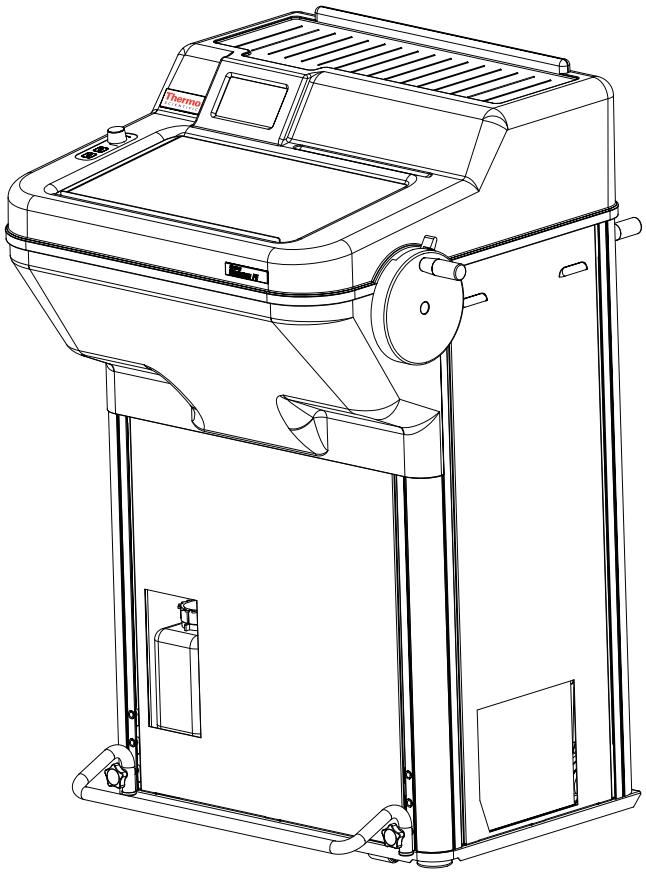
Cryotome® FE & FSE

Operator Guide - English

A78910100 Issue 4



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CE The Shandon Cryotome range meets the following CE Mark requirements:

In Vitro Diagnostic Directive 98/79/EC

Low Voltage Directive 73/23/EEC, as ammended by 93/68/EEC.

C SA® US

Contents

Symbols

The following symbols and conventions are used throughout this manual and on the instrument.

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT INSTRUCTIONS MUST BE FOLLOWED FOR SAFE AND CORRECT OPERATION. IF THIS SYMBOL APPEARS ON THE INSTRUMENT, ALWAYS REFER TO THIS OPERATOR GUIDE. s

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT THERE MAY BE A BIOHAZARD ASSOCIATED WITH THE INSTRUMENT. ALWAYS ACT WITH COMMON SENSE AND BE AWARE OF THE SAMPLES USED. TAKE SUITABLE PRECAUTIONS. s

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT THERE ARE POTENTIAL PINCH POINTS. IF THIS SYMBOL APPEARS ON THE INSTRUMENT, ALWAYS REFER TO THE OPERATOR GUIDE. s

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT HARMFUL CHEMICALS ARE USED WITH THE INSTRUMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS FOR THE CHEMICALS USED. ALWAYS ACT WITH COMMON SENSE AND BE AWARE OF LOCAL LABORATORY PROCEDURES. TAKE SUITABLE PRECAUTIONS. s

WARNING

A warning is given in the document if there is a danger of personal injury or damage to samples or equipment. s

Note *Notes given more information about a job or instruction but do not form part of the instruction.* s

Chapter 1 Welcome

Welcome to Thermo Fisher Scientific Shandon Cryotome FE and FSE Cryostats. They are designed for the routine sectioning of quick-frozen tissue specimens, for subsequent preparation and diagnosis by a pathologist. The Shandon Cryotome series of cryostats are intended for use in pathology laboratories by appropriately trained medical laboratory technicians.

Designed and made with care, the instrument is safe to use, simple to operate, and easy to maintain. The Shandon Cryotome series of cryostats conforms with IEC61010-1 and EN61326, the safety and EMC standards for laboratory instruments.

This Operator Guide gives instructions for the correct operation and use of the Shandon Cryotome FE and FSE. Instructions and information that applies only to a particular version of Shandon Cryotome are marked *[FE only]* or *[FSE only]*.

Safety

Thermo products are designed for convenient and reliable operation and to accepted standards of safety. The use of the Shandon Cryotome does not entail any hazard if operated in accordance with the instructions given in this manual. If the instrument is used in a manner not specified by Thermo Fisher Scientific, then the protection provided by the instrument may be impaired. It is important for you to follow the following safety precautions:

THE FOLLOWING PARAGRAPHS DETAIL IMPORTANT SAFETY INFORMATION. PLEASE READ THIS SECTION CAREFULLY. s

1. All users must read and understand the Operator Guide and only operate the unit in accordance with the instructions. If the instructions are not followed, then the protection provided by the instrument may be impaired.

2. Do not modify the instrument - if unauthorised modifications are carried out, the instrument may be made unsafe and the warranty will be invalidated.

3. Potentially lethal voltages above 110V a.c. or 50V d.c. are present in the instrument.

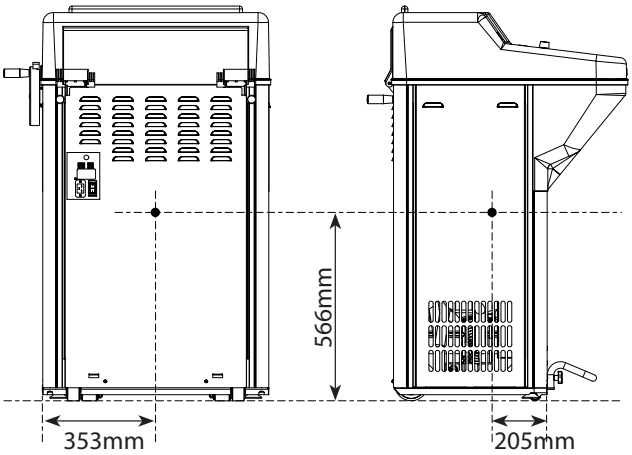
4. This instrument has a protective earth system and must be properly connected to a good earth (Ground) via the mains input supply,

5. Do not remove any panels or covers unless specifically instructed to do so.

6. It is important that normal standards of safety and good laboratory practises are employed. Always use of common sense and the best known practice when operating the instrument.

7. Sharp knives and blades are used in this instrument. Make sure you understand the correct methods for their installation and use.

8. The centre of gravity position for the Shandon Cryotome FE or FSE is shown below:



9. The Shandon Cryotome weighs approximately 125 kilograms (275 lbs); get help to move it.

10. If the instrument has been used with materials that are toxic or contaminated with pathogenic micro-organisms, follow your laboratory guidelines and the fumigation and cleaning instructions given in Chapter 6 of this Operator Guide. The Product Safety Declaration (in Appendix A) must be completed if the instrument is to be returned to Thermo or serviced by a Thermo trained engineer.

11. The instrument should be regularly cleaned as described in Chapter 6 of this Operator Guide. Refer to Material Safety Data Sheets when dealing with the reagents specified in Appendix B.

12. Do not use Shandon Cryotome for general refrigeration purposes such as storage of specimens. Use a conventional freezer.

13. Use only Thermo approved accessories or replacement parts with the Shandon Cryotome.

14. Correct maintenance procedures are essential to maintain safe operation and for consistent performance. It is recommended that a Maintenance Contract is taken out with your supplier.

15. The instrument should be serviced annually by a Thermo trained engineer in accordance with the instructions contained in the Shandon Cryotome Service Manual (A78910101).

16. Any problems and queries should be referred to your supplier.

17. **Refrigeration System:**

The Shandon Cryotome uses Isceon® 89 refrigerant

THE REFRIGERATION SYSTEM MUST ONLY BE MAINTAINED BY SUITABLY QUALIFIED ENGINEERS. s

REFRIGERANTS ARE GREENHOUSE GASSES AND ALL PRECAUTIONS MUST BE TAKEN TO RECOVER ANY GAS REMOVED FROM UNITS AND TO PREVENT ITS RELEASE INTO THE ATMOSPHERE.s

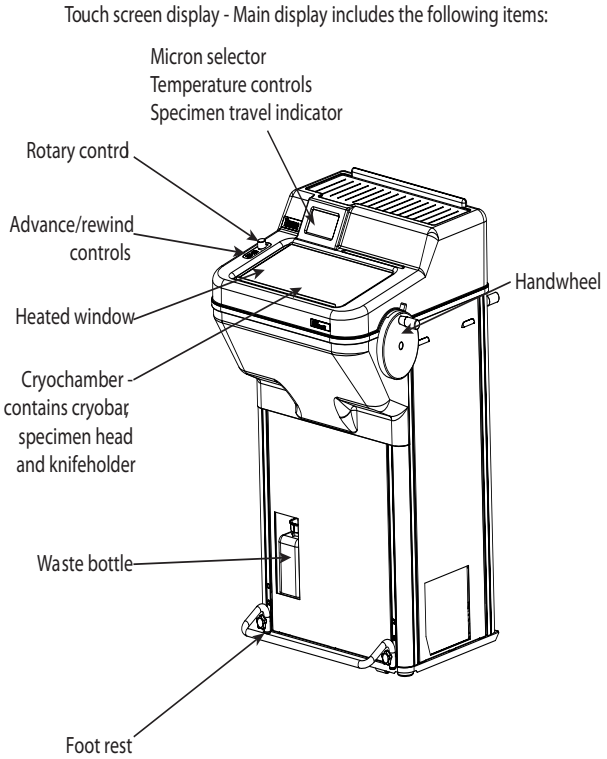
ALWAYS USE THE CORRECT REFRIGERANT TO CHARGE THE INSTRUMENT AND ALWAYS DISPOSE OF ANY USED REFRIGERANT IN ACCORDANCE WITH LOCAL AND NATIONAL REGULATIONS. s

Chapter 2 Description

Overview

The Cryotome is designed for cutting frozen sections of specimens, rapidly and accurately, for future microscopic examination. It operates by rapidly freezing the sample in a temperature controlled environment, and provides a means for sectioning the frozen sample by conventional microtome.

The different components of the Cryotome are shown in the diagram below.



For optimum performance, the microtome specimen head and knife holder are held within the refrigerated chamber. The main body of the microtome is mounted outside the chamber to give more space for working in, and for easier cleaning.

Principle factors for good sectioning of frozen specimens are:

1 the temperature must be correct for the specimen being cut

2 the microtome must be correctly adjusted and operated

3 the cutting blade must be sharp and set at the correct angle

4 the anti-roll plate must be correctly adjusted.

Chapter 3 Installation and Setting Up

The Shandon Cryotome is a precision instrument that must be unpacked and installed with care.

The maximum overall dimensions of the Shandon Cryotome FE and FSE cryostats are:

Width *(with handle)*	830 mm (33ins)
Depth	745mm (29½ ins)
Height *(working height)*	1050mm (41½ ins)
(instrument height)	1205 mm (47½ ins)

SHANDON CRYOTOME FE AND FSE WEIGH APPROXIMATELY 125KG (275 LBS). ALWAYS GET HELP TO SAFELY MOVE THE INSTRUMENT WITHOUT RISK OF INJURY. S

If the packaging has been damaged, check the condition of the instrument. Contact your dealer if there is any damage.

Check that the detail on the label of the packaging corresponds with your order.

Move the crate near to where the instrument is to be sited. Cut the retaining straps and turn the three locking handles to release the packing case. Remove the outer case and lower the ramp. Read the label on the rear of the instrument and check that the power requirements conform with your order.

Retrieve the accessories pack from on top of the pallet in front of the instrument. Two people are required to unload the instrument from the packing case. Fit the transport handles to the back of the instrument (the handles located in the foam packing at the back of the instrument).

Note *The handles should be left attached to make sure sufficient clearance is left behind the instrument to allow for ventilation and access to the mains connector.* S

With one person on either side of the instrument, ease it down the slopes off the pallet.

DO NOT TILT THE INSTRUMENT BACKWARDS WHEN WHEELING IT DOWN THE RAMP. s

Make sure that you have received all the parts listed on the packing list supplied with the instrument. Contact your dealer if necessary.

Note *Inform your dealer immediately if there are any breakages or shortages. Quote the instrument serial number (located underneath the top cover at the front of the instrument on the right hand side), your order number, delivery note (or packing slip) number and the date.* s

Note *If you ever need to transport the instrument, refer to Appendix A for repacking instructions.* s

WARNING

Always keep the instrument as near to vertical as possible to prevent damage to the refrigeration system. s

WARNING

Consult your Thermo dealer if the Shandon Cryotome is to be moved to another building, or out of the area. The transit fixing must be re-fitted. The instrument must be kept upright at all times,.

SHANDON CRYOTOME FE AND FSE WEIGH APPROXIMATELY 125KG (275LBS). ALWAYS GET HELP TO SAFELY MOVE THE INSTRUMENT WITHOUT RISK OF INJURY. s

When the Shandon Cryotome has to be moved for more than 2 metres (6ft), use the handles to the back of the unit to tilt the instrument backwards slightly to wheel it like a trolley.

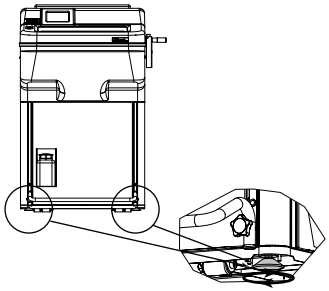
DO NOT LET THE INSTRUMENT DROP ONTO THE FRONT ROLLERS. s

To avoid damage to the compressor and to prevent power 'trips': if the instrument has been transported or tilted backwards

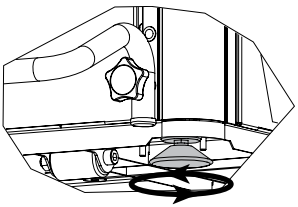
WARNING

beyond 45º, let it stand for 24 hours minimum before switching on to allow compressor oil to settle. s

The Shandon Cryotome can be moved for short distances - less than 2 metres (6ft) without tilting the instrument (for example to pull the instrument away from the wall). To do this, use the spanner provided to turn the two front feet clockwise until the two front feet of the instrument are clear of the floor.



Push the instrument. When in position, turn the front feet counter clockwise to lower them to the floor and adjust to level the instrument.

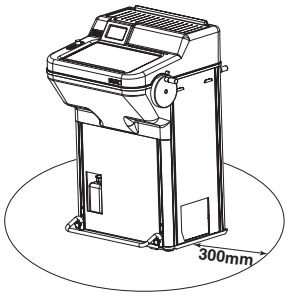


Note *The feet can be left in the raised position, but there may be a slight movement when sectioning.* s

THE SHANDON CRYOTOME IS HEAVY. TO AVOID COLLISIONS, ALWAYS MAKE SURE THE ROUTE IS CLEAR WHEN MOVING THE INSTRUMENT. s

Installation

Move the instrument to its permanent location. This must be level and provide a 300 mm (12") clearance to the sides and rear of the instrument for ventilation.



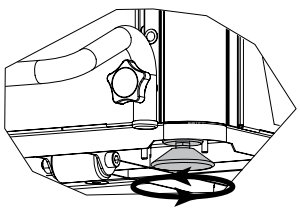
Note: *The transport handles at the rear of the instrument can be left in place.* s

Note *Performance of the refrigeration system may be affected at ambient temperatures above 25ºC (77ºF).* s

Note *Siting of the instrument on an uneven surface can have an adverse effect on the cooling system and the drainage of waste fluids from the chamber. Make sure that the unit is level.* s

SITE THE INSTRUMENT IN A WELL VENTILATED AREA AWAY FROM DOWNDRAUGHTS. DO NOT SITE THE INSTRUMENT NEAR TO SOURCES OF DOWNDRAUGHTS SUCH AS WINDOWS OR HEATING / VENTILATION DUCTS AS THE EFFICIENCY OF THE CHAMBER CAN BE AFFECTED. s

Use the spanner provided to turn the height adjustment knobs counter-clockwise until the feet of the instrument are on the floor and the unit is stable and level.

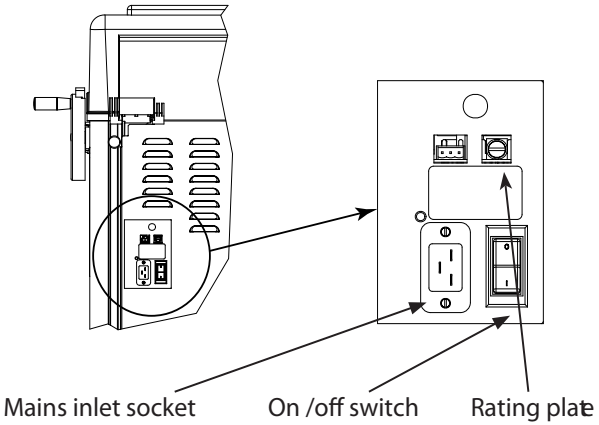


Raise the front edge of the top cover, remove the transit packing from the top of the sliding windows, then lower the cover back into position. Push open the sliding window to gain access to the refrigerated chamber.

Note *Make sure the window is closed before the top cover is lowered into position so that the cable is not caught up.* S

Electrical requirements

Make sure that the voltage of the mains supply corresponds with the voltage rating on the rating plate on the back of the instrument. The mains supply requirements are listed in Chapter 8.



Note *The ~ symbol on the rating plate indicates that the instrument operates on an alternating current supply (a.c.)* s

Make sure that the **I / O** power switch at the rear of the instrument is switched off (**O** side of the switch pushed inward).

Instruments are supplied with power cords with moulded plugs suitable for many countries. If another plug is required, a technically competent person should use the wiring convention shown in the following table to replace the existing moulded plug with a suitably rated, and, where appropriate, fused plug:

European cable	US Cable	Terminal
Brown	Black	Live (L or L2)
Blue	White	Neutral (N or L1)
Green / Yellow	Green	Earth - E, ground

THE SHANDON CRYOTOME MUST BE PROTECTIVELY EARTHED. MAKE SURE THAT THE INSTRUMENT IS PLUGGED INTO A PROPERLY EARTHED (GROUNDED) MAINS SUPPLY. THE SHANDON CRYOTOME MUST BE PROTECTIVELY EARTHED. MAKE SURE THAT THE INSTRUMENT IS PLUGGED INTO A PROPERLY EARTHED (GROUNDED) MAINS SUPPLY. s

IT MUST BE POSSIBLE TO INTERRUPT THE MAINS SUPPLY AT SOURCE BY REMOVING THE PLUG FROM THE MAINS SUPPLY SOCKET. s

Select the appropriate mains lead from those supplied and plug it into the mains inlet socket in the rear panel of the instrument. Connect the mains supply cable to the local power supply outlet.

Transit Bracket

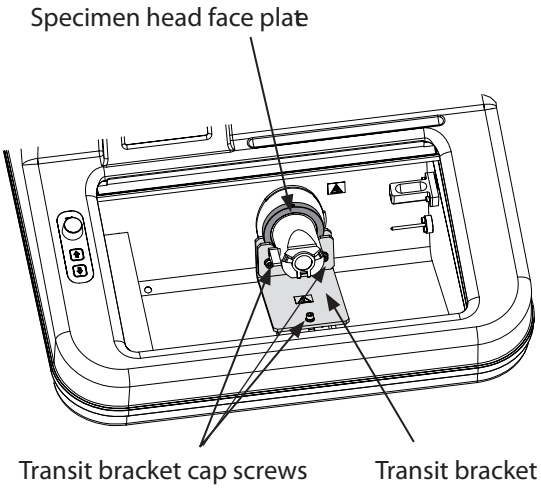
A TRANSIT BRACKET IS ATTACHED TO INTERNAL STRUCTURES TO PROTECT THE INSTRUMENT DURING TRANSPORT. IT IS ESSENTIAL THAT IT IS REMOVED BEFORE AN ATTEMPT IS MADE TO OPERATE THE INSTRUMENT. s

Open the window to access the chamber. Gradually loosen the two cap screws on the verticle part of the bracket (by no more than 2 full turns). Loosen the cap screw on the base if the transit bracket.

Lift the Shandon Cryotome head out of the bracket to its top position. Gently slide the bracket towards you along the knife holder base and remove it.

Note *Store the transit bracket for future use - it is needed when the Shandon Cryotome has to be transported.* s

When the instrument is switched on, the specimen head will be driven backwards to its reset position.



Switching on and off

Follow these instructions to turn the instrument on and off. Make sure the transit bracket is removed before the instrument is switched on.

To switch on

Press the **1** (ON) side of the **1 / O** switch inward to switch the instrument on.

The instrument will take a short time to initialise (an hour glass symbol will be displayed on the screen). Once the initialisation is over, check that the display lights up and the Language Screen is displayed.

The compressor will only start if the temperatures are set less than 0ºC. There may be a delay of approximately three minutes before the compressors start to operate.

To switch off

Press the **O** (OFF) side of the **1 / O** switch inward to switch the instrument off.

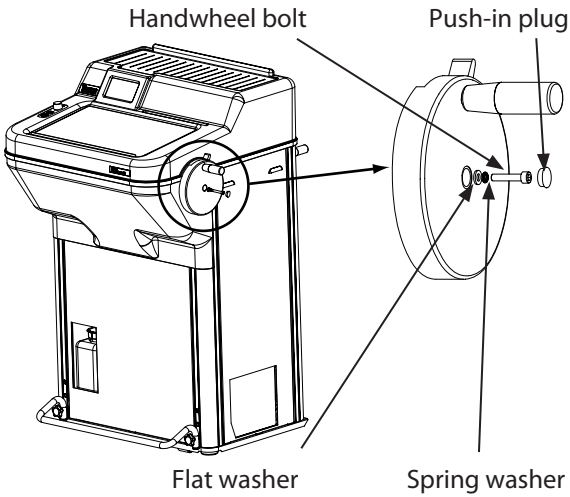
Fitting the Handwheel

Carefully locate the handwheel into the hole at the top of the right hand side. The handwheel is supplied in the accessory pack.

Note *If the specimen head is at the bottom of the stroke, the handwheel handle should also be at the bottom.* S

Make sure that the specimen head is at the top or bottom and turn the handwheel until the handle is at the top or the bottom to match. Make sure that the locating pin of the handwheel fits into the key-way of the drive shaft.

Place the spring washer and the flat washer (in that order) onto the handwheel bolt. Insert the bolt into the recess on the handwheel and use the Allen key to tighten it (turn it clockwise). Fit the push-in plug. Rotate the handwheel and check that movement is smooth and produces a corresponding movement of the specimen head.



The lever next to the handwheel handle is used to lock the handwheel in position. The handwheel can be locked in one of three positions - 12 o'clock, 3 o'clock and 6 o'clock, by pushing the lever away from you.

Turn the handwheel until the handle is used to lock the handwheel in position then push the lever of the lock away from you. Check that the lock operates and that the handwheel cannot rotate. Check that the specimen head is at the top of its travel.

Move the lock lever towards you and check that the handwheel rotates smoothly and that the specimen head moves up and down. Check also that the lock operates at the 3 o'clock and 6 o'clock positions.

Preparing the instrument for use

Read and understand the following warnings:

PRACTICE GOOD BIOLOGICAL SAFETY PROCEDURES WHENEVER THE SHANDON CRYOTOME IS USED. s

MAKE SURE THAT THE WASTE BOTTLE IS FILLED WITH SUFFICIENT 10% FORMALIN SOLUTION TO COVER THE OUTLET PIPE. REFER TO THE MATERIAL SAFETY DATA SHEET FOR FORMALIN AND FORMALDEHYDE. s

DO NOT USE THE SHANDON CRYOTOME FOR GENERAL LABORATORY REFRIGERATION PURPOSES. s

WARNING

Fumigate regularly to ensure decontamination of the refrigeration chamber and accessories. s

WARNING

Use cut resistant gloves when handling knives and blades. s

WARNING

Use the correct type of knife or blade appropriate for the knife holder. s

WARNING

Make sure that the knife guard is correctly installed. s

IF YOU KNOW THAT A SPECIFIC VIRUS OR BACTERIA IS LIKELY TO BE PRESENT IN THE SPECIMEN, MAKE SURE THAT YOU ARE AWARE OF A SUITABLE DECONTAMINANT BEFORE YOU INTRODUCE THE SPECIMEN INTO THE REFRIGERATED CHAMBER. s

ALWAYS MAKE SURE THAT THE WINDOW IS CLOSED BEFORE ANY SECTIONS ARE CUT. s

TO AVOID INJURY, DO NOT MOVE THE SPECIMEN HEAD WHEN YOUR HANDS ARE IN THE CHAMBER. s

Remove the waste bottle. Use approximately 200ml of a 10% solution of formalin (4% formaldehyde solution) to fill the waste bottle sufficient to cover the outlet tube.

Refit the waste bottle - make sure that the outlet tube fits through the hole in the lid and the end of the tube is below the level of the formalin.

REFER TO MATERIAL SAFETY DATA SHEET (MSDS) FOR FORMALIN AND FORMALDEHYDE. s

KEEP SUFFICIENT FORMALIN SOLUTION TO COVER THE END OF THE OUTLET TUBE IN THE WASTE BOTTLE AT ALL TIMES TO PREVENT THE RELEASE OF AEROSOLS OR CONTAMINANTS DURING USE. s

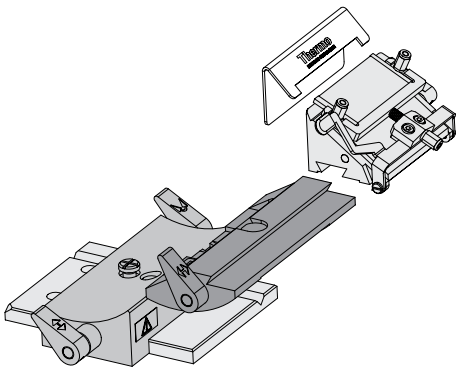
Routine Operation

Setting up the Shandon Cryotome for routine operation involves the installation and adjustment of one or more of the following:

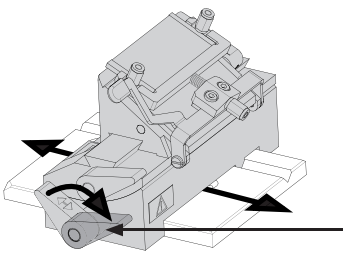
i Knife holder
ii Knife guard
iii Disposable blade or solid knife
iv Cutting angle
vii Anti-roll plate

Disposable Blade Holder

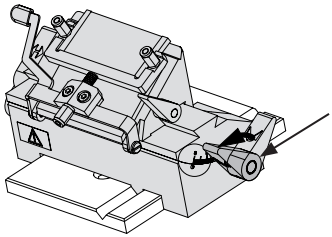
The disposable blade holder comprises three sections - a base, middle and top. The blade holder assembly is fitted to a common support plate attached to the base of the chamber.



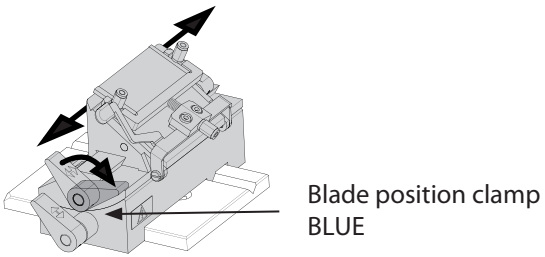
The base section allows movement towards and away from the specimen holder. Use the black lever (position clamp) on the left hand side to clamp the blade holder in position.



The middle section can be rotated on the base section to achieve the optimum cutting angle. Use the red level (angle clamp) on the right hand side to clamp the blade holder at the correct cutting angle.



The top section can be moved laterally along the middle section to use the entire length of the blade. Use the blue lever (blade position clamp) on the left hand side to clamp the top section in position. Two different top stages are available for low and high profile blades.

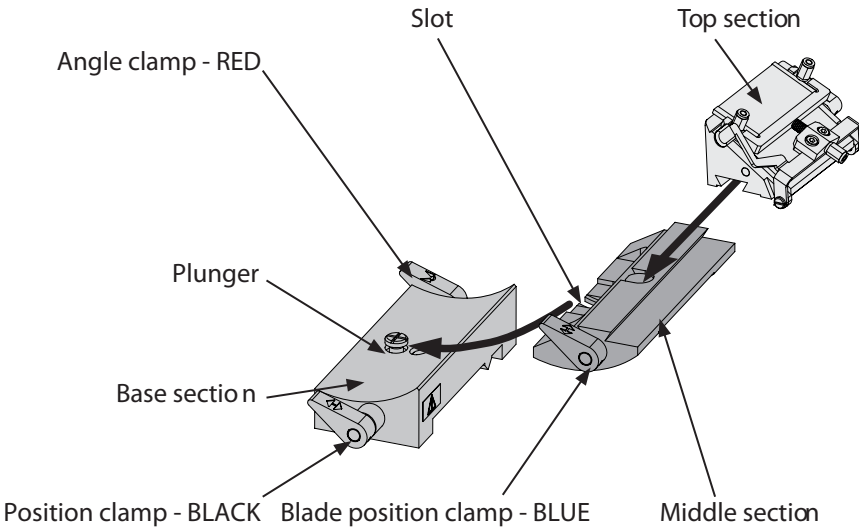


Assembling the disposable blade holder

Pull the red angle clamp towards you. Slide the middle section onto the base section of the knife holder, so that the base section plunger locates in the middle section slot. Line up the two sections and push the red angle clamp to lock them in position.

Pull the blue blade position clamp towards you. Line up the dovetails on the top section and the middle section and slide the two parts together. When the top section is central, push the blue blade position clamp away from you to tighten it.

Note *When fitting the top section to the middle section, lift the end of the top section slightly when sliding it along the middle section.*s



The blade holder is now assembled.

Note *Make sure that all the assembly slots, dovetails and plungers are free from debris. If debris is present, the assembled blade holder may not provide the required stability.* s

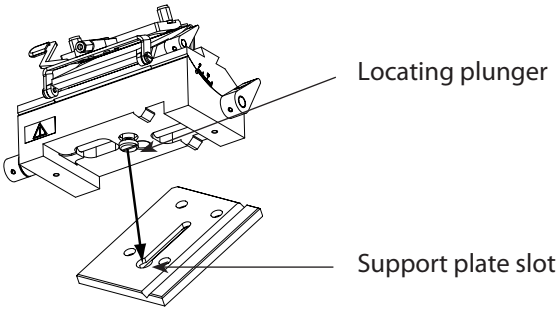
Fitting the disposable blade holder

Once assembled, the disposable blade holder can be fitted into the Shandon Cryotome FE and FSE chamber.

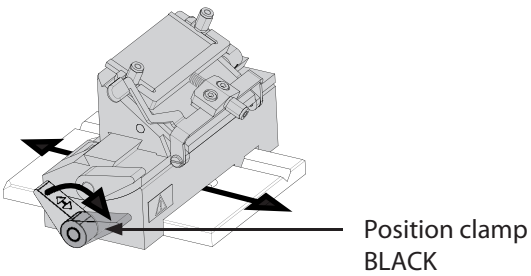
ALWAYS LOCK THE HANDWHEEL TO PREVENT THE SPECIMEN HEAD MOVING WHEN WORKING NEAR THE KNIFE HOLDER. s

Pull the black position clamp on the left hand side of the base section fully toward you.

Insert the plunger on the underside of the base section into the circular hole at the end of the support plate slot (the support plate is located in the base of the chamber).

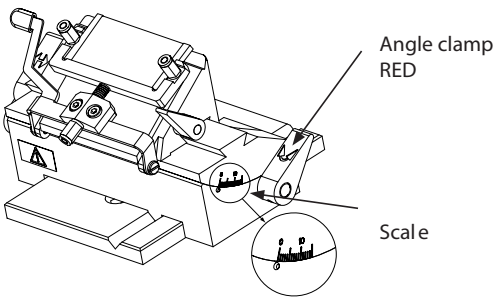


Slide the blade holder assembly along the support plate to the required position and push away the black position clamp to lock it in place.



Adjusting the disposable blade holder

To adjust the angle of the knife holder, pull the red angle clamp fully toward you. Adjust the angle of the knife holder until the '0' of the angle scales is approximately in line with the marker on the base section, then push the red angle clamp away from you to lock it. This gives a cutting angle of 22°.



Note *The knife holder is adjusted to its precise operating angle after the blade or knife is installed.* s

Note *The blade type used may affect the optimum blade angle. For Kai MX35 blades, start to section at an angle of 3⁰ on the scale and make small adjustments to achieve optimum performance.* s

Fitting a disposable blade

Be aware of the dangers of handling microtome blades.

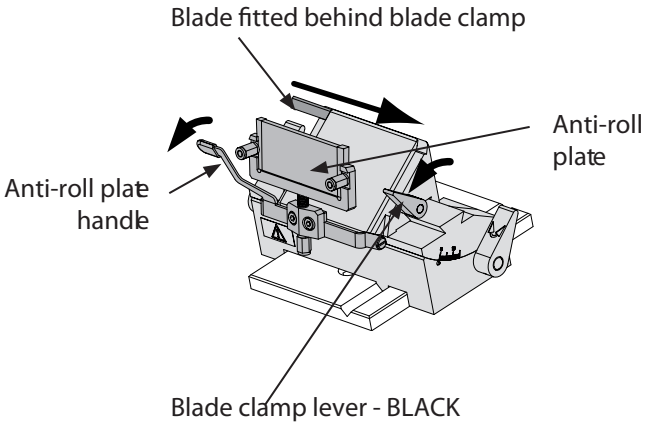
ALWAYS USE CUT RESISTANT GLOVES TO AVOID INJURY WHEN HANDLING DISPOSABLE BLADES. USE THE DISPENSER WHEN FITTING A NEW BLADE. s

Use the anti-roll plate handle to swing the anti-roll plate away from the blade clamp.

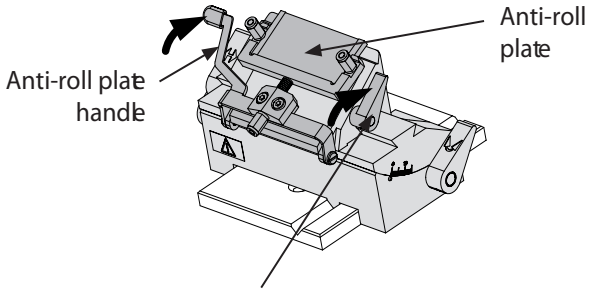
Pull the black blade clamp lever towards you to release the blade clamp. Push the end of the blade to be installed part way out of the dispenser and feed it behind either end of the blade clamp.

Slide the blade to the right until it is locked symmetrically in the top stage behind the blade clamp.

Note *The blade must be located symmetrically for correct operation of the anti-roll plate.* s



Push the black blade clamp lever back to clamp the blade in position and gently swing the anti-roll plate on top of the blade.



USE THE CORRECT BLADE TYPE FOR THE BLADE HOLDER - EITHER LOW OR HIGH PROFILE.s

FIT THE KNIFE GUARD OR REMOVE THE BLADE WHEN NOT CUTTING SECTIONS. s

The top section of the blade holder can be moved to allow the entire length of the blade to be used. Pull the blue blade position clamp towards you to loosen the top section. Slide the top section until the blade is in the required position. Push the blue blade position clamp away from you to lock the top stage.

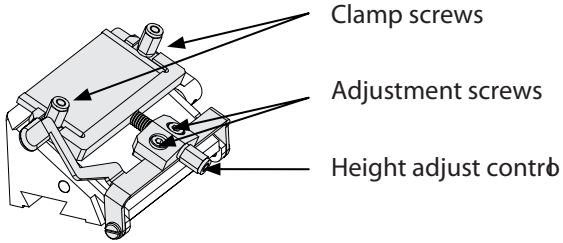
Anti-roll plate for disposable blades

Note *These are the recommended starting settings. You may need further minor adjustments to obtain best results.* s

Make sure that the top edge of the anti-roll plate is parallel to the blade. If adjustment is necessary, use a 3mm A/F Allen key to loosen the two adjustment screws.

Move the assembly carefully until the top edge is parallel to the blade. Hold the assembly firmly in position and tighten up the two screws.

Use the height adjustment control to set the height of the anti-roll plate relative to the knife edge (turn it counter-clockwise to raise the anti-roll plate and clockwise to lower it). It should be set just above the tope of the blade, but small adjustments may be required when sectioning to get sections to feed under the anti-roll plate. Once adjusted, further movements should not be required.



Note *Only a very small movement of the control knob is required to make a very fine adjustment. If it is set too low, sections will curl above the anti-roll plate. If it is set too high, the anti-roll plate will hit the block.*

When cutting sections, lower the anti-roll plate carefully into position on the knife blade - do not let it drop onto the blade. Any damage to the edge of the glass could result in loss of performance.

Ensure that there is a good edge i.e. there are no 'nicks' - on the anti-roll plate. Use the brush supplied to keep the anti-roll plate, the blade, and the clamp clean.

The anti-roll plate glass has four usable edges. If the edge being used is damaged, loosen the two clamp screws, pull the glass from its frame, rotate it and re-insert to present an undamaged edge for use. Make sure the glass is pushed to the bottom of the holder and re-clamp.

Note *To prevent the anti-roll plate heating up, make sure that it is kept close to the blade holder.*

Specimen Head

The specimen heads are designed to accept a Shandon Cryocassette that already has a frozen specimen mounted.

The Shandon Cryotome FE can be fitted with either a fixed or a fine orientation head.

The Shandon Cryotome FSE is only fitted with a fine orientation head for use with independent specimen cooling.

The frozen specimen on the Cryocassette is held in the specimen head by a Quick Release Cryocassette Clamp. The clamp lever at the left hand side of the Specimen head operates a moveable jaw at the bottom of the head that holds the Cryocassette firmly in position.

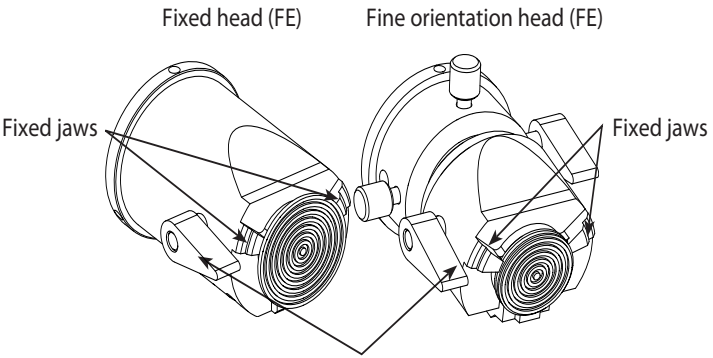
To install a cryocassette in the Quick Release Clamp:

i Pull the left hand clamp lever forward

ii Fit the cryocassette under the two fixed jaws as shown

iii Push the clamp lever back.

Note *The cryocassette handle (supplied) may be fitted to the cryocassette to aid manipulation and fitting to the specimen head.* s



Quick release cryocassette clamp lever.
Pull to release, push to clamp (shown in released positio

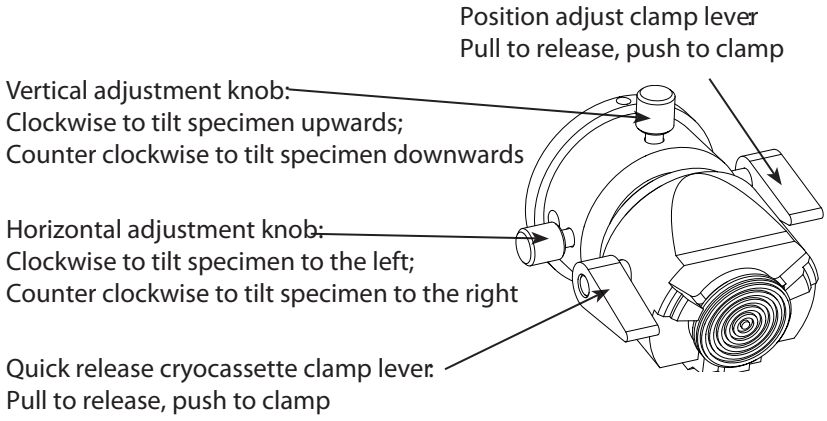
Fine Orientation Head

To adjust the up-to-down and left-to-right orientation of the specimen before sectioning takes place, pull the right hand clamp lever towards you to unlock the clamp.

Use the knurled rotary control at the top of the orientation head to set the verticle orientation of the specimen. Clockwise rotation tilts the specimen upward; counter-clockwise rotation tilts the specimen downward.

Use the knurled rotary control at the left hand side of the orientation head to set the horizontal orientation of the specimen. Clockwise rotation tilts the specimen to the left; counter-clockwise rotation tilts the specimen to the right.

Push the clamp lever on the right hand side away from you to lock the specimen in the required position.



Note *The picture shows the head for the FE. The FSE head has controls in similar positions.* s

Accessories

The following accessories can be used with the Shandon Cryotome and FE and FSE.

Shelves

Fit the narrow shelf (with side lip) to the right hand side of the chamber against the side wall if it is required for tool storage.

Fit the flat shelf next to the cryobar for storage of specimens at chamber temperature.

Cryocassettes A range of cryocassette sizes and styles are available.

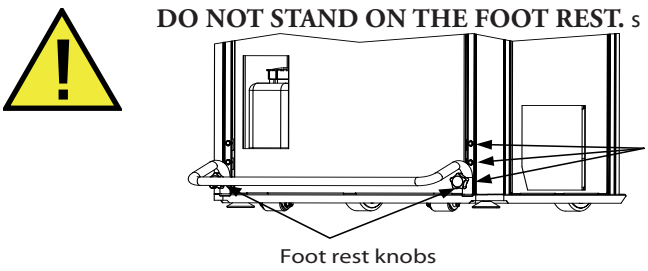
Cryocassette handle A removable / lockable handle can be used to handle the cryocassettes.

Cryocassette identifier These are clear strips with numbered rings designed to fit on the cryobar or shelves to locate and identify cryocassettes that are being frozen or stored before sectioning.

Heat extractors The heat extractors fit in the slots beside the cryobar to make specimen embedding and preparation easier. Three different weights are available.

Cryobar Cover If the cryobar is at a lower temperature than the chamber, it will attract frost. To keep the cryobar surface clear from frost and debris, place the cryobar cover on it whenever it is not being used to freeze specimens.

Foot rest To adjust the foot rest to suit individual requirements, unscrew and remove the knobs that secure the footrest to the instrument.



Move the foot rest to one of the other positions, and line up the footrest with the appropriate hole. Insert the knob and tighten it slightly to allow you to attach the other side of the foot rest. Tighten both knobs.

Note *The footrest does not have to be fitted. Remove it if this is more convenient.* s

Remote Alarm

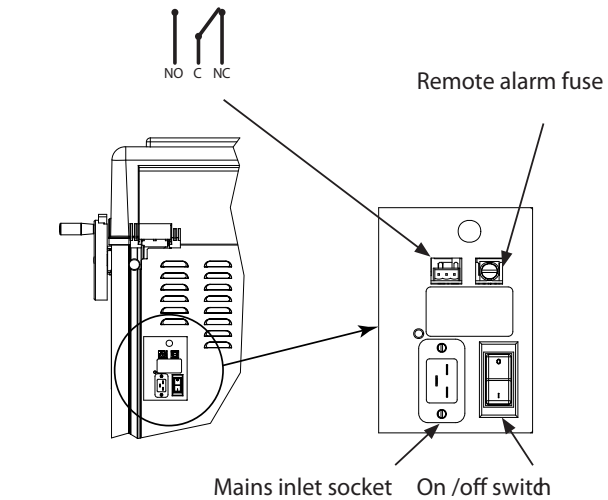
A switch is provided for connection to a remote alarm circuit. The switch operates if:

i A power fail occurs

ii An error occurs from which the instrument cannot automatically recover

iii The instrument malfunctions

Remote alarm relay connections:



The switch is rated for operation at 3A 250Va.c. / 24Vd.c. and disconnected in circuit with a named three pin socket at the rear of the Shandon Cryotome FE and FSE. The remote alarm facility is not a powered output.

A remote alarm connector is supplied, plugged into the remote alarm socket on the rear of the instrument. Use this to make connections to a remote alarm sounder.

If the remote alarm has been activated, the middle (common terminal - C) and right hand (NC) pins are connected as marked above the connector. In normal operation, the middle (common terminal - C) and left hand (NO) pins are connected.

Only a technically competent person may change the remote alarm fuse or connect an external circuit to the remote alarm socket. The external circuit must comply with the requirements of IEC61010-1 and IEC950.

Chapter 4 Controls

The Shandon Cryotome is controlled via a touch screen display panel. The images are displayed as black on a white background. If an item is selected, this is inverted to white on a black background.

Not Selected

Selected

To select a button, touch the relevant image displayed on the screen. Use your fingertips (not fingernails or sharp instruments). **Do not press too hard.**

DO NOT PRESS IN MORE THAN ONE PLACE AT A TIME - A FALSE KEY PRESS MAY OCCUR. s

Note *There is no 'feel' when the image is pressed, but there is an audible 'beep' when a valid button is pressed. If any other area of the screen is pressed, there is no 'beep.'* s

When the display backlight is dim and the chamber light is off, the instrument is in standby mode. If the user touches the screen surface, opens the window or operates any other control, the Shandon Cryotome will sense that a user is at the instrument and will exit from standby mode. The display backlight and chamber light will then come on.

If the instrument is not used for 15 minutes, then it will revert to standby mode.

Advance / Retract Controls

The advance / retract controls are located on the top cover to the left of the chamber (see page 1 illustration).

The  button advances the specimens head towards the knife;

The  button retracts the specimen head (ie moves away form the knife).

If either button is held down for more than 3 seconds, the specimen head will accelerate to its maximum speed.

To stop rapid retraction, release the retract button, then press either advance or retract button to stop.

To stop rapid advance of the specimen head, release the advance button  .

Note *There is no audible beep when the advance or retract buttons are pressed.*

Rotary Control

Used for fine control advance and retract.

Turn the rotary control clockwise to advance the specimen towards the knife.

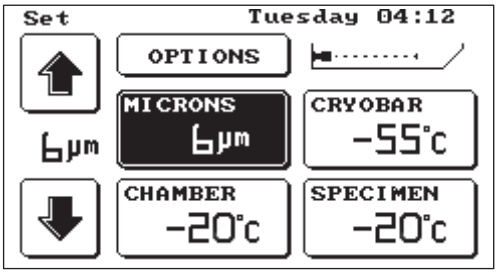
Turn the rotary control anti-clockwise to retract the specimen away from the knife.

Note *Each notch of the control knob gives 8µm of movement.* s

Screen Controls

The Shandon Cryotome is controlled by pressing buttons on the touch screen display panel. This section describes each screen and the buttons that appear.

Main Screen



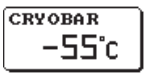
Selector Buttons

The buttons are described below:

Microns

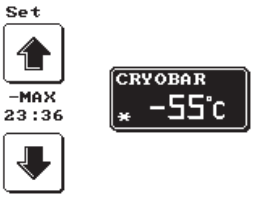
This displays the selected section thickness in µm. Normally when the Main Screen is entered, the *MICRONS* button will be highlighted.

Cryobar



This displays the actual temperature of the cryobar in °C.

Note *When the cryobar is in boost mode, the CRYOBAR button will have an asterix displayed and the text between the adjustment buttons will display the amount of time remaining for the boost cycle (as shown below).* S



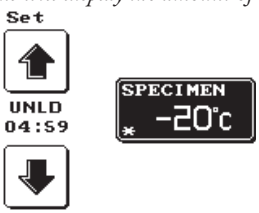
Chamber

This displays the actual temperature of the chamber in °C.

Specimen

This displays the actual temperature of the specimen head in °C *[FSE only]*.

Note *When the Cryotome is in the Unload sequence, the SPECIMEN button will have an asterix displayed and the text between the adjustment buttons will display the amount of time remaining for the cycle.* S



Options / Unlock

The *OPTIONS* and *UNLOCK* buttons share the same screen location, but are displayed in different conditions.

- When the instrument is unlocked, the *OPTIONS* button is displayed. Press and hold the *OPTIONS* for approximately 1 second to access the Options Screen (page).
- When the instrument is locked, the *UNLOCK* button is displayed instead of the *OPTIONS* button. The action of the *UNLOCK* button depends on the security mode. (See the Security Setup Screen - page).

Adjuster Control Arrows

Up and Down

These buttons adjust the value of the set point associated with the highlighted selector button

Micron increments	1-20µm in 1µm steps
	20-60µm in 5µm steps
Temperature increments	1°C steps
Minimum Temperature	-60°C (settable temperature)

Workable temperatures:

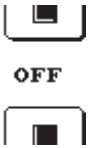
(*specified for an ambient temperature ≤+ 25°C)*

Cryochamber	0 to -35°C

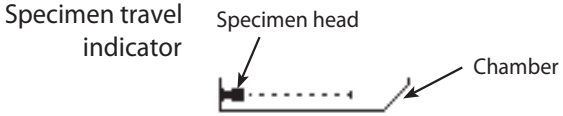
Setpoint display

The display located between the Up and Down arrows shows the set point associated with the highlighted selector button.

If a temperature setpoint of <0 is selected, the Setpoint Display will show the word OFF (as shown below) and the associated compressor or specimen head will be turned off.



Specimen travel indicator



The specimen travel indicator is a graphical representation of the specimen head and the chamber as shown.

The picture shows the current position of the specimen head in the chamber.

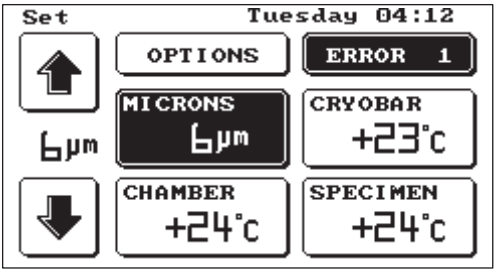
When the specimen head is almost at the end of forward travel position, the specimen travel graphic will flash.

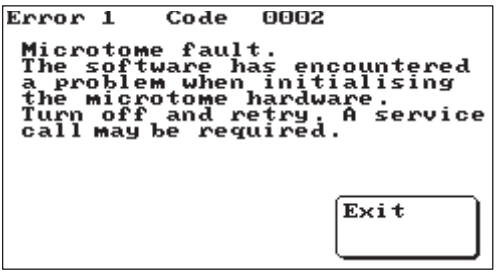
Press the specimen travel indicator graphic to display the help screen.

Note *The specimen travel indicator graphic is replaced with the ERROR button and an alarm sounded when there is an error with the instrument.* s

The *ERROR* button displays a short description of the current error. It flashes to highlight the error.

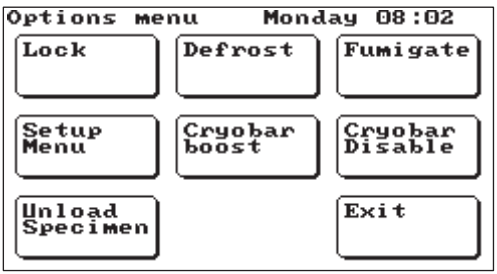
Press *ERROR* to display the Error Screen that describes the current error.





Press *EXIT* to clear the Error Screen and return to the Main Screen.

Options Screen



The buttons on the Options Screen are described below:

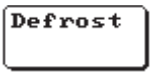
Lock / Unlock

Either the *LOCK* or the *UNLOCK* button is displayed in the same screen location.

The *LOCK* button is only displayed when the instrument is unlocked. Press *LOCK* to lock the window and activate the security mode selected (pg).

The *UNLOCK* button is only displayed when the window is locked and the security mode is off. Press *UNLOCK* to unlock the window.

Defrost



To carry out an immediate defrost cycle, press *DEFROST* to display the Defrost Screen from where the required defrost program can be selected (page)

Fumigate

Press *FUMIGATE* to display the fumigation screen (page)

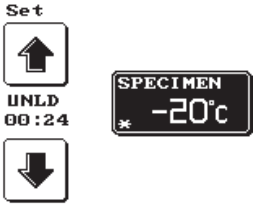
Unload specimen

[FSE ONLY]

Note *Use the UNLOAD SPECIMEN feature to warm the head to above 0°C to enable the cryocassette to be removed from the specimen head, or the specimen from the cryocassette. At the end of the unload or when CANCEL UNLOAD is pressed, the specimen head will return to its set point.* S

Either the *UNLOAD SPECIMEN* or the *CANCEL UNLOAD* button is displayed in the same screen location.

Press *UNLOAD SPECIMEN* (or press *SPECIMEN* on the main screen twice) to start a specimen unloaded sequence. The Main Screen will be displayed and will show that unloading is in progress - the *SPECIMEN* button will have an asterix displayed and the text between the adjustment buttons will show the countdown time of 5 minutes:



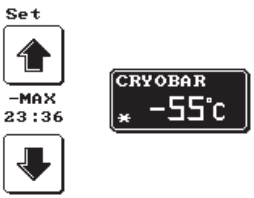
To cancel the unload sequence and return to the Options Screen, either press *CANCEL UNLOAD* or press the *SPECIMEN* button on the Main Screen when it is selected.

Cryobar boost
Cancel boost

Either the *CRYOBAR BOOST* or the *CANCEL BOOST* button is displayed in the same screen location.

To start a cryobar boost sequence either press *CRYOBAR BOOST* or press the *CRYOBAR* button on the Main Screen when it is already selected.

The Main Screen will be displayed and will show that the boost sequence is active - the *CRYOBAR* button will have an asterix displayed and the text between the adjustment buttons will show the amount of time remaining for the boost cycle:



Press *CANCEL BOOST* in the Options Screen to stop the boosts cycle and return to the Main Screen.

Note *Use the Cyrobar Boost to force the cryobar to go to its lowest temperature <-55°C. The Cryobar Boost lasts for 25 minutes and then returns to its setpoint or off.* s

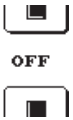
Cryobar disable
Cryobar enable

Either the *CRYOBAR DISABLE* or the *CRYOBAR ENABLE* button is displayed in the same screen location.

If the cryobar is enabled, press *CRYOBAR DISABLE.*

When the cryobar is disabled, its compressor is switched off and it will be cooled by the chamber temperature and will not be cooled to a lower temperature.

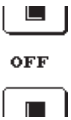
Note *When the cryobar is selected on the Main Screen while it is disabled, 'OFF' will be displayed between the Adjuster Control arrows in the main screen.* s



If the Cryobar is enabled, it can be disabled by:

1. Press  on the Main Menu until the temperature between the Adjuster Control arrows is >0°C,
   or
2. From the Main Screen, choose *OPTIONS, CRYOBAR DISABLE*

When the cryobar is disabled by either method, OFF is displayed between the Adjuster Control arrows:



To enable the cryobar:

1. From the Main Screen, choose *OPTIONS, CRYOBAR ENABLE*

   Note *If the cryobar was disabled by method 1 above, the cryobar will cool down to a default setpoint of -30°C.* s

   Note *If the cryobar was disabled by method 2 above, the cryobar will return to the last setpoint used. For example, if the cryobar was set at -40°C before it was disabled, the cryobar will go to -40°C again.* s

2. From the Main Screen, press ⇩. The set temperature will then decrease from °C,

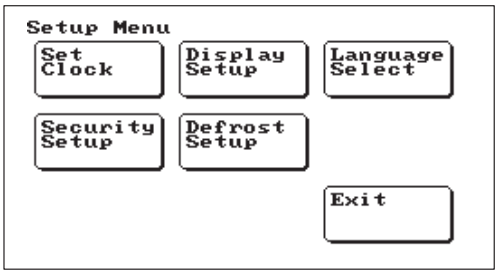
Setup Menu

Press SETUP MENU to display the Setup Screen (see below)

Exit

Press *EXIT* to leave the Options Screen and return to the Main Screen (page 36)

Setup Screen



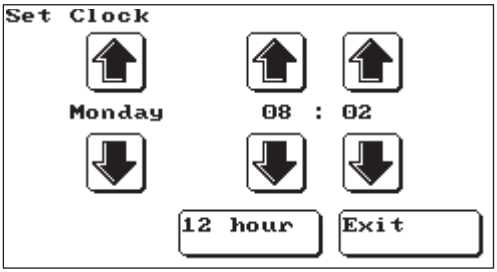
Press the required function key to display the Setup Screen for that function (pages 45 - 53)

Note *If any change is made to the Setup screens then EXIT is replaced by SET or SELECT.* s

Exit

Press *EXIT* to leave the Setup Screen and return to the Main Screen (page 36).

Set Clock Screen



Time and day display

The time and day display shows the days of the week and the time (in either 12 hour or 24 hour format).

The  and  buttons above and below each part of the Time and Day display will increase or decrease that value by 1 - for example:

Button	Change in time and day display
 button above the day	Wednesday, Thursday, Friday, Saturday...
 button below the day	Monday, Sunday, Saturday...
 button above the hour	Increments the hour display by 1 hour (including changing the am/ Shandon pm setting if 12-hour format is selected) - 05, 06, 07
 button below the hour	Decrements the hour display by 1 hour - 03,02,01
 button above the minute	Increments the minute display by 1 minute- 13,14, 15
 button above the minute	Decrements the minute display by 1 minute - 11, 10, 09

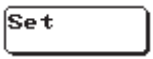
12 Hour
24 Hour

Either the *12HOUR* or the *24HOUR* button is displayed in the same screen location.

The *24HOUR* button is only displayed when the clock is in 12-hour mode. In 12-hour mode, the display will show am or Shandon Shandon pm.

Press *24HOUR* to change the time display to 24 hour mode and vice versa.

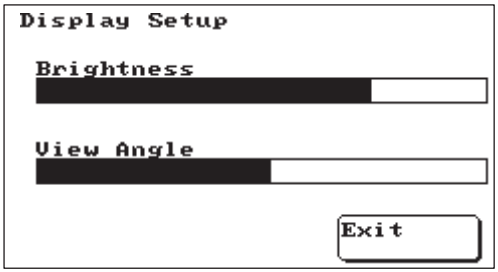
Set



Press *SET* to exit to the Setup Screen and save changes made to the time and day.

Note *The day and time are always displayed at the top of the Main Screen.* s

Display Setup Screen



The display setup screen consists of two interactive sliders for brightness and viewing angle, and an *EXIT* button.

Note *The brightness and view angle of the screen display may vary under different ambient conditions.* s

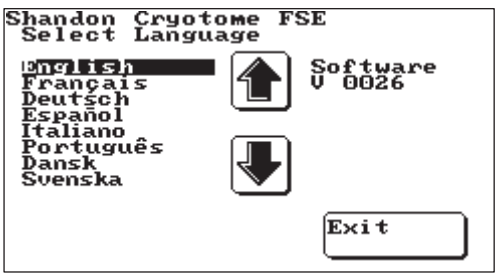
Interactive Sliders

Touch the screen at any point along the sliders to change the brightness and viewing angle of the screen. The coloured bar will move to that point and the screen display will change.

Select

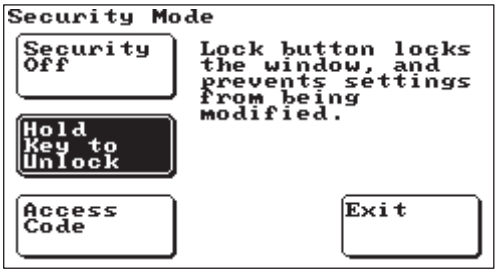
Press *SELECT* to save the display setup and return to the Setup Screen (page 44)

Language Setup Screen



The Language Setup Screen shows the list of languages that can be selected. Use the up and down arrows to select the required language for all the screen displays and then press SELECT to return to the Setup Screen (page 44)

Security Setup Screen



The buttons on the Security Setup Screen are used to select the relevant security mode. The security mode determines how you access the instrument when it has been locked. The highlighted button shows the current security mode.

Security Mode Activation

The security mode is activated when the *LOCK* key in the options screen is pressed (page)

Note *The EXIT button will change to SELECT if you press any of the security mode buttons.* s

Security Modes

The three different security modes are described below:

Security Off

When the security mode is activated, the window will be locked and the controls disabled. The screen options remain active.

To release the controls, unlock the screen from the Options Screen.

Hold key to unlock

This is the default option. It provides basic security to prevent inadvertent button presses, for example when cleaning the screen.

When the hold key mode is activated, the window will be locked, and the screen options and controls disabled.

When the screen or a control is touched or moved, the *TOUCH AND HOLD TO UNLOCK* button is displayed.

Press and hold this button for approximately 3 seconds to unlock the instrument.

Access Code

This provides full security where an access code number is required to unlock the instrument.

When the access code mode is activated, the window will be locked, and the screen options and controls disabled.

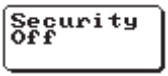
When then screen or a control is touched or moved, the Enter Unlock Code Screen is displayed (page 52). The current access code must be entered before the screen or controls can be used.

Security Mode Selection

The section describes how to select each security mode. To access the Security Mode Screen, from the Main Screen, select *OPTIONS, SETUP* and *SECURITY SETUP.*

The current security mode will be highlighted.

Security Off



To set the security off mode:

If the instrument is already in the security off mode (ie the *SECURITY OFF* button is highlighted), the selection can be confirmed by pressing the SECURITY OFF button. Press *SELECT* to return to the Setup Screen (page 44).

If the instrument is in the hold key mode (ie the *HOLD KEY TO UNLOCK* button is highlighted), the selection can be confirmed by pressing the *SECURITY OFF* button. Press *SELECT* to return to the Setup Screen (page 44).

If the instrument is in the access code mode (ie the *ACCESS CODE* button is highlighted), choose the security off mode by pressing *SECURITY OFF* button. Press *SELECT* to confirm this selection. The Enter Current Code Screen will be displayed (page) Input the current access code and press *ENTER* to return to the Setup Screen (page 44).

Note *The access code will be cleared.* s

Hold key to unlock

To set the hold key mode:

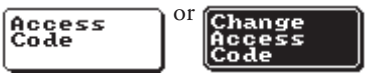
If the instrument is already in the hold key mode (ie the *HOLD KEY TO UNLOCK* button is highlighted), the selection can be confirmed by pressing the *HOLD KEY TO UNLOCK* button. Press *SELECT* to return to the Setup Screen (page 44).

If the instrument is in the security off mode (ie the *SECURITY* OFF button is highlighted), choose the hold key mode by pressing the *HOLD KEY TO UNLOCK* button. Press *SELECT* to return to the Setup Screen (page 44).

If the instrument is in the access code mode (ie the *ACCESS CODE* button is highlighted), choose the hold key mode by pressing the *HOLD KEY TO UNLOCK* button. Press *SELECT* to confirm the selection. The Enter Current Code Screen will be displayed (page 52). Input the current access code and press *ENTER* to return to the Setup Screen (page 44).

Note *The access code will be cleared.* s

Access Code



To set the access code mode, or to change the access code:

If the instrument is already in the access code mode (ie the *CHANGE ACCESS CODE* button is highlighted), press *EXIT* to confirm the selection and to return to the Setup Screen (page 44) without changing the access code.

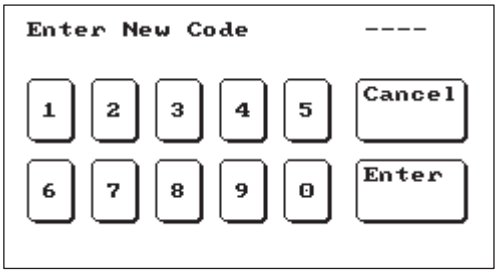
To change the access code, press the highlighted *CHANGE ACCESS CODE* button, and press *SELECT* to confirm the selection. The Enter Current Code Screen will be displayed (page 52). Input the current access code and press *ENTER*. Confirm this code when the Re-enter New Code Screen is displayed and press *ENTER* to return to the Setup Screen (page 44).

If the instrument is in the security off or hold key modes (ie the *SECURITY OFF* button or *HOLD KEY TO UNLOCK* button is highlighted), choose the access code mode by pressing the *ACCESS*

CODE button. Press *SELECT* to confirm the selection. The Enter New Code Screen will be displayed (page 52).

Input the new access code and press *ENTER*. The Re-enter New Code Screen will be displayed (page 52). Input the new access code and press *ENTER* to return to the Setup Screen (page 44).

Access code screens

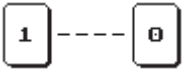


This selection applies to a series of four screens that all look similar. The screen names are displayed at the top of the screen (in this case 'Enter New Code'). The four screen are:

Enter New Code
Re-enter New Code
Enter Unlock Code
Enter Current Code

The buttons on all the Access Code Screens are described below:

Number Buttons

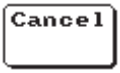


Press the relevant number button to input the requires Access Code. The numbers will be displayed as * in the code display at the top right of the screen.

Enter

Press *ENTER* to confirm the 4 digit code that was entered.

Cancel



Press *CANCEL* to reset all the entered digits as dashes and to exit back to the Security Setup Screen.

The Access Code Screens are described below:

Enter New Code

When this screen is displayed, enter a new access code. Press *ENTER* to submit the code.

The screen will now change to the Re-Enter New Code Screen.

Re-enter New Code

This screen checks that you have entered the code correctly. Type in the same code that you entered in the Enter New Code Screen and press *ENTER.*

If this code agrees with the first code entered then the code number is valid and should be used whenever requested.

Enter Unlock Code

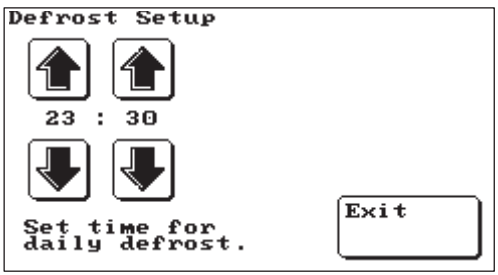
This screen is displayed when the instrument has been locked and a control is moved or touched. Enter the current valid access code followed by *ENTER* to unlock the instrument.

Enter Current Code

This screen is displayed when the access code security mode is selected, and a button for another option is pressed. Enter the current valid access code and press *ENTER* to access different screens.

Note *To clear the Access Code, change to another security mode (pages 48-51).* s

Defrost setup screen



Use this screen to set the start item for the daily automatic defrost cycle (*which only defrosts the cooling fins in the back of the chamber).* The buttons on the Defrost Setup Screen are described below:

Note *If the clock is set to 24-hour mode, then the defrost time will also be in 24 hour mode; if the clock is set to 12 hour mode, then the defrost time will also be in 12 hour mode.* s

Time Display

Increment Button

Decrement Button

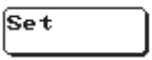
The main part of the Defrost Setup Screen is taken up with the INCREMENT and DECREMENT buttons and the Time Display.

The time Display shows the defrost start time in hours and minutes.

The and buttons above and below each part of the Time Display will increase or decrease that value by 1 - for example:

Button	Change in time and day display
button above the hour	Increments the hour display by 1 hour **Note** *When the hour display reaches maximum, the hour display will revert to 0.*
button below the hour	Decrements the hour display by 1 hour.
button above the minute	Increments the minute display by 1 minute **Note** *When the minutes display reaches 60, the hour display will NOT increment.*
button above the minute	Decrements the minute display by 1 minute.

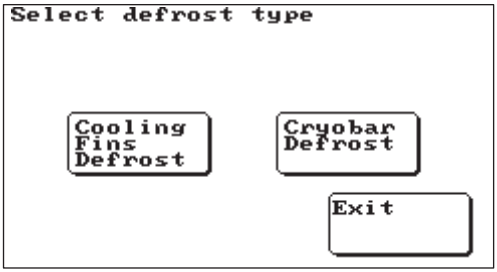
Set



Press *SET* to confirm the defrost time and return to the Setup Screen (page 44)

Note *During the defrost cycle, the chamber temperature will rise. However the cryobar will not be affected if it is enabled.* s

Defrost Screen



The buttons on the Defrost Screen are described below:

Cooling fins defrost

Press *COOLING FINS DEFROST* to start a quick defrost which defrosts only the cooling fins. When pressed, the screen displays the Defrosting Screen (see above).

This defrost lasts for approximately 5 minutes.

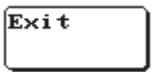
Cryobar Defrost

Press *CRYOBAR DEFROST* to start a quick defrost which defrosts the cryobar. When pressed, the screen displays the Defrosting Screen.

This defrost lasts for approximately 5 minutes.

Note *Remove the cryobar cover during the cryobar defrost.* S

Exit



Press *EXIT* to go to the Main Screen (page 36) without defrosting the instrument.

Defrosting Screen

The Defrosting Screen shows the type of defrost cycle - either cooling fins defrost or cryobar defrost. There is a *CANCEL DEFROST* button described below:

Cancel Defrost

Press *CANCEL DEFROST* to cancel the defrost and return to the Main Screen (page 36)

Note *A cryobar defrost will not affect the chamber temperature.* s

Note *During the cooling fin defrost cycle, the chamber temperature will rise. However, the cryobar will not be affected if it is enabled.* s

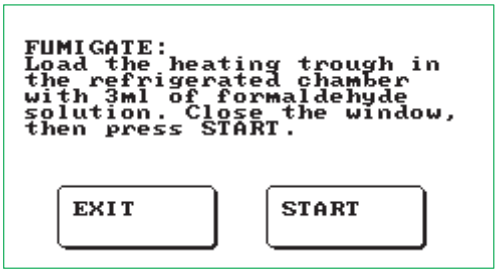
THE CRYOBAR MAY REACH TEMPERATURES OF MORE THAN +50°C DURING THE DEFROST CYCLE.

1. REMOVE THE SPECIMENS FROM THE CRYOBAR BEFORE DEFROSTING

2. DO NOT TOUCH THE CRYOBAR DURING DEFROSTING. s

Fumigating Screen

To start the fumigation cycle, press *FUMIGATE* on the Options Screen (page 40). Instructions will be shown on the screen. Press *START* to begin the fumigation.

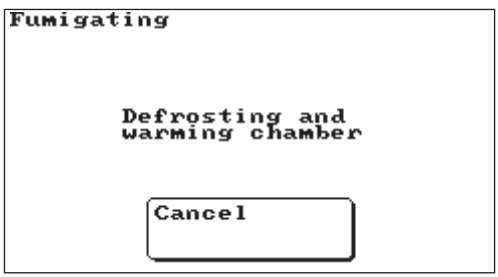


If the window is not closed or cannot be locked, the fumigation program will not start and will cause an error. An audible alarm will be sounded and the Main Screen will display the error (page 36).

The fumigation cycle is as follows:

1. The instrument performs a defrost.
2. The chamber is warmed up.
3. The formaldehyde solution is heated for 30 minutes and the instrument fumigates for 4 hours.
4. Finally fumes and excess moisture are extracted from the chamber.

During the first part of the cycle (steps 1 and 2 above), the fumigation cycle can be cancelled.



Press *CANCEL* to cancel the fumigation sequence during the first two steps of the fumigation cycle. The screen displayed depends on the security mode selected (page 48). Follow the instructions on the

screen to return to the Main Screen (page 36).

However, once the formaldehyde is being vapourised and the fumigation cycles has been activated (steps 3 and 4 above), it is not possible to cancel the fumigation process. The Fumigating Screen shows the time remaining for the fumigation cycle:

The length of the fumigation cycle will depend on the Chamber Temperature at the start, but will be approximately 6 hours.

When fumigation has ended, the chamber temperature will be controlled at -5°C, and the cryobar and specimen will be off. The following screen will be displayed:

When the window is opened, the following screen is displayed:

IT IS IMPORTANT THAT ALL THE KNIFE HOLDER SECTIONS ARE SEPARATED WHEN CLEANING. MAKE SURE THAT ALL SURFACES ARE COMPLETELY DRY BEFORE REASSEMBLING AND REFITTING INTO THE CHAMBER. s

Press *EXIT* to enable the instrument to return to normal operation with the previously set temperatures.

Chapter 5 Operation

When the instrument is not in use, lock the Handwheel and keep the instrument switched on, with the sliding window closed and locked, and the refrigerated chamber at the normal operating temperature.

When the lock option is selected, the following things occur:

- the touch screen control panel is disabled (dependant on the security mode)
- the window is locked
- the chamber light is turned off
- the display is dimmed

SURFACES INSIDE THE CHAMBER MAY BE EITHER VERY HOT OR VERY COLD AND MAY CAUSE INJURY IF TOUCHED WITH BARE HANDS. s

BE AWARE THAT TISSUE SAMPLES MAY POSE A BIOHAZARD. TAKE SUITABLE PRECAUTIONS. s

BE AWARE OF POTENTIAL BIOHAZARDS AND FORMALIN CONTAINED IN THE WASTE BOTTLE. DISPOSE OF CORRECTLY IN ACCORDANCE WITH LOCAL PROCEDURES. s

BE AWARE THAT FORMALDEHYDE SOLUTION IS USED DURING FUMIGATION. ALWAYS REFER TO MATERIAL SAFETY DATA SHEET (MSDS).s

TO AVOID INJURY, LOCK THE HANDWHEEL AND DO NOT MOVE THE SPECIMEN HEAD WHEN YOUR HANDS ARE IN THE CHAMBER.s

Touch the touch screen. If no security is set, the display will brighten and will be enabled; If security is set, press ***UNLOCK*** on the touch screen for 3 seconds or until an access code is requested. This will also unlock the window and turn the chamber light on.

Note *Refrigeration performance may be affected if the ambient temperature exceeds 25°C (77°F).* s

Mounting a Specimen

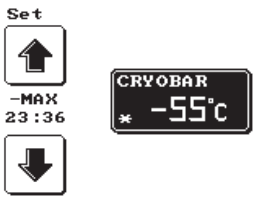
Use the cryobar to mount the specimen onto the cryocassettes as follows.

BE AWARE THAT THE CRYOBAR IS EXTREMELY COLD AND CAN CAUSE FROSTBITE. DO NOT TOUCH IT WITH BARE HANDS WITH THE COVER REMOVED. s

Make sure the cryobar us free from frost and dirt.

Lower the heat extractor on to the cryobar position required and, if the cryobar is not already being controlled at -55°C, turn on the cryobar boost option from the Main Screen (see page 36) by either pressing the *CRYOBAR* button twice, or select *OPTIONS* and *CRYOBAR BOOST.*

When the boost option is selected, the *CRYOBAR* button on the main screen will display an '*' and the time remaining for the boost will be displayed between the adjuster control arrows. The time can be adjusted by using ⇧ or ⇩:



The cryobar temperature is displayed on the Main Screen. In the illustration above, the actual cryobar temperature is -55°C.

THE CRYOBAR IS EXTREMELY COLD AND CAN CAUSE FROSTBITE. DO NOT TOUCH IT WITH BARE HANDS. s

(FSE version only) Use the table in Appendix C as a guide to select the temperature for the specimen to be cut according to the tissue type.

(FSE version only) To set the specimen head temperature, press *SPECIMEN* to select it and then use ⇧ or ⇩ to set the required temperature.

(FSE version and FSE versions) Press *CHAMBER* and use ⇧ or ⇩ to set the chamber temperature to the required temperature (normally between -20°C and -25°C, but should be at least as low as the specimen temperature guidelines listed in Appendix C).

Make sure you have a cooled blade ready for use.

There are several methods of embedding a specimen for work on a Shandon Cryotome. The following instructions describe one suggested method.

Take a clean Cryocassette that has been held a room temperature. Apply a layer of specimen embedding medium, such as Cryomatrix or Cryochrome, to the grooved side of the Cryocassette and place the Cryocassette on the cryobar.

When the embedding medium starts to freeze, place the specimen directly from the cutting - up board onto the embedding medium and press down lightly to eliminate any entrapped air. Add extra mountant to support the specimen if required.

To give a flat and parallel surface, and quicker freezing, lower the cooled heat sink onto the specimen. Allow the specimen and mountant to freeze until both are opaque and firm.

TO AVOID THE POSSIBILITY OF CROSS CONTAMINATION:

1. MAKE SURE THAT THE CRYOBAR AND HEAT EXTRACTOR ARE COLD ENOUGH

2. DO NOT USE TOO MUCH PRESSURE WHEN APPLYING THE HEAT EXTRACTOR

3. MAKE SURE THE CRYOCASSETTES AND HEAT SINKS ARE CLEAN BEFORE USE. s

Note *Do not use excessive mountant or get it onto the sides or back of the Cryocassette.* s

Note *CRYOBAR BOOST continues for 25 minutes after cryobar boost is initially enabled. This time can be adjusted in 5 minute steps by pressing*  *or*  .

There are two ways to switch off the cryobar boost during this period:

1 Press  *until the time displayed between the Adjuster Control Arrows is 15 seconds. The instrument will then count down until the boost ends.*

2 Select OPTIONS followed by CANCEL BOOST.

An audible warning will be sounded when the boost cycle is about to end. s

Turn the handle of the handwheel to the 12 o'clock position, and apply the break.

Fit the cryocassette handle (supplied) to the cryocassette and lock it in place by sliding the locking tab towards the cryocassette. Transfer the Cryocassette, complete with frozen specimen, from the cryobar to the specimen head and secure it in position with the specimen clamp (see page 29). The handle can now be removed, if required,

by sliding the locking tab away from the cryocassette.

Setting the blade holder

Fit a cooled blade and/or remove the blade guard.

If sufficient 'travel available' is indicated on the Specimen Travel Indicator, advance the specimen towards the knife using the advance push-button of the control panel on the left hand side of the instrument.

Alternatively, turn then handwheel to 3 o'clock and lock it in position. Pull the pivoting lever at the lower left hand side (black) of the knife holder towards you then carefully push the base of the knife holder towards you then carefully push the base of the knife holder along the carriage way from you until the blade is almost touching the specimen. Lock the knife holder in position by pushing the pivoting lever away from you.

If necessary use the rotary control to obtain fine positioning of the specimen with respect to the knife. The rotary control moves the specimen 8 microns (µm) with each notch.

Cutting Specimens

On the Main Screen select *MICRONS* and use or to set the required section thickness.

ALWAYS USE CUT RESISTANT GLOVES TO AVOID INJURY WHEN HANDLING DISPOSABLE BLADES. s

THERMO RECOMMENDS THAT THE WINDOW IS KEPT CLOSED WHEN CUTTING. s

To cut sections, turn the handwheel smoothly. The instrument performs a single cutting stroke with each full revolution of the handwheel.

Before you deal with any sections, lock the handwheel in the 6 or 12 o'clock position to move the specimen head to its lowest or highest position.

Use the brush to discard any unwanted sections - sweep them away to the sides or rear. **DO NOT BRUSH AGAINST THE TOP OF THE BLADE.**

Pick up the required selections on a slide.

Continue to turn the handwheel to cut more sections. The specimen automatically advances by the section thickness before the start of each cutting stroke and is automatically retracted by 40 microns during the return stroke.

Removing Specimens

When the last section has been removed, fit the knife guard and remove the cryocassette from the clamp using the cryocassette handle.

FIT THE KNIFE GUARD OR REMOVE THE BLADE WHEN NOT CUTTING SECTIONS. s

(FSE only) To help remove the cassette and/or specimen from the cassette, either press *SPECIMEN* twice or go to the Options Screen and select *UNLOAD SPECIMEN*. The specimen head will warm up to +2°c to allow the cassette and/or specimen to be removed. It will then return to it's set temperature. Press *SPECIMEN* again to stop *UNLOAD* (or *CANCEL UNLOAD* from the Options Screen) (page 40).

The specimen set temperature will be replaced by ***UNLD*** during this period. The display will flash and an audible warning given when the temperature reaches +2°C.

If the specimen is to be stored frozen, protect the cut surface with Shandon Cryotome, wrap the specimen in metal foil before putting it into a freezer. Do not store it in the refrigerated chamber of the Shandon Cryotome.

If the specimen is to be fixed, allow it to thaw before placing it in a suitable fixative; otherwise discard it in accordance with local regulations and procedures. Brush away any debris that has collected around the cassette clamp or head.

Decontaminate and clean the Cryocassette.

Note *Do not use bleach (sodium hypochlorite) to clean the coloured cryocassettes (unless this is a quick dip in bleach followed by a thorough water rinse) - prolonged contact with bleach will cause the colour to fade. Silver cryocassettes can be cleaned with bleach.* s

Housekeeping

Daily

An automatic defrost cycle takes place every day at 23.30 to clear the cooling fins of any frost build up. This time can be adjusted (described in the Setup Screen section). Extra defrosts can be activated as required from the *OPTIONS* screen.

Note *23.30 is the default time that can be changed from within the Defrost Setup screen (page 52).*

Use the small brush and debris tray to collect and remove debris from the chamber. The chamber can be wiped with an alcohol soaked cloth.

ALWAYS REFER TO MATERIAL SAFETY DATA SHEETS (MSDS) FOR REAGENTS SPECIFIED IN APPENDIX B. s

Chapter 6 Cleaning and Maintenance

It is important that decontamination and cleaning of the instrument becomes an automatic routine - especially if the source of material is unknown. It is recommended that a log is kept which lists:

i Material Cut
ii Degree of Risk
iii Decontamination Performed
iv Name of User
v Department.

Cleaning is a part of good laboratory housekeeping practice. External cleaning requirements are straightforward. The refrigerated chamber should only be washed and cleaned if required after the chamber is thoroughly decontaminated by fumigation. The instrument should be inspected for obvious damage whenever it is cleaned. If any damage is found, contact your Thermo supplier.

Routine maintenance by the operator does not require the removal of any panels or fixtures. Precision maintenance and adjustment should only be performed by Thermo trained service personnel and it is recommended that a Maintenance Contract is obtained from our Service Department.

IF HAZARDOUS MATERIAL IS SPLIT ON, OR INSIDE, THE INSTRUMENT, THE USER SHOULD CARRY OUT THE APPROPRIATE DECONTAMINATION (see World Health Organisation 'Laboratory Biosafety Manual.') s

CLEANING OR DECONTAMINATION METHODS, OTHER THAN THOSE RECOMMENDED IN THE OPERATOR GUIDE, SHOULD BE CHECKED WITH A THERMO AGENT TO ENSURE THAT THE PROPOSED METHOD WILL NOT DAMAGE THE EQUIPMENT. s

ALWAYS REFER TO MATERIAL SAFETY DATA SHEET (MSDS) FOR REAGENTS SPECIFIED IN APPENDIX B. s

ALWAYS WIPE UP ANY SPILLS IMMEDIATELY. IN THE EVENT OF A MAJOR SPILLAGE, DISCONNECT THE INSTRUMENT FROM THE MAINS SUPPLY WITHOUT DELAY AND DO NOT RECONNECT AND SWITCH ON UNTIL THE INSTRUMENT HAS BEEN THOROUGHLY DRIED OUT AND CHECKED BY A SERVICE ENGINEER.s

POTENTIALLY LETHAL VOLTAGES ABOVE 110V a.c. ARE PRESENT INSIDE THE UNIT. DO NOT REMOVE ANY ACCESS COVERS. s

WARNING

Always wear protective gloves when you clean or decontaminate the Shandon Cryotome to protect yourself against the effects of chemicals.s

WARNING

Do not use any chemicals that may interact with materials of manufacture (see Appendix B). If in doubt, check with the Thermo Service Department. s

WARNING

Do not use the abrasive compounds or metal components to clean the Shandon Cryotome or its components and accessories. s

Fumigation

The fumigation cycle is as follows:

1. The instrument performs a defrost
2. The chamber is warmed up
3. The formaldehyde solution is heated for 30 minutes and the instrument fumigates for 4 hours
4. Finally fumes and excess moisture are extracted from the chamber.

Carefully load the heating trough in the refrigerated chamber with 3ml of formaldehyde solution. Close the window and press *OPTIONS*.

To start the fumigation, press *FUMIGATE* in the Options Screen. The Fumigation Screen will display instructions. Press *START* to begin the fumigation cycle.

If the window is not closed, the screen will show an error and will prompt you to close it.

WARNING

Do not use any ammonia based reagent to neutralise formaldehyde. S

Note *For safety, the fumigation cycle cannot take place if the window is not closed and locked.* S

End of fumigation

Carefully remove the shelves, debris tray, covers, knife holder and any debris.

Wash the shelves, debris tray and covers in running hot water initially to remove the debris. Wash, dry thoroughly and replace in the Shandon Cryotome.

Follow the instructions below to clean the knife holder.

If the chamber is cold, wash it with alcohol to remove debris, and make sure the outlet tube in the bottom of the chamber is free from debris.

WARNING

Do not use scouring powder, acidic solutions or harsh detergents or you will degrade the brushed finish. S

Press *EXIT* and the chamber will return to the previously set temperature.

Cleaning

Use a spray foam cleanser, or a cloth damped in soapy water, and a dry polishing cloth to periodically clean the outside of the cabinet. **DO NOT USE EXCESSIVE WATER.**

Knife Holder

It is important to keep the knife holder clean.

Remove the knife or blade before cleaning knife holder. S

Remove any build up of debris with a stiff brush. If necessary, soak the brush in alcohol or use a tissue soaked in alcohol.

IT IS IMPORTANT THAT ALL THE KNIFE HOLDER SECTIONS ARE SEPARATED WHEN CLEANING, MAKE SURE THAT ALL SURFACES ARE COMPLETELY DRY BEFORE REASSEMBLING AND REFITTING INTO THE CHAMBER.S

Knife Holder Support Plate

Remove any debris, ice or moisture in the slot of the knife holder support plate in the base of the refrigeration chamber.

Air Intake

The efficiency of the refrigeration system is reduced if the air intake is blocked (bottom right hand side of the instrument). Use a vacuum cleaner or soft brush to remove dust from the black air intake.

Defrosting

An accumulation of frost within the cooling fins will also affect the efficiency of the refrigeration system.

To avoid this, the instrument will automatically defrost the cooling fins every day. The timing of this defrost can be programmed (see Setup Screen - Defrost).

Alternatively the defrost cycle can be started on demand. Choose Defrost from the Options Screen to select either a Cryobar Defrost or a Cooling Fins Defrost.

The Cooling Fins Defrost cycle is used to remove the build up of small amounts of ice around the main evaporator coil and the cooling fins at the rear of the cryochamber, and lasts approximately 5 minutes.

The Cryobar Defrost cycle will defrost the cryobar only and will last for approximately 5 minutes.

THE CRYOBAR MAY REACH TEMPERATURES OF MORE THAN +50°C DURING THE DEFROST CYCLE.

1. REMOVE THE SPECIMENS FROM THE CRYOBAR BEFORE DEFROSTING

2. DO NOT TOUCH THE CRYOBAR DURING DEFROSTING. s

To completely defrost the instrument, open the window and switch off both compressors (by raising the set points to +1°C or switching off the instrument).

The waste bottle collects water from the cooling fins. It also collects debris when the refrigerated chamber is washed down so the contents must be disposed of in an appropriate manner.

MAKE SURE ALL SURFACES AND PARTS ARE THOROUGHLY DRY BEFORE THE COMPRESSORS ARE RESTARTED. s

ALWAYS KEEP AT LEAST 200 ml OF 10% FORMALIN SOLUTION (4% FORMALDEHYDE SOLUTION) OR SIMILAR DE-CONTAMINANT IN THE WASTE BOTTLE. MAKE SURE THAT THE END OF THE DRAIN TUBE IS KEPT SUBMERGED. s

Maintenance

No maintenance is required to be carried out by the user.

If the fluorescent tube fails, either follow the instructions below or call the Thermo Service Department.

SWITCH OFF THE INSTRUMENT AT THE MAINS AND REMOVE THE PLUG FROM THE WALL SOCKET BEFORE PROCEEDING WITH ANY MAINTENANCE.s

Removing the lamp tube

Lift up the top cover.

DO NOT TOUCH ANY WIRES, CONNECTORS OR COVERS INSIDE THE INSTRUMENT. s

Grip the fluorescent tube firmly, rotate it be a quarter turn and pull it towards you to slide it from the end connectors.

Fitting the lamp tube

Hold the replacement tube firmly at the ends and align the connector pins with the slots at each end of the fitting.

Carefully push the tube into place and rotate it by a quarter turn.

Electrical Protection

The mains input supply feeds the Shandon Cryotome via a trip device that interrupts the electrical supply to the instrument if an internal fault occurs. The trip replaces the function of a fuse.

When the electrical protection device trips, the mains switch goes to its **O** position (OFF) and the instrument becomes inoperative.

If the protection circuit operates, this will normally indicate a compressor problem. Check that there is adequate space around the outside of the unit for cooling air and that the inlet grill on the right hand side is free of obstructions and dust. Allow 1 hour for the compressor to cool before attempting to reset the trip circuit.

Press and release the **I** side of the mains ON/OFF switch to switch the instrument on again. If the protection circuit keeps tripping

the switch, contact your Thermo Service representative.

ELECTRICAL PROTECTION IS INCLUDED TO PROTECT THE OPERATOR AND THE INSTRUMENT. DO NOT ATTEMPT TO OVERRIDE THE PROTECTION TRIP. s

WARNING

Portable Appliance Testing (PAT) should only be carried out by a competent person. It should only be carried out annually to avoid damaging the equipment. s

WARNING

Flash testing should only be carried out when absolutely necessary as damage to sensitive electronic devices may occur. It must only be carried out by a competent person. s

WARNING

Internal fuses are used to protect the electronics within the instrument. The fuses should only be changed by a qualified service engineer. s

Chapter 7 Troubleshooting

Correct service and maintenance is essential for the long term serviceability of precision engineered products such as the Shandon Cryotome. We strongly recommend that a Thermo Service Contract is used to ensure future reliability, and consistency of performance. Shandon Cryotome has self test routines built in so that error codes show in the display if malfunctions occur. You will be advised whether you need to contact your Thermo Engineer for service.

Table 1 lists basic instrument function problems and solutions.

Table 2 lists other problems mainly concerned with sectioning and their causes that are not shown in the displays.

Table 3 lists alarm signals, their causes and the remedial action to be taken.

If an error indication continues or recurs, remove the samples from the refrigerated chamber and store them in a suitable refrigerated container and contact your Thermo Service Representative.

Table 1 - Instrument Function

Symptom	Cause	Remedy
The Shandon Cryotome does not respond when the mains power is switched on	The instrument is still carrying out initial tests	Wait approximately 30 seconds (an hour glass is displayed) for the initial tests to finish
	No mains supply	Connect the power lead switch on the mains power and instrument main power switch (see pages.....)
	The circuit breaker has tripped	Reset the circuit breaker by switching the instrument off and on again (see page...)
	The mains fuses have blown	Replace the mains fuse Replace the instrument fuses **(Note only a technically competent person should replace fuses)**
The Shandon Cryotome is powered up, but does not respond correctly	The Shandon Cryotome may have started incorrectly	Switch off the instrument. Wait for 30 seconds. Switch on the main power switch
The knife holder or any part of the knife holder cannot be clamped or unclamped	Ice and / or debris between the parts of the knife holder	Full defrost Remove debris

Table 2 - Problems when sectioning

Symptom	Cause	Remedy
Specimen cracks as it is frozen	Too rapid freezing	Reduce cryobar temperature
	Specimen too thick	Cut specimen into thinner block
Specimen falls off cryocassette	Specimen too thick	Cut specimen into thinner block
	Cryocassette too cold before mountant added	Reduce time before adding mountant. 9Shoudl be at room temperature)
	Specimen unsupported	Give the specimen more support medium (e.g. Shandon Cryomatrix)
Specimen advances but does not cut	Knife loose	Make sure that the knife is clamped correctly
	Cryocassette loose	Make sure that the cryocassette is fitted and clamped correctly
	Specimen not firmly stuck to the Cryocassette	Re-mount the specimen on the Cryo-cassette using adequate mountant
	Knife angle incorrect	Increase knife angle
Sections roll up	Anti-roll plate too low	Raise the height of the anti-roll plate
	Specimen too cold	Raise the specimen temperature Warm the specimen slightly with a gloved thumb
Sections thaw when cut	Cutting equipment not cold enough	Allow more time for the knife and the anti-roll plate to cool

Cont.../

Table 2 - Problems when sectioning (cont)

Symptom	Cause	Remedy
Sections are puckered	The knife is dirty	Remove/clean the knife
	The knife is damaged	Check and, if necessary, sharpen the knife or use a new knife
	The anti-roll plate is nicked	Inspect and, if necessary, replace the anti-roll plate or rotate the plate to a new edge (there are 4 usable edges)
Sections appear with fine cracks parallel to the edge of the knife	Specimen is too cold when cut	Usually applies to fixed tissue, Soak in Dextran before freezing
Sections show ice artefacts	Specimen not frozen quickly enough	Allow Cryoboost longer time before adding mountant and admitting specimen
	Specimen too thick	Cut specimen into thinner block
	Frost or dirt on cryobar	Use cryobar cover to stop frost forming or debris collecting on the cryobar
Sections show signs of the effects of vibration	Knife not supported correctly	Disposable knives are most vulnerable. Make sure that the knife is fitted correctly and that there is no debris or ice under knife clamp
	Knife angle incorrect	Check and correct the knife angle Refreeze as necessary
	Specimen not sufficiently secured	Make sure the blade clamping is secure. Blade clamping force can be increased by tightening the clamp screw at the back of the top stage.
	The blade is not clamped securely	

Cont.../

Table 2 - Problems when sectioning (cont)

Symptom	Cause	Remedy
Sections thick and thin	Blunt knife or blade	Sharpen knife or use new blade
	Knife angle too shallow	Widen the knife angle
	Specimen not secure	Re-freeze and secure specimen
	Knife holder is loose	Make sure the knife holder is secure on the base
	Specimen temperature incorrect	Raise or lower the temperature
Sections stick to the anti-roll plate	Dirt or contaminant on the anti-roll plate	Use the brush to clean the anti-roll plate
	Anti-roll plate edge is damaged	Change to new edge on anti-roll plate
	Cutting equipment not cool enough	Allow more time for the knife and the anti-roll plate to cool
Sections are split vertically	The knife is dirty or blunt	Remove the knife/clean and sharpen it. WEAR CUT RESISTANT GLOVES.
	The knife/blade, anti-roll plate or clamp plate are damaged	Examine the knife/blade, anti-roll plate and clamp plate and replace if necessary
Sections curl after lifting from anti-roll plate	Anti-roll plate too warm	Lower chamber temperature
	Blade blunt	Change blade
	Static electricity in chamber	

Table 3 - Error messages

Help Screens are displayed for each error message

No	Cause	Remedy
1	**Microtome fault** A problem has occurred when the software has tried to initialise the microtome	Make sure that the specimen head is not obstructed. Press EXIT to reset the microtome. Remove the transit bracket Turn the instrument off and retry If neither of these solutions are successful, call Thermo Service
2	**Transit bracket has been fitted successfully**	Turn off instrument and repack it to move it safely. If the transit bracket has not been fitted, clear the obstruction in front of the head and fully retract the specimen head.
3	**Chamber temperature sensor is faulty** The chamber will be driven at maximum cooling effect	Call Thermo Service
4	**Cryobar Temperature Sensor is Faulty** The cryobar will be driven at maximum cooling effect	Call Thermo Service
5	**Specimen temperature sensor is faulty** The specimen head control has been disabled	Wait for the specimen temperature to stabalise in the chamber ambient before sectioning
6	**Window error lock**	Make sure the window is fully closed and retry
7	**Fumigation could not start** The window could not be locked	Make sure the window is fully closed and restart fumigation
8	**Fumigation Error** There was a fault during fumigation **THERE MAY BE FORMALDEHYDE FUMES IN THE CHAMBER** s	Call Thermo Service

Cont.../

Table 3 - Error messages (Cont...)

No	Cause	Remedy
9	**System error** A critical fault has occurred which may have resulted in one or more systems being disabled	Call Thermo Service
10	**Specimen head ahas overheated** The specimen head control has been disabled	Wait for 5 minutes for the head to cool down and then reselect the desired specimen head temperature
11	Read the text carefully. Error 11 is either: **Cryobar refrigeration system fault** *or* **Chamber refrigeration system fault**	Remove all specimens from the cryobar and chamber and call Thermo Service Remove all specimens from the chamber and call Thermo Service
12	**Specimen head temperature control fault**	Wait for 5 minutes and then reselect the desired specimen head temperature
13	**Voltage Selection Error**	The instrument needs to be reset for the local mains voltage. Call Thermo Service.
14	**Fumigation heater error** The fumigation heater is on permanently **THE FUMIGATION HEATER IS VERY HOT - DO NOT TOUCH.** s	Call Thermo Service.

Chapter 8

Specification and Accessories

Specification

Physical

Width	830mm (max)	(33ins)	*(including handwheel)*
Depth	745mm	(29½ins)	
Height	1050 mm	(41½ ins)	*(working height)*
	1205mm	(275 lbs)	*(instrument height)*
Weight	125kg	(275 lbs)	

Electrical

Supply Voltages

230Va.c. (~)	50Hz	1800VA
115Va.c. (~)	60Hz	1800VA

(Voltage is set at the factory)

Maximum supply voltage fluctuations not to exceed ±10% of nominal voltage

Power demand characteristics

Notes:

1. I (max) = Peak Current
2. Peak Current is for 22 secs max with stalled rotor.
3. Voltage drop affects compressor start capability.
4. Supply impedance affects compressor start-up capability

Nominal Input Vac	Nominal Voltage @I_{max} Vac	Maximum Voltage @no load Vac	I_{max} - Maximum Current when compressor starts A	Maximum Supply Impedance V/A
230V 50Hz	198	253	12	1.0
115V 60Hz	103	126	38	0.25

Fuses

Fuses should only be replaced by technically competent personnel

Main plug fuse	13A 250V	*(where applicable)*
Main fuses (x 2)	F5A 250V	(Part number P11171)

Main fuses must only be replaced by service personnel

Remote alarm fuse (x1)	F5A 250V	(Part number P11171)

Switch Convention

I	Power On
O	Power Off

Environment

General

Indoor use only

Safe operating temperature

+5°C to +40°C

Recommended operating temperature

+5°C to +35°C

NOTE - refrigeration performance may be degraded at ambient temperatures above +25°C s

Transit/storage temp

-25°C to +55°C (+70°C for short exposure)

Humidity

80% max. for temperatures <31°C
50% max. for temperatures 31°C to 40°C
(Non-condensing environment)

Altitude

Up to 2000m (6,500 feet)

Pollution degree

2

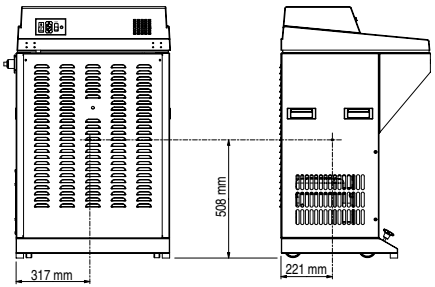
Over voltage category

II

Part Numbers

Shandon Cryotome FE	230V; 50Hz	A78900001
	115V; 60Hz	A78900002
Shandon Cryotome FSE	230V; 50Hz	A78900003
	115V; 60Hz	A78900004

Centre of Gravity See also page



Microtome

General	Rotary rocking microtome mounted outside refrigerated chamber.
Total specimen advance	25mm
Advance Speed	>1mm / second
Section thickness range	1 to 20µm in increments of 1µm 20 to 60µm in increments of 5µm
Cutting Stroke	57mm
Retraction	40µm on upward stroke
Cryochamber	at an ambient temperature of ≤+25°C
Cryochamber temperature	0 to -35°C
Cryobar temperature	-55°C *(minimum) (adjustable)*
Specimen head temperature (FSE)	0 to -40°C *(performance restricted to±10°C from chamber temp)*

Accessories

Instrument Accessories	Quantity	Part Number
Knife / blade holders		
Disposable blade holder with anti-roll plate - high profile	1	A78910033
Disposable blade holder with anti-roll plate - low profile	1	A78910032
Solid knife holder with anti-roll plate	1	A78910047
Orientation heads: X/Y orientation head [FE only]	1	A78910016
Cryobar Accessories:		
Cryobar cassette identification label	pk of 4	A78910054
Cryobar cover	1	A78910016
Cryocassettes:		
40mm diameter crosshatched (multicoloured)	pk of 6	A78910031
40mm diameter annular	pk of 4	A78910055
25mm diameter annular	pk of 4	77210150
25mm diameter crosshatched	pk of 4	A78910056
9.5mm diameter angular	pk of 4	77210153
28 X 40mm crosshatched	pk of 4	A78910057
Handle	pk of 4	A78910058
Debris Tray	1	A78910039
Heat Extractors: standard	1	A78910014
half weight	1	A78910036
double weight	1	A78910037
Shelves: Tool	1	A78930121
Narrow	1	A78930166
Wide	1	A78930063
Linistat Stainer: 220-240V, 50Hz	1	B1000201
110-120V, 60Hz	1	B1000200

REFER TO APPENDIX B FOR A LIST OF APPROVED REAGENTS IF A STAINING SYSTEM SUCH AS THE SHANDON LINISTAT IS USED ON TOP OF THE INSTRUMENT.

See catalogue for details of solid knives, disposable blades, Cryomatrix™ and other Cryostat accessories.

Spares

Instrument Spares	Quantity	Part Number
Allen key (handwheel transit fixings)	**1**	P13546
Anti-roll plate - glass (4 usable edges)	1	A78930200
Anti-roll plate - perspex (4 usable edges)	1	TBA
Brush (sections)	1	P12940
Brush (debris)	1	P12257
Fluorescent tube	1	AP14917
Mains leads:		
UK	1	P13291
EU	1	P13290
US	1	P13292
Operator Guide (available in different languages)	1	A78910100
Spanner (foot adjustment)	1	A78930178

Chapter 9 Warranty Statement

We are proud of our quality and reliability, and of our after sales service. We continuously strive to improve our service to our customers.

Please ask your distributor or representative about Service Contracts which can keep your purchase in peak condition for many years to come.

Warranty provisions necessarily vary to comply with differences in national and regional legislation, and you can find details in your delivery documents or from your dealer or representative.

Please note that your warranty may be invalid if:

- the instrument is modified in any way
- accessories and reagents are used that are not approved by Thermo, or
- the instrument is not operated or maintained in accordance with the instructions in this Operator Guide.

Declaration of Conformity

This Declaration of Conformity is only valid when the instrument is used in accordance with the Operator Guide A78910100

Manufacturer's Name: Thermo Shandon Limited (Trading as Thermo Fisher Scientific)

Manufacturer's Address: Chadwick Road, Astmoor, Runcorn,
Cheshire, WA7 1PR
ENGLAND

Product Description: Cryostat

Product Designation: **Shandon Cryotome® FE**
Shandon Cryotome® FSE

Part numbers: *A78900001, A78900002, A78900003, A78900004*
including accessories supplied as standard and the following accessories:

Orientation Heads: *A78910016, A78910022*

Cryocassettes: *77230540, 77230546, A78910031, A78910055, A78910056, A78910057*
A78910083

Knife Holders: *A78910032, A78910033*

Year of Marking (CE): 2005

This product conforms with the essential requirements of the following directives:

In Vitro Diagnostics Directive	98/79/EC
Low Voltage Directive	2006/95/EC

This product complies with the following International Standards:

EMC:	EN 61326:1998 EN 61000-3-2:2000 EN 61000-3-3:1995 Inc A1:2001
Safety:	EN 61010-2-101:2002 EN 61010-1:2001 CAN/CSA C22.2 No. 61010.1-04 UL Std No. 61010-1 (2nd Edition)

Issued by: K. Waldron
Quality Manager
Thermo Fisher Scientific
Anatomical Pathology, Diagnostics Division

Date: 1st June 2007

Optional accessories considered subject to the In Vitro Diagnostics Directive (IVDD) are specifically identified on this Declaration of Conformity. Further supplies of standard accessories are treated as spares. Convenience aids offered as accessories are not subject to the IVDD.

Appendix A Transportation Instructions

If you ever need to transport the Shandon Cryotome, follow these packaging instructions.

Repacking

SHANDON CRYOTOME FE AND FSE WEIGH APPROXIMATELY 125kg (275lbs). **ALWAYS GET HELP TO SAFELY MOVE THE INSTRUMENT WITHOUT RISK OF INJURY.** s

Follow the instructions in Chapter 6 and follow good laborartory practice to clean and decontaminate the instrument. Complete and sign the Product Safety Declaration (at the end of this chapter) to confirm that the instrument is fully decontaminated.

Make sure that all knives, blades and holders are removed from the instrument. Remove the shelves, heat extractors and tools from the chamber.

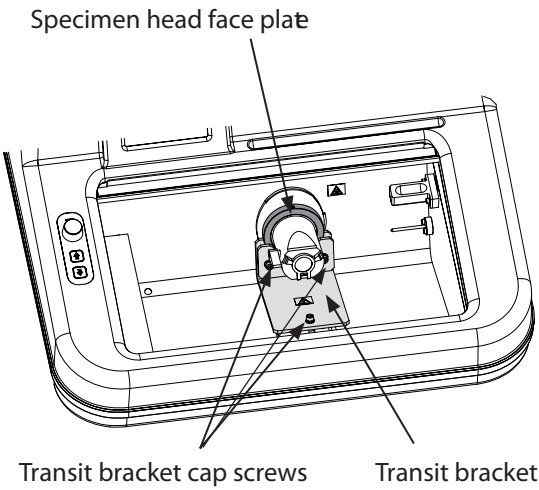
Use the Advance Control Panel to position the Specimen Head in the fully retracted posiiton. Move the specimen head to the top of its travel.

Fit the transit bracket to the knife holder support plate and slide it to the back of thechamber.

Lower the specimen head into the bracket.

Place the face plate at the rear of the specimen head into the transit bracket clamp and tighten the cap screw on the base of the transit bracket knob. Gradually tighten the other two cap screws.

MAKE SURE THE CAP SCREWS ARE TIGHT BEFORE MOVING ON TO THE NEXT STAGE. s



Use the control panel to move the specimen head forward until it jams. The screen will display an Error 2 warning screen. Switch off the instrument. Do not acknowledge the error.

Switch off the instrument and remove mains cables from the rear of the elctronics box.

Empty the waste bottle and replace it in the instrument.

BE AWARE OF POTENTIAL BIOHAZARDS AND FORMALIN CONTAINED IN THE WASTE BOTTLE. DISPOSE OF CORRECTLY IN ACCORDANCE WITH LOCAL PROCEDURES. s

Remove the handwheel bolt and remove the handwheel.

Lift the top cover and secure the window in the closed position using sticky tape. Turn the instrument lowering knobs counter-clockwise to lower the rollers to the ground.

SHANDON CRYOTOME FE AND FSE WEIGH APPROXIMATELY 125kg (275lbs). **ALWAYS GET HELP TO SAFELY MOVE THE INSTRUMENT WITHOUT RISK OF INJURY.** s

Repacking

Use two people for the following steps:

1. Place the packaging pallet in a convenient place, so that there is enough room for the ramp to lie on the floor in front of the pallet and that there is enough room for a person to get to the back of the pallet.

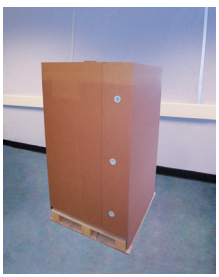
2. Push the instrument backwards up the ramp and make sure that the instrumnet sits inside the foam packing on the pallet. The front of the instrument should face forward.

3. Place the accessories box in front of the instrument underneath the footrest.

4. Raise the ramp and place the foam packing piece on top of the instrument, making sure that the top of the ramp fits into the slot in the foam.

5. Wrap the cardboard outer around the instrument so that the join is at the front next to the raised ramp. The large flap (with the three holes on the edge) must be under the small flap (with the three plastic fixings).

6. Push the plastic fixings so that they match up with the holes in the large flap, and teist the inner part of the plastic fixing so that the two cardboard flaps are joined together.



7. Put the cardboard lid on top of the packed instrument and finally bind the complete package so that the bingings run over the lid and through the pallet.

PRODUCT SAFETY DECLARATION

Part 1 DECONTAMINATION CERTIFICATE

Any instrument, or part of any instrument, must be clean before being returned or before any on-site service, and where necessary accompanied by a completed Decontamination Certificate. If the instrument, or any part of it, is found to be in an unclean condition upon receipt or before a service, or Thermo Fisher Scientific consider it to be a hazard, the instrument or part will be returned unrepaired at the expense of the customer or service will be refused.

In the case of returns, it is important that the certificate is forwarded by post or fax, and a copy attached to the exterior of the container. Containers will not be opened until the company is in possession of the required certificate. This form **MUST** be completed by the customer and **NOT** a Thermo or distributor employee.

If the instrument or any part of it is to be returned to Thermo and has been exposed to, or been in contact with potential pathogenic or radioactive material, it is essential that it is decontaminated. For decontamination, reference should be made, where appropriate, to the European Directive 2000/54/EC. To avoid any misunderstanding, we request that all instruments or parts returned to us must be accompanied by a certificate stating the following:

We certify that the instrument:	● has not been exposed to pathogenic, radioactive or other hazardous material and has been cleaned
Model	● has been exposed to pathogenic, radioactive or other hazardous material and has been decontaminated and cleaned according to approved procedures, following exposure to:
Serial No	. . . . .

Has the instrument been used for work with human, or animal, Transmissible Spongiform Encephalopathies, e.g. Creutzfeld-Jacob disease, Scrapie or BSE? If **YES**, please contact Thermo Service before taking any further action.	**YES / NO**

Signed . . . . . Signed . . . . .

Name (Block Capitals) . . . . . Company/Organisation . . . . .

Full address . . . . .

. . . . .

Part 2 GUIDELINES FOR RETURNING INSTRUMENTS

Please use the checklist (below left) to ensure that the instrument being returned is ready for collection, then fill in the details (below right).

● All reagents / wax removed from instrument, including vapour traps (if applicable)		RMA NUMBER . . . . .
● Accessories are secured / itemised		CARRIER . . . . .
● Instrument has had transit clamps fitted as detailed in the Operator Guide		FOR ATTENTION OF . . . . .
● Instrument is packed in original packaging		. . . . .

A784-1505-Issue 2

Thermo Fisher Scientific, 93-96 Chadwick Road, Astmoor, Runcorn, Cheshire, WA7 1PR, United Kingdom
Tel: +44 (0) 1928 566611; Fax: +44 (0) 1928 565845; www.thermo.com/shandon.

Appendix B Approved Reagent List

This Section lists all the reagents that Thermo specify can be used with the Shandon Cryotome Cryostat.

If you want to use a reagent not included in this list, contact your Thermo agent for advice.

ALWAYS REFER TO THE MATERIAL SAFETY DATA SHEET (MSDS) FOR THE REAGENTS USED. s

Reagent List

Industrial Methylated Spirits (IMS) / reagent alcohol (up to 5% methanol in ethanol)

Isopropyl Alcohol (IPA)

Formaldehyde solution

Formalin solution

Linistat staining reagents

Xylene

Toluene

Shandon Xylene Substitute (Histosolve)

Ethanol

Haematoxylin

Eosin (aqueous and alcohol based)

EA50/65

OG6

Scotts Bluing Reagent

Phosphotungstic acid (1% in water)

Cleaning Reagents

Industrial Methylated Spirits (IMS) / reagent alcohol 9up to 5% methanol in ethanol)

Dilute Detergent

Sodium Hypochlorite 10% **(not for coloured cryocassettes)**

Water

WARNING

Do not use ammonia or acidic solutions inside the chamber.

Appendix C Examples

This Section provides guideline cutting temperatures for the Shandon Cryotome.

BE AWARE THAT TISSUE SAMPLES MAY POSE A BIOHAZARD. TAKE SUITABLE PRECAUTIONS. s

Suggested cutting temperatures for frozen tissues

The chamber temperature for the Shandon Cryotome FE and FSE should normally be set at -25°C, but should at least be 5-10°C lower than the specimen head temperatures shown.

Tissue Type	Specimen Temperature (FSE) (°C)
Unfixed Tissue:	
Brain	-12
Liver	-13
Lymph Nodes	-14
Kidney	-15
Thyroid	-15
Muscle	-16
Skin	-16
Spleen	-16
Breast	-25
Breast with fat	-30 or below
Adipose Tissue	-30 or below
Fixed Tissue:	-12 to -17

THESE TEMPERATURES ARE GUIDELINES ONLY. MAKE SURE THAT THE TISSUE IS SUFFICIENTLY

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Contact Addresses

Anatomical Pathology
93-96 Chadwick Road
Astmoor, Runcorn
Cheshire, WA7 1PR, UK

Tel: +44 (0) 1925 562600
Fax: +44 (0) 1928 562627
www.thermo.com/pathology

Anatomical Pathology
4481 Campus Drive
Kalamazoo
MI 49008, USA

Tel: 1-800-522-7270
Fax: +1 269-372-2674
www.thermo.com/pathology