MC 63 A Photo-micrographic camera

for microscopes and stereomicroscopes

Operating Instructions

G 41 - 417 - e

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Fig 1: MC 63 A photomicrographic camera for 35 mm film on SR stereomicroscope

1 Camera body M 35 (47 60 72-9901)[1)]
2 Basic body with shutter M (47 60 12-9901)[2)]
3 Sensor ME (47 60 13-9901)
4 10x eyepieces with focusing eyelens for observation. The eyepiece fitted in the picture in the right-hand tube contains a photographic reticle with double crosslines (47 40 67) indicating the image section covered by the camera. The reticle is aligned by turning the eyepiece parallel with the camera body, and the eyepiece then secured with clamping ring (5).
5 Eyepiece clamping ring (46 49 12)
6 Binocular tube (47 50 89)
7 Intermediate phototube S (47 50 83) containing a 10x eyepiece for photomicrography
8 Pushrod to change between
a) photomicrography/monocular observation
b) binocular observation
9 Double iris diaphragm to increase the sharpness
10 Exposure control MA (47 74 20-9901)

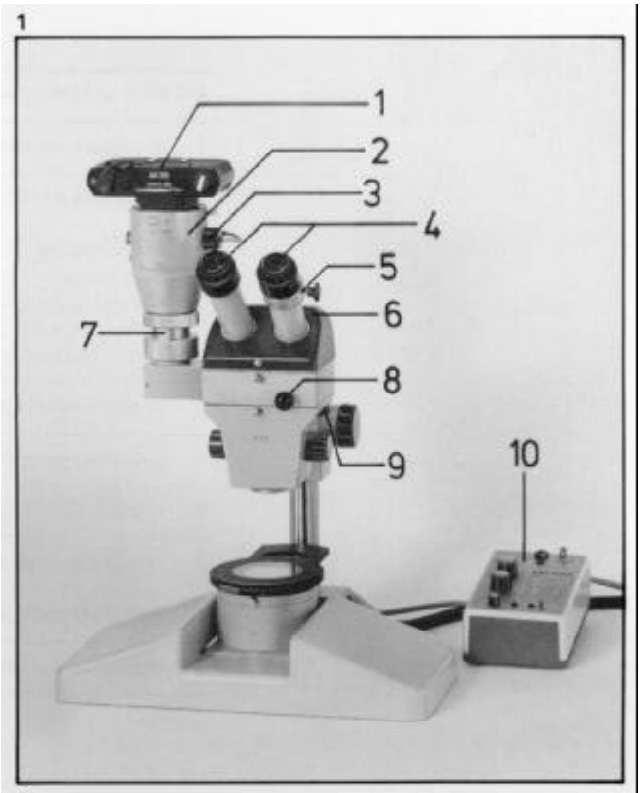
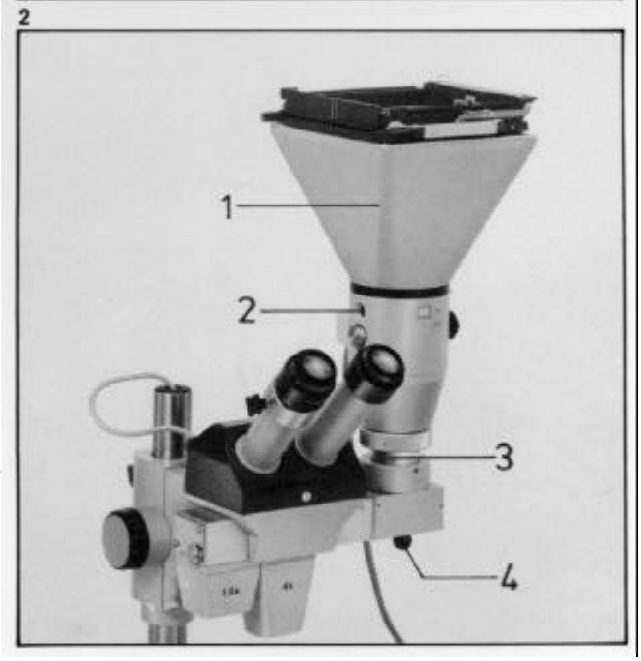


Fig. 2: MC 63 A photomicrographic camera for large formats 9x12 cm/4x5" on DRC stereomicroscope

1 Camera body 4x5" (47 60 57)
2 Flash contact (X contact)
3 DRC phototube (47 50 84) containing a 10x eyepiece for photomicrography
4 Pushrod to change between
a) photomicrography/monocular observation
b) binocular observation



1) Winder M (47 60 79) for motorized film advance can be used with camera body M 35, provided exposure control MA (47 74 20-9901) is available.
2) The 6- or 10-digit figures in brackets are ordering numbers which are imprinted on the modules.

Fig. 3: MC 63 A photomicrographic camera for 35 mm film on Standard microscope

1 Camera body M 35 (47 60 72-9901)
2 Basic body with shutter M (47 60 12-9901)
3 Binocular phototube 30° (47 30 38) with sliding prism and phototube containing a 10x or 16x eyepiece
4 Kpl wide-angle eyepieces with focusing eyelens. One eyepiece is provided with an orienting screw and contains the photographic reticle M (47 60 21) indicating the image section covered by the camera.
5 Pushrod for beam splitter
pushed in: 100 % of the light for observation
pulled out: 20 % of the light for observation and 80 % for photomicrography
6 Telescope attachment (46 48 31). The focus can be checked easier when the telescope is mounted on the eyepiece with reticle.
7 Exposure control MA (47 74 20)

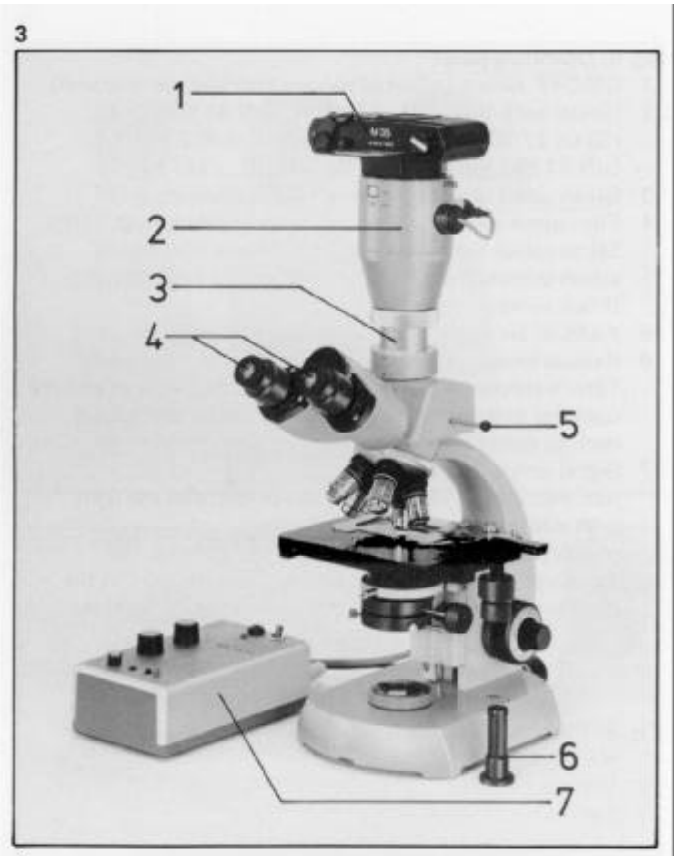


Fig. 4: MC 63 A photomicrographic camera for large formats 9x12 cm/4x5" on Universal microscope (the mounting is the same on a Photomicroscope)

1 Camera body 4x5" (47 60 57)
2 Basic body with shutter M (47 60 12-9901)
3 Phototube M (47 30 34) containing a 10x or 16x eyepiece
4 Inclined binocular tube G (47 30 12) with upright, unreversed reticle, 10x high-eyepoint, wide-angle eyepieces with focusing eyelens, one containing the photographic reticle M (47 60 21)
5 Cable for exposure control MA
6 Pushrod for beam splitter in tube head in click-stop position
red ring: photomicrography and observation
colorless ring: photomicrography
white ring: observation

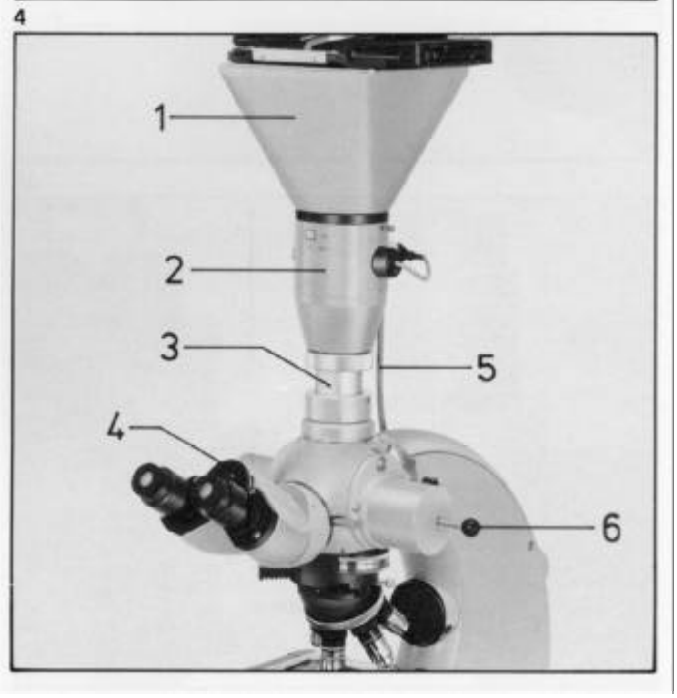
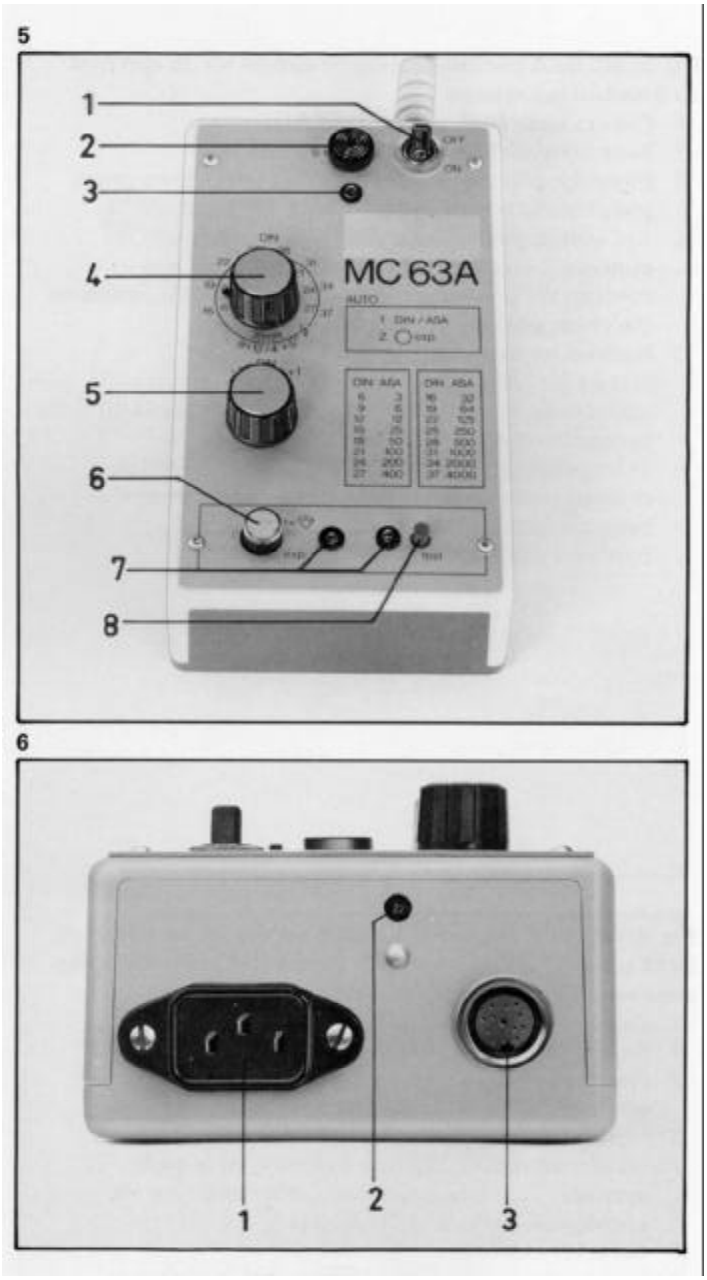


Fig. 5: Operating panel

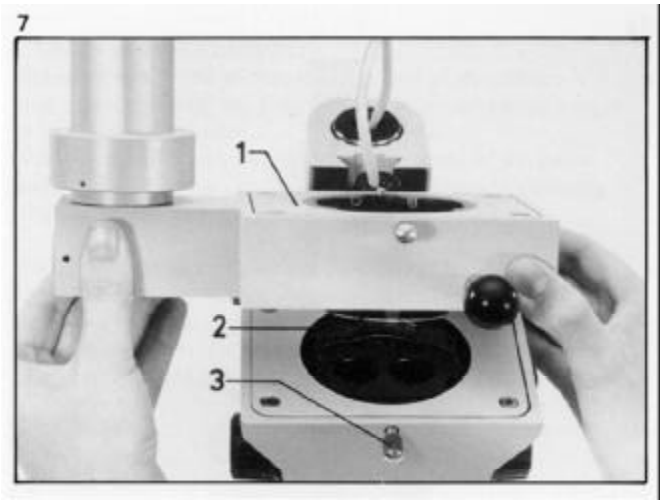
1 ON-OFF switch (adjusted voltage indicated on rear wall)
2 Holder with fuse: Si 1, T 0.05 A, DIN 41 662 (38 01 27-2040) for 220 and 240 V, or Si 2, T 0.1 A, DIN 41 662 (38 01 27-0100) for 100 ... 127 V
3 Green signal lamp, lights when the instrument is ON
4 Film speed selector with click stops in intervals of 3 DIN. Set to values inside the circle for 35 mm film and to values outside the circle for medium and large formats. (Flash symbol: fixed 1/60 s)
5 Knob to set intermediate values of (4), see p. 14
6 Release knob
Turn it clockwise before release if the shutter is to be kept open for extended periods; to close the shutter turn it back to normal position
7 Signal lamps
red: microscope illumination too bright; dim the light with a filter or the lamp adjustment
yellow: exposure time within the AUTO range
8 Test key: functions of signal lamps are released but the shutter remains closed (detailed operating instructions see p. 14)

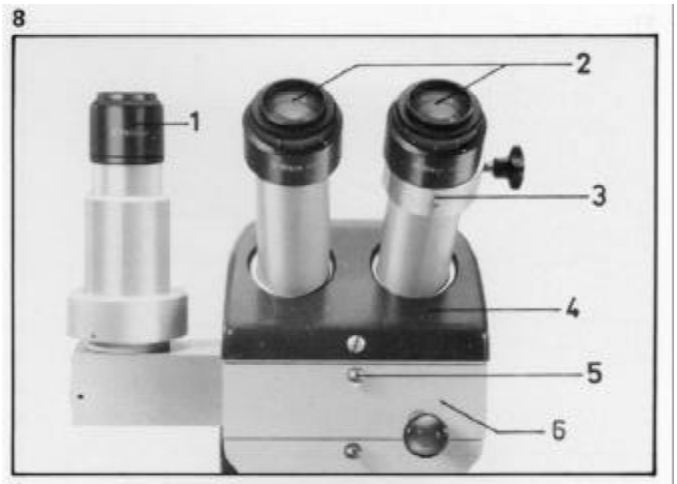
Fig. 6: Rear wall

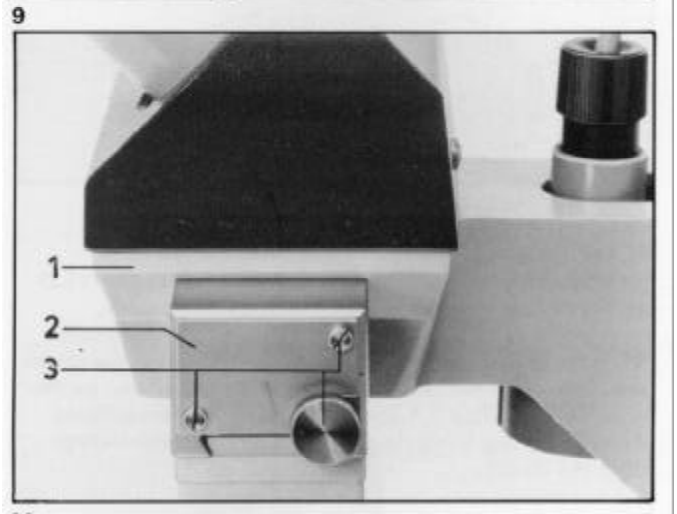
1 Mains cable socket
2 Voltage indicator
3 Socket for cable (4.5)[1] of basic body

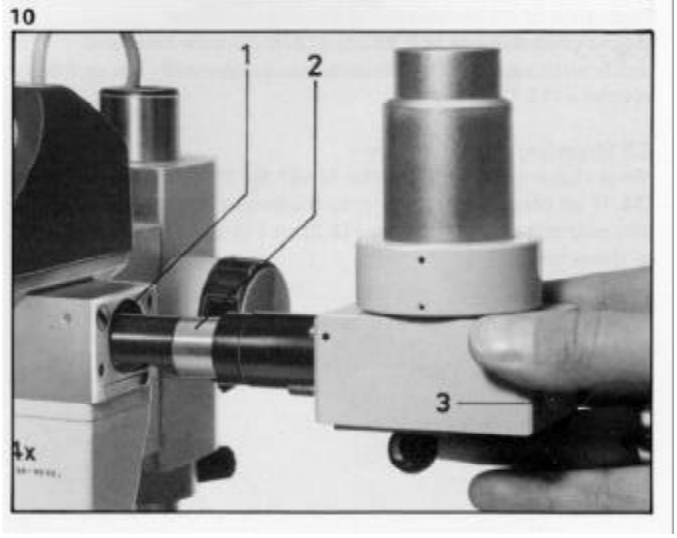


1) (4.5), for instance, meaning Fig. 4 item 5









2.1 Mounting the phototube

Intermediate phototube S on SR stereomicroscope

Place phototube S (47 50 83) (**7**.1) on stereo body so that its dovetails engage the recess of the tube, and the guiding pin the notch. Tighten screw (**7**.3). Put 10x eyepiece (**8**.1) into phototube. Put tube (**8**.4) on phototube S and secure with screw (**8**.5). Fit two eyepieces with focusing eyelenses (**8**.2). Provide tube not facing the phototube first with eyepiece clamping ring (**8**.3) and then with eyepiece with photographic reticle (47 40 67).

Phototube on DRC stereomicroscope

Phototube DRC (47 50 84) (Fig. **10**) can be mounted on the right- or left-hand side of stereo tube DRC (**9**.1): loosen screws (**9**.3) and remove plate (**9**.2).

Insert tube containing reflecting optical system (**10**.2) of phototube in port (**10**.1) and secure with two screws (**10**.3). Provide observation and phototube with eyepieces as described above.

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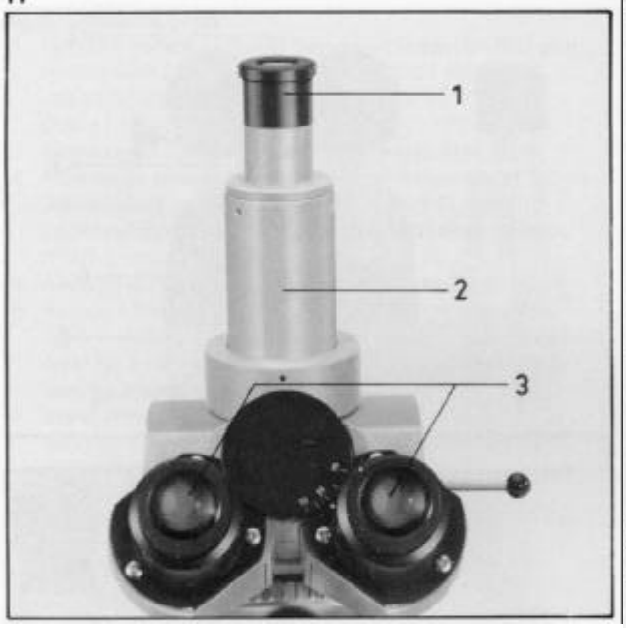

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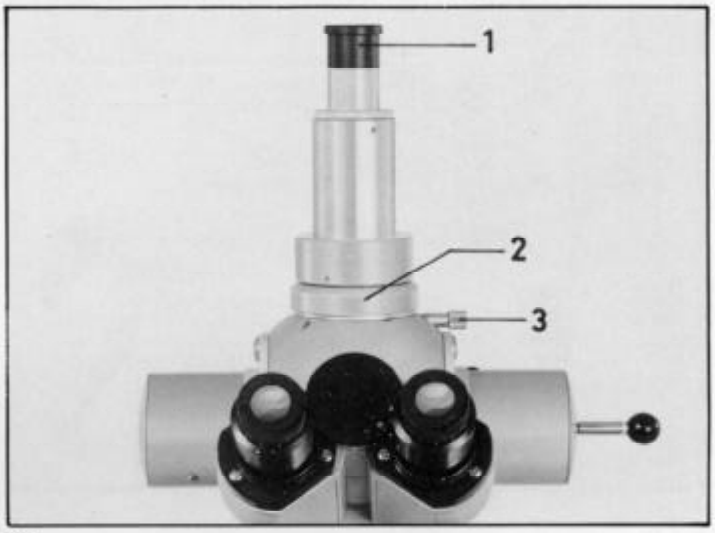

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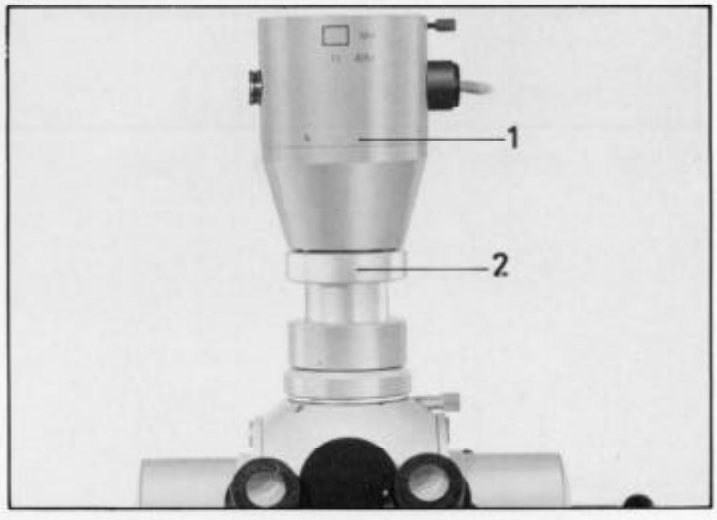

Mounting binocular phototube on Standard and WL microscopes

Put binocular phototube with sliding prism (47 30 28) (**11**.2) on microscope (Fig. **3**) and secure with clamping screw. Provide two Kpl wide-angle eyepieces with focusing eyelens (**11**.3) for observation and one 10x or 16x (**11**.1) in the phototube. The above-mentioned phototube can be replaced by the binocular phototube S 1.25x, 45° with fixed beam splitting (47 30 15) or the binocular phototube Pol 30° with sliding prism (47 30 29).

Phototube M on Universal and Photomicroscope

Mount phototube M (47 30 24) (**12**.2) on tube head and secure with screw (**12**.3). Provide phototube with 10x or 16x eyepiece (**12**.1).

2.2 Mounting the basic body

Mount basic body with shutter M (47 60 12-9901) (**13**.1) or (**14**.1) on phototube, lower it to the height of the eyepiece and secure it by turning ring (**13**.2) or (**14**.2) in the direction of the arrow.

2.3 Mounting the camera body
Mount camera body so that the long side of the camera is aligned parallel with the long side of the photographic reticle M in the binocular tube.
A pin of the camera body fits into a borehole of the basic body. Tighten screw (**15**.6). For alignment loosen clamping ring (**15**.7) and turn the basic body with the camera.

2.4 Camera body M 35 (47 60 72-9901) (Fig. 15)
Load 35 mm film. Pull out rewind knob (**15**.5) which unlocks the camera back.
Load 35 mm cartridge, push in rewind knob, fix film leader in clamping spring of take-up spool, and let sprockets engage the perforation of the film. Tighten film by turning it back with the rewind knob. Close camera back and advance film by two frames.
Function test: rewind knob turns.

Functions of the operating controls in front
15.1 Frame counter. "S" (Start) is automatically set when the camera back is closed.
15.2 Transport lever. Turn it fully clockwise to advance the film.
15.3 Release knob. It is pushed before operating the transport lever.
15.4 Light blocking slider. It must be pulled out during exposure and film advance, otherwise it blocks the latter; push it in before exchanging the housing.
15.5 Rewind knob turns while the film is advanced
15.6 Clamping screw to secure the camera body

Functions of operating controls and sockets at the rear
16.1 Release button. Push it in before rewinding the exposed film.
16.2 Sensor cable, connected to basic body
16.3 Beam splitter must be fully pushed in
16.4 Socket for cable of winder M (47 60 79). The winder can only be operated with exposure control MA (47 74 20-9901).
16.5 Cable leading to socket (**6**.3) of exposure control

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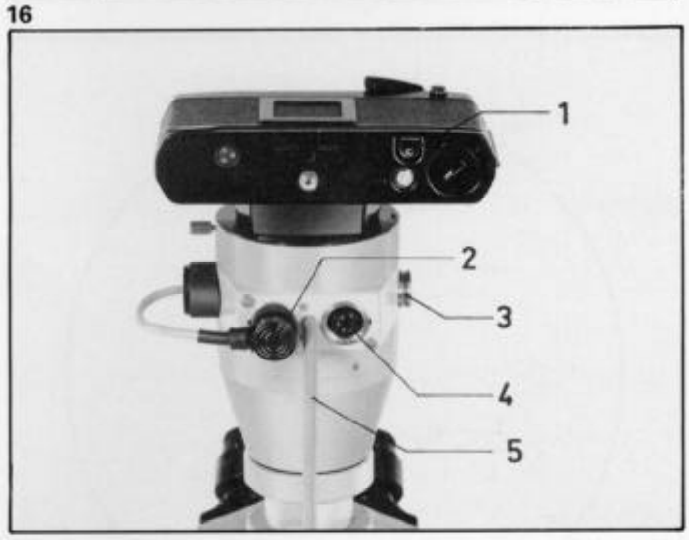

2.5 Camera body M 9x12 cm/4x5" with international camera back (46 60 57) (**17**.3)
Load cassette. Flick up lever (**17**.1), load cassette (**17**.2), and flick down lever.
The spring-loaded groundglass frame (**18**.1) keeps the cassette (**18**.2) in place once it is fully inserted.
Pull out slider (**18**.3) before photography and close cassette afterwards. Exchange cassette or turn double cassette (**18**.2).
For Polaroid cassettes, e.g. sheet-film holder 545 (41 61 28) (**19**.1) remove groundglass frame (**18**.1), and fix cassette with ledgers (**19**.2).

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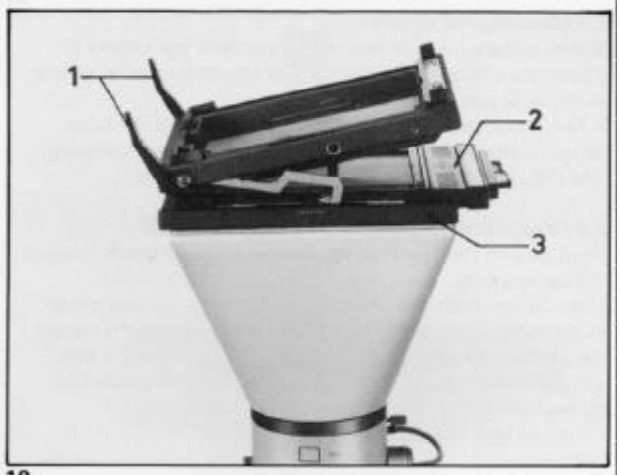

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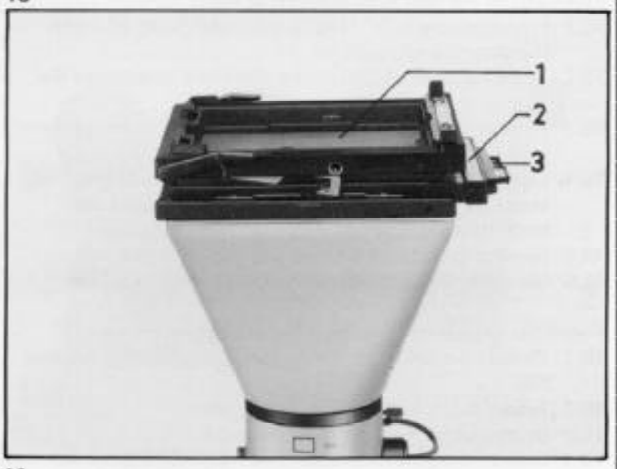

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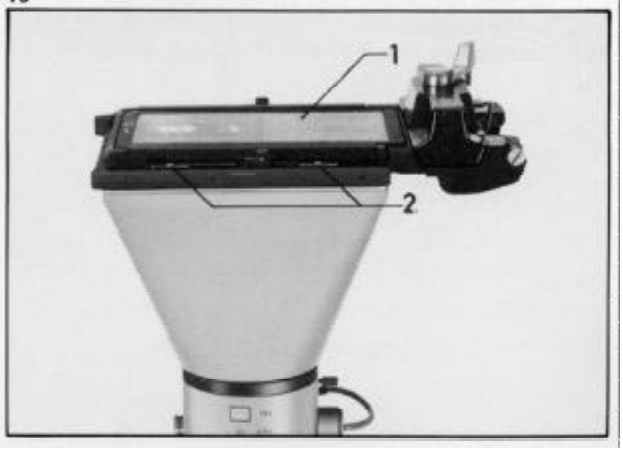

3 Preparing the microscope with MC 63 A for photomicrography

- Free the light path to the camera by operating the control of the phototube.

- Focus the eyelens of the eyepiece in the binocular tube (**20.1**) on the double crosslines of the photographic reticle (Fig. **21**). Focus on the specimen through the eyepiece with photographic reticle.
  Adjust the second eyepiece to the specimen. To avoid accommodation errors, always adjust the eyelens by turning it clockwise. For critical work, especially at low magnification, use the telescope attachment (46 48 31) (**20.2**) on the eyepiece with photographic reticle. Focus on the reticle by adjusting the eyelens with mounted telescope attachment.

- Adjust Köhler illumination: produce a sharp image of the luminous field diaphragm, center it and open it until the entire image format is fully illuminated.

- Adjust image contrast with condenser diaphragm (see microscope operating instructions). Operation of camera body M 35 see p. 9.

Fig. 21: Photographic reticle
fitted in one eyepiece of the binocular tube.
The outer corners apply to photomicrography with 10x eyepieces in the phototube, the inner corners to photomicrography with 16x eyepieces, with all camera bodies. (A reticle is in preparation for the smaller, eccentric format of Polaroid film packs 405).

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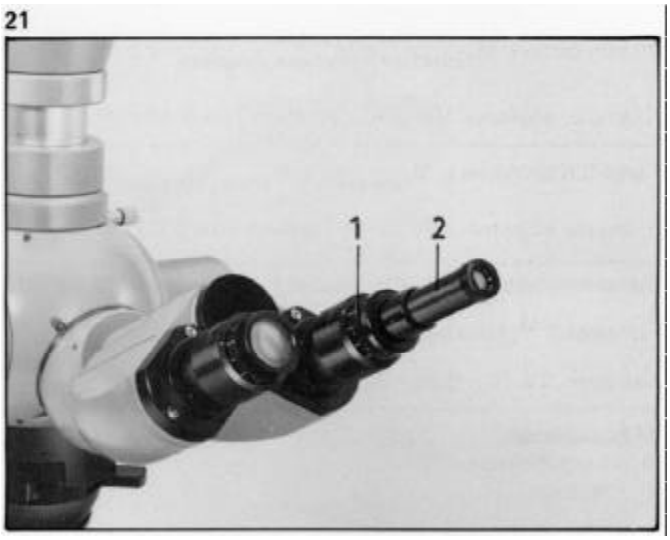

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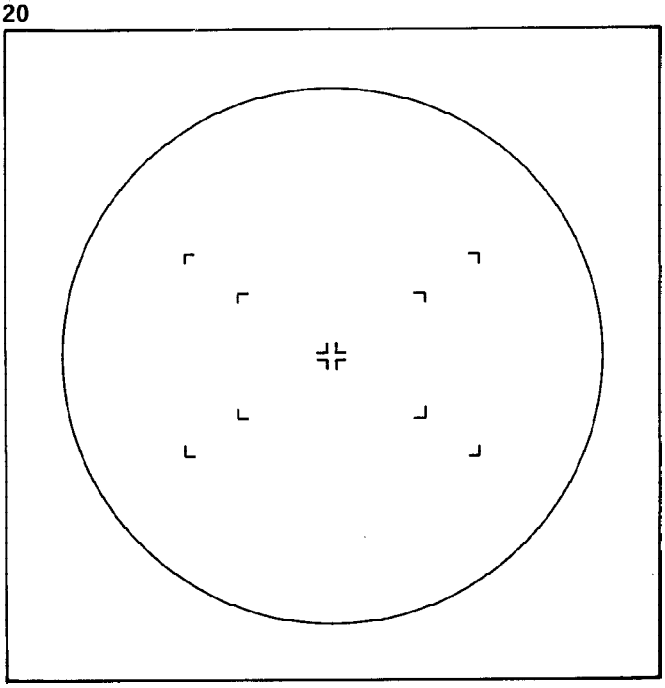

35 mm camera: $M_{objective} \times M_{photo\ eyepiece} \times 0.25$

Example: objective 10x photo eyepiece 10 x 0.25 = 25x

Large-format camera: $M_{objective} \times M_{photo\ eyepiece} \times 0.8$

Example: objective 25 x photo eyepiece 10 x 0.8 = 200 x

Stereomicroscope SR with objective f = 100 mm:

$F_{changer} \times M_{photo\ eyepiece} \times F_{camera}$

Example: 5 x 10 x 0.25 = 12.5 x

Abbreviations:
M = magnification
F = factor

Note
For photomicrography with SR stereomicroscope the **effective f-stops** are dependent upon the position of the double iris diaphragm (1.9)

Effective f-stops for DRC stereomicroscope with MC 63 A		with objective
M 35	M 9x12 cm/4x5"	
40	128	0.8
42	134	1
50	160	1.6
63	200	2.5
72	230	4
105	336	6.3

5 Checking the focus

This check is required only if **Photomicroscope** or **Universal** are subsequently equipped with MC 63 A or if faulty parfocalization is suspected. The specimen must be in focus together with the reticle in the eyepiece and in the film plane. For the check use a high-contrast specimen (e.g. micrometer scale), a low-power objective (e.g. 4x, 6.3x, 10x) (on a stereomicroscope always use the objective with the lowest power), and fully open condenser diaphragm. Use the telescope attachment (**20**.2) on the eyepiece with reticle, if possible.

- Focus eyepiece eyelens (with attached telescope) on the double crosslines of the photographic reticle (Fig. **21**).

- In the same plane focus the specimen with the fine focusing control.

- Focus magnifier (**22**.1) of instrument (41 48 33) on the circular raster. Insert focusing instrument in picture gate of open 35 mm camera. Open shutter (T) (**5**.6). Pull out light blocking slider (**22**.2).

- If the specimen is in focus in the **aerial image around the raster spot**, observation tube and phototube (**22**.3) are exactly aligned relative to each other.

- If the image is unsharp, loosen screw (**22**.4) with supplied screw-driver, and correct tube length by turning phototube with camera until the image is in focus in the focusing instrument (film plane). Then secure tube and align basic body with camera.
Follow the same procedure with camera body M 4x5" with groundglass frame.

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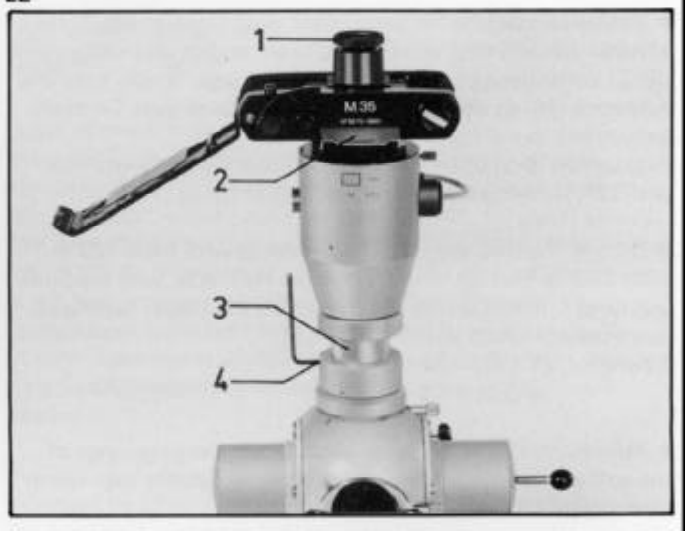

• Before connecting the instrument to the line, check whether the adjusted voltage (indicated on the rear wall (**24**.2) corresponds to the local mains voltage. If not, have the necessary change made by our maintenance service. Connect instrument to the line.
Plug cable (**16**.5) of basic body to socket (**24**.3). Switch on with (**23**.1); the green signal lamp (**23**.3) lights.

• Setting the film speed: 3 DIN intervals with knob (**23**.4). With 35 mm film set to values within the circle, with medium and large format films to values outside the circle. Setting of intermediate values with knob (**23**.5).
Examples: 25 DIN = 24 + 1;
14 DIN = **15** − **1**.

• Push knob (**23**.8) to check whether the working range of the automatic system is exceeded when extremely high-speed film material is used.
If the red signal lamp (**23**.7) lights dim the light (neutral density filter; with green filter also by reducing the lamp voltage). If the yellow signal lamp lights, the exposure time is within the AUTO range from 1/60 s to approx. 1.5 min. Prepare film for release and push release knob (**23**.6).

Notes on the film speed setting
The film speed setting of the exposure control MA is for 35 mm color reversal film, normal, for instance histological specimens, and artificial (3200 K) or daylight (5500 K).
In other cases, especially with color filters or extraordinarily sensitized films the correct exposure depends on the interaction of spectral distribution of the light, spectral sensitivity of the light sensor and of the film emulsion. Optimum exposure at other than the indicated DIN setting is therefore possible (test exposures!).

6.1 Exposure correction in fluorescence photomicrography
The MC 63 A uses the so-called integral light measurement which has proved a succes in photomicrography. The entire image field is measured to determine the correct exposure time. In order to avoid overexposure due to dark background (too dark negative, too bright diapositive, too bright Polaroid picture) the exposure, for instance in fluorescence photomicrography, is corrected as follows: set film speed to a 9 DIN higher value, and, in case of fluorescence specimens with a high area percentage, to a 6 DIN higher value. Possible corrections will in many cases be limited by the use of high-speed film material.

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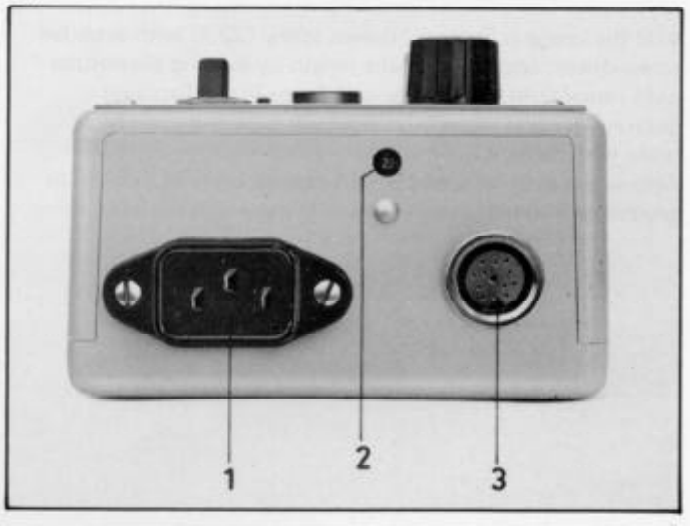

Black-and-white photomicrography
Other than normal photographic objects, microscopic specimens are generally of low contrast. To increase the contrast

1. use a color filter for stained specimens (for most histological stains a green filter is the best choice);
2. stop down the condenser (though not too much);
3. use a developer of higher concentration (steeper gradation);
4. use optical contrast-enhancement methods such as darkfield, phase contrast or differential interference contrast.

Universal film of medium speed is suited for almost every purpose, because its resolution is better anyway than that of the microscope.

Color photomicrography
Reversal film is gener

Color photomicrography
Reversal film is generally used, which after development supplies a slide ("-chrome" as final syllable refers to reversal film, whereas "-color" refers to negative film for paper prints). One type of film each is available for daylight and for artificial light 3200 K. If besides photomicrography flash photography in the macro range is required, use daylight film and incandescent lamp light with conversion (blue) filter CB 12. In other cases use artificial-light film and halogen light, which is optimally adapted to long exposure times; a filter is not needed.

In black-and-white photomicrography the contrast can be increased by color filters and/or special development. This is not possible in color photomicrography; the specimens should therefore be more intensely stained.

There may be the following reasons for color distortion: wrong film material (see above, daylight or artificial-light film), manufacturing tolerances (always use one batch), long exposure times (reciprocity failure), wrong color temperature (work at rated voltage), stained mounting media, transmission of the optical system not neutral (including, for instance, heat-absorption, neutral density or polarizing filters).

To correct the color hue we recommend graded blue conversion filters, 32 mm dia., CB 3 (46 78 52), CB 6 (46 78 51) and CB 12 (46 78 50-9901), because the light of the incandescent lamps is generally too "hot" (this does not apply to halogen lamps). Other types of color distortion can be corrected by sandwich filters of complementary colors (e.g. Kodak CC filters); with filters of the density 10 every type of color distortion due to manufacturing tolerances can generally be corrected.

Color distortion	required filter color
yellowish	blue (B)
reddish	blue-green (cyan, C)
greenish	purple (magenta, M)
bluish	yellow (Y)
blue-green	red (R)
purple	green (G)

Contrary to general opinion even Achromat objectives are suited for color, photomicrography, although the superiority of optimally corrected microscope objectives such as Plan-Neofluar objectives, for instance, is, of course, striking.

Fore more information about photomicrography see catalog A 41-400.1.