Inverted microscope IM

Operating Instructions

G 41 - 124 - e

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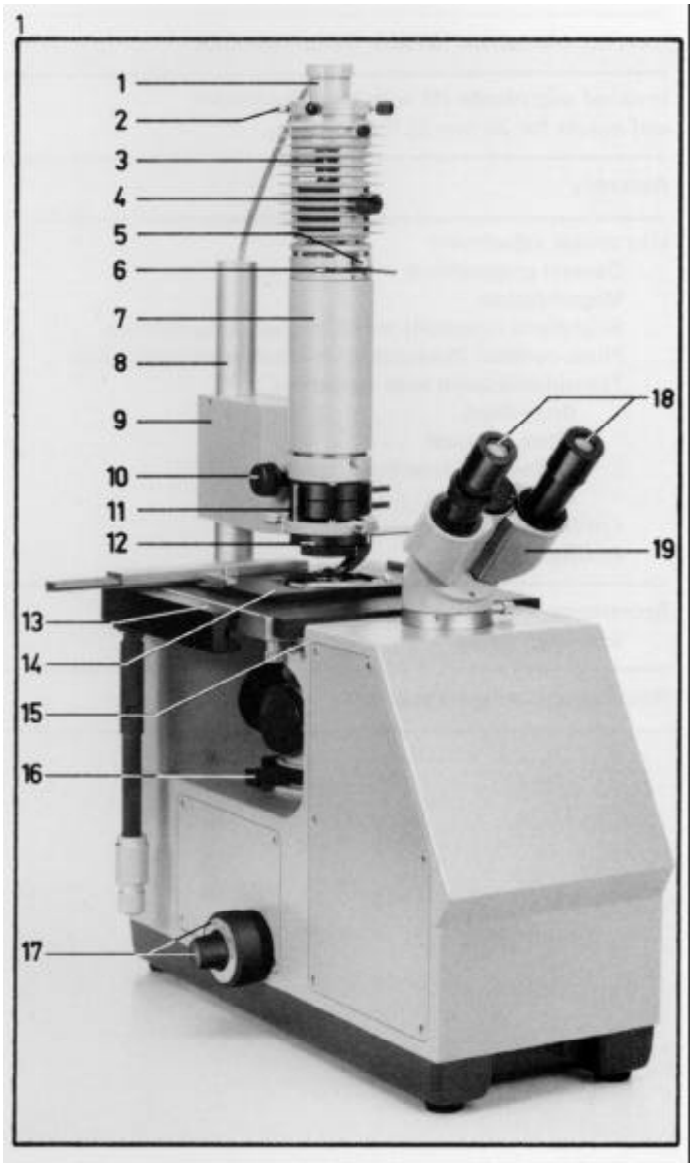
Specifications subject to change

1. Lamp socket 60/I (46 80 15) *) with 12 V 60 W filament lamp (38 00 18-2520)
2. Clamping screw for lamp socket
3. Lamp housing 60 with lamp condenser (46 72 57) (see operating instructions G 41-305)
4. Knob for ground glass
5. Clamping screw for illuminator 60
6. Intermediate piece with iris diaphragm (46 72 27)
7. Spacer tube with auxiliary lens (47 56 38)
8. Column to mount transilluminator carrier IM
9. Transilluminator carrier IM (47 17 52)
10. Illuminator focusing control
11. Two filter holders for 32 mm dia. filters (the lower filter holder accepts a polarizer)
12. Condenser
13. Stage plate 211 x 230 mm (47 17 40) with attachable mechanical stage IM (47 17 45)
14. Holding frame for specimen slide (47 17 49)
15. Nosepiece with transmitted-light objectives (not visible)
16. Dummy slider or analyzer (47 36 68)
17. Coarse/fine focusing controls acting on the nosepiece
18. CPL high-eyepoint, wide-angle eyepiece 10x/18 Br**) (46 40 22-9902) and CPL high-eyepoint wide-angle focusing eyepiece 10x/18 Br foc***) (46 40 23-9902)
19. Binocular tube D 1x (46 30 06)

*) The 6- or 10-digit numbers in brackets are ordering numbers.

**) Eyepiece for eyeglass wearers which offers them the same wide field of view the non-eyeglass wearer enjoys. Folding cups are recommended for observation by non-eyeglass wearers.

***) Eyepiece with focusing eyelens

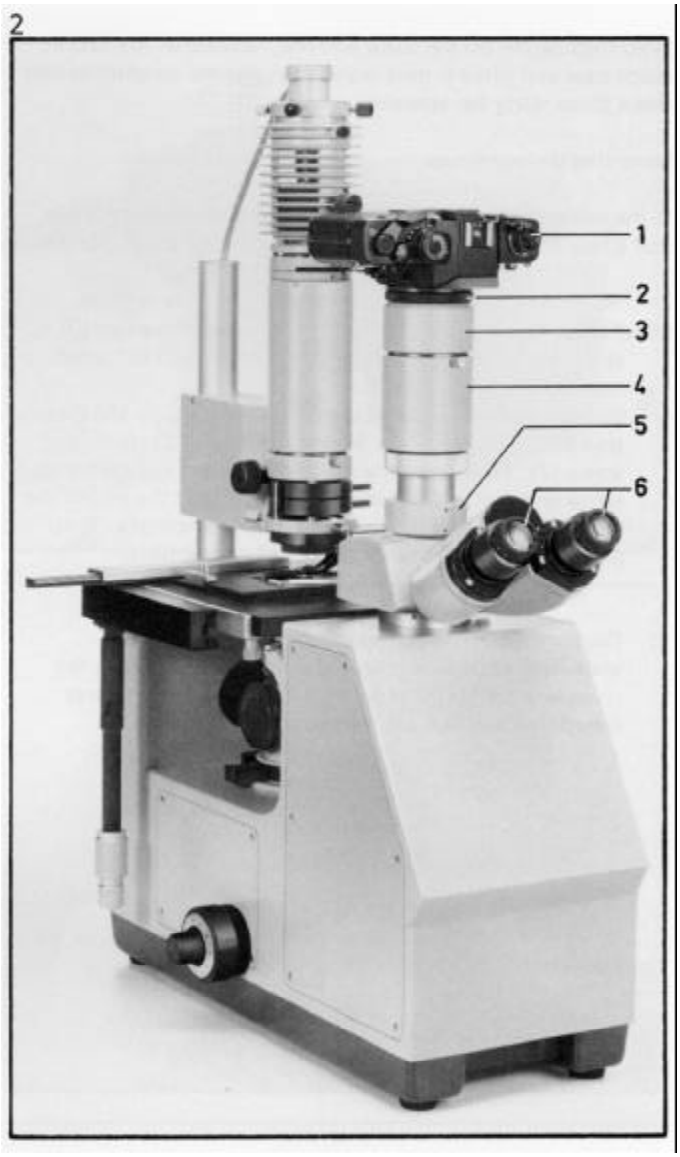


Inverted microscope IM with transilluminator and mount for 35 mm SLR camera

1. Camera, we recommend Contax RTS II Quartz (41 61 65-9901) with winder W3 (41 61 66-9901)
2. T2 adapter for Contax (47 60 89)
3. Objective 63 in T2 mount (47 60 29)
4. Adapter ring for 40 mm tubes (47 60 05)
5. Binocular phototube 30° with sliding prism (47 30 28)
6. Two CPL high-eyepoint, wide-angle focusing eyepieces 10x/18 Br foc (46 40 23-9902)

The photographic equipment also includes photo reticle MC (47 60 21) for the focusing eyepiece, Kpl wide-angle eyepiece 10x/20 Br (46 40 44-9901) which is inserted in the phototube part of the phototube, and cable release (41 61 67) (not shown in the illustration).

The MC 63 attachment camera is available for large-format or 35 mm photomicrography with fully automatic or semi-automatic exposure control, compensation of reciprocity failure and motorized film advance (35 mm only).
A further valuable accessory is the sensor-controlled computer flash. See separate operating instructions for full description of these accessories, which are listed on p. 22 of this manual.



Assembly

Hold microscope on the front and rear recesses of the microscope base and place it on a worktable; unpack accessories and make them ready for assembly.

Mounting the nosepiece

If the nosepiece*) is mounted already, remove dummy plugs and screw in objectives. To mount or exchange the nosepiece:

a) Hold nosepiece so that clamping screw (**1**) is in front.
b) Put on the nosepiece with its front dovetail surface (**5**) and then lower surface (**6**). Pin (**2**) and notch (**3**) avoid slipping of the nosepiece.
c) Slide nosepiece to the left as far as it will go (in the direction of the arrow in Fig. **5**) and secure it with clamping screw (**7**). To remove the nosepiece, loosen the clamping screw and pull out the spring locking pin at the end of the clamping screw, or unscrew the latter completely. Then proceed in the reverse sequence of the assembly.

*) Caution: To avoid damage to the optics (**4**) of the wide-field nosepiece engraved 0.8x (47 17 11) rack the nosepiece carrier up as far as it will go with the coarse focusing control of the microscope.

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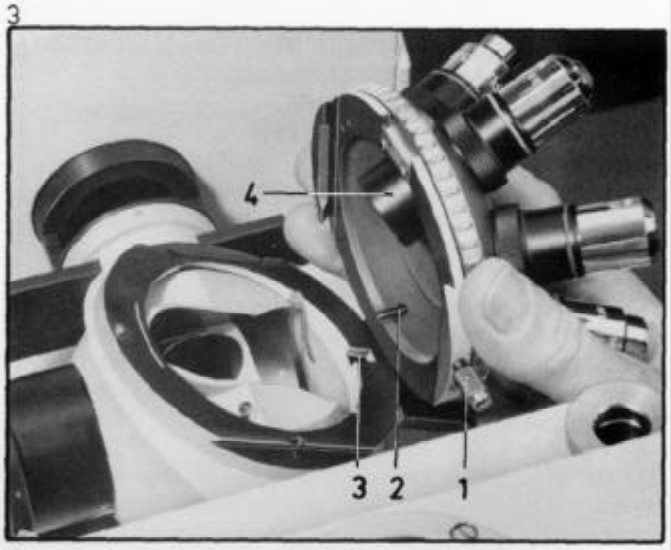

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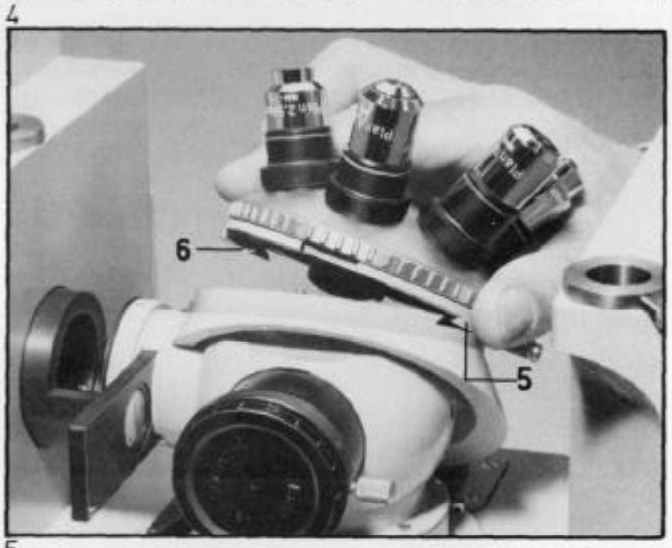

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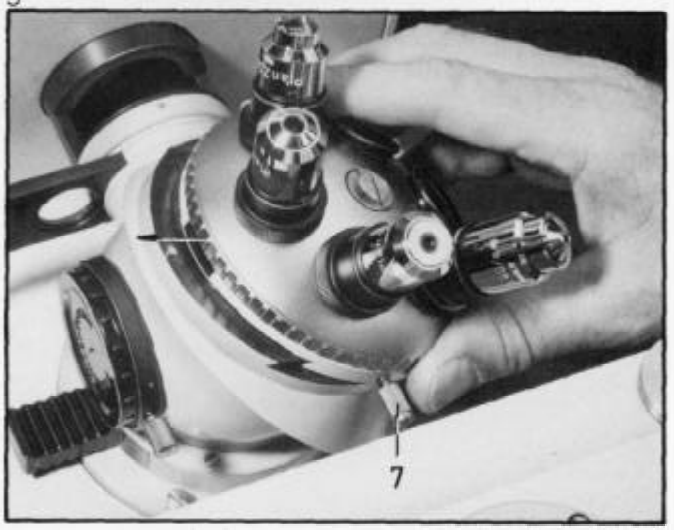
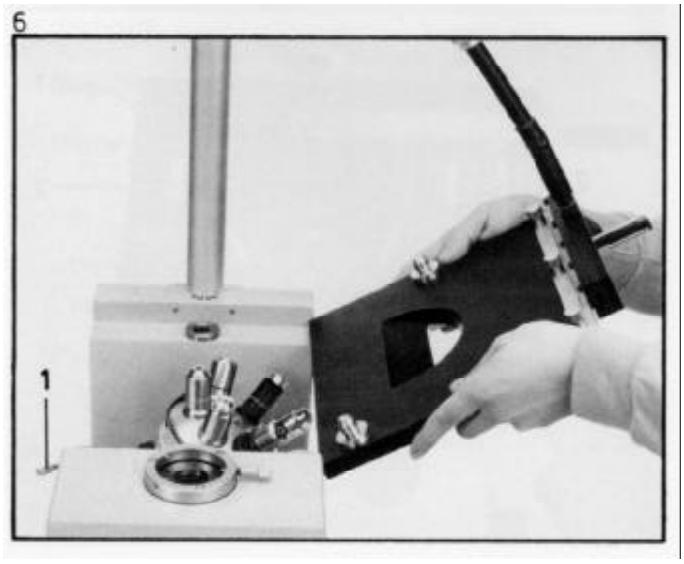


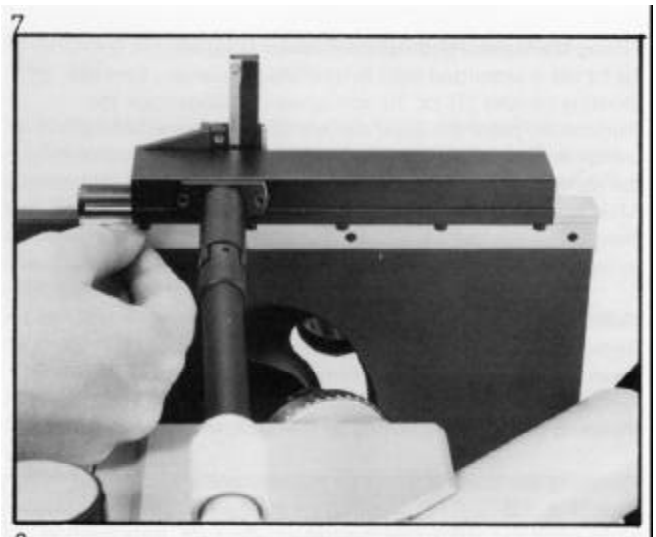
Fitting the specimen stage (Fig. 6)
Let the 3 pins of the specimen stage (here: stage plate 211 x 230 mm with attachable stage IM) engage the corresponding holes of the microscope stand. Tighten clamping screw (**1**), alignment is made automatically.
An attachable mechanical stage IM must be mounted before mounting the stage plate. Place the attachable mechanical stage on the left edge of the stage plate and secure it with 3 knurled screws (Fig. **7**) (for more details see p. 19).

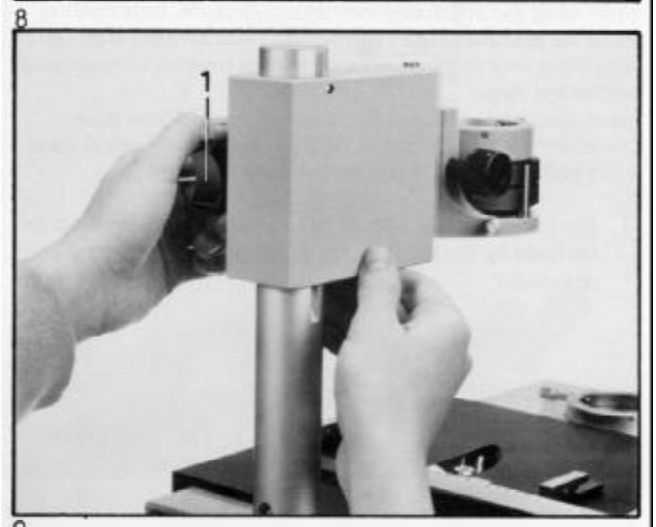
Mounting the illuminator carrier (Fig. 8)
Slide carrier with its pin in the notch of the column down as far as it will go and secure it with clamping screw (**1**).

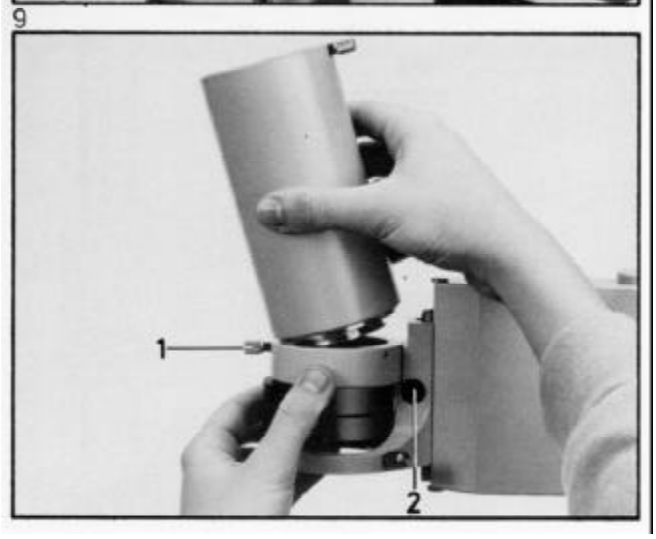
Assembling the illuminator parts (Fig. 9)
Please refer to Fig. 1 for this assembly.
With the ring dovetails of the part to be assembled – spacer tube with auxiliary lens, intermediate piece with iris diaphragm, illuminator – press down the spring bolt of the assembled part, let the part snap in and secure with clamping screw (**1**).

After fitting the filament lamp in its socket (see operating instructions G 41-305 of the microscope illuminator 60) remove fingerprints on the lamp bulb which would otherwise burn in.
Before inserting the filament lamp in illuminator 60 swing in ground glass by means of the black slotted knob on the lamp dissipator, then slide the lamp socket completely in, lift it slightly and secure it. The ground glass can now be moved freely.
The stiffness of the illuminator focusing control can be adjusted with an Allen wrench on screw (**2**).









Fitting the transmitted-light condenser (Fig. 10)
To fit the transmitted-light brightfield condenser, turn the focusing control (**1**) ca. 10 mm upwards. Hinge back the illuminator, place the taper surface of the transmitted-light condenser's ring dovetails to the illuminator bottom, and let the condenser's ring dovetails engage the spring bolt.
After pressing down the spring bolt the condenser is pressed from below against the illuminator bottom and secured with spring pin (**2**).

Mounting the binocular tube (Fig. 11)
Remove protective cap and loosen clamping screw (**1**)*). Press down the spring bolt of the clamping screw with the sloping surface down (dovetails) and put on the dovetails. Tighten clamping screw before letting go the tube. Insert eyepieces.

Mounting the holding frame on the attachable mechanical stage (Fig. 12)
When using the attachable mechanical stage IM, slide holding frame for specimen slide (**1**) from the front beneath clips (**2**) until these snap in. Paste scale stickers to recesses of attachable mechanical stage.
Insert specimen in the holding frame with coverglass down. The holding frame remains on the attachable mechanical stage when exchanging the specimen (for details see p. 19).

*) For the phototube (47 30 28) the clamping screw must be replaced by the longer screw which is supplied with the phototube.

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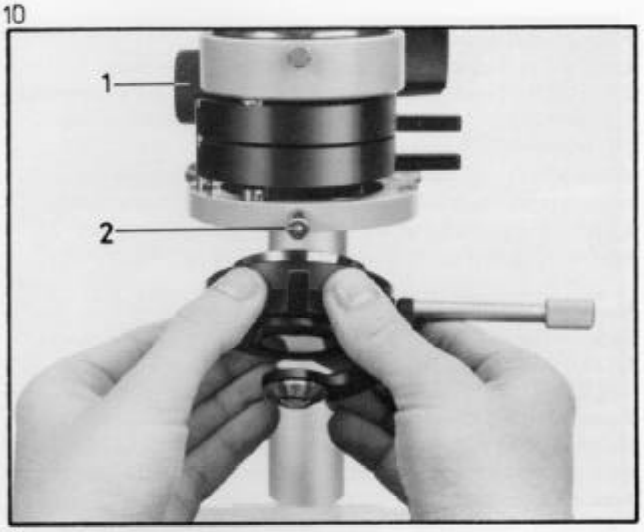

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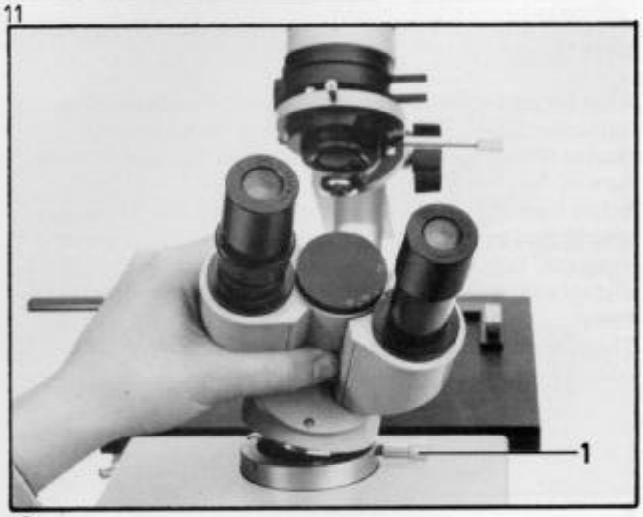

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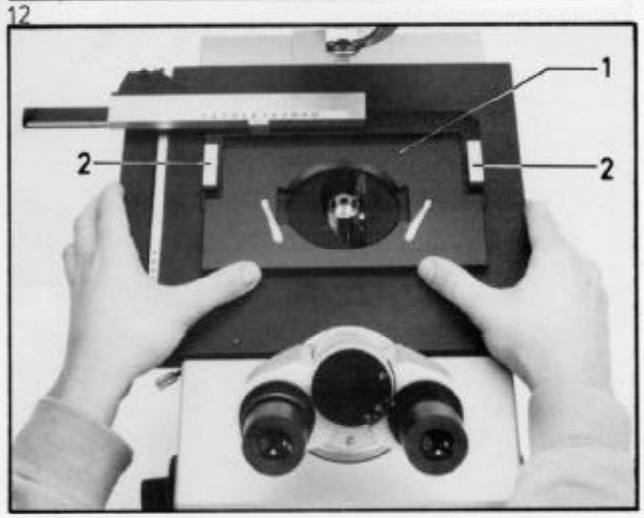

General preparations

- Place specimen slide on the stage with coverglass down. Specimens in dishes, flasks and plates are observed through the bottom of the vessel.
- Turn in a 10x or 16x objective.
- Insert eyepieces in binocular tube. Insert a focusing eyepiece in the fixed tube.
- Connect illuminator 60 (**4**) by means of transformer.
- To evenly illuminate the objective exit pupil: exchange one eyepiece in the binocular tube for the centering telescope (46 48 22-9902); the objective pupil will be seen enlarged (or in normal size through the empty tube). Focus the pupil image by shifting the eyelens.
- Open iris diaphragm (**6**) or condenser diaphragm.
- Center lamp filament in the pupil: swing ground glass out of beam path with knob (**5**), loosen clamping screw (**3**) of lamp socket (**1**), and move the socket up and down until the pupil image is evenly covered by the lamp filament. Clamp lamp socket and center lamp filament with screws (**2**), if necessary by loosening opposite screws and tightening them again after centering with screws (**2**).
- Replace the centering telescope again by the eyepiece.
- Fold the binocular tube to adjust it to the user's PD.
- Look through the right-hand eyepiece and focus on the specimen with the coarse/fine focusing control on the microscope base. If this eyepiece is a focusing eyepiece, set eyepiece scale to 0 and focus on the specimen. Adjust the sharpness for the left eye by the left adjustable tube.
- A large field is imaged by low-power objectives (6.3x and less); for full illumination swing out condenser front lens or unscrew it and open condenser diaphragm; the iris diaphragm (**6**) will then act as contrast (aperture) diaphragm.

Magnification

Microscope magnification = M_{obj} x F x M_{eyep}

e.g. 400 = 40 x 0.8 x 12.5

where:

M_{obj} = objective magnification
F = nosepiece factor
M_{eyep} = eyepiece magnification

Brightfield illumination for long working distance (Fig. 14)

To study specimens in chambers and flasks, free space is needed between specimen plane and illuminator, which is achieved by omitting condenser and spacer tube with auxiliary lens. The aperture of the light bundle emitted by the microscope illuminator is generally smaller than that of the objective. The illuminator should therefore be directly above the objective. When the intermediate piece with iris diaphragm is used, this diaphragm has the function of a contrast aperture diaphragm.

For the adjustment of brightfield illumination see the opposite chapter "General preparations".

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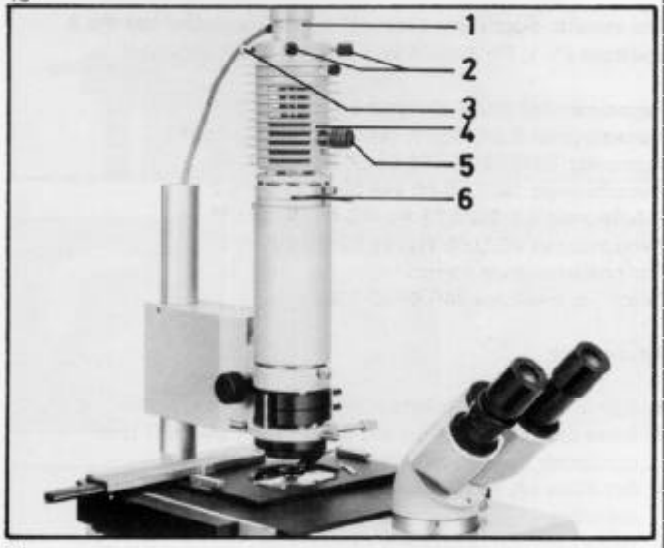

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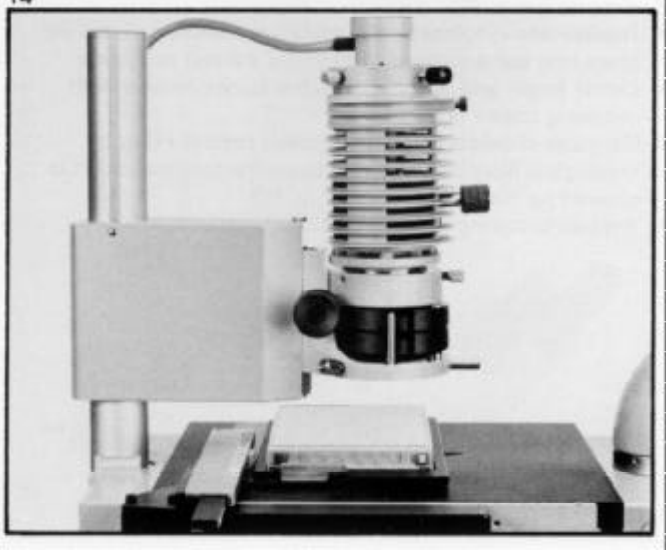

Phase-contrast illumination for long working distance

If brightfield and phase-contrast illumination are frequently used together for long working distances we recommend the use of the LD condenser.

The equipment is that for brightfield illumination for long working distance, without intermediate piece with iris diaphragm, but with LD condenser 0.3/70 (46 52 24) (5) which is fitted to the dovetails at the bottom of the transilluminator carrier and secured with spring bolt (3).

The annular diaphragms Ph 1 (47 57 15) and/or (47 57 16) can be fitted in the same manner to the transilluminator carrier instead of the LD condenser 0.3/70.

The annular-diaphragm slider (4) of the condenser has the 3 positions Ph 1, Ph 2 and free passage (middle position).

Recommended phase-contrast objectives:
Planachromat 6.3/0.16 Ph (46 30 11-9902) for Ph 1
Achromat 10/0.22 Ph (46 04 01-9904) for Ph 1
Planachromat 16/0.35 Ph (46 05 11) for Ph 2
F-Achromat LD 20/0.25 Ph (46 06 06) for Ph 1
Planachromat 40/0.65 Ph (46 07 11 for Ph 2
For phase-contrast adjustment:
Centering telescope (46 48 22-9902)

Adjustment

- Screw Ph objectives into nosepiece
- Move illuminator up on the column and secure it (the condenser back focal length is 70 mm)
- Set slider (4) to position Ph 1 or Ph 2, depending on the objective
- Adjust normal brightfield illumination for long working distance (see p. 9)
- Replace one eyepiece by the centering telescope. Focus on phase ring and annular diaphragm by shifting its eyelens.
- Center bright and dark rings relative to one another with centering screws (2).
- Vary size of bright ring with focusing control (1) or by moving the illuminator up and down the column until it is covered by the black ring (see Fig. 16).
- Replace centering telescope again by eyepiece.

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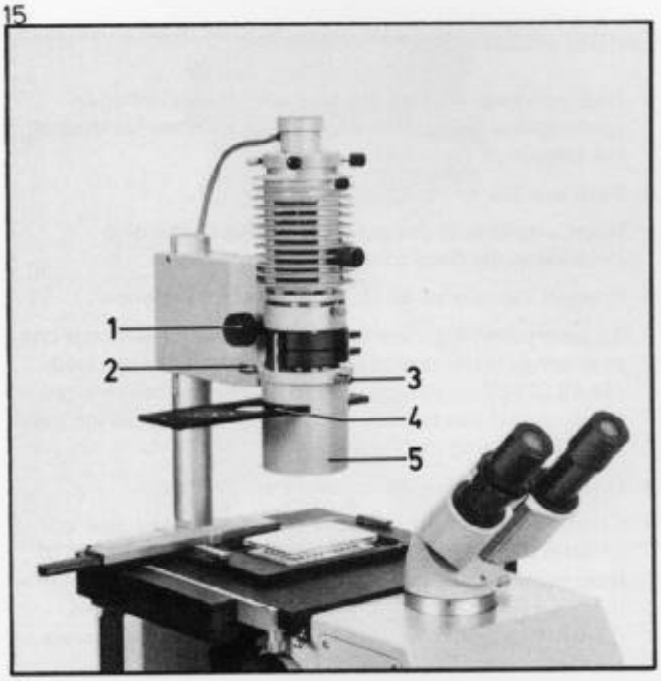

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Transillumination with condenser

The specimen is illuminated with the required illuminating aperture by the condenser. Only with a condenser will the resolving power of high-power objectives be fully utilized. Köhler illumination described below produces a uniformly illuminated object field, brilliant images without reflections and glare, and ensures optimum specimen protection.

Brightfield (Fig. 17)

Equipment
Condenser (**6**), spacer tube with auxiliary lens (**3**), intermediate piece with iris diaphragm (**2**), illuminator 60 (**1**).

Adjustment
Make the general preparations described on p. 9

- Turn control (**4**) ca. 10 mm upwards
- Close luminous field diaphragm (**2**)
- Produce a sharp image of the luminous field diaphragm in the specimen plane by lifting the condenser which is directly above the specimen with control (**4**) until the diaphragm image is sharp (Fig. 18).
- Roughly center luminous field diaphragm in the field of view with two centering screws (**5**).
- Open luminous field diaphragm almost to the edge of the field of view, re-center, if necessary, and open it further until it just disappears beyond the edge of the field of view (Fig. 20).
- Adjust image contrast with condenser diaphragm (**7**). Open condenser diaphragm until ca. 2/3 of the objective exit pupil are illuminated.
- Set the dial of special condensers (Ph, DIC) to "I" (iris). The aperture diaphragm (5, Fig. 21) can be centered with knurled control (2, Fig. 21) and lever (3, Fig. 21).

Phase contrast (Fig. 21)

Equipment as for brightfield illumination, plus:
Ph objectives, phase-contrast condenser, centering telescope (46 48 22), green filter VG 9/32x3 (46 78 05).

Adjustment

- Turn in objective, e.g. Planachromat 16/0.35 Ph 2
- Adjust specimen in brightfield with Ph condenser (**1**) in position "I" following the instructions on p. 9. Then turn condenser dial to phase ring "2" (**4**).
- Replace one eyepiece in the binocular tube by a centering telescope and adjust its eyelens until bright and dark rings are in focus.
- With knob (**2**) and lever (**3**) of the condenser Ph adjust the bright ring until it is completely covered by the black ring (see Fig. 16).
- Exchange the centering telescope again for the eyepiece.

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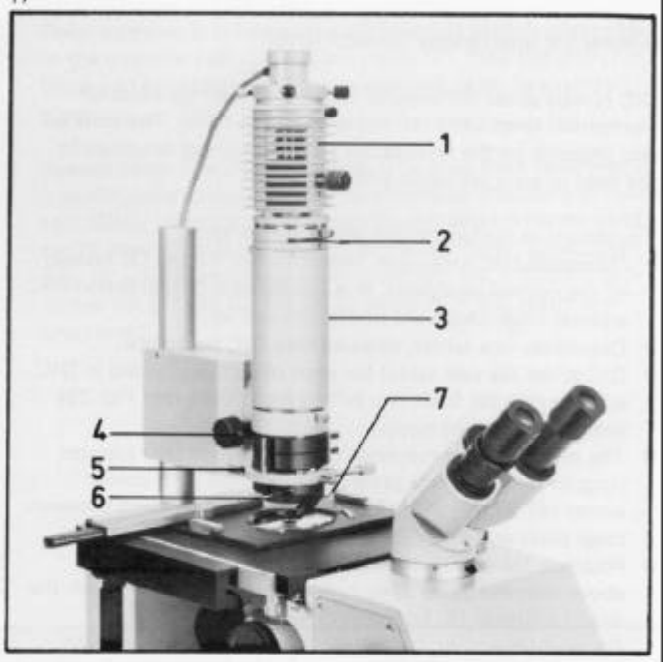

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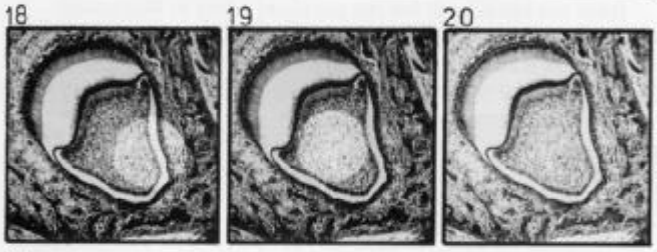

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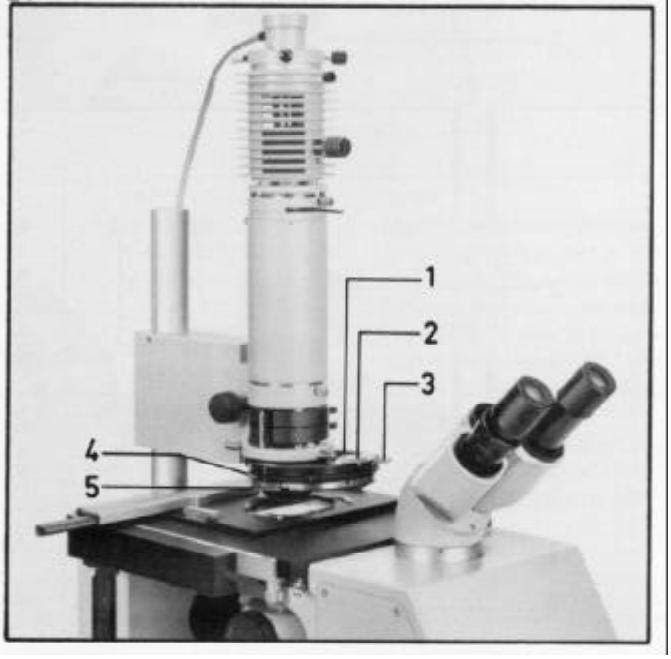

Differential interference contrast (DIC)

DIC reveals phase differences in the specimen (product of mechanical length and refractive index) as relief. The contrast also depends on the orientation of the observed structure in the field of view (azimuth effect).

Equipment as for brightfield illumination, plus:

- Quintuple DIC nosepiece, factor 1x (47 17 14) (**3**) instead of the normal nosepiece. It is equipped with 5 oriented DIC adapter rings which are firmly screwed in.
- Objectives (see table), screwed into DIC nosepiece.
- DIC slider (**5**) (see table) for each objective inserted in DIC adapter ring (**6**) from rear left to front right (see Fig. 23) with the engraving down.
- The objectives are mounted on 11 mm high DIC adapter rings so that the stage plate must be lifted by 3 spacer pieces (47 17 29) (**13**) (Fig. 24) which are screwed between stage plate and pin.
- Polarizer IM (47 36 14) (**10**) (Fig. 25) is screwed from above into the lower filter holder and then crossed with the slid-in analyzer (**8**) (extinction position).
  Remove objectives, DIC slider, eyepieces and condenser from the beam path for the purpose, swing in illuminator and turn polarizer from beneath (Fig. 26) until extinction position is achieved.
- Mount DIC-Ph-H condenser (**11**) or single DIC condenser on transilluminator carrier.
- Analyzer with exchangeable lambda plate (47 36 68) (**8**); to completely pull out the analyzer slider, push lever (**7**) out of its click-stop positon.
- It is recommended to exchange illuminator (**1**) for a high-power light source (e.g. high-power microscope illuminator 100), which is fitted to the intermediate piece with iris diaphragm (**9**) via deflecting mirror for 2 illuminators (46 70 48-9901) (see Fig. 28, p. 14).
- For the exact coordination of DIC condenser, DIC auxiliary prisms of the condenser, objective and DIC slider and objective see operating instructions G 41-215/I. Mount the single condenser so that the engraving S is facing the observer.
  Use binocular tube 45 (47 30 11) instead of binocular tube D 1 (47 30 06).

Adjustment

Adjust specimen in brightfield following the instructions on p. 9, thereby turning control (**2**) to topmost position.
Let DIC condenser engage in position "I" (iris), remove DIC slider (**5**), polarizer (**10**) and analyzer (**8**) from the beam path. Close the aperture diaphragm, because unstained specimens would otherwise be invisible.

- Turn in the DIC prism of the condenser which corresponds to the objective (condenser turret in position I or II, single condenser provided with its prism and its iris diaphragm open), polarizer (**10**) and analyzer (**8**) must be in the beam path.
- After insertion in the beam path adjust contrast by turning the screw of the DIC slider (**4**), and adjust it to the structures which are of interest.

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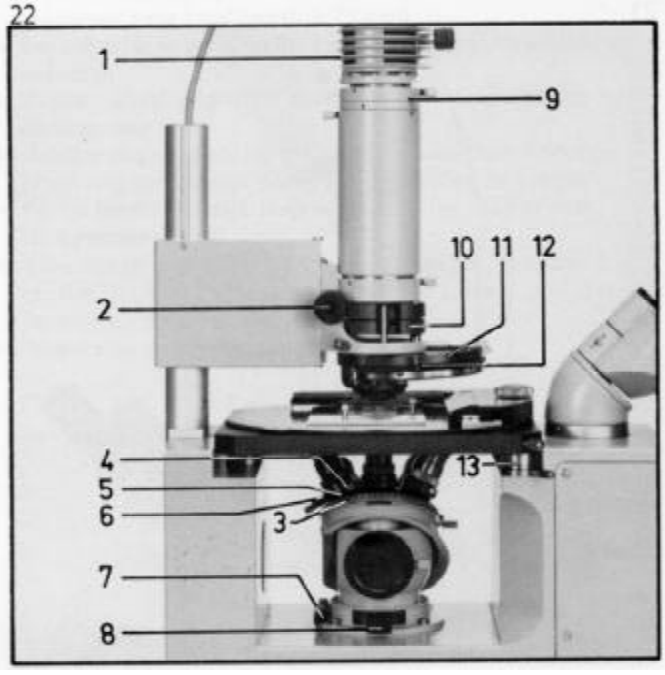

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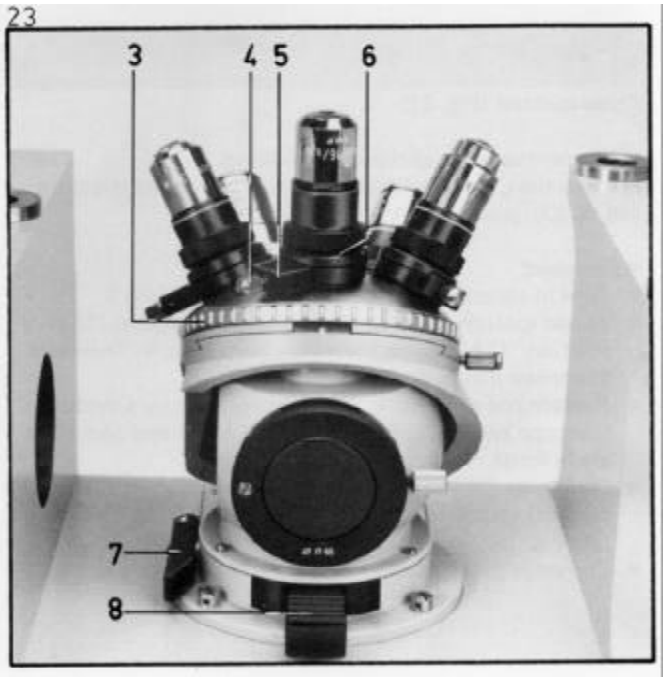

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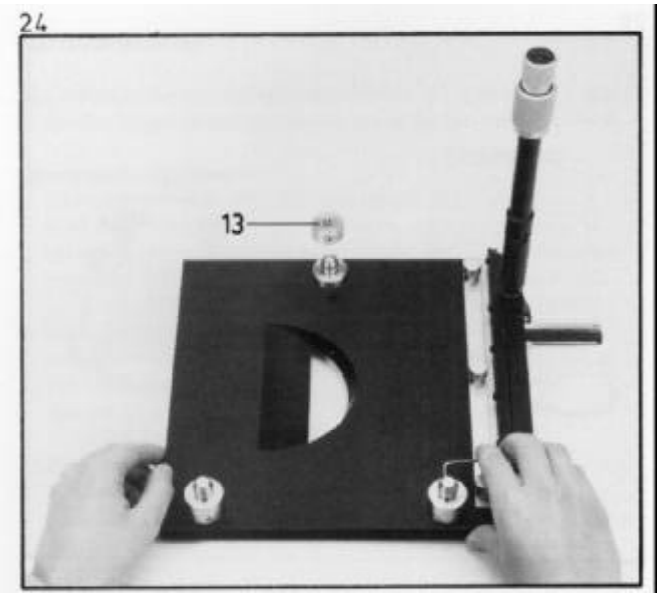

Color contrast is produced by insertion of lambda plate (**14**) in the analyzer (**15**). Press down lever (**7**), take out analyzer slider and plug lambda plate on analyzer, push in analyzer slider.

Special note: The DIC condenser with long back focal length is particularly suited to study specimens in chambers or micro test plates, which requires a long illumination distance (max. ca. 22 mm). This is achieved with Planachromat objectives 6.3, 16, and 40 and good image contrast, and a DIC-Ph condenser IV Z/7 (46 52 73) set to position II and front lens unscrewed.

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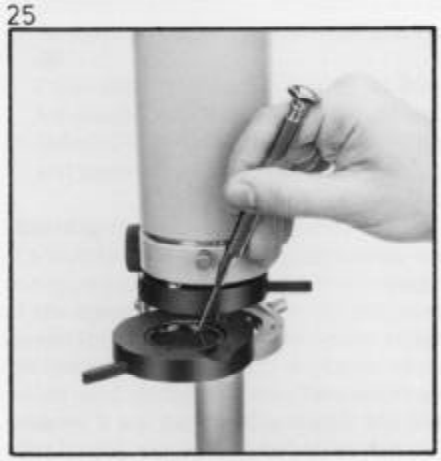

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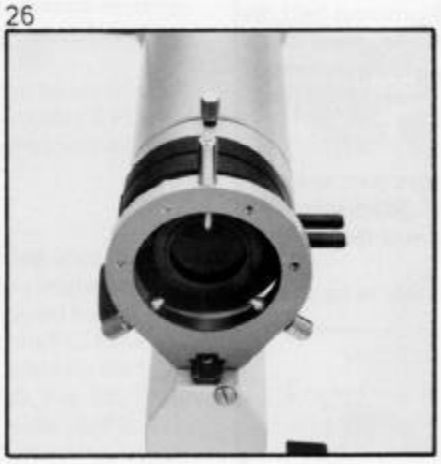

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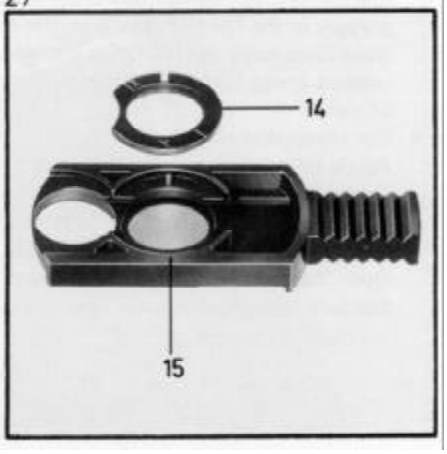

Objective	DIC slider Cat. No	DIC condenser IV Z/7, aperture 0.63 (46 52 73) in position	DIC condenser IV Z, aperture 1.4 (46 52 85) in position	Notes
Plan 6.3/0.16	47 45 31	I	I*	The DIC condenser prisms are correctly oriented in the turret when the white dot is opposite the alignment pin. *The field of view is incompletely illuminated Condenser position "I" (iris) for brightfield only Condenser position 2 or 3 for objectives Ph 2 or Ph 3. Condenser position III for special prisms.
Plan 16/0.35	47 45 51	I	I	
Plan-Neofluar 16/0.5 W oil	46 45 55	I	I	
Plan-Neofluar 25/0.8 W oil	47 45 60	II	II	
LD-Plan 40/0.60 corr	47 45 64	II	II	
Plan 40/0.65	47 45 71	II	II	
Planapo 63/1.40 oil	47 45 81	II	II	
Plan 100/1.25 oil	47 45 91	II	II	

Darkfield

Same equipment as for brightfield, only that a darkfield condenser is used instead of the brightfield condenser. It is recommended to use a higher-power light source (illuminator 100 fitted to intermediate tube with iris diaphragm via deflecting mirror for 2 illuminators (46 70 48-9901), see Fig. 28). The darkfield condenser illuminates the specimen with a hollow cone of rays whose inner aperture must be larger than that of the objective. Only the light diffracted by the specimen reaches the objective, the image background remains dark.

Adjustment
Center condenser V/Z (46 52 77) in brightfield, set turret to D, immerse, or use other darkfield condenser.

- Turn in objective, e. g. Planachromat 16 and close luminous field diaphragm of the intermediate piece with iris diaphragm.
- Adjust the height of the condenser with the focusing control until the light spot of the image is small, bright, and sharply defined. Center this image of the luminous field diaphragm in the field of view with the centering screws on the transilluminator carrier. Open luminous field diaphragm until its image just disappears beyond the edge of the field of view.
- For immersion objectives:
  Apply immersion oil bubble-free to the coverglass and put on specimen with the oil drop down. Close iris diaphragm of objective 100, focus the image, and correct the centration of the luminous field diaphragm.
  Open the iris diaphragm of the objective only so far that the dark background is not brightened.

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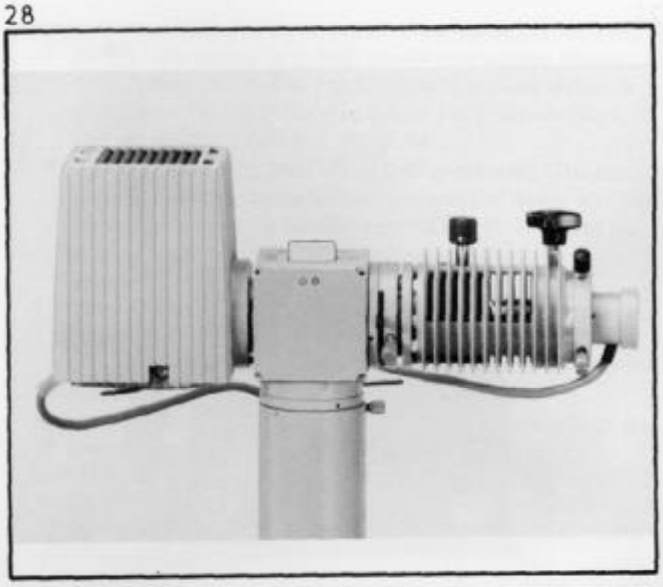

Epi-fluorescence

An inverted transmitted-light microscope IM is converted into an epi-fluorescence microscope by the epi-fluorescence system.

Fluorescence equipment

1 Microscope illuminator 100 (see operating instructions G 41-310). The HBO 50 W high-pressure mercury lamp as exciting light source gives good results with all fluorescence methods. A 12 V 100 W halogen filament lamp is available for FITC excitation.

2 Illumination attachment (47 17 61) for epi-fluorescence with centering (**3**), focusing (**4**) and adjusting (**5**) devices of the luminous field diaphragm.

6 Shutter and filter slider with the positions:
1: no light passage
2: red-attenuating filter BG 38
3: free light passage (filter holder which also accepts a polarizer)

7 Double reflector housing 2 FI allows the change between two types of fluorescence excitation by sliding the reflector housing in and out. To exchange a double reflector housing for another one with other filter sets loosen clamping screw (**8**).
Other filter sets (see brochure K 41-005) can be combined for specific applications. Double reflector housing 2 FI (46 63 01) combines exciter filter, chromatic beam splitter and barrier filter in a functional unit.

Mounting the fluorescence system

If a fluorescence system is subsequently supplied, slide the illumination attachment from behind through the circular recess of the stand after having removed the cover lid and keep the screws for fixing the epi-illumination attachment FL. Remove the black lid at the back of the turret carrier. Slide up the lever which controls the luminous field diaphragm (5, Fig. 29), unscrew it and pull out the shutter and filter slider (6, Fig. 29) after having removed a small screw. Secure illumination attachment at the rear by means of three socket head screws, screw on lever for luminous-field-diaphragm control, insert shutter and filter slider and provide with screw. Mount the microscope illuminator 100 (Fig. 30) on the illumination attachment. If the port is covered by a lid, loosen clamping screw (**1**) and remove lid. Press down the spring bolt of the clamping screw with the sloping surface of the dovetails and put on the ring dovetails at a small angle. Tighten the clamping screw before letting go the illuminator.
Insert reflector housing 2 FI in opening (Fig. 31) beneath nosepiece: loosen clamping screw, slide reflector housing into sliding sleeve as far as it will go (the pin must engage the notch) and secure with clamping screw.

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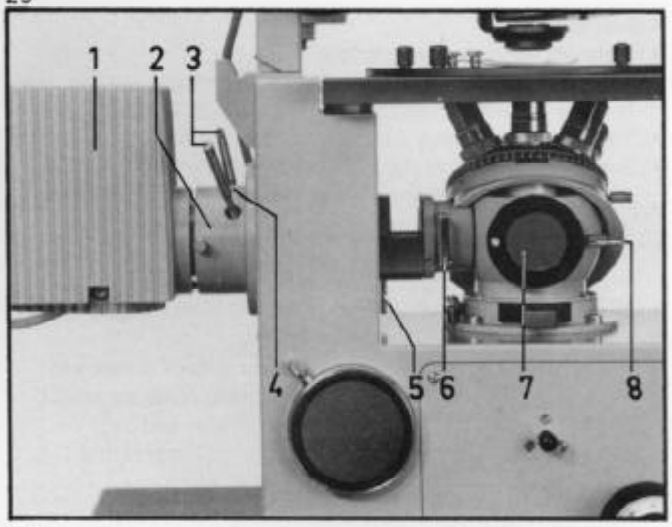

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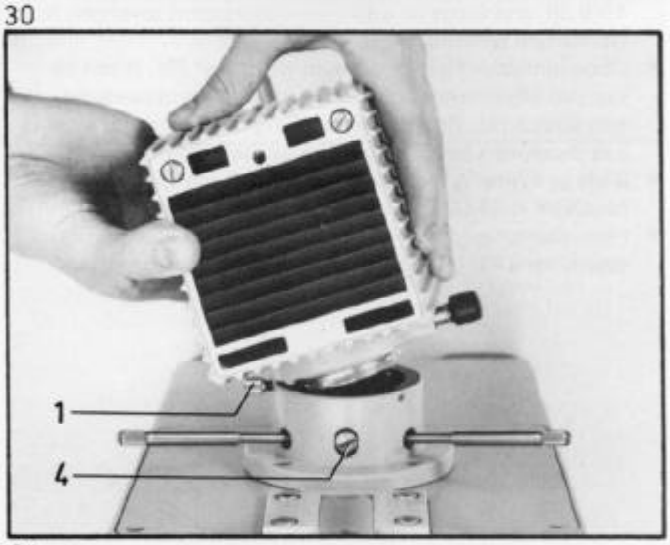

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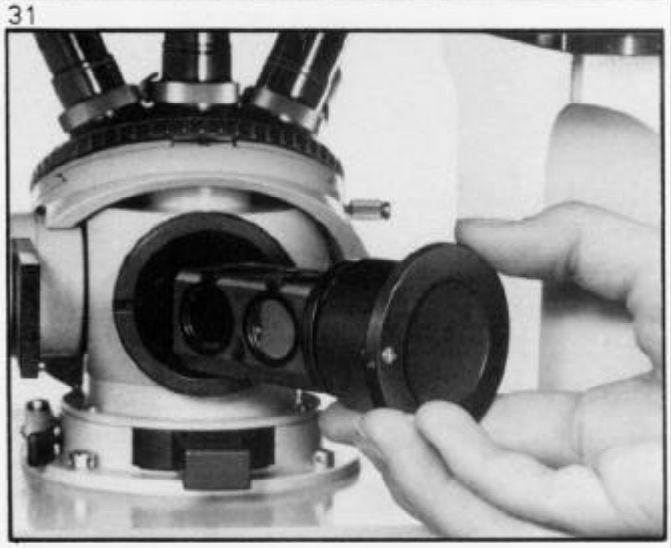

Adjustment

- Connect lamp to power supply and switch on. The HBO 50 W high-pressure mercury lamp ignites automatically and is ready for adjustment after 2 – 3 minutes warm-up time.
- Turn in filter set, e.g. for green or light-blue excitation.
- Set slider (**6**) to free light passage. Unscrew one objective from the nosepiece and turn in the empty position.
  Place a mat glass or transparent paper on the specimen stage. Center the reducing plate of the stage, if necessary. Improve the sharpness of the light-source images by closing the luminous field diaphragm. Focus the light-source images by turning the lamp condenser knob.
  Form a centered image on the ground glass of direct and reflected light-source images next to each other by adjusting the lamp socket vertically and laterally, and by focusing and tilting the concave mirror (see operating instructions G 41-310) (Fig. 33).
- Turn in a low-power objective, preferably a Neofluar 10/0.30, and focus on a strongly fluorescent specimen (e.g. HE-stained section).
- Close luminous field diaphragm with lever (**5**). It can be focused after loosening slotted screw (**4**), and centered with two screws (**3**). Open luminous field diaphragm (**5**) until it just disappears beyond the edge of the field of view.
- Slide in a filter set which is suitable for the specimen (see brochure K 41-005) with the reflector housing.
- Heat-absorption filter KG 1 is contained in illumination attachment FL (47 17 61).

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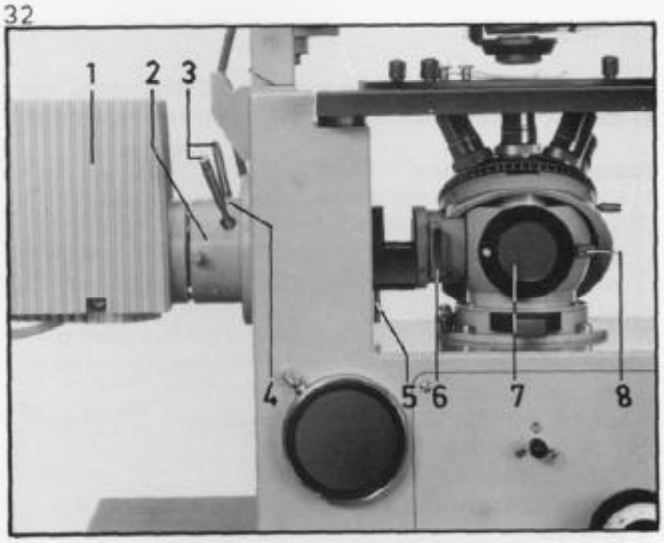

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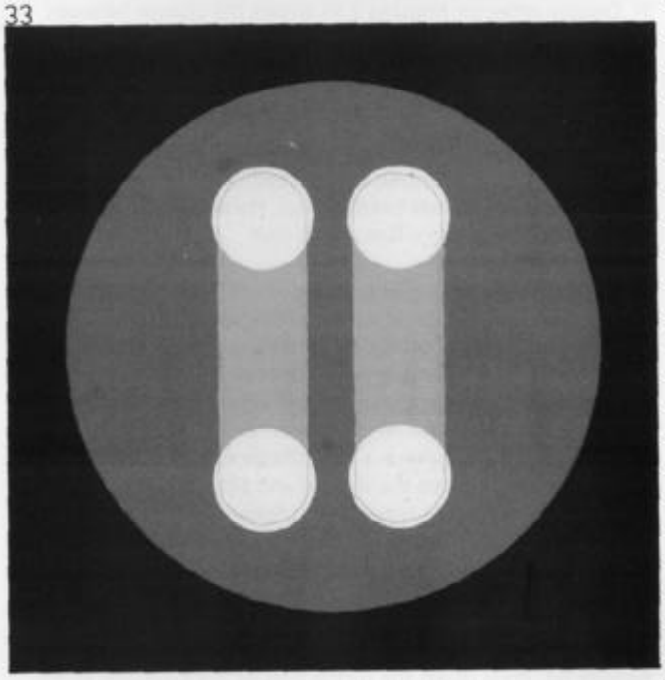
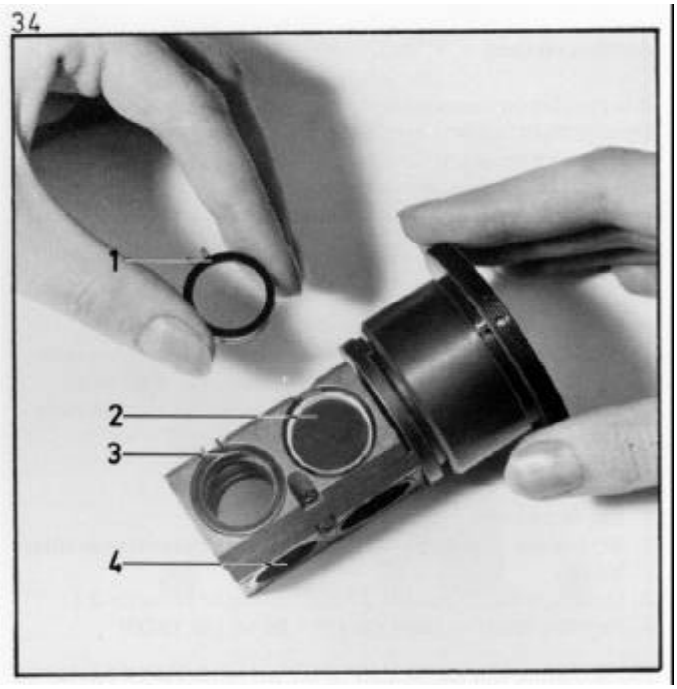


Exciter filter, chromatic beam splitter and barrier filter contained in the double reflector housing 2 FI are exchangeable. The 18 mm dia. exciter (**2**) and barrier (**4**) filters are kept in place by plastic rings with pins (**3**). Max. 6 mm thick exciter filters and max. 4 mm thick barrier filters fit into the filter holder. Thinner filters are supplied with spacer rings.

For filter exchange press both pins out of the notches and pull the plastic ring (**3**) out of the recess. Filter and spacer ring, if any, are now loosely contained in the filter holder and can be easily exchanged for other items. The seating edge of thicker filters should be on the outside. If the filter has too much play, place a spacer ring between filter and retaining ring. The 22 mm dia. chromatic beam splitters are loose in the holders and accessible after removing two screws. Because the highly sensitive interference layers of the chromatic beam splitters are unprotected on the top surface, these items should not be exchanged.

Additional exciter filters can be loosely inserted in the filter holder of the illumination attachment for epi-fluorescence. Use holding ring (46 72 52) for 32 mm dia. filters (e.g. polarizer), and, in addition, adapter ring (46 78 93) for 18 mm dia. filters.

It is possible to use epi-fluorescence in conjunction with transmitted-light methods like phase contrast, darkfield or DIC. All transmitted-light condensers can be used for the purpose.



Antiflex method

It is possible to increase the image contrast of weakly reflecting objects in incident light with the Antiflex method. In cell cultures, for example, part of the light is reflected by the cell bottom, part by the top surface of the culture vessel bottom. The superposition of these reflections results in characteristic interferences.

Such interferences can be shown with high contrast only if disturbing reflections by lens surfaces are eliminated, especially in the objective. This is achieved by objectives with rotary λ/4 crystal plates between front lens and specimen. Objective and specimen must in addition be arranged between crossed polarizing filters.

Equipment

1 Epi-fluorescence system
2 32 mm dia. polarizing filter (47 36 00) for insertion in filter holder
3 Double reflector HD (47 17 65) instead of reflector 2 FI
4 Antiflex-Neofluar objective 63/1.25 oil (42 18 00)

For mounting and adjustment of the epi-illumination attachment see p. 15. The polarizers must be crossed: remove objective with DIC slider and eyepiece from the beam path and turn polarizer in filter holder until maximum extinction is achieved.

Insert objective and eyepiece again and remove analyzer from the beam path.
Immerse objective and focus on the specimen with coarse/fine focusing control.

Pull out DIC slider of objective. Leave HD reflector inserted.
Insert in the filter holder bandpass interference filter green 546 nm 32x3 (46 78 07) and – next to the light source – reflecting heat-absorption filter 32x2 (46 78 32).
(Bandpass interference filter green is required for the high-pressure mercury lamp of the illuminator 100).
Slide analyzer again into beam path.
Turn objective (front part containing λ/4 plate) until maximum brightness of the field of view is achieved.

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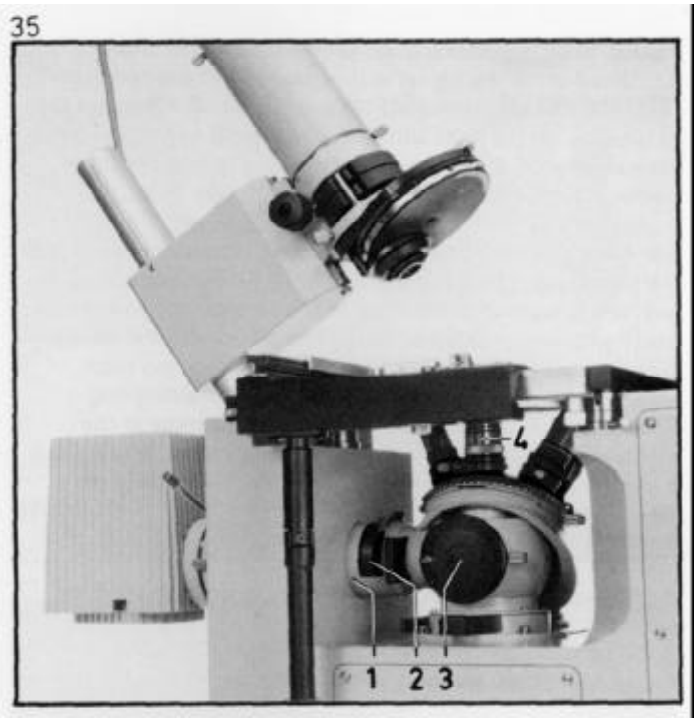

Accessories

Specimen stages

211 x 230 mm stage plate (47 17 40)

plus, optionally:
Holding frame for specimen slides
Holding frame M with scale stickers for:
micro titer plates 96 positions (47 17 46) (Fig. 36)
micro test plates 60, 72 or 120 positions (47 17 47) (Fig. 37)
Phase-contrast examination
Hamax plates 60 positions (e.g. for HLA determinations in fluorescence) (47 17 48)
multi dishes (47 17 44)

Two clips to hold flasks (47 12 45) can be slid on the stage plate from the front and secured with clamping screws on both sides (see Fig. 38, stage 300 x 230 mm).

It is possible to subsequently equip stage plate 211 x 230 mm with an attachable mechanical stage IM (47 17 45): put attachable mechanical stage on left edge of stage and secure it with three knurled screws as shown and described on p. 7.

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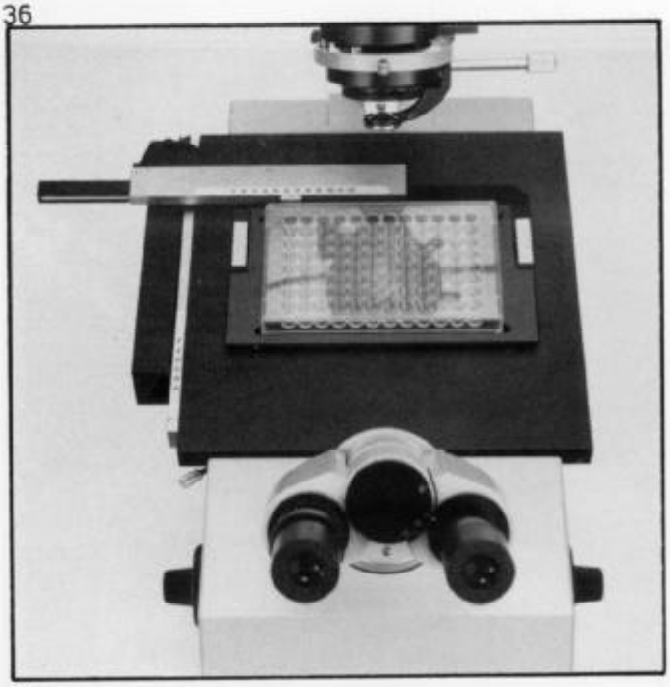

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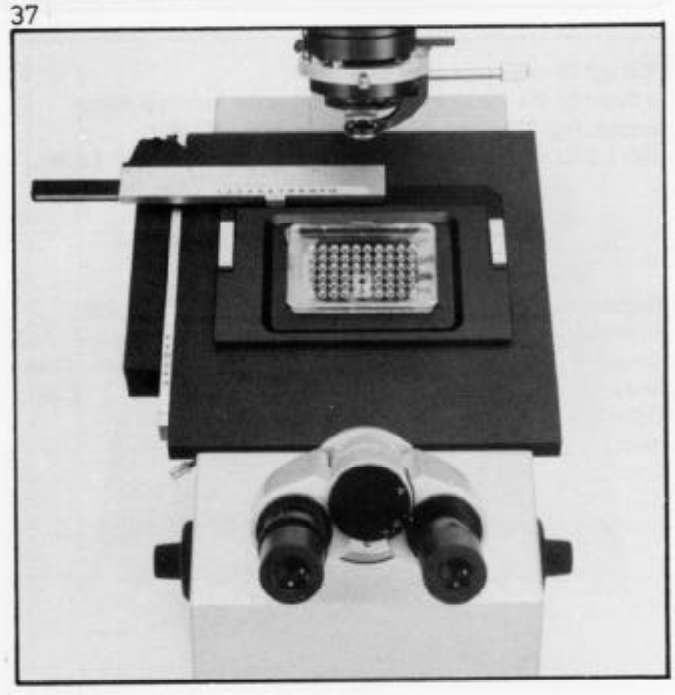

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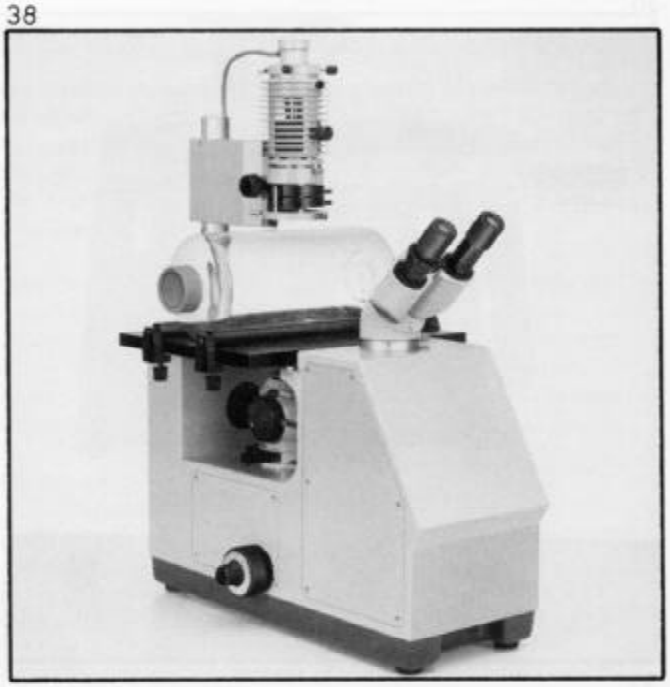

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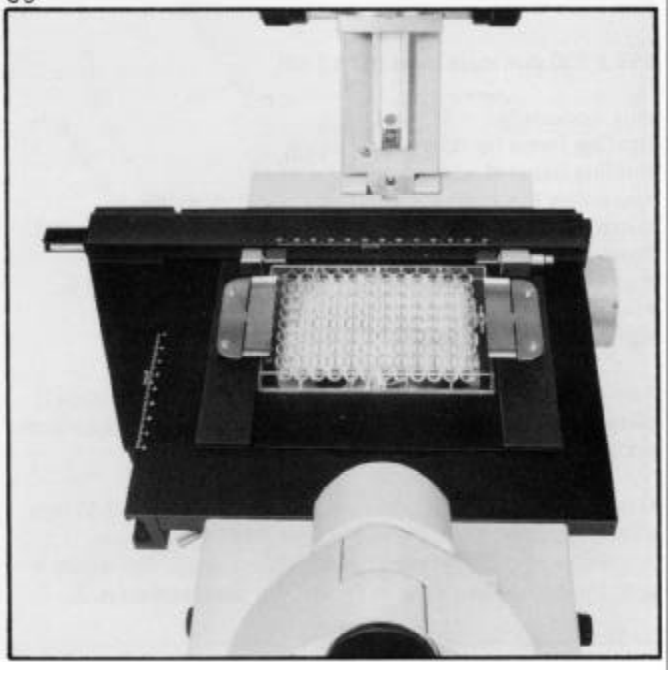

300 x 230 mm stage plate (47 17 41)
is fitted to the IM like the other stages for inverted microscopes. Fig. 38 shows inverted microscope IM with 300 x 230 mm stage plate and two clips for flasks (47 12 36).

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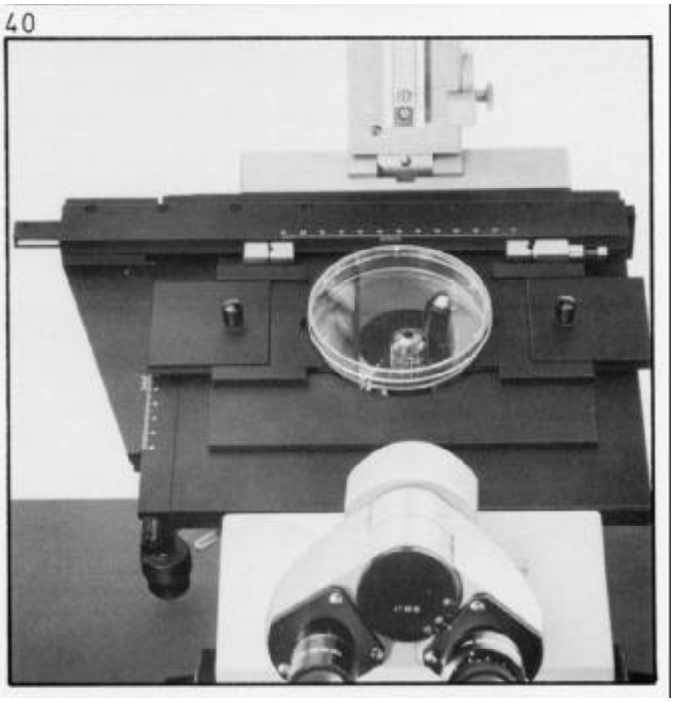

Rectangular mechanical stage (71 x 110 mm) (47 17 24)
with low-mounted control.
Specimen holder (47 17 30) for 76 mm specimen slides. It can be exchanged for the holder for plankton chambers (47 17 34).
Other specimen holders which can be used with this mechanical stage:
Specimen holder (47 17 33) for micro titer plates 82 x 127 mm (Fig. 39)
Specimen holder (47 17 38) for Petri dishes (Fig. 40).

Glide stage Z, including reducing plates D = 24 mm and D = 48 mm (47 17 22) (Figs. 41 and 42)
The glide stage insert (**1**) fits into the opening of the basic stage plate together with one of the reducing plates (**2**) (the diaphragm size depends on the size of the coverglasses used). Centering with centering screws (**3**), clamping with clamping screw (**4**).

For further accessories (e.g. TV equipment) see separate literature.

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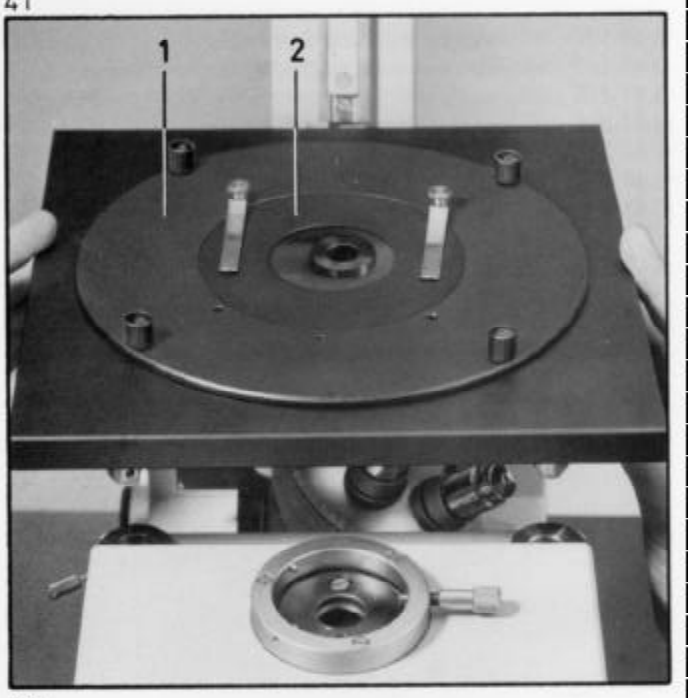

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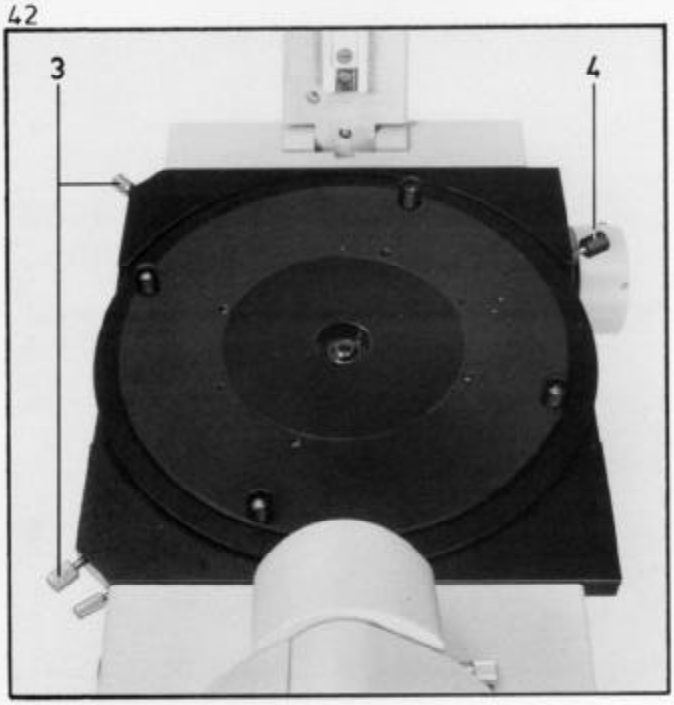

Relevant operating instructions

G 41-100	Microscopy from the very beginning
G 41-102	Maintenance and cleaning of the microscope
G 41-215	DIC equipment with transmitted-light condensers
G 41-305	Microscope illuminator 60
G 41-310	Microscope illuminator 100
G 41-331	Micro flash III
G 41-415	MC 63 attachment camera on microscopes and DRC stereomicroscopes
G 41-416	35 mm cameras with TTL meter on stereomicroscopes and microscopes
G 41-417	MC 63 A attachment camera
G 41-815	Photometer attachment SF