

**MICROTOME CRYOSTAT**

**HM 550 Series  
Options O M V P D**

**INSTRUCTION MANUAL**



**CERTIFICATION**

MICROM International GmbH 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:	387747
English:	387748
French:	387749
Spanish:	387750

**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.

The MICROM cryostat series HM 550 are highly efficient cryostats for sectioning techniques in routine and research.

Only skilled or specially trained personnel must operate the microtome cryostat, i.e. placing the specimen onto a chuck, sectioning and transferring sections onto a slide. The listed and marked safety measures as well as the regulations and hygiene measures of your respective lab must strictly be observed.

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MICROM Ser. No. :.....

Please check the MICROM Ser. No. on the type plate, which is placed on the rear side of your instrument and enter this number here. This way, questions and service can be handled faster.

Instruction Manual No. 387748

Issued: September 20, 2006

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**Intended Use**

**Table of Contents**

**EC Certificate of Conformity**

**Safety Precautions**

**PART 1 INTRODUCTION**

1-1 Description of the HM 550 Series

1-2 Technical data HM 550 Series

**PART 2 OPERATING INSTRUCTIONS**

2-1 Setting up the cryostat

2-2 Initial turn-on

2-3 Basic operational rules

2-4 Cutting process

2-4-1 Cutting movement and retraction

2-5 Setting section thickness and trimming thickness

2-6 Chamber cooling

2-6-1 Actual and set value of the chamber temperature

2-6-2 Function fast freezing for standard instruments

2-6-3 Heat extractors (optional accessories)

2-7 Feed

2-7-1 Specimen coarse feed

2-7-2 Speed of the specimen coarse feed

2-7-3 Setting the cutting window

2-7-4 Automatic approach system

2-7-5 Trimming and first cuts

2-7-6 Fine feed

2-8 Turning on/off the function retraction

2-9 Indication of cutting processes

2-9-1 Section counter

2-9-2 Section thickness sum

2-9-3 Remaining travel to front end position

2-9-4 Real time

2-10 Setting the real time, WAKE time, ACTIVE time and date

2-10-1 Setting the real time

2-10-2 Setting the WAKE time

2-10-3 Setting the ACTIVE time

2-10-4 Setting the date

- 2-11 Defrosting
  - 2-11-1 Setting the defrost time
  - 2-11-2 Defrosting cycle
  - 2-11-3 Interrupting a defrosting cycle
  - 2-11-4 Emptying the defrosting liquid
  
- 2-12 Customer-specific settings
  - 2-12-1 Setting the contrast
  - 2-12-2 Selecting the language
  
- 2-13 Illumination of the cooling chamber
  
- 2-14 Service settings
  
- 2-15 Specimen orientation
  
- 2-16 Knife carriers
  - 2-16-1 Standard knife carrier
  - 2-16-2 Disposable blade carrier EC
  - 2-16-3 Magnetic disposable blade carrier M
  
- 2-17 Option O – specimen cooling
  - 2-17-1 Actual and set value of the specimen temperature
  - 2-17-2 Specimen orientation with zero device (with option O)
  
- 2-18 Option M - motorized cutting drive
  - 2-18-1 Setting the cutting window
  - 2-18-2 Selecting the operating modes
  - 2-18-3 Setting the cutting speed
  - 2-18-4 Start and stop of the cutting drive
  - 2-18-5 Handwheel brake
  - 2-18-6 Emergency stop
  
- 2-19 Option V - Vacutome
  - 2-19-1 Setting the vacuum for stretching sections and disposing of section waste
  - 2-19-2 Inserting and replacing the filter unit
  - 2-19-3 Setting the suction window
  
- 2-20 Knife carrier for Vacutome
  - 2-20-1 Disposable blade carrier EV
  - 2-20-2 Magnetic disposable blade carrier MV
  
- 2-21 Option P – active deep freezing device with Peltier element
  
- 2-22 Option D – Integrated automatic unit for the application of disinfection media
  - 2-22-1 Preparing and starting the option D
  - 2-22-2 Interrupting the option D
  - 2-22-3 Programming the option D
  - 2-22-4 Cleaning after a cycle with the option D
  
- 2-23 Error code indication
  - 2-23-1 Definition of the error codes
  - 2-23-2 Error codes of the option D
  
- 2-24 Accessories
  - 2-24-1 Standard equipment
  - 2-24-2 Additional equipment

**PART 3 Theory of operation**

- 3-1 Microtome cooling, defrost cycle
- 3-2 Cutting movement
- 3-3 Specimen coarse feed and trimming stages
- 3-4 Automatic approach system
- 3-5 Option M - motorized cutting drive
- 3-6 Option V - stretching sections and disposing of section waste
- 3-7 Option O – Specimen fast and temperature control
- 3-8 Option D – Integrated automatic unit for the application of disinfection media

**PART 4 Working with the cryostat**

- 4-1 Preparations on the microtome and inside the cooling chamber
- 4-2 Freezing on the specimen
- 4-3 Orientation and trimming of specimens
- 4-4 Sectioning and taking off sections
- 4-5 How to avoid malfunctions
- 4-5-1 Possible sources of errors – cause and removal

**PART 5 Maintenance and care of the cryostat**

- 5-1 Shutting-off for cleaning
- 5-2 Removing the microtome
- 5-3 Cleaning and care of the microtome
- 5-4 Cleaning the cooling lamella
- 5-5 Changing the fluorescent lamp

**PART 6 CONDITIONS FOR THE TRANSPORTATION OF THE INSTRUMENT**

- 6-1 Taking back the instrument for repair or routine maintenance
- 6-2 Disposal of the instrument after final shutdown

**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 550 [U-W-X-Y-Z]

**Notification to Competent Authorities:**

These medical device have been registered with the German authority as "Microtomes" under the EDMA-classification code: 23-06-02

The designated product complies with the laid down regulation:

**DIRECTIVE 98/79/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL  
of 27 October 1998  
on in vitro diagnostic medical devices**

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

**DIN EN ISO 14971:2001-03**

Medical devices - Application of risk management to medical devices (ISO 14971:2000).

**DIN EN 61010-1:2002-08**

Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements (IEC 61010-1:2001).

**DIN EN 61010-2-101:2003-09**

Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-101: Particular requirements for In-Vitro-Diagnostic-(IVD)-Medical instruments.

**DIN EN 61010-2-081:2002-12**

Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes (IEC 61010-2-081:2001).

**DIN EN 61326:2002-03**

Electrical equipment for measurement, control and laboratory use - EMC requirements (IEC 61326-1:1997 + A1:1998 + A2:2000); German version EN 61326:1997 + A1:1998 + A2:2001

**DIN EN ISO 9001:2000**

Quality management systems - Requirements (ISO 9001:2000)



Hans Heid  
Managing Director

Walldorf, 10 February 2004

### SAFETY PRECAUTIONS

#### WARNING SIGNALS AND SYMBOLS

The installation and routine use of the HM 550 Series is easy and safe if the instructions in this manual are being observed.



**Note:**

Special instructions regarding operation of the instrument.



**Warning:**

Special precautionary measures to prevent damage to equipment. For a long lifetime of the equipment, please observe these instructions carefully.



**Caution – general danger spot:**

The instruction manual must strictly be observed whenever this symbol is visible on the instrument.



**Biohazard:**

Warning of biological danger.



**Radioactivity:**

Warning of radioactive danger.



**Chemicals:**

Warning of unhealthy or irritating substances.



**Separate taking back of electrical and electronic instruments in the countries of the European Union:**

This is to be applied in the countries of the European Union and other European countries with a separate collecting system within the waste management.

This product, being an electro and/or electronic instrument, must be treated separately within the waste management process (WEEE).

**CAUTION!**

The operator's safety is affected, when the instrument is not operated in accordance with this instruction manual.

Please observe the following general precautions during operation of this instrument. Failure to comply with these precautions violates safety standards and the intended use of the instrument. MICROM International GmbH is not liable for misuse of the instruments and failure to comply with basic safety requirements.

**INSTRUMENT GROUNDING**

To avoid injury from electrical current, the instrument must be connected with the protective earth. The instrument is equipped with a three wire ground plug. The power outlet must be connected to the protective earth and must meet the International Electrotechnical Commission (IEC) regulations.

**CAUTION: MAINS VOLTAGE**

Never remove instrument covers during operation. Component replacements as well as adjustments must only be made by trained service personnel. Unplug the unit before removing or opening the covers.

**DANGER IN EXPLOSIVE ENVIRONMENT**

The instrument must not be operated in the presence of flammable gases.

**HAZARD OF FROSTBITE**

Avoid permanent touching of metal parts inside the cryostat microtome chamber as frostbite may occur at unprotected hands and arms.

**HAZARD OF RADIOACTIVE RADIATION**

When working with radioactive specimens observe all applicable radiation safety procedures. When working with radioactive contaminated material, appropriate safety and disinfection measures must be carried out. According to the rules and regulations concerning the handling of radioactive contaminated material of the respective laboratory, safety clothing (e.g. particle mask, gloves, protective shoe covers) must be worn. Radioactive contaminated waste must be disposed of according to the respective regulations.

**HAZARD OF INFECTION**

Use the appropriate safety and disinfection measures when working with infectious specimens. According to the rules and regulations concerning the handling of infectious/radioactive contaminated material of the respective laboratory, safety clothing (e.g. particle mask, gloves, protective shoe covers) must be worn.

**HAZARD OF BIOLOGICAL DANGER**

Specimens used during the intended operation of the instrument might potentially be infectious. For this reason, it is recommended to observe the general laboratory regulations concerning protection against danger of infection.

Information on decontamination media, their use, dilution and effective range of application can be read in the Laboratory Biosafety Manual : 1984 of the World Health Organization.

**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.

In case of malfunctions and/or service work, please turn off the instrument and contact your local dealer.

**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 holder. Before changing the knife holder, 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!

**WARNING OF UNHEALTHY OR IRRITATING SUBSTANCES**

During the intended use of the option D, smallest amounts of irritating aerosols, which are based on quaternary compounds, might occur. For this reason, please care for sufficient ventilation. To avoid negative effects on your health while in direct contact with the disinfection medium or its residues, always wear respective safety clothing (e.g. protective glasses, laboratory gloves).

**WASTE DISPOSAL**

All debris, waste, defrosting liquid as well as infectious and radioactive contaminated material from operation must be disposed of in accordance with the respective regulations of the lab. Disinfection and cleaning liquids as well as section waste must be disposed of according to the respective regulations for special waste!

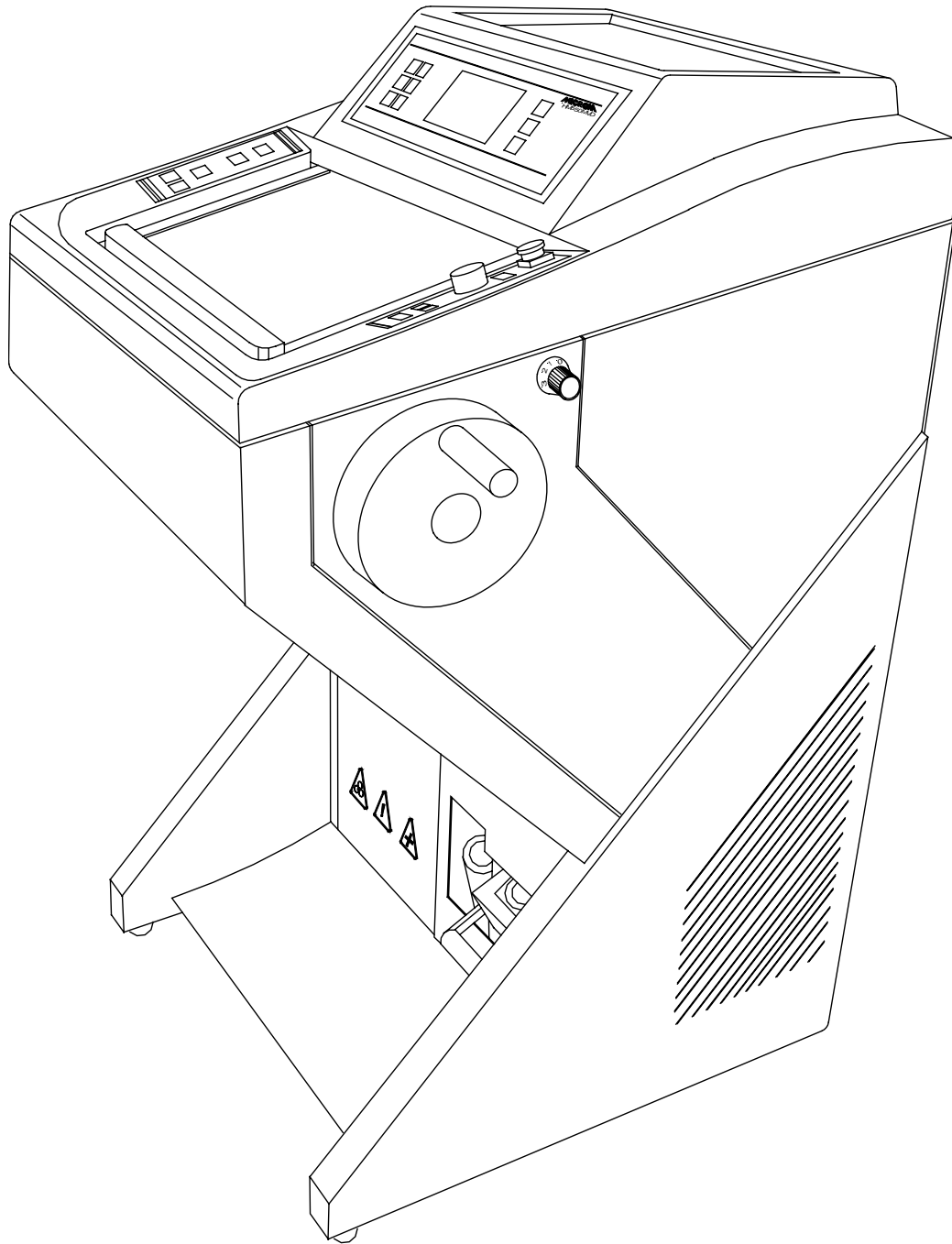


Fig. 1

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## 1 INTRODUCTION

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### 1-1 DESCRIPTION OF THE HM 550 SERIES

Open top cryostat. Modular design. Stainless steel cooling chamber. Chamber temperature regulation variable from  $-10^{\circ}\text{C}$  down to  $-35^{\circ}\text{C}$ . When the instrument is equipped with the option O, the specimen temperature can be controlled from  $+10^{\circ}\text{C}$  down to  $-50^{\circ}\text{C}$ .

Graphic LC-display of set and actual temperatures, electronic control with user-oriented touchpad keyboard, battery-buffered memory and self-diagnostic system. Standby and sleep status for noise reduction and energy savings. Automatic defrosting and in addition a manual defrost cycle which can be activated when needed. Defrost interrupt on keystroke request. Integrated fast freezing device with controlled cooling element down to  $-60^{\circ}\text{C}$  (option P). Sliding window with heater and integrated fluorescent lamp for cryo-chamber. Brush shelf and storage space inside the cryo-chamber. Large, flat storage space on top of the housing with integrated storage space for marked slides.

Rotary Microtome with backlash and maintenance-free cross roller bearings in stainless steel. Electro-mechanical feed system. Section thickness setting from 1 to 100 microns; up to  $10\ \mu\text{m}$  in  $1\ \mu\text{m}$ -increments, up to  $20\ \mu\text{m}$  in  $2\ \mu\text{m}$ -increments, up to  $70\ \mu\text{m}$  in  $5\ \mu\text{m}$ -increments and up to  $100\ \mu\text{m}$  in  $10\ \mu\text{m}$ -increments.

Trimming thickness setting from 5 to 500 microns; up to  $10\ \mu\text{m}$  in  $5\ \mu\text{m}$ -increments, up to  $100\ \mu\text{m}$  in  $10\ \mu\text{m}$ -increments, up to  $200\ \mu\text{m}$  in  $20\ \mu\text{m}$ -increments and up to  $500\ \mu\text{m}$  in  $50\ \mu\text{m}$ -increments.

Specimen retraction during the return stroke with optical indication. Horizontal feed range 28 mm. Vertical cutting stroke 60 mm. Max. specimen size  $75 \times 55\ \text{mm}$ .

Motorized coarse feed in two directions with three speed selections. Limit indication and automated switch off at front and rear limits of horizontal travel. Automatic approach system for exact and safe approach of specimen towards the knife edge from  $-5^{\circ}\text{C}$  to  $-35^{\circ}\text{C}$ .

Section counter and indication of sum of section thicknesses with reset-button. Indication of remaining travel.

Handwheel brake in any position. Fine orientation of specimen with zero device. Rotatable on Z-axis,  $360^{\circ}$ .

Basic outfit with three specimen chucks, 118 ml MICROM freezing medium, 100 ml cryostat oil, brush shelf and section waste tray, consisting of two parts.

#### Option M

Electric motor drive with electronic control of the cutting stroke. Cutting speed variable from 0 to 250 mm/s. Accelerated return travel. Freely selectable cutting zone.

Three modes of operation: interval, single and continuous stroke. Indication of handwheel brake. Manual control of motor drive via safety start procedure. Stop command selection via manual control, foot pedal or handwheel brake. Emergency stop key and foot pedal emergency stop.

#### Option V

Vacutome system for stretching cryo-sections as well as for the disposal of sections when trimming. The system consists of a duo filter system: The coarse filter collects the section waste. The micro filter with a 99,99% filtration efficiency for  $0,1\ \mu\text{m}$  particles filters the air. The coarse filter is actively cooled in its position in the cryostat.

A vacuum-generating unit with its controlling elements is also part of the system.

Stretching and disposing of is controlled by the cutting window that can be set on the microtome cryostat. The suction vacuum can be set via an turning knob on the microtome cryostat.

### Option D

The option D which is used in the HM 550 is a fumigation unit for the application of disinfection media onto the operation areas in the cryo chamber which are accessible for the user during the intended use.



#### **Warning:**

To guarantee the functionality and safety of the fumigation unit, only disinfection media must be used, which do not contain flammable substances as solvents.

Therefore, we recommend to use disinfection media based on water.



**1-2 TECHNICAL DATA HM 550 SERIES**

Handwheel brake: .....electromagnetic, in any position  
 Emergency stop: .....via handswitch or foot pedal

**Vacutome:** max. specimen size .....28 mm  
 max. section thickness to be disposed of .....40 µm  
 max. section thickness to be stretched .....20 µm  
 min. section thickness to be stretched .....1 µm

Clearance angle adjustment:  
 Standard knife carrier ..... 5 - 16°  
 Disposable blade carrier ..... 5 - 16°  
 Magnetic disposable blade carrier ..... 25 - 30°

Coarse filter: Glass fiber reinforced extraction thimble  
 Micro filter: Borsilicate micro fiber .....99,99% filtration efficiency  
 for 0,1 µm particles

**Option D:**  
 Max. filling amount: ultrasonic bath: ..... 125 ml  
 Max. filling amount: store reservoir disinfection medium: ..... 1000 ml

Frequency Ultrasonic-unit: ..... 1.63 MHz + 70 kHz

Transportation and storage conditions  
 Storage temperature range: ..... -20°C up to +50°C

Operating conditions: ..... +5°C up to +35°C (at a max. rel. humidity of 60%)  
 ..... altitude up to 2000 m M.S.L.  
 ..... for indoor use only  
 ..... Floor loading requirements: 300 kg/m<sup>2</sup>

Power requirements: ..... 100 V/50 Hz, 12 A, +/-10%  
 ..... 100 V/60 Hz, 12 A, +/-10%  
 ..... 115 V/60 Hz, 12 A, +/-10%  
 ..... 220...230 V/50 Hz, 6 A, +/-10%  
 ..... 220 V/60 Hz, 6 A, +/-10%  
 ..... 240 V/50 Hz, 6 A, +/-10%

Internal protection  
 Primary circuits:  
 Transformer: ..... T8AH, 100...115 V  
 ..... T4AH, 220...240 V  
 Illumination: ..... T0,8AH, 100...115 V  
 ..... T0,4AH, 220...240 V

Secondary circuits:  
 Window heating: ..... T2,5AH  
 Vacutome valve (optional): ..... T2AH

*All temperatures refer to an ambient temperature of +20°C!*

Cont'd on page -3-

**1-2****TECHNICAL DATA HM 550 SERIES**

Pollution degree:	.....2
Overvoltage category:	.....II
Sound pressure:	..... 45 dB(A) ..... measured with 1 m distance to the instrument
Fluids and gases:	.....cooling agent: R404a, filling amount: 230 g (230 V/50 Hz) ..... R404a, filling amount: 250 g (115 V/60 Hz)
Dimensions:	. Wide (w/o handwheel): 640 mm, deep: 760 mm, high: 1200 mm
Weight:	..... 125 - 155 kg (depending on the model)

*All temperatures refer to an ambient temperature of +20°C!*

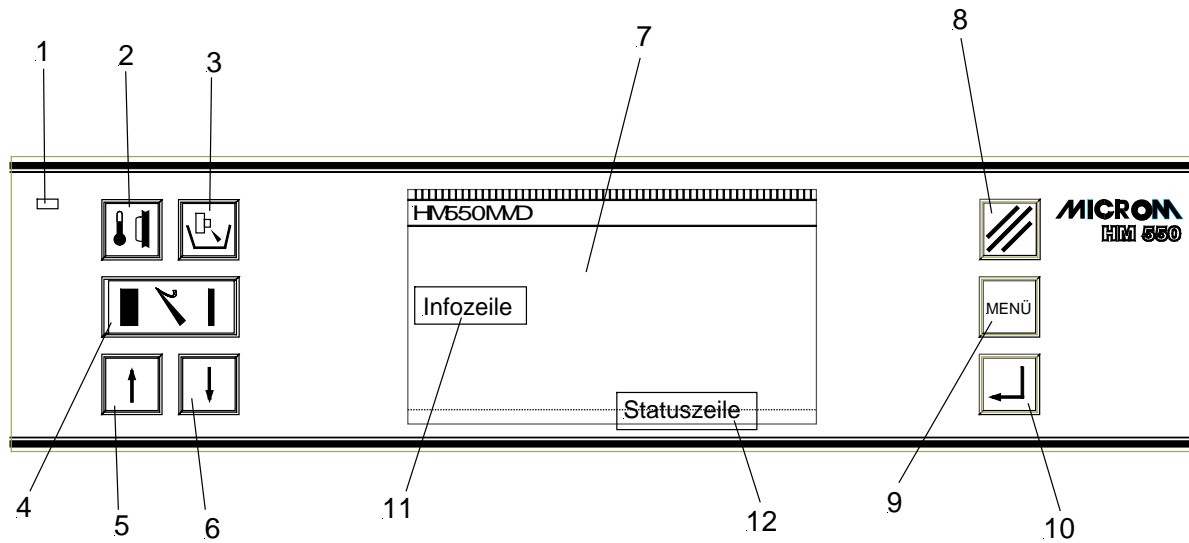


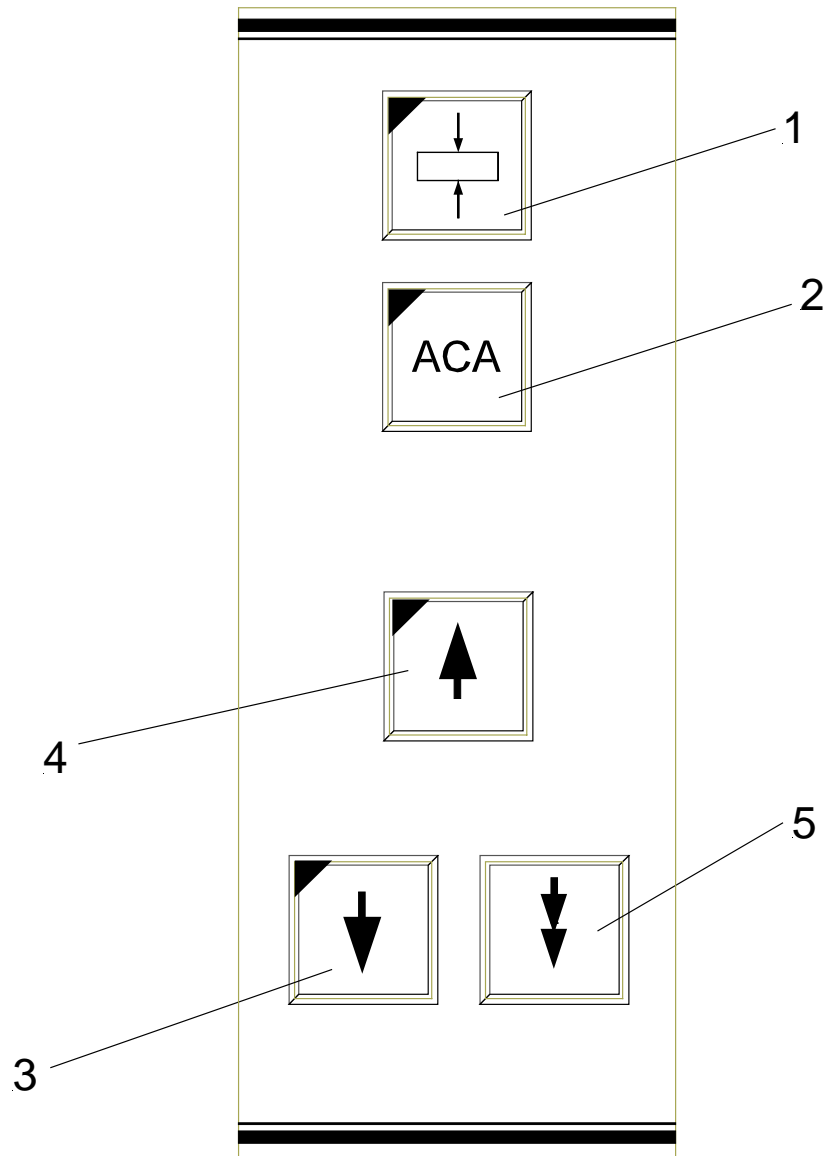
Fig. 2

- |  |   |
|--|---|
| 1 = On indication (sleep status)   | 6 = Arrow button DOWN   |
| 2 = Button specimen temperature (Standard version not used, as there is no specimen cooling) | 7 = LC display  |
| 3 = Button chamber temperature   | 8 = Reset button  |
| 4 = Button TRIM/FEED   | 9 = Menu button   |
| 5 = Arrow button UP  | 10 = enter button (within the menu settings)<br>scroll button (outside the menu settings) |



**Note:**

This instruction manual includes all options. If your instrument is not equipped with all options, some of the buttons might be disabled.



- 1 = Button cutting window
- 2 = Button ACA
- 3 = Button coarse feed, forwards
- 4 = Button coarse feed, backwards
- 5 = Button TRIM

Fig. 3

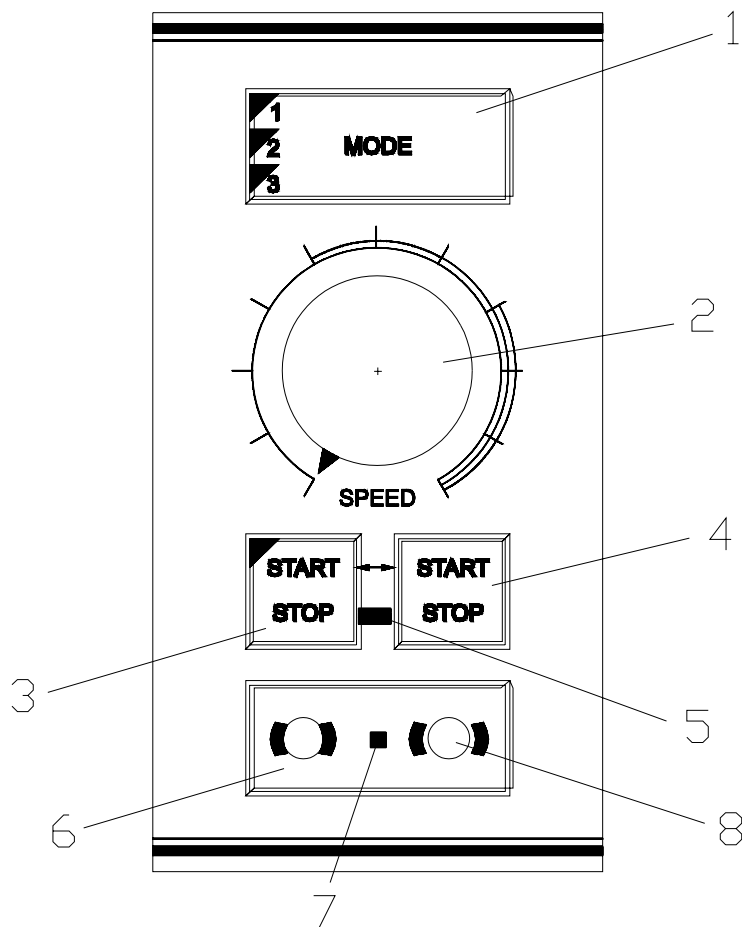


Fig. 4

- 1 = Button operating modes
- 2 = Operating knob
- 3 = Button START/STOP
- 4 = Button START/STOP
- 5 = Emergency stop LED
- 6 = Button to activate the handwheel brake
- 7 = Brake LED
- 8 = Button to loosen the handwheel brake

### 2 OPERATING INSTRUCTIONS

#### 2-1 SETTING UP THE CRYOSTAT

##### Unpacking the instrument:

- Cut through the three packing straps and remove the packing.
- Remove the upper wooden cover (fig. 5.1).
- The hinges of the upper wooden cover are secured with tape.
- Remove this tape.
- Lift the packing (fig. 5.2) over the instrument.
- Remove the upper and lower supporting foams (fig. 5.3, 5.4, 5.5, 5.6) from the cryostat.



##### Note:

The upper wooden cover now serves as an incline (fig. 5a.1) on which the cryostat can be moved from the pallet to the floor by using the handle (fig. 5a.2)

- The hinges of the upper wooden cover (fig. 5.1) are inserted into the screws of the bottom plate (fig. 5a.3). The correct side for this is marked with arrows.
- The tool (fig. 5b.2, size 30) for the height adjustment of the setting feet of the cryostat is packed together with the accessories of the cryostat (separate carton on the foot rest of the cryostat).
- Turn the setting feet completely upwards via this tool so that the cryostat stands with its rollers on the bottom plate (fig. 5a.3).
- Via the handle (fig. 5a.2) roll the cryostat from the bottom plate (fig. 5a.3) over the wooden cover (fig. 5a.1). In doing so, the rear side of the instrument must show to the incline (fig. 5a.1).

##### Caution:



The instrument is very heavy. While the instrument rolls down on the incline, it must be guaranteed that the instrument does not move in an uncontrolled way.

- Now the cryostat can be rolled to its site of installation.
- For possible return shipments, please keep the packing.

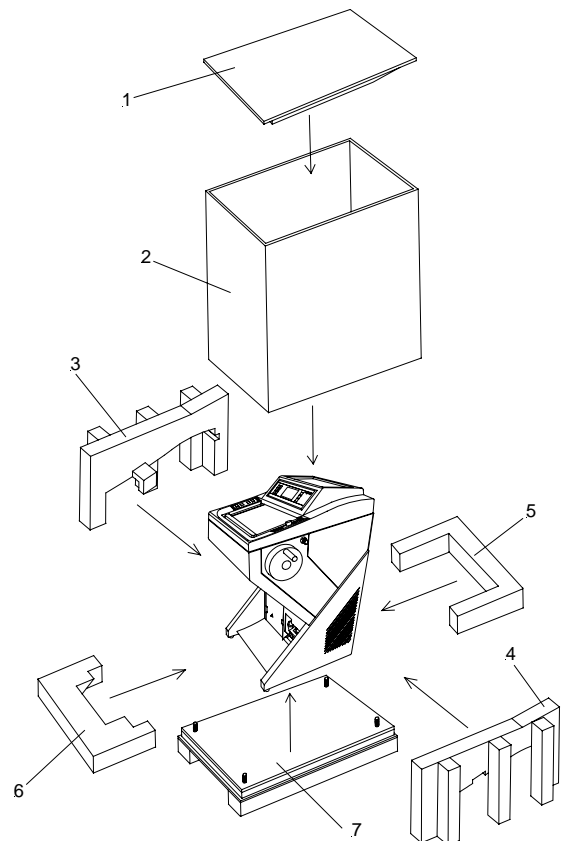


Fig. 5

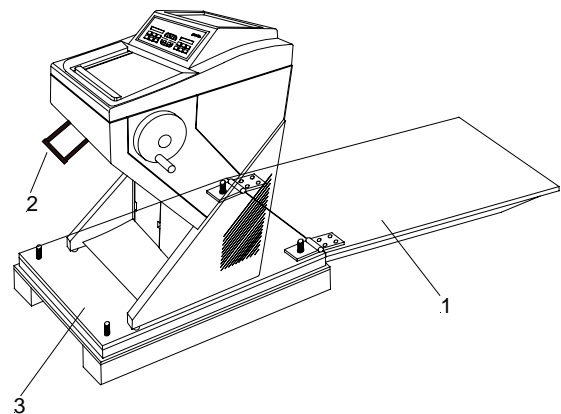


Fig. 5a

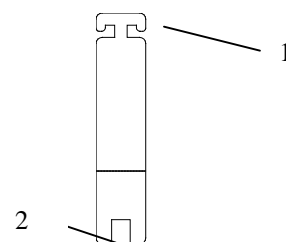


Fig. 5b



**Warning:**

The instrument must only be moved in standing or slightly tilted (approx. 30°) position.

**Choose installation site that**

- enough ventilation for the cooling system is guaranteed.
- the distance between wall and rear panel is approx. 15 cm. For this, install the distance bolts (fig. 6a.1).
- the suction areas on either side are kept free (fig. 6a.2).
- the mains switch for separating the instrument from the power supply is accessible any time.

**Moreover, the installation site must be free from:**

- draught by open doors or by air conditioning systems.
- direct exposure to sunlight into the cooling chamber.



**Note:**

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

- To fix the complete unit, tighten the screws (fig. 6.1) by using the attached tool.



**Warning:**

Instead of the handwheel handle, a transportation screw (fig. 6b.1) is inserted into the handwheel. This way, the handwheel is tightly and securely connected with the housing of the cryostat. **It is absolutely necessary to remove this transportation screw before the initial turn-on!**

- Loosen the transportation screw (fig. 6b.1) via the Allan key, size 6.
- Now fix the separately packed handwheel handle on the handwheel with the attached screw by means of the Allan key.

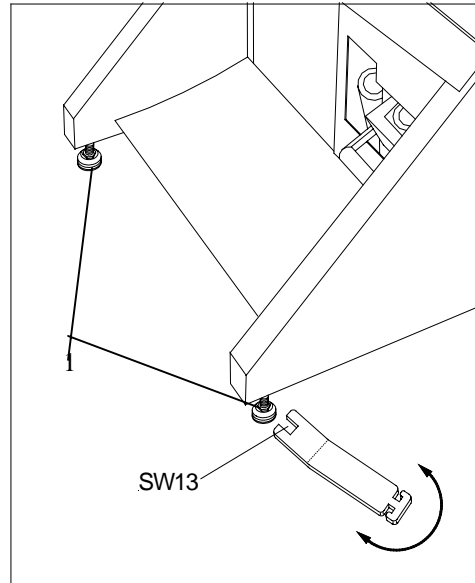


Fig. 6

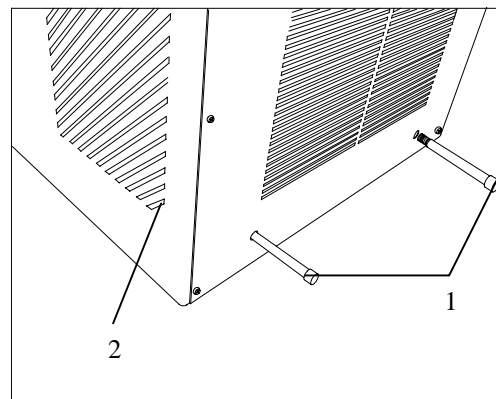


Fig. 6a

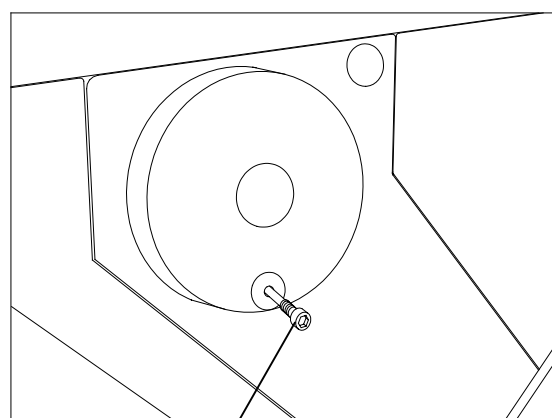


Fig. 6b

### Afterwards:

- If the instrument is equipped with the option M, connect the attached foot pedal to the socket (fig. 7.3) on the rear panel of the instrument.



### Note:

The enclosed foot pedal must be connected to the socket (fig. 7.3) only.

- If equipped with the option V, check that the micro filter is inserted in its proper position.
- Insert coarse filter into the filter unit.



### Caution:

Section waste is collected in the **coarse filter**. It must be replaced at least once a week depending on the amount of debris and nature of the specimens. The **coarse filter** is to be understood as a disposable filter and must not be used again.

The **micro filter** must be replaced at regular intervals, at least semi-annually.

Section waste as well as coarse and micro filters are to be disposed of according to the respective lab regulations.

(For this, please see "Inserting and replacing the filter unit", part 2-19-2).



### Note:

The serial interface (fig 7.4) must only be used for service purposes and must not be used by the user for its intended use. Only MICROM specific programming instruments must be connected to this interface.

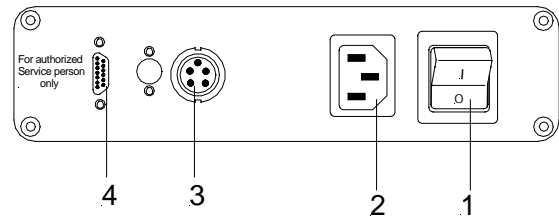


Fig. 7

- 1 = Power switch
- 2 = Mains plug
- 3 = Socket for foot pedal
- 4 = Serial interface

### 2-2 INITIAL TURN-ON



**Note:**

The kind of the used examination materials and all special conditions for their processing, pre-treatment and, if necessary, storage as well as instrument controls for correct and safe operation is in the responsibility of the operator. The operator is also responsible for special equipment and materials and/or reagents for the operation of the instrument.



**Warning:**

Before turning on the instrument for the first time, please check if the power requirements indicated on the type plate (fig. 8) 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.
- Connect the power line of the instrument to the power outlet.
- If the instrument is equipped with the option M, plug in the foot pedal into the respective socket (fig. 7.3).



**Note: Only for option M!**

If the foot pedal is not connected, there is the operating mode emergency stop (see part 2-18-6). This way, the handwheel brake is activated and the cutting drive motor cannot be started. Always connect the foot pedal, if the instrument is equipped with option M!

- We recommend to immediately install all accessories belonging into the cryo chamber, e.g. blade carrier.
- The instruction manual of the instrument can be found in the separate carton which is placed on the foot part of the cryostat.
- Close the heated sliding window (fig. 6.2).
- Turn on the mains switch (fig. 7.1) on the rear side of the instrument and cool down the instrument.

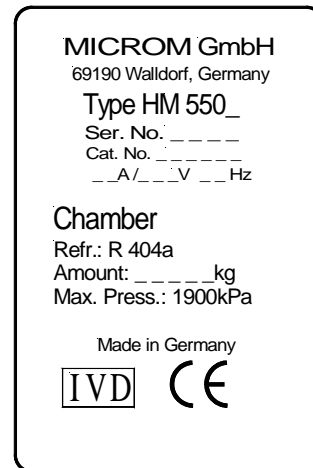


Fig. 8

**Note:**

The chamber temperature of the cryostat is factory set to  $-25^{\circ}\text{C}$ . In case the instrument is equipped with an optional specimen cooling, the specimen temperature is pre-set to  $-10^{\circ}\text{C}$ .

The cooling phase will take approx. 2 to 3,5 h depending on the set chamber temperature between  $-15^{\circ}\text{C}$  and  $-30^{\circ}\text{C}$ .

**Note:**

To avoid frost built-up on the specimen, the specimen temperature is controlled to a temperature of  $+10^{\circ}\text{C}$  until the knife has reached a temperature of  $-5^{\circ}\text{C}$ .

### 2-3 BASIC OPERATIONAL RULES

**When turning on the instrument, the display shows:**

- the configuration of the instrument (e.g. the figures show HM 550 MV)
- the section thickness selection
- the specimen and chamber temperatures with the corresponding set and actual values
- the symbol for the cutting window

This is the display (fig. 9) while the instrument is in its active status.

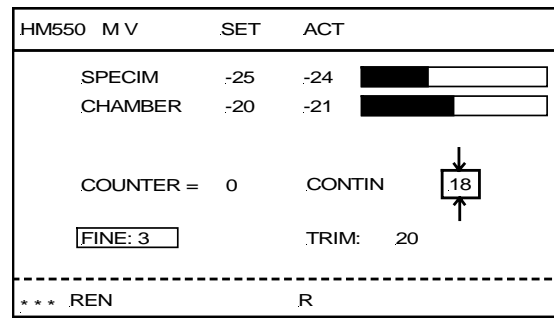


Fig. 9

The **WAKE** time is used to trigger the instrument back into the active state. It should be set with sufficient time before work is started (approx. 1,5 h).

To save energy and extend the lifetime of some instrument components, the instrument has two more operative status:

- Standby status
- Sleep status

The instrument switches to the **standby status** (fig. 10) when it is turned on, but not operated for more than a pre-selected active time (see part 2-10-3) between 1 and 9 h. The chamber illumination goes off and the display switches to a large indication of the chamber actual temperature. This is the clear sign for the **standby status** and gives the operator information on the chamber temperature, also from a greater distance.

When the instrument is not operated for another hour, the cryostat switches to the **sleep status**. The display illumination goes off. However, the equipment-on indicator (fig. 2.1) then lights up and shows that the instrument is still on.

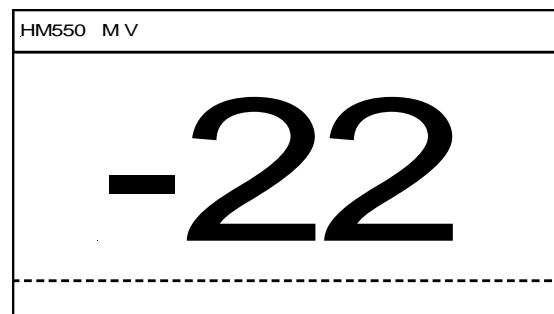


Fig. 10



**Note:**

While in the sleep status, the temperature control of the chamber temperature features a reduced control accuracy.

The specimen temperature in the sleep status is always kept at -15°C. The set temperature of the chamber is kept on a temperature of -20°C.

- To return to the active operating state, press any key on the control panels or move the handwheel. Also when reaching the WAKE time (see part 2-10-2) the instrument is in the active state again.

### UP/DOWN buttons

These two buttons (fig. 11.5 and 11.6) are used to change pre-selected values of different kinds in connection with the chosen function.

- section thickness
- trimming thickness
- specimen temperature
- chamber temperature
- time settings



**Note:**

**To operate the instrument easily and comfortably with a few buttons only, please note the following:**

After having chosen a function, its pre-selected values can be changed via the up or down buttons.

However, if no entry is made within five seconds, the operating control switches back into its basic status.

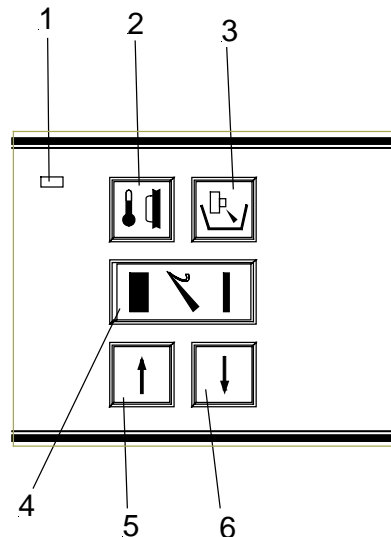


Fig. 11

### Reset button

This button (fig. 12.8) is used to reset added values (e.g. number of sections, sum of section thicknesses) to zero.

### Menu button

This button (fig. 12.9) is used to get into the submenus. Basic settings, times, service functions and options are set and/or called.

### Enter/scroll button

Within the submenu, basic settings are carried out, further submenus are called and other functions are activated via this button (fig. 12.10).

During operation of the instrument, e.g. while cutting, this button is used to choose between the indication of the section thickness, section sum, real time and indication of the distance to the end position of the specimen.

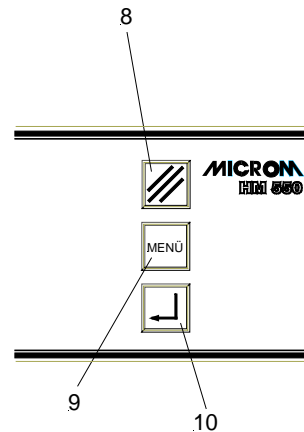


Fig. 12

### Keyboard lock

To lock the keyboards and to block the feed movement, press the buttons (fig. 12.8 and 12.10) for approx. 2 sec. The display (fig. 13) shows LOCKED.

To unlock the keyboards press the buttons (fig. 12.8 and 12.10) again.



#### Note:

When the keyboards have been locked, this leads automatically after 5 sec. to the standby status and after another 5 sec. to the sleep status.

HM550 M V	SET	ACT
SPECIM	-25	-24
CHAMBER	-20	-21
LOCKED		
COUNTER =	0	CONTIN
FINE: 3		TRIM: 20
*** REN R		

Fig. 13

### 2-4 CUTTING PROCESS

#### 2-4-1 CUTTING MOVEMENT AND RETRACTION

- 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 specimen during return travel, the specimen clamping is retracted electro-mechanically.
- This is shown by the letter "R" in the status line on the display.



**Warning:**

When the motor drive (option M) for the cutting movement has been turned on, the same run process as above-mentioned is carried out. Keep the rotating area of the handwheel clear! Keep enough distance to the rotating handwheel handle.

X=selected section thickness  
 1=specimen  
 2=cutting movement  
 3=knife  
 4=return travel  
 R=retraction

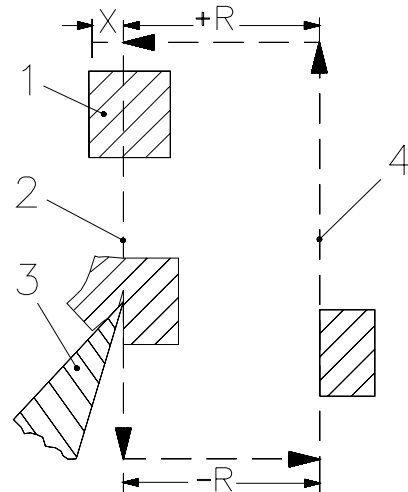


Fig. 14

### 2-5 SETTING SECTION THICKNESS AND TRIMMING THICKNESS

#### Basic status of the operating control:

- To choose between section thickness and trimming thickness, press button (fig. 16.4).
- The selected setting is shown inverted on the display (fig. 15).
- Then enter the desired section or trimming thickness via button up (fig. 16.5) or down (fig. 16.6).
- The altered values are shown on the display.

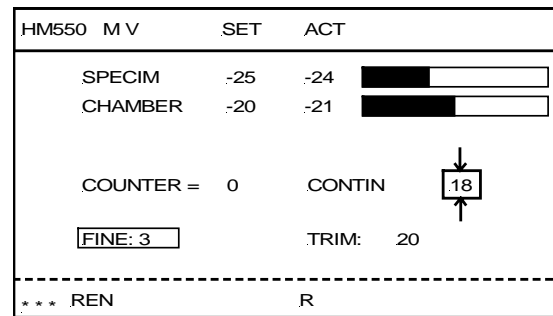


Fig. 15

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

range	graduation
from 1 $\mu\text{m}$ to 10 $\mu\text{m}$	1 $\mu\text{m}$
from 10 $\mu\text{m}$ to 20 $\mu\text{m}$	2 $\mu\text{m}$
from 20 $\mu\text{m}$ to 70 $\mu\text{m}$	5 $\mu\text{m}$
from 70 $\mu\text{m}$ to 100 $\mu\text{m}$	10 $\mu\text{m}$

The graduation of the trimming thicknesses (which can be pre-selected) is divided into 4 ranges:

range	graduation
from 5 $\mu\text{m}$ to 10 $\mu\text{m}$	5 $\mu\text{m}$
from 10 $\mu\text{m}$ to 100 $\mu\text{m}$	10 $\mu\text{m}$
from 100 $\mu\text{m}$ to 200 $\mu\text{m}$	20 $\mu\text{m}$
from 200 $\mu\text{m}$ to 500 $\mu\text{m}$	50 $\mu\text{m}$

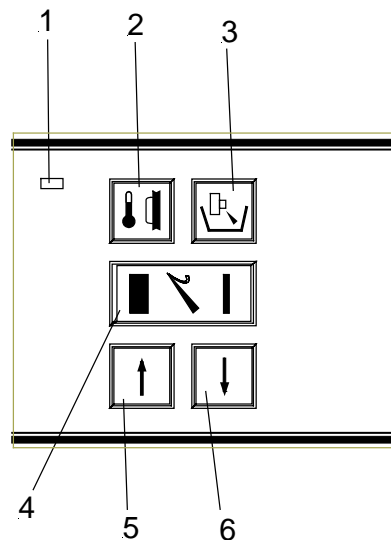


Fig. 16

### 2-6 CHAMBER COOLING

#### 2-6-1 ACTUAL AND SET VALUE OF THE CHAMBER TEMPERATURE

The actual and set values of the chamber cooling are shown in °C on the display (fig. 17). On the right side of the display, the actual value is also shown graphically.

- Press button (fig. 18.3) for chamber temperature.
- "CHAMBER" is then shown inverted.

The set value settings are made via the

- up button (fig. 18.5)
- down button (fig. 18.6)



**Note:**

The valid range of the set value goes from +10°C down to -35°C.

- The actual value of the chamber temperature is shown as actual temperature and as a graphic.
- After having chosen the requested values, the display automatically returns to its basic indications after three seconds, i.e. fine section thickness is again shown inverted.

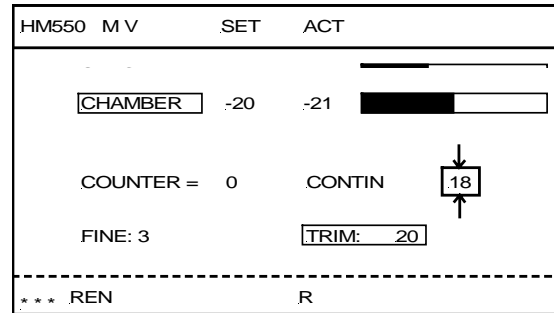


Fig. 17

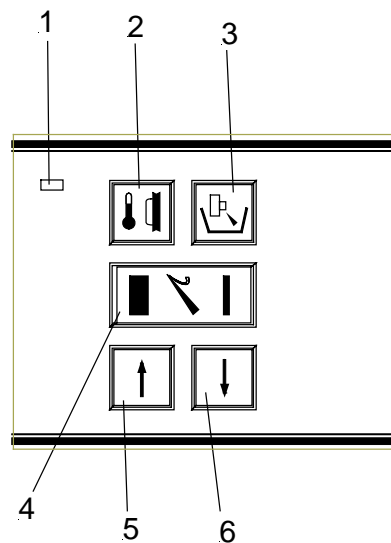


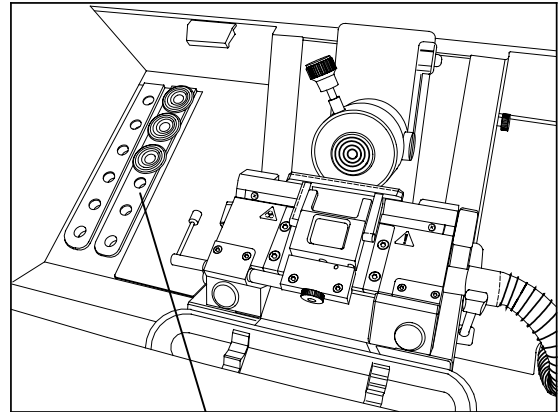
Fig. 18

### 2-6-2 FAST FREEZING FOR STANDARD INSTRUMENTS

There are several possibilities to freeze on specimens.

Various specimen chucks are available. Round specimen chucks can be supplied with a diameter of 30 mm and 40 mm and rectangular specimen chucks with a size of 50, 55, 60 and 70 mm. Special sizes on request.

- Put the warm chuck into the hole (fig. 19.1) of the fast freezing rail.
- Put freezing medium onto the chuck.
- Place fresh tissue onto the still liquid freezing medium.
- When the medium and tissue are frozen, the chuck can be inserted into the specimen clamping and can be fixed.
- The specimen can now be sectioned.



1

Fig. 19



**Note:**

The upper side of the freezing station must not be covered by frost or ice. To avoid this, use ethanol (absolute) or the like.



**Note:**

If the instrument is equipped with the option P (active deep freezing device with Peltier element), please also see part 2-21, Option P.

### 2-6-3 HEAT EXTRACTORS (optional accessories)

When using a heat extractor in combination with the so-called cryo molds, the specimen is frozen faster and more evenly, as the specimen is frozen from above and below at the same time. Thus the freezing time can be reduced.

Moreover, the formation of artifacts can also be reduced considerably.

Two different heat extractors (fig. 20a and fig. 20b) are available:

#### Heat extractor (fig. 20a):

- Insert the chuck (fig. 20a.3) into the fast freezing rail (for standard version) or into the rail with Peltier element (for versions with option P).
- Then insert a cryo mold (fig. 20a.2) onto the chuck (30 or 40 mm).
- Fill freezing medium into the mold and place the specimen onto the freezing medium.
- The heat extractor (fig. 20a.4) is placed horizontally onto the specimen.

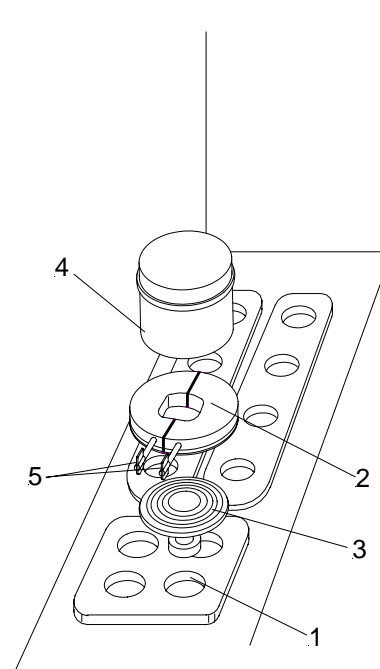


Fig. 20a



#### Note:

Use both a frozen cryo mold and a frozen heat extractor.

#### Heat extractor (fig. 20b):

- Insert the heat extractor (fig. 20b) into the fast freezing rail (fig. 20b.1).
- To pre-cool the heat extractor, turn the knob (fig. 20b.2) to lower the heat extractor onto the fast freezing plate (fig. 20b.4).
- Turn the knob (fig. 20b.2) to lower the heat extractor onto the specimen (fig. 20b.3).
- Further turn the knob (fig. 20b.2) to increase the pressure onto the specimen. Carefully observe this process to avoid a possible deformation of the specimen.
- To loosen the heat extractor, turn the knob (fig. 20b.2) in opposite direction.

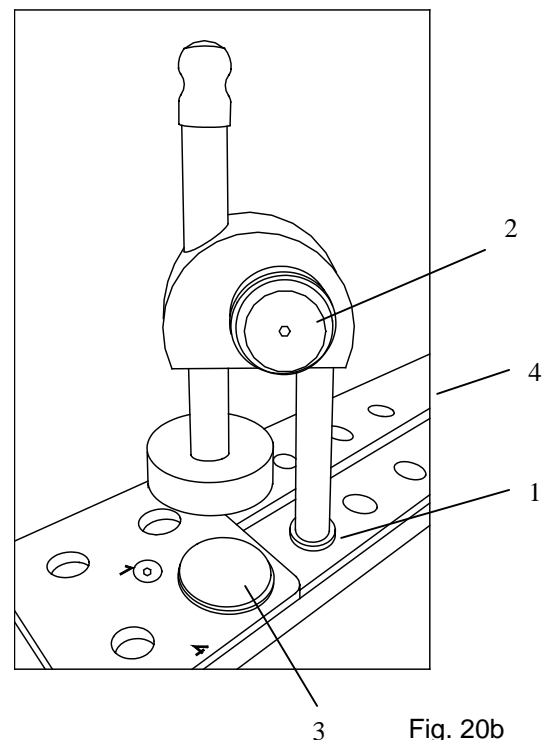


Fig. 20b

### 2-7 FEED

#### 2-7-1 SPECIMEN COARSE FEED

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

The approach between specimen and knife can also be carried out by means of an automatic function (see part 2-7-4).

#### Return travel of the specimen clamping

- Press button (fig. 21.4). Pressing the button briefly leads to short return travels only.
- Press the button (fig. 21.4) for more than approx. 2 seconds, the function is carried out continuously. The specimen clamping will entirely be moved backwards.



#### Note:

The rear end position is defined as that position which has the longest distance to the knife.

- To stop this function, briefly press button (fig. 21.4) once more.
- When the rear end position of the specimen clamping is reached, the coarse feed turns off.
- The LED in button (fig. 21.4) blinks, which means that the specimen clamping is in its rear end position.

#### Feed travel of the specimen clamping

- Press button (fig. 21.5). Briefly press this button, to carry out a forward travel of that trimming section thickness which was chosen via the control panel and shown on the display.
- The continuous forward travel is only carried out as long as the button (fig. 21.3) is being pressed.
- 



#### Warning:

With the function *coarse feed forwards* specimen and knife are adjusted very quickly. To avoid damage to specimen and knife, the following points are of utmost importance!

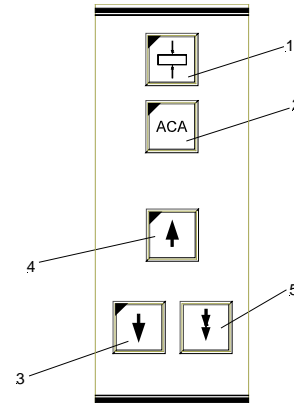


Fig. 21

- Take note that the specimen and knife edge do not come in contact with each other.
- Carefully observe the narrowing gap between specimen and knife edge to stop the function *coarse feed forwards* in time before the specimen touches the knife.

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 of the specimen clamping is reached, the coarse feed turns off.
- The LED in button (fig. 21.3) lights up and shows that the specimen clamping has reached its front end position.

### 2-7-2 SPEED FOR SPECIMEN COARSE FEED

The speed for the specimen coarse feed can be selected in three different settings. The selected setting is shown in the status line on the display by one, two or three little stars. Three stars means the fastest coarse feed setting.

#### Setting the speed:

- Press the menu button (fig. 23.9). This way, you will get into the list with the submenus.
- Select "coarse feed" via the arrow buttons (fig. 22.5 and 22.6). The selected submenu is now shown inverted.
- Press the enter button (fig. 23.10) to confirm the submenu and open it.
- Via the arrow buttons (fig. 22.5 and 22.6) choose between \*, \*\* or \*\*\*.



#### Note:

One star means a slow approach speed, two stars mean a medium speed and three stars stand for a fast approach speed.

- Press the enter button (fig. 23.10) to confirm the setting.



#### Note:

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 23.9).
- Now continue working with the selected settings.

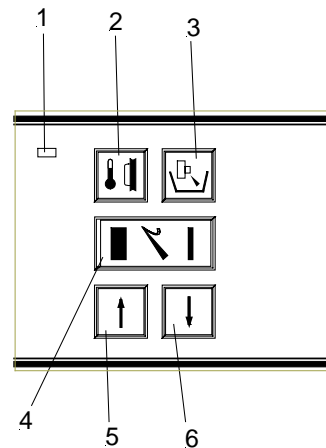


Fig. 22

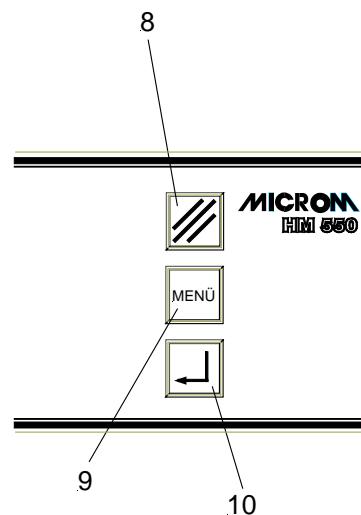


Fig. 23

### 2-7-3 SETTING THE CUTTING WINDOW

To activate an automatic approach process, it is necessary to set a cutting window first.

The size of this window is then shown in the symbol cutting window.

When passing the cutting window this symbol is shown inverted on the display.

#### Manual setting:

- The cutting window can be determined by manual entries.
- For this, press button (fig. 23.8) and while this button (fig. 23.8) is still being pressed, press button (fig. 25.1).
- Turn the handwheel so that the lower edge of the specimen is positioned slightly above the knife edge.
- Press button (fig. 25.1) to set the upper limit of the cutting window.
- Continue turning the handwheel clockwise to place the upper edge of the specimen just below the knife edge.
- Press button (fig. 25.1) to set the lower limit of the cutting window.
- The LED in button (fig. 25.1) lights up during each further passing through of the cutting window. The length of the cutting window is shown in mm within the cutting window symbol on the display.



#### Note:

A cutting window should only be set while the specimen is moved downwards. If, by mistake, a cutting window limit is set during return travel of the specimen, the set limits are applied to the cutting movement accordingly.



#### Note:

In case the cutting window limits are set incorrectly, please repeat above-mentioned process again.



#### Note:

If no cutting window is needed, briefly press the button (fig. 25.1) twice. The automatic approach system can now be released in any position.

### 2-7-4 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 -35°C with the MICROM freezing medium.



**Note:**

Use automatic approach system with conventional freezing medium only down to -35°C chamber and/or specimen temperature.



**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.



**Caution:**

When using different freezing techniques, for example by means of the fast freezing stations, liquid nitrogen, CO<sub>2</sub> and the like, which generate a freezing temperature of below -35°C, the automatic approach system can only be applied after the specimen will have adjusted itself to the respective temperature of the specimen holder which must be between the temperature range.

#### Starting the automatic approach

- Use the handwheel to make sure that the most protruding point of the specimen is opposite the knife edge. This position must be within the selected cutting window.



**Note:**

If the button (fig. 25.1) is pressed twice and the cutting window is inactive, the automatic approach can be released in any position.

- Press button (fig. 25.2) to start the automatic approach process.
- The red LED in this button (fig. 25.2) lights up and confirms the chosen function and AUT.APPROACH is shown in the status line on the display (fig. 24).
- The specimen clamping moves forwards until the knife edge touches the specimen.

HM550	M V	SET	ACT
SPECIM	-25	-24	
CHAMBER	-20	-21	
COUNTER =	0	CONTIN	
FINE: 3		TRIM: 20	
-----AUT.APPROACH-----			
*** REN		R	

Fig. 24

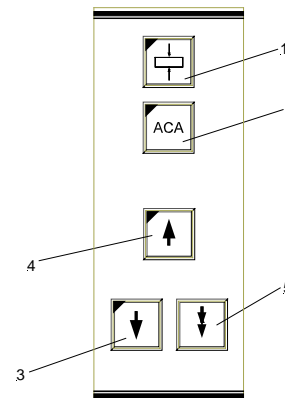


Fig. 25

- Immediately afterwards, this forward travel of the specimen clamping is stopped and moved backwards by a safety distance of 200 µm. AUT.APPROACH is still shown on the display as the process of the automatic approach has not yet been finished.
- When passing the next upper reversal point, the specimen clamping automatically moves forwards again by 200 µm.
- The red LED in button (fig. 25.2) goes off as well as the term AUT.APPROACH disappears.
- The specimen is now in position to start sectioning.

#### **Interruption of the automatic approach**

- Press button (fig. 25.2) or
- pass upper or lower reversal point via handwheel.

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.

#### **Error codes during an automatic approach process**

- **Error code 'AMPLIFIER ERROR'**  
is shown on the status line on the display, in case the activating signal for the automatic approach has already been recognized before the automatic approach movement has been started.
- Possible cause: the specimen has already been in contact with the knife edge, e.g. by protruding fibers.
- Press button (fig. 25.2), remove the cause for the error and press button (fig. 25.2) again, to start the automatic approach once more.
- However, if there is no obvious explanation for this error code, e.g. frost built-up, please call a service technician.
  
- **Error code 'OUT OF TEMPERATURE'**  
appears in the status line on the display, if the actual temperature of the knife or the specimen is outside the temperature range of -5°C and -35°C, which is valid for the automatic approach function only.

- Press button (fig. 25.2). The error message goes off.



**Note:**

In this case the function *automatic approach* cannot work. The approach between specimen and knife edge must be carried out via the coarse feed button (fig. 25.3) (see part 2-7-1).

### 2-7-5 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*.

- Make sure that the trimming thickness setting is selected via the button (fig. 26.4). Trimming thickness is shown inverted on the display.
- Press the arrow buttons (fig. 26.5 or 26.6) to select the desired trimming value.
- Turn the handwheel in a clockwise direction to carry out the trimming feed in the upper reversal point of the cutting movement.



**Note:**

If the trimming function is carried out via the motorized drive, please read part 2-18, option M.

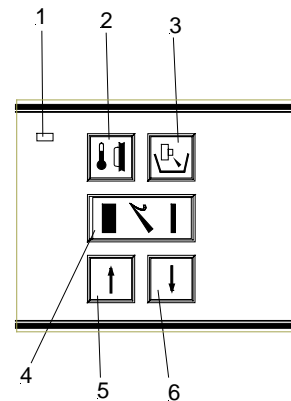


Fig. 26

### 2-7-6 FINE FEED

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

- Make sure that the section thickness setting is selected via the button (fig. 26.4). Section thickness is shown inverted on the display.
- Press the arrow buttons (fig. 26.5 or 26.6) to select the desired value.
- Turn the handwheel in a clockwise direction to feed the specimen at the selected section thickness.



**Note:**

If the fine feed is carried out via the motorized drive, please read part 2-18, option M.

### 2-8 TURNING ON/OFF THE FUNCTION RETRACTION

If needed, the function retraction can be turned off.

- Press the menu button (fig. 29.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 28.5 and 28.6) select the submenu "retraction ON/OFF". The selected submenu is now shown inverted.
- Via the enter button (fig. 29.10) confirm the submenu and simultaneously open it.
- Via the arrow buttons (fig. 28.5 or 28.6) select the desired setting (ON or OFF).
- Confirm the setting via the enter button (fig. 29.10).



**Note:**

You return immediately to the list of submenus (fig. 27). If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 29.9).
- Now continue working with the selected settings.
- The letters "REN" in the status line on the display go off, if the retraction function has been turned off.



**Note:**

The letter "R", however, might still be on. This function goes off only after having passed from the return travel again to the cutting movements via the handwheel.

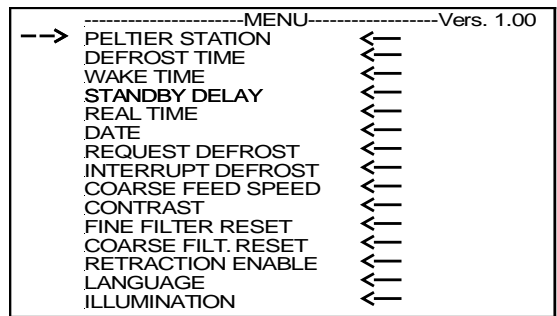


Fig. 27

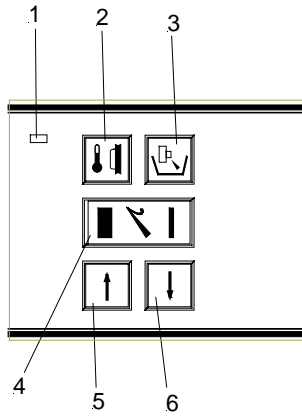


Fig. 28

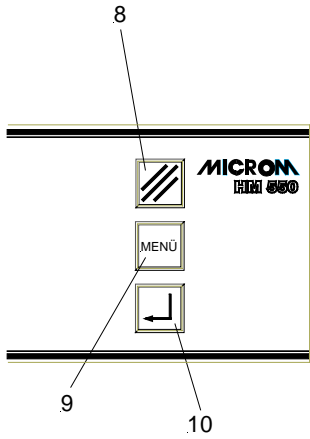


Fig. 29

### 2-9 INDICATION OF CUTTING PROCESSES

Further information on the cutting processes can be seen on the display. Press the scroll/enter button (fig. 30.10), to show the various functions one after the other.



**Note:**

Within the menu, the scroll/enter button is used to confirm submenus and/or settings. During operation, i.e. outside the menu, this button is used as a scroll button.

The following information on the carried-out cutting processes of the instrument can be read on the info line of the display:

- number of sections
  - sum of section thicknesses
  - remaining travel to the front end position
  - real time
- Press the scroll button (fig. 30.10) until the required information lights up on the display.
  - If no information is required in this line of the display, press button (fig. 30.10) until this line is blank.

#### 2-9-1 SECTION COUNTER

- The section counter adds up the number of sections produced.
- After each downward movement of the specimen holder, the number on the section counter increases by 1.
- The counter can be reset to zero via button (fig. 30.8).

#### 2-9-2 SUM OF SECTION THICKNESSES

- This value shows the sum in microns of the sections already cut.
- Trimming values as well as sectioning values are added up.
- This value can be reset to zero via button (fig. 30.8).

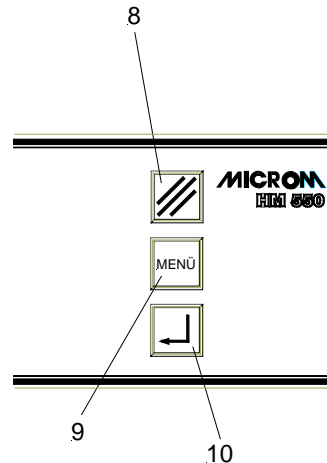


Fig. 30

HM550	M V	SET	ACT
SPECIM		-25	-24
CHAMBER		-20	-21
COUNTER =	38	CONTIN	18
FINE: 3		TRIM: 20	
*** REN		R	

Fig. 31

HM550	M V	SET	ACT
SPECIM		-25	-24
CHAMBER		-20	-21
SUM =	1.500	CONTIN	18
FINE: 3		TRIM: 20	
*** REN		R	

Fig. 32

### 2-9-3 REMAINING TRAVEL TO FRONT END POSITION

- This value shows the distance in microns, which is left for sectioning.
- When the specimen clamping is in the rear end position, the display shows 23 000 µm. This number decreases the closer the specimen holder moves towards the front.



**Note:**

If no further feed is possible anymore, the display automatically shows the remaining travel, independently which information on the sectioning processes, e.g. number of sections or sum of section thicknesses, was chosen before.

### 2-9-4 REAL TIME

The real time is shown here.

HM550 M V	SET	ACT	
SPECIM	-25	-24	
CHAMBER	-20	-21	
REM.TRV. =	23 000	.CONTIN	↓ 18 ↑
FINE: 3		.TRIM: 20	
*** REN		R	

Fig. 33

HM550 M V	SET	ACT	
SPECIM	-25	-24	
CHAMBER	-20	-21	
TIME	13:15		
FINE: 3		.TRIM: 20	
*** REN		R	

Fig. 34

### 2-10 SETTING THE REAL TIME, WAKE TIME, ACTIVE TIME AND DATE

#### 2-10-1 SETTING THE REAL TIME

- Press the menu button (fig. 38.9). This way, you get into the list of the submenus.
- Select "Real Time" via the arrow buttons (fig. 37.5 and 37.6). This submenu is now shown inverted.
- Via the enter button (fig. 38.10) confirm this submenu and simultaneously open it.
- To change the instrument's real time at intervals of one minute, press the arrow buttons (fig. 37.5 or 37.6). If the buttons are being pressed for more than 5 seconds, the time changing will be accelerated.
- Confirm via enter button (fig. 38.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 38.9).
- Now continue working with the selected settings.

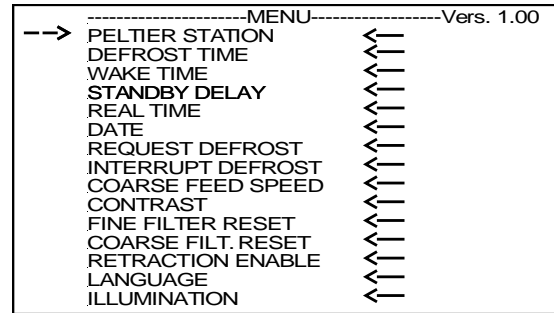


Fig. 35

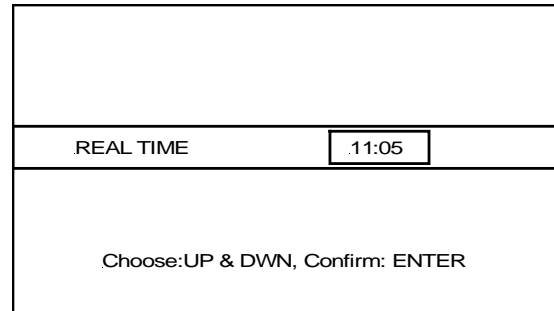


Fig. 36

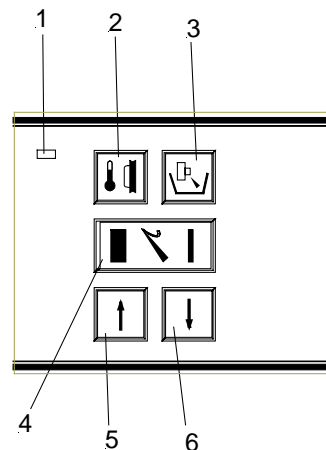


Fig. 37

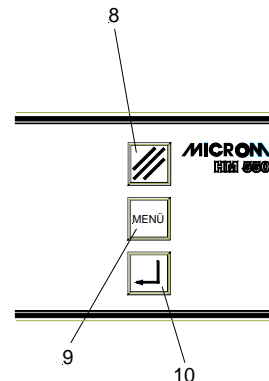


Fig. 38

### 2-10-2 SETTING THE WAKE TIME

The **WAKE** time is used to trigger the instrument back into the active state. It should be set with sufficient time before work is started (approx. 1,5 h).

- Press the menu button (fig. 42.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 41.5 and 41.6) select "Wake Time". This submenu is now shown inverted.
- Via the enter button (fig. 42.10) confirm this submenu and simultaneously open it.
- To change the WAKE time at intervals of 15 minutes, press the arrow buttons (fig. 41.5 or 41.6).
- Confirm with enter (fig. 42.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 42.9).
- Now continue working with the selected settings.

After having reached the WAKE time, the instrument switches over to the active status.

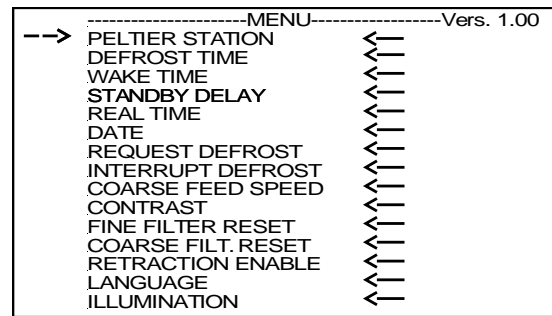


Fig. 39

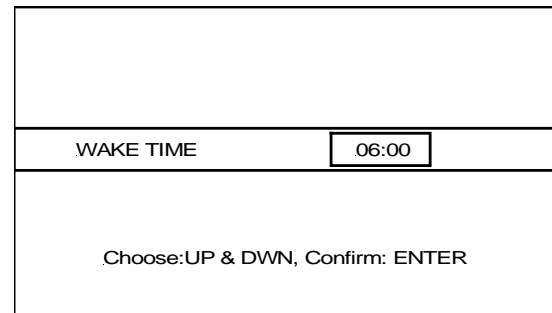


Fig. 40

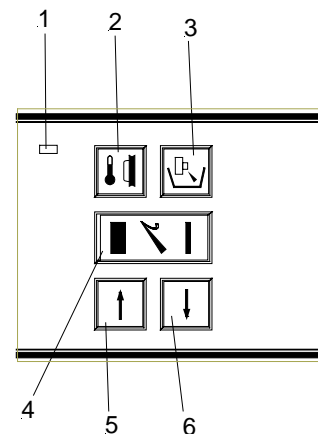


Fig. 41

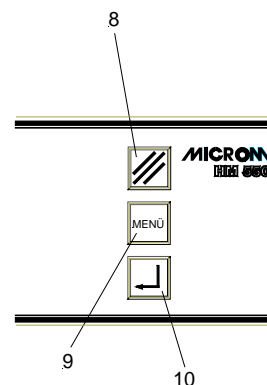


Fig. 42

### 2-10-3 SETTING THE ACTIVE TIME

- Press the menu button (fig. 46.9). This way, you get into the list of the submenus.
- Via the arrow buttons (fig. 45.5 and 45.6) select "Active Time". This submenu is now shown inverted.
- Via the enter button (fig. 46.10) confirm this submenu and simultaneously open it.
- To change the ACTIVE time at intervals of 1-hour-steps (1 to 9 h), press the arrow buttons (fig. 45.5 or 45.6).
- Confirm it via the enter button (fig. 46.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 46.9).
- Now continue working with the selected settings.

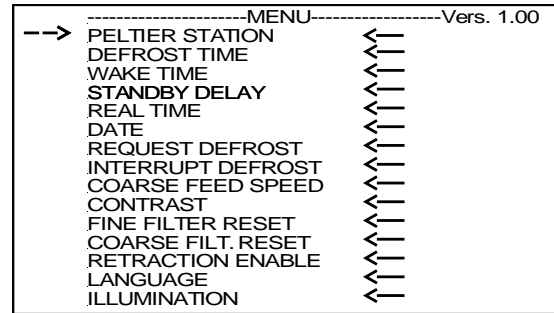


Fig. 43

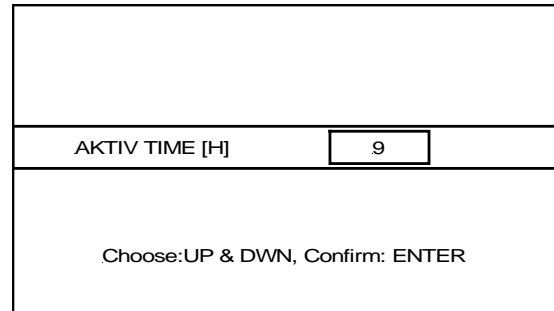


Fig. 44

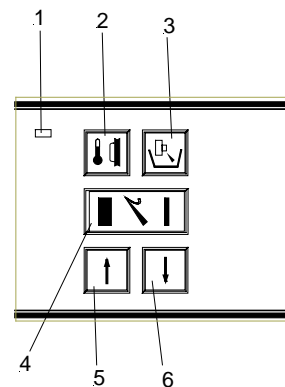


Fig. 45

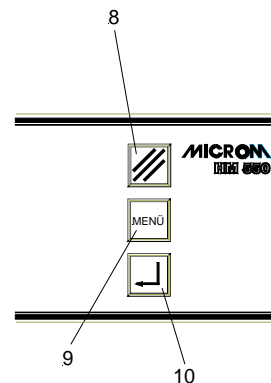


Fig. 46

### 2-10-4 SETTING THE DATE

- Press the menu button (fig. 50.9). This way, you get into the list of the submenus.
- Via the arrow buttons (fig. 49.5 and 49.6) select "Date". This submenu is now shown inverted.
- Via the enter button (fig. 50.10) confirm this submenu and simultaneously open it.
- To choose between day, month and year, press the reset button (fig. 50.8) to set the correct date.
- Via the arrow buttons (fig. 49.5 and 49.6) change the desired field of the date in steps of day, month or year.
- Confirm it via the enter button (fig. 50.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 50.9).
- Now continue working with the selected settings.

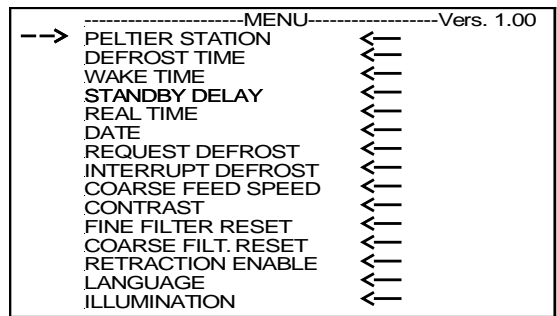


Fig. 47

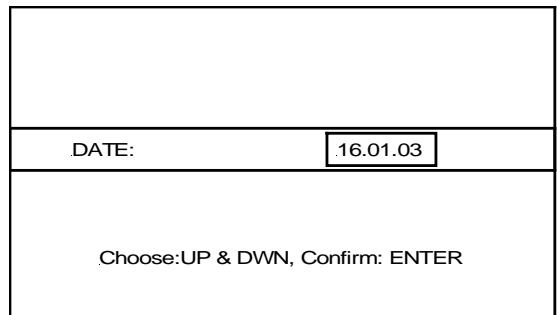


Fig. 48

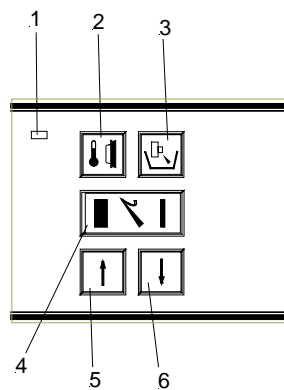


Fig. 49

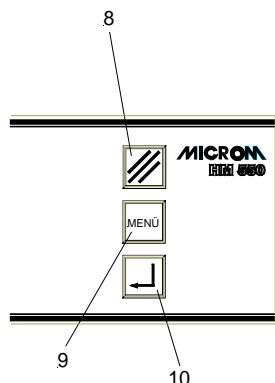


Fig. 50

### 2-11 DEFROSTING

#### 2-11-1 SETTING THE DEFROSTING TIME

- Press the menu button (fig. 54.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 53.5 and 53.6) select "Defrost Time". This submenu is now shown inverted.
- Via the enter button (fig. 54.10) confirm this submenu and simultaneously open it.
- To change the instrument's defrosting time at intervals of 15 minutes, press the arrow buttons (fig. 53.5 or 53.6).
- Confirm with enter (fig. 54.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 54.9).
- Now continue working with the selected settings.



**Note:**

Defrosting can only be carried out at the set defrosting time, if the real time is set correctly (see part 2-10-

1).

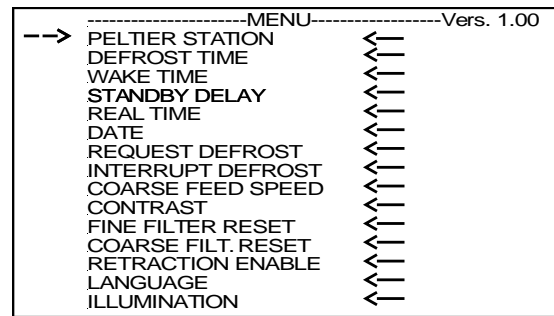


Fig. 51

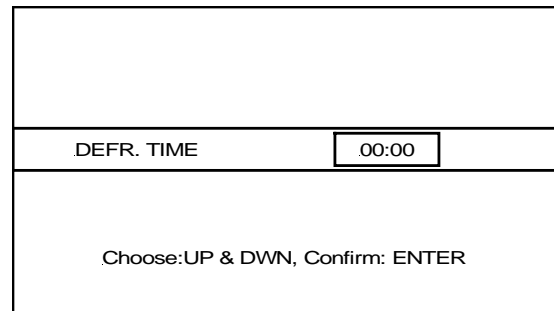


Fig. 52

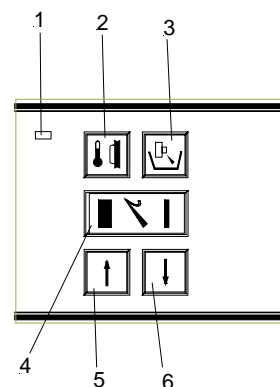


Fig. 53

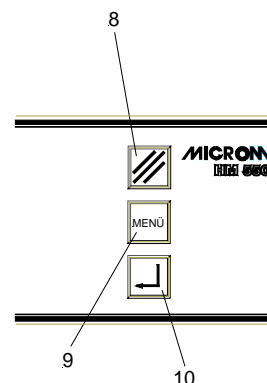


Fig. 54

### 2-11-2 DEFROSTING CYCLE

Every 24 hours the evaporator in the rear part of the microtome chamber is defrosted automatically.

- It is advisable to set the time of the defrosting cycle not during routine working time (see part 2-11-1).
- According to the frost built-up, a defrosting cycle normally takes approx. 40 min.
- **Immediate defrosting** can be carried out at any time (fig. 58.9).
- For this, press the menu button (fig. 58.9),
- Via the arrow buttons (fig. 57.5 and 57.6) select the submenu "request defrost". This submenu is now shown inverted.
- Via the enter button (fig. 58.10) confirm this submenu and simultaneously open it.
- Via the arrow buttons (fig. 57.5 or 57.6) choose "ON" or "OFF".
- If "ON" is confirmed, "request defrost" is shown in the info line.
- To confirm this setting, press the enter button (fig. 58.10).



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 58.9).
- Now continue working with the selected settings.



**Note:**

Before starting the immediate defrosting, it is absolutely necessary to remove the section waste as well as the tissue



**Warning:**

Remove the specimen from the chamber when defrosting is carried out. The temperature inside the chamber rises and thus the tissue specimen would be damaged.

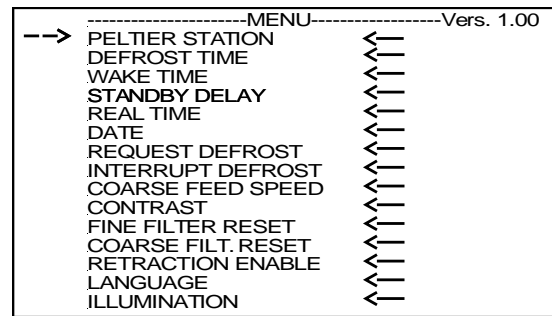


Fig. 55

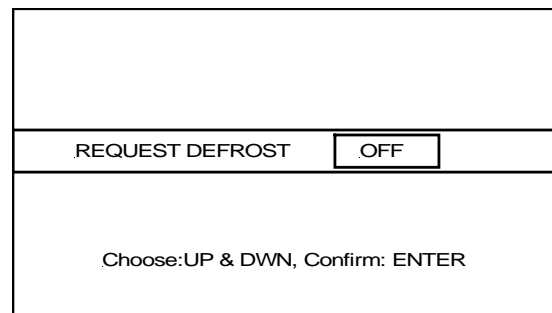


Fig. 56

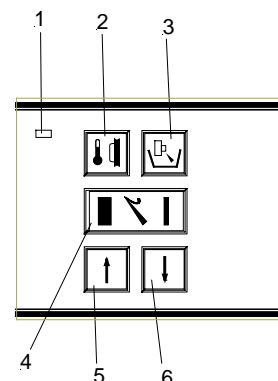


Fig. 57

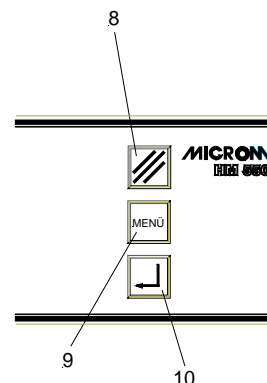


Fig. 58

### 2-11-3 INTERRUPTING A DEFROSTING CYCLE

If needed, the daily defrosting can be interrupted or cancelled.

- For this, press the menu button (fig. 60.9) This way, you get into the list of submenus.
- Via the arrow buttons (fig. 59.5 and 59.6) select the submenu "request defrost". This submenu is now shown inverted.
- Via the enter button (fig. 60.10) confirm this setting and simultaneously open this submenu.
- Via the arrow buttons (fig. 59.5 or 59.6) select "ON" or "OFF". ON is selected when defrosting is to be interrupted.
- Via the enter button (fig. 60.10) confirm the setting.



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 60.9).
- Now continue working with the selected settings.
- The interrupted defrosting is shown in the status line on the display (fig. 61) as INTR.



**Note:**

A cancelled or interrupted defrost cycle must be repeated later on, as otherwise the evaporator will cover completely with frost and cannot cool anymore (see immediate defrosting, part 2-11-2).

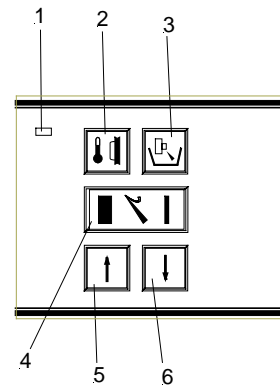


Fig. 59

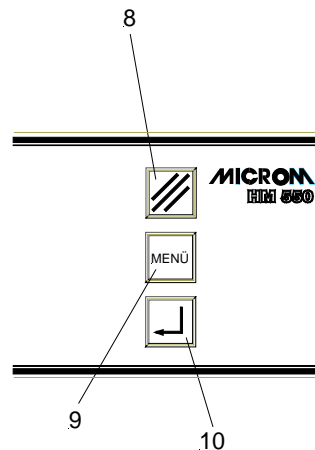


Fig. 60

HM550	M V	SET	ACT
SPECIM		-25	-24
CHAMBER		-20	-21
COUNTER =	0	CONTIN	18
FINE: 3		TRIM: 20	
-----			
*** REN		R	INTR.

Fig. 61

For this reason, the function INTERRUPT is automatically reset at the end of an interrupted defrosting (max. time approx. 1 h), i.e. the next defrosting is carried out again at the pre-selected defrosting time.



**Note:**

While INT. is active, neither the defrosting time nor the real time can be changed.

When INTR.ACT appears in the status line, this means that INTERRUPT was selected while defrosting should otherwise be carried out and the next defrosting is carried out again at the next pre-selected defrosting time.

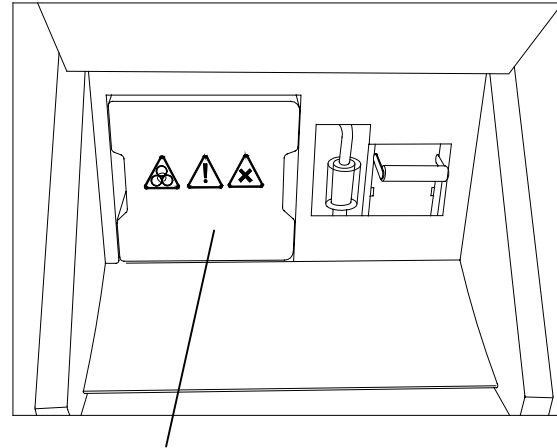
### 2-11-4 EMPTYING THE DEFROSTING LIQUID



**Note:**

The liquid from the daily defrosting process is collected in the container (fig. 62.1). Please note that this container is emptied in due time according to the safety precautions at the beginning of this instruction manual.

We highly recommend to treat the container with a disinfection solution after having emptied it.



1

fig. 62

### 2-12 CUSTOMER-SPECIFIC SETTINGS

The information on the display can be shown in various contrasts and in four different languages.

#### 2-12-1 SETTING THE CONTRAST

- To set the contrast higher or lower, press the menu button (fig. 65.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 64.5 and 64.6) select "contrast". This submenu is now shown inverted.
- Via the enter button (fig. 65.10) confirm this submenu and simultaneously open it.
- Several black stripes now appear on the display.
- To set the contrast of the stripes lower, constantly press the button down (fig. 64.6).
- To set the contrast of the stripes higher, constantly press the button up (fig. 64.5).
- When the desired contrast has been achieved, press the enter button (fig. 65.10) for confirmation.
- To quit the submenu, press the menu button (fig. 65.9).
- Now continue working with the selected settings.

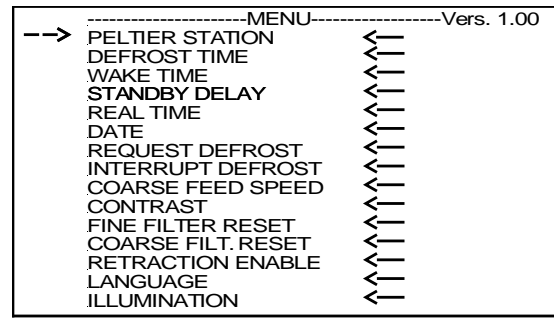


Fig. 63

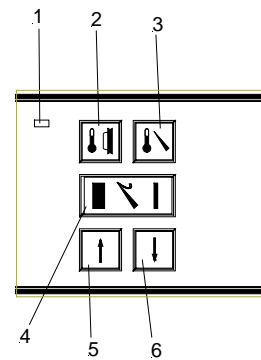


Fig. 64

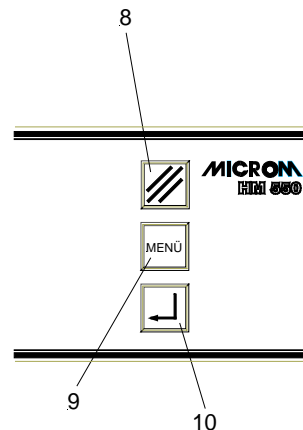


Fig. 65

### 2-12-2 SELECTING THE LANGUAGE

The information on the display can be shown in four different languages.

The following languages are available:

- German
- English
- French
- Spanish

- To select or change one of these languages, press the menu button (fig. 69.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 68.5 and 68.6) select the submenu "language". This submenu is now shown inverted.
- Via the enter button (fig. 69.10) confirm this submenu and simultaneously open it.
- Via the arrow buttons (fig. 68.5 and 68.6) select the desired language: "English", "Deutsch", "Español", "Français".
- Via the enter button (fig. 69.10) confirm the setting.



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 69.9).
- Now continue working with the selected settings.

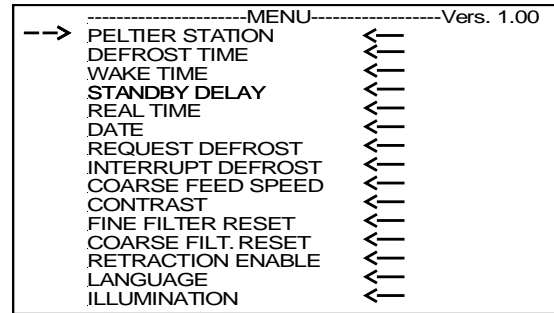


Fig. 66

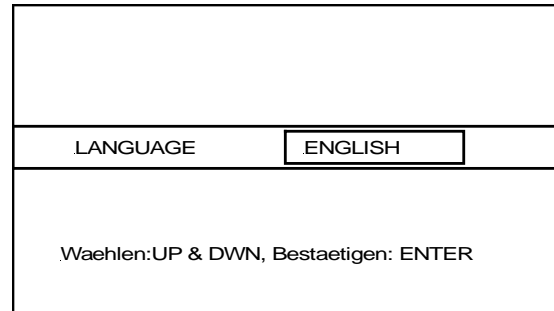


Fig. 67

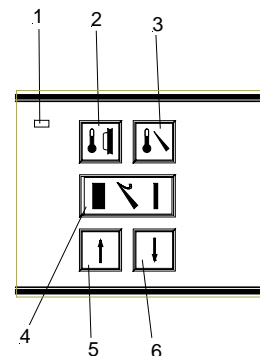


Fig. 68

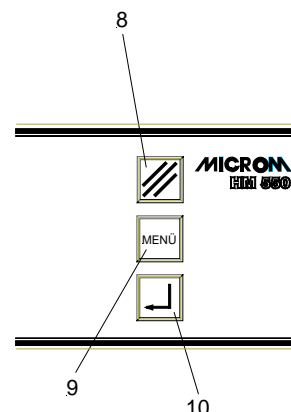


Fig. 69

### 2-13 ILLUMINATION OF THE COOLING CHAMBER

To illuminate the cooling chamber, a fluorescent lamp is located in the handle of the sliding window.

- The fluorescent lamp is automatically turned on when the instrument is turned on.
- The lamp remains on as long as the instrument is in its active status (see standby status, part 2-3).
- Used lamps can be changed by the user himself (see part 5-4).

#### Turning the light on/off:

- Press the menu button (fig. 72.9).
- Via the arrow buttons (fig. 72.5 and 72.6) select "Illumination".
- Confirm it via the enter button (fig. 72.10).
- Via the arrow buttons (fig. 71.5 and 71.6) select either ON or OFF.
- Confirm it via the enter button (fig. 72.10).
- Press the menu button (fig. 72.9) to quit the menu.

-----MENU-----		Vers. 1.00
→	PELTIER STATION	←
	DEFROST TIME	←
	WAKE TIME	←
	STANDBY DELAY	←
	REAL TIME	←
	DATE	←
	REQUEST DEFROST	←
	INTERRUPT DEFROST	←
	COARSE FEED SPEED	←
	CONTRAST	←
	FINE FILTER RESET	←
	COARSE FILT. RESET	←
	RETRACTION ENABLE	←
	LANGUAGE	←
	ILLUMINATION	←

Fig. 70

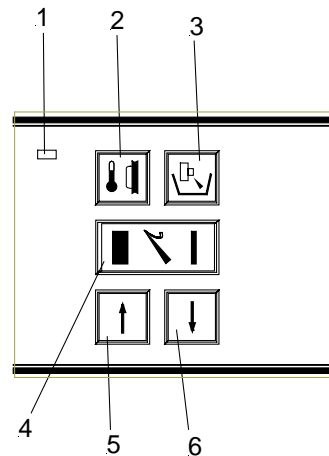


Fig. 71

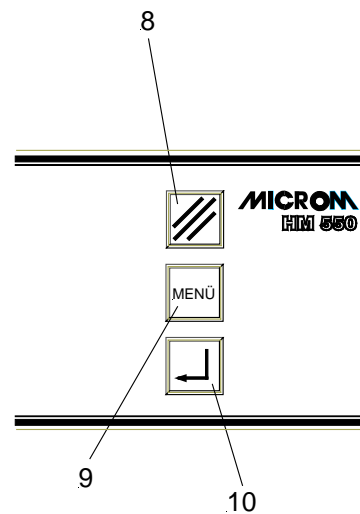


Fig. 72

### 2-14 SERVICE SETTINGS



**Note:**  
Menu service settings are only relevant for service technicians.

-----MENU-----		Vers. 1.00
-->	DEFROST TIME	←
	WAKE TIME	←
	STANDBY DELAY	←
	REAL TIME	←
	DATE	←
	REQUEST DEFROST	←
	INTERRUPT DEFROST	←
	COARSE FEED SPEED	←
	CONTRAST	←
	FINE FILTER RESET	←
	COARSE FILT. RESET	←
	RETRACTION ENABLE	←
	LANGUAGE	←
	ILLUMINATION	←
	SERVICE	←

Fig. 73

### 2-15 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. 74.7).
- Via the orienting lever (fig. 74.6) the specimen clamping can be moved in all directions by approx. 8°.
- After having achieved the desired alignment, fix the position via the clamping lever (fig. 74.7).
- The orienting lever (fig. 74.6) is also used for clamping the chuck into the orienting specimen holder.

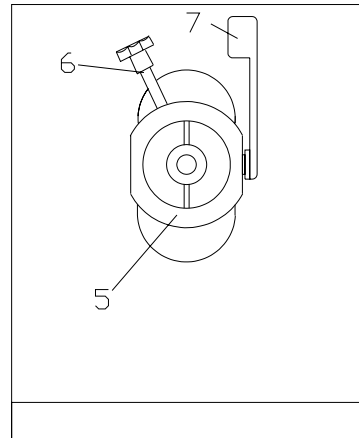


Fig. 74



**Note:**

The specimen orientation includes a zero device for the specimen (chuck is always parallel in relation to the knife).

Zero position can be felt noticeably.

**2-16 KNIFE CARRIERS**

**2-16-1 STANDARD KNIFE CARRIER**

The standard knife carrier of the cryostat is easy to use. The knife can be inserted either from the side or from the front. The standard knife holder takes up commercially available conventional knives with c- and d-profiles.

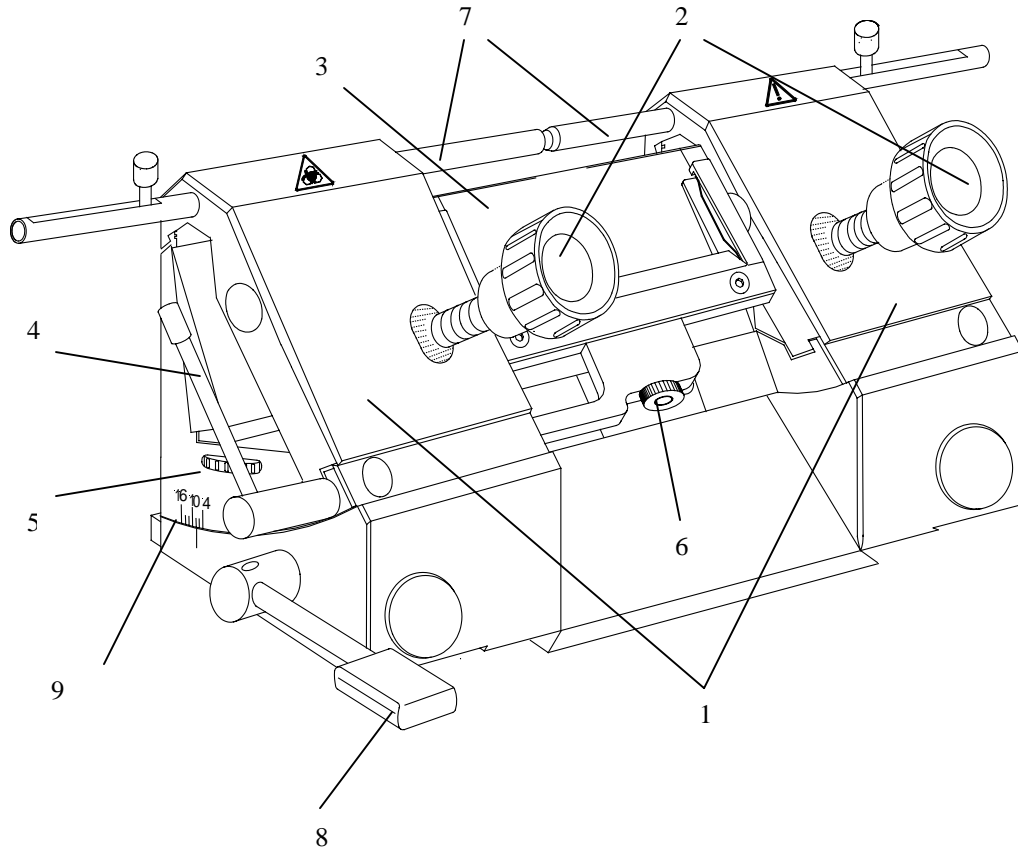


Fig. 75

### Inserting the knife:

- The knife is inserted into the knife carrier either from the side or from the front, independently if one or two clamping plates (fig. 75.1) have been removed.
- Loosen the clamping screws (fig. 75.2) on the clamping plates (fig. 75.1).
- Turn the turning lever (fig. 75.4) in a clockwise direction to tilt the anti-roll plate (fig. 75.3) forwards.
- Insert the knife.
- Turn the turning lever (fig. 75.4) in a counter clockwise direction to put the anti-roll plate (fig. 75.3) against the knife.
- Then tighten the clamping screws (fig. 75.2) to fix the knife in its position.

### If the cutting area of the knife is no longer usable, the knife can be moved:

- Open the clamping screws (fig. 75.2) and move the knife to the left or right side as required.
- Fix the knife again via the clamping screws (fig. 75.2).



#### Caution:

To avoid the danger of injury on the knife during adjustment of specimen, always position the knife guards (fig. 75.7) over the blade edge.

### Height adjustment of the knife:

- Loosen the clamping screws (fig. 75.2).
- Via the knurled screws (fig. 75.5) which are placed on the left and right side of the knife carrier adjust the height of the knife to the position of the anti-roll device.



#### Note:

Please note the parallel alignment of knife edge and edge of the anti-roll plate.

- Afterwards, tighten the clamping screws (fig. 75.2) to fix the knife in its position.

### Fine adjustment of the anti-roll device:

- The fine adjustment of the anti-roll device is carried out via the knurled screw (fig. 75.6).

### Selecting the clearance angle:

- Loosen the clamping lever (fig. 75.8) on the left side of the knife carrier.
- Swivel the upper part of the knife carrier on the base until the desired clearance angle is reached.
- The clearance angle can be read on the scale (fig. 75.9) on the left side on the base.
- Bring the clamping lever (fig. 75.8) upwards into clamping position.
- The selected clearance angle is now fixed in its position.



#### **Note:**

Usable cuts are only achieved at a clearance angle of 10° or more!

### 2-16-2 DISPOSABLE BLADE CARRIER EC

The disposable blade carrier EC takes up all commercially available low profile blades with a dimension of 80 x 8 mm and a facet angle of approx. 35° and as another version it takes also up high profile blades.

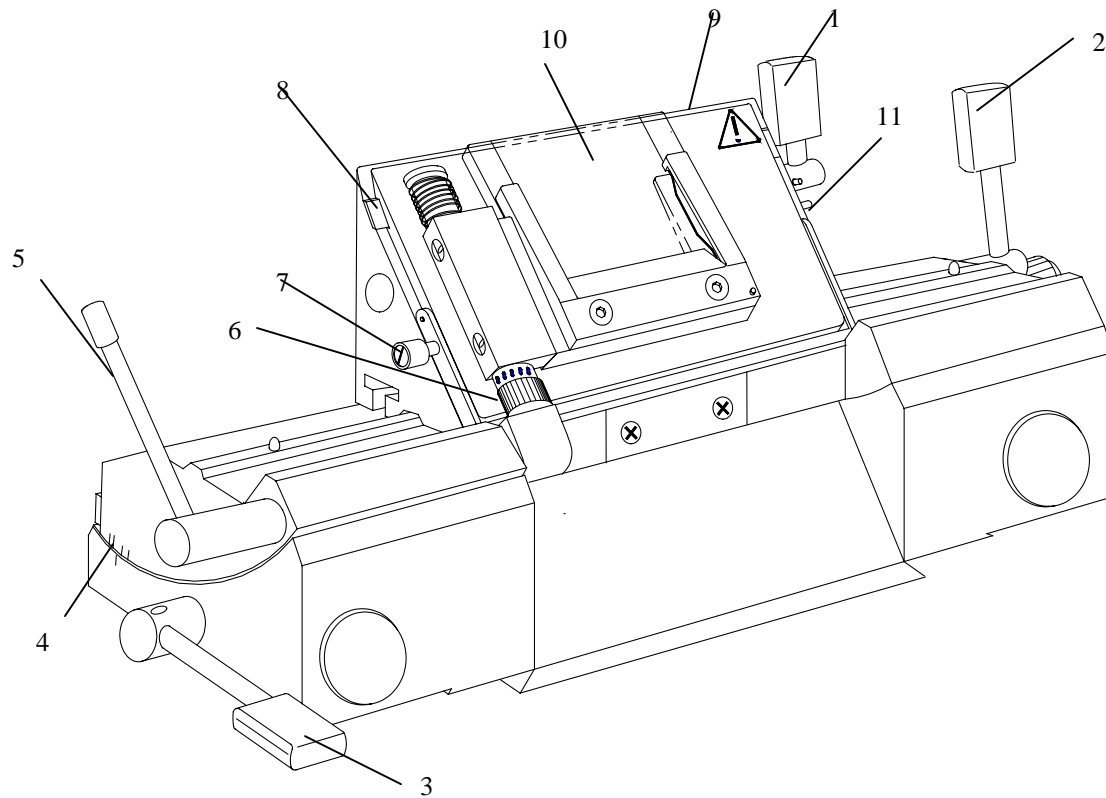


Fig. 76

### Inserting the blade:

- The blade is inserted into the slot behind the clamping plate.



**Note:**

When using high profile blades, first loosen the lever (fig. 76.1) and remove the spacer strip (fig. 76.8).

- For this, push in the stop bolt (fig. 76.11) and turn the clamping lever (fig. 76.1) in a counter clockwise direction over the stop bolt.
- Remove the clamping lever (fig. 76.1) together with the eccentric bolt.
- First remove the clamping plate and then the spacer strip.
- Fix the clamping plate with clamping lever (fig. 76.1) again in the blade carrier in reverse order.
- To insert the blade, now loosen the clamping lever (fig. 76.1).



**Note:**

Press the clamping plate on its lower area to open the slot behind the clamping plate.

- Insert the blade from the left side into the slot behind the clamping plate (fig. 76.9) as far as possible.
- Tighten the clamping lever (fig. 76.1). Thus fixing the blade in its position.

**If the cutting area of the blade is no longer usable, the blade carrier can be moved:**

- The blade itself is clamped solidly into the blade carrier. The complete carrier is moved.
- Open the clamping lever for the upper part of the carrier (fig. 76.2) and move the blade together with the upper part to the left or right side.
- Tighten the clamping levers (fig. 76.2) to fix this position.



**Caution:**

To avoid the danger of injury on the blade during adjustment of specimen, always position the knife guards (fig. 76.7) over the blade edge.

### Fine adjustment of the anti-roll device:

- The fine adjustment of the anti-roll device is carried out via the knurled screw (fig. 67.6).

### Selecting the clearance angle:

- Loosen the clamping lever (fig. 76.3).
- Swivel the upper part of the blade carrier on the base until the desired clearance angle is reached.
- The clearance angle can be read on the scale (fig. 76.4) on the left side on the base.
- Bring the clamping lever (fig. 76.3) into clamping position.
- The selected clearance angle is now fixed in its position.



#### **Note:**

Usable cuts are only achieved at a clearance angle of 10° or more!

**2-16-3 MAGNETIC DISPOSABLE BLADE CARRIER M**

The magnetic disposable blade carrier takes up MICROM blades with the dimensions 80 x 19 mm and/or 60x19 mm and a facet angle between 24° and 30°.

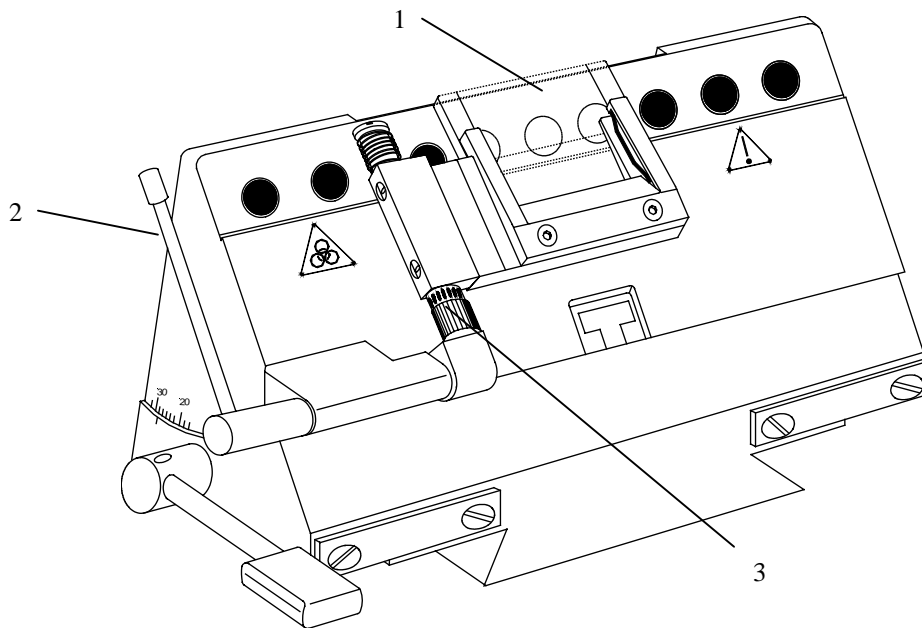


Fig. 77

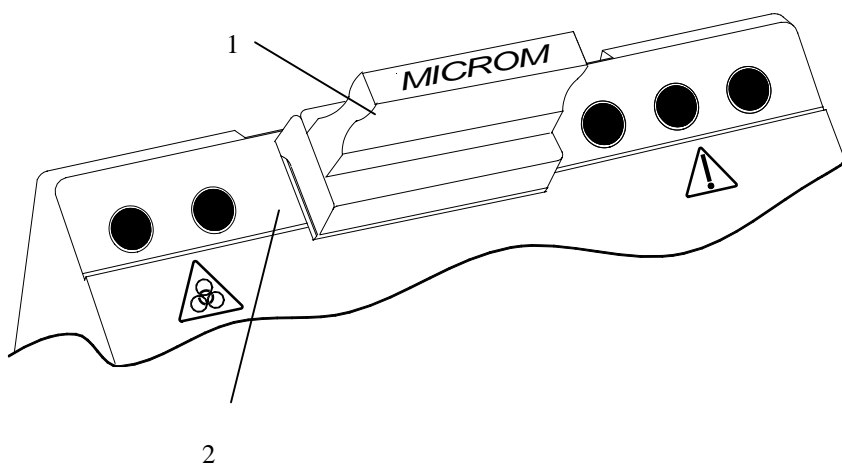


Fig. 78



**Note:**  
Special MICROM magnetic blades must be used only!

### Inserting the blade

- Insert the blade into the blade slider (fig. 78.1) and put it onto the magnetic surface (fig. 78.2) of the blade carrier from the side.



**Note:**  
Always insert the blade in a way that the large facet of the blade is inserted downwards. So it is invisible for the user.

- When inserting the blade, the blade slider together with the blade must be pressed downwards, so that the blade is put properly against the ledge.
- Turn the lever (fig. 77.2) to move the anti-roll plate (fig. 77.1).

### If the cutting area of the blade is no longer usable, the blade can be moved:

- Put the blade slider (fig. 79.1) onto the blade and shift it.



**Note:**  
The blade slider must always be put on in a way that the inscription MICROM can be read.

- This way, it is guaranteed that the slanted edge of the blade slider shows to the rear side of the blade.



**Caution:**  
To avoid the danger of injury on the blade during adjustment of specimen, always position the knife guard over the blade edge.

### Fine adjustment of the anti-roll device

- The fine adjustment of the anti-roll device is carried out via the knurled screw (fig. 77.3).

### Setting the clearance angle

- Loosen the clamping lever as well as the clamping screw on the right side of the magnetic disposable blade carrier.
- Swivel the upper part of the blade carrier on the base until the desired clearance angle is achieved.
- The clearance angle can be read on the scale on the left side of the base.
- Again tighten the clamping lever and the clamping screw.
- The selected clearance angle is thus fixed in its position.



#### **Note:**

Usable cuts are only achieved with a clearance angle between 24° and 30°.

### 2-17 OPTION P – SPECIMEN COOLING

If the cryostat is equipped with a specimen cooling, the chamber as well as the specimen temperature is shown on the display (fig. 79).

#### 2-17-1 ACTUAL AND SET VALUE OF THE SPECIMEN TEMPERATURE

The specimen cooling of the cryostat is set via the corresponding part on the operating controls (fig. 80.2).

The actual and set values of the specimen cooling are shown in °C on the display (fig. 79). On the right side of the display, the actual value is also shown graphically.

- Press button (fig. 80.2) for specimen temperature.
- "SPECIMEN" is then shown inverted.

**The set value settings are made via the**

- up button (fig. 80.5)
- down button (fig. 80.6)



**Note:**

The valid range of the set value goes from +10°C down to -50°C.

- The actual value of the specimen temperature is shown as actual temperature and as a graphic.
- After having chosen the requested values, the display automatically returns to its basic indications after three seconds, i.e. fine section thickness is again shown inverted.

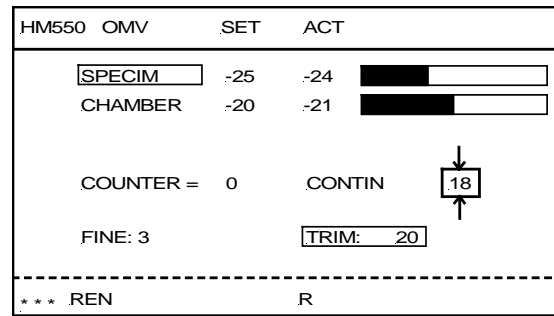


Fig. 79

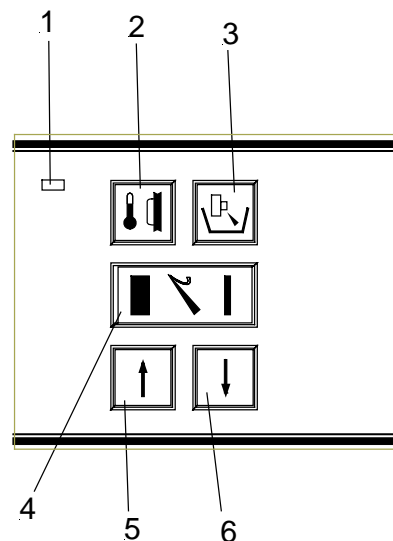


Fig. 80

### 2-17-2 SPECIMEN ORIENTATION WITH ZERO DEVICE (with option O)

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.

- Before the chuck can be inserted, pull off the spring-loaded eccentric bolt (fig. 81.1).
- Insert the chuck while the bolt is pulled off. Afterwards insert the eccentric bolt (fig. 81.1) again.
- For the specimen orientation now loosen the clamping lever (fig. 81.2) towards the front.
- The entire specimen head can now be oriented manually (together with specimen cooling, if equipped) in all directions by approx. 8°.
- After having achieved the desired alignment, press the clamping lever (fig. 81.2) upwards to fix this position.

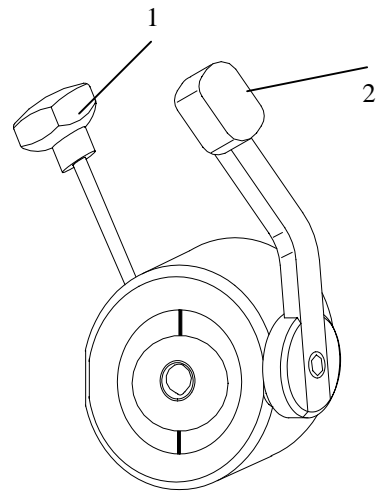


Fig. 81

#### For the further orientation of the specimen, the chuck can be rotated by 360°.

- Turn the spring-loaded eccentric lever (fig. 81.1) either to the right or left side. Then the chuck is loosened.
- Turn the chuck together with the specimen as desired.
- Then bring the eccentric lever (fig. 81.1) again into clamping position by turning it to right or left side.



#### Note:

The specimen orientation includes a zero device for the specimen (chuck is always parallel in relation to the knife).

Zero position can be felt noticeably.

### 2-18 OPTION M – 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 up to 250 mm/s.
- The cutting speed refers to the cutting window (see part 2-18-1).
- 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 (60 mm) and can be adjusted to the respective specimen.

#### 2-18-1 SETTING THE CUTTING WINDOW

The size of this zone is shown in millimeters within the symbol for the cutting window. When passing the cutting window this symbol is shown inverted on the display.



**Note:**  
Cutting and suction window are identical.

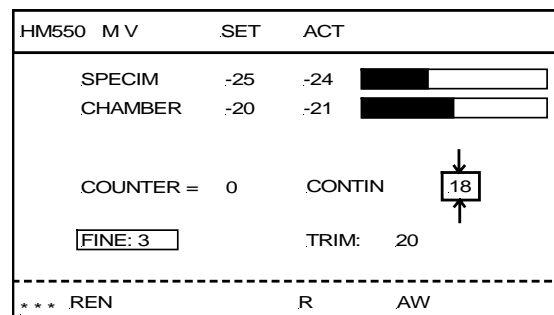


Fig. 82

### Manual setting:

- The cutting window is determined by manual entries.
- For this, turn the handwheel so that the lower edge of the specimen is positioned slightly above the knife edge.
- Press button (fig. 83.1) to set the upper limit of the cutting window.
- Continue turning the handwheel clockwise to place the upper edge of the specimen just below the knife edge.
- Press button (fig. 83.1) to set the lower limit of the cutting window.
- The LED in button (fig. 83.1) lights up during each further passing through of the cutting window. The length of the cutting window is shown in mm within the cutting window symbol on the display.



#### Note:

A cutting window should only be set while the specimen is moved downwards.



#### Note:

In case the cutting window limits are set incorrectly, please repeat above-mentioned process again.

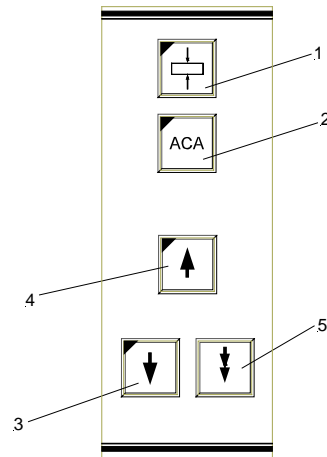


Fig. 83

### 2-18-2 SELECTION OF OPERATING MODES

For the motorized cutting movement of the microtome, the following operating modes are available:

- continuous stroke
- single stroke
- interval stroke

- If the cutting drive is turned off, choose one of the above-mentioned operating modes by pressing the button *MODE* (fig. 85.1) once or twice.
- The selected operating mode is shown on the display as CONTIN, SINGLE and INTERV and the corresponding LED in button (fig. 85.1) lights up.

#### Continuous stroke

- Press button (fig. 85.1) until the operating mode *continuous stroke* CONTIN is shown on the display.
- To start a continuous cutting cycle, use the foot pedal or press the two start buttons (fig. 85.3 and 85.4).
- To stop the continuous stroke, press foot pedal or one of the two start buttons (fig. 85.3 or 85.4).
- However, if a cutting cycle has been started, it will continue through and stop in the next lower reversal point.

#### Single stroke

- Press button (fig. 85.1) until the operating mode *single stroke* SINGLE is shown on the display.
- Press the two start buttons (fig. 85.3 and 85.4) or the foot pedal once to release a single cutting cycle.
- The movement stops in the lower reversal point.

#### Interval stroke

- Press button (fig. 85.1) until the operating mode *interval stroke* INTERV is shown on the display.
- The cutting drive only moves as long as the two start buttons (fig. 85.3 and 85.4) or the foot pedal are being pressed.

HM550 M V	SET	ACT
SPECIM	-25	-24
CHAMBER	-20	-21
COUNTER = 0	INTERV	18
FINE: 3	.TRIM: 20	
*** REN		R

Fig. 84

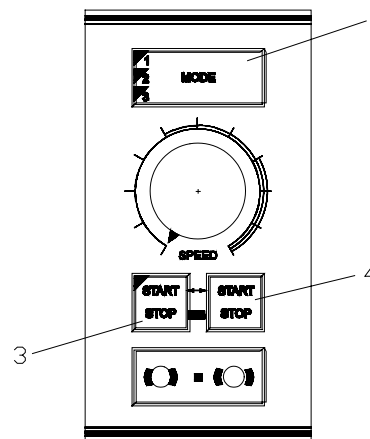


Fig. 85

### 2-18-3 SETTING THE CUTTING SPEED

- The desired cutting speed is set on the operating knob (fig. 86.2).



**Note:**

To save time, the return travel speed is enhanced in relation to the cutting speed, especially for slow cutting speeds.

### 2-18-4 START AND STOP OF THE CUTTING DRIVE

**Start**

- Press the two buttons (fig. 86.3 and 86.4) of the safety switch either at the same time or briefly one after the other.
- As an option, the motorized cutting drive can also be started via the foot pedal.
- The LED in button (fig. 86.3) lights up while the motorized cutting drive is active.



**Note:**

To start the motorized cutting drive, the functions *handwheel brake* and *emergency stop* must not be activated.

The course function of the cutting drive results from the selected cutting window, the selected operating mode and the set cutting speed (please see part 2-18-3).

**Stop in operating mode continuous stroke**

- Press one of the two buttons (fig. 86.3 or 86.4) or
- press the foot pedal.
- The LED (fig. 86.3) goes off.

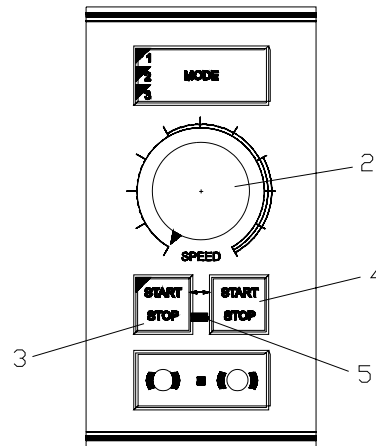


Fig. 86

### 2-18-5 HANDWHEEL BRAKE

Unintended movements of the specimen holder can be avoided via the handwheel brake.

This reduces the danger of being injured while adjusting specimen clamp and knife carrier!



**Warning:**

When the instrument is turned off, the handwheel brake is not operative.



**Warning:**

For your personal safety, the *handwheel brake* should be turned on when working on the specimen holder or knife carrier.

**Activating the brake**

- Stop the motorized cutting movement via buttons (fig. 87.3 and 87.4).
- Then activate the function *handwheel brake* via button (fig. 87.6).
- The red LED (fig. 87.7) lights up.
- The motorized cutting drive cannot be started by mistake anymore!

**Releasing the brake**

- To release the handwheel brake, press button (fig. 87.8).

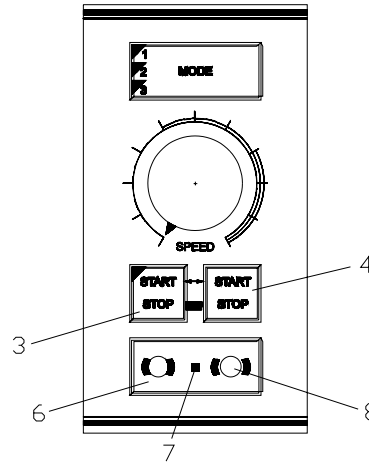


Fig. 87

### 2-18-6 EMERGENCY STOP

To quickly eliminate danger, the microtome is equipped with two **emergency stop** functions.



**Caution:**

In case danger arises from cutting drive, activate the *emergency stop*!

**Hand emergency stop:**

- The *hand emergency stop* (fig. 89.1) is located above the right arm rest.
- Press this button to immediately stop the motorized cutting drive.
- When the *hand emergency stop* is activated, the red LED (fig. 88.5) between the buttons (fig. 88.3 and 88.4) lights up.



**Note:**

After having activated the *hand emergency stop*, STOP is shown inverted on the display (fig. 90).

- After having eliminated the danger and to continue sectioning, pull out the red button (fig. 89.1).
- The cutting drive can be started again.

**Foot emergency stop:**

- The second emergency stop installation is located in the foot pedal (fig. 91).
- Vigorously step on the foot pedal to immediately stop the motorized cutting drive.
- However, the LED (fig. 88.5) **does not** light up when the *foot emergency stop* is pressed.



**Note:**

After having activated the *foot emergency stop*, STOP is shown inverted on the display (fig. 90).

- After having eliminated the danger and to continue sectioning, release the foot pedal.
- The cutting drive can be started again.

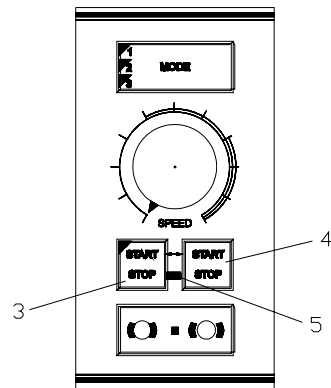


Fig. 88

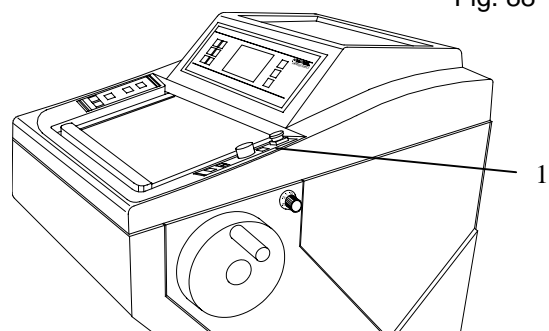


Fig. 89

HM550	OMV	SET	ACT
SPECIM	-25	-24	
CHAMBER	-20	-21	
COUNTER =	0	STOP	
FINE: 3		TRIM: 20	
*** REN		R	

Fig. 90

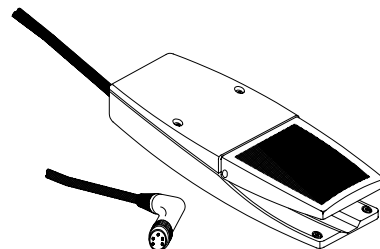


Fig. 91

### 2-19 OPTION V - VACUTOME

#### 2-19-1 SETTING THE VACUUM FOR STRETCHING SECTIONS AND DISPOSING OF SECTION WASTE

##### Setting the vacuum

- To select the suction power or the required vacuum between 0 - 10, turn the operating knob (fig. 92.1). (0 = no suction power, 10 = highest suction power).



##### Note:

The user sets the desired value depending on the desired function (stretching or suction process), section thickness and size of the specimen.



##### Note:

The applied vacuum for stretching sections and/or disposing of section waste is only active during the **cutting window** representing **also** the **suction window**. Outside the cutting window, the selected vacuum is turned off by means of a valve.

**Setting the suction window is carried out in the same way as the cutting window.**

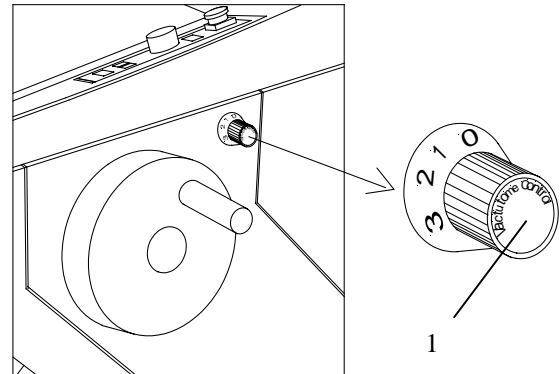


Fig. 92

### 2-19-2 INSERTING AND REPLACING THE FILTER UNIT

When the suction power and suction window are set in a correct way, the section to be disposed of gets via the suction slot in the knife carrier into the filter unit, consisting of a coarse filter for collecting section waste and a micro filter for filtering the air.

Section waste is collected in the coarse filter. This coarse filter must be replaced depending on the volume of waste. The coarse filter is actively cooled.

The micro filter must also be replaced regularly, however, at least every 6 months.

#### Removing coarse filter:

- Press the bow (fig. 93.2) of the coarse filter downwards either manually or via the foot.
- The coarse filter tilts forwards.
- Remove the coarse filter by means of the attached clamp for filter replacement.

#### Replacing the coarse filter:

The coarse filter must be replaced depending on the volume of the existing section waste. If the integrated counter detects that the sum of all sections exceeds 50 000  $\mu\text{m}$  after the last resetting, the message "Change coarse filt." appears on the display.

- For this, remove the coarse filter as described above.
- **Use lab gloves!!!**
- Remove the coarse filter from the metal carrier by using forceps or the like.
- Dispose of the coarse filter together with the section waste according to the respective lab regulations.



#### Note:

The coarse filter is to be understood as a disposable filter and must not be used again.

- Insert new coarse filter and close the filter.

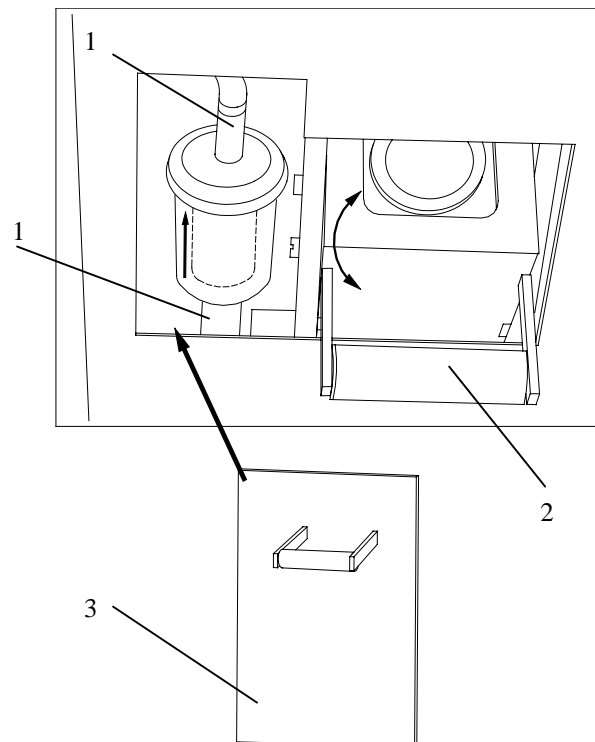


Fig. 93

**Note:**



In case section waste blocks the suction hoses of the Vacutome against ones expectations, it can be removed by using the attached hose cleaner.

During this cleaning cycle, the Vacutome should be operated with maximum power to guarantee that the released section waste is drained off properly.

The internal counter for the coarse filter must be reset:

- For this, press the menu button (fig. 95.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 94.8 and 94.6) select "coarse filter". This submenu is now shown inverted.
- Via the enter button (fig. 95.10) select this submenu and simultaneously open it.
- Via the arrow buttons (fig. 94.5 and 94.6) reset the sum of sections since the last resetting to 0  $\mu\text{m}$ .
- Via the enter button (fig. 95.10) confirm the setting.



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 95.9).
- Now continue working with the selected settings.

**Note:**



If there is no time to reset the internal counter for the coarse filter, it is possible to ignore the message "CHANGE COARSE FILT." for the moment.

- For this press the scroll/enter button (fig. 95.8). However, this means that the counter must still be reset. After further sections, the message will appear on the display again every 1000  $\mu\text{m}$ .

**Note:**



It is also possible to check if the filter must be replaced.

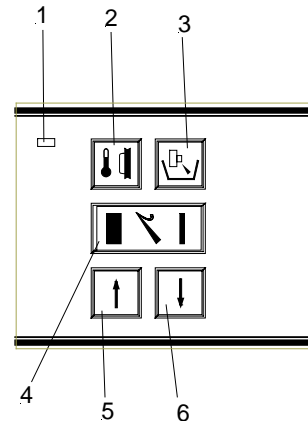


Fig. 94

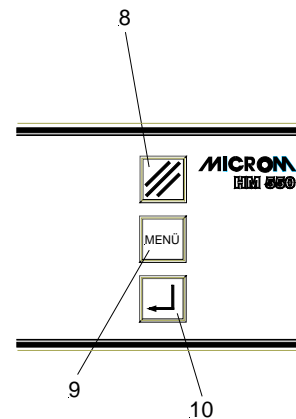


Fig. 95

- For this open the submenu "coarse filter" in the menu.
- If the message "COARSE FILT. ==> OK" appears on the display, the entire sum of sections of 50 000 µm has not yet reached.
- However, if the message "COARSE FILT.!!!!!" appears on the display, the filter must be replaced.

### Replacing the micro filter:

Depending on how often the instrument is used, the micro filter must be replaced at regular intervals, however, at least every 6 months.

If the internal software detects that the micro filter must be replaced, the message "CHANGE MICRO FILT." appears on the display.

- For this, remove the cover for the micro filter (fig. 96.3) which is placed beside the coarse filter.
- Pull off upper and lower connecting pieces (fig. 96.1) and remove the micro filter.
- Dispose of the micro filter according to the respective lab regulations.

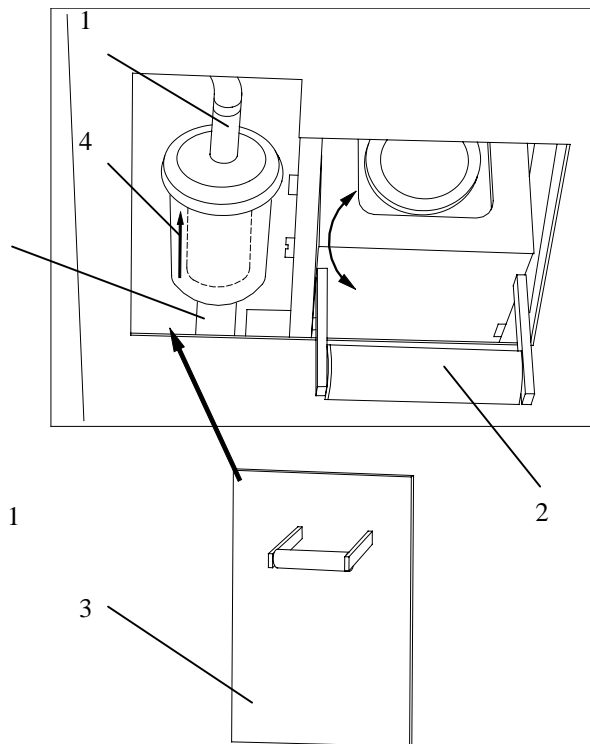


Fig. 96

### Note:

The micro filter is to be understood as a disposable filter and must not be used again.



### Inserting the micro filter:

- Connect the filter again with the connecting pieces.

### Note:

When inserting the filter, please note the correct direction (fig. 96.4). The arrow on the micro filter must show upwards.



The internal counter for the micro filter must now be reset:

- For this, press the menu button (fig. 98.9). This way, you get into the list of submenus.
- Via the arrow buttons (fig. 97.5 and 97.6) select "micro filter". This submenu is now shown inverted.
- Via the enter button (fig. 98.10) confirm this setting and simultaneously open it.
- Via the arrow buttons (fig. 97.5 and 97.6) reset the sum of sections since the last resetting to 0 µm.
- Via the enter button (fig. 98.10) confirm this setting.

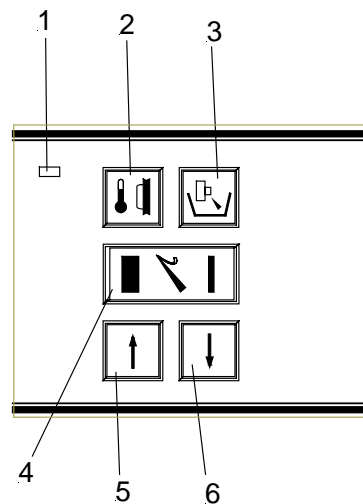


Fig. 97



**Note:**

You return immediately to the list of submenus. If the setting is not confirmed via the enter button, you will quit the submenu automatically after five seconds and you return into the list of submenus. The current setting of the submenu is also chosen and will still be valid.

- To quit the submenu, press the menu button (fig. 98.9).
- Now continue working with the selected settings.



**Note:**

If there is no time to reset the internal counter for the micro filter, it is possible to ignore the message "CHANGE MICRO FILT." for the moment.

- For this press the scroll/enter button (fig. 98.8). However, this means that the counter must still be reset. This message will appear on the display every 24 h.



**Note:**

It is also possible to check if the filter must be replaced.

- For this press the menu button (fig. 98.9) until the message "MICRO FILT. ==> OK" appears on the display.
- However, if the message "MICRO FILT.!!!!!" appears on the display, the filter must be replaced.

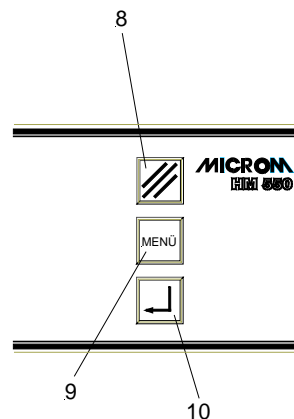


Fig. 98

### 2-19-3 SETTING THE SUCTION WINDOW

The size of this zone is shown in millimeters within the symbol for the suction window. When passing the suction window this symbol is shown inverted on the display.



**Note:**  
Cutting and suction window are identical.

HM550	M V	SET	ACT
SPECIM	-25	-24	
CHAMBER	-20	-21	
COUNTER =	0	CONTIN	
		.TRIM: 20	
-----			
*** REN		R	AW

Fig. 99

#### Manual setting:

- The suction window is determined by manual entries.
- For this, turn the handwheel so that the lower edge of the specimen is positioned slightly above the knife edge.
- Press button (fig. 100.1) to set the upper limit of the suction window.
- Continue turning the handwheel clockwise to place the upper edge of the specimen just below the knife edge.
- Press button (fig. 100.1) to set the lower limit of the suction window.
- The LED in button (fig. 100.1) lights up during each further passing through of the suction window. The length of the suction window is shown in mm within the suction window symbol on the display.



**Note:**  
A suction window should only be set while the specimen is moved downwards. If, by mistake, a suction window limit is set during return travel of the specimen, the set limits are applied to the cutting movement accordingly.



**Note:**  
In case the suction window limits are set incorrectly, please repeat above-mentioned process again.

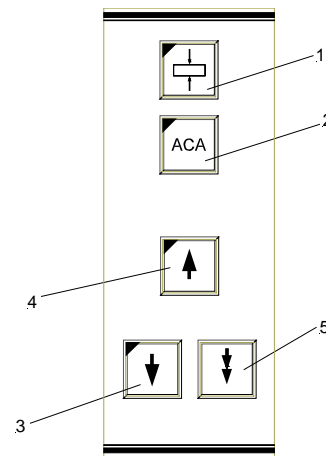


Fig. 100

**2-20 KNIFE CARRIERS FOR OPTION VACUTOME**

**2-20-1 DISPOSABLE BLADE CARRIER EV**

The disposable blade holder EV takes up all commercially available low profile blades with a dimension of 80 x 8 mm as well as high profile blades with a dimension of 76 x 14 mm and a facet angle of approx. 35°.

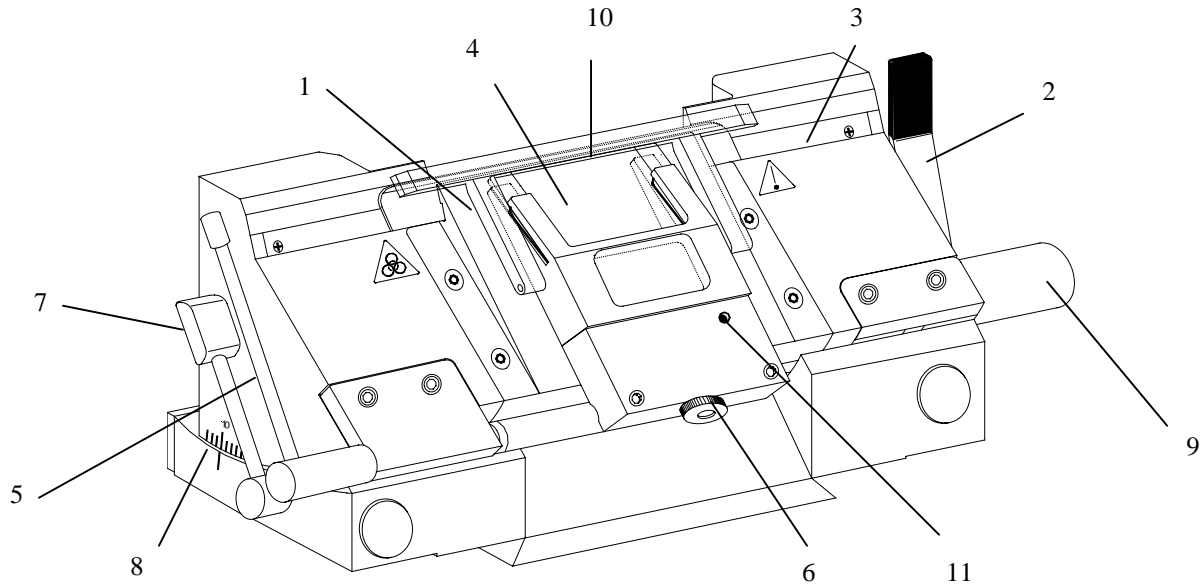


Fig. 101

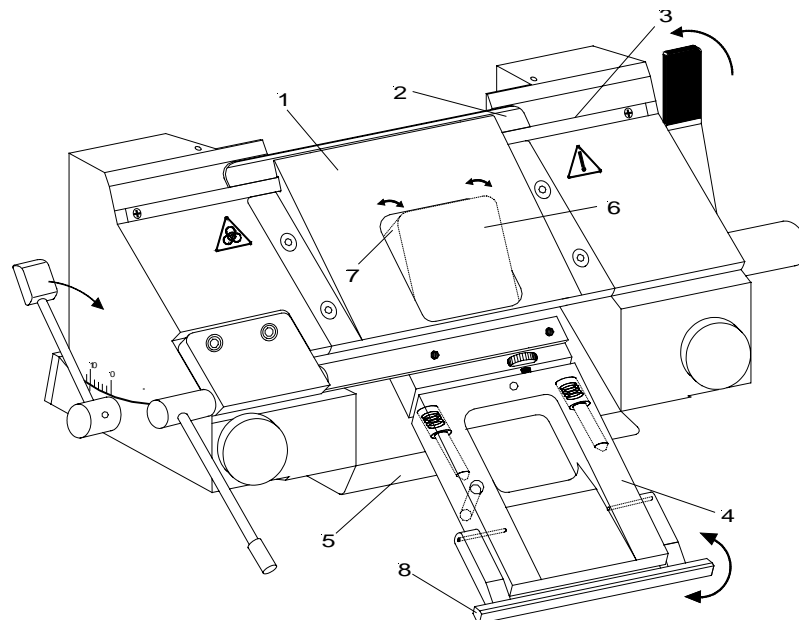


Fig. 102

### Inserting the blade:

- Insert the blade into the slot behind the clamping plate (fig. 101.1).



**Note:** When using high profile blades, first loosen the lever (fig. 101.2) and remove the spacer strip. The blade is clamped via the clamping plate which is placed on the rear part of the blade carrier.

- To insert the blade now loosen the clamping lever (fig. 101.2).



**Note:** Press the clamping plate on its lower area to open the slot behind the clamping plate.

- Push the blade from the left side into the slot behind the clamping plate (fig. 101.1) as far as possible.
- Close the clamping lever (fig. 101.2). Thus fixing the blade in its position.

### If the cutting area of the knife is no longer usable, the knife can be moved:

- Tilt the knife guard (fig. 101.10) forwards.
- Loosen the clamping lever (fig. 101.2). The blade is no longer clamped and can be moved e.g. by means of a brush until a suitable position of the blade is found.
- Clamp again the clamping lever (fig. 101.2)



**Caution:** To avoid the danger of injury on the blade during adjustment of specimen, always position the knife guards (fig. 101.10) over the blade edge.

### Setting the clearance angle:

- Loosen the clamping lever (fig. 101.7).
- Swivel the upper part of the blade carrier on the base until the desired clearance angle is achieved.
- The clearance angle can be read on the scale (fig. 101.8) on the left side of the base.
- Again tighten the clamping lever (fig. 101.7).
- The selected clearance angle is thus fixed in its position.



#### Note:

Usable cuts are only achieved at a clearance angle of 10° or more!

### Moving the blade carrier:

- To move the blade carrier, loosen the lever on the right side of the base plate.
- To fix the blade carrier in its new position, clamp the lever again.

### Fine adjustment of the vacuum anti-roll hood:

- The vacuum anti-roll hood (fig. 101.4) can be removed and put on by using the turning lever (fig. 101.5).
- The knurled screw (fig. 101.6) allows the adjustment of the edge of the vacuum anti-roll hood (fig. 101.4) in relation to the blade edge.
- The fine adjustment of the anti-roll device is carried out via the knurled screw (fig. 101.6).

### Function of the Vacutome:

- A closed vacuum anti-roll hood (fig. 102.4) and a suitable suction vacuum generate stretching or suction effects.
- For this, the closed vacuum anti-roll hood (fig. 102.4) slightly tilts the underneath flap (fig. 102.6) via the stud screw (fig. 101.11), thus opening a suction slot (fig. 102.7).
- Lift the vacuum anti-roll hood (fig. 102.4), the flap (fig. 102.6) beneath falls back in place and the slot gets closed.

### 2-20-2 MAGNETIC BLADE CARRIER MV

The magnetic blade carrier is suitable to take up MICROM blades with the dimensions 60 x 19 mm and a facet angle of approx. 33°.

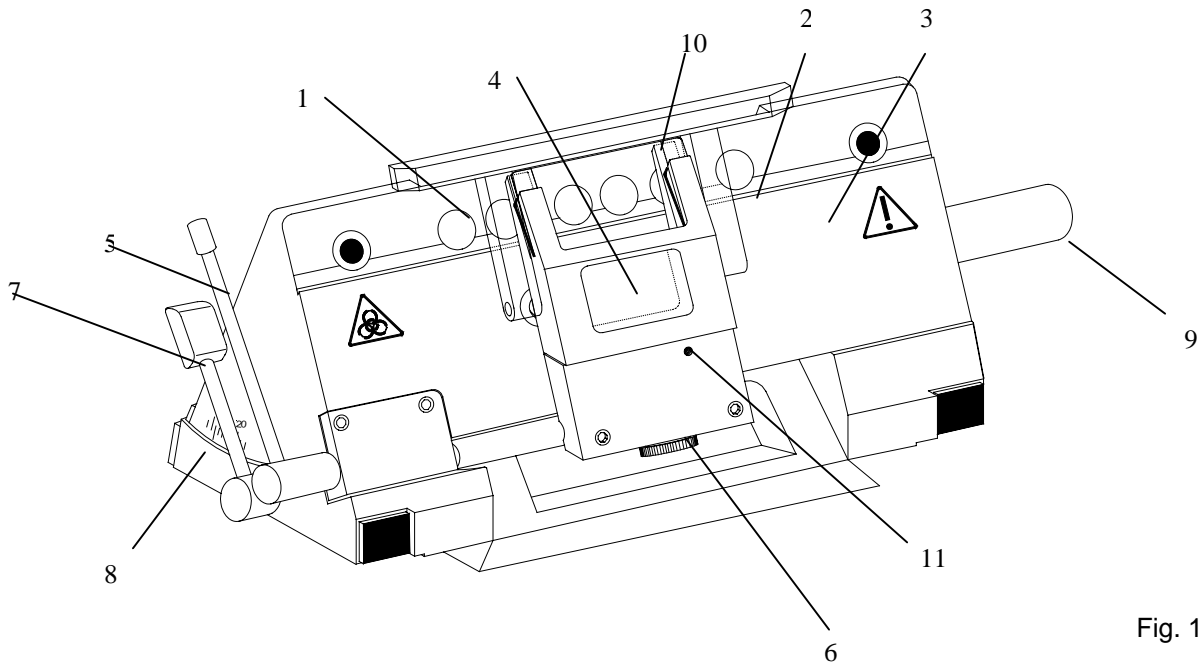


Fig. 103

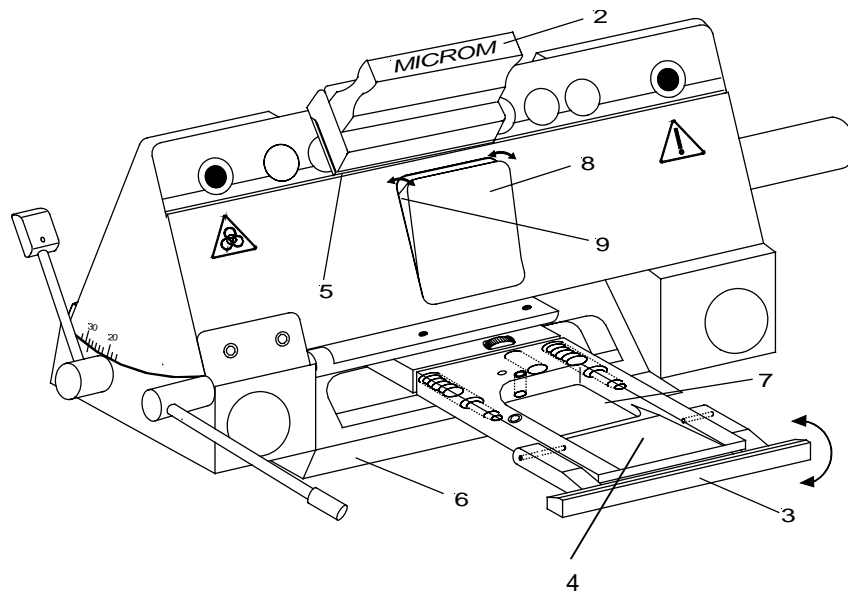


Fig. 104

**Note:**

Only special MICROM magnetic blades must be used!!

**Inserting the blade:**

- Insert the blade (fig. 103.1) into the blade slider (fig. 103.2) and put it on the magnetic surface (fig. 103.2) of the blade carrier from the side.

**Note:**

To move the blade to the side, press the blade slider downwards so that the blade is properly put against the ledge (fig. 103.3) of the blade carrier.

- To move the blade to the side, always use the blade slider (fig. 104.2) and shift it.

**If the cutting area of the blade is not longer usable, the blade can be moved:**

- Put the blade slider (fig. 104.2) onto the blade and shift it.

**Note:**

The blade slider must always be put on in a way that the inscription MICROM can be read.

- This way, it is guaranteed that the slanted edge (fig. 104.5) of the blade slider shows to the rear side of the blade.

**Caution:**

To avoid the danger of injury on the blade during adjustment of specimen, always position the knife guard (fig. 103.10) over the blade edge.

### Clearance angle adjustment:

- Loosen the clamping lever (fig. 103.7).
- Swivel the upper part of the magnetic blade carrier on the base until the desired clearance angle is adjusted.
- The set clearance angle can be read on the scale (fig. 103.8) on the left side of the base.
- Again tighten the clamping lever.
- This way, the set clearance angle is fixed in its position.



#### Note:

Usable cuts are only achieved at clearance angles between 24 – 30°!

### Moving the magnetic blade carrier:

- To move the magnetic blade carrier, loosen the lever on the right side of the base plate.
- To fix the blade carrier in its new position, tighten the lever again.

### Fine adjustment of the vacuum anti-roll hood:

- The vacuum anti-roll hood (fig. 103.4) can be removed and put on by using the turning lever (fig. 103.5).
- The knurled screw (fig. 103.6) allows the adjustment of the edge of the vacuum anti-roll hood (fig. 103.4) in relation to the blade edge.
- The fine adjustment of the anti-roll device is carried out via the knurled screw (fig. 103.6).

### Function of the Vacutome:

- A closed vacuum anti-roll hood (fig. 104.4) and a suitable suction vacuum generate stretching or suction effects.
- For this, the closed vacuum anti-roll hood (fig. 103.4) slightly tilts the underneath flap (fig. 104.8) via the stud screw (fig. 103.11), thus opening a suction slot (fig. 104.9).
- Lift the vacuum anti-roll hood (fig. 104.4), the flap (fig. 104.8) beneath falls back in place and the slot gets closed.

### 2-21 OPTION P – ACTIVE DEEP FREEZING STATION WITH PELTIER ELEMENT

To accelerate freezing-on of a specimen on a chuck, choose the function fast freezing. If this function is activated in due time (approx. 2 – 3 min.) before freezing-on, the fast freezing plate can achieve a temperature of -60°C.



**Note:** This fast freezing device can only be activated at a chamber temperature of less than -10°C.



**Note:** The upper side of the freezing station must not be covered by frost or ice. To avoid this, use acetone, ethanol or the like.

- Press the menu button (fig. 108.9).
- Via the arrow buttons (fig. 107.5 and 107.6) select "Peltier Station".
- Confirm it via the enter button (fig. 108.10).
- Via the arrow buttons (fig. 107.5 and 107.6) select HEAT., COOL. or OFF.
- Confirm the selected function via the enter button (fig. 108.10).
- The Peltier functions are turned off automatically after 8 min.
- To active or deactivate the fast freezing function, press button (fig. 107.2) for 1 sec. (fig. 109).

-----MENU-----Vers. 1.00	
--> PELTIER STATION	←
DEFROST TIME	←
WAKE TIME	←
STANDBY DELAY	←
REAL TIME	←
DATE	←
REQUEST DEFROST	←
INTERRUPT DEFROST	←
COARSE FEED SPEED	←
CONTRAST	←
FINE FILTER RESET	←
COARSE FILT. RESET	←
RETRACTION ENABLE	←
LANGUAGE	←
ILLUMINATION	←

Fig. 105

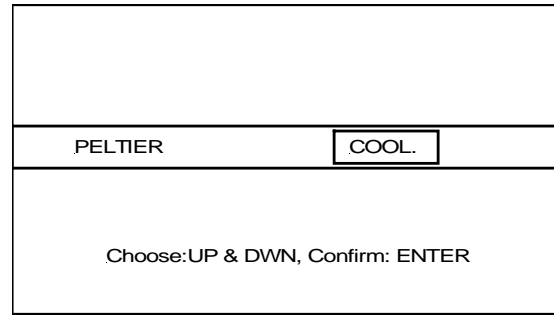


Fig. 106

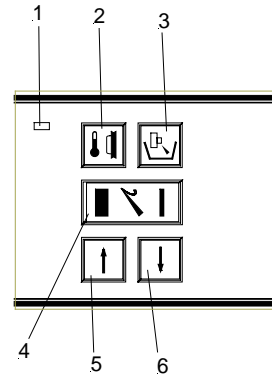


Fig. 107

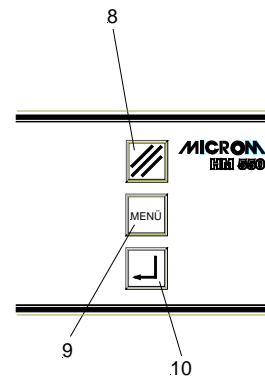


Fig. 108

HM550	OMVP	SET	ACT
SPECIM	-25	-24	
CHAMBER	-20	-21	
FREEZE ACTIVE			
COUNTER =	0	STOP	18
FINE: 3		TRIM: 20	
*** REN		R	

Fig. 109

- If "HEAT." is selected, the Peltier element heats up until it has reached a positive end temperature. This way, tissue specimens can be detached from the chuck inside the chamber (fig. 110).
- First put freezing medium onto a non-cooled chuck.
- Then put the specimen onto the freezing medium.
- Afterwards, the chuck together with the specimen is inserted with the peg into one of the four front fast freezing stations (fig. 111). These four front fast freezing stations are equipped with a Peltier cooling element.

HM550	OMVP	SET	ACT
SPECIM	-25	-24	<input type="text"/>
CHAMBER	-20	-21	<input type="text"/>
DETACH ACTIVE			
COUNTER =	0	<input type="button" value="STOP"/>	<input type="text" value="18"/>
<input type="text" value="FINE: 3"/>		.TRIM:	20
*** REN		R	

Fig. 110

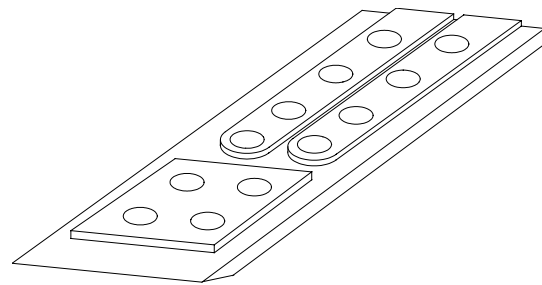


Fig. 111

### 2-22 OPTION D – INTEGRATED AUTOMATIC UNIT FOR THE APPLICATION OF DISINFECTION MEDIA

The option D which is used in the HM 550 is a fumigation unit for the application of disinfection media onto the operation areas in the cryo chamber which are accessible for the user during the intended use.

Spraying is carried out via the fumigation of disinfection solution by means of ultrasonic. The droplets of the mist have a size of 1 – 3 µm. This very small size allows for an even application of the disinfection solution onto surfaces.

This process takes approx. 5 – 6 h and several phases are processed.



**Caution:**

To guarantee the functionality and safety of the fumigation unit, only disinfection media must be used, which do not contain combustible and/or flammable substances as solvents.

Therefore, water-based disinfection media must be used with the following physical characteristics:

- surface tension larger than  $65 \times 10^{-3}$  N/m (water  $72 \times 10^{-3}$  N/m),
- viscosity smaller than  $1.3 \times 10^{-3}$  kg/ms (water  $1 \times 10^{-3}$  kg/ms)
- pH value is 7



**Note:**

Please be advised that with regard to the above-mentioned characteristics, the selected medium is to be fumigated.

It is the responsibility of the user to select a suitable disinfection medium with regard to the above-mentioned safety precautions and thus the related disinfection results.



**Note:**

We would like to emphasize that the usage of the device does not release the user from noticing and observing the operational regulations.

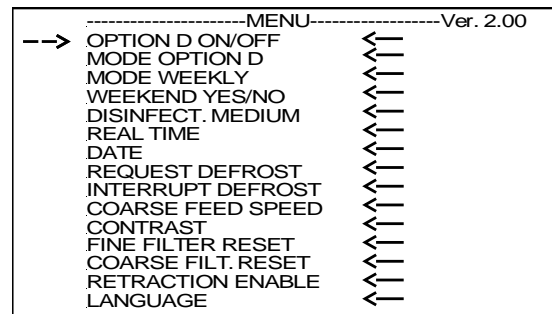


Fig. 112

Starting the first phase of the cycle is determined by the programmed defrost time. Each cycle finishes with a defrosting of the cooling system. Afterwards, the chamber and specimen temperatures, which have been selected before, are set automatically again.



**Note:**

It is not possible to operate the cryostat during a all phases. We recommend to program an overnight run of the cycle.

### 2-22-1 PREPARING AND STARTING THE OPTION D

Before the initial turn-on of the option D, first install the holder of the container (fig. 112a.1) for the disinfection solution via two screws on the rear panel of the instrument (fig. 112a).

- Place the container into the holder in a way that the feed hose lies in the lower guidance.
- Insert the fast coupling on the rear side of the instrument (fig. 112a.2).

After having filled the container and after having programmed the desired mode and the start time (= defrost time), the option D is active.



**Note:**

The sequence of the below-mentioned steps must strictly be observed so that the automatic fumigation device can operate in an optimal way. With regard to possible occurring (irritating) gases during the fumigation of disinfection medium into the cryo chamber, it is absolutely necessary to care for sufficient ventilation at the site of installation.

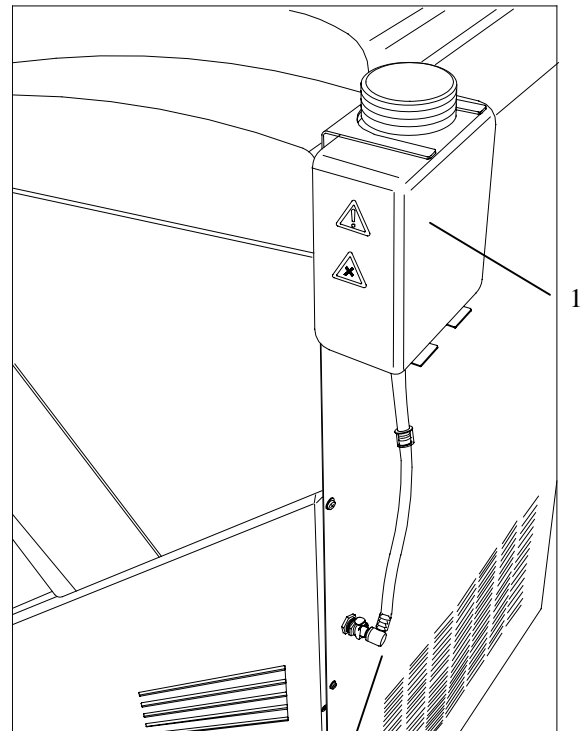


fig. 112a

#### 1. Filling in disinfection solution



**Note:**

The concentration of the disinfection medium should at least be select as it is recommended by the manufacturer for a 1-hour application of the disinfection medium.

- Fill the store reservoir on the rear side of the instrument with disinfection solution. Before filling the reservoir, please check the keeping quality and the safety data sheet of the respective disinfection medium. Please also observe the handling, storing and disposal instructions from the manufacturer of the respective disinfection medium. Moreover, please respect the instruction from the manufacturer concerning safety measures during an unintended release!

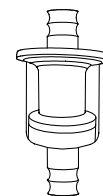


fig. 112b



**Caution:**

For this, please note the safety note in part 2-22.

- The max. filling amount of the storage container is 1 l, which will be sufficient for seven cycles. This way, it is guaranteed that the expiring date of the disinfection solution inside the cryostat will practically never be passed.

### 2. Cleaning the cryo chamber

- Clean the cryo chamber from all section waste after.
- Remove all tissue specimens, brushes and chucks from the chamber.
- Swivel the anti-roll guide upwards.
- Remove the two section waste trays. Manually clean and disinfect them according to the regulations in your lab.
- In case the cryostat HM 550 is equipped with a Vacutome, use this device to dispose of the section waste into the coarse filter already while sectioning.



#### **Biohazard:**

To guarantee an optimal efficiency of the disinfection medium, all surfaces must be accessible. Moreover, objects, which do not belong to the instrument, must not be inserted.

### 3. Closing the window

Always close the window, before starting a run.

- In case the window was not closed, the following message appears on the display:  
*Please close the window..*



#### **Note:**

Please close the window when leaving the instrument for the daily and/or weekly mode.



#### **Note:**

A locking mechanism secures the closed window against opening.

### 2-22-2 INTERRUPTING THE OPTION D

The cycle can be interrupted at any time.

- Press the reset button (fig. 113.8).
- Press the enter button (fig. 113.10) within three seconds to confirm the interruption process.



**Warning:**

Depending on the cycle phase when it has been interrupted, the cooling system needs between 1 – 4 h to cool down to the programmed temperature. Only after having reached the pre-selected values, sectioning is possible again.

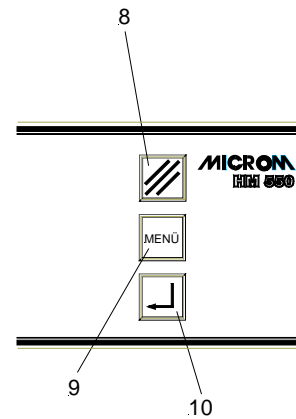


Fig. 113

### 2-22-3 PROGRAMMING THE OPTION D

- Press the menu button (fig. 116.9). This way, you get into the list of the submenus.
- Select the respective submenus from this list via the arrow buttons (fig. 115.5 and 115.6).
- Via the enter button (fig. 116.10) open the corresponding submenu.
- Carry out the respective entries (fig. 115.5 and 115.6).
- Confirm with the enter button (fig. 116.10)
- Either quit the list of submenus via the menu button (fig. 116.9) or select another submenu via the arrow buttons (fig. 115.5 and 115.6).

Within this list, the following submenus for programming the cycle are important:

#### Submenu "Defrost time"

- Press the enter button (fig. 116.10) to select the submenu.
- Enter the defrost time in this submenu (see part 2-10-2, Setting the defrost time).
- When the "daily" or "weekly" mode has been selected as described below, the cycle starts at the pre-selected defrost time.
- Confirm the settings via the enter button (fig. 116.10).



**Note:**

The last phase of each cycle is always a normal defrosting of the cryostat.

#### Submenu "Option D ON/OFF"

- Press the arrow buttons (fig. 115.5 and 115.6) to select the desired settings.
- Confirm with the enter button (fig. 116.10).



**Note:**

When selecting "ON", the "Mode Option D " that has been selected before, will be used again.

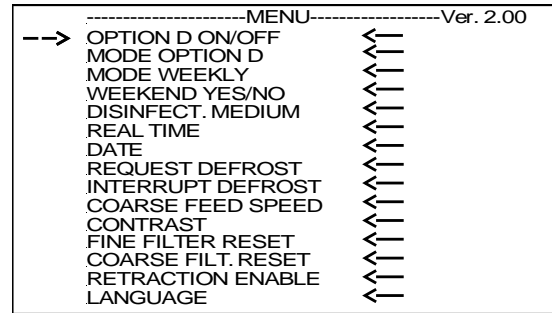


Fig. 114

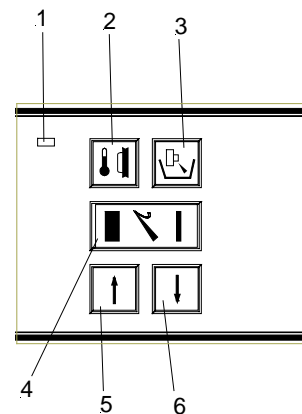


Fig. 115

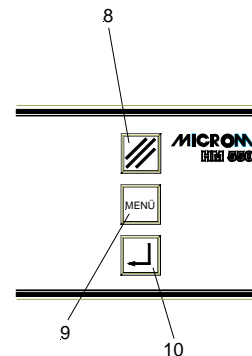


Fig. 116

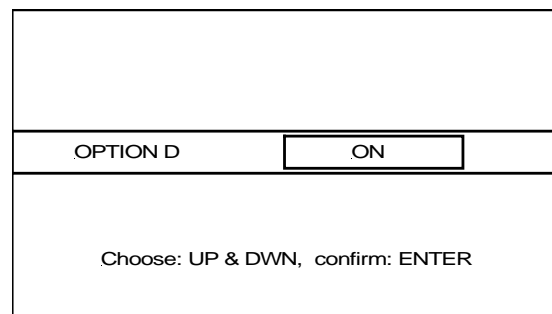


Fig. 117

### Submenu "Mode Option D"

- Press the enter button (fig. 116.10) to select the submenu.
- Select between "weekly", "daily" or "immediately" via the arrow buttons (fig. 115.5 and 115.6).
- Confirm with the enter button (fig. 116.10).

#### Mode immediate ("**immediat.**"):

In case this mode (fig. 119) has been selected, the cycle is immediately started after having pressed the enter button (fig. 116.10) and when quitting the menu.



#### Warning:

The automatic cycle starts after the sliding window has been closed. The immediate cycle is carried out only once.

In case another mode (daily or weekly) has been set, this mode remains active after having finished an "immediate" mode.

If the immediate start coincides with the previously selected mode (daily or weekly), an immediate start is carried out and the daily and/or weekly one is not started on that day.

#### Mode every day ("**daily**"):

When the "daily" mode (fig. 120) has been selected, the cycle is carried out daily, for seven days max. at the preselected defrost time.



#### Warning:

The automatic cycle can only start after the sliding window has been closed.

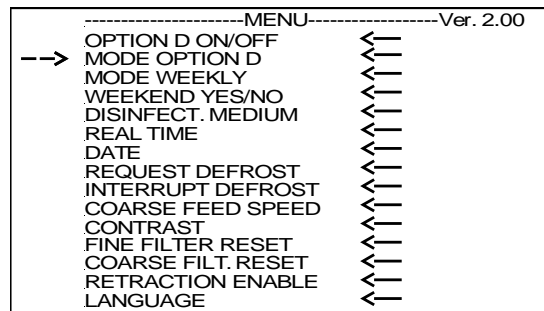


Fig. 118

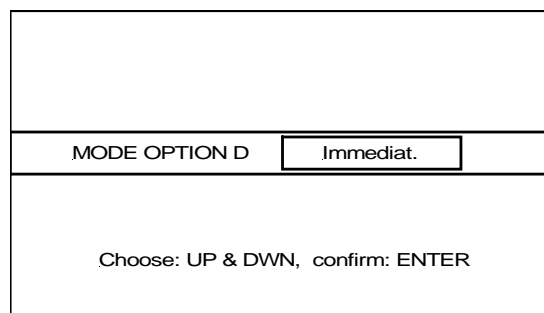


Fig. 119

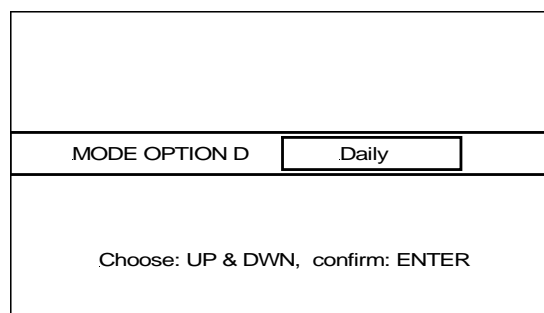


Fig. 120

### Mode once a week ("weekly"):

In case the "weekly" mode (fig. 121) has been selected, the cycle is carried out at the preselected defrost time on one day per week.



#### Warning:

The automatic cycle starts after the sliding window has been closed.

### Submenu "Mode weekly"

- Press the enter button (fig. 116.10) to select the submenu (fig. 122).
- In case the "weekly" mode has been selected in the submenu "Mode Option D", the weekday for the cycle must be entered in this submenu.
- Select from "Monday" until "Sunday" via the arrow buttons (fig. 115.5 and 115.6).
- Confirm with the enter button (116.10).

### Submenu "Weekend Yes/No"

- Press the enter button (fig. 116.10) to select the submenu (fig. 124).
- In case, the "daily" cycle has been selected in the submenu "Mode Option D", you should enter here, if a cycle should be carried out during the weekend or not.
- Select between "YES" and "NO" via the arrow buttons (fig. 115.5 and 115.6).
- Confirm with the enter button (116.10).

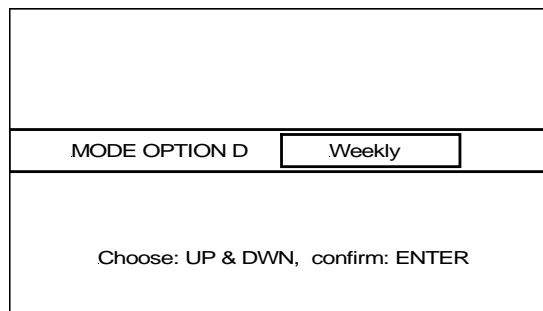


Fig. 121

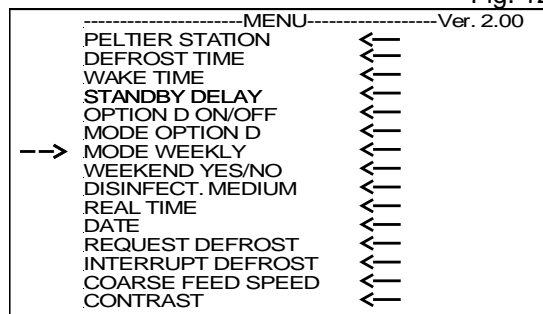


Fig. 122

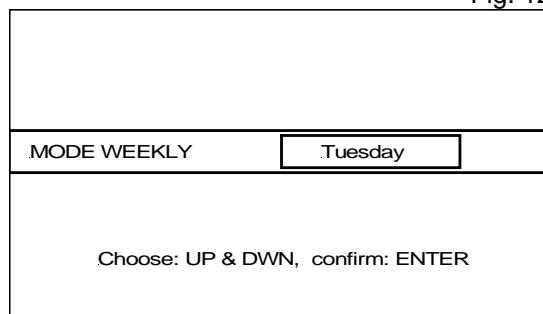


Fig. 123

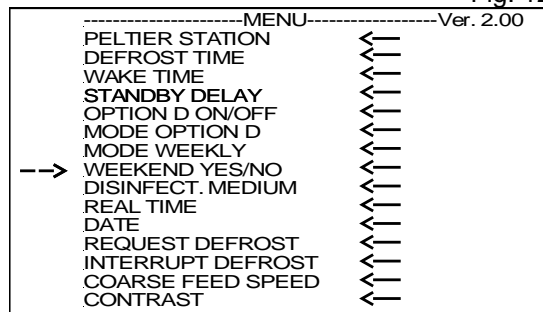


Fig. 124

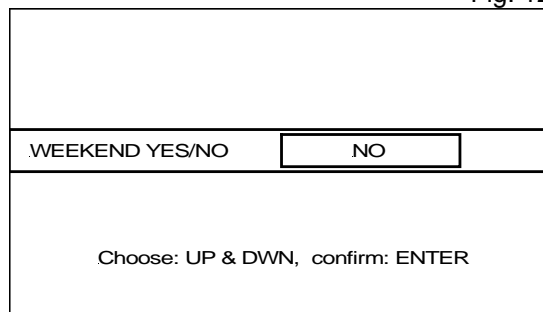


Fig. 125

### Submenu "Expiry date of the disinfection medium"

- Press the enter button (fig. 116.10) to select the submenu "Disinfect. Medium".
- Enter the date, the expiry date, into the six-digit date format (day, month, year) via the arrow buttons (fig. 115.5 and 115.6).
- Press the reset button (fig. 116.8) to change between day, month and year.
- Confirm with the enter button (fig. 116.10).
- In case the message "Desinf. Medium" is shown on the display, confirm and delete this message via the enter button (fig. 116.10).



**Note:**

After having pressed the enter button, this message does not re-appear on the display.



**Note:**

The expiry date, which is given from the manufacturer of the disinfection medium, mainly refers to unopened containers.

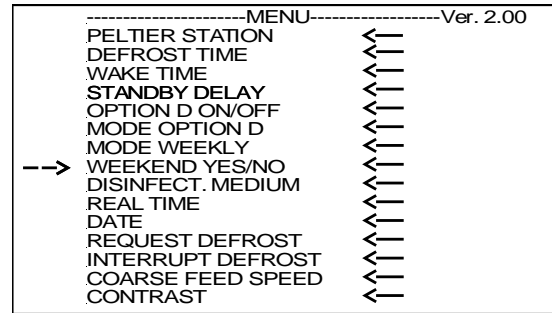


Fig. 126

### 2-22-4 CLEANING AFTER A CYCLE WITH OPTION D



**Chemicals:**

Working areas, which are accessible for the user and get into contact with the disinfection solution, show remainders of the disinfection medium after some cycles. Depending on the disinfection medium, please wear safety clothing (e.g. protective gloves).

- Wipe off these parts with e.g. 70% ethanol.
- Also empty the container for the defrosting liquid from time to time, as a part of the disinfection liquid is collected here. The liquids must be disposed of according to your respective lab regulations.

### 2-23 ERROR CODE INDICATION

The instrument has an error code indication to define faster and better possible malfunctions.

The error codes describe so-called system errors. Additionally, error messages are shown on the display as text messages, e.g. when the temperature sensors are faulty, when the end position of the specimen clamping has not been reached, when there is a high pressure in the cooling system and when the function of the automatic approach system is faulty (see part 2-7-4).



**Note:**

If an error code appears on the display of your instrument, please note it down and contact your sales organization where you bought the instrument or directly contact MICROM International GmbH.

#### 2-23-1 DEFINITION OF THE ERROR CODES

##### ERROR OF A TEMPERATURE SENSOR

Four different error codes, which indicate a defect on a temperature sensor, can appear on the display. The message is shown on the second line from below on the display (fig. 127):

##### 1. 'SPECIMEN SENSOR ERR'

The instrument recognizes a faulty operation on the specimen temperature sensor, which is placed in the specimen head.

##### 2. 'BOX SENSOR ERR'

The instrument recognizes a faulty operation on the box sensor, which is placed on the base plate of the microtome.

##### 3. 'EVAP SENSOR ERR'

The instrument recognizes a faulty operation of the defrost limiting sensor, which is placed between the fins of the evaporator.

HM550	M V	SET	ACT
	SPECIM	-25	-24
	CHAMBER	-20	-21
	COUNTER =	0	CONTIN
	FEIN: 3		TRIM: 20
-----'SPECIMEN SENSOR ERR'-----			
***	ER-5		R

Fig. 127



**Note:**

However, you can work with the instrument to a certain extent until the operational fault is removed by a trained service technician.

### ERROR CODE 'NO END POSITION'

Before turning on the instrument on the main switch, it carries out an automatic travel calibration of the specimen clamping. The specimen clamping is brought into that position which has the longest distance to the knife carrier.

If there is an operational fault during this process, e.g. debris or frost impedes the specimen clamping movement, this is shown via the message 'NO END POSITION' and means that a calibration was not carried out.

A service technician must be called.

### SYSTEM-ERROR

The instrument is designed to check for internal system errors.

In case such an error is recognized, it is shown as '**ER-10**' to '**ER-16**' for approx. 5 sec. in the middle of the display.

The recognition of such an error leads to an automatic RESET-process.

The cause for this might be a temporary fault.



**Note:**

In case one of these messages occur more than once, please note down the error code and contact a service technician.

**2-23-2 ERROR CODES OF THE OPTION D**

In case a malfunction occurs during a cycle, error codes are shown on the display.

As different phases of the cycle might be concerned, error codes are shown from step 1 to step 8 (fig. 127a).

Only step 3 is relevant for the operator. This error shows that there is insufficient disinfection medium in the container before a cycle can be started (fig. 112a).

After having filled the container, the next programmed cycle will be carried out automatically. Remove the error with the reset button.

The error steps 1 and 2 as well as 4 to 8 refer to service-related malfunctions during a cycle. Therefore, please contact a service technician.

**Behavior of the software in case of power failure:**

A power failure during the fumigation process is stored by the program.

After the power has been resumed, the window is locked. The display shows the following message, which means that a cycle was interrupted.

"CAUTION! Cycle interrupted due to power failure or turning off of the instrument. Continue with Reset button."

The window of the instrument remains locked, to avoid possible annoyance caused by odors.

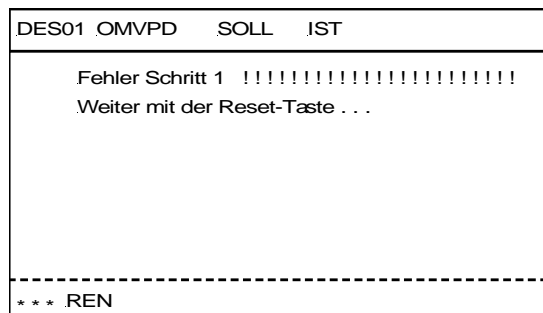


Fig. 127a

### 2-24 ACCESSORIES

#### 2-24-1 STANDARD EQUIPMENT

The microtome cryostat HM 550 series is equipped with the following accessories:

	Cat. No.
2 specimen chucks, 30 mm round	715710
1 specimen chuck, 40 mm round	715720
1 Allan key 2,5 mm	362220
1 Allan key 5 mm	362260
1 Allan key 6 mm	362120
1 flat brush	334170
1 brush	334170
1 cryostat oil no. 407      100 ml	350040
1 freezing medium 118 ml	161425
Section waste tray for instruments <b>without</b> specimen cooling, consisting of:	
1 waste tray	415600
1 intermediate tray	415620
1 brush shelf	415640
Section waste tray for instruments <b>with</b> specimen cooling, consisting of:	
1 waste tray	415610
1 intermediate tray	415630
1 brush shelf	415640
1 hose cleaner (option V)	202170
25 coarse filters (option V)	281070
5 disinfection medium filter (option D)	281050
1 hose with nozzle for Vacutome cleaning (option V)	570230
1 foot pedal (option M)	640280
1 instruction manual	387748

### 2-24-2 ADDITIONAL EQUIPMENT (OPTIONAL)

	Cat. No.
<u>Specimen chucks:</u>	
∅ 20 mm	715700
∅ 30 mm	715710
∅ 40 mm	715720
50 x 50 mm	715730
55 x 55 mm	715740
60 x 55 mm	715750
70 x 55 mm	715760
 <u>Cryo-Molds:</u>	
10 mm	570400
15 mm	570380
22 mm	570390
 <u>Knife carriers:</u>	
Standard knife carrier	705460
Disposable blade carrier EC	705470
Magnetic blade carrier	705230
 <u>Knife carriers for option Vacutome:</u>	
Disposable blade carrier EV	705580
Magnetic blade carrier	705590
 <u>Other accessories:</u>	
Heat extractor	524510
Detach block	
Coarse filter	281070
Micro filter	624100
Disinfection filter (option D)	281050
Disposable blade SEC 35 (50 pcs. in dispenser)	152200

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### 3 THEORY OF OPERATION

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#### 3-1 SPECIMEN AND CHAMBER COOLING, DEFROSTING

The chamber, the microtome and the specimen head are cooled by a refrigeration machine.

In the rear area of the microtome chamber is an evaporator which the cold coolant flows through as well as through the specimen head. Due to the heat extraction from the microtome chamber a cooling down of the microtome and/or cryo chamber to  $-35^{\circ}\text{C}$  can be achieved.

The temperature of the microtome and/or chamber can be adjusted continuously down to  $-35^{\circ}\text{C}$ . For this, pre-select the desired temperature as set value on the control panel. The actual value is constantly measured and sent to the control unit.

By means of an installed thermo-electrical element, controlled temperatures down to  $-50^{\circ}\text{C}$  can be achieved on the specimen head.

On the left side of the microtome chamber, there are freezing stations (fast freezing stations) which can be cooled down to a temperature of  $-35^{\circ}\text{C}$  depending on the cryo chamber temperature. This fast freezing station has 12 positions for one chuck each.

The instrument can optionally be equipped with an active deep freezing device.

The station can be cooled down to  $-60^{\circ}\text{C}$  by means of a Peltier cooling element. This Peltier cooling element has four positions for one chuck each. The eight positions correspond to the conventional fast freezing stations.

The specimen temperature control serves for a more efficient working with the cryostat. For various specimens, different cutting temperatures can be achieved very quickly.

After having cut, the specimen can be detached quickly from the chuck by using the function *detach*. Another possibility to detach the specimen is to warm it up outside the chamber.

The specimen temperature control is supplied via a secondary cooling circuit. The coolant flows through the cooling head serving as an evaporator of the system and cools it in combination with a Peltier element.

A thermo-electrical element is coupled with the evaporator housing on the specimen head. Via a set value input for the specimen head on the control panel, the electronics control the thermo-electrical element at any desired temperature between +10°C and -50°C.

Inevitably, when working on the microtome the dry cold air of the microtome chamber mixes with the warm humid air outside the chamber. Frost forms on the finned evaporator. The increasing thickness of the frost reduces the efficiency of the evaporator. For this reason, the daily defrosting of the evaporator becomes necessary. To carry out the defrosting cycle, a heating warms the evaporator from below.

Set the time of the daily defrosting on the control panel. The period of the defrosting takes approx. 40 min. and varies according to the thickness of the frost.

Possible frost built-up on the microtome or on the knife carrier are not removed by defrosting the instrument. However, the frost recedes after defrosting as now the evaporator is fully efficient again.

In addition, the instrument is equipped with an immediate defrosting function.

To avoid condensation the sliding window is heated when closed.

### **3-2 CUTTING MOVEMENT**

The microtome of this cryostat is a rustproof rotary microtome.

The cutting movement is carried out by turning the handwheel.

The rotary movement results in the vertical and horizontal movement of the specimen clamp.

Sectioning is carried out by knives or blades, which must be adjusted and fixed on the knife carrier.

With the downward movement of the specimen, sectioning is carried out (cutting movement).

The upward return travel of the specimen is carried out by turning the handwheel further in a clockwise direction. During this return travel, the specimen clamping is drawn back automatically to protect knife and specimen. If required, the function retraction can be turned off.

The selected section thickness is delivered at the upper reversal point of the return travel.

The number of the sections made can be shown on the section counter on the display.

After each downward movement of the specimen holder, the number on the section counter increases by 1.

The sum of the sections carried out can also be seen on the display. For this, trimming values and sectioning values are added up. Section counter and sum of section thicknesses can be reset to zero at any time by means of the RESET-button.

Moreover, the remaining travel to the front end position can also be shown on the display. The remaining travel, which is still available for sectioning, is shown in microns. When the specimen clamping is in the back end position, the display shows 28 000 µm. This number decreases, the further the specimen clamping is moved towards the front, i.e. in the direction of the blade.

**3-3 SPECIMEN COARSE FEED  
AND TRIMMING FUNCTION**

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

After the specimen and the knife are adjusted, further gradual feed for trimming can be carried out by pressing the button for trimming. If this function is chosen, the specimen clamping moves forwards by the pre-selected trimming value whenever pressing the button for trimming.

**3-4 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 -35°C.

**Caution!**

In case the specimen was frozen on to the chuck with CO<sub>2</sub> gas, liquid nitrogen or with the Peltier element it is not guaranteed that the automatic approach system functions perfectly. For the specimen temperature must not be lower than -35°C when activating the ACA.

In case the temperature is lower than -35°C, it is recommended to insert the chuck into the specimen clamping and wait until the specimen temperature has adjusted to the chamber and or set specimen temperature.

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.

**3-5 OPTION M -  
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 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 or the emergency stop in the foot pedal. Continue sectioning pull out the emergency stop button or unlock the emergency stop in the foot pedal.

**3-6 OPTION VACUTOME -  
STRETCHING SECTIONS AND  
DISPOSING OF SECTION WASTE**

The compression of sections when gliding onto the blade is a well known phenomena during sectioning in general and especially during cryo-sectioning. However, this can be enormously reduced by using a Vacutome with a special blade carrier.

For this, a vacuum can be set below the vacuum anti-roll hood via an operating knob. This vacuum anti-roll hood acts as a traditional anti-roll guide. By means of the suction vacuum prevailing in the slot between vacuum anti-roll hood and blade edge, the cut is drawn on the air cushion over the blade thus immensely reducing the compression. The section remains on the blade in stretched form. The vacuum for stretching sections is turned off immediately after reaching the end of the specimen via an in-line valve, however, depending on a correct setting of the cutting/suction window. Turn the vacuum anti-roll hood backwards to transfer the cut onto a slide.

The Vacutome is also highly suitable for the disposal of debris.

For this, the vacuum anti-roll hood is used as described above. When the anti-roll hood is put on, an air stream is generated in the suction window.

Continue cutting and the penultimate section is pushed forwards and reaches the area of the suction slot. From here the section gets through the blade carrier and the tubings into the filter unit. Section waste is collected in the coarse filter which can easily be replaced. It must be disposed of according to the respective lab regulations.

The air of the suction flow now passes the micro filter and is filtered there. Afterwards, the filtered air flows back into the rear area of the cryo-chamber.

### **3-7 OPTION O - SPECIMEN FAST AND TEMPERATURE CONTROL**

The specimen fast cooling and temperature control serves for a more efficient working with the cryostat. For various specimens, different cutting temperatures can be achieved very quickly.

There is the possibility to rapidly freeze-on the specimen at -50°C on a chuck with the freezing medium.

However, the freezing-on can also be carried out on the fast freezing stations or with the Peltier cooling element.

To bring the specimen to the desired cutting temperature, switch over to temperature control. The set value of the cutting temperature can be selected on the operating controls.

The specimen fast cooling and temperature control works with a refrigeration unit and an electronic control unit. The coolant (brine) flows through the cooling head of the system and cools it.

While sectioning, the pre-selected cutting temperature is kept constant by means of a corresponding control unit.

The specimen can be detached directly on the specimen head:

- Set specimen temperature to -0°C to 5°C (inside the chamber).

The following two processes are also possible:

- Active detach function, in case the instrument is equipped with this accessory (inside the chamber).
- Cooling block with 6 stations for one chuck each (outside the chamber).

### 3-8 OPTION D – INTEGRATED AUTOMATIC UNIT FOR THE APPLICATION OF DISINFECTION MEDIA

The option D which is used in the HM 550 is a fumigation unit for the application of disinfection media onto the operation areas in the cryo chamber which are accessible for the user during the intended use.



**Warning:**

To guarantee the functionality and safety of the fumigation unit, only disinfection media must be used, which do not contain flammable substances as solvents. Therefore, we recommend to use disinfection media based on water.

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**4 WORKING WITH THE CRYOSTAT**

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**4-1 PREPARATIONS ON THE  
MICROTOME AND INSIDE THE  
COOLING CHAMBER**

Before sectioning, the specimen clamping and the cryo chamber should be at a stable temperature around the desired cutting temperature.

Select a chamber and specimen temperature corresponding with the consistency of the specimen that should be sectioned.

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 favorable work conditions with a lower frost built-up on the microtome and knife are achieved.

In case the instrument is equipped with a Vacutome, please note that both the coarse filter and the micro filter are properly inserted in the filter unit. When needed, replace them and dispose of them according to the respective lab regulations.

**4-2 FREEZING-ON THE SPECIMEN**

The specimen is frozen-on to the specimen chuck with clinging grooves by means of a freezing medium.

To freeze-on specimens, use the fast freezing device or the active deep freezing device on the left side of the chamber.

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 onto the stage and surround it with some freezing compound. Please note that the frozen tissue remains connected with the freezing medium and the chuck.

Then insert the specimen stage into one of the fast freezing stations.

The standard version is equipped with a fast freezing station with 12 stations. A cryostat with option P has an active deep freezing device with eight freezing stations and another four stations with Peltier element.

Start the function "Fast freezing of standard instruments" in due time before freezing-on the specimen. It will take the deep freezing device approx. 2 - 3 min. to achieve a temperature of max. -60°C.

If the instrument is equipped with a heat extractor (additional equipment) the specimen can be frozen faster and more evenly. Put the pre-cooled 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 artifacts considerably.

### **4-3 ORIENTATION AND TRIMMING**

Clamp the specimen chuck together with the frozen specimen into the specimen holder.

For this loosen the orienting lever (standard version) and/or spring-loaded eccentric lever (version with option O) and insert the chuck into the specimen clamping. To loosen the chuck, turn the eccentric lever.

Loosen the clamping lever to have the possibility to adjust the specimen parallel in relation to the cutting edge. Afterwards, press the clamping lever to the rear.

To position the chuck parallel in relation to the knife, please use the zero device of the specimen clamp, i.e. the specimen clamping together with chuck and specimen latches noticeably into the zero position. Afterwards, clamp the specimen clamping via the clamping lever. The chuck is now in a parallel position with regard to the knife.

After this orientation, now set the cutting/suction window. Please note that the lower cutting window limit corresponds with the upper edge of the specimen.

With the motorized coarse feed specimen and knife can roughly be adjusted.

The process of the first approach between specimen and knife edge can also be carried out via the automatic approach system.

Then carry out a further gradual feed by using the function *trimming*. Turn the handwheel in a clockwise direction resulting in the first contact between knife and specimen. Continue this thus achieving the desired level.

Any waste should be wiped away in an upward direction with a brush.

When doing first cuts in combination with a Vacutome, these sections are removed automatically.

While trimming, determine the correct force of the vacuum by continued cutting and varying it via the operating knob.

The setting is optimal, when the last section remains stretched on the blade, while the penultimate section gets into the suction slot when starting a new cut.

**4-4 SECTIONING AND TAKING  
OFF SECTIONS**

For sectioning, pre-select the desired section thickness by means of the buttons on the operating controls.

Put the anti-roll plate against the knife by means of the knob. Turn the handwheel in a clockwise direction or use the motorized cutting drive to carry out sectioning. The section slides into the space between the knife and the anti-roll guide.

Then remove the anti-roll guide by means of the knob. The section sticks to the knife surface. Transfer the specimen now onto a slide by using a brush or tweezers.

For instruments which are equipped with a Vacutome, also pre-select the desired section thickness by means of the buttons on the operating controls (see part 2-4).

In addition, set the desired vacuum on the operating knob.

Put the vacuum anti-roll hood against the blade by means of the lever. Turn the handwheel in a clockwise direction or use the motorized cutting drive to carry out sectioning.

At the same time, the vacuum prevailing in the slot between vacuum anti-roll hood and blade draws the section over the blade. The section remains stretched on the blade. Open the vacuum anti-roll hood to pick up the section onto a slide.

### 4-5 HOW TO AVOID MALFUNCTIONS

To cut usable sections, the following points are of utmost importance:

- Condition of the knife edge, probably move it horizontally to the left or right side.
- Check adjustment of anti-roll guide and correct it, if necessary.
- Carefully remove frost from front and rear part of the knife and from the anti-roll plate (i.e. with ethanol, acetone or the like).
- Tighten all clamping screws and clamping levers on the knife carrier and specimen holder.
- Select the appropriate chamber and specimen temperature according to the specimen.



**Note:**

If the specimen was frozen with liquid nitrogen or similar freezing techniques, the specimen must adapt itself to the cutting temperature.

- Carefully select the required knife material and profile.
- Adjustment of knife height.
- Adjustment of proper clearance angle. Select a clearance angle of 8-12° according to the facet angle of a steel knife.
- Select a proper cutting speed:  
The harder the material, the slower the cutting speed!
- Take care in bringing specimen and knife together.
- The most protruding point of the specimen must be recognized for the optimal operation of the automatic approach system.
- The specimen must not be covered at all or too thick by freezing medium.

- Moreover, for the functionality of the automatic approach system, a certain conductivity must be given via the specimen chuck as well as from the knife edge to the microtome base.  
For this reason, the original equipment such as knife carrier and specimen chucks should be used only.
- The specimen clamping of the microtome is connected with a sensitive electronic detecting device. The temperature sensor on the left side of the microtome housing is also connected with such a device.  
Malfunctions might occur after electrostatic discharges on one of the above-mentioned parts.  
**Recommendation:** Before touching the cylinder head or temperature sensor, touch another metallic part, e.g. knife carrier, inner wall of chamber or waste tray to guarantee a safe discharge.
- When working with the active deep freezing device, sufficient time must have been passed to allow this device reaching a temperature of -60°C.

For optimal sectioning, the knife and anti-roll guide must be cleaned of paraffin waste. Only use a sharp knife and exactly adjust the anti-roll guide in relation to the knife edge.

**Warning:**

During defrosting, remove the specimens from the cooling chamber, as the temperature inside the chamber will increase.

Do not leave or store tissue inside the cryostat over a longer period. Due to a power failure or other unexpected malfunctions of the instrument, the specimen might be damaged.

### How to avoid malfunctions when working with the Vacutome:

- Assure the opening of the Vacutome flap via a correct adjustment of the stud screw in the vacuum anti-roll hood. (Normally, it is adjusted in the factory!)
- Exactly adjust the cutting and suction window to the specimen size, to avoid inadvertent disposal of good sections.
- Set the suction vacuum according to the specimen and the selected section thickness.
- Always note that the specimens are cooled sufficiently to avoid that section waste sticks together and thus blocks the suction hoses of the Vacutome

#### **Note:**



However, in case section waste blocks the suction hoses of the Vacutome inadvertently, it can be removed by using the attached hose cleaner.

During this cleaning cycle, the Vacutome should be operated with maximum power to guarantee that the released section waste is drained off properly.

**4-5-1 POSSIBLE SOURCES OF ERRORS – CAUSE AND REMOVAL**

<b>Problem</b>	<b>Cause</b>	<b>Removal</b>
Cryostat temperature cannot be achieved	Ambient temperature too high	Lower ambient temperature by fresh air, climate. Please note the specified temperature of +22°C!
	Cryostat is influenced by near, heat-generating instruments	Change site of installation
	Draught into the cryostat	Change site of installation
	Soiled condenser	Open the service door on the left side, clean the condenser
	Defective cooling	Call a service technician
Frost built-up on chamber wall and on microtome	Draught (open doors, windows)	Change site of installation; close windows, doors
Retarded freezing-on of the specimen	Surface of the fast freezing station is soiled	Remove debris
	Lower part of the chuck is soiled or damaged	Remove debris, remove damage
Chatter while cutting	Unfavorable clearance angle	Readjust clearance angle
	Insufficient knife sharpness	Move the knife in the knife carrier
	Knife not adequately clamped	Check knife clamping
	Chuck inadequately clamped	Check clamping
	Specimen inadequately frozen on onto the chuck	Again freeze on the specimen
	Specimen grossed too thick – it loosens from the chuck	Again freeze on the specimen
	Specimen very hard and inhomogeneous	Select new section thickness, reduce the specimen
Sticky sections	Specimen not cold enough	Select a deeper temperature
	Knife and/or anti-roll plate are not yet cold enough – section melts	Wait until the knife and/or the anti-roll plate have reached the corresponding chamber temperature

<p>Sections do not stretch, although the correct temperature has been selected and the anti-roll plate has been adjusted correctly</p>	<p>Knife and/or anti-roll plate are not clean</p> <p>Edge of anti-roll plate is damaged</p> <p>Blunt knife</p>	<p>Clean with a dry cloth or brush</p> <p>Replace anti-roll plate</p> <p>Move the knife</p>
<p>Sections break, fissures in the sections, sections are not stretched properly</p>	<p>Specimen too cold</p> <p>Static charge/draught</p> <p>Specimen not cold enough</p> <p>Spacious specimen</p> <p>Anti-roll plate not adjusted properly</p> <p>Anti-roll plate not aligned parallel towards the knife edge</p> <p>Incorrect clearance angle</p> <p>Blunt knife</p>	<p>Select a higher temperature</p> <p>Remove the cause</p> <p>Select a deeper temperature</p> <p>Trim the specimen in a parallel way; select a thicker section thickness</p> <p>Readjust the anti-roll plate</p> <p>Align parallel</p> <p>Readjust the clearance angle</p> <p>Move the knife</p>
<p>Sections roll over the anti-roll plate</p>	<p>Anti-roll plate does not project over the knife edge properly</p>	<p>Readjust the anti-roll plate</p>
<p>Scratching noise while cutting and during the return travel of the specimen clamping</p>	<p>Anti-roll plate projects over the knife edge too much and scratches on the specimen</p>	<p>Readjust the anti-roll plate</p>
<p>Thick-thin-sections</p>	<p>Knife sharpness</p> <p>Knife angle</p> <p>Clamping on knife carrier</p> <p>Clamping on specimen holder</p>	<p>Move the knife</p> <p>Readjust</p> <p>Check clamping</p> <p>Check clamping</p>
<p>Tight handwheel punctual</p> <p>during the entire movement</p>	<p>Debris and section waste between microtome and base plate</p> <p>Soiled link block</p> <p>Toothed belt tension</p>	<p>Remove and clean</p> <p>Please call a service technician</p>
<p>No chamber illumination</p>	<p>Defective lamp</p> <p>Defective starter</p>	<p>Check, replace</p> <p>Check, replace</p>

Automatic approach system (ACA) cannot be started	Temperature outside the area	Check
	Specimen clamping outside the cutting window	Check
	Contact between specimen and blade/knife already at the ACA start	Check
Automatic approach system does not stop	Specimen too cold	Check



**Note:**

In case of malfunctions and/or service work, please turn off the instrument and contact your local dealer.

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## 5 MAINTENANCE AND CARE OF THE CRYOSTAT

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### 5-1 SHUTTING-OFF FOR CLEANING

Cleaning, care and decontamination of the cryostat depends on how frequently the instrument is used. However, it is recommended to shut the instrument off every 6 - 8 weeks.



**Caution:**

As the following work might be hazardous because of the danger of freezer burns on frozen parts and potential contaminated material, it should only be done by skilled or trained personnel.



Please proceed as follows:

- Wear protective gloves.
- Remove knife/blade from the knife carrier and store it in a knife case.
- Remove the brush shelf, tools as well as chucks.
- Bring the handwheel handle into its upper position, i.e. the specimen clamping is also in its upper position.
- Remove the middle and rear section waste tray. Dispose of the section waste according to the respective lab regulations.
- Remove and/or suck off cold section waste.
- If the instrument is equipped with the option Vacutome, pull off the Vacutome connection on the right side of the knife carrier and insert the cleaning hose on the Vacutome connection.
- Turn off the mains switch and unplug the unit.
- When equipped with the option Vacutome remove the coarse filter and if necessary the fine filter and dispose of according to the applicable lab regulations.
- Loosen the clamping lever on the knife carrier and pull off the knife carrier. If necessary, treat it with disinfectant.



**Caution:**

Caution of freezer burns due to the frozen knife carrier.

- Remove the left and right side sheet. For this, turn the knurled screws approx. two rotations.
- Remove the sheets on the black grips with a circular movement upwards/forwards.

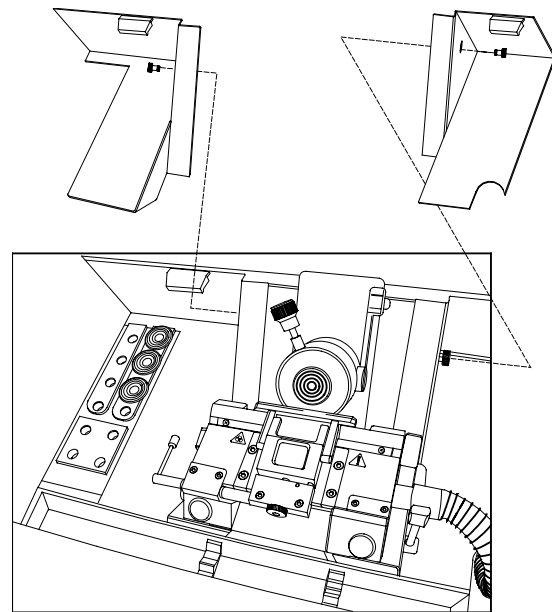


Fig. 128

### 5-2 REMOVING THE MICROTOME

- In the left rear part of the microtome there is the so-called connector housing including the two electrical connections and for the option O (specimen cooling) two cool-technical quick couplings as well.
- Pull off the red and blue coded electrical connector. For this, touch the connectors on their connector housings.
- Insert the blue coded connector (fig. 130.1) into the park position 9 (fig. 130.9) of the fast freezing station.
- Insert the red coded connector (fig. 130.2) into the park position 10 (fig. 130.10).

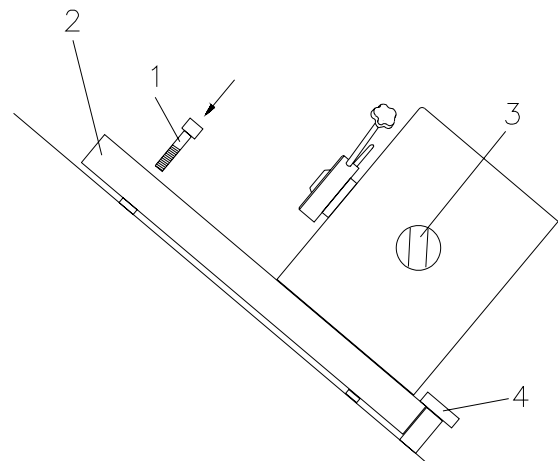


Fig. 129



**Warning:**

Cover the connector sockets via the attached caps, as cooling liquid is critical for the electrical connectors.



**Note:**

Put a small cloth under the quick coupling of the option O before pulling it off, as a small amount of cooling liquid might leak out.

- For the option O pull off the quick coupling. For this, touch the connectors on the ring sleeve and pull them towards the operator to the front and pull the connector off.
- Insert the left connector into park position 11 (fig. 130.11) and the right one into park position 12 (fig. 130.12) of the fast freezing station. (If the positions are mixed up, this will have no influence on the function.)

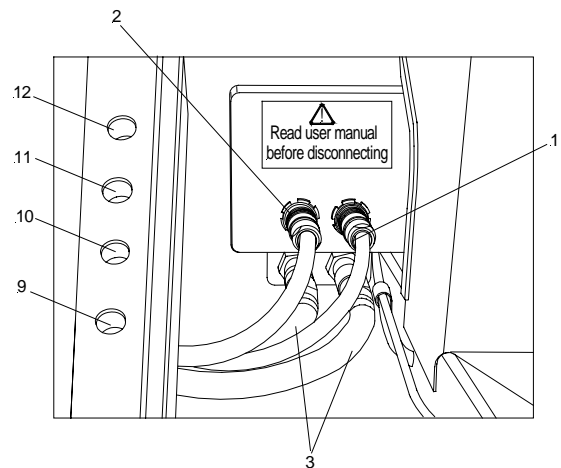


Fig. 130



**Note:**

The described electrical/cool-technical order as well as the corresponding insertion of the connectors must be **strictly observed** for the option O.

- Bring the handwheel handle into its lower position, i.e. the specimen clamping is also in its lower position.
- Slightly lift the heated window on the handle and pull it forwards over the front arm rest.
- Then swivel the window upwards and slightly move it backwards. Then insert it into the anchorage of the guide rails (fig. 131).
- Unscrew the Allan screw (fig. 129.1) in the middle of the front part of the microtome base plate via an Allan screwdriver size 5 mm.

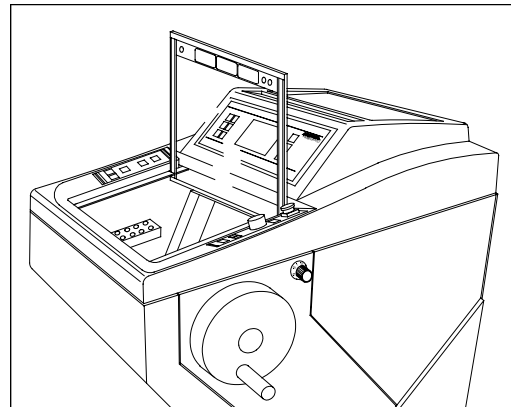


Fig. 131



**Caution:**

It is recommended for all further work to wear isolating gloves because of the danger of freezer burns on the frozen microtome.

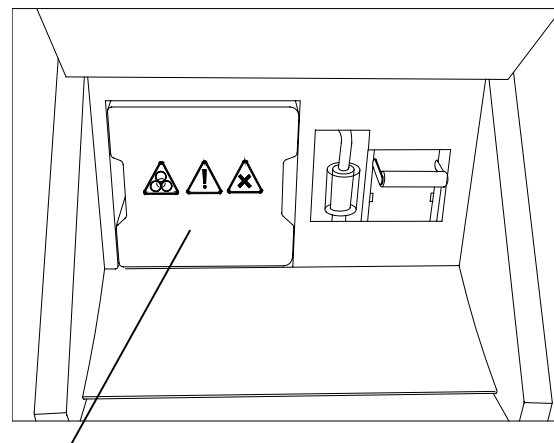
- Move the microtome to the left side until the stop. This way, the clutch on the right side of the microtome becomes free.
- Move the microtome forwards and remove it from the cryo-chamber.
- Thoroughly clean and wash the interior.



**Caution:**

Chloric cleaning agents must not be used for cleaning purposes. In case of a malfunction hazardous gases might be generated together with the cooling brine Tyfoxit of the cooling system.

- Pull off the red stopper at the bottom of the chamber. The cleaning liquid is collected in the container (fig. 132.1) with a volume of 4,8 l at the front lower side



1

Fig. 132

**Note:**

Please observe the filling level!!



- The red stopper must be inserted after cleaning as otherwise cold air leaks out during cooling operation. Thus generating frost built-up.
- The installation and re-setting up of the instrument is carried out in reverse order.

### 5-3 CLEANING AND CARE OF THE MICROTOME

- Carefully clean and dry the dismantled microtome.
- Carefully clean and dry the dismantled knife carrier as well.
- As there is condensed humidity inside the microtome, dry the microtome components inside the cooling chamber very carefully.
- For this, the microtome can be treated in a drying closet at temperature up to +60°C.
- After each shutting-off or cleaning of the cryostat, the cross roller bearing should be lubricated.
- By means of a pipette (fig. 133.3) the cross roller bearings (fig. 133.4) can be reached from an angle from behind below the housing (fig. 133.1).
- Fill the pipette with a small amount of cryostat oil (cat. no. 350040).
- Put one or two drops into the space (fig. 133.2) of the cross roller bearings.
- The specimen clamping should be in the lower position.
- Also slightly lubricate the horizontal cylinder guide behind the specimen clamping.

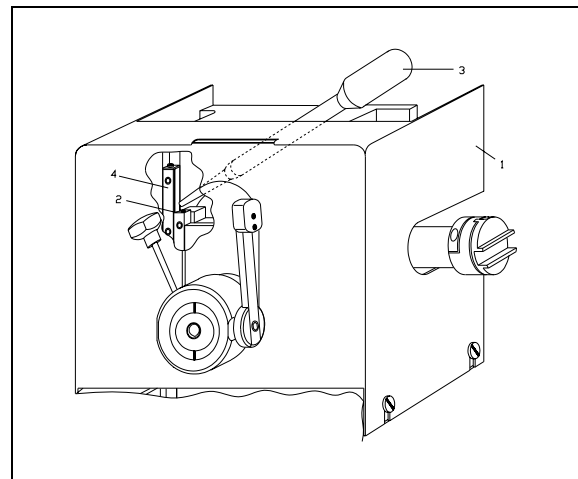


Fig. 133



#### Note:

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

#### Cleaning and care of the microtome during routine work:



#### Caution!

A regular and/or immediate disinfection of the blade carrier, the cryo chamber as well as all the other potentially contaminated parts of the instrument is highly recommended. All commercially available cryostat disinfection solutions can be used.

### 5-4 CLEANING THE COOLING LAMELLA

- Open the cleaning opening via the attached tool (fig. 135.1).
- For this, insert the tool (fig. 134.1) through one of the middle ventilation slots.
- Turn the tool by 90° so that the t-shaped holder latches into the adjacent slots.
- Pull the tool to open the grid (fig. 134.1) of the cleaning hole.



**Note:**

The grid of the cleaning hole is kept on the right side by a magnet (fig. 134.2) and is inserted on the left

side.

- Remove the dust from the cooling lamella by means of a commercially available vacuum cleaner.



**Note:**

Carry out this cleaning in regular intervals. Thus expending the lifetime of the compressor.

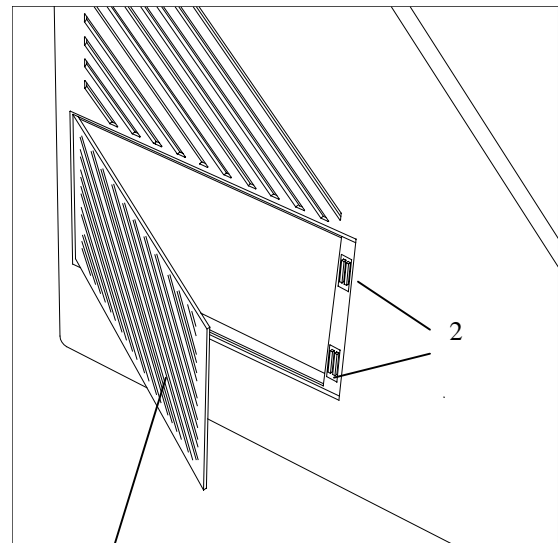


Fig. 134

1

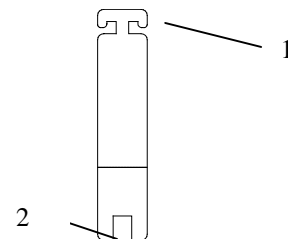


Fig. 135

### 5-5 CHANGING THE FLUORESCENT LAMP

The fluorescent lamp L8/12 of the cryostat is integrated in the grip (fig. 136.1) of the heated sliding window.

- Before exchanging the lamp, turn off the mains switch and unplug the instrument.
- Open the sliding window halfway.
- Turn the two red knurled screws (fig. 136.2) which are placed on the right and left lower side of the sliding window in a counter-clockwise direction and remove them.
- Remove the grip (fig. 136.1) from the upper side of the sliding window.
- Turn the lamp by 90° forwards or backwards and remove it from the sockets (fig. 136.4).
- Insert the new lamp from above into the socket and turn it by 90°.

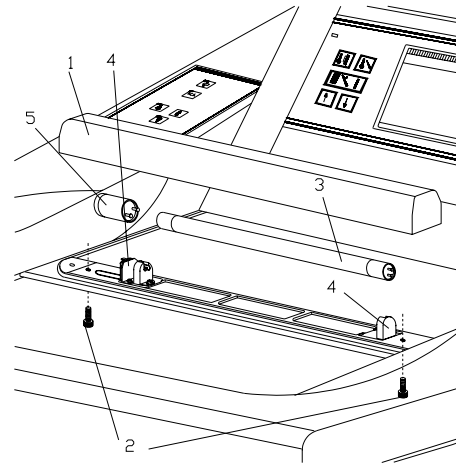


Fig. 136



**Note:**

Only use the lamp type L8/12, cat. no. 346190, which was installed in the factory.



**Note:**

Whenever exchanging the fluorescent lamp, please also exchange the starter S10 Philips (cat. no. 322710).

- Turn the starter (fig. 136.5) in a counter-clockwise direction and remove it from the socket.
- Insert the new starter into the socket.
- Turn the new starter clockwise until the starter is positively locked.
- Place the grip (fig. 136.1) onto the illumination ledge from above.
- Screw in the two red knurled screw clockwise from below and tighten them.
- Plug in and then turn on the instrument and check the illumination.

### PART 6 CONDITIONS FOR THE TRANSPORTATION OF THE INSTRUMENT

#### 6-1 TAKING BACK THE INSTRUMENT FOR REPAIR OR ROUTINE MAINTENANCE

Repair or maintenance work are normally carried out at the site of installation. If this is not possible for some special reasons, the instrument can be returned to MICROM. The contact address can be found at the beginning of this instruction manual.

- To guarantee trouble-free function of the instrument after transportation, please note the below-mentioned measures for the transportation preparation.
- In addition, the conditions for storage and transportation as mentioned in part 1-2 must be observed during the entire transportation.

#### **Biohazard:**



Please also note the precautionary measures described in our safety precautions concerning biological hazards!

#### **Measures for closing down:**

- Turn off the instrument.
- Unplug the unit.
- Remove blade and/or knife from blade and/or knife carrier.
- Remove section waste trays, brush shelf, blade/knife carrier and other accessories as well as tools from the cryo chamber.
- Before the transportation, empty all containers for defrosting liquid and disinfection solution to avoid the unintended release of the fluids. When removing the containers, please also note the precautionary measures which are described in the chapter "Safety Precautions".



#### **Note:**

Clean and disinfect these accessories according to the respective applicable lab regulations and transport them in dry condition.

- To remove the container for the disinfection medium, first loosen the rapid action hose (fig. 137). Then remove the container from the supports.
- Clean and disinfect the cryo chamber according to the respective applicable lab regulations.
- Unscrew the handwheel handle for transportation.
- Before the transportation, loosen the fastening screws of the rollers.
- Keep the heated sliding window closed during transportation.



**Note:**

If the new site of installation can be reached in less than half an hour, keep the sliding window closed so that the cryo chamber does not heat up. This avoids the formation of condensation water inside the chamber.

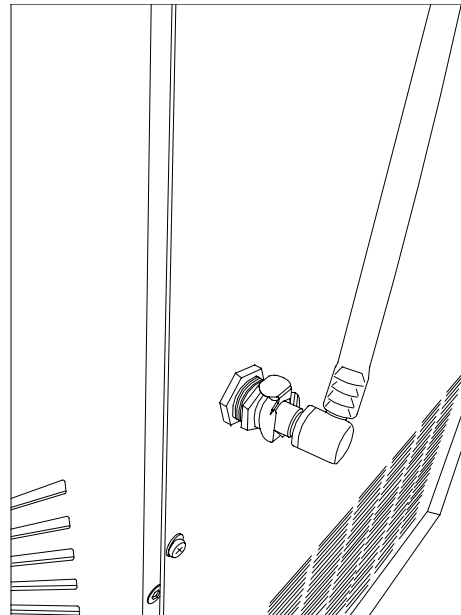


fig. 137



**Note:**

It is recommended that at least two persons are available for the transportation.

**Measures for turning on again:**

- Again install the blade carrier, section waste trays and the brush shelf.
- Attach the handwheel handle again.
- After having turned on the instrument and after having reached the set temperature, the instrument is ready of operation again.



**Note:**

Blade carrier which was heated up to ambient temperature, needs approx. 1 h in the chamber at  $-25^{\circ}\text{C}$  to be able to section specimens again.

**For transportation outside closed buildings, please observe the following measures:**

- Turn off the instrument.
- Unplug the unit.
- Remove blade and/or knife from blade and/or knife carrier.
- Remove section waste trays, brush shelf, blade/knife carrier and other accessories as well as tools from the cryo chamber.



**Note:**

Clean and disinfect these accessories according to the respective applicable lab regulations and transport them in

dry condition.

- Clean and disinfect the cryo chamber according to the respective applicable lab regulations.
- Unscrew the handwheel handle for transportation.



**Note:**

To make sure that there is no condensation water inside the chamber, let the instrument approx.

48 h dry.

- Loosen the fastening screws of the rollers to move the instrument.
- Arrange the dismantled accessories into the intended transportation packing.



**Note:**

Before the further transportation, tighten the fastening screws so that the instrument does not move during

transportation.

- Slightly tilt the cryostat and insert the foam parts underneath it.
- Place the case over the instrument.
- Insert the wooden cover.
- Attach the tightening strips around the packing.

### 6-2 DISPOSAL OF THE INSTRUMENT AFTER FINAL SHUTDOWN

After the final shutdown of the instrument, we recommend to contact a local recycling company for the disposal according to the national applicable regulations.



**To be applied in the countries of the European Union and other European countries with a separate collecting system within the waste management.**

The marking of the product and/or the respective literature indicates that, after its final shutdown, it must not be disposed of together with ordinary domestic waste.

- Please dispose of your instrument separately from other waste to not harm our environment and/or human health by uncontrolled waste disposal.
- Recycle your instrument to support the sustainable recycling of material resources.
- **Industrial users** should contact their suppliers and observe the conditions of the contract. This product must not be disposed of together with other commercial waste.
- **Please contact your supplier!!**