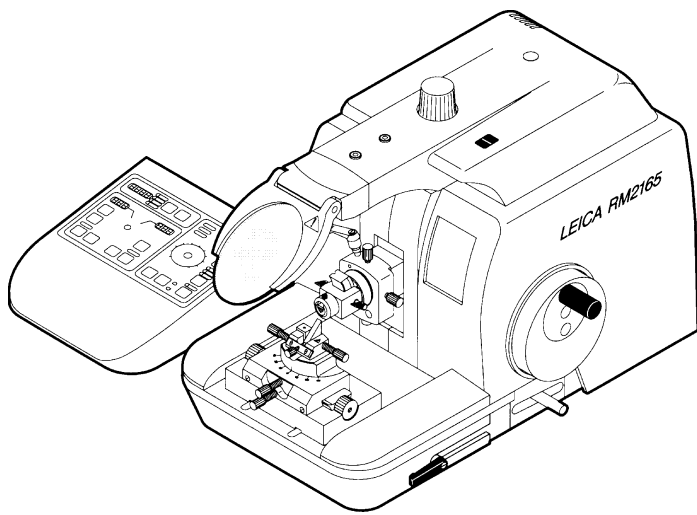




Leica RM2165

Rotary Microtome

Instruction Manual

Leica RM2165 V1.2 English – 06/2002
Always keep this manual near the instrument!
Read carefully prior to operating the instrument!

Leica
MICROSYSTEMS

Serial No.

Year of manufacture

Manufactured in: Federal Republic of Germany

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For the instrument serial number and year of manufacture, please refer to the name plate at the back of the instrument.



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The safety devices on the instrument and accessory equipment must not be removed or modified!

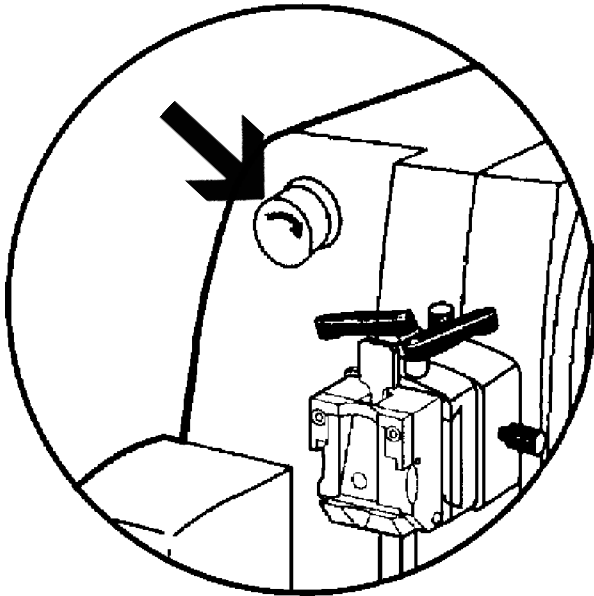


Fig. 5.1

E-STOP

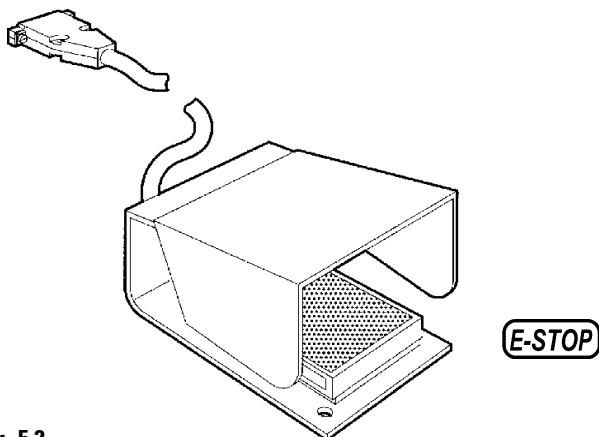


Fig. 5.2

3.1 Safety devices

The instrument incorporates the following safety devices: safety handwheel, emergency-stop switch, protective guard on the foot switch (optional accessory) and knife guard on the knife holder.

The consistent use of these safety features and strict observation of the warnings and cautions in this manual, will safeguard the operator from accidents and/or personal injury to a great extent.

3.1.1 Emergency-stop switch

The instrument has an emergency stop function which is activated with the red emergency-stop switch on the front of the instrument (Fig. 5.1) or with the foot switch (Fig. 5.2)

Performance check

- Push the emergency-stop switch.

The sectioning motor will stop immediately.

E-STOP (red) on the control panel illuminates indicating that the emergency-stop function is activated.

- To deactivate, turn the red emergency-stop switch in the direction of the arrow.

E-STOP (red) on the control panel extinguishes.

3.1.2 Foot switch with protective guard (optional accessory)

The sectioning motor is started with the foot switch. The foot switch is provided with a protective guard to prevent unintended activation.

In addition, the foot switch incorporates a function similar to the emergency-stop function.

Performance check

- Firmly press the foot switch.

The sectioning motor stops immediately upon activation of the emergency-stop function.

E-STOP (red) on the control panel illuminates as long as the foot switch is held down.

3. Safety instructions for handling the instrument

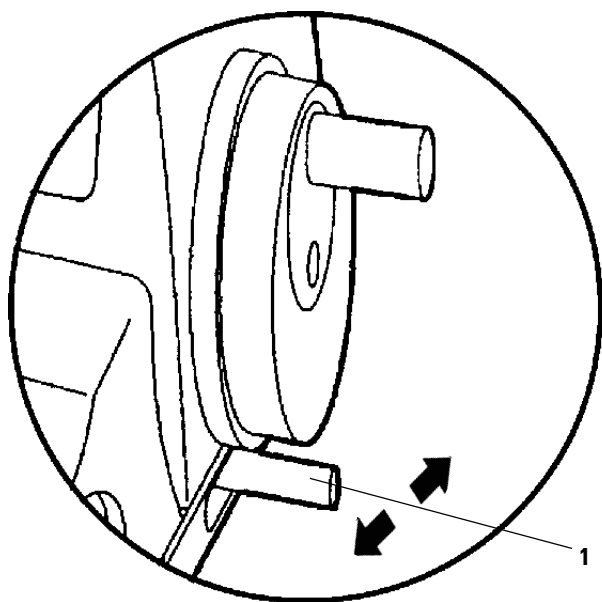


Fig. 6.1

LOCK

3.1.4 Safety handwheel

Activating the mechanical handwheel brake



Always lock the handwheel prior to manipulating the knife and specimen or before changing the specimen or knife!

The handwheel can be locked in any position using the locking lever (1) on the right side of the microtome base plate.

Performance check

- To activate the brake, pull the locking lever (1) **entirely** to the front.

The sectioning motor is then electronically and mechanically blocked.

LOCK (yellow) on the control panel (Fig. 23) illuminates.

- To release the brake, push the locking lever (1) to the rear.

LOCK extinguishes.

The sectioning motor can then be again activated.

Centering the handle



The handle must always be centered in motorized operation to prevent injury by the revolving handle (Fig. 6.3).

- Activate the mechanical handwheel brake.
- To center, lightly pull the handle (1) out (Fig. 6.2) and rotate it to the center of the handwheel (Fig. 6.3).
- The handle will lock when released.

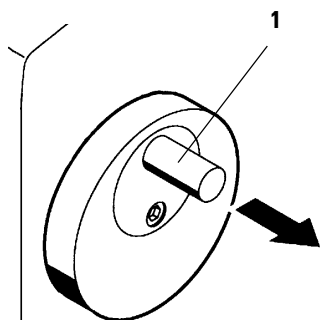


Fig. 6.2

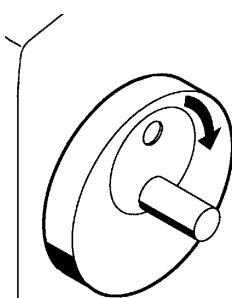
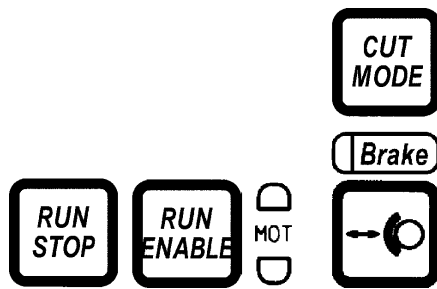


Fig. 6.3

3.1.5 Electronic handwheel brake



The electronic handwheel is activated and deactivated by means of button on the control panel.

Once activated, the handwheel motion becomes tight and the motorized sectioning functions are inoperational. Nevertheless, it is still possible to move the handwheel by using force.

Activating the mechanical handwheel brake neutralizes the effect of the electronic brake automatically.

- Press the button to activate the electronic handwheel brake.

The green BRAKE LED illuminates. All motorized sectioning functions are inoperational, and the handwheel becomes extremely difficult to turn.

- Press the button again to deactivate the electronic handwheel brake.

The green BRAKE LED extinguishes. All motorized sectioning functions are operational.

When activating the mechanical handwheel brake while the electronic handwheel brake is activated, the BRAKE LED extinguishes and LOCK (yellow) illuminates. The electronic handwheel brake function is then inoperational.

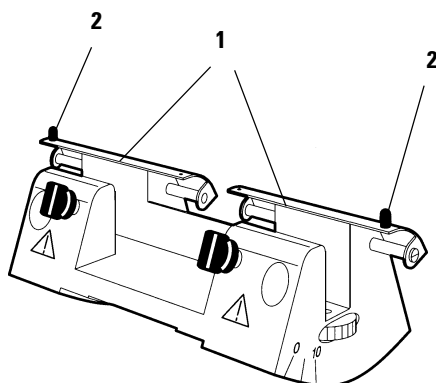
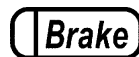


Fig. 7.1

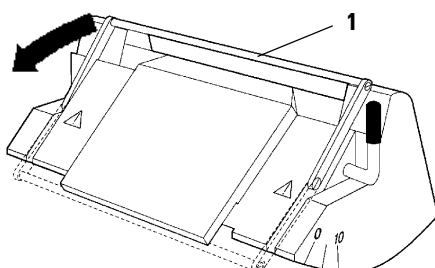


Fig. 7.2



Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock the handwheel and cover the cutting edge with the knife guard!

All knife holders are equipped with a permanent, movable knife guard (1) which allows to cover the entire cutting edge with the knife clamped in any position.

Knife holders N

The knife guard of knife holder N (Fig. 7.1) has two small grips (2) for conveniently moving the knife guard rails.

To cover the knife edge, push both halves of the knife guard to the center.

Knife-holder E

Knife holder E (Fig. 7.3) is equipped with a tilting shackle (1) which functions as a knife guard.

3. Safety instructions for handling the instrument

Transport and setup



- Please refer to chapter 4 - 'Technical data'!
- The instrument must be transported in an upright position!
- **Caution!** The voltage selector is preset at the factory.
Before connecting the instrument to the mains power, please check if this setting complies with the local power requirements of your laboratory.
The mains cable inlet is closed with an adhesive tape that indicates the actual voltage setting of the instrument upon arrival.
- Severe damage can be caused to the instrument if the voltage selector is set to an incorrect voltage!
- When changing the voltage selector setting, ensure that the instrument is not connected to the mains power!
- The instrument must be connected to a grounded mains power outlet socket by means of one of the supplied mains cables!
- Exposure to extreme temperature changes and high air humidity may cause condensation inside the instrument.
After transporting, please wait at least 2 hours to allow the instrument to adopt the ambient temperature before turning it on! Failure to comply with this may cause damage to the instrument.
- Do not operate in rooms with explosion hazard!
- The safety devices on the instrument and accessory equipment must not be removed or modified!

Operating the instrument



- Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause severe injury!
- Never leave knives and knife holders with a mounted knife or blade lying around! Always put the knives back into the knife case when not in use!
- Do not place a knife on a table with the cutting edge facing upward!
- Never try to catch a falling knife!
- Always clamp the specimen before the knife!
- Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock the hand-wheel and cover the cutting edge with the knife guard!
- Do not attempt to clamp, approach or orient the specimen in the retraction phase (while RETRACT illuminates)!
Prior to the subsequent section, a specimen advance will take place by the retracted value plus the selected section thickness.
This involves the risk that the specimen collides with the knife!
- The handle must always be centered in motorized operation!
- Always wear protective glasses when sectioning brittle specimens!
Risk of splintering!!
- Ensure that liquids do not enter the interior of the instrument during work!

Cleaning



- Before cleaning, activate the handwheel brake, turn the instrument off and pull the mains plug!
- Do not use solvents that contain acetone and xylene!
- Ensure that no liquids enter the interior of the instrument when cleaning!
- When using detergents please comply with the safety precautions of the manufacturer.
- Do not turn the instrument on before it is completely dry!

Maintenance



- Only authorized and qualified service personnel may access the internal components of the instrument for service and repair!
- Turn the instrument off with the mains switch and pull the mains plug, before replacing the fuses!
- Only use fuses of the same specification! For the required values, please refer to chapter 4 - 'Technical data'.

Optional accessories

Magnifier & illumination carrier



- Do not operate the magnifier & illumination carrier at a power rating other than specified on the nameplate!
- Protect the magnifier glass from exposure to direct sunlight! Exposure to sunlight may cause a burning glass effect.

Risk of fire!

- Prior to replacing the lamp, turn the illumination off with the mains switch and disconnect the carrier from the mains power supply!
- Use lamp of the same specification only!
- Before replacing the fuses, turn the illumination off with the mains switch and disconnect the carrier from the mains power supply!
- Use fuses of the same specification only!

4. Technical data

Typ	RM 2165
Approvals	VDE, UL-cUL
Nominal supply voltages	100 / 120 / 230 / 240 V AC $\pm 10\%$
Nominal frequency	50/60 Hz
Power draw	340 VA
Protective class ①	I
Mains fuses	2 x T 3,2 A UL-listed
Pollution degree ①	2
Overvoltage installation category	II
Maximum heat emission	340 J/s
Operating temperature range:	+10 °C to +35 °C
Relative humidity:	80% non-condensing

① according to IEC-1010, UL 3101, EN 61010

Microtome

Type	RM 2165 rotary microtome
Sectioning thickness setting	0.25 - 60 μm 0.25 μm , 0.5 μm , 1 μm , 1.5 μm ; from 2 - 20 μm in 1 μm increments from 20 - 60 μm in 5 μm increments
Horizontal specimen feed	28 mm ± 1 mm via stepper motor
Vertical stroke	70 mm
Max. sectioning area w/o retraction	65 mm with out specimen orientation
Max. sectioning area with retraction	60 mm
Specimen retraction	
in manual operation	5 - 100 μm in 5 μm increments can be turned off
in motorized operation	varying with the sectioning speed can be turned off
Electric coarse feed	300 $\mu\text{m/s}$ and 900 $\mu\text{m/s}$
Sectioning speed	0; 0.5 - 420 mm/s
Return speed	approx. 120 - 420 mm/s
Repositioning of knife holder base *	
North/south	± 25 mm
East/west	± 20 mm
Maximum specimen size (W x H x D)	50 x 60 x 40 mm
Specimen orientation *	
horizontal	8°
vertical	8°
Rotation	$\pm 90^\circ$

* optional accessory

Dimensions and weight**Basic instrument**

Width (including handwheel)	370 mm
Width (excluding handwheel)	300 mm
Depth	550 mm
Height (overall)	285 mm
Working height (knife edge)	100 mm
Weight (without accessories)	approx. 40 kg

Control panel

Width	215 mm
Depth	240 mm
Height	95 mm
Height (in inclined position)	125 mm
Net weight	2.5 kg

5. General description

5.1 Product description

The Leica RM 2165 is a motorized rotary microtome.

The specimen feed system with zero-backlash and maintenance-free cross roller guides and the stepper motor operated coarse feed system are located in a dustproof plastic housing. The instrument has a safety handwheel with centering handle that can be locked in any position by means of a mechanically or electronically operated handwheel brake.

All controls and LEDs are centralized in a separate control panel. All control elements are logically arranged in functional groups and easily identifiable.

The specimen retraction can be turned off. In manual operation the retraction can be adjusted. In motorized operation the retraction value varies with the selected sectioning speed. An LED illuminates while the sample is in retraction.

The electric coarse feed operates at two speeds. In the trimming mode, the coarse feed buttons have a TRIM-STEP function.

Two motorized sectioning modes ('Single' and 'Cont') are available. In manual sectioning it is possible to use the conventional method of completing a full handwheel rotation or the rocking mode ('Rock'). In the rocking mode it is sufficient to move the handwheel back and forth over a small distance.

A number of special functions are available: cutting window, a programmable horizontal specimen stop-function, sectioning and trimming program.



The plastic grips of all clamping levers can be repositioned as preferred by the individual user.

Pull the grip out of the lever, hold it in this position, and turn it to the desired position. It will then lock automatically when released.

5.2 Standard delivery

The Leica RM 2165 basic instrument is delivered without accessories. The basic instrument configuration includes the following:

- 1 control panel,
- 1 arm rest, right,
1 arm rest, left,
- 1 maintenance kit consisting of:
 - 1 Allen key size 5,
 - 1 Allen key size 4,
 - 1 Allen key size 3,
 - 2 screwdrivers,
 - 1 bottle of microtome oil no. 405, 50 ml
 - 1 dust cover,
- 1 set of replacement fuses,
- 1 set of mains cables,
- 1 dummy plug,
- 1 instruction manual.

You will find these accessories as well as any further accessories that you may have ordered, in the cardboard box on top of the instrument.

Compare the delivered components with the parts list and your order. Should you find any discrepancies, please contact your Leica sales office immediately.

5.3 Leica RM 2165 - Overview

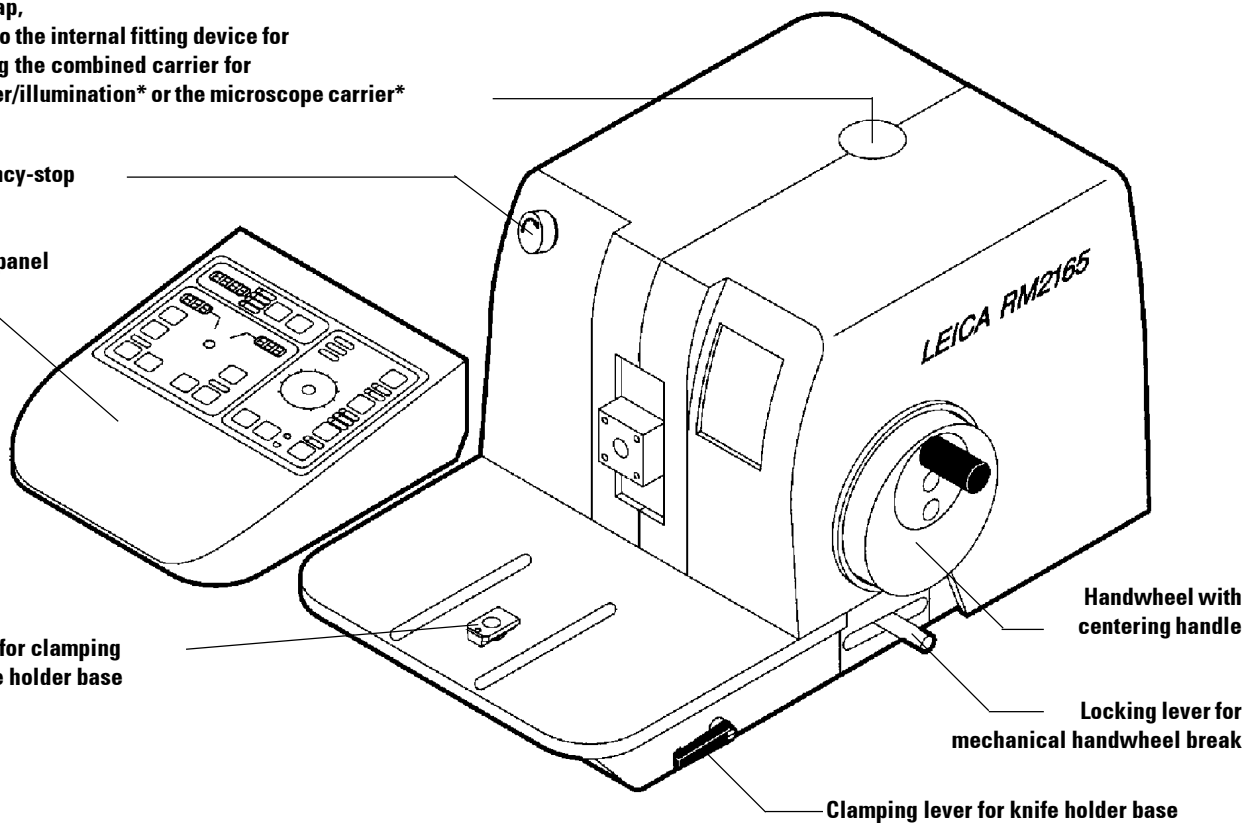
Cover cap,
access to the internal fitting device for
mounting the combined carrier for
magnifier/illumination* or the microscope carrier*

Emergency-stop
switch

Control panel

T-piece for clamping
the knife holder base

Fig. 13.1



* Optional accessory

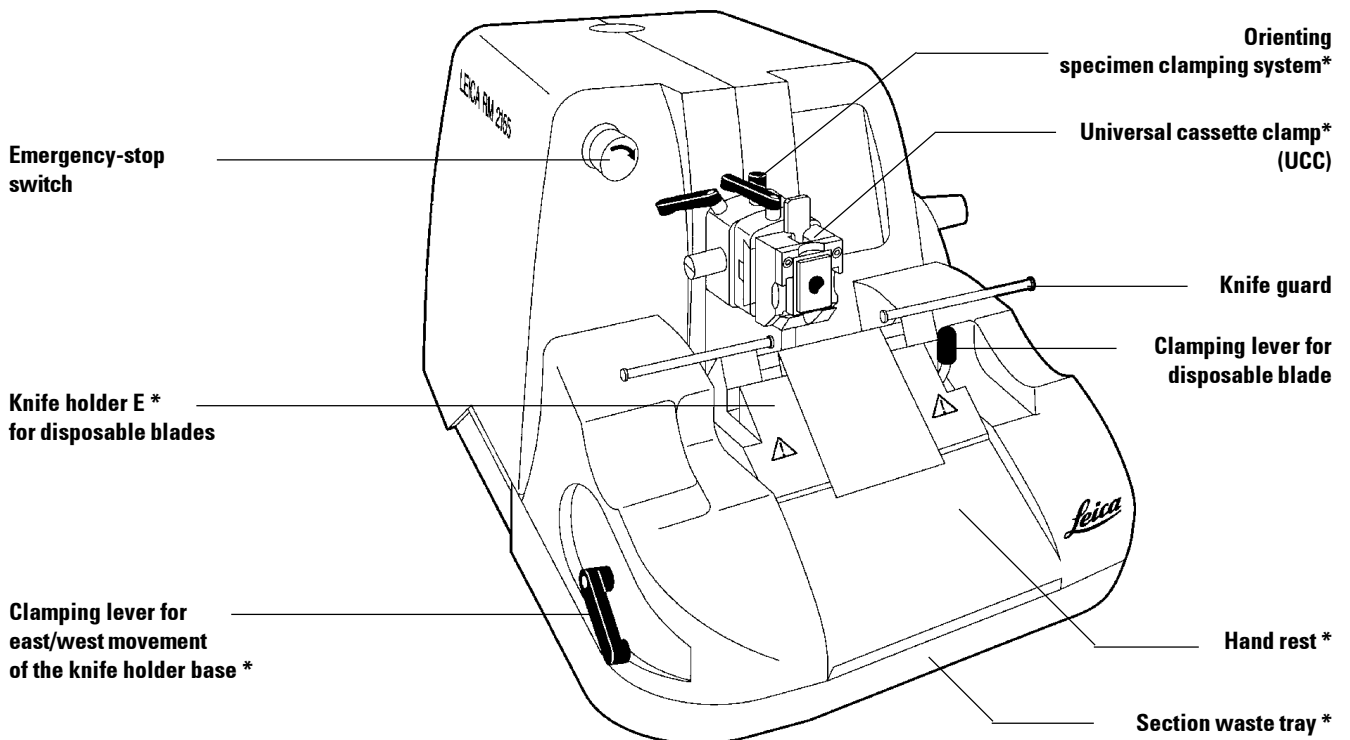


Fig. 13.2

6. Unpacking and setup

6.1 Unpacking



Please check the Tip-n-Tell indicators  on the outside of the box upon arrival. If the tip of the arrow is blue, the box was not transported as required. Please note this on the shipping documents and check the contents for damage. If damaged, make a complaint to the carrier immediately.

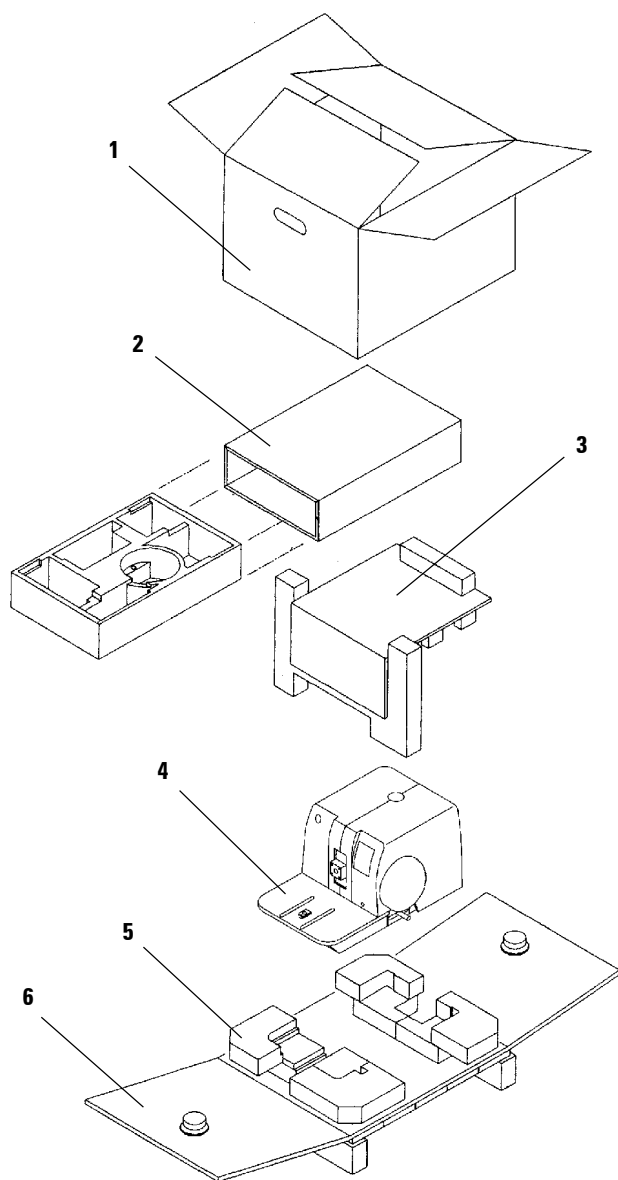


Fig. 14.1

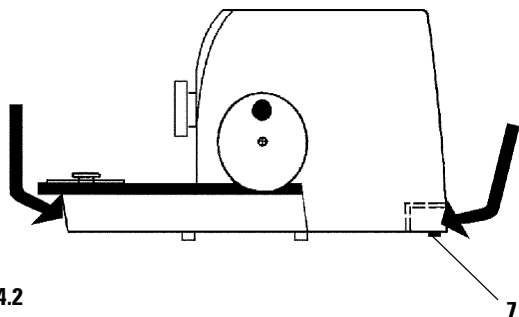


Fig. 14.2

6.1.1 Cardboard box

- Cut off the steel bands on the outside of the cardboard box.
- Open the outer cardboard box (1).
- Take out the accessory box (2) and the instruction manual.
- Remove the outer cardboard box (1) by lifting it upwards.
- Fold down the lateral parts of the inner cardboard box (6).
- Take out the fixing module (3).
- Lift the instrument (4) from the foam part (5) holding it at the front of the base plate and at the recessed grip at the rear (Fig. 14.2).
- Place the instrument on a stable laboratory table.

Two slide faces (7) located at the rear of the base plate facilitate to reposition the instrument on the table.

- To relocate, lightly lift the instrument at the front of the base plate and slide it on the slide faces.

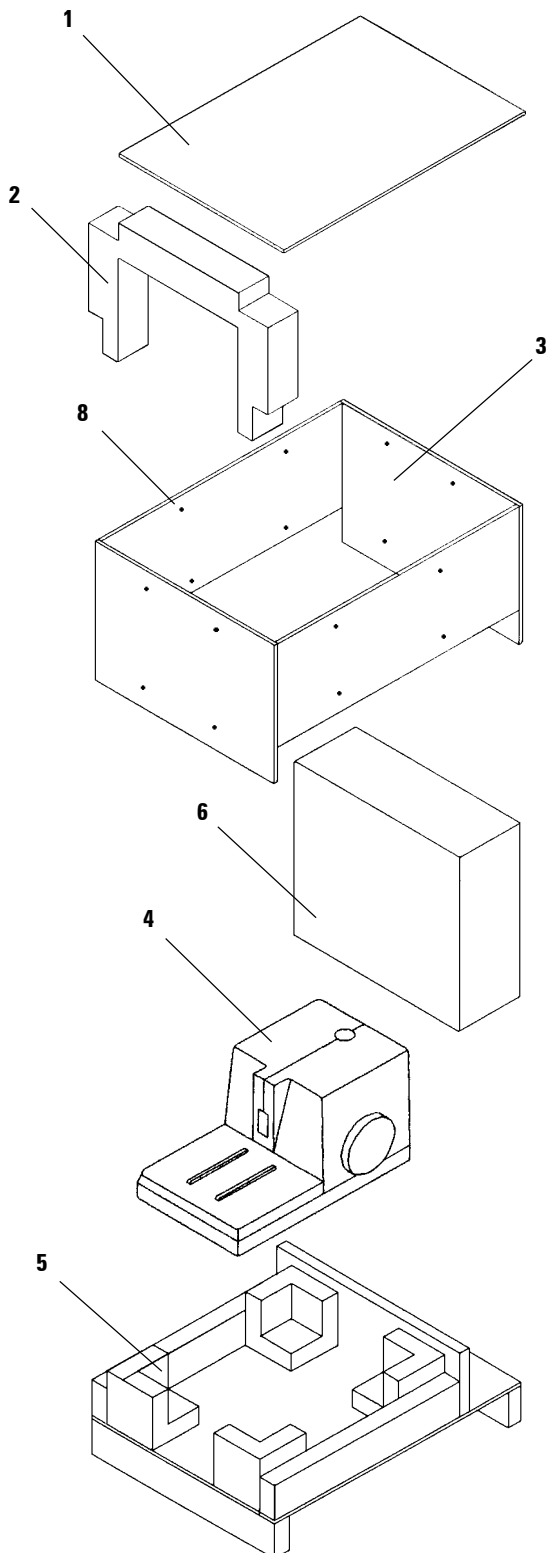


Fig. 15

6.1.2 Wooden crate

- Remove two screws (8) at the top and bottom of each of the four sides of the crate and take off the lid (1).
- Take out the foam bridge (2).
- Remove the box side walls (3) by lifting them up.
- Take out the accessory box (6).
- Lift the instrument (4) from the foam part (5) by holding it at the front of the base plate and at the recessed grip at the rear (Fig. 14.2).
- Place the instrument on a stable laboratory table.

Two slide faces (7, Fig. 14.2) located at the rear of the base plate facilitate to reposition the instrument on the table.

- To relocate, lightly lift the instrument at the front of the base plate and slide it on the slide faces.

6. Unpacking and setup

6.2 Assembly of the handwheel



The handwheel has to be assembled before attempting to use the instrument. The required parts and tools are contained in the crate.

The feather key (5) is loosely placed in the handwheel shaft (1) and fixed in place with a tie-rop during transport.

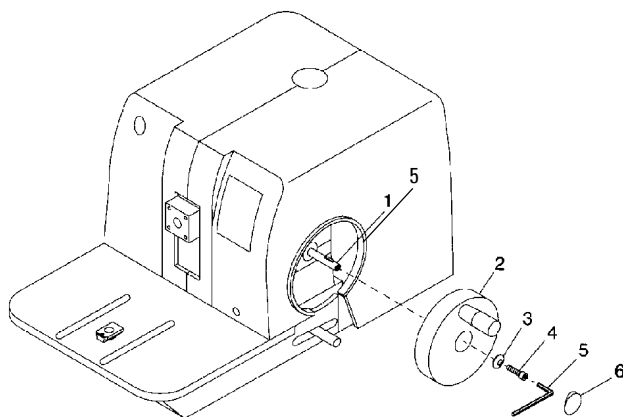


Fig. 16

- Remove the tie-rop.
Attention! Make sure not to lose the feather key!
- Place the handwheel (2) on the handwheel shaft (1) as shown.
- Tighten the screw located in the center hole of the handwheel with an Allen key size 5 (3).
- Remove the cover foil from the self-adhesive cover disk (4) and fix the cover disk on the handwheel.

To disassemble, proceed in reverse order.

6.3 Site requirements



Do not operate in rooms with explosion hazard!



To ensure a smooth operation, the instrument should be set up with at least 10 cm distance from walls and furniture.

The installation site must meet the following requirements:

- Stable, vibration-free laboratory table.
- Vibration-free floor.
- Obstruction-free access to the handwheel.
- Room temperature always between +10 °C and +35 °C.
- Relative air humidity must not exceed 80%.

7.1 Connection to mains power

7.1.1 Checking the voltage selector setting



Caution! The voltage selector is preset at the factory.

Before connecting the instrument to the mains power, please check if this setting complies with the local power requirements of your laboratory.

The mains cable inlet is closed with an adhesive tape that indicates the actual voltage setting of the instrument upon arrival.

Severe damage can be caused to the instrument if the voltage selector is set to an incorrect voltage!

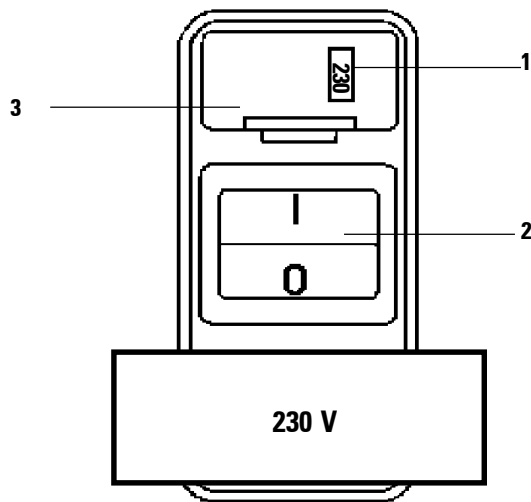


Fig. 17

The voltage selector is located in the voltage selector housing (3) above the mains switch (2) on the rear of the instrument. The actual voltage setting can be seen in the small window (1) of the voltage selector housing.

- Remove the adhesive tape.
- Check if the voltage selector setting indicated in the window (1) complies with the local power requirements of your laboratory.

If the setting is correct, please continue at 7.1.3.

If the setting indicated in the window does not correspond to the local power supply, the voltage selector setting **must** be changed before connecting the mains cable!

7. First use of the instrument

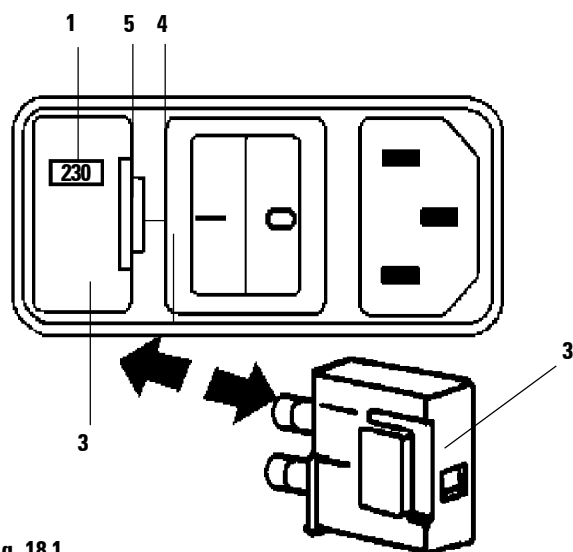


Fig. 18.1

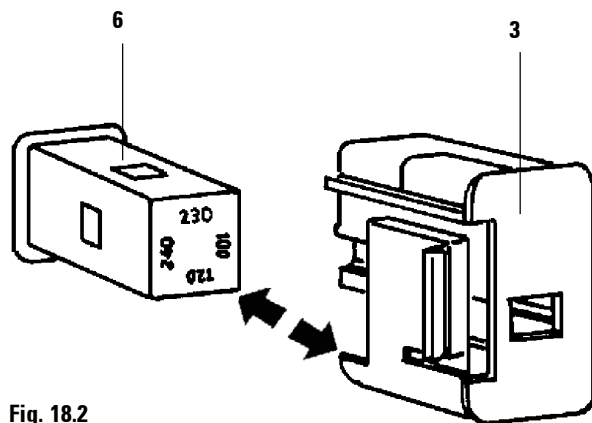


Fig. 18.2

7.1.2 Changing the voltage selector setting



When changing the voltage selector setting, ensure that the instrument is not connected to the mains power!

- Place the tip of a small screw driver into the small recess (4) of the cover (5) and push carefully to remove.
- Pull out the voltage selector housing (3).
- Pull the voltage selector (6) out of the housing (3) and insert it again so that required value can be seen through the small window (1).
- Insert the voltage selector housing (3) with the fuses into the instrument, lightly push until it locks in place.
- Check if the correct voltage is indicated in window (1).

7.1.3 Connecting the dummy plug

- Place the supplied dummy plug in the socket (1) at the rear of the microtome and fix by tightening the screws.



Please note that the instrument is inoperational if the dummy plug is not connected! The foot switch adapter and foot switch (optional accessory) can be connected instead of the dummy plug.

7.1.4 Connecting the control panel



The connecting cable of the control panel is fixed to the microtome.

- Place the plug of the connecting cable in the socket at the rear of the control panel.
- To fix the plug, thoroughly tighten the two screws.

7.1.5 Connecting the mains cable



The instrument is delivered with a set of different, country-specific mains cables.



The instrument must be connected to a grounded mains power outlet socket by means of one of the supplied mains cables!

- Before connecting the mains cable, check if the mains switch (3) at the rear of the instrument is in the OFF position ('O').

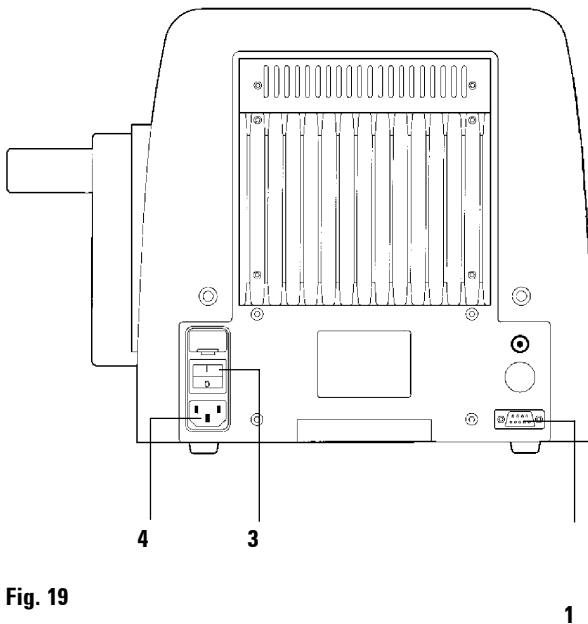


Fig. 19

7. First use of the instrument

- Select the mains cable with the appropriate plug for your local mains power outlet.
- Connect the mains cable to the socket (4).
- Connect the mains cable to the mains power outlet at the wall.

The instrument is now ready to be turned on.



Exposure to extreme temperature changes and high air humidity may cause condensation inside the instrument.

After transporting, please wait at least 2 hours to allow the instrument to adopt the ambient temperature before turning it on! Failure to comply with this may cause damage to the instrument.

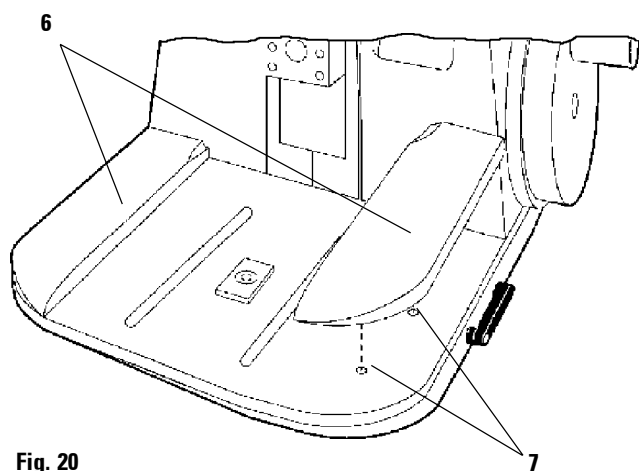


Fig. 20

7.2 Mounting the arm rests

- Insert the pins on the underside of the arm rests (6) in the holes (7) of the microtome base plate as shown.



The basic instrument is delivered with an orienting or non-orienting specimen clamping system as ordered, which has to be mounted first.

All specimen clamps can be used with both the orienting and non-orienting specimen clamping system.

7.3 Assembly of the specimen clamping system



Before mounting the specimen clamping system, activate the mechanical handwheel brake.

7.3.1 Non-orienting specimen clamping system (Fig. 21.1)

- Place the non-orienting specimen clamping system (11) on the specimen arm (13) as shown and fix with the 4 screws (12) by using an Allen key size 4.
- Place the dovetail adapter (2) on the specimen clamping system (11) and fix it by tightening the 4 screws (1) with an Allen key size 3.

To disassemble, proceed in reverse order.

7.3.2 Orienting specimen clamping system (Fig. 21.2)

- To remove, turn the eccentric bolt (6) counter-clockwise.
- Unscrew the thrust piece (5) with a screw driver and pull it out together with the spring (5a) and pin (5b).
- Unscrew the orienting screws (3) and (4) and remove.
- Place the orienting specimen clamping system (10) on the specimen arm (13) as shown.
- Put the 2 screws (7) into the holes (9a). The 2 screws (8) are accessible through the holes (9b).
- Tighten the screws (7) and (8) by using an Allen key size 3.
- Insert the spring (5a) and the pin (5b) with the flat end into the thrust piece (5) and screw down the thrust piece (5) with a screw driver.
- Screw down the orienting screws (3) and (4).
- Place the dovetail adapter (2) on the specimen clamping system and fix it by tightening the 4 screws (1) with an Allen key size 3.

To disassemble, proceed in reverse order.

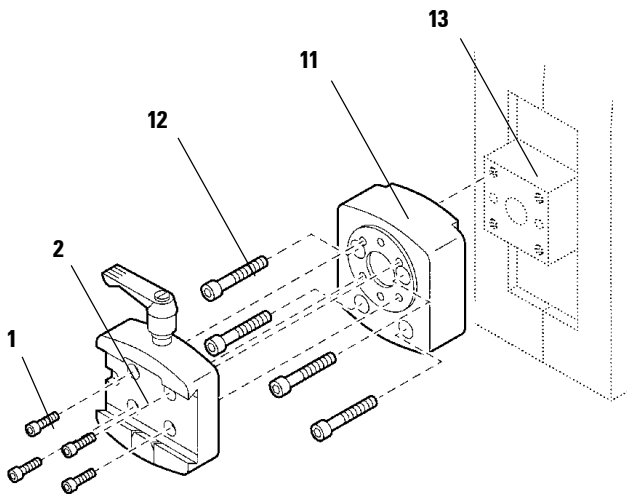


Fig. 21.1

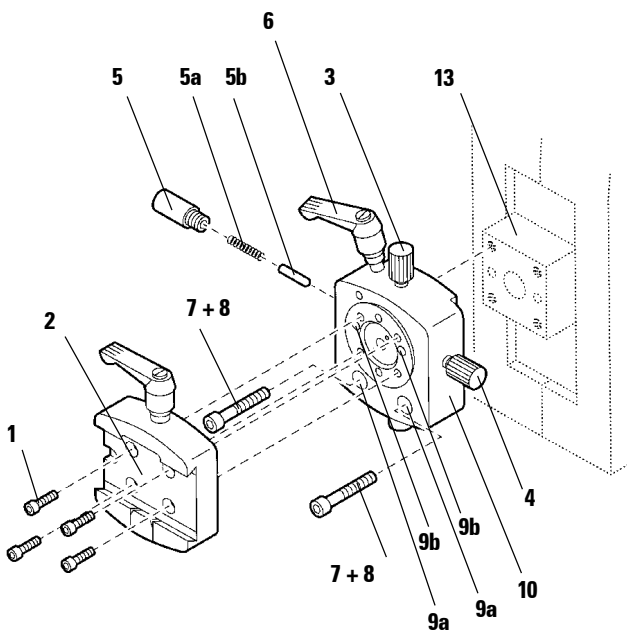


Fig. 21.2

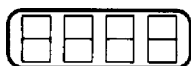
7.4 Turning on



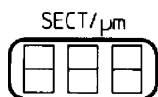
When turning the instrument on with the mains switch, do not press any of the buttons of the control panel or the foot switch (optional accessory)!

- Turn the instrument on with the mains switch at the rear.

This is followed by a beep. The instrument initializes.

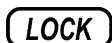


The software version is displayed in the 4 digit display for approx. two seconds. Then the display reads '0000'.



Depending on the setting, one of the two 3 digit displays reads the currently selected sectioning ('SECT./μm') or trimming ('TRIM/μm') thickness.

After turning on, the LEDs of all activated functions illuminate.



If '**LOCK**' (yellow) on the control panel illuminates, the mechanical handwheel brake is activated.



If the **BRAKE** LED illuminates, the electronic handwheel brake is activated.

7.5 Control panel

All controls of the microtome are operated via the separate control panel. Only safety relevant controls such as the EMERGENCY-STOP-switch and the mechanical handwheel brake are located on the microtome.

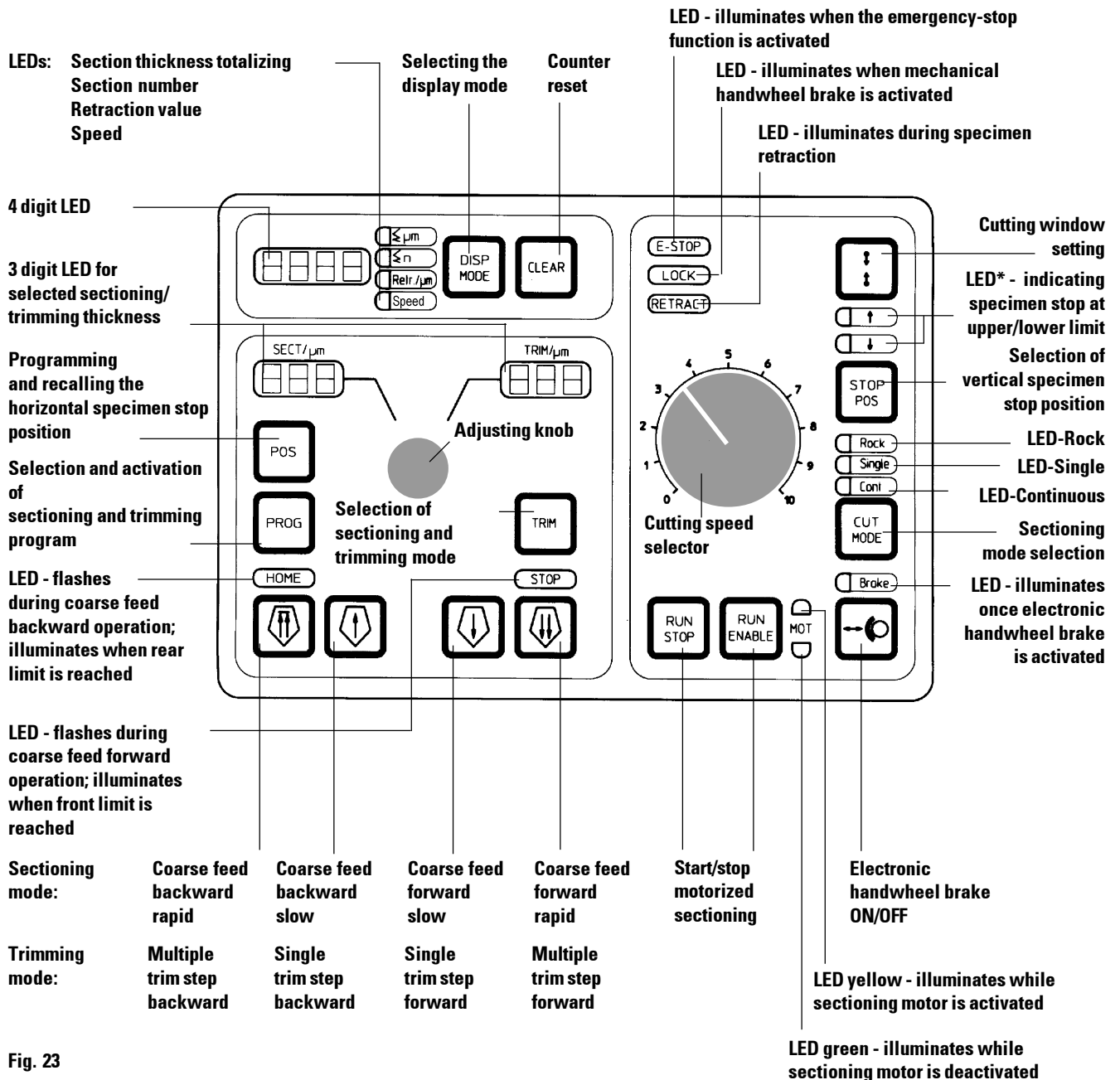
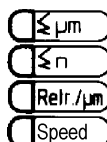
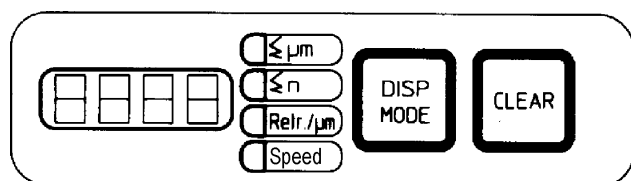


Fig. 23

* flashes if cutting window was incorrectly set; extinguishes after setting first cutting window limit and illuminates after setting second cutting window limit

7. First use of the instrument



4 digit display

The display mode of the 4 digit display can be selected as required, or the display can be turned off.

Display modes:

- $\Sigma \mu\text{m}$ - Sectioning thickness totalizing
- Σn - Section number
- Retr./ μm** - Selected retraction value in μm
- Speed** - Display OFF

The LED of the selected display mode illuminates.

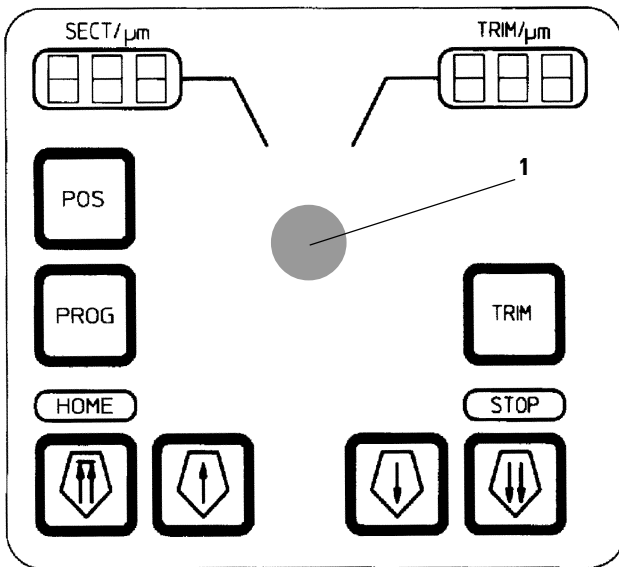
- To change the display mode, push **DISP MODE** until the LED of the desired mode is illuminated.
- Press **CLEAR** to reset section thickness totalizing and section number.

This will only reset the value displayed at a time.

Section thickness totalizing and section number will be cleared when the instrument is turned off with the mains switch.

When selecting and activating the sectioning and trimming programs, the 4 digit display reads the set and actual section number values.

When selecting the horizontal specimen stop positioning mode, the positioning status is indicated in the display.



This field of the control panel includes all settings and selections relevant for trimming and sectioning.

3 digit displays

The 3 digit display **SECT./µm** reads the selected sectioning thickness. The 3 digit display **TRIM/µm** indicates the selected trimming thickness.

Adjusting knob

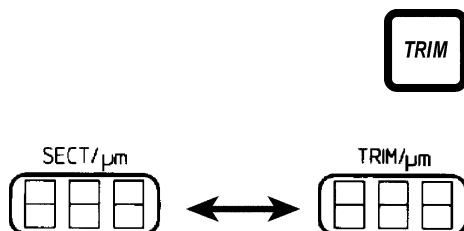
The adjusting knob (1) is used to adjust all values indicated in the 4 digit and 3 digit displays.



The adjusting knob rotation has no mechanical limit stop and therefore can be turned endlessly in both directions. The values can be adjusted only within the given setting range (e. g. sectioning thickness 0,25-60µm).

Selecting the sectioning and trimming mode

- Press **TRIM** to change from the sectioning mode **SECT./µm** to the trimming mode **TRIM/µm** and vice versa.



The display reading changes between **SECT./µm** and **TRIM/µm** each time the button is pressed.

The **SECT./µm** display always indicates the sectioning thickness in a range from 0,25 to 60 µm and the **TRIM/µm** display the trimming thickness between 1 and 600 µm.

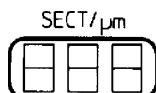
Adjusting the sectioning thickness

Setting range: 0.25 - 60 μm

Adjustable values:

0.25 μm , 0.50 μm , 01.0 μm , 01.5 μm ,
from 2 - 20 μm in 1 μm increments,
from 20 - 60 μm in 5 μm increments.

The value is adjusted within the setting range by turning the adjusting knob (1).



The selected sectioning thickness value is indicated in the **SECT./μm** display.

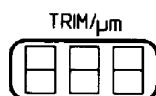
Adjusting the trimming thickness

Setting range: 1 - 600 μm

Adjustable values:

from 1 - 10 μm in 1 μm increments,
from 10 - 20 μm in 2 μm increments,
from 20 - 50 μm in 5 μm increments,
from 50 - 100 μm in 10 μm increments,
from 100 - 600 μm in 50 μm increments.

The value is adjusted within the setting range by turning the adjusting knob (1).



The selected sectioning thickness value is indicated in the **TRIM/μm** display.

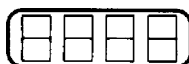
Storing a horizontal specimen stop position



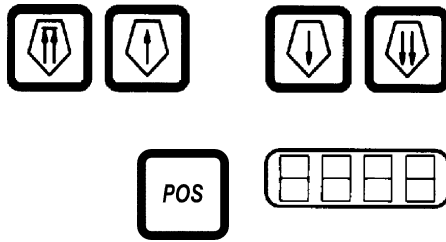
This function allows a reproducible approach of the sample to the knife.
A previously defined and stored stop position can be recalled at the push of a button.



- To store a horizontal specimen stop position shortly press **POS**.



A beep will be heard and the 4 digit display reads 'PoS'.



- Move the sample to the appropriate position by using the coarse feed buttons.
- To store the position, press **POS** again until the 4 digit display indicates '**Sto**' (stored).

The stop position is stored. In a control movement the sample first travels to the rear limit of the horizontal stroke (HOME position) and then forward to the stored stop position. This control movement allows the user to check if the stored position actually is appropriate.

The stored position can be recalled as required or changed by storing a different position.

A stored position is maintained even after turning the instrument off.

If the **POS** button is released before '**Sto**' reads in the display, the sample will be positioned in the previously stored position.

If during the backward travel to the HOME position in the course of the control movement the emergency-stop switch is activated, the previously stored position will be maintained.

Recalling a programmed stop position



Any change of the knife holder position since recalling the stored stop position involves the risk that the sample collides with the knife during the forward travel. Therefore, the advance movement of the sample should be observed by the user and interrupted if necessary by activating the EMERGENCY-STOP switch.

2 x



- To call a stored horizontal stop position, shortly press **POS** twice successively.

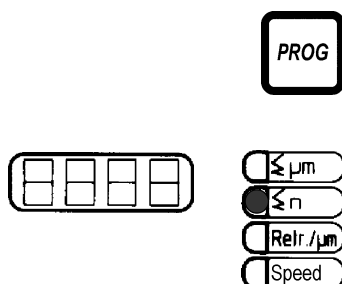
The 4 digit display reads '**PoS**'. The sample will then be moved to the stored position.

Entering a trimming and sectioning program

It is possible to enter one trimming and one sectioning program, which can be recalled and operated one after another.

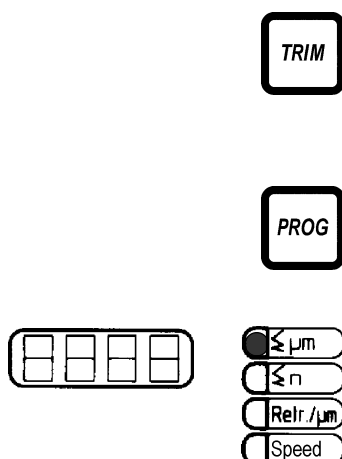
The number of sections can be selected in a range of 1 - 100 for both programs.

- Select the sectioning thickness in the **SECT./ μ m** display and/or trimming thickness in the **TRIM/ μ m** display with the adjusting knob.
- Press **PROG** to enter the number of sections.



The 4 digit display indication changes to 'P...' for the number of sections.

- Select the required number by means of the adjusting knob.
- Press **TRIM** to change to the other program.
- Select the required number by means of the adjusting knob.
- Press **PROG** again to exit the program mode, or start the program (see 'Starting a trimming and sectioning program').



The 4 digit display returns to the previously selected display mode (sectioning thickness totalizing, section number, retraction value or OFF).

Selecting a trimming and sectioning program

- Press **PROG** to select a program.

The display will always read the section number and selected sectioning thickness for the previously selected program.

- Press **TRIM** to change from the trimming to the sectioning program or vice versa.

The number of sections can be changed at this stage as required.

The displayed program can be started by pressing **RUN/STOP** and **RUN/ENABLE** simultaneously.

Starting a trimming and sectioning program

- Press **PROG** to select a program.

The motorized sectioning mode **Cont** (continuous stroke) is activated automatically.

- Press **TRIM** to select the trimming or sectioning program as required.
- Press **RUN/STOP** and **RUN/ENABLE** simultaneously to start the program.

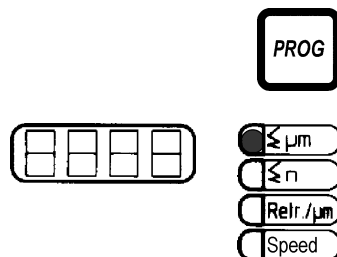
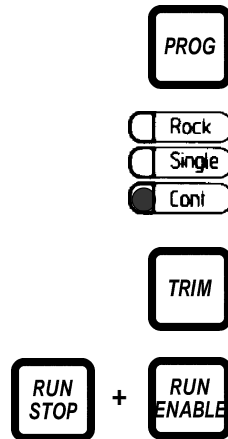
The 4 digit display always reads the number of sections to be cut. At the count of '0000' the sectioning motor stops and the display reads the originally entered number of sections (e.g. 'P012' = 12 sections). It is possible to restart the program at this stage.

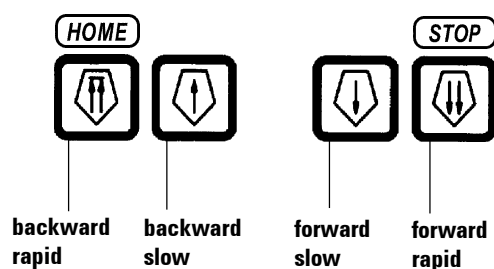


The two programs are not executed one after another automatically.
After changing from trimming (TRIM/μm) to sectioning (SECT./μm) or vice versa, the displayed program will always have to be restarted.

- Press **PROG** to exit the program mode.

The 4 digit display returns to the previously selected display mode (sectioning thickness totalizing, section number, retraction value or OFF).





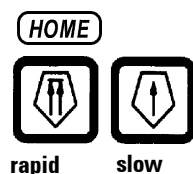
Coarse feed functions

The electric coarse feed at two speeds is used for a rapid movement of the sample towards and away from the knife.

With the double-arrow buttons, the coarse feed operates at 900 $\mu\text{m/s}$, with the single-arrow buttons at 300 $\mu\text{m/s}$.

The coarse feed functions are different in the sectioning (SECT./ μm) and trimming mode (TRIM/ μm).

Sectioning mode (SECT./ μm)



In the sectioning mode (SECT./ μm), the coarse feed buttons operate a continuous movement as long as the button is held down. The double-arrow button for rapid coarse feed backward movements has a lock-in function.

- Press the appropriate button to start a **rapid backward** movement.

After activation of the button, the backward travel continues to the rear limit of the stroke (HOME position).

- To stop the movement, press any of the four coarse feed buttons.
- Press the appropriate button to start a **slow backward** movement.

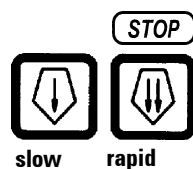
The travel continues as long as the button is held down.

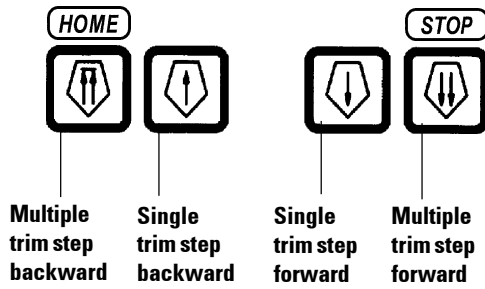
HOME (yellow) flashes while the sample is in motion and illuminates on reaching the rear limit.

- Press the appropriate button to start a **rapid or slow forward** movement.

The travel continues as long as the button is held down.

STOP (yellow) flashes while the sample is in motion. On reaching the front limit, a beep will be heard and STOP illuminates.





Trimming mode (TRIM/ μm)



In the trimming mode the coarse feed buttons have a TRIM-STEP function. When activated, a defined, stepwise advance (TRIM-STEP) takes place in the corresponding direction by the value selected in the TRIM/ μm display.

- By activation of a single-arrow coarse feed button, a single trim step is effected in the appropriate direction.
- By short activation of a double-arrow coarse feed button, a single trim step is also effected in the appropriate direction.
- By holding down a double-arrow coarse feed button, a multiple trim step is effected in the appropriate direction as long as the button is depressed.

Specimen retraction

The specimen retraction protects the knife and specimen from damage during the return travel of the sample to the upper limit of the vertical stroke.

In motorized operation, the retraction value varies with the selected sectioning speed. In manual operation the retraction value can be selected in 5 μm increments between 5 and 100 μm .

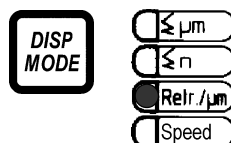
The specimen retraction can also be deactivated for the manual and motorized operation if required.

The selected setting is maintained when the instrument is turned off.

Selecting the retraction value for manual sectioning



Specimen retraction is set to 10 μm at the factory.



- To select the retraction value setting, press **DISP MODE** maybe several times until the LED of the display mode '**Retr./ μm** ' illuminates.



The 4 digit display reads the currently selected value (e.g. '020' = 20 μm or 'OFF').



- Select the desired value with the adjusting knob.
- To exit the retraction value setting, press **DISP MODE** until the LED of the desired display mode illuminates.

In the manual sectioning mode, a retraction movement takes place by the selected value after each section.



RETRACT (yellow) illuminates while the sample is in retraction.

Specimen retraction ON/OFF



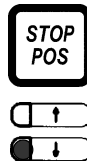
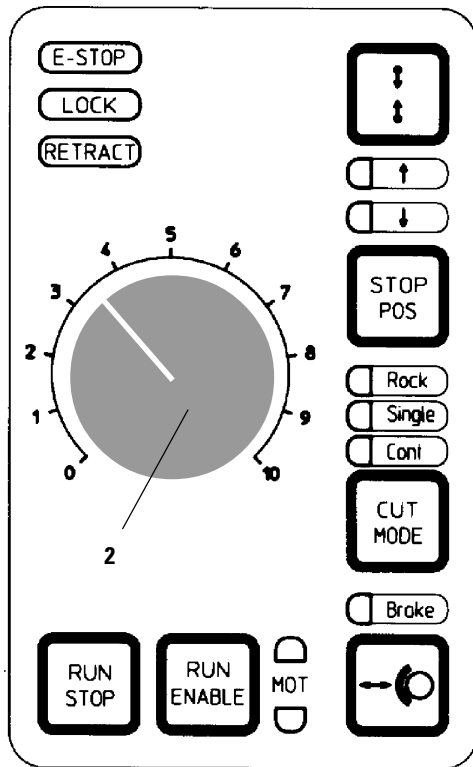
- To select the retraction value setting, press **DISP MODE** maybe several times until the LED of the display mode '**Retr./ μm** ' illuminates.

The 4 digit display reads the actually selected value (e.g. '010' = 10 μm or 'OFF').



- To turn retraction on, turn the adjusting knob clockwise until the desired value is displayed.
- To turn retraction off, turn the adjusting knob counterclockwise until '**OFF**' is displayed.
- To exit the retraction value setting, press **DISP MODE** until the LED of the desired display mode illuminates.

When the retraction is deactivated, the sample is no longer retracted after the cutting stroke and the yellow RETRACT LED does not illuminate.



LEDs

E-STOP (red) illuminates when the emergency-stop switch is activated.

LOCK (yellow) illuminates when the mechanical handwheel brake is activated.

RETRACT (yellow) illuminates while the sample is in the retracted position when specimen retraction is activated.

Sectioning speed selection

The sectioning speed is adjusted continuously with speed selector (2) from 0 - 420 mm/s.

The speed selector has scale graduation from 1 to 10. The graduation is provided for reference purposes and does not indicate a particular speed.

Selecting the vertical specimen stop position

The vertical specimen stop position after the cutting stroke can be selected in the upper or lower limit of the vertical stroke.

- To select, press **STOP POS**.

The LED of the selected stop position illuminates.

Cutting window setting

The cutting window function allows to optimally adapt the size of the cutting area to the actual size of the specimen. The selected sectioning speed is only applicable within the cutting window limits. A higher speed is used outside the cutting window.

The cutting window setting is maintained even after turning the instrument off.



Do not attempt to set any of the cutting window limits when the handle of the handwheel is placed in the range of the 12 or 6 o'clock position. Failure to comply with this will cause the LED to flash and a beep, which indicate that the value was not recorded.

An upper and lower limit always has to be entered. The sequence of entry (upper or lower) is optional.

- Turn the handwheel to position the lower edge of the sample approximately 3 mm above the cutting edge.



- Press the button.

The LED of the vertical specimen stop position (upper or lower as selected) turn off once the first cutting window limit is defined.



- Turn the handwheel to position the upper edge of the sample right below the cutting edge and push the button again.

Once the second cutting window limit is defined, the LED of the vertical specimen stop position (upper or lower as selected) turns on again indicating that the value has been recorded.



If only one cutting window limit was actually defined or recorded, the maximum cutting window size will automatically be used when motorized sectioning is started.

Cancelling a defined cutting window



- To cancel a previously defined cutting window, press the button.

This will set the cutting window to the maximum size.

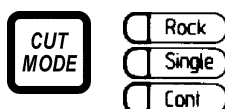
Sectioning modes

The microtome can be used both in manual and motorized operation.

Three sectioning modes are available: '**Rock**' in manual operation, and '**Single**' and '**Cont**' in motorized sectioning.

Selecting a sectioning mode

- To select the sectioning mode, press **CUT MODE** until the LED of the desired mode illuminates.

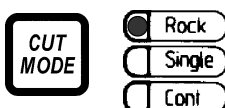


Manual sectioning



Even if the '**Single**' or '**Cont**' sectioning mode is selected without starting motorized sectioning, it is possible to section manually by completing full handwheel rotations.

In the manual sectioning mode, it is possible to use either the conventional method of completing a full handwheel rotation or to work in the rocking mode ('Rock').



- Select sectioning mode '**ROCK**'.
- Move the handwheel back and forth over a small distance.

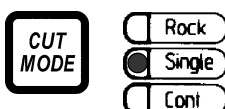
Each change in the sense of rotation will be electronically detected and automatically converted into an advance or retraction movement.

Motorized sectioning

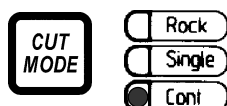
In motorized operation there is a choice of two sectioning modes: '**Single**' (single stroke) and '**Cont**' (continuous stroke).

'Single' - Single stroke

- Select sectioning mode '**Single**'.



After starting sectioning, a single sectioning stroke is completed. The sample stops automatically in the upper or lower position of the vertical stroke as selected.



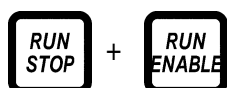
'Cont' - Continuous stroke

- Select sectioning mode '**Cont**'.

After starting sectioning, the sectioning process continues until it is stopped.

Once the sectioning process is stopped, the sample stops reaching the upper or lower limit of the vertical stroke as selected.

Start and stop motorized sectioning



- To start motorized sectioning after selection of the sectioning mode, press **RUN/STOP** and **RUN/ENABLE** simultaneously.

Once the sectioning motor is started, MOT (yellow) illuminates.

- To stop motorized sectioning, press **RUN/STOP** or **RUN/ENABLE**.

In the continuous stroke mode ('Cont'), the sample will stop reaching the upper or lower limit of the vertical stroke as previously selected.

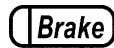


If both the green and yellow MOT LEDs are illuminated, the sectioning motor is still operating and will stop reaching the upper or lower limit of the vertical stroke as selected.



In motorized operation, sectioning can be started with the foot switch (optional accessory) instead of the RUN/STOP and RUN/ENABLE buttons.

Electronic handwheel brake



- Press the button to activate the electronic handwheel brake.

The green BRAKE LED illuminates. All motorized sectioning functions are inoperational, and the handwheel becomes extremely difficult to turn.

- Press the button again to deactivate the electronic handwheel brake.

The green BRAKE LED extinguishes. All motorized sectioning functions are operational.



When activating the mechanical handwheel brake while the electronic handwheel brake is activated, the BRAKE LED extinguishes and LOCK (yellow) illuminates. The electronic handwheel brake function is then inoperational.

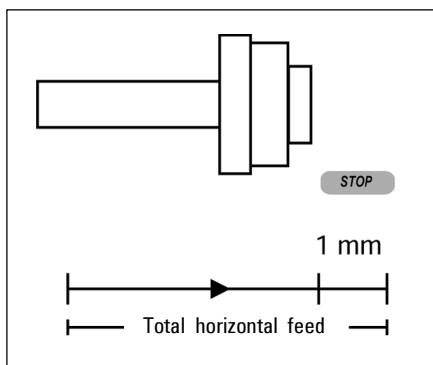


Fig. 38

Indication of remaining horizontal feed

The visual and audible remaining feed indication feature informs the user during trimming and sectioning when a remaining feed of approximately 1 mm is available before the front limit is reached.

STOP (yellow) illuminates approx. 1 mm before the specimen reaches the front limit. In addition, a beep is emitted for approx. 2 seconds.

Motorized sectioning is interrupted and the sample stops on reaching the upper or lower limit of the vertical stroke as selected.

At this point, a horizontal feed of approximately 1 mm is available, but no further advance towards the knife will take place when activating the coarse feed button.

- Restart motorized sectioning.

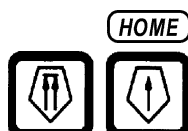
STOP

STOP (yellow) illuminates.

On reaching the front limit, sectioning will stop automatically.

No further specimen advance will take place when trying to restart sectioning.

- To continue sectioning, move the sample to the rear limit of the horizontal stroke (HOME position) by means of the appropriate coarse feed button.



If the specimen is in the remaining feed area when turning the instrument on, an additional beep will be heard after the indication of the software version. To continue sectioning, move the sample to the rear by means of the appropriate coarse feed button.

In the remaining feed range, the TRIM-STEP function is inoperational. To move the sample to the rear with the coarse feed buttons, press TRIM to change from the 'TRIM/ μm ' to the 'SECT./ μm ' mode if required.

8.1 Mounting the specimen clamp



Always lock the handwheel prior to manipulating the knife and specimen or before changing the specimen or knife!

- Rotate the handwheel to position the specimen clamping system at the top of the stroke and activate the mechanical handwheel brake.
- To release, turn the clamping lever (1) counter-clockwise.
- Insert the dovetail guide (2) of the specimen clamp into the mount (3) from the left.
- To clamp, turn the clamping lever (1) clockwise to the limit stop.



Always clamp the specimen before the knife!



For clamping the specimen in the individual specimen clamps and holders, please refer to chapter 12.

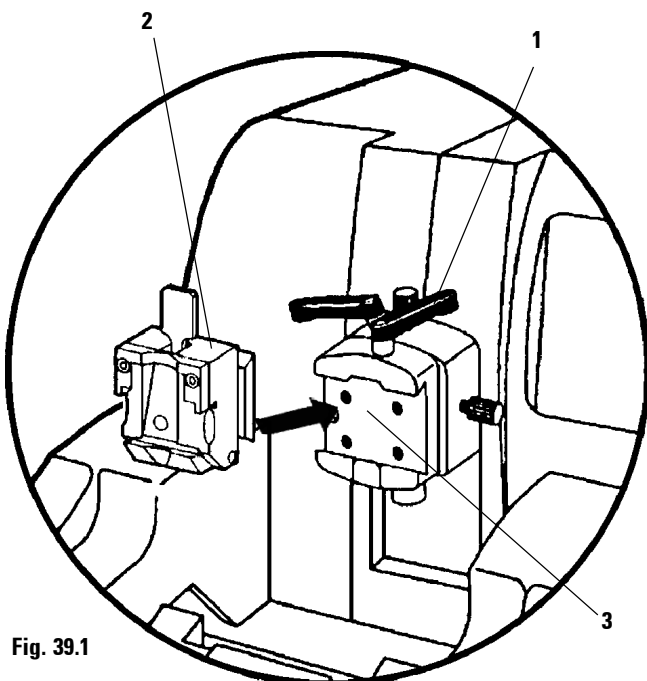


Fig. 39.1

8.2 Mounting the knife holder base

- To release, turn the lever (1) counterclockwise.
- Place the knife holder base (2) with the two clamping levers (3) and (4) mounted in place on to the T piece (5) of the microtome base plate.
- To secure the knife holder base, turn the lever (1) clockwise.

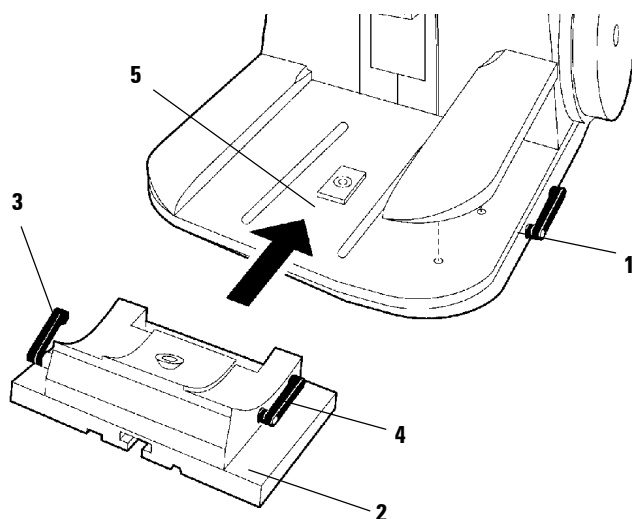


Fig. 39.2

8. Daily use of the instrument

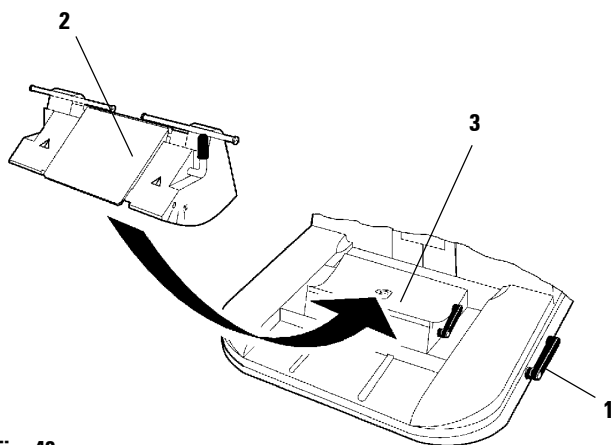


Fig. 40

8.3 Mounting the knife holder

- To release, turn the clamping lever (1) counter-clockwise.
- Slide the guide of the knife holder (2) onto the T piece (3) of the knife holder base.
- To lock, turn the clamping lever (1) clockwise.

8.4 Inserting the knife or blade into the knife holder



Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause severe injury!



The insertion of the knives or blades in the individual knife holders is described in chapter 12.

- Push the knife guard to the middle of the knife holder.
- Insert the knife/blade into the knife holder and clamp.

8.5 Adjusting the clearance angle

The scale for the clearance angle adjustment (0° , 5° and 10°) is located on the right side of the knife holder.

Moreover, a reference line is provided on the right side of the knife holder base to adjust the angle.

- To release, turn the clamping lever **(1)** counter-clockwise.
- To adjust the clearance angle, slide the knife holder on the base until the reference line on the knife holder base is located below the scale line for the required adjustment (recommended angle 0° to 3°).
- Hold the knife holder in this position and fix the adjustment by turning the lever **(1)** clockwise.

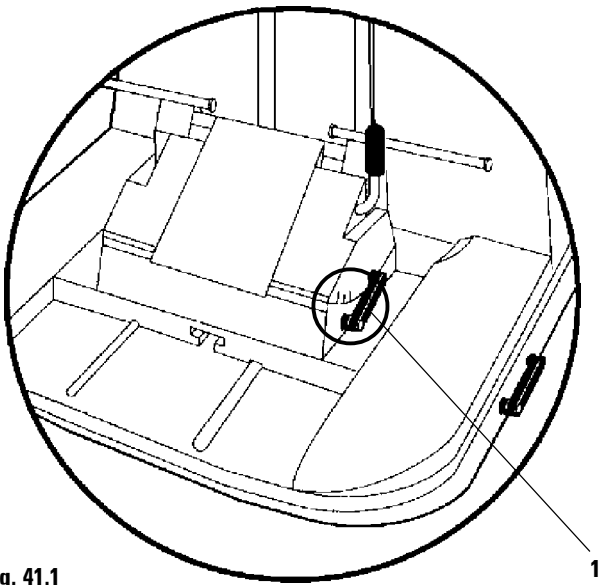


Fig. 41.1

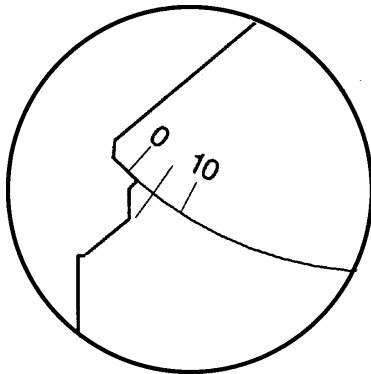


Fig. 41.2

8.6 Orienting the specimen (only orienting specimen clamping system)

The specimen orientation allows for a simple correction of the position of the specimen surface when the specimen is fixed in the clamp.

- Push the coarse feed button to move the sample to the HOME position.
- Approach the knife holder base and knife holder to the sample as close as possible.



Do not attempt to clamp, approach or orient the specimen in the retraction phase (while the RETRACT illuminates)! Prior to the subsequent section a specimen advance will be effected by the retracted value plus the selected section thickness. This involves the risk that the specimen collides with the knife!

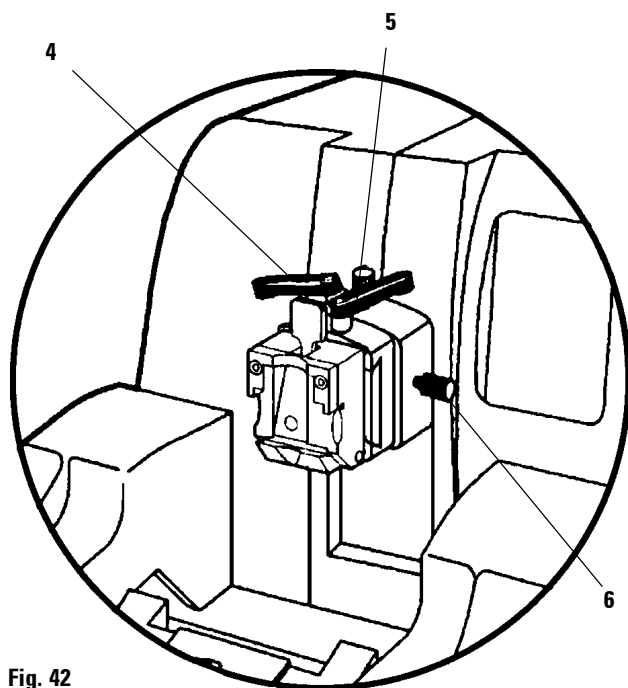


Fig. 42

- Rotate the handwheel to position the specimen clamping system at the top of the stroke and activate the handwheel brake.
- To release, turn the eccentric bolt (4) counter-clockwise.
- To orient the sample in north/south direction, turn the adjusting screw (5). To orient it in east/west direction use the adjusting screw (6).
- To fix the orientation, turn the eccentric bolt (4) clockwise.



When using the large standard specimen clamp (50 x 55 mm) the specimen orientation of 8° in north/south direction is limited to approximately 4°.

8.7 Trimming the specimen



Trimming and sectioning can also be performed by means of the trimming and sectioning program.

8.7.1 Trimming in manual operation

- Select the trimming mode **'TRIM/μm'**.
- Select the appropriate trimming thickness.
- Pull the section waste tray (optional accessory) out.
- Pull the knife guard to the side.
- Deactivate the handwheel brake.
- Approach the sample to the knife/blade by means of the TRIM-STEP mode.
- Trim the sample by turning the handwheel
or
- Select the **'Rock'** mode and trim the sample by moving the handwheel back and forth over a short distance.
- Terminate trimming when reaching the desired sectioning surface and depth.



Select a sectioning speed that corresponds to the hardness of the specimen!
Always select a slow speed when sectioning hard samples.

- Adjust the appropriate sectioning speed.
- Select the sectioning mode **'Cont'** (continuous stroke).
- Pull the section waste tray (optional accessory) out.
- Pull the knife guard to the side.
- Deactivate the handwheel brake.
- Start motorized sectioning and trim the sample.
- Terminate trimming when reaching the desired sectioning surface and depth.



It is advisable to use an unused part of the cutting edge after trimming.
To do so, laterally displace the blade or knife in the knife holder.
When using the universal knife holder base with lateral displacement feature, it is sufficient to reposition the base with the knife holder.

8.7.2 Trimming in motorized operation



The handle of the handwheel must always be centered in motorized operation!

- Center the handle of the handwheel.
- Select the trimming mode **'TRIM/μm'**.
- Select the appropriate trimming thickness.
- Select the desired vertical specimen stop position in the upper or lower limit of the stroke.
- Set the cutting window.

8. Daily use of the instrument

8.8 Sectioning



The handle of the handwheel must always be centered in motorized operation!

- Center the handle of the handwheel.



Trimming and sectioning can also be performed by means of the trimming and sectioning program.

- Select the sectioning mode 'SECT./ μm '.
- Adjust the appropriate sectioning thickness or verify the selected value.
- Select sectioning mode 'Single' or 'Cont'.
- Select the desired vertical specimen stop position in the upper or lower limit of the stroke.
- Set the cutting window.



Select a sectioning speed that corresponds to the hardness of the specimen. Always select a slow speed when sectioning hard samples.

- Check if the selected sectioning speed is appropriate.
- Start motorized sectioning.
- Prepare the sections.

8.9 Changing the specimen or interrupting sectioning



Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock the handwheel and cover the cutting edge with the knife guard!

- Rotate the handwheel to position the sample at the top of the vertical stroke and activate the mechanical handwheel brake.
- Position the knife guard over the cutting edge.
- Remove the specimen from the specimen clamp and mount a new sample to continue.

8.10 Terminating sectioning



Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock the handwheel !

- Rotate the handwheel to position the sample at the top of the vertical stroke and activate the mechanical handwheel brake.



Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause severe injury!

Do not place a knife on a table with the cutting edge facing upward!

Never leave knives and knife holders with a mounted knife or blade lying around!

Always put the knives back into the knife case when not in use!

Never try to catch a falling knife!

- Remove the blade from the knife holder and insert it in the receptacle at the bottom of the dispenser, or remove the knife from the knife holder and put it back in the knife case.
- Remove the specimen from the specimen clamp.
- Transfer or all section debris to the section waste tray (optional accessory) and empty the tray.
- Turn the instrument off with the mains switch.
- Clean the instrument (see chapter 11).

9.1 Instrument failures



Certain instrument failures or malfunctions are indicated in the 4 digit display or by illuminated LEDs on the control panel.

9.1.1 Error message 'E-1'



This message may be displayed after the indication of the software version after turning the instrument on to indicate a loss of the retraction parameters.

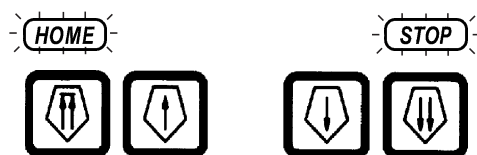
- Press any key to continue.

This will set all retraction parameters to their default settings.

Sectioning can be continued.

- Before continuing, check if the maybe previously entered values are still correct and change them if necessary.

9.1.2 HOME and STOP LEDs illuminate simultaneously



This indicates a failure in detecting the rear (HOME) and front (STOP) limits of the horizontal feed.

This malfunction can only be corrected by the technical service.

9.1.3 Sectioning motor cannot be restarted

The sectioning motor operation is blocked. The motor cannot be restarted.

The overload cutout turned the motor off as a result of a short-term overload.

Operator action:

- Turn the instrument off with the mains switch and wait approximately 30 seconds.
- Push the overload cutout button (1) at the rear of the instrument.
- Turn the instrument on again.

The motor can then be restarted.

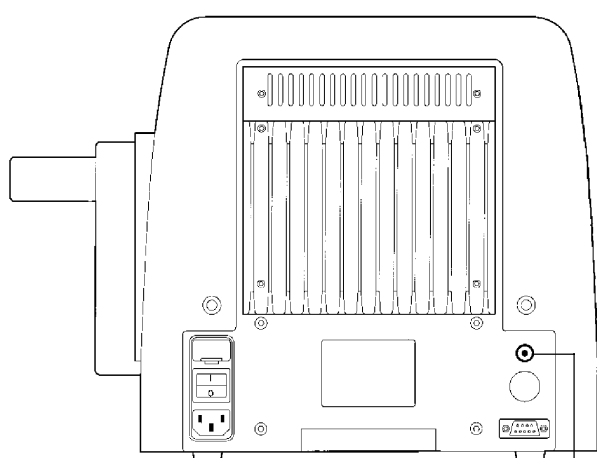


Fig. 45

1

9. Trouble shooting

9.2 Sectioning problems, possible causes and corrective action

Problem	Possible causes	Corrective action
Thick/thin sections The section thickness varies from one section to another. In extreme cases, sections are skipped meaning that a section is not obtained.	- Insufficient knife inclination; consequently the clearance angle is too small. - Insufficient clamping of specimen and/or knife.	- Systematically try several clearance angle adjustments, until the optimum angle is found. - Check if all levers are locked and screws are tightened on the specimen and knife holder systems. Retighten the levers and screws if necessary.
Compressed sections The sections are extremely compressed, wrinkled or jammed together.	- Blunt knife. - Blunt knife. - Specimen too warm. - Clearance angle too big. - Sectioning speed too high.	- Use a different part of the knife edge or use a new knife. - Use a different part of the knife edge or use a new knife. - Precool the specimen on a cold plate. - Cool the specimen in iced water immediately before sectioning. - Clearance angle adjustment; systematically decrease the clearance angle until the optimum adjustment is obtained. - Select lower sectioning speed.
The knife "rings" on the cutting stroke when sectioning hard specimens. Sections exhibit scratches and chatter marks.	- Sectioning speed too high. - Clearance angle too big. - Insufficient clamping of specimen and/or knife.	- Select lower sectioning speed. - Clearance angle adjustment; systematically decrease the clearance angle until the optimum adjustment is obtained. - Check if all levers are locked and screws are tightened on the specimen and knife holder systems. Retighten the levers and screws if necessary.

9.3 Instrument or operating errors, possible causes and corrective action

Problem	Possible causes	Corrective action
No display indication, no response to push button activation after turning on	1. Mains cable not properly connected. 2. Mains fuses defective. 3. Connecting cable of the control panel not properly connected.	1. Check if mains cable properly connected. 2. Replace the fuses (see chapter 11). 3. Check if control panel cable is properly connected.
LED reads 'E-1' after turning on	1. Loss of the retraction para-meter as a result of a strong peak in the mains power supply.	1. Press any key to continue. Check if the reaction para-meters are still correct and change if necessary.
LED repeatedly reads 'E-1' after turning on.	1. Battery exhausted. (Expected life time approximately 7 years!)	1. Call technical service.
Sectioning motor cannot be restarted.	1. The EMERGENCY-STOP switch is activated. 2. Handwheel brake is activated. 3. Sectioning motor was turned off by the safety cutout due to a short-term overload condition. 4. No foot switch* or control panel connected. 5. Foot switch* or control panel not properly connected.	1. Unlock the EMERGENCY-STOP switch and select a sectioning mode. 2. Deactivate the handwheel brake. 3. Turn the instrument off and wait 30 seconds; turn on again and push the safety cutout switch at the rear of the instrument 4. Connect foot switch* or control panel. 5. Connect foot switch* or control panel properly.
No more specimen advance. Sectioning motor cannot be restarted.	1. Specimen reached the front feed limit. 2. The specimen already was close to the front limit when turning on.	1. Push the coarse feed button at the rear to move the specimen towards the rear limit. 2. Push the coarse feed button at the rear to move the specimen towards the rear limit.
The sample can only be moved backward with the coarse feed button.	1. A motorized sectioning process continues.	1. Stop motorized sectioning with the foot switch* or by pressing RUN/STOP or RUN/ENABLE.

* optional accessory

9. Trouble shooting

Problem	Possible causes	Corrective action
Sample cannot be moved backward with the coarse feed buttons in the remaining horizontal feed range.	1. TRIM-STEP function (TRIM/ μm) is activated.	1. Press TRIM to change the 'SECT/ μm ' display to deactivate the TRIM-STEP function; move the sample backward by pressing the appropriate coarse feed button.
Sectioning motor stops in the continuous stroke mode ('Cont') before completing the sectioning stroke.	1. Foot switch* was held down when starting sectioning. 2. Foot switch* was connected without the foot switch adapter*. 3. The RUN/STOP and RUN/ENABLE buttons of the control panel were not released simultaneously when starting sectioning.	1. Start sectioning by a short activation of the foot switch*. 2. Disconnect the foot switch*; connect the foot switch adapter* and reconnect the foot switch. 3. Try to release the two buttons simultaneously.
HOME and STOP illuminate simultaneously.	1. Failure to detect the rear and front limits of the horizontal feed.	1. Call for technical service.

* optional accessory



Before cleaning, activate the handwheel brake, turn the instrument off and pull the mains plug!

- Remove all debris with a dry brush.
- Remove the section waste tray (optional accessory) for emptying.
- Remove the arm rests or hand rest (optional accessory) for cleaning.
- Remove the knife holder and knife holder base for cleaning.



**Do not use solvents that contain acetone and xylene for cleaning!
Ensure that liquids do not enter the interior of the instrument during cleaning!**



Only use mild household detergents or soap water for cleaning!

- Clean the instrument and accessory components with a damp not a wet cloth.



Do not turn the instrument on before it is completely dry!

11.1 General maintenance



Only authorized and qualified service personnel may access the internal components of the instrument for service and repair!

The microtome is virtually maintenance-free. To ensure a smooth operation of the instrument over several years we recommend the following:

- Have the instrument inspected **once a year** by a qualified service engineer authorized by Leica.
- Enter into a service contract at the end of the warranty period.
For further information, please contact your local Leica service center.
- Clean the instrument every day.
- Lubricate the following parts with the oil No. 405 once a month (1- 2 drops will be sufficient):
 - T piece **(1)** on the microtome base plate.
 - Guides **(2)** of the knife holder base on the microtome base plate.
 - Clamping levers **(3)** and **(4)** on the right and left of the knife holder base.
 - T piece **(5)** on the knife holder base.
- Clean the ventilation slits at the rear of the instrument with a brush or vacuum cleaner from dust and dirt.
- Do not carry out any repairs on your own as this will invalidate the warranty.

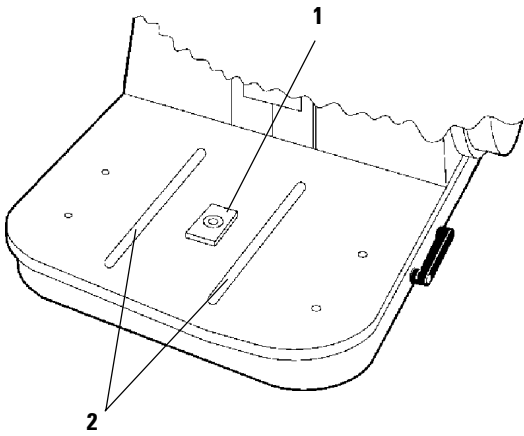


Fig. 50.1

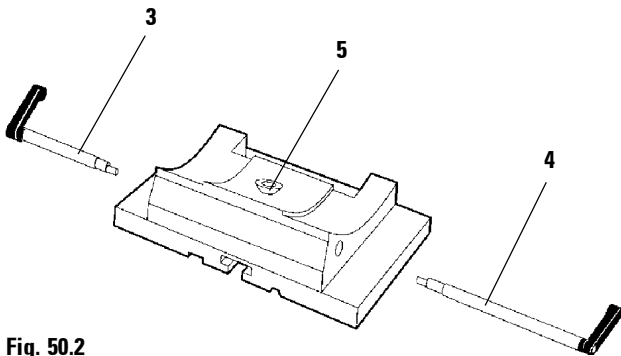


Fig. 50.2

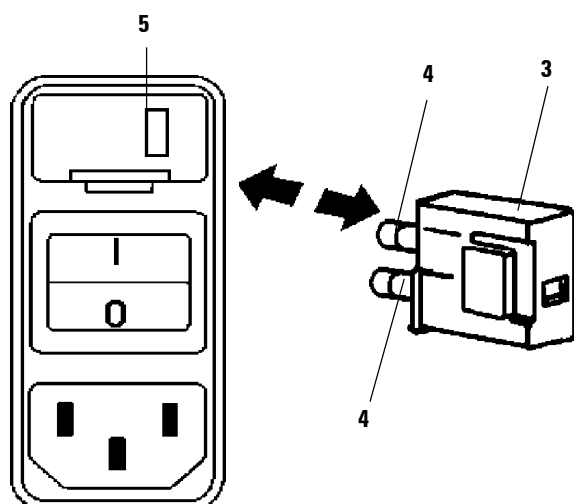


Fig. 51

11.2 Fuse replacement



Turn the instrument off with the mains switch and pull the mains plug, before replacing the fuses.
Only use fuses of the same specification!
For the required values, please refer to chapter 4 - 'Technical data'.

The mains fuses are located in the voltage selector housing (3) above the mains switch at the rear of the instrument.

- Remove the voltage selector housing (3) as described under 7.1.2 'Changing the voltage selector setting.
- Remove the fuses (4).
- Mount new fuses of the same technical specification.

The actual voltage setting can be seen in the small window (5) of the voltage selector housing (3).

- Insert the voltage selector housing with the fuses into the instrument, lightly push until it locks in place.
- Check if the correct voltage is indicated in window (5).

12. Optional accessories



All specimen clamps can be used in combination with both the orienting and non-orienting specimen clamping system.

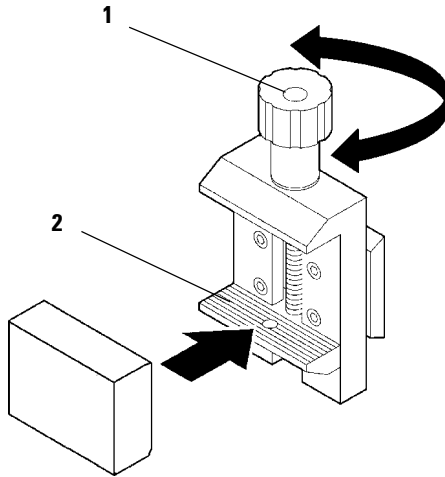


Fig. 52.1

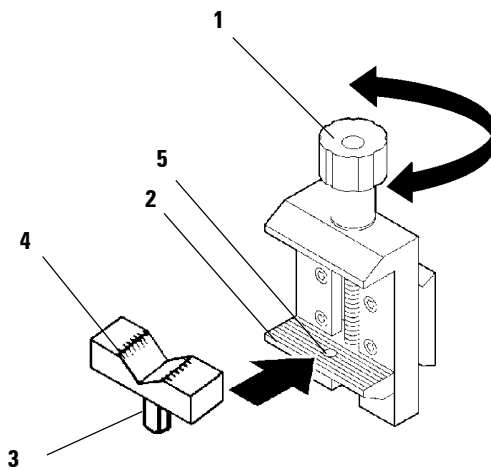


Fig. 52.2

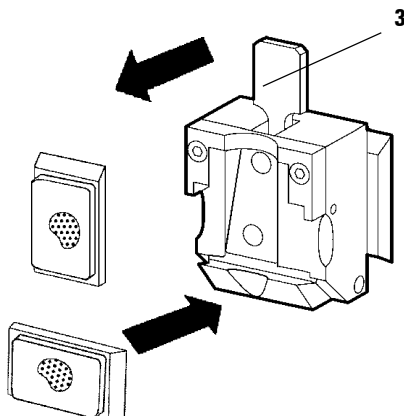


Fig. 52.3

12.1 Specimen clamps and holders

12.1.1 Standard specimen clamp

The standard specimen clamp is available in two sizes: 40 x 40 mm and 50 x 55 mm.

It is designed for direct clamping of rectangular blocks. In addition, it accommodates the foil clamps.

- Turn the knurled knob (1) counterclockwise to move the movable jaw (2) downward.
- Mount the sample as required.
- Turn the knurled knob (1) clockwise to move the movable jaw (2) upward against the fixed jaw to securely clamp the sample.

12.1.2 Vee insert

The vee insert is mounted in the hole provided in the lower movable jaw of the standard specimen clamp. This enables to clamp round specimens in the standard specimen clamp.

- Turn the knurled knob (1) counterclockwise to move the movable jaw (2) downward.
- Insert the pin (3) of the vee insert (4) in the hole (5) of the lower jaw (2).
- Mount the sample as required.
- Turn the knurled knob (1) clockwise to move the movable jaw (2) with the vee insert (4) upward against the fixed jaw to securely clamp the sample.

12.1.3 Universal cassette clamp

The universal cassette clamp (UCC) is designed to for horizontal or vertical clamping of all kinds of commercial cassettes.

- Pull the lever (3) to the front.
- Mount the cassette horizontally or vertically as required.
- Release the lever (3) to secure the cassette in position.

12.1.4 Foil clamp - Type 1

This foil clamp is appropriate both for clamping very small foil pieces and flat, angular samples. It is mounted in the standard specimen clamp.

Clamping of foil pieces

- Move the movable jaw (3) to the right or left as required by turning the set screw with an Allen key size 4 (6).
- Place the foil (2) between the movable jaw (3) and the fixed jaw (4).
- To clamp the foil, screw the movable jaw (3) against the fixed jaw (4) by using the Allen key (6).
- Insert the foil clamp in the standard specimen clamp as shown.
- Turn the knurled knob (1) clockwise to securely clamp the foil clamp in the standard specimen clamp.

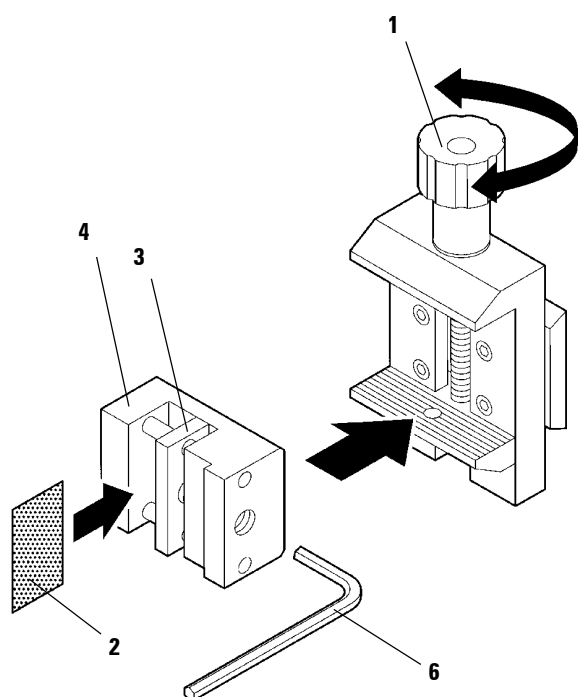


Fig. 53.1

Clamping of flat samples

To clamp flat samples, replace the long set screw (5) with the short set screw (7) provided with the foil clamp.

- Unscrew the long set screw (5) on the left with an Allen key size 4.
- Screw the short set screw (7) in the hole on the right.
- Place the sample (2) between the movable jaw (3) and the fixed jaw (4).
- To clamp the sample, screw the movable jaw (3) against the fixed jaw (4).
- Insert the foil clamp in the standard specimen clamp as shown.
- Turn the knurled knob (1) clockwise to securely clamp the foil clamp in the standard specimen clamp.

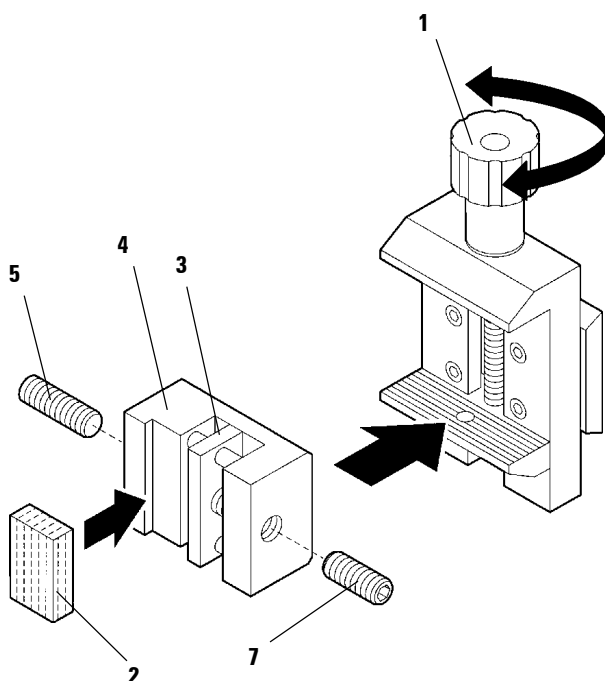


Fig. 53.2

12. Optional accessories

12.1.5 Foil clamp - Type 2

This foil clamp is appropriate for large foil ribbons and is mounted in the standard specimen clamp.

- To open the jaws **(3)** and **(4)** lightly loosen the 3 screws **(5)** with an Allen key size 4 **(6)**.
- Insert the foil **(2)** from behind to position it between the movable jaw **(3)** and the fixed jaw **(4)**.
- To clamp the foil, first tighten the screw **(5)** in the middle and then the other two screws with the Allen key.
- Place the foil clamp in the standard specimen clamp so that the bevelled surface **(7)** on the back of the foil clamp points to the right or left.
- Turn the knurled knob **(1)** clockwise to securely clamp the foil clamp in the standard specimen clamp.

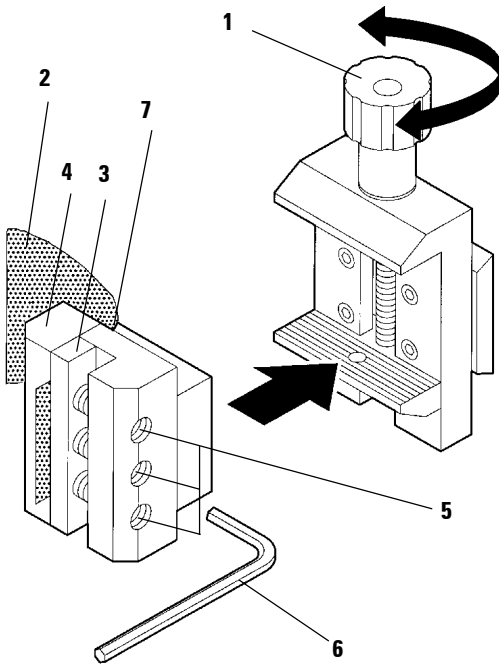


Fig. 54.1

12.1.6 Holder for round specimens

The holder for round specimens is designed to accommodate cylindrical samples. Inserts for specimens of 6, 15 and 25 mm diameter are available.

- To mount the required insert **(2, 3, 4)** turn the clamping ring **(1)** counterclockwise and remove.
- Place the insert **(2, 3)** or **(4)** in the clamping ring **(1)** and fix the clamping ring **(1)** by turning it clockwise.
- To mount the specimen, turn the clamping ring **(1)** counterclockwise, mount the sample **(5)** and fix by turning the clamping ring clockwise.
- To orient the sample, put the pin **(9)** in one of the holes **(10)** and turn counterclockwise.
- To fix the orientation, put the pin **(9)** again in one of the holes **(10)** and turn clockwise.

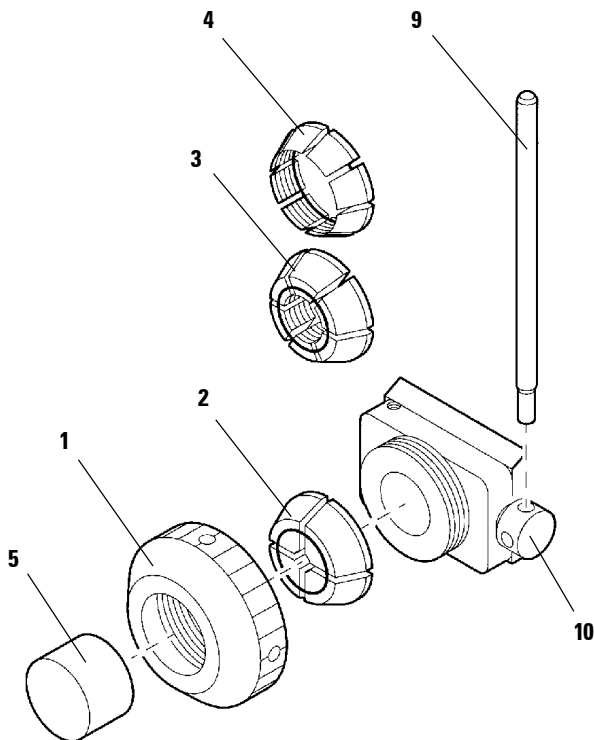


Fig. 54.2

12.1.7 EM specimen holders

The EM specimen holders are designed for very small specimens. Two versions are available: flat specimen holder (**not illustrated**) and universal specimen holder (1).

Both specimen holders can be mounted in the segment arc or in the non-orienting holder for EM specimen holders.

Clamping the specimen

- Introduce the special wrench (2) in the hole (3) and open the clamping jaws with the special wrench.
- Place the specimen between the jaws.
- Clamp the specimen by tightening with the special wrench.

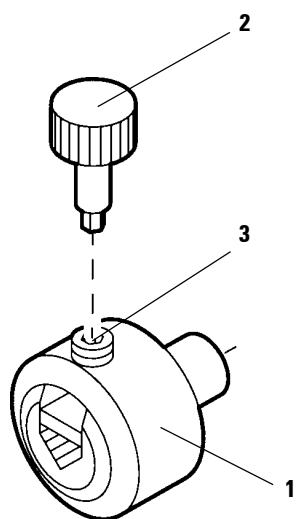


Fig. 55.1

12.1.8 Non-orienting holder for EM specimen holders

The non-orienting holder for EM specimen holders (1) is mounted in the dovetail adapter like a specimen clamp.

- To open, turn the knurled knob (2) counterclockwise.
- Introduce the pin (3) of the EM specimen holder (4) in the hole (5).
- Turn the knurled knob (2) clockwise to clamp the EM specimen holder.

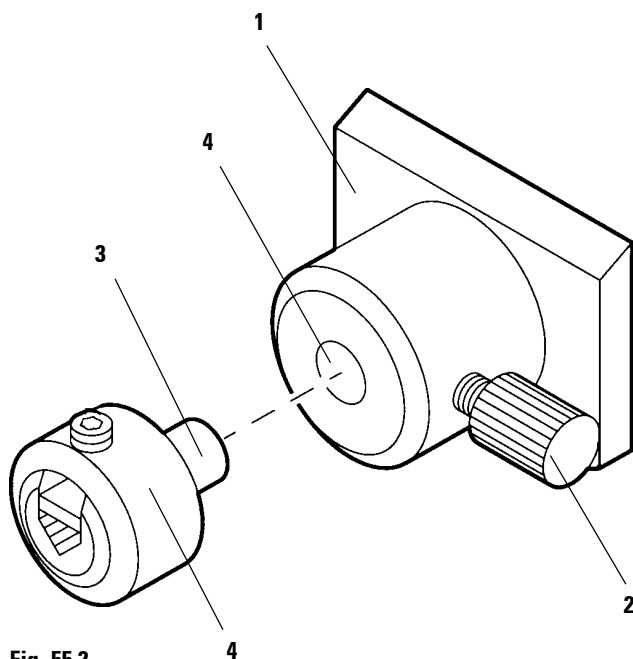
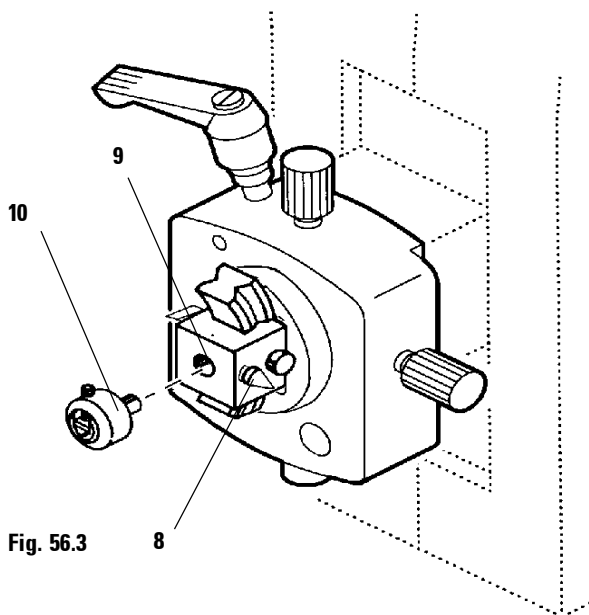
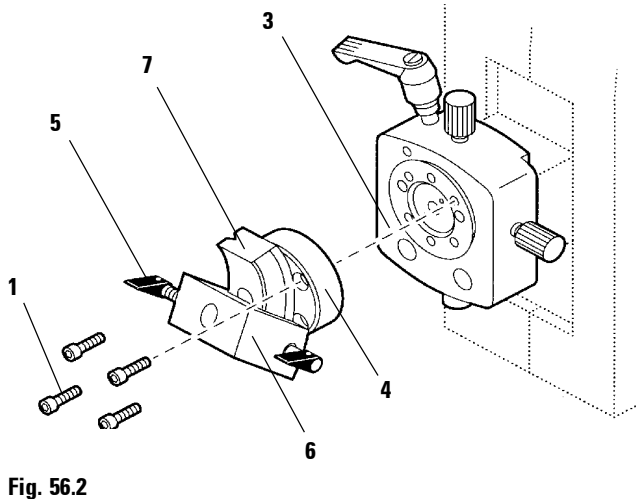
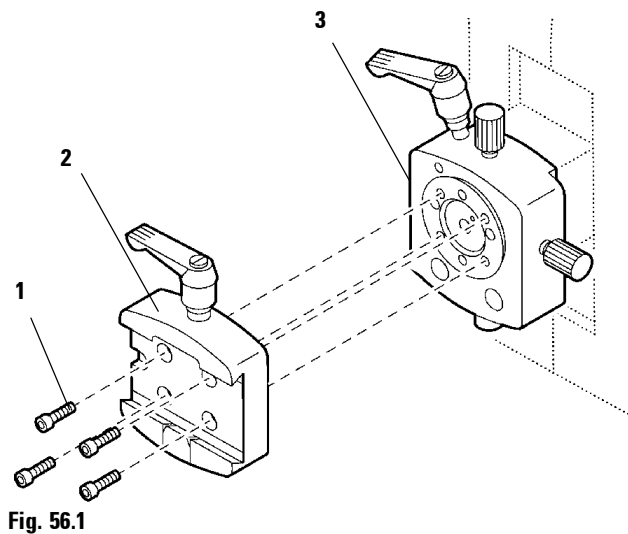


Fig. 55.2

12. Optional accessories



12.1.9 Segment arc

The segment arc is designed for clamping specimen holders. It is directly assembled to the non-orienting or orienting specimen clamping system.

Dismounting dovetail guide

- Activate the handwheel brake.
- Remove the knife holder.
- Remove the specimen clamp.
- Loosen the 4 screws (1) with a 3 mm Allen key and remove the dovetail guide (2) from the orienting specimen clamping system (1).

Mounting the segment arc

- Place the segment arc with its back plate (4) on the orienting specimen clamping system (3) and fix with the 4 screws (1) with a 3 mm Allen key.

Two of these four screws (1) are accessible at a time by releasing the lever (5) and by repositioning the receptacle (6) on the segment arc (7) up and down.

Clamping the specimen holder

- Release the lever (8) by turning it counterclockwise.
- Introduce the pin of the specimen holder (10) into the location hole (9).
- To clamp the specimen holder in position, tighten the lever (8) by turning it clockwise.

12.2 Universal knife holder bases



Both universal knife holder bases are available in two versions. The version with short clamping levers is used with the two arm rests.

The version with long clamping levers is used in combination with the hand-rest (see 12.8).

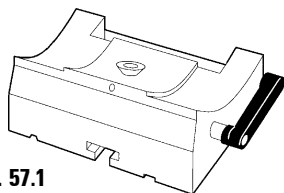


Fig. 57.1

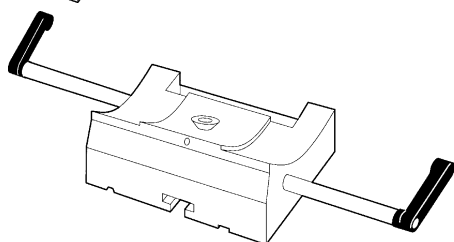


Fig. 57.2

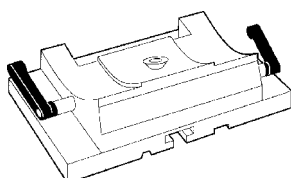


Fig. 57.3

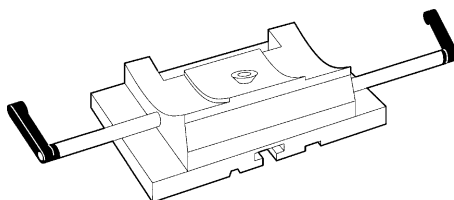


Fig. 57.4

12.2.1 Knife holder base without lateral displacement

The universal knife holder base without lateral displacement function can be repositioned on the microtome base plate only in north/south direction.

12.2.2 Knife holder base with lateral displacement

The universal knife holder base with lateral displacement function consists of two parts and can be repositioned on the microtome base plate both in north/south and in east/west direction.

12. Optional accessories

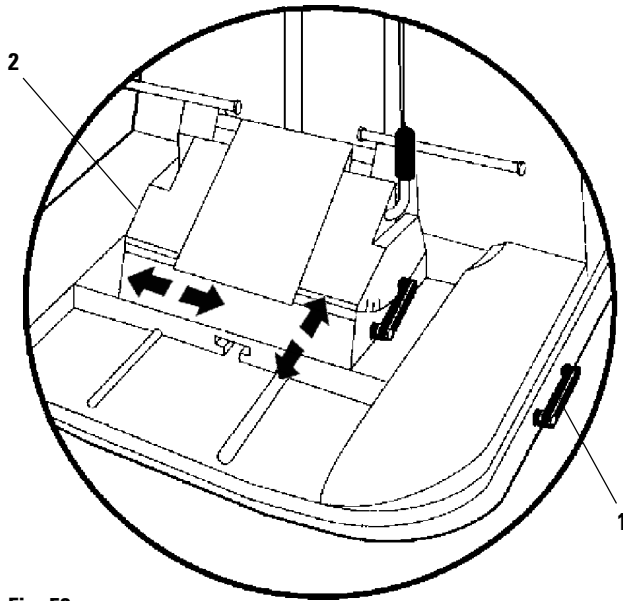


Fig. 58

12.2.3 Repositioning the knife holder base

North/South

North/South displacement enables the approach of the knife holder to the sample as close as possible.

- To release, turn the clamping lever **(1)** on the right side of the microtome base plate counterclockwise.
- Reposition the knife holder together with the knife holder base forward or backward as appropriate.
- To clamp, turn the clamping lever **(1)** clockwise.

East/West (12.2.2 only)

The lateral displacement feature of the knife holder base enables the use of the entire length of the blade or knife eliminating the need for readjusting the knife holder.

- To release, turn the clamping lever **(2, not visible)** on the left of the knife holder clockwise.
- Reposition the knife holder together with the knife holder base sideways as required.
- To secure, turn the clamping lever **(2)** counterclockwise.

12.3 Knife holders

Knife guard



The safety devices on the instrument and accessory equipment must not be removed or modified!

Every knife holder has a permanent, movable knife guard (1) that allows to cover the cutting edge completely in any position of the knife.

Grips (2) are provided to conveniently move the knife guard. Push both parts of the knife guard to the middle to cover the knife edge.

Knife holder E (Fig. 59.2) is equipped with a tilting shackle (3) which functions as a knife guard.

To cover the knife edge, tilt the shackle (3) upwards.



Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock the handwheel and cover the cutting edge with the knife guard!

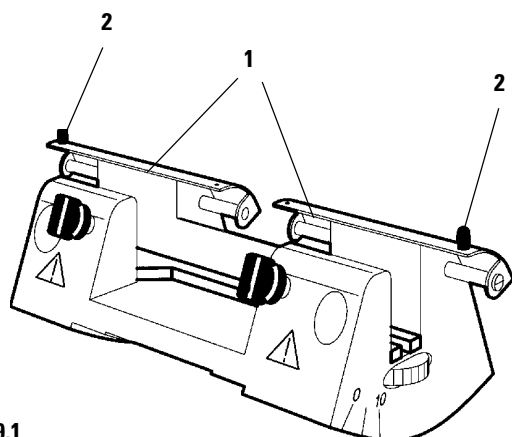


Fig. 59.1

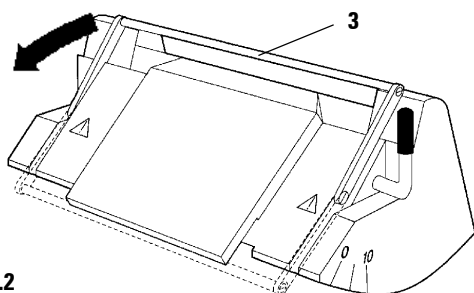


Fig. 59.2

Microtome knives and disposable blades



Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause severe injury!

**Never leave knives and knife holders with a mounted knife or blade lying around!
Always put the knives back into the knife case when not in use!**

Do not place a knife on a table with the cutting edge facing upward!

Never try to catch a falling knife!

Cleaning



**Only use mild commercial detergents or soap solution for cleaning!
Do not use solvents that contain acetone and xylene!**

- Clean the knife holders with a damp not a wet cloth.

12.3.1 Knife holder N

This knife holder is designed for standard steel and tungsten carbide knives, profile c and d, up to 16 cm long. In addition, it is appropriate for various blade rails for disposable blades, which are inserted in the holder like a knife.

The knife can be repositioned in height. This enables the use even of frequently resharpened knives.

Mounting the knife support bar

- Push the knife guard (1) to the middle.
- Place the knife support bar (3) as shown on the height adjustment screws (not visible), ensuring that the flat top ends of the height adjustment screws are seated in the slots at both ends of the knife support bar.

Inserting the knife

- Turn the knurled wheels (6) on the right and left of the knife holder in opposite directions to the front to move the knife support bar via the height adjustment screws to the lowest position, to prevent damage to the cutting edge while inserting the knife.
- Unscrew the knife clamping screws (2) counter-clockwise as far out as possible.
- Hold the knife (4) at the knife back and carefully insert it in the holder from the side as shown with the cutting edge facing upward.

Adjusting the knife height

When adjusting the clearance angle, the cutting edge of the knife should be positioned in the center of rotation of the knife holder. The knife is correctly positioned in height when the cutting edge is at the level of the locating edge of the rear clamping jaws. The knife edge should be parallel with the locating edges.

- Turn the knurled wheels (6) in opposite directions to the rear to position the knife edge parallel and at the level of the locating edge (Fig. 60.2) of the rear clamping jaws.
- To clamp the knife (4), tighten the two clamping screws (2) uniformly by turning them clockwise.

Inserting blade rails

The blade rails are inserted in the knife holder and clamped like a knife.

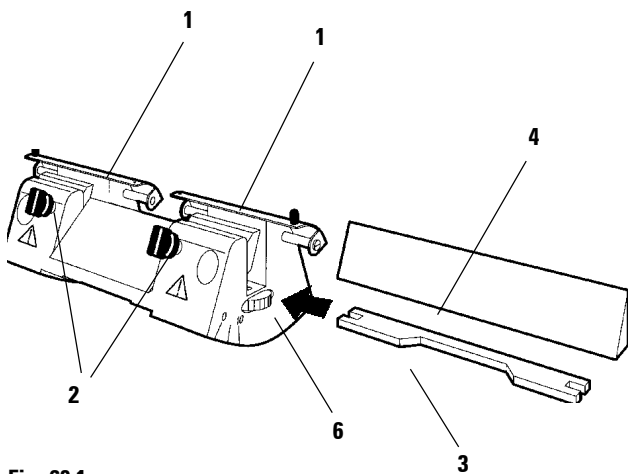


Fig. 60.1

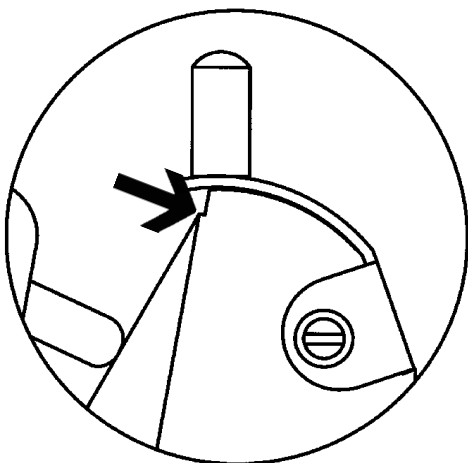


Fig. 60.2

12.3.2 Knife holder NZ

The knife holder NZ is appropriate for standard steel and tungsten carbide knives, profile c and d, up to 16 cm long. With its central clamping feature, the knife can be laterally repositioned and enables the use of the full length of the cutting edge. The knife can be repositioned in height. This enables the use even of frequently resharpened knives.

Mounting the knife support bar

- Push the knife guard (1) to the middle.
- Place the knife support bar (3) as shown on the height adjustment screws (not visible), ensuring that the flat top ends of the height adjustment screws are seated in the slots at both ends of the knife support bar.

Inserting the knife

- Turn the knurled wheels (6) on the right and left of the knife holder in opposite directions to the front to move the knife support bar via the height adjustment screws to the lowest position, to prevent damage to the cutting edge while inserting the knife.
- Unscrew the knife clamping screws (2) counter-clockwise as far out as possible.
- Hold the knife (4) at the knife back and carefully insert it in the holder from the side as shown with the cutting edge facing upward.

Adjusting the knife height

Please refer to 12.3.1 Knife holder N (Fig. 59.2).

Lateral repositioning of the knife

- Push the knife guard (1) to the middle.
- Loosen the clamping screws (2) by turning them counterclockwise.
- Push the knife (4) to the left or right as required.
- To clamp the knife (4), always tighten the clamping screw (2) first which is located on the side to which the knife has been repositioned by turning it clockwise.

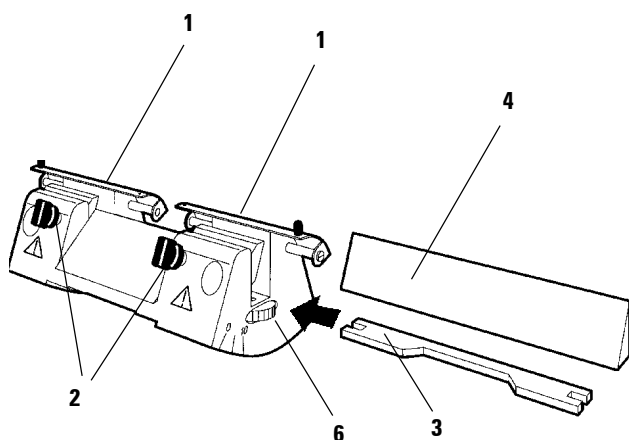


Fig. 61

12. Optional accessories

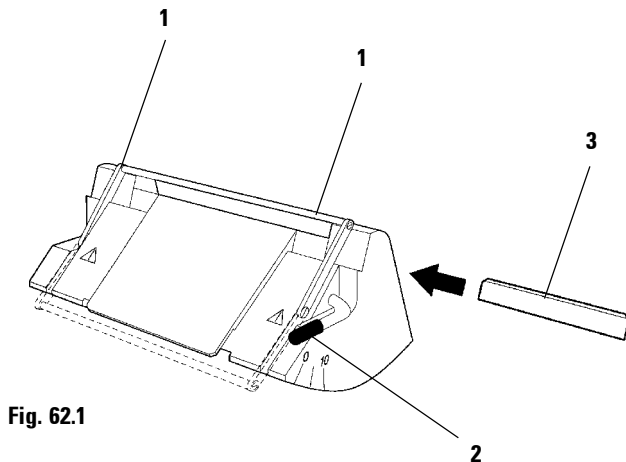


Fig. 62.1

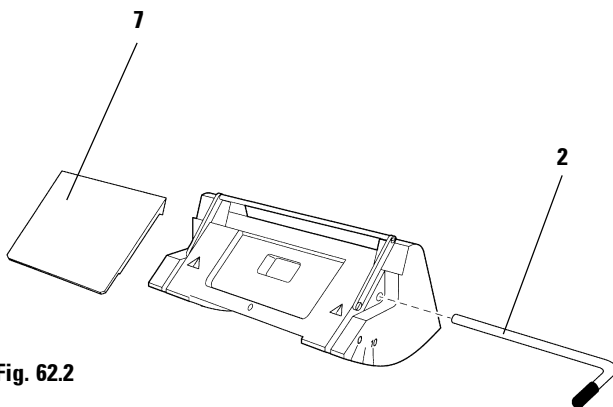


Fig. 62.2



Convenient for left-handers:
The clamping lever (2) can also be inserted in the hole on the left side of the knife holder. This will however change the locking position of the lever!
To unlock, relocate the lever upward; to clamp, relocate the lever downwards.

12.3.3 Knife holder E

The knife holder E is designed for conventional disposable blades from different manufacturers.

It is available in two versions:

With pressure plate for low profile blades and with pressure plate for high profile blades.

Both pressure plates also are available as accessories. If you would like to change from one blade type to another, just order the required type of pressure plate. The pressure plate can be exchanged easily.

Inserting the blade

- Tilt the knife edge protection shackle (1) downwards.
- To insert the blade, relocate the clamping lever (2) down.
- Carefully insert the blade (3) from the side.
- To clamp the blade, relocate the clamping lever (2) up.

Changing the pressure plate

- Loosen the 4 screws (4) on the back of the knife holder by using an Allen key size 4.
- Remove the pressure plate (5).
- Attach the new pressure plate by tighten the 4 screws (4).

Cleaning

The clamping plate (7) can be removed for cleaning.

- To remove the blade, relocate the clamping lever (2) down.
- Carefully remove the blade.
- Pull out the clamping lever (2).
- Remove the clamping plate (7).



Only use mild commercial detergents or soap solution for cleaning!
Do not use solvents that contain acetone and xylene!

- Clean the knife holder with a damp not a wet cloth.
- Place the clamping plate (7) on the holder ensuring that the upper edge of the clamping plate and of the pressure plate (5) are parallel and at the same height.
- Insert the clamping lever (2) in the hole and relocate it up.

12.3.4 Knife holder E-TC

The knife holder E-TC is designed for the Leica TC-65 tungsten carbide blades.

Inserting the blade

- Tilt the knife edge protection shackle (1) downwards.
- To insert the blade, relocate the clamping lever (2) down.
- Carefully insert the tungsten carbide blade (3) from the side with the shining facet to the front.
- To clamp the blade, relocate the clamping lever (2) up.

Cleaning

The clamping plate (7) can be removed for cleaning.

- To remove the blade, relocate the clamping lever (2) down.
- Carefully remove the blade.
- Pull out the clamping lever (2).
- Remove the clamping plate (7).



Only use mild commercial detergents or soap solution for cleaning!
Do not use solvents that contain acetone and xylene!

- Clean all components with a damp not a wet cloth.
- Place the clamping plate (7) on the holder ensuring that the upper edge of the clamping plate and of the pressure plate (5) are parallel and at the same height.
- Insert the clamping lever (2) in the hole and relocate it up.

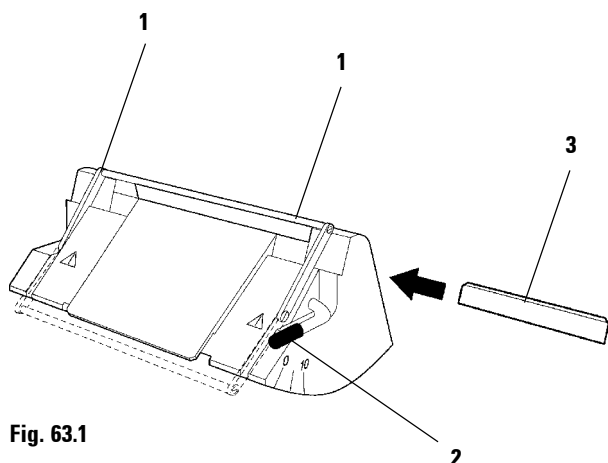


Fig. 63.1

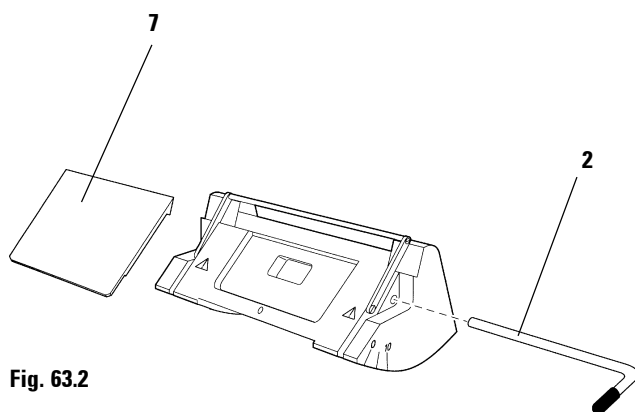


Fig. 63.2

12. Optional accessories

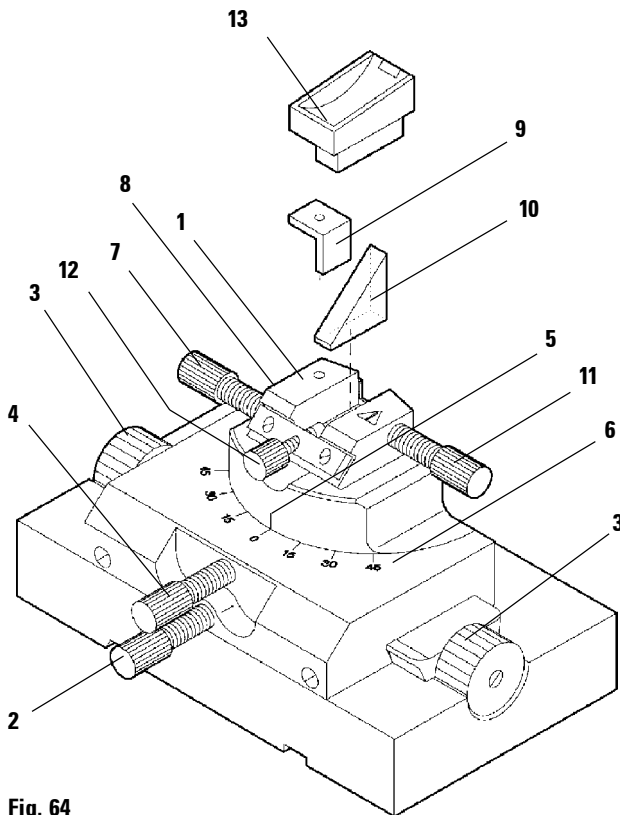


Fig. 64

12.3.5 Knife holder GD

The knife holder GD is designed for glass and diamond knives. It has its own base and therefore cannot be used with the universal knife holder base. The knife holder GD is placed on the microtome base plate and clamped like the universal knife holder base.

Several adjustments can be made on this knife holder. The insert (1) can be removed and exchanged for other inserts.

East/west movement

- Loosen the screw (2).
- To reposition the upper part to the right turn the knobs (3) clockwise; for repositioning to the left turn counterclockwise.
- Retighten the screw (2).

45° rotation of the upper part

- Loosen the screw (4).
- Position the index line (5) of the upper part over the desired value of the scale (6).
- Retighten the screw (4).

Clearance angle adjustment

- Loosen the screw (7).
- Reposition the insert (1) using the clearance angle scale (8, not visible here) on the left side of the insert to the required value.
- Retighten the screw (7).

Insert for triangular glass knives

The insert for triangular glass knives (10) is designed for triangular glass knives of 6 - 12 mm width. The angle insert (9) is used in combination with 6 mm knives.

- Loosen the screw (11).
- Mount the angle insert (9) as shown.
- Mount the glass knife (10) as shown and clamp with the screw (11).
- Lightly tighten the screw (12) to stabilize the knife during sectioning.

Inserting diamond knives

The insert (1) can also be used for diamond knives with a water bath (13).

- Loosen the screw (11).
- Insert the diamond knife (13) as shown and fix with the screw (11).
- Lightly tighten the screw (12).

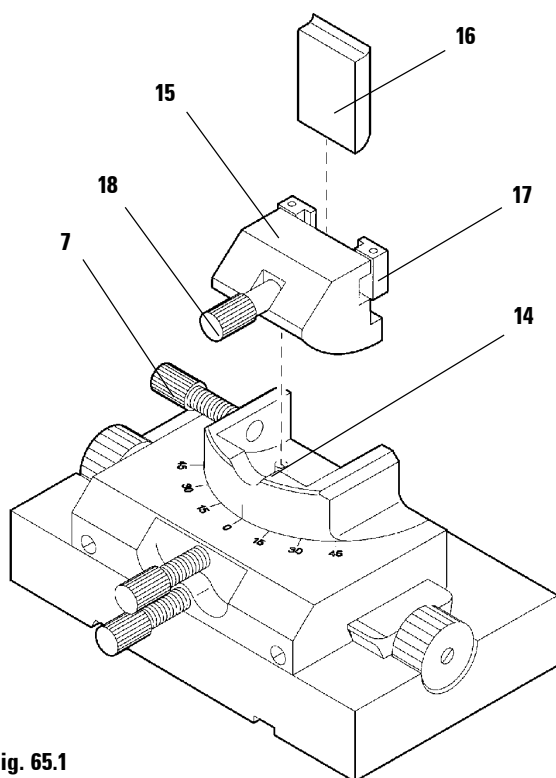


Fig. 65.1

Changing the insert

It is possible to replace the insert (1, Fig. 51) by other inserts.

- Loosen the screw (7).
- Pull the insert out of the guide (14) to the front.
- Place the new insert in the guide (14) from the front, push it against the stop face and clamp with the screw (7).

Insert for Ralph knives

The insert (15) for Ralph knives is designed for clamping 25 mm and 38 mm wide Ralph glass knives (16).

- Loosen the screw (18).
- Place the Ralph knife (16) in the clamping frame (17) from above as shown and clamp with the screw (18).

Trimming insert

The trimming insert (19) accommodates the universal specimen holder (20) and the segment arc.

- Loosen the screw (21).
- Place the universal specimen holder (20) into the hole (22) from above as shown and clamp with the screw (21).
- To clamp the specimen, put the special wrench (23) in the hole (24) and open the clamping jaws of the specimen holder with the special wrench.
- Place the specimen between the jaws.
- Clamp the specimen by tightening with the special wrench.

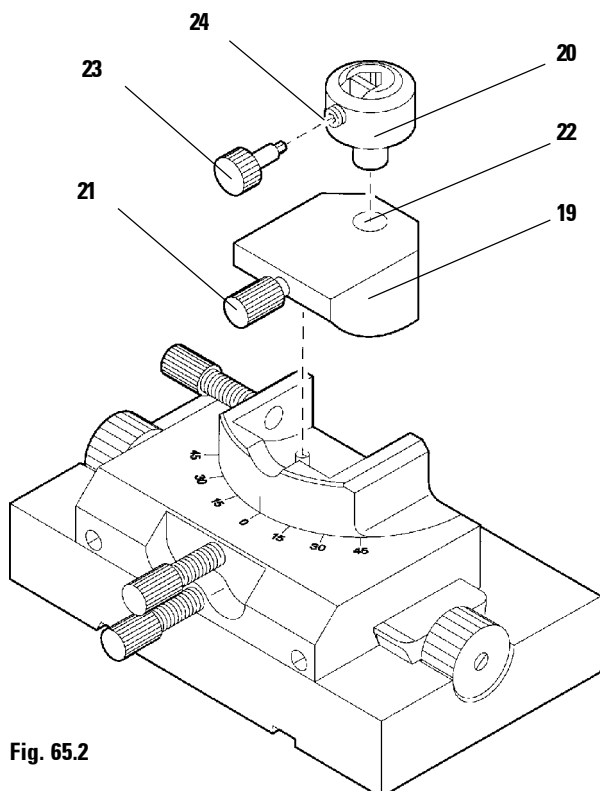


Fig. 65.2

12. Optional accessories

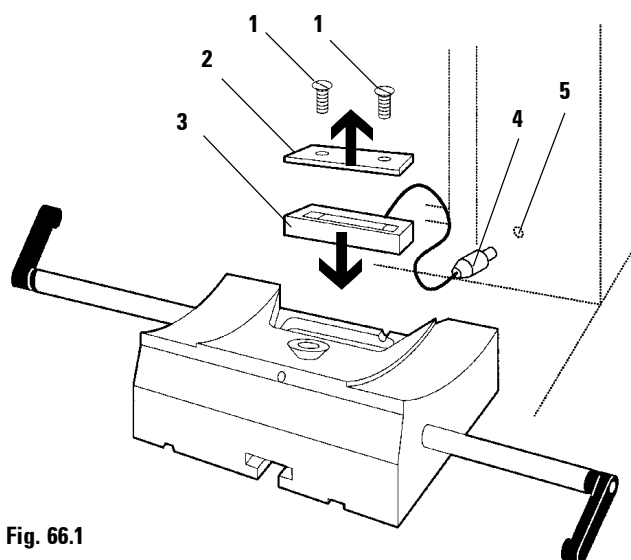


Fig. 66.1

12.4 Backlighting



The backlighting can be used only in combination with the knife holder base without lateral displacement function or with the knife holder GD.

- Loosen the 2 screws (1) with the provided screw driver and remove the cover plate (2).
- Insert the backlighting (3) in the recess at the rear of the knife holder base.
- Connect the plug (4) to the socket (5) on the microtome.

The backlighting illuminates once the microtome is turned on with the mains switch.

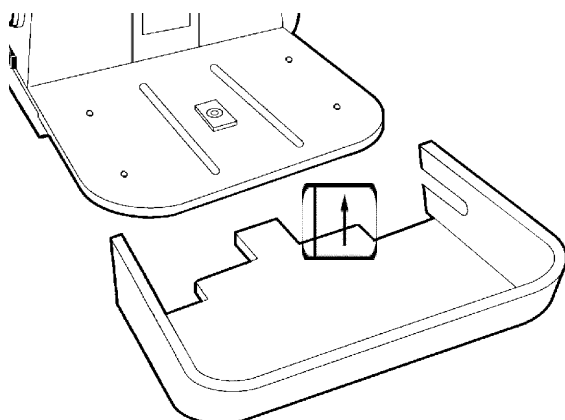


Fig. 66.2

12.5 Section waste tray

- Insert the section waste tray under the microtome base plate at front.



The combined carrier with magnifier and illumination can be mounted on all instruments that contain the appropriate fitting device inside the housing.

If the instrument is not equipped with such a fitting device, please contact your local Leica service department.

12.6 Combined carrier with magnifier and illumination

This carrier includes a fluorescent lamp. The inclination angle of the magnifier can be adjusted as appropriate. It is possible to slew the entire carrier to the side.



Protect the magnifier glass from exposure to direct sunlight! Exposure to sunlight may cause a burning glass effect. Risk of fire!

Mounting the magnifier

- Introduce the pins (1) of the magnifier holder into the holes of the carrier (2) and push the holder entirely in.
- To fix the magnifier, insert the set screws (3) into the holes on the underside of the carrier and tighten with a screwdriver.

To disassemble, proceed in reverse order.

Mounting the carrier

- Turn the microtome off with the mains switch.
- Remove the cover cap (4).
- Introduce the screw (5) into the hole of the carrier (2).
- Place the carrier (2) with the screw on the microtome housing so that the screw is located in the hole of the fitting device inside the housing.
- Tighten the screw (5) with an Allen key size 6.
- Close the hole with the cover cap (6).

To disassemble, proceed in reverse order.

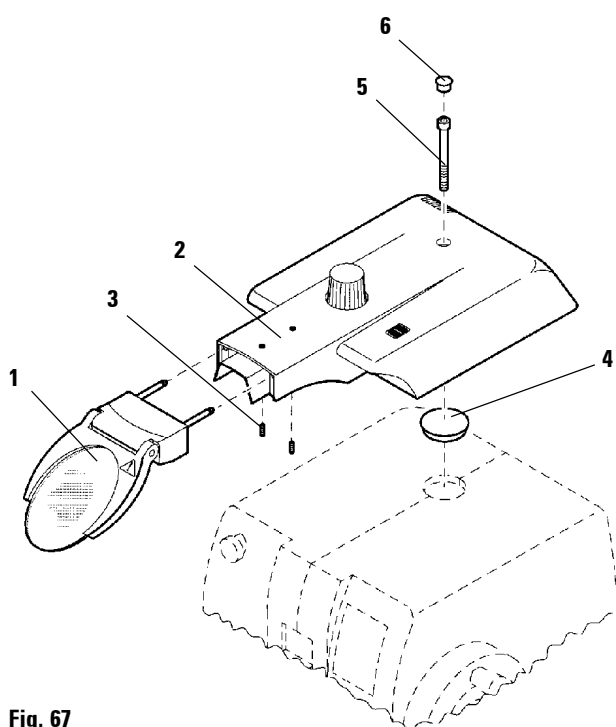


Fig. 67

12. Optional accessories

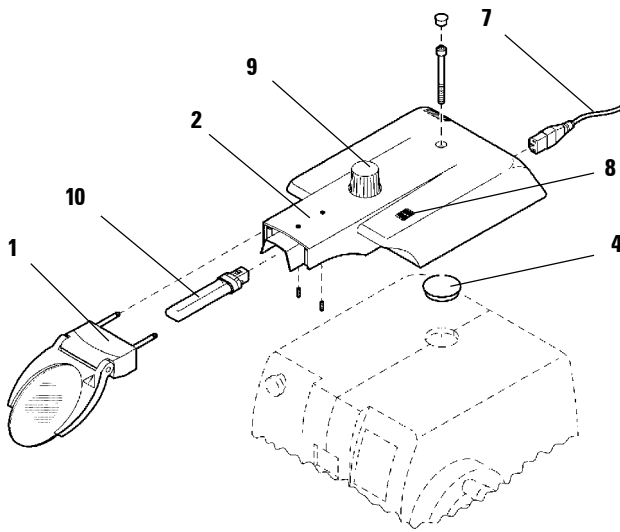


Fig. 68



Do not operate the magnifier & illumination carrier at a power rating other than specified on the nameplate!

Connecting the mains cable and turning on

- Connect the mains cable (7) to the socket at the rear of the carrier.
- Place the mains plug into the mains power outlet socket.
- Turn on with the mains switch (8).

Carrier adjustments

- The carrier (2) can be repositioned back and forth on the microtome housing.
- It also may be swung to the side if required. To do so, slightly lift the carrier at front and move as desired.
- The carrier may be adjusted in height by means of the knob (9).
- The inclination angle of magnifier (1) can be adjusted as required.

Lamp replacement



Prior to replacing the lamp, turn the illumination off with the mains switch (8) and disconnect the carrier from the mains power supply!

- Fold the magnifier (1) up.
- Pull the lamp (10) out of the holder.



**Use lamp of the same specification only!
Lamp type: Osram DULUX 7 W**

- Lightly push the new lamp into the holder until it locks in place.
- Reconnect the carrier to the mains power supply.
- Turn on with the mains switch.

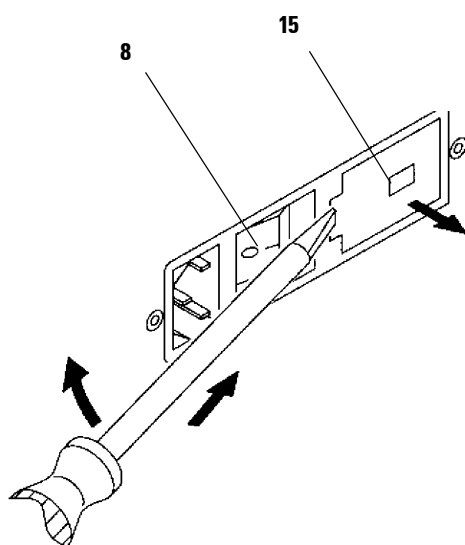


Fig. 69.1

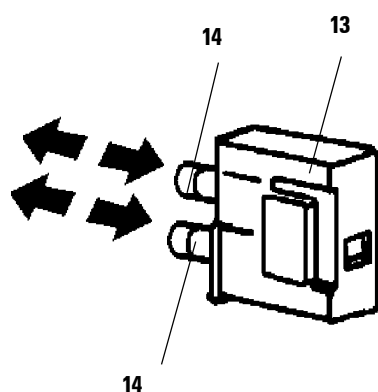


Fig. 69.2

Fuse replacement



Prior to replacing the fuses, turn the illumination off with the mains switch (8) and disconnect the carrier from the mains power supply!

The fuses are located in the voltage selector housing (3).

- Place the tip of a small screw driver into the small recess of the cover and push carefully to remove.
- Pull out the voltage selector housing (13).
- Remove the fuses (14).



**Use fuses of the same specification only!
For correct fuse type, see label on the carrier.**

- Mount new fuses of the same technical specification.

The actual voltage setting can be seen in the small window (15) of the voltage selector housing.

- Insert the voltage selector housing with the fuses into the instrument, lightly push until it locks in place.
- Check if the correct voltage is indicated in window (15).
- Reconnect the mains plug.
- Turn on with the mains switch.

12. Optional accessories



The microscope carrier with fiber optical light guide can be mounted on all instruments that contain the appropriate fitting device inside the housing. If the instrument is not equipped with such a fitting device, please contact your local Leica service department.

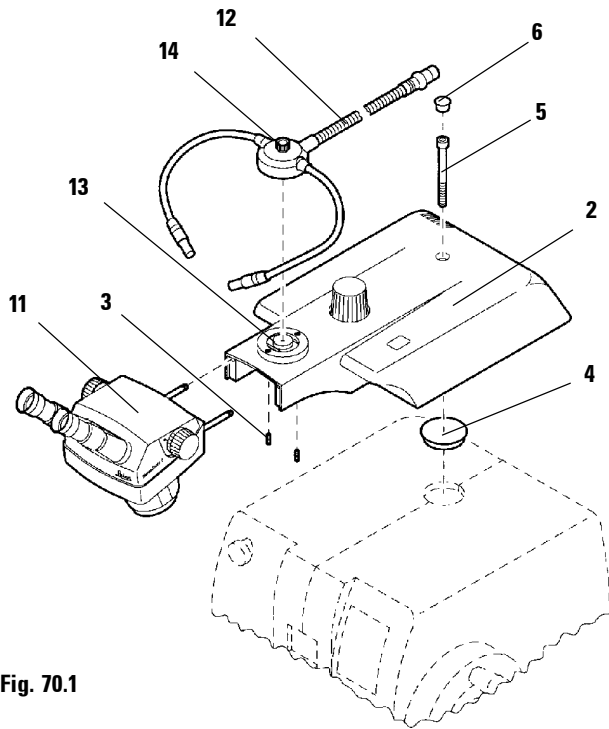


Fig. 70.1

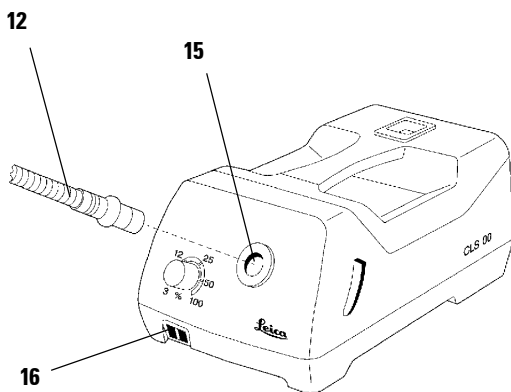


Fig. 70.2

12.7 Microscope carrier

The microscope carrier is supplied with a two-armed fiber-optical light guide for connection to the cold light sources of the Leica CLS series. The carrier can be slewed to the side if required. To focus the microscope, the carrier can be adjusted in height.

Mounting the microscope

- Introduce the pins of the microscope adapter (11) into the holes of the carrier (2) and push the adapter in entirely.
- To fix the magnifier, insert the set screws (3) into the holes on the underside of the carrier and tighten with a screwdriver.

To disassemble, proceed in reverse order.

Mounting the microscope carrier

- Turn the microtome off with the mains switch.
- Remove the cover cap (4).
- Introduce the screw (5) into the hole of the carrier (2).
- Place the carrier (2) with the screw on the microtome housing so that the screw is located in the hole of the fitting device inside the housing.
- Tighten the screw (5) with an Allen key size 6.
- Close the hole with the cover cap (6).

To disassemble, proceed in reverse order.

Mounting the fiber-optical light guide

- Place the light guide (12) onto the receptacle (13) of the carrier as shown and fix by tightening the screw (14).

Connecting the coldlight source

- Push the light guide (12) into the socket (15) of the coldlight source.



For details about connection and operation of the coldlight source, please refer to the instruction of the cold light source.

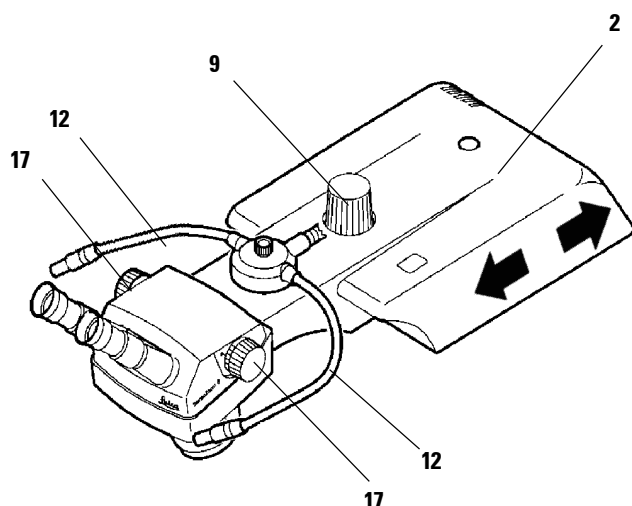


Fig. 71.1

Carrier adjustments

- The carrier (2) can be repositioned back and forth on the microtome housing.
- It also may be slewed to the side if required. To do so, slightly lift the carrier at front and move as desired.
- To focus the microscope, the carrier may be adjusted in height by means of the knob (9).
- The flexible arms of the light guide (12) can be placed in the optimum position. One spot can be directed on the sample, whilst the other may be directed on the knife.

Sectioning with a microtome will inevitably cause vibrations, which might be disturbing when using the microscope at great magnification factors.

An adjustable plastic device (18) is located on the underside of the carrier. To eliminate such disturbances, readjust the plastic device.

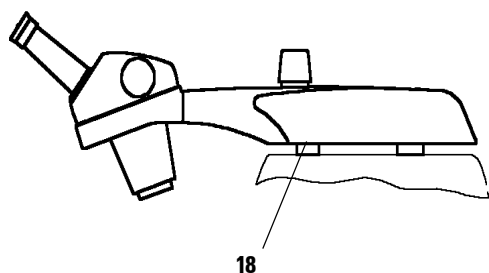


Fig. 71.2

- Slew the carrier (2) to the side.
- Screw the plastic device (18) further in or out as required.
- Slew the carrier (2) back.
- Adjust the microscope zoom with the knurled knobs (17).



A magnifier (optional accessory) may be used as an alternative to the microscope. Please refer to the combined carrier with magnifier and illumination for mounting instructions.

12.8 Hand rest



The hand rest is supplied with two long clamping levers for the knife holder base. The trimming lever extension included can only be used on the RM 2135.

12.8.1 Mounting the hand rest

Depending on the type of universal knife holder base you are using, the short clamping lever(s) will have to be removed before mounting the hand rest.

- To release, turn the clamping lever **(1)** counter-clockwise.
- To release, turn the clamping lever **(2)** (only on the knife holder base with lateral displacement function) clockwise.
- Pull the lever(s) out of the knife holder base.



The universal knife holder without lateral displacement function has a hole on the left side that is covered with a cap. The cap can be removed with a screwdriver. The hole is provided to accommodate a second clamping lever for stabilizing the hand rest.

- Place the hand rest **(3)** on the microtome base plate.
- Introduce the longer clamping lever **(4)** on the left and the shorter clamping lever **(5)** on the right through the holes of the hand rest in the holes of the knife holder base and turn them to the required direction to clamp.

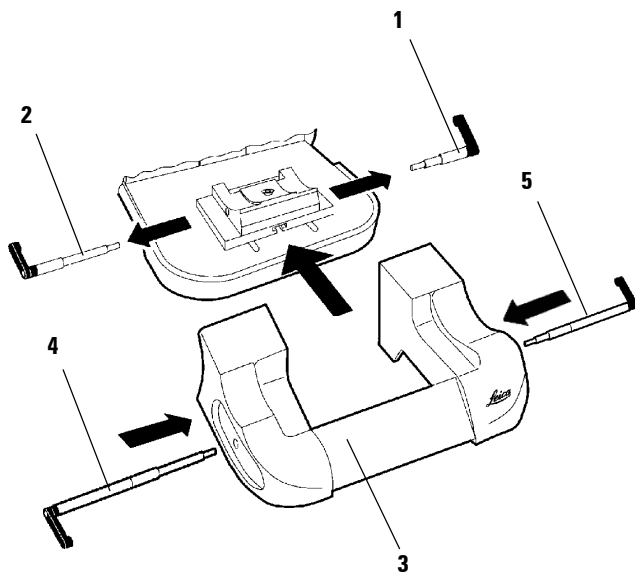


Fig. 72

12.8.2 Inserting the knife holder

- Turn the clamping lever (1) counterclockwise to release the clamping.
- Slide the knife holder (2) onto the T-piece (3) of the knife holder base.
- To lock, turn the clamping lever (1) clockwise.

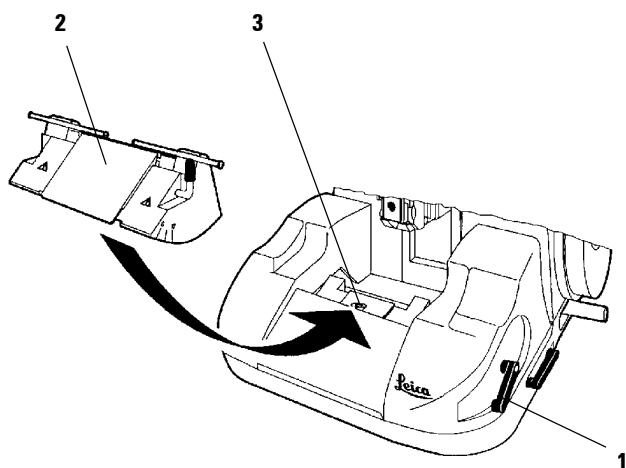


Fig. 73.1

12.8.3 Adjusting the clearance angle

The scale for the clearance angle adjustment (0°, 5° and 10°) is located on the right side of the knife holder. A reference point is provided on the hand rest.

- To release, turn the clamping lever (3) counterclockwise.
- To adjust the clearance angle, slide the knife holder on the base until the reference point on the hand rest or line is located next to the scale line for the required adjustment.
- Hold the knife holder in this position and fix the adjustment by turning the lever (3) clockwise.

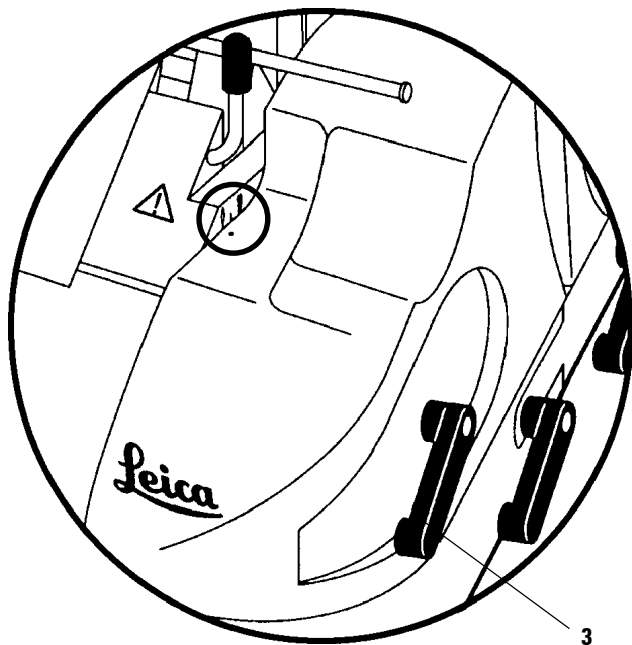


Fig. 73.2

12.8.4 Repositioning the knife holder base



The hand rest and knife holder do not need to be removed as they are repositioned with the knife holder base.

North/South

North/South displacement enables to approach the knife holder to the sample as close as possible.

- To release, turn the clamping lever **(1)** on the right side of the microtome base plate counterclockwise.
- Reposition the knife holder base together with the knife holder and the hand rest forward or backward as appropriate.
- To clamp, turn the clamping lever **(1)** clockwise.

East/West

(only knife holder base with lateral displacement function)

The lateral displacement feature of the knife holder base enables the use of the entire length of the blade or knife eliminating the need for readjusting the knife holder.

- To release, turn the clamping lever **(2)** on the left of the hand rest clockwise.
- Reposition the knife holder base together with the hand rest and knife holder sideways as appropriate.
- To clamp, turn the clamping lever **(2)** counterclockwise.

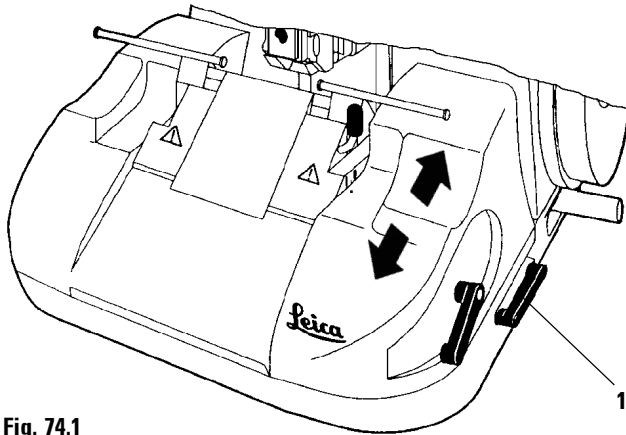


Fig. 74.1

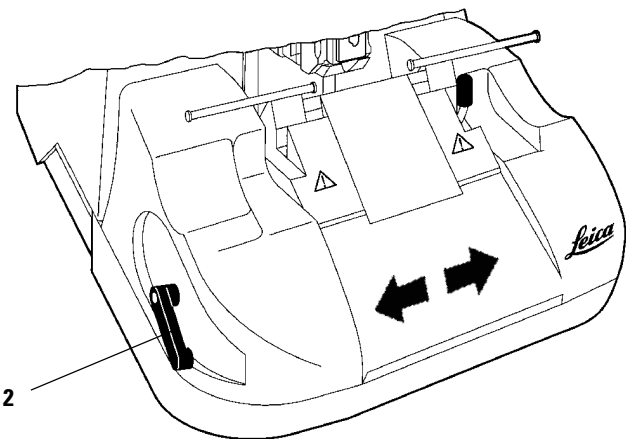


Fig. 74.2

12.9 Foot switch



The foot switch is operational only if the foot switch adapter is connected to the microtome.

The foot switch is used to start and stop motorized sectioning. In addition, the foot switch incorporates a function similar to the **emergency-stop** function.

Connecting the foot switch

- Remove the dummy plug from the socket (1) at the rear of the instrument.
- Connect the foot switch adapter to the socket (1) and fix by tightening the screws.
- Connect the plug of the foot switch to the foot switch adapter and fix by tightening the two screws (2).



When disconnecting the foot switch, please do not forget to remove the foot switch adapter and to reconnect the dummy plug. Otherwise the microtome will not be operational!

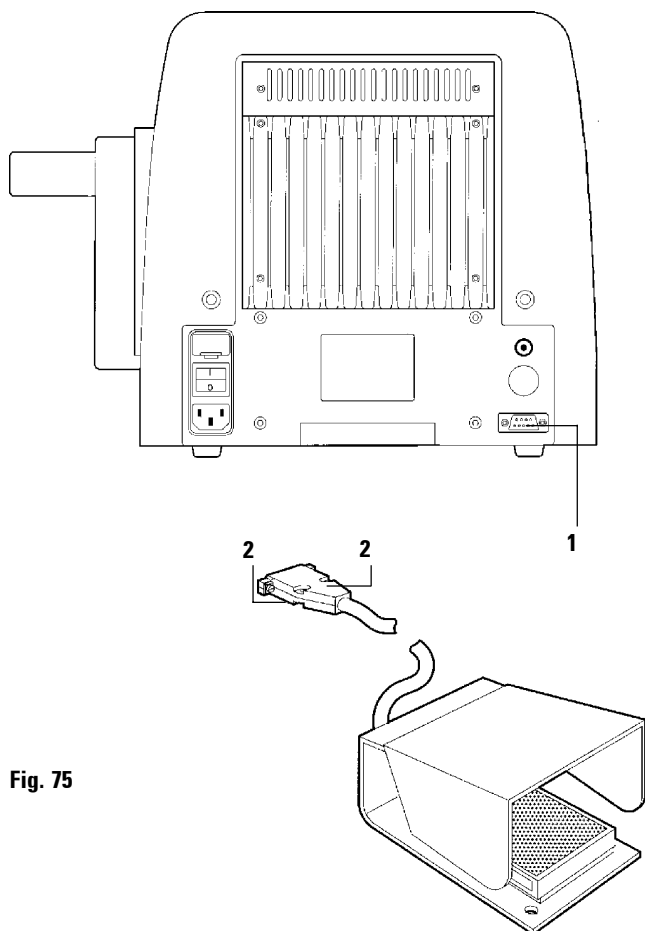


Fig. 75

Operation

- Select the desired sectioning mode 'Single' or 'Cont' on the control panel.

'Single' - Single stroke

- Lightly activate the foot switch once to start motorized sectioning.

Sectioning will stop automatically after a section in the upper or lower limit of the vertical stroke as selected.

'Cont' - Continuous stroke

- Lightly activate the foot switch once to start motorized sectioning.



**If the foot switch is held down for more than half a second, the sample will stop on next reaching the upper or lower limit of the stroke as selected.
To stop sectioning, activate the foot switch again.**

Sectioning continues until stopped.

- Lightly activate the foot switch once to stop motorized sectioning.

The sample will stop on next reaching the upper or lower limit of the vertical stroke as selected.

How to activate the emergency-stop function

- Press the foot switch strongly to activate the emergency-stop function.

Sectioning stops immediately.

E-STOP (red) on the control panel illuminates while the foot switch is depressed.

- To continue, reselect a sectioning mode and start sectioning by activating the foot switch.

Knife holder system

Universal knife holder base without lateral displacement	
with one short clamping lever for use with the right and left arm rests	0500 30147
with two long clamping levers for use with the hand rest	0502 29585
Universal knife holder base with lateral displacement	
with two short clamping levers for use with the right and left arm rests	0500 29703
with two long clamping levers for use with the hand rest	0502 29954
Knife holder N	0502 29955
Knife holder NZ	0502 29956
Knife holder E for low profile blades	0502 29957
Pressure plate for high profile blades	0502 29553
Knife holder E for high profile blades	0502 29982
Pressure plate for low profile blades	0502 29551
Knife holder E-TC	0502 29958
Knife holder GD for glass and diamond knives	0502 29959
Trimming insert for knife holder GD for clamping EM specimen holders or segment arc	0402 20369
Insert for Ralph knives for knife holder GD with clamping frame for 25 mm knives	0402 09996
Insert for Ralph knives for knife holder GD with clamping frame for 38 mm knives	0402 09997

Specimen clamping systems

Specimen clamping system, non-orienting	0502 29963
Specimen clamping system, orienting	0502 29962
Standard specimen clamp with adapter (50 x 60 mm)	0502 29964
Standard specimen clamp with adapter (40 x 40 mm)	0502 29980
Universal cassette clamp with adapter	0502 29965
Vee insert for round specimens	0402 09299
Foil clamp, Type I	0402 09307
Foil clamp, Type II	0402 26922
Holder for round specimens with adapter with 3 inserts	0502 29979
Holder for round specimens with adapter without inserts	0502 29522
Insert for holder for round specimens, ø 6 mm	0356 08322
Insert for holder for round specimens, ø 15 mm	0356 09200
Insert for holder for round specimens, ø 25 mm	0356 08320
Holder, non-orienting, for EM specimen holder	0502 29968
Segment arc with adapter for EM specimen holder	0502 29969
Universal specimen holder (EM)	0356 10868

13. Ordering information

Flat specimen holder (EM)	0355 10405
Special wrench for EM specimen holders	0356 10869

Optional accessories

Foot switch with protective guard including foot switch adapter	0502 29977
Foot switch adapter	0502 29413
Section waste tray	0500 29807
Hand rest including two long clamping levers	0500 30143
Backlighting for universal knife holder base without lateral displacement and for knife holder GD	0502 29970
Combined carrier "Magnifier & illumination" -100 V, 50/60 Hz	0502 29364
-120 V, 50/60 Hz	0502 29971
-230 V, 50/60 Hz	0502 29972
-240 V, 50/60 Hz	0502 29365
Microscope carrier including stereo-zoom microscope, eye pieces, microscope adapter and fiber optical light guide without coldlight source	0502 29366
Leica CLS 100 coldlight source -100 V, 50/60 Hz	0502 29364
-120 V, 50/60 Hz	0502 29971
-230 V, 50/60 Hz	0502 29972
-240 V, 50/60 Hz	0502 29365
Magnifier for alternative mounting on microscope carrier	0502 29973

Standard accessories of basic instrument

Arm rest, right	0500 29608
Arm rest, left	0500 29609
Maintenance kit	0502 29360
Dummy plug	0443 30420
Cover cap	0430 18995
Dust cover	0212 30350
Instruction manual V 1.2 – 06/2002 (German, English, French, Spanish)	0700 37105

Product changes

Due to a policy of continuous improvement of our products, Leica Microsystems Nussloch GmbH reserves the right to change specifications without notice.

Warranty

Leica Microsystems Nussloch GmbH guarantees that the contractual product delivered has been subjected to a comprehensive quality control procedure based on the Leica in-house testing standards, and that the product is faultless and complies with all technical specifications and/or characteristics warranted.

The warranty conditions depend on the contents of the individual contract concluded, supplemented by the warranty conditions of your local Leica sales unit.

The warranty period starts on the day of passing of risk or on the day of delivering the product.

Excluded are warranties for defects or damage attributable to, for example, operational and normal wear and tear, improper use, faulty operation, installation and/or use of non-original spare parts, installation and/or use of non-original accessories, negligent handling of the product by the customer, connection to unsuitable power supply sources, operation at incorrect voltage, force majeure such as fire, lightning, earthquakes, humidity etc.

We will not assume any liability for damages due to improper handling of the product.

Any repairs and/or exchange of parts of the product must be carried out by technical service engineers authorized by Leica. Otherwise warranty claims can no longer be made.

The local Leica sales unit, the Leica representative responsible or the factory in Nussloch must be consulted prior to any changes to the instrument, to any modifications as well as prior to any use of the instrument in combination with non-Leica components not expressly authorized by Leica.

Spare parts and accessories not supplied by Leica can under no circumstances be considered as inspected and/or approved by Leica.

Installation or use of any such parts may impair the technical design features and thus the properties of the instrument.

Warranty claims can only be made as long as the product or system has been operated according to its designated use and according to the instructions given in this manual.

In case of justified claims the manufacturer is entitled to repair or replace the goods. Rescission of the sales contract can only be demanded after two unsuccessful attempts at repairing the instrument on the part of the manufacturer.

Disposal

The instrument or parts of the instrument must be disposed of in compliance with the local laws.

Technical service information

If you require technical service or replacement parts under warranty, please contact your Leica Sales Representative or Dealer from whom the instrument was purchased.

Be sure to state the model type, serial number and date of delivery. Leica Microsystems Nussloch GmbH (Germany) cannot accept goods returned without official authorization.

If an instrument or any part of it is to be returned to Leica, please note the following:

- a. If the instrument or any part of it has been exposed to or been in contact with potentially pathogenic or radioactive materials, it is essential to decontaminate the instrument or part. Decontamination must explicitly be confirmed by the customer. Our service engineers have to enquire about this.
- b. Ensure that there is no radioactivity or hazardous bacteria present and advise Leica of any decontamination procedure that may have been carried out.

Should the instrument or any part of it be received in a condition that Leica considers to be a potential biological hazard, the instrument or part will be returned unrepaired at the expense of the customer.

When requesting a service call, please provide the following information:

- a. Model type and serial number of the instrument;
- b. Location of the instrument and the person to contact;
- c. The reason for the service call.

