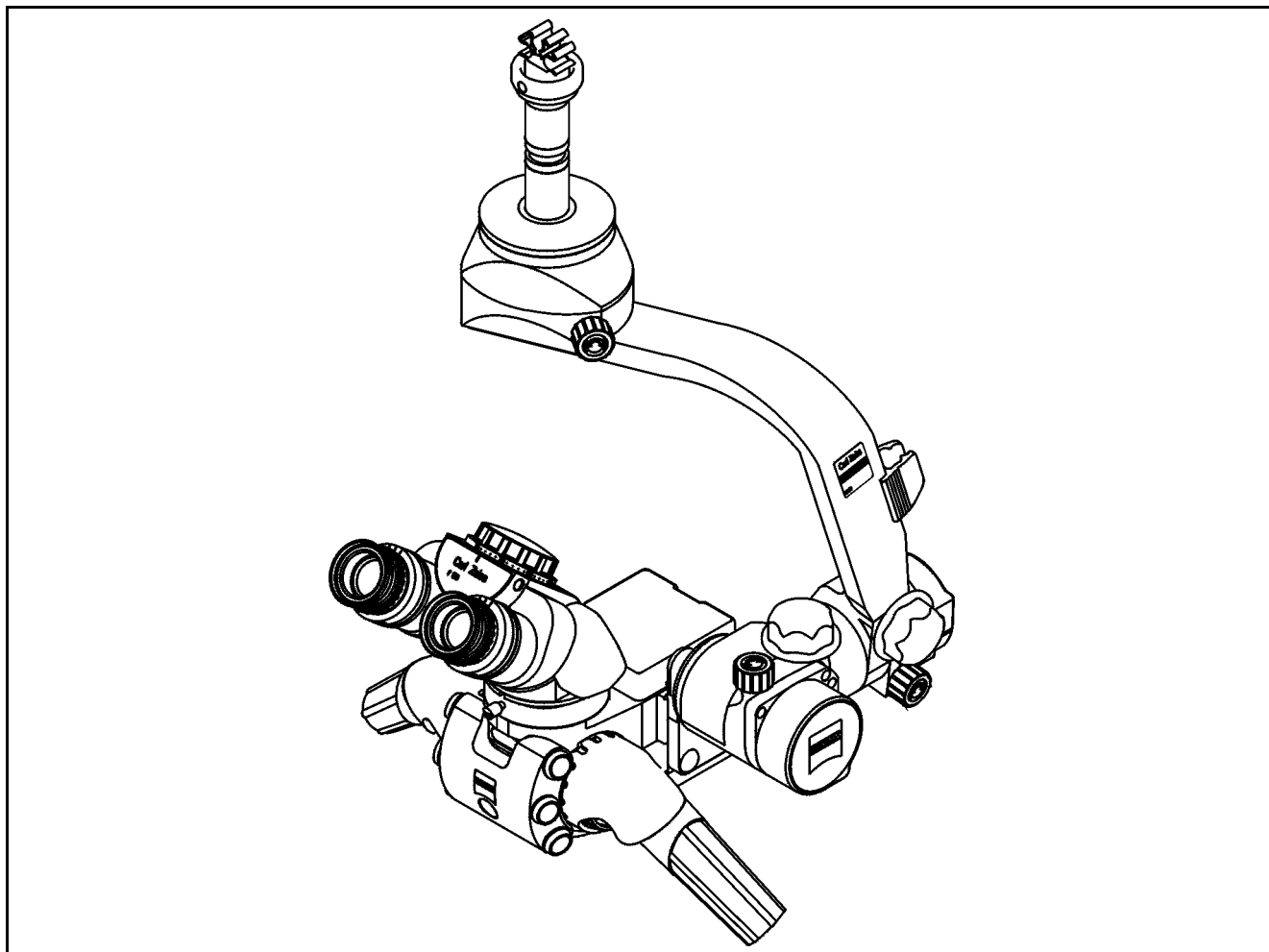


# OPMI® PRO magis Surgical Microscope



Instructions for use

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# Functions at a glance

OPMI® PRO magis surgical microscope

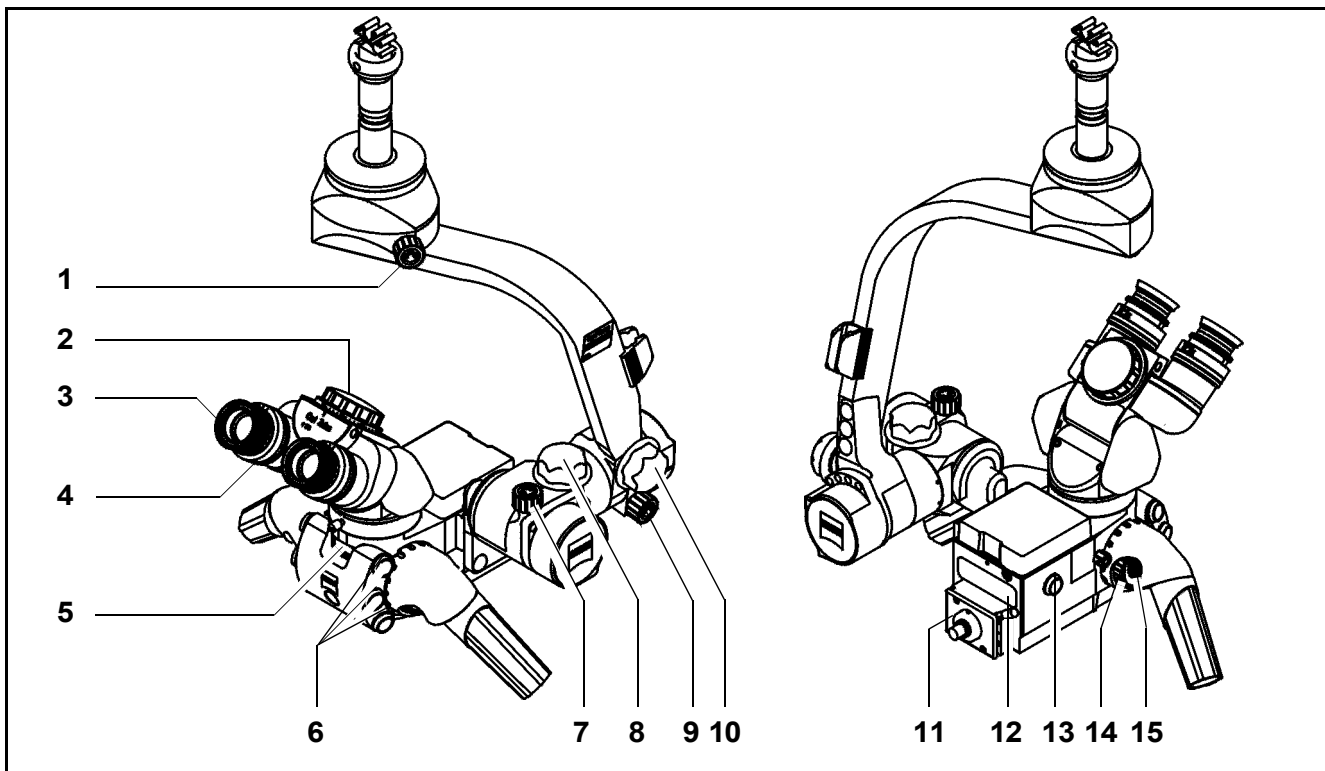
6

Key for symbols

7

## OPMI® PRO magis surgical microscope

- 1 Setting the friction of the microscope's axis of rotation
- 2 Setting the interpupillary distance
- 3 Adjusting the eyecups
- 4 Setting the prescription on the diopter scale
- 5 Display of the zoom system's magnification factor
- 6 Releasing the magnetic brakes (three keys each on the right and left)
- 7 Adjusting the friction of the front-to-back tilt motion
- 8 Balance setting of the front-to-back tilt of the microscope
- 9 Setting the friction of the lateral tilt motion
- 10 Balance setting of the lateral tilt of the microscope
- 11 Connecting the light guide
- 12 Adjusting the illuminated field diameter
- 13 Moving to the starting position of the focusing range
- 14 Motorized focusing (left and right on handgrip)
- 15 Motorized zooming (left and right on handgrip)



## Key for symbols



### Warning!

The **warning triangle** indicates potential sources of danger for persons which may constitute a risk of injury for the user or a health hazard.



### Caution:

The **square** indicates situations which may lead to malfunction, defects, collision or damage of the instrument.



### Note:

The **hand** indicates hints for the use of the instrument or other tips for the user.





# Safety

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The instrument described in this manual has been developed and tested in accordance with Carl Zeiss safety standards and with national and international regulations. A high degree of instrument safety is thus ensured.



We would like to inform you on the safety aspects involved in operating the instrument. This chapter contains a summary of the most important precautions to be observed.

Further safety notes are also contained in other parts of this user's manual; they are marked with a warning triangle containing an exclamation mark as shown here. Please pay special attention to these safety notes.

Safety is only ensured when this instrument is operated properly. Please read through this manual carefully before turning the instrument on. Also read through the user's manuals of the other equipment used with this instrument. You may obtain further information from our service organization or authorized representatives.

## Directives and standards

The instrument described in this manual has been designed in compliance with the following standards:

- EN
- IEC
- UL
- CSA

In accordance with Directive 93/42/EEC, Annex II, Article 3, the quality-management system of Carl Zeiss has been approved by TÜV Rheinland, which is a notified body. The registration number is: 95 102 7601.

- The instrument must be connected to a special emergency backup line supply in accordance with the regulations or directives which apply in your country.
- This is a class I instrument as defined by Directive 93/42 /EEC.
- Please observe all applicable accident prevention regulations.

## Notes on installation and use

### Safe working order

- Do not operate the equipment contained in the delivery package in
  - explosion-risk areas,
  - the presence of inflammable anesthetics or volatile solvents such as alcohol, benzine or similar chemicals.
- Do not station or use the instrument in damp rooms. Do not expose the instrument to water splashes, dripping water or sprayed water.
- Immediately unplug any equipment that gives off smoke, sparks or strange noises. Do not use the instrument until our service representative has repaired it.
- Do not place any fluid-filled containers on top of the instrument. Make sure that no fluids can seep into the instrument.
- Do not force cable connections. If the male and female parts do not readily connect, make sure that they are appropriate for one another. If any of the connectors are damaged, have our service representative repair them.
- Potential equalization: The instrument can be incorporated into potential equalization measures. For this purpose, contact our service department.
- Do not use a mobile phone in the vicinity of the equipment because the radio interference can cause the equipment to malfunction. The effects of radio interference on medical equipment depend on a number of various factors and are therefore entirely unforeseeable.
- Modifications and repairs on these instruments or instruments used with them may only be performed by our service representative or by other authorized persons.
- The manufacturer will not accept any liability for damage caused by unauthorized persons tampering with the instrument; this will also forfeit any rights to claim under warranty.
- Use this instrument only for the applications described.
- Only use the instrument with the accessories supplied. Should you wish to use other accessory equipment, make sure that Carl Zeiss or the equipment manufacturer has certified that its use will not impair the safety of instrument.

- Only personnel who have undergone training and instruction are allowed to use this instrument. It is the responsibility of the customer or institution operating the equipment to train and instruct all staff using the equipment.
- Keep the user's manuals where they are easily accessible at all times for the persons operating the instrument.
- Never look at the sun through the binocular tube, the objective lens or an eyepiece.
- Do not pull at the light guide cable, at the power cord or at other cable connections.
- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.  
If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.

### **Requirements for operation**

Our service representative or a specialist authorized by us will install the instrument. Please make sure that the following requirements for operation remain fulfilled in the future:

- All mechanical connections (details in the user's manual) which are relevant to safety are properly connected and screw connections tightened.
- All cables and plugs are in good working condition.
- The voltage setting on the instrument conforms to the rated voltage of the line supply on site.
- The instrument is plugged into a power outlet which has a properly connected protective earth contact.
- The power cord being used is the one designed for use with this instrument.

### **Before every use and after re-equipping the instrument**

- Make sure that all "Requirements for operation" are fulfilled.
- Go through the checklist.
- Re-attach or close any covers, panels or caps which have been removed or opened.

- Pay special attention to warning symbols on the instrument (triangular warning signs with exclamation marks), labels and any parts such as screws or surfaces painted red.

**For every use of the instrument**

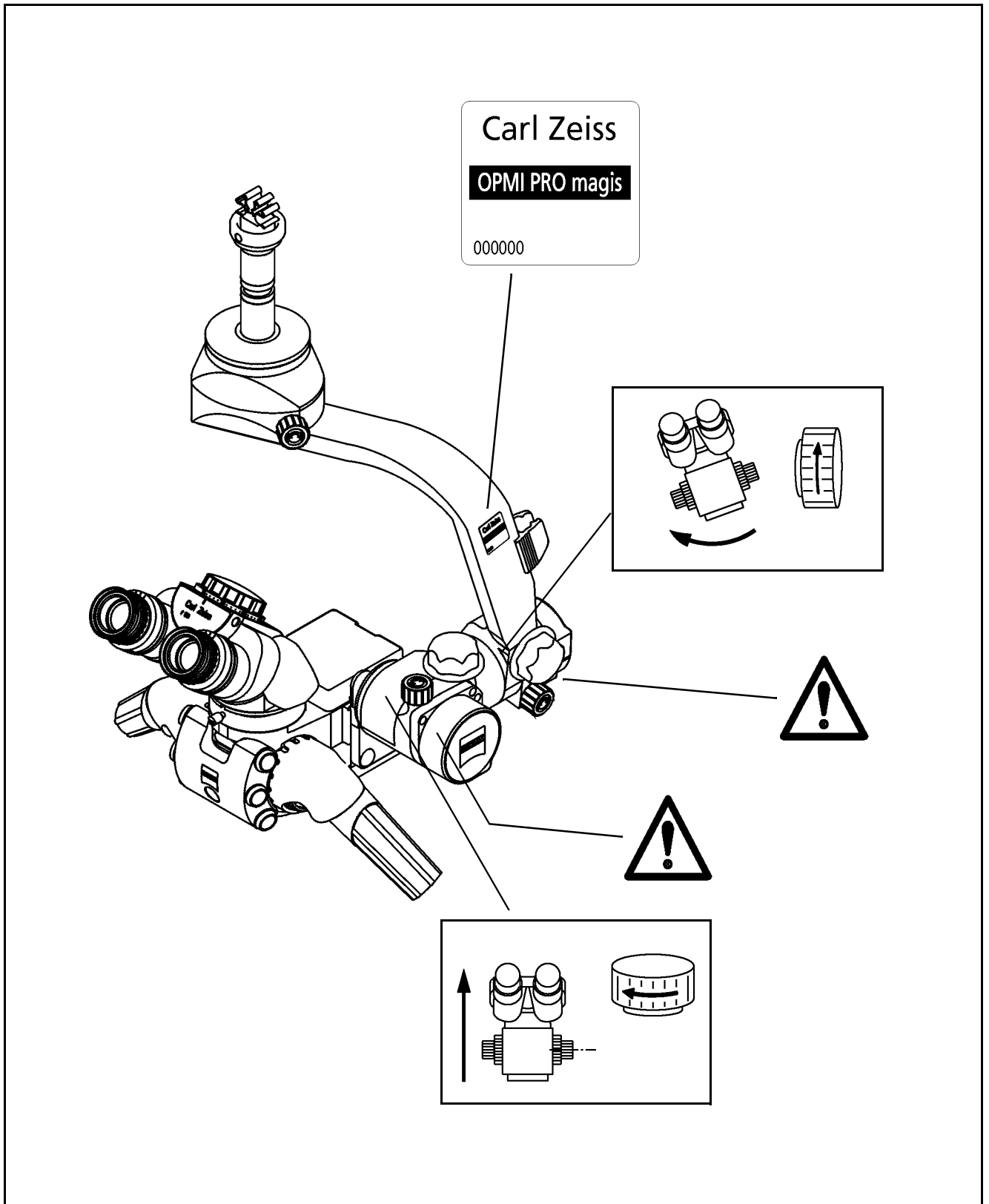
- Avoid looking directly into the light source, e.g. into the microscope objective lens or a light guide.
- Any kind of radiation has a detrimental effect on biological tissue. This also applies to the light illuminating the surgical field. Please therefore reduce the brightness and duration of illumination on the surgical field to the absolute minimum required.
- When operating on the eye, always use a GG 475 protection filter to ensure that the patient's retina is not exposed to unnecessary (blue) radiation (retinal injury).

## Warning labels and notes

**Caution:**

Observe all warning labels and notes!

If any label is missing on your instrument or has become illegible, please contact us or one of our authorized representatives. We will supply the missing labels.







# Description

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# OPMI<sup>®</sup> PRO magis

## Intended use

The OPMI<sup>®</sup> PRO magis surgical microscope is a compact and easy-to-use instrument which is ideally suited for neurosurgery, ENT applications and reconstructive and plastic surgery. It is also suitable for the use in other microsurgical disciplines.

The friction of the front-to-back and lateral tilt motion can be adjusted as required. The tilt and rotary axes of the OPMI<sup>®</sup> PRO magis surgical microscope are equipped with magnetic brakes permitting the microscope to be locked in any position.

The zoom and focusing functions of the OPMI<sup>®</sup> PRO magis surgical microscope are motorized, and can be directly activated on the microscope. A foot control panel is not required for operation of the instrument. However, you can also control the motorized functions via a foot control panel or hand control panel. The magnetic brakes can be operated from the microscope direct.

The coaxial illumination system is supplied with light via an S light guide. The diameter of the illuminated field can be continuously adjusted from a fully illuminated field (Ø 55 mm) to "spot" illumination (Ø 11 mm) using a light stop lever. This data applies to an objective focal length of  $f = 200$  mm. With the "spot" setting, luminance is approx. twice as high as in the largest possible illuminated field.

You can equip the OPMI<sup>®</sup> PRO magis surgical microscope with all accessories required for documentation and coobservation. These accessories can be mounted quickly and easily.

For adjustment of the depth of field, we recommend using a double iris diaphragm. Cat. No. 30 33 54-0000.



### Caution!

If the xenon light source is used, the unit must not be used in ophthalmic applications. Severe injury to the patient's eye is possible.



## Controls, displays, connections

1 Cable and light guide clip

2 Securing screw

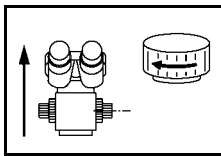
3 Microscope shaft

4 Axis of microscope rotation

A magnetic brake clamps the axis of rotation as soon as you let go of the release keys for the magnetic brakes.

5 Adjusting knob

for setting the friction of the microscope's axis of rotation.

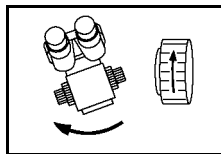


6 Knob for balance setting of the front-to-back tilt motion

Use this knob to balance the front-to-back tilt motion. The balancing procedure is described in the chapter: "Operation/Balancing the surgical microscope".

7 Adjusting knob

for setting the friction of the microscope's front-to-back tilt motion.



8 Knob for balance setting of the lateral tilt motion

Use this knob to balance the lateral tilt motion. The balancing procedure is described in the chapter: "Operation/Balancing the surgical microscope".

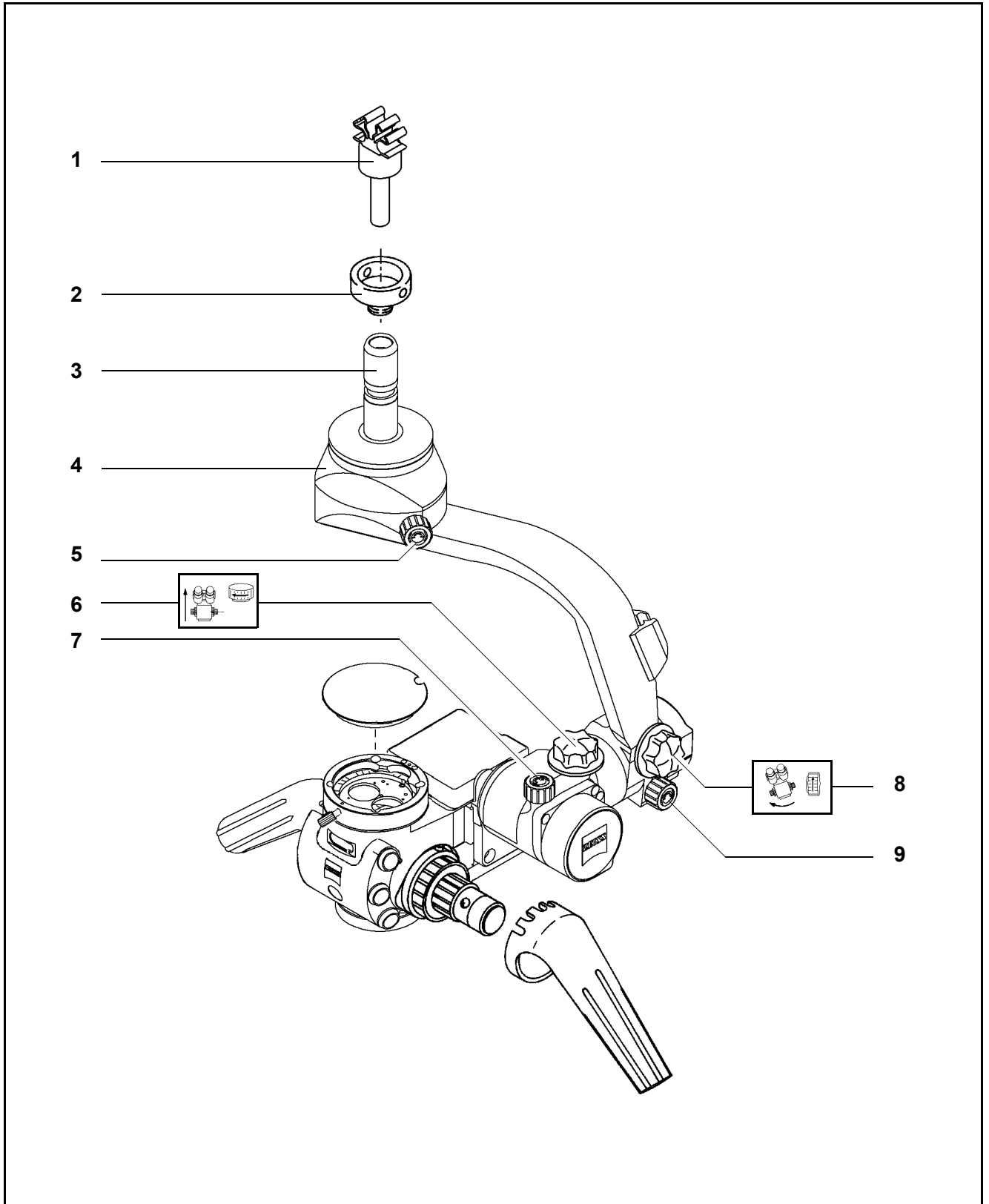
9 Adjusting knob

for setting the friction of the microscope's lateral tilt motion.



### Warning!

Before removing the microscope or changing any microscope equipment, make sure to tighten the knobs (7) and (9).



**10** Dust cover**11** Securing screw

Tighten the securing screw firmly after you have inserted the binocular tube or another module in the mount on the surgical microscope.

**12** Display of magnification factor  $\gamma$  of the zoom system**13** Release keys for the magnetic brakes

As long as you press one of these keys, the magnetic brakes of the surgical microscope and suspension system are released (if the suspension system used is equipped with magnetic brakes).

**14** Focusing control rings

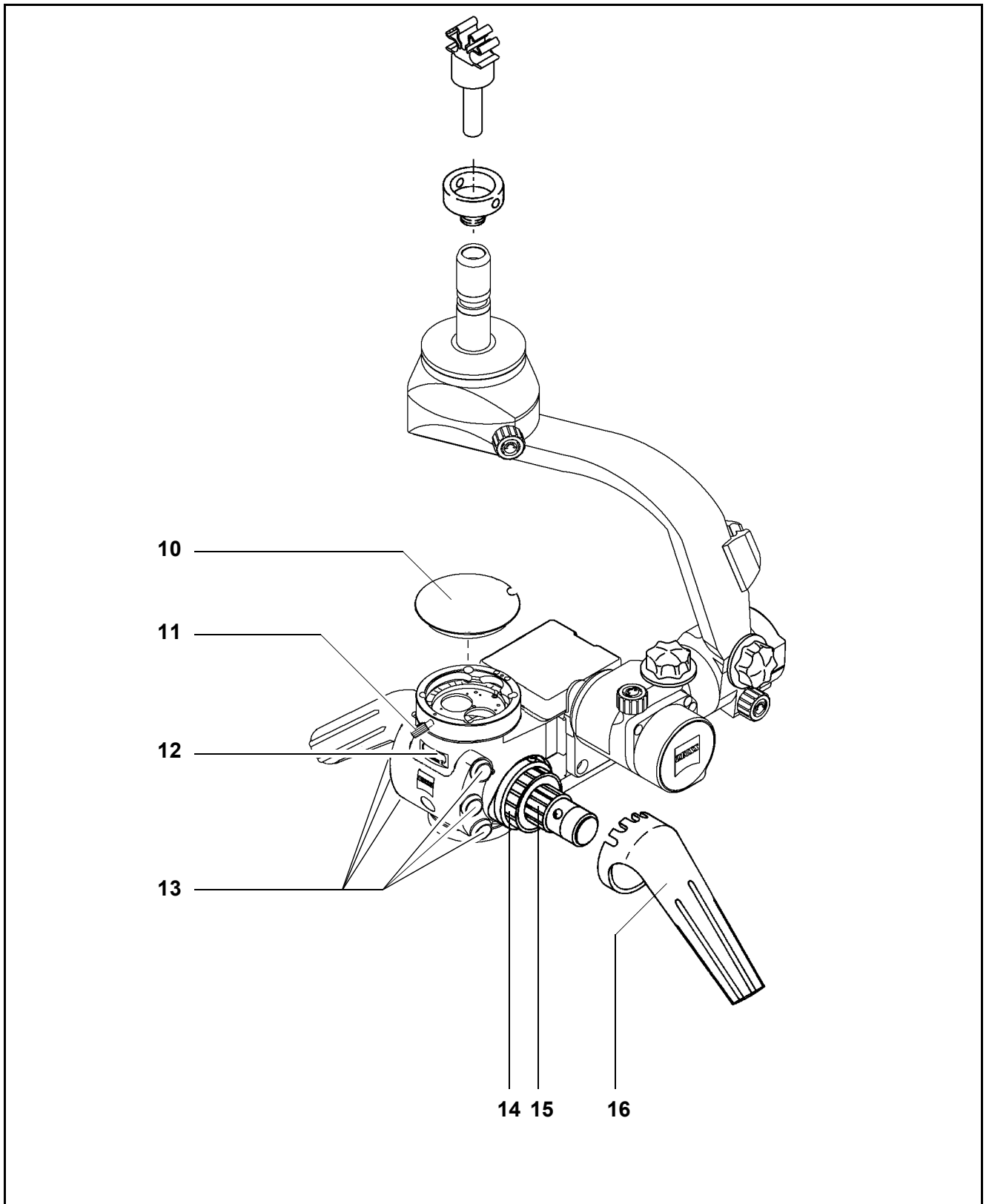
(on the right- and left-hand sides of the housing).

**15** Magnification control rings (zoom)

(on the right- and left-hand sides of the housing).

**16** Handgrips for maneuvering the surgical microscope

You can attach the handgrips to the surgical microscope at different angles.



**17** Cable and light guide clip**18** Instrument connector

for the power supply of the microscope.

Note:

Switch off the main power switch at the suspension system before plugging in or unplugging the instrument connector.

**19** Socket for the S light guide

Insert the S light guide into the socket until it snaps in.

**20** Light stop lever

The diameter of the illuminated field can be continuously adjusted from a fully illuminated field ( $\varnothing$  55 mm) to "spot" illumination ( $\varnothing$  11 mm) using the light stop lever. This data applies to an objective focal length of  $f = 200$  mm. With the "spot" setting, luminance is approx. twice as high as in the largest possible illuminated field.

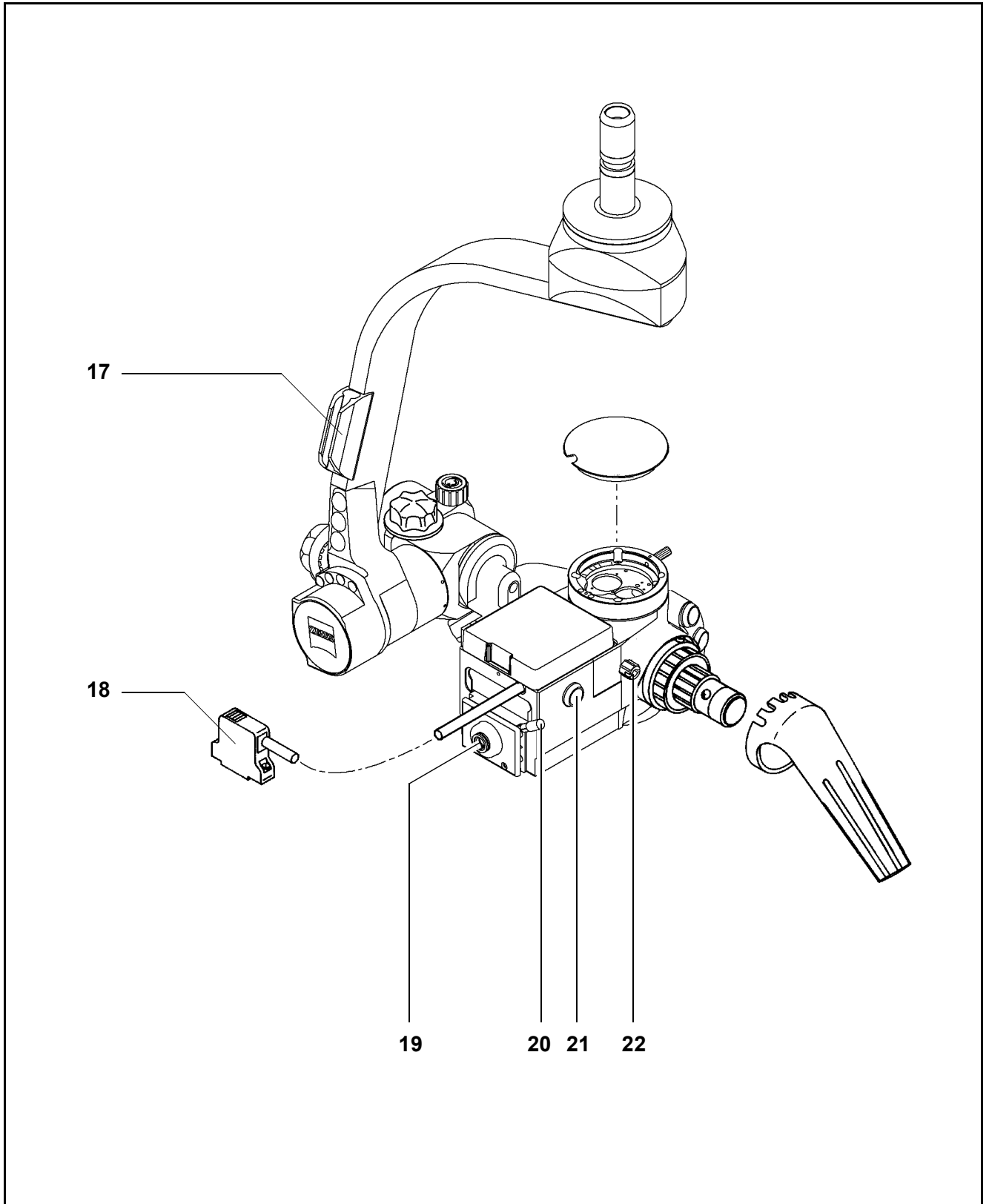
**21** Reset button

Press this button to set the microscope to the starting position of the focusing range.

**22** Zoom knob

Use this knob for manual setting of the magnification.





## Tiltable binocular tube and eyepieces

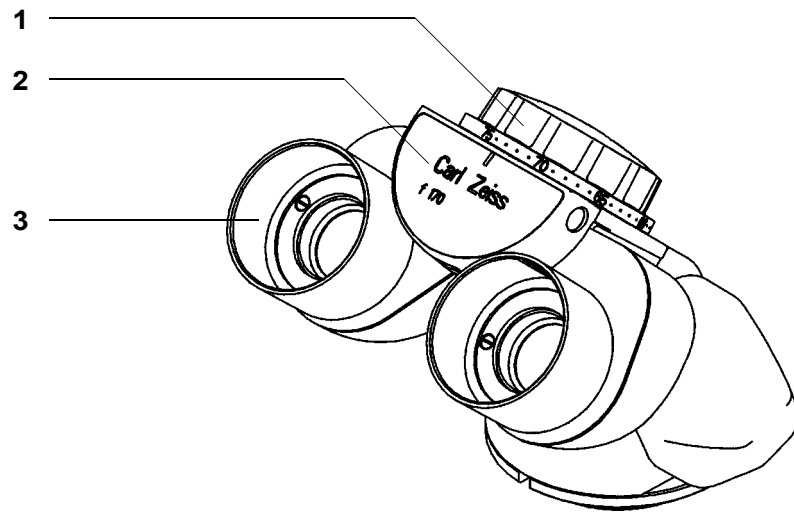
### 180° tiltable tube

1 PD adjustment knob

The correct position has been set when the two eyepiece images merge into one.

2 180° tiltable tube

3 Eyepiece tube



## Widefield eyepieces with magnetic coupling



### Note:

When you remove these eyepieces from the tube, please note that they are fitted with a magnetic coupling. When mounted, the eyepieces display a very weak magnetic field, so that the usual rules for the handling of magnets must only be observed with eyepieces which have not been mounted on the microscope:

- Do not place the eyepieces close to instruments where there is any risk of magnetization.
- Do not place the eyepieces on sensitive electronic units such as infusion pumps, cardiac pace-makers, measuring instruments or magnetic data carriers such as disks, audiotapes and videotapes, or credit cards.
- Always store eyepieces not used in their original packaging.

### **1** Eyecup

Always adjust the eyecups in such a way that you can see the full field of view.

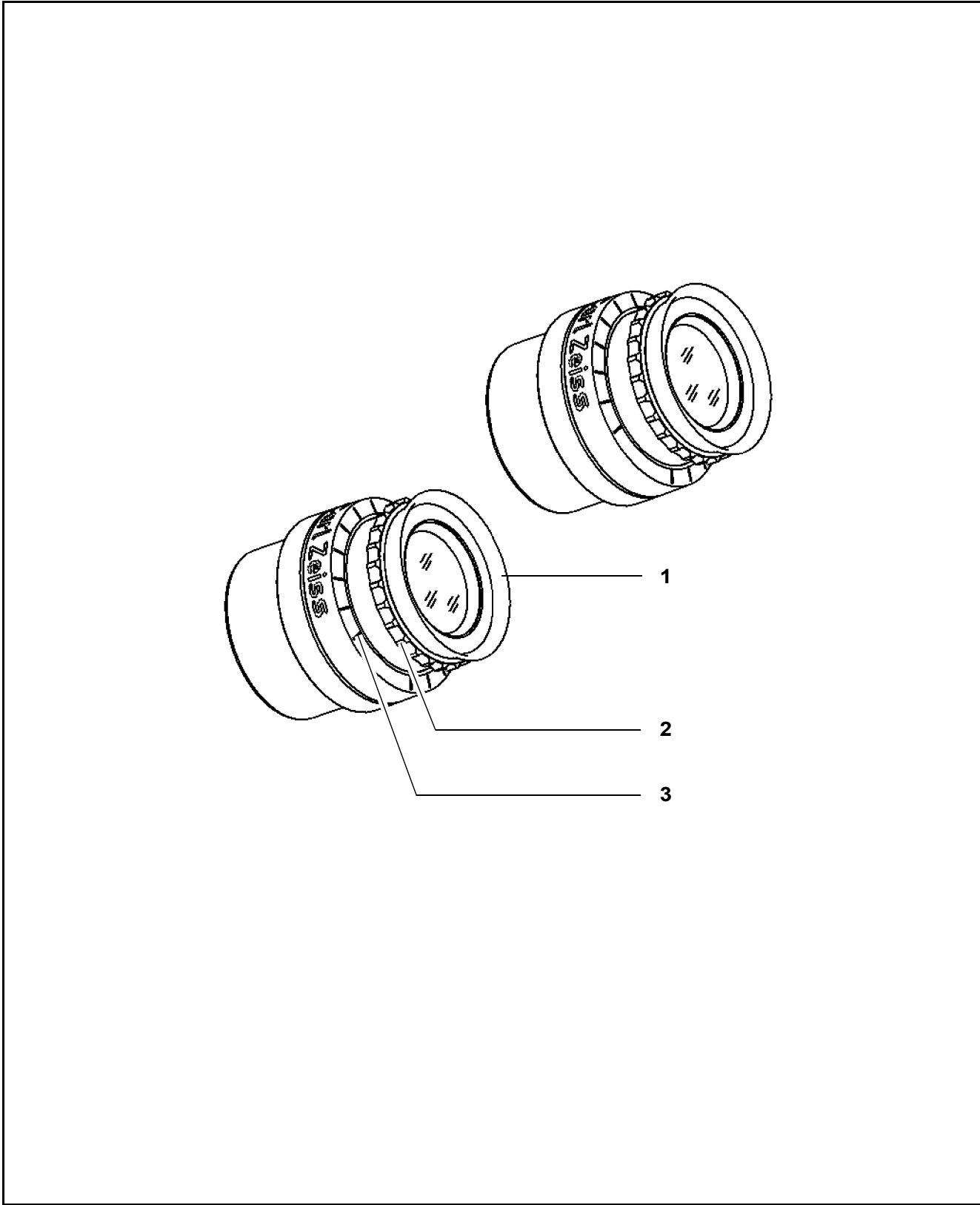
- Viewing with eyeglasses: Screw in the eyecups all the way.
- Viewing without eye-glasses: Screw out the eyecups until you see the full field of view.

### **2** Diopter adjustment ring

The eyepieces provide ametropia compensation between -8 D and +5 D. Eyeglass wearers who perform surgery wearing their glasses set the diopter adjustment ring to 0 D. Turn the ring until you have obtained the optimum setting. An integrated brake holds the ring in the position set.

### **3** Diopter scale

for reading the prescription set.





# Preparations for use

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## Attaching the equipment

### Attaching the tube, eyepieces, objective lens and handgrips

- Loosen securing screw (4) by a few turns.
- Remove cover (3) and store it in a safe place.
- Place binocular tube (2) on the surgical microscope and tighten securing screw (4) firmly .
- You can install accessory equipment between the binocular tube and the microscope body. Lock these units in position in the same way using securing screw (4).
- Insert widefield eyepieces (1) into the appropriate mounts as far as they will go. The magnetic coupling reliably secures them in position.



#### Note:

If a documentation device is used, one of the eyepieces can be delivered with a reticle to aid focusing. Retrofitting the reticle is only possible at the factory or by our service representative. Always use the eyepiece with the reticle on the same side of the binocular tube where the documentation device is installed.

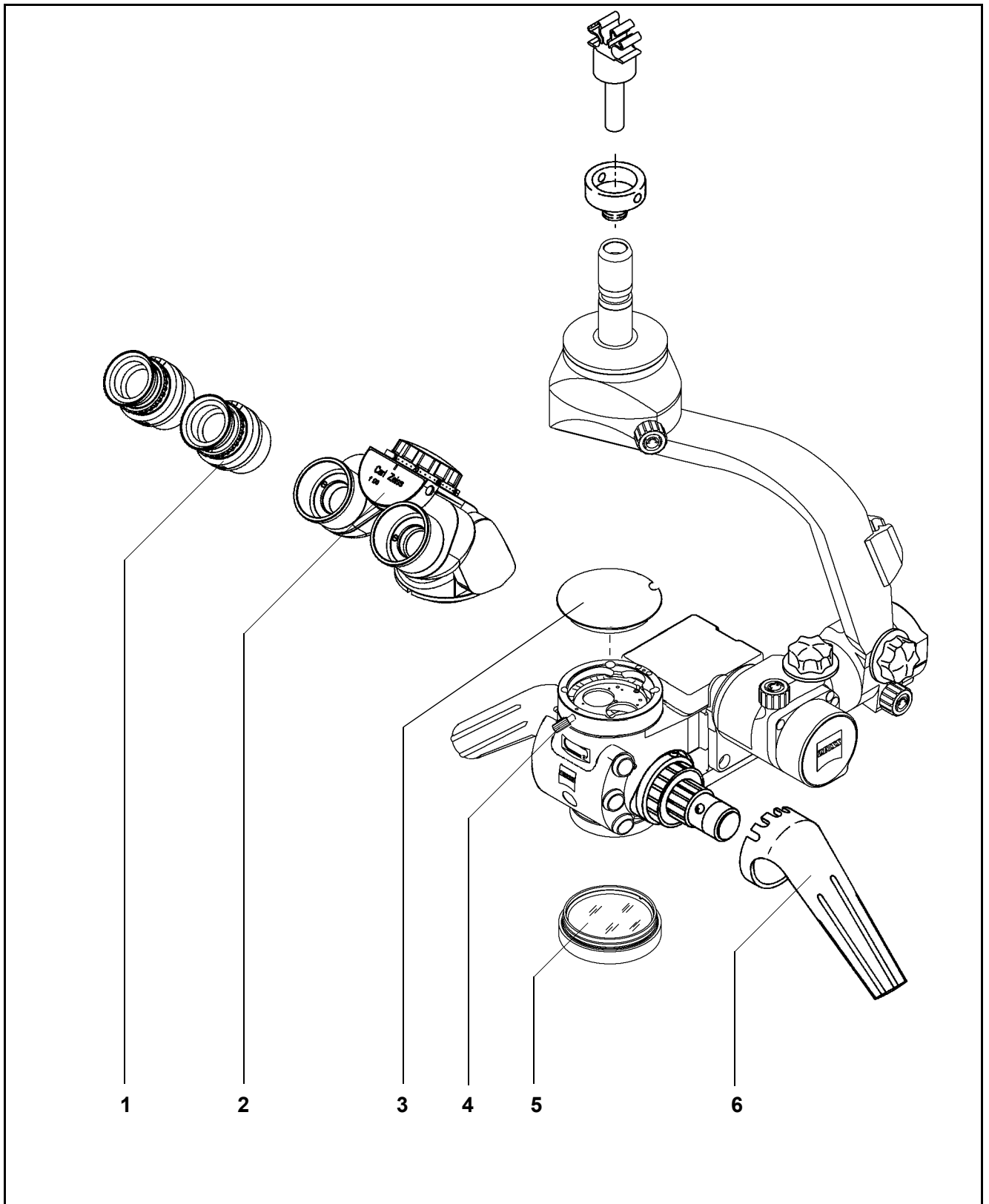
- Screw the objective lens (5) into the microscope body and tighten it firmly.
- You can adjust the position of the handgrips (6) as required. Choose a position which is most convenient for the surgical procedure to be performed.
- Plug on the handgrips (6), making sure they snap in.



#### **Warning!**

Before every use and after re-equipping the instrument, make sure that the binocular tube (2) and the objective lens (5) are securely locked in position. Make sure that the securing screw (4) has been firmly tightened!







# Operation

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## Preparations for use

### Balancing the surgical microscope

- Turn on the instrument at the power switch of the suspension system.



Note:

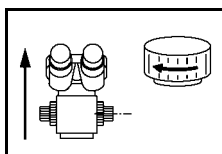
Press one of the release keys for the magnetic brakes to set the balance of the microscope's front-to-back and lateral tilt axes.



**Warning!**

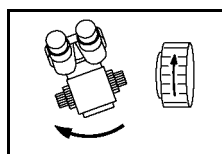
To permit almost effortless guidance of the surgical microscope, the surgical microscope and the suspension system used must be correctly balanced. If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. Therefore, hold the surgical microscope securely at its handgrips before releasing the magnetic brakes.

#### Balancing the front-to-back tilt motion

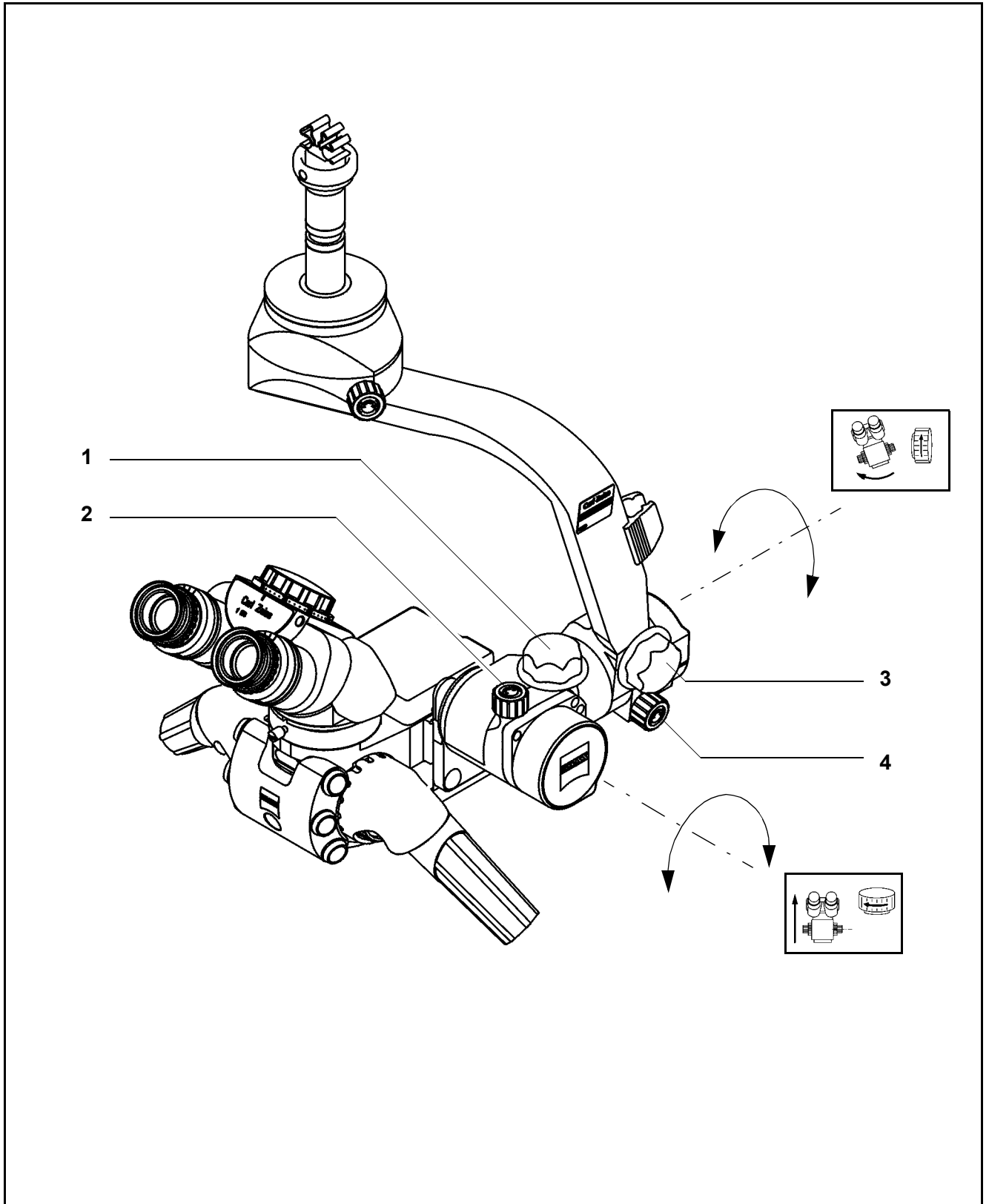


- Hold the microscope with one hand and turn knob (2) in the "-" direction until the braking function has been deactivated.
- Use knob (1) to adjust the spring force in such a way that the surgical microscope is balanced about its front-to-back tilt axis and remains stationary in the viewing direction required.
- Use knob (2) to set the friction of the front-to-back tilt motion as required.

#### Balancing the lateral tilt motion



- Hold the microscope with one hand and turn knob (4) in the "-" direction until the braking function has been deactivated.
- Use knob (3) to adjust the spring force in such a way that the surgical microscope is balanced about its lateral tilt axis and remains stationary in the viewing direction required.
- Use knob (4) to set the friction of the lateral tilt motion as required.



**Note:**

Press one of the release keys for the magnetic brakes to set the balance and friction of the microscope's axis of rotation.

**Adjusting the friction of the axis of rotation**

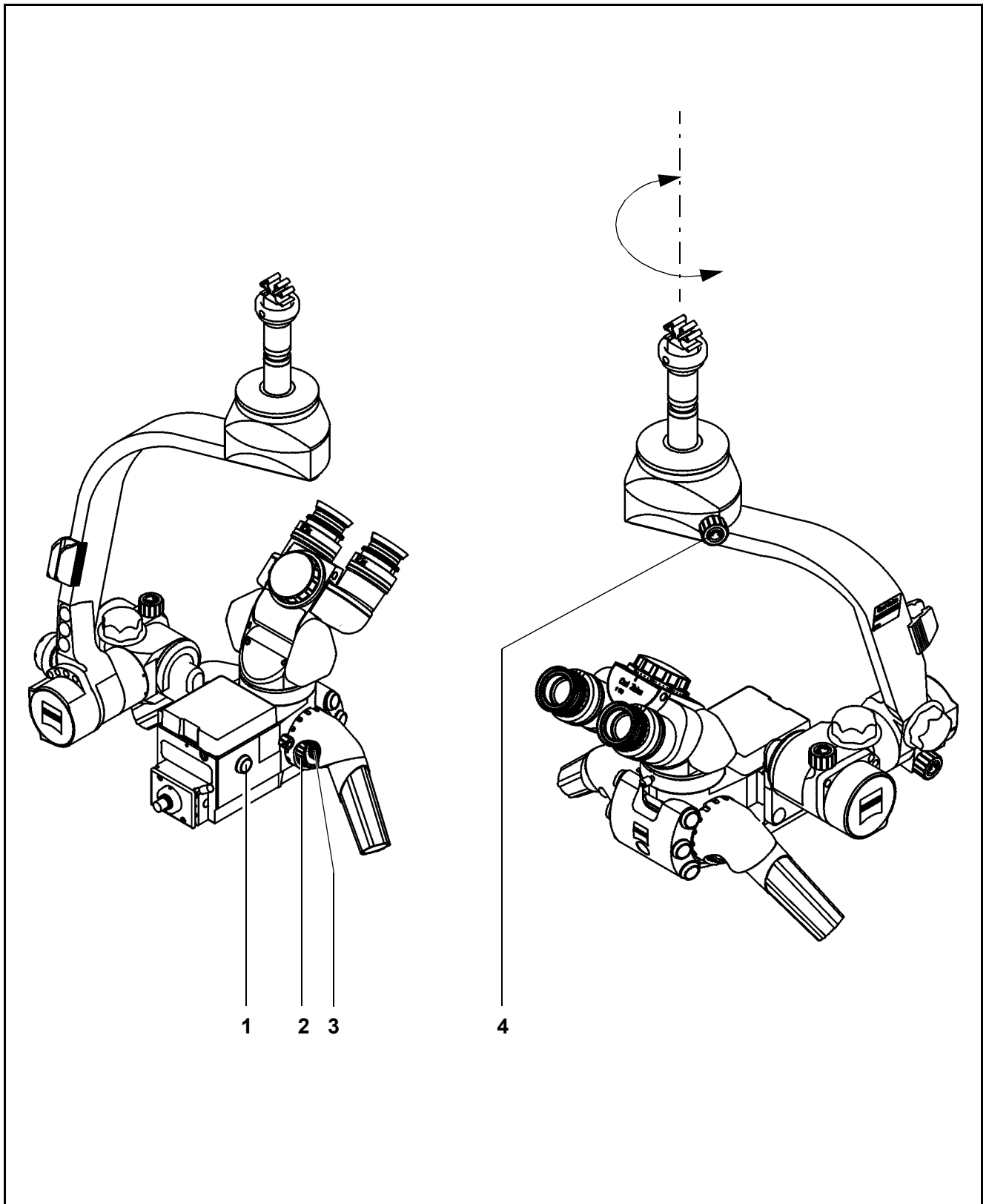
- Use knob (4) to set the friction of the microscope's axis of rotation as required.

**Setting the starting position of the focusing range**

- Press button (1) to set the surgical microscope to the starting position of the focusing range.

**Setting zoom and focus**

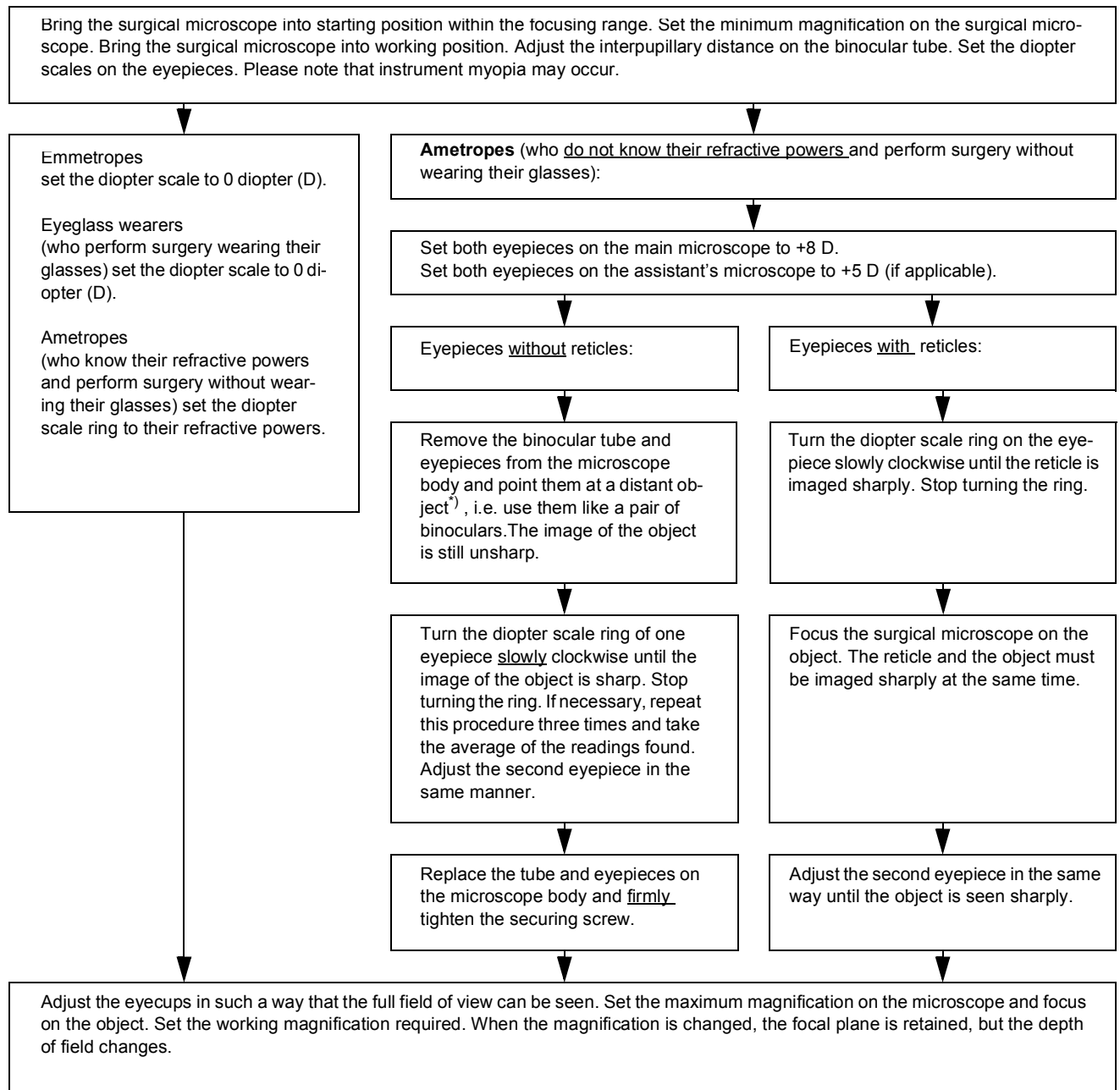
- Use the control rings for setting zoom (2) and focus (3).
- Set the speed of the zoom and focusing functions on the control panel of the suspension system.







## Adjusting the surgical microscope



**Note:** If several surgeons use the instrument, it is advisable to draw up a table showing the individual refractive powers of each surgeon and to keep it in a handy location near the instrument.

**\*) CAUTION:** Never point the eyepieces at the sun!

## Checklist

Always check the following points before surgery (without the patient!):

- Make sure that there is enough room between the instrument and the accessories installed.
- Turn on the instrument at the power switch of the suspension system.

### Release keys for magnetic brakes

The magnetic brakes of the surgical microscope and suspension system (if the suspension system used is equipped with magnetic brakes) function properly.

### Balance setting and friction

- The balance of the microscope's front-to-back and lateral tilt has been correctly set.
- The friction of the microscope's front-to-back and lateral tilt has been set as required.

### Illumination

- The light guide (1) has been connected.

### Zoom and focus

- Proper function has been checked using the control rings (2) and (3).

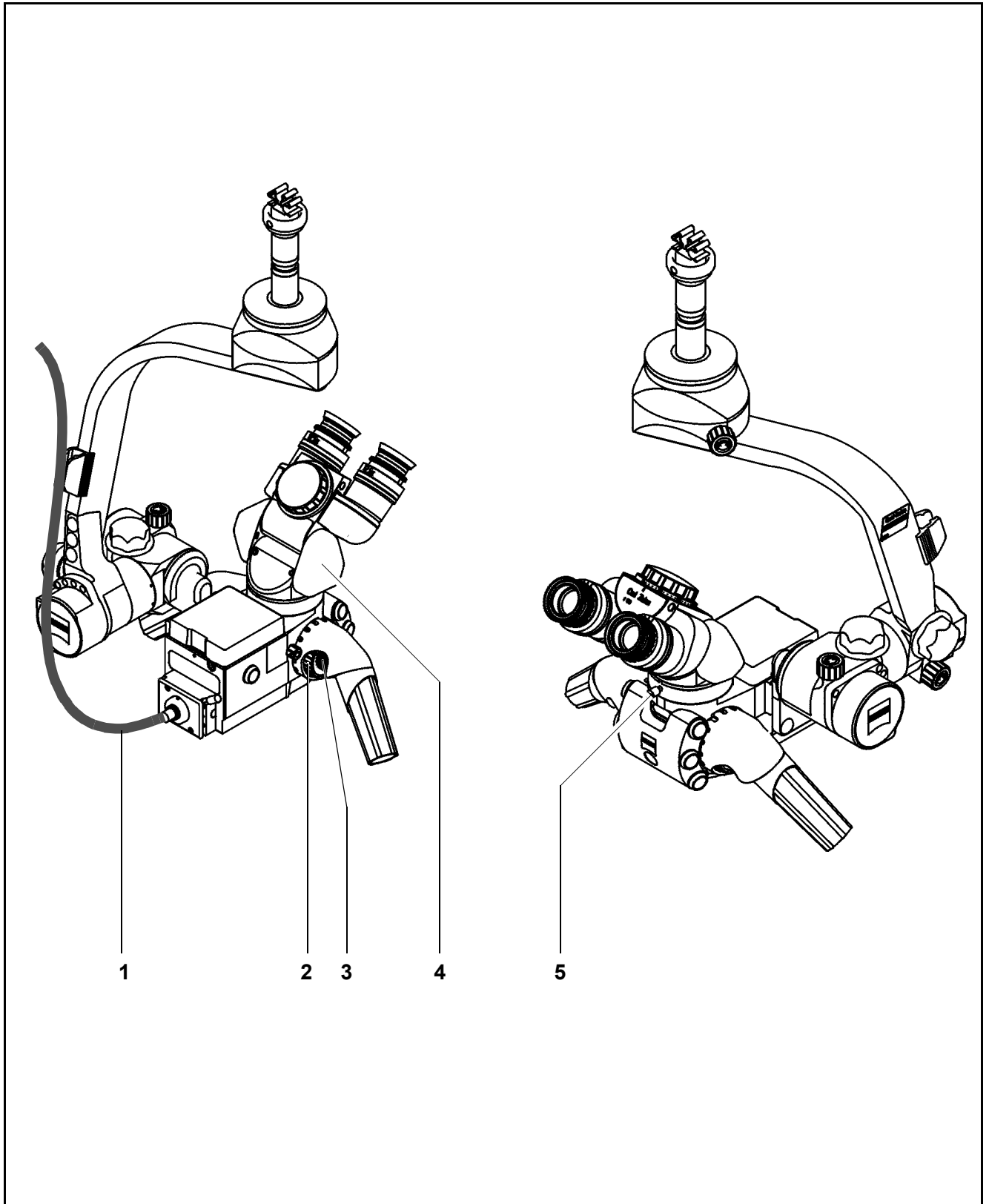
### Eyepieces / binocular tube

- The binocular tube (4) has been securely mounted.
- The securing screw (5) has been firmly tightened.
- The surgical microscope and the tube are in a position convenient for you.
- The correct interpupillary distance has been set.
- The eyecups have been adjusted in such a way that you can see the full field of view.
- The correct prescription has been set on the diopter scale.
- Image quality is good throughout the entire magnification range.



### **Warning!**

If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.



## Procedure

- Turn on the instrument at the power switch of the suspension system.
- Set the required brightness of the surgical field illumination on the suspension system.
- Check the instrument using the checklist.
- Swing the surgical microscope over the surgical field into an ergonomic position within the working distance.
- Select the lowest magnification (zoom).
- For coarse focusing, look through the eyepieces and lower the surgical microscope until the surgical field comes into focus.
- Select the highest magnification (zoom).
- Look through the eyepieces and activate the focusing function until the microscope is sharply focused on the surgical field.
- Select the magnification required (zoom). Look through the eyepieces of the binocular tube. Adjust the eyepieces in such a way that you can see both the edge of the field of view and the microscope image sharply.
- Adjust the handgrips in a position which is most convenient for the surgical procedure to be performed.
- Switch off the instrument when you are not using it.



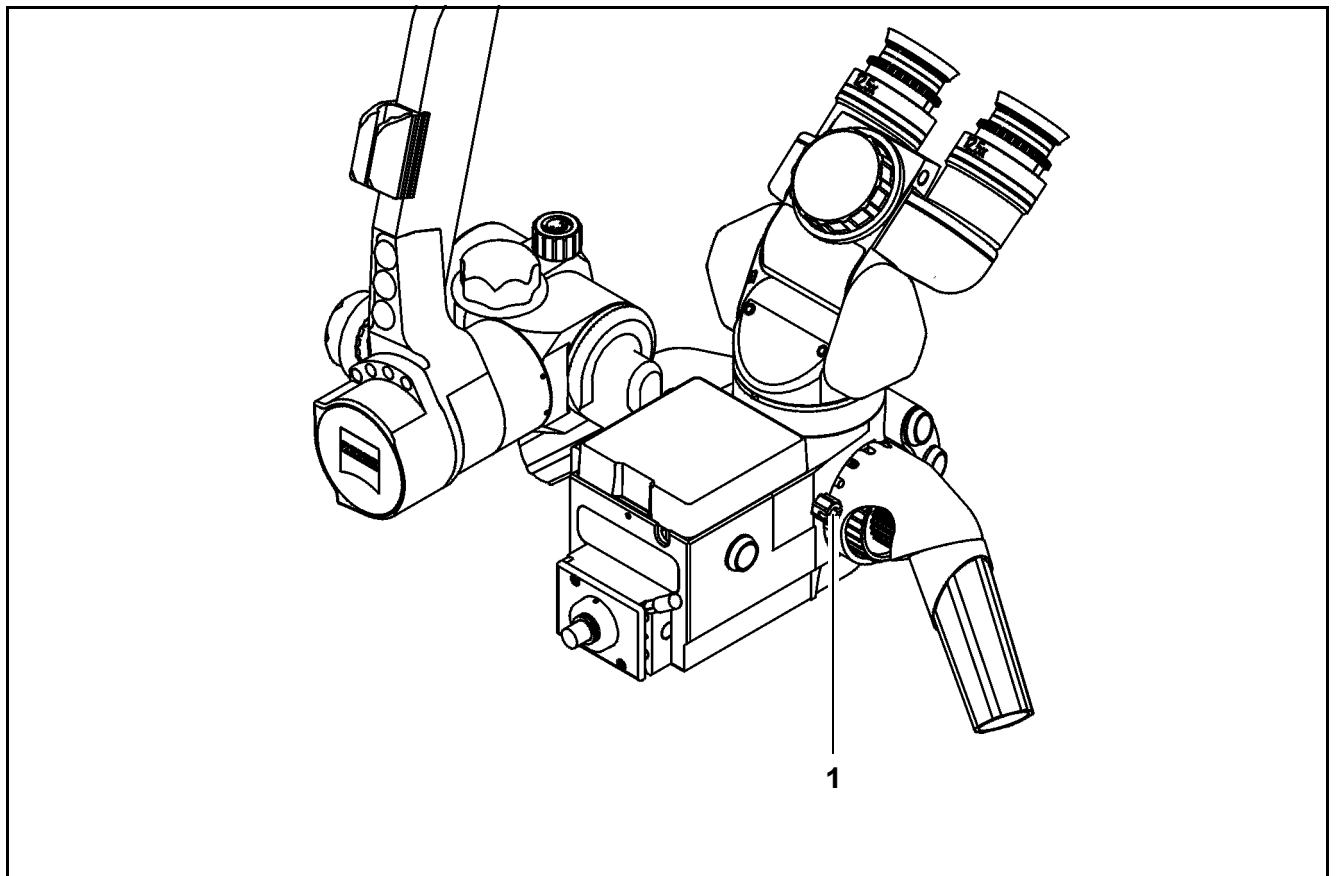
### Warning!

- Avoid looking directly into the light source, e.g. into the microscope objective lens or into the light guide!
- When operating on the eye, always use a GG 475 protection filter to ensure that the patient's retina is not exposed to unnecessary (blue) radiation (retinal injury)!

## What to do in an emergency

### Failure of the zoom function

- Adjust the magnification manually using the zoom knob (1).
- If the zoom drive moves into an end position, press the "MANUAL" button on the control panel of your S8/S81 suspension system to switch to the manual mode. The motorized functions of the surgical microscope are deactivated.
  - Continue surgery by manually operating the suspension system and the surgical microscope.



## Failure of the focusing function

- Manually focus the surgical microscope by moving the suspension arm or lift column of the suspension system up or down.

## Failure of magnetic brakes

If the magnetic brakes fail (magnetic brakes are locked), you can manually position the suspension arm including the microscope by overcoming the locking effect of the magnetic brakes.

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## Trouble-shooting table

- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.

If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.

### OPMI® PRO magis Surgical Microscope

Problem	Possible cause	Remedy	See
No function at all.	Suspension system switched off.	Switch on suspension system.	–
	Line power failure.	Contact in-house electrician.	–
Surgical field illumination inoperative.	Illumination system of suspension system switched off.	Switch on illumination system of suspension system. See user's manual for suspension system.	–
	Defective lamp.	Change the lamp. See user's manual for suspension system.	–
	Light guide not properly inserted in lamp or microscope.	Insert light guide as far as it will go.	–
	Lamp module on suspension system has no contact.	Insert lamp module as far as it will go.	–
	Failure of electronics.	Illuminate surgical field using an OR illuminator. Contact service dept.	–



<b>Problem</b>	<b>Possible cause</b>	<b>Remedy</b>	<b>See</b>
Insufficient surgical field illumination.	Brightness level set too low.	Adjust brightness using the brightness control on the illumination system. See user's manual for suspension system.	–
	Light guide not properly inserted in lamp and/or microscope.	Insert light guide as far as it will go.	–
	Defective light guide (illumination not uniform).	Contact service dept.	–
Zoom system inoperative.	Defective motor.	Adjust magnification manually using the zoom knob. Contact service dept.	–
	Zoom always moves to upper or lower end position.	Switch suspension system to "MANUAL" (S8/S81 suspension system only). Adjust magnification manually using the zoom knob. Contact service dept.	–
Focusing system inoperative.	Defective motor.	Adjust the working distance manually using the focusing knob. Contact service dept.	–
	Focus always moves to upper or lower end position.	Switch suspension system to "MANUAL" (S8/S81 suspension system only). Adjust the working distance manually using the focusing knob. Contact service dept.	–

## Care of the unit

### Cleaning optical surfaces

The multilayer T\* (T-star) coating of our optical components (e.g. eyepieces, objective lenses) results in optimum image quality.

Image quality is impaired by even slight contamination of the optics or by a fingerprint. In order to protect the internal optics from dust, the instrument should never be left without the objective lens, binocular tube and eyepieces installed when it is not in use. Always store objective lenses, eyepieces and accessories which are not being used in dust-free cases.

The external surfaces of optical components (eyepieces, objective lenses) should only be cleaned when required:

- Do not use any chemical cleaning agents.
- Blow off dust on the optical surfaces using a squeeze blower or remove the dust using a clean and grease-free brush.

### Prevention of fogging

To prevent the eyepieces from fogging, you may treat them with our anti-fogging agent.

This anti-fogging agent consists of a dry, chemical solid in the form of a stick and produces a dry film when applied to the eyepieces.

This film protects against fogging without causing any damage to the T\* coating. The anti-fogging agent contains neither wax nor silicone; it is non-poisonous and does not scratch glass.

The anti-fogging agent does not only ensure fog-free optics; it cleans and protects the eyepiece optics against dirt, grease, dust, fluff and fingerprints.

Every pack of anti-fogging agent (contains 1 stick) includes instructions for use which we would ask you to observe.



#### Important:

Spread the anti-fogging agent film with a dry cotton cloth - do not use paper!

Anti-fogging agent: Cat. No.

30 55 50- 9910

### Cleaning mechanical surfaces

All mechanical surfaces of the equipment can be cleaned by wiping with a moist cloth. Do not use any aggressive or abrasive cleaning agents.

Wipe off any residue with a mixture of 50% ethyl alcohol and 50% distilled water plus a dash of household dish-washing liquid.

## Sterilization

The asepsis sets supplied by Carl Zeiss contain rubber caps, sleeves and handles which you can sterilize in the autoclave. We recommend the following program for sterilization:

Sterilization temperature: 134° C

Sterilizing time: 20 minutes

Single, disposable drapes are available to cover the instrument.



Note:

Attach the drapes loosely enough to provide sufficient room for maneuver for the microscope carrier and the surgical microscope. The drapes must be particularly loose around the hand grip. The surgeon must be able to operate the controls through the drape.

## Magnifications / Fields of view

If the magnification factor  $\gamma$  of the zoom system is known, you can calculate the total magnification of the surgical microscope. The following equation is used to determine the total magnification:

$$M_T = \frac{f_{\text{tube}}}{f_{\text{obj}}} \cdot \gamma \cdot M_{\text{eye}}$$

where:

$f_{\text{tube}}$  the focal length of the binocular tube

$f_{\text{obj}}$  the focal length of the main objective lens

$\gamma$  the magnification factor of the zoom system

$M_{\text{eye}}$  the magnification of the eyepiece

Example:

$f_{\text{tube}} = 170 \text{ mm}$ ,  $f_{\text{obj}} = 200 \text{ mm}$ ,  $\gamma = 1.6$  and  $M_{\text{eye}} = 12.5 \times$ .

The resulting total magnification is:

$$M_T = \frac{170 \text{ mm}}{200 \text{ mm}} \cdot 1.6 \cdot 12.5 = 17.0$$

If the total magnification of the surgical microscope  $M_T$  is known, you can use the formula:

$$\text{FoV}_D = \frac{\text{FoVN} \cdot M_{\text{eye}}}{M_T}$$

to calculate the field of view diameter  $\text{FoV}_D$  of the surgical microscope. The field of view diameter is the diameter of the circular surgical field which can be seen through the eyepieces.

FoVN in the above formula stands for the field of view number of the eyepiece.

By entering the value  $M_T = 17.0$  in the formula, we obtain the following field of view diameter for 12.5x eyepieces with a field of view number FoVN of 18 mm:

$$\text{FoV}_D = \frac{18 \text{ mm} \cdot 12.5}{17.0} = 13.2 \text{ mm}$$

## Ordering data

### OPMI® PRO magis surgical microscope

Description	Cat. No.
OPMI® PRO magis surgical microscope	1025-287
180° tiltable binocular tube	30 37 91-0000
12.5x widefield eyepiece (2x)	30 55 43-0000
Objective lens f=250 mm, mount diameter 65 mm	30 26 54-0000
Dust cover	1055-278

## Spare parts

### OPMI® PRO magis surgical microscope

Description	Cat. No.
Dust cover	1055-278
Drape	32 60 75
Light guide, 2.5 m long, with 90° adapter	30 34 81-9225
Sterile covers for tiltable binocular tube	30 37 91-0153
Spare lamps see user's manual for S8/S81 suspension system.	

## Accessories

Please observe the following:

Only operate the instrument with the accessories included in the delivery package. If you want to use other accessories, make sure that Carl Zeiss or the manufacturer of the accessories has proved and confirmed that these accessories meet the respective technical safety standards and can be used without risk.

### OPMI® PRO magis surgical microscope

Description	Cat. No.
X-Y coupling incl. X-Y power cable for S8/S81	1043-103
S8 coupling with shaft mount	30 59 52-8030
Foot control panel, 14 functions, 6 m cable	30 49 79-9020
Stereo bridge	1040-085
Rotatable dovetail for binocular tubes	1030-023
180° tiltable binocular tube	30 37 91-0000
45 ° inclined tube	30 37 84-0000
Straight tube	30 37 65-0000
Sleeves for push-in eyepieces on binocular tubes with screw threads (2x)	30 55 42-0107
10x push-in widefield eyepiece (2x)	30 55 42-0000
12.5x push-in widefield eyepiece (2x)	30 55 43-0000

## Technical data

Power supply	The surgical microscope is powered via the suspension system.
Tube / Eyepieces	Widefield tube, $f = 170$ mm. 12.5x/18/B widefield screw-type eyepieces with integrated eyecups. This equipment provides full illumination of the field of view (diameter 55 mm).
Objective lenses	$f = 200$ mm objective lens, mount diameter 65 mm. Options: objective lenses with different focal lengths from $f = 200$ mm to $f = 400$ mm.
Magnification	Zoom system with 1:6 ratio, magnification factor $\gamma = 0.4x - 2.4x$ . Motorized or manual magnification change on microscope.
Focusing	Motorized, focusing range 18 mm. At the press of a button, the focusing drive moves to the starting position of the focusing range.
Illumination	Coaxial fiber optic illumination, supplied via S light guide from 12 V 100 W halogen reflector lamp in suspension system. Manually adjustable illuminated field (dia. 55 mm) to "spot" illumination (dia. 11 mm). This data applies to an objective focal length of $f = 200$ mm. Increased illumination intensity in a small illuminated field. With the "spot" setting, luminance is approx. twice as high as in full-field illumination.
Microscope rotation	Locked using magnetic brake. Friction manually adjustable until rotation is locked. Range of rotation $310^\circ$ .
Front-to-back tilt of microscope	Locked using magnetic brake. With torque compensation, manually adjustable using a knob. Friction manually adjustable until the tilt motion is locked. Tilt angle after balance setting for viewing direction $\pm 20^\circ$ .



Lateral tilt of microscope	Locked using magnetic brake. With torque compensation, manually adjustable using a knob. Friction manually adjustable until the tilt motion is locked. Tilt angle after balance setting for position $\pm 20^\circ$ .
Cat. No.	OPMI® PRO magis surgical microscope 30 26 10- 0000
Weight of surgical microscope	7.3 kg

## Ambient requirements

For operation	Temperature Rel. humidity Air pressure	+10 °C...+40 °C 30%...75% 700 hPa...1,060 hPa
For transportation and storage	Temperature Rel. humidity (without condensation) Air pressure	- 40 °C...+70 °C 10%...100% 500 hPa...1,060 hPa

The unit meets the essential requirements stipulated in Annex I to the 93/42/EEC Directive governing medical devices. The unit is marked with:



Subject to change.

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