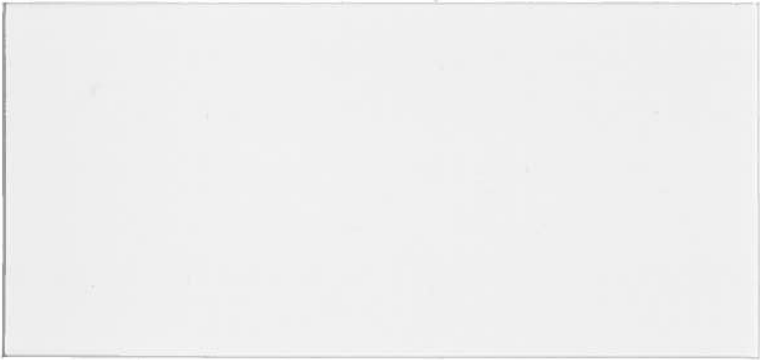


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MICROM
INTERNATIONAL



MICROTOME CRYOSTAT

HM 500 OM

INSTRUCTION MANUAL

MICROTOME CRYOSTAT
HM 500 OM
INSTRUCTION MANUAL

CERTIFICATION

MICROM certifies that this instrument has been tested and checked carefully. Its technical data was verified before shipment to be in accordance with the published specifications.
The instrument complies with applicable international safety regulations.

WARRANTY

This MICROM product is warranted against defects in material and workmanship for a period of 1 year. Parts which prove to be defective during the warranty period will be repaired or replaced free of charge by MICROM International GmbH. No other warranty is expressed or implied. Unauthorized modification or repair by third party persons will void the warranty.
The warranty will expire in case of improper or wrong use of the instrument and in case the warning and precautionary messages are not observed. MICROM International GmbH is not liable for any occurring damage.

Errors and omissions excepted. Subject to amendment and improvement without further notice.

This instruction manual will be supplied together with each instrument. Further copies can be ordered at the nearest MICROM sales office by giving the serial number of the instrument, the number of the instruction manual and the date of issue.

This instruction manual is available in the following languages:

	Cat. No.
German:	386 030
English:	386 040
French:	387 280

INTENDED USE

Dear Customer,

Before putting the instrument into operation, please read these operating instructions carefully to familiarize yourself with its proper operation and functions.

Only skilled or specially trained personnel must operate the microtome, i.e. clamping the specimen, trimming, sectioning and taking off the sections from the instrument. The listed and marked safety measures as well as the regulations of your respective lab must be strictly observed.

MICROM Ser. No.....

Please check the MICROM Ser. No. on the type plate of your instrument and enter this number here. Questions and service can be handled faster by giving the serial no.

Instruction Manual No. 386040

Issued on 29.02.00

<p>MICROM International GmbH Robert-Bosch-Strasse 49</p> <p>D-69190 Walldorf</p> <p>Telefon: (06227) 836-0 Telefax: (06227) 836-111</p>
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Intended Use

Table of Contents

EC Certificate of Conformity

Safety Precautions

Part 1 Introduction

- 1-1 Description of HM 500 OM
- 1-2 Technical specifications

Part 2 Operating instructions

- 2-1 Setting up the cryostat
- 2-2 Initial turn-on
- 2-3 Cooling of microtome chamber
 - 2-3-1 Actual and set value of temperature
 - 2-3-2 The function FREEZE OBJECT
 - 2-3-3 Defrosting the evaporator
 - 2-3-4 Illumination of cooling chamber
- 2-4 Specimen fast cooling and temperature control
 - 2-4-1 Fast cooling of a specimen
 - 2-4-2 Temperature control of a specimen
 - 2-4-3 Detaching the specimen
- 2-5 Cutting movement and section counter
- 2-6 Setting section thickness and trimming thickness
- 2-7 Specimen feed
 - 2-7-1 Specimen coarse feed
 - 2-7-2 Automatic approach system
 - 2-7-3 Trimming and first cuts
 - 2-7-4 Fine feed
- 2-8 Motorized cutting drive
 - 2-8-1 Setting cutting window
 - 2-8-2 Selection of operating modes
 - 2-8-3 Setting cutting speed
 - 2-8-4 START and STOP of cutting drive
 - 2-8-5 Handwheel brake
 - 2-8-6 Emergency stop

- 2-9 Specimen holding device and specimen orientation
- 2-9-1 Specimen holding device using the active deep freezing device
- 2-9-2 Specimen holding device using a heat extractor (optional equipment)
- 2-9-3 Specimen orientation

- 2-10 Knife carriers for cryostat
- 2-10-1 Standard knife carrier with anti-roll guide
- 2-10-2 Magnetic disposable blade carrier with anti-roll guide
- 2-10-3 Disposable blade carrier EC with anti-roll guide

- 2-11 Accessories
- 2-11-1 Standard equipment
- 2-11-2 Additional equipment (optional)

Part 3 Theory of operation of the Cryostat

- 3-1 Cooling of chamber and defrosting
- 3-2 Specimen fast cooling and temperature control
- 3-3 Microtome with retraction
- 3-4 Specimen coarse feed and trimming stages
- 3-5 Motorized cutting drive
- 3-6 Automatic approach system

Part 4 Working with the Cryostat

- 4-1 Preparing the cooling chamber
- 4-2 Freezing-on the specimen
- 4-3 Temperature list for cryo-sectioning
- 4-4 Orientation and trimming of specimen
- 4-5 Sectioning and taking off sections
- 4-6 How to avoid malfunctions

EC Certificate of Conformity

**Name and address of
the manufacturer:** MICROM International GmbH
Robert-Bosch-Straße 49
D-69190 Walldorf

Product designation: Microtome Cryostat
Type reference: HM 500 [O-M-V]

The designated product complies with the laid down regulations:

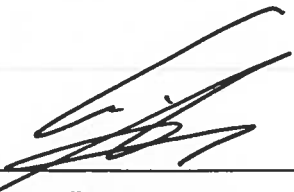
73/23/EWG
89/336/EWG

The designated product complies with the EC regulations by strictly observing the following norms:

DIN EN 55 011 1992
Electromagnetic compatibility (EMC) noise radiation

DIN EN 50 082 part 1/03. 1993
Electromagnetic compatibility (EMC) immunity from disturbance

EN 61010-1:1994 . A2:1996
Classification VDE 0411 part 1:1994 , A1:1996
IEC 1010-1:1990 + A1:1992 + A2:1995



Hans-Jürgen Hess
General Manager

Walldorf, 13 December 1999

EC Certificate of Conformity

Name and address of the manufacturer:
MICROM International GmbH
Friedrich-Böckler-Strasse 49
74876 Weilbach

Product designation:
Type reference:
MICROM Optima
HM 500 (O-M-V)

The designated product complies with the laid down provisions:

7323EWG
88336EWG

The designated product complies with the EC requirements by strictly observing the following norms:

EMC: EN 55 011 1992
Electromagnetic compatibility (EMC) noise radiation

EMC: EN 50 085 part 1/03 1993
Electromagnetic compatibility (EMC) immunity from disturbance

EN 61010-1:1994, AS:1996
Classification VDE 0411 part 1:1994, A1:1996
IEC 1074-1:1995 + A1:1995 + A2:1996


Hans-Jürgen Heese
General Manager

Weilbach, 13 December 1995

CARE IN USING MICROTOME KNIFE



To diminish the danger of being injured by the knife or blade, use the knife guard when adjusting specimen and knife. If possible, the specimen should be clamped in before the knife is inserted into the knife carrier. Before changing the knife carrier, always remove blade or knife! Unused knives should always be kept in a knife case. Never place the knife with the cutting edge upwards. Never try to catch a dropping knife!! Never check the sharpness of the cutting edge with your fingers. The cutting edge is extremely sharp!



Avoid permanent touching of metal parts inside the cryostat microtome chamber. Frostbite at unprotected hands and arms may occur at working temperatures down to -40°C .

HAZARD OF RADIOACTIVE RADIATION



When working with radioactive specimens observe all applicable radiation safety procedures.

HAZARD OF INFECTION



Use the appropriate safety and disinfection measures when working with infectious specimens.

HAZARD OF MALFUNCTION

To avoid the hazard of malfunction of an instrument, it must only be operated in a controlled electromagnetic environment. This means, that transmitters such as mobile phones must not be operated in their close vicinity.

CARE IN USING MICROTOME KNIFE



To diminish the danger of being injured by the knife or blade, use the knife guard when adjusting specimen and knife. If possible, the specimen should be clamped in before the knife is inserted into the knife carrier. Before changing the knife carrier, always remove blade or knife! Unused knives should always be kept in a knife case. Never place the knife with the cutting edge upwards. Never try to catch a dropping knife!! Never check the sharpness of the cutting edge with your fingers. The cutting edge is extremely sharp!



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HAZARD OF RADIOACTIVE RADIATION



When working with radioactive specimens observe all applicable radiation safety procedures.

HAZARD OF INFECTION



Use the appropriate safety and disinfection measures when working with infectious specimens.

PART I INTRODUCTION

1-1 DESCRIPTION OF HM 500 GM

The present HM 500 GM from MICROM Instrumental GmbH is a highly efficient instrument-circuit for a cutting temperature range down to -90°C. Designed as an upright stand-up and with an up-top working seat, the instrument allows convenient and ergonomic handling in standing and sitting position.

The circuit has a cooling system to control the temperature of the working area of the instrument and knife carrier as well as to cool the bearing system for feeding- or specimens on the specimen stage.

A second cooling system ensures the specimen fast cooling and temperature control until with the unit the specimen can be frozen on very quickly. The second cooling system is also very rapidly switched after switching over to regard cooling independency of the present temperature in the instrument chamber. Another function doubly allows detaching the specimen.

The instrument has a section thickness range from 0.2 mm to 30 mm. For the precision of knife and specimen, the instrument extracts the specimen at the end of the coil. The motorized coarse feed system allows specimen forward and backward travel. This way specimen and knife edge distance can be adjusted quickly. A fast and exact approach of the specimen towards the knife edge is guaranteed by the automatic approach system. An advanced, winning function with values from 2 mm to 300 mm permits the fine adjustment up to the fine coil and results in large section thickness when freezing. These knife carriers are available. The standard knife carrier is designed so the knives can be easily changed in place and adjusted, the magnetic disposable blade carrier offers plenty of clearance while approaching, the disposable blade carrier is taken up high and low profile blades. The corresponding multi-roll motor facilitates taking off sections.

The second counter on the operating panel shows the number of sections made. In addition, the model HM 500 GM has a motorized cutting drive with three motor of specimen and an emergency-stop device, which can be controlled by means of the operating controls on the foot pedal.

PART 1 INTRODUCTION

1-1 DESCRIPTION OF HM 500 OM

The cryostat HM 500 OM from MICROM International GmbH is a highly efficient microtome-cryostat for a cutting temperature range down to -40°C . Designed as an upright standing unit with an open-top working area, the instrument allows convenient and ergonomic handling in standing and sitting position.

The cryostat has a cooling system to control the temperature of the working area of the microtome and knife carrier as well as to cool the freezing stations for freezing-on specimens on the specimen stages.

A second cooling system represents the specimen fast cooling and temperature control unit. With this unit, the specimen can be frozen-on very quickly. The desired cutting temperature is also very rapidly achieved after switching over to regulated cooling; independently of the present temperature in the microtome chamber. Another function quickly allows detaching the specimen.

The rustproof microtome has a section thickness range from $0,5\ \mu\text{m}$ to $90\ \mu\text{m}$. For the protection of knife and specimen, the instrument retracts the specimen at the end of the cut. The motorized coarse feed system allows specimen forward and backward travel. This way specimen and knife edge distance can be adjusted quickly. A fast and exact approach of the specimen towards the knife edge is guaranteed by the automatic approach system. An additional trimming function with values from $5\ \mu\text{m}$ to $300\ \mu\text{m}$ permits the fine adjustment up to the first cuts and results in larger section thicknesses when trimming. Three knife carriers are available. The standard knife carrier is designed so the knives can be easily clamped in place and adjusted; the magnetic disposable blade carrier offers plenty of clearance while sectioning, the disposable blade carrier EC takes up high and low profile blades. The corresponding anti-roll guides facilitate taking off sections.

The section counter on the operating panel shows the number of sections made.

In addition, the model HM 500 OM has a motorized cutting drive with three modes of operation and an emergency-stop device, which can be controlled by means of the operating controls or the foot pedal.

1 - 2

TECHNICAL SPECIFICATIONS HM 500 OM

Cooling of microtome chamber (at +20°C ambient temp.) temperature range +20°C down to -40°C
 resolution 1°C
 automatic defrosting 1 each 24 h

Specimen fast and temperature control temperature range +5°C down to -55°C
 resolution 1°C

Section counter with reset 3-digit

Microtome: Section thickness range 0,5 - 90 µm
 Resolution 0,5 µm for 0,5 - 2 µm
 1 µm for 2 - 10 µm
 2 µm for 10 - 20 µm
 5 µm for 20 - 50 µm
 10 µm for 50 - 90 µm

Trimming thickness range: 5 - 300 µm
 Resolution: 5 µm for 5 - 10 µm
 10 µm for 10 - 100 µm
 100 µm for 100 - 300 µm

Specimen retraction during return travel 40 µm
 Horiz. feed range 28 mm
 Vertical specimen stroke 64 mm
 Coarse feed 800 µm/s
 Specimen fine orientation x/y/z - axes
 z- and y-axes each +/- 8°, z-axis 360°
 Specimen stage size 30, 40, 50, 55, 60 mm
 special sizes upon request

Cutting drive: Modes: interval, single and continuous stroke
 Cutting speed: 0,5 - 250 mm/s

Microtome chamber illumination: PL-L 18 W 84 4 P
 Heated sliding window

Storage temperature range: -20°C up to +50°C

Operating temperature range: +5°C bis +40°C (at a max. rel. humidity of 60%)
 altitude up to 2000 m M.S.L.
 for indoor use only

Power requirements: 220 V 60 Hz 8,1 A (+/-10%) 1800 VA
 (max. configuration): 230 V 50 Hz 7,7 A (+/-10%) 1800 VA
 240 V 50 Hz 7,2 A (+/-10%) 1800 VA
 100 V 50 Hz 17,8 A (+/-10%) 1800 VA
 100 V 60 Hz 17,5 A (+/-10%) 1800 VA

Pollution degree: 2
 Overvoltage category: II

Dimensions: 840x1120x780 mm (wide/high/deep)
 Weight: 230 V 180 kg
 110/115 V 204 kg

PART 2 OPERATING INSTRUCTIONS

2-1 SETTING UP THE CRYOSTAT

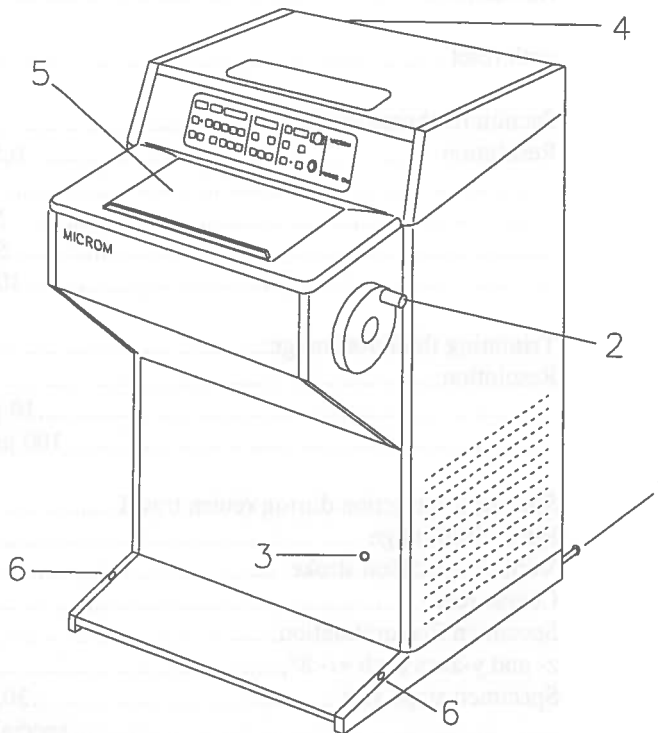


Fig. 1

Unpack the instrument and remove packing as follows:

Loosen and remove the cover of the case, remove the packing material. Loosen the side parts at the bottom and remove them by lifting them over the instrument. To remove the pallet from the instrument, cut off the packing material in the foot area, if necessary. The pedestal of the instrument is equipped with rollers so it can be easily moved to the installation site.

CAUTION! The instrument must only be moved in an upright or slightly tilted (approx. 30°) position.

The installation site must be chosen so that enough ventilation for the cooling system is guaranteed. The distance between wall and rear panel should be approx. 10 - 15 cm. To ensure this, screw in the two enclosed spacers on the lower rear panel of the instrument (fig. 1.1).

Moreover, the suction areas on either side must be kept free.

Please avoid draught by open doors or by air conditioning systems at the installation site. In addition, the microtome chamber should not be exposed to sunlight.

Both measures reduce the formation of frost and therefore results in more favourable work conditions. A high air moisture as well as high ambient temperatures reduce the maximum performance of the instrument.

Turn the screws on the front foot ends (fig. 1.6) to fix the instrument. Then install the handwheel handle (fig. 1.2), which is separately packed, and connect the enclosed foot pedal on the socket (fig. 1.3) above the right foot of the pedestal.

2-2 INITIAL TURN-ON

CAUTION! Before switching on the instrument for the first time, please check if the power requirements indicated on the type plate correspond to the power supply voltage being used.

No other instruments should be connected to the circuit used for the cryostat, as the compressor needs high surge currents when started. Do not use multi-socket power outlets with small wire sizes for the supply of the instrument.

Now connect the plug of the instrument to the power outlet. Then turn on the power switch (fig. 1.4) on the backside of the instrument.

NOTE! If the display shows HELP after turning on, the battery for storing the variable values is used up. (See part 5-2) However, sections can be made with the instrument, but the variable values must be set again.

Then close the heated sliding window (fig. 1.5) and cool down the instrument, which will take approx. 2 - 4 hours according to the set BOX-temperature.

2-3 COOLING OF MICROTOME CHAMBER

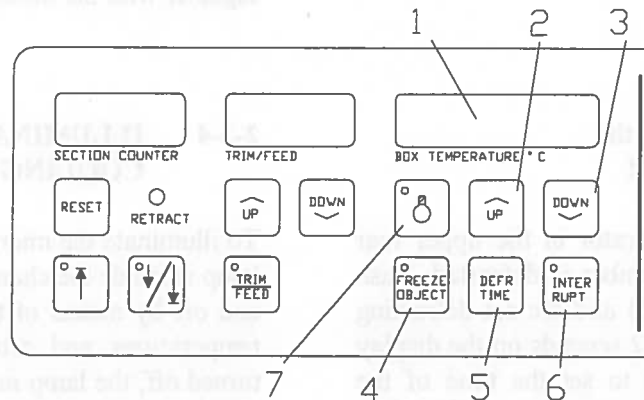


Fig. 2

2-3-1 ACTUAL and SET VALUE OF TEMPERATURE

The cooling of the microtome chamber can be controlled by the corresponding part of the operating controls (fig. 2). The actual temperature of the microtome chamber is shown in °C on the digital display (fig. 2.1). Briefly press the UP- or DOWN-button (fig. 2.2 or 2.3.), the set value of the temperature in the microtome chamber is shown for approx. 2 sec. Afterwards, the display shows again the actual value of the temperature of the microtome chamber.

To change the set value, press permanently the UP-button (fig. 2.2) or DOWN-button (fig. 2.3). The UP-button leads to higher, the DOWN-button to lower temperatures.

The valid range of the set value goes from +20°C down to -40°C. If the UP-button (fig. 2.2) is used beyond the limit of +20°C, the display shows - - - and the temperature control is turned off. Using the DOWN-button (fig. 2.3), the cooling system is turned on again.

2-3-2 The function FREEZE OBJECT

To accelerate freezing-on of a specimen on a specimen stage, choose the function FREEZE OBJECT (fig. 2.4). This way, the additional cooling system for the four front fast freezing stations is turned on for 8 minutes independent of the selected set value and the actual temperature of the microtome chamber. Then, the instrument itself changes to temperature control. To interrupt this process, press again the function FREEZE OBJECT.

To achieve a temperature of -55°C of the fast freezing stations, choose the function FREEZE OBJECT a few minutes before preparing the specimen for sectioning. Consequently, the freezing-on process is accelerated and qualitatively improved.

2-3-3 DEFROSTING the EVAPORATOR

Every 24 hours the evaporator in the upper rear part of the microtome chamber is defrosted. Push the button DEFR (fig. 2.5) and the set defrosting time is shown for approx. 2 seconds on the display (fig. 2.1). It is advisable to set the time of the defrosting process not during routine working time. To change the starting time of defrosting at intervals of 15 minutes, simultaneously press the button DEFR (fig. 2.5) and the button UP or DOWN. Defrosting can only be carried out at the set defrosting time, if the real time is set correctly. The real time can be read on the display (fig. 2.1), if the button FREEZE OBJECT (fig. 2.4) is pushed in addition to the already pressed button DEFR (fig. 2.5).

To correct the real time at intervals of one minute, additionally press the UP- or DOWN-button. After finishing the adjusting process, the display (fig. 2.1) shows the set temperature of the microtome chamber after two more seconds.

If needed, the daily defrosting can be interrupted or cancelled. Press the button INTERRUPT (Fig. 2.6), the LED lights up. If the function INTERRUPT is chosen during the defrosting period, the LED blinks for the rest of the suppressed defrosting process. A cancelled or interrupted defrosting process must be repeated later on, as otherwise the evaporator will cover completely with frost and cannot cool any more.

For this, press the button fig. 2.6 again to turn off the function INTERRUPT (LED is off). The next defrosting process will then be started when the next pre-selected defrosting time is reached. Immediate defrosting can be carried out at any time by pressing the button DEFR (fig. 2.5) together with the button RESET (fig. 4.2).

2-3-4 ILLUMINATION of COOLING CHAMBER

To illuminate the microtome chamber a fluorescent lamp is inside the chamber, which can be turned on and off by means of the button (fig. 2.7). At low temperatures and after longer periods of being turned off, the lamp might flare when turning it on. Used lamps can be changed by the user himself (see 5-3).

2-4 SPECIMEN FAST COOLING and TEMPERATURE CONTROL

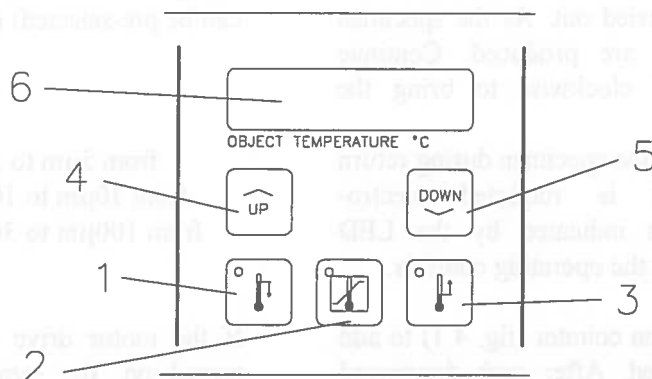


Fig. 3

The specimen fast cooling and temperature control has three functions. If none of the three possible functions were chosen, the display (fig. 3.6) remains blank. As soon as a function is turned on, the display shows the actual value of the specimen temperature. The display turns off after approx. 4 seconds, if no other function is selected after having used the function <detach specimen> (fig. 3.3).

2-4-1 FAST COOLING of a SPECIMEN

Press the button <fast cooling> (fig. 3.1). Then place the specimen together with freezing compound on the specimen stage. Put the specimen stage on one of the fast freezing stations for freezing-on. For solid fast freezing of the specimen, remove the specimen stage together with the specimen and the thickening freezing compound from the fast freezing station and clamp it in the specimen head. The specimen head, which is designed as an evaporator, reaches a temperature of -55°C when using the operating mode <fast cooling>. Fast cooling should be turned on until specimen and freezing compound are frozen evenly. If a manual change to <temperature control> is not made, the instrument changes automatically from <fast cooling> to <temperature control> after 8 minutes.

2-4-2 TEMPERATURE CONTROL of a SPECIMEN

With the specimen temperature control, an optimal cutting temperature can be set. A specific cutting temperature is required according to fat content and consistency of the specimen (see part 4: Working with the Cryostat).

Press permanently the UP- or DOWN-button (fig. 3.4 or 3.5) to select the desired cutting temperature as set value. Briefly press the UP- or DOWN-button to show the valid set value of the temperature control for approx. 2 seconds. Afterwards, the display (fig. 3.6) shows again the actual value of the specimen temperature. To start the function <temperature control> press the button fig. 3.2.

2-4-3 DETACHING the SPECIMEN

After sectioning is finished, there are two ways to detach the specimen from the specimen stage. One way is to remove the specimen stage from the specimen head and then detach the specimen outside the microtome chamber, the other way is to use the function <detach specimen>. Press the button <detach specimen> (fig. 3.3) to warm up the specimen stage. After a short while the specimen can be removed easily.

If the temperature is higher than $+5^{\circ}\text{C}$, the function <detach specimen> is turned off automatically. Within 2 minutes the display is turned off, if no other function is chosen.

2-5 CUTTING MOVEMENT and SECTION COUNTER

Turn the handwheel in a clockwise direction so the cutting movement is carried out. As the specimen moves down, sections are produced. Continue turning the handwheel clockwise to bring the specimen back up.

To protect the knife and the specimen during return travel, the specimen is retracted electro-mechanically, which is indicated by the LED RETRACT (fig. 4.3) on the operating controls.

The cryostat has a section counter (fig. 4.1) to add up the sections produced. After each downward movement of the specimen holder, the number on the section counter rises by 1. The counter can be re-set to zero by means of the RESET-button (fig. 4.2) at any time.

2-6 SETTING SECTION THICKNESS and TRIMMING THICKNESS

To choose between section thickness and trimming thickness setting, press the button (fig. 4.6).

If the trimming thickness setting is chosen, the LED in button (fig. 4.6) lights up. If the LED does not light up, the section thickness can be set.

The desired section or trimming thickness can be selected via the buttons UP (fig. 4.8) or DOWN (fig. 4.9) and is shown on the display (fig. 4.7).

For the trimming thickness, also values of 100, 200 or 300 μm can be selected. The numbers are shown on the display as 1 H, 2 H or 3 H. The letter "H" stands for hundred.

The graduation of the section thicknesses (which can be pre-selected) is divided into 5 ranges:

range	graduation
from 0,5 μm to 2 μm	0,5 μm
from 2 μm to 10 μm	1 μm
from 10 μm to 20 μm	2 μm
from 20 μm to 50 μm	5 μm
from 50 μm to 90 μm	10 μm

The graduation of the trimming thicknesses (which can be pre-selected) is divided into 3 ranges:

range	graduation
from 5 μm to 10 μm	5 μm
from 10 μm to 100 μm	10 μm
from 100 μm to 300 μm	100 μm

If the motor drive for the cutting movement is turned on, the same process is carried out as described above. For the manual mode, the handwheel on the right side of the instrument turns during this process.

CAUTION! Keep the rotating area of the handwheel clear! Keep enough distance to the rotating handwheel handle.

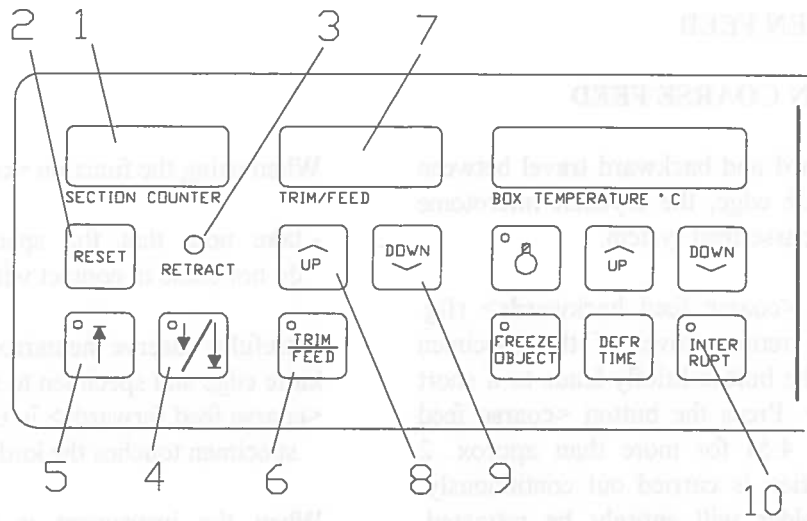


Fig. 4

CAUTION! For your personal safety, before activating the coarse feed forward, move the anti-roll plate onto the blade against possible splintering of the blade. This might be caused by an incorrect approach.

Press the button <coarse feed forward> to start a continuous forward travel (Fig. 4-4). This continuous forward travel is carried out as long as the button is being pressed. This way of trimming is normally chosen, when there is still some distance between specimen and knife edge.

To carry out a defined, short forward travel, briefly press the button (Fig. 4-4). The value for the forward travel was chosen via the operating control and is shown on the display. The continuous forward travel is only carried out, when the button (Fig. 4-4) is pressed for a longer time.

CAUTION! With the function <course feed forward> specimen and knife edge are adjusted very quickly. To avoid damages to specimen and knife, the following points are of utmost importance!

CAUTION! For your personal safety, before activating the automatic approach system, move the anti-roll plate onto the blade against possible splintering of the blade. This might be caused by an incorrect approach.

2-7-1 AUTOMATIC APPROACH SYSTEM
The automatic approach system performs the fine and coarse approach of the specimen towards the knife edge and can be applied between -2°C and -30°C. Outside this temperature range, the automatic approach system is blocked (see error code E-06).

When the instrument is just carrying out the retraction movement and the function <course feed forward> is selected, the coarse feed will be carried out and the instrument is unblocked.

When the first cut position is reached the motorized coarse feed turns off. The LED in button (Fig. 4-4) lights up and an acoustic signal sounds. However, the cut can still be finished.

2-7 SPECIMEN FEED

2-7-1 SPECIMEN COARSE FEED

For the fast forward and backward travel between specimen and knife edge, the cryostat microtome has a motorized coarse feed system.

Press the button <coarse feed backwards> (fig. 4.5) to start the return travel of the specimen holder. Pressing the button briefly leads to a short return travel only. Press the button <coarse feed backwards> (fig. 4.5) for more than approx. 2 seconds, the function is carried out continuously. The specimen holder will entirely be retracted. However, the function can be stopped at any time by briefly pressing again the button <coarse feed backwards> (fig. 4.5).

When the back end position is reached, the coarse feed turns off. The LED of the button (fig. 4.5) blinks which means that the specimen holder is at the back end position.

CAUTION! For your personal safety, before activating the coarse feed forwards, move the anti-roll plate onto the blade against possible splintering of the blade. This might be caused by an incorrect coarse feed function.

Press the button <coarse feed forwards> to start a continuous forward travel (fig. 4.4). This continuous forward travel is carried out as long as this button is being pressed. This way of trimming is normally chosen, when there is still some distance between specimen and knife edge.

To carry out a defined, short forward travel, briefly press the button (fig. 4.4). The value for this forward travel was chosen via the operating control and is shown on the display. The continuous forward travel is only carried out, when the button (fig. 4.4) is pressed for a longer time.

CAUTION! With the function <coarse feed forwards> specimen and knife edge are adjusted very quickly. To avoid damages to specimen and knife, the following points are of utmost importance!

When using the function <coarse feed forwards>

- take note that the specimen and knife edge do not come in contact with each other,

- carefully observe the narrowing gap between knife edge and specimen to stop the function <coarse feed forwards> in time before the specimen touches the knife edge.

When the instrument is just carrying out the retraction movement and the function <coarse feed forwards> is selected, the coarse feed movement is carried out and the retraction is annulled.

When the front end position is reached the motorized coarse feed turns off. The LED in button (fig. 4.4) lights up and an acoustic signal sounds. However, the last cut will be finished.

2-7-2 AUTOMATIC APPROACH SYSTEM

The automatic approach system performs the fast and exact approach of the specimen towards the knife edge and can be applied between -5°C and -30°C . Outside this temperature range, the automatic approach system is blocked (see error code E-06).

Before starting the automatic approach system, place the anti-roll plate onto the blade for your personal safety.

CAUTION! For your personal safety, before activating the automatic approach system, move the anti-roll plate onto the blade against possible splintering of the blade. This might be caused by an incorrect approach.

DANGER! When using different freezing techniques, for example by means of the fast freezing stations, liquid nitrogen, CO₂ and the like, which generate a freezing temperature of below -30°C, the automatic approach system can only be applied after the specimen will have adjusted itself to the respective chamber temperature.

As a safety measure, place the anti-roll plate onto the blade, otherwise an incorrect approach will be carried out and the blade might splinter.

Use the handwheel to make sure that the most protruding position of the specimen is opposite the knife edge.

Use the buttons (fig. 4.4 and 4.10) to start the automatic approach system.

For this, first press button (fig. 4.4) and then press button (fig. 4.10) while button (fig. 4.4) is still being pressed. The red LED in button (fig. 4.4) lights up.

Then the specimen holder moves forwards until the specimen touches the knife edge.

Immediately afterwards this forward movement of the specimen holder is stopped and moved backwards by a safety distance of 200 µm. The red LED in button (fig. 4.4) goes off.

When passing the next upper reversal point, the specimen holder automatically moves forwards again by 200 µm. The specimen is now in position to start sectioning.

If necessary, the process of the automatic approach can be cancelled by pressing the button (fig. 4.5) or by using the buttons (fig. 4.4 and 4.10) again.

Passing the upper or lower reversal point by turning the handwheel, the automatic approach can also be interrupted.

When an automatic approach has been carried out, another approach can be started immediately, if needed.

This might become necessary when the specimen has been oriented again.

If the automatic approach is not carried out, an error code is shown on the display (fig. 2.1). The error code E-05 is shown on the display in case the activating signal for the automatic approach system has already been recognized before the automatic approach system was started. This might be possible, in case a specimen has already been in contact with the knife edge, e.g. by protruding fibers. The error code E-05 is shown for approx. 4 sec. Then the box temperature is shown automatically again.

However, if there is no obvious explanation for the error code E-05, please call a service technician.

The error code E-06 is also shown on the display (fig. 2.1) in case the actual temperature is not between the range of -5°C and -30°C. The error code E-06 is shown for approx. 4 sec. on the display. Then the box temperature is shown automatically again.

2-7-3 TRIMMING and FIRST CUTS

After the specimen and the knife are adjusted, further gradual feed for trimming can be carried out using the function <trimming>. For different sectioning series, deeper layers of the specimen can be reached with the function <trimming>.

Press button (fig. 4.6) to select the trimming thickness setting (the LED in button, fig. 4.6 lights up). Then press the buttons UP (fig. 4.8) or DOWN (fig. 4.9) to select the desired trimming value.

The pre-selected trimming value is shown on the display (fig. 4.7).

Turn the handwheel in a clockwise direction to carry out the trimming thickness in the upper reversal point of the cutting movement.

2-7-4 FINE FEED

After having adjusted knife and specimen as well as having trimmed the specimen, sectioning can be started.

Press button (fig. 4.6) to select the section thickness setting (FEED) (LED in button, fig. 4.6 does not light up). Then press the buttons UP (fig. 4.8) or DOWN (fig. 4.9) to set the desired section value.

The pre-selected section thickness is shown on the display (fig. 4.7).

Turn the handwheel in a clockwise direction to feed the specimen at the selected section thickness.

2-8 MOTORIZED CUTTING DRIVE

Sectioning can be carried out either manually by turning the handwheel or by means of a motorized cutting drive. The controlled cutting speed can be set continuously from 0,5 up to 250 mm/s. The cutting speed refers to the cutting window; for the upward return travel a proportionally higher retraction speed is carried out.

To adjust the cutting window in relation to a specimen, it can be set continuously within the maximum values. To activate the functions of the cutting drive, turn on the group switch ON/OFF (fig. 5.14) first.

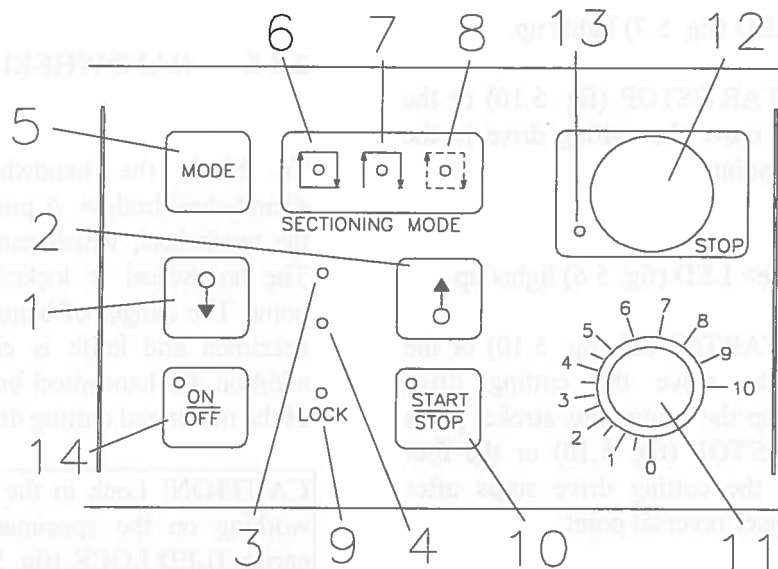


Fig. 5

2-8-1 SETTING CUTTING WINDOW

Turn the handwheel in a clockwise direction so that the lower edge of the specimen is positioned approx. 8 mm above the knife edge. Then briefly press the button <cutting window upper limit> (fig. 5.1). Continue turning the handwheel clockwise to place the upper edge of the specimen just below the knife edge. Briefly press the button <cutting window lower limit> (fig. 5.2) to finish the setting. The green LED (fig. 5.3) confirms the correct setting of the cutting window.

If the red LED (fig. 5.4) lights up, this shows that the cutting window limits have been set incorrectly. In this case, the cutting window limits have been interchanged and must be re-set again with valid upper and lower limits. The cutting window limits cannot be set during retraction (LED RETRACT, fig. 4.3 lights up).

2-8-2 SELECTION of OPERATING MODES

Press the button MODE (fig. 5.5) one or two times to select between the three different operating modes of the cutting drive:

- <Interval stroke> LED (fig. 5.8) lights up.

The cutting drive only moves as long as the button START/STOP (fig. 5.10) or the foot pedal is pressed.

- <Single stroke> LED (fig. 5.7) lights up.

Press the button START/STOP (fig. 5.10) or the foot pedal once, to move the cutting drive to the next lower reversal point.

- <Continuous stroke> LED (fig. 5.6) lights up.

Press the button START/STOP (fig. 5.10) or the foot pedal once to move the cutting drive continuously. To stop the continuous stroke, press the button START/STOP (fig. 5.10) or the foot pedal again. Then the cutting drive stops after reaching the next lower reversal point.

2-8-3 SETTING CUTTING SPEED

The desired cutting speed is set on the potentiometer (fig. 5.11) on the operating controls. The scaling from 0 up to 10 corresponds to a cutting speed of 0,5 up to 250 mm/s. To save time, the return travel speed is enhanced in relation to the cutting speed, especially for slow cutting speeds.

2-8-4 START and STOP of CUTTING DRIVE

The cutting drive can be turned on and off by means of the button START/STOP (fig. 5.10) or the foot pedal.

For this, the functions <handwheel brake> and <emergency stop> must not be activated (see 2-8-5 and 2-8-6).

The course function of the cutting drive results from the selected cutting window, the selected operating mode and the set cutting speed (see 2-8-1, 2-8-2, 2-8-3).

2-8-5 HANDWHEEL BRAKE

To block the handwheel use the function <handwheel brake>. A pin is situated on the rim of the handwheel, which can be pressed backwards. The handwheel is locked in the upper reversal point. The danger of being injured while adjusting specimen and knife is considerably reduced. In addition, the handwheel brake prevents the starting of the motorized cutting drive.

CAUTION! Lock in the handwheel brake, when working on the specimen holder and the knife carrier (LED LOCK (fig. 5.9) lights up).

2-8-6 EMERGENCY STOP

To quickly eliminate danger, the cryostat has a function <emergency stop> (fig. 5.12). Press the red button (fig. 5.12.) on the operating controls to stop immediately the motorized cutting drive. (The LED (fig. 5.13) lights up). Continue sectioning pull out the red button (fig. 5.12). The cutting drive can be started again.

CAUTION! In case danger arises from cutting drive, push the <emergency stop> (fig. 5.12).

2-9 SPECIMEN HOLDING DEVICE and SPECIMEN ORIENTATION

2-9-1 SPECIMEN HOLDING DEVICE USING THE ACTIVE DEEP FREEZING DEVICE

There are several possibilities to freeze-on specimens.

First, decide whether the specimen fast cooling and temperature control should be used or not. Various specimen stages (fig. 10) are available. Round specimen stages can be supplied with a diameter of 30 mm (fig. 8.1) and 40 mm (fig. 8.2) and square specimen stages with a size of 50, 55 and 60 mm (fig. 8.3). Special sizes upon request.

Using the specimen fast cooling and temperature control, freeze-on the specimen to a specimen stage (see 2-4-1), which can be inserted into the cooling head of the specimen fast cooling and temperature control. The specimen stages can be used in combination with the fast freezing device on the left side of the microtome chamber (fig. 6.1). Put the specimen together with the freezing compound on the specimen stage at positive temperatures. Then put the specimen stage together with the specimen (fig. 6.3) into one of the four front fast freezing stations (fig. 6.2).

NOTE! The deep freezing device can only be activated if the temperature of the cooling chamber is below -10°C .

The upper side of the freezing station must not be covered by frost or ice. To avoid this, use acetone, ethanol or the like. Moreover, use the four enclosed cover caps to avoid frost or ice built-up.

2-9-2 SPECIMEN HOLDING DEVICE USING A HEAT EXTRACTOR (OPTIONAL EQUIPMENT)

Prepare and freeze the specimen as described in part 2-9-1.

To achieve faster and more even freezing of the specimen use a heat extractor. This way, the specimen is frozen at the same time from above and below, which reduces the formation of artefacts considerably.

The drop device (fig. 7.3) can be moved horizontally on a guide rail (fig. 7.1) and can be moved in a circle by means of a turning knob (fig. 7.2).

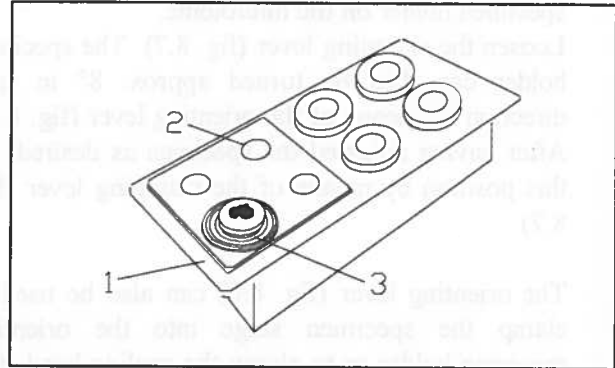


Fig. 6

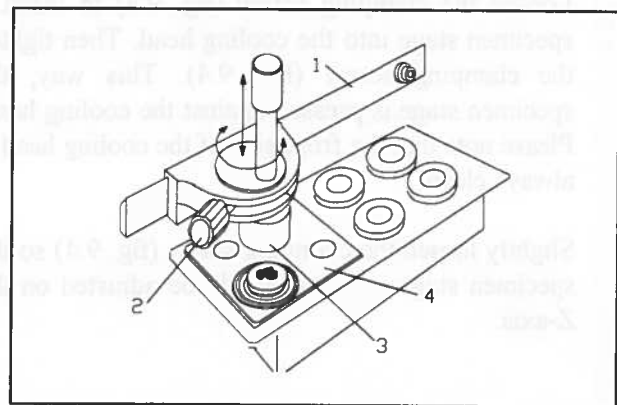


Fig. 7

To pre-cool the heat extractor, move it on the rail to the front and lower it onto the fast freezing plate (fig. 7.4) by turning the knob (fig. 7.2).

When required, position the drop device (fig. 7.3) above the specimen and turn the knob (fig. 7.2) to put the stamp slightly on the specimen.

By further turning the knob, the pressure is increased, which might lead to a deformation of the specimen.

Should the drop device (fig. 7.3) stick to the specimen, loosen it by turning the handle of the drop device to the right side.

2-9-3 SPECIMEN ORIENTATION

In many cases, the orientation of the specimen in relation to the cutting edge would be advantageous. This can easily be done by means of the orienting specimen holder on the microtome.

Loosen the clamping lever (fig. 8.7). The specimen holder can then be turned approx. 8° in each direction by means of the orienting lever (fig. 8.6). After having adjusted the specimen as desired, fix this position by means of the clamping lever (fig. 8.7).

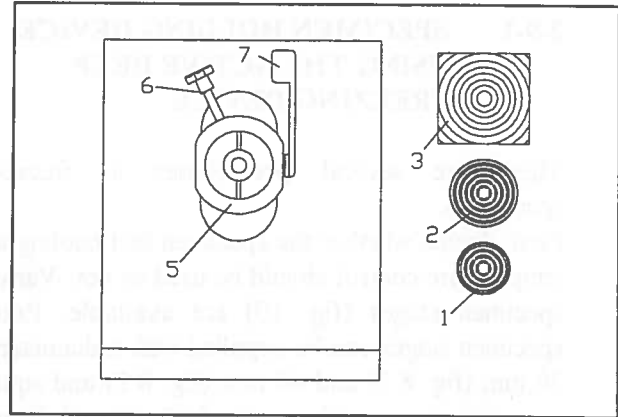


Fig. 8

The orienting lever (fig. 8.6) can also be used to clamp the specimen stage into the orienting specimen holder or to clamp the cooling head (fig. 9.1) when working with the specimen fast cooling and temperature control.

Loosen the clamping screw (fig. 9.4) to insert a specimen stage into the cooling head. Then tighten the clamping screw (fig. 9.4). This way, the specimen stage is pressed against the cooling head. Please note that the front side of the cooling head is always clean.

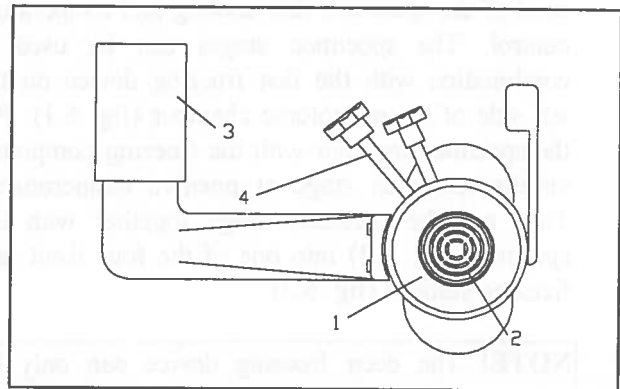


Fig. 9

Slightly loosen the clamping screw (fig. 9.4) so the specimen stage can universally be adjusted on the Z-axis.

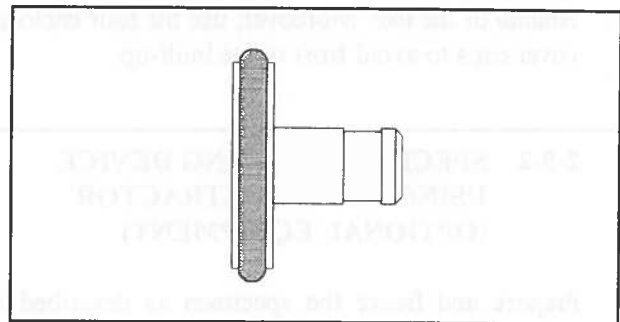


Fig. 10

2-10 KNIFE CARRIERS for CRYOSTAT

2-10-1 STANDARD KNIFE CARRIER with ANTI-ROLL GUIDE

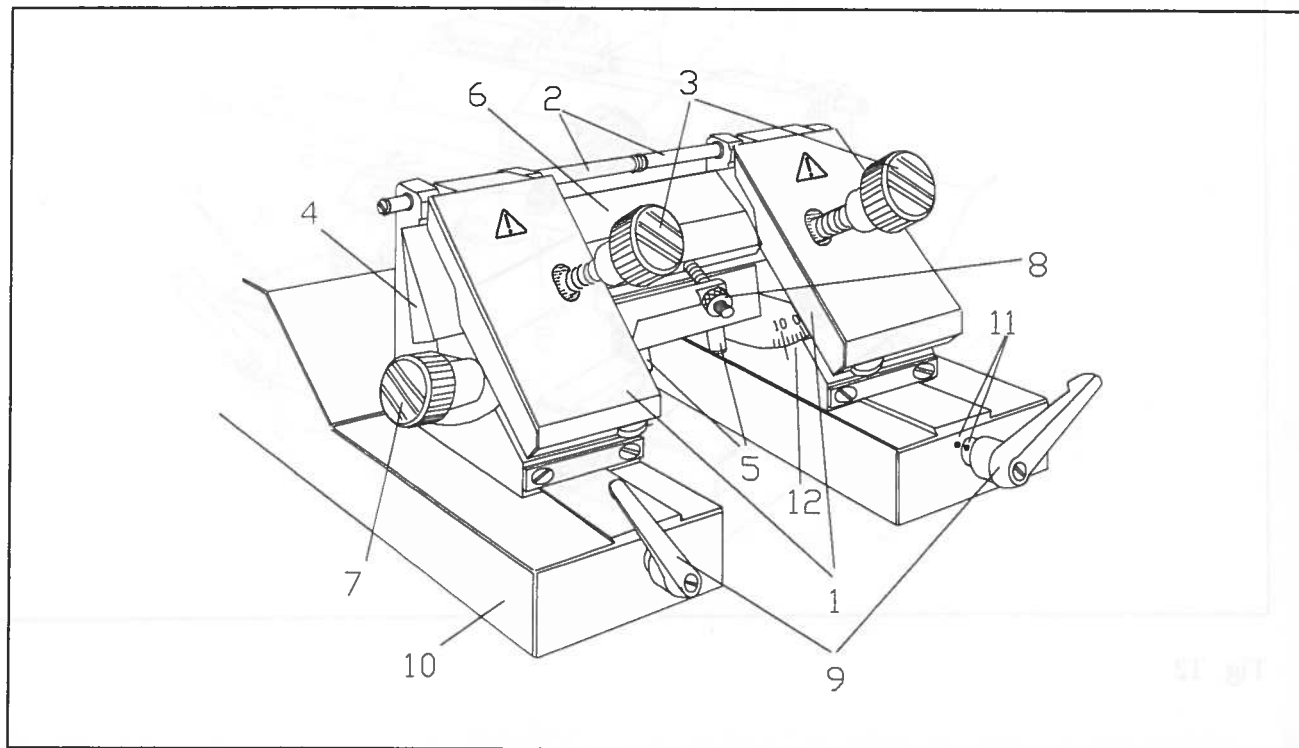


Fig. 11

The standard knife carrier of the cryostat microtome is easy to use. Loosen the clamping screws (fig. 11.3) and flip up the clamping plates (fig. 11.1) to insert the knife. First, slightly move the clamping plates (fig. 11.1) upwards, lift them off and turn them upwards. Fig. 12 shows the standard knife carrier with a clamping plate in upward position.

CAUTION! The knife carrier is equipped with two knife guards (fig. 11.2) which can be moved sideways. These knife guards should be pushed together to the middle while knife or specimen are adjusted. This reduces the danger of injury considerably!

The anti-roll plate (fig. 11.6) is lifted forwards in clockwise direction by means of the turning knob (fig. 11.7).

Now the knife (fig. 11.4) can easily be inserted from the front.

Then, turn the clamping plates (fig. 12.1) downwards. To fasten them, slightly move them downwards.

To put the anti-roll plate (fig. 12.6) against the knife (fig. 12.4) turn the knob (fig. 12.7) in a counter-clockwise direction.

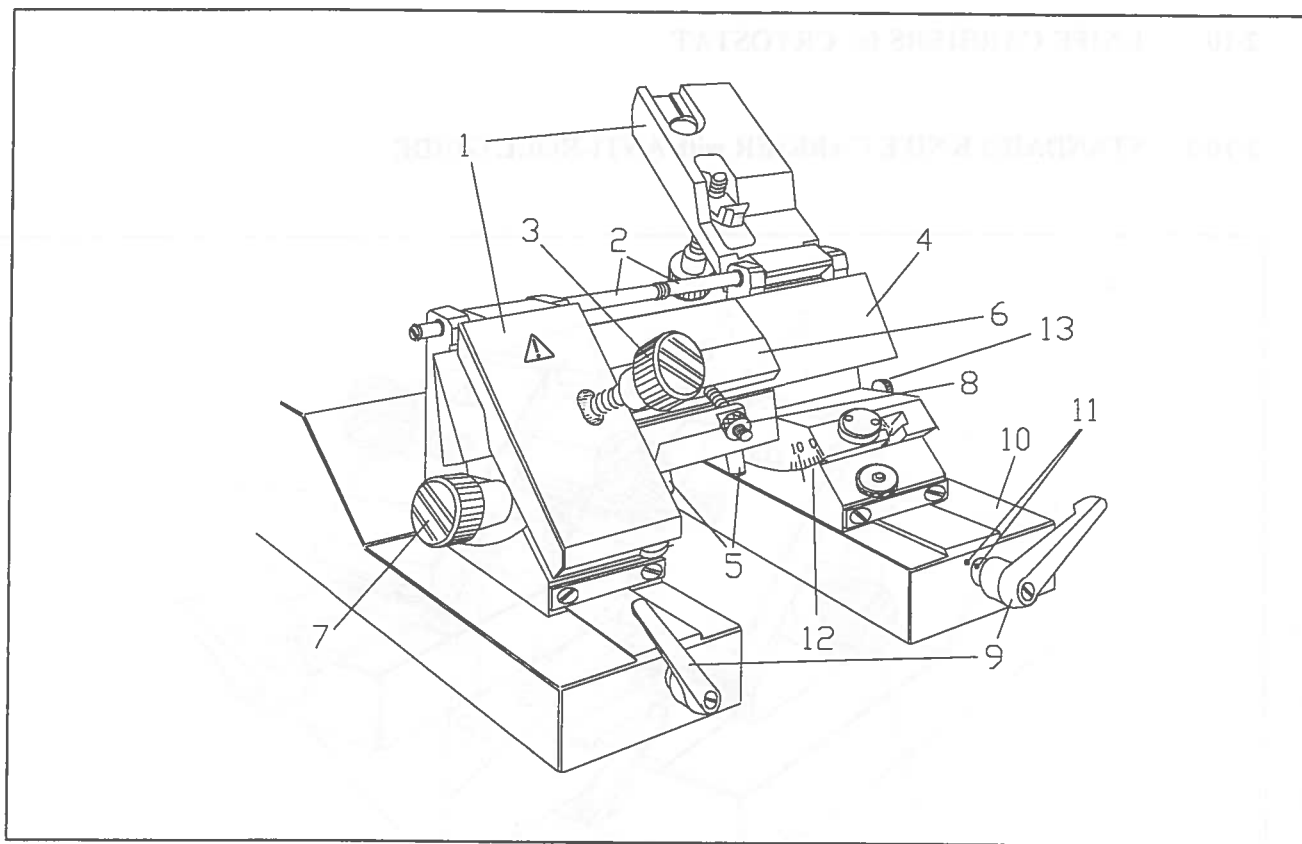


Fig. 12

To adjust the knife edge in relation to the anti-roll guide, use the height adjustment screws (fig. 12.5). Especially note the parallel alignment of knife edge and anti-roll guide edge. The knife edge should correspond to the red marks on the knife carrier. To fix the knife in its position, tighten the clamping screws (fig. 12.3) simultaneously.

The knurled screw (fig. 12.8) on the anti-roll guide allows the fine adjustment of the anti-roll guide in relation to the knife edge.

With the two flat levers (fig. 12.9) the clearance angle can be adjusted and, at the same time, the knife carrier is fixed on the base (fig. 12.10). To move the knife carrier on the guide rails, turn the two flat levers (fig. 12.9) inwards.

Afterwards, move the flat levers outwards to their clamping position.

To change the clearance angle adjustment loosen the clamping screw (fig. 12.13) on the right side of the knife carrier in addition to the already loosened flat levers (fig. 12.9). Tighten clamping screw and flat levers after having re-adjusted the clearance angle.

By experience, usable cuts are only achieved at a clearance angle of 10° or more. The adjusted clearance angle is shown on the scale (fig. 12.12).

The dots (fig. 12.11) on the base (fig. 12.10) and on the flat levers (fig. 12.9) show the clamping position. The position of the grips of the flat levers can be adjusted in 30°-steps, by pulling them slightly out and then turning them into a favourable position.

2-10-2 MAGNETIC DISPOSABLE BLADE CARRIER with ANTI-ROLL GUIDE

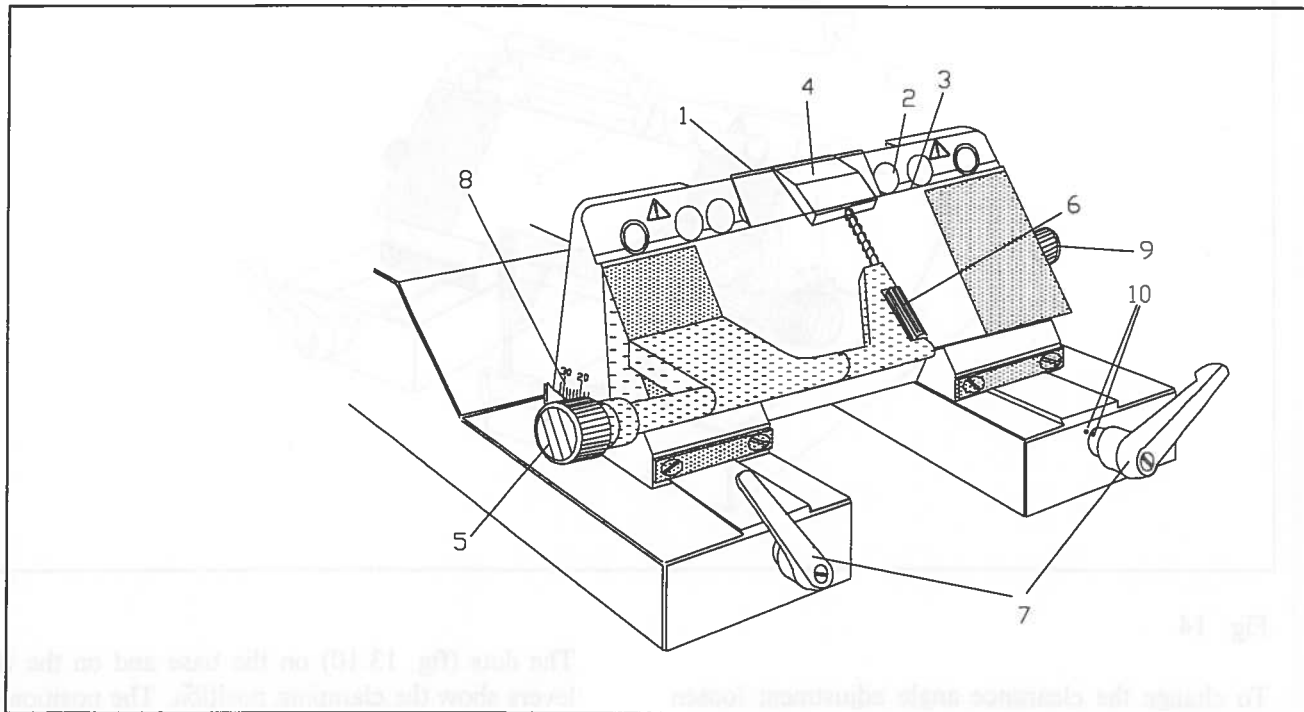


Fig. 13

With the magnetic disposable blade carrier, MICROM blades of 70 x 19 mm and a facet angle of approx. 33° can be clamped.

Insert the blade (fig. 13.1) onto the blade slider (fig. 14.1) and put it on the magnetic surface (fig. 13.2) of the knife carrier from the side. To move the blade sideways, press the blade slider downwards so that the blade is properly put against the ledge (fig. 13.3) of the blade carrier. Then take off the blade slider.

To move the blade to a new position, put on the blade slider (fig. 14.1) onto the blade and shift it. The blade slider must always be put on in a way that the inscription MICROM can be read, which guarantees that the slanted edge (fig. 14.2) of the blade slider shows to the backside of the blade.

Turning the grip (fig. 13.5), the anti-roll plate (fig. 13.4) can be turned forwards and backwards. The knurled screw (fig. 13.6) allows the adjustment of the edge of the anti-roll plate in relation to the blade edge.

With the two flat levers (fig. 13.7) the clearance angle can be adjusted and, at the same time, the knife carrier is fixed on the base. To move the knife carrier on the guide rails, turn the two flat levers (fig. 13.7) inwards. Afterwards, move the flat levers outwards to their clamping position.

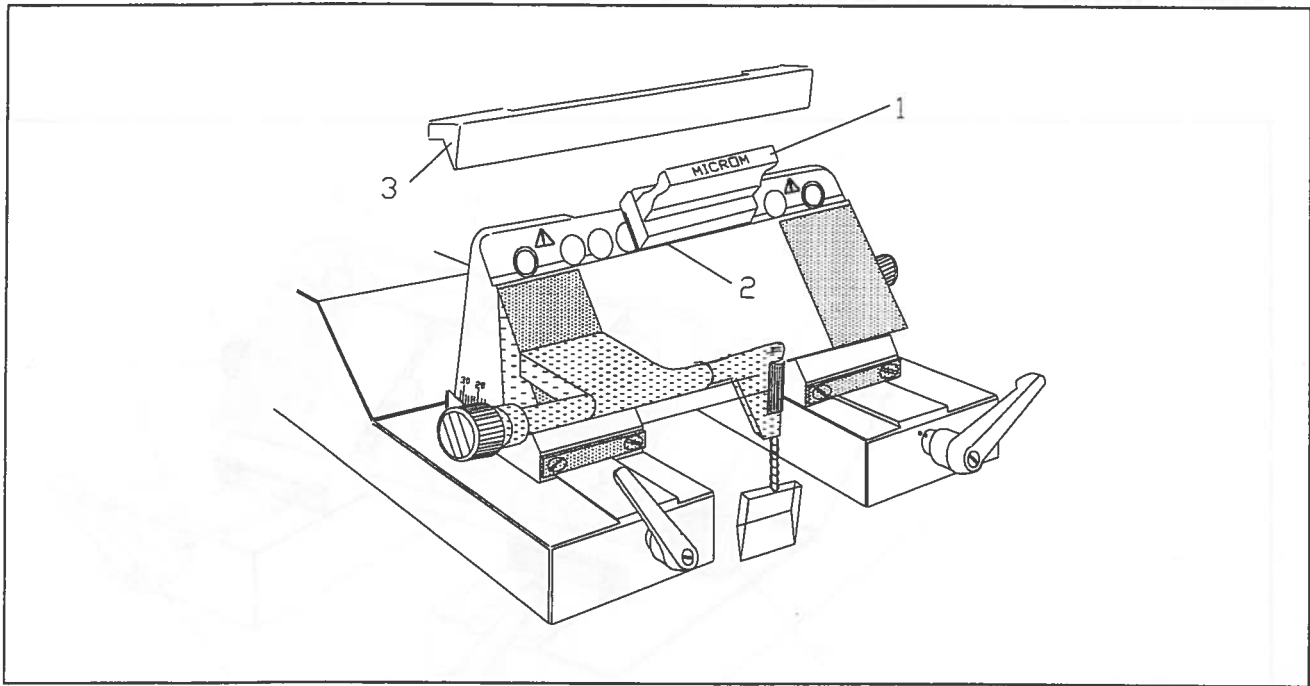


Fig. 14

To change the clearance angle adjustment loosen the clamping screw (fig. 13.9) on the right side of the knife carrier in addition to the already loosened flat levers (fig. 13.7). Tighten clamping screw and flat levers after having re-adjusted the clearance angle.

By experience, usable cuts are only achieved at a clearance angle between 24° and 30°. The adjusted clearance angle is shown on the scale (fig. 13.8).

The dots (fig. 13.10) on the base and on the flat levers show the clamping position. The position of the grips of the flat levers can be adjusted in 30°-steps, by pulling them slightly out and then turning them into a favourable position.

CAUTION! During breaks or while working on the specimen or the specimen holder, the knife guard should be used (fig. 14.3).

2-10-3 DISPOSABLE BLADE CARRIER EC with ANTI-ROLL GUIDE

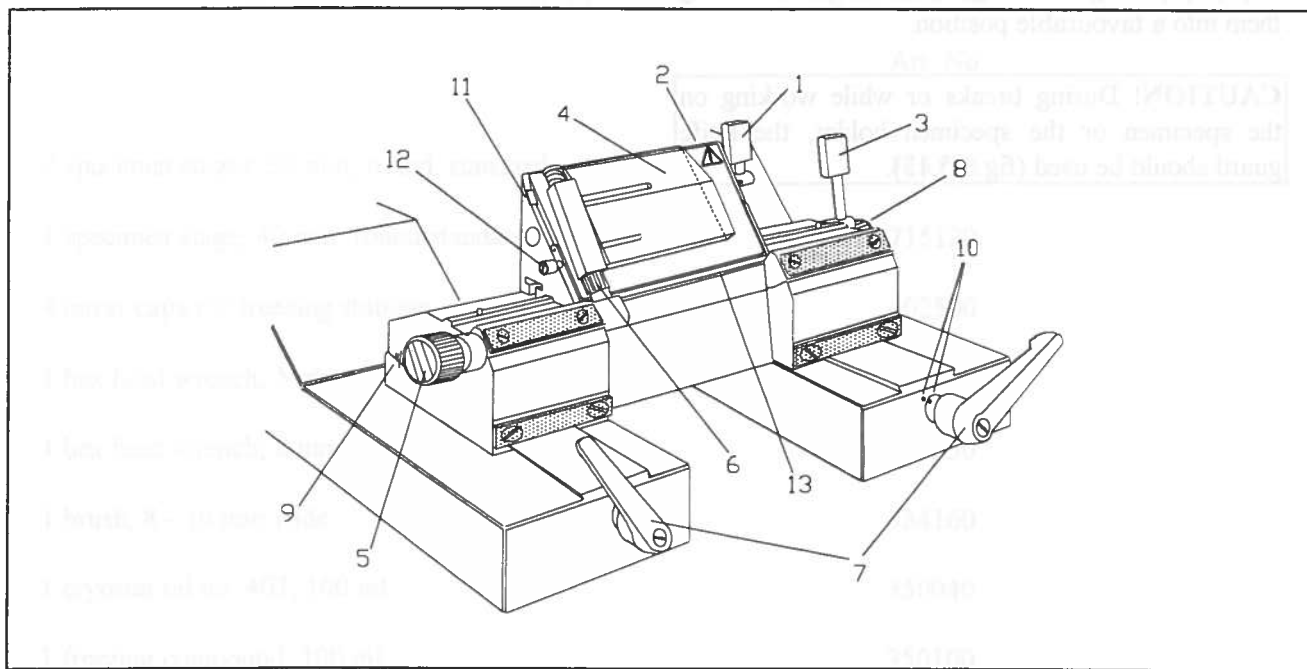


Fig. 15

With the disposable blade carrier EC, all commercially available low profile blades of 80 x 8 mm and a facet angle of approx. 35° as well as high profile blades can be clamped.

Insert the blade into the slot behind the clamping plate (fig. 15.2). When using high profile blades, first loosen the lever (fig. 15.1) and remove the spacer strip (fig. 15.11). The clamping plate can be opened and tightened by means of the small lever (fig. 15.1). For the full use of the blade, the entire clamping plate can be moved sideways by loosening the right lever (fig. 15.3)

Turning the grip (fig. 15.5), the anti-roll plate (fig. 15.4) can be turned forwards and backwards. The knurled screw (fig. 15.6) allows the adjustment of the edge of the anti-roll plate in relation to the blade edge.

With the two flat levers (fig. 15.7) the clearance angle can be adjusted and, at the same time, the knife carrier is fixed on the base. To move the knife carrier on the guide rails, turn the two flat levers (fig. 15.7) inwards. Afterwards, move the flat levers outwards to their clamping position.

To change the clearance angle adjustment loosen the clamping screw (fig. 15.8) on the right side of the knife carrier in addition to the already loosened flat levers (fig. 15.7). Tighten clamping screw and flat levers after having re-adjusted the clearance angle.

By experience, usable cuts are only achieved at a clearance angle of 10° or more. The adjusted clearance angle is shown on the scale (fig. 15.9).

3-3 MICROTOME WITH RETRACTION

The microtome of this cryostat is a rustproof rotary microtome. The cutting movement is carried out either manually by turning the handwheel or by means of the motorized cutting drive. The rotary movement results in the vertical movement of the cylinder head which carries the specimen holder with the specimen. The specimen is moved up- and downwards close to the knife edge. The knife is clamped securely into the knife carrier.

The section thickness is delivered at the upper reversal point of the vertical movement. The specimen holder together with the specimen moves to the front by the size of the section thickness, which can be selected on the operating controls.

With the downward movement of the specimen, sectioning is carried out. During the return travel, the specimen is drawn back automatically to protect knife and specimen, which means that the knife can be used longer and that the specimen is protected against artefacts.

The number of sections made is indicated on the section counter. After each downward movement of the specimen holder, the number on the section counter increases by 1. The section counter can be re-set to zero at any time.

3-4 SPECIMEN COARSE FEED AND TRIMMING STAGES

After changing the specimen, moving the knife or knife carrier, it is necessary to adjust the specimen to the knife edge again. This can easily be done by means of the specimen coarse feed and the defined trimming values.

To move the specimen holder electronically forwards or backwards, use the corresponding buttons on the operating controls.

After the specimen and knife are adjusted, further gradual feed for trimming can be carried out by using the function <trimming>. During each rotation of the handwheel, the selected feed is carried out.

3-5 MOTORIZED CUTTING DRIVE

The motorized cutting drive facilitates routine work and ensures an even cutting speed also for harder specimens.

When using the motorized cutting drive a regulated D.C. motor works on the handwheel of the cryostat microtome by means of an electromechanical clutch and a reduction gear.

The speed of the motorized drive can be pre-selected continuously on the operating controls from 0.5 to 250 mm/s. The selected speed will be carried out in the cutting window.

Outside the cutting window a higher return speed is determined by the electronic control unit. Use either the operating controls or the foot pedal to turn on/off the drive.

The limits of the cutting window can be changed continuously and can be adjusted to the specimen.

Three operating modes for the motorized cutting drive are available. When in operating mode <interval stroke>, the cutting drive only moves as long as the button START/STOP or the foot pedal is pressed. The movement can be stopped in any position. When in operating mode <single stroke> the cutting drive moves from the starting position to the next lower reversal point. When in operating mode <continuous stroke>, an unlimited number of sections is carried out. To stop the continuous stroke, press the button START/STOP or the foot pedal. The cutting drive will stop after reaching the next lower reversal point.

In case of danger, the motor drive can be stopped in every operating mode by pressing the emergency stop button. Continue sectioning pull out the emergency stop button; the cutting drive can be started again.

The specimen holder can be locked by means of the handwheel brake in the upper position. The handwheel brake should be locked for your personal safety when changing specimens, moving the knife or knife carrier. The cutting drive cannot be inadvertently started, if the handwheel brake is locked.

3-6 AUTOMATIC APPROACH SYSTEM

The automatic approach system is used for the fast and exact approach of the specimen towards the knife edge.

The function of the automatic approach system is limited to the temperature range between -5°C and -30°C.

Up to now, this procedure has been carried out manually and has been quite time-consuming.

The automatic approach system uses the intrinsic capacity of the specimen to notice a first contact between specimen and knife edge. If specimen and knife edge get in contact with each other, a very low current is measured via a pre-amplifier, which is placed directly behind the specimen holder. The signal form of the detected current is transferred via the outlet of the pre-amplifier to the micro-processor. A corresponding software recognizes the threshold value causing an immediate interruption of the horizontal drive. The threshold value is also determined regarding the temperature. The optimal function of the automatic approach system is based on the fact that the knife is conductively connected with the knife carrier base, whereas the specimen holder is separated by an isolating piece.

PART 4 WORKING WITH THE CRYOSTAT

4-1 PREPARING THE COOLING CHAMBER

Before sectioning, the microtome chamber should be at a stable temperature around the desired cutting temperature. The specimen fast cooling and temperature control determines only the temperature of the specimen holder and the specimen. The temperature of the knife is determined by the cooling of the microtome chamber.

All tools which are necessary to take off sections or to manipulate the specimen must also be cooled, as the section will stick to them. For this reason, the required working accessories should always be stored on the shelves or brush tray in the microtome chamber.

The heated sliding window should be closed during breaks and while preparing work to avoid warm air getting into the chamber. Consequently, more favourable work conditions with a lower frost built-up on the microtome and knife are achieved.

4-2 FREEZING-ON THE SPECIMEN

The specimen is frozen-on to the specimen stage with clinging grooves with a freezing compound.

To freeze-on specimens, use the fast freezing device on the left side of the chamber or the specimen fast cooling and temperature control. The four front fast freezing stations with Peltier system are used for the fast freezing of specimens and the rear four are used for storing them.

When using the fast freezing device put some freezing compound onto the specimen stage, which should be outside the chamber at a low positive temperature. Then put the specimen on the stage and surround it with some freezing compound.

Then insert the specimen stage into one of the four fast freezing stations, which must have been cooled down to -55°C by using the function FREEZE OBJECT. The specimen and freezing compound are quickly frozen evenly.

If the instrument is equipped with a heat extractor (additional equipment) the specimen can be frozen faster and more evenly. Put the heat extractor onto the specimen from above. This way, the specimen is frozen at the same time from above and below, which reduces the formation of artefacts considerably (see 2-9-2).

When working with the specimen fast cooling and temperature control put some freezing compound onto the specimen stage, which should be outside the chamber at a low positive temperature. Put the specimen onto the stage and surround it with some freezing compound. Insert the specimen stage together with the specimen into one of the four front fast freezing stations and freeze it on. It is possible to leave the specimen there until it is frozen evenly (function FREEZE OBJECT must be turned on). However, the specimen can be removed immediately after the freezing-on. Then insert it into the cooling head of the specimen fast cooling and temperature control to have it frozen evenly (function <fast cooling> must be turned on). Then switch over to <temperature control> (see 2-4-2) with the desired cutting temperature.

4-3 TEMPERATURE LIST FOR CRYO-SECTIONING

The optimal cutting temperature of a specimen depends on the respective characteristics of the tissue especially on the fat content. The following table won by experience recommends cutting temperatures for some typical applications:

Range A -10 to -20°C

- Liver
- Kidney
- Spleen
- Thyroid
- Lymph Node
- Uterine Curettings
- Tongue
- Testicle

Range B -20 to -30°C

- Muscle
- Breast without fat
- Brain
- Bone Marrow
- Lungs
- Intestine
- Prostata
- Cervix
- Uterus
- Pancreas
- Adrenal
- Skin without fat

Range C -30 to -60°C

additional cooling with liquid nitrogen or dry ice might be necessary

- Adipose
- Omentum
- Breast with fat
- Skin with fat
- Cheese
- Butter
- Industrial Waxes
- Soft Rubber

In range C additional cooling with liquid nitrogen or dry-ice might be necessary.

PART 5 MAINTENANCE OF THE CRYOSTAT

5-1 SHUTTING-OFF FOR CLEANING

Cleaning of the cryostat depends on how frequently the instrument is used. The more it is used, the more it needs to be cleaned. However, it is recommended to shut the instrument off every 6 - 8 weeks.

This should be done as follows:

- Turn off the main switch; pull the mains plug off.
- Remove or suck off cold section waste.
- Remove the knife from the carrier and put it into a knife case, remove section waste tray, specimen stages and working tools. Loosen and pull out the two clamping levers (fig. 11.9) on the knife carrier and remove the knife carrier upwards. Lift the two side accessory shelves in the front, pull them out of the rear pegs and also remove them.
- Suck off again cold section waste.
- The warming up of the microtome chamber can actively be accelerated by using a hair dryer.
- Disconnect the warm microtome as follows:

CAUTION! Turn the handwheel into the lower position, i.e. the specimen holder is also in the lower reversal point.

Turn out the socket head screw (fig. 16.1) in the middle of the front part of the microtome base plate with the hex head wrench no. 5; then slightly lift the base plate (fig. 16.2) in the front and move it approx. 2 cm to the left side until the clutch on the right side of the microtome is free. Then pull the microtome to the front to loosen it from the rear clamp (fig. 16.4). Turn the microtome to the right side so that the frontside of the microtome faces the right lateral wall of the chamber; now the coded connector (16-lead) on the backside of the microtome can be unplugged. The connector (4-lead) for the automatic approach system must be disconnected as well

Carefully take the microtome out and remove all loose waste immediately by using a brush

- Carefully clean and wash the interior. Open the stopper on the bottom of the microtome chamber. The waste detergent can be collected again at the end of the outlet tube. Insert the stopper after cleaning as otherwise cold air leaks out and the instrument will cover with frost.
- After having finished cleaning and maintaining (see 5-2) install the microtome in reverse order.

CAUTION! The handwheel must be in the lower position when the microtome is introduced into the clutch.

- Insert accessory shelves, accessories and knife carrier into the instrument.
- Connect the mains plug to the power outlet. Turn on the mains switch.
- Close the sliding window.

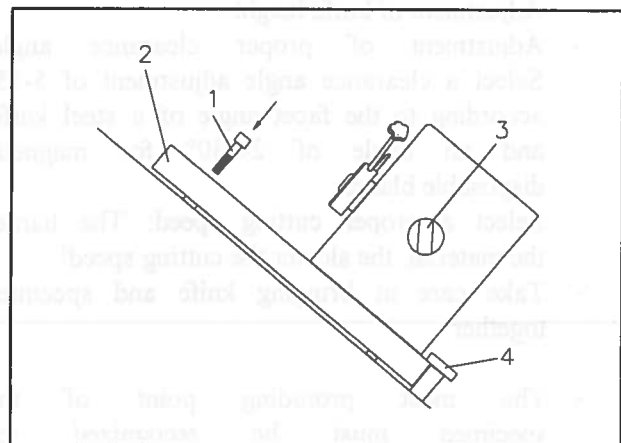


Fig. 16

NOTE! To maintain the cooling power of the instrument, clean the fins of the condenser at least once a year, if necessary more often.

5-2 CLEANING AND CARE OF THE MICROTOME

Carefully clean and dry the disconnected microtome. As there is condensed humidity inside the microtome dry it very carefully. A drying closet at temperatures up to 60°C can be used. Another possibility is to dry it by means of a hair dryer.

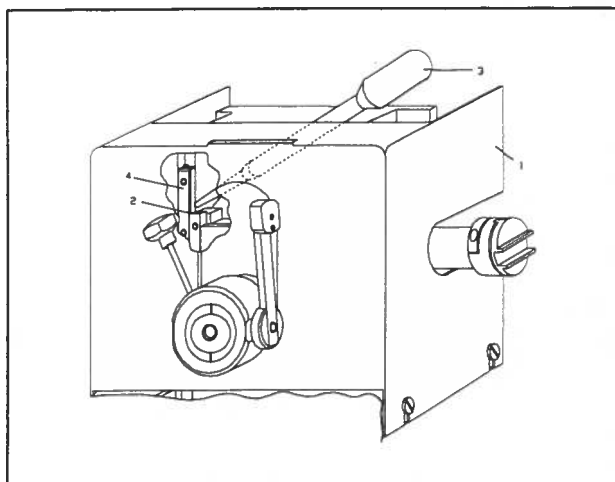


Fig. 17

By means of a pipette (fig. 17.3) the cross roller bearings (fig. 17.4) can be reached from an angle from behind below the housing (fig. 17.1).

Fill the pipette with a small amount of cryostat oil (cat. no. 350040). Put one or two drops into the space (fig. 17.2) of the cross roller bearings. The monobloc should be in the lower position.

Also slightly lubricate the horizontal cylinder guide behind the specimen holder.

For the examination and re-adjustment of the microtome a routine maintenance should be performed by a trained service technician once a year.

When turning on the instrument and the display (fig. 2.1) shows the word HELP, the battery for storing values is used up. In this case the battery should be changed also by trained a service technician.

5-3 CHANGING THE FLUORESCENT LAMP

The fluorescent lamp of the cryostat is situated on the upper wall inside the chamber just behind the sliding window.

First turn off the instrument and pull out the mains plug. Open the sliding window and remove the cover from the lamp by loosening the two black knurled nuts. Be sure that you keep the cover in one hand while opening the nuts. Take off the cover. Carefully, pull the lamp to the right side out of the socket. Then pull the lamp downwards out of the clip and take the lamp out of the instrument.

Insert a new lamp in reverse order. Install the cover again by means of the knurled nuts.

NOTE! Only use the lamp type, which was installed in the factory.

4-2 CHANGING THE FLUORESCENT LAMP

The fluorescent lamp in the system is rated on the spot - all inside the chamber has behind the lighting window.

First turn off the instrument and pull out the engine plug. Open the lighting window and remove the cover from the lamp by loosening the two black torqued nuts. Be sure that you keep the cover in one hand while opening the nuts. Turn off the cover. Carefully pull the lamp to the right side out of the socket. Then pull the lamp downwards out of the dim and take the lamp out of the instrument.

Insert a new lamp in reverse order. Install the cover again by means of the torqued nuts.

NOTE: Only use the lamp type which was installed in the factory.

4-1 CLEANING AND CARE OF THE MICROTOME

Careful cleaning and care are recommended. The instrument is a precision instrument and the accuracy of the results can be affected. Another factor is the temperature up to 60°C can be used. Another factor is the humidity of the air.



Fig. 13

By means of a pencil (Fig. 13) the cover holder bearing (Fig. 13+) can be checked from an angle from behind using the bearing (Fig. 13).

Fill the points with a small amount of instrument oil (oil no. 320000) but not or two drops into the space (Fig. 13) of the cover holder bearing. The microtome should be in the lower position.

The slightly tilted in the horizontal position and behind the specimen holder.

For the connection and re-connection of the instrument a certain procedure should be followed by a trained service technician and a

NOTE

When working on the instrument and the display (Fig. 13) shows the word "EOL", the battery for the display should be changed. In the case the battery should be changed also by trained a service technician.