DAKEWE

CT520

Cryostat Microtome

User's Manual

V2.1 English - May. 2024

Product name: Cryostat microtome

Product model: CT520

Date of manufacture: see the label

Name of registrant: Dakewe (Shenzhen) Medical Equipment Co., Ltd.

Domicile of registrant: Floor 5, Building B, No.2 Luhui Road, Jinsha Community, Kengzi Street, Pingshan District, Shenzhen, China.

Tel.: 0755-26413421

Name of manufacturer: Dakewe (Shenzhen) Medical Equipment Co., Ltd.

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Introduction

Dear user:

Thank you for choosing our product!

In order to present an overall understanding of our product and facilitate your use, we specially provide these Instructions for Use, covering the structural features, technical features, instructions for use, fundamental troubleshooting and maintenance of the instrument. The Instructions for Use are an essential guide for you to use the instrument.

The Instructions for Use should be kept near the instrument for reference by the user or service personnel.

Before use, please be sure to read and follow the Instructions for Use carefully. We believe this information will be very helpful for you to use the instrument effectively. In addition, if you have any question during use, please call us or inform our technical service engineer. We will serve you wholeheartedly.

Important Statement

The information, data, notes and value judgments contained in the Instructions for Use only represent the scientific knowledge and advanced technology that we currently have mastered through research in the field.

Dakewe (Shenzhen) Medical Equipment Co., Ltd. reserves the right to change manufacturing processes without prior notice under the condition of complying with regulatory requirements. Only in this way is it possible to continuously improve the technology and manufacturing techniques used in our products.

For erroneous descriptions, charts and technical illustrations contained in the Instructions for Use, organizations or personnel are encouraged to feed them back to us for updates. It should be especially noted that we will accept no liability for any direct or indirect economic loss or damage caused by non-compliance with statements or other information in the Instructions for Use.

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For the serial number and year of manufacture of the instrument, please refer to the label on the back of the instrument.

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1. Information

1.1. Symbols and meanings

	Danger: Indicates an immediate danger, which, if not avoided, will result in death or serious injury
	Warning: If this danger is not avoided, it may lead to death or serious injury
	Caution: Indicates a potential danger, which, if not avoided, may lead to death or serious injury
	Attention: Indicates information that is not related to risk but is very important
	Indicates the need for the user to consult the Instructions for Use
	In vitro diagnostic medical device
	Indicates that waste electrical and electronic equipment should be collected separately
	The power is on
	The power is off
	Biohazard warning (black line on yellow background)
	This warning symbol indicates the surface of the instrument that will be hot during operation; Avoid direct contact to prevent burns
	Electrical hazard

Warning, low temperature / freezing conditions.

Caution: UV adiation!
Parts near this label emit ultraviolet radiation when UVC light is turned on. Avoid any unprotected contact.

Environmental protection symbol of the RoHS directive.
The number in the symbol indicates the "Environmentally-friendly Use Period" of the product in years

Indicates the need for the user to consult the important warning information in the Instructions for Use

Serial number

Date of manufacture

Manufacturer

Unique device identification

Do not stack

Maximum of 2 floors (for accessories cases only)

Indicates the correct upright position of the packing case.

Fragile; handle with care

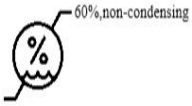
Avoid dampness and keep dry

Do not flip

Recycle in accordance with local laws and regulations.

Item indication number in the illustration.

Indicates the storage and transport temperature limits.



Indicates the sotrage and transport range of humidity.

Tilt indicator

Monitors whether the shipment has been transported and stored in upright position according to requirements during the logistics process.

When the arrow-shaped indicator window contains blue quartz sand, it indicates that the shipment is handled improperly in the logistics process, and that the angle of inclination reaches 60˚ or above.

Shock indicator: handle with care. The indicator turns red if mishandling has occured.

Ground marking, must be grounded.

Authorized representative in the European Community

Importer

The CE marking is the manufacturer’s declaration that the medical product meets the requirements of the applicable EC directives and regulations

Name and Address of Switzerland responsible person

The UKCA (UK Conformity Assessed) marking is a UK product marking used for certain goods, including medical devices, being placed on the Great Britain market (England, Wales and Scotland)

Name and Address of UK responsible person

1.2. Use of the instrument

The Dakewe CT520 Cryostat microtome is used to freeze and section human and animal body tissue. It can be widely used for preparing thin sections of samples of varying hardness for use in pathological diagnosis, analysis and research in hospitals, medical colleges by legal medical experts and propagation institutes.The instrument is designed to produce frozen sections for biological, medical and industrial applications.

The instrument consists mainly of three systems:

- Control: includes related function buttons and displays;
- Cryochamber: quickly obtains low temperature for sectioning;
- Refrigeration: includes compressors and Peltier elements.

1.3. Personnel qualifications

- The instrument may be operated by trained laboratory personnel only;
- The instrument may be operated only according to the Instructions for Use.

1.4. Instrument model

See the label on the back of the instrument.

1.5. Contraindication

No contraindication has been found yet.

2. Safety

2.1. Safety notes

The Instructions for Use include important information related to the operating safety and maintenance of the instrument.

As an important part of the product, the Instructions for Use must be read carefully prior to installation and use and always be kept close to the instrument.

The performance indicators of the instrument meet the Specifications for Cryostat microtome Products of Dakewe.

To maintain safety and performance and ensure safe operation, the user must observe all safety notes and warnings contained in the Instructions for Use.

The safety notes described in this chapter must always be observed.
Be sure to read these instructions even if you are already familiar with the operation and use of other Dakewe products.
The instrument has been designed and constructed with the latest state-of-the-art technology and according to recognized standards and regulations with regard to safety technology. Operating or handling the instrument incorrectly can place the user or other personnel at risk of injury or can cause damage to the instrument or other property.

Do not remove or modify the protective devices on the instrument and its accessories. Only authorized service personnel may repair the instrument and access its internal components.

2.2. Warnings

The safety devices installed in the instrument by the manufacturer only constitute the basis for accident prevention. The primary responsibility for safe operation should be taken by the owner of the instrument, followed by those assigned by the owner to operate, maintain or repair the instrument. To ensure trouble-free operation of the instrument, be sure to comply with the following instructions and warnings.

2.2.1. Warning - symbols on the instrument

Where there is such a warning triangle symbol on the instrument, the correct operating instructions defined in the Instructions for Use must be followed during operation or replacement. Failure to follow these instructions may lead to accidents, personal injury or damage to the instrument or its accessories.

Where there is such a warning symbol on the instrument, it indicates that there is a heat source in this area during the operation of the instrument, and care should be taken to prevent burns at the time of touching this area.

2.2.2. Warning - transportation and installation

The instrument must be kept upright during transportation and handling.
Do not handle the instrument by grasping the handwheel grip or the knob for setting section thickness.
Never remove or modify the protective devices on the instrument and its accessories.

2.2.3. Warning - operation of the instrument

Be careful when handling the blade. The blade is extremely sharp and it may cause seriou sinjury. It is strongly recommended to wear safety gloves.
Be sure to take out the blade before removing the blade holder from the instrument. When the blade is not in use, be sure to put it back into the case!
No matter where the blade is placed, never keep the cutting edge upwards, and never try to catch a falling blade!
Be sure to clamp the specimen block first, and then clamp the blade.
Before handling the specimen or the blade, or changing the specimen, lock the handwheel and ensure that the blade is covered by the safety guard.
Always wear safety goggles when sectioning fragile specimens! Specimens may be fragmented!
Make sure that no liquid enters the instrument during operation!
Immediately clean the embedding agent that falls on the floor or injury due to slippery floor may occur!

Make sure the specimen disc is tightly clamped on the specimen head before sectioning. Failure to follow this may lead to the damage of the specimen.

2.2.4. Warning - cleaning and maintenance

Only qualified maintenance personnel authorized by Dakewe can access the internal components of the instrument for maintenance and repair!
Never try to catch falling accessories as it may cause injury!
Always lock the handwheel before cleaning!
Do not use any solvent containing acetone or xylene for cleaning!
Make sure that no liquid enters the instrument during cleaning!

2.3. Requirements for the location of the instrument

- The floor must be level;
- The floor must be largely free of vibration;
- The instrument must be connected to a grounded power socket nearby,and mains supply voltage fluctuation is up to ±10% of nominal voltage;
- The handwheel must be able to spin without obstacles;
- The operating ambient temperature range is 5°C to 35°C;
- It is recommended that the air humidity not exceed 60%, or frost and condensate water may be prone to generate aournd the refrigeration components of the instrument;
- Avoid direct sunlight.

Reminder: Do not place items within 100 mm around the instrument and within 300 mm from the vent. Room temperatures and humidity levels in excess of the requirements will affect the cooling capacity of the cryostat.

2.4. Handling of the instrument

The instrument is a movable floor-standing cryostat with four casters at the bottom, including two rigid casters at the front and two swivel casters at the rear. Two adjustable feet are arranged near the front casters, and their height can be adjusted by rotation.

After the instrument is transported to the site where it is to be installed at, extend the adjustable feet so

that the feet support the instrument on the floor and the front casters are hanging in the air. The whole instrument is then standing stably. When transporting the instrument on the casters, shorten the adjustable feet so that the adjustable feet are off the floor and the front casters land on the floor. The instrument can then be,move on casters.

After removing the package, make sure that the adjustable feet do not touch the floor so that the instrument can be transported on the casters. Transport the instrument to the location where it will be placed. After positional adjustment, adjust the adjustable feet to support the instrument on the floor, so that it is fixed in place.

2.5. Notes for the use of the instrument

- After transporting, wait at least two hours before turning the instrument on.
- Before starting the instrument, check that the voltage and frequency of the power supply comply with the specification requirements on the label of the instrument.
- Confirm that the power supply is grounded (three-hole socket). Connect the instrument to the power socket with the power cord provided. Switch on the instrument by the switch on the back.
- Use only power cords supplied with DAKEWE or certified power cords.
- The handwheel must be locked when the instrument is not in use.
- The window should be opened to let the moisture evaporate as soon as possible to keep the chamber dry after the instrument is switched off.
- If the UV disinfection lamp is damaged, replace it with a lamp only from the same brand, of the same model and specification carefully.
- The electrical system, such as the control panel and the electric control box, must be maintained by professionals, and other personnel must not touch them.
- The refrigeration system is composed mainly of compressors, condensers, filters and evaporators. The condensers (with a fan) absorb dust after long-term use, which will affect the cooling effect. It is necessary to open the vent plate on the right side of the instrument and remove the dust on the condenser fins with a brush or by blowing the dust away with high-pressure compressed air. (If the vent on the right side is equipped with a dust-proof mesh, it must be cleaned regularly with a brush to ensure that the mesh is unblocked, as the blockage of the mesh will reduce the cooling effect of the instrument)
- Remove section waste and debris in the cryochamber after every sectioning operation to keep the chamber clean. Avoid being injured by the blade during cleaning .
- Never use rapid cooling sprays in the cryochamber.

3. Components and specificationst

3.1. Main features

(1) The instrument is equipped with a 12.1-inch color touch screen with concise UI interface showing common functions and parameter. Operation can be achieved intuitively on the interface, making the instrument simple, convenient and easy to learn and use;

(2) High-performance double compressors provide continuous cooling capacity, and can reduce the chamber temperature to the target working temperature within 1.5 hours at a room temperature of 20°C. Multiple sets of precise temperature sensors accurately monitor the temperature. The instrument can cool the cryochamber, specimen head, blade holder and freeze shelf to separate temperatures and ensure continuous sectioning of multiple specimens;

(3) Three presets of separate temperature of the specimen head, the blade holder and the freeze shelf can be customized by the user. The temperature presets can be selected quickly for different specimens;

(4) The brand-new chamber structure in which the sectioning machine core is outside the chamber makes the feeding system unaffected by the cooling of the chamber, avoids damage to the feeding system due to core freezing, and reduces maintenance to a greater extent;

(5) The high-precision step motor that drives specimen feed ensures accurate steps in specimen feeding and provide quality homogeneous sections;

(6) The high-precision smooth and durable double-guide rail design can easily cope with heavy workload;

(7) The stable blade holder structure ensures more stable sectioning;

(8) The easy-to-adjust anti-roll guide can effectively flatten sections and reduce curling helping quickly obtaining quality sections;

(9) The 53 Liter large-capacity cryochamber brings more flexible and comfortable operation; the freeze shelf can quickly freeze 20 specimens at a time (including 2 Peltier elements). The multi-color specimen discs assist specimen identification;

(10) The instrument has rapid cooling. The freeze shelf is equipped with two Peltier elements, with a

minimum temperature of - 60°C, to prevent the formation of ice crystals in specimens due to insufficient cooling speed.

(11) The specimen discs adopts a plane design, providing sufficient contact area between the freeze shelf and the specimen head and thus faster specimen cooling.

(12) The instrument has specimen head position memory. The position of specimen head can be recorded and achieved with a click, improving the efficiency of operation;

(13) The instrument can detect the movement of the handwheel and switch between rocking mode and sectioning mode automatically without manual toggling, improving the efficiency of operation;

(14) The instrument has a multi-functional control panel which can be used to trigger the forward and backward movement of the specimen head, to switch between sectioning and trimming, and to adjust the temperature;

(15) The chamber has a UV disinfection lamp, which can be manually turned on or for UV disinfection or performed scheduled disinfection to reduce biological contamination;

(16) Illumination is available in the cryochamber. The brightness of the illumination can be adjusted on the main interface. The illumination can be turned on and off along with the opening and closing of the window, which is convenient for observation;

(17) The instrument can perform manual or scheduled defrosting. The instrument performs defrosting according to the set schedule. Defrosting can also be activated manually;

(18) The instrument can detect the liquid level in the condensate bottle and remind the users to empty the bottle;

(19) The cryochamber has an antibacterial nano-silver ion coating to effectively reduce the reproduction of infecting microorganisms on the surface;

(20) The instrument has an ergonomic arc design and convenient handwheel operation, improving user experience and avoiding fatigue;

(21) The instrument has a slide storage area providing easy access to marked slides;

(22) The intelligent compressor working algorithm ensures efficient cooling and meanwhile maintain low-noise operation.

3.2. Overview - components

Figure 3- 1Diagram of the Instrument

1. Screen	4. USB2.0 port & RJ45 network port	7. Condensate bottle
2. Control panel	5. Slide storage area	8. Feet
3. Window	6. Handwheel	9. Caster

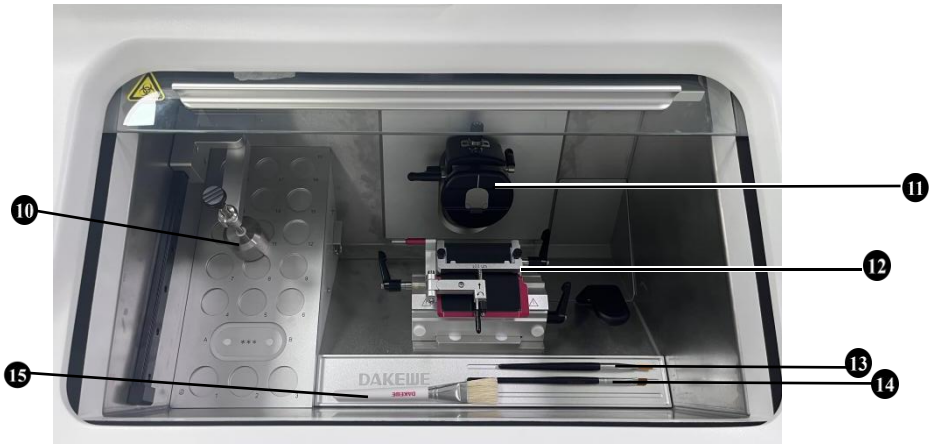


Figure 3- 2 Diagram of the cryochamber

10.Heat extractor	12. Blade holder	14. No. 5 brush
11. Specimen head	13. No. 4 line drawing pen	15. Brush

3.3. Technical parameters

All relevant temperature indicators are valid only when the ambient temperature is between 5°C and 35°C and the relative humidity does not exceed 60%.

3.3.1. General performance parameters

Table3- 1 General Parameters

General	Parameter
Supply voltage and frequency and Power consumption	220-240VAC，50Hz，1400VA； 220-230VAC，60Hz，1400VA； 110-127VAC，60Hz，1200VA；
USB2.0 port rated output voltage	5V/0.5A
Working temperature range	+5°C to +35°C
Temperature for transportation and storage	+5°C to +55°C
Relative humidity for transportation and storage	A maximum of 60%, with no condensation
Classification as per IEC61010.1	Class of pollution: 2; overvoltage category: II
Altitude	up to 2,000m above sea level
A-weighted noise level	≤ 60 dB (A)
IEC 60529 Shell protection grade	IP20

3.3.2. Sectioning parameters

Table3-2 Sectioning Parameters

Performance	Parameter	
Section thickness range	1 - 100μm	
Section thickness	0.5 - 5 μm	0.5 μm increment
	5 - 20 μm	1 μm increment
	20 - 50 μm	2 μm increment
	50 - 100 μm	5 μm increment
Trimming thickness range	5 - 600 μm	
Trimming thickness	5 - 50μm	5 μm increment
	50 - 100μm	10 μm increment
	100 - 600μm	20 μm increment
Retraction value	0-100μm	5.0 μm increment
Horizontal feed	30 ± 1 mm	
Vertical stroke	62 ± 1 mm	

Size of specimen discs	Standard: Φ30 mm, Φ40 mm Optional: Φ55 mm
Specimen orientation range	x/y±8°
Zero-position indication	Yes
Specimen orientation	Precise adjustment with the knob (with no graduation)

3.3.3. Refrigeration parameters

Table3- 3 Refrigeration Parameters

Refrigeration	Parameter
Freeze shelf temperature range	-10 °C to -42 °C (±5°C at room temperature of 20 °C)
Specimen head temperature range	-10 °C to -50 °C (±5°C at room temperature of 20 °C)
Blade holder temperature range	-15 °C to -30 °C (± 5°C at room temperature of 20 °C)
Cryochamber temperature	-15 °C to -30 °C(±5 °C at room temperature of 20 °C)
Peltier elements minimum temperature	-60 °C to +3°C (at freeze shelf temperature of -42 °C (+5 °C))
Number of freezing points	18
Number of Peltier elements	2
Cooling speed	In the case of start-up at room temperature of 20°C, sectioning may begin after cooling for 1.5 hours (freeze shelf at -30 °C, specimen head at 20 °C, blade holder at -20 °C).
Refrigerant	R449A/400g±5g
Cooling capacity	690W

Refrigerant and compressor oil should only be replaced by qualified authorized service personnel!

3.3.4. Control parameters

Table3- 4 Control Parameters

Control	Parameter
Fast forward/backward movement	1800 μm/s
Slow forward/backward movement	900 μm/s
Rocking mode	Automatic switching between rocking and sectioning (can be turned off)
Screen	12.1-inch color touch screen
Control panel screen	1.4 inches, displays temperature control and section/trimming thickness
Control panel	Forward and backward movement of specimen head, switching between sectioning and trimming, and temperature adjustment
Handwheel	Can be lock at 12 o'clock/6 o'clock position
Temperature control	Separate adjustment of freeze shelf/specimen head/blade holder, three

Control	Parameter
	groups of preset temperatures

3.3.5. Auxiliary parameters

Table3- 5 Auxiliary Parameters

Auxiliary	Parameter
Manual/scheduled defrosting	One defrosting can be schedule per day (65 min or 85 min);25 min each time after manual activation
UV disinfection	High-power UV lamp disinfection. Two disinfection can be scheduled per day; 30 min each time after manual activation
Standby/sleep	The instrument can be set to enter standby mode (the screen brightness decreases) after idling for a period of time.. The instrument can be set to enter sleep mode after a certain period of being on standby (the screen display is off, only a basic chamber temperature of -10 °C to -15 °C is maintained, and the temperature of other components are no longer maintained. Sleep mode can be exited by clicking on the screen)
Activate	Activate hours can be set and the instrument will not enter sleep mode during activate hours;
Status indicator light	Front indicator light indicates the status of the instrument
Section count	Yes
Section thickness count	Yes
Silver ion protection of enclosure	The plastic upper cover has an antibacterial coating to prevent the growth of bacteria
Specimen head position memory	The common working position of the specimen head can be memorized, and the recorded specimen head can automatically reach the memory position with one click easily

3.3.6. Dimensions and weight

Table3- 6 Size and Weight Parameters

Dimensions and weight	Parameter
Dimensions (Width × depth × height)	830 (including handwheel) x 910 (including rear grip) x 1,300 mm 700 (excluding handwheel) x 830 (excluding grip) x 1,300 mm
Weight (without accessories)	About 185kg

4. Installation requirements

Safety gloves must be worn during installation and disassembly to avoid injury.

Before unpacking the instrument, check that the fasteners of the packing case are complete, and the appearance is not damaged or deformed. If the above situations occur, please mark on the shipping document accordingly.
Please check that the received components are in accordance with the list and order and the shipment is delivered complete and intact! If any discrepancy is found, please contact the manufacturer or your representative.

4.1. Installation requirements

- The room temperature is maintained between + 5 °C and + 35 °C;
- The maximum relative humidity is 60%, with no condensation;
- The instrument is for indoor use only;
- There must be enough space around the handwheel to facilitate operation;
- The instrument must be placed in a largely vibration-free environment with no instruments that may cause vibration near it;
- After the instrument is placed at the designated position, the feet must be adjusted to stabilize the instrument to avoid compromising the sectioning quality;
- Avoid vibration, direct sunlight and sudden temperature variation;
- The location must be well ventilated, and no fire source is allowed.

4.2. Tools required for unpacking

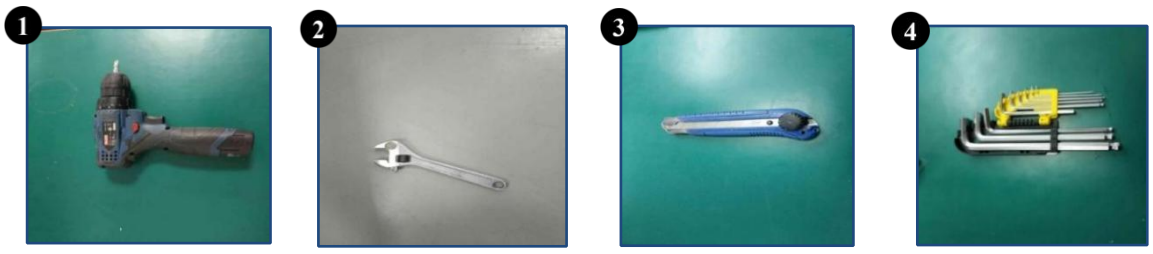


Figure4- 1 Unpacking Tools

1. Electric screwdriver 2. Adjustable wrench 3. Utility knife 4. Allen wrench

4.3. Unpacking

Figure a Remove the top screws

Figure b Remove the rear board

Figure c Dismantle the crate, remove the EPE, and set up a slope

Figure d Move the instrument to the floor

Figure4- 2 Unpacking Process

4.4. Handling of the instrument

Move the instrument from the base of the crate to the floor, pull the grip at the rear of the instrument to move the instrument to the target position. After the instrument is in position, turn the feet clockwise so that they support the instrument stably on the floor.

Do not to push the instrument forwards as the instrument tends to lean forwards if it's stumbled in the way forward due to its high mass center which may cause damage and injury.

4.5. Verification of accessories

Place the instrument at the designated location, unpack all the accessories, and check that the handwheel, blade holder, heat extractor, specimen discs, accessory tray and other parts are complete and intact against the packing list.

Communicate with the installation personnel if there is any doubt in the verification in time. If there is any accessories missing or damaged, please contact your representative or the manufacturer.

4.6. Install the handwheel

Take the handwheel and the cover out of the accessory box.

Figure4- 3 Install the Handwheel

4.7. Install the blade holder

Take the blade holder out of the accessory box.

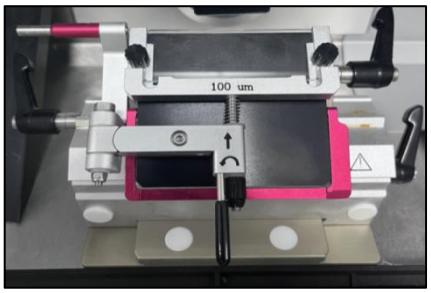


Figure a Snap the blade holder from the front

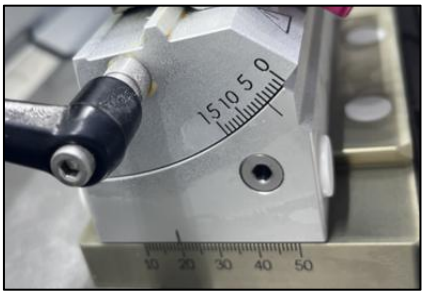


Figure b Installation location of the blade holder

Figure4- 4 Install the Blade Holder

4.8. Install the heat extractor

Take the heat extractor out of the accessory box.

Figure4- 5 Install the heat extractor

4.9. Electrical connection

Power supply: Plug one end of the mains cord into the mains input socket on the back of the instrument, and plug the other end into the socket nearest to the instrument.

Figure4- 6 Connect of Mains Cord

The instrument must be connected to a grounded mains socket.

Place the instrument at a place that is convenient to operate.

5. Operation

5.1. Start-up

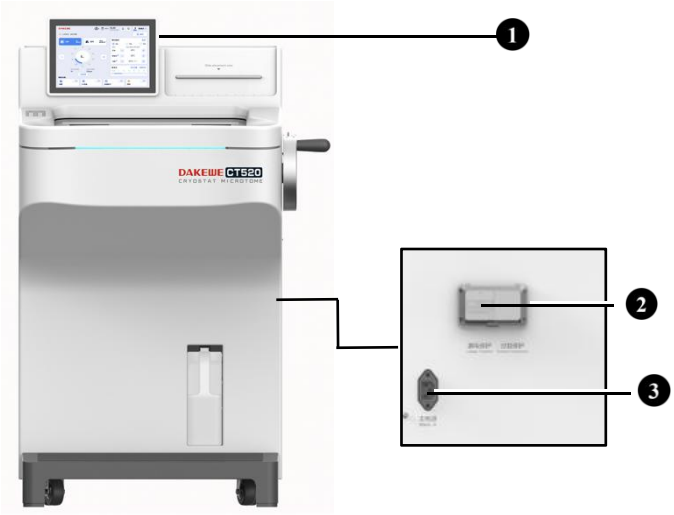


Figure5- 1 Diagram of Instrument

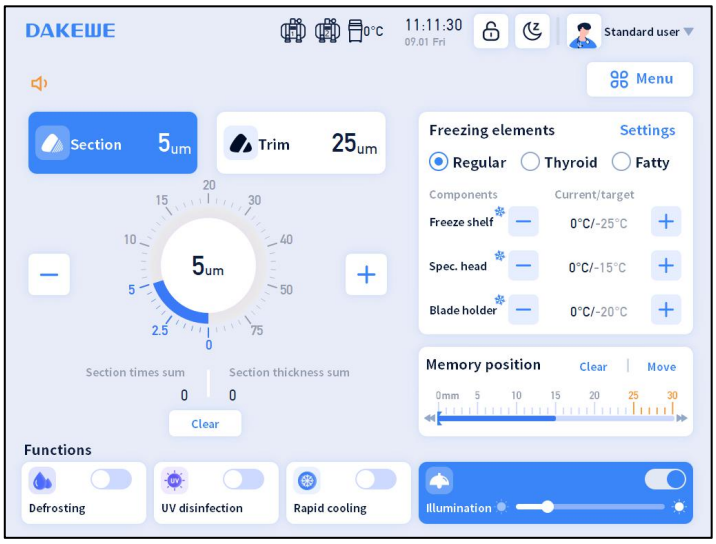


Figure5- 2 Main Interface of Software

Install the power cord at the socket on the back of the instrument (Figure 5-1-3), connect to the power supply, and turn on the power switch on the back of the instrument (Figure 5-1-2). After start-up, the display screen lights up (Figure 5-1-1), and the compressors start at the same time. The refrigeration of the freeze shelf, specimen head and blade holder is conducted according to the respetive set temperature.

5.2. Permissions

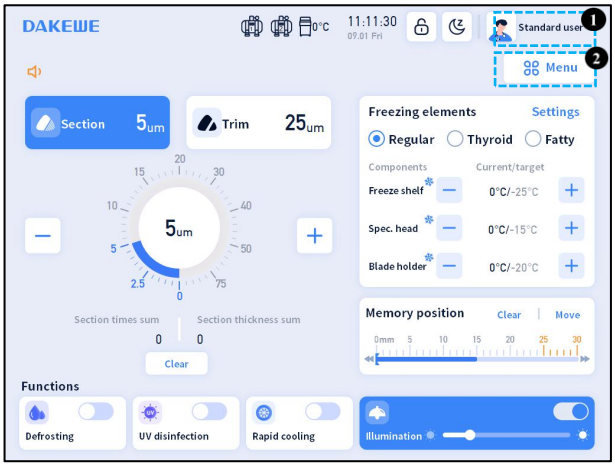
The user can operate as a standard user by default without logging in. A standard user can only modify sectioning related parameters on the main interface such as section thickness and temperature. An administrator can schedule programs such as defrosting, sleep and disinfection. The administrator owns the highest permission. Only one administrator is available on an instrument and the default password is "1".

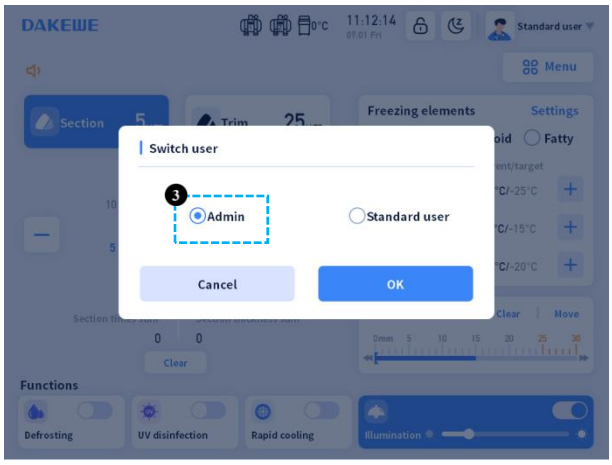
Switch user:

In the upper right corner of the main interface, click the Standard User button (Figure 5-3-1) to show the dropdown menu (Figure 5-3-2).

Click the Switch User, and then select “Administrator” on the popup window (Figure 5-3-3). Click “Confirm”.

On the Administrator Login popup, click the password input (Figure 5-3-4), enter the password using the virtual keyboard, and click “Confirm” to switch to the administrator user.





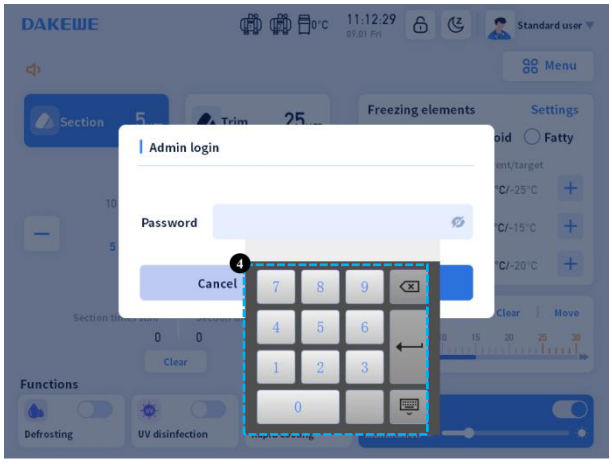


Figure5- 3 Switch user

See Section 6.1 for details on administrator password updates.

5.3. User interface

5.3.1. Top status bar

The following information is displayed on the status bar at the top of the interface:

(1) Company logo, displayed on the left.

(2) The status of the main and the auxiliary compressors, displayed in the middle. The compressor icon lights up when the corresponding compressor is activated. The main compressor is marked by 1 and the auxiliary by 2. The compressor icon turns dim when the corresponding compressor is not activated..

(3) The chamber temperature icon is to the right of the compressors. The chamber temperature icon displays the real time chamber temperature.

(4) The current date and time are displayed to the right of the chamber temperature. Refer to Section 6.1 to learn how to set the date and time of the instrument.

(5) The lock screen button is to the right side of the date and time. The lock screen button displays an image of an unlocked lock. Click the lock screen botton to lock the screen, and a locked lock icon will show on the interface. To exit the lock, click the locked lock button. Please refer to Section 6.2.4 for screen time out settings.

(6) The sleep button is to the right of the lock screen button. Click the sleep button to enter the sleep mode. At this time, the screen turns to the lowest brightness, the freeze shelf, specimen head and

blade holder are no longer refrigerated, and the chamber temperature is maintained at -10°C to -15°C. Please refer to Section 6.2.2 for details on scheduled sleep settings. Please refer to Section 6.2.4 for details on automatic sleep settings.

(7) The user is displayed on the far right. Please refer to Section 5.2 for details on switching user.

Figure5- 4 Status Bar

5.3.2. Sectioning modes

Sectioning module on the main interface: click Section/Trim, and the icon will be highlighted accordingly, indicating the selected current sectioning/trimming.

Sectioning: Click Section (Figure 5-5-1). Click the "-" or "+" button beside the dial (Figure 5-5-3) to adjust the section thickness value, and the dial will show the current sectioning value according to the selected mode. When the section value is adjusted to 2 μm or below, the color of the dial rim will change from blue to orange to remind that the section of this thickness may be too thin (Figure 5-6).

Trimming: click Trimming (Figure 5-5-2), and click the "-" or "+" button beside of the dial (Figure 5-5-3) to adjust the trimming thickness value, and the dial will show the current trimming thickness value according to the selected mode.

Section times sum and section thickness sum: the instrument counts the section times and total section thickness according to the set sectioning/trimming value (Figure 5-5-4).

Clear: Section times sum and section thickness sum do not reset everyday. Only by clicking the Clear button (Figure 5-5-5) will the Section times sum and section thickness sum be cleared.

Figure5- 5 Sectioning settings on the Main Interface

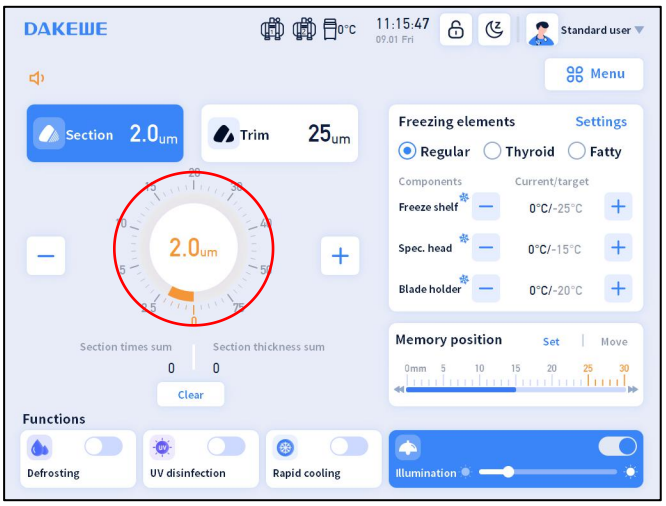


Figure5- 6 Thin Section Indicator

5.3.3. Freezing elements

The freezing elements can be used to adjust the temperature of the freeze shelf, the specimen head and the blade holder.

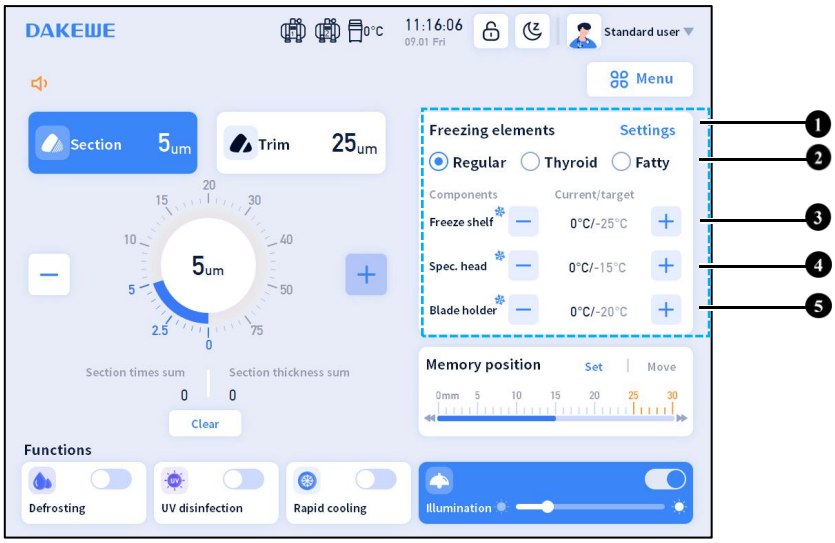


Figure5- 7 the Freezing elements on Main Interface

Freeze shelf: As shown (in Figure 5-7-3), the current temperature of the freeze shelf is displayed. The - and + buttons can be used to adjust the target temperature of the freeze shelf. When there is a difference between the target temperature and the current temperature, the instrument will refrigerate the freeze shelf, and the corresponding refrigerating icon will be displayed at the same time. When the current temperature reaches the target temperature the refrigerating icon will disappear, and only the current temperature will be displayed.

Specimen head: As shown (in Figure 5-7-4), the current temperature of the specimen head is

displayed. The - and + buttons can be used to adjust the target temperature of the specimen head. When there is a difference between the target temperature and the current temperature, the instrument will refrigerate the specimen head, and the corresponding refrigerating icon will be displayed at the same time. When the current temperature reaches the target temperature, the refrigerating icon will disappear, and only the current temperature will be displayed.

A red "--" is shown at the temperature field if the corresponding component (freeze shelf, specimen head, or blade holder) is warmer than 55 °C. (as shown in Figure 5-8).

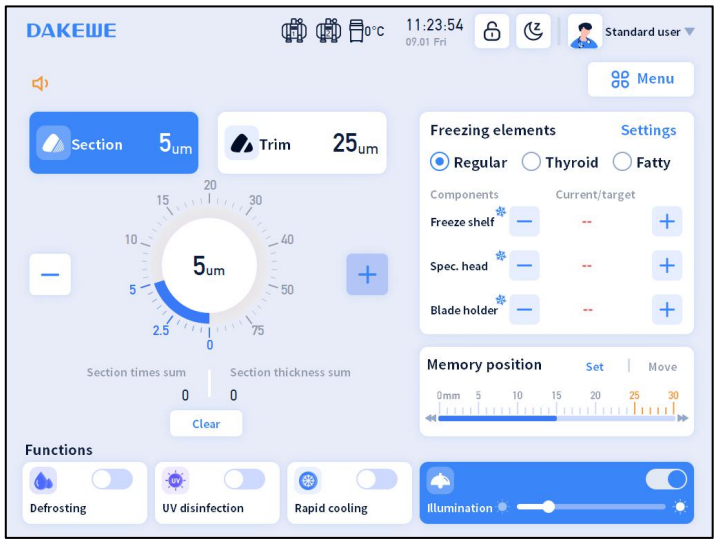


Figure5- 8 The Interface with Abnormal Specimen Head Temperature

Blade holder: As shown (in Figure 5-7-5), the current temperature of the blade holder is displayed. The - and + buttons can be used to adjust the target temperature of the blade holder. When there is a difference between the target temperature and the current temperature, the instrument will refrigerate the blade holder, and the corresponding refrigerating icon will be displayed at the same time. When the current temperature reaches the target temperature, the refrigerating icon will disappear, and only the current temperature will be displayed.

Temperature preses: As shown in (Figure 5-7-1), click the Settings button, and a popup will display the preset value of the components (Figure 5-9). The temperature of the freeze shelf, the specimen head and the blade holder can be set separately to meet the temperature requirements for different tissues.

Preset Temperature Module Quick Select: As shown in (Figure 5-9), three presets (Regular/Thyroid/Fatty) of temperature can be stored and selected easily.

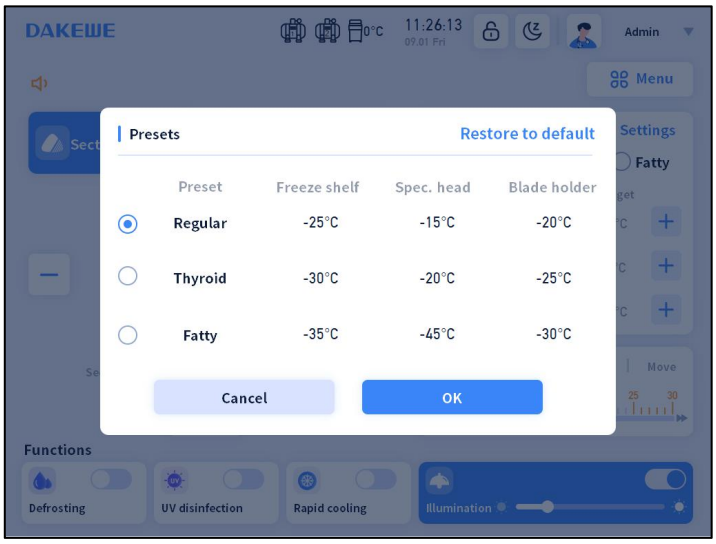


Figure5- 9 Set Temperature Presets

Edit preset name: As shown in (Figure 5-10), click the preset name (default Regular/Thyroid/Fatty) to edit the name according to the needs, and click Confirm to save the change.

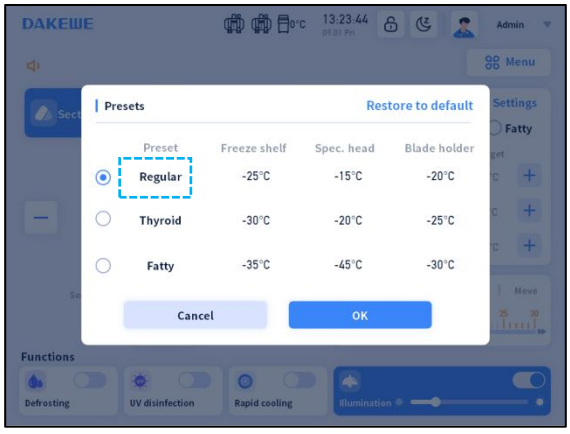


Figure a the preset name area

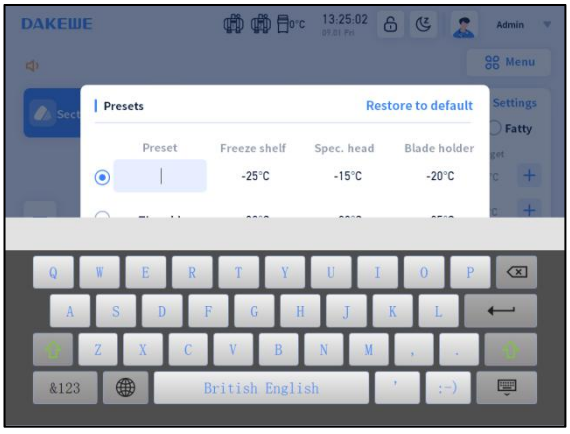


Figure b Enter a name via the soft keyboard

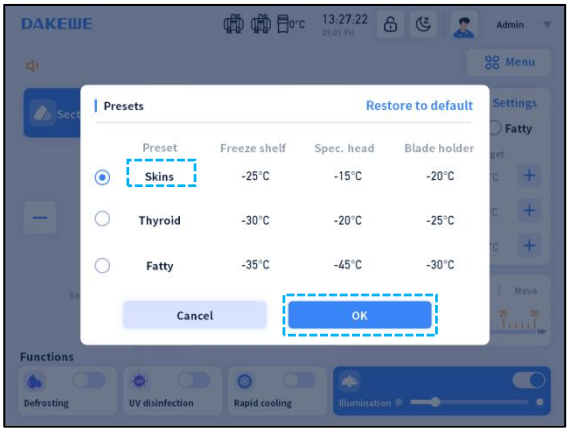


Figure c Confirm after editing

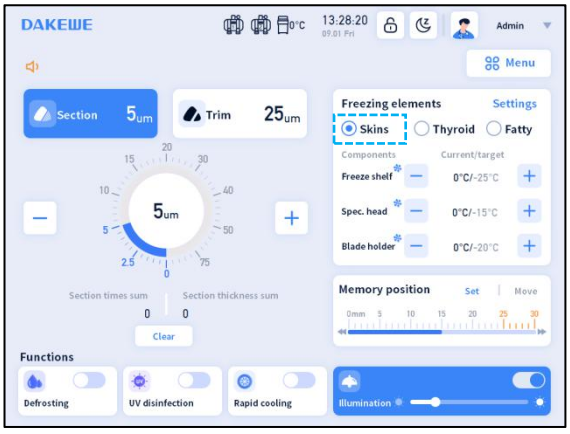


Figure d Edited preset name on the main interface

Figure5- 10 Edit preset name

5.3.4. Specimen head position

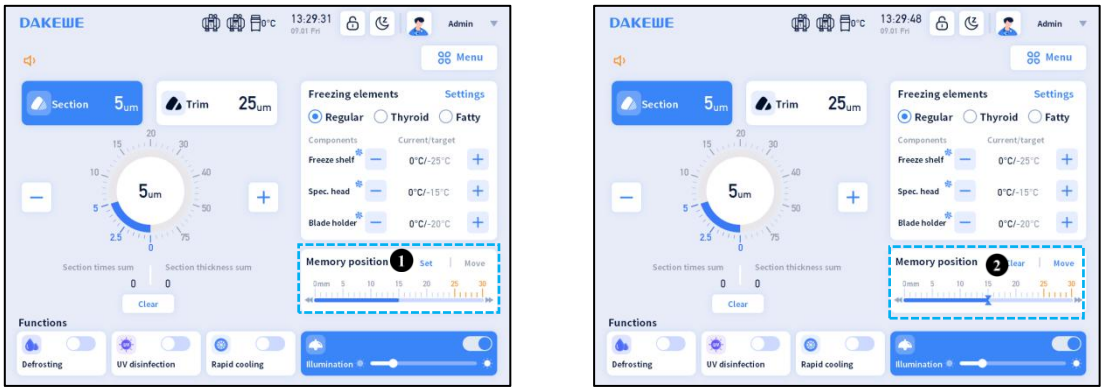


Figure5- 11 Specimen Head Position Indicator on the Main Interface

The total feed and current position of the specimen head are indicated. The feed range of the specimen head is 30 mm. The specimen head position indicator moves with the operation of the forward and backward buttons on the control panel within the feed range. When the specimen head reaches the end of the feed, a buzzer will sound to alert the user.The specimen head distance bar turns from blue to yellow after the specimen head position is over 25 mm to alert that it's approaching the limit.

Click “Set” button to record the current position of the specimen head (Fig. 5-11-1). A memory position is then recorded. The “Set” button will change to “Clear” when a memory position is se t(Figure 5-11-2).

Click “Move” and the specimen head will return to the recorded memory position.

5.3.5. Functions

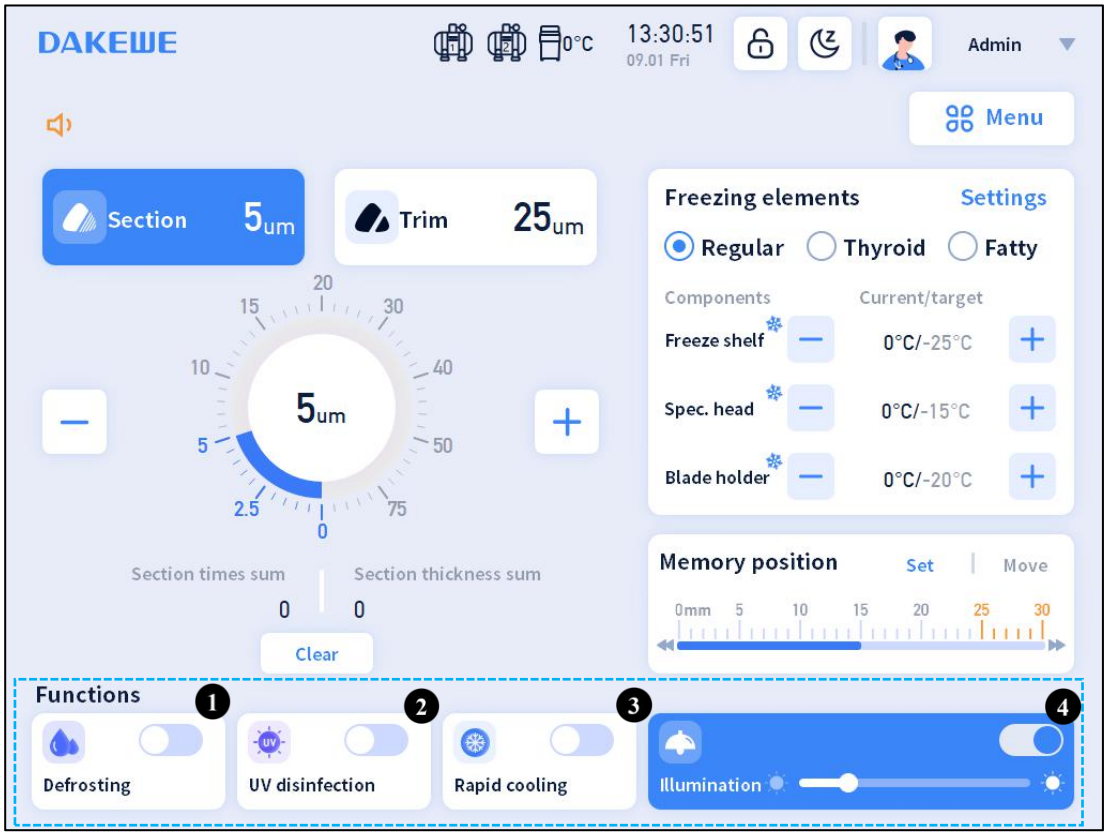


Figure5- 12 Functions on the Main Interface

Defrosting: as shown in (Figure 5-12-1). Click the defrosting toggle to start defrosting, and a pop-up window will prompt "1.Please remove all specimens on the freeze shelf otherwise they can be damaged!!2.Fast defrosting will be activated. Only the evaporator will be defrosted" Please confirm that there are no specimen on the freeze shelf and click OK to start defrosting. The defrosting icon on the interface will be highlighted.There is a 25-minute countdown, at the end of which the defrost icon returns to the unopened state and the cooling mode is automatically restored.

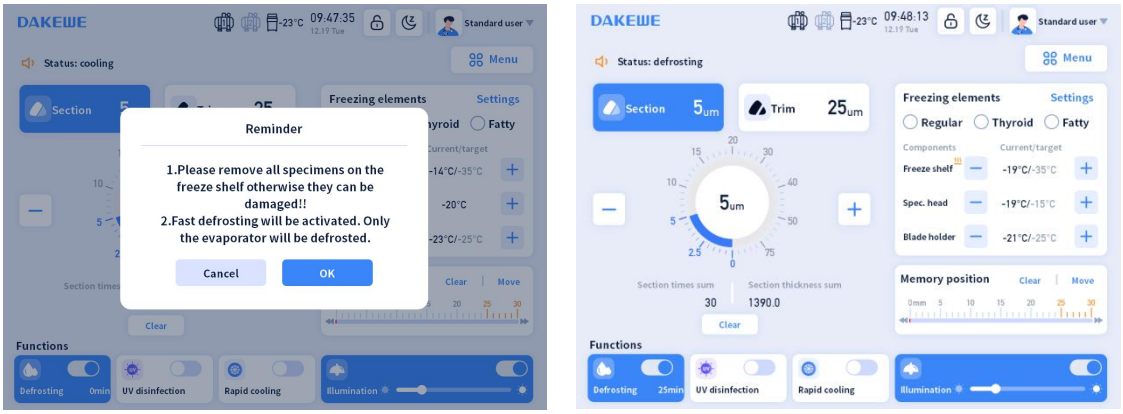


Figure5- 13 Defrosting Prompt

UV disinfection: as shown in (Figure 5-12-2). Click the UV disinfection toggle to start UV disinfection, and and a pop-up window will prompt "Please remove all specimens on the freeze shelf otherwise they can be damaged!!" Please confirm that there are no specimen on the freezing shelf and click OK to start UV disinfection. The UV lamp in the chamber will light up and UV disinfection icon will be highlighted.

Rapid cooling: as shown in (Figure 5-12-3). To enable rapid cooling, the current freeze shelf temperature must be lower than -10 ℃. After turning on, the Peltier element will refrigerate for the duration set in "Menu - Settings - Preferences" (the default duration is 10 min and can be adjusted within 5 - 30 min in “Preferences”). After the duration, rapid cooling will be turned off.

Illumination: as shown in (Figure 5-12-4), click the illumination toggle to turn on illumination. The illumination in the chamber will be turned on, and the brightness of the illumination can be adjusted on the main interface.

5.3.6. Maintenance Tips

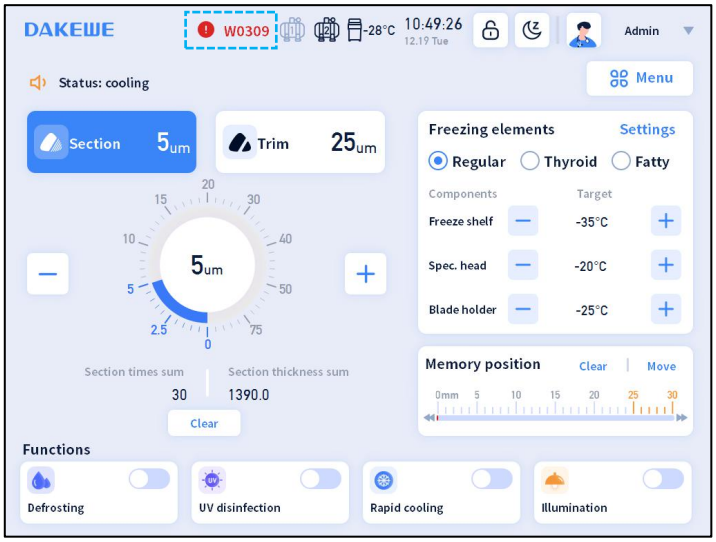


Figure5- 14 Maintenance Tips Schematic

A W0309 prompt will show on the main interface when the liquid in the waste liquid bottle is reaching the threshold. Liquid overflow may occur. Please empty the waste liquid bottle and W0309 propmpt will disappear automatically.

A W307 prompt will show on the main interface when the ambient temperature exceeds 35℃. The cooling capacity of the instrument is compromised under the condition. Please turn on the air conditioning system in the room to lower the temperature. The W307 prompt disappears when the

ambient temperature is below 35 ℃.

5.4. Control panel operation

<table>
<tr><td rowspan="8"> 
</td><td>  </td><td>The screen is generally turned off. It displays the contents in sectioning/trimming and freezing elements when turned on;</td></tr>
<tr><td> 
</td><td>Press this button to switch between sectioning/trimming ;</td></tr>
<tr><td> 
</td><td>Press this button to turn on/off the screen. The screen displays the contents in sectioning/trimming and freezing elements when turned on. The temperature of the freeze shelf, the specimen head and the blade holder can be adjusted directly with the control panel;</td></tr>
<tr><td>  </td><td>These buttons can be used to adjust thickness and temperature;</td></tr>
<tr><td>  </td><td>Specimen head slow backward movement;</td></tr>
<tr><td>  </td><td>Specimen head slow forward movement;</td></tr>
<tr><td>  </td><td>Specimen head fast backward movement till the end;</td></tr>
<tr><td>  </td><td>Specimen head fast forward movement;</td></tr>
</table>

6. Menu

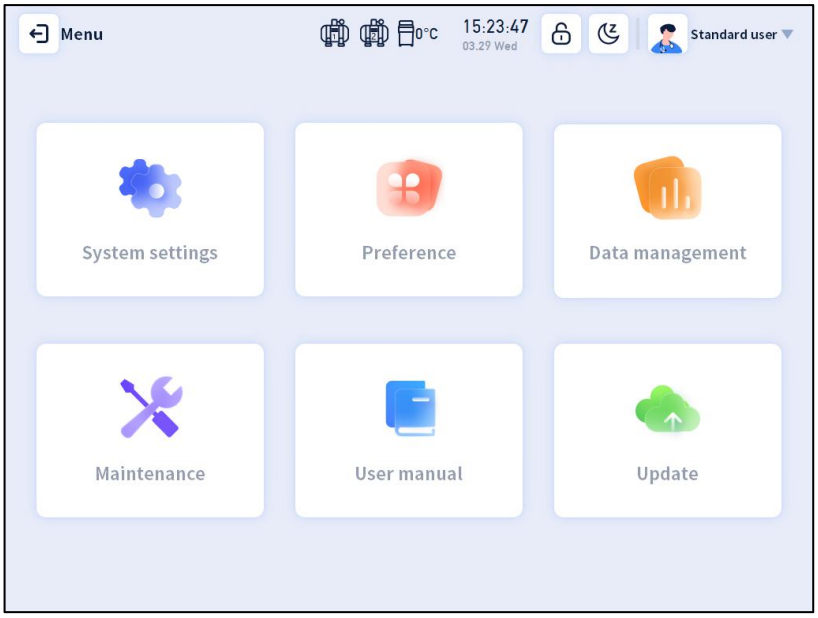


Figure 6- 1 Menu

There are 6 modules in the menu: system settings, settings, data management, maintenance, user manual and update.

6.1. System settings

The password of the administrator can be edited only when the user is logged in as an administrator.

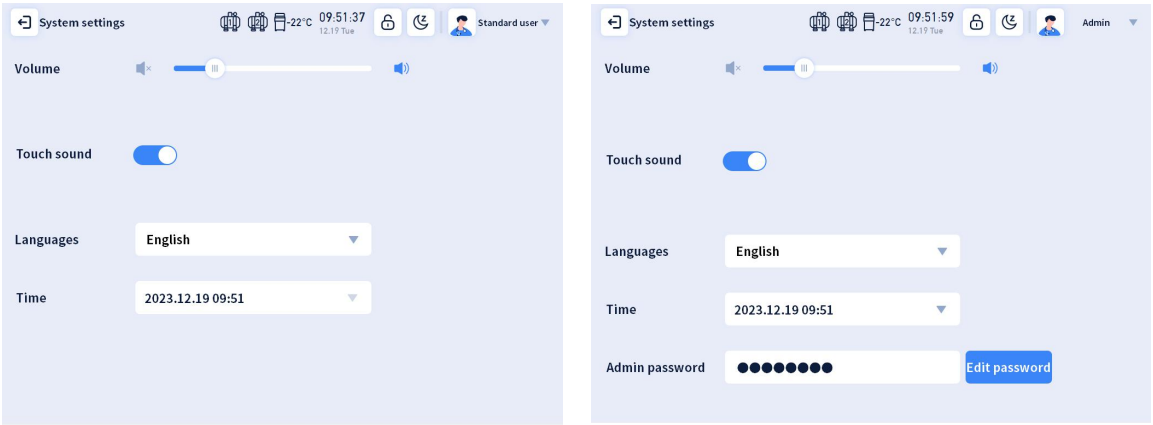


Figure 6- 2 System Settings

Volume: slide the slider to adjust the volume.

Touch sound: click to turn on/off touch sound.

Language: drop down to choose a system language.

Time settings: under the permission of the admin, click time settings to adjust the date and time, and

click OK to save the changes.

Admin password: under the permission of the admin, click the Edit Password button, enter the original password, the new password and repeat the new password, and click OK to change the admin password.

6.2. Settings

6.2.1. Schedule Disinfection

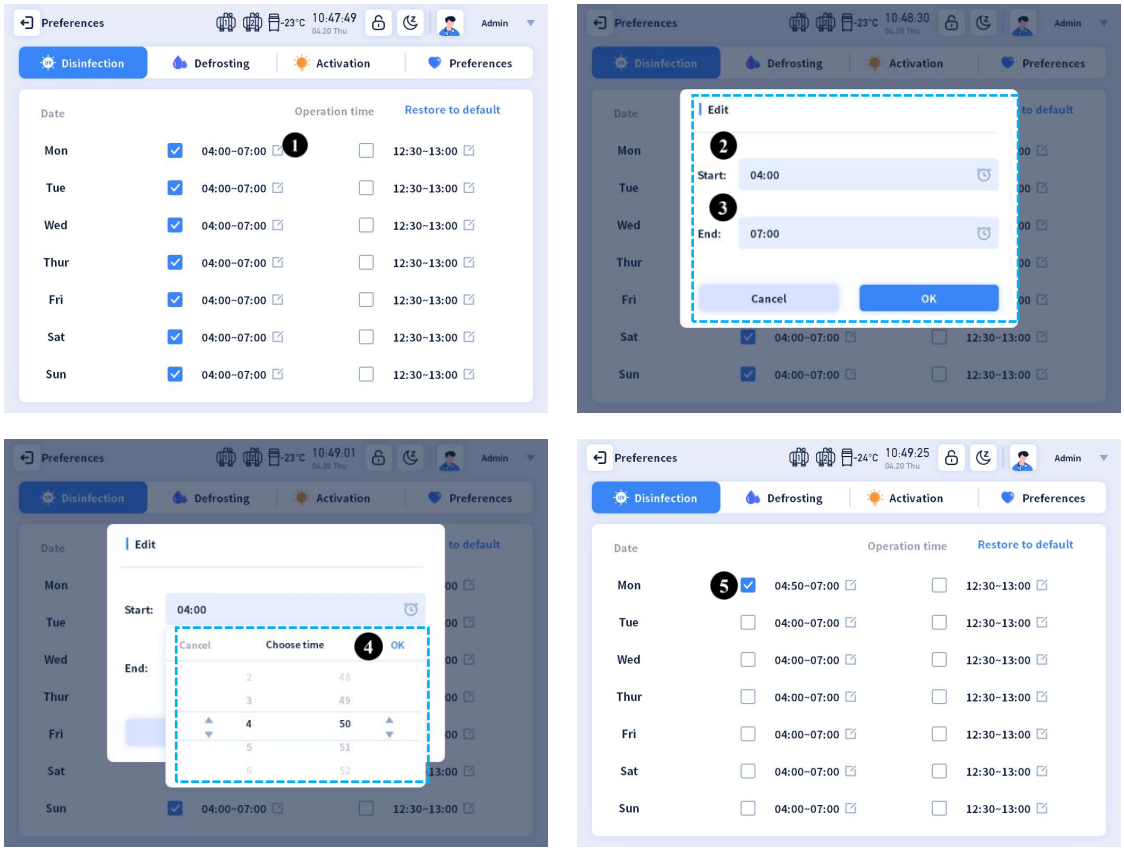


Figure 6- 3 Disinfection Settings

Disinfection can be scheduled on the Menu - Settings - Disinfection interface.

Step 1: click the edit icon button after the time period (Figure 6-3-1).

Step 2: the start time and the end time can be adjusted in the popup window (Figure 6-3-2 and Figure 6-3-3).

Step 3: configurate the start time or the end time and click OK (Figure 6-3-4). Click the OK button on the edit pop-upto save the changes.

Step 4: check the box beside the chosen time period (Figure 6-3-5).

① Disinfection can only be scheduled by the admin, and standard users can only view the schedule.

② The end time set cannot be earlier than the start time.

③ To restore to default disinfection time, click the Restore to Defaults button in the upper right corner.

6.2.2. Schedule Defrosting

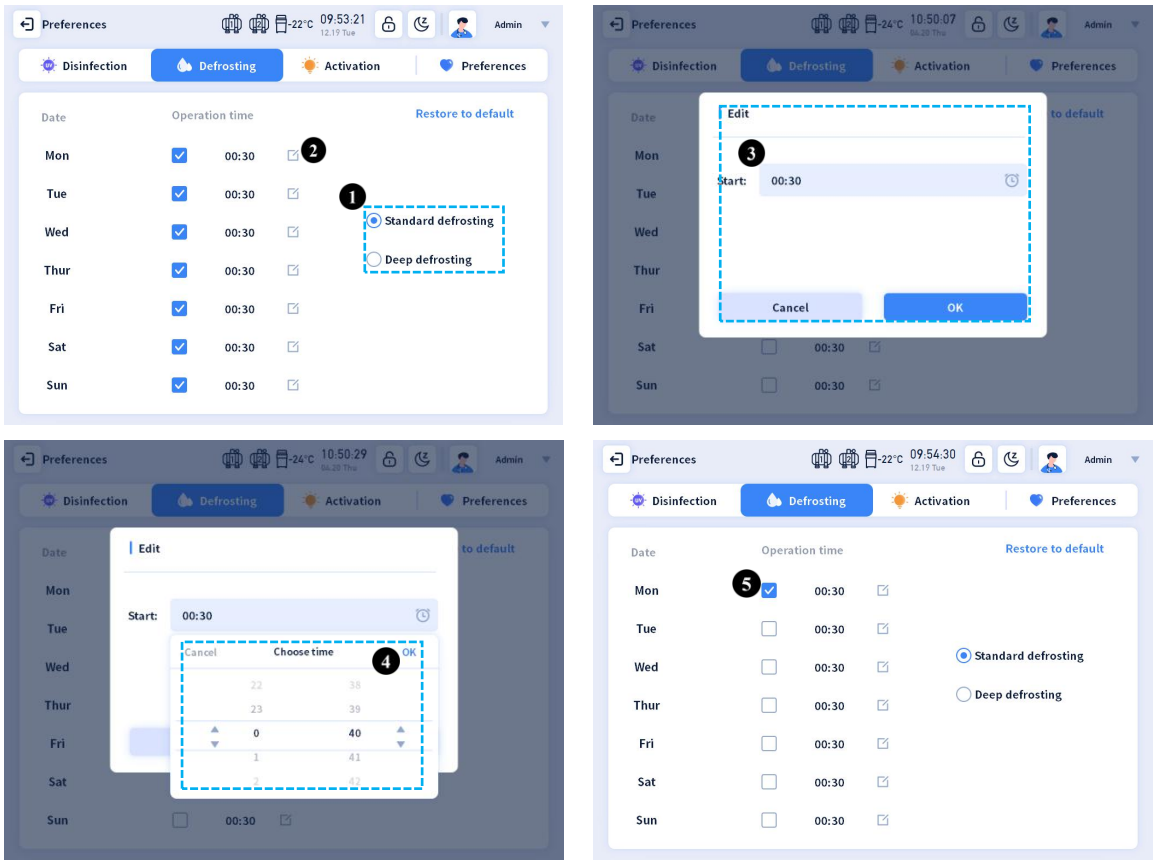


Figure 6- 4 Schedule Defrosting

Defrosting can be scheduled on the Menu - Settings - Defrosting interface.

Step 1: select a defrosting mode (Figure 6-4-1).

Step 2: click the button after the time to adjust defrosting time (Figure 6-4-2).

Step 3: the start time and the end time can be adjusted in the popup window (Figure 6-4-3).

Step 4: configurate the start time or the end time and click OK (Figure 6-4-4) . Click the OK button on the edit pop-up to save the changes.

Step 5: Check the box beside the chosen time period (Figure 6-4-5).

① Defrosting can only be scheduled by admins, and standard users can only view the schedule.

② The duration of deep defrosting is 85 minites and the standard defrosting is 65 minutes.

③ Standard defrosting is suitable for routine defrosting. Remove the debris tray and perform deep defrosting if serious ice or frost formation occurs in the chamber.

④Please select Standard Defrosting in the mode selection after a deep defrosting procedure completes.

⑤ To restore to the default defrosting time, click the Restore to Default button in the upper right corner.

6.2.3. Activation

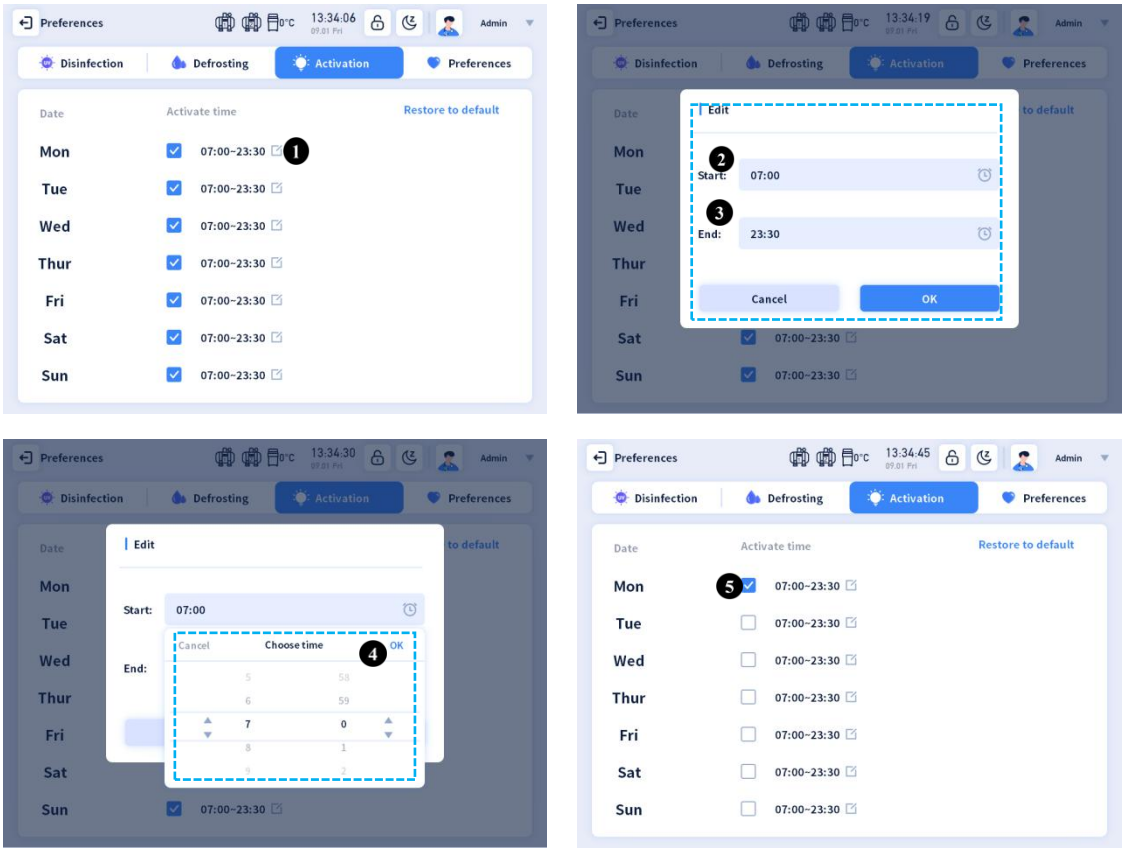


Figure 6- 5Activation

Activation can be scheduled on the Menu - Settings - Activation interface.

Step 1: click the edit icon button after the time period (Figure 6-5-1).

Step 2: the start time and the end time can be adjusted in the popup window (Figure 6-5-2 and Figure 6-5-3).

Step 3: configurate the start time or the end time and click OK (Figure 6-5-4). Click the OK button on the edit pop-upto save the changes.

Step 4: check the box beside the chosen time period (Figure 6-5-5).

① Activation can only be scheduled by admins, and standard users can only view the schedule.

② 1.5 hours before the start of the scheduled activation time, the instrument will exit sleep mode and start refridgeration so that the work temperature can be reached at the activation start time. The instrument will not automatically enter sleep mode during activation.

③ To restore to the default activation time, click the Restore to Default button in the upper right corner.

④ The longest activation duration can be set is 20 hours.

6.2.4. Preferences

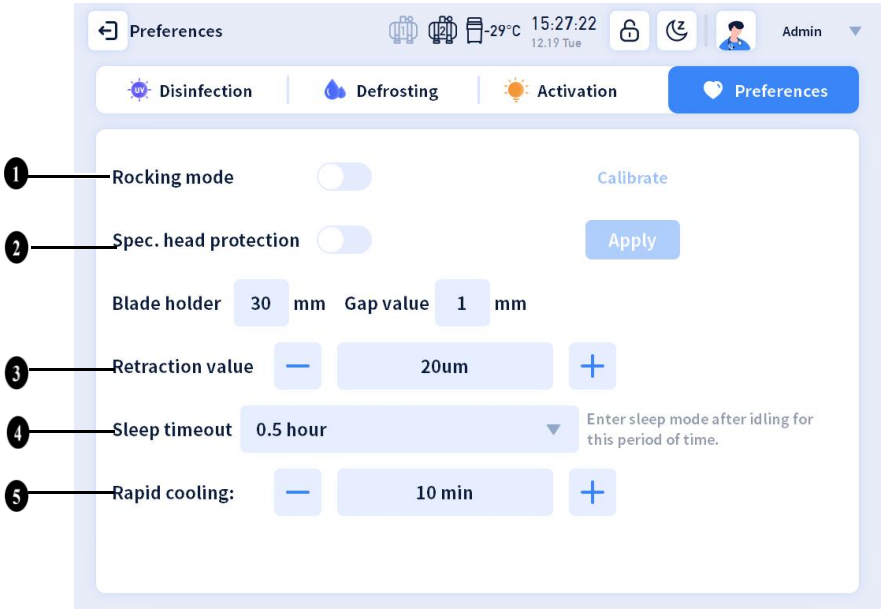


Figure 6- 6 Function Settings

Rocking mode: click the rocking mode toggle to turn on/off rocking mode.

Spec. head protection: click the spec. head protection toggle to turn on/off specimen head protection. The maximum feed of the specimen head is 30 mm. Set gap value and compensation value and click the Apply button.

Retraction value: the retraction value is the distahnce that the specimen head retracts after a section/trimming, and the default retract value is 20 μm. Click "-" and "+" to adjust the retraction value.

Sleep timeout: the instrument will automatically enter sleep mode after it's in screen lock mode for the set period of time.

Rapid cooling: rapid cooling duration is how long the Peltier element is turned on. The default rapid cooling duration is 10 min. Click "-" and "+" to adjust rapid cooling duration within the range of 5 - 30 min.

Functions in Preferences can only be adjusted by admins, and standard users can only view them.

6.3. Data management

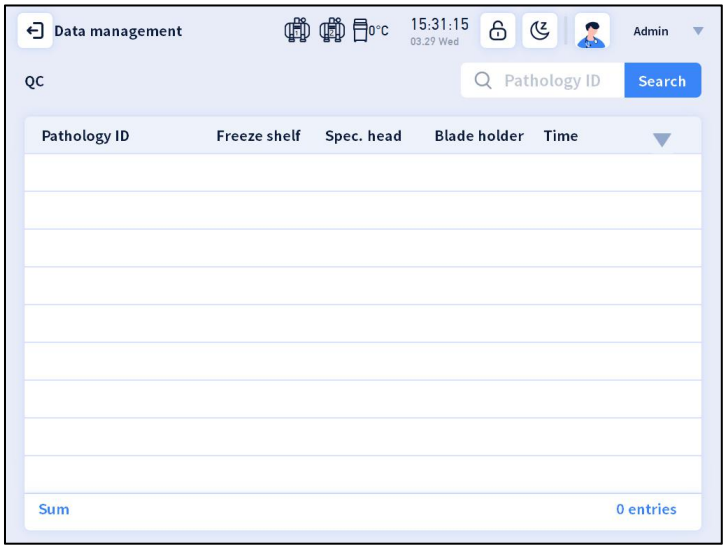


Figure 6- 7 Data Management

Data Management element records operation logs. Current record contents include Pathology ID, freeze shelf temperature, specimen head temperature and blade holder temperature.

Search is available on the interface. Enter the key word in the input box and click the Search button to search for data.

Information can only be recorded when a slide is scanned on the main interface using a scanner connected to the USB 2.0 port. Scanning a code on other interfaces will not input information.

6.4. Maintenance

6.4.1. Component monitoring

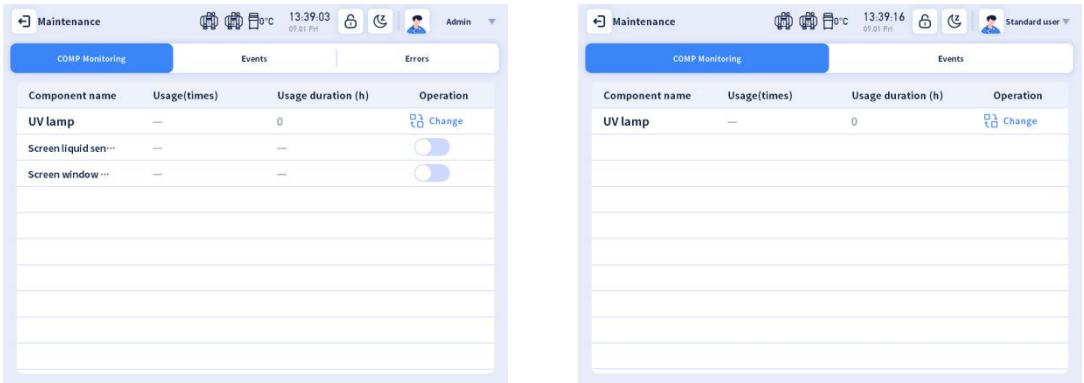


Figure 6- 8 Component Monitoring

Record the component name, usage times, usage duration and operation on the component records interface.

The admin and the standard users see different contents.

The expected service life of the UV lamps is approximately 8,000 hours.

Turn off and unplug the UV lamp before replacing it! Wear appropriate safety gloves and safety goggles.
If the lamp is damaged, it must be replaced by a qualified service personnel to avoid injury.

6.4.2. Events

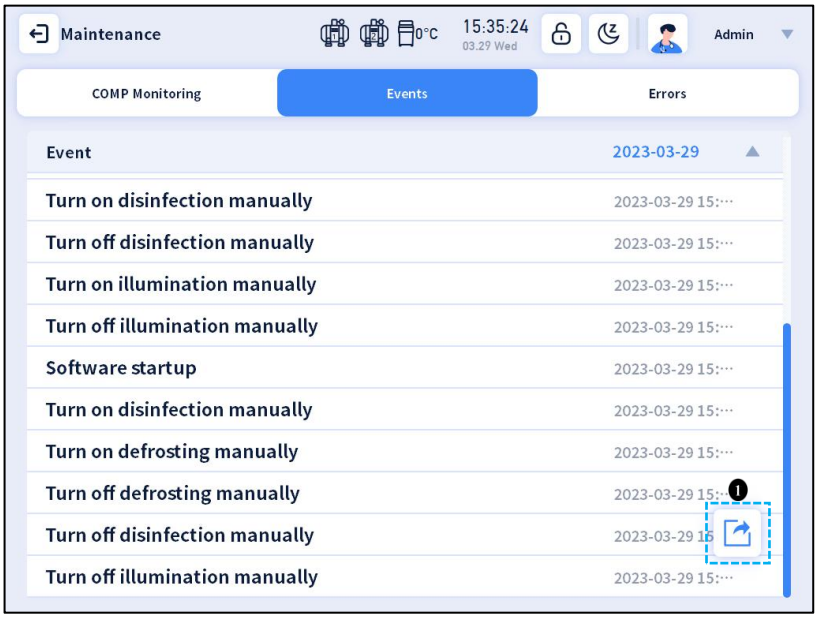


Figure 6- 9 Events

Operation and the corresponding time can be seen in Menu - Maintenance - Events Choose a date to see the events happened on the chosen date.

Insert a USB 2.0 port driver, and click the Export button (Figure 6-9-1) to export the logs. The exported logs will be saved in the output folder in the USB drive (Figure 6-10).

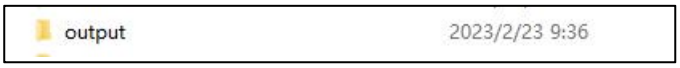


Figure 6- 10 Exported Logs

6.4.3. Errors

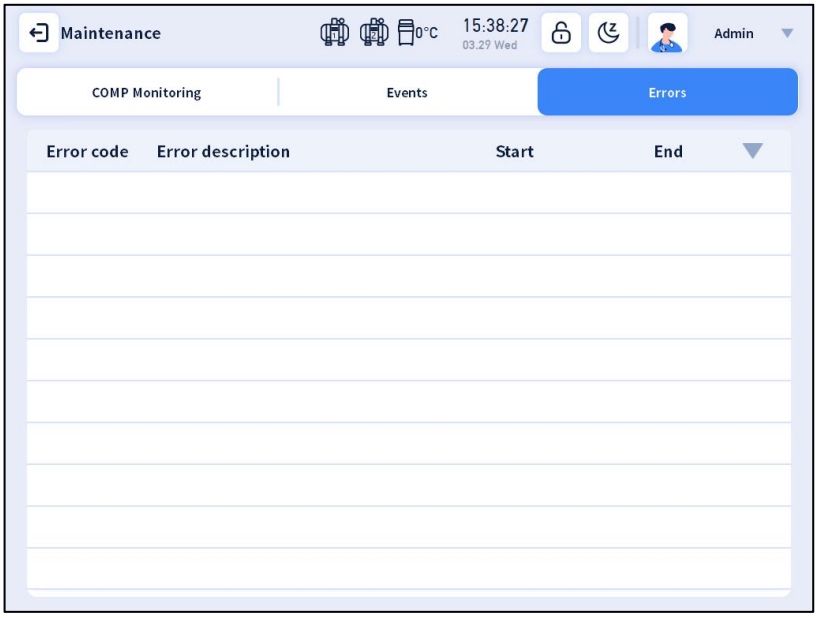


Figure 6- 11 Errors

On the Menu - Maintenance - Errors interface, the error code, error description, operation and error time will be shown in the list.

Error recordcan only be viewed by the admin, and cannot be viewed by standard users.

6.4.4. User manual

Instructions, common error handling, precautions for use and other documents are included inside the user manual to assist users to use the equipment properly.

6.5. Software update

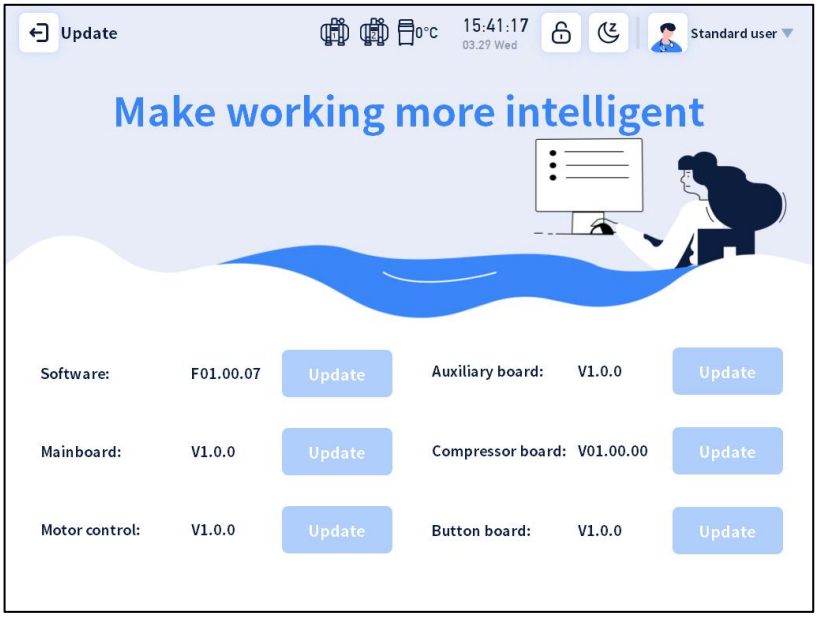


Figure 6- 12 Software Update

On the Menu - Update interface, following information is shown: current software version, auxiliary board version, mainboard version, compressor board version, motor control version and coarse feed wheel version.

Create an update folder under the root directory of the USB drive, put the update file into this folder, insert the USB drive into the instrument's USB 2.0 port, click the Update button that lights up on the update interface, and wait for the update to be completed.

7. Sectioning

7.1. Sectioning preparations

7.1.1. Blade holder assembly

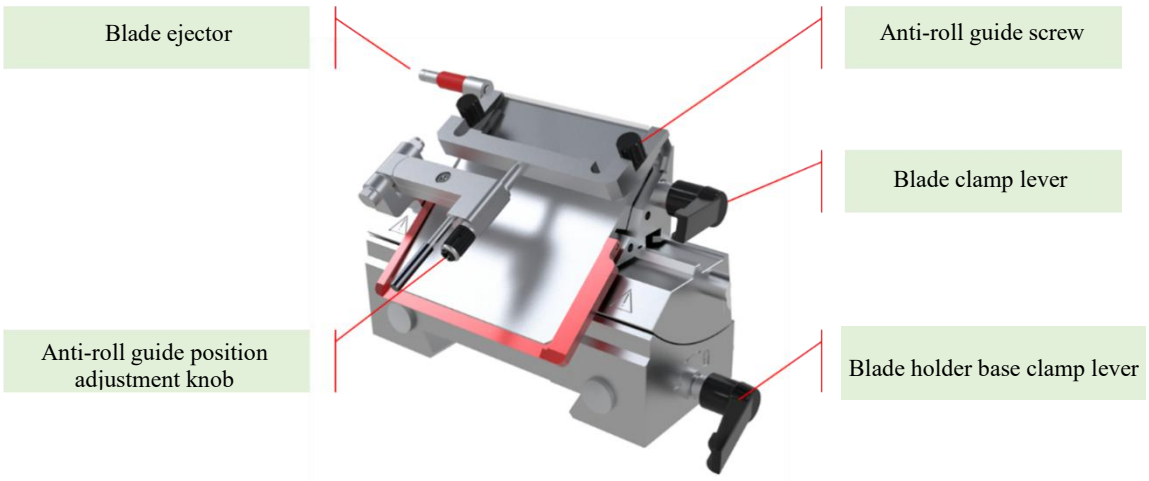


Figure 7- 1 Blade Holder (Front)

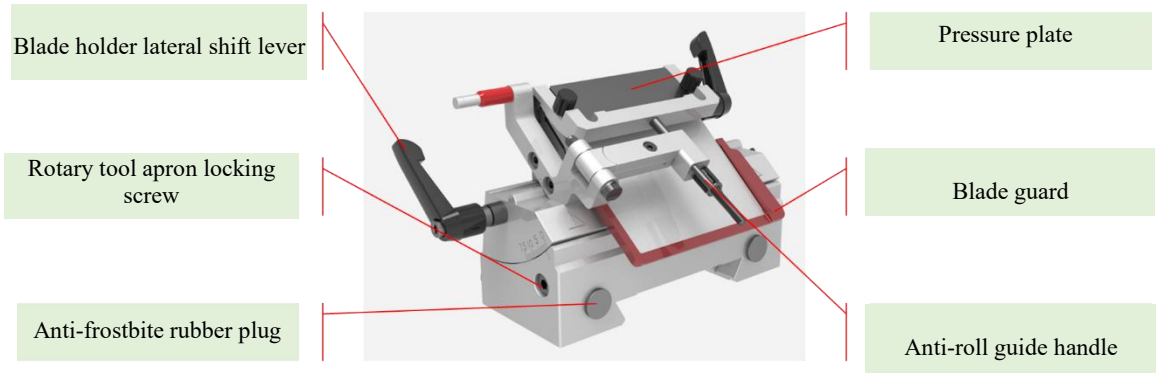


Figure 7- 2 Blade Holder (Side)

(1) Front and rear position adjustment of the blade holder base

Rotate the "blade holder base clamp lever" counterclockwise so that the blade holder base can be moved back and forth. Move the blade holder base to the desired position, and then rotate the lever to clamp.

The blade holder base can be wholy removed away from the rail.

(2) Lateral movement of the blade holder

Rotate the "blade holder lateral shift lever" on the left counterclockwise, and move the blade holder laterally to make use of the whole blade for sectioning. Rotate the lever clockwise to clamp the blade holder.

Always clamp the blade holder and the blade holder base after adjusting.

Never touch the metal part of the blade holder when it is cold or frostbite may occur. Hold the rubber plug if moving the blade holder is required.

(3) Insert and replace a blade

Rotate the "blade clamp lever" counterclockwise on the upper right of the blade holder , to release the blade clamp, anduse the "blade ejector" to push the blade out of the blade holder. Take out the blade carefully. Insert the new blade from right between the pressure plate and the blade rest, rotate the "blade clamp lever" to clamp the blade.

The sectioning blade is extremely sharp! Handle with care!

(4) Anti-roll guide adjustment

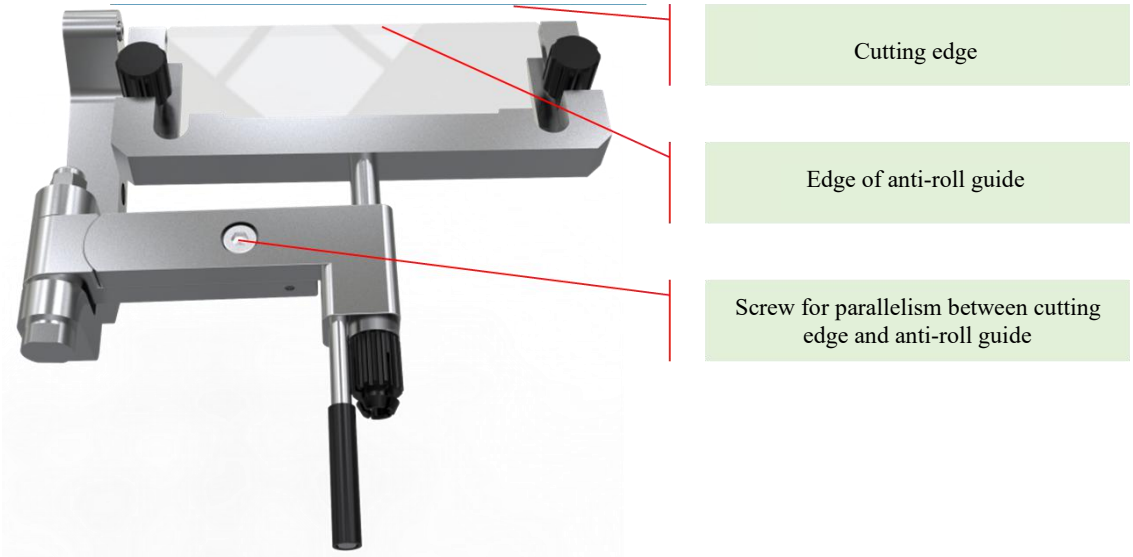


Figure 7- 3 Anti-roll Guide

- Insert the blade and rotate the "blade clamp lever" to clamp;
- Tighten the two "anti-roll guide screw";
- Use a hexl wrench to loosen the "screw for parallelism between the cutting edge and the anti-roll guide";
- Adjust the angle of the anti-roll guide so that the edge of the anti-roll guide is parallel to the cutting edge of the blade;

- Tighten the "adjusting screw for parallelism between the cutting edge and the anti-roll guide".

Notes:

- Protect the part where the anti-roll guide is in contact with the tissue section from any damage;
- If the section quality is not satisfactory, check that there are no tissue debris, grease or foreign objects remaining on the cutting edge and anti-roll guide;
- Avoid touching the edge of the anti-roll guide with hands or other high-temperature objects or it cause tissue section adhesion.

(5) Adjust section angle

Use a #4 hex key to loosen (rotate counterclockwise) the "rotary tool apron locking screw", and then push the edge of the rotary tool apron by hand to make it rotate along the arc surface of the tool apron for angle adjustment. The adjustable angle range is 0-10°. After angle adjustment, fix the "rotary tool apron locking screw".

If the section quality is not satisfactory, try to change the angle by 1° until satisfatory. Do not change the angle for greater than 10°.

(6) Insert or switch to a high profile blade

The blade holder on CT520 cryostat is compatible for both high profile and low profile blades.

Follow these steps:

- Remove the blade rest (Figure7-4-a);
- Insert the high profile blade, and then rotate the “Blade clamp level” to clamp the blade.

Figure a Remove blade rest

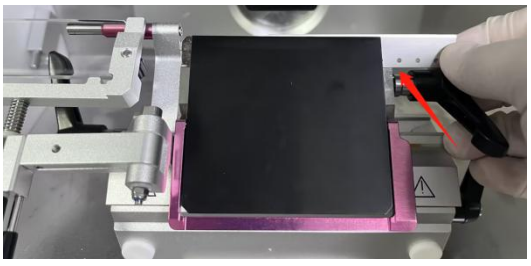


Figure b Insert high profile blade

Figure 7- 4Insert a high profile blade

7.1.2. Fix the specimen head

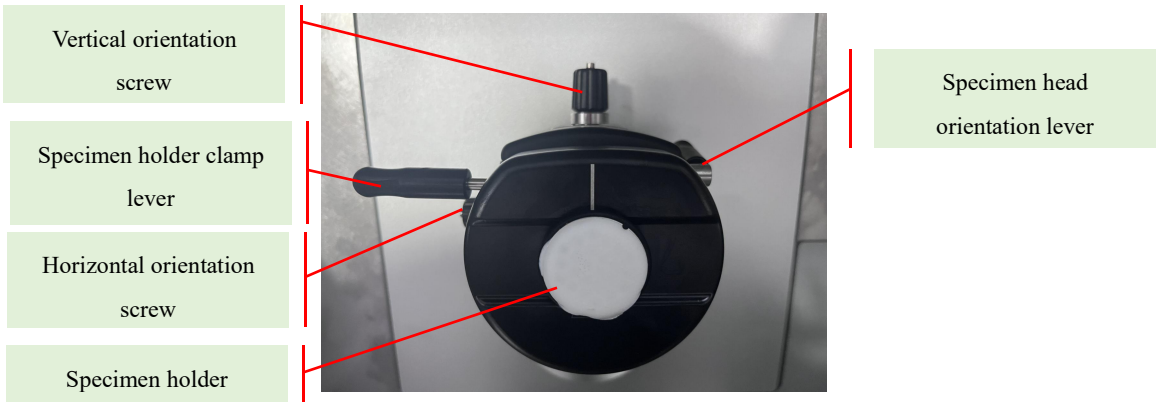


Figure 7- 5 Spec. Specimen Head

- Put the handwheel handle at the highest position, and push the handwheel locking lever into the bottom of the handwheel groove to lock the handwheel, so that the specimen head is locked at the highest position;
- Freeze the tissue on the specimen disc, lift the specimen head clamp lever, and insert the specimen disc to the specimen head, make sure the specimen disc is in proper contact with the specimen head. Press the specimen head clamp lever down to clamp the specimen disc to the specimen head.
- Rotate the "specimen head orientation lever" to loose the clamp of the specimen head, pull the "orientation screws" to adjust the angle of the specimen. Clamp the specimen head.

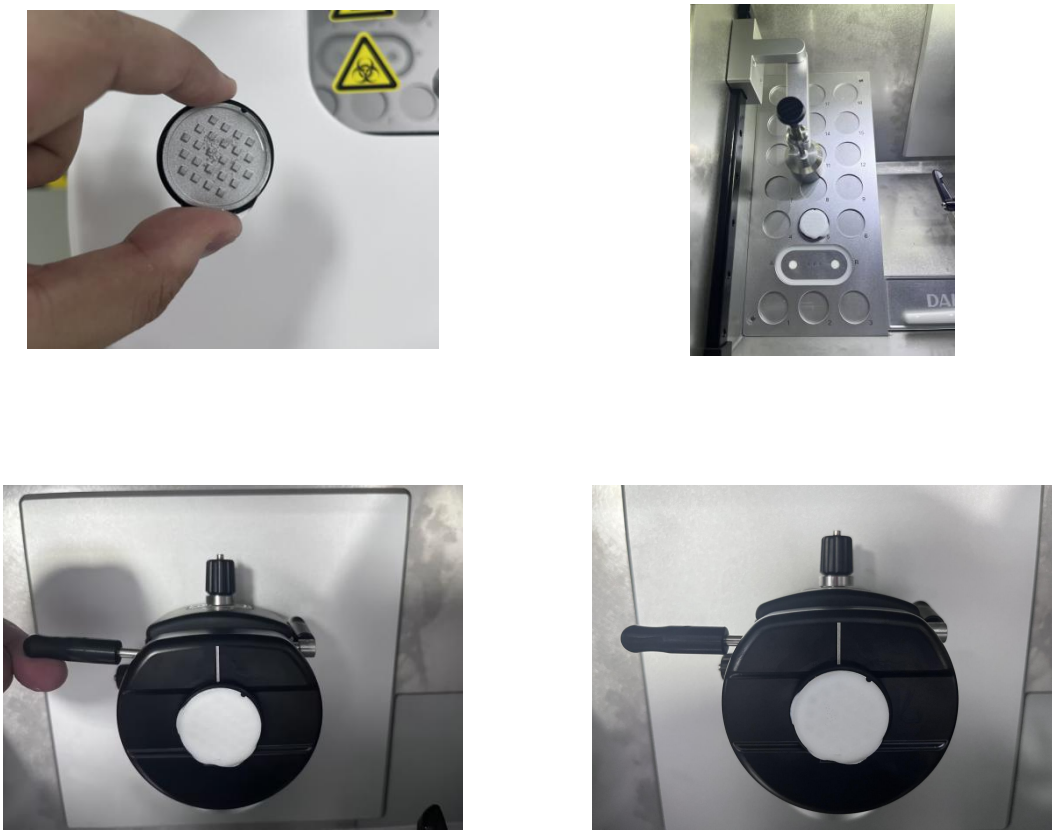


Figure 7- 6 Install Specimen Head

7.1.3. Freezing specimens

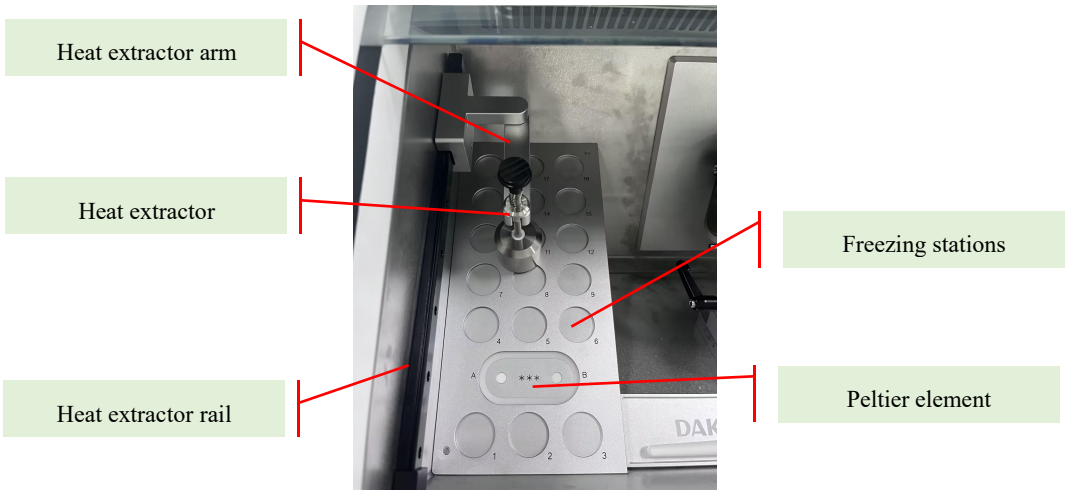


Figure 7- 7 Freezing Shelf

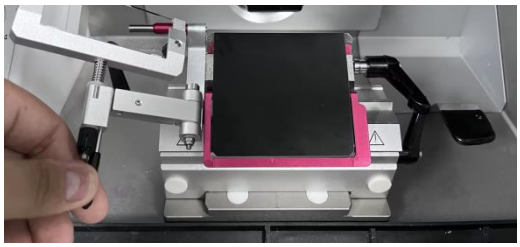
The freeze shelf is on the left side of the cryochambe with 20 stations, including 2 Peltier element for rapid freezing and 18 freezing stations. The temperature of the freezing shelf is always lower than that of thecryochamber.

- At room temperature, cut the specimen to size, place it on the specimen disc and cover it with freezing compound;
- Place the specimen disc in the freezing station to freeze at a low temperature;
- When freezing a specimen, place the heat extractor on the specimen to accelerate freezing and flatten the specimen if required;

7.1.4. Prepare tools

Tools, such as blade dispenser, blades (stored in the dispenser), brushes, tweezers, brush holder, No. 4 pen and specimen discs can be placed in the cryochamber.

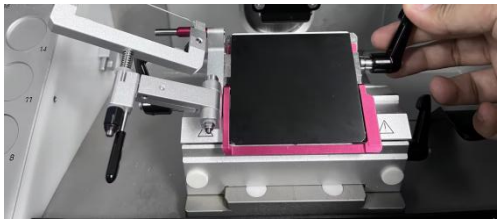
7.2. Install a blade



1) Prepare a blade

2) Unfold the anti-roll guide

3) Insert the blade from the right of the blade holder



4) Tighten the blade clamp lever

Figure 7- 8 Install a blade

7.3. Trimming

Trimming is to prepare the specimen for sectioning. Following the instructions:

- Insert the pre-cooled blade into the blade holder, clamp it, and adjust the anti-roll guide;
- Check that the angle of the blade holder is 5°~8°. 5° is recommended (it is not recommended to adjust the angle as it is adjusted to a proper angle);
- Adjust the relative position between the blade holder and the specimen to leave space for feed;
- Unfold the anti-roll guide;
- Unlock the handwheel;
- Switch to trimming mode, press the fast forward key or the slow forward key to drive the specimen close to the blade. Spin the handwheel to start trimming. A recommended trimming thickness is 20 ~ 30 μm;
- Trim the specimen to the desired surface, switch to section mode and start sectioning.

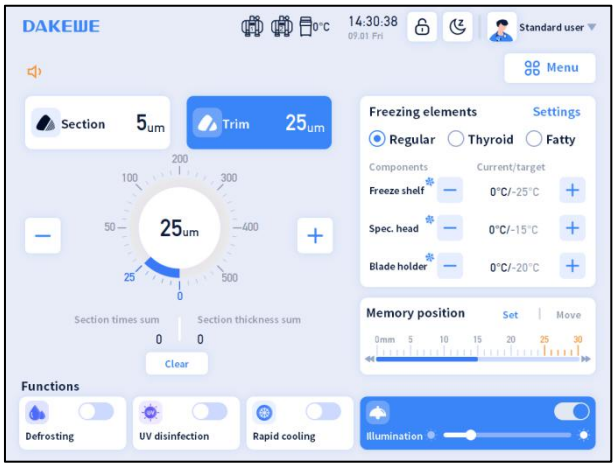


Figure 7- 9 Trimming

7.4. Sectioning

One sectioning is completed when the handwheel is turned clockwise or counterclockwise for one round. The section thickness is the set section thickness value. The recommended section thickness is 5 -10 μm.

Notes:

- Clamp the specimen first and then insert the blade;
- Lock the handwheel properly;
- Use the protection of anti-roll guide and blade guard properly;

Nver leave the blade in the blade holder after operation.

7.5. Sectioning references

1. When using a Cryostat microtome, the key to ideal section is the appropriate sectioning speed and proper use of the anti-roll guide. The appropriate sectioning speed is mastered through practical experience and obtained by skillful operation of the handwheel. There are many parts to adjust the anti-roll guide. Some of them influence each other, so the anti-roll guide needs to be carefully adjusted and cannot be placed on the cutting edge casually.

2. When the living tissue is freezing, the water in it turns into ice and thus the tissue hardens. The hardness changes with its temperature. The lower the temperature is, the harder the tissue is. How to choose a proper temperature for a kind a tissue is explored through practice. The sectioning temperature of most tissues without fat and fixed with formalin is preferably between -13 ℃ and -23 ℃.

3. To obtain quality sections, pay attention to the following aspects:

(1) Select suitable temperature of the cryochamber;

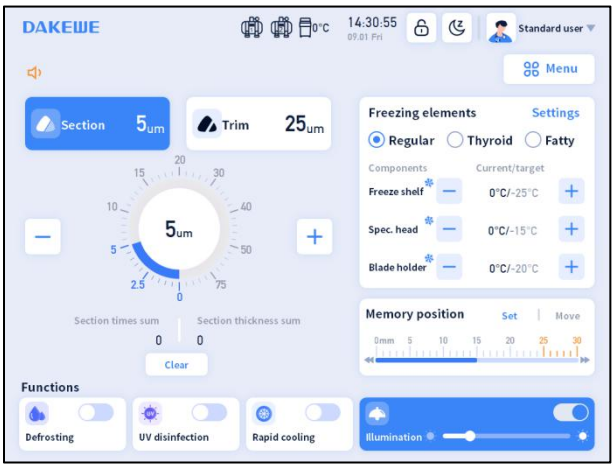
(2) Section properly;

(3) Adjust anti-roll guide properly;

(4) Sharp blade and suitable cutting angle.

4. Contrary to the general paraffin block section, for the frozen section, it is better to cut the short side of the tissue instead of the long side, that is, to make the line of contact between the tissue and the

sectioning blade shorter.



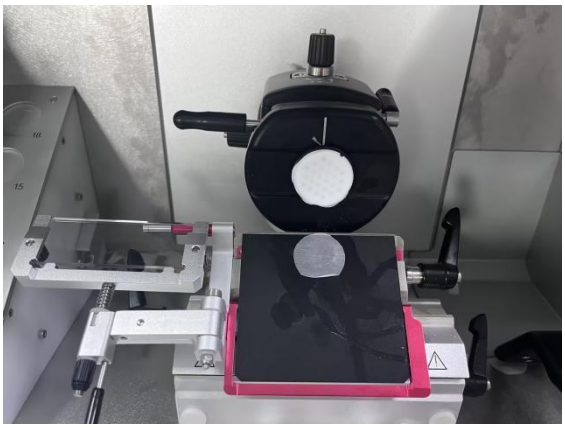


Figure 7- 10 Sectioning

8. Cleaning and Maintenance

8.1. Daily finishing touches

- Lock the handwheel;
- Remove the blade from the blade holder and put it back into the blade dispenser in the cryochamber;
- Remove the section waste;
- Close the sliding glass window;
- Turn off the illumination;
- Do not disconnect the main switch. The cooling system cannot be stopped.
- Clean the blade holder and brush holder.

8.2. Long-time idling

- Switch off the main power switch;
- Open the sliding glass window to ventilate and keep the cryochamber dry;
- Remove all specimen discs from the freezing chamber;
- Lock the handwheel;
- Remove the blade from the blade holder;
- Use a brush to remove all section wastes;
- Take out the open waste tray, brush holder and blade holder, and then clean and disinfect them.

Notes:

Before restarting the instrument, checked that all parts in the cryochamber are completely dry.

8.3. Cleaning

Alcohol or conventional disinfectants containing alcohol can be used for cleaning. DO NOT use solvents containing acetone, xylene or other corrosive substances for cleaning or disinfection.

Before every time of cleaning, perform the following previous steps:

- Rotate the handwheel so the specimen head is at the top position, lock the handwheel;
- Loosen the "specimen holder clamp lever" and remove the specimen holder;
- Remove the blade from the blade holder and put it back into the blade dispenser;
- Remove the blade holder and clean it;
- Remove the specimen from the specimen disc. Use a dry brush to remove the section waste.

8.3.1. Clean the housing

The housing is processed by spray so it can only be cleaned with a soft cloth dampened with household cleaning agents, soapy water, alcohol or conventional disinfectants containing alcohol. Do not use solvents containing acetone, xylene or other corrosive substances for cleaning or disinfection.

8.3.2. Blade holder cleaning

Clean the blade holder as follows:

- Check whether there is a blade. Take out the blade first;
- Unlock the "blade clamp lever" on the right side, pull it out, and then remove the pressure plate;
- Clean the surfaces of the pressure plate and blade holder, especially the surfaces where the two are in contact with the blade;
- Loosen the "blade holder lateral shift lever" on the left, and take out the entire blade holder from the right;
- Clean the blade holder and rotary tool apron, especially the contact surfaces between the two;
- Dry the parts, apply low-temperature lubricating oil on the contact surface between the blade holder and the rotary tool apron;
- Install and restore the blade holder in sequence;

8.4. General maintenance

- Clean the cryochamber every day;
- Lubricate the specimen feeding mechanism every week: press the fast forward button to move the specimen head to the headmost position, drop a drop of low-temperature lubricating oil on the copper guide sleeve, and then press the fast backward button to return the specimen head to the rearmost position;
- Lubricate decorative plates as needed;
- Rotate the handwheel. When the specimen head is at the highest and the lowest position, drop a few drops of low-temperature lubricating oil on the decorative guard plate, and then rotate the handwheel to make the lubricating oil evenly distributed;
- Clean the condenser as needed;

Open the condenser sealing baffle on the right of the instrument, use a brush to remove the dust on the cooling fins of the condenser, or blow it with high-pressure airflow.

8.5. Waste liquid bottle

The waste liquid bottle collects liquid and waste. To avoid potential risk to people and the environment caused by the waste, 200 ml 10% formalin solution or other disinfectants should be pre-filled in the bottle. The discharge of waste water and waste must be in accordance with the relevant regulations.

Pull upwards the plate that presses the bottle to take out the bottle and unplug the connected pipe.

Notes:

Observe the liquid level frequently and empty the waste liquid bottle in time;

The waste must be treated in a correct and effective way. Relevant regulations on waste water treatment must be observed.

9. Common Problems and Handling

Problem	Cause	Remedy
Frost in the cryochamber	Air currents enters the cryochamber	Relocate instrument
	Sliding window was open too long	1.Close the sliding window in time 2.Only open half sliding window when
	Frost built up by breathing into the cryochamber	Wear a mask if necessary
	Chamber temperature is too high	Set chamber tempeturature to below -25℃ and freeze shelf below -35℃
	Defrosting interrupted	Defrost thoroughly when idling
	Power failure during operation	Defrost thoroughly when idling
	Specimen head was too cold for too long	Set specimen temperature higher than chamber temperature when not sectioning
	Blade holder was too cold for too long	Set blade holder temperature to -20~-25℃ when not sectioning
Decreased cooling capacility	Frost on the chamber condenstor	Defrost manually, ensure scheduled defrosting is enabled, open half sliding window when sectioning
	Instrument back too close to wall	Relocate instrument so the back is at least 30 cm away from any wall
	Unstable voltage	Install a voltage regulator
	Warm environment	Decrease room temperature
	Dust on the condensator	Clean condensator
Blade holder failing to achieve target temperature	Instrument not left static after being moved	Shut down instrument, leave static for 10 min if moved horizontally; leave static for 2 hours if moved between floors or vehicles
	Instrument not leveled	Adjust clearance angle to less than 3°
Slow tissue freezing speed while the freeze shelf temperature is consistent	Foreign objects between the specimen disc and the freezing shelf leading to poor heat transfer	Wipe specimen disc and freeze shelf before freezing a specimen

9 Common Problems and Handling

Problem	Cause	Remedy
Ice formation on the bottom of the cryochamber	Debris was not cleaned in time leading to poor	1.Defrost, dry the chamber, and remove debris when idling 2.Clean instrument after daily operation
Inconsistent section thickness	Incorrect temperature setting for the tissue to be sectioned	Select correct temperature (refer to User manual)
	Incorrect blade profile for the tissue to be sectioned	Use proper blade
	Debris or ice on back of blade	Remove debris or ice
	Handwheel speed not uniform or turned too fast	Adjust handwheel speed
	Specimen disc not clamped properly	Check clamping
	Blade not clapmed properly	Check clamping, fasten the lever
	Blade holder not clapmed properly	Fasten the lever
	OCT applied to specimen disc; tissue fell off after freezing	Apply OCT to room temperature specimen disc and then place the tissue on it
	Dull or damaged blade	Use a different part of the blade or change the blade
	Incorrect thickness setting	Select proper section thickess, recommend 5 - 10 μm
	Incorrect clearance angle	Set proper angle
	Tissue dried	Prepare tissue again
	Tissue even and hard	Rotate specimen disc 90°
Strips in sections	Specimen not sufficiently frozon onto the specimen disc	1.Use sufficient OCT； 2.Freeze the specimen on a room
	Specimen disc not clamped properly	Check clamping
	Blade not clamped properly	Check clamping
	Tissue too thick and detach from the specimen disc	Section thickess recommend 5 - 10 μm
	Tissue even and hard	Increase section thickness or decress surface area of the specimen if necessary

9 Common Problems and Handling

Problem	Cause	Remedy
	Dull blade	Use a different part of the blade or change the blade
	Incorrect blade profile for the tissue to be sectioned	Use proper blade
Molten sections	Blade, specimen head, anti-roll plate or blade holder too warm	Set freeze shelf, specimen head, blade holder to colder, wait till cooling to target temperature (refer to User manual)
	Brush too warm	Leave the brush in the chamber
	Brush dirty	Clean the brush
	The slide window was open too wide or breathing into the blade holder	Adjust window angle, adjust operating posture, wear a mask if necessary
Splinters or cracks in the section	Blade not clapmed properly	Check clamping, fasten the lever
	Blade not properly clamped due to foreign objects in the blade rest	Clean pressure plate and blade rest
	Blader holder base not clampled properly	Fasten blade holder base lever
	Specimen too cold	Warm specimen
Uneven or wrinkled sections	Specimen not cold enough	Set freeze shelf, specimen head, blade holder to colder (refer to User manual)
	Foreign object attached to the blade or	Remove foreign objects
	Anti-roll plate poorly positioned	Reposition anti-roll plate
	Anti-roll plate poorly aligned with blade	Align anti-roll plate with the blade
	Damaged anti-roll plate edge	Change anti-roll plate glass
	Dull or damaged blade	Use a different part of the blade or change the blade
Fractured sections	Specimen too cold	1.Set proper specimen head temperature (refer to User manual) 2.Section when the specimen is properly froze;
	OCT turned brittle when too cold	1.Increase specimen head temperature 2、Switch to an OCT with better performance

9 Common Problems and Handling

Problem	Cause	Remedy
Section tear or separate	Sectioning temperature setting too low	Set specimen head, blade holder warmer (refer to User manual)
	Dull or damaged blade, or debris, dust, frost or rust on the blade	Remove cause
	Damaged anti-roll plate edge	Change anti-roll plate glass
	Hard objects in the tissue	Trim. If issue persists, use the blade for hard tissue
	Dirt on back of blade	Clean the back of blade
Curl sections	Sectioning thickness setting too large	Reduce section thickness
	Specimen temperature setting too low for the tissue to be sectioned	Set specimen head warmer (refer to User manual)
	Blade holder too warm	Decrease blade holder temperature to 5-10℃ lower than specimen head
Section sticking to the anti-roll plate	Anti-roll plate too warm	Close window and cool down anti-roll plate
	Foreign object or grease on edge of anti-roll plate	Clean anti-roll plate, remove debris and grease
Anti-roll plate glass damaged	Anti-roll plate too high above the knife edge.	Change anti-roll plate glass and position properly
	Objects clashed with anti-roll plate	Change anti-roll plate glass
Ice crystals in sections	Tissue contains water	Absorb tissue water before freezing it
	Tissue froze too slow	1. Freeze specimen with Peltier elements； 2.Use hammer to help freezing；
Scraping noise during sectioning	Anti-roll plate is too close to the specimen head	Reposition anti-roll plate
Tissue fall off	Insufficient OCT	Use more OCT
	OCT applied to cold specimen disc leading to poor adherance	Apply OCT to room temperature disc
	Trimming thickness setting too large	Trim under trimming mode with thickness between 20 to 30 μm

9 Common Problems and Handling

Problem	Cause	Remedy
Water condensate on glass window	High room humidity or temperature	Follow enviroment requirement
	Window heating stops when cryostat shutdown during cooling	Resume after turned on
Specimen disc cannot be removed from the freezing shelf	Moist specimen disc before freezing	1.Knock disc with hammer 2.Apply high concentration alcohol to contact surface 3、Ensure disc is dry before embedding
Warning W307	Room too warm	Cool down the environment
Warning W309	Condensate bottle almost full	Empty condensate bottle

After the fault occurs, please troubleshoot the fault according to the temporary solution. If the above solution fails to remove the fault, please contact the technical engineer of DAKEWE based on the severity of incident;

"Immediately" means that the microtome completely stops working, and the engineer must intervene;

"When idle" means that the current fault does not affect the normal sectioning. This function can be temporarily turned off or postponed for later handling by the technical engineer of DAKEWE.

10. Section Tissue Temperature Selection Table

Tissue	specimen head temperature	blade holder temperature	freeze shelf temperature	Chamber temperature
Brain	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Nose	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Liver	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Muscle	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Spleen	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Tongue	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Thyroid	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Uterine scraping	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Cartilage	-15℃~-20℃	-20℃~-25℃	-20℃~-25℃	-25℃~-30℃
Intestinal	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Heart	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Kidney	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Lips	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Lung	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Lymph nodes	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Ovaries	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Skin	-20℃~-25℃	-25℃~-30℃	-30℃~-35℃	-25℃~-30℃
Cervix	-25℃~-30℃	-30℃	-30℃~-35℃	-25℃~-30℃
Pancreas	-25℃~-30℃	-30℃	-30℃~-35℃	-25℃~-30℃
Prostate	-25℃~-30℃	-30℃	-30℃~-35℃	-25℃~-30℃
Adipose tissue	-45℃	-30℃	-40℃	-25℃~-30℃
Fat Skin	-45℃	-30℃	-40℃	-25℃~-30℃
Breast fat	-45℃	-30℃	-40℃	-25℃~-30℃

The temperature given in the above table is a summary of long-term experience, but these are only approximate values, because specific adjustments may be required for actual organizations.

11. Warranty and service

11.1. Warranty

Dakewe employs a comprehensive quality control program based on Dakewe' internal testing standards to ensure that delivered contract products are in good condition and meet all technical specification requirements.

The scope of warranty is based on the content of the agreement. If the customer needs special warranty service, please contact the local sales representative or the distributor who sold the instrument.

11.2. Technical service information

If the customer needs technical service or replacement parts, please contact the local sales representative of Dakewe or the distributor who sold the instrument.

Please provide the following information:

- The model name and serial number of the instrument;
- The location of the instrument and the name of the contact person;
- The reason for the service request;
- Delivery date.

11.3. Service life

See nameplate on back of instrument

11.4. Scrap and disposal

Instruments or instrument parts must be disposed of in accordance with local regulations.

Appendix: Hazardous substance information

Part name	Hazardous substance					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr(Vl)	Polybrominated biphenyl (PBB)	Polybrominated diphenyl ethers (PBDEs)
PCB	×	○	×	○	○	○
Electronic parts and components	×	○	×	○	○	○
Mechanical parts and components	×	○	○	○	○	○
Cables	×	○	○	○	○	○

This form is prepared according to the provisions of SJ/T 11364-2014.

○: It indicates that the content of the hazardous substance in all homogeneous materials of the part is below the limit requirement specified in GB/T26572.

×： It indicates that the content of the hazardous substance in at least one homogeneous material of the part exceeds the limit requirement specified in GB/T26572.

Toxic and hazardous substances or elements in the product will not leak or change within the above-mentioned years from the production date, provided that the safety and use precautions of the product described in the instruction manual are followed, and there is no exemption from other laws and regulations. The use of this product will not cause serious pollution to the environment or serious damage to the user's personal or property. The "environmentally friendly use period" is not a safe use period, which is completely different from the limited use period based on electrical performance safety, electromagnetic safety and other factors.

The product shall be disposed of in accordance with the laws and regulations on the recycling and reuse of electronic information products.

Appendix: Electromagnetic compatibility performance index

Electromagnetic compatibility

⚠ Note:

[CT520][Cryostat microtome] conforms to the emission and immunity requirements stipulated in IEC61326-2-6.

It is the user's responsibility to ensure the electromagnetic compatibility environment of the equipment so that the equipment can work normally.

It is recommended to assess the electromagnetic environment before using the equipment.

⚠ Caution:

[CT520][Cryostat microtome] is designed and tested according to Class A equipment in CISPR11.

In the home environment, this equipment may cause radio interference in which case protective measures must be taken.

Do not use this device near strong radiation sources (such as unshielded radio frequency sources), otherwise it may interfere with the normal operation of the device.

Table 1: Electromagnetic Emission

Electromagnetic emission	
Launch test	**Compliance**
CISPR11 conducted emission	Group 1 Class A
CISPR11 radiated emission	
IEC61000-3-2 harmonic emission	N/A
IEC61000-3-3 voltage fluctuation/flicker emission	N/A

Table 2 Electromagnetic immunity

Electromagnetic immunity			
Immunity test items	**Basic standards**	**Test values**	**Performance criteria**
Electrostatic discharge (ESD)	IEC61000-4-2	Contact discharge: ±4kV Air discharge: ±2kV, ±4kV, ±8kV	B
Radio frequency electromagnetic field	IEC61000-4-3	3V/m, 80MHz～6.0GHz	A
Pulse cluster	IEC61000-4-4	Power cord: ±1kV(5kHz or 100kHz)	B
Surge	IEC61000-4-5	Line to ground: ±1kV Line to line: ±0.5kV	B
Radio frequency transmission	IEC61000-4-6	Power cord: 3V, 150kHz- 80MHz, 80%AM	A
Power frequency magnetic field	IEC61000-4-8	3A/m, 50/60Hz	A
Voltage sag and interruption	IEC61000-4-11	0% during 0.5 cycle 0%; during 1 cycle 70%; during 25/30 cycle 0% during 250/300 cycle	B B C C
Performance criteria: A. In the test, the performance is normal within the specified limit. B. In the test, the function or performance is degraded or lost temporarily, but can restore automatically. C. In the test, the function or performance is degraded or lost temporarily, and cannot restore until reference or system operation by the operator			

DAKEWE

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