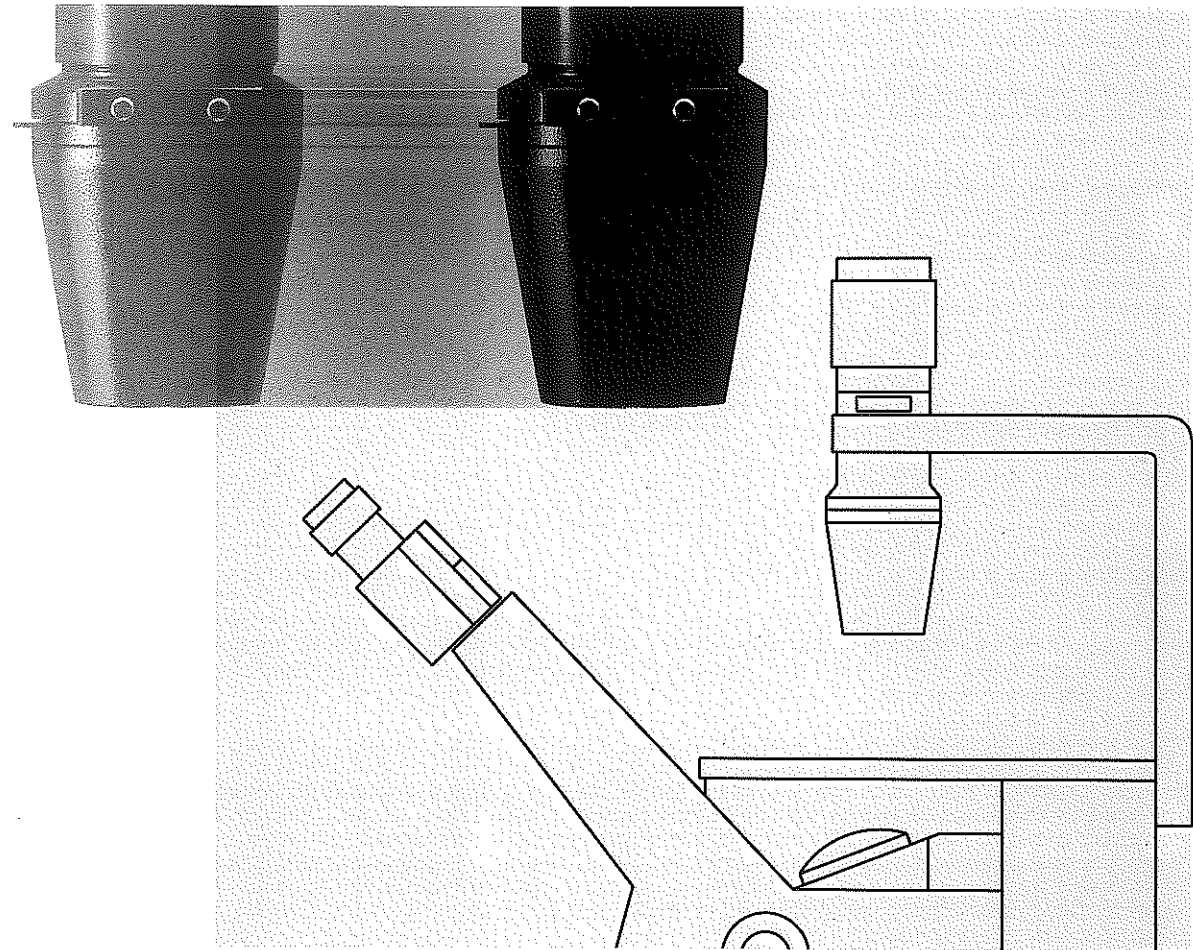


Invertoskop Inverted Microscope



Operating manual

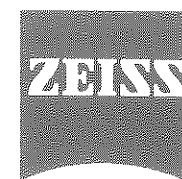




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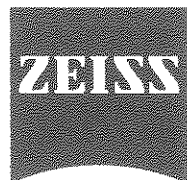
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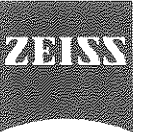
07740 Jena
Germany
Phone: (03641) 64-2936
Fax: (03641) 64-3144
Internet: mikro@zeiss.de
<http://www.zeiss.de>

Number of this
instruction manual: B 40-013 e

Date of issue: 01/97



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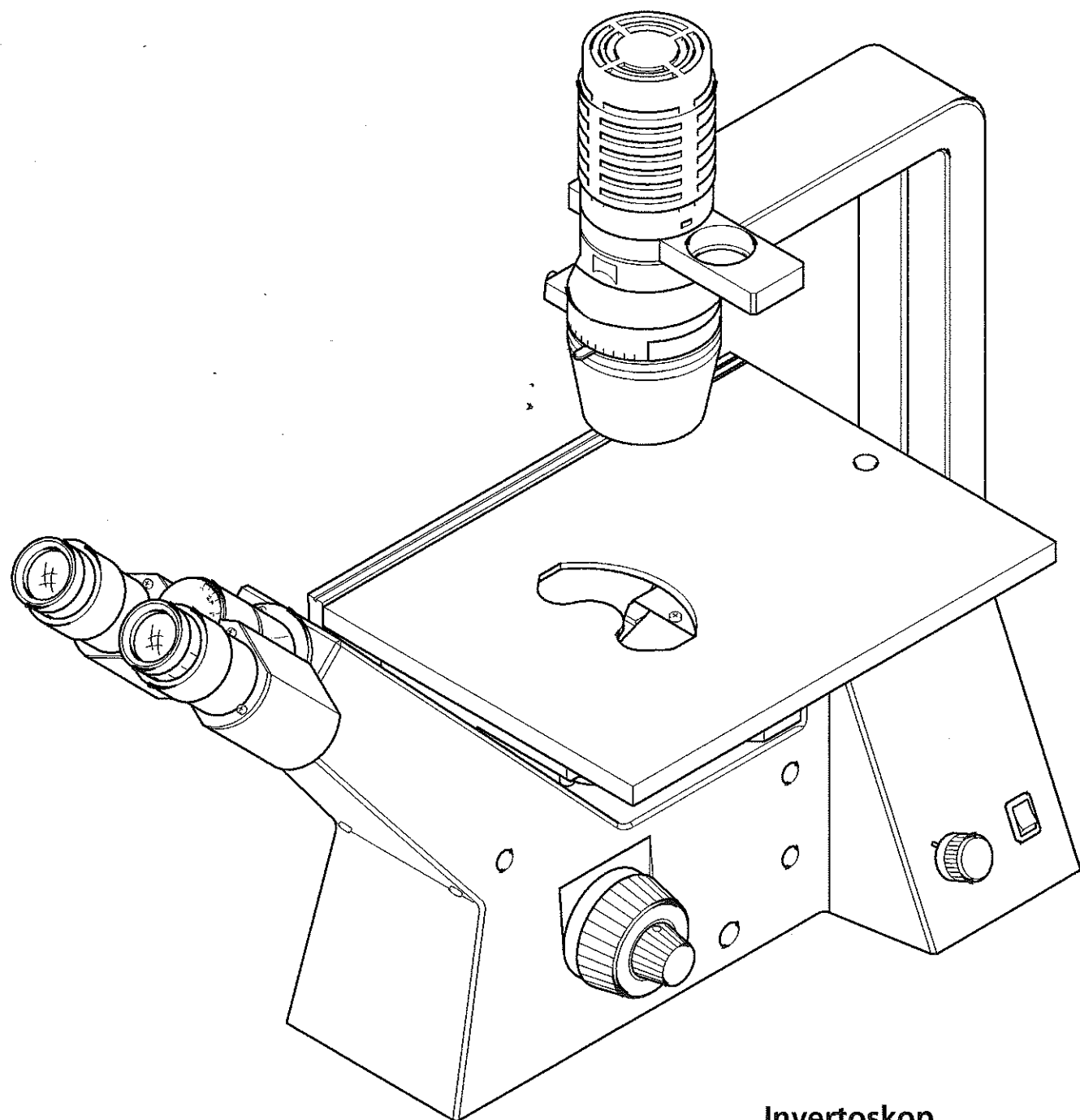
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NOTE

- The figures integrated in the text each have a figure number and a caption, e.g. "Figure 2-9" signifies: the figure in Section 2 with the serial number 9. In each figure, details discussed in the text are assigned a reference line marking and an item number. In the running text, "Eyepiece support (2-9/4)" signifies: in Figure 9 of Section 2, the eyepiece support is marked with the item number 4.
- Refer to the annex for explanations of the abbreviations.
- This operating manual refers to the Invertoskop microscope equipment (see Section 1.4).

GENERAL VIEW



Invertoskop

NOTES ON DEVICE SAFETY

The Invertoskop microscopes and its original accessories may only be used for the purposes and microscopy techniques described in this manual (intended use).

The manufacturer will not assume liability for any malfunction or damage caused by any other than the intended use, or by repair or other service operation performed or attempted by persons other than duly authorized service staff. Any such action will invalidate any claim under warranty, including for parts not directly affected by such action.

Particular attention must be paid to the following warning notes:

- ☐ The Invertoskop microscopes are designed, built and tested in conformity with the DIN EN 61010-1 (IEC 1010-1) standard "Safety requirements for electrical instrumentation and control and laboratory apparatus" as well as relevant CSA and UL regulations. The microscope(s) has/have been delivered in a safe state. This operating manual contains information and warnings which must be followed by the operator.
- ☐ The Invertoskop microscopes are light microscopes conceived in accordance with the latest scientific and technical knowledge for visual, analysis of microscopic specimens. The units must only be used for the intended purpose. They are not intended for continuous unsupervised operation!
- ☐ The microscopes have no special facilities to protect the user against samples that have caustic, toxic, radioactive or other effects that are damaging to health.
- ☐ The permissible sample mass (≤ 5 kg) must not be exceeded.
- ☐ To avoid dazzling, an attenuation filter must always be left in the beam path. It must only ever be removed from the beam path when the light intensity is too low.
- ☐ Users must check whether the available power supply agrees with the value specified on the rear of the unit.
- ☐ The Invertoskop microscopes are protective class I units. The mains plug must only be inserted in a socket that is equipped with a protective earthing contact. This protective measure must not be rendered ineffective by using an extension cord without a PE conductor. If the mains voltage is adapted by means of a variable transformer, this transformer must not interrupt the PE conductor. Any interruption of the PE conductor inside or outside the unit or disconnection of the protective earthing connection will involve a hazard for the user of the unit and is therefore forbidden.



Internal protection terminals of the units may carry hazardous voltages when the microscopes are connected to the mains, and opening covers or removing parts (unless required for proper functioning) may possibly expose parts carrying a hazardous voltage. Therefore, the units must be disconnected from the mains before opening for adjustment, replacement, maintenance or repairs.

If adjustment, maintenance or repair of the live unit is unavoidable, this activity must be carried out by a specialist who is aware of the risk involved.

Ventilation slots on the lamp housings must not be detrimentally affected by covering them up. This also applies to ventilation slots on the rear of the units. Tools, specimens or liquids must not be allowed to penetrate into the units through ventilation slots or other openings on the units.

Before carrying out lamp replacement, remove the mains plug and allow it to cool to room temperature (cooling time approx. 15 min).

During operation, the lamp housings become hot and must therefore not be touched. If lamp housings are opened while warm, it is imperative to avoid touching the lamp and parts in its proximity.

Make sure that only those fuses are used as spares for the unit fuses that are actually intended for the prescribed rated current and the specified version. It is forbidden to use provisional fuses or to short-circuit the fuse holders.

If it is found that the protective measures are no longer effective, operation of the unit must be discontinued and it must be secured against unintentional operation. For repair of the microscope, contact a workshop authorised to carry out servicing or get in touch with the manufacturer.

Modifications to the units to keep in line with technical progress are always reserved.



1 Description

1.1 Designation, purpose

Manufacturer's designation: Invertoskop inverse transmitted light microscope

Within the product family of inverse transmitted light microscopes, the Invertoskop fits in as follows:

Laboratory microscopes	Research microscopes
- Invertoskop	- Axiovert 100
- Axiovert 25	- Axiovert 135
- Axiovert 25 C	- Axiovert 135 M
- Axiovert 25 CFL	

The Axiovert 25 and Invertoskop microscopes are universally applicable type-related light microscopes of inverse design that serve the purpose of routine analyses of cell and tissue cultures and of sediments in culture bottles, Petri dishes, microtitre plates in transmitted light.

The following microscopy methods are possible:

- in transmitted light - bright field illumination
- phase contrast

1.2 Description of the unit

The Axiovert 25 and Invertoskop microscopes are supplied as powerful desktop units in 4 microscope stand variants:

- Invertoskop	Inverse transmitted light microscope for bright field illumination and phase contrast with HAL 6 V 25 W lighting
- Axiovert 25	Inverse transmitted light microscope for bright field illumination, phase contrast and VAREL-contrast with HAL 6 V 25 W lighting
- Axiovert 25 C	Inverse transmitted light microscope with HAL 6 V 25 W lighting and documentation
- Axiovert 25 CFL	Inverse transmitted/reflected light microscope with HBO 50 simultaneous with 6 V 25 W lighting and documentation

Essential features of the units are:

- Modular design for optimum adaptation of application tasks
- Stand featuring a compact design, ergonomic operation thanks to a stage height of only 188 mm and operator controls placed in a low position
- Integrated power supply
- Continuous adaptation of illuminance
- Images reproduced at the correct height and on the correct sides
- Fixed KÖHLER illumination with a numeric aperture of 0.2 and an operating distance of ≥ 90 mm; general bright field illumination for large specimen fields and for vessel heights of up to 190 mm
- User-friendly phase contrast by means of a ring diaphragm slide
- Brightness compensation for dazzle-free changeover between phase contrast and bright field illumination by means of an attenuation filter
- Variable stage utilisation by fitting the specimen guide
- Use of different holding frames including marking strips for various culture vessels
- Fixed stage
- Type-related customer interface for lenses, eyepieces and lamps

1.2.1 Mechanical design

Invertoskop

- Featuring an integrated power supply for 6 V 25 W lighting
- 0.2 condenser; movable
- Featuring coaxial coarse and fine drive, with focusing acting on the lens turret
- Binocular tube adjustable to two heights with one fixed and one adjustable eyepiece
- 5-fold lens turret
- With specimen stage, prepared for fitting the specimen guide with the possibility of using different holding frames
- With phase contrast slide

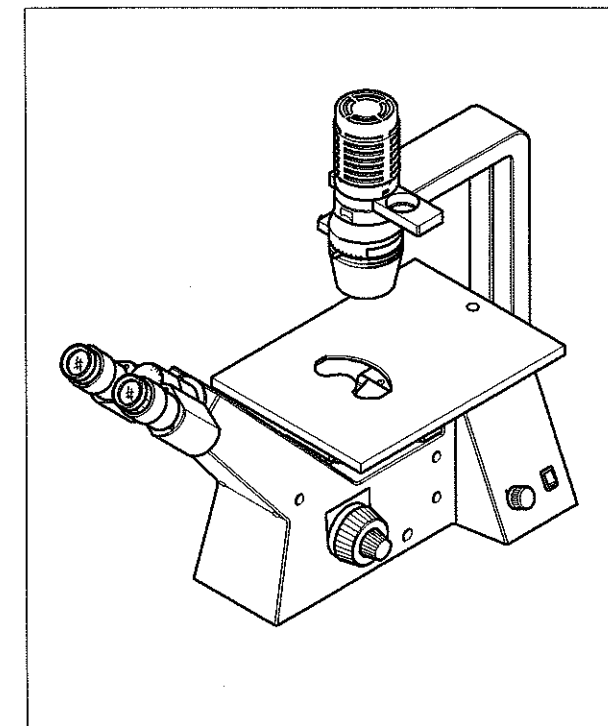


Figure 1-1 Main assemblies of the Invertoskop

1.2.2 Optical Structure (shown with reference to the Invertoskop)

The optical system belonging to the proven ICS class (Infinity Colour-corrected System) guarantees high optical performance for all methods (up to SFZ 20, tube factor 1x). Different combinations of lenses and eyepieces allow optimum adaptation to the task in hand.

The Invertoskop microscopes are equipped with a 6 V 25 W halogen lamp.

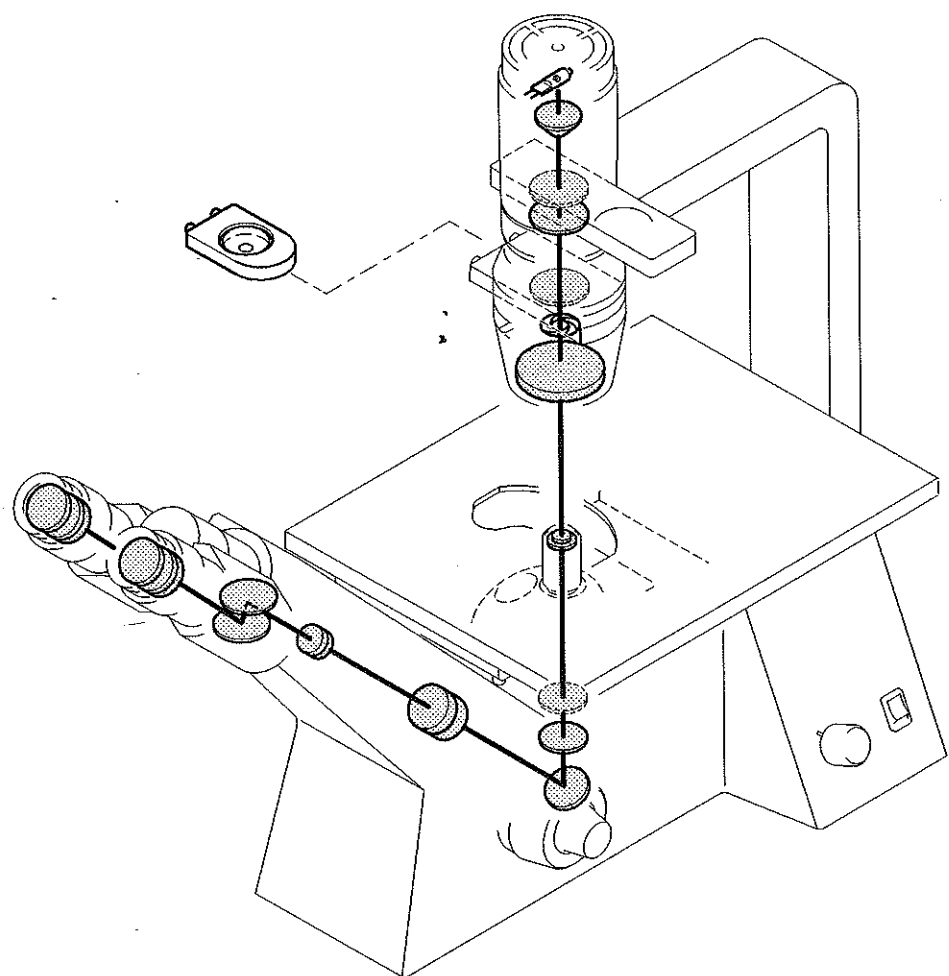


Figure 1-2 Optical schematic of the Invertoskop

1.3 Technical data

(1) Dimensions and weight

Dimensions (width x depth x height)	
Invertoskop	245 x 570 x 510 mm
Support surface	
Invertoskop	245 x 360 mm
Mass	
Invertoskop	approx. 13 kg

(2) Ambient conditions

Storage and transport (in packaging)	
Permissible ambient temperature	-40 to +70 °C
Permissible relative humidity	≤ 100 %
Operation	
Permissible ambient temperature	+10 to +35 °C
Permissible relative humidity	≤ 85 %

(3) Operating data

Class of use	closed rooms
Class of protection	SK 1
Type of protection	IP 20
Electrical safety	acc. IEC 1010-1, taking CSA and UL specifications into account
RFI suppression	acc. EN 55011 Class B
Interference resistance	acc. EN 50082-1
CE – the unit meets the requirements of the EC guideline 89336/EWG and the EMC law of 09.11.92 (see also EC conformity declaration, Annex p. A-5)	
Mains voltage	115 V
Permissible mains voltage fluctuation	± 10 %
Mains frequency	50/60 Hz
Mains voltage range identification	on rear of unit
Power consumption of the internal power supply unit	60 VA



(4) Light source

Halogen lamp S 5 A 6 V/25 W
Variability of light source continuous, ≤ 1.5 to 6 V

(5) Optical/mechanical data

Stand with lens focusing with coarse drive (7.5 mm/rev) and fine drive (0.75 mm/rev) total stroke > 8 mm (focus between 1 mm below and > 7 mm above stage surface)
Binocular tube eye spacing adjustable from 55 to 75 mm with constant tube length
Visual output tube factor 1x
Variable observation height with 2 positions for eye spacings 56 mm → 350 or 390 mm 65 mm → 355 or 385 mm
Observation angle 45°
Specimen stage (width x depth) 210 x 290 mm operating height 188 mm stage coupling point compatible with the Axiovert stage range (e.g. for use of temperature stages)
Specimen guide M enables the use of holding frames M can be fitted on left or right search range 130 x 85 mm
Clearance for specimen vessels (between stage and condenser) 90 mm for 0.2 condenser expandable to 190 mm by sliding condenser
0.2 condenser adjustable aperture diaphragm with scale, max. aperture 0.2 mount for Ph slide
Lenses ICS lens assortment with W 0.8" x 1/36 thread
Lens change manual via 5-fold lens turret
Eyepieces 30 mm insertion diameter use of eyepieces up to SFZ 20 standard: Pl 10x/18 spect. and Pl 10x/18 spect. foc.



1.4 Overview of components

1.4.1 Microscope equipment

Microscopes equipment, transmitted and reflected light		Equipment
1	Invertoskop microscope stand	X
2	Halogen lamp, 6 V 25 W	X
3	0.2 condenser	X
4	Specimen stage, 210 x 290 mm	X
5	H/Ph slide	X
6	Ph1-0.2 ring diaphragm	X
7	Lenses	
7.1	CP Achromat 5x/0.12	X
7.2	CP Achromat 10x/0.25 Ph1	X
7.3	LD Achrostigmat 20x/0.30 Ph1	
8	Eyepieces	
8.1	Eyepiece Pl 10x/18 spect.	X
8.2	Eyepiece Pl 10x/18 spect. foc.	X
8.3	Auxiliary microscope d = 30 mm	X
9	Band pass interference green filter, d = 32x2	X
10	Dust cover for Invertoskop	X

Options (on request)	
1	Specimen guide M for Invertoskop
2	Holding frame M for microtitre plates 96 positions
3	Specimen mount 76 x 26
4	Microtest plates 60, 72 and 120 pos.
5	Petri dishes d = 36 mm
6	Petri dishes d = 54 mm
7	Petri dishes d = 65 mm
8	Petri dishes d = 88 mm
9	Microtitre plates 96 pos.
10	Multiple dishes 133.5 x 88.5
11	Universal holding frame M
12	Reflected light specimens with stage inlay d = 24, replaceable

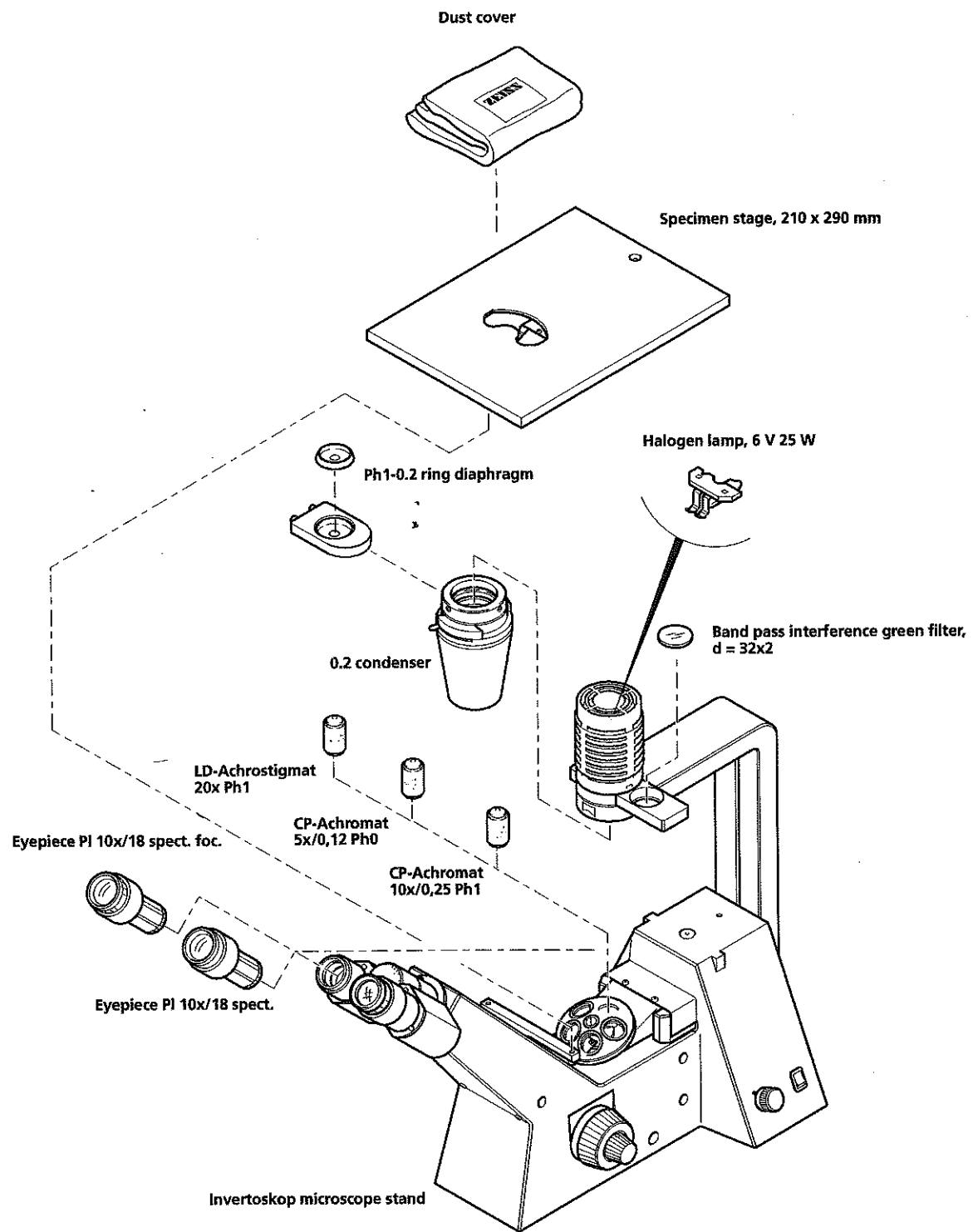


Figure 1-3 Microscope equipment for Invertoskop

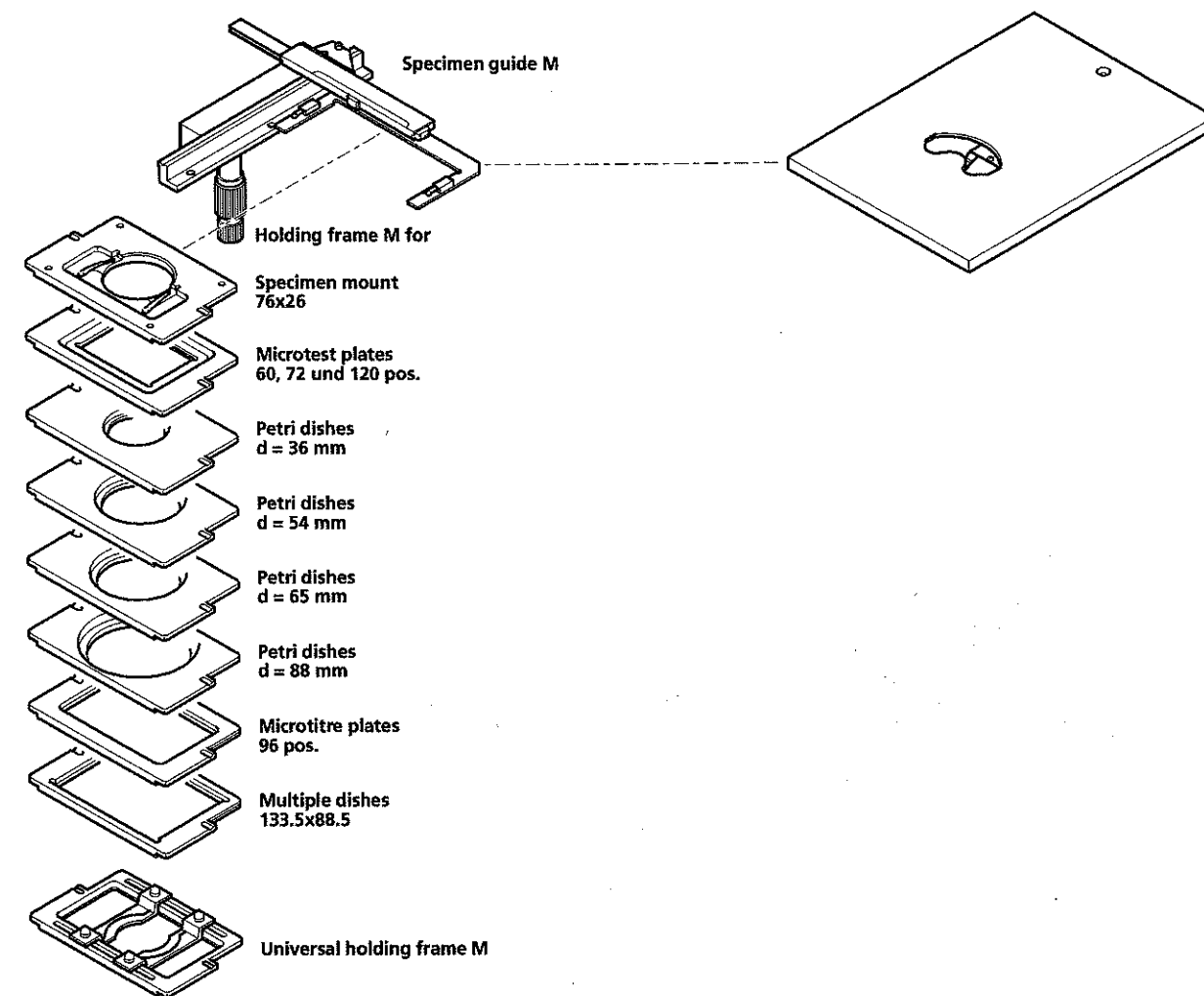


Figure 1-4 Accessories for the Invertoskop microscope equipment

1.5 Function elements
 (see Figures 1-3 following the table)

Item No.	Designation	Purpose/description
1	Microscope stand	Support of the Invertoskop microscope
2	Auxiliary microscope	For observation of the lens pupils and thus of phase contrast diaphragms
3	Eyepiece, focusing	Eyepiece for focusing the format reticule when using eyepiece measuring plates to compensate for myopia for binocular observation
4	Binocular tube swivelling	For insertion of eyepieces, adjustable to 2 heights and to eye spacing
5	Eyepiece	Non-focusing eyepiece
6	Specimen guide M coaxial drive	For sensitive shifting of the inserted holding frames and movement of specimens within a range of 130 x 85 mm (on request)
7	Specimen stage	Stage area 210 x 290 mm; if required, replaceable by glass table or heated microscope stage
8	Aperture diaphragm	For varying the lighting aperture by means of a lever
9	H/Ph slide	Slide for phase contrast, left and right positions to hold one ring diaphragm each, can be centered, middle position with \varnothing 42 mm attenuation filter
10	0.2 condenser	Condenser with a 90 mm free operating distance
11	Lighting unit 25	Microscope lighting with 6 V 25 W halogen lamp, with sliding condenser change position, free operating distance when condenser off \geq 190 mm
12	Filter	Band pass interference green filter
13	Filter slide	Enables insertion of \varnothing 32 mm light filters in the observation beam path
14	On/Off switch	Main switch of the unit for switching the mains voltage on/off
15	Control "Illuminance"	Continuously variable control of the light source/illuminance by varying the lamp voltage from 1.5 V to 6 V
16	Lenses	ICS lens assortment
17	Lens turret	Mount for up to 5 lenses, which swivelled manually into the beam path
18	Focusing drive, left and right	Enables adjustment of the optical system to the specimen (max. adjustment range > 8 mm)
19	Unit connecting lead	For connection to the power mains (US version)
20	Mains terminal, 3-pole	Mains connection terminal for 120 V

Item No.	Designation	Purpose/description
21	Fuse link	0.8 A/120 V slow-blow
22	Fuse holder	Fuse holder for 2 fuse links

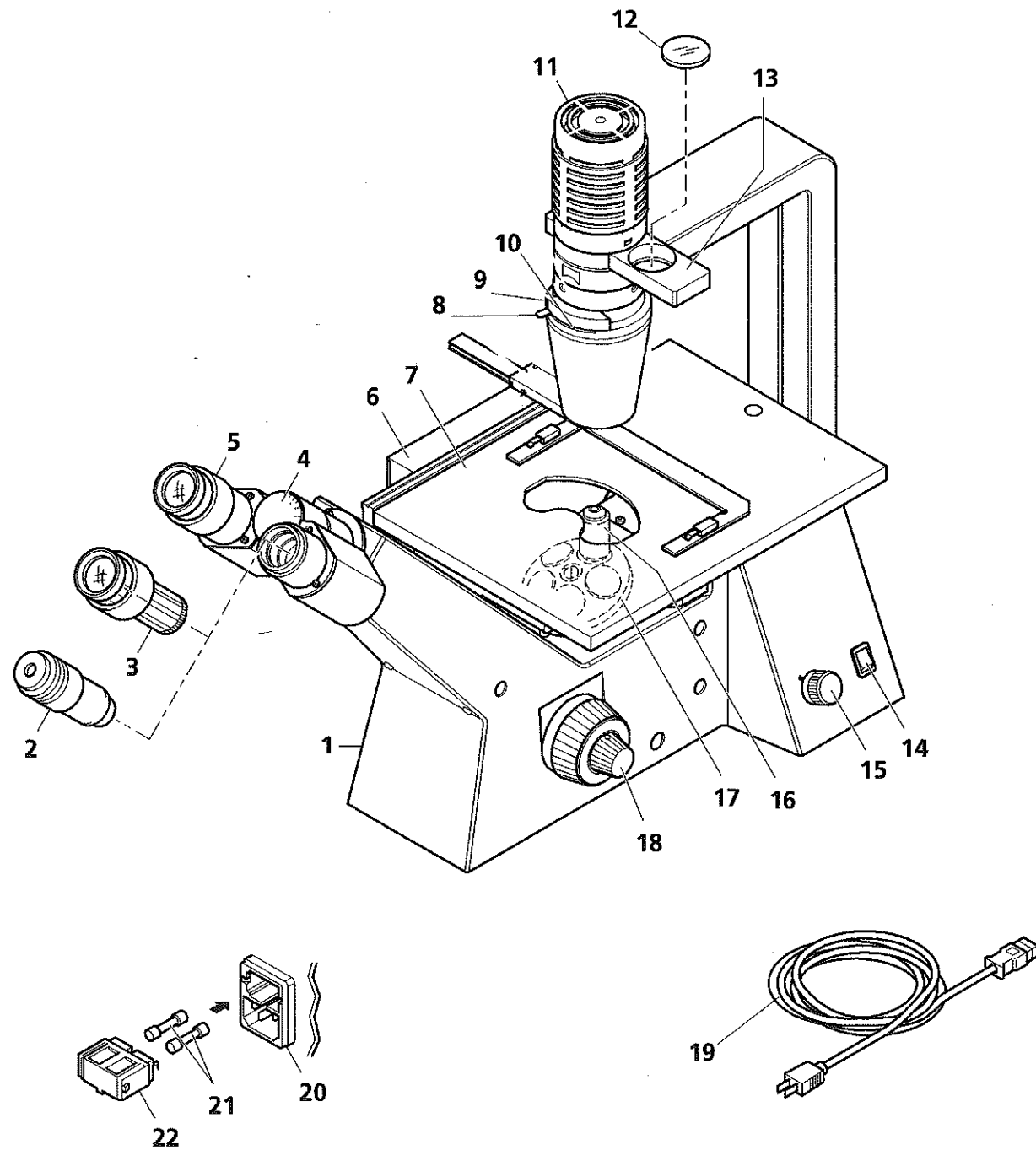


Figure 1-5 Function elements of the Invertoskop

2 Operation

2.1 Setting up the unit

2.1.1 Unpacking

The respective variants of the Invertoskop, including accessories, are delivered in commercially usual packaging. It is advisable to keep the transport receptacles in case prolonged storage or returning to the manufacturer should be necessary.

- Remove cardboard box (1) with accessories.
- Use the openings (3) to remove the styrofoam packing (2) including the microscope from the cardboard box and **place it on the side**.
- Remove the upper half of the packing
- Remove the microscope from the lower half of the packing, but **do not** touch it on the illumination arm or the binocular tube.
- Check for completeness in accordance with the delivery note.
- Store packing material in the transport box or dispose of it as indicated.

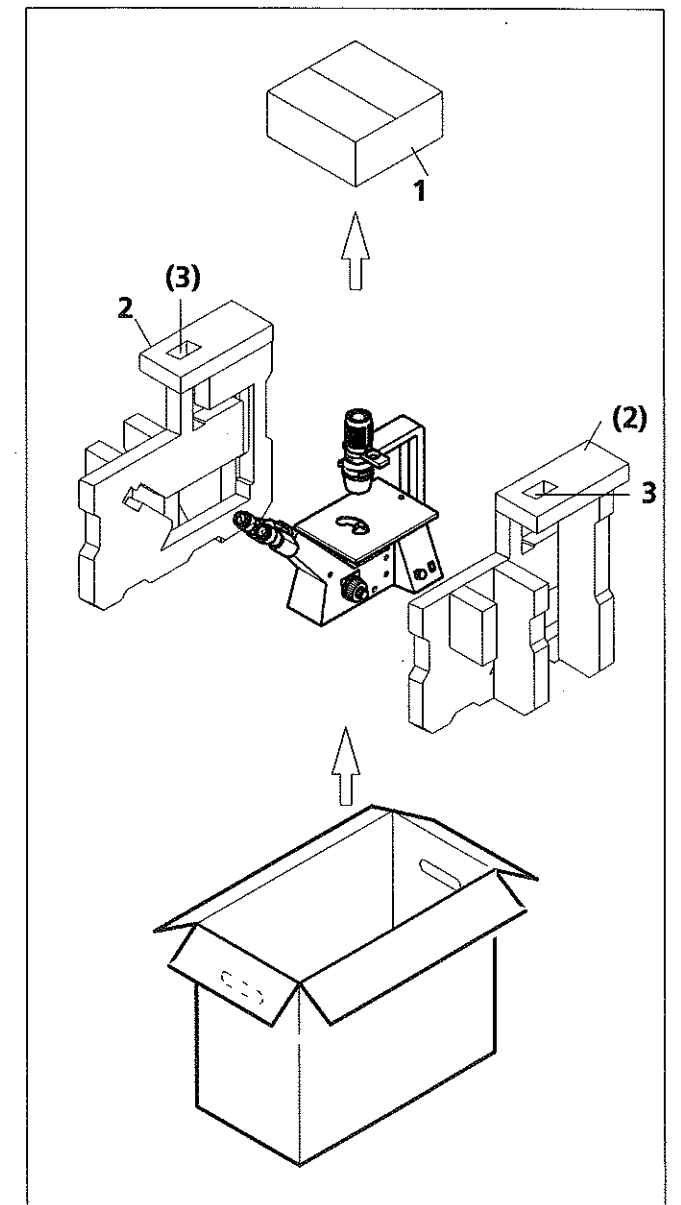


Bild 2-1 Packing units of the Invertoskop

2.1.2 Setting up

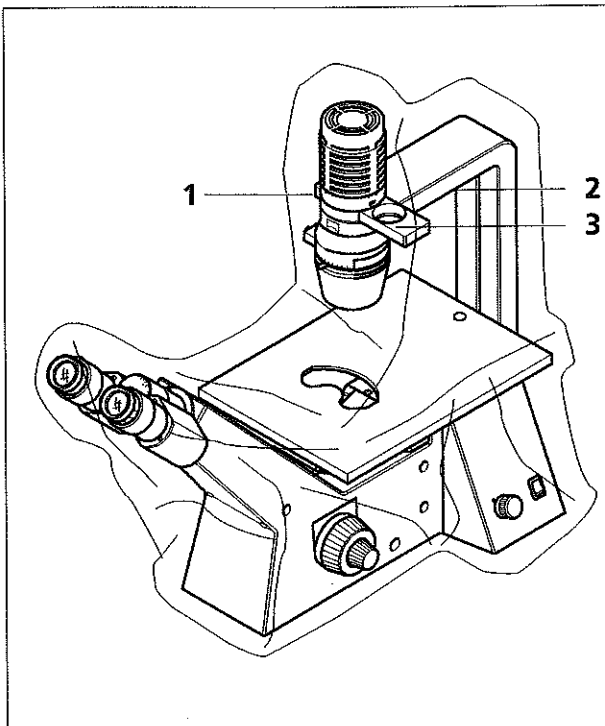


Figure 2-2 Unpacking and setting up

(1) Preparations

- Place the microscope stand on a suitable working surface.
- Remove the plastic sleeve (2-2/1).
- Remove the foam part (2-2/2) that secures the condenser shifter.
- Remove the foam part (2-3/1) above the lens turret.

NOTE The filter slide (2-2/3) is permanently installed; corresponding filter glasses (Band pass interference green filter) are not yet inserted during transport.

(2) Screwing in lenses

- Corresponding to the number of lenses, undo the dust protection caps (2-3/3) and screw in the lenses (2-3/2) in the ascending order of magnification factors.

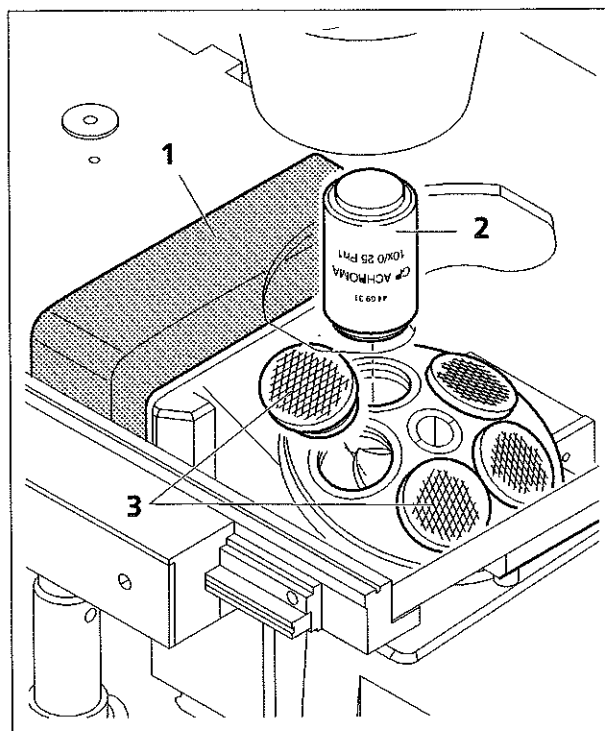


Figure 2-3 Screwing in lenses

(3) Inserting ring diaphragm slides

- Remove the dust protection slide (2-4/1) from the slide mount and, instead, insert the
 - H/Ph slide (2-4/2)
 from the right and engage it in the middle position (bright field setting).

NOTE The marking on the slide must be legible in the upright position and the inserted ring diaphragms must correspond to the condenser/lens combination (see also Section 2.4.2).

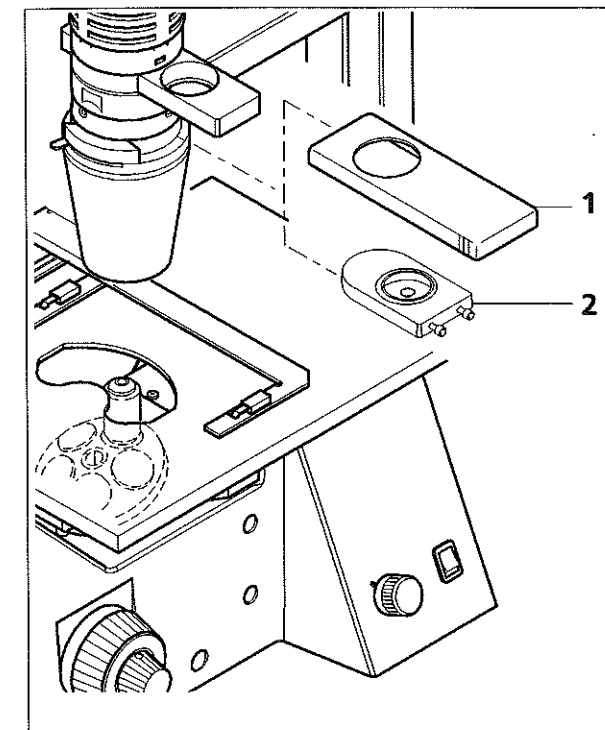


Figure 2-4 Inserting ring diaphragm slides

(4) Fitting the specimen guide M (on request)

- Fit the specimen guide M for Invertoskop (2-5/6) on the left or right of the stage (2-5/2) and secure it from below with three knurled screws (2-5/3).

NOTE The L rail (2-5/4) of the specimen guide must be flush with the stage. The specimen guide is moved by means of a coaxial drive (2-5/5) (bottom drive knob for X movement and top drive knob for Y movement).

- Select the suitable holding frames (2-5/1) for the intended specimen vessel and fit the affiliated scales in the recesses on the specimen guide and stick them on.

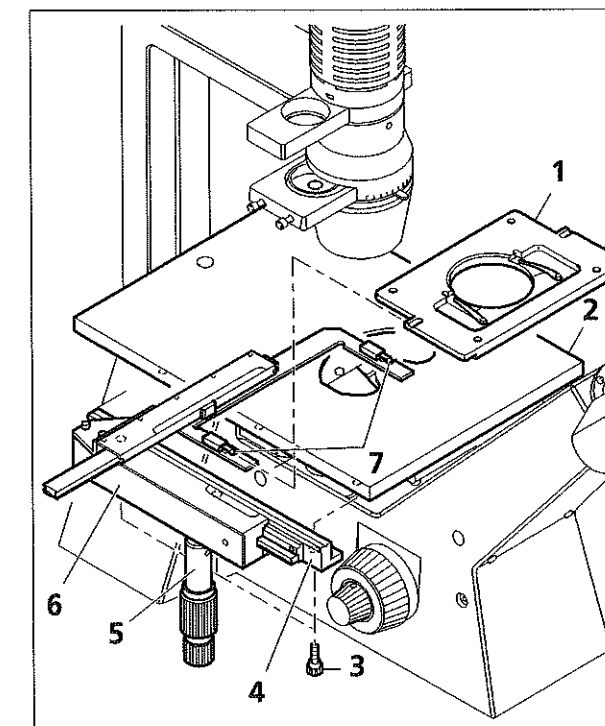


Figure 2-5 Fitting the specimen guide M

NOTE When using the holding frames, make sure that the holding frames are inserted correctly in the specimen guide, i.e. the holding frames must engage in the two holding clips (2-5/7).

- Figure 2-15 shows a selection of available holding frames including the affiliated specimen vessels. The suitable vessels are not, however, included in the scope of delivery and must be provided by the customer (see Section 2.5, "Working with the specimen guide and holding frames").

(5) Connecting to the mains

IMPORTANT Check whether the value printed on the rear of the unit corresponds to the value of the mains voltage!

- Plug the mains cable (2-6/4) into the mains connection terminal and establish connection with the mains.
- Switch on the unit by means of the On/Off switch (2-6/3) on the right of the unit.

NOTE When in the off setting, the marking "0" can be seen on the mains switch.

- Operability of the unit is signalled by the fact that the unit's lighting is on.
- In the event of a fault, check the two G-type fuse links (5 x 20 mm) (2-6/2) conforming to IEC 127: for 115 V: 0.8 A slow-blow/250 V

To do this, remove the fuse holder (2-6/1) from the housing by simultaneously pressing the two spring tabs in the direction of the arrows.

IMPORTANT Only use the described fuses.

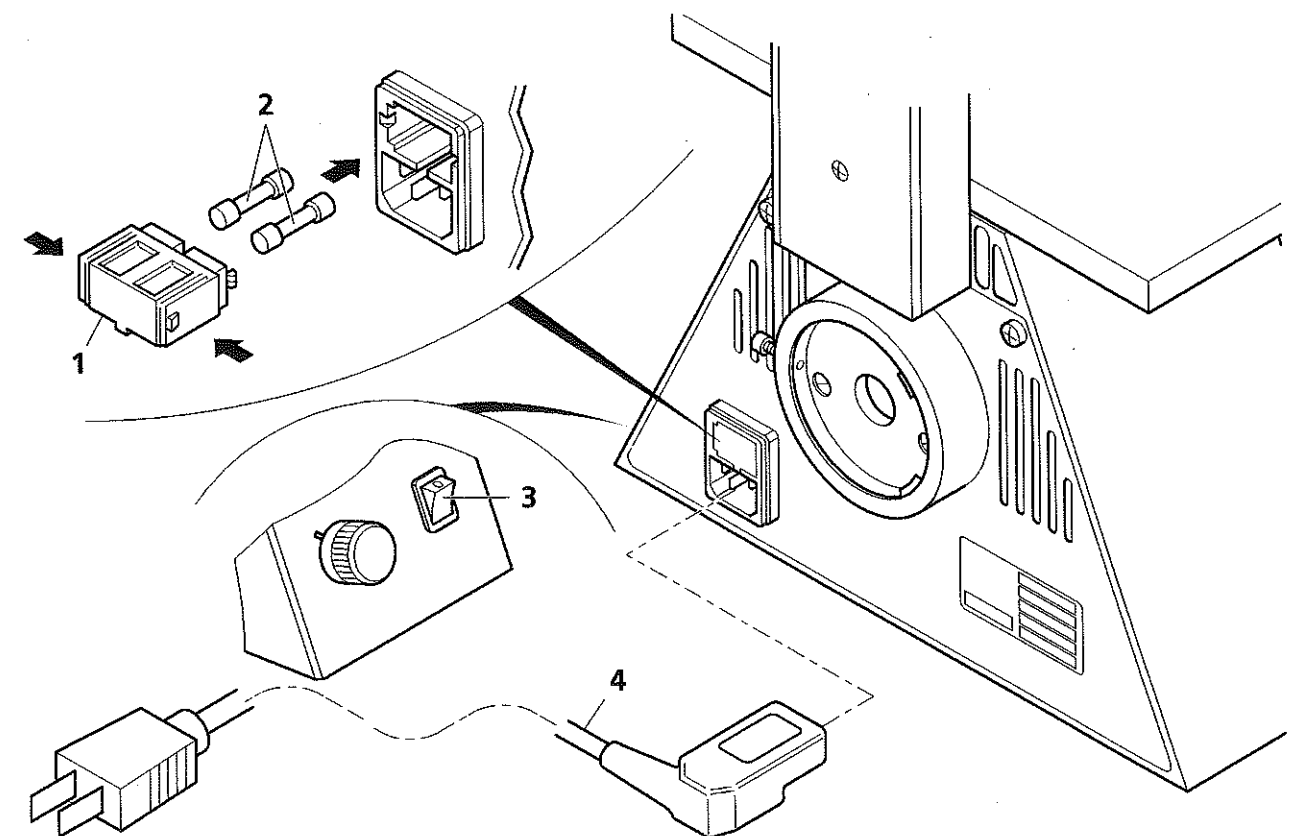


Figure 2-6 Connecting to the mains

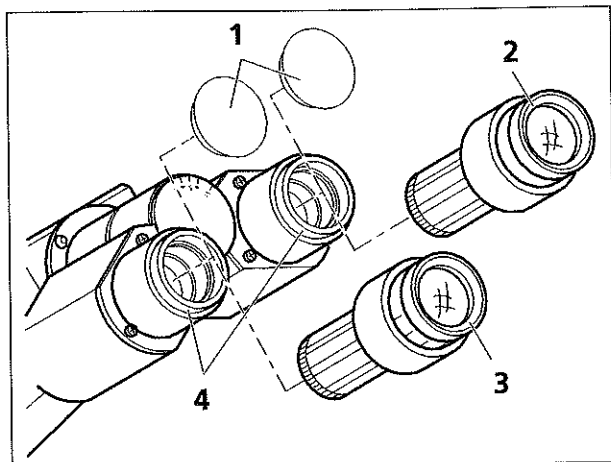


Figure 2-7 Inserting the eyepieces

(6) Inserting Eyepieces

- Remove the dust protection caps (2-7/1) and insert the fixed eyepieces (2-7/2, 3) or the adjustable eyepieces in the eyepiece connectors (2-7/4).

NOTE Depending on the equipment, one or two eyepieces may permit focusing to compensate for differing degrees of myopia of the two eyes.

(7) Compensating for myopia

with one fixed and one adjustable eyepiece

- Focus on the specimen with the fixed eyepiece (2-7/2) and the focusing drive. With the eye lens of the adjustable eyepiece (2-7/3) focus on the specimen for the second eye.

NOTE In doing so, the position of the focusing drive on the stand must not be altered.

(8) Using the binocular tube

- The eyepiece distance is adapted to each individual's eye spacing by symmetrically swivelling the two eyepiece connectors with respect to each other.
- A higher (2-8/A) or lower (2-8/B) observation height is achieved by swivelling the tube.

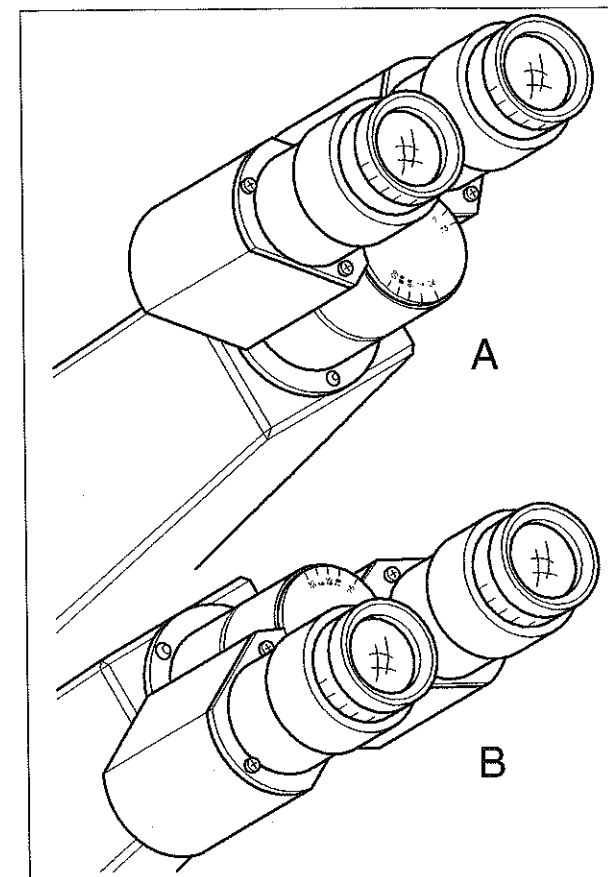


Figure 2-8 Positions of the binocular tube

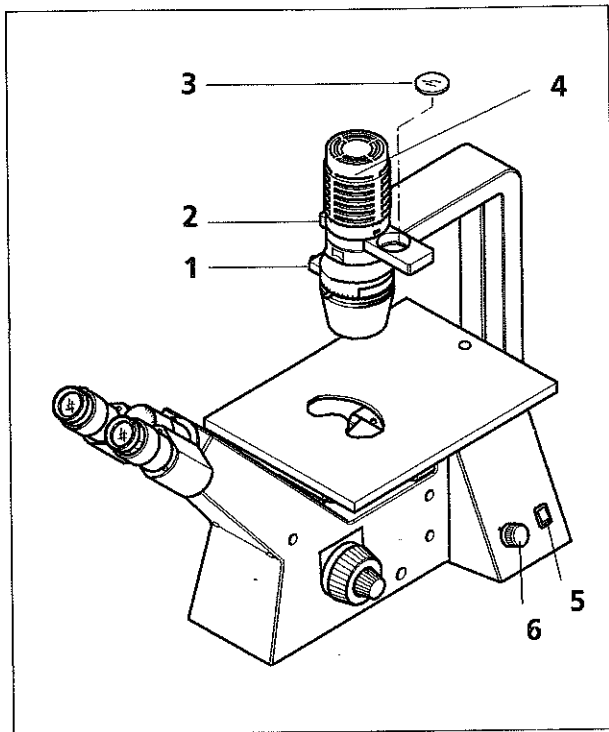


Figure 2-9 Positioning and switching on the unit

(9) Positioning/switching on the unit

- Unless you have already done so, switch on the unit by means of the On/Off switch (2-9/5).
- After switching on, the lamp in the lighting unit (2-9/4) must light up.
- Set the required brightness by means of the lighting control (2-9/6).
- Insert the attenuation or green filter (2-9/3) in the filter slide (2-9/2) as required, and slide it into the beam path.
- Set the H/Ph slide (2-9/1) to the middle position.

2.2 Commissioning

When commissioning the Invertoskop microscope for the first time, unpack the unit as described in Section 2.1.1 and set it up (see Section 2.1.2), connect it and prepare it for operation.

The Invertoskop microscope is delivered with a lighting unit that has been centred at the works. Even after a lamp replacement by the customer, there is no need to centre the lighting unit.

Smaller-scale adjustment, for example adjusting a ring diaphragm, are each explained in the explanations of the corresponding microscopy process.

Otherwise, adjustments are restricted to changing the lenses (manually swivelling them into the beam path) and handling LD lenses.

2.3 Using LD lenses

When conducting analyses with inverse microscopes, it is common to use vessels featuring bottoms that are thicker than the usual cover glass thickness of 0.17 mm.

Normally, the operating distances of weak lenses bridge such distances effortlessly:

- CP-Achromat 5x/0.12 FWD (in air) 10.8 mm or
- CP-Achromat 10x/0.25 FWD (in air) 5.1 mm.

Already in the middle magnification range, however, these operating distances mostly shrink to values around or below 1 mm. Such lenses can then no longer be used for thicker bottoms.

This shortcoming is remedied by special LD (Long Distance) lenses; these lenses have a relatively large operating distance, but simultaneously the normal 45 mm adjustment length of all other lenses.

Table of free operating distances on the Invertoskop

Lens designation	FWD for bottom thickness	
	D=0.17 [mm]	D=1 [mm]
CP-Achromat 5x/0.12	10.7	10.3
CP-Achromat 10x/0.25 Ph1	5.0	4.6
LD-Achrostigmat 20x/0.30 Ph1	2.2	1.8

2.4 Lighting and contrast methods

The following microscope settings are assumed in the description/application of lighting/contrast methods:

- Invertoskop microscope is switched on.
- The "Illuminance" control (2-10/5) is set to the middle position.

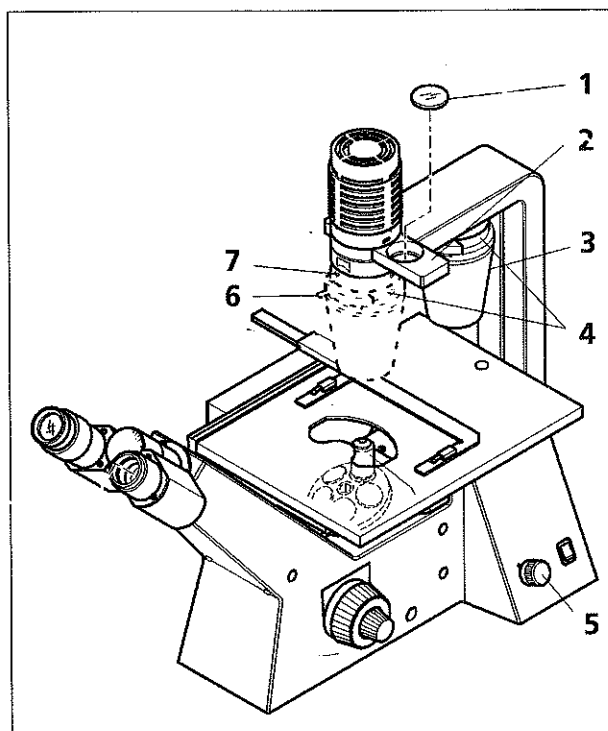


Figure 2-10 Bright field illumination variants

2.4.1 Bright field illumination

- Carry out the preparations described in Section 2.4.
- Move the H/Ph slide (2-10/4) to middle position.
- Place the specimen on the specimen stage and, by means of the focusing drive, focus it with a low magnification factor, e.g. with the "CP-Achromat 10x" lens.
- By means of the lever (2-10/6), close the aperture diaphragm until you arrive at optimum contrast.

NOTE The aperture diaphragm does not serve to control image brightness (loss of image quality)!

- If necessary, modify the lamp voltage by means of the setting control (2-10/5) or place an attenuation filter (2-10/1) in the filter slide (2-10/2) and slide it into the beam path.

Use of condensers

Condenser	0.2
Lens magnification	5x, 10x, 20x

- To fully illuminate specimen fields with weaker lenses (less than 5x), push the condenser (2-10/3) out of its working position (dashed in Figure 2-10).
- When using particularly high culture vessels, this position of the condenser is also necessary in order to increase the free operating distance to around 190 mm.

NOTE Without condenser only simple general illumination is active!

- When returning to illumination with the condenser, slide it exactly up to the stop position.

2.4.2 Phase contrast

- Carry out the preparations described in Section 2.4.

NOTE Phase contrast lenses have a green lens identification.

- Move the phase contrast lens (2-11/3) into the beam path.
- Open the aperture diaphragm (2-11/2) fully.
- Instead of the eyepiece, insert the auxiliary microscope (2-11/4) into one of the tube supports and visualise the phase rings of the lens by focusing its eye lens.
- The phase ring of the phase contrast lens appears as a grey ring in the right pupil (A).

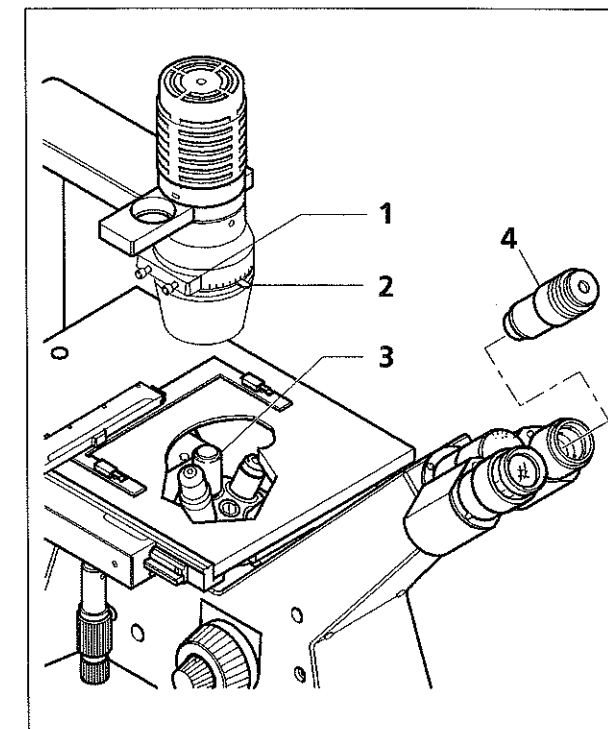


Figure 2-11 Phase contrast observation

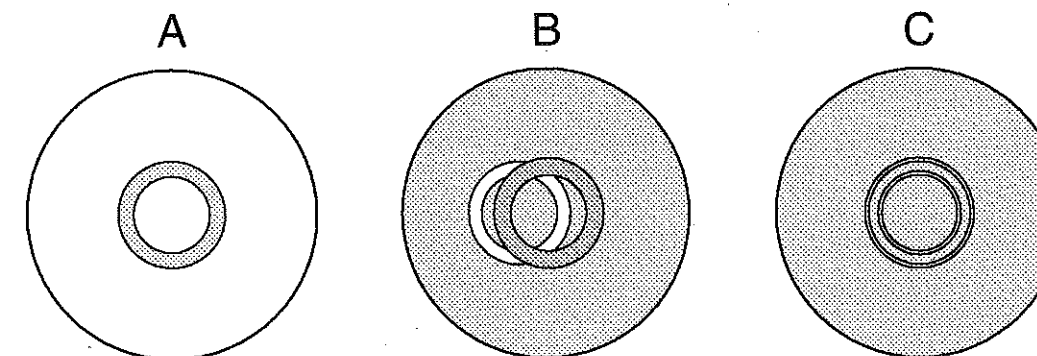


Figure 2-12 Depiction of phase contrast adjustment

- Slide the ring diaphragm Ph1-0.2 (/1) of the H/Ph slide (2-11/1) matching the lens and the inserted condenser into the beam path. The phase ring of the lens appears centrally in the field of vision, but the bright ring diaphragm may be out of centre (B).
- By means of the affiliated centring screws (2-13/2) on the H/Ph slide, move the phase ring and the ring diaphragm until they are flush. In doing so, the grey phase ring of the lens must cover the bright ring diaphragm completely (C).

NOTE If the setting range of the centring screws should not be sufficient, please check whether the condenser is at the front stop and the H/Ph slide is engaged. A plane-parallel specimen is the prerequisite for exact imaging of the ring diaphragm.

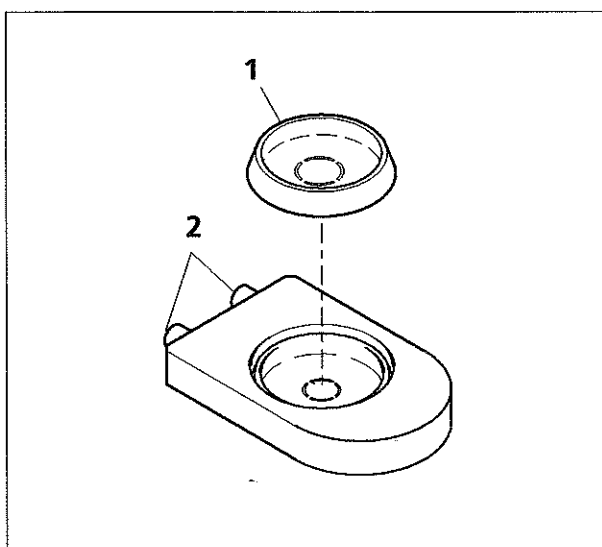


Figure 2-13 Inserting the ring diaphragm

- Then once again replace the auxiliary microscope by the eyepiece.
- The middle position of the H/Ph slide permits bright field illumination and, at the same time, its brightness is adapted by an attenuation filter (grey filter) (2-13) to the brightness of the phase contrast image.

Lens	Ring diaphragms for 0.2 condenser
CP-Achromat 10x/0,25 Ph1	Ph1 - 0.2
LD-Achrostigmat 20x/0,30 Ph1	Ph1 - 0.2

- After undoing the centring screws, the inserted ring diaphragm can be replaced by a different one.

2.5 Working with the specimen guide M and holding frames (on request)

- Carry out the preparations described in Section 2.4.
- Specimen guide M fitted as described in Section 2.1.2(5).

In conjunction with various holding frames (2-14/3), e.g. for 76 x 26 mm specimen mounts (2-14/2), the specimen guide M (2-14/6) offers the possibility of sensitive movement by means of a coaxial drive (2-14/4).

Defined indication of the positions of vessels is possible thanks to stick-on scales (2-14/5), which are supplied with the chosen holding frame and which must be attached in recesses on the specimen guide. Holding frames are secured by means of holding clips (2-14/1).

Figure 2-15 overleaf shows the assortment of available holding frames. Please inquire about further holding frames for COSTAR, CORNING and tissue culture bottles, Hamax plates, Coates plates and plankton plates etc.

- 1 Holding frame M for specimen mounts, 76 x 26 mm
- 2 Holding frame M for Petri dishes; \varnothing 36, 54, 65, 88 mm
- 3 Holding frame M for microtitre plate 96 pos.
- 4 Holding frame M for microtest plates 60, 72, 120 pos.
- 5 Holding frame M for multiple dishes (133.5 x 88.5 mm)
- 6 Universal holding frame for the use of:

- Petri dishes in the range from 35 to 60 mm
- Petriperm dishes
- Terasaki plates
- Hamax plates
- Cell cultivation chambers such as
 - TSCS-1, -2 and -3
 - POC chamber
 - ROSE chamber
 - DVORAK-STOTLER chamber etc.
- Specimen mounts and all vessels on a specimen mount basis

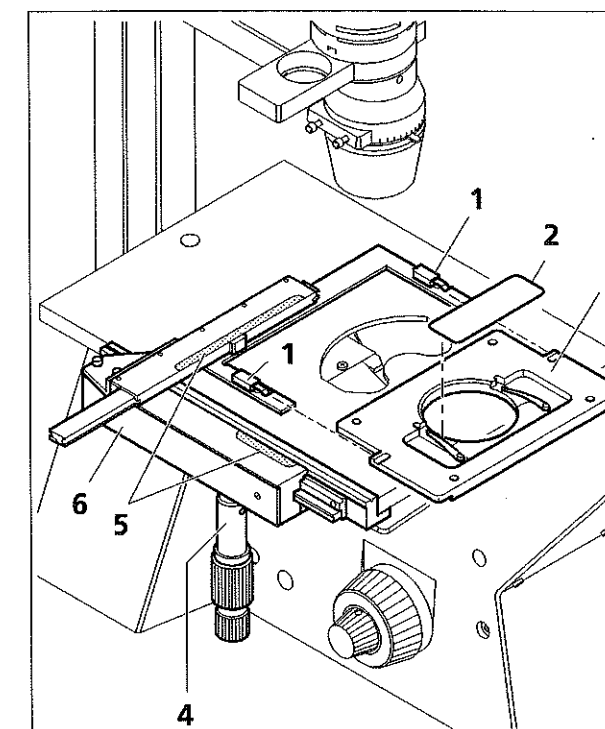


Figure 2-14 Working with specimen guide M

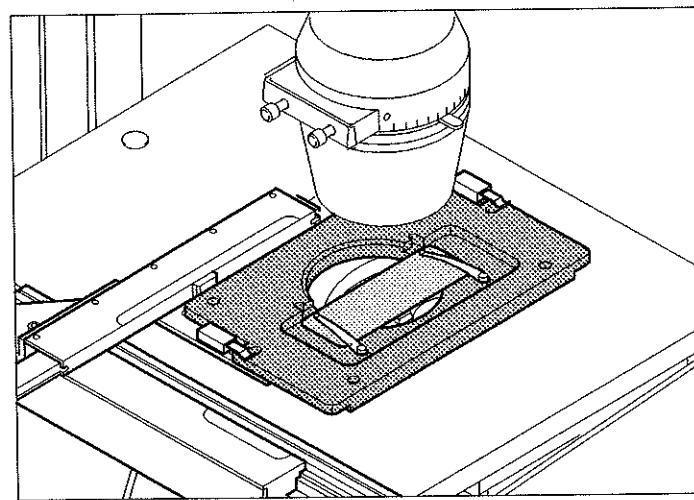
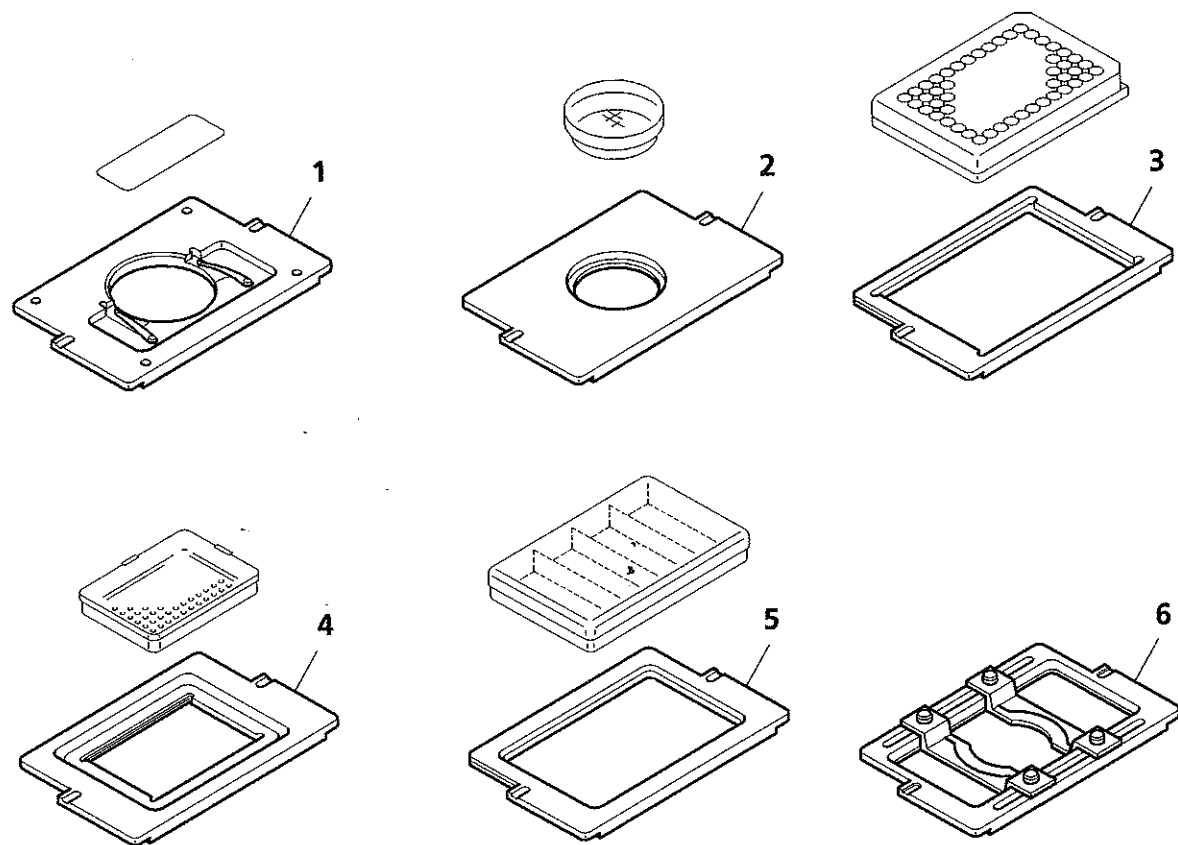


Figure 2-15 Selection of available holding frames (on request)

3 Care and troubleshooting

3.1 Care

Care of the Invertoskop microscope is limited to the following operations:

- Cover the unit with the dust cover after every use.
- Whenever required, clean exposed optical parts.
- Conscientiously wipe off moisture deposits or precipitation of aggressive vapours using a dry cloth.
- Protect the unit against temperatures in excess of 50 °C, frost, moisture and chemically aggressive vapours/substances.
- Remove dust from optical surfaces with a rubber blower or with a natural hair brush. Degrease the brush in alcohol and then dry it. Remove stubborn soiling and fingerprints with a dust-free cloth or leather, if necessary after breathing onto the soiled surface. Clean the front surfaces of lenses with light petroleum, but do not use any alcohol.
- Use commercially available optical and spectacle cleaning cloths to remove extreme soiling (e.g. fingerprints) from optical surfaces; if necessary, moisten cloths lightly with petroleum ether.

When using the Invertoskop microscope in moist and warm climate zones, pay attention to the following notes:

- Store the Invertoskop microscope in bright, dry and well ventilated rooms with a humidity < 85 %; store particularly sensitive modules and accessories such as lenses and eyepieces in dry cabinets.
- When storing the microscope or its parts in closed receptacles for longer periods of time, fungi can largely be avoided by placing absorbent substances soaked in fungicide in the receptacles.

NOTE

Fine mechanical and optical devices are always at a risk of fungus infection under the following conditions:

- Relative humidity > 75 % for more than 3 days at temperatures from + 15 °C to +35 °C.
- Placing them in dark rooms where there is no movement of air and
- In the event of dust deposits and fingerprints on optical surfaces.

3.2 Troubleshooting and service

Troubleshooting on the Invertoskop microscope is limited to only a few activities:

- Check the mains voltage
- Check the lighting unit
 - Replace fuses as described in Section (1)
 - Replace lamps as described in Section (2)

(1) Checking the mains supply

- Check and if necessary, replace the mains cable (3-1/3).
- Remove the fuse holder (3-1/1) by simultaneously pressing in the direction of the arrow and check the fuse links (3-1/2); replace defective fuse links.

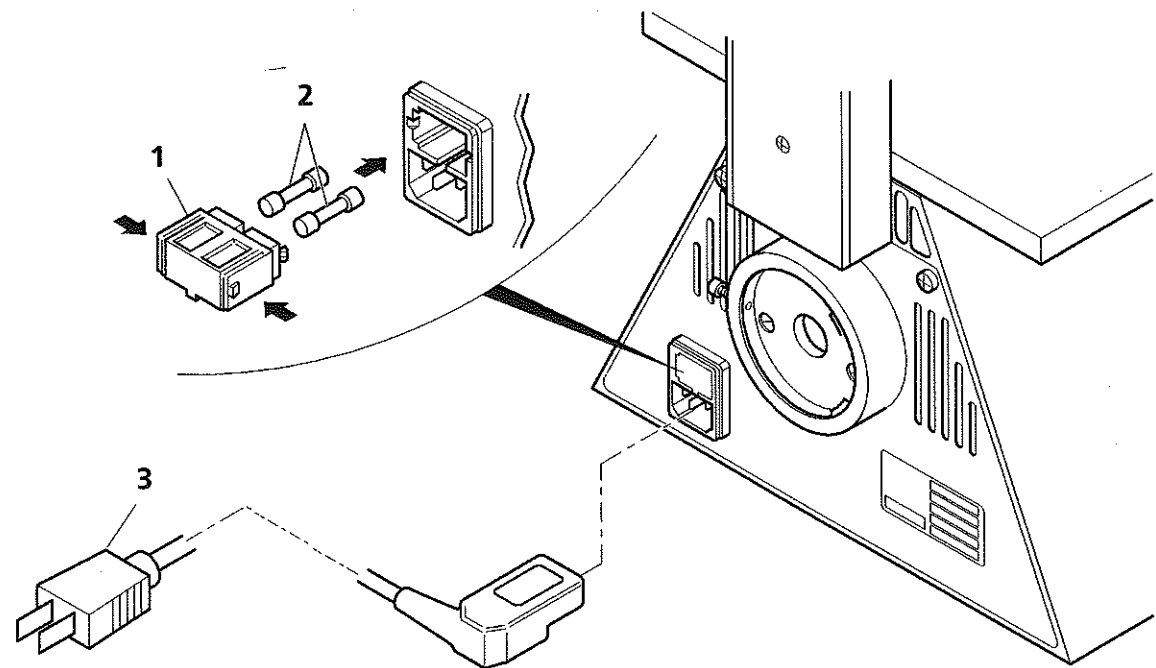


Figure 3-1 Checking the mains supply

(2) Halogen lamp replacement

Carry out the following activities when replacing the lamp:

- Remove the mains plug.
- Release the housing (3-2/1) by lightly turning it counter-clockwise and detach it.
- After it has cooled down for approximately 15 minutes, remove the halogen lamp with the adjustment socket (3-2/2).
- Take a new 6 V 25 W halogen lamp with adjustment socket out of the packing box and insert it in the lamp holder part; in doing so, the tip of the lamp holder part must engage in the centring notch of the carrier plate.

IMPORTANT Do not touch the lamp bulb with your bare hands; if necessary, clean the bulb with pure alcohol before switching on for the first time, thus preventing dirt from baking in.

- After replacing the halogen lamp, fit the lamp housing again and lock it.

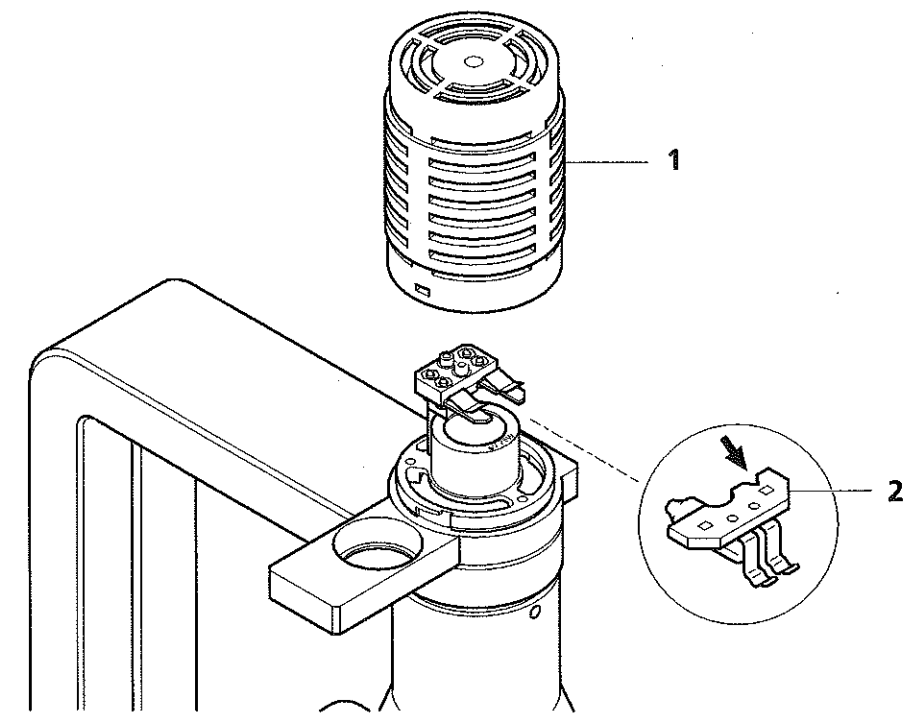
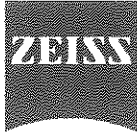


Figure 3-2 Halogen lamp replacement



(3) Service

All tampering on optical parts or motion elements in the interior of the unit or work on the electrics of the Invertoskop may only be carried out by service specialists or specially **authorised** personnel.

For servicing, contact your nearest regional representative or

Carl Zeiss Jena GmbH
Zeiss Gruppe
Unternehmensbereich Mikroskopie
Tatzendpromenade
D-07745 Jena

Telefon: (03641) 64-2936
Fax: (03641) 64-3144
Internet: micro@zeiss.de
<http://www.zeiss.de>



ANNEX

- List of key words
- List of abbreviations
- Certification in accordance with ISO 9001/EN 29001/EN 46001
- EC conformity declaration



List of key words

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List of abbreviations

BP	Bandpass
CB	<u>C</u> onversion <u>B</u> lue
Corr	corrected
CP	Clinical Plan
D	Cover glass thickness
DF	Dark field
DIN	German standards institute
EC	European Community
EN	European standard
ENG	<u>E</u> lectronic <u>N</u> ews <u>G</u> athering
FWD	Free working distance
foc.	focusing
FT	Colour splitter
HAL	Halogen lamp
HF (H)	Bright field
ICS	<u>I</u> nifinity <u>C</u> olour-corrected <u>S</u> ystem
IEC	<u>I</u> nternational <u>E</u> lectrotechnical <u>C</u> ommission
IP	<u>I</u> nternational <u>P</u> rotection
ISO	<u>I</u> nternational <u>O</u> rganisation for <u>S</u> tandardization
LD	<u>L</u> ong <u>D</u> istance
LP	Long pass
Ph	Phase
PI	Plane
SFZ	Field-of-view number
SLR	<u>S</u> ingle <u>L</u> ens <u>R</u> eflex
spect.	Spectacle wearer
vis.	Visual



CERTIFICATE



The TÜV-Zertifizierungsgemeinschaft e.V.
hereby certifies that

Carl Zeiss Jena GmbH

D-07740 Jena

has established and applies
a quality system for

The whole company

Manufacturing of precision-mechanical, optical,
electronic and medical products

An audit was performed, Report No. 4111

Proof has been furnished that the requirements according to

DIN ISO 9001 / EN 29001 / EN 46001

are fulfilled.

The certificate is valid until
July 1997

Certificate Registration No.
09 100 4111

Bonn, 22.08.1994

[Signature]

TÜV CERT Executive Board

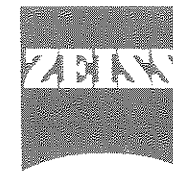


TÜV Rheinland

Cologne, 22.08.1994

[Signature]

TÜV CERT Certification Body of
TÜV Rheinland
Sicherheit und Umweltschutz GmbH



EG-Konformitätserklärung EC Declaration of Conformity

Carl Zeiss Jena • 07740 Jena • Germany

(Qualitätsmanagementsystem zertifiziert nach/Quality Management System certified to meet:
DIN EN ISO 9001, EN 46001)

Wir erklären hiermit die Übereinstimmung des genannten Gerätes mit der EG-Richtlinie 73/23/EWG - Niederspannungsrichtlinie einschließlich der Änderung 93/68/EWG und mit der Richtlinie 89/336/EWG über die Elektromagnetische Verträglichkeit einschließlich der Änderungen 92/31/EWG und 93/68/EWG.

Bei Änderungen am Produkt, die nicht von uns autorisiert wurden, verliert diese Erklärung ihre Gültigkeit.

We declare the compliance of the device with the requirements of the Council Directive 73/23/EEC - Low Voltage Directive including modification 93/68/EEC and with the Council Directive 89/336/EEC about the Electromagnetic Compatibility including modifications 92/31/EWG and 93/68/EWG.

Any modification to the product, not authorized by us, will invalidate this declaration.

Gerätebezeichnung/Device name:

Invertoskop

Normen/Standards:

EN 61010-1	(03/94)	/IEC 1010-1
EN 55011	(07/92)	/CISPR 11
EN 50082-1	(03/93)	/IEC 801-2
		/IEC 801-3
		/IEC 801-4

Klasse B/Class B
 8 kV (Luft/Air)
 4 kV (direkt/contact)
 3 V/m
 2 kV (Netzleitung/Power cord)
 1 kV (Datenleitung/Data line)

Grundlage - Konformitätsakte Nr./Basis - Record of Conformity No.: MI 009/96

Das Gerät ist gekennzeichnet mit/ The device is marked with



Prüfung/Test: **EMV- und GS-Labor Servicebereich Qualität/EMC- and Product Safety Laboratory Service Department of Quality - Carl Zeiss Jena**

Registriert/Registered: CZJ MICE 1137-97

Jena, 10.02.1997

Carl Zeiss Jena

Sharp

Unternehmensbereich Mikroskopie
Business Group Microscopy



Dr. Frenzel

Qualitätsmanagement
Quality Management

Die Erklärung bescheinigt die Übereinstimmung mit der Richtlinie und dem Gesetz. Gewährleistung und Haftung sind in unseren Allgemeinen Lieferbedingungen geregelt.

The declaration certifies the compliance with the Directive and the Law. Conditions of guarantee and liability are dealt within our General Conditions of Sale.