

Leica RM 2135

Rotary Microtome

Instruction Manual

Leica RM 2135 V1.1 English – 02/2001

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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3. Safety instructions for handling the instrument

3.1 Safety devices



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

The instrument incorporates the following safety devices: quick locking system for the handwheel and a knife guard on the knife holder.

3.1.1 Activation of the quick locking system of the handwheel



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. The two locking positions of the lever (● = locked; ○ = released) are marked on the microtome base plate (Fig. 5.2).

Performance check

- To activate, pull the locking lever (1) to the front (●).

The handwheel is mechanically blocked and cannot be turned.

- To deactivate, push the locking lever (1) to the rear (○).

The handwheel can then be rotated again.

3.1.2 Knife guard on the knife holder



Prior to manipulating the knife and specimen, or changing the specimen or knife, and during breaks, always lock cover the cutting edge with the knife guard (1)!

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.

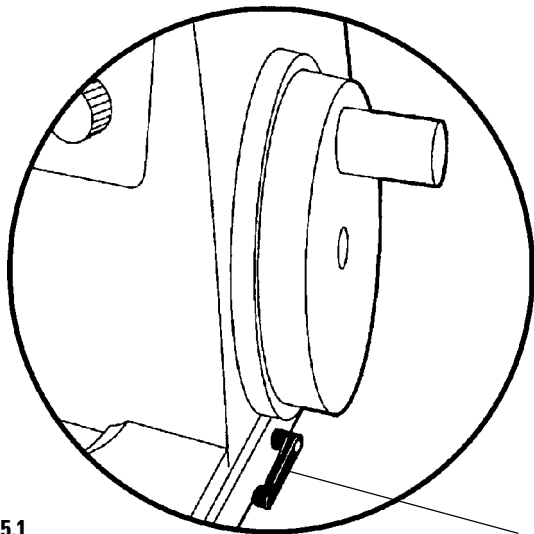


Fig. 5.1

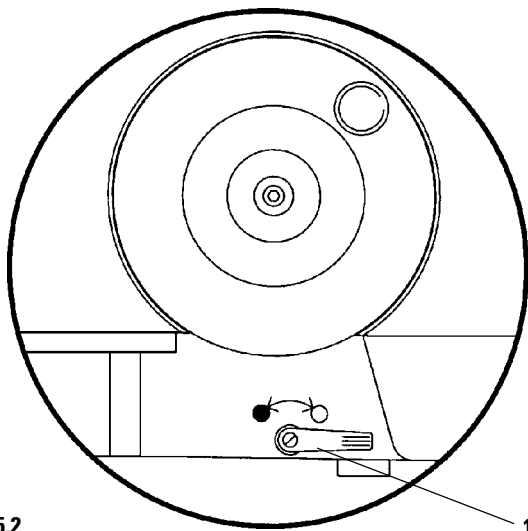


Fig. 5.2

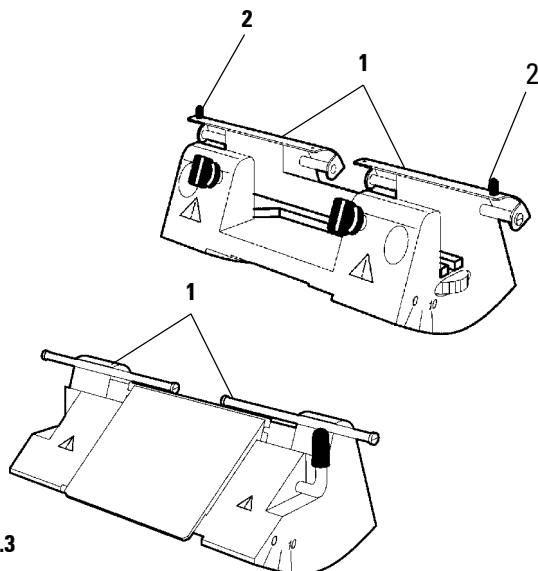


Fig. 5.3

3. Safety instructions for handling the instrument

Transport and installation



- Please refer to chapter 4 - 'Technical data'!
- The instrument must be transported in an upright position!
- Do not carry the instrument with the handle of the handwheel, coarse feed wheel or control knob for section thickness setting!
- The safety devices on the instrument and accessory equipment must not be removed or modified!

Cleaning



- Before cleaning, activate the handwheel locking system!
- 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!

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 handwheel 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!
- Always wear protective glasses when sectioning brittle specimens!
Risk of splintering!!
- Ensure that liquids do not enter the interior of the instrument during work!

Maintenance



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

Type	RM 2135	
Operating temperature range:	+10°C to +40°C	
Microtome		
Type	RM 2135 Rotary Microtome	
Section thickness setting	1 - 60 µm	
	from 1 - 10 µm in 1 µm increments	
	from 10 - 20 µm in 2 µm increments	
	from 20 - 60 µm in 5 µm increments	
Horizontal specimen feed	30 mm (-10%)	
Vertical specimen stroke	70 mm	
	Max. sectioning area without retraction	
	69 mm without specimen orientation 1 µm	
	Max. sectioning area with retraction	
	62 mm	
Specimen retraction	200 µm	
	with ON/OFF	
Optional accessories		
Specimen orientation (option)		
horizontal	8°	
vertical	8°	
rotation	±90°	
Trimming steps (option)	10, 30 µm	
Repositioning of knife holder base		
Knife holder base with lateral displacement		
North/south	±25 mm	
East/west	±20 mm	
Knife holder base W/O lateral displacement		
North/south	±25 mm	
Dimensions and weight		
	Side coarse feed	Front coarse feed
Width	475 mm	415 mm
Depth	525 mm	565 mm
Overall height	295 mm	300 mm
Working height (knife edge)	105 mm	110 mm
Net weight:	34 kg	
Weight (including accessories)	38 kg	

5. General description

5.1 Leica RM 2135 - Overview

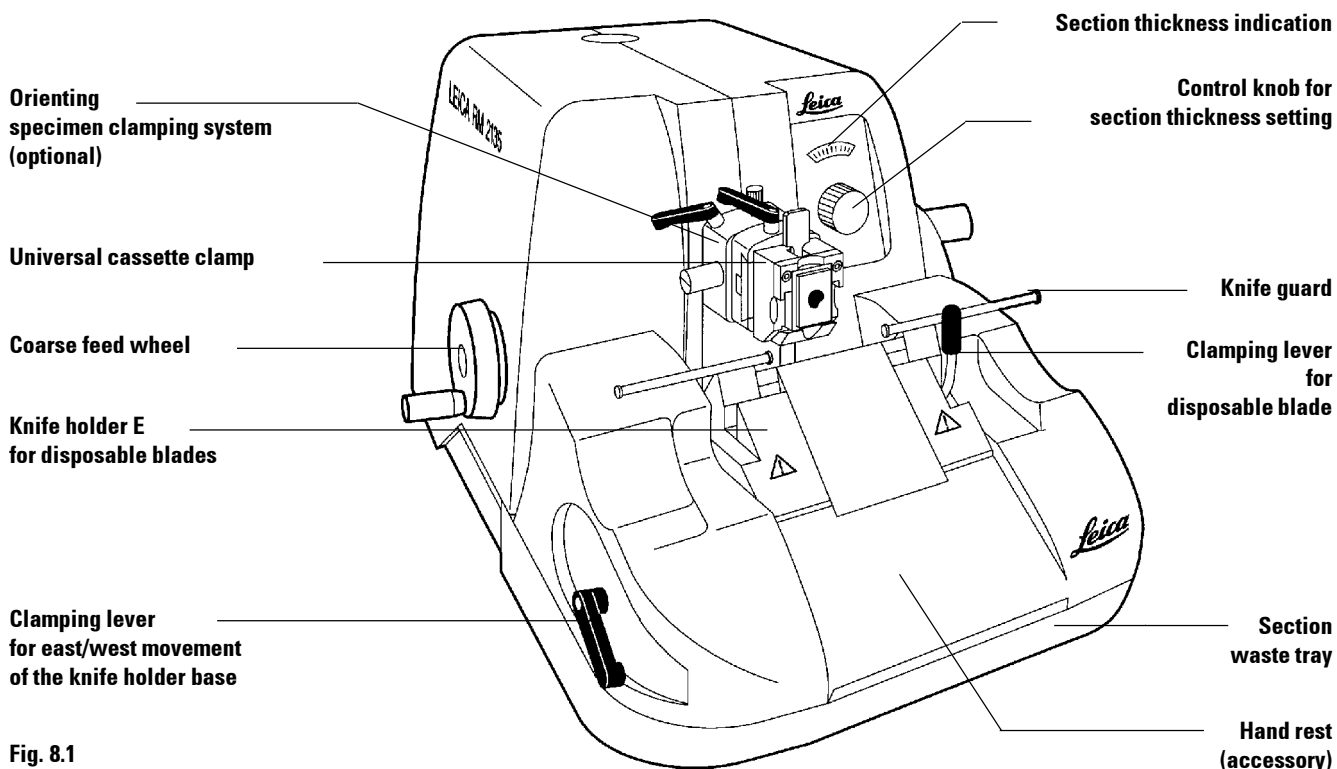


Fig. 8.1

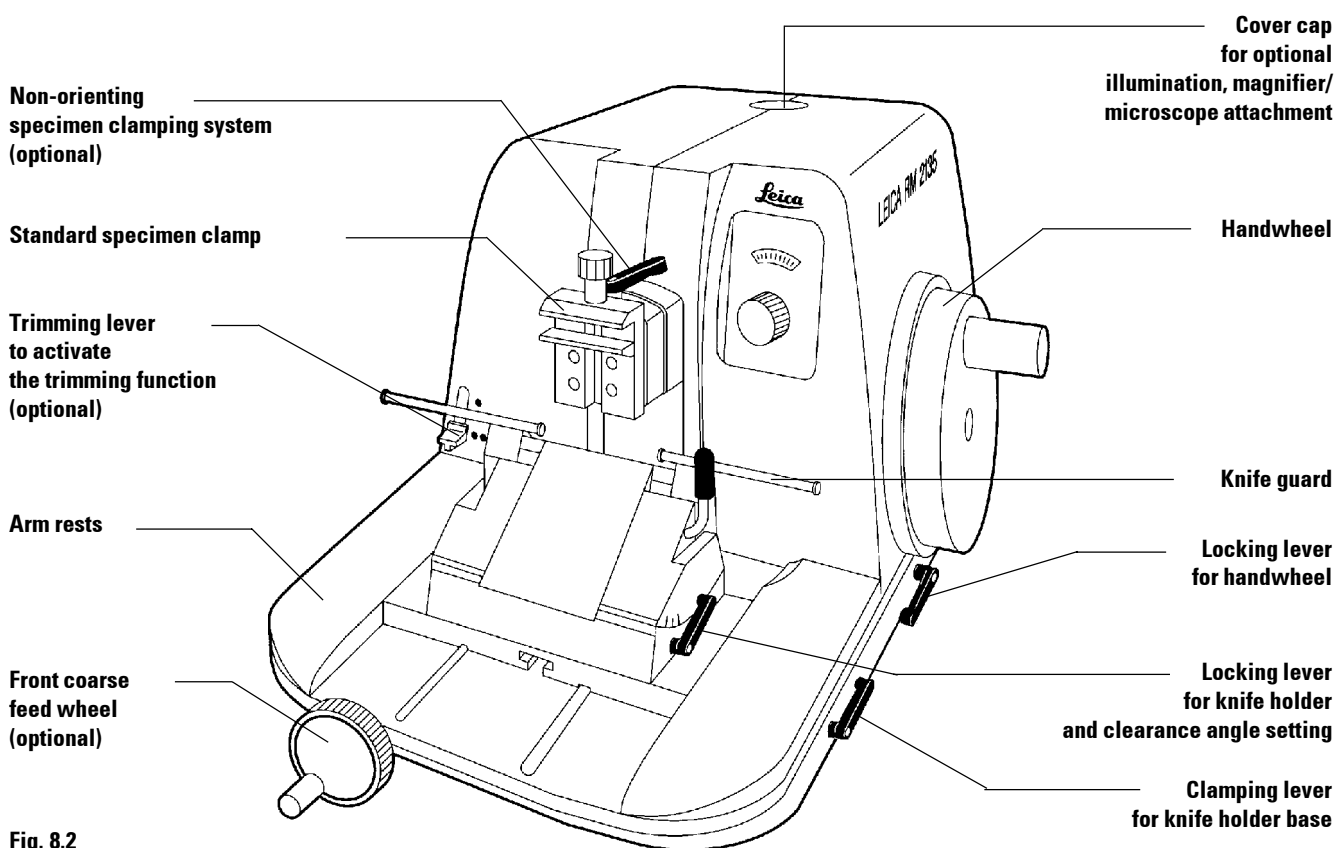


Fig. 8.2

5.2 General description

The Leica RM 2135 is a manually operated rotary microtome.

The vertical and horizontal specimen movement takes place via zero-backlash and maintenance-free cross roller guides. The coarse advance is manually operated by turning the coarse feed wheel. All components are well protected in a dustproof plastic housing. Sectioning takes place by turning the extremely smooth running handwheel.

The section thickness is selected via a control knob. The mechanical trimming function (optional) is activated by means of a lever.

Specimen retraction is a standard feature and may be turned off when required.

The instrument is designed and manufactured to conform with the strict VDE safety standards.

5.3 Standard delivery

The RM 2135 is available in six versions:

1. RM 2135 basic instrument with mechanical trimming function, lateral coarse feed, CW
2. RM 2135 basic instrument without mechanical trimming function, lateral coarse feed, CW
3. RM 2135 basic instrument with mechanical trimming function, lateral coarse feed, CCW
4. RM 2135 basic instrument without mechanical trimming function, lateral coarse feed, CCW
5. RM 2135 basic instrument with mechanical trimming function, front coarse feed, CW
6. RM 2135 basic instrument without mechanical trimming function, front coarse feed, CW

The basic instrument is delivered with the following accessories:

- 1 Arm rest, right,
1 Arm rest, left,
- 1 Maintenance kit consisting of:
1 Allen key size 4,
1 Allen key size 3,
1 Screw driver,
1 Bottle of oil No. 405, 50 ml,
1 Dust cover,
- 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 without delay.

6. Unpacking and installation

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.

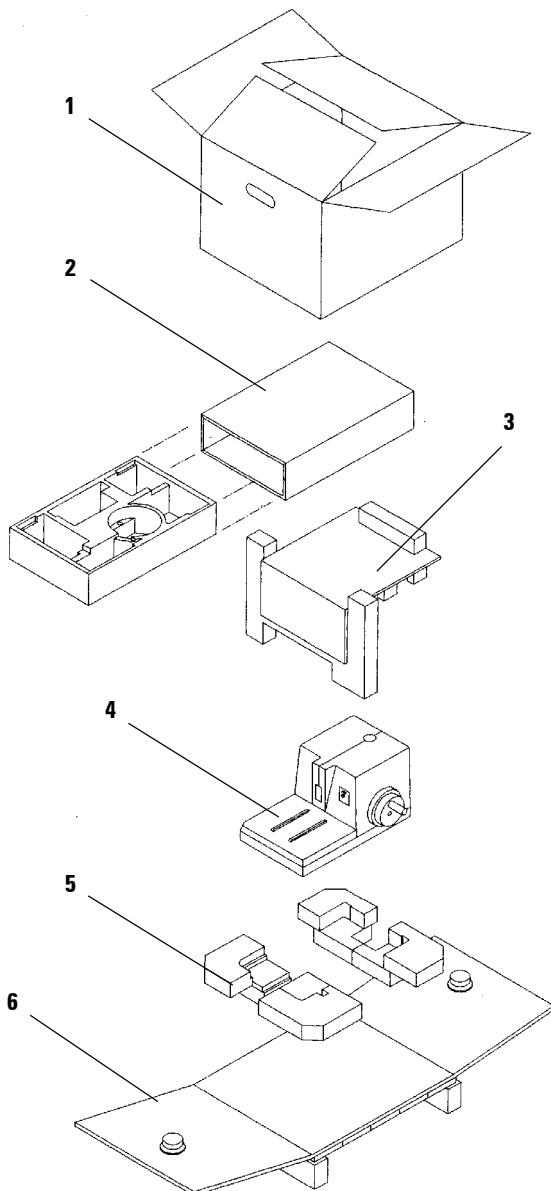


Fig. 10.1

- 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).



Do not carry the instrument with the handle of the handwheel, coarse feed wheel or the control knob for section thickness setting!

- 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. 10.2).

Installing the instrument

- 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.

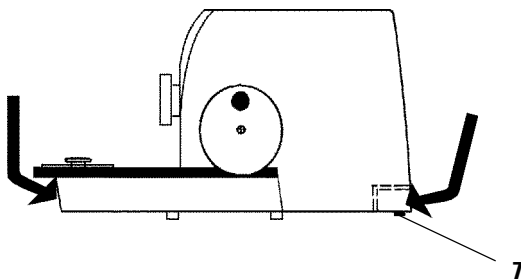


Fig. 10.2

6.2 Site requirements

The installation site must meet the following requirements:

- stable, vibration-free laboratory table,
- vibration-free floor,
- Obstruction-free access to the handwheel and coarse feed wheel,
- Room temperature always between +10 °C and +40 °C.

7. Setup



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.

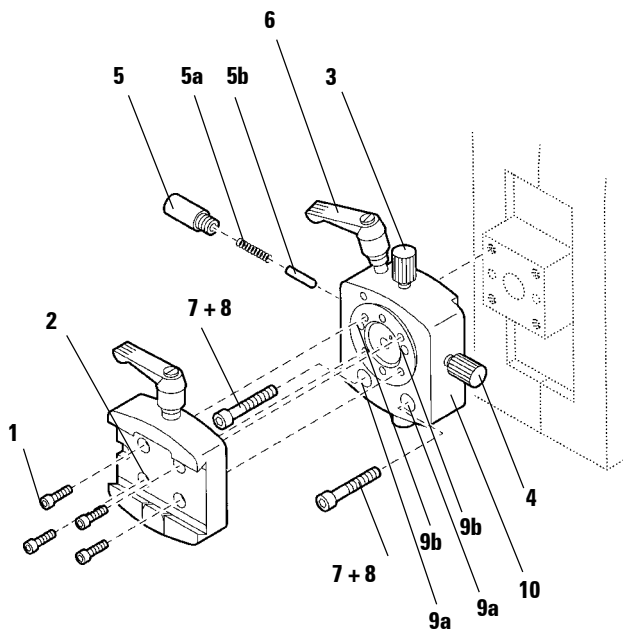


Fig. 12.1

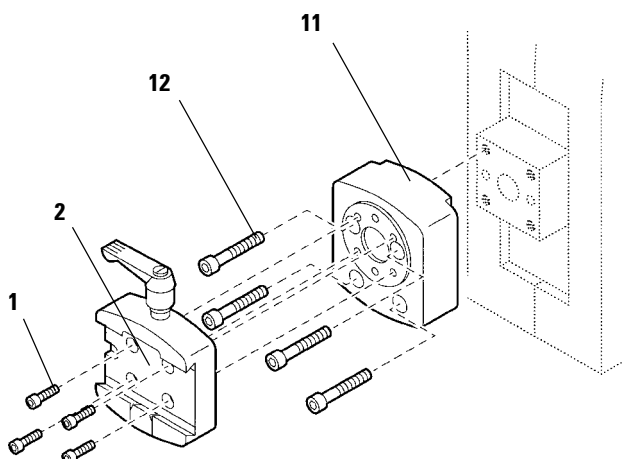


Fig. 12.2

7.1 Mounting the specimen clamping system

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

7.1.1 Orienting specimen clamping system

- Lock the handwheel.
- To remove, turn the eccentric bolt (6) counterclockwise.
- 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 microtome cylinder as shown.
- Introduce 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 dismount, proceed in reverse order.

7.1.2 Non-orienting specimen clamping system

- Place the non-orienting specimen clamping system (11) on the microtome cylinder 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 dismount, proceed in reverse order.

7.2 Mounting the accessories



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.

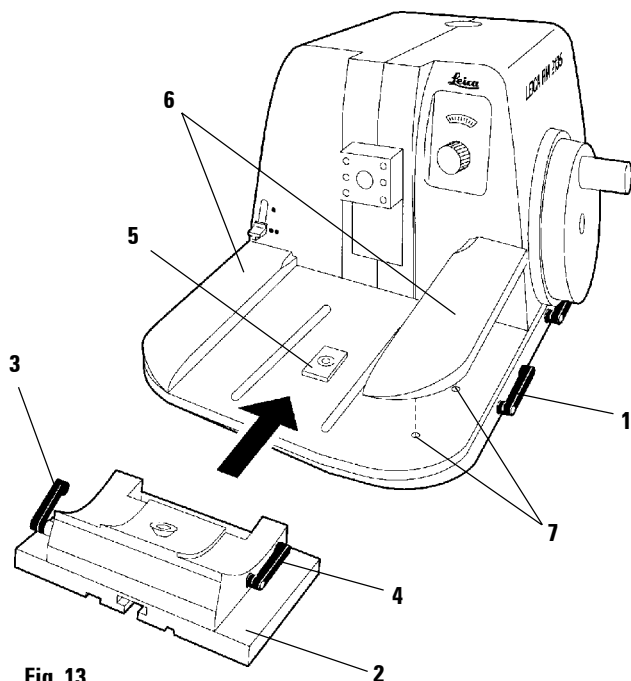


Fig. 13

7.2.1 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 onto the T piece (5) of the microtome base plate.
- To secure the knife holder base, turn the lever (1) clockwise.

7.2.2 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.



For mounting the hand rest (optional accessory), please refer to chapter 15 Accessories.

8. Operation

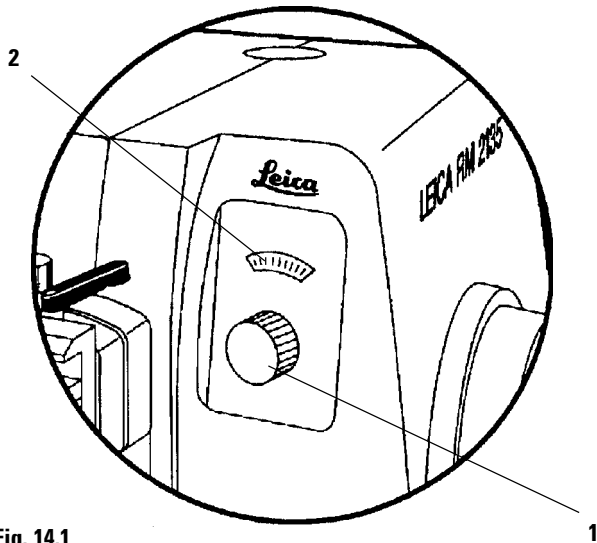


Fig. 14.1

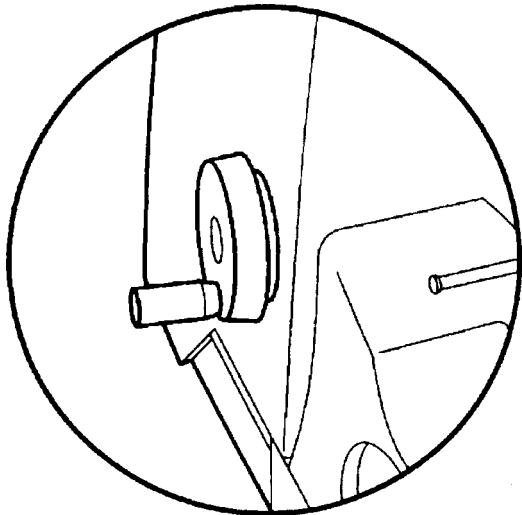


Fig. 14.2

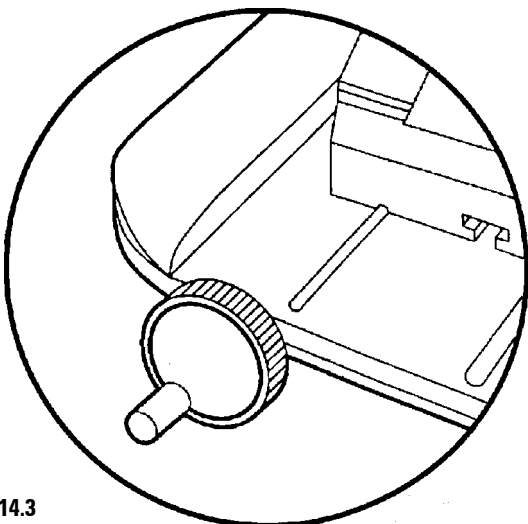


Fig. 14.3

8.1 Section thickness setting

The section thickness is selected with the control knob (1) which is located on the right at the front of the microtome.

The control knob has a lock-in position for each increment.

Setting range: 1 - 60 μm
from 1 - 10 μm in 1 μm increments
from 10 - 20 μm in 2 μm increments
from 20 - 60 μm in 5 μm increments

The selected section thickness is indicated in the display window (2).

8.2 Coarse feed wheel

The instrument is available with side coarse feed (Fig. 14.2) or front coarse feed (Fig. 14.3).

The model with side coarse feed can be delivered with the coarse advance movement of the specimen towards the knife being effected either by clockwise (CW) or by counterclockwise (CCW) rotation.

The function is the same on both versions. The coarse feed operates the rapid horizontal specimen movement forward - towards the knife - and backward - away from the knife by turning the coarse feed wheel in the corresponding direction.

Once it becomes hard to turn the coarse feed wheel, the front or rear limit is reached. When the front limit is reached, no further advance will take place.



**The coarse feed wheel rotates while sectioning by turning the handwheel!
Therefore, make sure that the coarse feed wheel can rotate freely!
If obstructed, no section thickness feed takes place and thus no section will be obtained.**

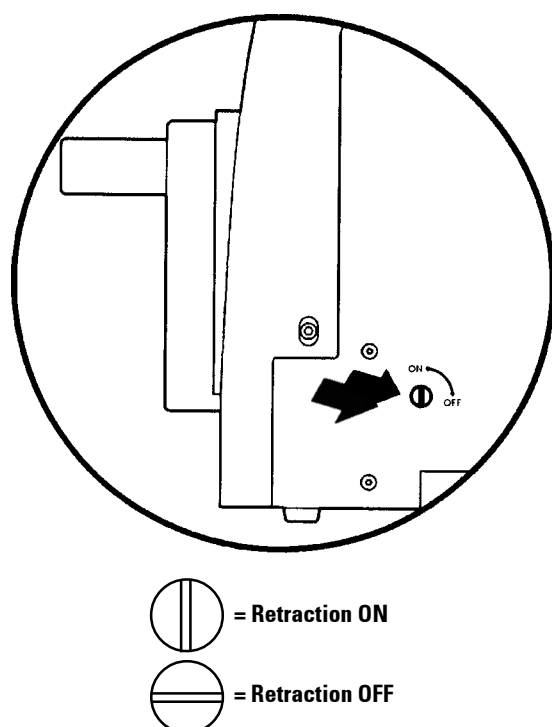


Fig. 15.1

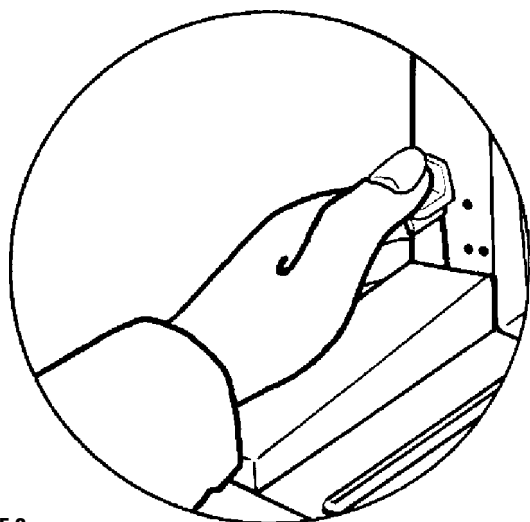


Fig. 15.2

8.3 Specimen retraction

The specimen retraction protects the knife and specimen from damage.

When using the specimen retraction feature, the sample is retracted by 200 μm after the sectioning stroke while travelling upward and returning to the starting position. Before the sample advances by the selected section thickness, a feed by the retraction value takes place.

The specimen retraction feature can be deactivated when required via the screw at the rear of the instrument by using the screw driver provided.

Prior to activating or deactivating the specimen retraction, move the specimen head in the top position of the stroke by turning the handwheel.

- To deactivate, position the slot of the screw horizontal.
- To activate, position the slot of the screw vertical.

8.4 Mechanical trimming function (optional)

The RM 2135 is available with and without mechanical trimming function. The trimming function is activated by means of the trimming lever.

The trimming lever has three locking positions (off, 10 μm , 30 μm). The trimming increments are marked by dots:

- ● = 10 μm
- ●● = 30 μm
- To activate the trimming function, push the lever and hold it down in one of the locking positions.

Each rotation of the handwheel will then cause a specimen advance of 10 μm or 30 μm .

Once released, the lever automatically flips back into its off-position. The trimming function will then be deactivated.



The selected section thickness will not be added to the trimming value. If the section thickness value is greater than the trimming value, the sample will advance by the section thickness.

9. Specimen clamping system



The handling of the specimen clamps and specimen holders is described in chapter 15 Accessories.

The specimen clamping system accommodates all specimen clamps which are available as accessories. The specimen clamping system is available in a non-orienting and an orienting version. Both systems are exchangeable.

The specimen orientation feature allows for an easy correction of the position of the specimen surface when the specimen is fixed in the clamp.

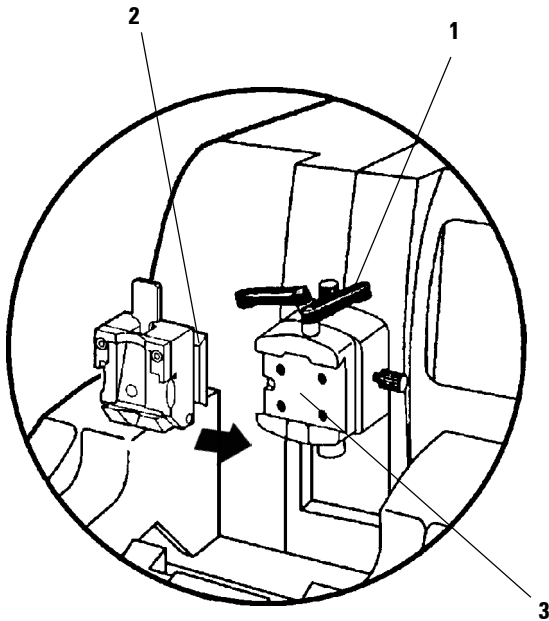


Fig. 16.1

9.1 Mounting the specimen clamp

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

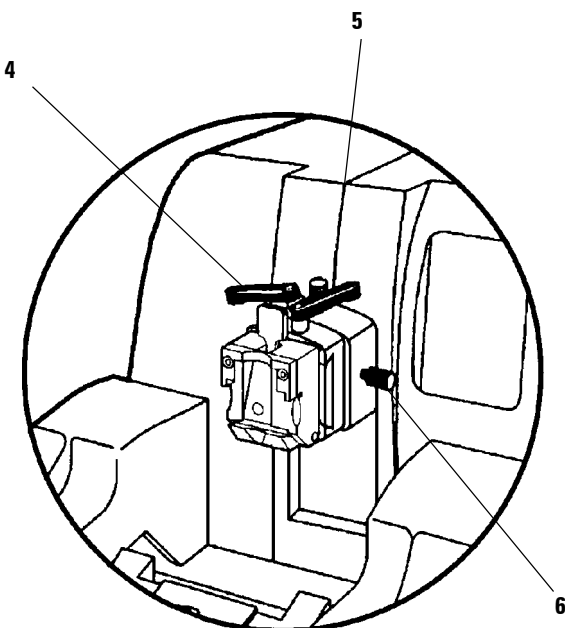


Fig. 16.2

9.2 Orienting the specimen

- 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) counterclockwise.
- 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.

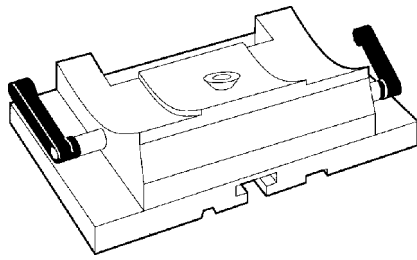


Fig. 17.1

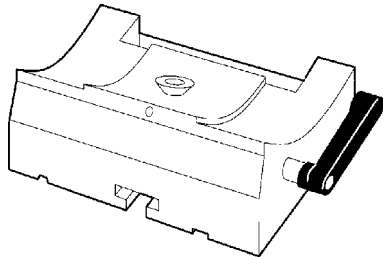


Fig. 17.2



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.

10.1 Knife holder base with lateral displacement

The knife holder base with lateral displacement function consists of two parts and therefore allows for both north/south and east/west displacement.

10.2 Knife holder base without lateral displacement

The knife holder base without lateral displacement can only be repositioned forth and back on the base plate of the microtome.

10.3 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 base together with the knife holder forward or backward as appropriate.
- To clamp, turn the clamping lever (1) clockwise.

East/west (applies only to 10.1)

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

- To release, turn the clamping lever (2 not visible in Fig. 17.3) on the left of the knife holder clockwise.
- Reposition the knife holder base together with the knife holder sideways as required.
- To secure, turn the clamping lever (2) counterclockwise.

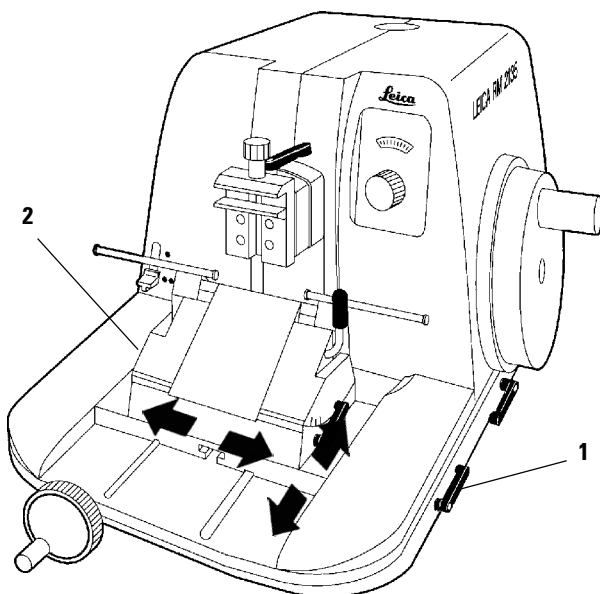


Fig. 17.3

10. Universal knife holder base



The handling of the various knife holders is described in chapter 15 Accessories.

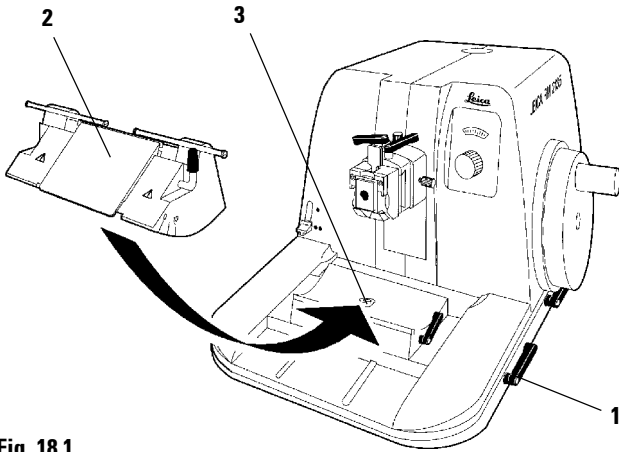


Fig. 18.1

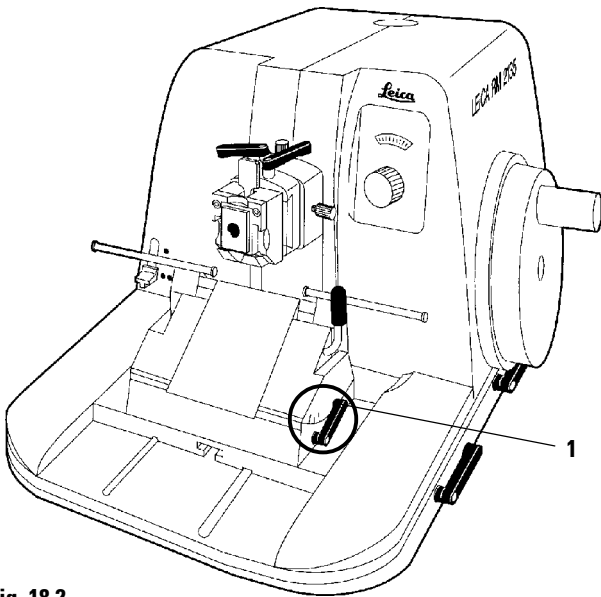


Fig. 18.2

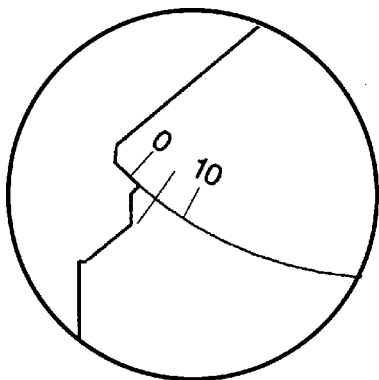


Fig. 18.3

10.4 Mounting the knife holder

- To release, turn the clamping lever (1) counterclockwise.
- 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.

10.5 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) counterclockwise.
- 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.
- Hold the knife holder in this position and fix the adjustment by turning the lever (1) clockwise.

Description of the individual steps using the paraffin sectioning technique



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

- Lock the handwheel.



Always clamp the specimen before the knife!

- Mount the precooled paraffin block in the universal cassette clamp.



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

- Push the knife guard to the middle of the knife holder.
- Insert the blade into the knife holder and clamp.
- Adjust the appropriate clearance angle (try an angle between 0 and 3°).
- Move the specimen to the rear limit by turning the coarse feed in the appropriate direction.



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

- Approach the knife holder on the knife holder base to the specimen as close as possible.
- Orient the specimen surface towards the knife.
- Pull the section waste tray (if available) out.
- Remove the knife guard from the blade.
- Unlock the handwheel.
- Hold the trimming lever down to select the appropriate trimming value.



Rotate the handwheel at a speed that suits the hardness of the specimen! Always rotate at a slow speed when sectioning hard samples.

- Start trimming by turning the handwheel.
- Stop trimming upon reaching the desired sectioning plane.
- Release the trimming lever.
- Select the appropriate section thickness or verify the value previously selected.



Make sure that the coarse feed wheel can rotate freely! If obstructed, no section thickness feed takes place and thus no section will be obtained.

- Rotate the handwheel clockwise at a uniform speed.
- Prepare the sections.

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!

- Lock the handwheel.
- Position the knife guard over the cutting edge.
- Remove the specimen from the specimen clamp and mount a new specimen to continue.

Terminating sectioning

- Lock the handwheel.
- Remove the blade from the knife holder and put it in the receptacle at the bottom of the dispenser.
- Remove the specimen from the specimen clamp.
- Transfer all section waste to the section waste tray if available.
- Empty the section waste tray.
- Clean the instrument (see chapter 13 - 'Cleaning').

12. Trouble shooting

12.1 Problems, possible causes and corrective action

Problem	Cause	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.	<ul style="list-style-type: none">- Insufficient knife/blade inclination; consequently the clearance angle is too small.- Insufficient clamping of specimen and/or knife.- Blunt knife/blade.	<ul style="list-style-type: none">- 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.- Use a different part of the cutting edge or use a new knife/blade.
Compressed sections The sections are extremely compressed, wrinkled or jammed together.	<ul style="list-style-type: none">- Blunt knife/blade.- Specimen too warm.- Clearance angle too big.- Sectioning speed too high.	<ul style="list-style-type: none">- Use a different part of the cutting edge or use a new knife/blade.- 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.- Rotate the handwheel at a lower speed.
The knife "rings" on the cutting stroke when sectioning hard specimens. Sections exhibit scratches and chatter marks.	<ul style="list-style-type: none">- Sectioning speed too high.- Clearance angle too big.- Insufficient clamping of specimen and/or knife.	<ul style="list-style-type: none">- Rotate the handwheel at a lower 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.

12.2 Instrument errors, possible causes and corrective action

Problem	Possible Cause	Corrective action
No more specimen advance and consequently no section produced.	1. Specimen reached the front feed limit.	1. Turn the coarse feed wheel in the appropriate direction to move the specimen towards the rear limit.
	2. The coarse feed wheel cannot rotate freely.	2. Remove any obstruction.

13. Cleaning



Lock the handwheel before cleaning the instrument!

- Remove all debris with a dry brush.
- Remove the section waste tray (if available) for emptying.
- Remove the arm rests for cleaning.
- Remove the knife holder and knife holder base for cleaning.



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

Ensure that no liquids enter the interior of the instrument when cleaning!

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

14.1 General maintenance

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.
- Do not carry out any repairs on your own as this will invalidate the warranty.
Repairs may only be carried out by qualified service engineers authorized by Leica.

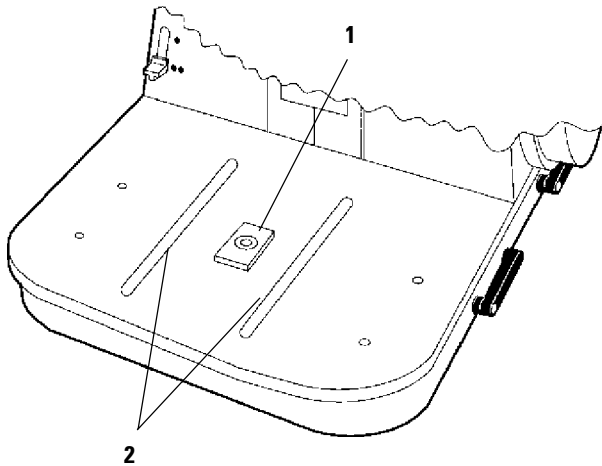


Fig. 23.1

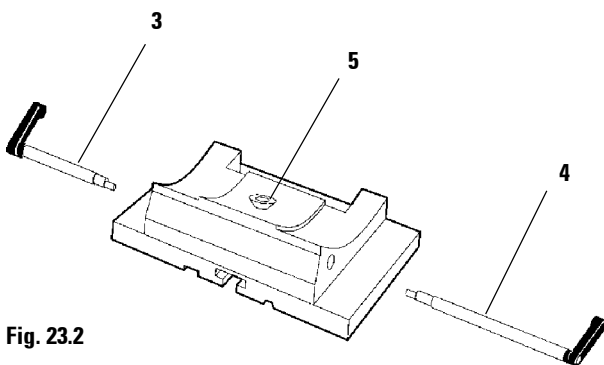


Fig. 23.2

14.2 Adjusting the spring lever system

When using different specimen clamps and samples of various sizes and weights, it may be necessary to readjust the counterbalance weight.

How to check correct adjustment

- Fix the specimen clamp with the sample.
- Turn the handwheel to position the sample at half the height of the vertical stroke.

If the specimen head remains in this position without travelling upward or downward, the adjustment is correct.

Readjustment will be required if the specimen head slightly rises or drops.

How to readjust

The adjustment is made with the screw that is accessible through the hole on the underside of the microtome base plate, after having removed the section waste tray if used, by means of the screw driver provided.

- If the specimen head slightly **rises**, turn the screw **counterclockwise** completing two or three full rotations.
- If the specimen head slightly **drops**, turn the screw **clockwise** completing two or three full rotations.

Check for correct adjustment after each adjusting step. Repeat the adjustment several times if required.

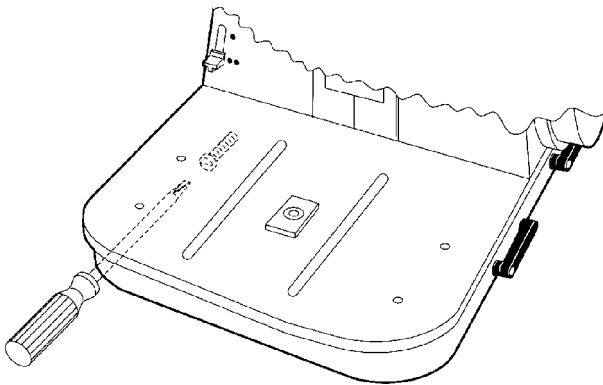


Fig. 24

15.1 Specimen clamps



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

15.1.1 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.

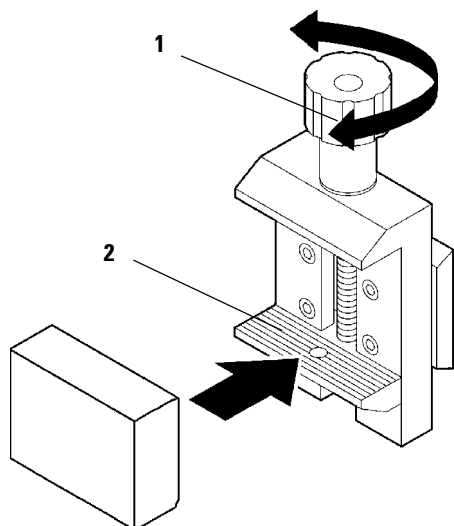


Fig. 25.1

- 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.

15.1.2 Universal cassette clamp

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

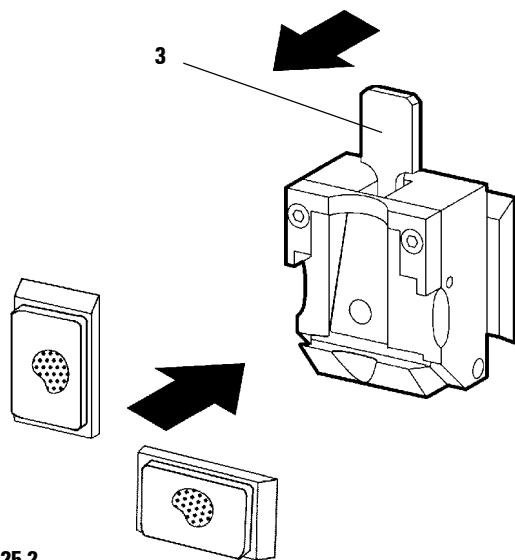


Fig. 25.2

- 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.

15. Accessories

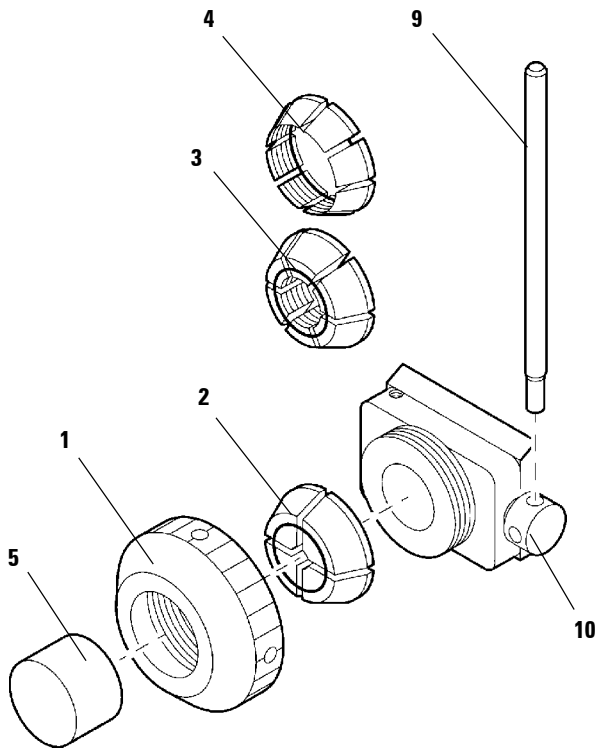


Fig. 26.1

15.1.3 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, introduce the pin (9) in one of the holes (10) and turn counterclockwise.
- To fix the orientation, introduce the pin (9) again in one of the holes (10) and turn clockwise.

15.1.4 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.

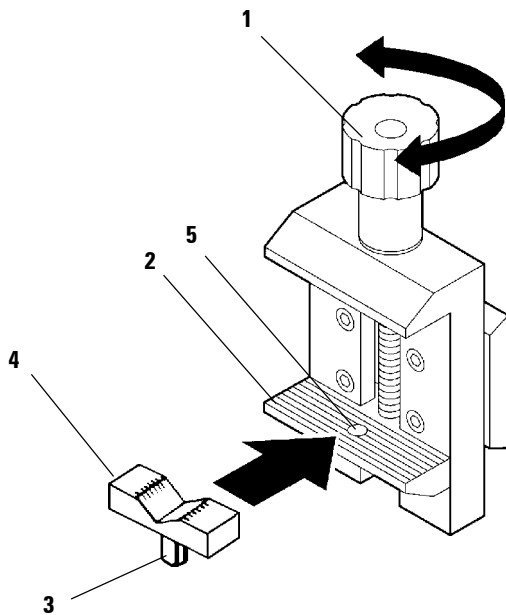


Fig. 26.2

15.1.5 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.

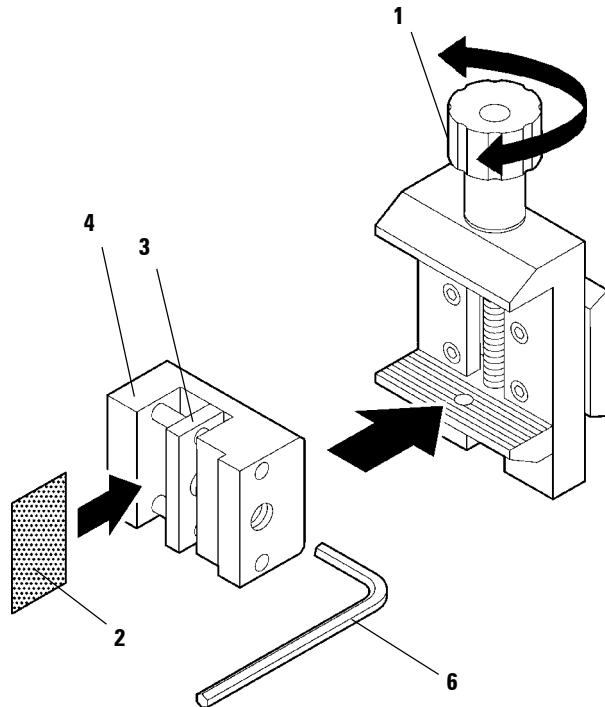


Fig. 27.1

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.

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.

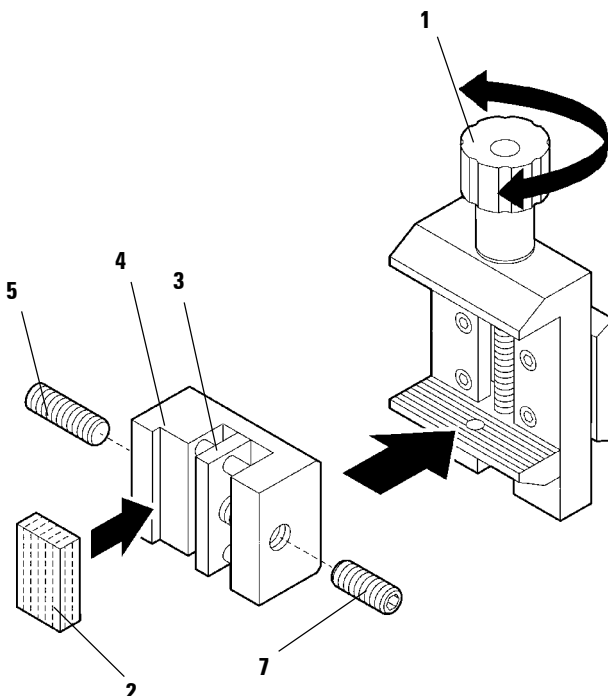


Fig. 27.2

- 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.

15.1.6 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.

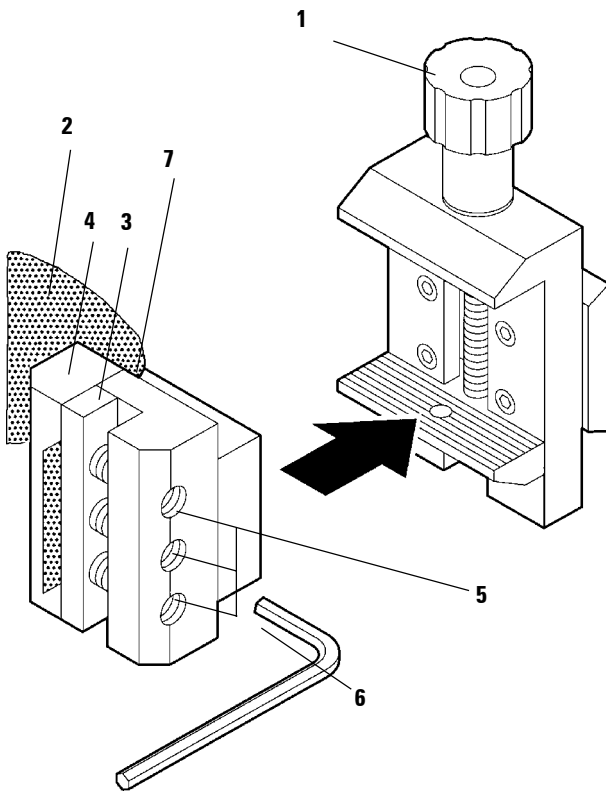


Fig. 28

15.2 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.



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!

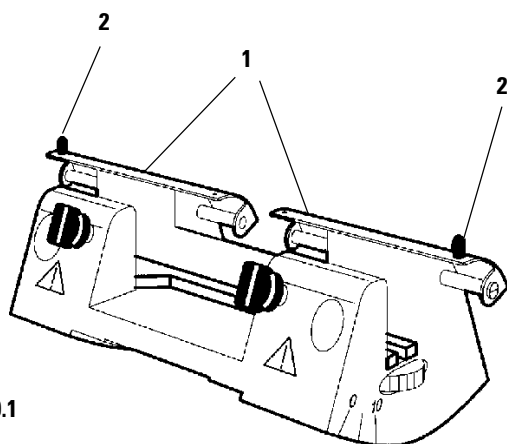


Fig. 29.1

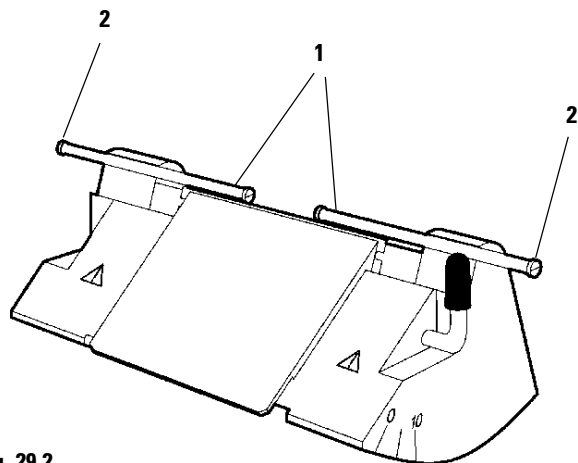


Fig. 29.2

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.

15.2.1 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.

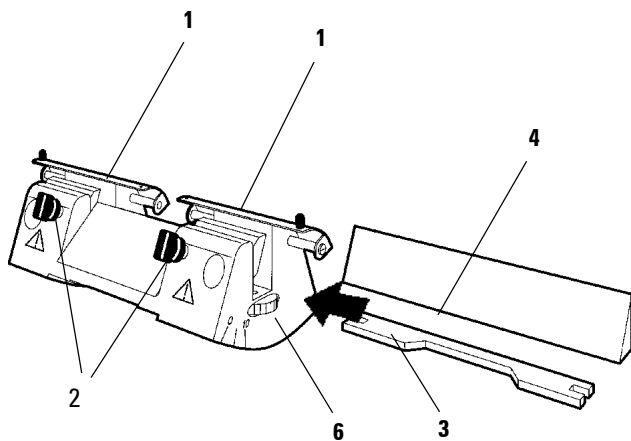


Fig. 30.1

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.

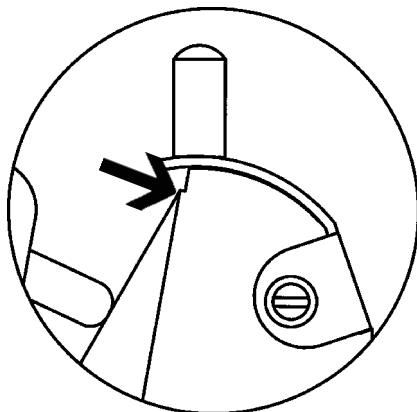


Fig. 30.2

- 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. 30.2) of the rear clamping jaws.
- To clamp the knife (4), tighten the two clamping screws (2) uniformly by turning them clockwise.

Inserting the blade rails

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

15.2.2 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.

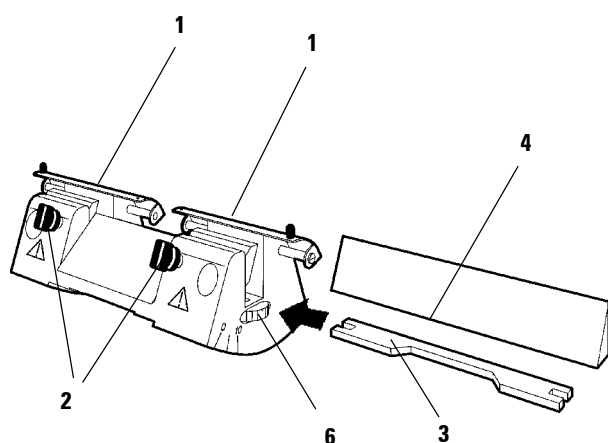


Fig. 31

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) counterclockwise 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 15.5.1 Knife holder N (Fig. 30.2).

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.

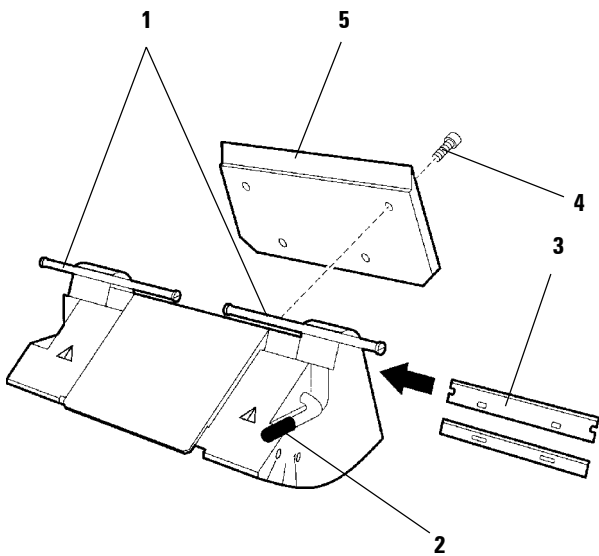


Fig. 32.1

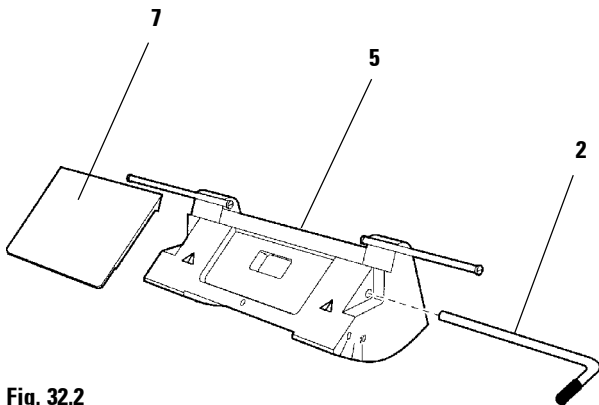


Fig. 32.2



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.

15.2.3 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

- Push the knife guard (1) to the middle.
- 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.

15.2.4 Knife holder E-TC

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

Inserting the blade

- Push the knife guard (1) to the middle.
- 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.

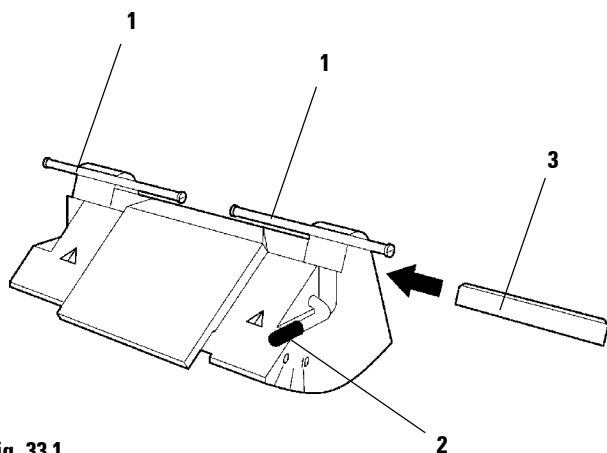


Fig. 33.1

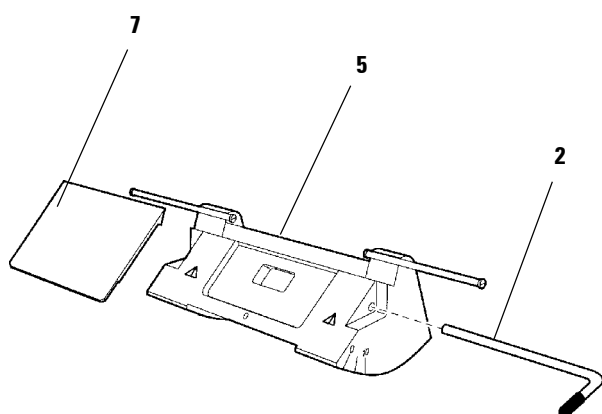


Fig. 33.2

15.3 Section waste tray



The section waste tray is a handy accessory for instruments with lateral coarse feed wheel.

When using it with the front coarse feed model, the waste tray will have to be pulled out of the base plate very far in order to enable convenient turning of the coarse feed wheel.

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

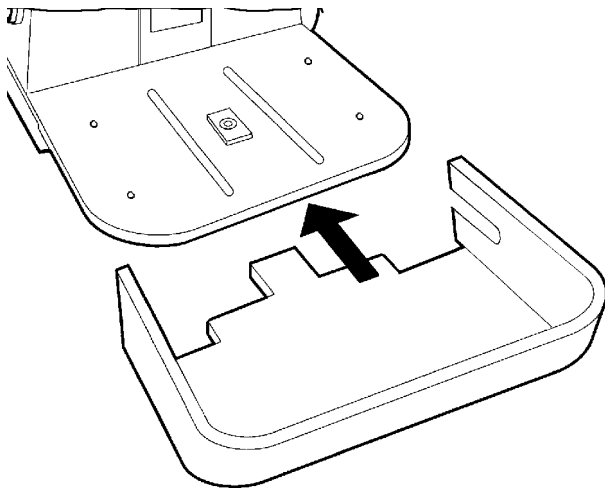


Fig. 34

15.4 Hand rest



The hand rest is accompanied by two long clamping levers for the knife holder base and a long trimming lever for instruments with mechanical trimming function (option).

Exchanging the trimming lever

(on instruments with mechanical trimming function)

- Pull the short trimming lever out of the holding device.
- Insert the long trimming lever into the slot and push it until it engages in the holding device.

Mounting the hand rest

Prior to mounting the hand rest, the short clamping lever(s) - depending on the knife holder base type you are using - has/have to be removed from the knife holder base

- To release, turn the lever (1) counterclockwise. To release turn the lever (2) (on knife holder base with lateral displacement only) clockwise. Pull both levers out of the knife holder base.



The knife holder base without lateral displacement has hole on the left side which is covered with a plastic cap. The cap can be removed with a screw driver. The hole will accommodate a second clamping lever to stabilise the hand rest.

- Place the hand rest (3) on the microtome base plate.
- Insert the longer lever (4) and the shorter lever (5) through the holes on the right and left of the hand rest in the holes of the knife holder base and lock both levers.

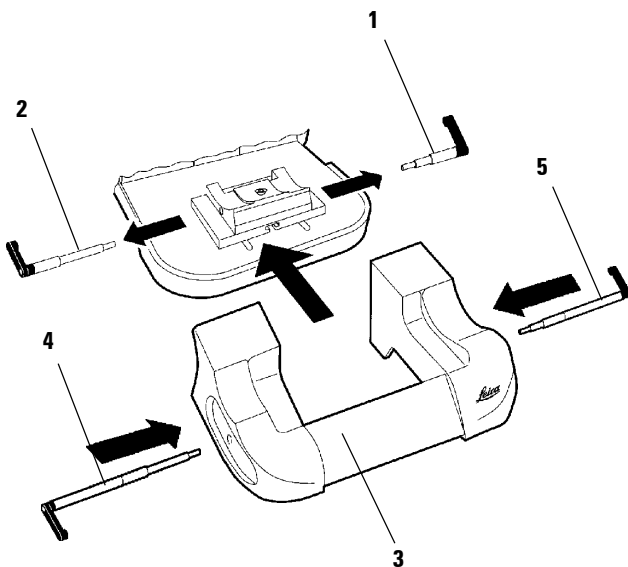


Fig. 35

Repositioning the knife holder base



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

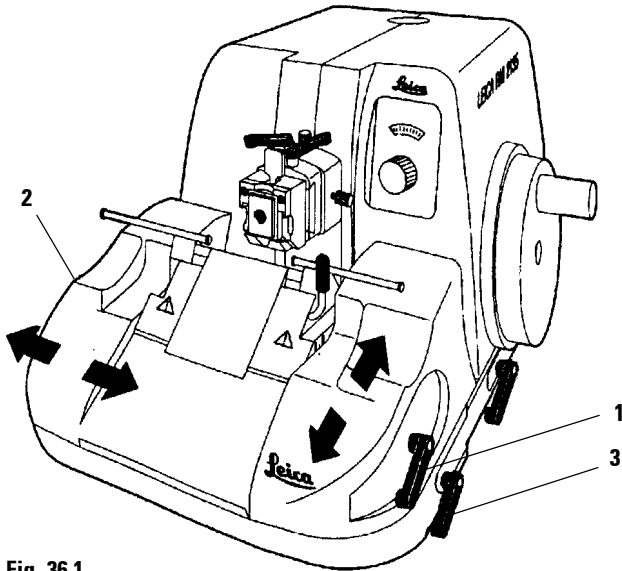


Fig. 36.1

North/South

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

East/West (applies only to knife holder base with lateral displacement)

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

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 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.

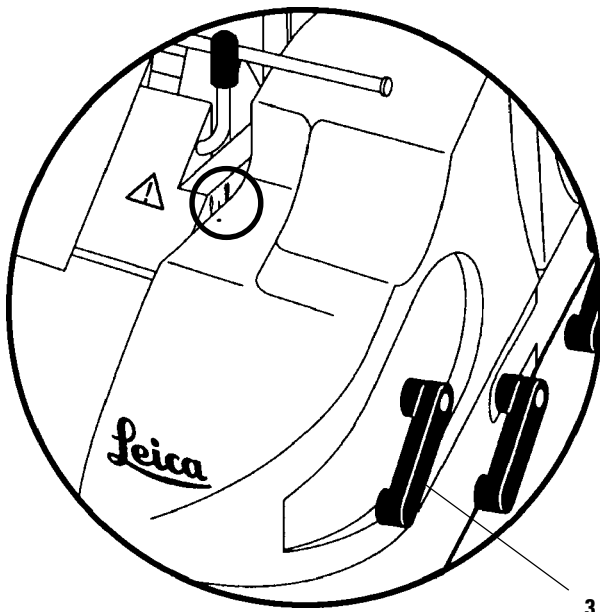


Fig. 36.2

RM 2135 Rotary Microtome - Basic instrument	
with mechanical trimming device, side coarse feed, clockwise	0500 29802
without mechanical trimming device, side coarse feed, clockwise	0500 29134
with mechanical trimming device, side coarse feed, counterclockwise	0500 29135
without mechanical trimming device, side coarse feed, counterclockwise	0500 29136
with mechanical trimming device, front coarse feed, clockwise	0500 29137
without mechanical trimming device, front coarse feed, clockwise	0500 29138

Knife holder system

Universal knife holder base with lateral displacement	0500 29703
Universal knife holder base without lateral displacement	0500 30147
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

Specimen holder system

Specimen clamping system, non-orienting	0502 29963
Specimen clamping system, orienting	0502 29962
Standard specimen clamp with adapter (50 x 55 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, \varnothing 6 mm	0356 08322
Insert for holder for round specimens, \varnothing 15 mm	0356 09200
Insert for holder for round specimens, \varnothing 25 mm	0356 08320
Holder for EM specimen holder	0502 29968
Segment arc with adapter for EM specimen holder	0502 29969

Accessories

Section waste tray	0500 29807
Hand rest including long clamping levers and long lever for the trimming device	0500 30143

Accessories included in standard delivery for reordering

Arm rest, right	0500 29608
Arm rest, left	0500 29609
Maintenance kit	0500 30144
Cover cap	0430 18995
Dust cover	0212 04091
Instruction manual V 1.1 – 02/2001 (German, English, French, Spanish)	0700 37103

17. Appendix

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 delivered product has been subjected to a comprehensive quality control procedure based on our strict in-house testing standards in order to ensure that the product complies with its technical specification. The warranty conditions depend on the contents of the individual contract concluded, supplemented by the warranty conditions of your local Leica sales agency. Any repairs and/or exchange of parts of the product must be carried out by authorized Leica technical service engineers. Otherwise, any warranty becomes invalid and warranty claims can no longer be made.

The local Leica representative or the manufacturer in Nussloch must be consulted prior to any handling of or changes to the instrument beyond the scope of this instruction manual as well as prior to any modifications or 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.

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



Leica assumes no liability whatsoever for any damage caused by the use of non-original spare parts or non-original accessories.

The warranty is only valid and warranty claims can only be made as long as the instrument has been operated according to its designated use and according to the instructions given in this manual.

Improper use of the product and/or faulty operation invalidate the warranty and any claims based thereon, and likewise Leica will not assume liability for any consequential damage.

Disposal

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

The RM 2135 contains a great number of recyclable components. For more information about our recycling program, please contact your local Leica Sales Rep.

representative or Dealer, or Leica Microsystems Nussloch GmbH in Germany.

We will be glad to provide you with details on the recycling concept for our microtomes meeting today's environmental requirements.

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 unrepairs 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.

