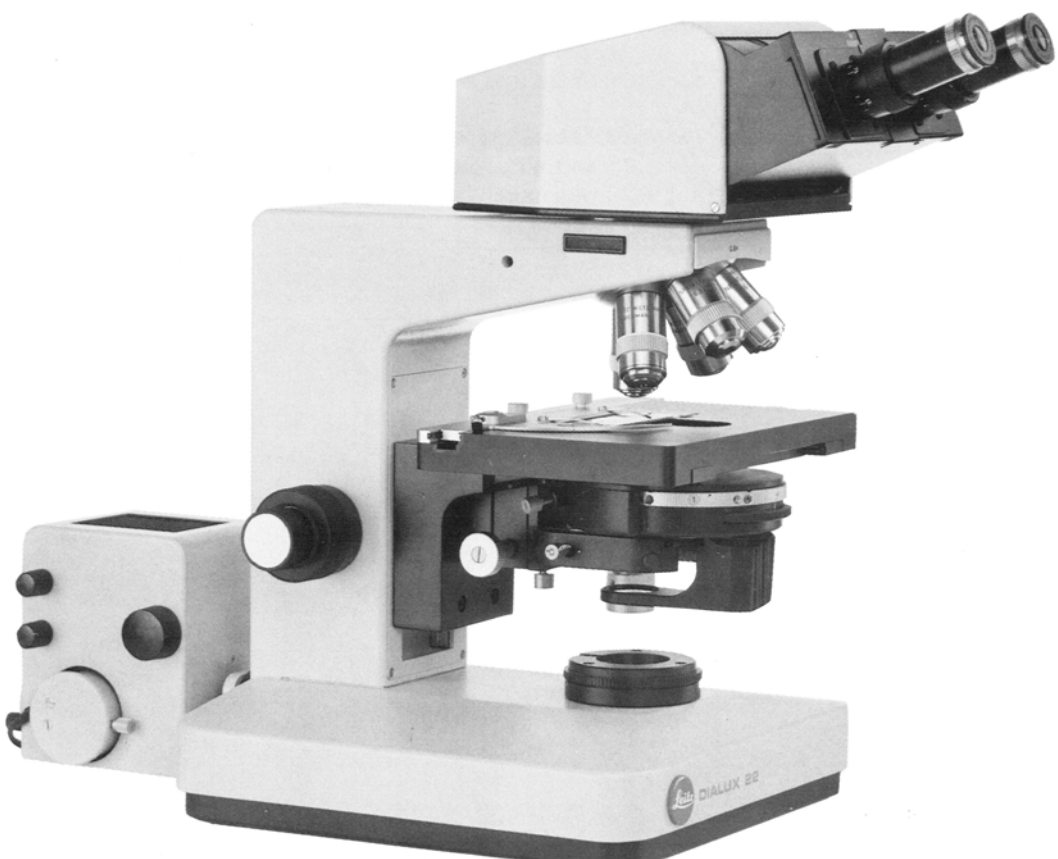
LEITZ DIALUX 22/22 EB

Laboratory and research microscope

Instructions

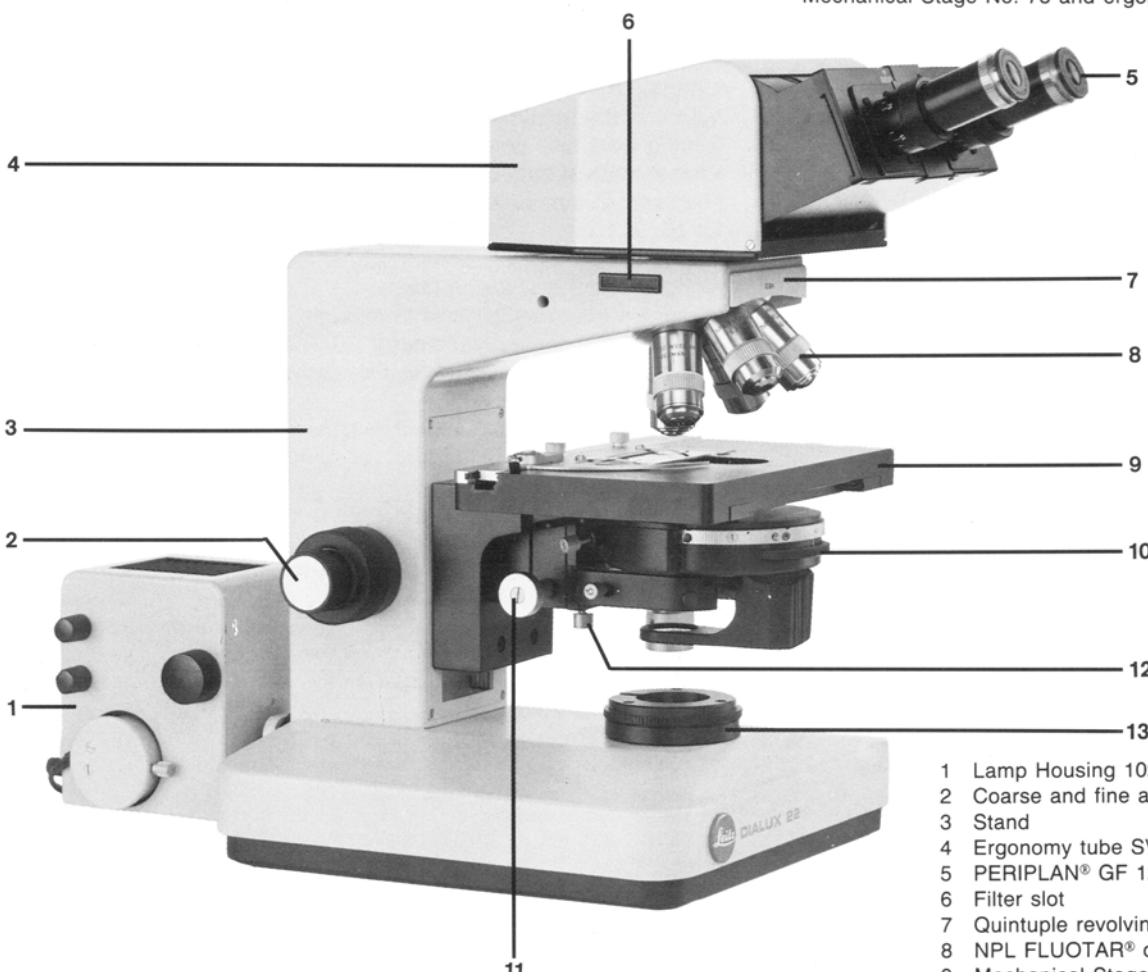


Code-No. **933 411**

Contents

Technical description

Fig. 1
DIALUX 22 with Lamp Housing 102 Z, universal condenser UK, Mechanical Stage No. 78 and ergonomy tube SV.



1 Lamp Housing 102 Z, interchangeable
2 Coarse and fine adjustment
3 Stand
4 Ergonomy tube SV, interchangeable
5 PERIPLAN® GF 12.5 x /18 eyepieces
6 Filter slot
7 Quintuple revolving nosepiece, interchangeable
8 NPL FLUOTAR® objectives
9 Mechanical Stage No. 78
10 Universal condenser UK, interchangeable
11 Vertical condenser adjustment
12 Adjustable condenser stop
13 Field diaphragm

Tubes

Binocular observation tubu S (30° viewing angle)
With adjustable eyepiece tubes for the mechanical compensation of the tube length for different interpupillary distances of observers.
Binocular observation tube S (45° viewing angle) (not illustrated).

Binocular observation and photo tube FSA. When the eyepieces are set at the individual interpupillary distances the tube length is automatically compensated.
→ 100% of the light to the eyepieces.
↳ 50% of the light to the eyepieces, 50% to the photo tube.
↑ 10% of the light to the eyepieces, 90% to the photo tube.

Binocular observation and photo tube FSA R, (with fade-in of format outlines); corresponds to the tube FSA; in addition it is equipped with a triple prism which with measurement with the LEITZ MPV compact microscope photometer permits simultaneous observation of the measuring field diaphragm with the images of the object and of the field diaphragm. If the automatic LEITZ VARIO-ORTHOMAT® camera system is used, the outline markings of the various camera formats and the movable measuring spot are optically superimposed on the image in the observation beam (not illustrated).

Binocular observation tube SV, viewing angle variable between 0° and 40°, integrated image erection for right-way-up and right-way-round viewing of the microscopic image. The tilting eyepiece tube varies the viewing level and allows assumption of the most comfortable working and sitting position.

Fig. 2
Binocular tube S

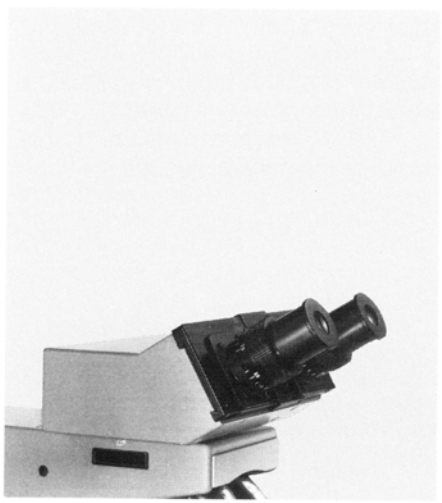


Fig. 3
Binocular photo tube FSA

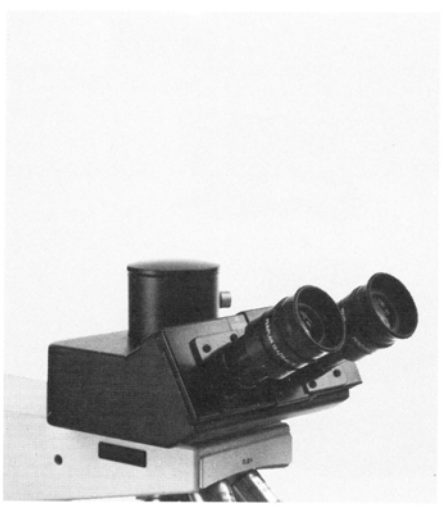
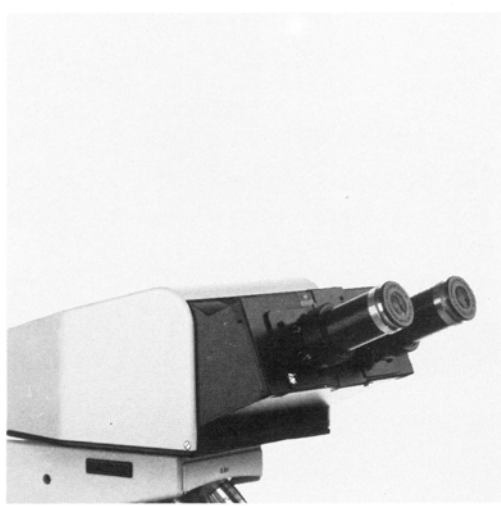


Fig. 4
Ergonomy tube SV



Object stage

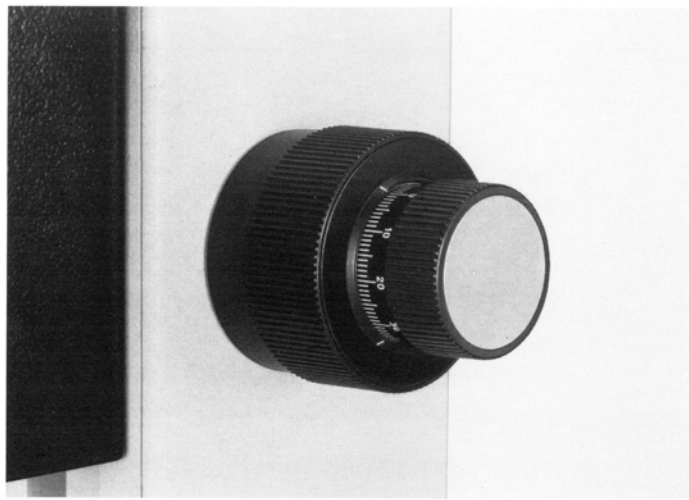
The Object Stage No. 78 measures 200 x 140 mm, its adjustment range is 76 x 50 mm. Graduations and verniers permit reading the position of a lined-up object detail to an accuracy of 0.1 mm.

Fig. 5
Large Mechanical Stage No. 78

Fine adjustment

The coarse and fine adjustment on both sides of the stand has an adjustment range of 35 mm and acts on the object stage. One interval on the scale of the fine adjustment corresponds to a vertical difference of about 2μm.

Fig. 6
Coarse and fine adjustment



Condensers

Condenser SK with dovetail change, hinged condenser top fitting and additional lens. It can be adapted for certain purposes when different condenser tops are screwed in.

Condenser UK with dovetail change, tilting condenser top fitting and supplementary lens; can be adapted for various purposes. Revolving turrets for phase contrast (P. 22) and interference contrast T (Instructions 550—054) can be inserted.

Fig. 7
Standard condenser SK
1 Interchangeable condenser top
2 Condenser top fitting
3 Lever for swinging out the condenser top. At the same time the lens 6 is introduced into the illuminating beam.
4 Aperture diaphragm lever
5 Dovetail guide
6 Supplementary lens

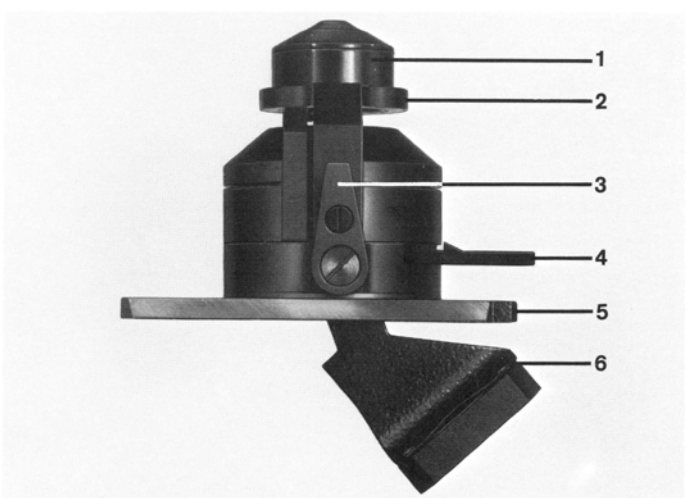
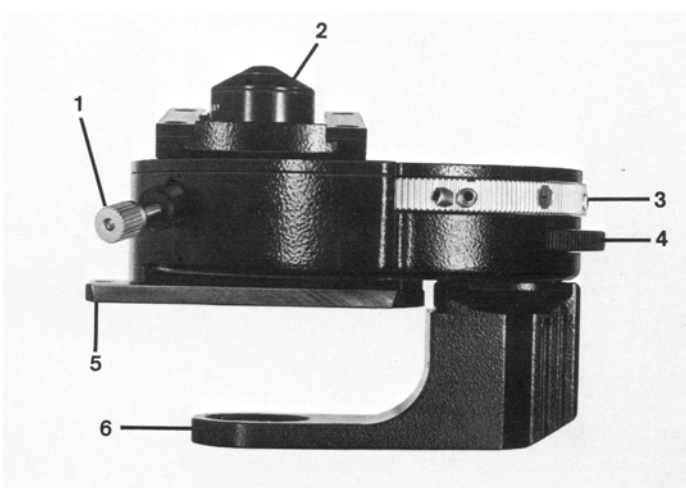


Fig. 8
Universal condenser UK
1 Two centring screws for the adjustment of the light ring (only one is visible)
2 Interchangeable condenser top
3 Revolving turret
4 Aperture diaphragm
5 Dovetail change
6 Supplementary lens



Condenser tops for the standard condenser SK and the universal condenser UK

Condenser top		Use
0.90 S 1.1	Condenser top turned out (supplementary lens turned in)	For objevtives of apertures < 0.25
0.90 S 1.1	Condenser top turned in (supplementary lens turned out)	For objectives of apertures > 0.25
OEL 1.32	Condenser top turned in (supplementary lens turned out), immersion oil on the front lens of the condenser top	When the 100/1.32 OEL objective is used
0.70 S 4	Condenser top turned in (supplementary lens turned out)	Intercept distance 4 mm. For investigations in which microscope slides thicker than 1 mm are used.
0.55 S 15	Condenser top turned in (supplementary lens turned out)	Intercept distance 15 mm. For investigations in which microscope slides thicker than 6 mm are used.
0.35 S 30	Condenser top turned in (supplementary lens turned out)	Intercept distance 30 mm. For investigations in which object slides thicker than 10 mm are used.
D 0.80-0.95	Condenser top turned in (supplementary lens turned out)	Darkfield for objectives of apertures < 0.75
D 1.19-1.44	Condenser top turned in (supplementary turned out) immersion oil on the front lens of the condenser top	Darkfield for objectives of apertures > 0.75 up to ~ 1.10, and objectives of aperture > 1.10 which are fitted with a funnel stop or iris diaphragm (e. g. OEL 100/1.25-0.60)

Light sources

The **Lamp Housing 20** contains the 6 V 20 W low-voltage halogen lamp and a push-on diffusion disc.

The **Lamp Housing 102 Z** accepts tungsten halogen lamps, ultra-high-pressure mercury lamps and ultra-high-pressure xenon lamps up to 100 W. Lamp and mirror are centred separately. The lamp condenser is horizontally adjustable.

Fig. 9
Lamp Housing for attachment to the DIALUX 22 EB microscope with built-in power unit consisting of transformer and regulator.

1 Rotary knob on the DIALUX 22 EB stand for adjusting the lamp brigtness.
2 Lamp Housing 20.

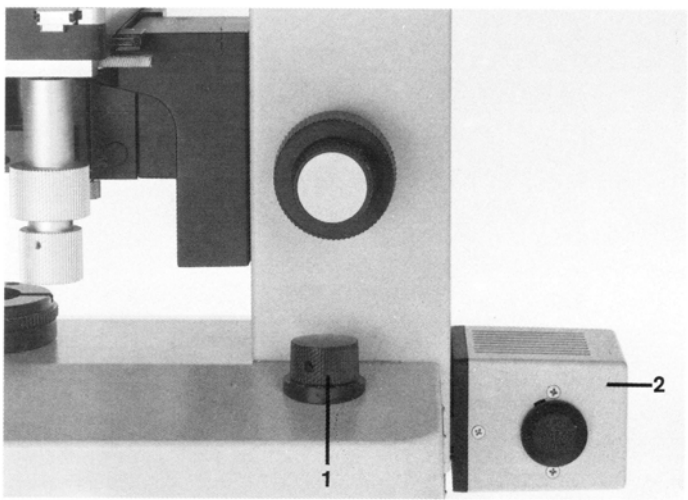
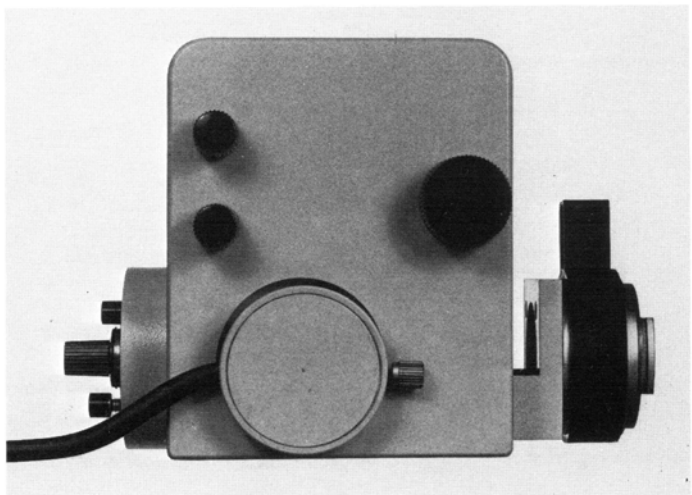


Fig. 10
Lamp Housing 102 Z for attachment to the DIALUX 22 and DIALUX 22 EB microscopes



Objectives

All Leitz microscope objectives computed for a tube length of 160 mm can be used on the DIALUX 22/22 EB. Microscope objectives for the 170 mm tube length can be used from 16:1.
The information on the objectives indicates:

1 **160** (170): mechanical tube length: the distance in mm between the flange of the objective to the rim of the tube.
2 **0,17:** coverglass thickness. Only specimens under a coverglass (thickness 0,17 mm) should be observed through these objectives. If a "—„ takes the place of 0.17, specimens with and without coverglass can be observed without limitation.
3 **EF** objectives (PLANO objectives with largely flattened field of view up to 18 mm intermediate image).
NPL objectives (PLANO objectives with flattened field of view up to 22 mm intermediate image)
PL objectives (PLANO objectives, flattened field of view up to 28 mm intermediate image)
Ordinary achromats do not have any additional letter code. Objectives for phase contrast investigations have the additional designation **PHACO** (in the EF and NPL FLUOTAR objectives the entire engraving is in green), and the indication of the position of the PHACO ring turret of the universal condenser UK necessary for this objective (e.g. PHACO 1 = turret position 1).
4 Reproduction ratio: the dimensional ratio of intermediate image and object (e.g. 100:1).
5 Numerical aperture: (e.g. /**1.25**).
6 The indication of the aperture is followed by that of the immersion medium.
7 Colour code: see table on the right.
8 Immersion objectives have an additional black ring = oil immersion, or a white ring = water immersion.

Reproduction ratio	2,5 : 1	4 : 1	6,3 : 1	10 : 1
Colour	Brown	Red	Orange	Yellow

16 : 1	25 : 1	40 : 1	63 : 1	100 : 1
Light green	Dark green	Light blue	dark blue	White

Fig. 11
NPL FLUOTAR® 100/1.32 OEL

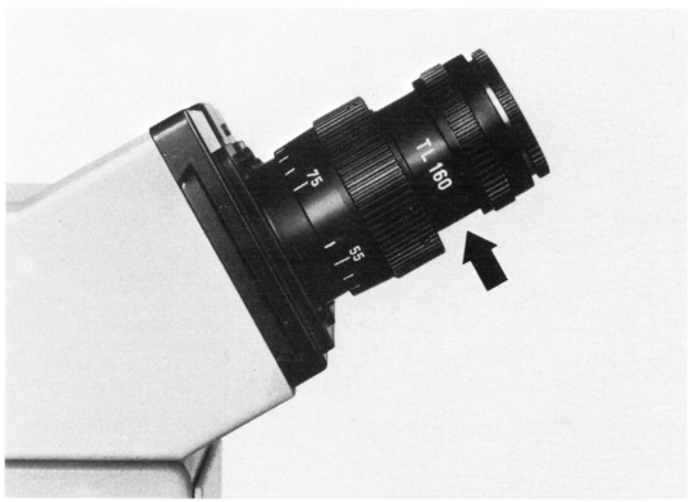
Eyepieces

LEITZ eyepieces computed for the 160 mm mechanical tube length are used. They are distinguished from those for 170 mm tube length by the additional indication of the field-of-view index after that of the magnification.

The field-of-view index of the eyepiece is the diameter of the intermediate image in the tube that can be observed through the eyepiece. It appears magnified by the eyepiece factor.

If LEITZ eyepieces without indication of the field-of-view index are to be used, a spacing ring TL 160 (Fig. 12) must be inserted.

Fig. 12
Inserting the spacing ring TL 160 (arrow)



The image diameter of an eyepiece as it appears to the observer at a distance of 250 mm is calculated from the eyepiece magnification and the field-of-view index.
An example with the PERIPLAN® GF 12.5 x /18 eyepiece;
Eyepiece magnification 12.5 x
Field-of-view index 18
Image diameter: 12.5 x 18 = 225 mm. When the diameter of the field of view is divided by the objective magnification and any tube factor (revolving nosepiece 1x) the diameter of the observable object area is obtained. With the above-mentioned GF 12.5x/18 eyepiece, a 25/0.50 objective, and a 1x tube factor, an object area of

$$\frac{18}{25 \times 1} = 72 \text{ mm diameter,}$$

witha tube factor of 0.8x one of

$$\frac{18}{25 \times 0.8} = 0.9 \text{ mm diameter is therefore observed.}$$

The final magnification of the microscope is calculated as follows:
Reproduction ratio of the objective x eyepiece magnification x tube factor.
Example:
Objective 25/0.50
Eyepiece 12.5 x/18
Tube factor 0.8x
Final magnification: 25 x 12.5 x 0.8 = 250:1.

Assembling the microscope

Inserting the tube

Push the lever in the direction of the arrow and insert the tube straight into the rapid tube changer. Allow the lever to slide forward. After it has been locked, the tube can be rotated through 160°.
The tube can be clamped by slightly tightening the lever. Insert the eyepieces in the eyepiece tubes.

Inserting the revolving nosepiece

Screw the objectives into the apertures of the revolving nosepiece so that an increase in magnification is possible (e.g. 6.3, 16, 40 etc.).
Slightly lower the object stage with the coarse drive (Fig. 6), release the clamping screw on the horizontal dovetail guide, insert the revolving nosepiece with the objectives in it as far as it will go, tighten the clamping screw.

Fig. 13
Inserting the tube

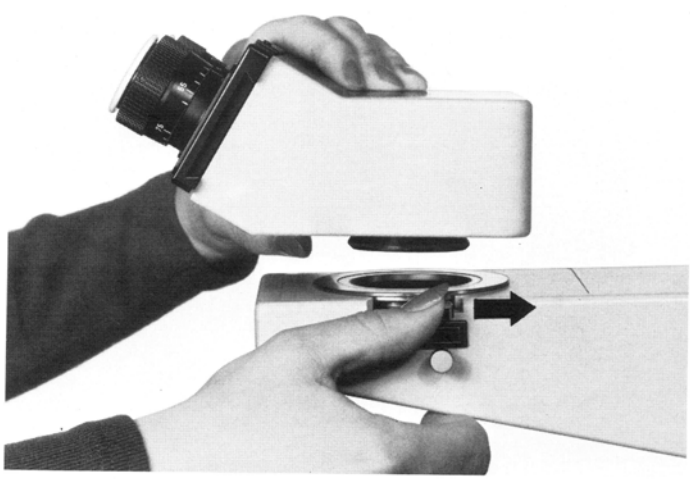
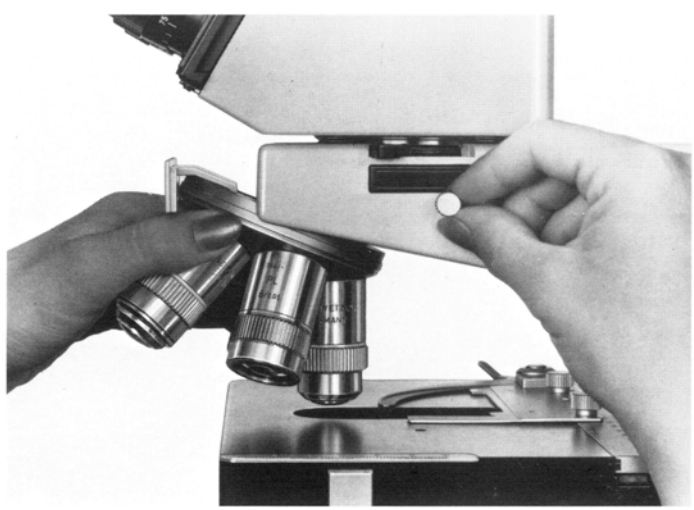


Fig. 14
Inserting the revolving nosepiece with objectives



Inserting the condenser

The vertically adjustable condenser holder has two screws (1) for the centration of the condenser. (Koehler's illumination) and a condenser clamp (4). An adjustable vertical stop (2) ensures reproducible vertical condenser adjustment. (3) Vertical adjustment of the condenser holder.

Turn the condenser clamping device (4) so that the markings on the screw and on the condenser holder face each other.
Lower the condenser dovetail changer with the knob (15.3)* sufficiently for the condenser to be conveniently pushed into this as far as it will go, and clamp the condensor by turning it. The aperture diaphragm lever or knurled revolver edge (7.4 or 8.4 resp.) must face the observer. Move the condenser upwards as far as it will go.

* i.e. figure 15, part 3

Fig. 15
Condenser holder

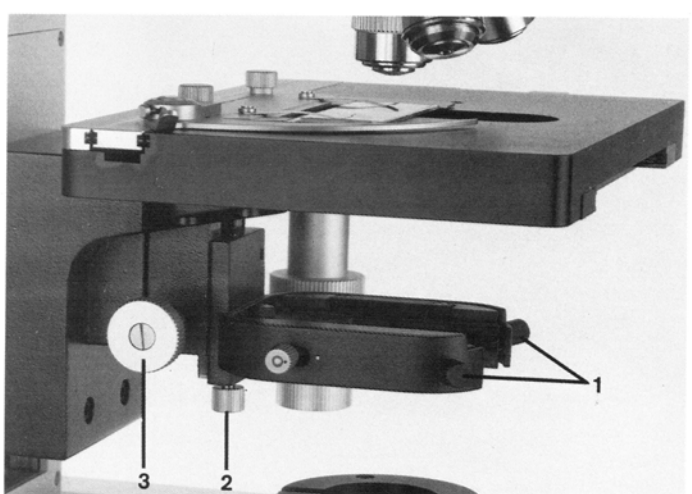


Abb. 16
Inserting the condenser

Lamp Housing 20

Engage the diffusion disc and attach the Lamp Housing 20 to the stand with the screws (if necessary with a coin).

Allow the lamp to cool sufficiently, apply pressure to the lamp mount, unlock it with an anticlockwise turn and remove it. Remove the defective lamp.
When inserting the new lamp do not remove the protective cover of the tungsten halogen lamp before insertion. Return the lamp mount to the lamp housing, apply pressure and lock it with a clockwise turn.

Fig. 17
Engaging the diffusion disc on the Lamp Housing 20

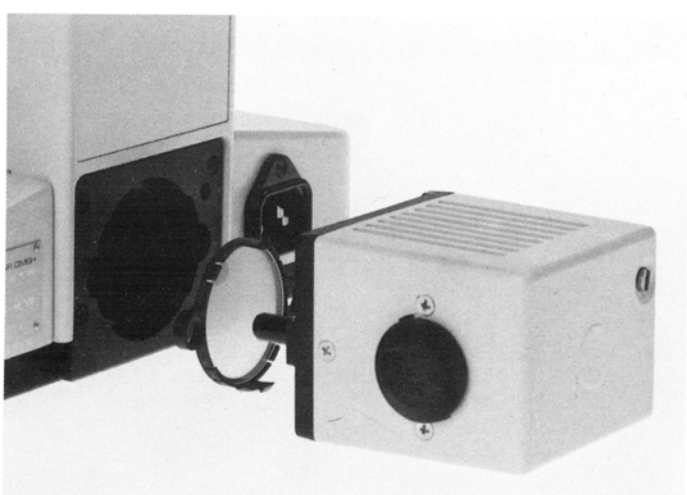
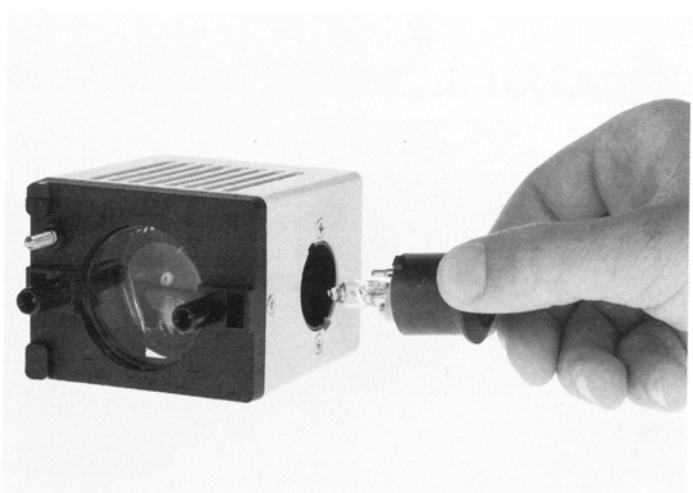


Fig. 18
Lamp change



Lamp Housing 102 Z

Attention: Remove the transport anchorage screw of the lamp condenser in the bottom of the lamp housing before attaching the lamp housing.

Move the bayonet lever of the lamp housing into a vertical position. Insert the changing tube of the lamp housing in the bayonet fitting of the microscope and lock it.

Disconnect it from the power unit. Release the knurled screw (24.7) of the lamp mount. Allow the lamp to cool sufficiently and pull the lamp mount out of the lamp housing. Remove the defective lamp. Insert a new tungsten halogen lamp. Do not remove its protective cover until after insertion. Return the lamp mount to the lamp housing. Reconnect it with the power unit and centre the lamp (Fig. 24).

Fig. 19
Attaching the Lamp Housing 102 Z

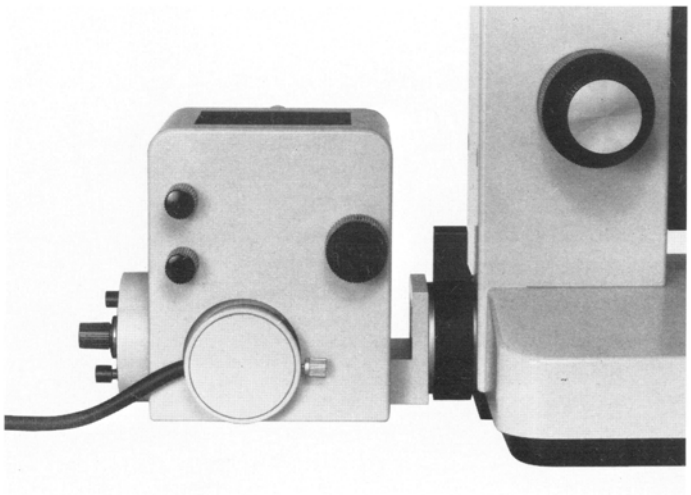
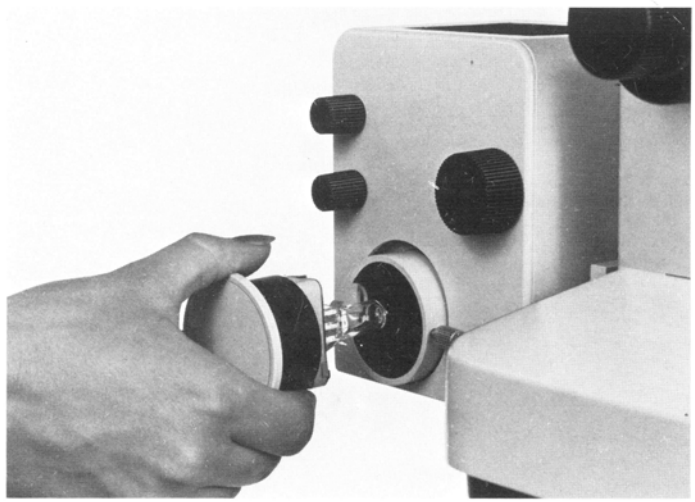


Fig. 20
Lamp change in the Lamp Housing 102 Z



Preparing the microscope for operation

DIALUX 22 EB with the Lamp Housing 20

Before operating the DIALUX 22 EB for the first time make certain that the voltage selector in the baseplate is set at your mains voltage.

Connect the microscope to the mains, switch on the illumination, and adjust the brightness with the knurled knob.

Transformer:
Maximum consumption 30 W
Mains voltage 220/230 – 240 v or 110/120 – 130 v adjustable, 50 – 60 Hz
Two fuses T 160 mA
Safety category I
Electrical test VDE and CSA

DIALUX 22/22 EB with Lamp Housing 102 Z attached and 12 v 100 W tungsten halogen lamp
Connect the lamp housing to the power unit and the power unit to the mains. Brightness regulation with the knob on the power unit.
Please study the separate instructions for the power unit.

Fig. 21
Adjusting the microscope illumination on the DIALUX 22 EB
1 Mains switch
2 Brightness regulating knob
3 Voltmeter

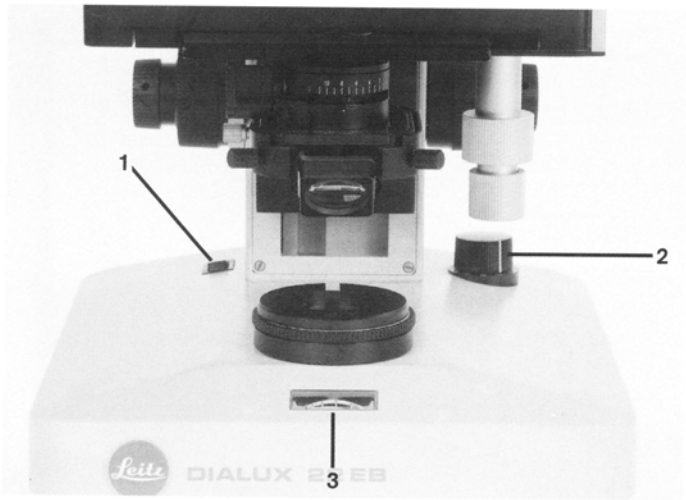
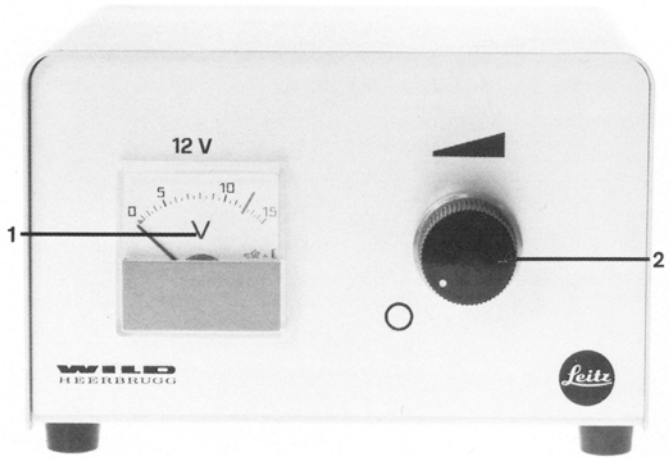


Fig. 22
Power unit for the 12 v 100 W tungsten halogen lamp
1 Voltage indication
2 Knob for the continuous adjustment of lamp brightness



Centring the light source in the Lamp Housing 102 Z with transmitted-light illumination

— Switch on the light source.
— Fully open the field diaphragm (1.13).
— Insert the adjustment device in the filter slot of the field diaphragm (Fig. 23).

Fig. 23
Adjustment device (with the diagrammatically represented filament adjustment)

Fig. 24
Lamp Housing 102 Z
1 + 3 Centring screws for the lamp
2 Lamp condenser adjustment
4 + 6 Centring screws for the adjustment of the mirror image
5 Axial adjustment of the mirrior
7 Knurled screw for attaching the lamp mount
8 Lamp mount

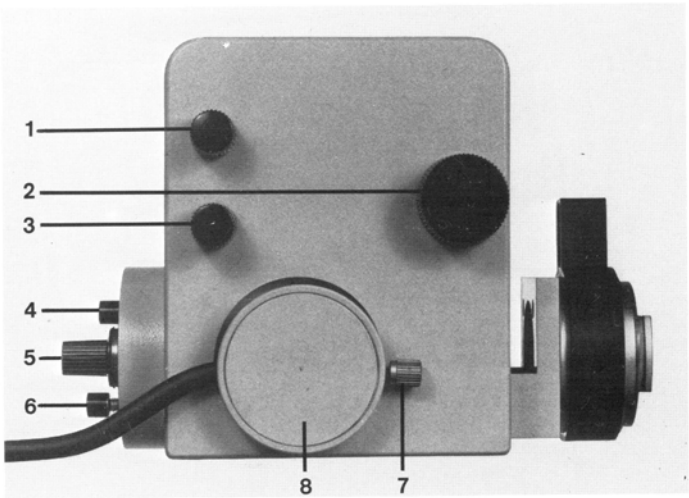


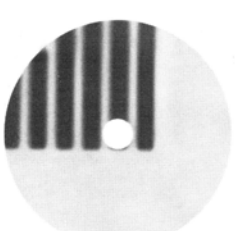
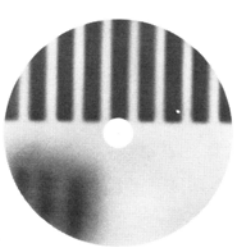
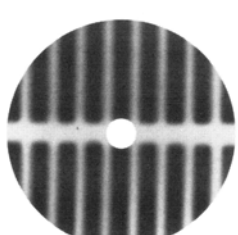
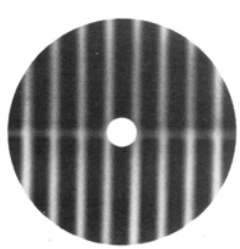
Fig. 25
Image of the lamp filament and mirror image (diagrammatic representation)

When the lamp condenser knob (2) is rotated, form a sharp image of the lamp filament. With the centring screw (1) move the lamp filament into the upper half of the illuminated field. With centring screw (3) adjust the lamp filament so that the upper illuminated area is completely filled.

By adjusting the two centring screws (4, 6) capture the mirror image of the lamp filament in the bottom half of the illuminated area.

Axially (5) adjust the mirror so that the mirror image of the lamp filament also appears in focus. With the two adjustment screws 4, 6 move the mirror image so that it is coincident with the direct image of the lamp filament on the bottom halves.

Through fine adjustment of the lamp (1) and mirror adjustment screws (4) move the two images of the lamp filament so that they are exactly side by side.
The two images should just touch in the centre.

Setting up the image-forming optical system

Attach the specimen to the object stage with the stage clips. The clamping of the specimen can be adjusted individually: press the button at the joint of the stage clip, move it to the left (firmer) or to the right (looser) and permit it to engage.
For first observation choose an objective of medium magnification (for instance NPL FLUOTAR 16/0.40).
Turn in the condenser top. Open the aperture diaphragm and the field diaphragm.

When the binocular observation tube S or the ergonomy tube SV is used adjust for interpupillary distance (by pushing or pulling) so that both images are completely coincident (only a single round image is seen). Transfer the interpupillary distance determined (index on the front plate of the tube) to the two eyepiece tubes — e.g. when an interpupillary distance of 65 mm has been found, set the left hand and right hand eyepiece tube each on the index 65 engraved on it.

Fig. 26
Clamping the specimen

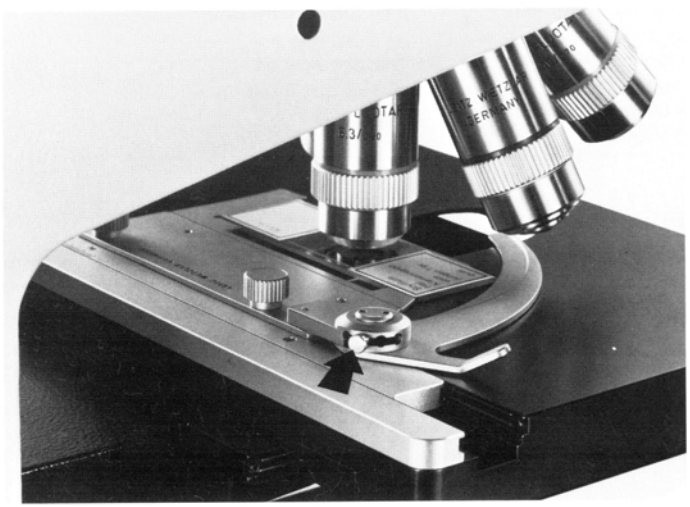
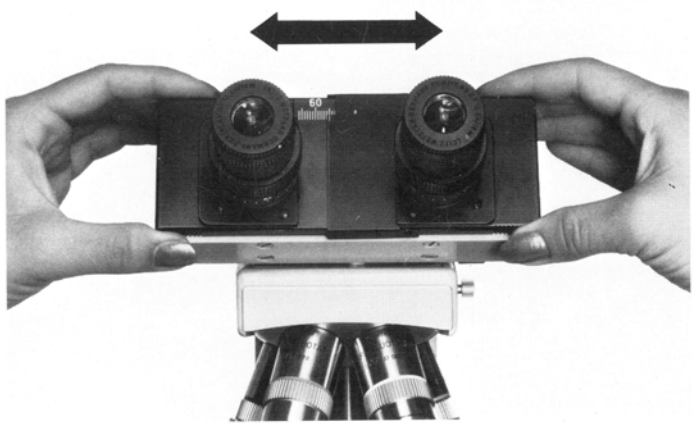


Fig. 27
Setting the individual interpupillary distance



Eyepieces with fixed eyelenses:
Look through the right hand eyepiece with the right eye and focus the specimen with the fine adjustment. Now look at the same area of the specimen with your left eye through the left hand eyepiece tube and rotate this until the same object area is in sharp focus; the fine adjustment must not be touched during this procedure. Check the setting once again after centration of the condenser.

Eyepieces with focusing eyelenses:
Holding eyepiece up to the light, adjust the eyelens, whilst looking with the left eye, so that the rim of the eyepiece diaphragm is in focus. Insert the eyepiece into the left mount, then repeat the process for the other eyepiece using the right eye. Look through the right hand eyepiece with the right eye and focus the specimen with the fine adjustment. Now look at the same area in the specimen with the left eye through the left hand eyepiece tube and rotate the eyepiece tube until the same object area is in sharp focus; the fine adjustment must not be touched during this procedure. Check the setting after centration of the condenser.

With the ergonomy tube SV, the viewing angle can be varied between 0 and 40° through tilting of the eyepiece tubes, and the viewing level thereby adjusted to the microscopist's sitting position.

Fig. 28
Transfer the interpupillary distance

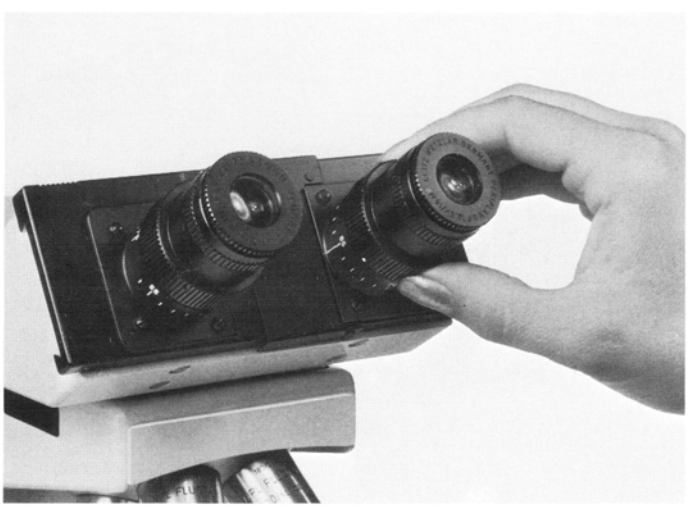
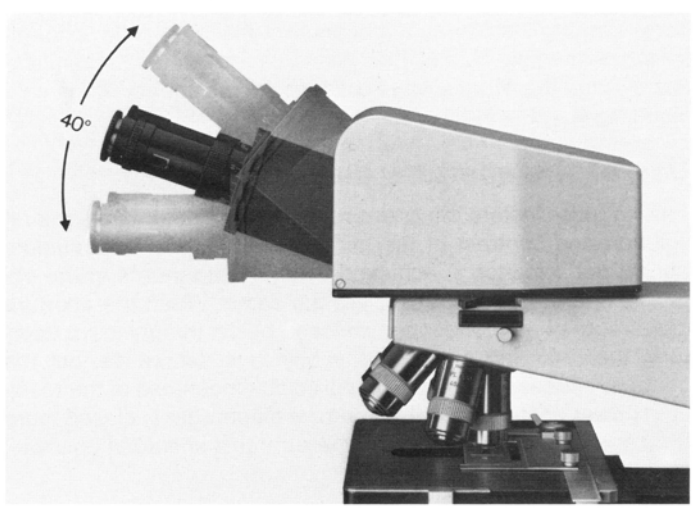


Fig. 29
Adjusting the viewing angle on the tube SV



Centring the condenser and adjusting the field diaphragm

Focus the specimen with the coarse and fine adjustment.
Adjust the field diaphragm so that the white ring (Fig. 30 arrow) is fully covered.
When objectives of < 0.25 are used, turn out the condenser top. The condenser remains in the same position as for objectives of apertures > 0.25. The aperture diaphragm must always be fully open.

1. Close the field diaphragm.
2. By turning the condenser stop screw (15.2) lower the condenser so that the edges of the field diaphragm appear in focus.
3. Centre the image of the field diaphragm with the two centring screws (15.1).
4. Open the field diaphragm so that it just disappears beyond the field of view.

When objectives are changed fine centration is carried out only through the movement of the field diaphragm.

Use of the field diaphragm

The field diaphragm protects the specimen against unnecessary heat and blocks all the light not required for image formation from reaching the object. It is therefore only opened far enough for the observable field of view just to be transmitted. Magnification change therefore always calls for an adjustment of the field diaphragm.

Use of the aperture diaphragm

Among other factors the aperture diaphragm determines the resolution and contrast of the microscopic image. The optimum optical performance is achieved when the apertures of the objective and of the condenser are the same. When the aperture diaphragm of the condenser is closed below the objective aperture, the resolving power of the objective decreases, but the contrast increases. A visually appreciable decrease of the resolving power occurs when the aperture diaphragm is closed more than one-third of the objective aperture; this should, if possible, be avoided.

Remove the eyepiece from the eyepiece tube, close the aperture diaphragm so that its image becomes just visible on the rear lens of the objective. This position is considered normal.
Replace the eyepiece. With objects of low contrast the aperture diaphragm can be further closed so that the less contrasty structural elements, too, are clearly discernible.
The scale permits the reproducible setting of the aperture diaphragm.

Attention:

The aperture diaphragm does **not** serve for adjusting the image brightness. This is exclusively done with transformer adjustment, neutral-density screens or the illumination adapter.

Fig. 30
Adjusting the field diaphragm

Oil immersion

Oil immersion objectives are distinguished by their engraving "Oil" and a black ring at the bottom rim of the objective mount. The immersion oil has approximately the same refractive index $n_e = 1.515$ as the coverglass and the front lens of the mikroscope objective. Focal length and working distance of an immersion objective are usually very short. Care is therefore indicated during work with oil immersion objectives.
Ensure that the LEITZ immersion oil is free from air bubbles.
Generally, the condenser top 0.90 S 1.1 will be fully adequate also with oil immersion objectives. But if the full aperture of the immersion objective is to be utilised, for instance with very fine structures, the aplanatic-achromatic condenser top oil 1.32 should be used. Here, immersion oil must be applied also between the condenser top and the underside of the microscope slide. After the end of the examination immersion oil must be carefully removed from all surfaces with a soft rag moistened with methylated spirit.

Transmitted-light darkground

For investigations in darkground, the condenser top D 0.80 – 0.95 is used with objectives of apertures < 0.75 and the condenser top D 1.19 – 1.44 with objectives of apertures > 0.75.
With apertures > 1.10 use the funnel stop, or an objective with iris diaphragm.

Setting up the darkground image (D 1.19 – 1.44 and D 0.80 – 0.95)

Place the specimen on the object stage. Turn the condenser top screw (15.2) clockwise as far as it will got. Insert the condenser with the darkground condenser top swung in and raise it up to the condenser stop (cf. Fig. 15).Apply a drop of immersion oil to the top surface of the condenser top D 1.19–1.44, and raise the condenser. Slowly turn the stop screw (15.2) during the raising until the drop of oil makes contact with the underside of the microscope slide. This will be indicated by a brief flashing of the microscope slide.
Focus the specimen (use the 10/0.25 or 16/0.40 objective). Close the field diaphragm. Turn the condenser stop screw to the left and with the condenser drive raise the condenser so that when the specimen is viewed, the sharpest possible image is obtained of the rim of the diaphragm.
With the two centring screws move the image of the diaphragm to the centre of the field of view. Open the field diaphragm so that it just disappears beyond the edge of the field of view.

Phase contrast

The universal condenser UK can be converted into a phase contrast condenser through insertion of the light-ring turret. Different light rings are available for the various condenser tops (see table p 24).

Inserting and exchanging the light rings:

All light rings are marked for the necessary position in the light ring turret and the condenser top to be used (see Fig. 32).

Slacken the (2 mm) Allen screws (31.7) until the screw heads are flush with the knurled rim of the light-ring turret. Push the light ring against the spring-loaded fixing pin and take it out or insert it respectively.
Screw the two centring screws in so that the light ring is roughly central.
The light rings must always be inserted in the fitting **opposite** the position indication. The fitting (31.3) opposite the fitting indication "H" remains empty and therefore has no centring screws.

Fig. 31
Revolving turret and focusing telescope
1 Light-ring turret
2 Light ring
3 Remains empty for brightfield
4 Eyelens
5 Clamping ring
6 Focusing telescope
7 Centring screws for light rings

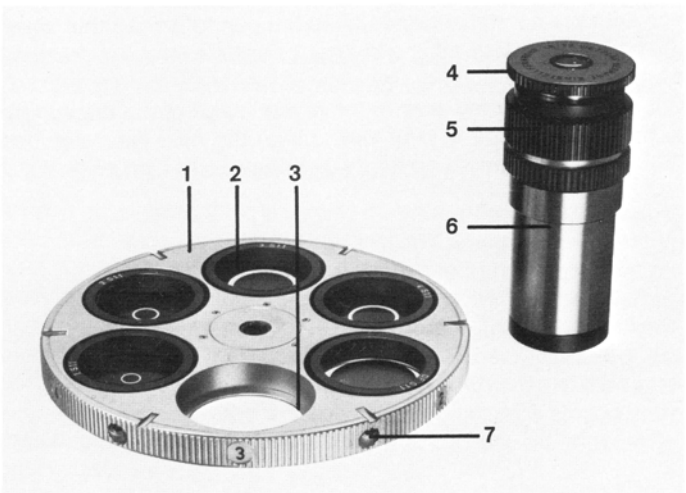
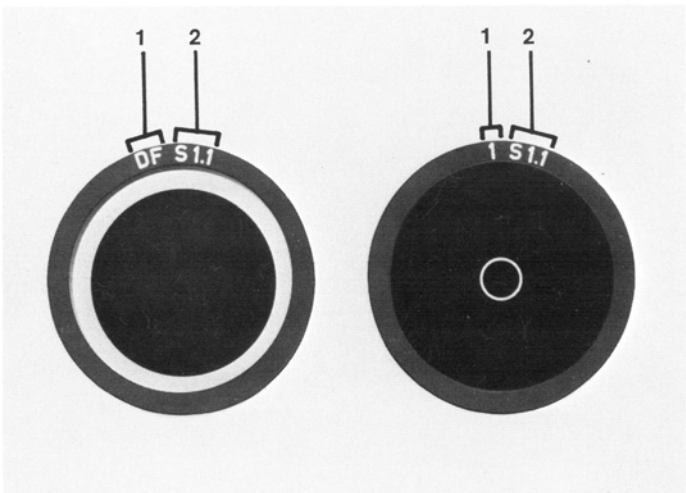


Fig. 32
1 Indicates the position of the light ring in the light-ring turret (DF is inserted in position 5)
2 Associated condenser top, for instance S 1.1



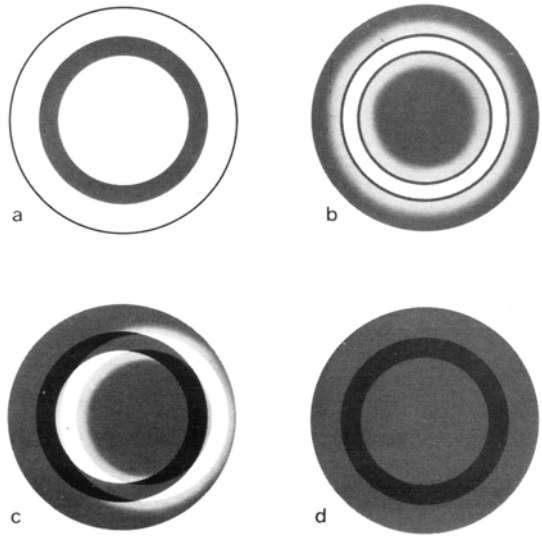
Inserting the light-ring turret

Turn in the top of the UK condenser. Slacken the holding screw in the bottom part of the condenser. Pull the dust cap out of the condenser. Insert the light-ring turret so that the light-ring fittings face upwards, and fix it with the holding screw.

Setting up the phase contrast

Screw the phase contrast objectives into the revolving nosepiece and insert this in the nosepiece changer (p. 11). Fix the nosepiece with the fixing screw. Insert the universal condenser UK with the light-ring-turret in position in the condenser fitting and raise it to its highest position with the condenser drive. Set the aperture diaphragm at the marking "PH". Place the specimen on the object stage. Turn in objectives 10/0.30 PHACO 1 or 16/0.40 PHACO 1. Set the light-ring turret at position 1. Focus the specimen with the coarse and fine adjustment.
Close the field diaphram. Adjust the condenser with the condenser drive knob (15.3) and stop screw (15.2) so that the rim of the field diaphragm appears in sharp focus. Centre the image of the field diaphragm with the two centring screws (15.1), open the field diaphragm so that it just disappears beyond the edge of the field of view. Remove the eyepiece from the eyepiece tube and insert the focusing telescope (31.6). Slacken the clamping ring (31.5) on the focusing telescope, and adjust the eyelens (31.4) so that sharp images are formed of the light and of the phase rings. Set the light ring with centring screws (31.7, push in and turn) so that it precisely coincides with the phase ring of the objective (Fig. 33). Centration is carried out once for all objective light-ring combinations, and will be preserved for all settings.

Fig. 33
Phase ring and light ring as seen in the focusing telescope
a In brightfield
b In phase contrast, centred
c In phase contrast, off-centre
d In darkground



Universal condenser UK for phase contrast

Condenser top	Light ring	Revolving turret position	Objectives engraved	
0.90 S 1.1	—	H	(all objectives)	Brightfield
	1 S 1.1	1	PHACO 1	phase contrast
	2 S 1.1	2	PHACO 2	phase contrast
	3 S 1.1	3	PHACO 3	phase contrast
	4 S 1.1	4	PHACO 4	phase contrast
	DF S 1.1	5	(all objectives of aperture < 0.75)	darkground
0.70 S 4	—	H	(all objectives)	brightfield
	1 S 4	1	PHACO 1	phase contrast
	2 S 4	2	PHACO 2	phase contrast
	3 S 4	3	PHACO 3	phase contrast
	4 S 4	4	PHACO 4	phase contrast
0.55 S 15	—	H	(all objectives)	brighfield
	1 S 15	1	PHACO 1	phase contrast
	2 S 15	2	PHACO 2	phase contrast
	4 S 15	4	PHACO 4	phase contrast
0.35 S 30	—	H	(all objectives)	brightfield
	1 S 30	1	PHACO 1	phase contrast
	2 S 30	2	PHACO 2	phase contrast

Microscopic measurements

Length measurements of microscopic objects are carried out in conjunction with a micrometer eyepiece (graduation usually 10 mm = 100 intervals). Before measurement is begun the micrometer value of the objective used must be known. The micrometer value is the distance in the object plane of which the objective forms an image precisely on an interval of the graticule graduation in the micrometer eyepiece. Because the optical constants of the objectives are subject to minor fluctuations it is advisable to determine the micrometer values once and for all with the aid of a stage micrometer.

Example:
Determination of the micrometer value with the aid of a stage micrometer 2 mm = 200 intervals and a micrometer eyepiece with graticule 10 mm = 100 intervals.
Make the zero lines of the micrometer eyepiece and of the stage micrometer coincide in the microscope. Read the micrometer value at the end of the graduation of the micrometer eyepiece with unchanged setting.
Example:
If 1.220 mm of the stage micrometer coincide with 100 intervals of the micrometer eyepiece, the micrometer value will be 1.22 : 100 = 0.0122 mm = 12.2 μm. With low-power objectives, which do not form an image of the stage micrometer scale across the entire scale of the micrometer eyepiece, only 10 intervals of the latter will be compared . If, then, 0.36 mm of the stage micrometer coincide with 10 intervals of the micrometer eyepiece, the micrometer value will be 0.36 : 10 = 0.036 mm = 36 μm.
The screw micrometer eyepiece is used for very precise measurements under the microscope. Our list 513-017 provides information about this item.

Polarized light

Insert the filter holder (34.2) in the field diaphragm mount so that the open filter slot faces the observer. The rib of the holder thereby engages the recess of the mount. Insert the polarizer (34.4) in the bottom slot of the filter holder. It can now be rotated through 90°. If necessary a compensator (34.3) (λ- or λ/4-plate) can be inserted in the second filter slot above the polarizer. Push the analyser (34.1) into the filter slot (in the limb of the stand) until it engages.

Fig. 34
Filter polarizing device

Fluorescence investigations in transmitted light

Place the excitation filter on the dust glass in the foot of the stand, and insert the appropriate suppression filter in the filter slot in the limb of the stand.
For red suppression a BG 38 filter is inserted in the filter slot of the Lamb Housing 102 Z.

Attention: Never look into the microscope when the mercury vapour lamp is switched on and no suppression filters are in the filter slot.

Excitation filters

Designation	Useful range	Excitation Filter	Type of filter	Code-No.
A	Ultra violet	BP 330 – 385	G	513 457
C	Violet	BP 405/20	IB	513 458
G	UV + Violet + blue	BP 350 – 460	G	513 459
H	Violet + blue	BP 390 – 490	IKP	513 460
M	Green	BP 546/20	IDP	513 461

Slides with suppression filters

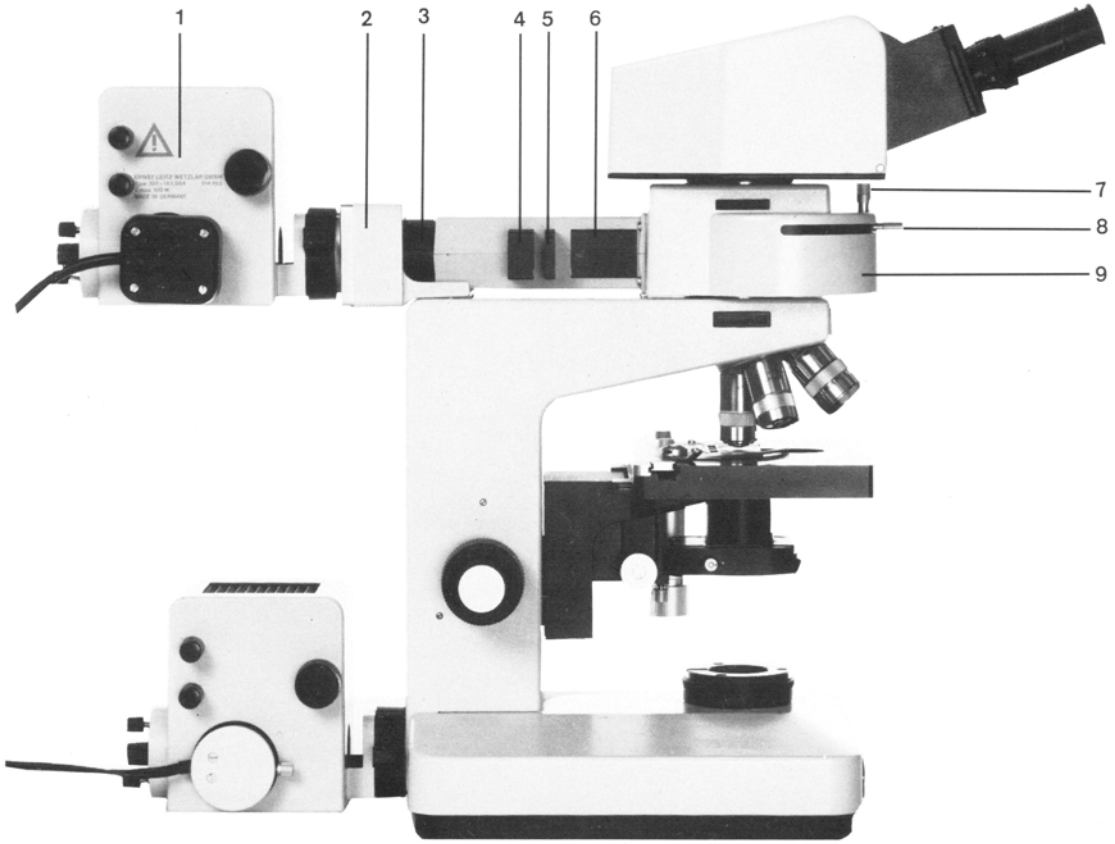
For excitation filter	Suppression filter	Code No.
A	K 430 and K 460	514 570
C	K 470 and K 490	514 571
G	K 510 and K 530	514 572
H	K 510 and K 530	514 572
M	K 570 and K 580	514 573

BP = band pass filter
G = dyed-in-the-mass glass filter (combination)
IB = interference band filter
IPB = high-performance interference band filter
IKB = high-performance interference short-pass filter

Fluorescence vertical illuminator 3-λ PLOEMOPAK

Fig. 35

1 Lamp housing 102 Z with 50W ultra-high-pressure mercury lamp
2 Lamp housing holder
3 Light baffle
4 Disengageable BG 38 red suppression filter
5 Exciting-light block
6 Centrable field diaphragm
7 Arresting device for the switch lever for the 2-wave lengths method
8 Filter system changing lever
9 3-λ PLOEMOPAK



Exchanging and inserting of filter systems

Fig. 36
Opening the lid of the housing to change the filter system

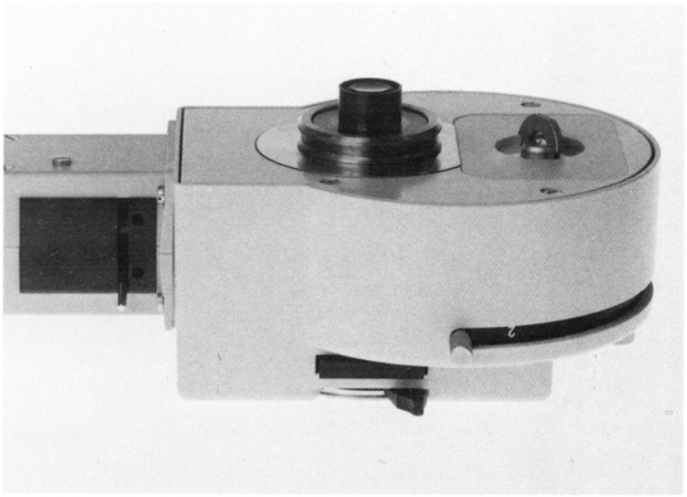
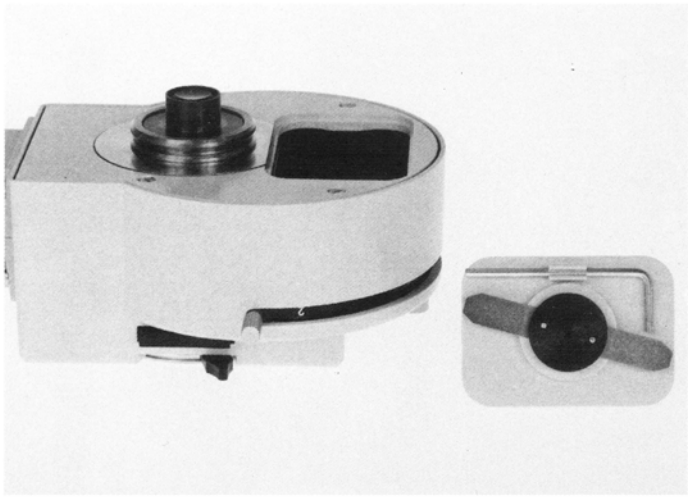


Fig. 37
3-λ PLOEMOPAK with the lid of the housing removed and spanner for the slackening/fixing of the filter system



Assembling the device

Remove the cover plate and screw the lamp holder on to the back of the stand.
Unlock the observation tube and remove it from the stand. Mount the PLOEMOPAK with the light baffle in position on the stand. Insert the light baffle. Insert the observation tube in the tube changer of the PLOEMOPAK. Push the lever to the back and release it after insertion. Insert the lamp housing in the lamp holder (the grip of the bayonet lock is vertical) and lock it by an anticlockwise turn. Remove the condenser and replace it by the light baffle (Fig. 39).

Attention:
Fluorescence vertical illuminators (1x) must be combined only with revolving nosepieces without tube lens or those of tube factor 1.25x.

Fig. 38
Slackening/fixing the filter system

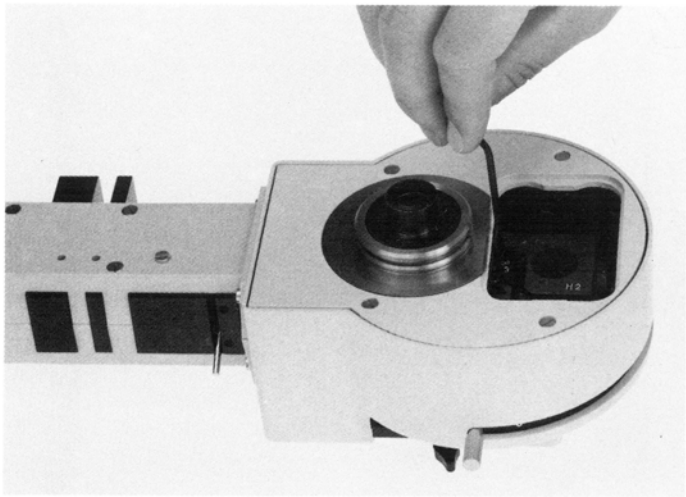
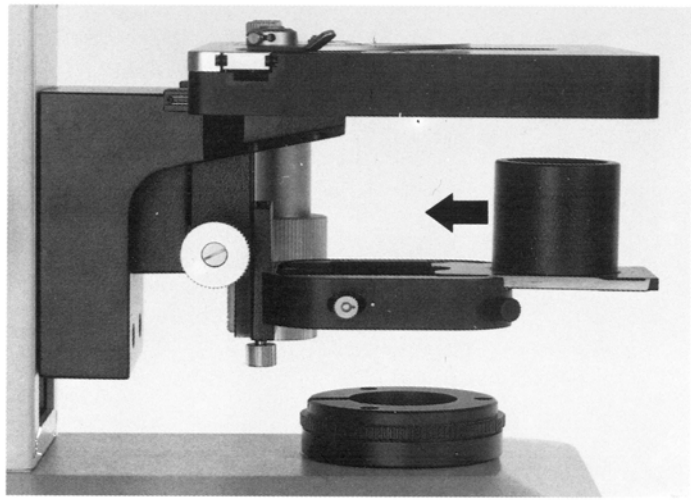


Fig. 39
Inserting the light baffle



Inserting the 50 W ultra-high-pressure mercury lamp

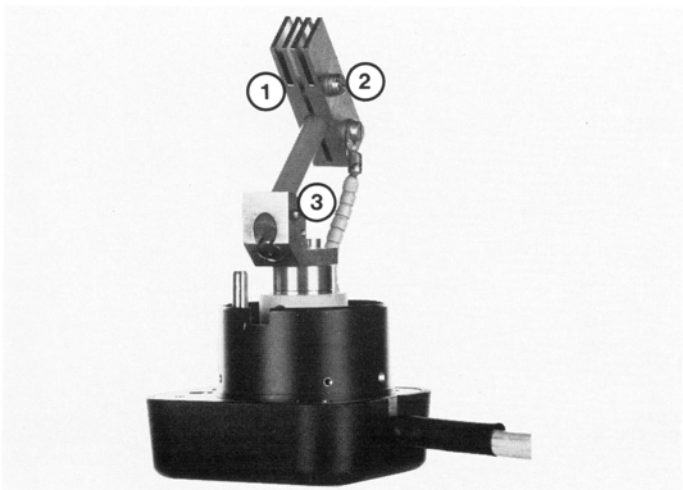
Slacken the screw pin (35.2) and pull the lamp mount with separation plug (for breaking the circuit when the lamphousing is opened) out of the lamp housing.

Insert the lamp between clamping jaws (40.1) of the flexible current supply and fix it with knurled screw (40.2). Release the grub screws (40.3) in the mount, and insert the (lettered) socket of the lamp. Tighten the grub screw. Insert the lamp mount with the lamp in the lamp housing and clamp it with the screw pin. Connect it with the power unit.

Attention! Before changing the lamp

1. disconnect it from the mains,
2. allow the lamp to cool.
3. take out the lamp
4. put in the new lamp,

Fig. 40
Lamp mount with 50 W ultra-high-pressure mercury lamp



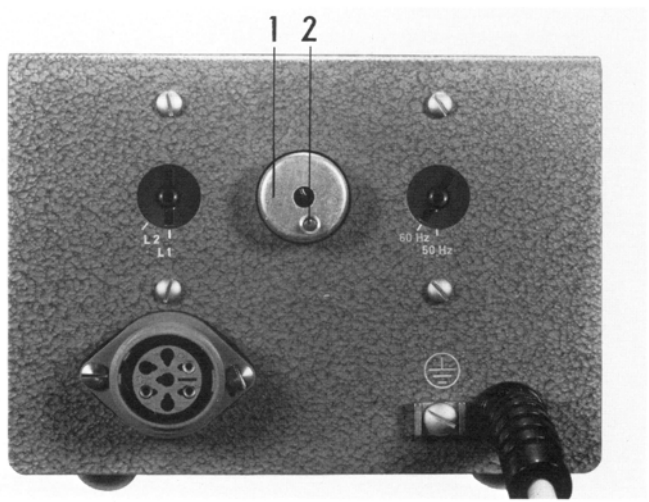
Preparing the 50 W ultra-high-pressure-mercury lamp for operation

DIALUX 22/22 EB with Lamp Housing 102 Z attached and 50 W ultra-high-pressure mercury lamp for fluorescence investigations.

Before switching on ensure that the mains voltage is 220 V and the mains frequency (50/60 Hz) is correctly set on the power unit, which is designed only for 220 V $\pm$10%. If the mains voltage is different (e. g. 20 V), a suitable transformer must be connected.

Also ensure that the markings of the lamp socket and of the power unit agree. If, for instance, the lamp socket is market L_1 or

Fig. 41
Power unit for the 50 W ultra-high-pressure mercury lamp
1 Safety starting switch
2 Fuse



L_2 the power unit, too, must be set at L_1 or L_2 respectively on the mains side, to utilise the lamp fully and not to shorten its life.

Connect the lamp housing to the power unit for the 50 W ultra-high-pressure mercury lamp, connect the power unit to the mains.

The safety starting button (1) (e.g. the OSRAM St. 192) fires the lamp. If this does not fire properly after a few attempts (the lamp is still too hot or exhausted), the safety starter (1) will switch off. When the lamp has had time to cool or has been replaced by a new one, the safety starter is again made operative with the red push-button (2). The starter can be removed by anticlockwise rotation and replaced with a new one. If the OSRAM safety starter is marked "For HBO 75 W", this means that it had been originally developed for this lamp, but is suitable also for other, similar, lamps.

Please follow the instructions for the use of the lamp.

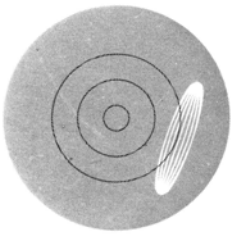
Centring the 50 W ultra-high-pressure mercury lamp in the Lamp Housing 102 Z on the 3-λ PLOEMOPAK

— Switch on the light source.
— Turn in the filter system with the required filter combination.
— Unscrew one objective and turn the empty revolving nosepiece aperture into the optical path.
— Place a piece of white paper on the object stage and centre the lamp (Fig. 42).

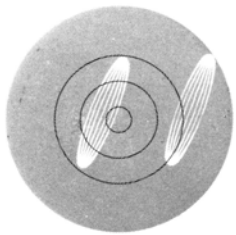
Observing the microscopic image now adjust the lamp condenser until the image is evenly illuminated.

Fig. 42
Discharge arc and mirror image (diagrammatic representation)

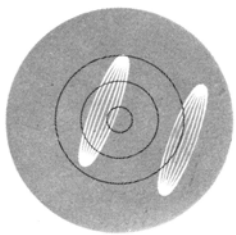
Adjust the knurled knob for the lamp condenser until a sharp image of the discharge arc is produced.
Turn the knob for the vertical adjustment until the discharge arc is raised to the correct level according to the illustration.



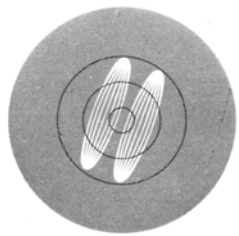
Turn the knob for horizontal adjustment until the arc occupies the centre.
Adjust the focusing knob for the concave mirror in the direction of the optical axis until a sharp mirror image of the discharge arc is produced.



Turn the knob for vertical adjustment until the mirror image is in the correct position relative to the discharge arc according to the illustration.



Operate the knob for lateral adjustment until both images (discharge arc and mirror image) are side by side.



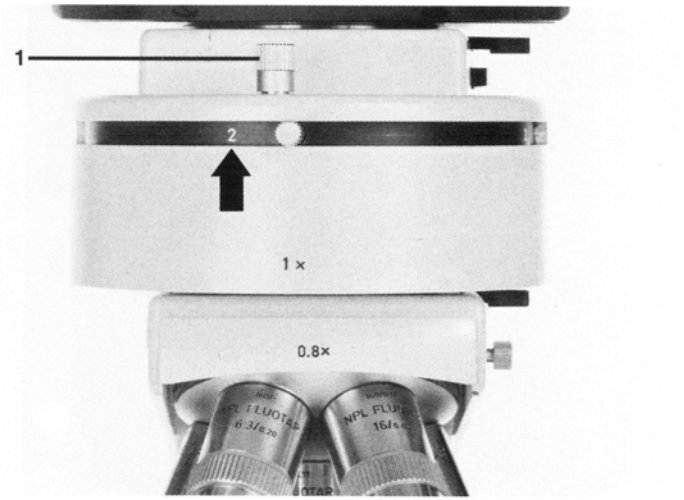
Two-wave lengths method

This method is used for the identification of small quantities of a fluorochrome in the presence of relatively large quantities of a second fluorochrome. With successive excitation with two wave lenghts the specific fluorescence emission can be observed separately from the other. Two different components can then be identified, for instance, both inside a cell and in cells separated from each other.

Use of transmitted light

In the place of one of the three filter blocks a transmitted-light insert for ordinary transmitted light microscopy can be installed in the 3-λ PLOEMOPAK.
The microscope can now be used alternately for transmitted-light brightfield or phase contrast observation and incident-light fluorescence investigations.

Fig. 43
The figure (arrow) indicates the effective filter system.
Permit the stop (1) to engage. It is now possible only to alternate between two filter systems (in position 1 and 2). If change is required between all three positions, pull the stop up and arrest it by a slight turn.



Filter blocks for the PLOEMOPAK vertical illuminator

Designation	Range of use	Excitation filter	Beam splitting mirror	Suppression filter	Code No.
A 2	U.V.	BP 270 – 380	RKP 380	BP 410 – 580	513 597
A	U.V.	BP 340 – 380	RKP 400	LP 430	513 596
B 2	U.V. + violet	BP 350 – 410	RKP 455	LP 470	513 599
D	U.V. + violet	BP 355 – 425	RKP 455	LP 460	513 600
E 3	blue	BP 436/7	RKP 475	LP 490	513 601
G	UV + violet + blue	BP 350 – 460	RKP 510	LP 515	513 602
H 2	violet + blue	BP 390 – 490	RKP 510	LP 515	513 603
I 2	blue	BP 450 – 490	RKP 510	LP 515	513 604
K 2	blue	BP 470 – 490	RKP 510	LP 515	513 605
L 2	blue	BP 450 – 490	RKP 510	BP 525/20	513 606
L 2.1	blue	BP 450 – 500	RKP 510	BP 515 – 560	513 607
M 2	green	BP 546/14	RKP 580	LP 580	513 608
N 2	green	BP 530 – 560	RKP 580	LP 580	513 609
N 2.1	green	BP 515 – 560	RKP 580	LP 580	513 610

1-λ PLOEMOPAK fluorescence vertical illuminator

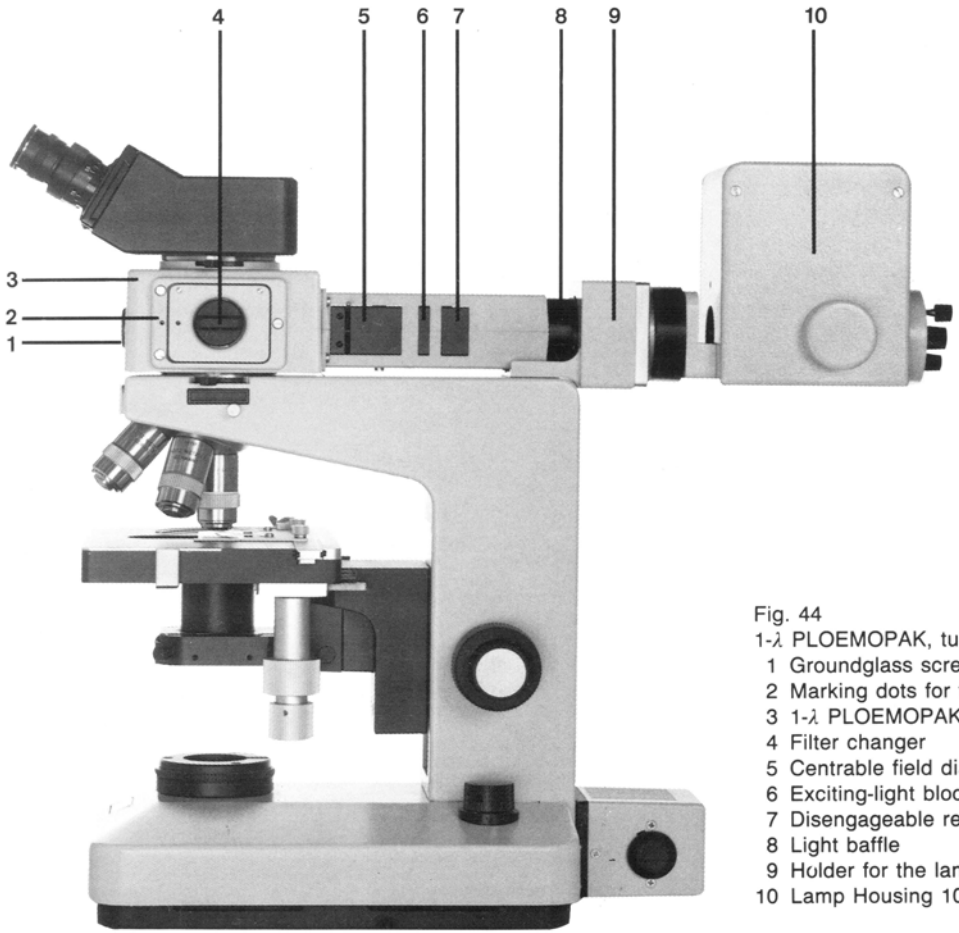


Fig. 44
1-λ PLOEMOPAK, tube factor 1x
1 Groundglass screen for checking the lamp centration
2 Marking dots for the insertion of the filter changer
3 1-λ PLOEMOPAK
4 Filter changer
5 Centrable field diaphragm
6 Exciting-light block
7 Disengageable red-suppression filter BG 38
8 Light baffle
9 Holder for the lamp Housing 102 Z
10 Lamp Housing 102 Z with 50 W ultra-high-pressure mercury lamp

Assembly and first operation

are analogous to those of the 3-λ PLOEMOPAK (see pp 29, 30); when the 50 W ultra-high-pressure mercury lamp is centered (cf. p 31) the discharge arc and its mirror image can be checked on the groundglass screen (44.1) after removal of the filter changer (44.4).

Exchange of filter blocks

Fig. 45
Removal of the filter changer for changing the filter system

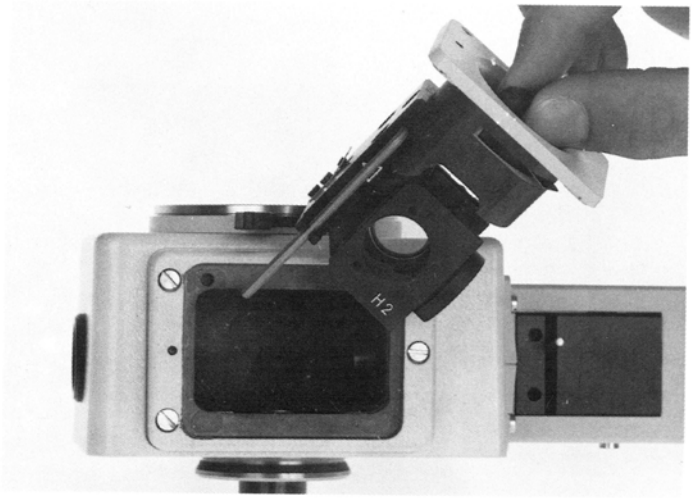


Fig. 46
Filter changer removed with key for slackening/fixing the filter block

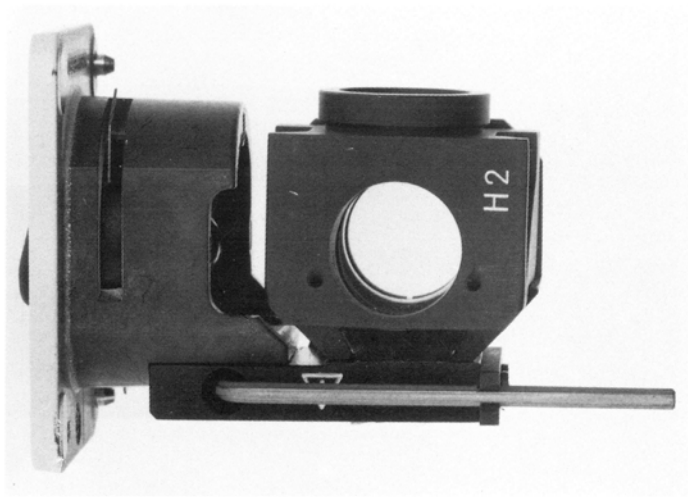


Fig. 47
Slackening/Fixing the filter block
Insertion of the filter block in the filter changer. The filter block designation (1) must be visible together with the marking (2).

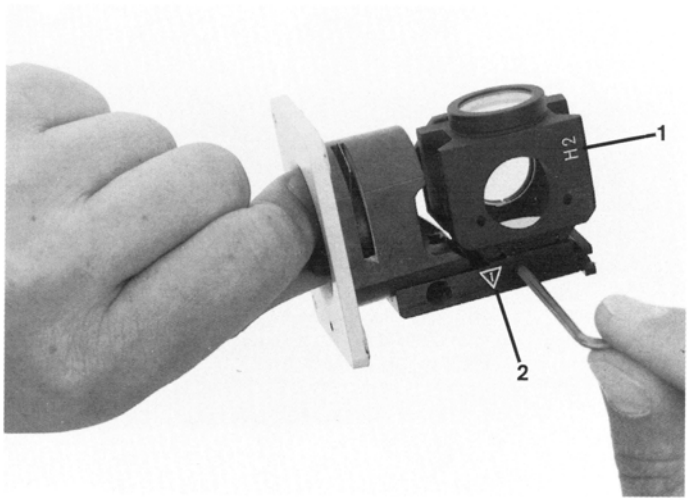
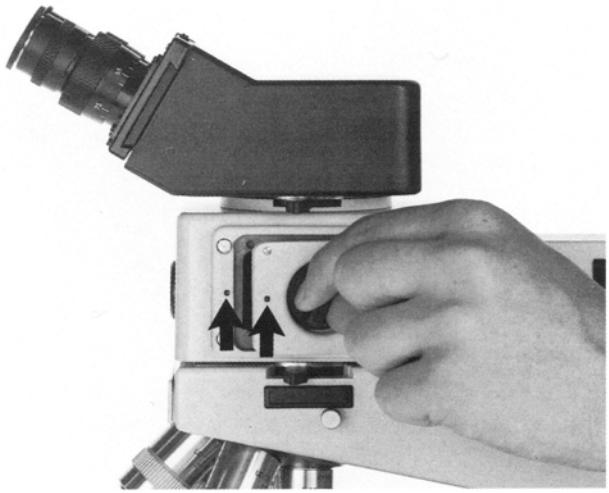
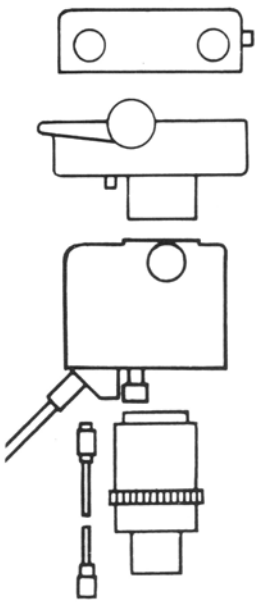


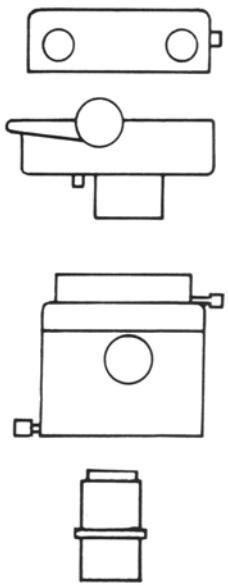
Fig. 48
When the rapid changer is inserted in the housing ensure that the two marking dots (arrowed) face each other.



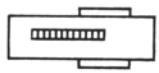
Accessories



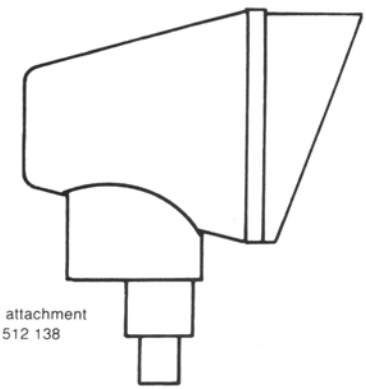
LEITZ VARIO-ORTHOMAT automatic camera system
Detailed information is contained in the relevant list



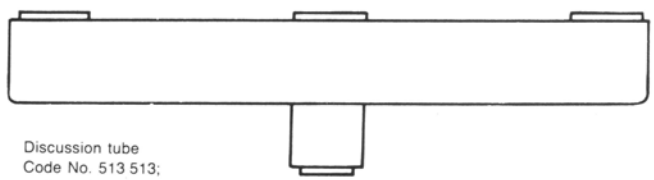
WILD MPS micro camera system
Detailed information will be found in the relevant literature or instruction manual



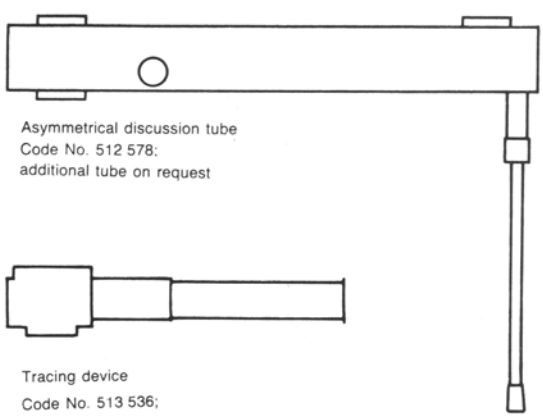
Magnification changer
Code No. 512 683



Projection attachment
Code No. 512 138



Discussion tube
Code No. 513 513;
additional tubes on request



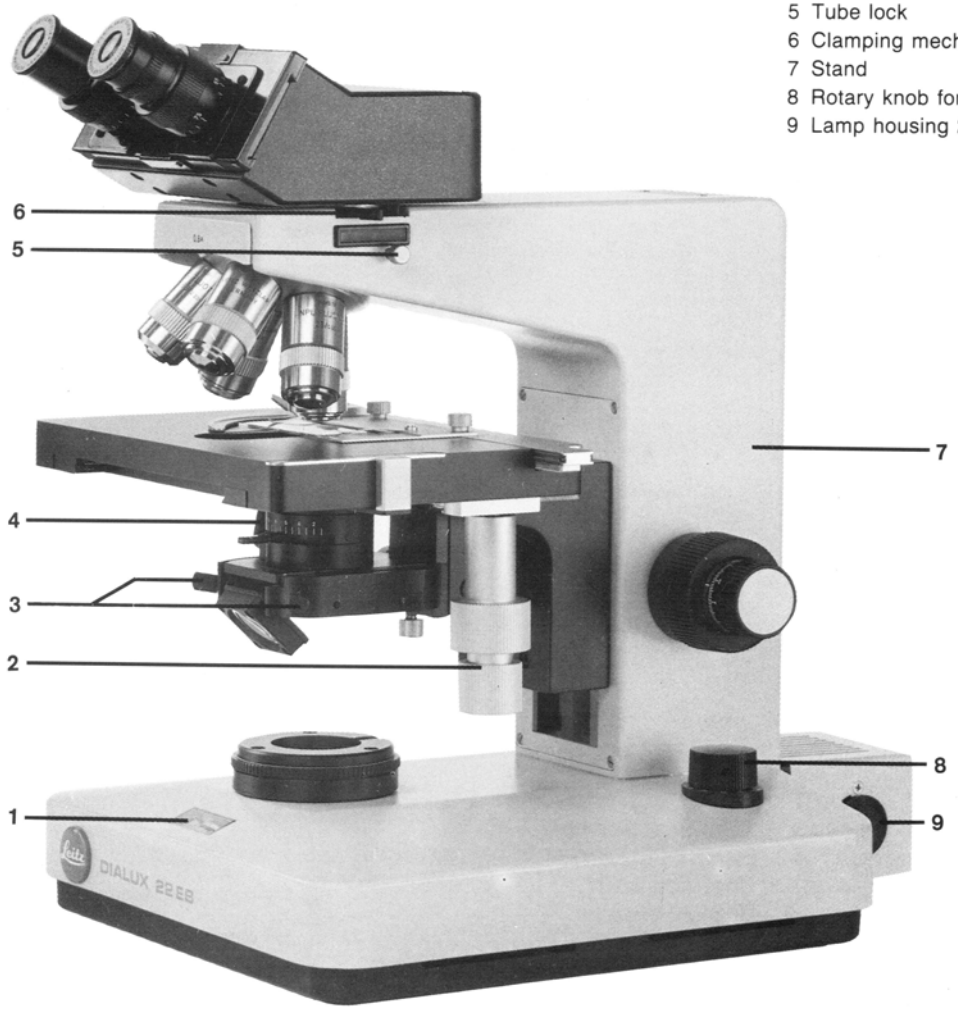
Asymmetrical discussion tube
Code No. 512 578;
additional tube on request

Tracing device
Code No. 513 536;
recommended eyepiece Code No. 519 630

Technical description

Fig. 49
DIALUX 22 EB with Lamp Housing 20, standard condenser SK, Mechanical Stage No. 78 and binocular tube S.

1 Voltmeter
2 Mechanical adjustment of the object stage
3 Centring screws for the condenser
4 Aperture diaphragm
5 Tube lock
6 Clamping mechanism of the revolving nosepiece
7 Stand
8 Rotary knob for brightness regulation
9 Lamp housing 20 with lamp changer



5 Care and Maintenance

Dust protection is provided by a flexible dust cover which should always be used when the instrument is not in use. The stand should be cleaned from time to time with a linen or leather cloth; alcohol must not be used as it attacks the paint, but petroleum is well suited for cleaning the painted surfaces. Pale spots on the object stage can be removed by rubbing with paraffin oil or vaseline.

Particular care should be taken when undertaking studies using acids or other aggressive chemicals. Direct contact of these substances with the stand or optics must be avoided under all circumstances, and all parts should be carefully cleaned after use. The optics must be kept scrupulously clean. Dust can be removed from glass surfaces by means of a dry, fine-haired brush, blowing gently across the surface whilst brushing. If the dirt is difficult to remove, a clean cloth, moistened with distilled water, can be used or, if this also has no effect, pure alcohol may be applied. Particular care should be taken when cleaning anti-reflection coatings. The outer eyepiece surfaces and the front elements of the objectives have coatings of approximately the same hardness as glass and must be correspondingly carefully cleaned.

Objectives should not be screwed apart during cleaning. If damage or dirt is noticed inside them, they should be ruturned to us for repair. Cleaning of the inner surfaces of the eyepieces is also advised against.

Microscopes being used in hot and/or humid climates require special care. It should be ensured that a build-up of fungus does not occur, which is managed, in the first place, by thorough and meticulous cleaning and storage in a cupboard whose inside temperature is at least 5° C above that of the room. It must also be provided with airing holes, loosely plugged with cotton wool or gauze as protection against dust. If this type of storage is not possible, the microscope must be kept in a closed container with an adequate amount of drying agent (e. g. silica gel). These measures should be taken even in laboratories with air conditioning. In warm and dry climates, dust is the greatest enemy. The instrument should, therefore, be covered with the dust cover immediately after use or cleaning and stored in a cupboard. If a humid period of longer than one month occurs, storage in a warm cupboard, as described above, is desirable.

Proper handling of the microscope will ensure decades of service. If, however, a check over or repair becomes necessary, please contact your Leitz agency or our Technical Service direct.

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