

**INSTRUCTIONAL MANUAL**  
**CAT. #7000smz-2**  
**Vibrating Blade Tissue Slicer**



**Electron Microscopy Sciences**

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## Introduction

The 7000smz-2 unit with a Z-axis deflection of Sub-Micron and a blade advance controllable to 10 microns/second. The section thickness step size is 0.001 mm. The 7000smz-2 has its own Z-axis calibration verifier. The effect of excessive Z-axis deflection on the health and viability of the tissue preparation has been much discussed since the publication of Jonas et al (2003) and the 7000smz-2 will now deliver perfect sections every time with sub-micron Z-axis deflection across a wide range of vibration speeds and amplitudes.

Blade motion is by non-contact magnetic attraction that gives a high degree of immunity from out-of-plane forces while also allowing variable oscillation rates, making all types of sectioning is possible including sectioning for visual patching of neurological tissue, heart, and lung, and much more.

The all-new user interface is both easy to use and versatile. The versatility includes simple operation at the push of a button or a range of changeable and programmable parameters and a menu enables the settings of your own preferences.

The 7000smz-2 also gives you longevity of performance; in other words it not only gives submicron performance out-of-the-box, but the advance vibrating mechanism does not contain bearings and other components subject to wear. Consequently it will retain the sub-micron Z-axis deflection performance for years to come, giving you consistency in your biological preparation.

Tissue cooling is accomplished by the use of either an ice-water bath or an electronically controlled thermo-electric cooler. Other options include a LED cold light source and a magnifier or a stereoscope for clear observation whilst slicing.

The user interface that comes with the premium 7000smz-2 places a wide range of adjustable parameters at the user's fingertips. Use in fully manual or the semi-automated "slice window" mode which automatically remembers the start and finish position of the slice. A sealed LCD display and membrane keypad allows the user to control the instrument and set parameters for blade frequency, section thickness, etc. As the unit can be operated under fully automatic control an emergency stop facility is provided.



Front of Instrument

Many researchers have found that certain combinations of oscillation frequency; oscillation amplitude and tissue advance rate can give superior slice quality for a given tissue. The 7000smz allows these combinations to be customized solely by input from the keypad.

For machine stability and long life the amplitude of cut is related to the frequency of oscillation – the larger the amplitude, the lower the maximum frequency available and vice versa. The 7000smz-2 is built on a heavy, rigid cast base that makes it highly immune to secondary vibration.

The entire instrument is enclosed in a molded enclosure to protect against liquid ingress from spillage and is tolerant of most commonly used solutions.

Be sure to keep all packing material, should the instrument ever need to be serviced off-site.

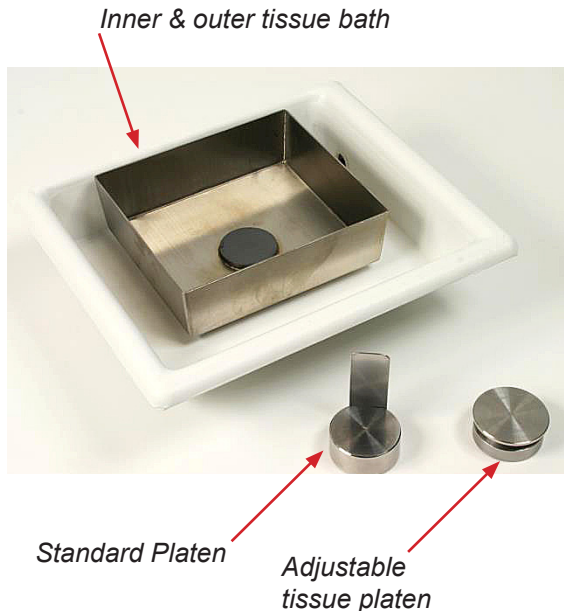
Be aware that in order to achieve maximum usability and expertise with the 7000smz-2, one must read and understand the information set forth in this manual. Only capable, competent personnel should attempt use the instrument.

- Feature Highlights of the 7000smz-2**
- Includes a Z-axis calibration unit
  - Minimal Z-axis deflection (less than 1µm) at all speeds and amplitudes
  - Z-axis blade adjust minimizer
  - Blade holder angle to user requirement
  - Set start and stop position of blade travel
  - Tissue sample automatically retracted before blade returns to start point
  - Full range of adjustable parameters with 8 customizable user profiles
  - Vibration speeds from 50 to 120Hz
  - Amplitudes from 0.5mm to 2.5mm
  - Controlled blade advance at 10 microns per sec
  - "Auto" programming by storage of the first slicing
  - Ice water bath easily removed for cleaning
  - Optional LED light and scope for clear observation
  - Leaf spring vibratory mechanism for optimal longevity and accuracy



Back of Instrument

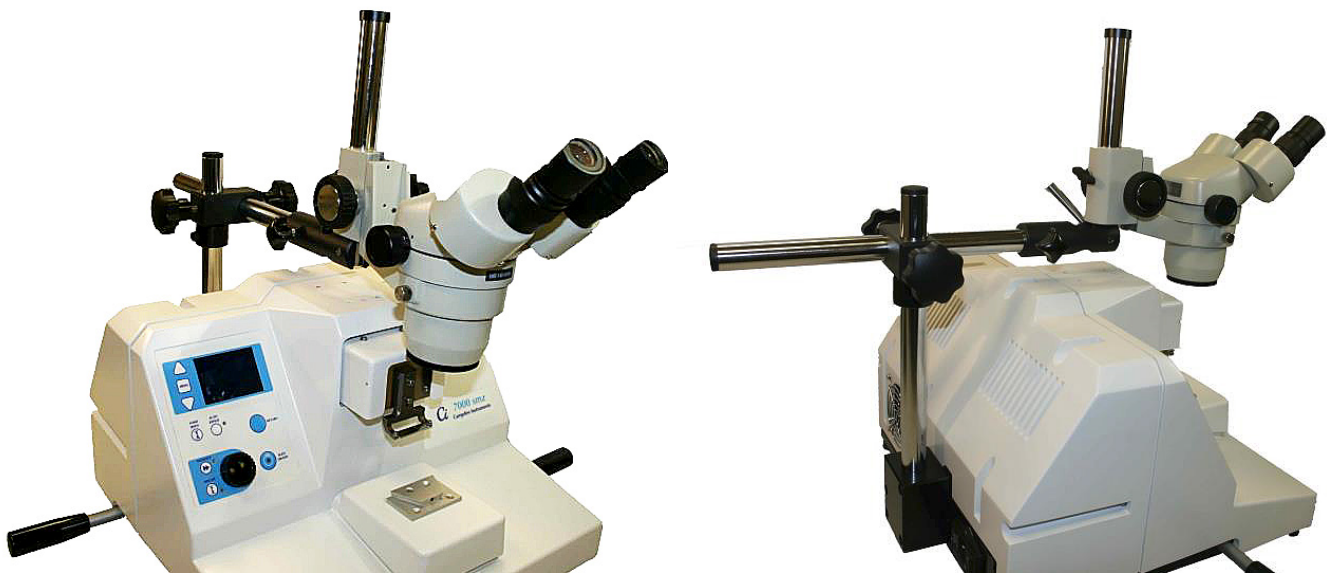
## Description of Standard Tissue Bath and Common Optional Accessories



### **Tissue Bath**

#### *Standard*

The instrument comes with a tissue bath that has a ceramic magnet to locate and retain the specimen plate. Also supplied, is a fixed specimen platen with removable tissue support. An adjustable tissue platen, also which also uses a magnet for retaining placement, is available as optional equipment.



### **Microscope/s**

#### *Optional*

Two microscopes are available for use with the 7000smz-2 Instrumentation Microscope fixed x5-x10 (CAT. # 7000-1-2).

2. Inspection Microscope zoom x20-x40 (CAT. # 7000-1-1).

The microscope is attached to the instrument via screws to a dedicated mounting pad on the rear of the instrument; this ensures a rigid mount rendering the microscope free from vibration. If you are using the optional light source (next page) with a microscope, be sure to fit the light source before fitting the microscope.

*Photos show how the zoom microscope fits to the instrument.*

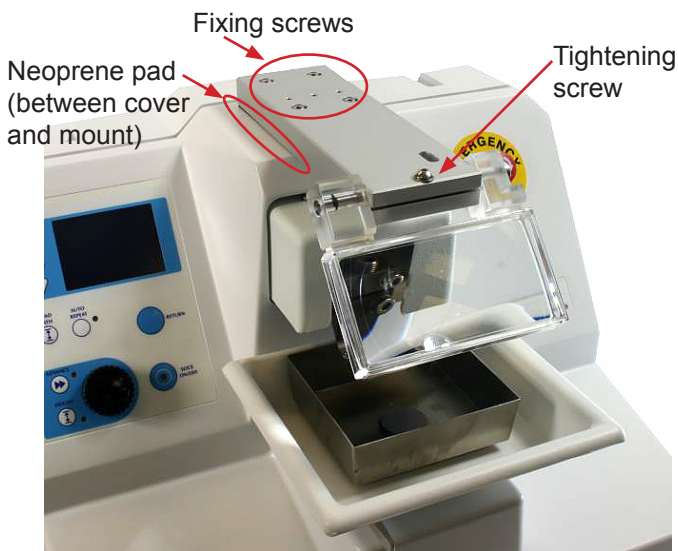
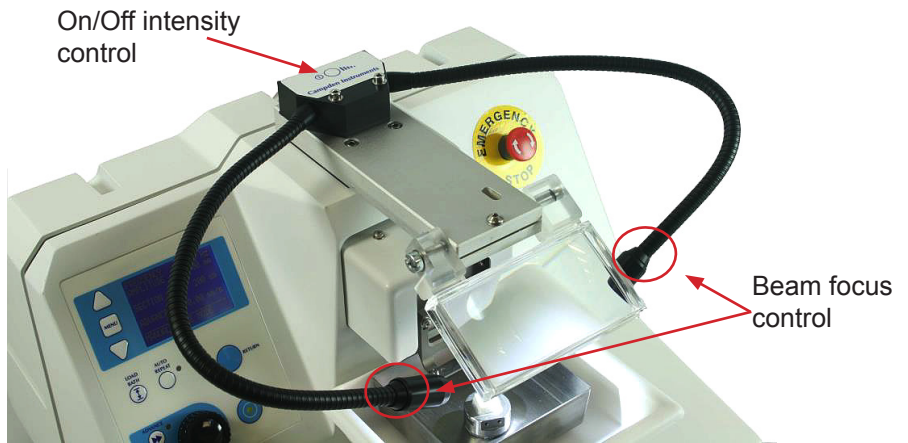
### **Cold Light Source (CAT. #7000-2-1)**

#### *Optional*

The light source should be fixed to either the top of the covers of the instrument or (if you have the optional magnifier) to the mounting bracket for the magnifier. If the light source is fitted directly to the instrument cover, place the neoprene cushioning pad between the cover and the light source body before fitting and tightening the fixing screws. Do not over-tighten the screws.

#### *Features:*

- On/Off and intensity control: Light intensity is controlled via a combined press button on the body of the light source (where the flexible arms are mounted). A brief press will switch the unit on or off and a sustained press will cause the unit to cycle through the light intensities available – release the button when it reaches desired intensity. The unit will ‘remember’ the chosen intensity for the next use.
- Beam focus control: Focus the output beams by rotating the lens ferrule at the end of each flexible arm.
- The power supply has a number of adapters and can be easily fitted with the appropriate adapter to suit the available power outlet.



### **Magnifier (CAT. #7000-1-3)**

#### *Optional*

When fitting this 2x magnifier, place the supplied neoprene cushioning pad between the magnifier mount and the instrument cover. The magnifier should then be fixed to the top of the instrument cover using the screws provided. Do not over-tighten the screws.

If you also have the optional light source, the magnifier should be fitted before the light source which should then be fitted to the magnifier mount.

To adjust the lens, slacken the tightening screw and pivot the lens as required. Re-tighten the screw.



### **Standard Temperature Controlled Tissue Bath (autoclavable) and Controller**

(CAT. #7610-A}

#### *Optional*

The 7610-A Tissue Bath Cooler Unit is intended for use with our 7000 and 5100 range of vibrating microtomes. Unfixed brain slices sectioned at 4°C give better tissue preservation and are viable for longer in-vitro recordings. Additionally, some enzyme histochemical techniques give better staining results when sectioned at low temperatures.

## Standard Packing List

### *One each, unless otherwise noted:*

- 7000smz-2 Tissue slicer
- Blade holder (for 7550-1-SS & 7550-1-C blades)
- Blade guard
- Mains lead
- Tissue bath assembly
- Outer bath assembly
- Specimen holder
- Opti-Cal - optical Calibration unit
- Stainless steel blades (10) (CAT.# 7550-1-SS)
- Ceramic blades (2) (CAT.# 7550-1-C)
- Cross head (Phillips/PoziDriv) screwdriver
- Hexagonal drivers (2)
- Carrying handles (4)
- Operator's Manual
- Unpacking instructions
- Transit crate

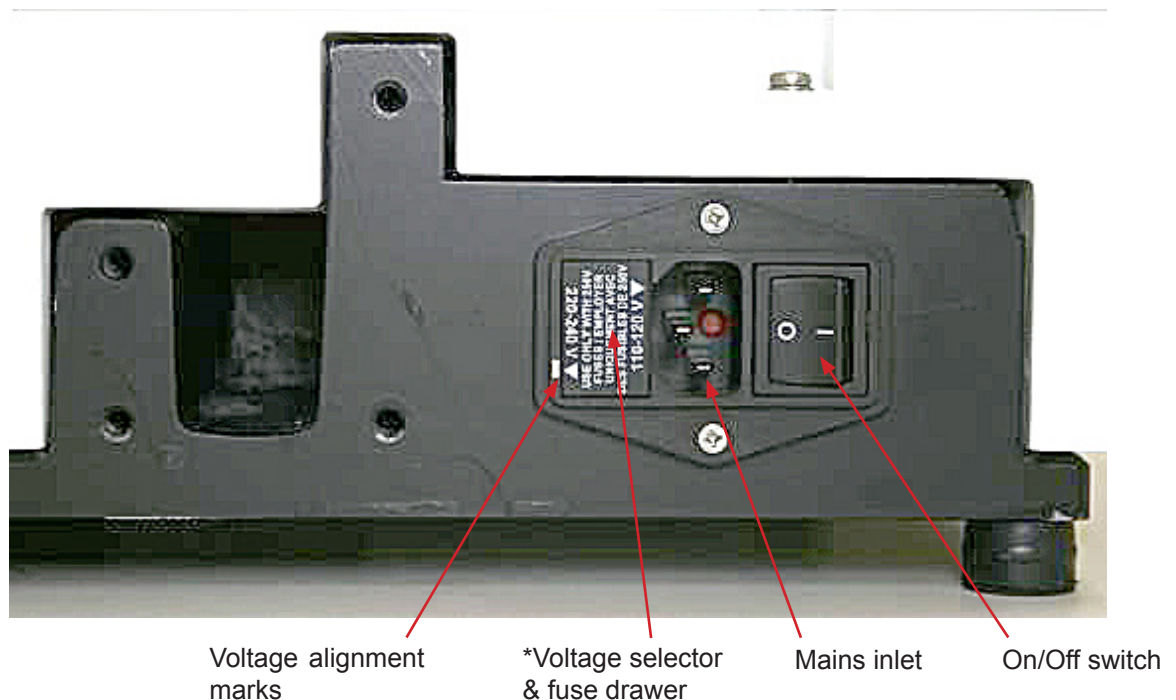
## Installation

Place unit on a sturdy bench. Even though the unit has a very high static-mass-to-vibrating-mass ratio and absorbent rubber feet, a rigid support bench will better guard against secondary vibration transmission.

Make sure to read and follow the directions for installing any accessories that you may have ordered, such as microscope/magnifier attachment or light source.

Be sure unit is set for your particular voltage before connecting the unit to a mains supply. Set voltage by prising out the fuse holder drawer and re-inserting it such that the voltage legend for your supply is aligned with the mark on the inlet molding, as shown below.

The inlet molding accepts a standard IEC socket. Where possible, a standard mains lead - IEC socket/mains plug – suitable for your mains outlet will have been supplied with the instrument. ***The instrument must not be operated unless it is connected to a suitably earthed (grounded) mains supply.***



\*The voltage supply selector is shown set to 220-240V

## Microtome Blades

The 7000smz-2 instrument is supplied with fixed angle titanium blade holders suitable for the 7550-1-SS stainless steel and 7550-1-C ceramic blades. One of each blade type is included:

### 7550-1-SS Stainless Steel Blades

- Made from surgical quality stainless steel
- Double beveled on both faces, honed to an acute cutting edge

**NOTE:** Because of the relative softness of stainless steel, it is recommended these blades be used once only or, at a maximum, changed every day.

### 7550-1-C Ceramic Blades

- Made from ultra hard zirconium, this is a material that creates a precise cutting edge with a rigid blade body, while maintaining a straight cutting edge. The resultant slice quality is especially fine for the most difficult tissues such as young brain, where structures are yet to be formed, or very old brain with build up of extracellular proteins and added structures.
- The ultras hard cutting edge, gives the blade a much longer usable life, plus it does not corrode.
- Ceramic blades are best for studies where the deposition of metal into the slice would have undesirable effects. The initial higher cost of the ceramic blade is more than offset by its longevity.

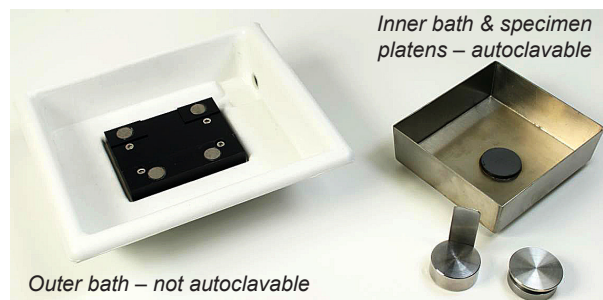
**NOTE:** To a special blade holder tool is provided to ensure proper fitting of the narrow blades. This helps to correct blade alignment and reduces the risk of personal injury when fitting the blade.

## Cleaning, Sterilizing and Autoclaving

Cleaning, Sterilizing & Autoclaving Table		
Part	Autoclavable?	Comment
Blade Holder	Yes	Blade holder can be fitted to or removed from the vibrating head using the included Pozidriv screwdriver.
Specimen platen		
The inner (stainless steel) bath		
Outer bath and its associated parts	NO	They should NOT be dismantled

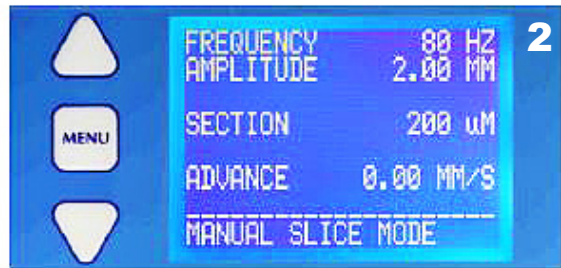
### NOTES:

- Replacement blade holders are available as spares should the original items be lost or damaged.
- The stainless steel inner bath and specimen platens are made magnetic stainless steel; which is not completely immune from the effects of a.c.s.f. and needs to be rinsed thoroughly with clean water on a regular basis.
- The specimen holder is located by a circular magnet in the inner bath. To separate, simply pull the two items apart. The inner bath is also located in the outer bath by magnets.
- Additional or replacement baths parts and specimen platens are available. Having spares on hand can be advantageous.



## Operation

### Edit an existing user name or register a new user name



When the instrument is switched on the display will be as shown, showing any personalized user slots. This screen can also be accessed from the main menu.

1. Use the  $\Delta$  or  $\nabla$  keys to scroll to the desired user name or to an unused position.
2. Press the 'MENU' key to go to the display shown. This is the normal operating display.
3. Press the MENU key again and the display will change to that shown. Use the  $\Delta$  or  $\nabla$  keys to scroll to the line 'SETTINGS'.
4. Then scroll to the line 'EDIT USER NAME' and select.
5. Use the  $\Delta$  or  $\nabla$  keys to scroll to the line (in the example shown) 'USER 2'. Pressing 'MENU' again will cause the 1st letter of the name to be highlighted. The rotary knob can now be used to scroll through the alphabet to select a new letter or symbol. Press the MENU to confirm and move to the next letter position; use the rotary knob to select a new letter. (selects the previous position). Continue until the new user name is acceptable.
6. Press the MENU key - this will highlight the new name.
7. Use the  $\Delta$  or  $\nabla$  keys to scroll to the line 'CHANGE'.
8. Press MENU to confirm the change. Any changes to the oscillating frequency, amplitude and section thickness will be remembered under that user name so that when that user comes back to the instrument and selects that user name those settings will also be selected for immediate use.
9. An existing user name can be deleted by scrolling to the line 'CLEAR NAME' and pressing MENU.
10. Press MENU again to revert to the normal operating display.





Change the Operating Parameters: Frequency, Amplitude and Section Thickness



Press the MENU key to display the basic menu screen as shown:

1. Use the  $\Delta$  or  $\nabla$  keys to scroll to the desired parameter: Frequency – amplitude - section.
2. Press the MENU key to select that parameter and highlight the value. The  $\Delta$  or  $\nabla$  keys can now be used to change the parameter's value.
3. Press the MENU key to confirm and store the change.



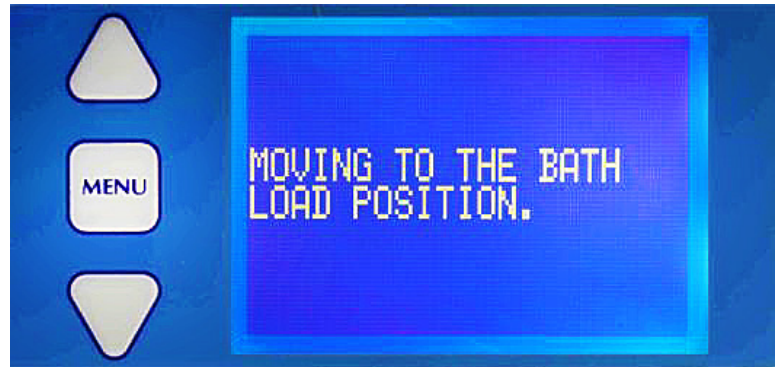
Frequency Hz	Amplitude mm									
	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	
20										
40										
45										
50										
55										
60										
65										
70										
75										
80										
85										
90										
95										
100										
105										
110										
115										
120										
125										

Frequency settings can be changed in 5Hz steps and amplitude can be changed in 0.25 mm steps.

**NOTE:** There are restrictions limiting the amplitudes available for any given frequency – see the above chart: The instrument may only be operated within the shaded area.

## Load or Unload the Specimen Bath

1. Press the 'LOAD BATH' key (and hold for 2 seconds) and the display will change to that shown. The bath table will be moved to its lowest position to allow a specimen bath to be loaded (or an existing one removed).



2. Once the table has reached its lowest position the display will be as shown. The specimen bath is located on the rising table in a sprung loaded dovetail mount.
3. To remove the bath, move the clamp lever to the left and pull the bath away from the instrument.



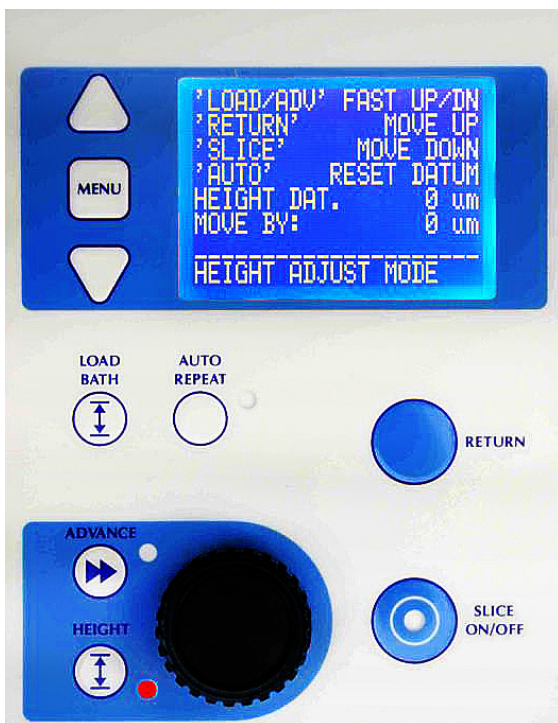
### NOTE:

- Pressing 'LOAD BATH' keypad will cause the table to rise to a preset (nominal) position.
- The display will then revert to the 'home' display.
- Pressing 'Auto Repeat' keypad will enter the blade alignment routine. 'Alignment of the blade with the axis of oscillation' for detailed guidance on the use of the 'Opti-Cal' alignment calibrator.

## Manual Operation



1. With the instrument on, scroll to the desired user name and press MENU. All cutting parameters associated with that user will be recalled.
2. If desired, make any changes as described in Section 6.2 and scroll to the 'EXIT MENU' line and press the 'MENU' key. If necessary load a bath to the table and press the 'LOAD BATH' key. The table will raise the bath to a nominal position and the operating screen will change to that shown in the following illustration:
3. Note that the 'SLICE ON/OFF' key is now illuminated green and the advance speed as shown on the display is 0.00 mm/s.

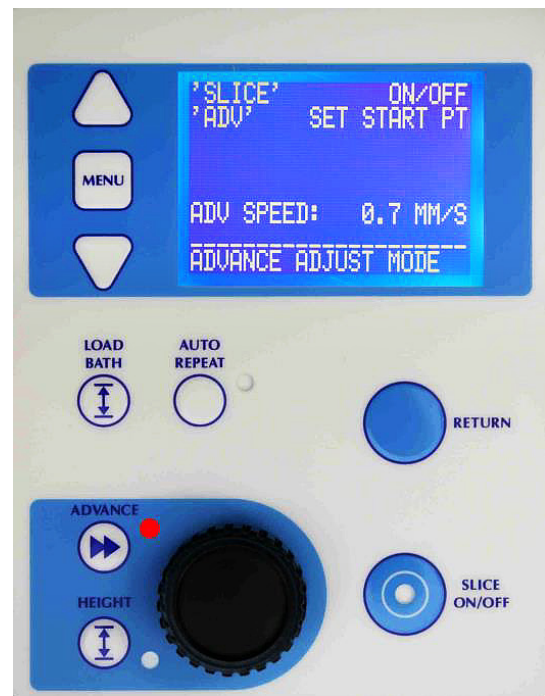


### Bringing the Blade to the Start Height

4. Press the 'HEIGHT' key.
5. Press the 'LOAD BATH' key to quickly raise the table. Press again to stop.
6. Press the 'ADVANCE' key to quickly lower the table. Press again to stop.
7. Set a movement amount using the rotary knob. Press the 'RETURN' key to raise the table by this amount. Press the 'SLICE' key to lower the table by this amount.
8. Press the 'AUTO REPEAT' key to reset the height datum.
9. Press the 'HEIGHT' key once more to exit.

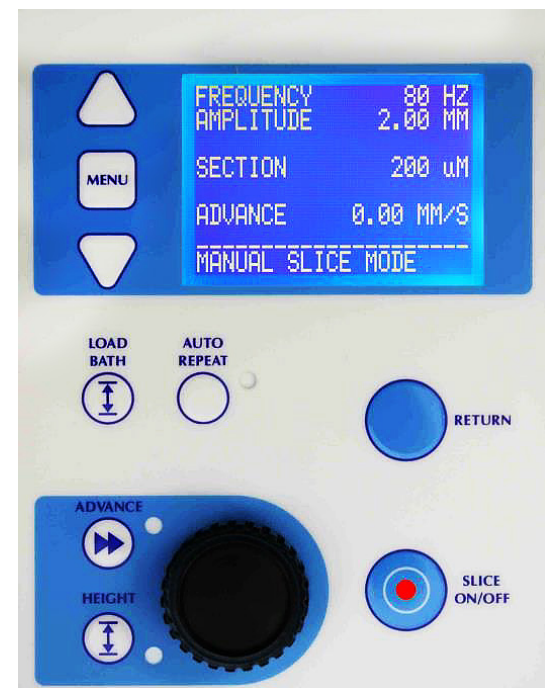
### Bringing the Specimen to the Start Position

1. Press the 'ADVANCE' key and using the rotary knob to control the advance speed. Press the 'SLICE' key to switch the movement on or off.
2. Bring the cutting blade into a suitable position for commencement of cut. When the blade is in a suitable position, press the 'ADVANCE' key again to exit. **NOTE:** This selects the start position such that when the 'RETURN' key is pressed [see next page] this is the position the blade will return to.



### Cutting a Slice

3. Press the 'SLICE ON/OFF' key to commence the cut. The 'SLICE ON/OFF' key will now change to a red illumination. Use the rotary knob to control the advance speed as the blade moves through the tissue. **NOTE:** If desired, the advance speed can be reduced past zero and the cutting head moved in reverse.
4. When the cut has been completed press the 'SLICE ON/OFF' key to halt the process.
5. The 'RETURN' key may now be used to retract the head to the position you had selected as the start position above. Before the head retracts the bath will be lowered so that the blade does not drag across the surface of the specimen. After the head has been retracted the bath will be raised to its previous position and then raised once more by the thickness of the section in readiness for another cut
6. When the cutting head has been retracted to the start position, the section thickness will be highlighted on the display. If required, the section thickness may be changed by pressing the height button.
7. Set a movement amount using the rotary knob.
8. Press the 'RETURN' key to raise the table by this amount.
9. Press the 'SLICE' key to lower the table by this amount.
10. Press the 'HEIGHT' key once more to exit. Note that this will change the section thickness for this slice only. If you want to change the repeat thickness this should be done by changing the general operating parameters – see the section above 'Changing the operating parameters'.



**NOTE:** The cut may now be repeated as often as you wish. If you want to make repeated cuts using the same parameters the automatic repeat can be used – see the next section 'Automatic Operation'.

### Automatic Operation – Slice Window Mode

Once a cut has been taken as described in the manual slice procedure, the start point and end point of that slice operation is stored in memory. In slice window mode the user can slice between these points and the unit will automatically stop at the end point. The user can select if the slice operation finishes at the end point or automatically retracts to the start point ready for the next slice (see section 6.10).

If you try to operate the instrument in the slice window mode without having previously set a slice window, via the manual slice procedure, the display will indicate 'NO SLICE PROFILE HAS BEEN CREATED'. This display will time out and revert to the basic manual operating screen.

When a satisfactory cut window has been made, press the 'AUTO REPEAT' key once until the slice window screen is displayed. The led adjacent to that key will be illuminated in red as a warning.

Using the rotary knob set a suitable advance speed for cutting. You only need to do this the first time you take a slice. Successive slices will be taken at this speed.

Pressing the RETURN button will take the slicer to the start point and increment the section thickness for the next slice.

Press the 'SLICE ON/OFF' key to commence cutting or to stop cutting. The unit will automatically stop cutting at the stop point.



## Automatic Operation – Profile Repeat Mode



Once a cut has been taken as described manual slice procedure, the speed profile of that cut is stored in memory and the instrument is able to repeat that profile under automatic conditions. All that is further required is for the number of sections to be entered. The user can select if the slice operation finishes at the end point of the slice or automatically retracts to the start point ready for the next slice.

If you try to operate the instrument in the automatic mode without having previously set a cutting profile, via the manual slice procedure, the display will indicate 'NO SLICE PROFILE HAS BEEN CREATED'. This display will time out and revert to the basic manual operating screen.

1. When a satisfactory cut profile has been made, press the 'AUTO REPEAT' key twice until the profile repeat screen is displayed. The led adjacent to that key will be illuminated in red as a warning.
2. Use the  $\Delta$  or  $\nabla$  keys to input the number of cutting cycles required.
3. Press the 'SLICE ON/OFF' key to commence cutting. The instrument will now carry out the number of cycles under automatic control.
4. The automatic slicing process may be halted prematurely by pressing the 'SLICE ON/OFF' key in which case the display will change to that shown.
5. Follow the instructions on screen to CONTINUE or ABORT the procedure.
6. Pressing 'MENU' at this stage will allow access to menu functions permitting changes to frequency and amplitude etc.
7. Note that the **EMERGENCY STOP** button on the right front of the instrument may be used to halt the process at any time.



### Recovery from an Emergency Stop

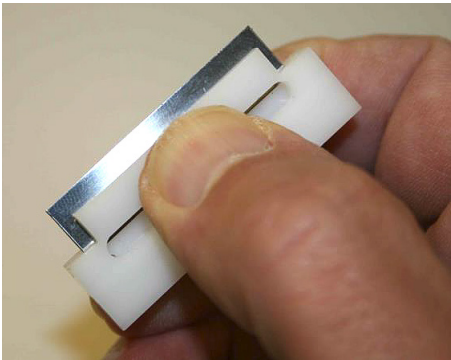
If the instrument has been halted by use of the **EMERGENCY STOP** facility it must be reset before operations can continue: Twist the red Emergency Stop button clockwise to unlatch it. When the button is unlatched the instrument will revert to initial user select screen.

## Blade Fitting and Adjustment

### Fitting blades with the blade fitting tool

The fixed angle blade holder accepts only 7550-1-SS Stainless Steel Blades and 7550-1-C Ceramic Blades.

Blades are extremely sharp! Take care when fitting or removing blades. **Always use the blade holding tool supplied.** The blade tool is designed so that the blade may be safely handled without damaging the cutting length of the blade or injuring the operator.



1. Carefully unwrap the blade.
2. Place it, sharp edge first, into the slot of the blade tool. The blade tool can then be squeezed using the thumb and forefinger – see photo to the left. The blade is now safely gripped with its cutting edge protected from damage and can be safely handled during the fitting operation with minimal risk of personal injury.

3. Fit the blade by loosening the two screws on the arms of the holder and sliding the blade under each washer and pushing it firmly back against the rear stops. The screws should not be over-tightened. See photo at right.

**NOTE:** The left hand screw has a left hand thread and should be turned counter-clockwise to tighten it. The right hand screw has a normal right hand thread.



4. A blade guard is included with the instrument. This guard uses a magnet and can simply be fitted over the blade with the magnet holding it in position. See photo at right. **NOTE:** This will provide some protection to the user and reduce the possibility of accidental damage to the blade edge. We recommend that it is used whenever the instrument is not actually in use.
5. Once the blade has been fitted it should be aligned to the axis of oscillation in order to reduce Z axis (vertical) errors to a minimum and achieve optimum performance.
6. See 'Alignment of the blade with the axis of oscillation' for detailed guidance on the use of the 'Opti-Cal' alignment calibrator.



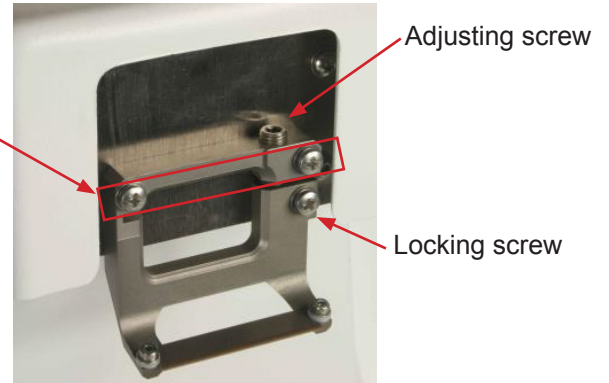
## Aligning Blade with the Axis of Oscillation

The mechanism of the slicer controls the lateral oscillation of the blade within very fine tolerances. Since there are many different tolerances and variables in blade manufacturing, the edge of the blade should be aligned with the lateral motion in order to ensure the best possible cut with least damage to the tissue.



The blade holder is secured by two screws to the oscillating faceplate. A third screw locks the blade holder in position once the alignment procedure has been completed.

Securing screws



Fit the blade holder as shown and tighten the two upper securing screws - (tightening torque = 30-40cN.m). *Do not over-tighten the screws.* The lower locking screw should be tightened sufficiently to just grip the lower portion of the blade holder.

The instrument uses a demountable calibration device to facilitate alignment of the blade with the axis of travel, thereby minimizing the z axis deflections.

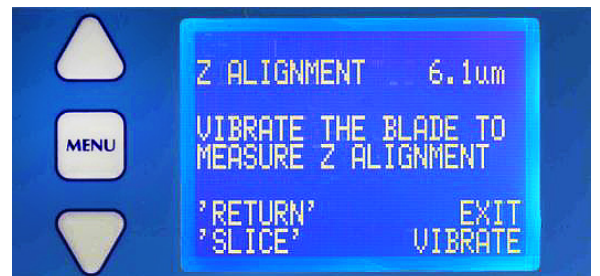
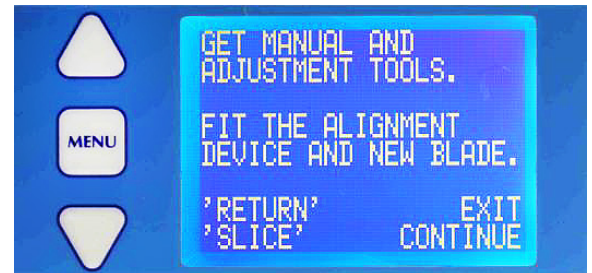
When the 'Opti-Cal' calibration device is plugged into the instrument it will be automatically be detected and thus take control of the amplitude and frequency settings, adjusting them to a magnitude that allows best adjustment of the blade alignment error. The alignment process also automatically moves the blade so that the cutting edge is in its optimal position relative to the calibration device for best alignment evaluation.

### To enter the alignment routine

1. Press the 'LOAD BATH' key (and hold for 2 seconds). The bath table will be moved to its lowest position to allow the 'Opti-Cal' to be loaded. Press 'AUTO REPEAT' to begin the blade alignment routine.

**NOTE:** The alignment routine can also be accessed from the main menu.

2. When the unit has been connected, the instrument will detect the connection and the display will change as shown.
3. Install the alignment device and new blade.
4. Press 'SLICE' to continue. Choose which type of blade you want to calibrate. Scroll to the appropriate blade using the or keys and press 'MENU' to select.
5. Press 'SLICE' to continue. The instrument will now re-position the blade with respect to the alignment device ready for adjustment.
6. The display will now change to that shown on the left. **NOTE:** the uppermost line shows the current Z axis (vertical) deflection. At this point it indicates zero because the blade is not moving.
7. Press 'SLICE' as instructed and when the blade is vibrating note the Z axis deflection reading.
8. Press 'SLICE' again to stop the blade vibration.
9. Loosen the lower locking screw just sufficiently tight to retain its grip on the blade holder but without locking it in place.





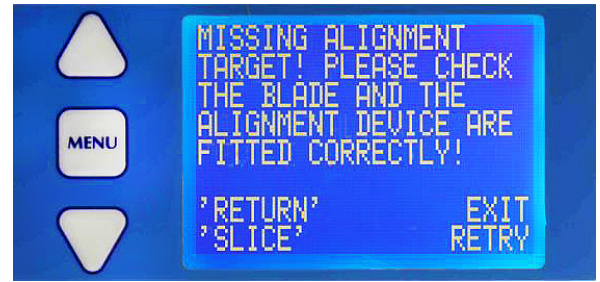
The blade holder can be tilted in either a clockwise or counterclockwise direction by turning the adjusting screw accordingly. Use the supplied hexagonal driver to tighten the lower screw.

Press 'SLICE' to set the blade vibrating again and note the Z axis deflection. Stop the blade vibrating. If the error has increased you should repeat the adjustment but in the opposite direction.

Continue the above process until the Z axis deflection has been reduced to acceptable limits. Once the blade is within acceptable limits the lower locking screw may be tightened to a torque of 30-40 cN.m. Do not over-tighten the screw. Recheck the blade alignment. Repeat the adjustment procedure if required.

When you have completed the alignment procedure press the 'RETURN' key and follow the removal instructions as shown on the display.

In certain circumstances, for example if a steel blade is fitted and you have specified a ceramic blade, the control system may position the blade incorrectly and not detect the blade edge. In these instances the display will show the following message: Correct any problems and press 'SLICE' to retry.



## Settings

1. From the basic menu screen, use the  $\triangle$  or  $\nabla$  key to scroll to the line 'SETTINGS' and press the MENU key. The display screen may be adjusted for brightness and contrast to suit local conditions.
2. Use the  $\triangle$  or  $\nabla$  keys to scroll to line required and press the MENU key. The feature value will be highlighted and may be adjusted by using the  $\triangle$  or  $\nabla$  keys.
3. Press the MENU key to confirm the change.
4. Use the  $\triangle$  or  $\nabla$  keys to scroll to line EXIT MENU and press the MENU key to get back to the basic menu display.
5. When in an automatic slice mode, the park position for the slicer can be set as either at the end of the slice just taken or at the beginning of the next slice.
6. Use the  $\triangle$  or  $\nabla$  keys to scroll to the AUTOSTOP line. Press the MENU key to toggle between AUTOSTOP AT END or AUTOSTOP AT START. Use the  $\triangle$  or  $\nabla$  keys to scroll to line EXIT MENU and press the MENU key to get back to the basic menu display.

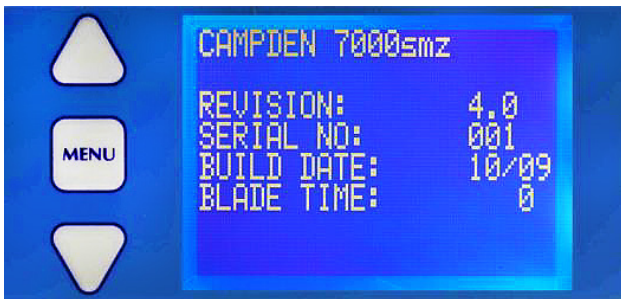


## Recording Technical Information About the Instrument

If you experience any problems with this instrument, please have the following information ready before you contact Technical Support.

- Instrument model number Instrument serial number Build date
- Blade run time
- Software revision code
- Any error codes that you may have witnessed
- 

This information may be readily accessed from the basic menu screen as follows.



1. Use the  $\triangle$  or  $\nabla$  keys to scroll to the line 'ABOUT' and press the MENU key.



2. The screen will now display the parameters required to contact Technical Support.
3. Pressing the MENU key once more will exit this screen

## Maintenance and Service

The 7000smz-2 Instrument has been designed to give reliable, trouble-free service. It is advisable to have only qualified service personnel to service the instrument. Call Customer Service at 1-800-523-5874, if you have any questions.

## Code Errors

### Notes:

- If an error code occurs the instrument will stop. The instrument must be restarted by recycling the power.
- If the error occurs repeatedly during normal use, please contact Technical Support at 1-800-523-5874.

Code #	Type of Error	Descriptor/Action to Take
1	Internal communications error	Restart the instrument. If the problem persists contact Technical Support for advice.
2	Internal communications error	Restart the instrument. If the problem persists contact Technical Support for advice.
3	Advance limit switch fault	If the error occurs repeatedly during normal use contact Technical Support for advice.
4	Table limit switch fault	Both limit switches flagged. Contact Technical Support for advice.
5	Advance drive overload	If the blade has collided with an obstruction, restart the instrument and carefully drive the blade away from the obstruction. If the error occurs repeatedly during normal use contact Technical Support for advice.
6	Oscillating head fault	Restart the instrument. If the problem persists contact Technical Support for advice.
7	Oscillating head fault	If motion of the vibrating head has been obstructed, restart the instrument and carefully drive the blade away from the obstruction. If the problem persists contact Technical Support for advice.
8	Instrument overheat fault	Contact Technical Support for advice.
9	Memory Fault	Restart the instrument. If the problem persists contact Technical Support for advice.
10	Alignment tool communications error	If the alignment tool has been unplugged during the blade alignment procedure, restart the instrument.
12	Upper Table limit switch fault	Upper limit switch flags continually or intermittently. Contact Technical Support for advice.
13	Lower Table limit switch fault	Lower limit switch flags continually or intermittently. Contact Technical Support for advice.

## Spare Parts and Accessories List

Spare Parts and Accessories	
Catalog #	Description
7610-A	Standard Temp. Controlled Tissue Bath (autoclavable) and Controller
7000-1-3	Magnifying Glass, mounted to machine
7000-1-2	Inspection Microscope fixed x5-x10
7000-1-1	Inspection Microscope zoom x20-x40
7000-2-1	Cold Light Source
5100-1-45	Upgrade Kit for 5100mz
5100-1-3	Integrally Mounted Cold Light Source and Magnifying Glass for 5100mz-Plus and 5100mz
7000-3-1A	Tissue Bath Mount (additional price only - this mount comes standard with purchase of 7000smz-2, 5100mz-Plus or 5100mz)
7000-3-2	Stainless steel inner specimen bath
7000-4-1	Specimen Mount Only
7000-4-2	Tilting Tissue Mount
7000-5-3	Blade holder - special angle, includes right and left hand clamp screws, single-axis adjustment screw
7000-6-1	'Opti-Cal' Z-axis measurement, traceable to national standards
7000-7-1	Blade handling tool
7000-50-1	Tool kit - hexagonal drivers
7000-60-1	Transit crate, includes packaging expansion bags
7550-1-SS	Stainless steel blades - narrow, ultrasonically cleaned
7550-1-C	Ceramic blades

## Specifications for the 7000smz-2 Vibrating Blade Tissue Slicer

Specifications for the CAT. 7000smz-2 Vibrating Blade Tissue Slicer	
Section thickness step size	1 $\mu$ m
Vertical (Z-Axis) calibration device "Opti-cal" is calibrated with metrology equipment traceable to National Standards	'Opti-cal' included as standard
Optimal Z-axis Deflection	Sub- $\mu$ m ( $\pm$ 0.1 $\mu$ m)
Max specimen size	33 x 50 x 19
Maximum (vertical) travel of bath table	19 mm
Memory to store section thickness	Yes
Multiple user settings	8 different
Cutting head advance speed while slicing	From a minimum of -1.00 mm/sec, through zero to a maximum of +1.00 mm/sec
Cutting head advance speed resolution while slicing	0.01 mm/sec
Cutting head advance speed max (fast mode when not slicing)	+/- 4.0 mm/sec
Specimen retraction as blade retracts	Yes
Cutting head retraction speed (fast mode)	4.0 mm/sec
Operating Modes	Manual, semi-auto 'slice window' or fully automated 'profile repeat'
Blade oscillation frequency range (dependent on amplitude)	50-120 Hz
Frequency step size	5 Hz
Blade oscillation amplitude	Minimum: 0.5 mm (nominal) Maximum: 2.5 mm (nominal)
Amplitude step size	0.25 mm (nominal)
Cooling options	Ice bath or optional Model 7610A Tissue Bath Cooler
Power requirements	115 VAC 60 Hz or 230 VAC 50 Hz (selectable)
Power rating	100 W
Fuse rating 115v 230v	T2A 250 VAC T1.25A 250VAC
Light source	100-240 VAC 3 W mains connection
Unit Dimensions	420 mm W x 400 mm D x 270 mm H (excluding light source and microscope)
Unit weight	35 kg
Packaged dimensions Packaged weight	Wooden crate 70 cm x 54 cm x 48 cm 55 kg

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For any questions or for ordering information,  
please contact Customer Service at  
**1-800-523-5874**

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