



**Campden
Instruments Ltd.**

A Lafayette Instrument Company

www.campdeninstruments.com

Tissue Sectioning & Electrophysiology



- **Oscillating Microtomes**
- **Autoclavable Accessories**
- **Precision Blade Technology**
- **Temperature Controlled Tissue Baths**
- **Slice Chambers**
- **Perfusion Systems**
- **Patch Clamp Amplifier**
- **McIlwain Tissue Chopper**

**Healthy Slices:
The Foundation of
Your Research**

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Tissue Sectioning & Electrophysiology

Campden Instruments is perhaps most famous for the Vibroslice™, Oscillating Microtome, which for 20 years has been the standard tool for producing acute slices the world over.

With our acquisition by Lafayette Instrument Co, Inc. in 1998 Campden has been able to carry out new product development. Several years of hard work and investment in new design has now yielded the range of instruments presented in this, our first major brochure for several years.

The Vibroslice line of instruments continues to be simple and inexpensive. They are renowned for their flexibility of operation and responsive fingertip control, especially the manual HA752 model.

However, knowing that many researchers now require high quality cells on the surface of the slice, this requires a higher precision and control of blade movement. Campden's engineers conducted a prolonged period of research into materials, mechanisms and methods, resulting in **Integraslice** our high precision Oscillating Microtome. Please visit our website for a list of researchers who have realized the benefits of having **Integraslice** and its accessories in their laboratory.

All of our slicing instruments incorporate a removable Tissue Bath and Specimen Block for ease of cleaning. Autoclavable and freezable versions as well as tilting tissue blocks are available. A temperature controlled bath with a Peltier heat pump will also fit in the place of the standard bath. Cold light sources, magnifiers and microscopes are available to complete your system.

While developing Integraslice we also researched and developed our new blade technology, stainless steel and zirconium ceramic. *Researchers with aged mouse brain have reported a doubling of slice life when using the new ceramic blade.* So, if you are still using a cheap razor you may want to rethink your choice of blade!

Now that you have achieved healthy slices with the microtomes, Campden offers its multi-channel Slice Chambers and a Perfusion System to maximize experimental results. The Perfusion Chamber is designed to fit into the electrophysiology rig itself. Both are temperature controlled systems and have been developed in conjunction with experienced electrophysiologists from England and Germany.

We are committed to providing our customers with products that will continue to meet their needs. Therefore, we appreciate your comments, suggestions and support in our continuous quest to supply both innovative and quality instrumentation.

We wish you great success with your work.
Yours sincerely,

Greg Prescott
Managing Director
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Integraslice

High Precision Oscillating Microtome

Model 7550PSDS - Blade

Main Features:

Integraslice is designed to provide you with the highest quality slices in the most difficult tissue slicing applications. This is achieved with the following combination of features:

- Precision mechanical movement
- Electronic control system
- Precision blade technology
- Temperature control

All models are supplied with a standard tissue bath and holder, 50 stainless steel blades, and two ceramic blades.



Fine control at your fingertips

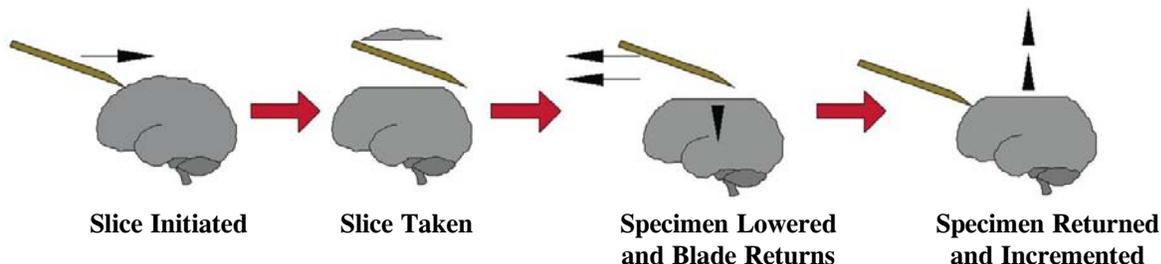
- 10 micron per second speed resolution for blade advance and reversing during sectioning.
- Constant feedback system allows cutting speed to be maintained through variations in tissue density.
- Blade returns for next slice at high speed to minimize total sectioning time.

The result is a minimum of induced trauma, and maximum preservation of cell structure and biochemical action.

Micron control of slice thickness

- A precision mechanical system raises tissue against gravity between slices for maximum accuracy.
- Increments of 1 micron height resolution by stepper motor control.
- Viewing mirror at rear of tissue enables you to see the point of entry.
- Coarse vertical height adjustment of 1mm per second is also available.

Tissue is automatically withdrawn during the reverse stroke so the blade is not drawn across the next slice. This is illustrated below.



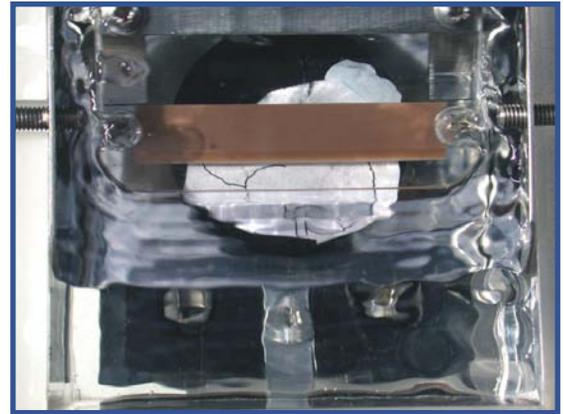
Observation during sectioning

The unique 'Clearview' observation window above the blade provides a ripple free surface on the artificial cerebro-spinal fluid (a.c.s.f.).

Observation can be with the naked eye or with an integrally mounted inspection microscope or magnifying glass.

Flexible fibre optic guides of the cold light source provide illumination where it is needed. The Cold Light Source Model 7550LS, Magnifying Glass Model 7550MG and Inspection Microscope Model 7550IM may be purchased as separate options.

'Clearview' observation window



Ergonomic user interface

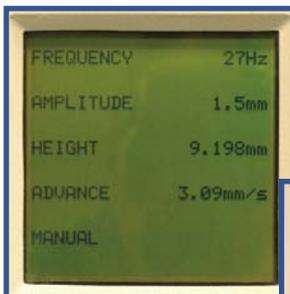
- Liquid Crystal Display (LCD) with associated membrane keypad.
- Easy-to-follow menu available in multiple languages.
- Twin rotary dial knobs offer variable control of the blade advance and return during sectioning and variable control of brightness for the cold light source.
- Two-stage foot-switch; first starts the blade oscillating and the second starts the advance of the blade. Thus, when the footswitch is released the tissue is never pushed against a static blade.
- The enclosure gives style and cleanliness, sealing against accidental spillage and is tolerant of salt and sugar a.c.s.f.
- Easy access to change the light source bulb and the drive belts.

Rotary dial knobs



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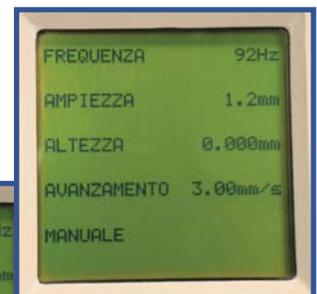
English



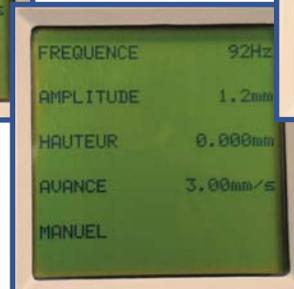
German



Italian



Spanish



French

Model 7550PSDS

Programmable cutting profiles of Speed, Distance and Section thickness

Features include Dynamically Adjustable Speed and Amplitude (DASA).

Model 7550PSDS Features:

PSDS denotes Programmable cutting profiles of Speed, Distance and Section thickness.

Using the rotary dial knob, the speed of advance can be slowed through one area and increased through another, with a resolution of 10 microns per second. By selecting record mode and going manually through the first slice, the instrument effectively learns the changes of speed and distance as the blade travels. When the third parameter of section thickness is entered and the number of slices required is set, the instrument will then faithfully reproduce the parameters that it recorded. This frees the operator's hands enabling them to harvest the slices in the shortest possible time.

Another feature is the DASA control. This is unique to Campden Instruments and is available only in this model. DASA is where both the speed of oscillation and the amplitude of the cut can be dynamically adjusted, in steps of 0.1mm, while the blade is in motion. The relationship between speed and amplitude is inversely proportional, the limits of which are set by an internal control system.



Model 7550PSDS Shown with optional accessories:
 Model 7550LS Cold Light Source
 Model 7550IM Inspection Microscope

The relationship between speed and amplitude:

Amplitude (mm)	Max. Speed (Hz)	Min. Speed (Hz)
0.5	115	20
1.0	100	20
1.5	80	20

Microtome Accessories:

- Campden's Precision Blades in Zirconium Ceramic and Stainless Steel
- Temperature Controlled Peltier Tissue Baths
- Cold Light Source
- Magnifying Glass or Inspection Microscope
- Autoclavable Baths
- Autoclavable Cutting Head
- Tilting Tissue Mount

Model 7550MM

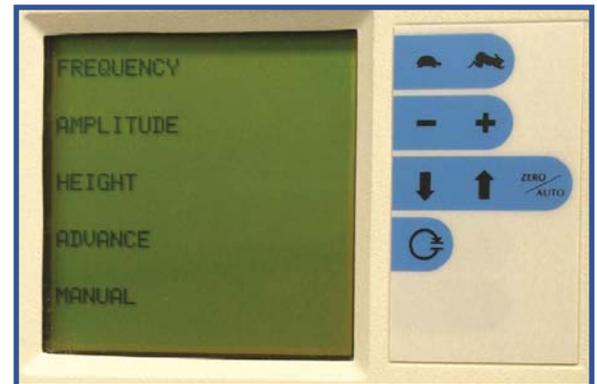
Motorized or Manual advance of the oscillating blade

Features include a set speed motorized advance/manual advance controlled by a rotary dial knob. Amplitude of oscillation can be manually adjusted.

Features:

MM denotes Manual or Motorized blade advance. This model has all the fine control of the PSDS but without the programmability or the DASA control. The amplitude is manually adjustable between 0.5mm to 1.5mm at a maximum oscillation speed of 80Hz. The manual advance offers the fingertip sensitivity of the rotary dial knob. The set speed advance gives repeatability and consistency. Visually the MM and the PSDS models are similar with the only differences appearing in the menu selections and membrane switch user interface.

LCD with associated membrane keypad



Precision Microtome Blades:

Development of our blade technology has been integral to our Microtome design. The blades are available in stainless steel and zirconium ceramic. Due to their special shape, they fit into Campden's blade holder so that the tissue returns to the perfused a.c.s.f. as quickly as possible. See pages 11 and 12 for further details.

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Integraslice Specifications:

Blade Motion:	Semi-elliptical with minimal vertical movement
Oscillation Speed:	Linear from 20Hz to 115Hz by rotary dial knob
Amplitude of Cut:	7550MM Manually adjustable, 0.5mm to 1.5mm 7550PSDS Dynamically adjustable with speed [DASA], 0.5mm to 1.5mm
Blade Advance Speed:	From -1.0mm/sec to + 3.0mm/sec in 10 micron steps
Blade Return Speed:	4.0mm/sec (tissue is automatically lowered)
Section Thickness:	1 micron resolution, retained in memory
Vertical Range:	32mm total, in 1mm steps / max speed of 1mm/sec
Sectioning Range:	From 1mm to 40mm
Maximum Specimen Size:	30mm x 40mm
Tissue Bath:	55mm x 82mm x 31mm /140ml, Standard, Autoclavable or Cooled
Cutting Head:	Autoclavable as standard
Blades:	Ceramic 7550/1/C or Stainless Steel 7550/1/SS
Observation:	Inspection Microscope 10x-40x with zoom or Magnifying Glass 2x and 'Clearview' window
Power Supply:	115/230VAC at 50Hz to 60Hz

Engineering, Quality Assurance and Metrology in Production

The following is abridged from a paper written for in-house project planning lead by Campden Chief Mechanical Engineer Geoff Hutton. A full copy is available on our website, www.campdeninstruments.com.

Engineering Design

- To satisfy the requirements of both user and specimen preservation, design must encompass many areas such as ergonomics, material selection and analysis, production techniques, metrology, quality control and assurance, microprocessor circuitry, software design and programming. The design procedure must ensure compliance with international directives and standards for product safety, Electromagnetic Compliance (EMC), etc.
- Prototype production units should be sent to some of the most demanding researchers for critical review.
- When designing new products (or upgrading existing ones) it is essential that the components selected will have a long production life. Where possible, component selection is made to incorporate the most up to date technologies.
- Components manufactured to our designs are supplied by companies that have been accredited to internationally recognized quality standards.

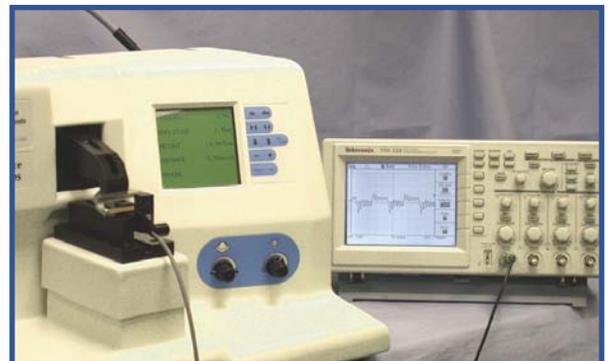
Production and Quality Assurance

Quality Assurance during product build must be continuous and all stages of assembly must be carefully monitored to ensure all specifications are met.

Metrology

- The difference between accuracy and resolution also needs to be clearly understood – accuracy may be defined as the degree of correctness while the resolution is the readable limits within which the measurement can be ascertained using a particular instrument.
- Repeatability of measurement is also a significant factor to be considered. The instrumentation must be suitably reliable. Statistical analysis of readings should be employed to establish the reliability and allow confidence to be quantified.
- When investigating the accuracy of motion of a microtome blade that is vibrating at frequencies up to 125Hz and to measure that motion to accuracies in the micron (0.001mm) range, specialized techniques have to be used as conventional mechanical contact inspect methods cannot react quickly enough or be relied upon. Thus, the in-house development of non-contact optical inspection techniques calibrated to micron accuracy using certificated masters that are traceable to National Standards is an integral part of the microtome development project.

In-House Metrology Device and Oscilloscope



Vibroslice™

**For 20 years the standard in acute slice laboratories worldwide.
Also used in Dermatology, Embryology, & Pathology.**



Model MA752 Shown with optional accessories:
 Model 752LS Cold Light Source
 Model 752IM Inspection Microscope
 Model 765LP Peltier Tissue Bath
 Model 752/2/AC Autoclavable Tissue Bath

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Microtome Accessories:

- Campden's Precision Blades in Zirconium Ceramic and Stainless Steel
- Temperature Controlled Peltier Tissue Baths
- Cold Light Source
- Magnifying Glass or Inspection Microscope
- Autoclavable Baths
- Autoclavable Cutting Head
- Tilting Tissue Mount

There are three Vibroslice models as follows:

- Model HA752 - manual tissue transport
- Model MA752 - motorized tissue transport
- Model ROMA752 - remotely operated motorized tissue transport and blade height

Vibroslice Specifications:

Blade Motion:	Straight Line
Oscillation Speed:	0Hz to 70Hz by rotary dial knob
Amplitude of Cut:	1mm nominal, all models
Bath Advance Speed:	
HA752	Manual
MA752	Motorized from 0.08mm/sec to 1.6mm/sec
ROMA752	Motorized from 0.08mm/sec to 1.6mm/sec
Bath Return Speed:	
HA752	Manual
MA752	Fixed speed of 1.7mm/sec
ROMA752	Fixed speed of 1.7mm/sec
Section Thickness:	
HA752	Manual with 2 micron resolution
MA752	Manual with 2 micron resolution
ROMA752	Dual speed motorized with resolution of 1 micron
Vertical Range:	32mm
Sectioning Range:	From 1mm to 40mm
Max. Specimen Size:	30mm x 40mm
Tissue Bath:	55mm x 82mm x 31mm / 140ml, standard, autoclavable or cooled
Cutting Head:	Removable Autoclavable as standard
Blades:	Ceramic 7550/1/C or Stainless Steel 7550/1/SS
Observation:	Inspection Microscope 10x - 40x with zoom or Magnifying Glass 2x and 'Clearview' window
Power Supply:	230VAC 50Hz or 115VAC 60Hz
Power Rating:	HA752, 15W; MA752 and ROMA752, 20W

General Description:

- Vibroslice is designed to cut sections of fresh, unfixed tissue for in-vitro recordings, tissue culture and microassay work.
- Vibroslice can be used to section fixed tissue without previously embedding or freezing.
- Vibroslice will section tissue such as brain stem and liver, maintaining the integrity of surface.
- Ultra-low advance speed is now available on motorized models.
- The speed of oscillation has been increased.
- New blade holder for both ceramic and slim stainless steel blades is incorporated on all Vibroslice models.
- The blade oscillates at a fixed lateral displacement of 1.0mm at a frequency set by the user.
- All models are supplied with:
 - Removable Tissue Holder and Bath (standard model)
 - 50 Stainless Steel and two Ceramic Blades
- The Removable Tissue Holder and Bath allows tissue to be prepared and stored, ready for later use and provides for easy cleaning which prevents carryover of fixative between fixed and unfixed tissue.
- Original concept of John Jefferys, (University of Birmingham Medical School, UK).
Ref: J.G.R. Jeffreys. The Vibroslice, a new vibrating-blade tissue slicer. J.Physiol. (Lond.) 234:2P, 1982. (Abstract)

The motorized tissue transport Model MA752

Control of the speed of advance of the tissue to be sectioned is set on a rotary dial and the user then presses a footswitch leaving both hands free during operation. This model is recommended for use in cutting serial sections for reconstruction or for producing multiple sections.

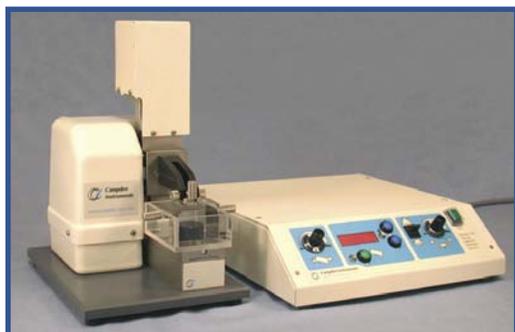
Both the HA752 and the MA752 are fitted with the Standard Tissue Bath and Holder. Optionally, this can be replaced by Autoclavable Bath and/or Tilting Tissue Holder. The standard cutting head can be removed for autoclaving in applications where sterility is important.

Model HA752 (left) and Model MA752 (right)



The manual tissue transport Model HA752

The manual advance of the section gives complete control during sectioning. The HA752 is recommended for use in producing a small number of sections or for use on tissues with differing mechanical properties.



Model ROMA752

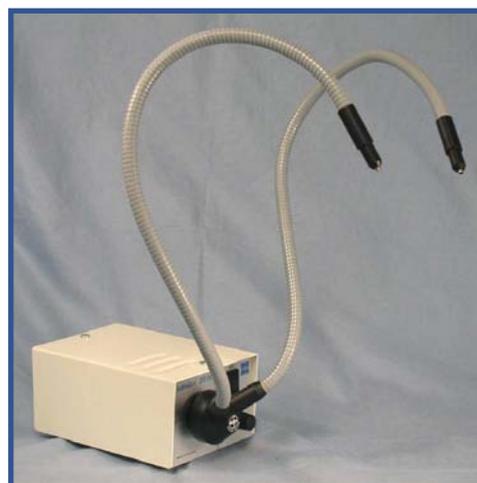
The remote motorized Model ROMA752

This instrument was designed especially for work with hazardous tissues such as those containing Prions or rabies infection. The cutting head, tissue bath and associated drive mechanisms are operated remotely from the control box. Thus the slicing portion of this instrument can be placed inside a controlled environment such as a thin film isolator. A tissue bath and cutting head capable of withstanding autoclaving at 140°C are included.

Illumination

To facilitate the careful slicing operation, it is most important that the progress of the blade through the tissue be clearly observed. This observation is used to ensure control of the speed of advance and of the oscillation of the blade. Two elements are required for clear observation, light and magnification.

Model 7550LS - Built into Integraslice



**Model 752LS - Free standing
for use with Vibroslice**

Cold Light Source Features:

- Ability to direct the light where it is needed with the two flexible fiber optic light guides.
- Maintains temperature stability of the tissue or surrounding a.c.s.f.
- Light intensity is adjustable by a rotary dial knob.

Observation Accessories Specifications:

752LS/7550LS Cold Light Source: 20W/12V Halogen lamp, 2000 hour life approx
Fan and electronic power supply
Adjustable with potentiometer
Twin 500mm fibre optic light guides

752IM/7550IM Inspection Microscope: Binocular, 45° inclined
1x to 4x zoom
10x to 40x magnification
WF10x/20mm eyepiece
80mm working distance

752MG/7550MG Magnifying Glass: 115mm diameter
305mm focal length
2x magnification

Observation



Model 752IM - free standing for Vibroslice
Model 752MG (not shown)



Model 7550MG and 7550IM - built into Integraslice

For general global slices a magnifying glass offering approximately 2x magnification is sufficient. However, if specific loci are under study then an inspection microscope is desirable. The binocular inspection microscope with 10x to 40x magnification, a zoom range of 1x to 4x and a working distance of 80mm is ideal for the task.

Autoclavable Tissue Baths

Autoclavable and Freezable Tissue Baths

Model 752/2/AC is the same in volume and dimensions as the standard tissue bath. However, it is machined from high temperature plastic and will withstand temperature extremes.



Model 752/2/AC

Model 752/2A/A



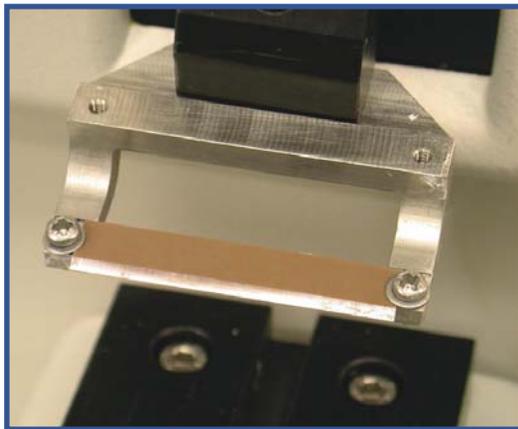
Tilting Tissue Mounts

Model 752/2A/A fits into the Tissue bath in the same way as the standard tissue mount and can be adjusted to a 15 degree angle in all directions.

Specialist Blade Technology for Campden Oscillating Microtomes

Campden Precision Blade Specifications:

	752/1/SS	7550/1/C	7550/1/SS
Material	Stainless Steel	Ceramic	Stainless Steel
Dimensions	39mm x 18mm x 0.5mm	38mm x 7mm x 0.5mm	38mm x 9mm x 0.5mm
Geometry	Double sided	Single sided	Double sided
Bevel	Double bevel	Single bevel	Double bevel
Honing	Ground edge	Lapped edge	Ground edge



Ceramic Blade - Mounted

Microtome Blades:

Campden Instruments supplies three types of blades, (1) ceramic and (2) stainless steel, for its complete range of oscillating microtomes, Vibroslice and Integraslice.

Blade Technology:

- The new blade holder design is now included with all Integraslice and Vibroslice instruments.
- 7550/1/C and 7550/1/SS are designed for new Vibroslice and Integraslice instruments.
- 752/1/SS blades are for Vibroslice instruments manufactured prior to 2003.

Slice Image:

The image below shows a cell from the Medial Nucleus of the Trapezoid Body (MNTB) in the brainstem of a 12 day-old rat. Especially evident on the left of the cell is a giant pre-synaptic terminal 'Calyx of Held'. The cell is about 20 μ m across and the terminals are less than 1 μ m thick around the cell.

The slice was produced using a Model 7550PSDS Integraslice with an oscillation speed of 100Hz and oscillating amplitude of 1mm. A ceramic blade was used with the blade advance speed set to 0.02mm/sec to 0.04mm/sec. The slice thickness is 300 μ m.



Photograph courtesy of Dept. of Cell Physiology and Pharmacology, University of Leicester with thanks to Prof. Ian Forsythe & Dr. Brian Billups



Model 752/1/SS

Model 752/1/SS Stainless Steel Blades

- Double bevelled on both faces, honed to an acute cutting edge and hardened to 56 Rockwell.
- Nevertheless, stainless steel is relatively soft and these blades are usually used once or at a maximum changed every day.
- These blades are for use in specially designed blade holders for Vibroslice instruments manufactured prior to 2003.
- **Dimensions:** 39mm x 18mm x 0.5mm

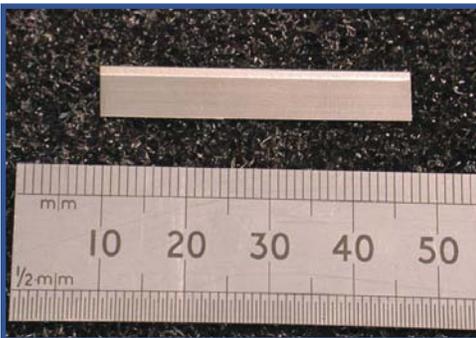
Model 7550/1/C Ceramic Blades

- Made from ultra hard zirconium and honed by a process of 'lapping' both sides of the single bevel to micron flatness.
- Great rigidity, hence a straight cutting edge.
- Prolonged slice life, especially in the most difficult of tissues such as young brain or very old brain.
- Inert and impervious to corrosion.
- Initial higher cost is offset by its longevity.
- Fits into a special blade holder now standard on both Integraslice and Vibroslice instruments.
- **Dimensions:** 38mm x 7mm x 0.5mm



Model 7550/1/C

Model 7550/1/SS



Model 7550/1/SS Stainless Steel Blades

- The same geometry as the proven 752/1/SS used in the Vibroslice for many years.
- Allows the tissue to slip over the blade and back into the perfused a.c.s.f.
- Interchangeable with the 7550/1/C in the special blade holder supplied as standard on both Integraslice and Vibroslice instruments.
- **Dimensions:** 38mm x 9mm x 0.5mm

Blade & Blade Motion: an Integrated Design

The three factors that will determine the quality of the slice are the motion of the oscillating blade, the control of the advance speed and the blade technology. The Integraslice design, features a cutting head mounted upon a parallel leaf-spring assembly. The precision mechanical action is designed to hold the motion of the oscillating blade exactly in line with its cutting edge and to minimize the vertical motion to a few microns. In house testing and quality control build consistency into all instruments to ensure accuracy while oscillating at speeds of up to 115Hz.

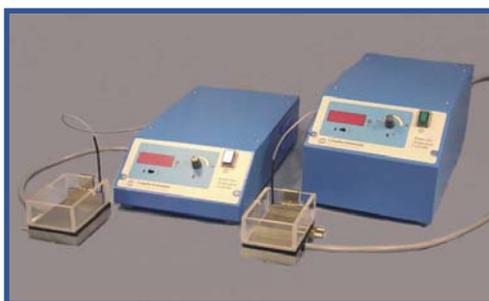
An important feature arising from the motion of the leaf spring assembly is that the path of the blade is semi-elliptical. Thus the advancing tissue is never in contact with a static blade. There is no possibility of the tissue becoming compressed against the blade which would result in damage to cells and a differential in thickness across the slice.

Campden Temperature Controlled Tissue Baths for Integraslice and Vibroslice™ Oscillating Microtomes:

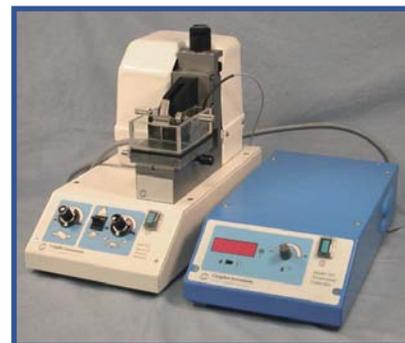
Thermoelectric Cooling:

The control unit supplies power to the Peltier thermoelectric elements in the base of the tissue bath. These act as energy transfer units so that heat is drawn off, cooling the solution in the tissue bath. The heat is removed by transfer to the water supply running through the heat exchanger. The unit uses proportional temperature control to take the bath temperature to within 0.5°C at the point of measurement. The temperature feedback sensor is located in the stainless steel temperature feedback block (the high power 765HP has an additional heatsink block) and will indicate the temperature at the point of measurement.

Model 765LP with Model 765HP



Vibroslice MA752 with Model 765LP



Features - Model 765LP and Model 765HP

- Compatible with Microtome models 7550PSDS, 7550MM, HA752, MA752 and ROMA752.
- Autoclavable versions have baths detachable from the thermoelectric elements.
- The bath chamber has the same volume as the Standard Tissue Bath Model 752/2B and Autoclavable Bath Model 752/2/AC.
- Uses a Standard Tissue Mount Model 752/2A or Tilting Tissue Mount Model 752/2A/A
- Sectioning at 4°C improves preservation and viability for in-vitro recordings.
- Some enzyme histochemical techniques give better staining results when sectioned at low temperatures.

Autoclavable Tissue Baths for 765 series Peltier Temperature Controllers

Machined from solid aluminum bronze, these tissue baths, Model 765LP-AC and Model 765HP-AC, are detachable from the thermoelectric element unit and can be placed in an autoclave. The Standard Tissue Mount or Tilting Tissue Mount can be used and autoclaved along with the bath.



Model 765LP-AC

Tissue Bath Temperature Controllers Specifications:

Display Resolution:	0.1°C
Temperature Accuracy:	± 1°C
* Temperature Range 765LP:	-1°C to +40°C
* Temperature Range 765HP:	-10°C to +40°C
Voltage Requirements LP (HP):	230VAC 50Hz Fused at 1A, (2A) 110VAC 60Hz Fused at 2A, (4A) Selectable via switch on the rear of the unit
Power Requirement LP (HP):	unit

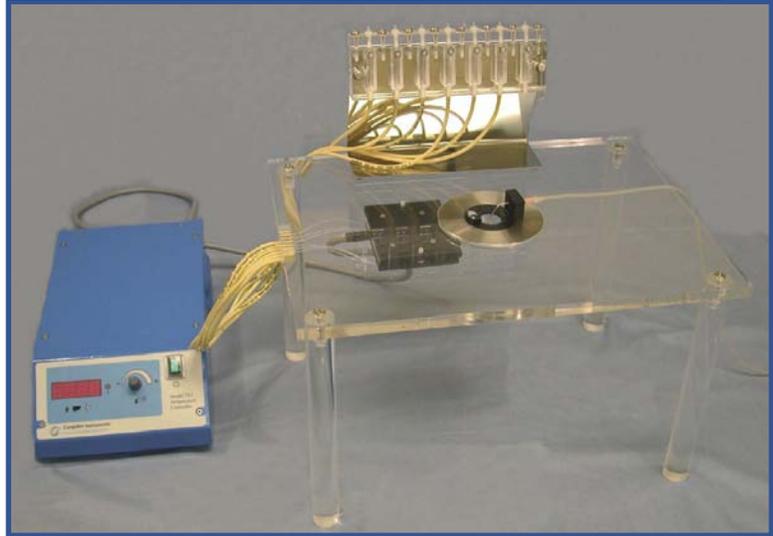
** (The actual temperature achievable will be dependent upon the solutions used and local temperature conditions)*

Multichannel Perfusion Systems

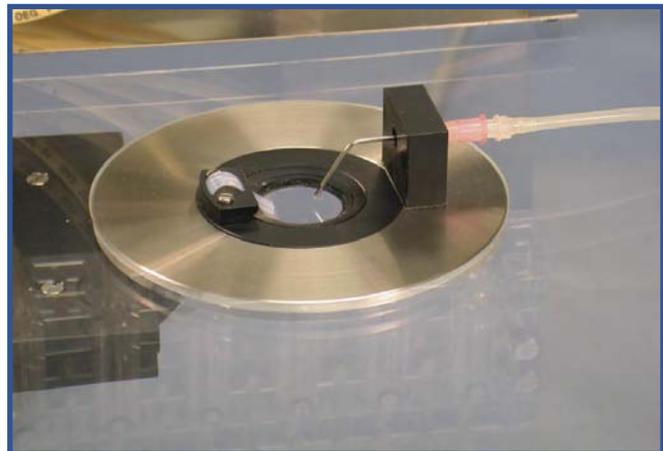
Model 755 Perfusion System

Features:

- Multichamber Feeder Block, mounts inside the Faraday Cage and provides a visual indication of perfusion rate and isolation from spurious electrical and electrostatic noise.
- Allows delivery of gassed saline.
- Flow rates suitable for brain slice maintenance and for rapid application of drugs and antagonists.
- Switching between channels is performed at the perfusion pump and each channel is independent, thus minimizing dead-volume.
- Self equilibrating delivery system eliminates surface vibrations and minimizes fluid level fluctuations.
- Outflow precisely controlled by spark eroded suction tip developed at University of Leicester technical workshops.
- Eliminates vibration from bubbles and maintains stability of water interface.



Model 755 Perfusion System



Spark Eroded Suction Tip

Perfusion System Specifications:

Perfusion Bath Volume:	0.5ml to 1.0ml
Perfusion Rate:	0.5ml/min to 4.0ml/min
Bath Volume:	Changed in 30 to 50 seconds
Flow Ratio Inflow to Outflow:	Typically 1:4

In-Vitro Chambers for Brain Tissue Slices

General Description:

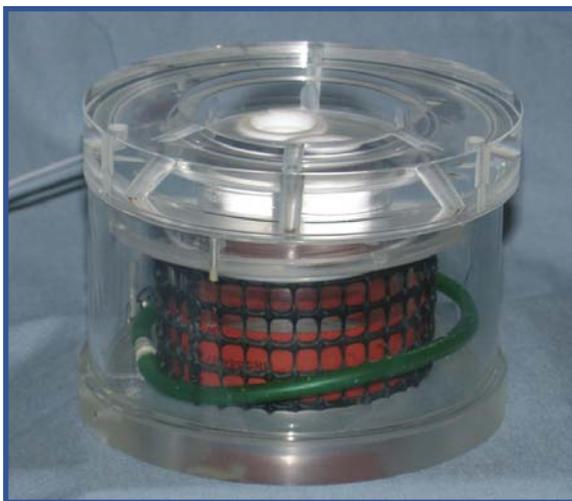
Campden Instruments' Model 745 series of slice chambers guarantee high stability and a vital environment for brain slice tissue in electrophysiological, biochemical, anatomical or pharmacological studies. The chambers are manufactured from Plexiglas, or, for pharmacological or toxicological studies, the inner wells and all tubing are supplied in chemically inert p.t.f.e. (Teflon®) to avoid adhesion of drugs. The one or two channel chambers can be used either in the classical submerged or in the air/fluid interface mode by adjusting the fluid surface above the tissue. In the four, six or eight channel chambers there are separate chamber heads for the submerged and interface modes. Different head configurations can be manufactured on request including heads with one, two, three, four or six inner wells, different types of suction procedures and replaceable inner wells. For electrophysiology each recording well contains a silver wire as a reference electrode and an optionally available thermistor probe Model PT-100.

General Chamber Features:

- Oslo-type for submerged or Haas-type for air/fluid interface with humidified atmosphere above the tissue slices.
- Outer water bath has a heating element and gas tube for oxygenation.
- Tubing is routed in upper chamber head for reliable and fast gas exchange.
- Chamber head construction incorporates inner wells.
- In one and two channel chambers, inner wells are configured either as a static pool or with continuous perfusion.
- The tissue slices are located on nylon mesh stretched over a removable ring.
- Custom head designs are available.

Two Channel Chamber Heads:

In the standard chamber version, the level of the perfusion medium is controlled by suction in a second well which is connected through an outlet port to each of the recording wells.



Two Channel classic Oslo-type
Model 745-2PO for submerged slice

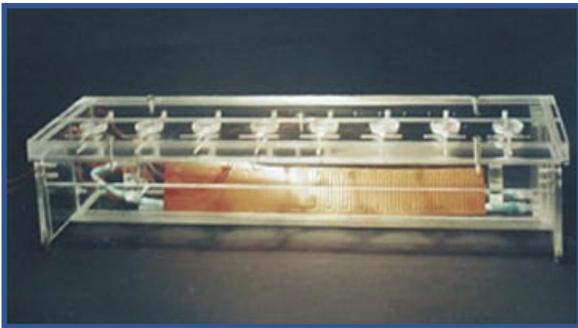
Customized chamber heads



Eight Channel Chamber Heads:

In the Oslo-type chambers each inner well in the chamber head includes a fluid inlet and outlet into a second suction well. From there the fluid level in the inner wells can be regulated using the suction port. All connections are made to be used with male Luer connectors. In Haas models, slices are maintained in an air-liquid interface. The head of the chambers consists of eight inner Haas-type chambers, covered to maintain a well oxygenated and humidified atmosphere above the slice preparations which maintains tissue viability. The chamber can also be manufactured as two or four channel versions. Inner interface chambers can be arranged in linear or concentric arrangements.

8 Channel Oslo-type Model 745-8PO for submerged slices



8 channel Haas-type Model 745-8TH for interface mode



Model LTR-1 Temperature Controller for In-Vitro Chambers:

- Single channel temperature control unit is for use with the in-vitro chambers.
- A proportional, integral and derivative (PID) algorithm, precisely controls the heating elements, maintaining the outer water bath at the desired temperature.
- Equipped with a microprocessor controlled PID temperature regulator to drive the heating pads.
- The LTR-1 Temperature Controller is simple to operate and easy to use.
- User sets only the sensor type, desired temperature and the control mode.
- All values can be stored for subsequent operation.
- No recalibration is necessary, unless sensor probes or heating elements need to be replaced.



Model LTR-1

Optopatch Patch Clamp Amplifier

Model 7700 Series Optopatch Patch Clamp :

The Optopatch patch clamp amplifier from Cairn Research is a general purpose amplifier, incorporating a number of unique features in order to optimize its performance across a wide range of applications. The headstage includes a patented optical technique for measuring small currents over a wide bandwidth (up to 200 KHz). A major feature is the inclusion of a lock-in amplifier for measurement of membrane capacitance and resistance, with linear calibrated resistance and capacitance outputs. This built in device has a unique “track-in” mode that keeps the lock-in amplifier in perfect balance, maintaining discrimination between resistance and capacitance, details of which have now been published in **Pflügers Archiv** Vol 443, pp 653-663 (2002). The Optopatch also includes unique circuitry for protection against overcompensation of series resistance and electrode capacitance, safeguarding your cells during recording.

Applications:

- Single channel recording
- Whole cell recording
- High resolution capacitance measurement
- Fast, high impedance amplifier
- Voltammetry



Key Features:

- Optical headstage for high bandwidth and low noise
- Differential reference input on headstage
- True voltage follower in current clamp mode
- Unique cell protection against over compensation of series resistance and electrode capacitance
- Calibrated resistance and capacitance outputs
- Integral lock-in amplifier for membrane capacitance measurement
- Choice of four or eight pole Bessel filtering
- Gain and frequency telegraphing outputs
- Electrode capacitance compensation of up to 15pF
- Membrane capacitance compensation of up to 200pF with standard headstage
- High resolution metering displays
- Optional external control of many functions

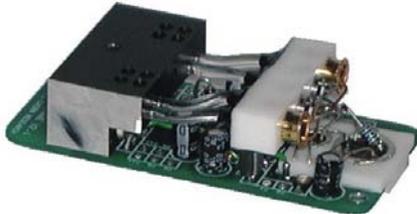
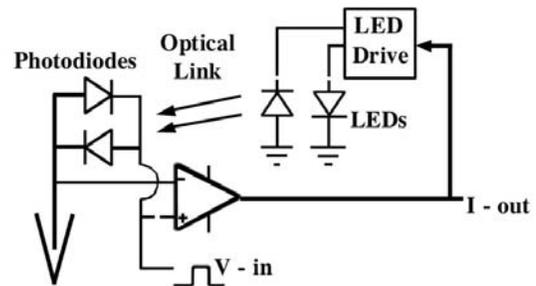
System Options:

- High capacitance headstage (Up to 2nF capacitance correction)
- Eight pole Bessel filter (recommended)

Optopatch Patch Clamp Amplifier

Optical Headstage:

The headstage uses a patented optical technique for passing current in both ranges. It has a true voltage follower mode that does not degrade the performance in other configurations, and also incorporates a differential reference input. A separate headstage is available for large membrane capacitance compensation (up to 2nF).



Internal view of headstage

Optical Headstage Specifications:

- Gain : 10mV/pA (1nA max) or 0.1mV/pA (100nA max)
- Input Voltage Range : $\pm 1V$ (for voltammetry)
- Bandwidth (-3dB) : 100KHz or 200KHz (internally selectable)
- Dimensions (W x H x D) : 30mm x 20mm x 75mm

Optopatch:

The patch clamp amplifier unit incorporates all the facilities expected on a modern patch clamp amplifier, with the several unique additions, including the built-in lock-in amplifier for membrane capacitance measurement and protection against overcompensation of electrode capacitance and series resistance. Additional standard features include a sine/square wave signal generator, three resistance and capacitance ranges for higher resolution, and four pole Bessel filtering. Gain and frequency telegraph outputs conform to the standards used by commercial electrophysiological software.

Optopatch Specifications:

- Prefilter Settings: 3KHz, 10KHz or 100KHz (or off)
- Output Filter Range: 1Hz to 100KHz
- Electrode Capacitance Range: 0pF to 15pF
- Membrane Capacitance Range: 0pF to 200pF (0nF to 2nF with high capacitance headstage)
- Series Resistance Compensation: 0.5M Ω to 100M Ω
- Oscillator Range: 100Hz to 100KHz
- Capacitance Measurement: < 10fF
- Tracking Range: $\pm 50\%$ of full scale resistance and capacitance settings
- Metering Display Settings: Vcom, Vj, Signal, Filter, RMS, Oscillator frequency, Resistance, Capacitance, Phase

Acquisition and Control:

Episodic Data Acquisition - For high speed single channel and whole cell recordings using sweep based protocols we recommend using the Strathclyde Electrophysiology Software written by Dr. J.Dempster, together with a third party acquisition card (current recommendation is the National Instruments PCI-MIO-16E). This provides a complete versatile and economical electrophysiology system.

Continuous Acquisition - In applications where data is acquired continuously we can supply the Cairn acquisition system, which runs under Win95, 98, Me and 2000. This includes a high resolution Data Acquisition Card and a graphical front end for data acquisition and manipulation.

McIlwain Tissue Chopper

Model TC752 General Description:

The McIlwain Tissue Chopper has been designed to prepare samples of tissue for metabolic experiments and is particularly suitable for small and irregular samples for biopsy or from small organs. For Neuroscience it offers the opportunity for rapid chopping of tissue such as hippocampus, which is relatively flat, and will not suffer excessive stress damage. The McIlwain also has applications in organotypic slices and for preparing tissue for immunology studies. For slicing cortical or sub-cortical regions Campden's oscillating microtomes will provide more precise and gentle slice sectioning. The tissue chopper is also good for preparing cell cultures from the brain of young animals. Its operation is such that it will cause much less disturbance of cell structure than would a blender or homogeniser, and it can be used on fragments which would be difficult to cut by ordinary methods. Typical applications are for liver, kidney and parts of the central nervous system.



- Preparation of 1mm thick slices or cubes and prism samples can be prepared in 30 seconds.
- The Chopper offers stepless variation of slice thickness from zero to maximum.
- The specimen table is traversed automatically, from left to right, at a speed which can be varied.
- During travel the chopping arm, with blade, is raised and dropped, at speeds of up to 200 strokes per minute.
- If prism shaped pieces are required the table is returned to the left hand side of the machine, rotated through 45 degrees, and the process repeated. To prepare cubes the table is rotated through 90° for the second chop.
- A safety limit switch prevents overrunning and a quick return mechanism is fitted for the return of the table.

McIlwain Tissue Chopper Specifications:

Slice Thickness:	Maximum 1mm
Power Supply:	220VAC to 240VAC 50Hz or 110VAC 60Hz
Power Rating:	0.5A
Fuse:	3.15A anti-surge (T) 5mm x 20mm
Operating Conditions:	Indoor use Altitude < 2000 meters Ambient Temperature 5°C to 40°C Maximum RH 80% at 31°C decreasing linearly to 50% RH at 40°C
Dimensions:	32cm x 28cm x 15cm
Weight:	6.6kg (240VAC) 6.3kg (110VAC)



Model TC752/1 Blade and
Model TC752/CT Chopping Disc

Safety:

By the nature of its use this machine does NOT have any guards around the cutting blade. In the interest of safety, care must be taken during use. At all times keep hands clear of the blade and cutting table when the machine is switched on. It is recommended that the blade be removed when the machine is not in use.

Integraslice

7550MM	Integraslice Manual and Motorized	6, 14
7550PSDS	Integraslice Programmable Speed, Distance and Section	3, 5, 12, 14

Integraslice - Spares and Consumables

752/2A	Tissue Holder	14
752/2B	Tissue Bath	14
752/2A/A	Tilting Tissue Mounts	12
752/2AB	Tissue Holder and Bath Assembly	-
752/2/AC	Autoclavable Tissue Bath and Holder	8, 11, 14
765TFB	Feedback Block for Temp. Controller Bath	14
765HS	Heatsink Block for Temp. Controller Bath	14
7550/1/C	Ceramic Blades (pk 5)	12, 13
7550/1/SS	Slim Stainless Steel Blades (pk 50)	12, 13

Integraslice - Illumination and Observation

7550IM	Inspection Microscope, Integral Mount	4, 5, 10, 11
7550MG	Magnifying Glass, Integral Mount	4, 10, 11
7550LS	Cold Light Source, Integral Mount	4, 5, 10

Vibroslice

HA752	Vibroslice Manual Advance	8, 9, 14
MA752	Vibroslice Motorized Advance	8, 9, 14
ROMA752	Vibroslice Remote Operation Motorized	8, 9, 14

Vibroslice - Spares and Consumables

752/2A	Tissue Holder	14
752/2A/A	Tilting Tissue Mount	11
752/2B	Tissue Bath	14
752/2AB	Tissue Holder and Bath Assembly	-
752/2/AC	Autoclavable Tissue Bath and Holder	8, 11, 14
752/4	Drive Belts for 752M (pk 8)	-
752/5	Drive Belts for 752 (pk 4)	-
752/6	Blade Guard, Plastic (pk 5)	-
752/7	Removable Autoclavable Cutting Head	-
752/8	Vernier	-
752/9/SS	Stainless Steel Blade Holder, Screw and Clamp	-
752/069	Protractor for Blade Angle (pk 5)	-
765TFB	Feedback Block for Temp. Controller Bath	14
765HS	Heatsink Block for Temp. Controller Bath	14
752/1/SS	Stainless Steel Blades (pk 50)	12, 13
7550/1/C	Ceramic Blades (pk 5)	12, 13
7550/1/SS	Slim Stainless Steel Blades (pk 50)	12, 13

Vibroslice - Illumination and Observation

752IM	Inspection Microscope, Free Standing	8, 10, 11
752MG	Magnifying Glass, Free Standing	10, 11
752LS	Cold Light Source, Free Standing	8, 10

Temperature Controlled Tissue Baths

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765HP-AC	Autoclavable High Power Bath	14

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Slice Chambers

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745-2TO	Teflon	16
<i>2 Channel Chambers: Haas Type for Slices at Air/fluid Interface</i>		
745-2PH	Plexiglas	16
745-2TH	Teflon	16
<i>8 Channel Chambers: Oslo Type for Submerged Slices</i>		
745-8PO	Plexiglas	17
745-8TO	Teflon	17
<i>8 Channel Chambers: Haas Type for Slices at Air/fluid Interface</i>		
745-8PH	Plexiglas	17
745-8TH	Teflon	17
<i>Temperature Controller</i>		
LTR-1	Temp. Control Unit for Slice Chambers	17
PT-100	Temperature Sensor	16
745-HESC	Heating Element for Slice Chambers	17

Optopatch

7700/4	Amplifier with 4 pole Bessel Filter	18, 19
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7700/MOD	Model Cell	18, 19
7700/DAC	Data Acquisition Card	18, 19
7700/2CH	Data Interface Cable	18, 19
7700/PCS	D-Strathclyde Patch Clamp Software	18, 19

McIlwain' Tissue Chopper

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TC752/1	Blades (Pk 10)	20
TC752/CT	Spare Chopping Discs (Pk 10)	20

'-' Denotes product is available but not included within the text of this catalog.

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Please include the following information on all orders: (Phoned orders must be followed by a hard copy.)

- 1) Complete billing and shipping addresses
- 2) Name and department of end user
- 3) Model number and description of desired item(s)
- 4) Quantity of each item desired
- 5) Purchase order number or method of payment
- 6) Telephone number

DOMESTIC TERMS

There is a \$50/£50 minimum order. Open accounts can be extended to most recognized educational institutions, hospitals and government agencies. Net amount due 30 days from the date of shipment. Enclose payment with the order; charge with VISA, MasterCard, American Express; or pay COD. We must have a hard copy of your order by mail or fax. Students, individuals and private companies may call for a credit application.

INTERNATIONAL PAYMENT INFORMATION

There is a \$50/£50 minimum order. Payment must be made in advance by: draft drawn on a major US bank; wire transfer to our account; charge with VISA, MasterCard, American Express; or confirmed irrevocable letter of credit. Proforma invoices will be provided upon request.

EXPORTS

If ordering equipment for use outside the USA/UK, please specify the country of ultimate destination, as well as the power requirements (110V/60Hz or 220V/50Hz).

QUOTATIONS

Quotations are supplied on an as-requested basis. Written quotations will include the price of goods, plus estimated shipping and handling if requested. Quotations are good for 90 days; following that time, prices are subject to change. In such a case, please ask us to requote your order.

EXCHANGES and REFUNDS

Unaccepted merchandise may be returned for credit *only* if we have been consulted and have issued prior authorization. The merchandise should be packed well, insured for the full value and returned along with a cover letter explaining the reason for return. Merchandise may be returned prepaid within thirty (30) days after receipt of the item and in the original shipping carton. Collect shipments will not be accepted. Unit must be returned in saleable condition, and credit is subject to inspection of the merchandise. Customer may be assessed a restocking fee of up to 20%.

RETURNS

Equipment may not be returned without first completing a Decontamination Form and requesting a Return Goods Authorization Number (RGA).

When returning equipment for service, please call Campden Instruments or Lafayette Instrument to receive a RGA number. Your RGA number will be good for 30 days. Address the shipment in USA to: Lafayette Instrument Company, 3700 Sagamore Parkway North, Lafayette, IN 47904, USA. Shipments cannot be received at the PO Box. For the rest of the world, address to: Campden Instruments Ltd., 4, Park Road, Sibley, Loughborough. LE12 7TJ. England. The items should be packed in the original packaging (replacement packaging can be sent at the customers' expense), insured for full value, and returned along with a cover letter explaining the malfunction. Please also state the name of the company representative authorizing the return. An estimate of repair will be given prior to completion **ONLY** if requested in your enclosed cover letter. We must have a hard copy of your purchase order by mail or fax, or repair work cannot commence.

WARRANTY

Campden Instruments guarantees its equipment against all defects in materials and workmanship to the ORIGINAL PURCHASER for a period of one (1) year from the date of shipment, unless otherwise stated. During this period, Campden Instruments will repair or replace, at its option, any equipment found to be defective in materials or workmanship. If a problem arises, please contact our office for prior authorization before returning the item. This warranty does not extend to damaged equipment resulting from alteration, misuse, negligence or abuse, normal wear or accident. In no event shall Campden Instruments be liable for incidental or consequential damages. There are no implied warranties or merchantability of fitness for a particular use, or of any other nature. Warranty period for repairs or used equipment purchased from Campden Instruments is 90 days.

DAMAGED GOODS

Damaged equipment should not be returned to Campden Instruments or Lafayette Instrument prior to thorough inspection.

If a shipment arrives damaged, note damage on delivery bill and have the driver sign it to acknowledge the damage. Contact the delivery service, and they will file an insurance claim. If damage is not detected at the time of delivery, contact the carrier and request an inspection within 10 days of the original delivery. Please call your company representative for a return authorization for repair or replacement of the damaged merchandise.

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