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SC3500

Operator's Manual

SHURCut™ 3500 Microtome

Semi-Automated Rotary Microtome

Catalog #
SC3500

General Data Healthcare

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User Resources and Customer Support

Contact your TBS representative for customer support. For the latest information on TBS products and services, please visit the TBS website at: www.trianglebiomedical.com.

Scope

This document contains basic information on the use and operation of a SHUR**Cut™** 3500 Microtome and assumes you have received basic training on the instrument. Please contact your TBS representative for information not provided in this manual.

Intended Use

The SHUR**Cut™** 3500 Microtome is designed to section embedded specimens with up to .5 micron precision to provide best possible samples in the field of histology.

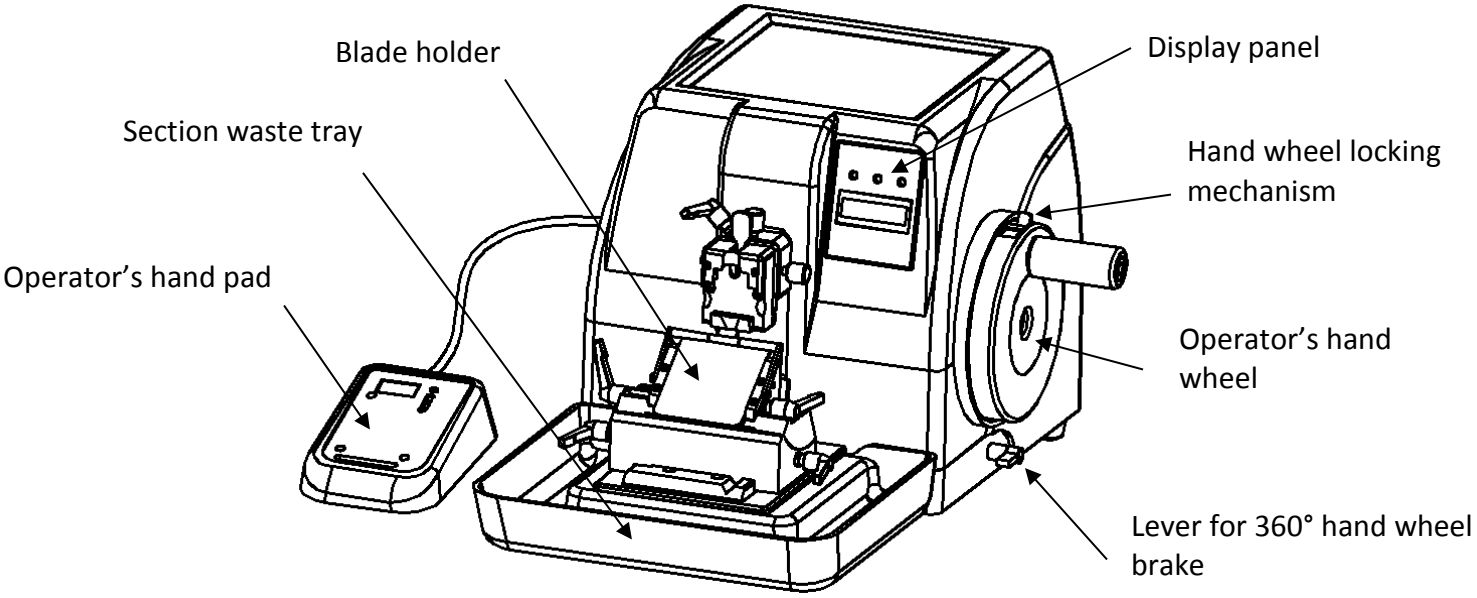
Installation Procedure

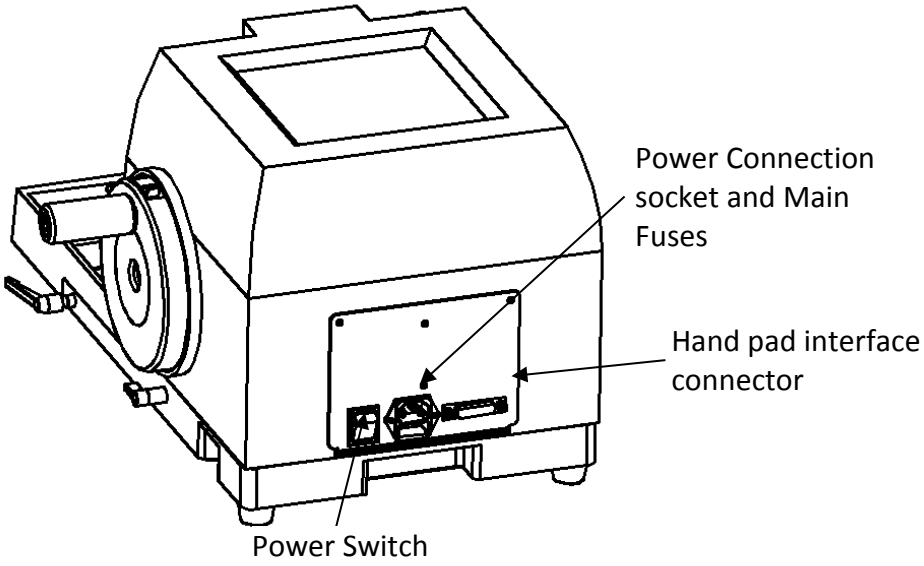
The SHUR**Cut™** 3500 must be installed, and instrument performance is to be verified, at the customer site by trained TBS representatives.

Disclaimers

This manual is not a substitute for the detailed operator training provided by TBS, or for other advanced instruction. A TBS representative should be contacted immediately for assistance in the event of any instrument malfunction

Operator Controls and Components





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Instrument Compliance

TBS-A Division of General Data Healthcare hereby declares the equipment specified conforms to the Classification(s), Directive(s) and Standard(s) set forth in this document.

Certifications: CE, TUV

EMC Emissions

FCC 47 CFR Part 2, Part 15 CISPR PUB.22 (USA)

EMC Immunity:

EN 55011:2007: (Class B), EN 61000-3-2:2006/A2:2009, EN 61000-3-3:2008, EN 61326-1:2006
IEC 61000-4-2:2008, IEC 61000-4-3:2010, IEC 61000-4-4:2010, IEC 61000-4-5:2005, IEC 61000-4-6:2008
IEC 61000-4-8:2009, IEC 61000-4-11:2004

EN 61010-1: (Third Edition) :2001, EN61010-1:2010

Section 1 | Safety Instruction

Summary

This instrument was built and tested in accordance with the safety regulations as specified below:

Gb9706.1-1995 medical electricity equipment

	**Note:** Safety instruction labels on the instrument must be kept in the original place to avoid an accident, personal injury, or damage to the instrument.

Safety Notes

The following instructions are regarding the transport, installation, regulation, operation and maintenance of the instrument which must be read and complied with.

Warnings-Transport and Installation

	The instrument may only be transported in an upright position.
	Never lift the instrument by the hand wheel or the cassette clamp. Always remove the section waste tray and blade holder before transporting the instrument.
	Check to make sure that the voltage available at your facility complies with the requirements of this unit.
	Connect the unit using the power cable provided. It is critical to connect to a grounded socket.
	Do not operate in rooms with explosion hazards.
	Do not tamper with the safety devices of the unit.

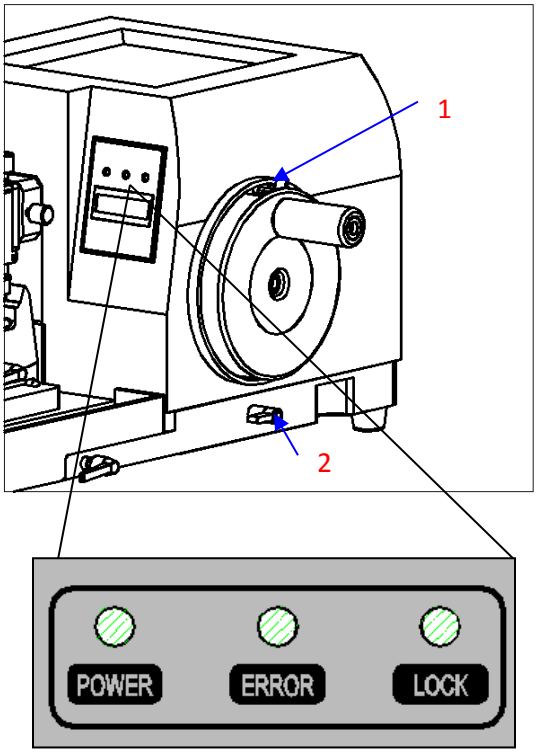
Warnings-Operation

	Take great care in handling microtome blades. The cutting edge is extremely sharp and can cause serious injury.
	Always remove the blade and put in a safe location before detaching the blade holder from the unit.
	Always clamp the specimen block before inserting or clamping the blade.
	Always keep the hand wheel locked when handling the blade or specimen on the unit. Cover the cutting edge with the blade guard.
	Place the blade guard over the blade when sectioning.
	Make sure that liquids do not enter the interior of the instrument.

Warning- Maintenance and Cleaning

	Only authorized and qualified service personnel may access the internal components of the instrument for service and repair.
	Before each cleaning, switch the unit off, disconnect the power plug, and remove the blade holder completely and clean it separately.
	Lock the hand wheel before each cleaning.
	Do not use any solvents containing acetone or xylene for cleaning.
	Make sure that liquids do not enter the interior of the instrument when cleaning.
	Let the unit dry completely before powering up again.
	Turn the unit off and disconnect the power plug before replacing fuses. Only use fuses of the same specification and replace them as described in the manual.

Safety Devices



Hand wheel Locking Mechanism

There are two hand wheel locking mechanisms.

- **Locking mechanism** indicated by (1) on the diagram can be engaged by flipping the corresponding switch and rotating the hand wheel to the upper most position where it will lock into position.
- **Locking mechanism** indicated by (2) on the diagram can be engaged in any position of the hand wheel by rotating the handle 180° clockwise. To unlock, rotate 180° counter clockwise.
- If lock (1) is engaged, the **LOCK** LED indicator will illuminate on the display panel.

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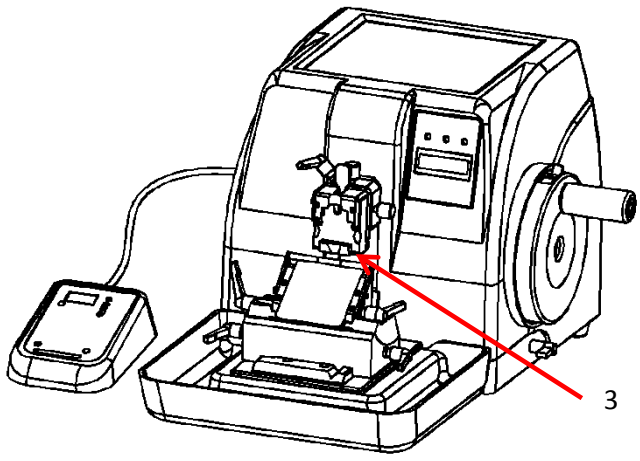
⚠	Do not lock the hand wheel (1) when the hand wheel is rotating as it will damage the unit.
⚠	Whenever cleaning the unit, changing the specimen, or changing the blade, make sure the hand wheel is locked with either mechanism (1) or (2).



Blade guard

- Position the **blade guard** (3) over the blade when **not** operating the unit to avoid personal injury and prevent damaging the blade edge.
- The **blade guard**（3）in Fig is shown in the up position where it protects the blade.

Section 2 | Performance & Parameters

Performance Index

SHUR**Cut**™ 3500 is a motorized rotary microtome. This unit combines precision sectioning with ease of use.

- The motorized coarse feed operates two speeds for versatility.
- Operator's hand pad provides an ergonomic interface for the user.
- Retraction function helps give optimum quality sections.
- The Memory and recall Feed buttons provide improved efficiency during sectioning.

Technical Data

SC3500	
Item:	Description:
Dimensions	Length: 21.6 in (55 cm) Width: 16.5 in (42 cm) Height: 12.6 in (32 cm)
Weight:	92 lbs. (42 kg)
Environment requirements:	Working temperature：+10℃—40℃ Working humidity: <80% Working pressure:（86～106）kpa
Power Supply:	110/220 v ac±10 %
Frequency:	50/60 Hz
Fuse:	1.5 Amps
Safety Classification:	I - Type b
Blade Profile	Low Profile Blade – Recommended, DMB-LP SHUR/Sharp™ Disposable Microtome Blade, Low Profile, Teflon Coated; (0.012" x 0.312" x 3")
Trimming/Section Thickness:	0.5 to 600µm 0.5 to 2µm - 0.5µm increments 2 to 10µm - 1µm increment 10 to 20µm - 2µm increments 20 to 100µm - 5µm increments 100 to 600µm - 50µm increments
Retraction thickness:	5-100µm in 5µm increments (can also be deactivated)
Specimen horizontal feed:	20mm
Specimen vertical feed:	70mm
Maximum specimen size:	40mm x 50mm x 30mm or standard cassette size
Specimen holder adjustment system:	Horizontal orientation: ±8° Vertical orientation： ±8°
Left/Right Blade holder adjustment:	50mm
Electric Coarse Feed Speed	300µm/s (Slow) and 900µm/s (Quick)

Section 3 | Preparation

Installation Site Requirement

	Place the unit on a well-supported table. Ensure the table is sitting level.
	Ensure that the operating temperature and humidity is according to spec.
	Ensure that there is nothing obstructing the hand wheel operation.

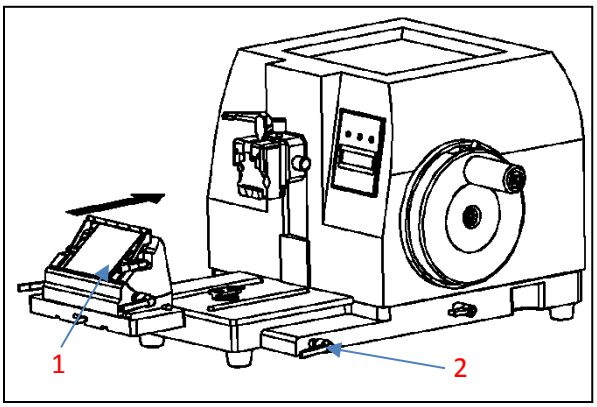
Standard Accessory List

Part:	Quantity:
Microtome	1
Blade holder	1
Quick Release Clamp for Standard Cassette	1
Operator's Hand Pad	1
Waste Tray	1
M3 Wrench	1
M4 Wrench	1
Disposable Blades	1
Fuse	2
Operation Manual	1

Installation

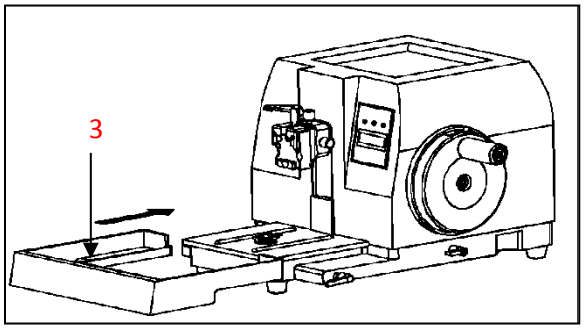
Blade Holder

Remove the **blade holder** (1) from the box, and slide it along the track as shown in the picture, rotate the blade holder **locking lever** (2) to lock the blade holder.



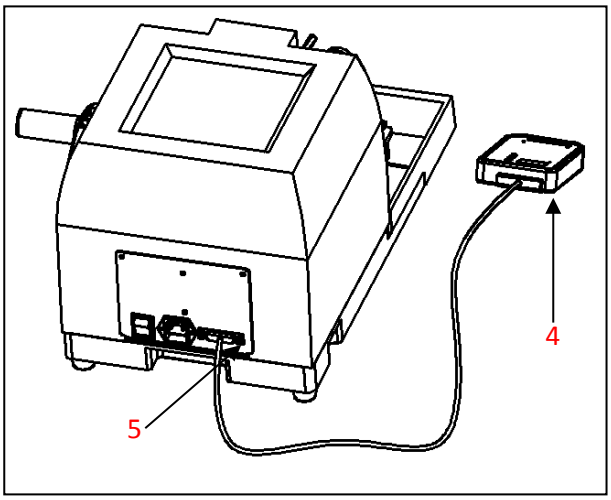
Waste Tray

Remove the **waste tray** (3) out from the box and slide it along the track as shown in the picture.



Operator's Hand Pad

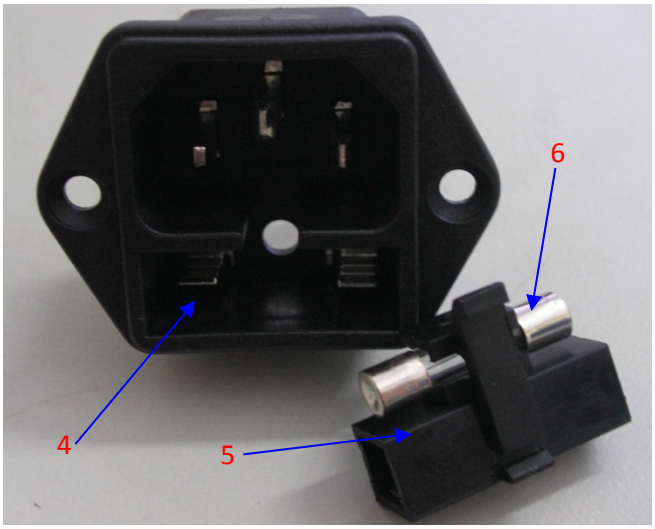
Connect the **Operator's Hand Pad** (4) to the **jack** in the microtome (5) as described in the picture.



Electrical Connection

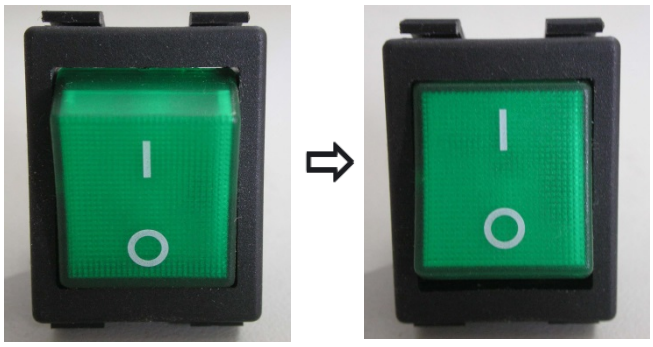
	Check to make sure that the voltage available at your facility complies with the requirements of this unit.
	Connect the unit using the power cable provided. It is critical to connect to a grounded socket.
	Before changing a fuse, make sure to disconnect power from the unit.

1. Insert the fuse (6) into the **fuse holder** (5) as it is showed in the picture and the insert fuse holder into the **socket** (4).



2. Energize the instrument with the switch at the rear right side. The instrument should initialize.

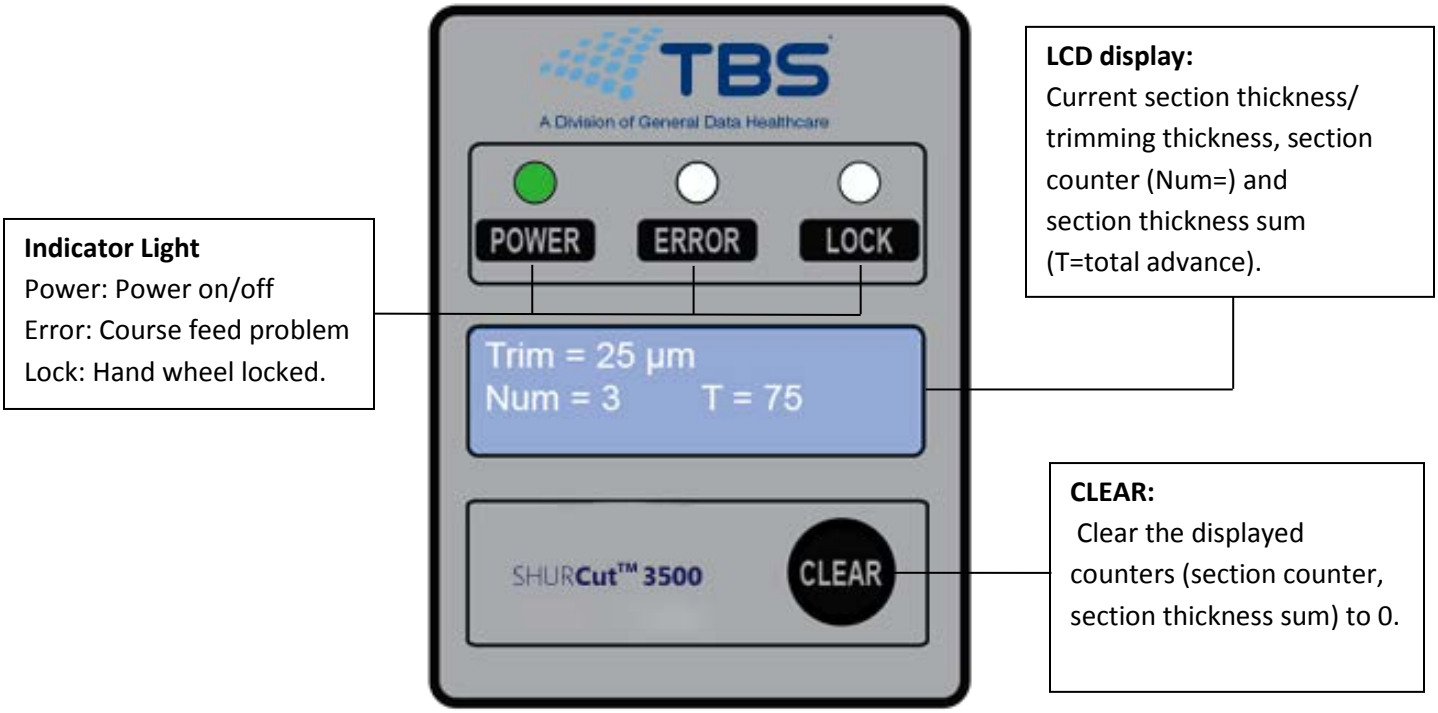
3. After the microtome is energized, the display panel and hand pad illuminate. The specimen holder will automatically retract back to zero. This is indicated by a beep.

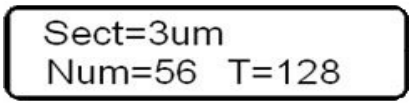


Section 4 | Operation

Display Panel and Its Features

All the parameters are set and displayed via display panel. After being energized, use the display panel to operate the instrument, the following is a diagram and explains the functions of the display panel.





Display Panel

- The value in the first line of the display window is the set sectioning or trimming thickness.
- The value in the second line of the display window is the section or trim counter and section or trim thickness sum (total advance).
- The system is in trimming mode after you power on.

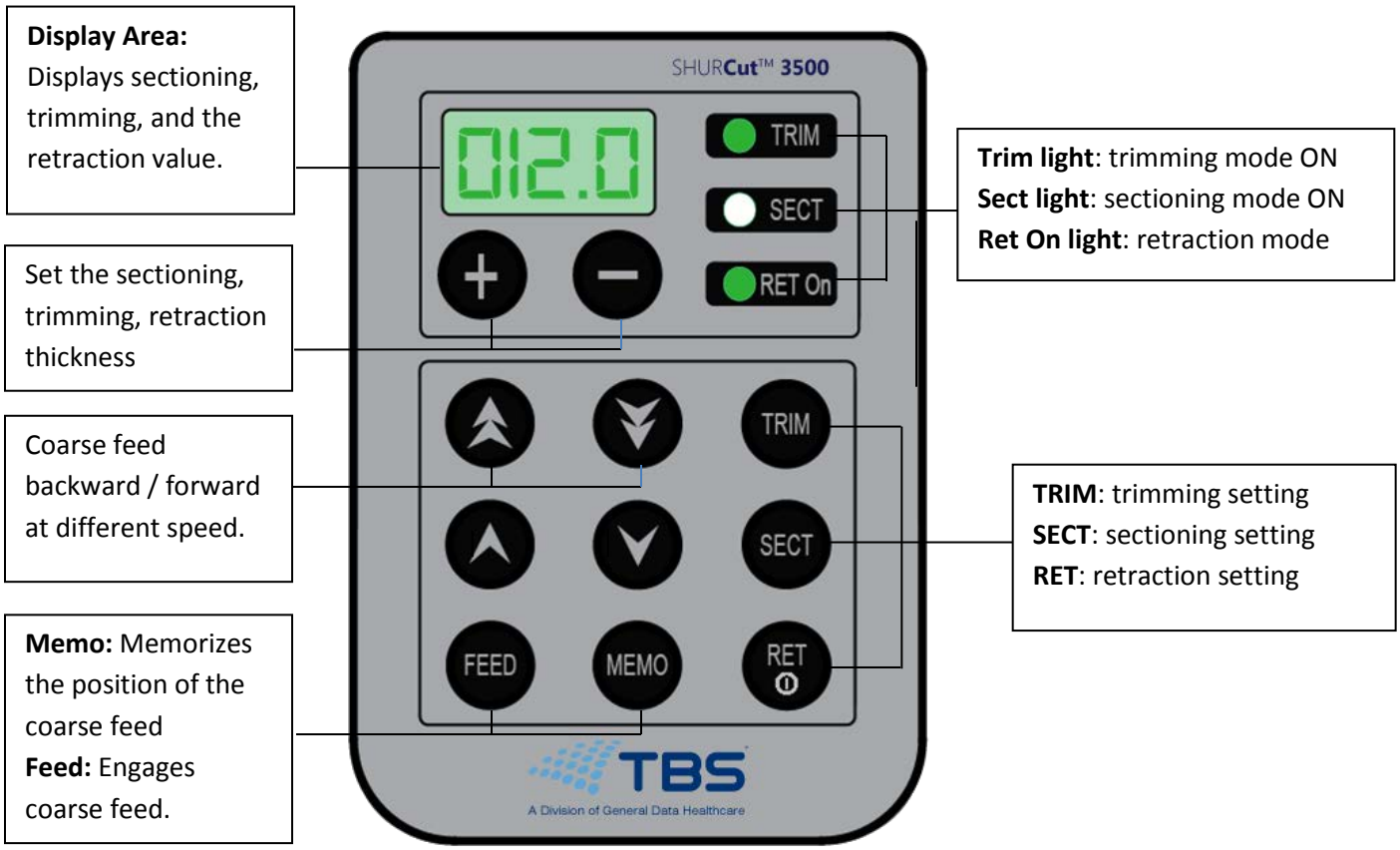
Indicator Light

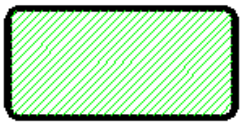
- POWER LED - indicates the unit is energized.
- ERROR LED - indicates feed operation error and sounds an alarm at the same time.
- LOCK LED - indicates the hand wheel is locked.

Clear Button

- Pressing the CLEAR button will clear the section / trimming counter and the thickness sum (total advance).
- When the instrument is energized, the value of the section counter and section thickness sum will go back to zero automatically.

Operator's Hand Pad

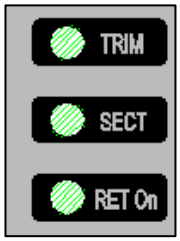




Display Area

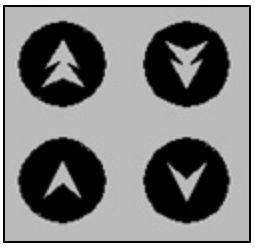
- Shows the sectioning / trimming and retraction setting value.

LED Indicators



- TRIM LED - Indicates the microtome status at trimming and the trimming thickness setting can be adjusted using the hand pad interface.
- SECT LED - Indicates the microtome status at sectioning and the sectioning thickness setting can be adjusted using the hand pad interface.
- RET On LED - Indicates the microtome status at retraction and retraction thickness setting can be adjusted using the hand pad interface.

- Press the + (plus) or – (minus) buttons to set the section, trim, or retraction value.
  Adjusting range: 0.5 to 600µm
  0.5 to 2µm, 0.5µm increments
  2 to 10µm, 1µm increment
  10 to 20µm, 2µm increments
  20 to 100µm, 5µm increments
  100 to 600µm, 50µm increments
  Retraction range: From 5µm to 100µm, in 5µm increments.



Buttons for coarse feed backward/forward fast (Top)

- Fast advance/retract movement of the course feed
- Speed is 900µm/s.

Buttons for coarse feed backward/forward slow (Bottom).

- Slow advance/retract movement of coarse feed.
- Speed is 300µm/s.

	The max backward and forward distance is 20MM. An alarm will sound if the moving distance is beyond the max distance, and the specimen will also stop moving.

TRIM Button

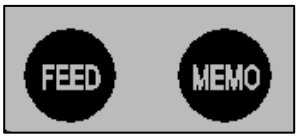
- TRIM button activates the trimming mode. Used for setting the trimming thickness.

SECT Button

- SECT button to activate the sectioning mode. Used to adjust the sectioning thickness.

RET Button

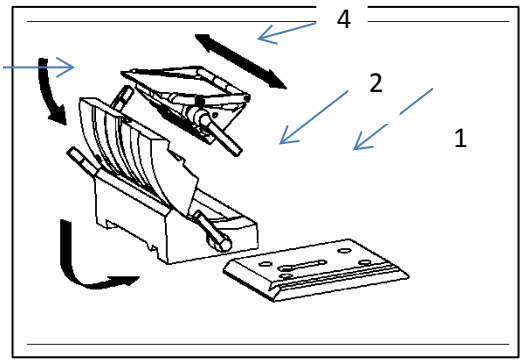
- RET activates the retraction mode. Push again and it will deactivate.
- Press and hold the button for 3 seconds, the retraction mode LED indicator will start to pulse. You can now select the retraction amount. Push the TRIM or SECT button to exit.



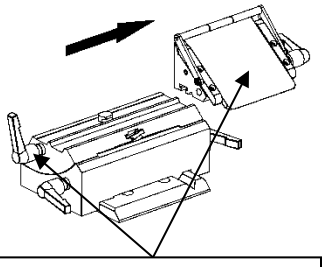
FEED and MEMO Buttons

- Press the MEMO button for the instrument to memorize its current advance position.
- Press the FEED button to activate the memorized advance of the instrument that you have set using the MEMO button. The instrument will now move the specimen holding arm forwards or backwards to the set position.

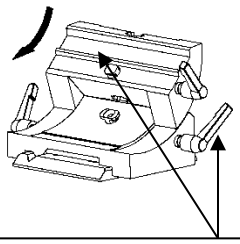
Blade Holder



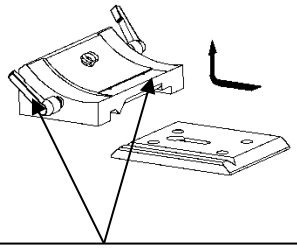
- The blade holder consists of the **blade holder base** (2), X-axis slider (3), and the **blade holder clamp** (4).
- The whole assembly sits on the **base plate** (1) attached to the microtome.
- The **X-axis slider** (3) allows for 10 degrees of adjustment of the blade with respect to the specimen.
- The pictures below explain what each lever controls.



The lever on the left operates the blade holder clamp.



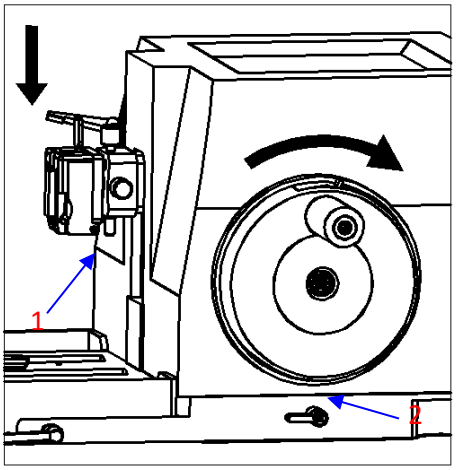
The lever on the right operates the X axis slider clamp.



The lever on the left operates the Y axis slider clamp.

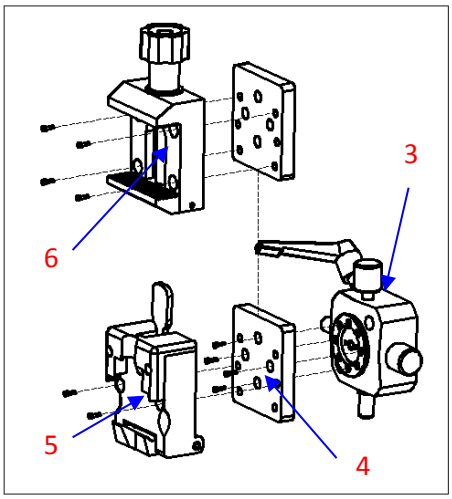
	Always remove the blade first before detaching any of the components of the blade holder assembly.
	Always make sure that all 4 levers on the blade holder are tight before using the microtome to avoid potentially ruining a specimen sample.

Specimen Clamping System

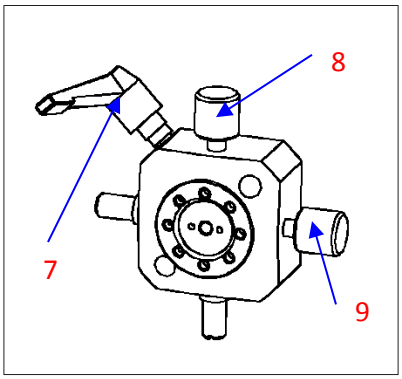


- To actuate **the specimen holding arm** (1), rotate the **hand wheel** (2) clockwise, counterclockwise or rock.

- The specimen clamping system comes with two separate clamps:
  - **Quick Release Clamp (5):**
    Dimension of Specimen:
    40mm x 50mm x 30mm or the standard cassette size.
  - **C-Type Clamp (6) (Optional Accessory):**
    Dimension of Specimen:
    Accepts standard cassette size as well as any specimen carrier that is less than 40mm in length/width. The clamp will also accept carriers as small as 12mm in length/width.

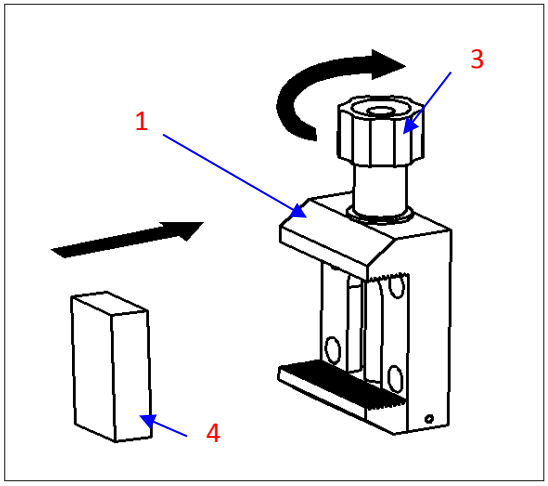


- The **clamps** (5 or 6) attach to a **connector** (4) which attaches itself to the **adjuster** (3).
- To attach a clamp, first attach the **connector** (4) to the **adjuster** (3) using four screws. Then attach either the **Quick Release Clamp** using two screws or the **C-Type Clamp** using four screws.



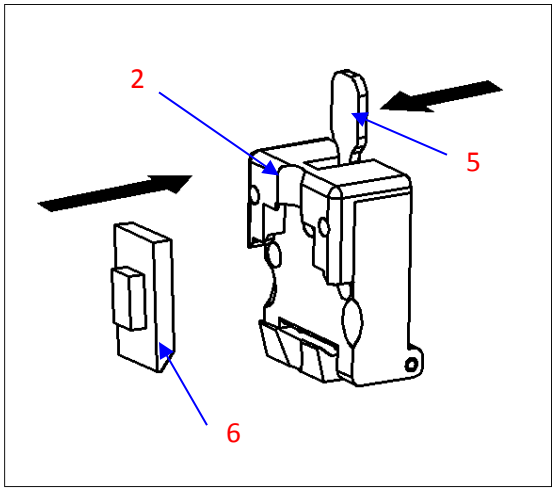
- The specimen clamp adjustor allows for the specimen to be swiveled in the horizontal and vertical direction:
  - Horizontal orientation: ± 8°
  - Vertical orientation: ±8°
- To make an adjustment, first loosen the **lever** (7). Next, you are able to either adjust the vertical orientation using the **knob** on top (8) or the horizontal orientation using the **knob** of the right side (9). After the adjustments are made, retighten the **lever** (7).

Clamping the Specimen and Blade Installation



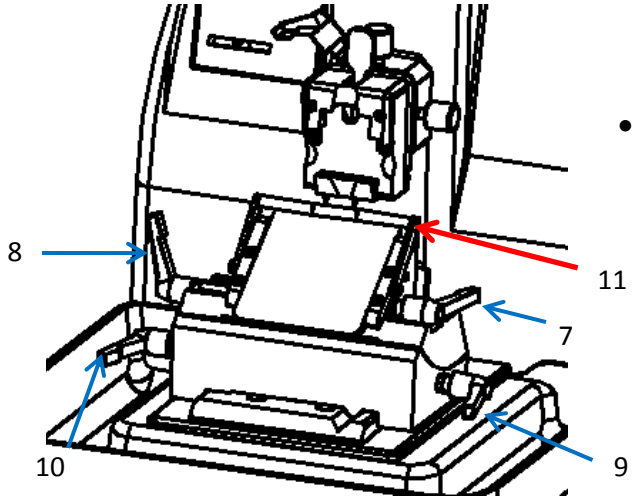
Clamping the specimen:

- Using the C-Type Specimen Clamp:
  - Put the specimen (4) into the **clamp** (1) as is shown in the picture. Then rotate the **nut** (3) clockwise to tighten the clamp. To remove the specimen, rotate the nut counterclockwise.



- Using the Quick Release Clamp:
  - Pull the **clamp handle** (5) in the direction showed in the picture. The clamp will open. You can now insert the specimen (6) into the clamp (2). Release the **handle** (5), the specimen will be clamped automatically. To remove the specimen, repeat the same operation.

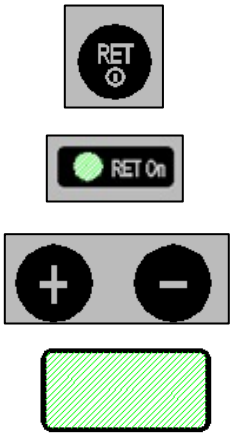
⚠	Always clamp the specimen first before installing the blade to avoid injury.



Installing the blade:

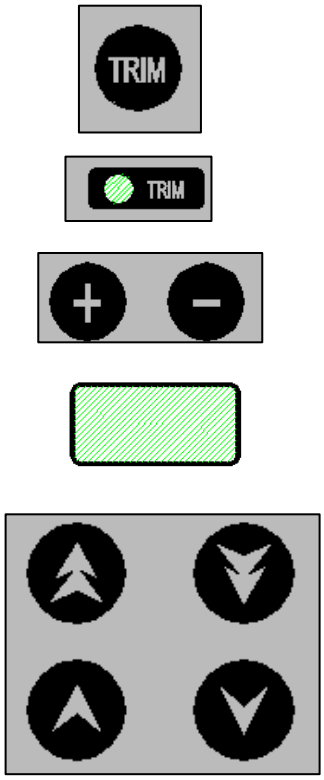
- Before installing the **blade** in the **blade holder clamp**, make sure that the **blade holder base** is secured (9). Then, choose the angle of the X-Axis slider and secure it using lever (10). Choose the lateral location of the **blade holder clamp** and secure it rotating **lever** (8). Finally, place the blade in the **blade holder clamp** as shown by the red arrow (11) and secure it by rotating **lever** (7).

Activating Retraction



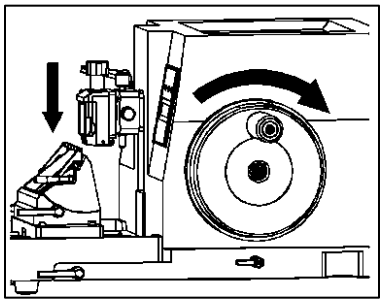
- To activate retraction mode, press the RET button. The RET On LED indicator will illuminate. To deactivate, press the RET again.
- Once activated, the operator can set the retraction value by pressing and holding the RET button for 3 seconds which will cause the RET On LED indicator to pulse. The + − buttons can now be used to set the retraction thickness. The range is between 5µm and 100µm in 5µm increments. The values will be displayed on the hand pad.
- Once the desired retraction thickness is set, the TRIM or SECT buttons can be pressed to set the retraction value and be able to start sectioning or trimming.

Activating Trimming



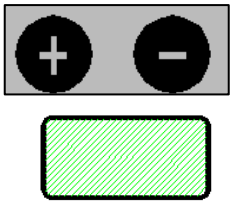
- To activate the trimming mode, press the TRIM button. The TRIM LED indicator will light up.
- The operator can now set the trim thickness setting using the + − buttons. The values range from 0.5µm to 600µm. The set values will be displayed on the handpad.
- The instrument is now ready to have the specimen position adjusted to be in line with the blade to be able to start trimming.
- Using the ⏫ ⏬ buttons, adjust the coarse feed to get the specimen close to the cutting edge of the blade.
- Afterwards, use the ⬆ ⬇ buttons to precisely adjust position of the specimen with respect to the cutting edge.

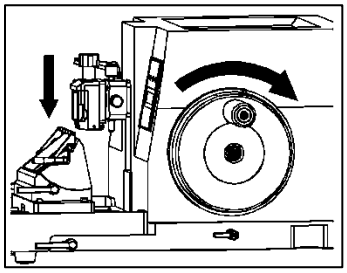
⚠	Ensure that the specimen has not been moved too close to the blade to prevent cutting a large portion of the specimen, potentially ruining the sample.
⚠	Always make sure that all 4 levers on the blade holder are tight before using the microtome to avoid potentially ruining a specimen sample.



- The operator can now unlock the hand wheel and begin to trim the specimen. Turning the hand wheel clockwise will actuate the specimen holding arm down and up across the blade.
- With each turn the specimen holding arm will also advance forward by the set trim thickness at the top most position.
- If the retract function is turned on, the specimen arm will retract backwards a set amount when the arm is at its lowest position to prevent the specimen from being scrapped by the blade on its way up.
- The arm will then advance forward the full retract amount plus the set trim thickness amount.

Activating Sectioning





- At this stage, the operator should have properly trimmed the specimen and it should be ready for sectioning without adjusting the feed mechanism.
- To activate the sectioning mode, press the 

button. The 

LED indicator will light up.
- The operator can now set the sectioning thickness using the  buttons. The values range from 0.5µm to 600µm. The set values will be displayed on the handpad.
- The operator can now unlock the hand wheel and begin to trim the specimen. Turning the hand wheel clockwise will actuate the specimen holding arm down and up across the blade.
- With each turn the specimen holding arm will also advance forward by the set trim thickness at the top most position.
- If the retract function is turned on, the specimen arm will retract backwards a set amount when the arm is at its lowest position to prevent the specimen from being scrapped by the blade on its way up.
- The arm will then advance forward the full retract amount plus the set trim thickness amount.

- To obtain optimum quality sections, the following factors need to be taken into consideration:
    a. The hardness of the specimen.
    b. The angle of the cutting blade.
    c. Whether the blade is clamped tightly.
    d. Whether the specimen is clamped tightly.
- To ensure a quality section, first adjust the proper angle of the cutting blade and the specimen:
    a. The smaller the angle, the less the section will be compressed.
    b. The harder the specimen, the larger the angle will be needed.
    c. If the section is not good, please try increasing the angle from zero.

⚠	When finished sectioning, turn the hand wheel until the specimen is in the upper most position. Then lock the hand wheel and take the blade off and dispose of safely.

Memorized Feed Function

- Memorized feed function allows for the operator to switch between specimens, readjust the specimen holding arm forwards or backwards, and then return back to the first specimen and be able to quickly recall the memorized position of the specimen holding arm allowing for a quick restart in trimming / sectioning.
- To activate the feed memory function, move the specimen arm to the desired position and then press the 

button. The operator can now change the specimen if desired and readjust the arm.
- To move the arm back to the memorized position, press the 

button.

	Make sure that the hand wheel is locked in its upper most position when recalling the memorized position or else an alarm will sound and the ERROR LED indicator will light up.

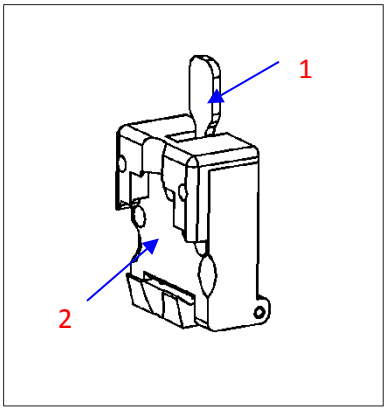
Section 5 | Cleaning & Maintenance

- Cleaning the Unit:

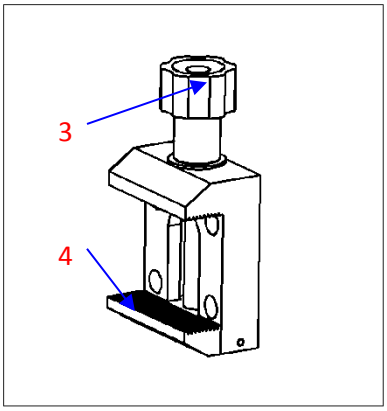
  Use a damp cloth to clean the areas that are always touched when operating the instrument. For example, the handle and the base holder locking lever and the storage area on the housing can be cleaned with a damp cloth. Use the dry cloth to clean the other sections.

- TBS offers PARA**Gard™ Paraffin Repellent** for cleaning the SHUR**Cut™** 3500 Microtome. Please contact your TBS representative for more information.

Cleaning the Clamp:

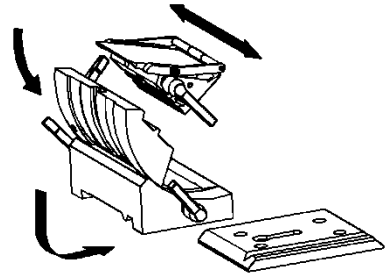


- Quick Release Cassette Clamp
  - Position (1) which is often touched when operating, and position (2) which is in contact with the specimens, need to be cleaned frequently to ensure there is no contamination.



- C-Type Specimen Clamp
  - Position (3) which is often touched when operating and position (4) which is in contact with the specimens need to be cleaned frequently to ensure there is no contamination.

Cleaning the Blade Holder:



- Remove all the parts of the knife holder as it is showed in the picture and then clean all the parts separately. Remember to clean the blade clamp every time before installing the blade to ensure good sectioning and no cross contamination.

To ensure a high quality section, it is important to keep the instrument clean. The user must clean the instrument regularly according to recommendations of the manual to consistently obtain the best sectioning quality.

⚠	Only authorized and qualified service personnel may access the internal components of the instrument for cleaning and maintenance.
⚠	Makes sure the unit is off and disconnected from the outlet before starting to clean the instrument.
⚠	The blade must be removed before taking off the blade holder for cleaning.
⚠	Lock the hand wheel before cleaning.
⚠	Do Not use any solvents for cleaning the unit.
⚠	Make sure no liquid enters the interior of the unit when cleaning.

Section 6 | Troubleshooting

Below is a list of the problems that most frequently occur in the operation of the SHUR**Cut**™ 3500 Microtome. Be aware that some issues are operator controlled, so please read the Operator's Manual carefully before using this instrument.

Problem	Description	Remedy
· No display or button response after the instrument is powered on.	· Main display cable is not properly connected or there is a break in the cable. · Main fuses have blown or are not properly installed. · The voltage input does not match the voltage specified for this unit.	· Check if main cable is properly connected or replace the main cable. · Check the fuse holder for proper installation or replace the fuses. · Contact TBS or review the correct voltage requirements shown in the Technical Data table in Section 2.
·An alarm is activated after powering the instrument on.	· The cable connecting the hand pad to the instrument is not installed properly.	· Cycle the power off and reconnect the hand pad cable to the instrument.
· Producing thick and thin sections.	· Insufficient blade angle. · Specimen clamp not properly securing the block. · Blade holder not secured.	· Increase the blade angle until optimum clearance has been found. · Check if all the levers are tightened.
· Sections are not continuous.	· The angle between blade and the embedded cassette is too large. · The preset sectioning thickness is too thick. · Blade cutting edge is dull.	· Decrease the angle between the blade and embedded specimen. · Adjust the setting thickness. · Replace the blade or adjust the position of the blade.
· The section is curved or damaged	· The wax is wedge shaped. • The embedded specimen is not parallel with the cutting edge.	· Trim the embedded specimen to make the top line parallel with the bottom line, and the width of the embedded specimen must be even. · Adjust the specimen clamping to ensure the top line and the bottom line of the embedded specimen parallel with the cutting edge.

Problem	Description	Remedy
· The section is curved or damaged. *(Cont.)*	• The density of the paraffin is uneven. • Other outside factors (light, heat and ventilation affect the temperature around the embedded specimen).	· Remove the uneven paraffin and embed the specimen again. · Operate the microtome in a temperature controlled environment.
· The section is extremely compressed, wrinkled or jammed together.	· Blade edge is dull. · Specimen block is warming. · The inclined angle of the blade is too small. · There is a buildup of paraffin wax on the blade edge.	· Sharpen the blade, change the blade or adjust the blade position in horizontal orientation. · Cool down the embedded specimen in an ice bath or apply a cryogen spray like TBS SHUR**Freeze**™, to instantly chill the specimen block. · Increase the blade angle to avoid the incline plane of the blade holder in rubbing the embedded specimen. · Use a cotton swab and a cleaning solution to remove paraffin buildup from the front and back of the blade. **Use extreme caution when cleaning the blade. Personal injury may result**.
· The section is extremely compressed, wrinkled or jammed together.	·The wax is old or damaged.	· Change the paraffin, and embed the specimen again.
• The section is broken or the specimen is torn.	·The tissue is not completely dehydrated, or it is not cleaned correctly ·The specimen is immersed in the paraffin too long, or the paraffin is too hot ·The specimen is too hard ·The blade is uneven.	· Dehydrate or clean the tissue again · Penetrate the specimen with paraffin and embed it again. · Replace blade. · Do not section on the uneven edge of the blade or change the blade.
• The section splits while cutting or there is a scratch lengthwise.	·The blade has debris on it. ·The specimen is scratched by hard particles.	· Clean the blade. · Filter the paraffin.

Problem	Description	Remedy
• The section sticks to the blade.	・The blade edge has debris.	・Clean the blade
• The blade produces scraping sounds when sectioning, and the sections are scratched and show vibration marks.	・Insufficient blades angle.	・Reinstall the blade and adjust the angle of the blade holder.

If there are any other maintenance or service issues that cannot be resolved, please contact TBS-A division of General Data Healthcare.

More Information

PH: 844.643.1129

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