



Vibrating Microtome
7000smz-2

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01 Introduction

The 7000smz-2 Vibrating Microtome by Campden Instruments is an oscillating blade microtome and is the result of more than 25 years of experience in the design and manufacture of tissue slicers.

The 7000smz-2 is a programmable unit that allows the instrument to learn a cutting cycle input by the operator and then repeat that cycle a desired number of times. The cycle may have a varying speed/distance profile so that particular areas of tissue can be sliced at different speeds.

A number of 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-2 allows these combinations to be developed 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.

Experienced users of oscillating microtomes will no doubt be aware that large amplitudes and/or high oscillation frequencies can lead to excessive vibration and unstable tissue fluid. The 7000smz-2 instrument benefits in this area by being built on a heavy, rigid cast base giving exceptional immunity to secondary vibration transmission.

The purpose of this manual is to allow the user to achieve expertise in the use of the 7000smz-2 instrument. Please read and understand the information contained in this manual before using the instrument. Only competent and capable personnel should use the instrument.

This document should be retained for future reference as it contains the name and address of the manufacturer.

02 Packaging

Please retain the original packaging for future use.

Instruments will not be accepted for service or repair unless the unit has been adequately and properly packaged. Additionally, instruments will not be accepted without prior authorisation and have been certified as being uncontaminated with any material that may be hazardous to the health of service personnel. A Returns Authorisation and Decontamination Certificate blank form is included at the end of this manual and may be photocopied as required. Blank forms can also be obtained by contacting Campden Instruments.

Packing List

Item	Quantity
Vibrating Microtome 7000smz-2	1
Blade holder (for 7550-1-SS and 7550-1-C blades)	1
Blade guard	1
Mains lead	1
Tissue bath assembly	1
Outer bath assembly	1
Specimen holder	1
Opti-Cal Calibration unit	1
Stainless steel blades (7550-1-SS)	10
Ceramic blades (7550-1-C)	2
Cross head (Philips/PoziDriv) screwdriver	1
Hexagonal drivers	2
Carrying handles	4
Operator's handbook	1
Unpacking instructions	1
Transit crate	1

Microscope, cold light source, magnifying glass and other optional extras: as ordered.

03 Safety Warnings

Before operating this equipment, all users should read this manual fully. The safety warnings listed below; plus, any risks to the equipment will be referred to in the following sections and denoted by the symbol:



- 3.1. The 7000smz-2 with accessories can weigh as much as 33kg and therefore should be placed on a secure, level bench with suitable non-slip surface characteristics to ensure that the machine cannot be inadvertently moved and thus giving rise to a falling object hazard to the user or other laboratory personnel.
- 3.2. Users to keep fingers clear of the Bath area during operation since both the horizontal Blade Advance drive and vertical rising table mechanisms are capable of very high thrust forces and therefore gives rise to a potential finger cut and crush hazards between the Blade/Blade Holder and the Specimen Holder/stainless steel bath.
- 3.3. The blade edge is exposed during operation hence users are to keep fingers away from the tissue specimen cutting area. Where tissue slices require manipulation after cutting it is recommended that this should be done via a soft brush.
- 3.4. When not in use, the magnetic blade cover is to be used to reduce risk of contact with the blade edge.
- 3.5. The 7000smz-2 machines are designed for indoor laboratory use only; the machines are resistant to fluid ingress and foreign object ingress when operated as intended and as instructed in this manual. The operating temperature limits for this machine are +5°C to +40°C with a maximum relative humidity of 50%. **Should this machine be operated outside of these environmental limitations user safety protection may be impaired.**
- 3.6. When using the Opti-Cal Blade Alignment accessory two hazardous situations are possible:
 - 3.6.1. Opti-Cal fitted but machine operating in error in "Slice mode" giving rise to potential finger trap hazard between Opti-Cal device and blade/blade holder.
 - 3.6.2. Opti-Cal fitted with machine operating in Opti-Cal mode gives rise to close clearances and therefore crushing/cut hazard.
- 3.7. Users to keep fingers clear off the Blade/Blade Holder area when loading the Bath or Opti-Cal blade alignment accessory to avoid finger crush hazard. All users to be aware that both "Load Bath" and "Remove Bath" operations are non-interruptible i.e., the Opti-Cal /Rising table will be driven to the pre-set machine limits and cannot be stopped by the user during these operations.
- 3.8. All relevant laboratory hygiene and bio-hazard protocols to be adhered to when preparing tissue samples, operating this equipment, and the disposal of tissues samples and bath fluids.
NOTE: where a machine has been used in an application requiring thin film isolation it may NOT be returned for servicing.

04 Description of the instrument

The 7000smz-2 instrument features a removable cutting head mounted on a deep section parallel leaf spring assembly giving exceptional resistance to vertical (z axis) deflections and motion errors.

Blade motion is by non-contact magnetic attraction giving a high degree of immunity from out-of-plane forces whilst allowing variable oscillation rates.

The blade holder can be adjusted to ensure that the blade edge travels parallel to the vibration axis resulting in a cleaner slice with minimal damage to the surface of the tissue. A mountable non-contact metrology device is able to monitor the blade edge travel profile giving feedback to facilitate adjustment.

The blade is advanced into the tissue under motor control via a rotary control on the front of the instrument allowing continuous adjustment of speed. This is particularly useful when different areas of tissue need to be cut at different speeds. Blade retraction is carried out at maximum speed and only after the uncut tissue has been lowered away from the blade, eliminating the possibility of the blade being dragged back across the uncut tissue causing damage.

Dynamic feedback on the oscillation and advance axes maintains accurate control over speed and (in the case of the advance axis) distance travelled. Raising the tissue up into the path of the advancing blade controls section thickness. This movement against gravity reduces lost motion and uncertainty to a minimum allowing section thickness to be controlled accurately. A sprung loaded dovetail arrangement for mounting the tissue bath gives a positive location of the bath whilst still allowing easy removal.

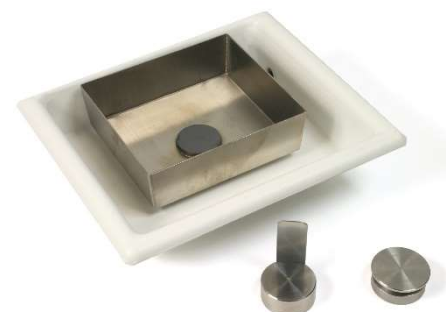
A sealed LCD display and membrane keypad allows the user to control the instrument and set the parameters governing blade frequency, section thickness, etc. As the unit can be operated under fully automatic control an emergency stop facility is provided.

The entire instrument is enclosed in a molded enclosure giving protection against liquid ingress from spillage and is tolerant of most commonly used solutions. Up to 8 users or combinations of cutting parameters can be stored.

The Unit has a memory facility to remember the cutting profile and can auto-repeat that profile. The unit can also retain a slice window which marks the start and end point of the slice, so blade will return to a set point to start a new slice and stop at a fixed point once the slice has been taken.

The instrument is supplied with a tissue bath having a ceramic magnet to locate and retain the specimen platen. A fixed specimen platen with removable tissue support is supplied as standard. An adjustable tissue platen is available as an optional extra.

The tissue bath is also located and held in place within the outer bath by magnets. Photo at right displays inner and outer tissue bath (background) with standard tissue platen (front left) and adjustable tissue platen (front right).



A stereoscopic zoom microscope, magnifying glass and a cold light source are available as optional extras. The stereoscopic microscope, with magnification factors of between 10 and 40x allows close observation of the cutting procedure.



The light source incorporates focusable LEDs and allows concentrated, cold illumination to be directed selectively at the specimen being processed.

A lower power (2x) magnifying lens assembly can be fitted as an alternative to the microscope.

05 Specifications

Dimensions

Bench space requirement (excluding light source and microscope):	Width: 410 mm (excluding handles), 620 mm (including handles) Depth: 400 mm Height: 270 mm
Weight (excludes microscope)	33 Kg
Boxed shipping weight (excludes microscope)	60 Kg
Tissue bath size	80 mm x 90 mm x 25 mm (nominal)
Tissue bath volume (with specimen holder)	160 ml (nominal)

Slice table and cutting head

Bath table rise and fall speed	1.0 mm/sec maximum
Maximum (vertical) travel of bath table	19 mm
Cutting head advance speed	Minimum: - 4.0 mm/sec (- 1.00 during slicing) Maximum: +4.0 mm/sec (+1.00 during slicing)
Cutting head retraction speed	4.0 mm/sec
Maximum travel of cutting head	37 mm (nominal)

Blade

Section thickness step size	0.001 mm
Blade oscillation frequency (7000smz-2)	Minimum: 50 Hz Maximum: 120 Hz (amplitude dependent)
Frequency step size	5 Hz
Blade oscillation amplitude (7000smz-2)	Minimum: 0.5 mm (nominal) Maximum: 2.5 mm (nominal)
Amplitude step size	0.25 mm (nominal)

Power

Power requirements (Selectable)	115 VAC 60Hz 230 VAC 50Hz
Power rating	100 W
Fuse rating (115V) (230V)	T2A 250 VAC T1.25A 250 VAC
Light source	100 - 240 VAC 3W

06 Installation



Potential crush/Musculo-skeletal injury and risk of damage to equipment warning – when lifting the 7000smz-2 onto a bench or moving the machine short distances, due to the high mass of the 7000smz-2, end users must use the removable lifting screw-in lifting handles in conjunction with a two-man lift.



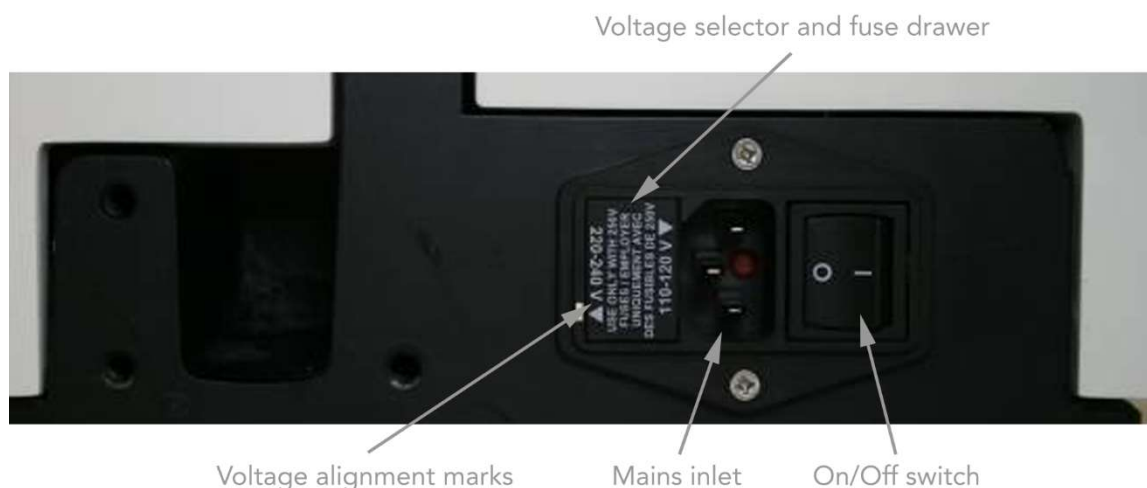
Potential crush injury and risk of damage to equipment warning – Due to the high mass of the 7000smz-2 care to be taken by user that the machine is placed on a sturdy bench with a level non-slip surface.

The unit should be placed on a sturdy bench. Although the unit has a very high static mass to vibrating mass ratio and absorbent rubber feet, a rigid support bench will enhance immunity from secondary vibration transmission.

If any accessories – microscope/magnifier attachment or light source - have been supplied with the instrument, reference should be made to the appropriate section of this manual for the fitting and setting up procedure.

Before connecting the unit to a mains supply, the unit must be set for your particular voltage supply.

The voltage is set by prizing 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. See 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. See *Options* for fitting the light source, magnifier and microscope

07 Microtome Blades

Whatever features and controls an oscillating microtome possess, the quality of the slice can be enhanced by good blades and degraded by poor blades. The average razor blade consists of a triple bevel on both faces of a thin foil made from either carbon or stainless steel. The triple bevel terminates in a relatively nonacute angle and is designed for cutting when being drawn across a surface perpendicular to the edge of the blade. The thin foil of a razor blade will almost certainly flex when clamped into a blade holder.

Carbon steel is relatively hard compared to stainless steel and a carbon steel blade will keep its cutting edge longer however it has the inherent disadvantage that it will rust quickly when exposed to moist air. To prevent rusting in storage, carbon steel blades have a film of oil that must be removed before the blade can be used. The corrosion process is, of course, accelerated significantly in A.C.S.F. saline.

For these reasons normal razor blades and carbon steel blades are not recommended for precision tissue sectioning. Campden Instruments supplies two types of blade for its oscillating microtomes:

7550-1-SS Stainless-Steel Blades

Made from surgical quality stainless steel these are double beveled on both faces, honed to an acute cutting edge. Because of the relative softness of stainless steel, for optimum performance it is recommended that stainless steel blades should 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 can be lapped to the finest of edges and the body of the blade is very rigid maintaining a straight cutting edge. The result is that slice quality is substantially improved with prolonged slice life especially in the most difficult tissues such as young brain where structures are yet to be formed or very old brain with buildup of extracellular proteins and added structures. Additionally, the blade has a much longer life due to the ultra-hard cutting edge not losing its sharpness and being impervious to corrosion.

For studies where the deposition of metal into the slice would have undesirable effects the benefit of ceramic blades is clear. The initial higher cost of the ceramic blade is more than offset by its longevity.

To facilitate fitting of the narrow blades a special blade holder tool is provided. This helps ensure correct blade alignment and reduces the risk of personal injury when fitting the blade. Further details are shown in *Fitting 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. Sample 7550-1-SS and 7550-1-C blades are included with each instrument.

08 Cleaning, Sterilizing and Autoclaving

The blade holder can be fitted to or removed from the vibrating head using the Pozidriv screwdriver supplied. The blade holder may be autoclaved by normal methods. 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 from a magnetic stainless steel; this steel is not completely immune from the effects of A.C.S.F. and the items should be thoroughly rinsed with clean water on a regular basis.

The specimen platen and the inner (stainless steel) bath as shown in the illustration below are autoclavable. The specimen holder is located by a circular magnet in the inner bath. They may be separated by simply pulling the two items apart. The inner bath is also located in the outer bath by magnets.

Autoclaving of the specimen holder and inner bath may be carried out using normal procedures. The outer bath and its associated parts are not autoclavable, nor should they be dismantled.

Additional or replacement outer baths, inner baths and specimen platens are available as spares.



09 Operation

9.1 Registering a new user name or editing an existing user



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

Use the [UP] or [DOWN] arrows to scroll to the desired user name or to an unused position.



Press [MENU] to go to the display shown. This is the normal operating display.



Press [MENU] again and the display will change to that shown. Use the [UP] or [DOWN] arrows to scroll to the line *SETTINGS*.



Then scroll to the line *EDIT USER NAME* and select.



Use the [UP] or [DOWN] arrows 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 TO position). Continue until the new username is acceptable. 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 username is acceptable.



Press [MENU] to highlight the new name.

Use the [UP] or [DOWN] arrows to scroll to the line *CHANGE* and press [MENU] to confirm the change. Any changes to the oscillating frequency, amplitude and section thickness will be saved with 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.

An existing user name can be deleted by scrolling to the line *CLEAR NAME* and pressing [MENU].

Press [MENU] again to revert to the normal operating display.

9.2 Change the operating parameters: Frequency, Amplitude, and Section thickness



Press [MENU] to display the basic menu screen



Use the [UP] or [DOWN] arrows to scroll to the desired parameter

Press [MENU] to select that parameter and highlight the value.

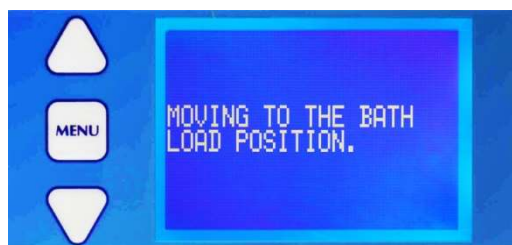
The [UP] or [DOWN] arrows can now be used to change the parameter's value. Press [MENU] to confirm and store the change.

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

Note that there are restrictions limiting the amplitudes available for any given frequency – see the chart on the next page. The instrument may only be operated within the shaded area.

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									

9.3 Load or unload the specimen bath



Press and hold [LOAD BATH] 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).

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.




Potential crush injury and risk of damage to equipment warning - Users to keep fingers clear of the Bath assembly during bath lowering process The "Remove Bath" operation is non-interruptible i.e., the Opti-Cal /Rising table will be driven to the pre-set machine lower limit and can only be stopped by via the Emergency Stop button during these operations.

To remove the bath, move the clamp lever to the left and pull the bath away from the instrument.



Pressing [LOAD BATH] will cause the table to rise to a reset (nominal) position.



Potential crush injury and risk of damage to equipment warning - Users to keep fingers clear of the Bath assembly during bath lowering process The "Remove Bath" operation is non-interruptible i.e., the Opti-Cal /Rising table will be driven to the pre-set machine lower limit and can only be stopped by via the Emergency Stop button during these operations.

The display will then revert to the home display.

Pressing [AUTO REPEAT] will enter the blade alignment routine. See *Alignment of the blade with the axis of oscillation* for detailed guidance on the use of the Opti-Cal alignment calibration unit.

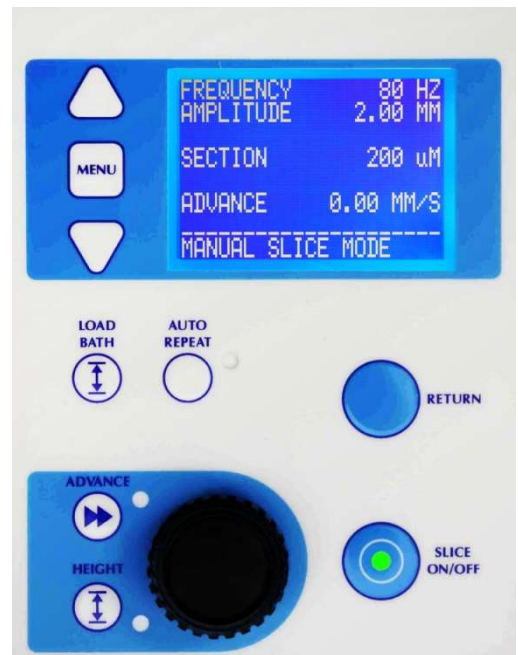
Note: Users wanting to customise the tissue mount must ensure that the total weight of ice bath, tissue bath and contents must not exceed 800g, or this would cause overload of the motor.

9.4 Manual Operation

When the instrument is first switched on, scroll to the desired username and press [MENU]. All cutting parameters associated with that user will be recalled.

If desired, make any changes as described in *Changing the operating parameters* and scroll to the *EXIT MENU* line and press [MENU]. If necessary, load a bath to the table and press [LOAD BATH]. The table will raise the bath to a nominal position and the operating screen will change to that shown in this illustration.

Note that [SLICE ON/OFF] is now illuminated green and the advance speed as shown on the display is 0.00 mm/s.

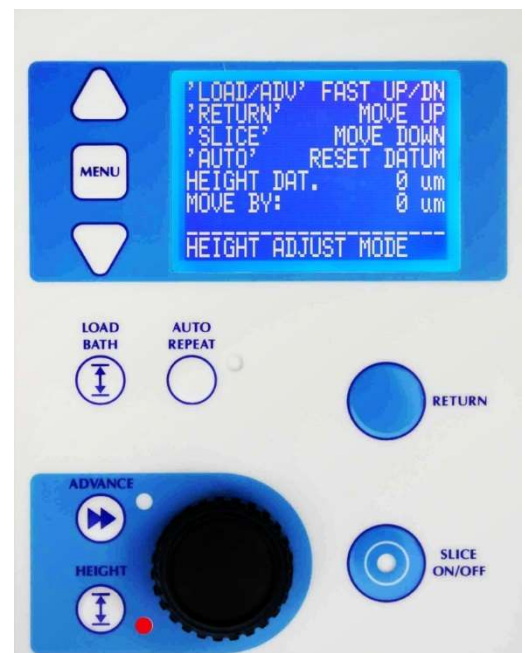


Steps to Set the Bath to Start height



Potential crush injury warning - Users to keep fingers clear of the Bath assembly during bath raising/lowering process.

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



Steps to Set the Start Position

1. Press [ADVANCE] and use the rotary knob to control the advance speed.
2. Press [SLICE] to switch the movement On or Off.
3. Bring the cutting blade into a suitable position for commencement of cut.
4. When the blade is in a suitable position, press [ADVANCE] again to exit.
(This selects the start position such that when [RETURN] is pressed this is the position where the blade will return).



Cutting a slice

1. Press [SLICE ON/OFF] to commence the cut.
Pressing [SLICE ON/OFF] will now change to a red illumination.
2. Use the rotary knob to control the advance speed as the blade moves through the tissue. (Note that, if desired, the advance speed can be reduced past zero and the cutting head moved in reverse).
3. When the cut has been completed press [SLICE ON/OFF] to halt the process.



The [RETURN] key may now be used to retract the head to the previously set start (see 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.



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. Set a movement amount using the rotary knob. Press [RETURN] to raise the table by this amount. Press [SLICE] to lower the table by this amount. Press [HEIGHT] 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 **Changing the operating parameters**.

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 section **Automatic Operation**.

9.5 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 **Settings**).

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 [AUTO REPEAT] 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 [SLICE ON/OFF] to commence cutting or to stop cutting. The unit will automatically stop cutting at the stop point.



9.6 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 (see *Settings*).

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.



When a satisfactory cut profile has been made, press [AUTO REPEAT] twice until the profile repeat screen is displayed. The LED adjacent to that key will be illuminated in red as a warning.

Use [UP] or [DOWN] arrows to input the number of cutting cycles required. Press [SLICE ON/OFF] to commence cutting.

The instrument will now carry out the number of cycles under automatic control.



The automatic slicing process may be halted prematurely by pressing [SLICE ON/OFF] in which case the display will change to that shown. Follow the instructions on screen to *CONTINUE* or *ABORT* the procedure. Pressing [MENU] at this stage will allow access to menu functions permitting changes to frequency and amplitude etc.

Note that the **[EMERGENCY STOP]** button on the right front of the instrument may be used to halt the process at any time.



9.7 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 **[EMERGENCY STOP]** button clockwise to unlatch it. When the button is unlatched the instrument will revert to initial user select screen.

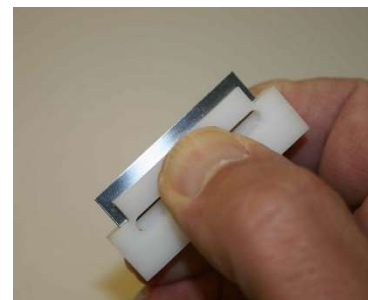
9.8 Fitting blades with the blade fitting tool

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

When fitting or removing blades, care must be taken as the blades supplied by Campden Instruments are very sharp. Always use the blade holding tool supplied. The blade tool has been designed so that the blade may be safely handled without the effective cutting length of the blade edge being exposed to possible damage or injuring the operator.

After carefully unwrapping the blade it should be placed, sharp edge first into the slot of the blade tool. The blade tool can then be squeezed using the thumb and forefinger – see illustration at right.

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.



The blade should be fitted 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 the illustration at left.

Note that the left-hand screw has a left-hand thread and should be turned counterclockwise to tighten it. The right-hand screw has a normal right-hand thread.

A blade guard is included with the instrument: this incorporates a magnet and can simply be fitted over the blade with the magnet holding it in position. See the illustration at right.

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.

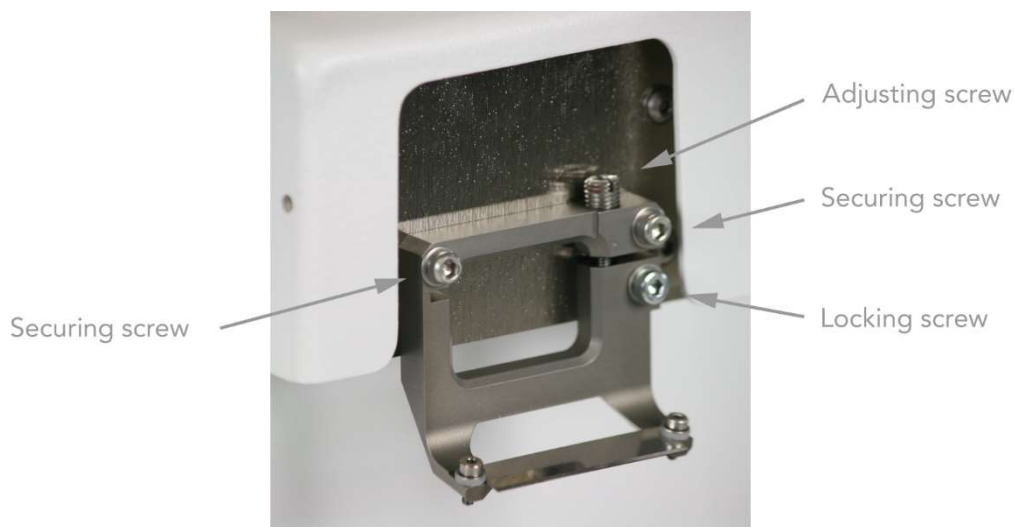


Once the blade has been fitted it should be aligned to the axis of oscillation in order to reduce Z axis (vertical) errors to a minimum and achieve optimum performance. See *Alignment of the blade with the axis of oscillation* for detailed guidance on the use of the Opti-Cal alignment calibration unit.

9.9 Alignment of the blade with the axis of oscillation

The mechanism of the slicer controls the lateral oscillation of the blade within very fine tolerances. Owing to manufacturing variations and tolerances in blades, blade holder, etc., and inconsistencies in mounting the blade in its holder, the blade edge should be aligned with the lateral motion 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.



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.

In order to facilitate alignment of the blade with the axis of travel and so minimise the z axis deflections, the instrument uses a demountable calibration device.

When the Opti-Cal calibration unit is plugged into the instrument its presence will automatically be detected and it will 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 advances the blade and raises the Opti-Cal unit so that the cutting edge is in its optimal position relative to the calibration device for best alignment evaluation.



Potential crush injury and risk of damage to equipment warning -
Users to keep fingers clear of the Bath assembly during bath lowering process The "Remove Bath" operation is non-interruptible i.e., the Opti-Cal /Rising table will be driven to the pre-set machine lower limit and can only be stopped by via the Emergency Stop button during these operations.

To enter the alignment routine, press and hold [LOAD BATH] 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.



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

When the unit has been connected, the instrument will detect the connection and the display will change as shown.

Install the alignment device and new blade.

Press [SLICE] to continue.



You must now choose which type of blade you want to calibrate. Scroll to the appropriate blade using the [UP] or [DOWN] arrows and press [MENU] to select.

Press [SLICE] to continue.

The instrument will now re-position the blade with respect to the alignment device ready for adjustment.



The display will now change to that shown on the left. Note that the uppermost line shows the current Z axis (vertical) deflection. At this point it indicates zero because the blade is not moving.

Press [SLICE] as instructed and when the blade is vibrating note the Z axis deflection reading.

Press [SLICE] again to stop the blade vibration.

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 a clockwise direction by turning the adjusting screw clockwise using the supplied hexagonal driver. Tighten the lower screw. Conversely, the blade holder can be tilted in a counter-clockwise direction by turning the adjusting screw counter-clockwise.

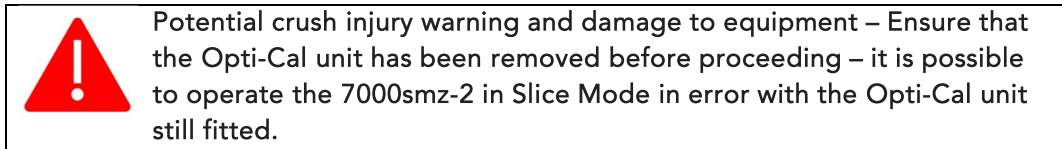
Press [SLICE] to set the blade vibrating again and note the Z axis deflection. Stop the blade vibrating. If the error has increased you should repeat the adjustment but in the opposite direction.

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 [RETURN] 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.



9.10 Settings



From the basic menu screen use the [UP] or [DOWN] arrows to scroll to the line *SETTINGS* and press [MENU].



1. The display screen may be adjusted for brightness and contrast to suit local conditions.

Use the [UP] or [DOWN] arrows to scroll to the line required and press [MENU]. The feature value will be highlighted and may be adjusted using the [UP] or [DOWN] arrows. Press [MENU] to confirm the change. Use the [UP] or [DOWN] arrows to scroll to line *EXIT MENU* and press [MENU] to get back to the basic menu display.



2. 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.

Use the [UP] or [DOWN] arrows to scroll to the *AUTOSTOP* line. Press [MENU] to toggle between *AUTOSTOP AT END* or *AUTOSTOP AT START*. Use the [UP] or [DOWN] arrows to scroll to line *EXIT MENU* and press [MENU] to get back to the basic menu display.

10 Options

10.1 Light Source CL200-1 (optional)

The 7000smz-2 Instrument may be (optionally) supplied with an LED cold light source. 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. This is illustrated below.



The light source can be switched on and the light intensity 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 whilst a sustained press will cause the unit to cycle through the light intensities available – release the button when you have the preferred intensity. The unit will remember the chosen intensity for the next use. The output beams may be focused by rotating the lens ferrule at the end of each flexible arm.

The power supply is supplied with a number of adapters and should be fitted with the appropriate adapter to suit the available power outlet.

10.2 Magnifier 7000-1-3 (optional)

The 7000smz-2 Instrument may be (optionally) supplied with a low power magnifier (2x magnification).

When fitting the magnifier, place the neoprene cushioning pad (supplied) 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. This is illustrated below.

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, loosen the tightening screw and pivot the lens as required. Retighten the screw.

10.3 Microscope Mounting Point

A microscope can be attached to the instrument with four bolts to a dedicated mounting area on the base casting on the rear of the instrument; this ensures a rigid mount rendering the microscope free from vibration.

Highlighted area denotes mounting point for microscope with four location bolts set directly into the base casting.

Note:

The Campden CL200-1 cold light source (referenced in 9.1) can be fitted directly to the top of the 7000smz-2 independently of the microscope. For ease of access, you should fit the light source before fitting the microscope.



11 Maintenance and Service

The 7000smz-2 Instrument has been designed to give reliable, trouble-free service. When the equipment has been in service for a number of years it may be advisable to have a comprehensive service, Campden Instruments or its local agents will be pleased to advise on this and operate a fast turnaround on equipment returned for service or repair.

Instruments will not be accepted for service or repair unless the unit has been adequately and properly packaged. Additionally, instruments will not be accepted without prior authorisation and have been certified as being uncontaminated with any material that may be hazardous to the health of service personnel.

Before returning the instrument, contact Campden Instruments to obtain a Returns Authorisation Number. A Returns Authorisation and Decontamination Certificate blank is shown on the next page. The form may be photocopied as required. Further blanks can be obtained by contacting Campden Instruments.

NOTE: Where a machine has been used in an application requiring thin film isolation it may NOT be returned for servicing.

12 Technical Support

Should any problems with the instrument be experienced, Campden Instruments has a Technical Support facility. Before contacting Technical Support, it is helpful to have the following information available so that enquiries may be dealt with more efficiently. Technical Support can only help with queries relating to the instrument function, queries regarding instrument application should be directed to the sales department at Campden Instruments.

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

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



Use the [UP] or [DOWN] arrows to scroll to the line *ABOUT* and press [MENU].



The screen will now display the parameters required when contacting Technical Support.

Pressing [MENU] once more will exit this screen

13 Error Messages

Note that if an error code occurs the instrument will stop. The instrument must be restarted by recycling the power.

Code	Definition	Action
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 error occurs repeatedly during normal use 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.	Upper limit switch flags continually or intermittently. Contact Technical Support for advice.

14 Campden Returns Authority and Decontamination Certificate

Note: You must complete the following form before returning the equipment, failure to do so may result in a refusal to accept the shipment and may cause delays in processing the service or repair.

	Number	Date
Customer		
Address		
Contact Name		
Contact Details		
Product/Serial Number		
Product Name/Description		
Contact Name		
Contact Details		

Description of problem/reason for return. (continue on separate page if necessary)

Note: Blade must be removed from blade holder. Returns from outside the EU must be state as "Returns of Nominal Value." Failure to do so will incur customs charges.

The following Declaration of Decontamination status applies to all items returned to Campden Instruments. If the answers to Sections A2 and all B questions are NO then ignore Sections D to F. Otherwise all Sections must be completed. You must complete and sign the Declaration.

A	1. Has the package been opened?	YES	NO
	2. Has the product been used?	YES	NO
B	Has the product been exposed internally or externally to any of the following?		
	1. Biological Hazards (pathogenic viruses, bacteria, fungi etc.)	YES	NO
	2. Radioactive Sources (If yes, DO NOT RETURN)	YES	NO
	3. Chemical Hazard (mercury, salts, acids, bases etc.)	YES	NO
	4. Rabies, BSE, CJD, nCJD etc	YES	NO
	5. Any Other Hazard (specify in section D)	YES	NO

C Does your laboratory contain animals that need to be shielded against pathogens? YES NO

D Provide details of any indicated hazards. Include detail of names and quantities of agents, Material Safety Data Sheets and First Aid Information.

E Describe your methods of decontamination, including agents used for this purpose.

F Are there likely to be any areas of residual contamination? Please be specific.

Declaration

I declare that the information given above is true and complete to the best of my knowledge and belief, and that I have taken all reasonable steps to ensure its accuracy. If there is any subsequent outbreak of an infectious agent in my laboratory, I will inform Campden Instruments immediately.

Authorised Signature

Date

Name (Print)

Position

Phone

Fax

Return Address

Campden Instruments, 4, Park Road, Sileby, Loughborough. LE12 7TJ. U.K.

15 Spare Parts and Accessories

When ordering, please order by part number and description.

Product	Model
Magnification	
Magnifying glass (2X)	7000-1-3
Microscope Bracket	Contact CI
Illumination	
Cold light source	CL200-1
Tissue bath assemblies	
Complete tissue bath assembly (inner bath + outer bath)	
For 7000smz prior to serial number 7000smz-078 and 5000mz prior to s/n 5000mz-1004	7000-3-1
For 7000smz serial number 7000smz-078 onwards and 5000mz s/n 5000mz-1004 onward	7000-3-1A
Inner tissue bath assembly	7000-3-2
Outer bath assembly	
For 7000smz prior to serial number 7000smz-078 and 5000mz prior to s/n 5000mz-1004	7000-3-3
For 7000smz serial number 7000smz-078 onwards and 5000mz s/n 5000mz-1004 onward	7000-3-3A
Specimen holders	
Replacement specimen holder (<i>standard</i>)	7000-4-1
Replacement adjustable specimen holder	7000-4-2
Blade holders	
5000mz Blade holder (for 7000smz prior to serial number 7000smz-020 and 5000mz prior to s/n 5000mz-1004)	7000-5-1
Blade holder – special angle (<i>Non-standard part – contact Campden Instruments</i>)	7000-5-2
Mk2 Blade holder (for 7000smz serial number 7000smz-020 onwards and 5000mz s/n 5000mz-1004 onward)	7000-5-3
Replacement blade clamp screws for 7000-5-3	7000-5-4

(Left and righthand screws with washers)

Blade alignment equipment

Opti-Cal Calibration unit

For 7000smz prior to serial number 7000smz-078 and 5000mz prior to s/n 5000mz-1004 7000-6-1

For 7000smz serial number 7000smz-078 onwards and 5000mz s/n 5000mz-1004 onward 7000-6-1A

Blade Handling

Blade Handling Tool 7000-7-1

Blade guard 7000-7-2
(for 7000smz serial number 7000smz-020 onwards and 5000mz s/n 5000mz-1004 onwards)

Blades

Stainless steel blades *(pack of 50)* 7550-1-SS

Ceramic blades *(pack of 5)* 7550-1-C

Miscellaneous

Tool set 7000-50-1

Transit Crate 7000-60-1

16 EC Declaration of Conformity

Name and address of Manufacturer

Campden Instruments Limited
PO Box 8148
Loughborough LE12 7XT
UK

Description of Instrument

Oscillating Blade Microtome

Model Type/Number

7000smz-2

The instrument specified above complies with the relevant health and safety requirements of the following:

1. EC Directive(s)

The Machinery Directive 89/392/EEC as amended by
Directive 91/368/EEC
Directive 93/44/EEC
Electromagnetic Compatibility Directive 89/336/EEC
The Low Voltage Directive 73/23/EEC

2. UK Regulations

The Supply of Machinery (Safety) Regulations 1992 (SI 1992/3073)
Electricity at Work Regulations 1989

3. European Standards

EN 50081-1: 1992 Electromagnetic compatibility generic emissions standard part 1
EN 50082-1: 1992 Electromagnetic compatibility generic immunity standard part 1

Additionally, the health and safety requirements of the following British and harmonised European Standards have been incorporated in the design of the above instrument:

BS 2771: part 1:1986 (EN 60 204: part 1:1985)
BS 5304:1988

Signed:

Name: G Prescott
Position: Managing Director
Date: 9 April 2009



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Instruments**

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