

# ***REICHERT ULTRACUT S***

## *Operating Instructions*

The Leica logo, featuring the word "Leica" in a stylized, italicized serif font with a horizontal line underneath.

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*Printed in Austria*

*REICHERT ULTRACUT S - 2.GA - E- 12/92*



## EG Konformitäts-Erklärung

Wir,       Leica Aktiengesellschaft  
          Hernalser Hauptstrasse 219  
          A-1171 Wien   Austria

erklären in alleiniger Verantwortung, dass die Maschine

Modell                                    Ultracut S

Typenbezeichnung-Hauptgerät       702501

Typenbezeichnung-Steuergerät       654901

Konstruktionsjahr                    1990

beschrieben in der beigelegten Dokumentation, mit der  
EG-Maschinenrichtlinie 89/392, geändert durch die EG-Richtlinien 91/368  
und 93/44, übereinstimmt.

Name:                   Dr. Lihl  
Vorname:               Reinhard  
Stellung:               Entwicklungsleiter

Wien, 30. Dezember 1994



Unterschrift

## EC Conformity Declaration

We,       Leica Aktiengesellschaft  
          Hernalser Hauptstrasse 219  
          A-1171 Wien   Austria

declare in exclusive responsibility that the machine

Model                                    Ultracut S

Type of main unit                    702501

Type of control unit                  654901

Year of construction                  1990

described in the enclosed documentation, is corresponding to  
EC-direction 89/392, changed by EC-directions 91/368 and 93/44.

Name:                   Dr. Lihl  
First name:             Reinhard  
Position:               R & D Manager

Vienna, 30. December 1994



Signature

## Sicherheitshinweise

Das Gerät ist so gefertigt, dass bei bestimmungsgemäsem Gebrauch Gefahren für den Benutzer vermieden werden.

Der bestimmungsgemäße Gebrauch setzt das Einhalten der Bedienungshinweise in der Bedienungsanleitung voraus.

Weiters ist es notwendig, dass der Benutzer im Gebrauch dieser Geräte geschult ist.

Die Geräte dürfen nur von autorisiertem Servicepersonal geöffnet werden.

Vor dem Öffnen ist der Netzstecker zu ziehen.

Das Gerät ist mit einer Erdleitung versehen. Vor Anschluss des Gerätes muss sichergestellt werden, dass das örtliche Stromnetz eine Erdleitung besitzt und diese vorschriftsmässig mit der Geräteerdung verbunden wird.

Vor einem Wechsel oder Einbau der Sicherungen ist der Netzstecker des Gerätes zu ziehen.

### Verletzungsgefahr beim Berühren der Messer

Zum Schneiden der Präparate werden extrem scharfe Messer verwendet, die bei Berührung zu Verletzungen führen können.

Das Messer darf erst kurz vor dem Schneiden montiert werden und muss nach der Schnittabnahme wieder aus der Halterung entfernt werden.

Solange sich ein Messer in der Halterung befindet, muss die Beleuchtung eingeschaltet bleiben.

Für das Brechen von Glasmessern sind ebenfalls Vorsichtsmassnahmen einzuhalten.

Das Entsorgen von gebrauchten Messern hat nach den örtlichen Bestimmungen zu erfolgen.

### Verletzungsgefahr beim Trimmen von Präparaten

Das Trimmen von Präparaten kann mit einer Rasierklinge durchgeführt werden. Dazu wird das Präparat in eine Trimmhalterung eingespannt. Bei der Handhabung der Rasierklinge ist extreme Vorsicht geboten!

Eine grössere Sicherheit wird durch die Benützung von Trimmmaschinen erreicht.

### Hohe Temperaturen der Lampen

Vor dem Öffnen des Lampengehäuses und vor dem Lampenwechsel ist der Netzstecker zu ziehen.

Vor dem Tausch der Halogenlampe ist eine Auskühlzeit von 15 Minuten erforderlich, um ein Verbrennen an der Lampe zu vermeiden.

Aus diesem Grund darf auch das Lampengehäuse bei eingeschalteter Lampe sowie in der Abkühlzeit bis 15 Minuten nach Betrieb nicht berührt werden.

Vor dem Tausch der Fluoreszenzlampen (Auflichtbeleuchtung) ist eine Abkühlzeit von 5 Minuten erforderlich.

## Safety Instructions

The instrument has been so designed and manufactured that the user is not exposed to any danger if the instrument is used as intended.

The observance of the directions in the operating instructions is a prerequisite for the intended use.

Furthermore, it is necessary that the user is trained in the use of this type of instruments.

The instruments are only allowed to be opened by authorized service personnel.

Before opening, the instrument has to be disconnected from the electrical mains supply.

The instrument is equipped with protected ground. Before connecting it to the local electrical supply, make sure that the mains has the required ground and that the instrument is connected to it in accordance with the legal regulations.

Unplug the instrument before installing or changing fuses.

### Danger of injury when contacting knives

Extremely sharp knives are used for sectioning the specimens which can lead to injuries when touched.

The knife must therefore only be mounted just before sectioning and must be removed from the knife holder after section collection.

As long as a knife is in the knife holder, the overhead illumination must be left switched-on.

Safety rules must also be observed for the breaking of glass knives.

The local regulations must be observed for the disposal of glass knives.

### Danger of injury during trimming of specimens

Trimming of specimens can be carried out with razor blades. Doing this, the specimen is clamped in a trimming-block and the excess material removed with a razor blade. Extreme caution is advised when using the razor blade!

Greater safety is obtained using trimming machines.

### High temperatures of lamps, bulbs and burners

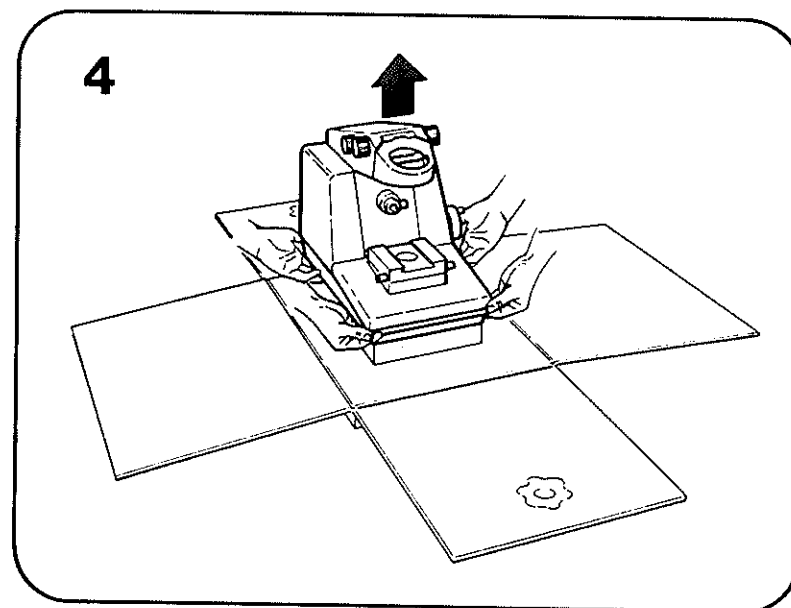
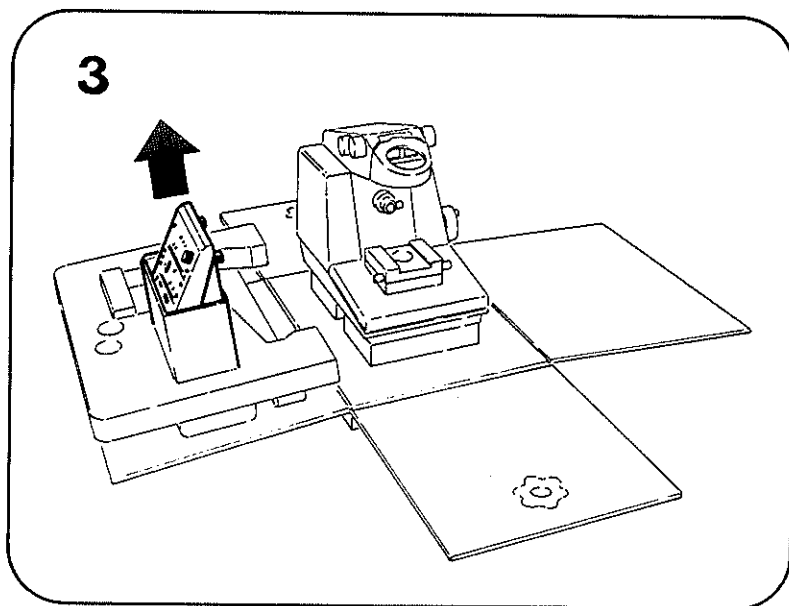
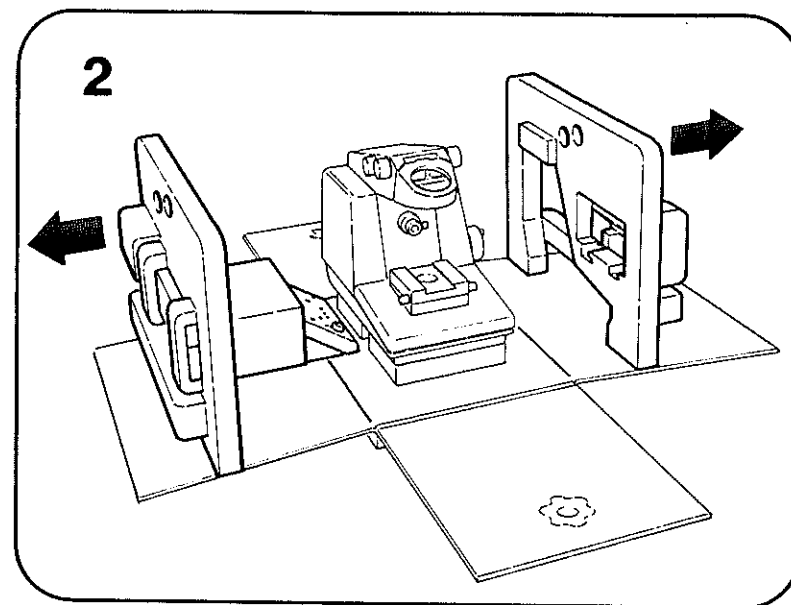
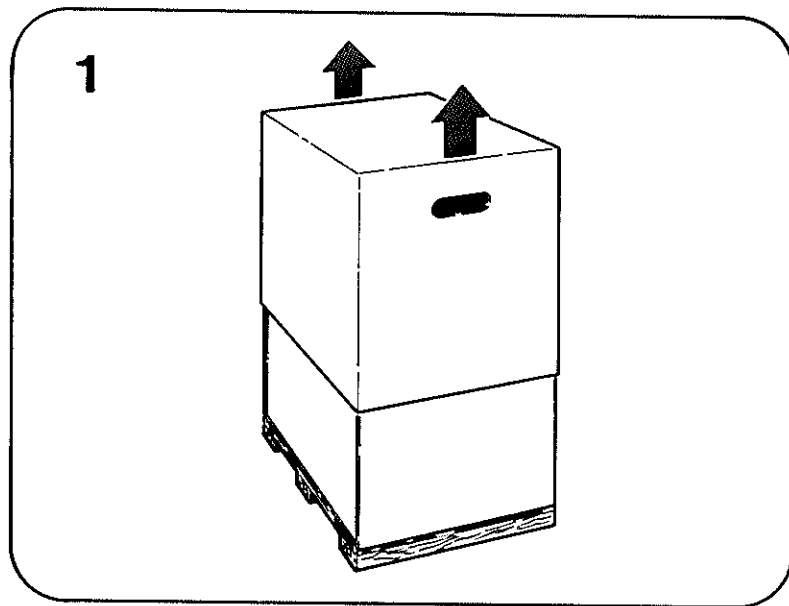
Unplug the instrument from the mains supply before opening lamp housings and changing bulbs. Allow at least 15 minutes cooling off period before changing the Halogen bulb to avoid severe burns on the bulb.

For this reason, also the lamp housing must not be touched as long as the bulb is on and during the 15 min cooling off period.

Before changing the fluorescent bulbs (incident light illumination) a cooling off period of 5 minutes is needed.

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# 1. Unpacking and Installation of the Ultracut S

When the instrument is supplied with a working table the ultramicrotome ULTRACUT S is packed in a special carton. This special carton is fastened below the working table. When the ULTRACUT S is supplied without working table the special carton is inside a second carton. Cut open the first carton on the top and take out the second carton. Pull off the upper part of the carton and unfold the four lateral walls of its lower part. See label on the carton.

The instrument is packed within foam pads. Remove the right hand pad first. Then put left hand side pad on its side, the control unit sticks in it. Now place instrument and control unit at the appropriate place (Table or Antivibration Base Plate).

## **IMPORTANT**

Do not operate the knobs which are now accessible until the transport lock has been removed. The ULTRACUT S should be lifted only by means of the lateral carrying ledges in the microtome base ( 1 ).

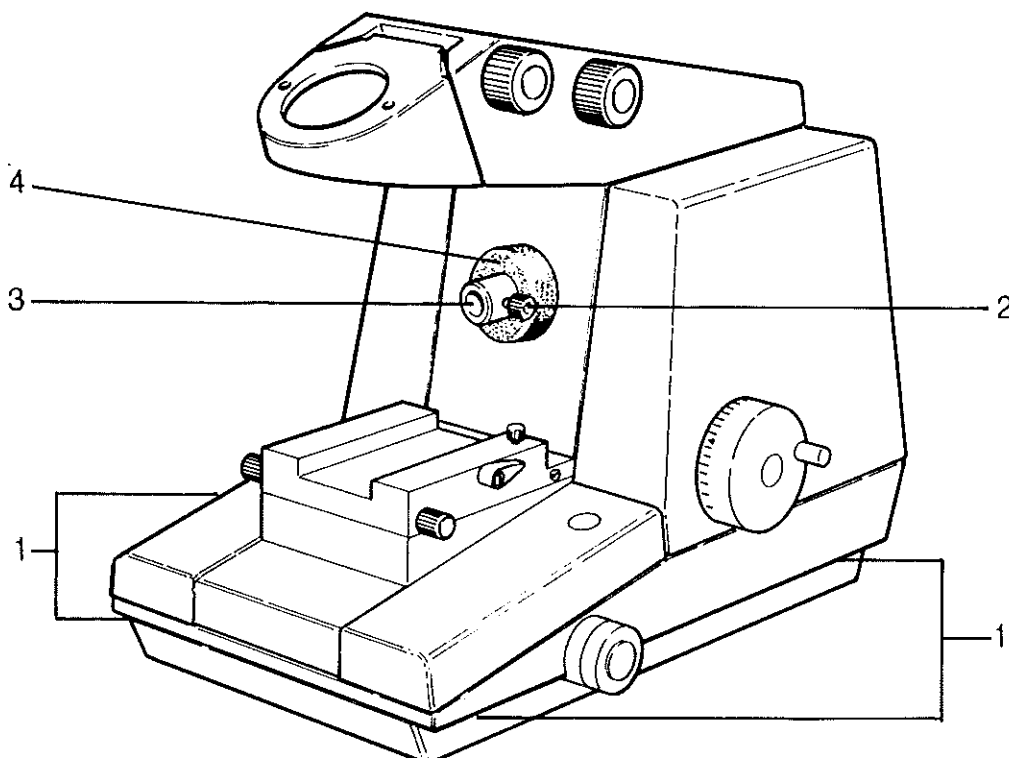
## **Removal of transport lock**

The ULTRACUT S is shipped factory sealed and it is neither for removing the transport lock nor during its operation necessary to open the cover. Remove knurled head clamping screw ( 2 ), hold specimen arm ( 3 ) in its position and pull out plastic insert ( 4 ) towards the front. Now lower specimen arm slowly to its lowest position.

Before transporting the ULTRACUT S again the transport lock has to be replaced. Remove knurled clamping screw ( 2 ), lift specimen arm ( 3 ) and push plastic transport lock over arm (as shown). Screw knurled clamping screw ( 2 ) back into specimen arm.

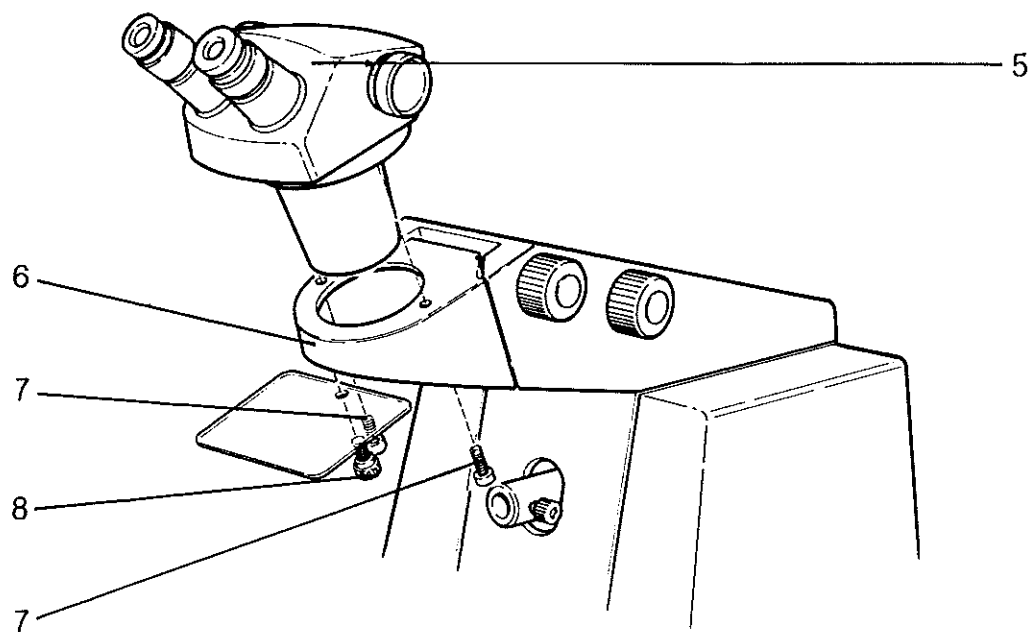
## **IMPORTANT**

After attaching the transport lock the handwheel must no longer be rotated. Shipment without transport lock as well as without special carton can cause damages. The special carton and the transport lock is available from your local Leica Agency or from Leica Aktiengesellschaft, A-1171 Vienna, Austria.



## Mounting of the Stereomicroscope

The stereomicroscope ( 5 ) is placed in the corresponding opening of the microscope carrier ( 6 ) and tightened with the 2 screws ( 7 ). Now the breath shield is mounted with knurled screw ( 8 ).





## ULTRACUT S Special Instrument Table

The instrument table with its special antivibration system is delivered assembled.

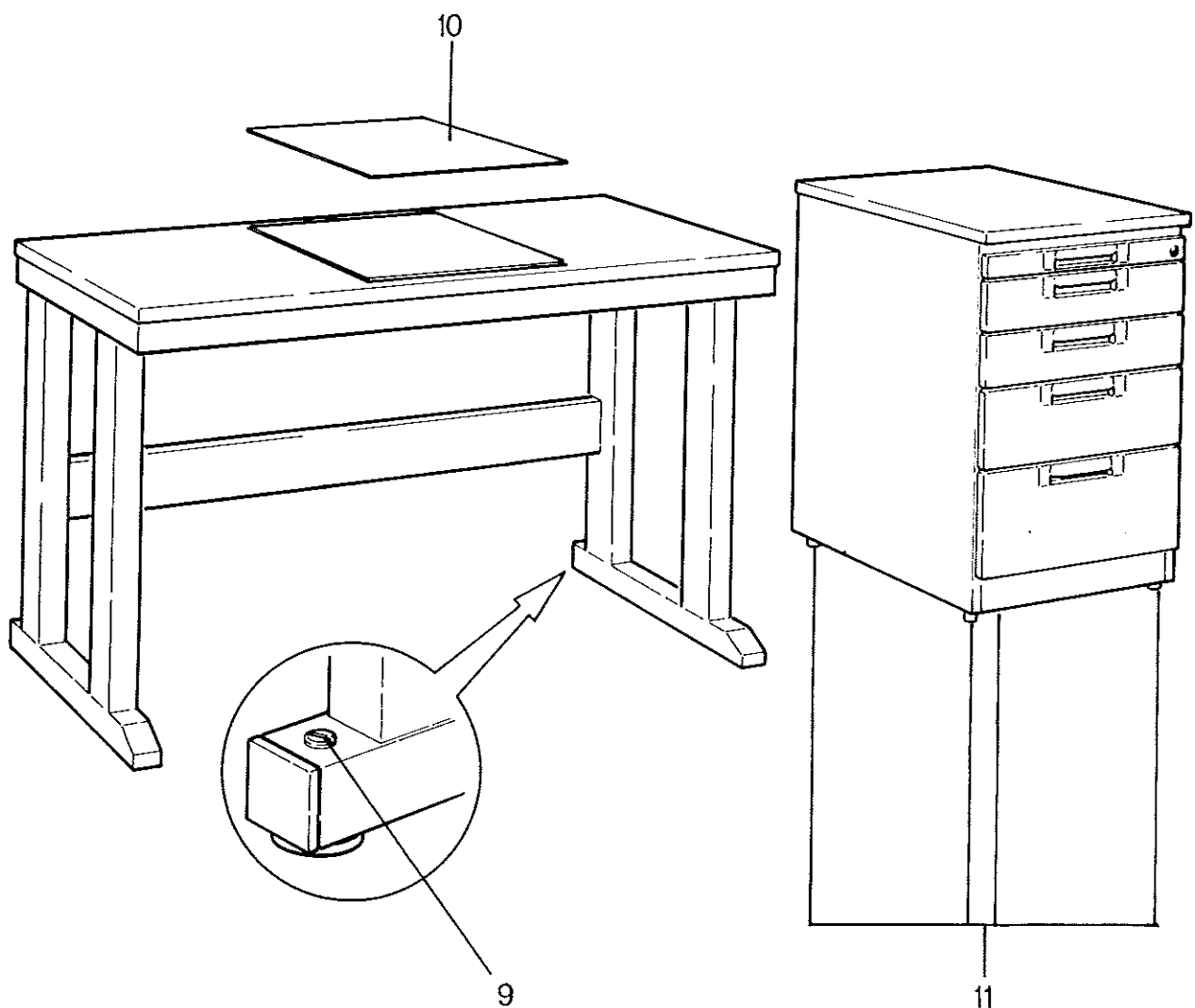
### IMPORTANT

After placing the table in its exact location the right leg ( 9 ) has to be adjusted to compensate for unevenness of the floor. This adjustment has to be carried out before putting the instrument on the table as follows:

Put the table exactly in the place provided for it, lift the table on the front in the middle, now lower it slowly and see whether the right and left front legs are touching the floor simultaneously. If not, adjust the levelling screw in the rear right leg ( 9 ) until repeated lifting and lowering guarantees that both legs contact the floor simultaneously.

Before placing the ultramicrotome on top of the table put the plastic sheet ( 10 ) symmetrically over it. Then place the ultramicrotome centrally on the plastic mat. Lift, do not slide!

If the special table is supplied with a drawer unit or the drawer unit is supplied subsequently, the following has to be observed. By adjusting the 4 legs ( 11 ) of the drawer units (either in or out) their height has to be adjusted to that of the instrument table. The side of the drawer unit and of the table should be parallel and the 4 legs should touch the floor.



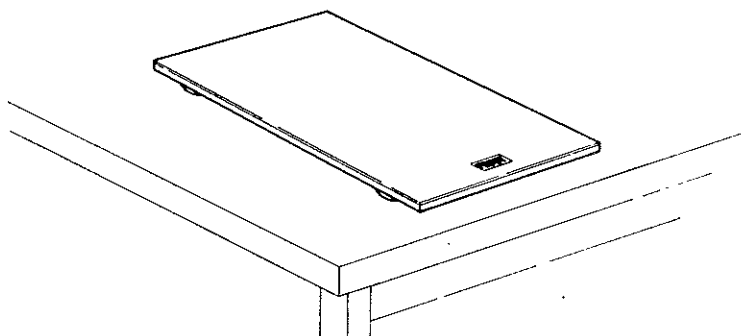
## ULTRACUT S Antivibration Base Plate

The antivibration base plate may be placed on any stable and even table. Take care that no objects are lying between table top and antivibration base plate - this would make the antivibration ineffective.

For the installation of the ultramicrotome in combination with the antivibration base plate masonry laboratory tables are particularly recommended (tiled chemistry tables). Standard laboratory tables grant good results as long as they have a table top of at least 35 mm thickness and absolutely rigid legs standing on a stable floor and are not in direct mechanical contact with other laboratory furniture.

In case of an unstable floor it is recommended to mount a wall console (steel profile 50 x 50 x 5 mm with wooded top of 40 mm) provided the supporting wall is strong enough. Place ultramicrotome in central position on the antivibration plate!

**Attention:** The sign FRONT must face the frontside of the ultramicrotome!

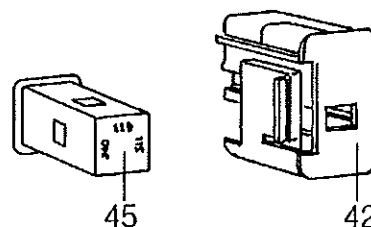
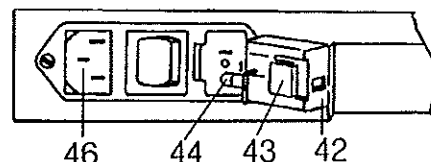
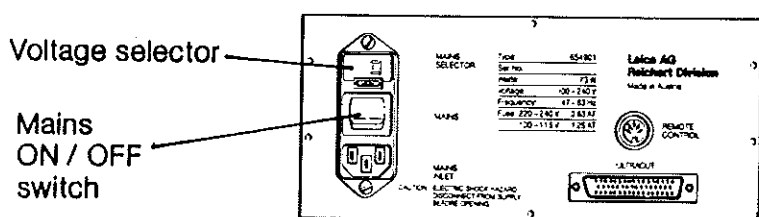


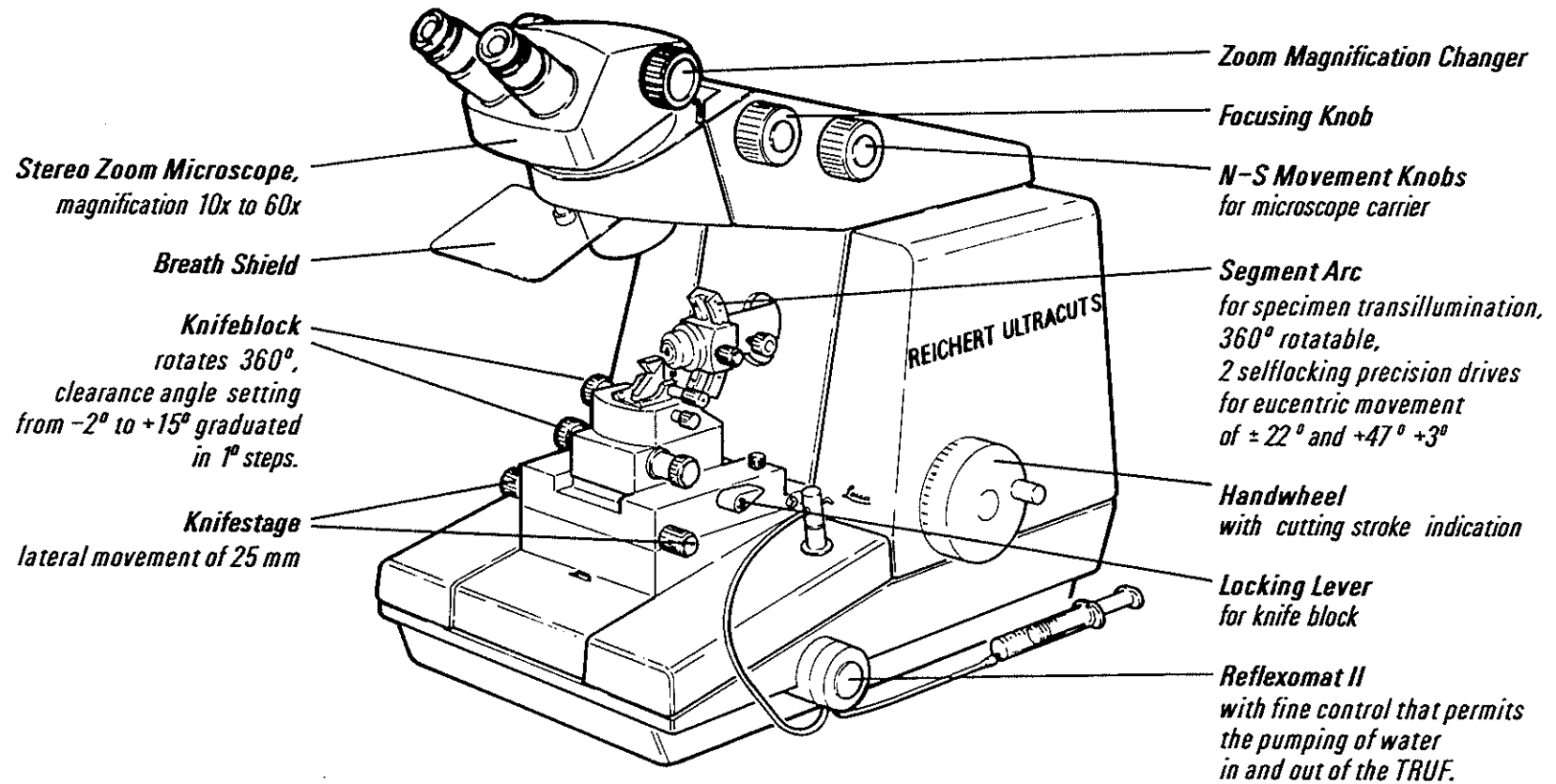
## ULTRACUT S Control Unit (Electrical Connections)

**Attention:** Before connecting to the mains make sure that the ON/OFF switch of the control unit is in position "OFF".

Check the voltage selector ( 42 ) to make sure the machine is set for the correct voltage. To change the voltage to a different setting. Press the lip ( 43 ) to the insert and remove the voltage selector ( 42 ) with the fuse ( 44 ) out. Turn the inner part ( 45 ) and select the voltage. Use for 110 Volt a mini fuse 1.25 AT and for 220 Volt a mini fuse 0.63 AT. Insert the plug of the power cord into the socket ( 46 ) and the other end into the mains.

When the setting of the line voltage selector has been checked the control unit can be connected to the mains by using the supplied power cord. Now connect by means of the multipin power cord the Ultracut with the control unit and make sure that the retaining screws are tightened.





## RETURN

### *Return Speed*

The choice of 10/20 or 30mm/sec return speed allows perfect matching of the cycling time to the particular situation.

## WINDOW

### *Cutting Window*

Two push-buttons, one for setting the START and one for setting the END facilitate the adjustment of the cutting window from 0.1mm to 14mm length.

## SPEED

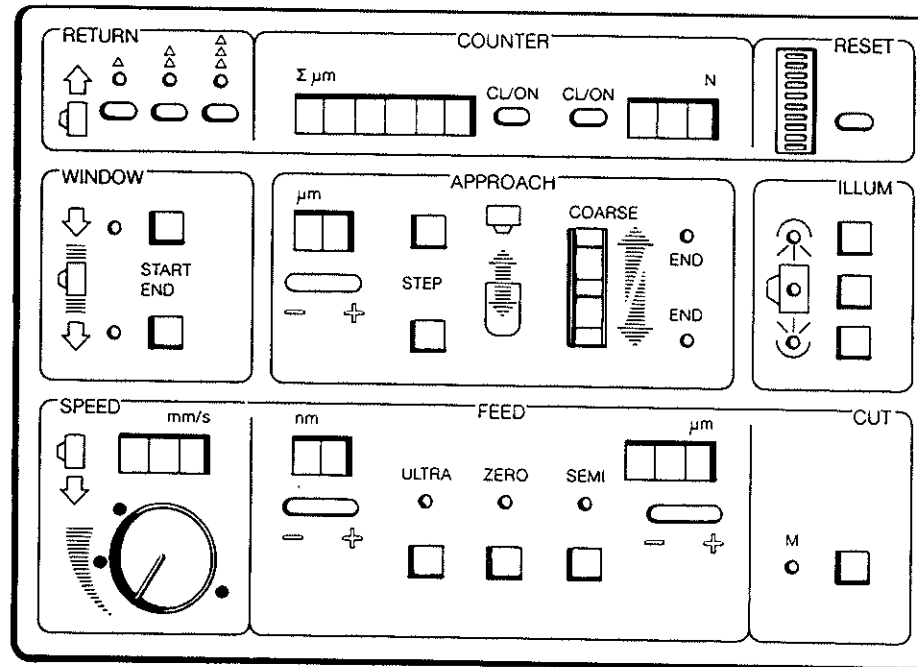
### *Cutting Speed Control*

The variable cutting speed has the extremely wide range from 0.05 to 100mm/sec. Click-stops at 1.0/2.5 and 50mm/sec.

## COUNTER

### *Section Counter and Feed Totalizer*

The section counter and the feed totalizer may be switched off and set to zero independently at any time. This display shows the total advance and the total number of sections cut from the moment of zero setting.



## APPROACH

### *Motorized Fine Feed*

over a range of 10mm. This feed is ideal for precise and effortless approach of knife to specimen. Variable speed joystick control and jog control with adjustable steps from 0.1 to 0.5 microns in 0.1 microns steps and from 0.5 to 5 microns in steps of 0.5 micron.

## FEED

### *Automatic Ultra Feed*

over a range of 200 microns.

Setting 5 to 95nm in 5nm increments.

### *Automatic Semi Feed*

over a range of 10 mm for sections with 0.01 up to 15 microns thickness. Sections from 0.01 up to 2.5 microns are adjustable in increments of 0.01 microns and sections from 3 up to 15 microns in increments of 0.5 micron. Push button for 0 advance.

## RESET

### *Advance Indicator and Reset Control*

Every bar of the 10bar LED-display that is lit indicates 20 micron feed. When the last LED lights-up, an acoustic signal alerts the operator of the end of the specimen advance. Instant resetting may be carried out at any time by depressing the reset button.

## ILLUM

### *Multi-Illumination System with Options*

Three push-buttons provide the following illumination modes

- 1 - Incident Light
- 2 - Darkfield
- 3 - Transillumination
- 4 - Incident Light + Darkfield
- 5 - Darkfield + Transillumination
- 6 - Transillumination + Incident Light
- 7 - Incident Light + Darkfield + Transillumination

## CUT

### *Operation Control*

Pushbutton "M" to start and stop the motor drive.

## **Achtung**

Bitte weder den Messerblock noch den Trimmblock mit denen anderer Ultramikrotome zu tauschen.

Messerblock und Trimmblock sind diesem Gerät angepaßt.

## **Important**

Please do not interchange knife block and/or trimming block with other ultramicrotomes.

Knife block and trimming block are matched to this instrument.

## **Attention**

Ne pas intervertir le support de couteau ou le bloc de taillage avec ceux d'un autre ultramicrotome.

Le support de couteau et le bloc de taillage sont spéciaux à cet instrument.

## 2. Operating Elements

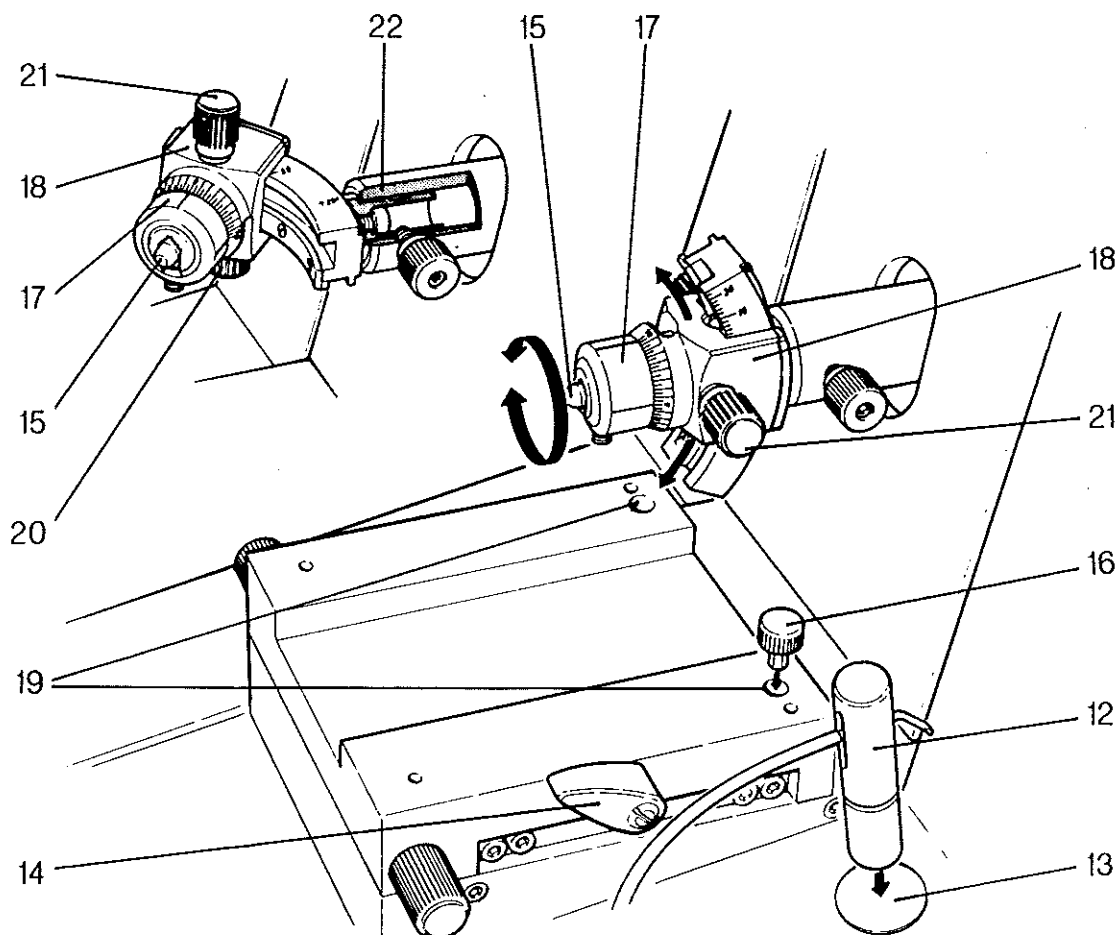
The following instructions for the use of the instrument will mediate all information of the proper use and maintenance of the ULTRACUT S ultramicrotome which unpacked and set up after removal of the transport lock is now ready for use. May we suggest you familiarize yourself with the operating elements and run through the following manipulations several times before starting sectioning.

### **Specimen - Knife Area - Trimming Block/Trimming Adapter**

Move the microscope carrier ( 6 ) to the side. Place the REFLEXOMAT spout ( 12 ) with its magnetic base on the steel plate ( 13 ). Unlock the lever ( 14 ) and lift the knife block upwards out of its guide and put it aside. After removal of the knife block, the segment arc and specimen holder are completely freely accessible and all manipulations can be easily carried out.

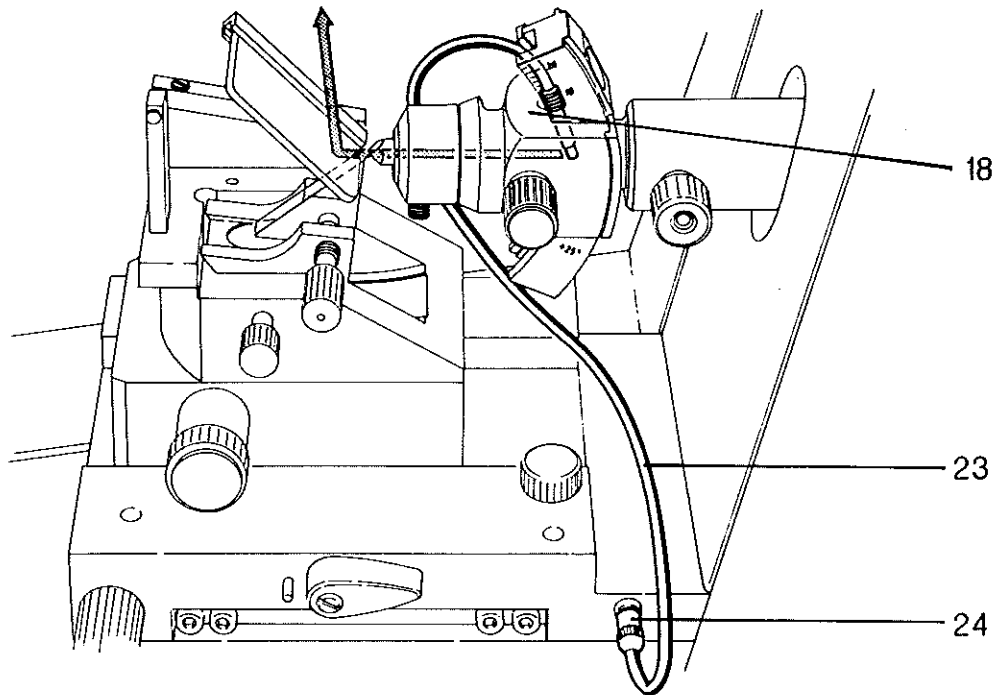
### **Vertical Use of the Segment Arc**

The specimen is fixed in the specimen holder ( 17 ) by means of a special key ( 16 ). The same special key ( 16 ) fastens the specimen holder in the segment arc. Store special key in either the right or the left opening in the support. In the horizontally used segment arc the specimen block ( 15 ) may be rotated about its long axis with knurled knob ( 20 ) and swivelled about its cutting face (arrows). Both controls of the segment arc are selflocking precision drives. For longitudinal or radial sections the shaft ( 22 ) of the segment arc can also be placed at the end position of the segment arc. This is done by unscrewing it from the center position and remount it again at the end position of the segment arc.



## Specimen Transillumination

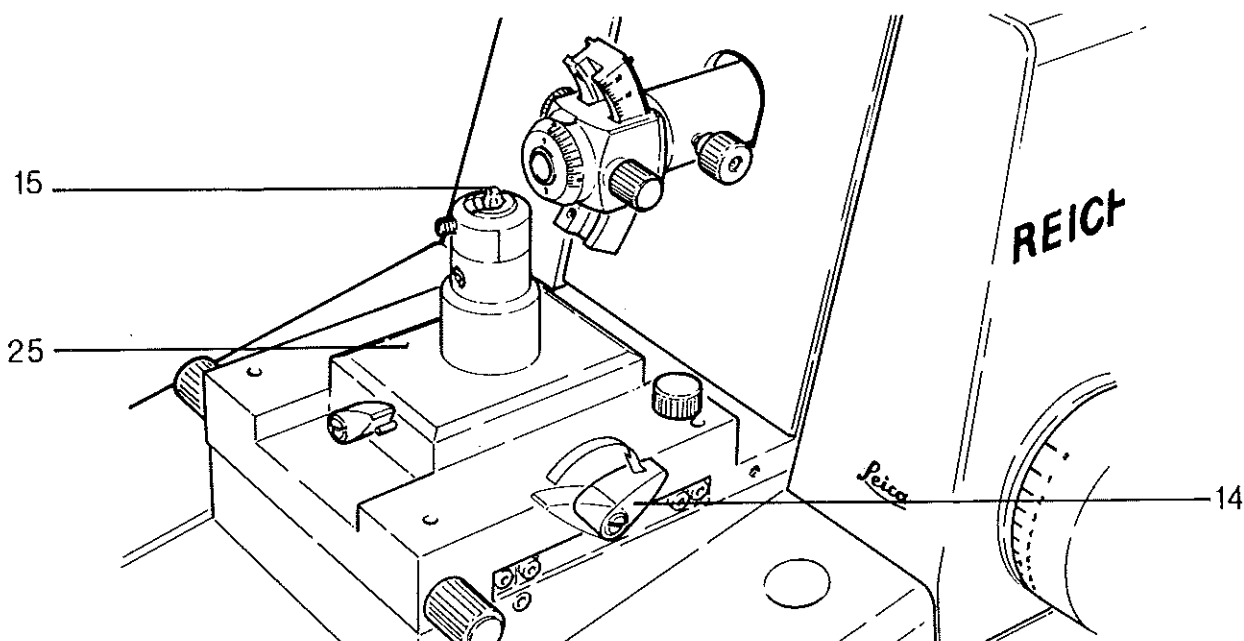
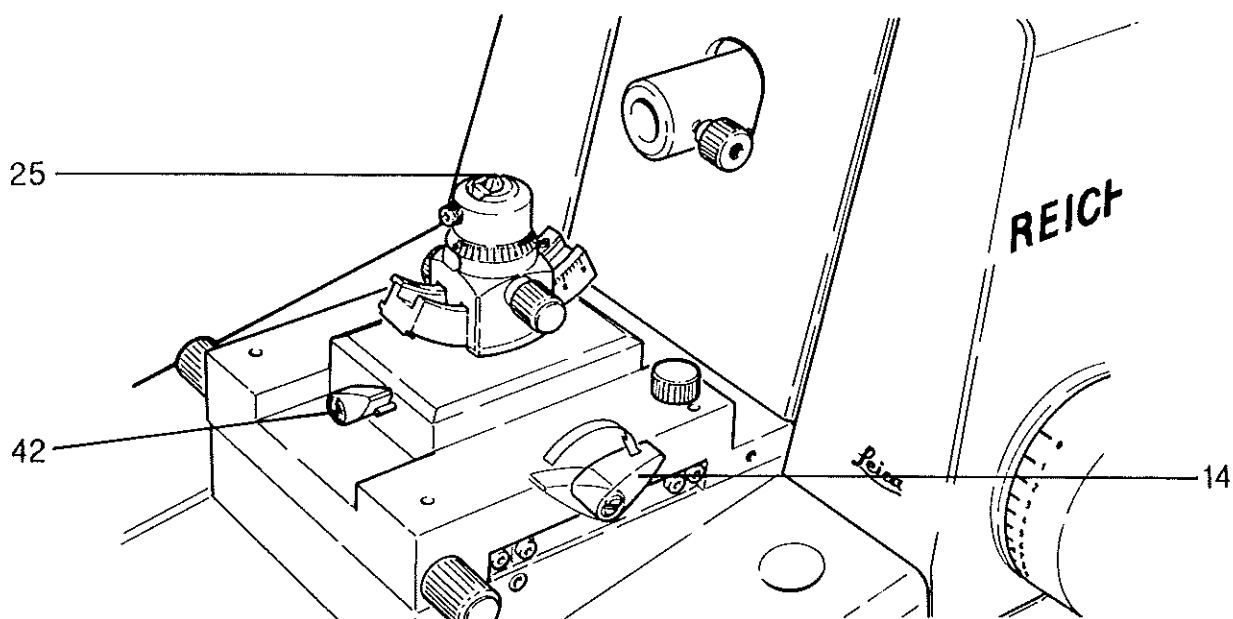
As an exclusive aid the segment arc of the ULTRACUT S has a possibility for transillumination. The transillumination is connected with the connecting cable ( 23 ) and its plug ( 24 ) to the outlet. The other side with the bulb is inserted into the swivelling part of the segment arc ( 18 ).



## Trimming Block / Trimming Adapter

For inspection of the block ( 15 ) or the cutting face as well as for manual trimming with a razor blade a trimming block ( 25 ) is supplied. It is placed into the guide track of the knife support in place of the knife block and clamped by the lever ( 14 ). After clamping the trimming block ( 25 ), the standard segment arc or the trimming adapter ( 42 ) can be put into the opening of the trimming block and clamped with lever ( 42 ). For expedient working coarse alignment of the specimen block in the stereo is made by opening the clamping of the trimming block and moving it along its guide into the center of the field of view and by swivelling the stereomicroscope left to right. Together with the trimming adapter the use of the very bright backlight is possible to trim selected parts of the specimen:

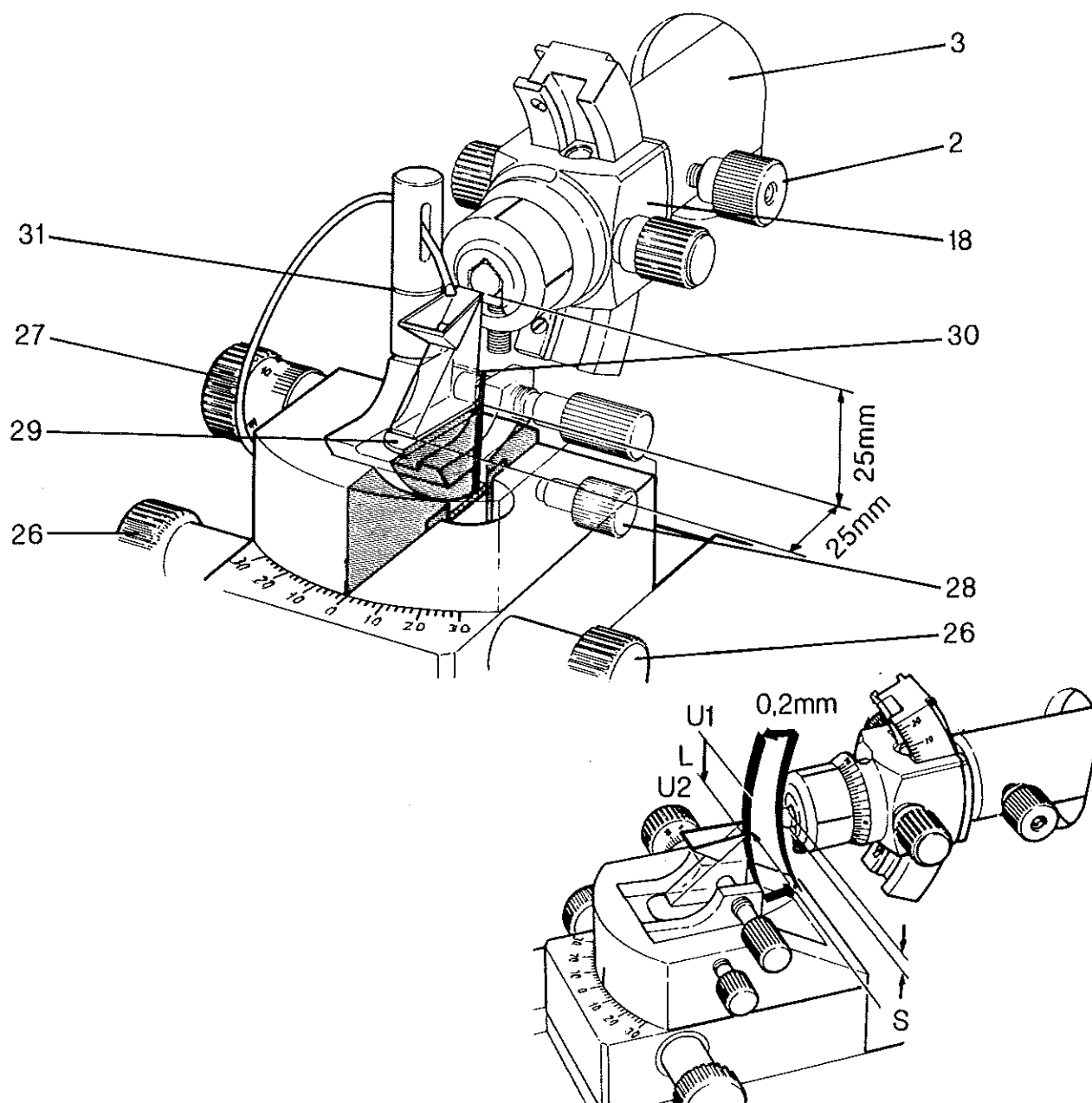
Fine adjustment at high magnification can be done with the knife support controls and as well as the stereomicroscope N-S control. To start the Zoom control should be set to the lowest magnification. Focusing is carried out with the controls. Further details are in the separate manual for the stereomicroscope.





## Knife block

After trimming, the segment arc ( 18 ) is taken from the trimming block, returned into the specimen arm and securely tightened with clamping screw ( 2 ). Now the clamping lever ( 14 ) is released and the trimming block ( 25 ) lifted from the instrument and the knife block put back into place and fixed with lever ( 14 ). The knife block consists of the upper portion, the lower part and the knife holder. For coarse and quick movement of the knife about the vertical axis the upper portion of the holder is rotated by hand in its selflocking bearing. Fine adjustment can be carried out with the selflocking precision drive ( 26 ). For moving or exchanging the knife holder the clamping screw ( 28 ), has to be released. The clearance angle may be set from  $-2^{\circ}$  to  $+15^{\circ}$  with the calibrated control. On the control knob ( 27 ) is a position (  $\blacktriangleleft$  ) which is used for the inspection of a knife with backlight illumination. The insert ( 29 ) with its mirror surface gives improved reflection in the block face and is for orientation of standard  $45^{\circ}$  knives with  $90^{\circ}$  base with consistent dimensions as produced with a knifemaker. When using knives higher than 25mm or knives with other shapes the insert ( 29 ) has to be removed. The front surface of the knife has to be pressed against the stop plate ( 30 ) and the height of the cutting edge has to be aligned with the red ring on the true filler ( 31 ) which is placed onto the knife holder as shown.



### 3. Basic Instrument and Control Unit

#### Drive system

To switch on the motor drive, the green button M in the section CUT has to be pressed.

The handwheel rotates and the specimen arm moves up and down. Rotating the control knob in the section SPEED varies the cutting speed between 0.05 and 100 mm/s. After having set a cutting window the cycling is as illustrated in the schematic drawing. The specimen slows down at switching point U1, goes slowly over the length L to switching point U2 after which it goes fast to the starting point U1.

During the return stroke the specimen is automatically retracted by approx. 0.2 mm so that the cutting edge S of the knife is not touched by the specimen in the return stroke.

If the specimen arm is in its retracted mode both red diodes in the section APPROACH - Joystick (COARSE) light up.

#### Cutting window

The length of the cutting window L on the ULTRACUT S has to be set the following way:

Move the lower edge of the blockface by means of the handwheel above the knife edge. Press button START in the section WINDOW.

The upper diode lights up.

Now move the blockface down until the upper edge of the blockface is below the knife edge. Press the button END, the lower diode lights up. This can be done for cutting window sizes from 0.1 mm up to 14 mm. The return speed can now be selected in the section RETURN by pressing one of the keys (10 mm/sec  $\Delta$  20 mm/sec  $\Delta$  or 30 mm/sec  $\Delta$  ).

#### Advance system, section thickness, section counter and feed totalizer

The left/right movement of the block is done with the 2 knurled knobs ( 26 ) on the mechanical stage. The motorized knife advance (back/forward) is done by means of the joystick (COARSE) in the section APPROACH. The total range is 10 mm. If the end of travel is reached a red diode lights up - please reset. There is also a possibility of a stepwise advance from 0.5  $\mu\text{m}$  up to 5  $\mu\text{m}$ . The thickness setting is done by pressing the  $\pm$  key and the advance or retraction by pressing the STEP buttons.

**Attention:** The motorized single step advance (0.5  $\mu\text{m}$  to 5  $\mu\text{m}$ ) operates only outside the cutting window and in the cutting stroke, not in the retractive mode. Any wrong operation will be indicated by an acoustic signal.

The fine feed has to be set in the section FEED. The range is 5 nm to 95 nm for ultrathin sections and 0.01  $\mu\text{m}$  - 15  $\mu\text{m}$  for semithin sections. There is also a ZERO setting where no advance at all takes place. The fine feed works automatic and manually.

The range of the FEED is 200  $\mu\text{m}$ . The 200  $\mu\text{m}$  are indicated in the section RESET with 10 bars.

Each bar represents 20  $\mu\text{m}$ . When all 10 bars light up press the RESET button for 2 seconds for the automatic reset. The section COUNTER shows the numbers of sections done and the thickness of material already sectioned. Both values can be reset by pressing the respective button or switched off completely.

## Setting the thickness for semithin sections

The standard range is from 0,01  $\mu\text{m}$  up to 2,5  $\mu\text{m}$  for automatic semithin sectioning. The thickness has to be set in the section FEED with the button SEMI $\pm$ . The extended range is from 3 $\mu\text{m}$  up to 15  $\mu\text{m}$  and works over a range of 10 mm. This enlarged range of thickness can be set by programming the SEMI limit Adjustment "SEL" which is in the instruments users menu:

Range: 1  $\mu\text{m}$  - 15  $\mu\text{m}$

Steps: 0,5  $\mu\text{m}$ , from 1  $\mu\text{m}$  up to 10  $\mu\text{m}$   
1  $\mu\text{m}$  from 10  $\mu\text{m}$  up to 15  $\mu\text{m}$

**Attention:** with a thickness setting from 1  $\mu\text{m}$  or more it is not possible to switch from ULTRA or ZERO into the SEMI range whilst the motor is on. This is a precaution for the use of a diamond knife. For the adjustment of sections for 3  $\mu\text{m}$  or thicker the following has to be done:

1. Push all 3 RETURN buttons and the button for the backlight illumination in the section ILLUM at the same time, now you are in the menu.
2. In the section FEED you will see ALA and O4.
3. Push the button  $\pm$  in the SEMI display until SEL and 2,5 appears (2,5  $\mu\text{m}$ ).
4. Now push the button  $\pm$  in the ULTRA-display until the desired thickness appears. You can set the thickness from 1  $\mu\text{m}$  up to 15 $\mu\text{m}$ . However the thinnest section always remains 0,01  $\mu\text{m}$  only the upper end (1  $\mu\text{m}$  - 15  $\mu\text{m}$ ) can be altered. So the smallest range is 0,01  $\mu\text{m}$  up to 1 $\mu\text{m}$  and the largest range will be 0,01  $\mu\text{m}$  up to 15  $\mu\text{m}$ .
5. To enter the chosen setting you have to push once again all 3 RETURN buttons and the backlight illumination button at the same time. The display on the control unit will show:

RETURN: middle speed

APPROACH: 1  $\mu\text{m}$  step

FEED: SEMI 0,35  $\mu\text{m}$   
ULTRA 70 nm

**Attention:** To start automatic sectioning with a section thickness of 3  $\mu\text{m}$  or more you have to press the motor button approximately 1 second to start the instrument. This is another safety precaution for the use of a diamond knife.

## Special Functions

### Acoustic alarm

There are acoustic alarm signals whenever an incorrect operation is attempted e.g. - if the specimen arm is in its retracted mode and the advance is operated and if the end of travelling for the mechanical stage is reached.

The loudness of this alarm can be adjusted the following way:

1. Press all three keys in the RETURN section and the key back illumination in the section ILLUM at the same time (you are now in the reprogramming mode).
2. In the section FEED you can read now in the SEMI display ALA (Alarm) and in the ULTRA display the figures O4. This is the standard setting. Press now the key ULTRA  $\pm$  and decrease (down to 0) or increase (up to 15) the loudness of the signal.

**NOTE:** In the setting 0 there is no acoustic signal at all!

3. To enter the new setting you have to press all three RETURN keys and the key back illumination once again at the same time. Now you have entered the new programme.

### Continuous advance by means of the STEP keys

1. Press all 3 RETURN keys and the back illumination key at the same time - you are in the menu.
2. In the section FEED you will see in the ULTRA-display 04 and in the SEMI-display ALA. Press now the key  $\pm$  in the SEMI-display until StP appears and in the section COUNTER SINGLE. This is the standard setting. Press now the  $\pm$  key in the section COUNTER once and rPEAt appears in the window.
3. To enter the new setting you have to press once again all 3 RETURN keys and the back-illumination key at the same time.

#### Attention:

The STEP key is not in operation if the specimen arm is in its retractive mode during approach of knife to specimen. Acoustic signal. During sectioning (motor on) the STEP advance is not operating within the set cutting window to avoid any advance during sectioning. Acoustic signal.

### Illumination, Observation and Adjusting the Reflection in the Boat

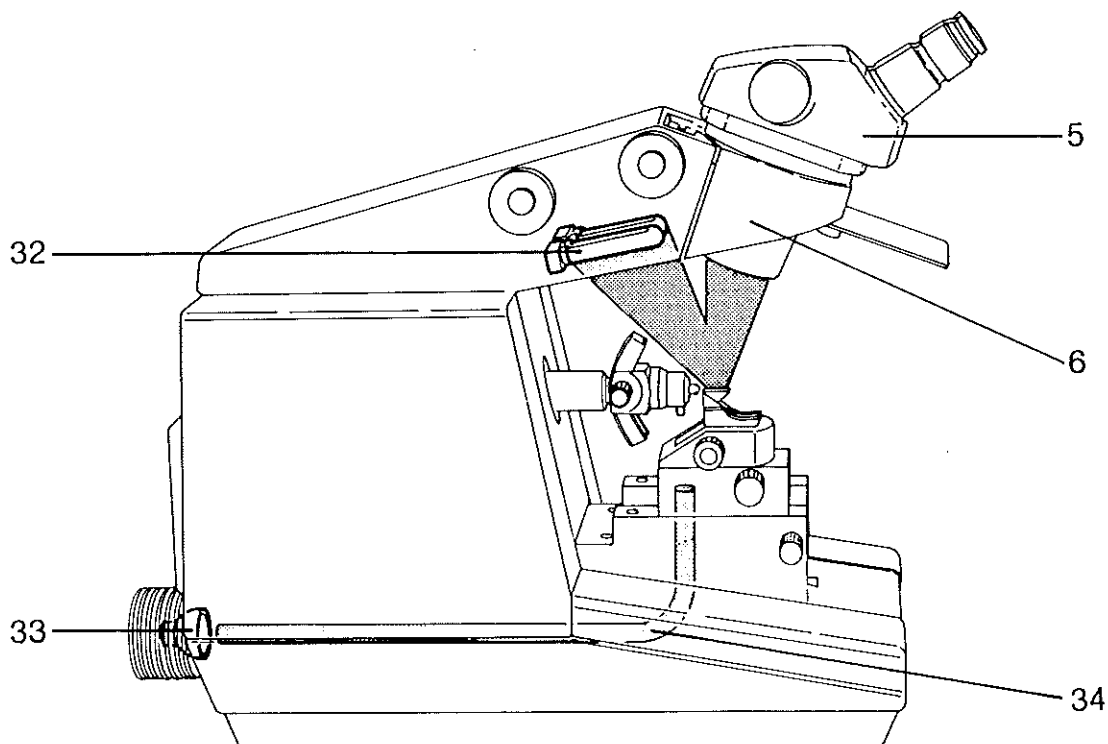
The ULTRACUTS has three light sources:

The prealigned twin-tube fluorescent illuminator ( 32 ) built into the microscope carrier ( 6 ) which is so aligned to the stereomicroscope ( 5 ) that an exactly plane and horizontal surface (water surface in the boat of the knife) reflects the light from it into the objective of the stereomicroscope ( 5 ) (incident light).

The second light source is in the lamp housing ( 33 ) on the rear of the ultramicrotome:

The light from it comes through the light guide ( 34 ), through the knife support, the knife block and illuminates the knife and specimen from below (backlight illumination).

The third light source can be mounted into the segment arc and illuminates the specimen from behind (transillumination). Switching from one to the other lightsource and mixing any combination is done in the section ILLUM by pressing the desired buttons.



## **General applications :**

Incident light for glass knife approach, observation of the cutting process and judgement of the section thickness. Backlight illumination for alignment of diamond and glass knives and for knife inspection for contaminations and flaws (nicks) before sectioning. Transillumination for locating and identifying interesting structures within the specimen block when trimming with the MESACUT or with the trimming block.

For observation and adjustment of the reflection the stereomicroscope ( 5 ) has to be moved over the specimen/knife area and focussed with the controls.

The magnification of the optics can be varied with the Zoom magnification changer.

If the Zoom Magnification Changer is in position 1 one square in the eyepiece reticule is 0,5 mm. This enables you to measure precisely the size of the block face.

The knifeboat (TRUF) is filled by means of the Reflexomat 2 and the correct waterlevel (reflection) adjusted. For this purpose you place the spout (magnetic) on the knife holder so that the spout looks inside the knifeboat. Rotating the knob ( 37 ) is now pumping water into the knifeboat and by looking through the microscope the correct water level ( reflection) is adjusted.

## **Preparations for sectioning**

After having familiarized yourself with the individual operating parts of the ULTRACUT S system you may proceed as follows:

### **Preparation for sectioning:**

1. Switch on control unit (main switch)
2. Select required illumination and switch on
3. Move microscope to left hand side
4. Remove knife block, lift upwards
5. Turn handwheel to index 7 (arrow)
6. Put specimen block into specimen holder. Now insert specimen holder into segment arc and tighten
7. Segment arc, specimen holder and specimen are now inserted into the trimming block and mounted onto the mechanical stage. Lock all parts properly
8. Set stereomicroscope to lowest magnification and shift trimming block into field of view (N-S) by hand. Now clamp trimming block
9. Set magnification to index "1". One square is 0,5mm
10. Trim the block with razor blades to desired size
11. After trimming replace segment arc into specimen arm and lock it. The segment arc is normally used in a vertical position
12. Take off trimming block/adaptor and put knife block back
13. Look through the microscope and shift knife block with knife close to the block face
14. Now the knife to blockface alignment is done by the means of the selflocking drives
15. Fill Reflexomat syringe with Aqua Bidest
16. Now the final knife to block face alignment is done. Use first incident and then backlight illumination . Backlight illumination has to be used specially for diamond knives
17. Set the cutting window with buttons START and END
18. Fill the knife boat and adjust the reflection
19. Set the feed for ultrathin to 70 nm and the semithin feed to 0.35  $\mu\text{m}$ . For diamond knives select 50 nm thickness
20. Set cutting speed to 50 mm/sec. (only for glass knives), there is a click stop
21. Set thickness to SEMI (0,35 $\mu\text{m}$ ). Diode lights up
22. For the automatic start of sectioning press button M. Observe sectioning through microscope. Keep your hand on the cutting speed control knob
23. After the first fragments of sections are cut change cutting speed to 2,5 mm/sec. Section until whole blockface is cut. Switch over to ultrathin
24. Wait for even sectioning of golden or silver sections
25. Change to required section thickness (nm)
26. For picking up sections stop motor immediately after last section (specimen is below knife)
27. To continue sectioning, press again button M

## 4. Care and Maintenance

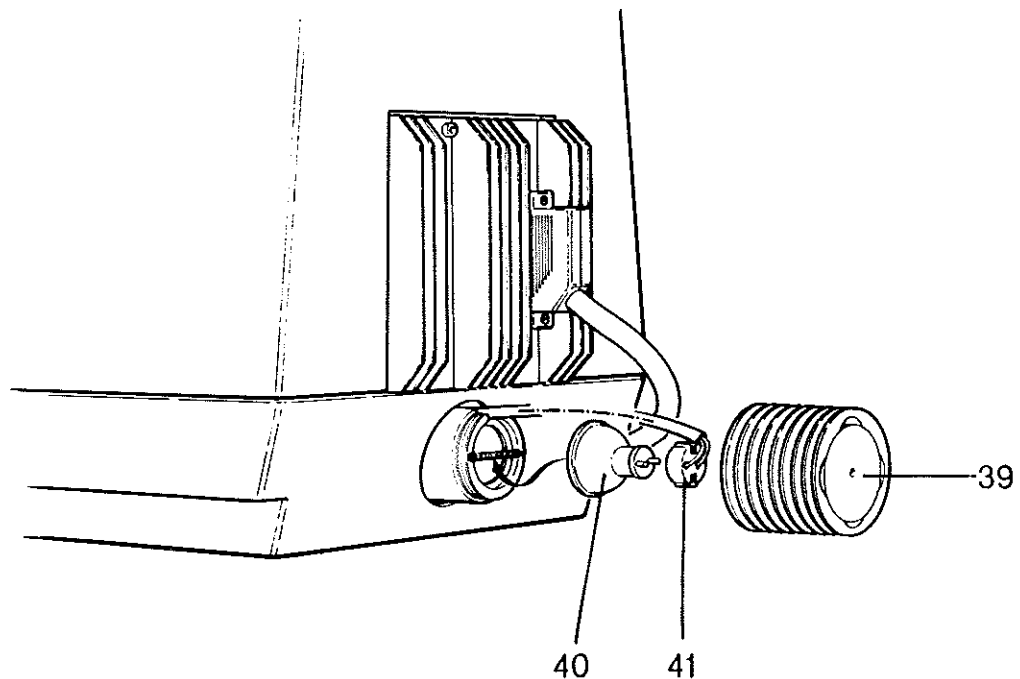
Since glass fragments and dirt may cause instability of the knife carrier and the knife holder it is essential that the knife holder and guide track for knife carrier are periodically cleaned with alcohol at least once a week or daily if used every day before starting to work.

### Replacement of Backlight Bulb

**Attention:** Switch off mains of the control unit

1. Unscrew lamp housing complete ( 39 )
2. Remove bulb ( 40 ) and socket ( 41 )
3. Take out bulb of socket
4. Replace bulb and remount again

**Bulb:** 86 00 32 halogen reflector 8V/20W

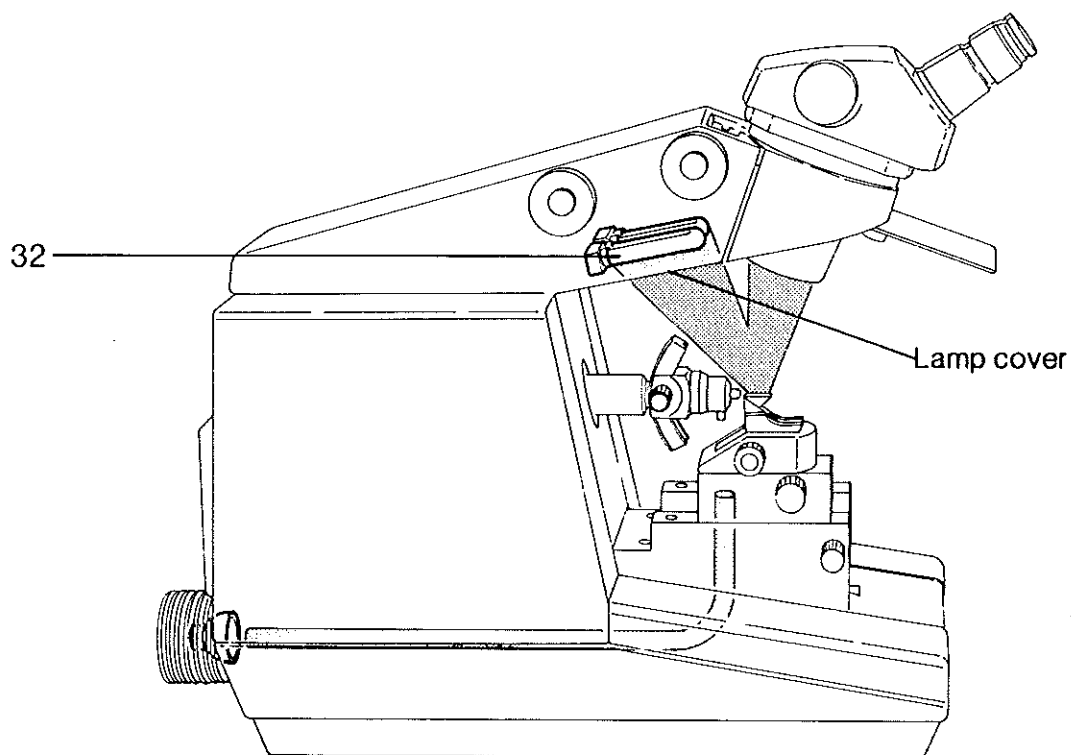


## Replacement of Incident Light Bulb

### Attention:

Switch off mains at the control unit. Raise microscope to highest position.

1. Lower lamp cover by pulling downwards
2. Remove bulb ( 32 )
3. Insert new bulb
4. Put back lamp cover





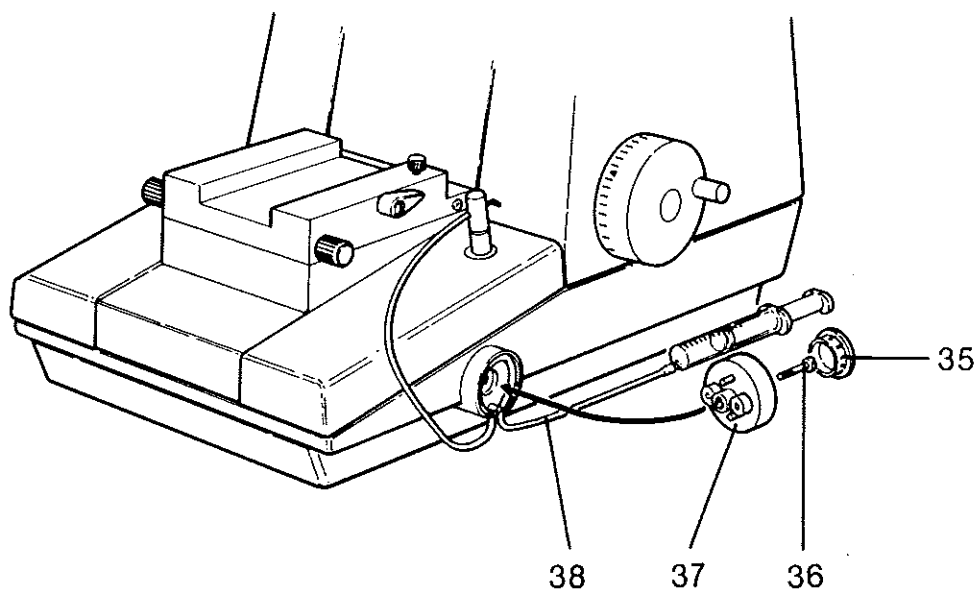
## Replacement of Transillumination Bulb

1. Unplug transillumination bulb and cord.
2. Remove (pull) bulb
3. Insert new bulb and remount

**Bulb:** 86 00 38 6V/1W

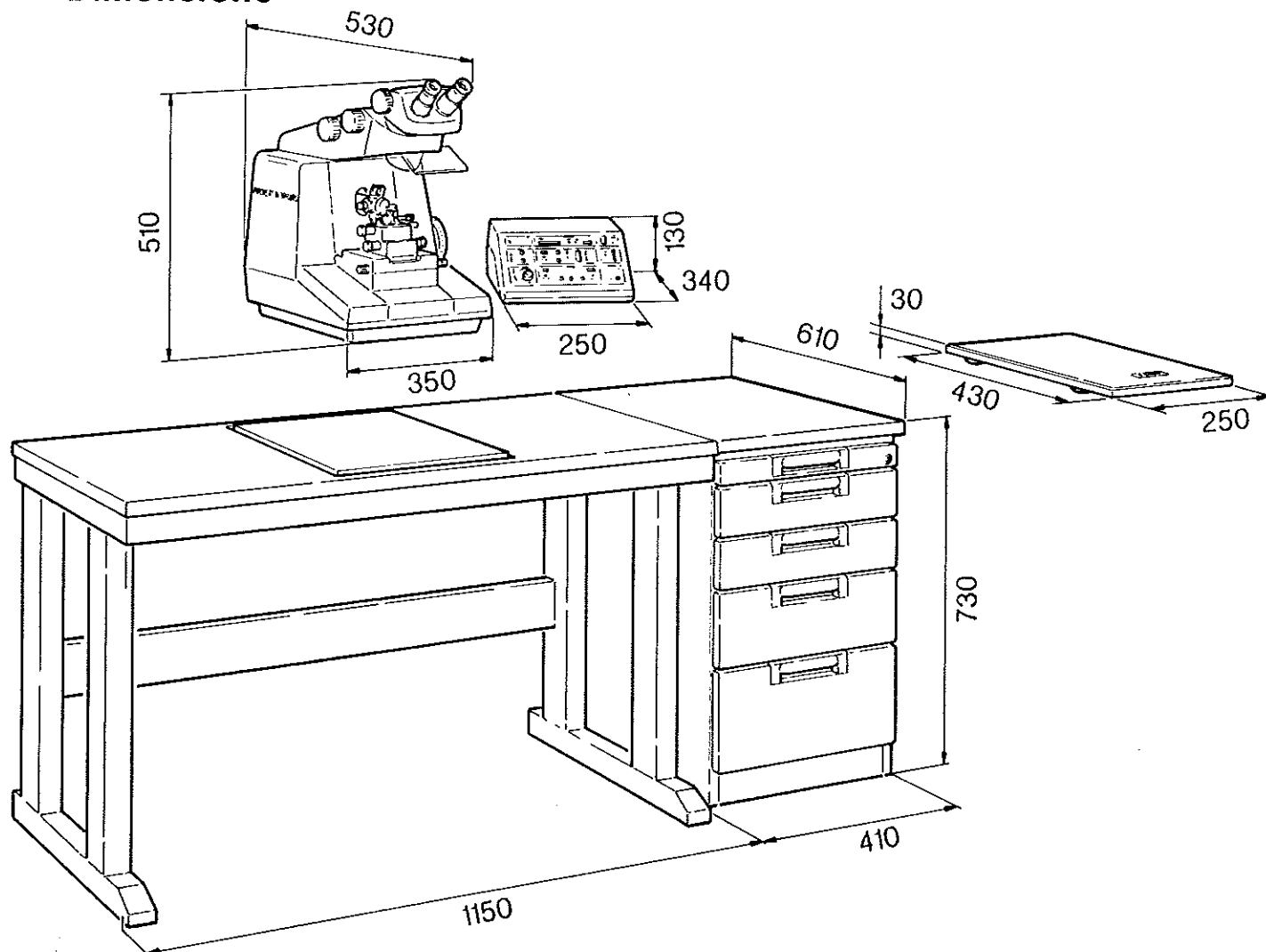
## Replacement of Silicon Tubing of the Reflexomat 2

1. Remove cap ( 35 ) of Reflexomat filling knob
2. Open Allan screw ( 36 ) and take off knob
3. Replace tubing ( 38 )



## 5. Technical Specifications

### Dimensions:



### Weights:

Working table	70 kg
Drawer unit	38 kg
Ultracut S	41,5 kg
Control Unit	6,5 kg
Antivibration Plate	2,5 kg

### Electrical Data:

Control unit: Volts 115/220/240  
HZ 50/60

Fuse:	115 V	1,25 AT
	220 V	0,63 AT
	240 V	0,63 AT

## 6. Accessories and Spare Parts

70 54 01	Multiplate hotplate
70 17 41	Mesacut 2 structure viewer with special mirror
70 17 61	Universal specimen holder UT
70 17 62	Flat specimen holder FT
70 25 98	Draught shield for Ultracut S
70 52 25	Knifebox, 3 pcs.
70 55 25	Gridbox for 100 grids, 10 pcs.
84 00 31	Glass strips 6.4 mm, 30 pcs.
84 00 32	Glass strips 8.0 mm, 24 pcs.
84 00 42	Trufs for 6.4 mm glass 500 pcs.
84 00 45	Trufs for 8.0 mm glass, 500 pcs.
84 01 09	Dental wax,
84 01 71	Razor blades, 1x10 pcs.
70 50 91	Single edged blades 2 x 5 pcs
84 01 12	Copper grids 100 mesh, 100 pcs.
84 01 14	Copper grids 200 mesh, 100 pcs.
84 01 15	Copper grids 300 mesh, 100 pcs.
84 01 16	Copper grids 400 mesh, 100 pcs.
84 00 43	Easymold embedding mould for 50 x 5.6 mm diameter
84 00 44	Easymold embedding mould for 50 x 8.0 mm diameter
84 01 05	Tweezers with straight tips
84 01 04	Tweezers with curved tips
89 50 05	Dust cover for Ultracut S basic unit
89 50 29	Dust cover for Ultracut S control unit
70 25 97	Special tubing for Reflexomat
70 04 21	Knurled head Allan key 3 mm
70 25 40	Breath guard for standard stereo BL
70 25 85	Breath guard for special stereo WL
70 17 54	Case for accessories
70 25 32	Knifeholder insert with two different surfaces
86 01 60	Mini fuse 0.63AT for 220 VAC
86 01 63	Mini fuse 1.25AT for 115 VAC
86 00 38	Pin-socket bulb 6V 1W for segment arc
86 00 32	Halogen reflector lamp 8V 20 W for backlight illumination
87 00 41	Compact energy saving fluorescent tubes
70 26 36	Adaptor for LKB-specimen holders
70 57 26	Drawer unit with table top 0.61x0.42m and 4 drawers
70 25 25	Trimming block