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JENA

ZEISS
JENAPOL

Polarizing Microscopes

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Gebrauchsanleitung
Инструкция по эксплуатации
Operating instructions
Mode d'emploi
Instrucciones para el uso

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Table of Contents

1. Introduction

Using this instruction manual presupposes the knowledge of the fundamentals of microscopy and photomicrography and, moreover, of the working methodsand dissecting techniques required for special fields of microscopy.

2. Unpacking and installation

- In case of great temperature differences between transport and the place of installation, unpack only after a 24-hour temperature equalization period.
- Place foamed plastic container so that the inscription can be read. Remove the adhesive tape, take off the cover.
- Take stand (14) out of container and set it up.
- Mount phototube pol (22) onto stand (4), push it to the rear until an audible stop is heard, and tighten clamping screw (23) by means of special wrench, model B.
- Attach binocular tube pol (43) and clamp it in position by means of screw (21).
- Attach stage carrier (34) with condenser guideway so that it is flush with the upper edge of the dovetailed slideway, and fix clamping screw (33) using special wrench B.
- Mount stage insert and object traverser (51).
- Equip revolving nosepiece (75) with objectives (observing the objective assignment to the respective apertures, cf. p. 27), attach it, and clamp it to the left side by means of screw (4).
  Prior to attaching the revolving nosepiece to, or removing it from, the JENAPOL u, turn Berek prism back to upper stop by means of control (5).
- Attach condenser support (57) with condensers, and clamp it in position by tightening clamping screw (36). Attach support to focussing control in such a way that, first of all, the left edge engages into the guideway. Then make the

right edge approach the contact surface so that clamping screw (36) can be securely screwed into the respective notch. Observe that there is a locating pin at the contact surface, which has to engage into a groove in the locating surface.

- Insert the eyepieces.
- Insert the polarizers for incident light (44) and for transmitted light (58).
- Pull slide for attenuation filter (1) out of analyzer slide, placing, to this end, arresting lever into a horizontal position by actuating rotary knob, and provide it with attenuation filter d or a, as required.
- Loosen screw of analyzer slide (2) stop with special wrench B, push in analyzer slide (2) from the right, and screw on stop again.
- Insert slide for attenuation filter again.
- Insert aperture diaphragm slide for incident light (24).
- Insert field diaphragm slide for incident light (25).
- Use special wrench B to take filter changer (10) out of lamp housing (12), and equip it with filters (cf. 5).
- Loosen knurled screw (16) on lamp housing back panel, detach the latter, unscrew lamp's angular holder (71) with the aid of special wrench B, and take it out.
  After introducing the lamp (72) up to the stop of the lamp support (70), insert angular holder by considering the locating pins, and close the lamp housing. In doing so, take care not to touch the glass bulb of the lamp with the fingers.
- Attach arm rests (38).

3. Operation

3.1. Starting the completely assembled instrument

- Insert mains plug into socket.
- Turn lamp voltage rotary knob (29) to the right (switch-on and brightness setting).

- Set toggle switch (13) to transmitted light source.
- Open transmitted light field diaphragm (32), transmitted light aperture diaphragm (56) and tube iris diaphragm (45). Rod (19) for the 1.6X objective is pushed in.
- Bring condenser 0.95 into a position close to stage.
- Place centring plate 76 x 26 onto stage.
- Set diopter setting rings (42), cf. 3.4.
- Switch in objective 20X/0.40 oo/0.17 pol and focus it onto centring plate.
- Use centring wrench to centre objectives relative to rotary stage centre (see par. 6), move condenaer pinion head (8) until field diaphragm is sharply depicted in object plane, and then turn stop screw (35) of condenser guideway upward to the stop.
- Place Bertrand lens (29) into optical path and focus. Close transmitted light aperture diaphragm (56) and centre it with screws (55), remove Bertrand lens from optical path.
- Set toggle switch (13) to incident light source.
- Switch in plane glass illuminator (3).
- Centre incident light field diaphragm (25).
- Place Bertrand lens (20) into optical path, and centre incident light aperture diaphragm (24).
- Open field and aperture diaphragms in accordance with field and pupil sizes.

3.2. Transmitted light examinations

- Set lamp selector toggle switch (13) to transmitted light source.
- Swing in low-power condenser, if objectives $\leq$ 10X are intended tp be used.
- Exchange condenser 0.95 for low-power condenser 0.20 by

depressing lever (7) with the left thumb downward to the stop. Condenser 0.95 is unlatched and movesdownward to the stop. Swing out condenser 0.95 to the left up to the atop.

- According to the kind of specimen attach the revolving nosepiece with objectives with cover glass correction or without.
- The object traverser (51) is mounted on rotary stage (52).
- Berek priam (5) and plane glass illuminator (3) are removed from the optical path (check with Bertrand' lens).
- The 1.6X objective (19) is, for the time being, removed from the path of raye.
- The push-pull rod (46) for switching over to the photographic path of rays is set to "visual observation".
- The analyzer slide (2) is set to "analyzer" or "free passage" (not to "angular reading"), the mide-position detent (41) is not effective (cf. par. 8).
- The Bertrand lens (20) is removed from the optical path.
- The screw for clamping the rotary stage and setting the 45° detent (6) is loose, for the moment; loosening should be made only in one detent position.

3.3. Incident light examinations

- Turn lamp selector toggle switch (13) to incident light source.
- Attach revolving nosepiece with oo/O objectives.
  Doing this, Berek prism and plane glass illuminator are removed from the optical path.
- Switch Berek prism (5) or plane glass illuminator (3) into the optical path.
- The 1.6X objective (19) is removed from the optical path.
- The push-pull rod for switching over to the photographic path of rays (46) is set to "visual observation".
- The analyzer slide (2) is set to "free passage".

- Remove transmitted light polarizer (37) from optical path. In the case of very high objects remove condenser support (57), if required, lower stage carrier in guideway to lower stop after loosening clamping screw (36) and removing atop screw, so that the stage height can be adapted to the thickness of the incident light specimen.
- Turn incident light polarizer with knurled screw up to the stop; the "0" is positioned in the centre.

3.3.1. Plane glass illuminator

The plane glass illuminator is required for the observation of fine structured specimen but is less suited for polarization-optical measurements, since, in this case, the degree of polarization will be falsified.

3.3.2. Berek prism

Working with the Berek prism requires the aperture diaphragm to be adjusted asymmetrically, i.e. the margin of the image of the aperture diaphragm narrowed down to at least 50% of the objective's entrance pupil contacts the edge of the Berek prism in the optical axis. For this adjustment the Bertrand lens is inserted into the optical path. For microscopic polarization examinations and measurements it is necessary - to limit the illumination aperture to between 0.12 and 0.15. To this end, for each objective the diameter of the aperture diaphragm image is to be set so as to be equal to one eightth of the maximum pupil diameter divided by the objective aperture.

The Berek prism is well suited for polarization-optical examinations in incident light. However, in the vertical direction to the prism edge only half the aperture is utilized and thus, a corrspondingly lower resolution is attained.

3.4. Compensation of visual defects by means of the diopter setting ring

When carrying out microscopic examinations without using spectacles, it is necessary to compensate different ametropia of the two eyes with the aid of the diopter setting rings (42) at the binocular tube sockets. To this end, starting from the plus position the tube sockets equipped with the eyepiece are moved until a sharp image of the cross hairs in the tube becomes visible to the eye while looking through the eyepiece.

3.5. Using the point counting device

The object traverser pol (51) has interchangeable pinion heads (61, 62), which can be used for point counting techniques in step sizes of 0.1 mm, 0.2 mm and 0.4 mm. For engaging the detent, turn set-screw (63) to the left with the aid of a small screwdriver. Turning it to the right causes the detent pin to be disengaged. For exchanging the pinion heads, remove the two cheese-head screws in the conical portion.

4. Lamp voltage setting

The index marks of the indicating instrument (39) approximately correspond to the operating voltage applied to the lamp. It is recommended to set the pointer to the wide index (= 4.8 ... 5 V lamp voltage). In this region (also in colour photomicrography) a colour-correct image reproduction is attained, and the lamp life comprises about 2,000 hours. The lamp voltage of 6 V is attained when setting is made to the 6th index mark. Operation at an overvoltage is possible but considerably reduces the lamp life.

5. The filter changer

The filter mounts in filter turret (10) can be equipped with filters to be selected as required. The mounts in the 5x filter changer are designed for filters of a thickness of up to 10 mm. In the 10x filter change one of the

turrets is intended for taking up filters or filter combinations of up to 10 mm thickness. The other turret has been designed for filters of up to 4 mm thickness.

Providing the filter changer with filters:

- Loosen clamping screw (14) by means of socket wrench, swing filter changer aside and lift it off.
- Remove snap ring from filter mount, insert filter or exchange it, making sure of a perfect fit of the filter vertical to the light passage. Reinsert snap ring.

Suggestion for placing the filters:

0 conversion filter C 311 (daylight filter; 12 decamired
1 filter SIF 486 shifting to shorter wavelengths)
2 filter SIF 551
3 filter SIF 589
4 filter SIF 656

6. Centring the objectives

Switch in the objective 20X/0.40. After placing the centring plate onto the rotary stage, the plate's centre aligned with the cross hairs in the tube does, usually, not coincide with the stage centre. Centring is quickly done by turning the microscope stage and correcting the deviation of the plate's centre from the stage's rotary point, half with the aid of the object traverser and half with the aid of the objective. This procedure is repeated several times until a centred state has been attained that meets the user's requirements. The other objectives are swung in one after the other without a change of the stage position being required. It is just necessary to make the centre of the centring plate coincide with the centre of the cross hairs in the tube by means of the objective centring screws.

7. Using the 1.6X objective

For using the above objective in transmitted light it is necessary to swing a free aperture of the revolving nose-

piece into position and place the installed 1.6X objective into the optical path, using, to this end, rod (19). For illumination, use is made of the low-power condenser. For this purpose, move condenser 0.95 downward after pressing lever (7), and swing it to the left. Completely open field and aperture diaphragms.

8. Analyzer with internal angle reading

The analyzer is arranged on a slide with three light passages. It is within the optical path when the analyzer rotations control (39) is at a position next to the tube. At the slide's mid-position the angle is read. To this end, it is necessary to engage the detent by pulling out and turning lever (41), and to swing the Bertrand lens into the optical path by means of rotary knob (20) and to focus onto the scale by shifting knob (20). The slide's third position permits the free passage of the imaging rays. If in this position the image should be too bright for observation, it is possible to introduce an attenuation filter into the optical path by means of slide (1). The rotary knob of this filter is connected with an arresting lever. Turning the knob to the right causes the lever to be swung out, so that the filter slide can be removed from the analyzer slide. As required by the user, the brighter attenuation filter d (recommended for transmitted light) or the darker one a (recommended for incident light) may be inserted into the free aperture. If analyzer and polarizer are positioned at "0", the vibration planes of the respective light passing through are vertical to each other: the polars are crossed.

9. Conoscopy

For observing interference figures the Bertrand lens is switched into the optical path by means of rotary knob (20) and focussed onto the aperture diaphragm. Field diaphragm and tube iris diaphragm are closed as much as required. Polarizer and analyzer are positioned at "0". The aperture diaphragm is completely opened. For photo-

graphing interference figures it is necessary to swing in the Bertrand lens in the magnification changer of the tube adapter pol.

10. Using immersion objective

Switching the objective into the optical path:

- Critically focus medium- or high-power dry objective onto specimen, retain the focussed state.
- Place immersion objective between two detent positions of the revolving nosepiece so as to point to the left or right front. In this way, the specimen spot to be observed becomes accessible.
- Apply a drop of immersion oil to the specimen.
- Switch immersion objective into working position.
- Critically focus onto the image and observe it.

Removing the objective from the optical path:

- Retain the focussed state of the specimen.
  Swing out the objective in such a way that an adjacent low-power objective engages into working position (otherwise, there will be the danger of moistening the front lens of objectives of short working distance with oil).
- Change specimen or remove oil or continue to work as required.

11. Condenser immersion

In order to take the high-power capability of the immersion objectives into account also on the illumination side, especially for conoscopy, the 0.95 achromatic-aplanatic condenser can be provided with an immersion head. It is advisable to remove the stop screw from the underside of the condenser changer when using the immersion condenser. Then the condenser can be swung to the left out of its engaged position so that it is beside the microscope stage at a distance that allows to screw off the 0.95

condenser head and replace it by the 1.30 condenser head. After applying a drop of immersion oil to it the condenser is swung in and carefully moved to the object until the latter is moistened by the immersion oil.

12. Connecting the model mf-AKS photomicrographic equipment

The JENAPOL standard outfit with phototube has been designed for connecting the mf-AKS photomicrographic system. The mechanical-optical components of the mf-AKS equipment are mounted via the tube adapter pol onto the photographic output of the phototube. The electronic components are set up beside the microscope at a variable place.

For the operation of model mf-AKS equipment please cf. the instructions attached hereto.

In the calculation of the imaging scale M, consider the tube factor q = 0.8 of the photo tube for the photographic path of rays, i.e.

$$M = Magn_{obj} \times 0.8 \times M_{projective} \times q_{camera}$$

13. Changing the stage

- Loosen clamping screw (33) with special wrench B, push stage upward, and remove it from the dovetailed slideway.
- Attach stage required for use, e.g. heating and cooling stage (74), pushing it into the dovetailed slideway of the stage carrier downward up to the stop, tighten clamping screw (33).
- The following operations require the stage carrier to be lowered in the dovetailed slideway relative to its normal position. For this purpose, remove the shank screw in the centre of the dovetailed slideway of the stage carrier by means of a screwdriver:
  - attachment of U-stage outfit
  - attachment of heating chamber 400

- examination of large incident-light specimens
- use of LD objectives of 75 mm parfocalizing length

14. Changing the condenser

According to the microscopic method to be applied the JENAPOL can be equipped with different condensers. Apart from the 0.95 achromatic-aplanatic condenser included in the standard outfit the following condensers are available.

1.3 achromatic-aplanatic condenser head
LD condenser 0.4 pol
LD condenser 0.5 pol
LD condenser 0.6 pol

Exchange for LD condensers:

- Lower condenser by actuating pinion head until clamping screw (36) becomes accessible. Loosen clamping screw, swing support to the left and remove it.
- Insert LD condenser (73) from the left into the dovetailed slideway, swing it to the right into its correct position, and make it rest on the stop pin.
- Tighten clamping screw.

15. Phase contrast work

15.1. Phase contrast with the standard outfit

- Screw ph or phv phase objectives into revolving nosepiece. The objectives should be inserted into the apertures in the order given by the examination to be carried out. As a rule, they should be screwed in so as to switch always the next higher-power objective into the optical path when turning the revolving nosepiece in clockwise direction, since the annular diaphragmsin the modulator turret are arranged in this way.
- Insert annular diaphragm into mount (57) of condenser support, pushing it as far as it will go, and clamp it in position by means of the knurled nut.

- Turn annular diaphragm turret so that the symbol o (free passage) appears in the window.
- Switch in objective, place specimen on stage, critically focus onto it and illuminate it by applying the Köhler principle.
  Objects difficult to see should be brought into focus with the aperture diaphragm almost closed. After this procedure the aperture diaphragm has again to be opened completely.
- Move Bertrand lens into the optical path and focus it onto the objective's phase ring appearing grey-coloured on a bright background.
- Close aperture diaphragm until its rim becomes visible, and centre it relative to the phase rings by actuating the centring screws.
- Turn annular diaphragm turret until the magnification value of the objective used appears in the window.
  In the objective pupil the annular diaphragm image (bright) is now superimposed on the phase ring image (grey).
- Introduce wrenches into the centring holes on the right and left of the annular diaphragm turret, i.e. into thos which are next to the optical axis. By actuating the wrenches make the annular diaphragm image coincide with that of the phase rings.
- Close aperture diaphragm until only a big and a small luminous ring are still visible:
  Normal phase contrast with the objectives 20X, 40X, and HI 100X.
  (When using the 10X objective, only a big ring is to be seen).
- Close aperture diaphragm until only the small luminous ring is still visible:
  Strict phase contrast with the objectives 20X, 40X, and HI 100X.

- Remove Bertrand lens from the optical path. In the object field the object image can be seen in phase contrast, which may be improved by inserting the green filter.

According to the above instructions centre the annular diaphragms relative to the remaining objectives used. To this end, displace the individual annular diaphragms independently of each other. After objectives and annular diaphragm turrets have been centred once, they can, as a rule, be used without further centring procedure being necessary.

Rapid change between phase contrast and quasi bright field is possible:

- by completely opening the aperture diaphragm when using the objectives 20X, 40X, and HI 100X,
- by turning the annular diaphragm turret to symbol o.

15.2. Operation of the small phase contrast equipment

- Insert annular diaphragm into single diaphragm mount so that the inscription of the annular diaphragm is pointing to the objective.
  Avoid finger prints.
- Insert single diaphragm mount into the resptive dovetailed slideway (60) of the condenser support, pushing it as far as it will go, and clamp it in position by means of the knurled nut.
- Make the following operations in the same way as described in par. 15.1.

16. Adjustable condenser stop

The mount for the condenser support is provided with a setscrew (35) representing a stop for the uppermost position of the condensers.

Operation:

- Select a specimen on an object slide of "standard thickness" (e.g. 1.0 mm thickness) and place it on the microscope stage for observation.

- Screw out set-screw up to a length of about 10 mm.
- Focus onto field diaphragm image and centre it.
- Screw in set-screw until a distinct resistance is felt. After lowering and raising the condenser again to the stop the field diaphragm must be sharply depicted.
- For observing the following specimensretain the stop pcsition thus found for the condenser (or, if necessary, move the condenser with the aid of the pinion head) without correcting the definition of the field diaphragm image. This is an advantage when using object slides whose thickness does not differ too much from the "standard thickness" selected.

If the full intercept distance of the condensers is to be utilized (e.g. for exact Koehler illumination when using thicker object slides), the set-screw has to be screwed out to a length of about 10 mm. The stop is thus removed.

17. Adjusting the mechanical brakes

Coarse motion control (27)

The microscope is delivered with the pinion brake released. This measure serves for protecting the pinion mechanism against damages during transport.
For adjusting the smoothness of the coarse motion, move the pinion head until no stop is felt. Then move the two coarse motion controls against each other until the smoothness meets the user's requirements.

Condenser motion control (8)

The condenser motion mechanism is adjusted in the same way as the coarse motion.

Binocular tube (43)

The binocular tube contains a brake ensuring that the set interpupillary distance is retained and the sockets do not move by themselves.

Readjusting the brake:

- Set the two binocular tube sockets to the narrowest distance. Two groups of three screws each will become visible.
- Use a screwdriver
  to tighten the small screws = stiffer motion
  to slacken the small screws = smoother motion.
- Do not change the position of the big screws.

18. Maintenance

The microscope has a long life. Care and maintenance are easy. Please observe the following directions:

- Protect the instrument from temperatures above +50 °C, frost, humidity, gross and rapid temperature variations, chemically aggressive substances, direct sunlight, and dust (Use anti-dust caps, slide plugs, and anti-dust hoods). Most of the birefringent dust particles will reduce the image quality.
  Optimum conditions prevail at room temperatures between 18 and 28 °C.
- Remove dust from optical surfaces with the aid of a rubber blower or a natural hair brush degreased in alcohol and dried afterwards (optics cleaning kit). Avoid any finger prints on optical surfaces. Remove any obstinate contaminations and finger prints with the aid of an anti-dust cloth or a leather cloth (optics cleaning kit); if necessary, breathe on the contaminated surface before. Check objective front surfaces with a magnifier (for possible immersion oil on dry systems).
- Remove immersion oil from HI objectives with the aid of a dust-free cloth and benzine, xylene or benzene. Do not use alcohol.
- Cleaning the objectives is confined to keeping clean the front and rear lenses. Do never dismantle objectives.

- Do not treat objective capsules and other plastic containers with xylene.
- Do not repair damages by yourselves, but send the instrument to be repaired to our competent representatives or service workshop.

Fungus

In tropical climates, the instrument can be protected from fungus growth on the glass surfaces by paper boards soaked or glass tubes filled with p-chloro-m-cresol. The paper boards or glass tubes have to be newly prepared about every two years (if no smell is noticeable any longer). You may likewise put tablets or powder (packed in paper bags) of formaldehyde as fungicide into the containers.

19. Instructions for unpacking and operation in damp and warm climates

The microscope is designed for operation in tropical rain climate, too, but in order to keep it ready for operation continuous maintenance is necessary.

The optical elements are specially coated. Because of their high precision, particular functional parts are metallicly bright. These parts are to be protected against the effects of the tropical rain climate.

- For transport and storage purposesthe instrument is provided with an anti-corrosive and dehumidifying agent. The protection holds for a period of 200 days from the date of packing.
- After the receipt of the instruments - no later than after 200 days from the date of packing -, they should be unpacked. The fully unpacked instruments are to be stored in dry rooms (relative air humidity below 65 %, if possible).
- To maintain their original value avoid air humidities above 70 % lasting for a longer period.
- Regular use of the instruments reduces the risk of fungus infection. In case of unavoidable down times or longer

storage time we recommend the following:

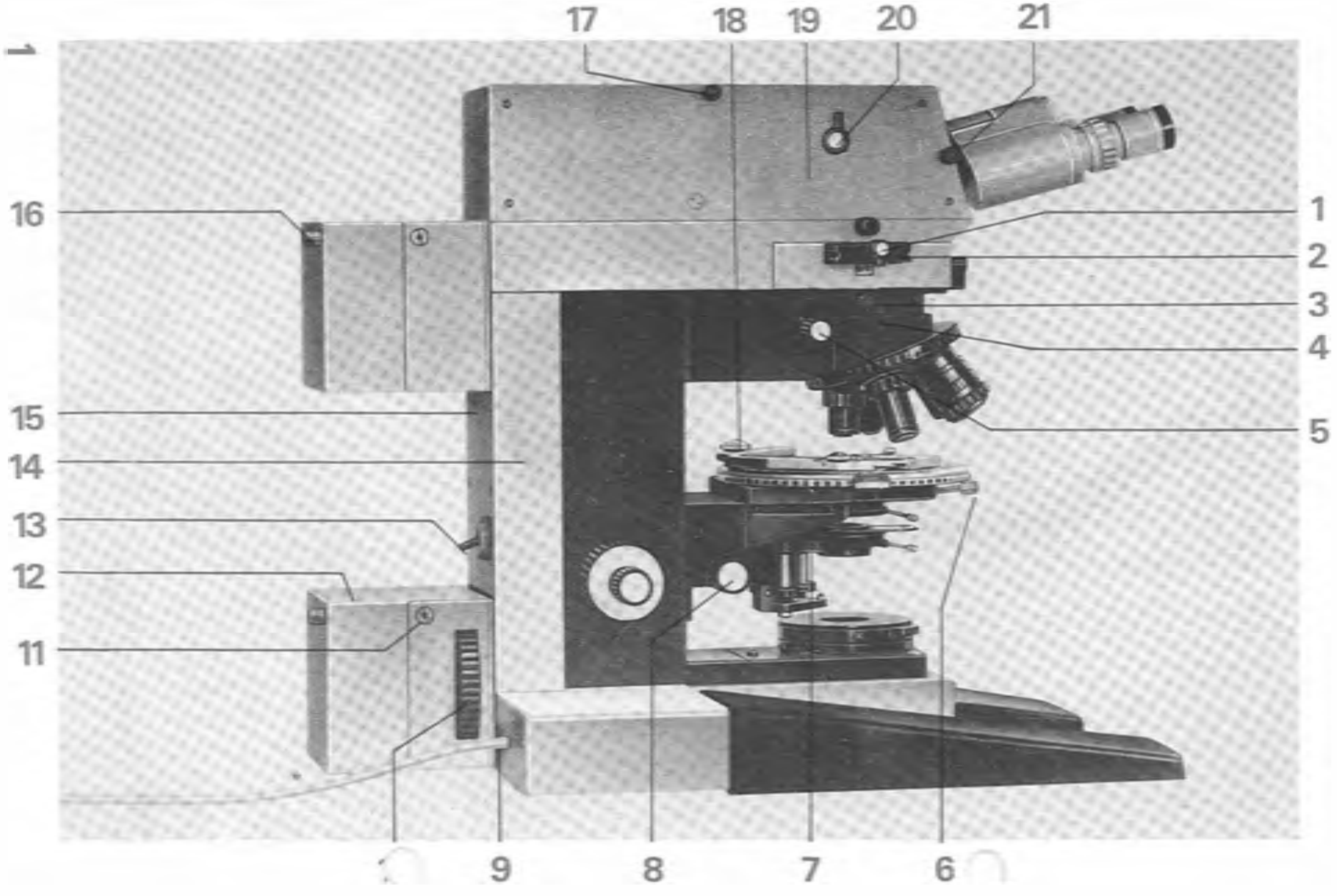
- Store the instruments in bright and dry rooms. Rooms of air humidities below 65 % are most favourable which can be obtained by using air dehumidifying plants. The instruments should be aired periodically by installing ventilators near them.
- Components, small instruments and accessories as eye-pieces and objectives that are especially susceptible to fungus should be stored in drying cabinets. For example, confined and glazed cabinets of noncombustible material, in which heating sources (as incandescent lamps or infrared radiators) produce an overtemperature of about 5 K, are suitable as depository. Components, small instruments and accessories can also be stored in exsiccators.
- Steel parts that are bright, burnished or phosphatized due to functional reasons are to be protected by acidless greases (vaseline) and oils. It is advisable to renew the protection against corrosion at intervals of three months, using greases and oils for this purpose.

Precision mechanical and optical instruments will be exposed to fungus growth under the following conditions:

- relative air humidity above 75 % for more than three days on end, darkness, no air motion
- dust and finger prints on optical surfaces
- longer storage times in wooden or leather containers. (The growth of fungus is accelerated at temperatures between +15 °C and +35 °C).

20. Legends to illustrations

1 Slide with attenuation filter and rotary knob with stop for removing attenuation filter
2 Analyzer slide
3 Push-pull rod for plane glass illuminator
4 Clamping screw for revolving nosepiece
5 Control for Berek prism
6 Screw for setting 45° detent of rotary stage
7 Selector control for condensers
8 Condenser focussing control
9 Securing element
10 Filter turret
11 Clamping screw for above
12 HLW 25 lamp housing with filterhouse
13 Lamp selector toggle switch (transmitted light - incident light)
14 Stand
15 Model a/d rear panel
16 Knurled screw for fastening lamp housing back panel
17 Clamping screw for photographic attachment
18 Screw for fastening object traverser to rotary stage
19 Push-pull rod for switching in achromatic objective 1.6:1
20 Rotary knob for introducing and focussing Bertrand lens
21 Binocular tube clamping screw
22 Phototube pol
23 Clamping screw for phototube pol
24 Diaphragm slide with incident-light aperture diaphragm
25 Diaphragm slide with incident-light field diaphragm
26 Slot for incident-light compensators 20 x 6
27 Coarse focussing control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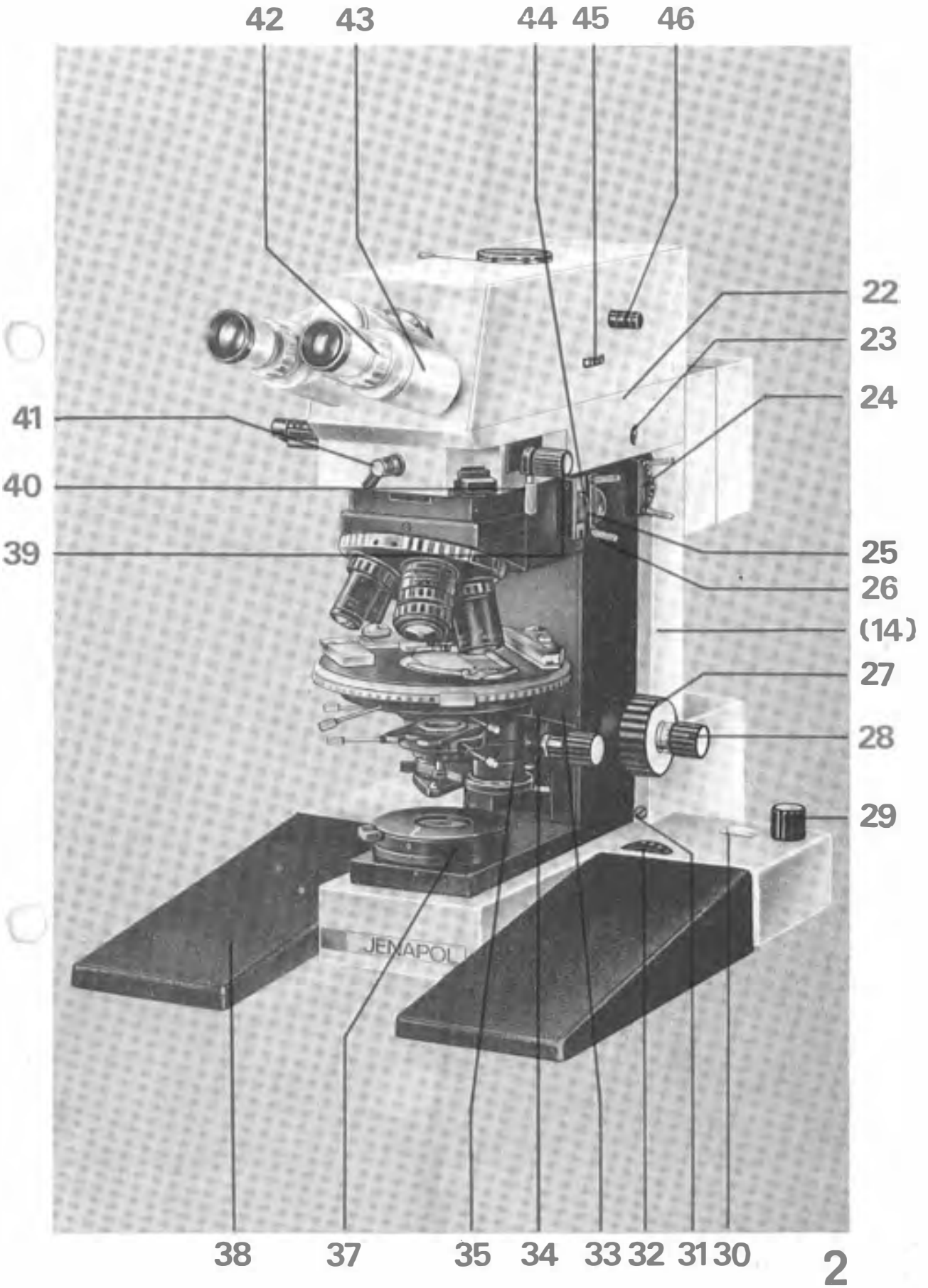
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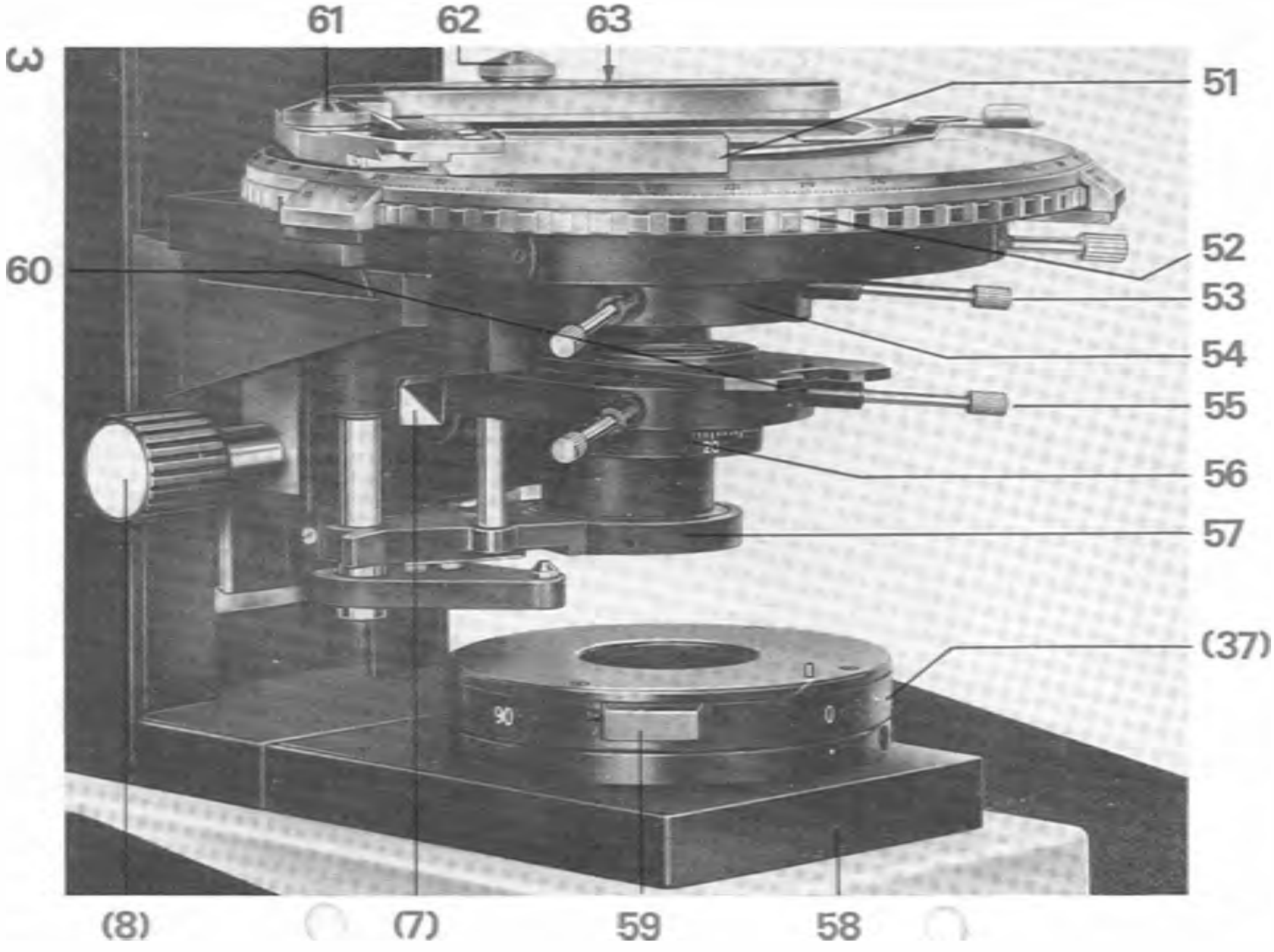
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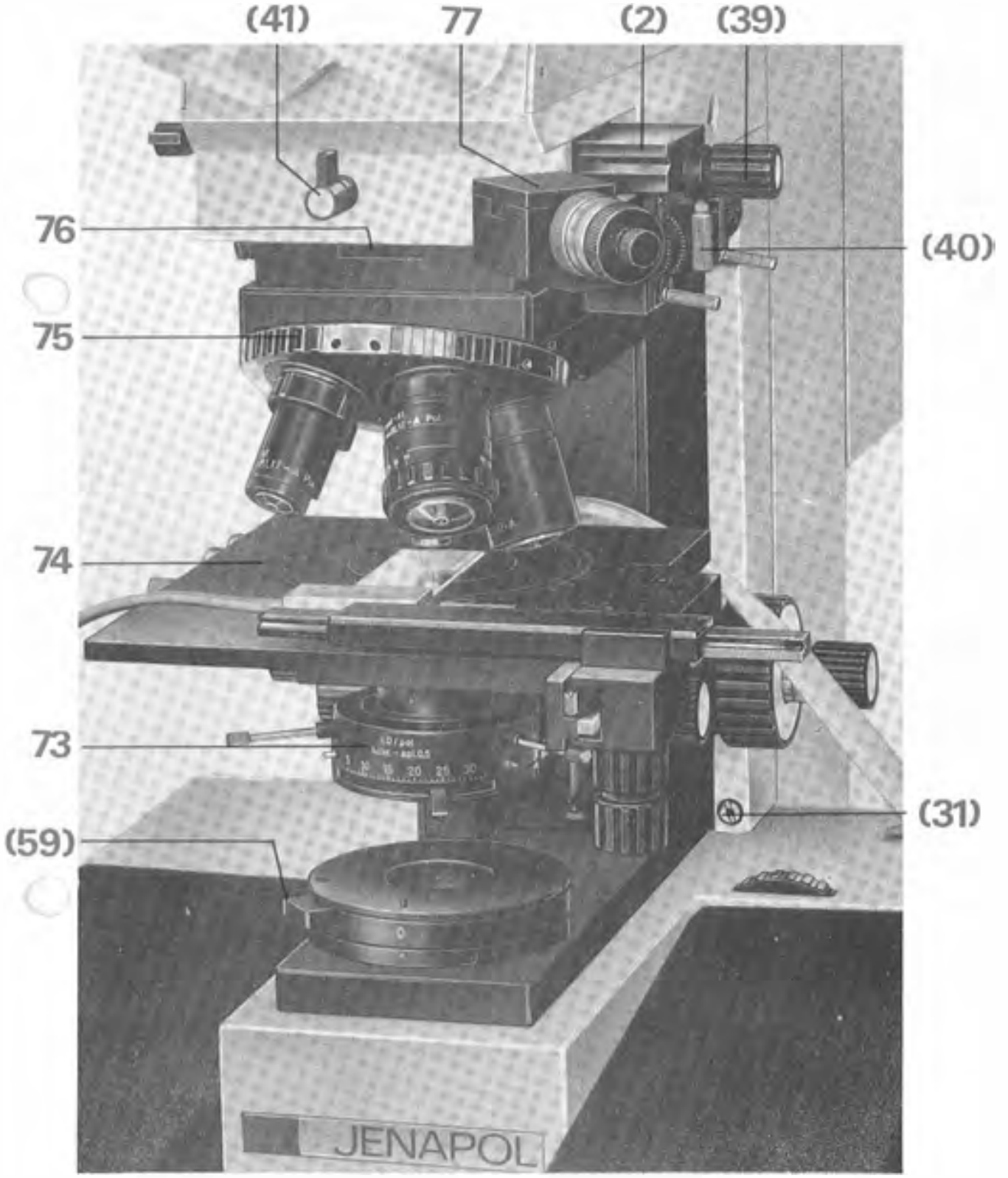
28 Fine focussing control
29 Lamp voltage On-Off and rotary switch
30 Lamp voltage indicating instrument
31 Lamp housing fixing screws
32 Setting ring for transmitted-light field diaphragm
33 Clamping screw for stage carrier
34 Stage carrier with condenser guideway
35 Condenser stop screw
36 Condenser support clamping screw
37 Transmitted-light polarizer
38 Arm rests
39 Analyzer rotation control
40 Analyzer rotation arresting screw
41 Detent engaging lever for scale for internal reading of analyzer
42 Diopter setting ring
43 Binocular tube pol
44 Incident-light polarizer slide
45 Tube iris diaphragm setting control
46 Push-pull rod for switching to photographic output
51 Object traverser pol
52 Rotary stage pol
53 Centring screws for transmitted-light condenser
54 Achromatic-aplanatic condenser 0.95 pol
55 Centring screws for transmitted-light aperture diaphragm
57 Condenser support with low-power condenser
58 Transmitted-light polarizer slide
59 Slot for transmitted-light compensator 20 x
60 Mount for annular diaphragm turret or single diaphragm holder
61 Rotary knob for y-motion of object traverser
62 Rotary knob for x-motion of object traverser
63 Set-screw for engaging detent of object traverser
70 Lamp carrier
71 Angular holder for lamp mount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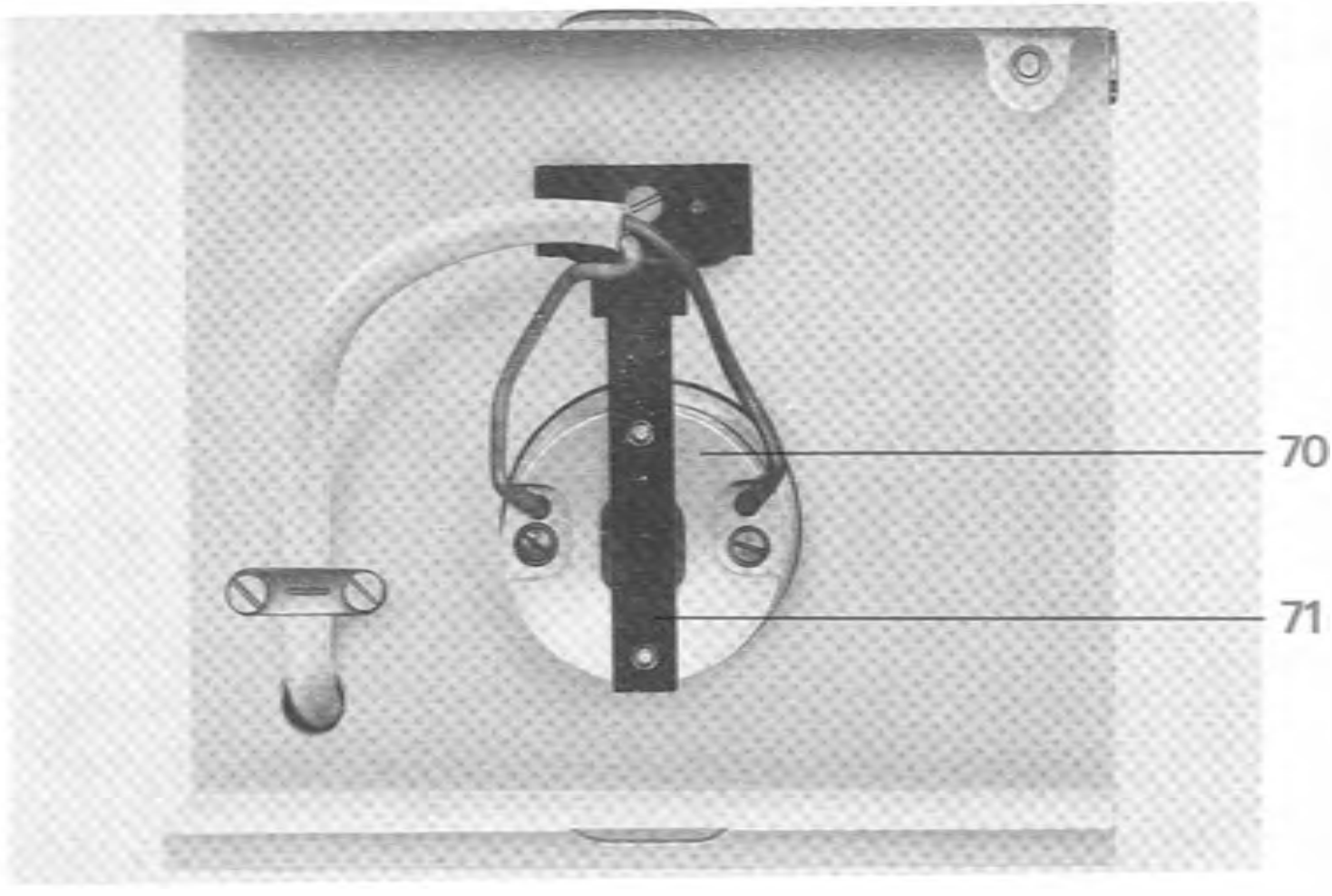

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72 HLW 25 halogen lamp with carrier plate
73 LD condenser 0.6
74 Heating and cooling stage
75 Objective revolving nosepiece
76 Slot for compensator 30 x 6
77 Slot for compensator 20 x 6 with rotary compensator

The objectives of the JENAPOL polarizing microscopes are optimally adjusted in their mounts in regard of optical polarization, if they are paired as follows:

Planachromat 3.2X/0.06 oo/-	No. .....
	in objective mount .....
Planachromat 10X/0.20 oo/-	No. .....
	in objective mount .....
Planachromat 20X/0.40 oo/0.17	No. .....
	in objective mount .....
Planachromat 50X/0.95 oo/0.17	No. .....
	in objective mount .....
Planachromat HI 100X/1.30 oo/0.17	No. .....
	in objective mount .....
Planachromat 3.2X/0.06 oo/-	No. .....
	in objective mount
Planachromat 10X/0.20 oo/-	No. .....
	in objective mount
Planachromat 20X/0.40 oo/0	No. .....
	in objective mount .....
Planachromat 50X/0.80 oo/0	No. .....
	in objective mount
Planachromat HI 100X/1.30 oo/0	No. .....
	in objective mount .....

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Kombinat
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