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ZEISS
TELAVAL 2
Inverted Microscope

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

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1. Description of the microscope

The TELAVAL-2 is an inverted microscope for transmitted light mainly designed for low-power observations of cell and tissue cultures, especially of these specimens, which are located on the bottom of medium-sized glass or plastic sample vessels.

Essential characteristics of the microscope:

. Basic equipment:

Objectives: achromats of 45 mm parfocalizing length for 160 mm tube length 3.2/0.10; 6.3/0.16 and 10/25

Free working distance for all objectives: 7 mm

Body magnification 1.6X

Eyepieces: A 12.5X (16)

The eyepiece image is upright and non-reversed.

Total range of microscope magnification: 63X to 200X

Illumination system: 6 volt 25 watt halogen bulb

Illumination method	working distance of illumination system
Köhler illumination technique and phase contrast	26 mm
diffuse bright-field illumination	170 mm

Large and rigid specimen stage

Focussing drive acting on the specimen stage;

It is possible to harmonize the drive motion with the weight of the culture vessels.

. Supplementary equipment:

		Cat. No.
- Phase contrast attachment with achromat 10/0.25 160/- Phv		301105:901.21/4
- Additional eyepieces:	A 6.3X (19)	303107:001.24/7
	P 10X (18)	303170:062.24
	A 16X (12.5)	303108:001.24

- mf-AKS photomicrographic attachments

see para. 10.

2. Unpacking and setting up

- Put foam laminate packaging so, that impresses are readable, remove adhesive tape and cover. The illumination system is packed separately.
- Stand (1) and objective revolving nosepiece (15) are already assembled. Mount specimen stage and stage carrier (16) to the corresponding dovetail guide (Fig. 1) of the stand, push it downwards until stop is reached and clamp it with the corresponding clamping screw (by means of the special wrench). Mount holder for illumination system (3) together with illumination system according to the figure and screw it down firmly. Put power cable in the corresponding clamp, attach and clamp inclined tube (4) and binocular tube (5). Screw objectives (14) into objective nosepiece (15), insert eyepieces (6) into binocular tube (5); the eyepiece with adjustable eye lens belongs into the right tube.
- Insert slide for neutral density filter and green filter (or frosted glass, if necessary) into slide mount (11). It is also possible to insert the frosted glass into frosted glass slide (9).
- Insertion of the bulb: Pull lamp mount (8) upwards out of the illumination system. Insert 6 V/25 W bulb with (white) backing plate into the slots of the mount, and position the backing plate until it is seated on the lamp mount's noses on both sides with one of the noses fitting into the slot of the backing plate. Clamp knurled screws (Caution! Do not touch quartz bulb directly with the fingers! If necessary, clean the bulb with spirit). Push lamp mount (8) into the illumination system again until stop is reached.

3. Handling of the microscope

- Connect illumination system of the microscope by means of the transformer with the power system (Caution! Rated voltage of the power system must coincide with the primary voltage labelled on the transformer).
  Turn on the lamp with the toggle switch of the transformer.
- Position the specimen on the stage.
- Open field diaphragm (10) and aperture diaphragm (12) entirely.
- Focus specimen with focussing control (2); take notice of paras. 5 and 6!
- Illumination of the specimen:
  Illumination according to Köhler method (for 26 mm working distance of the condensor)
  - Bring objective A 10/0.25 160/- to operating position.
  - Lamp mount (8) is inserted into the illumination system up to the stop.
  - Rotate lamp mount (8) carefully, until the visual field is uniformly illuminated. Refocus the lamp, if necessary, to achieve again in brightness in the visual field.
  - Insert, if necessary, neutral density filter into filter slide (11).
  - **Close field diaphragm (10), centre it by means of the centring screws, and open it again. Insert frosted glass into frosted glass slide (9), if the lamp filament is visible in the visual field. Should the frosted glass structure be imaged, insert frosted glass into filter slide (11) and attenuation filter into frosted glass slide (9).** Now, the specimen is illuminated after Köhler.

  Adjustment of the contrast:
  reduce aperture (12) until an optimal contrast is achieved. The aperture diaphragm does not serve to regulate the image brightness (loss of image quality); if necessary, insert neutral density filter into filter slide (11).

Diffuse bright-field illumination (for 170 mm working distance):

- Screw off the lower part of the illumination system (screw thread directly below the filter slide mount (11) in order to increase the working distance of the illumination system. Thereby, the specimen illumination after Köhler is given up.
- If necessary, insert neutral density filter into filter slide (11) and frosted glass into frosted glass slide (9).
- Adjust the image contrast by means of diaphragm (10), which does not function as field diaphragm now.

4. Observation in phase contrast

. Position specimen on the stage, use objective 10/0.25 phv (14), focus the image (for that purpose, it is advantageous to close as far as possible aperture diaphragm (12) if the specimen is hardly visible; afterwards, open it again).

. Illuminate the specimen after Köhler (see para. 3.).

. Insert the phase telescope in the place of an eyepiece (6) in the tube (5) and focus it onto the phase annuli (which appear grey) of the objective. Insert slide with annular diaphragm into mount (13). The image of the annular diaphragm (which appears black-white) is visible in the phase telescope. Set exact coincidence of the phase annuli of the objective with the white zones of the annular diaphragm by means of the adjusting screws on the slide of the annular diaphragm.

. Replace the phase telescope by eyepiece (6) again. Now, the microscopic field is shown in phase contrast. According to requirements it is possible to improve the image quality by inserting the green filter into the filter slide (11). While scanning certain (e.g. wedge-shaped) preparations it may happen that the contrast deteriorates. Correct the coincidence of the image of the phase annuli with the image of the annular diaphragm!

5. Correction of ametropia by diopter ring

Different ametropia of both eyes should be definitely compensated while microscoping without spectacles by means of the diopter ring located on the left tube body of binocular tube (5) (lower viewing fatigue of the operator, with relaxed eyes).
It is only once necessary to adjust the diopter ring, if always the same person operates the microscope.

. Adjust and illuminate the specimen for observation (if possible, use objective 10/0.25).

. Focus specimen for the right eye by means of focussing control (2).

. Correct image sharpness for the left eye by means of diopter ring (not by means of focussing drive! Take notice of

. para. 6.).

6. Use of the focussing eyepiece

One of the eyepieces (6) of the TELAVAL-2 standard equipment is adjustable. Thus, the microscopic image and the image of the line pattern of an eyepiece graticule (e.g. counting graticule, framing graticule) can be focussed individually and appear sharply visible at the same time.

. Screw off the screw ring located at the bottom of the focussing eyepiece, insert the graticule into the screw ring with the side of the line pattern showing downwards, screw the screw ring into the eyepiece again.

. Insert focussing eyepiece (6) into the right tube body of binocular tube (5). First, unscrew the adjustable eye lens until the image of the line pattern is unsharply visible, and then screw in the eye lens into the eyepiece, until the line pattern appears sharply. Focus the microscopic image for the right eye by means of focussing control (2).

. Correct image sharpness for the left eye by means of diopter ring (not by means of focussing drive).

If you want to work without eyepiece graticule:

. Insert focussing eyepiece (6) into the right tube body of binocular tube (5).

. Turn the adjustable eye lens until the edge of the field stop appears sharply in the eyepiece (6).

. Continue according to para. 5.

7. Adjustable motion of the focussing drive

Focussing control (2) acts on specimen stage (16). With regard to the very different loads on the stage caused by light or heavy sample vessels, the motion of the drive (2) is easily adjustable.

. Rotate both control knobs (2) against each other.
Rotation anti-clockwise: smoother motion
Rotation clockwise: stiffer motion

8. Specimen protection

If the microscopes is correctly assembled according to para. 2, the specimen plane lies about 7 mm above the surface of the stage, even with the lowest position of the specimen stage (16) (drive (2) at down stop). Then, the objectives (14) of the standard equipment never protrude beyond the surface of the stage and damages of both the specimens and the objectives are impossible.

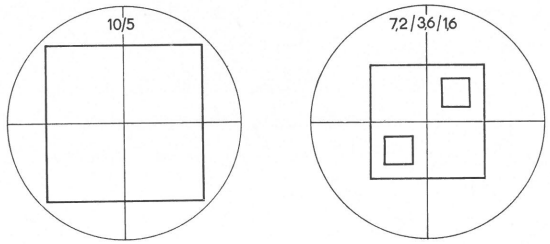
If in special cases larger objectives of extended constructional lengths are applied (which requires very thin bottoms of the specimen vessels), the specimen protection for these objectives becomes ineffective. But also for these objectives it can be

re-established by loosening the clamp on the stage carrier, raising the stage (16) until the corresponding distance is reached and by tightening the clamp again.

9. Eyepiece counting graticules

The counting graticules are shown in the figure below and applied in connection with the focussing eyepiece (insertion of the graticules see para. 6.). The figures on the counting graticules indicate the side lengths of the microscopic field in mm. By dividing the side lengths by the product of the magnification of the objective and the factor 1.6 (body magnification) it is possible to determine the side length of the counting field in the object (in mm).
The objective magnification may differ by ± 5 % and the body magnification by ± 2 % from the nominal value. In order to achieve a higher accuracy, determine the object field size by means of a stage micrometer.
The side lengths of the counting fields are chosen in such a way, that the following object field sizes (in mm^2) can be used for counting:

objective	side length mm	10	5	7.2	3,6	1,6
3.2/0.10	object field		1.0		0.5	0.1
6.3/0.16	size (mm^2)	1.0	0.25	0.5		0.025
10/0.25			0.1		0.05	0.01



10. Photomicrography

For photomicrography with the TELAVAL-2, three different standard equipments of the mf-AKS photomicrographic system are available.

	Cat. No.
mf-AKS 24 x 36 M	300460:201.21/1
mf-AKS 24 x 36 EXPOMET M	300460:300.21/2
mf-AKS 24 x 36 AUTOMATIC M-A	300460:400.21/5

11. Change of the bulb

. Pull lamp mount (8) upwards out of the illumination system.

. Insert 6 V/25 W bulb with (white) backing plate into the slots of the mount, and position the backing plate, until it is seated on the lamp mount's noses on both sides with one of the noses fitting into the slot of the backing plate.

. Clamp knurled screws (Caution! Do not touch the bulb directly with the fingers! If necessary clean the bulb with spirit).

. Push lamp mount into illumination system again until stop is reached.

12. Maintenance

The TELAVAL-2 has a long service life. Maintenance and care are easy. Please, mind the following instructions:

. Protect the device from temperatures of more then +50 °C, frost, moisture, chemically aggressiv substances and - as far as possible - from dust (use dust-protective caps and dust-protective cover).

. Remove dust from optical surfaces by means of the rubber blower or by means of the natural-hair brush which can be degreased in alcohol and afterwards dried again.

Remove persistent impurities and finger-prints by means of a dust-free cloth or leather, if necessary breathe on the dirty surface before; clean front lenses of the objectives with cleaner's naphtha - do not use alcohol.

. Do not treat objective capsules and other plastic boxes with xylene.

. Do not try to repair defects; send the device to our competent agency or our contracted workshop for checking.

Decreasing stability of the two tube bodies of binocular tube (5): Binocular tube (5) is provided with a brake which ensures, that the adjusted interpupillary distance of the tube bodies is maintained and does not change by itself.
Adjustment of the brake:

. Set the two tube bodies of binocular tube (5) to the smallest distance; two groups of three screws each are visible.

. By means of a screwdriver, the little screws must be
- tightened: stiffer motion
- loosened: smoother motion

. The position of the big screws must not be changed.

13. Wearing parts for replacement

	Cat. No.
Halogen bulb HLW S 5A 6 V/ 25 W	105.859/6
fuse links:	
T 200 slow-blow for 220 V and 240 V	343.28/8
T 400 slow-blow for 110 V and 127 V	343.30/2

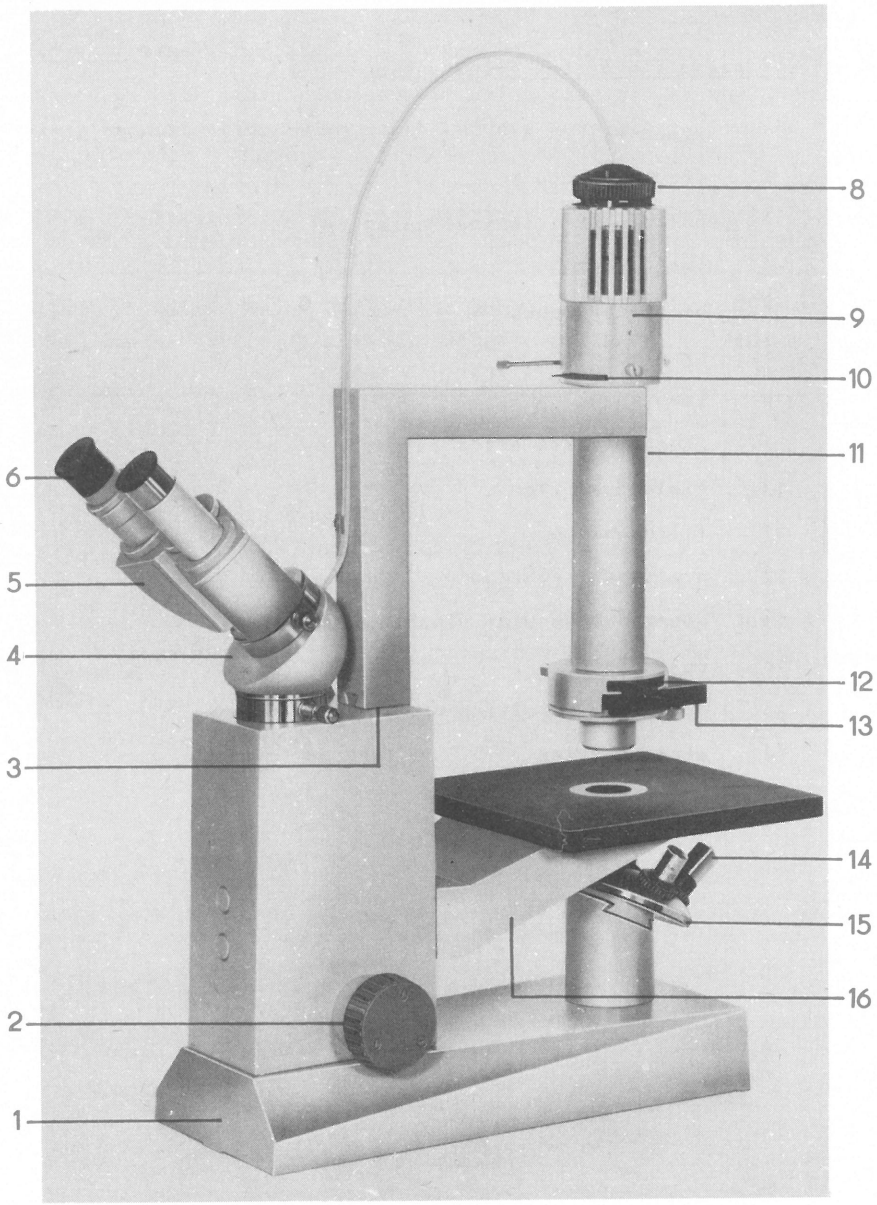
14. Range of magnification

In connection with other eyepieces of our optics range, the following magnifications with TELAVAL-2 are possible:

objective	eyepiece A 6.3X(19)	P10X(18)	Standard A 12.5X (16)	A16X (12.5)
3.2/0.10	32X	50X	63X	80X
6.3/0.16	63X	100X	125X	160X
10/0.25	100X	160X	200X	250X

15. Explanation of the illustration

1. stand
2. focussing control
3. holder for illumination system
4. inclined tube
5. binocular tube
6. eyepieces
8. lamp mount
9. frosted glass slide
10. field diaphragm
11. filter slide
12. aperture diaphragm
13. mount for annular diaphragm slide
14. objectives
15. objective revolving nosepiece
16. stage carrier


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