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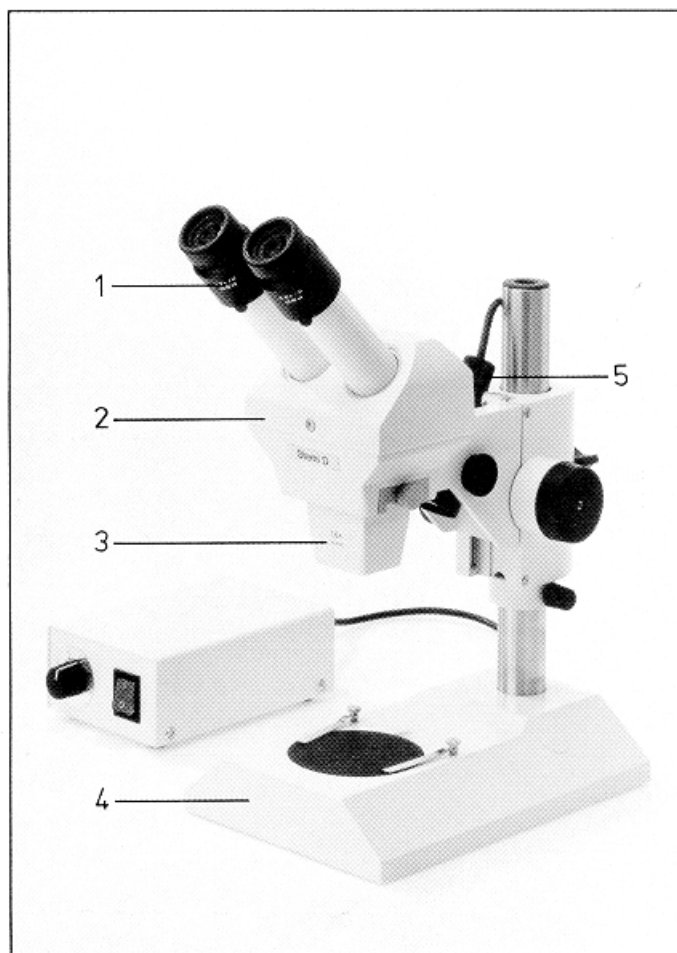
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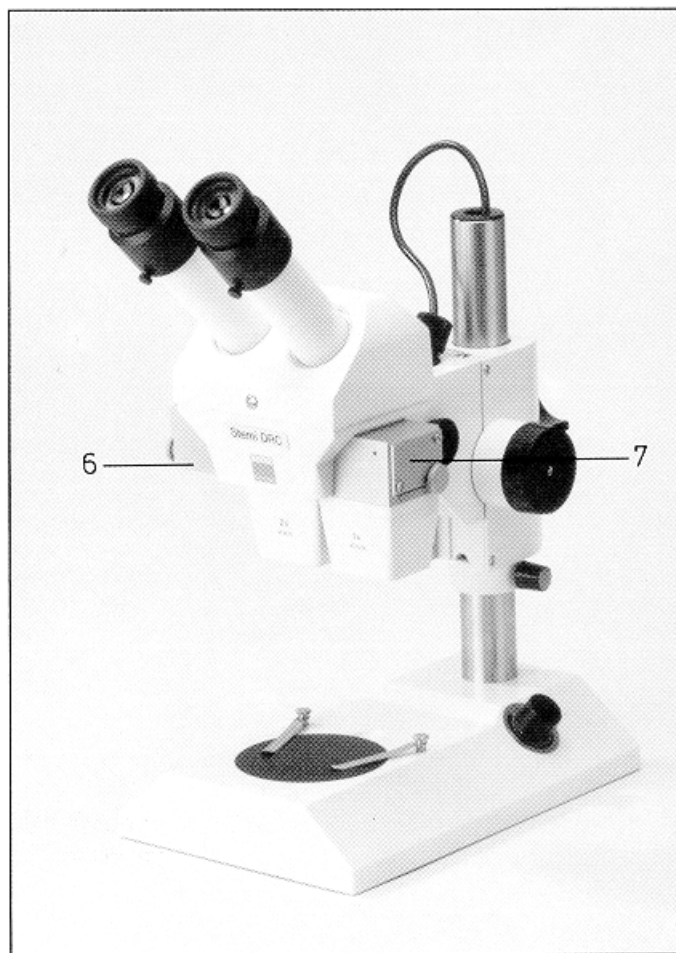
**Stereomicroscopes  
D and DRC**

Operating Instructions



### Stereomicroscope D

- 1 Eyepieces
- 2 Stereo tube
- 3 Objective pair D
- 4 Stand
- 5 Illuminator



### Stereomicroscope DRC

- 6 Change slide for 2 objective pairs D
- 7 Opening for phototube DRC

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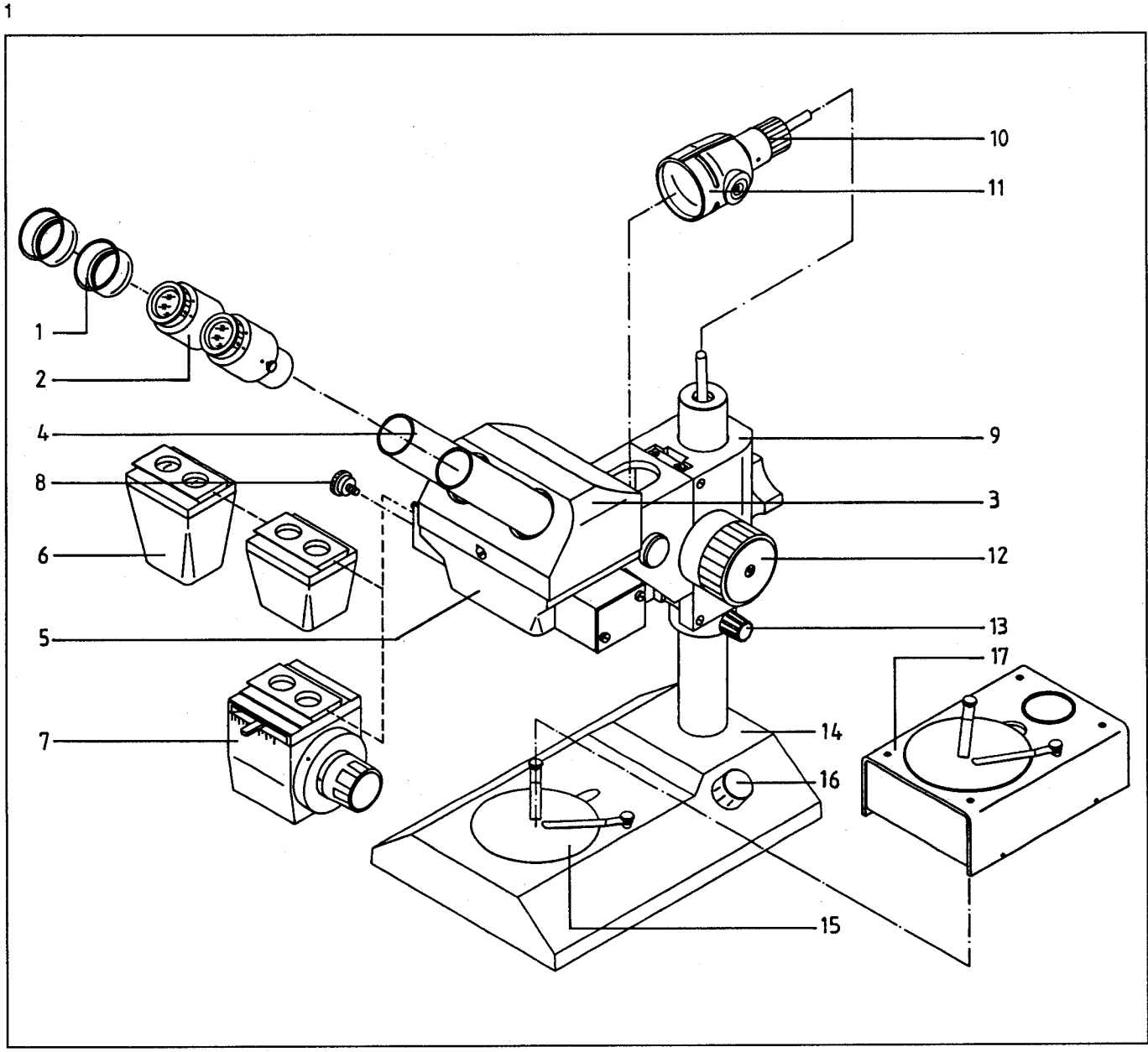
**Note :**

- \* The 6 to 10-digit numbers are ordering numbers of instruments or parts, e.g. 457465.
- \* Alterations and repairs to these instruments may only be carried out by the manufacturer or by persons expressly authorized to do so.
- \* Subject to technical change.

The Stereomicroscopes D and DRC are Greenough microscopes with two completely separate optical systems which provide the stereoscopic image. The beam path goes through the center of the lens systems of the objective pairs. The modular principle has been used in the product line for the stereomicroscopes.

The wide variety of eyepieces, objective pairs, microscope illuminators, stands and specimen stages permit instrument configurations to be optimally adapted to the type and size of the specimen. The combination of eyepieces and objective pairs allow magnifications from 5x to 200x.

The Stereomicroscope DRC can be equipped with the phototube DRC, to which a microscope camera, SLR or TV camera can be attached.



Preparations :

- Mount stereo tube with carrier (9) on stand column.
- Remove stop screw (8), insert objective pair D (6) or turret changer D 2x-4x-8x (7) in change slide from the left-hand side and screw in stop screw again.
- Insert eyepieces in the tube and tighten locking screw.
- Place specimen on stage plate.
- Lower stereo tube to the approximate working distance. The carrier with focusing gear box should be in the middle of the focusing range. The distance between the mount of the objective and the specimen is 88 mm for the objective pairs D 1x to D 2.5x (for other objective pairs D please see table on page 6).
- Push securing ring (13) upwards against microscope carrier (9) and secure.
- Attach illuminator 10 (11) and insert a 6V10W halogen bulb (see page 10).
- Check instrument voltage. If the voltage indicated on the transformer is the same as the line voltage available, connect power cable to line. Switch on lamp using knob on transformer and adjust brightness.

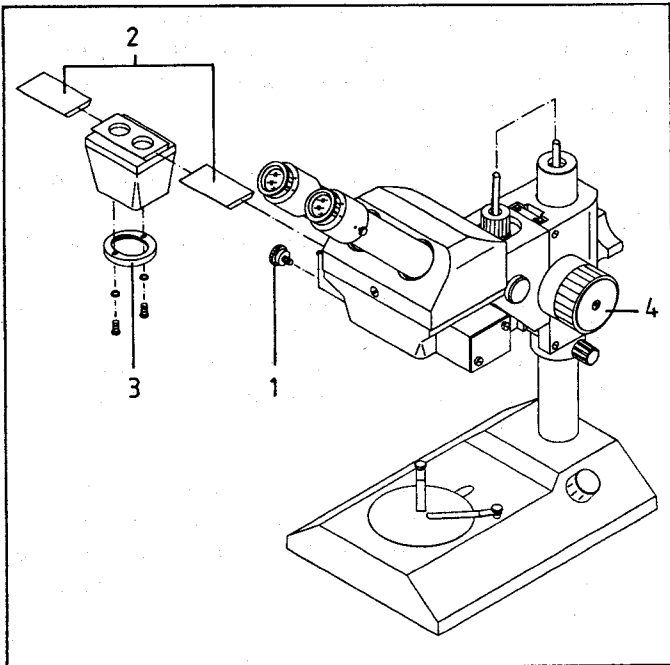
Focusing the microscope image

- When looking through the focusing eyepieces (2) in the binocular tube, you will see a bright circle (field stop) with each eye. To obtain one image, set eyepiece barrels (4) to your interpupillary distance.
- Set eyepieces to "0".
- Look through the right tube first and focus on object using control.
- Then focus on the same object feature through the left foc. eyepiece.
- Tilt illuminator 10 (11) and turn lamp mount (10) until optimum illumination of the object is obtained.
- Depth of field can be improved by narrowing the aperture diaphragm of the turret changer; however, this will result in a deterioration in resolution.
- For **transparent specimens**, the **transmitted-light** attachment (17) can be inserted in such a way that its pins engage with the holes intended for the stage clips of the base. (Set lamp mount (10) at right angles to the entrance aperture of the attachment).

**Fig 1: Stereomicroscope DRC**

- 1 Eyecups
- 2 Eyepieces
- 3 Binocular tube
- 4 Eyepiece barrels
- 5 Stereo tube DRC
- 6 Two objective pairs D
- 7 Turret changer D 2x-4x-8x
- 8 Stop screw for objective pair
- 9 Carrier for column 32 with focusing gear box and receptacle for illuminator
- 10 Lamp mount with 6V 10W halogen bulb
- 11 Illuminator 10
- 12 Focusing control
- 13 Securing ring
- 14 Stand L with built-in transformer
- 15 Plastic plate, b/w, dia. 84 mm
- 16 Power switch with brightness control
- 17 Transmitted-light attachment

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### Stereo tubes D and DRC

The stereo tubes D and DRC consist of the stereo body with binocular tube.

The carrier with focusing gear box is mounted on the stereo tube. This unit is attached to the stand column 32 mm and secured using the clamping screw. Focus on specimen using focusing control (4). The travel range is 50 mm.

Objective pairs D and turret changer can be fitted to the change slide from the left-hand side. Unscrew knurled screw (1) before exchanging objectives and screw it in again after the exchange. The DRC stereo tube has an opening for the phototube DRC (455005) which can be mounted to the right of the instrument (see page 13). It also has a change slide for two objective pairs D. If only one objective pair D or the turret changer D alone is used on the change slide 2x of the Stereomicroscope DRC, exact centration of the objective pair is achieved by inserting the two spacer pieces (435031) (2) to the right and left of the objective pair.

### Objectives

Various objective pairs D and the turret changer D are available for the Stereomicroscopes D and DRC. The objectives differ in their magnifications, apertures and free working distances.

Objective pair/ Magnification	N.A.	WD mm	Cat.No.
D 0.8x	0.025	63	45 50 19
D 1 x	0.03	88	45 50 38
D 1.6x	0.04	88	45 50 32
D 2 x	0.04	88	45 50 37
D 2.5x	0.05	88	45 50 13
D 4 x	0.07	63	45 50 34
D 6.3x	0.075	63	45 50 35
Turret-changer			45 50 10
D 2 x	0.05	56	
D 4 x	0.08	56	
D 8 x	0.12	56	

N.A. = numerical aperture x1,000, e.g. 0.12 = 120x is the highest recommended magnification, as nothing additional can be seen at higher magnifications.

WD = working distance between objective and specimen surface

The turret changer D 2x-4x-8x (see 7 in Fig.1) permits the fast change of magnifications. It contains a double iris diaphragm improving depth of field, but reducing resolution.

The objective mount accepts filters M 35.5x0.5 available from camera dealers.

The holding ring with internal thread M 35.5x0.5 (455020) (3) can be attached to the front of objective mount D using the 2 screws supplied. Here, filters available from specialist shops, e.g. Pol filters for reflection-reducing illumination, can be attached.

To obtain a higher total magnification, it is advisable to increase the magnification of the objective instead of that of the eyepiece.

## Eyepieces

Magnification/ Field of view number	AF	D mm	Cat.No.
W 6.3x/30	41°	-	45 50 39
W-PL 10x/23 Br.foc. with spectacle protection ring	50°	26	45 50 44
W 10x/21 foc. with eyecup	46°	26	45 50 42
W-PL 16x/16 Br.foc. with spectacle protection ring	54°	21	45 50 48
W 25x/10 foc.	53°	21	45 50 46

AF = Angular field

D = diameter of insertable reticle

Eyecups (44 48 01) are available for the W-PL 10x/23 and W-PL 16x/16 eyepieces.

### Designations

The eyepieces are marked with their magnifications and field of view numbers.

Other:

**W:** wide-angle eyepiece

**PL:** wide-angle eyepiece with particularly good field flattening and low distortion

**Br:** eyepieces for spectacle wearers, i.e. the distance between the eye and the last eyepiece lens is large.

**foc:** focusing eyepiece with reticle mount.

### Inserting and setting the eyepieces

Loosen locking screw to allow insertion of the foc. eyepieces into the binocular tube; fasten eyepieces using locking screw.

• Setting the eyepieces:

- Set foc. eyepieces to "0".

- Look only through the right tube first and focus on the object using the focusing control.

- Then focus on the same object feature via the left tube by turning the eyepiece inwards.

## Reticles

Focusing eyepieces are suitable for the integration of reticles; the image shift caused by the reticles can be compensated by setting the eyepiece to the red dot.

The reticles should be changed by an expert, as cleanness and accuracy of alignment are extremely critical. (For this, the lower eyepiece section of eyepieces 16x and 25x must be unscrewed. In the eyepieces 10x/21 and 10x/23, three threaded bolts must be loosened. The reticle side with the scale must face downwards.)

### Reticles with 26 mm dia. :

• Micrometer disk 10:100 47 40 66-9901  
10 mm in 100 subdivisions

• Crossline disk 47 40 64

• Net micrometer disk 12.5x12.5/5 47 40 68  
12.5x12.5 mm, divided into 5x5 squares,  
with additional marking of edge centers

### Reticles with 21 mm dia. :

• Mikrometer disk 10:100 43 40 11  
10 mm in 100 subdivisions

• Crossline micrometer disk 10:100 43 40 13  
10 mm in 100 subdivisions.

The reticles are calibrated using a stage micrometer 25 + 50/10 mm 47 40 25

Reticles with format outline for photomicrography are described in the manuals on the microscope cameras (see page 13).

### General rules

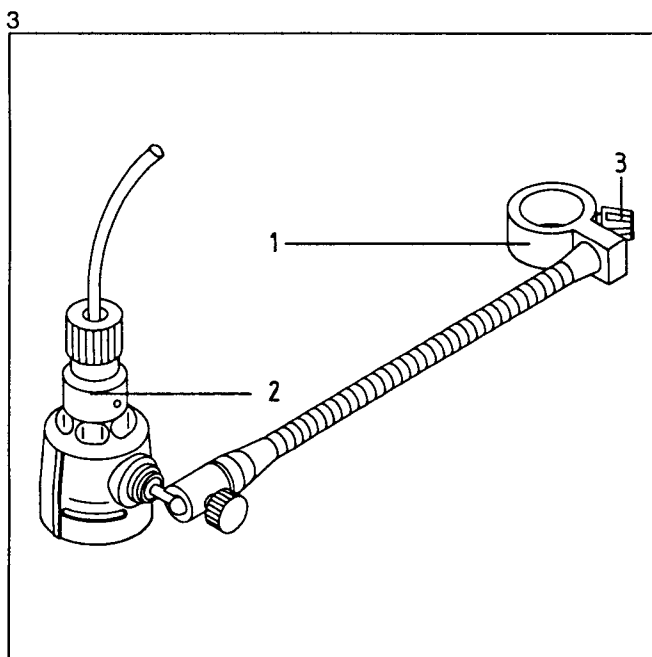
- The illuminators described in the following can be used singly or in combination. Use as few light sources as possible. Shadows produced by several light sources cause unsteadiness in the image.
- Shadows may only be just visible and no more, otherwise they will appear too dark in the photograph.
- If more importance is attached to color than form in a color photograph, the illumination must be set to produce fewer shadows.
- With directed light, the brightness decreases as the square of the distance (the brightness difference between the object and the background can be easily set using different distances between the object and the background; with inclined illumination, the uniformity of object illumination increases, the greater the distance of the lamp).

### Illuminators with 6V 10W halogen bulb

#### Illuminator 10 with support for 32 mm dia. column (Fig.3)

Attach illuminator 10 (2) and support (45 51 52) (1) to the stand column below the stereo body and secure with locking screw (3).

The lamp mount, halogen bulb, transformer and power cable are the same as used in the illuminator 10 described in the following.





### Illuminator 10 for integration in stemi carrier

Stand L already contains the lamp mount Hal (1) and a transformer with brightness control. Also required are a 6V 10W halogen bulb (38 61 08) (2) and a power cable with safety plug (38 01 37-6750).

The following is required for the L0 stand:

- Illuminator 10 (46 72 53-9902) (3)
- Mount Hal 10 W for illuminator 10 (46 80 43-9901) (4)
- 6V 10W halogen bulb (38 61 08) (2)
- 6V 10W step transformer (45 84 10)  
for 115 - 230V, 50 . . . 60Hz, 16VA power consumption,  
steps 3.5 - 4.2 - 5 - 6 - 6.6 V,  
and power cable with safety plug (38 01 37-6750)

Further accessories:

Filter holder for illuminator 10 (for 32 mm dia. filters) 46 60 51

Frequently used 32 mm dia. filters:

KG 1 heat-absorbing filter 46 78 30

Interference filter, green 46 78 03

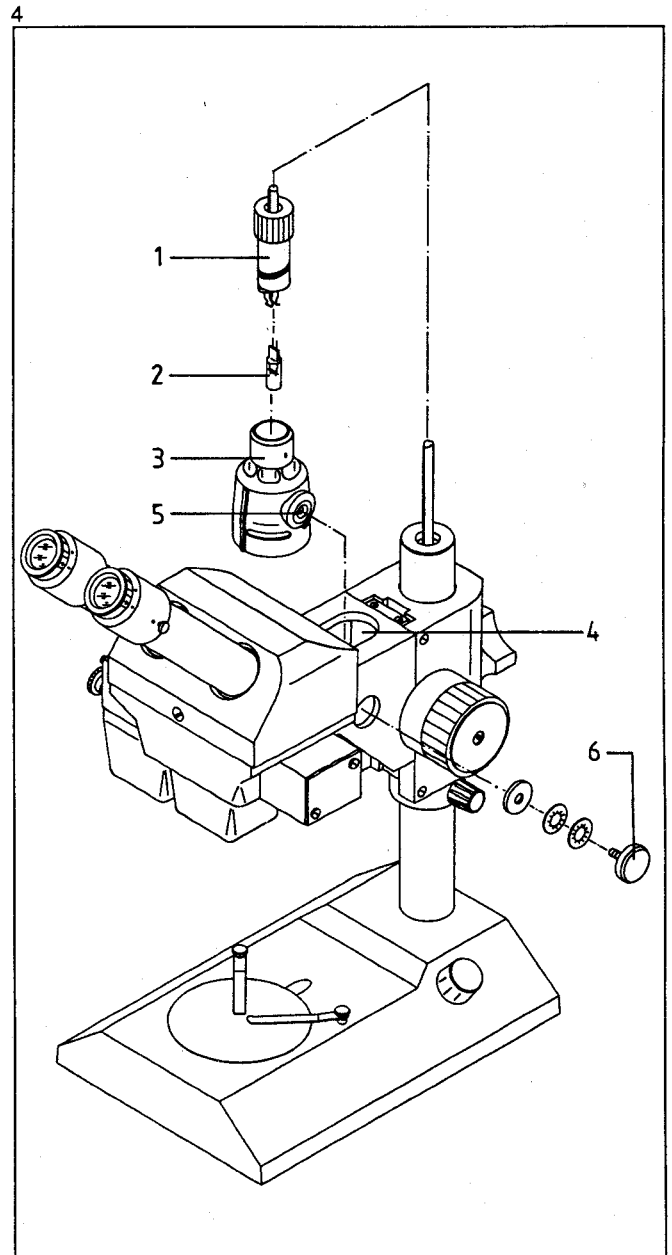
CB 12 conversion filter 46 78 50-9901

### **Installing the illuminator 10 into the microscope carrier:**

The illuminator 10 is integrated in the microscope carrier at the factory. For subsequent installation, proceed as follows:

- Insert hood of illuminator 10 (3) from below into the microscope carrier (4) in such a way that the threaded hole in the illuminator hood is aligned with the opening in the carrier.
- Hold illuminator and screw in screw (6) including washer and plate spring in such a way that the illuminator can still be tilted with ease.
- Hold protective cap of halogen bulb (2) and push bulb into lamp mount (1); do not touch bulb with your fingers.
- Introduce lamp mount with inserted bulb into the illuminator hood in such a way that the pin of the illuminator hood engages with recess.
- Check transformer voltage given on the power plate. If this corresponds to the line voltage present, connect transformer to line supply.
- To achieve the best possible illumination of the object, turn lamp mount (1) and tilt illuminator 10 as required.

At rated voltage, the color temperature of the 6 V 10 W halogen bulb is 2,900 °K.



## Illuminators with light guides

All illuminators with light guides must be connected to the KL 1500 electronic source (for 230 V: 41 70 75, for 115 V: 41 70 76).

For this, insert light guide in socket as far as it will go and tighten collet. The KL 1500 cold light source contains a 15V 150W halogen bulb.

(See also the instruction manual for the KL 1500 electronic.)

The following filters can be integrated in the KL 1500 electronic:

- Set of filters (yellow, blue, green and red) 41 70 75-9005
- Neutral density filter 0.25 (D) 41 70 75-9006
- Conversion filter (D) 41 70 75-9007

### Illuminator with light guide and focusing lens attachment

(45 51 45) (Fig. 5)

includes a flexible light guide (1) with rigid end and focusing attachment (2).

Also required mount for illuminator (45 51 44) (3).

#### **For mounting, proceed as follows:**

- Insert end of light guide in mount (45 51 44) (3).
- Mount focusing attachment to end of light guide.
- Insert mount including light guide in the microscope carrier from above. Secure with locking screw (4) and washer.

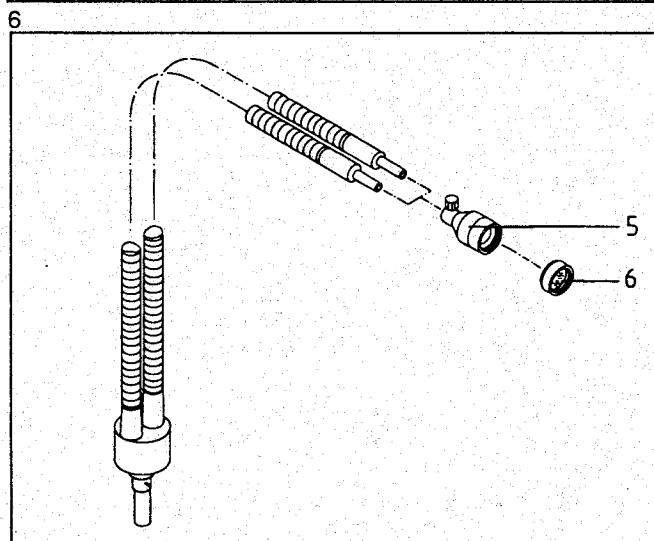
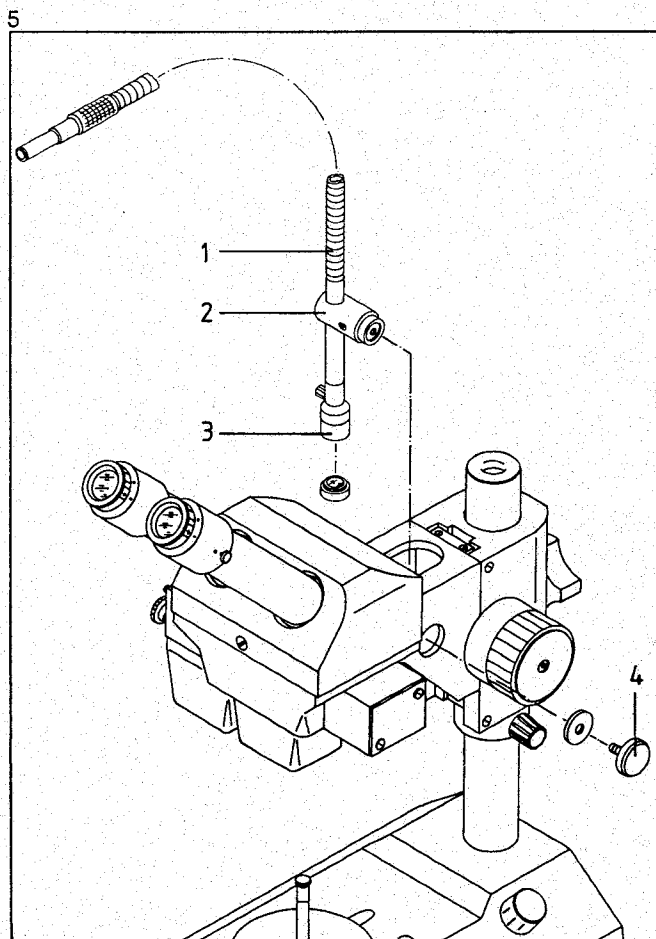
The light guide can be bent and focused for optimum illumination of the object.

### Two-armed swan-neck light guide (41 70 75-9901) (Fig 6)

Swan-neck light guides are self-supporting fiber bundles with a diameter of 4.5 mm and a length of 750 mm. They can be separately adjusted to obtain optimum illumination of the object. The following different attachments can be mounted on the light guide ends:

- Focusing lens attachment (5) 41 70 59-9901 for illumination with focused or defocused light
- Polarizing filter (6) 41 70 65

to eliminate surface reflections. For this insert a commercial polarizing filter in the holding ring M 35.5x0.5 (45 50 20) in front of the objective pair D (see 3 in Fig.2).

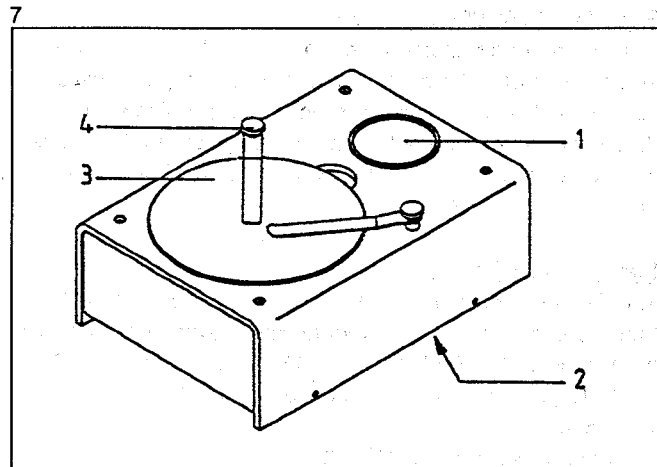


Transmitted-light attachment (45 51 36) (Fig. 7)

can be used in combination with the illuminator 10 (see page 9) or the illuminator with focusing lens attachment (45 51 45) (see page 10). For this, the halogen lamp or the light guide must be set to a vertical position to ensure that the light enters at (1). The transmitted-light attachment has two pins (2) for mounting on the stand base. The attachment is provided with a 84 mm dia. glass plate (3) and specimen clips (4).

Attachment 0.8 (43 52 13) (not shown)

replaces the 84 mm dia. glass plate (3) if a large object field must be illuminated using the objective pair D 0.8 or eyepieces 6.3x/30.



**Stand LO (45 51 05) (Fig. 8 top)**

has a permanently installed column with a diameter of 32 mm and a length of 260 mm (1). The securing ring (2) prevents inadvertent lowering of the stereomicroscope. The stand base (3) contains a removable 84 mm dia. stage plate (4) which is white on one side and black on the other. The specimen is held by stage clips (5).

**Stand L (Fig.8, below)**

The design of the stand L is the same as that of stand LO. Stand L also contains lamp mount Hal (6) and a transformer with brightness control (7) for 220 V (455110) or 120 V (455108) 50..60 Hz, with a power consumption of 18 VA.

Also required:

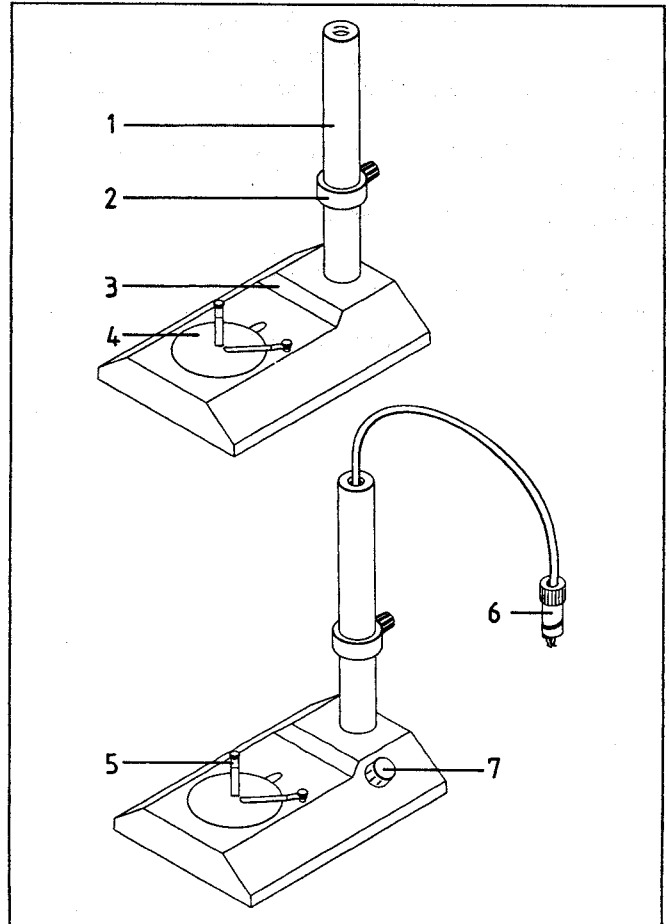
6 V 10 W halogen lamp (386108)

Power cable with safety plug (380137-6750) or with American flat plug (380137-6740).

The instrument is interference-free, short-circuit-proof and complies with VDE, IEC, CSA and UL standards.

The stand L is categorized as a safety class I, type B instrument.

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### Phototube DRC

The phototube DRC (455005) (5), to which a microscope camera, reflex camera (1) or TV camera can be mounted, is attached to the right of the stereomicroscope as follows:

- Loosen two screws and remove cover (8).
- Insert lateral tube of the phototube in opening (a pin is provided for positioning). Tighten two fastening screws (6) using offset screwdriver SW 3 supplied.

A mirror can be set in two positions using knob (7).

Knob (7) pushed in:

monocular observation and photography

Knob (7) pulled out: binocular observation.

The following cameras can be attached to the tube port:

- Reflex camera body (1) with T2 adapter (2) via adapter for SLR 2.5x (456005) (3), without eyepiece.

The image in the SLR camera can be focused through the camera viewfinder direct or via a format outline reticle in one of the foc. eyepieces.

For more details see manual G 42-406 (SLR cameras for stereomicroscopes).

- TV camera with standard C-mount via TV adapter 1.0x (456105) (4), without eyepiece, or TV adapter 0.5x (456106), without eyepiece.

For operation of microscope cameras, we refer to:

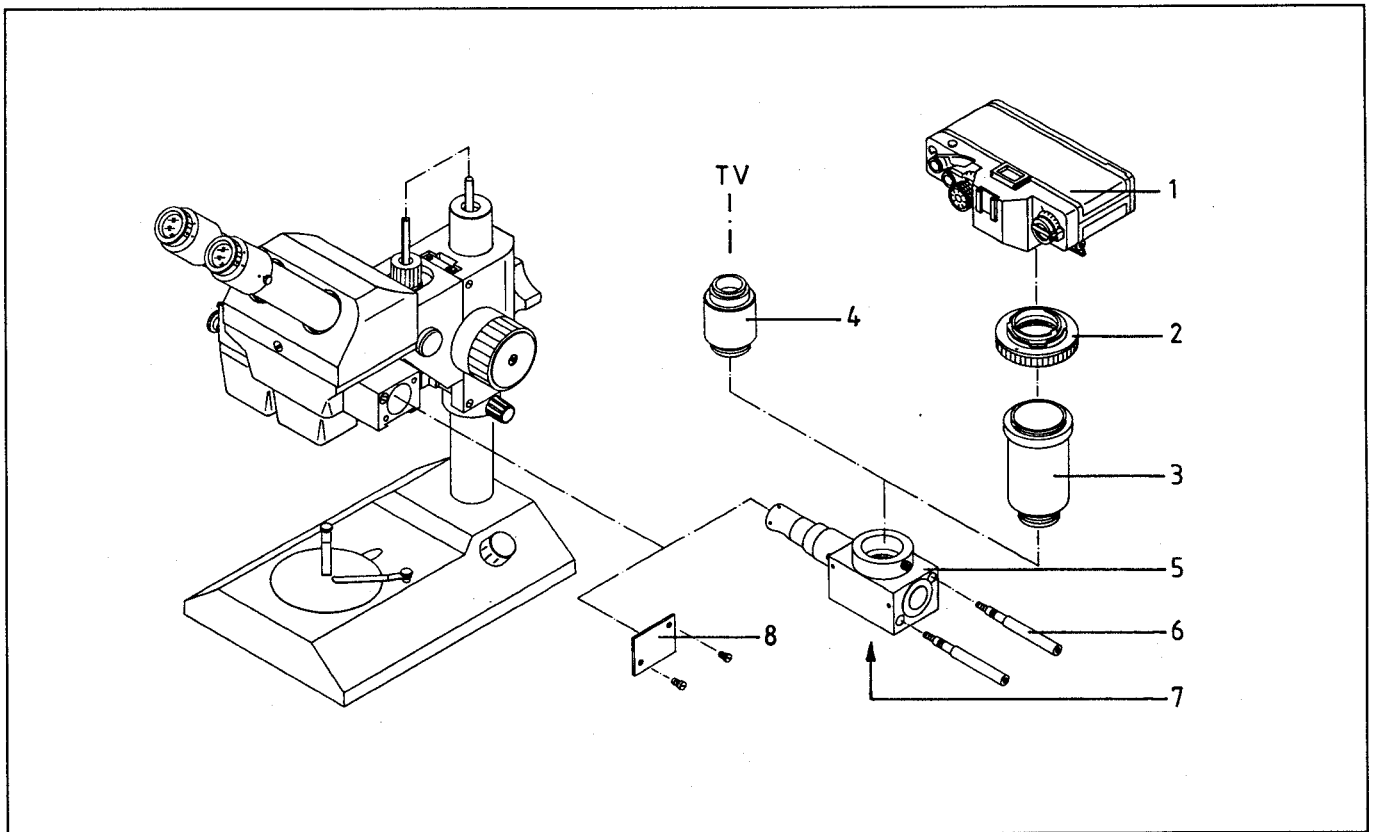
MC 100 Microscope Camera

G 42-401

MC 80 Microscope Camera

G 42-407

9



**Total magnification and object field**

The total magnification of the stereomicroscope is:

$$M_{\text{microscope}} = M_{\text{eyep.}} \times M_{\text{obj.}}$$

Meaning of abbreviations:

$M_{\text{eyep.}}$  = eyepiece magnification

$M_{\text{obj.}}$  = objective magnification

The visible object field in the stereomicroscope is:

$$\text{Object field dia [mm]} = \frac{\text{fvn}_{\text{eyep. [mm]}}}{M_{\text{obj.}}}$$

$\text{fvn}_{\text{eyep.}}$  = field of view number

## Protection against dust

If the instrument is not used for extended periods of time, cover it with a dust cover. Close tube openings with eyepieces or dummy plugs. When not in use, store eyepieces in cases to protect them against dust.

## Cleaning

of objective front lenses, eyelenses, bulbs and filters:

Remove dust using a soft brush or a puffer brush. If fingerprints on glass surfaces cannot be avoided, breathe on them and remove them immediately using a clean optics cleaning cloth.

Fixed dirt, mascara etc.:

remove by moistening an optics cleaning cloth with a mixture consisting of distilled water and some liquid detergent.

To finish cleaning, breathe lightly on the glass surface and wipe with a clean cloth. Remove fluff or dust using a clean brush or puffer brush.

Check the surface cleaned using a loupe (eyepiece upside down).

The following method is also frequently applied for cleaning optical surfaces:

Moisten a stick with cotton wool wrapped around it with pure alcohol and remove dirt.

## How to avoid fungus growth

In an extremely humid climate, it is advisable to store the optical components in an air-tight container with a desiccant (silica gel).

If this is not available, the container should be heated to 40-50°C using a filament bulb and the air circulated with a ventilator.

## Cleaning varnished surfaces on the stand

Fresh contamination (fingerprints etc.):

Dip cleaning cloth in a mixture of distilled water and some liquid detergent and remove dirt. Dry with a clean cloth.

## Dirt of long standing:

Moisten cloth with gasoline, remove dirt and dry with a clean cloth. Make sure that the solvents do not seep into mechanical guideways as they remove the film of grease necessary for smooth operation. Do not grease or oil any controls or knobs.

