

Instruction Manual

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EPIVAL interphako[®] Interference Microscope

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EPIVAL interphako[®] Interference Microscope
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1. Optical Layout (Fig. 1)

Illumination of the specimen is effected according to the Koehler principle. The light source L is depicted by the collector O_1 in the plane of slit Sp, in which a grating or an annular stop may be located, and in the rear focal plane of objective O_5 at Sp' by lenses O_2 and O_3 via the beam-splitting prism O_4 . The objective depicts Sp' at infinity and after reflexion by the object O in its rear focal plane at Sp". Via the lens groups O_6 , O_7 , O_9 and O_{10} Sp" is imaged at Sp''' where the rotary wedge O_{12} or an annular stop is inside the interferometer formed by prisms O_{11} and O_{16} . The objective and the aforementioned lens groups depict the object at O' and then in the focal plane of the eyepiece at O".

In order to depict the objectives' focal plane exactly into the plane Sp" the prism O_8 is designed as a sliding prism. The weak glass wedge O_{14} acts as a phase shifter, and the compensating plates O_{13} and O_{15} serve for obtaining a homogeneous interference field or fringes in the field.

With the Bertrand lens O_{17} swung into the optical path the pupil may be observed, and with the prism O_{18} introduced in it the light is deflected to the opening where the photomicrographic equipment is attached.

2. Unpacking and Assembling the Instrument (Figs. 2, 3, and 4)

The various constructional units of the EPIVAL interphako Interference Microscope are contained in a foam polystyrene case.

2.1. Place the case on a table with the inscription facing upward, remove the adhesive tape and lift off the cover. Take out and assemble the components in the following order:

2.2. Set up basic stand (1).

Use socket wrench (15) to screw clamping screw (23) out of stage carrier (4) until its top side is just projecting over the stage carrier's narrowest spot. Slide the stage carrier, from above, on the dovetail (22) of the basic stand as far as it will go, and fix it by clamping screw (23). If specimens higher than 25 mm are intended to be examined, remove the stop screw of the stage carrier which may then be lowered by another 25 mm.

2.3. Mount incident-light carrier (10) onto the dovetail of basic stand (1) and push it to the rear as far as it will go. Use socket wrench (15) to tighten clamping screw (38).

2.4. After screwing out clamping screw (25) attach specimen stage (2) to stage carrier (4), moving it as far as it will go, and tighten clamping screw.

2.5. Insert 12V 50W halogen lamp into the lamp housing (18), introduce illumination adapter (19) with illuminating lens into the bore of basic stand (1) as far as it will go, holding arresting lever to the right and observing that - on introducing the adapter - the clamping segment does not strike the basic stand's wall. Clamp lamp housing to the illumination adapter (19) by means of bayonet fixing device (17).

2.6. Attach InPh ∞ basic body (5) to dovetail (45) of incident-light carrier (10) and clamp it in position by means of screw (46).

2.7. Introduce insert In (13) into the recess of basic body InPh ∞ and secure it by clamping screw (29).

Warning!

Do never handle insert In roughly! On inserting same pro-

tect it by holding your hand underneath.

2.8. Attach monocular or binocular tube (9) provided with eyepieces to the frontal quick-changing device of the InPh ∞ basic body and fix it.

2.9. Attach revolving nosepiece (16) to the dovetail of incident-light carrier (10), moving it as far as it will go, and screw the objectives into same.

3. Operation (Figs. 3, 4, 5)

3.1. Adjusting and Centering Processes

3.1.1. Adjusting the smoothness of the coarse motion
The instrument is despatched with the coarse-motion brake disengaged. The desired torque is obtained by turning the two pinion heads (20) located on the left and the right in opposite direction. Hold fast left-hand control; turning the right one clockwise causes a stiffer motion and turning it counterclockwise a smoother motion. Do not make this adjustment in one of the end positions of the pinion head.

3.1.2. Adjusting the illuminant

Open aperture diaphragm (36) and luminous-field diaphragm (34) (set aperture diaphragm to 9, turn setting wheel of luminous-field diaphragm upward), introduce dust-protective slide (59) for incident-light carrier into receiving slit (39) of the latter, dust-protective slide for In Ph ∞ basic body (52) into the slit provided for the half-shade plate (42) of basic body In Ph ∞ , and Interphako diaphragm slide (56) into slit (43) of insert In (13) from the left and with the grooves pointing upward so that only the small circle on the left edge of the housing is to be seen. Place a well reflecting, plano-parallel specimen onto the stage. Swing in 25x/0.50 objective as well as Bertrand lens by actuating pull-rod (27). Turn illumination adapter (19) until the light spot seen in the microscope is of maximum brightness.

Slightly press arresting lever of illumination adapter downward.

Adjust eyepiece tubes with each eye separately until the annuli are sharply depicted. Pull out Interphako diaphragm slide so far that the black circle is to be seen.

Swing Bertrand lens out of the optical path. Close luminous-field diaphragm, actuate coarse-motion control (20) and fine-motion control (21) to focus the microscope until the luminous-field diaphragm is sharply depicted, open the latter one.

Introduce annular stop slide (58) into receiving slit (40). Swing in Bertrand lens and actuate control (26) until a sharp image of the annular stop is visible in the microscope. Remove annular stop slide. Completely open aperture diaphragm (36) and sharply depict the filament by shifting the lamp in axial direction. Then centre the filament in the bright opening (exit pupil of objective) by moving the lamp and turning or axially shifting the illumination adapter (19), moving, to this end, the lever of (19) further to the right.

Close aperture diaphragm until setting 5 is reached. Swing Bertrand lens out of the optical path. Use setting wheel (34) to close luminous-field diaphragm, then centre it by actuating centring screws (33) and (37) and finally open it until its rim has just disappeared from the visual field. When employing the 6.3x/0.12 objective insert auxiliary lens (60) into the opening of luminous-field diaphragm (32) to be taken out on the right side. Do not use this lens in conjunction with any other objective.

3.1.3. Centring the objectives and the object stage

and focus it onto the specimen. Push rotary wedge slide (54), from the left, into receiving slit (43) of insert In (13) as far as it will go and with the grooves pointing upward and annular stop slide (58) into slit (40). Swing in Bertrand lens, close aperture diaphragm (36), and sharply depict annular stop (58) by actuating control (26). Make the annular stop's double image to coincide by moving controls (31) and (44). Replace rotary wedge slide (54) by Interphako diaphragm slide (56) (large ring at left edge of housing), and remove annular stop slide (58). Completely open aperture diaphragm, actuate squared screws of revolving nosepiece (16), using square socket wrench (48), until the bright, circular opening (exit pupil of objective) is concentric to the annular stop.

Insert crosshair into adjustable PK 12.5x eyepiece. Bring a striking object point into the centre and rotate the stage, determining, in this way, the centre of rotation, which frequently is outside the object field. Actuate centring screws (24,47), using square socket wrench (49), to displace the centre of rotation towards the cross-hair centre. Repeat this process until an image point located at the place of the cross-hair is stationary when rotating the stage.

Centre the remaining objectives required relative to the stage's centre of rotation (striking object point).

3.2. Shearing Method

3.2.1. A field free from fringes.

3.2.1.1. Working with the illumination slit acc. to 3.1.3. Introduce rotary wedge slide (54) into insert In. Use knob (57) to push slit stop slide (7) into receiving slit (40) of incident-light carrier from the left and so far that marking "32" is at the edge of the housing; introduce filter slide (3) into receiving slit (39) of incident-light carrier. Set drum rim of micrometer screw (30)