OPERATING
MANUAL

slee solutions for pathology

TISSUE PROCESSOR
MTM I / II

COST-EFFECTIVE PREMIUM TISSUE PROCESSING
HIGHEST RELIABILITY
EASY CLEANING

DESIGN &
MANUFACTURING
MADE IN GERMANY

Dear Customer,

thank you very much for your confidence in Slee products!
Before you start operating the device, please read the operating instructions carefully to familiarize yourself with the proper operation and functions. The device should only be operated by specially trained and instructed staff. The specified safety measures as well as the regulations and hygiene standards of the respective laboratories must be respected.
Enjoy working with your new device!
Your team from SLEE medical GmbH

Please note:

Some of the images in this manual may show special equipment and / or accessories that are subject to a charge. The image may differ slightly from the product. Errors excepted.
We always try to keep our documents up-to-date and free of errors. However, should you notice any mistakes, we would be grateful if you could provide us with feedback. Comments on the actual content are also welcome at any time. Simply e-mail us at marketing@slee.de.

The information, numerical data and notes contained in this document represent the current state of scientific knowledge and state-of-the-art technology as we understand it following thorough investigation in this field. SLEE medical GmbH is under no obligation to update the present manual periodically and on an ongoing basis according to the latest technical developments, nor to provide our customers with additional copies, updates etc. of this document. To the extent permitted in accordance with the national legal system as applicable in each individual case, we shall not be held liable for erroneous statements, drawings, technical illustrations etc. contained in this document. In particular, no liability whatsoever is accepted for any financial loss or consequential damage caused by or related to compliance with statements or other information in this document. Statements, drawings, illustrations and other information regarding the contents or technical details are not to be considered warranted characteristics of our products. These are determined only by the contract provisions agreed between ourselves and our customers. SLEE medical GmbH reserves the right to change technical specifications as well as manufacturing processes without prior notice.

CONTENT

1. INTENDED USE

1.1. Designated use

The MTM I / II is an automatic closed cycle floor standing tissue processor, designed to be solely used:

- in a histology laboratory,
- by on purpose trained technicians,
- for processing specimen,
- provided that is used accordingly with the instructions contained in this manual.

It is designed for the following laboratory applications:

- fixation,
- dehydration,
- paraffin wax infiltration of histological tissue samples.

Any other usage is expressly prohibited.
Failure to follow to these instructions may result in accidents, damages to the device and accessory equipment, personal injury.

Important note:
The same instructions apply for both MTM I and MTM II tissue processors. Some parts only refer to the MTM II model and are clearly indicated.

1.2. General warnings

Before using the device, please carefully read this manual.
Please pay particular attention to the precautions that must be taken for user and product safety.
To avoid potential device damage, do not use reagents different from those specified in this manual.
The warranty applies only if the device is used in the correct manner and in accordance with the information and advice provided herein.
The manufacturer declines all responsibility for possible damages to persons and/or objects due to improper or inexperienced use of the device.

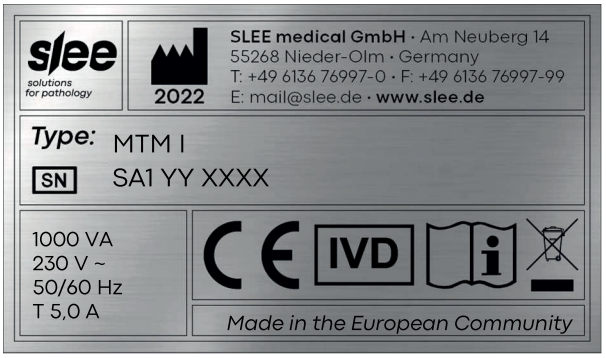
2. SYMBOLS

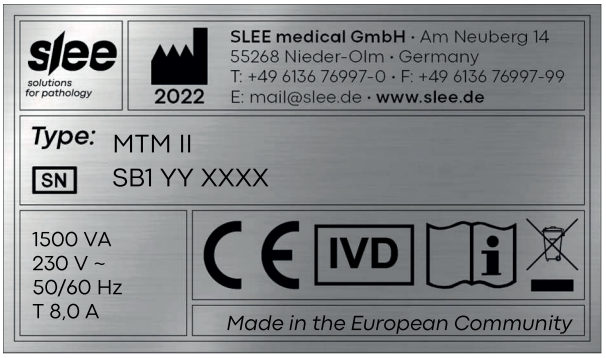
2.1. Type plate symbols

Not all symbols might appear on the label of the respective device.

20xx	Year of manufacturing
	Manufacturer address
	CE mark
	In Vitro Diagnostic device
	Caution! Please read accompanying documentation.
	Please read the instructions for the use.
	Do not throw on domestic garbage, please follow the local rules for special waste recycling and treatment.

Illustration of type plate (example):



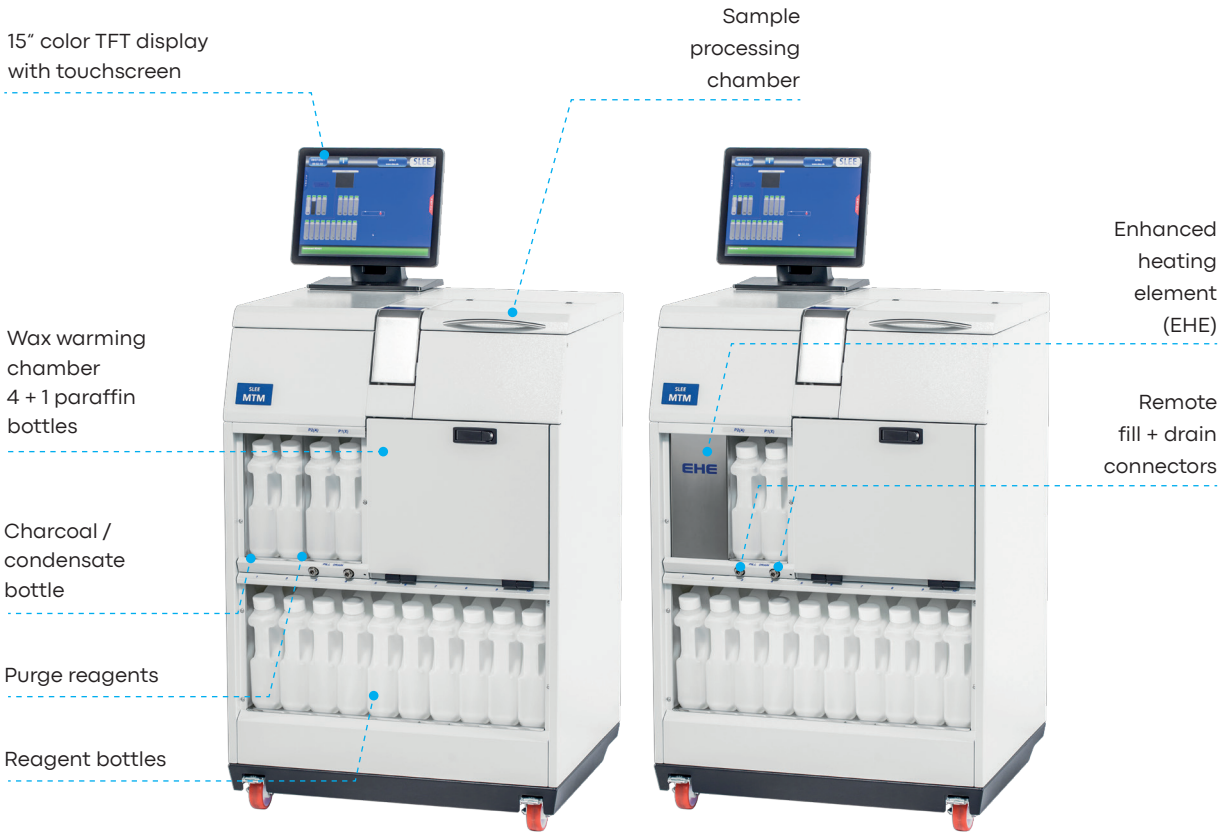


2.2. Manual symbols

	Dangers, warnings and cautions are marked by this symbol.
	Special instructions regarding the operation of the device are marked by this symbol.

3. OVERVIEW DEVICE

Picture: MTM I / II tissue processor



MTM I **MTM II**

4. SAFETY NOTES

4.1. Electrical power connection

Do not use any extension lead.

Before installing the device, make sure that the electrical connection values match the specifications on the type plate and that a constant power supply is guaranteed. The electrical circuit at the installation site must be checked by an electrical engineer to ensure that it meets the requirements for smooth operation of the device.

- Severe damage can result if the device is connected to a power supply different from the rating stated in the identification tag placed on the rear of the device.
- The device must NEVER be used without being connected to an appropriate and fully efficient ground connection.
- If damages due to transport occur, DO NOT use and DO NOT connect the device to a power source. Contact our technical service.
- This device has been designed to work 24/7; for this reason and for operative precautions, the power switch is placed on the rear of the device.
- Access to the device's internal components is reserved only to specialists trained in the service of the device.
- Always disconnect the processor from the electrical main source before accessing the electronics and internal parts.
- BEFORE replacing fuses, disconnect the device from the power source.
- Always make certain to correctly engage the reagent bottles.
- DO NOT open the processing chamber lid when the device is working without following the instructions contained in this manual.
- Use specific precautions in handling flammable reagents such as ethanol (wear protective gloves and eyeglasses).
- Use specific precautions in handling liquid waxes as they can cause burns.
- The emptying and filling of reagent bottles must only be done only by qualified technicians.
- Due to the presence of flammable substances inside reagents bottles, it is recommended to:
  - Avoid smoking near the device.
  - Avoid using open flames near the device (e.g. Bunsen burner).
  - DO NOT wear clothes that can create electrostatic charges while handling reagents (wool, synthetic fibers, etc.).
- Contaminated reagent waste must be disposed off in accordance with all applicable local laws, ordinances and safety standards.
- Use only original spare parts supplied by the manufacturer or by authorized dealers.
- DO NOT extract bottles, replace reagents or do other maintenance operations when the device is operating.
- To complete the knowledge on the device safety please read the chapter SAFETY DEVICES.

5. COMPONENTS

5.1. Standard components

The Slee vacuum tissue processor MTM I / II is provided with the following standard components:

	MTM I	MTM II
Enhanced heating element (EHE) for preheated reagents	-	•
15" color TFT display with touchscreen	•	•
Cassette basket (2 x 150 cassettes; stainless steel)	•	•
Basket carrier	•	•
Reagent beaker (10 pcs.)	•	•
Paraffin beaker (4 + 1 pcs.)	•	•
Cleaning solution beaker (2 pcs.)	•	•
Charcoal container (1 pcs.)	•	•
Condensate container (1 pcs.)	•	•
Sieve insert	•	•
Mains cable	•	•
Manual	•	•

• = standard component, o = optional, - = not available

6. SPECIFICATIONS

6.1. General

	MTM I		MTM II	
Nominal power	115 V AC ±10 %	230 V AC ±10 %	115 V AC ±10 %	230 V AC ±10 %
Nominal frequency	60 Hz	50 Hz	60 Hz	50 Hz
Fuses	2 x T 10 A	2 x T 5 A	2 x T 16 A	2 x T 8 A
Protective class	I			
Overvoltage category	II			
Pollution class	II			
Max. heat energy	1,000 J / sec		1,500 J / sec	
Operating temperature range	+10 to +35 °C			
Operating humidity	max. rel. 80 % non-condensing			
Storage temperature range	-10 to +50 °C			
Storage humidity	max. rel. 80 % non-condensing			
Max. elevations	2,500 msl			
Dimension (w x d x h)	720 x 600 x 1,300 mm (with monitor)			
Weight	154 kg		180 kg	

All temperature specifications refer to an ambient temperature of +20 °C and a relative humidity of 60 %.

6.2. Technical features

	MTM I	MTM II
Cassettes processing capacity	300 standard cassettes	
Equipped baskets	n. 2 baskets made of stainless steel with capacity of 120 / 150 cassettes each	

6.3. Protocol features

	MTM I	MTM II
Processing programs	n. 18	
Favorite programs, with quick starting up	n. 6	
Washing programs	n. 4	
Inverted processing program	n. 1	
Max time for each step	99 h and 59 min	
Max delay time	14 days, 23 h, 59 min	
Process end time	modifiable for each process, self-recording	
Process start	programmable by the user	

6.4. Reagents

	MTM I	MTM II
Reagent tanks	10 reagent tanks, capacity 2.5 l 2 reagent tanks for washing reagents, capacity 2.5 l	
Wax tanks	5 wax tanks, capacity 2.5 l (4 tanks for processing, 1 tank spare / stand by)	
Melting time (approximate)	8 h	
Paraffin cleaning cycle	activated by the user	
Reagent heating temperature	room temperature +65 °C	
Paraffin heating temperature	45 - 65 °C	
Process pressures	600 / 1200 HPa	
Reagent agitation	n. 6 mixing levels	
Vacuum and pressure function	4 (V/P, V, P, ambient)	
Reagent management system	RMS: complete control on reagents, paraffins, clean cycles and charcoal filters	
Hardware & software features	1 tank 2.5 l - charcoal filter, with forced ventilation	

6.5. Hardware & software features

	MTM I	MTM II
Monitor	color monitor touch screen LCD TFT 15"	
USB ports	nr. 5 for data transfer, backup, printer and UPS	
Network	2 LAN net port 10/100Mb (Ethernet)	
Alarm	input for external alarm (48 v AC/DC max 1A)	
UPS	external dedicated UPS (optional)	

7. UNITS OF MEASURE AND ABBREVIATIONS

Monitor	Color monitor touch screen LCD TFT 15"
EHE	Enhanced Heat Exchanger
WWC	Wax Warm Chamber
SPC	Retort - Sample Processing Chamber
RMS	Reagents Management System
RFD	Remote Fill and Drain system
WCC	Wax Cleaning Cycle
HPa	Pressure unit of measure
W	Power unit of measure: Watt
A	Current unit of measure: Ampere
V	Voltage unit of measure: Volt
IOB2	Input Output Board
TSM	Touch Screen Monitor
PS	Power Supply
CPU	Control Processing Unit
CF	Compact Flash memory
TP	Pressure Transducer
TS	Temperature Sensor
UPS	Uninterruptable Power Source
VR	Rotary Valve
MV1	Main Valve 1
MV2	Main Valve 2
MV3	Main Valve 3
M1	Rotary Valve Motor
PM	Air Pump
VT	Vapor Trap
WT1, WT2	Wax Traps
VV1	Vacuum Valve
PV1	Pressure Valve
PNV	SPC Pressure Normalize Valve
SV	Safety Valve

8. UNPACKING AND INSTALLATION

8.1. Handling

Before moving or transporting the device, it is essential to carefully read this chapter, paying particular attention to the device setup instructions. The warranty is invalid if the device is improperly operated. Be certain to follow the instructions and recommendations provided by this manual. The manufacturer is not responsible for damages resulting from improper operation or handling of the device.

i	Pay particular attention to the outside of the shipping container. In the event of concealed damage, save all shipping crates and packing material. DO NOT unpack the device if damage is apparent. Immediately notify the carrier of any damage and contact the shipper to initiate any claims. When the device is delivered, check the tilt and impact indicators attached to the packaging. If the tilt indicators are active (blue arrowhead), the appliance was transported lying flat, tilted too much or fell over during transportation. If the impact indicators are active, the appliance has been tilted too much during transportation or has been subjected to excessive acceleration. Make a note on the shipping documents and inspect the device for possible damage.

Open the cardboard box from the top and remove the accessories together with the supporting foams. Then remove the cardboard box (lift it up).
Remove the screws on the two fixation brackets that hold the device on the wooden pallet.
Swing out the ramp. The device can then be rolled down the transport pallet. Due to the high weight of the device two (2) persons are required to ensure a safe transport.
Carefully lift the device slightly while rolling it down the ramp from the pallet. Roll the device to the desired installation location.
Tighten the device's locking feet to prevent it from rolling or slipping away during use. The height of the device can be adjusted via the feet.
Please only use the original packaging material for further transportation. Keep the packaging material if necessary.

8.2. Installation site requirements

The installation site for the MTM I / II should meet the following conditions to ensure the specified device performance:

- Mains power supply within 3 m.
- No air circulation (for example by air conditioning).
- Device may only be used inside rooms.
- The mains supply should not be connected in series with other devices, such as multiple sockets - a separate circuit should be provided.
- Relative humidity lower than 60 %.
- A minimum distance between wall and rear of the device of 10 - 20 cm must be guaranteed.

8.3. Unpacking the device

The proper steps to be taken are:

1. Open the top of the box.
2. Lift the side walls out of the way.
3. Raise the device to the vertical position.
4. Remove the plastic layers that wrap the device.
5. Carefully check the external condition of the device. In the event of evident damage, DO NOT connect the device. Immediately notify the carrier and promptly contact the seller.
6. For the setup of the device, see the specific chapter (Installation and Start-up) in this manual.
7. Save the box and all the internal packaging in the event that the unit requires future shipment.

8.4. Verify the presence of the following accessories and components

Description	Qty
RFD hoses	2
Remote alarm connector	1
Basket, 150 cassettes (with cover and dividers)	2
Basket carrier	1
Video touch screen	1
Reagent bottles (with Delrin cap)	10
Paraffin bottles (with Delrin cap)	4
Paraffin bottles reserve (with Delrin cap)	1
Purge bottles (with Delrin cap)	2
Charcoal filter	1
Condensate bottle	1
Main power cord 115 / 230 V - 16A	1
Wall spacers	2
Sieve insert	1
User manual	1
Charcoal filter installation instructions	1

8.5. Packaging and / or preparation for transport

To transport the device, perform the following steps:

1. **Remove all reagents (waxes included) from their bottles.**
2. **Remove and close, with the proper threaded cap, the charcoal filter bottles, put also some adhesive tape on the air inlet to avoid charcoal pellets to get out.**
3. Transport the charcoal filter bottles separately from the device, wrapped and securely closed in a protective nylon bag.
4. If the original box has been saved, follow the unpacking instructions in the reverse order, using all the interior packaging to avoid serious damage to the device during shipping.
5. If you do not have the original packaging, transport the device in a vertical position.

8.6. Transportation

Before shipping, please keep in mind that

1. The device is fragile;
2. the device is equipped with electronic parts;
3. contact with water and / or any other liquid is to be avoided; please ensure that the internal plastic protection bag that wraps the device is utilized;
4. transporting and storing temperature(s) must be between -10 °C and +50 °C;
5. using the original box, the device MUST be transported horizontally;
6. transporting the device vertically is highly discouraged as its center of gravity is quite high.

9. INITIAL OPERATION

9.1. General features

The MTM I / MTM II can be used as a conventional vacuum tissue processor for overnight, not fast, tissue processing, or, thanks to the device EHE (Enhanced Heat Exchanger – only for MTM II) capable to warm up the reagent during the transfer from the tank to the processing chamber, it can be used for the fast processing of biopsies or for semi-rapid processing of larger samples.

The MTM I / II tissue processor recycles the air utilized to move the reagents to and from the processing chamber. Two effective charcoal filters on the external air-intake reduce the exhaust fumes to acceptable and safe levels.

The wax and reagent bottles can be rapidly removed and easily reinstalled in their housing slots.

The control devices (hardware and software) are based on the most up-to-date processing control technologies.

Up to 12 different programs can be permanently stored and be easily modified. The 12th program is a special "REVERSED" program that is used to de-process samples that have not had good infiltration.

During a run, every step and action is displayed on the screen, such as current step and function (emptying, filling, etc.), processing chamber and wax heating chamber temperatures, processing chamber pressure, completion time and date, and any other parameter necessary to simplify the use of the device.

In the event of power failures, the computer saves all the data necessary to restart the process exactly where it was interrupted. If the interruption happens during the wax stages, particular precautions are taken to guarantee melting before any wax filling or emptying begins.

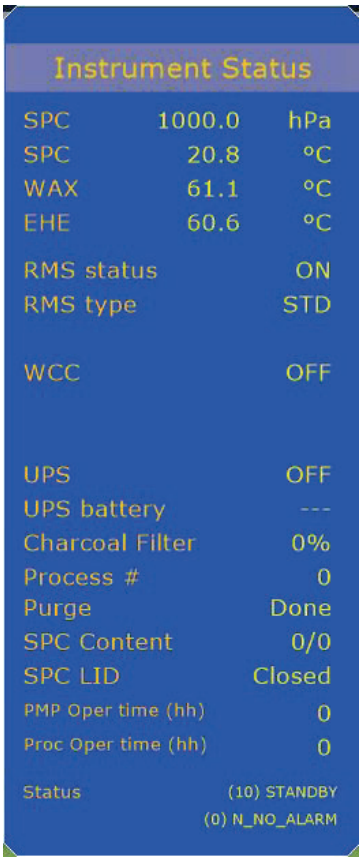
9.2. User interface and keyboard

The user interface is based on "Touch Screen" technology. Therefore there isn't any traditional keyboard, all the device functions are activated by a finger touch.

At the top left, near the clock, there is an icon with the letter "i", by pressing this a temporary window appears (which closes automatically after 30 seconds) containing information on the most important parameters regarding the status of the device:

By pressing the I (info) key, a window will appear containing information about:

- SPC - Sample Processing Chamber Pressure
- SPC - Sample Processing Chamber Temperature
- WAX - Wax chamber Temperature
- EHE - Device for fast reagent heating Temperature
- RMS Status (Reagent Management System)
- RMS Type - The type of RMS selected (BCODE= Barcode)
- WCC - Wax Cleaning System status
- UPS - Uninterruptible Power Source status
- UPS battery - Battery pack of the UPS charge
- Charcoal Filters - 0 % = new; 100 % = exhausted
- Process # - Total number of processes executed
- Device status: STAND-BY = waiting for a process start.
- Purge – Cleaning cycle status: DONE = executed
- SPC content – The number on the left indicates the reagent currently filled into the SPC, the number on the right indicates the last reagent filled in the SPC.
- SPC LID – SPC Cover Status
- Number of pump operating hours
- Number of processing hours
- Status - The state of the device (action it is currently performing)



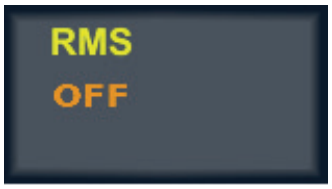
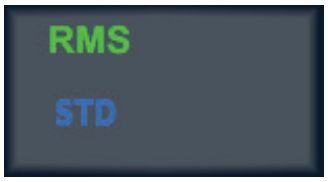
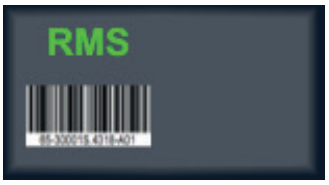
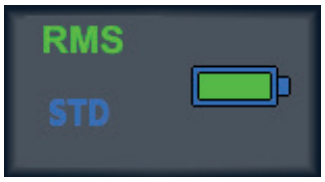
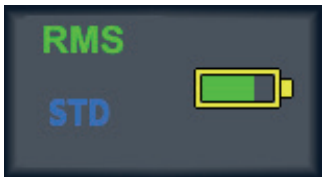
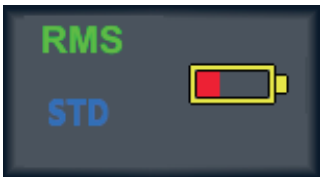
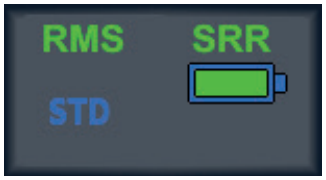
On the screen the graphical representation of the device hydraulic circuit is always visible. This will allow the fast recognition of: rotary valve position, the SPC and its level sensor situation, reagents quality (cap color), the presence or the absence of reagent in the tanks, charcoal filter status.

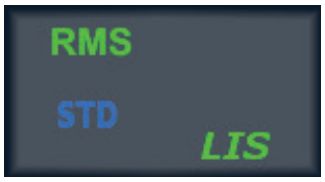
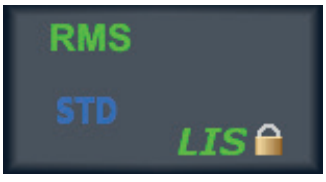
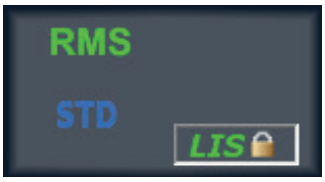
There are two menus (START and SETUP) that can be activated by simply pressing on their icons. Once activated, when not used, the menus will disappear in 30 seconds.

At the bottom of the display a small window with messages for the operator is always visible; the messages will guide and inform the operator about what is going on in the device and about what he(she) can / cannot do. In order to correctly operate the device the messages must always be carefully followed.

i	**IMPORTANT NOTE:** **In case of TOUCH-SCREEN malfunction it is possible to continue to operate the device by simply connecting a mouse to one of the USB ports available on the device back panel. The mouse must be Windows XP compatible. The operating system should recognize it promptly by plug-and-play functions, in case it would not work, please try restarting the device (power OFF then ON after 10 sec).**

9.3. Status display of optional functions

Standard RMS reagent management system (Reagent Management System)	
 RMS STD DISABLED	 RMS STD ENABLED
Reagent management with RMS Barcode system	
	
External UPS enabled	
 UPS enabled - AC ON	 UPS enabled - AC OFF
 UPS enabled - AC OFF and insufficient battery charge level	
SRR function – (Safety Reagents Recovery)	
 SRR function enabled	

Connection with LIS System – (Laboratory Information System) For the SETUP of the LIS system, refer to the description in the manual. For the operation of the LIS system, refer to the dedicated LIS manual		
 LIS function enabled	 LIS function enabled and processor operation authorized to execute orders only coming from the LIS	 The flashing white box indicates that there are orders coming from the LIS waiting for execution

9.4. Screen saver

Modern LCD screens life is quite long but the lamps that provide screen's lighting are characterized by a much shorter life. For this reason a screen saver device cuts-off the screen power 30' after the last time somebody touched the screen surface. A simple touch in any place of the screen surface will re-start the power and the screen functions in approximately 1 second. In case the screen would not wake-up, it will be necessary to switch OFF and then ON (after 10 sec) the entire device from the main switch located on the rear panel. If also this attempt will fail, there is still the possibility, quickly after the switching ON of the device, to switch ON the screen by its small push button switch (which is located on the right bottom of the screen frame). It is recommendable to not touch the screen more than once to wake it up, the first touch it is not recognized as a command but only as a request to wake-up the screen, the following touches are recognized as commands and with the screen not yet visible may give unpredictable results.

9.5. Rear panel

On the rear panel of the control module there are:

MAIN POWER	On / Off main switch and Main power connection module. Please note that, neither the switch, nor the unplugging of the plug from the socket, can provide electrical separation from the main power.
FUSES	Fuses (for the capacity see the table at the end of the manual)
RESET	Reset button (turn off the device, turn it on again keeping this button pressed until the MAIN MENU appears)
POWER SUPPLY SOCKET	Mains supply of the low voltage power supply (must always remain connected)
POWER SUPPLY SWITCH	It must be always at ON.
REMOTE ALARM	Remote Alarm socket: No alarm = pins 1-2 closed, pins 1-3 open Alarm = pins 1-2 open, pins 1-3 closed The electrical contacts are insulated from the rest of the device. An Auto Dialer or other external alarm notification devices can be connected here. Please note: This socket is a low voltage connection (maximum 48 V, 1 A)
ETHERNET	2 x network connection (Internet, Intranet)
USB	4 x USB ports to connect various peripherals (T.S., keyboard, mouse, UPS, printer)
VGA	LCD screen connector
AUDIO MONITOR	Audio screen connector
POWER SUPPLY 12V	12V connector for monitor power supply

10. OPERATION OF THE EHE DEVICE

10.1. The EHE device – installed only on MTM II

The EHE (Enhanced Heat Exchanger) is a device capable to warm up the reagents (tanks from 1 to 10) during their transfer to the SPC. The heating of the reagents up to 55 - 60 °C allows the performing of faster processing especially on small samples (biopsies).
This device is capable to increase the reagents temperature of 30 - 35 °C without relevant delays; the reagents filling lasts only a few seconds more (approx. 15'') than the filling made directly without using the EHE.
The reagent heating up to 50 - 60 °C allows the reduction of the processing time, in the MTM II this reduction is increased thanks to the fact that the reagent heating is made during the reagents filling (through the EHE) without any delay (in other microwave-free fast tissue processor the reagents heating is made in the sample processing chamber after the filling, so the heating is significantly delayed).

The EHE is devised to make fast BUT SAFE reagents heating; this is accomplished thanks to safety devices but also thanks to its special conformation, the reagent during its trip into the EHE is never in contact with hot spots so its temperature is increased in a homogeneous and gentle way.
The EHE is located inside the device and is not visible from the outside.

10.2. Installation and start-up

After the unpacking and the electrical connection to the main line the device is almost ready for the use; there isn't any particular transport internal device that needs to be removed. The next steps will be:

1. Installation of the charcoal filter on its slot C1. Remove the cap from the charcoal filter bottle and make a hole with a screwdriver or a pencil in the tape that seals the air intake on the top rear of the bottle.
2. Connect the LCD screen. The LCD screen is transported unconnected in a separate cardboard box. The screen must be placed on the top left of the device housing. The electrical connection is made by connecting the 2 connectors on the device rear panel. One must be connected to the VGA, the other in one of the USB.
3. Connect the device to the main power. The power connection must provide a voltage compliant to the voltage indicated on the label in the back of the device and the ground.

The connection to the mains power supply must ABSOLUTELY guarantee:

4. Adequate voltage and power in relation to the data on the device identification label.
5. Adequate and efficient grounding.

It is recommended that the device is plugged into a wall socket equipped with Ground Fault Circuit Interruption (GFCI) protection, as an additional electrical safeguard.

In addition to the MTM I / II anti-blackout feature, an uninterruptible power supply can be utilized to provide power in the event of power outages and some protection against power fluctuations, line noise and power spikes.

	It is highly recommended that the device be operated away from heat (radiators, stoves, direct sunlight, etc.) and moisture (sinks, drains, etc.). It is necessary to install it in a place where it is possible to easily reach the back panel of the unit. In order to make possible to switch OFF the device in case of need or in case of danger (either using the power switch or unplugging the main power cord)

10.3. Check-list for using the device

Initial stage set-up

- Check system time and date.
- Set reagent and protocol names.
- Check and set SETUP parameters (including EHE default temperature).
- Setup the RMS parameters.
- Set protocols.
- Install charcoal filters.
- Fill wax and reagent bottles.

Before starting a process

- Check wax and reagent bottle levels.
- Check the processing chamber for cleanliness.
- Insert samples into the processing chamber.
- Firmly close the processing chamber lid.
- Select the desired program.
- Enter date and time of program completion (include a delay function if desired).
- Enter the number of cassettes processed.

At the end of a process

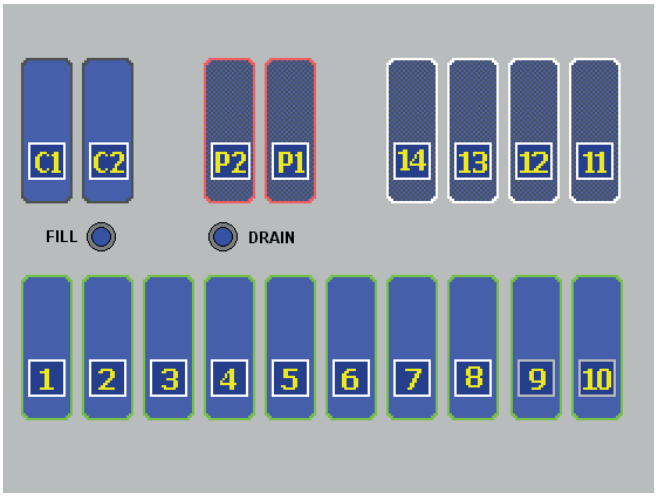
- Follow the instructions to empty the last reagent.
- Wait for complete emptying before opening the processing chamber.
- Take samples out of the processing chamber.
- Clean the SPC and lid of any wax residue.
- Execute the purge program.
- At the end of the purge program, check that the SPC and lid are clean of any trace of wax or foreign bodies. If necessary, complete the cleaning manually.
- Check the graph of the last process executed (from the Main Menu press the key GPH) to verify if the process has been executed properly and without any fault.

	**PLEASE NOTE:** **The reagents MUST be defined in the RMS even if the RMS will not be used!**

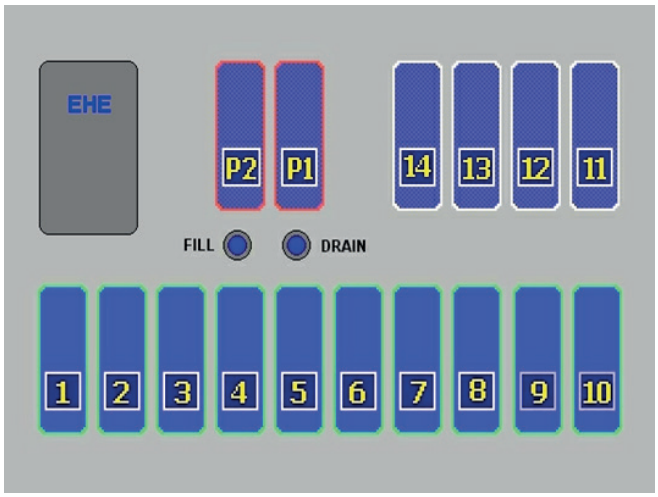
11. REAGENTS

11.1. Reagent tanks arrangement

The following picture shows the arrangement of the device tanks for reagents, waxes, purge agents and charcoal filters as seen from the device front.



MTM I



MTM II

P2	Purge agent 2 (Ethyl Alcohol 95/100)
P1	Purge agent 1 (Xylene or substitutes)
11 -> 14	Waxes
1 -> 10	Reagents
FILL	Filling Port for RFD system
DRAIN	Draining Port for RFD system
C2	Charcoal filter for waxes and reagents (MTM II: on the back side of the device)
C1	Condensate bottle (MTM II: on the back side of the device)

11.2. Compatible reagents

The following reagents can be utilized in the MTM I / II without any risk of damage:

- WATER
- FORMALIN
- ETHYL ALCOHOL (PURE OR DENATURED)
- METHYL ALCOHOL
- ISOPROPYL ALCOHOL
- Xylene
- Xylene SUBSTITUTES
- PARAFFIN WAX

The following materials are used in the construction of the MTM I / II. Reagents other than those listed above can be utilized in the device if they DO NOT damage the materials listed:

STAINLESS STEEL	Processing chamber, Rotating valve, connectors
TEFLON	Rotating valve, air pump
KYNARFLEX	Reagent pipes
VITON	Seals
GLASS	Vapor trap
HDPE	Wax and reagent bottles
DELRIN (ACETALIC RESIN)	Connectors
NICKEL	Air connectors, solenoid valves

The manufacturer is NOT responsible for damages due to the use of reagents NOT listed here.

Warning:
DO NOT use Acetone, Benzene or Trichloroethane. We also advise against the use of fixatives containing mercury salts, acetic or picric acid as they may corrode the metal components of the device and shorten a component's useful life.

11.3. Flammable reagents

The following reagents and / or their substitutes are classified as flammable:

ETHYL ALCOHOL	Flammable liquid, category 2 - H225 - Flash point : <23 °C
ISOPROPYL ALCOHOL	Flammable liquid, category 2 - H225 - Flash point : <23 °C
XYLENE	Flammable liquid, category 3 - H226 - Flash point : >23 °C

11.4. Disposable pre-filled bottles

The MTM I / II can utilize disposable, ready-to-use, factory pre-filled reagent bottles.
It is very important to note that the use of pre-filled bottles is possible without making any changes to the device. It can be done at the same time with the use of bottles refilled by the user (the latter are simply thicker and stronger than the disposable bottles).

Advantages of using disposable pre-filled bottles include:
- Faster reagent and wax replacement.
- Minimal user handling exposure to toxic vapors.
- Reduction of risks from handling flammable substances.
- Possibility of always having perfectly clean containers for the reagents and paraffins without having to subject them to risky and costly manual washing (often these washings are not carried out and the dirt deposited on the bottom of the paraffin tanks or vats can cause failures and/or malfunctions of the devices).

Replacement of disposable bottles is easy:
- Take the bottle containing the exhausted reagent out of its housing slot.
- Screw the special cap on the opening of the bottle.
- Unscrew the cap of the new bottle.
- Insert the bottle into its housing slot.

The procedures to be followed regarding the recycling of contaminated reagents are the same adopted with traditional systems. MTM I / II bottles are made of completely recyclable (100 %) HDPE (high-density polyethylene). Check with your local recycler about recycling HDPE with chemicals and wax residue.

11.5. Filling reusable reagent bottles

The emptying and subsequent refilling of reusable reagent bottles must be done in accordance with all safety regulations for handling flammable and toxic substances.

The procedure must be performed with proper ventilation and away from open flames and / or electrical circuits.

Bottles must be filled to the indicated level; a volume of 2.5 l. When exchanging bottles, use the special screw-caps supplied with the device to avoid reagent spillage and fumes.

After emptying, dirty or encrusted bottles must be replaced with new ones. Avoid cleaning them with solvents or similar products.

The o-rings and all the openings on the quick couplers should be checked periodically for cleanliness. If the quick couplers leak, the o-rings should be replaced.

If leakage problems persist, contact our customer service.

11.6. RFD – Remote Fill and Drain system

The Remote Fill and Drain allows the draining and the filling of the reagent bottles (with the exclusion of the waxes) without removing them from their slots. The RFD connectors are placed in the front of the device as shown in the picture in the previous page. In the left side there is the one for the FILL while in the right there is the one for the DRAIN. To those ports it is necessary to connect the hoses with quick connectors and 90° elbows that will be placed inside the external tanks with the waste and the clean reagent.

The RFD can work in three different modalities:

Modality "DRAIN and FILL":

- The MTM fills the SPC with the content of the chosen bottle.
- Then it drains the SPC through port 17 into an empty tank (right side quick connector).
- Afterward it fills the SPC with 2.5 l of reagent from port 18 (left side quick connector).
- Then it drains the SPC content into the chosen bottle.
- This modality completion takes approximately 6 minutes.

Modality "Only DRAIN":

- The MTM fills the SPC with the content of the chosen bottle.
- Then it drains the SPC through port 17 into an empty tank (right side quick connector).
- This modality completion takes approximately 3 minutes, it can be useful in case there is the need of a complete washing of the chosen bottle before to proceed to its filling.

Modality "Only FILL":

- The MTM fills the SPC with 2.5 l of reagent from port 18 (left side quick connector).
- Then it drains the SPC content into the chosen bottle.
- This modality completion takes approximately 3 minutes.

	**Caution:** Obviously in this last modality the chosen bottle must be empty before the start of the operation, in case the fill is performed on a not empty bottle there will be a spill of reagents into the nearby bottles and possibly also outside of the device.

After the first few steps in which the computer asks for information regarding the bottle required for fill / drain and confirmation about the presence of tanks connected to the ports 17 and 18, all the cycles are completely automated and the device can be left unattended until the operation ends.
See also sub-chapter SETUP > OVERALL SETUP > RFD calibration for more information about the RFD precision and its calibration.
The RFD can also be used in conjunction with the RMS during the reagents substitution.

	It is possible (but not recommendable) to interrupt the execution of the RFD by pressing the ESC key. Pressing again the ESC key the RFD will be definitely aborted while pressing ENTER it will be re-started. In case of events that would have stopped half-way the execution of the MTM (for example: alarms or mistakes on the tanks positions) if some reagent is left into the SPC it is possible to remove it (draining it back to a bottle) by using the function DRAIN SPC in the Service menu.

It is highly advisable to take every precaution during the handling of reagents potentially flammable or toxic.

Despite the RFD operator safety increases (thanks to the fill / drain automation), there is always some risk on handling flammable and / or toxic substances.

We recommend to always have at hand a suitable fire extinguisher or at least to know the exact location of the closest one accordingly to the local rules of your country and laboratory.

CAUTION:
Verify that the external pipes are well connected the quick couplers and are correctly inserted into the external tanks.

Verify that the external tank for the waste reagent would have at least 5 l remaining capacity.
Verify that the tank with the new reagent would have at least 2,5 l available for the filling and that the pipe end reaches the tank bottom.

Verify that the room in which the RFD is performed would be adequately ventilate (the RFD doesn't have a recirculation system on the external tanks).

In case different kind of reagents are drained together into the external waste tank, before to do it, in order to avoid potentially dangerous chemical reaction, verify their chemical and physical compatibility.

11.7. Filling wax bottles

In the MTM I / II the paraffin waxes are contained in the same bottles used for reagents.
The advantages of it are the following:

- Easy handling and emptying of the wax bottles.
- Easy and economical substitution of the wax bottles.
- Possibility to use the device in "Factory pre-filled" modality also for the waxes.

There is only one disadvantage: bottles must be re-filled with melted wax. Attempting to fill them with flakes, other than to be uneasy, may produce under fill conditions that will cause a blocking alarm. Furthermore, the filling hose cannot be inserted into bottles 11-14 (located in the wax heating chamber), in presence of not melted wax.

The filling level is the same for reagents and wax (2.5 l).
Wax bottles are placed in a special heating chamber that maintains a constant temperature consistent with the temperature required for the waxes during the process.

There are 5 wax bottle slots. The one labeled "R" contains a spare bottle, thus:

- In "Factory pre-filled" mode the "R" slot in the wax heating chamber is used to melt the paraffin prior its utilization as a replacement of a dirty bottle.
- In "Standard" mode the "R" slot can be used to keep a wax bottle warm for immediate replacement of a dirty bottle.

CAUTION: Since the normal wax temperature approaches the level at which a first-degree burn may be possible, we recommend the following:

- Always wear protective gloves and eye wear when handling bottles of wax.
- Always place a cap on wax bottles immediately after their removal from the wax heating chamber.
- Handle them with care.
- The wax heating chamber door is insulated and must be kept closed except when extracting or replacing bottles.

WARNING: Never leave a slot without a bottle; the bottles should always stay in their slots with their normal wax level of 2.5 l. The absence of one bottle may cause an incorrect heating of the other bottles.

View of the wax warm chamber (WWC)

11.8. Wax Cleaning Cycle (WCC)

Use of the WCC will reduce the consumption of paraffin by approximately 50 %. The system is able to reduce paraffin consumption by removing the contamination of the preceding reagents.
The removal is accomplished by a flow of air bubbled through the wax containers.

The volatile reagents evaporate due to the heating of the wax containers during the WCC process. The air bubbled through the wax carries these reagent vapors through the charcoal filter C1 where them are trapped.
Use of the Wax Purification Cycle, while it will reduce consumption of waxes, will also shorten the estimated life of the charcoal filters, therefore we estimate that:

- Without the use of the WCC, filter life will be from 90 - 120 processes,
- With the use of the WCC, filter life will be from 60 - 90 processes.

These values are only estimates because they are influenced by:

- Environmental factors (humidity, temperature),
- the duration of the processes,
- the application of the vacuum (or pressure) on all the steps of the process,
- the frequency of reagent agitation.

The duration of the Wax Purification Cycle is about 30 minutes. If the WCC option is selected, it will begin automatically after each purge cycle, but only when a wax has been used in the preceding process.
It is always possible to manually run a Wax Purification Cycle from the RMS Setup Menu, independent of wax usage in the previous process. During the WCC the waxes are not transferred from their containers; the SPC will stay clean and it will not be necessary to start a purge cycle after the WCC. However during the WCC, the SPC lid must always stay closed.

12. PROCESSING CHAMBER (SPC)

12.1. Processing capacity

The MTM I / II is equipped with 2 stainless steel baskets of identical dimensions. Each of the baskets can hold up to 150 cassettes. The total processing capacity therefore is 300 cassettes. As optional accessory is available a large basket that can hold big specimens or up to 300 STD cassettes.

As with all tissue processors, good processing quality requires that certain guidelines be followed:

- Processing every day large quantity of samples, the reagents will need to be replaced more often.
- Larger specimens require longer times at each station. The use of vacuum (or pressure / vacuum cycles) and reagent heating in each step of the process improves infiltration.
- The daily replacement of the most contaminated reagent, with subsequent "shifting" of the remaining reagents, is preferable to the periodical substitution of all reagents. In this way, the process quality remains constant; while in the latter method process quality varies from a maximum (with all new reagents) to a minimum (last process before all reagents are replaced).
- The MTM I / II Reagent management System will minimize the "shifting" process work because it will not be necessary to physically move (shift) the reagent bottles into adjacent slots. The RMS will automatically selects the most contaminated reagent first and the least contaminated reagent last.

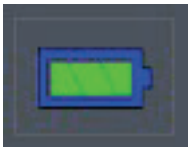
13. SETUP OF THE DEVICE

From the SETUP menu it is possible to modify the most important device parameters (except processing protocols), in this menu are located all the parameters that do not require frequent access.

13.1. Overall setup

Here the main parameters can be modified. After the modifications, by pressing SAVE the new values are stored in the memory, by pressing ESC modifications are discarded. In any case it is necessary to press ESC to get out from the function.
In the first row on the top right of the OVERALL SETUP screen the current software version is shown. For example: "SW Ver. 3.2.0.0 " - "Serial Nr. 2000/200"
The displayed and modifiable parameters are related to the type of device configured by the manufacturer.

LANGUAGE	Seven languages are available: English, French, German, Italian, Spanish, Czech and Turkish.
DATE Format	In the USA the date format is: month/day/year. In Europe the format is: day/month/year. Also the time is displayed in a different way. Here it is possible to choose the desired format.
ALERT show	The displays of the ALERTs during the processing (low level not blocking alarms) can here be enabled / disabled.
EOP SIGNAL	The End Of Process beeping can here be enabled / disabled.
PRINTER port	Allows you to activate / deactivate the printer
SPC LID Sensor	The SPC lid status is controlled by a sensor (micro switch). If the lid is closed but the system displays that it is open, probably the micro switch is broken or out-of-position. Waiting for service, from this function the sensor can be disabled, after that it is possible to continue to operate the device. If the micro switch is disabled the SPC lid indicator will show the label "DISABLE". **Please note that the sensor can reveal the lid complete opening but cannot sense its perfect closing.** Thus if the lid is simply turned down but the lock is not engaged, the sensor may indicate lid closed, but the device will not be available for processing. The device will allow the process or purge start but soon it will issue an alarm caused by the impossibility to create vacuum or pressure in the SPC. Please always check the correct lid closing and lock engagement before the start of any kind of operation.
Touch Screen Beep	This function allows the user to enable / disable the acoustic signal when the touch screen is touched
UPS activation	**Allows you to activate the UPS STD (External UPS)** To be recognized by the system it must be selected by this function, in case of malfunctions it can be disabled. Note: enabling or disabling only concerns the data communication system between the UPS and the processor computer. Even if disabled, the UPS will continue to provide electrical continuity to the device but its status will no longer be displayed or considered by the computer. If you try to enable the UPS in its absence, the command is not accepted.

		
UPS enabled AC line = Power ON Battery charge = Level 100%	UPS enabled AC line = Power Failure Battery charge = Level < 99%	UPS enabled AC line = Power failure Battery charge = Level < 50%

If the UPS is activated and the external power supply is cut off, the system works as follows:

With the battery charge level between 99 % to 50 %
The process continues but the features that involve significant energy consumption are disabled.

With the battery charge level below 50 %
At the end of the step the reagent present in the chamber is not discharged.

If the charge level drops below 50 % during a drain phase, the next reagent is still loaded.
In the event of a power return, the protocol will be reactivated continuing the process in progress.

13.2. SRR Activation

Allows you to activate the management of Safeguard Reagents (when the UPS battery charge level is below 50 %).
This mode, which can be activated at the operator's discretion, requires the reagent in the chamber to be replaced with a safeguard reagent previously defined in the "RMS Setup - RMS Definition of reagents" function (see chapter dedicated to RMS).
As soon as the device detects that the battery charge drops below 50 %, it interrupts the process in progress, discharging the reagent in the chamber and loading the safeguard reagent set.
The processing protocol is permanently interrupted, even in the event of a power return.
The operator at the feed back will only be able to unload the safeguard reagent and extract the samples from the chamber.

13.3. User Auto Logout

If enabled, the program carries out the automatic logout of the logged in operator in the absence of keystrokes and after 300 sec.

13.4. Panel Off Time (screen saver time)

After a period of not utilization of the touch screen, the LCD screen is completely switched off to extend its life span and save energy.
This function allows the setting of the panel ON time:

- The minimum time is 0 min (function disabled, screen always ON)
- the maximum time is 90 min

The tissue processor will continue to work perfectly even when the screen is switched off, by touching any point in the screen surface it will be switched on in not more than 2 seconds and the MTM I / II computer will emit a beep to confirm. It is advisable to not press more than one time the screen surface and wait for the screen data and pictures to be visible before to perform any command. The first touch will not be considered a command but any subsequent touch may be recognized as a command.

13.5. RFD Calibration

This procedure allows the calibration of the volume of reagent filled during the RFD cycle (Remote Fill / Drain).
To find the right value proceed as follow:

- Using the RFD execute a fill in one of the reagent bottles.
- With a system sufficiently precise (+/- 10 ml) take a measurement of the filled reagent.
- Set the calibration value considering that every increase of 10 corresponds to +25 ml.
- Repeat the filling with the RFD to check if the correction has given the right result.

The standard precision of the RFD is +/- 1 %, which correspond, respect to the standard value of 4 l, to a maximum of 4.04 l and a minimum of 3.96 l.
The above cited values are compatible with the correct functioning of the processor in normal conditions.

13.6. ELEVATION (m)

The ambient pressure decreases together with the elevation from the sea level (approx. 100 HPa less every 1.000 meter for the first 2,000 meters). It is important to tell the device what is the level at which it is installed to avoid it to require the air pump to reach differentials of pressure (levels of vacuum) impossible to make especially when the elevation is **higher than 800 - 1,000 m.**

13.7. WWC Setpoint

This function allows the setting of the WWC temperature setpoint. The range is 55 - 65 °C.
It is advisable to set its value to the highest point compatible with the laboratory procedures. Particularly it is necessary to set the value at least 2 °C over the declared paraffin melting point. For example for paraffin with a melting point of 56 - 58 °C the correct WWC setpoint value would be 60 °C.

13.8. EHE Standby Activation - only for MTM II

The EHE (Enhanced Heat Exchanger - special heat exchanger) is the device that allows the execution of rapid processes thanks to its ability to heat the reagent during loading into the SPC and without delays.
The EHE must be activated by this function in order to keep it at the default temperature of 65 °C **when the MTM II is NOT processing** to make sure that it will be always ready to perform a fast processing program.
During a process the EHE is set (independently from the setup activation) following this plan:

- Warm if in the running process one of the steps is scheduled to use the EHE.
- At the opposite, to save power, the EHE is switched OFF if no steps in the running process are scheduled for using the EHE.
- Switched OFF after the last step / tank with EHE of the running process has been filled into the SPC.

Then, as said, at the end of a process the EHE is set ON to be ready to eventually perform a fast process (**but only if set active here**).
By this function it is possible to set inactive the EHE in case it is known that the MTM II will not (never or for a long time) be used for fast tissue processing. In this case it is **IMPORTANT** to know that if a fast process is started there will be a delay up to 20 min for the EHE pre-heating!
By setting the EHE inactive it is possible to save electrical energy, please consider that the EHE power is 450 W, when it is warm the power absorption goes down to approximately 200 W, still this power has a significant impact on your laboratory electricity bill, especially considering that a tissue processor is made to work 24/7 all year long.

13.9. EHE Setpoint STANDBY - only for MTM II model

From this function it is possible to change the EHE default temperature. The range goes from a minimum of 40 to a maximum of 70 °C. It is advisable to modify the default temperature only in case the factory set is too much different from the temperatures used in the process protocols. Please keep in mind that to reach a temperature of 50 °C for the reagents it would be necessary to set the EHE default temperature to at least 60 °C (10 °C over the protocol temperature).

13.10. EHE Setpoint PURGE - only for MTM II model

From this function it is possible to change the EHE temperature for the purge processes. The range goes from a minimum of 40 to a maximum of 70 °C. It is advisable to modify the default temperature only in case the factory set is too much different from the temperatures used in the process protocols. Please keep in mind that to reach a temperature of 50 °C for the reagents it would be necessary to set the EHE temperature to at least 60 °C (10 °C over the protocol temperature).

14. REAGENT MANAGEMENT SYSTEM (RMS)

14.1. RMS Basic Concepts

A Reagent Management System in a tissue processor is necessary to:

- Optimize the reagents utilization.
- Avoid the not recommendable bulk substitution (altogether once a week for example).
- Avoid boring and not reliable paper records.
- Avoid the manual movements of tanks to prepare the device for the next process (for example by manually substituting the dirtiest tank of a group of reagents and shifting the other tanks backward).

In the MTM I / II the usage of a good RMS is much more important given that, as explained in other chapters, the device can be used for fast and for slow processes with a different utilization of the reagents. The reagent management is made more complex by the fact that, while slow overnight processes use all the reagents, fast processes use only a few reagents, normally one per group. Moreover in these fast-short processes there is the need to use the best reagent for each group.
The concept of "homogeneous group" is based on the type of reagent and the kind of work that it does. In the tissue processing 4 fundamental types of reagent can be identified:

- FIXATIVE
- DEHYDRANT
- CLEARING
- EMBEDDING

The dehydrants can be split in two sub-groups: low and high gradation.
Sometimes a tank with water is set between fixative and dehydrant to remove from the samples as more as possible fixative that in contact with alcohol can form noxious salts.
Thus, considering that a group can be constituted by one tank, usually in a tissue processor there are 4 to 6 groups. Some users set the dehydrant in a way to form a incremental scale that can bring the number of groups over the above mentioned total of 6. It is here important to note that the MTM I / II RMS accepts a maximum of 8 groups.

It is highly advisable to not form too many groups, 5 or 6 groups are the ideal situation for a successful reagent management and the samples best quality. Particularly a maximum of two groups of dehydrants are sufficient to guarantee a correct incremental alcohol gradation. But also a single big group of dehydrant has demonstrated to work fine provided that at the first start of the device a certain incremental gradation has been manually created.

Other important concepts of the MTM I / II RMS are:

- The reagents are maintained at the end of every process to keep constant the specimens quality. The MTM I / II RMS most important concept is based on the assumption that the constancy of the quality is more important than the quality itself.
- The reagents used first in each group are those that are more polluted by the previous reagent and by the substances removed from the samples. Accordingly, those are the reagents that require the most frequent replacement.
- During the reagent maintenance the RMS will require the substitution of only one reagent per group also when more than one tank in that group has exceeded the pre-defined limit.
- In a fast-short process (with only one reagent per group activated in the process program) the RMS will select and use the tank with the best/youngest reagent independently from its position inside a group (meaning for position both the real position and the programmed step position) of that tank.
- Once the RMS is activated, it is not anymore possible to consider the physical position of the tanks or their position in the program (STEP). It will be necessary to "fully trust the device" and follow its instructions regarding the substitution of the reagents. When there is a doubt that something is not working properly (for example, in case of poor tissue quality) it will be necessary to replace all the reagents and use the counters reset functions to reset the counters. In this case it is recommended to reconsider the RMS settings and decrease the limits until a substantial tissue quality is obtained.
- It is not possible to foresee a RMS standard setting. The RMS ideal setting is strictly related to the kind of usage done with the MTM I / II (type and quantity of fast-short and slow-long processes performed, type of reagents, type and quantity of samples processed), that ideal setting may be experimentally found after a few weeks of continuous and regular use of the device.

14.2. The DAF (Decreasing Aging Factor)

In order to obtain a good reagent management it is necessary to set the RMS not only in terms of type of reagents used but also in terms of predefined limits (that will trigger the reagent substitution) set for each reagent tank. In the MTM I / II the limits are based only on the number of cassettes processed.

Those limits will be defined for each tank of reagent (see next chapters), it is here important to describe how the limits will be handled by the RMS:

1. The limit (maximum number of processed cassettes) is defined for each tank independently from the group to which that tank is assigned.
2. The number of processed cassettes will be then stored in memory for each tank and will be reset after that tank reagent renewal.
3. Also the number of processes performed by each tank is stored in the memory, but it will be used only to be shown under request of the operator, also this counter is reset after that tank reagent renewal.
4. The real effective counter is a third one, its name is DAF (Decreasing Aging Factor).

The DAF is calculated from:

- The number of cassettes actually processed.
- The position of a tank in its group.

The concept is based on the assumption that in a group the reagent that will age more is the first one while the last is the one that will age less. Thus, inside a group, the number of processed cassettes will be assigned to the DAF counters in a decreasing manner, for example:

Group taken as example: Clearing
Processed cassettes per process: 100
Regressive percentage of the DAF inside an homogeneous group:
100, 60, 40, 30, 20, 15, 10 (minimum admissible)
Predefined limit for the 3 tanks of this group: 300 cassettes

End of process 1

Tank	Processed Cassettes	DAF (regressive counter)
8	100	100
9	100	60
10	100	40

End of process 2

Tank	Processed Cassettes	DAF (regressive counter)
8	200	200
9	200	120
10	200	80

End of process 3

Tank	Processed Cassettes	DAF (regressive counter)
8	300	300
9	300	180
10	300	120

At this point the RMS will require the substitution of tank 8 because its DAF has reached the predefined limit of processed cassettes, after the substitution the counters of this tank will be reset. In the next process the tank number 8 will be the last in the group and, at the end of the process, the counters will be as follow:

End of process 4

Tank	Processed Cassettes	DAF (regressive counter)
9	400	280
10	400	180
8	100	40

After process 4 the RMS will not require any substitution because none of the counter reached or exceeded the limit.

End of process 5

Tank	Processed Cassettes	DAF (regressive counter)
9	500	380
10	500	240
8	200	80

After process 5 the RMS will require the substitution of tank 9 because its DAF has exceeded the limit.

End of process 6

Tank	Processed Cassettes	DAF (regressive counter)
10	600	340
8	300	140
9	100	40

And so on.

The sequence here shown (typical of a long overnight process) would be surely influenced, in the real world, by variations in the quantity of cassettes processed and by the usage of fast-short processes with only one tank per group. In this case, without using the RMS, it would be quite complex to keep trace of the reagents unbalanced aging. At the opposite, **thanks to the RMS, the tracing of the reagents aging is automatic, precise and reliable.**

The RMS is not as rigid as it may appear; if for any reason (malfunction of a tissue processor component, accidental loss of reagent from a tank, etc.). It is necessary to substitute a reagent independently from the RMS requests, that can be done by the RFD (that will automatically reset the tank counters) or manually, **in the second case it will be necessary to reset the tank counters by the RMS setup menu.** Of course, during the next process, that tank will be the last used in its group.

RMS requires the replacement of ALL reagents that have exceeded at least one of the two preset limits (DAF or PROCESSES performed).

The user can still decide to manually replace a reagent (in addition to what is indicated by the RMS) with the foresight to then reset the counters from the RMS Setup menu. If the RFD is used, the counter reset is always automatic.

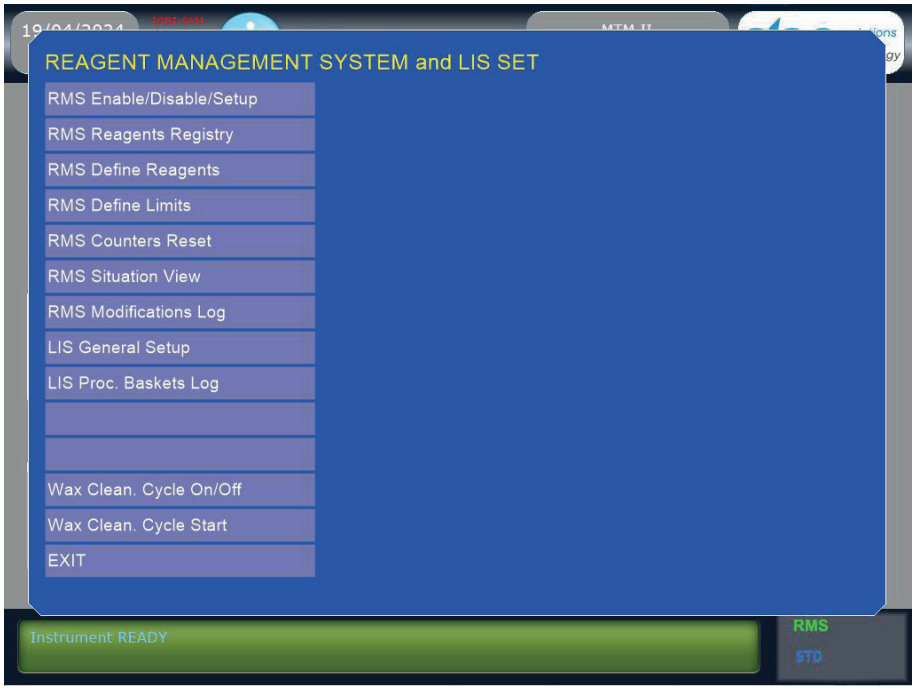
PLEASE NOTE: DAF is also used to decide which reagent of a group to use in the case of rapid processes that require the use of only one reagent per group, for example:
Clearing Group:

Reagent	DAF
8	200
9	120
10	80

Even if in the short process the activated reagent (time greater than zero) is the one relating to step 8, the RMS will use the number 10 as it is the cleanest of the group, if there are two active reagents of that group the RMS will use the tank 9 and 10 discarding 8 which is the dirtiest.
At the start of a process (if the RMS is active), it is possible to see, next to the column of the program step, the sequence of use of the tanks, this can correspond to the number of steps when all the reagents are clean and the counters are all zero, vice versa it will no longer have a match when the reagents are no longer new.

14.3. RMS / LIS Setup

The MTM I / II RMS is a system to punctually and exactly manage all reagents to guarantee a constant process and sample quality. The use of the Reagent Management System eliminates the need to make annoying written annotations of reagent tank status. This results in substantial time savings and eliminates the possibility of errors caused by multiple operators using the device. Although explained later in more detail, basically, following the purge cycle (and the WCC, if activated), the system will automatically prompt the user to replace the reagents that have reached their pre-determined processing limit.



For the correct programming of the RMS system it is recommended to proceed in this order:

1. RMS Activation/setup
2. RMS Definition Reagents
3. RMS Definition limits

14.4. RMS Enable / Disable / Setup

Based on the hardware configuration of the processor, it is possible to set the RMS in the following ways which allow you to manage the maintenance of the reagents using the same tanks (emptying-filling) or using coded and factory-loaded tanks.

15. DESCRIPTION OF RMS TYPES

15.1. RMS Standard

It involves the use of reagents that are replaced in the laboratory or reagents pre-loaded in the factory.

15.2. RMS Barcode

It involves the use of reagent tanks pre-loaded in the factory.
With this method (option 906060) the tank is identified with a bar code on which there are no. 2 information:

- Reagent code
- Production lot number

The barcode is printed on the tank label which is read by a barcode reader connected to the processor.
This system checks at each reagent replacement that the barcode on the new tank has not already been used previously.

15.3. RMS Activation

This function decides whether to activate or deactivate the RMS. Every time RMS is activated / deactivated, the counters of processes and processed cassettes are reset to zero. If this occurs it is recommended to change all reagents before reusing the processor.

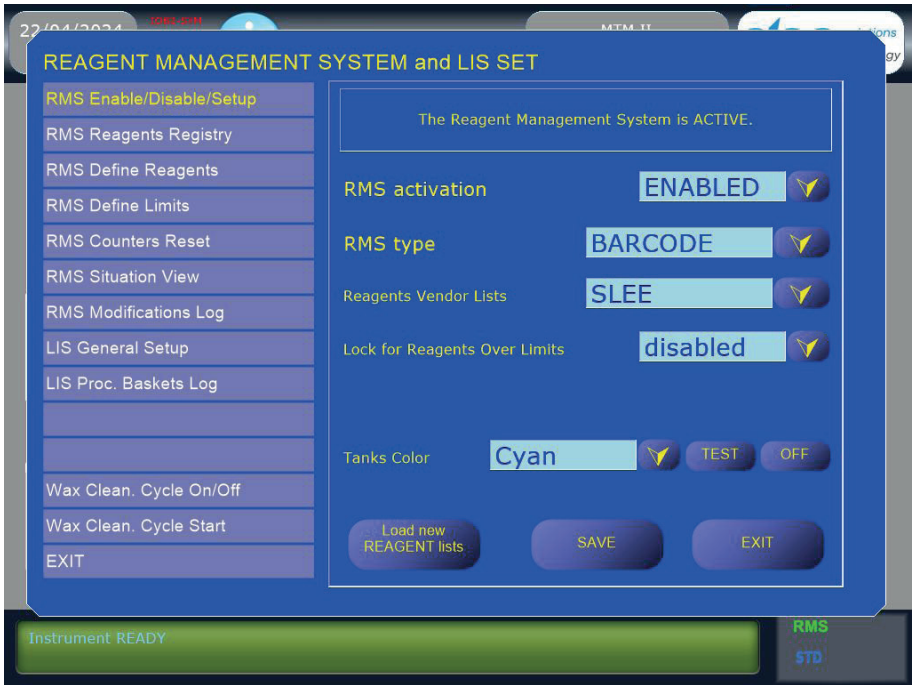
15.4. RMS Type

This function allows you to configure the RMS system, in the following ways:

RMS Type	Description	Supporting hardware	Price list option
STANDARD	Use free reagents		
	None	-	
BARCODE	Identification of the reagent (by barcode), supplied in a tank pre-loaded at the factory	Barcode Reader Gun (3BCR01)	906060

15.5. RMS Vendor List

With this function it is possible to select the file that identifies the list of reagents used with the type of RMS selected.



15.6. Lock for Reagents Over Limits

This function, if enabled, inhibits the launch of the processing protocol if the RMS (Reagent Management System) has detected that the usage limit of one or more reagents has been exceeded.

15.7. Load New Reagents Lists

Allows you to load, from a USB stick, a file that identifies a new list of reagents.
At the end of the above settings, press the "SAVE" button to memorize.

15.8. RMS Reagents Registry

This function allows you to view the list of reagents present in the "Reagent Vendor List" file selected in the "RMS Activation / Setup" function). In the case of reagents supplied in pre-loaded and coded tanks (BARCODE), the name of the reagent and its identification code are displayed.

15.9. RMS Define Reagents

The definition of the reagents allows you to assign, and therefore identify, the type of reagent that is used in the individual tanks. The label, i.e. the name of the reagent, is selected from those present in the previously described "Vendor List" file.
Note: the assignment of reagents in the RMS must still be carried out regardless of whether the RMS is then activated / used, under penalty of inability to use the tank to which no reagent has been assigned.

It is important to know that the name tag of a reagent contributes to the creation and automatic assignment of the reagent to a certain homogeneous group. It is therefore recommended to use a criterion for creating the labels and their subsequent assignment which allows the computer to automatically create "homogeneous groups"
The assignment of reagents must respect the following rules:

- Tank 1 – tank 10 = Free assignment
- Tank 11-12-13-14 = Paraffins
- Tank 15-16 = Washing reagents
- Tank 19 = Coal

If the UPS unit is connected and activated and the SRR function is simultaneously enabled, the reagent definition page will consist of 2 columns. Assigned reagents on the left side, safety reagents on the right side.

15.10. RMS Define Limits

The definition of the limits determines the frequency of reagent substitution. It is possible to assign to each tank a limit based on the number of cassettes processed. When this limit is reached or exceeded, the RMS will require the substitution of the reagent for that specific tank. If the limit is set to zero, the RMS will never prompt the user to replace the reagent in that tank but its quality light will always be shown in red to remind that this tank is not managed by the RMS for a lack of limit. It is advisable to fix the same limit to all the tanks of a group, otherwise the RMS can asks for unbalanced substitutions with unpredictable results. Moreover the limit can be proportioned to the length of a group, in other words the longer is a group the higher can be the limit.

	Please note: If in the „Reagent definition" function the reagent is not assigned to tank 10 (destined for the PWD function), tank 10 will not appear in the „RMS Definition Limits" function.

15.11. Purge Reagents Limits Setting

The purge reagents are also under the supervision of the RMS. It is therefore sufficient that the RMS is active to have it recommend the substitution of the purge reagents every 3 to 9 processes. The recommended number of processes for the substitution of the purge reagents are as follows:

- Cleaning only the SPC: 9 processes
- Cleaning the SPC and the baskets: 5 processes

The aforementioned quantity is valid for correct use of the device. It is, however, contingent upon the manual removal of as much residual paraffin as possible (from the lid and SPC) before beginning the purge cycle.

	Please note: If the user desires to replace the purge reagents before their counter reaches the preset limit, it will be necessary to reset the counter by the "Zero Resetting Single Counter" function.

15.12. Charcoal Filters Limits Setting

The charcoal filters are also administered by the RMS. In addition to the percentage indicator visible on the Main menu (with 0 % representing a new filter and 100 % representing an expended filter), when the filters reach or exceed their preset limits, the RMS will prompt the user to replace them at the same time he is prompted to replace reagents. The charcoal filters should be replaced between a minimum of 30 and a maximum of 60 processes based upon the following factors:

- Without the use of the WCC the filters should be replaced every 90 to 120 processes.
- With the use of the WCC the filters should be replaced every 60 to 90 processes.

These values are approximate because they can vary due to:

- Environmental factors (humidity, temperature),
- the duration of the processes,
- the application of the vacuum (or pressure) on all the steps of process,
- the frequency of agitation of the reagents.

If the MTM I / II is operated in an area with high relative humidity, if pressure and / or vacuum is requested for most or all of the process steps, if the reagents mixing in the SPC is set to the maximum frequency, it will be necessary to set the limits for the charcoal filters substitution at or below the minimum values mentioned above.

	Important Note: If the charcoal filters are changed before the process counter reaches the preset limit it will be necessary to reset the counter with the "RMS Single Counter Reset" function on the RMS Setup menu. If the charcoal filters are changed before the process counter reaches the preset limit it will be necessary to reset the counter with the "RMS Single Counter Reset" function on the RMS Setup menu.

15.13. RMS Single Counter Reset

The Single Counter Reset selection allows the user to reset the counters of individual tanks. This function is useful if the user decides to replace / renew a reagent before the preset limit of a particular tank is reached.
The Single Counter Reset is also the only function that allows the operator to reset the counters of the charcoal filters and the purge reagents. Please note: The counters of the charcoal filters and purge reagents are not reset by the Counters Total Reset function.

Whenever the user replaces the purge reagents or the charcoal filters without being prompted by the RMS, it will be necessary to utilize the Single Counter Reset to reset their counters.
This function is disabled if the "RMS type" defined in the "RMS function Activation/setup" is different from STANDARD.

15.14. RMS Counters Total Reset

The Counters Total Reset selection allows the user to set to zero the number of processes performed and the number of cassettes processed including the DAF counter. This function may be used when it is necessary to replace / renew the reagents of all tanks and, at all the effects, restart the RMS.
The complete zero resetting does not include the counters for the charcoal filters or the tanks of the purge reagents. These two counters can be reset using the "RMS Single Counter Reset", see next sub-chapter.

	**Please note**: The counters total reset automatically occurs each time the RMS is activated or de-activated.

When the definition of the reagents / groups and / or their limits are modified the system doesn't make any automatic reset of the counters. That was decided to give to the user the maximum freedom, but in case of modifications on the run it will be necessary to act carefully and eventually manually reset all or some of the counters (see next sub-chapter).
This function is disabled if the "RMS type" defined in the "RMS function Activation / setup" is different from STANDARD.

15.15. RMS Situation View

This function generates a report on the RMS status, and reports the usage status of all reagents. It can be printed and / or exported to a USB stick.

15.16. RMS Modification Log

This function generates a report that lists all the changes / modifications made to the management of the RMS. It is possible to print it and / or export it to a USB stick.

15.17. LIS General Setup

This function manages the operation of the processor connected to the LIS (Laboratory Information System) system, i.e.:
- Enable or Disable it.

When the system is activated you can select whether the processor should:
Block device on LIS orders
- Only the protocol indicated in the order coming from the LIS system can be launched on the processor

Device NOT blocked on LIS orders
- Any protocol can be launched on the processor or the one indicated in the LIS order or chosen by the operator from the list of protocols stored on the device.

15.18. LIS Proc. Baskets Log

This function generates a report that lists all the protocols performed with the following information indicated for each one:
- Protocol no. (1-18)
- Basket Code
- Protocol start date and time
- Protocol end date and time

15.19. Wax Clean. Cycle On / Off

The activation / de-activation of the WCC takes place on the RMS Setup menu. De-activation of the WCC is advisable when an excessive consumption of the charcoal filter makes its use less advantageous than the paraffin savings, this may occur due to a combination of the environmental and usage factors mentioned above. The device is malfunctioning frequently. Discontinuing use of the WCC will lower the workload for the ETP-EFTP and may eliminate one possible source of malfunction.

15.20. Wax Clean. Cycle Start

If for any reasons the WCC has been interrupted or not allowed to start automatically, it can be started manually by selecting “Start Wax Purif. Cycle” on the RMS Setup menu. If a process has been performed it is important to run a purge cycle before the WCC start.

16. USING THE RMS

The color of the caps of the tanks shown on the synoptic indicates the quality status of the contained reagent:

- **GREEN = new reagent, or already used but not out of limit**
- **RED = reagent that has exceeded at least one of the limits**
- **YELLOW = reagent parameters not defined (reagent name, limits not assigned)**
- **BLACK = empty tank (no reagent in the tank)**
- **GRAY = RMS disabled**

This function represents only a situation of the status of all reagents. Reagent maintenance is performed directly on the synoptic by clicking on the tank, as explained below.

16.1. Important notes on the use of RMS:

i	An important fact that must be taken into account when setting the RMS (and in particular the limits) is that the MTM I / II has 2.5 liter reagent tanks. Processors of other brands are often equipped with larger tanks which, with the same number of processed cassettes, require less frequent replacements, apparently this is an advantage, but in terms of processing quality a more frequent replacement of the reagent (due to the presence of smaller tanks) brings with it the advantage of a better and more constant processing quality over time without however increasing the costs of the reagent. This is also of particular importance for the washing reagents, their replacement frequency, in order to keep them fully efficient in terms of cleaning capacity of the process chamber, is crucial for the proper functioning of the device. The order in which the reagent tanks are loaded in a process will depend on the status of their counters, i.e., the cleanest tanks of the same group of reagents will be loaded last, vice versa the least clean ones first. This fact will cause a behavior that may seem disconcerting since, for example, tank 6 could be loaded before 5 (see the chapter relating to the DAF for more information).

16.2. Reagents maintenance with RMS TYPE = STANDARD

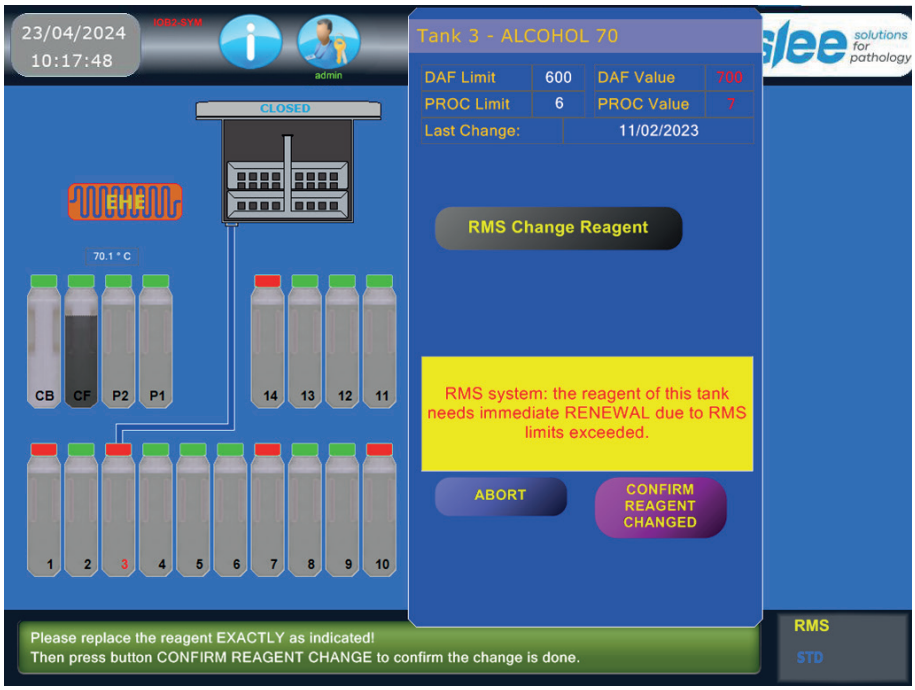
With RMS type STANDARD non-coded reagents are used therefore maintenance can be done by replacing the reagent (emptying and filling) or using reagents supplied in tanks pre-loaded at the factory. To know the status of the reagent, simply click on the tank.

In the case shown below, tank 1 was clicked. When the tank is selected, its number is displayed in red and on the left side a window is displayed which shows the situation of the reagent and its identifiers.

DAF limit:	Set limit of the DAF
PROC limit:	Set limit of the number of processes
DAF value:	Current value of the DAF (if highlighted in red the limit has been exceeded)
PROC value:	No. of processes performed (if highlighted in red, the limit has been exceeded)
Last Replacement:	Last replacement date

In the center of the window, a box is displayed in which the description of the reagent situation is indicated.

If the DAF Value or the number of Processes has been exceeded, the "RMS Change Reagent" button is displayed.
By clicking on the "RMS Change Reagent" button, the reagent is replaced.
The operator replaces the selected tank and at the end must confirm the replacement by pressing the "Confirm Reagent Change" button



The window will be closed and the tank cap will be displayed in green. The replacement process is finished.

At any time it is possible to know the status of the reagent contained in any of the tanks and if the reagent is valid, the following page is displayed:

If you want to replace a reagent tank whose cap is green, (considered in good condition by the RMS system: DAF value < DAF limit).It is necessary to press the "Declare empty" button, the tank cap will be displayed in Black.
At this point it is necessary to exit by pressing the Exit button, the tank will appear empty and if we click again on the tank the window will be reopened and the "RMS Change Reagent" button will be displayed.

Proceed with replacing the tank as previously described.

16.3. Reagents maintenance with RMS TYPE = BARCODE

With RMS type BARCODE the maintenance of the reagents requires the use of tanks pre-loaded in the factory. The tank is identified with a label on which a barcode and the corresponding alphanumeric code are printed. The code identifies the type of reagent and the production lot.

To know the status of the reagent, simply click on the tank.

In the case shown below, tank 1 was clicked.
When the tank is selected, its number is displayed in red and on the left side a window is displayed which shows the situation of the reagent and its identifiers.

DAF limit:	Set limit of the DAF
PROC limit:	Set limit of the number of processes
DAF value:	Current value of the DAF (if highlighted in red the limit has been exceeded)
PROC value:	No. of processes performed (if highlighted in red, the limit has been exceeded)
Last Replacement:	Last replacement date

Reagent Code:	**Reagent code**
Lot number:	**Lot number of the reagent**

In the center of the window, a box is displayed in which the description of the reagent situation is indicated.
If the DAF Value or the number of processes has been exceeded, the "RMS Change Reagent" button is displayed.

By clicking on the "RMS Change Reagent" button, the reagent is replaced and to guide the operator, 2 fields TANK OUT and TANK IN are displayed.

The operator will have to remove the spent reagent tank from the processor and use the barcode reader to read the code on the label. The read code will be displayed in the "TANK OUT" field. If the code read from the extracted tank corresponds to the code indicated in the upper part, it is accepted and can be continued. The operator will have to take a tank with new reagent and read the barcode. The read value will be displayed in the "TANK IN" field. At this point you can insert the tank in the processor.

If the code read from the new tank meets the following conditions:
a) same type of reagent
b) tank with new reagent (never used by the processor)

The "CONFIRM REAGENT CHANGED" button will be enabled and displayed in magenta. Clicking on this button will confirm the replacement.

The window will be closed and the tank cap will be displayed in green.
When an error is detected on the code of the exhausted tank (TANK OUT) and / or of the new tank (TANK IN) the error is signaled on the screen with a yellow window and the replacement process is aborted and must be repeated.
If it is not possible to read the barcode on the label (damaged or missing / not working barcode reader) it is possible to enter the reagent codes manually, by clicking directly on the "TANK OUT" and "TANK IN" fields using the on-screen keyboard.
To display the keyboard, press the button at the bottom right.
The replacement process is finished.

	**Please note:** If the code entered manually or read from the barcode (both for TANK IN and TANK OUT), is not recognized, is incorrect or has already been used; a window with the appropriate error message appears and the replace operation is aborted.

16.4. TIME and DATE

A screen opens to display day, month, year, hour, minute and second. Press on the field to be changed, then increase or decrease its values with "+" and "-" keys. Press CONFIRM to save changes and to go back to the previous menu. Press ESC to abort changes and to go back to the previous menu.

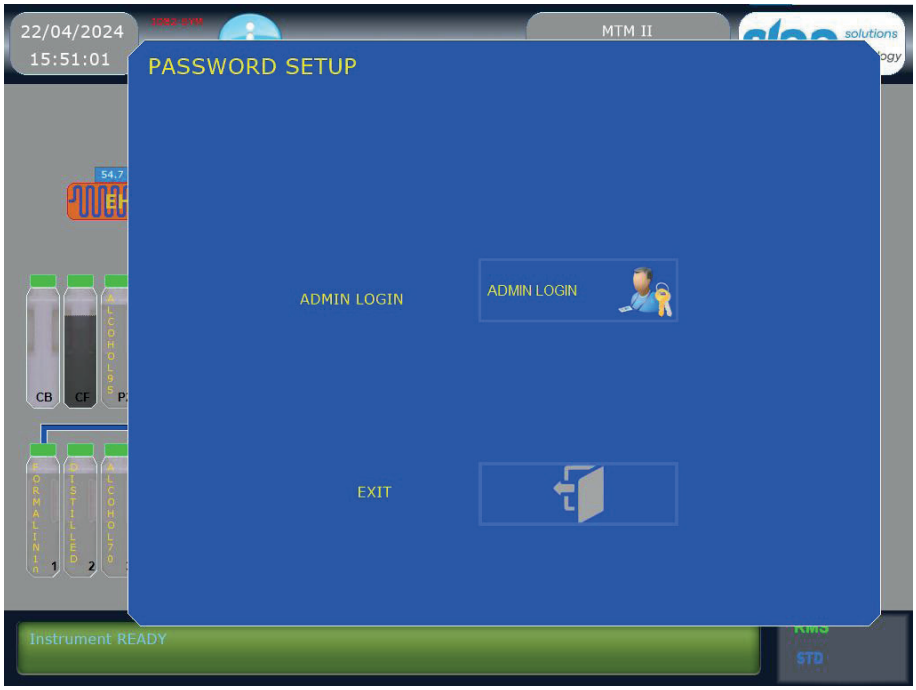
16.5. PASSWORD setup

The device is equipped with a password system that allows you to restrict access to all the main functions. It allows you to identify up to 13 operators. Password management is common to the whole range of Intelsint processors (the following pages show a synoptic not part of the tool).

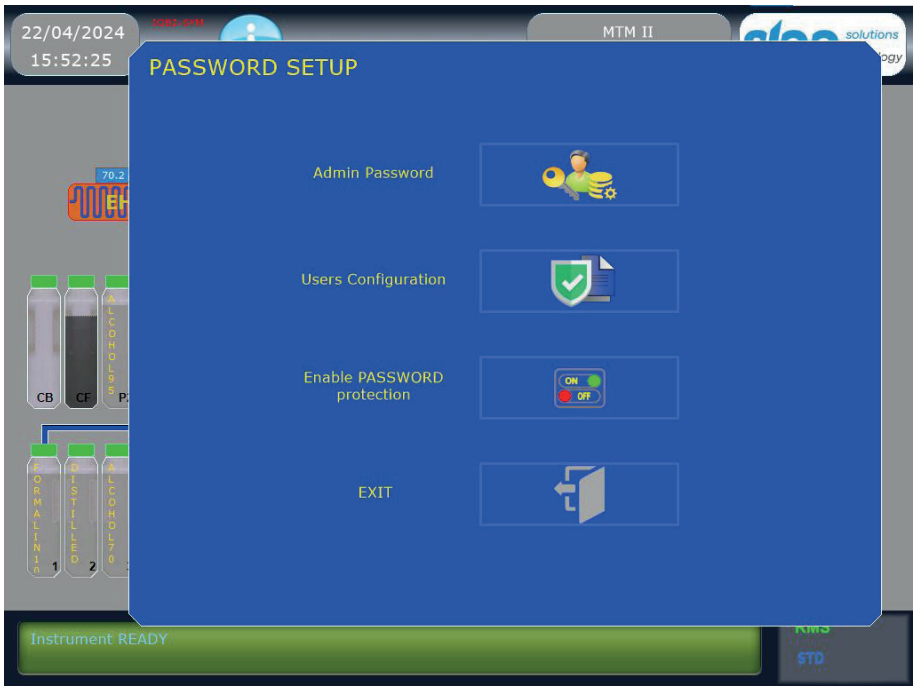
To each operator can be assigned :
- Name
- Password

Each of the 13 operators can be enabled / disabled to use the functions of the device listed below:
- Start a process
- Edit a process
- Abort a process
- Start the RMS
- Enter inside the RMS Setup
- Start a Remote Fill / Drain
- Enter inside Setup Parameters
- Enter inside the Service Menu
- Start a Purge

Only the Administrator can access the “SETUP PASSWORD” function using a dedicated password (Default 12345).



After the administrator has logged in, the following page will be displayed



16.6. Password administrator

The administrator can change his own login password

16.7. Enable / Disable the password protection

With this function, the administrator enables / disables access to the processor functions.

If it is disabled, all functions are accessible. If access is enabled, only authorized operators are allowed to log in (see Using the processor with password).

16.8. User configuration

With this function the administrator identifies each operator and enables / disables him to use the functions.

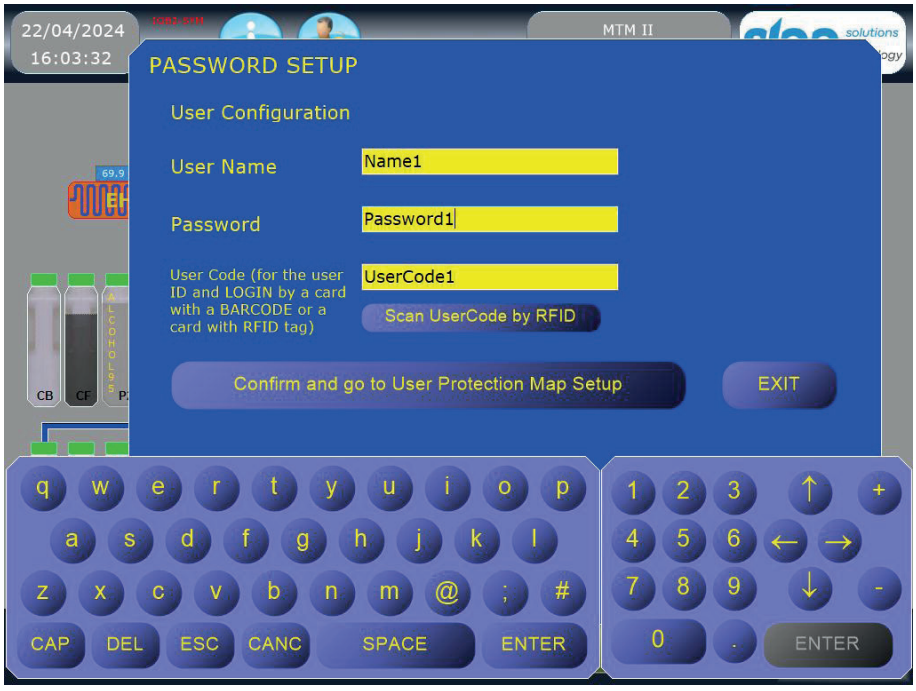
The page lists all 13 operators and the following 2 information is displayed for each:
Name, Password

If any operator is selected (click on the icon indicated by the “hand”) a new page opens which lists the processor functions to which it is enabled (green dot) or disabled (red dot).

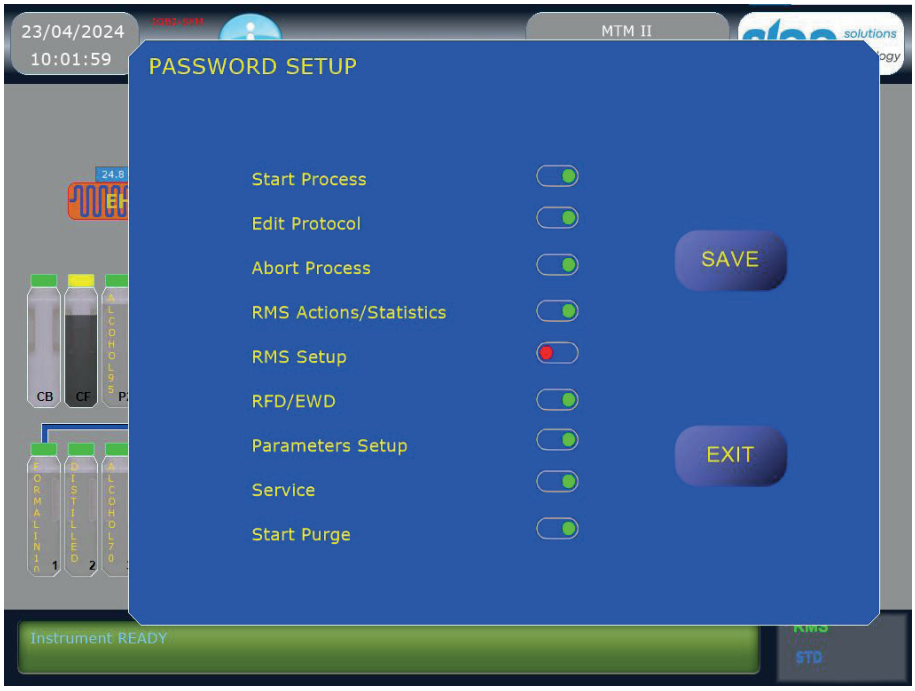
There are nine functions that can be protected and the laboratory manager (administrator) must decide which functions to protect based on real security needs.
The levels of protection that can be obtained are varied in relation to what you decide to activate, the most important are:

1. Total protection: all functions activated.
2. Protection of programming functions by activating only the functions of: Edit process, RMS setup, Parameter setup.
3. Protection of programming functions and some others that can be harmful to the device or the samples: Process Edit, Process Abort, RMS setup, Parameter Setup, Service.

To modify each operator it is necessary to press the SETUP key and the following page will open:

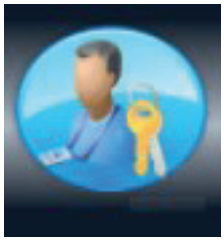
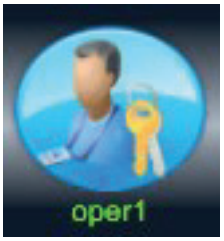


The operator's credentials are assigned on this page. Each operator must be identified with Name, Password.
To assign a name and password click on the field highlighted in yellow.
On the same page there is a RESET button which is used to clean all the fields indicated above.
By pressing the "Confirm" key all the setting will be saved and you can directly access the Protection Map of the selected operator.



After having properly set the options, press the SAVE key to save.

16.9. Access mode with password protected system

Buttons and their meanings	
	
Button (active) indicates that the system is password protected (user must press it to login).	Button (active) indicates that the user as logged in. Under the icon is indicated the name of the operator (user must press it to logout).

If the secure access system is active, the user must always login by pressing the button on the top bar.
The program will present a window which is already set up to receive the code through the barcode reader. If the user does not have the reader, he must press the "Manual" button. The program will present a window in which the USER and PASSWORD must be indicated.
If the credentials entered with Bar Code or Manual are accepted, the system will indicate in the top bar the name of the user who has logged in.
At the end of the activities, the user is required to log out always using the button on the top bar.
If the program does not detect manual operations, for 5 minutes (300 sec), on the touch screen, it automatically logs out.

17. PROCESS EDITING

17.1. Advices and suggestion for processing

17.1.1. Timing

The most common processing program has a stationing time of one hour for each step / bottle.
Is suitable for the vast majority of histology samples, moderate variations on the timing are sometimes adopted in relationship to specific needs and the kind of reagent used.
For example:

- The Xylene substitutes may require a time longer than the Xylene,
- higher reagent temperature allows shorter timing,
- also the use of vacuum may allows shorter timing.

17.1.2. Vacuum and Pressure

The pressurization or de-pressurization of the SPC allows a better sample infiltration.
Normally the use of vacuum (de-pressurization) is sufficient to obtain a good infiltration for most of the samples and it is advisable in each station except for the formalin and the first wax.
The combined use of vacuum and pressure should be limited to the processing of very difficult samples (big and / or fatty). The usage of P/V with normal samples, other than uselessly expend the processor components, may provoke undesired samples over-processing.

17.1.3. Heating

The reagent heating in the SPC up to the maximum allowed temperature (45 °C) is advisable starting from the 2-3 reagents before the waxes to prepare the samples to the thermal jump from the ambient temperature to the 60 °C of the waxes. Moreover pre-heating the samples (and the SPC and the baskets) helps to reduce the unavoidable cooling of the first wax that always happens especially with high loads of samples. This phenomenon must be avoided especially when it is requested a short step time for the first wax because an excessive cooling may impede a good drain of it.

17.1.4. Mixing

One or two mixing for each step are normally sufficient to ensure a good reagent movement around the samples. More mixing are advisable for high sample loads. At this regard it is necessary to consider that the SPC floor continuously receives a moderate heating from the WWC ceiling, this heating creates a convection movement that results in a gentle but forced and homogeneous mixing of the reagents. Furthermore that convection mixing is increased when the SPC heating is set ON.

17.1.5. EHE (only with MTM II)

For advices on the EHE usage please refer to the following sub-chapters about fast-processing.

17.1.6. NOT fast processing in the MTM II

In the following procedures are propose a series of processing programs that can be adopted in various situations, these are programs for NOT RAPID processing, for the RAPID processing protocols please consult the next chapter.

17.1.7. Example of protocols (without EHE)

Normal size samples					
Step	**Reagent**	**Time (min)**	**TMP**	**PV**	**MX**
1	Formalin	60	A	A	2
2	Alcohol 95	60	A	V	2
3	Alcohol 95	60	A	V	2
4	Alcohol 95	60	A	V	2
5	Alcohol 100	60	A	V	2
6	Alcohol 100	60	A	V	2
7	Alcohol 100	60	A	V	2
8	Xylene	60	30	V	2
9	Xylene	60	40	V	2
10	Xylene	60	45	V	2
11	Wax 58	60	60	A	2
12	Wax 58	60	60	V	2
13	Wax 58	60	60	V	2
14	Wax 58	60	60	V	2
Total Time (h:min)	**14:00**				

Biopsies					
Step	**Reagent**	**Time (min)**	**TMP**	**PV**	**MX**
1	Formalin	0	A	A	0
2	Alcohol 95	20	A	V	0
3	Alcohol 95	20	A	V	0
4	Alcohol 95	20	A	V	0
5	Alcohol 100	20	A	V	0
6	Alcohol 100	20	A	V	0
7	Alcohol 100	20	A	V	0
8	Xylene	20	30	V	0
9	Xylene	20	40	V	0
10	Xylene	20	45	V	0
11	Wax 58	20	60	A	0
12	Wax 58	20	60	V	0
13	Wax 58	20	60	V	0
14	Wax 58	20	60	V	0
Total Time (h:min)	**4:20**				

Difficult samples					
Step	**Reagent**	**Time (min)**	**TMP**	**PV**	**MX**
1	Formalin	60	35	A	3
2	Alcohol 95	90	35	V	3
3	Alcohol 95	60	35	V/P	3
4	Alcohol 95	60	35	V/P	3
5	Alcohol 100	90	35	V	3
6	Alcohol 100	60	35	V/P	3
7	Alcohol 100	60	35	V/P	3
8	Xylene	90	35	V	3
9	Xylene	60	40	V/P	3
10	Xylene	60	45	V/P	3
11	Wax 58	90	60	A	3

12	Wax 58	60	60	V	3
13	Wax 58	60	60	V/P	3
14	Wax 58	60	60	V/P	3
Total Time (h:min)	**16:00**				

17.1.8. Short time process (without the EHE)

MTM I / II can perform short step time processes with reduced times compared to normal overnight processes.
Reduced step times can be adopted for biopsies or small size samples.

	**Please note:** These processes are normally considered short programs and are generally used to process biopsies or very small samples during the day, but they SHOULD NOT BE CONFUSED with the RAPID processes that can be performed with the aid of the EHE and which will be discussed in the next chapter.

The user will have to determine the best step timing basing his choices on past experiences and also taking care of what follow:

1. The efficiency of a vacuum tissue processor (like the MTM) is superior to that of a traditional "carousel" tissue processor.
2. The shorter are the step time the more is important the overall quality of the reagents and their correct maintenance.
3. The time indicated for each step program is inclusive of the fill and drain times, normally:
   1'15" for the filling
   2'30" for the drain for processing programs with a total time > 5 hours
   1'15" for the drain for processing programs with a total time < 5 hours
4. For the correct infiltration of small samples it is not strictly necessary the use of 4 waxes, 3 would be sufficient, it is advisable to jump the second wax.
5. The minimum step time is 5 minutes. **We recommend to not set short times in the first wax. The minimum time for it must not be shorter than 20 minutes.** That is due (as already explained above) to the contact of the first wax with samples and baskets that are still quite cold. In the following wax steps this problem doesn't exist anymore. If the MTM is asked to drain the first wax after only a few minutes from the fill it may happen that the drain is not complete due to the formation of cold and solidified wax spots especially in the core of the SPC. It may also happen that one of the cold solidified wax spots will clog the draining holes in the bottom of the SPC resulting in incomplete drain alarms. This problem (which is more or less common to any and each kind or brand of tissue processors) is more probable with a full samples load, with a low samples load (for example 50 biopsies) the problem doesn't practically exist, any case it does not make any sense (and it doesn't bring any benefit to the process) to set step times shorter than 10 minutes. A good timing choice for the first wax is a minimum of 1 minute every 10 samples (thus 20 minutes for 200 samples and 30 minutes for 300).
6. For the reasons described at point 5 the first wax is not subject to cycles of vacuum (even when vacuum is set in the program), that is due to the possible formation, with high samples load, of a sort of solidified foam on top of the sample baskets that will require long time for its melting. The two phenomenon above described are more or less common to every kind and brand of tissue processor. That is easily understandable by the fact that, as said, the first wax gets in contact with quite cold samples baskets and SPC walls. The problem can be reduced if in the last reagent the temperature is set at 45 °C. In case of drain alarms in the first wax the most useful and efficient remedy is the first wax step time increasing. Another sign of this problem can be the systematic decrease of the level of the first wax bottle together with the increase of the level in the second wax bottle.

17.1.9. The FAST tissue processing with the MTM II

The MTM II can be considered today the fastest "not microwave" vacuum tissue processor available on the market.
In this device up to 300 biopsies can be safely processed in about 45 minutes (excluding fixation time) using conventional reagents or using the various alcohol and Xylene substitutes today available.
The processing speed-up is obtained by:

1. The pre-heating of the reagents, during their transfer from the tank to the SPC and without any delay, up to a temperature very close to that selected for the SPC in the current program step.
2. The heating of the reagents in the SPC up to 55 - 60 °C.
3. The reduction of the program steps used in the process down to 3-4 (only for small samples).
4. The optimization of the Reagent Management System.

For the execution of fast processes with the MTM II it is necessary to employ the EHE (most of its characteristics have been explained in previous chapters).

The EHE is capable to warm-up the reagents with a simple, not direct contact, thermal transfer, without any risk of direct exposure of high energy, thermal radiations for the samples (as it may happen in the microwave tissue processors).

The risks of over or under processing are largely reduced and may happen only in case of big mistakes on the processing time programming. At the opposite in a microwave tissue processor a few minutes more or less can be very harmful for the samples, also the risk of "hot-spots" typical of MW-TP is not existent in the MTM II.

17.1.10. Reagents warm-up by the EHE

As said, to perform a fast process in the MTM II it is necessary to use the EHE.
To be successfully used the EHE must be:

1. Activated in the device SETUP->Param. Setup (if not activated the EHE will work anyways but the process start will be delayed for the need to pre-heat it)
2. Be selected in the process program for the steps for which it is desired its intervention
3. For the same steps also an adequate temperature (50 - 60 °C) must be set in order to decrease the processing time thanks to the increased infiltration capability of warm reagent, conversely to that the steps time can be proportionally reduced.

Thus at the start of a fast process it is necessary to be sure that the EHE temperature would be sufficient to warm-up the reagent (as said approx. 10 °C more than the desired SPC temperature for that step). In case the EHE would be cold (at ambient temp.) Please allow about 20 minutes to warm it up.

Please also read the sub-chapter SETUP -> EHE activation.

17.1.11. Protocols for Fast processing (with EHE)

Step	Reagent	Time (min)	Temp. (°C)	P/V	Mix	EHE
	Thickness 1 mm					
7	Ethyl Alcohol 100%	15	55	A	0	YES
10	Xylene	15	55	A	0	YES
14	Paraffin wax	15	60	V	0	NO
	Total time	**45**				

Step	Reagent	Time (min)	Temp. (°C)	P/V	Mix	EHE
	Thickness 3 mm					
2	Water	10	ambient	A	0	NO
3	Ethyl Alcohol 70 %	10	45	A	5	YES
4	Ethyl Alcohol 95 %	10	50	A	5	YES
6	Ethyl Alcohol 100 %	20	55	A	5	YES
7	Ethyl Alcohol 100 %	20	55	A	5	YES
8	Xylene	10	55	A	5	YES
9	Xylene	15	55	A	5	YES
10	Xylene	25	55	A	5	YES
12	Paraffin wax	15	60	V	5	NO
13	Paraffin wax	15	60	V	5	NO
14	Paraffin wax	30	60	V	5	NO
	Total time	**180**				

Step	Reagent	Time (min)	Temp. (°C)	P/V	Mix	EHE
	Thickness 5 mm					
2	Water	10	ambient	A	0	NO
3	Ethyl Alcohol 70 %	15	45	A	5	YES
4	Ethyl Alcohol 95 %	20	50	A	5	YES
5	Ethyl Alcohol 100 %	20	55	A	5	YES
6	Ethyl Alcohol 100 %	25	55	A	4	YES
7	Ethyl Alcohol 100 %	30	55	A	4	YES
8	Xylene	20	55	A	5	YES
9	Xylene	30	55	A	5	YES
10	Xylene	40	55	A	4	YES
11	Paraffin wax	15	60	V	5	NO
12	Paraffin wax	20	60	V	5	NO
13	Paraffin wax	25	60	V	4	NO
14	Paraffin wax	50	60	V	4	NO
	Total time	**320**				

Please note:

1. Fixation steps and times are not shown because may widely vary in relationship with the samples origin.
2. The step numbers here shown do not necessarily correspond with those actually used in the MTM II, they may change depending upon the kind of reagent used.

17.1.12. Fixation

The overall samples fixation is normally done outside the tissue processors. That is due also to the need to perform different fixation type and timing in relationship to the kind and size of sample.
The first step in formalin is not necessary if the fixation has been completely executed outside the tissue processor. It can be useful to remember that the formalin can leave solid crystals that may be detrimental for some of the internal parts of the tissue processor (and again this is worth for every kind and brand of tissue processor).

Thus we recommend the following:

- Perform a complete fixation outside the tissue processor.
- Wash the samples in fresh tap water before to introduce them in the tissue processor.
- Set for the first step a low gradation alcohol or water.
- In case the fixation is completed in the tissue processor, set a bottle of water in the following station (that is worth especially for week-end processes).

17.1.13. Alcohols dilution

More or less in every kind and brand of tissue processor the alcohols are subject to a forced dilution due to the water released by the samples (that is the work done by the alcohols: water removals from the samples or dehydration). This unavoidable dilution is exploited in the RMS by Group to avoid the need to dilute the alcohol before their loading in the bottles.
In the processing program examples previously shown only 95 % and 100 % alcohols are used implying that:

- The tissue processor would be used with the RMS activated.
- Only at the very first alcohols loading the first three would be manually diluted in order to create a gradual increase of the alcohol concentration (for example 50 – 80 – 95), theoretically only once in the life of the tissue processor, practically every time for any reason it would be necessary to substitute all the reagents and reset the RMS.

Please note that what suggested in point 3 is advisable but not strictly necessary because in several laboratories where the MTM is installed are used 95 % and 100 % alcohols without ever performing any dilution and with very good processing results.

17.2. EDIT process

The function EDIT PROTOCOL can be accessed from the SETUP menu. Select a process protocol from the menu by pressing on the related icon. The available protocols 18. A new screen will open showing the entire process content.
With the ARROW keys it will be possible to explore the entire table to select the field to edit. Each field content can be varied by using the extended character keyboard or, in same case, by using the +/- keys. Each field can also be accessed by just pressing on it. Press SAVE to save changes and exit the function. Press ESC to abort the operation.
Below are explained limits and characteristics of each field:

17.2.1. Time

The station time can be set from 0 to 99 hours. The data control function can give unexpected results in case a number higher than 59 is entered in the field of the minutes. For example:

- Entering 1 or 2 digits and moving over another field the entered number is interpreted as minutes, if the number is higher than 59 it is transformed in hours and remaining minutes, thus: 60 will be transformed in 1 hour and 0 minutes, 65 will be transformed in 1 hour and 05 minutes and so on.
- Entering more than 2 digits the result may appear more strange when the last two digits entered are higher than 59. Thus: the number 159 will be transformed in 1 hour and 59 minutes, but the number 160 will be transformed in 2 hours (1 hour + 60 minutes = 2 hours). The number 1099 will be transformed in 11 hours and 39 minutes and so on.

Initially this particularity may appear cumbersome, but by respecting the principle of not entering more than 59 at the end of the time string, nothing unexpected will happen. If a time of 0 hours and 0 minutes is set, the step will be ignored even if the other parameters (temperature and vacuum) are set. The station time includes the reagent filling and draining times (approx. 3 minutes).

17.2.2. Temperatures (Temp)

The selectable reagent temperature range is: 0 for ambient, from 20 - 45 °C.
The selectable paraffin temperature range is: 45 - 65 °C.

17.2.3. Processing pressure (P/V)

The Pressure / Vacuum field allows the selection of the following options:
A = ambient pressure
V = vacuum, SPC pressure will be lowered to 600 HPa below ambient
P = pressure, SPC will be pressurized up to 200 HPa above the ambient
P/V = an alternating cycle with an 8 minute frequency of pressure and vacuum

Varying the pressure in the processing chamber facilitates reagent infiltration into tissue specimens. The following P/V settings are recommended:
Biopsies = vacuum or ambient pressure
Samples of normal size = vacuum in every station
Mix of biopsies and normal samples = vacuum in every station
Large samples = cycles of pressure and vacuum in every station

It is not recommended to simultaneously process samples of very different sizes.

17.2.4. Reagent agitation (MIX)

The reagent mixing in the MTM I / II is accomplished by bubbling air up from the bottom of the processing chamber. Select from the following frequencies:

0 = no mixing
1 = one mixing every 30 minutes
2 = one mixing every 20 minutes
3 = one mixing every 15 minutes
4 = one mixing every 10 minutes
5 = one mixing every 5 minutes

17.2.5. Reagent pre-heating (column EHE)

In this column it is possible to decide whether to warm-up the reagent during the filling or not.
The reagent is heated using the EHE, the end temperature of the reagent is decided in the column of the reagent temperature for the SPC (column TMP). The precision of the EHE is +/- 3 °C; at the end of the filling, during the stationing in the SPC, the reagent temperature is further corrected toward the defined setpoint with a precision of +/- 1 °C. The EHE precision is lower than the SPC because in the EHE the heating is made dynamically during the filling and approximately 2.5 l of reagent are heated in 90 sec, despite this speed the heating is safely made and controlled. If in this column the EHE is chosen the reagent, instead to be directly loaded in the SPC, is diverted through the EHE, during the drain the reagent will anyways not pass through the EHE.

In conclusion: For fast processing it is necessary to set a temperature between 50 and 60 °C in the column TMP and choose "yes" in the EHE column to activate it for that step. More informations are contained in the chapter "Advices and suggestion for processing" in the following of this manual.

17.2.6. Process #18: Reversed

Process #18, REVERSED possesses all the characteristics of the other programs except:
- It begins at the last non-zero time on the steps list and moves backwards (REVERSED),
- it is not possible to insert a delay on the first step,
- it is not possible to start it from a step other than the last,
- the operator cannot modify its name,
- its position in the list of the processes is always the #18.

Except as specified above, it is identical to the other processes, therefore:
- It increments the RMS counters,
- all RMS rules are respected,
- at the end of the process, the user will be prompted to run a purge cycle,
- at the end of the purge cycle, if during the last process at least one paraffin was used, the WCC will be automatically started,
- at the end of the WCC, the Reagent Management System will be started.

There are no particular restrictions to the use of this process, however be aware that the reagent contamination will also be reversed.

So for example: the clearing from tank n° 10 will get dirty with the paraffin from container n° 11, the dehydrant from tank n° 8 will get dirty with the clearing agent from tank n° 9 and so on. If this process is launched infrequently (as it is logical to expect, since it essentially serves to de-process bad samples) it will not substantially affect subsequent normal processes.

17.3. EDIT PURGE

This function allows you to:

- View the Standard purging protocol (not editable),
- view and customize 3 Custom purging protocols.

17.4. SERVICE

From this function it is possible to carry out a series of checks and checks on the functionality of the device. For a detailed explanation of the SERVICE go to the bottom of the manual after the section relating to alarms.

17.5. EXT. SERVICE

This function is protected by a special password and is reserved for service technicians.

18. STARTING THE DEVICE

By clicking on the "START" button the following MENU is presented:

18.1. START RECENT

This function displays the last 5 protocols performed.

18.2. START ALL

This function allows you to choose the process to start from the 18 available.

18.3. Processing with the MTM I - MTM II

18.3.1. Checks and procedures before operating

- Check paraffin and reagent levels.
- Check and, if necessary, clean the processing chamber.
- Place the samples into the processing chamber.
- Close the processing chamber lid firmly.
- Select a program.
- If it is a quick process that requires the use of the EHE, check that it has an adequate temperature compared to those required in the process (see also the chapter relating to the EHE and the one relating to rapid processing).
- Check that the process end date and time correspond to what you want and change them if necessary.

18.3.2. Fast processes (only MTM II)

As said, to perform a fast process in the MTM II it is necessary to use the EHE (please also see the next chapters).
To be successfully used the EHE must be:

1. **Activated in the device SETUP->Param. Setup (if not activated the EHE will work anyways but the process start will be delayed for the need to pre-heat it).**
2. **Be selected in the process program for the steps for which it is desired its intervention.**
3. **For the same steps also an adequate temperature (50 - 60 °C) must be set in order to decrease the processing time thanks to the increased infiltration capability of warm reagent, conversely to that the steps time can be proportionally reduced.**

Thus at the start of a fast process it is necessary to be sure that the EHE temperature would be sufficient to warm-up the reagent (as said approx. 10 °C more than the desired SPC temperature for that step). In case the EHE would be cold (at ambient temp.) please allow about 20 minutes to warm it up. Please also read the sub-chapter SETUP -> EHE activation.

18.3.3. Setting the program end-time

Before to start a process program it is necessary to check (and in case to set) the program time and date of completion.

In the above figure the top-left window contain all the EOP parameters.
The indication of the number of cassettes and basket processed is compulsory.
Please note: Remaining in this screen, for every minute that elapses, the delay (if any) will decrease by one minute while the Program End-time remains constant. But if the delay time is set to or reaches zero, the Program End-time will increase.

18.3.4. Delay setting

By pressing on the fields their value can be changed. The computer will automatically update the total processing time, the date and time of completion, and the fields that indicate the amount of the delay expressed in days, hours and minutes. The maximum delay is 14 days, 23 hours, 59 minutes. It is not possible to set an End-time lower than what will result by adding the total process time to the current time.
Any delay programmed will extend the length of time the specimens will remain in the first reagent.

18.3.5. Process End-time memory

A convenient feature of the MTM I / II is the automatic recall of the End-time:

- Every time a delay is requested or updated (thus every time an End-time different from the natural one is set) the computer stores the resulted End-time it in the long term memory.
- When a program is started, the computer will propose (recalculating the delay) the same End-time set during the previous start of that program. If no delay was set the computer will propose for the End-time the natural time: current time + total process time.

- The delay necessary to end the process at the predetermined hour and / or day is automatically calculated and displayed in the appropriate display field.
- To reset the delay, press “CLR”. The delay will be set to zero and the delay memory will be erased. The next time this program is started, the End-time will be the natural one (current time + total process time).
- Any update of the delay / End-time here made will be stored in the long term memory only if the program is actually started.
- Obviously the device needs sufficient time to complete the selected process. If it isn’t possible to complete a process at the desired time, the computer will propose a different End-time.

Anyways it is highly recommended that the user verify time, day and date of process completion before starting a program.
If the End-time is incorrect, after the start of a program the only user option is to abort the process and restart it again with a corrected End-time. Process programs can not be edited during processing.

18.3.6. Start from step different from the first

At the start of a program press the "UP" and "DOWN" arrows: note that the bar that highlights the step will move from the first step to every valid step (every step is valid if its time value is greater than 0). This feature can be useful, for example, on partially processed tissue samples to re-start their processing where it was interrupted.

18.4. Starting a process program

After the process End-time and the number of cassettes and baskets has been set, the data can be stored in the memory by pressing SAVE, then the program can be started by pressing START. Pressing the ESC key the operation can be aborted.

After the final start the following information will appear on the screen:

- Each step of the process with time, temperature, pressure and mix data.
- The current step highlighted.
- In the highlighted step, the time remaining will ramp down minute by minute until the step is completed.
- On the top of the process window the name of the current program and the scheduled date and time of completion and other information are shown.
- In the message line: the action that the processor is performing (e.g. .: loading the reagent, unloading the reagent, positioning the rotary valve, etc.)
- Any alarms.
- If the RMS is active, the number of the tank that will be loaded in that step is displayed next to the step number.

Once a program is started, it is not required any other user intervention. Processing step times and total time include the time necessary to fill and empty the SPC.

18.4.1. Process execution with coded baskets (LIS option)

If codified baskets are used (i.e. they can be identified with a number or barcode printed on the outside) and the "Basket ID" option is enabled in the Parameters Setup. When launching the process, the program will ask you to assign a code to each loaded basket, which can be entered manually or using a barcode reader. This information will then be reported on the final report of the performed process.

18.4.2. Interrupting (suspending) the process

When a process program is running, it is possible to suspend and later abort it but only during stationary phases (for example not during filling and draining).

To suspend a process, press SUSPENSION and, within 3 seconds, ENTER. The device will suspend for 3 minutes every activity. During

this period it is possible to open the SPC lid. Pressing the key ENTER the process resumes. If the process is not resumed within 3 minutes, the device will try to do it by itself.
If the SPC lid is not closed an ALERT will be issued and a beeper will alert the user of the mistaken situation.
When the process is suspended it is possible to abort it by pressing the key ESC and after 1 second pressing again ESC three times in sequence. The SPC will then be drained, after that the samples can be removed. As said, the interruption of a program is only possible when the reagent is in stand-by in the processing chamber and not during the other steps (filling / emptying, positioning the rotating valve, etc.).

18.4.3. Opening the SPC lid during a process

There are situations in which the processing chamber lid CANNOT be opened (when the SPC is under vacuum). Others in which it MUST NOT be opened (during fill and drain operations).

	**IMPORTANT NOTE:** NEVER open the SPC while a program is running in a phase other than "Processing". Alarms may occur and the computer control system may abort the process. Moreover, potentially toxic or flammable substances may exit from the SPC.

The SPC lid is equipped with a micro switch that detects if the lid is open or closed, thus, if the lid is opened during a process, the process it is automatically suspended. But before to open the SPC lid it is BETTER to suspend the process by pressing the keys ESC and ENTER in sequence. This will signal the system to normalize the SPC pressure and equalize it with the ambient pressure.

As said the SPC lid can be opened when the message line displays "Processing".
Please take the following precautions:

1. Suspend the process before to open the SPC lid.
2. Close back the SPC lid as soon as possible.
3. Respect all the safety rules about precautions to be taken when handling toxic or flammable substances.
4. If the system is processing during a vacuum step, after the lid handle opening, it will be necessary to wait that the system suspend the process and perform the VACUUM RELEASE before the opening of the SPC lid will be possible. The message line will then display "Normalizing pressure in the SPC" and, after 10 seconds, the SPC lid can be opened.
5. If the processing chamber is not closed within 3 minutes, an ALERT will occur (20 PROC SUSPENDED) and a beeper will start to sound. When the SPC lid is closed back the process is automatically resumed after a while or the process can be resumed by pressing the key ENTER.
6. If the opening of the chamber is difficult, DO NOT force it, wait for the ambient pressure to be resumed.

18.4.4. Device auto-tests

Before and during the process the system verifies if there are the right conditions to start / continue the work.
At the start of a process a series of parameters is being checked, if one of them is not conform to what is required to safely start the process, the start is aborted and a message is shown so that the user can take adequate measures to remove the fault condition (see also the chapter "Safety devices – Runtime test").
During the process another series of checks is performed continuously to ensure the safest sample processing. For example: before to fill a bottle the filling pipeline is tested to ensure that there isn't any clog or reagent of the previous step left in the SPC. If the pipeline is not completely open Alert 6 and Alarm 53 are issued, that specific bottle is jumped, and the process continues on the previous bottle (which will be reloaded) with the time of the jumped step. If two adjacent bottles are found faulty a blocking alarm is issued and the process is aborted.

18.4.5. Display of alarms

During the execution of the process any alarms (non-blocking or alerts) are displayed in the message line. All the alarms are in any case saved and can be consulted in the following functions:

- Start Menu - Graphs function
- Start Menu - Graphs - Archive - Textual report of the process
- Setup Menu - Service - Alarm file function

18.4.6. Process completion

At the end of a program, the device maintains the last reagent in the processing chamber. Press ENTER to empty the chamber. After the reagent draining, it is possible to open the SPC and take out the samples.
After the confirm that the samples have been taken out of the SPC the computer will prompt a message with a request to start the purge program. If the program included paraffin steps, the purge execution will be compulsory.

18.5. START PURGE

The purge is necessary to remove wax residue from the process chamber. It is always necessary if wax was used during the last process. It is advisable to perform anyways a purge even if in the last process no wax has been loaded into the SPC, only in case the loaded reagents where formalin or alcohols the purge can be jumped without any problem.

The FIRST purge program has been set and optimized by the manufacturer and cannot be modified, but there are other 3 purge programs that can be on some extent modified by the user.

It can be started anytime from the Main Menu, however at the end of a complete process the purge start is automatically requested by the system, it can be jumped by pressing the ESC key, but, if a wax was loaded during the last process, the following process start will be denied until a purge is performed.

Press “ENTER” to start the purge. As well as in any other program, the purge cycle can be aborted by pressing ESC and then ENTER within 3 second.

The bottles containing the purge reagents are labeled with P1 and P2 and must contain: (P1) Xylene (or substitutes), the second (P2) 95 or 100 % Ethanol. The reagent must be substituted every 3 to 9 purge process (see sub-chapter “ Purge reagents limits setting”).
The removal of wax residues before the start of the purge program is useful to extend the life of the purge reagents. Avoid the use of sharp tools that can damage the processing chamber surface.
Even if the processing chamber is maintained at the last wax temperature till the execution of the purge cycle, it is preferable to run the purge cycle immediately after the process.
The purge total time duration is 64 minutes.
The last purge step is the drying of the processing chamber from any alcohol residue. This step is not critical and can be stopped at any time without damaging the device.

i	**Please note:** **Jumping the drying step the purge total time is reduced to 34 minutes.**

18.6. REMOTE FD

Widely discussed on page 21 in the paragraph: RFD - Reagent loading / unloading system

18.7. EWD/PWD manually

Allows you to manually replace the 11-12-13 paraffins or with the PWD or EWD option based on how the processor has been configured in the RMS SETUP function - Auto EWD/PWD Enable/Disable.

18.8. RMS SITUATION

With this function it is possible to consult the RMS situation

In the example shown above some reagents need to be replaced.
The RMS function displays:
The RMS table indicates for all reagents (10 process - 4 paraffins - 2 washing - 1 carbon):

- Alert = (Green = Reagent OK, Red = Reagent to be replaced)
- TK = Tank number
- REAGENT = Name of the reagent
- STATUS = Status of the reagent (OK = good = Reagent needs substitution = Reagent to replace)

18.9. STATISTICS

18.9.1. Overall statistics

This function displays the processor status from the date it was installed. The data presented allows us to understand both the overall state of use and the components that require maintenance / replacement (air pump). The processor configuration data and set calibrations are also listed.

18.9.2. Reagents statistics

This function allows you to calculate and evaluate the consumption of reagents in a period between two dates. The start date and end date are attributable. The calculation carried out is presented in a report presented on screen.

18.9.3. Process statistics

This function allows you to calculate and evaluate the quantity of protocols of the same type that have been executed in a period between two dates. The start date and end date are attributable.
The calculation carried out is presented in a report presented on screen.

18.9.4. Reagent Consumption Forecast

This function allows you to calculate the consumption of the reagents used on the processor taking into consideration:

- The number of working days over which to calculate consumption,
- up to 3 protocols normally used in the same working day,
- the number of samples normally processed by each selected protocol,
- possibility to also include the reagents used for washing.

Some important notes for the correct setting of the calculation parameters:

Before RUNNING THE CALCULATOR IT IS NECESSARY TO COMPLETE THE RMS SETUP (the RMS does not necessarily need to be set ON).

Please input the EFFECTIVE number of working days in a month or in a year.

Examples: To obtain the average reagents consumption in a month: input 26 days if the lab is working also on Saturday, otherwise input 2.

To obtain the average reagents consumption in a year: 365 days, less 52 Saturdays, less 52 Sundays, less 2 weeks of vacation closure = 251 days of effective work.

To indicate the name of the protocols used every day, it is foreseen that not more than 3 protocols can be performed in 24 hours considering the need to perform also a Purge after each Process (for example 1 log protocol + 2 short protocols).

The calculator will account also the reagents used in each purge needed.

Finally for each process please input the average number of processed samples.

The field can be left empty in case for RMS purposes you are only using the number of processes run to determine the triggering of reagent substitution.

When correctly set, the function calculates the number of samples treated based on the working days set with the other parameters and generates a report that can be viewed or exported to a USB stick.

The report that is generated shows the calculation parameters and the number of changes made for each reagent used.

18.10. PROCESS REPORTS

The list of executed processes appears. The name of the process is composed of nr. 3 fields namely:

- Sequential number
- Process end time
- Process end date

18.10.1. Visual

By clicking on the VISUAL button the report of the selected process is presented on the screen. The report can be printed by clicking on the "PRINT" button.

18.10.2. Graph

By clicking on this button the process graph is displayed and the following information is displayed for each step:

- The temperature of the SPC
- The temperature of the WWC
- The pressure of the SPC
- The temperature of the EHE
- Any occurred alarm or alert
- The program steps

There are two windows:

- The upper one is reserved to the temperatures and the alarms
- The lower one is reserved to the SPC pressure

In the event of an alert / alarm their visualization is made by a small box with the alert / alarm number inside it, an arrow that points into the graph indicated the exact time in which the alarm occurred. All of it, together with the alarm archive (in the service menu), may be of great help on determining what really happened in case of a faulty event during the process. The graphs, other than to be helpful in case of an alarm, may also allow the avoidance of a future faulty event. For example: A not sufficiently stable temperature or pressure graph may indicate a degradation of the temperature control system or the air pump performances. In this case it will be possible to call our technical service for a preventive maintenance and avoid possible future alarms and the risks of not complete processes.

Please see in the following pages some graph examples.

18.10.3. Example of a correctly executed process chart

18.10.4. Example of a process executed with alarm

19. ALARMS

19.1. Managing alarms

There are two types of alarms:
Alarms 1 through 50 are NOT-BLOCKING ALERTS.
NOT-BLOCKING alerts are only WARNINGS and do not interrupt the program execution because the cause of them is not critical for the process completion. In this situation, a program stoppage may produce worsen results than its continuation.
When an ALERT occurs, the program continue and the screen displays the alert number and a brief explanation of it. Upon the process program completion, the cause of the alert can be determined and usually easily eliminated by the operator.

Procedures listed below for each type of alert / alarm should be followed to correct the cause of the problem. If the problem persists, a call to the our service department may be indispensable.

Alarms 51 through 99 are BLOCKING ALARMS. These are true alarms, and the process cannot continue as the cause of the alarm makes it impossible to proceed.
In the event of a BLOCKING alarm, follow the instructions displayed on the screen to:

1. Stop the acoustic alarm
2. Try to empty the SPC from wax/reagent
3. Remove the samples
4. Reset the device

After the reset, the device is again ready to run a program. The alarm could simply have been an error in closing the chamber lid or something else easy to resolve. Before to proceed please do what follow:

1. Remove all samples
2. Check that the SPC does not contain any reagent residuals
3. Check reagent and wax bottle levels
4. Check that the bottles are correctly placed in their housing slots
5. Check that the waxes are melted and, if possible, verify their temperature
6. Check and clean the SPC lid gasket
7. Start a purge to verify the correct function of the device

When the cause of the alarm is unknown or uncertain, it could be helpful to check the voltage and the quality of the main power line. If the alarm persists, please call our technical assistance.

19.2. Procedure for the device reset

In the top left of the device rear panel there is a green o red button. Its purpose is the complete reset of the device software program. It must be used under the following circumstances:

- When, for any reason, the user is unable to reset an alarm in the usual way
- When a user faces unexpected situations that cannot be resolved by any other means
- To reset the device's memory that holds variables pertaining to the state and contents of the SPC, possible processes in progress, possible actions in progress and / or alarms in progress

The procedure for using the reset button is the following:

- Switch off the device (the switch is located near the main power cord)
- Press and hold the reset button
- Switch on the device and maintain the reset button pressed until the Main Menu screen appear.

After this operation the MTM I / II may be ready for operations again, but before to start any kind of process it is necessary to verify:

- That the SPC is empty
- That the SPC is clean (above all in reference to the presence of paraffin residue)
- That the lid gasket of the SPC is clean and in its correct position
- That the device works correctly, by performing tests from the service menu
- That an alarm present before the reset is not again on the display, in this case will be necessary to switch off the device and call our service department, (with the exception of the alert #1)
- Before to start the purge cycle execute the device check list
- Run a purge cycle to verify that the device is fully operative.

In the next paragraphs, each alert / alarm and the appropriate solution is described.

19.3. Graph of the last 30 processes

In case of an alarm it can be useful to consult the graphs of the last 30 processes executed to verify if there are information that may allow to better understand why an alarm was issued.
See also the preceding chapters for more information on the graphs.
The alarms numbers are shown inside a small box and an arrow points to the graph to indicated the exact moment of the happening.
Checking also the alarm archive the chances to understand why an alarm occurred are greatly increased. For example:

- If the wax temperature graph is unstable (more than +/- 1 °C) or if the temperature shown is different from the pre-defined setpoint, it is possible to suspect a failure of the wax temperature control system. These temperature problems may also cause drain or fill alarms.
- Analogous situation may happen with the SPC temperature.
- The pressure graph allows the control of the air pump efficiency and the good sealing of the pneumatic circuitry. In case of leaks the graph will be not stable to indicate an excessive frequency of the air pump start to restore the requested pressure into the SPC.
- A blocking alarm may be foregone by one or more alerts, in the processing screen it is shown only the last alert/alarm occurred in each step, in the graph all the alerts/alarms are shown even when happened in the same step. That can be useful to understand what really caused the final blocking alarm.
- From the graph it is also very easy to verify if one or more steps has been jumped and the reason why it happened.

19.4. ALERTS (NOT-BLOCKING)

1 - PW FAILURE

EXPLANATION – the alert #1 indicates that there has been an interruption of power. It may be due to a loss of power in the main line or merely due to the switching OFF of the device. If the loss of power occurs during a process, the EFTP automatic power outage protection will allow it to resume the process program exactly from where it was interrupted. The program resume will be performed according to the formula:
Steps 1 to 10 (formalin, alcohol, Xylene, etc): no special action, the power failure time is considered processing time and the EFTP continues as if nothing happened.
Steps 11 - 13 (paraffin): processing will pause (for approximately as much time as the unit was without power) waiting for the processing and the paraffin chambers to return to the proper temperature. The power failure time and the related re-heating time is NOT considered processing time.
CAUSES – Loss of power in the lab, a blown fuse, or the simple switching OFF of the unit.
SOLUTION – If the power supply doesn't resume, check the electric network, plug and cord. If necessary, replace the device fuses. If the device is found fully operational but this alert appears too frequently (e.g. more than once in a month), it would be prudent to have the unit connected to its own power supply (separate circuit and breaker). To increase the device safety and reliability, an uninterruptible power supplies (UPS) may be used to protect against power failures, fluctuations and spikes.

4 - P/V TIMEOUT

EXPLANATION – the device is not able to create the proper vacuum in the processing chamber at the scheduled time. The processor will not try anymore to create vacuum in that step and will go on with the program. During the next step, if scheduled, it will try again.
CAUSE – not perfect sealing of the lid gasket.
SOLUTION – check and clean the lid gasket.

5 – SPC FULL FILL

EXPLANATION – excessive level of reagent in the bottle during the fill; the overfill is recognized and the filling is stopped before it can produce a failure. The process can continue without problems.
CAUSE - Excessive level of reagent in the bottle.
SOLUTION - Verify reagent levels.

6 - ABORTED STEP

EXPLANATION – it is impossible to fill the content of a bottle into the SPC. The bottle will be jumped and the following bottle in the process list will be used, the time of the aborted step will be added to the current one. If the attempt succeed the process can continue without problems. In case also the following bottle cannot be filled the process is interrupted and the device indicates alarm 53 – LINE CLOGGED
CAUSE - full clogging somewhere in the part of the hydraulic circuit of the jumped bottle.
SOLUTION - verify where possible the bottle pipeline.

7 - FILE NOT FOUND

EXPLANATION – file not found or corrupted in the long term computer memory; the recovery systems replaces the lost or incomplete file from a backup copy.
CAUSE – transitory malfunction of the CPU memory.
SOLUTION - No intervention by the user is possible. If the problem persists, contact our technical service.

8 – DRAIN TIMEOUT

EXPLANATION – the time required to drain the SPC was excessive.
CAUSE - Insufficient pressure in the SPC due to: not fully efficient air pump, an air leak in the pneumatic circuit or an air leak from the SPC lid gasket.
SOLUTION - Check the SPC lid gasket, contact our service department for other causes.

9 - WWC TEMP LOW

EXPLANATION – during the process before the first paraffin step, the temperature of the paraffin chamber dropped down to a level not sufficient to guarantee the paraffin melting; the process continues till the last reagent. If the problem persists, before the draining of the last reagent, the process is stopped (see alarm 60).
CAUSE - The thermo-regulation system of the paraffin chamber is out of order.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

11 – VR M1 FAILURE

EXPLANATION – M1 is the name of the motor that provides the clockwise rotation of the VR (Rotary Valve). If the position of the VR doesn't change within 10 seconds from the starting of the clockwise command this alert is issued. This is not a blocking event because

the device may continue to work by using the counter-clockwise motor (M2).
CAUSE – Possible malfunction of: M1, wiring, IOB.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

12 – VR M2 FAILURE

EXPLANATION – M2 is the name of the motor that provides the counter-clockwise rotation of the VR (Rotary Valve). If the position of the VR doesn't change within 10 seconds from the starting of the counter-clockwise command this alert is issued. This is not a blocking event because the device may continue to work by using the clockwise motor (M1).
CAUSE – Possible malfunction of: M2, wiring, IOB.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

13 - RESET FLAGS

EXPLANATION - This is a simple indication that the SPC FLAGS have been reset from the SERVICE menu or from the EXTENDED SERVICE menu.
CAUSE - Device operator intervention.
SOLUTION - Na.

14 - SPC TEMP. LOW

EXPLANATION – during the process the temperature of the sample processing chamber did not reach the setpoint; the process continues till the "last reagent before the paraffins". If the problem persists, before the draining of the "last reagent before the paraffins", the process is stopped (see alarm 60).
CAUSE - The thermo-regulation system of the SPC is out of order, or step time too short to allow the reagent to be heated at the desired setpoint (when the EHE is not used).
SOLUTION – If the problem is due to a mistaken programming: change the step time or temperature. If the problem is due to a fault on the SPC thermo regulation system no intervention by the user is possible. If the problem persists, contact our service department for technical assistance.

15 - SHORT FILL

EXPLANATION – during the reagent fill the filling time was too short, the reagent level may be insufficient to cover the samples.
CAUSE – Malfunction of the pneumatic system, reagent level in the tank too low.
SOLUTION – Verify the reagent level in the tank(s). If the problem persists, contact our service department for technical assistance.

20 - PROC SUSP USER

EXPLANATION – The process has been suspended for the opening of the SPC lid or by user request.
CAUSE – When the SPC lid is opened during a process, or the user suspend it by pressing ESC and ENTER, the computer temporarily halt the process execution. When the SPC lid is closed back the computer automatically resume the process execution within 3 minutes form the opening. The user can also manually resume the process, if the lid is closed, by pressing the key ENTER.
SOLUTION – Close the SPC lid as soon as possible. If the process is not resumed wait for the system to automatically check the SPC lid micro switch functionality (that it will happen within 3 min from the lid closing). If the micro switch will be found broken the system will automatically disable it and it will resume the process execution. (Of course, meanwhile, the SPC lid must be left closed). If the SPC lid is closed but the system shows that it is open, the micro switch that controls the SPC lid status is surely broken or out-of-position. Waiting for service it is possible to manually disable it by the device SETUP menu.

21 - PROC SUSP LID

EXPLANATION – The process has been suspended indefinitely cause the opening of the SPC lid.
CAUSE – in case of process suspension the process MUST be resumed within 3 minutes, after that time the suspension is considered accidental and this ALERT is issued to not confuse it with alert 20.
SOLUTION – see ALERT 20.

22 - PROC SUSP UPS

EXPLANATION – This alert is issued only in unit with the RS-232 connected UPS.
CAUSE – The process has been suspended because, during a power failure, the UPS batteries went below 40% charge. The process is suspended to avoid that the energy would be completely lost during a drain or fill action with the risk that the sample will remain in air. The device is set in a condition of power saving to increase the UPS batteries life
SOLUTION – Restore the electrical power, if the power is restored before the batteries would be completely exhausted the process will be automatically restarted. Anyways the process will be restarted after the power is restored, even in case of total loss of batteries charge, but in case of paraffin steps a delay is introduced to ensure the paraffin complete melting. If the electrical power is not restored within 5 minutes from the issuing of this alert, the condition is switched to alert 23 and the device prepare itself for the complete switching OFF (see alert 23).

23 - PROC SUSP INDEF

EXPLANATION – The process has been indefinitely suspended due to the extended opening of SPC lid or lack of power when the device is equipped with the UPS and the batteries are too low (see alert 22).
CAUSE – In case of suspension (see alert 20 and 21) the process must be restored within 3 minutes, over that limit the suspension is considered unwanted or accidental and this alert is issued to not mistakenly confuse the situation with the temporary suspension. A beeping start to signal the potentially faulty situation to the users. This alert is also issued on devices equipped with UPS when there is a power failure and the batteries charge is not sufficient to keep the device alive, the process has been suspended and the device prepare itself to the complete power failure.
SOLUTION – see alerts 20, 21 and 22.

25 - PNEUSYS LOW EFF

EXPLANATION - The pneumatic system of the device is not fully efficient.
CAUSE - The causes may be due to: decreased efficiency of the pneumatic pump, small leaks in the pneumatic / hydraulic system.
SOLUTION - The device requires maintenance. In the meantime it can continue to be used but for the safety of the samples it might be better to stop its activity.

30 - RMS POSTPONED

EXPLANATION – The RMS (Reagent Management System) is an automatic feature that periodically request the user the substitution of certain reagents in relationship to pre-determined plans. The user may decide to postpone the execution of an RMS request, but in this case an alert is issued and stored in the memory for future consultation. If the RMS is postponed only once nothing bad can happen to the processing quality, but in case of more than once postponing events the quality of the reagents may go under an acceptable level.
CAUSE – The RMS execution has been postponed by the user.
SOLUTION – Execute the RMS every time is requested by the system.

37 – SRR EXECUTED

EXPLANATION – The SRR procedure (Safety Reagent Recovery) has been performed.
CAUSE – Main power failure and UPS batteries with charge level <50 %.
SOLUTION – It is necessary to restore the main power and check the correct functioning of the UPS.

41 / 42 / 43 – L1, L2 or L3 SL WRONG

EXPLANATION – One of the SPC level sensors has a behavior not consistent with what the control system expected.
CAUSE – Level sensor malfunction, or level sensor dirty, or the indicated basket number is wrong (the presence of a basket in front of a level sensor inhibits its functions, for example: if two basket has been declared, during the reagent fill the system expects the sensor L2 activation, but if the real number of baskets inserted into the SPC is 3 the sensor L2 will not work properly).
SOLUTION – Clean level sensors optical prims, verify that the number of declared baskets is correct.

44 - IOB COM ISSUES

EXPLANATION – The communication with the IOB (Input Output Board) has been temporarily halted.
CAUSE – Causes may be due to failures (probably transient) on: CPU<-> IOB connecting cable, IOB RS-232 components, CPU RS232 components, electrical noises.
SOLUTION – Check and eventually substitute the above mentioned components.

46 - SPC LEVEL LOW

EXPLANATION - During a check (carried out during a process step) the device measured a low level of reagent in the process chamber.
CAUSE - The causes may be due to: leaks on the Main Valve (possibly due to dirt) due to which the reagent returns back to the original tank, hydraulic leaks.
SOLUTION - Replace the dirtiest reagents. Carry out one or more washes with clean reagents. The device requires maintenance. In the meantime it can continue to be used but for the safety of the samples it might be better to stop its activity.

49 - VR REPOSITION

EXPLANATION – An anomalous positioning of the rotary valve VR has been detected.
CAUSE – Possible malfunction of the position sensor.
SOLUTION – If this alarm is repetitive. Please contact our service department for assistance.

19.5. ALARMS (BLOCKING)

51 - FILL NO VACUUM

EXPLANATION – The device was unable to produce vacuum in the process chamber while attempting to fill from a reagent or a paraffin station.
CAUSE – During the filling stage, a leak in the pneumatic or hydraulic circuit occurred; the air pump is not fully efficient or broken.
SOLUTION – Check the SPC lid gasket . Please contact our service department for assistance.

52 - FILL TIME OUT

EXPLANATION – The filling from a reagent or a paraffin bottle has not occurred in the allotted time.
CAUSE – See alarm 51.
SOLUTION – See alarm 51.

53 - LINE CLOGGED

EXPLANATION – Before to fill the content of a tank the system tests the tank specific portion of pipeline. If the pipeline is clogged the system tries to fill the following reagent and issues the alert 6 ABORTED STEP, in case also the following bottle would be clogged the system will issue this blocking alarm and will stop the process.
CAUSE – The pipeline of the bottle that the system is going to fill is clogged, or the previous reagent was not completely drained due to the pipeline obstruction or due to some problem in the hydraulic or pneumatic circuit.
SOLUTION – Check the specific portion of pipeline of the tank involved in this alarm (or the previous tank), there may be debris (or drops of solidified paraffin) that clogs it.

54 - SPC OVERTEMP

EXPLANATION – During a paraffin step the processing chamber temperature went over the allowed limit (not to be confused with alarm #20).
CAUSE – SPC thermo-regulating system damage.
SOLUTION – No intervention by the user is possible. Please contact our service department for assistance.

55 - SPC TS OUT

EXPLANATION – Malfunction of the SPC temperature sensor.
CAUSE – SPC temperature sensor failure.
SOLUTION – No intervention by the user is possible. Please contact our service department for assistance.

56 - SHORT FILL

EXPLANATION – A reagent fill was completed before the minimum allotted time. The SPC will be drained and the process will proceed to the next step. If the problem persists, the process will be stopped.
CAUSE – Very low quantity of reagent in a bottle; reagent bottle quick connector not fully inserted into the female receptacle.
SOLUTION – Check reagent bottle position and fluid levels. If the problem persists, contact the our service department for technical assistance.

57 - VR OUT

EXPLANATION – The rotary valve is out of position.
CAUSE - The Rotary Valve motor failed or the Rotary Valve position sensor failed.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

59 - SPC TEMP LOW

EXPLANATION - The SPC chamber temperature was too low during the drain of a paraffin step, the drain cannot be completed. The process will be stopped to avoid other problems.
The samples will be left in paraffin till the user intervention.
CAUSE – Incorrect working of SPC: temperature sensor, heater, safety thermostat.
SOLUTION – No intervention by the user is possible. Please contact our service department for assistance.

60 - WWC TEMP LOW

EXPLANATION – At the moment of the fill of a paraffin step, the temperature of the WWC chamber was too low. The process will be halted because the fill cannot be guaranteed.
CAUSE - Incorrect working of WWC: temperature sensor, heater, safety thermostat.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

61 - WWC OVERTEMP

EXPLANATION – The temperature of the paraffin chamber is well above the set point.
CAUSE – WWC temperature system failure.
SOLUTION – No intervention by the user is possible. Please contact our service department for assistance.

62 - TS WWC OUT

EXPLANATION – The WWC temperature sensor is out of the correct range.
CAUSE – WWC temperature sensor failure.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

63 - PRESSURE NR

EXPLANATION – During the ending phases of the drain the pressure in the SPC is too low.
CAUSE - The air pump or other pneumatic circuit parts failed.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

64 - DRAIN NO PRESS

EXPLANATION – During the drain the pressure has not reached the correct value.
CAUSE - see alarm 63.
SOLUTION - see alarm 63.

65 - DRAIN TIME OUT

EXPLANATION - The drain has gone over the maximum time allowed.
CAUSE - see alarm 63.
SOLUTION - see alarm 63.

66 - SPC NOT EMPTY

EXPLANATION – The user attempted to begin a process with the SPC either not empty or not cleaned from paraffin residue.
CAUSE – The SPC is not empty. The purge cycle, compulsory after a process which involved paraffins, was not performed.
SOLUTION – If the SPC is not empty, drain it manually. Enter the Service Menu and perform “alarm reset” and “flag reset”. Return to the Main Menu and start the purge.

67 – SPC OVER FILL

EXPLANATION – An overfill of reagent or paraffin has occurred in the SPC (Alarm sensed by overpressure during fill). Normally an event of overfill is intercepted and solved by the anti-overfill devices of the EFTP, in this case a simple alert is shown. If the anti-overfill devices fail to correct the problem this blocking alarm is called and the process is stopped.
CAUSE – Complete emptying of the previous reagent failed due to an incorrect solenoid valve opening or, in case of paraffin, temperature problems.
SOLUTION – No intervention by the user is possible. If the problem persists, contact our technical assistance.

68 - DRAIN TEST

EXPLANATION - Following numerous attempts, it is not possible to correctly complete the discharge of the reagent present in the process chamber (SPC).
CAUSE - Pneumatic or hydraulic system malfunction.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

74 – IOB COM FAULT

EXPLANATION - Communication with the Input Output Board (IOB) has suffered an interruption or has failed.
CAUSE - The causes may be due to faults on: serial connection cable, IOB serial communication device, CPU serial communication device.
SOLUTION - No intervention by the user is possible. Please contact our service department for assistance.

86 - LS FAILURE

EXPLANATION - SPC level 2 (intermediate) sensor malfunction occurred during a Remote Fill and Drain (RFD).
CAUSE - Incorrect switching on of the SL2.
SOLUTION - Try to clean the level sensors, if the problem persists call the assistance service.

90 - OVERPRESSURE

EXPLANATION - Too high pressures have been detected in the pneumatic system of the device.
CAUSE - The causes may be due to malfunctioning of the pressure transducer or a failure of the safety valve.
SOLUTION - There are NO solutions that can be practiced by the operator, call the assistance service.

91 - OVERVACUUM

EXPLANATION - Too low pressures have been detected in the pneumatic system of the device.
CAUSE - The causes may be due to malfunctioning of the pressure transducer or a failure of the safety valve.
SOLUTION - There are NO solutions that can be practiced by the operator, call the assistance service.

95 - EHE OVERTEMP (only for MTM II)

EXPLANATION – The temperature of the EHE is well above the set point.
CAUSE – EHE temperature system failure.
SOLUTION – No intervention by the user is possible. If the problem persists, contact our service department for technical assistance.

96 - EHE TS OUT (only for MTM II)

EXPLANATION – The EHE temperature sensor is out of the correct range.
CAUSE – EHE temperature sensor failure.
SOLUTION - No intervention by the user is possible. If the problem persists, contact our service department for technical assistance.

97 - EHE T LOW (only for MTM II)

EXPLANATION – The temperature of the EHE is too low. The process will be halted because the fast processing cannot be guaranteed.
CAUSE - Incorrect working of EHE: temperature sensor, heater, safety thermostat.
SOLUTION - No intervention by the user is possible. If the problem persists, contact our service department for technical assistance.

19.6. Alarms historical archive

The alarms historical archive is under the "SERVICE" menu and consists of a list of the last 100 alarm occurrences. Thanks to this feature, a service technician can immediately recognize the problem, its frequency, the step in which it occurred and other information useful to solve the problem. Alarms are displayed from top to bottom on the screen, starting with the most recent one. Use DOWN arrow to display older alarms. Use ESC to go back to "SERVICE" menu.
If a printer is available the alarm list can be printed from the "SETUP" menu.

19.7. Service (first-aid device assistance)

With the service functions, the following tests can be performed:

Touch S. Calibr.

This function is used to calibrate the TOUCH SCREEN position in respect to the LCD screen. After the activation of this function it is necessary to carefully follow the procedure indicated in the screen. At the end of the calibration the system will automatically restart.

TS Cleaning

This function must be used before cleaning the screen. The Touch screen is disabled therefore the buttons on the screen are inactive.

Flush Lines

This function is used to clean the piping that starts from the tank and reaches the process chamber.
Select the line to clean (1-10). Fill the corresponding tank with water and press the FLUSH button.
The water contained in the selected tank will be brought into the process chamber (SPC) and after a defined time it will be discharged into the tank.

Drain SPC

This function is used to empty the SPC in case for any reason (for example a blocking alarm during a process) reagent residue are still present into it. Before to use this function it is important to remove the cause that create the alarm (for example by substituting the SPC lid gasket if the alarm was vacuum/pressure related). Activating this function firstly the processor checks the status of the rotary valve and the "SPC last" and "SCP cont." flags. In case of inconsistency between the flags and the rotary valve position, or in case the position of the rotary valve is unknown (POS value = to 99), the processor will require the operator to decide in which bottle drain the SPC content.
In this case it is solely responsibility of the operator to choose the right bottle (an empty bottle or a bottle with a residue volume sufficient to contain the SPC content).

Pressing ENTER the processor will perform a normal drain procedure, in case of blocking alarms the procedure will be stopped. Caution: do not use this function in case of not melted wax would be present in the SPC. In this case it is necessary to first melt the wax with the service function "SPC HEATING". When the wax is completely melted the drain procedure can be started but being certain to choose a rotary valve position from 11 to 14.

For safety reasons, if case of presence of reagent, the SPC lid must remain closed all time.

Vacuum test

The device will create vacuum in the SPC; this test must be done with the SPC empty and clean. The SPC must reach a pressure of 600 HPa (see Pressure field) within 35 seconds (see Timer field).
If the time exceed 35 seconds, the SPC lid gasket must be checked and cleaned. If this action does not correct the problem, contact our service department for technical service.

Pressure test

The device will create pressure in the SPC; this test must be done with the SPC empty and clean. The SPC must reach a pressure of 1200 HPa (see Pressure field) in a maximum time of 15 seconds (see Timer field) If the time exceed 15 seconds, the SPC lid gasket must be checked and cleaned. If this action does not correct the problem, contact our service department for technical service.

SPC Heating

This test allows to:
- Check the SPC heating elements.
- Melt the wax residuals that could remain in the SPC in case of an alarm.

The processing chamber temperature is automatically brought to 60 °C.
This process may require up to 30 minutes.

Alarms File

This function displays the last 100 alert / alarm. From left to right are shown: date, time, alarm, step in which the alarm was issued. Only 18 alarms at time are shown starting from the more recent. With the key DOWN it is possible to show the remaining.

Data Backup

With this function it is possible to save on a USB memory all device data files, later, in case of need, the saved files can be restored into the device memory. The restore operation can be performed only by the service technicians. Before to start this function it is necessary to insert in the USB port a blank, formatted, memory. Be careful during these operations! If the USB memory is not empty, the space can be insufficient to backup all files! Always use blank and formatted USB memories.

Reset Alarms

This function may be used to eliminate an alarm appeared during the device testing. It can also be used to reset an alarm that for any reason was not possible to reset by the normal way.

Remote Control

This function allows remote viewing and / or control of the program functions processor control. It is particularly useful for:
- Monitor the processor operation remotely (e.g. faults and / or anomalous behavior)
- Read / write memory files (e.g. software updates, files retrieval for checking)
- Perform remote training

The remote is done using the TeamViewer software which is pre-installed in the CF memory.
The Remote Control function requires the stainer to be connected to the internet via the wired network of the place where it is installed and that its IP address has been correctly configured (see description of functions operating system WIN10). Selecting the Remote Control function, the TeamViewer program is launched which through an id and a password communicates with a remote PC.

Barcode Test

With this function it is possible to test the operation of the barcode reader (optional). The code read by the barcode is displayed in the window (only for devices that are equipped with it).

19.8. Service menu abbreviation list

POS/TANK	VR position / VR position required
Binary	Data reserved to service technicians
Input A	Data reserved to service technicians
Pressure	SPC direct pressure in Hpa (Etto Pascal)
Timer	Time necessary to make vacuum and pressure in the SPC
Hold	Elapsed time between two pump starts during vacuum / pressure tests
ALARM	Current alarm code
SPC C/L	SPC content: it is set to the bottle number filled, after a successful drain is set to 0. SPC last: Last reagent filled in the SPC, after a successful purge it is set to 0.
SETP. EHE	EHE temperature setpoint
TEMP EHE	EHE temperature
T MAX EHE	EHE maximum temperature reached since the last reset
SETP. SPC	SPC temperature setpoint
TEMP SPC	SPC temperature
T MAX SPC	SPC maximum temperature reached since the last reset
SETP. WWC	WWC temperature setpoint
TEMP WWC	WWC temperature
T MAX WWC	WWC maximum temperature reached since the last reset

20. SAFETY DEVICES

20.1. Protection against over-heatings

The thermostat controls include a maximum temperature cutoff switch to prevent overheating of WWC and SPC. These devices do not prevent alarms, but prevent overheating when primary control devices fail.
Do NOT use the device when an alarm indicate an abnormal temperature status.
In the event of an overheating, it is advisable to switch off the device and disconnect the power cord.

20.2. Protection against over-pressures

In the MTM there is no danger of excessive pressures. The pressure levels developed in the SPC are small and do not present any hazard. Sometimes a light pressure can be present in the SPC at the end of a process. The lid must be opened with care to avoid the possibility of eye injury by reagent vapors and splashing. Always wear safety glasses when handling reagents.

20.3. Fuse replacement for MTM I

The mains fuses are located on the rear panel above the mains cable socket and the main switch.
It is advisable that their replacement be carried out by specialized personnel (preferably by our assistance service, also because the intervention of the general fuse normally occurs in the event of a serious fault).

In any case, it is essential to disconnect the appliance from the mains!

These are 2 fuses with the format:
- 115 V = 10 A (6.3 x 32mm) (T)
- 230 V = 5 A (6.3 x 32mm) (T)

	**NEVER USE FUSES OF DIFFERENT RANGE AND CHARACTERISTICS, AND NEVER ATTEMPT TO REPAIR THOSE FAULTS!**

20.4. Remote Alarm

The socket of the Remote Alarm connector has 3 contacts with the following disposition:
- No alarm = contacts 1-2 closed, contacts 1-3 open.
- Alarm active = contacts 1-2 open, contacts 1-3 closed.

For the location of the Remote Alarm connector please refer to the paragraph "The Rear Panel" at the beginning of the manual. There are no electrical signals on the remote alarm contacts. They are isolated from the rest of the device and can be used to activate an external device such as an Auto-Dialer to call a pre-selected phone number and relay the message that an alarm occurred.
Rating of the remote alarm connector and its associated electronics:
Maximum voltage: 48V ac/dc
Maximum current: 1A

20.5. Runtime Test

Before the start of a main function (process or purge) the device executes a series of testing to verify if there are the correct conditions to safely and successfully operate.
If the test fails the requested action is aborted and an alarm is issued.
The test are referred to:
- The temperatures of all the heated components, those temperatures must be compatible with their correct operational ranges.
- The SPC lid closing, if the lid is open an alarm is issued.
- The correctness of the signals from the pressure transducer.
- The correctness of the signals from the VR position sensor.
- The content of the starting process program, if the program is incomplete or part of the data is lost or inconsistent the process cannot be started
- Various memory variables to make sure that a process is not started with the SPC not empty or dirty.

- Active alarms: no active alarm can be present at the starting of a process or purge.
- The UPS: if a UPS is present and active, and there is a power failure, even if the device is working thanks to the UPS, no process can be started because the UPS autonomy is limited to 30 or 60 minutes depending on the charge status of the batteries.

20.6. SPC lid heating

The SPC lid is heated (independently from the SPC and WWC heating) to avoid the building up of condensation underneath the lid when in the SPC is present a warm reagent (the condensation will then fall down when the lid is opened creating an uncomfortable situation for the user).
The efficiency of the heating is sufficient to avoid most of the condensation, only a few drops of reagent may still be present in the peripheral zones of the lid especially when the reagent inside the SPC is warm and the outside (ambient) temperature is particularly low (under 20 °C).
The temperature of the inside lower face of the SPC lid may reach 54 - 60 °C, so it can be uncomfortable at the touch but it is not anyhow dangerous. The limited power of the heating element (22 W) compared to the mass and size of the lid makes it impossible the creation of dangerous temperatures. Anyways a safety thermostat (80 °C max) has been added to the heater to prevent any kind of over-temperature.

21. OPTIONAL ACCESSORIES - UPS

21.1. UPS (Uninterruptible Power Source)

21.1.1. General description

The UPS is an optional. The MTM I / II can be powered by an external UPS connected or not connected to the MTM I / II by the USB port, the difference consists in the following advantages:

- It can communicate with the MTM I / II to manage the situations of power failure,
- it reduces the power consumption in case of power failure,
- it will avoid operations of fill and drain when the batteries charge is low,
- it stores the events of power failure in the alarm memory,
- during a power failure it allows the continuation of the process,
- thanks to the communication it is also possible to always know the situation of the batteries and the correct functioning of the UPS itself,
- it acts as a filter to eliminate noises that can come from the electrical power line,
- it will issue an alert and a resounding warning in case of power failure.

Usually a small UPS doesn't allow the tissue processor to terminate a process in case of prolonged power failure, but considering that most of the power failures are shorter than 15 minutes, it reduces the possibility that a power failure will create a failure on the tissue processor functioning. The MTM I / II is endowed with a system to make it capable to overcome power interruptions, but that system cannot guarantee 100 % success. The system consists in a special memory capable to retain its content also when the computer doesn't receive electrical power, in that memory every action of the tissue processor is stored every minute or less, when the power is restored the MTM I / II will re-start the process exactly from where it was interrupted.
Unfortunately some of the power failures are also characterized by sudden oscillations of the voltage that can overcome the MTM I / II electrical protection systems, furthermore some of these events may be characterized by a timing (fast transient) particularly harmful for the computers memory. It is impossible to foresee how many times a power failure may disrupt the functioning of the MTM I / II, it depends also on the quality of the electrical power supply, a fast transient (or spike) or a very short interruption (between 0.1 and 0.5 seconds) can be much more harmful than a prolonged interruption.

i	**We highly recommend the installation of a UPS when the main electrical power supply quality is known to be poor and the interruptions are frequent.**

21.1.2. Switching the UPS ON and OFF

To switch OFF devices equipped with a UPS it is not sufficient to turn OFF the main wall switch or disconnect the power cord before the UPS! The UPS will keep the unit powered also with the UPS power cord removed!

To switch OFF the MTM I / II it is necessary to:

1. Switch OFF the MTM I / II
2. switch OFF the UPS,
3. disconnect the MTM I / II from the UPS supply power cord.

To switch ON the MTM I / II it is necessary to:

1. Reconnect the main power cord to the UPS,
2. switch ON the UPS,
3. switch ON the MTM I / II.

i	**In case it would be necessary to open the rear panels of the MTM I / II to operate on the internal parts we recommend to take particular attentions to ensure the real power disconnection from the UPS. The simple switching OFF of the main power wall switch and/or the disconnection of the power cord may not be sufficient to ensure that the MTM I / II is not electrically powered!**

To ensure that the MTM I / II is not electrically powered it is necessary to switch the UPS OFF! Moreover, for total safety, when it is necessary to work on internal parts, after the UPS is switched OFF, we also recommend to disconnect the UPS power cord from the MTM I / II!

21.1.3. UPS installation and maintenance

For the installation and the maintenance of the optional UPS please carefully read and follow the instructions contained on the UPS manual.

21.1.4. UPS behavior in case of power failure

Batteries status	Action
Nc	Starting a process or a purge is not allowed independently from the batteries charge status.
Nc	Independently from the batteries charge status, when a process is automatically suspended due to a prolonged power failure, it is not possible to manually restart it (by pressing ENTER on the touch screen as it is possible to do with processes suspended by the user), the process is kept in a suspended modality and the MTM is operated in power saving modality until the main power is back.
Nc	To save energy the mixing and other minor actions are suspended since the very beginning of a power failure event.
< 100 %	The SPC heating is disabled except when in the SPC are loaded waxes. The lack of heating of the reagents for a limited time doesn't prevent a good quality processing.
< 100 %	The temperature of the WWC is temporary reduced by 3 degrees (if the process is far from loading waxes), this temporary reduction significantly increase the UPS autonomy.
< 100 %	The creation of pressure and vacuum in the SPC is disabled: the temporary lack of pressure or vacuum is not vital for a good quality processing, but the UPS autonomy is significantly increased.
< 40 %	The process is completely suspended until the power is back. No fill/drain actions are performed, in case the suspension happens during a fill/drain the actions are completed to ensure that the samples will not dry in air. The processing timer continues to work, when the power is back, if the step time is expired the following one is loaded.

Nc = batteries charge status not considered in this action.

Please note:
As explained in other chapters, to be recognized by the MTM I / II computer the UPS must be enabled in the Device SETUP function. In case of malfunctions of the communication system the UPS can be disabled. The communication will be suspended but the UPS will continue to backup the MTM I / II.
Attempts to enable the UPS when the UPS is not implemented will result unsuccessful.

In case of malfunctions of the UPS, its disabling from the Device SETUP may not be sufficient to allow the MTM I / II a correct functioning, in this case it will be necessary to call our technical service to either repair the UPS or physically disconnect it from the MTM I / II.

21.1.5. Important notes

If the UPS is used for a long time, until the batteries are almost completely discharged (less than 20 % of residual charge), it will shortly stop powering the device and will turn itself off. When the mains power returns, it will take some time before the batteries are recharged. If this does not happen, this could indicate a UPS malfunction (defective batteries or defect in the charging system), wait a couple more hours, if the problem is not solved, call our technical assistance service.

When the power supply returns, the UPS will reactivate autonomously without having to operate any switch or press any button, unless the UPS has been shut down voluntarily, in this case it will be necessary to operate its specific button / switch to restart it (see UPS manual).

i	Please note that to turn off a unit that it is connected to a UPS, it is necessary to turn of the UPS as well, otherwise the device will be on until the batteries are low and the UPS turns off!

For more information, consult the specific UPS manual.

22. CLEANING AND MAINTENANCE

22.1. Recommended maintenance and service schedule

Daily	• Clean the processing chamber. • Clean the processing chamber lid and gasket. • Check the level of reagent and wax. • Check that reagent and wax bottles are correctly positioned in their slots.
Monthly	• Check the indicator of the Charcoal filter and in case is at 100 % replace the filters. • Check for the presence of residues at the bottom of reagent and wax bottles. • When replacing reagents, carefully clean their bottles. • Grease the processing chamber lid gasket with silicone or PTFE grease. • Grease the bottle insertion o-rings with silicone or PTFE grease.
Yearly	• Complete service (performed by authorized Slee service technician) • Of all functions • Oiling of movable parts • Check of system • Complete disinfection / cleaning / drying

22.2. Charcoal filters replacement

Filter replacement is required approximately every 60 to 120 processes, based upon environmental factors and the use of the WCC. Regardless of usage, the charcoal filters should be changed at least once every six months. Charcoal filters must be replaced with the required frequency as they may release toxic and contaminated vapors into the air when exhausted. Exhausted filter waste is to be handled in accordance with the local regulations.

22.3. SPC lid gasket replacement

The processing chamber lid gasket is made of VITON rubber (a DuPONT trademark).
It needs to be periodically greased with TEFLON grease.
When replacing it, use a plastic sharp tool (not a metallic one) to extract the gasket.
Before to insert a new gasket carefully clean the gasket housing slot.
The gasket replacement may be not easy due to the fact that, to keep it in place, its length is purposely longer than the slot in the lid. The length excess must be “distributed” on all slot sides. The insertion is normally possible, with a little bit of patience, after one or two attempts.

23. OPTIONAL ACCESSORIES

Cassette basket	39600061
Holder for cassette basket	39600062
Reagent container	39600030
Refill Pack Active Carbon	39600268
UPS unit MTM I	11000510
UPS unit MTM II	11000504

24. SERVICE

Internal components should only be serviced by technicians authorized by SLEE medical GmbH.
If technical service or spare parts are necessary, please contact your local SLEE medical GmbH distributor. Please have the following information available:

- complete contact details,
- type of device and serial number,
- location of device and name of user,
- purpose of service call,
- delivery date of the device.

If it is necessary to return the device, it must be cleaned and disinfected before delivery. It must be returned in its original packing.
If the device or parts thereof are sent back in a dirty or non-disinfected condition, we reserve the right to not accept the delivery of the device.

25. WARRANTY

SLEE medical GmbH guarantees that the product delivered has been subjected to a comprehensive quality control procedure, and that the product is faultless and complies with all technical specifications and / or agreed characteristics warranted.
SLEE medical GmbH guarantees that the device is manufactured under an ISO 9001:2015 and ISO 13485:2016 quality management system.
Unauthorized modification or repair by third party persons will void the warranty.
Only original SLEE medical GmbH spare parts must be used.
Guarantee claims can be put forward only if the device is used according to this manual and for the purpose described.
Mistakes and errors which occur because of improper use cannot be accepted.

26. DISPOSAL

The device or parts of the device must be disposed of according to existing local applicable regulations.

NOTES

SLEE medical GmbH • Am Neuberg 14
55268 Nieder-Olm • Germany
www.slee.de

T: +49 (0) 6136 76997-0
E: mail@slee.de

www.slee.de YouTube LinkedIn Instagram

Manual_MTM_I_II_2024-09-001.00_EN