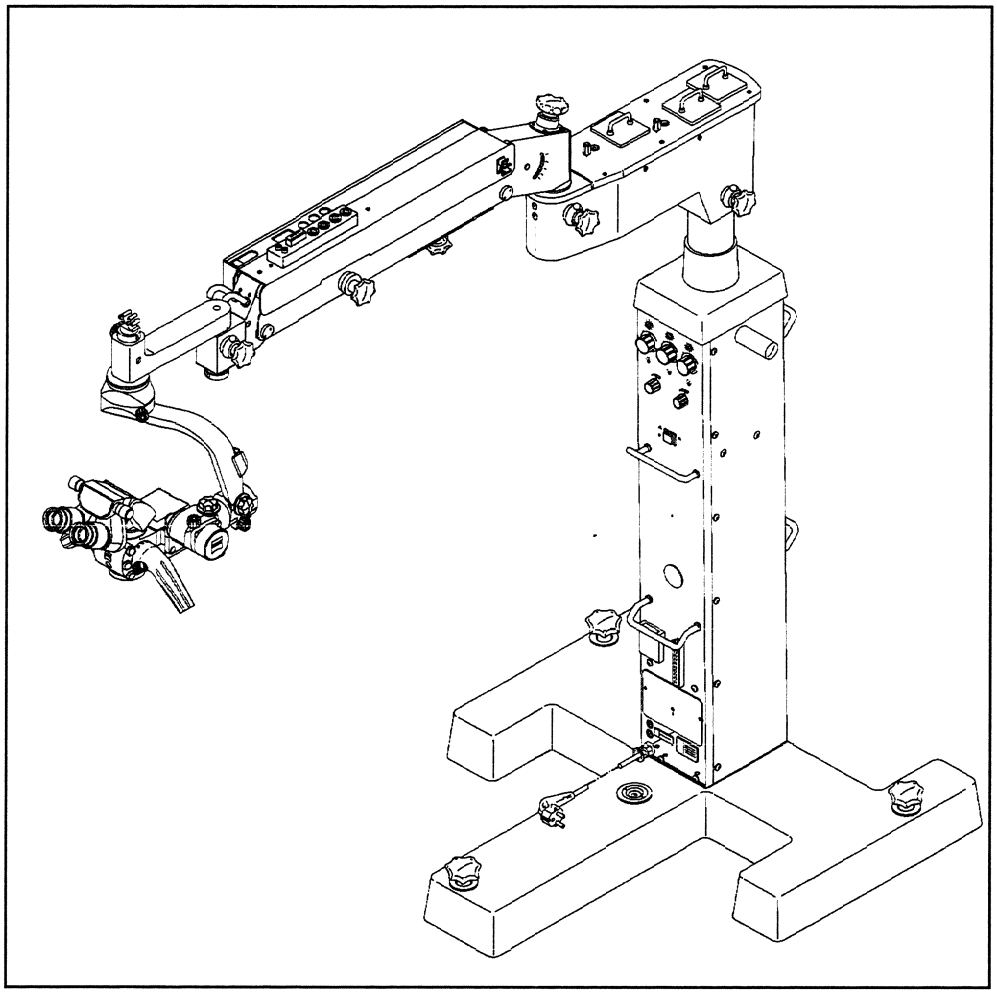
OPMI® PRO magis Surgical Microscope on S3 Floor Stand



Instructions for use

G-30-1246-e
Oct. 24, 1997

ZEISS

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Notes on safety

General

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 contained in other parts of this user's manual; they are marked with a triangle containing an exclamation mark. 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.

Regulations and standards

- This instrument was developed in accordance with the following regulations (where applicable):
  - VDE
  - IEC
  - UL
  - CSA

  The complete quality management system of Carl Zeiss has been approved by TÜV Rhineland, as the relevant authority, in accordance with the 93/42/EU guidelines, annex II, article 3 under the registr. no. 95 102 7601.
- Please observe the relevant accident prevention regulations.
- The instrument must be connected to a special emergency backup line supply" in accordance with the regulations or guidelines which apply in your country.
- This is a class I instrument as defined by guideline 93/42 /EU.
- The declaration of CE conformity contained in this manual applies only to new instruments, which are supplied with this manual. The declaration does not apply to older instruments not provided with a CE sign.

Notes on installation and usage

- Do not operate the equipment contained in the delivery package in:
  - explosion-risk areas
  - the presence of volatile anesthetics or inflammable solvents such as alcohol, benzine or similar chemicals.
- Do not station or use this 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 equipment 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.
- The foot control panel has been specially designed for use with the S3 floor stand in ORs. It is watertight and conforms to IP 67.
- Modifications and repairs on this instrument and on instruments used with the OPMI® PRO magis and the S3 floor stand may only be performed by our service representative or by other authorized persons.
- The manufacturer is not liable for damage caused by unauthorized persons tampering with the instrument; such tampering will also forfeit any rights to claim under warranty.
- Use this instrument only for the applications described.
- Do not use a cellular telephone 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.
- 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.
- Only use this 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 usage will not impair the safety of the system.
- 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.

- 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.

Safe working order

- This instrument is a high-grade technological product. In order to ensure optimum performance and safe working order of the instrument, we recommend that our service representative inspect this instrument on a regular basis.
  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 will install the instrument. Please make sure that the following requirements for operation remain fulfilled in the future:

- All mechanical connections (details in this 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 S3 floor stand 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 connection.

  Only medical instrument approved by us may be connected to outlet (9) on the column of the stand (see page 31). When using other instruments, make sure that no safety hazards are caused by ground leakage currents.

Each time before turning on and after changes to the instrument

- Make sure all "Requirements for operation" are fulfilled.
- Go through the checklist on page 44.
- Re-attach or close any covers, panels or caps which have been opened or removed.
- 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 (see illustration on page 13 f.).
- Check whether the power plug and the connector of the foot control panel are properly seated.
- Do not cover any ventilation grids or slits.
- Make sure the instrument remains switched off when not in use.

Important when using the instrument

- The long extension of the stand base must always point in the direction of the surgical field.
- Avoid looking directly into the light source, e.g. into the microscope objective lens or into a fiber light guide.
- When operating on the eye, always use a GG 475 protection filter so that the patient's retina is not exposed to unnecessary (blue) radiation (retinal injury).

Important after each usage of instrument

- Always use the main power switch of the instrument to turn it off.
- Be sure to turn off the main power switch when the instrument is not in use.

Equipping the microscope

- Put the suspension arm in the top position before changing the microscope equipment (microscope, tube, etc.). When finished, the balance setting of the suspension system must be re-adjusted.
- The weight of the microscope including accessories mounted on the S3 floor stand may total a maximum of 18 kg.

Safety devices of the floor stand

1 Locking screw
This screw is used to lock the vertical movement of the articulated arm. Tighten this knob before removing or mounting any module (microscope, tube, etc.). The articulated arm is now prevented from abruptly moving upward due to lack of weight.
Note: The clamping screw only acts a a brake, not as a lock.

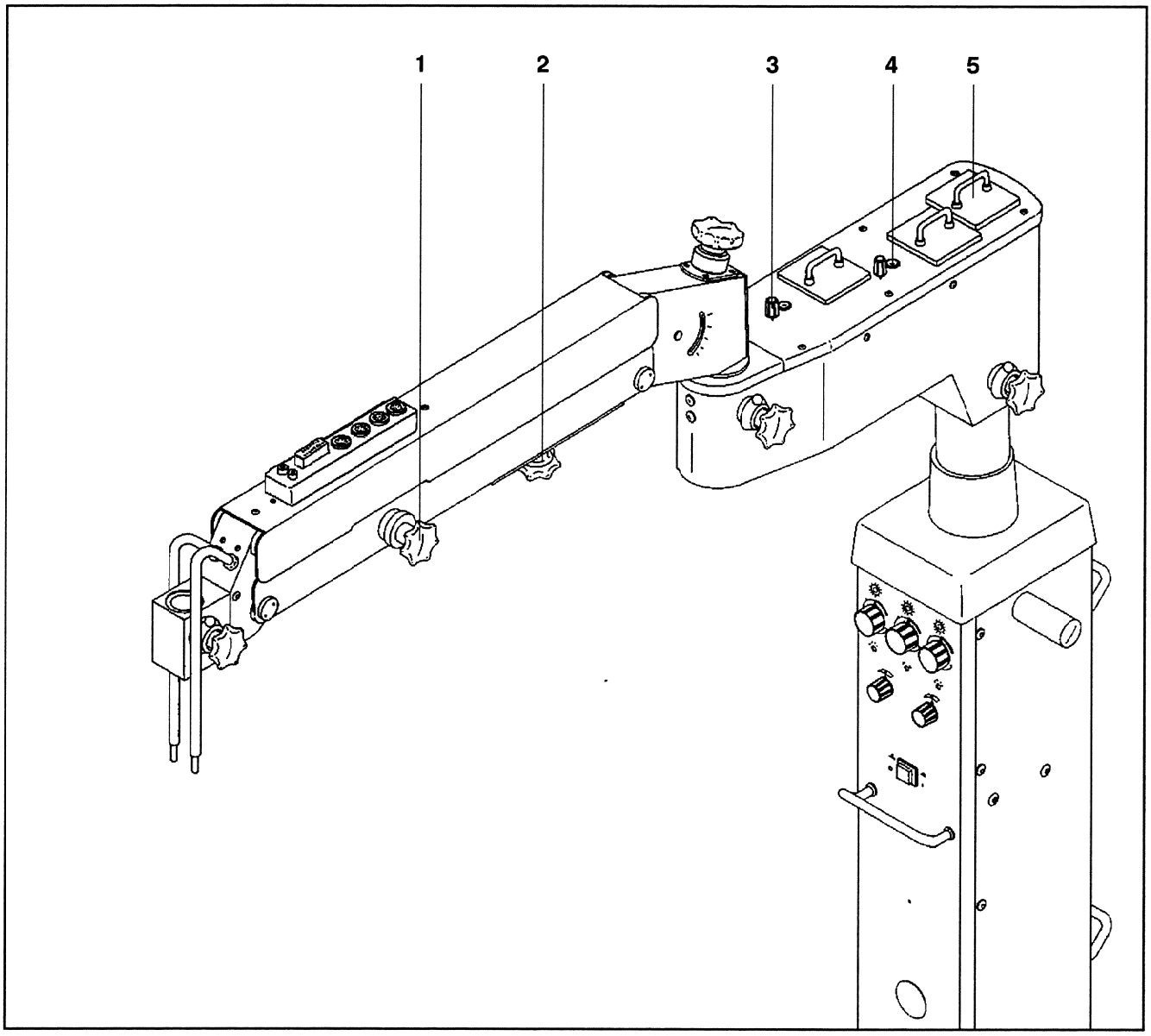
2 Safety slider
The safety slider is used to limit the minimum vertical working distance to the surgical field. This setting must be checked each time before surgery.

3 GG 475 retinal protection filter
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).

4 Thermoswitch
The Thermoswitch switches off the halogen lamp in the lamp module when it overheats. If this happens, you must correct the cause of the overheating. For example, drapes might be covering the ventilation slits. Press the Thermoswitch back in after the halogen lamps have cooled down.

5 Backup lamp module
If one of the fiber illuminations fails, pull out the defective lamp module and insert the backup lamp module. Changing the halogen lamp is described on page 54.

1



Warning labels and notes

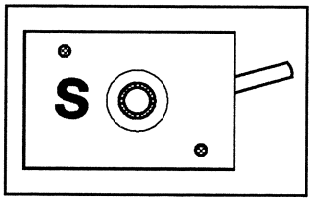
Caution:

Observe all warning labels and notes!
If any label is missing on your instrument or has become illegible, please contact us or our authorized representative. We will supply the missing labels.

OPMI® PRO magis surgical microscope

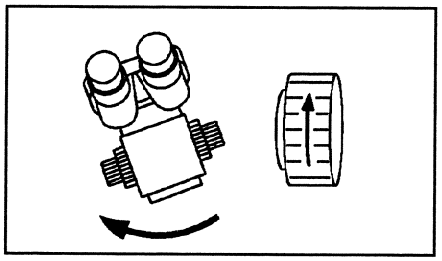
1 Instrument label
This label indicates:
- the name of the instrument
- the serial number

2 Use only S-light guides on the OPMI® PRO magis surgical microscope.



3 Warning triangle
When changing the microscope or accessories, observe the following:
- Firmly tighten the rotary knobs.
- Support the microscope when loosening the rotary knobs!

4 Adjusting the balance of the lateral tilt motion.

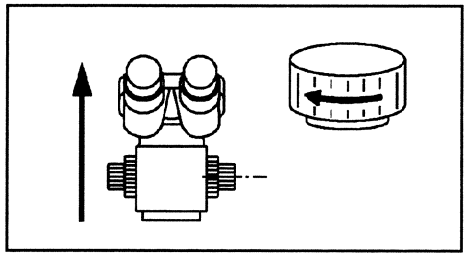


5 Warning triangle

When changing the microscope or accessories, observe the following:

- Firmly tighten the rotary knobs.
- Support the microscope when loosening the rotary knobs!

6 Adjusting the balance of the front-to-back tilt motion



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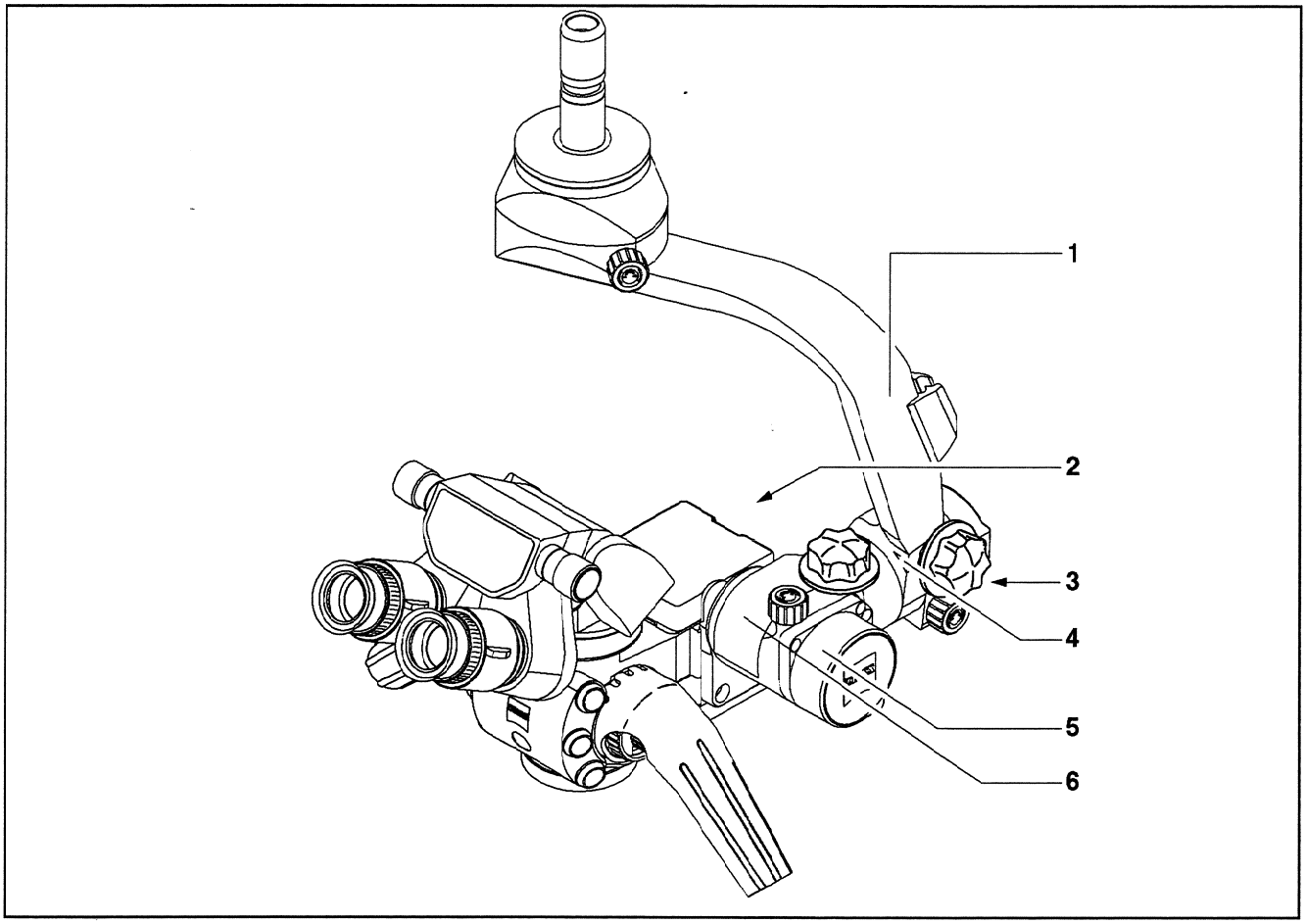


S3 Floor Stand

1 **Thermoswitch reset button**
Temperaturschalter Rückstellknopf

If a Thermoswitch is activated, press the button back in after the halogen lamp has cooled down.

2 **max. Belastung**
max. load
18 kg

see instructions

The weight of the microscope including accessories may total a maximum of 18 kg.

3 **SICHERUNGSSCHIEBER, Mit Sicherheitsabstand zum Operationsfeld fixieren.**

SAFETY - SLIDER, fix at safe distance from surgical field.

The safety slider is used to adjust the safety distance to the surgical field.

4 **Vor Gerätewechsel Knopf anziehen.**

Before changing equipment, tighten knob.

Clamp the articulated arm of the stand before mounting or removing any equipment (microscope, tube, etc.).

5 **CAUTION max. 18 kg**

See 2.

6

OP-					**12 V**
Spala*	**OPMI**	**MDO**	**XY**	**OPMI**	**100 W**

* Surgical slit illuminator

7 Serial number

8 Fuse ratings

9 CE label

10 Instrument label

The instrument label indicates:

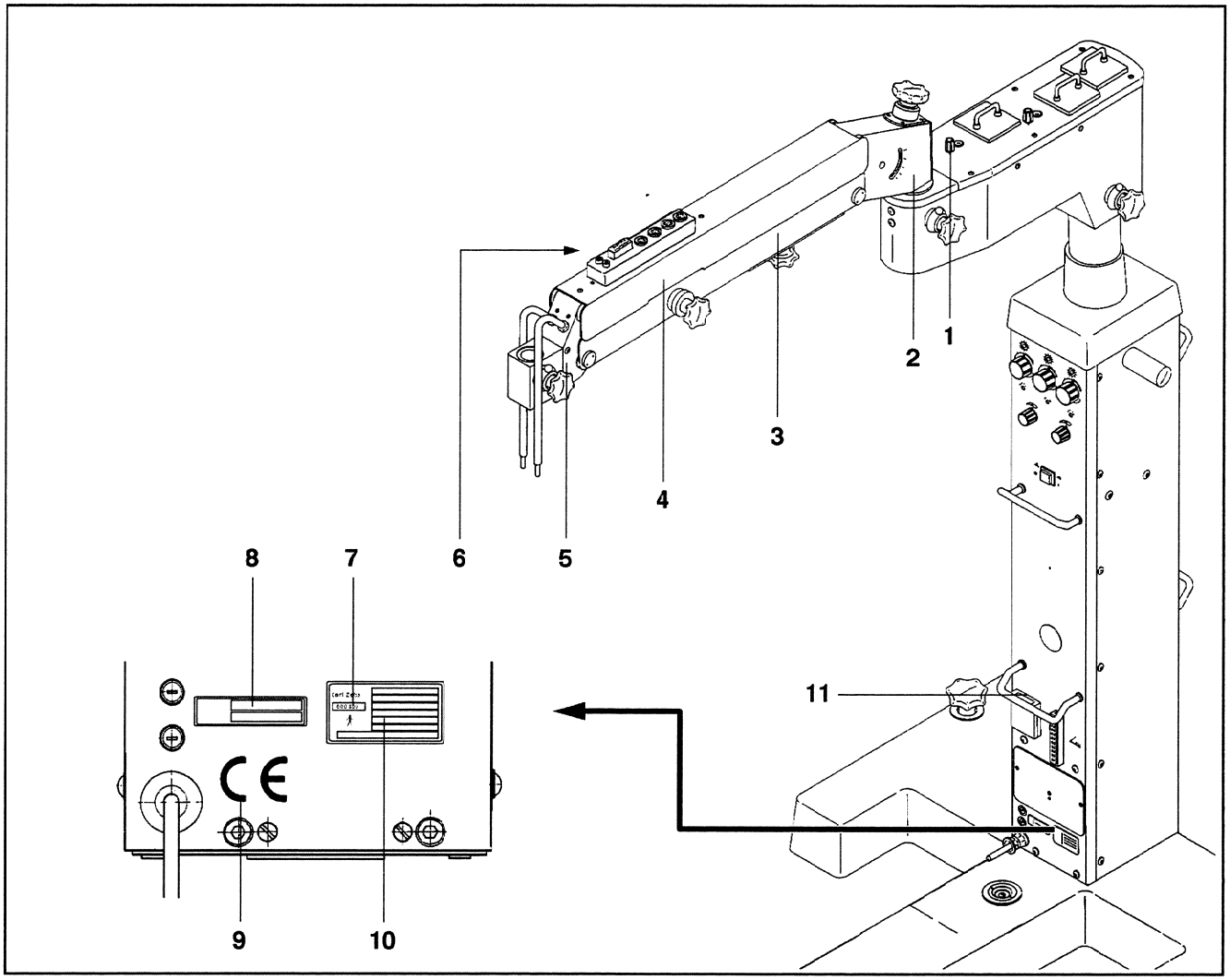
- name of instrument
- ordering number
- line voltage
- line frequency
- power consumption

11 **max. 900 VA**

The power consumption of an instrument connected here must not exceed 900 VA.

The max. permissible ground leakage current of 500 µA, measured via the power cable of the stand, must not be exceeded.

3



Description

General

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

The microscope is mounted on a suspension arm system which allows the surgeon to balance the fully-equipped microscope quickly and easily for lateral and front-to-back tilt motion. The friction of the tilt motions can be individually adjusted. The tilt and rotary axes of the OPMI® PRO magis are equipped with magnetic brakes permitting the surgical microscope to be locked in any position.

The zoom and focusing functions of the OPMI® PRO magis are motor-driven and can be directly activated on the microscope. A foot control panel is not required for operation of the instrument, but can be used for additional control of the zoom and focus functions and the illumination, if desired. The magnetic brakes can only be operated from the microscope direct.

The coaxial illumination system is supplied with light via an S light guide. When using an f = 200 objective, the diameter of the illuminated field can be continuously adjusted from a fully illuminated field (55 mm dia.) to a "spot" (11 mm dia.) using a light stop lever. The light intensity in the "spot" is twice as high as that provided in the largest field of illumination.

The OPMI® PRO magis can be equipped with a wide range of accessories for documentation and coobservation. These accessories can be mounted quickly and easily.

For adjustment of the depth of field, we recommend using the double iris diaphragm, catalog no. 30 33 54- 0000.

Note:
This user's manual describes the OPMI® PRO magis together with other units and accessories, (e.g. S3 floor stand). The system described herein represents a common instrument configuration. The description generally applies for other similar configurations as well. The scope of the delivery package is not defined by the configuration shown herein, but by the delivery specification.

OPMI® PRO magis surgical microscope

1 Cable and light guide clip

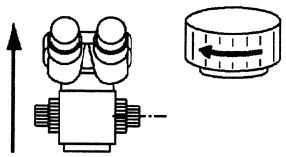
2 Securing screw
This securing screw retains the microscope in the reception bore of the floor stand and secures it from falling out. Be sure to screw in this screw firmly as far as it will go.

3 Rotation shaft
Before inserting the rotation shaft of the microscope into the reception bore of the suspension system or the tilt coupling, lubricate the shaft lightly with instrument grease or vaseline.

4 Axis of microscope rotation
A magnetic brake clamps the axis of rotation as soon as keys (11) are released.

5 Rotary knob
Use this knob to set the desired friction of the axis of rotation when the magnetic brakes are released.

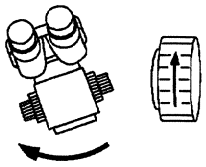
6 Adjustment knob for balance setting of front-to-back tilt motion



Use this knob to adjust the balance setting of the front-to-back tilt motion. This figure shows how the balance setting works. The balancing procedure is described on page 38.

7 Friction adjustment knob
Use this knob to set the desired friction of the front-to-back tilt motion.
Caution:
Before removing or changing any microscope equipment, tighten this knob to clamp the tilt motion.

8 Adjustment knob for balance setting of lateral tilt motion



Use this knob to adjust the balance setting of the lateral tilt motion. This figure shows how the balance setting works. The balancing procedure is described on page 38.

9 Friction adjustment knob
Use this knob to set the desired friction of the lateral tilt motion.
Caution:
Before removing or changing any microscope equipment, tighten this knob to clamp the tilt motion.

10 Window for y magnification factor of zoom system

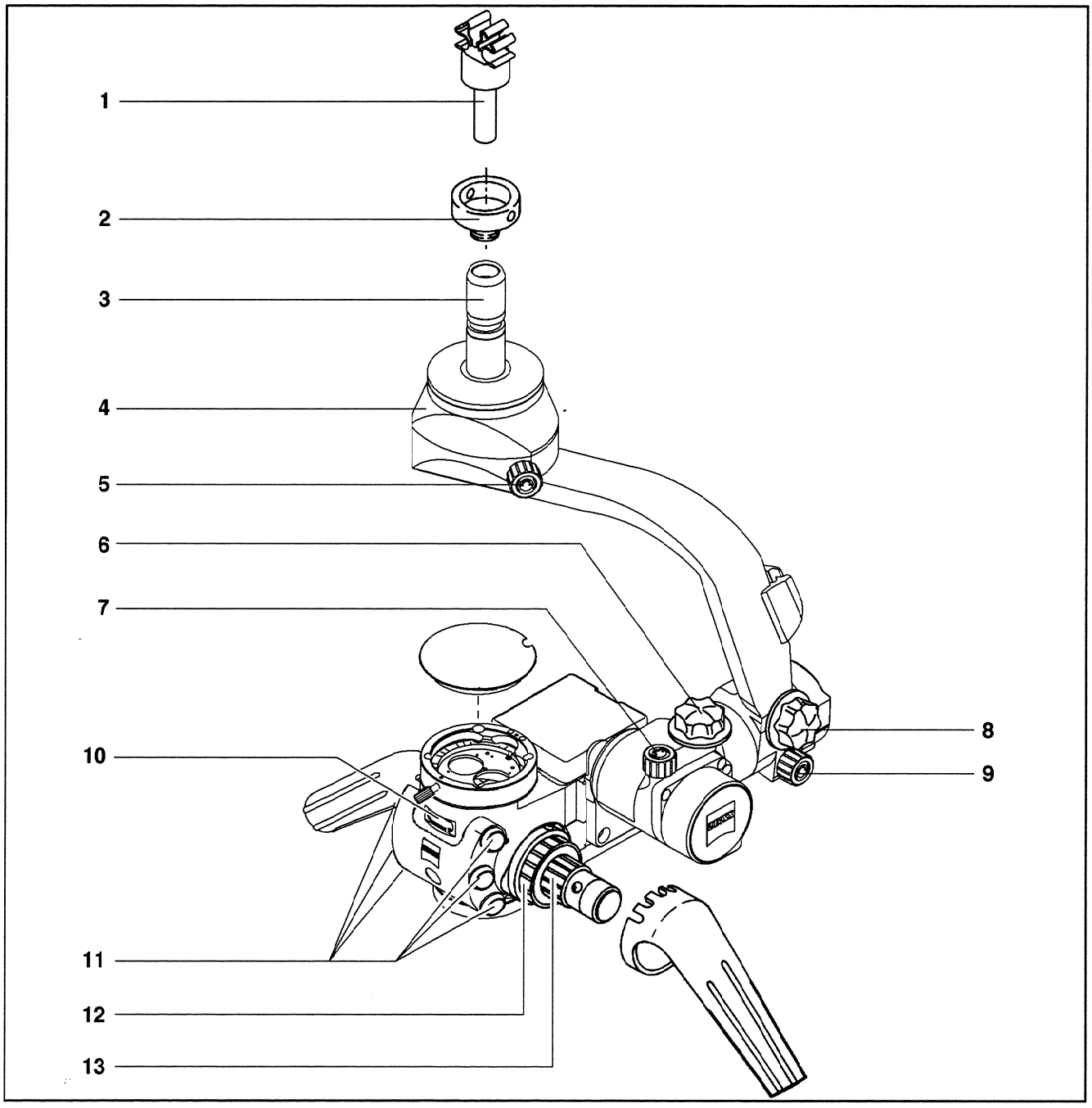
11 Keys unlocking magnetic brakes for front-to-back tilt, lateral tilt and rotary motions
If one of the six keys is pressed, the surgical microscope can be moved

in all three axes simultaneously. When the key is released, all three axes are clamped by the magnetic brakes.

12 Focusing control ring (on the left and right-hand sides of the housing)

13 Magnification control ring (zoom) (on the left and right-hand sides of the housing)

4



14 Cable and light guide clip

15 Instrument connector
for the power supply of the microscope.
Note: Switch off the main power switch at the floor stand before connecting or disconnecting the instrument connector.

16 Receptacle for S light guide
The S light guide must be inserted as far as it will go (snaps in).

17 Light stop lever
When using an f=200 objective, the diameter of the illuminated field can be continuously adjusted from a fully illuminated field (55 mm dia.) to a "spot" (11 mm dia.) using a light stop lever. The "spot" luminance is twice as high as the luminance in the largest field of illumination.

18 Reset button
When you press this button, the focusing drive of the microscope moves to its starting position.

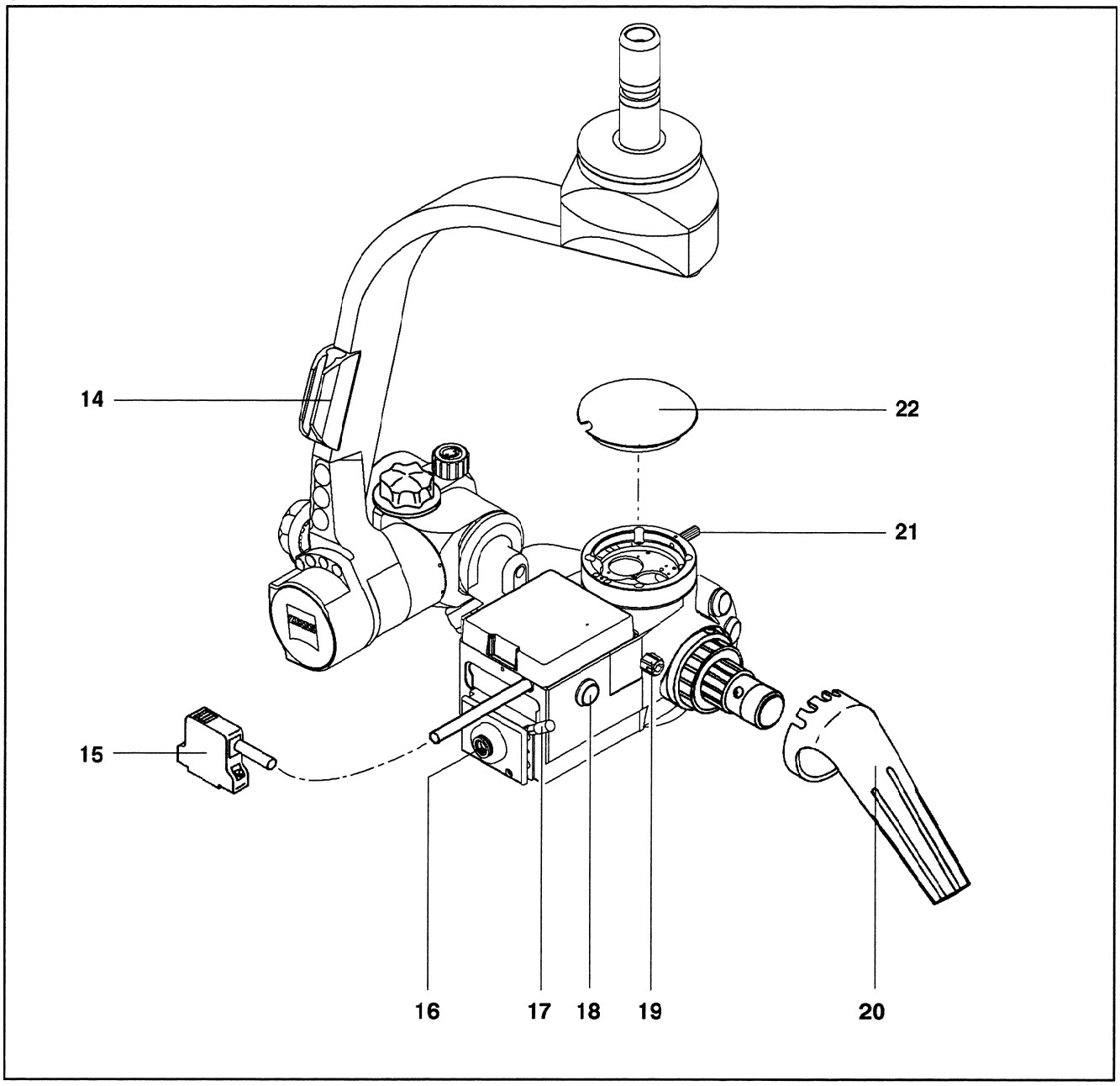
19 Zoom knob
Use this knob for manual setting of the magnification.

20 Grips for maneuvering the microscope
The grips can be mounted on the microscope at different angles.

21 Securing screw
After installing the binocular tube or another unit in the receptacle of the microscope, tighten this screw firmly as far as it will go.

22 Dust cover
Remove the dust cover before installing the binocular tube or another component.

5



Binocular tube and eyepieces

1 Knurled knob
Use this knurled knob to adjust the interpupillary distance. The PD is correct when the two eyepiece images merge into one.

2 Binocular tube

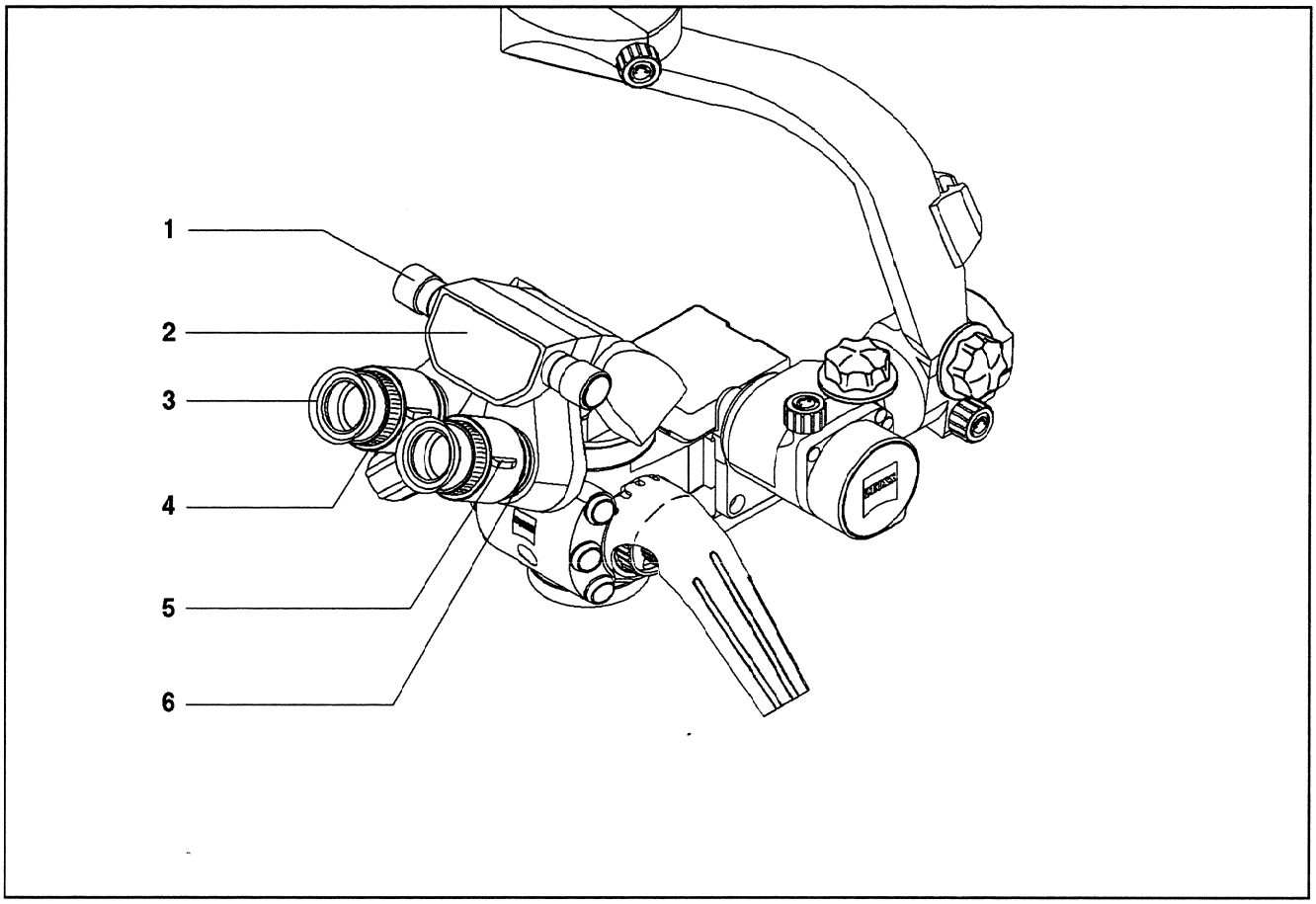
3 Eyecups

4 Diopter scale
The refractive power is shown on the diopter scale.

5 Catch lever for diopter adjustment
The eyepieces are equipped with ametropia compensation between – 8 to + 8 D. To adjust the eyepiece, press in the catch lever and turn the eyepiece in the " + " or "–" direction. The setting cannot be inadvertently changed after the catch lever has snapped back in.

6 Screw ring
Firmly tighten this ring when mounting the eyepiece.

6



S3 Floor stand

1 The articulated arm

Exact and effortless positioning of the microscope is achieved by the combination of a carrier arm with a suspension arm whose angle of motion is very wide. The spring tension of the suspension arm can be readily adjusted to compensate the weight of the microscope equipment used. The wide range of carrying capacity from 3 kg to 18 kg permits reliable counterbalancing of even heavy equipment. A scale is provided to show the setting of the weight compensation system.

The friction of all joints is adjustable, and the arm can be secured at any height and in any lateral position.

All cables and the fiber optic light guides for two illumination systems run inside the arms.

Two slide-in lamp modules are integrated in the carrier arm. The GG 475 and FG6 filters can be selected at the lamps. If a third fiber optic illumination system is needed, our service representative can mount an additional lamp housing on the articulated arm.

The end of the articulated arm has sockets for the surgical microscope and accessories.

2 The column

All electrical assemblies for the control of the surgical microscope and the supply of the illumination are contained in the column.

The controls are arranged at the upper end of the column. The knobs and their corresponding outlets on the arm are marked with the same color to avoid confusion.

The entire column can be mounted on the base in two different positions so that the controls are facing either the surgeon or the OR staff. A hand control panel, a foot control panel or an operating chair with foot control elements can be connected for controlling various functions.

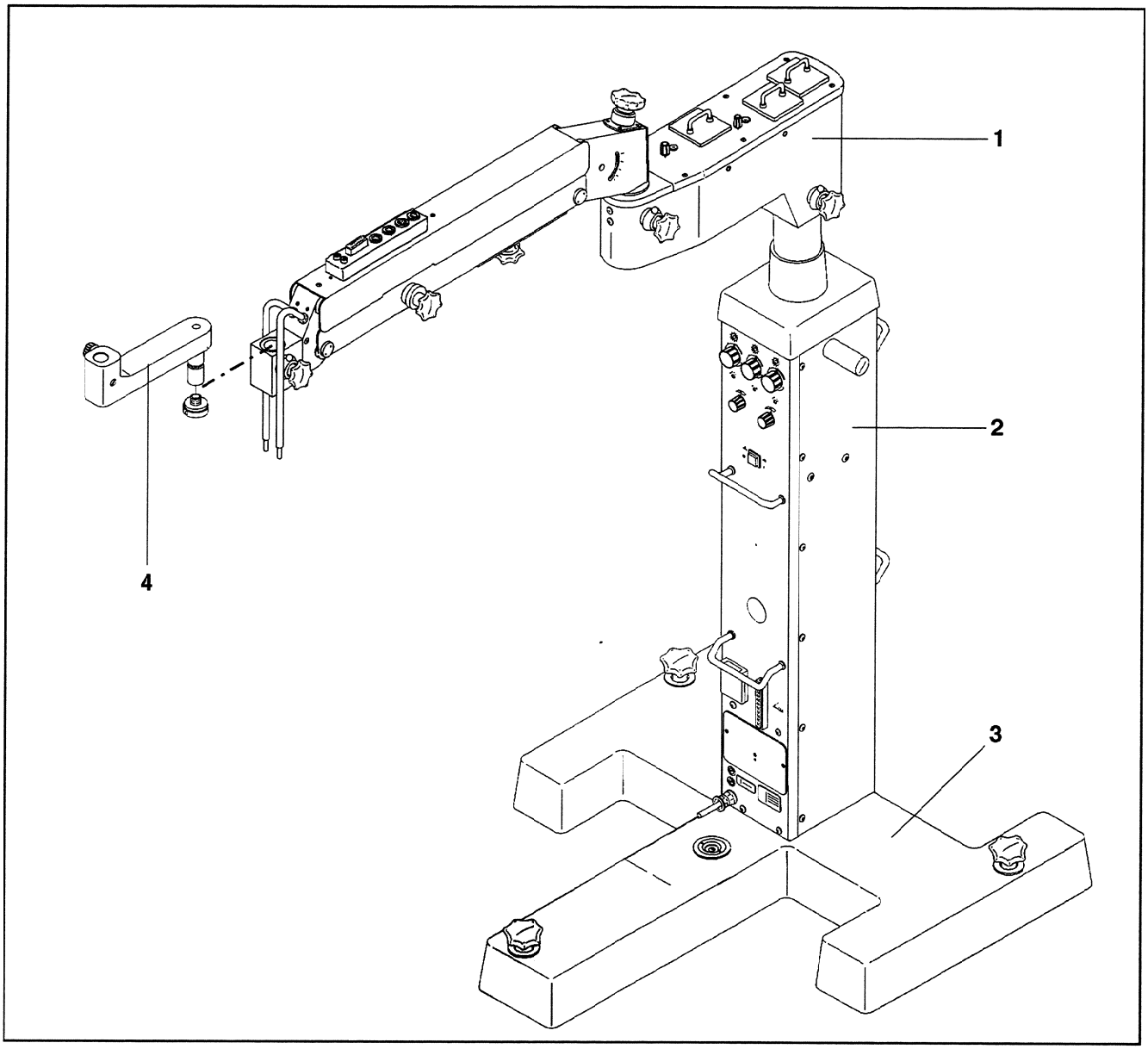
3 The base

The stand is mounted on a three-wing base with five anti-static twin castors and three floor locks. A built-in level facilitates leveling of the stand. The base is designed to ensure absolute stability even under maximum load and arm extension.

4 The cross arm

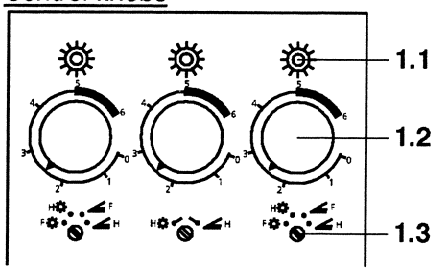
By mounting an additional cross arm (30 27 37- 0000), the OPMI® PRO magis is provided with additional freedom of motion.

7



Illumination system

1 Control knobs



Using these control elements, you can control three different illumination systems. The knobs (1.2) each have a different color. The illumination systems are also color-coded, enabling the user to easily see which knob controls which illumination system.

The exact function of the knobs (1.2) depends on the setting of switches (1.3):

☼ Illumination can be switched on/off at knob (1.2).

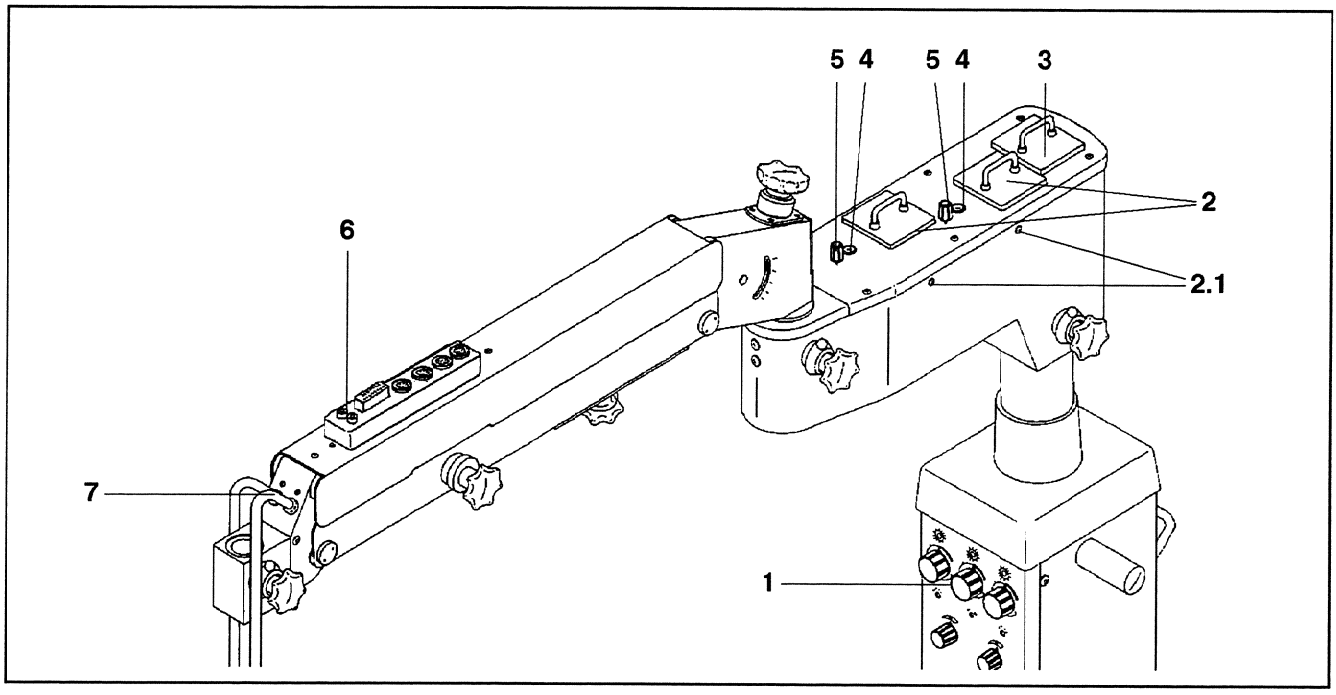
Illumination can be switched on/off at foot control panel.

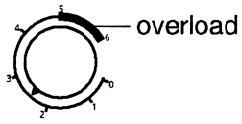
H Knob (1.2) controls an illumination module connected to the pair of sockets (6).

F Knob (1.2) controls a lamp module (2) (only red or blue).

When an illumination module is turned on, the indicator lamp (1.1) lights up. It might also be necessary to turn on the illumination at the foot control panel.

8





The brightness settings 1 to 5 are for normal operation. Maximum brightness can be achieved in the overload range 5-6; however, this shortens the service life of the lamp.

2 Lamp modules
The brightness of the lamp modules can be set using knobs (1.2). The colored dots (2.1) show which module is controlled by which knob.
If a halogen lamp goes out during surgery, switch off the stand and install the backup lamp module (3).
The lamp change is described on page 54.

3 Backup lamp module
If a halogen lamp goes out during surgery, pull out the defective lamp module (2) and install the backup lamp module.

4 Thermoswitches
The thermoswitches automatically switch off the halogen lamp modules (2) when they overheat. When this happens, first correct the cause of the overheating. When the lamp modules have cooled down again, press the thermoswitches back in.

5 Filter selectors
The filter selectors have three positions:

O	no filter
FG 6	FG 6 filter for increasing the color temperature ("whiter" light
GG 475	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).

6 Pair of sockets
Illumination modules or accessory equipment can be connected to this pair of sockets. The supply voltage can be adjusted using knobs (1.2) once the corresponding switches (1.3) have been set to H. Please observe the connection ratings given for the sockets.

7 Light guides
The light sources for these light guides are lamp modules (2). The connection is made in accordance with the color dots (2.1).

Articulated arm

1 Cable conduit
The S3 Floor Stand is supplied with a cable conduit which can be attached to the side of the suspension arm. If necessary, excess cable, e.g. from the XY coupling, can be stored here. The cable conduit is equipped with double-sided adhesive tape (1.1).

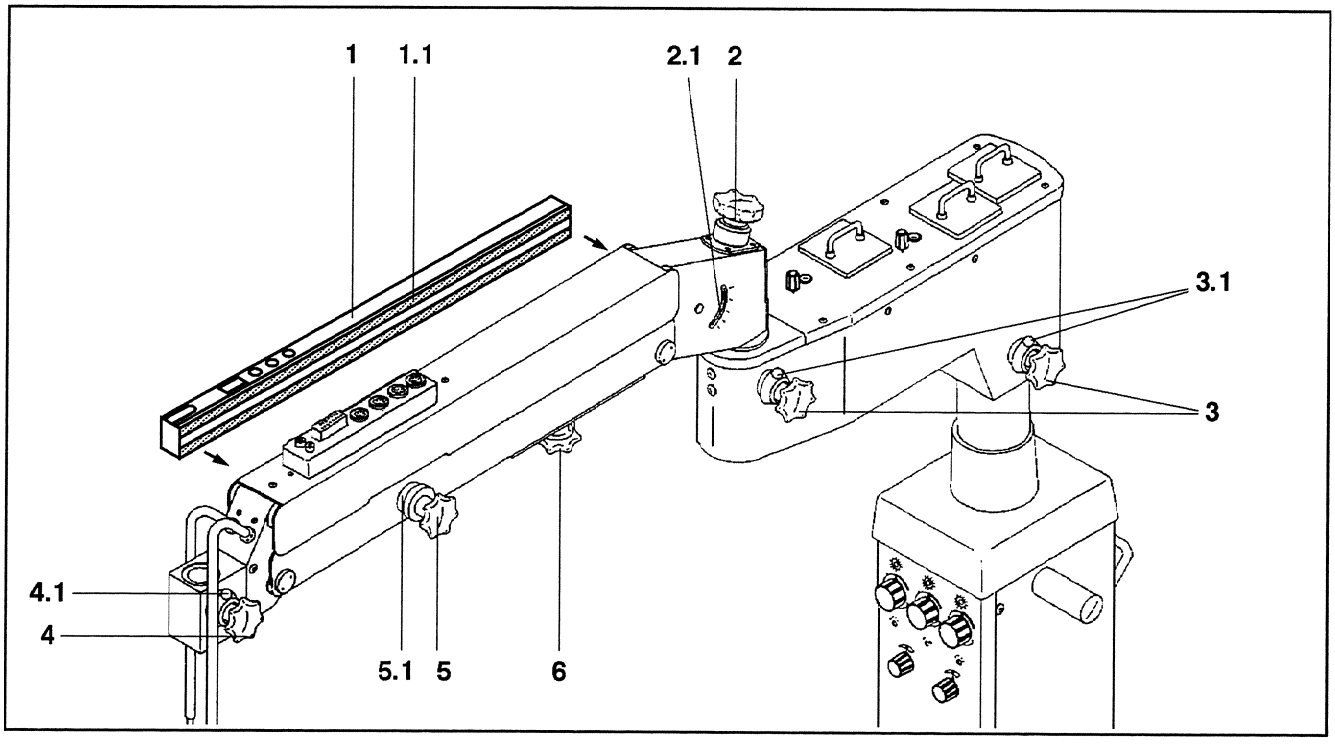
2 Adjusting knob for weight compensation
Adjust the weight compensation after installing the microscope with all accessory equipment. The setting is indicated at scale (2.1).

3 Clamping knob for horizontal motion
The friction of the horizontal motion of the arms can be adjusted using ball knobs (3.1).

4 Clamping knob for microscope rotation
Tighten clamping knob (4) firmly when mounting the surgical microscope directly on the S3 Floor Stand. When using the cross-arm, you can adjust the friction of the cross-arm using ball knob (4.1).

5 Clamping knob for vertical motion
Tighten this knob before mounting or removing a component (microscope or binocular tube) to prevent the arm from abruptly moving upward due to the change in weight. The friction of the vertical movement can be adjusted using ring (5.1).
Note: Clamping screw (5) only acts a brake, not as a lock.

9



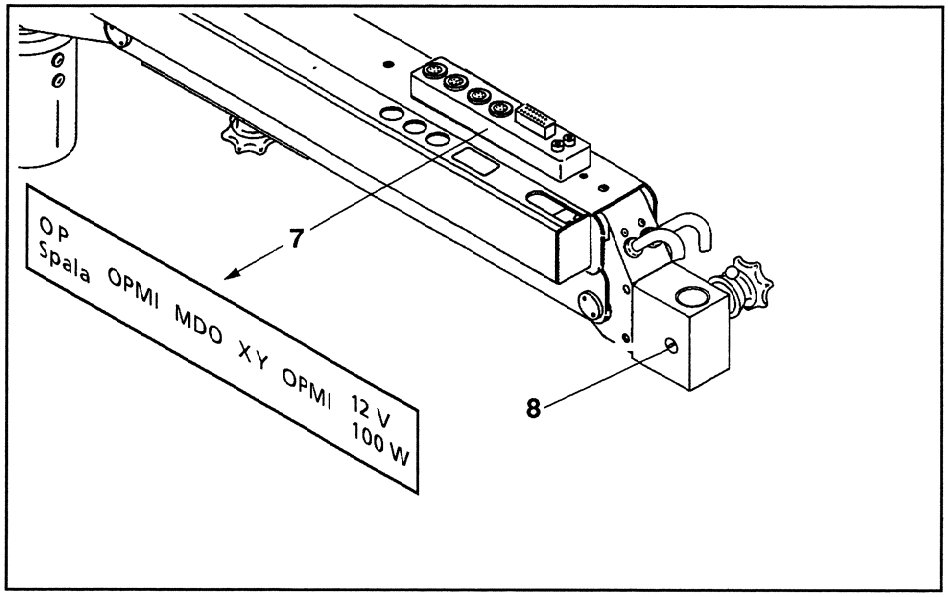
6 Safety slider
The safety slider is used to adjust the minimum vertical working distance to the field of surgery. This setting must be checked before surgery.

7 Connecting sockets
The following instruments can be connected here:

OP-Spala	motorized surgical slit illuminator
OPMI	OPMI® surgical microscope with fiber optic illumination (except OPMI® MDO)
MDO	OPMI® MDO surgical microscope
XY	X-Y coupling
OPMI	OPMI® PRO magis surgical microscope
12 V 100 W	Additional illumination equipment.

8 Securing screw
After installing the microscope, tighten this screw firmly. The screw head must be flush with the surface of the suspension arm.

10



Column and base

1 Illumination control knobs

2 Grips
Use these grips for moving the stand.

3 Speed setting for ZOOM

4 Speed setting for FOCUS

5 Power switch
When the stand is turned on, the green indicator lamp in the switch lights up.

6 Brackets (2x at the front) for winding up the power cord

7 Brackets(2x at the rear) for hanging up the foot control panel

8 Locking and leveling knobs
Use these knobs to lock the stand in position on the floor and to level it. You can see whether it is properly leveled at (8.1).

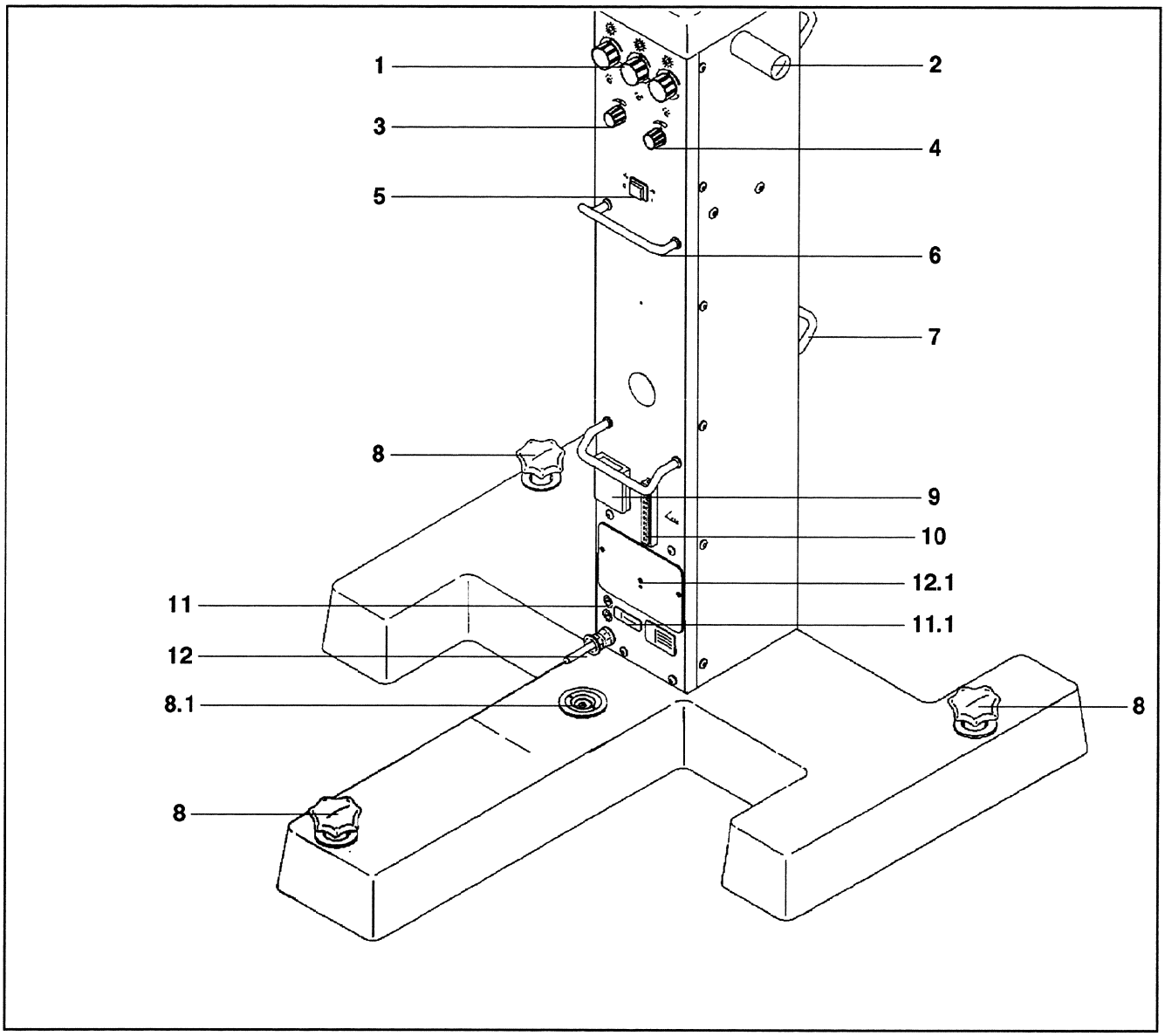
9 Line power outlet
Only medical equipment which we have approved may be connected to this outlet. For any other equipment, it is the responsibility of the customer to ensure that the safety of the system is guaranteed with reference to ground leakage currents. The power consumption of a unit connected here must not exceed 900 VA.

10 Connector for control unit
A foot control unit, hand control unit or an operating chair with foot controls can be connected here.

11 Fuses
The fuse ratings depend on the rated voltage of the line supply on site. The correct ratings are given on label (11.1). Changing the fuses is described on page 54.

12 Power cable
Only use a power outlet which has a properly connected protective earth connection. The rated voltage indicated at (12.1) must be the same as the rated voltage of the line supply on site.

11



Installation of equipment

Note
The description in this chapter applies in the same manner for other stands.

Mounting the cross arm

Note: The cross arm (Cat.No.: 30 27 37- 0000) provides you with additional freedom of movement. Optionally, the surgical microscope can also be mounted directly on receptacle (3) of the suspension arm.

Caution:

- The weight of the microscope including accessory equipment on the S3 Universal Floor Stand must not exceed 18 kg!
- Tighten clamping screw (14) and do not loosen the screw until
  - you have mounted the complete equipment and
  - made the electrical connections.
- Clamping screw (14) only acts as a brake, not as a lock.
- Now balance the weight of the suspension arm. For the weight balancing procedure, see page 40.

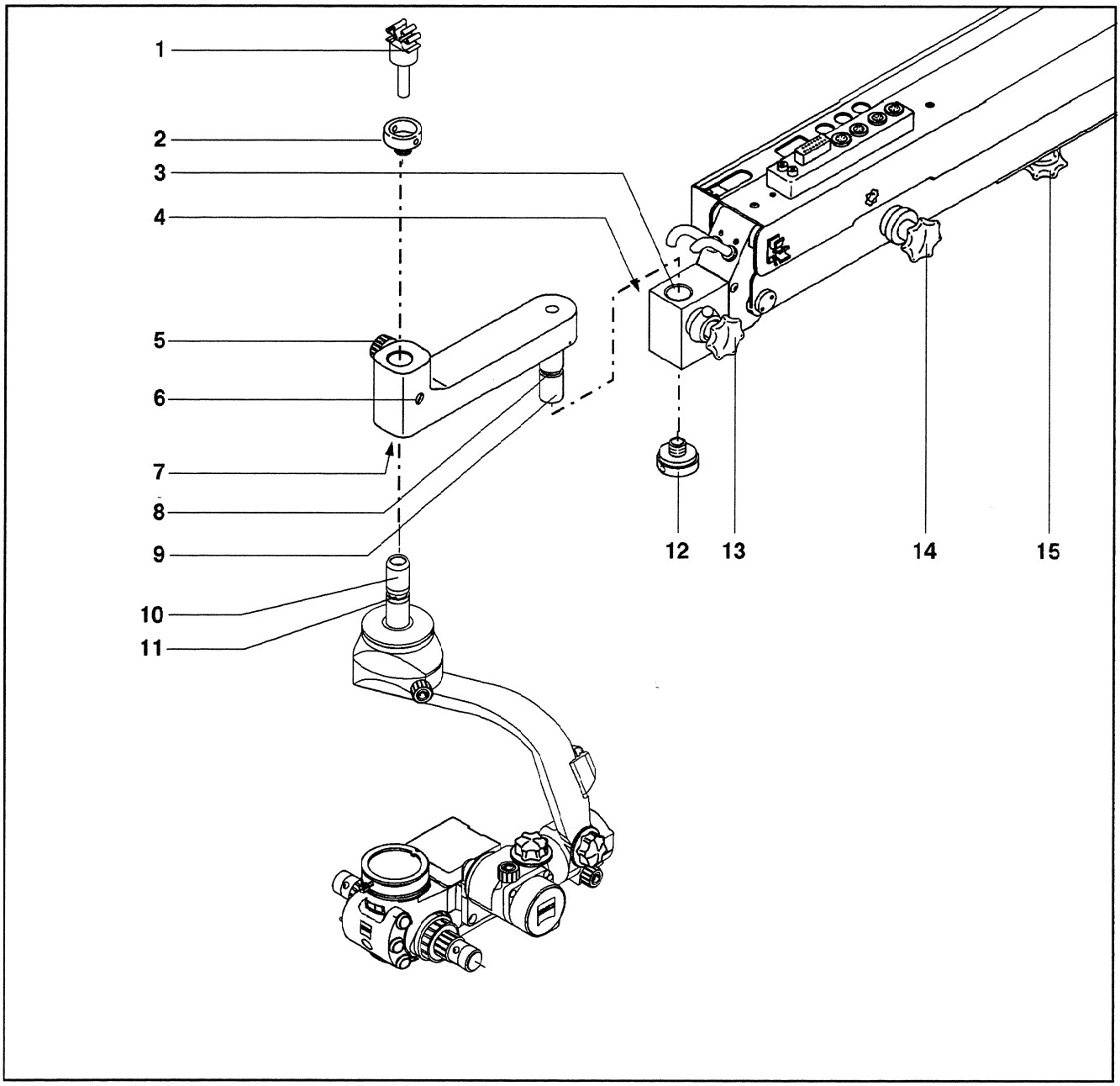
- Loosen safety slider (15).
- Move the suspension arm into a convenient position and use clamping screw (14) to lock the vertical motion of the suspension arm.
- Loosen securing screw (4) and clamping screw (13) by a few turns.
- Slightly lubricate shaft (9) of the cross arm (e.g. with grease or vaseline) and insert it into reception bore (3) of the suspension arm from above. Screw in securing screw (12) from below and tighten it firmly using a suitable tool (e.g. a pin key).
- Screw in securing screw (4) and tighten firmly. Securing screw (4) must engage in groove (8), which is ensured when the head of the securing screw is flush with the outer surface of the suspension arm.

Installing the microscope

- Slightly lubricate the microscope shaft (10) (e.g. with grease or vaseline).
- Insert microscope shaft (10) into reception bore (7) of the cross arm from below. Screw in securing screw (2) from above and tighten it firmly using a suitable tool (e.g. a pin key).
- Screw in securing screw (6) and tighten firmly. Securing screw (6) must engage in groove (11), which is ensured when the head of the securing screw is flush with the outer surface of the cross arm.
- Insert cable clip (1) into securing screw (2).

Caution:
Make sure that the securing screws 2, 4, 6 and 12 are firmly tightened before using and after re-equipping the instrument!

12



Attaching the binocular tube, eyepieces, objective lens and grips

- Loosen securing screw (5) by a few turns.
- Remove cover (4) and store it in a safe place.
- Place the binocular tube (3) on the surgical microscope and tighten securing screw (5) firmly.
  Accessory equipment may be mounted between the microscope body and the binocular tube. Secure these assemblies in the same manner using securing screw (5).
- Screw eyepieces (1) onto the eyepiece mounts of the tube and tighten knurled rings (2) firmly.

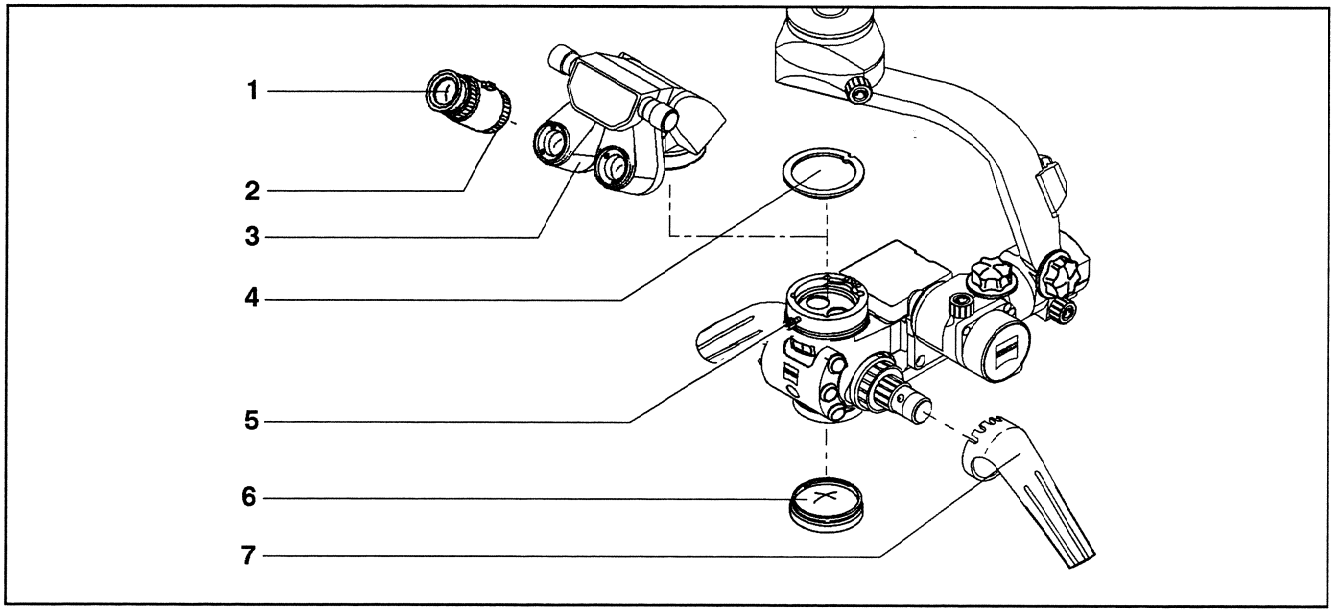
Note: When documentation equipment is used, one of the eyepieces can be delivered with a reticle to aid focusing. Subsequent retrofitting of a reticle to an eyepiece can only be done in the factory or by our service representative. Install the eyepiece with the reticle on the same side as the documentation equipment.

- Insert objective lens (6) into the microscope body and tighten firmly.
- Plug on the grips (7).

Caution:
Before using the instrument and after re-equipping it, always ensure that the binocular tube (3) is properly installed!
Make sure the following are tightened firmly:

- securing screw (5)
- knurled rings (2) and
- objective lens (6)

13



Changing the microscope and microscope accessories

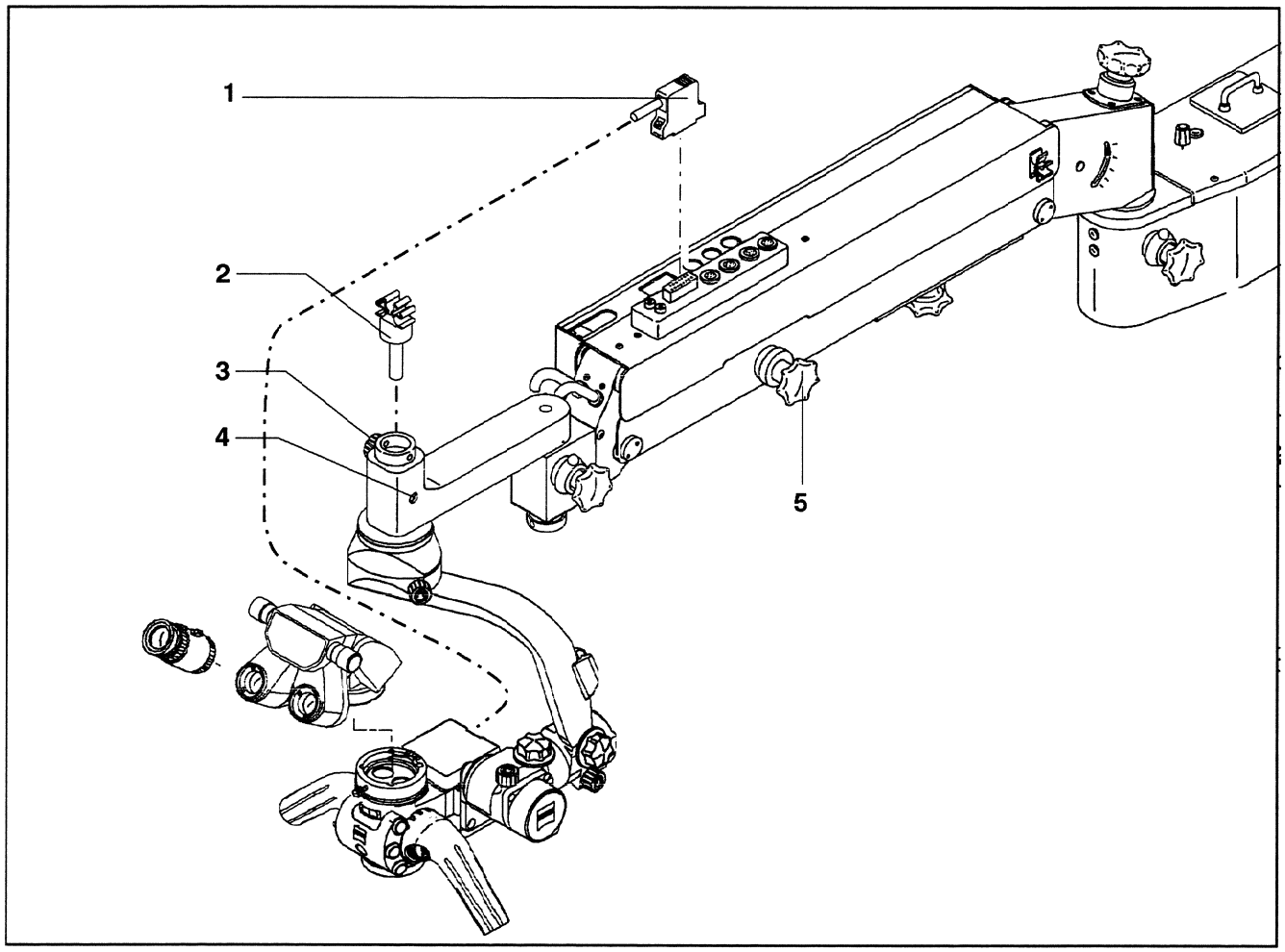
The microscope and microscope accessories are removed in the reverse order to that used for their installation. Observe the following:

- Clamp the suspension arm using clamping screw (5), thus locking the vertical motion of the arm.
- Switch off the instrument at the power switch.
- Remove connector (1) from the socket before changing the microscope.
- Pull cable clip (2) out of securing screw (3).

Note: Do not loosen clamping knob (5) until
- you are finished changing the microscope and microscope equipment
- and you are ready to re-adjust the weight compensation of the suspension system (see page 40).

Caution:
Securely support and hold the surgical microscope while loosening securing screws (3) and (4)!

14



Connections

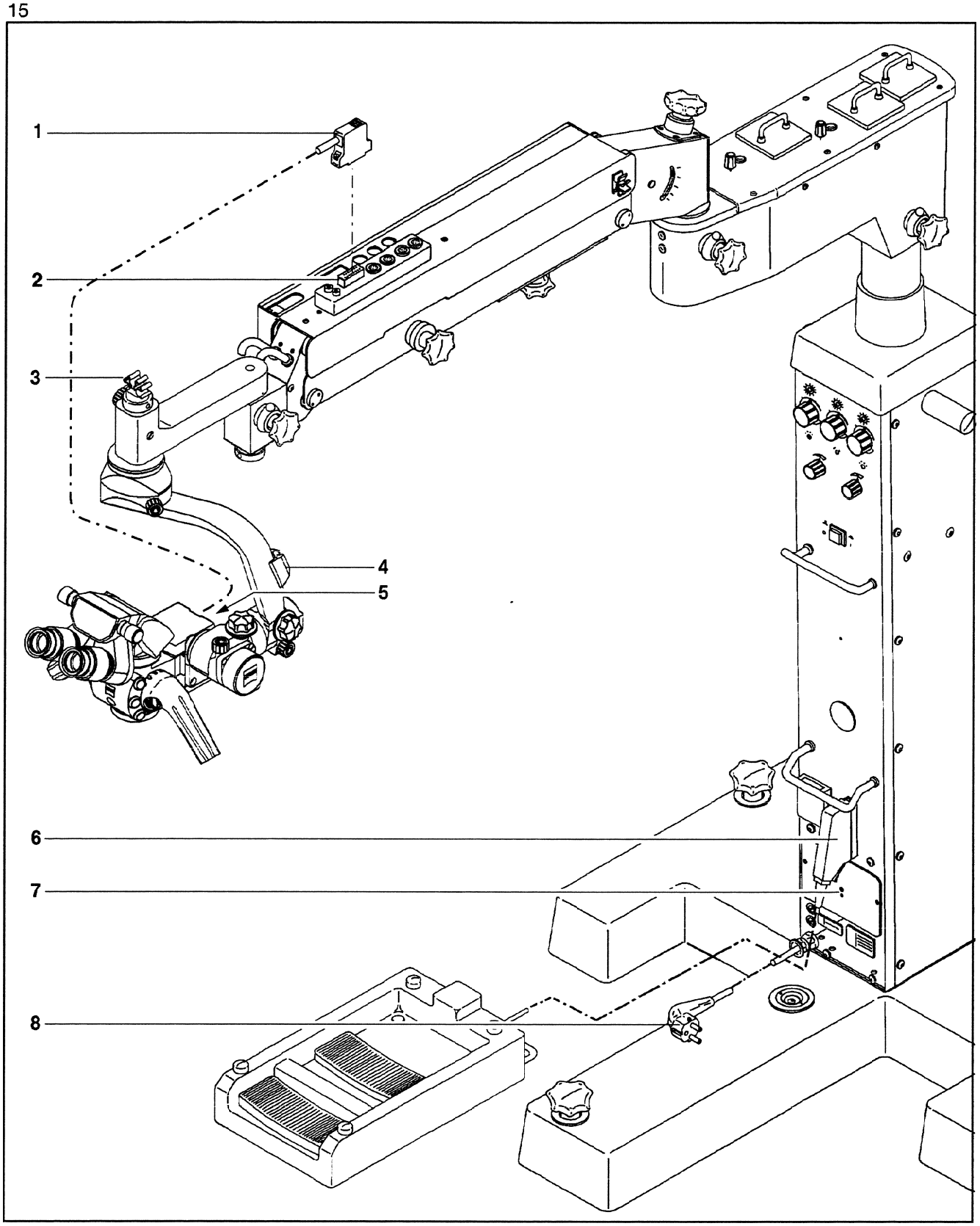
- Check the voltage indicated at (7).

Caution:
The floor stand is set in the factory for the voltage at the destination country. The voltage indicated at disk (7) must correspond with the rated voltage of the available line power. If not, the instrument must be converted by our service representative.

Note: Only plug in or unplug connectors (1), (6) and (8) when the power switch on the stand is turned off.

- Plug in connector (1) of the microscope into socket (2) on the suspension arm and secure it firmly with screws.
- Plug connector (6) of the hand or foot control panel into the knife-edge socket of the floor stand.
- Press the microscope cable into cable clips (3) and (4). Make sure that the microscope cable is not stretched or kinked when the microscope is rotated or tilted.
- Press the light guide into cable clips (3) and (4) and insert the light guide all the way into light guide receptacles (5) on the microscope. Make sure that the light guide is not stretched or kinked when the microscope is rotated or tilted.
- Plug in power cord (8). The power outlet used must be equipped with a properly connected protective earth connection.

15



Use of the instrument

Preparations

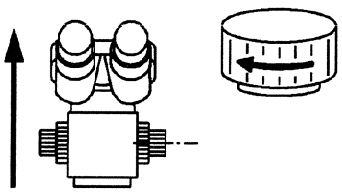
- Turn the system on at the power switch.
- Tighten clamping knob (2) firmly when mounting the surgical microscope directly on the S3 Floor Stand.
  When using cross-arm (3), first tighten securing screw (4) and then adjust the friction of the cross-arm using ball knob (1).

Note: Press any one of the magnetic brake keys to be able to adjust the necessary friction and balance settings of the microscope's tilt motions.

Adjusting the friction of the rotation motion

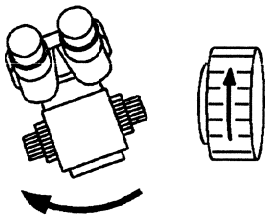
- Use knob (5) to adjust the friction of the rotation motion as required.

Adjusting the balance setting of the front-to-back tilt



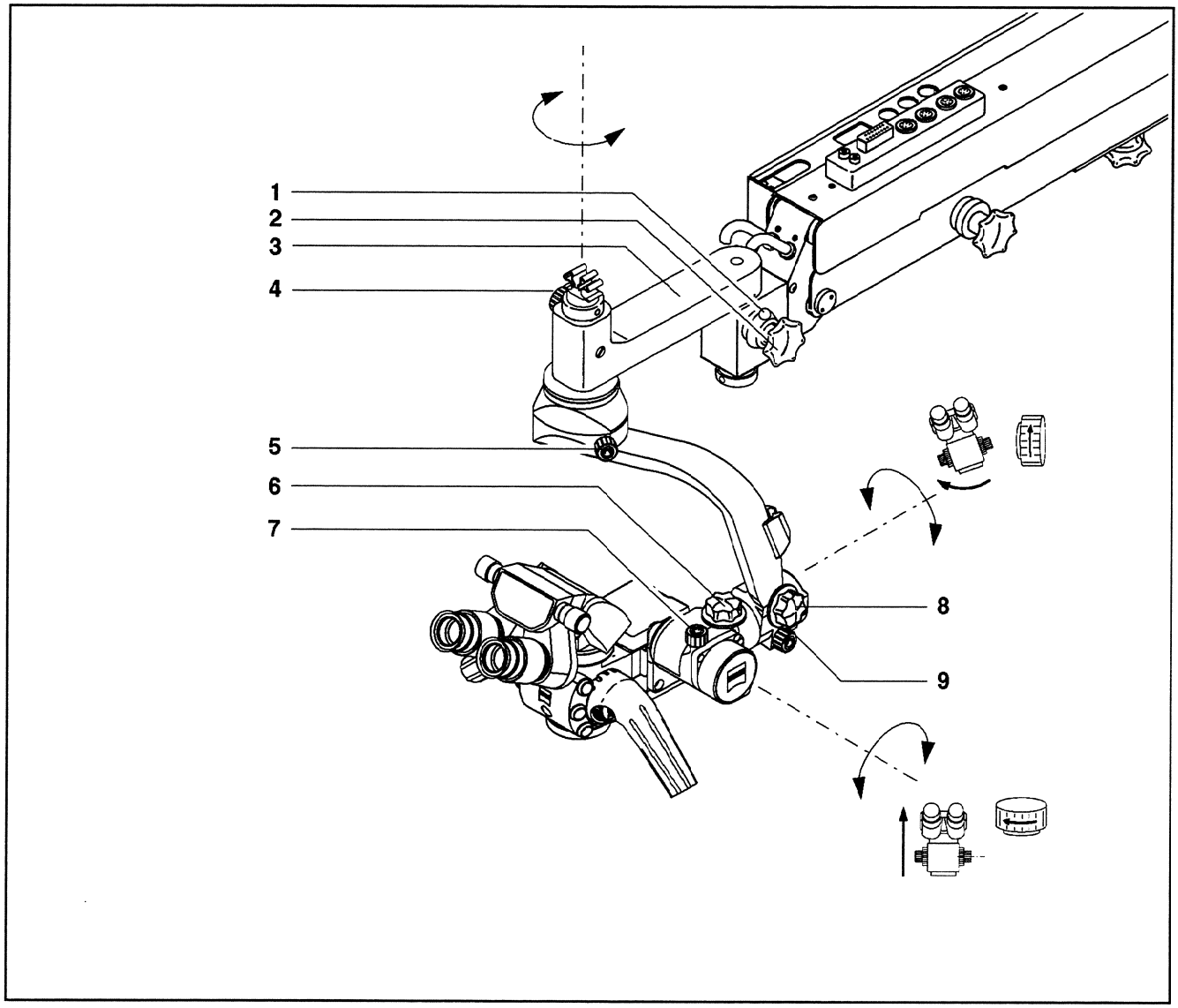
- Hold the microscope with your hand and turn knob (7) in the "–" direction until the friction function has been deactivated.
- Turn knob (6) until the surgical microscope remains stationary in the viewing direction required.
- Turn knob (7) in the " + " direction to set the friction of the front-to-back tilt as required.

Adjusting the balance setting of the lateral tilt



- Hold the microscope with your hand and turn knob (9) in the "–" direction until the the friction function has been deactivated.
- Turn knob (8) until the surgical microscope remains stationary in the viewing direction required.
- Turn knob (9) in the " + " direction to set the friction of the lateral tilt as required.

16



Positioning and leveling the stand

Note: Please also read the chapter "Relocating the stand", page 56.

Caution:

- Always position the stand in such a way that the long extension points in the direction of the surgical field.
- Turn locking knobs (14) clockwise until the stand can no longer be moved. Circular level (15) indicates whether the stand is level.

Weight compensation

- Hold the microscope with your hand and loosen clamping screw (8).
- Turn knob (1) to adjust the weight compensation of the suspension arm. When correctly balanced, the arm remains in the position required.

Safety distance to the surgical field

Use safety slider (7) to limit the downward movement of the suspension arm, thus ensuring that there is no risk to the patient. Check this setting before each surgical procedure.

- Loosen the star knob of safety slider (7) as far as it will go.
- Lower the surgical microscope to a point where the distance to the surgical field is still sufficiently large to ensure the safety of the patient.
- Push the safety slider as far as it will go into the direction of the surgical microscope and re-tighten star knob (7).
- Check the safety distance by lowering the surgical microscope to the lower stop set.

Friction adjustments

- Use ball knobs (2) to adjust the friction of the rotation of the arms.
- Tighten clamping screw (10) firmly, if you mount the surgical microscope directly on the S3 floor stand.
  When using the cross-arm, first tighten securing screw (12) firmly and then adjust the friction of the cross-arm rotation using ball knob (11).
- Use ring (9) to adjust the friction of the vertical movement.

ZOOM and FOCUSING speeds

- Turn the system on at power switch (6).
- Activate one of the control rings for zoom or focus.
- Use knobs (5) to set the speed of the zoom and focusing functions.

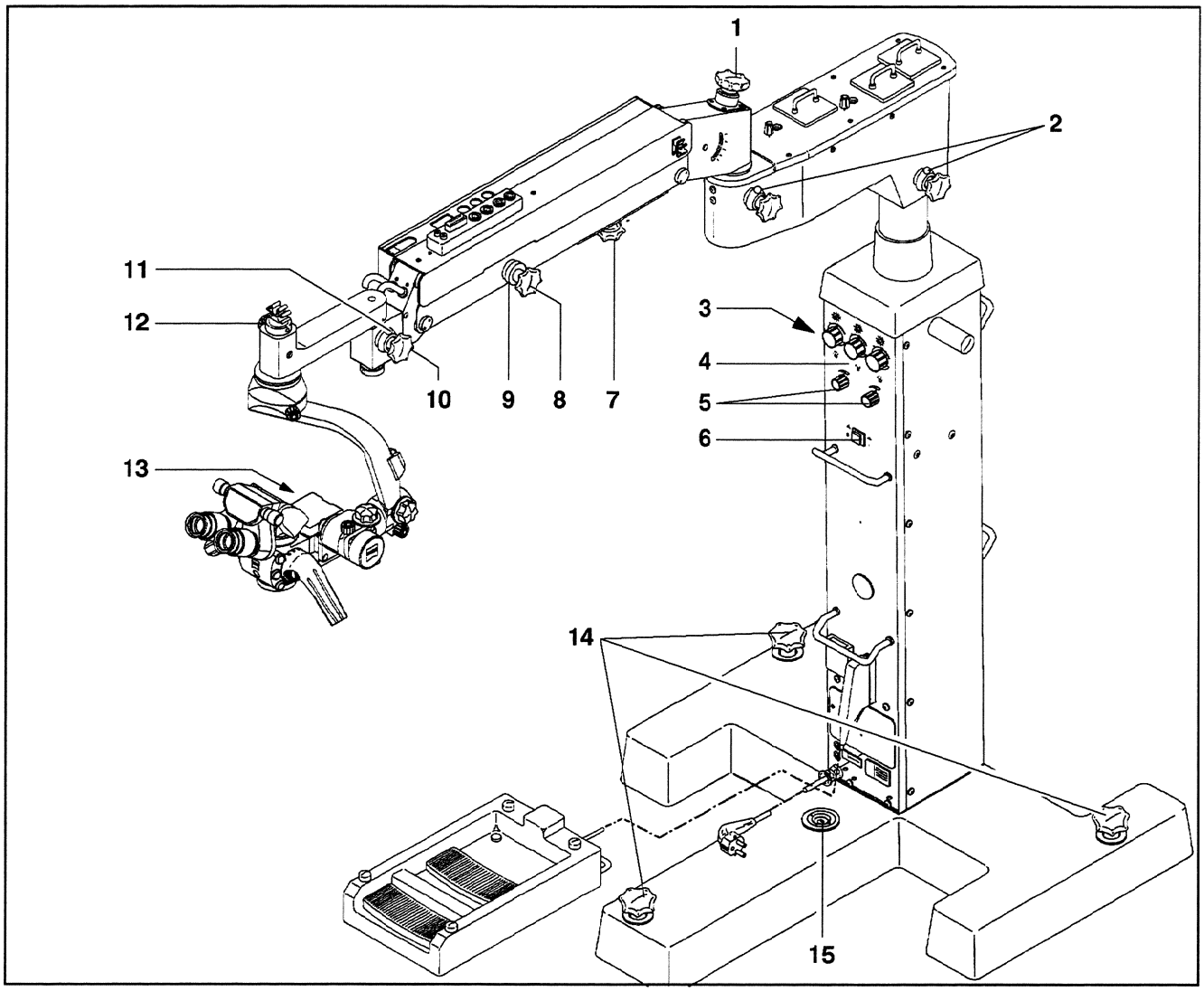
Illumination

- To be able to control the lamp modules for fiber illumination using the foot control panel (option), select the following setting for the "red" and the "blue" illumination at switches (4:
  F See also pos. (1), page 26 ff.
- Switch on the illumination at knobs (3). Use knobs (3) to adjust the brightness as required.

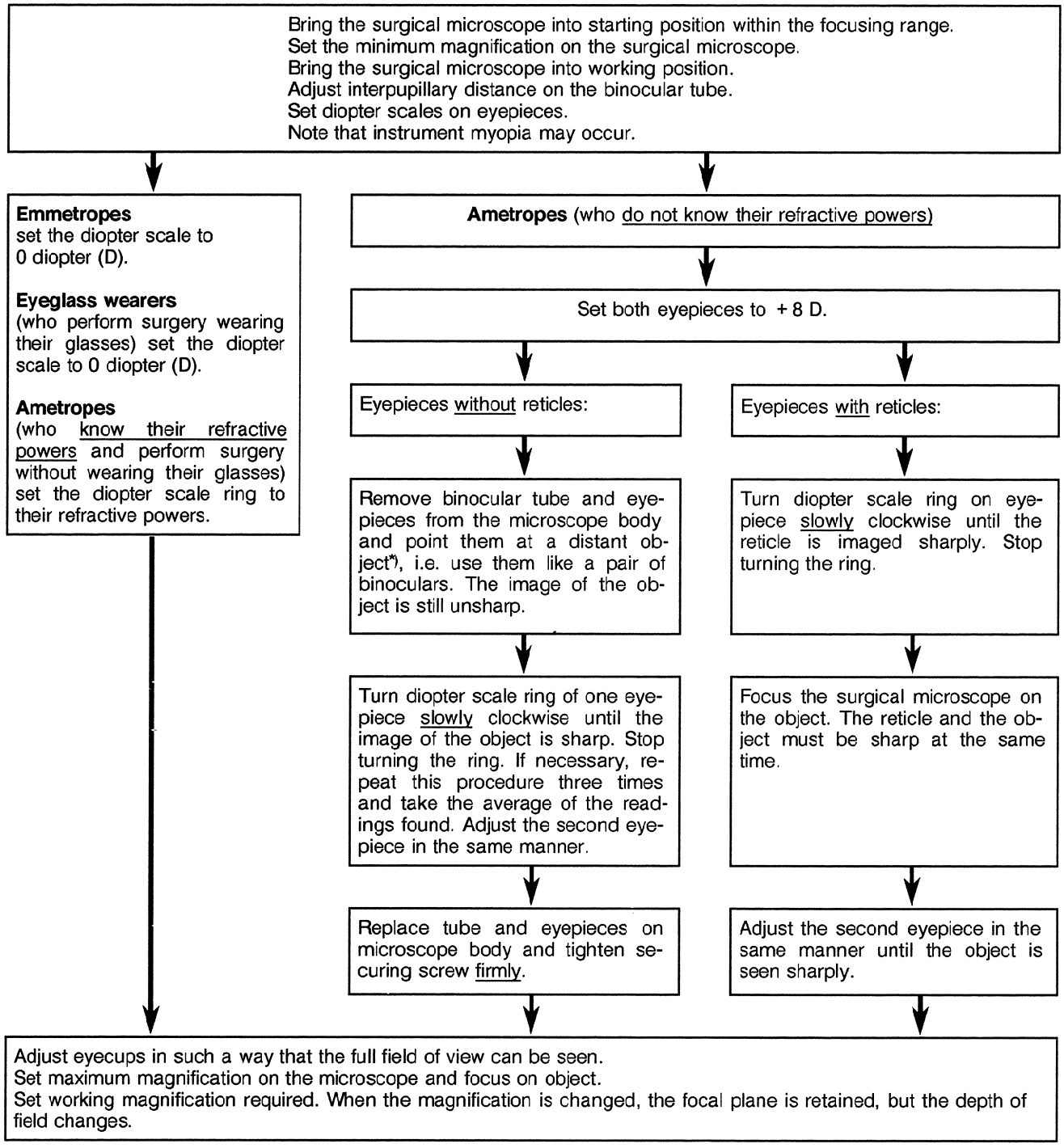
Re-setting the focusing system to its starting position

- Press button (13) to return to the starting position of the focusing range.

17



Adjusting the surgical microscope



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

*) **Caution:** Never point at the sun.

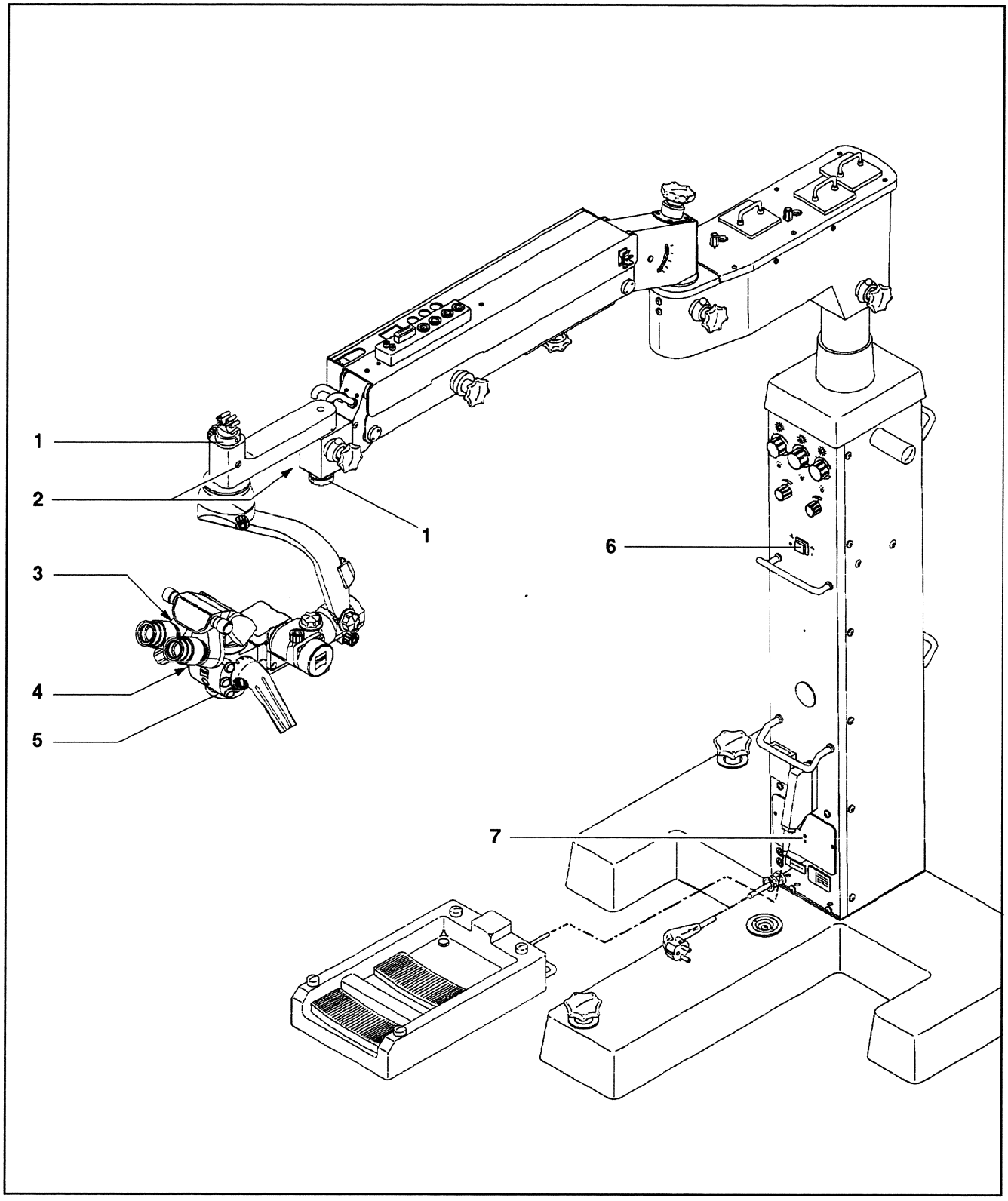
Checklist

The following points must always be checked (without the patient) before surgery:

- The correct rated voltage is adjusted at (7).
- All cables are connected.
- The power switch (6) is on.
- The halogen lamps including the lamp in the backup module are in proper working order.
- Securing screws (1), (2) and (4) are tightened firmly.
- The knurled rings (3) and objective lens (5) are tightened firmly.
- The S light guide is connected.
- The weight compensation of the suspension arm is properly adjusted.
- The friction of the tilt motions of the surgical microscope are adjusted as required.
- The balance setting of the tilt motions of the surgical microscope is adjusted as required.
- The keys for the magnetic brakes are in proper working order.
- The minimum working distance (height) from the surgical field is set on the stand.
- The friction of the suspension arm is adjusted as required.
- The friction of the microscope rotation is adjusted as required.
- The friction of the rotation of the suspension and carrier arms is adjusted as required.
- The friction of the cross-arm rotation is adjusted.
- The zoom and focusing drives function properly throughout their entire ranges.
- The starting position of the focusing range is set.
- The interpupillary distance is set as required.
- The correct dioptric values are set on the eyepieces.
- The image quality is not impaired throughout the entire magnification range.

Caution:
If a malfunction is detected, you must not use this instrument for safety reasons. If possible, correct the fault (see troubleshooting table on page 49) or contact our service dept.

18



Operation

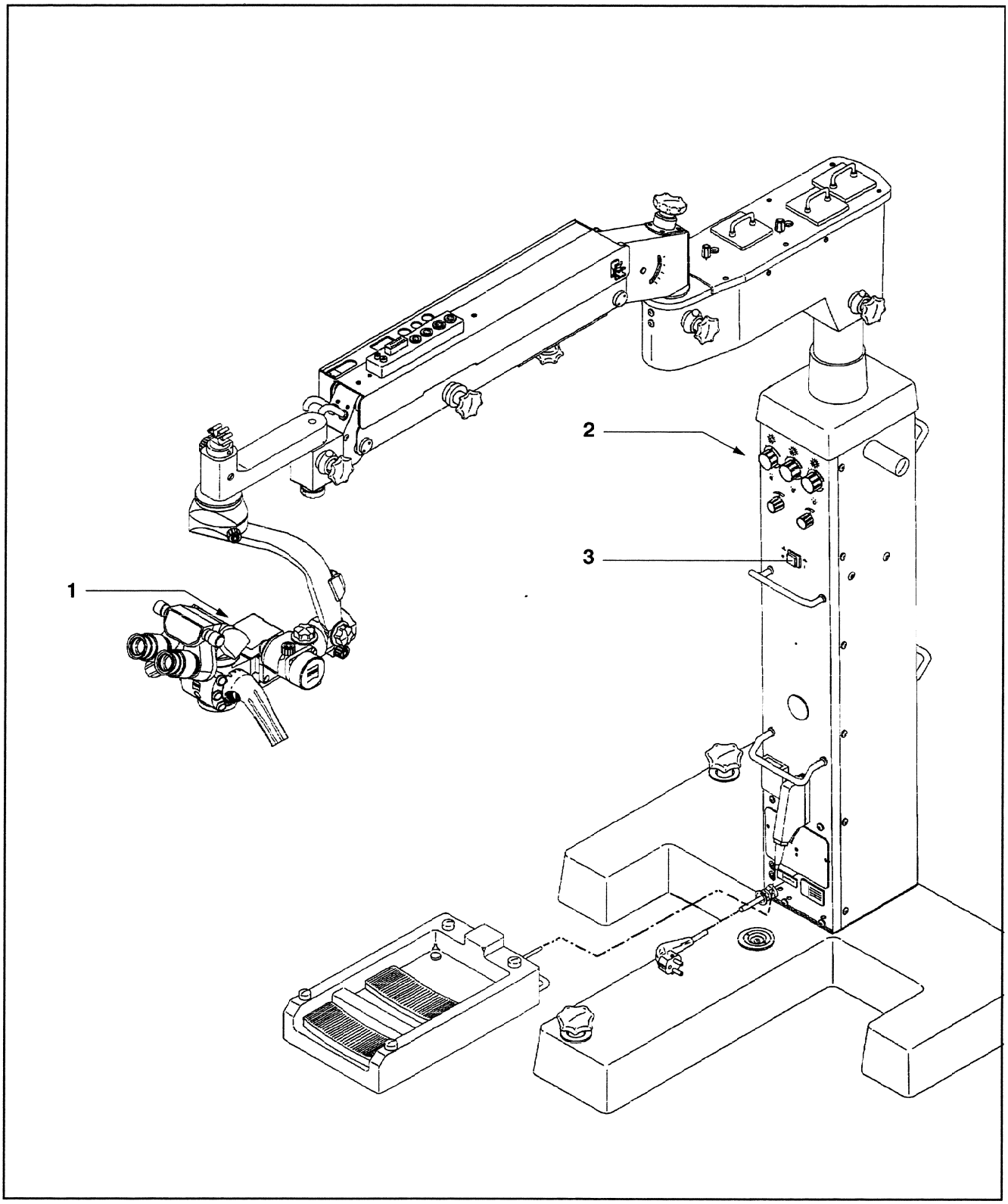
- All preparations have been completed. See page 38.
- The instrument has been checked in accordance with the checklist.

- Switch on the instrument at power switch (3) and adjust the brightness using (2).
- Move the microscope over the surgical field to the position required.
- Re-check the setting of the minimum working distance to the surgical field.
- Press button (1). The focusing drive moves to its starting position.
- Zoom out to the lowest magnification.
- For coarse focusing, look through the eyepieces and lower the surgical microscope using the suspension arm to where the surgical field is visible.
- Zoom in to highest magnification.
- Look through the eyepieces and activate the focusing function until the surgical field is focused sharply.
- Zoom to the magnification required. Look through the eyepieces and adjust them in such a way that you see both the edge of the field and the image itself sharply. See also page 43.
- Switch the instrument off when it is not in use.

Caution:

- Never look directly into the light source, e.g. into the microscope objective lens or into a fiber light guide.
- When operating on the eye, always use a GG 475 protection filter to ensure that the patient's eye is not exposed to unnecessary (blue) radiation (retinal injury).

19



What to do in an emergency

Lamp failure

When a Thermoswitch (1) has activated:

- First correct the cause of the overheating. For example, drapes might be covering the ventilation slits. Press the Thermoswitch (1) back in after the lamp module has cooled down.

Defective bulb:

- Switch off the stand at power switch (5).
- Remove defective lamp module (3) and install backup lamp module (2).
- Switch the stand back on. Adjust the brightness of the illumination as required using knob (4).

Failure of zoom function

- Adjust magnification manually using zoom knob (6) on the microscope.

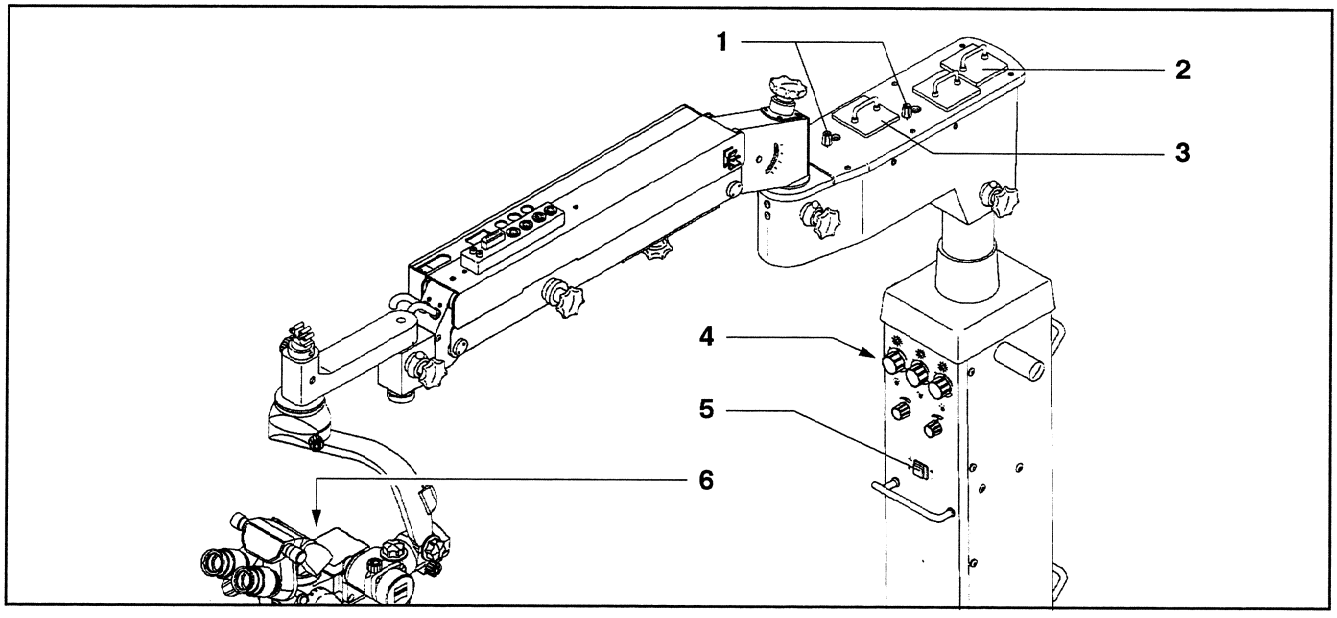
Failure of focusing function

- Focus by moving the suspension arm up/down.

Failure of magnetic brakes

- In the event of a failure of the magnetic brakes (magnetic brakes do not unlock), apply force to override the brake effect.

20



Maintenance / Further information

Safe working order

This instrument is a high-grade technological product. In order to ensure perfect and safe working order of the instrument, we recommend that our service representative inspect this instrument on a regular basis.

Trouble-shooting table

If a malfunction occurs which you cannot remedy using the trouble-shooting table, attach a label to the instrument stating it is out of order and contact our service department.

Problem	Possible cause	Remedy	See
No function at all.	Power plug not connected.	Connect power plug.	Page 37 Pos. 8
	Power switch not on.	Press power switch. Green light in switch must come on.	Page 31 Pos. 5
	Defective fuse in stand.	Change fuse.	Page 54
	Power failure.	Contact in-house electrician.	–
Microscope illumination not working, but the green light in the power switch is on.	Halogen lamp not turned on.	Switch on illumination.	Page 26
	Defective halogen bulb.	Install backup lamp module. Change bulb.	Page 48 and page 54
	Ceramic base does not have proper contact to halogen lamp.	Plug the ceramic base firmly onto the contacts of the halogen lamp.	Page 54 Pos. 1
	Lamp module does not have proper contact.	Push in lamp module as far as it will go.	Page 54

cont'd on next page

Problem	Possible cause	Remedy	See
Microscope illumination not working, but the green light in the power switch is on.	Thermoswitch activated.	First correct the cause of overheating. When the lamp module has cooled down again, press the thermoswitch back in.	Page 48 Pos. 1
	S light guide not properly inserted.	Insert light guide as far as it will go.	–
	Defective electronics in stand.	Illuminate area of surgery with surgical lamp. Contact service technician.	–
Insufficient illumination.	Brightness level too low.	Adjust brightness using the brightness control knobs on the stand.	Page 27
	S light guide not properly inserted at lamp and/or microscope.	Insert S light guide as far as it will go.	–
	Defective S light guide (illumination not even).	Change S light guide. Contact service technician.	–
Zoom system not functioning.	Connector not installed properly.	Install connector properly.	Page 36
	Defective motor.	Adjust the magnification using manual zoom knob on microscope. Contact service technician.	Page 21 Pos. 19
Focusing system not functioning.	Connector not installed properly.	Install connector properly.	Page 36
	Defective motor.	Focus using the suspension arm of the stand. Contact service technician.	–
Microscope movement sluggish.	The respective friction setting is too tight.	Loosen friction setting.	Page 40

Care of the microscope

Cleaning optical surfaces

The multilayer T* (T-star) coating of our optical components (e.g. eyepieces and objective lenses) results in optimum image quality.
The image quality is impaired by even slight contamination of the optics or by a fingerprint. To protect the internal optics of the microscope from dust, it should never be left without the objective lens, binocular tube and eyepieces installed. After use and cleaning, cover the microscope with a dust cover. Always store objective lenses, eyepieces and accessories which are not being used in dust-free cases.

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

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

Prevention of fogging

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

The 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 unpoisonous and does not scratch glass.

The anti-fogging agent not only prevents fogging: It also cleans the optics of the eyepieces and protects them from dirt, grease, dust, lint 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 instrument 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 consisting of 50% ethyl alcohol and 50% distilled water plus a dash of dishwashing liquid.

Sterilization

The asepsis set available from Carl Zeiss contains rubber caps, sleeves and grips which can be sterilized in conventional autoclaves. We recommend the following program for sterilization:

- Sterilization temperature: 120° C
  Sterilizing time: 20 minutes

Sterile single-use drapes are available to cover the instrument.

Changing the halogen lamp

Caution:

When you change the lamp shortly after it has gone out, wear heat-insulating gloves to prevent burns!

Note: If the halogen lamp goes out during surgery, install the backup lamp module. For this reason, make sure before surgery that the halogen lamp in the backup module functions properly.

To change the lamp, proceed as follows:

- Switch off the illumination at knobs (6) and the stand at power switch (7).
- Remove lamp module (4).
- Pull ceramic base (1) off from the contact pins of the halogen lamp.
- Remove the halogen lamp from the spring holding device.
- Install the new halogen lamp. Observe the following:
  - Do not touch the lamp bulb (3) or the interior of the lamp reflector.
  - The centering tongue (2) - if provided - must fit into the recess provided.
- Slide ceramic base (1) onto the contact pins of the halogen lamp.
- Install the lamp module with the new halogen lamp in the stand.
- Switch the stand back on at power switch (7) and the illumination at knobs (6).

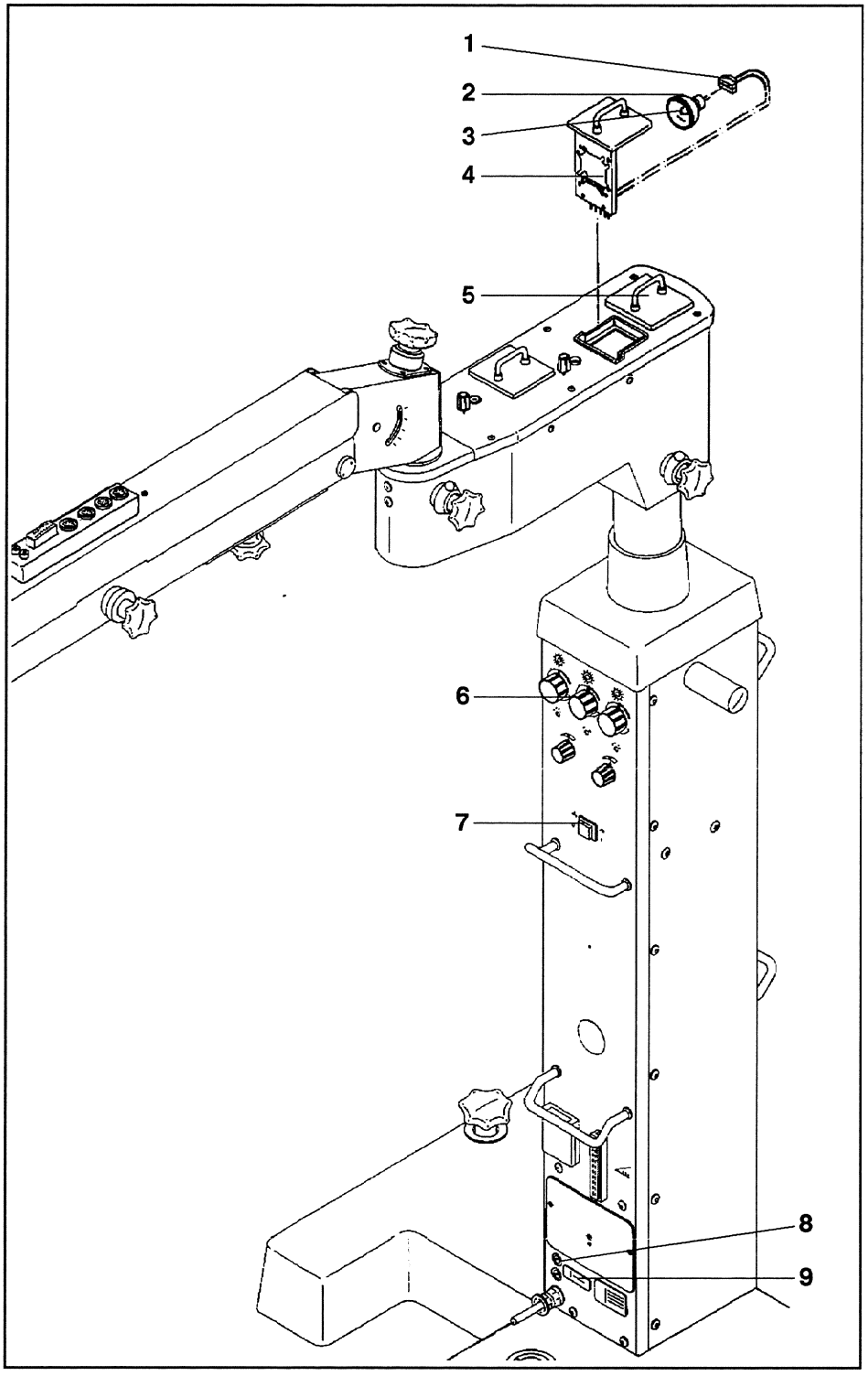
Note: Only use 12 V, 100 W halogen lamps with the catalog number given. Cat. No.: 38 00 79- 9040

Changing the fuses

To change the fuses, proceed as follows:

- Switch off the stand at power switch (7).
- Unplug the power plug from the wall socket.
- Unscrew caps (8) and remove defective fuse.
- Insert new fuse and screw caps (8) back in. Observe the fuse ratings given on label (9).
- Plug power plug into the wall socket and switch the stand back on at power switch (7).

21



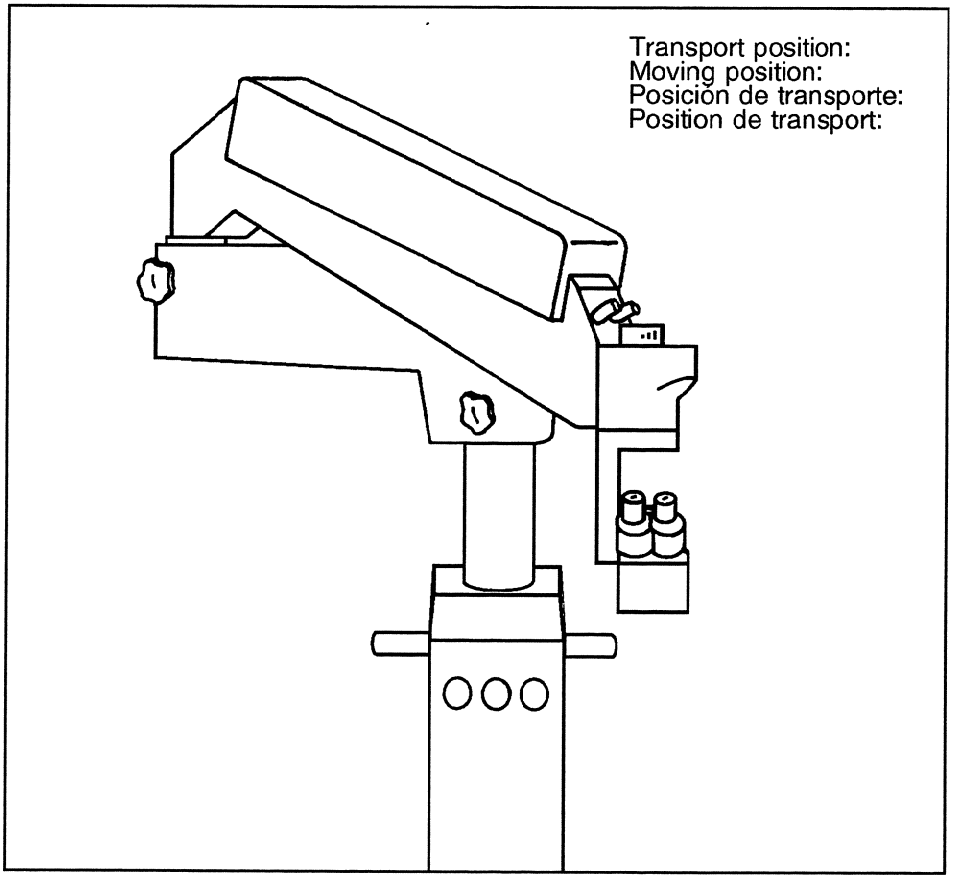
Relocating the stand

Observe the following points when relocating the stand:

- Switch off the illumination at knobs (3) and the stand at power switch (5).
- Unplug the power cord.
- In order to prevent the stand from toppling, position the suspension arm, the carrier arm and the microscope in such a way that their centers of gravity are as close to the stand column as possible. Clamp the arms in this position by tightening clamping screws (1).
- Wind the cable of the foot control panel onto two brackets (6) and hang up the foot control panel on the upper bracket.
- Wind the power cable onto two brackets (6).

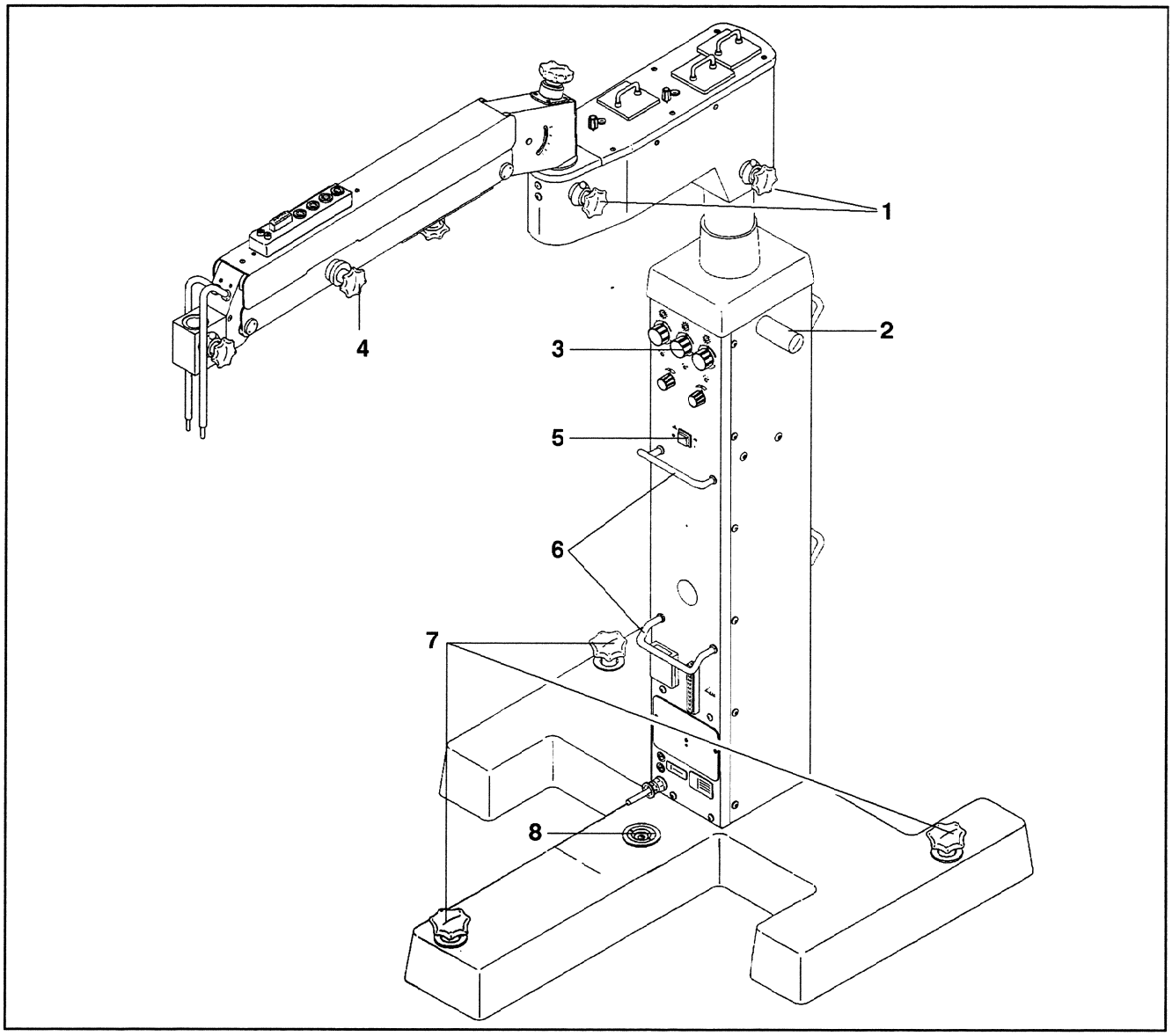
Turn three locking knobs (7) counterclockwise as far as they will go. You can now roll the stand.

22



- Use grips (2) to move the stand.
- Be careful of clearance height when passing through doorways.
- Avoid collisions of any kind.
- Do not go over steps or edges: the stand might topple.
- Be extremely careful when moving over slopes.
- Do not park the stand on slopes.
- At the new location, turn locking knobs (7) clockwise until the stand can no longer be rolled. Circular level (8) indicates whether the stand is level.

23



Magnifications / Fields of view

Using the magnification factor γ of the zoom system you can calculate the total magnification of the microscope. The following equation is used to determine the total magnification:

$$M_T = \frac{f_{Tube}}{f_{Obj}} \cdot \gamma \cdot M_{eye}$$

where

f_{Tube} the focal length of the binocular tube

f_{Obj} the focal length of the main objective lens

γ the magnification factor of the zoom system

M_{eye} the magnification of the eyepiece

Example:

f_{Tube} = 170 mm, f_{Obj} = 200 mm, γ = 1,6 and M_{eye} = 12.5 x.

The total magnification is thus:

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

If total magnification M_T of the surgical microscope is known, the field of view diameter (FoV_D), i.e. the circular area of the surgical field which can be seen through the microscope when used properly, can be calculated according to:

$$FoV_D = \frac{FoV_N \cdot M_{eye}}{M_T}$$

FoV_N in the above formula stands for field-of-view number, which is marked on our widefield eyepieces.

Inserting M_T = 17.0 in this formula, we obtain the following field-of-view diameter for 12.5 eyepieces with a field-of-view number of 18 mm:

$$FoV_D = \frac{18 \text{ mm} \cdot 12.5}{17.0} = \underline{\underline{13.2 \text{ mm}}}$$

Spare parts

		Cat. No.
1	Halogen lamp 12 V, 100 W	38 00 79- 9040
	S light guide, 2.5 m (not shown)	30 34 81- 9025
	Anti-fogging agent (not shown)	30 55 50- 9910

Accessories

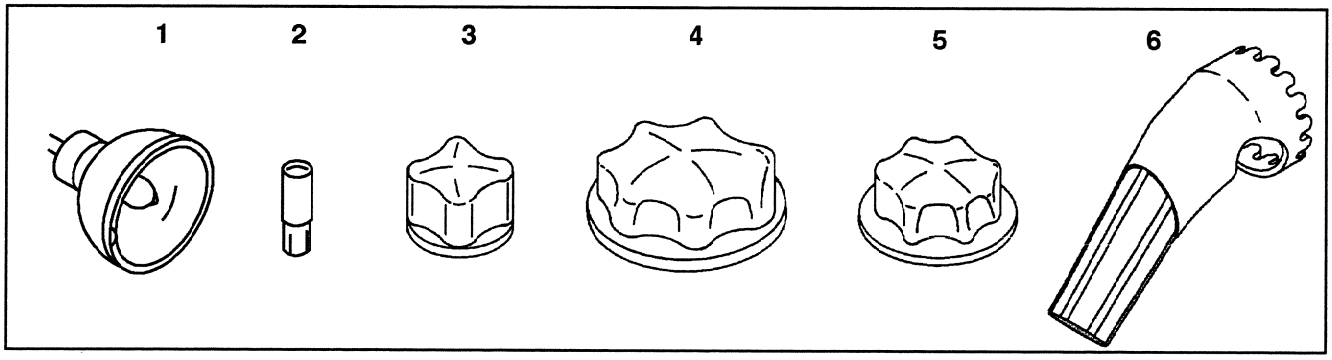
Please observe the following:
Only operate the instrument with accessories included in the delivery package. If you want to use other accessories, make sure that Carl Zeiss or the manufacturer of the accessories has proved and confirmed that these accessories meet the respective technical safety standards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

		Cat. No.
	Cross arm (not shown)	30 27 37- 0000

Asepsis

		Cat. No.
2	Sterilizable sleeve for light stop lever (17), page 21.	30 58 09- 0000
3	Sterilizable rubber cap for knobs (7) and (9), page 19. inner diameter 22 mm.	30 58 10- 0000
4	Sterilizable rubber cap for star knobs (4) and (5), page 28. inner diameter 50 mm.	30 58 03- 0000
5	Sterilizable rubber cap for knobs (6) and (8), page 19. inner diameter 27 mm.	30 58 07- 0000
6	Sterilizable grip, page 21	30 26 13- 9002

24



Ambient requirements

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

Technical data

OPMI® PRO magis Surgical Microscope

Power supply	electrical supply for surgical microscope from stand
Tube/eyepieces	f = 170 mm binocular inclined tube, widefield screw-type 12.5x/18B eyepieces with integrated eyecups, full illumination of field of view (dia. 55 mm) with this configuration
Objective lenses	f = 200 mm objective lens with 65 mm dia. mount, other objective lenses available: f = 200 mm to f = 400 mm
Magnification	zoom system with 1:6 zoom ratio, magnification factor γ = 0.4x - 2.4x, motorized and manual adjustment on microscope
Focusing	motorized, 18 mm focusing range, focus drive returns to starting position when a button is pressed
Illumination	coaxial fiber-optic illumination supplied via S light guide from 12 V 100 W halogen reflector lamp in stand, adjustable diameter of illuminated field, range: 55 mm to 11 mm "spot" (when using f = 200 mm objective), the smaller the illuminated field, the higher the luminance (approx. twice as high in spot illumination as in full-field illumination.)

Microscope rotation	locked using magnetic brake. Friction manually adjustable until rotation is locked. Range of rotation 310°.
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 when balance setting is adjusted for viewing direction ± 20°.
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 when balance setting is adjusted for viewing direction ± 20°.
Cat. No.	OPMI® PRO magis Surgical Microscope 30 26 10- 0000
Weight of microscope body	7.3 kg

S3 Floor Stand

Mechanical data

Suspension arm	length	825 mm
	angle of rotation	285°
	vertical range	722 mm
	weight compensation	3 - 18 kg
Carrier arm	length	400 mm
	angle of rotation	210°
Max. load allowed on suspension arm	18 kg (entire microscope equipment including accessories)	
Base	820 mm x 870 mm	
Stand height	1,685 mm	
Weight	158 kg	

Electrical data

Power connection	Connect the stand only to power outlets equipped with a properly installed protective earth connection.	
Rated voltage	100-110-120-125-230-240 V DC ± 10%	
Rated frequency	50...60 Hz	
Power consumption	600 VA (1,500 VA when the stand power outlet is also used)	
Fuse ratings	100-125 V: 230-240 V:	NORMAL BLO 12 A 250 V Cat. No. 0122.739 T 6,3 A 250 V Cat. No. 0127.029
Electrical outlets	- power outlet (outlet with earthing contact), 230 V, max. 900 VA - 12 V / 100 W, adjustable - XY coupling - surgical slit illuminator - surgical microscope	
Electrical standard	In accordance with IEC 601-1/EN 60 601-1/VDE 0750, Part 1,	
EMC requirements	comply with EN 60601-1-2: 1993 Class A (hospital use)	
	Class I, Type B equipment  , degree of protection IP X1	
Ambient requirements	Temperature Rel. humidity Air pressure	+ 10 °C ... + 40 °C 30 % ... 90 % 700 hPa...1060 hPa
Transportation and storage	Temperature Relative humidity Air pressure	– 40 °C... + 70 °C 10%...100% (no condensation) 500 hPa...1060 hPa
Fiber-optic illumination	12 V, 100 W halogen reflector lamps in quick-change lamp modules, with GG 475 and FG 6 filters, 1x backup lamp module Additional illumination modules can be connected.	

The unit meets the main requirements stipulated in Appendix I to the 93/42/EEC and 93/68/EEC Directives governing medical devices.

CE

Subject to change

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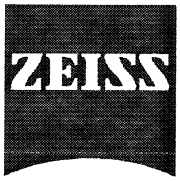

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