REICHERT POLYVAR-MET

Operating Instructions

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PRINTED IN AUSTRIA

REICHERT POLYVAR-MET - 2.GA - E - 1/85

TABLE OF CONTENTS

A Setting-up

1. Unpacking

Cut both steel bands of the outward packing with scissors (or pliers).
Cut the adhesive tape of the upper cover and open outer cardbord box.
Take off the four polystyrene corner pieces.
Take out the inner cardboard box by means of the handles.
Cut the steel band of the inner cardboard box with scissors.
Take off the folding box without bottom.
Cut the adhesive tape of the folding box without cover on the four edges of the upper part and fold the sides outwards.
Take off the cardboard cover and the supporting box upwards.
Unscrew the two wing nuts which fasten the microscope stand (A1) to the wooden base plate.
Take off the microscope stand upwards.

The following accessories are packed separately:

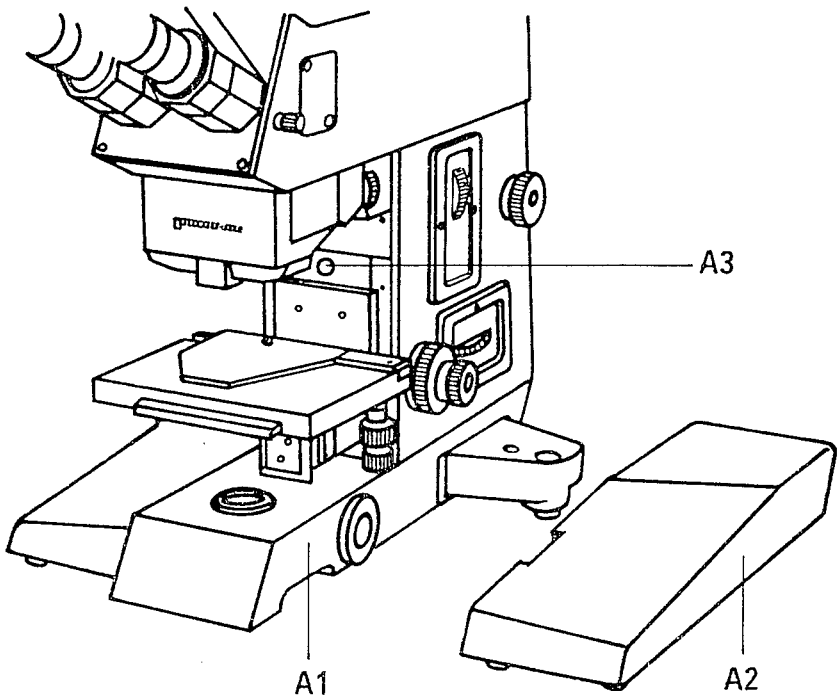
- Arm rests,
- Objective nosepiece,
- Objectives,
- Object stage,
- High-performance burner,
- Lamp housing with high-performance lamp,
- Mains supply units,
- IL modules,
- IK main prism,
- Cameras,
- Control unit (with number).

2. Setting-up

Grip holes at the right and left of the light-exit opening as well as on the rear of the lateral outriggers of the base plate of the microscope stand (A1) (weight about 30kg) are provided for transport.
The arm rests (A2) are inserted from above into the threaded holes of the two lateral outriggers.

3. Transport locks

The red screw (A3) for securing the coarse and fine focusing controls is placed above the stage carrier which has been fixed in its lowest position.
Only after unscrewing the red screw by means of the Allen key (which is to be found in the right arm rest) the drive motions may be operated.
The red screw should be carefully stored in order to be at disposal for another transportation.
The knurled knob of the deviating mirror insert and the binocular viewing tube with the setting pin of the beam splitter are secured by means of rubber rings.
Besides, the N-S movement of the square mechanical stage is secured by means of a band.
Instead of the objective nosepiece there is a foam rubber stopper in the corresponding opening.



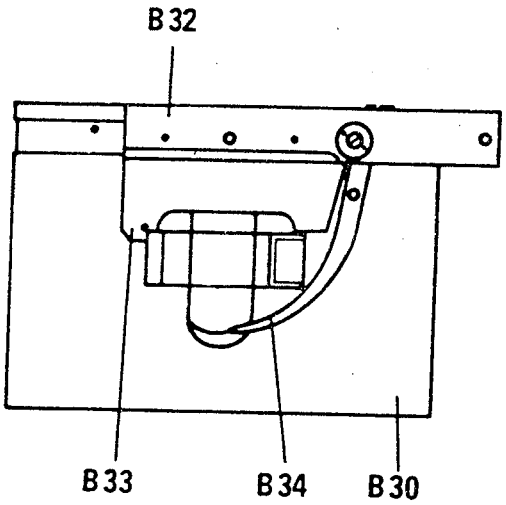
B Assembling

For easier identification of the described instrument components fold out the picture page at the end of this manual.

1. Object stage

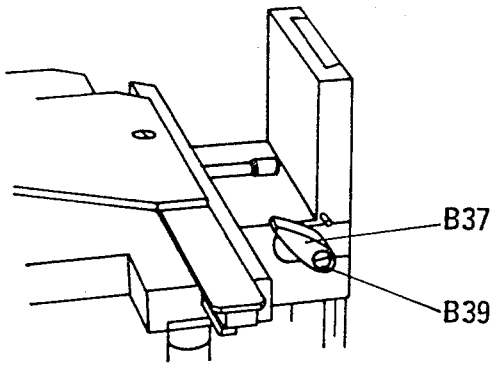
1.1. Square Mechanical Stage U1

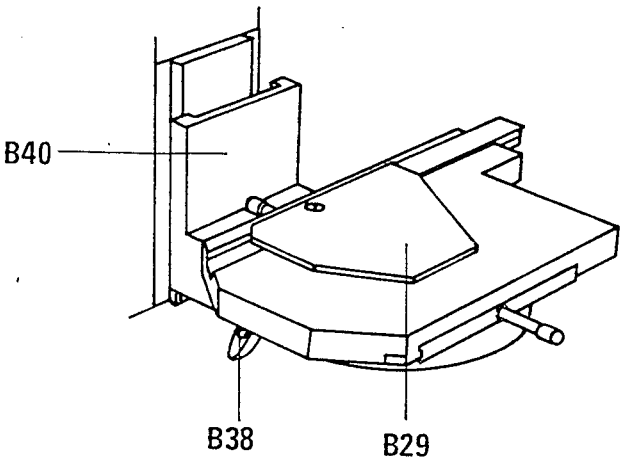
Stage carrier with object stage are not detachable.
The square mechanical stage (B30) has a stage surface of 115 x 200mm. Coordinate movement of 50 x 75mm are operated by low-positioned coaxial controls (B31) on vertical operating shafts.
The standard equipment includes a specimen holder (B32) for 26 x 76mm object slides.
The object slide is firmly clamped between the fixed jaw (B33) and the spring-loaded finger (B34).



1.2. Rotating Mechanical Stages U2 and A3 Mechanical Stage A4 (4x4") and Auto Leveling Stage A5

To mount the stage, unscrew the screw (B39) with the coin slot and withdraw the clamping lever (B37) from the toothed clamping screw. Then the clamping screw is unscrewed until the guide-portion of the stage carrier may be slit from the left onto the dovetail (B40) of the guide-way.
Hand-tighten the clamping screw and fit clamping lever (B37). Select the position of the clamping lever in such a way on the tothed clamping screw that the stage carrier is safely clamped before the upper stop is reached.
At the lowest position of the coarse-fine focusing motions and that of the stage model-specimens up to 70mm height may be examined.
Stage rotation is clamped by means of clamping lever (B38).

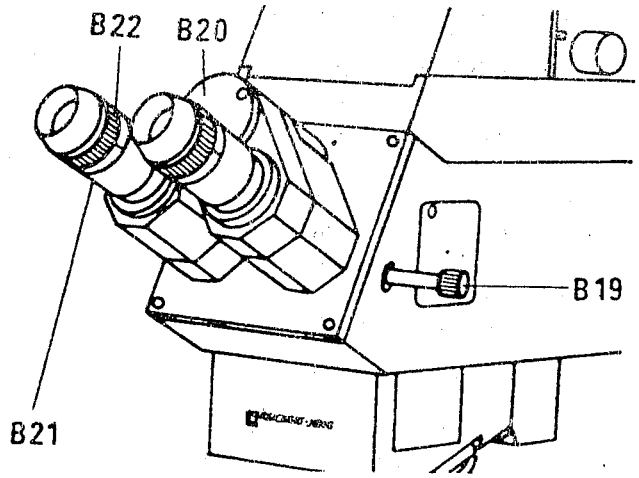




2. Optics

2.1. Binocular viewing tubes

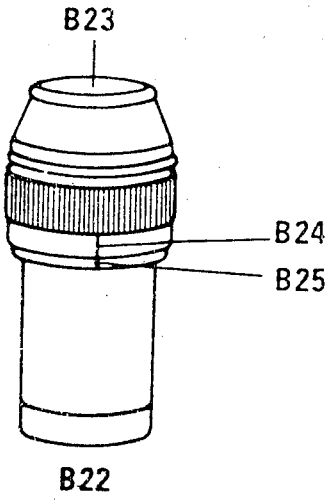
The eyepieces (B22) are inserted into the binocular viewing tibe (B20) so that the alignment pins engage with the grooves of the eyepiece sleeves (B21).
The binocular viewing tube has a constant tube factor q = 1x.
The interpupillary distance is adjusted within a range of 55–75mm by pivoting the two eyepiece sleeves.



Widefield plane compensating eyepieces

Correction Magnification Field of view No.	Image field diam in mm	Eye relief in mm	Ref. No.
WPK 6,3x (24)	151	17,5	91 11 08
WPK 10 x (24)	240	17,5	91 11 06
WPK 16 x (15,5)	248	16,0	91 11 09

The great eye relief enables spectacle wearers to work with WPK eyepieces.
For all normal-sighted microscopists eyepieces will be supplied with eyecups (B23).



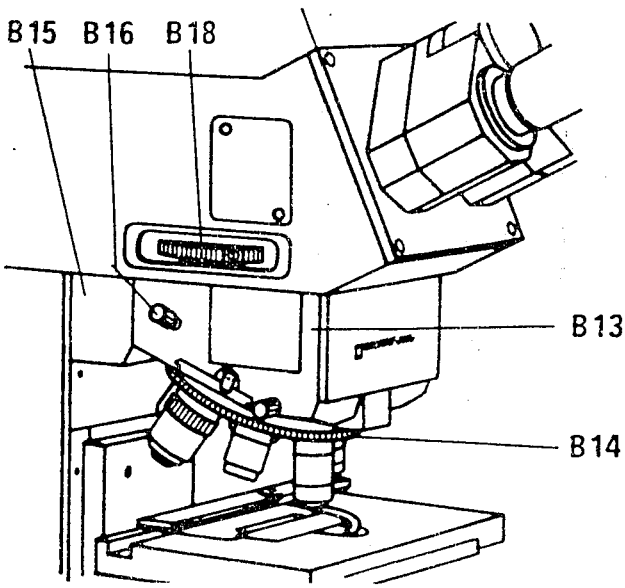
2.2. Beam splitter

The beam splitter, a system of prisms, directs the light either into the viewing tube or into the viewing tube and the camera by means of a setting pin (B19).

Viewing tube	Camera	
100%	–	setting pin withdrawn
20%	80%	setting pin pushed home

2.3. Magnification changer

The magnification changer is housed on the right side of the microscope stand. It is operated by means of a turret (B18) which has 3 magnification steps viz.
0,8x/1x/1,25x and a Bertrand lens for checking phase contrast and illumination setting. On request a 2x magnification step will be built-in (e.g. in lieu of the Bertrand lens) if so requested.

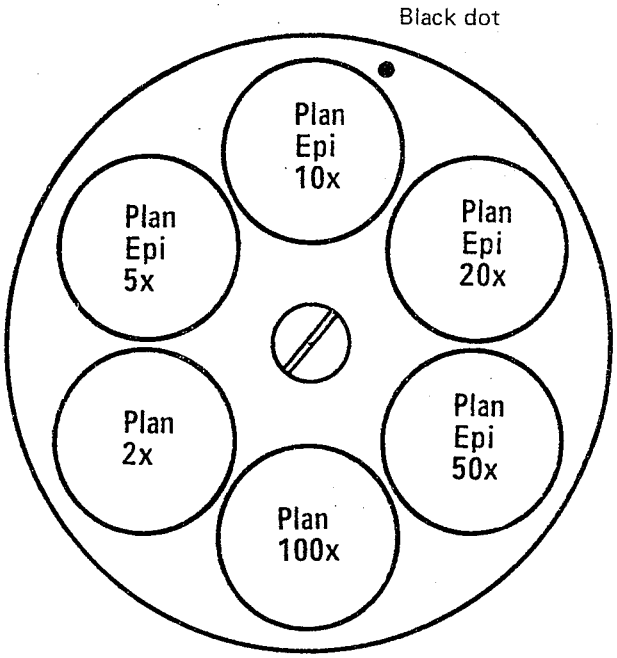


2.4. Optics carrier

The optics carrier (B13) accepts 6x objective nosepiece on changer slide (B14). IL modules of the interference-contrast insert (46 10 53) and various compensators.

2.5. 6x Objective nosepiece on changer slide

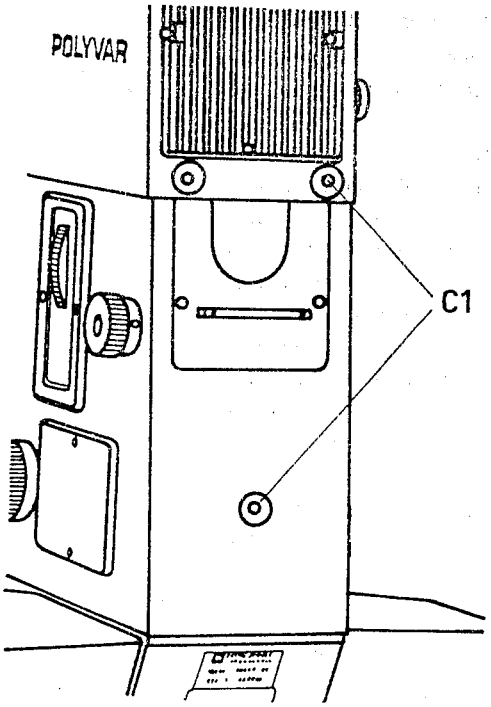
The 6x objective nosepiece on changer slide (B 14) is placed into the optics carrier (B 13) from the left side and clamped into position with screw (B 16).
The insert for interference contrast or a compensator must not be placed into the optics carrier.
The objective Plan Epi 10x is screwed into the threaded hole of the objective marked with a dot. The setting of the remaining objectives for brightfield and brightfield and phase contrast is shown alongside.
In general, objectives are fitted so that clockwise rotation of the nosepiece brings in objectives of increasing magnification.



3. High-intensity lamps

3.1. Fitting the lamp housing

On the back of the microscope stand there are 3 centring excentrics (C1) which are factory centred for the fitting of the lamp housing (C2).
Before the lamp housing is fitted to the stand the clamping portion (C3) is aligned – as shown in the illustration – and the screw (C4) loosened with a coin. The lamp housing is fitted from above on the centring excentrics and fixed with the screw. The lamp housing is available in two executions.



3.2. Outfit for operation on alterning current

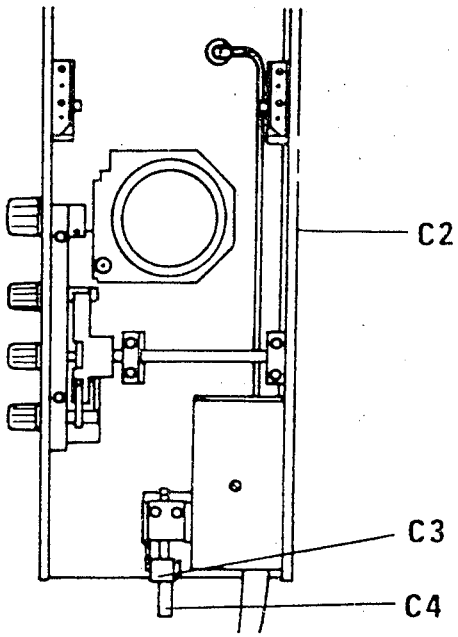
3.2.1. Lamp housing W

This execution is taken for the super-pressure mercury vapour burner HBO 200W/4 (No. 86 00 16).

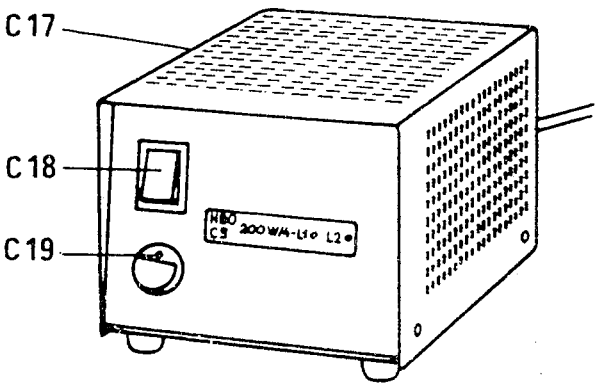
3.2.2. Mains supply unit for the HBO 200W/4

For 220 V AC the mains supply unit (C17) has been provided for. For other mains voltages such as e.g. 110 V, 125 V, 150 V or 250 V a supplementary transformer (No. 62 11 01) – which will be supplied by us – has to be intercalated. This supplementary transformer is provided with a 10A fuse for 110 – 125 V, with a 6,3A fuse for 150 V and with a 4A fuse for 250 V.
On the front side of the mains supply unit (C17) there is a toggle switch (C18) and the safety starter (C19).
At the rear side there are 2 plug boxes. In the left one the multi-pin plug of the lamp housing cable is placed whereas the right one accepts the mains connecting cable.
The mains supply unit is normally adjusted for L1 burners. A reversal of the polarity of the L2 burner can be made after unscrewing the cover cap. (If required please ask for the wiring scheme).

IMPORTANT NOTE: Before igniting the high-intensity burner check whether the lamp housing is closed.



The HBO 200W/4 burner is switched on with the toggle switch (C18). After ignition the pilot lamp of the safety starter (C19) extinguishes and the light of the toggle switch shows that the burner is in operation.
If the burner does not ignite the red button of the safety starter will jump out automatically to protect the ignition device.
The red button has to be depressed before switching on the burner with the toggle switch.



Electrical specification:

Type: 6210 – 01

V 220 Hz 50/60
VA 1000

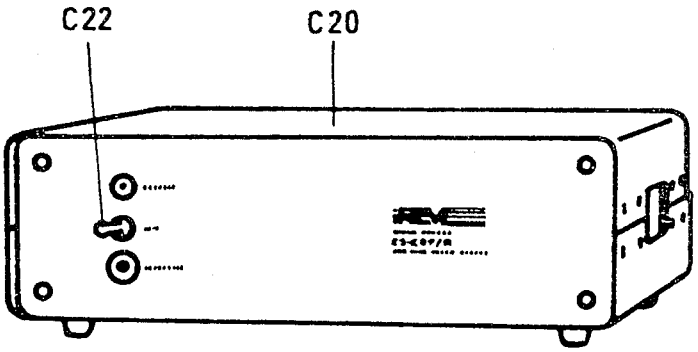
3.3. Outfit for operation on direct current

3.3.1. Lamp housing G

This execution is taken for use with the xenon high-pressure burner XBO 150 W/1 (No. 86 00 14) or the super-pressure mercury vapour burner HBO 200 W/2 (No. 86 00 12).

3.3.2. Mains supply units for operation on direct current

Connection to a mains voltage of 220 V/50 Hz is made with a stabilized mains supply unit. Externally both units differ in the inscription and the name plate. For connection to a deviating mains voltage a supplementary transformer is required.



Mains supply unit (No. 62 15 01)

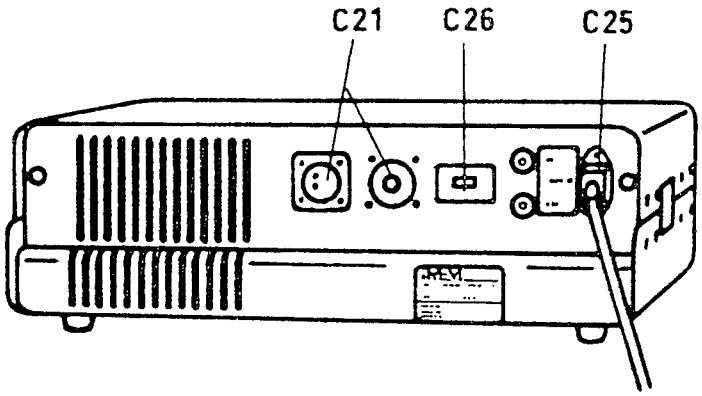
This mains supply unit is used for the xenon high-pressure burner XBO 150 W/1 and has the following lettering:

"POWER SUPPLY E2 – X8P/R FOR XENON LAMPS"

Mains supply unit (No. 62 13 02)

This mains supply unit is used for the super-pressure mercury vapour burner HBO 200 W/2 and is lettered as follows:

"POWER SUPPLY E2 – H200 P/R FOR 200 Hg LAMPS"



At the rear side of the mains supply unit (C20) there is a plus box (C25) for the mains connecting cable, a counter (C26) on which the burning hours may be read as well as two plug boxes (C21) for connecting the two lamp cables with their special plugs.
The instrument is fused (with 2 fuses) against the mains. (Spare fuses may be obtained from the electro trade).

IMPORTANT NOTE: Before igniting the high-intensity burner check whether the lamp housing is closed.

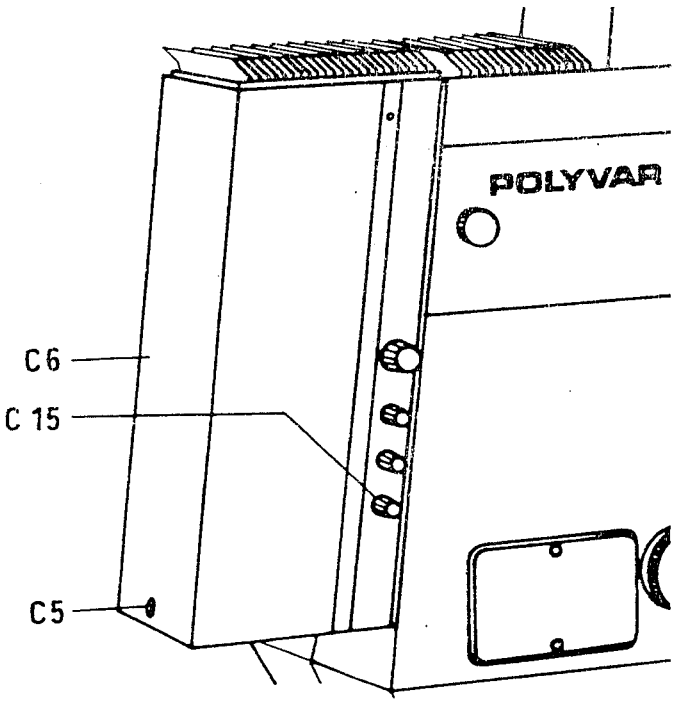
Switch on the mains supply unit with the toggle switch (C22). In position "ON" the red glow-lamp lights up; then shortly depress the red "START" key to ignite the burner.
If it should not burn immediately press the red "START" key again.
The burner is switched off by tilting the toggle switch (C22).

Electrical specification:

Type: 6215 – 01
E2 – X8P/R
Prim. 220V ± 5% – 50/60Hz
Sec. 20V – 7,5A DC
VA 150W

3.4. Inserting the high-intensity burner

Before opening the lamp housing pull off the mains connecting cable. After a few revolutions the screw (C5) with coin slot jumps out slightly by spring tension.
The lower part of the lamp housing back (C6) is drawn to the rear, then raised to abt. 15mm and finally detached toward the rear.
Handle the burner carefully to avoid any mechanical damage. Do not grip it by its quartz envelope but by the terminal fittings only.
Tightly hold the respective terminal fitting to prevent any bending or torsional forces acting on the envelope.
After loosening the headless screw (C7) the adapter (C8) can be taken from the holder of the burner.
Unscrew the two knurled screws of the burner.
Following the indicated poling, screw the burner into the adapter (C8) by means of the threaded bolt.

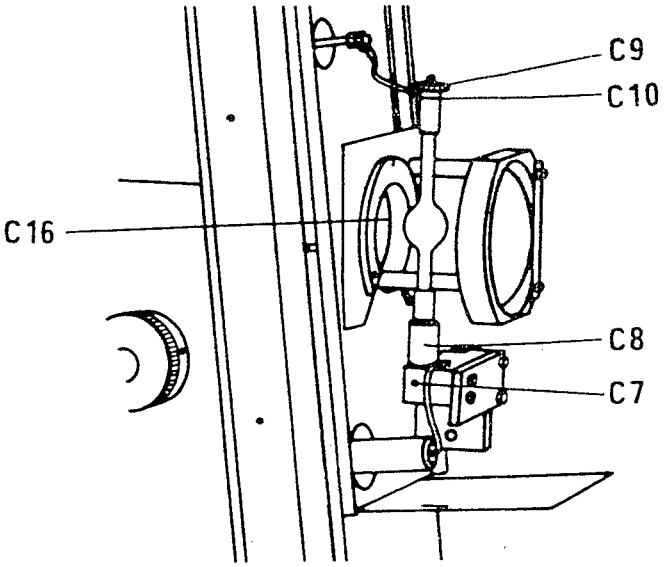


HBO 200

HBO 200 W/4 (No. 86 00 16)
In working position the lettering on the terminal fittings should be upright.

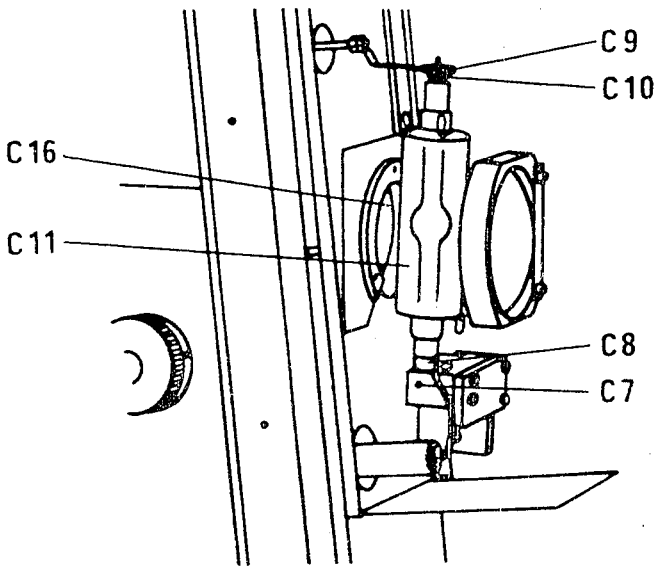
HBO 200 W/2 (No. 86 00 12)
Screw the positive pole of the burner into the adapter.

XBO 150 W/1 (No. 86 00 14)
In its cold state this burner has already an excess pressure of 100 kPa.



XBO 150

For safety reasons the burner is wrapped in a protective cover (C11). When removing the protective cover the operator must wear a mask and gloves.
Adjust the holder of the burner with the adjusting knob (C15) so that the burner with its protective cover is as far away from the heating ray barrier filter (C16) as possible.
Then screw the burner with its cathode (negative pole) into the adapter (C8).
After slipping on the cable shoes (C10) and tightening them with the knurled screw (C9) the two clamps and afterward the bipartite protective cover (C11) are removed.
Ensure that the adapter (C8) in the burner holder is positioned in such a way that an eventual sealing pin on the quartz envelope is not in the optical path (reflector-condenser axis).
Tighten the headless screw (C7) of the burner holder.
Slip the cable shoe (C10) of the connecting cable into the threaded bolt of the upper terminal fitting and clamp it with the knurled screw (C9).
Before starting up the burner for the first time clean the quartz envelope with a clean cloth and alcohol as finger prints will burn into the glass envelope.
To ensure safe operation change the burner when it has reached its average life (please refer to the instruction for the burner).



Mounting–indication

Mercury vapour burner 200W/4

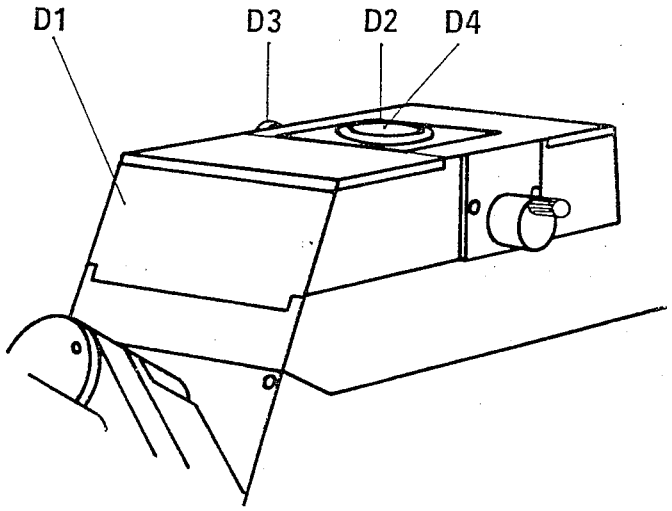
Insert the burner with the short vaporized side into the adapter and then put it in the burner holder.

4. Camera system

4.1. Camera insert

The camera insert (D 1) is fully integrated in the microscope stand and comprises:

a system of deviating mirrors
the photo eyepiece
the electronically controlled swing-out mirror camera shutter
the silicone photo element (can be used also as an exposure meter for cinemicrographic outfits)
the opening (D2) with clamping screw (D3) for a camera

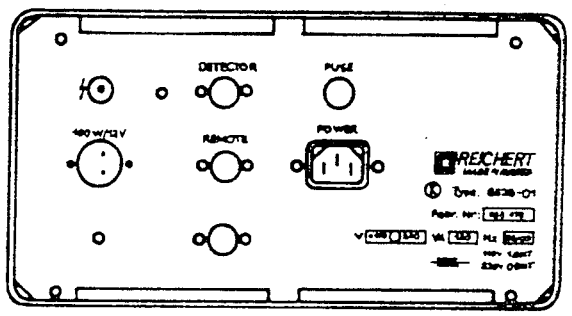


4.2. Control unit

The camera insert (D 1) is connected with the 100 W low-voltage lamp and the control unit with cables (D 5) running from the rear of the microscope stand. The cables are provided with unconfoundable plugs.

The control unit may be connected with:

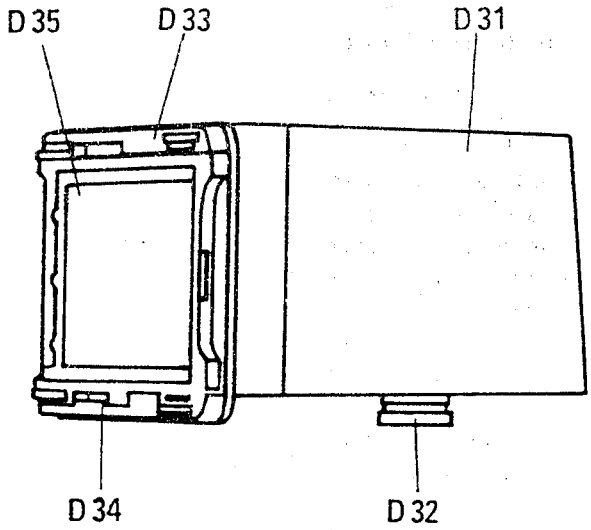
	flash lamp
100 W/12 V	lamp
DETECTOR	light measurement
REMOTE	remote control
	control (projection of signs, transport etc.)
FUSE	fuse 1,6 MT/110 V or
	0,8 MT/220 V
POWER	connection to the mains.



4.3. Large format camera

The large format camera consists of
- the camera housing (D31)
- the objective sleeve (D32)
- a deviating mirror system
- the international camera back (D33)
- the frosted screen (D35) with springback device (D34).

After removing the protective cap (D4) turn the clamping screw (D3) of the camera insert (D1) in anticlockwise direction up to the stop.
The camera housing (D 31) is fitted to the opening (D2) provided in correct orientation and fixed with the clamping screw (D3).

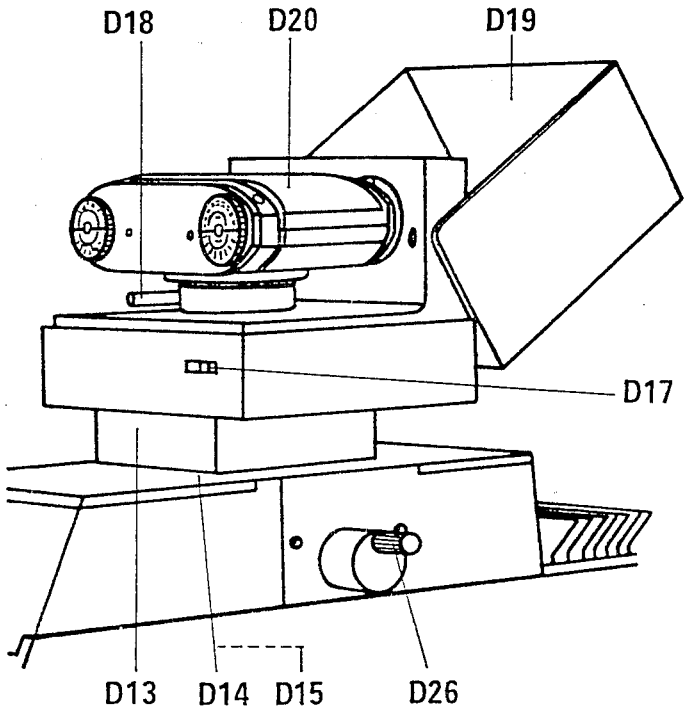


4.4. Automatic miniature camera

The automatic miniature camera consists of the following parts
- camera basic body (D 13) with
- transport motor
- swing-up cover (D 19)
- objective sleeve (D 14)
- orienting pin (D 15)
- clamping lever (D 18) for attaching film changing cassette (D 20)
- frame counter (D 17) with reset key.

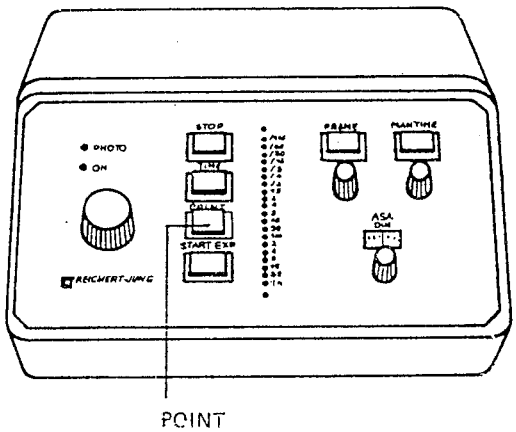
After removing the cover (D4) turn the clamping screw (D3) of the camera insert (D1) anticlockwise up to the stop.
Put the camera basic body (D 13) in the opening (D2) provided and fix it with the clamping screw (D3).

The push-button (D26) switches — over from integral — to point measurement (this applies to POLYMATIC P only!)



4. 5. Point measurement

Point measurement can be realized with the „POLYMATIC P" camera system only. With the rotary knob (D26) the camera system is set to point measurement, visually shown by flashing up of control lamp (POINT) on the control unit. The measuring field which has to be used for measurement is that within the double circle of the format delineation.

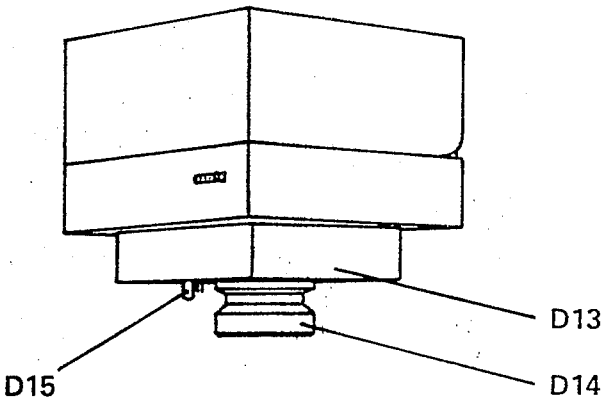


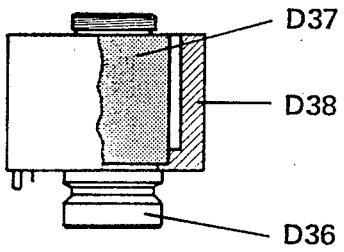
4. 6. Special objective p = 5x for the automatic miniature camera

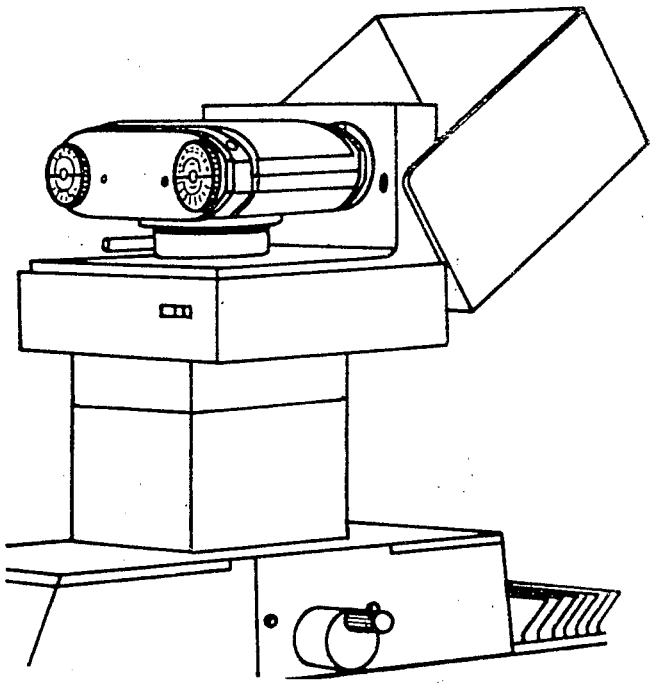
The standard equipment of the automatic miniature camera includes a standard objective with camera factor p = 2,25x. If the special objective should be used the camera basic body (D13) has to be re-set. For this purpose the standard objective with its objective sleeve (D14) is unscrewed by turning it anticlockwise. The special objective with its objective sleeve (D36) is unscrewed from the objective casing (D38) by turning it anticlockwise. The spacer sleeve (D37) which now can be removed is screwed into the camera basic body (D13) instead of the standard objective. Finally the objective casing (D38) is attached so that the orienting pin (D15) of the camera basic body fits into the groove and the special objective screwed into the spacer sleeve (D37). As soon as the automatic miniature camera with its special objective is mounted on the microscope the film transport motor is switched on and the camera system ready for miniature photography.
If pictures should be taken with the special objective the film speed has to be reduced on the control unit by 7 DIN by means of the DIN–ASA knob (D11) (e.g. with a film speed of 21 DIN to 14 DIN).
The magnification in the film plane is determined as follows:

$$M_{Cam} = V_{Obj} \cdot q \cdot p$$

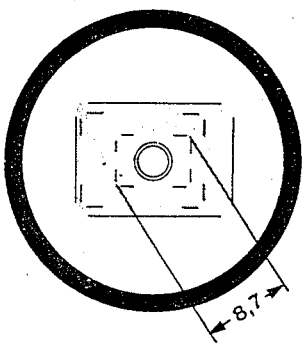
M_{Cam} = Magnification in the film plane
q = Magnification of the tube lens
p = Camera factor (with special objective p = 5x)
V_{Obj} = Objective magnification







The framing marks are matched to the camera system. The innermost marks have to be used for the special objective p = 5x.



Supplement to the table "Camera Data" on page E–5:

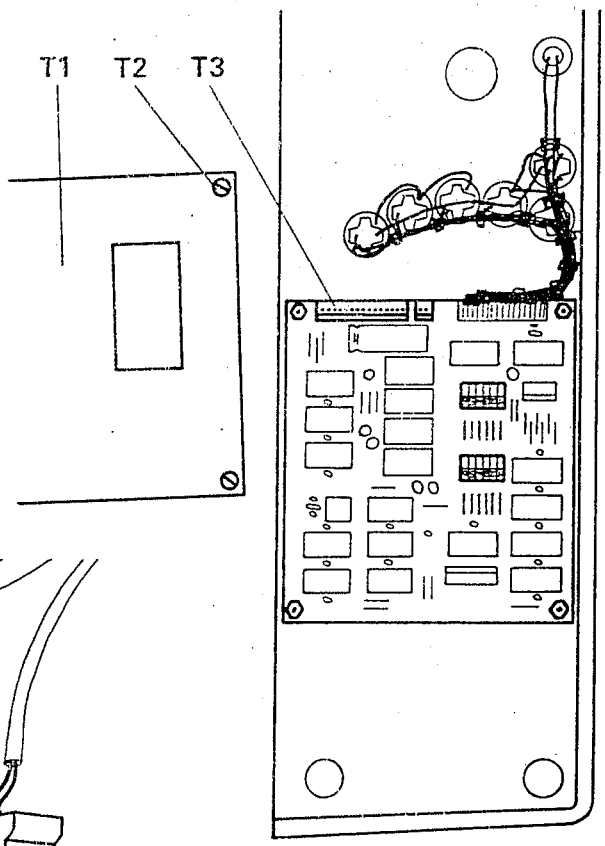
	Film format diagonal B' (in mm)	Camera factor p	Image field No. B_{FZ}
Automatic miniature camera 24 x 36 mm with special objective	43,3 mm	5x	8,7 mm

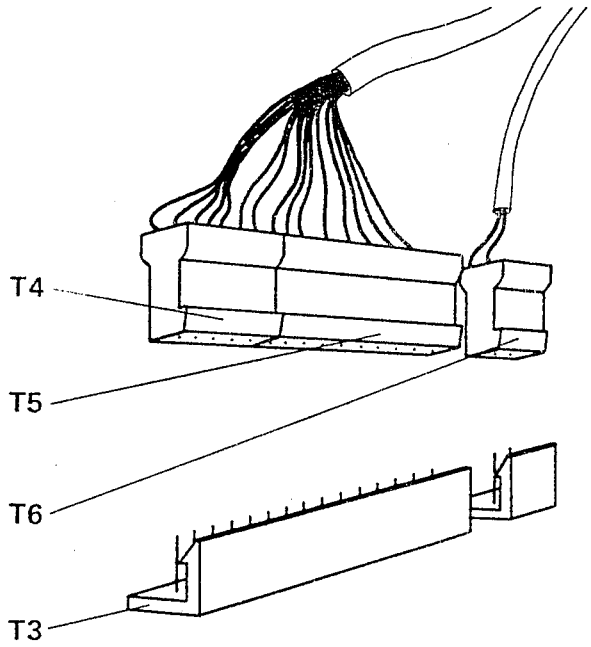
5. TELEMATIC objective changing device

5. 1. Assembling

5. 1. 1. Left arm rest

The electronic control system for the TELEMATIC is housed in the left arm rest. For connection to the microscope base detach the cover plate (T 1) on the lower side of left arm rest by unscrewing the four screws (T 2). See illustration alongside.
The three cables (T 4, T 5 and T 6) with plugs running from the rear of the microscope base are connected to the terminal (T 3) as shown in the lower sketch:
T 4 five-pin plug
T 5 ten-pin plug
T 6 two-pin plug.
Attach the cover plate (T 1) to the lower side of the left arm rest with the four screws (T 2).



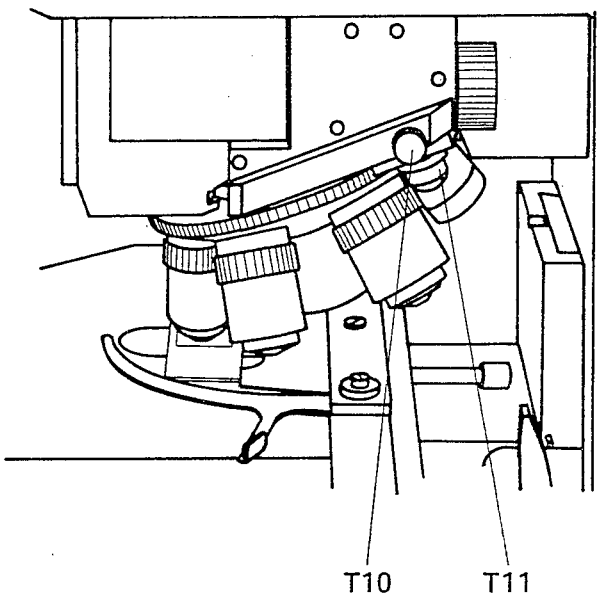


5. 1. 2. Objective nosepiece 6x on changer slide

As far as the assembling of the objective nosepiece on changer slide and setting of objectives is concerned please refer to chapter 2.5., on page B–3 of this manual. By fitting the objective nosepiece on changer slide to the optics carrier (B 13) it is automatically connected to the control system of the TELEMATIC by the contact pins.

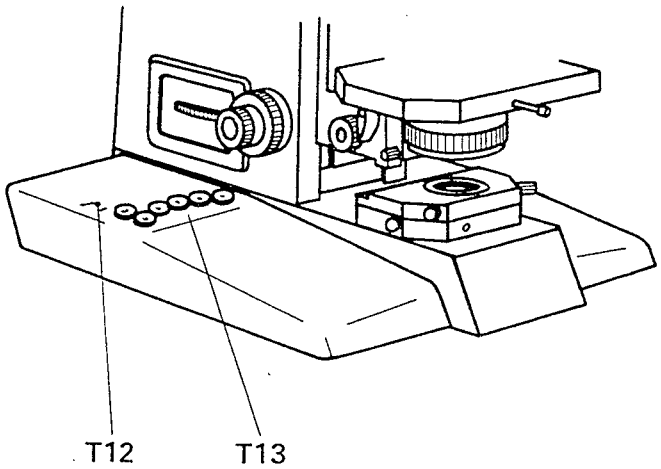
5. 2. Starting up the TELEMATIC objective changing device

The TELEMATIC objective changing device is switched on with the rotary knob (D 7) of the control unit. Please refer also to page C–1 of this manual.
The objective changing device is switched on and off by means of the knurled screw (T 10). When the screw is turned up to the stop the objective changing device is switched on. At the same time the motor of the nosepiece is set into its working position. A green LED (light emitting diode) (T 12) on the left arm rest signals that the TELEMATIC is ready for operation. The keyboard (T 13) on the left arm rest shows six keys marked with the objective magnifications, e. g. 2,5x, 4x, 10x, 40x oil and 100x oil. When depressing one of these keys the objective changing device will advance the nosepiece up to the selected low-power objective placing it into working position. At the same time the depressed key will light up.



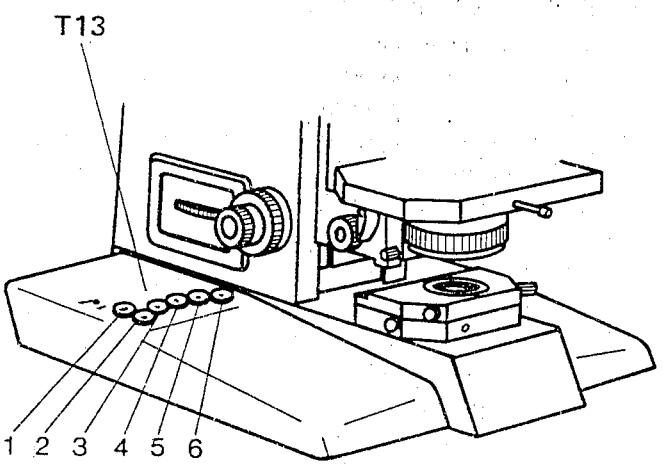
5. 2. 1. Immersion stop – intermediate stop

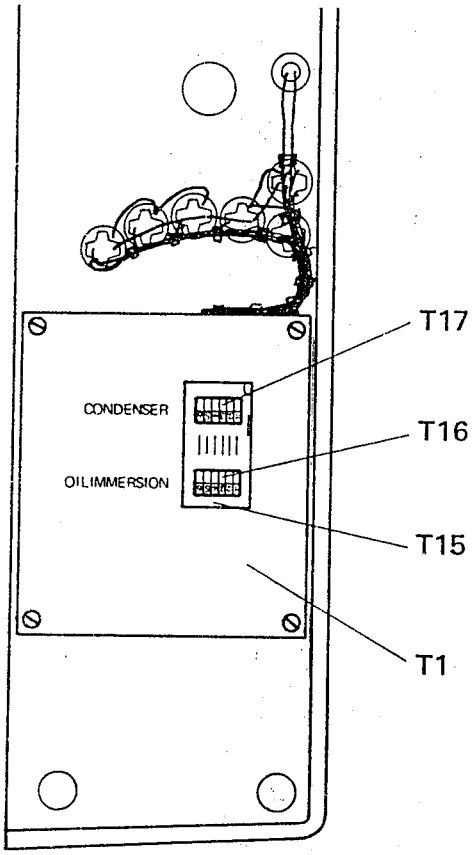
When an oil immersion objective has to be used depress at first the respective key on the keyboard (T 13). The objective nosepiece is turned automatically at first to an intermediate position and stops there – half way – before the selected oil immersion objective. At the same time the selected key for the oil immersion objective starts flashing. In that position immersion oil conveniently may be applied to the specimen. When depressing the same key once again the selected oil immersion objective will be intercalated. Proceeding to a dry objective the nosepiece will be stopped again in an intermediate position and thus prevents that the selected dry objective is dipped into the immersion oil. In that position both the oil immersion objective and the specimen may be cleaned without defocusing.
The intermediate stop is programmed also for use with LWD objectives (long working distance) which are par-focalized to the standard objectives. These shorted-mounted objectives enable the microscopist to focus on recessed specimen points.
To prevent a collision between standard objectives and specimens, the objective nosepiece, likewise, is stopped in an intermediate position; after lowering the microscope stage the standard objective may be switched in.



5. 3. Programming the intermediate stop

To each key on the keyboard (T 13) a certain position of the objective nosepiece is correlated (see illustration alongside). When depressing one of these keys the objective nosepiece will be turned into the respective position. By this means the corresponding positions easily may be determined on the objective nosepiece.
If for instance an oil immersion objective is screwed into position 3 of the nosepiece the intermediate stop can be selected appropriately. For this purpose turn round the arm rest of the TELEMATIC. Through the window (T 15) of the cover plate (T 1) the position switches (T 16 and T 17) will be vissible. When the position key 3 on the position switch (T 16) is depressed the intermediate stops before and after position 3 will be stored.





C Working with the POLYVAR-MET

1. 100 W low-voltage halogen lamp

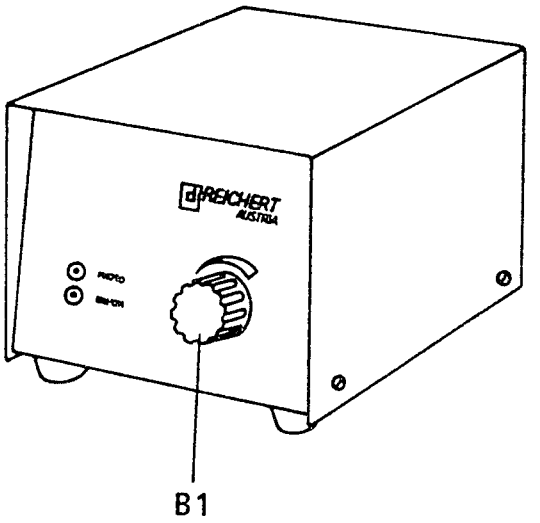
The thermally isolated 100 W low-voltage lamp is integrated in the microscope stand. The lamp is suitable also for colour photography with tungsten-light colour film (3200° K).

1.1. Mains supply unit

Check whether the voltage on the capacity shield of the lamp conforms to that of the mains before connecting it.

1.1.1. Regulating transformer

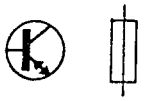
A regulating transformer (No. 62 09 05) with thyristor control will be supplied if the microscope is ordered without camera system.
The sockets for the mains connecting cable, the cable of the instrument as well as the fuse holder with screw lock are located on the rear of the regulating transformer.
The rotary knob (B1) is used to switch on and to regulate the voltage on the low-voltage lamp.
Turning the rotary knob clockwise the lamp is switched on, the yellow light-emitting diode "EIN/ON" lights up.
Turning the rotary knob farther the green light of the light-emitting diode "PHOTO" will indicate that the lamp burns at the correct colour temperature of 3200° K for tungsten-light colour film.
By means of an electronic circuitry mains fluctuations are automatically regulated in this position and correct voltage is always supplied to the lamp.



B1

Electrical specification:

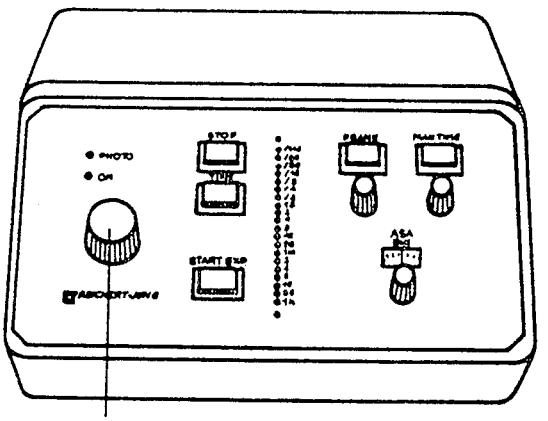
Type: 6209 – 05



prim.	sec.
o 110V 1,25MT	0 – 12V
o 220V 0,8MT	8A
o 240V 0,8MT	
VA 130 Hz 50/60	

1.1.2. Control unit

When ordering the microscope with camera system a control unit (65 26 01) will be supplied. A regulating transformer with thyristor control and LED display are integrated in the control unit.
The operating method is the same as that for the regulating transformer (No. 62 09 05).


D7

Section C 5 on "Photomicrography deals with the functions of the camera portion.

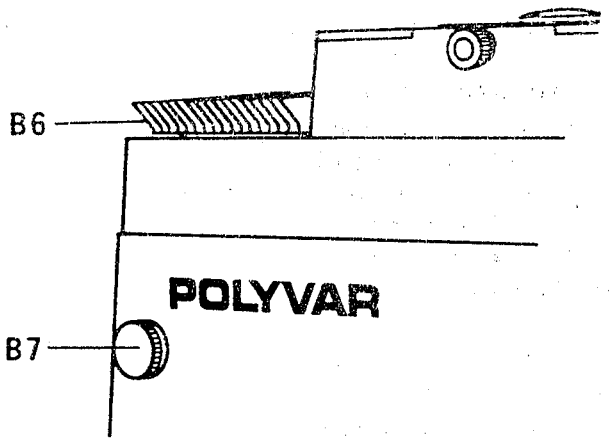
Electrical specification:

Type: 6526 – 01

V		VA	Hz
	o 110	120	50/60
	o 220		110V 1,6MT
	o 240		220V 0,8MT
			240V 0,8MT

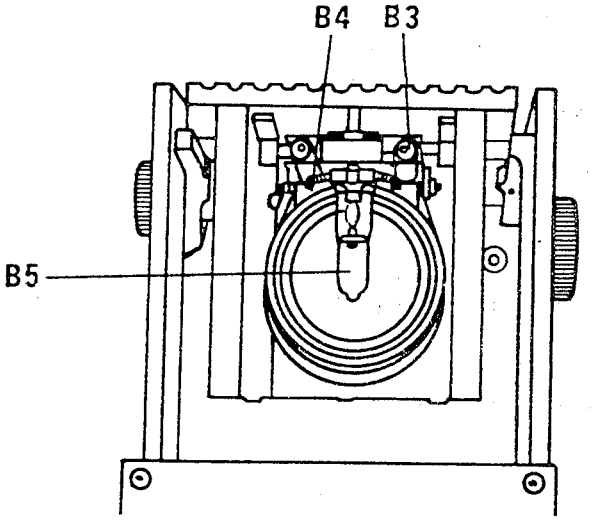
1.2. Changing the 100 W low-voltage halogen bulb

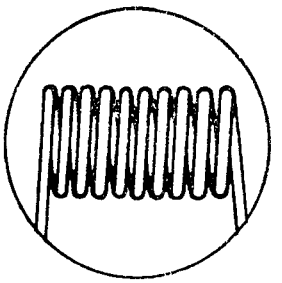
The microscope is supplied with inserted bulb.
A burned-out one is changed as follows:
Lift off the vent collar (B6) of the lamp.
If it should be too hot grip the bulb with a cloth and lift it off allowing the bulb to cool down.
Press the lamp-holder clips (B4) together and carefully insert the bulb (B5) with its protective cover in the lamp-holder.
When the clips are released the bulb is held in position.
Take off protective cover and clean the bulb.



1.3. Adjusting the 100 W low-voltage halogen bulb

Remove the Allen key from the rear side of the right arm rest. Set the rotary knob (B2) of the deviating mirror insert to black dot. Switch on the bulb with the rotary knob (B1) of the regulating transformer resp. of the control unit.
Adjust the microscopic image as described under C 4.
Screw off the 2 hexagon socket screws (B8) with the Allen key and remove the IL filter-insert (B15).
Image the lamp filament in the specimen plane with rotary knob (B7).
Turn the two excenter sleeves (B3) with the Allen key and center the lamp filament.
Adjust as uniform an illumination as possible with rotary knob (B7) and fit the IL filter-insert.

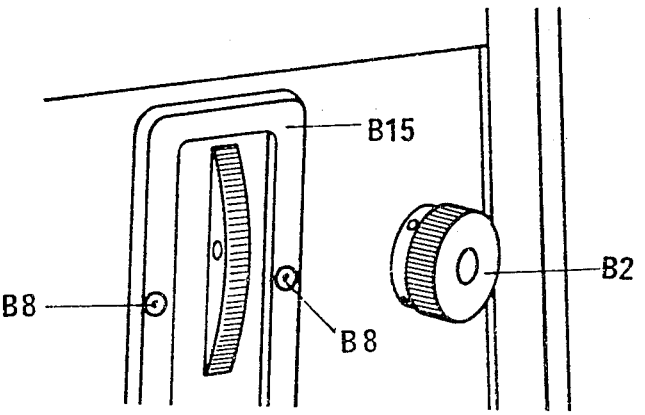




1.4. Deviating mirror insert

The deviating mirror insert is set by means of the rotary knob (B2). The following illumination settings can be made:

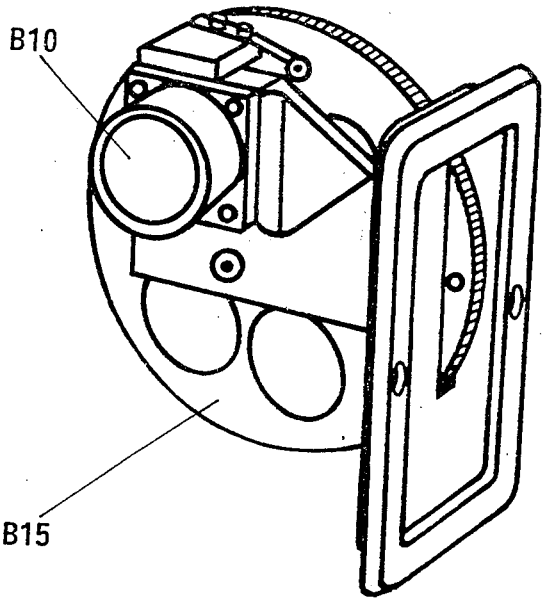
Red dot setting		Black dot setting
100 W LV lamp	TL	High-intensity lamp
High-intensity lamp	IL	100 W LV lamp



1.5.1. IL filter-insert

The filter insert (B 15) is built into the right side of the microscope stand. Its turret has six openings for the inseration of filters. A frosted glass has been provided in screw-off mount.

Marking	Filter	Reference No.
Red	Empty opening (UV barrier filter 2 GG 395)	49 32 32
White	Neutral filter N 3, T=12,5%	49 32 01
White	Neutral filter N 6, T= 1,6%	49 32 02
White	Neutral filter N 9, T= 0,2%	49 32 03
Green	Green filter BP 495-580	49 32 59
x	Cover disc	49 32 99



1.5.2. IL filter-insert 30 06 53 with 2 turrets

The lamp near turret is fitted with filters as described under 1.5.1. In the second turret neutral filters or colour filters with a diam. of 32mm may be inserted.

2. High-intensity lamp

Adjusting the burner

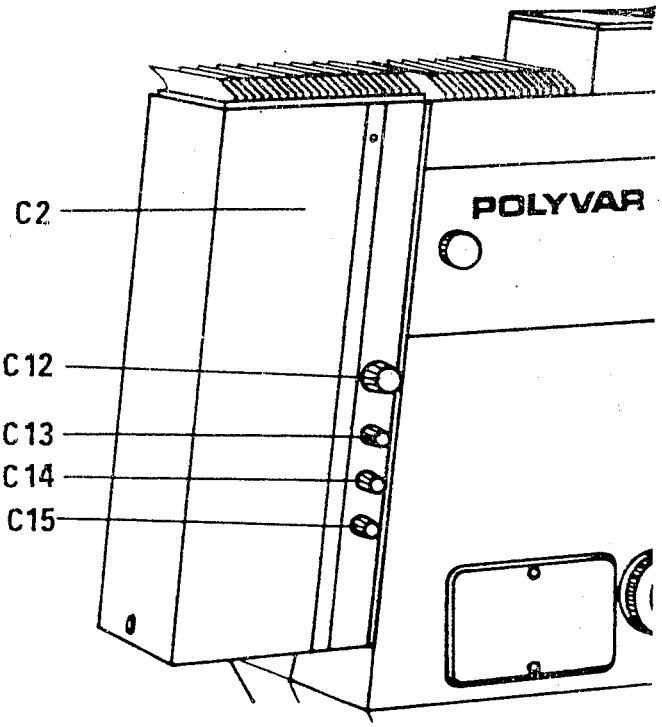
The following controls are positioned on the left side of the lamp housing (C2):

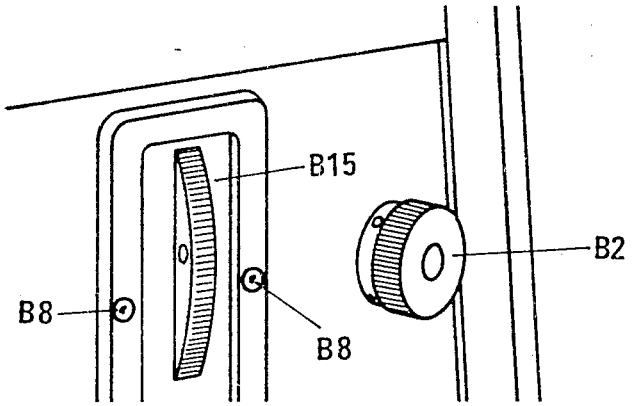
the rotary knob (C12) for adjusting the lamp collector
the adjusting knob (13) for vertical adjustment
the adjusting knob (C14) for horizontal adjustment and
the adjusting knob (C15) for axial adjustment of the burner.

With rotary knob (B2) set the deviating mirror insert to red dot. Switch on the burner with switch (C18 resp. C22) on the mains supply unit.

ATTENTION: 5 to 10 minutes after being switched on the mercury-vapour burner will reach its maximum brightness.
Adjust the microscopic picture as described under C 4.
Screw off the two hexagon socket screws (B 8) with the Allen key and remove the IL filter-insert (B 15).
Image the light-arc in the specimen plane with rotary knob (C12).
With the adjusting knob (C14) adjust the image of the light-arc so that it becomes distinctly visible close to its mirror image.
With the adjusting knob (C13) adjust the image and the mirror image so that they are at the same height and side by side.
With the adjusting knob (C 15) adjust that position in which both images are of equal size.
With the rotary knob (C12) sharply focus both images of the light-arc.
Turn the adjusting knob (C14) until the image of the light arc and its mirror image superimpose.

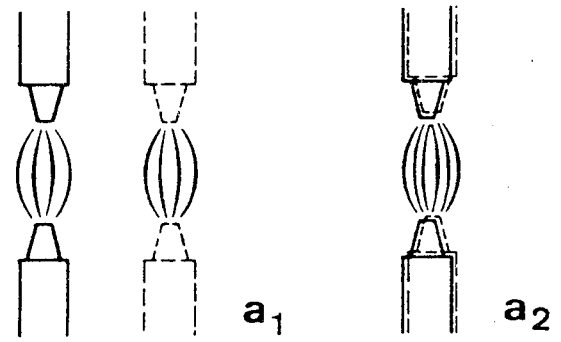
Adjust as even an illumination as possible with rotary knob (C12) and fit the filter insert.

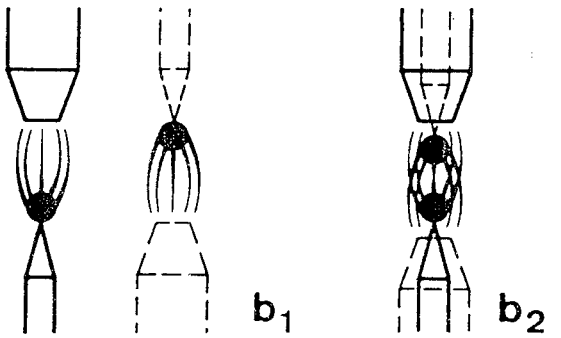




The adjacent figures show the image resp. the mirror image of the light arc of a super-pressure mercury vapour burner.

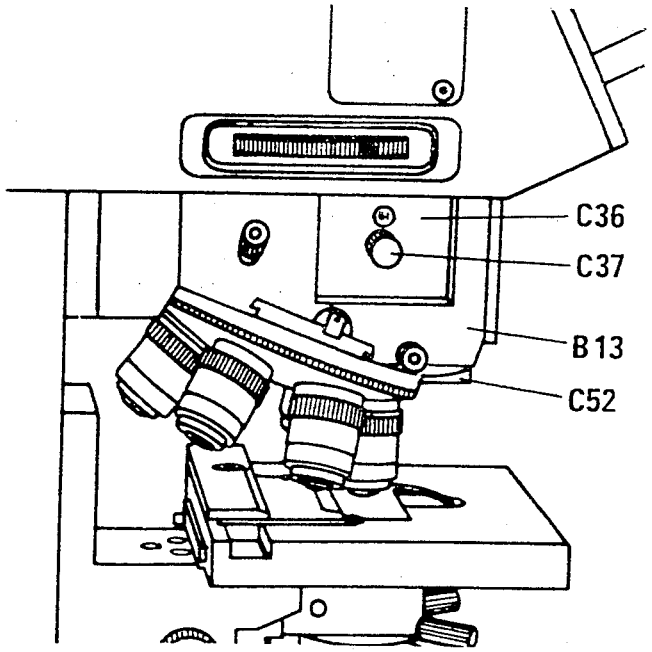
Fig. a_1 and a_2 shows the HBO 200 W/4 (alternating current)
Fig. b_1 and b_2 shows the HBO 200 W/2 (direct current)





3. IL modules

Every IL module is a unit carefully tuned to a specific method of examination.
After removing the cover the IL modules may be placed into the opening of the optics carrier (B 13) either from the left or the right side. The opening provides sufficient space for 2 IL modules.
The knurled button (C37) may be screwed either into the right or the left IL module, as required.
The module to be used is slit into the opening of the optics carrier until lock-in position.



3.1. The IL-brightfield module No. 30 06 43 (Designation "BF")

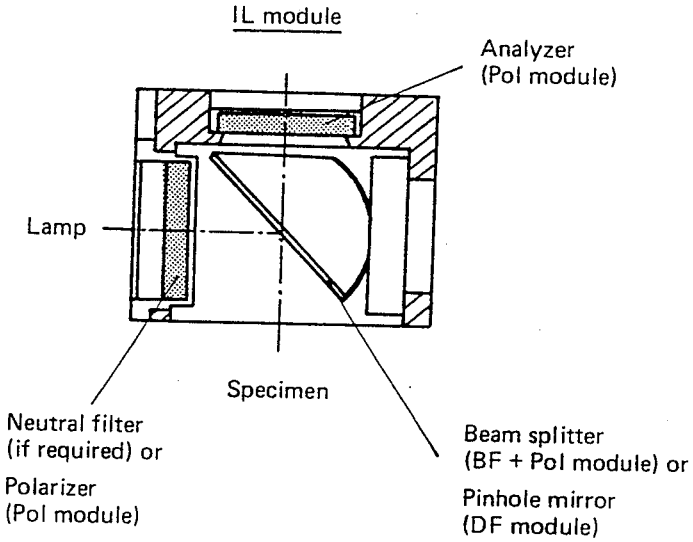
with illuminator-beam splitter 50%/ 50% is included in the standard outfit.
To reduce the brightness in comparing brightfield/darkfield examinations the supplied absorption filter (C38) should be inserted into the opening of the brightfield module turned to the lamp.

3.2. The IL-POL module No. 30 06 44 (Designation "POL")

with illuminator beam-splitter 50%/50%, fixed polarizer and filter analyzer is used for examinations with polarized light and interference contrast.
Objectives marked "np" (non polarizing) are suitable for brightfield examinations with polarized light and interference contrast, those marked "IK" for brightfield and interference contrast.
Compensators are slit into the slot (C52) of the optics carrier (B 13).

3.3. The IL-darkfield module No. 30 06 39 (Designation "DF")

with illuminator pinhole mirror 100%/100% is used with Plan-Epiobjectives for darkfield examinations. If the IL-modules (C36) are in the outer positions the ray-path is released for TL examinations.



4. Adjusting the microscopic image

Switch on the light source and set the rotary knob (B2) of the deviating mirror insert following the table shown hereunder.

Red dot setting		Black dot setting
100 W LV illuminator	TL	High-intensity illuminator
High-intensity illuminator	IL	100 W LV illuminator

Slide the BF module into the opening of the optics carrier (B13) until it locks in.

Lower coarse drive and place specimen on object stage.

Specimens which are not planeparallel are properly adjusted with a specimen mounting press and some plasticine. By means of the clamping device on the rod of the press, specimens of equal height easily may be obtained. For protection of the surface put a piece of paper on the specimen.

Swing-in objective Plan-Epi 10x.

Set the magni-changer (B18) to 0,8 or 1.

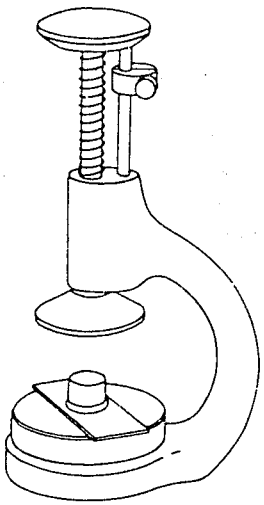
Insert the set pin (B19) of the beam splitter.

Sharply focus the specimen with the coarse and fine drives.

The adjustable drive stop of the coarse drive limits the height adjustment of the object stage by means of the coarse drive and facilitates, therefore, essentially the focusing of specimens of equal height.

After opening the clamping lever (B37) the object stage may be displaced in its guideway and the stop of the coarse drive be adjusted to the height of the specimen.

If required, insert neutral- or colour filters with filter turret (B9).



Diopter setting

a) Microscope POLYVAR-MET without photographic equipment:

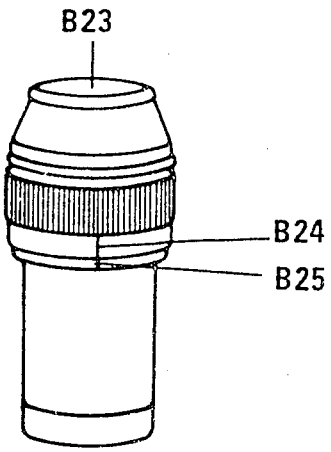
Set the white reference stroke (B24) on the right eyepiece opposite 0-diopter mark (B25). With the right eye look into the right eyepiece and sharply focus the microscopic image with the fine drive. Then look with the left eye into the left eyepiece and sharply focus the microscopic image by turning the eyelens.

Spectacle wearers may detach the eyecups (B25).

b) Microscope POLYVAR-MET with photographic equipment:

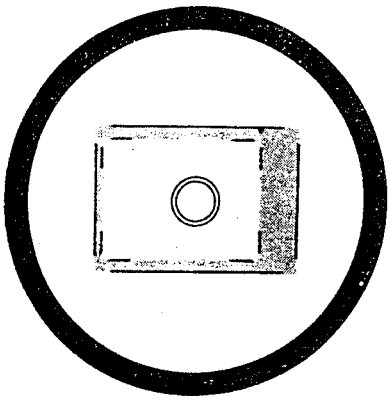
The focusing device is incorporated in the microscope. It is switched on with the key FRAME on the control unit (D6).

After swinging in the beam splitter (20% viewing tube, 80% camera) the setting ping (B19) is slit in – the luminous signs will be visible in the binocular viewing tube (B20).

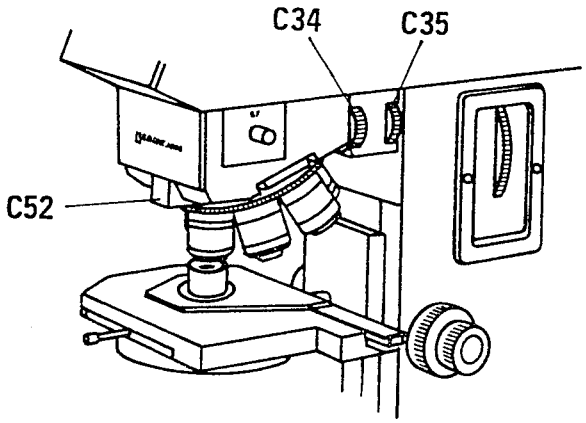


With knob (D 10) the brightness of these signs will be matched to that of the microscopic image. Without taking the microscopic image into consideration the eyelens mounts of the two WPK 10x eyepieces are rotated until in the left as well as in the right eyepiece the concentric circles are seen distinctly. Then the microscopic image is sharply focused with the fine control.

Close aperture-iris diaphragm (C35) until the microscopic image will be seen as clear and contrasty as possible.
This is usually the case when the anterior lens of the objective is brightly illuminated approximately to two thirds of its diameter (check with Bertrand lens).
Slightly open the field-iris diaphragm (C34) beyond the field-of-view.
Adjust uniform illumination of the object field by means of rotary knob (B 7) or (C 12).



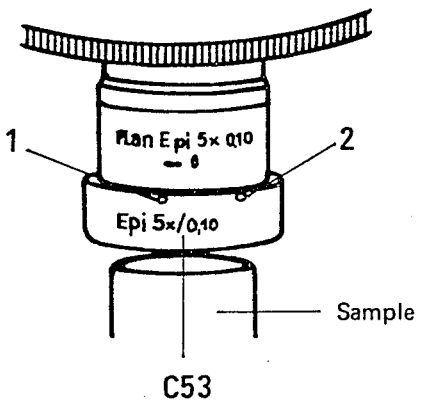
For examinations in darkfield resp. with polarized light the respective IL module is swung into the path-of-rays.
For darkfield examinations both the field diaphragm (C 34) and the aperture-iris diaphragm (C35) have to be opened.



4.1. Anti-reflex covers

Images essentially more contrasty may be obtained of weak or diffuse-reflecting specimens with objectives Plan 2x/0,04 and Plan Epi 5x/0,10 by using anti-reflex covers.

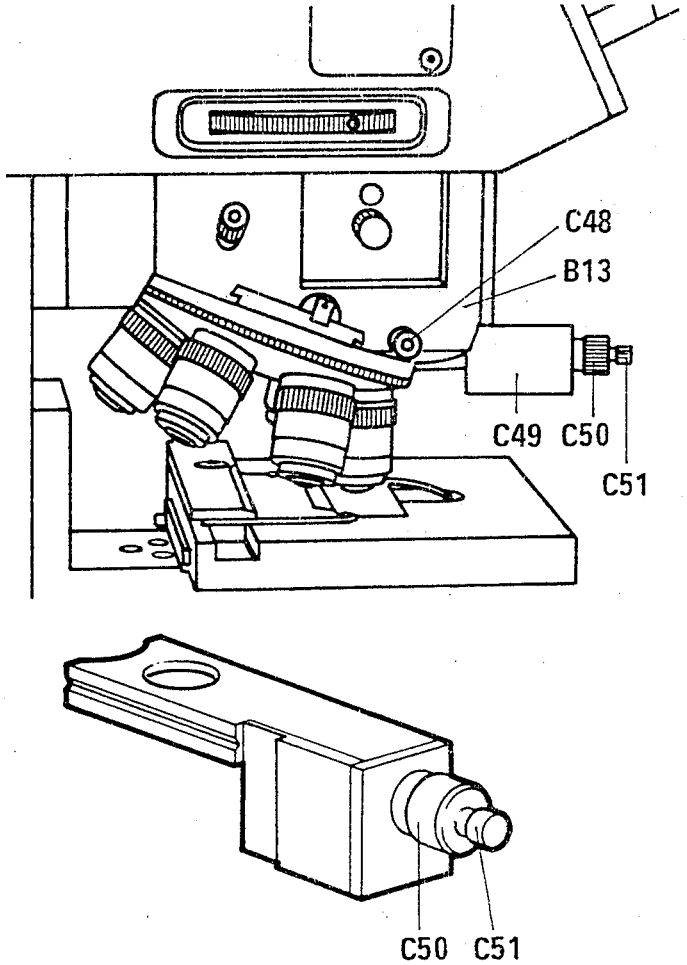
Application: put the anti-reflex covers (C35) on the objectives as shown on the opposite illustration.
Adjust the microscopic image with the IL-BF-module.
Swing the IL-POL-module in the path-of-rays and adjust the darkest object field by turning the anti-reflex cover.
Mark position of point 1 on the objective by means of a felt-tip.
Turn the anti-reflex cover until point 2 takes the position of point 1.



4.2. IL interference contrast

Objectives engraved with "IK" or "np" have to be used for examinations with interference contrast.

Slide the IL-POL-module in the raypath.
After unscrewing the screw (C48) by abt. 3mm slide the interference contrast insert (C49) from the front into the optics carrier instead of the filler.
The clamping screw (C48) acts as a fixation and when slightly unsrewed as a stop.
In action ..... slide IK insert up to the stop
Out of action ..... withdraw IK insert up to the stop
Even staining of the object field can be adjusted with knurled screw (C51).
Any desired colour- or grey tint may be adjusted with the knurled screw (C50).



4.3. Incident-light fluorescence

Remove the IL filter insert (B9) as described under C.1.3.
Screw off the frosted screen in mount (B10).
Remove the UV barrier filter 2 GG 395 (colourless) from the filter turret.
Attach the filter insert and set the turret to red dot. Adjust the microscopic image as described under C.4. Set the magni-changer to 0,8. Switch on the high-intensity lamp.
Swing the IL-fluorescence module in the raypath. Set the rotary knob (B2) to red dot.
Open field-iris diaphragm (C34) and aperture-iris diaphragm (C35) completely.
Adjust the most uniform illumination by means of rotary knob (C12).
Correct adjustment of high-intensity burner is described under C.2.

Incident-light fluorescence module

Marking Reference No.	U1 90 11 92	B1 90 11 91
Incident-light exciter filter	ultra-violet BP 330–380	blue BP 455–490
Dichroic mirror	DS 420	DS 500
Barrier filter	ultra-violet LP 418	blue LP 515

4.4. Transmitted-light illumination

4.4.1. Mechanical stages U 1 and U 2

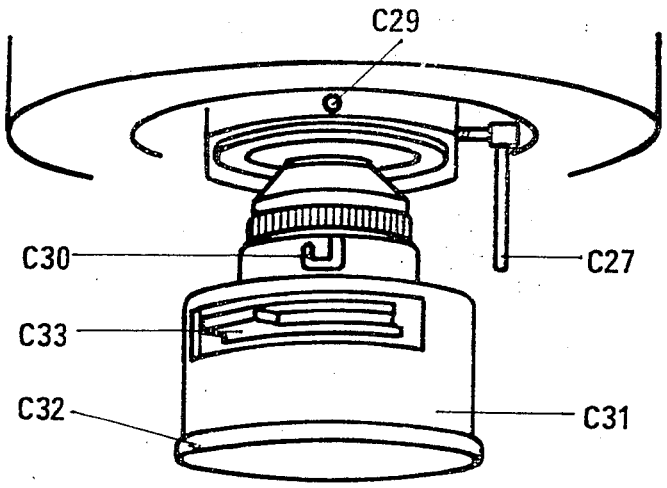
All examination methods for biological specimens with transmitted light may be realized with mechanical stages U 1 and U 2.

The manual for the POLYVAR microscope describes in detail how the accessories have to be mounted.

4.4.2. Mechanical stage A 3

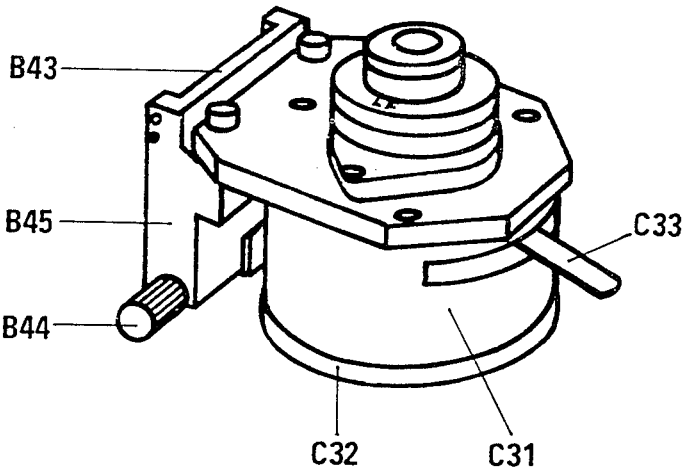
In the condenser carrier (C28) which is rigidly mounted on the stage carrier the widefield condenser (C31) is inserted from below and turned to the right.

NOTE. Take care of the orienting screw (C29) and slot (C30). Height adjustment by sliding the widefield condenser and fixing it with clamping lever (C27).



4.4.3. Mechanical stage A 4

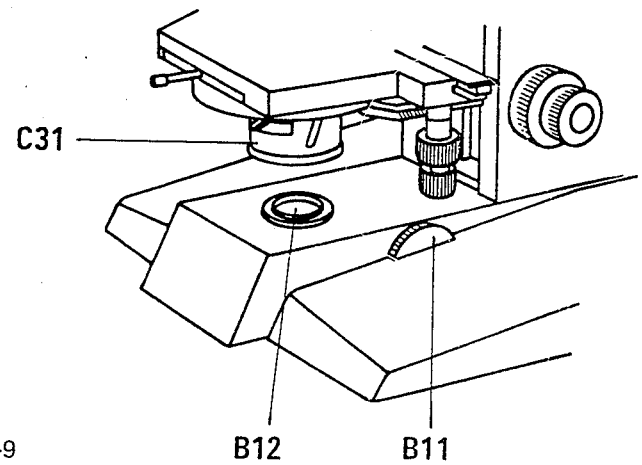
The widefield condenser has a changing device. To mount the condenser rack the condenser receptacle (B42) down to its lower stop position with control (B41). The knurled knob (B44) of the condenser quick changing device is turned anticlockwise up to the stop. Then hook the condenser carrier (B45) from above in the condenser receptacle (B42) press it down and clamp it tightly with the knurled button (B44). Height adjustment with control (B41).



Transmitted-light filter insert

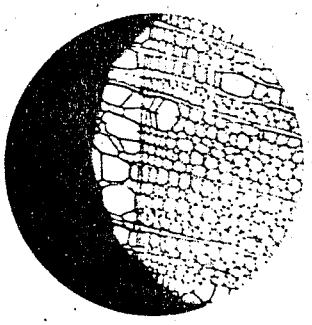
The transmitted-light filter insert which consists of a turret (B9) with openings for 6 filters is built into the right side of the microscope stand.

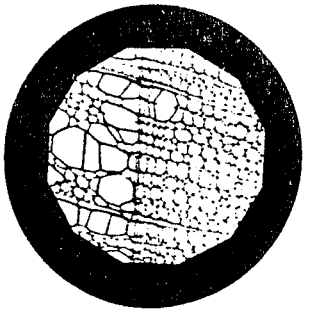
Marking	Filter	Ref.No.
Red	Empty opening	
White	Neutral filter N 3, T=12,5%	49 32 01
White	Neutral filter N 6, T= 1,6%	49 32 02
White	Neutral filter N 9, T= 0,2%	49 32 03
Green	Green filter 2 VG 14	49 32 12
Blue	Daylight conversion filter	49 32 41

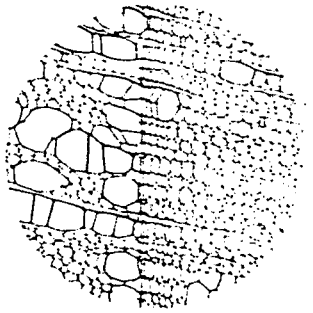


4.4.4. Adjusting the illumination of the surrounding field

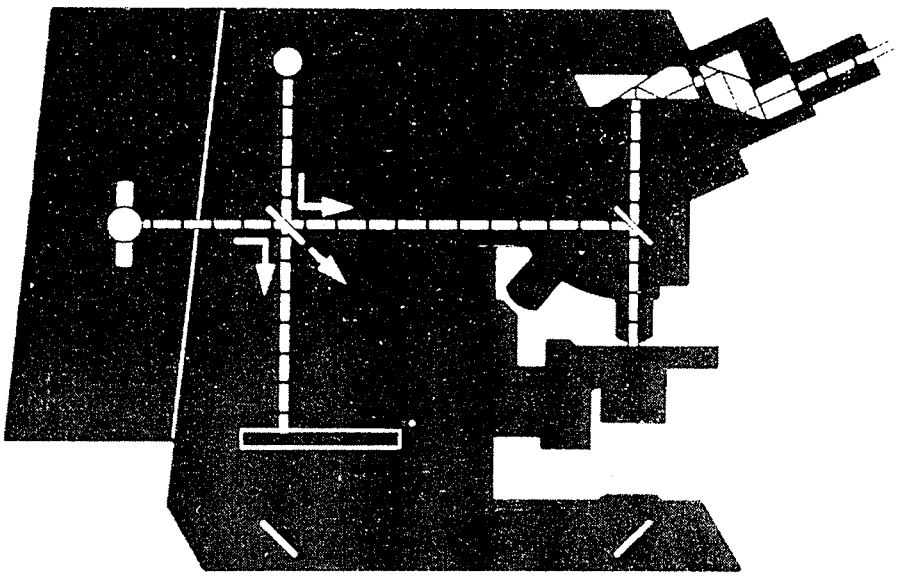
Swing in objective 10x.
Place a transparent specimen on the object stage and sharply focus with coarse and fine control.
Slightly close the field-iris diaphragm (with control B 11) and sharply focus it by raising and lowering the condenser.
Centre the field-iris diaphragm with the sliding lens (C32).
Then open the field-iris diaphragm slightly beyond the field of view with control (B11).
With the set pin (C33) close the aperture-iris diaphragm of the widefield condenser so far that the microscopic image appears as clear and contrasty as possible.
This is the case if the last lens of the objective is illuminated to abt. two thirds of its diameter (visible in the viewing tube if the eyepiece has been detached or the Bertrand lens been swung-in).
If necessary, swing in a colour- or neutral filter with the filter turret of the TL filter-insert (B9).







If the POLYVAR-MET is equipped with a high-intensity lamp the specimen may be examined simultaneously in incident- and transmitted light with inserted IL-BF module.
With red dot setting of the rotary knob (B2) the high-intensity lamp will serve as light source for incident light and the arc lamp as light source for transmitted light.



5. Photomicrography

Apart from a good quality of the specimen exact adjustment of the illumination and of the microscopic image are the prerequisites for obtaining satisfactory photomicrographic pictures. We, therefore, request you to study carefully the adjustments described in the preceding chapter before taking your photomicrographs.

Dirty objective front lenses are not only disturbing visual observation but are also responsible for poor photomicrographs low in contrast and resolution. For cleaning use a soft, lint- and grease-free cloth eventually moistened with alcohol.

5.1. Control unit

The control unit and the regulating transformer of the 100 W LV halogen lamp are switched on with the rotary knob (D7) on the front side of the control unit. The light-emitting diode "ON" as well as one of the two light-emitting diodes of the exposure time indication (D12) will light up.

When using films for artificial-light slides the rotary knob (D7) has to be set so that the light-emitting diode PHOTO likewise will light up. If daylight film or polaroid-pola-colorfilm is used do not forget to insert an equivalent conversion filter into the filter turret (B9).

The DIN-ASA knob (D11) adjusts the film speed within a range of 9—24 DIN resp. of 6—12800 ASA.

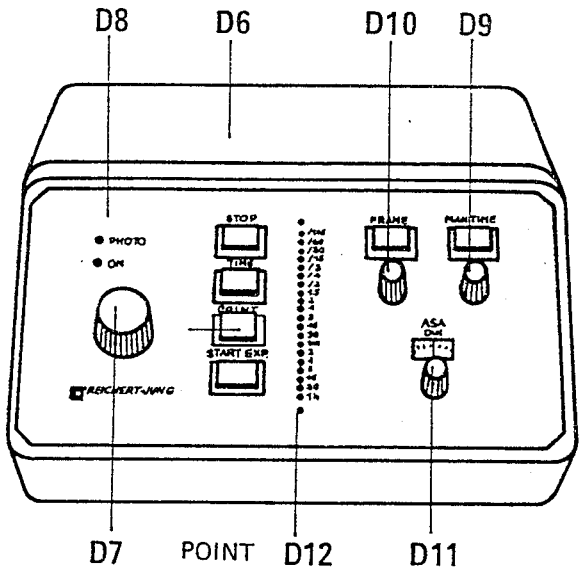
The exposure time is fully automatically measured and adjusted by the available light. It is shown by light-emitting diodes (D12). By altering intentionally the film speed exposure factors automatically will result.

Moreover any desired exposure time may be set by simply depressing the key "MAN.TIME" with knob (D9).

Point measurement is switched on with the rotary knob (D26) on the camera insert. The control lamp "POINT" will light up. The measuring field is the one which is within the double circle in the centre of the framing marks (this is valid for "POLYMATIC-P" only!)

The outer rectangle of the framing marks corresponds to the formats 24 x 36 mm and 4 x 5". The inner rectangle shows the image contents of the format 3 1/4 x 4 1/4". Note that this format is slightly displaced from the centre by the Polaroid cassette.

Before taking an exposure using the TIME key, the framing marks have to be switched off by depressing the FRAME key.



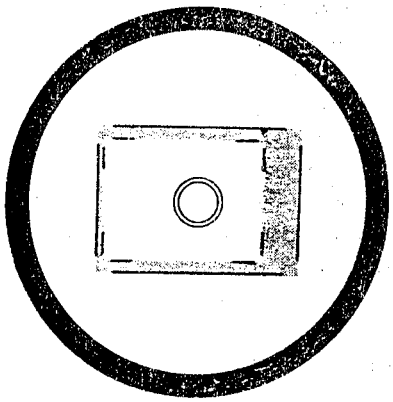
Press key	Function
STOP (red)	Interrupts the automatic exposure and closes the camera shutter.
TIME (yellow)	Opening or closing the camera shutter by pressing the key.
Possibility of long-time exposures (t > 1 hour) or of projection to a frosted screen.	
START EXP (green)	Start of the automatic exposure shown by light emitting diodes (D12).
When the upper red light-emitting diode lights up and therewith indicates an exposure time t ≦ 1/125 sec. the equipment is blocked, no exposure takes place. When the lower red light-emitting diode lights up and indicates an exposure time t > 1 hour, the shutter is openend by pressing the "START EXP" key but has to be closed again after exposure by pressing the "STOP" key.	
FRAME (yellow)	The brightness of the luminous signs may be matched to the microscopic image with knob (D10).
During the exposure the focusing device is switched off.	
MAN TIME	is used in those special cases where the automatic exposure time is altered manually with knob (D9).

On request:

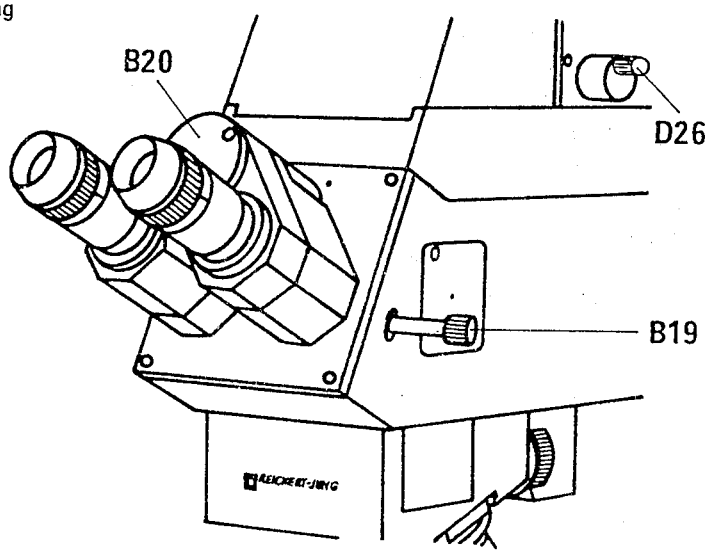
POINT (control lamp	Lights up when point measurement is swtched on. Change-over switch (D26) on microscope.

5.2. Focusing device

The focusing device is integrated in the microscope. It is switched on with the key "FRAME" of the control (D6). After swinging in the beam splitter (20% viewing tube, 80% camera) the setting ping (B 19) is slit in – the luminous signs will be visible in the binocular viewing tube (B 20). With knob (D 10) the brightness of these signs will be matched to that of the microscopic image. Without taking the microscopic image into consideration the eyelens mounts of the two WPK 10x eyepieces are rotated until in the left as well as in the right eyepiece the concentric circles are seen distinctly. Then the microscopic image is sharply focused with the fine control. The framing marks are matched to the camera system (camera factor).



With stages U2 and A3 the object may be adapted to the image area by turning the stage after opening the clamping lever (B37).

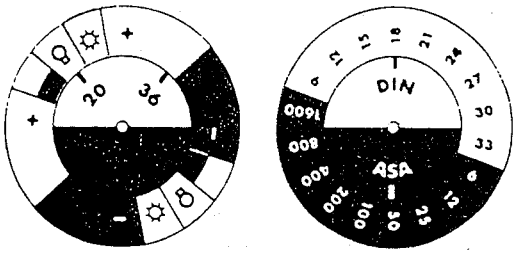


5.3. Film changing cassette

The front of the film changing cassette (D20) has two dials to mark the film data.
The right dial shows the DIN–ASA scales, the left one additional data such as:

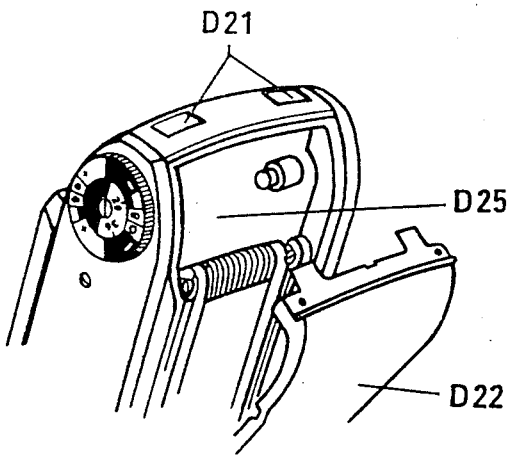
■	black and white film
💡	indoor (artifical light) color film
☼	daylight color film
+	positive (reversal) film
–	negative film
20 - 36	number of frames

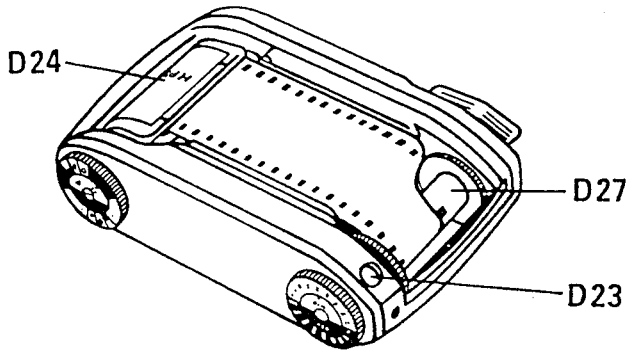
The illustration alongside shows the following setting: Tungsten-light colour reversal film with 20 exposures, film speed 18 DIN resp. 50 ASA.



5.3.1. Opening the film changing cassette

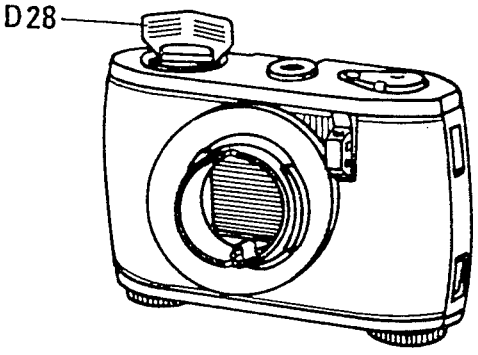
Press down the two locking keys (D21) on the film changing cassette and remove the cassette back (D22) which springs open. The frame counter (D23) which is visible through the magnifier automatically resets to the start position "A" when the cassette back (D22) is opened.





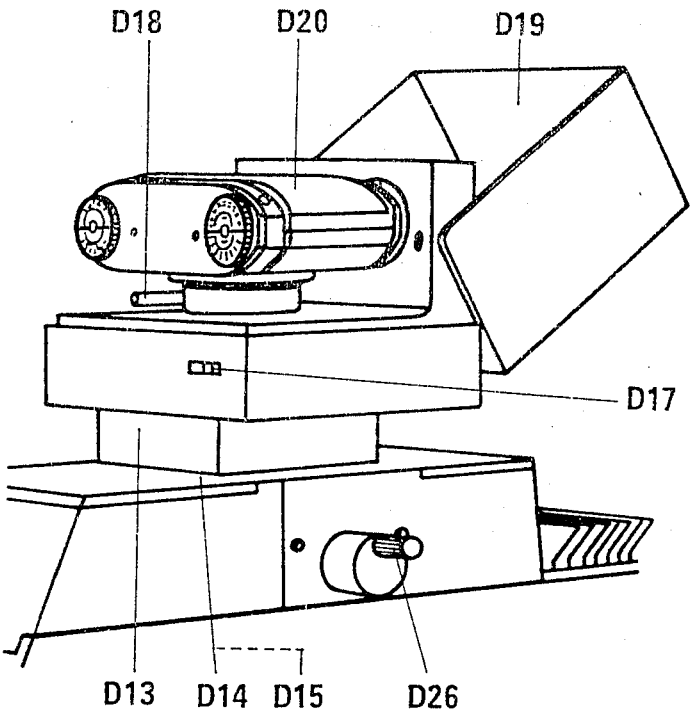
5.3.2 Loading the film changing cassette

Put the film cartridge (D24) in the cartridge chamber (D25) with the perforated side forward. The film leader is inserted in the slot of the takeup spool (D27) and is hung on the tooth with the second perforation hole. Then the takeup spool is turned by its knurled ring until the film is tightened and the teeth of the transport wheel fully engage with the film perforations. The cassette back (D22) is inserted in the groove of the housing and closed by pressing it upward in direction to the locking keys.
The film is advanced with the rapid transport key (D28) until the number "1" appears in the frame counter (D23) and the key shows upward.



5.3.3. Placing the film changing cassette into the camera basic body

Turn the clamping lever (D 18) of the basic camera body (D 13) to the right up to the stop. The cassette transport key (D28) unfolded and vertical to the film plane is set into the camera basic body in oriented position to the driving cam (D 16) of the automatic film transport; at the same time the cassette shutter is opened. The cassette is fixed by turning the clamping lever (D 18) to the left. With the push-button the frame counter (D 17) on the camera basic body can be reset to "000". After every exposure the film is transported automatically and the number of already made exposures shown on the frame counter.



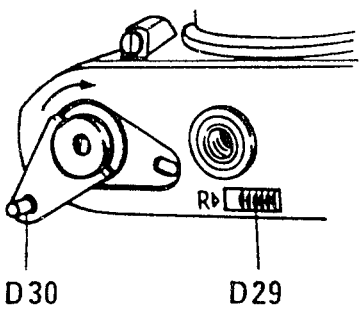
5.3.4. Unloading the film changing cassette

When the whole film has been exposed a red dot will appear in the film counter (D23) of the film changing cassette after 20 or 30 exposures. A slipping clutch between the transport motor and the driving cam (D 16) will prevent torn preforations whenever transports are being made beyond the above number of exposures. When the typical noise occasioned by the slipping clutch will be heard put the equipment out of action with the rotary knob (D 7).

After the film changing cassette has been removed from the camera basic body the exposed film must be re-wound into the cartridge. For that purpose slide the locking lever (D29) in direction of the arrow "R" so that the film rewind crank (D30) jumps up. After unfolding the drank the film may be rewound.

A slight resistance will be felt when the film is released from the takeup spool. The crank is then folded back into its rest position and the locking slide jumps back to "R". After opening, the film changing cassette the film cartridge can be removed.

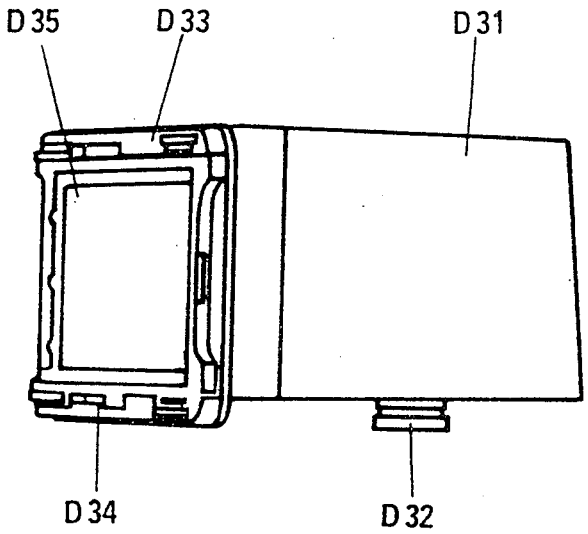
We recommend to detach the film changing cassette at first and later on the camera basic body as otherwise one frame of the film is exposed automatically when detaching the complete automatic miniature camera.



5. Large format camera

The large format camera consists of

the camera housing (D31)
the objective sleeve (D32)
a deviating mirror system
the international camera back (D33)
the frosted screen (D35) with springback device (D34).



After removing the protective cap (D4) turn the clamping screw (D3) of the camera insert (D1) in anticlockwise direction up to the stop.
The camera housing (D31) is fitted to the opening (D2) provided in correct orientation and fixed with the clamping screw (D3).
Focus the microscopic image with the focusing device (see page D–2, para 3). The image may be focused also by means of the frosted screen (D35).
To observe the image on the frosted screen the camera shutter has to be opened with the "TIME" key.

5.1. International camera back

With the springback device (D34) the following cassettes can be used on the international camera back (D33):

double cassette, for sheet films 4 x 5" (No. 85 00 07)
double cassette, for sheet films 9 x12" (No. 85 00 06)
Polaroid sheet film cassette 4 x 5" (No. 85 00 11)
Polaroid filmpack cassette 3 1/4 x 4 1/4" (No. 85 00 20).

All these cassettes may be inserted underneath the frosted screen (D35). For that purpose the frame of the screen is slightly raised against the spring and the cassette inserted between the camera back and the frosted screen.

Polaroid filmpack cassette 3 1/4x4 1/4" (No.850020) (No. 85 00 20)

This cassette may be fitted on the international camera back only after having removed the frosted screen frame (D35). For that purpose the two springy straps of the springback device (D34) which are on the frosted screen are depressed. Then the frame is slit to the right and can be removed.
The cassettes are fitted with two slides marked "off".

A swing-out and detachable light hood (No. 16 06 21) is available.

6. Optical data

Incident-light widefield objectives

Correction–Magnification of objective V_{Obj}	Numerical aperture N.A.	Free working distance in mm	Order number
Plan 2x	0,04	5,3	*24 81 01*
Plan Epi 5x	0,10	3,9	*24 82 02*
Plan Epi 10x	0,20	5,0	*24 84 02*
Plan Epi 20x	0,40	2,5	*24 85 02*
Plan Epi 50x	0,70	0,50	*24 87 02*
Plan Flour 100x	0,95	0,12	*29 70 01*
Plan Oel 100x	1,25	0,14	*24 90 01*
Plan Epi 10x IK	0,20	5,0	*24 84 52*
Plan Epi 20x IK	0,40	2,5	*24 85 52*
Plan Epi 50x IK	0,70	0,50	*24 87 52*
Plan Fluor 100x IK	0,95	0,12	*29 70 51*
Plan Oel 100x IK	1,25	0,14	*24 90 51*

Widefield plane compensating eyepieces

Correction–eyepiece magnification V_{Ok}	Field of view number S_{FZ} in mm	Field of view diameter S in mm	Angle of view	Eye relief in mm	Measuring constant K in um	Order number
WPK 6,3 x	24,0	151	33,5	17,5		*91 11 08*
WPK 10 x	24,0	240	51	17,5		*91 11 06*
WPK 16 x	15,5	248	52	16		*91 11 09*

Microscope magnification V_{Mikr}
Diameter of the field of view D (in mm)

Magnification of the intermediate image $V_{Obj} \cdot q$				Microscope magnification $V_{Mikr} = V_{Obj} \cdot q \cdot V_{Ok}$			Field of view diameter (in mm) $D = S_{FZ} / V_{Obj} \cdot q$		
0,8x	V_{Obj}	1,25 x	2,0 x	Eyepiece magnification V_{Ok}			Eyepiece magnification V_{Ok}		
				6,3 x	**10 x**	**16 x**	**6,3 x**	**10 x**	**16 x**
1,6x				10x	16x	25x	15	15	9,7
	2x			12,5x	20x	32x	12	12	7,75
		2,5x		16x	25x	40x	9,6	9,6	6,2
4x			4x	25x	40x	63x	6,0	6,0	3,88
	5x			32x	50x	80x	4,8	4,8	3,1
		6,3x		40x	63x	100x	3,81	3,81	2,46
8x				50x	80x	125x	3,0	3,0	1,94
	10x		10x	63x	100x	160x	2,4	2,4	1,55
		12,5x		80x	125x	200x	1,92	1,92	1,24
16x				100x	160x	250x	1,5	1,5	0,97
	20x		20x	125x	200x	320x	1,2	1,2	0,78
		25x		160x	250x	400x	0,96	0,96	0,62
40x			40x	250x	400x	630x	0,6	0,6	0,39
	50x			320x	500x	800x	0,48	0,48	0,31
		63x		400x	630x	1000x	0,38	0,38	0,25
80x				500x	800x	1250x	0,3	0,3	0,19
	100x		100x	630x	1000x	1600x	0,24	0,24	0,16
		125x		800x	1250x	2000x	0,19	0,19	0,12
			200x	1250x	2000x	3200x	0,12	0,12	0,08

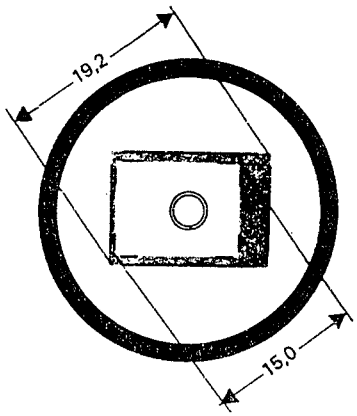
Magnification in the film plane M_{Cam}

Object field diagonal D' (in mm)

Magnification of the intermediate image $V_{Obj} \cdot q$				Automatic miniature camera · p 2,25x		Large format camera · p 8x		
					B' (mm) 43,3		4 x 5" B' (mm) 153,6	31/4x41/4" B' (in mm) 120,0
0,8x	V_{Obj}	1,25x	2,0x	M_{Cam}	D'	M_{Cam}	D'	D'
1,6x	2x	2,5x		3,6x	12,03	12,8x	12,00	9,38
				4,5x	9,62	16x	9,60	7,50
				5,6x	7,73	20x	7,68	6,00
4x	5x	6,3x	4x	9x	4,81	32x	4,80	3,75
				11,3x	3,83	40x	3,84	3,00
				14,2x	3,05	50x	3,07	2,40
8x	10x	12,5x	10x	18x	2,40	64x	2,40	1,88
				22,5x	1,92	80x	1,92	1,50
				28,1x	1,54	100x	1,54	1,25
16x	20x	25x	20x	36x	1,20	128x	1,20	0,94
				45x	0,96	160x	0,96	0,75
				56,2x	0,77	200x	0,77	0,60
40x	50x	63x	40x	90x	0,48	320x	0,48	0,38
				112x	0,38	400x	0,38	0,30
				142x	0,31	500x	0,31	0,24
80x	100x	125x	100x	180x	0,24	640x	0,24	0,19
				225x	0,19	800x	0,19	0,15
				281x	0,15	1000x	0,15	0,12
			200x	450x	0,10	1600x	0,10	0,08

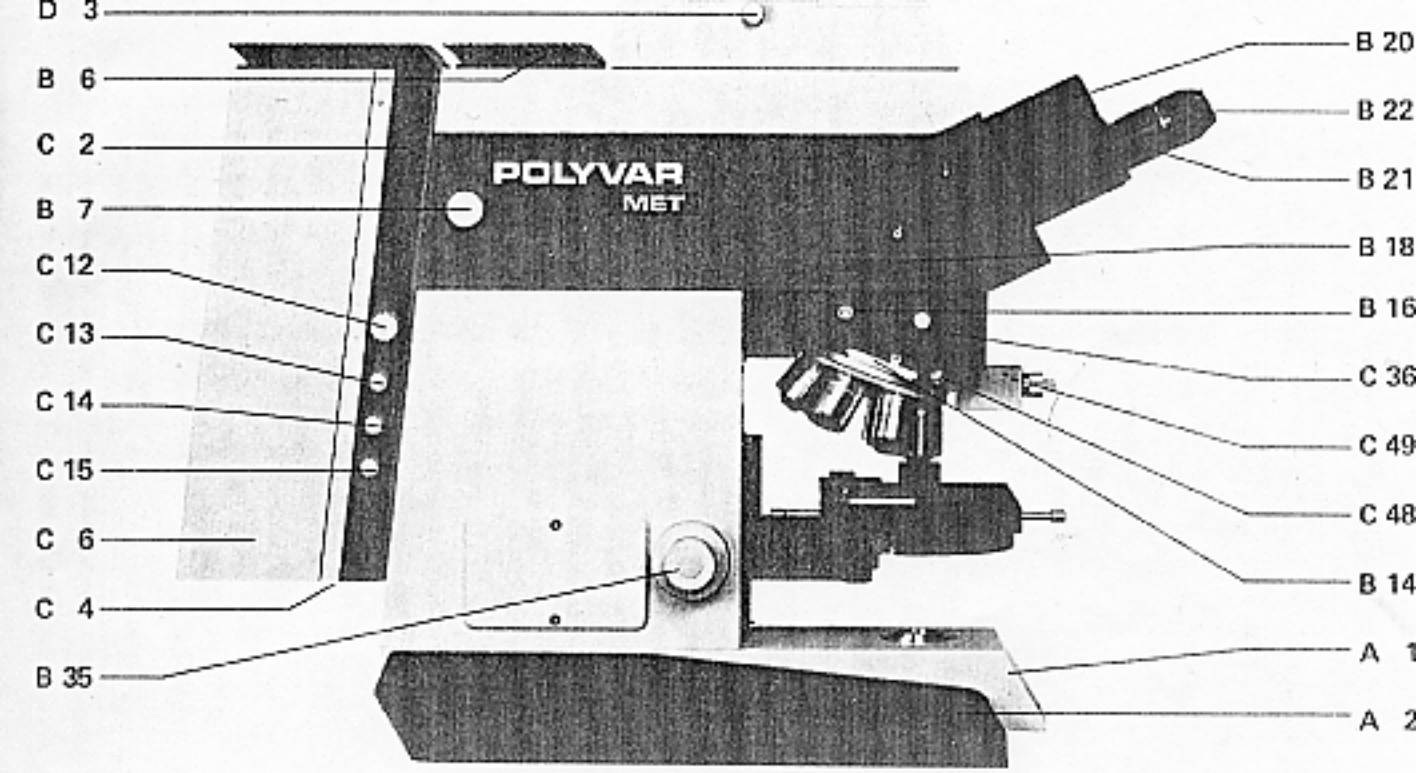
Camera data

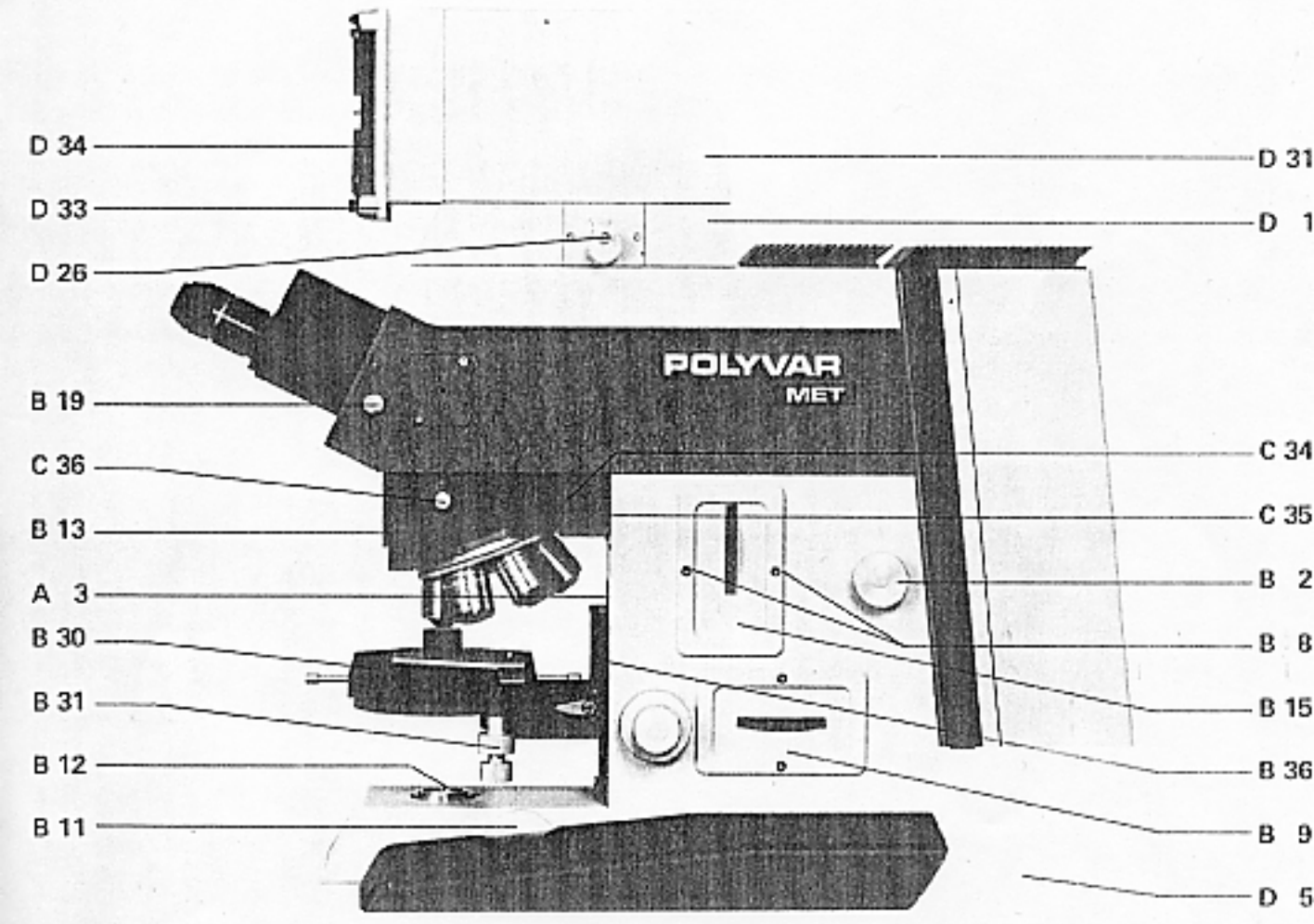
	Film format diagonal B' (in mm)	Camera factor p	Image field no. B_{FZ}
Automatic miniature camera 24 x36 mm	43,3 mm	2,25x	19,2 mm
Large format camera Double cassette 4 x 5" 95,25 x 120,65	153,6 mm	8x	19,2 mm
Large format camera Polaroid 4 x 5" 89 x114 mm	144,6 mm	8x	18,1 mm
Large format camera Polaroid 3 1/4 x 4 1/4" 73,03 x 95,25	120,0 mm	8x	15,0 mm



No.	Description
A 1	Microscope stand
A 2	Arm rests
A 3	Red screw
B 1*	Rotary knob of the regulating transformer (C–1)
B 2	Rotary knob of the deviating mirror
B 3*	Excentric sleeve (C–2)
B 4*	Lamp holder clips (C–2)
B 5*	LV halogen bulb (C–2)
B 6	Vent collar
B 7	Rotary knob for the displacement of the bulb and collector
B 8	Screws for incident-light filter-insert
B 9	Turret for transmitted-light filter insert
B 10*	Turret for incident-light fluorescence filter insert
B 11	Control of the field-iris diaphragm
B 12	Light exit-opening
B 13	Optics carrier
B 14	Objective nosepiece 6x on changer
B 15	IL filter-insert
B 16	Claming screw
B 18	Turret of the magnification changer
B 19	Setting pin of the beam splitter
B 20	Binocular viewing tube
B 21	Eyepiece sleeves
B 22	Widefield plane compens. eyepiece
B 23*	Eye cups (B–2)
B 24*	White reference stroke of the eyepiece (B–2)
B 25*	O–Diopter mark
B 29*	Specimen holder for IL specimen (B–1)
B 30	Square mechanical stage
B 31	Coaxial controls
B 32*	Specimen holder (B–1)
B 33*	Fixed jaw (B–1)
B 34*	Spring loaded finger (B–1)
B 35	Coaxial coarse and fine controls
B 36	Stage carrier
B 37*	Clamping lever (B–1)
B 38*	Stage rotation clamping lever (B–1)
B 39*	Coin slot screw (B–1)
B 40*	Dovetail for the stage carrier (B–1)
B 43*	Condenser quick-changing device (C–9)
B 44*	Knurled knob (C–9)
B 45*	Condenser carrier (C–9)
C 1*	Centring excentrics (B–4)
C 2	Lamp housing
C 3*	Clamping portion (B–4)
C 4*	Screw (B–4)
C 5*	Screw (B–6)
C 6	Lamp housing back
C 7*	Headless screw (B–6)
C 8*	Adapter (B–6)
C 9*	Knurled screw (B–6)
C 10*	Cable shoe (B–6)
C 11*	Bipartite protective cover (B–6)
C 12	Rotary knob
C 13	Adjusting knob
C 14	Adjusting knob
C 15	Adjusting knob
C 16*	Heating ray barrier filter (B–6)
C 17*	Mains supply unit (B–4)
C 18*	Toggle switch (B–4)
C 19*	Safety starter (B–4)
C 20*	Mains supply unit (B–5)
C 21*	2 plugs (B–5)
C 22*	Toggle switch (B–5)
C 25*	Plug (B–5)
C 26*	Hour counter (B–5)
C 27*	Clamping lever (C–9)
C 28*	Condenser carrier fix
C 29*	Orienting screw (C–9)
C 30*	Orienting slot (C–9)
C 31*	Widefield condenser (C–9)
C 32*	Sliding lens (C–9)
C 33*	Aperture iris diaphragm (C–9)
C 34	Control of the field-iris diaphragm
C 35	Control of the aperture-iris diaphragm
C 36	Incident-light module
C 37*	Knurled button (C–5)
C 38*	Absorption filter for BF-module (C–5)
C 48	Clamping screw
C 49	IC mains prism
C 50*	Knurled screw (C–8)
C 51*	Knurled screw (C–8)
C 52*	Opening for IC mains prism (C–7)
C 53*	Anti-reflex cover (C–7)
D 1	Camera insert
D 2*	Opening for taking a camera (B–7)
D 3	Clamping screw
D 4*	Cover (B–8)
D 5	Cables
D 6*	Control unit (B–7)
D 7*	Rotary knob of control unit (C–11)
D 8*	Light emitting diodes (C–11)
D 9*	"MAN TIME" knob (C–11)
D 10*	"FRAME" knob (C–11)
D 11*	"DIN–ASA" knob (C–11)
D 12*	Light emitting diodes (C–14)
D 13*	Camera baic body (B–8)
D 14*	Objective sleeve (B–8)
D 15*	Orienting pin (B–8)
D 16*	Driving cam (B–8)
D 17*	Frame counter (B–8)
D 18*	Clamping lever (D–2)
D 19*	Swing-up cover (B–8)
D 20*	Film changing cassette (B–8)
D 21*	Locking keys (C–13)
D 22*	Cassette back (C–13)
D 23*	Frame counter (C–13)
D 24*	Film cartridge (C–13)
D 25*	Cartridge chamber (C–13)
D 26	Change-over switch for point measurement
D 27*	Take-up spool (C–13)
D 28*	Transport key (C–13)
D 29*	Locking lever (C–14)
D 30*	Film rewind crank (C–14)
D 31	Camera housing
D 32*	Objective sleeve (C–15)
D 33	International camera back
D 34	Springback device
D 35*	Frosted screen (C–15)
T 1*	Cover plate (B–10)
T 2*	Screw (B–10)
T 3*	Terminal (B–10)
T 4*	5-pin plug (B–10)
T 5*	10-pin plug (B–10)
T 6*	2-pin plug (B–10)
T10*	Knurled screw (B–11)
T11*	Motor (B–11)
T12*	LED,green (B–11)
T13*	Keyboard (B–11)
T15*	Window (B–12
T16*	Position switch IMMERSION (B–12)
T17*	Position switch CONDENSER (B–12)

*) This part, e.g.(B 1) is not shown in the adjacent picture. You will find it on page (C–1) of the instruction manual.


D 3
B 6
C 2
B 7
C 12
C 13
C 14
C 15
C 6
C 4
B 35
B 20
B 22
B 21
B 18
B 16
C 36
C 49
C 48
B 14
A 1
A 2
POLYVAR
MET


D 34
D 33
D 26
B 19
C 36
B 13
A 3
B 30
B 31
B 12
B 11
D 31
D 1
C 34
C 35
B 2
B 8
B 15
B 36
B 9
D 5
POLYVAR
MET