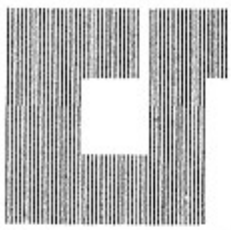
Reichert Univar Manual



REICHERT Manual

UnivaR

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Translated from the 11/1975 German language edition,
with slight modifications.

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San Marcos CA USA
2017

v 1.3

Notes

This is a very slightly-modified, new (2017) American English translation of the 1975 German-language version of the Reichert Univar microscope operating manual.

In a very few places, the text has been rewritten slightly for clarity. Any mistakes are probably mine. No other Univar manuals or literature were used (nor indeed available) in the production of this one. This manual was translated purely for the use of myself; it is being made available to the public, free of charge, for their own use and enjoyment, with all the usual disclaimers and the understanding that they do so at their own risk, etc., etc.

It was composed with the help of SoftMaker Presentations, Google Translate, and an assortment of utilities, all on Ubuntu Linux.

The typeface is DejaVu Sans Condensed.

Table of contents

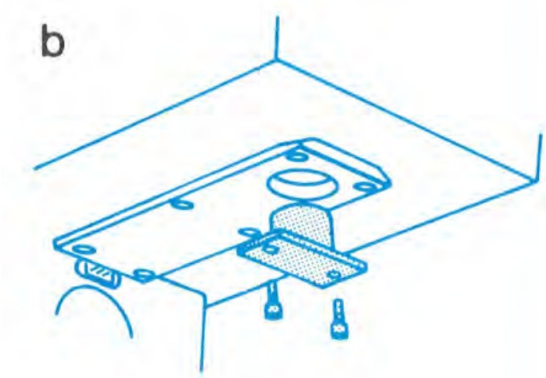
Please note:
The mirror house 4 was used in the illustrations of the different working methods. If the mirror house 2 is installed, the workflow remains the same, but references to non-existent knobs should be ignored. There are left and right and upper and lower knobs, as well as the coaxial knobs for filters.

Erecting and assembling

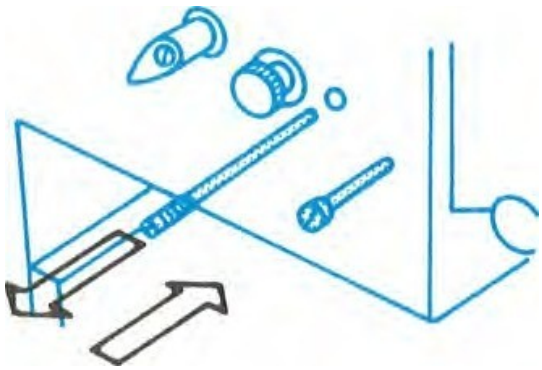
Setting up:
Three handles are screwed into the base plate, and are used to lift the microscope stand. The tripod weighs approx. 55 kg (121 lb) and should be lifted by 2 people. The desk on which the Univar is positioned must be stable, since the microscope with all of its associated gear can weigh up to 120 kg (264 lb).The countertop must be hard and flat, so that an 8mm air gap on the underside of the large lamps houses is ensured for proper air circulation.

Remove the protective transport pieces. The necessary hex wrench to unscrew the pieces is included.

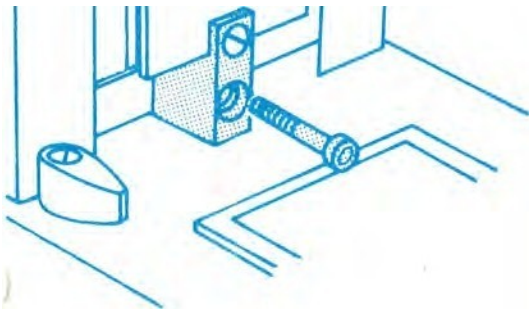
a) Remove the red plate covering the projection prism by unscrewing the two allen screws.



b) Remove the red protector in the relay housing.

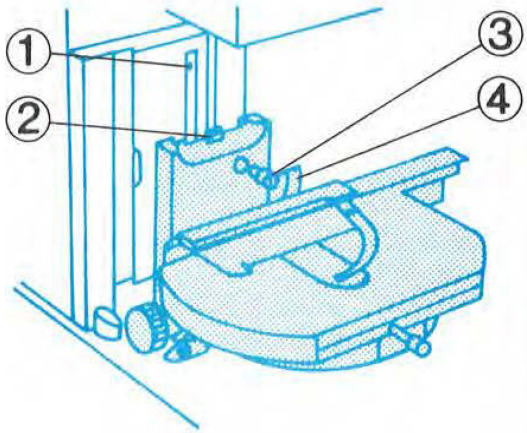


c) Remove the red locking screw for the beamsplitter prism and replace with the supplied 32mm long screw.

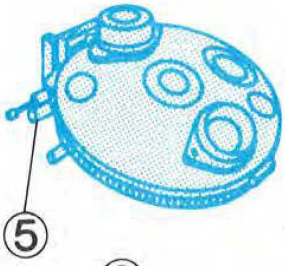


d) Remove the red protector on the focus rack, after unscrewing the hex bolt and the slotted screw. Withdraw the protector after the rack is slightly raised. Replace the slotted screw.

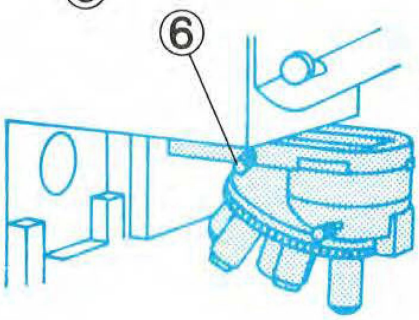
e) Do not move the coarse feed before the assembly of the stage support.



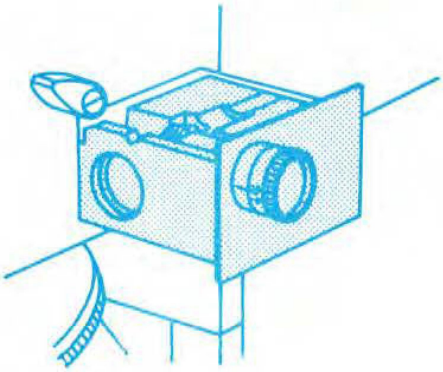
Assembly of the stage:
The stand has a dovetail mount and the stage support has a mating dovetail. There are cutouts on each dovetail that allow the two to be fastened together. First, unscrew the large screw with a coin slot, ③**,** near the top of the stage dovetail. Then, push the stage support onto the stand dovetail (you may have to move the stage up and down to accomplish this using the recesses). Once together, lower the stage support until the focusing lever (the end of which is visible through the opening ①) is centered behind the threaded hole for screw ③. The table support is held in this position. Run the screw into the threaded hole in the release lever.
Lower the stage support until the upper edge of the index ② is level with the upper surface of the stand dovetail mount. Clamp the locking lever ④. This is the correct setting for the coarse-drive stop for regular transmitted-light preparations on 1mm thick microscope slides.



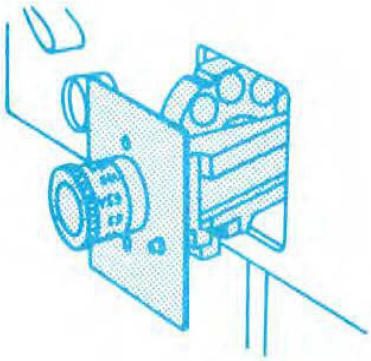
Assembly of the condenser holder:
Turn the condenser turret to the illustrated position; the screw-in condensers should be oriented in a front-back direction. Run the condenser mount with the condenser coarse-feed to the lower stop position. Hang the condenser turret transverse pin into the v-shaped notch on top of the stand's condenser mount by tilting it back slightly, hanging by the pin, and letting it down gently. Then clamp the condenser carrier to the mount by tightening the knurled control knob ⑤ in a counter-clockwise direction a partial turn.



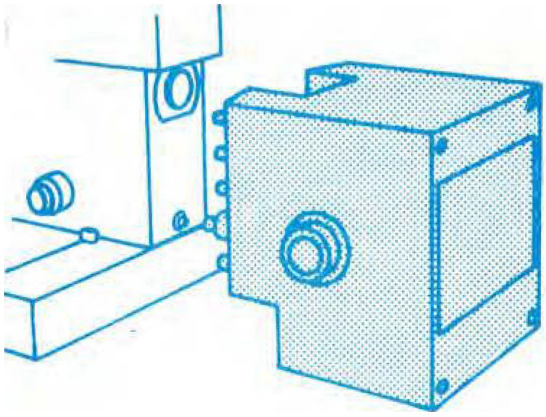
Assembling the nosepiece carrier and the objectives:
Screw in objectives into the optics carrier (the 10x lens is screwed into the threaded hole marked with a dot.) The other lenses are installed so that the objectives are higher magnification when the rotation of the objective nosepiece is in a clockwise direction. With the stage in its lowest position (with coarse focus), insert the optics carrier into the guide on the microscope stand up to the stop and clamp with clamping screw ⑥.



Magnification changer (if available):
Remove the cap from the opening on the stand. Turn the knob of the magnification changer position to 2.5 (arrow). In this position you can slide in the the magnification changer on its dovetail until it stops.

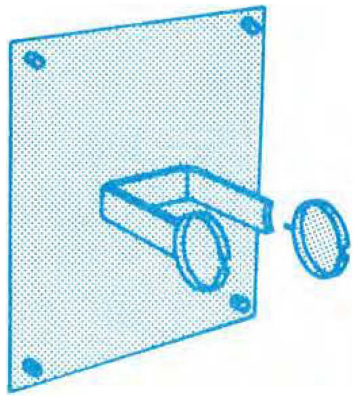


Phase-ring knob (if available):
Remove the cap from the opening of the stand. Insert the phase-ring assembly by pressing on the adjustment knob to slide it onto the dovetail, and clamp with the captive cap-head screw.



Attaching the mirror housing:

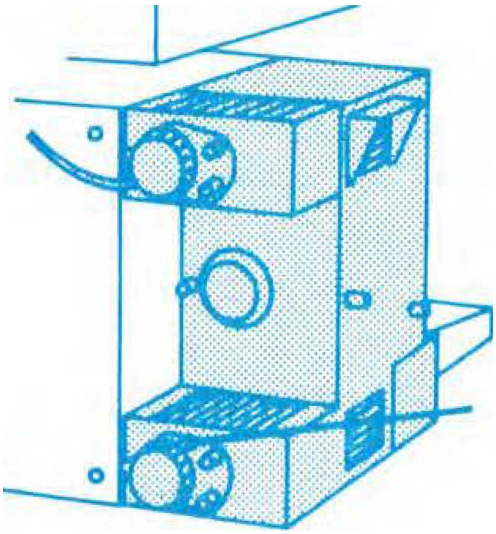
Remove the back of the mirror housing, after loosening the four corner fasteners by turning each fastener counterclockwise 1/4 turn.
Fasten the housing to the microscope stand with the captive allen screw inside the housing (about a third of the way down in the center) using a long allen wrench or other hex key tool. Do this with care so no prism or filter is damaged.
Remove the protective covers and foam blocks for the sliding mirror, rotating prism and oscillating mirror. Do not touch optical parts with your fingers.



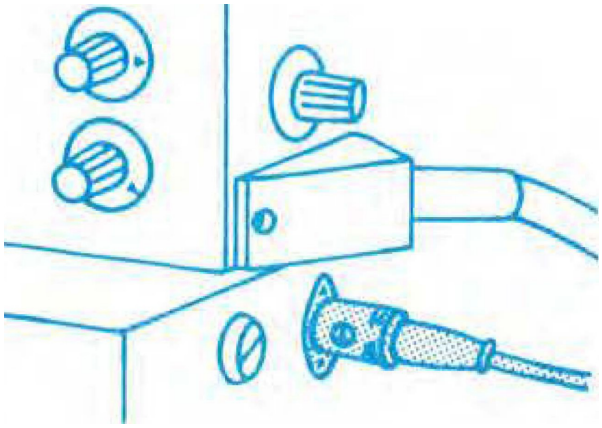
Insert the filter holder with IR-blocking filters in the filter holder on the rear. The filter holder top is marked either X or H .
The filter holder X is used for working with the XBO 450W Xenon lamp; for the HBO 200W mercury-vapor pressure lamp, use filter holder H.
Replace the back panel of the mirror housing on the orientation pin located above, and secure it with the four captive corner fasteners by tightening them about 1/4-turn clockwise.

Be careful that the filters are not damaged.

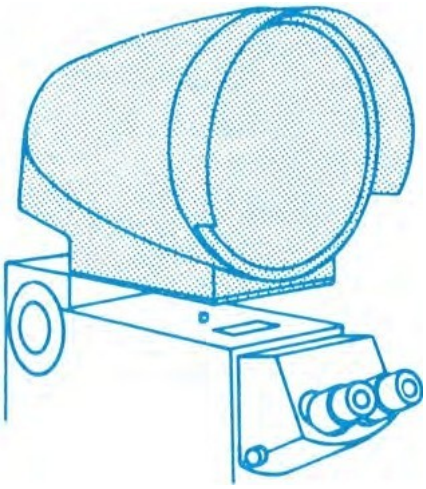
Note! If the rear panel heat-blocking filters are not in place, do not operate the xenon or mercury-vapor lamps, since the prisms will be damaged by the heat from the lamp.



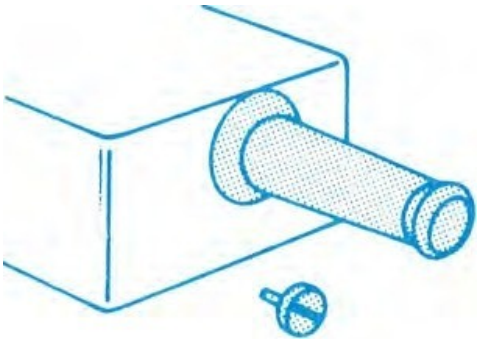
Mounting the lamp housings:
Remove the protective caps on the mirror housing and attach the lamp housings with the screws at the back. See the description of the lamp housing and the electrical connection on the lighting equipment.



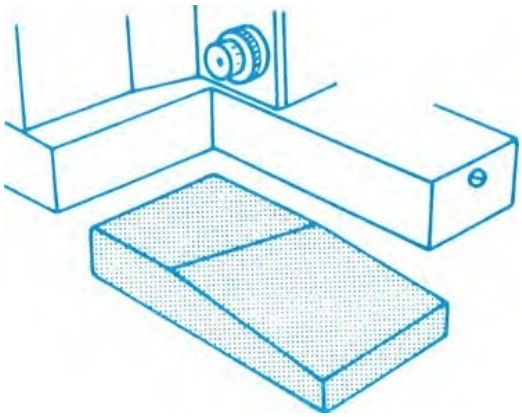
Zoom lighting:
The connection cable for the automatic zoom lighting is connected between the microscope base and the power supply for the 100W low-voltage halogen lamps.



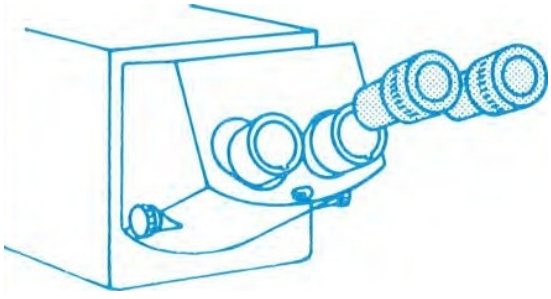
Projection attachment:
The projection tower is placed on the microscope stand, with the cylindrical light inlet over the opening of the stand.



Carrying handles:
The three carrying handles can be unscrewed from the base of the microscope stand. The threaded holes are provided with screw plugs.



Hand pads:
The magnetic hand rests are pushed on to the stand.



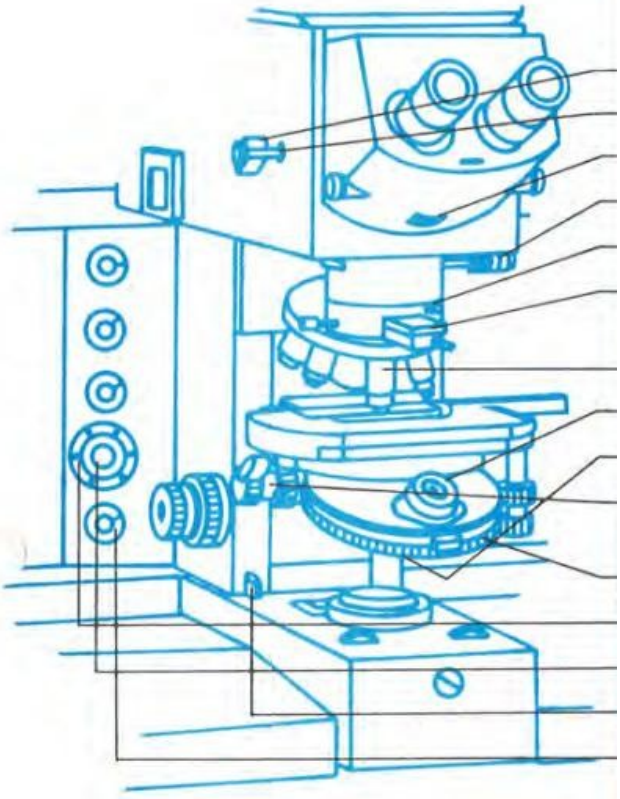
Eyepieces:
The eyepieces are inserted into the eyepiece tubes so that the orientation pins engage in the grooves.

Photo Setup: The assembly of the photo setup is described elsewhere.

Transmitted-light brightfield microscopy

A) with halogen lamp:

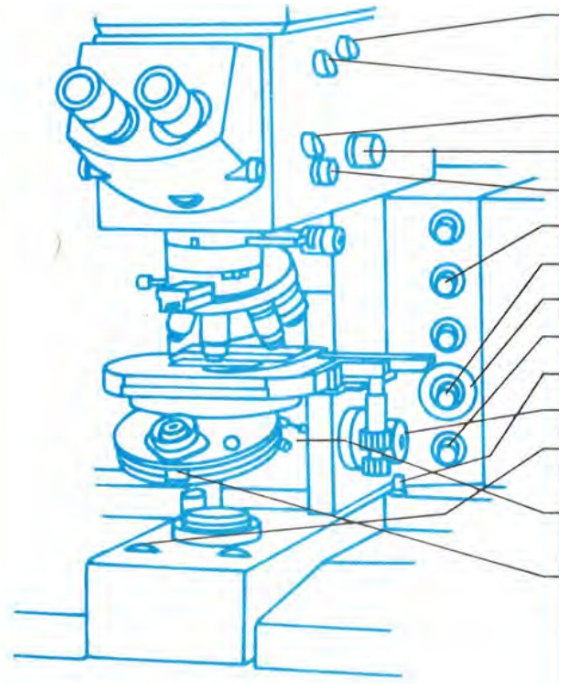
- When transmitted-light brightfield microscopy with the halogen lamp, the controls of the Univar are set at the red-dot positions.



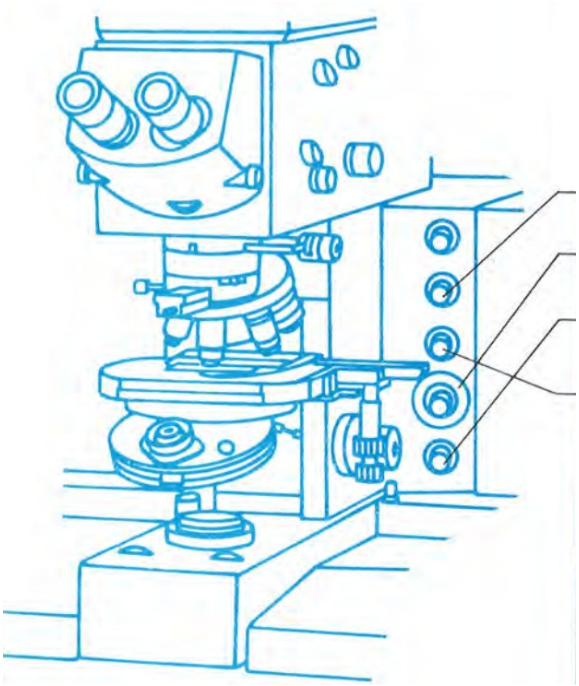
- Turn on halogen lamp with control transformer
- Turn on relay (red dot)
- Switch off Bertrand lens (pull out pin)
- Turn off neutral density filters in the body (black dot not visible)
- Deactivate blocking-filter slide or rotatable analyzer (red dot)
- Switch off the compensator
- Pull out interference-contrast main prism until it stops (loosen the clamping screw on the left side first)
- Place into position the 10x objective

- Turn condenser turret to brightfield wide-field
- Swing out the transmitted-light polarizer.
- Set condenser fine-feed in the central position and move condenser up to the stop with the coarse feed

- Turn lower condenser turret to the empty opening (red dot)
- Switch off excitation filter for transmitted-light (red dot)
- Switch off neutral density filters for transmitted-light (red dot)
- Switch off the auxiliary optics for wide-field condenser (red dot)
- Adjust collector for transmitted-light halogen lamp set (red dot)



- Adjust the photo system magnification changer to low magnification (L,red dot)
- Set the beam path to the camera (red dot, CAM)
- Set the beam to 20% to the tube (red dot, CAM/PRO)
- Switch the phase ring knob to empty (red dot)
- Set the magnification changer to 1x (red dot)
- On mirror housing 2, set the rotary prism on transmitted-light with halogen lamp
- Switch off color filters for contrast fluorescence (red dot)
- On mirror housing 2 set excitation filter on red dot
- Set sliding mirror for halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment
- Slightly close field iris diaphragm and focus on the image with condenser fine adjustment in the specimen plane.
- Center field iris diaphragm with centering screws on the condenser turret. Then open field iris diaphragm slightly larger than field of view
- Close the condenser iris diaphragm so that the microscopic image appears clear and high contrast. This is usually the case when the oculars' back focal plane has about 2/3 of their diameters brightly illuminated (check with Bertrand lens)
- When changing objectives, check the openings of the field and the condenser iris diaphragms and correct if necessary.



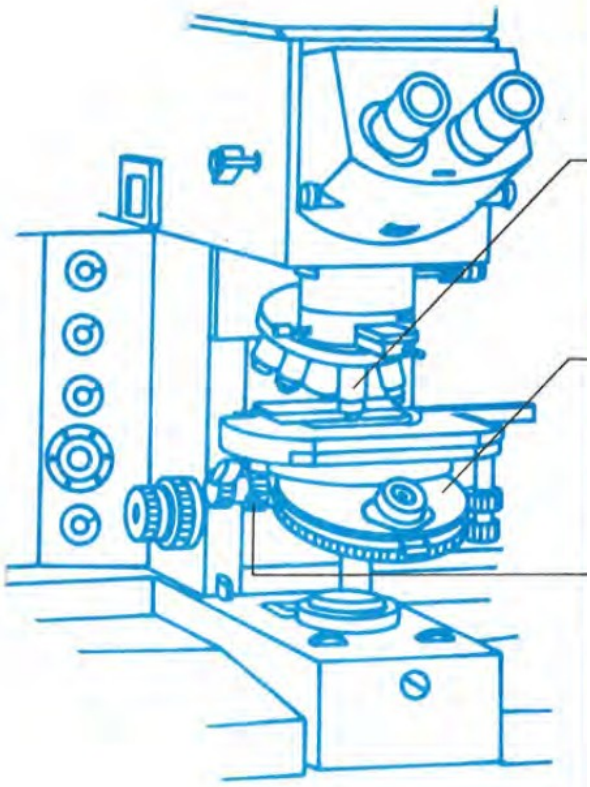
B) with high-performance lamp:
Adjustment of the microscope and the microscopic image is done in the same way described for the halogen lamp.

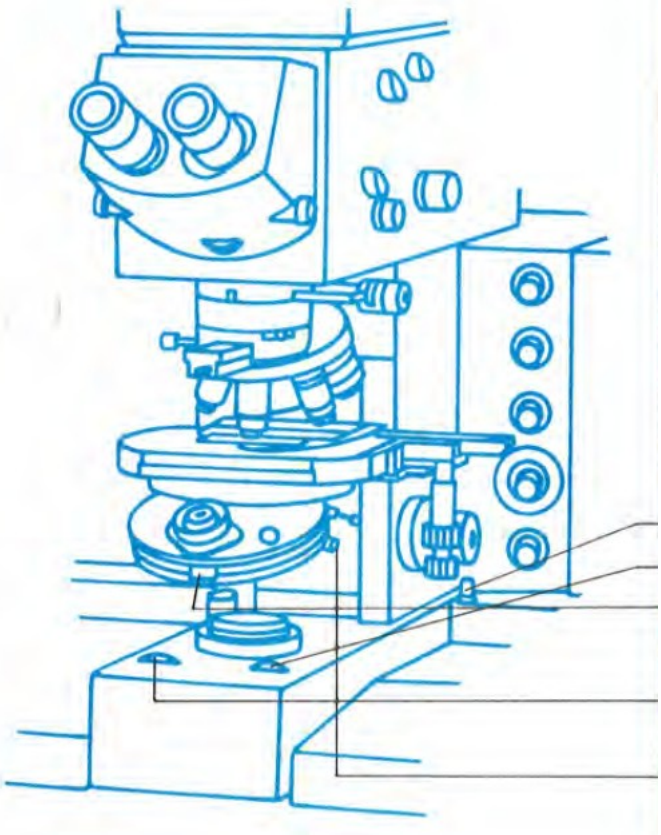
- Turn on the desired high-performance lamp.
- Turn the rotary prism for light from the HBO lamp
- When working with mirror housing 4, switch exciter filter to white dot. When working with mirror housing 2, set exciter filter to red dot
- Turn on collector for high-performance lamp
- Use appropriate neutral density filters for transmitted-light
- With the appropriate high-performance lamp collector, evenly illuminate the field

Brightfield immersion condenser:
N.A.: 1.30
Free working distance: 0.42mm
Use: for all lenses from 4x to 100x.
When working with the 4x objective, the condenser turret is set on 4. Suitable for all contrast methods.

Brightfield dry condenser:
N.A.: 0.90
Free working distance: 0.29mm
Use: for all lenses from 4x to 100x.
When working with the 4x objective, the condenser turret is set on 4
Recommended for all investigation methods where the immersion condenser NA=1.30 cannot be used and immersion is not desired. Suitable for all contrast methods except for contrast fluorescence.

Large field condenser:
Aperture: 0.12
Free working distance: 43.7mm
Use: for all objectives from 2.5x to 10x.
The condenser is permanently mounted in the turret. When working with this condenser and with objectives below 4x, the supplementary optics lever (if available) in the microscope base plate is set to LP. To sharpen the field diaphragm, the condenser is lowered first with coarse feed to the lowest position, then lowered with fine adjustment. The upper condenser turret is rotated so that the mark LP is toward the observer, and for no filtering, the lower condenser turret is rotated so the white edge mark is under the LP





Transmitted-light darkfield microscopy

A) with halogen lamp:

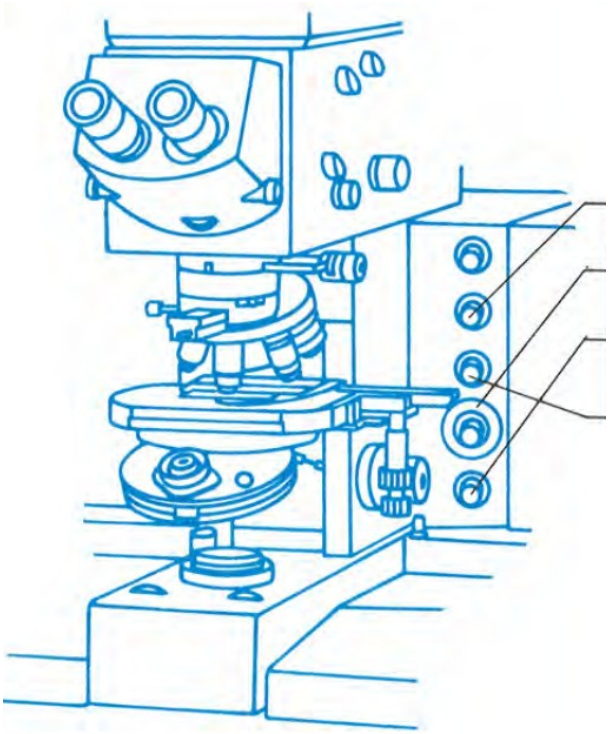
- Switch to the halogen lamp with control transformer
- Relay switch: red dot
- Turn off the Bertrand lens (pull out pin)
- Switch out the eyepiece neutral density filters (black dot not visible)
- With the immersion darkfield condenser, use the 40x objective
- With the dry darkfield condenser, use the 25x objective
- Switch off exciter filter for transmitted-light (red dot)
- Switch off neutral density filters for transmitted-light (red dot)
- Use darkfield condenser: apply immersion oil to the immersion darkfield condenser
- When working with the dry darkfield condenser and the Apo 25x and Plan 40x objectives, the aperture insert is inserted into the condenser.
- The transmitted-light polarizer is swung out

- Set condenser fine drive in the central position and move condenser, with the coarse drive, up to the stop. With the immersion darkfield condenser, use oil between condenser and the specimen slide
- Turn to an empty opening of the lower condenser turret (red dot)
- Switch off the auxiliary optics (if available) for wide field condenser (red dot)
- Adjust the collector for transmitted-light halogen lamp (red dot)
- Set the magnification lever in the photo system to low magnification (red dot, L)
- Redirect the beam path to the camera (red dot, CAM)
- Set eyepiece light to 20% (red dot, CAM/ pro)
- Set the phase ring knob to empty (red dot)
- Set magnification changer to 1x (red dot)
- Disengage blocking-filter slide or rotatable analyzer (red dot)
- When using the mirror house 2, set the rotary prism on transmitted-light with halogen lamp
- Disengage the compensator
- Interference contrast main prism: loosen the clamping screw on the left side and pull out to the stop (red dot)
- Switch off color filters for contrast fluorescence (red dot)
- On mirror house 2, set excitation filter to red dot
- Switch sliding mirror to halogen lamp (red dot)

- Switch off the automatic zoom lighting (lever to the side)

- Set manual zoom lighting to DF
- Fully open condenser iris diaphragm. Focus on the specimen.

- Slightly close field iris aperture and focus on the diaphragm image with the condenser fine adjustment. Frame the field iris diaphragm in the middle of the field using the centering screws. Then open the field iris diaphragm just past the field of view
- When moving a different objective into position, the iris of the objective can be closed to avoid glare by turning the the knurled ring. This objective iris can be opened again for brightfield work.



B) With high-performance lamp

The adjustment of the microscope and the microscopic image is done in the same way as described for the halogen lamp

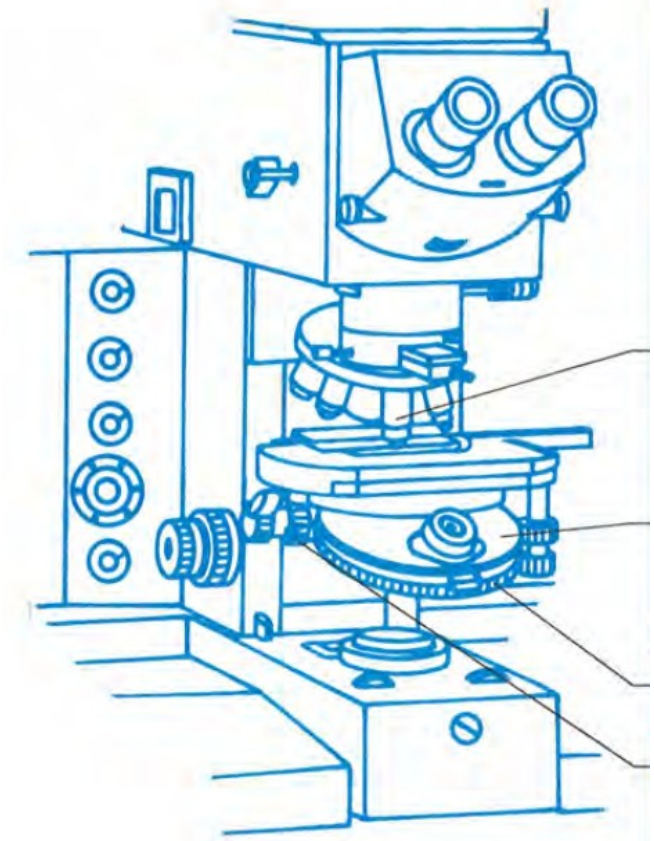
- Switch to the high-performance lamp: switch on the desired high-performance lamp with corresponding power supply

- Redirect this light with rotating prism into the microscope for transmitted-light
- On mirror house 4, turn the exciter filter to the white dot. On mirror house 2, set the exciter filter to red dot
- Set sliding mirror for high-performance lamp. Engage the neutral density filters for transmitted-light when needed

- Evenly illuminate the field with the high-performance lamp collector

Immersion darkfield condenser:
N.A.: 1.18 -1.42 oil
Free working distance: 0.38mm
slide thickness: 1.1 ± 0.1mm
Use: for all objectives from 40x to 100x
A cardioid condenser, fully suitable for fluorescence studies

Dry darkfield condenser:
N.A.: 0.7-0.9
Free working distance: 4.8mm
Slide thickness: 1.1 ± 0.1mm
Use: In combination with the condenser turret, can work with 25x and 40x objectives
An aperture insert is used in the condenser when working with the Apo 25x and Plan 40x objectives
The condenser is fully suitable for fluorescence studies



Transmitted-light phase- and anoptral-contrast

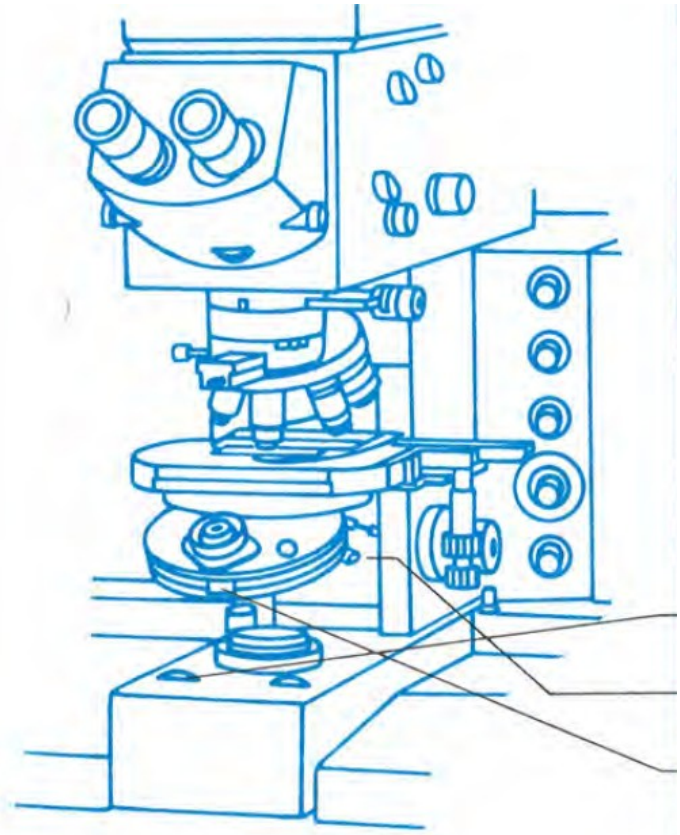
A) with halogen lamp:

- Turn on halogen lamp with control transformer. Turn on relay (red dot).
- Set Bertrand lens off (pull out the pin)
- Turn off neutral density filters in the body (no black dot)
- Disengage blocking-filter slide or rotating analyzer (red dot)
- Disengage compensator
- Pull out the interference contrast main prism to the stop, after loosening the clamping screw
- Turn to the 10x objective. All transmitted-light objectives from 10x are suitable for phase- or anoptral-contrast
- Switch out exciter filters for transmitted-light (red dot)
- Turn off neutral density filters for transmitted-light (red dot)

- Turn to the brightfield condenser. The following condensers can be used (p. B2): Immersion condenser NA=1.30 and dry condenser NA=0.90
- Swing out the polarizer filter

- On lower condenser turret, rotate to the phase ring 10Ph , corresponding to the 10x objective

- Set the condenser fine feed in the central position and with condenser coarse feed, raise the condenser up to the stop
- Switch off supplementary optics for widefield condenser (red dot)
- Adjust the transmitted-light halogen lamp collector for even illumination (red dot).

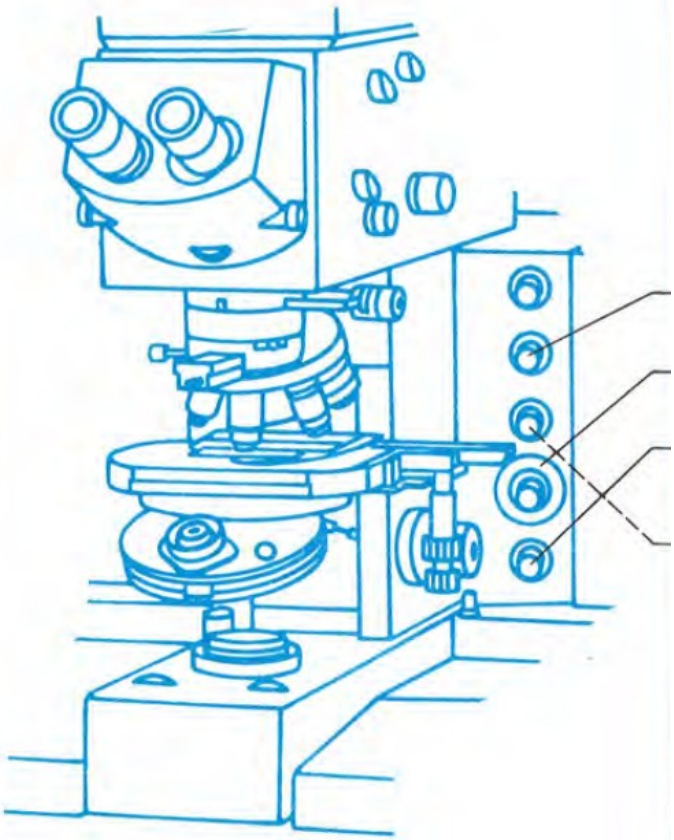


- Set the photo magnification changer to L (red dot)
- Redirect beam to the camera (red dot,CAM)
- Set light for 20% to the ocular body (red dot, CAM/PRO)
- Turn the phase ring knob (for the objective of 10x) either to phase-contrast ring 10, or for the anoptral-contrast ring 10A
- Set the relay magnification changer to 1x (red dot)
- On mirror house 2, set the rotary prism for transmitted-light with halogen lamp. Switch off color filters for contrast fluorescence (red dot)
- Set exciter filter on mirror house 2 to red dot
- Set the sliding mirror switch to halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment

- Slightly close field iris aperture and focus on the image with condenser fine focus. Frame the field iris diaphragm in the middle of the field using the centering screws. Then open field iris diaphragm just past the field of view

- Open the condenser iris wide open

When moving a different objective into position, it is necessary to set the relay phase knob to the appropriate phase or anoptral ring to match the new objective.

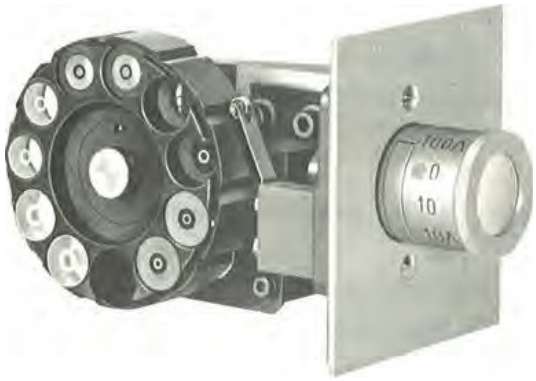


B) with high-performance lamp
The adjustment of the microscope and the microscopic image is done in the same way as described for the halogen lamp.

- Switch to the high-performance lamp with corresponding power supply

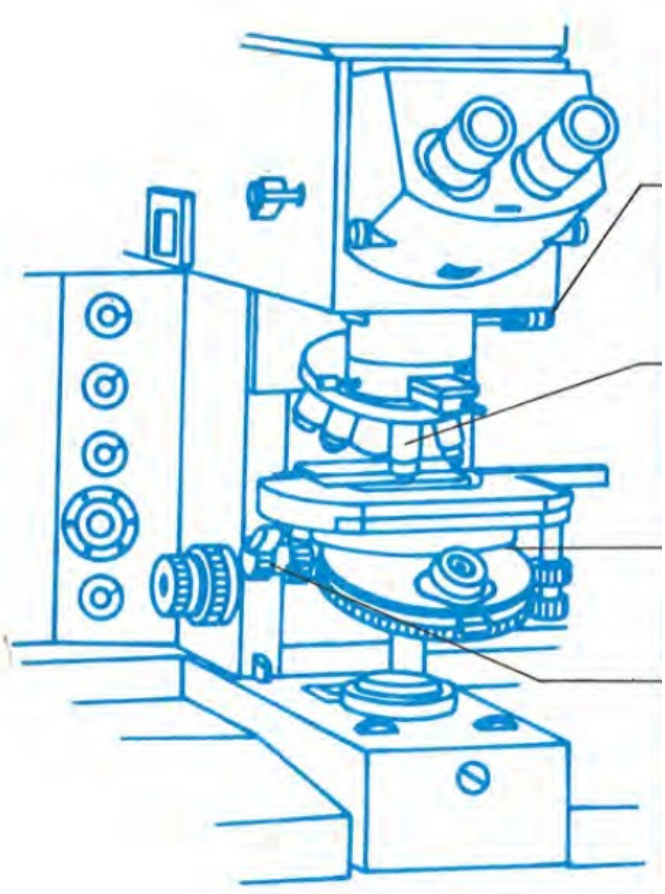
- Set rotary prism for transmitted-light

- When working with mirror house 4, set the white-coded exciter filter. Working with mirror house 2, set exciter filter to red dot
- Set the sliding mirror for high-performance lamp
- Engage the neutral density filters for transmitted-light as needed.
- Adjust the collector of the high-performance lamp so that the field is just moderately bright



Phase ring knob with phase and anoptral annuli
The internal turret contains the phase and anoptral rings (i.e., the diffraction or phase plates, which are built into the objective lenses in ordinary microscopes) that the relay system places into the optical path. For the 10x objective, the phase ring with 10 and anoptral ring with 10A are used. The rings of the other lenses are also marked with the objective magnification. The position 0 of the knob, the red dot position, provides an empty hole in the beam path.

Phase ring selection
The phase annuli (annular diaphragms) are in the lower turret of the condenser. The correct centering of each phase or anoptral annulus to the image of the corresponding ring phase plate should be done after changing objectives. For the ring aperture to be centered:
First as in A) described, set the illumination with 10x objective. Set the lower condenser turret to 10Ph , and the phase ring knob to 10. Carefully center the field iris diaphragm.
The Bertrand lens pin is then pushed in so that the superimposed images of the phase annulus and the diffraction plate are visible.
By turning the knurled head of the Bertrand lens pin, the lens is focused on the plate and the annulus. Using the two centering wrenches ① on the underside of the condenser, press the wrenches to engage, and then turn them individually to shift the images and make them concentric. The centering screws ② on the condenser carrier, which serve to center the field iris diaphragm, must not be adjusted during the above procedure.



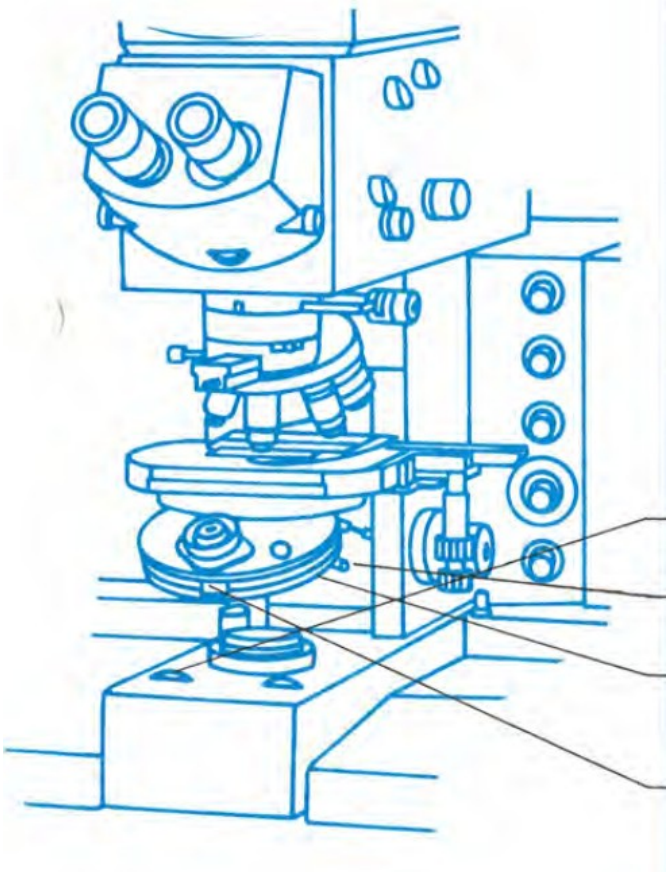
Transmitted-light microscopy with polarized light:
(A) with halogen lamp

- Turn on halogen lamp with control transformer
- Turn on relay (red dot)
- Turn off Bertrand lens (pull out pin)
- Turn off neutral density filter in the ocular body (black dot not visible)
- Insert analyzer and set to 0 .
- Disengage the compensator.
- Pull out interference contrast main prism until it stops, after loosening the clamping screw

- Rotate to the 10x objective. Stress-free lenses must be used for polarization-optical investigations
- Switch off the exciter filter for transmitted-light (red dot)
- Switch off the neutral density filters for transmitted-light (red dot)

- Line up the brightfield condenser. The brightfield condensers described on page B2 are available in strain-free versions (P). Turn lower condenser turret to the empty opening (red dot)

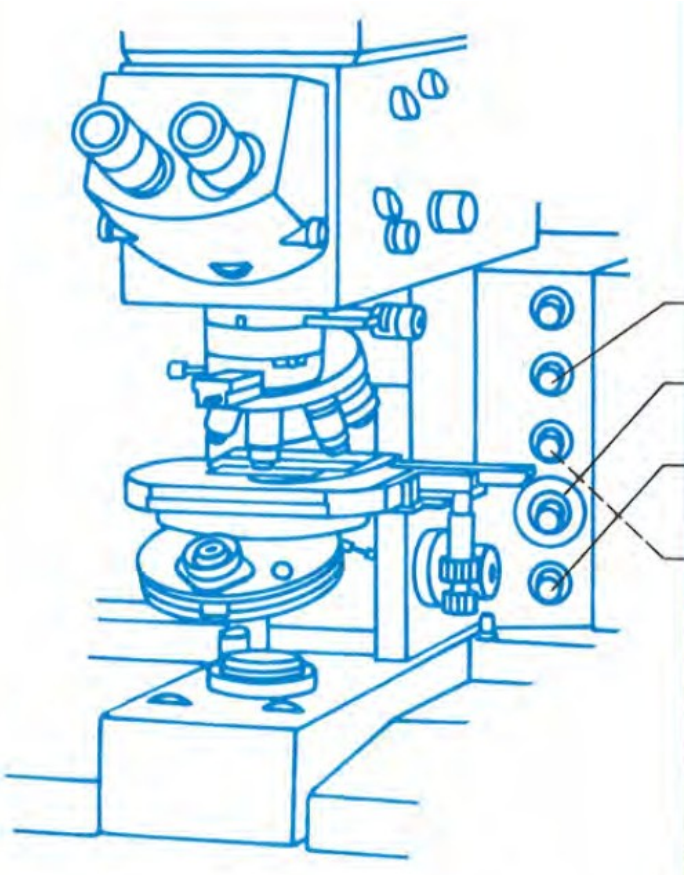
- Turn condenser fine feed to the central position and raise condenser with coarse feed up to the stop
- Set the collector for transmitted-light halogen lamp (red dot)
- Switch off the auxiliary optics for wide-field condenser (red dot)



- Set the photo system magnification changer to low magnification (red dot, L)
- Direct beam path to the camera (red dot, CAM)
- Set beam at 20% to the body (red dot, CAM/PRO)
- Set the phase ring knob to empty position (red dot)
- Set the relay magnification changer to 1x (red dot)
- On mirror housing 2, set rotary prism for transmitted-light with halogen lamp
- Switch off color filters for contrast fluorescence (red dot)
- On mirror housing 2, set excitation filter to red dot
- Set sliding mirror to halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment

- Close field iris diaphragm, then focus its image with condenser fine adjustment
- Center field iris diaphragm in the middle of the field with centering screws. Then open field iris diaphragm just larger than the field of view
- Swivel the polarizer into place. The interference colors are visible when observing a birefringent specimen

- Close the condenser iris diaphragm to the usual 2/3-open position, highlighting the interference colors
- For comparative observations with normal light you can switch out the analyzer or the polarizer



B) with high-performance lamp
The adjustment of the microscope and the microscopic image is done in the same way as described for the halogen lamp

- Switch on the desired high-performance lamp with corresponding power supply.

- Redirect this light with rotating prism into the microscope for transmitted-light
- When working with mirror house 4, use white-dot exciter filter. Working with mirror house 2 , set exciter filter to the red dot
- Set sliding mirror for high-performance lamp
- Use neutral density filters for transmitted-light when needed.
- Evenly illuminate the field with the respective high-performance lamp collector

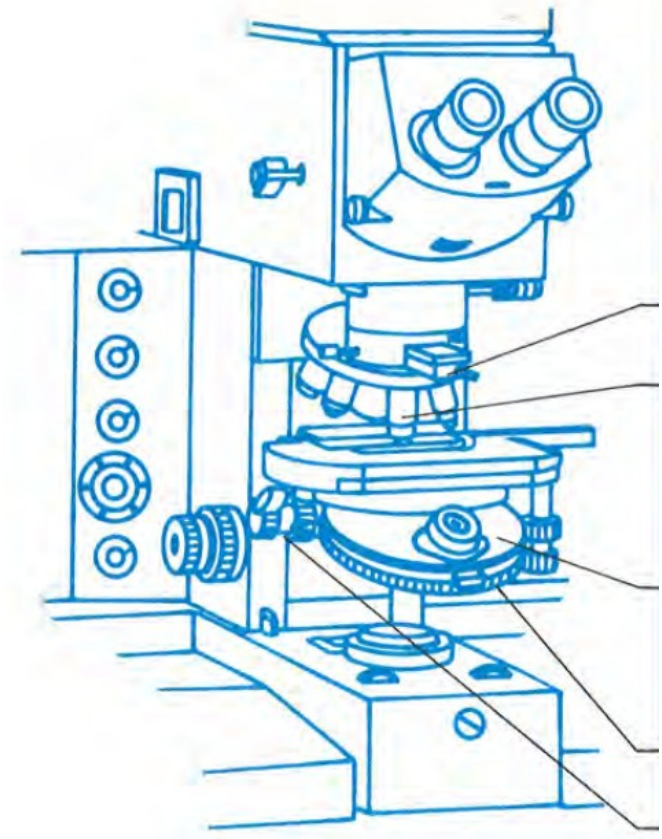
Rotating analyzer filter for transmitted-light
- The analyzer filter can be used in the optics carrier slide cavity (after removing the blocking-filter slide, if that is in place)
- Pushed in up to the stop (red dot showing), the analyzer is out of the light path; pulled out to the stop, it is in place
- The analyzer filter can be rotated through 360°, by 10° increments on the inner scale. The outer scale indicates degrees by 1/10°
- The polarization direction is north-south at the 0 position

A readjustment of the analyzer can be carried out as follows: move the polarizer into place. Hold the measuring drum of the analyzer at the 0 degree position, and using a coin, turn the screw at the front of the measuring drum until the field is quite dark

Transmitted-light filter polarizer
- The swivel-out polarizer filter is located on the underside of the condenser. The east-west polarization direction is when swiveled into place

Bertrand lens
The Bertrand lens is used to view the rear focal plane of the objective lens in the binocular tube or the projection screen. It is used for polarization-optical investigations (axis imaging observations) or phase-contrast examinations (the phase plate to phase ring alignment). Also can be used to check the front of some objectives for damage or dirt.
To use the Bertrand lens, push in the pin until it stops; turn the knurled end of the pin to focus on the objective back focal plane. To replace the Bertrand lens to its storage position, pull out the pin until it stops.

Compensators
Standard cross-section 6 x 20mm compensators can be used in the compensator slide cavity.

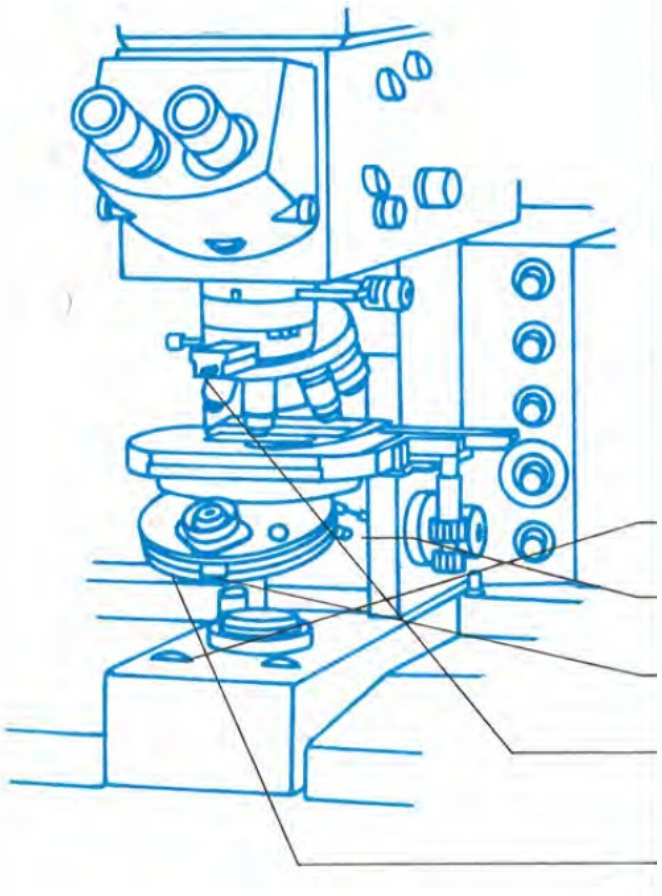


Transmitted-Light Interference Contrast
(A) with halogen lamp

- Turn on halogen lamp power supply
- Turn on relay (red dot)
- Disengage Bertrand lens (pull out pin)
- Turn off neutral density filters in the ocular body (no black dot)
- Remove blocking-filter slide or rotating analyzer (the white marked blocking-filter can be left in the light path)
- Remove the compensator
- Slide the interference contrast main prism up to the stop and clamp with the screw located on the left side
- Rotate in the 10x objective; interference contrast studies can be carried out with this magnification. Only IK low-power lenses may be used

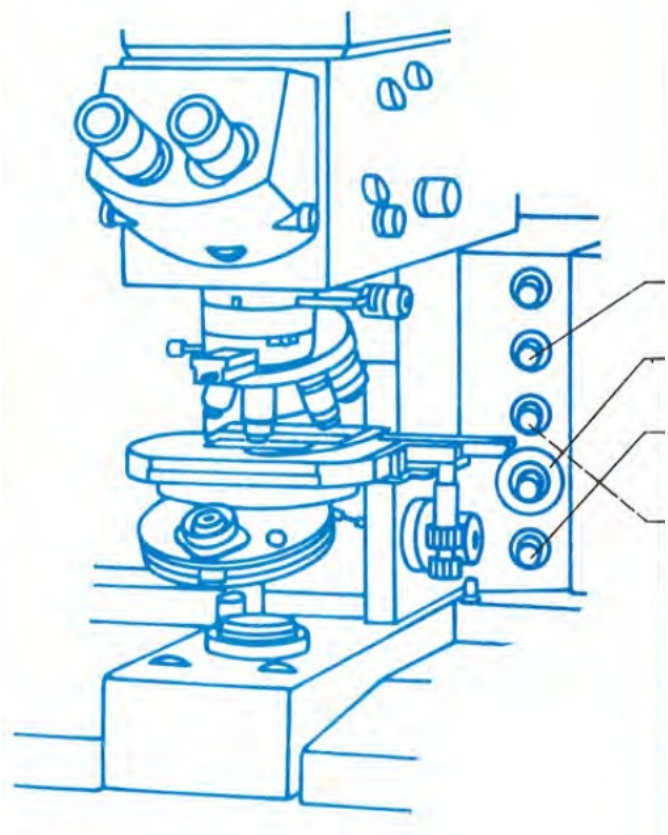
- Remove exciter or color filter for transmitted-light (red dot)
- Engage neutral density filters for transmitted-light
- Rotate to brightfield condenser on upper turret; the following strain-free condensers (P) can be used: dry condenser, NA=0.90; immersion condenser, NA=1.30
- Swing out polarizer filter

- On lower condenser turret, rotate to the compensation prism 10 IC
- Set condenser fine feed in the central position and raise condenser with coarse feed to the stop



- Switch off the auxiliary optics for wide-field condenser (red dot)
- Adjust collector for halogen lamp (red dot)
- Adjust the photo system magnification changer to low magnification (red dot, L)
- Redirect beam path to the camera (red dot, CAM)
- Set ocular body light to 20% (red dot, CAM/PRO)
- Switch off the phase ring knob (red dot)
- Set the relay magnification changer to 1x (red dot)
- For mirror house 2, set rotary prism for transmitted-light with halogen lamp
- Switch off color filters for contrast fluorescence (red dot)
- On mirror house 2, set excitation filter to red dot
- Set sliding mirror for halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment

- Close down field iris aperture and focus on the image with condenser fine feed
- Center field iris diaphragm with centering screws; then open field iris diaphragm just larger than the field-of-view
- Close condenser iris diaphragm so far that the microscopic image appears clear and full of contrast
- Adjust the interference contrast main prism by turning the knurled screw, until the desired contrast, black and white or colored, appears
- When moving to stronger objectives, the similarly marked IC prism is rotated in with the condenser hub



B) with high-performance lamp
The adjustment of the microscope and the microscopic image is done in the same way as described for the halogen lamp.

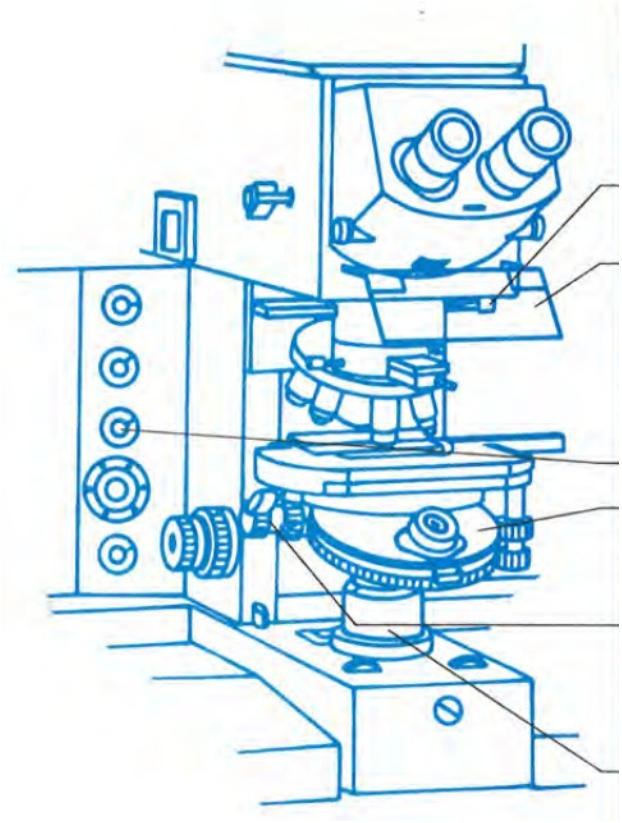
- Switch on the desired high-performance lamp with corresponding power supply.
- Set the rotating prism for transmitted-light.

- When working with mirror house 4, use the white dot exciter filter; with mirror house 2, red dot exciter filter
- Move sliding mirror to high-performance lamp position.
- Use neutral density filters as needed.

- Adjust the collector for the high-performance lamp to evenly illuminate the field.

Interference contrast prism for transmitted-light:
The interference contrast main prism is inserted into the opening just above the front of the objective nosepiece, and secured with the knurled screw at the side of the nosepiece. To remove, loosen the knurled screw and withdraw the prism.
An analyzer is built-in to the prism, so with the knurled stem at the front of the main prism you can turn on black and white or colored.

Interference contrast prisms:
The IC prisms are installed into the lower turret of the condenser. They are marked with the objective magnification and with IC. A dedicated prism is required for each objective. A polarizer is built into each prism.
The lower condenser turret contains the prisms and phase contrast rings; you can adjust only the ring aperture position with the centering screws on the underside of the condenser. A mistaken adjustment of the prisms is not possible.

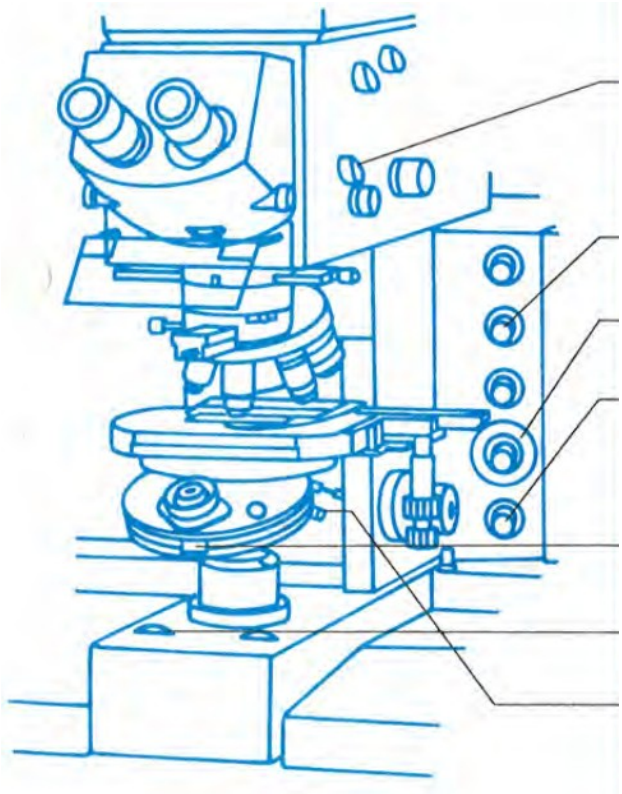


Transmitted-light brightfield fluorescence:

- Turn on HBO 200W mercury-vapor high-pressure lamp
- Set light path to relay (red dot). With weak fluorescent objects it can switched off
- Disengage Bertrand lens by pulling out pin
- Disengage neutral density filters in the ocular body (black dot not visible)
- Slide the UV blocking filter slide to the yellow-marked filter

- Mount the UV blocking eye shade
- Rotate the IC prism out of position
- Pull out the main (upper) interference contrast prism until it stops, after loosening the clamping screw on the left side
- Rotate the 10x objective into position

- Set the collector knob of the respective high-performance light to the mark
- Position the fluorescence immersion condenser and oil with fluorescence-free immersion oil (Cargille D/A)
- Swing out the transmitted-light filter polarizer
- Set condenser fine drive in the central position and raise condenser up to the stop with the coarse drive. A uniform liquid contact must be formed between the specimen slide and the condenser
- Move the condenser turret to the empty opening (red dot)
- Set UV light-shield tube over the light outlet



- Switch off the exciter filter for transmitted-light (red dot)
- Switch off the neutral density filters for transmitted-light (red dot)
- Switch off the auxiliary optics for wide-field condenser (red dot)
- Adjust the photo magnification changer to low (red dot, L)
- Direct the beam path to the camera (red dot, CAM)
- Set the beam to 20% to the ocular body (red dot, CAM/PRO)
- For weak fluorescent preparations, use EYE position
- Set the phase ring knob to its empty setting (red dot)
- Set the relay magnification changer to 1x (red dot)
- Set the rotary prism to the high-performance lamp position
- Set off the color filters for contrast fluorescence (red dot)
- Turn on exciter filter for UV light box
- Mirror house 4: exciter filter U1. Mirror house 2: yellow exciter filter S1
- Set sliding mirror for high-performance lamp
- Turn on automatic zoom lighting (red dot)
- Turn on the power for the zoom lighting with the halogen lamp power supply
- Fully open condenser iris diaphragm
- Focus on a specimen with coarse and fine adjustment

- Slightly close field iris aperture and focus on the iris image with condenser fine adjustment
- Center the field iris diaphragm, then open the field iris diaphragm just larger than the field of view
- The glycerin immersion objectives are particularly suitable for higher magnifications. With strongly fluorescent preparations, the objective iris can be closed down to control glare

Fluorescence immersion condenser
N.A.: 1.35 oil
Free working distance: 0.37mm
Use: For fluorescence microscopy in brightfield, with objectives between 10x and 100x, to meet the highest requirements of brightness and contrast.
Also for working with normal light with 4x objective (use the frosted 4 filter on the lower condenser turret)

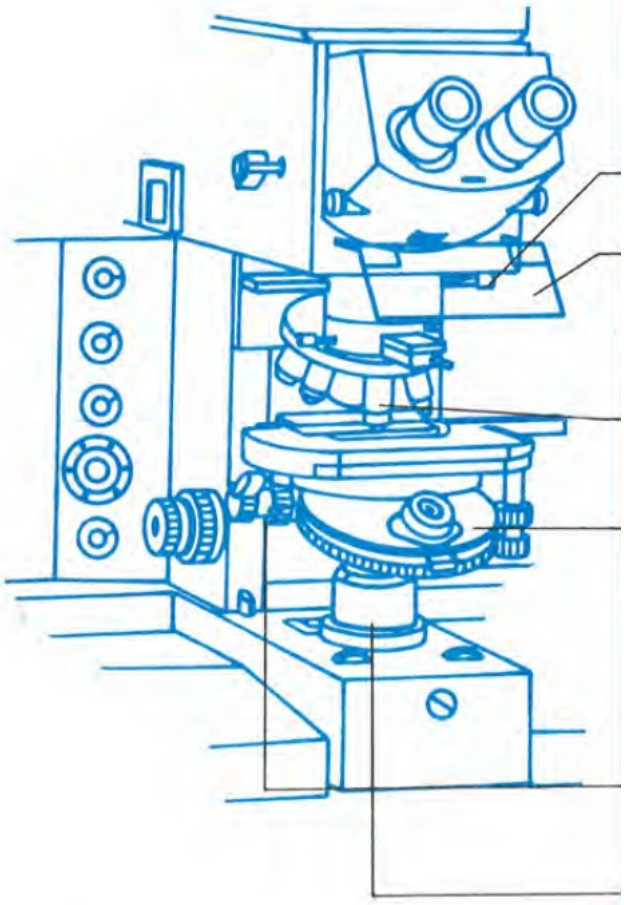
Brightfield immersion condenser
N.A.: 1.30 oil
Free working distance: 0.42mm
Use: this condenser can be used in normal situations for contrast fluorescence and fluorescence microscopy. Only a small brightening of the image background will occur
You can perform fluorescent work with objectives of 10x to 100x. Also for working with normal light with 4x objective (use the frosted 4 filter on the lower condenser turret)

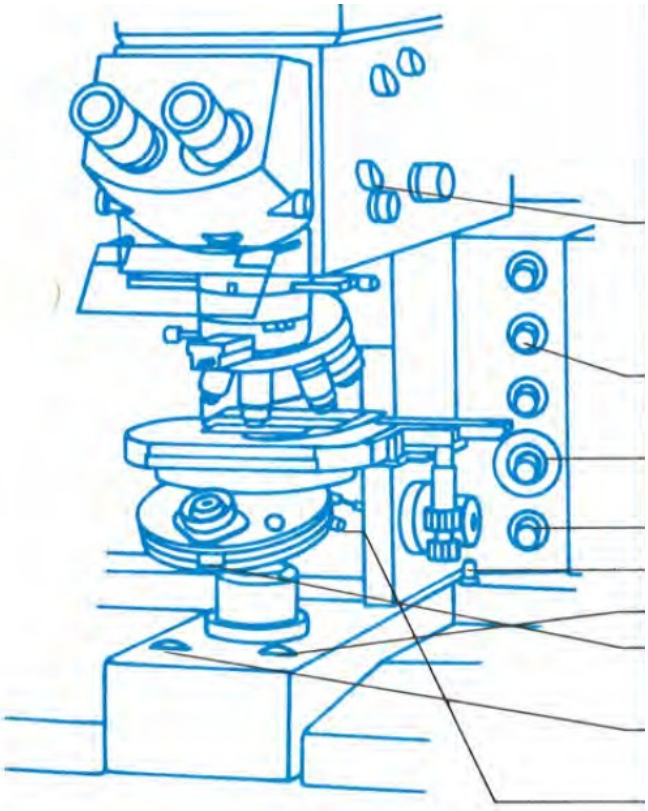
Blocking filter slide for fluorescence
The blocking filter slide is inserted into the transmitted-light optics carrier. The spring retainer on the front of the optics carrier is pulled out and the empty slide removed. The colors of the notch filters must be visible from the front.

Light shade
The light shade protects the observer from stray UV light. It is magnetically attached underneath the ocular body of the microscope stand.

UV light blocking tube
The light tube is placed on the light well of the microscope base and protects from UV glare. In addition, it can be used to hold various light filters with a 50mm diameter.

For an overview of the use and combination of the excitation and blocking filters, please read the fluorescence methods descriptions of the mirror houses 2 and 4.





Transmitted-light darkfield fluorescence:

- Turn on HBO 200 W mercury vapor high-pressure lamp
- Turn on relay (red dot). For weak fluorescent objects, it can be switched off
- Pull out pin of Bertrand lens (set off)
- Turn off neutral density filters in the ocular body (black dot not visible)
- Slide the UV blocking filter slide to the white marked blocking filter

- Mount the UV blocking lamp shade
- Rotate the compensator out of position
- Pull out the interference contrast (IC) main prism to the stop, after loosening the clamping screw on the left side
- Use the 40x objective when using the immersion darkfield condenser; when working with the dry darkfield condenser, use the 25x objective

- Rotate into place the darkfield condenser, and oil with fluorescence-free immersion oil (Cargille D/A)
- When working with the dry darkfield condenser, with apo 25x and plan 40x objectives, the aperture insert is inserted into the condenser
- Swing out the transmitted-light filter polarizer
- Turn the lower condenser turret to the empty opening (red dot)
- Set condenser fine drive in the central position and raise the condenser with the coarse drive up to the stop, with liquid on the condenser top to form a uniform liquid contact between the specimen slide and the immersion condenser
- Put UV shade tube on light well

- Set the collector of the high-performance light on the mark
- Switch off the auxiliary optics for wide field condenser (red dot)
- Set off exciter filters for transmitted-light (red dot)
- Set off neutral density filters for transmitted-light (red dot)
- Adjust the photo system magnification changer to low magnification (red dot, L)
- Direct the beam path to the camera (red dot, CAM)
- Direct the beam (20%) to the body (red dot, CAM/PRO). With weak fluorescent preparations, use position EYE
- Switch off the phase ring knob (red dot)
- Set the relay magnification changer to 1x (red dot)

- Set the rotary prism for transmitted-light with high-performance lamp
- Set off the color filters for contrast fluorescence (red dot)
- For darkfield UV exciter filter use (mirror house 4) exciter filter U2; (mirror house 2) exciter filter S2 (white)
- Set sliding mirror for high-performance lamp
- Switch off the automatic zoom lighting (lever to the side)
- Set manual zoom lighting to DF
- Fully open condenser iris diaphragm
- With coarse and fine adjustment, focus on a specimen

- Close the field iris aperture and focus on the diaphragm image with the condenser fine adjustment
- Center the image of the iris diaphragm, with centering screws on the condenser rack. Then open the field iris diaphragm just larger than the field of view
- Some higher-power objectives have a built-in iris diaphragm, which can be closed slightly to avoid glare with strongly fluorescent specimens

Immersion darkfield condenser
N.A.: 1.18 -1.42 oil
Free working distance: 0.38mm
Slide thickness: 1.1 ± 0.1mm
Use: for all objectives between 40x and 100x. A cardioid condenser, fully suitable for fluorescence studies.

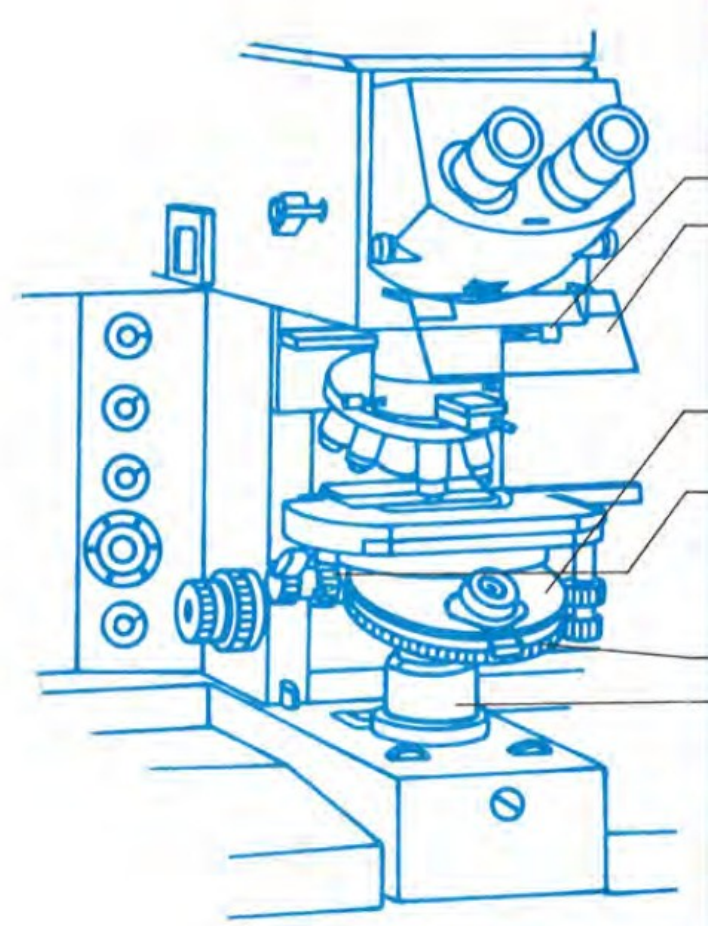
Dry darkfield condenser
N.A.: 0.7-0.9
Free working distance: 4.8mm
Slide thickness: 1.1 ± 0.1mm
Use: In combination with the lower condenser turret can work with objectives 25x and 40x. An insert is used when working with the apo 25x objective and plan 40x. The condenser is fully suitable for fluorescence studies.

Blocking filter slide for transmitted-light fluorescence
The blocking filter slide is inserted into the transmitted-light optics carrier. The empty slide is removed by pulling on the spring retainer at the front of the optics cavity. The colors of the notch filters must be visible from the front.

Light shade
The light shade protects the observer from stray UV light. It is magnetically attached underneath the ocular body of the microscope stand.

UV light blocking tube
The light tube is placed on the light well of the microscope base and protects from UV glare. In addition, it can be used to hold various light filters with a 50mm diameter.

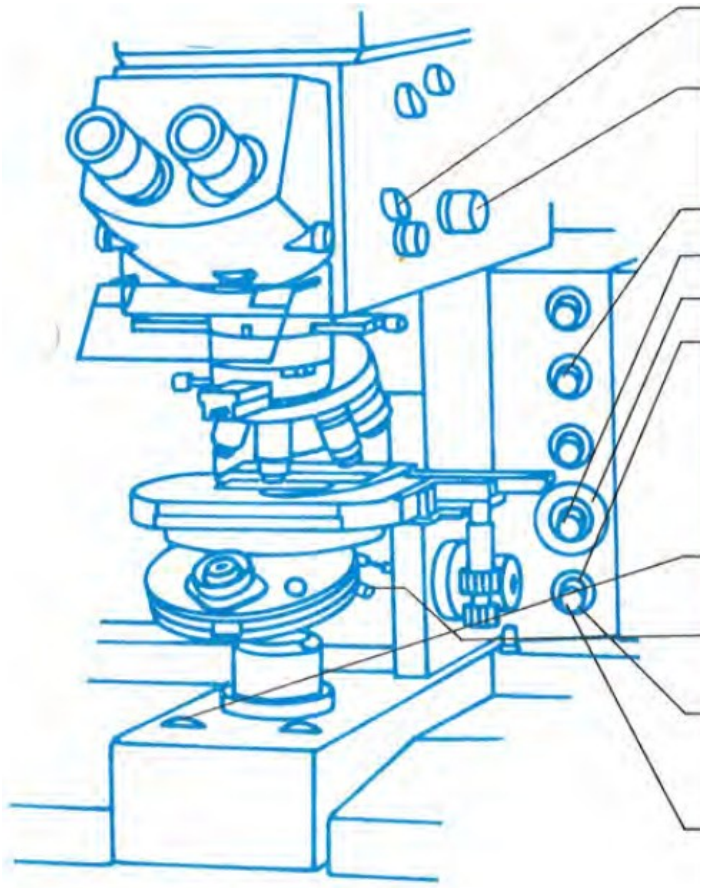
For an overview of the use and combination of the excitation and blocking filters, please read the fluorescence methods descriptions of the mirror houses 2 and 4.



Simultaneous contrast fluorescence in transmitted-light (possible only with mirror house 4)

- Turn on halogen lamp and 200W HBO mercury vapor lamp
- Turn on relay (red dot)
- Turn off Bertrand lens (pull out pin)
- Turn off neutral density filters in the ocular body (black dot not visible)
- Slide into place the yellow blocking filter on the slide
- Attach the UV blocking shade
- Switch off the compensator
- Pull out the interference contrast main prism until it stops
- Move the 10x objective into position

- Position the fluorescence immersion condenser or the brightfield immersion condenser and oil with immersion oil (Cargille D/A)
- Set condenser fine drive in the central position and, with the coarse feed, raise the condenser up to the stop. A uniform liquid contact should be formed between the specimen slide and the condenser
- Swing out the transmitted-light filter polarizer
- Turn to the 10Ph position of the lower condenser turret
- Place UV blocking light tube on the light well



- Turn off exciter filters for transmitted-light (red dot)
- Turn off neutral density filters for transmitted-light (red dot)
- Switch off the auxiliary optics for wide-field condenser (red dot)
- Adjust the collector for transmitted-light halogen lamp (red dot)
- Adjust the photo magnification changer to (red dot)
- Direct the beam path to the camera (red dot, CAM)
- Direct 20% beam to the body (red dot, CAM/PRO)
- For weak fluorescent objects, select position EYE
- At the relay phase ring knob, select 10 for phase contrast, or 10A for anoptral contrast
- Set the relay magnification changer to 1x (red dot)
- Set the rotary prism to transmitted-light with high-performance lamp
- Choose red filter or neutral density filters for contrast fluorescence
- Turn to exciter filter U3
- Set the sliding mirror to halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Fully open condenser iris diaphragm
- Focus on the specimen with coarse and fine adjustment using halogen illumination

- Close field iris aperture and focus on the aperture image with condenser fine adjustment
- Center field iris diaphragm with centering screws to the center of the field of view, then open field iris diaphragm to just larger than the field-of-view
- Set the sliding mirror to high-performance light and adjust for best fluorescence image with the high-performance lamp collector
- Set the sliding mirror for mixed light and adjust the brightness of the image of the halogen lamp on the fluorescence image
- When changing objectives, use the corresponding phase ring or anoptral ring. The condenser iris can be closed to control fluorescence when using different magnification objectives

Fluorescence immersion condenser
N.A.: 1.35 oil
Free working distance: 0.37mm
Use: For fluorescence microscopy in brightfield, with objectives between 10x and 100x for highest requirements of brightness and image contrast. When working with normal light, usable with 4x objective; the lower condenser turret must be turned to 4, the frosted auxiliary lens.

Brightfield immersion condenser
N.A.: 1.30 oil
Free working distance: 0.42mm
Use: this condenser can also be used for normal contrast fluorescence and fluorescence microscopy. It gives a pale cast to the image background. Can be used for fluorescence work with 10x to 100x objectives. When working with normal light, usable with 4x objective; the lower condenser turret must be turned to 4, the frosted auxiliary lens.

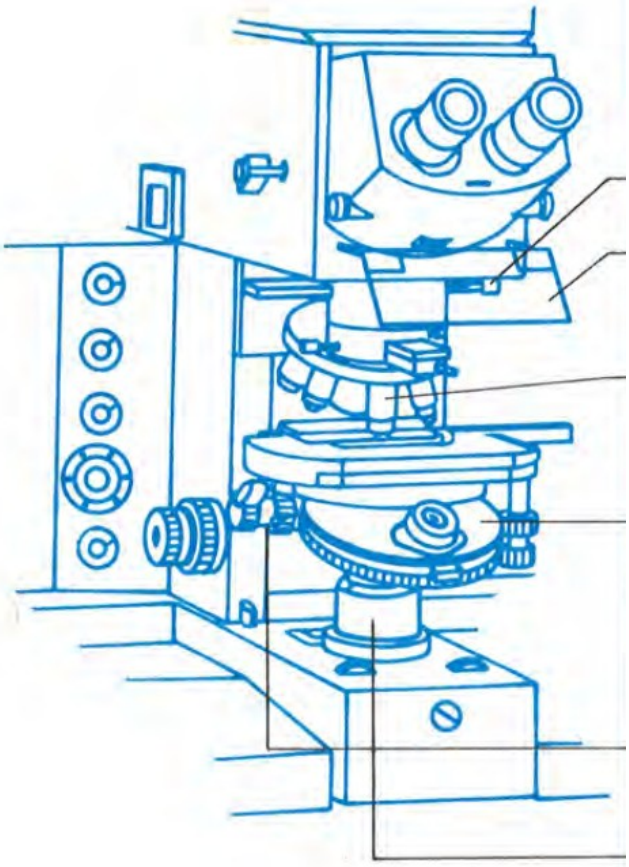
Phase ring knob with phase and anoptral rings
This turret contains the phase and anoptral rings that are inserted into the relay path. For the 10x objective use the phase ring 10 or anoptral ring 10A. The rings for other objectives are also marked with the objective magnification. In the knob position 0 (red dot) the beam path is empty.

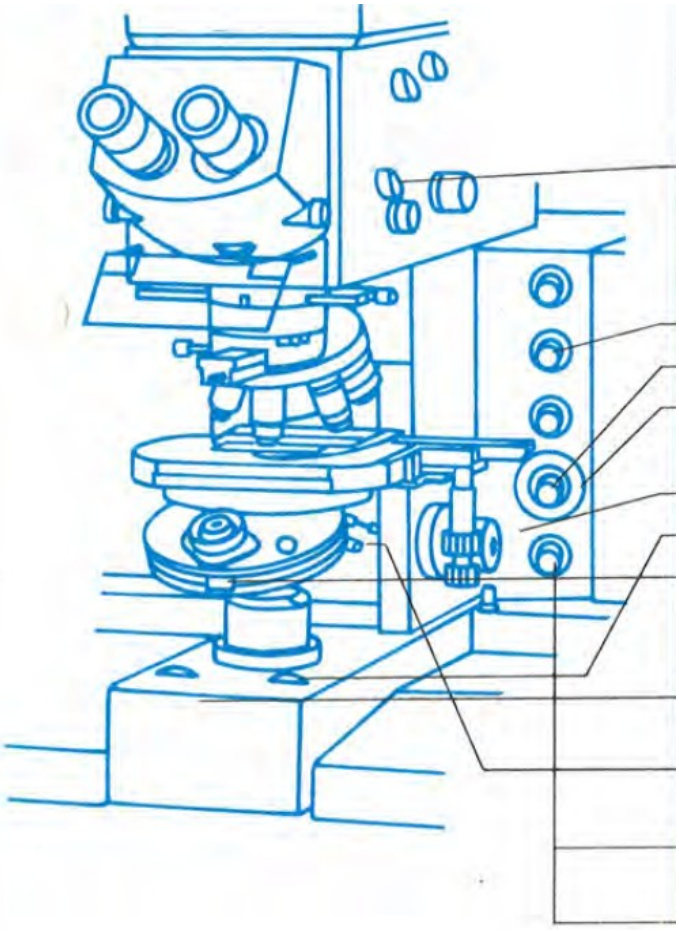
Ring aperture for contrast fluorescence
There are specially designed UV-transmissive ring apertures, allowing the brightfield immersion condenser to do contrast fluorescence. The rings are included in the lower condenser turret. When changing objectives, each should be centered to the image of the corresponding ring diaphragm. Otherwise it will need to be centered as on page B6.

Blocking filter slide for transmitted-light fluorescence
The blocking filter slide is inserted from the right in the transmitted-light optics carrier. The spring plate on the front of the optics carrier is pulled slightly out and the empty slide removed. The colors of the notch filters must be visible from the front.

Lamp shade
The lamp shade protects the observer from stray UV light. It is magnetically attached below the body of the microscope stand.

UV light blocking tube
The light tube is placed on the light well of the microscope base plate and protects from UV glare. In addition, it can be used to hold various light filters with a diameter of 50mm.





Simultaneous darkfield fluorescence in transmitted-light (possible only with mirror house 4)

- Turn on halogen lamp and HBO 200W mercury vapor lamp
- Turn on relay (red dot). For weak fluorescent objects, it can be switched off
- Turn off Bertrand lens (pull out pin)
- Switch off neutral density filter in the body (black dot not visible)
- Set the blocking-filter slide for UV darkfield to the white marked filter
- Attach the UV blocking shade
- Switch off the compensator
- Pull out the interference contrast main prism to the stop
- With the immersion darkfield condenser, use the 40x objective. When working with the dry darkfield condenser, use the 25x objective. If the condenser is on the quick-coupler, use the 10x objective
- Position the immersion darkfield condenser and oil with immersion oil (Cargille D/A). Use the aperture insert In the dry darkfield condenser for apo 25x and plan 40x objectives

- Swing out the transmitted-light polarizer
- Turn lower condenser turret to empty opening (red dot)

- Set condenser fine drive in the middle of its travel and raise the condenser with coarse feed up to the stop. Build a uniform liquid contact between specimen slide and the immersion condenser
- Turn off the wide-field condenser auxiliary optics (red dot)
- Place UV light blocking tube on light well
- Switch off exciter or color filter for transmitted-light (red dot)
- Switch off neutral density filters for transmitted-light (red dot)
- Adjust the halogen lamp transmitted-light collector (red dot)
- Set photo magnification changer (red dot)
- Direct beam path to the camera (red dot, CAM)
- Direct 20% beam to the body (red dot, CAM/PRO)
- Use position EYE for weak fluorescent preparations
- Set the relay phase ring knob to empty (red dot)
- Set the relay magnification changer to 1x (red dot)
- Set the rotary prism to transmitted-light with high-performance lamp
- Set the red filter or neutral density filters for simultaneous fluorescence
- Set the exciter filter U2 for UV darkfield
- Set sliding mirror to halogen lamp (red dot)
- Turn off the automatic zoom lighting (lever to the side)

- Set manual zoom lighting to DF
- Fully open condenser iris diaphragm
- With coarse and fine condenser controls, focus illumination from halogen lamp on the specimen
- Close field iris aperture and focus on the aperture image with condenser fine adjustment
- Center field iris diaphragm with centering screws to the center of the field of view, then open field iris diaphragm to just larger than the field-of-view
- Set the sliding mirror to high-performance light and adjust for best fluorescence image with the high-performance lamp collector
- Set the sliding mirror for mixed light and adjust the brightness of the image of the halogen lamp on the fluorescence image

Immersion darkfield condenser
N.A: 1.18 -1.42 oil
Free working distance: 0.38mm; slide thickness: 1.1 ± 0.1mm
Use: for all objectives between 40x and 100x
A cardioid condenser, fully suited for fluorescence studies

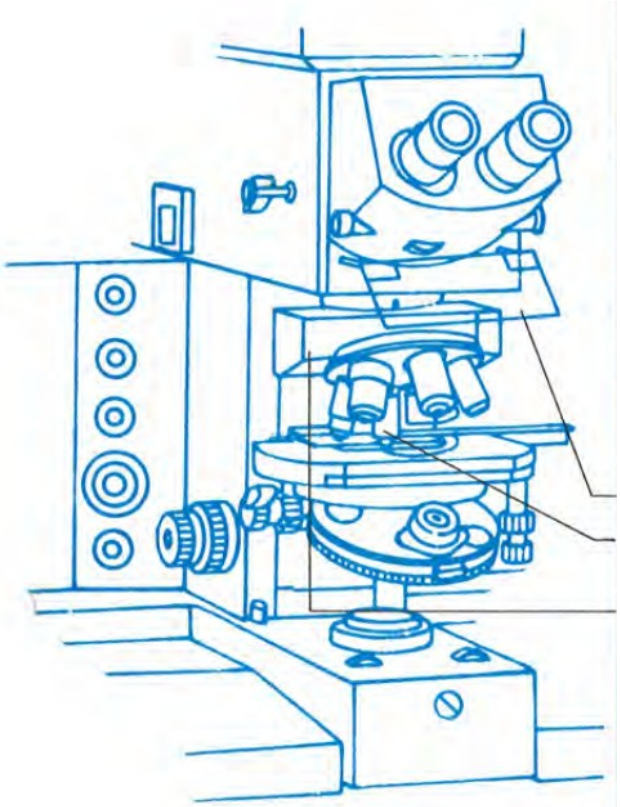
Dry darkfield condenser
N.A.: 0.7-0.9
Free working distance 4.8mm; slide thickness: 1.1 ± 0.1mm
Use: In combination with the lower condenser turret, can work with lenses 25x and 40x. There is a torus lens under the condenser; the 10x objective can be used in conjunction with the quick change.
An insert aperture in the condenser is used when working with the apo 25x and plan 40x objectives.
The condenser is fully suitable for fluorescence studies.

Blocking filter slide for transmitted-light fluorescence
The blocking filter slide is inserted from the right in the transmitted-light optics carrier. The spring retainer on the front of the optics carrier is pulled slightly out and the empty slide removed. The colors of the notch filters must be visible from the front.

Lamp shade
The lamp shade protects the observer from stray UV light. It is magnetically attached below the body of the microscope stand.

UV light blocking tube
The light tube is placed on the light well of the microscope base plate and protects from UV glare. In addition, it can be used to hold various 50mm light filters

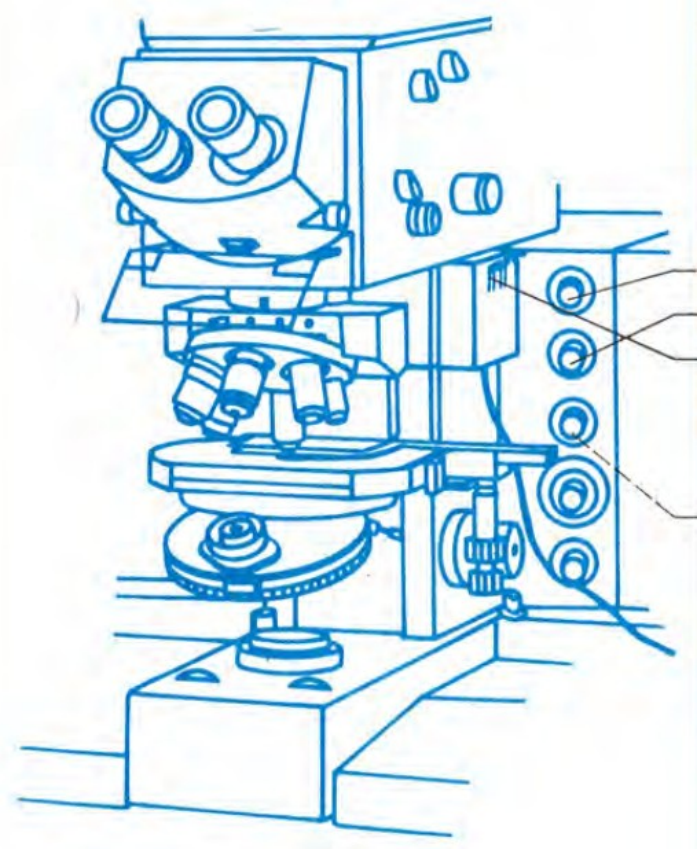
For an overview of the use and combination of the exciter and blocking filters, please read the fluorescence methods descriptions of the mirror houses 2 and 4.



Immunofluorescence with epifluorescence attachment
With the epifluorescence optics carrier, the interference splitter mirror set on 40 can perform all transmitted-light and simultaneous methods. To achieve best specimen detail we recommend transmitted-light phase contrast (page C9) or transmitted-light darkfield (page C7).

Immunofluorescence:

- Turn on HBO 200W mercury vapor high-pressure lamp
- Turn off transmitted-light halogen lamp
- Turn off neutral density filters in the body (black dot not visible)
- Turn on relay (red dot); with weak fluorescent objects, it can be switched off
- Turn off Bertrand lens (pull out pin)
- Turn off the main interference contrast prism and analyzer
- Mount the UV blocking shade
- Switch to 10x objective (if not already using transmitted-light phase contrast or darkfield on the specimen)
- Set the interference beam-splitting mirror slide to 40, 49, 49°, or 56, depending on the desired excitation (page C2)

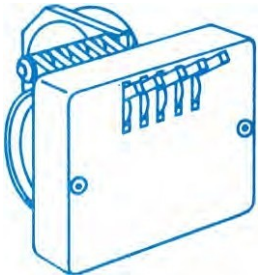


- Adjust the photo magnification changer to low (red dot, L)
- Direct beam path to the camera (red dot, CAM)
- Direct 20% beam to the body (red dot, CAM/PRO)
- With weak fluorescent preparations, use EYE position
- Set phase ring knob to empty position (red dot)
- Set relay magnification changer to 1x (red dot)
- Set the swivel mirror to high-performance lamp
- Set the rotary prism to high-performance lamp

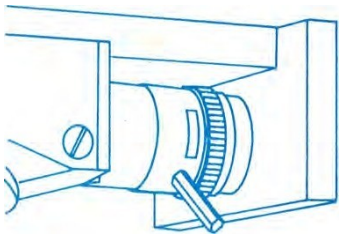
- If available: pivot into place any desired color filters, and open electronic shutter
- Focus on the fluorescent image with coarse and fine adjustment

- Adjust the collector of the high-performance light to evenly illuminate the field
- With the knurled wheel, close the field iris diaphragm in the illumination tube (page C4) and focus on your specimen image after loosening the hex pin. Open the field iris diaphragm.

NOTE: Each filter in the epifluorescence carrier has a colored indicator for each fluorescence method. If you can also perform these fluorescence methods with transmitted-light excitation, mirror houses 2 or 4 are marked with the same color on the mirror house exciter filters



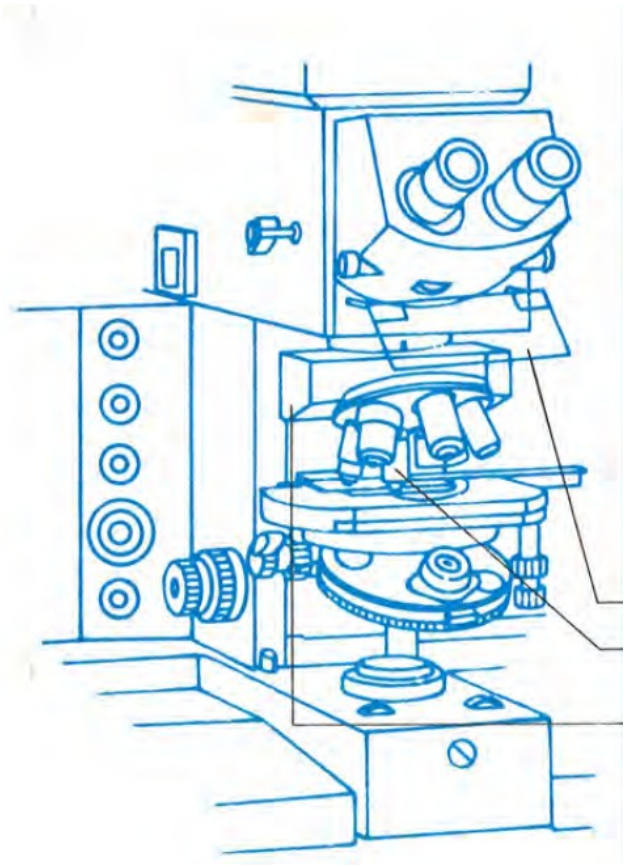
Epi-illumination swivel filter holder:
The swivel filter holder is screwed into the side of the microscope stand. It contains the following filters which can be combined with the filters of the epifluorescence illuminators:
Markings on the swivel arms:
S (white)..... Empty special filter (2-11mm thick)
I (black)..... Shield, to block the exciter radiation
I (white)..... Red blocking filter 50x4 BG 38/h
FITC 490 or UG 1 if image too bright
II (white)..... Yellow filter 50x1 GG 475
To FITC 490 for narrow band exciter
III (white)..... Empty special filter (2-4mm thick)
For micro photography, an electrical lock can be fitted into the swivel filter holder.



Field iris diaphragm, illumination aperture for microphotometry:
There is an iris diaphragm in the epifluorescence illuminator light pipe. This is adjusted to prevent UV fading of large areas of the specimen. Opening the field iris diaphragm is done by rotating the knurled ring, while focusing is done by loosening the hex locking pin and using it to slide the cylindrical part towards or away from the observer, then retightening the pin.
In the light pipe is an opening for inserting an aperture slide with a hole of desired size for microphotometry. These apertures are used when measuring the smallest object details, and are centered and focusable.

Light filters in the epifluorescence illuminator for immunofluorescence:
Exciter filter, interference beamsplitter mirror and blocking filter are coupled to each other and can be adjusted at the same time with the help of the lever located on the front panel. The filter numbers derive from the long wavelength end of the range of reflection of the interference beamsplitter mirror in nm divided by 10 (nm/10)

Filter Number	Exciter Filter	Interference Mirror	Blocking Filter	Use
40 (white)	UV exciter filter 18x2 UG 1 (Broadband)	UV reflecting up to 400 nm	18x3 KV 418/VG	For stimulation of tissues in which it wants to locate FITC provided that autofluorescence is desired. Generally weak fluorescence.
49° (blue)	Blue exciter filter 18x(3.5 FITC 490 + 2 GG 400) broadband	Blue reflective until approx. 490 nm	18x3 (λ= 525nm)/VG	Double staining for the presentation of FITC alone
49 (blue)	Blue exciter filter 18x(3.5 FITC 490 + 2 GG 400) broadband	Blue reflective until approx. 490 nm	18x3 (GG 9 + OG 515)/VG	For FITC alone or for double staining, if FITC and TRITC will be visible at the same time.
56 (green)	Green exciter filter 18x4 (λ=546 nm)/VG Narrow band	Green reflective until approximately 660 nm	18x3 OG 590/VG	Rhodamine and derivatives



Conventional fluorescence and quinacrine with epifluorescence

With the epifluorescence illuminator, you can simultaneously perform all illumination methods using the interference beamsplitter mirror 40. For isolation of paler details we recommend transmitted-light phase contrast (page C9) or transmitted-light darkfield (page C7) to sharpen the specimen image

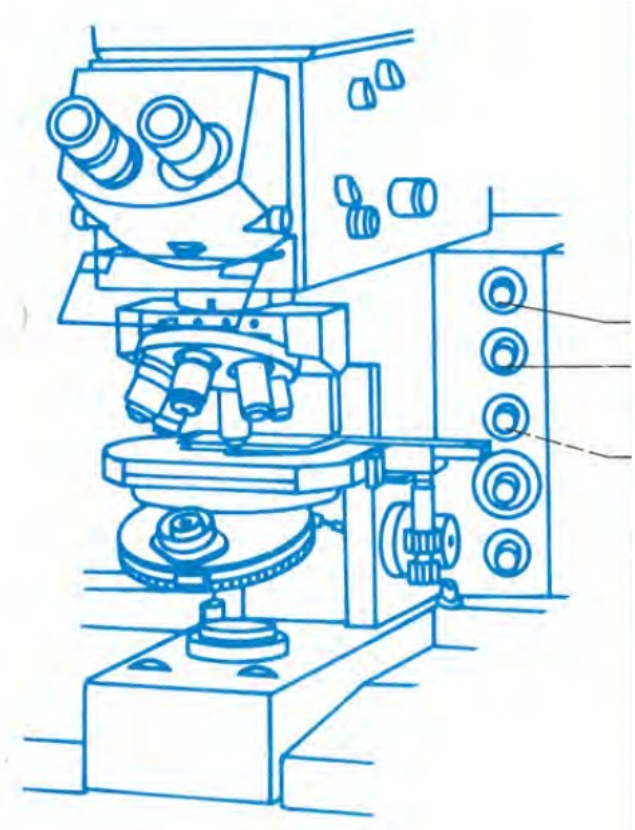
Conventional fluorescence and quinacrine:

- Turn on the HBO 200W mercury-vapor pressure lamp
- Turn off the transmitted-light halogen lamp
- Turn off the neutral density filters in the body (black dot)
- Turn on relay (red dot). For weak fluorescent objects, it can be switched off
- Turn off the Bertrand lens
- Turn off the main IC prism and analyzer

- Put on the UV-blocking orange shade

- Rotate into place the 10x objective

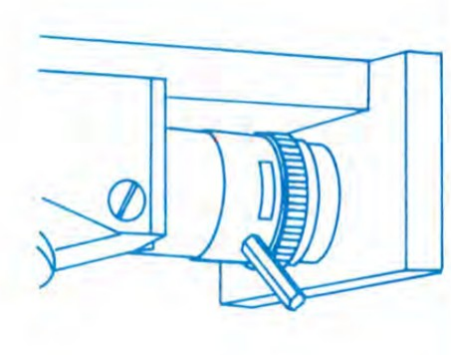
- Slide the interference mirror switch to 40 or 49, depending on the desired excitation (page C4)



- Set the photo system magnification changer to low magnification (red dot, L)
- Direct beam path to the camera (red dot, CAM)
- Set beam to the body to 20% (red dot,CAM/PRO)
- For weak fluorescent preparations, set to EYE
- Switch off the phase ring knob (red dot)
- Set the relay magnification changer to 1x (red dot)
- Set the swivel mirror to high-performance lamp
- Set the rotary prism to high-performance lamp
- Sharpen with coarse and fine focus on the fluorescent image
- Adjust the high-performance light collector to evenly illuminate the field
- Adjust the field iris diaphragm opening in the epifluorescence illumination pipe (page C4) with the knurled wheel; to focus the iris image, loosen the hex pin and move axially. Tighten the pin and open the field iris diaphragm

NOTE:

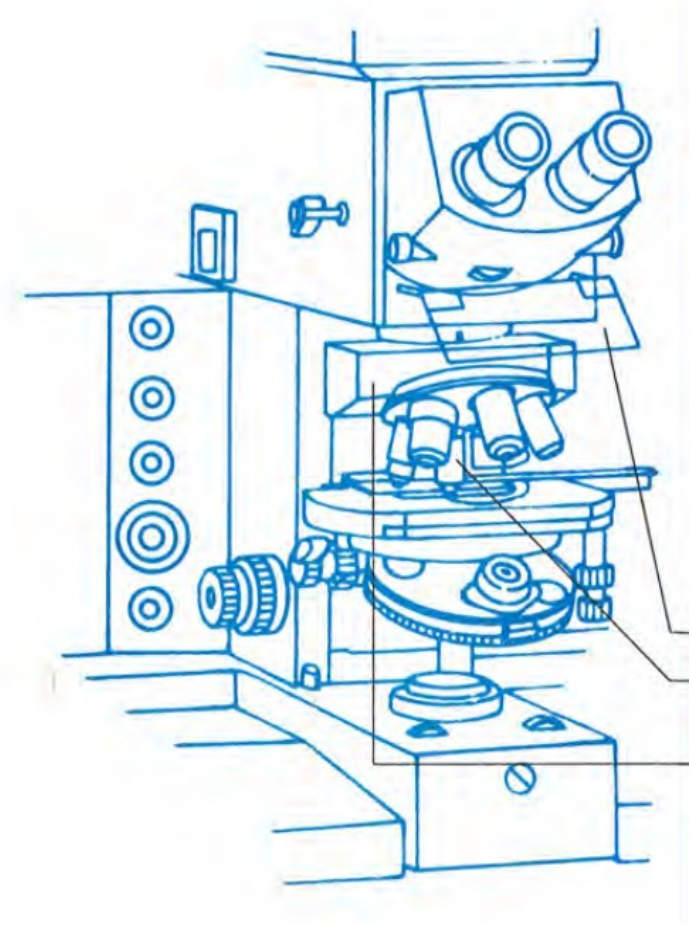
The filters in the epifluorescence attachment have a colored label for each fluorescence method. These fluorescence methods can also be done with transmitted-light exciter using the corresponding transmission exciter filter with the same color, on the mirror house 2 or 4



Field iris diaphragm & aperture slot for microphotometry
There is an iris diaphragm in the epifluorescence illuminator light pipe. This is adjusted to prevent UV fading of large areas of the specimen. Opening the field iris diaphragm is done by rotating the knurled ring, while focusing is done by loosening the hex lock pin and using it to slide the cylindrical part towards or away from the observer, then retightening the pin.
In the light pipe is an opening for inserting an aperture slide with a hole of desired size for microphotometry. These apertures are used when measuring the smallest object details and are centered and focusable.

Light filter in the epifluorescence illuminator for conventional fluorescence and quinacrine
Exciter filter, interference divider mirror and blocking filter are coupled to each other and can be adjusted at the same time with the help of the sliding lever located on the front of the house.
The number designation is derived from the long wavelength end of the reflection band of the individual interference beamsplitting mirror, in nm divided by 10 (nm/10).

Filter Number	Exciter filter	Interference mirror	Blocking filter	Use
40 (White)	UV exciter filter 18x2 UG 1	UV reflecting up to approx. 400nm	18x3 KV 418/VG	For UV stimulation, primary fluorescence, secondary fluorescence
45 Yellow	Cover plate	UV-blue reflecting up to approx. 450nm	18x3 (GG 9 + G2 + GG 9)/VG	By default, no function. The built-in filters are intended for future expansion
49 Blue	Blue exciter filter 18x3 BG 12	Blue reflective until approx. 490nm	18x3 (GG 9 + OG 515)/VG	Blue light fluorescence, quinacrine, primary fluorescence and secondary fluorescence with commonly used fluorochromes. The filters enable the excitation of FITC with the very strong 436nm emission line of the Hg lamp. These are the default filters for blue excitation.
56 Green	Cover plate	Green reflective until approximately 560nm	18x3 OG 590/VG	By default, no function. The built-in filters are intended for future expansion



Detection of aromatic amines with epifluorescence

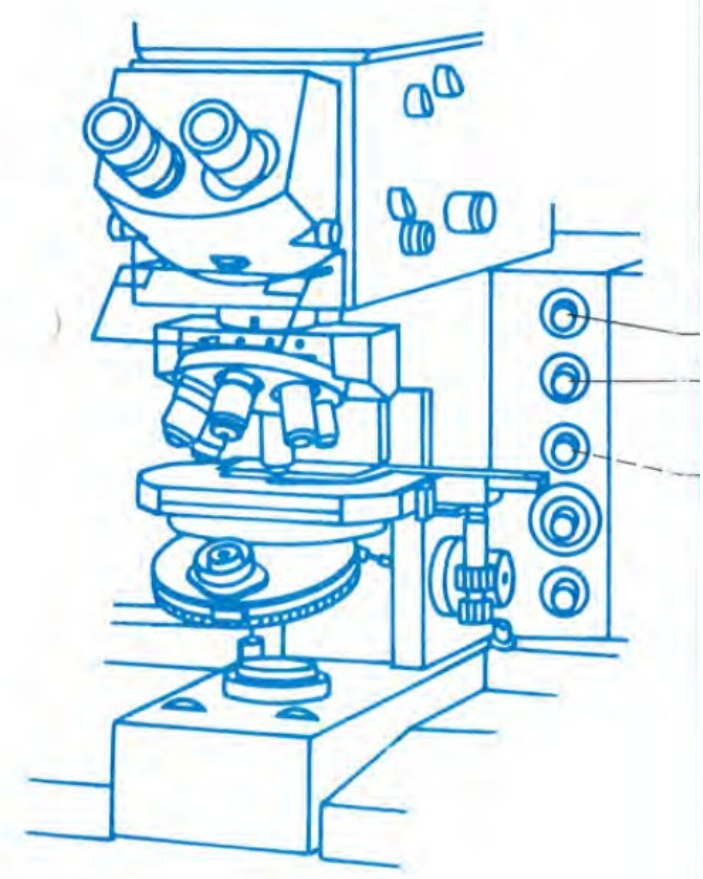
With the epifluorescence illuminator, you can simultaneously perform all light methods using the interference beamsplitter mirror 40. For isolation of paler details, we recommend transmitted-light phase contrast (page C9) or transmitted-light darkfield (page C7) to sharpen the specimen image.

Verification of aromatic amines

- Turn on HBO 200W mercury vapor high-pressure lamp
- Turn off transmitted-light halogen lamp
- Turn off the neutral density filters in the body (black dot)
- Turn on relay (red dot). For weak fluorescent objects, it can be switched off.
- Turn off the Bertrand lens
- Turn off the main IC prism and analyzer
- Put on the UV-blocking orange shade

- Rotate into place the 10x objective

- Slide the interference mirror switch to 40, 45 or 45°, depending on the desired exciter (page C6)

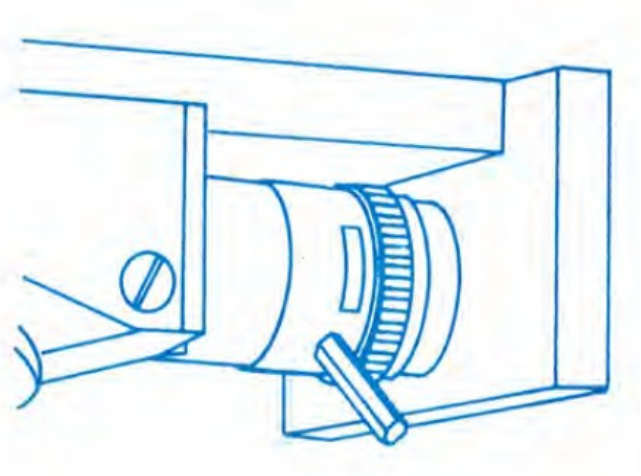


- Set the photo system magnification changer to low magnification (red dot, L)
- Direct beam path to the camera (red dot, CAM)
- Set beam to 20% (red dot,CAM/PRO)
- For weak fluorescent preparations, set to to EYE
- Switch off the phase ring knob (red dot)
- Set the relay magnification changer to 1x set (red dot)
- Set the swivel mirror to high-performance lamp

- Set the rotary prism to high-performance lamp
- Focus with coarse and fine adjustment on the fluorescence
- Adjust the high-performance light collector to evenly illuminate the field
- Adjust the field iris diaphragm opening in the epifluorescence illumination pipe (page C4) with the knurled wheel; to focus the iris image, loosen the hex pin and push or pull. Tighten the pin. Open the field iris diaphragm.

NOTE:

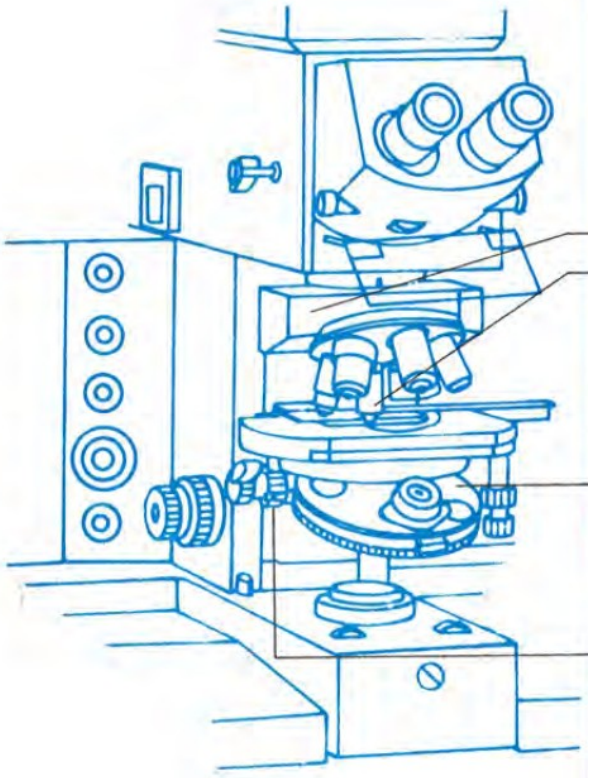
The filters in the epifluorescence attachment have a special colored icon for each fluorescence method. These fluorescence methods can also be done with transmitted-light excitation using the corresponding transmissive exciter filter with the same color on the mirror house 2 or 4.

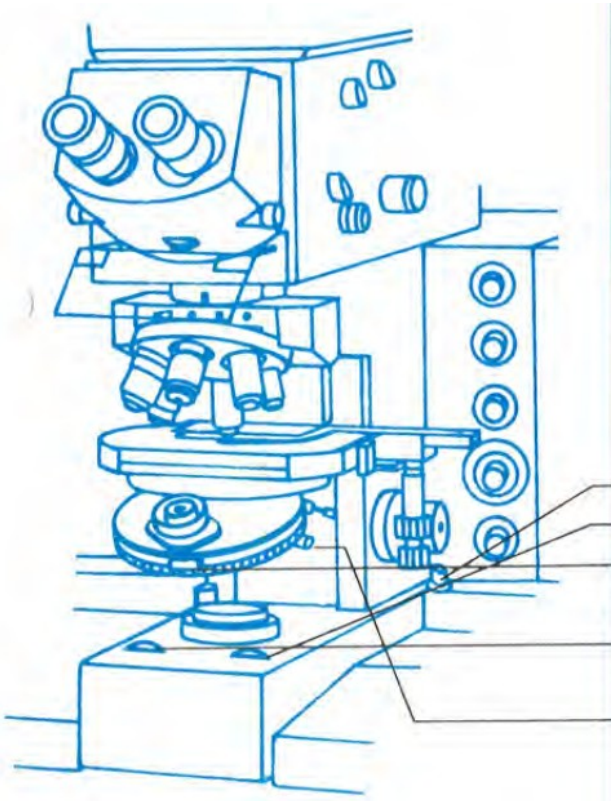


Field iris diaphragm aperture illumination for microphotometry
There is an iris diaphragm in the epifluorescence illuminator light pipe. This is adjusted to prevent UV fading of large areas of the specimen. Opening the field iris diaphragm is done by rotating the knurled ring, while focusing on the iris is done by loosening the hex lock pin and using it to slide the cylindrical part towards or away from the observer, then retightening the pin.
In the light pipe is an opening for inserting an aperture slide with a hole of desired size for microphotometry. These apertures are used when measuring the smallest object details, and are centered and focusable.

Light filter in the epifluorescence illuminator for aromatic amines
Exciter filter, interference divider mirror and blocking filter are coupled to each other and can be adjusted at the same time with the help of the sliding lever located on the front of the attachment.
The number designation is derived from the long wavelength end of the reflection band of the individual interference beam-splitting mirror, in nm divided by 10 (nm/10).

Filter Marking	Exciter filter	Interference mirror	Blocking filter	Use
40 White	UV exciter filter 18x2 UG 1	UV reflecting up to approx. 400nm	18x3 KV 418/VG	For UV-excitation, dopamine and derivatives
45 White	Violet exciter filter 18x5, λ=405nm	UV + blue reflecting up to approx. 450 nm	18x3 KV 418/VG	For Violet excitation, adrenaline, noradrenaline, serotonin. Narrow band exciter with very good distinction
45° yellow	Violet exciter filter 18x2, λ=425nm	UV + Blue reflective up to approx. 450 nm	18x3 (GG 9 + G2 + GG 9)/VG	For Violet excitation, adrenaline, noradrenaline, serotonin. Brighter fluorescence than above, however less distinction
56 Green	Cover plate	Green reflective until approx. 560 nm	18x3 OG 590/VG	By default, no function. The built-in filters are intended for future expansion



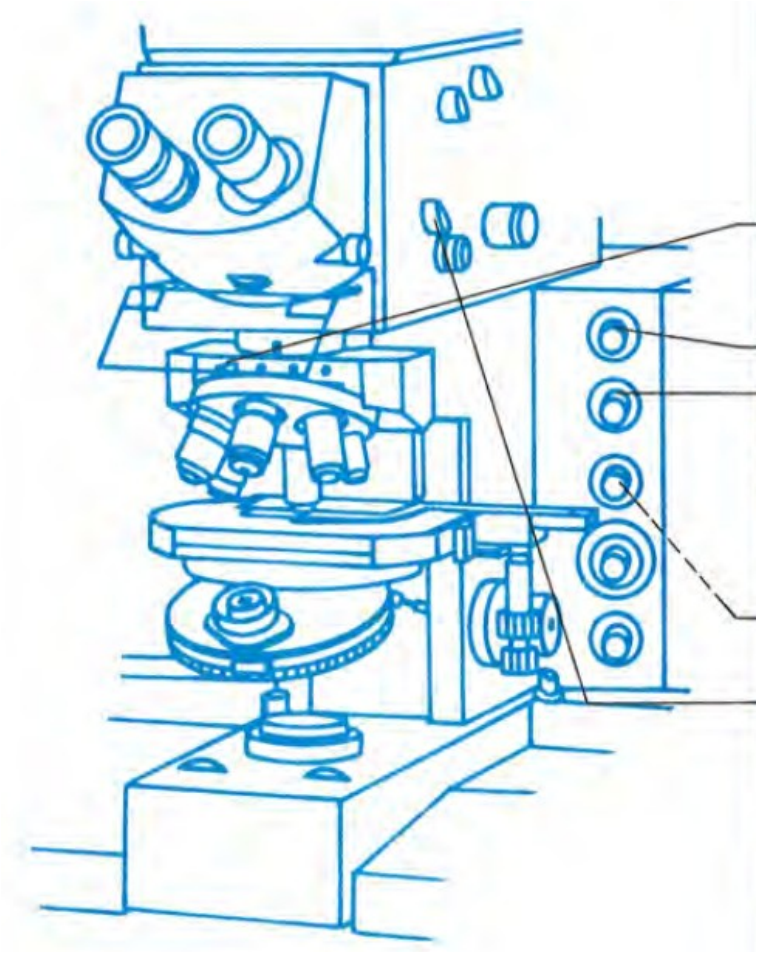


Mixed illumination: epifluorescence + transmitted-light darkfield, epifluorescence + transmitted-light darkfield fluorescence

A) transmitted-light darkfield with halogen lamp:

- Turn on halogen lamp with control transformer
- Turn on relay (red dot)
- Turn off neutral density filters in the ocular body (dot not visible)
- Turn off Bertrand lens (pull out pin)
- Set interference beamsplitter mirror to 40
- Turn to 40x objective when using the immersion darkfield condenser. Turn to 25x objective when working with the dry darkfield condenser located on the condenser turret. Use the 10x objective if the condenser is on the quick coupler
- Turn off exciter or filter for transmitted-light (red dot)
- Turn off neutral density filters for transmitted-light (red dot)
- Turn to darkfield condenser. Apply immersion oil to the immersion darkfield condenser. When working with the dry darkfield condenser and 40x or 25x apo objectives, an aperture is inserted into the condenser
- Swing out the transmitted-light filter polarizer
- Set condenser fine focus in the central position and use the coarse focus to raise condenser up to the stop. A uniform liquid contact should occur between the immersion darkfield condenser and the specimen slide
- Turn the lower condenser turret to the empty opening (red dot)
- Rotate off the auxiliary optics for wide field condenser (red dot)
- Adjust the collector for the transmitted-light halogen lamp (red dot)
- Adjust the photo system magnification changer to low magnification (red dot, L)
- Direct beam path to the camera (red dot, CAM)
- Direct 20% beam to the ocular tube (red dot, CAM/PRO)
- Rotate the phase ring knob to the empty position (red dot)
- Set relay magnification to 1x (red dot)
- On mirror house 2, set the rotary prism to transmitted-light with halogen lamp
- Turn off the analyzer or interference contrast main prism
- On mirror house 2, set exciter filter to red dot
- Switch off color filters for contrast fluorescence (red dot)
- Set the sliding mirror to halogen lamp (red dot)
- Switch off the automatic zoom lighting (lever to the side)
- Set manual zoom lighting to DF

- Fully open condenser turret iris diaphragm
- Focus on a specimen with coarse and fine adjustment
- Slightly close field iris and focus on its image with condenser fine adjustment
- Center field iris diaphragm in the middle of the field with centering screws on the condenser. Then open field iris diaphragm just wider than the field of view



B) epifluorescence

- Turn on the HBO 200W mercury-vapor high-pressure lamp
- Turn off the halogen lamp
- Attach the UV-blocking eyeshade
- Switch the interference beam-splitting mirror between 40 and 56, according to the desired excitation, for immunofluorescence (page C1), aromatic amines (page C5), or conventional fluorescence (page C3)
- Turn swivel mirror for light from the HBO high-performance lamp
- Turn the rotary prism for illumination from the HBO lamp
- With immunofluorescence, additional color filters can be moved into the light source path when needed, and the electronic shutter opened
- Correct the sharpness of the fluorescence image with fine focus
- Adjust the collector of the high-performance light to evenly illuminate the field
- With weak fluorescence, divert 100% light to the tube (EYE). You may also switch off the relay optics
- The field iris diaphragm in the epifluorescence light pipe can be adjusted via the knurled ring (CCW: open), and focused by loosening the hex rod and sliding the iris assembly towards or away from the operator.

C) mixed light: epifluorescence + transmitted-light darkfield

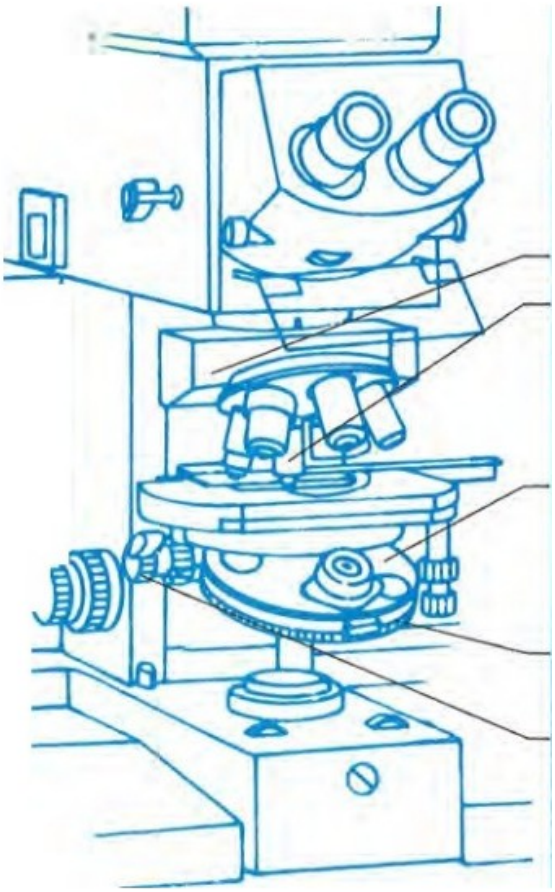
- Set up initially, as in (A), for transmitted-light darkfield with halogen lamp
- Then adjust as in (B), for incident-light fluorescence.
- Turn on the halogen lamp and adjust to simultaneously see transmitted-light darkfield and epifluorescence. To better distinguish the two superimposed images, a contrast filter can be switched on for the halogen lamp.

D) mixed light: light fluorescence + transmitted-light darkfield fluorescence

- Set up initially, as in (A), for transmitted-light darkfield with halogen lamp. Turn to a matching exciter filter in the transmitted-light beam to get transmitted-light darkfield fluorescence. The exciter filter can be inserted into the light tube or placed on the light aperture of the microscope base plate. When using a quick-change condenser, it may be in the filter holder of the condenser.
- Then set up fluorescence as in (B)
- Turn on the halogen lamp and adjust to simultaneously see transmitted-light darkfield fluorescence and epifluorescence.

Dark field condenser

The immersion-darkfield condenser and the dry darkfield condenser are described on page B4.



Mixed illumination: epifluorescence + transmitted-light phase- and anoptral-contrast

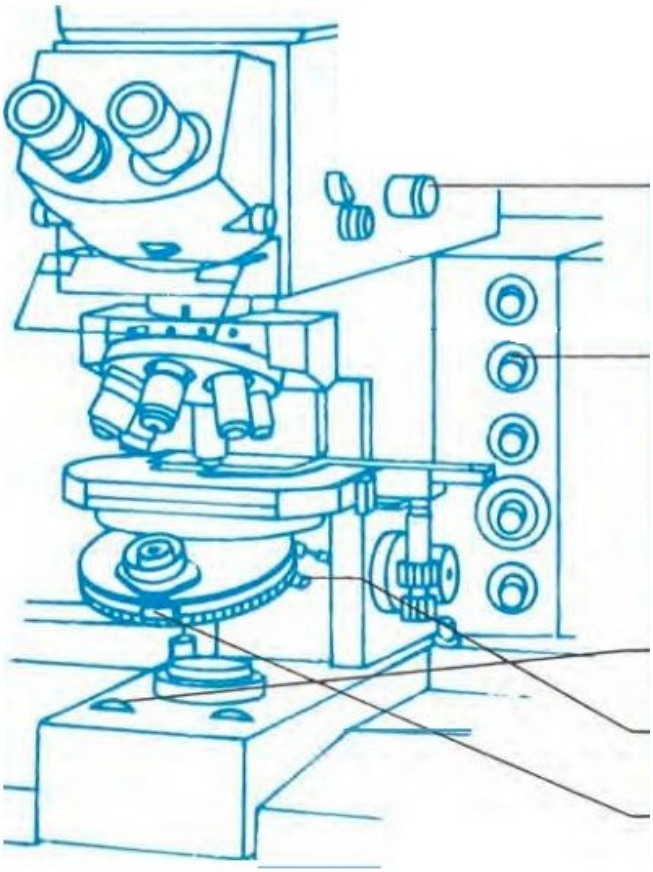
(A) Transmitted-light phase- and anoptral-contrast, halogen lamp

- Turn on halogen lamp. Turn on relay (red dot)
- Turn off Bertrand lens (pull out pin)
- Turn off neutral density filters in ocular body (no black dot)
- Turn off the analyzer or interference-contrast prism
- Turn on interference beamsplitting mirror 40
- Engage the 10x objective (all transmitted-light objectives from 10x up are suitable for phase- or anoptral-contrast)
- Switch off transmitted-light exciter filters (red dot)
- Switch off transmitted-light neutral density filters (red dot)

- Turn to brightfield condenser (following condensers can be used: immersion condenser NA=1.30 and dry condenser NA=0.90)
- Swing out transmitted-light filter polarizer

- Rotate the lower condenser turret to 10 Ph

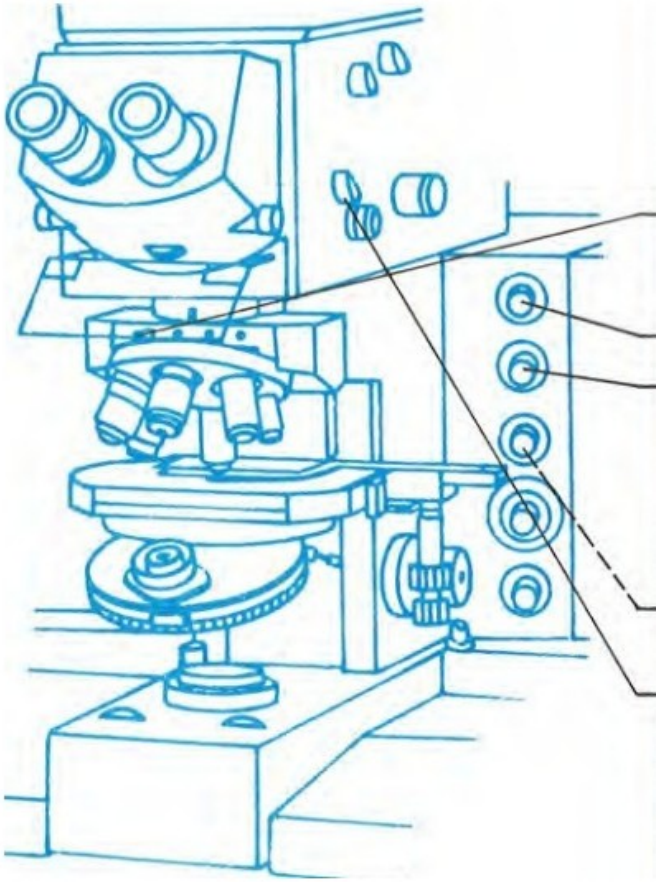
- Set condenser fine drive in the central position and lift condenser with coarse feed up to the stop
- Switch off the auxiliary optics for wide field condenser (red dot)
- Set collector for transmitted-light halogen lamp (red dot)



- Adjust the photo system magnification changer to low magnification (red dot, L)
- Direct the beam path to the camera (red dot, CAM)
- Direct beam (20%) to the ocular body (red dot, CAM/PRO)
- Rotate the phase ring per the objective: e.g., 10 for phase contrast or 10A for anoptral-contrast, for 10x objective
- Set magnification changer to 1x (red dot)

- On mirror house 2, turn rotary prism for transmitted-light using the halogen lamp
- Switch off the color filters for contrast fluorescence (red dot)
- On the mirror house 2, set exciter filter to red dot
- Set the sliding mirror to the halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment

- Close field iris diaphragm, then focus the its image in the specimen image plane with condenser fine focus
- Center field iris diaphragm in the middle of the field with centering screws on the condenser. Then open field iris diaphragm just wider than the field of view.
- Open the condenser iris wide open
- When using stronger objectives, don't forget to use the appropriate contrast ring setting



B) epifluorescence

- Turn on HBO 200W mercury-vapor lamp
- Turn off the transmitted-light halogen lamp
- Mount the UV blocking shade

- Switch to the desired exciter interference beam-splitting mirror (40 to 56) - as described (page C1), aromatic amines (page C5), or conventional fluorescence (page C3) for immunofluorescence
- Rotate the swivel mirror for epi-illumination from the HBO lamp
- Turn the rotary prism for epi-illumination from the HBO lamp
- If immunofluorescence is present, swing out the cover plate in the light-pipe hinged filter group, and perhaps swivel additional color filters into the light-pipe, and open the electronic shutter. Correct the sharpness of the fluorescence image with fine focus
- Adjust the collector of the HBO lamp to evenly illuminate the field

- For weak fluorescence, divert 100% of the light to oculars (EYE)
- Close the field iris diaphragm in the epifluorescence light-pipe with the knurled ring, and focus your image after loosening the hex shaft and moving forward or backward

C) mixed light:

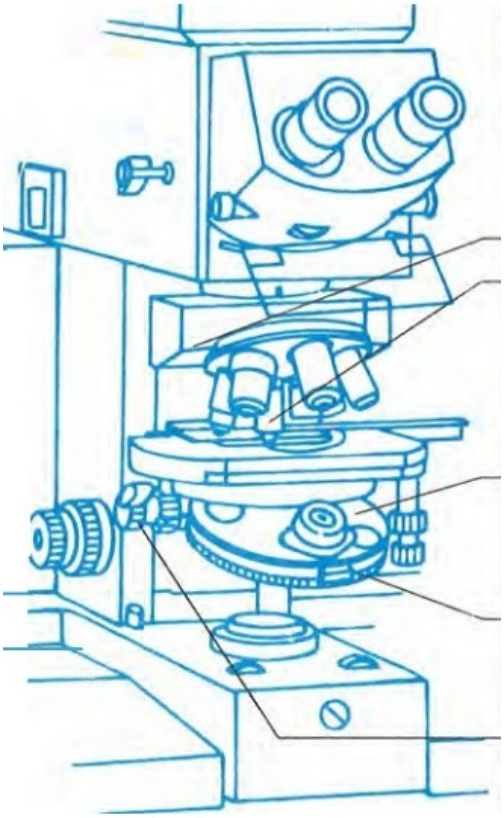
- Turn on the halogen lamp so that the epifluorescence image and transmitted-light phase contrast image can be seen simultaneously; to better distinguish between the two images, you can insert a contrast filter into the halogen lamp light path

Phase ring knob with phase and anoptral annuli

This turret contains the phase and anoptral annuli (rings) that be inserted into the relay optical path. The annuli are marked with the lens magnification of the appropriate objective, e.g., the phase ring 10 and the anoptral ring 10A are for the 10x objective. In the position 0 (red dot), the knob positions the empty hole into the beam path

Ring aperture

The phase/anoptral rings are included in the lower rotating condenser turret. For correct centering, each ring must be adjusted to the image of the corresponding ring diaphragm (in the relay system turret) when changing objectives (page B6)



Mixed illumination: epifluorescence + transmitted-light interference contrast

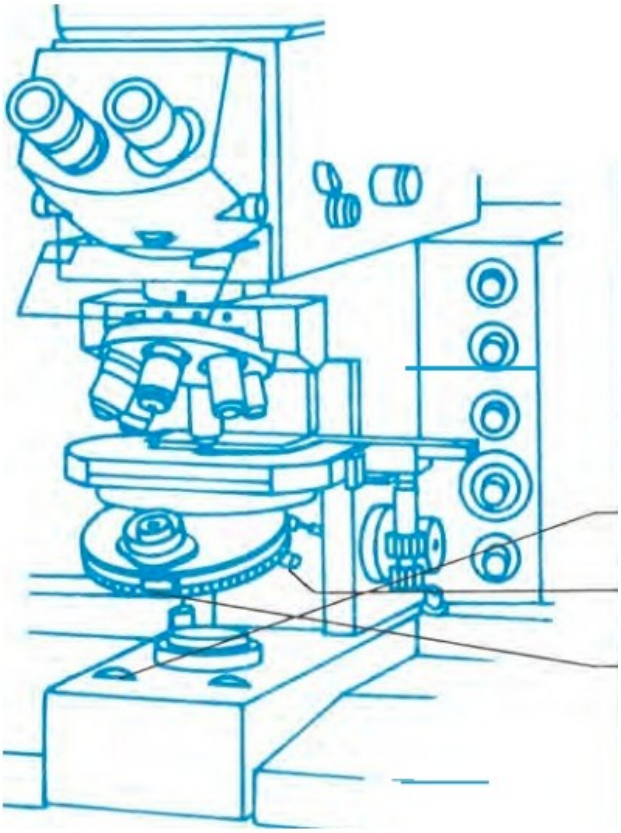
A) Transmitted-light interference contrast with halogen lamp

- Turn on halogen lamp
- Turn on relay optics (red dot)
- Turn off Bertrand lens (pull out pin)
- Turn off neutral density filters in the ocular body (black dot not visible)
- Rotate main prism for transmitted-light
- Set interference beamsplitter to 40
- Turn to 10x objective (with this objective magnification, interference contrast studies can be performed. Only stress-free (IK or P) objectives may be used
- Switch off exciter or color filters for transmitted-light (red dot)
- Switch on neutral density filters for transmitted-light

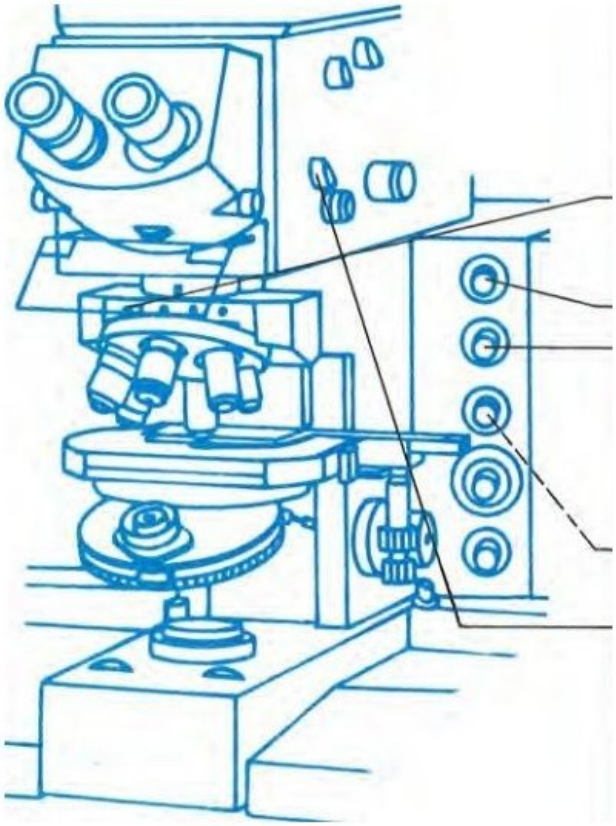
- Rotate upper condenser turret to brightfield condenser. The following strain-free condensers (P) can be used: dry condenser, NA=0.90, and immersion, NA=1.30

- Turn lower condenser turret to the compensation prism 10 IC
- Swing off the transmitted-light filter polarizer

- Set condenser fine drive in the central position and raise condenser with coarse feed up to the stop
- Switch off the auxiliary optics for wide field condenser (red dot)
- Set collector for transmitted-light halogen lamp (red dot)



- Adjust the relay magnification to low (red dot, L)
- Direct beam path to the camera (red dot,CAM)
- Set ocular light to 20% (red dot, CAM/PRO)
- Switch off the phase ring knob (red dot)
- Set magnification changer to 1x (red dot)
- With mirror house 2, set the rotary prism to transmitted-light with halogen lamp
- Switch off the color filters for contrast fluorescence (red dot)
- With mirror house 2, set exciter filter off (red dot)
- Set sliding mirror for halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment
- Slightly close field iris and focus the iris image in the specimen plane with condenser fine adjustment
- Center the field iris diaphragm in the middle of the field of view with centering screws. Then open field iris diaphragm just wider than the field of view
- Close condenser iris diaphragm just until the microscopic image appears clear and full of contrast, but without diffraction halos
- Adjust the main interference contrast prism by turning the knurled screw to the desired contrast (black and white or color)
- When switching to a stronger objective, use the appropriate IC prism in the lower condenser turret



B) epifluorescence

- Turn on HBO 200W mercury-vapor lamp
- Turn off the transmitted-light halogen lamp
- Mount the UV blocking shade
- According to the desired exciter, move slide to interference beam-splitting mirror 40 to 56 for immunofluorescence (page C1), aromatic amines (page C5) or conventional fluorescence (page C3)
- Turn swivel mirror for light from high-performance lamp
- Turn rotary prism for illumination with high-performance lamp
- With immunofluorescence, swing out the light-pipe filter opaque plate, and if necessary swivel into place additional color filters and open the electronic shutter
- Fine focus on the fluorescence image

- Evenly light the field with the collector of the high-performance lamp

- With weak fluorescent images, divert 100% light to the oculars (EYE); you may also switch off the relay
- Adjust the field iris diaphragm (in the epifluorescence light-pipe) using the knurled ring, and sharpen the iris image in the image plane by loosening hex shaft and sliding fore-and-aft

C) mixed light

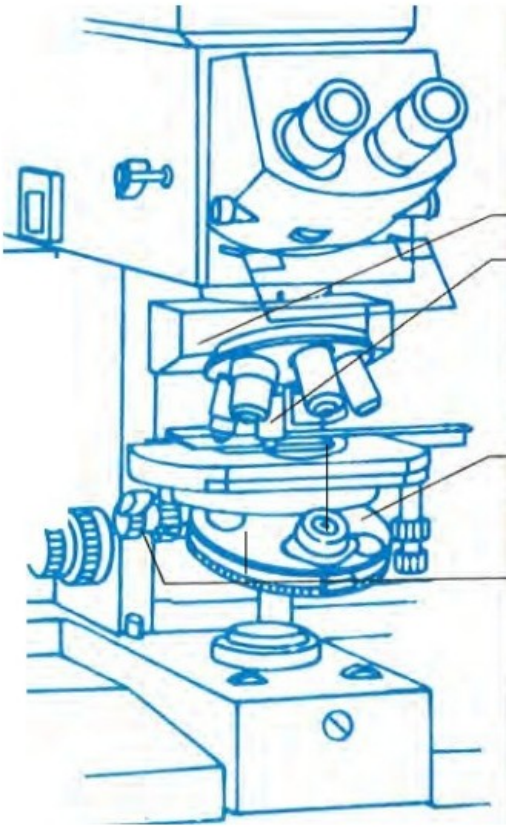
- Turn on the halogen lamp so that the epifluorescence image and the transmitted-light interference contrast image can be seen at the same time
- To better distinguish between of the two images, you can rotate in a contrast filter for the halogen lamp

Interference contrast (IC) main prism for epifluorescence

The interference contrast main prism is inserted from the right into the fluorescence light path. The front spring retainer must be pulled out on the optics carrier so that it can engage the indent in the prism slide. An analyzer is permanently installed over the main prism. With the edge screw on the device you can adjust the contrast type, black or colored.
Engaged - IC main prism slid in all of the way
Disengaged - IC main prism pulled out to the stop

Interference contrast prisms

The IC prisms are firmly incorporated into the lower turret of the condenser. They are marked with the objective magnification and with IC. A unique compensation prism is required for each objective magnification. A polarizer is firmly fitted under each compensation prism.
The lower condenser turret contains compensation prisms and ring apertures for phase contrast, but you can adjust only the ring apertures with the condenser centering screws. A mistaken adjustment of the fixed adjusted compensation prisms is not possible.

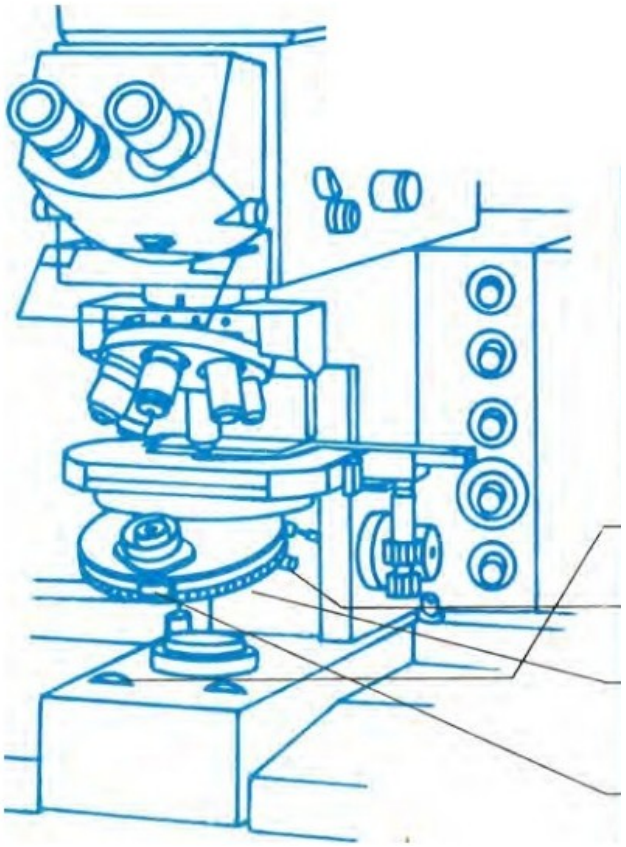


Mixed illumination: epifluorescence +transmitted-light polarization

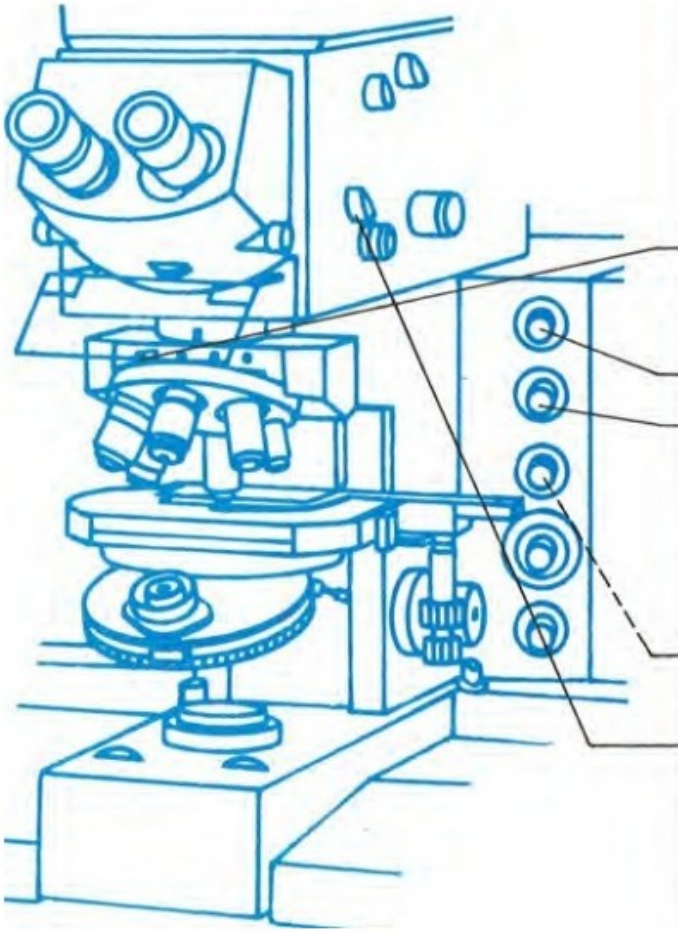
A) Polarization with halogen lamp

- Turn on halogen lamp with control transformer
- Turn on optical relay (red dot)
- Disengage Bertrand lens (pull out pin)
- Rotate off the neutral density filters in the ocular body (black dot not visible)
- Install the analyzer
- Set interference beamsplitter to 40
- Rotate 10x objective into place. Stress-free objectives, marked with P or IK, must be used for polarization investigations
- Remove exciter, neutral density, and color filters from transmitted-light path (red dots)

- Rotate upper condenser turret to brightfield. All condensers described on page B2 are available in strain-free
- Turn lower condenser turret to empty opening (red dot)
- Set condenser fine drive in the central position and raise condenser with coarse feed up to the stop
- Turn condenser auxiliary turret to red dot
- Set the collector for transmitted-light halogen lamp to red dot



- Set the photo magnification changer to low (red dot, L)
- Direct light path to the camera (red dot, CAM)
- Direct 20% beam to the ocular tube (red dot, CAM/PRO)
- Turn the phase ring knob to off (red dot)
- Set magnification changer to 1x (red dot)
- On the mirror house 2, set the rotary prism to transmitted-light with halogen lamp
- Set off color filters for contrast fluorescence (red dot)
- On mirror house 2, set exciter filter to red dot
- Set sliding mirror to halogen lamp (red dot)
- Turn on automatic zoom lighting (red dot)
- Focus on a specimen with coarse and fine adjustment
- Center the field iris diaphragm in the middle of the field of view with centering screws. Then open field iris diaphragm just wider than the field of view
- Close condenser iris diaphragm just until the microscopic image appears clear and full of contrast, but without diffraction halos
- Swivel into place the polarizer on the bottom of the condenser. The interference colors are visible when observing a birefringent specimen. To highlight the interference colors, close the condenser iris more than the usual 2/3
- For comparative observations with normal light, you can swivel out the polarizer or the analyzer



B) Epifluorescence

- Turn on the HBO 200W mercury vapor lamp
- Turn off the halogen lamp
- Mount the UV blocking shade

- For the desired UV exciter, set the interference beam-splitting mirror from 40 to 56 for immunofluorescence (page C1), aromatic amines (page C5), or conventional fluorescence (page C3)
- Rotate the swivel mirror for light from the HBO lamp
- Turn the rotary prism for light from the HBO lamp
- With immunofluorescence, swing out the light-pipe filter opaque plate, and if necessary swivel into place additional color filters and open the electronic shutter
- Adjust the sharpness of the fluorescent image with fine adjustment
- Evenly light the field with the collector of the high-performance lamp

- With weak fluorescent images, divert 100% light to the oculars (EYE). You may also switch off the relay
- Adjust the field iris diaphragm (in the epifluorescence light-pipe) using the knurled ring, and sharpen the iris image in the image plane by loosening hex post and sliding fore-and-aft

C) Mixed illumination

- Turn on the halogen lamp so that the epifluorescence image and the transmitted-light interference contrast image can be seen at the same time
- To better distinguish between of the two images, you can rotate in a contrast filter for the halogen lamp

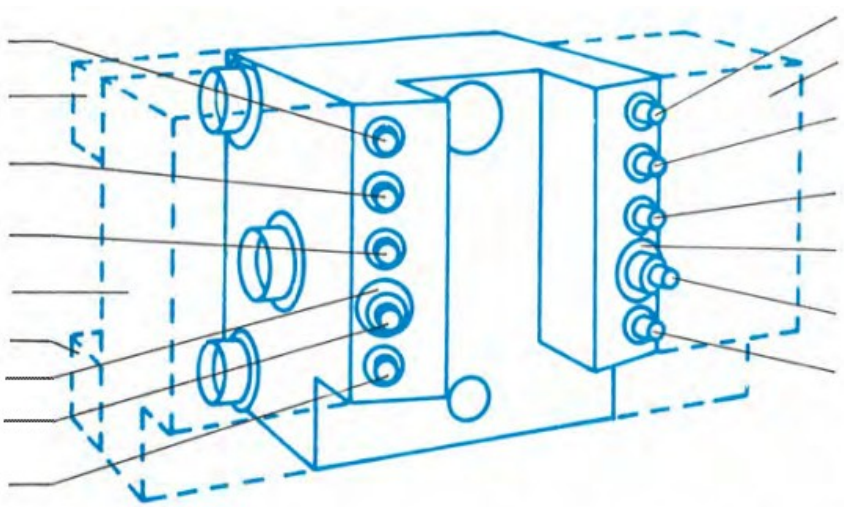
Transmitted-light analyzer in the epifluorescence attachment

The analyzer is built into a slide and oriented North-South. It can be inserted into the microscope after pulling out the spring retainer which is located in front of the epifluorescence head
Two stop positions is as follows:
Push the slide to the left stop position = Analyzer off
Push the slide to the right stop = Analyzer on

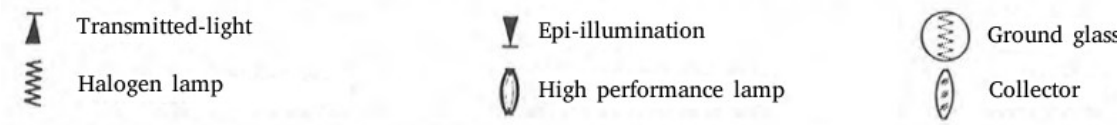
Transmitted-light polarizer

The swing-out polarizer is mounted on the underside of the condenser. The east-west plane of polarized light is the working position.

Mirror House 4



On the mirror-house 4, a halogen lamp can be used for both transmitted and reflected light and can be supplemented by two high-power lamps; e.g. on the left, lamp house 25, and on the right, lamp house 50. The mirror knobs allow (by simply switching):
a) alternating the lighting between transmitted or epi-illumination
b) mixing lighting from transmitted or epi-illumination
c) simultaneous lighting, e.g., contrast- or darkfield fluorescence



Use and combination of the exciter and blocking filter:
The exciter and blocking filters have the same color, allowing a rapid mapping.

Transmitted-light fluorescence methods with lamp houses 25 or 50	**Transmitted-light filter selector** N	CF	U	S	**Transmitted-light filter**
Visible light	●	●	○	●U	●○
UV-Brightfield	●	●	U 1	●U	●
UV-Darkfield	●	●	U 2	●U	●○
UV-Contrast fluorescence	●	●◎◎ *)	U 3	●U	●
Blue fluorescence (e.g. quinacrine)					
Blue brightfield	●	●	S	S 1	●
Comparative observation visible L.	●	●	S	S 2	●○
Blue darkfield	●	●	S	S 3	●
Immunofluorescence (darkfield)					
FITC, broadband, blue	●	●	S	S 1	●
FITC, narrow-band, blue	●	●	S	S 2	●
Rhodamine, narrow-band, green	●	●	S	S 3	●
Catecholamines (darkfield)					
UV for dopamine detection	●	●	S	S 1	●○
Catecholamines, broadband	●	●	S	S 2	●
Catecholamines narrowband	●	●	S	S 2	●○

*) according to choice

Filter hub N for transmitted-light

● (Red dot)	Empty opening	
●	Neutral density filters	32x2 N3, T=12.5%
●	Neutral density filters	32x2 N6, T=1.6%
●	Neutral density filters	32x2 N9, T=0.2%
●	Neutral density filters	32x2 N12, T=0.025%
⊗	Cover plate	

Filter holder CF for contrast fluorescence

● (Red dot)	Empty opening
○ (red)	Red filter 50x3 RG 610/h
○ (black)	Neutral density filter 50x2 N6, T=1.6%

Filter hub U for transmitted-light

U1 (yellow)	Exciter filter for UV brightfield 50x(2.5 BG 38/h + 3 UG 1/h)
U2 (white)	Exciter filter for UV darkfield 50x1.5 UG 1/h
U3 (yellow)	Exciter filter for simultaneous contrast fluorescence 50x (2 BG 12/h + 1.5 UG 1/h)
O (white)	IR- and UV-blocking filter 50x (4 KG 3/h + 2 GG 395 + 1.5 FG 2)
S (black)	IR-blocking filter 50x 1.7 KG 1/h
O	Cover plate

Filter hub S for transmitted-light

● (Red dot)	Empty opening
○ (blue)	Conversion filter for halogen lamp, 3200° to 6000°K, 32x2 KB 12
○ (green)	Green filter for phase contrast and photo, 32x2 VG 14/h

For conventional blue fluorescence (e.g., with quinacrine)

S1 (blue)	Exciter filter for blue brightfield 32x3 BG 12/h, 2 Pcs.
S2 (white)	Neutral density filters for comparison observation with visible light, 32x2 N 6, T=1.6%
S3 (blue)	Exciter filter for blue darkfield, 32x3 BG 12/h

For immunofluorescence (only with darkfield condenser)

S1 (blue)	Exciter filter for FITC, broadband, 32x(2.5 FITC 490 + 2 GG 395)
S2 (blue)	Exciter filter for FITC, narrowband, 32x3, 5 FITC-N
S3 (green)	Exciter filter for rhodamine, narrowband, green, 32x4 (λ=546nm)

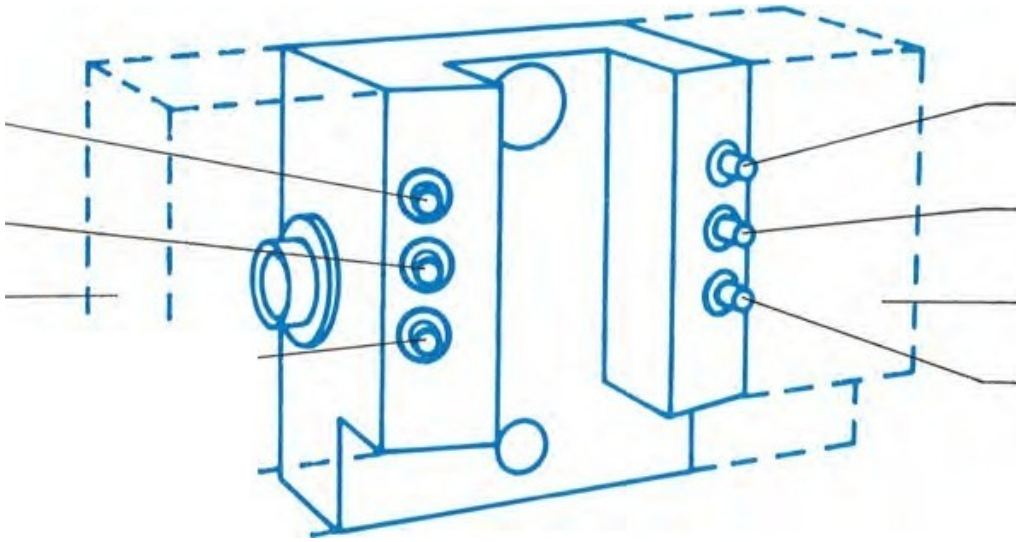
For catecholamines (only with darkfield condenser)

S1 (white)	Exciter filter for UV for dopamine detection, 32x1.5 UG 1/h
S2 (yellow)	Exciter filter for catecholamines, broadband, 32x2 CAT 425
S3 (white)	Exciter filter for catecholamines, narrowband, 32x5 (λ = 405nm)

Blocking-filter slide in the transmitted-light optics carrier

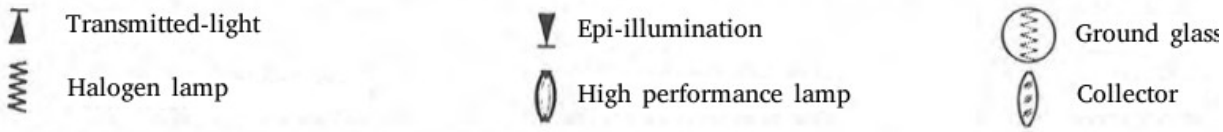
O (yellow)	UV blocking filters 25x3 KV 450/VG
OO (red, white)	UV blocking filters 25x3 KV 418/VG
O (blue)	Blue blocking filter 25x3 (GG9 + OG 515/VG
O (green)	Blue blocking filter 25x3 (GG9 + OG 530/VG. For immunofluorescence for observation of rhodamine, the green blocking filter 25x3 OG 590/VG is used. It is combined with filter S3.

Mirror House 2



On the mirror house 2, two bulbs of your choice can be attached, e.g., the halogen lamp on the left, and the lamp house 25 or 50 on the right. This allows:

a) alternative transmitted- or epi-illumination
b) mixed transmitted- and epi-illumination



Use and combination of the exciter and blocking filter:
The exciter and blocking filters have the same color, allowing a rapid mapping.

Transmitted-light fluorescence methods with lamp houses 25 or 50	Transmitted-light filter selector N	Transmitted-light filter selector S	Transmitted-light filter
Visible light	●	●	● ○
Conventional fluorescence and quinacrine:			
UV Brightfield	●	S 1	●
UV darkfield	●	S 2	● ○
Blue darkfield	●	S 3	●
Blue brightfield	●	S 3 *)	●
Immunofluorescence (darkfield):			
FITC, broadband, blue	●	S 1	●
FITC, narrow-band, blue	●	S 2	●
Rhodamine, narrow-band, green	●	S 3	●
Catecholamines (darkfield):			
UV for dopamine detection	●	S 1	● ○
Catecholamines, broadband	●	S 2	●
Catecholamines narrowband	●	S 3	● ○

*) A loose excitation filter, 50x3 BG 12/h, is placed on the UV light-shield tube, is placed on the lightwell opening of the microscope base, for a blue brightfield.

Filter hub N for transmitted-light

● (Red dot)	IR-blocking filter	32x1.7 KG 1/h
●	Neutral density filters	32x2 N3, T=12.5%
●	Neutral density filters	32x2 N6, T=1.6%
●	Neutral density filters	32x2 N9, T=0.2%
●	Neutral density filters	32x2 N12, T=0.025%
⊗	Cover plate	

Filter hub S for transmitted-light

● (Red dot)	IR- and UV-blocking filter 32x (3 KG 3/h + 2 GG 395 + 1.5 FG 2)
○ (blue)	Conversion filter for halogen lamp, 3200° to 6000°K, 32x2 KB 12
○ (green)	Green filter for phase contrast and photo, 32x2 VG 14/h

For conventional fluorescence (e.g., with quinacrine)

S1 (yellow)	Exciter filter for UV brightfield 32x(2.5 BG 38/h + 3 UG 1/h)
S2 (white)	Exciter filter for UV darkfield 32x1.5 UG 1/h)
S3 (blue)	Exciter filter for blue darkfield, 32x3 BG 12/h

A loose filter for blue brightfield is to be placed on the UV-light shield tube, 50x3 BG 12/h

For immunofluorescence (only with darkfield condenser)

S1 (blue)	Exciter filter for FITC, wideband, 32x(2.5 FITC 490 + 2 GG 395)
S2 (blue)	Exciter filter for FITC, narrowband, 32x3.5 FITC-N
S3 (green)	Exciter filter for narrowband, rhodamine, green, 32x4 (λ=546nm)

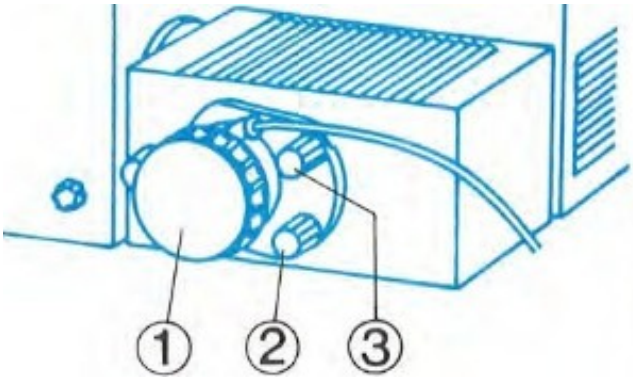
For catecholamines (only with darkfield condenser)

S1 (white)	Exciter filter for UV Dopamine detection, 32x1.5 UG 1/h
S2 (yellow)	Exciter filter for catecholamines, wideband, 32x2 CAT 425
S3 (white)	Exciter filter for catecholamines, narrowband, 32x5 (λ= 405 nm)

Blocking-filter slide in the transmitted-light optics carrier

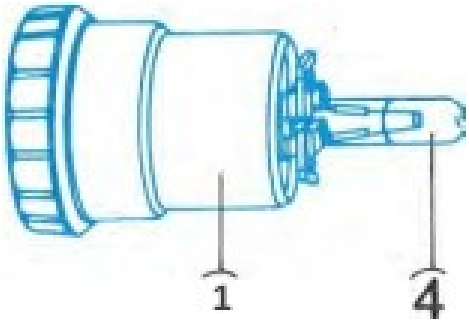
O (yellow)	UV-blocking filters 25x3 KV 450/VG
OO (red, white)	UV-blocking filters 25x3 KV 418/VG
O (blue)	Blue blocking filter 25x3 (GG9 + OG 515)/VG
O (green)	Blue blocking filter 25x3 (GG9 + OG 530)/VG.

For immunofluorescence for observation of rhodamine, the green blocking filter 25x3 OG 590/VG is used. It is combined with filter S3.



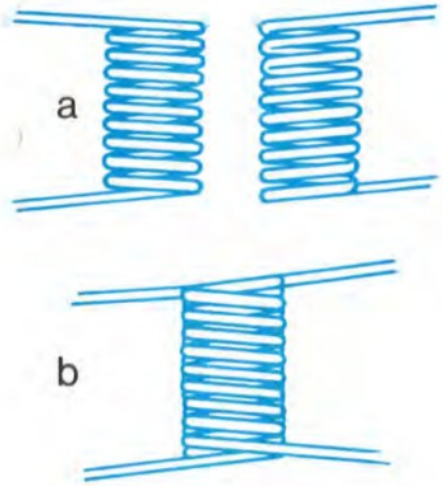
Lamp house 10
The lamp house 10 houses the 100W low-voltage halogen bulb.

Insert the 100W low voltage halogen light bulb
• Loosen the cam screw ③, pull out the lamp socket ① from the housing. Hold the new bulb ④ with optical tissue, and insert its pins into the lamp pin holes while pressing together the spring-loaded clamp levers. After the levers are released, the lamp is held firmly.
Following insertion of the lamp into the socket, always clean the lamp glass with an optical wipe.
Insert the lamp socket back into the housing, making sure the lamp filament is vertical, and turn the cam lock ③ to secure.



Electrical connection of the low voltage halogen lamp
Connect the lamp cord to the device described on page D11, or to an independent 0-12v AC or DC power supply.

Adjustment of the low-voltage halogen lamp
• Rotate to the 10x objective, and use 10x eyepieces in the observation tube. Do not place a specimen on the stage
• After switching on the low-voltage halogen lamp, adjust for transmitted-light brightfield microscopy
• Swivel the ground-glass to off
• Turn the collector of the halogen lamp In a clockwise direction until it stops.
• Redirect 100% light to the observation tube, and set prism to position EYE
• Position a sheet of paper about 10 cm from an eyepiece to view an image of the filament on the paper, by height adjustment of the brightfield condenser (NA=0.90 or NA=1.30) with coarse and fine adjustment of the condenser height



• Two images are visible, and one image is the figure of the filament made by the collector lens, while the second is from the reflector built inside the lamp house, Fig.a
• Slightly loosen cam lock ③. Move the lamp socket in and out to merge the two filament images sideways together as in Fig.b. Tighten the cam-lock ③
• Loosen the screw ②, rotate the lampholder to merge the two filament images vertically as in Fig.b.

If still dark gaps are visible between the single coils, a slight twisting of the bulb holder may get rid of the dark gaps

• Tighten the lock ②

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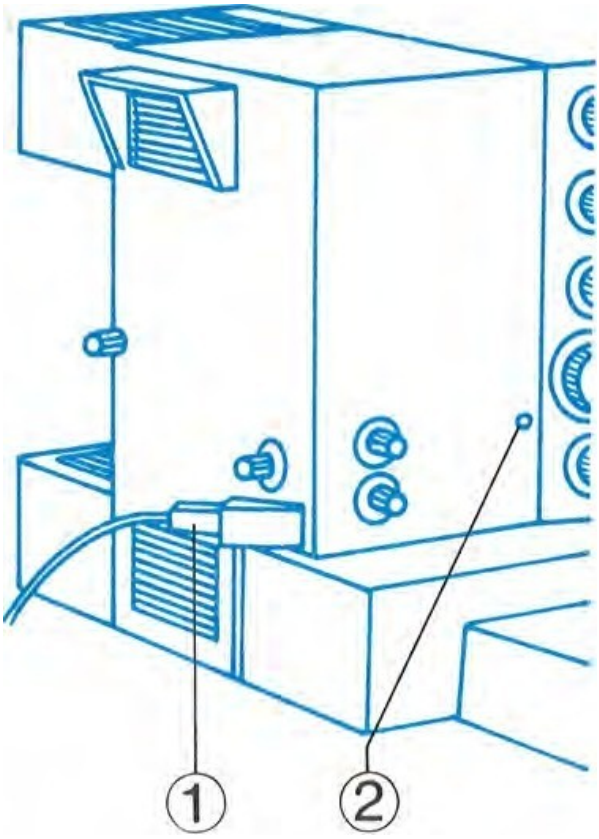
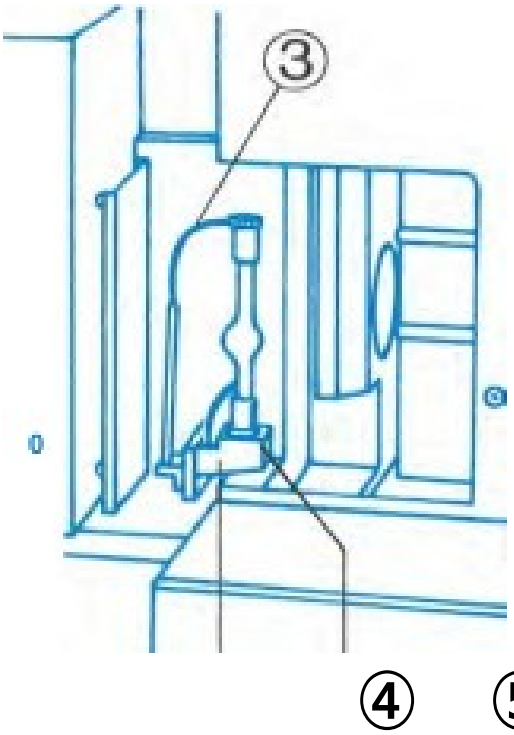


Lamp House 25
The lamp house 25 is manufactured in two versions; one mounted on the left side of the mirror house, the other on the right side. The illustration shows the left-mounted version.
The following lamp can be used in the lamp house 25: HBO 200W/4 or CS 200W/4 mercury vapor high-pressure lamp; CSI 250 W/1 metal halide short-arc lamps

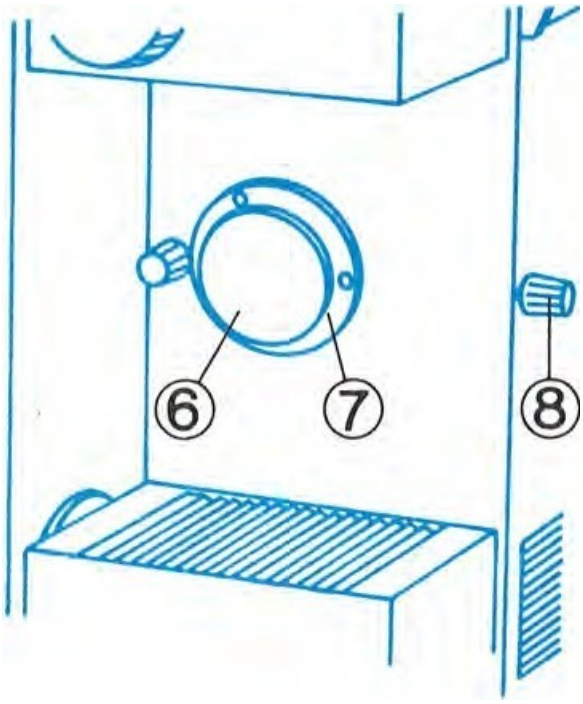
Use of mercury-vapor, high-pressure lamp HBO 200W/4 or CS 200W/4 and the CSI metal halide short-arc lamp 250W/1

PLEASE NOTE!
Disconnect the connection cable ① before opening the lamp house!

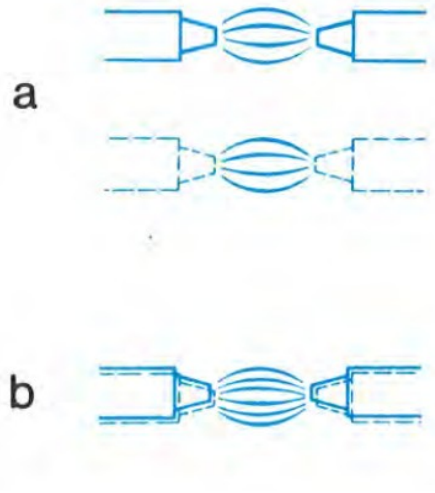


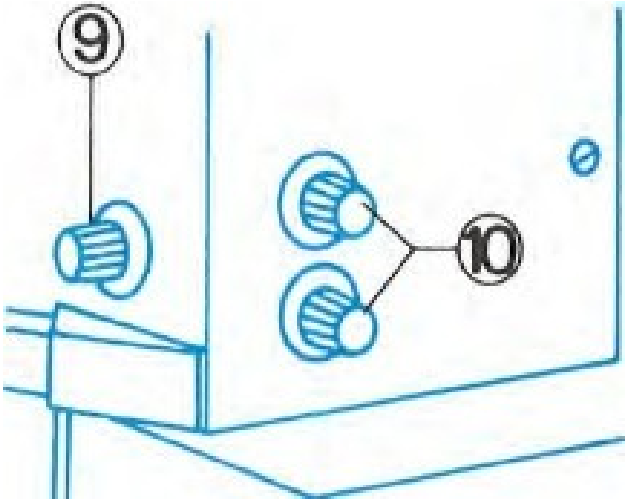
- Handle the lamp carefully to prevent mechanical damage. Touch the lamp base instead of the quartz body. When tightening the lamp, always hold the base so no rotation or bending forces act on the quartz body. Before first use, clean the quartz body with a clean cloth and alcohol, since fingerprints on the quartz body will burn. For reasons of operational safety, change the lamp when the average lifespan is reached – please observe the instruction manual for the lamp.
- With the coin screw ②, open lamp house. Screw the lamp into the bracket ④, so that the inscription on the base is legible. If the arc point of the quartz bulb is not be located in the optical beam path (reflector-collector axis) when the lamp housing is closed, loosen the grub screw ⑤ to correct the position of the lamp. Then tighten the grub screw ⑤.
- Connect the cable ③ to the threaded stud of the upper lamp end and tighten with the knurled nut.
- Close the lamp housing and tighten the coin screw ②.
- Electrical connections for the HBO 200W/4 or CS 200W/4 mercury-vapor high-pressure lamps and the CSI 250 W/1 metal halide short arc lamp: the electrical connection of the lamp is via the connecting devices described on page D12.

PLEASE NOTE!
Close the lamp house before lighting the lamp, to protect the sensitive electronics in the photo automation circuitry



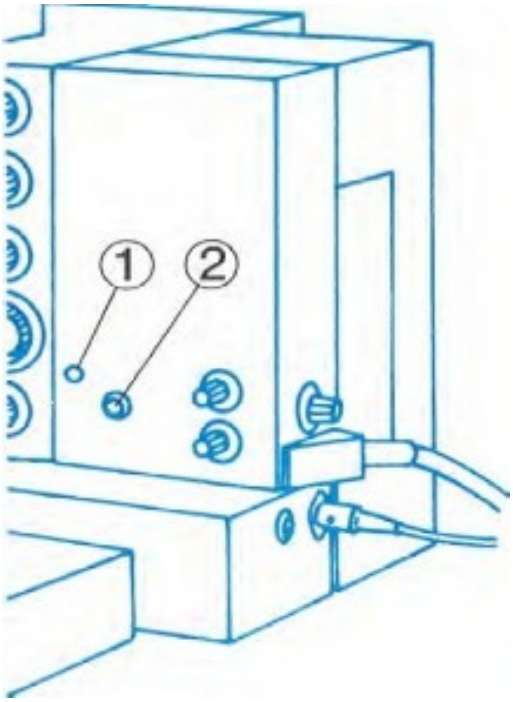
Inserting the spectral lamps
A spectral lamp can be installed in the opening ⑦ after loosening the clamping screw ⑧ and removing the blank ⑥. The mercury vapor high-pressure lamp or the metal halogen short-arc lamp must be removed from the lamp house.





Adjust the HBO 200W/4 or CS 200W/4 mercury-vapor high-pressure lamp or the CSI 250W/1 metal halide short arc lamp:

- Turn to the 10x objective, and insert the 10x eyepieces into the observation tube.
- Ignite the lamp, and with no specimen on the stage, set the Univar to transmitted-light brightfield microscopy with epi-illumination
- Switch off the ground glass
- Turn off automatic zoom lighting and adjust handwheel for zoom to 63. Turn the collector knob of the high-performance lamp counterclockwise until it stops.
- Redirect the microscopic optical path to view the lamp arc on the projection screen. This is done through height adjustment of the brightfield condenser NA=0.90 or NA=1.30 with the condenser knobs, or with coarse and fine adjustment of the microscope. If there is no projection head, the observation of the arc is made through the eyepieces using the ocular body's neutral density filters
- There will be seen two arc images, fig.a: one directly from the collector, the second from the reflector built inside the lamp house
- The side adjustment screw ⑨ on the lamp house is used to set both images to the same size. Then you can superimpose both images, as in Fig.b, by turning the two screws ⑩ located on the front of the lamp house. This way the arc will be located exactly on the collector/reflector optical axis



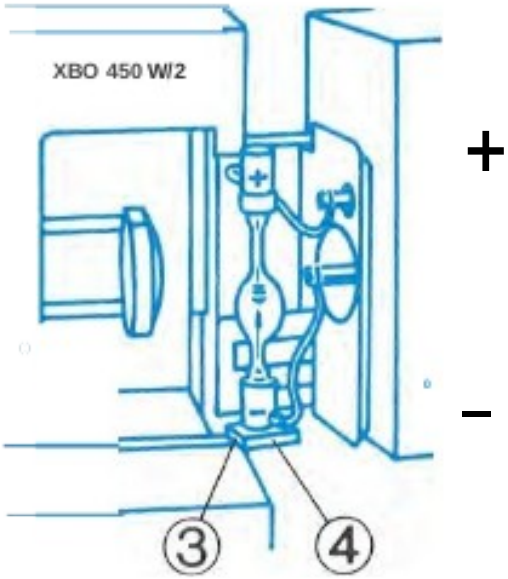
Lamp house 50
The lamp house 50 can hold either the XBO 450W Xenon lamp or the HBO 200 W/2 mercury-vapor high-pressure lamp

Installation of the XBO 450W/2 Xenon lamp:
PLEASE NOTE! Before opening the lamp house, unplug the connection cable.

The lamp contains a pressure of several atmospheres. For safety reasons it therefore required to put on a protective mask and put on gloves with cuffs when the cover is removed from the lamp. Touch lamp only by the posts. If the quartz body was accidentally touched immediately clean with alcohol and then with distilled water. For reasons of operational safety, change the lamp when a maximum of 25% of the average life has been exceeded; please note the operating instructions of the lamp.

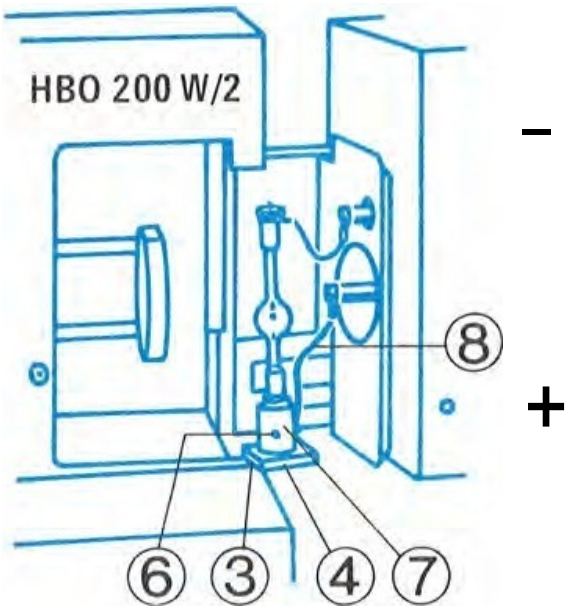
- Use the coin screw ① to open the lamp house.
- Insert the lamp with protective cover into the bracket ④, with the plus end up. The flexible cables should be attached to the terminals with hex nuts. The cables are there so that no forces act on the lamp, and they should not touch the walls, due to danger of a short-circuit.
- Clamp the lamp into its holder with the setscrew ③
- Don face protection and gloves, and remove the lamp cover
- Close the lamp house and tighten the coin screw

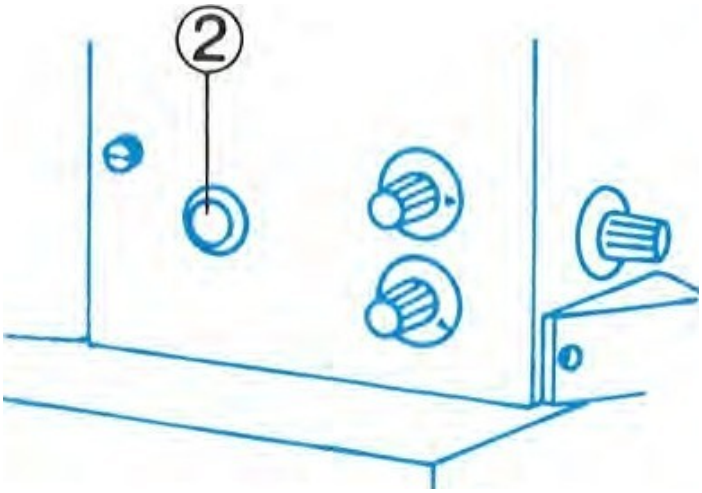
Note: If the flexible cables are more than 100mm long, and are not carefully arranged, then the lamp may fail to ignite, since the cables may short out to the metal housing

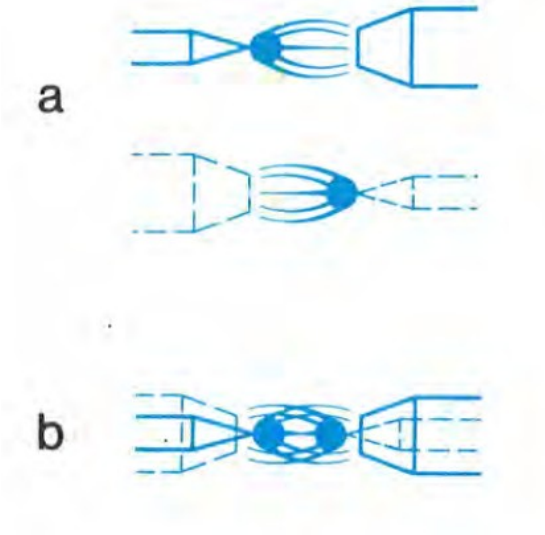


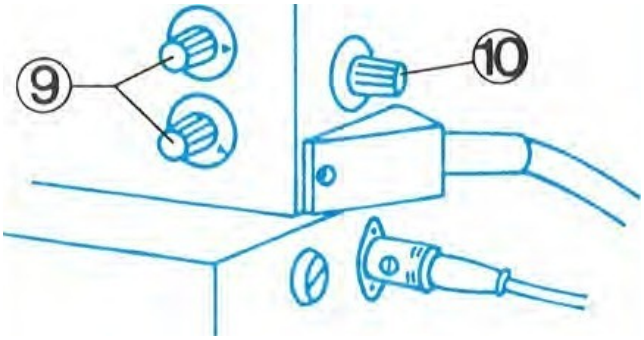
Installation of the mercury-vapor high-pressure lamp HBO 200W/2:
PLEASE NOTE! Before opening the lamp house, unplug the connection cable.

- Handle the lamp carefully to prevent mechanical damage. Touch lamp not on the quartz body, but by the metal ends. When tightening the lamp, always hold the respective base so no turning or bending forces act on the quartz body. Before first use, clean the quartz body with a clean cloth and alcohol, since fingerprints on the quartz will burn. For reasons of operational safety, change the lamp when a maximum of 25% of the average life has been exceeded; please note the operating instructions of the lamp.
- Loosen the coin screw ① and open the lamp house. Screw the supplied connection cable ⑧ to the adapter ⑦. Insert the adapter ⑦ into the holder ④ and clamp with setscrew ③. Fasten the lower cable ⑧ of the adapter with hex nut, clamp the upper short connection cable ⑤ with hex nut on the house wall. Screw the mercury vapor high-pressure lamp into the adapter, positive end down.
- If the arc point of the quartz bulb is not located in the optical beam path (reflector-collector axis) when the lamp housing is closed, to correct the position of the lamp, loosen the setscrew ⑥ to move the lamp. Then tighten the setscrew ⑥.
- Attach the upper end of connection cable ⑤ on the threaded part of the upper lamp end (negative), and clamp with knurled nut.
- Close the lamp house and tighten coin screw ①.









Electrical connection of the XBO 450W Xenon lamp and the HBO 200W/2 mercury-vapor high-pressure lamp

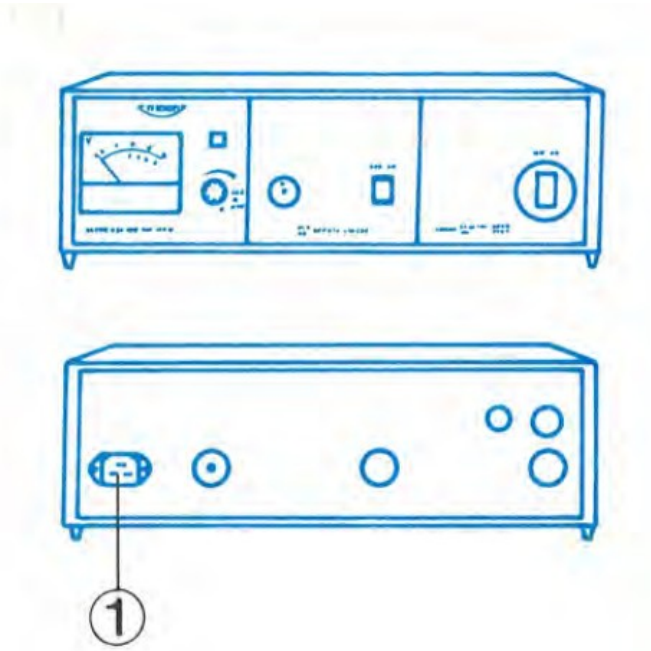
The electrical connections of the lamp are described on page D13 and D14.

PLEASE NOTE!
Before lighting the lamp, close the lamp house and select heat and UV blocking filters in the mirror house.

- To protect the sensitive electronics of the auto photo mode, these are turned off during the ignition of the lamp.
- When the lamp is switched on, the connecting device is switched on first, placing the fan in the lamp house 50 into operation. Then the lamp is lit with the red start button ②. If the fan should fail during operation, the lamp is switched off immediately.

Adjust the XBO 200 W/2 450W Xenon lamp and the HBO 200W/2 mercury-vapor high-pressure lamp:

- Turn to the 10x objective, and insert the 10x eyepieces into the observation tube.
- Ignite the lamp and with no specimen on the stage, set the Univar to transmitted-light brightfield with the high-performance lamp for the light source
- Swivel ground-glass off.
- Turn off automatic zoom lighting and adjust the zoom handwheel to 63. Turn the collector knob of high-performance lamp clockwise until it stops.
- Redirect the microscopic optical path to view the lamp arc on the projection screen. This is done through height adjustment of the brightfield condenser NA=0.90 or NA=1.30 with the condenser knobs, or with coarse and fine adjustment of the microscope. If there is no projection head, the observation of the arc is made through the eyepieces using the ocular body's neutral density filters.
- There will be seen two arc images, fig.a: one directly from the collector, the second from the reflector built inside the lamp house.
- The side adjustment screw ⑩ on the lamp house is used to set both images to the same size. Then you can superimpose both images as in Fig.b, by turning the two screws ⑨ located on the front of the lamp house. This way the arc will be located exactly on the collector/reflector optical axis



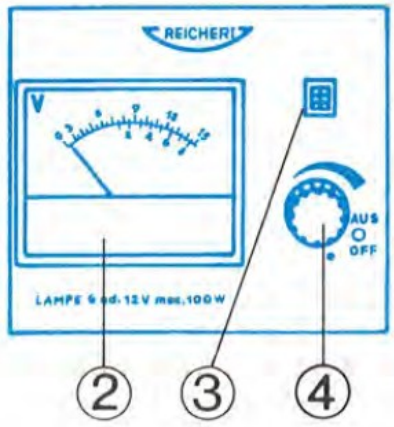
Power supply connections:

Up to three lamps may be supplied from the power supply shown, with connectors for the following lamps:

- 100W low-voltage halogen lamp
- HBO 200W/4 or CS 200W/4 mercury-vapor high-pressure lamp
- CSI 250W/1 metal halide short-arc lamps
- Transformer for 220v line voltage, remote-control connector for the XBO 450W xenon lamp.
- The housing has a socket ① for the line power connection on the back.

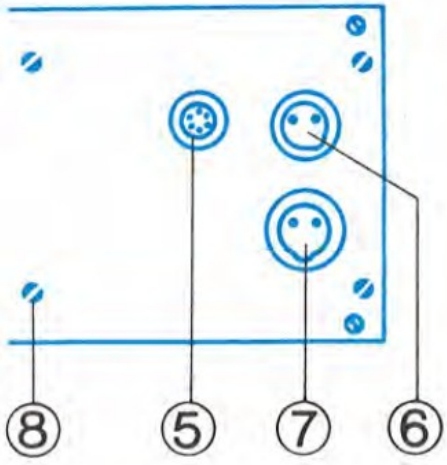
Supply for the 100W low-voltage halogen lamp

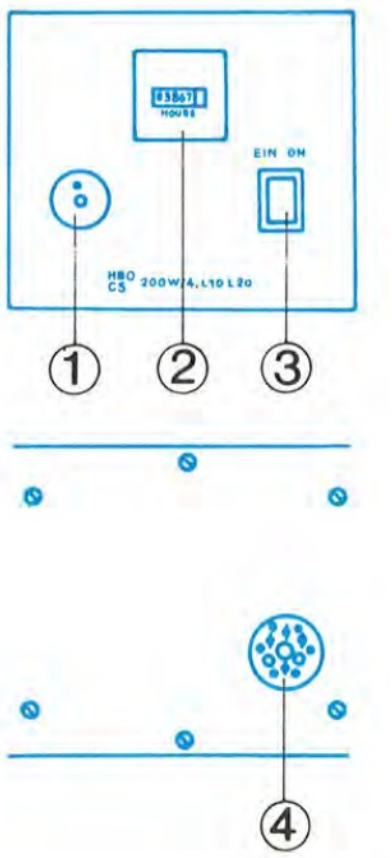
2. Volt meter
3. Indicator
4. Rotary dimmer control for the low voltage lamp and zoom lighting
5. Connector for zoom lighting
6. Connector for 6V low voltage lamp
7. Connector for 12V low voltage lamp



- The control transformer serves the 6V or 12V low-voltage lamps. It must be connected only to alternating current. The primary voltage range is set by 100-125V or 200-250V in the factory. The line cord into the power supply supplies power to everything.
- When you turn on the rotary switch ④, power is supplied to the microscope base to light up the lamp; more CW, the greater the lamp brightness.
- The upper scale of the voltmeter is for 12V, the bottom for 6V. The pointer of the voltmeter must not exceed the red marks at 12V or 6V.
- The transformer from the socket box is removed to replace the miniature fuse. This can be done after unscrewing the four fixing screws ⑧ on the back of the cabinet. For 200-250V primary voltage, the fuse should be 0.8A; at 100-125V, the fuse should be 1.25A.

If a different control transformer is used in the power supply, the back will have only the 12V 100W low-voltage halogen lamp connection



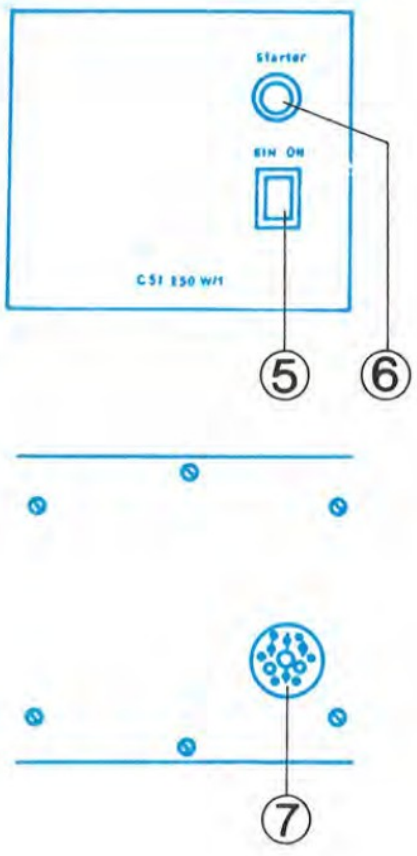


Connections for HBO 200W/4 or CS 200W/4 mercury-vapor high-pressure lamp

1. safety starter
2. hour counter
3. power switch
4. connector for lamp 25

The power supply is intended for 220VAC. If the line voltage is not 220V, the intermediate transformer, page D13, is connected upstream. The housing has a socket for the line power connection on the back.

- By default, the power supply is set for a line frequency of 50Hz and an L1 lamp. There is a selector option for L2 lamps at 50Hz or L1 lamp at 60 Hz.
- When turning the lamp on, please refer to page D7!
- The lamp is turned on with the power switch ③. When the ignition is completed, the glow lamp of the safety starter ① goes out. If the lamp does not ignite, the red button of the safety starter pops out to protect of the ignition device. The red button must be pushed in again (reset) before again turning on with the switch ③. It is also advisable to take a break before re-igniting, so that the lamp can cool down.
- The burning time can be read on the hour counter ②. Please pay close attention to the lamp manufacturer specifications.

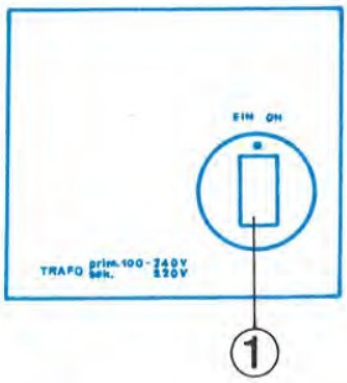


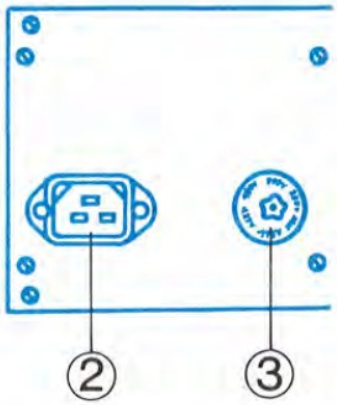
Power supply for CSI 250W/1 metal halide short-arc lamps

5. switch
6. Starter
7. connector for lamp 25

- The power supply is suitable only for alternating current. It is set for a 220V/50Hz standard and can be switched to 220V/60Hz or 240V/50Hz. If the line voltage has a different value, the intermediate transformer, page D13, should be used upstream. The housing has a socket for the line power connection on the back.

- Please follow the notes on page D7 when the lamp is switched on!
- To turn on the lamp, first turn on the switch ⑤ and then push and hold the starter ⑥ for about 2-3 seconds. The light in the starter must light up while the lamp is lit.

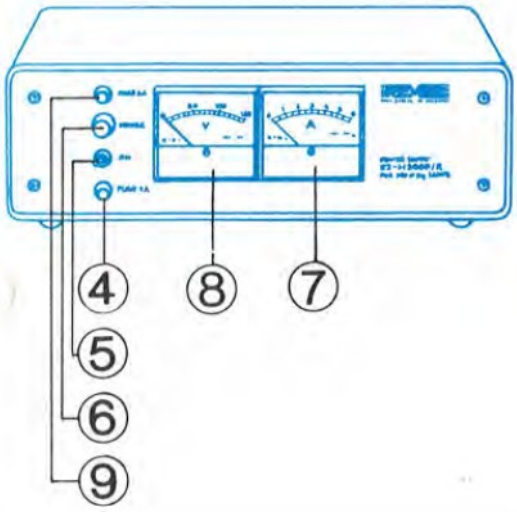


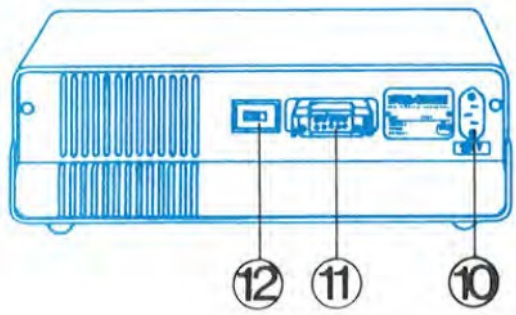


Intermediate transformer

1. main switch
2. power connection
3. voltage selector

- The intermediate transformer is used if the supply voltage differs from 220V. It is installed upstream of the other power supplies.
- The line connection is via connector ②.
- To set the desired line voltage, go to the voltage selector ③, push the button in the middle, turn clockwise, and remove together with the fuse. Insert a coin or screwdriver blade in the now visible slot and adjust the red line to the desired voltage by turning. Then insert a fuse corresponding to the modified power supply voltage, and replace the button into the voltage selector.
- The fuse to be used for line voltage of 110-125V is 10A; for 150V is 6.3A; and for 200-240V is 4A.
- The main switch ① on the front powers all of the power supplies.

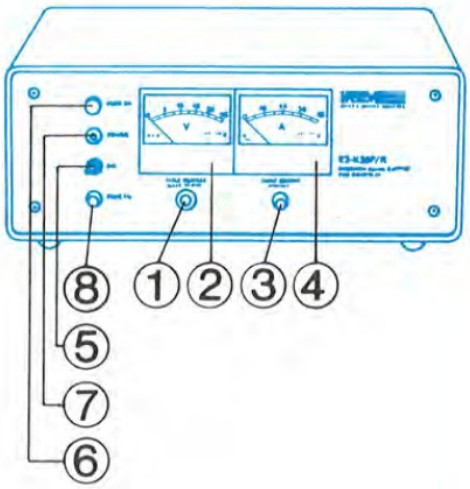


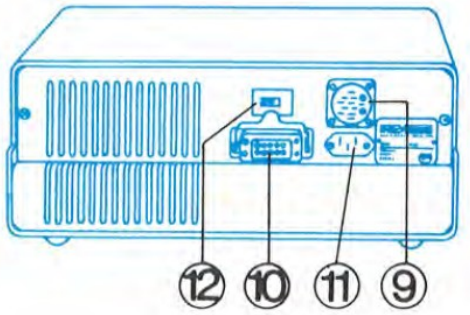


Power supply for HBO 200W/2 mercury-vapor high-pressure lamp

4. Start button not function
5. main switch
6. indicator light
7. ammeter
8. voltmeter
9. fuse, 4A
10. socket for power cord
11. connection for connection cables of the lamp house 50
12. hour counter

- The device is suitable only for 220V line voltage. A special intermediate transformer is required for different line voltages.
- Press main switch ⑤ to turn on the lamp, then ignite lamp with red start button. See instructions on page D10.

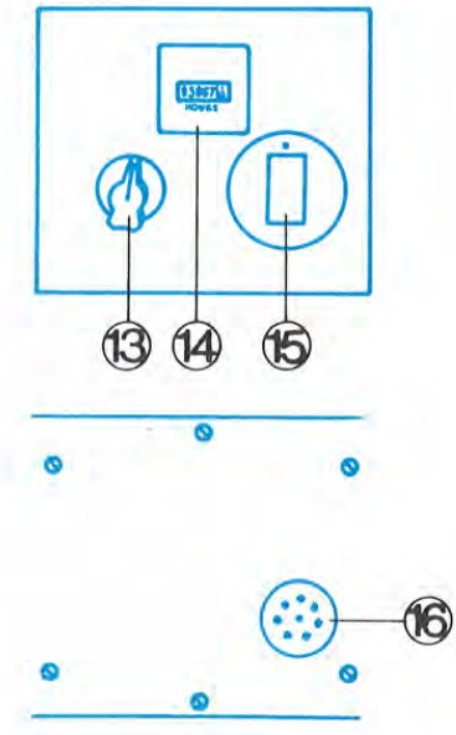




Power supply for 450W/2 xenon lamp

1. test button for voltage
2. voltmeter
3. current controller
4. ammeter
5. main switch
6. fuse, 8A
7. pilot light
8. fuse, 1A
9. connection for control cable for the remote control unit or jumper
10. connection for connection cables to the lamp house 50
11. socket for power cord
12. hour counter

- The control unit can be operated only with 220-240V line voltage. The appropriate intermediate transformer must be used for different voltages.
- The cable from the lamphouse 50 with special plug is connected to the socket ⑩.
- The power cord is connected to the socket 11.
- A jumper must be inserted in the outlet ⑨ if no remote control unit is connected.
- Turning on the lamp is done with the main switch ⑤, whereby the pilot lamp ⑦ lights up and the fan in the lamphouse 50 comes on. Then, the lamp is lit with the red start button on the lamphouse 50. See instructions on page D10!
- The current controller is set at the factory for 25A and should not be adjusted.



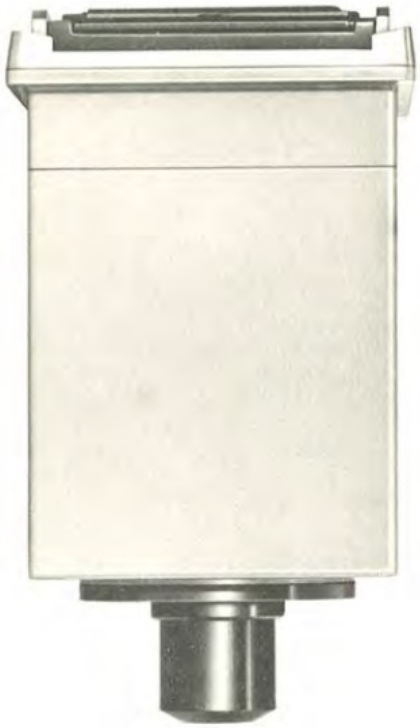
Remote control device for the control unit to the XBO 450W/2 Xenon lamp

13. level regulator for electric current (17-30A)
14. hour counter
15. power switch
16. Control cable socket

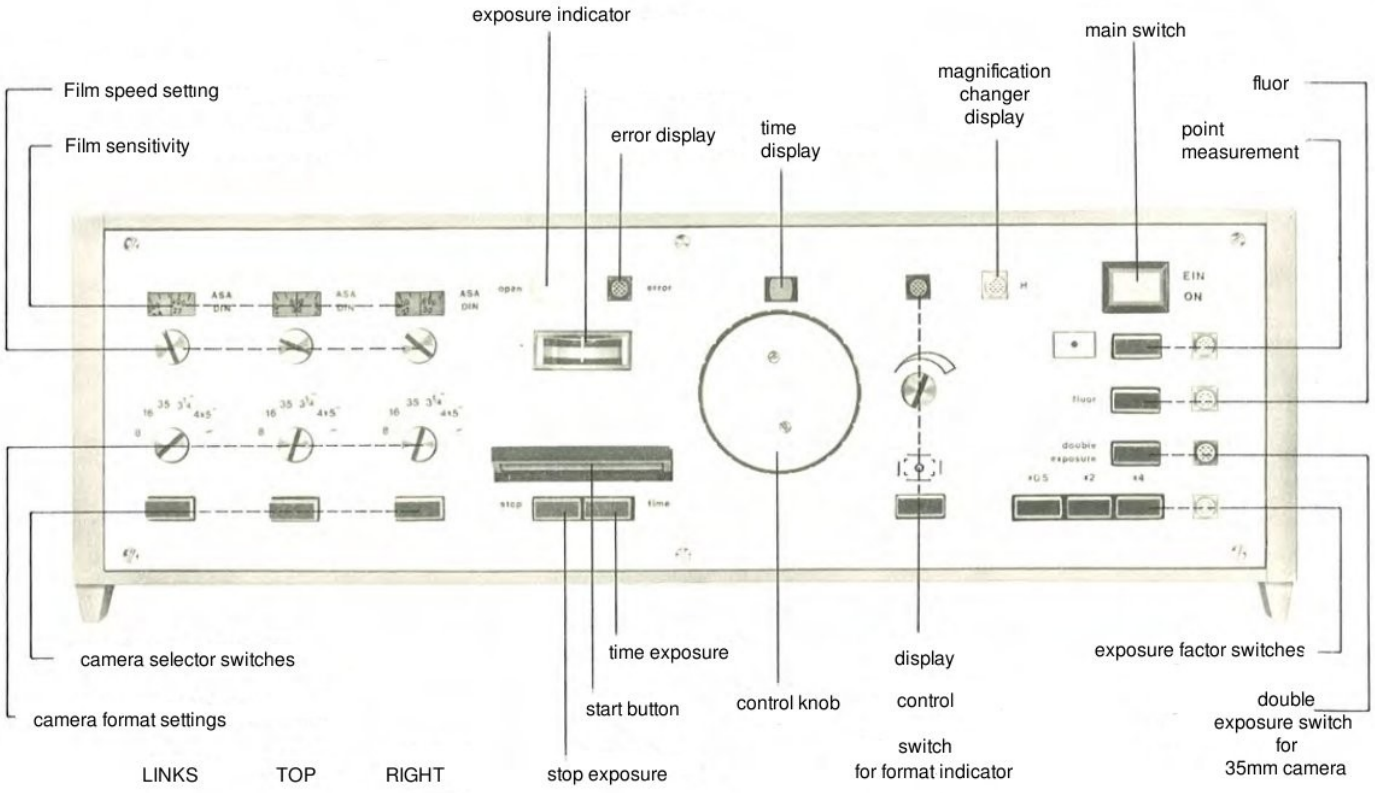
- The remote control unit is mounted in the rack house described on page D11.
- The connection between the power supply for the xenon lamp and the remote control device is via the control cable. This is connected to the power supply instead of the short circuit plug to the socket ⑨, and on the remote control unit to the line socket 16.
- Lighting up the lamp is done by the power switch 15; which position the main switch ⑤ of the control unit is in, does not matter. Please follow the notes on page D10 when the lamp is switched on!
- The brightness of the lamp can be changed with the control knob 13

Camera with Polaroid film cassette, 3 1/4" x 4 1/4"

Camera with 4"x5" International film back



Automatic camera, 35mm 24 x 36mm format



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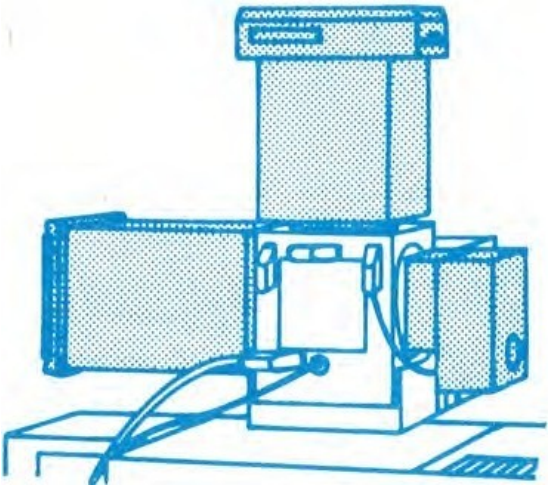
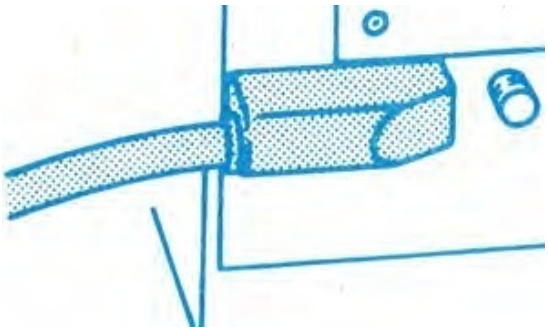


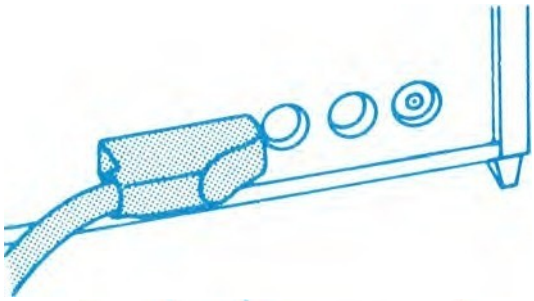
Installation and connection of the Trimatic camera system

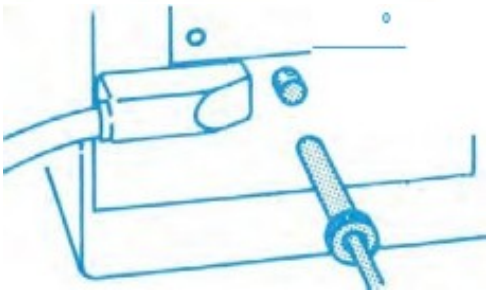
You can place three different cameras in any arrangement on the Univar.

- To install, turn cover plate counterclockwise and remove.
- Line up the locking bayonet pins on the male camera tube with the slots in the cavity, insert the camera and turn clockwise to lock into place.

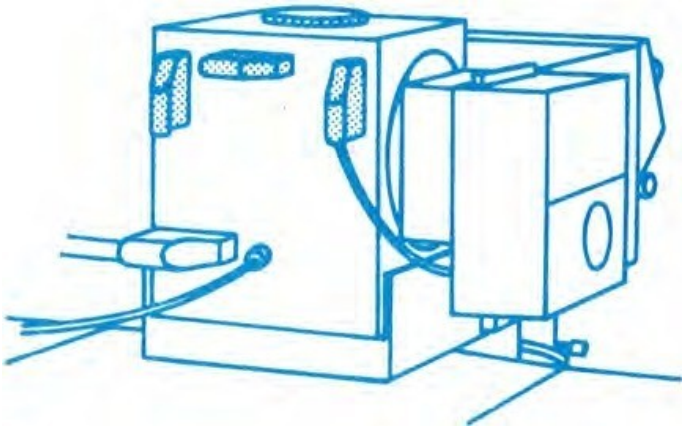


- All three cameras are each connected with the control unit via a cable that has two identical plugs. One plug goes into the socket on the back of the microscope, the second plug is connected to the back of the control unit. The connectors will only connect in the correct manner.





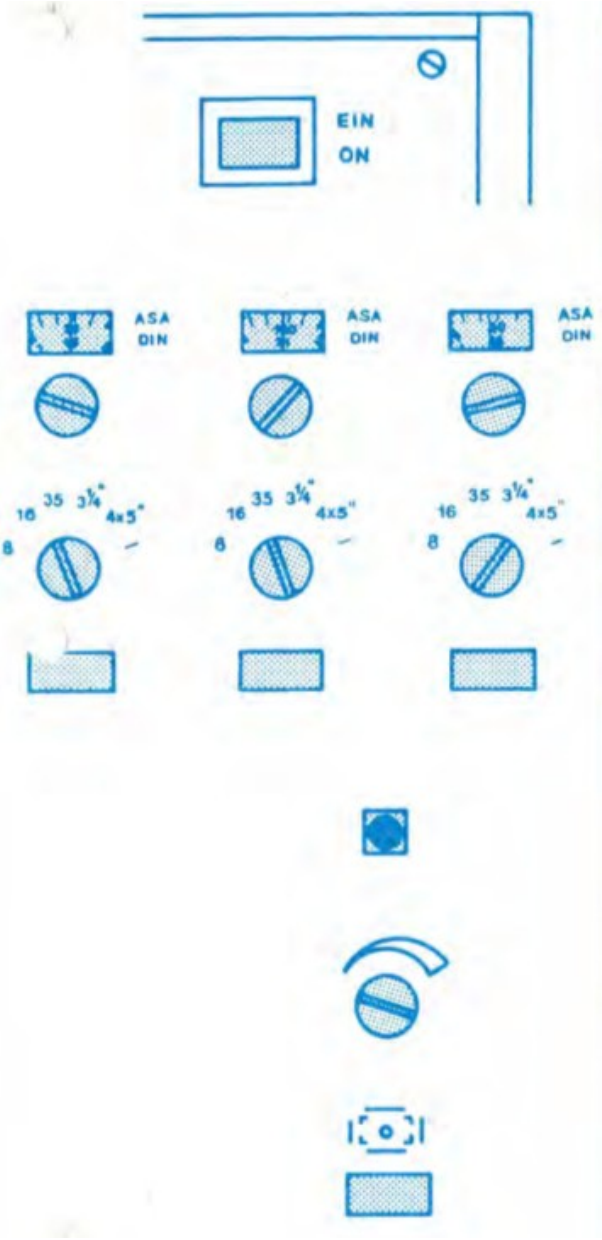
- The fiber-optic cable for the photomultiplier is used with the larger diameter end into the back of the microscope, and the smaller end into the control box, and each fastened with the knurled fitting. Please handle the fiber-optic cable with care and do not bend tightly. The bending radius must be not less than 6 cm.
- Also ensure that the cable does not rest on a lamphouse.

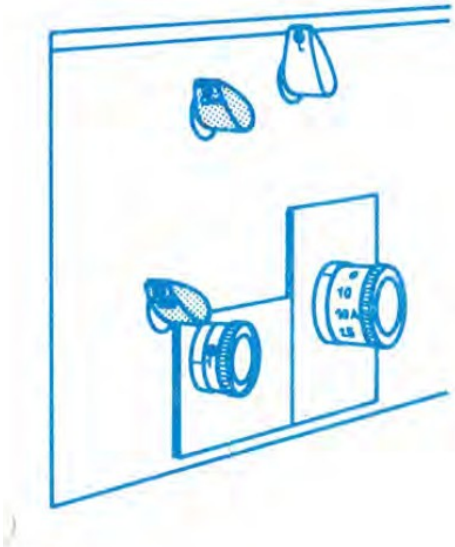


- The connection cable of the automatic camera with the multiple plug is connected to the associated connector at the rear of the microscope. There are three female connectors: one for a camera on the left, the second for a camera on the right, and the third for a top-mounted automatic camera.
- Please make sure that the unused sockets are provided with shorting plugs!

- Operating voltage: the control unit is normally set to 220V. When switching to a different voltage, the inner head of the voltage selector is pushed in and removed after a quarter-turn of the screw counterclockwise. With a coin or screwdriver blade, you can then move the voltage selector to the desired voltage.
- For voltages up to 150V, one changes the internal fuse (0.25A) for one rated 0.5A.
- The control unit is then connected to the power supply with the supplied cable.

Please note!
For thermal reasons, the control unit for the camera system should always be located at the bottom, when several control-boxes/power-supplies are placed one above the other.





Operation

• Turn on controller box with main switch. The switch cap lights up red, along with the exposure time display, as well as more signals that indicate a state of readiness.

• Select camera

The data for all three cameras are stored in the controller simultaneously. The left-hand settings are for the left-hand camera, the middle settings for the upper camera, and the right settings for the right-hand camera.

• With one of the three selection keys, the microscope beam path to the desired camera is set and the connector for this camera is ready for operation. The window with the film sensitivity indicator lights up.

• Setting the film speed is proportional by turning the upper knob with a coin. The set DIN or ASA values can be read in the middle of the window at the indicator mark.

The camera format is set with the lower knob. The indicator means:

8..... 8mm movie camera

16.....16mm film camera

35.....24 x 36mm automatic camera

3 1/4”....3 1/4” x 4 1/4” Polaroid cut film adapter

4 X 5”....Camera body with international camera back for the use of 4 x 5 sheet-film holders; 9 x 12 cm Polaroid cassette adapter for roll film; and 70mm film.

- .....This position is kept free for a not yet specified camera format.

• The eyepiece mounts are adjusted by turning so that the lines of the double circle appear separated and as sharp as possible.

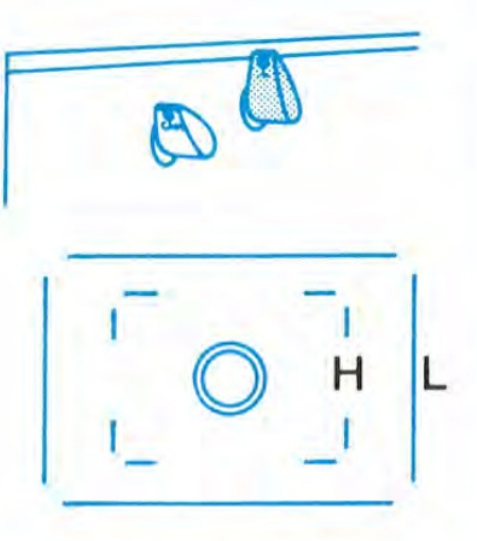
• With the pushbutton pressed, the double circles for focusing, as well as the format limit lines, are switched on. These appear as illuminated figures in the insertion tube. The brightness of the illuminated figures should be adjusted with the image brightness knob. The indicator light indicates the power-on state.

At the same time the microscopic image should not be necessarily focused, since in certain circumstances a defocussing of the image is recommended; the microscopic image with coarse and fine focus is adjusted so that the double circle appears sharp.

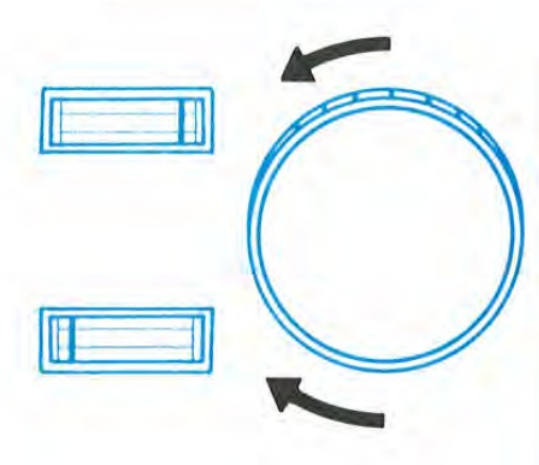
The illuminated figures are automatically switched off during exposure, so that no incorrect exposure of the film will take place.

• Set the lever to CAM (red dot) for the camera. In the PRO position, the shutter release is disabled, and the “error”red light is lit

• In the case of fainter preparations, however, the prism can be pivoted to the EYE position (100% light in the viewing tube) for the purpose of focusing. In the EYE position, the shutter release is blocked, the red “error” light is lit, and the illuminated figures are not visible



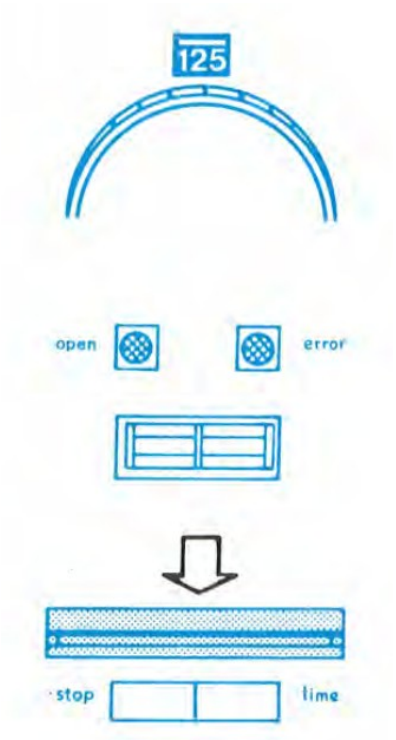
• Adjust the photo system magnification changer to L, normal magnification. In special cases, increasing magnification by a factor of 1.6x is possible by switching to H.
• For all cameras, the same image section, which is located in the formatting eyepiece within the limit lines, is photographed. The large outer rectangle indicates the section for "L", the smaller inner rectangle indicates the section for "H". In the "H" position, a red signal light illuminates on the controller. The image can be photographed only in position L and H. In the intermediate settings, the shutter is locked, and the red "error" light is lit.
• To focus, we recommend the WPK 10x eyepiece. For additional magnification the relay magnification changer should be used. This increase is visible in the formatted image in the eyepiece.



-The exposure is optimized with the control knob on the control unit. The needle of the meter should be within the green field. The direction of rotation of the control knob is selected so that the red field in front of the pointer is turned towards the green: If the pointer is in front of the right red field, the set exposure time is too long, the control knob must be turned to the left (CCW); If the pointer is in the left red field, then the exposure time is too short, you must turn to the right (CW). The bandwidth of the green field is 3 DIN.

• In the case of very dark specimens, in which the brightness of the reflected format limits are too bright, they are switched off during the exposure adjustment.

• The shutter speed scale is divided into white, 1/125 sec to 1 hour, and in red, from 2 to 8 hours.

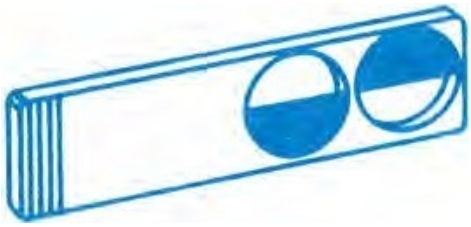


• The exposure times of the white scale are stored in the controller and run automatically, i.e., the shutter opens and closes automatically for the duration of the set exposure time. The exposure times of the red scale show only the values, measured with the built-in exposure meter, which are necessary for optimum exposure. In this case, the shutter must be opened and closed by pressing the 'time' button. If you want to allow a longer exposure time to run automatically, you can also use the buttons for up to 8 hours. Time is set to 1 hour and extended with factor 2, 4 or 2x4, and in this way is automatically exposed for 2-8 hours.

• The exposure is carried out by pressing the start button. The white light "open" is on for the duration of the exposure and indicates that the shutter is open.

• When working with the automatic small-format camera, the film is automatically advanced after exposure.

• Wait about 2 seconds before making the next exposure.



Special cases

Point measurement

Normally, the light measurement is integrated, i.e., an average value of all brightnesses occurring in the object is measured. When the button is switched on, it is possible to select individual object details, which are within the double circle, if the brightness of specimen zones varies a lot. The orange light indicates the switched on position.

Fluor button

- With the "fluor" button, the measuring range for the exposure time can be shifted by four exposure stages in the direction of longer exposures. In fainter preparations, such as fluorescence microscopy, or in darkfield, this allows a measurement of exposure time up to 8 hours (18 DIN). If, therefore, the pointer is located in the left red zone, the measured exposure time will be too short, and an exposure adjustment is no longer possible. Press the "fluor" key, and the pointer will move to the right so that you can balance up to 8 hours.

- During the measurement of the long exposure times the format mirror must be switched off to avoid affecting the measurement result.

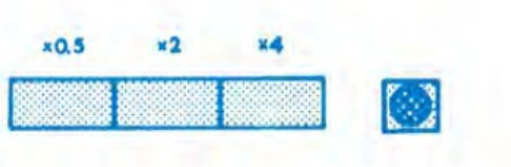
- The orange light indicates that the fluor button has been pressed.

Double exposure

When working with the automatic small-format camera, the film transport can be blocked by pressing the "double exposure" button before triggering the start button. By this means, the film can be exposed several times.

Half-frame photographs

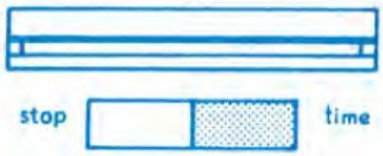
A slide with two half format panels can be inserted into the relay, each covering one half of the image. any image format can accommodate two shots. Comparison shots of different or same objects in different processes can be produced very easily. The exposure setting takes place when the slide is inserted, the exposure is performed while pressing the factor 0.5 button.



Extension factors
These factors allow compensation for the blackboard effects at low brightness levels.

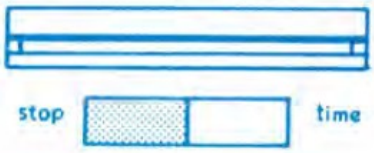
This feature offers the following options:

1) the factor is automatically transferred to the shutter by pressing buttons x0.5, x2, or x4. The factors are effective with exposures on the white scale. An exception is the shutter speed 1/125 sec, which cannot be combined with the factor button x0.5.
- The orange light indicates that a factor button is pressed.
- The factor buttons switch off by lightly pressing another key.



2) The exposure time display is not coupled to the factor keys, i.e., displayed exposure time x factor = actual exposure time.

3) The "time" button allows the shutter to trigger any exposure time. The shutter (white indicator light) remains open until the button is released again.



Interruption of exposure
The stop button is used to interrupt an ongoing exposure. When working with the automatic camera, the film is transported after pressing the button, as with automatic termination of the exposure time.

Block Gate
The triggering of the shutter is blocked both in the red exposure scale and when the "error" light is on. The "error" lamp lights up if the following faults occur:

(a) the optical path is not directed to the camera: the two levers on the right side of the Univar are not in the position CAM or CAM/PRO (red dot positions)

(b) the lever of the magnification changer for the photo system is not located at L or H

(c) something is wrong with the automatic camera

(d) the short circuit plugs at the back of the Univar are not installed

Magnification in the film plane
Photomicrograph image scale (M) is calculated according to the formula:

M = Vobj * q * Vok * P

Vobj.....Magnification of the lens
q.....Relay magnification
Vok.....Enlargement by the Photo eyepiece
P.....Camera factor

The table below provides information on the product Vok * p, considering the camera format and the positions L or H of the magnification changer in the photosystem

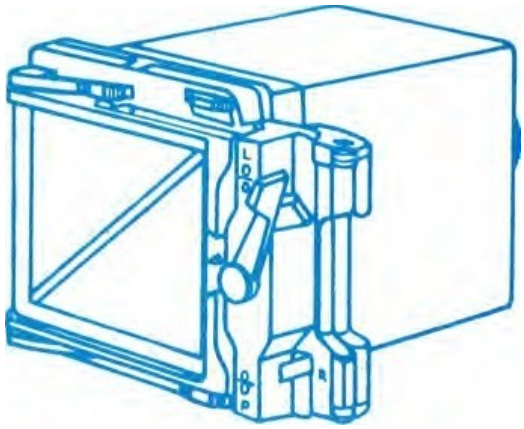
Camera Format	Vok * P L	H
24 x 36	1.8	2.9
3 1/4” x 4 1/4”	5	8
4” x 5” 9 x 12cm	6.3	10

An accurate determination of the scale of the figure can be performed with an object micrometer:
(a) make a photomicrograph
(b) measure the image on the film

Remote control
The Jack in the rear of the control unit is intended for the connection of a remote control (e.g. foot button), which takes over the function of the START button.

Micro Flash Terminal
This Jack is for connecting the connection cable to the microflash power supply. The shutter is synchronized as an x-contact for all exposures up to the shortest of 1/125 sec. The operation is described in a separate manual.

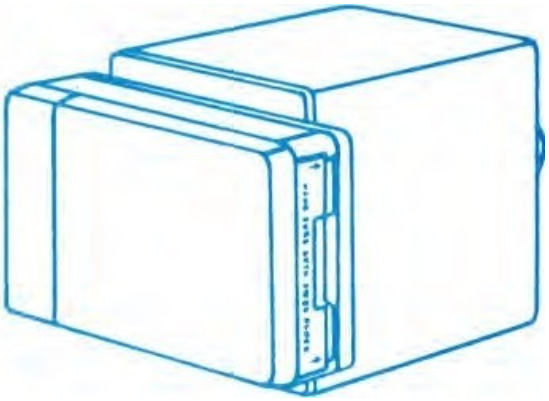
Brightness-dependent voltage
According to the brightness of the microscopic image, the output voltage range is 0-5V (for high to low light intensity).



Camera with international camera back, format 4”x 5”

Accommodates traditional double film-holders for plates and film, 9x12 cm or 4x5, and the Polaroid cut-film holder Model 545, by means of an international spring camera back.
In use, the frame of the spring-loaded frame is lifted slightly, and the film holder is inserted between the camera housing and the frame.
The ground-glass focusing screen has a diagonal blank strip. A Fresnel lens screen is available as an accessory. A fold-out light shade is also available as an accessory for shielding the ground-glass or Fresnel lens from ambient light.

The Graflex Polaroid Roll Film Cassette, 3 1/4” x 4 1/4" or the Roll Film Cassette "Super Rollex" 56 x 72mm can only be installed after removing the spring back. The two springy levers, which are located on the removable spring back, are pressed down, and the frame slid slightly to the side for removal. The roll film cassette is fastened with the two slides labeled "off". To adjust the image when working with the Graflex Polaroid Roll Film Cassette, a special Matte Screen Adapter is supplied as required.

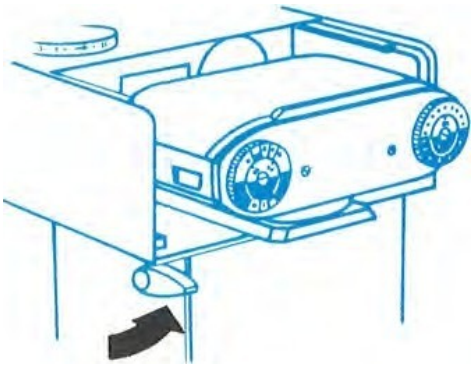


Camera with Polaroid pack-film cassette, format 3 1/4” x 4 1/4”

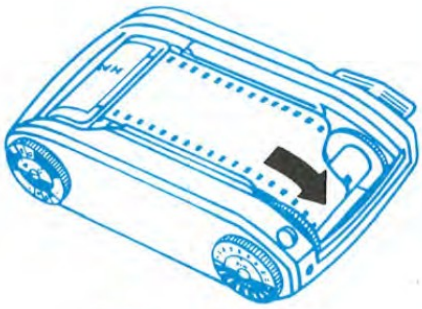
The handling of the Polaroid pack-film cassette is described in the enclosed operating instructions.

During removal of the camera body from the microscope stand, an aperture in the camera body is automatically closed, which prevents an exposure of film already inserted.

Automatic camera for 35mm film (24 x 36mm)



To remove the cassette (which looks like a 35mm camera body) from the camera, the locking lever must be moved forward, and the red light "error" illuminated on the control unit, so that the automatic operation is blocked. At the same time, the cassette shutter closes and the cover lock is fixed so that the lid can be removed and the cassette can be removed. It is advisable to replace the cover so that the camera lens cannot become dusty. Pressing down the two locking buttons on the end of the cassette house and lets down the spring-loaded back cover.
The exposure counter, visible through the magnifying glass, automatically returns to the initial position "A" after each opening of the cassette rear.

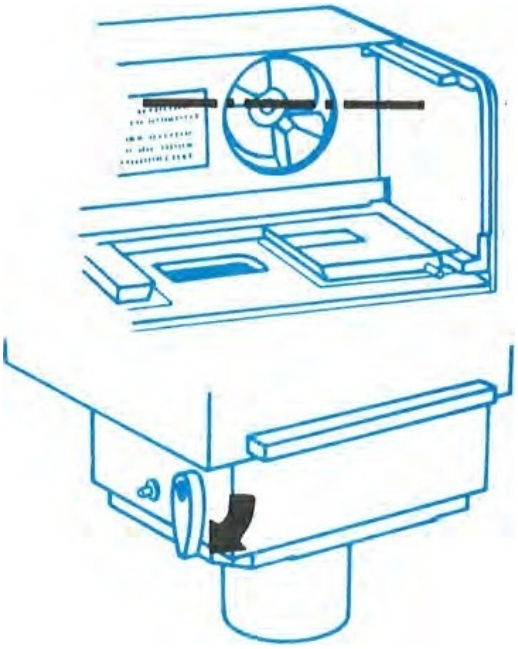


The film spool is first inserted into the empty side of the cartridge chamber. The beginning of the film is pushed into the slot of the take-up spool until the teeth get hooked on the second perforation hole. Now turn the take-up spool by the knurled edge, which tightens the film and engage the teeth of the take-up spool well into the perforation holes. Then, the cassette back is hooked back into the groove of the housing and closed by pressing upwards in the direction of the locking keys. The film is advanced via the film-advance key until number 1 is displayed upon the frame counter .

Two manual indicator discs for the film data are located on the front of the cassette. The right includes the DIN ASA scales, the left other information, such as:

Black-and-white film
Artificial light color film
Daylight color film
\+ Reverse film
– Negative film
20 - 36 Number of pictures

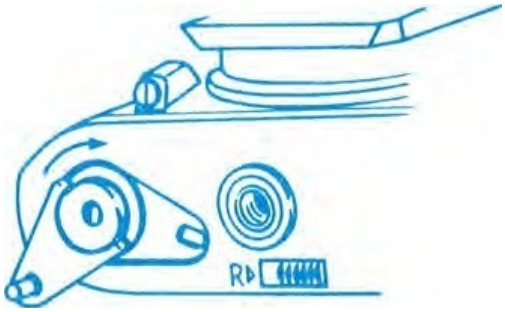
The adjacent figure shows the following setting:
Color reversal film for tungsten light with 20 shots, sensitivity 18 DIN =50 ASA.



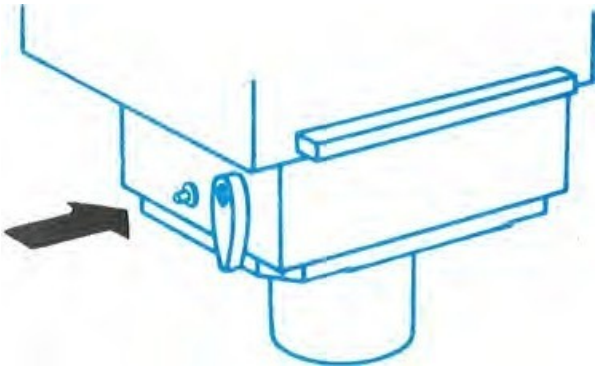
• After loading the cassette with film, make sure the transport key is raised before pushing the cassette into the camera housing. Be sure that the transport key is parallel to the film plane. This will ensure a proper engagement with the driving cam. The lid is then placed horizontally and pressed with one hand as far as it will go, while the other hand reverses the locking lever. If the error signal goes out, then the seat and clamping are in order, and the cassette is opened. If the signal continues to be lit, one of the interlocks is not properly locked.

• The setting of the external camera counter may be made only in the direction of the arrow. The counter adds up the exposures and switches off at 36, when the red signal error indicates the end of the film. In the case of a film with 36 recordings, the same number is set on the external counter as are indicated by the cassette counter. In 20-exposure film, which is indeed shorter by 16 shots, 16 must be added, e.g., for a new 20-exposure roll, the first exposure should be set on 17 on the external camera counter. One proceeds similarly if only a certain number of shots are to be made. The number of images set on the external counter must not allow more exposures than the cassette counter, so that the film transport is not disturbed. (If necessary, set to an exposure less.)

• After all exposures are made, the end of the film is indicated by lighting up of the red error signal, and at the same time, the camera is locked. The cassette with the exposed film can be removed after flipping the lever to the front.

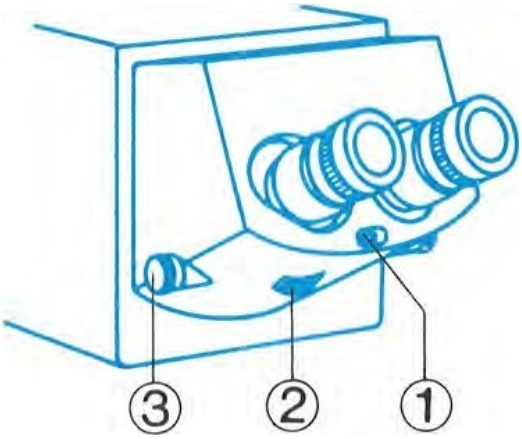


Unloading of removable cassette
The exposed film must first be rewound into the cassette. Press the lock lever in the arrow direction R, which frees the rewind crank. After flipping the handle out, the film can be rewound. At the end of the rewind, it has a slight resistance to overcome to free the film from the take-up spool. Then the crank is folded back into its resting position, where the lock slide jumps back to R. The film spool can be removed after opening the cassette.



Red error button and “error” signal on the control unit
If the camera cover was not closed, or the opening lever has not been moved, or when the cartridge is not properly inserted, or when the end of the film is reached, the red error signal lights on the control unit, and the Auto mode is locked off. If the fault is on the camera, and cleared, the error signal can be extinguished by pressing the error button. If it continues to glow, look at the microscope for the error.

The special accessories were already described in the different working methods. In the following, you will find general instructions that make it easier for you to work with the Univar.

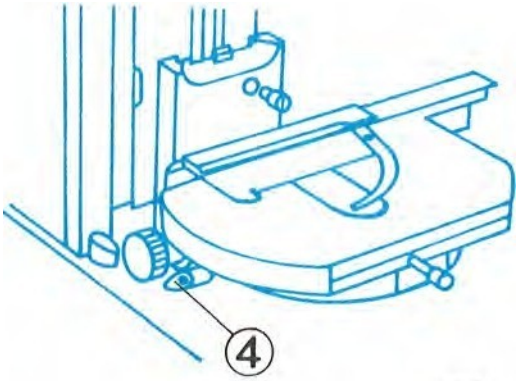


Ocular body

The Interpupillary distance is set with the knurled control knob ③, and can be read on the scale ① in millimeters.

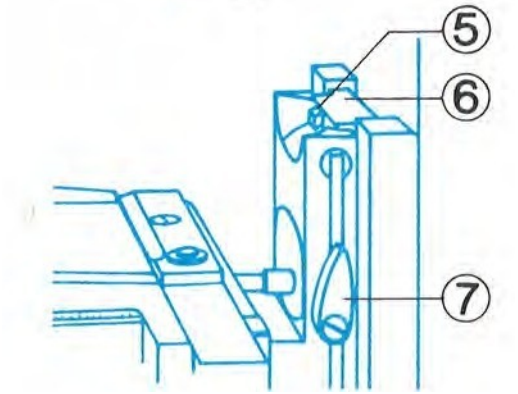
Before focusing on the specimen image, the eyepieces must be adjusted to the correct height, taking into account the different visual acuity of the two eyes. This is done by first using the relay. A micrometer scale slider, or the camera format-limit slider, is placed into the relay slot. The image is then focused sharply for each eye by twisting the eyepiece eye lenses individually. If not using the relay, a specimen on the stage is first focused with one eye, using coarse and fine focus controls, and then adjust the focus for the second eye, used by itself, by twisting the other eyepiece. When then using both eyes, the image should be in mutual focus.

In the tube, a neutral density filter is installed. It acts only on the view through the ocular body and dampens excessive light to the observer, if full light intensity is being used for projection or photography. To engage the neutral density filter, use the knurled wheel ②. If filter is turned on, the black dot is visible.



Revolving stage 28

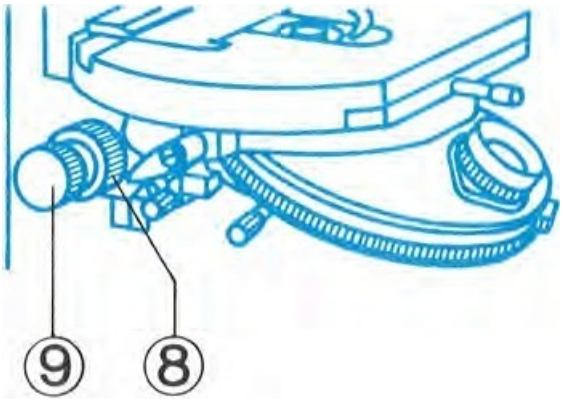
The specimen slide is clamped between a fixed corner and a spring-loaded hook. The 50 x 75mm coordinate movements operate with the coaxial drive knurled knobs. The positions of the coordinates can be read accurately to the millimeter divisions with verniers to 0.1mm. The verniers are located in the red areas of the divisions. The table can be rotated 180° after loosening the lever ④. Thus, you can fit the specimen to the camera format in photography and bring interference contrast specimens into the best contrast position. After loosening the fastening screw of the specimen slide positioner, it can be removed from the stage table.



Coarse drive stop

The adjustable coarse-focus drive-stop limits the height setting of the stage table with the coarse feed, and thus facilitates the focus of preparation and prevents slide breakage.

First, completely lower the stage with the coarse motion control. Then lower also with the fine motion control until the coarse motion knob starts to rotate in opposite direction to the fine motion knob. In this basic setting of the coarse and fine motion, the height of the stage, after releasing the clamping lever ⑦, can be adjusted on its special guide and the coarse-motion stop can be set to the specimen thickness. For normal transmitted-light specimens on slides of 1mm approx. thickness, the stop is set so that the end of the plate ⑤ is level with the end of the guide ⑥. IMPORTANT NOTE: The above described basic setting of the coarse and fine motion should be checked from time to time, or reset, so that the maximum range of the coarse motion is preserved.



Condenser: coarse and fine drive

The coarse adjustment is done with the knurled wheel ⑧. The fine adjustment (range 1mm), that is maintained during the lowering of the condenser with the coarse (fixed focus setting), is done with the knurled wheel ⑨.

The stiffness of the coarse feed can be adjusted as follows:

Condenser coarse feed is too easy: turn the coarse feed to the lower stop position and then continue to rotate the knob a little bit more than the limit stop.

Condenser coarse feed is too hard: turn the coarse feed to the upper stop and then turn the knob a little further until the correct tension is set.

Transmitted-light Objectives

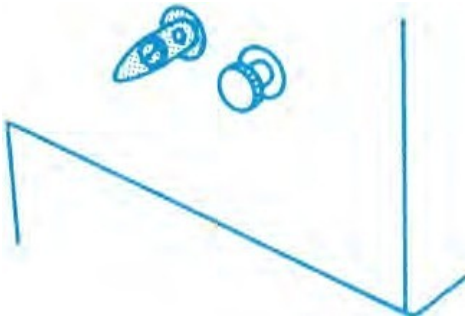
Objective	Color Bands	Use								Working Distance (mm)
		HF	DFI	DFT	PhK	DLF	AFBL	AFUV	IK	
Planachromat Objective:										
Plan 2,5x/0,075 oo/–	brown	x								6.10
Plan 4x/0,12 oo/–	red	x								13
Plan 10x/0,25 oo/–	yellow	x			x	x	x	x		1.90
Plan 25x/0,45 oo/–	dark green	x	x	x	x	x	x	x		0.60
Plan Iris 40x/0,75 oo/0,17 fed	light blue	x	x	x	x	x	x	x		0.29
Plan Glyz Iris 63x/1,00 oo/0,17 fed	dark blue + orange	x	x		x	x	x	x		0.22
Plan Oel Iris 100x/1,25 oo/0,17 fed	white + black	x	x		x	x	x			0.13
Plan Glyz Iris 100x/1,25 oo/0,17 fed	white + orange	x	x		x	x	x	x		0.10
Plan apochromat Objective:										
Plan Apo 10x/0,32 oo/–	yellow	x			x	x	x	x		0.58
Plan Apo 25x/0,65 oo/0,17 fed	dark green	x	x	x	x	x	x			0.19
Plan Apo Oel Iris 40x/1,00 oo/0,17 fed	light blue + black	x	x	x	x	x	x			0.23
Plan Apo Oel Iris 100x/1,25 oo/0,17 fed	white + black	x	x		x	x	x			0.10
IK Planachromat Objective:										
Plan 10x/0,25 IK oo/–	yellow	x			x	x	x	x	x	1.90
Plan 25x/0,45 IK oo/0,17 fed	dark green	x	x	x	x	x	x	x	x	0.60
Plan Iris 40x/0,75 IK oo/0,17 fed	light blue	x	x	x	x	x	x	x	x	0.29
Plan Glyz Iris 63x/1,00 IK oo/0,17 fed	dark blue + black	x	x		x	x	x	x	x	0.22
Plan Oel Iris 100x/1,25 IK oo/0,17 fed	white + black	x	x		x	x	x		x	0.13
Plan Glyz Iris 100x/1,25 IK oo/0,17 fed	white + orange	x	x		x	x	x	x	x	0.10
IK Plan Apochromat Objective:										
Plan Apo 10x/0,32 IK oo/–	yellow	x			x	x	x	x	x	0.58
Plan Apo 25x/0,65 IK oo/0,17 fed	dark green	x	x	x	x	x	x		x	0.19
Plan Apo Oel Iris 40x/1,00 IK oo/0,17 fed	light blue + black	x	x	x	x	x	x		x	0.23
Plan Apo Oel Iris 100x/1,25 IK oo/0,17 fed	white + black	x	x		x	x	x		x	0.10

HF: Brightfield
DFI: Darkfield with immersion darkfield condenser
DFT: Darkfield with dry darkfield condenser
PHC: Phase and phase anoptral contrast
DLF: Transmitted fluorescence excitation
AFBL: Epi-illumination fluorescence with blue light excitation
AFUV: Epi-illumination fluorescence w/ UV excitation
IK: Interference contrast

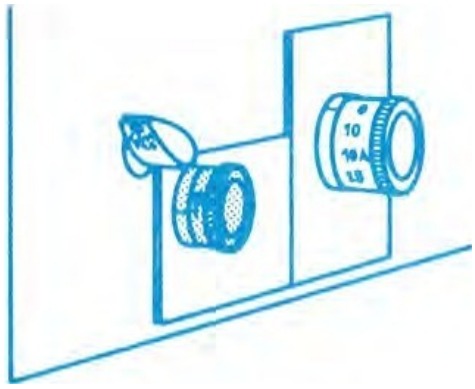
The engravings on the lens barrel have the following meanings:
Plan ..... Plan achromatic lens
Plan Apo..... Plan apochromatic objective lens
Oil, Glyz.....for oil or glycerin immersion
Iris.....built-in iris diaphragm
100x/1.25..... objective magnification 100x/numerical aperture 1.25
∞/0.17 fed..... infinity tube length/cover glass to use=0.17mm thick, springy front lens version
If the coverglass thickness is "- ", then preparations can be used without a coverslip
The iris diaphragm built into the stronger lenses is used, if needed, for darkfield or fluorescence investigations.
For all other studies, they are fully opened by turning the adjusting rings on the lens barrel.

Widefield-Plan-Compensation eyepieces

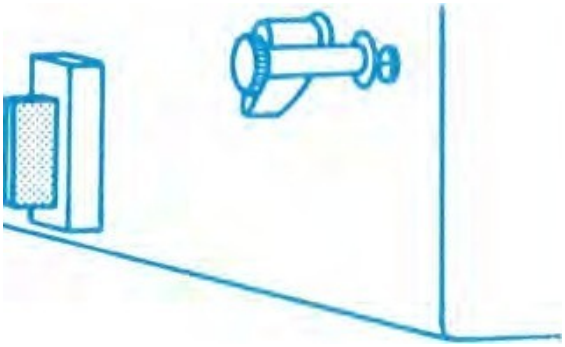
WPK eyepiece	Eye relief (mm)	Field of view in°	Magnification changer					
			1x		1.6x		2.5x	
			Mag.	Field	Mag.	Field	Mag.	Field
6.3 x	17.5	40	6.3 x	28	10 x	17.5	16 x	11
10 x	17.5	51	10 x	24	16 x	15	25 x	9.6
16 x	16	51	16 x	15.5	25 x	9.7	40 x	6.2



Relay system
The relay system is an apochromatic transport optical path that can be inserted between objectives and eyepiece. It generates intermediate pictures of the image field and the objective pupil. In this path are then made the necessary interventions in the optical path of the microscope, while lenses and eyepieces remain unchanged.
In the image plane, different field insertions can and will be accommodated in the objective pupil phase rings for phase and anoptral contrast. The optical system allows the installation of a magnification changer. In general, the relay system stays on (red dot). If poor lighting necessitates it, e.g., in darkfield or fluorescence studies, you can switch it off with the lever.



Relay system magnification changer
A highly-corrected optical system can change the magnification of the eyepiece inserted in the ocular body in the range of 1x to 2.5x
Available options:
Stepped magnification changer: 1x, 1.6x, and 2.5x
Zoom system: 1x to 2.5x, stepless
The image quality, focus, and the center of the image are fully preserved. The zoom system is especially useful for format-filling photomicrography, for an ideal adaptation to the specimen size

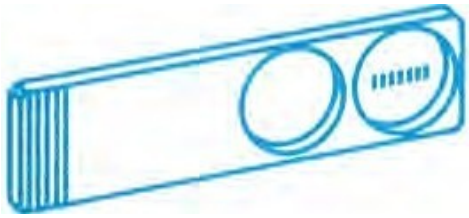


Slider slot
An opening in which you can insert a scale, a counting grid, or different aperture is located on the upper left side of the microscope. Using the relay, these parts are mirrored into the optical path and are visible with the specimen image in the eyepiece

Measuring micrometers
The test section is divided into 150 sections. Length measurements in the specimen plane can be made using the objective-dependent micrometer value MW (µm).

MW = 100/objective mag.

You observe how many gradations correspond to the length to be measured in the specimen, and multiply that number by the micrometer value (1 µm = 0.001mm)

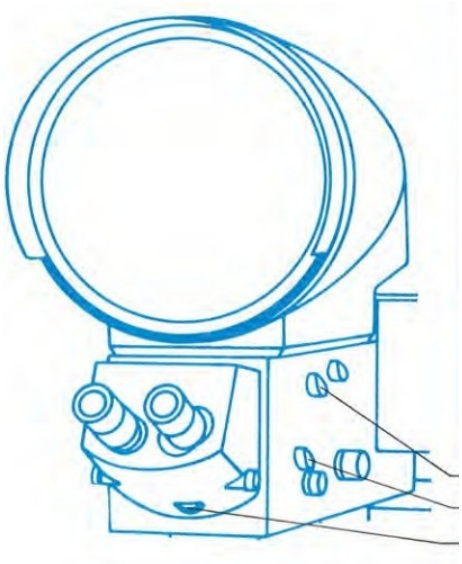


Counting scales
The counting system is divided into 100 fields. Area measurements in the specimen plane can be carried out using the objective-dependent micrometer value MW (µm) of a side of the field.

MW = 1000/objective mag.

For accurate measurements, we recommend finding the micrometer values with a stage (slide) micrometer

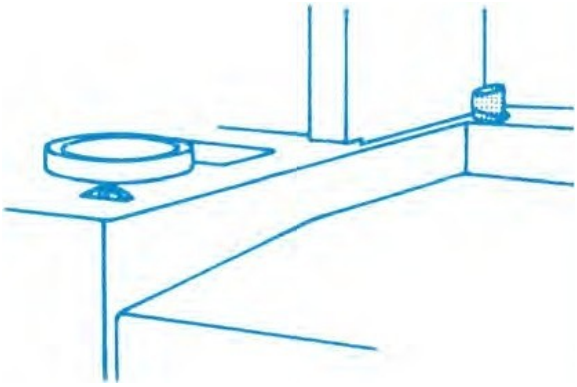
Half-frame panels
With the help of the two half-frame panels, you can cover each half of the picture with a separate image in a photograph



Projection attachment

The projection tower has a diameter of 240mm, this corresponding to a field of view number of 24.
Projection magnification = Objective magnification x 10x the magnification in the relay

- Lever position PRO
- Lever position CAM/PRO (red dot)
- Neutral-density filter switch black dot is visible



Automatic zoom lighting system/ indicator for objective magnification

- The automatic lighting system is located in the microscope base and is used for the adjustment of the transmitted-light illumination path for the particular objective. A fixed aperture is imaged in the object plane, and the image of the diaphragm will automatically adjust the field of view to 28. Together with the lighting setup, this system achieves automatic Köhler illumination. The light coming from the lamp is optimally utilized and the conductance, i.e., the product of the field and aperture, is held constant.
- The power supply for the lighting system is produced with the rotary switch of the power supply for the 100W low-voltage halogen lamp (please refer to page D11)
- When turning the objective turret, the position of the zoom is automatically adjusted by a servo motor to the respective lens. The control is programmed at the factory according to the objective turret assembly. The knurled wheel in the base of the microscope indicates the magnification of the powered-on objective.
- The zoom remains lit for all transmitted-light brightfield methods
- For transmitted-light darkfield, the automatic zoom is turned off with the lever, and the handwheel rotated to the position of DF.

Care of the microscope

Tripod

- The microscope should be covered after use with a protective cover. From time to time, clean the stand with a clean rag.
- A mild water-based surface cleaner is suitable for the cleaning of painted parts. Alcohol must never used, as this can damage the paint.
- On the stage, stains may be caused by solvents, so you can remove them by rubbing with paraffin oil or acid-free Vaseline.

Optics

- Objectives, eyepieces, and condensers may not be unscrewed during cleaning by a non-expert.
- Dust the freely accessible glass surfaces with an artist's brush: degreased, cleaned well in solvent, and completely dried before use.
- Fingerprints or dirt be cleaned with lens tissue, clean lab wipes, cotton swabs, or a non-abrasive cloth, pre-moistened with chemically pure xylene or water-based lens cleaner. Do not use alcohol!

Lenses with concave front lens:

- Remove gross contaminants with air or blast of canned air, or moistened soft cloth, lens tissue or cotton swab.
- As a solvent (only if absolutely necessary) use pure xylene.
- The often still-lingering coating can be removed with a piece of polystyrene foam. However, the previously used solvents must have evaporated completely. It is pressed against the front lens and rotated, whereby the lipophilic material should completely remove particularly greasy deposits. The adherent polystyrene particles are blown off.

Immersion oil

- Immersion oil should be cleaned off immediately after use.
- The immersion oil can be wiped off with lens tissue or a linen cloth. The remaining oil film is removed with a linen cloth which has been moistened with lens cleaner or xylene.
- Final cleaning is carried out, where appropriate, with chemically pure xylene. Do not use alcohol!

We are constantly striving to perfect our products, to meet the demands of the most modern investigation techniques and to point the way to new methods. This endeavor requires occasional changes to the mechanical and optical construction of improvable instruments. All descriptions and illustrations in catalogs and instructions for use, as well as all numerical information on mechanical structure and optical data, are therefore not binding.

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