LEITZ BIOMED

Instructions

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WILD LEITZ

Fig. 1

1 Binocular tube S 45°
2 Eyepiece tube with eyepieces
3 Objective nosepiece
4 Achromat objectives
5 Attachable object guide no. 12
6 Object mount
7 Drive knobs of the object guide for moving the specimen in x and y direction
8 Knurled screws for securing the object guide
9 Specimen stage no. 11
10 Condenser no. 55L
11 Push-in extra lens
12 Aperture diaphragm
13 Slide with diffusion disc
14 Illuminating tube with filter holder
15 Coarse and fine focus drive

Assembling the microscope

Before you start working with the BIOMED, make sure that the voltage selector (15.2)* in the base plate is set at the local mains voltage.

Mounting the tubes
Loosen the clamp screw (2.1) and insert the tube (2.2) into the change mount. Then tighten the clamp screw. If you want to rotate the tube, loosen the clamp screw and tighten it again after defining the new viewing position.

* 15.2 means: Fig. 15, component 2

Inserting the eyepieces

The eyepieces (3.1) are inserted into the eyepiece tubes (3.2). Leitz eyepieces are used, which are calculated for the mechanical tube length of 160 mm. These eyepieces are distinguished from those for 170 mm tube length by the additional identification after the magnification, e.g. 10x/18. If Leitz eyepieces without this identification of the field of view index are to be used, i.e. eyepieces for 170 mm tube length, a spacer ring must be inserted.
The field of view of an eyepiece is the visible area of the intermediate image in the tube. It appears magnified by the eyepiece factor.

Fig. 2
2 Mounting the tubes
2.1 Clamp screw for changing the tube
2.2 Binocular tube S 30°

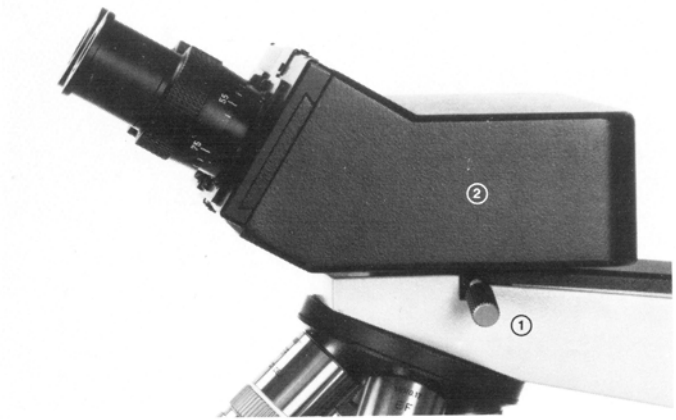
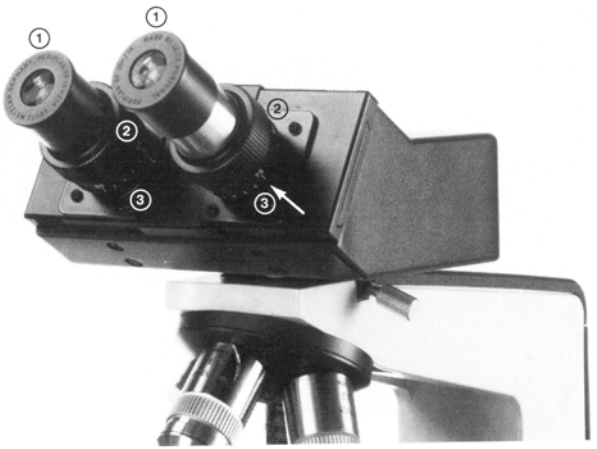


Fig. 3
3 Inserting the eyepieces
3.1 Eyepieces
3.2 Eyepieces tubes, adjustable
3.3 Scales for transfer of interpupillary distance



The total magnification of the microscope is given by: reproduction ratio of the objective x eyepiece magnification (x tube factor).
Example:
25/0.50 objective
10x/18 eyepiece
tube factor 1x
Total magnification: 25 x 10 x 1 = 250 : 1
The tube factor of the BIOMED changes only when the tracing device or the magnification changer is used.

Screwing in the objectives

All Leitz microscope objectives from a magnification of 4 : 1 and calculated for a tube length of 160 mm can be used on the Leitz BIOMED. Please note in this context the field illumination capacity of the condensers.
Microscope objectives calculated for 170 mm tube length can be used from 16 : 1 magnification.
Screw the objectives into the nosepiece in such a way that stepwise magnification change is possible (e.g. in the order 4, 10, 40, etc)

Fig 4
4 Screwing in the achromat objectives
4.1 Achromat objective
4.2 Objective nosepiece
4.3 Rotatable plastic sleeve
4.4 Clickstop

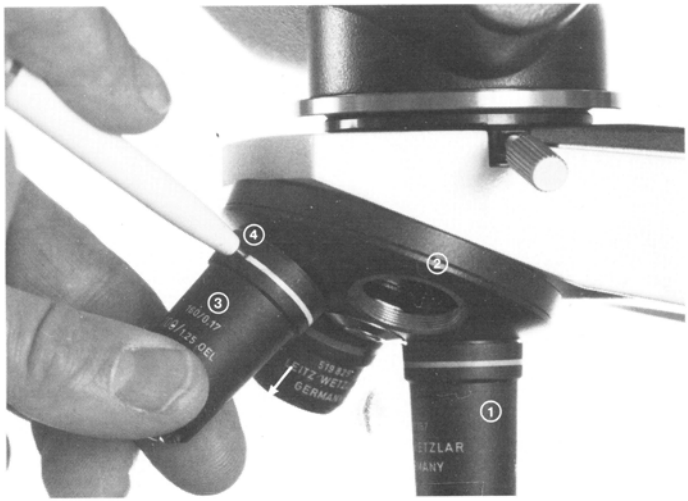
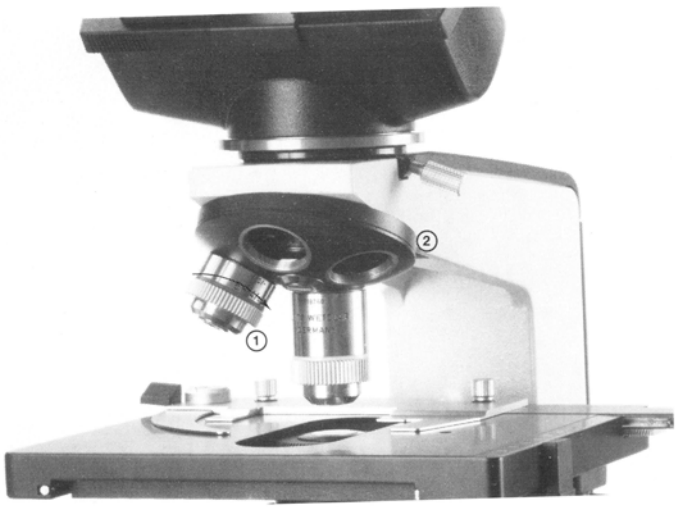


Fig. 5
5 Screwing in the achromat objectives
5.1 Cam
5.2 Clickstop
5.3 Object clips

The achromat objectives (4.1) are safeguarded against theft by a rotatable exterior plastic sleeve. This plastic sleeve (4.3) must therefore first be removed from the actual objective mount before the objective is screwed into the nosepiece (4.2). The catch is released by pressing in a cam, which engages in a hole (4.4) at the upper edge of the plastic sleeve. This is done with a sharp object, such as a biro refill.

When the achromat objectives have been screwed in position, push the sleeves onto the objectives until the cam (5.1) of the spring ring engages in the hole (5.2) again. No special measures are necessary for screwing EF objectives (6.1) into the objective nosepiece (6.2).

Fig. 6
6 Screwing in EF objectives
6.1 EF objective
6.2 Objective nosepiece



Identification markings on the objectives

7.1 Mechanical tube length
The distance in mm from the objective shoulder to the edge of the tube.

7.2 Coverglass
The engraving 0.17 is the thickness of the coverglass. A dash (–) instead of a number indicates that the objective can be used for specimens without a coverglass.

7.3 Field flatness of the objective
EF objectives are systems with a more or less flat field of view of up to 18 mm intermediate image diameter.
PLAN objectives are systems with a flattened field of view up to 22.5 mm intermediate image diameter.

Fig. 7
7 Objective identification

If there is no indication of field flattening, the objective is an achromat with optimum correction, for use with up to 18 field of view index.

7.4 Reproduction scale in the intermediate image
Size ratio between the intermediate image and the object, e.g. 10 : 1.

7.5 Numerical aperture
Physical identification of the objective's resolving power.

7.6 Immersion medium
Immersion media can be, for example, oil (OIL), water (W) or glycerine (GLYC). The objective must always be used with the engraved immersion medium.
Before the immersion objective is focused, a drop of immersion medium without air bubbles should be applied to the object.

7.7 Phase contrast objectives
Objectives with phase ring for phase contrast observation. These objectives have green writing (with the exception of achromats).

7.8 Annular stop
This number (e.g. 3) means that when the objective is used for phase contrast observation, annular stop no. 3 must be used in the condenser (condenser no. 55L/56 = slide 3, UKL condenser = annular stop 3 in the turret plate).

7.9 Colour code of the reproduction ratio (see chart below)

7.10 Immersion objectives

Reproduction ratio	4 : 1	6.3 : 1	10 : 1
Colour	red	orange	yellow

16 : 1	25 : 1	40 : 1	63 : 1	100 : 1
light green	dark green	light blue	dark blue	white

Attaching the object guide

The object guide no. 12 (1.5) for left- or right-hand operation is attached to the left or right of the specimen stage with two screws (1.8).

Inserting the condensers

Two different condenser mounts are available for the Leitz BIOMED:

Fixed sleeve

Condenser no. 55L (9.1) is mounted with a fixed sleeve with thread mount attached to the underneath of the specimen stage no. 11 (1.9).

Push condenser no. 55L into the fixed sleeve from below and rotate upwards with slight pressure until the guide pin engages in the condenser mount. Then turn condenser no. 55L to the right as far as the stop. Due to the inclination of the guide slit in the fixed sleeve, the condenser becomes nearer and nearer to the object plane.

If using the illuminating tube with field diaphragm, it may be necessary to lower the condenser no. 55L slightly by rotating it to the left in order to obtain an image of the field diaphragm in the object plane.

Illuminating tube
Two types of illuminating tube can be used on the BIOMED:
– Illuminating tube without field diaphragm
– Illuminating tube with adjustable field diaphragm
The second type is used for realisation of Köhler illumination with the BIOMED. **For all condenser settings, first check that the field diaphragm, adjustable with the knurled ring, is in the centre of the illuminating tube.**
Both illuminating tubes have a holder for light filters ø 32 mm.

Sledge guide with rack-and pinion drive

All other BIOMED condensers fit into the sledge guide with rack-and-pinion drive (8).
Rotate the condenser clamp (8.2) until the two dots coincide. Lower the sledge guide with knob (8.1) until the condenser can be comfortably pushed into the sledge guide as far as the stop. Use the knob to raise the sledge guide to the stop. The height of the stop can be set with the screw (8.4).

Condenser no. 55L

The two-lens condenser no. 55L (9.1) is designed for Leitz BIOMED outfits with a fixed sleeve.

This condenser provides homogeneous illumination of all object fields of objectives from 4 : 1 magnification upwards and with field of view index 18 without a hinged front lens. When using the illuminating tube with field diaphragm, it is important to insert the extra lens (10.1), order no. 512 896, into the condenser from below. Without this extra lens an image of the field diaphragm is not formed.

Condenser no. 55L works with the numerical aperture A 0.90. This can be raised to A 1.25 with the screw-on oil cap (11.2), order no. 512 652, using Leitz immersion oil between the condenser and the specimen.

Fig. 8
8 Condenser mount with sledge guide and rack-and-pinion drive
8.1 Knob for height adjustment of the condenser mount with the sledge guide
8.2 Condenser catch in the sledge guide
8.3 Condenser mount with sledge guide
8.4 Screw for setting the upper stop of the height adjustment
8.5 Centring screw for sledge guide

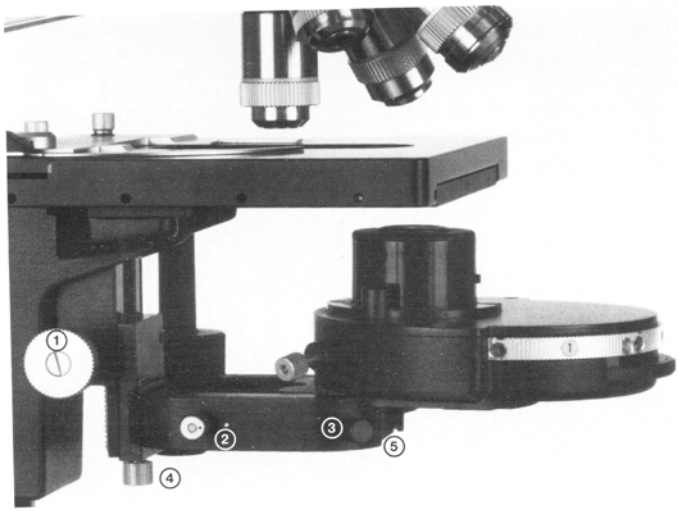
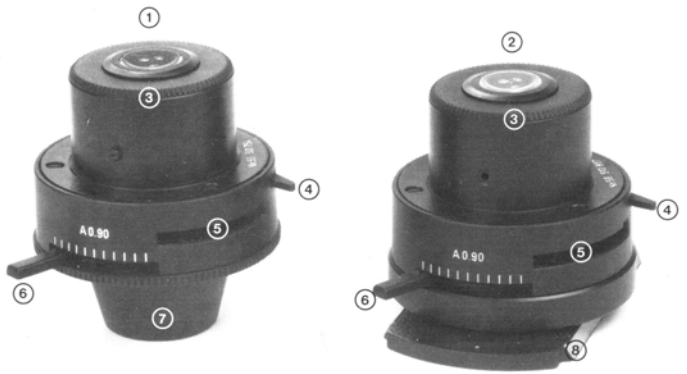


Fig. 9
9 Condensers no. 55L and no. 56
9.1 Condenser no. 55L with extra lens
9.2 Condenser no. 56
9.3 Protection ring
9.4 Catch lever for slide with diffusion disc and annular stops
9.5 Slit for slide with diffusion disc and annular stops
9.6 Lever for adjusting the aperture diaphragm
9.7 Extra lens
9.8 Dovetail sledge



To screw the oil cap onto condenser 55L, the protection ring (9.3) must be screwed off with the outer knurled ring.

The aperture diaphragm is adjusted with the lever (9.6). There is a scale for reproducible setting of the condenser diaphragm. The side slit (9.5) accommodates the slide with raster diffusion disc (11.3). Insertion of the raster diffusion disc optimises object illumination, especially for scanning magnifications.

The side slit is also intended for insertion of slides with annular stops (11.1, 4, 5 and 6) for the production of simple darkfield or phase contrast illumination. These can only be pulled out of the condenser again after the lever (9.4) is pushed.

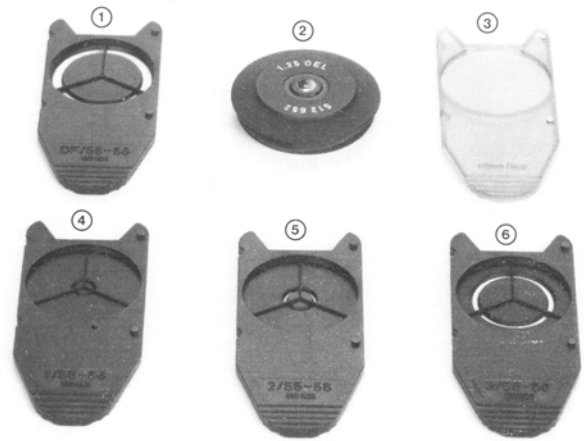
Condenser no. 56

The two lens condenser no. 56 (8.2) is intended for BIOMED outfits with sledge guide and rack-and-pinion drive.
Its performance features and controls are the same as those of condenser no. 55L.

The only difference is the absence of an extra lens. This is integrated in the condenser mount (8.3) of the BIOMED stand.

Fig. 10
10 Pushing the extra lens into condenser no. 55L
10.1 Extra lens

Fig. 11
11 Accessories for condensers no. 55L and no. 56
11.1 Slide with annular stop DF for darkfield with objectives from 10 : 1 to 40 : 1
11.2 Oil cap A 1.25
11.3 Slide with raster diffusion disc
11.4 Slide with annular stop PHACO 1
11.5 Slide with annular stop PHACO 2
11.6 Slide with annular stop PHACO 3



Condenser LK

The condenser LK (12) is only for BIOMED outfits with sledge guide and rack-and-pinion drive.

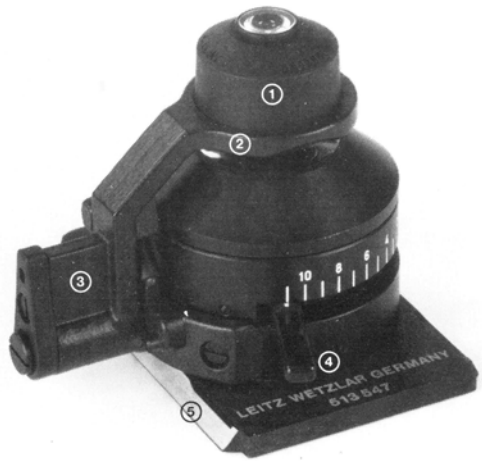
It has a hinged condenser top S 1.1 (12.1). If the illuminating tube with field diaphragm is used, the lower part of the condenser can illuminate all object fields of objectives from 4 : 1 upwards with field of view index 18 when the condenser top is swung out. When using objectives of 10 : 1 and higher the condenser top must be swung in.

With condenser top A 0.90 S 1.1 swung in, the condenser LK works with the numerical aperture A 0.90. The image of the field diaphragm is produced with the front lens S 1.1 in a glass medium 1.1 mm over the stage surface.

The condenser top S 1.1 is interchangeable via the thread (12.1) with other condenser tops with a higher numerical aperture or tops with a longer working distance. Darkfield condenser tops D 0.80 or D 1.19 can also be screwed on instead of the S 1.1 standard top. Further information on condenser tops can be found in the table on page 12.

The aperture iris diaphragm is adjusted with the lever (12.4). There is a scale for reproducible setting of the condenser diaphragm.

Fig. 12
12 Condenser LK
12.1 Condenser top S 1.1 for brightfield investigations
12.2 Thread mount for condenser tops
12.3 Handle for swinging condenser tops in and out
12.4 Lever for adjusting the aperture diaphragm
12.5 Dovetail sledge



Universal condenser UKL

The performance features of the universal condenser UKL (13) in brightfield are the same as those of the condenser no. 56.

The annular stops necessary for phase contrast or darkfield illumination are situated in a turret plate (13.4) for quick change. Position »H« of the turret is for brightfield (Hellfeld) investigations. In positions 1, 2 and 3 are the annular stops, PHACO 1, 2 and 3. These can be aligned to the phase ring of the objective in use by pushing in the two centring screws (13.3). The adjustment telescope (13.1) is required for this.

Position 4 is occupied by an annular stop for darkfield with objectives from 10 : 1 to 40 : 1.

The wheel (13.5) is for adjusting the aperture diaphragm, only necessary for brightfield investigations. It is fully opened for phase contrast or darkfield (PH position).

Darkfield condensers D 0.80 and D 1.19

The condenser D 0.80 (14.1) is intended for darkfield investigations with 10 : 1 to 40 : 1 objectives. Image contrast is optimised here as compared with the darkfield produced with annular stops.

The condenser D 1.19 (14.2) has an oil immersion cap and is used together with the oil immersion objective.

Fig. 13
13 UKL universal condenser with adjustment telescope
13.1 Adjustment telescope for centring the annular stops for phase contrast
13.2 UKL universal condenser
13.3 Centring screws
13.4 Annular stop turret
13.5 Adjustment wheel for aperture diaphragm

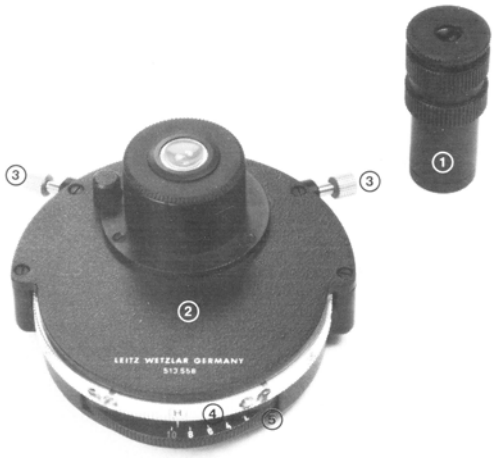
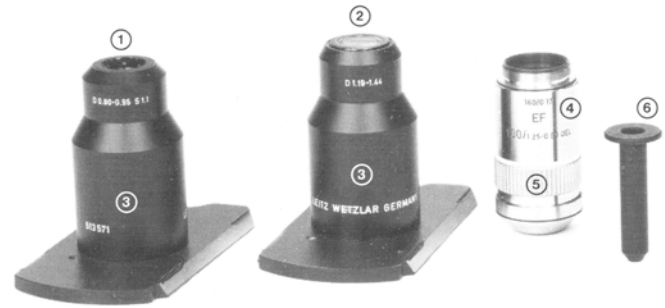


Fig. 14
14 Darkfield condensers D 0.80 and D 1.19 with special darkfield objective and funnel stop
14.1 Condenser top D 0.80 – 0.95 S 1.1
14.2 Oil condenser top D 1.19 – 1.44
14.3 Lower part of condenser with dovetail guide
14.4 Special darkfield objective EF 100/1.25 – 0.60 Oel with built-in iris diaphragm
14.5 Knurled ring for adjustment of the iris diaphragm
14.6 Funnel stop for the oil immersion objective



Condenser LK

Condenser Top	Top in/out	Use
0.90 S 1.1.	Out	With objective aperture < 0.25
0.90 S 1.1	In	With objective aperture > 0.25
OEL 1.32	In (Immersion oil on front element.)	With objective aperture > 1.0, e.g. OEL 100/1.32
0.70 S 4	In	Intercept distance 4 mm. With specimen slides of thickness > 1 mm.
D 0.80	In	Darkfield With objective apertures < 0.75
D 1.19	In (Immersion oil on front element.)	Darkfield With objective apertures < 1.10

UKL universal condenser for phase contrast

Condenser Top	Turret setting	Application	Objective with engraving
0.90 S 1.1	H 1 2 3 5	Brightfield Phase contrast Phase contrast Phase contrast Darkfield	All objectives PHACO 1 PHACO 2 PHACO 3 All objectives with aperture < 0.75

Changing the lamp

Disconnect the microscope from the mains. Tilt the microscope backwards onto the upper part of the stand. Unlock the lamp mount (15.1) in the base of the stand (16.4) and open it as far as necessary to gain access to the lamp. Remove the defect lamp (16.2). When inserting the new lamp, do not remove its protective wrapping until the lamp is in position.

Close the flap in the base and lock. Place the microscope upright again and connect to the mains.

Fig. 15
15 Base plate
15.1 Lamp holder closed
15.2 Voltage selector
15.3 Fuse holder

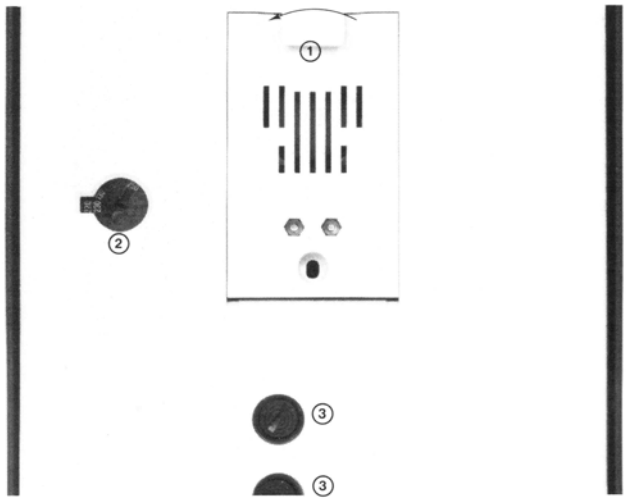
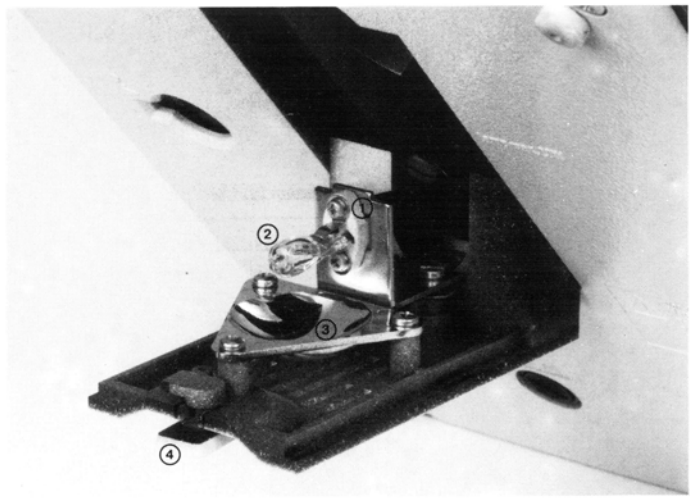


Fig. 16
16 Lamp holder open
16.1 Lamp socket
16.2 6V 20W halogen lamp
16.3 Reflector
16.4 Lock



Operation of the microscope

Focusing the image

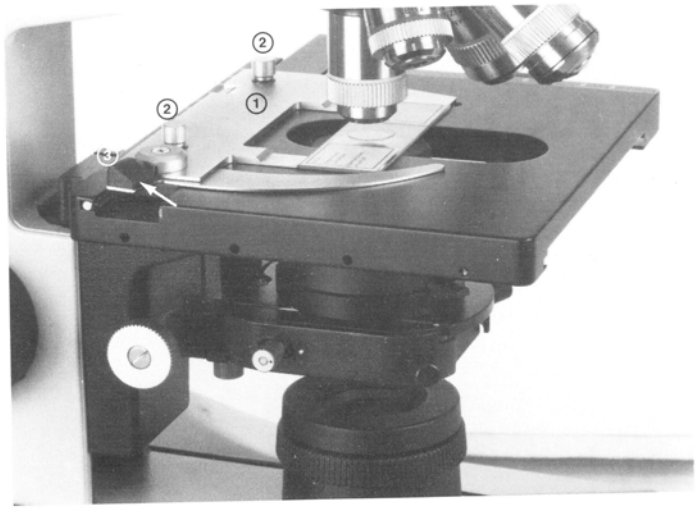
Place a specimen on the stage or slide it into the mounting plate if available.

Specimen stage no. 11 (1.8) can be supplied with two clips (5.3) to secure the specimen. Instead of these clips, object guide no. 12 can be attached to the left or right of the stage for left- or right-handed operation (1.5).
It has an adjustment range of 76 x 26 mm.

Precise movement of the specimen within a range of 76 x 52 mm is possible with the mechanical stage no. 18.

The object guide no. 12 and mechanical stage no. 18 (21.3) have a vernier scale for adjustment of both the x and the y axis.
This enables certain parts of the specimen to be set reproducibly.

Fig. 17
17 Mechanical stage no. 18
17.1 Specimen mounting plate
17.2 Screws to remove the mounting plate
17.3 Opening of the mounting plate (press in the direction of the arrow)



Turn in a medium-power objective e.g. EF 10/0.25 by rotating the nosepiece. Switch on the illumination (21.16) and regulate the intensity by turning knob (1.10).
Turn the screw (8.4) by approx. 5 rotations to the left and use the height adjustment (8.1) to move the condenser to the upper stop near the specimen.
With the LK condenser, the condenser top (12.1) is swung into the illuminating light path with the handle (12.3). If you change to objectives of less than 10 : 1 magnification afterwards, swing the condenser top out of the illuminating light path.
Open the aperture diaphragm (1.12) and the field diaphragm (21.13).

Tube adjustment

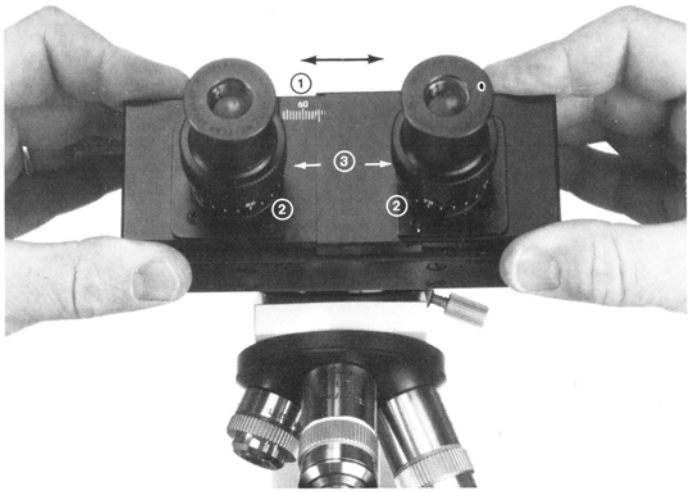
If using the binocular observation tube S, adjust the interpupillary distance until the images for both eyes completely cover each other and appear as a single circular image.

The binocular tube S is available for the Leitz BIOMED either with or without adjustable eyepiece tubes.

In the case of the binocular tube S without adjustable eyepiece tubes, high-point eyepieces or eyepieces with adjustable eyelens must be used. With the high-point eyepieces, defective vision is compensated for by the viewer being able to wear his spectacles when looking through the microscope; with the eyepieces with adjustable eyelenses, compensation is attained by adjusting the eyelenses.

When using the binocular tube S (3) with adjustable eyepiece tube, the interpupillary distance (scale (18.1) on the front plate of the tube) must first be transferred to the two scales of the adjustable eyepiece tubes (18.2). Differences in vision between the two eyes can be compensated for by slight adjustment of one of the eyepiece tubes.

Fig. 18
18 Adjusting the observation axes on the binocular tube S 30°
18.1 Interpupillary distance scale
18.2 Scales on the adjustable eyepiece tubes
18.3 Index



Condenser centration

The Leitz BIOMED is supplied with different illuminating tubes, with or without a field diaphragm.
The illuminating tube with field diaphragm enables Köhler illumination to be set.

The stand variant with precentred fixed sleeve takes condenser no. 55L (9.1). In this case there is no nead to carry out the centring procedure otherwise necessary for Köhler illumination. When the illuminating tube with field diaphragm is used with medium- or high-power objectives, however, a certain amount of centre deviation is unavoidable, which must be compensated for by adjusting the field diaphragm. The image of the diaphragm is focused in the specimen plane by rotating condenser no. 55L in the fixed sleeve.

If stands with mounts for condensers with sledge changer are used together with an illuminating tube without field diaphragm, the condenser must be centred as follows:

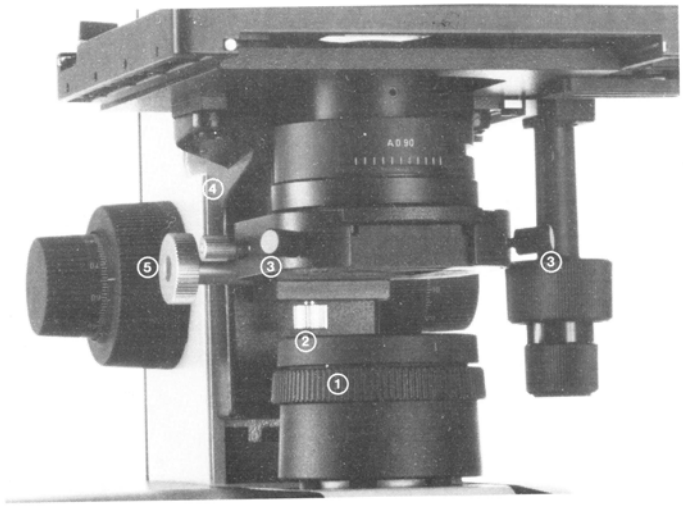
1. Move the mount to its upper stop with the knurled knob (8.1)
2. Put a specimen on the stage and focus with the 10 : 1 objective.
3. Remove one eyepiece from the tube.
4. Observe the rear focal plane of the objective at a distance of 25 cm. At the same time close the aperture diaphragm of the condenser.
5. If the image of the aperture diaphragm does not appear in the centre of the rear focal plane of the objective, the position of the condenser must be corrected accordingly with the centring screws (21.8).

The extra lens (10.1) is not required here. It is only necessary when Köhler illumination is to be set with this stand variant combined with the illuminating tube with field diaphragm.

If the Leitz BIOMED with the mount for condensers with sledge changer is used together with an illuminating tube with field diaphragm, centre the condenser as follows (the field diaphragm is in its central position):
Focus the specimen exactly with the coarse and fine drive.

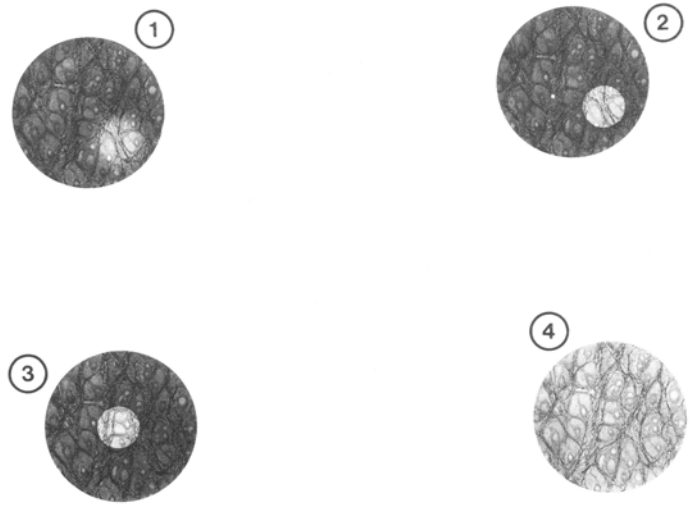
1. Close the field diaphragm (19.1). Screw the stop screw (19.2) back and move the condenser to its top position using the vertical adjustment (19.5).
   IMPORTANT: When using the LK condenser, make sure that the condenser top does not touch the specimen.
2. Rotate the condenser stop screw (19.2) to lower the condenser until both the specimen and the edges of the field diaphragm are in sharp focus.
3. Centre the image of the field diaphragm with the two centring screws (19.3).
4. Open the field diaphragm (19.1) until its image just disappears out of the field of view.

Fig. 19
19 Controls for centration of condensers with sledge changer
19.1 Field diaphragm
19.2 Screw for setting the upper stop of the vertical adjustment
19.3 Centring screw for sledge guide
19.4 Condenser catch in the sledge guide
19.5 Knob for vertical adjustment of the condenser mount with sledge guide



Use of the field diaphragm

If optimum contrast is to be attained, it is important to illuminate only the part of the specimen that appears in the image. Therefore the field diaphragm is only opened as far as the field of view. For this reason, a change of magnification always necessitates matching the field diaphragm to the object field.



Use of the aperture diaphragm

The more the aperture diaphragm is narrowed, the higher the image contrast. Axial resolving power (image sharpness in the direction of the optical axis) also increases. However, excessive closure of the aperture diaphragm has an adverse effect on lateral resolving power (selectivity).

The best optical solution is obtained when the apertures of the objective and the condenser are the same.

A visible deterioration of resolving power is seen when the aperture diaphragm is closed over 1/3 of the aperture of the objective, and this should be avoided as far as possible. To check this, an eyepiece must be taken out of the eyepiece tube, the aperture diaphragm narrowed until its image covers 1/3 of the illuminated rear lens area. Replace the eyepiece.

If necessary, the aperture diaphragm can be narrowed further for objects with weak contrast.

Once determined, the aperture diaphragm can be reproduced with the aid of the scale on the condenser.

Note:
The aperture diaphragm should not be used to set image intensity. This is done with the rotary knob (21.15) for regulation of lamp intensity, or for photomicrography, with neutral light-blocking filters.

Oil immersion objectives

Oil immersion objectives are labelled with the additional engraving »OEL« and a black ring on the lower edge of the objective mount.

The immersion oil has almost the same refractive index n_e = 1.515 as the coverglass and the front lens of the microscope objective. The focal length and the working distance of an immersion objective are usually very small. For this reason, working with oil immersions requires great care.

Check that there are no air bubbles in the Leitz immersion oil.
For routine work, the normal condenser 0.90 is adequate even for oil immersions. However, if the full aperture of the immersion objective is to be used, e.g. for very fine structures, the condenser aperture must also be enlarged. For condensers no. 55L and 56, this can be done by screwing on a 1.25 OEL condenser cap (11.2), or for the LK condenser, an APL OEL 1.32 S 1.1. condenser top.

In these cases, immersion oil must also be applied between the condenser cap/top and the underneath of the specimen slide. After the investigation, all surfaces where immersion oil has been applied must be carefully cleaned. Use a soft cloth moistened with alcohol or benzine.

Transmitted light darkfield with the LK condenser

For darkfield investigations, condenser top D 0.80 – 0.95 is used when the objective has an aperture of less than 0.75 and condenser top D 1.19 – 1.44 when the objective's aperture is larger than 0.75. For apertures greater than 1.10, insert a funnel stop (14.5) into the oil immersion objective or use an objective with built-in iris diaphragm. Separate bottom parts (14.3) with interchangeable slide are also available for the darkfield condenser tops.

Focusing the darkfield image (D 1.19 – 1.44 and D 0.80 – 0.95)

Put a specimen on the stage. Turn the condenser stop screw (19.2) to the right as far as the stop. Insert the condenser and raise to the condenser stop.

If using the D 1.19 condenser top, first apply a drop of immersion oil to the surface of the condenser and then raise until the drop of oil touches the underneath of the specimen slide. This can be seen by a brief lighting up of the slide.

Bring the specimen into focus. (Use the 10/0.25 or 16/0.40 objective). Close the field diaphragm (19.1). Raise the condenser by turning the condenser stop screw (19.2) to the left and using the condenser drive (19.5) until the edges of the diaphragm are as sharp as possible when the specimen is observed.

Move the image of the diaphragm into the centre of the field of view with the two centring screws (19.3).Apply a drop of immersion oil to the coverglass of the specimen (avoid air bubbles!). Turn in the oil immersion objective with inserted funnel stop or closed iris diaphragm and focus on the specimen. Open the field diaphragm (19.1) until it just disappears from the field of view.

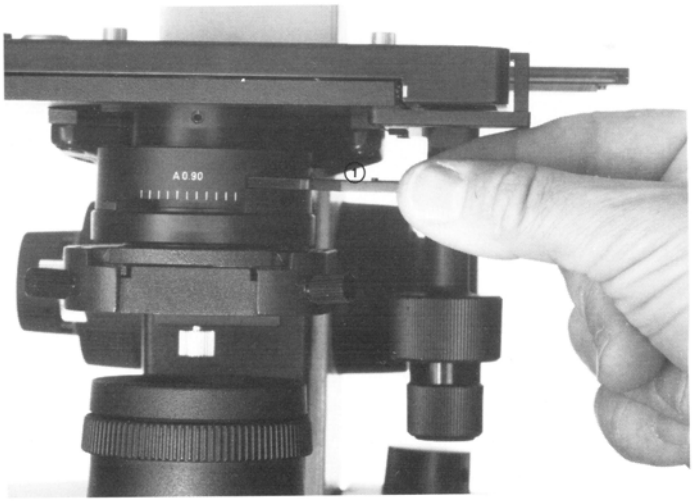
Phase contrast or darkfield illumination with condensers no. 55L and 56

These condensers can be fitted with annular stop slides for phase contrast or darkfield illumination.

Proceed as follows for phase contrast illumination:

- Screw in phase contrast objectives
- Centre condenser no. 56 as described on p. 15. Condenser no. 55L has no centring device. Therefore phase contrast with oil immersion is not recommended.
- Open the aperture diaphragm.
- Push the slide with the annular stop (20.1) into the condenser according to the following chart.

Fig. 20
20 Insertion of slides in condensers no. 55L and 56
20.1 Slide



Using the DF/55 – 56 annular stop slide, simple darkfield illumination can be obtained with 10 : 1 to 40 : 1 brightfield or phase contrast objectives.

Stop	Achromat objectives	EF objectives
1	10/0.25 PHACO 1	10/0.25 PHACO 1
2	40/0.65 PHACO 2	25/0.40 PHACO 2
		40/0.65 PHACO 2
3	100/1.32 OEL PHACO 3	100/1.25 PHACO 3

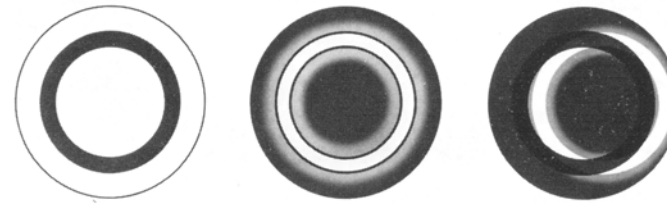
Phase contrast with the UKL universal condenser

Screw in phase contrast objectives. Insert the UKL condenser into the condenser mount and bring to its highest position with the vertical adjustment (19.5). Set the aperture diaphragm (13.5) to »PH« (green). Put a specimen on the stage. Turn in the 10/0.25 PHACO 1 objective.

Set the annular stop turret (13.4) at position 1 and focus the specimen with the coarse and fine drive (1.15). Close the field diaphragm (21.13). Set the condenser with the vertical adjustment (8.1) so that the edges of the closed field diaphragm are in sharp focus. Centre the image of the field diaphragm with the two centring screws (1.8). Open the field diaphragm until it just disappears from the field of view.

If you are using an illuminating tube without field diaphragm, centre the UKL condenser as described on page 15.

Remove an eyepiece from the eyepiece tube and insert the focusing telescope (13.1). Loosen the clamp ring on the focusing telescope and adjust the eyelens until light and phase rings are in sharp focus. Using the centring screws (13.3, press in and turn) adjust the light ring so that it is exactly covered by the phase ring of the objective. Centration must be carried out once for all objective/annular stop combinations and is then retained for all further settings.

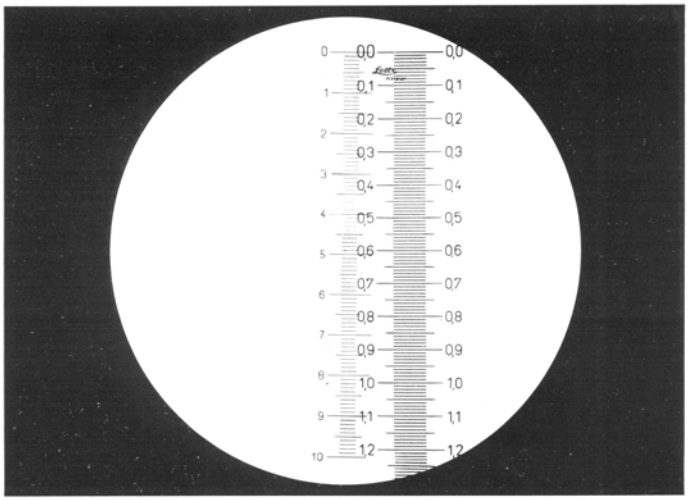


4 Microscopic Measuring

The measurement of microscopic objects is carried out using a measuring eyepiece (usual scale; 10mm = 100 divisions). Before starting the measurement, the micrometer value of the objective in use must be known. The micrometer value is the distance in the specimen plane which produces an image exactly one division long on the graticule scale in the measuring eyepiece. As the optical constants of the objectives fluctuate slightly, it is recommended that the micrometer value be determined initially with the aid of a specimen micrometer.

Examples:
Evaluation of the micrometer value with a specimen micrometer (2mm = 200 divisions) and a measuring eyepiece with graticule (10mm = 100 divisions).

Graticule scale in the eyepiece and specimen micrometer image.



Move the micrometer until the zero lines on both it and the measuring eyepiece coincide; the micrometer value can be read off from the end of the measuring eyepiece scale.

In this example (fig. 32), the end of the eyepiece scale (100 divisions) coincides with 1.220 mm on the micrometer scale. 100 divisions therefore is equivalent to 1.220 mm, and 1 division = 0.01220mm = 12.20 µm.

For low-power objectives where the micrometer scale does not cover the entire eyepiece scale, only 10 eyepiece scale divisions are measured. For example, if the tenth division corresponds to 0.36 mm on the micrometer scale, then 1 division = 0.036 mm = 36 µm.

For very precise measurements, the screw micrometer eyepiece is available; further details from brochure 513 – 17.

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. Paricular care should be taken when cleaning anti-reflection coatings. The outer eyepiece surfaces and the front elements of the objectes have coatings of approximately the same hardness as glass and must be correspondingly carefully cleaned.

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 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.

Technical Service
Ernst Leitz Wetzlar GmbH,
Postfach 20 27,
D-6330 Wetzlar
West Germany.
Telex: 483 727 eltsc

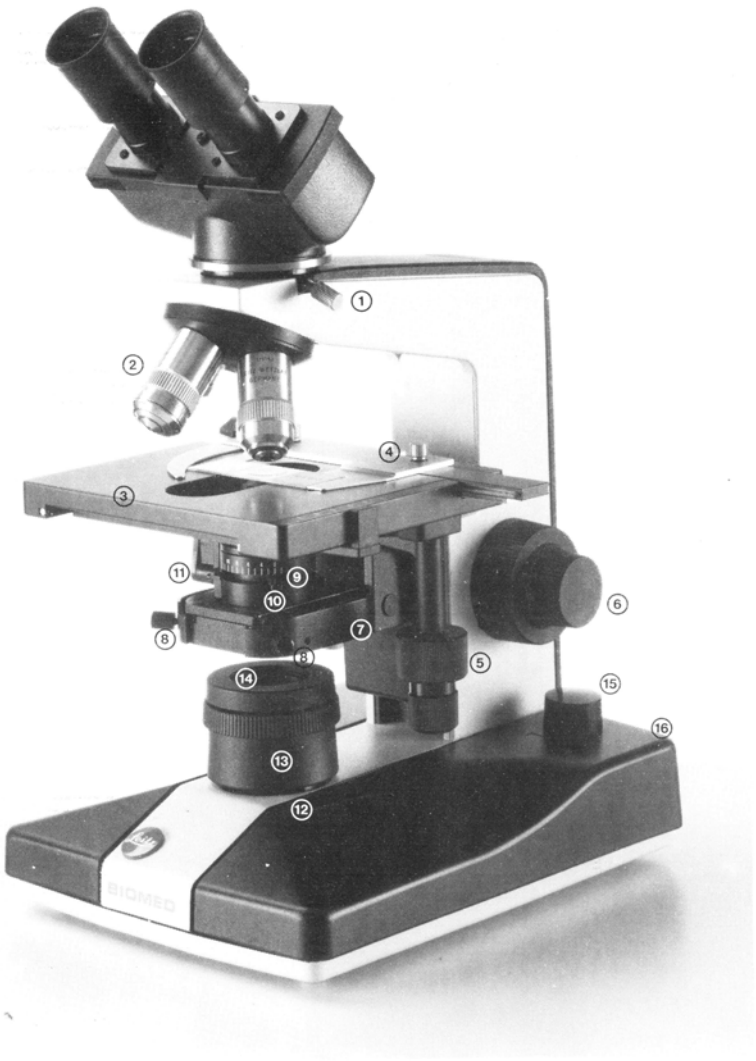


Fig. 21

1 Tube release lever
2 EF objectives
3 Mechanical stage no. 18
4 Specimen mounting plate
5 Drive knobs for moving the specimen in x and y direction
6 Coarse and fine drive
7 Condenser mount with sledge guide
8 Condenser mount centring screws
9 LK condenser
10 Aperture diaphragm lever
11 Lever for swinging out the condenser top
12 Illuminating tube with filter holder
13 Adjustable field diaphragm
14 Filter holder
15 Intensity regulation
16 Illumination switch (concealed, next to socket for mains cable)

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Part. No. 512-235 engl. Printed in West Germany X/88/AX/S

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