

Surgical microscope  
OPMI CS-NC  
on the NC2 Floor Stand

Instructions for use

G-30-1102-e

19/10/1992

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This instrument 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.

It is recommended in these regulations that the manufacturer explicitly informs the user about the safety aspects of operating the instrument. This chapter contains a summary of the most important precautions to be observed.

Further safety notes, which are framed, are also contained in other parts of this user's manual. 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

- This instrument was developed in accordance with the following regulations:
  - VDE
  - IEC
  - UL
  - CSAManufacturing, inspection, installation and service are done in accordance with German and international regulations (Good Manufacturing Practice).
- The instrument must be connected to an emergency backup line supply in accordance with the regulations or guidelines which apply in your country for the specific application.

- This is a class 3 medical instrument as defined by the German medical instrument regulations MedGV.
- Please observe all applicable accident prevention regulations.

## Notes on installation and usage

### General

- 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, benzoin 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.
- Modifications and repairs on this instrument and on instruments used with the OPMI CS-NC surgical microscope and the NC2 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.
- Only use this instrument with the accessories obtained from Carl Zeiss. Only use other accessory equipment when Carl Zeiss or the manufacturer of the accessory equipment has certified that its usage will not impair the safety of the system.
- Only personnel who have undergone training and instruction are allowed to use this instrument.

- It is the duty of the operator to train and instruct all staff using the equipment.
- Keep the user's manuals where they are easily accessible at all times.
- Never look at the sun through the binocular tube, the objective, or an eyepiece.
- Do not pull at the light guide cable, at the power cord or at other cable connections.

### 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.

### Requirements for operation of the instrument

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.
- The voltage at the voltage selector on the instrument corresponds with the available line voltage.
- The instrument is plugged into a power outlet which has a properly connected ground connection.
- The power cord being used is the one designed for use with this instrument.
- All cables and plugs are in good working condition.

### Important each time before turning on instrument

- Make sure all operation requirements listed above are fulfilled.
- Go through the checklist on page 27.
- 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 figures 1 and 2). If any label is missing on your instrument, please contact us or our authorized representative. We will supply the missing labels.
- Do not cover any ventilation grids or slits.
- Make sure the power cable and the connector for the foot control panel are properly plugged in.

### Important when using the instrument

- Because of the high luminance of the xenon lamp and its light spectrum, which is similar to natural daylight, do not use the lamp in ophthalmic applications.
- Avoid looking directly into the light source, e.g. into the microscope objective or into a fiber light guide.

### Important when you are finished using the 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.

## Re-equipping the microscope

- When changing the accessories of the microscope, the microscope may shoot up unexpectedly because it is no longer balanced. This may be dangerous. Please observe the caution note on page 23.
- After re-equipping the microscope and after changing the orientation of the microscope, the stand must be re-balanced. Please observe the caution note on page 23.

## Warning labels and notes


(figures 1 and 2)

### Caution:

Observe all warning labels and notes!

Figure 1 shows the warning labels and notes. Figure 2 shows their positions on the instrument. If any label is missing on your instrument, please contact us or our authorized representative. We will supply the missing labels.

1

**Position 1** 

See the caution note on page 45

**Position 2**

- CAUTION-

Keep air vents free.  
Do not cover with drape.

- ATTENTION-

Ne pas empêcher la ventilation. Ne pas recouvrir de tissus.

- ACHTUNG-

Lüftungsöffnungen nicht verdecken.  
Nicht unter steriler Abdeckung benutzen.

**Position 4**

ACHTUNG - CAUTION -  
NOTA BENE - CUIDADO


Beim Wechsel von Mikroskopzubehör ändert sich der Balancezustand!  
Gebrauchsanweisung beachten.

The equipment is no longer balanced during and after any change to the microscope accessories.  
See instruction manual.

Vu que le changement des accessoires du microscope modifie l'équilibre de l'équipement, se conformer aux instructions d'emploi pour le rectifier en conséquence.

Al cambiar los accesorios del microscopio, el instrumento queda desequilibrado!  
Consultar los instrucciones de manejo.

See the caution note on pages 19 and 23


**Position 3** 

See the caution note on page 40


**Position 5**

**Max. Load 14 kg**

Weight of microscope with equipment must not exceed 14 kg on this stand!

**Position 7** 

See the caution note on page 23

**Position 6** 


**Caution!**

- Check all detachable connections for tightness prior to each surgical use!
- Only use the instrument when it is balanced and when the floor locks are pressed down or the stand automatically leveled.
- Park the instrument only on level surfaces.

**Position 8**

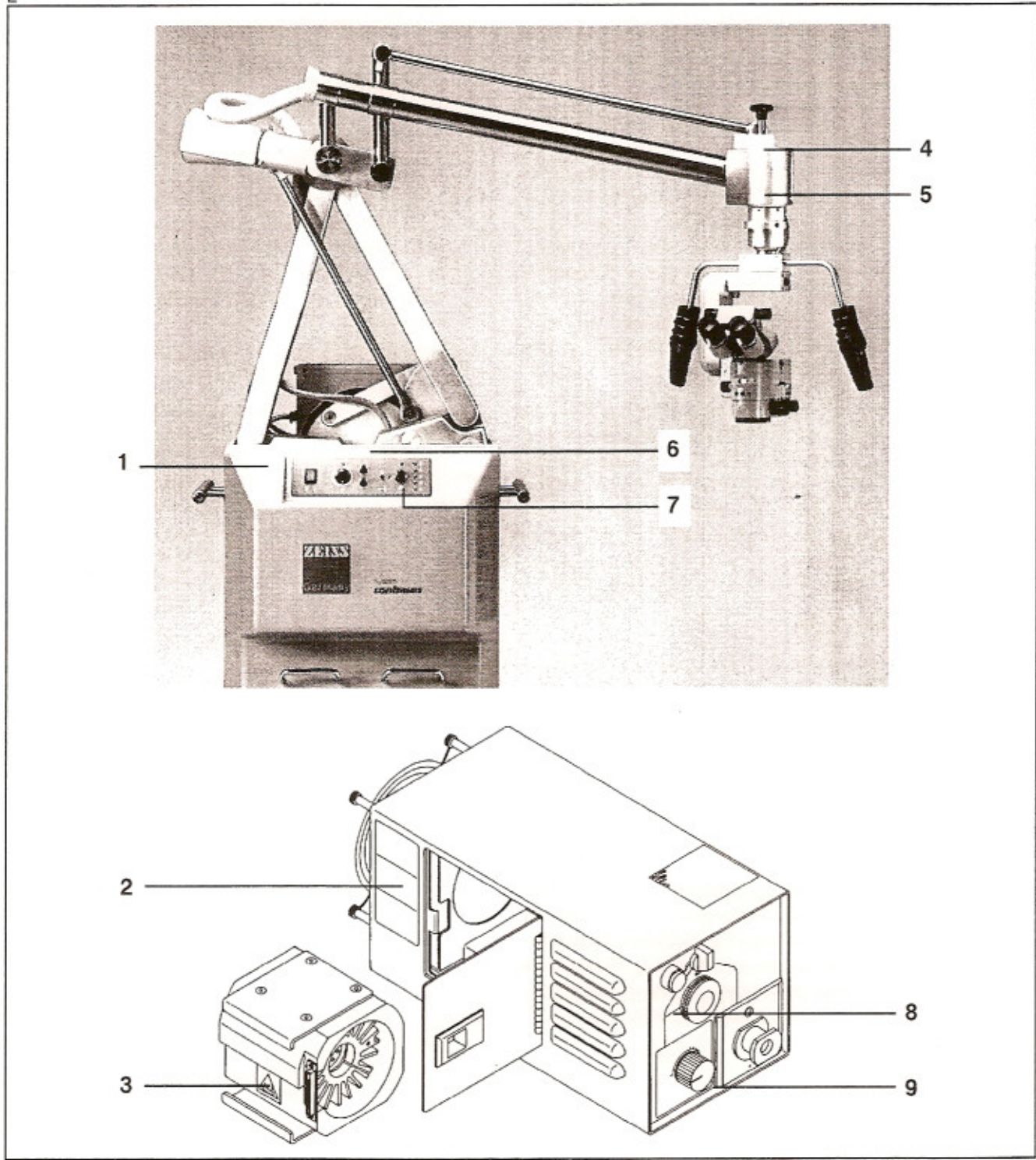
~~Ophthalmology~~

Because of the high luminance of the xenon lamp and its light spectrum, which is similar to natural daylight, do not use the lamp in ophthalmic applications.

**Position 9** 

For details see section "Xenon lamp", page 33.

2



## General

The OPMI CS-NC surgical microscope and the NC2 Floor Stand form an optimum instrument combination which is specially adapted to the requirements of neurosurgery.

The innovative design of the OPMI CS-NC opens up new possibilities for the surgeon. Various microscope components can be attached to the interface on the underside of the microscope body. The component of interest here is the Varioskop, which allows adjustment of the working distance between 200 mm and 400 mm before and during a surgical procedure. The microscope need not be set to a fixed working distance, but can be positioned to ensure maximum convenience for the surgeon.

The Variospot is another component, whose illuminated field can be adjusted from the size of the field of view to a spot of 11 mm diameter (at objective focal length  $f = 200$  mm). The Combilux is a component providing automatic brightness adjustment when the magnification is changed. Separate manuals are available for the individual microscope components.

Further features of the microscope are:

Motorized focusing and zoom action; convertible from a microscope for one surgeon to a microscope for two surgeons sitting face to face; attaching of stereo coobservation tube, 35 mm camera and video camera.

The system for adjusting the tilt angle between the microscope and the microscope carrier arm is motorized.

The NC2 Floor Stand is equipped with solenoid brakes which prevent inadvertent changes to the position of the microscope. The brakes can be disengaged by pressing the respective buttons, thus enabling weightless positioning of the microscope. The balancing system is semiautomatic.

The xenon lamp of the Superlux 300 high-intensity light source provides a color temperature equivalent to that of daylight. The high light intensity can be reduced as required or briefly increased when the camera is triggered for documentation purposes. The lamp housing incorporates a 100 W halogen lamp as a back-up illumination system. The light is supplied to the microscope via a light guide.

This instrument configuration has been designed for neurosurgery and is also suitable for other fields of microsurgery, with the exception of ophthalmology.

The automatic leveling system is offered as an optional function for the NC2 Floor Stand. The automatic leveling system is used to level the NC2 Floor Stand when it is standing on an unlevel surface. It can compensate for gradients of up to  $1^\circ$  with an accuracy of  $\pm 2'$  (arc minute).

The automatic leveling system is necessary when the NC2 Floor Stand is used on an unlevel floor and the microscope must be positioned using a mouth switch.

The OPMI CS-NC and the NC2 Floor Stand can function as a laser delivery microscope system when used together with the following:

- laser instrument
- micromanipulator MM 6 with automatic focal length adaption
- microscope component Varioskop

The working distance in this system can be varied between 200 and 400 mm without changing the objective.

An interlock connection locks all the motorized functions of the microscope during lasing.



This user's manual describes the following equipment:

- OPMI CS-NC surgical microscope
- Varioskop
- 180° inclinable binocular tube,  $f = 170$  mm
- 10 x 22 B wide field eyepieces (2 pcs)
- NC2 Floor Stand
- automatic leveling system (optional)
- Superlux 300 with power supply unit, lamp housing and one lamp module
- back-up lamp module for Superlux 300
- 12 V, 100 W halogen bulb
- S light guide, 3,6 m
- 8-function foot control panel

The following functions can be controlled over an foot control panel or an operating chair.

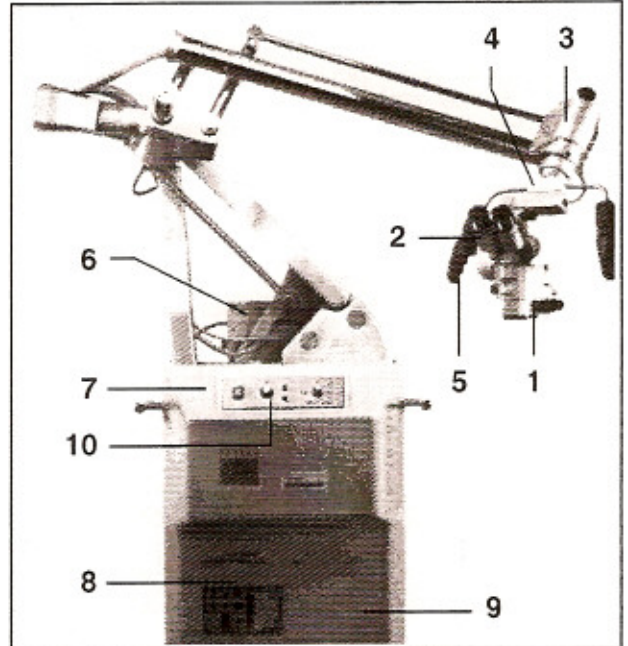
- zoom
- focus
- triggering of cameras.

This user's manual describes use of the system with the foot control panel.

The following components are described in detail on page 10 ff.

- 1 OPMI CS-NC surgical microscope
- 2 binocular tube and eyepieces
- 3 microscope suspension head
- 4 connections
- 5 grips
- 6 Superlux 300 high-intensity light source
- 7 automatic leveling system (not shown)
- 8 socket for power cord
- 9 stand housing
- 10 control panel
- 11 8-function foot control unit (not shown)

3



## Safety systems

### Halogen illumination

If there is a malfunction of the xenon light source, you can switch over to the halogen illumination. Exchanging the lamps is described on page 40 ff.

### Interlock switch for laser instruments

The interlock switch in our laser instruments will block all motorized functions of the surgical microscope when the laser beam is being released. These functions then cannot be activated by accident.

### Housing door for the xenon lamp

When the door of the housing is open, the xenon lamp cannot be ignited.

If the xenon lamp is on when the door is opened, it will be atomically shut off. The xenon lamp cannot be re-ignited until the housing door is closed again.

## 1 OPMI CS-NC surgical microscope (figure 4)

### 1.1 Indication arrows

These arrows mark the focusing range and the position of the microscope within this range. From the initial position, the microscope can be moved 30% up and 70% down on the microscope carrier arm.

### 1.2 Clamping screw

When attaching the binocular tube or a different module, tighten this screw firmly using an allen key as far as it will go.

### 1.3 Window for magnification scale $\gamma$ of the zoom system

The entire magnification and the fields of view of the surgical microscope can be calculated as shown on page 46.

### 1.4 Protective earth screw for additional grounding of the surgical microscope

### 1.5 light guide clips

Secure the light guide by pressing it into these clips.

### 1.6 Knob for manual zooming

This knob is used to manually adjust the magnification.

### 1.7 Switch

The tilt angle of the OPMI can be adapted to meet the needs of the surgeon. The motorized tilting system is activated using this switch. Selector (7.7), see figure 10, must be in position 1 to do this.

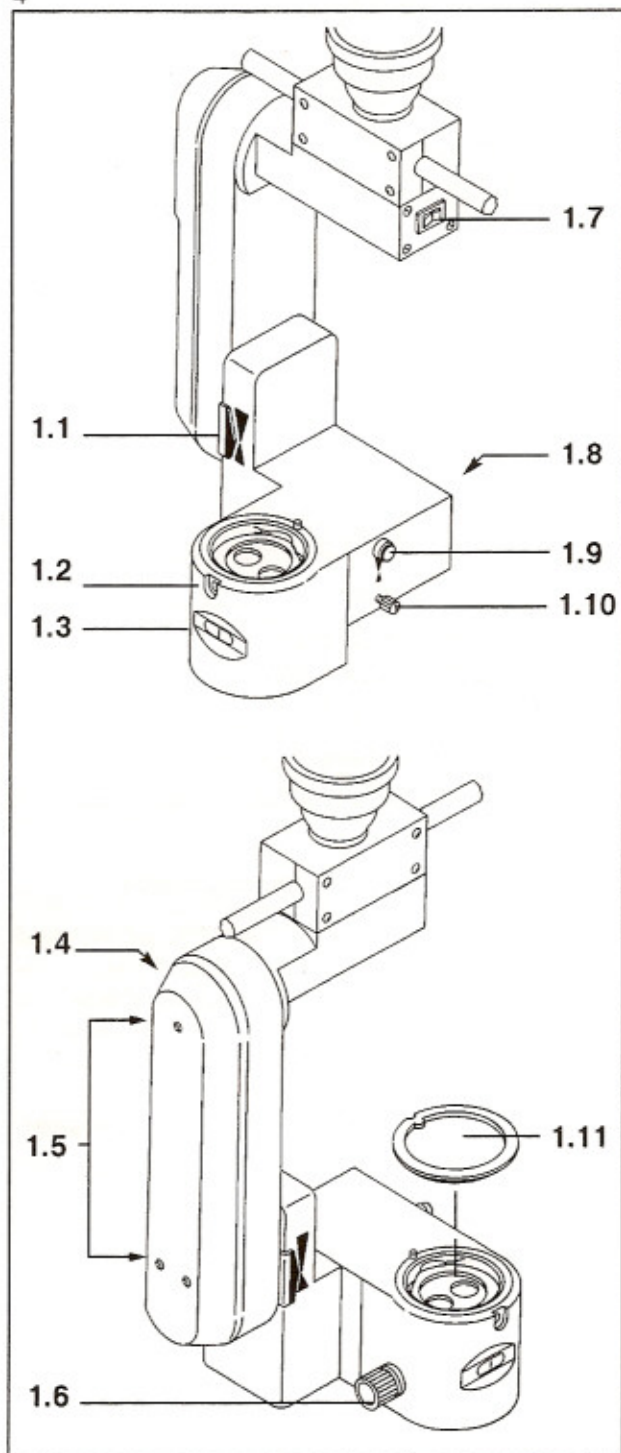
### 1.8 Receiving dovetail

A microscope component can be mounted here.

### 1.9 Button

Press this button to set the initial position within the focusing range. See position 1.1. If a Varioskop is used, this button is inoperative.

4



**1.10 Securing screw**

For securing a microscope component. After mounting the component, this screw must be tightened firmly as far as it will go.

**1.11 Dust cap**

Remove this dust cap when attaching the binocular tube or another component.

**2 Binocular tube and eyepieces**

(figure 5)

**2.1 PD adjustment knob**

Adjust the interpupillary distance with this knob. When adjusted correctly, the image is visible as one image through both eyepieces.

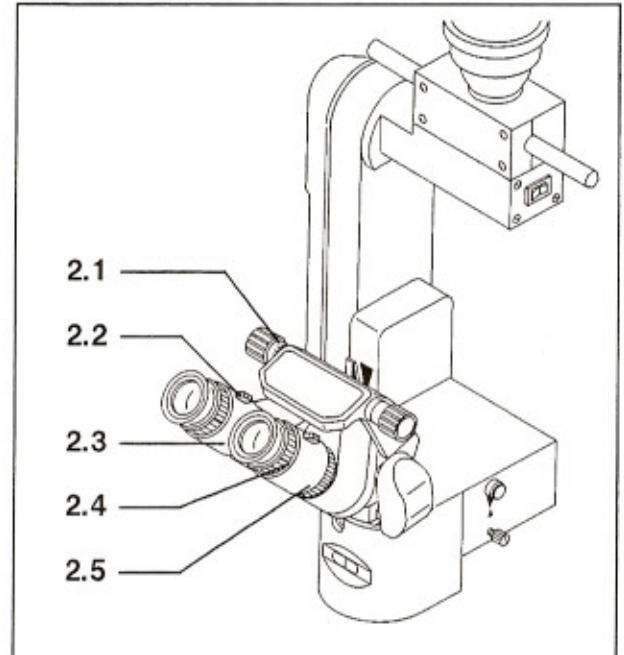
**2.2 Catch lever for diopter adjustment**

The eyepieces are equipped with ametropia compensation. The upper part of the eyepieces can be turned in + or - direction while pressing in the catch lever. The diopter setting cannot be accidentally changed after the catch lever has clicked in.

**2.3 Eyecups**

The eyecups can be adjusted so that the full field of view can be seen.

5

**2.4 Diopter scale**

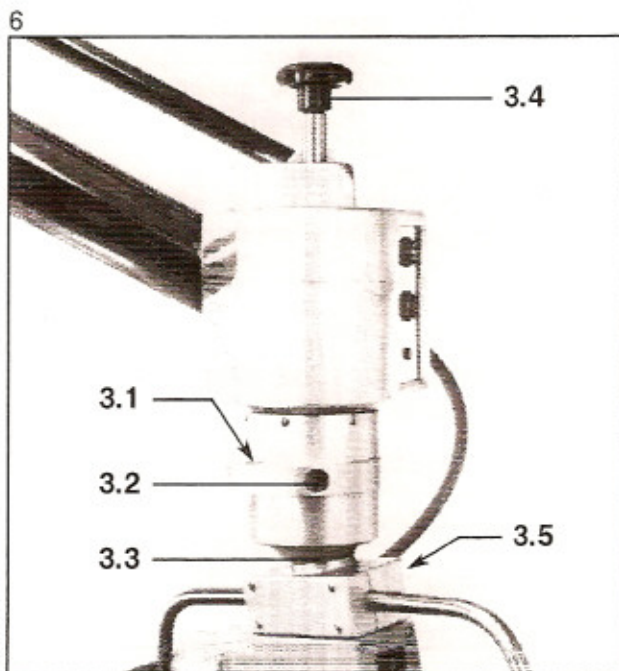
The refractive powers can be read off on the diopter scales. The range of the diopter adjustment is  $-8$  to  $+8$  D.

**2.5 Retaining ring**

When mounting the eyepieces on the binocular tube, tighten these rings firmly.

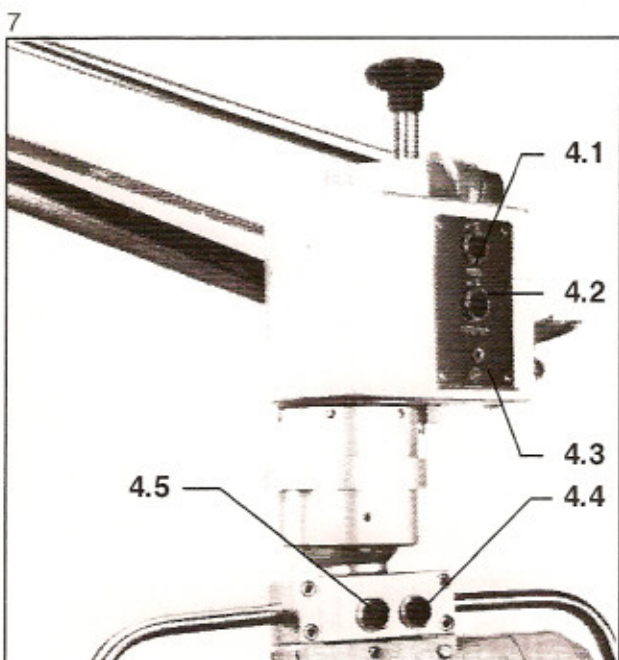
### 3 Microscope suspension head (figure 6)

- 3.1 Level for leveling the monoball
- 3.2 Clamping screw for loosening and locking the monoball (allen screw)
- 3.3 Monoball
- 3.4 Star knob for manually balancing the tilt motion
- 3.5 Screws for fastening grips.  
The positions of the grips can be adapted to the needs of the surgeon. To do this, loosen one of the screws, adjust the grip and then re-tighten the screw.



### 4 Connectors (figure 7)

- 4.1 Connector (3 pin) for the control cable of auxiliary equipment  
Auxiliary equipment such as a video system can be activated by pressing button (5.1).
- 4.2 Connector (8 pin) for the control cable of the 35 mm camera  
The camera is triggered using button (5.2), the foot control panel or a foot switch.
- 4.3 Protective earth socket.  
This socket allows low-resistance connection of the surgical microscope to the protective earth conductor.
- 4.4 Connector for microscope control cable.  
This connector is not needed when using the OPMI CS Surgical microscope. The connector is only required for configurations including a different type of surgical microscope.
- 4.5 Connector for mouth switch.  
When the mouth switch is activated, the movement of the stand in the X,Y,Z directions is unlocked.



## 5 Grips (figure 8)

### 5.1 Button

This button is used to activate auxiliary equipment such as a video system.

### 5.2 Button

This button is used to trigger a 35 mm camera.

### 5.3 Focus up button

With Varioskop:  
focus moves from 200 to 400 mm  
Without Varioskop:  
focus of OPMI moves up.

### 5.4 Focus down button

With Varioskop:  
focus moves from 400 to 200 mm  
Without Varioskop:  
focus of OPMI moves down.

### 5.5 Button for magnification "up" $\gamma$ 0.4 $\rightarrow$ 2.4

### 5.6 Button for magnification "down" $\gamma$ 2.4 $\rightarrow$ 0.4

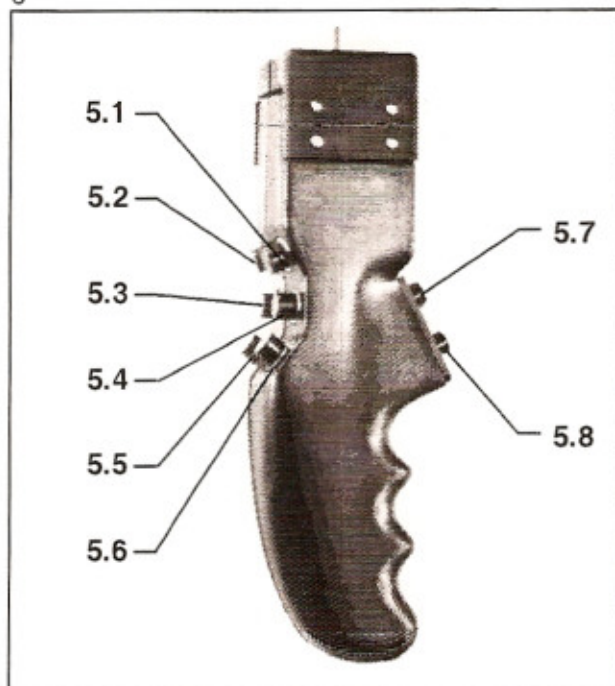
### 5.7 Button for microscope positioning

Unlocks 3 degrees of freedom. The same functions can be performed using the mouth switch.

### 5.8 Button for microscope positioning

Unlocks 6 degrees of freedom.

8



## 6 Superlux 300 high-intensity light source (figure 9)

### 6.1 Ignition readiness indicator

This indicator is lit when the xenon lamp is ready for ignition.

### 6.2 Lamp selector knob

Select the xenon lamp by switching the selector to the "XENON" position. The ready lamp (6.1) must light before you can ignite the xenon lamp.

The xenon lamp is ignited by turning the selector (6.2) to the lightning symbol and holding it for up to ten seconds. Repeat this step if the lamp does not ignite.

As soon as the xenon lamp ignites, let go of selector (6.2).

When this selector is in position "HALOGEN", the 12 V / 100 W halogen illumination is selected. This illumination is used in the event of a failure of the xenon lamp or when the specific application requires it. To do this, plug the light guide into socket (6.11) in the halogen module (6.10).

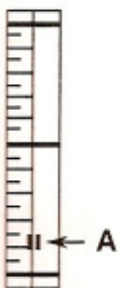
The on/off switch for the halogen illumination is located on the stand.

### 6.3 Light guide socket for xenon lamp

### 6.4 Safety notes (see page 6)

### 6.5 Service-hour counter

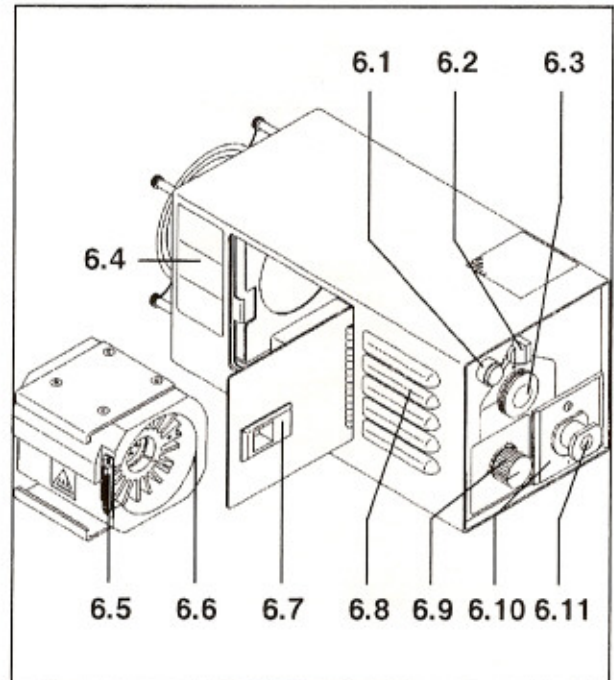
+ 500 HR



The hour counter for the operation of the xenon lamp can be read at marking A. The entire scale represents 500 hours of operation. The scale does not register more than 500 hours, although the service life of the lamp may be longer. The example shown here corresponds to approx. 65 hours.

0 HR

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### 6.6 Xenon lamp slide-in module

Exchanging the xenon lamp module is described on page 40.

### 6.7 Door

If this door is open, the xenon lamp cannot be ignited. If the xenon lamp is in operation and the door is opened, the xenon lamp will be automatically switched off for safety reasons. Re-ignite the lamp after closing the door.

### 6.8 Ventilation slots

### 6.9 Brightness control for xenon lamp

Intensity adjustment in %.

### 6.10 Lamp module for halogen illumination

See page 34 for exchanging the 12 V 100 W halogen lamp.

### 6.11 Light guide socket for halogen lamp

Changing of the halogen lamp module is described on page 41.

## 7 Control panel (figure 10)

### 7.1 Main power switch

This is the on/off power switch. When switched on, the green lamp lights.

### 7.2 On/off knob and brightness control of the 12 V 100 W halogen illumination in the Superlux 300 light source

Before the halogen illumination can be used, selector (6.2) must be set to HALOGEN. For details, see page 34.

The indicator LED above the switch lights when the microscope illumination is switched on.

### 7.3 ZOOM speed adjustment

For setting the zoom speed of the OPMI CS-NC.

**Note:** zooming itself is activated using the buttons on the grips or using the foot control panel.

### 7.4 FOCUS speed adjustment

For setting the speed of motorized focusing.

**Note:** Focusing itself is activated using the buttons on the grips or using the foot control panel

### 7.5 Toggle switch for balancing the stand

This switch is only operative if mode selector (7.7) is either in position 2 or 5.

Position 2: Balancing of vertical motion.

Position 5: Balancing of tilt motion.

When the LED beside the switch lights, then the toggle switch is active.

### 7.6 Indicator LED

When the LED lights, then the stand is ready for operation (mode selector (7.7) in position 6).

### 7.7 Operating mode selector

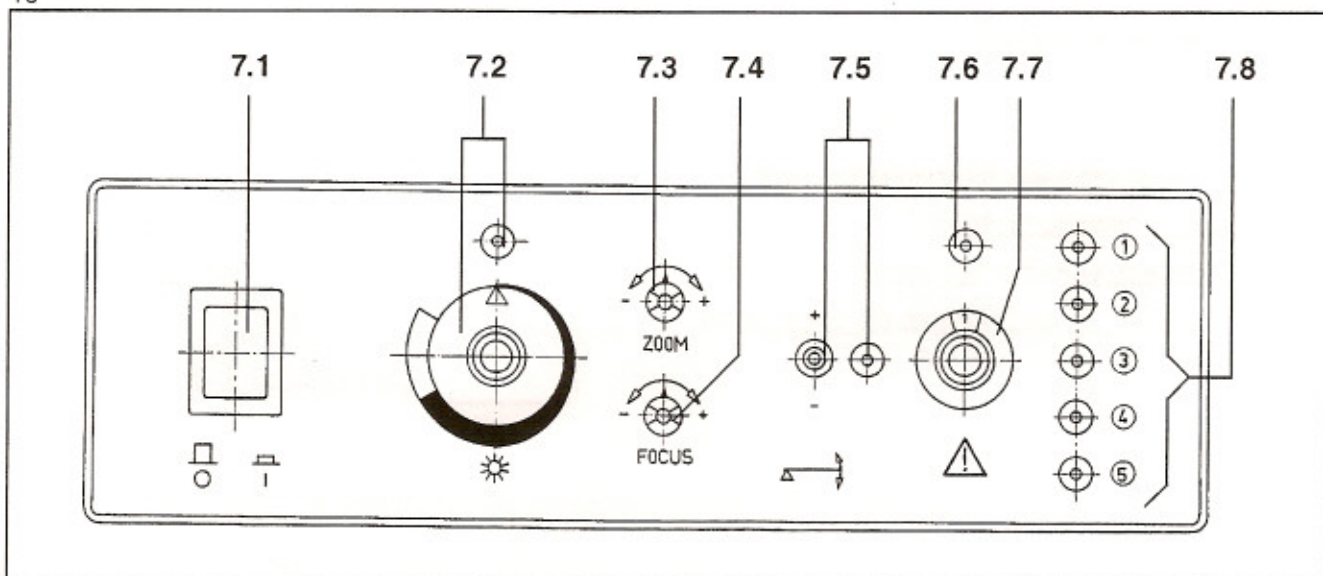
This selector is used to select the operation modes of the NC2 Floor Stand, e.g. "balancing" or "operation".

For details, see "Balancing the Stand", page 23.

### 7.8 LEDs

Depending on the position of mode selector (7.7), the corresponding LED will light.

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## 8 Power connection panel (figure 11)

### 8.1 Line fuses

Unscrew the covers to exchange the fuses. The fuse ratings depend on the voltage of the line supply. The correct fuse ratings are given on plate (8.2). Exchanging the fuses is described on page 42.

### 8.2 Fuse rating plate

### 8.3 Instrument label plate

This plate gives information on the line voltages for which the stand can be set.

### 8.4 Power inlet socket

### 8.5 Voltage indicator disk

### 8.6 "CAMERA START" socket

A footswitch for triggering the camera can be connected to this socket.

### 8.7 "LASER" socket

When our laser instruments are used, it is possible to connect an interlock system. For details, see "Laser instruments", page 22.

### 8.8 Connector

A foot control panel or an operating chair can be connected here for control of the microscope functions.

## 9 Stand housing (figure 12)

### 9.1 Additional weight

### 9.2 Grips

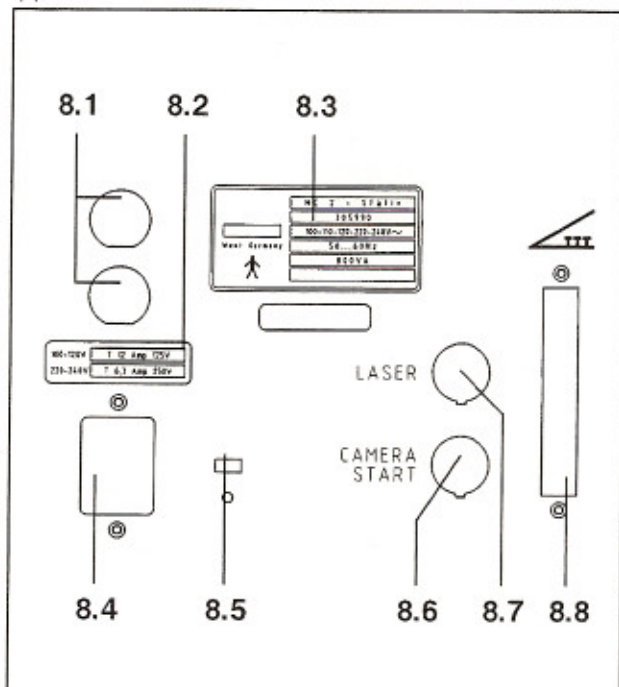
Please use these for moving the stand.

### 9.3 Brief instructions for use

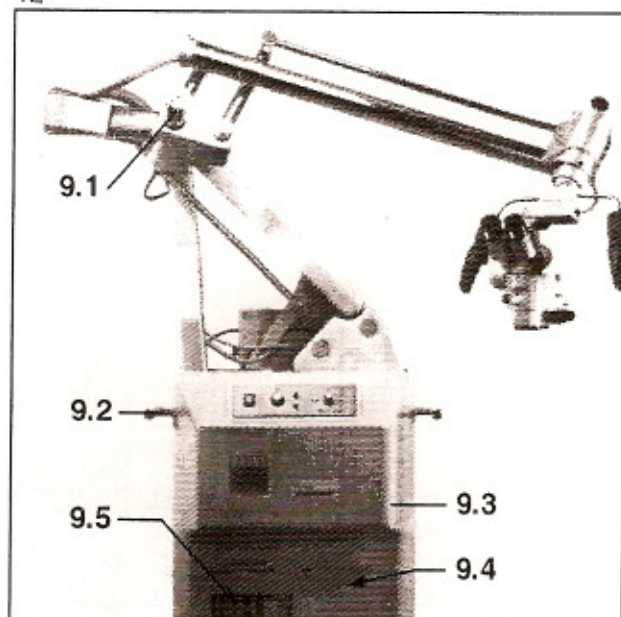
### 9.4 Bracket for foot control panel

### 9.5 Bracket (2x) for coiling up the power cable

11



12

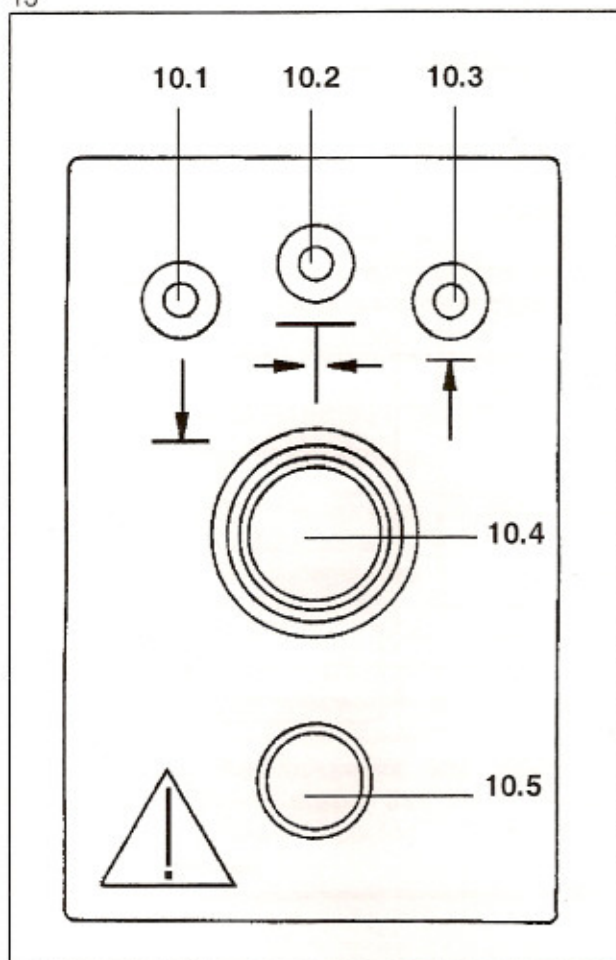




## 10 Automatic leveling system (optional) (figure 13)

- 10.1** "Cleaning position" LED (red/green)  
This LED lights in accordance with selector (10.4).
- 10.2** "Automatic leveling" LED (red/green)  
This LED lights in accordance with selector (10.4).

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- 10.3** "Moving position" LED (red/green)  
This LED lights in accordance with selector (10.4).
- 10.4** Selection knob (three positions)  
Three LEDs light in accordance with the position selected:
- 10.1 "Cleaning position"
- 10.2 "Automatic leveling"
- 10.3 "Moving position"

### "Cleaning position"

When you turn selector (10.4) to "cleaning position" and press the start button (10.5), the base feet will automatically move out as far as they will go. LED (10.1) lights red until the feet are out all the way and then changes to green.

### "Automatic balancing"

When you turn selector (10.4) to "automatic balancing" and press the start button (10.5), the stand will be automatically balanced. LED (10.2) lights red until the balancing is finished and then changes to green.

### "Moving position"

When you turn selector (10.4) to "moving position" and press the start button (10.5), the base feet will automatically retract upwards so that the stand can be moved. LED (10.3) lights red until the feet are in all the way and then changes to green.

## 10.5 Start button

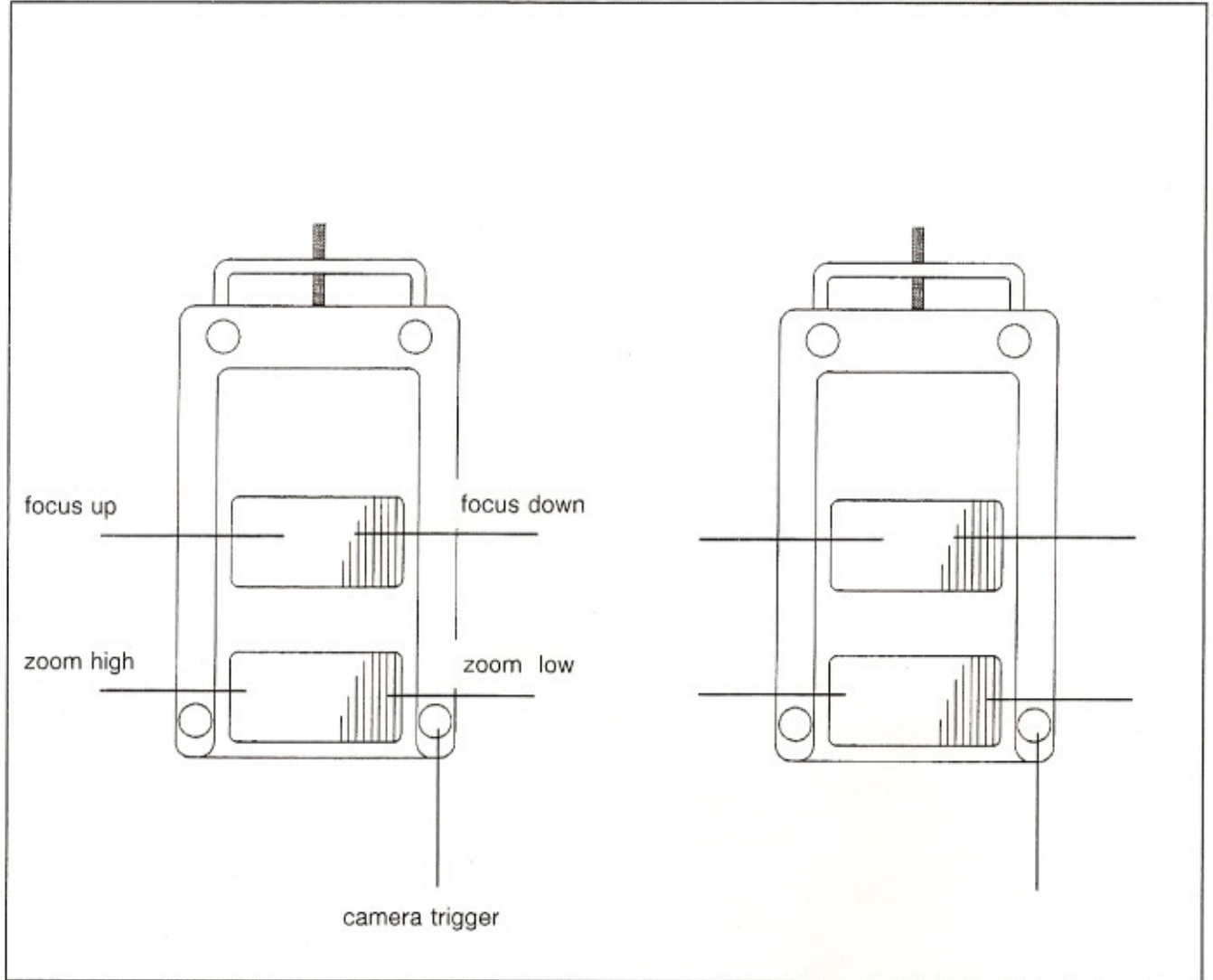
## 11 8-function foot control panel

(figure 14)

In the left of figure 14 the standard function assignment of the foot control panel is shown. Our service representative can rewire the foot control panel as desired.

If the standard function assignment has been changed, then enter the changes on the right side of figure 14.

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**Caution:**

When changing the microscope equipment, the stand is no longer balanced and the microscope suspension system might suddenly move out of its position! Always re-balance the stand after changing the microscope equipment.

### Attaching the binocular tube and eyepieces

(figure 15)

**Caution:**

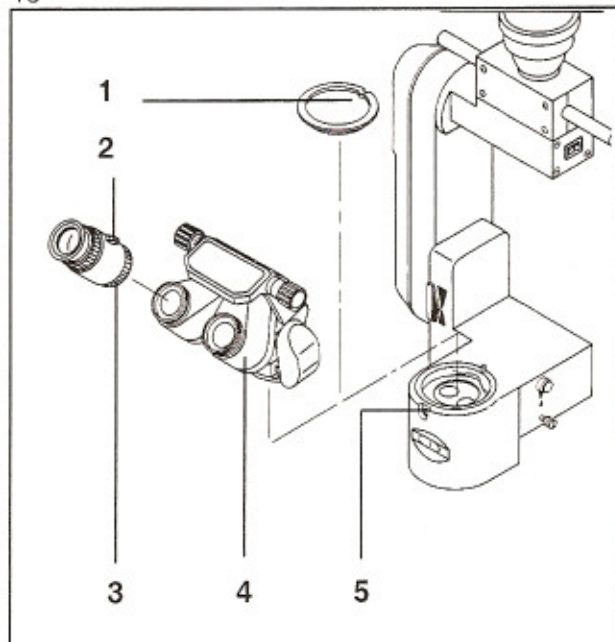
The weight of the microscope, including all accessory equipment, must not exceed maximum 14 kg when used on this suspension system.

- Loosen securing screw (5) a few turns.
- Remove cover (1) and store it.
- Place binocular tube (4) onto the surgical microscope and tighten securing screw (5) firmly.  
Note: Other components may be installed between the microscope and the tube. These components are secured in the same manner using securing screw (5).

**Caution:**

Before using the instrument and after re-equipping it, always ensure that the binocular tube (4) is properly mounted and securing screw (5) tightened.

15



- Place the screw-type eyepieces (2) onto the eyepiece mounts and tighten the knurled rings firmly.  
Note: A reticle can be installed into one of the eyepieces as a focusing aid. Installing a reticle can only be done in factory or by our service representative.

**Caution:**

Before using the instrument and after re-equipping it, always ensure that knurled rings (3) are firmly tightened!

**Caution:**

When changing the microscope equipment, the stand is no longer balanced and the microscope suspension system might suddenly move out of its position! Always re-balance the stand after changing the microscope equipment.

### Mounting the microscope component (figure 16)

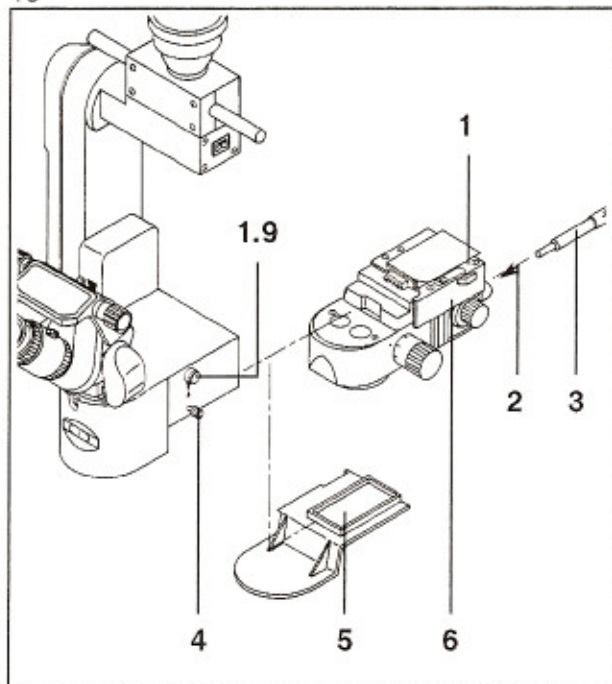
**Note:** Bring the focusing system into the initial position within the focusing range using (1.9) before mounting the Varioskop component. Mode selector (7.7), see figure 10, must be in position 1. The motorized focusing system of the microscope is inoperative when the Varioskop is mounted.

- Loosen securing screw (4) a few turns.
- Pull dust cover (5) off to the back and store it.
- Insert component (6) in the receiving dovetail of the surgical microscope and push in as far as it will go. Lock (1) must audibly click twice when the lock on the component engages.  
**Note:** Do not use too much force when inserting the component.
- Re-tighten securing screw (4) firmly. The lock (1) of the component and the securing screw (4) now protect the component from inadvertent removal.

**Caution:**

Tighten securing screw (4) firmly before every use. At the same time, check whether the component is firmly seated in the dovetail!

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- Press the light guide into the light guide clip on the microscope and insert light guide into the socket (2) of the component. The light guide must have enough slack so that it will not be pulled when the microscope is being tilted and turned.
- To change the component, loosen screw (4) by a few turns, press lock (1) of the component and pull it out. The component should always be stored in a dust-proof location when not in use.

**Note:**

The various microscope components, although they differ in design, are always mounted on the surgical microscope in the same manner.

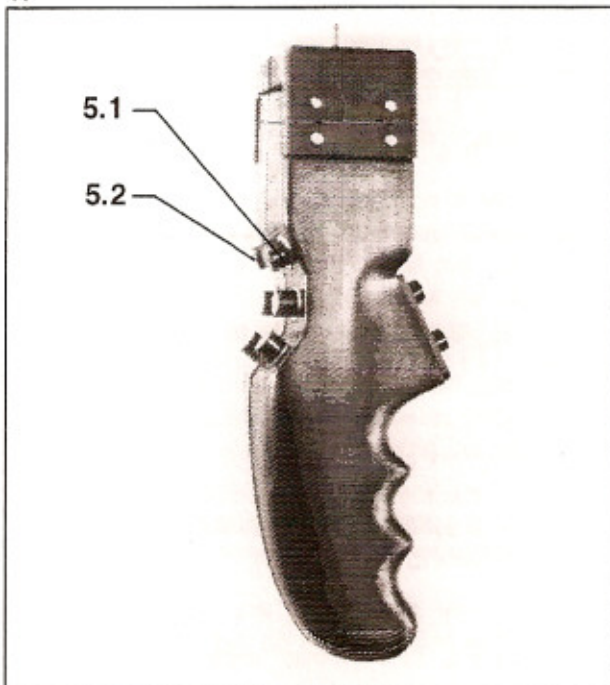
## Photographic and video equipment

(figures 17 and 18)

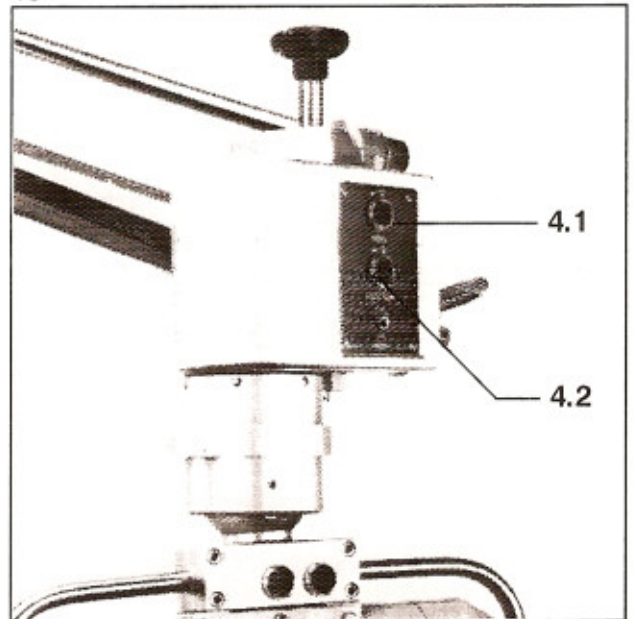
- A 35 mm camera can be released using button (5.2) on the grips, a foot control panel or a foot switch.  
For this function, a control cable is required which must be connected to socket (4.2).  
Button (5.1) on the grips is used to control a video system. A control cable connected to socket (4.1) is required for this.

- The video cable leading to the monitor or any other module must be guided through the tube through which the light guide has been laid. When installing the cable, make sure that no pressure is applied to the stand.  
Note: The connection of the video system must be performed by a video technician. See also "Technical Data".

17



18



## Laser instruments (figure 19)

- When our laser instruments are used, it is possible to connect an interlock system to socket (8.7). For this, a cable (cat. no. 30 69 53-9010) linking the stand to the laser is required.

**Note:** The connecting cable linking the stand to the laser has been designed as a safety device to ensure that all motorized functions of the surgical microscope are inoperative when the foot switch is pressed to actuate the laser. this prevents inadvertent triggering of these functions.

## Electrical connections

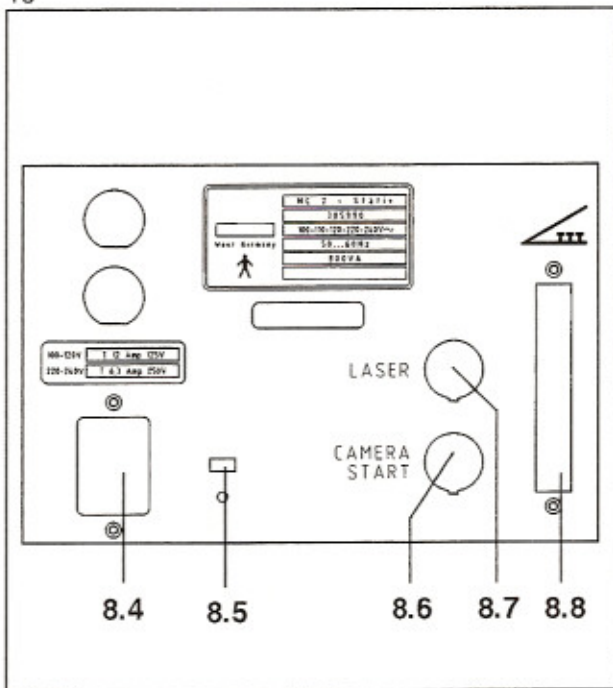
(figures 19 and 20 )

### Caution:

Selector (7.7) must be in position 1 before the system is switched on. If not, the microscope suspension head may suddenly move out of position, which could cause injuries!

- Check the voltage indicated at (8.5)  
**Note:** The stand is adjusted in the factory to the voltage of the destination country. However, you should always check this by reading off the voltage shown on disk (8.5). If they do not correspond, our service personnel must convert the stand accordingly.

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- Plug in the power cord to inlet socket (8.4).
- Plug the power cord into a power outlet. The outlet must be equipped with a properly connected ground connection.
- Connect the foot control panel to connector (8.8) or the foot switch for triggering the camera to socket (8.6).

**Note:** Only plug in or unplug these connectors when the power switch on the stand is turned off.

### Balancing the stand (figures 20 and 21)

**Note:** When the stand is equipped with the automatic leveling system, you must level the stand before balancing can be done. For more information, see page 30.

#### Caution:

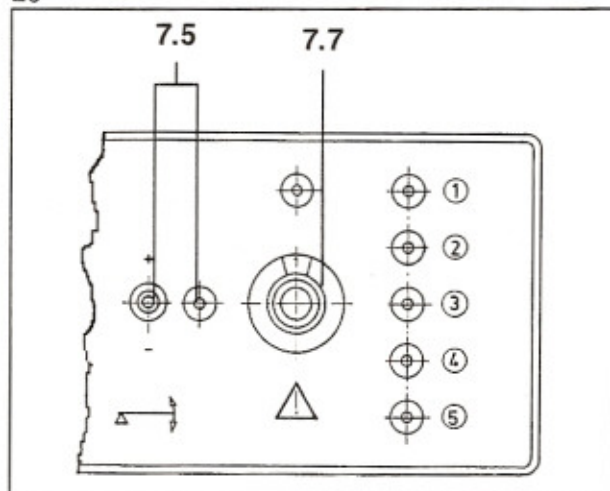
Correct balancing of the stand is essential if the almost effortless positioning of the microscope is to be assured. The stand must be rebalanced after every change to the microscope equipment or to the orientation of the microscope. When reequipping the microscope, lack of balance might cause the carrier arm to move upwards in an uncontrolled manner, which may be dangerous. To prevent this, proceed as follows:

- Set selector (7.7) to position 1 and switch on main power switch.
- Set selector (7.7) to position 2 and press toggle switch (7.5) downwards (–) for about 15 s. It is vital that you hold the equipment while doing this using either of the two grips and move it to its lowest position.
- Reset selector (7.7) to position 1 to lock the brakes.
- Change equipment on the two interfaces separately, e.g. change the component on the bottom interface first and then the accessories on the top interface.

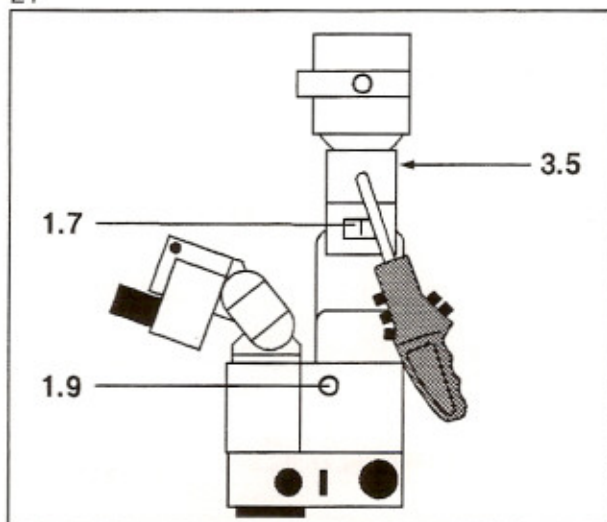
### Preparing the microscope and grips for surgery (position 1)

- Set mode selector (7.7) to position 1.
- Using button (1.9), set the focusing range to the initial position.  
**Note:** Button (1.9) does not function when Varioskop is installed.
- Bring the microscope suspension head into a vertical position. Use switch (1.7) to position the microscope in relation to the carrier arm as required for the surgery to be performed.

20



21

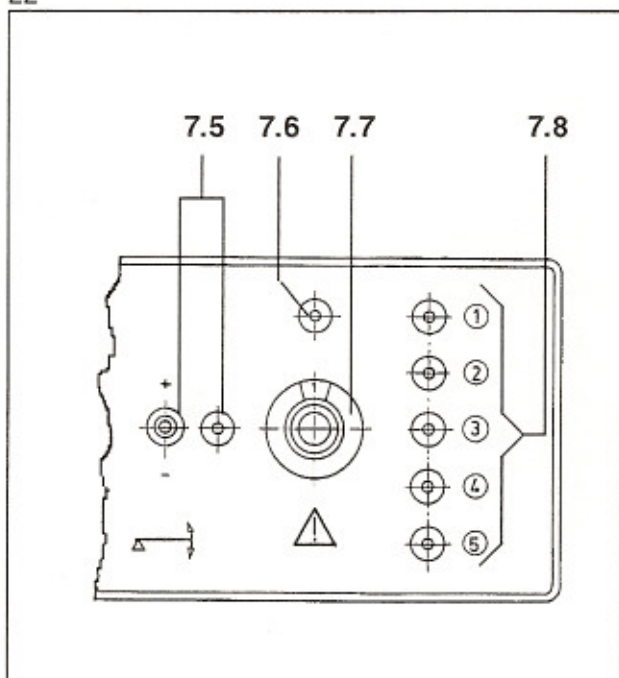


- For ergonomic reasons and to prevent collisions with the accessories, the position of the grips can be adjusted, if necessary. To do this, loosen one of the fastening screws (3.5), bring grips into the position desired and re-tighten screw firmly.

### Balancing the vertical motion (position 2)

- Use grip (5) to hold microscope and set selector (7.7) to position 2. Light 2 of (7.8) comes on.
- If the microscope moves downwards, press switch (7.5) upwards (+).  
If the microscope moves upwards, press switch (7.5) downwards (-).
- Balance stand in such a way that the microscope remains stationary in every position.

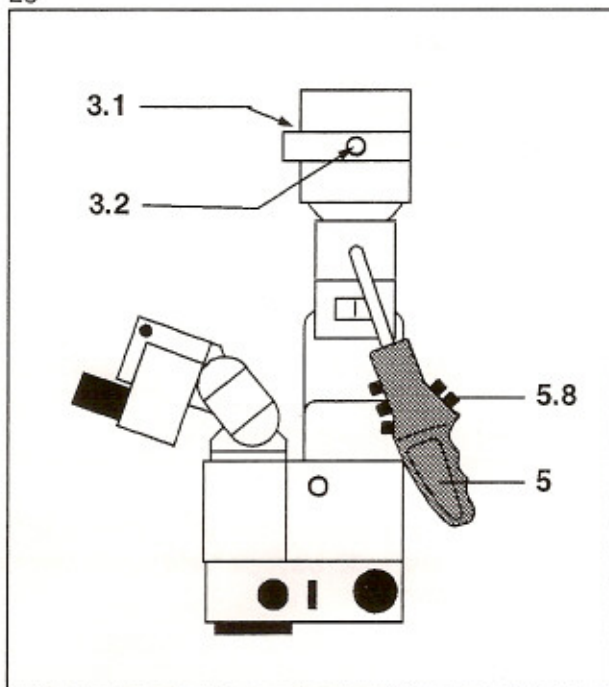
22



### Leveling the microscope suspension head (position 3)

- Make sure that clamping screw (3.2) is tightened firmly.
- Set selector (7.7) to position 3. Light 3 of (7.8) comes on.
- Hold grip and press button (5.8) and keep pressing. All magnetic brakes are now unlocked. Move microscope in all 6 degrees of freedom until the bubble of level (3.1) is centered, then release button (5.8).

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#### Determining the center of gravity (position 4)

- Set operating mode selector (7.7) to position 4.  
Light 4 of (7.8) comes on.
- Hold monoball, loosen clamping screw (3.2) and let microscope drift into its center of gravity. Make sure the bubble in level (3.1) remains centered, if not, repeat the procedure "leveling the microscope suspension head".
- Re-tighten clamping screw (3.2) firmly.

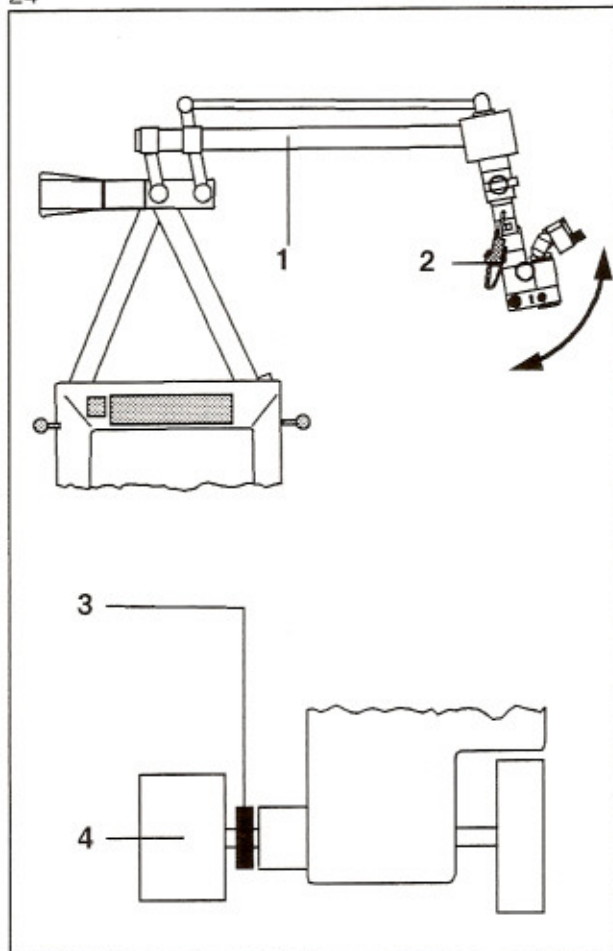
#### Balancing the tilt motion (position 5)

- Use grip (5) to hold the equipment and set selector (7.7) to position 5.  
Light 5 of (7.8) comes on: One brake is unlocked.
- Move the microscope suspension arm (1) to where it is horizontal.
- Move the microscope to a slightly tilted working position (2).
- Press toggle switch (7.5) to + or - until the microscope no longer moves in the direction of the arrows.

#### Adjusting weight M and checking all functions (position 6)

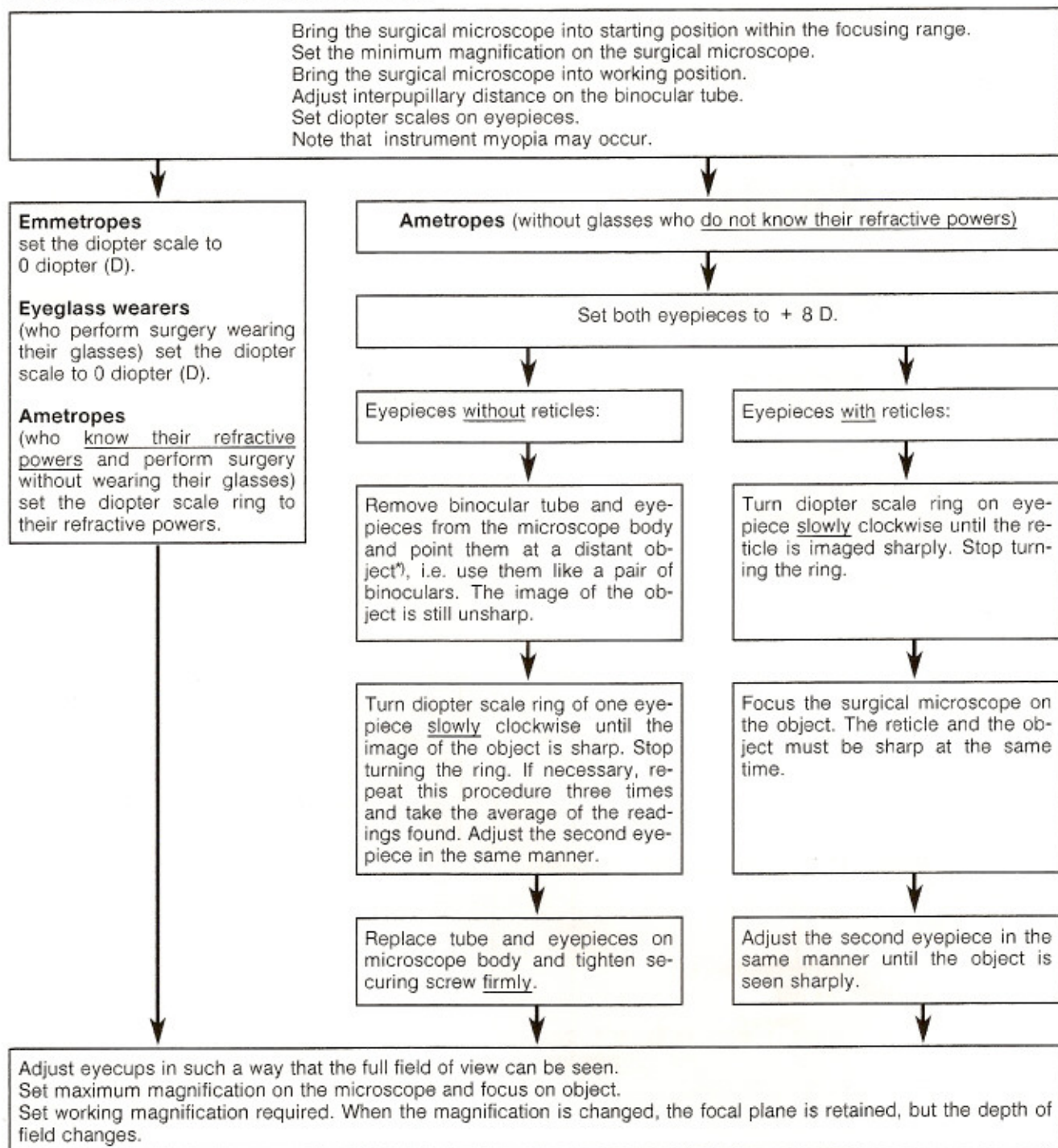
- Set selector (7.7) to position 6.  
Light (7.6) comes on.
- Press the bottom button (5.8) and turn weight (M) until the microscope remains stationary in the working position.
- Lock the weight with ring (3)

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- Check the balance in position 2 and do fine adjustment.
- Switch back to position 6. In this position check the microscope and stand in accordance with checklist on page 27.
- Attach the sterilized cover.

## 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.

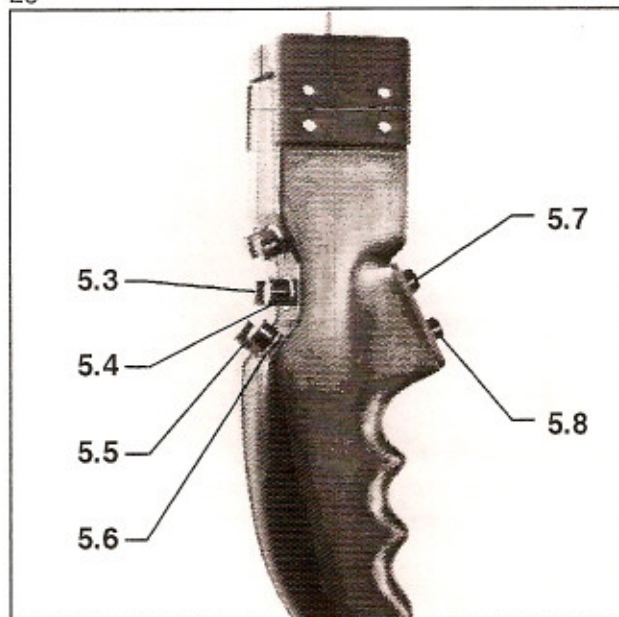
7 **Caution:** Never point at the sun.

## Checklist

Check the following points before surgery (without the patient):

- Illumination  
Xenon lamp  
Halogen lamp
- Maneuverability  
Movement in X,Y,Z directions (button (5.7) or mouth switch).  
In all directions (button (5.8)).
- Zoom  
Buttons (5.5) and (5.6) or foot control panel.  
Check throughout the total range.  
Adjust zoom speed using control (7.3), if necessary.
- Focus  
Buttons (5.3) and (5.4) or foot control panel.  
Without Varioskop: focus using the motorized microscope adjustment;  
With Varioskop: focus by varying the working distance (200 – 400 mm).  
Change focusing speed using knob (7.4), if necessary.

25

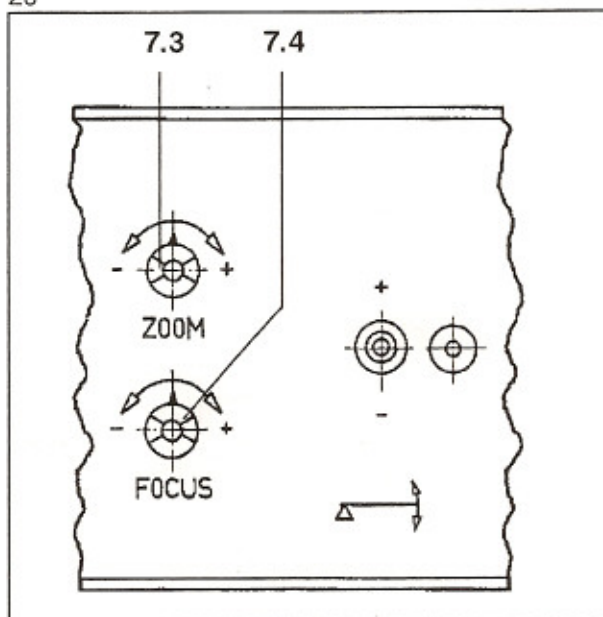


- Knobs  
Check that the zoom knob on the microscope and the knob for setting the working distance (focal length) on the Varioskop can be moved smoothly.
- Eye-piece setting  
Check and correct, if necessary. See page 26.
- Image quality  
Focus an object and check image quality.
- Image brightness  
Check that the brightness is adjusted properly for the surgical procedure. If necessary adjust using knob (6.9), see figure 9, page 14.
- Documentation system  
(35 mm camera or video)  
Check whether equipment is properly functioning.

### Caution:

If a malfunction is detected, for safety reasons you must not operate using this instrument. If possible, correct the fault (see trouble-shooting table, page 37) or contact our service dept.

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### Covering the stand with sterile drapes

- Sterile cloths can be used to avoid any contact with the stand (figure 28). For this, two frames are required which must be inserted in the grips on the housing. Make sure that they are correctly positioned (figure 27).

**Caution:**

The ventilation slots of the Superlux 300 must not be covered!

Note: The drapes should not impair the maneuverability of the stand.

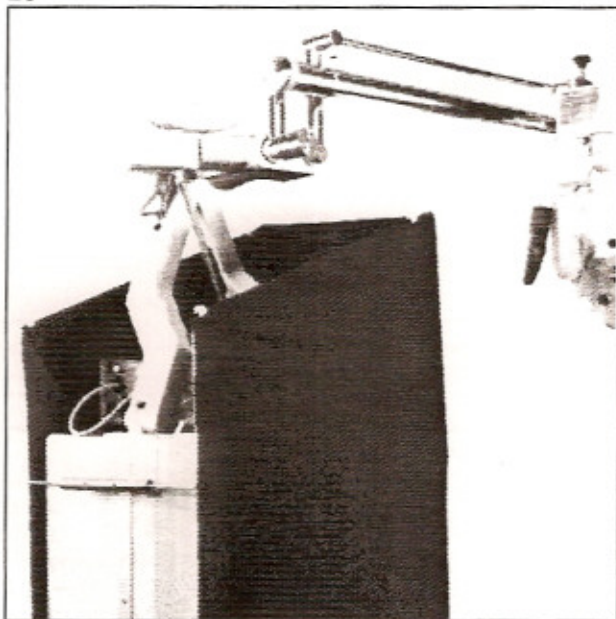
### Covering the microscope with sterile drapes

You may also use the disposable sterile drapes to cover the surgical microscope.

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28



## Balancing the stand (brief instructions)

29

Turn selector (F) on the control panel to positions 1 - 6 (in sequence).

### 1 Initial position:

- Press button (D): Focus moves to initial position. **Note:** Button (D) does not function when Varioskop is installed.
- Bring suspension head to vertical position.
- Using switch (C), position the microscope for the surgical procedure.

### 2 IMPORTANT: Hold on to microscope!

Press toggle switch (E) to + or - until microscope remains stationary in vertical position.

### 3 Press button (G) and level the microscope using bubble level (A).

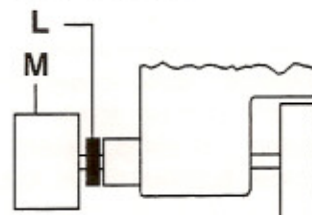
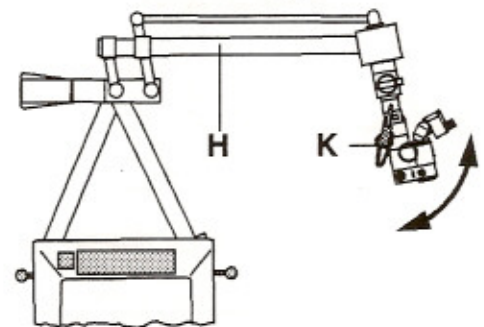
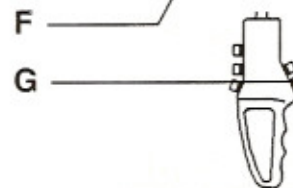
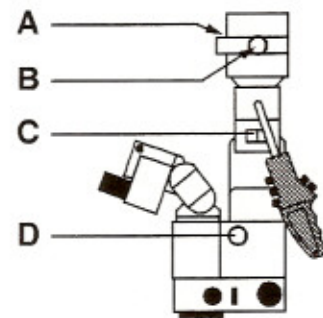
### 4 Loosen screw (B) and let the microscope find its center of balance. Re-tighten screw (B).

### 5 IMPORTANT: Hold on to microscope!

- Place the microscope suspension (H) in horizontal position.
- Move the microscope to a slightly tilted position (K).
- Press switch (E) to + or - until the microscope no longer moves in the direction of the arrows.

### 6 Adjusting weight M / checking functions

- Press the bottom button (G) and turn weight (M) until the microscope remains stationary in the working position.
- Lock the weight with ring (L).
- Check the balance in position 2 and do fine-adjustment.
- Switch back to position 6 and check all the stand and microscope functions.
- Attach the sterilized cover.



## Requirements

The stand, the surgical microscope and the foot control panel are connected.

- The instrument has been checked in accordance with the checklist.

## Automatic leveling (optional)

- Select the moving position. Turn the selector (10.4) to "moving position" (position 10.3) and press the start button (10.5).

**Note:**

LED (10.3) lights red until the feet are in all the way and then changes to green.

**Caution:**

Do not place hands or feet underneath the stand base while the stand is

- going into moving position,
- automatically leveling,
- going into cleaning position.

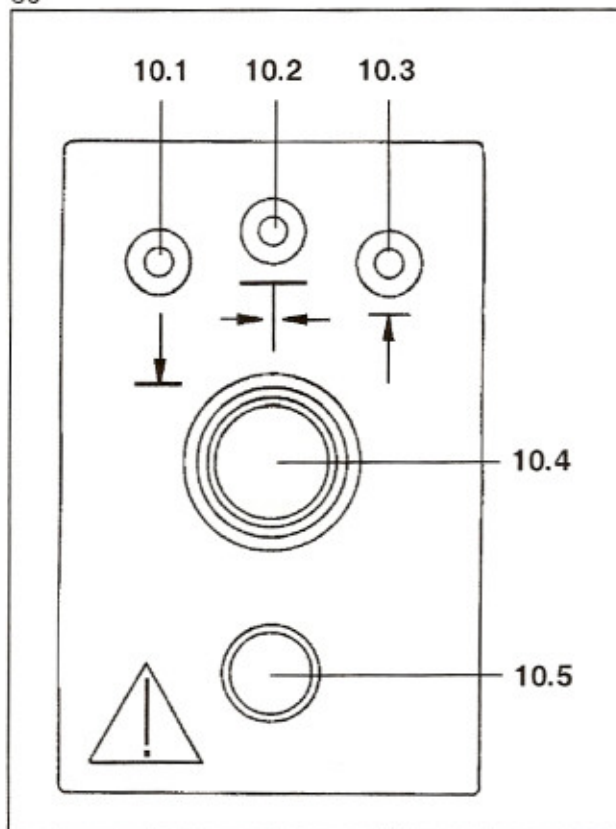
The corresponding LED (10.1), (10.2), or (10.3) lights red until the function selected is finished.

- Move the stand to the desired position. Position the stand in such a way that optimum maneuverability is assured for the surgical site in question.

**Important:**

After positioning the stand, select "automatic leveling" so that the feet move back out and prevent the stand from accidentally rolling away!

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- Select automatic leveling. Turn selector (10.4) to "automatic leveling" (position 10.2) and press the start button (10.5).  
**Note:** LED (10.2) lights red until the balancing is finished and then changes to green.
- If necessary, the stand feet can be extended to "cleaning position" to facilitate cleaning of the double castors of the stand. For details, see page 45.
- When your NC2 Floor Stand is not equipped with the automatic leveling system, lock the stand using the floor locks located on the stand base.

## Operation

### General notes

- The main power switch must always be turned off when the stand is not in use.

#### Caution:

Selector (7.7) must be in position 1 before the system is switched on. If not, the microscope suspension head may suddenly move out of position, which could cause injuries!

- After surgery, the stand can be moved to a suitable storage location. For details on moving the stand, see "Moving the stand", page 44 ff.

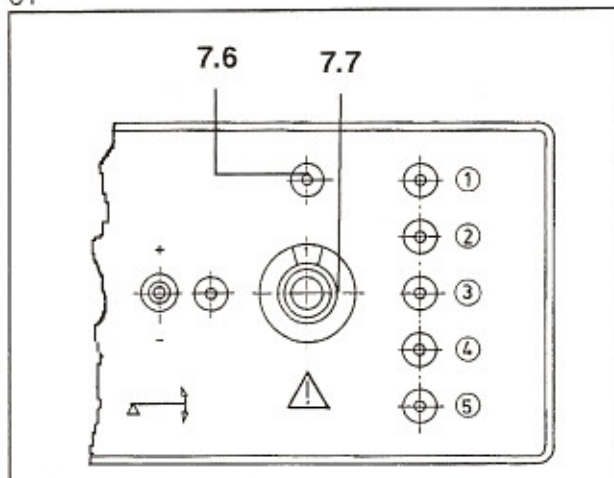
#### Caution:

Selector (7.7) must be in position 6 during usage. Indicator LED (7.6) must light. If there is any malfunction, observe the emergency instructions on page 36 and the troubleshooting table on page 37.

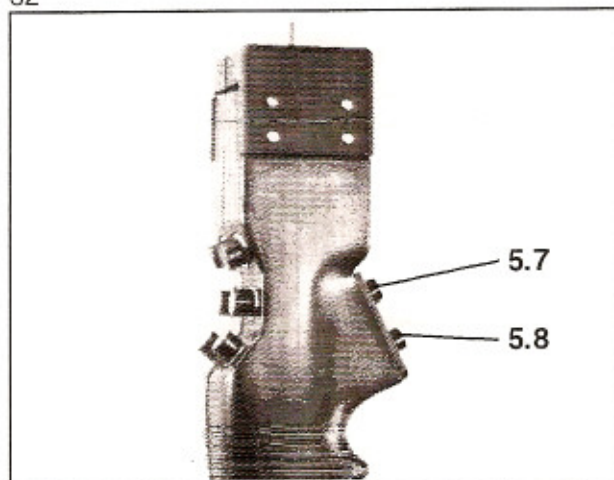
### Positioning the microscope

- Move the stand to the desired position. Position the stand in such a way that optimum maneuverability is assured for the surgical site in question.
- When your NC2 Floor Stand is not equipped with the automatic leveling system, lock the stand using the floor locks located on the stand base.
- Move the surgical microscope over the field of surgery and position it as desired.

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Pressing the lower button (5.8) unlocks all 6 degrees of freedom. Using the grips, you can now effortlessly bring the microscope into any position. To lock it in place, release the button. Pressing the upper button (5.7) unlocks the X,Y,Z movements while locking the tilt and rotation movements. These three movements can also be controlled using the mouth switch.

## Zoom / Focus

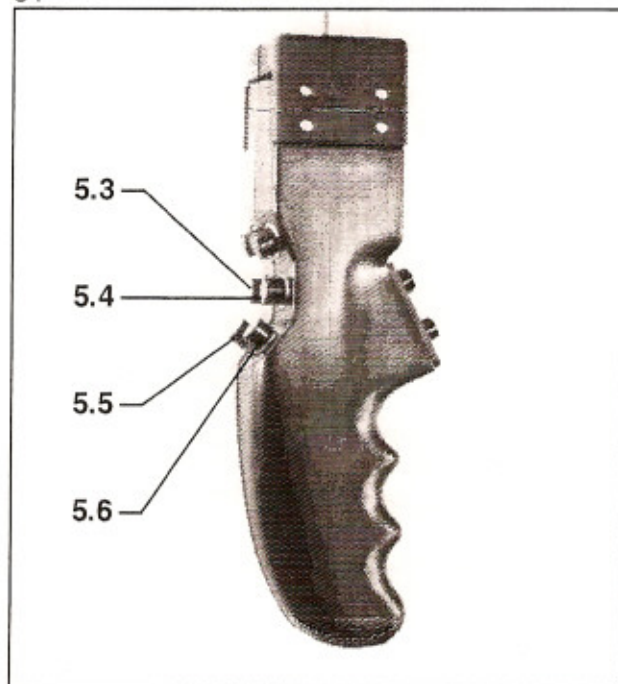
The zoom and focusing functions are motorized. The zoom action is controlled using buttons (5.5) and (5.6), focusing is controlled using buttons (5.3) and (5.4). These functions can also be activated using a foot control panel. The speed of the zoom and focus adjustments can be preselected using the ZOOM (7.3) and the FOCUS (7.4) controls.

**Note:** In the event of an electrical failure in the zoom/focus system, position 3 of selector (7.7) can also be used as an emergency mode. In this position, maneuvering of the microscope is the same as in normal operation (position 6). However, the electrical systems for focusing and zoom action are inoperative, i.e. their motors cannot be activated.

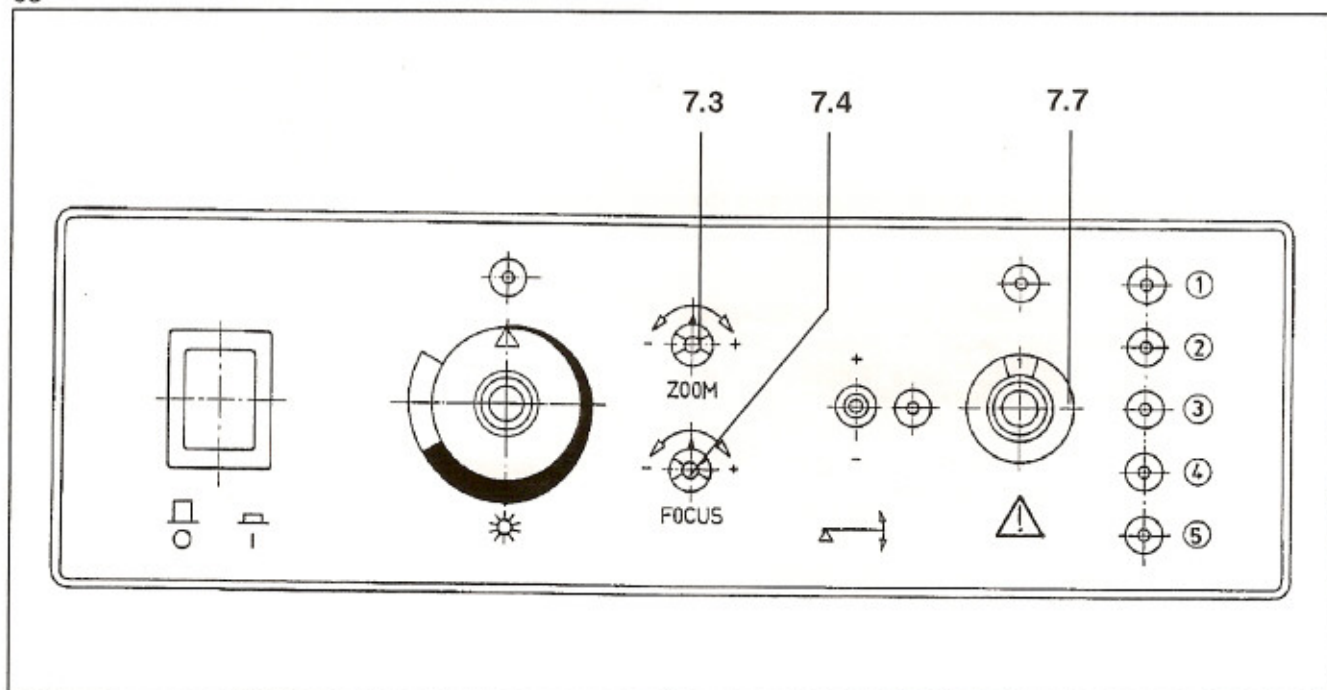
The zoom function can be manually controlled directly on the microscope.

The focus can be manually adjusted using the stand arm or the Varioskop.

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### Xenon lamp (figure 35)

**Caution:**

Due to its high light intensity and the similarity of its spectrum to daylight, this light source must not be used in ophthalmology.

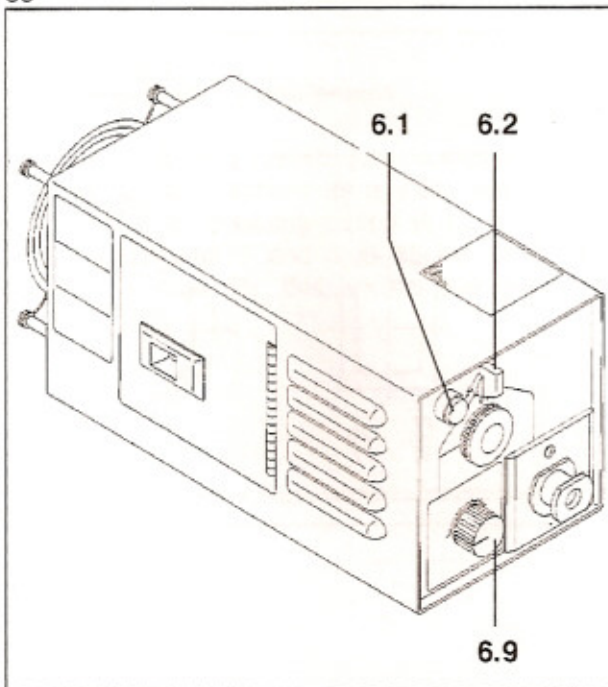
**Caution:**

Never look directly into the light source, e.g. into the microscope objective or into a fiber light guide!

**Caution:**

Do not cover any ventilation grids or slits. Make sure there is sufficient ventilation.

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Before switching on the the xenon lamp, make sure that the light guide is inserted in the light guide socket of the Superlux 300 light source and in the illumination component of the surgical microscope. If not, there may be a fire hazard or someone could burn themselves on the light beam of the xenon lamp.

#### Igniting xenon lamp and adjusting brightness

- Set selector (6.2) to position XENON. Indicator (6.1) lights when the xenon lamp is ready for ignition.
- Turn selector (6.2) from the XENON position to the lightning symbol and hold it for up to ten seconds. As soon as the xenon lamp ignites, let go of selector (6.2).

Note:

It might take a bit longer for the xenon lamp to ignite. This is especially the case when the lamp is warm.

- Adjust brightness control (6.9) as required by the procedure to be performed. Tissue should not be over-illuminated.

Note: If the xenon lamp fails during operation, switch over to the halogen lamp (see page 34, ("Halogen illumination")). When the xenon lamp fails, always exchange the xenon lamp module after the operation (see page 40).

A xenon lamp which has failed must not be used again even though it may be possible to re-ignite the lamp after it has cooled down. The lamp will normally fail again after a short period of time.

## Halogen illumination

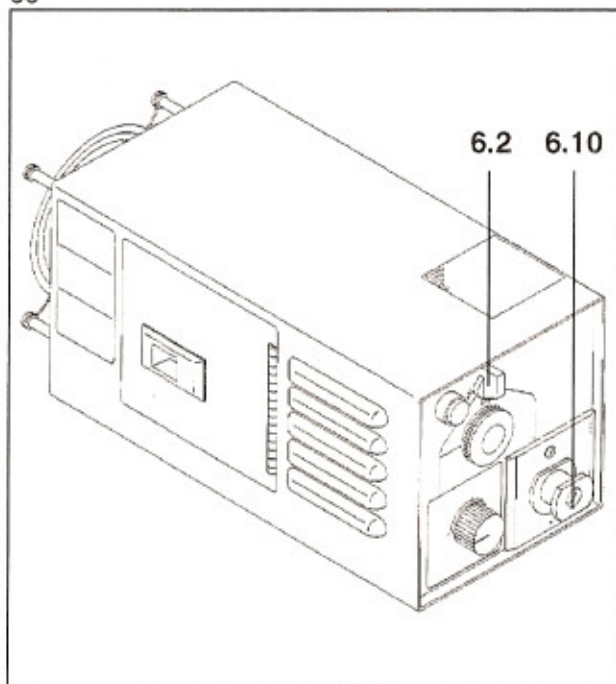
**Note:** In the event of a failure of the xenon lamp, a halogen illumination system is immediately available.

- Set selector (6.2) to position "HALOGEN".
- Insert light guide in halogen socket (6.10).
- Switch on the halogen illumination using knob (7.2) and adjust light intensity.
- Exchanging the halogen lamp is described on page 41.

### Caution:

Do not cover any ventilation grids or slits. Make sure there is sufficient ventilation.

36

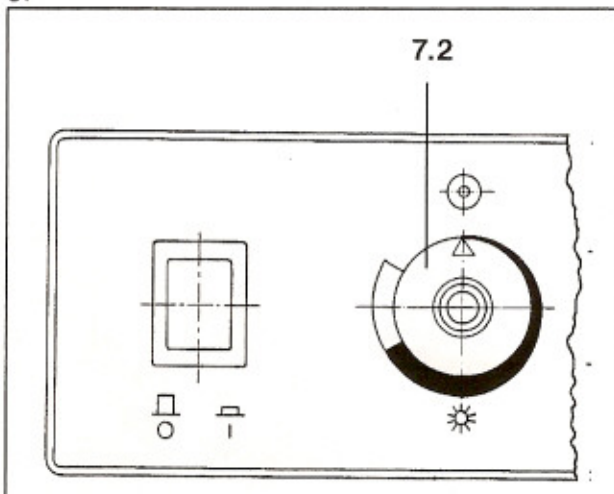


## Microscope illumination without Superlux 300 light source

If the microscope is used without a Superlux 300, a lamp housing for fiber optic illumination is required for microscope illumination.

The microscope illumination is switched on and controlled using knob (7.2). Light (LED) above the knob is on when this knob has been switched on.

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### Triggering a 35 mm camera

To ensure automatic increase of the light intensity for an photographic exposure, the camera must be connected to connector (4.2) (Camera) using a suitable control cable.

The camera can then be triggered using one of the following:

- button (5.2) on grips
- a hand or foot control panel
- a foot switch

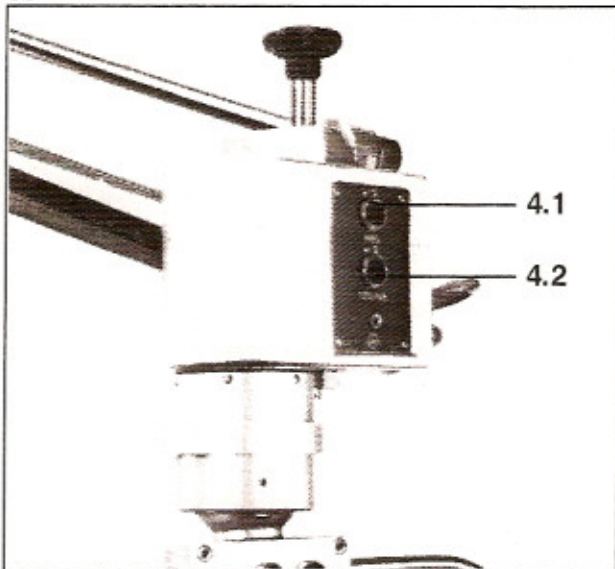
Note: The Superlux 300 is a light source providing a color temperature equivalent to that of daylight and the color temperature is independent of the brightness set. Because of this daylight films should be used for documentation.

If halogen illumination is used, the camera is triggered using the two-step foot switch. The first step switches the microscope illumination to maximum brightness, the second step triggers the camera.

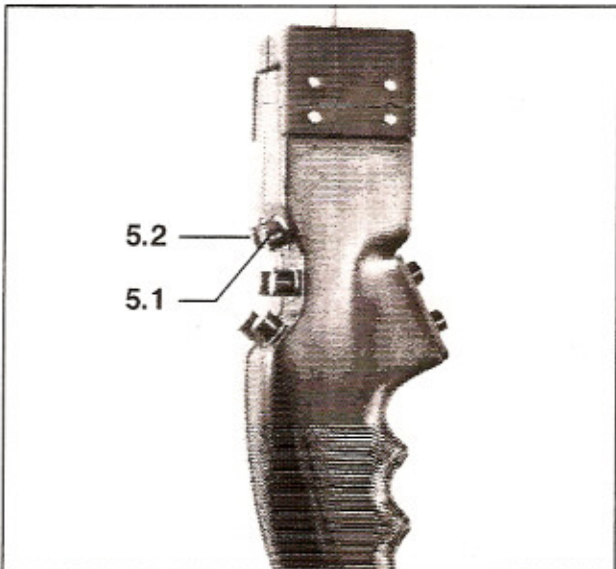
### Activating auxiliary equipment

Auxiliary equipment such as a video system can be activated by pressing button (5.1). Doing this short-circuits pins 1 and 3 in socket (4.1). The electrical ratings for this socket are given on page 49.

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## What to do in an emergency (figures 40 and 41)

### Lamp failure

- Turn selector (6.2) from XENON to HALOGEN.
- Insert the end of the light guide into light guide socket (6.10).
- Switch on the halogen lamp at the stand and adjust the brightness.
- Exchange the xenon lamp module as soon as possible. See "Exchanging the xenon lamp module", page 40.
- After you have exchanged the xenon lamp module, re-insert the light guide into the xenon light guide socket and ignite the xenon lamp.

### Failure of zoom function

- Turn selector (7.7) to position 3 and adjust the magnification using knob (1.6) (see figure 4 on page 10).  
In this mode, focusing must be done by moving the stand carrier arm or using the knob on the Varioskop.

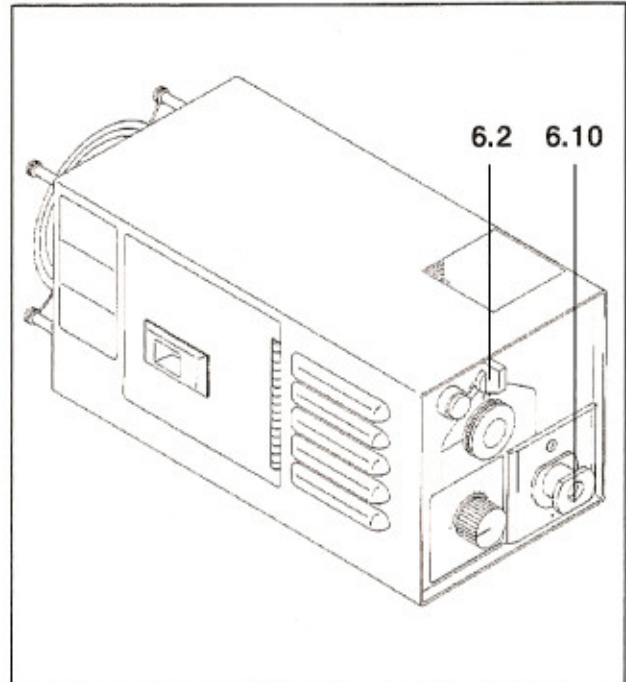
### Failure of focusing function

- without Varioskop:  
Focus by moving the stand carrier arm.
- with Varioskop:  
Turn selector (7.7) to position 3 and focus using the knob on the Varioskop  
In this mode, zooming must be done using knob (1.6) (see figure 4 on page 10).

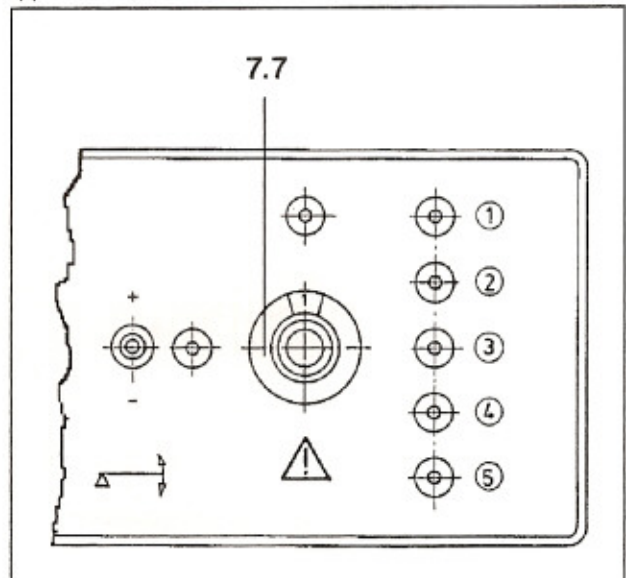
### Solenoid brakes do not disengage

- Use force to move the microscope to the desired position.

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### 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

Note: For the positions given in brackets, refer to chapter "Description" page 10 ff.

Problem	Possible cause	Remedy
<u>No function at all:</u>	Power plug not connected.	Connect power plug.
	Main power switch not pressed.	Press main switch. Green pilot light must come on.
	Defective fuse in stand.	Change power fuse.
	Power failure.	Contact in-house electrician.
	Failure of stand electronics.	Contact service technician.
<u>Xenon illumination not functioning:</u> lamp does not ignite:  Lamp goes out during operation:          No light: (xenon lamp operative)	Main power switch on stand OFF.	Switch on.
	Switch (6.2) on lamp housing in position HALOGEN.	Switch to position XENON.
	Door of lamp housing open.	Close door.
	Defective lamp.	Insert new lamp module.
	Defective power supply.	Contact service technician.
	Door of lamp housing open.	Close door.
	Incorrect connection of power cable.	Connect power plug. Re-ignite xenon lamp.
	Covered ventilation slots.	Uncover slots.
	Thermal cutout activated.	Switch to halogen lamp and plug light guide into halogen lamp module; switch on halogen lamp on stand and adjust brightness. After a few minutes, the light guide can be inserted into the xenon lamp module and the xenon lamp reignited.
	Defective xenon lamp.	Switch to halogen lamp or insert new xenon lamp module.
	Defective power supply.	Switch to halogen lamp.
	Light guide not inserted or in wrong socket.	Plug light guide first into illumination unit on microscope, then into the xenon light guide socket (6.3).
	Defective light guide.	Change light guide.

Problem	Possible cause	Remedy
<u>Xenon illumination not functioning</u> <u>(continued):</u>  Light too weak:     Light flickers:	Attenuator in lamp housing closed.	Open attenuator using knob (6.9), avoid excess illumination.
	Light guide not inserted as far as it will go.	Insert both ends of light guide as far as they will go.
	Defective light guide.	Change light guide.
	Defective lamp.	Insert new lamp module.
	Defective power supply.	Contact service technician.
	Defective lamp.	Switch to halogen lamp. Exchange lamp module.
	Defective power supply.	Switch to halogen lamp. Contact service technician.
<u>Halogen illumination not functioning:</u>  Lamp does not turn on:       Lamp goes out during operation:   No light: (Lamp operative)   Light too weak:	Main power switch on stand OFF.	Switch on.
	Switch (6.2) on lamp housing in position XENON.	Switch to HALOGEN.
	Switch (7.2) not ON.	Switch on (7.2) and adjust brightness.
	Lamp module does not fit tightly in lamp housing.	Push in lamp module as far as it will go.
	Defective lamp.	Change lamp.
	Defective power supply.	Contact service technician.
	Defective lamp.	Change lamp.
	Incorrect connection of power cable.	Connect power cable.
	Defective power supply.	Contact service technician.
	Light guide not inserted or in wrong socket.	Insert light guide in socket of halogen lamp module.
	Switch (7.2) in position 0.	Use switch to adjust brightness as required.
	Switch (7.2) not adjusted as required.	Use switch to adjust brightness as required.
	Light guide not inserted as far as it will go.	Insert both ends of light guide as far as they will go.
	Defective light guide.	Change light guide.
	Defective lamp.	Change lamp.
Defective power supply.	Contact service technician.	
<u>Difficult positioning of microscope:</u>	Poorly balanced.	Perform balancing procedure.
	Brakes cannot be unlocked: Selector (7.7) not in position 6.	Set selector to position 6.
	Defective power supply or defective button on grip.	Use increased force to override the friction of the magnetic brakes and position microscope; contact service technician.

Problem	Possible cause	Remedy
<u>Zoom system not functioning:</u> Foot or hand control panel:	Selector (7.7) not in position 6.	Set selector (7.7) to position 6.
	Loose connection.	Make plug connection.
	Defective control panel.	Activate zoom using grip. Contact service technician.
	Grips:	Grips or power supply defective.
<u>Focusing system not functioning:</u> Foot or hand control panel:	Selector (7.7) not in position 6.	Set selector (7.7) to position 6.
	Loose connection.	Make plug connection.
	Defective control panel.	Activate zoom using grip. Contact service technician.
	Grips:	Grips or power supply defective.
<u>Zoom and focusing systems cannot be switched off:</u> If foot or hand control panel is used:	Defective control panel.	Disconnect panel, activate zoom and focus using grips. Contact service technician.
	If no foot or hand control panel is used:	Grips or power supply defective.
<u>All functions go out during operation:</u>	Power cord not properly plugged in.	Plug in power cord. Re-ignite the xenon lamp.
	Defective fuses in stand.	Change power fuses.

## Exchanging the xenon lamp module

(figure 42)

### Caution:

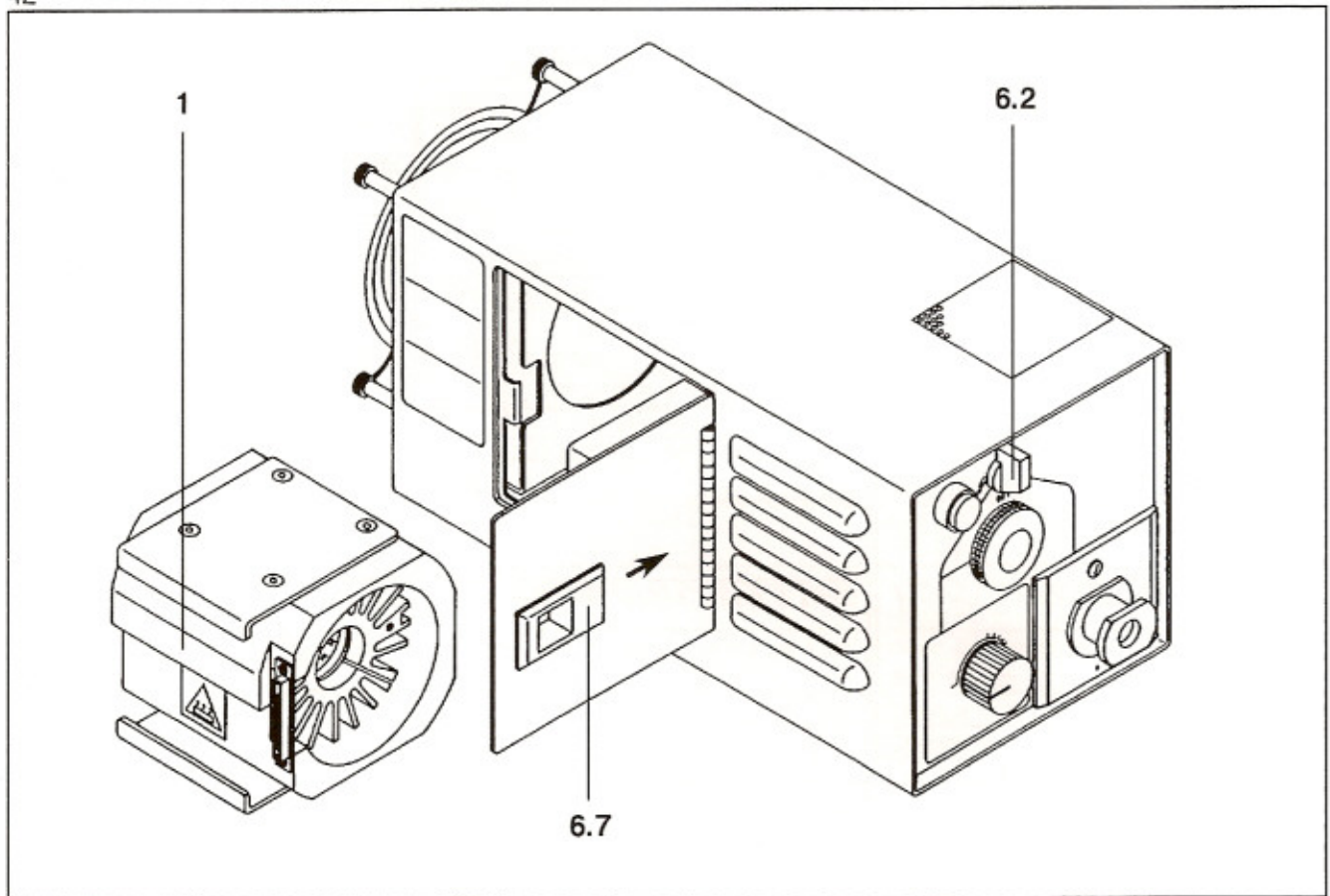
Wait until the xenon lamp has cooled down completely before exchanging the slide-in unit!

Note: If the xenon lamp fails during surgery, switch over to halogen illumination. It is thus vital that you make sure the halogen lamp is working properly before surgery begins.

Proceed as follows to exchange the xenon lamp module:

- Set selector (6.2) to OFF.
- Switch off stand at main power switch (7.1), see figure 10, page 15.
- Press lock (6.7) on the door in the direction of the arrow and open.
- Use grips (1) to pull entire xenon lamp module out of the instrument.
- Insert new xenon lamp module in instrument in reverse order.

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## Exchanging the halogen lamp (figure 43)

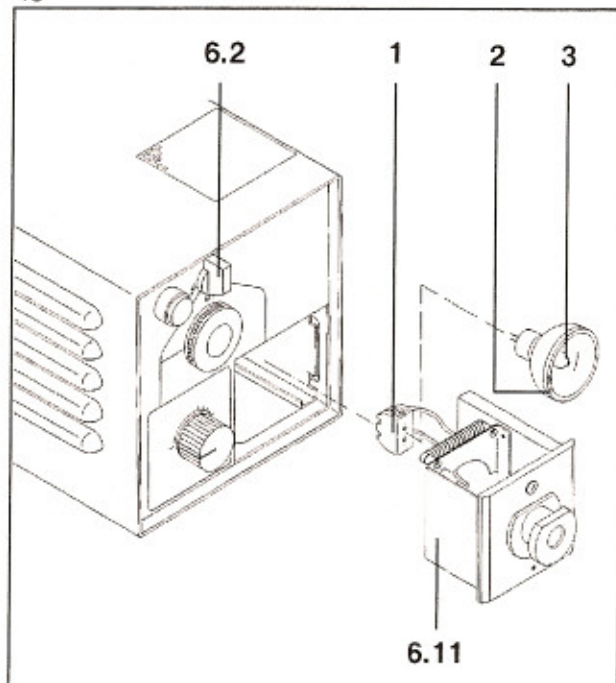
### Caution:

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

To exchange the lamp, proceed as follows:

- Switch off the brightness control (7.2), see figure 10, page 15.
- Switch off the instrument at main switch (7.1), see figure 10, page 15.
- Pull out lamp module (6.11).
- Pull the ceramic base (1) off of the contact pins of the halogen lamp.
- Pull the halogen lamp out of the spring holding device.
- Install the new halogen lamp. Observe the following points:
  - The centering nose (2) must fit into the hole.
  - Do not touch the lamp bulb (3) or the interior of the lamp reflector.
- Slide the ceramic base (1) onto the contact pins of the lamp.

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- Install the lamp module (6.11) with the new halogen lamp into the instrument.
- Switch the instrument back on at power switch (7.1), see figure 10, page 15.
- Switch the illumination back on at brightness control (7.2), see figure 10, page 15.

**Note:** Use only 12 V 100 W halogen lamps.

Catalog number: 38 00 79- 9040

## Exchanging the fuses

(figures 44 and 45)

To exchange the fuses, proceed as follows:

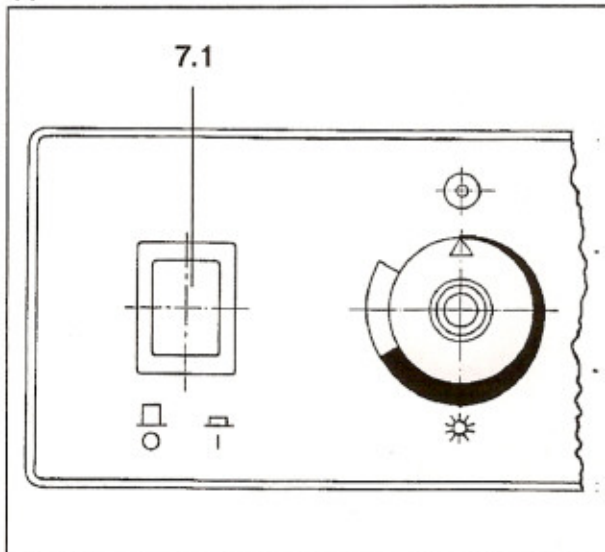
- Switch off the xenon or halogen illumination.
- Switch off the power at (7.1).
- Unplug the power cord from the power outlet.
- Unscrew caps (8.1) and remove the defective fuses.

- Install the new fuses and screw caps (8.1) back on.

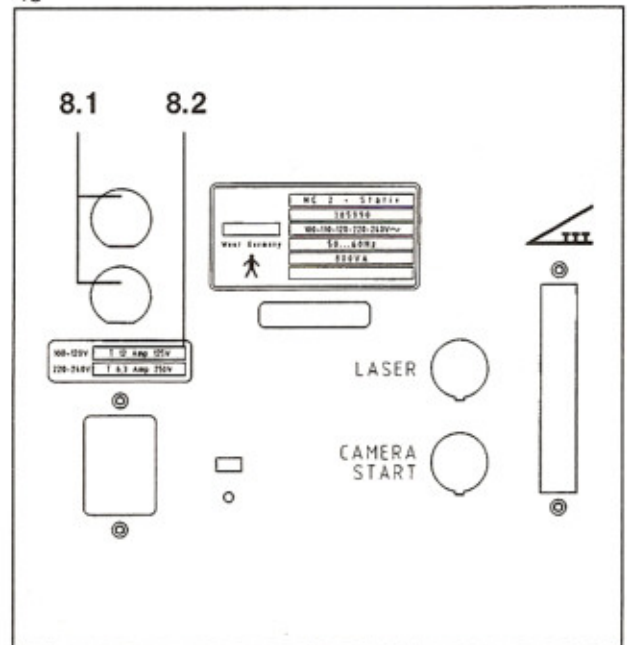
Note: Observe the fuse ratings. These are shown on plate (8.2).

- Switch the instrument back on at (7.1).
- Switch on the xenon or halogen illumination.

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## Care of the microscope

### Cleaning optical surfaces

The multilayer T\* (T-star) coating of our optical components (e.g. eyepieces and objectives) results in optimum contrast and high-quality observation and image quality.

These advantages, which provide a brilliant image, are markedly impaired by even slight contamination of the optics or by a fingerprint. In order to protect the internal optics from dust, when the instrument is not being used it should never be left without the objective, binocular tube and eyepieces installed. After use, cover the instrument to protect it from dust. Always store objectives, eyepieces and accessories which are not being used in dust-free cases.

The external surfaces of the optical components (eyepieces, objectives) should be cleaned on a regular basis:

- Blow off dust on the optical surfaces using a squeeze blower or a grease-free brush.
- Thorough cleaning is now extremely easy and can be quickly performed with our new antistatic cleaning cloths.  
Please follow the instructions on the packing of the cleaning cloths.

In this manner the optical image will remain brilliant and high in contrast.

Pack of 100 cleaning cloths:

Catalog no. 30 61 18- 0000

### 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 coating. The anti-fogging agent contains neither wax nor silicone; it is unpoisonous and does not scratch glass.

The anti-fogging agent does not only ensure fog-free optics; it also cleans, polishes 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:

Catalog no. 30 55 50- 9910

### Cleaning painted surfaces

All parts 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 household dishwashing liquid.

## Moving the stand

(figures 46, 47 and 48 )

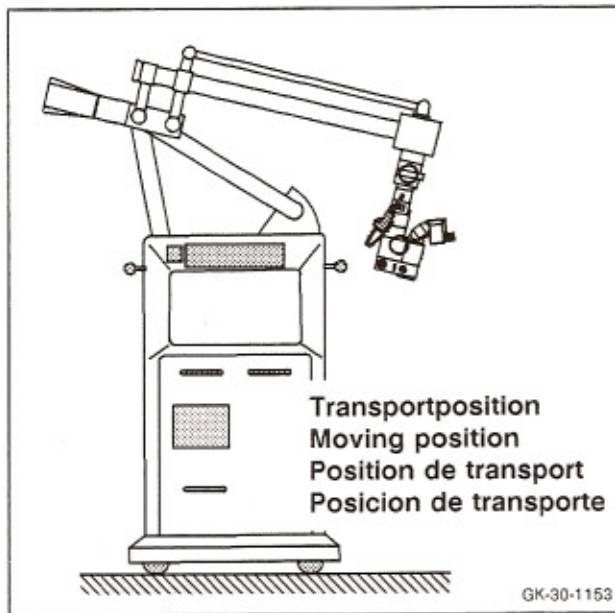
Observe the following points when moving the stand:

- In order to prevent the stand from toppling, move the arms of the stand in so that the center of gravity of the equipment is as close to the stand as possible. Figure 46 shows the moving position.

Note: If your stand is equipped with automatic leveling (optional) observe the information given on page 45.

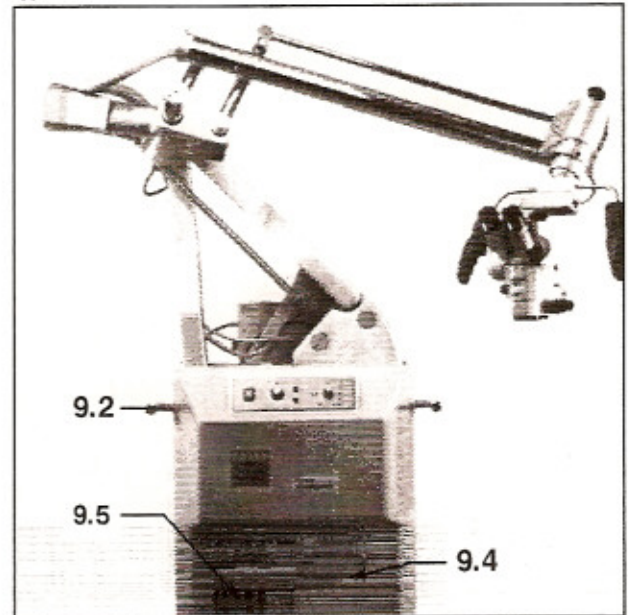
- Switch off main power switch (7.1), see figure 10, page 15).
- Coil up the cable for the foot control panel on bracket (9.4) and hang the foot control panel on bracket (9.4).

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- Disengage the floor locks on the stand base (this is not done when the automatic leveling system is installed).
- Unplug the power cord from the power outlet and coil it on bracket (9.5).
- Be careful of maximum height at door frames.
- Use handles (9.2) of the stand to move it.
- Avoid any collisions.
- Do not go over steps: The stand might topple!
- Be extremely careful when going over slopes.
- Do not park the stand on slopes.
- Move the stand to the desired location.

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### Moving the stand when equipped with automatic leveling system

#### Caution:

Do not place hands or feet underneath the stand base while the stand is

- going into moving position,
- automatically leveling,
- going into cleaning position.

The corresponding LED (10.1), (10.2), or (10.3) lights red until the function selected is finished.

#### Moving position

- Turn the selector (10.4) to "moving position" (position 10.3) and press the start button (10.5).

#### Note:

LED (10.3) lights red until the feet are in all the way and then changes to green.

#### Important:

After positioning the stand, select "automatic leveling" so that the feet move back out and prevent the stand from accidentally rolling away!

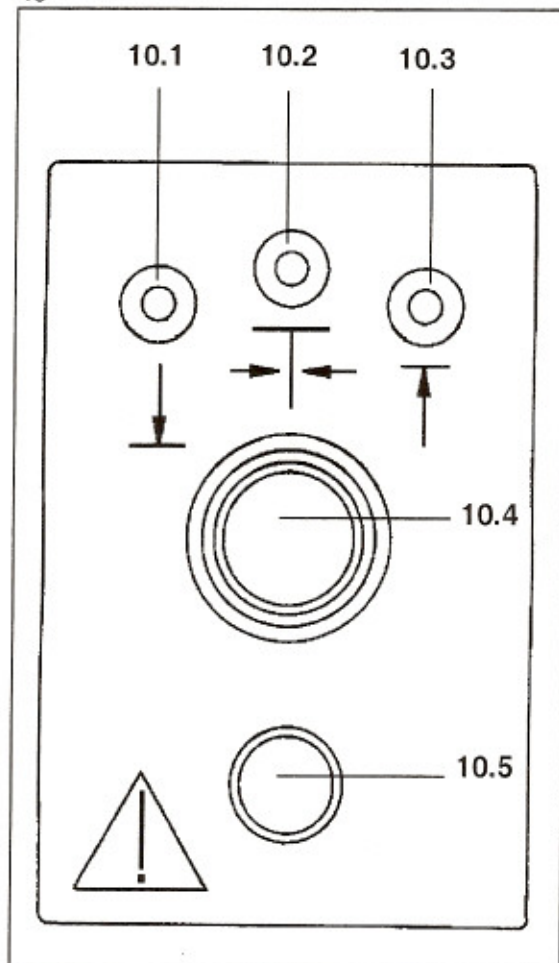
#### Automatic leveling

- Turn selector (10.4) to "automatic leveling" (position 10.2) and press the start button (10.5).

#### Note:

LED (10.2) lights red until the balancing is finished and then changes to green.

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#### Cleaning position

If necessary, the stand feet can be extended to "cleaning position" to facilitate cleaning of the double castors of the stand.

- Turn selector (10.4) to "cleaning position" (position 10.1) and press the start button (10.5).

#### Note:

LED (10.1) lights red until the feet are out all the way and then changes to green.

## Magnifications / Fields of view

Using the magnification factor, which can be read in magnification window (1.3), page 10, you can calculate the total magnification of the microscope.

If:

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

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

$\gamma$  is the factor set on the zoom system,

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

then the total magnification of the surgical microscope can be calculated according to:

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

Example:

$f_{\text{tube}} = 170 \text{ mm}$ ,  $f_{\text{obj}} = 200 \text{ mm}$ ,  $\gamma = 1.6$  and  $M_{\text{eye}} = 10 \times$ .

The total magnification is thus:

$$M_T = \frac{170}{200} \cdot 1.6 \cdot 10 = \underline{13.6}$$

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

$$\text{FoVD} = \frac{\text{FoV}_N \cdot M_{\text{eye}}}{M_T}$$

FoV<sub>N</sub> in the above formula stands for the field-of-view number, which is marked on our widefield eyepieces.

Using  $M_T = 13.6$  from the example above, the field-of-view diameter is thus:

$$\text{FoVD} = \frac{22 \text{ mm} \cdot 10}{13.6} = \underline{16.2 \text{ mm}}$$

Note on magnifications / fields of view when using the Varioskop

When the Varioskop is used, the distance indicated is the working distance and not the focal length.

display on Varioskop	200 mm	corresponds to focal length	f = 291 mm
display on Varioskop	300 mm	corresponds to focal length	f = 379 mm
display on Varioskop	400 mm	corresponds to focal length	f = 467 mm

**Spare parts**

	catalog number		catalog number
Halogen lamp bulb 12V 100W	38 00 79- 9040	Fuses for the stand 100 - 120 V mT 12 A 125 V 220 - 240 V T 6.3 A 250 V	0122.739 0127.029
Back-up xenon lamp module for Superlux 300	30 49 53- 9030	Fuses for Superlux 300 for 115 V: T 6.3 A SLO BLO for 230 V: T 3.15 A SLO BLO	0146.811 0127.026
Cleaning cloths for optical components (100 pcs)	30 61 18- 0000		
S light guide 3.6m	30 34 81- 9036		

**OPMI CS-NC surgical microscope**

Magnification	Zoom system with 1:6 ratio, magnification factors $\gamma$ 0.4x - 2.4x, motorized magnification activated over buttons on grips on the stand, or over hand control panel, foot control panel or operating chair, adjustable speed.
Focusing	Motorized, via microscope carrier arm, focusing speed adjustable between 1.5 and 5 mm/s, Focusing range 40 mm, with Varioskop: internal focusing range 200 mm - 400 mm.
Illumination	Superlux 300 light source.
Electrical standard	In accordance with IEC 601-1, VDE 0750, part 1.
Weight	4.4 kg
Catalog number	OPMI CS-NC surgical microscope      30 25 08- 9901



## NC2 Floor Stand

### Electrical data

Power connection	The stand may only be plugged into a power outlet equipped with a properly connected ground connection.	
Rated voltage	100/110/120/127/220/240 V ~	
Allowed fluctuation of rated voltage	± 10%	
Rated frequency	50...60 Hz	
Power consumption	800 VA	
Power fuses	100 - 120 V mT 12 A 125 V	catalog number 0122.739
	220 - 240 V T 6.3 A 250 V	catalog number 0127.029
Electrical standard	In accordance with IEC 601-1, VDE 0750, part 1, class I, type B.	
Electrical connection of socket (4.1), page 12	max. switching capacity:	60 VDC, 42 VAC 1.5 A, 90 VA. Pins 1 and 3 are used.
	Required connector:	Catalog number 0012 204 (BINDER 3 pin, 09.0305.00.03)

### Mechanical data

Dimensions, weight	net weight of stand:	275 kg
	gross weight in package:	440 kg
	package size, l x w x h :	1500 x 1240 x 2080 mm
Max. load at microscope carrier arm	The weight of the microscope, including all accessory equipment, must not exceed <u>maximum</u> 14 kg when used on the NC 2 Floor Stand.	
Catalog number	30 59 90- 9901	

## Automatic leveling system (optional)

Accuracy	± 2'
Range of compensation	1°
Maximum lift	35 mm
Catalog number	30 59 90- 9010

## Superlux 300 high-intensity light source

### Electrical ratings

Rated voltage	115/230 V~
Allowed fluctuation of rated voltage	± 15%
Rated frequency	50...60 Hz
Power consumption	500 VA
Power fuses	For 115 V: T 6.3 A SLO BLO, catalog number: 0146.811. For 230 V: T 3.15 A SLO BLO, catalog number: 0127.026.
Electrical standard	In accordance with IEC 601-1, VDE 0750, part 1, class I, type B.

### Performance data

Pulse sequence	Shortest pulse sequence: 2 s
Output lamp power of xenon lamp	280 W
Maximum illumination at surgical field with f = 200mm objective	850 to 1000 kLx

### Dimensions and weights

Weight	Lamp housing 4.7 kg without lamp module, Xenon lamp module 0.9 kg, Power supply 8.9 kg.
Dimensions h x w x d	Lamp housing 150 x 150 x 300 mm, Power supply unit 150 x 150 x 300 mm.

### Illumination

Illumination system over light guide,  
300 W xenon lamp, near daylight spectrum suitable for daylight film,  
100 W halogen lamp as back-up.

<u>Catalog number</u>	30 49 53- 0000
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### Subject to change

## Sterilization Methods

### Gas (ETO) Sterilization\*

Standard ETO is acceptable for use with Kraton® thermoplastic rubber based compounds. The ETO gas will penetrate the Kraton, plasticize it and relieve molded in stresses or imposed stresses on the part.

Aeration time is greatly dependent on the size of the master carton and its permeability. One week is the minimum requirement to bring the ETO residuals below 1 PPM, as tested by the standard liquid extraction method. If the product is heated to 125-135 F in an aeration chamber with high airflow, the time can be accelerated to as little as four days.

### Gamma Sterilization\*

Kraton thermoplastic rubber can be sterilized using gamma radiation without suffering a large loss in physical properties even after extended storage.

Kraton G-2705 rubber was exposed to Cobalt 60 radiation doses of 3, 6, and 12 Mrads. The table below shows the effect of the radiation on the tensile properties of the material after being aged for 21 months:

Property	Original	0 Mrads	3 Mrads	6 Mrads	12 Mrads
Hardness, Shore A	55	50	48	48	43
Tensile Strength, psi	1200	+8%	+12%	-3%	-15%
300% Modulus, psi	550	+3%	-4%	-10%	-15%
Elongation, %	700	+3%	+10%	+8%	+12%

### Steam Sterilization\*

GLS Corporation can suggest the following maximum autoclave cycles for selected materials\*\*

250 F for 17 minutes

240 F for 27 minutes.

There will be some slippage or creep with any Kraton thermoplastic rubber based products at these temperatures because of the relieving of molded in stress and the relaxation of imposed stresses.

To minimize these effects, parts should be molded at the suggested processing conditions; and not autoclaved while being subjected to outside mechanical stresses.

\* Information pertains only to Kraton G-based compounds

\*\* Information pertains only to Kraton G-2705 compound.

## Disposables

### Endure Number

### Spare Bulbs

90-1200	Zeiss 6V 30W Bt58Z	390158
90-1201	Zeiss 6V 50W Bt86Z	390186
90-1202	Zeiss 12V 100W HLX #64626	380075 1020
90-1203	EFR Housing #900	
90-1204	Zeiss 15V 150W EFR	310198
90-1205	Zeiss 12V 100W HLX #64627	380079 9040
90-1206	Zeiss Superlux 40	
90-1207	Zeiss Superlux 175	
90-1208	Zeiss Superlux 300 with Cartridge	
90-1209	Zeiss Superlux 300 Bulb Only - No Housing or Meter	
90-1302	ELS 150 21V 150W EKE	
90-1400	ELS 250 24V 250W ELC	
90-1403	ELS 24 60V 24W Metal Halide	
90-1402	ILO 300W with Cartridge	

### Sterilizable Knob Covers

91-0100	Zeiss Knob Cover, MD Zoom	302602 0203
91-0101	Zeiss Knob Cover, 0-60 PD Adjustment	303418 0000
91-0102	Zeiss Knob Cover, Small, 0-180 PD Adjustment	305810 0000
91-0103	Zeiss Knob Cover, Medium,	305807 0000
91-0104	Zeiss Knob Cover, Magnification Changer	303673 0000
91-0105	Zeiss Knob Cover, Large	305803 0000
91-0106	Zeiss Knob Cover, Extra Large	303674 0000
91-0110	Zeiss Handle Cover, CS/MD Short	302501 9060
91-0111	Zeiss Handle Cover, CS/MD Long	302627 9001
91-0112	Zeiss Handle Cover, F-Cover	305808 0000
91-0113	Zeiss Handle Cover, Pro Magis	
91-0114	Zeiss Hande Cover for MDU Post	305809 0000

### Dust Covers

92-0010 Dust Cover, Large

### Foot Control Covers

92-0200 Endure Poncho Disposable Foot Control Cover, 20 per Case

### Drapes

93-8222	Sterile Drape, 50/180cm, 20/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/o Side Observer, 20 per Case
93-8214	Sterile Drape, 115/180cm, 45/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/Side Observer, 20 per Case
93-8296	Sterile Drape, 115/300cm, 45/118", Zeiss 65mm, MD/CS/11/111/ORL/Pro Magis/Neuro/ VISU 150/VISU 200, 20 per Case