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# Leica EM UC7

## Operating Manual

Version 16216032 09/2010

Living up to Life

**Leica**  
MICROSYSTEMS

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Issued by:

Leica Mikrosysteme GmbH  
Hernalser Hauptstrasse 219  
A-1170 Vienna

# Leica EM UC7

## Operating Manual

**Leica EM UC7** Serial Number:

**Date of purchase:**

For the instrument serial number, please refer to the name type label on the back of the instrument!



**Please read this instruction manual carefully before operating the instrument.**



## Foreword

This Technical Documentation is intended to provide essential information about the proper operation and servicing of the Leica EM UC7 Ultramicrotome.

This user manual describes commissioning of the Leica EM UC7 Ultramicrotome, phased testing and adjustment of all components and movement sequences, and restoring the basic functionality.

Service and operating staff must familiarize themselves with all components of the system before commissioning. Particular attention must be paid to the aspect of safety.

This user manual must be retained for future reference.

Texts, schedules and tables may not be copied, reproduced, or divulged to third parties without our express consent.

It should be noted that this Technical Documentation does not constitute a part of any existing, prior agreement or covenant or legal relationship.

All obligations are derived from the purchase agreement, which is also the sole document of record regarding the terms of the warranty. Contractual provisions are not affected by the Technical Documentation.

The documentation issued by the respective suppliers shall apply in addition to this manufacturer's documentation.

In addition, all generally applicable legal and otherwise binding regulations for preventing accidents and protecting the environment must be observed and communicated.

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## 1. Safety Introduction

The instrument has been so designed and manufactured that the user is not exposed to any danger if the instrument is used as intended. Please read the instruction before use. It is advisable for the user to be trained in the use of the ultramicrotome. The instruments are only allowed to be opened by authorized service personnel. Before opening, the instrument must be disconnected from the electrical mains supply. The instrument is equipped with protected ground. Before connecting it to the local electrical supply make sure that the mains has the required ground and that the instrument is connected to it in accordance with the legal regulations.

### **Danger of injury when contacting knives**

Extremely sharp knives are used for sectioning which can lead to injury when touched. The knife must therefore only be mounted just before sectioning and must be removed from the knife holder after section collection. As long as a knife is in the knife holder, the overhead illumination must be left switched-on. Safety rules must also be observed for the breaking of glass knives. The local regulations must be observed for the disposal of glass knives.

### **Danger of injury during trimming of specimens**

Trimming of specimens can be carried out with razor blades. Doing this, the specimen is clamped in a trimming-block and the excess material removed with a razor blade. Extreme caution is advised when using the razor blade! For safety, Leica recommends the use of a trimming machine.

In certain chapters, a symbol appearing in the margin refers to the function of the respective section of text and is relevant for the operation or maintenance of the system, or indicates important descriptions or additional remarks:



#### **Caution!**

*This symbol alerts the user to important information which may endanger staff or result in damage to the system if it is ignored.*



#### **Note!**

*This symbol indicates further information relating to a previous explanation, which does not have a safety-critical function. However, it is important to observe this information to ensure that the system functions optimally.*





## **2. Identification**

### **2.1 Product**

Leica EM UC7 Ultramicrotome

### **2.2 Manufactured by**

Leica Mikrosysteme GmbH  
Hernalser Hauptstrasse 219  
A-1170 Vienna

Tel.: +43 1 488 99-0

Fax: +43 1 488 99-350

Internet: [http:// www.leica-microsystems.com](http://www.leica-microsystems.com)

### **3. Installation and Set-up**

#### **3.1 Transportation and storage condition**

The Leica EM UC7 Ultramicrotome is delivered properly packed and in the semi-assembled state. The customer must check the condition of the system upon delivery and file a damage report with the shipping company if the equipment is damaged. The customer must immediately inform the manufacturer of any possible damage in transit.

The system must be positioned upright for transporting.

The overall weight including packaging is approx. 80 kg, with antivibration table approx. 170kg

The packed equipment must be stored in clean, dry areas at temperatures between 5° and 40°C. It must not be exposed to aggressive or corrosive substances.

#### **3.2 Installation requirements**

##### **3.2.1 Work area conditions**

A certain working distance must be maintained all around the system, to allow the supply connections to be made, and also to enable access for essential servicing activities.



***Note!***

***Minimum of 30 cm.***

### 3.2.2 Connections

The following connections must be assured:

- Electricity supply: 100 – 240 V, 47 – 63 Hz

## 3.3 Installing, assembling and commissioning

### 3.3.1 Unpacking

When the instrument is supplied with a working table the EM UC7 is packed in a special carton fastened below the working table. When the EM UC7 is supplied without working table it is housed in a second carton. Cut open the first carton on the top and take out the second carton. Pull off the upper part of the carton and unfold the four lateral walls of its lower part.

#### ***1. Cut off the transport ribbons***



#### ***2. Lift the outer carton above the handle on both sides.***



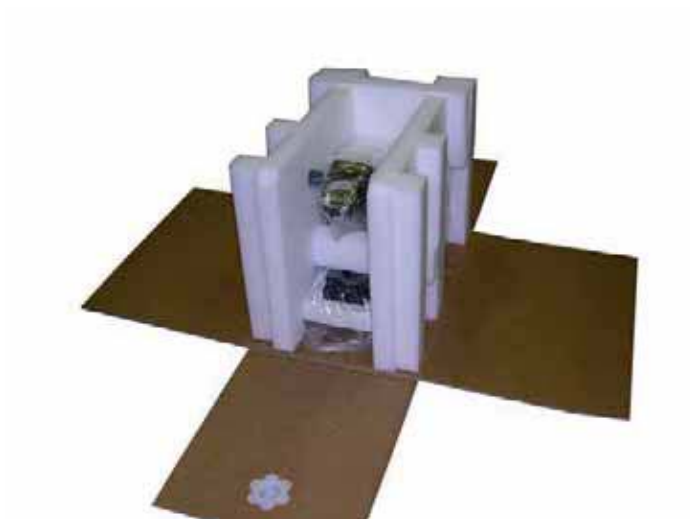
**3. Remove the outer carton.**



**4. Cut the sticky tape on the edges.**



**5. Unfold the four lateral walls of the inner carton.**



**6. Remove the rear foam pad.**



**7. Remove the front foam pad**



**8. Put the left and right hand pads to the side.**



**9. Remove plastic bag covering the instrument.**



**10. Two persons should lift the instrument.**

**Important:** the instrument has to be lifted only by means of the lateral carrying ledges on the base plate.



**Caution!**

***Do not operate the knobs which are now accessible until the transport lock has been removed.***

### **3.3.2 Installation of the antivibration table**

The instrument table with its special antivibration system is delivered assembled. By using this table the EM UC7 built-in antivibration system will be disabled.

***1. Remove the foam transportation lock from the antivibration insert.***



***2. Remove Allen key and unscrew retaining screws from the cross beam.***



***3. Mount the shelf on the table cross beam, wider part to the rear.***





**4. After placing the table in its exact position the right leg has to be adjusted to compensate for unevenness of the floor (use spirit level). This adjustment has to be carried out before putting the instrument on the table.**



**5. Place plastic sheet symmetrically over the antivibration insert of the table.**



**6. Place the EM UC7 centrally on the antivibration insert. The feet of the instrument are inserted in the recesses.**



**7. Mount the armrests in such a manner that the tongue rests on the groove of the guide bar. Clamp the armrest with the star-handle against the screw nut.**



**8. Adjustment screws of the armrest: star handle for longitudinal and lever for height adjustment.**



### 3.3.3 EM UC7 built in antivibration system

The EM UC7 is equipped with a built in antivibration system. The instrument may be placed on any stable and even table. For installation of the EM UC7 masonry laboratory tables are particularly recommended (tiled chemistry tables). Standard laboratory tables provide good results as long as they have a table top of at least 35 mm thickness and absolutely rigid legs standing on a stable floor and are not in direct mechanical contact with other laboratory furniture. With an unstable floor it is recommended to mount a wall console (steel profile 50 x 50 x 50 mm with wooden top of 40 mm) provided the supporting wall is strong enough.

### 3.3.4 Removal of Transportation Lock

Remove the knurled head clamping screw, hold specimen arm in position and pull out the red plastic insert towards the front. Now lower specimen arm slowly on to its stop. Replace the clamping screw.



#### **Caution!**

***Before moving the EM UC7 again the transportation lock has to be replaced.***

*After attaching the transport lock the hand wheel must not be rotated. Shipment without transport lock as well as without special carton may cause damage. The special carton and the transport lock with packing hints are available from your local Leica Agency or from Leica Mikrosysteme GmbH, A-1170 Vienna, Austria.*

### 3.3.5 Mounting the stereo microscope and breath shield

**1. Insert stereo microscope in the adaptor and clamp it with the knurled screw in front of the adapter ring.**



**2. Screw in one of the provided slot screws on the side of the stereo adaptor.**



**3. Place the breath shield on the screw.**



***4. Screw in the second screw on the other side of the adaptor.***



### 3.3.6 Mounting the knife stage

*Place the knife stage on the support. Clamp it with the locking lever.*



### 3.3.7 Mounting the segment arc

*Insert the segment arc into the specimen arm and clamp it with the knurled screw.*



### 3.3.8 Mounting the Peristaltic pump

*The peristaltic pump can be mounted either on the left hand side or on the right hand side of the armrest.*



***Remove the armrest from the instrument. Remove the hand wheel of the pump by opening the screw and mount the hand wheel on the other side of the armrest.***



### **3.3.9 Mounting the antistatic electrode for room temperature work (optional)**

***1. Insert the electrode into the cover of the stereo carrier.***



***2. Pull the cable of electrode out of the cable channel.***



**3. Mount the gooseneck on the stereo adapter of the stereo microscope.**



**4. Secure the gooseneck by tightening the lock nut.**



**5. Mount the electrode in its adaptor and clamp it on the gooseneck by tightening the Allen screw.**



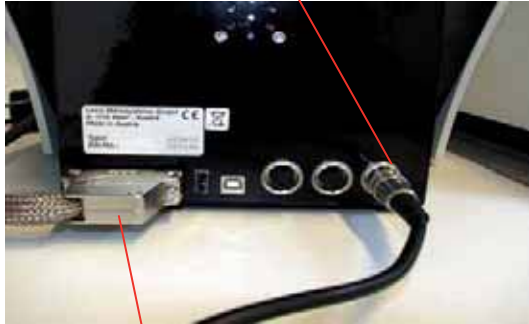
**6. Clamp the cable of the electrode with the clip on the gooseneck.**





### 3.3.10 Electrical connections of the High End control unit

***Power supply cable with retaining screw has to be tightened on the socket.***

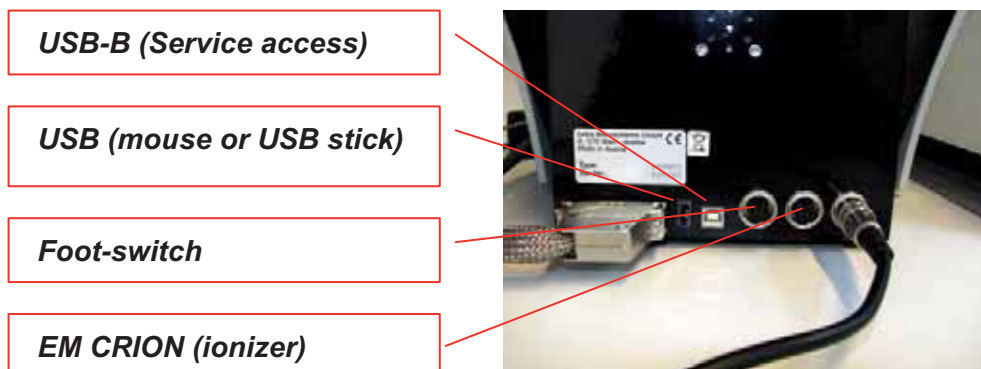


***EM UC7 cable: tighten the plug with the two screws onto the socket of the control unit.***

***EM UC7 cable: tighten the plug with the two screws onto the socket of the multiway connector.***



***Further connections of the EM UC7 High End controller.***



**ON /OFF switch on side of control unit**



### 3.3.11 Electrical connections of the 7" basic touch screen control unit



**Power supply cable with retaining screw has to be tightened on the socket.**

**EM UC7 cable: tighten the plug with the two screws onto the socket of the control unit.**

**EM UC7 cable: tighten the plug with the two screws onto the socket of the multiway connector.**

**USB-B (service access)**

**USB (USB-stick for software update)**

**Foot-switch**

**EM CRION (ionizer)**

**ON /OFF switch**



**The control units are connected to a full range power supply for a voltage input range from 100 to 260VAC 50/60 Hz.**

### **3.4 Repacking to prevent damage during transportation**

The Leica EM UC7 must not be transported unless it is in its original packaging; if it is not, the system may be damaged.

If the system needs to be moved again, disassemble and pack it away by following the instructions listed in 3.3.1 and 3.3.4 Transport Lock in the reverse order.

### **3.5 Storage location for the instructions**

The user manual and associated supplementary documentation (e.g., manual of the stereo microscope) must be kept close to the Leica EM UC7 for fast access.

## 4. Operation of the controller

Environmental specifications of the touch screen:

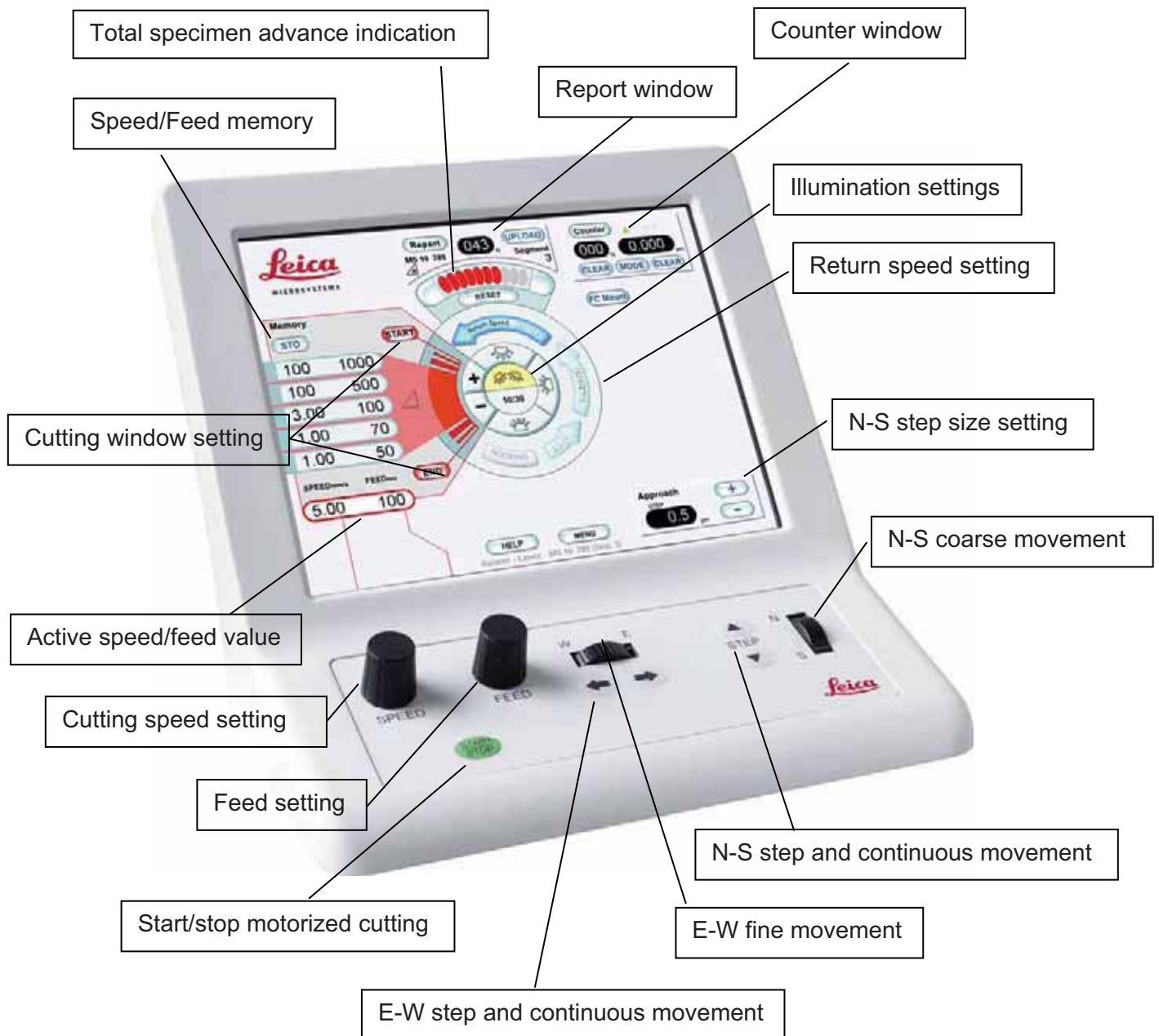
Operating temperature:	0°C to 60°C (no condensation)
Operating humidity:	Less than 90% RH (no condensation)
Storing temperature:	-20°C to 70°C (no condensation)
Storing humidity:	Less than 95% RH (no condensation)



***Cleaning of the touch screen can be carried out with a commercially available damp, lint-free cloth.***

***After switching on the controller with the rocker switch the initialization process starts. The user interface will appear after about 20 seconds***

## 4.1 Advanced touch screen control Unit



#### 4.1.1 Start/Stop



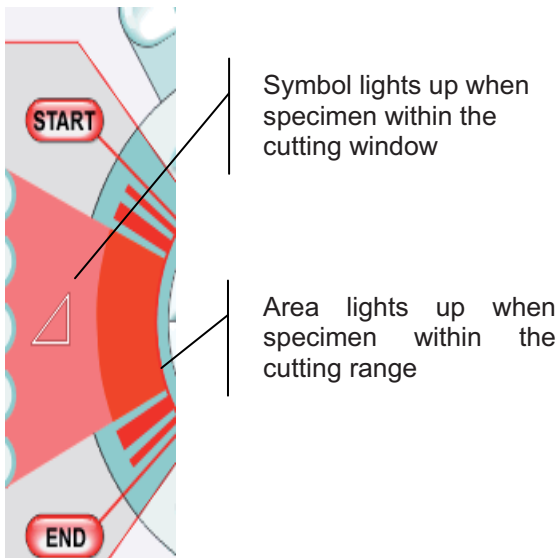
By pressing this button the motor of the specimen arm movement will be switched on or off.

#### 4.1.2. Help



By touching this button followed by the button in question on the touch screen the appropriate function will be described.

#### 4.1.3 Cutting window

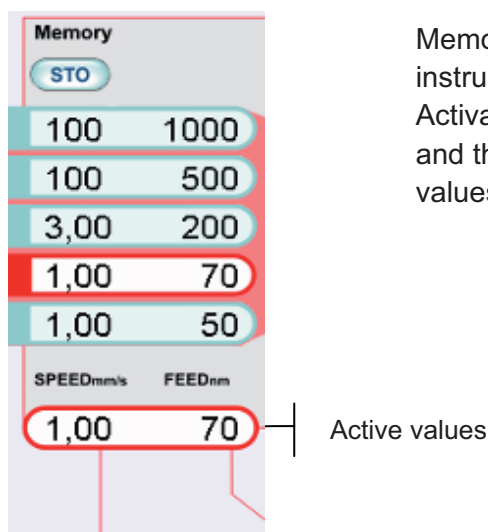


Set the cutting window with buttons START and END.

The length of the cutting window on the EM UC7 has to be set the following way: Turn the hand wheel so the specimen is in the forward cutting stroke (figures on the hand wheel in front of you). Move the lower edge of the block face by means of the hand wheel to approx. 1mm above the knife edge.

Press the button START. Now move the block-face down until the upper edge of the block face is below the knife edge. Press the button END. This can be done for cutting window sizes from 0,2mm up to 14mm.

#### 4.1.4 Speed/Feed



Memory lines: by touching one of these lines the instrument operates with the displayed values. Activated memory is indicated by a red frame and the values are displayed in the "Active values" line.



### Set Cutting speed and feed:

Rotate knob to adjust speed of the specimen between 0.05 and 100mm/sec and feed between 1nm and 15µm. Values are indicated in the “active values” line.

### Storing SPEED / FEED values:

Set speed and feed by turning the knobs, press STO followed by one of the five memory lines.

#### 4.1.5 Antistatic



As soon as the antistatic device EM CRION is connected and switched on the control area will be displayed on the screen and can be used to adjust the intensity of the electrode.

- decreases the intensity of the electrode + increases the intensity. The control area can be activated by touching ANTISTATIC ON/OFF button. It is fade to grey if inactive.

Note: using the EM CRION with discharge and charge mode switching on and off the control area is activated by using the foot switches only. The control area is not active if the name ANTISTATIC is fade to grey.

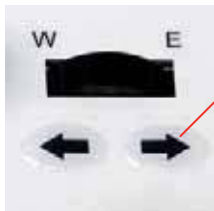
#### 4.1.6 Knife approach



Coarse control with the track wheel and jog control by using STEP buttons. If continuous approach is enabled (menu) the knife stage will move towards the specimen while STEP is pressed. Continuous return of the knife stage can be achieved while STEP to the north is pressed.

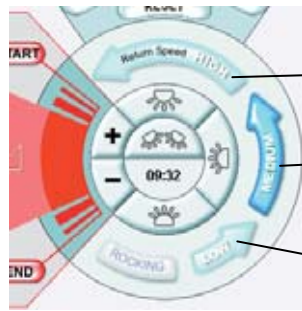


Step size can be set using +/- buttons on the screen.



E-W control can be performed with the track wheel and jog control by using the E-W buttons. An E-W step advance of 0.25mm is performed by pushing the button. Keeping the button pressed the E-W movement is performed continuously.

#### 4.1.7 Return speed



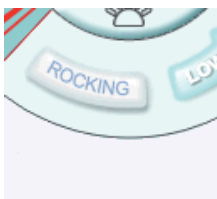
50mm/sec  
preferable for frozen hydrated sectioning

30mm/sec  
standard setting

10mm/sec  
preferable for polymer sectioning

During the return stroke the specimen is automatically retracted by approx. 0.2 mm so that the cutting edge of the knife is not touched by the specimen in the return stroke.

#### 4.1.8 Rocking

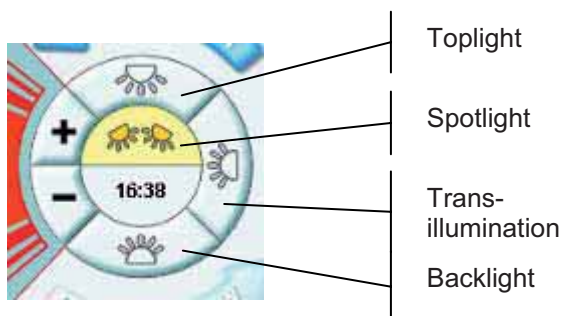


ROCKING enables fast up and down manual movements of the specimen arm using the hand wheel, in conjunction with an advance of the selected feed. This mode is used for fast trimming procedure. Advance of the specimen arm will be performed when specimen arm is moved above the cutting window. Therefore setting the cutting window is a prerequisite. Rocking mode switches off as soon as another button of the screen is pressed.



***During rocking a retraction of the specimen arm is not performed which could cause knife damages if a section sticks on the rear side of the knife edge.***

#### 4.1.9 Illumination



Toplight

Spotlight

Trans-illumination

Backlight

The EM UC7 is equipped with four different types of LED illumination. The intensity of the top- and backlight as well as specimen trans-illumination can be independently controlled by using the + or – button as long as the light is switched on.

The intensity of the spot illumination can't be controlled.



#### 4.1.10 Reset (total specimen advance indication)



Advance indicator and reset control. Each mark indicates the beginning of 20µm of the specimen arm feed. When the last indication mark lights up, an acoustic signal and blinking alerts the operator of the end of the specimen advance. An automated reset will be performed at the end of the advance (200µm). Instant resetting may be carried out at any time by pressing the reset button.

#### 4.1.11 Counter

MODE toggles through the four modes: Section counter and Feed Totalizer, Count down, Integrated E-W measuring system and AutoTrim function. The window can be faded to grey by pressing the COUNTER button.



##### SECTION COUNTER and FEED TOTALIZER

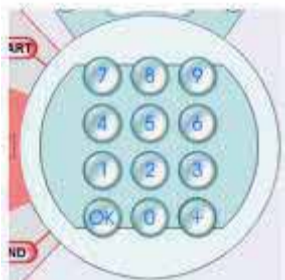
*(green arrow points upward)*

Display shows the total advance and the total number of sections cut from the moment of CLEAR setting.



##### COUNT DOWN (green arrow points downward)

Enables sectioning and trimming to a predefined total thickness or predefined amount of sections of up to 200µm or to 999 sections.



After pressing SET either for "N" (sections) or "µm" (thickness) a numerical keypad appears. Choose desired value and press OK.

Start motorized sectioning. Sectioning will be done until zero is reached. For further runs press SET again, change or leave value and press OK. Start motorized sectioning again.

Note: as soon as zero is reached the instrument stops cutting. To continue with standard sectioning change to another counter mode.



## E-W MEASUREMENT

The Integrated E-W measuring system offers the possibility to determine the size of the block face and inclusions. Measuring procedure:

- Use the corner of the knife as a reference
- Move the knife to the starting point of measurement
- Clear the value indicated
- Move the same knife corner to the end position of the part to be measured



## AUTOTRIM:

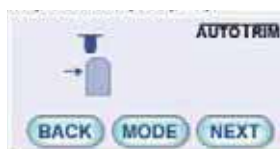
This is a useful function of the touch sensitive controller which saves time during trimming samples with a double sided trimming knife (e.g. diamond trimming knife). Before programming make sure the knife block is swivelled into the 0° position.

By pressing the mode button the AutoTrim function can be selected. An information window on the left upper corner appears to prompt you through the programming procedure. In order to trim the blockface to size automatically the knife width has to be entered by pressing the SET button. The knife width can be measured with the measuring system by pressing the MODE button for change-over (see E-W MEASUREMENT description). Once the measurement is done by pressing the MODE button again the AUTOTRIM function can be recalled and the measured value can be entered. This value is stored and has to be changed when the knife width of other trimming knives varies.

Note: using a bevelled trimming blade the knife width is determined by the cutting edge of the knife, which is smaller than the total width of the knife.



Step 1, after setting the start position (origin) for block-facing the depth of sectioning has to be entered after the button SET is pushed (step 2). Press NEXT to continue.



Step 3, upon entering the trimming depth, the knife is then moved to the right to determine the position of the right edge of the blockface. The instrument starts in that E-W position regardless of the N-S

position. N-S is determined by the origin position (step 1). Press NEXT to continue.



***By using a 45° bevelled trimming knife blade it has to be taken into account that the position of the right edge of the specimen block will be shifted by approx. 1.25x of the trimming depth.***



Step 4, key in the total depth of trimming after pushing the SET button. Press NEXT to continue.



Step 5, the size of the blockface is entered after pushing the SET button. During trimming the knife moves automatically to the left E-W position of the sample block (calculated by the width of the knife, right position of step 3 and specimen width which was entered). Press NEXT to continue.



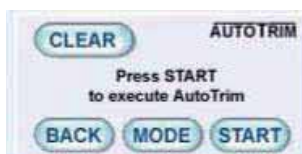
***By using a 45° bevelled trimming knife blade it has to be taken into account that the specimen width will be reduced by approx. 2.5x of the trimming depth, e.g. in order to receive a 500μm blockface-size with a total depth of trimming of 200μm the entered specimen width should be 1000μm.***



For safety reasons after pressing START button the knife moves approx. 500μm backwards before moving E-W and starts sectioning at the position of the 1st step.



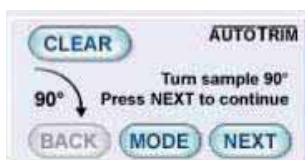
The progress of the cutting step is indicated on the status line. It might be that trimming the blockface needs to be interrupted and skipped. This can be done by pressing the green START/STOP button followed by YES in the "Blockface ready?" box.



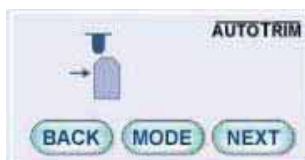
Once the blockface is ready cutting of the left and right edges of the blockface starts automatically. For safety reasons the knife moves approx. 500µm backwards before moving E-W.



**Every step can be interrupted by pressing the green START/STOP button. An information window appears on the left corner. By pressing the START button of the AUTOTRIM window the pre-programmed trimming cycle starts from the 1st step onwards. By pressing the green START/STOP button the trimming cycle will be resumed. By pressing the CLEAR button a new program can be written or MODE to leave AUTOTRIM.**



Once the blockface, the right and left edge of the sample has been trimmed, the knife moves to the right edge of the sample. An acoustic signal is given and an information window prompts you to turn the sample manually (step 6).



Step 7, after the sample has been turned 90° clockwise, the position of the 3<sup>rd</sup> edge has to be determined. Press next to continue.



Step 8, the specimen width in step 5 is recalled for step 8. For changing the specimen width in order to get a rectangular blockface the desired value has to be entered by pressing the SET button. Press next to continue.



**By using a 45° bevelled trimming knife blade it has to be taken into account that the specimen width will be reduced by approx. 2.5x of the trimming depth, e.g. in order to receive a 500µm blockface-size with a total depth of trimming of 200µm the entered specimen width should be 1000µm.**



The total depth of trimming for the upper and lower edges (3<sup>rd</sup> and 4<sup>th</sup> side) is taken over from step 4. After pressing the START button of the instrument starts trimming the last two edges.

Once the upper and the lower edge of the sample is trimmed an acoustic signal is given. Turn the sample counter clockwise and change to another mode e.g. count up for sectioning the sample.



- Before programming make sure the knife block is swivelled into the 0° position.
- The AutoTrim works only with a double sided trimming tool (e.g. diamond knife)
- After pressing START the program will be executed. It stops automatically before the specimen has to be rotated 90°.
- The FEED of the knife will be performed by the knife stage. The step size of the FEED is 100nm. It can be changed during AutoTrimming by using the feed control knob.
- The status bar indicates the progress of the cutting step.
- For safety reasons before the knife moves to its predefined positions the knife will retract 0.5mm.
- While the programme is running it can be interrupted by pressing the green START/STOP button and resumed by pressing this button once again.
- With the CLEAR button the programme can be started again from step 1 onwards.
- Once the program is interrupted, pressing the START button will restart the program from the beginning.

#### 4.1.12 Menu

**Menu**

**Power Off**

Userprofile	Sample	Knife
Andi	Lever	No reporting
<input type="checkbox"/> Bind to data stick		
Stores user specific settings like - Manual cutting on/off - Message options - Temperature unit	Stores Cutting and FC settings like - Speed / Feed values - FC temperature / mode - Light settings - Counters	Select / add knife to: - Save count of sections per knife segment - Enable continuous reporting to data stick (toggle on main screen)
<b>Edit User</b>	<b>Edit Sample</b>	<b>Edit Knife</b>
<b>Add New</b>	<b>Add New</b>	<b>Add New</b>
<b>Delete</b>	<b>Delete</b>	<b>Delete</b>

**Back** **Setup** **Service**

By touching the MENU button up to 100 different user/ sample and knife profiles can be set and recalled. Every parameter e.g. brightness of the illumination, speed/feed, memory or the AutoTrim and counter setting are stored for each sample profile.

If an USB stick is connected to the controller “Bind to data stick” can be selected. If tick marked all user settings are stored on the USB stick as well. The controller recognizes the user as soon the USB stick is connected again. If “Bind to data stick” is applied can be seen on the \* sign in front of the user name.

#### 4.1.12.1 Add and edit user profile

If a new user is added key in the name in the window which appears after "Add New" is pressed. Continue as mentioned below.

**Edit userprofile "Andi"** Power Off

**Userprofile**

\* Andi

Rename

Click "OK" to save or "Cancel" to discard settings.

OK

Cancel

Reset

- ☒ Enable Manual Cutting
- ☒ Bind Motor to EM Crion Pedals
- ☒ Enable Continuous Approach
- ☒ Show Cutting Animations
- ☒ Show Info Messages
- ☒ Show Confirm Messages
- ☒ Play Sound on Button-Click
- ☐ Standby

Temperature Unit

☒ Celsius

☐ Fahrenheit

☐ Kelvin

Stage Feed Minimum: 2500

Beep Volume: 7

Back Setup Service

- Enable Manual Cutting - sectioning can be performed using the hand wheel.
- Bind Motor to EM Crion Pedals – the specimen arm motor is switched off or on as soon the foot switch is pressed.
- Enable Continuous Approach - by pressing the north step button of the control panel the knife moves towards the sample while this button is pressed.
- Show Cutting Animation - the segment of the cutting range, the indication of the cutting window and the selected return speed lights up on the control panel when the specimen arm is in that position.
- Show Info Messages - the instrument indicates information messages in the upper right corner
- Show Confirm Messages - for safety reasons, confirm messages will be displayed when the RESET and the FC Mount button is pressed.
- Play Sound on Button-Click – enables button click as soon the buttons are pressed.
- Standby – screensaver, after the selected time the light of the screen is switched off.
- Stage Feed Minimum - advance of the stage (instead of the specimen arm) will be performed when the selected FEED corresponds or exceeds that value.

- Beep Volume - increases or decreases the volume of the acoustic signals.

In conjunction with the EM FC7 temperature Unit °C or °F or °K can be selected to be displayed.

#### 4.1.12.2 Add and edit sample

If a new sample is added key in the name in the window which appears after "Add New" is pressed. Continue as mentioned below.

**Edit sample "Lever"** Power Off

**Cutting Settings**

Following settings are stored for the current sample and can be modified using the speed / feed knobs and the controls on main screen.

- Speed / Feed + Presets
- Return Speed
- Approach
- Illumination
- Antistatic
- Counter values
- Autotrim values

Sample

Lever

Rename

Click "OK" to save or "Cancel" to discard settings.

OK

Cancel

**FC Mode**

☒ Standard Mode

☐ High Gas Flow

☐ Wet Sectioning

FC temperature settings can be modified on the main screen.

Back
Setup
Service

Up to 100 different samples can be created or edited. Cutting settings like speed/feed (and memory-lines), return speed, step size to approach, brightness of top- and backlight as well as trans-illumination, intensity of the ionizer and AutoTrim settings are automatically stored to the current sample.

For cryo sectioning three different modes of the cryo-chamber EM FC7 are available. Please see manual of the EM FC7.



#### 4.1.12.3 Add and edit knife / knife segmentation

If a new knife is added key in the Number and Type of the knife using the "Change" buttons.

**Edit knife "1124G"**

Power Off

Knife

1124G

Type: Imuno

Active segment: 2 (12 Sect.)

☒ Segment auto-selection

Set Seg. 1 position

OK

Cancel

Reset

Number: 1124G Change

Type: Imuno Change

Width: 2.50 mm + -

Segments: 10

Active Segment: 2

Sections: 12

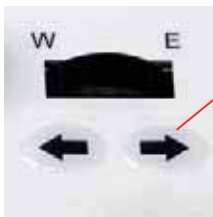
Sect.

10 1

Segment

Back Setup Service

The knife width can be set by using the + - buttons. The number of the segments is calculated by a default width of 0.25mm for each segment as soon the knife width is keyed in. The segment can be selected in two ways:



either by touching < or > button as well as by touching the column on the chart. Move the knife to the segment by pushing the E-W step buttons on the controller (each step corresponds to 0.25mm movement of the knife).

or: by enabling Segment auto-selection (tick mark the box) and follow the instruction on the screen. Once the position (1<sup>st</sup> segment) is set the knife moves automatically to the segment which is selected on the chart (by touching on the column or < > button)



***For selecting a segment the knife should be not to close to the sample, as the knife could interfere with the sample while traversing and a knife/sample damage could be the result.***



*If the sample size is smaller than 0.25mm width of the segment the position within the segment can be changed by using the E-W coarse wheel. The actual position is indicated with the yellow triangle. The sections at the complete segment will be continuously counted.*

*The selected segment is displayed on the REPORT window on the main screen. The segment can be changed using the E-W movement without changing over to the menu.*

After resharpening the knife the segments can be cleared by pressing the RESET button.

#### 4.1.12.4 Setup

**Setup** Power Off

	year	month	day	hour	minute	second
Set Date / Time:	▲	▲	▲	▲	▲	▲
	2009 /	7 /	7	10 :	0 :	23
	▼	▼	▼	▼	▼	▼

Reset to Factory Defaults: Factory Defaults

Center Stage / Reset Feed: Center / Reset

Software update (Data Stick required): Software Update

Back Setup Service

**“Factory Defaults”**: all settings (user, sample and knife) will be deleted and changed to the status as delivered from the factory.

**“Center / Reset”**: the stage moves in the E-W and N-S centre position. The feed advance of the specimen arm will be reset. Note: for safety reasons the specimen arm must be set into the cutting stroke (figures of the hand wheel in front of you)

**“Software Update”:** to perform software updates connect the USB stick on the USB port of the controller. As soon the “Software Update” button is pressed the instrument compares current to possible new software versions. The highlighted Update buttons indicates the versions which can be sequential updated.

Press the highlighted Update button to perform the update. When the update is finished, press the next highlighted Update button or “Back” to reboot the system if necessary (depending on the update).

Update

Do not switch off device during updates!

Software	Part ID	Version		
		Current	New	
Operating System	6558 31-940	04.01.03	04.01.04	Update
1 User Interface	6558 31-931	04.01.03	??.??.??	Update
3 Panel	6558 31-933	04.01.04	04.01.05	Update
4 Stepper Motor	6558 31-934	04.01.02	04.01.03	Update
5 Cutting Motor	6558 31-935	04.01.01	??.??.??	Update
6 FC Box	6560 31-921	03.06.01	??.??.??	Update
7 FC Pump	6560 31-922	04.01.00	??.??.??	Update

Status:

0 %

Press 'Update' to start.

Back

Update

Do not switch off device during updates!

Software	Part ID	Version		
		Current	New	
Operating System	6558 31-940	04.01.03	04.01.04	Update
1 User Interface	6558 31-931	04.01.03	??.??.??	Update
3 Panel	6558 31-933	04.01.04	04.01.05	Update
4 Stepper Motor	6558 31-934	04.01.02	04.01.03	Update
5 Cutting Motor	6558 31-935	04.01.01	??.??.??	Update
6 FC Box	6560 31-921	03.06.01	??.??.??	Update
7 FC Pump	6560 31-922	04.01.00	??.??.??	Update

Status: Updating Panel controller

40.7 %

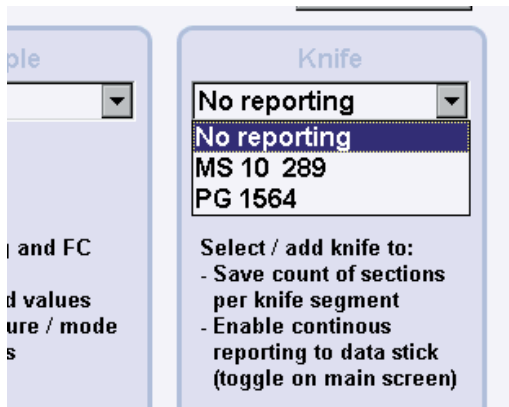
Back



### Caution!

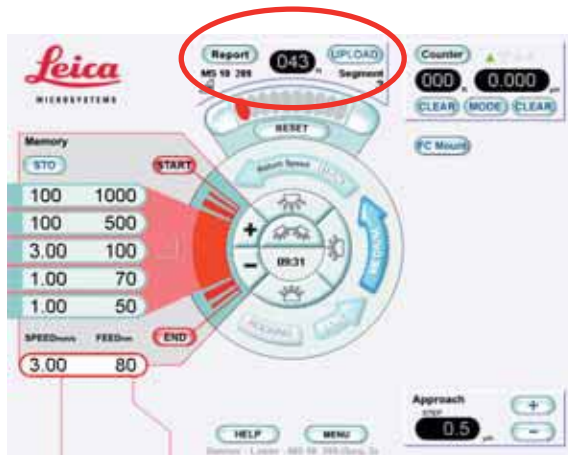
**Do not switch off the controller or remove USB stick during update!**

#### 4.1.13 Knife usage (report and upload data to USB stick)



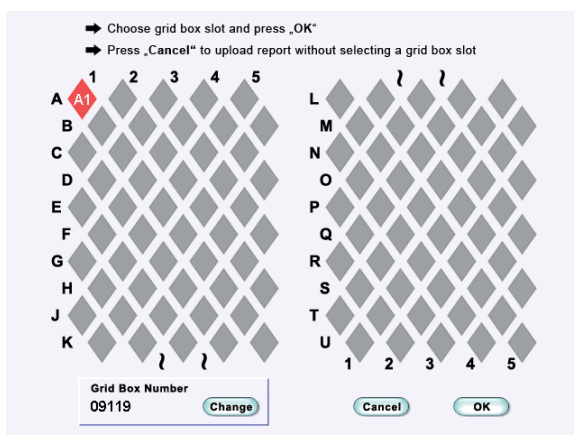
For reporting the knife usage chose a knife from the menu window. Uploading user-, sample- and knife parameter to an USB stick will be enabled as well. If you select “No reporting” uploading these parameters is not possible and the report window on the main screen will not appear.

Select the knife segment on which the sectioning process will be performed.



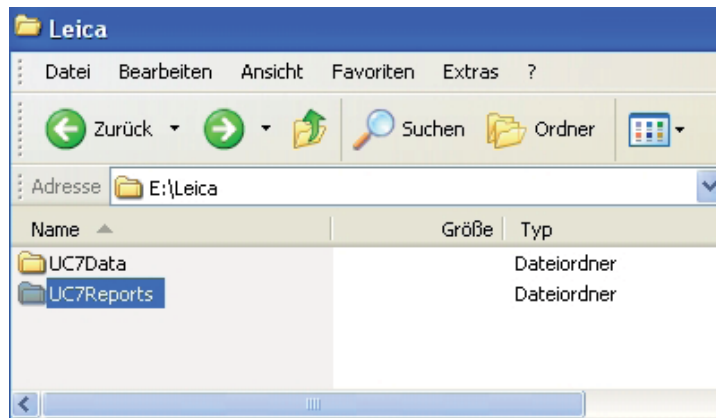
As soon a knife is selected the report window appears on the main screen. The sections on the segment will be counted as long as this window is activated by pressing the Report button. Pressing the Report button again the window is fade to grey and the counter is inactive.

To upload user-, sample- and knife data connect the USB stick to the controller and press “UPLOAD”, a grid box window will appear.

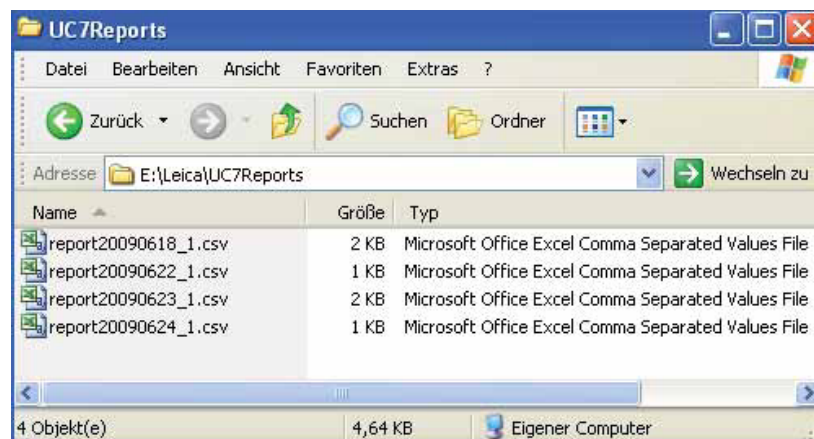


Select the grid position on the box by touching the field e.g. A1. You may change the grid box number by pressing the “Change” button. Press “OK” to upload grid position to the log file. Press “Cancel” to upload parameter without uploading grid information.

#### 4.1.14. Creating a protocol (log book)



Disconnect the USB stick from the UC7 controller and connect it to a computer which has an Excel program installed. Select the “UC7Reports” folder. “UC7Data” folder will be created if “Bind to data stick” was enabled (see 4.1.12) and can be left unconsidered.

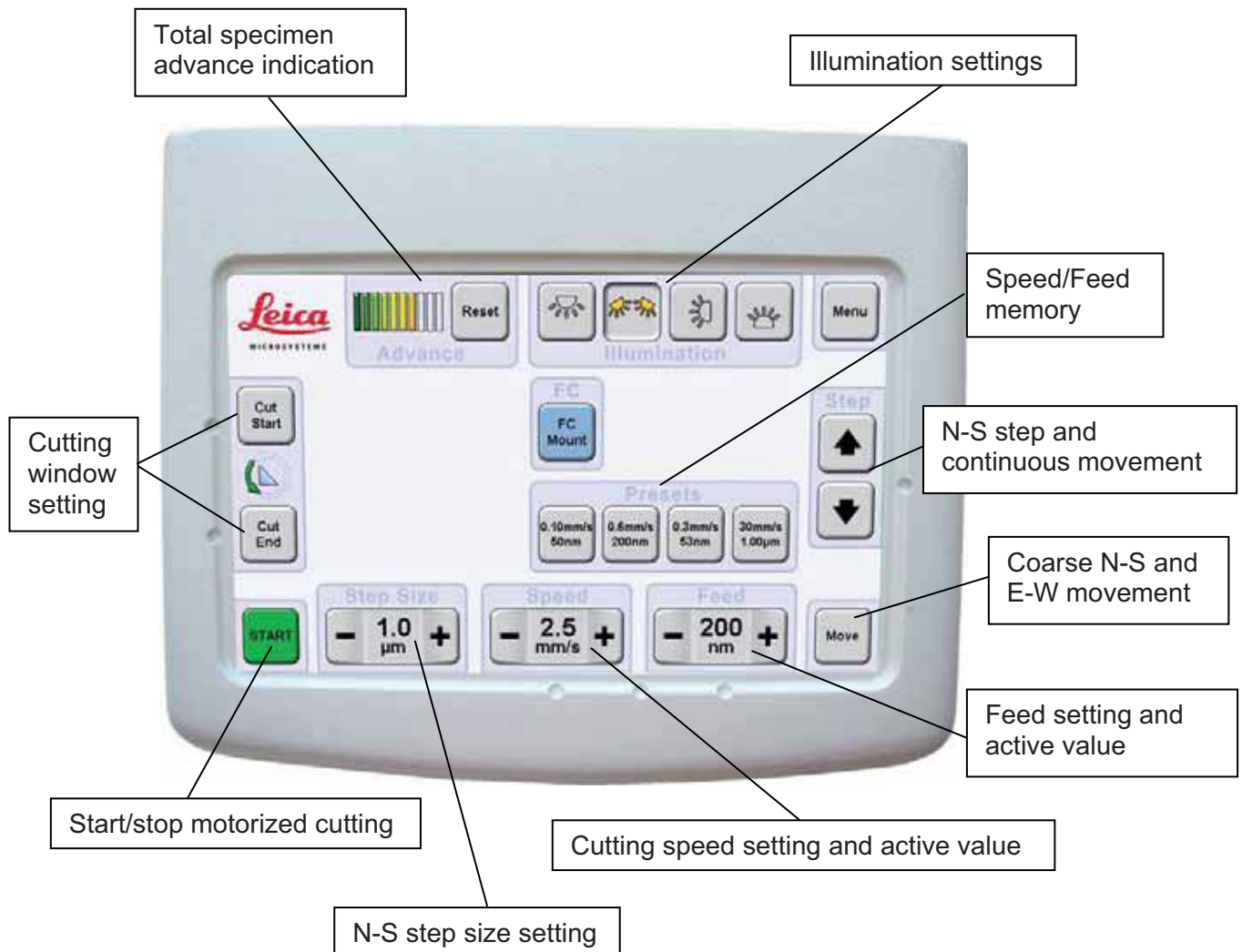


Open the desired report by double-clicking the report file.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Date	Sample	Speed (mm/s)	Feed (mm)	FC Mode	Knife Temperature (°C)	Specimen Temperature (°C)	Gas Temperature (°C)	Knife No.	Segment No.	Total Segment Sections	Grid Box Number	Grid Box Pos.	User
1														
2	04.05.2009 09:06	A017	5	1000	--	--	--	--	--	--	--	--	--	John Doe
3	04.05.2009 09:13	M01	1.8	100	--	--	--	--	MS 10 289	3	83	9119	C4	John Doe
4	04.05.2009 09:15	Liver	0.8	70	--	--	--	--	MS 10 289	3	87	9119	C5	Ann Doe
5	07.05.2009 10:15	Liver	1.2	70	high gas flow	-120	-120	-120	MT 7742	5	49	9119	B1	Mike Doe
6	11.05.2009 17:30	PPF	0.6	50	standard	-100	-100	-100	MC 11 209	1	22	1987	A1	Bob Doe
7	11.05.2009 18:10	PI12	1.2	70	wet sectioning	-40	-160	-160	MS 12 234	4	11	1964	A2	Mary Doe
8														

The report will be opened by using the Excel program. It might be necessary to adjust the size of the columns.

#### 4.2. 7" basic touch screen control Unit



***By connecting a mouse on the USB port all buttons can be operated via mouse control.***

#### 4.2.1 Start / Stop



By pressing this button the motor of the specimen arm movement will be switched on or off. As soon the motor is switched on the colour of this button changes to red to indicate that the specimen arm is moving. The button on the screen is positioned in the lower left corner enable you to locate the control buttons whilst viewing the sample.

#### 4.2.2 Cutting window



Set the cutting window with buttons "Cut Start" and "Cut End". The indentations in the casing enable you to locate the control buttons whilst viewing the sample.

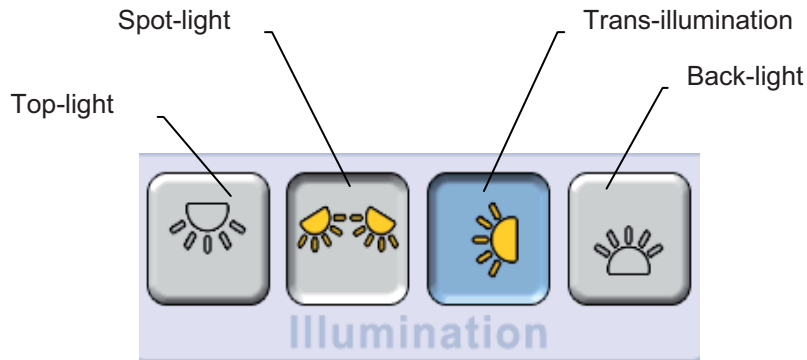
The length of the cutting window on the UC7 has to be set the following way: Turn the hand wheel so the specimen is in the forward cutting stroke (figures on the hand wheel in front of you). Move the lower edge of the block face by means of the hand wheel to approx. 1mm above the knife edge. Press the button "Cut Start". Now move the block-face down until the upper edge of the block face is below the knife edge. Press the button "Cut End". This can be done for cutting window sizes from 0,2mm up to 14mm. When the specimen arm is moving its position in the cutting range will be indicated with the green arrow. As long as the knife sign is visible the specimen arm is in the cutting window position.

#### 4.2.3 Reset (total specimen advance indication)



Advance indicator and reset control. Each mark indicates the beginning of 20µm of the specimen arm feed. When the last indication mark lights up, an acoustic signal and blinking alerts the operator of the end of the specimen advance. An automated reset will be performed at the end of the advance (200µm). Instant resetting may be carried out at any time by pressing the reset button.

#### 4.2.4 Illumination



The UC7 is equipped with four different types of LED illumination.

**Top-light** is used for observation of the cutting process and judgment of the section thickness.

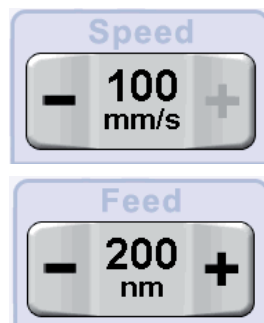
**Spot-light** is used for knife inspection and site specific trimming.

**Trans-illumination** is used for locating and identifying interesting structures within the specimen block when trimming with the MESACUT or with the trimming block. Mounting the trans-illumination see point 5.3

**Back-light** is used for alignment of the diamond and glass knives with the sample and for knife inspection for contamination and flaws (nicks) before sectioning.

The brightness can be set in the menu (see point 4.2.8).

#### 4.2.5 Speed / Feed



##### Set Cutting speed and feed:

Use the + or - button to adjust speed of the specimen between 0.05 and 100mm/sec and feed between 1nm and 15µm. Actual values are indicated in between the + and – buttons.



*The specimen arm performs the advance of the specimen up to 2500nm feed setting. Above 2500nm the feed is performed by the stage.*





#### **Speed / Feed memory:**

By pressing one of these buttons the instrument operates with these speed / feed values.

#### **Storing SPEED / FEED values:**

Set cutting speed and feed, press one of these buttons longer than one second. The values are stored on this button.

### **4.2.6 Antistatic**



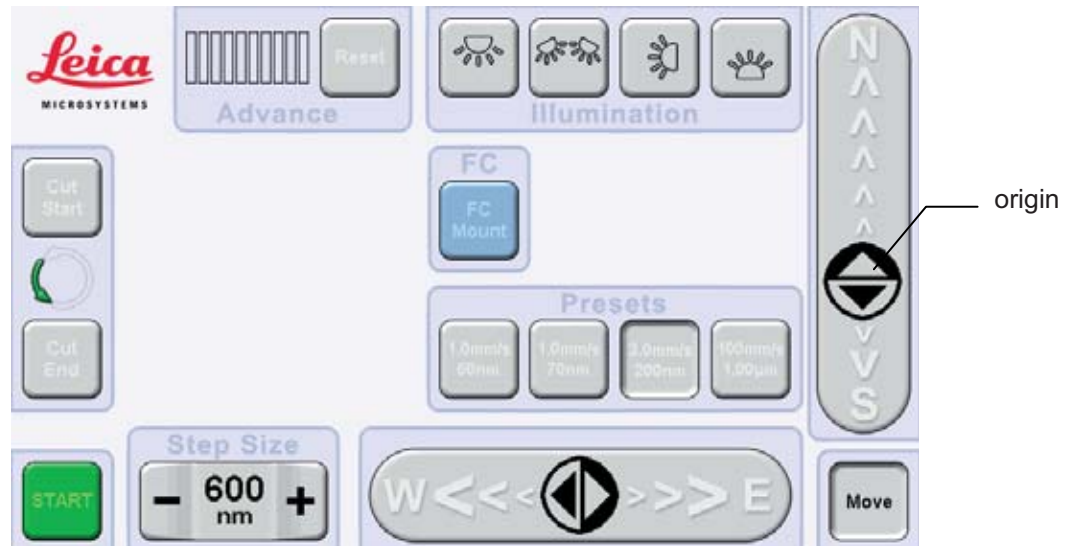
As soon as the antistatic device EM CRION is connected and switched on the control area will be displayed on the screen and can be used to adjust the intensity of the electrode. - decreases the intensity of the electrode + increases the intensity. The control area can be activated by touching the area. It is faded to grey if inactive.



***Using the EM CRION with discharge and charge mode switching on and off the control area is activated by using the foot switches only. The control area is not active if the name ANTISTATIC field is faded to grey.***

#### 4.2.7 Knife approach

By pushing the “Move” button two slide controls for N-S and E-W movement of the knife stage appear. Some buttons changes the colour of the lettering to white which indicates that they are disabled.



To control the N-S movement touch the slide control and move the finger to north or south. The larger the distance from the origin the faster is the movement of the stage. N-S step advance can be performed by pushing the slide control on the north side above of origin or on the south side below of origin. The step size can be set from 100nm to 15µm. E-W step advance can be performed by pushing the slide control on the west side left of origin or on the east side right of origin. The step size of the E-W step control is 0.25mm and can't be changed.

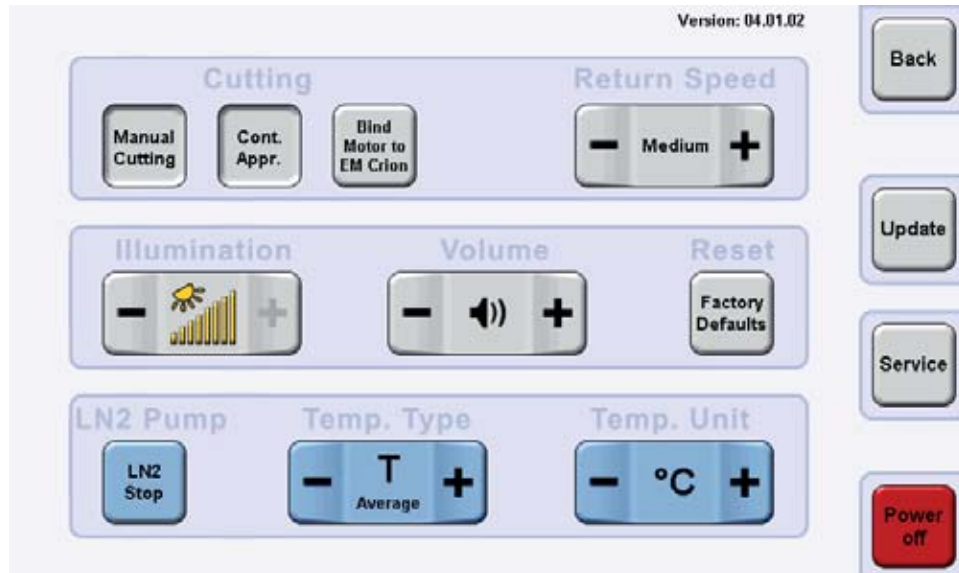


After leaving the “move” screen a step advance can be performed on the main screen as well. Step size can be set using +/- buttons.

If continuous approach is enabled (menu) the knife stage will move towards the specimen while Step is pressed. Continuous return of the knife stage can be achieved while Step to the north is pressed.

#### 4.2.8 Menu

By pushing the “Menu” button you enter the menu



- **Manual Cutting** - sectioning can be performed using the hand wheel.
- **Cont. Appr.** - by pressing the north step button the knife moves towards the sample while this button is pressed.
- **Bind Motor to EM Crion** – the specimen arm motor is switched off or on as soon the foot switch is pressed.
- **Return Speed** – three different retraction speeds of the specimen are can be selected.
- **Illumination** – to control the brightness of top-light, back-light and trans-illumination.
- **Volume** - increases or decreases the volume of the acoustic signals.
- **Factory Defaults** - all settings (e.g. speed/feed – memory) will be deleted and changed to the status as delivered from the factory.

In conjunction with the EM FC7 temperature type and unit °C or °F or °K can be selected to be displayed.

Never switch off device during software updates!

Software	Part ID	Version		Select updates
		Current	New	
Operating System	6558 31-941	04.01.03	-	n/a
1 ... User Interface	6558 31-932	04.01.02	04.01.03	✓
3 ... Panel	6558 31-933	04.01.04	04.01.05	✓
4 ... Stepper Motor	6558 31-934	04.01.03	04.01.04	✗
5 ... Cutting Motor	0655 81-319	04.01.02	-	n/a
6 ... FC Box	????-?? ???	??,??,??	-	n/a
7 ... FC Pump	????-?? ???	??,??,??	-	n/a

Choose updates and click "Start". 100.0%

Back Start Update

**Software Update** - to perform software updates connect the USB stick on the USB port of the controller. As soon the "Update" button is pressed the instrument compares current to possible new software versions. Available updates are marked with a red cross. To update press this (these) button(s) followed by the "Start Update" button.



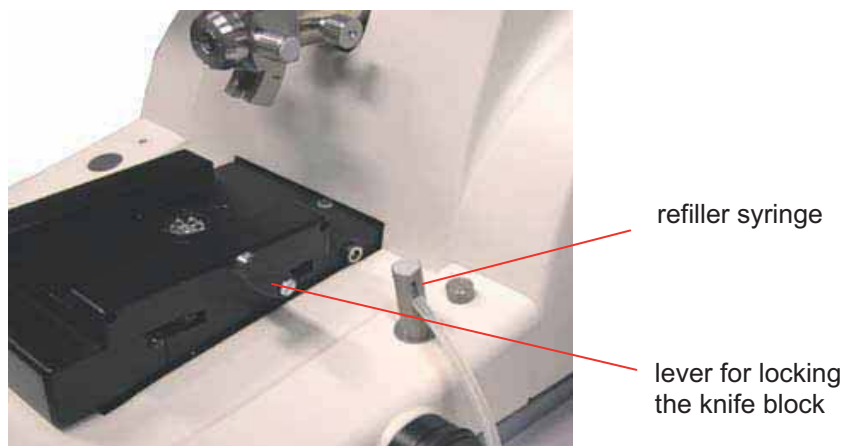
**Caution!**

**Do not switch off the controller or remove USB stick during update!**

## 5. Description of the Equipment

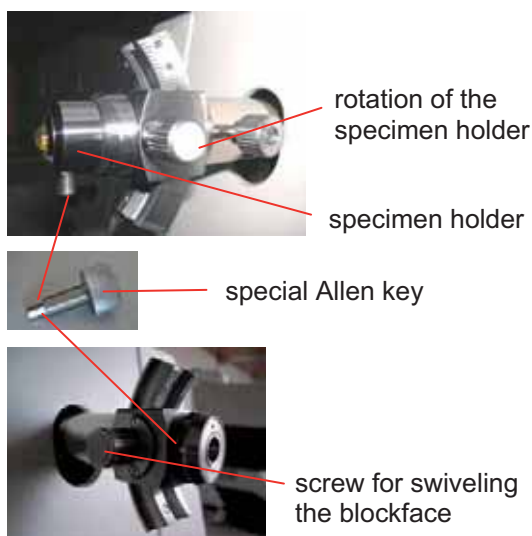
The following instructions for the use of the instrument will mediate all information of the proper use and maintenance of the Ultramicrotome. May we suggest you familiarize yourself with the operating elements and run through the following manipulations before starting sectioning.

### 5.1 Specimen-knife area

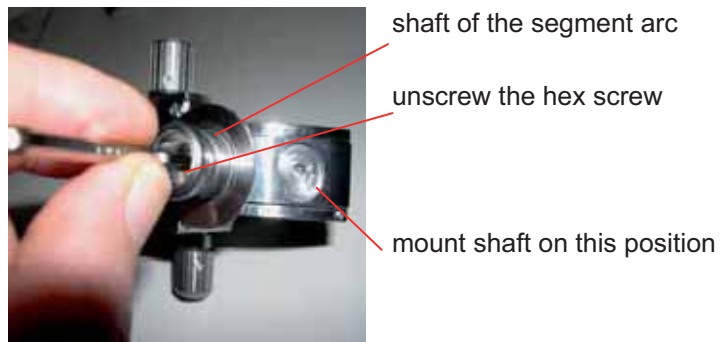


Move the microscope carrier to the left or right. Place the REFLEXOMAT refiller syringe with its magnetic base on one of the steel plates. Unlock the lever and lift the knife block upwards out of its guide and put it aside. After removal of the knife block, the segment arc and specimen holder are completely freely accessible and all manipulations can be easily carried out.

### 5.2 Segment arc



The specimen is fixed in the specimen holder by means of a special Allen key. The same key fastens the specimen holder in the segment arc. Store the special key either in the right or the left opening of the armrest. With the segment arc in the vertical position the specimen holder may be rotated about its long axis with the knurled knob and swivelled about its cutting (block) face. Both controls of the segment arc are self-locking precision drives.



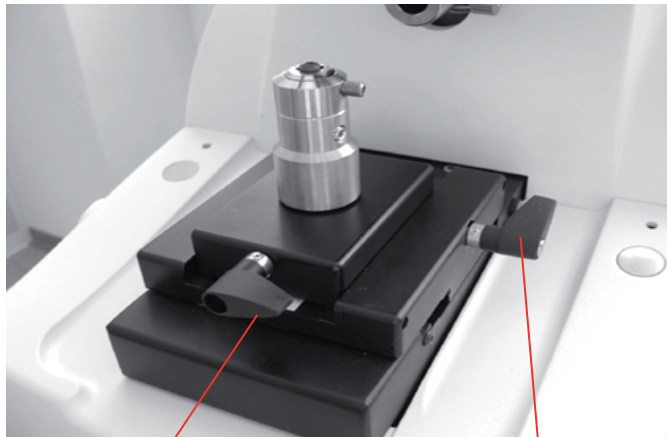
For longitudinal or radial sections the shaft of the segment arc can also be placed at the end position of the segment arc. This is done by unscrewing it from the centre position and tightening it again at the end position of the segment arc.

### 5.3 Specimen transillumination



The transillumination is connected with the connecting cable and its plug to the outlet on the right side of the support carrier. The other side with the LED is inserted into the swivelling part of the segment arc. Swivel the arc into the upper position and insert the LED mounting, clamping screw (plastic head) facing you.

## 5.4 Trimming block



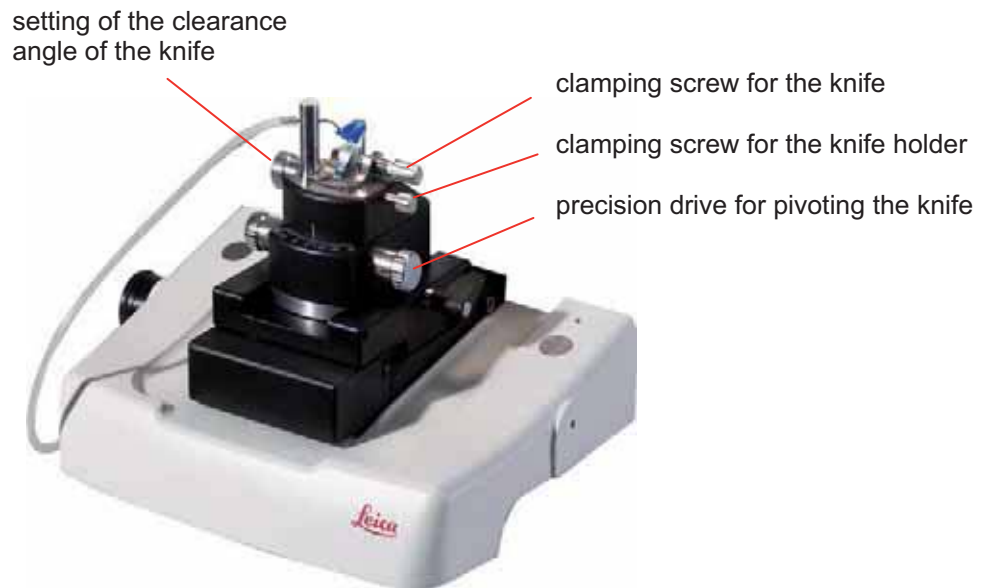
clamping lever of the  
trimming adaptor

clamping lever of  
the  
trimming (knife)  
block

For inspection of the block and the cutting face as well as for manual trimming with a razor blade a trimming block is available. It is placed into the guide track of the knife support in place of the knife block and clamped by the lever.

After clamping the trimming block, the standard segment arc or the trimming adaptor can be put into the opening of the trimming block and clamped with lever. For expedient working coarse alignment of the specimen block in the stereo is made by opening the clamping of the trimming block and moving its guide into the centre of the field of view and by swivelling the stereomicroscope left to right. Fine adjustment at high magnification can be done with knife support controls and as well as the stereomicroscope N-S control. To start the zoom control should be set to the lowest magnification.

## 5.5 Knife block



The knife block consists of the knife holder, the upper portion and the lower part. For coarse and quick movement of the knife about the vertical axis the upper portion of the holder is pivoted by hands in its self-locking bearing. Fine adjustment can be carried out with the self-locking precision drive. For moving or exchanging the knife holder the clamping screw has to be released. The clearance angle may be set from  $-2^{\circ}$  to  $+15^{\circ}$  with the calibrated control. When inserting the knife the front of the knife has to be pressed against the stop plate.



## 5.6 Drive system

To switch on the motor drive, the green button START/STOP has to be pressed. The motor runs and the handwheel rotates.

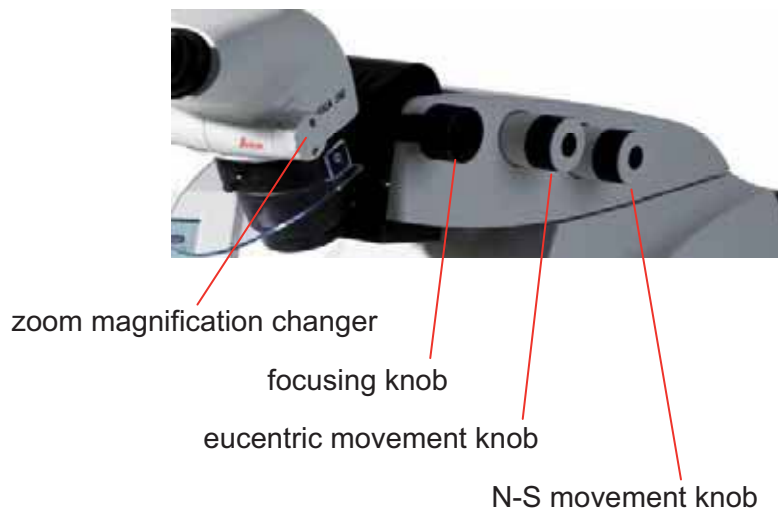
Turning the SPEED knob varies the cutting speed between 0,05 and 100 mm/s. When choosing a very slow speed e.g. 0,05 mm/s it will be easy to see that the specimen is moving very slowly in a certain part of its downward movement (cutting window) and thereafter much faster.

The cycling will be indicated by the highlighted segments on the control unit (if Show Cutting Animation is enabled see 4.1.12). During the return stroke the specimen is automatically retracted by approx. 0,2 mm so that the cutting edge of the knife is not touched by the specimen in the return stroke.

## 5.7 Stereo carriers

Two types of carriers are available. One with the eucentric tilting mechanism of the stereo microscope and one without which has the same arrangement of the control knobs as described below except eucentric movement knob.

### With eucentric movement of the stereo microscope



The eucentric movement of the Leica EM UC7 viewing system allows examination of sections, even with a lowered water level (e.g. for Lowcryls) and dry sections. Defined position marks provide optimum positioning of the stereo microscope for alignment with glass and diamond knives for approaching the sample towards the knife edge.

The click stop position in the middle of the movement is used for diamond knife approach. The upper end position is used for glass knife approach.

Example using the eucentric movement at lowered water level:



without eucentric movement



with eucentric movement

## 5.8 N-S Position indication of the stage



The arm rest is equipped with an N-S position indicator which is helpful to estimate the position of the stage within its 10mm travel range. For approaching the specimen with the knife using the motorized N-S movement the stage should be in the centre position of the indicator (depending on the specimen-knife distance after sliding the knife block towards the specimen manually).

To avoid parallax errors look at the indicator at the position as viewing the sample via the stereo microscope. Observing the indicator at a different angle leads to misinterpretation of the stage position. If the edge of the stage casing is coincident with the tip of the indicator the stage is in the outmost north position. If the edge is coincident with the base of the indicator the stage is in the outmost south position.

## 6. Technical specifications

Magnification	M80: 9.6x-77x
	S6E: 10x -64x
Ergo-Wedge	5°-25°
Eucentric movement of the stereo carrier	+5°/-8°
Built in control of antistatic device and FC7	yes
Top-light	LED brightness controllable
Back-light	LED brightness controllable
Transillumination	LED brightness controllable
Spot-light	LED
Cutting transmission	vibration decoupled gravity stroke
Specimen advance	200µm
Reserve warning	20µm
Segment arc	360° rotatable specimen
eucentric movement	+/-22°
Knife block	360° rotatable
self locking	yes
graduation	+/-30° graduation
clearance angle adjustment	-2° to 15° with 1° scale
Knife holder	for 6-12mm knives
Coarse knife-movements N-S:	10 mm stepping motor
E-W.	25mm stepping motor
Cutting window	0.2 -14 mm adjustable
Cutting speed	0.05 -100 mm/s wheel controlled
Section thickness	0-15000nm wheel controlled
FEED/SPEED storage (combined)	5 advanced controller / 4 basic controller
Return speeds	10, 30, 50mm/s
Step control	0.1 -15 µm steps



# EC Declaration



EC Declaration of Conformity

EG Konformitäts-Erklärung

Déclaration CE de Conformité

---

We/Wir/Nous

**Leica Mikrosysteme GmbH**  
**Hernalser Hauptstrasse 219**  
**A-1170 Wien, Austria**

declare in exclusive responsibility that the product  
erklären in alleiniger Verantwortung, dass das Produkt  
déclarons sous notre seule responsabilité que le produit

Model **LEICA EM UC7**

Modell **LEICA EM UC7**

modèle **LEICA EM UC7**

Type/Typenbezeichnung/type **UC7/655850**  
**UC7/655851**

to which this declaration relates is in conformity with the following standards:  
auf das sich diese Erklärung bezieht, mit den folgenden Normen übereinstimmt:  
auquel se réfère cette déclaration est conforme aux normes :

**EN 61010-1**

**EN 61326-1**

following the provisions of directive  
gemäss den Bestimmungen der Richtlinie  
conformément aux dispositions de directive

<b>2004/108/EC</b>	(Electromagnetic compatibility) (Elektromagnetische Verträglichkeit)
<b>2006/95/EC</b>	(Low Voltage Equipment) (Niederspannungsrichtlinie)
<b>2006/42/EC</b>	(Machinery) (Maschinen)

A handwritten signature in black ink, appearing to read "Reinhard Lihl".

Wien, 25. June 2009

Dr. Reinhard Lihl  
Entwicklungsleiter  
R & D Manager  
Chef du service développement

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