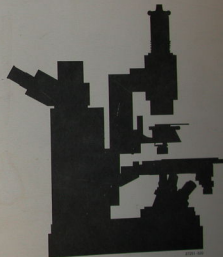




# DIAVERT Inverted Microscope



## Instructions



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Design subject to alterations without notice.

**ERNST LEITZ GMBH D-6330 WETZLAR**

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# DIAVERT Inverted Microscope



## Instructions

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## 1 Technical description

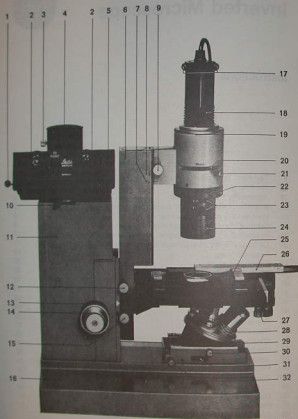


Fig 1

- 1 Switch lever of the beam splitter
- 2 PERIPLAN® QF eyepieces
- 3 Clamping screw for photo tube
- 4 Dust cover for FSA tube
- 5 FSA tube
- 6 Illuminator holder
- 7 Index for the lamp holder setting (condenser No. 31)
- 8 Index for lamp holder setting (condenser 600)
- 9 Clamping screw for the lamp fitting
- 10 Loading lever for tube change
- 11 Microscope stand
- 12 Arresting screw for illuminator holder
- 13 Rotating knob for coarse adjustment
- 14 Rotating knob for fine adjustment
- 15 Arresting screw for object stage
- 16 Hand rest
- 17 Lamp centring screws
- 18 15 W Illuminator
- 19 Lamp mount
- 20 Slot for the phase contrast light ring
- 21 Centring screws for phase contrast
- 22 Lever of the aperture diaphragm for condenser No. 31
- 23 Field-of-view diaphragm for condenser 600/600
- 24 Filter slot
- 25 Condenser No. 31
- 26 Push-in object holder
- 27 Attachable object guide
- 28 Object stage
- 29 Revolving nosepiece with objectives
- 30 Rotating fitting for the revolving nosepiece
- 31 Clamping screw for revolving nosepiece
- 32 Clamping screw for the revolving nosepiece fitting

## 2 Unpacking the microscope

The following parts are packed in a special container:

- 1) Microscope stand
- 2) Microscope tube
- 3) Object stage
- 4) Illuminator holder with lamp mount
- 5) 6 V 15 W illuminator or Lamp Housing 50
- 6) Revolving nosepiece
- 7) Individual parts such as objectives, eyepieces, condenser, dust cover, as well as transformers or other heavy accessories are packed separately.

All contact with the lenses of the objectives and eyepieces should, if possible, be avoided. Any finger marks on glass surfaces should be at once removed with a soft chamois leather or linen rag. Even minor traces of finger perspiration may rapidly attack the surface of high-quality optical glass.

Check the unpacked equipment carefully with the packing note and ensure that no components are left behind in the packing material.

The microscope should be used in a room free from dust, oil fumes and chemical vapours which may attack optical and mechanical parts. In addition it should not be subject to major temperature fluctuations and vibration. The components housed inside the stand are completely sealed off against external influences.

The mains connection of the transformer should be fused for 10 amp.

### 3 Assembling the microscope

#### 31 Outfit with condenser No. 91 for low magnifications

Rotate the coarse focusing control until the stage changing guide is in the lowest position.

Release clamping screw 2.15 (Fig. 2, item 15), insert the object stage into the changing guide and lower it until the relevant letter marking 2.33 faces index line 2.34. Fix the stage with clamping screw 2.15.

The markings indicate:

L = Long working distance

NL = Normal working distance

UD = ULTROPAK

A = Vertical illuminators with objectives ≈ 45mm adjustment length

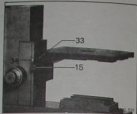


Fig. 2 Inserting the object stage  
12 Clamping screw of the object stage  
33 Letter marking  
34 Index line

Release clamping screw 3.12, insert the illuminator holder 3.6 in the changing guide and lower it to the stop onto the stage bracket. Fix clamping screw 3.12.

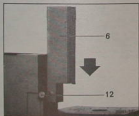


Fig. 3 Inserting the illuminator holders 6  
12 Clamping screw of the illuminator holder

Release clamping screw 4.9 and insert the lamp mounting into the changing guide from above; lower it to the figure marking 1 (4.7) and clamp it with clamping screw 4.9.

Insert the 6V 15W illuminator or Lamp Housing 50 in the bayonet ring of the lamp mount and lock it by turning it clockwise. Fix the lamp cable on the cable holder and connect it to the stand. Screw the condenser No. 91 (7.24) fully into the lamp mount.

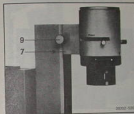


Fig. 4 Inserting the lamp mount  
7 Index 1 for the condenser 91  
9 Clamping screw of the lamp mount



Fig. 5 Attaching the 15W lamp



Fig. 6 Attaching the Lamp Housing 50



Fig. 7 24 Screwing in the condenser 91

Push the locking lever 8.10 to the right, insert the tube vertically and release the locking lever. In this position it must be possible to rotate the tube without effort. It is arrested by short pressure on the locking lever to the left.

Unscrew the clamping screw 9.32 and swivel the revolving-nosepiece fitting 9.29. Raise the object stage by means of the coarse adjustment 1.13. Push the revolving nosepiece 10.28, with objectives screwed in position, into the fitting to the stop. Fix the objective revolving nosepiece with arresting screw 10.30.

Swing the revolving nosepiece fitting in again and fix it by means of the arresting screw 11.32.

The attachable object guide can be attached to the object stage from 3 sides. Place the attachable object guide on to the object stage in the desired position and push it into the recesses provided there. Fix it with the knurled screws 12.35.



Fig. 8 Mounting the binocular tube 8  
10 Locking lever

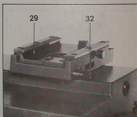


Fig. 9 Swivelling the revolving nosepiece fitting  
29 Rotating fitting for the revolving nosepiece  
32 Arresting screw for the revolving nosepiece fitting

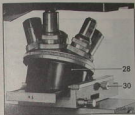


Fig. 10 Inserting the objective revolving nosepiece  
28 Revolving nosepiece  
30 Clamping screw for revolving nosepiece

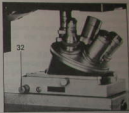


Fig. 11 Tapping in of the revolving nosepiece fitting  
32 Arresting screw

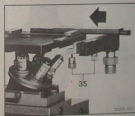


Fig. 12 Attaching the object guide  
35 Knurled screws for fixing the object guide



Fig. 13 Inserting the object holder

### 3.2 Outfit with Series 600 brightfield condensers.

Series 400 phase contrast condensers and darkground condenser D 0.80-0.95 and D 1.20-1.40

The object stage and the illuminator holder are inserted according to Figs. 3 and 4.

Unscrew the clamping screw 14.37 and insert the condenser fitting 14.36 with fork changer in the changing guide from above and lower it to the stop. Tighten clamping screw 14.37.

Insert the condenser in the fork changer to the stop. The swing-out lens 15.38 points downwards.

Unscrew clamping screw 16.9, insert the lamp mount in the changing guide from above, lower it to the figure marking 2 (16.8) and clamp it. Only with condenser top of long intercept distance / otherwise figure 1.

The tube, object carrier and object guide are inserted according to directions pp. 6-7.

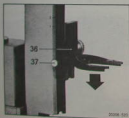


Fig. 14 Inserting the condenser fitting 36  
36 Condenser fitting  
37 Clamping screw of the condenser holder



Fig. 15 Inserting the condenser  
38 Condenser top of long intercept distance



Fig. 16 Inserting the lamp mount  
9 Clamping screw of the lamp mount  
8 Index 2 for long intercept distance

### 3.3 Inserting the 6V 15W lamp

The lamp is changed as follows:

- 1) Unscrew the clamping screw 17.39 and pull out the lamp mount.
- 2) Take lamp 17.50 out (push new lamp into the socket 17.51 and turn it anti-clockwise for clamping).

3) Precentred or non-centred lamps can be used:

- a) Insert a precentred lamp so that the slot of the lamp comes to lie below the red dot of the lamp socket.
- b) Insert the non-centred lamp into the guide grooves of the socket with the two pins and lock it in position by pushing it in to the right.

Insert the Lamp Housing 15 in the bayonet mount and lock it in position.

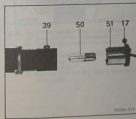


Fig. 17 Inserting the 15W lamp  
17 Clamping screw  
39 Clamping screw  
50 Lamp  
51 Socket

### 3.4 Centring the 6V 15W

Insert the centring disc in the aperture of the object stage. Completely open the aperture diaphragm. Adjust the lamp socket 17.51 until the light point appears smallest on the centring disc.

By adjusting the two centring screws 17.17 move the light points into the centre of the centring disc.

After removal of the centring disc adjust the lamp socket until the rear focal plane of the objective is evenly illuminated.



Fig. 18 Attaching the 15W lamp to the microscope

### 5 Inserting the 12 V 50 W tungsten halogen lamp

Unscrew the knurled screw 19.46 from the Lamp Housing 50 and remove the sidewall from the housing.

Insert the 12 V 50 W lamp with protective sleeves in the socket and remove protective sleeve.

Insert the sidewall so that holder and plugs 19.44 engage. Tighten the knurled screw.

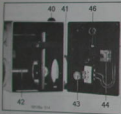


Fig. 19 Inserting the 12 V 50 W lamp in the Lamp Housing 50

- 40 Lamp condenser adjustment
- 41 Locking device and filter fixture
- 42 Reflector
- 43 12 V 50 W lamp
- 44 Plug
- 46 Knurled screw



Fig. 20 Attaching the Lamp Housing 50 to the microscope

### 6 Centring the 12 V 50 W tungsten halogen lamp in the Lamp Housing 50

After each change of lamp, the tungsten halogen lamp must be recentred.

Completely open the aperture diaphragm. Insert the centring disc in the stage aperture.

a) Focus the mirror image of the lamp filament by adjusting the reflector 20.42. Form an image and a mirror image of the lamp filament on the centring disc by rotating ring 20.40.

b) Move the image and mirror image of the filament into the centre by adjusting knob 20.45.

c) Turn knob 20.47 for the vertical adjustment of the lamp until the image and mirror image of the filament overlap along the edges.

Remove the centring disc and replace it by the specimen.

Rotate the lamp condenser, simultaneously observing the rear focal plane of the objective (removal of the eyepiece from the eyepiece tube) until the focal plane is evenly illuminated.

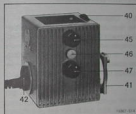


Fig. 21 Lamp Housing 50

- 40 Lamp condenser adjustment
- 41 Locking device and filter fixture
- 42 Reflector
- 45 Knurled knob for the lateral adjustment of the lamp
- 46 Knurled screw
- 47 Knurled knob for the vertical adjustment of the lamp

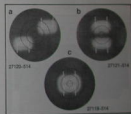


Fig. 22 Centring the tungsten halogen lamp

## 4 Technical hints

### 4.1 Binocular tube S

The tube can be set for the individual interpupillary distance of the observer. This requires a corresponding correction of the tube length, which is carried out on the eyepiece tubes as follows: set the interpupillary distance by pushing or pulling with both hands so that the 2 part-images coincide in the microscope; thus only a single circular image is seen. Read the interpupillary distance on the scale engraved in the front plate of the tube and transfer it to the two eyepiece tubes.

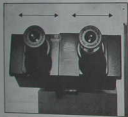


Fig. 20 Binocular tube S

### 4.2 Binocular tube FSA

The binocular tube FSA has a hinged beam-splitting prism, which either splits the light intensity at a ratio of 80:20 (80% for photography, 20% for visual observation) or directs the entire light flux into the eyepiece tubes (for visual observation). The interpupillary distance is set on the tube with both hands laterally pulling or pushing.

If the interpupillary distance is not known, the tube is adjusted during binocular observation until only a single, circular, and easily surveyed field of view appears. Corrections of visual defects must be carried out with the aid of the focusing eyelens of one of the two PERIPLAN eyepieces.

### 4.3 Objective revolving nosepiece

The revolving nosepiece has 5 numbered threads for the objectives. An objective/eyepiece chart accompanies every outfit. It indicates, amongst other data, the nosepiece threads to which the individual objectives are matched.

### 4.4 2-knob operation

The fine adjustment is operative for about 2 turns, and then actuates the mechanism of the coarse adjustment. When the rotating direction is reversed, fine adjustment will automatically be re-engaged. One drum division of the fine adjustment corresponds to about 2  $\mu$ m.

apochromat, NPI = normal plano objective and PI = plano objective. Objectives without letters of designation are achromats. Objectives for phase contrast are engraved "Phaco". Immersion objectives have the word "Oil" and a black ring engraved on the mount.

The letter L indicates long working distance.

The following objectives can be used with the condenser No. 91 (aperture 0.25):

| Objective | Flat working distance | Bright-field-transmitted light | Phase contrast-transmitted light |
|-----------|-----------------------|--------------------------------|----------------------------------|
| PI        | 1.60.05               | 11mm                           | x                                |
| PI        | 2.50.28               | 16mm                           | x                                |
| PI FI     | 4.0.14                | 26mm                           | x                                |
| Achromat  | 4.0.12                | 6.9mm                          | x                                |
| PI FI     | 12.0.20               | 7.6mm                          | x                                |
| Achromat  | 19.0.20               | 7.6mm                          | x                                |
| Achromat  | 19.0.25               | 7.6mm                          | x                                |
| Phaco     | 19.0.25               | 7.6mm                          | x                                |
| L         | 20.0.32               | 8.7mm                          | x                                |
| Phaco L   | 20.0.32               | 8.7mm                          | x                                |
| L         | 22.0.40               | 8.4mm                          | x                                |
| Phaco L   | 22.0.40               | 8.4mm                          | x                                |

### 4.5 Objectives

The data engraved on the microscope objectives next to the LEITZ emblem indicate:

170

distance in mm from the flange of the objective to the rim of the tube (mechanical tube length).

0.17

is the coverglass thickness to be used in mm. Instead of the figure 0.17 a dash may appear, which means that with these objectives specimens can be observed with or without coverglass.

Below the tube length and coverglass thickness indication the reproduction ratio (dimensional ratio of intermediate image) and the numerical aperture of the objective 10/0.30 are engraved in abbreviated form.

In addition the state of correction is also given. FI = fluorite system, Apo =

For work with histological sections, smear preparations and microcilia with a bottom of 0.17mm thickness, all LEITZ transmitted-light objectives right up to oil immersion can be used.

Here the use of a Series 600 brightfield condenser is recommended. For phase contrast investigations a Series 400 condenser is used. Ensure that the supplementary lens K 3 is inserted in the 600 or 400 Series condenser.



#### 4.6 Eyepieces

Eyepieces of field-of-view index 18mm can be used in the DIAVERT tube.

If the diameter of the field of view is divided by the objective magnification,

| PERIPLAN® eyepieces<br>(dia. 23.2mm) |               |
|--------------------------------------|---------------|
| Magnification                        | Field of view |
| 6.3 x                                | 18            |
| 6.3 x M                              | 18            |
| 8 x                                  | 16            |
| 10 x <sup>a</sup>                    | 14            |
| 25 x                                 | 8             |
| High-point eyepieces                 |               |
| 8 x                                  | 18            |
| 10 x                                 | 15            |
| 10 x M                               | 15            |
| 10 x MF <sup>b</sup>                 | 15            |
| Graticule<br>10mm = 100 intervals    |               |

<sup>a</sup> with enlarged field of view

<sup>b</sup> = eyepiece with focusing eyepiece and suitable to use a graticule.

MF = eyepiece with focusing eyepiece and focusing graticule.

#### Special eyepieces (dia. 23.2mm)

| Magnification        | Description  |
|----------------------|--|
| H 6.3 x              | Pointer eyepiece                                   |
| H 6 x                | Double pointer eyepiece                            |
| P 10 x <sup>a</sup>  | Eyepiece with fixed pointer (° engraved in yellow) |
| NF 10 x <sup>a</sup> | Eyepiece with fixed pointer (° engraved in yellow) |
| GF 10 x <sup>a</sup> | Eyepiece with fixed pointer (° engraved in yellow) |
| P 10 x               | Comparison eyepiece                                |
| GF 10 x              | Eyepiece for photomicrography (red dot engraved)   |
| 12.5 x               | Screw micrometer eyepiece                          |
| 12.5 x               | Screw micrometer eyepiece for monochromatic light  |

the diameter of the object area to be surveyed is obtained:

Field-of-view-index

Objective magnification x tube factor

| Widefield eyepieces<br>PERIPLAN NF/GF (dia. 23.2mm) |               |
|---|---------------|
| Magnification                                       | Field of view |
| NF 10 x   | 18            |
| NF 10 x M   | 18            |
| GF 10 x   | 18            |
| GF 10 x M   | 18            |
| GF 12.5 x   | 18            |
| GF 12.5 x M   | 18            |
| GF 12.5 x MF <sup>b</sup>                           | 18            |
| GF 16 x   | 15            |
| GF 25 x   | 10            |
| GF 25 x M   | 10            |
| Graticule<br>10mm = 100 intervals                   |               |

<sup>b</sup> with graticule for ORTHOMAT-W or for attachment camera with Polaroid back or for system attachment camera.

#### 4.7 Condensers on the DIAVERT

When the condenser No. 91 of long working distance is used a simple method of illumination is realized. Here the condenser is arranged so that with optimum lamp centration even illumination of the microscopic image is ensured. The iris diaphragm in the holder serves as aperture diaphragm. Depth of field (axial resolving power) and contrast of the microscopic image can be changed with it. In most cases best results are obtained if the field aperture and objective aperture have a ratio of 2:3, i.e., if about 2/3 of the diameter of the rear focal plane of the objective is illuminated. This can easily be checked when the eyepiece is removed from the eyepiece tube. More drastic stopping down may result in noticeable diffraction effects and adversely affect the quality of the image.

With the system condenser (Series 400 and 600) Köhler's method of illumination is used. Here the iris diaphragm built into the lamp mount serves as the field diaphragm. When the condenser is correctly set (see p. 20) a sharp image of the diaphragm is formed in the object plane. Referred to the size of the microscopic image field, the field diaphragm limits the ray cone in the object. Only the cone of rays required for the formation of the image will reach the objective. This avoids a degradation of the image owing to flare, loss of contrast, and disturbing reflections. At the same time unnecessary heating of the specimen is prevented.

The centreable system condensers of Series 600 consist of a standard base No. 600 with condenser lens which is the condenser for low powers, the

aperture diaphragm for the complete condenser and interchangeable condenser tops of various corrections, intercept distances and apertures. The condenser top can be swung out of the beam. The condensers are interchangeable in a horizontal dovetail guide, and can be vertically adjusted by means of a rack and pinion.

### Brightfield condenser system 600

| Condenser No.                              | Designation   | Aperture | Focal length (mm) | Use<br>illumination of the objectives<br>in field and<br>in aperture                                 |
|--|---|----------|-------------------|--|
| <b>Dry condensers</b>                      |   |          |                   |  |
| 600  | condenser<br>bottom part                                | 0.25     | 38                | from 2.5:1 up to aperture 0.25<br>for low-power objectives   |
| 601  | S.26<br>spherical<br>condenser                          | 0.90     | 10                | from 10:1 up to apertures 1.30<br>for achromatic objectives with the<br>field diaphragm stopped down |
| 602  | Achr. S.26<br>achromatic<br>condenser                   | 0.90     | 10                | from 10:1 up to aperture 1.30<br>for highly corrected objectives<br>especially for photomicrography  |
| <b>Oil immersion condensers</b>            |   |          |                   |  |
| 610  | Oil 1.25<br>simple oil immersion<br>condenser           | 1.25     | 7.9               | from 16:1 up to aperture 1.30<br>for achromatic immersion objectives<br>at large field aperture      |
| 603  | Apl Oil 1.25<br>aplanatic oil<br>immersion condenser    | 1.25     | 8.1               | from 16:1 up to aperture 1.30<br>for immersion objectives of maximum<br>correction                   |
| 608  | Achr. Oil 1.40<br>achromatic oil<br>immersion condenser | 1.40     | 8.0               | from 16:1 up to aperture 1.40<br>for highest demands of resolving<br>power                           |
| <b>Condensers of long working distance</b> |   |          |                   |  |
| 606  | Achr. S.76/L 4  | 0.75     | 13                | from 10:1 up to aperture 1.10<br>for all objectives  |
| 606  | S.66/L 11   | 0.80     | 17                | from 8.3:1 up to aperture 0.90<br>for all dry objectives   |
| 607  | S.66/L 20   | 0.45     | 20                | from 8.3:1 up to aperture 0.70<br>for objectives of up to medium power                               |

### Phase contrast condenser system 400 according to Zernike

| Condenser No. | Designation   | Aperture | Focal length (mm) | Use  |
|---------------|---|----------|-------------------|--|
| 401 a         | Achromatic phase<br>contrast condenser<br>base 400 c<br>and top 902 | 0.90     | 10                | Brightfield with objectives 10x - 100x<br>Phase contrast with the objectives<br>for annular stops 1, 2, 3<br>Darkground with annular stop 3<br>for objectives 10:1 - 40:1.66 |
| 401 c         | Aplanatic oil<br>immersion condenser<br>base 400 c<br>and top 903   | 1.25     | 8.1               | Phase contrast with objectives<br>for annular stops 2 and 3  |
| 401 e         | Achromatic condenser<br>base 400 e<br>and top 905                   | 0.70     | 13                | Phase contrast with all Phaco<br>objectives for annular stops 1, 2, and 3  |
| 401 f         | Condenser<br>base 400 f<br>and top 906                              | 0.60     | 17                | Phase contrast with objectives<br>for annular stops 1 and 2  |
| 401 g         | Condenser<br>base 400 g<br>and top 907                              | 0.45     | 20                | Phase contrast with objectives<br>for annular stops 1 and 2  |

## 5. Operation of the microscope

Since the tube of the DIAVERT can be easily rotated on the stand, the microscope can be operated very practically and conveniently in the lateral position (see Fig. 24).

The left hand grips the rear rotating knob for the coarse or fine adjustment. The right hand actuates the object guide, or the specimen directly whichever the case may be.

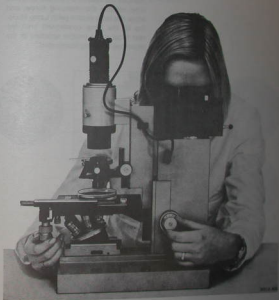


Fig. 24 Lateral operation of the microscope

### 5.1 Observation with the condenser No. 91

Place object to be investigated (e.g. Petri dish) directly on the object stage or in the object guide. Choose the objective of lowest power for first observation. The lever of the aperture diaphragm is on the right-hand stop. Switch on the illumination. Ensure that the lamp holder is in position 1. Focus the specimen by means of the coarse and fine adjustment.

Corrections are carried out as follows: Look through the eyepiece with fixed eyelens with one eye (e.g. right-hand eyepiece/right eye). Focus the specimen with the fine adjustment. Now look through the eyepiece with focusing eyelens, with the left eye.

Adjust the eyelens until the same areas in the object also appear sharp. Do not interfere with the fine adjustment.

Now set up the correct illumination for the specimen.

First check centration of the lamp (see p. 9, paragraph 3.3).

Remove the eyepiece from the eyepiece tube, release the clamping screw, and move the lamp mount (with Lamp Housing 50 the lamp condenser) until the rear focal plane (visible aperture of the objective) is evenly illuminated.

### 5.2 Observation with the Series 600 swing-out condenser

Place the object to be investigated (e.g. Petri dish) either directly on the object stage or into the object guide. Switch on the illumination.

Focus the specimen by means of the coarse and fine adjustment.

Carry out correction for visual defects (see para. 5.1).

Ensure that the lamp mount is in position 1. For the condenser of long intercept distance set the lamp mount at position 2.

**1** Close the field diaphragm (diaphragm in the lamp mount).

**2** Lower the condenser by means of the vertical adjustment until a sharp image of the field diaphragm is formed in the plane of the specimen.

**3** Centre the image of the field diaphragm with the two centring screws.

**4** Open the field diaphragm so that it just disappears beyond the edge of the field of view.

Check lamp centration and illumination as under para. 3.3 p. 9 and, if necessary readjust it.

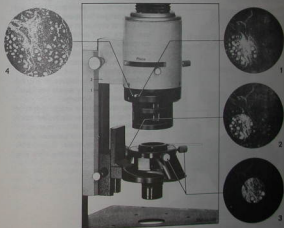


Fig. 26 Centring the field diaphragm

### 5.3 Investigation in phase contrast according to Zernike

Two outfits are available for phase contrast investigation:

1. Phase contrast outfit with condenser No. 91 for long working distances. Magnification range 63x to 320x.
2. Phase contrast outfit with special Series 400 condensers for normal working distance. Magnification range 63x to 1250x.

### 5.31 Phase contrast outfit with condenser No. 91

For this device the light-ring holder and its centring facility is already built into the lamp mount, in addition to the phase contrast objectives

Phaco 10/0.25

Phaco L 20/0.32

Phaco L 32/0.40

a light ring diaphragm (Phaco 1) and a focusing telescope are required.



Fig. 26 Light ring diaphragm

### Setting the phase contrast outfit

Screw the Phaco objectives into the revolving nosepiece, insert the latter into the changing guide and clamp it in the working position. Focus the specimen (objective 10/0.25). Insert the light ring diaphragm in the slot marked "Phaco" to the stop. Completely open the aperture diaphragm.

Remove one eyepiece from the eyepiece tubes and insert the focusing telescope. Release the knurled screw on the focusing telescope and adjust the upper part until both the light and the phase ring are equally in focus.

Check whether both rings are concentric and superimposed, if not, establish this position by means of the two centring screws.

The size of the image formed of the light ring is changed in phase contrast observation of objects in liquids when the level of the liquid varies. The necessary compensation can be carried out by adjustment of the illuminator holder (uniform superimposition of light and phase ring).

Replace the focusing telescope with the eyepiece. If necessary repeat centration after magnification change.

A further check of the image formation of the ring is no longer necessary, since the centration, once set, is preserved.

For a rapid change-over between phase contrast and brightfield illumination, merely remove or insert the light ring diaphragm in its holder.

### 5.32 Phase contrast outfit with Series 400 condenser

In addition to the phase contrast objectives, a Series 400 phase contrast condenser, a focusing telescope, and two centring keys are required.

### Setting the phase contrast image

Screw the Phaco objectives into the revolving nosepiece, insert the nosepiece into the changing guide and clamp it in the working position.

Swing the Phaco 10/0.25 objective into the beam and set phase ring 1 in the Phaco condenser.

Focus the specimen.

Close the field diaphragm.

Lower the condenser by means of its vertical adjustment, until a sharp image of the field diaphragm is formed in the field of view. Centre the image of the diaphragm with the two condenser centring screws.

Open the field diaphragm so that its rim just disappears beyond the edge of the field of view.

Insert the focusing telescope in one of the eyepiece tubes.

Unscrew the knurled screw on the focusing telescope and adjust its top until a sharp image of both the light and the phase rings is seen.

When the rings are off-centre: insert the centring keys into the two rear apertures of the condenser and make the light and phase rings coincide by turning the centring keys.

Take out the centring keys and check this type of centration for all other objectives.

No further check of the image formation of the ring is now necessary, since centration, once carried out, is preserved. For further details see Instructions: Phase Contrast Equipment According to Zernike, No. 513-84.



Fig. 27 DAVERT with phase contrast condenser according to Zernike

#### 5 4 ULTROPAK incident-light illuminator

Attach the lamp mount 28.49 to the foot of the stand and clamp it with screw 28.48.

Push the ULTROPAK with carrier piece into the changing guide and lock it in the working position. Insert the objective.

Insert the Lamp Housing 50 in the bayonet lock and secure it by turning it. Connect the Lamp Housing with the mains via the 12 V 50 W transformer.

Further directions are contained in the instructions, ULTROPAK No. 513-90.

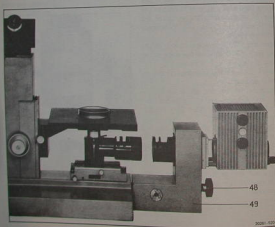


Fig. 28 DIAVERT with ULTROPAK incident-light illuminator

#### 5 5 Darkground investigations

For the darkground illumination of objects requiring a long working distance, ring diaphragms of the Phaco device in conjunction with the condenser No. 91 are used for low-power work.

For this purpose the annular stop is pushed into the slot marked Phaco of the lamp holder.

For large objects such as culture vessels a special holder with a 6 V 15 W illuminator is available.

This illuminator holder is pushed into the dovetail guide above the object stage instead of the usual illuminator holder and secured. When the lamp is set vertically, brightfield illumination can then also be obtained with large vessels.



Fig. 29 DIAVERT with special lamp holder for large objects

**General hints**

It is essential to observe the following points for a good photomicrograph:

1. The precise setting of the illumination (para. 3.3)
2. Critical focusing of the image,
3. Accurate determination of the exposure time.
4. Scrupulous cleanliness of all the optical faces, e.g. deflecting mirror, dust glass, condenser, objective, tube lens, eyepiece, etc., accessible to the user.

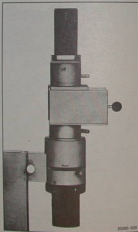


Fig. 20 Micro-flash on the DIAVERT

Special attention must also be paid to the question of useful magnification, the choice of a light filter for the correct tonal rendering (on black-and-white film) of the specimen, the setting of the correct colour temperature of the low-voltage lamp (with colour photography) and the choice of suitable exposure materials for photomicrography.

The following attachments are available for photomicrography with the DIAVERT. ORTHOMAT® W fully automatic microscope camera. Micro-attachment for the LEICA® with vibration damper LEITZ System Camera LEITZ COMBIPHOT® automatic system camera. Please obtain further details about these instruments from their individual instruction leaflets.

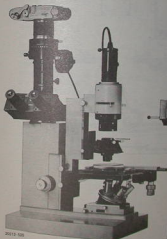


Fig. 21 DIAVERT with System Camera and LEICA M6c

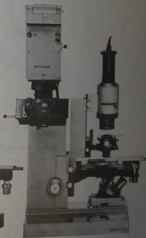


Fig. 22 DIAVERT with ORTHOMAT W fully automatic microscope camera

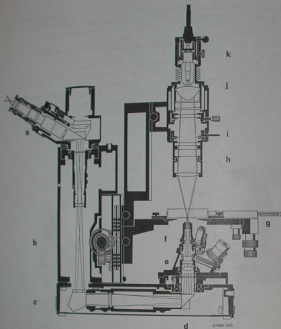


Fig. 21 Beam path in the DIAVERT with condenser No. 91

- a Bimolecular photo tube PSA
- b Control and fine adjustment
- c Periscopium
- d Deflecting prism
- e Revolving nosepiece
- f Objective
- g Object stage
- h Optical system of the condenser
- i Aperture diaphragm
- j Lamp condenser
- k Centering low-voltage lamp

## 6 Care and maintenance

For protection against dust the microscope should always be covered with the flexible hood after use. From time to time the stand should be cleaned with a piece of linen or chamois leather. Methylated spirit must on no account be used for this purpose since it attacks the varnish. Petrol, on the other hand, is eminently suitable for the cleaning of varnished parts.

Light patches on the object stage caused by petrol can be removed by treatment with liquid paraffin or acid-free vaseline.

Special caution is necessary during investigations involving the use of acids (above all acetic acid) or other corrosive chemicals. Direct contact between optical components and stand and these chemicals must be avoided at all costs and all parts should be cleaned thoroughly and immediately after use.

The optical parts of the microscope must be kept scrupulously clean. Dust on glass surfaces is removed with a fine, dry sable brush; lightly blow across the surface as you apply the brush.

Bad contamination requires cleaning with a soft linen or chamois leather rag with water or xylolene as solvent.

For cleaning, objectives must not be dismantled. Any internal damage of the objectives must be repaired in our factory.

Special care is necessary during the cleaning of anti-reflection-coated surfaces. The external surfaces of the eyepieces and the front lens of the objectives are coated with layers of about glass hardness. They must be cleaned with as much care as non-coated glass surfaces. For some internal surfaces of objectives and eyepieces, however, very soft layers are used; here, dirt must be very gently blown off. It is therefore not advisable to clean internal surfaces of eyepieces.

Correct treatment preserves the performance of a LEITZ microscope for many years. If, however, an overhaul or repair of a damaged instrument becomes necessary, one of our agencies or our factory will be able to help.

## Outfits

### Outfit for low magnification brightfield

Stand of inverted design with coaxial controls for coarse and fine adjustment; interchangeable quadruple revolving nosepiece (35.5--); lamp holder; 8 V 15 W low-voltage illuminator and filter set K (conversion filter CB 16.5, groundglass disc, and green filter) (---); inclined binocular tube 5; large object stage No. 915, 184 x 180 mm.

|   |         |
|---|---------|
| <b>Basic outfit</b>                           |         |
| (Numerical designation: 35.5--37 S 918/-)     | 520 301 |
| Condenser No. 91 for low magnifications       | 520 379 |
| Objectives Pl 2.5/0.08                        | 519 049 |
| 40.12   | 519 262 |
| 100.25  | 519 265 |
| L 200.32                                      | 519 434 |
| L 320.40                                      | 519 436 |
| Paired PERIPLAN GF 10 x M widefield eyepieces | 519 127 |

Complete DIAVERT outfit for low magnification brightfield, without transformer (Numerical designation: 35.5--37 S 918/91 + optical outfit)

Step transformer, for connection to 110-240 V 50 and 60 c/s

8 V 15 W filament lamp (replacement)

The following objectives are available for special purposes

|  |         |
|--|---------|
| Objective L 100.22, free working distance 18.8 mm                      | 519 436 |
| (The 100.25 objective 519 265 has a free working distance of 7.8 mm)   |         |
| Objective L 250.22, free working distance 14.8 mm                      | 519 439 |
| (The L 200.32 objective 519 434 has a free working distance of 8.7 mm) |         |

### Outfit for low magnification phase contrast

|   |         |
|---|---------|
| <b>Basic Outfit</b> (as on the left)          |         |
| (Numerical designation: 35.5--37 S 918/-)     | 520 301 |
| Condenser No. 91 for low magnifications       | 520 379 |
| Light ring 1                                  | 513 362 |
| Focusing telescope                            | 513 362 |
| Objectives Phaco                              | 519 185 |
| Phaco L 200.32                                | 519 436 |
| Phaco L 320.40                                | 519 437 |
| Paired PERIPLAN GF 10 x M widefield eyepieces | 519 127 |

Complete DIAVERT outfit for low magnification phase contrast, without transformer (Numerical designation: 35.5--37 S 918/91 + Phaco optical outfit)

Step transformer, for connection to 110-240 V 50 and 60 c/s

8 V 15 W filament lamp (replacement)

### Outfit for incident-light investigations with the ULTROPAK®

|   |         |
|---|---------|
| <b>Basic outfit</b> (as on the left)  | 520 391 |
| ULTROPAK illuminator on carrier, with 2 slots for the polarizer, sector stop, or filters. Adjustable sector stops from 90° to 180°, and from 180° onwards | 513 344 |
| Polarizer in mount  | 513 173 |
| Analysar in mount   | 513 334 |
| ULTROPAK-POL  | 513 345 |
| Objectives UD   | 513 182 |
| UD 4.0/10   | 513 054 |
| UD 8.5/18   | 513 055 |
| UD 110.25   | 513 056 |
| UD 220.45   | 513 056 |

#### Light source for incident light

|   |         |
|---|---------|
| Carrier for the Lamp Housing 50   | 520 378 |
| Light screening tube  | 520 383 |
| Lamp Housing 50 with 12 V 50 W tungsten halogen lamp and filter set F (conversion filter CB 12, groundglass disc, and green filter) | 514 395 |
| Regulating transformer for 12 V 50 W with ammeter, connection to 110-240 V 50 and 60 c/s  | 500 188 |
| 12 V 50 W tungsten halogen lamp (replacement)   | 500 182 |