ERGOSTAR HM 200

INSTRUCTION MANUAL

MICROM International GmbH
Robert-Bosch-Str. 49

D- 69190 Walldorf

387 440 - English

MICROM International GmbH
Robert-Bosch-Str. 49

D- 69190 Walldorf

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 ommissions 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:	387 430
English:	387 440
French:	387 450
Spanish:	387 699

MICROM International GmbH
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D- 69190 Walldorf

INTENDED USE

Dear Customer,

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

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

MICROM-Ser. No.: .....

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

Instruction Manual No. 387440

Issued on April 25, 2006

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Intended Use

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MICROM International GmbH
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EC Certificate of Conformity

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

Product designation: Bench Microtome
Type reference: HM 200 Ergostar

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:

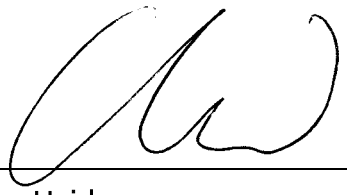
DIN EN ISO 14971:2001-03
Medical devices - Application of risk management to medical devices (ISO 14971:2000).

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 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

ATTENTION !

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 safety ground. The instrument is equipped with a three wire ground plug. The power outlet must be connected to the safety ground and must meet the International Electrotechnical Commission (IEC) regulations.

CAUTION: VOLTAGE

Never remove instrument covers during operation. Component replacement 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.

CARE IN USING MICROTOME KNIFE

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

HAZARD OF RADIOACTIVE RADIATION

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

HAZARD OF INFECTION

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

HAZARD OF MALFUNCTION

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

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.

WARNING SIGNALS AND SYMBOLS

The installation and routine use of the HM 200 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.

Hazard of hand injuries:
Due to moving parts in connection also with the microtome knife, a danger area arises, which might lead to hand injuries in case of non-compliance with the safety features of the microtome and when disregarding the instruction manual.

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).

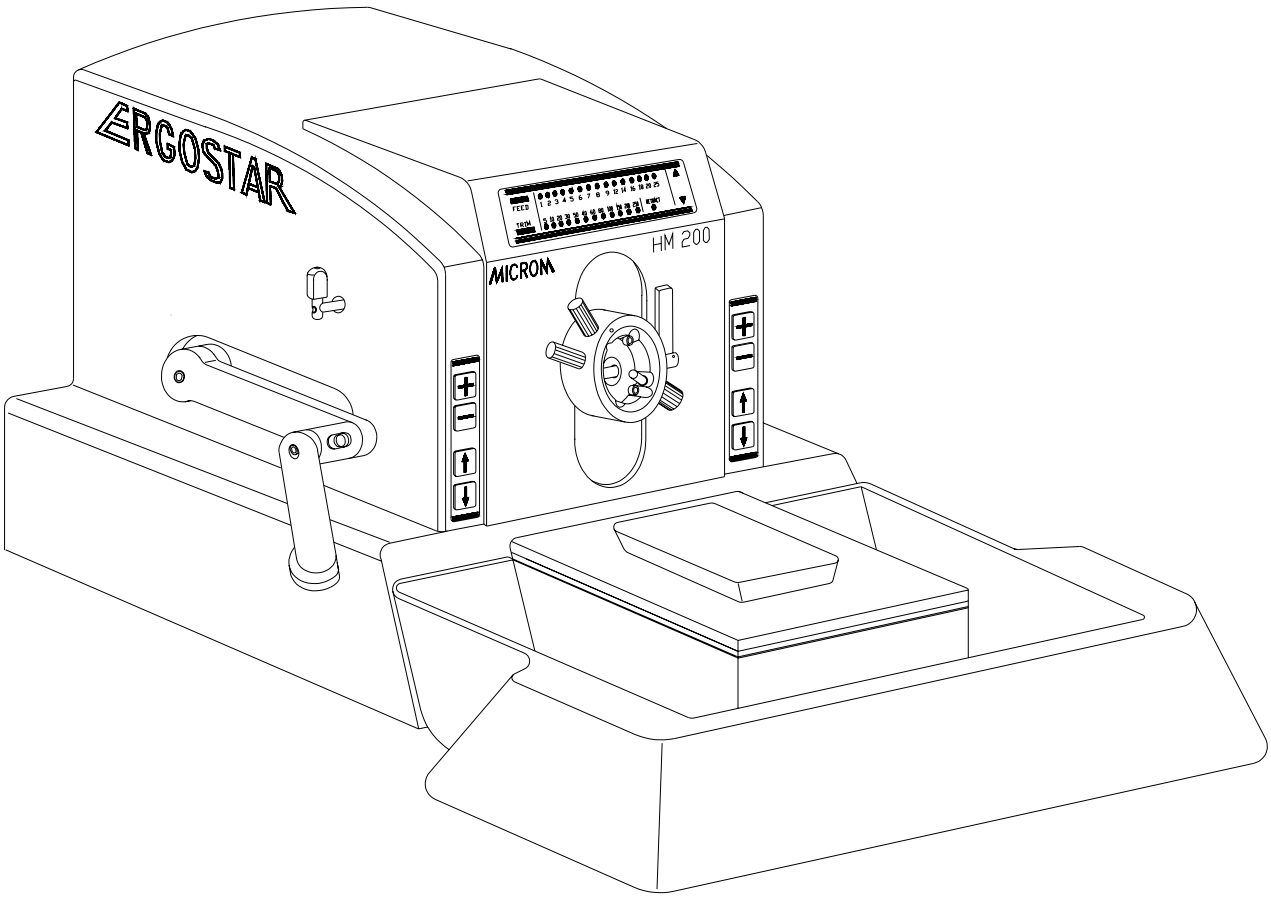


Fig. 1

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PART 1 INTRODUCTION

1-1 DESCRIPTION OF THE ERGOSTAR HM 200

The ERGOSTAR HM 200 from MICROM International GmbH is a highly efficient multi-purpose microtome which can be used for paraffin, hard- and thin-sectioning techniques in biology, medicine, industry and research.

The ERGOSTAR HM 200 sets new ergonomical standards concerning operation and comfort. The instrument is equipped with a section waste tray with integrated arm rest, which is built around the knife carrier for direct collection of section waste.

This model can be equipped with all specimen clamps and knife carriers of the Rotary Microtome HM 300 series. This includes segment arc and universal specimen holder.

The ERGOSTAR HM 200 will cut sections in a range from 1 µm up to 25 µm. All horizontal feed and retraction movements are carried out by the moving knife carrier. For the protection of knife and specimen, the instrument retracts the knife carrier at the end of each cut.

The motorized coarse feed system allows the continuous knife carrier forward and backward travel. This way, specimen and knife edge distance can be adjusted quickly.

The trimming function with defined steps from 5 µm to 250 µm also permits the fine adjustment of the knife carrier up to the first cuts and allows for larger section thicknesses when trimming.

The operating arm can be installed on the right, left or both sides. The control buttons as well as the indication panel are clearly arranged for easy and safe operation. For optimal symmetry the control buttons on either side have the same functions.

The knife carriers are designed so the knives can be easily clamped in place and adjusted.

In addition, the instrument is equipped with a brake for the operating arm(s) that locks in any position.

1 - 2 **TECHNICAL SPECIFICATIONS ERGOSTAR HM 200**

Microtome:	Section thickness range ..... 1 - 25 µm
	Resolution: ..... 1 µm for 1 - 10 µm ..... 2 µm for 10 - 20 µm ..... 5 µm for 20 - 25 µm
	Trimming thickness range.....5 - 250 µm
	Resolution .....5 µm for 5 - 10 µm .....10 µm for 10 - 60 µm .....20 µm for 60 - 100 µm .....50 µm for 100 - 250 µm
	Knife carrier retraction during return travel of the specimen ..... 40 µm Horiz. feed range of the knife carrier..... max. 28 mm Vertical specimen stroke ..... max. 64 mm
Specimen size:	Standard .....55 x 50 mm
Specimen orientation:	x - and y - axes: ..... universal 8° z - axis: ..... up to 360°
Cutting drive:	..... operating arm horizontal 128 mm
Coarse feed:	..... motorized, graduated and continuous
Storage temperature range:	..... -20°C up to +50°C
Operating conditions:	.....+5°C up to +40°C (at a max. rel. humidity of 60%) .....altitude up to 2000 m M.S.L. .....for indoor use only
Power requirements:	.....220...230 VAC/140 mA +/-10%/50...60 Hz ..... 240 VAC/140 mA +/-10%/50...60 Hz ..... 100 VAC/350 mA +/-10%/50...60 Hz ..... 115 VAC/350 mA +/-10%/50...60 Hz
Pollution degree:	 2
Overvoltage category:	II
Dimensions:	... 375x573x280 mm (wide with 1 operating arm/deep/high)
Weight:	..... 24,0 kg

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PART 2 OPERATING INSTRUCTIONS

2-1 SETTING UP THE MICROTOME

Unpack the microtome and remove the wrapping. On the lower side of the instrument towards the front and rear longitudinal axis, there are recessed grips to lift or carry the microtome.
The microtome should be placed on a stable and vibration free table as sectioning can be influenced by nearby instruments which generate vibrations.

Unpack the two attached operating arms which can be installed on the left, right or either side of the instrument, as desired.
By means of the attached Allan key, the operating arm can be solidly mounted to the driving carriage of the instrument via the attached screw (fig. 2.3). The operating arm can be fixed horizontally or up to max. 15° upwards.
Via this screw (fig. 2.3) the corresponding operating arm can then be fixed horizontally or continuously upwards up to a 15° position.
Loosen the screw (fig. 2.1), to swivel the operating handle forwards and backwards, as well.
These two setting possibilities can be used to find the optimal ergonomical handle position of each operator.

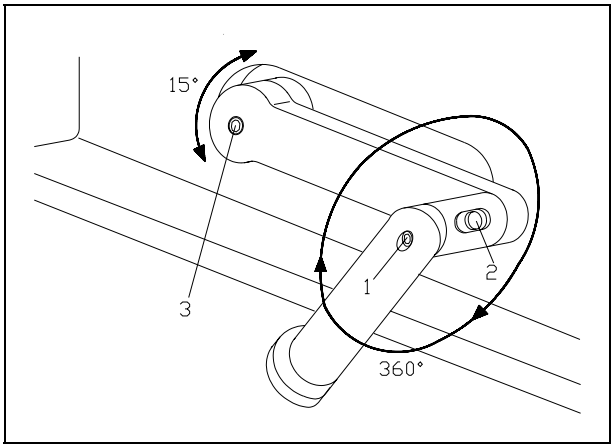

Fig. 2

Install the section waste tray, which is packed separately, by placing it at the front of the base plate and sliding it backwards to engage the clips.

NOTE! Always remove the section waste tray to move or carry the instrument. The section waste tray can be pulled out of its proper position and re-installed.

To move the unit on the table, remove the waste tray. Lift the base slightly under the front end and slide it on the rear feet.

2-2 INITIAL TURN-ON

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

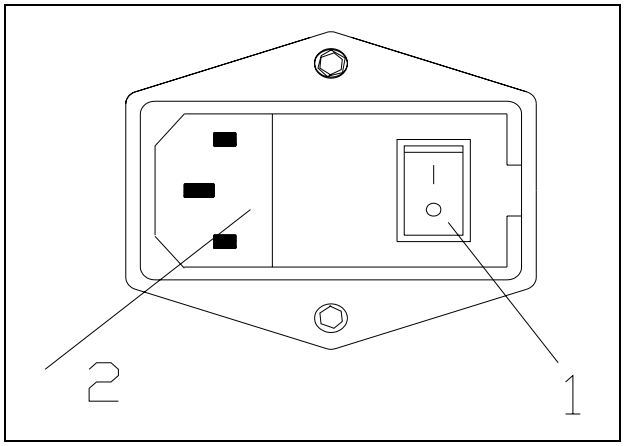

Fig. 3

Connect the power cord to the power socket (fig. 3.2) on the back of the instrument. Turn on the power switch (fig. 3.1).
Each time the unit is turned on, the knife carrier moves to the back end position. This movement is always carried out when the instrument is turned on. This way, the instrument feed mechanism is calibrated.

The insert for the two fuses is placed beside the power switch.
(Exchange of fuses, see part 5).

2-3 CUTTING MOVEMENT AND RETRACTION

To start the cutting movement of the microtome, carry out forward stroke movements via the operating arm. As the specimen moves down, sectioning is carried out (cutting movement, fig. 42). Reverse the stroke movement backwards to bring the specimen back up. To protect the knife and specimen during return travel, the knife carrier is retracted (R). The yellow LED RETRACT (fig. 6.5) lights up.

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

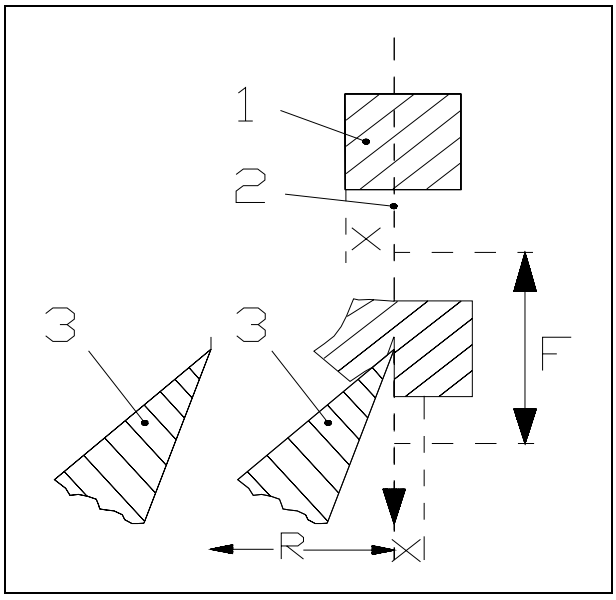

Fig. 4

2-4 LOCKING AND UNLOCKING THE OPERATING ARM

Each horizontal position of the operating arm corresponds to a certain vertical position of the specimen holder. To fix the specimen in its position, the operating arm can be locked in any position.

The locking lever for the operating arm is placed on the left and right side of the instrument.

To loosen the operating arm, turn the lever upright until it reaches a stop. Turn the lever backwards from this position, to lock the operating arm in any position.

CAUTION! For your personal safety, the operating arm should be locked in the upper range of the vertical movement when changing specimens.

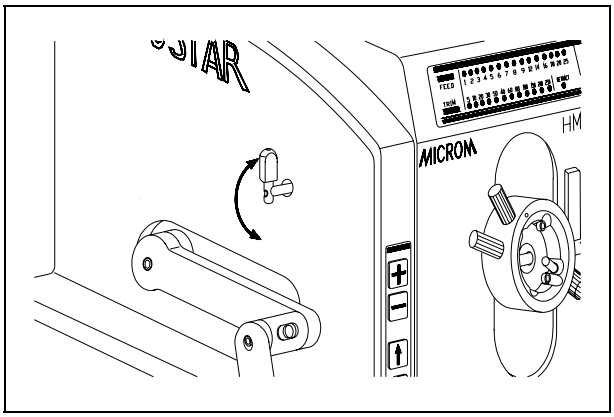

Fig. 5

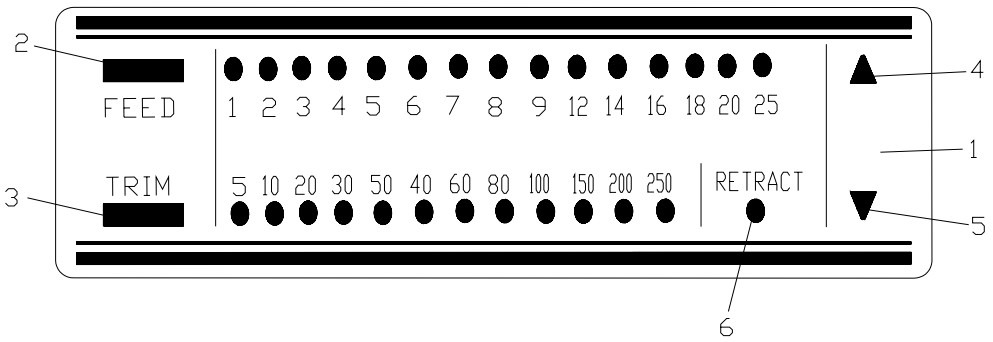

Fig. 6

2-5 SETTING SECTION THICKNESS AND TRIMMING THICKNESS

The required section and trimming thicknesses are set by means of the control buttons (fig. 7), which are placed on the left or right side of the instrument.

Press the knob (fig. 2.2) on the handle of the operating arm to select between section or trimming thickness. The corresponding LED (fig. 6.2 or fig. 6.3) lights up on the indication panel (fig. 6.1).

The green LED FEED (fig. 6.2) lights up when the section thickness is set. The yellow LED TRIM (fig. 6.3) lights up when the trimming thickness is selected.

The selected values are shown by the red LEDs on the indication panel (fig. 6.1). The upper row of LEDs represent the values for the section thickness and the lower row represent the values for trimming thicknesses.

When the instrument is turned on again, the values which were used before the instrument was turned off are shown again.

The graduation of the section thicknesses is divided into 3 ranges:

range	graduation
from 1µm to 10µm	1µm
from 10µm to 20µm	2µm
from 20µm to 25µm	5µm

The graduation of the trimming thicknesses is divided into 4 ranges:

range	graduation
up to 10µm	5µm
from 10µm to 60µm	10µm
from 60µm to 100µm	20µm
from 100µm to 250µm	50µm

Please note: If intensive electrostatic discharges occur, the pre-selected values for trimming and fine cutting might change. To correct this, turn off the instrument.

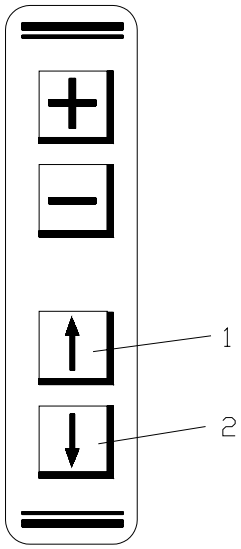

Fig. 7

2-6 SPECIMEN FEED

2-6-1 COARSE FEED

For the fast forward and backward travel between specimen and knife edge, the microtome has a motorized coarse feed system. The knife carrier is moved to the front towards the specimen as long as the button <coarse feed forwards> (fig. 7.1) is pressed. To move the knife carrier backwards, press the button <coarse feed backwards> (fig. 7.2).
The instrument carries out movements of various lengths according to how long the button (fig. 7.2) is pressed. Press the button (fig. 7.2) only very briefly and the knife carrier moves backwards by a fixed value of 2 µm. If the button (fig. 7.2) is pressed a little bit longer (not longer than 2 seconds), the knife carrier moves backwards as long as the button is being pressed. If the button (fig. 7.2) is pressed for more than 2 sec., the knife carrier moves automatically to the back end position and the motorized coarse feed shuts off. This function can be stopped at any time by shortly pressing the button (fig. 7.2) again.

When the back end position of the knife carrier movement is reached, the red LED on the indication panel (fig. 6.4) lights up.
When the front end position of the specimen movement is reached, the red LED (fig. 6.5) lights up.

CAUTION! With the function <coarse feed forwards> specimen and knife edge are adjusted very quickly. To avoid damages to specimen and knife, carefully observe this adjustment process.

Beware that the specimen and knife edge do not come in contact with each other. Carefully observe the narrowing gap between knife edge and specimen to stop the function <coarse feed forwards> by removing finger pressure from the button before the specimen touches the knife edge.

2-6-2 TRIMMING AND FIRST CUTS

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

First check if trimming thickness was selected via the knob (fig. 2.2) of the handle on the operating arm. Via very short stroke movements of the operating arm, feed movements corresponding to the selected thickness can be released. When the knife touches the specimen, trimming can be carried out via stroke movements adjusted to the corresponding specimen size.

2-6-3 FINE FEED

After having adjusted knife and specimen as well as having trimmed the specimen, sectioning can be started.
For this, press the knob (fig. 2.2) on the handle of the operating arm to switch over to fine sectioning.

Via the operating arm carry out stroke movements in the desired length, to cut the specimen with the selected section thickness.

2-7 SPECIMEN CLAMPS

To clamp specimens, different specimen clamping systems are available depending on the application. With the orienting adapter it is simple to properly align the specimen in relation to the knife or quickly change systems.

2-7-1 UNIVERSAL CASSETTE CLAMP

The universal cassette clamp (fig. 8) represents a quick change system for commercial paraffin cassettes.

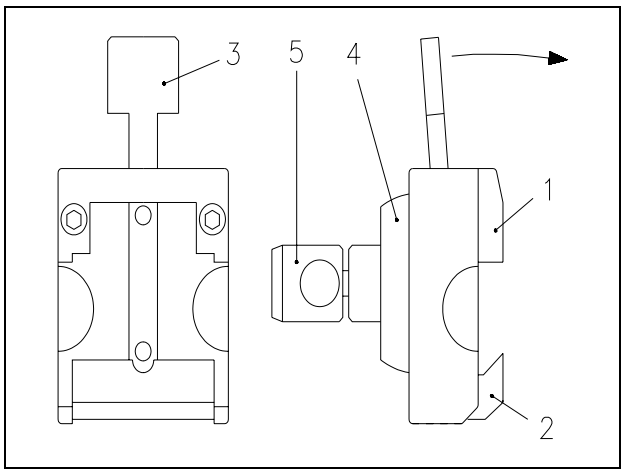

Fig. 8

To insert or remove the cassette from between the fixed (fig. 8.1) and movable (fig. 8.2) jaws, pull the lever (fig. 8.3) to the front.

CAUTION! To achieve an optimal clamping keep the locating surface of the cassette free of paraffin.

2-7-2 STANDARD SPECIMEN CLAMP

The standard specimen clamp (fig. 9) is used for rectangular and square paraffin and plastic blocks and embedding rings.

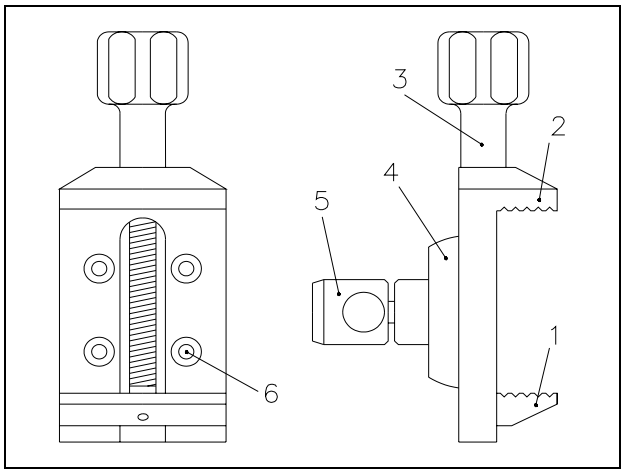

Fig. 9

Insert the specimen against the fixed jaw (fig. 9.2) first. Turn the knob (fig. 9.3) to tighten the jaw (fig. 9.1). Fig. 9.4 and 9.5 show the orienting adapter (see 2-8-2, adapter orienting, specimen orientation), fig. 9.6 indicates the four holes for the fastening screws of the non-orienting adapter.

NOTE! For the stability of the specimen, do not let it project over the clamping jaws too much.

The standard specimen clamp is supplied with two movable jaws, which are different in weight.
The lightweight jaw is used in addition with inserts for round specimens.
The heavier jaw is intended to be used together with the standard specimen clamp with no other holding elements.

To exchange the clamping jaw, unscrew the clamping screw (fig. 9.3) to remove the jaw and replace it with the other one.

2-7-3 INSERT FOR ROUND SPECIMENS, V-INSERT AND V-DISTANCE PIECE

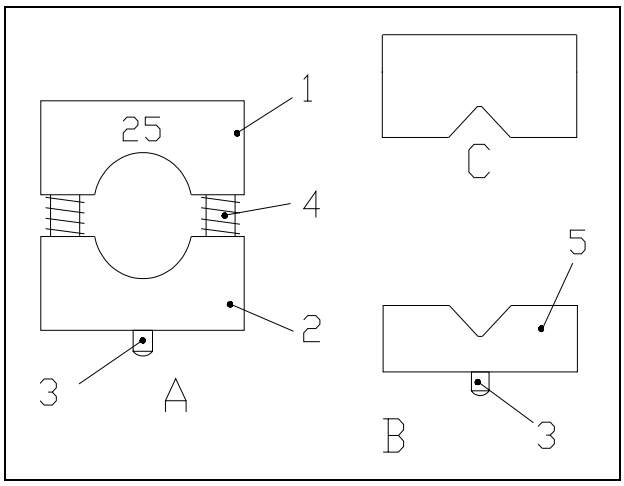

Fig. 10

To cut round specimens, an insert for round specimens (fig. 10 A) with defined diameters of 6, 15 or 25 mm (special sizes on request). The V-insert (fig. 10 B) or the V-distance piece (fig. 10 C) can also be clamped into the standard specimen clamp. The pin (fig. 10.3), which fits into the lower clamping jaws (fig. 9.1), positions the insert precisely. The two springs (fig. 10.4) make it easy to remove the specimen from the inserts (fig. 10.1 and 10.2).
For round or odd shaped samples insert the V-distance piece (10 C) against the fixed jaw (fig. 9.2) of the standard specimen clamp. First unscrew the knob from the spindle and pull the spindle out of the clamp. After inserting the V-distance piece, put in the spindle and turn the knob (fig. 9.3) on the spindle. The V-insert fits into the lower clamping jaw.

2-7-4 FOIL CLAMP

The foil clamp (fig. 11) is a clamping system for foils, films or thin specimens especially used in industry. To insert the specimen, loosen the three clamping screws (fig. 11.5) slightly and push the movable jaw (fig. 11.2) sideways against the two springs (fig. 11.3). The specimen is kept in place by the springs. For a new alignment its position can be changed. Tighten the three clamping screws (fig. 11.5) to secure the specimen snugly.

When using an orienting adapter with the instrument, first insert the enclosed graduated ring into the orienting adapter by means of the pin. Then mount the foil clamp.

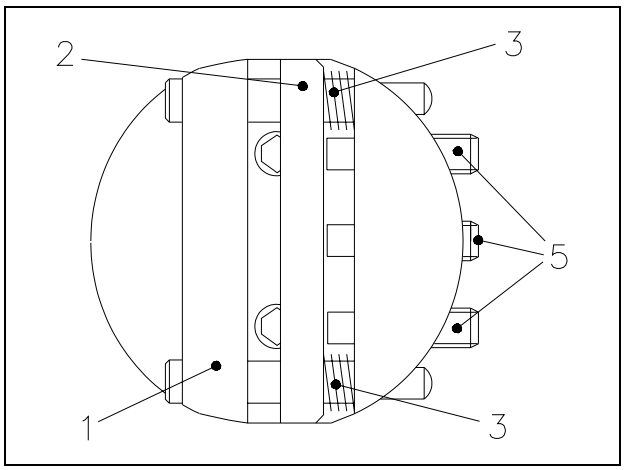

Fig. 11

According to the various specimens, it might be helpful to use in addition MICROM's sandwich supporting material (cat. no. 176010) on the right and left side between specimen and clamping jaw.

2-7-5 SEGMENT ARC AND UNIVERSAL SPECIMEN HOLDER

The segment arc and universal specimen holder are highly suitable for the clamping of small specimens embedded in plastic (fig. 12) for semithin sectioning.

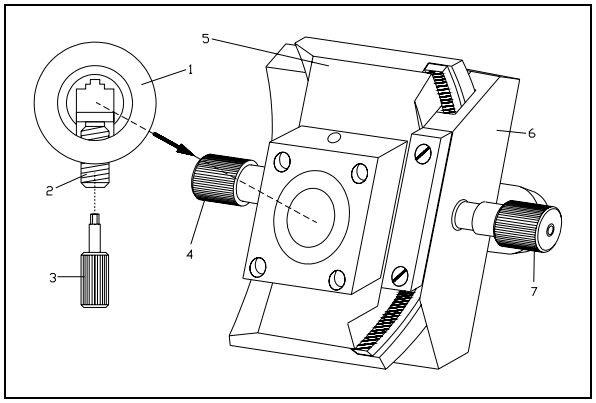

Fig. 12

The specimen is inserted in the holder (fig. 12.1) and clamped by means of the screw (fig. 12.2) with the hex head wrench (fig. 12.3). The holder together with the specimen is put into the segment carrier (fig. 12.5), where the holder can be rotated 360°. Thus, the specimen can be aligned as required. Then, the holder is clamped by means of the screw (fig. 12.4) in the selected position. The carrier (fig. 12.5) can be moved on the base (fig. 12.6). In this way, the surface of the specimen can be oriented parallel to the knife. The knurled screw (fig. 12.7) is used to tighten the carrier (fig. 12.5) on the base (fig. 12.6).

2-8 ADAPTERS FOR SPECIMEN CLAMPING

2-8-1 ADAPTER, NON-ORIENTING

This adapter serves for the non-orienting fastening of the specimen clamps directly on the microtome.

NOTE! To avoid undesirable movement while adjusting the specimen, press the eccentric lever (fig. 13.1) upwards slightly. This will lightly hold the specimen clamp.

2-8-2 ADAPTER, ORIENTING, SPECIMEN ORIENTATION

Using the orienting adapter (fig. 8.4 and 8.5) fasten the specimen clamps onto the microtome. This allows the specimen to be aligned in relation to the knife.

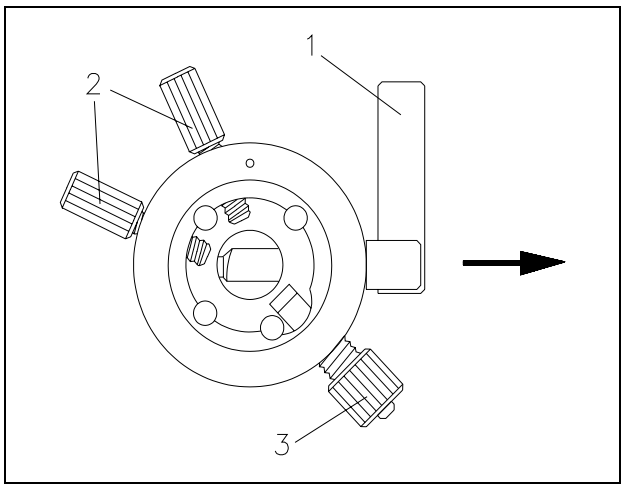

Fig. 13

To bring the specimen into the desired position, turn the eccentric lever (fig. 13.1) to the front. This will loosen the specimen clamp and a rotation of 360° on the cylinder axis (Z-axis) is possible. With the two adjusting screws (fig. 13.2) the specimen clamp can be oriented by 8° in each direction on the X-axis and Y-axis. Before starting cutting, press the eccentric lever (fig. 13.1) upwards to fix the orientation of the specimen.

CAUTION! The spring bolt (fig. 13.3) must always be tightened to keep the adjusting screws under constant tension.

2-8-3 CHANGING AND/OR CLAMPING SPECIMEN CLAMPS

The orienting specimen clamps are all clamped or removed in the same way.

To insert or change a specimen clamp, press the eccentric lever (fig. 13.1) downwards and pull it sideways in the direction of the arrow. Slightly unscrew the two adjusting screws (fig. 13.2) as well as the spring bolt (fig. 13.3).

Now the specimen clamp can be pulled out and can be replaced with another specimen clamping system.

Insert the new specimen clamp into the cylinder head so that the clamping lever can be put through the hole of the adapter (fig. 8.5) from the right side all the way through. Tighten spring bolt (fig. 13.3). Align and orient the specimen clamp to the knife edge by means of the orienting screws (fig. 13.2). Press the clamping lever (fig. 13.1) upwards (see 2-8-4, readjusting specimen clamps) to lock in place.

2-8-4 READJUSTING SPECIMEN CLAMPS

Frequent use of the clamping lever (fig. 13.1) can lead to the fact that the specimen clamps cannot be clamped optimally anymore. If the necessary readjustments are not carried out, it might even be possible that the specimen clamp cannot be clamped anymore by means of the clamping lever (fig. 13.1).
The locked clamping lever (fig. 13.1) should be in an almost upright position. To determine the clamping position of the clamping lever, adjust the inner screw (fig. 14.1) on the backside of the orienting adapter by means of an Allen key (size 3 mm).

Turn the allan key in a clockwise direction if no clamping was achieved at all or if the clamping position of the clamping lever is too high towards the microtome.
If the position of the clamping lever is too low, turn the allen key in a counter-clockwise direction.

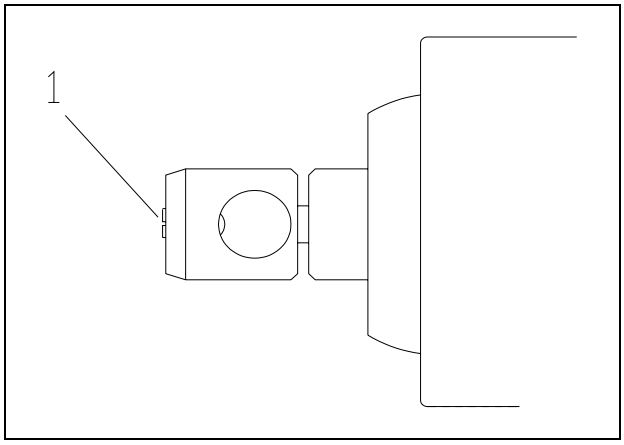

Fig. 14

Then insert the specimen clamp and check clamping position. If necessary, repeat above-described process.

2-9 KNIFE CARRIERS

Hazard of hand injuries:
Due to moving parts in connection also with the microtome knife, a danger area arises, which might lead to hand injuries in case of non-compliance with the safety features of the microtome and when disregarding the instruction manual.

The knife carriers of the microtome are easy to use, can be moved sideways and are equipped with knife guards for user safety while adjusting knife and specimen. A dovetail guide is connected with the integrated feed system. It can be moved forwards and backwards on the base plate. This dovetail guide is designed universally so that the different knife carriers can be clamped and moved to the front and the back.

2-9-1 STANDARD KNIFE CARRIER N

a) Inserting the knife

To insert the knife, unscrew the two clamping screws (fig. 15.9) slightly until the knife can be pushed in from the side. The height of the knife is adjusted by the two knurled nuts (fig. 15.6) and the bar (fig. 15.7). If a cutting area of the knife is no longer usable, the knife can be moved approx. 2-3 cm to the left or right side by loosening the clamping screws (fig. 15.9).

b) Adjusting the clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 15.4) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 15.2) on the knife carrier base (fig. 15.1). The adjusted clearance angle can be read on the scale. Then turn the clamping lever (fig. 15.4) upwards to lock in the new clearance angle.

NOTE! By experience, usable cuts are only achieved at a clearance angle of 10° or more.

If the clamping lever (fig. 15.4) is loosened, the upper part of the knife carrier can be moved
1 cm to the left or right side. This way, the cutting edge can optimally be used.

c) Moving the knife carrier on the dovetail guide

Loosen the clamping lever (fig. 15.5) on the left side of the knife carrier to move the carrier forwards or backwards on the dovetail guide. This allows a rough adjustment of the knife to the specimen.

d) Protection against injury

The knife carrier is equipped with two knife guards (fig. 15.8) that can be moved sideways. They should be pushed together to the middle while the knife and specimen are adjusted. In this way, the danger of injury from the knife can considerably be diminished.

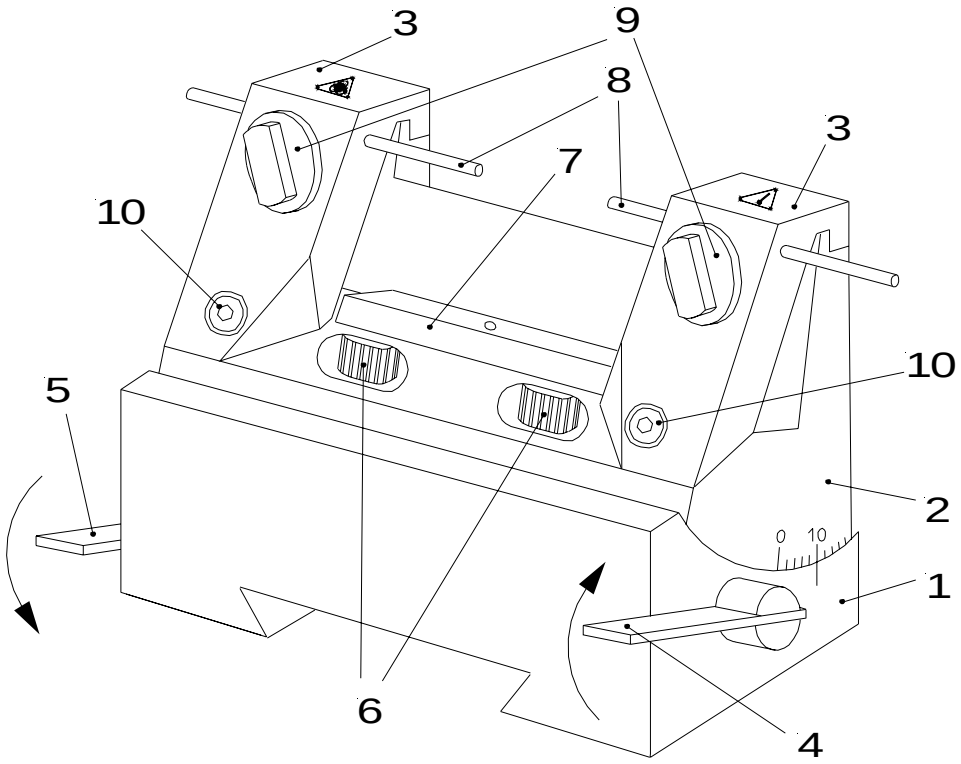

Fig. 15

2-9-2 DISPOSABLE BLADE CARRIER E

a) Inserting the blade

The disposable blade carrier E is designed to take all commercially available high and low profile blades. Insert the blade into the slot behind the clamping plate (fig. 16.5). When using high profile blades, first loosen the two screws and remove the spacer strip.

Turn the clamping lever (fig. 16.7) to the front. Swing the bracket with scale (fig. 16.4) to the front. Loosen the clamping lever (fig. 16.7) and, if necessary, push the lower part of the clamping plate as well. A small gap between rail (fig. 16.3) and clamping plate (fig. 16.5) can be seen. Insert the blade on the rail (fig. 16.3) and push it from the side to the middle. Afterwards, return the clamping lever (fig. 16.7) upright, thus locking the blade in position.

The bracket (fig. 16.4) is provided with a scale. After loosening the clamping lever (fig. 16.7), move the blade together with the clamping plate (fig. 16.5) according to the scale by means of the knife guard to the left or right side. This way, the entire cutting length of the blade can be used. Then press the clamping lever (fig. 16.7) upwards.

b) Adjusting the clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 16.8) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 16.2) on the base (fig. 16.1). The adjusted clearance angle can be read on the scale. Then turn the clamping lever (fig. 16.8) upwards to lock in the new clearance angle.

NOTE! By experience, usable cuts are only achieved at a clearance angle of 10° or more.

If the clamping lever (fig. 16.8) is loosened, the upper part of the knife carrier can be moved
1 cm to the left or right side. This way, the cutting edge can optimally be used.

c) Moving the knife carrier on the dovetail guide

Loosen the clamping lever (fig. 16.6) on the left side of the knife carrier, to move the carrier forwards or backwards on the dovetail guide. This allows a rough adjustment of the knife to the specimen.

d) Protection against injury

A bracket (fig. 16.4) on the clamping plate can be moved upwards over the blade for the protection against injury.

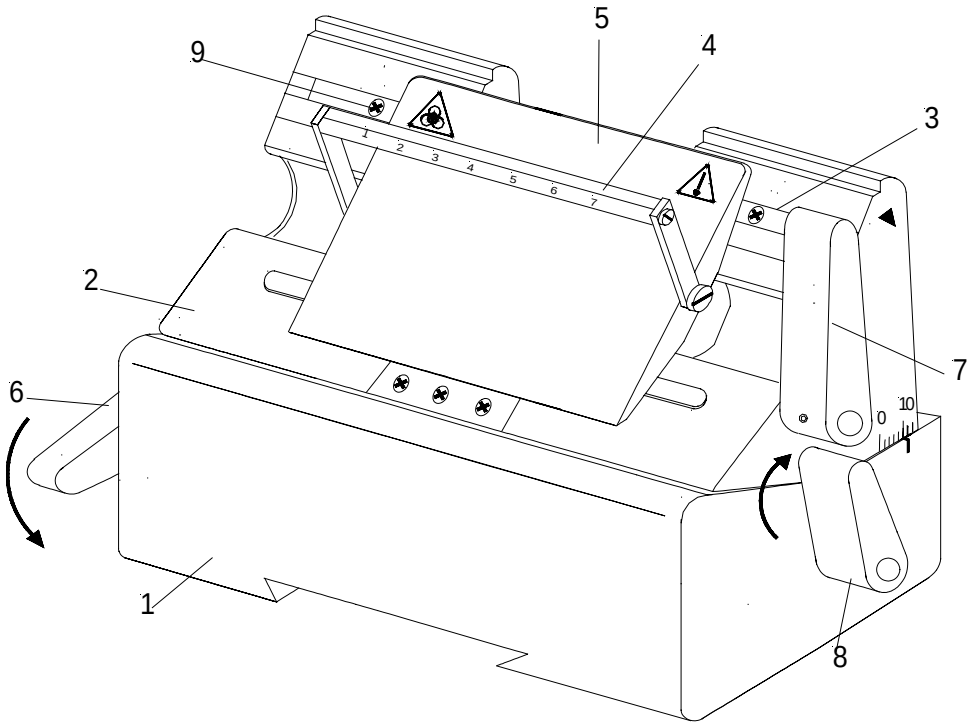

Fig. 16

2-9-3 KNIFE CARRIER C

a) Inserting the knife

To insert the knife, the clamping screws (fig. 17.10) must be unscrewed slightly so the knife can be pushed in from the side. The height of the knife is adjusted with the two knurled nuts (fig. 17.6) and the bar (fig. 17.7). If the cutting zone of the knife cannot be used anymore, it can be moved over its entire length to the left and right side by loosening the clamping screws. This allows an optimal use of the entire knife edge.

CAUTION! When clamping the knife, please tighten the two clamping screws (fig. 17.10) simultaneously.

b) Adjusting the clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 17.4) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 17.2) on the base (fig. 17.1). The adjusted clearance angle can be read on the side scale. Then turn the clamping lever (fig. 17.4) upwards to lock in the new clearance angle.

NOTE! By experience, usable cuts are only achieved at a clearance angle of 10° or more.

If the clamping lever (fig. 17.4) is loosened, the upper part of the knife carrier can be moved
1 cm to the left or right side. This way, the cutting edge can optimally be used.

c) Moving the knife carrier on the dovetail guide

Loosen the clamping lever (fig. 17.5) on the left side of the knife carrier to move the carrier forwards and backwards on the dovetail guide. This allows a rough adjustment of knife and specimen.

d) Protection against injury

The knife carrier is equipped with two knife guards (fig. 17.9) which can be moved sideways. These knife guards should be pushed together in the middle while adjusting knife or specimen. This reduces the danger of injury considerably.

e) Central clamping plate

The knife is clamped and stabilized in the cutting zone by the central clamping plate (fig. 17.8.1, 17.8.2) - exactly where the highest cutting forces are applied.

NOTE ! Two types of clamping plates are available for the knives:

clamping plate c for c-knives,
clamping plate d for d-knives.

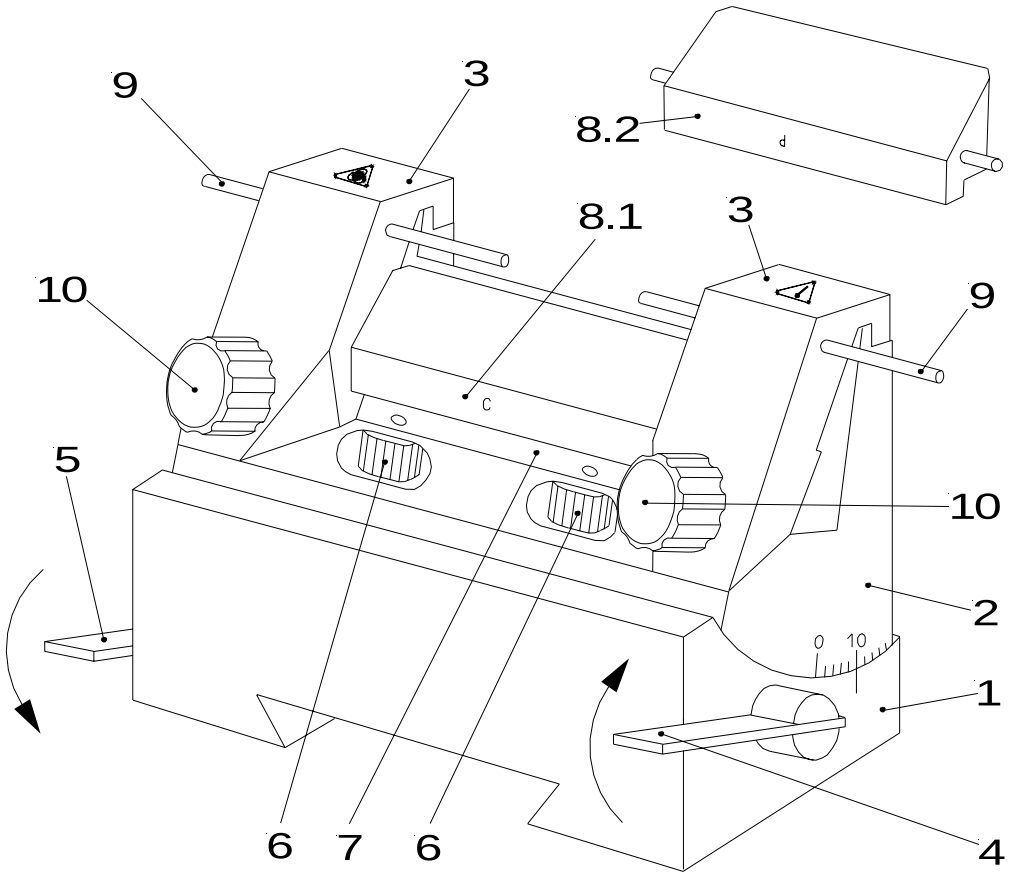

Fig. 17

Fig. 18 shows schematically the angles on the cutting edge profiles of c- and d-knives.

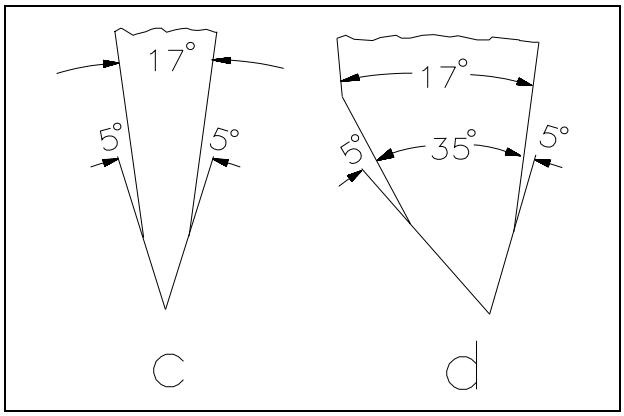

Fig. 18

2-9-4 KNIFE CARRIER S

a) Inserting the knife

The knife carrier S is designed to take triangular glass knives, diamond and sapphire knives. These knives are put into the knife insert (fig. 19.8) and clamped with the clamping screw (fig. 19.9). The black arrows in fig. 19 show the clamping direction of the various clamping devices.

b) Adjusting the clearance angle

The clearance angle adjustment of the knife can be set by moving the insert (fig. 19.8) on the support (fig. 19.5). Turn the clamping lever (fig. 19.10) downwards to lock in the selected clearance angle.

c) Moving the knife sideways

Move the knife carrier together with the support (fig. 19.5) sideways.
Thus, the desired position concerning the specimen can be adjusted. Loosen the knurled screw (fig. 19.7) slightly. Turn one of the two set screws (fig. 19.6) to achieve the desired side movement of the support (fig. 19.5) with regard to the carrier (fig. 19.3). Tighten the knurled screw (fig. 19.7) slightly after this positioning.

CAUTION! If the knurled screw (fig. 19.7) is tightened, do not adjust the set screws (fig. 19.6)

d) Turning the carrier

Loosen the clamping screw (fig. 19.4) to move the carrier to the left or right side on the socket up to approx. 30 ° according to the bowed orientation scale. Afterwards, tighten the clamping screw (fig. 19.4) again.

e) Moving the knife carrier on the dovetail guide

Swing the clamping lever (fig. 19.2) to the back to release the knife carrier. The knife carrier can then be moved forwards or backwards.

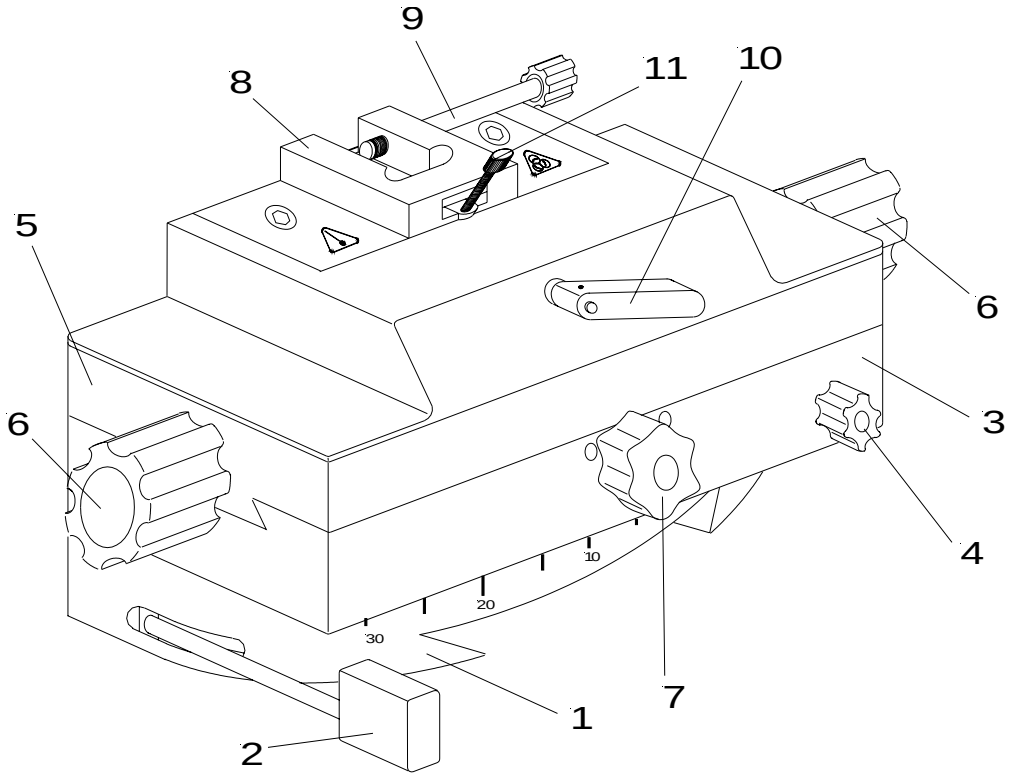

Fig. 19

2-9-5 READJUSTING KNIFE CARRIERS N, E AND C

Frequent use of the clamping levers can lead to the fact that the knife carriers cannot be clamped optimally anymore. If the necessary readjustments are not carried out, it might even be possible that the knife carriers cannot be clamped anymore.

If possible, the clamping lever should be in a 45°-position towards the front (fig. 20).

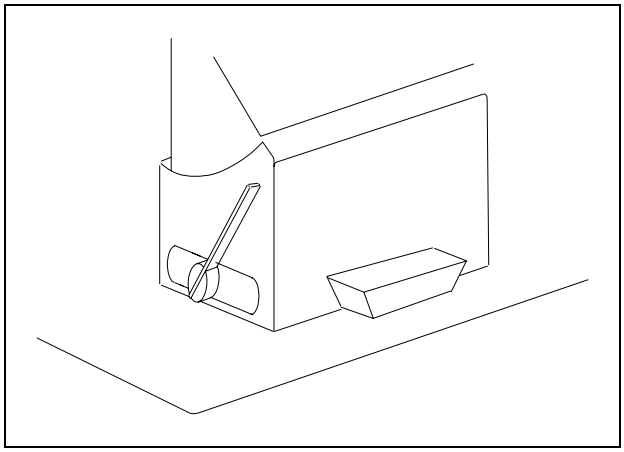

Fig. 20

If the clamping lever is in an unfavourable clamping position, i.e. not in a 45°-position, remove knife carrier. Loosen the set screw (fig. 21.1) on the bottom of the knife carrier. Insert a pin into one of the holes (fig. 21.2) that can be seen in the brass screw and turn the brass screw.

If the clamping position of the lever should be moved towards the front, turn the brass screw (fig. 21.2) in a clockwise direction. If the clamping position of the lever should be moved towards the back, turn the brass screw (fig. 21.2) in a counter-clockwise direction. Before putting on the knife carrier again, tighten set screw (fig. 21.1).
Then put the knife carrier on the dovetail guide and check the clamping position of the clamping lever. If necessary, repeat above process.

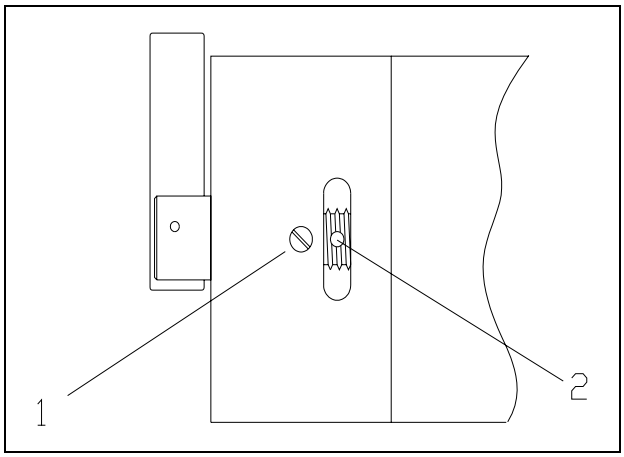

Fig. 21

2-9-6 READJUSTING KNIFE CARRIER S

Readjusting the clamping lever (fig. 19.2) of the knife carrier S can also become necessary.

If the clamping lever is in an unfavourable position, i.e. not in a 45°-position, remove the knife carrier. Loosen or tighten the set screw on the bottom of the knife carrier to change the clamping position of the lever.

If the clamping position of the lever should be moved towards the front, turn the set screw in a clockwise direction. If the clamping position of the lever should be moved towards the back, turn the set screw counter-clockwise.
Then slide the knife carrier on the dovetail guide and check the clamping position of the lever. If necessary, repeat above process.

2-10 SECTION WASTE TRAY WITH INTEGRATED ARM REST

The section waste tray with integrated arm surrounds the knife carrier area. It can easily be cleaned and allows non-tiring working with the microtome. It can easily be removed to the front.

2-11 STANDARD EQUIPMENT

The ERGOSTAR HM 200 is supplied with the following accessories:

1 Hex head wrench 4 mm
1 Cover
1 Para Gard, 100 ml
1 Instruction manual

2-12 ADDITIONAL EQUIPMENT, OPTIONAL

2-12-1 KNIFE CARRIERS

	Cat. No.
Standard knife carrier N	705010
Standard knife carrier N for Ralph insert	705400
Insert for Ralph knives for standard knife carrier N	565310
Disposable blade carrier E	705050
Knife carrier C	705040
Knife carrier SL	705350
Knife carrier S	705070
Insert for Ralph knives for knife carrier S	565320

2-12-2 SPECIMEN CLAMPS

Standard specimen clamp	715010
Universal cassette clamp	715020
Foil clamp	715030
Sandwich supporting material	176010
Insert for round specimens, ø 6 mm	715070
Insert for round specimens, ø 15 mm	715080
Insert for round specimens, ø 19 mm	715280
Insert for round specimens, ø 25 mm	715090

V-insert	715100
V-distance piece	715320
Segment arc	715050
Universal specimen holder	715060

2-12-3 MICROTOME KNIVES

Steel knives, type c	
12 cm	152010
16 cm	152020
18,5 cm	152270
22 cm	152030
Steel knives, type d	
12 cm	152060
16 cm	152070
22 cm	152080
Tungsten carbide knife, 16 cm, d	152120
Knife cases	
12 cm	152220
16 cm	152230
18,5 cm	152280
22 cm	152240
Disposable blades for paraffin	
S 35, 50 pieces in dispenser	152170
R 35, 50 pieces in dispenser	152370
Superlap blades (10 pieces)	152190

2-12-4 ADDITIONAL ACCESSORIES

Fast freezing unit K-300	
100 V, 50 - 60 Hz	770080
115 V, 60 Hz	770070
230 V, 50 Hz	770030
240 V, 50 Hz	770090
Section transfer system STS	
100 V, 50 - 60 Hz	771030
115 V, 60 Hz	771020
230 V, 50 Hz	771010
240 V, 50 Hz	771040
Automatic approach system	604120
Lubricating oil, 100 ml	350110
Lubricating oil, 250 ml	350120
Paraffin repellent, Para Gard, 100 ml	350170

PART 3 THEORY OF OPERATION

3-1 CUTTING MOVEMENT

The manual stroke movement of the operating arm of the ERGOSTAR HM 200 is converted into a vertical movement of the specimen clamping which carries the specimen holder.
The feed movement is carried out by a horizontal movement of the knife carrier.
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 moving the operating arm backwards. During this return travel, the knife carrier is drawn back to protect knife and specimen. The selected section thickness is delivered at the upper reversal point of the return travel.

3-2 KNIFE CARRIER COARSE FEED AND TRIMMING FUNCTION

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

3-3 SPECIMEN CLAMPING SYSTEM AND SPECIMEN ORIENTATION

According to the form and size of the specimens, different specimen clamping systems are available to carry the specimen.
It is very easy to align the specimen to the knife, using the orienting adapter.

3-4 KNIFE CARRIERS

The knife carriers are easy to use. They allow the microtome knives to be clamped and adjusted as needed. Depending on application, special knife carriers are available.

3-5 MICROTOME WITH FAST FREEZING UNIT

The fast freezing unit K-300 allows frozen sectioning with the specimen temperature as low as -45°C.

PART 4 WORKING WITH THE MICROTOME

4-1 PREPARATION AND ORIENTATION

Before sectioning, the specimens must be prepared appropriately and embedded in suitable media. Cassettes as well as different forms for round or rectangular specimens can be used for the embedding. With the orienting adapter and cylinder head, the specimen can easily be oriented to the knife. (See 2-8-2, adapter, orienting, specimen orientation).

4-2 COARSE FEED AND TRIMMING FUNCTION

The knife carrier can be moved and the coarse feed or the trimming function can be used to adjust approximately the space between cutting edge and specimen. Moving the operating arm results in the first contact between knife and specimen. Continue this to start trimming the specimen, thus achieving the level of interest. Any waste should be wiped away in an upward direction with a brush.

4-3 SECTIONING INSTRUCTIONS

Hazard of hand injuries:
Due to moving parts in connection also with the microtome knife, a danger area arises, which might lead to hand injuries in case of non-compliance with the safety features of the microtome and when disregarding the instruction manual.

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

4-3-1 CONDITION OF THE KNIFE EDGE

Only use a sharp knife! If the cutting edge is blunt, move the knife horizontally either to the right or left side to continue working with the sharp area of the cutting edge, or have the knife resharpened.

4-3-2 CLEAN KNIFE SURFACES

For optimal sectioning, front and back of the knife must be clean. Especially paraffin waste must be removed thoroughly!!

4-4 HOW TO AVOID MALFUNCTIONS

4-4-1 PREPARATION OF THE SPECIMEN

When preparing specimens, be sure that a suitable embedding medium, fixation, dehydration and infiltration time are chosen.

4-4-2 TEMPERATURE OF THE SPECIMEN

Sectioning is carried out at ambient temperature (excluding frozen sections). If the temperature is too high, the paraffin softens. Therefore, avoid heating paraffin specimens by direct exposure to sunlight or other near sources of heat.

4-4-3 TIGHTENING THE CLAMPING SCREWS

Tighten all clamping screws and clamping levers on the knife carrier, specimen holder and specimen orientation.

4-4-4 SELECTION OF THE KNIFE

Carefully select the required knife material and profile.

4-4-5 ADJUSTMENT OF THE KNIFE

Take care to adjust the proper clearance angle of the knife: 5 - 7° for glass knives. For diamond knives ask the knife manufacturer.

Select a clearance angle adjustment of 5 - 15° according to the facet angle. Typically, adjust an angle of 10 - 12 °.

Take care to adjust knife height.

4-4-6 CUTTING SPEED

Take care to select proper cutting speed.

General Rule: The harder the material, the slower the cutting speed!!

4-4-7 TRIMMING

Take care in bringing knife and specimen together.

PART 5 MAINTENANCE

Annual routine maintenance

To secure section quality and functioning of the microtome, it is recommended that a routine maintenance be performed by a trained service technician once a year.

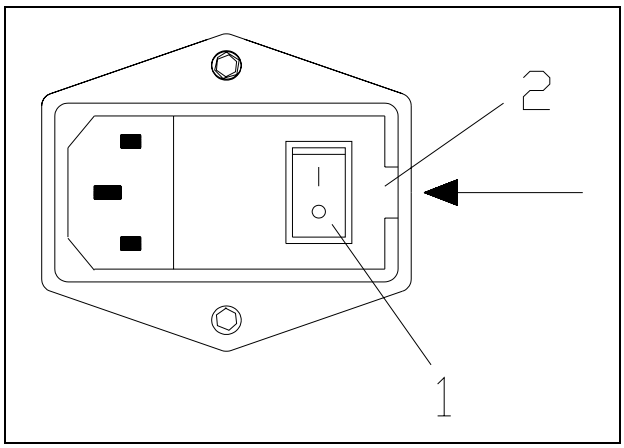

Fig. 22

Service contract

MICROM offers a service contract which guarantees that your instrument is always in perfect condition. For more information, please contact the nearest MICROM sales office.

Exchange of fuses

The two mains fuses are installed on the rear side of the instrument beside the power switch (fig. 22.1).
To exchange the two fuses, turn off the power switch of the instrument and unplug the instrument. Open the small cover (fig. 22.2) of the fuse holders from the right side by means of a flat screw driver. Pull out the fuse holders, each of which is marked with an arrow, and exchange the fuses against new ones.

Rating of fuses:
For power requirements: 220-240 V:
- 2 fuses 0,4 AT slow-blow
For power requirements: 100-120 V:
- 2 fuses 0,8 AT slow-blow

PART 6 CLEANING AND CARE

6-1 CLEANING

Cleaning intervals

Cleaning of the microtome depends on how frequently the microtome is used. The more it is used, the more it will need to be cleaned.

Cleaning agents

Mild household cleaners can be used to clean the microtome. Do not use aggressive cleaners or solvents, as the paint and plastic parts can be affected.

NOTE! Before starting sectioning, instrument, knife carrier and section waste tray should be treated with a commercially available paraffin repellent (see part 2-12-4)

CAUTION! When getting in contact with cleaning agents or paraffin repellents, e.g. Para Gard, the surface of the cover ribbon behind the specimen clamping might be affected. For this reason, please note that the cover ribbon does not get in contact with these agents when cleaning the housing, knife carrier or the base plate.

Care

Remove the knife from the knife carrier. Clean it and keep it in a knife case.

CAUTION! Never put the knife with the cutting edge upward on the table.

Loosen the clamping lever on the left side of the knife carrier and pull the knife carrier off to the front.

Clean the control buttons and the surfaces of the knife carrier, especially the groove of the dovetail guide and the space where the knife carrier is installed.

Clean the dovetail guide, operating arm, specimen clamping system, specimen orientation as well as the base plate and housing.

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!!**