	51~75mm
Ultra widefield trinocular tilting eyepiece tube TL	Erect	25	10~30°	100:0/20:80	51~80mm
Binocular tilting eyepiece tube BL	Erect	20	10~30°	—	51~80mm

2. Stages

The stages permit minute movement of the sample and to read out the amount of travel. Choose the most appropriate stage depending on the sample.

- Stages that can be used with the MM-40: 2x2, O3L, 4x4, 6x4
- Stages that can be used with the MM-60: 2x2, O3L, 4x4, 6x4, 8x6

Each stage has linear encoders inside, and when connected to a counter, X and Y coordinates can be read. The minimum reading is 0.0005mm. For further details, read the instruction manual that comes with each stage.

Table 2 (unit: mm)

Stage	2 x 2	O3L	4 x 4	6 x 4	8 x 6
Stage dimensions (L x W)	ϕ 174	285 x 192	285 x 240	350 x 240	400 x 280
Stage glass dimensions (L x W)	ϕ 107	170 x 120	170 x 145	204 x 145	245 x 192
Stroke (L x W)	50 x 50	100 x 50	100 x 100	150 x 100	200 x 150
Maximum load (kg)	5	5	6	15	15

3. TV camera adapter

(Only when trinocular eyepiece tube is used.)

TV camera adapter with cross hairs

① Remove the cap from the vertical tube.
② Insert the TV adapter with cross hairs into the vertical tube until it touches the thrusting end of the vertical tube. Clamp it into position.

For details, read the instruction manual that comes with the TV adapter.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

C-mount TV adapter

① Remove the cap from the vertical tube.
② Insert the PL lens into the vertical tube until it touches the thrusting end, then insert the C-mount adapter into the vertical tube until it comes in contact with the thrusting end. Clamp it into position.

Direct C-mount adapter.

① Remove the screw that holds the upper tube of the vertical tube, then remove the upper tube.
② Insert the direct C-mount adapter into the vertical tube.

4. Photomicrographic attachment

(Only when trinocular eyepiece tube is used.)

Installing the photomicrographic attachment

① Remove the cap from the vertical tube.
② Insert the CF PL projection lens into the vertical tube until it touches the thrusting end.
③ With the finder facing front, insert the photomicrographic attachment into the vertical tube until it touches the thrusting end. Clamp it into position.

Photomicrography

① Pull out the optical path changeover knob on the eyepiece tube.
② Look into the finder of the photomicrographic attachment, and focus on the sample. Compose and press the shutter key.

For details, see the instruction manual that comes with the photomicrographic attachment.

● **Note**

Focusing through the binocular eyepiece is not effective for photomicrographing. Put caps on the eyepieces to prevent incorrect exposure due to light leaking through the eyepiece.

5. Counter SC113

(Measurement of Z-axis movement can be performed only on Z-axis scale built-in model.)

① Remove three screws holding the circular panel at the opposite side of the focus knob, then remove the circular panel.
② Attach the display unit of the SC113 instead of the circular panel.
③ Using the provided cord, connect the display unit to the DISPLAY socket on the counter unit.
④ Plug X and Y cords of the stage into the X-IN and Y-IN sockets on the counter unit.
⑤ Using the cord provided with the microscope base, connect the Z socket on the rear of the base to the Z-IN socket on the counter unit.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

V. SPECIFICATIONS

1. Vertical travel range

(1) Range

MM-40: 150mm up from the standard position
MM-60: 200mm up from the standard position

(2) Moving speed (per rotation of knob)

3-stage focus knob

Coarse focus: approx. 32mm
Medium focus: approx. 3.6mm
Fine focus: approx. 0.2mm

2-stage focus knob

Coarse focus: approx. 32mm
Fine focus: approx. 0.5mm

2-stage fine focus knob

Coarse focus: approx. 32mm
Fine focus: approx. 0.15mm

2. Supporting pillar

Shape: Rectangular section type.

3. Illuminators

(1) Diascopic illuminator

MM-40

Light source: 6V-20W halogen lamp.
The intensity can be varied continuously. Green filter attachable.

MM-60

Light source: 12V-50W halogen lamp.
The intensity can be varied continuously. Green filter attachable.

(2) Episcopic illuminator (Universal epi-illuminator 10)

Light source: 12V-50W halogen lamp
The intensity can be varied continuously.

4. Power supply

AC100V/120V/230V±10%, 50/60Hz

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. Ratings

100V 1.5A or less
120V 1.3A or less
230V 0.7A or less

6. Operating environmental conditions

10 ° C to 35 °C, humidity 75% or less
This product is made to perform best at 20 °C. It is recommended that it be used at 20 °C.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VI. MAINTENANCE

● **Note**

Never disassemble the parts of this system. Doing so may harm performance, and result in electric shock or injury.

1. Lamp replacement

Refer to the section describing the assembly of diascopic illuminator and the episcopic illuminator.

● **Note**

Use specified light bulbs only. Use of any other light bulb may result in equipment malfunction or fire.

When replacing a light bulb, always turn the power switch OFF and unplug the power cord to prevent electric shock. Also, the light bulb and surrounding parts are extremely hot while the bulb is lit or immediately after it is switched off. To prevent burns, wait sufficiently until the bulb and the surrounding parts cool off.

2. Fuse replacement

① Turn the power switch OFF and unplug the power cord.
② Remove the fuse holder from the power socket by inserting a minus screwdriver into the notches. (P.15)
③ Replace both fuses in the holder.
④ Replace the fuse holder to its original position in the socket.

● **Note**

Use specified fuses only. Use of any other type of fuse may result in electric shock, fire or equipment malfunction.

Specified fuse: 2.5A time lag fuse (x 2)

3. Cleaning optical parts

Clean optical parts by dusting them and then wiping them lightly, with a clean, dry cloth. Only when removing finger prints, use a soft cotton cloth moistened with pure alcohol (methyl or ethyl alcohol). For cleaning optical parts inside the instrument, contact your nearest Nikon representative.

When using pure alcohol, be sure to follow the instructions given by the manufacturer of the pure alcohol.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

4. Cleaning painted and plastic parts

To clean painted and plastic parts, use a silicone cloth. If and only if the soiling is severe, wipe with a diluted neutral detergent. Do not use organic solvents (thinner, alcohol, ether, etc.).
Use only water to wipe printed plastic surfaces.

5. Dust protection

When not using the instrument, protect it from dust with a vinyl cover, especially the sliding surfaces of the stage and the focusing mount guide.

6. Oiling

With normal use, oiling of the focusing mount guide and the rack will not be necessary for a long time. If oiling should become necessary, use a lubricant such as Nippon Sekiyu Epi-Knock Grease AP-0.

7. Installation

Observe the following precautions when installing this instrument.

- Install the Measuring Microscope in a room with constant temperature and humidity, or in a dry location. If it is installed in a location with high temperature and humidity, mold and condensation will form on the lens, causing performance to deteriorate.
- Choose a location that is free from vibration.
- Make sure the location is dust free and clean. When not in use cover the microscope with a vinyl cover so that dust will not collect on it.

8. Lenses

To obtain a bright sharp image, always keep the lenses clean, including the eyepieces and the objectives.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

NIKON reserves the right to make such alterations in design as may be considered necessary in the light of experience. For this reason, particulars and illustrations in this handbook may not conform in every detail to models in current production.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



NIKON CORPORATION

9-16, Ohi 3-chome, Shinagawa-ku, Tokyo 140, Japan
Tel: +81-3-3773-8122 **Fax:** +81-3-3773-8115

NIKON INC.

Instrument Group

1300 Walt Whitman Road, Melville, NY 11747-3064, U.S.A.
Tel: +1-516-547-8500 **Fax:** +1-516-547-0306

NIKON EUROPE B.V.

Schipholweg 321, P.O. Box 222, 1170 AE Badhoevedorp, The Netherlands
Tel: +31-20-44-96-222 **Fax:** +31-20-44-96-299

NIKON AG

Kaspar-Fennerstrasse 6, 8700 Küsnacht, Zürich, Schweiz
Tel: +41-1-913-62-00 **Fax:** +41-1-910-37-44

NIKON GMBH

Tiefenbroicher Weg 25 40472 Düsseldorf 30, Fed. Rep. of Germany
Tel: +49-0211-94-14-0 **Fax:** +49-0211-94-14-322

NIKON FRANCE S.A.

191, rue du Marché Rollay, 94504 Champigny Sur Marne Cedex France
Tel: +33-1-45 16 45 16 **Fax:** +33-1-45 16 00 33

NIKON INSTRUMENTS S.P.A.

Via Tevere, 54 50019 Sesto Fiorentino (FI), Italia
Tel: +39-55-3009601 **Fax:** +39-55-300993

NIKON U.K. LTD.

380 Richmond Road, Kingston, Surrey KT2 5PR, United Kingdom
Tel: +44-181-541-4400 **Fax:** +44-181-541-4564

Printed in Japan

E110 E 96.4.T.1

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP