

THE REVOLUTIONARY

# QS<sup>12</sup>

CRYOSTAT

## The Avantik QS<sup>12</sup> and QS<sup>12UV</sup> Cryostats

Your laboratory...refined, efficient, easy.



AVANTIK



36 Commerce Street, Springfield, NJ 07081 / USA

[www.avantik-us.com](http://www.avantik-us.com)

800-783-9424

 AVANTIK

Notes

Notes

## Important Note Regarding Instrument Variants

This document is designed for use with the Avantik QS12.

Only two variants UVC and non UVC are available on this instrument and the instructions contained in this manual are not specific to any one variant. Thus some features described may not be available on your instrument.

## Symbols

The following symbols and conventions may be used throughout this document and on the instrument:



This symbol is used on the instrument, or in a document, to indicate that instructions must be followed for safe and correct operation. If this symbol appears on the instrument, always refer to the operator guide.



This symbol is used on the instrument, or in a document, to indicate that there are potential biological risks associated with the instrument and / or instrument use. Always use Good Laboratory Practice.



This symbol indicates that a surface is hot. If this symbol appears on the instrument, always refer to the operator guide.



Cold surface, if necessary, use gloves



This symbol is shown in the manual and on the instrument to indicate that hand injuries are possible due to moving parts. Take suitable precautions.



Cutting hazard, sharp edges, watch your fingers.

This symbol is used on the instrument, or in a document, to indicate that irritants or potentially harmful chemicals are present. Refer to the Material Safety Data Sheets for the products, and always use Good Laboratory Practice.



This symbol is used to identify the UV disinfection system. Do not open the window when the disinfection cycle is in process and do not look directly at the UV light.



Manufacturer.

# Table of Contents

Notes .....	2-3
Important Note Regarding Instrument Variants .....	4
Symbols.....	5
Table of Contents.....	6
1 - Safety Information .....	9
General Safety.....	9
Chemical Safety .....	10
Environment.....	10
Warranty Statement .....	10
2 - Introduction.....	11
Intended Use .....	11
Instrument Features .....	11
Technical Specifications .....	12
Mechanical Specifications .....	12
Electrical Specifications.....	12
Environmental Specifications.....	12
3 - Instrument Setup .....	15
Unpacking and Repacking .....	15
Unpacking Procedure .....	15
Location & Setup.....	18
Identification of Parts.....	19
Solid Knife Holder.....	20
Disposable Blade Holder EC.....	21
Disposable Blade Holder EC 70.....	22
Inserting the blade: .....	22
Set Up .....	24
Specimen Setup .....	25
4- Operation .....	26
Switching On.....	26
System Interfacing.....	27
Using the Touch screen .....	27
Note.....	27
Main Screen .....	27
Setting Preferences .....	29
Quick Freezing of the Specimen .....	29
To set the Specimen Head Position: .....	30
Microtome/Chamber Temperature.....	30

## Chapter 1 – Safety Information

Trim and Fine Section Thickness .....	31
Multi Function Bar.....	32
Trim Button.....	32
Trimming.....	32
Time and Date .....	32
Outstanding Service Message.....	32
Handwheel Lock .....	34
Menu .....	34
Language .....	35
Time and Date .....	35
Set the Duration of the UV Cycle:.....	38
Chamber Light .....	39
Standby mode.....	40
Display Lock .....	40
Defrost .....	41
Immediate Defrosting.....	41
Programming the Daily Defrost Cycle .....	42
Log File .....	43
Factory Settings .....	44
Screen.....	45
Service .....	45
Heat Extractors.....	45
Sectioning Procedures .....	46
Cutting Movement and Retraction .....	46
Trimming and First Cuts.....	46
Sectioning and Taking Off Sections.....	47
Hand Wheel Lock .....	47
Mechanical Handwheel Brake.....	47
How to Avoid Malfunctions.....	48
5 - Troubleshooting.....	49
Troubleshooting Tables .....	49
Tips for Successful Sectioning .....	51
Temperature list for cryo-sectioning.....	51
6 --- Maintenance and Care of the QS12 .....	53
Cleaning the Touch Screen Display .....	53
Shutting Off for Cleaning .....	53
Cleaning and Care .....	54
Cleaning and care during routine work: .....	54

Chapter 1 – Safety Information

Cleaning the cooling Vent ..... 54

Conditions for the transportation of the instrument ..... 55

Returning the instrument for repair or routine Maintenance..... 55

Accessories standard equipment..... 57

Index..... 58



# 1 - Safety Information

Avantik Biogroup instruments are designed for convenient and reliable service; however, improper use or handling by a user may damage the instrument, or cause a hazard to health. The instrument must not be used in a manner not specified by Avantik Biogroup. Correct maintenance procedures are essential for consistent performance.

Any problems and queries should be referred to your Avantik Biogroup service department.



The following sections contain important information for the safe setup and use of the instrument, and should be read and understood by the user before using the instrument.

## General Safety

This instrument, as supplied, conforms to IEC 61010-1 and IEC 61010-2-101; however, the addition of chemicals introduces potential hazards. Good Laboratory Practice must be employed and consideration must be given to the potential for hazard when dealing with these chemicals.



Do not use the instrument in close proximity to strong electromagnetic radiation, as these may interfere with the proper operation. The electromagnetic environment should be evaluated prior to operation of the device.



Good Laboratory Practice must be used when handling tissue samples to prevent cross contamination and infection. The user should complete a risk assessment to determine any potential hazards related to tissue handling.



- Do not remove any panels or access covers, unless specifically instructed to do so. The instrument does not have any user serviceable parts. Potentially lethal voltages are present inside the instrument.
- The instrument must be properly connected to a good earth (ground) via the Mains input supply and positioned such that it is possible to interrupt the Mains supply at the source by removing the plug from the socket.
- Use only factory approved accessories or replacement parts within the instrument.
- Only use reagents/supplies recommended in the operator guide.

## Chemical Safety

The introduction of chemicals creates potential hazards. Avantik Biogroup has adopted the following position with regard to the subject of volatile chemicals used in laboratories:



- Customers using non-specified chemicals in the instrument, do so at their own risk.
- All chemicals recommended by Avantik Biogroup have auto-ignition temperatures considerably above any surface temperatures that can be reached during a single fault failure on the instrument.
- The instrument contains no source of ignition in any areas of the instrument where chemicals are stored, or likely to leak into, in a single fault condition.
- The operator is fully aware of the contents of the specification documents detailing the properties of the chemicals they are using.
- The operator has carried out any legally required assessment of chemicals used and is using Good Laboratory Practice.

## Warranty Statement

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

Please ask your distributor or Avantik representative about service contracts which can help maintain your instrument in an optimal operating condition.

Warranty provisions necessarily vary to comply with differences in national and regional legislation. Specific details can be found in the delivery documentation or from your dealer or representative.

Please note that your warranty may be invalidated if:

- This instrument is modified in any way, or not used as intended by Avantik.
- Accessories and reagents which have not been approved by Avantik are used.
- The instrument is not operated or maintained in accordance with instructions.

## 2 - Introduction

### Intended Use



The Avantik QS12 is an in vitro diagnostic high-performance cryostat designed to prepare tissue sections of frozen samples in medical, pharmaceutical and research laboratories. Only trained laboratory personnel may operate the QS12.

The instrument may only be operated within the scope of its intended use and as per the instructions given in this manual.

Any other use of this instrument is considered as improper operation.

### Instrument Features

The QS12 is a precision-engineered, ergonomically-designed, high-performance cryostat in modular design with a stainless steel cooling chamber. Some of its features are:

- Colour touch-screen user interface.
- Lighted window, easy positioning.
- Intricate freezing device down to max.  $-55^{\circ}\text{C}$  via the cryobar.
- Automatic or manual defrost.
- Stainless Steel cooling chamber.
- Chamber temperature regulation variable from  $+5^{\circ}\text{C}$  down to  $-35^{\circ}\text{C}$ .

## Technical Specifications

### Mechanical Specifications

Depth	760 mm (29.9 in)
Width	640 mm (25.19 in) w/o handwheel
Height Range	1150 mm ( 45.3 in)
Maximum Weight	143 kg (315.2 lb)

### Electrical Specifications

Power Requirements	Dedicated 20 Amp circuit recommended.
	100V, 50/60Hz, 7A, +/-10%, 110-120V, 60Hz, 7A, +/-10%
	220-240V, 50/60Hz, 4A, +/-10%
BTU	1020BTU/hour

### Environmental Specifications

For Indoor Use Only	
Temperature (Operating Limits)	+5°C to +35°C (+41°F to +95°F) (at a max. Relative humidity of 60%)
Temperature (Recommended Operation)	+15°C to +30°C (+59°F to +86°F) <b>Note</b> Performance may deteriorate when operated outside of this range.
Temperature (Transport and Storage)	-20°C to +50°C (-4°F to 122°F)
Relative Humidity	Max. 60% RH up to 35°C
Altitude	Up to 2000 m (6,500 ft)
Pollution Degree	2
Over Voltage Category	II
Floor Loading Requirements	230 kg/m <sup>2</sup> (507 lb/ft <sup>2</sup> )
Safety Class	I
Sound Emission	45 dB (A) - measured with 1m distance to the instrument.
Refrigerant	R404a, filling amount: 100...120V 175g 220...240V 175g

**Cooling Specifications**

Cryobar Cooling (Peltier Element)	Max. - 55°C (-67°F)
Chamber Temperature	Max. -35°C -2K/+1K (-31°F -2K/+1K) at +20°C room Temp. (decrease 0,7°C/1°C room temp. increase)
Defrosting Options	Programmed / Immediate

**Microtome and Sectioning Specifications**

Section Thickness Range	1 – 500 µm
Fine Section Thickness Range	1 – 100 µm
Fine Section Thickness Resolution	1 – 10 µm in 1 µm steps
	10 µm – 20 µm in 2 µm steps
	20 µm – 50 µm in 5 µm steps
	50 µm – 100 µm in 10 µm step
Trimming Thickness Range	5 – 500 µm
Trimming Thickness Resolution	5 – 30 µm in 5 µm steps
	30 µm – 100 µm in 10 µm steps
	100 µm – 200 µm in 20 µm steps
	200 µm – 500 µm in 50 µm steps
Specimen Retraction (Return Travel)	20 µm
Vertical Specimen Stroke	64 mm
Horizontal Specimen Movement	28 mm
Specimen Approach	Automated via arrow buttons
Chuck Size	30, 40 mm (additional special sizes are available)
Specimen Orientation	x - and y - axes universal 8° with zero positioning; z - axis up to 360°
Coarse Feed	Motorized
Cutting Drive	Manual via handwheel
Handwheel Lock	Mechanical
Clearance Angle Adjustment	Disposable blade carrier 8- 16°

## Chapter 2 - Introduction

### Factory settings

Counter Mode	C=0
Retraction	ON
Language	English
Chamber Temperature	-20°C
Fine	1 µm
Trim	5 µm
Chamber Light	100%
Screen Brightness	100%
Stepper Motor Initialization	Yes
Cryobar	OFF
Defrost Cycle (Automatic)	ON (00:00 Night)
Section Counter	0
Section Sum	0

## 3 - Instrument Setup

### Unpacking and Repacking

#### Safety Precautions



Use safe lifting practices when moving the QS12. At least two people are required to safely move the instrument.



The QS12 has a high centre of gravity and care should be taken when moving.



Do not tip the QS12 more than 30° from the upright position.



After moving the QS12, wait at least 8 hours before switching on to allow the refrigerant to settle - failure to do so may cause damage to the unit.

#### Note

*The packing materials should be carefully stored for use in any future instrument shipment.*

#### Unpacking Procedure

##### General Information:

- Inspect the packaging, if it is damaged and/or the contents do not match the supplied packing list, inform your local Avantik representative.
- Ensure that these Instructions are retained for future use.
- The QS12 is delivered on a pallet. The sides of the instrument are encased in cardboard and cushioned with foam spacers inside the container. A wooden cover protects the top of the instrument.
- In unpacking be aware of the weight (143 Kg/315.2 lbs) of the instrument, at least two people are required to safely move the instrument.

##### Unpacking the Instrument:

- Cut through the three packing straps and remove the packing.
- Remove the upper wooden cover (fig. 1) (item 1).
- The hinges of the upper wooden cover are secured with tape.
- Remove this tape.
- Lift the packing over the instrument (fig. 1) (item 2).
- Remove the upper and lower supporting foams (fig. 1.3, 1.4, 1.5, 1.6) from the QS12.

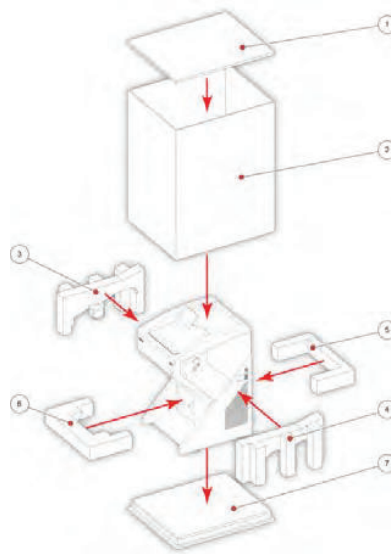


Fig 1

### Note

*The upper wooden cover now serves as a ramp (fig. 1a.1) on which the QS12 can be moved from the pallet to the floor by using the handle (fig. 1a) (item 2).*

- The hinges of the upper wooden cover (fig. 1) (item 1) are inserted into the screws of the bottom plate (fig. 1a) (item 3). The correct side for this is marked with arrows.
- The tool (fig. 2a) (item 2) for the height adjustment of the setting feet of the QS12 is packed together with the accessories of the QS12 (separate carton on the foot rest of the QS12).
- Turn the setting feet completely upwards via this tool so that the QS12 stands with its rollers on the bottom plate (fig 1a) (item 3).
- Via the handle (fig 1a) (item 2), roll the QS12 from the bottom plate (fig. 1a)(item 3) over the wooden cover (fig. 1a) (item 1). In doing so, the rear side of the instrument must face the incline (fig. 1a) (item 1).

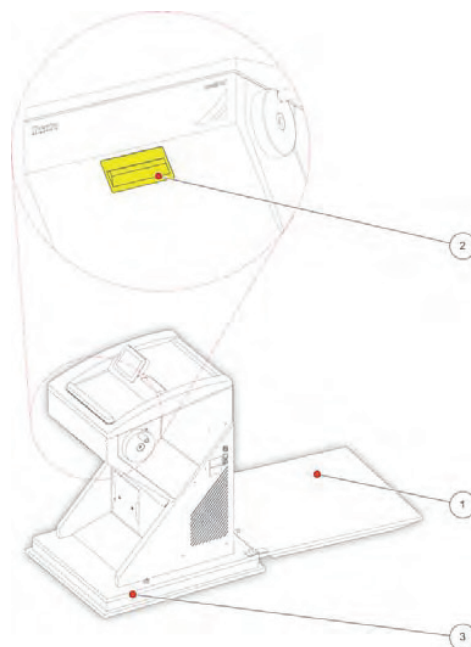


Fig 1a



The instrument is very heavy. While the instrument rolls down the ramp, it must be carefully controlled.

- Now the QS12 can be rolled to its site of installation.
- For possible return shipments, please keep all packing materials.
- In the future, if the instrument is transported by forklift, truck, train, ship or aircraft, it must be packed in the original shipping container with all transportation locks in place.

### When Unpacking the Instrument, be sure that:

- Enough ventilation for the cooling system is guaranteed.
- The distance between the wall and rear panel is approx. 15 cm/ 6". For this, install the distance bolts (fig 2) (item 1).
- The suction vent areas on either side are kept free (fig. 2) (item 2).
- The mains switch for separating the instrument from the power supply is accessible at any time.

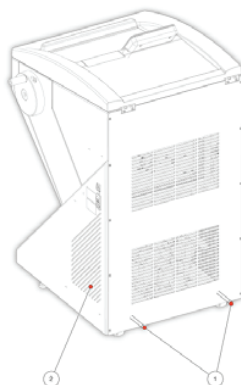


Fig 2



**The installation site must also be free from:**

- Draught by open doors or by air conditioning systems.
- Direct exposure to sunlight into the cooling chamber.

**Note**

Both measures reduce the formation of frost and therefore result in more favourable work conditions. High air moisture as well as high ambient temperatures reduce the maximum performance of the instrument.

- To stabilize the complete unit, tighten the screws (fig 2a) (item 1) by using the attached tool.
- Install the separate, packed handwheel handle.

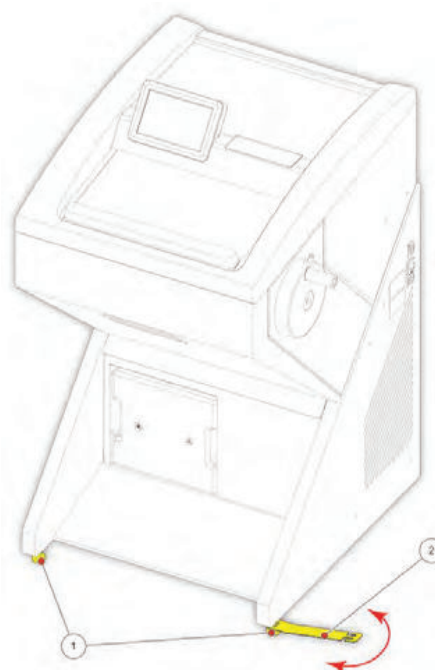


Fig 2a

- Install the separately packed handwheel handle on the handwheel with the attached screw by means of the Allan key.

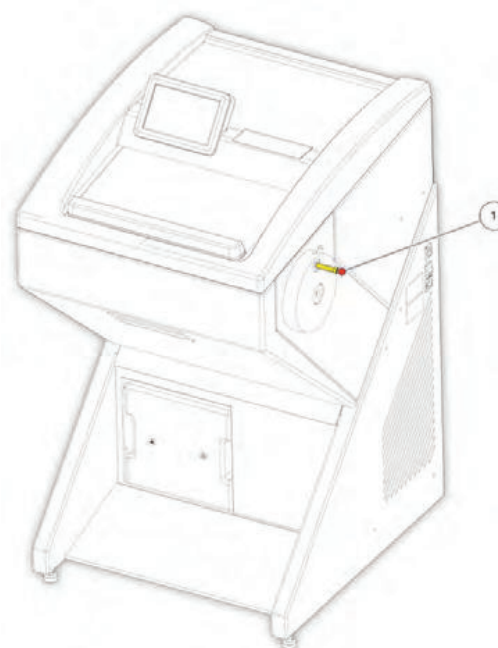


Fig 2b

**Repacking the Instrument**

To repack the instrument, follow the above instructions in reverse order.

## Location & Setup

When deciding where to locate the QS12, the following items must be taken into consideration:

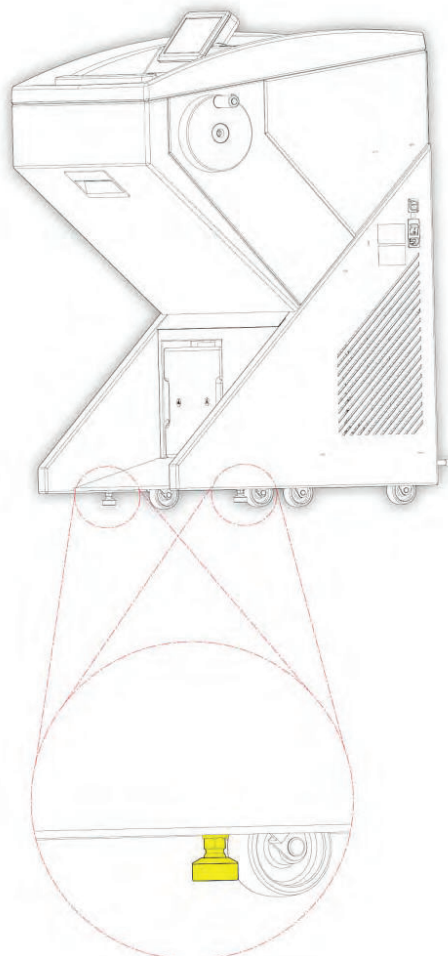
- Approximately 10 cm (4 in) must be allowed around the cooling system to allow free air flow.
- Approximately 15 cm (6 in) must be allowed between the wall and the rear panel.
- The vents on the sides of the rear panel must be unobstructed at all times.
- The mains power socket must be accessible at all times.
- The location must be free from draughts, open doors or air conditioning systems.
- The location must not expose the cryo chamber to direct sunlight.

### Note

*These measures are intended to reduce the build-up of frost and maintain consistent cooling temperatures resulting in more favourable working conditions. Locations which have high humidity and / or high ambient temperatures can reduce the performance of the instrument.*

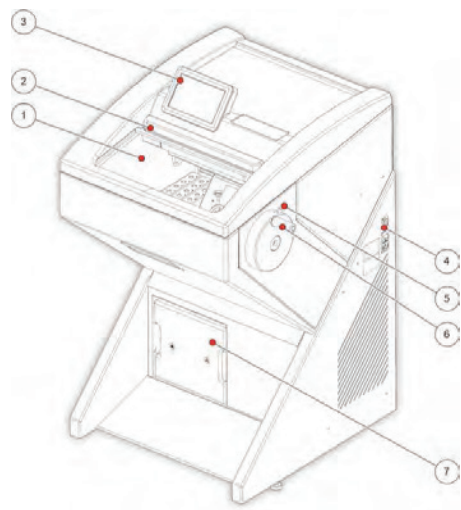


Once the QS12 has been located, ensure the fixing bolts shown are tightened to prevent the unit from moving during operation.



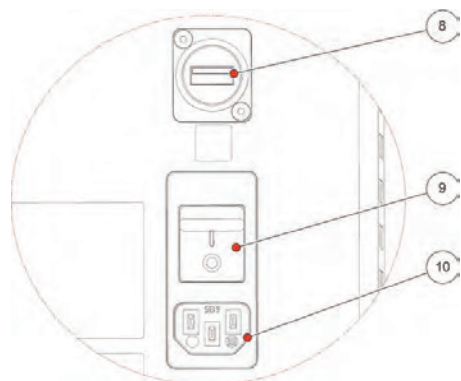
## Identification of Parts

### Overview



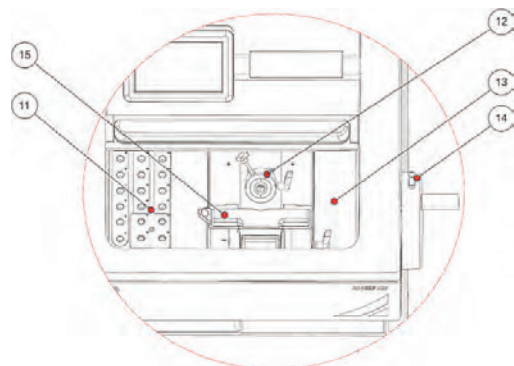
- 1 Cryo chamber
- 2 Cryo chamber Window
- 3 Touch Screen
- 4 Connections Panel
- 5 Handwheel Mechanical Lock
- 6 Handwheel
- 7 Water Drain Reservoir

### Connections Panel



- 8 USB port
- 9 Power Switch
- 10 Power Socket

### Cryochamber

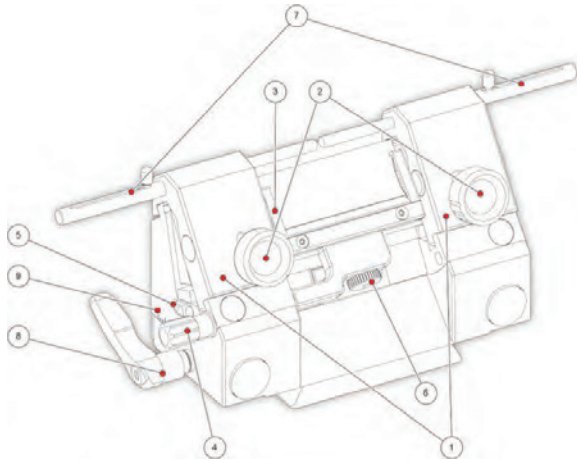


- 11 Cryobar and Cooled Storage Area
- 12 Specimen Head
- 13 Tool storage
- 14 Handwheel Mechanical Brake Button
- 15 Waste Tray

## Solid Knife Holder

### Inserting the knife:

- ☒ The knife is inserted into the slot behind the clamping plate.



- 1 Clamping Plates
- 2 Clamping Screws
- 3 Anti-roll Plate
- 4 Anti-roll Plate Turning Lever
- 5 Knurled Screw
- 6 Anti-roll Plate Knurling Screw
- 7 Knife Guards
- 8 Clearance Angle Clamping Lever
- 9 Clearance Angle Scale

### Inserting the knife:

- The knife is inserted into the knife carrier either from the side or from the front, independently if one or two clamping plates have been removed.
- Loosen the clamping screws.
- Turn the turning lever in a clockwise direction to tilt the anti-roll plate forwards.  
Insert the knife.
- Turn the turning lever in a counter clockwise direction to put the anti-roll plate against the knife.

#### Note

*Insert the glass anti-roll plate parallel towards the blade edge.*

- Then tighten the clamping screws to fix the knife into position.

### If the cutting area of the knife is no longer usable, the knife can be moved:

- Open the clamping screws and move the knife to the left or right side as required.
- Fix the knife again via the clamping screws.



To avoid the danger of injury on the knife during adjustment of specimen, always position the knife guards over the blade edge.

### Height adjustment of the knife:

- Loosen the clamping screws.
- Via the knurled screws which are placed on the left and right side of the knife carrier, adjust the height of the knife to the position of the anti-roll device. These should be parallel to each other.
- Afterwards, tighten the clamping screws to fix the knife in its position.

### Fine adjustment of the anti-roll device:

- The fine adjustment of the anti-roll device is carried out via the knurled screw.

### Selecting the clearance angle:

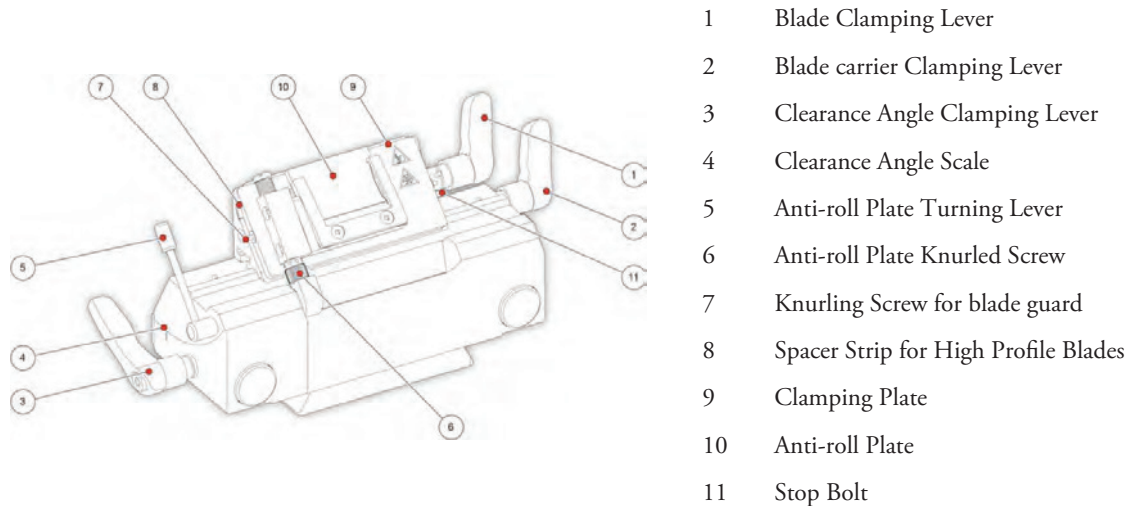
- Loosen the clamping lever on the left side of the knife carrier.
- Swivel the upper part of the knife carrier on the base until the desired clearance angle is reached.
- The clearance angle can be read on the scale at the left side of the base.

#### Note

Usable cuts are only achieved at a clearance angle of 10° or more.

## Disposable Blade Holder EC

- The disposable blade carrier takes all commercially available low and high profile blades. The anti-roll plate length is 39.5 mm.



### Inserting the blade:



The blade is inserted into the slot behind the clamping plate.

#### Note

*When using high profile blades, first loosen the lever and remove the spacer strip.*

- For this, push in the stop bolt and turn the clamping lever in a counter clockwise direction over the stop bolt.
- Remove the clamping lever together with the eccentric bolt.
- First remove the clamping plate and then the spacer strip (if necessary).
- Fix the clamping plate with the clamping lever again in the blade carrier in reverse order.
- To insert the blade, now loosen the clamping lever.
- Press the clamping plate on its lower area to open the slot behind the clamping plate.
- Insert the blade from the left side into the slot behind the clamping plate as far as possible.
- Tighten the clamping lever fixing the blade in its position.
- To section the specimen, put the anti-roll plate against the blade via the turning lever in a counter clockwise direction.

**If the cutting area of the blade is no longer usable, the blade carrier can be moved:**

- The blade itself is clamped solidly into the blade carrier. The complete carrier is moved.
- Open the clamping lever for the carrier and move the carrier to the left or right side.
- Tighten the clamping levers to fix this position.



To avoid the danger of injury on the knife during adjustment of specimen, always position the knife guards over the blade edge.

**Fine adjustment of the anti-roll device:**

- The fine adjustment of the anti-roll device is carried out via the knurled screw.

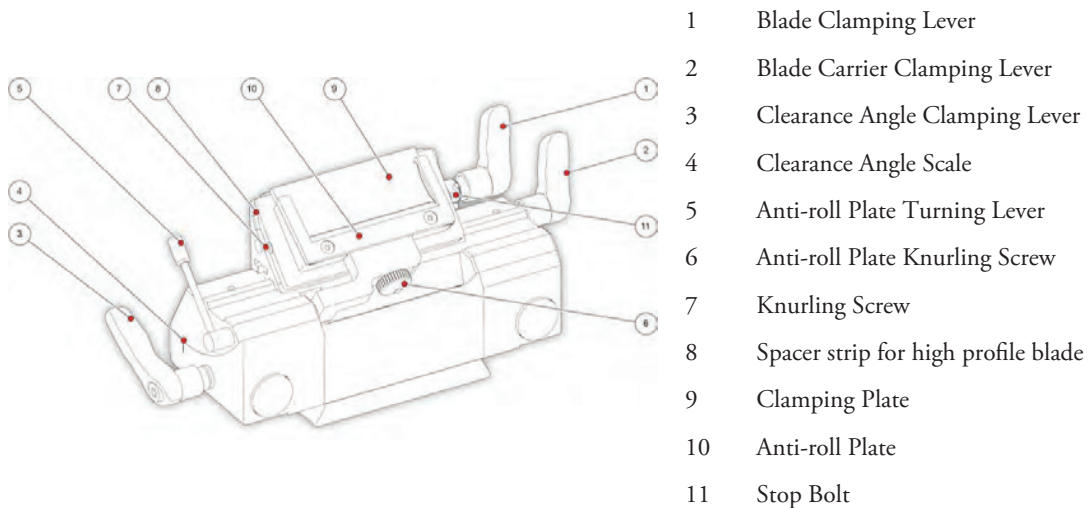
**Selecting the clearance angle:**

- Loosen the clamping lever.
- Swivel the upper part of the blade carrier on the base until the desired clearance angle is reached.
- The clearance angle can be read on the scale on the left side of the base.
- Bring the clamping lever into clamping position.
- The selected clearance angle is now fixed in its position.

**Note**

*Usable cuts are only achieved at a clearance angle of 10° or more.*

## Disposable Blade Holder EC 70



**Inserting the blade:**

- The blade is inserted into the slot behind the clamping plate.

**Note**

*When using high profile blades, first loosen the lever and remove the spacer strip.*

- For this, push in the stop bolt and turn clamping lever in a counter clockwise direction over the stop bolt.
- Remove the clamping lever together with the eccentric bolt.
- First remove the clamping plate and then the spacer strip (if necessary).

## Chapter 3 – Instrument Setup

- Fix the clamping plate with the clamping lever again in the blade carrier in reverse order.
- To insert the blade, now loosen the clamping lever.
- Press the clamping plate on its lower area to open the slot behind the clamping plate.
- Insert the blade from the left side into the slot behind the clamping plate as far as possible.
- Tighten the clamping lever fixing the blade in its position.
- To section the specimen, put the anti-roll plate against the blade via the turning lever in a counter clockwise direction.

If the cutting area of the blade is no longer usable, the blade carrier can be moved:

- The blade itself is clamped solidly into the blade carrier. The complete carrier is moved.
- Open the clamping lever for the carrier and move the carrier to the left or right side.
- Tighten the clamping levers to fix this position.



**To avoid the danger of injury on the knife during adjustment of specimen, always position the knife guards over the blade edge.**

Fine adjustment of the anti-roll device:

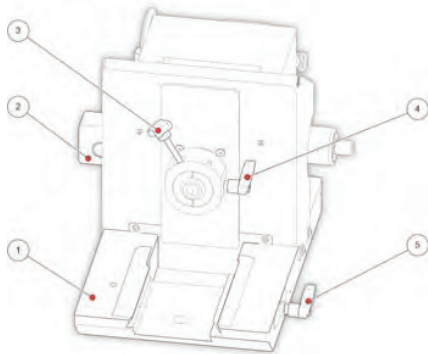
- The fine adjustment of the anti-roll device is carried out via the knurling screw.

Selecting the clearance angle:

- Loosen the clamping lever.
- Swivel the upper part of the blade carrier on the base until the desired clearance angle is reached.
- The clearance angle can be read on the scale on the left side of the base.
- Bring the clamping lever into clamping position.
- The selected clearance angle is now fixed in its position.

### Note

Usable cuts are only achieved at a clearance angle of 10° or more. **Specimen Head QS12**



- |   |                                   |
|---|-----------------------------------|
| 1 | Microtome base plate              |
| 2 | Electrical connector              |
| 3 | Specimen Chuck Release Lever      |
| 4 | Specimen Head Clamping Lever      |
| 5 | Blade/Knife holder Clamping Lever |

### Set Up

Before sectioning, the blade holder and the cryo chamber should be at a stable temperature close to the desired cutting temperature. These temperatures should be selected to suit the consistency of the specimen.

All tools which come into contact with the sections or which are used to manipulate the specimen must also be cooled to prevent the tissue from sticking to them. Therefore all accessories should be stored on the shelves or in the brush tray in the cryo chamber. The exceptions to this rule are the specimen chucks which should be kept at room temperature.

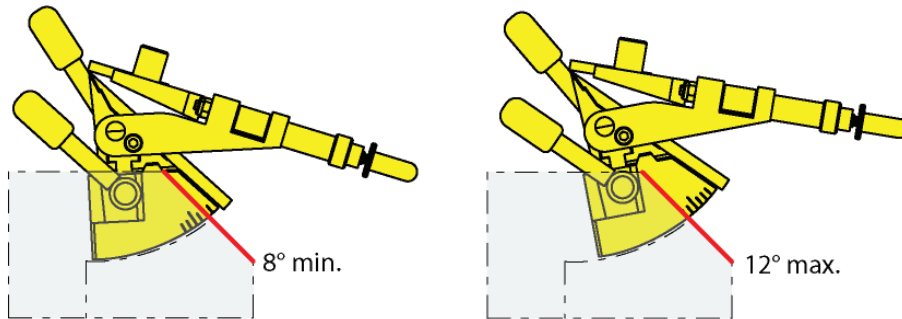
The heated sliding window should be closed during periods of inactivity and while preparing specimens to avoid warm air getting into the chamber. This will result in more favourable working conditions and a lower frost build-up.



**The surface of the blade holder base might be cold. Use gloves if necessary.**

### Note

*The clearance angle can be read on the scale on the left side on the upper part of the blade holder.*



### Note

Usable cuts are only achieved at a clearance angle of 10° or more.

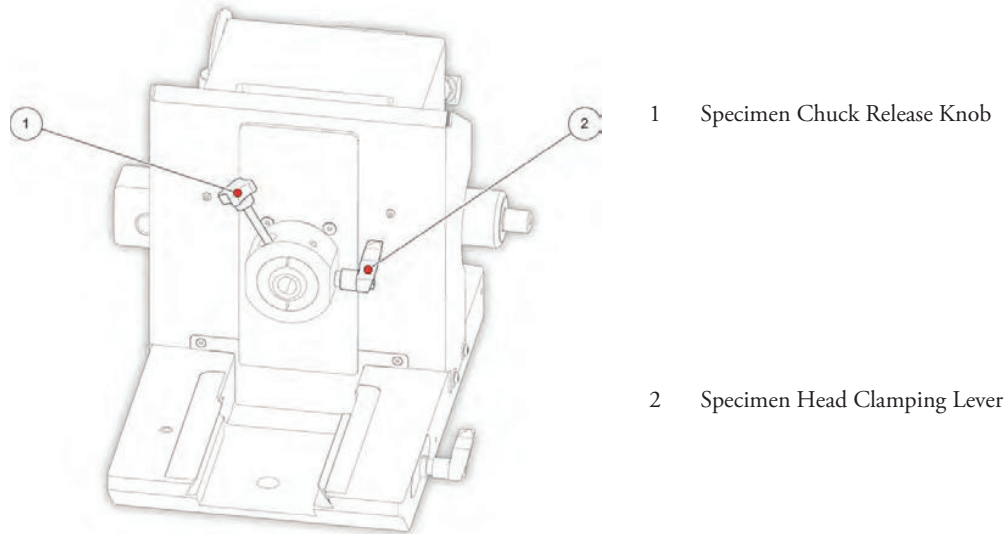


### Specimen Setup

Before sectioning can begin, the specimen must be correctly clamped and oriented in the specimen head.

To clamp and orient the specimen:

- Loosen the specimen chuck release lever and insert the specimen chuck into the center hole of the specimen head.



- Tighten the specimen chuck release knob again to allow the jaws to grip the chuck.
- Loosen the specimen head clamping lever to allow adjustment of the specimen parallel to the cutting edge.
- Use the specimen chuck release knob to orient the specimen on the x- and y-axes.

### Note

*The specimen chuck release knob will click into place when the centre position has been reached.*

- Tighten the specimen head clamping knob again.

For further specimen orientation, the specimen chuck can also be rotated by 360° as described below:

- Loosen the specimen chuck clamping knob slightly.
- Rotate the chuck as required.
- Tighten the specimen chuck clamping knob.



**To avoid severe damage ensure that the blade does not crash into the specimen.**

## 4- Operation

### Switching On



Before switching on the instrument for the first time, ensure that the power requirements indicated on the rating label correspond to the power supply voltage being tested.

#### Note

*No other instruments should be connected to the circuit used for the QS12, as the compressor needs high surge currents when started.*

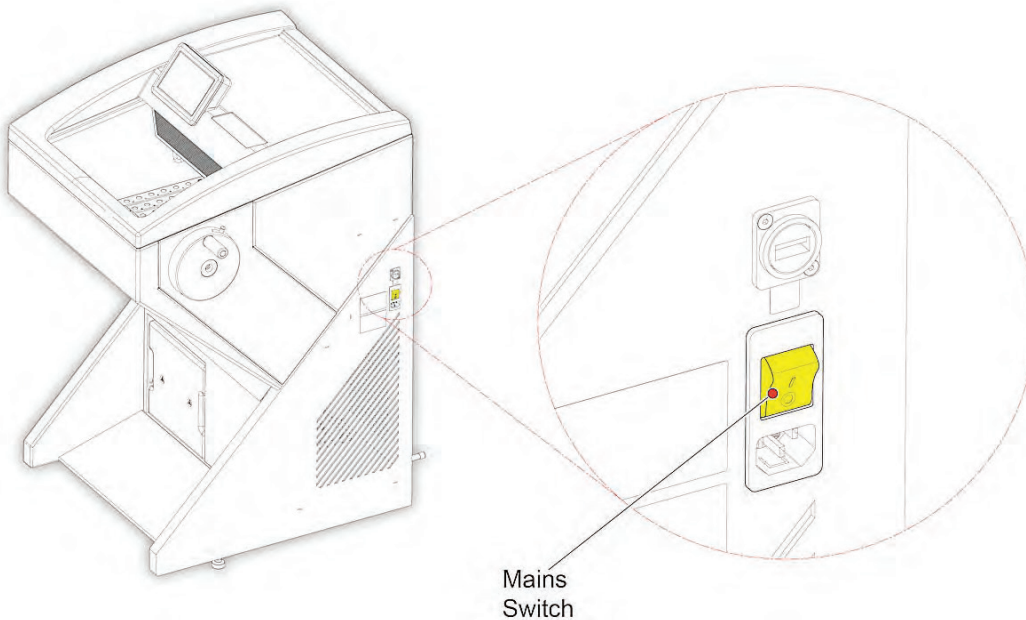
Do not use multi-socket power outlets with small wire sizes for the supply of the instrument.

- Insert the supplied power cord into the power socket and then connect the power cord to the mains supply.
- Install the blade holder if necessary.
- Close the heated window.
- Turn on the power switch.

#### Note

*The default setting of the specimen head temperature is  $-20^{\circ}\text{C}$ .*

The cooling phase will take approximately 2 to 3.5 hours depending on the set chamber temperature and Ambient temperature.



## System Interfacing

### Using the Touch screen

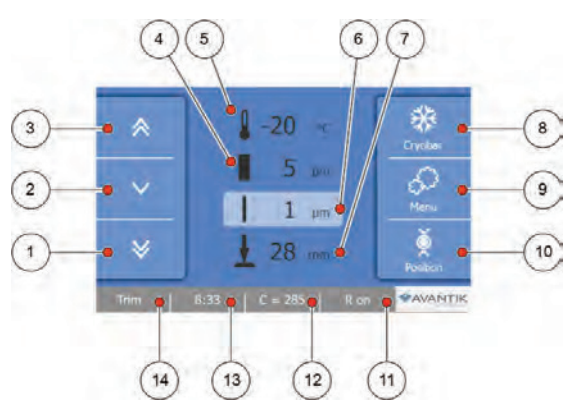
The QS12 has an embedded touch screen user interface which is used to set all preferences.

#### Note

*Avoid using sharp or pointed objects to press buttons on the touch screen. It is recommended that a clean finger is used to operate the touchscreen. However, if you require a stylus, the eraser-tipped end of a pencil is suitable.*

### Main Screen

The Main screen appears after the instrument has been switched on.



The diagram shows the main screen of the QS12 instrument. It features a central display area showing various parameters: a temperature of -20 °C, a pressure of 5 psi, a trim thickness of 1 µm, and a remaining travel of 28 mm. The screen is surrounded by touch-sensitive buttons and indicators, numbered 1 through 14. The bottom status bar displays 'Trim', '8:33', 'C = 28S', 'R on', and the 'AVANTIK' logo.

1	Fast forward movement of specimen head
2	Slow forward movement of specimen head
3	Fast Backward movement of specimen head
4	Trim thickness
5	Chamber temperature
6	Section thickness
7	Remaining Travel
8	Cryobar button
9	Menu button
10	Position button
11	Retraction button
12	Counter mode (sum of sections, number of sections)
13	Time/Date button
14	TRIM button

- Press the required button to activate / deactivate the function or to display the options screen for the selected function - See Setting Preferences.

### "OK" Button



- Press the "OK" button to save any changes to specific settings.

### "Back" Button

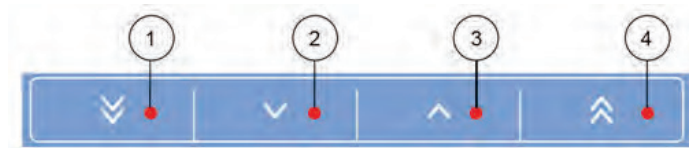


- Press the "Back" button to return to the previous menu without saving any changes.

### "Arrow" button

The "Arrow" buttons are used in several menus to increase or decrease values.

- Use the arrow button to adjust the value to the required setting.



- 1 Decreases the selected value by multiple steps.
- 2 Decreases the selected value by 1 step.
- 3 Increases the selected value by 1 step.
- 4 Increases the selected value by multiple steps.

### Note

*The number of steps by which the 'multiple step' increase / decrease buttons alters the selected value will vary depending on the function.*

## Setting Preferences

### Quick Freezing of the Specimen

The cryobar provides on-demand, quick freezing of specimens.

#### Note

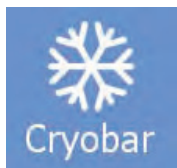
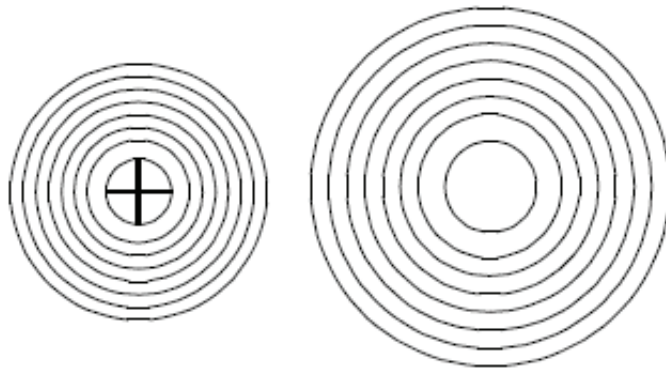
*When the cryobar is activated, it will take approximately 2 - 3 minutes for the cryobar to reach a temperature of maximum  $-55^{\circ}\text{C}$ .*

The cryobar remains active for approximately 10 minutes indicating by the timeline display below the cryobar button on the screen.

The specimen is frozen onto the specimen chuck using a freezing compound and the cryobar.

#### Note

*To ensure optimal adhesion of the specimen to the chuck, store the chucks at room temperature prior to use.*



- Press the "**Cryobar**" button on the Main screen to activate it



- The "**Cryobar**" button is highlighted in blue when the function is activated and the white Process Bars below the icon will gradually increase



- To turn off the Cryobar function, press the highlighted "**Cryobar**" button again.

### To set the Specimen Head Position:

- Move the Specimen Head to the desired position and press the “**Position**” button on the Main screen for about 3 seconds.
- The colour will change to yellow, showing that the position has been saved and the required position is stored.
- When a new block is inserted into the Specimen Head, press the “**Position**” button for 1 second and the Specimen Head will return to the set position.
- To save a new position, again align the Specimen Head to the desired position and press the “**Position**” button for 3 seconds. The new position will be stored.
- To reset the position, hold down the position button for approx 6 seconds.

### Backward fast movement of specimen head (1mm/sec) button



- Press the button for 1 sec to move the Specimen Head backwards a short distance.
- After about 2 sec the head moves back automatically.
- Press the button again to stop the movement immediately.

### Slow forward movement of specimen head (0.5mm/sec) button



- Press the button to move the Specimen Head forward
- The head will only move while the button is pressed
- It will stop immediately if not pressed

### Fast forward movement of specimen head (1mm/sec) button

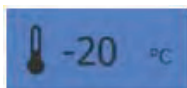


- Press the button to move the Specimen Head fast forward
- The head will only move while the button is pressed
- It will stop immediately if not pressed

### Microtome/Chamber Temperature

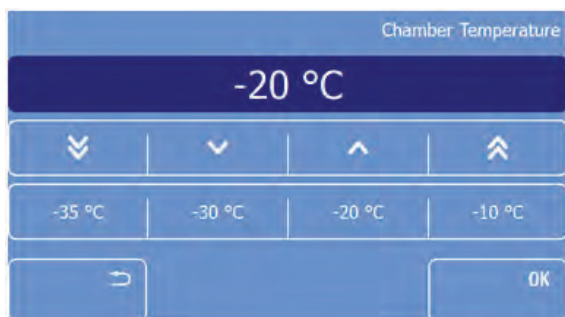
The microtome/chamber is actively cooled and the user can adjust the temperature independently.

### Setting the temperature:



- Press the “**Microtome/Chamber Temperature**” button on the Main screen

### Setting the temperature:

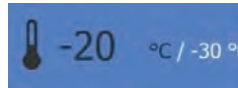


## Chapter 4 – Operation

- Either select one of the preset temperatures (-35°C, -30°C, -20°C or -10°C) or adjust the temperature using the arrow keys.
- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button to exit back to the Main screen without saving the changes.

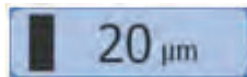
### Note

*The new set temperature is displayed in white on the Main screen until the temperature is reached.*



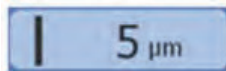
### Trim and Fine Section Thickness

To set the trim/trimming section thickness:



- Press the "**Trim Thickness**" button on the Main screen.
- The Trim Section screen will be displayed.
- Either select one of the preset values (400μm, 200μm, 100μm or 10μm) or adjust the value using the arrow buttons.
- For details of the thickness steps see Technical Specifications.
- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button to exit back to the Main screen without saving the changes.

To set the fine section thickness:

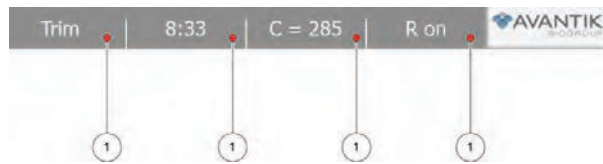


- Press the "**Fine Section Thickness**" button on the Main screen.
- The Fine Section screen will be displayed.
- Either select one of the preset values (100μm, 50μm, 10μm or 5μm) or adjust the value using the arrow buttons.
- For details of the thickness steps see Technical Specifications.
- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button to exit back to the Main screen without saving the changes.
- Remaining Distance to Front End Position is displayed beneath the Fine Section area.

## Multi Function Bar

The multi function bar provides the user access to useful information and functions.

The Multi Function Bar is located at bottom of the Main screen.



- 1 TRIM button
- 2 Time/Date
- 3 Counter (section thickness / section counter)
- 4 Retraction

## Trim Button

After the specimen orientation and the blade angle have been set, trimming can be carried out using the trimming function.

### Trimming



- Make sure that the trimming thickness setting is selected

### Note

*Trimming thickness is shown highlighted on the display.*

Turn the hand-wheel in a clockwise direction to begin trimming.

- Press the "**Trim**" button to move forward the specimen holder by the preset trim value. The hand-wheel does not need to be turned to utilize this function.

### Note

*The specimen holder will move forwards by the preset trim thickness value every cycle.*

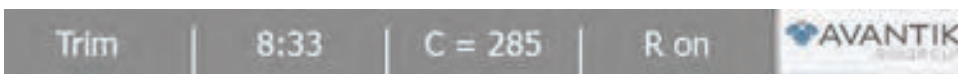
## Time and Date

To toggle between Time or Date indication:

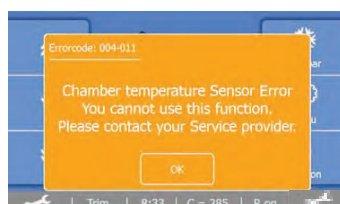
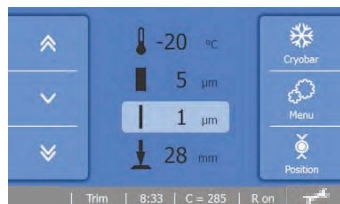


- Press the "**Time / Date**" button

## Outstanding Service Message



*When there is an outstanding service message, a wrench symbol is shown.*



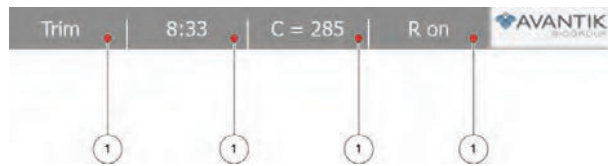
- Press the **Wrench** symbol to see the service message.



## Multi Function Bar

The multi function bar provides the user access to useful information and functions.

The Multi Function Bar is located at bottom of the Main screen.

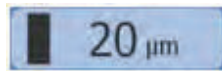


- 1 TRIM button
- 2 Time/Date
- 3 Counter (section thickness / section counter)
- 4 Retraction

## Trim Button

After the specimen orientation and the blade angle have been set, trimming can be carried out using the trimming function.

### Trimming



- Make sure that the trimming thickness setting is selected

### Note

*Trimming thickness is shown highlighted on the display.*

Turn the hand-wheel in a clockwise direction to begin trimming.

- Press the "**Trim**" button to move forward the specimen holder by the preset trim value. The hand-wheel does not need to be turned to utilize this function.

### Note

*The specimen holder will move forwards by the preset trim thickness value every cycle.*

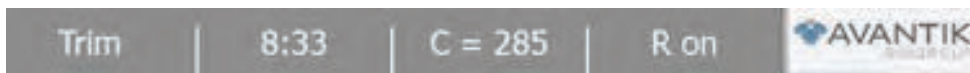
## Time and Date

To toggle between Time or Date indication:

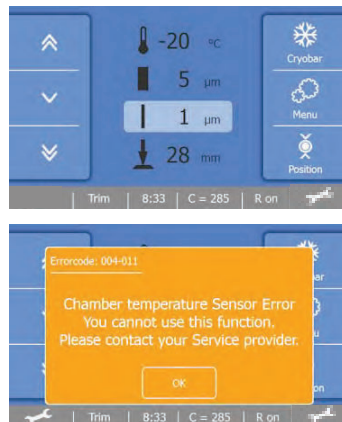


- Press the "**Time / Date**" button

## Outstanding Service Message



*When there is an outstanding service message, a wrench symbol is shown.*



- Press the **Wrench** symbol to see the service message.

## Counter

To Toggle between the Section Counter and the Section Thickness Sum:

### Section Counter



- The section counter adds up the number of the produced sections. After each downward movement of the specimen head, the number on the section counter increases by 1

To reset the section counter:

- Press the **Section Counter** button for approximately 3 seconds to reset it to zero.

### Section Thickness Sum



- The Section Thickness Sum adds up the total number of microns that have been cut.

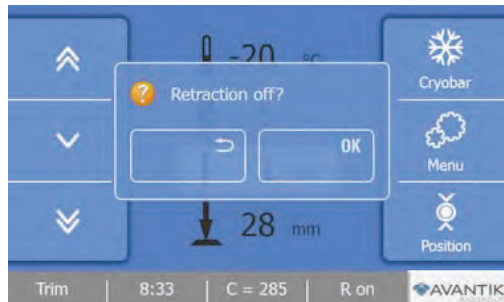
To reset the section counter:

- Press the **Section Counter** button for approximately 3 seconds to reset it to zero.

## Retraction

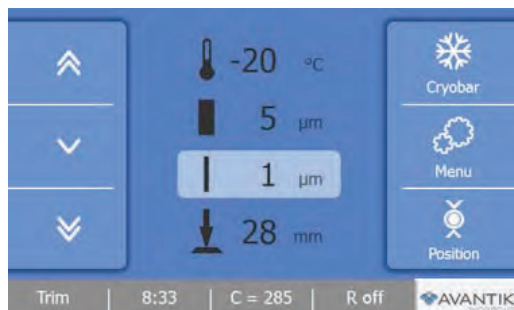
- If required, the Retraction function can be turned off.

To toggle the Retraction On or Off:

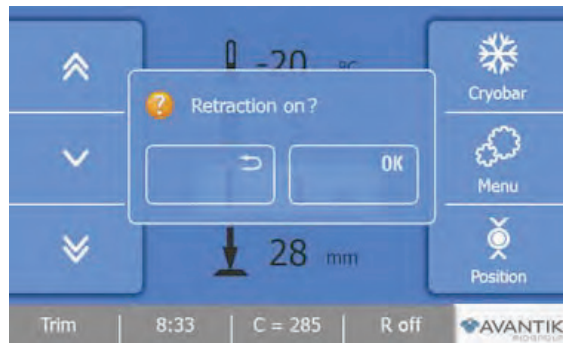


- Press the **Retraction** button on the Main Screen.
- The Retraction screen will be displayed.
- Press the “**OK**” button to turn off the Retraction and return to the Main screen. The button will change to white and display “R Off”.
- Press the “**Back**” button to return to the Main screen without saving the changes.

To turn on the Retraction:



- Enter the Retraction menu screen as described above.



- Press the “**OK**” button on the screen to turn on the Retraction. The button will display “R On”.
- Press the “**Back**” button to return to the Main screen without saving the changes.

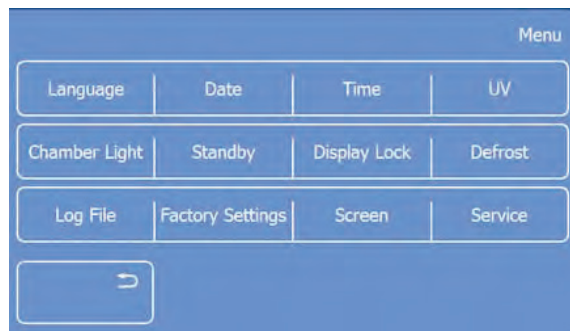
### Handwheel Lock

- The Handwheel must be in the 12’ o'clock position to engage the lock.
- Push the “**Brake**” lever on the Handwheel forward. To release the brake, pull it backward again.

### Menu

The “**Menu**” button provides access to submenus for adjustments and settings.

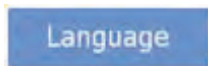
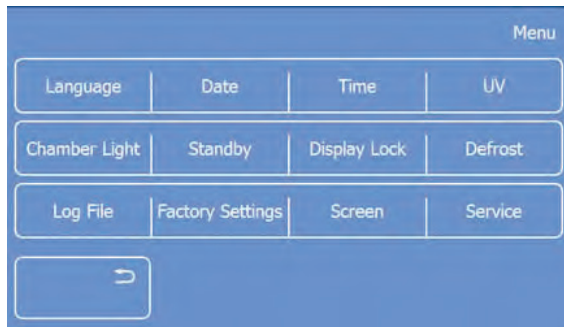
To enter the Menu screen:



- Press the “**Menu**” button.
- The Menu screen will be displayed.
- Press the “**Back**” button to return to the Main screen.
- Press the desired function button to access the respective submenu.

## Language

To set the Language:



- Press the "**Menu**" button on the Main screen.

- The Menu screen will be displayed.

- Press the "**Language**" button.

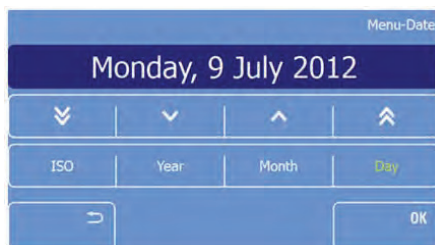
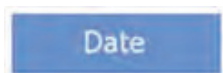
- The Menu-Language screen will be displayed.

- Select the desired language by pressing the respective button
- Press "**OK**" to save the changes and to return to the Main screen
- Press the "**Back**" button two times to return to the Main screen without saving the changes

## Time and Date



Set the Date:



- Press the "**Menu**" button on the Main screen

- The Menu screen will be displayed

- Press the "**Date**" button.

- The Menu: Date screen will be displayed.

**Set the Day:**



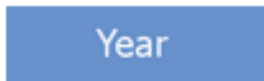
- Press the "**Day**" button to highlight it.
- Use the arrow buttons to select the desired day and date.

**Set the Month:**



- Press the "**Month**" button to highlight it.
- Use the arrow buttons to select the desired month.

**Set the Year:**



- Press the "**Year**" button to highlight it
- Use the arrow buttons to select the desired year
- Press "**OK**" to confirm the setting and to return to the Main screen
- Press the "**Back**" button one time to exit back to the Main screen without saving the changes

**Change to ISO format**

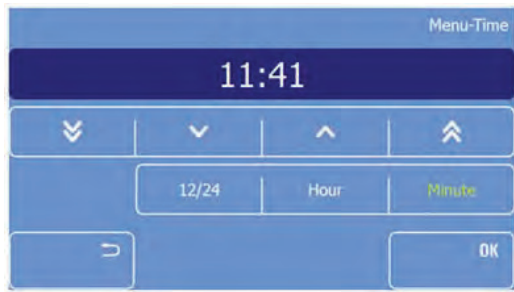


- Press the "**ISO**" button to toggle between the full date format and the ISO format.
- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button one time to exit back to the Main screen without saving the changes.

**Setting the Time**



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Time**" button.



- The Time screen will be displayed.

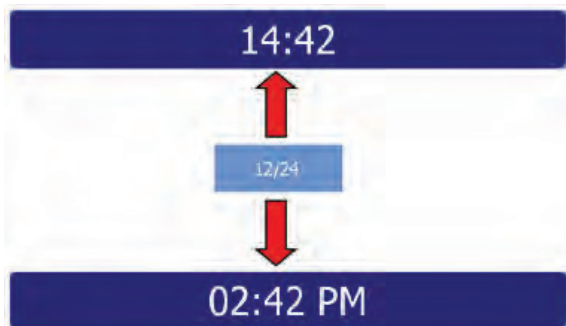
#### Set the minutes

- Press the "**Minute**" button to highlight it.
- Use the arrow keys to select the desired minute.

#### Set the hour

- Press the "**Hour**" button to highlight it.
- Use the arrow keys to select the desired hour.

#### Set the time format



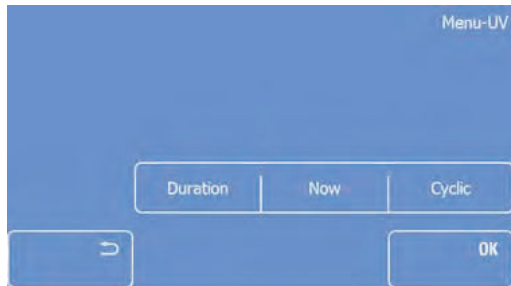
- Press the "**12/24**" button to toggle between the 12 and 24 hour modes.

#### Note

The 12/24 button is highlighted in yellow if the 12h mode is active.

- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button one time to exit back to the Main screen without saving the changes.

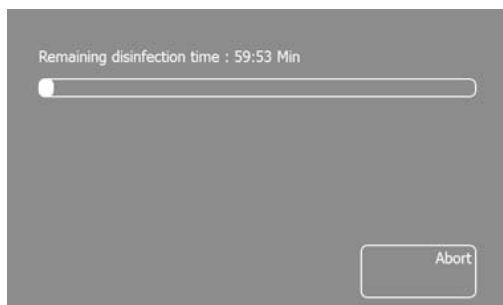
## UV Option



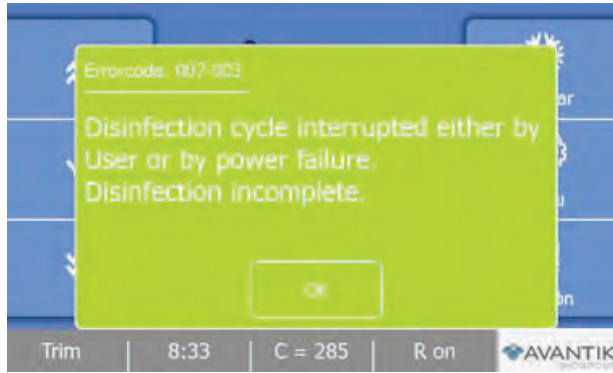
### Set the Duration of the UV Cycle:



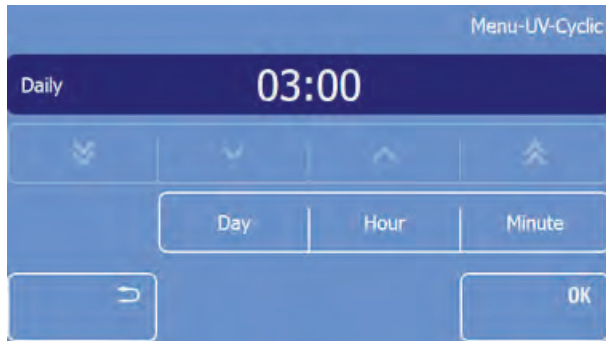
To select the Now option:



- Press the "**Menu**" button on the Main screen
- The Menu screen will be displayed
- Press the "**UV**" button
- The UV screen will be displayed
- Select Duration, Now, or Cyclic
- Press "**Duration**" to choose between 4h, 3h, 2h, or 1h, or use the arrow buttons to select the duration of the UV cycle.
- Press "**Now**" button to start and immediate UV cycle.



- Press “OK” when the Errorcode: 007-003 window comes up.
- Set the Time for the UV cycle to start:
- Press “Cyclic” to set a programmed time for the UV cycle to start:



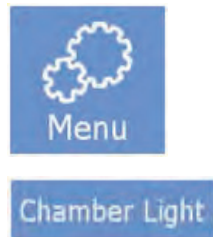
- Do not open the window during the disinfectant cycle.
- Do not look directly into the UV light.

#### Note

*The average life span of a UVC lamp is approx. 9000 operation hours with a dissipation down to approx. 80%. It is recommended to renew the UVC lamp every 3 years.*

#### Chamber Light

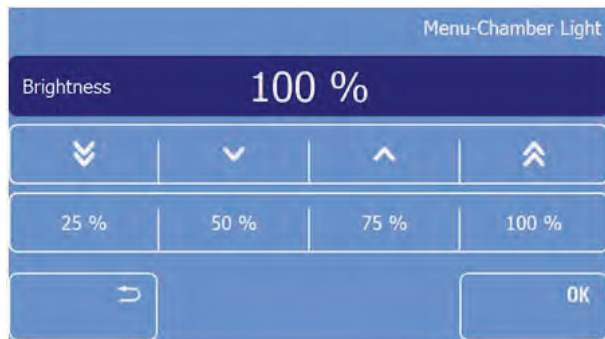
The Chamber light is located in the sliding window. To adjust the brightness of the chamber light:



- Press “**abort**” to stop the cycle.
- Press “**Day**” and select the day for the UV cycle to run.
- Press “**Hour**” and use the arrow keys to set the hour for the UV cycle to start on the indicated day.
- Press “**Minute**” and use the arrow keys to set the additional minutes to the hour for the UV cycle to start on the indicated day.
- Press “OK” to confirm the settings and to return to the Main screen.
- Press the “**Back**” button three times to exit back to the Main screen without saving the changes.

- Press the “**Menu**” button on the Main screen.
- The Menu screen will be displayed.





**Note**

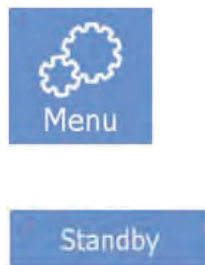
*The chamber illumination can be adjusted; from the lowest (0%) to the highest (100%) level.*

**Standby mode**

When the QS12 is switched on but has been inactive for 1 hour, it will automatically enter the Standby mode. The QS12 maintains the user adjusted temperature during Standby.

In Standby mode the chamber light switches off and the touch screen display will dim:

**To enter the Standby-mode manually**



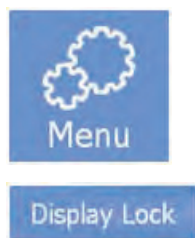
- Press the "**Chamber Light**" button.
- The Chamber Light screen will be displayed
- Select one of the preset values (25%, 50%, 75% or 100%) or adjust the brightness using the arrow keys.
- Press "**OK**" to confirm the setting and to return to the Main screen.
- Press the "**Back**" button twice to exit back to the Main screen without saving the changes.

- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Standby**" button to switch the instrument immediately into the Standby mode.
- Press the touch screen to exit the Standby.

**Display Lock**

**Note**

*The display lock is used to avoid unwanted changes to the settings of the QS12. To activate the Display Lock:*



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press "**Display Lock**" to activate the display lock immediately.

### To deactivate the DisplayLock



- Press the "**Lock**" Symbol three times.

#### Note

The symbol changes its colour (red - yellow - green) each time it is pressed.

### Defrost

Inevitably, when working on the microtome, the dry cold air of the cryo chamber mixes with the warm humid air outside the chamber. Frost forms on the finned evaporator. The increasing thickness of the frost reduces the efficiency of the evaporator. For this reason, the daily defrosting is necessary.



**Remove the specimens from the cryo chamber during defrosting, as the temperature inside the chamber will increase. Do not leave or store specimens inside the QS12 over a long period of time. Due to a power failure or other unexpected malfunctions of the instrument, specimens might be damaged.**

#### Note

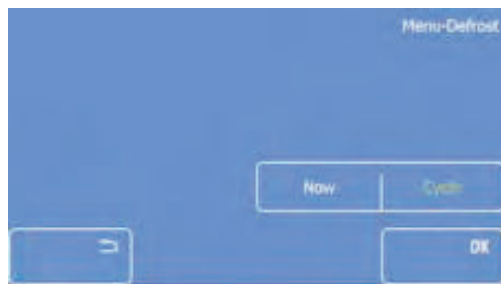
*Set the time of the daily defrosting on the control panel. The period of the defrosting takes approximately 1 hour and varies according to the thickness of the frost.*

Possible frost build-up on the microtome or on the knife carrier is not removed by defrosting the instrument. However, the frost recedes after defrosting as now the evaporator is fully efficient again.

In addition, the instrument is equipped with an immediate defrosting function. The immediate defrosting takes maximum 60 minutes.

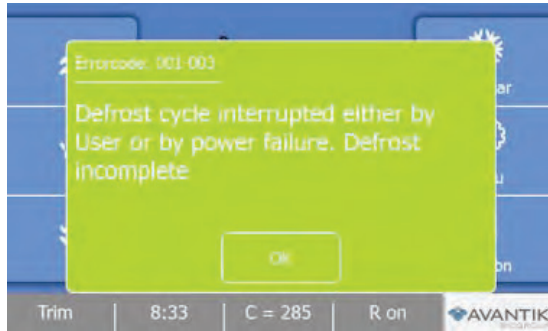
### Immediate Defrosting

#### To start the defrosting immediately:



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Defrost**" button.
- The Defrost screen will be displayed.
- Press the "**Back**" button two times to return to the Main screen without starting the defrosting.
- Press the "**Now**" button to start the defrosting immediately
- The Defrosting screen will appear, showing the progress of the defrosting and the actual temperature of the evaporator.

**To abort the defrosting:**



- Press the "**Abort**" button on the Defrosting progress screen.
- The Main screen will appear, displaying an error message.
- Press the "**OK**" button to remove the error message.

**Note**

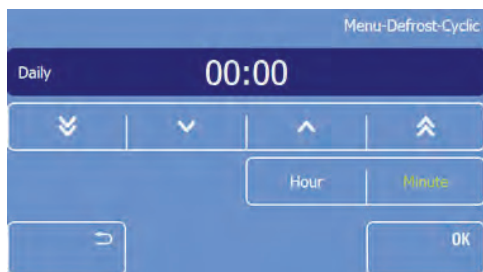
The Defrosting cycle can be aborted at any time.

**Programming the Daily Defrost Cycle**

**Note**

*The time for the daily defrost cycle should be programmed outside of the normal working hours to avoid delays in the workflow.*

**To program the Daily Defrost Cycle:**



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Defrost**" button.
- The Defrost screen will be displayed.
- Press the "**Cyclic**" button.
- The Defrost-Cyclic screen will be displayed.

**Note**

*The standard setting for the daily defrost cycle is daily at 00:00 a.m.*



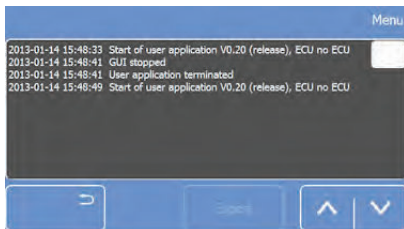
- Adjust the time by using the arrow keys.
- Press the "**OK**" button to confirm your settings.
- Press the "**Back**" button three times to return to the Main screen.

- To change the standard setting, press the "**Hour**" and / or the "**Minute**" button.

### Log File

The Data Log records all events and error messages on the QS12. The Log file can be exported to the original USB-Stick for Service purposes in case of a malfunction.

To enter the Log File:



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Log File**" button.
- The Log screen will be displayed.
- Password has to be provided by service technician.
- After entering the right password (Service only) Log File screen will be displayed.
- Use the scroll bar on the right side to scroll through the Log File.
- Insert the USB-Stick.

### Note

The "**Export**" button is now highlighted in white.

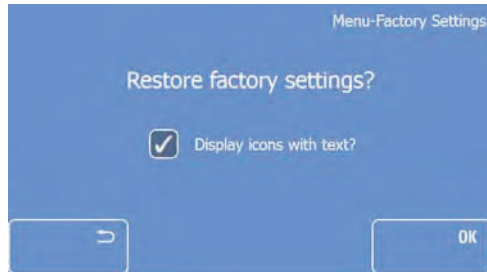
- The "**Export**" button is now highlighted in white.
- Press the "**Export**" button to transfer the log data to the original USB-Stick.
- Press the "**Back**" button twice to return to the Main screen.
- Export complete box opens when completed
- Press to return to previous menu

**Note:** The Log file can only be exported to the USB-Stick supplied with the instrument

## Factory Settings

If required, the instrument can be reset to the factory settings.

To restore the Factory settings:



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Factory settings**" button.
- The factory settings screen will be displayed.
- Press the "**OK**" button to restore the factory settings and to return the Main screen
- Press the "**Back**" button two times to return to the Main screen without restoring the factory settings.

### Note

*A message appears on the Main screen to inform the user that the factory settings have been restored. The message disappears after approximately 3 seconds.*

### Display icons with text

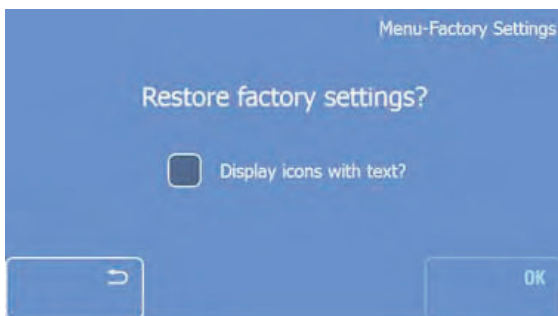
The text underneath the Main screen icons can be switched off if required.

To switch the text off:

- Enter the factory settings screen as described above.
- Uncheck the box and press the "**Back**" button one time to save the changes and to return to the Main screen.



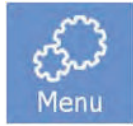
Pressing 'OK' will reset the instrument to the factory settings.



## Screen

The brightness of the Screen can be adjusted.

To set the Screen brightness:



- Press the "**Menu**" button on the Main screen.
- The Menu screen will be displayed.
- Press the "**Screen**" button.
- The Menu: Screen will be displayed.
- Select one of the preset values (25%, 50%, 75% or 100%) or adjust the brightness using the arrow keys.
- Press the "**OK**" button to confirm the factory settings and to return the Main screen.
- Press the "**Back**" button two times to return to the Main screen without saving the changes.

## Note

*The screen brightness can be adjusted; from the lowest (20%) to the highest (100%) levels.*

## Service

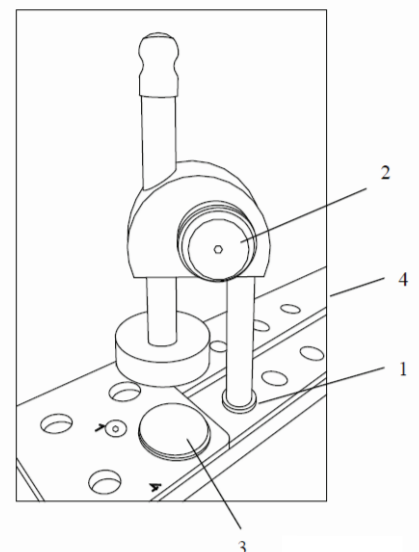


This submenu is for service purposes only. A password is required to enter the Service menu.

## Heat Extractors

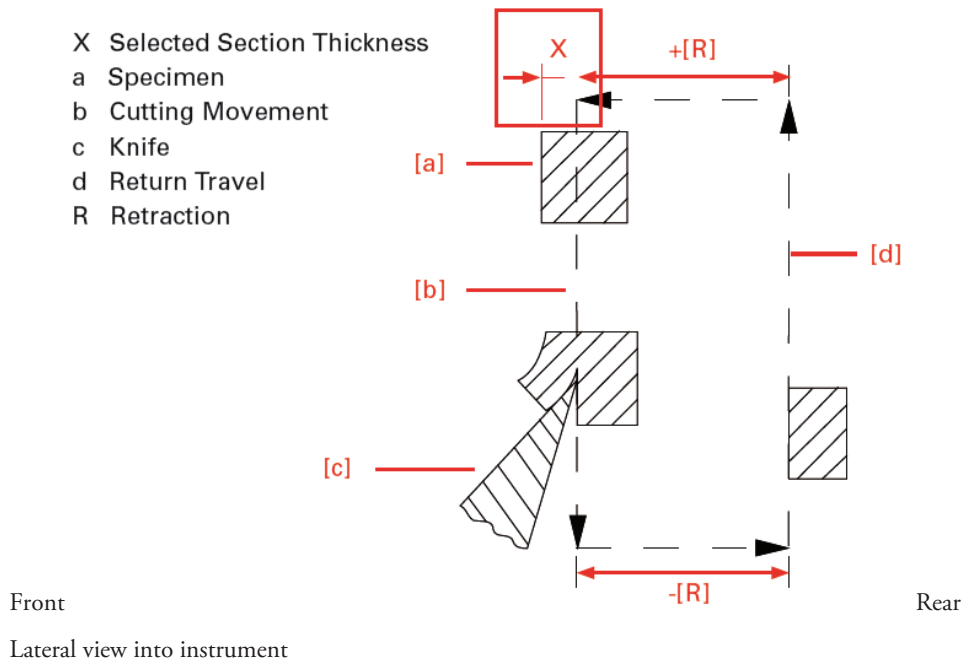
- Using a Heat Extractor in combination with a cryo mold or specimen stage promotes a faster freezing method which freezes from the top and the bottom simultaneously.
- It also reduces the formation of freezing artifacts.
- The specimen stage is inserted into the fast freezing rail and the specimen mounted. A cryo mold can also be used.

1. Insert the heat extractor into the fast freezing rail (fig. 1).
2. Turn the knob (fig. 2) to lower the heat extractor onto the specimen (fig. 3).
3. Further turn the knob (fig. 2) to increase the pressure onto the specimen.  
Carefully observe this process to avoid a possible deformation of the specimen.
4. To loosen the heat extractor, turn the knob (fig. 2) in opposite direction.



## Sectioning Procedures

### Cutting Movement and Retraction



#### Note

*The retraction prevents the surface of the specimen being damaged during the return stroke of the specimen head.*

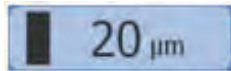
*The retraction can be switched off- see "Switching the Retraction On - Off".*

*The retraction distance required is 20  $\mu\text{m}$  and cannot be changed.*

### Trimming and First Cuts

After the specimen orientation and the blade angle have been set, trimming can be carried out using the trimming function.

#### Trimming



- Make sure that the trimming thickness setting is selected

#### Note

*Trimming thickness is shown highlighted on the display.*

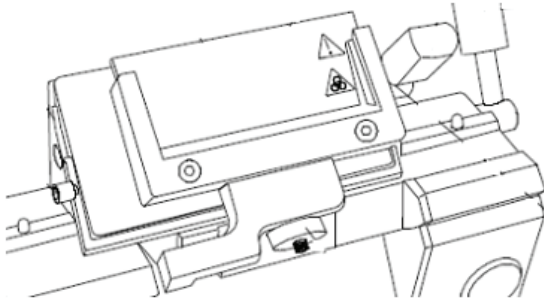
*Turn the hand-wheel in a clockwise direction to begin trimming.*

- Press the "Trim" button to move forward the blade holder by the preset trim value. The hand-wheel does not need to be turned for this function.

#### Note

*The specimen head will move forwards by the preset trim thickness value every cycle.*

### Sectioning and Taking Off Sections



- Set the desired section thickness - see Cutting Thickness.
- Place the anti-roll plate against the blade.
- Turn the hand wheel in a clockwise direction to carry out sectioning.

#### Note

*The section slides into the space between the blade and the anti-roll plate.*

- Use the handle to move the anti-roll plate assembly away from the specimen.
- The section should remain on the clamping plate.
- Arrange specimen section gently with a brush.
- Transfer the specimen onto a glass microscope slide with help of adhesion forces.

### Hand Wheel Lock

Before placing or removing a specimen on the specimen head, or adjusting the orientation, always ensure that the mechanical hand wheel lock brake is engaged. The handwheel lock brake will prevent unintended movement of the specimen head.

Activating the lock reduces the risk of being injured when adjusting the specimen head and/or the blade carrier.

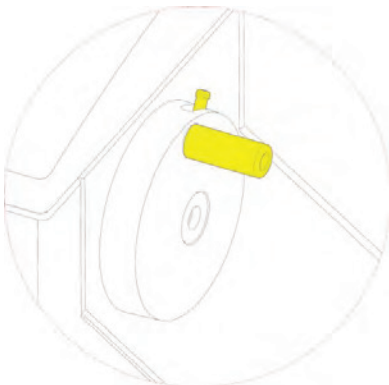


**When the instrument is turned off, the mechanical hand wheel brake has to be activated.**

### Mechanical Handwheel Brake

The mechanical handwheel lock acts as an additional safety device, especially when the instrument is turned off. To mechanical handwheel lock can be activated by the lever on the handwheel.

To activate the mechanical Handwheel Lock



- Bring the handwheel handle into a 12 o'clock position.
- The switch for the handwheel lock can now be pressed forward into the locked position.

#### Note

*If the lever is not in the correct position to lock, keep the lever pressed and move the handwheel slowly forward and backwards until the switch is locked.*

- Sectioning is not possible when the instrument is turned off or when the mechanical hand wheel lock is activated.
- To unlock the mechanical Handwheel Lock: Pull back the Handwheel Brake switch Lever.



## How to Avoid Malfunctions



To cut usable sections, the following points are of utmost importance:

- Fit the knife edge, possibly move it horizontally to the left or right.
- Check adjustment of anti-roll plate guide and correct it, if necessary.
- Carefully remove debris from the front and rear part of the knife and from the anti-roll plate with the use of ethanol, alcohol, or a similar reagent.
- Tighten all clamping screws and clamping levers on the knife carrier and specimen holder.
- Select the appropriate cutting temperature according to the specimen.
- Select the appropriate freezing medium.

### Note

*If the specimen was frozen with liquid nitrogen or similar freezing techniques, the specimen must adapt itself to the cutting temperature.*

- Carefully select the required knife material and profile.
- Adjustment of knife height.
- Adjustment of proper clearance angle. Usable cuts are only achieved at a clearance angle of 8-12° or more.
- Take care in bringing the specimen and knife together.



**Remove the specimens from the cooling chamber during defrosting, as the temperature inside the chamber will increase. Do not leave or store tissue inside the QS12 over a longer period. Due to power failure or other unexpected malfunctions of the instrument, the specimen might be damaged.**

## 5 - Troubleshooting

### Troubleshooting Tables

Problem	Cause	Removal
QS12 temperature cannot be achieved	Ambient temperature too high	Lower ambient temperature by fresh air, climate. Please note the specified temperature of +20°C!
	QS12 is influenced by near, heat-generating instruments	Change site of installation
	Draught into the QS12	Change site of installation
	Soiled condenser	Open the service door on the left side, clean the condenser
	Defective cooling	Call a service technician
Frost built-up on chamber wall and on microtome	Draught (open doors, windows)	Change site of installation; close windows, doors
Retarded freezing-on of the specimen	Surface of the fast freezing station is soiled	Remove debris
	Lower part of the chuck is soiled or damaged	Remove debris, remove damage
	Static electricity in chamber.	
Chatter while cutting	Unfavourable clearance angle	Readjust clearance angle
Sections tear or crack	Insufficient knife sharpness	Move the knife in the knife carrier
	Knife not adequately clamped	Check knife clamping
	Chuck inadequately clamped	Check clamping
	Specimen inadequately frozen on onto the chuck	Re-freeze the specimen onto chuck
	Specimen grossed too thick – it loosens from the chuck	Again freeze on the specimen
	Specimen very hard and uneven	Select new section thickness, reduce the specimen
Sticky sections	Specimen not cold enough	Select a lower temperature
	Knife and/or anti-roll plate are not yet cold enough – section melts	Allow knife and/or anti-roll plate to cool.
	Specimen incorrectly clamped.	Blade clamping force can be increased by tightening. Wait until the knife and/or the anti-roll plate have sufficiently cooled.
		Check specimen is securely mounted and clamped in specimen head jaws. Check there is no debris or ice on the back of the chuck or on specimen head.

Problem	Cause	Removal
Sections do not stretch, although the correct temperature has been selected and the anti-roll plate has been adjusted correctly	Knife and/or anti-roll plate are not clean Edge of anti-roll plate is damaged Blunt knife	Clean with a dry cloth or brush Replace anti-roll plate Move / replace / sharpen the knife
Sections break, fissures in the sections, sections are not stretched properly	Specimen too cold Static charge/draught Specimen not cold enough Large specimen Anti-roll plate not adjusted properly Anti-roll plate not aligned parallel towards the knife edge Incorrect clearance angle Blunt knife	Select a higher temperature Remove the cause Select a lower temperature Trim the specimen in a parallel way; select a thicker section thickness Readjust the anti-roll plate Align Anti-roll plate parallel to knife edge Readjust the clearance angle Move / replace / sharpen the knife
Sections roll over the anti-roll plate	Anti-roll plate does not project over the knife edge properly	Readjust the anti-roll plate
Scratching noise while cutting and during the return travel of the specimen clamping	Anti-roll plate projects over the knife edge too much and scratches on the specimen	Readjust the anti-roll plate
Thick-thin sections	Knife sharpness Knife angle Clamping on knife carrier Clamping on specimen holder	Move the knife – if necessary replace or sharpen Readjust Check clamping Check clamping
Tight handwheel during the entire movement	Debris and section waste between microtome and base plate Soiled link block Toothed belt tension	Remove and clean Please call a service technician
No chamber illumination	Defective lamp	Check, replace

## Tips for Successful Sectioning

For optimal sectioning, the following points should be followed:

- Check the condition of the blade edge; move carrier horizontally to the left or right side to obtain a sharp cutting edge.
- Check adjustment of anti-roll plate and correct it, if necessary.
- Ensure that the edge of the anti-roll plate glass is clean and free of debris.
- Carefully remove frost from the front and the rear part of the blade, from the anti-roll plate and the clamping plate (i.e. with ethanol).
- Tighten all clamping screws and clamping levers on the blade holder and specimen head.
- Select the appropriate chamber temperature according to the specimen type - see Temperature list for Cryo-sectioning.
- Allow time for the temperatures within the chamber to stabilise
- Select the appropriate freezing compound.
- Avoid excessive use of freezing compound.

### Note

*If the specimen was frozen with liquid nitrogen or similar freezing techniques, the specimen must be allowed to adjust to the cutting temperature.*

- Adjustment of proper clearance angle. Select a clearance angle of 8-12°. The preset clearance angle is 10°.
- Take care when bringing knife and specimen together.



**During defrosting, remove the specimens from the cryo chamber, as the temperature inside the chamber will increase. Do not leave or store specimens inside the QS12 over a period of time. Due to a power failure or other unexpected malfunctions of the instrument, the specimen might be damaged.**

### Temperature list for cryo-sectioning

The optimal cutting temperature of a specimen depends on the respective characteristics of the tissue especially the fat content. The following table based on experience recommends cutting temperatures for some typical specimens:

Range A -10 to -20°C	Liver
	Kidney
	Spleen
	Thyroid
	Lymph Node
	Uterine Curettings
	Tongue
	Testicle

Range B -20 to -30°C	<p>Muscle</p> <p>Breast without fat</p> <p>Brain</p> <p>Bone Marrow</p> <p>Lungs</p> <p>Intestine</p> <p>Prostate</p> <p>Cervix</p> <p>Uterus</p> <p>Pancreas</p> <p>Adrenal</p> <p>Skin without fat</p>
Range C -30 to -60°C	<p>Adipose</p> <p>Omentum</p> <p>Breast with fat</p> <p>Cheese</p> <p>Butter</p> <p>Industrial Waxes</p> <p>Soft Rubber</p>
Additional cooling with liquid nitrogen or dry ice might be necessary	

**Note**

*The indicated cutting temperatures are subject to a tolerance, as the fat contents of tissue differs and pathological tissue shows natural variations.*

## 6 --- Maintenance and Care of the QS12

### Cleaning the Touch Screen Display

- Use commercially available cleaning tissues or use a soft and slightly wet towel to clean the Touch screen.



**Do not use household cleaner or chemicals (i.e Xylene) for cleaning of the touchscreen to avoid severe damage.**

### Shutting Off for Cleaning

Cleaning, care and decontamination of the QS12 depends on how frequently the instrument is used. In accordance with regulations, it may be necessary to shut the instrument off every 10-12 weeks due to environmental conditions.



**As the following work might be hazardous because of the danger of freezing burns from contact with frozen parts and potentially contaminated material, it should only be performed by skilled or trained personnel.**

Please proceed as follows:

- Wear protective gloves.
- Remove knife/blade from the knife carrier and store it in a knife case.
- Remove the brush shelf, tools as well as chucks.
- Bring the handwheel handle into its upper position, i.e. the specimen clamping is also in its upper position.
- Remove the middle and rear section waste tray. Dispose of the section waste according to the lab regulations
- Remove any cold section waste
- Turn off the mains switch and unplug the unit
- Loosen the clamping lever on the knife carrier and remove the knife carrier. If necessary, treat it with disinfectant.
- Empty water drain reservoir.



Risk of freezer burns due to frozen knife carrier.

## Cleaning and Care

### Cleaning and care during routine work:



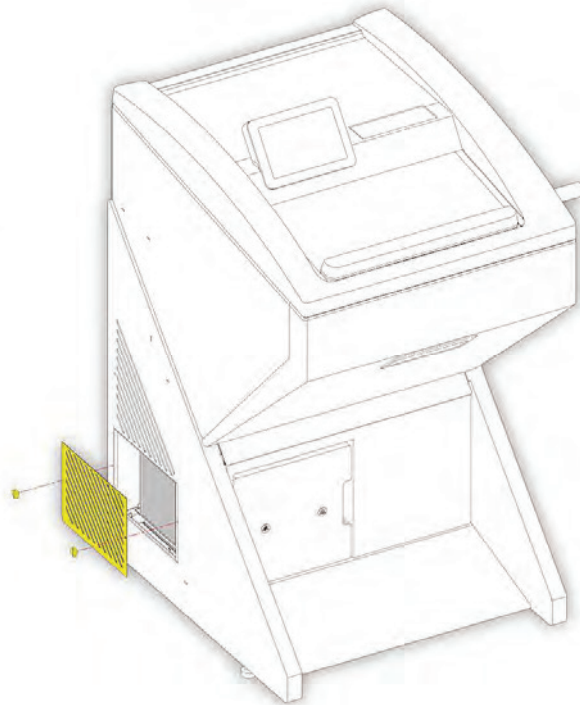
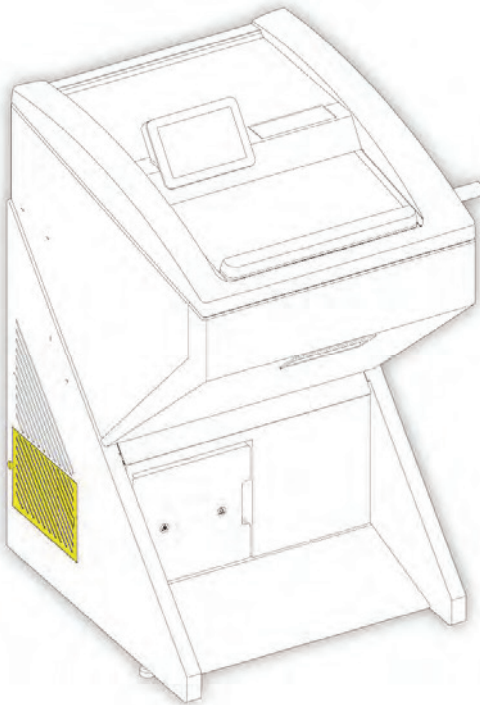
A regular and/or immediate disinfection of the blade carrier, the cryo chamber as well as all the other potentially contaminated parts of the instrument is highly recommended. Most commercially disinfection solutions can be used.

### Cleaning the cooling Vent

- Open the cleaning door with a coin on the left and right side.
- Remove the dust from the cooling grill / vent by means of a commercially available vacuum cleaner.

### Note

*Carry out this cleaning in regular intervals, thus extending the lifetime of the compressor.*



## Conditions for the transportation of the instrument

### Returning the instrument for repair or routine Maintenance

Repair or maintenance work is normally carried out at the site of installation. If this is not possible for some special reason, the instrument can be returned to manufacturer.

The contact address can be found at the beginning of this instruction manual.

- To guarantee trouble-free function of the instrument after transportation, please note the below-mentioned measures for the transportation preparation.
- In addition, the conditions for storage and transportation as mentioned in part 1-2 must be observed during the entire transportation.



**Note the precautionary measures described in the safety precautions concerning biological hazards.**

### Measures for closing down:

- Turn off the instrument.
- Unplug the unit.
- Remove blade and/or knife from blade and/or knife carrier.
- Remove section waste trays, brush shelf, blade/knife carrier and other accessories as well as tools from the cryo chamber.

### Note

*Clean and disinfect these accessories according to the lab regulations and transport them in dry condition.*

- Clean and disinfect the cryo chamber according to lab regulations.
- Unscrew the handwheel handle for transportation.
- Before the transportation, thread up the fixing bolts.
- Keep the heated sliding window closed during transportation.

### Note

*After reaching ambient temperature, the blade holder needs approx. 1 h in the chamber at  $-25^{\circ}\text{C}$  to be able to section specimens again.*

For transportation exterior, please observe the following measures:

- Turn off the instrument.
- Unplug the unit.
- Remove blade and/or knife from blade and/or knife carrier.
- Remove section waste trays, brush shelf, blade/knife carrier and other accessories as well as tools from the cryo chamber.



**Note**

*Clean and disinfect these accessories according to the lab regulations and transport them in a dry condition.*

- Clean and disinfect the cryo chamber according to the lab regulations.
- Unscrew the handwheel handle for transportation.

**Note**

*To make sure that there is no condensation water inside the chamber, let the instrument dry for approx 48 hours.*

- Clean and disinfect the cryo chamber according to the lab regulations
- Arrange the dismantled accessories into the intended transportation packaging .

**Note**

*Before the further transportation, tighten the fastening screws so that the instrument does not move during transportation.*

- Slightly tilt the QS12 and insert the foam parts underneath it.
- Place the case over the instrument.
- Insert the wooden cover.
- Attach the tightening strips around the packing.
- Drain and rinse the water drain reservoir

**Disposal of the instrument after final shutdown**

After the final shutdown of the instrument, we recommend to contact a local recycling company for disposal according to the national applicable regulations.



To be applied in countries of the European Union and other European countries with a separate collecting system within the waste management.

The marking of the product and/or the respective literature indicates that, after its final shutdown, it must not be disposed of together with ordinary domestic waste

- Please dispose of your instrument separately from other waste to prevent damage to the environment and/or human health by uncontrolled waste disposal.
- Recycle your instrument to support the sustainable recycling of material resources.
- Industrial users should contact their suppliers and observe the conditions of the contract. This product must not be disposed of together with other commercial waste.
- Please contact your supplier.

## Accessories standard equipment

The microtome QS12 is equipped with the following accessories:

### Specifications

Instrument dimensions	29"W x 30"D x 45.3"H
Recommended clearances	36"W x 33"D x 60"H
Instrument weight	315 lbs.
Electrical requirement *Recommended dedicated 20 amp circuit	120V, 12 amp*

### Standard Accessories Included

Description	Qty.	Item #
Avantik OCT Embedding Matrix	1 bottle	EM0199
Accu-Edge - HP Blades	1 pack	SE3024
30 mm Specimen Chucks	18	EM0162-A
Heat Extractor	1	5265121
Anti-Roll Glass	2	8265036
#3 Camel Hair Anti-Roll Brush	2	SE3053
#4 Camel Hair Anti-Roll Brush	1	SE3054
#5 Camel Hair Anti-Roll Brush	1	SE3057
#7 Camel Hair Anti-Roll Brush	1	SE3055
Angle Sectioning Brush	1	SE3062
Debris Brush	1	SE3077
Brush Shelf	1	n/a
Waste Tray - Long	1	n/a
Waste Tray - Small	1	n/a
Deposit Rack - Right Side	1	n/a
Deposit Rack - Left Side	1	n/a
Distance Bolts (Set of 2)	1	n/a
Microtome Lubricating Oil	1	SE3082
5 mm Allen Key	1	n/a
6 mm Allen Key	1	n/a
Open End Wrench	1	n/a
Operator Manual	1	n/a
Allen Key Set	1	n/a

## Index