

**ROTARY MICROTOME**  
**HM 315**  
**INSTRUCTION MANUAL**

## Rotary Microtome HM 315

**CERTIFICATION**

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

The instrument complies with applicable international safety regulations.

**WARRANTY**

This MICROM product is warranted against defects in material and workmanship for a period of 1 year. Parts which prove to be defective during the warranty period will be repaired or replaced free of charge by MICROM International GmbH. No other warranty is expressed or implied. Unauthorized modification or repair by third party persons will void the warranty.

The warranty will expire in case of improper or wrong use of the instrument and in case the warning and precautionary messages are not observed. MICROM International GmbH is not liable for any occurring damage.

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

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

This instruction manual is available in the following languages:

	Cat. No.
German:	386 310
English:	386 320
French:	387 250
Spanish:	387 684

**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.

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

Please enter the serial number of the instrument here. It is placed on the type plate on the rear side of the instrument. Questions and service can be handled faster by giving the serial number.

Instruction Manual No. 386320

Issued on September 28, 2005

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

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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:** Rotary Microtome  
**Type reference:** HM 310, 315, 325

**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 ISO 9001:2000**

Quality management systems - Requirements (ISO 9001:2000)



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Hans Heid  
Managing Director

Walldorf, 23 June 2004

## SAFETY PRECAUTIONS

<b><u>ATTENTION !</u></b>
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**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.**

### 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 taking off 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 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 315 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.

**PART 1 INTRODUCTION**

**1-1 DESCRIPTION OF THE ROTARY MICROTOME HM 315**

The Rotary Microtome HM 315 from MICROM International GmbH is a highly efficient instrument for all paraffin techniques in routine and research laboratories as well as less sophisticated sectioning techniques in the industrial laboratories.

The HM 315 will cut sections in a range from 0,5 µm up to 60 µm. Forward and backward travel is carried out by the coarse feed wheel. This way specimen and knife edge distance can be adjusted quickly.

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

1 - 2

TECHNICAL SPECIFICATIONS HM 315

Microtome:	Section thickness range ..... 0,5 - 60 µm
	Resolution: ..... 0,5 µm for 0,5 - 2 µm
	..... 1 µm for 2 - 10 µm
	..... 2 µm for 10 - 20 µm
	..... 5 µm for 20 - 60 µm
	Horiz. feed range .....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:	..... manual by means of handwheel
Coarse feed:	..... manual by means of handwheel
Storage temperature range:	..... -20°C up to +50°C
Dimensions:	..... 420x490x280 mm (wide/deep/high)
Weight:	..... 22 kg

## 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. Do not transport the instrument on the handles of the handwheels!

The microtome should be placed on a stable and vibration free table as sectioning can be influenced by nearby instruments.

Take the section waste tray (fig. 2.3), which is separately packed and install it at the front of the base plate.

To move the unit on the table, lift the base slightly at the front end only and slide it.

**NOTE!** Remove the section waste tray to move or carry the instrument. The section waste tray can be pulled out of its proper position.

### 2-2 CUTTING MOVEMENT

To start the cutting movement of the microtome turn the handwheel in clockwise direction (fig. 2.1). As the specimen moves down, sectioning is carried out (cutting movement). Continue turning the handwheel clockwise to bring the specimen back up.

### 2-3 LOCKING AND UNLOCKING THE HANDWHEEL

The handwheel is integrated into the housing. The position of the handle corresponds to the vertical position of the specimen.

To unlock the handwheel, turn the lever downwards in the direction of the arrow.

To lock the handwheel, turn the lever upwards. The handwheel can be locked in any position.

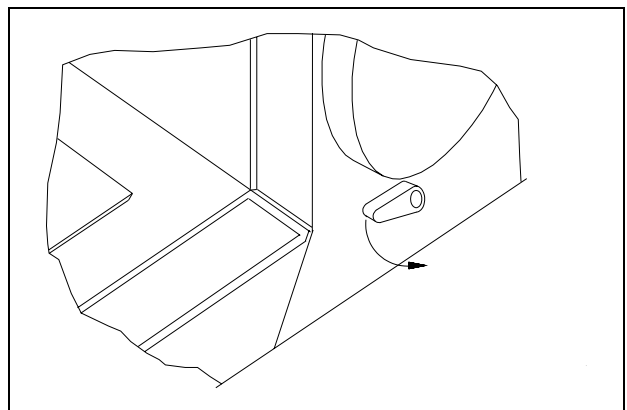


Fig. 1

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

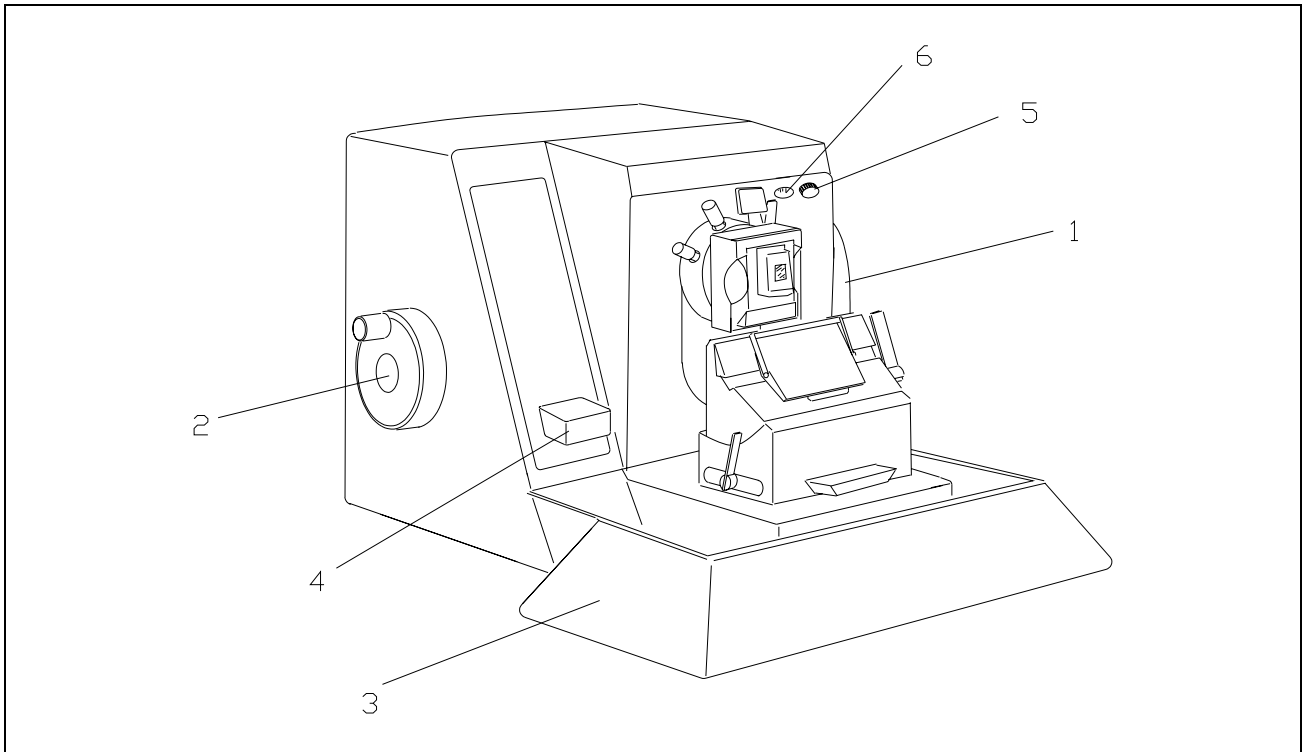


Fig. 2

## 2-4 SETTING SECTION THICKNESS

The required section thickness is set by means of a turning knob (fig. 2.5). The setting is indexed. The selected value is readable on the window (fig. 2.6). The graduation of the section thicknesses (which can be pre-selected) is divided into 4 ranges:

range	graduation
up to 2 $\mu$ m	0,5 $\mu$ m
from 2 $\mu$ m to 10 $\mu$ m	1 $\mu$ m
from 10 $\mu$ m to 20 $\mu$ m	2 $\mu$ m
from 20 $\mu$ m to 60 $\mu$ m	5 $\mu$ m

**CAUTION!** When the setting is changed from larger to smaller section thicknesses, the next section will be done at the previous value, if the setting was changed in the upper position of the cutting process. Therefore, when changing the section thickness, always use the lower position of the cutting process, then set the thickness.

## 2-5 SPECIMEN FEED

### 2-5-1 COARSE FEED

For the fast forward and backward travel between specimen and knife edge, the microtome has a coarse feed system. By means of the coarse feed wheel (fig. 2.2) the specimen holder can be moved horizontally backwards and forwards. When the front end position of the specimen feed is reached, resistance can be noticed.

**CAUTION!** When turning the coarse feed wheel, take note that the specimen and knife edge do not get in contact with each other.

**CAUTION!** Do not continue to advance the specimen after reaching the front end position with the coarse feed wheel or the handwheel. This will damage the mechanical parts.

**NOTE!** At the beginning of a sectioning series, it is advisable to use the coarse feed to move the specimen to the back third of the horizontal specimen movement and to move the knife carrier towards the specimen feed.

### 2-5-2 TRIMMING AND FIRST CUTS

The feed can also be carried out in graduated trimming stages. Trimming stages of 10  $\mu\text{m}$  and 30  $\mu\text{m}$  are available. For trimming stage 1 (10  $\mu\text{m}$ ), press the trimming key (fig. 2.4) down until a first resistance can be felt and turn the handwheel clockwise at the same time. For trimming stage 2 (30  $\mu\text{m}$ ), press the trimming key completely downwards.

**CAUTION!** The trimming mechanism can only be activated if the specimen is not in the upper position!

After the specimen is adjusted approximately to the knife edge, press the trimming key (fig. 2.4) to further advance the specimen gradually for the first cuts.

### 2-5-3 FINE FEED

The fine feed in  $\mu\text{m}$ -steps is adjusted by turning the knob (fig. 2.5) to the left or right side and is indicated in the window (fig. 2.6). The feed of the selected section thickness is effected automatically in the upper specimen position when the handwheel (fig. 2.1) is turned.

### 2-6 ACOUSTIC SIGNAL FOR FRONT END POSITION OF THE SPECIMEN MOVEMENT

About 1 mm before the front end position of the specimen feed an acoustic signal sounds during each rotation of the handwheel.

**CAUTION!** When the signal sounds, a feed range of no more than 1000  $\mu\text{m}$  is available to finish sectioning. To avoid damaging mechanical parts, set back the specimen holder by means of the coarse feed wheel before starting the next sectioning series.

**NOTE!** Sections should be cut in the back third of the horizontal specimen movement because the mechanical stability of the guide cylinder is best in this area.

## 2-7 SPECIMEN CLAMPING

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

### 2-7-1 UNIVERSAL CASSETTE CLAMP

The universal cassette clamp (fig. 3) represents a quick change system.

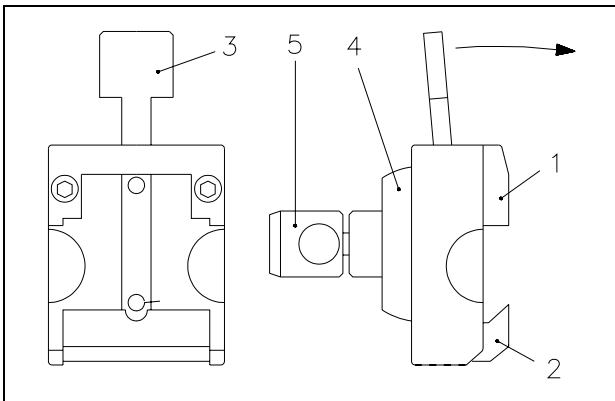


Fig. 3

To insert or remove the cassette from between the fixed (fig. 3.1) and movable (fig. 3.2) jaws, pull the lever (fig. 3.3) 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. 4) is used for rectangular and square paraffin and plastic blocks. Insert the specimen against the fixed jaw (fig. 4.2). Then turn the knob (fig. 4.3) to tighten jaw (fig. 4.1.). Fig. 4.4 and 4.5 show the orienting adapter (see 2-8-2, adapter, orienting, specimen orientation), fig. 4.6 indicates the four holes for the fastening screws.

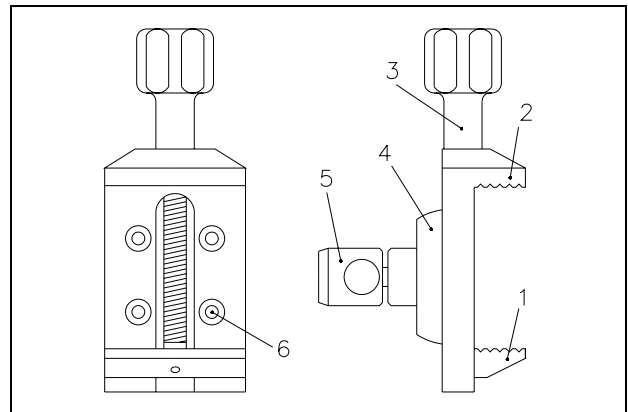


Fig. 4

**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. 4.3) to remove the jaw and replace it with the other one.

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

To cut round specimens, the insert for round specimens (fig. 5, A) with defined diameters of 6, 15 and 25 mm (special sizes on request) or the V-insert (fig. 5, B) can be clamped into the standard specimen clamp.

The pin (fig. 5.3), which fits into the lower clamping jaws (fig. 4.1), positions the insert precisely. The two springs (fig. 5.4) make it easy to remove the specimen from the inserts (fig. 5.1 and 5.2).

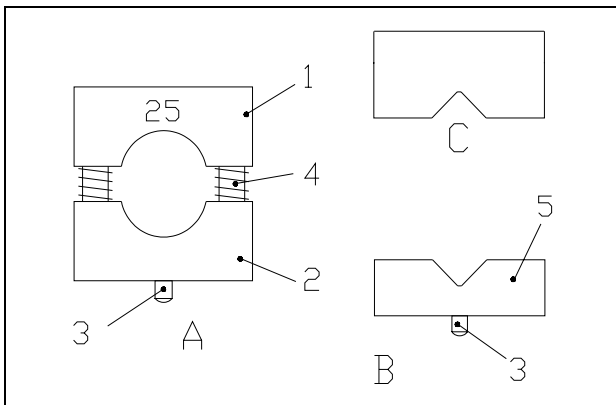


Fig. 5

**2-7-4 FOIL CLAMP**

The foil clamp (fig. 6) is a clamping system for foils or thin specimens.

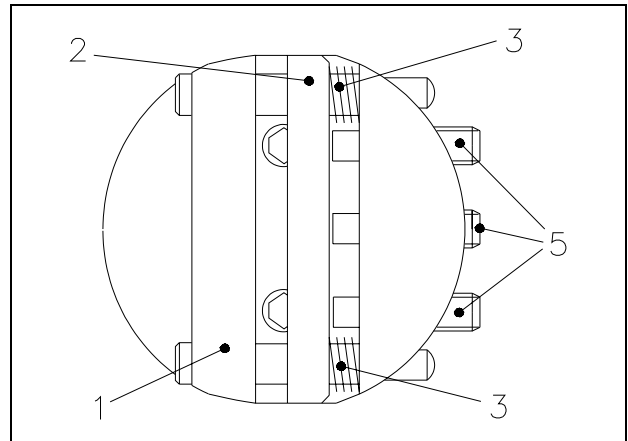


Fig. 6

To insert the specimen, loosen the three clamping screws (fig. 6.5) slightly and push the movable jaw (fig. 6.2) sideways against the two springs (fig. 6.3). The specimen is kept in place by the springs, however, its position can be changed. Turn the three clamping screws to clamp the specimen tightly.

When using an orienting adapter with the instrument, first insert the enclosed graduated ring into the orienting adapter by means of the pin. With the graduated ring the orientation in X-/Y-direction is annulled. However, it is possible to turn in Z-axis 60° in either direction. Then mount the foil clamp.

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.

## 2-8 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 cylinder.

### 2-8-2 ADAPTER, ORIENTING, SPECIMEN ORIENTATION

Using the orienting adapter (fig. 3.4 and 3.5) fasten the specimen clamps on the cylinder head (fig. 7). This allows the specimen to be aligned in relation to the knife.

To bring the specimen into the desired position, turn the eccentric lever (fig. 7.1) 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. 7.2) the specimen clamp can be oriented 8° in each direction on the X-axis and Y-axis. Before starting cutting, press the eccentric lever (fig. 7.1) upwards to fix the orientation of the specimen.

**CAUTION!** The spring bolt (fig. 7.3) must always be tightened to keep the adjusting screws under constant tension.

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

To change the specimen clamping system, press the eccentric lever (fig. 7.1) downwards and pull it sideways. Slightly unscrew the two adjusting screws (fig. 7.2) as well as the spring bolt (fig. 7.3).

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

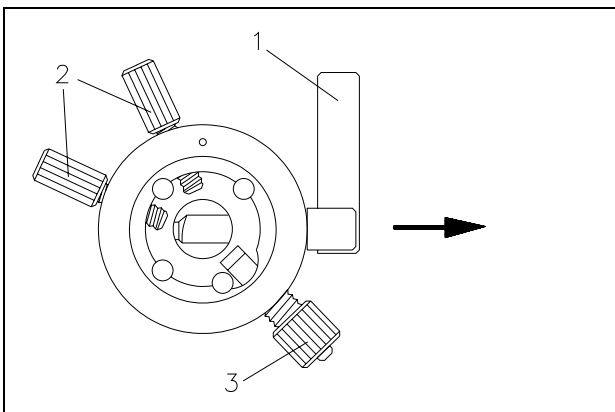


Fig. 7

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

#### 2-8-4 READJUSTING SPECIMEN CLAMPS

Frequent use of the clamping lever (fig. 7.1) 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. 7.1).

The clamping lever (fig. 7.1) should be in an almost upright position. To determine the clamping position of the clamping lever, adjust the inner screw (fig. 8.1) on the backside of the orienting adapter by means of an allen key (size 3 mm).

Turn the allen key in a clockwise direction if no clamping was achieved at all or if the clamping position of the clamping lever is too high.

If the clamping position of the clamping lever is too low, turn the allen key in a counter-clockwise direction.

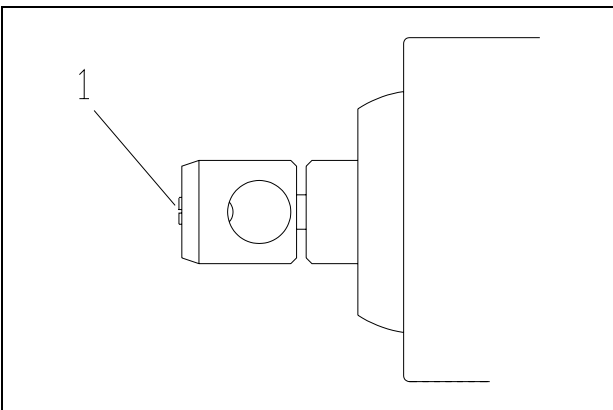


Fig. 8

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 screwed on the base plate. This 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, the two clamping screws (fig. 9.9) must be unscrewed slightly until the knife can be pushed in from the side. The height of the knife is adjusted by the two knurled nuts (fig. 9.6) and the bar (fig. 9.7). 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. 9.9).

#### b) Adjusting clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the respective requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 9.4) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 9.2) on the knife carrier base (fig. 9.1). The adjusted clearance angle can be read on the scale. Then turn the clamping lever (fig. 9.4) 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. 9.4) 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. 9.5) 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 the knife to the specimen.

#### d) Protection against injury

The knife carrier is equipped with two knife guards (fig. 9.8) that can be moved sideways. They should be pushed together in the middle when the knife and specimen are adjusted. In this way, the danger of injury from the knife can considerably be diminished.

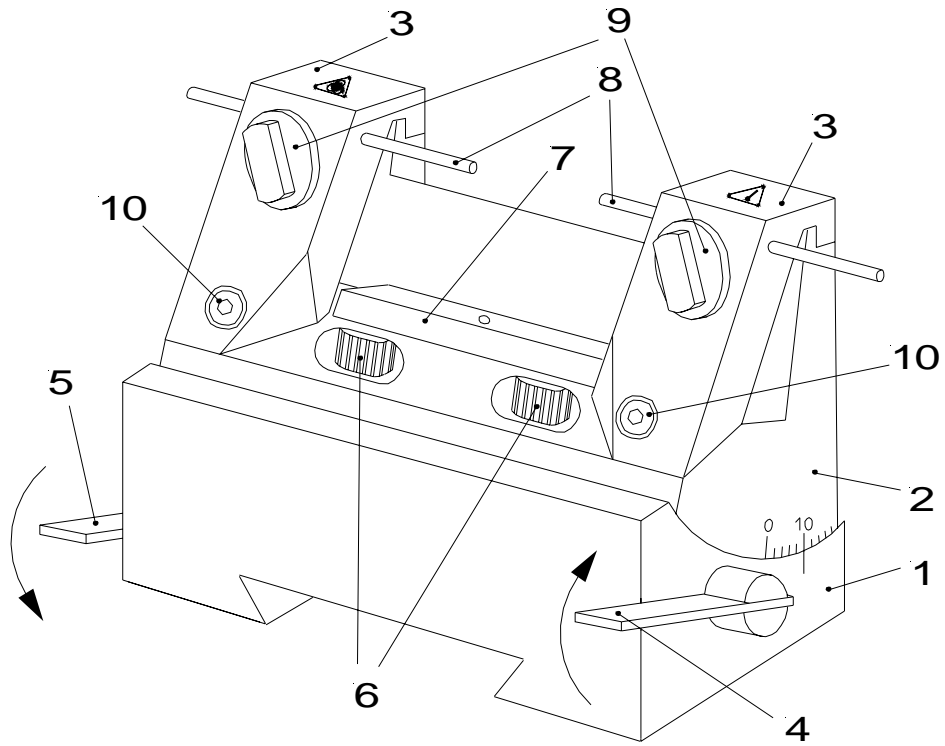


Fig. 9

## 2-9-2 DISPOSABLE BLADE CARRIER E

### a) Inserting the blade

Turn the clamping lever (fig. 10.7) to the front. Swing the bracket with scale (fig. 10.4) to the front. Loosen the clamping lever (fig. 10.7) and, if necessary, slightly push the lower area of the clamping plate (fig. 10.5) as well. Insert the blade on the rail (fig. 10.3) and push it from the side to the middle. Afterwards, return the clamping lever (fig. 10.7) upwards, thus locking the blade in position.

The bracket (fig. 10.4) is provided with a scale. After loosening the clamping lever (fig. 10.7) and after having moved the bracket upwards, move the blade together with the clamping plate (fig. 10.5) according to the scale to the left or right side. This way, the entire cutting length of the blade can be used. Then press the clamping lever (fig. 10.7) upwards.

### b) Adjusting clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the respective requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 10.8) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 10.2) on the knife carrier base (fig. 10.1). The adjusted clearance angle can be read on the scale. Then turn the clamping lever (fig. 10.8) 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. 10.8) 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. 10.6) 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 the knife to the specimen.

### d) Protection against injury

The bracket (fig. 10.4) on the clamping plate can be moved upwards over the blade for the protection against injury.

Rotary Microtome HM 315

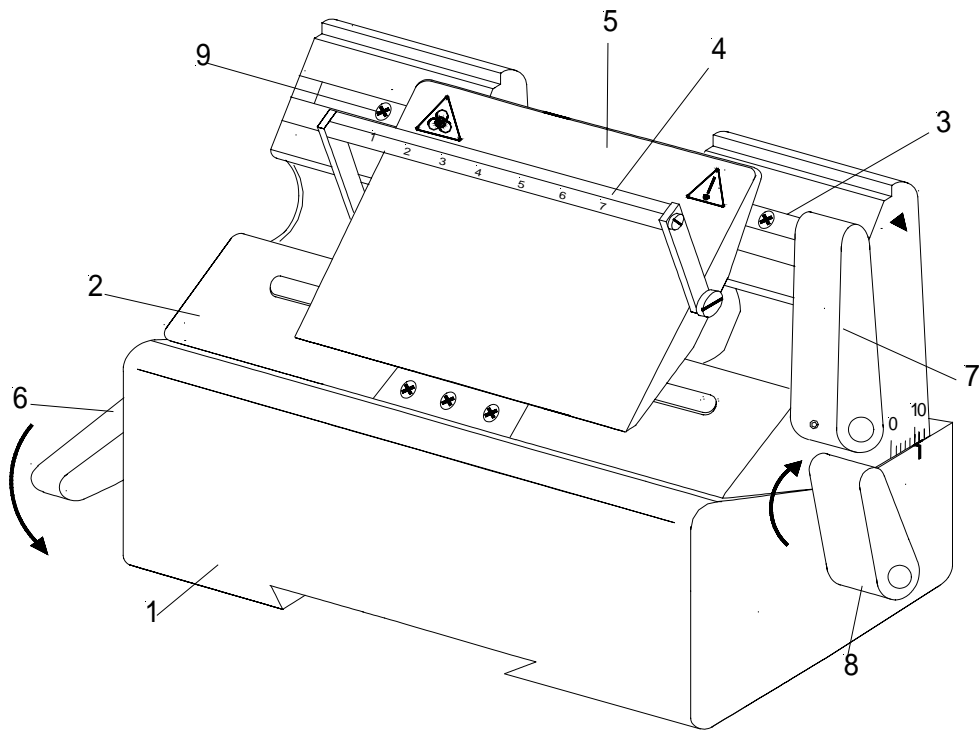


Fig. 10

### 2-9-3 KNIFE CARRIER C

#### a) Inserting the knife

To insert the knife, the clamping screws (fig. 11.10) 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. 11.6) and the bar (fig. 11.7). 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 simultaneously.

#### b) Adjusting clearance angle

The clearance angle between cutting edge and specimen can be shifted and adjusted to the respective requirements of the tissue to be sectioned. Loosen the clamping lever (fig. 11.4) on the right side of the knife carrier and move the upper part of the knife carrier (fig. 11.2) on the knife carrier base (fig. 11.1). The adjusted clearance angle can be read on the side scale. Then turn the clamping lever (fig. 11.4) 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. 11.4) 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. 11.5) 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 to specimen.

#### d) Protection against injury

The knife carrier is equipped with two knife guards (fig. 11.9), which can be moved sideways. These knife guards should be pushed together to the middle while knife or specimen are adjusted. This reduces the danger of injury considerably!

#### e) Central clamping plate

The knife is clamped and stabilized in the cutting zone by the central clamping plate (fig. 11.8.1/8.2) - 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.

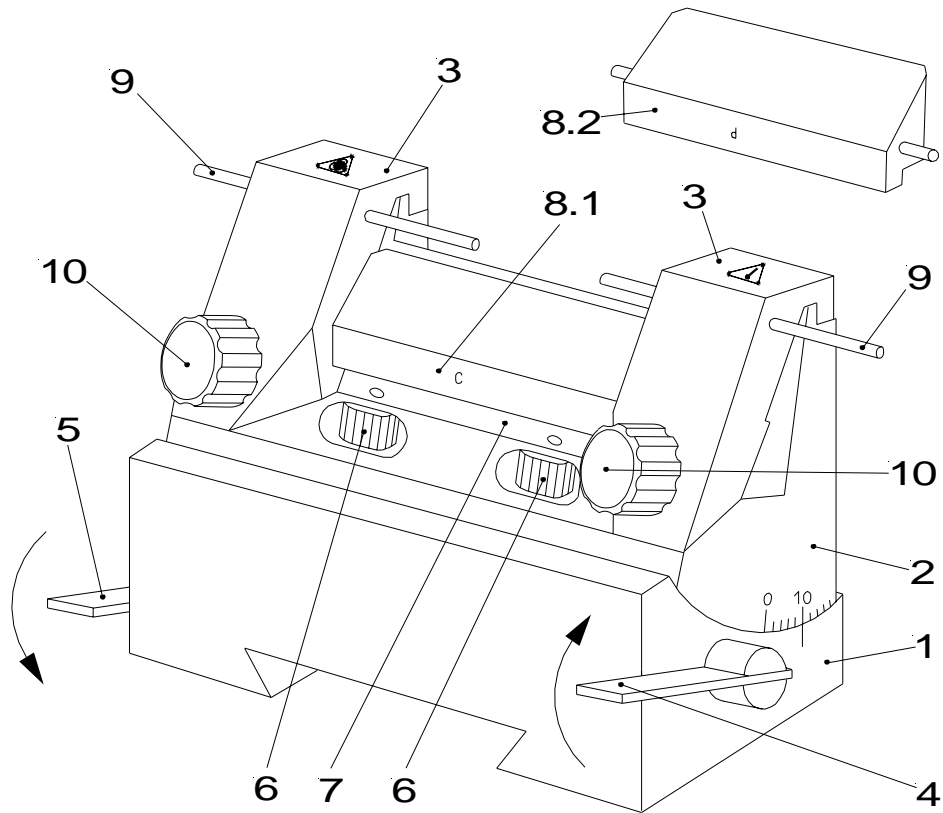


Fig. 11

Fig. 12 shows schematically the angles on the cutting edge profiles of c- and d-knives.

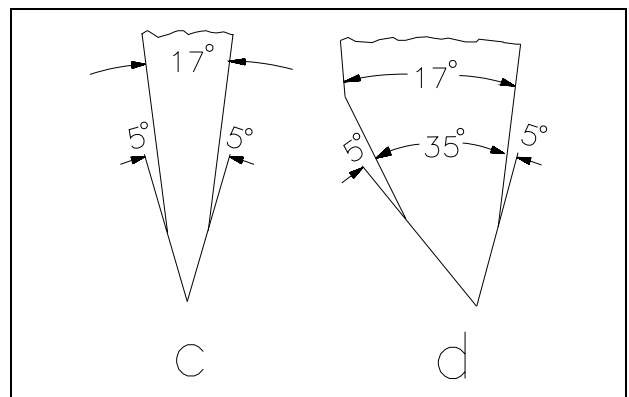


Fig. 12

#### 2-9-4 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. 13).

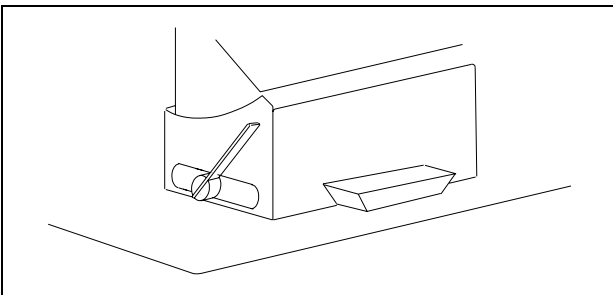


Fig. 13

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. 14.1) on the bottom of the knife carrier. Insert a pin into one of the holes (fig. 14.2) 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. 14.2) in a clockwise direction. If the clamping position of the lever should be moved towards the back, turn the brass screw (fig. 14.2) in a counter-clockwise direction. Before putting on the knife carrier again, tighten set screw (fig. 14.1).

Then put the knife carrier on the dovetail guide and check the clamping position of the clamping lever. If necessary, repeat above-mentioned process.

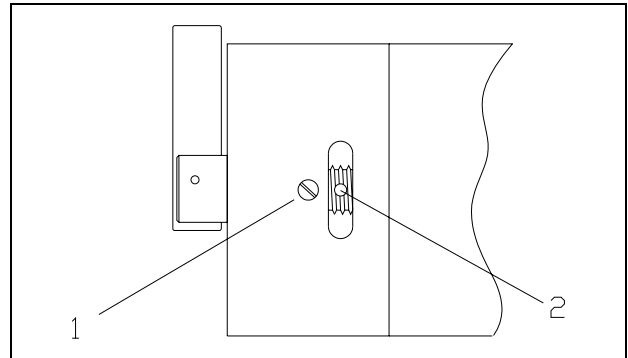


Fig. 14

## 2-10 BACKLIGHTING SYSTEM

The adjustment between specimen and cutting edges is facilitated considerably by the backlighting system. The small gap between knife edge and specimen is illuminated and thus better visible. The backlighting system is fastened to the backside of the base of the knife carrier with two screws.

The plug of the supply cord is connected to the socket on the right front side of the microtome.

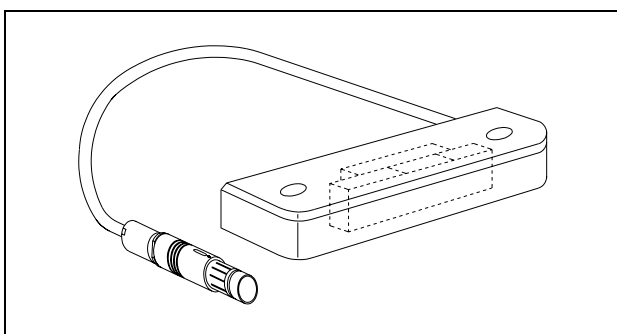


Fig. 15

**CAUTION!** Loosen the connecting cable, before removing knife carrier or backlighting system.

## 2-11 LARGE FIELD MAGNIFIER

The large field magnifier (fig. 16.1) is for looking at section production.

The light is connected to the power outlet with the power cord (fig. 16.2) and turned on and off with the switch (fig. 16.3).

**CAUTION!** Before using the large field magnifier for the first time, please check if the voltage conditions at the installation site comply with the power requirements and frequency mentioned on the supply unit of the magnifier.

### INSTALLING THE MAGNIFIER ON THE MICROTOME

Please use the enclosed fastening elements to attach the magnifier to the microtome. Remove the front plastic caps from the upper side of the housing.

If there are no drilled holes in the housing, it must be replaced with a new one with drilled holes.

Fasten the peg (fig. 16.4) to the plate (fig. 16.6) with the screw (fig. 16.7). Carefully introduce the four sleeves (fig. 16.8) into the drilled holes with the screws (fig. 16.5).

**CAUTION!** Please note that the sleeves do not fall into the interior of the microtome.

**CAUTION!** Make sure the plate (fig. 16.6) is mounted in a way that the peg (fig. 16.4) is closer to the front of the microtome.

Put the plate (fig. 16.6) on the sleeves and fasten it to the microtome with four screws (fig. 16.5).

A movable plastic socket that should be put on the peg (fig. 16.4) is on the under side of the magnifier. The magnifier can be adjusted forwards and backwards for the most favourable viewing position.

If the large field magnifier is not used, slightly raise it and turn it sideways on the peg.

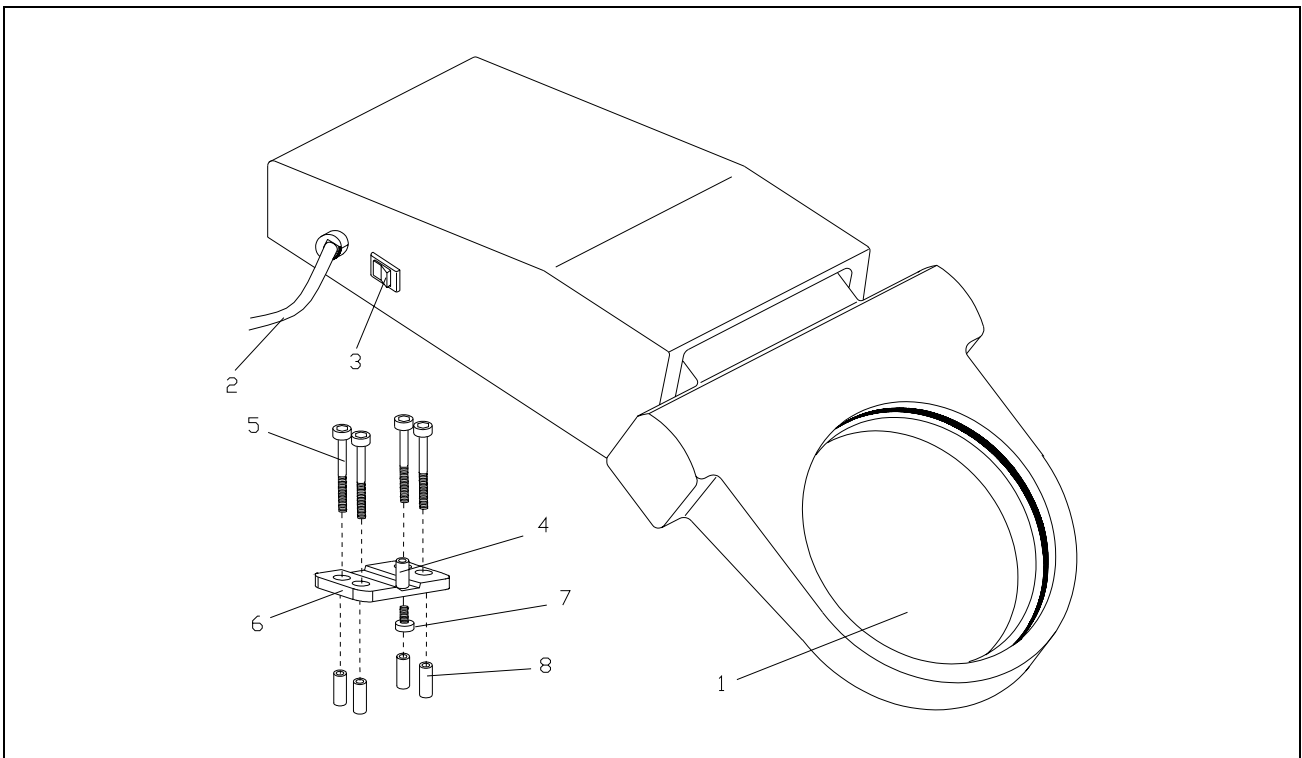


Fig. 16

**2-12 STANDARD EQUIPMENT**

The microtome HM 315 is supplied with the following accessories:

- 1 Hex head wrench 6 mm
- 1 Cover
- 1 Para Gard, 100 ml, paraffin repellent
- 1 Instruction manual

**2-13 ADDITIONAL EQUIPMENT, OPTIONAL**

Cat. No.

**2-13-1 KNIFE CARRIERS**

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

**2-13-2 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

**2-13-3 OPTICAL ACCESSORIES**

**Cat. No.**

Large field magnifier, 220 V	760160
Large field magnifier, 120 V	760170
Stereomicroscope Stemi 2000	755210
Adapter for Stemi 2000	532090
KL 1500 with ring light	
230 V, 50 - 60 Hz	760280
120 V, 50 - 60 Hz	760290
Backlighting system	630010
Power supply for backlighting system	
230 V	602030
115 V	602020

**2-13-4 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

**2-13-5 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
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 rotary movement of the handwheel of the Rotary Microtome HM 315 is converted into a vertical movement of the cylinder head which carries the specimen holder.

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

### **3-2 SPECIMEN 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 specimen coarse feed and the two trimming stages.

### **3-3 SPECIMEN CLAMPS 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 FREEZING UNIT**

The freezing unit K 300 allows frozen sectioning with the specimen temperature as low as  $-45^{\circ}\text{C}$ .

## PART 4 WORKING WITH THE MICROTOME

### 4-1 PREPARATION AND ORIENTATION

Before sectioning, the specimens must be prepared appropriately and embedded in suitable media. The universal cassette 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.

### 4-2 COARSE FEED AND TRIMMING FUNCTION

The knife carrier can be moved and the coarse feed wheel or the two trimming stages can be used to adjust approximately the space between specimen and knife edge. Turning the handwheel in clockwise direction 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 knife 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!

#### 4-3-3 POSITION OF THE CYLINDER

During cutting, the cylinder ought to be in the back third of the horizontal specimen movement. The most favourable stability is in this range.

## 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 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 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.

**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.

**PART 6 CLEANING AND CARE**

**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 2-13-5, additional accessories).

**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 operating controls 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, handwheel, coarse feed wheel, specimen clamping system, specimen orientation as well as the base plate and housing.