



Leica RM2255

Rotary Microtome

Instruction Manual

Leica RM2255

V1.3 English - 02/2005

Always keep this manual with the instrument.

Read carefully before working with the instrument.

Leica
MICROSYSTEMS

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1. Important notes

1.1 Symbols in the text and their meanings



Dangers, warnings and cautions appear in a gray box and are marked by a warning triangle .



Notes, i.e. important user information appear in a gray box and are marked by an information symbol .

(5)

Numbers in parentheses refer to item numbers in illustrations.

RUN/
STOP

Function keys which must be pressed on the control panel are shown in the text in bold capital letters.

1.2 Qualification of personnel

- The Leica RM2255 may be operated by trained laboratory personnel only.
- All laboratory personnel designated to operate the instrument must read this instruction manual carefully and must be familiar with all technical features of the instrument before attempting to operate it.

1.3 Intended use of instrument

The Leica RM2255 is a fully automatic, power rotation microtome with a separate control panel for creating thin sections of specimens of varying hardness for use in routine and research laboratories in the fields of biology, medicine and industry.

It is designed for cutting soft paraffin as well as harder specimens, as long as they are suitable for being cut manually or automatically.

Any other use of the instrument is considered improper!

1.4 Instrument type

All information provided in this manual applies only to the instrument type indicated on the cover page.

A name plate indicating the instrument serial number is attached to the left side of the instrument.



Fig. 1



Be sure to comply with the safety instructions and warnings provided in this chapter. Be sure to read these instructions, even if you are already familiar with the operation and use of other Leica products.

2.1 Safety notes

This instruction manual contains important instructions and information regarding the operational safety and maintenance of the instrument.

The instruction manual is an important part of the product, which must be read carefully prior to startup and use and must always be kept near the instrument.



If additional requirements on accident prevention and environmental protection exist in the country of operation, this instruction manual must be supplemented by appropriate instructions to ensure compliance with such requirements.

This instrument was built and tested in accordance with the safety regulations for electrical measuring, control, regulating and laboratory devices as specified below:

- EN 61010-1: 2001
- EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003
- EN 61000-3-2
- EN 61000-3-3.

In order to maintain this condition and ensure safe operation, the operator must observe all the instructions and warnings contained in this instruction manual.



The protective devices on both instrument and accessories may neither be removed nor modified. Only service personnel qualified by Leica may repair the instrument and access the instrument's internal components.

2.2 Warnings

The safety devices installed in this instrument by the manufacturer only constitute the basis for accident prevention. Primarily responsible for accident-free operation is above all the owner of the instrument and, in addition, the designated personnel who operates, services or cleans the instrument.

To ensure trouble-free operation of the instrument, make sure to comply with the following instructions and warnings.

2. Safety

Warnings - safety instructions / warning labels attached to the instrument



- Safety instruction labels on the instrument marked with a warning triangle indicate that the correct operating instructions (as described in this manual) must be followed when operating or replacing the instrument component bearing the label. Failure to adhere to these instructions may result in an accident, personal injury, damage to the instrument or accessory equipment.

Warnings - Transport and installation



- Once removed from the crate, the instrument may only be transported in an upright position.
- Never lift the instrument by the handwheels or the cassette clamp. Always remove the section waste tray before transporting the instrument.
- Caution! The voltage selector has been preset at the factory. Before connecting the instrument to the mains power, please check that 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!
- Connect the instrument to a grounded power socket only using one of the power cables provided. Do not interfere with the grounding function by using an extension cord without a ground wire.
- The instrument is ready for operation only if a dummy plug or foot switch (optional) is connected. If you hear a beeping sound (continuous) after switching on the instrument, check that the control panels are connected correctly.
- Do not operate in rooms with explosion hazard.
- Exposure to extreme temperature changes between storage and installation locations and high air humidity may cause condensation inside the instrument. If this is the case, wait at least two hours before switching on the instrument. Failure to comply with this may cause damage to the instrument.
- The protective devices on both instrument and accessories must neither be removed nor modified.

Warnings - working at the instrument



- Take care when handling microtome knives and disposable blades. The cutting edge is extremely sharp and can cause serious injury!
- Always remove the knife / blade before detaching the knife holder from the instrument. Always put the knives back into the knife case when not in use!
- Never place a knife anywhere with the cutting edge facing upwards and never try to catch a falling knife!
- Always clamp the specimen block BEFORE clamping 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!
- ALWAYS turn the handwheel clockwise; otherwise, the brake will not work properly.
- Always wear protective glasses when sectioning brittle specimens! Specimen may splinter!
- Ensure that liquids do not enter the interior of the instrument during work!
- Do not attempt to clamp, approach or orient the specimen during the retraction phase. If a block is oriented during retraction, prior to the next section the block will advance by the retraction value PLUS the selected section thickness. This may cause damage to both specimen and knife!
- The handle of the handwheel must always be centered while in motorized sectioning mode. Do not touch the handwheel while it is running – danger of injury from the handwheel lock.

Warnings - cleaning and maintenance



- Only authorized and qualified service personnel may access the internal components of the instrument for service and repair!
- Before each cleaning, switch off the instrument, disconnect the power plug, remove the knife holder completely and clean it separately.
Always remove the blade before detaching the knife holder from the instrument.
- Lock the handwheel before each cleaning!
- Do not use any solvents containing acetone or xylene for cleaning!
- Ensure that no liquids enter the interior of the instrument when cleaning!
- Do not turn the instrument on before it is completely dry!
- When using detergents please comply with the safety precautions of the manufacturer.
- 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 fuse specifications, [refer to chapter 3.3](#) - 'Technical data'.

2. Safety

2.3 Integrated safety devices

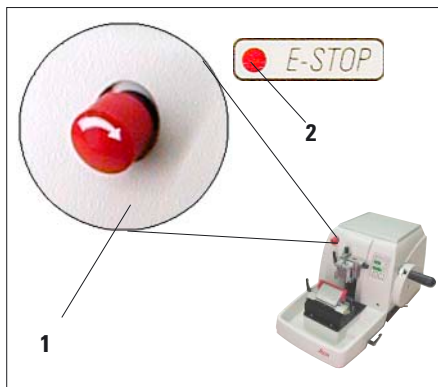


Fig. 2

Emergency-stop function

The emergency-stop function is activated with the red **EMERGENCY STOP** switch (1) on the upper left of the front of the microtome. The sectioning motor stops immediately when the **EMERGENCY STOP** switch is pressed. The red LED in the **E-STOP** field (2) on the control panel of the instrument lights up, indicating that the emergency stop function has been activated.

To deactivate this function, turn the **EMERGENCY STOP** switch in the direction of the arrow.



Fig. 3

Handwheel locking mechanism (manual operation only)

- To lock, push lever (5) outward and rotate the handwheel until it locks into place in the 12 o'clock position. LED (4) next to **LOCK** will emit light.



Caution!

The lever (5) may never be pushed during motorized sectioning.

Handwheel brake

Using the lever (3) on the right side of the microtome base plate, the handwheel can be stopped in any position.

- To lock the handwheel, pull the lever all the way forward.
- To unlock the handwheel brake, push the locking lever (3) back to its original position.



Important!

The yellow LED in the **M-STOP** field (4) only indicates that the instrument cannot be started. It is not a reference to sufficient handwheel braking.

The lever (3) must be pulled completely forward forcefully, so that the handwheel brake is applied correctly. The handwheel is securely locked only when the lever (5) is in the 12 o'clock position.



Fig. 4

Centering the handle

For safety reasons, the handle of the handwheel must always be centered while in motorized sectioning mode.

- Activate the handwheel lock.
- To center the handwheel, lightly pull the handle (6) out and rotate it to the center of the handwheel (12) (see Fig. 4).
- The handle will then lock automatically when released.

Knife guard on the knife holder

Each knife holder is equipped with a tightly mounted knife guard (8, 9). This makes it possible to cover completely the cutting edge in every knife or blade position.

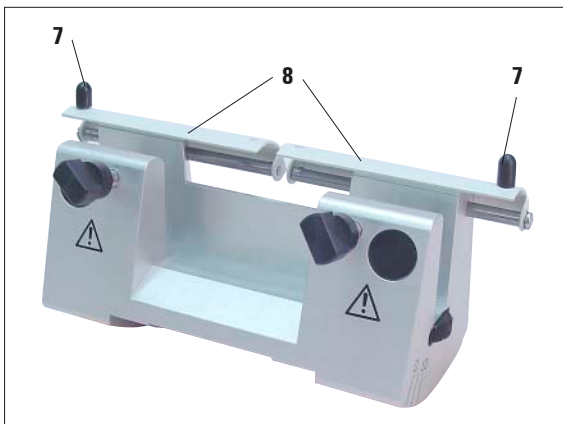


Fig. 5

Knife holder N/NZ

The knife guard (8) of the knife holder N/NZ can be easily positioned via the two buttons (7) (Fig. 5).

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

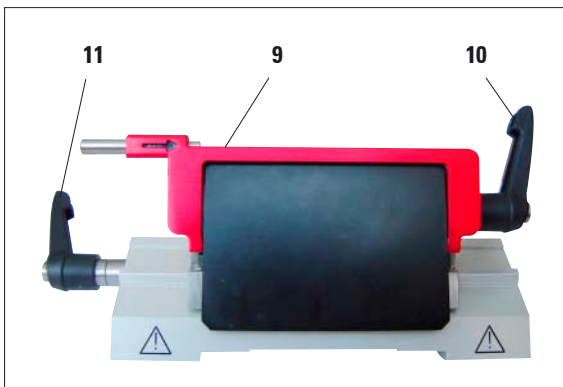


Fig. 6

Knife holder E

The knife guard on knife holder E consists of a red foldaway handle. To cover the edge, turn the shackle (9) upwards as shown in Fig. 6.



Important for knife holder E! The two clamping levers (10, 11) must always remain in the position shown here. Clamping lever for the blade (10) at the right, clamping lever for the lateral displacement (11) at the left.

3. Instrument components and specifications

3.1 Overview - instrument components

Leica RM2255

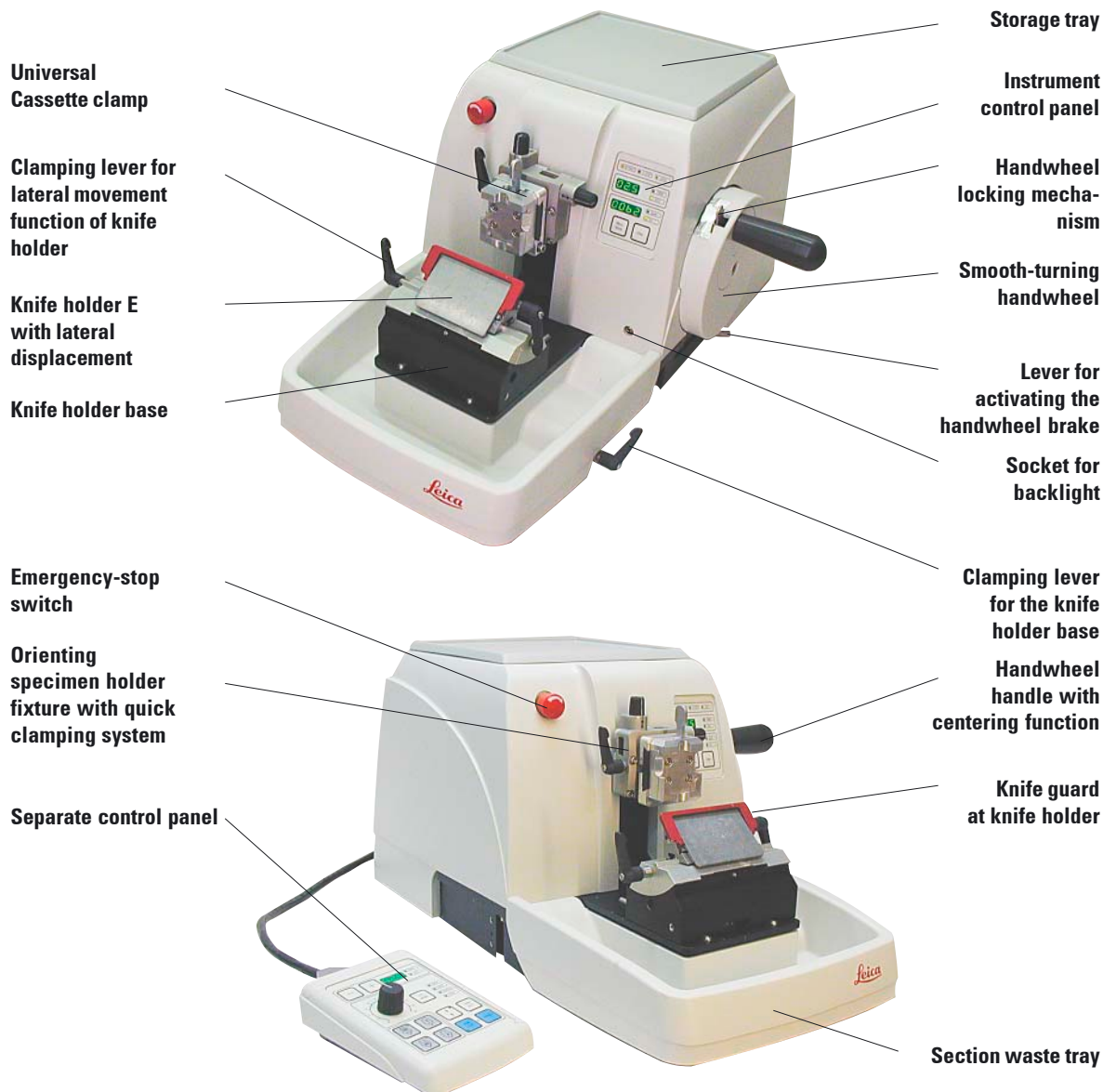


Fig. 7

Rear side of instrument



Fig. 8

3.2 Instrument specifications

The Leica RM2255 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 dust-proof plastic housing.
- The instrument is equipped with a safety handwheel with a handle that can be centered, as well as a mechanical handwheel lock.
- All controls and LEDs are centralized in a separate control panel. The 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 sectioning mode, the coarse feed buttons have a STEP function.
- Three motorized sectioning modes (**CONT**, **SINGLE** and **STEP**) 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 rocking mode, it is enough to move the handwheel a short distance back and forth in order to create a section.

3. Instrument components and specifications

3.3 Technical data

General

Approvals:	The instrument-specific marks are located next to the name plate.
Nominal supply voltages:	100 / 120 / 230 / 240 V AC ± 10 %
Nominal frequency:	50/60 Hz
Power draw:	340 VA
Protective class [®] :	I
Power fuses:	2 x T 3.2 A UL listed
Pollution degree [®] :	2
Overvoltage installation category [®] :	II
Maximum heat emission:	340 J/s
Operating temperature range:	+10 °C to +35 °C
Storage temperature range:	+5 °C to +55 °C
Relative humidity:	max. 80 % non-condensing
Humidity during storage:	< 80 %

[®] according to IEC-1010, UL 3101, EN 61010

Dimensions and weight

Basic instrument

Width (including handwheel):	413 mm
Width (excluding handwheel):	300 mm
Depth (including waste tray):	618 mm
Height (total):	305 mm (with storage area on cover)
Working height (knife edge):	100 mm (measured from the base plate)
Working height (knife edge):	168 mm (measured from the stage)
Weight (without accessories):	approx. 37 kg

Control panel

Width:	121 mm
Depth:	166 mm
Height:	50 mm
Height (in inclined position):	81 mm
Weight (net):	approx. 0.660 kg

3. Instrument components and specifications

Microtome

Section thickness:

Section thickness setting range:

0.50 to 100 μm

Setting values:

from 0.50 μm , to 5.0 μm in 0.5 μm increments
from 5.0 to 20.0 μm in 1.0 μm increments
from 20.0 to 60.0 μm in 5.0 μm increments
from 60.0 to 100.0 μm in 10.0 μm increments

Trimming section thickness setting range: 1 to 600 μm

Setting values:

from 1.0 to 10.0 μm in 1.0 μm increments
from 10.0 to 20.0 μm in 2.0 μm increments
from 20.0 to 50.0 μm in 5.0 μm increments
from 50.0 to 100.0 μm in 10.0 μm increments
from 100.0 to 600.0 μm in 50.0 μm increments

Object feed:

28 mm $\pm$ 1 mm, feed motion via step motor

Vertical specimen stroke:

70 mm

Maximum sectioning area w/o retraction: 65 mm without specimen orientation

Maximum 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 $\pm$ 10 %

Return speed:

approx. 120 - 420 mm/s $\pm$ 10 %

Repositioning of knife holder base

North-south:

$\pm$ 24 mm

East-west:

$\pm$ 23 mm

Maximum specimen size (W x H x D):

50 x 60 x 40 mm

Specimen orientation

horizontal:

8°

vertical:

8°

4. Startup

4.1 Installation site requirements

- Stable, vibration-free laboratory bench with horizontal and even table top; practically vibration-free floor.
- No other instruments nearby which might cause vibrations.
- Room temperature permanently between +10 °C and +35 °C.
- Obstruction-free access to the handwheel.



Never operate the instrument in rooms with explosion hazard.

4.2 Standard delivery

The Leica RM2255 standard delivery includes:

1 Leica RM2255 basic instrument	
1 handwheel, complete	0502 37734
1 external control panel	0502 37950
1 set of power cables consisting of:	
1 power cable for Germany	0411 36958
1 power cable for USA/Canada/Japan	0411 36960
1 power cable for UK ST/BU F-5A	0411 36959
1 footswitch, dummy CM 3050	0443 30420
1 section waste tray	0502 37931
1 tool set - consisting of:	
1 Allen key with handle, size 5	0194 04760
1 Allen key with handle, size 4	0194 04782
1 Allen key size 3	0222 04138
1 screwdriver 3x50, 186 long	0170 11568
1 bottle (50 ml) of oil for drives, type 405	0336 06086
2 micro-fuses 3.2 A T	6943 03201
1 dust protective cover	0212 30350
1 instruction manual G/E/F/S	0700 37112



The above accessories plus any further accessories you ordered can be found in the cardboard box packed on top of the instrument (Item 2 in Fig. 9).

Please carefully compare the supply with the packing list, delivery note and your order.

If you detect any discrepancies, immediately contact your responsible Leica selling unit.

4.3 Unpacking and installation

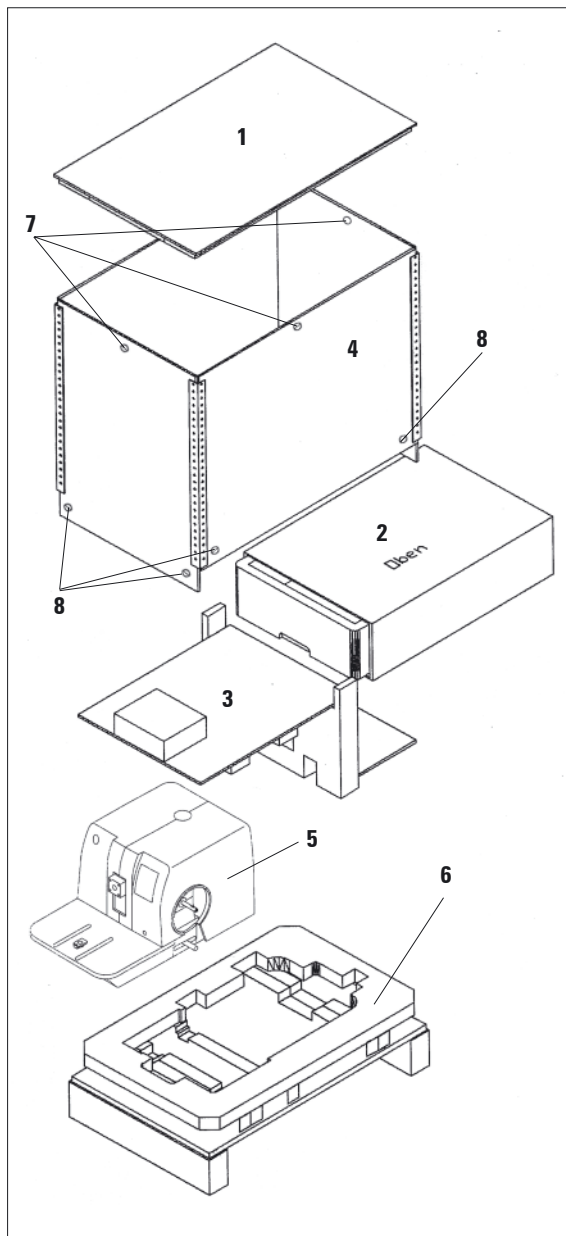


Fig. 9

Unpacking

- Loosen and unscrew the four upper screws (7).
- Remove the cover (1).
- Take out the accessories box (2) and instruction manual.
- Take out the fixing module (3).
- Remove the eight lower screws (8).
- Carefully pull up the wooden case (4).



Do not transport the instrument by holding it on the handwheel shaft, the object head or the cover!

- Lift the instrument (5) by holding it by the base plate and the recessed grip on the back (Fig. 10) and lift it out of the formed cushion (6).

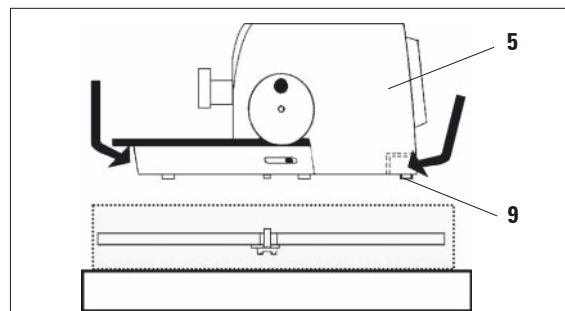


Fig. 10

Setting up the instrument

- Place the instrument on a stable laboratory table.
- The two sliding elements (9) located on the rear of the base plate make it easier to move the instrument on the table.
- To move the instrument, hold it by the front of the base plate, lift it up gently and slide it on its slides.

4. Startup

4.4 Assembling the handwheel



**The handwheel has to be assembled before attempting to use the instrument.
The necessary parts and tools can be found in the toolkit.**

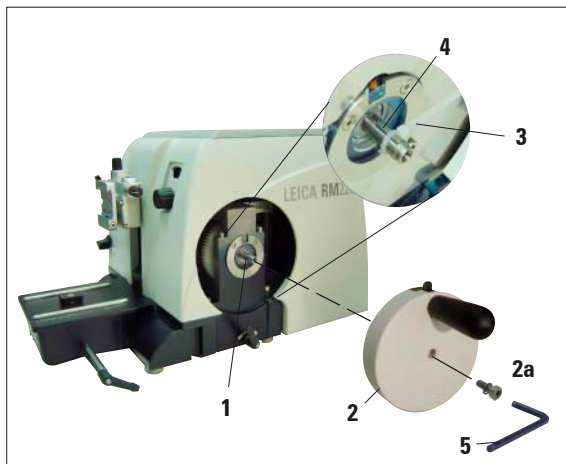


Fig. 11

The feather key (4) is loosely placed in the handwheel shaft (1) and fixed in place with a tie-clip during transport.

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

4.5. Electrical connections



The instrument MUST be connected to a grounded power socket. Use only the power cable provided that matches the power supply (outlets) of the country of use. Do not use an extension cable without a ground wire!

Checking the voltage

The Leica RM2255 can be connected to various electrical power grids (depending on voltage and frequency) and, for this reason, is always delivered with a set of various power cables.

New instruments are factory-set to 230 volts. This is documented by a yellow label (**230 VOLT**) on the rear of the instrument, which covers the power switch and power socket.



Before connecting the instrument to the power supply, be absolutely certain to check that the voltage selector is set to the voltage in use in your country!

**Severe damage can be caused to the instrument if the voltage selector is set to an incorrect voltage!
Never change the setting of the voltage selector while the instrument is connected to the power supply.**

Checking the voltage (continued)

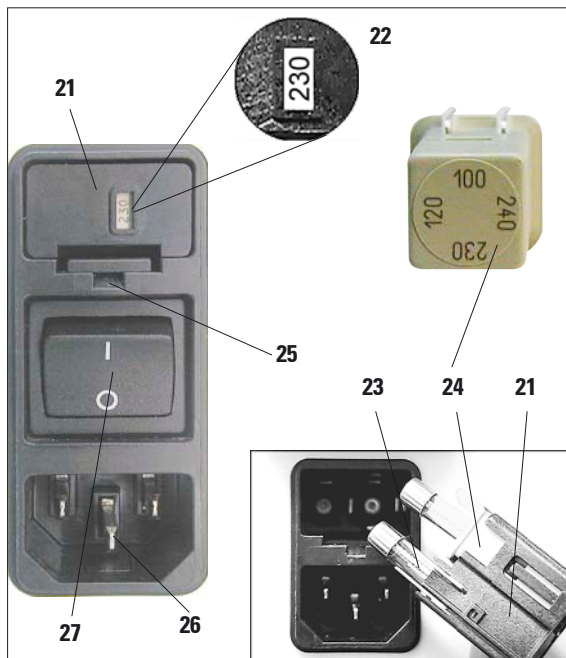


Fig. 12

The voltage selector is located above the main power switch, on the left-rear side of the instrument (Fig. 12). The voltage setting is displayed in the viewing window (22).

- Insert a small screwdriver into the cutout (25) and carefully pry out the insert.
- Remove the voltage selector housing (21) together with the fuses (23). Remove the voltage selector block (24) (white) and insert it again such that the correct local voltage is displayed in the viewing window (22).
- Reinsert the voltage selector housing with the block and fuses and push it in until it engages (audible click).

Connecting the power supply

- Before connecting the power cable, make sure that the power switch (27) on the rear of the instrument is switched to '0' = OFF.
- Various country-specific power cables are provided with the instrument. Make sure that the power cable used has the correct plug for the power socket.
- Insert the connector of the power cable into the connection socket (26) and plug the power plug into the socket.



Exposure to extreme temperature changes and high air humidity may cause condensation to form 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.

4. Startup

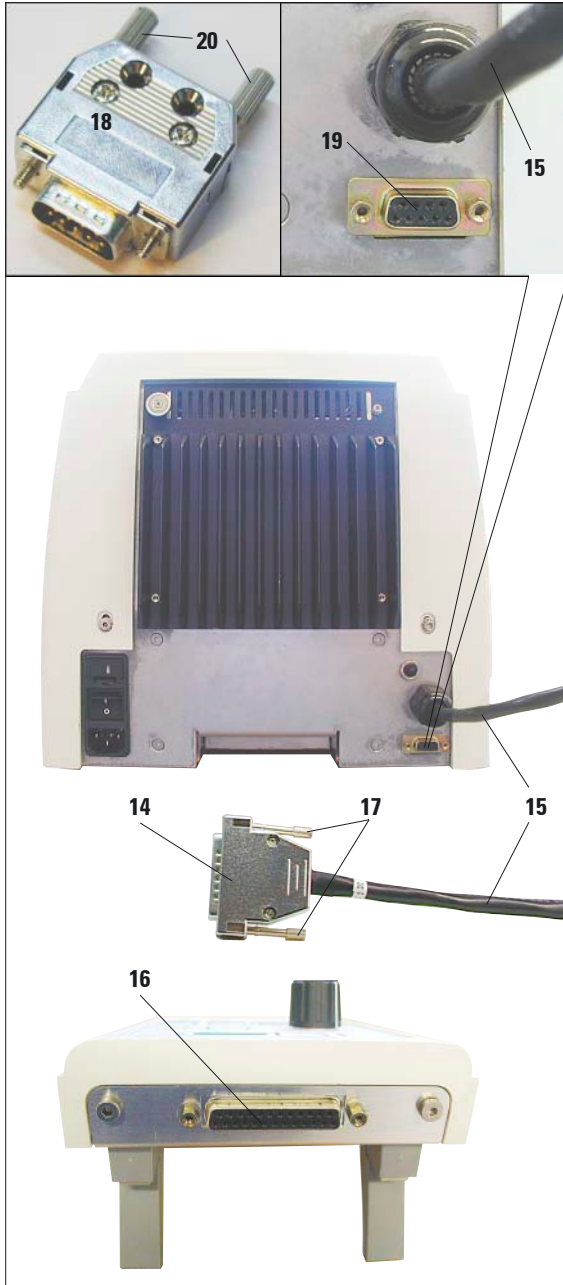


Fig. 13

Connecting the dummy plug

- Insert the dummy plug provided (18) into the connecting jack of the foot switch (19) on the rear of the instrument and fasten it by tightening the screws (20).

Connecting the foot switch (optional accessory)

- If a foot switch is to be used with the instrument, attach it in the same way as the dummy plug.



Caution!

If neither the dummy plug nor the foot switch is connected, the instrument is not ready for operation. In this case, the LED E-STOP is lit at the instrument.



Connecting the control panel

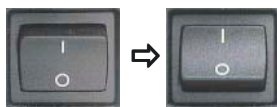
The connecting cable (15) of the control panel is fixed to the microtome. It may not be disconnected.

- Insert the plug (14) of the connecting cable (15) into the connecting jack (16) on the rear of the control panel.
- To fasten the plug, tighten the two screws (17).

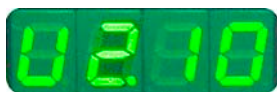
4.6 Switching on the instrument



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



Turn the instrument on with the mains switch at the rear right side.
This is followed by a beep.
The instrument initializes.



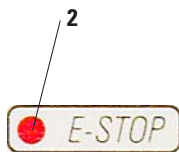
The software version is displayed in the 4 digit display for approx. two seconds. Then the display reads '0000'.

After the microtome is switched on, the display fields and LEDs of all activated functions are lit up on the instrument's control panel and display field.



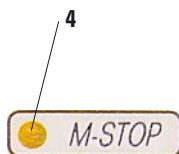
The three-digit LED display indicates the last value set for the section thickness or trimming thickness, depending on which setting was last activated. This is indicated simultaneously on the control panel and microtome.

The LED of the active mode (here the section thickness) is illuminated in green.



When the red LED in the **E-STOP** field (2) on the control panel of the instrument is illuminated, either

- the emergency-stop function has been activated or (E-STOP button pushed or footswitch depressed completely)
- the dummy plug (or the optional foot switch) is not correctly connected to the jack, or not connected at all.



If the yellow LED in the **M-STOP** field (4) of the control panel is lit, the mechanical handwheel lock or the handwheel brake (Pos. 3 in Fig. 3) is activated.

The instrument cannot be started as long as the LED is lit.

5. Operation

5.1 Operating elements and their functions



The operating functions of the microtome are divided between a control panel and a display unit on the microtome.

A control panel on the instrument displays the current operating mode as well as various settings.

All operating functions are centrally located in the separate control panel. All keys and displays are logically arranged in functional groups and easily identifiable.

5.1.1 Instrument control panel

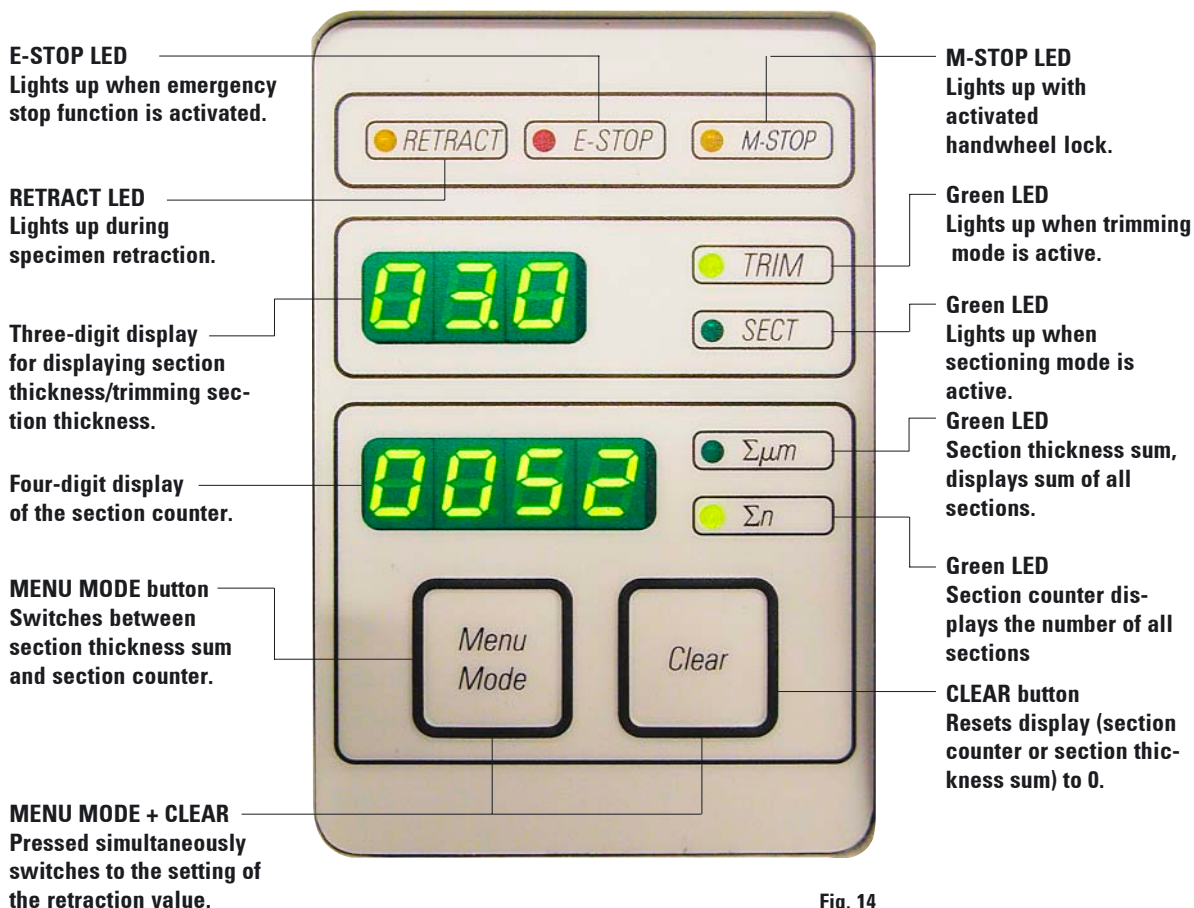


Fig. 14

5.1.2 Control panel

Buttons for setting the section thickness/trimming section thickness.

Turn knob for setting the sectioning speed.

Yellow LED
Flashes during backwards movement of coarse feed; lights up when rear end position is reached.

Yellow LED
Flashes during forward movement of coarse feed; lights up when front end position is reached.

Coarse feed buttons

Trimming mode:

Coarse feed backward fast

Coarse feed forward fast

Coarse feed forward slow

Coarse feed backward slow

Sectioning mode:

Multiple step backward

Multiple step forward

Single step forward

Single step backward

Three-digit display for section thickness/trimming section thickness.

Green LED
Lights up when trimming mode is active.

Green LED
Lights up when sectioning mode is active.

Button CUT MODE for selecting a sectioning mode.

Green LEDs for displaying the active operating mode.

Button for setting the sectioning window.

Green LED
Flashes until second cutting window edge is set.

TRIM/SECT button
Button for switching between sectioning mode and trimming mode.

Yellow LED
Lights up when motor is switched on.

Green LED
Lights up when motor is switched off or stops at the next stopping point.

Buttons
Start and stop motorized sectioning.

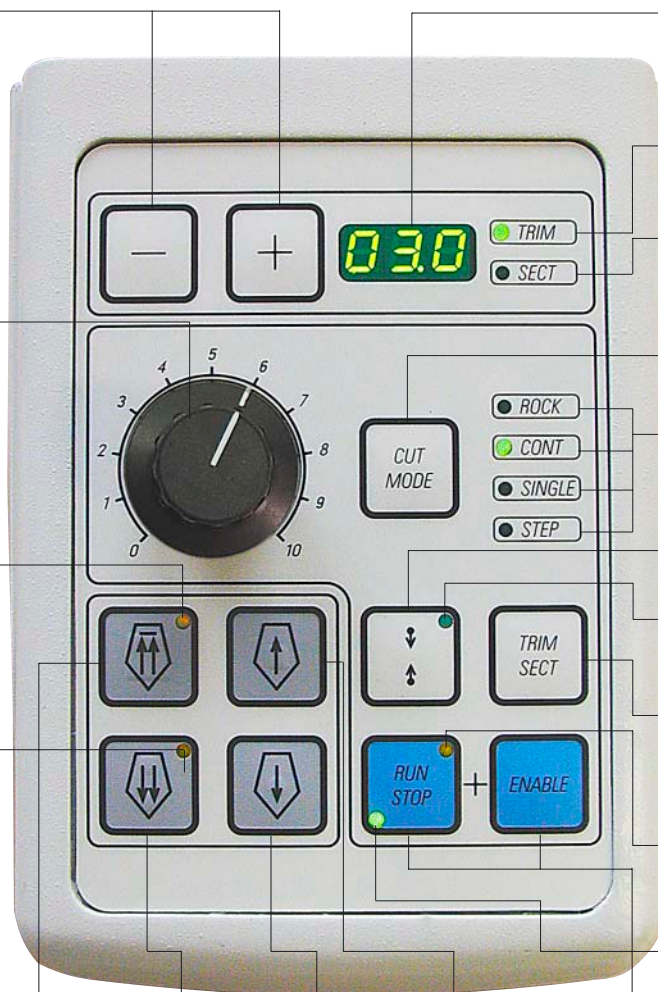


Fig. 15

5. Operation

5.1.3 Display and control elements



Fig. 16

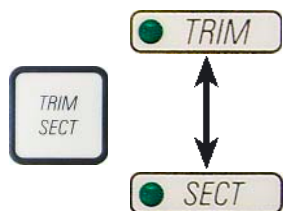
Three-digit display

This display is located both on the instrument and on the control panel.

If the **SECT** LED is lit up, the display shows the section thickness setting in μm .

If the **TRIM** LED is lit up, the display shows the trimming section thickness setting in μm .

Selecting sectioning and trimming mode



To switch between sectioning mode and trimming mode, press the **TRIM SECT** button. Whenever the button is pressed, the display toggles between **SECT** and **TRIM**.

In the **SECT** display, the sectioning thickness in the range from 0.50 to 100.0 μm is shown, and in the **TRIM** display, the trimming section thickness between 1.0 and 600 μm is displayed.

Setting the section thickness/trimming section thickness



Adjust these settings using the $\boxed{+}$ - $\boxed{-}$ keys on the control panel.

Section thickness setting range:	0.50 to 100.0 μm
Setting values:	from 0.5 μm to 5.0 μm in 0.5 μm increments
	from 5.0 to 20.0 μm in 1.0 μm increments
	from 20.0 to 60.0 μm in 5.0 μm increments
	from 60.0 to 100.0 μm in 10.0 μm increments

Trimming section thickness setting range:	1 to 600 μm
Setting values:	from 1.0 to 10.0 μm in 1.0 μm increments
	from 10.0 to 20.0 μm in 2.0 μm increments
	from 20.0 to 50.0 μm in 5.0 μm increments
	from 50.0 to 100.0 μm in 10.0 μm increments
	from 100.0 to 600.0 μm in 50.0 μm increments

Coarse feed functions



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

Keys with the double arrow represent a speed of 900 $\mu\text{m/s}$; keys with a single arrow represent a speed of 300 $\mu\text{m/s}$. In the sectioning mode, the function of the coarse feed allows for selecting a defined approach (**STEP** function) and a continuous movement of the specimen. The instrument is delivered with the **STEP** function deactivated (factory setting).

Sectioning mode

Button functions in
STEP modeMultiple
step
backwardSingle
step
backwardMultiple
step
forwardSingle
step
forward

In sectioning mode the user can select between step-by-step specimen feed (**STEP** function) and continuous specimen feed.

When continuous feed is selected, the coarse feed buttons have the same functions as in trimming mode. The **STEP** function is useful for careful step-by-step approximation of the specimen towards the blade.

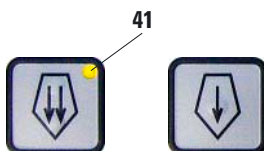
How to activate the **STEP** function:

- Switch the instrument on and simultaneously press the  button on the control panel. Likewise, to deactivate the STEP function, switch the instrument on while pressing the  button.
- When pressing a slow-speed coarse feed button in **STEP** mode, the specimen moves towards or away from the specimen by the value indicated on the display (single step).
- By short activation of a double-arrow coarse feed button, a single step is also effected in the appropriate direction.
- Longer activation of the double-arrow coarse feed button effects a repeated feed motion for as long as the button is pressed.

Trimming mode

Backwards coarse
feed

Forward coarse feed



In the trimming mode, 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.

- To start the rapid backwards movement (away from the blade) press the  button.
After the  button is pressed, the object head moves to the rear end position.
- To stop the movement, press any of the four coarse feed buttons.
- The yellow LED (40) in the button flashes while the object head is in motion, and remains lit continuously when the rear end position is reached.
- To start the slow backwards motion, press the button. The motion only continues as long as the button is pressed.
- Press the appropriate button to start a rapid or slow forward movement. The travel continues as long as the button is held down.
- During the forwards movement, the yellow LED (41) in the button flashes. When the front end position is reached, you will hear a beep and the LED stops flashing and remains lit.

5. Operation

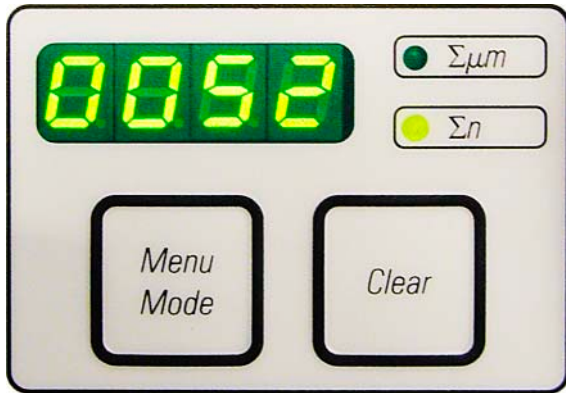


Fig. 17

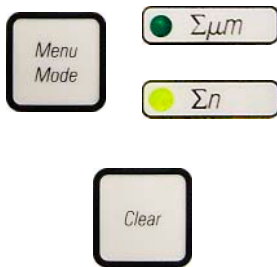
Four-digit display on the instrument

The four-digit display is adjustable.

When the **Σ μm** LED is lit, the display shows the sum of the section thicknesses for all completed sections in μm.

(Section thickness sum)

When the **Σ n** LED is lit, the display shows the number of all previously completed sections.



- To change the display mode, push **MENU MODE** until the LED of the desired mode is illuminated.
- Press **CLEAR** to reset section thickness sum or section number.
- This will only reset the currently displayed value.



Caution!

When the instrument is switched off using the main power switch, both values (section thickness sum and section number) are erased from memory.

Specimen retraction

To prevent damage to the blade and specimen, the specimen is moved away from the blade during the return motion to the upper home position.

In motorized sectioning mode, the retraction depends on the setting of the sectioning speed.

In manual mode, the retraction value can be selected in 5 μm increments between 5 and 100 μm. Specimen retraction is set to 10 μm at the factory.

The specimen retraction can 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



- To call up the retraction settings, simultaneously press the **MENU MODE** and **CLEAR** buttons.



- The current set value is displayed as a **three-digit number** in the four-digit display (e.g. '025' = 25 μm).



- Select the desired retraction value.
The retraction value can be adjusted in increments of 5 μm to a maximum of 100 μm using the - buttons on the control panel.



- To exit the retraction settings, press **MENU MODE**.
In the manual sectioning mode, a retraction movement by the selected value takes place after each section.
- While the specimen is in retraction, the yellow LED on the **RETRACT** display (4) lights up.

Switching off the specimen retraction



- Call up the retraction setting by simultaneously pressing **MENU MODE** and **CLEAR**.



- To switch off retraction, press the button on the control panel until the display indicates "OFF".



- To exit the retraction settings, press **MENU MODE**.
When retraction is switched off, the specimen is not retracted.



The yellow LED (4) of the **RETRACT** indicator does not light up.

5. Operation

Setting the sectioning speed



The sectioning speed can be set continuously (in the range of 0 - 420 mm/s) using the rotary knob.

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



The set cutting speed is only active within the boundaries of the sectioning area. A higher speed is used outside the sectioning area.

Setting a sectioning window



The sectioning window function allows optimum adaptation of the size of the cutting area to the actual size of the specimen. The selected sectioning window setting is maintained when the instrument is turned off.

- Turn the handwheel to position the lower edge of the sample approximately 3 mm above the cutting edge.
- Press the **"SET SECTIONING WINDOW"** button. This defines the first window border.
- The green LED (43) in the button flashes after the first window border is defined.
- Pass the specimen through to the upper border of the cutting edge and press the **"SET SECTIONING WINDOW"** button again.
- After the second window border is defined, the green LED in the button goes out. This indicates that both values were accepted.



An upper and lower limit always have to be entered to set a sectioning window. The sequence of entry (upper or lower) is unimportant.

Canceling a defined sectioning window



- To cancel a defined cutting window before the start, press the **"SET SECTIONING WINDOW"** button once. This will set the window to the maximum size.

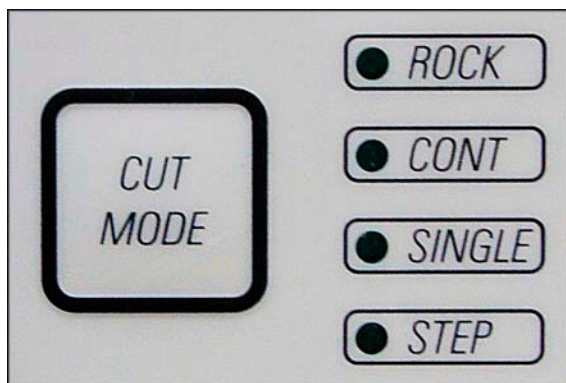


Fig. 18

Sectioning modes

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

You can choose between four settings:

ROCK in manual mode as well as **CONT**, **SINGLE** and **STEP** in motorized mode.



For safety reasons, none of the operating modes is active when the instrument is first switched on.

Sectioning mode selection

- For selecting the sectioning mode, press the **CUT MODE** button on the control panel until the green LED of the desired operating mode lights up.

Manual sectioning



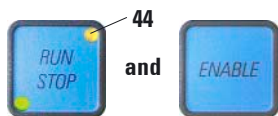
- Select **ROCK** operating mode.
- Turn the handwheel a short distance forwards and backwards for cutting (rocking mode).

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

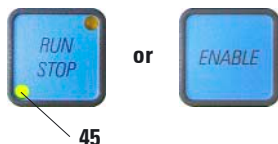


In the manual sectioning mode, it is possible to use either the conventional method of completing a full handwheel rotation or to work in the rocking mode ('Rock').

Start and stop motorized sectioning



- To start motorized sectioning, press the **RUN/STOP** and **ENABLE** buttons simultaneously after selecting the desired operating mode.
- While the sectioning motor is running, the yellow LED in the **RUN/STOP** key lights up.
- To stop motorized sectioning, press **RUN/STOP** or **ENABLE**.



If both the green and the yellow LEDs are lit up in the **RUN/STOP** key, the sectioning motor is still running; however, it will stop in the next upper end position of the vertical stroke.

5. Operation

Motorized sectioning

In motorized operation, you can choose between three operating modes:

CONT = continuous stroke,

SINGLE = single stroke,

STEP = step stroke.



CONT (continuous stroke) operating mode

- Select **CONT** operating mode.

After beginning the sectioning process, sectioning continues until the process is stopped by pressing **RUN/STOP** or **ENABLE**.

The specimen then stops in the next upper end position of the vertical stroke.



SINGLE (single stroke) operating mode

- Select **SINGLE** operating mode.

After starting sectioning, a single sectioning stroke is effected.

The specimen then stops automatically in the upper end position of the vertical stroke.



In motorized sectioning mode, the sectioning process can be started and stopped with the foot switch (optional accessory) instead of the **RUN/STOP** and **ENABLE** buttons. See the "Foot switch" chapter (Page 32).



STEP (step stroke) operating mode

- Select **STEP** operating mode.

After starting the sectioning process, the specimen is moved as long as the keys are held depressed or as long as the foot pedal is pressed.

If the buttons or the foot switch are released, the specimen stops automatically.



Indication of remaining horizontal feed

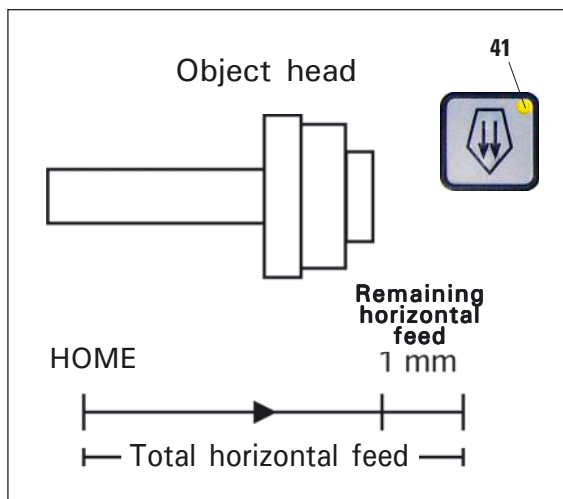


Fig. 19

The visible 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.

The yellow LED (41) in the **COARSE FEED** button lights up from the beginning of the remaining feed. In addition, you will hear a beep for approx. 2 seconds.

The sectioning process is interrupted and the object head stops in the upper end position.

From this point on, a remaining feed of approx. 1 mm is available.

In the remaining feed area, no more object feeding to the knife is possible using the coarse feed button.



and



- Restart motorized sectioning.

The yellow LED (41) in the **COARSE FEED** button lights up.

- When the front end position is reached, the sectioning process stops automatically.
- Upon restart, no more feed motion takes place.
- You can continue to work on the specimen by pressing the corresponding coarse feed button in the rear end position (**HOME**) and continuing with sectioning.



or

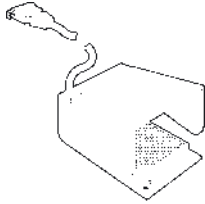


This requires switching to the Trimming mode using TRIM/SECT. Otherwise, it is not possible to use the coarse feed. If the object head is in the remaining feed range when the instrument is switched on, you will hear a beep after the software version is displayed.

- For continued work, the specimen must be moved back a short distance using the coarse feed buttons (set the Trimming mode!).
- The **STEP** function is disabled in the remaining feed range.

5. Operation

Foot switch (optional accessory)



The foot switch is used to control the motorized sectioning process. It also has a function that is similar to the emergency stop function.



Caution!

All functions of the control panel and all keys on the instrument remain active parallel to the foot switch.

- Select the desired operating mode, **CONT**, **SINGLE** or **STEP**, on the control panel (Fig. 18) with the **CUT MODE** button.

CONT (continuous stroke) operating mode



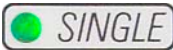
- Press the foot switch once briefly to start motorized sectioning.



If the foot switch remains pressed for longer than half a second, the specimen stops in the next upper end position.

- Press the foot switch again to stop the sectioning.
The specimen stops in the next upper end position.

SINGLE (single stroke) operating mode



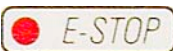
- Press the foot switch once briefly to start motorized sectioning. After each section, the specimen stops automatically in the upper end position.

STEP (step stroke) operating mode



- Press down the foot switch once to start the sectioning process. The specimen is now moved for as long as the foot switch is depressed.
- If the foot switch is released, the specimen remains stationary in the position that it has reached.

How to activate the emergency stop function



- Press the foot switch strongly to activate the emergency stop function. Sectioning stops immediately.
The red LED in the **E-STOP** field on the instrument (Fig. 14) is lit up as long as the foot switch remains depressed.
- To continue, reselect a sectioning mode and start sectioning by activating the foot switch. The operating mode that was previously used remains active.

Directional fixture for specimen clamps



In the quick clamping device of the directional fixture for specimen clamps, all object clamps available as optional accessories can be used (implemented).

The object orientation allows for simple position correction of the specimen surface when the specimen is clamped into place.

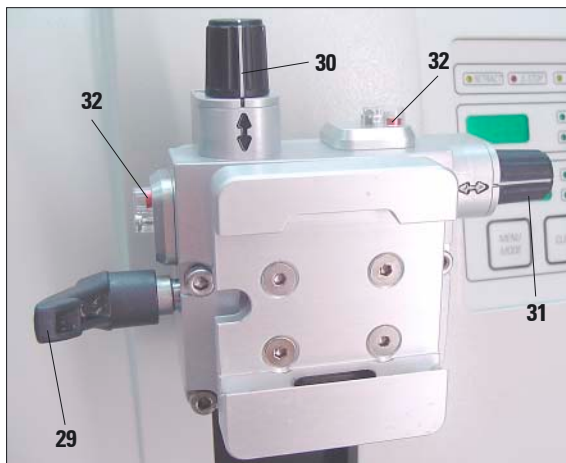


Fig. 20

Display of the zero position

For better display of the zero position, the orientation has two red indicators (32).

When both indicators are visible and both set-screws (30, 31) are in zero position at the same time (notch point, white marking on "↕"), the specimen is in zero position.



When the large standard clamp (50 x 55 mm) is used, the specimen orientation of 8° in north-south direction is no longer possible. The usable angle is only about 4° in this case.

The directional fixture for specimen clamps may be exchanged for a non-directional fixture (optional accessory).

Orienting the specimen



Specimen blocks must not be oriented during the retraction phase!

If a block is oriented during retraction, the block will advance by the retraction value PLUS the selected section thickness before the next section.

This may cause damage to both specimen and knife!

- Raise the object head to the upper end position and activate the handwheel lock.
- To release the clamp, turn the eccentric lever (29) forwards.
- Turn adjusting screw (30) to orient the specimen in north-south direction. Turn adjusting screw (31) to orient the specimen in east-west direction.

Each complete turn of the screw inclines the specimen by 2°. A total of 4 complete turns = 8° are possible in every direction. The accuracy is approximately $\pm 0.5^\circ$.

For ease of estimation, there is a white marking on the handle and a notch point that is noticeable during turning.

- To lock the current orientation, turn the eccentric lever (29) backwards.

5. Operation



Fig. 21

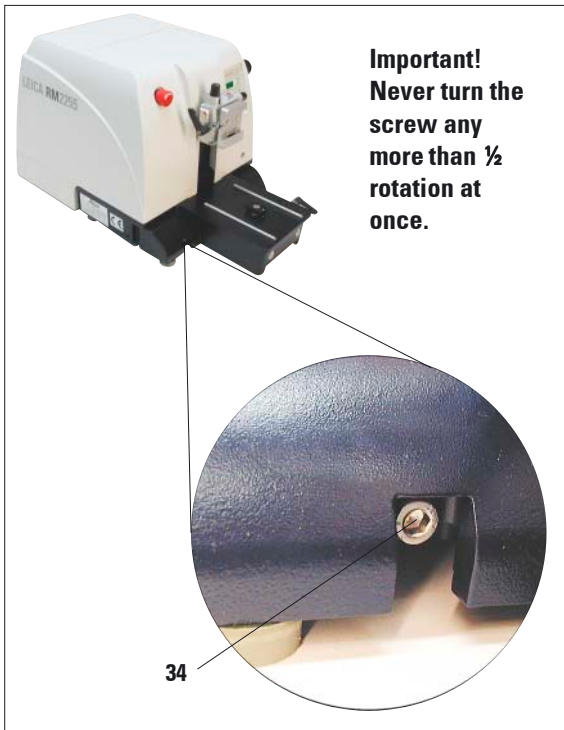


Fig. 22

Fine adjustment of the force balance

If another accessory with a variation in weight is mounted on the object head (33), it is necessary to check if the force balance needs to be readjusted.

Checking the correct setting:

- Attach the new accessories and insert the specimen.
- Turn the handwheel to set the object head to half the distance of the vertical lift (Fig. 21).

If the object head remains precisely in this position, the setting is correct.

If the object head moves (goes up or down), a fine adjustment is required.



If the force balance is not adjusted, it may cause injuries during operation.

The adjustment is performed via screw (34) which is accessible after removing the section waste tray at the bottom of the microtome base plate. Use the supplied SW 5 Allen key (with handle) to perform the adjustment.

- If the object head is **lowered**, turn the screw approx. ½ turns **clockwise**.
- If the object head is **raised**, turn the screw (34) approx. ½ turns **counterclockwise**.
- Continue this procedure until the handwheel no longer moves after being released.

5.2 Inserting the knife holder

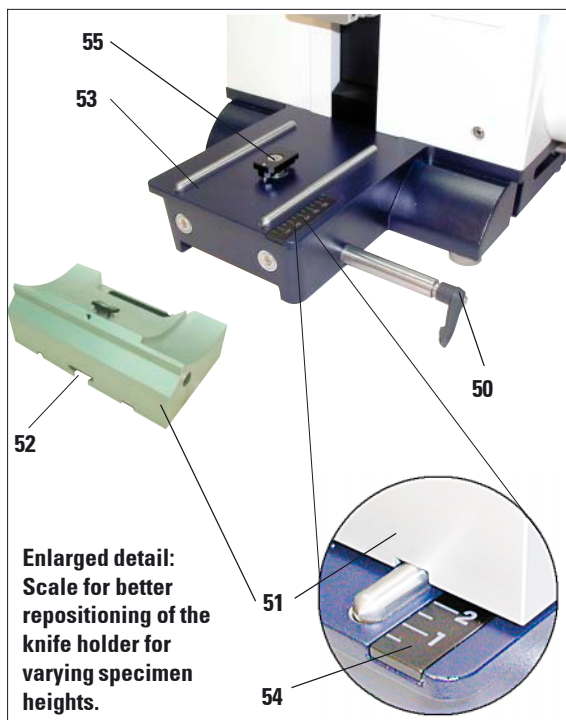


Fig. 23

Setting up the knife holder base

- Release the clamping lever (50) by rotating it counterclockwise.
- Insert the knife holder base (51) using the notch (52) on the bottom into the T-piece (55) of the microtome base plate (53).
- To secure the knife holder base, turn the lever (50) clockwise.

The knife holder base (51) can be moved back and forth on the microtome base plate. This allows bringing the knife holder to optimal cutting position in relation to the specimen.

There is a scale (54) on the right side of the microtome base plate. This enables faster and better positioning of the knife holder at the specimen if various combinations of standard specimens and specimen holders are used. The rear edge of the knife holder base (51) functions as the scale reference.

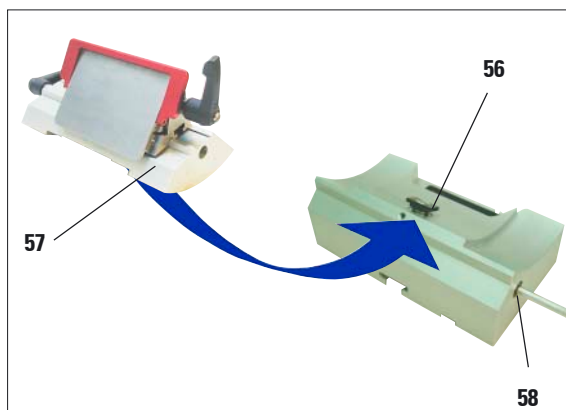


Fig. 24

Inserting the knife holder

- Release the screw (58) with the size 4 Allen key (71) so that the knife holder (57) can be moved.
- Place the knife holder (57) with the underside groove onto the T-piece (56) of the knife holder base (51).
- To clamp, retighten the screw (58).

5. Operation

5.3 Inserting the universal specimen clamp

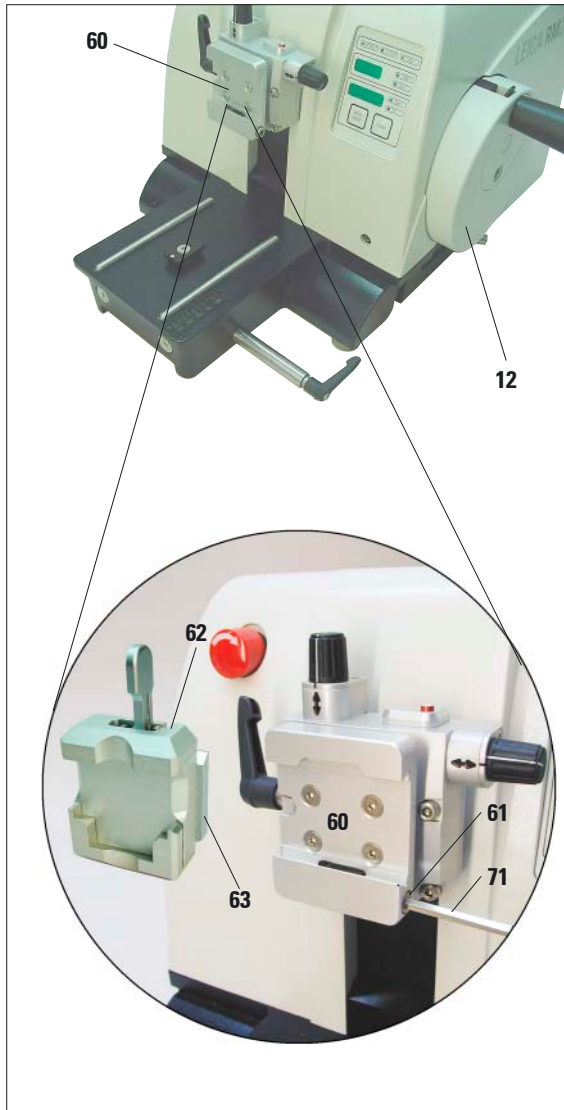


Fig. 25

The fixture for specimen clamps is available in two different versions, with and without specimen orientation. The two versions are interchangeable.

The object orientation allows for simple position correction of the specimen surface when the specimen is clamped into place.

All specimen clamps listed in chapter 6 'Optional Accessories' fit into the fixture (60).

To do so, proceed as follows:

- Turn the handwheel (12) to move the fixture (60) to uppermost position and activate the handwheel locking mechanism.
- Release clamping screw (61) with the SW 4 Allen key (71) (rotate counterclockwise).
- Slide the guide (63) of the specimen clamp (62) from the left into the fixture for specimen clamps (60) as far as it will go.
- To secure the specimen clamp, rotate the clamping screw (61) clockwise as far as it will go.

5.4 Adjusting the clearance angle

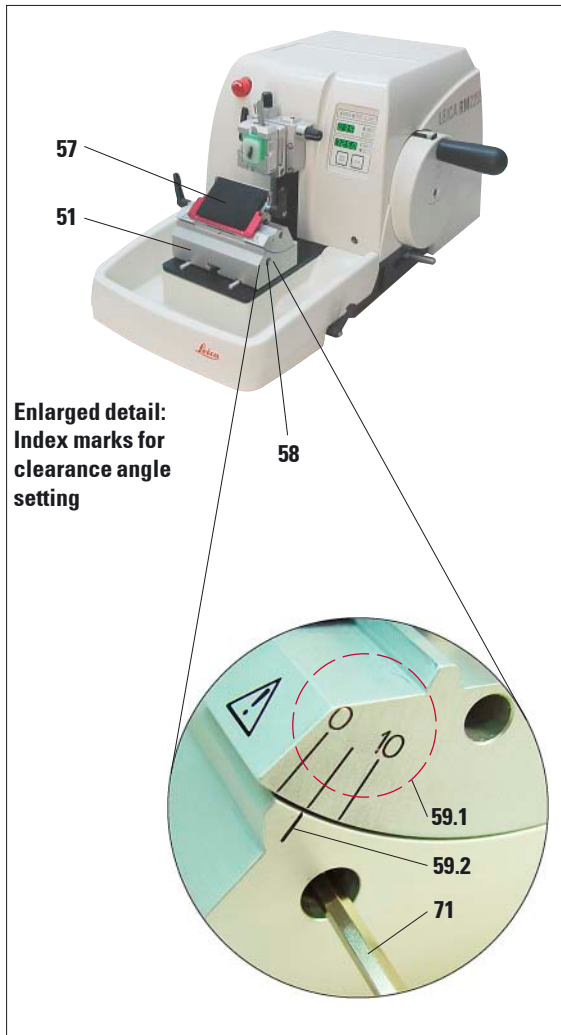


Fig. 26

- The index marks (0°, 5° and 10°) for adjustment of the clearance angle (**59.1**) are located on the right side of the knife holder (**57**).
- There is also an index mark (**59.2**) on the right side of the knife holder basis (**51**) which serves as a reference point when adjusting the clearance angle.
- Release the screw (**58**) with the size 4 Allen key (**71**) so that the knife holder (**57**) can be moved.
- Move the knife holder until the index mark of the desired clearance angle coincides with the reference line on the knife holder base.
Example:
Enlarged detail showing a clearance angle setting of 5°.



The recommended clearance angle setting for knife holder E is in the range of at least 2.5° to 5°.

- Hold down the knife holder in this position and retighten the screw (**58**) for clamping.

5. Operation

5.5 Clamping the specimen



Always clamp the specimen block BEFORE clamping the knife. Lock the handwheel and cover the knife edge with the knife guard prior to any manipulation of knife or specimen, prior to changing the specimen block and during all work breaks!

- Rotate the handwheel until the specimen clamp is in its uppermost position.
- Activate the handwheel lock by allowing the handwheel handle to lock in place and then activate the brake.
- Insert a specimen block into the specimen clamp.



A detailed description for inserting the specimen into various object clamps and specimen holders is can be found in [Chapter 6](#), “Optional accessories”.

5.6 Inserting the knife / disposable blade



Be very careful when handling microtome knives or blades. The cutting edge is extremely sharp and can cause serious injuries!

- Carefully insert knife or disposable blade into the knife holder and clamp.
- Make sure that the blade is clamped parallel to the upper edge of the pressure plate.
(for more information see [Chapter 6.3.2, Fig. 36](#))



A detailed description for inserting the blade or the knife into the individual knife holders can be found in [Chapter 6](#), “Optional accessories”.

5.7 Trimming the specimen

5.7.1 Trimming in manual operation



- Use the **TRIM/SECT** key to select the trimming mode.
- Set the desired trim section thickness.
- Deactivate the handwheel lock and release the brake.
- In **TRIM** mode, use the course feed buttons to move the sample against the knife/blade.
- Trim the sample by turning the handwheel
or
- Using the **CUT MODE** key, select the **ROCK** operating mode and cut the specimen with forward and backward motions of the handwheel.
- Terminate trimming when the desired sectioning surface and depth have been reached.

5.7.2 Trimming in motorized operation



The handle of the handwheel must always be centered in motorized operation! Always turn the handwheel evenly in clockwise direction; otherwise the brake will not work properly.



- Use the **TRIM/SECT** key to select trimming mode.
 - Set the desired trim section thickness.
 - If necessary, set the cutting window.
- 

Always set the cutting speed according to the hardness of the specimen! For hard specimens, always select a slow speed.
- Using the turn knob, set the appropriate cutting speed.
 - Using the **CUT MODE** button, select the **CONT** operating mode (continuous stroke).
 - Deactivate the handwheel lock and release the brake.
 - Start motorized sectioning and trim the sample.
 - Terminate trimming when the desired sectioning surface and depth have been reached.

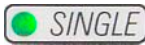
5. Operation

5.8 Sectioning



Always use a different area of the cutting edge for trimming and cutting. To do so, laterally displace the blade or knife in the knife holder.

When using the knife holder E with lateral movement, it is sufficient to move the knife holder sideways.



- Center the handle of the handwheel.
- Use the **TRIM/SECT** key to select the cutting mode.
- Adjust the appropriate sectioning thickness or verify the selected value.
- Depending on the operation planned, use the **CUT MODE** key to select one of the motorized cutting modes, **CONT**, **SINGLE** or **STEP**.



Always set the cutting speed according to the hardness of the specimen! For hard specimens, always select a slow speed.

- Check the cutting speed setting and set an appropriate speed.
- Start motorized sectioning.
- Pick up the sections and mount them on microscope slides.

5.9 Changing the specimen or interrupting sectioning



Lock the handwheel and cover the knife edge with the knife guard prior to any manipulation of knife or object head, as well as prior to changing the specimen block and during all work breaks!

- Raise the specimen to the upper end position and activate the mechanical handwheel lock.
- Cover the cutting edge with the knife guard.
- Remove the specimen from the specimen clamp and mount a new sample to continue.
- Before cutting into a new specimen, move the object head back to the rear end position.



6.1 Assembly for fixture for specimen clamps



Depending upon the purchase order, the basic instrument is delivered with the directional or rigid fixture for specimen clamps which must be assembled first. All specimen clamps available as accessories can be used in both fixtures for specimen clamps.

Before assembling the fixture for specimen clamps, activate the mechanical handwheel lock!

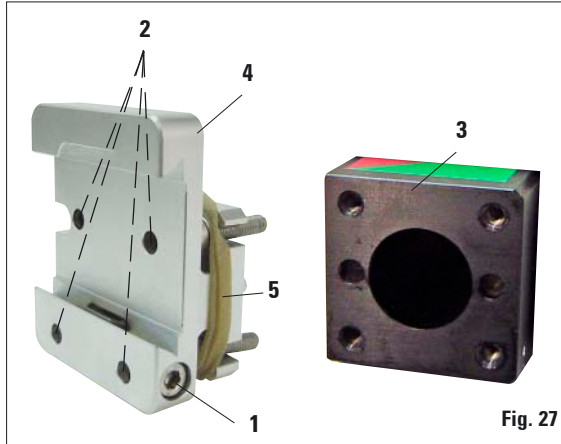


Fig. 27

6.1.1 Rigid fixture for specimen clamps

- Screw the rigid fixture for specimen clamps (4) onto the object head (3):

Remove the screw (1), attach the fixture for specimen clamps (4) onto the object head (3) from the front and tighten the screws (2) with an SW 3 Allen key.

Next, insert the screw (1) from the side and briefly tighten it with an SW 4 Allen key.



Remove the rubber ring only after attaching the object head!

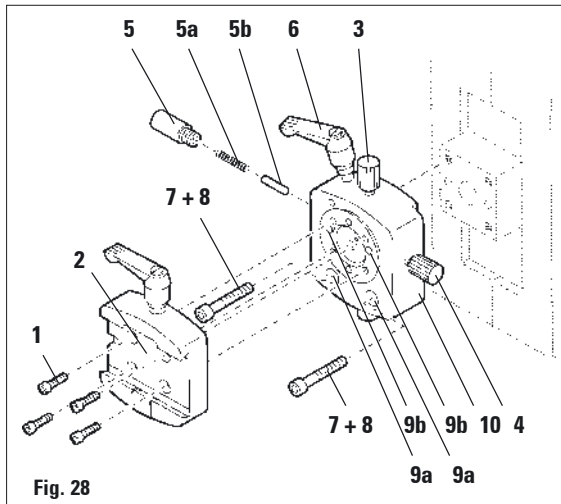


Fig. 28

- Finally, place the dovetail holder (2) and fasten by screwing in the 4 screws (1) using an SW 3 Allen key.

6.1.2 Directional fixture for specimen clamps

- Loosen the eccentric bolt (6) by turning it counterclockwise.
- Completely unscrew the thrust piece (5) with a flat-tip screwdriver and pull it out with spring (5a) and pin (5b).
- Completely unscrew the setscrews (3) and (4).
- Attach the directional fixture for specimen clamps as shown.
- Insert the screws (7+8) in the bore (2 screws (8) are accessible through the bore (9a)) and evenly screw them in using an SW3 Allen key.
- Insert spring (5a) and pin (5b) with the flatter side into the thrust piece (5). Completely screw in the thrust piece with a flat-tip screwdriver.
- Fully screw the setscrews (3+4) back in.

6. Optional accessories

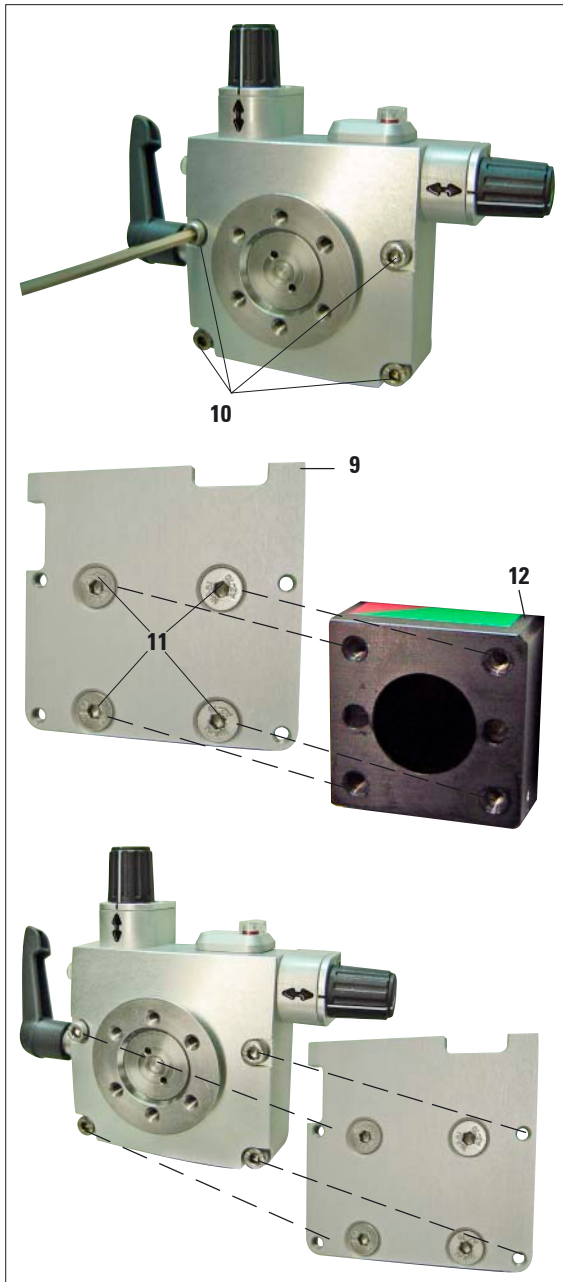


Fig. 29

6.1.3 Fine-directional fixture for specimen clamps

- Before the fine-directional fixture for specimen clamps can be mounted, loosen 4 screws (10) (SW 3 hex key) and carefully remove the fixture for specimen clamps from the baseplate (9).
- Using the 4 supplied screws (11) and the SW 3 hex key, fasten the baseplate to the object head (12).
- Now, screw the fine-directional fixture for specimen clamps with the 4 screws (10) and the SW 3 hex key onto the object head.



If the fine-directional fixture for specimen clamps is not used, retain the baseplate and the 4 screws (11) together with the fine-directional fixture for specimen clamps!

6.1.4 Quick clamping system

It is used as specimen holder for use with the fine-directional fixture for specimen clamps with zero point indicators or the directional fixture for specimen clamps.

- Screw the 4 screws (**13**) into bore A with an SW 2.5 hex key and tighten them.

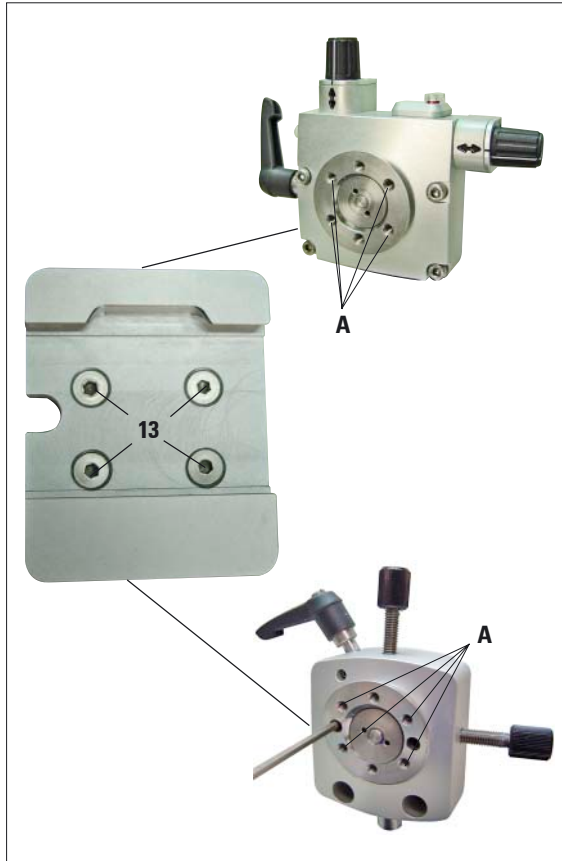


Fig. 30

6. Optional accessories

6.2 Specimen clamps and holders



All specimen clamps available as accessories fit into the directional as well as in the non-directional fixture for specimen clamps.

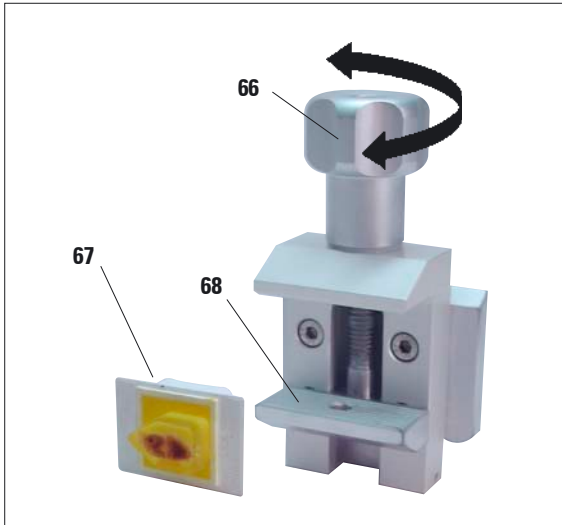


Fig. 31

6.2.1 Standard specimen clamp

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

Rectangular blocks can be clamped directly in the standard specimen clamp. In addition, this clamp accommodates the foil clamps.

- Turn knurled screw (66) counterclockwise lowering the movable jaw (68) as far as it will go.
- Insert block (67) as required.
- Turn knurled screw (66) clockwise to raise the movable jaw until the block is securely clamped.

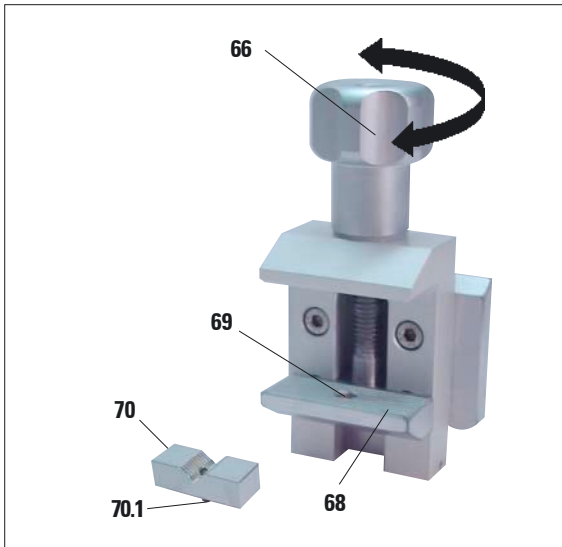


Fig. 32

6.2.2 Vee insert

The vee insert (70) fits into the lower movable jaw of the standard specimen clamp for clamping round specimens.

- Turn knurled screw (66) counterclockwise lowering the movable jaw (68) as far as it will go.
- Insert pin (70.1) of vee insert (70) into the hole (69) of the lower movable jaw (68).
- Insert the specimen.
- Turn knurled screw (66) clockwise to raise the lower movable jaw / vee insert until the block is securely clamped.

6.2.3 Foil clamp type 1

The foil clamp type 1 is suitable both for clamping very small foil pieces and flat, angular samples. It is clamped in the standard specimen clamp.

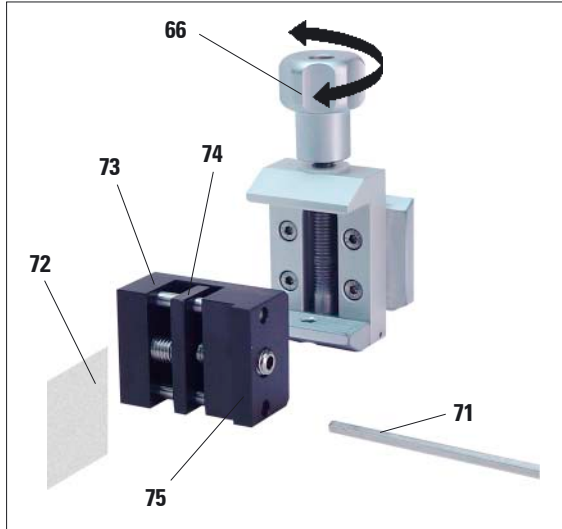


Fig. 33

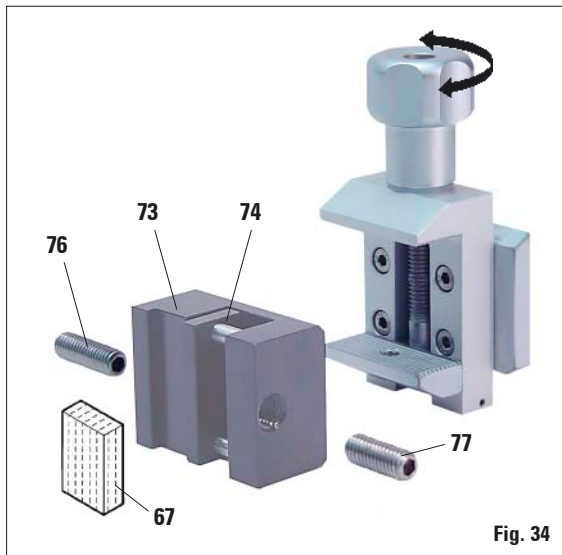


Fig. 34

Clamping foils

- Move the movable jaw (74) to the right by turning the set screw with an Allen key size 4 (71).
- Insert foil sample (72) between the movable jaw (74) and the fixed jaw (73).
- Clamp the foil by bringing the movable jaw (74) close to the fixed jaw (73) (use Allen key).
- Insert foil clamp (75) into standard specimen clamp as shown.
- Rotate knurled screw (66) clockwise until the foil clamp is securely clamped.

Clamping flat specimens

To clamp flat samples, remove the longer setscrew (76) and insert the shorter one (77):

- Use Allen key size 4 (71) to unscrew the longer setscrew (76) to the left.
- Insert shorter setscrew (77) into the thread.
- Insert specimen (67) between the movable jaw (74) and fixed jaw (73).
- To clamp the specimen, screw setscrew (77) inwards bringing the movable jaw (74) close to the fixed jaw (73).
- Insert foil clamp into standard specimen clamp as shown.
- Rotate knurled screw (66) clockwise until the foil clamp is securely clamped.

6. Optional accessories

6.2.4 Foil clamp type 2



Foil clamp type 2 is appropriate for clamping ribbons of foil. It is clamped in the standard specimen clamp.

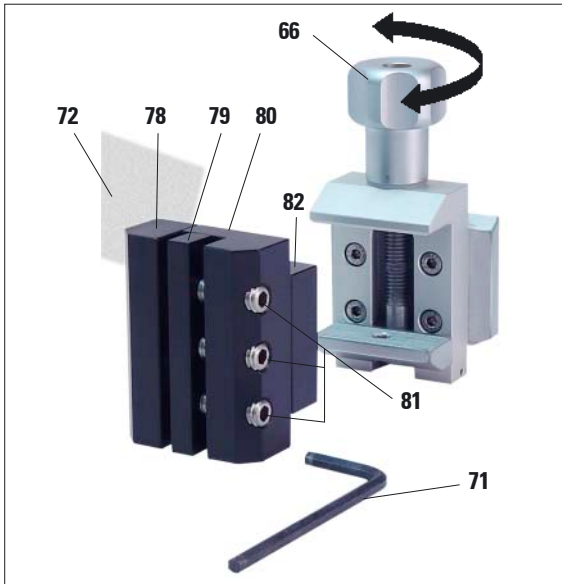


Fig. 35

- To open the jaws (78) and (79), release the three screws (81) somewhat using an Allen key size 4 (71).
- Insert the foil ribbon (72) from the back between the movable jaw (79) and the fixed jaw (78).
- To clamp the foil, tighten first the center screw and then the two outer screws (81) with the Allen key (71).
- Place the foil clamp (82) into the standard specimen clamp so that the beveled surface (80) on the back of the foil clamp is pointing to the right or to the left.
- Rotate knurled screw (66) clockwise until the foil clamp is securely clamped.

6.2.5 Universal cassette clamp

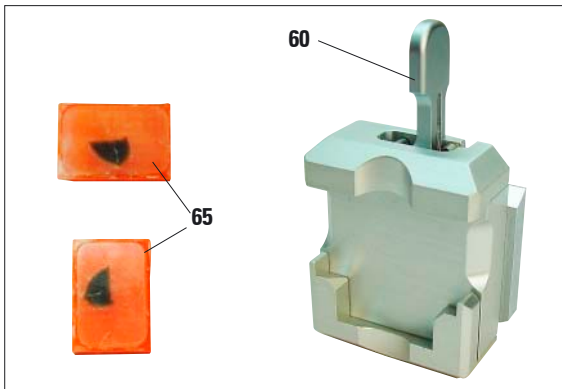


Fig. 36



All common brands of cassettes fit into the universal cassette clamp (UCC), either horizontally or vertically.

- Pull lever (60) on the left.
- Insert a cassette (65) horizontally or vertically.
- Pull lever (60) to the right to secure the cassette in position.

6. Optional accessories

6.2.6 Holder for round specimens



The holder for round specimens accommodates cylindrical samples. Inserts for cylindrical specimens of 6, 15 and 25 mm diameter are available.

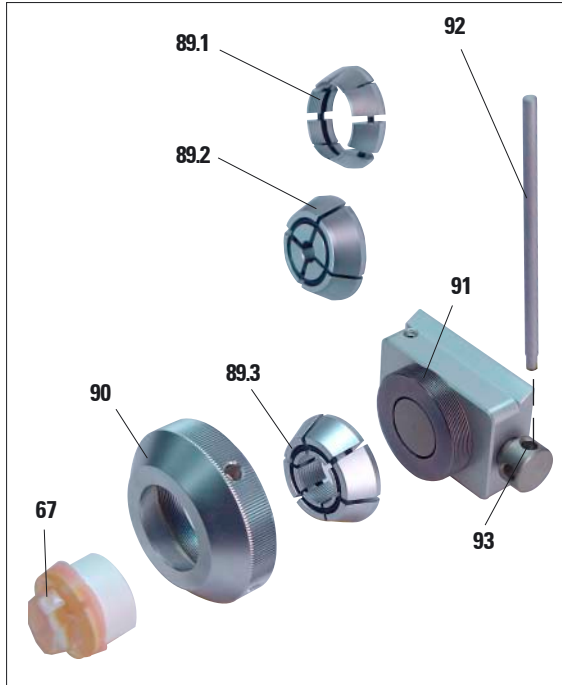


Fig. 37

- To mount the required insert (**89.1-3**) turn the clamping ring (**90**) counterclockwise and remove it.
- Place the required insert into the clamping ring (**90**) and screw the clamping ring onto the thread (**91**) (rotate clockwise).
- Insert specimen (**67**) and secure by rotating the clamping ring (**90**) clockwise.
- To orient the clamped specimen, insert pin (**92**) into the hole (**93**) and turn counterclockwise to release the clamping mechanism. The specimen can now be oriented as desired.
- Turn the pin (**92**) clockwise to secure the specimen.

6. Optional accessories

6.2.7 Super mega-cassette clamp

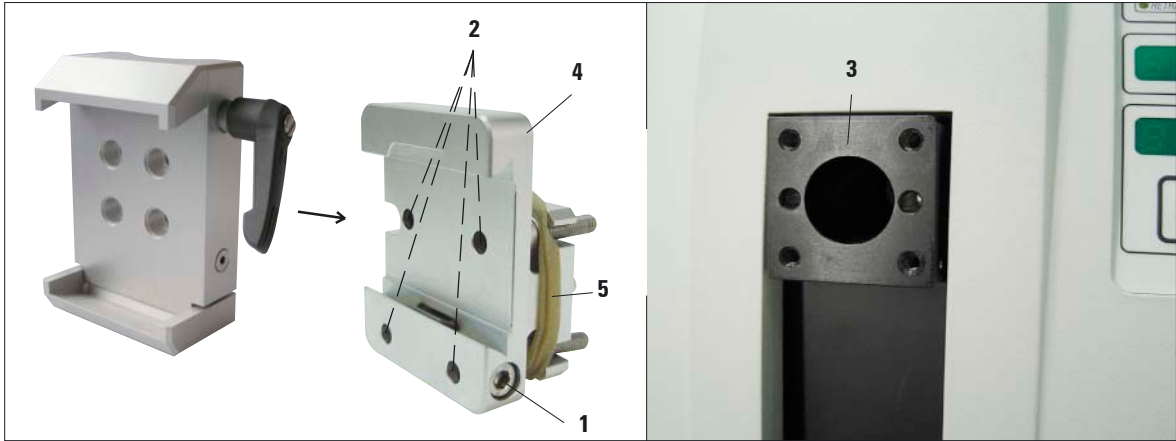


Fig. 38

Assembly of the super mega-cassette clamp

The super mega-cassette clamp should preferably be used with the rigid fixture for specimen clamps. To do so, proceed as follows:



Remove the rubber ring (5) only after attaching the object head!

- Screw the rigid fixture for specimen clamps (4) onto the object head (3): Remove the screw (1), place the fixture for specimen clamps (4) onto the object head (3) from the front and tighten the screws (2) with an SW 3 Allen key.
Next, insert the screw (1) from the side and briefly tighten it with an SW 4 Allen key.
- Insert the super mega-cassette clamp from the side on the left into the dovetail guide of the rigid fixture for specimen clamps and tighten screw (1).



If the directional fixture for specimen clamps is used with the rigid knife holder base, the orientation must be in position „0“ and the cover for backlighting illumination must be detached. (Danger of collision if not observed!)

NEVER use the super mega-cassette clamp with backlighting illumination!

6.3 Knife holder base and knife holder



Fig. 39

6.3.1 Knife holder base, without lateral movement feature



Fig. 40

The plastic handles of all clamping levers on the instrument and knife holders can be moved to the position that is most convenient for each user.

Pull the grip (94) out of the lever, hold it in this position, and rotate it to the desired position. It will then lock automatically in place when released.

Repositioning the knife holder base

The one-piece knife holder base (rigid) (51) can be moved forwards and backwards on the microtome base plate.

This vertical displacement allows bringing the knife holder into the optimal cutting position in relation to the specimen.

- To release, rotate the clamping lever (50) 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.
- Secure the clamping mechanism by rotating the lever (50) clockwise.

6. Optional accessories

6.3.2 Knife holder E/E-TC



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



Prior to inserting the blade, both knife holder and knife holder base must have been installed on the instrument!

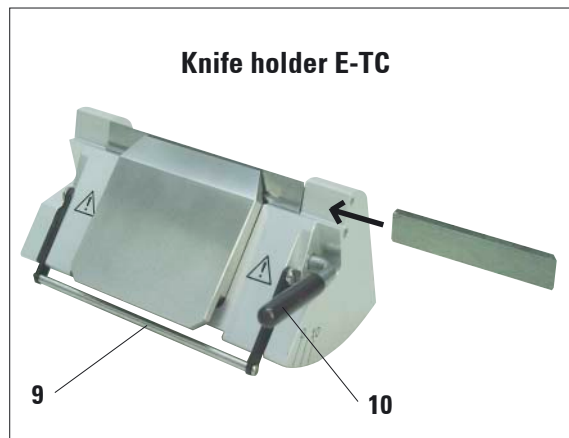


Fig. 41

Inserting blade, knife holders E and E-TC

- Fold knife guard (9) downward.
- To insert the blade, flap the right clamping lever (10) forward and down.
- Carefully insert the blade from the side. Make sure that the blade is clamped parallel to the upper edge of the pressure plate.
- To clamp the blade, rotate clamping lever (10) back upwards.



The knife holder E is designed for conventional disposable blades from all current manufacturers. It is available in two models: one for narrow-band blades and one for broad-band blades. The knife holder has a lateral movement, so that the entire width of the blade can be used. The ejector (9a) allows for a safe change of the blades.

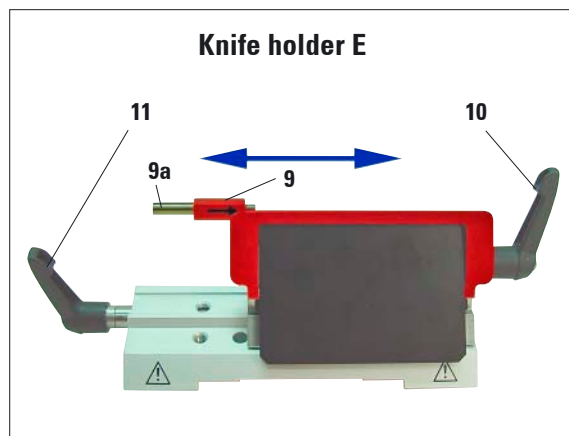


Fig. 42



The clamping levers on the knife holder are not interchangeable. The two clamping levers (10, 11) must remain in the position shown at all times, as otherwise isolated malfunctions of the knife holder can occur.

Clamping lever for the blade (10) at the right, clamping lever for the lateral displacement (11) at the left.

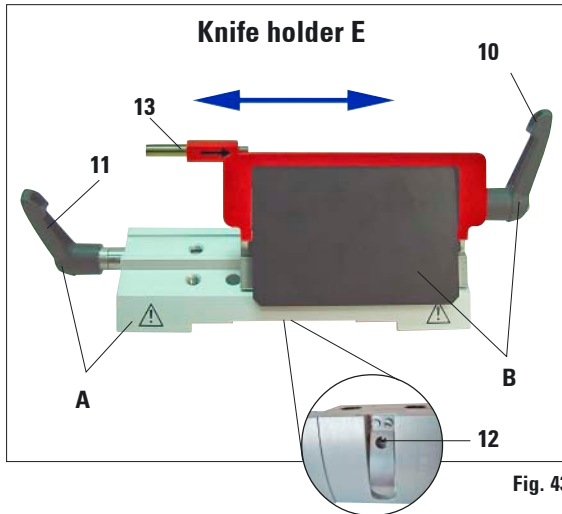


Fig. 43

Lateral displacement (only for MH E)

The lateral movement 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. The MH E consists of a segment arch **A** (with lever **(11)**) and the clamp mount **B** (with lever **(10)** and ejector **(13)**). The extreme left and right positions as well as the middle position are each marked with a notch point.

- To release the clamp, rotate the lever **(11)** on the left side of the knife holder forwards.
- Move the knife holder sideways.
- To clamp, rotate the lever **(11)** back.

Note on the knife holder E:

The knife holder E is an important precision component, the quality and precise adjustment of which have a lasting effect on the entire function of the microtome. In case of malfunctions or damages to the clamp mount, it is always required to replace the clamp mount, including the pertinent clamping lever.

Leica Microsystems offers special prices for new clamp mounts in case of damages to the clamp mount after the warranty has expired.

In this way, perfect function of the instrument can be ensured over the course of many years.

Setting of the clamping system of the clamp mount on the segment arch

To ensure a proper sectioning result, the clamp mount B must be securely clamped onto segment arch A.

The clamping is carried out using an eccentric at the lever **(11)**. The clamping force is adjusted with the setscrew **(12)** on the underside of the segment arch. The setting of the clamping is carried out so that the clamping lever can be rotated to the stop with constantly increasing resistance.

Adjust the clamping with a 2.5 mm Allen key at the grubscrew **(12)** so that the lever initially "turns without engaging" when the lever is activated. Continue turning the grubscrew **(12)** a little bit (approx. $\frac{1}{4}$ turn to the left or right), then check that the lever no longer "turns without engaging", but also does not jam "heavily".

(The language CD features a short video film to show this.)

6. Optional accessories

6.3.3 Knife holder N/NZ



The knife holders N and NZ are appropriate for standard steel and tungsten carbide knives, profile c and d, up to 16 cm long. The integrated height adjustment feature allows you to also use knives that have been resharpened numerous times.

Mounting the knife support bar

- Push the knife guard (8) to the center.
- Set the knife support bar (46) onto the height adjustment screws (not visible) as shown. The flat ends of the height adjustment screws must be located in the slots at each end of the knife support bar.



Prior to inserting the knife, both knife holder and knife holder base must have been installed on the instrument!

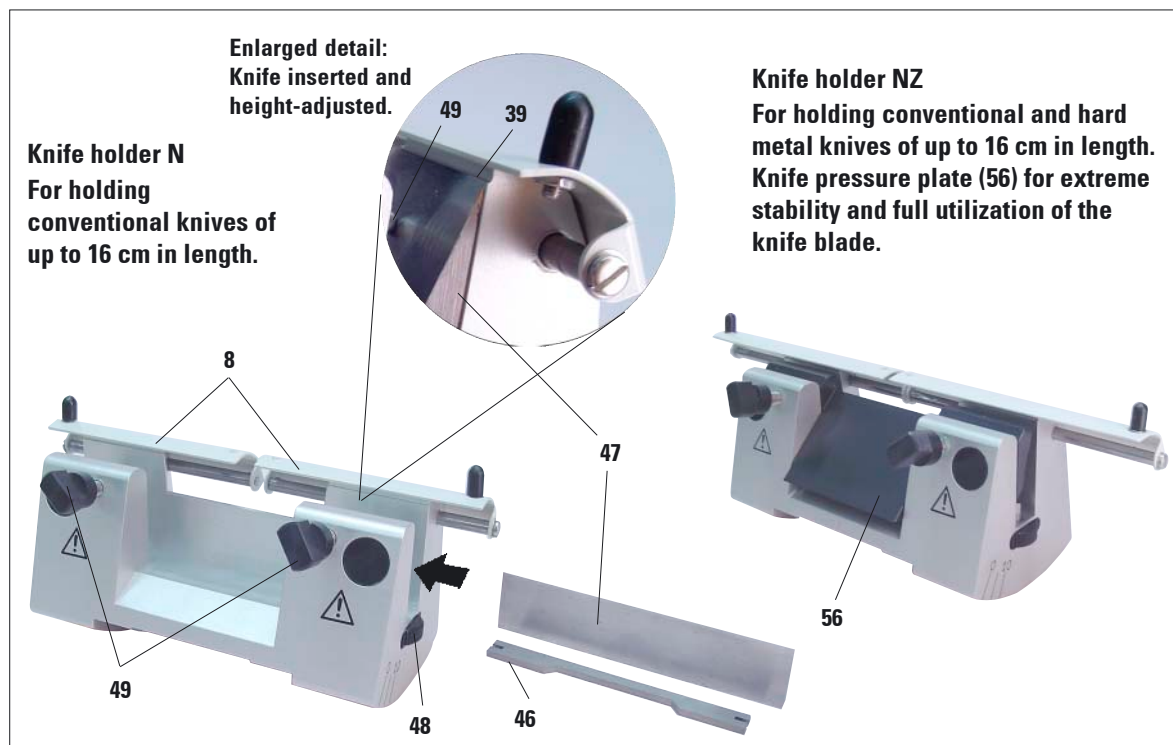


Fig. 44

Inserting the knife

- Rotate the knurled nuts **(48)** on the right and left of the knife holder forward in opposite directions, lowering the knife support bar to the lowest possible position, thus ensuring that the knife edge will not be damaged when inserting the knife.
- Unscrew the clamping screws **(49)** as far out as possible (rotate counterclockwise).
- Hold the knife **(47)** at the knife back and carefully insert it in the holder from the side as shown with the cutting edge facing upward.

Knife height adjustment

When adjusting the clearance angle, the knife edge should be positioned as exactly as possible in the actual center of rotation of the knife holder. The edge of the rear clamping jaws **(39)** serves as a reference position for correct knife height adjustment. The knife edge should be parallel with the locating edges.

- Rotate the knurled nuts **(48)** uniformly backwards until the knife blade is parallel to the lay-on edge **(39)** (see detailed illustration) of the rear clamping chucks.
- To clamp the knife **(47)** evenly screw the two knife clamping screws **(49)** inward (rotate clockwise).

Lateral repositioning of the knife

- Push the knife guard **(8)** to the center.
- Loosen the clamping screws **(49)** by turning them counterclockwise.
- Push the knife **(47)** to the left or right as required.
- To clamp the knife **(47)**, always tighten the clamping screw **(49)** first which is located on the side to which the knife has been repositioned by turning it clockwise.

6. Optional accessories

6.4 Section waste tray

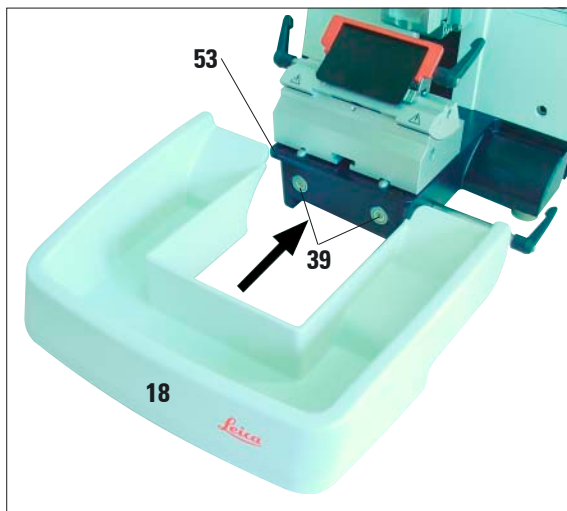


Fig. 45

- Push the section waste tray (18) from the front to the microtome base plate (53) until it is held in place by the two magnets (39) (on the front of the microtome base plate). To remove it, slightly lift the section waste tray and pull it to the rear.

6.5 Backlighting

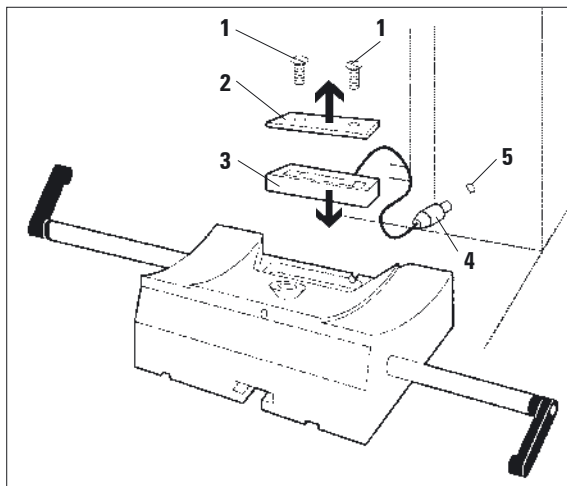


Fig. 46



The backlighting is inserted at the front into the one-piece knife holder base.

- Remove the two screws (1) using a slotted screwdriver and then 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.



NEVER use the backlighting illumination together with the super mega-cassette clamp!

6.6 Storage tray



Fig. 47

The tray is mounted on the hood of the microtome so that the small feet on the underside fit into the cutouts on the hood.

It can be used for storage of the utensils used during sectioning as well as the sectioned specimens.

6.7 Freezer pack

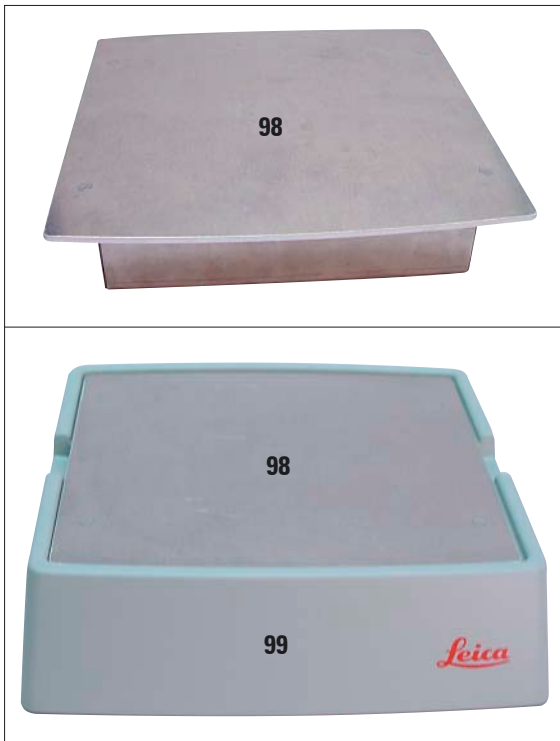


Fig. 48

The freezer pack consists of the freezer plate (98) and the insulation jacket (99). It is for cooling (or keeping cold) paraffin specimens. Up to 48 standard cassettes can be cooled off at the same time. The specimens require approx. 20 min. to be cooled down from room temperature (approx. 20 °C) to “sectioning temperature.”

The cooling performance depends on the ambient temperature and the volume of the specimens being cooled.

The insulation jacket can be placed on the hood of the microtome in the same manner as the tray, or it can be placed next to the instrument.



When using the freezer pack on the instrument, the tray (Fig. 47) must be removed.

- Remove the freezer plate from the insulation jacket and place it in a deep freezer, ideally overnight (but for at least six hours) at approx. -23 °C.
- Reassemble the freezer plate and insulation jacket and place them on the bench or the instrument.

6. Optional accessories

6.8 Ordering information

Fixture non-orienting, silver	050238160
Fixture orienting, silver	050238949
Fixture orienting, silver	050237717
Quick clamping system, assembly	050237718
Knife holder-base non-orienting, silver	050237962
Knife holder N RM2200 silver	050237993
Knife holder NZ RM2200 silver	050237994
Knife holder E SB RM2200, silver	050237958
Knife holder E narrow band RM2200, silver, with ejector ... (new)	050240508
Knife holder E BB RM2200, silver	050237961
Knife holder E broad band RM2200, silver, with ejector (new)	050240509
Knife holder E SB Run-off tray RM22	050238961
Knife holder E BB Run-off tray RM22	050239114
Knife holder E-TC RM2200, silver	050237997
Standard specimen clamp with adapter 50x60, silver	050238005
Standard specimen clamp with adapter 40x40, silver	050237998
V-insert for Standard specimen clamp, silver	050238000
Universal Cassette Clamp (UCC), ice-cooled	050237793
Megaclamp assembly RM2200, silver	050238967
Foil clamp - type 1 black	040209307
Foil clamp - type 2 black	040226922
Round specimen holder, silver	050238001
Round specimen holder, 3 clamping rings, silver	050238002
Clamping ring, d = 6 mm	035608322
Clamping ring, d = 15 mm	035609200
Clamping ring, d = 25 mm	035608320
EM specimen holder, fixture black	050229968
EM univ. specimen holder	035610868
EM flat specimen holder	035510405

6.8 Ordering information (continued)

Special wrench for EM holder	035610869
Backlighting assembly	050238719
Foot switch	050238257
Wrist rest	050238768
Hand rest for waste tray	050238770
Cooling device assembly	050238325
Section waste tray	050237931
Section waste tray RM2265	050339060
Demo Box RM2200 series	050238930
Storage tray	050237932
'Leica' brush with magnet	018340426

7. Trouble shooting

7.1 Instrument failures



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

7.1.1 Error messages



The message “E 1” may be displayed after the indication of the software version to indicate a loss of the retraction parameters.

- Press any key to continue.

This will set all Instrument parameters to their default settings.

- Before continuing, check if the values are all correct and change them if necessary.

Sectioning can be continued.

7.1.2 Instrument or operating errors, possible causes and corrective action



Below you find a list of the problems that most frequently occur, their cause and how to take corrective action.

For errors that cannot be corrected using the information listed here, or when an error code is displayed repeatedly, please contact your Leica technical service center.

Problem	Possible causes	Corrective action
• No display, no reaction to buttons pressed after the instrument is switched on..	1. Mains cable not properly connected. 2. Mains fuses defective. 3. Connecting cable of the control panel not properly connected. 4. The voltage selector is set incorrectly.	1. Check if mains cable is properly connected. 2. Replace the fuses (see chapter 8.2.1). 3. Check if control panel cable is properly connected. 4. Check the voltage setting and adjust it if necessary (see chapter 4.5).

Problem	Possible causes	Corrective action
Sectioning motor cannot be started.	- The E-STOP button is pressed, or the footswitch is depressed completely. - Handwheel brake is activated. - Sectioning motor was turned off by the safety cutout due to a short-term overload condition. - Foot switch or dummy plug is not connected or incorrectly connected.	- Unlock the E-STOP switch and select a sectioning mode, release the footswitch. - Deactivate the handwheel brake. - Turn the instrument off and wait 30 seconds; Press the switch of the automatic fuse (28) on the rear side. Reactivate the instrument. - Connect foot switch or dummy plug and ensure that it is correctly connected.
 Fig. 49		
No more specimen advance. Sectioning motor cannot be restarted.	- Specimen reached the front feed limit. - The specimen already was in the remaining feed area when turning on.	- Switch to the trimming mode with TRIM/SECT. Then push the coarse feed button to move the specimen towards the rear. - Proceed as in point 1.
The sample can only be moved backward with the coarse feed button.	A motorized sectioning process is still running.	Stop motorized sectioning with the foot switch or by pressing RUN/STOP or ENABLE.
Sample cannot be moved backward with the coarse feed buttons in the remaining horizontal feed range.	STEP function (LED in button SECT is lit) is activated.	Press TRIM/SECT to select the trimming mode; move the sample backward by pressing the appropriate coarse feed button.
Sectioning motor stops in the CONT-mode before completing the sectioning stroke.	- The foot switch was held down for too long at the start. RUN/STOP and ENABLE buttons of the control panel were not released simultaneously when starting sectioning.	- Start sectioning by a short activation of the footswitch. - Release both buttons simultaneously.
The LED HOME and STOP illuminate simultaneously.	Failure to detect the rear and front limits of the horizontal feed.	Call for technical service.

7. Trouble shooting

7.2 Possible errors

Problem	Possible causes	Corrective action
1. Thick/thin sections Alternately thick and thin sections are produced. In extreme cases, every second section is skipped, being followed by a very thick section.	• Insufficient clamping of blade, knife holder, specimen and/or orientation. • Blunt cutting edge. • Pressure plate damaged or incorrectly adjusted. • Clearance angle of the knife/blade too small.	• Check clamping points and repeat clamping. • Adjust knife holder laterally or use new blade. • Insert new pressure plate or use new knife holder. • Systematically try wider clearance angle settings until optimum angle width has been found.
2. Sections compressed Sections are extremely compressed, wrinkled or jammed together.	• Blunt cutting edge. • Specimen too warm. • Sectioning speed too high.	• Use different zone of cutting edge or use new blade. • Cool specimen prior to sectioning. • Work at slower sectioning speed.
3. "Streak" present in sections (working with knife holder E)	• Paraffin has accumulated at rear pressure plate of knife holder.	• Remove paraffin debris regularly.
4. Noise during sectioning Knife "sings" when sectioning hard specimens. Sections shows scratches and chatter marks.	• Sectioning speed too high. • Clearance angle too wide. • Insufficient clamping at specimen and/or knife holder.	• Select lower sectioning speed. • Systematically reduce clearance angle settings until optimum angle width has been found. • Check all screws and clamping mechanisms at specimen holder system and knife holder. Retighten, if necessary.
5. Blades wear out very quickly	• Cutting forces too high.	• Adjust sectioning speed and/or trimming thickness during sectioning according to specimen hardness. Select smaller sectioning thickness.

8.1 Cleaning the instrument



Always remove the knife / blade before detaching the knife holder from the instrument.

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

Never place a knife anywhere with the cutting edge facing upwards and never try to catch a falling knife!

When using cleaners, comply with the safety instructions of the manufacturer and the labor-safety regulations of your laboratory!

To clean the outside surfaces, do not use any xylene and no acetone or xylene-containing solvents. Xylene or acetone will damage the finished surfaces!

Ensure that liquids do not enter the interior of the instrument during cleaning!

Before each cleaning carry out the following preparatory steps:

- Raise the specimen clamp to the upper end position and activate the handwheel lock.
- Turn the instrument off with the mains switch and pull the mains plug from the socket.
- 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 knife holder base and knife holder for cleaning.
- Remove the specimen from the specimen clamp.
- Remove section waste with a dry brush.
- Remove specimen clamp and clean separately.

Instrument and outside surfaces

If required, the painted outside surfaces of the control panels can be cleaned with a mild commercial household cleaner or soap solution and wiped off with a moist cloth.

To remove paraffin residue, xylene substitutes, paraffin-oil or paraffin removers such as "Para Gard" (Polysciences) can be used.

The instrument must be completely dry before it can be used again.

Cleaning the knife



Always wipe the knife from the back of the knife to the cutting edge. NEVER wipe in the opposite direction - risk of injury!

Clean using an alcohol-based solution or acetone.

8. Cleaning and maintenance

Knife holder E

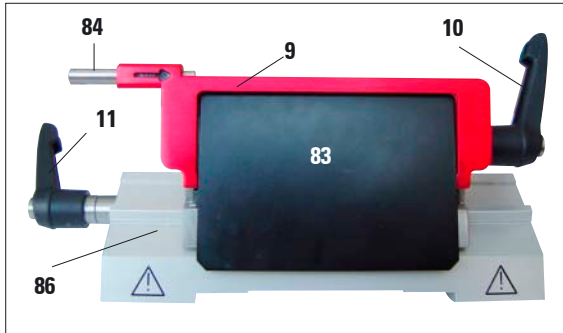


Fig. 50

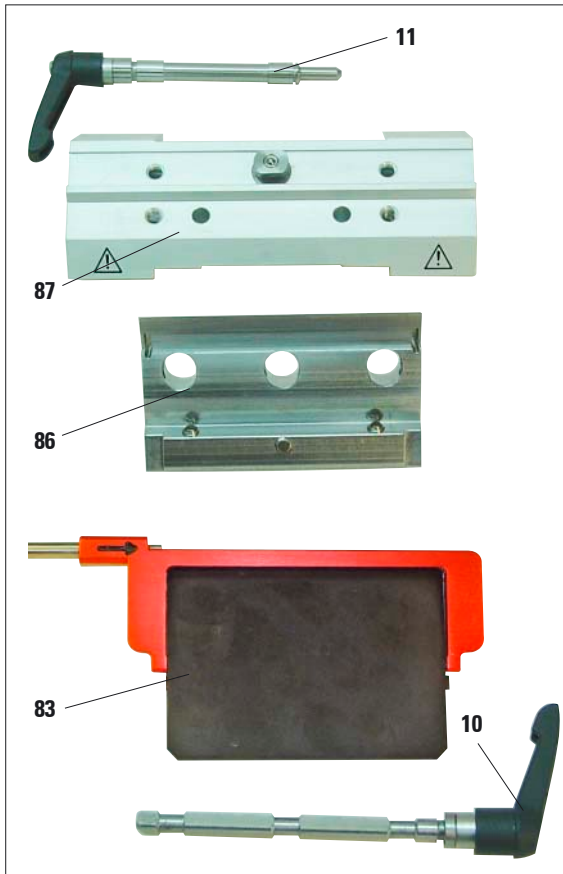


Fig. 51

Take the knife holder apart for cleaning. To do so, proceed as follows:

- Fold the knife guard (9) with ejector (84) down.
- Rotate the clamping lever (11) of the lateral displacement forwards and pull it out sideways.
- Push the knife holder base plate (86) with the pressure plate (83) until it can be removed from the segment arch (87).
- Rotate the blade clamping lever (10) downward and pull it out sideways.
- Remove pressure plate (83).
- Clean all parts of the knife holder.



If several knife holders are cleaned at the same time, the parts must not be mixed up!



For cleaning and removal of paraffin, do not use xylene or any cleaning fluids containing alcohol (e.g. glass cleaner).

- Dry knife holder and reassemble.
- After cleaning the moving parts, apply a thin coat of drive part oil to them (see also [Chapter 8.2.3](#)).
- When installing the pressure plate (83) make sure that the upper edge is parallel and level with the rear edge of the knife holder base plate (86) (see also [Fig. 41, page 50](#)).

Universal cassette clamp

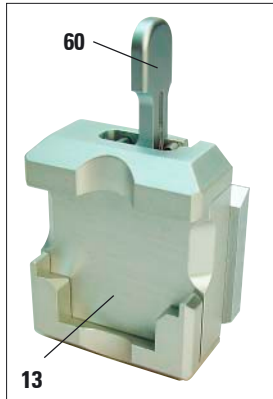


Fig. 51

- Detach cassette clamp for a thorough cleaning, removing all paraffin residues (13).
- For cleaning, do not use xylene; use xylene substitutes or paraffin removers such as "Para Gard" instead.
- The cassette clamp (13) can also be placed in an oven heated to a maximum of 65 °C, until the liquid wax escapes.
- Remove paraffin residues with a dry cloth.
- After such a cleaning procedure in an oven, always be sure to lubricate the axle of the clamping lever (60) (see also [chapter 8.2.3](#)).

8.2 Maintenance

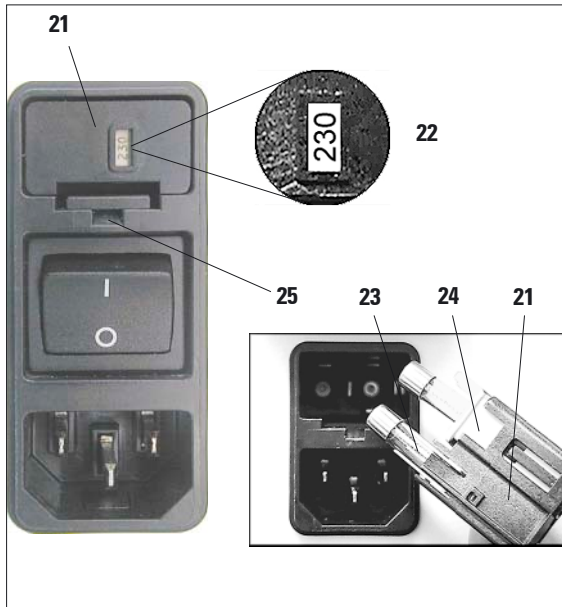


Fig. 52

8.2.1 Replacing fuses



Switch the instrument off and unplug from mains. Replace defective fuses only with the fuses supplied together with the instrument. Both fuses must have the same rating (observe the label!).

- Insert a small screwdriver into the cutout (25) and carefully pry out the insert.
- Remove the voltage selector housing (21) together with the fuses (23).
- Then remove fuses without removing the white voltage selector (24) from the cartridge.
- Replace defective fuses and reinsert the voltage selector cartridge into the instrument housing.
- Verify whether the correct voltage is shown in window (22).

8. Cleaning and maintenance

8.2.2 Maintenance instructions



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

The instrument is basically maintenance-free.

To ensure trouble-free operation of the instrument over a long period of time, the following is recommended by Leica:

1. Thoroughly clean the instrument on a daily basis.
2. Enter into a service contract at the end of the warranty period (at the latest). For further information, please contact your local Leica service center.
3. Have the instrument inspected at least once per year by a qualified service technician authorized by Leica.
The time period depends on how heavily the instrument is used.

Depending on which of the two categories listed in the table the instrument fits into, we recommend the following inspection intervals eighteen months after first use:

	Category I	Category II
Number of sections/day:	> 8,000 sections/day	< 8,000 sections/day
Utilization (hours/day):	> 5 hours/day	< 5 hours/day
Sectioning speed:	Primarily high sectioning speed	Slow to medium sectioning speed
Specimen material:	Sectioning of soft and hard specimens	Primarily soft specimen material
Maintenance:	All 12 month	All 24 month



Note for inspection

- When the instrument reaches approx. 2 million performed strokes, the code **SEr** appears for approx. 3 seconds in the three-digit display every time the **TRIM/SECT** button is pressed (switching between trimming and sectioning mode). This serves as a reminder that the instrument must be inspected by an authorized Leica service technician, regardless of how heavily the instrument was used.

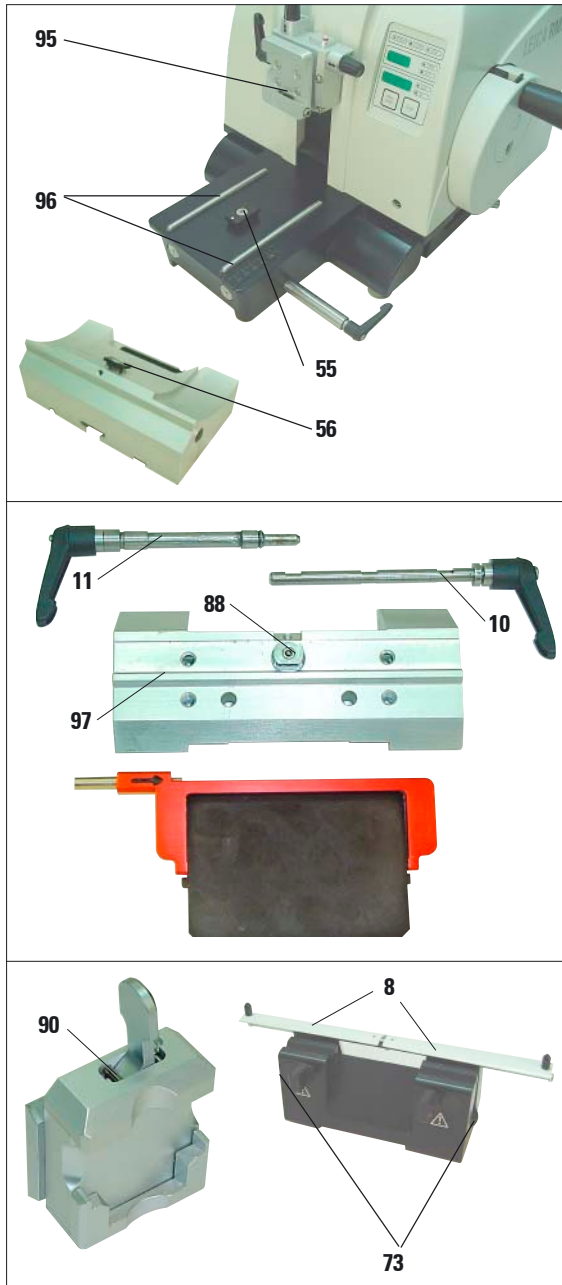


Fig. 53

8.2.3 Lubricating the instrument

Once a month, lubricate the following parts with the included drive parts oil No. 405 (1- 2 drops are enough).

Instrument and specimen holder:

- The clamping key (95) of the quick clamping system.
- The T-piece (55) on the microtome base plate.
- Guide rails (96) for the knife holder base on the microtome base plate.
- On the knife holder base the T-piece (56).

Knife holder E:

- Clamping lever (11) for the lateral displacement.
- T-piece (88) and guide (97) of the knife holder for the lateral displacement.
- Clamping lever (10) for the blade.

Knife holders N and NZ:

- Sliding surfaces of the finger guard (8).
- Knurled nuts (73) for measuring height adjustment.

Universal cassette clamp:

- Axle of the clamping lever (90) of the cassette clamp. After lubrication, move the lever back and forth several times.

9. Warranty and service

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 scope of warranty depends on the contents of the individual contract concluded, being regarded as binding only the warranty conditions of your local Leica sales unit or of the company from which you acquired the product.

Technical service information

If you require technical service or replacement parts, please contact your Leica sales office or dealer who sold the product.

Please provide the following information:

- Model name and serial number of the instrument.
- Location of the instrument and name of the person to contact.
- Reason for the service call.
- Date of delivery.

Decommissioning and disposal

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

Special attention should be paid to the lithium cell of the electronic circuit board!