Leica
BIOSYSTEMS

Instructions for Use

Leica CM1950

Cryostat

CE

Leica CM1950, V 1.5 RevF, English – 08/2014
Order No.: 14 0477 80101 RevF
Always keep these instructions near the instrument!
Read carefully before working with the instrument.

The information, numerical data, notes and value judgments contained in this manual represent the current state of scientific knowledge and state-of-the-art technology as we understand it following thorough investigation in this field. We are under no obligation to update the present manual periodically and on an ongoing basis according to the latest technical developments, nor to provide our customers with additional copies, updates etc. of this manual.

To the extent permitted in accordance with the national legal system as applicable in each individual case, we shall not be held liable for erroneous statements, drawings, technical illustrations etc. contained in this manual. In particular, no liability whatsoever is accepted for any financial loss or consequential damage caused by or related to compliance with statements or other information in this manual.

Statements, drawings, illustrations and other information regarding the contents or technical details of the present Instructions for Use are not to be considered warranted characteristics of our products. These are determined only by the contract provisions agreed between ourselves and our customers.

Leica reserves the right to change technical specifications as well as manufacturing processes without prior notice. Only in this way is it possible to continuously improve the technology and manufacturing techniques used in our products.

For the instrument serial number and year of manufacture, please refer to the type plate at the rear side of the instrument.

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Table of Contents

1.1 Symbols in the text and their meanings

Warnings
appear in a gray box and are marked by a warning triangle .

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

Caution – UVC radiation!

(5)
(Fig. 5) Numbers in parentheses refer to item numbers in illustrations or to the illustrations themselves.

This product fulfills the requirements of the Council's Directive 98/79/EC concerning in vitro diagnostics (IVD) medical devices.

SN Serial number

REF Order no.

Observe the Instructions for Use

Manufacturer

Date of Manufacture

IVD In vitro diagnostics (IVD) medical device

Symbol for labeling electrical and electronic equipment in accordance with Section 7 of the German Electrical and Electronic Equipment Act (ElektroG). ElektroG is the law regarding the sale, return and environmentally sound disposal of electrical and electronic equipment.

Environmental protection symbol of the China RoHS directive. The number in the symbol indicates the "Environment-friendly Use Period" of the product. The symbol is used if a substance restricted in China is used in excess of the maximum permitted limit.

C US The CSA test mark means that a product has been tested and fulfills the applicable safety and/or performance standards, including the relevant standards defined or administered by the American National Standards Institute (ANSI), Underwriters Laboratories (UL), the Canadian Standards Association (CSA), the National Sanitation Foundation International (NSF) and others.

1.2 Instrument type

All information given in these Instructions for Use applies only to the instrument type indicated on the title page. A nameplate indicating the instrument serial number is attached to the rear side of the instrument (Fig. 1 is provided as an example only and shows a valid nameplate for this instrument with the necessary information about instrument type and power requirement. Precise data for the various versions is specified in Chap. 3 "Technical Data".

Fig. 1

1.3 Qualification of personnel

The Leica CM1950 may be operated by trained laboratory personnel only.

Prior to operating the instrument, the operator must thoroughly read and understand these Instructions for Use and must familiarize him/herself with all technical details of the instrument.

Despite chemical and/or UV-light disinfection, personal safety precautionsas per the applicable laboratory regulations must still be taken (i.e. safety goggles, gloves, laboratory coat and mask must be worn).
This type of disinfection reduces the number of germs by at least 99.99 %.

1.4 Intended use of the instrument

The CM1950 is a high-performance cryostat with an encapsulated microtome and separate specimen cooling. It features a UV disinfection system, an (optional) integrated extraction system for section waste and an (optional) motor for motorized sectioning.

The cryostat is designed to produce frozen sections for biological, medical and industrial applications.

The CM1950 is suitable for in-vitro diagnostic (IVD) applications.

The instrument may only be operated within the scope of its designated use as described above and as per the instructions given in these Instructions for Use.

Any other use of this instrument is considered as improper operation.

The safety and caution notes in this chapter must be observed at all times.
Be sure to read these notes even if you are already familiar with the operation and use of other Leica products.

2.1 Safety notes

These Instructions for Use include important instructions and information related to the operating safety and maintenance of the instrument.

The Instructions for Use are an important part of the product, and must be read carefully prior to startup and use and must always be kept near the instrument.

This instrument has been built and tested in accordance with the safety requirements for electrical equipment for measurement, control, and laboratory use.

To maintain this condition and ensure safe operation, the user must observe all notes and warnings contained in these Instructions for Use.

For the CE certificate and up-to-date certificates pertaining to UV disinfection, visit us online at: www.LeicaBiosystems.com.

These Instructions for Use must be appropriately supplemented as required by the existing regulations on accident prevention and environmental safety in the operator's country.

The protective devices located on the instrument and the accessories must not be removed or modified. The instrument must only be opened and repaired by service technicians authorized by Leica.

Only original spare parts and permitted original accessories may be used!
Use only the provided power cable - this must not be replaced with a different power cable!
If the power plug does not fit in the socket, then contact our service.

2.2 Warnings

The safety devices installed in this instrument by the manufacturer only constitute the basis for accident prevention. Operating the instrument safely is, above all, the responsibility of the owner, as well as the designated personnel who operate, service or repair the instrument.
To ensure trouble-free operation of the instrument, make sure to comply with the following instructions and warnings.

The instrument has been designed and constructed with the latest state-of-the-art technology and according to recognized standards and regulations with regard to safety technology. Operating or handling the instrument incorrectly can place the user or other personnel at risk of injury or can cause damage to the instrument or other property. The instrument may be used only as intended and only if all of its safety features are in proper working condition. Malfunctions that impede safety must be remedied immediately.

2.3 General safety notes

The CM1950 is a cryostat with an encapsulated microtome and separate specimen cooling. It is primarily used for work in the area of fast-cut diagnostics.

The displays and instrument controls are easy to operate due to their largely self-explanatory symbols. LED displays make it easy to read. The cryochamber is made of seamlessly welded, high-quality stainless steel that is free of difficult-to-access corners and thus easy to clean and disinfect.

Flammable substances may not be used in the Leica CM1950 when it is turned on and plugged in. Do not place staining solutions or other liquids on top of the instrument.

2.4 Unpacking and installation

To ensure proper function of the instrument, it must be set up with a minimum distance on all sides from walls and furniture (see Chap. 6, 6.1 "Site requirements").

- The instrument may only be transported in an upright or slightly inclined position.
- To ensure a safe transport with a fork lift 3 people are required: one operating the fork lift, and the other 2 holding the instrument on either side to prevent it from sliding down.
- Before connecting to the power supply system, please observe "Technical Data"!
- Never connect the instrument to a power socket that does not have a protective conductor terminal.

  Length of the power cable: up to 3.5 m extension possible: **No**

After transporting, wait at least 4 hours before turning the instrument on. This waiting period is necessary to allow the compressor oil, which may have been displaced during transport, to return into its original position. Any condensation on electrical parts that has formed due to temperature differences during transport must be allowed to dry completely. Failure to comply with this can cause severe damage to the instrument!

Fig. 2

When the instrument is delivered, check the tilt indicators on the packaging.
If the arrowhead is blue, the shipment was transported laying flat, was tilted at too great an angle or fell over during transport.
Note this on the shipping documents and check the shipment for possible damage.

Caution when removing the metal strips!
There is a risk of injury (the strip has sharp edges and is under tension)!

Fig. 3

To remove the metal strips (**1**), you need metal shears and suitable gloves. Stand next to the crate and cut the strips at the location shown (see Fig. 3 "⇦").

Fig. 4

- Lift the carton (**2**) straight up and tip toward the back to remove.
- Remove the foam transport anchors (**3**).
- Remove the dust cover (**4**).
- Remove the accessory carton (**5**).

Fig. 5

- Lift and remove the wooden edge (**7,** Fig. 5).
- Remove the ramp (**6,** Fig. 4) from the pallet.
- Properly insert the ramp. Make sure that the ramp components designated "L" (left) and "R" (right) click into place in the intended guide channel (**10**, Fig. 6a). When correctly assembled, the guide rails (**11**) are located inside, while the arrows (**12**) point toward each other.

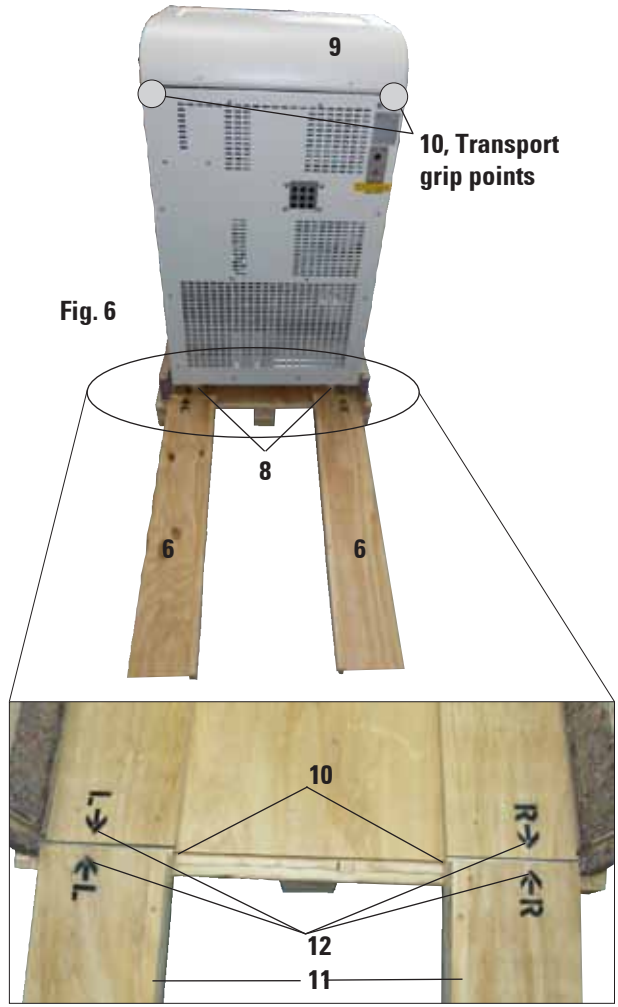


Fig. 6

Do not push the device by its hood (9, Fig. 6)!
Instead, use transport grip points (10 ◯, Fig. 6)!
The front and rear rollers must stay on the ramp (6). Danger of tipping!

- Carefully roll the instrument backwards over the ramp from the pallet.
- Push the instrument to the installation location on the castors (**8,** Fig. 6).

2.5 Safety devices

The Instructions for Use include important instructions and information related to the operating safety and maintenance of the instrument.
These Instructions for Use are an important part of the product, and must be read carefully **before** startup and use and must always be kept near the instrument.
If additional requirements on accident prevention and environmental protection apply in the country of operation, these Instructions for Use must be supplemented by appropriate instructions to ensure compliance with such requirements.
The instrument is equipped with the following safety devices: an emergency stop switch (motorized instruments only), a handwheel lock and centering system (motorized instruments only), knife guard on the blade and knife holder, and a blade ejector.

To prevent adverse health effects from UV radiation, the UV disinfection cycle can be started only after the sliding window has been properly closed. Closing the window activates the corresponding safety features.

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

Microtome knives

- Take care when handling microtome knives/disposable blades. The cutting edge is extremely sharp and can cause serious injuries!
- Never leave knives and knife holders with a knife/blade mounted lying around!
- Never place a knife on a table with the cutting edge facing upward!

We strongly recommend using the safety gloves included with the standard delivery!

- **Never** try to catch a falling knife!
- Before handling the specimen or the knife, or changing the specimen, lock the handwheel and ensure that the knife is covered by the knife guard.
- Avoid contact with cold parts of the instrument as this can cause frostbite – wear the safety gloves supplied!

Knife guard

Prior to making modifications to the knife and specimen, changing the specimen or knife, or taking a break, always lock the handwheel and cover the cutting edge with the knife guard!

The CE, CN and CN-Z knife holders feature knife guards; the glass anti-roll plate of the CE knife holder also serves as a knife guard.

2.6 Securing/locking the handwheel

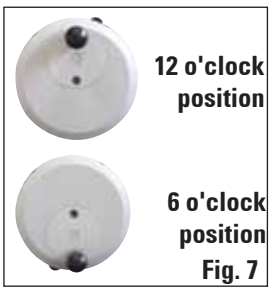


Fig. 7

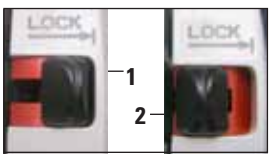


Fig. 8

Always lock the handwheel prior to making modifications to the knife or specimen, changing the specimen, or taking a break!

To lock the handwheel, press the lever (**1**) outward. Continue turning the handwheel slowly until the grip is in the upper or lower position and the handwheel is locked. Press the lever fully outward; gently rock the handwheel back and forth until the locking mechanism clicks into place noticeably.

To release the handwheel, press the lever (**2**) on the handwheel toward the cryostat housing.

Fig. 9

Centering of the handwheel (motorized instruments only)

Pull out the handwheel's handle and position it in the middle of the handwheel. The handle automatically engages in this position.

An important safety device on the cryostat is the centering of the handwheel for motorized instruments.

Rotate the handwheel only if the refrigeration system is on and the cryochamber is cold.

2.7 Cleaning, disinfection – Turning the instrument back on

It is not necessary to remove the microtome for disinfection.

- The instrument has been designed for UV disinfection! Spray disinfection with Leica Cryofect is also possible, thanks to the special insulation of the microtome. (Cryofect is not available in all countries!)

Remove section waste after EVERY sectioning operation and BEFORE changing specimens. Remove the section waste using a paper towel soaked in Cryofect (or an alcohol-based disinfectant) or by means of an extraction nozzle (optional). Do not start the disinfection before swiveling the anti-roll plate to the side! Each new specimen is a potential source of contamination.

- When disinfecting the instrument, take appropriate protective measures (gloves, mask, protective clothing, etc.).
- When using detergents and disinfectants please comply with the safety precautions of the disinfectant manufacturer!
- The integrated glass anti-roll guide of the blade holders CE, CN and CN-Z can be cleaned either with acetone or alcohol.
- Dispose of waste liquid according to the waste disposal regulations!
- Do not use external heaters for drying the cryochamber. This can cause damage to the cooling system!
- Do not turn the instrument on before the cryochamber is completely dry! Frost formation!
- All components removed from the cryostat must be carefully dried before returning them to the cryochamber!
- The front panel and the slit cover of the microtome must be completely dry before turning on the instrument!

For more detailed information about disinfection, visit the Leica Biosystems Division website at

www.LeicaBiosystems.com

2.8 Handling specimens – Defrosting

- When working with contaminated or infected material, the general safety guidelines for laboratories must be applied!
- Before defrosting the cryochamber remove all samples!
- Before defrosting the specimen head, remove all samples!

Never leave samples in the cryochamber! – The instrument is not suitable for storing frozen specimens, as the refrigeration dehydrates the specimens!

The quick freeze shelf can become very hot during the defrosting process. Therefore, do not touch it!

2.9 Removing the microtome

- The microtome is encapsulated and therefore does not require removal by the user.

2.10 Maintenance

Replacing the fuses

- Turn the instrument off and disconnect the power plug before replacing the fuses!
- Use only the fuse types specified in Chap. 3, "Technical Data"! The use of fuses other than specified by the manufacturer may cause severe damage to the instrument!

Replacement of the lamp/UVC lamp

- Turn the instrument off and disconnect the power plug before replacing the lamps.

It is possible to break the UVC lamp during replacement. If this happens, the lamp change must be completed by Technical Service. If any metallic mercury is released, handle it carefully and dispose of it properly.

If both disinfection indicator lights are blinking alternately, the UV tube must be replaced!

3. Technical Data

All specifications related to temperature are valid only up to an ambient temperature of 18 °C to 35 °C and a relative humidity of no more than 60 %!

Instrument type	-1	-2	-3
Nominal voltage (±10 %)	100 VAC	120 VAC	230 VAC
Nominal frequency	50/60 Hz	60 Hz	50 Hz
Power draw	1900 VA	1900 VA	1900 VA
Max. start-up current for 5 sec.	35 A eff.	35 A eff.	25 A eff.
Protective class	I	I	I
Automatic cutout	T15A M3	T15 A T1	T10 A T1
Pollution degree②	2	2	2
Overvoltage category	II	II	II
Heat emission (max.)	1900 J/s	1900 J/s	1900 J/s
Approval	CE	CE/c_CSA_us	CE

② in acc. with IEC-1010; UL 3101

Microtome

Type	Rotary microtome encapsulated
Section thickness range	1 to 100 µm
Trimming range	
Clinic	10 – 40 µm ③
Research	1 – 600 µm ③
Total specimen feed	25 mm + 1 mm
Vertical stroke	59 mm ±0.5 mm
Specimen retraction	20 µm (can be deactivated)
Maximum specimen size	50 x 80 mm
Cutting speed	slow: 0 – 50 strokes/min fast: 0 – 85 strokes/min Vmax: 85 – 90 strokes/min
Specimen orientation	8° (x-, y-axis)
Electric coarse feed	slow: 300 µm/s fast: 900 µm/s
Lamp	50/60 Hz version: Osram DULUX L 18 W/840

③ For additional details, see p. 35

Cryostat

Dimensions	
Width (excluding handwheel)	700 mm
Width (including handwheel)	835 mm
Depth (cabinet only)	850 mm
Height (total)	1215 mm
Working height (armrest)	1025 mm
Weight	
Weight (w/motor and extr.)	193 kg
Weight (w/motor, w/o extr.)	185 kg
Weight (w/o motor, w/extr.)	183 kg
Weight (w/o motor, w/o extr.)	175 kg
Weight (with specimen head cooling)	165 kg
Weight (w/o specimen head cooling)	145 kg

General information

Operating temperature range	18 °C to 35 °C
Temperature range during storage	+5 °C to +55 °C
Relative humidity	max. 60 % non-condensing
Storage humidity	< 60 %

Observe item 6.1, "Installation site requirements"!

Refrigeration system	CM1950, 50 Hz	CM1950, 60 Hz
Cryochamber		
Temperature range	0 °C to -35 °C ± 5 K, adjustable in 1 K increments, at an ambient temperature of 20 °C	0 °C to -35 °C ± 5 K, adjustable in 1 K increments Ambient temperature of 20 °C
Cooling time to -25 °C	approx. 5 h	approx. 5 h
Cooling time to -35 °C	approx. 8 h	approx. 8 h
Refrigeration capacity①	690 W	690 W
Cut-out pressure	25 bar	25 bar
Safety factor	3	3
Refrigerant*	300 g (± 5 g), refrigerant R-404A*	300 g (± 5 g), refrigerant R-404A*
Compressor oil*	0.6 l EMKARATE RL22S, ICI*	0.6 l EMKARATE RL22S, ICI*
Defrosting of cryochamber		
Automatic defrosting		
Programmable	Yes (hot gas defrost), selectable time	Yes (hot gas defrost), selectable time
Defrosting intervals	1 defrost in 24 h or manual hot gas defrost	1 defrost in 24 h or manual hot gas defrost
Defrost time:	12 minutes	12 minutes
Automatic shutoff Defrost	at a chamber temperature of -5 °C	at a chamber temperature of -5 °C
Quick-freeze shelf		
Minimum temperature	-42 °C (+5 K), at chamber temp. -35 °C	-42 °C (+5 K), at chamber temp. -35 °C
Number of freezing stations	15+2	15+2
Defrosting	Manual hot gas defrost	Manual hot gas defrost
Peltier element		
Number of freezing stations	2	2
Max. temperature difference	17 K, at chamber temp. of -35 °C	17 K, at chamber temp. of -35 °C
Specimen cooling		
Temperature range	-10 to -50 °C ± 3 K	-10 to -50 °C ± 3 K
Refrigeration capacity①	320 W	320 W
Cut-out pressure	25 bar	25 bar
Safety factor	3	3
Refrigerant and quantity	at 230 V/50 Hz 130 g (± 5 g), refrigerant R-404A* at 100 V/50/60 Hz 140 g (± 5 g), refrigerant R-404A*	at 120 V/60 Hz 140 g (± 5 g), refrigerant R-404A*
Compressor oil*	0.4 l alpha 22, Kyodo*	0.4 l alpha 22, Kyodo*
Defrosting of specimen head		
Automatic defrosting	No	No
Manual defrost (defrost time)	15 min.	15 min.

① in acc. with CECOMAF: Liquid temperature 45 °C, evaporation temperature: -25 °C

***) Refrigerant and compressor oil must be replaced by qualified, authorized service personnel only!**

Basic instrument WITHOUT motor/WITHOUT extraction, in the specific voltage variant

1 handwheel, manual 14 0477 41346
5 specimen discs, 3 mm 14 0477 40044
1 section waste tray 14 0477 40062
1 position holder for freeze shelf 14 0477 40080
1 freeze shelf cover 14 0477 43763
1 tool set 14 0436 43463
- 1 brush, fine 14 0183 28642
- 1 Leica brush w/magnet 14 0183 40426
- 1 Allen key, size 1.5 ..... 14 0222 10050
- 1 Allen key, size 2.5 ..... 14 0222 04137
- 1 Allen key, size 3.0 ..... 14 0222 04138
- 1 Allen key, size 4.0 ..... 14 0222 04139
- 1 Allen key with ball head, size 4.0 ..... 14 0222 32131
- 1 Allen key, size 5.0 ..... 14 0222 04140
- 1 key with handle, size 5.0 ..... 14 0194 04760
- 1 Allen key, size 6.0 ..... 14 0222 04141
- 1 Single-head wrench, No. 13 ..... 14 0330 33149
- 1 Single-head wrench, No. 16 ..... 14 0330 18595

1 power cable ..... 14 0441 xxxxx
1 bottle of cryostat oil, type 407, 50 ml 14 0336 06098
1 bottle of OCT freezing compound, 125 ml 14 0201 08926
1 pair of safety gloves, size M *, for cryosectioning 14 0340 29011
1 Instructions for Use DE/EN + language CD 14 0477 80001
1 CM1950 "Troubleshooting" DVD ..... 95.10696 Rev A

* Note: for the Japanese version: 100 V, 50/60 Hz; 1 pair of safety gloves, size S (14 0340 40859) is included.

Basic instrument WITHOUT motor and WITH extraction,

Standard scope of delivery as above, additionally:

1 accessory kit (extraction) 14 0477 43300
- Hose adapter 1 ..... 14 0477 40293
- Hose adapter 2 ..... 14 0477 40294
- Suction nozzle 14 0477 40295
- Silicone hose 14 0477 43302
- Silicone stopper 14 0477 43304
- Chamber suction nozzle 14 0477 43779
- Set of filters (5 pieces) 14 0477 43792

Compare the delivered components with the parts list and your order. Should you find any discrepancies, please contact your Leica Biosystems sales office without delay.

A choice of different blade/knife holders is available for the CM1950.

Basic instrument WITH motor/WITHOUT extraction, in the specific voltage variant

1 handwheel, motorized	14 0477 41347
5 specimen discs, 30 mm	14 0477 40044
1 section waste tray	14 0477 40062
1 position holder for freeze shelf	14 0477 40080
1 freeze shelf cover	14 0477 43763
1 tool set	14 0436 43463
- 1 brush, fine	14 0183 28642
- 1 Leica brush w/magnet	14 0183 40426
- 1 Allen key, size 1.5	14 0222 10050
- 1 Allen key, size 2.5	14 0222 04137
- 1 Allen key, size 3.0	14 0222 04138
- 1 Allen key, size 4.0	14 0222 04139
- 1 Allen key with ball head, size 4.0	14 0222 32131
- 1 Allen key, size 5.0	14 0222 04140
- 1 key with handle, size 5.0	14 0194 04760
- 1 Allen key, size 6.0	14 0222 04141
- 1 Single-head wrench, size 13	14 0330 33149
- 1 Single-head wrench, size 16	14 0330 18595
1 power cable	14 0441 xxxxx
1 bottle of cryostat oil, type 407, 50 ml	14 0336 06098
1 footswitch dummy	14 0443 30420
1 bottle of OCT freezing compound, 125 ml	14 0201 08926
1 pair of safety gloves, size M *, for cryosectioning	14 0340 29011
1 Instructions for Use DE, EN + language CD	14 0477 80001
1 CM1950 "Troubleshooting" DVD	95.10696 Rev A

* Note: for the Japanese version: 100 V/50/60 Hz; 1 pair of safety gloves, size S (14 0340 40859) is included.

Basic instrument WITH motor and WITH extraction, in the specific voltage variant

Standard scope of delivery as above, additionally:

1 accessory kit (extraction)	14 0477 43300
- Hose adapter 1	14 0477 40293
- Hose adapter 2	14 0477 40294
- Suction nozzle	14 0477 40295
- Silicone hose	14 0477 43302
- Silicone stopper	14 0477 43304
- Chamber suction nozzle	14 0477 43779
- Set of filters (5 pieces)	14 0477 43792

Compare the delivered components with the parts list and your order. Should you find any discrepancies, please contact your Leica Biosystems sales office without delay.

A choice of different blade/knife holders is available for the CM1950.


Emergency-stop switch (motorized instruments only)
On/off switch, also circuit breaker
Cryostat chamber (with activated UV disinfection)
Footswitch dummy (motorized instruments only)
Handwheel in 12 o'clock position
Bacteria filter (optional, only for instruments with filter)
Condenser
Catch tank for condensate
Unscrew and align adjusting feet after transport
Castors for safe transport over short distances
Align adjusting feet for secure upright position

Fig. 10

5.1 Control panel fields and cryostat chamber

1 Control panel field 1: Extraction, temperature and time control, illumination, UV disinfection
2 Control panel field 2: Electric coarse feed (sectioning and trimming thickness adjustment)
3 Control panel field 3: Motorized sectioning, optional (adjustment of stroke type, cutting speed etc.)

Fig. 11

4 Heat extractor, stationary (optional)
5 Peltier element (with 2 stations)
6 Freeze shelf, 15 positions
7 Position holder on freeze shelf
8 Heat and cold extractor, mobile (opt.)
9 Shelf, movable (optional)
10 Blade holder CE with blade ejector (**a**)
10b Finger rest on the blade holder CE
10c Knife guard on the blade holder CE
11 Extraction nozzle on the extraction hose
12 Extraction hose for section waste
13 Brush shelf (optional)
14 Adapter piece for extraction hose (the coarse filter insert is behind it)
16 Object head, directional
17 Waste tray

6. Installation

6.1 Site requirements

Do not operate the instrument in rooms with explosion hazard.

The place of installation must meet the following requirements:

- The instrument requires an installation area of approx. 835 x 850 mm,
- Room volume must be at least 8 m^3,
- Room temperature consistently 18 °C to 35 °C,
- Temperature range during storage: 5 °C to 55 °C,
- Relative humidity, maximum 60 % (non-condensing)
- Storage humidity: < 60 %
- Elevation: up to a max. of 2000 m above sea level,

- The instrument is designed for indoor use only.
- The power plug/circuit breaker must be freely and easily accessible.
- The power supply must be within the range of the length of the power cable: An extension cable must **NOT** be used.
- The floor must be largely vibration-free and have sufficient load capacity and rigidity for the weight of the instrument.
- Avoid impacts, direct sunlight, and excessive temperature fluctuations. Furthermore, this instrument must NOT be operated directly under the outlet of an air-conditioning system, since the increased air circulation accelerates icing of the chamber.
- The instrument must be connected to a grounded power socket. Use ONLY the power cable provided, which is intended for the local power supply.
- The chemicals generally to be used are easily inflammable and hazardous to health. Therefore the installation location must be well ventilated, and must contain no sources of ignition of any kind.
- The installation location must be protected against electrostatic charge.

Noise information: A-weighted noise level: < = 70 dB (A)

Room temperatures and humidity levels in excess of the recommendations above will affect the cryostat's cooling capacity and the lowest stated temperatures will not be reached.

To ensure proper function of the instrument, it must be set up while maintaining a minimum distance from walls and furniture.

- Distance to walls and furniture, calculated from the cabinet:

  - rear: 15 cm - right: 30 cm - left: 15 cm

- No heat dissipating appliances around.

6.2 Transport to the site

- First, check if the location meets the conditions specified in "Site requirements".
- Transport the instrument to the desired location.
- Observe the following:

The instrument must be transported in an upright position or slightly tilted (max. 30°)!

When tilting the instrument 2 people must counterbalance from the front side to prevent the instrument from falling down and causing severe injury!

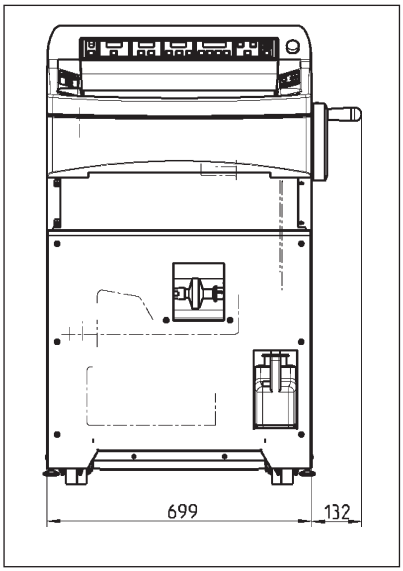
Fig. 12

- When transporting the instrument on wheels, (**2**) grip the cabinet only at the marked locations (◯).
- To do so, unscrew the adjustable feet using the No. 13 open-end wrench (when subsequently transporting the instrument on castors, screw the feet back in as far as they will go). To ensure a secure upright position at its intended location, align both adjusting feet (**1**).

Before transport or relocation, remove the filter bag from the chamber. If you fail to do this, the filter bag will thaw, then freeze solid when the instrument is reconnected. When subsequently removed, the filter will be destroyed, causing section waste to get into the bacteria filter (also refer to Chap. 6.5.8 Assembling the filter bag).

When not using the extraction for a long period, tightly close the opening for the extraction hose using the silicone stopper included in the standard scope of delivery (E, Fig. 29)!

Transport with a fork lift



- The instrument can be transported with a fork lift.

To ensure a safe transport with a fork lift 3 people are required: one operating the fork lift, and the other 2 holding the instrument on either side to prevent it from sliding down.

- At the installation location, unscrew the adjusting feet (**1**) (see Fig. 12) using the open-end wrench (13 mm). This is absolutely necessary for the instrument to stand stably.

Fig. 13, Total width with handwheel

6.3 Assembling the handwheel

Fig. 14

Rotate the handwheel only if the refrigeration system is on and the cryochamber is cold.

- Insert the pin (**1**) of the handwheel shaft into the hole (**2**) of the handwheel.
- Tighten the screw (**4**) using the size 6 Allen key.
- Place the protective cap on the screw (**4**).

To dismount, proceed in reverse order.

6.3.1 Locking/unlocking the handwheel

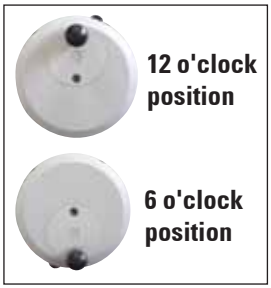


Fig. 15

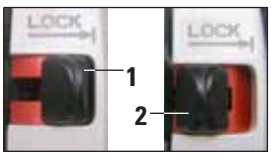


Fig. 16

Rotate the handwheel only if the refrigeration system is on and the cryochamber is cold.

Always lock the handwheel prior to making modifications to the knife or specimen, changing the specimen, or taking a break!

To lock the handwheel, move its handle to the 12 or 6 o'clock position. Press the lever (**1**) fully outward; gently rock the handwheel back and forth until the locking mechanism clicks into place noticeably.

To release the handwheel, press the lever (**2**) on the handwheel toward the cryostat housing.

Centering the Handwheel (Optional)

Fig. 17

An important safety device on the cryostat is the feature for centering the handwheel in motorized sectioning mode.

To do so, pull out the handwheel's handle and position it in the middle of the handwheel. The handle automatically engages in this position.

6.3.2 Installing the footswitch dummy (instruments with cutting motor)

Fig. 18

- The footswitch dummy must be installed on the outer right side of the instrument (see Chap. 5 "General Overview") if no footswitch (optional) is used.

If the red LED in the E-STOP field in control panel field 3 is illuminated, either:

- emergency-stop function active, or
- Footswitch dummy (opt. foot switch) not connected or incorrectly connected.

6.4 Electrical connection

After transporting, wait at least 4 hours before turning the instrument on. This waiting period is necessary to allow the compressor oil, which may have been displaced during transport, to return into its original position. Furthermore, any condensation that has formed during this time due to temperature fluctuations must be allowed to dry completely.
Failure to comply with this can cause severe damage to the instrument!

During the start-up of the compressor the nominal voltage must not drop below the values specified in the "Technical data"!
Please note that the compressor requires a start-up current between 25 and 35 A.
Therefore, the electric circuit at the installation site must be inspected by an electrical engineer to ensure that it meets the requirements for a smooth operation of the instrument.
Failure to comply with the above will cause severe damage to the instrument!

- Check power supply voltage and frequency to comply with the specification on the type plate (see Fig. 1).
- Do not connect any other appliances to this electric circuit.

Never connect the instrument to a power socket that does not have a protective conductor terminal.

Only for instruments sold in Japan

Fig. 19

Selecting the frequency

- After unpacking the instrument and setting it up at its intended location, use the lever (**1**) to select the frequency corresponding to the conditions of the existing power system.

6.5 Installing accessories/inserting chamber accessories

6.5.1 Installing the adjustable footrest (optional)

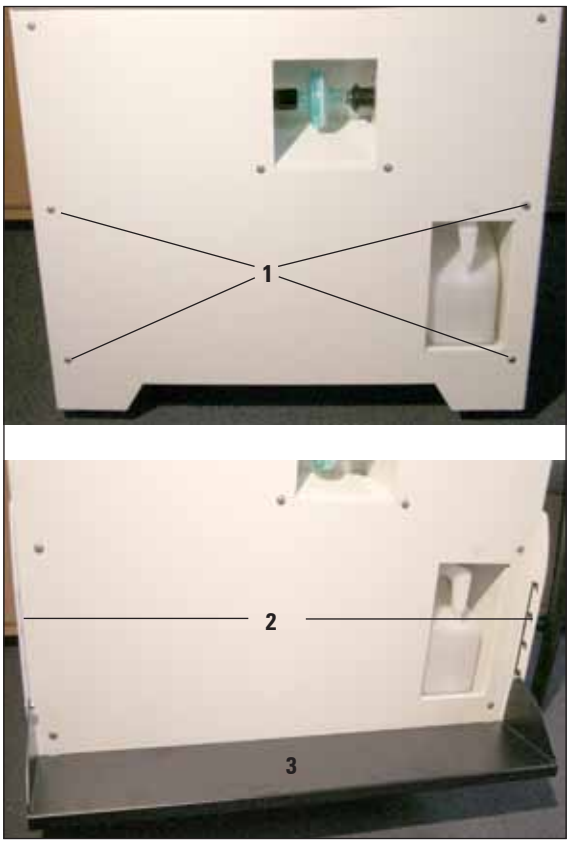


Fig. 20

- To install the optional footrest, the screws (**1**) must be unscrewed using the size 3 Allen key provided.

When installing the holder (2), ensure that the cutout faces downwards so that the support (3) can be hooked in.

- Attach the holders (**2**) for the footrest on the left and right to the front wall of the housing from the **outside**. To do so, use the Allen screws you used earlier. Ensure that the screws are tight.
- Hook the footrest (**3**) into the installed holder according to individual requirements (height).
- Once installed, the user can adjust the height of the footrest at any time by relocating it (**3**) to the desired height on both sides in the holder (**2**).

6.5.2 Installing the storage systems (optional)

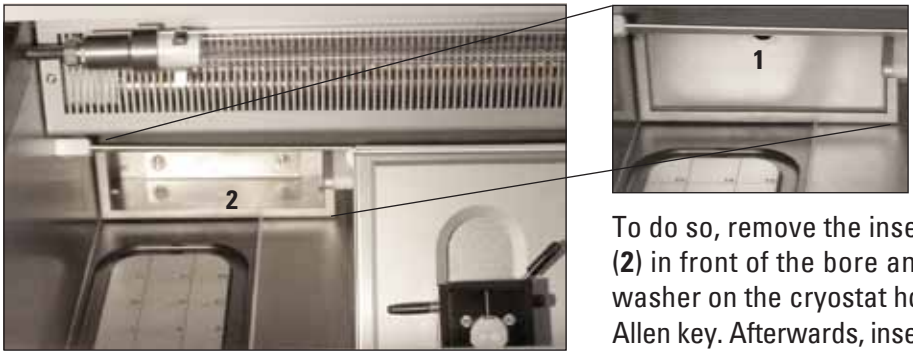


Fig. 21

For reasons of accessibility, the (optional) storage system must always be installed first.

To do so, remove the insert (**1**), place the frame (**2**) in front of the bore and tighten the screws/ washer on the cryostat housing using the size 4 Allen key. Afterwards, insert the insert (**1**) into the frame and fold it up.

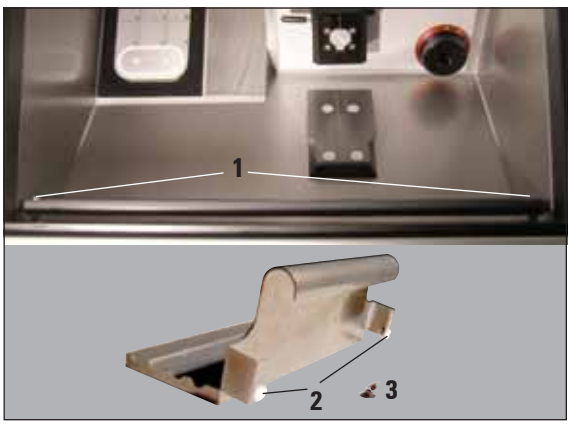
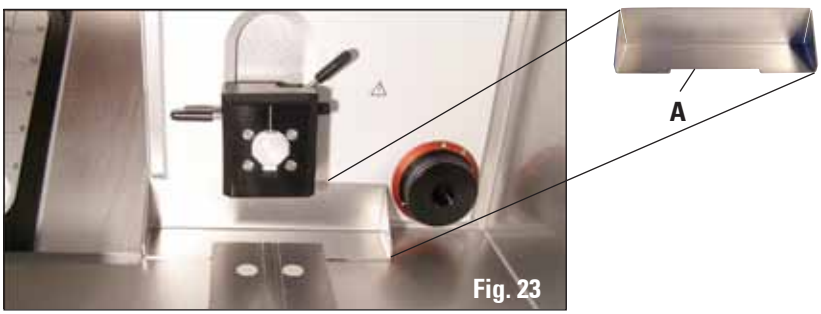


Fig. 22

6.5.3 Shelf, movable (optional)

Attach the rod for the shelf to the inner front side of the cryostat housing using the provided screws (**1**) and the size 3 Allen key, then attach the caps (**3**). (The rear side of the movable shelf has white plastic screws (**2**) that prevent the interior of the chamber from being scratched.) Now hook the movable shelf into the guide rod.

6.5.4 Inserting the section waste tray



Before installing the knife/ blade holder base, insert the section waste tray with the cutout (**a**) facing the user.

6.5.5 Installing the heat extractor, stationary (optional)

Fig. 24

The holder (**1**, Fig. 24) of the heat extractor is screwed to the left housing wall using the size 4 Allen key provided (it is better to begin with the bottom screw). Then, rotate the holder upwards (see arrow) and insert and tighten the top screw.

Now attach the cover for the quick freeze shelf to protect the shelf from frost.

For temperature reasons, install the knife/blade holder on an appropriate base.

6.5.6 Installing the knife/blade holder and adjusting the clearance angle

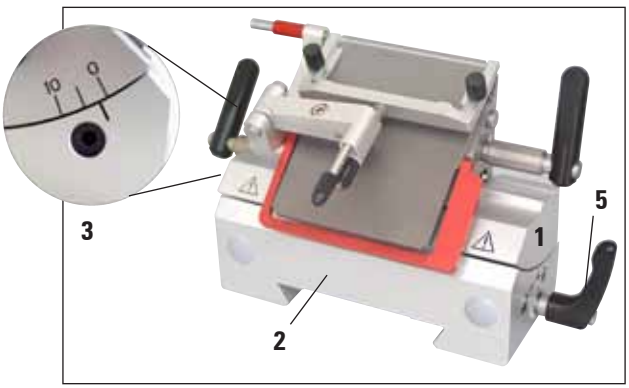


Fig. 25

- Set the knife or blade holder (**1**, Fig. 25) on the base (**2**), adjust the clearance angle (on the left of the knife/blade holder) to approx. 2° - 5° and secure it in the bore (**3**) on the base (**2**) using the size 4 Allen key.

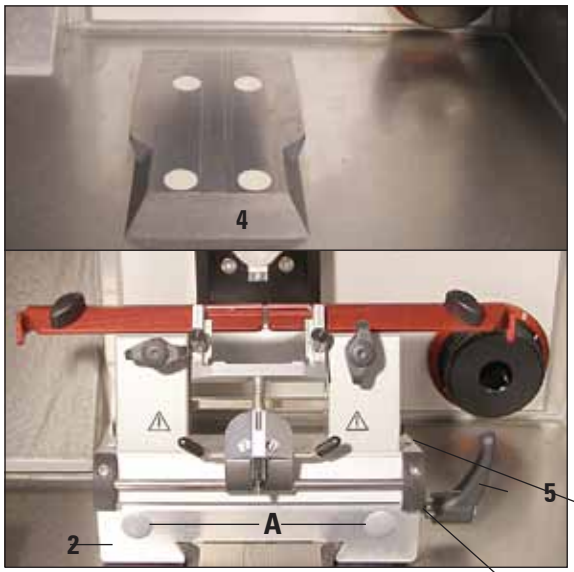
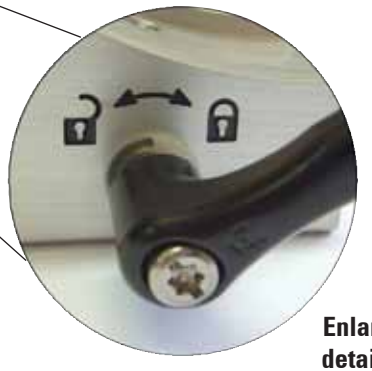


Fig. 26

- Push the knife/blade holder base (**2**) on the dovetail guide (**4**) from the front and tighten it using the clamping lever (**5**). Move the clamping lever clockwise (toward the closed lock symbol) on the right side of the blade/knife holder base (see Detail of Fig. 26). To move the base, open the clamping lever only a little to prevent accidental sliding in the direction of the specimen head! Move the clamping lever counterclockwise (toward the open lock symbol) on the right side of the blade/knife holder base (see Detail of Fig. 26).

When removing the knife holder base (2) from the refrigerated cryostat chamber, hold it by the grip points (a – front and rear) to keep your fingers from freezing. Safety gloves must be worn!



Enlarged detail: 26

- If the clamping distance is not sufficient, the clamping lever (**3**) can be moved. To do so, pull the lever out and move it to the next position.

6.5.7 Inserting/changing the bacteria filter

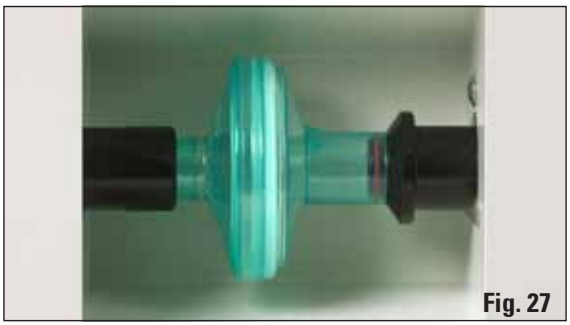


Fig. 27

The holder for the bacteria filter (optional) is visible in the front of the instrument.

- To insert the filter, hold it with one hand, press on the right of the socket, then guide the filter into the tube from the left.
- To change the bacteria filter, follow the opposite procedure: press the filter to the right, then pull it to the left and out of the tube.
- The filter must be changed approx. every 3 months (we recommend writing the date on the filter using a marker).

The filter must be disposed of according to valid laboratory specifications.
If completely defrosted, bacteria filters and filter bags MUST be removed, as melted coverslip mountant clogs the extraction line. The bacteria filter absorbs the moisture during defrosting and becomes unusable!

6.5.8 Assembling the filter bag

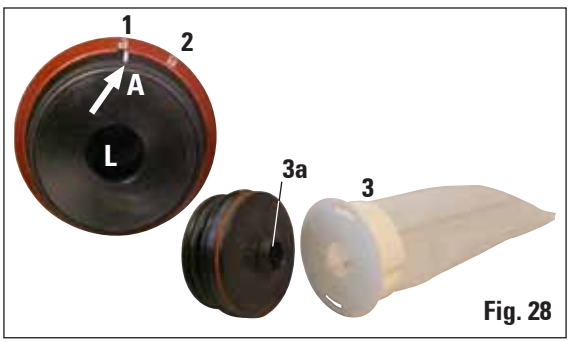


Fig. 28

Fig. 29

- Set the mark (**A**) of the extraction opening to open (**1**) and pull it out. Plug the filter (**3**) into the extraction hose connecting piece (**3a**) until there is an audible click.

Now push the connected parts back into the opening in the cryostat chamber (filter first) and set it to the "closed" mark (**2**, Fig. 28).

When not using the extraction, tightly close the opening for the extraction hose using the silicone stopper (E) included in the scope of delivery.

Reasons:

1. To prevent section waste from falling into the opening.
2. To prevent cold from escaping from the chamber.
3. To prevent moisture from penetrating the chamber.

6.5.9 Installing the section extraction (optional) – Use with blade holder CE only

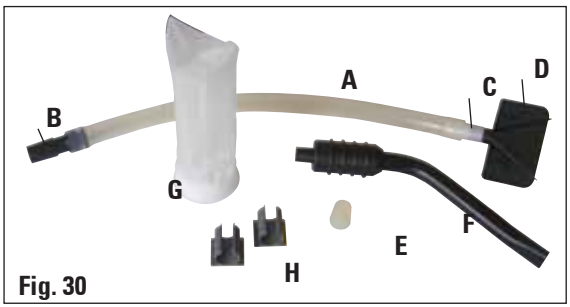


Fig. 30

- Silicone hose (**A**) with hose adapter 1 (**B,** for filter in instrument), hose adapter 2 (**C,** for suction nozzle **D** or **F**) and suction nozzle (**D**) – factory pre-assembled
- Silicone stopper (**E**)
- Chamber suction nozzle (**F**)
- Filter (**G**)
- Plastic clips (**H**), for parking the chamber suction nozzle.

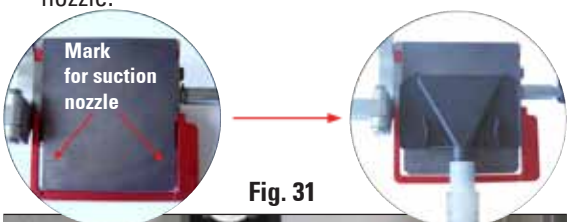


Fig. 31

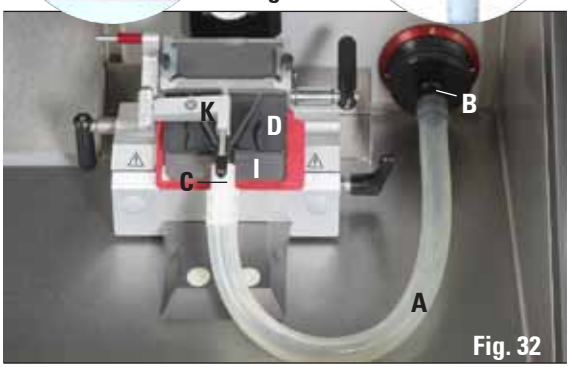


Fig. 32

When the suction nozzles are changed, the adapter (white) remains in the silicone hose. Pull off the nozzle by rotating and pulling it gently and firmly plug in the desired nozzle.

Ensure that the hose with the nozzle is not installed against its "natural" curvature on the pressure plate of the knife holder.

The tension acting on the hose can be minimized by turning the red ring (Fig. 31, top right) clockwise so that the suction nozzle presses against the pressure plate (**I**, Fig. 31).
Afterwards, fold the anti-roll guide (**K**) back onto the pressure plate.

- The scope of delivery also includes 2 plastic clips (**H**). These enable comfortable "parking" of the chamber suction nozzle (**F**) during sectioning.

The clip must be glued in **before** switching on the refrigeration. Before doing so, briefly degrease the surface to ensure a secure hold.
Preferably, the clip should be attached outside the working area, e.g. on the left inside wall of the instrument.

If the suction nozzle (D) is not being used, it can be "parked" on one of the two magnetic surfaces indicated in the interior of the instrument.

If the extraction is not used for a long time, it is absolutely necessary to clean the extraction hose in order to ensure maximum extraction capacity. To do so, place the hose in commercially available disinfectant or alcohol. After several cleanings, the hose must be replaced (see Chap. 11.1)!

7.1 Control panel fields on the CM1950 – Control panel field 1

Fig. 33

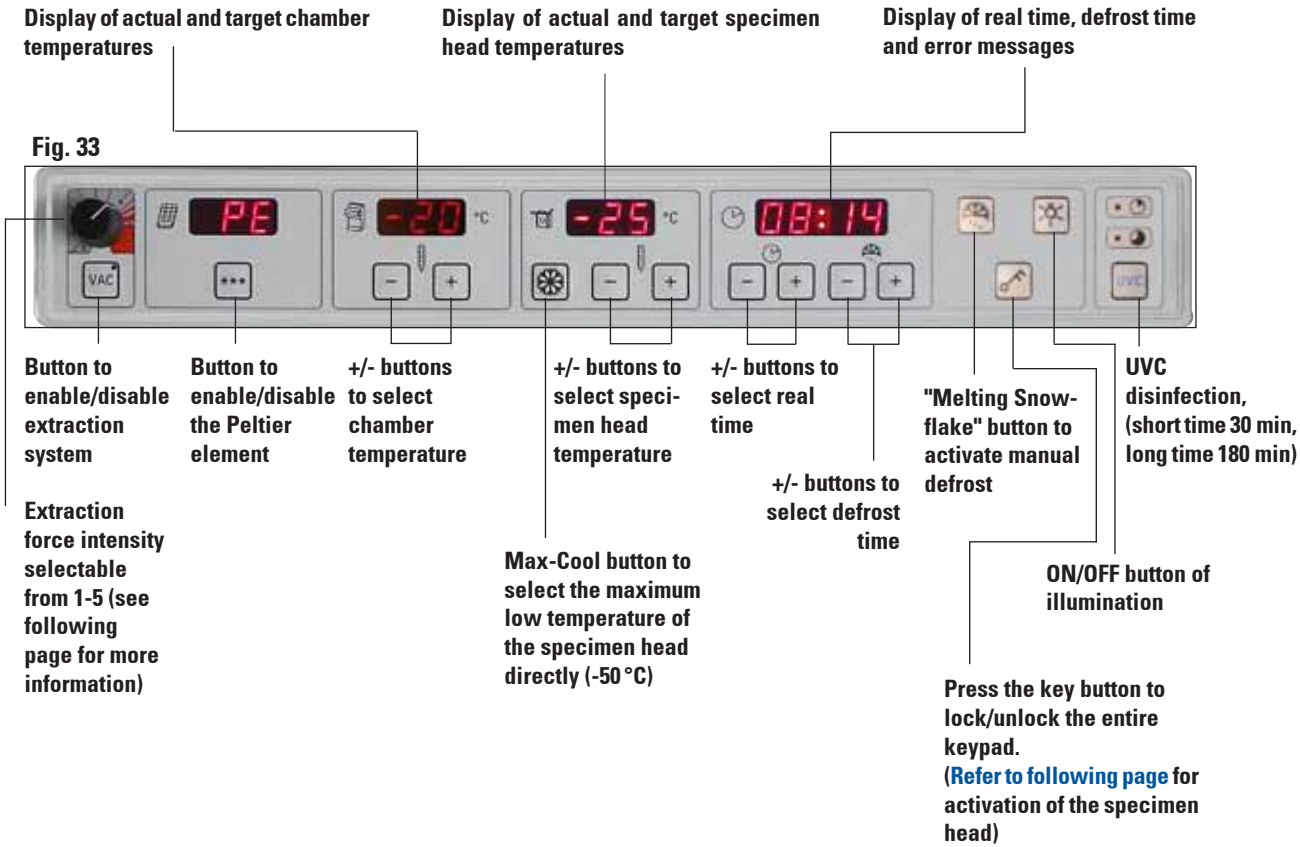


Fig. 34

EMERGENCY STOP switch to the right of control panel field 1 (motorized instruments only)

For danger situations during motorized sectioning.

- **Immediate** stop of the sectioning process – motor stops – LED in E-Stop is illuminated in red.
- Turning in direction of arrow cancels the stop – LED in E-Stop goes out.
- Select single stroke (Single) or continuous stroke (Cont.) operating mode again.

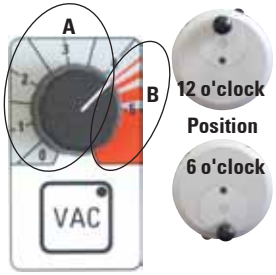


Fig. 35

- Press the "VAC" button to enable the vacuum extractor. The LED in the "VAC" button is lit while the extractor is on. Press the button again to disable it.
- Use the knob to adjust the intensity of the vacuum.

A Optimal area for trimming and sectioning

- Trimming: Handwheel position 12 – 6 o'clock, valve open
  Handwheel position 6 – 12 o'clock, valve closed
- Sectioning: Handwheel position 12 – 3 o'clock, valve open all the way
  Handwheel position 3 – 6 o'clock, valve half open
  Handwheel position 6 – 12 o'clock, valve closed

B Optimal area for extraction from the chamber

- To clean the chamber, turn the knob to the red range.

The strength of the required extraction force depends on the following:
- **Size of the specimen**
- **Sectioning speed**
- **Section thickness used**

Fig. 36

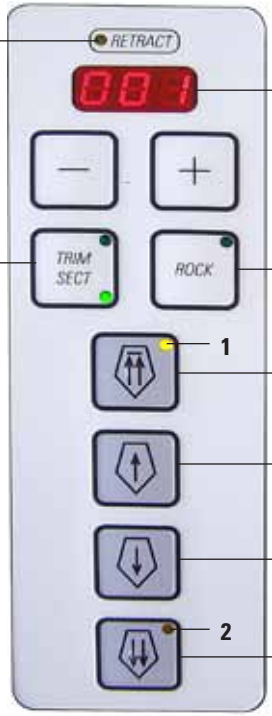
- The Peltier element provides additional cooling for the freezing stations. After the button is pressed, the display changes from "PE" to "10", indicating an additional cooling period of 10 minutes. The countdown of the remaining cooling time is permanently displayed. Once only 4 minutes are remaining, a dot will appear after the "4". As of this time, the Peltier element may be switched off early by pressing the button again.

Caution:
The specimen head and Peltier do not switch on until the chamber temperature reaches -5 °C, in order to prevent icing.

If the condenser (resting phase) is off and the Peltier cooling is activated, the number 10 flashes; until the condenser switches on again to prevent the Peltier from being destroyed when the condenser is not running. When the condenser starts up, the flashing starts and the 10 minutes are counted down.

(For exact instructions for using the chamber, specimen head and real time display fields, refer to the chapter on "Working with the Instrument".)

Control panel field 2 – Electric coarse feed, sectioning and trimming thickness display



Illuminates in yellow when the specimen is in retraction.

Toggle TRIM and SECT (LED active).

Press approx. 3 sec.; "on" or "off" appears (for the retraction). Toggle using the "+" or "-" key

Retraction: − off = 0
+ on = 20 µm
In manual mode.

For **motorized sectioning**, the retraction value is fixed and cannot be changed (see Chap. 8, "Control panel field 2").

In the "off" setting, there is no retraction in manual, automatic or rocking mode.

LED for trimming and section thickness display

For trimming values with a section thickness greater than 200 µm, the display flashes to expressly notify the user of thick sections!

Rocking mode – only in manual mode; in rear area, i.e. approx. 12 - 3 o'clock position of the handwheel (rock handwheel back and forth a short distance).

Move specimen head backwards quickly to home position (latched)

Move specimen head backwards slowly – pressing briefly retracts the specimen 20 µm

Specimen head forwards – pressing briefly advances the specimen 20 µm

Specimen head fast forward

Fig. 37

Setting section/trim thickness

Use the + - − keys on the control panel for setting; 2nd setting range **section thickness**: 1 - 100 µm

Values

1.0 µm	–	5.0 µm	in	0.5 µm	increments
5.0 µm	–	20.0 µm	in	1.0 µm	increments
20.0 µm	–	60.0 µm	in	5.0 µm	increments
60.0 µm	–	100.0 µm	in	10.0 µm	increments

Trimming section thickness setting range: 1–600 µm (Recommended for research applications)

Values

1.0 µm	–	10.0 µm	in	1.0 µm	increments
10.0 µm	–	20.0 µm	in	2.0 µm	increments
20.0 µm	–	50.0 µm	in	5.0 µm	increments
50.0 µm	–	100.0 µm	in	10.0 µm	increments
100.0 µm	–	600.0 µm	in	50.0 µm	increments

Trimming section thickness setting range:
(Recommended for clinical applications)
Values: 10 µm, 20 µm, 30 µm, 40 µm.

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. With the double-arrow buttons, the coarse feed operates at 900 µm/s; with the single-arrow buttons, it runs at 300 µm/s.

Retracting the specimen head from the knife

fast

- Pressing once starts the rapid backwards movement to the rear end position (**H**ome **p**osition).
  LED (**1**) flashes, while the specimen head is in motion.
  The LED (**1**) lights up when the rear end position (**Hp**.) has been reached.
- The return movement can be stopped by pressing one of the coarse feed buttons.

slow

- The rapid backwards movement to the rear end position (**Hp**.) starts.
  The advance movement operates as long as the button is pressed.
- A brief press of the button retracts the specimen by 20 µm.

Advancing the specimen toward the knife

slow

- Start the slow forwards movement to the knife.
  To feed the specimen, press and hold the button.
- Pressing the button briefly results in a feed motion of 20 µm.
- Start the fast forwards movement to the knife.
- The LED (**2**) flashes while the specimen head is in motion.
  The LED (**2**) lights up when the forward end position has been reached.

fast

Manual sectioning mode

Select **ROCK** operating mode (LED active) – retraction must be enabled!

- For sectioning, turn the handwheel a short distance (approx. 1/4 turn) forwards and back (rocking mode) – only possible at rear (handwheel in approx. 12 - 3 o'clock position). Every change in rotation direction is electronically detected and automatically translated into a specimen feed or retraction movement.

Control panel field 3 – Motorized sectioning (optional)

Switching the sectioning mode ("CUT MODE") from continuous stroke ("CONT") to single stroke ("SINGLE") (active)

Motor speed controller (0-100 %)

Hold the button to section at maximum speed. Release the button to continue sectioning at the previously selected speed (see controller, above).

Switch from slow speed range to fast speed range: while switching on the instrument, press and hold down the Vmax button.

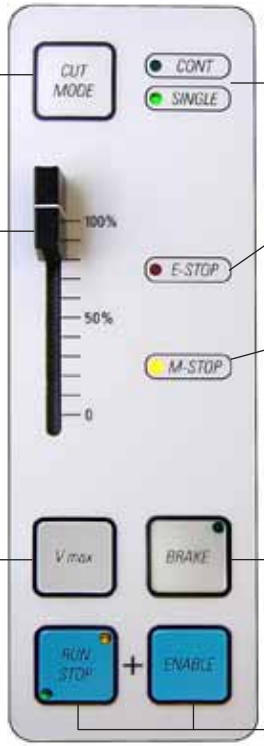


Fig. 38

Speed ranges

slow:	0 – 50 strokes/min
fast:	0 – 85 strokes/min
Vmax:	85 – 90 strokes/min

If emergency stop has been activated, the cutting mode must be selected again.

The red LED in the E-STOP field indicates either:

- **emergency-stop function active, or**
- **Footswitch dummy (opt. foot switch) not connected or incorrectly connected.**

The mechanical handwheel brake is enabled when the yellow LED is lit in the M-STOP field.

The handwheel must also be locked when working on the specimen head.

Press to brake the handwheel electronically (LED lit) – specimen stops in lower (6 o'clock) position. Can be used in any position.

1. **Press the buttons at the same time to start motorized sectioning.**
2. **To end the sectioning process, press RUN/STOP, ENABLE or BRAKE – Specimen head stops at bottom (for BRAKE, automatic electronic braking takes place).**
3. **Does not have to be unlocked during motorized sectioning; continue working by pressing both the RUN/STOP and ENABLE keys.**
4. **work using the handwheel, you have braked using BRAKE, also use BRAKE to release!**

Sectioning modes

The microtome can be used both in manual and motorized operation.
The following settings are available:

- **Single stroke (SINGLE)** or **continuous stroke (CONT.)** in motorized mode, and
- **ROCK** (sectioning using handwheel) in manual mode.

When switching the instrument on, no operating mode is active for safety reasons.

Fig. 39

Disinfection
Duration - 30 min

Duration – 180 min

UVC key - to activate / deactivate the disinfection cycle and/or to acknowledge interruption of a disinfection cycle.

To start disinfection, the sliding window must be completely closed.

- Press UVC key once briefly to start the 30 min. mode
- UVC button – press 1x for a longer time (approx. 4 sec), 180 min mode

For current information about certificates and recommendations, visit:
http://www.leicabiosystems.com/specimen-preparation/sectioning/cryosectioning/details/product/leica-cm1950/downloads/

UVC disinfection is effective when disinfecting surfaces and air within the irradiated working area of the Leica CM1850 UV, CM1900 UV and CM1950 cryostats at -20 °C (Table 1, see Certificate I. Maier). For powerful disinfection, we recommend irradiation for three hours (CM1850 UV/CM1950) and four hours (CM1900 UV). Vegetative bacteria including Mycobacterium tuberculosis, bacterial endospores (Bacillus sp.) and fungi are killed during this time. Viruses, including such resistant species as, for example, hepatitis viruses, are also deactivated to at least 4 log10 units (99.99 %).
Medium disinfection can be attained through short irradiation for 30 minutes (CM1850 UV/CM1950) and 40 minutes (CM1900 UV). This reduces vegetative bacteria including Mycobacterium tuberculosis and sensitive viruses such as the influenza A virus (also including the highly pathogenic avian influenza virus H5N1) and the polio virus by at least 5 log10 units (99.999 %).
UVC irradiation within the working area of the cryostats can provide reliable and efficient disinfection of surfaces and the air and significantly reduces the risk of infection.
We recommend wiping off visible contamination in the cryostat with an alcohol-based disinfectant prior to using the UV lamps. The germicidal effect of the irradiation is restricted to the directly irradiated areas, which is why UVC irradiation cannot be a replacement for regular chemical disinfection of the cryostat chamber.

Specimens and section waste must be thoroughly removed from the cryochamber first (e. g. using the vacuum extractor (optional), or a paper towel soaked with Cryofect* or alcoholic disinfectant). Before UV disinfection, move the anti-roll guide to the side to allow complete disinfection.
Opening the sliding window cancels the disinfection cycle. Press the UVC key to acknowledge this.
When the keypad lock is activated (via the key button) the UV lamp can be shut off only by opening the glass, as the UV keys are locked.
The cancellation can be acknowledged only if the keypad lock is disabled. Only then can the UV lamp be switched back on.

* Leica Cryofect is not available in all countries.

8.1 Preparing cutting tools, specimen discs and preparation aids

The knives are extremely sharp! Handle with care!
Never try to catch a falling knife!

- Place working materials such as the blade box or knives (in the knife case), brush, forceps or preparation needles and, where applicable, specimen discs into the cryostat chamber.

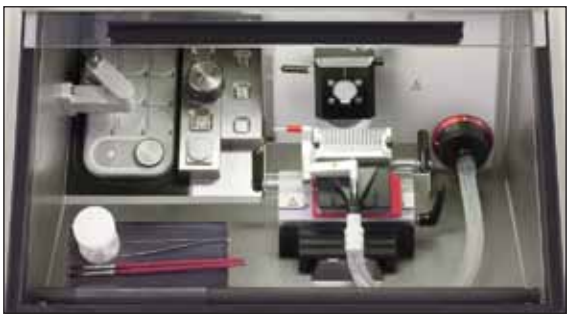


Fig. 40

- The necessary tools and preparation aids can be precooled on the (optional) movable shelf, making them available at all times in a convenient position for the user.
- Additionally, specimen discs can be pre-cooled and stored in the storage system (see Chap. 6.5.2 - Fig. 21).

For installation of knife/blade holder and installation in the chamber see Chap. 11 "Optional Accessories".

8.2 Switching on the instrument

Fig. 41

The instrument must be switched on at least 5 hours before the planned use.

The circuit breaker is used simultaneously as the power switch. The switch must be in the top position for switching on and in the bottom position for switching off. The switch must be accessible without obstruction.

- Close the sliding window.

To avoid frost formation always put the cover on the quick freeze shelf.
Always cover the quick freeze shelf during breaks and overnight.

8.3 Configuring the parameters

The instrument must be switched on at least 5 hours before the planned use.

- Turn the lamp on or off.

- This button activates or deactivates the manual defrost of the cooling chamber, specimen head or freeze shelf. (For more detailed handling instructions, refer to the chapter on "Working with the Instrument" in these Instructions for Use.)

- Pressing the key button for approx. 5 sec. locks the entire keyboard (the LEDs in the clock go out).
- Pressing the key button briefly, then the "-" key in the specimen head control panel field, switches off the specimen head.
- Pressing the key button briefly, then the "+" key in the specimen head control panel field, switches the specimen head back on.

Programming the temperature of the cryochamber

Fig. 42

- The temperature of the cryochamber is set and indicated on the control panel marked with the cryostat symbol.

  The actual temperature is the standard indication.

  Briefly pressing the "+" or "-" button displays the target temperature.

  Set the desired value via the "+" / "-" buttons. Pushing the "+" or "-" button for more than 1 sec. increases or decreases the chamber temperature continuously.

  The actual value will be indicated 5 seconds after finishing the programming.

Refer to Chap. 10 "Temperature selection chart" for a table with guide values. The temperature values given there are based on experience, but are intended solely as guide values, as any tissue may require particular adjustments.

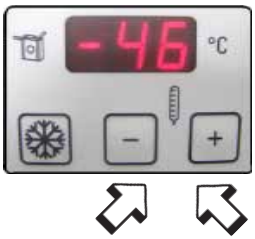


Fig. 43

Programming the specimen temperature

- Select the desired temperature of the specimen.
- The specimen temperature is set and indicated on the control panel marked with the specimen head symbol.

  The actual temperature is the standard indication.

  Briefly pressing the "+" or "-" button displays the target temperature.

  Set the desired value via the "+" / "-" buttons. Pushing the "+" or "-" button for more than 1 sec. increases or decreases the specimen temperature continuously.

  The actual value will be indicated 5 seconds after finishing the programming.

Caution:
The specimen head and Peltier do not switch on until the chamber temperature reaches -5 °C, in order to prevent icing.

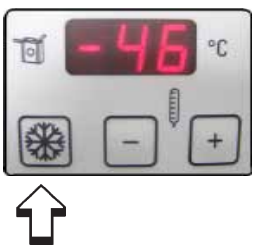


Fig. 44

Specimen temperature - "Max-Cool" function

- The snowflake button for the "**Max-Cool**" function is in the specimen temperature field.
  Pressing the button sets the lowest possible specimen head temperature (-50 °C) as the target temperature. The instrument adjusts the maximum low temperature of the specimen head, i.e. -50 °C.
- Push the snowflake button again to stop the "**Max-Cool**" function.
  The temperature adjusts to the value programmed prior to activating the "Max-Cool"-function.
- Alternate flashing of "**LL**" and the actual temperature indicates activation of the Max-Cool function.

Fig. 45

Setting the time

- The clock time is set with the +/- buttons in the control panel marked with the clock symbol.
  To do so, set the current time using the "+" or "-" button below the small clock symbol.
  Pushing the "+" or "-" button for more than 1 sec. increases or decreases the time continuously (auto-repeat function).

Fig. 46

Programming the defrost cycle

- Set the beginning of the automatic defrost cycle.
  The automatic defrost cycle takes place once within 24 hours.
  It is set with the "+"/"-" buttons on the right of the panel with the clock symbol. The two buttons are marked by a melting snowflake .
- Briefly press the "+" or "-" button for indication of the beginning of the defrost cycle which has actually been set. At the same time, the LEDs between the indication of hours and minutes are flashing.
- To change the beginning of the defrost cycle in steps of 15 minutes, push the "+" or "-" key. When the "+" or "-" button is pushed for more than 1 sec., the defrost time value increases or decreases continuously.

Before starting the defrost cycle remove all samples from the cryochamber!

- When the automatic defrost cycle begins, the specimen head temperature adjusts to a temperature between -10 °C and -5 °C (reduction of ice formation). The specimen head cooling turns off. This is confirmed by the flashing of the decimal points on the panel for the specimen cooling. The specimen cooling (controlled to set value) automatically turns back on after 4 hours, once the chamber temperature varies by less than 5 K from the target temperature.
- If you want to turn the specimen cooling back on manually before the automatic activation sets in, push the "+" or "-" button on the control panel field for the specimen cooling and then the key button.
- The temperature of the specimen cooling first raises to +10 °C and then adjusts to the programmed specimen temperature.

Manual defrost for the freeze shelf (including Peltier element)

- Press the key for manual defrost, then press the key.
  The manual defrost takes 12 min.
- Press the button again, then the button to stop manual defrosting again.

After defrosting the freeze shelf, carefully wipe it out, as otherwise a lot of water collects in the channel. Ice does not melt during normal defrosting.

Fig. 47

Fig. 48

Manual defrosting of the cryochamber

- Push the manual defrost button (with the melting snowflake) on the left over the key button to activate the defrost cycle of the cryochamber on demand.
- Activation is confirmed by an audible signal.
- Then, push the "+" or "-" button on the panel for the cryochamber temperature.
- The manual defrost cycle (12 min.) is activated.
- There is a flashing indication of the temperature of the cryochamber during the whole defrost cycle.
- If necessary, push the manual defrost button again to deactivate the manual defrost cycle.
- When the manual defrost begins, the specimen head adjusts to a temperature between -10 °C and -5 °C (reduction of ice formation). The specimen head cooling turns off. This is confirmed by the flashing of the decimal points on the panel for the specimen cooling.
- Ten seconds after the manual defrost cycle has been completed, the specimen cooling turns back on.

Before starting the defrost cycle, remove all specimens from the cryochamber!

Manual defrosting of the specimen cooling

Fig. 49

- Push the manual defrost button (with the melting snowflake) on the left over the key button to activate the defrost cycle of the specimen head.
- Activation is confirmed by an audible signal.
- Then, push the "+" or "-" button on the panel for the specimen temperature.
- There is a flashing indication of the specimen temperature during the defrost cycle.
- For 15 minutes, the specimen head is adjusted to a temperature of 45 °C.
- Subsequently, the instrument adjusts to the specimen temperature which has been programmed prior to the manual defrost cycle.
- If necessary, push the manual defrost button again to deactivate the manual defrost cycle.

Press the key button, then the "+" button = specimen head on
Press the key button, then the "-" button = specimen head off

Fig. 50

Entering the trimming thickness

To switch from a trimming section thickness for research applications (1- 600 µm) to a thickness for clinical applications (10, 20, 30 or 40 µm), press and hold down the TRIM/SECT key while switching on the instrument.

- Press the **TRIM/SECT** button. **TRIM** mode is active if the LED at the top right is illuminated.
- Set the desired trimming thickness using the "+" or "-" button in control panel field 2 (for the adjustable sequence of steps, see Chap. 7 "Instrument Controls" - "Control panel field 2").

Fig. 51

Entering the section thickness

- Press the **TRIM/SECT** button. **SECT** mode is active if the LED at the bottom right is illuminated.
- Set the desired trimming thickness using the "+" or "-" button in control panel field 2 (for the adjustable sequence of steps, see Chap. 7 "Instrument Controls" - "Control panel field 2").

Switching the retraction on or off in manual sectioning mode

- Press the **TRIM/SECT** button for approx. 3 sec. The LED in control panel field 2 displays on  or oFF  .

- You can switch by pressing the "+" or "-" button.
- "Retraction on" means a specimen retraction of 20 µm in manual mode.

During motorized sectioning, the retraction value is speed-dependent and cannot be changed by the user.

8.4 Working with the precooled cryostat

8.4.1 Preparatory work


Fig. 52


Fig. 53

- Lock the handwheel in the top (12 o'clock) position.
- Cut the specimen to size outside of the cryostat.
- Select the precooled specimen disc, cover it with freezing compound, then attach and orient the specimen.

The safety gloves included in the standard scope of delivery must be worn when working inside the cryostat chamber!

- Attach the specimen disc and specimen to the Peltier position on the freeze shelf. Activate the Peltier element and wait until the specimen is completely frozen.

Specimens that have been frozen on the Peltier element are often too cold and split apart during sectioning. Allow time for the specimens to become acclimated.

- Insert the specimen disc into the specimen head.

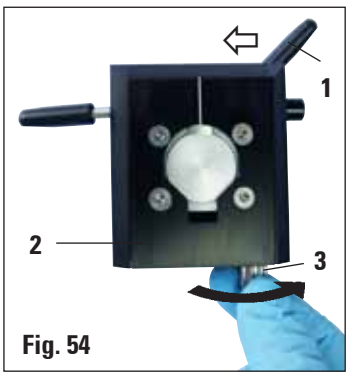


Fig. 54

Specimen head adjustment:
After extended use, it is possible for the specimen head (2) to loosen and cause artifacts when sectioning. In this case, a simple re-adjustment is necessary.

To prevent injuries, remove the blade/knife holder before adjusting the dovetail guide. Place the blade/knife holder within the cryochamber so that it does not get warm and can be reused right after the adjustment.

- Move the specimen head forwards and out, into the front end position.
- Move the locking lever (**1**) for orientation on the specimen head (**2**) to the left to loosen the specimen head.
- Now turn the setscrew (**3**) on the bottom of the specimen head clockwise until you feel the specimen head click into place.
- Move the locking lever for orientation back to the right to lock the specimen head and make sure that the specimen head is now stable.
- Repeat the procedure if necessary.

Check the stability of the specimen head each time it clicks back into place. This can prevent it from becoming difficult to set the zero position.

Fig. 55

Before using them for the first time, degrease new knives using acetone or alcohol.

- Approach the specimen with the knife or blade holder:
- To do so, open the clamping lever of the base, approach the specimen and close the lever again.
- Open the lever of the orientation. Orient the specimen (move it into a favorable position relative to the knife/blade) and close the lever again.
- Approach the knife or blade holder using the coarse feed buttons and gentle movements of the handwheel.

If the sections are cracked, the specimen head temperature is too cold. Set a warmer temperature.
If the sections smear, the specimen head temperature is too warm. Set a colder temperature.

8.4.2 Trimming with extraction – 1. Anti-roll guide installed

Fig. 56

- Remove the silicone stopper from the filter cover (and keep it in a safe place).
- Insert the extraction hose with the black adapter.
- Fold the anti-roll guide to the side and fasten the extraction nozzle to the pressure plate (using 4 magnets on the rear side of the nozzle) – see mark (Fig. 56**a**) – (using 4 magnets on the rear side of the nozzle).
- Fold the anti-roll guide back into position.

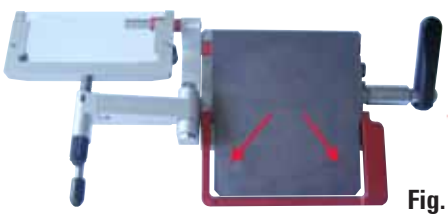


Fig. 56a

Fig. 56b

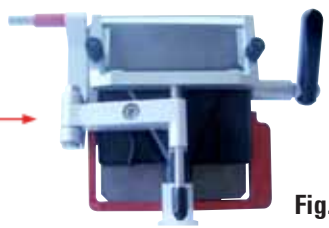


Fig. 56c

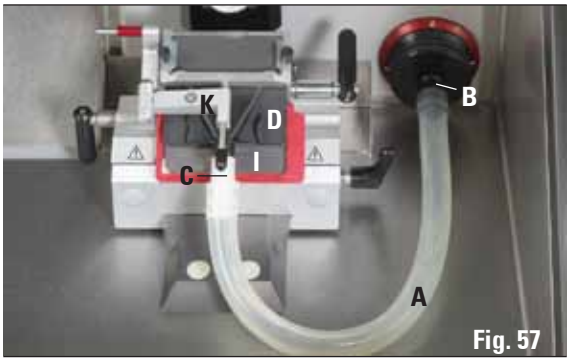


Fig. 57

Ensure that the hose with the nozzle is not installed against its "natural" curvature on the pressure plate of the knife holder.

The tension acting on the hose can be minimized by turning the red ring (Fig. 57, top right) clockwise so that the suction nozzle presses against the pressure plate (**I,** Fig. 57).

- Check that the anti-roll guide is parallel and correctly adjusted. Readjust if necessary (see page 62).
- Activate trimming mode.
- Select the trimming thickness.
- Switch on the VAC and select a low extraction level (between 1 and 2).
- Start trimming by manually moving the handwheel or press the **RUN/STOP** and **ENABLE** buttons simultaneously to start motorized sectioning.

For motorized sectioning, always begin at low speed for safety reasons.

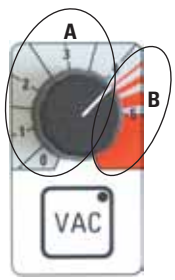


Fig. 58

- Optimize the vacuum settings if necessary.
- Press the "VAC" button to enable the vacuum extractor. The LED in the "VAC" button is lit while the extractor is on. Press the button again to disable it.
- Use the knob to adjust the intensity of the vacuum.

A Optimal area for trimming and sectioning

- Trimming: Handwheel position 12 – 6 o'clock, valve open
  Handwheel position 6 – 12 o'clock, valve closed
- Sectioning: Handwheel position 12 – 3 o'clock, valve open all the way
  Handwheel position 3 – 6 o'clock, valve half open
  Handwheel position 6 – 12 o'clock, valve closed

B Optimal area for extraction from the chamber

- To clean the chamber, turn the knob to the red range.

If the handwheel is not moved for approx. 5 sec, the valves close and the fan remains on. If the handwheel is moved for approx. 1 min, the valves close, the fan shuts off (the LED in the VAC switch goes off to prevent icing).
To continue working, you now have to reactivate the VAC button.

Fig. 59

Trimming with extraction – 2. Brush technique, finger rest installed

- Remove the silicone stopper (**E**) from the filter cover (and keep it in a safe place).
- Insert the extraction hose with the black adapter.
- Fasten the suction nozzle to the pressure plate (using 4 magnets on the rear side of the nozzle) as far as possible towards the blade.

Ensure that the hose with the nozzle is not installed against its "natural" curvature on the pressure plate of the blade holder.

Fig. 60

The tension acting on the hose can be minimized by turning the red ring (Fig. 28) clockwise so that the suction nozzle presses against the pressure plate.

- Check that the suction nozzle is seated optimally (by gently turning the handwheel)
- Activate trimming mode.
- Select the trimming thickness.
- Switch on the VAC and select a low extraction level (between 1 and 2).
- Start trimming by manually moving the handwheel or press the **RUN/STOP** and **ENABLE** buttons simultaneously to start motorized sectioning.
- Use a brush to apply the section to a precooled specimen slide, then warm it from below using your finger.
- Move the knife guard forward after removing the section.
- Remove the knife or disposable blade (using the blade ejector!).
- Insert the knife into the knife case.

8.4.3 Cutting with extraction – Anti-roll guide installed

- Shut off VAC (LED in **VAC** button goes out).
- Switch from trimming to sectioning mode (important for section stretching, as the valves work differently than in trimming mode).
- Set the desired section thickness.
- Switch on the VAC and begin at level 1. If the section does not stretch correctly, turn the VAC knob higher in small increments.
- Once the desired section is on the pressure plate, switch off the VAC! Carefully fold the anti-roll guide to the side and remove the section from the side.

After removing the section, wipe off moisture/condensate from the pressure plate – otherwise, the next sections will become jammed.

Sectioning with extraction without anti-roll guide (brush technique) is not possible, as the position of the pressure plate means that no suitable air flow is obtained.

A few rules:

- Always begin at a low extraction level, then slowly increase it.
- Do not use high extraction levels unless absolutely necessary.
- Different specimen sizes require different extraction levels.
- The faster the trimming or sectioning speed, the lower the extraction level should be.
- The larger and/or thicker the specimen to be trimmed, the lower the extraction value.
- For section specimens with a diameter of 0.5 cm, the anti-roll guide stretches the section adequately. For larger specimens, we recommend using the vacuum function.

After trimming or sectioning:

Specimen:

- Unclamp and thaw.
- Immerse in fixative for further processing.

Cleaning

- Use the brush to sweep up the section waste (section waste tray) and remove it from the cryostat (follow applicable laboratory regulations for disposal).

or

- Clean the cryostat chamber using the chamber suction nozzle:
  - To do so, turn the (flat) suction nozzle of the extraction hose by holding the hose on the white adapter and removing it with a quick twist. "Park" the flat suction nozzle in a designated place in the chamber – e.g. on the right inside wall of the cryochamber.
  - Remove the chamber suction nozzle from the plastic clip and attach it firmly to the white adapter.

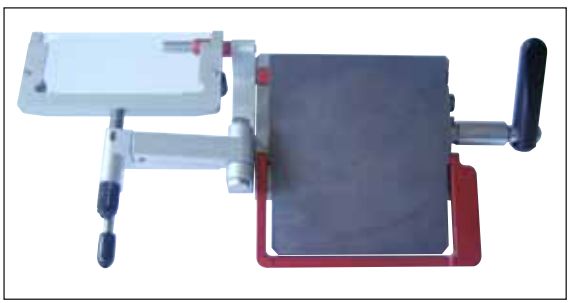


Fig. 61

- Check the remaining capacity of the filter (in the interior of the chamber) and change the filter if necessary (see Chap. 6.5.8).
- Check the bacteria filter (in the front of the unit, (see Chap. 6.5.7), change it at least every 3 months.
- Move the anti-roll guide to the side (see Fig. 61).
- Spray the cryostat chamber using Cryofect.
- Activate the UVC disinfection.

The use of flammable sprays within the cryostat chamber is permitted only with the Leica Cryofect tested by us.

9.1 Problems during work

Problem	Cause	Remedy
Frost on chamber walls and microtome	Cryostat is exposed to air currents (open windows and doors, air conditioning).	Move to a draft-free location.
	Frost built-up by breathing into the cryochamber.	Wear mouth protection.
Sections smear	Specimen not cold enough. Anti-roll plate not yet cold enough, thus warming the section.	Select lower temperature. Wait until knife and/or anti-roll plate have reached chamber temperature.
Sections splinter	Specimen too cold.	Select higher temperature.
Sections not properly flattened	Static electricity/air currents. Specimen not cold enough. Large area specimen. Anti-roll plate poorly positioned. Anti-roll plate poorly aligned with knife edge. Incorrect clearance angle. Blunt knife.	Remove cause. Select lower temperature. Trim the specimen parallel, increase section thickness. Reposition anti-roll plate. Align correctly. Set correct angle. Use different part of the knife.
Sections not properly flattened despite correct temperature and correctly aligned anti-roll plate	Dirt on knife and/or anti-roll plate. Edge of anti-roll plate damaged. Blunt knife.	Clean with dry cloth or brush. Replace anti-roll plate. Use different part of the knife.
Sections curl on anti-roll plate	Anti-roll plate does not protrude far enough beyond the knife edge.	Readjust correctly.
Scraping noise during sectioning and specimen return movement	Anti-roll plate protrudes too far beyond the knife edge and is scraping against the specimen.	Readjust correctly.

Problem	Cause	Remedy
Ridged sections	Cryostat is exposed to air currents (open windows and doors, air conditioning). Frost built-up by breathing into the cryochamber.	Use different part of the knife. Replace anti-roll plate.
Chatter during sectioning	Specimen insufficiently frozen onto the specimen disc. Specimen disc not clamped tightly. Knife not clamped tightly enough. Specimen has been sectioned too thickly and has detached from disc. Very hard, inhomogenous specimen. Blunt knife. Knife profile inappropriate for specimen cut. Incorrect clearance angle.	Refreeze specimen onto the disc. Check disc clamping. Check knife clamping. Refreeze specimen onto the disc. Increase section thickness; reduce specimen surface area if necessary. Use different part of the knife. Use knife with different profile. Set correct angle.
Condensation on anti-roll plate and knife during cleaning	Brush, forceps and/or cloth too warm.	Store all tools on storage shelf in the cryochamber.
Anti-roll plate damaged after adjustment	Anti-roll plate too high above the knife edge. The adjustment was carried out in the direction of the cutting edge.	Replace anti-roll plate. Be more careful next time!
Thick/thin sections	Temperature incorrect for the tissue cut. Knife profile inappropriate for the specimen cut. Ice buildup on the knife back. Handwheel speed not uniform or turned at incorrect speed. Knife not clamped tightly enough. Specimen disc not clamped tightly enough. Cryocompound applied to cold specimen disc; specimen detached from disc after freezing.	Select correct temperature. Use knife with different profile (c or d). Remove ice. Adapt speed. Check knife clamping. Check disc clamping. Apply cryocompound to warm disc, mount specimen and freeze.

Problem	Cause	Remedy
	Blunt knife Inappropriate section thickness. Incorrect clearance angle. Microtome not dried thoroughly enough. Dried specimen.	Use different part of the knife. Select correct section thickness. Set correct angle. Dry microtome. Prepare new specimen.
Tissue sticks to the anti-roll plate	Anti-roll plate is too warm or incorrectly positioned. Fat on the corner or edge of anti-roll plate. Anti-roll plate not correctly fixed. Rust on the knife.	Cool down anti-roll plate, or reposition correctly. Remove fat from anti-roll plate. Fix correctly. Remove rust.
Flattened sections curl up when anti-roll plate is folded up	Anti-roll plate too warm.	Cool down anti-roll plate.
Sections tear or separate	Temperature too low for the tissue cut. Blunt part, dirt, dust, frost or rust on the knife. Top edge of the anti-roll plate damaged. Hard particles in the tissue. Dirt on knife back.	Set alternative temperature and wait. Remove cause. Replace anti-roll plate. - - - Clean.
Cryostat non-operational	Power plug not properly connected. Defective fuses, or circuit breaker has triggered.	Check if properly connected. Replace fuses, or switch circuit breaker back on. If not possible, call technical service.
Specimen disc cannot be removed	Moisture on the underside causes the specimen to freeze to the freezing shelf or specimen head.	Apply concentrated alcohol to the contact point.

Problem	Cause	Remedy
No or insufficient refrigeration of the cryochamber	Cooling system or electronic drive defective.	Call technical service.
Sliding window collects condensation	Air humidity and room temperature too high.	Comply with the requirements for the installation site.
No or insufficient refrigeration of the specimen	Cooling system or electronic drive defective.	Call technical service.
Sections not properly flattened	Lamp defective. Switch defective.	Check lamp and replace it, if necessary.
Both disinfection LEDs flash alternately	UV radiation provided by UV tube no longer sufficient.	Replace UV tube following the manufacturer's instructions.
 **Fig. 62**	Image of an open-ended wrench appears due to fault to be rectified	Contact technical service and follow the instructions given.

Tissue type	Chamber temperature	Specimen head temperature
Spleen	-15 °C to -20 °C	-11 °C
Liver	-10 °C -15 °C	-20 °C off until -15 °C
Intestine	-10 °C -15 °C	-20 °C A*: off until -20 °C E*: -20 °C
Heart	-10 °C -15 °C	A: -20 °C E: -20 °C to -30 °C off until -20 °C
Ovaries	-10 °C -15 °C	E: -20 °C off until -15 °C
Fallopian tube	-10 °C -15 °C	E: -20 °C off until -15 °C
Kidney	-10 °C -15 °C -20 °C	-20 °C A: off until -15 °C -20 °C
Muscle	-18 °C to -20 °C -	15 °C
Skin with fat	-19 °C	-32 °C to -40 °C
Hard fat	-19 °C	-21 °C to -25 °C
Stomach	-10 °C -15 °C	-20 °C off until -15 °C
Brain	-15 °C	-10 °C, *E

***A = blocked, *E = complete**

The temperature values given in this table are based on experience, however, these are only approximate values, as any tissue may require particular adjustments.

11.1 Ordering information

Specimen disc ø 20 mm assembly	14 0477 43739
Specimen disc ø 30 mm assembly	14 0477 40044
Specimen disc ø 40 mm assembly	14 0477 40045
Specimen disc ø 55 mm assembly	14 0477 40046
Specimen disc 80 x 50 mm assembly	14 0477 43714
O-ring blue (10 pieces), ø 20 mm	14 0477 43247
O-ring red (10 pieces), ø 20 mm	14 0477 43248
O-ring blue (10 pieces), ø 30 mm	14 0477 43247
O-ring red (10 pieces), ø 30 mm	14 0477 43248
O-ring blue (10 pieces), ø 40 mm	14 0477 43249
O-ring red (10 pieces), ø 40 mm	14 0477 43250
O-ring blue (10 pieces), ø 55 mm	14 0477 43251
O-ring red (10 pieces),ø 55 mm	14 0477 43252
Blade holder base, assembly	14 0477 40351
Blade holder CE-BB, assembly	14 0477 43005
Low-profile straight edge, assembly	14 0477 42488
Finger rest, assembly	14 0477 40387
Anti-roll plate 70-50 µm assembly	14 0477 42491
Anti-roll plate 70-100 µm assembly	14 0477 42492
Anti-roll plate 70-150 µm assembly	14 0477 42493
Glass insert 70 mm, polished	14 0477 42497
Glass insert 50 mm, for knife holder CN	14 0419 33816
Knife holder base assembly	14 0477 42359
Knife holder attachment CN, assembly	14 0477 42358
Knife support CN short	14 0477 42380
Knife support CN	14 0477 42370
Knife holder attachment CN-Z, assembly	14 0477 42363
Anti-roll plate assembly glass 50 mm	14 0419 33981
Heat and cold extractor, assembly	14 0477 41039
Cold extractor, assembly	14 0477 43737

Heat extractor, assembly	14 0477 43126
Section waste tray	14 0477 40062
Brush shelf	14 0477 43036
Storage system, assembly	14 0477 42618
Shelf, movable	14 0477 43037
Retaining device freezing shelf	14 0477 40080
Cover freezing shelf	14 0477 43763
Specimen disc, 37 x 37 mm	14 0477 42603
Specimen disc, 28 x 28 mm	14 0477 42604
Shelf, large	14 0477 42600
Shelf, medium size	14 0477 42601
Shelf, small	14 0477 42602
Heat extractor, Dr.Peters, assembly	14 0477 41338
Freezing griddle/heat extractor	14 0201 39119
Dispensing slides 8 pieces	14 0201 39127
Foot rest assembly	14 0477 42832
Accessory kit extraction	14 0477 43300
Bacteria filter 350/5865	14 0477 40296
Hose set, 5 pieces	14 0477 44469
Filter assembly 25 pieces, with coarse filter insert	14 0477 44307
Leica Cryofect, 4x 350 ml	14 0387 42801
Safety gloves size M	14 0340 29011
Safety gloves size S	14 0340 40859
Footswitch, dummy plug CM3050	14 0443 30420
Laboratory chair on sliders (8030442)	14 0710 34911
Footswitch assembly	14 0505 33888
Easy Dip staining container white	14 0712 40150
Easy Dip staining container pink	14 0712 40151
Easy Dip staining container green	14 0712 40152
Easy Dip staining container yellow	14 0712 40153
Easy Dip staining container blue	14 0712 40154
Easy Dip staining rack gray	14 0712 40161

Blade**h**older **CE with anti-roll guide (**for **l**ow-**p**rofile, **LP,** and **h**igh-**p**rofile**, HP)**

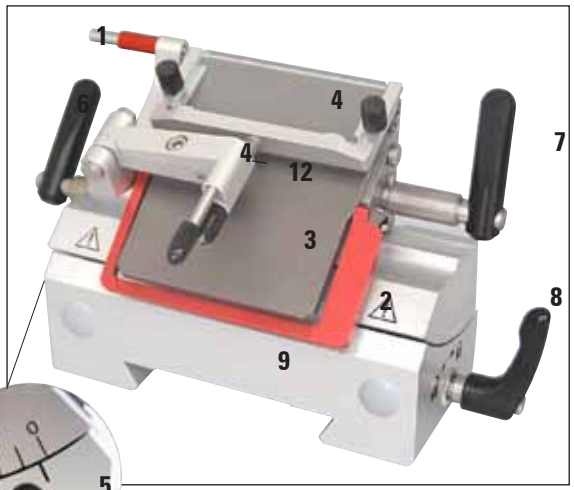


Fig. 63

Fig. 63a

- With blade ejector (**1**)
- With knife guard (**2**)
- integrated lateral shift and stable base
- Clearance angle adjustment (**5**) using size 4 Allen key (see Detail Fig. left on the blade holder) – recommended angle between 2° and 5°.
- With anti-roll guide (**4**)
- Lever (**6**) for the lateral shift
- Lever (**7**) for clamping the blade
- Lever (**8**) for clamping the base (**9**) to the dove-tail guide in the chamber
- Pressure plate (**3**) for section extraction
- When using low-profile blades, the straight-edge (**7a,** Fig. 66) must be inserted.

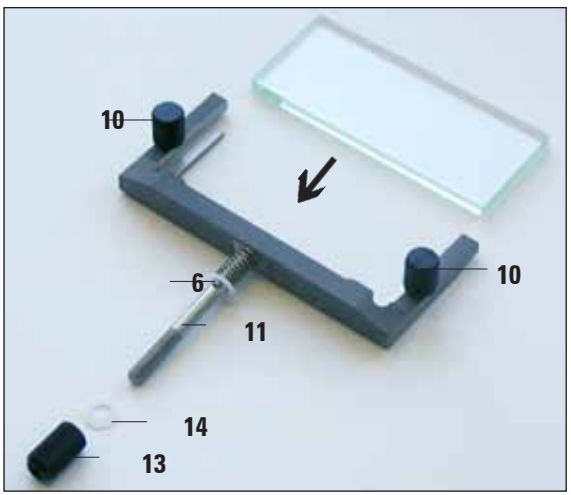


Fig. 64

Assembling the anti-roll guide system (for the blade holder CE)

1. Insert the glare-minimizing glass insert into the interchangeable frame and tighten it evenly using the knurled screw (**10**).
2. Insert the shaft (**11**) of the metal frame for exchangeable glass inserts from above into the bore of the swing arm (**12**) in such a way that the pin rests in the notch.
3. Push the white plastic plate (**14**) from below onto the shaft (**11**).
4. Screw the knurled nut (**13**) from below onto the shaft (**11**).

The glass of the anti-roll guide can be used from all 4 sides when replacement is necessary (the glass stage plate can be reordered).

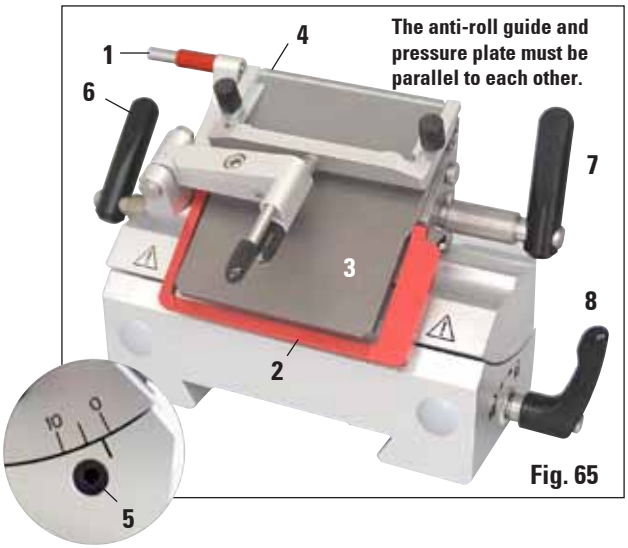


Fig. 65

Blade holder CE with finger rest (for LP + HP)

Fig. 66

Red elements on the blade and knife holders, such as the knife guard and ejector, are protective devices that may not be removed.

- Blade ejector (**1**) and knife guard (**2**)
- integrated lateral shift and stable base
- Clearance angle adjustment using size 4 Allen key (recommended angle between 2° and 5°)
- With finger rest (**6a,** Fig. 66) for brush specimen
- Clamping lever (**8**) for lateral shift must point downward to permit unhindered shifting of finger rest.
- When using high-profile blades, remove the blade rest (**7a,** Fig. 66).

Conversion of blade holder with anti-roll guide to blade holder with finger rest

- Screw off the anti-roll guide.
- Unscrew left Allen screw using size 2.5 Allen key and remove base of anti-roll guide.
- Attach the finger rest (**6a**) from the left, tighten the Allen screw using the size 2.5 key – be careful of the blade ejector!

If you are working with the brush technique, the knife guard must be folded upwards.

Inserting/ejecting the blade into/from the blade holder CE

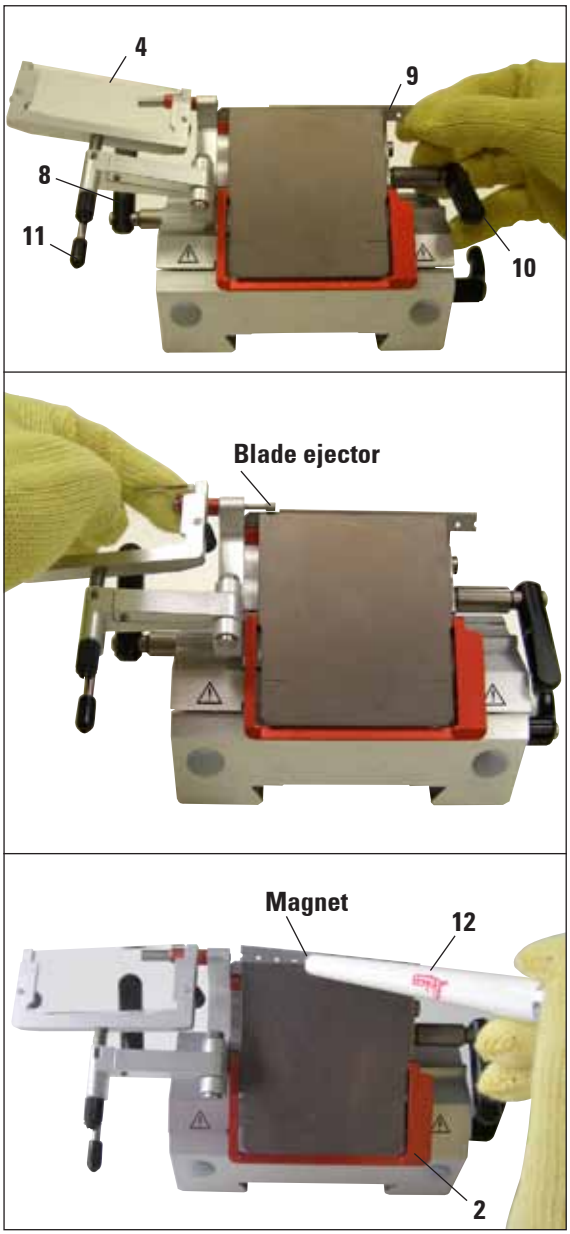


Fig. 67

The safety gloves included in the standard scope of delivery must be worn when inserting the blade!

1. Fold the anti-roll guide system (**4**) to the left – while doing so, hold the lever (**11**) (**not** the adjusting screw of the anti-roll guide) so that the height of the anti-roll guide remains unchanged.
2. Open the clamping lever (**10**) by turning it counterclockwise.
3. Carefully insert the blade (**9**) from above or from the side between the pressure plate and the blade rest. Make sure that the blade is inserted so that it is centered.
4. Rotate lever (**10**) clockwise to clamp.
5. Fold the anti-roll guide system (**4**) back to the right (toward the blade) using the lever (**11**).

Anti-roll guide system functions as a knife guard here!
Use the blade ejector to eject the blade!

6. Another option for removing the blade is to use the brush with magnet (**12**).

   To do so, fold the clamping lever (**10**) downwards counterclockwise. Likewise, fold the knife guard (**2**) downward.

   Guide the brush with magnet to the blade and lift it upwards and out.

Fig. 68

The safety gloves included in the standard scope of delivery must be worn when disposing of the blade!

Once the blade has been removed from the blade holder, it is disposed of into the dispenser container (storage compartment in bottom, Fig. 68), or according to laboratory regulations.

Lateral shift for blade holder CE

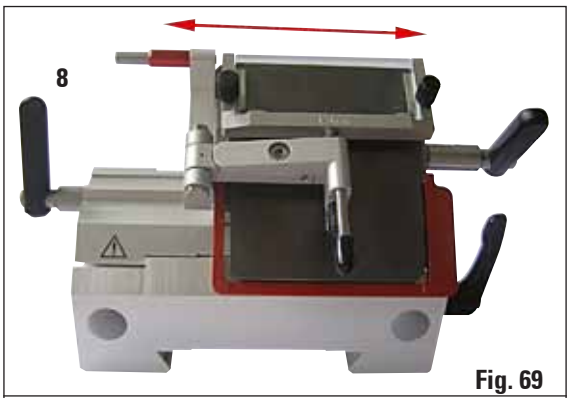


Fig. 69

Fig. 69a

Knife holder CN with glass anti-roll guide

If the sectioning results are not satisfactory, the knife holder can be shifted sideways in order to use another part of the blade.

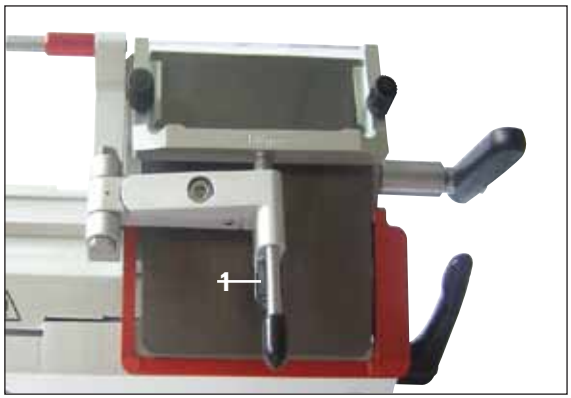
To do so, follow these steps:

1. Release the clamping lever (**8**) by folding it back and move the knife holder back until the desired position is reached (3-point click stop enables you to accurately find a new cutting position).
2. Fold the clamping lever (**8**) forwards for clamping.

Adjusting the blade holder with anti-roll guide

You can adjust the height of the anti-roll guide system using the knurled nut (**1**):

- If you turn the nut counterclockwise, the anti-roll guide system moves toward the blade.
- If you turn the nut clockwise, the anti-roll guide system moves away from the blade.



Blade holder CE with glass anti-roll guide **Fig. 70**

If the anti-roll guide system is in the wrong position relative to the cutter, the following problems will result:

Fig. I: The section rolls over the glass insert of the anti-roll guide system.

Error: Glass insert not high enough.

Remedy: Turn the knurled nut counterclockwise until the section is pushed between the blade and anti-roll guide as shown in Fig. III.

Fig. II: Section tears and block hits the glass insert after sectioning.

Error: Anti-roll guide system is set too high.

Remedy: Turn the knurled nut clockwise until the section is pushed between the blade and anti-roll guide as shown in **Fig. III.**

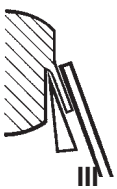


Fig. III: Correct position of the anti-roll guide to the cutter

Generally, we recommend pre-adjusting the anti-roll guide system at a high section thickness (e.g. 10 µm). Start from there and work your way down to the desired section thickness in small increments, readjusting the anti-roll guide system at each increment using the knurled nut.

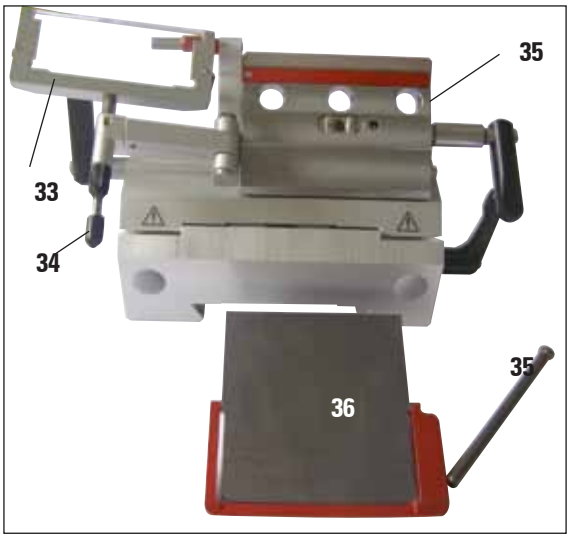


Fig. 71

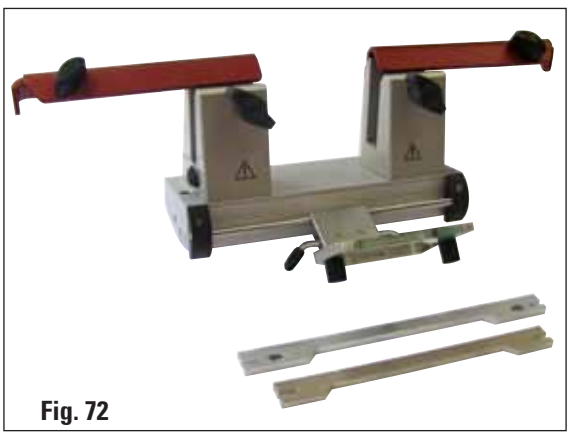


Fig. 72

Cleaning the blade holder CE

Daily cleaning

The safety gloves included in the standard scope of delivery must be worn when cleaning the blade holder to prevent frostbite of the skin.

1. Fold the anti-roll guide system (**33**) to the left while holding it down by the lever (**34**).
2. Unscrew the bolts (**35**) of the pressure plate.
3. Afterwards, the pressure plate (**36**) can be removed for cleaning (with alcohol or acetone).

For disinfection, commercially available, mild cleaners and disinfectants can be used – we recommend Leica Cryofect.

Cleaning the knife holder CN

Daily cleaning

For daily cleaning, it is enough to fold the anti-roll guide system forwards and remove the section waste from the knife holder using a dry brush. Please use a cold brush, as otherwise the section waste will thaw and stick to the knife holder.

It is not necessary to oil the parts, such as the T-piece on the microtome base plate, clamping lever etc.

Disinfection (e.g. with Leica Cryofect)

Spray contaminated surfaces with a uniform coat of concentrate or wipe them down with a rag soaked in it, allow it to make contact for 15 minutes, then wipe it off.

The use of flammable sprays within the cryostat chamber is permitted only with the Leica Cryofect tested by us.

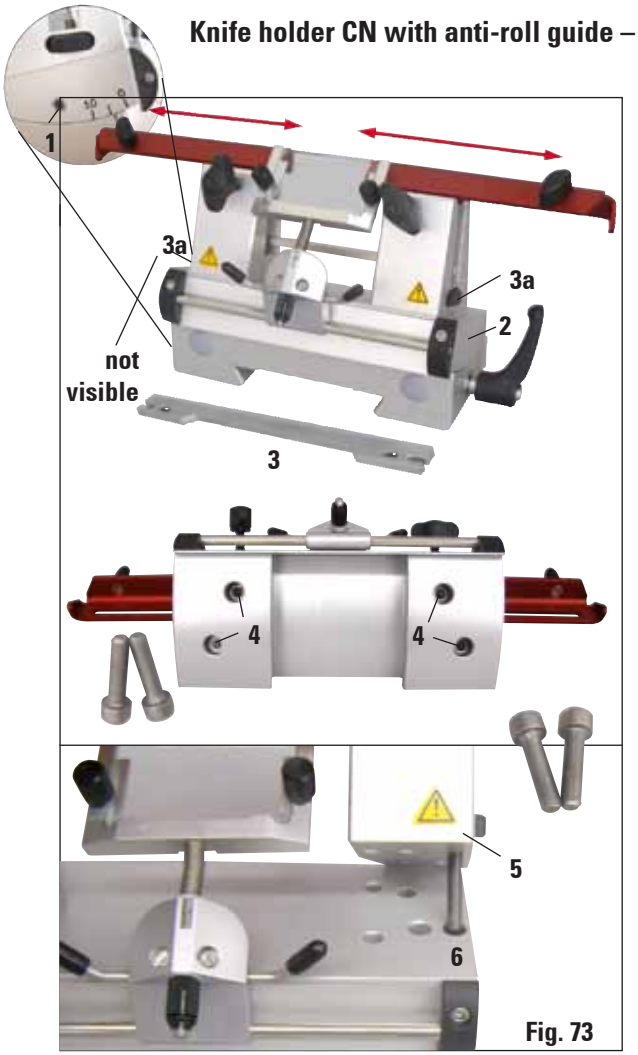


Fig. 73

Knife holder CN with anti-roll guide – Moving the clamping jaws and inserting the knife

The specimen disc 50x80 mm is suitable only for section thicknesses up to approx. 5 µm (due to the large specimen size).

The large specimen disc (80x50 mm) should preferably be used with knife holder CN and the 16 cm C-profile steel knife.
The clamping jaws are factory-installed in the knife holder with a clearance of 64 mm. If necessary, both clamping jaws can be offset with a clearance of 84 mm.
Perform the following steps:

- Use a size 4 Allen key to loosen the screw over the clearance angle adjustment (**1**) and remove the segment arc (**2**) from the knife holder base.
- Use a size 4 Allen key to loosen the screws (**4**) on the underside of the segment arc.
- Carefully pull the clamping jaw (**5**) on the right upward and insert it in the neighboring hole (**6**). Tighten the screws from the underside of the segment arc. Repeat on the left side.
- Insert the long knife support (**3**) on the side over the knurled screw (**3a**) so that the recess faces the user – turn the height adjustment knurled screws until the lower stop is reached.
- The knife can now be inserted from the side and its height adjusted via the knurled screws (**3a**).

Never work with only one clamping jaw, as this does not ensure the stability required for the sectioning process. Also, a long knife will not be sufficiently protected by the knife guard in this instance.

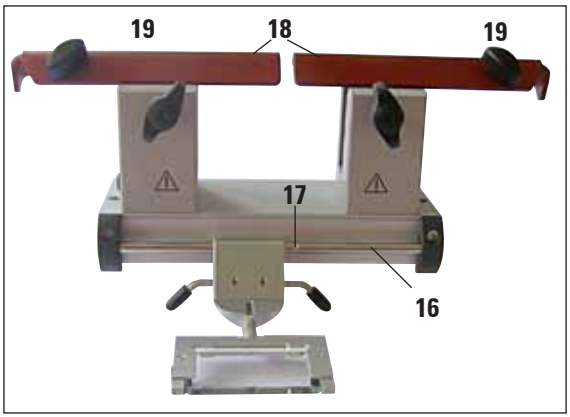


Fig. 74

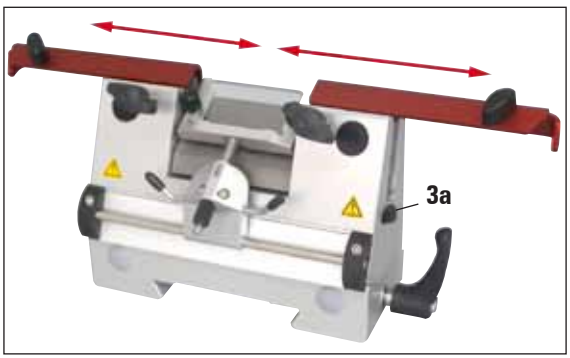


Fig. 75

Fig. 76

Knife guard/lateral movement for knife holder CN

The knife guard (**18**) is fixed and integrated into the clamping jaws. The knife guard has handles (**19**) that allow it to be moved. The knife guard is adequate for knives up to 22 cm in length. Always cover exposed parts of the knife blade after sectioning.

The anti-roll guide system can be moved sideways (only for the 84 mm variant). To better find the mid position, a groove (**17**) is provided in the shaft (**16**).

Knife holder CNZ with anti-roll guide

- Pressure plate permits the full length of the knife to be utilized.
- Use hard metal and steel knives here.

The height of resharpened knives must be adjusted using knurled screws (3a) (approx. 1 mm under the edge of the clamping jaw).
Ensure that the knife is adjusted in parallel vertically.

The safety gloves included in the standard scope of delivery must be worn when inserting/ejecting the knife!

After removing the knife from the knife holder, place it safely into the knife case. **NEVER** place it onto the work surface next to the instrument!

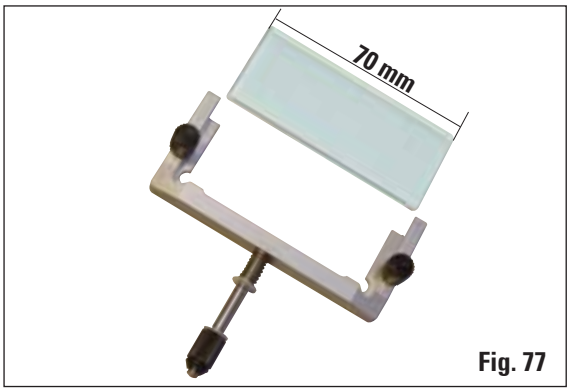


Fig. 77

Anti-roll guide system

Anti-roll plate (with glass stage plate)

Available with various spacers:

- 70 mm - 50 µm, for section thickness: < 4 µm
- 70 mm - 100 µm, for section thickness: 5 µm - 50 µm
- 70 mm - 150 µm, for section thickness: > 50 µm

The 50 µm and 100 µm anti-roll plates are included in the standard scope of delivery of the blade holder CE.

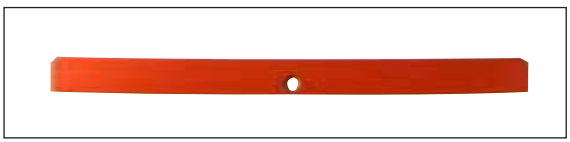


Fig. 78

Straightedge (blade rest)

Insert for low-profile blades for blade holder CE (14 0477 43005) replacement

The blade rest is also included in the standard scope of delivery of the blade holder CE.

When using low-profile blades, the blade rest (**7**) must be inserted into the blade holder CE first, then the low-profile blade (see page 59, Fig. 49)

Fig. 79

Bacteria filter

Bacteria filter 350/5865, pack of 1. Recommendation: bacteria filters should be replaced every 3 months.

(Write the installation date on the filter)

Filter bags and bacteria filter must be disposed of according to applicable laboratory regulations for infectious material. Filters must be replaced, not cleaned.

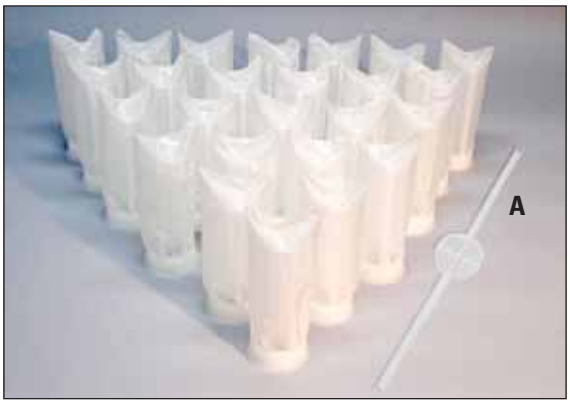


Fig. 80

Replacement filter for extraction system, pack of 25,

with coarse filter insert (**A**) 14 0477 44013

- Change when extraction power is impaired.
- When using the cryostat frequently, check the filter bag daily and replace as required.

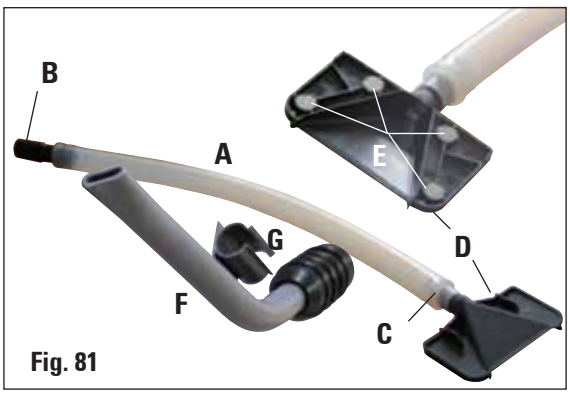


Fig. 81

Vacuum extraction system

A - Hose
B - Hose adapter, black (for filter bag in instrument)
C - Hose adapter, white (for suction nozzle **D** or extraction nozzle **F**)
D - Suction nozzle – with 4 magnets (**E**) on knife holder
G - Plastic clip (for parking the extraction nozzle)

Fig. 82

Storage system, assy. ("hidden")

- Storage system for installation in the rear part of the cryostat for cooled storage of specimen discs and cutting accessories

(For assembly, refer to page 28)

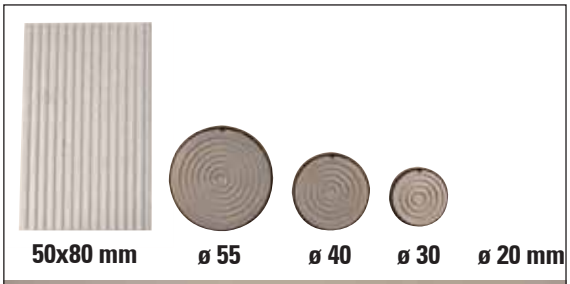



Fig. 83

- Specimen discs in various dimensions

The specimen disc 50 x 80 mm is suitable only for section thicknesses up to approx. 5 µm (due to the large specimen size).

O-rings in various colors

- for plate Ø 20 mm (red or blue), 10x each
- for plate Ø 30 mm (red or blue), 10x each
- for plate Ø 40 mm (red or blue), 10x each
- for plate Ø 55 mm (red or blue), 10x each

for labeling specimen discs using color

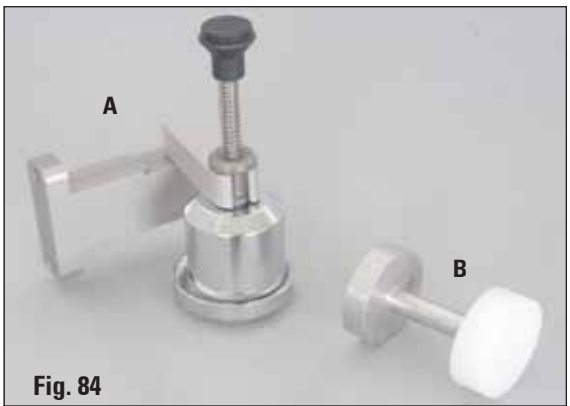


Fig. 84

A Heat extractor with parking station, stationary

- Heat extractor for installation in the cryostats. Consisting of: suspension, heat extractor and parking station

B Heat and cold extractor

- Dual use: For extracting cold from warm storage location; For extracting heat from cold storage location.

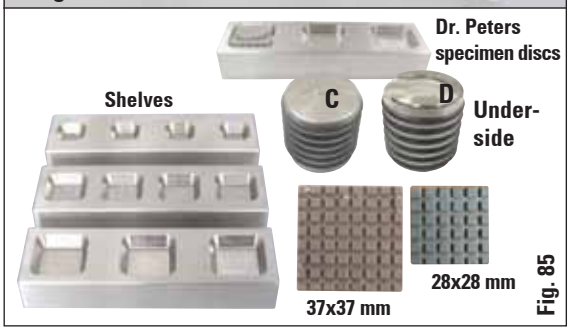


Fig. 85

- The specimen discs of the **Dr. Peters cryoembedding system** can be conveniently removed from the shelf using the underside of the heat extractor (removal aid **D**). Slide the underside over the specimen disc in the direction of the arrow so that the disc remains in the slot and can be removed from the rack.

Large shelf with 3 recesses LxWxH: 30 x 30 x 7 mm
Medium shelf with 4 recesses LxWxH: 24 x 24 x 6 mm
Small shelf with 4 recesses LxWxH: 18 x 18 x 6 mm

Fig. 86

Footswitch,

for use with motorized instruments only.

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

Caution!
All control panel functions and all buttons on the instrument remain active along with the foot switch.

- Using the **CUT MODE** button, select the desired operating mode **CONT** or **SINGLE** on the control panel (Fig. 38, page 37).

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 it.
  The specimen then stops in the 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 end position.

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. 38) is lit up as long as the foot switch remains depressed.
- To resume the sectioning process, select the sectioning type (**CONT** or **SINGLE**) and restart the system using the foot switch.

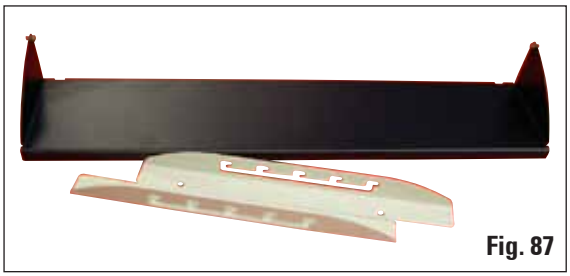


Fig. 87

Footrest,
individually height-adjustable footrest with 5 adjustment options.

Fig. 88

Brush shelf,
for use with blade holder CE

Fig. 89

Storage system, movable

for installation in the front part of the cryostat for cooled storage of preparation aids

12.1 General maintenance instructions

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

- At least **once** a year, have the instrument inspected by a qualified service engineer authorized by Leica.
- Enter into a service contract at the end of the warranty period. For more information, please contact your local Leica technical service center.

- Clean the instrument daily.

If completely defrosted, bacteria filters and filter bags MUST be removed, as melted coverslip mountant clogs the extraction line. The bacteria filter absorbs the moisture during defrosting and thus becomes unusable!

- Every day, remove frozen section waste from the cryostat using a cold brush or use the (optional) extraction device.
- Remove the section waste tray for emptying.
- Remove the storage shelves and the brush shelf for cleaning.
- Remove the closed sliding window from the front by gently lifting it (see page. 75 "Replacing the fluorescent lamp").

Do not use organic solvents or any other aggressive substances for cleaning and disinfecting!
Use only disinfectants listed in these Instructions for Use, such as Leica Cryofect (alcohol or other common alcohol-based disinfectants).

- Drain the cleaning liquid through the hose after the recommended exposure time is over and collect it in the waste container (**1**).

Emptying the condensate bottle

Fig. 90

Check the fill level of the condensate bottle (**1**) visible in the front panel of the instrument at regular intervals.

- The bottle collects the condensate that accumulates during defrosting.

Dispose of the contents of the bottle in accordance with laboratory regulations.

Basically, we recommend UV disinfection (for application, see Chap. 7 "Instrument Controls" - Disinfection).
For easy-to-use spray disinfection we recommend Leica Cryofect. (Cryofect is not available in all countries!)
The cryostat has to be disinfected after each daily use.

Comply with the instructions for use!
The glass anti-roll plate can remain in place during disinfection.

It is not necessary to oil the parts, such as the T-piece on the microtome base plate, clamping lever etc.

In case of visible pollution (such as dust), clean the air inlet opening (Fig. 10, p. 20) of the condenser on the bottom right-hand side of the instrument using a brush, broom or extraction cleaner in the direction of the louvers.

Be exceptionally careful when cleaning the louvers as they have sharp edges and can cause cutting injuries if cleaned improperly.

Do not turn the instrument on before the cryochamber is completely dry! Frost formation!
The front panel and the slit cover of the microtome must be completely dry before turning on the instrument!
All parts that have been removed from the cold cryostat must be dried thoroughly before they are put back into the chamber.

12.2 Changing fuses

- In case of power supply faults, please contact an authorized Leica service technician immediately.

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.

12.3 Replacing the UVC lamp

Turn the instrument off and disconnect the power plug before replacing the UVC lamp.
If the lamp is broken, it must be replaced by the technical service, as the replacement involves a high risk of injury. Beware of the metallic mercury in the UVC lamp; handle it carefully and dispose of it properly.

A UVC lamp has an estimated service life of approx. 9,000 hours.
Each on/off switching cycle reduces the lamp life by approx. one hour plus burning time (**30 min**utes or **180 min**utes respectively).

When both LEDs (short and long-term disinfection) are blinking alternately in control panel field 1, the lamp must be replaced.

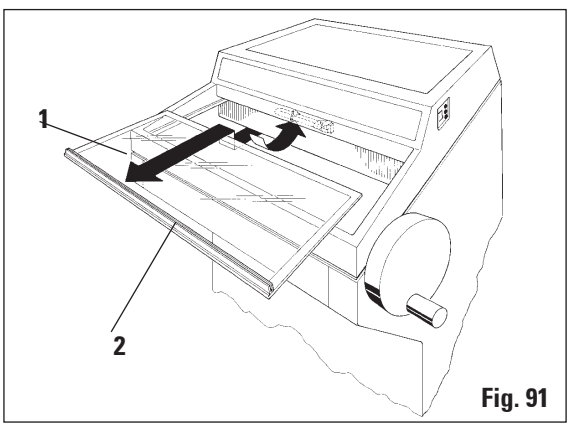


Fig. 91

- Switch off the instrument at the circuit breaker.
- Disconnect the power plug.
- Slightly lift the sliding window **(1)** using the grip **(2)** and pull it out to the front.

Fig. 92

Fig. 93


Fig. 94

Dispose of the UVC lamp separately!

Removal of the lamp

The UVC lamp **(3)** is installed in front of the protection screen for chamber illumination **(4)**.

- Hold the lamp with both hands and carefully pull it out of the clips **(5)** with a **slight** forward movement.
- Detach the metal ring (**7**) on the holder (**6**) in the direction of the arrow (**8**) and carefully pull the lamp out of the holder with your right hand (see Fig. 93)

Installation of the new lamp

- Carefully slide the metal ring (**7**) over the lamp from the left (see Fig. 93).
- Push the lamp into the holder on the left side until it engages.
- Screw the metal ring onto the holder, then hold the lamp with both hands and carefully push it into the clips (**5**).
- Replace the sliding window.
- Connect the instrument to the power supply again and switch it on.

If the UVC key is depressed for more than 30 seconds, the running-time meter for the UVC lamp is reset. This is required every time the UVC lamp is replaced to ensure sufficient power for disinfection!

12.3.1 Replacing the fluorescent lamp

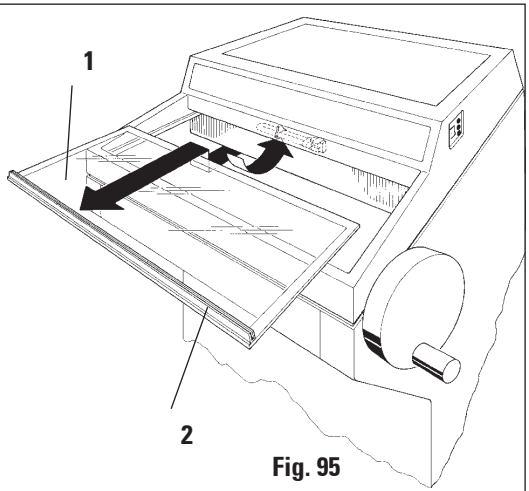


Fig. 95

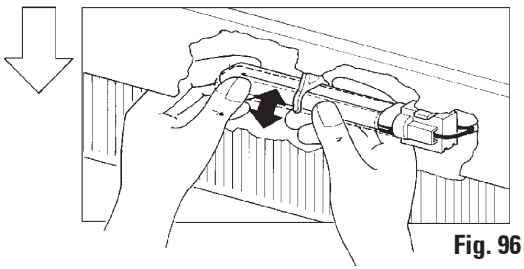


Fig. 96

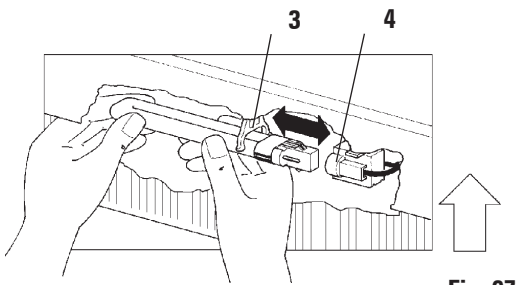


Fig. 97

Switch the instrument off and disconnect the power plug before replacing the fluorescent lamp!
If the lamp is broken, it must be replaced by the technical service, as the replacement involves a high risk of injury.

- Slightly lift the sliding window (**1**) holding it by the grip (**2**) and pull it out to the front.

Removal of the lamp

- The lamp is mounted behind a glare shield and therefore not visible.
- Touch the lamp for better orientation.
- Lightly tilt the fluorescent tube down to the right and pull it out of the clip (**3**).
- Hold the lamp with both hands and pull it to the right out of the holder (**4**).

Only use lamps of the same specification!

Installation of the new lamp

Type:
OSRAM DULUX L 18 W/840.

- Hold the lamp in the correct mounting position, as shown, and push it to the right until it engages in the holder.

13. Decontamination Certificate (Master)

Dear Customer,

Any product that is to be returned to Leica Biosystems or serviced on site, must be cleaned and decontaminated in the appropriate manner. Since it is not possible to decontaminate for prion diseases, such as CJD, BSE, CWD etc., equipment exposed to specimens containing prion diseases cannot be returned to Leica Biosystems for repair. On-site repair of prion contaminated equipment will only be conducted after the Field Service Engineer has been educated in the risks, instructed in the policies and procedures of the institution, and provided with personal protective equipment. Please fill out this confirmation carefully and enclose a copy with the instrument. Attach the confirmation to the outside of the flight case or hand it directly to the service technician.

Packages will not be opened, nor servicing commenced until the Company or service engineer have received a satisfactory certificate. Should returned goods be considered a hazard by the Company, they will be returned immediately to the customer at his/her expense. **Note:** Microtome knives must be in boxes.
Mandatory information: Fields marked with * are mandatory. Depending on whether the instrument is contaminated, please also complete either section A or section B.

Nameplate information

Model (see nameplate)*

SN (see nameplate)*

REF (see nameplate)*

Tick Box A if applicable. Otherwise please complete all parts of B, providing further information as requested or appropriate.

A

Yes ☐

This equipment has not been in contact with unfixed biological samples.

B

1 This equipment has been exposed internally or externally to hazardous materials as indicated below:

Yes	No		Please provide further detail here:
☐	☐	Blood, body fluids, pathological samples	
☐	☐	Other biohazards	
☐	☐	Chemicals/substances hazardous to health	
☐	☐	Other hazards	
☐	☐	Radioactivity	

2 This equipment has been cleaned and decontaminated:

Yes ☐ **No** ☐

If yes, give details of the method: **Please provide further detail here:**

If no**, please indicate why not:

** Such equipment must not be returned without the written agreement of Leica Biosystems.

3 The equipment has been prepared to ensure safe handling/transportation. Whenever possible, please use the original transportation case/box.

Yes ☐ **No** ☐

Important - to avoid refusal of shipment:
Place one copy in the unit prior to packaging, or hand it over to the service engineer. Customer assumes all responsibility for the immediate return shipment of articles sent to Leica without proper decontamination documentation.
If you have any further questions, please call your local Leica organization.
Leica Internal Use: If applicable, note corresponding Job and RAN-/RGA-Number:

Job Sheet No.: _____ BU **R**eturn **A**uthorization **N**umber: _____ SU **R**eturn **G**oods **A**uthorization: _____

Signature/Date*

Name*

Position*

eMail

Institute*

Department*

Address*

Phone* **Fax**

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Warranty

Leica Biosystems 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 agreed characteristics warranted.

The scope of the warranty is based on the content of the concluded agreement. The warranty terms of your Leica sales organization or the organization from which you have purchased the contractual product shall apply exclusively.

Service information

If you are in need of technical customer support or spare parts, please contact your Leica representative or the Leica dealer where you purchased the instrument.

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
- Delivery date

Shutdown and disposal of the instrument

The instrument or parts of the instrument must be disposed of according to existing applicable, local regulations.

Dispose of the UV tube separately.