

SHANDON

Histocentre 2 **Tissue Embedding System**



Your Histocentre 2 refrigeration system contains
HFC134A refrigerant, which is classified as a non-ozone depleting chemical.

OPERATING INSTRUCTIONS AND PARTS LIST

LT874X1 • 8/9/96
Operator Manual No. 1001209

Serial Number: _____

This manual contains important operating and safety information. The user must carefully read and understand the contents of this manual prior to the use of this equipment.

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Safety Information

Your Shandon Histocentre 2 has been designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.

Alert Boxes



WARNING

Warning alerts apply when there is a possibility of personal injury.



CAUTION

Caution alerts apply when there is a possibility of damage to the equipment.



NOTE

Notes alert the manual user to pertinent facts and conditions.

Warnings

WARNING

TO AVOID ELECTRICAL SHOCK, ALWAYS:

1. Use a properly grounded electrical outlet of correct voltage and current handling capacity.
2. Disconnect from the power supply prior to maintenance and servicing.

TO AVOID PERSONAL INJURY:

1. Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.
2. As an operating necessity, there are exposed hot surfaces on the Histocentre 2. Avoid Contact.
3. Refer servicing to qualified personnel.
4. **Do not use XYLENE for cleaning purposes.** While highly effective as a paraffin cleaner, xylene is also highly flammable with a flash point of 27 C (81 F) to 32 C (90 F). Hence, xylene is totally inappropriate for use with the Histocentre 2 which contains hot surfaces and internal sparking contacts.

Introduction

The Shandon Histocentre 2 provides all the components necessary, in one efficiently integrated unit, to effectively perform histological paraffin embedding procedures. Included on the same working level are a temperature-controlled paraffin tank and nozzle (spigot) used to hold and dispense molten paraffin as needed; a temperature-controlled, three-chamber tissue tank used to hold specimen cassettes, to prewarm empty moulds, and to provide a cassette working area; a fixed-temperature forceps warmer and a pair of electrically heated forceps; an illuminated and temperature-controlled hot plate used as an embedding area; and a cold plate area used to cool the embedded specimens prior to microtomy. The unit also provides complete controls to activate the cooling and heating systems and to set and monitor temperature levels.

The paraffin tank is constructed of cast aluminum and utilizes an aluminum foil heater controlled by a precision temperature sensor and automatic proportioning controller. The controller features zero voltage switching, line isolation and all-solid-state circuitry to provide accurate, repeatable and stable operating conditions. The tank dispensing mechanism consists of a filter, plumbing, electro-mechanical valve and nozzle (spigot). When the valve is opened (by hand or footswitch), gravity effects the flow rate which can be controlled by an adjustment screw. A second adjustment screw locks and seals the flow from residual dripping. All dispensing components are heated to assure paraffin fluidity.

The warming tank is similarly constructed of cast aluminum with an aluminum foil heater. An electronic temperature control switches the heater on and off to provide a constant casting temperature. The forceps warmer consists of a removable aluminum block that is drilled to hold four forceps and is ported to allow paraffin overflow to run into the waste container. The removable hot plate is controlled by resistive heaters and an electronic temperature control. The waste well is located directly under the removable hot plate. The waste container is removable. Drainage is channelled into this container from the hot plate, forceps warmer and cassette working area. The large cast aluminum cold plate can hold up to 100 moulds, and functions through a standard hermetic refrigeration system with HFC134A refrigerant in a copper evaporator bonded to the plate.

The heated forceps operate from a 18 volt power supply. The heating elements are temperature sensitive and maintain the forceps' tip within 65-75 C.

Safety features include a circuit breaker for the overall electrical system. Additionally, the compressor in the cooling system is thermally fused with an automatic reset. Electrical fuses protect the internal circuitry from overloading in a fault condition. Thermal protection is provided by one-shot cutoffs to prevent temperature runaway in the heater circuits for both the paraffin tank and the warming tank.

Performance Characteristics

Paraffin Tank:	Temperature Range	45 to 65°C
	Control Accuracy	±0.5°C
	Control Stability	±0.2°C
	Indication Accuracy	±0.5°C
	Overtemperature Protection	104°C
Hot Plate:	Temperature Range	55 to 70°C
	Temperature Stability	±1.0°C at 65°C
	Readout Accuracy	±3.0°C at 65 °C
Warming Tank Temperature Range		40 to 80°C ± 5°C
Overtemperature Protection		121°C
Forceps Warmer Temperature		80°C ± 8°C
Cold Plate Temperature Range		-15°C ± 5°C
Ambient Operating Range		17 to 27°C
Electrical Forceps Temperature Range		70°C ±5°C

Specifications

Electrical Requirements	120 Volts + 5% -10%	220-240 Volts ± 5%
	13.2 Amps	6.6 Amps
	1750 Watts	1750 Watts
	60 Hz	50-60 Hz

Electrical Forceps Power Supply	16 VAC
Solenoid Valve Power Supply	24 VAC
Paraffin Tank Capacity	5.2 litres (10 lbs.)
Warming Tank Capacity	1 litre

Dimensions	
Height	38 cm (15")
Height (working)	12.5 cm (5")
Width (inc. holster)	95 cm (37.5")
Width (exc. holster)	92 cm (36.5")
Depth	61 cm (24")
Net Weight	47.5 kg (105 lbs.)

Refrigeration Circuit
Refrigerant: HFC134A
Charge Quantity: 0.96 lbs
High Side Pressure: 95 psi
Low Side Pressure: 5 psi

Definitions

Control accuracy is the degree to which the resultant paraffin temperature as observed on the display agrees with the set temperature as observed on the display.

Control stability is the degree to which the temperature fluctuates around the average temperature of the paraffin at the location of the temperature sensor.

Indication accuracy represents the maximum error in the actual paraffin temperature as displayed on the digital readout (with the PUSH TO SET switch released) compared to that reading which would be attained by a calibrated temperature measuring device located at the position of the temperature sensor.

Unpacking

Your Shandon Histocentre 2 is shipped completely assembled in a single carton. After unpacking, locate each item in the list below. If a shortage exists, notify Shandon, giving the name and number of the missing item.



NOTE

If shipping damage is observed, retain the carton and packing material intact with the unit and file a claim with the final carrier. Usually, the firm will send an inspector to ascertain liability.

QUANTITY	ITEM	NUMBER	
1	Shandon Histocentre 2	64000011	64000012
		&	&
		6400011	6400012
		(USA only)	(USA only)
	Supply Voltage	220-240V	120V
1	Paraffin Tank Cover	CV814X9B	CV814X9B
1	Footswitch and Cable	SWX96	SWX96
2	Light Bulbs	LMX14	LMX14
1*	Magnifying Lens	LEX5	LEX5
1*	Supporting Cable, for Magnifying Lens	SF332X1	SF332X1
1	Scraper	SAX1	SAX1
1	Hot Plate	PT387X1	PT387X1
1	Large Forceps	TWX1	TWX1
1	Forceps Warming Block	BK387X1	BK387X1
1	Waste Container, for Hot Plate Well	TY387X3A	TY387X3A
1	Base Mould Prewarming Well Cover	AY814X1	AY814X1
1	Holding Container Well Cover	AY814X2	AY814X2
1	Base Mould Prewarming Well Insert	BC387X2A	BC387X2A
1	Cassette Cover Waste Container	PT387X2A	PT387X2A
2	Partitions, for Base Mould Insert	PT387X3A	PT387X3A
1	Instruction Manual	LT814X1	LT814X1
1	Stainless Steel, 1 litre Holding Tray	TY387X2B	TY387X2B
1	Nylon Plate Hot Plate	PT436X2A	PT436X2A
1	Touch Plate Pad (6.3 mm X 66.7 mm X 50.8 mm)	CV387X1	CV387X1
1	Touch Plate Pad (12.7 mm X 66.7 mm X 50.8 mm)	CV387X2	CV387X2
1*	Knob, Screw, Magnifying Glass	KBX41	KBX41
1*	Knob, Screw, Spout, Flow Control	KB332X1	KB332X1
1*	Knob, Screw, Lock, Flow Control	KB332X2	KB332X2
1	Heated Forceps, Yellow, 2 mm	TYX2	TYX2
1	Forceps Holder	HR814X1	HR814X1
1**	Detachable Cordset, North America		CRX84
1**	Detachable Cordset, UK	CRX85	
1**	Detachable Cordset, European	CRX70	

*Shipped assembled or mounted.

**The 120 volt model is supplied with one 120 volt detachable cordset. The 220-240 volt model is supplied with one UK and one European cordset. Use the cordset mating to your mains inlet.

In the event that additional accessories are needed, order by the specified part number, description and quantity described above.

Controls and Indicators

The operating controls and indicators are described on pages 7 and 8. The following information is organized in three groups: Front Panel Controls; Top Deck Controls; and Rear Controls.

Front Panel Controls

Footswitch Connector. Receptacle accepts footswitch cable connector for foot-actuated operation of the wax dispensing mechanism.

Cold Plate On/Off Switch. Rocker switch turns cold plate compressor and cooling mechanism on or off. Compressor runs continuously when control is ON. Switch illuminates to indicate cold plate switch is ON.

Hot Plate Temperature Control. Knob with OFF and HI positions plus any position in between, labelled LO through 6, used to select hot plate operating temperature.



NOTE

Hot plate heater is actuated by the Paraffin Tank On/Off Switch described below.

Hot Plate Push to Read Switch. When depressed and held, this pushbutton switch causes the Paraffin Tank Temperature digital display (described below) to switch to displaying the current hot plate temperature. When this pushbutton is released, the digital display reverts to a continuous display of current paraffin tank temperature.

Hot Plate Control Indicator. Control light cycles on and off for HOT PLATE TEMPERATURE Control setting, LO through 6, as hot plate heater comes on and off to maintain set temperature. Both the hot plate heater and this control indicator remain continuously ON when HOT PLATE TEMPERATURE Control is set to HI position.

Paraffin Tank On/Off Switch. Illuminated rocker switch turns power on or off to all system heaters (i.e., to the heaters for the paraffin tank, the hot plate, the forceps warmer, the electrically heated forceps, the lights and the three-chamber warming tank).

Paraffin Tank Control Indicator. Indicates temperature condition of paraffin in paraffin tank; i.e., it remains illuminated when paraffin temperature is more than 1 C below the selected paraffin temperature set point (see discussions below for Temperature display, for Push to Set Switch, and for Set Point Control); it remains extinguished when paraffin temperature is more than 1 C above the selected paraffin temperature set point, and it flashes on and off continuously whenever the paraffin temperature is stabilized at a selected set point.

Paraffin Tank Temperature Digital Display. Illuminates continuously (whenever the paraffin tank ON/OFF switch is energized) to show current paraffin tank temperature (C). The display can be made to switch momentarily to displaying the selected paraffin tank temperature set point by pressing and holding the PARAFFIN TANK PUSH TO SET Switch (see discussion below). As soon as this button is released, the display then reverts to current paraffin tank temperature. The display can also be made to momentarily show the current hot plate temperature simply by pressing and holding the HOT PLATE PUSH TO READ Switch (see discussion above). Again, the display reverts to current paraffin tank temperature as soon as this switch is released.

Paraffin Tank Push to Set Switch. When pressed and held, this pushbutton switch causes the display to show the selected paraffin tank temperature (°C) as chosen by the operator with the PARAFFIN TANK SET POINT Control (see below). When this switch is released, the display then reverts to showing the current paraffin tank temperature.

Paraffin Tank Set Point Control. A ten turn adjustable knob with a locking ring, used in conjunction with PUSH TO SET Switch (see above), to select a desired temperature for the paraffin tank (within the specified range of 45 to 85°C). The operator presses and holds the PUSH TO SET Switch and observes the changing display while adjusting the SET POINT Control for the desired temperature set point. Note that the full counterclockwise position for the SET POINT Control will cause the display to show the minimum operating temperature of 45°C. Once the desired set point shows on the display, the operator then releases the PUSH TO SET Switch and locks the knob setting by turning the locking ring clockwise. To review the set point temperature, the operator need only press and hold the PUSH TO SET Switch, and the selected paraffin tank temperature will show on the display.

Tissue Tank Temperature Adjustment. This control knob provides temperature adjustment (within specified range) for warming tank compartment areas. Turning it clockwise increases temperature while counterclockwise decreases temperature.



NOTE

Operator should strive for adjustment that allows paraffin to remain melted with the cover removed over the stainless steel holding container. Typically, 56-58°C over paraffin will require a holding container temperature of approximately 62°C, adjust control setting upward slightly if surface filming occurs.

Electrically Heated Forceps Socket. Pilot light adjacent to the receptacle illuminates when the forceps tips are cold. The light gradually dims and eventually extinguishes when the forceps tips are at working temperature.

Top Deck Controls

Paraffin Flow Adjustment. Turning this screw adjustment (located on shroud directly above nozzle (spigot)) allows the operator to control the rate of paraffin delivery from the nozzle (spigot), relative to specimen size, stage of embedding procedure, etc. Control can range from a drop at a time to steady flow. The lower screw secures and seals the flow rate adjustment.

Manual Touch Plate. When pressed inward, this plate (located directly behind nozzle (spigot)) actuates the dispensing mechanism.

Light Switch. Press to illuminate orientation platform.

Rear Panel Controls

Circuit Breaker. Located on left side of rear panel (when facing appliance), breaker switch has ON/OFF positions and provides protection against excess current.

Installation

The following procedures cover the general set up and assembly of the Histocentre 2. Also provided is an operational check out procedure which assures that all system components are functioning properly.

Set Up:

1. Remove the unit from the carton with accessories. Inventory the accessories described in the unpacking instructions on page 6.
2. Set the Histocentre 2 on a level counter top to assure proper drainage.



NOTE

Do not place unit directly under an air-conditioning vent, an open window, or a heating vent.

Do not block air flow around the sides of the condenser shroud located at the centre rear of the unit. However, the back of the shroud may abut a wall.

3. While the unit is unplugged, inspect the paraffin reservoir and holding wells. Clean, if needed, by wiping down with an alcohol saturated cloth.
4. Allow the unit to sit 24 hours before operating the cold plate. This allows compressor oil to drain into the compressor if the unit has been shipped upside down.
5. Check the electrical specifications on the rear panel specification plate to be sure they are compatible with your electrical supply. See electrical specifications on page 5.
6. Turn the tissue tank temperature adjustment knob to a 5 setting, and set the circuit breaker to "ON."
7. Mount the supplied magnifying glass and flexible cable by attaching them to the fitting located at the lower bottom left side of the paraffin tank column. Tighten fitting screw after inserting shaft.
8. Insert the base mould separator into the base mould prewarming compartment. Adjust the partitions to your liking. Place the cassette cover waste container in the immediate front of the insert.
9. Insert the stainless container into the paraffin holding container well.
10. Remove the paraffin flow adjustment screw from the nozzle (spigot). Lift the hinged hood and screw the two lamps into the sockets. Push hinged cover back into position and reinsert screw.
11. Plug the footswitch cable into the receptacle on the front panel of the Histocentre 2.
12. Plug the appropriate detachable cordset into the mains inlet located at the left rear corner of the unit (when facing the unit). Turn on the main power switch (circuit breaker) adjacent to the mains unit.



NOTE

The 220-240 Volt Histocentre 2 is supplied with a UK and a European cordset. Use the cordset mating to your mains inlet.

13. **Heated forceps:** Insert the jack plug into the socket on the far right of the front control panel labelled "Electrical Forceps." With the paraffin tank switched on, the green indicator light will illuminate. As the forceps tip temperature rises, the indicator light will dim and gradually extinguish. The forceps tips will attain a working temperature (85 °C to 75 °C) within 90 seconds. The indicator may illuminate again briefly as the forceps compensate for any cooling at the tips. A pair of medium forceps (2 mm) are supplied with the unit; fine (1 mm) and large (4 mm) are also available (see Accessory parts list in Appendix).
14. The forceps holder must be mounted in the forceps holder clip located on the right side of the main case. The forceps tips are separated when in the holster. Please see photograph below:



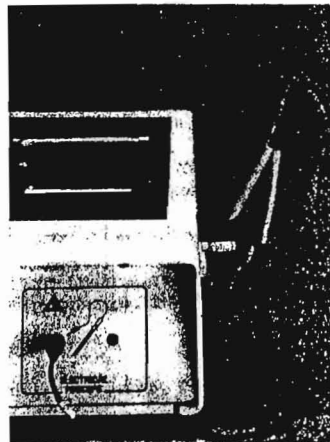
NOTE

A large 9 3/4" forceps is supplied as a tool to perform the following functions:

- (a) Remove cassettes from the holding container and working area.
- (b) Remove hot plate: Two ports in the hot plate accommodate the forceps tips. The hot plate is designed to rest over holding container well.
- (c) Remove waste container in the hot plate well by inserting forceps tips into centre bar ports. Slide the container to left and lift.
- (d) Remove cassette cover waste container by inserting forceps tips into centre port and lifting container. Transport container to wastebasket and open flip-open cover to empty cassette covers.
- (e) Adjust the base mould partitions by placing forceps tips in centre ports and lifting.
- (f) Remove forceps block.

Accumulation of paraffin on the forceps tips may be removed by storing forceps tips in paraffin using the holder located in a corner of the holding container. Also, a port in the holding container well cover may be used to store your forceps.

The supplied paraffin scraper is designed to remove paraffin droppings from the case and castings without marring the finish.



Forceps in Holder



CAUTION

Never leave the forceps tips together for extended periods of time. Doing so will cause early failure of the heaters.

Operational Check Out:

1. Turn the COLD PLATE ON/OFF switch to "ON." The COLD PLATE POWER switch will illuminate, and the condenser cooling fan will run.
2. The cold plate will start to cool. Verify this by touch.
3. Turn the PARAFFIN TANK ON/OFF switch to "ON." Turn the HOT PLATE TEMPERATURE control knob to setting 3. Depress the "Push To Set" switch and observe the starting temperature of the hot plate on the digital display.
4. Turn on the orientation platform lights.
5. Depress the HOT PLATE PUSH TO READ switch. Observe the increasing temperature of the plate on the digital display.
6. Turn the PARAFFIN TANK SET POINT control knob fully counterclockwise then depress and hold the PARAFFIN TANK PUSH TO SET switch. The digital display will read 45.0 C 0.2 C or lower.
7. Release the PUSH TO SET switch. Observe, on the digital display the paraffin tank temperature rise to 45 C. The PARAFFIN TANK CONTROL light will illuminate as long as the temperature is 1 C, or more, below 45 C. As the temperature nears 45 C, the indicator will flash. As the temperature overshoots 45 C (because tank is unloaded so far), the indicator will go out.
8. Insert the jack plug on the electrically heated forceps cable into the socket on the far right of the Histocentre front panel. Make sure that it is pushed fully in. Rest the forceps on a convenient horizontal surface with their black heaters and tips in free air, or position them in the holster provided. The green indicator will illuminate (assuming the forceps are not already at working temperature) and remain lit for up to 30 seconds before beginning to fade. After about 90 seconds the indicator will be off (or very dim if 4 mm forceps are connected).
9. Set COLD PLATE and PARAFFIN TANK ON/OFF switches both to "OFF." Also, turn HOT PLATE TEMPERATURE control knob and light switch back to "LO" position.

Operation

Operating instructions are given below in two main groups: first, all necessary preliminary procedures, followed by the actual sample embedding methodology. Sections are also provided on operational checks and precautions and on general cleaning. Prior to operating the unit, be sure to read and observe the following safety instructions:

Safety Instructions



WARNING

Do not use in the presence of flammable or combustible chemicals. Fire or explosion may result; this device contains components which may ignite such materials.

"Caution: Hot Surface. Avoid Contact."



CAUTION

Use a grounded electrical supply of correct voltage and ample current capacity. (See specification plate on unit.)

Do not place the unit directly under an air-conditioning vent or in extreme sunlight.

Do not block the ventilation in the centre rear of the unit.

Disconnect the unit from the electrical supply before servicing.

Preliminary Procedures

The following preliminary procedures should be completed prior to starting any embedding operation.

1. Fill the paraffin tank with paraffin. Fill the stainless steel paraffin holding container about half full with paraffin. Turn the PARAFFIN TANK ON/OFF switch to "ON."
2. Set the temperature in the paraffin tank to the desired operating temperature by using the PUSH TO SET switch and the SET POINT control as described under Controls and Indicators. Set the Tissue Tank Temperature Control to the desired setting. (A setting of "5" will give a paraffin temperature of approximately 63 C in the Tissue Tank. Adjust as necessary.) Allow one hour for the paraffin temperature to stabilize before checking temperature or dispensing wax.



NOTE

Polymer-based paraffin normally contains instructions not to grossly exceed the melting point as doing so results in a precipitation of the polymer.

3. The paraffin tank temperature may be checked by removing the cover and placing a calibrated, total-immersion thermometer in the centre with the bulb near the filter. Replace cover and take reading after one hour. Reading should be within 0.5 C of any setting.
4. Observe the paraffin in the stainless steel holding container. If it is not melting, turn the TISSUE TANK TEMPERATURE ADJUSTMENT knob so as to increase the paraffin temperature (clockwise increases the temperature). Readjust the knob, as required, so the paraffin remains melted with the cover removed.

**NOTE**

The higher the setting on the tissue tank, the higher the lowest setting on the Hot Plate, due to heat carryover.

5. Holding container operating temperature may be checked with a partial immersion thermometer with the cover removed. 56-58 C melting-point paraffin is usually heated to 62 C to 63 C, depending on the amount of paraffin in the container.

**NOTE**

Placement of the cover over the holding container well will elevate the paraffin temperature about 4 C. All settings must be made with the cover removed.

6. When the paraffin in the paraffin tank has melted, dispense paraffin into the clean waste container and pour into cassette working area if you prefer to partially immerse cassettes in paraffin. Waste valve must be closed to retain paraffin.
7. Place molten paraffin or paraffin chips into all three forceps wells. Fill them to the overflow level. Place your forceps into the wells. Any excess wax will drain into the waste container.
8. Fill the base mould prewarming compartment with base moulds. Place the most commonly used size in the compartment immediately behind the cassette cover waste container.

**NOTE**

Once the preliminary procedures have been completed, it is recommended that the heating systems remain ON at all times. This will avoid daily delays while paraffin is remelted.

Embedding Procedures

The embedding methodology provided below gives a general idea of how to operate the Shandon Histocentre 2. Obviously, there are various kinds of commercial moulds and cassette/ mould systems which are widely used in histopathology laboratories. Specific embedding techniques are usually specified by the supplier of each system and any special requirements should be incorporated into the following general procedure.

1. Turn COLD PLATE ON/OFF Switch to "ON."

**NOTE**

Allow about 30 minutes for cold plate to reach optimum operating temperature.

**CAUTION**

The cold plate will normally develop a frost build-up, the rate of which depends upon the humidity in the laboratory. Minimal build-up will not interfere with cooling; for excessive build-up, simply turn off the cold plate for a short time until defrosting takes place.

2. Turn on the orientation platform lights. Adjust HOT PLATE TEMPERATURE control to setting appropriate for moulds being used. Typical operating temperatures are 60 C to 70 C.



NOTE

The HOT PLATE TEMPERATURE control should always be adjusted with both cold plate and orientation lights turned on as they significantly affect the Hot Plate temperature.

3. Place your processed tissue capsules or cassettes in the stainless steel holding container in molten paraffin.
4. Remove a tissue capsule or cassette from the holding container. Remove the cover and place in the cassette working area of the warming tank. Molten paraffin in this trough will prevent the specimen from solidifying (which could contribute to specimen loss during sectioning).
5. Select from the prewarmer area a base mould which will accommodate the size of your specimen. Place mould on the hot plate and fill to your desired level.



NOTE

Some systems contain identification tags which should be embedded at this step.

6. Remove the specimen from the tissue capsule or cassette and place in the base mould. Orient your specimen as required.
7. Slide the mould to the cold plate section (adjacent to the hot plate) holding the specimen and position with the forceps if necessary. Wait a few seconds for the paraffin to change from clear to translucent appearance.

When using conventional non-heated forceps, microspecimens may be embedded by sliding the base mould to the case area immediately in front of the hot plate. This slower solidification will give you time to remove the non-heated forceps without the specimen adhering to them.

Rapid solidification can cause your paraffin to cool the microspecimen so quickly as to adhere to the forceps tips. Only your Shandon Histocentre offers this unique, slow solidification working area immediately in front of the hot plate for your convenience.



CAUTION

Do not allow a skin to form on the surface of the paraffin. This partial solidification could cause the block to separate during microtomy.

8. Slide the mould onto the channelled section of the hot plate. Channels minimize heat conduction to the base mould.
9. Place your cassette on top of the base mould and fill. Fill mould to top if a cassette is not used.
10. Slide the mould to the back of the cold plate for rapid chilling. Then remove the case specimen from the mould to microtome.



NOTE

An hour's chilling is generally more than adequate; prolonged chilling may cause minute cracks at the bottom of the mould with some paraffins.

11. Upon completion of daily embedding, turn the COLD PLATE ON/OFF SWITCH to "OFF." The paraffin tank and warming tank are designed for continuous operation. Place covers over the base moulds prewarming area and holding-container compartment. Insert forceps through port in holding-container cover. Disconnect heated forceps if in use.



NOTE

Turning the cold plate off over night removes frost buildup, allowing better heat transfer.

Operational Checks and Precautions

The following information is designed to assure optimum and safe operation of your Shandon Histocentre 2.

1. Periodically check the temperature of the paraffin in the paraffin tank with a calibrated thermometer, and compare the reading with the digital display. The two readings should be within 0.5 C at any setting. If this specification is not met, contact your distributor.
2. It is recommended that the cassette working area paraffin be drained daily to avoid cross-contamination. Also, the forceps warming well should be cleaned daily or whenever necessary to avoid cross-contamination.
3. Do not place the Histocentre 2 directly under an air conditioner vent, as this can form a skin on the surface of the molten paraffin in the warming tank.
4. Do not block the air flow at the rear of the Histocentre 2.
5. The Histocentre 2 is sealed in critical areas to prevent spilled paraffin from leaking inside the unit. Also, a splash plate located at the rear deflects spilled paraffin, preventing it from clogging the condenser. Copious spillage of paraffin should be inspected thoroughly to assure paraffin did not leak inside the unit. Unit should be disassembled and cleaned thoroughly in the event internal leakage is discovered.
6. Surplus wax may be removed from the tips of the hot electrical forceps by wiping them with a dry tissue.



WARNING

Do not use XYLENE for cleaning purposes. While highly effective as a paraffin cleaner, xylene is also highly flammable with a flash point of 27 C (81 F) to 32 C (90 F). Hence, xylene is totally inappropriate for use with the Histocentre 2 which contains hot surfaces and internal sparking contacts.

General Cleaning

The metallic enclosures of the Histocentre 2 are protected by a baked powder coated finish. The warming tank, cold plate, paraffin tank, hot plate and forceps warmer are finished in a hard, oxidized coating, impregnated with Teflon fluorocarbon resin. Seams on the working surface are sealed with a special silicone sealant. The materials are resistant to common cleaning agents and solvents which are normally used as a cleaning agent for paraffin wax.



WARNING

We point out once again that, although it is an effective paraffin wax cleaner, xylene is extremely flammable. Its vapour is heavier than air and may travel a considerable distance to a source of ignition and flash back.

Therefore, we do not recommend xylene for cleaning.

A plastic paraffin scraper is provided to remove spilled paraffin on the case or cold plate.

Spilled paraffin in the base-mould prewarming and holding-container compartments may be removed by turning off the heat control and allowing paraffin to solidify. Heat slightly and lift out paraffin. Wipe with an absorbent napkin.

To clean the paraffin dispenser, drain the paraffin tank by depressing the touch plate or footswitch. Remove the filter by twisting base counterclockwise to clean and replace.

Service



WARNING

Disconnect from power supply before maintenance or servicing.

Refer servicing and troubleshooting to qualified personnel.

Service information for the Histocentre 2 is provided below in a highly-condensed "troubleshooting" chart format. See also the REPLACEMENT PARTS section following at the end of this manual.

When requesting service or ordering parts, or in any correspondence relating to your unit, always refer to the specification plate for complete identifying information: model number, serial number and series number. All parts listed herein may be ordered from Shandon.



CAUTION

Recharge refrigeration system with HFC134A only. Do not add R12.

Troubleshooting



WARNING

Disconnect from power supply before maintenance or servicing.
Refer servicing and troubleshooting to qualified personnel.

Locate on the chart the malfunctioning component and the symptom(s) that apply, then read the diagnosis and recommended remedy.

SYSTEM COMPONENT	SYMPTOMS	DIAGNOSIS	REMEDIES
Tissue Tank	Will not heat.	Control failed may have caused thermal fuse to blow.	Replace control and fuse.
	Erratic temperature control.	Element is open. Defective control.	Replace element. Replace control.
Forceps Warming Block	Will not heat.	Power resistors open.	Replace power resistors.
Hot Plate	Will not heat or operates erratically.	Control unit is defective.	Replace control unit.
	No LED indication when "push to read" switch is depressed.	Power resistors are open. Sensing thermistor is open.	Replace power resistors. Replace thermistor.
Paraffin Tank and Dispensing System	Will not heat.	Element open.	Replace element.
		Thermal Fuse open.	Replace Fuse.
	Erratic temperature control.	External-interference from electrical noise. Temperature control malfunctioning.	Find source and eliminate. Replace.

SYSTEM COMPONENT	SYMPTOMS	DIAGNOSIS	REMEDIES
Paraffin Tank and Dispensing System (con't)	Solenoid valve drips. Paraffin will not dispense.	Lower thumb screw too loose. Worn "O" rings and plunger assembly. Solenoid resistors open causing paraffin to solidify in pipes. Solenoid valve failed. Defective foot switch. Defective finger switch.	Secure bottom thumb screw. Replace. Replace. Replace. Replace. Replace.
Refrigeration System	Inadequate cooling. Compressor will not turn on. Compressor runs briefly, shuts "OFF" then comes "ON."	Ambient above 27 C. Leak causing HFC134A refrigerant loss. Condenser air-flow blocked. System unbalanced. Thermal overload opening, then closing.	Lower ambient. Repair leak and recharge. Be certain charging is accomplished by personnel trained in 134A systems. Replace dryer. Remove blockage. Turn cold plate switch off, wait 5 minutes for system to balance and restart. Allow system to balance and restart. Replace thermal overload if symptom reoccurs.
Orientation	One or both lights off. Both lights off.	One or both lights are defective. Switch defective.	Replace bulb(s). Replace switch.

SYSTEM COMPONENT	SYMPTOMS	DIAGNOSIS	REMEDIES
Electrically Heated Forceps	Light out but forceps cold or failing to reach working temperature	Faulty Connection at receptacle Fuse blown Cable short circuit Failure of one of the heating elements	Insert forceps jack fully into the receptacle. Replace receptacle. Replace fuse Replace forceps Replace forceps

Parts List For Shandon Histocentre 2

Models 6400011, 6400011, 6400012 & 6400012

Parts are classified by systems.

Paraffin Tank and Dispensing System Consists of tank, solenoid dispensing valve, nozzle (spigot), electronic printed circuit board bracket, digital temperature display and control adjustment knobs and switches.

Description	Part No.	
	64000011 & 6400011 (USA only)	64000012 & 6400012 (USA only)
Supply Voltage	220-240V	120V)
Paraffin Tank and dispensing system consisting of tank element, dispensing valve, sensor, connectors, case and filter. Tank cover not included. Fully assembled.		
Element, aluminum foil, 575 Watts, with fuse		EL814X2A
Element, aluminum, 480 Watts, with fuse	EL814X4A	
Adhesive, 10.3 oz, one tube per element	GSX3	GSX3
Fuse, thermal, 104 C, one shot	FZX23	FZX23
Fuse, thermal, 121 C, one shot	FZX23	FZX23
Filter, paraffin	FL332X1A	FL332X1A
Dispensing solenoid, valve with heater	RY814X2A	RY814X1B
Element assembly for solenoid valve	RS814X9A	RS814X7A
Solenoid valve repair kit - O-ring and spring and plunger assembly	CL332X2	CL332X2
Solenoid valve replacement coil	CL332X1	CL332X1
Hood, covers lights and dispensing nozzle	CV332X2A	CV332X2A
Knob, flow control, dispensing nozzle	KB332X1	KB332X1
Knob, locking flow control dispensing nozzle	KB332X2	KB332X2
Sensor, leads have pin fasteners	RS814X4A	RS814X4A
Connectors, quick disconnect, 4 amp pins (2 required)	WH814X3A	WH814X3A
Amp pin extractor for connectors	305183	305183
Sealant, epoxy, for dispensing piping assembly	ADX11	ADX11
Bulbs, incandescent, 12 volt, 6 watt (2 required)	LMX14	LMX14
Sockets, orientation lights (2 required)	PL386X1A	PL386X1A
Switch, orientation lights	SWX146	SWX146
Switch, manual touch plate, dispensing	SWX95	SWX95
Socket, foot switch, control panel left side	CEX219	CEX219
Capacitor assembly, mounted on terminal for touch plate	CA662X1A	CA662X1A
Face Plate, Dispensing Tank, Shandon Logo	DL814X3	DL814X3

Heated Forceps System

Description	Part No.	
	64000011 & 6400011 (USA only) (220-240V)	64000012 & 6400012 (USA only) (120V)
Holder	HR814X1	HR814X1
Holder, Clip, Spring	FC814X1A	FC814X1A
Receptacle	CEX217	CEX217
Light, temperature indicator	SCX204	SCX204
Forceps		
Connector Assembly	CE866X1A	CE866X1A

Tissue Tank System Consists of a casting incorporating a holding container well, base mould prewarming well, cassette working well, forceps warmer, hot plate and waste container well. Hot plate and warming tank controls are included.

Element with thermal fuse	EL814X3A	EL814X1A
Element adhesive, 10 oz. tube (one element)	GSX3	GSX3
Thermal fuse	FZX23	FZX20
Resistor assembly, forceps warmer	RS814X7A	
Resistor assembly, hot plate elements	RS814X8A	
Sensor, hot plate	RS814X5A	RS814X5A
Printed Circuit Board, prewarming	PC866X1A	PC866X1A
Sensor, tissue tank	RS814X6A	RS814X6A

Cold Plate Refrigeration System Consists of a compressor, condenser, drier, evaporator (cold plate), accumulator, and miscellaneous copper tubing and fittings silver solder in circuit, and charged with HFC134A refrigerant. The compressor and condenser fan.

Compressor (Requires HFC134A refrigerant)	PUX13	PUX12
Drier		
Accumulator with capillary tube		
Condenser		
Shroud, cover, perforated		
Fan, condenser	FAX4	FAX3
Cover, fan, plated		
Evaporator assembly, cold plate, insulation		
Accumulator, capillary tube, condenser, copper fitting and mounting studs		

Wiring Bracket Assembly — Located in case behind control panel.

Description	Part No.	
	64000011 & 6400011 (USA only) (220-240V)	64000012 & 6400012 (USA only) (120V)
Terminal		
Printed Circuit Board (PCB) — Controls paraffin and tissue tanks, heated forceps, hot plate and orientation lights.	PC814X1A	PC814X1A
Fuse, Schurter, transformer, solenoid	FZX48	FZX49
Transformer, PCB, 115/230V, 50/60 Hz, 8-16V	TNX100	TNX100
Transformer, solenoid valve, 115/230V, 24V, 1.0A	TNX99	TNX99
Fuse, PCB transformer, primary	FZX51	FZX54
Fuse, PCB transformer, secondary	FZX53	FZX53

Control Panel Assembly

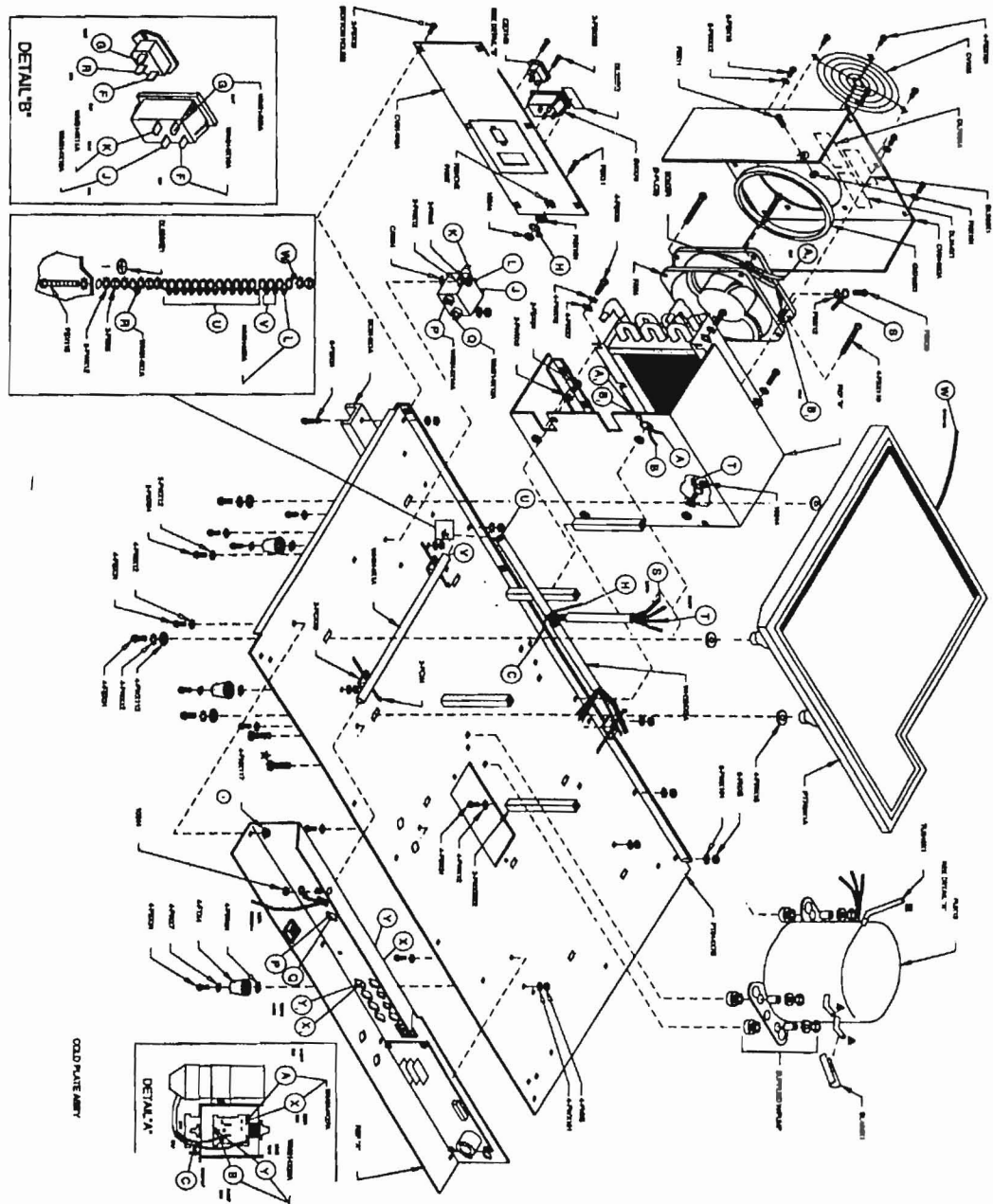
Receptacle, Foot Switch	CEX219	CEX219
Switch, rocker, illuminated, cold plate	SWX144	SWX143
Switch, "Push to Read", hot plate	SW814X1A	SW814X1A
Knob, hot plate	KBX82	KBX82
Light, cycle, hot plate	SCX204	SCX204
Switch, rocker, illuminated, paraffin tank	SWX144	SWX143
Light, cycle, paraffin tank	SCX204	SCX204
Display, digital, paraffin tank		
Switch, "Push to Set", paraffin tank	SW814X2A	SW814X2A
Knob, locking, temperature control, paraffin tank	KBX38	KBX38
Knob, temperature control, paraffin tank	KBX37	KBX37
Socket, heated forceps with resistor assembly	CE814X1A	CE814X1A
Light, temperature indicator, heated forceps, green	SCX204	SCX204
Knob, tissue tank	KBX82	KBX82
Light, tissue tank, green	SCX204	SCX204

Miscellaneous

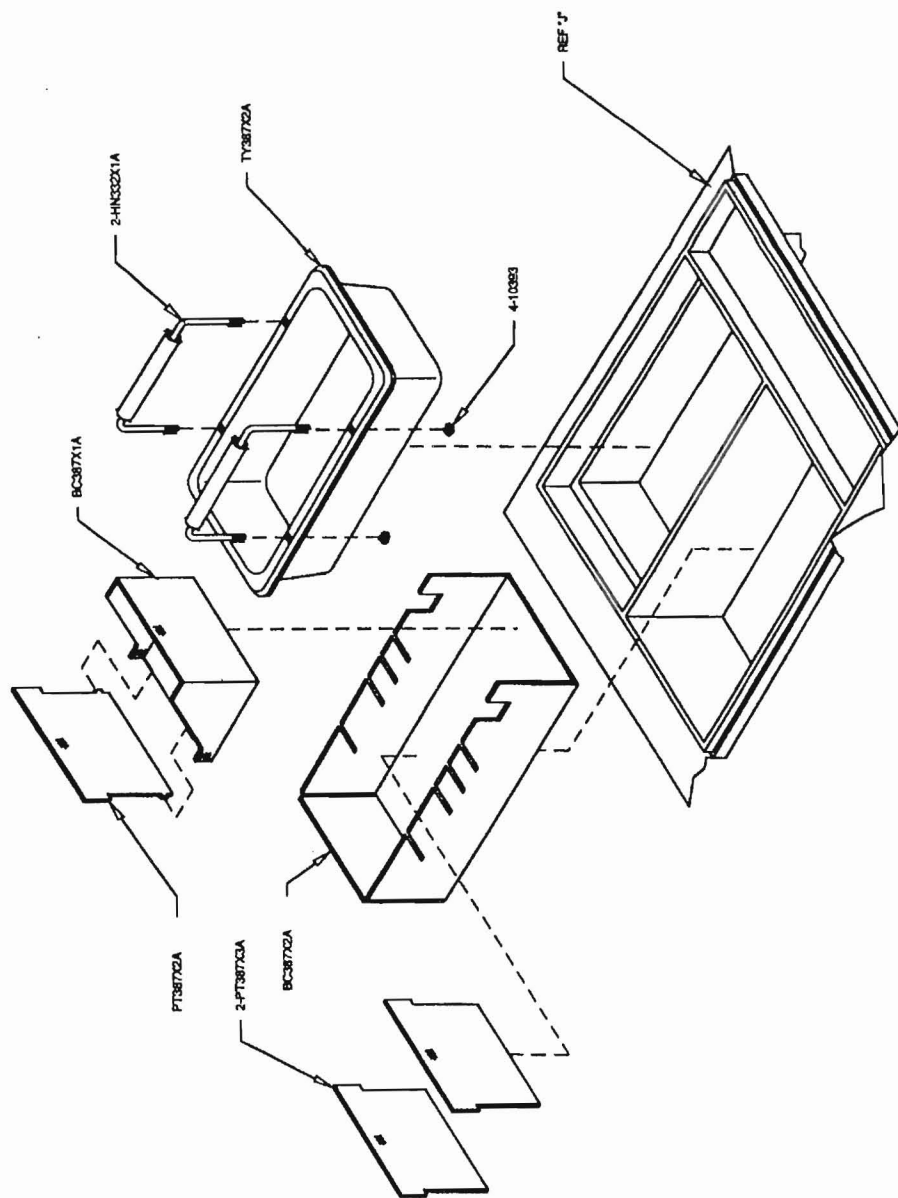
Feet, mounted bottom plate (4 required)	FTX4	FTX4
Screw, feet, mounted bottom plate (4 required)	FSX31	FSX31
Washer, feet mounted bottom plate (4 required)	FWX61	FWX61
Washer, feet mounted bottom plate (4 required)	FWX7	FWX7
Circuit breaker, mounted left rear cover	SWX70	SWX65
Service Manual, all series		
Operating Instructions (Series 814)	LT814X1	LT814X1
Receptacle, Cordset	CEX149	CEX220

Accessories

Description	Part No.	
	64000011 & 6400011 (USA only) (220-240V)	64000012 & 6400012 (USA only) (120V)
Paraffin Tank Cover	CV814X9B	CV814X9B
Footswitch and Cable	SWX96	SWX96
Light Bulbs	LMX14	LMX14
Magnifying Lens	LEX5	LEX5
Support Cable for Magnifying Lens	SF332X1	SF332X1
Scraper	SAX1	SAX1
Hot Plate	PT387X7B	PT387X7B
Large Forceps	TWX1	TWX1
Forceps Warming Block	BK387X1A	BK387X1A
Waste Container for Hot Plate Well	TY387X3A	TY387X3A
Base Mould Prewarming Well Cover	AY814X2	AY814X2
Holding Container Well Cover	AY814X1	AY814X1
Base Mould Prewarming Well Insert	BC387X2A	BC387X2A
Cassette Cover Waste Container	TY387X2B	TY387X2B
Black Partitions for Base Mould Insert	PT387X3A	PT387X3A
Stainless Steel, 1 Litre Holding Tray		
Nylon Hot Plate	PT436X2A	PT436X2A
Touch Plate Pad (8.3 mm X 66.7 mm X 50.8 mm)	CV387X1	CV387X1
Touch Plate Pad (12.7 mm X 66.7 mm X 50.8 mm)	CV387X1	CV387X1
*Knob, Screw, Magnifying Glass	KBX41	KBX41
*Knob, Screw, Spout, Flow Control	KB332X1	KB332X2
*Knob, Screw, Lock, Flow Control	KB332X2	KB332X2
*Handle, Base Mould and Holding Container Well Covers	HNX10	HNX10
*Screws for KNX10 (2 required)	FSX18	FSX18
Heated forceps, red, 1mm	64010040	64010040
Heated forceps, yellow, 2mm	TWX2	TWX2
Heated forceps, blue, 4mm	64010042	64010042
Forceps holder	HR814X1	HR814X1
Detachable cordset, North American		CRX84
Detachable cordset, UK	CRX85	
Detachable cordset, European	CRX70	
Holding Tray with handle		
Forceps, spring clip	FC814X1A	FC814X1A
Retaining clamp, cordset plug	CEX222	CEX223

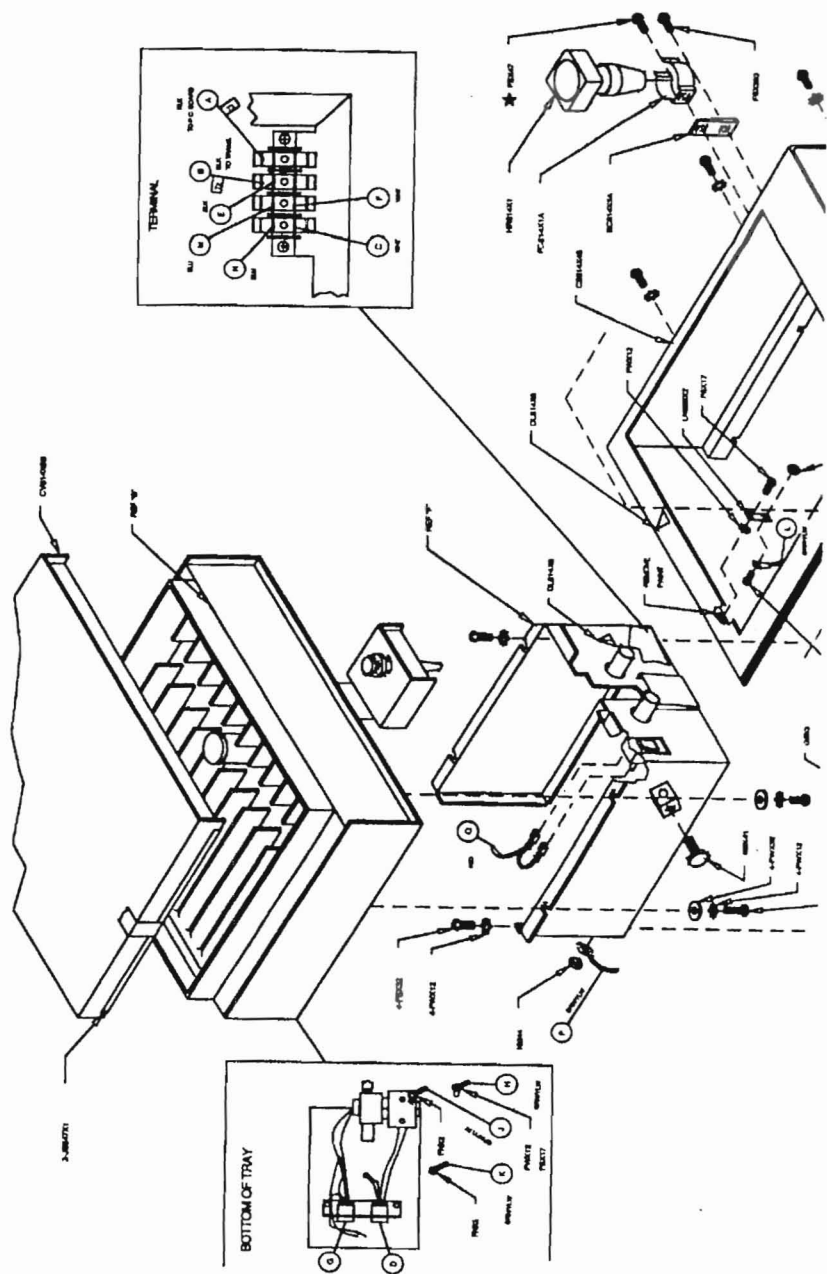


Exploded View - Refrigeration System

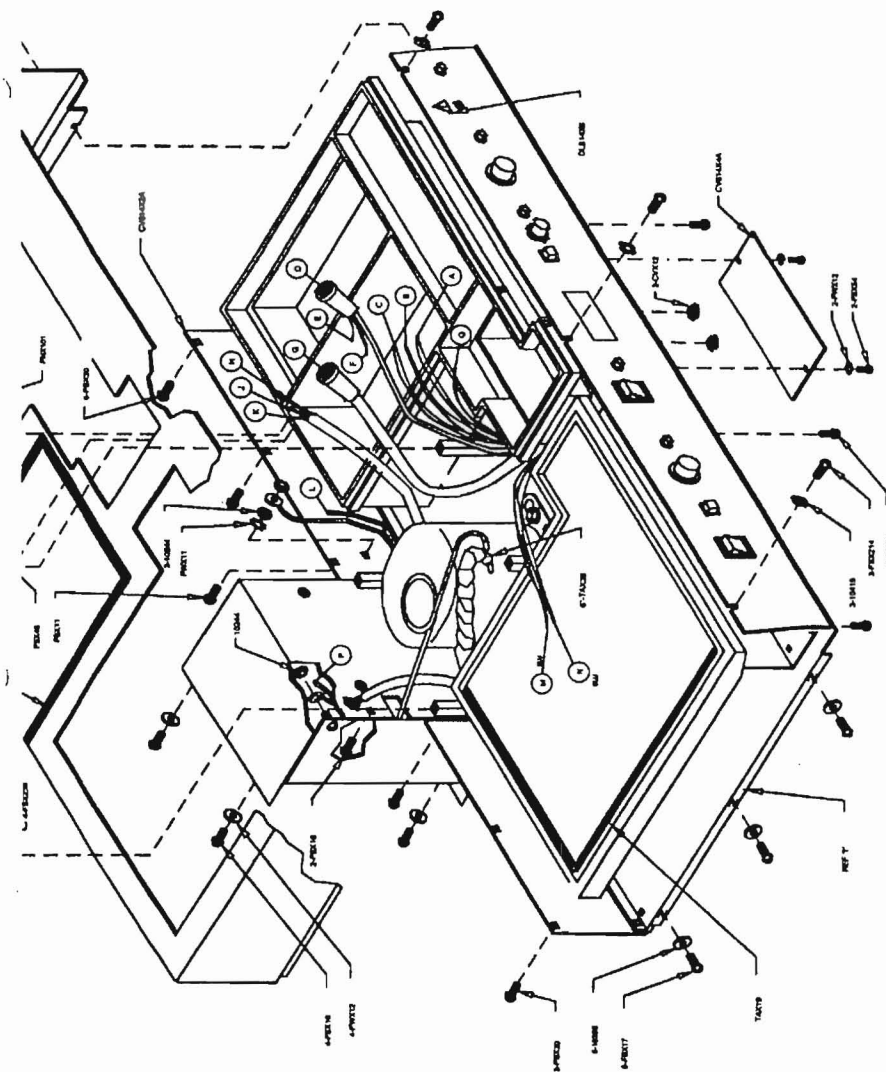


Exploded View - Tissue Tank

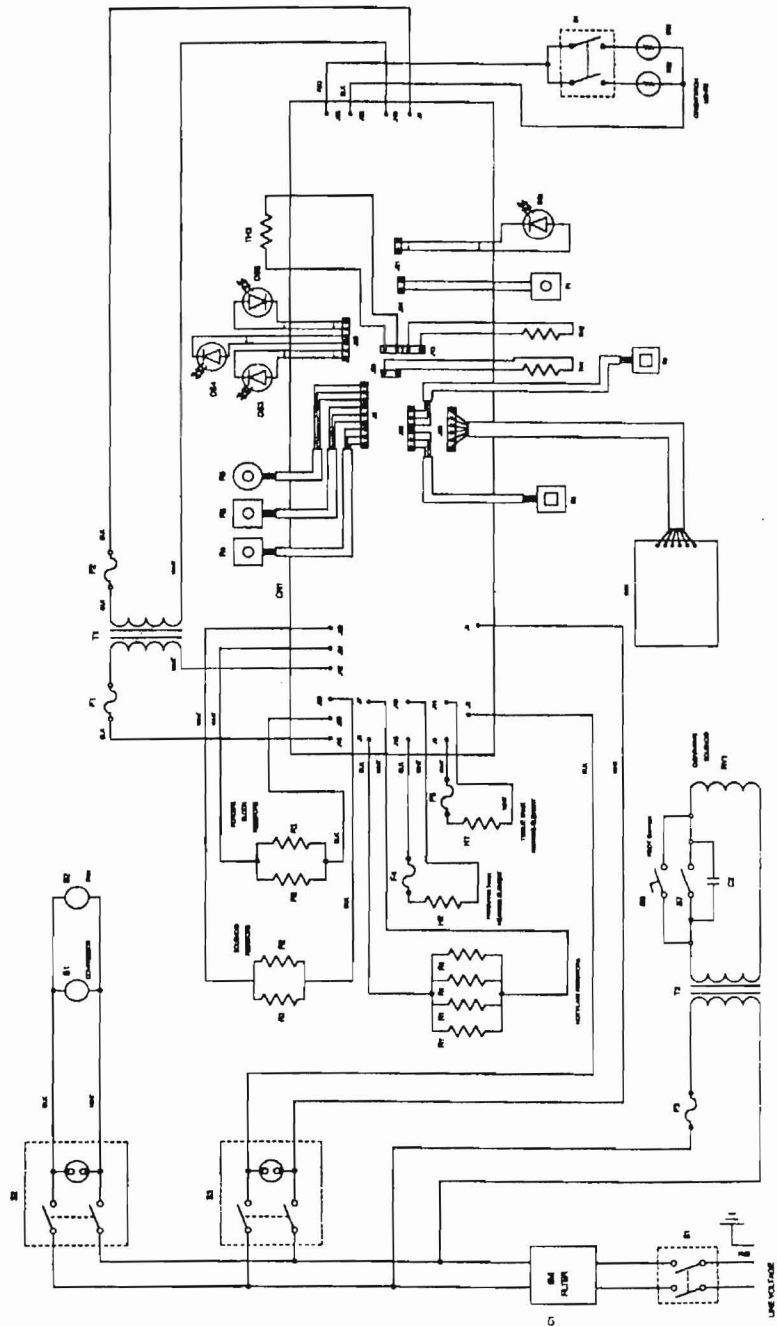




Exploded View - Upper Assembly

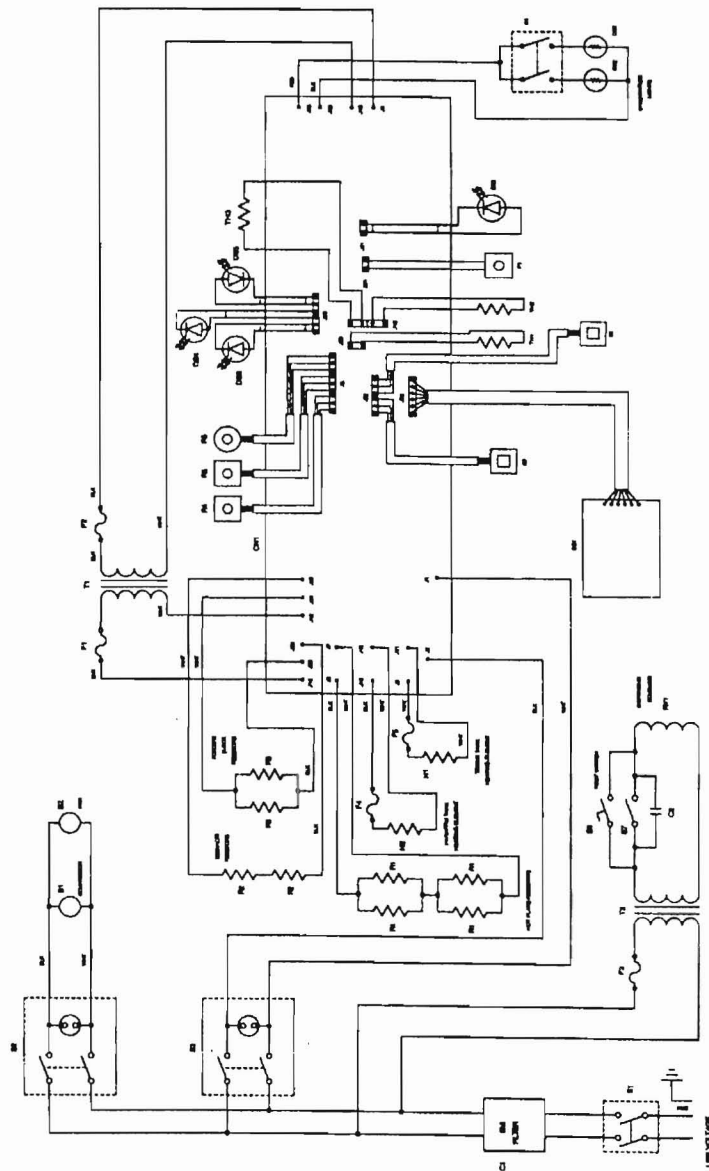


WIRING DIAGRAM FOR HORN 120V (120V)



Wiring Diagram (120 Volt)

WIRING DIAGRAM FOR HCT (240V)



Wiring Diagram (240 Volt)

DIAGRAM COMPONENT LIST 120 Volt

REF NO	DESCRIPTION	PART NO.34
B1	COMPRESSOR, 110V	PL012
B6	FAUL WIRE, 110V	FA02
C1	5M FILTER	CA05H
C2	CAPACITOR CERAMIC DISC, .21 uF	CA336
CH1	CONTROL ASSEMBLY	PC080X1A
CH1	DISPLAY ASSEMBLY	PC081402A
CH1	(5) ORIENTATION LIGHTS	LC014
D03	HOT PLATE LID	SC0304
D04	PANAPPIN TANK LID	SC0304
D05	TUBULE TANK LID	SC0304
D06	ELECTRICAL FORCIPS LID	SC0304
F1	FUSE, 0.25A, TIME-LAG	FZ004
F2	FUSE, 4.0A, TIME-LAG	FZ003
F3	FUSE, 0.315A, TIME-LAG	FZ001
F4	FUSE, THERMAL, CUT-OFF, 10A C	FZ008
F5	FUSE, THERMAL, CUT-OFF, 10A C	FZ003
H1	TUBULE TANK HEATING ELEMENT, 110V, 400W	BL000X1
H2	PANAPPIN TANK HEATING ELEMENT, 110V, 400W	BL000X2
P1	ELECTRICAL FORCIPS RESISTOR, 1.0M, 10W	RE000X1A
P2	(4) HOT PLATE RESISTOR, 1.0M, 10W	RE000
P3	(2) SOLENOID RESISTOR, 2500, 10W	RE0100
P4	(2) FORCIPS BLOCK RESISTOR, 470, 20W	RE0100
P5	HOT PLATE POT ASSEMBLY	RB01402A
P6	TUBULE TANK POT ASSEMBLY	RB000X1A
P7	PANAPPIN TANK POT ASSEMBLY	RB01401A
RY1	SOLENOID VALVE, 24VAC	RY008
S1	SAFETY SWITCH/CONTROL BREAKER, 15A, 2 POLE	SW005
S2	COLD PLATE SWITCH	SW0143
S3	HEATED COMPONENT SWITCH	SW0143
S4	ORIENTATION LIGHTS SWITCH	SW0148
S5	PANAPPIN TANK SETPOINT PUSH-BUTTON ASSEMBLY	SW01402A
S6	HOT PLATE TEMPERATURE PUSH-BUTTON ASSEMBLY	SW01401A
S7	PANAPPIN DISPENSER SWITCH	SW006
S8	PANAPPIN DISPENSER FOOT SWITCH	SW007
T1	TRANSFORMER, 15 VCT, 40VA	TR0100
T2	TRANSFORMER, 24 VCT, 50VA	TR009
TH1	HOT PLATE SENSOR, THERMISTOR, 100K @ 25 C	RB01402A
TH2	TUBULE TANK SENSOR, THERMISTOR, 100K @ 25 C	RB01405A
TH3	PANAPPIN TANK SENSOR, THERMISTOR, 100K @ 25 C	RB01405A

DIAGRAM COMPONENT LIST 240 Volt

REF NO	DESCRIPTION	PART NO.34
B1	COMPRESSOR, 240V	PL012
B6	FAUL WIRE, 240V	FA02
C1	5M FILTER	CA05H
C2	CAPACITOR CERAMIC DISC, .21 uF	CA336
CH1	CONTROL ASSEMBLY	PC080X1A
CH1	DISPLAY ASSEMBLY	PC081402A
CH1	(5) ORIENTATION LIGHTS	LC014
D03	HOT PLATE LID	SC0304
D04	PANAPPIN TANK LID	SC0304
D05	TUBULE TANK LID	SC0304
D06	ELECTRICAL FORCIPS LID	SC0304
F1	FUSE, 0.25A, TIME-LAG	FZ004
F2	FUSE, 4.0A, TIME-LAG	FZ003
F3	FUSE, 0.315A, TIME-LAG	FZ001
F4	FUSE, THERMAL, CUT-OFF, 10A C	FZ008
F5	FUSE, THERMAL, CUT-OFF, 10A C	FZ003
H1	TUBULE TANK HEATING ELEMENT, 240V, 570W	BL000X2
H2	PANAPPIN TANK HEATING ELEMENT, 240V, 570W	BL000X2
P1	ELECTRICAL FORCIPS RESISTOR, 1.0M, 10W	RE000X1A
P2	(4) HOT PLATE RESISTOR, 1.0M, 10W	RE000
P3	(2) SOLENOID RESISTOR, 4000, 10W	RE0100
P4	(2) FORCIPS BLOCK RESISTOR, 1700, 20W	RE0100
P5	HOT PLATE POT ASSEMBLY	RB01402A
P6	TUBULE TANK POT ASSEMBLY	RB000X1A
P7	PANAPPIN TANK POT ASSEMBLY	RB01401A
RY1	SOLENOID VALVE, 24VAC	RY008
S1	SAFETY SWITCH/CONTROL BREAKER, 15A, 2 POLE	SW005
S2	COLD PLATE SWITCH	SW0144
S3	HEATED COMPONENT SWITCH	SW0144
S4	ORIENTATION LIGHTS SWITCH	SW0148
S5	PANAPPIN TANK SETPOINT PUSH-BUTTON ASSEMBLY	SW01402A
S6	HOT PLATE TEMPERATURE PUSH-BUTTON ASSEMBLY	SW01401A
S7	PANAPPIN DISPENSER SWITCH	SW006
S8	PANAPPIN DISPENSER FOOT SWITCH	SW007
T1	TRANSFORMER, 15 VCT, 40VA	TR0100
T2	TRANSFORMER, 24 VCT, 50VA	TR009
TH1	HOT PLATE SENSOR, THERMISTOR, 100K @ 25 C	RB01402A
TH2	TUBULE TANK SENSOR, THERMISTOR, 100K @ 25 C	RB01405A
TH3	PANAPPIN TANK SENSOR, THERMISTOR, 100K @ 25 C	RB01405A

Wiring Diagram Components List

Ordering Procedures

Please refer to the Specification Plate for the complete model number, serial number, and series number when requesting service, replacement parts or in any correspondence concerning this unit.

All parts listed herein may be ordered from the **Shandon** dealer from whom you purchased this unit or can be obtained promptly from the factory. When service or replacement parts are needed we ask that you check first with your dealer. If the dealer cannot handle your request, then contact our Customer Service Department.

One Year Limited Warranty

Life Sciences International/Shandon Lipshaw warrants this product to be free from defects in material and workmanship for a period of one year from date of purchase.

This warranty applies only to defects in original parts or components, and does not apply to claims or alleged product failures resulting from unauthorized repairs, misuse, accidents or lack of proper maintenance, failure to follow the instructions for use or from ordinary wear and tear.

Warranty service may be obtained by returning any defective product to an authorized **Shandon** dealer. Heating elements, because of their susceptibility to overheating and contamination, must be returned to our factory and if, upon inspection, it is concluded that failure is not due to excessive high temperature or contamination, warranty replacement will be provided.

THE SOLE OBLIGATION OF LIFE SCIENCES INTERNATIONAL/SHANDON LIPSHAW UNDER THIS WARRANTY SHALL BE TO REPAIR OR REPLACE ANY PRODUCTS WHICH IT DELIVERS AND ARE FOUND TO BE DEFECTIVE.

THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, MADE IN CONNECTION WITH THE SALE OF THIS PRODUCT. LIFE SCIENCES INTERNATIONAL/SHANDON LIPSHAW EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR SPECIFIC USE.

See also Warranty Exclusion defined in Appendix 1 (heated forceps).

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Appendix 1

Shandon Heated Forceps System



WARNING

For your own safety and to protect the Forceps, please observe these simple precautions:

1. Use *only* with a Shandon Histocentre.
2. Do *not* touch the heaters on the working Forceps.
3. *Never* use the Forceps near inflammable materials.
4. Do *not* leave the working Forceps in cold water.
5. *Never* clean the Forceps with abrasives or chemical solvents.
6. Do *not* attempt to sterilize the Forceps by bleach or autoclave.
7. Do *not* hold the Forceps closed when not in use.

Description

Shandon electrically heated forceps are designed to assist in the preparation of histological or histopathological slides.

Orientation of a specimen during wax mounting has traditionally been completed using stainless steel forceps. To prevent their cold tips from solidifying the liquid wax medium, it is necessary to repeatedly remove the forceps from the work and heat them by external means - in a flame or embedding centre.

Insufficient heating results in sticking, while excessive temperatures will damage the specimen. Considerable time and skill are required to utilise this technique successfully.

Shandon Forceps incorporate safe, low-voltage, energy controlled heating elements which constantly maintain their tips at the optimum temperature for manipulation of specimens in histological wax. They may be used continuously, without adjustment, and without significantly influencing the temperature of the medium or tissue.

Eliminating the task of keeping the forceps at a usable temperature enables the operator to concentrate on orientation of the tissue, and results in a significant increase in productivity.

Construction

The forceps are of conventional stainless steel construction with an offset form to enable fine control of closure and to provide clearance around the twin heating elements. These are encapsulated in black epoxy resin approximately 20mm from the tips. The remainder of the blades are encased in polyolefin plastic, which affords thermal insulation and a reliable finger grip for the user.

Electric current is fed to the heaters via a one metre lightweight cable, terminated in a miniature jack plug for connection to the Histocentre 2.

Shandon forceps are manufactured in several different tip sizes to accommodate user preference and the type of specimen to be handled. Each size of forceps is distinguished by the colour of its plastic covering. Details of the currently available variants are listed in the Specification Section of this Appendix.

Operating Principles

The prime requirement for the forceps is that their tips transfer minimum heat energy to or from the specimen and its surrounding liquid wax.

A closed-loop control system with sensors detecting the temperature of the specimen and adjusting the electrical power to heaters at the tips of the forceps is impractical. Such an arrangement would be physically fragile and expensive. It would require sophisticated control algorithms to avoid temperature lag and overshoot, and would not be inherently fail-safe.

The required characteristics are achieved in the Shandon system by utilising tips of low thermal capacity, and heating them from a fixed temperature source via a path of high thermal resistance.

The constant source temperature is achieved without any external control system by employing ceramic heating elements fabricated from a compound of barium, lead, and strontium titanates. This material exhibits a rapid increase in electrical resistance when its temperature rises above a critical value. The electrical power demand of the heaters will thus change automatically to maintain this temperature as more or less heat is drawn from the forceps.

Control using this "smart material" is smooth, without any lag or overshoot. More importantly, the system is inherently fail-safe.

The operating temperature of the heaters is designed to be greater than the required tip temperature to compensate for the drop occurring across the intervening thermal resistance of the blades. When horizontal in free air, the tips will normally stabilise between 65 C and 75 C. This is slightly above the melting point of histological waxes.

If the forceps are applied to a specimen as its mounting medium solidifies, the tips will rapidly assume the temperature of the wax, and a small quantity of heat will always flow from them, retarding the setting process and preventing them from sticking.

To provide an indication of the temperature of the forceps, a green "heating" indicator light is incorporated in the Histocentre's front panel. This is connected to an internal circuit which monitors the electrical power drawn by the heaters.

When first switched on at room temperature, the forceps will initially consume approximately 11 watts, and the green indicator will be brightly illuminated.

In about 30 seconds, the heaters will reach their control temperature, the power demand will start to fall, and the indicator will become progressively less bright.

After a further 60 seconds, when the blades and tips have reached a stable temperature, the power demand of the 1mm or 2mm forceps will have fallen to about 2.5 watts, and the indicator will be extinguished.

In the case of the larger 4mm tipped forceps (part number 64010042) which have a greater rate of heat loss, the power demand may not fall below 2.7 watts. In this case, the indicator will continue to glow very slightly.

When the tips of the forceps are applied to a cold surface, the power demand will increase and the heating indicator will again glow more brightly.

Setting Up

Insert the Jack plug on the Forceps cable into the socket on the front panel of the Histocentre. Make sure that it is pushed fully in.

Rest the forceps on a convenient horizontal surface with their black heaters and tips in free air, or position them in the holster provided.

If the forceps are operating correctly, the green indicator on the front panel of the Histocentre will illuminate and remain brightly lit for 30 seconds. This "heating" indicator will then begin to fade, and after about 90 seconds will be off (or very dim if the 4mm forceps are connected). The forceps are now at working temperature and ready for use.

If the green indicator remains bright after 90 seconds, switch off, and refer to Section 7 of this Appendix for troubleshooting procedures.

Operation

The Forceps may be used continuously. They may be left switched on for long periods without risk of damage, providing their tips and heaters remain in free air and not in contact with any heat absorbing surfaces.

When using the Forceps, the following safety precautions *must* be observed:



WARNING

Do NOT touch the heaters of the working Forceps! Hold the Forceps only by the coloured plastic covering of the blades. Although the Forceps heaters are temperature regulated, their black surface becomes sufficiently hot to cause discomfort and possibly minor injury to sensitive skin.

Never use the Forceps near inflammable materials! The vapour of alcohol, ether, xylene, and other low flash point solvents may be ignited by the hot tips, causing serious fire and injury.

Do NOT leave the working Forceps in cold water! Operating the Forceps with their tips immersed in cold water will sustain a high power demand from the internal power supply. Prolonged immersion may cause its protective fuse to rupture. Damage caused in this way is not covered by the Shandon Product Warranty.

Cleaning



CAUTION

NEVER clean the Forceps with abrasives or chemical solvents! The polyolefin covering of the Forceps and the PVC cable sheathing can both be damaged by abrasive cleaning agents, and by solvents including alcohol, ether, xylene, toluene, and chloroform. Such damage is not covered by the Shandon Product Warranty.

Do NOT attempt to sterilise the Forceps by bleach or autoclave! The polyolefin covering of the Forceps and their PVC cable sheathing will not withstand contact with corrosive bleach, nor will they survive the temperatures encountered in an autoclave. Damage caused in this way is not covered by the Shandon Product Warranty.

Surplus wax may be removed from the tips of the hot Forceps from time to time by wiping them with a dry tissue.

For more thorough cleaning *always* unplug the Forceps from the Histocentre 2. The Forceps may then be wiped using a tissue or soft cloth moistened with a little water, to which a small quantity of mild detergent may be added.

Ensure that any traces of wax are removed from the contacts of the connector plug.

Troubleshooting

If the indicator light on the Histocentre's front panel does not operate correctly, and/or the Forceps fail to reach a satisfactory working temperature, the system may have become faulty.

To confirm that a fault exists, you should carry out the following test sequence:

- a. Confirm that the Histocentre is switched on.
- b. Plug the Forceps into the Histocentre and rest the Forceps with their heaters and tips horizontal in free air, or in the holster provided.
- c. The GREEN indicator must light brightly. If it does not, the system is faulty. Unplug immediately.
- d. After 30 seconds the GREEN indicator should start to dim. After 90 seconds it must be very dim or off. If it is still bright after 90 seconds, the system is faulty. Unplug immediately.
- e. If the GREEN indicator is now very dim or off, apply a *very small* flake of histological wax with a melting temperature between 55 C and 60 C to each of the Forceps tips. The wax flakes must be no longer than 1 mm in diameter. Do not close the Forceps.
- f. The wax flakes on *both* tips should liquefy within 60 seconds. If they remain solid on *both* tips, the system is faulty. Unplug immediately.
- g. If the wax remains solid on *one* tip only, and this tip is cold, the Forceps themselves are defective and must be replaced.

If the system fails the above test sequence and another pair of electrically heated Forceps is available, it may be possible to isolate the fault to either the Forceps or the circuitry inside of the Histocentre. Take care not to leave the Forceps plugged in for longer than absolutely necessary for testing.

**Specifications
Heated Forceps**

Part Number	64010040	64010041	64010042
Finger Grip Colour	Red	Yellow	Blue
Tip Width	1mm (0.04")	2mm (0.08")	4mm (0.16")
Blade Width	10mm (0.4")	12mm (0.5")	12mm (0.5")
Overall Length	150mm (5.9") (excluding cable termination)	160mm (6.3") (excluding cable termination)	160mm (6.3") (excluding cable termination)
Cable Length	1 metre (39")	1 metre (39")	1 metre (39")
Connector	3.5mm mono jack plug	3.5mm mono jack plug	3.5mm mono jack plug
Weight	55 grams (1.9 ounces) including cable and connector	60 grams (2.1 ounces) including cable and connector	60 grams (2.1 ounces) including cable and connector
Blade Material	Stainless steel with polyolefin covered finger grip	Stainless steel with polyolefin covered finger grip	Stainless steel with polyolefin covered finger grip
Heating Elements	Self-regulating ceramic, encapsulated in epoxy resin	Self-regulating ceramic, encapsulated in epoxy resin	Self-regulating ceramic, encapsulated in epoxy resin
Electrical Resistance	13 $\pm$ 25 C	13 $\pm$ 25 C	13 $\pm$ 25 C
Nominal Supply Voltage	12 volts rms ac	12 volts rms ac	12 volts rms ac
Rated Power Input	2.5 watts in 25 C ambient	2.5 watts in 25 C ambient	2.7 watts in 25 C ambient
Initial Surge Power Input	11 watts for less than 30 seconds in 25 C ambient	11 watts for less than 30 seconds in 25 C ambient	11 watts for less than 30 seconds in 25 C ambient
Heater Surface Temperature	80 C in 25 C ambient	80 C in 25 C ambient	80 C in 25 C ambient
Tip Temperature	70 C in 25 C ambient	70 C in 25 C ambient	70 C in 25 C ambient

Warranty Exclusions

Life Sciences International/Shandon Lipshaw specifically exclude the following from the warranty:

Any damage resulting from a failure of the user to heed the warnings, and observe the precautions, detailed in this Appendix

Any damage resulting from attempts to use the system for a purpose other than that specified in this Appendix.

Any damage caused by connection to an electricity supply other than the Histocentre 2.

Any damage caused by use beyond the environmental limits defined in the equipment Specification included in in this Appendix.

Any superficial damage which can reasonably be assumed to have resulted from fair wear and tear in normal use.

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