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Histology Innovation for a NEW Generation

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RTP-300

Operator's Manual

RTP™/RTPH™-300 Rapid Tissue Processor

Catalog #s
RTP-300; RTPH-300

General Data Healthcare
Corporate Headquarters
4354 Ferguson Drive
Cincinnati, Ohio 45245
Tel. 513-752-7978
Fax.513-965-3636

TBS-A Division of General Data Healthcare
3014 Croasdaile Road
Durham, NC 27705
tel. 919-384-9393
Fax. 919-384-9595

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

Scope
This document contains basic information on the use and operation of the **RTP™/RTPH™-300** Tissue processor, and assumes you have received basic training on the instrument. Please contact your TBS representative for information not provided in this manual.

Intended Use
This instrument has been designed to be solely used in a Histology laboratory, by trained technicians, for processing specimen, provided that is used accordingly with the instructions contained in this manual.
The RTP™/RTPH™-300 is a tissue processor designed for the following laboratory applications:

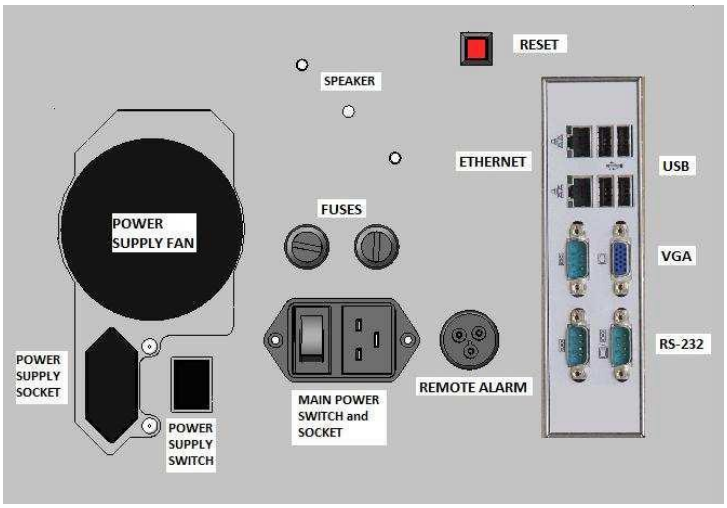
- fixation
- dehydration
- Paraffin wax infiltration of histological tissue samples. Any other usage is expressly prohibited.

Failure to follow to these instructions may result in accidents, damages to the instrument and accessory equipment, personal injury.

Installation Procedure
The **RTP™/RTPH™-300** Tissue Processor must be installed, and instrument performance is to be verified, at the customer site by trained TBS representatives.

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

Operator Controls and Components



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We/Wir/ Nous/WIJ/Noi

TBS-A Division of General Data Healthcare

Declare under our sole responsibility that the product,
erklären, in alleniniger Verantwortung,daß dieses Produkt,
déclarons sous notre seule responsabilité que le produit,
declaramos, bajo nuestra sola responsabilidad, que el producto,
verklaren onder onze verantwoordelijkheid, dat het product,
dichiariamo sotto nostra unica responsabilità, che il prodotto,

RTP™/RTPH™-300 Tissue Processor

to which this declaration relates is in conformity with the following standard(s) or other normative documents.
auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder Richtlinie(n) übereinstimmt.
auquel se réfère cette déclaration est conforme à la (aux) norme(s) ou au(x) document(s) normatif(s).
al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).
waarnaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.
a cui si riferisce questa dichiarazione è conforme alla/e seguente/i norma/o documento/i normativo/i

Instrument Compliance

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

Certifications:

CE, TUV CSA UL

EMC Immunity

IEC 61010-1:2001 (Second Edition) / EN 61010-1: 2001
CAN/CSA C22.2 No. 61010-1 +GI1 (2nd Edition, R2009);
UL 61010-1 (2nd Edition, R10.08)
IEC 61010-2-010: 2003 (2nd Ed) for use with IEC 61010-1: 2001
EN 61010-2-010: 2003, CAN/CSA 22.2 No.61010-2-010-4 (R9)
IEC 61010-2-101: 2002 (ed.1) for use with IEC 61010-1: 2001 (ed.2)
EN 61010-2-101: 2002 (ed.1) for use with IEC 61010-1: 2001 (ed.2)
CSA C22.2 61010.2.101-04-2004

Section 1 | Safety Instructions

	Severe damage can result if the instrument is connected to a power supply different from the rating stated in the identification tag placed on the rear of the instrument.
	The instrument 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 instrument to a power source. Contact our technical service.
	This instrument has been designed to work 24/7; for this reason and for operative precautions, the power switch is placed on the rear of the instrument.
	Access to the instrument's internal components is reserved only to specialists trained in the service of the instrument.
	Always disconnect the processor from the electrical main source before accessing the electronics and internal parts.
	BEFORE replacing fuses, disconnect the instrument from the power source.
	Always make certain to correctly engage the reagent bottles.
	DO NOT open the processing chamber lid when the instrument 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 paraffin's 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 instrument - Avoid using open flames near the instrument. - DO NOT wear clothes that can create electrostatic charges while handling reagents.
	Contaminated reagent waste must be disposed of 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 instrument is operating.

	To complete the knowledge on the instrument safety please read also the chapter SAFETY DEVICES near the end pages of this manual.

Safety Devices

Protection against overheating
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 instrument when an alarm indicates an abnormal temperature status.
In the event of an overheating, it is advisable to switch off the instrument and disconnect the power cord.

Protection against over-pressures
In the **RTP™/RTPH™-300** 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.

Fuse replacement


Fuse replacement should be done only by qualified personnel. Please note: always disconnect the instrument from the main power line! Never use fuses of a different rating and never try to repair damaged fuses.

The **RTP™/RTPH™-300** is equipped with two line voltage fuses.
Fuses are placed into fuse holders located on the rear panel. Rating:
100V = 20A / 110V = 16A / 125V = 13A / 225V = 8A / 240V = 8A / (6.3x32mm) (T)
After the instrument is powered, if a fuse blows again, do not try to substitute it another time! A possible main electrical failure is undergoing in the instrument.
Call our service department for technical assistance.

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 instrument 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

Runtime Test
Before starting a function (process or purge), the instrument executes a series of tests to verify the conditions are correct for operating.
If the test fails, the requested action is aborted and an alarm is issued. The tests include:
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 instrument 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.

SPC lid heating

The SPC lid is heated independently from the SPC and WWC heating, this reduces the buildup of condensation underneath the lid when in the SPC is present a warm reagent.
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℃).
The temperature of the inside lower face of the SPC lid may reach 54-60℃, so it can be uncomfortable at the touch but it is not anyhow dangerous. The limited power of the heating element (22W) compared to the mass and size of the lid makes it impossible the creation of dangerous temperatures. Any case a safety thermostat (80℃ max) has been added to the heater to prevent any kind of over temperature.

Section 2 | Performance and Specifications

The RTP™/RTPH™-300 can be used as a conventional vacuum tissue processor for overnight, tissue processing. The EHE (Enhanced Heat Exchanger) is capable of warming up the reagent during the transfer from the tank to the processing chamber, thereby increasing the processing time of biopsies, or for semi-rapid processing of larger samples.

The **RTP™/RTPH™-300** 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 safe levels. The wax and reagent bottles can be rapidly removed and easily reinstalled in their housing slots.
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 instrument.
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.

Technical Specifications

RTP™-300	
Item	Description
Rating	100/240V 50/60Hz (not user-adjustable)
Max power	1500 W
Main Fuses	100V = 20A / 110V = 16A / 125V = 13A 225V = 8A / 240V = 8A / (T) (dim. 6.3 x 32
Weight	225 Kg (496 lbs.) (empty) – 284 Kg (626 lbs.) (with
Running ambient temperature	10°/ 35°C
Storing temperature	-10°/ 50°C
Relative Humidity	Max 80% (not condensing)
IEC1010 classification	Protective Class 1, Pollution degrees 2 Overvoltage category II - 800V impulse (115V versions) - 1500V impulse (230V versions)
Classification 98/79/EC – IVD	Other general devices – Annex III (without 6)
Max elevation (maximum altitude from the sea level, and related ambient pressure, at which the instrument can be operated)	2500m (8202 ft.) msl
Temperature controls precision	+/- 1℃
Remote alarm socket and relay	48V DC/AC, 1A maximum
Paraffin Tanks/Volume	4 + reserve / 2.5L
Paraffin Melting Time	Approx. 8 hours
Paraffin Temperature Range	52°– 65℃ (default 60°)
Sample Processing capacity	300 standard cassettes
SPC working temperature	From ambient to 65℃
Pressure range	600/1200 HPa
Reagent Tanks/Volume	10 / 2.5 L
Purge agents Tanks/Volume	2 / 2.5 L
Printer	Normal paper – optional - connected on USB port
RMS – Reagent Management System	For all reagents, purge agents, charcoal filter
WCC – paraffin Cleaning Cycle	Efficient on site system (no SPC filling)
Reagent Agitation	User selectable (from 5' to 30' frequency)
RFD – Remote Fill/Drain	For reagents and purge agents
Data backup	On USB memory
User interface	LCD 15" color monitor with Touch Screen

Process Programs	18 (including one for reverse processing)
Delay	Up to 14 days, 23 hours, 59 minutes.
Process End Time management	For every process program, with auto-memorization
Purge	1 – factory optimized + 3 customizable
Charcoal filter	2 – easily replaced
Password	User selectable, multilevel
Power failure device	In the event of a power failure, the processor restarts the process from the interrupted point.

Section 3 | Preparation/Installation

Unpacking, transporting and handling

Before moving or transporting the instrument, it is essential to carefully read this chapter, paying particular attention to the instrument setup instructions.
The warranty is invalid if the instrument 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 instrument.
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 instrument if damage is apparent or evident. Immediately notify the carrier of any damage and contact the shipper to report any claim.

Unpacking

1. Open the top of the box
2. Lift the side walls out of the way
3. Raise the instrument to the vertical position
4. Remove the plastic layers that wrap the instrument
5. Carefully check the external condition of the instrument. In the event of evident damage, DO NOT connect the instrument. Immediately notify the carrier and promptly contact the seller
6. **For the setup of the instrument, 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. Verify the presence of the following accessories and components:

Unpacking Procedure

Verify the presence of the following accessories and components:

Item #	Description	Q.ty
9A6RFDE	RFD hoses (Remote Fill & Drain tubes)	**2**
7EC960	Remote alarm connector)	**1**
8V1250-A	Basket, 150 cassettes (with cover and dividers)	**2**
8V1259-A	Basket carrier	**1**
7TSM04	Video Touch Screen	**1**
8V1123	Reagent Bottles (with Delrin Cap)	**10**
	Paraffin Bottles (with Delrin Cap)	**4**
	Purge Bottles (with Delrin Cap)	**1**
9A1070	Charcoal Filters	**2**
7EV998	Main power cord 115-230V - 16A	**1**
8V1616	Wall Spacers	**2**
8nnMAN	User Manual	**1**
IO 755.05	Charcoal filter installation instructions	**1**

Packaging and/or preparation for transport

To transport the instrument, perform the following steps:

1. **Remove all reagents (paraffin's included) from their bottles and containers.**
2. **Remove and close, with the proper threaded cap, the charcoal filter bottle, seal with adhesive tape the filter air inlet to avoid charcoal pellets to get out.**
3. Transport the charcoal filter separately from the instrument, 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 potential damages to the instrument during shipping

Transportation

The instrument is fragile;

1. The instrument is equipped with electronic parts;
2. Contact with water and/or any other liquid is to be avoided; please ensure that the internal plastic protection bag that wraps the instrument is utilized;
3. Transporting and storing temperature(s) must be between -10℃ +50℃;
4. Using the original box, the instrument is to be transported horizontally;
5. Transporting the instrument vertically is highly **discouraged** as its center of gravity is quite high.

Installation and start-up

1. Installation of the two charcoal filter on their slots C1 and C2. 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 instrument housing. The electrical connection is made by connecting the 2 connectors on the instrument rear panel. One must be connected to the VGA, the other in one of the USB.
3. Connect the instrument to the main power. The power connection must provide a voltage compliant to the voltage indicated on the label in the back of the instrument and the ground

It is recommended the instrument be plugged into a GFCI electrical outlet (Ground Fault Circuit Interruption)
In addition to the RTP™/RTPH™-300 anti-blackout feature, a UPS (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 also recommended that the instrument be operated away from heat (radiators, stoves, direct sunlight, etc.) and moisture (sinks, drains, etc.).

Store instrument where access to power switch or main power cord is possible. It might be necessary to quickly and easily obtain access in case of unforeseen danger.

Check-lists for using the instrument

Initial stage set-up

- Check system time and date.
- Set reagent and protocol names.
- Check and set SETUP parameters, (including EHE/RHE default parameters)
- Setup the RMS parameters
- Set protocols.
- Install charcoal Filter(s)
- Fill paraffin containers and reagent bottles.

Before starting a process

- Check paraffin containers 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 protocol.
- Enter date and time of program completion (including a delayed end-of-process time if desired)
- Enter the number of cassettes and basket processed.

At the end of a process

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

Section 4 | Operation

Introduction to the RTP™/RTPH™-300 Tissue Processor

User interface and keyboard

Monitor

The user interface is based on “Touch Screen” technology. Therefore there isn’t any traditional keyboard; all the instrument functions are activated by a finger touch.
At the bottom of the screen there is a window, with a green background color, used for messages to the operator. Those messages inform and guide the operator about actions that can or must be taken to safely operate the instrument.

Screen Saver

The screen saver de-energizes the screen power 30 minutes after the last time somebody touched the screen surface. Touching the screen will re-start the power and the screen functions in approximately 1 second.
IMPORTANT NOTE: in case of TOUCH-SCREEN malfunction, it is possible to continue to operate the instrument by simply connecting a mouse in one of the USB ports available on the instrument 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 instrument (power OFF then ON after 10 seconds).

The screen graphics of the instrument hydraulic circuit indicates:

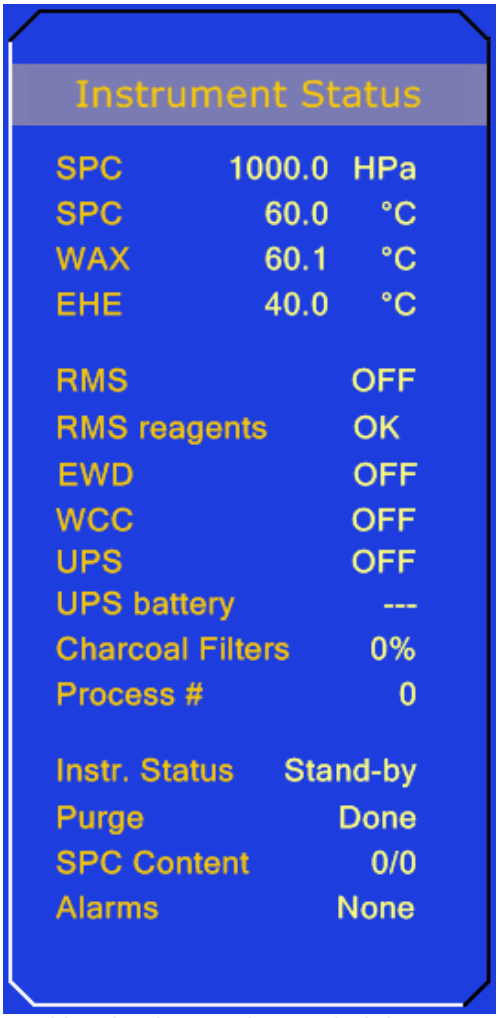
- The position of the rotary valve,
- The SPC and its level.
- Reagents quality (cap color),
- The level of reagent in the tanks,
- Charcoal filter status.

By pressing on the icon  (info) a small window will appear with the following information:

- SPC - Sample Processing Chamber Pressure
- SPC - Sample Processing Chamber Temperature
- WAX - Wax Chamber Temperature
- EHE - Device for fast reagent heating Temperature

- RMS - Reagent Management System status (ON/OFF)
- RMS reagents – Status of reagents maintenance:
  - OK = RMS executed,
  - NEEDED = Not executed or not completely executed.
  - OFF = RMS disabled.
- EWD - Not active on RTP-300 models
- WCC - Wax Cleaning System status
  - ON = Active
  - OFF = Not active
- 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

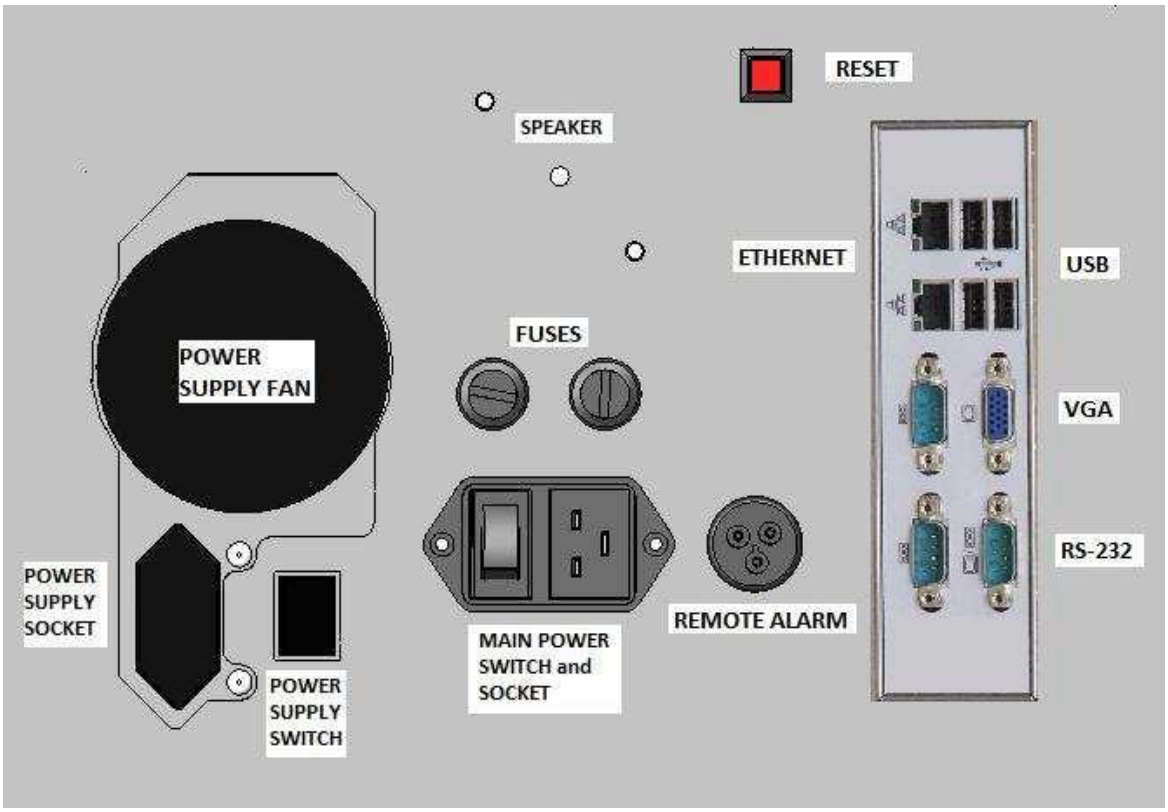
- Status – Instrument status:
  - STAND-BY = waiting for a process start.
- Purge – Cleaning cycle status:
  - DONE = executed
- SPC content:
  - First number represents the current contents.
  - Second number the last reagent used.
- Alarms – A number 1 through 99 will displayed



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

- 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 instrument and about what he(she) can/cannot do. In order to correctly operate the instrument the messages must always be carefully followed.

Rear panel
On the rear panel of the control module there are:



MAIN POWER = On/Off main switch and Main power connection module.
FUSES = Fuses holder
REMOTE ALARM = Remote Alarm socket:
No alarm = pins 1-2 closed, pins 1-3 open
Alarm = pins 1-2 open, pins 1-3 closed
Please note: This socket is a low voltage connection (maximum 48V, 1A) insulated from the rest of the instrument. An Auto Dialer or other external alarm notification devices can be connected here.
RS232 = 3x RS-232 serial ports
RESET = Reset button
USB = 4x USB ports to connect various peripherals like: touch screen, keyboard, mouse, printer, UPS
VGA = LCD screen connector
ETHERNET = 2x network connection (Internet, Intranet)

The RHE device
The RHE (Rapid Heat Exchanger) is a device capable of warming up the reagents (tanks from 1 to 10) during their transfer into the SPC. The heating of the reagents up to 55-60°C allows the performing of faster processing especially on small samples (biopsies).
The Rapid Heat Exchanger is comprised of electric heating pads in between coils of copper tubing encased in an insulated compartment. Temperature is regulated through the software and for added safety overtemp thermostats are incorporated to prevent overheating.
Utilizing the RHE increases the reagents temperature 30-35°C prior to entering the SPC thereby reducing the processing time. Filling time is only increased by approximately 15 seconds.

Reagents

Reagent tanks arrangement

The following table shows the arrangement of the instrument tanks for reagents, paraffin's, purge agents and charcoal filter as seen from the instrument front.

C2	**Charcoal filter for Paraffin's(in the back of the instrument)**
C1	**Charcoal filter for Reagents(in the back of the instrument)**
P2	**Purge agent 2 (Ethyl Alcohol 95/100)**
P1	**Purge agent 1 (Xylene or substitutes)**
11 -> 14	**Paraffin's**
1 -> 10	**Reagents**
FILL	**Filling Port for RFD system**
DRAIN	**Draining Port for RFD system**

Compatible reagents

The following reagents can be utilized in the **RTP™-300** without any risk of damage:

- Water
- Formalin
- Ethyl alcohol (pure or denatured)
- Methyl alcohol
- Xylene
- Xylene substitutes
- Paraffin wax

The following materials are used in the construction of the **RTP™-300**. Reagents other than those listed above can be utilized in the instrument 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	paraffin 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 instrument and shorten a component's useful life.

Disposable factory pre-filled bottles

The **RTP™/RTPH™-300** 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 instrument. It can be done at the same time with the use of bottles refilled by the user.

Advantages of using disposable pre-filled bottles include:

- Faster reagent replacement.
- Minimal user handling exposure to toxic vapors.
- Reduction of risks from handling flammable substances.
- Eliminates the technician time required to empty, clean and re-fill bottles.

Replacement of disposable bottles is easy:

- Take the bottle containing the exhausted reagent out of its slot and bring it under a cabinet.
- Unscrew the cap of the bottle with the new reagent.
- Unscrew the cap of the used bottle and place it on the new bottle.
- Place the cap removed from the new bottle on the used bottle.
- Insert the new bottle into its housing slot.

The procedures to be followed regarding the recycling of contaminated reagents are the same adopted with traditional systems. **RTP™/RTPH™-300** bottles are made of completely recyclable (100%) HDPE (high-density polyethylene). Check with your local recycler about recycling HDPE with chemicals residue.

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 with 2.5 liters of reagent. When exchanging bottles, use the special screw-caps supplied with the instrument 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 coupler leaks, the O-rings should be replaced. If leakage problems persist, contact our customer service.

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 instrument as shown in the picture in the previous page. On the left side there is the FILL PORT while on the right there is the DRAIN PORT. Connect the hoses with quick connectors and 90° elbows and to the appropriate ports. Place the hoses inside the external tanks for the waste or clean reagent.

The RFD can work in three different modalities:

Modality "DRAIN and FILL":

- The **RTP™/RTPH™-300** fills the SPC with the content of the chosen bottle.
- Then it drains the SPC through the Right port into an empty tank (center side quick connector). Afterward it fills the SPC with 2.5 L of reagent from the Left port (left side quick connector). Then it drains the SPC content into the chosen bottle.
- This modality completion takes approximately 7 minutes.

Modality "Only DRAIN":

The **RTP™/RTPH™-300** fills the SPC with the content of the chosen bottle.
Then it drains the SPC through the Right port into an empty tank (center side quick connector).
This modality completion takes approximately 3.5 minutes, it can be useful in case there is the need of a complete washing of the chosen bottle before to proceeding to fill.

Modality "Only FILL":

The **RTP™/RTPH™-300** fills the SPC with 2.5 L from the Left Port (Left side quick connector).
Then it drains the SPC content into the chosen bottle.
This modality completion takes approximately 3 minutes.

Caution: In this last modality the chosen bottle must be empty before the start of the operation, if the fill is performed in a bottle that is not empty there will be a spill of reagents into the nearby bottles and possibly also outside of the instrument.

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 (Right/Fill) and 18 (Left/Drain), all the cycles are completely automated and the instrument can be left unattended until the operation ends.
See sub-chapter SETUP > PARAM. 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

Caution: It is possible (but not recommended) to interrupt the process of the RFD by pressing the ESC key. Pressing the ESC key again will abort the RFD. Pressing ENTER will restart the process. In case the process is halted during the RFD, (for example: alarms or mistakes on the tanks position) 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.

Caution: It is highly advisable to take every precaution during the handling of reagents potentially flammable or toxic. Despite the RFD operator safety increases, there is always some risk on handling flammable and/or toxic substances. We recommend to always have on hand the proper safety equipment.

WARNING

- 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 3 liters remaining capacity.
- Verify that the tank with the new reagent would have at least 2.5 liters available for the filling and that the pipe end reaches the tank bottom.
- Verify that the room in which the RFD is performed is adequately ventilated (the RFD doesn't have a recirculation system on the external tanks)
- Mixing of different reagents into the external waste tank is not recommended. To avoid potentially dangerous chemical reaction; verify their chemical and physical compatibility.

Filling Paraffin Bottles

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

- Always wear protective gloves and eyewear when handling melted paraffin.
- Always place the cap on paraffin containers immediately after the filling.
- Handle them with care.

In the **RTP™/RTPH™-300**, the paraffin waxes are contained in the same bottles used for reagents. The advantages are:

- Easy handling and emptying of the wax bottles
- Easy and economical substitution of the wax bottles

Paraffin bottles must be re-filled with melted wax. Attempting to fill them with flakes 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).

The fill levels are the same for reagents and wax (2.5 liters).
Paraffin 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 an exhausted paraffin bottle.

- In “Standard” mode the “R” slot can be used to keep a wax bottle warm for immediate replacement of an exhausted paraffin bottle.
- Water or Xylene can be warmed for cleaning and clearing.

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

Warm Wax Chamber

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 they 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

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.

Processing capacity

The **RTP™/RTPH™-300** 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 an optional accessory, a large basket holding big specimens or up to 300 STD cassettes is available.

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 **RTP™/RTPH™-300** 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.

SETUP of the instrument

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

PARAMS SETUP

Changes can be made in the PARAMS SETUP.

- Press <SAVE> after making the changes and the new values will be stored in the memory.
- Press <ESC> to are discard changes.
- 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 PARAMS SETUP screen the current software version is shown. For example: "SW version 5.5 – RTP-360". The only relevant parameter for the instrument user is the software version, the others are related only to manufacturing internal use data.

Languages
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.

Elevation
The ambient pressure decreases with an increase in elevation from sea level. (approx. decrease of 100 HPa for every 1,000m (3281 ft.) for the first 2,000m (6562 ft.)). It is important to enter the altitude above msl (mean sea level) to avoid pumping differentials with pressure and vacuum. This is especially important when the elevation is higher than 800-1000 meters.

L/L Alarming
Enabled/Disabled Low Level *non-blocking* alarms during processing.

EOP Signal
Enabled/Disabled End Of Process beeping.

Printer Port
If a printer is not installed, this port must be disabled. Program operation will be faster with the port disabled.

SPC lid open/closed sensor
The SPC lid status is controlled by a microswitch. If the lid is closed and the system displays that it is open, the microswitch may be broken or out-of-adjustment. From the SETUP\PARAM SETUP function, the microswitch can be disabled, once disabled; it is possible to continue to operate the instrument. With the microswitch disabled, the SPC lid indicator will indicate "DISABLE". Please note that the microswitch can indicate the lid open but cannot sense it's closed. Thus if the lid is simply lowered but the lock is not engaged, the sensor may indicate lid closed, but the instrument will not be available for processing. The instrument will allow the process or purge start but will issue an alarm caused by the inability to create vacuum or pressure in the SPC. With the LID SENSOR DISABLED, always check that the lid is closed and secured by the lock.

WWC set point

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

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:

- Fill one of the reagent bottles using the RFD function.
- Pour the contents of the reagent bottle into a graduated cylinder (+/- 10mL
- Set the calibration value considering that an 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 corresponds, to the standard value of 4 liters, to a maximum of 4.04 liters and a minimum of 3.96 liters.
The above cited values are compatible with the correct functioning of the processor in normal conditions.

UPS unit (Uninterruptible Power Source)

The **RTP™/RTPH™-300** can be equipped with an optional UPS. To be recognized by the computer, the UPS *must be enabled*, it can also be disabled in due to a malfunction. Please note that both enabling and disabling are related only to the computer -> UPS unit communications. Even if disabled by this function, the UPS will continue to supply power to the Tissue Processor, but its status will not be indicated. In an attempt to enable the UPS when the UPS is not installed, the command will be refused. In case of a serious malfunction of the UPS, the software may not be able to disable the COM port. It would be advisable to physically disconnect the UPS from the **RTP™/RTPH™-300**. Please call our technical service to perform the repair or the disconnection.

Panel On 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 minutes (function disabled, screen always ON)
- The maximum time is 90 minutes

The tissue processor will continue to work even though the screen is blank. Reactivate by touching any point on the screen. Allow at least 2 seconds; a beep will emit to confirm activation. **It is advisable to not press more than once**. The first touch will not be considered a command but ANY subsequent touch may be recognized as a command.

EHE activation

The RHE must be ENABLED in order to maintain the default temperature of 65°C when the tissue processor is idle. This ensures the reagents are ready to perform a fast processing program. During a process the RHE 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.
- 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**).

It is possible to set disable the EHE if the **RTP™/RTPH™-300** will not 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 minutes 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 Watts, when it is warm the power consumption goes down to approximately 200 Watts.

EHE set point

From this function it is possible to change the EHE default temperature. The range goes from a minimum of 40°C to a maximum of 70°C. It is advisable to modify the default temperature only in case the factory set is 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 degrees over the protocol temperature).

RMS SETUP

Please see the RMS chapter ahead in the manual.

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.

Password Setup

The **RTP™/RTPH™-300** software can be password protected. That will allow restricted access to the main functions of the instrument. Password general rules:

- The password field can accept an alpha numeric combination of up to 12 characters
- Spaces are permitted in the password.

Enable/Disable Password

This function allows the enabling and disabling of the Password. If the password is not active, the software requires the definition of a new one. If the password is active, the system allows the disabling by entering in the current password.

NOTE: We recommend to carefully keep note of the password before the activation because once activated, there is no way to deactivate it without the password . If the password is lost, it will be necessary to contact our Technical Service Team to deactivate or retrieve it!

Password modification

The password can be modified/changes from this function, the modification is allowed only after entering the current password.

NOTE: We recommend to carefully keep note of the password before the activation because once activated there is no way to deactivate it without the password. If the password is lost, it will be necessary to contact our Technical Service Team to deactivate or retrieve it!

Password Protection Map

There are nine functions that can be protected by password. The lab manager must decide which level of protection is suitable for the laboratory.

The extensive usage of the password while increasing the instrument security may create problem to the day by day operations. The password will be requested for the activation of each protected functions and can be requested many times during the usage of the instrument (for example during the RFD it will be requested for each bottle managed), that may result to be bothering but it is necessary to guarantee a real protection of the instrument especially when the work done is multiple and complex (as it is during the RFD). If the RFD is under password its usage will be protected during an execution of it from the RMS even if the RMS is not protected. There are three levels of protection:

Total protection:

- All functions activated

Programming protection: only the instrument programming functions are activated.

- Edit Process
- RMS Setup
- Parameters Setup

Mid-level protection (recommended):

- Edit Process
- Abort Process
- RMS Setup
- Parameters Setup

Service

- To access the password map modification it is necessary to know the current password.

Reagent Labels
The most common reagent names are already set by the factory. It is possible to modify them as desired. Up to 40 labels are available.

Service
With this function various instrument tests can be performed. Please see the chapter SERVICE.

EXT. SERVICE
This function is protected by a special factory set password and it is reserved to service technicians.

Programming process protocols

Press <START> then <EDIT PROTOCOL>. Select a process protocol from the menu by pressing on the related icon. There are 18 available protocols. A new screen will open showing the entire process protocol. Using the ARROW keys, 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 <EXIT> prior to saving the changes to abort the operation. Press <SAVE> to save changes and then press to<EXIT> leave the function.

Below are explained limits and characteristics of each field:

Reagent Names
Reagent names are labels prepared in advance as explained before. They do not have an influence on the process. The tank contents are decided in the RMS setup menu with the function “Define Reagents”. Therefore it is necessary to pre-define them in advance even if the RMS is not used.

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)

Temperatures (TMP)
- The selectable reagent temperature range is: 0 for ambient, from 20 - 45°C
- The selectable paraffin temperature range is: 52 - 65°C

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.

Reagent agitation (MIX)

The reagent mixing in the **RTP™/RTPH™-300** 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

Reagent pre-heating (RHE)

Selecting whether to warm-up the reagent during the filling or not is set in this column. To use the RHE feature, the operator must set the Reagent to YES in the RHE column. This is accomplished by touching or clicking on the reagent step under the RHE column. By pressing the + or – key will toggle the selection between YES and NO. Press <SAVE> to save and exit.

If YES is selected, the reagent will pass through the heating coils of the RHE, the temperature of the reagent is set in the column of the reagent temperature for the SPC (column TMP). The RHE is has a temperature tolerance of +/- 3°C, however once in the SPC, the reagent temperature is further corrected toward the defined set point with a precision of +/- 1°C. The RHE precision is lower than the SPC because in the RHE the heating is made dynamically during the filling and approximately 4 liters of reagent are heated in 120 seconds.

For fast processing, it is necessary to set a temperature between 50° and 60℃ in the column TMP and choose “yes” in the RHE column to activate it for that step.

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
- 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, 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.

Reagent Management System (RMS)

RMS basic concepts

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

- Optimize the reagents utilization
- Avoid bulk reagent replacements
- Avoid possible errors in paper records
- Avoid the manual shifting of tanks to prepare the instrument for the next process (for example by manually substituting the dirtiest tank of a group of reagents and shifting the other tanks backward)

The RMS is much more important given that, as explained in other chapters, the instrument can be used for fast and slow tissue processing with the utilization of different 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 function it performs. In tissue processing, 4 fundamental types of reagents are:
Fixative
Dehydrant
Clearing
Embedding

The dehydrants can be split in two sub-groups: low and high gradation. Sometimes a tank with water is set in between fixatives and dehydrants to remove 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 a dehydrant in a way to form an incremental scale that can bring the number of groups over the above mentioned total of 6. It is important to note that the RMS accepts a maximum of 8 groups.
It is recommended to keep the number of group to 5 or 6. 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 instrument a certain incremental gradation has been manually created.

Other important concepts of the RMS are:

- The reagents are maintained to keep a consistent quality of specimen processing. The RMS most important concepts are 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 contaminated by the previous reagent containing substances removed from the Tissue samples. Therefore, they are the most frequently replaced.
- 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 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, the physical location of the tanks or their position in the program is no longer relevant to the process (STEP). It will be necessary to "fully trust the instrument" 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 **RTP™/RTPH™-300** (type and quantity of processes performed, type of reagents, type and quantity of samples processed), the ideal setting may be experimentally found after a few weeks of continuous and regular use of the instrument.

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 **RTP™/RTPH™-300** 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:

- The limit (maximum number of processed cassettes) is defined for each tank independently from the group to which that tank is assigned.
- The number of processed cassettes will be then stored in memory for each tank and will be reset after that tank reagent renewal.
- 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.
- 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 counters 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 shown here (typical of a long overnight process) would be influenced 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 maintain tracking of the reagents unbalanced aging. With the RMS enabled, the tracking of the reagents aging is done automatically with precision and reliability. The RMS is not as inflexible 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, this can be performed by using the RFD (this will automatically reset the tank counters) or manually**. (NOTE: 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 setup

The RMS is a system to accurately manage all reagents to guarantee consistent tissue processing quality. The use of the Reagent Management System eliminates the need to write notes on reagent tank status. This results in substantial time savings and eliminates the possibility of errors caused by multiple operators using the instrument. As explained later in more detail, following the purge cycle (and the WCC, if activated), the system will automatically prompt the user to replace the reagents that have reached their previously determined processing limit.

RMS Define Reagents

Defining reagents allow the operator to identify the type of reagent used in any single tank. The labels to be used here must be previously defined in the instrument SETUP. It is important to note that the assignment of a reagent name to a tank in the RMS automatically updates the reagent names in the process programs. However, it is important that the reagent label corresponds exactly to the content of the tank defined during the setup of the RMS. This is due to the fact that when the RMS prompts the user to replace a tank, it will suggest the reagent that needs to be filled in the tank in accordance with what is programmed. If the label is different than the actual reagent, a serious error in processing will occur. For example, if the reagent label “Paraffin” is assigned to the tank in position #4 (which is not located in the paraffin chamber), the RMS will prompt the user to replace tank #4, the user will be instructed to put “Paraffin” in that position. Therefore it is important to carefully plan the entire reagent selection process prior to setting up the RMS.

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 the limit is reached or exceeded, the RMS will require the substitution of the reagent for that tank. If the limit is set to zero, the RMS will never prompt the user to replace the reagent in that tank but the tank cap will be shown in red to remind that the tank is not managed by the RMS. It is advisable to attach the same limit to all the tanks of a group, otherwise the RMS can ask for unbalanced substitutions with unpredictable results. Moreover the limit can be proportioned to the size of a group, in other words the larger the group is, the higher limits can be set.

RMS Counters Total Reset

The Counters Total Reset selection allows the user to set the number of processes performed and the number of cassettes processed including the DAF counter to zero. This function may be used when it is necessary to replace/renew the reagents of all tanks and, takes effects at, restart of the RMS. Counters Total Reset does not include the counters for the charcoal filter or the tanks of the purge reagents. These two counters must be reset using the "RMS Single Counter Reset". **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 does not automatically reset 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).

RMS Single Counter Reset

The Single Counter Reset selection allows the user to manually 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 filter and the purge reagents. **Note: the counters of the charcoal filter and purge reagents are not reset by the Counters Total Reset function.** Whenever the user replaces the purge reagents or the charcoal filter without being prompted by the RMS, it will be necessary to utilize the Single Counter Reset to reset their counters.

RMS Enable/Disable

This function turns the RMS ON or OFF. Every time the RMS is set to Enable or Disable, **all** reagents counters are set to zero. In this case it is recommended that all reagents be replaced prior to using the instrument again.

Purge Agents Setting

The purge reagents are controlled by the RMS. The RMS will request the substitution of the purge reagents every 3 to 9 processes. The recommended number of processes for the substitution of the purge reagents is:
Cleaning only the SPC: 9 processes
Cleaning the SPC and the baskets: 5 processes
The manual removal of as much residual paraffin as possible from the lid and SPC before beginning the purge cycle is recommended. **Note: If the user replaces the purge reagents before their counter reaches the preset limit, it will be necessary to reset the counter by the "Single Counter Reset" function.**

Charcoal filter limits setting

The charcoal filter is also managed by the RMS. In addition to the percentage indicator visible on the "info" window (with 0% representing a new filter and 100% representing an expended filter), when the filter reaches or exceeds its preset limit, the RMS will prompt the user to replace it at the same time he is prompted to replace reagents. The charcoal filter should be replaced between a minimum of 60 and a maximum of 120 processes based on the following:

- 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 somewhat approximate because 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.
- The usage of the WCC.

I**mportant Note: If the charcoal filter is 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.**

WCC activation / de-activation

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. Discontinuing use of the WCC will lower the workload for the **RTP™/RTPH™-300** and may eliminate one possible source of malfunction.

Manual start of the WCC

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

RMS prints

From the RMS Menu it is possible to print the following information:

- RMS status
- RMS settings

It is always advisable to print the RMS settings and status before and after any change made to it. A printout of the RMS status can be useful if there is a doubt that something didn't work properly during the reagent substitution and a check of the reagent situation and relative limits becomes necessary.

Using the RMS

Using the RMS is certainly simpler than initial setup. It will be sufficient to follow its instructions when, after the execution of a process and the purge, and if any of the predefined limit has been exceeded, the RMS screen will automatically appear. The RMS can also be accessed manually by pressing RMS from the START Menu.

TK	REAGENT	DAF	LIM	CAS	PROC	SUBST.
1	FORMALIN	300	200	300	001	YES
2	ALCOHOL 95	300	200	300	001	YES
3	ALCOHOL 95	180	200	300	001	NO
4	ALCOHOL 100	300	200	300	001	YES
5	ALCOHOL 100	180	200	300	001	NO
6	ALCOHOL 100	120	200	300	001	NO
7	ALCOHOL 100	090	200	300	001	NO
8	XYLENE	300	200	300	001	YES
9	XYLENE	180	200	300	001	NO
10	XYLENE	120	200	300	001	NO
11	WAX 60	300	200	300	001	YES
12	WAX 60	180	200	300	001	NO
13	WAX 60	120	200	300	001	NO
14	ND	000	000	000	000	NA
P1	Xylene		003		000	NO
P2	Alcohol		003		000	NO
C1	Cha. Filter		060		001	NO
C2	Cha. Filter		060		001	NO

In the example shown, none of the reagent requires maintenance. The RMS table shows:

- DAF = Decreasing Aging Factor counter
- LIM = predefined limits
- CAS = counter of the actual number of cassettes processed
- PROC = counter of the number of process performed
- SUBST = the tank that needs to be changed

The color of the tanks indicates the quality of the reagents as follow:

- GREEN = new reagent or already used reagent but with DAF counter not exceeding its limit.
- RED = reagent that has reached/exceeded the limit.
- GREY = tank with undefined content.
- BLACK = empty tank.

The screen will instruct the user to renew the reagent tanks that exceed the previously set limits. By pressing the “DO IT WITH RFD” icon the (current) tank substitution will be made with the Remote Fill & Drain system.

CAUTION:

- To avoid mistakes it is advisable to faithfully follow the given instructions and to confirm, by pressing <CONFIRM>, each singular substitution.
- The reagents must be substituted ONLY when requested by the RMS.
- Is it possible but not recommended to suspend the RMS operations, by pressing <ESC>, then later restart (by pressing <RMS> from the START Menu).

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
- Edit date and time of process-end

Fast processes

To use the Fast Process, (**RTPH™-360** only) it is necessary to enable the RHE by:

- From <SETUP>-<PARAMS SETUP> RHE Activation set to ENABLE.
- Or from <START>-<EDIT PROTOCOL> RHE set to YES

When the RHE is activated, the RHE temperature must be set to 10°C higher than the SPC set temperature. The increase in reagent temperature decreases the time necessary for processing tissue. If the RHE is at ambient temperature, it may take up to 20 minutes to reach the set temperature.

Setting the program END TIME

Before starting a process program it is necessary to verify the following:

- Software time and date
- Program time and date of completion

In the above figure the top-left window contains all the EOP parameters.
Before starting a process, the number of cassettes and baskets is required.

Note: 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.

Delay setting

By increasing/decreasing the *Day* field, the delay will automatically update the total processing time, date and time of completion. The delay is expressed in days, hours and minutes. The maximum delay is 14 days, 23 hours, 59 minutes. It is not possible to set the END-TIME lower than 00 dd 00 hh 00 mm.

Process END-TIME memory

A feature of the **RTP™/RTPH™-300** software is the automatic recall of the END-TIME:

- Every time a delay or updated is requested (every time an END-TIME is different from the one that was set) the computer stores the new calculated END-TIME in 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 calculated 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 “RESET”. 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 calculated one. (current time + total process time)

- Any update of the delay/END-TIME made here will be stored in the long term memory only if the program is actually started.
- The instrument 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.

NOTE: 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 cannot be edited during processing.

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 partially processed tissue samples to re-start their processing where it was interrupted.

Starting a process program

After determining the process END-TIME, number of cassettes and baskets, the data can be stored in the memory by pressing <SAVE>. Then the program can be started by pressing <START>. Pressing the <EXIT> key will abort the operation.

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 count down minute by minute until the step is completed.
- On the top of the process window displays the name of the current program and the scheduled date and time of completion and other information are shown.

Once started, the program will run automatically, no other action is required.
Total processing time includes the time necessary to fill and drain the SPC.

When starting from a step other than the first, press the "UP" and "DOWN" arrows: Note that the bar that highlights the step will move to only a valid step that includes a time value that is greater than 0. This feature can be useful on partially processed tissue samples to re-start their processing during interruption.

Interrupting/Suspending the process

When processing, it is possible to suspend and later abort but only during stationary phases, and **NOT** during filling/draining cycles.

To suspend a process, press <SUSPENSION> and within 3 seconds press <ENTER.>. The instrument will be suspended for 3 minutes. During this period it is possible to open the SPC lid. Pressing the <ENTER> key will resume the process. If the process is not restarted within 3 minutes, the instrument will automatically restart. During suspension it is also possible to ABORT by pressing the <EXIT> key and after 1 second pressing <EXIT> three more times in succession. The SPC will then drain, and samples can be removed.

Opening the SPC lid during a process

There are situations in which the processing chamber lid CANNOT be opened

Under vacuum.

During fill and drain operations.

NEVER open when a program is running in a phase other than "Processing". Alarms may occur and the computer control system may abort the process.

<u>If ignored, potentially toxic or flammable substances may be released from the SPC.</u>

The SPC lid is equipped with a microswitch that detects if the lid is open or closed, therefore, if the lid is opened during a process, the process will be automatically suspended. If it is necessary to open SPC lid during processing, 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 ambient pressure.

Please take the following precautions when opening the SPC lid when a process is running:

- Suspend the process before to open the SPC lid.
- Close the SPC lid as soon as possible.
- Comply with all safety precautions when handling toxic or flammable substances.

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 will automatically resume after a pause, or the process can be restarted by pressing the <ENTER> key.

If the opening of the chamber is difficult, DO NOT force it, wait for the ambient pressure to normalize.

Instrument auto-tests

Before and during a process, the system runs diagnostics to verify processing conditions.
At the start of a process a series of parameters are checked. If all parameters do not conform to what is required in order to safely start the process, the process will abort and an error message is displayed. See "Safety devices – Runtime test"
During the process another series of parameter checks are performed to ensure the sample's integrity. For example, before filling a bottle, the filling pipeline is tested to ensure that there aren't any clogs or reagent from the previous step left in the SPC. If the pipeline is not completely open, Alert 6 and Alarm 53 are issued. That particular bottle is then bypassed and the process continues on the previous bottle with the addition of time. If two adjacent bottles are found faulty, a blocking alarm is issued and the process is aborted.

Process completion

At the end of a program, the instrument maintains the last reagent in the processing chamber. Press <ENTER> to empty the chamber. Once the reagent is drained, will be possible to open the SPC and take out the samples. After confirming 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.

Purging the SPC

Total purging time is 64 minutes and is always necessary to remove paraffin residue from the process chamber. It is also advisable to perform a purge even if the last process did not load paraffin into the SPC. Only if the loaded reagents were formalin or alcohols can the purge be skipped.

NOTE: The purge program has been set and optimized by the manufacturer and cannot be modified.

Purging can be started anytime from the **START** Menu, however at the end of a complete process, the purge cycle is automatically requested by the system. It can be bypassed by pressing the <EXIT> key, but if paraffin was loaded during the last process the following process start will be halted until a purge is performed.

- The purge cycle can be aborted by pressing <EXIT> and then <ENTER> within 3 second.

The bottles containing the purge reagents are labeled as P1 and P2 and must contain the following:

- P1: xylene (or substitutes)
- P2: 95% or 100% ethanol

Purge Steps

1. P1 reagent is diverted through the RHE and its control valves.
2. P1 reagent passes through the main filling line to wash the SPC Main Valve.
3. P2 only passes through the main filling line to wash the SPC Main Valve from P1.
4. Drying of the processing chamber from any alcohol residue. This step is not critical and can be stopped at any time without damaging the instrument and will reduce purging time to 34 minutes.

Purge reagents must be substituted every 3 to 9 purge process. See sub-chapter "Purge reagents limits setting".

Note: The removal of paraffin residue before the start of the purge cycle is beneficial to extending the life of the processing reagents. Even if the processing chamber is maintained at the last paraffin temperature until the execution of the purge cycle, it is preferable to run the purge cycle immediately after the process.

Suggestion for Processing

Timing
The most common processing program has a processing time of one hour for each step/bottle.
That 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:

- Xylene substitutes may require a longer time than the xylene.
- Higher reagent temperature allows shorter timing.
- The use of vacuum may allow shorter timing.

Vacuum and Pressure
The pressurization or de-pressurization of the SPC allows for a better sample infiltration. Normally the use of vacuum (de-pressurization) is sufficient to obtain good infiltration for most of the samples and it is advisable in each station except for the formalin and the first paraffin.
The combined use of vacuum and pressure should be limited to the processing of very difficult samples (large and/or fatty). The usage of P/V with normal samples may cause over-processing of tissue specimens.

Heating
The reagent heating in the SPC up to the maximum allowed temperature (45°C) is advisable starting from the last 2-3 reagents before the paraffin. This prepares the samples for the thermal increase from the ambient temperature to the 60°C of the paraffin.
Pre-heating the samples, SPC and the baskets, help to reduce the unavoidable cooling of the first paraffin that occurs in high sample loads. This phenomenon must be avoided when short processing time in the first paraffin is needed. This prevents excessive cooling which may impede a SPC draining.

Circulation/Agitation
Additional agitation for each step is needed to ensure good reagent circulation around the samples. Increased circulation is advisable for high sample loads. Take into consideration that when the SPC is heated, the heating creates a convection movement that results in a gentle but forceful homogeneous circulation of the reagents.

RHE
For information on the RHE usage, refer to the following sub-chapters about fast-processing.

Routine process with the RTP™-300

In the following procedures it is shown how to use the **RTP™-300** for conventional overnight tissue processing:
Routine protocols (without EHE)

Step	Reagent	Time	Temp C°	P/V	Mix
Small BX					
1	Formalin	10	Ambient	-	0
2	Formalin	10	Ambient	V	0
3	70% ETOH	20	Ambient	V	0
4	80% ETOH	20	Ambient	V	0
5	95% ETOH	20	Ambient	V	0
6	100% ETOH	20	Ambient	-	0
7	100% ETOH	20	Ambient	V	0
8	100% ETOH	20	Ambient	V	0
9	Xylene	20	30°	V	0
10	Xylene	20	40°	V	0
11	Paraffin wax	20	50°	-	0
12	Paraffin wax	20	60°	V	0
13	Paraffin wax	20	60°	V	0
Total Time		**240 Min**			
Thickness 1mm-3mm					
1	Formalin	60	Ambient	V	2
2	Formalin	60	Ambient	V	2
3	70% ETOH	60	Ambient	V	2
4	95% ETOH	60	Ambient	V	2
5	95% ETOH	60	Ambient	V	2
6	100% ETOH	60	Ambient	V	2
7	100% ETOH	60	Ambient	V	2
8	100% ETOH	60	Ambient	V	2
9	Xylene	60	30°	V	3
10	Xylene	60	40°	V	3
11	Paraffin wax	60	50°	V	3
12	Paraffin wax	60	60°	V	3
13	Paraffin wax	60	60°	V	3
Total Time		**13 Hrs**			
Difficult Samples					
1	Formalin	75	Ambient	P/V	3
2	Formalin	60	Ambient	P/V	3
3	70% ETOH	60	45°	P/V	3
4	95% ETOH	60	45°	P/V	3
5	95% ETOH	60	45°	P/V	3
6	100% ETOH	75	45°	P/V	3
7	100% ETOH	60	45°	P/V	3
8	100% ETOH	60	45°	P/V	3
9	Xylene	75	55°	P/V	3
10	Xylene	60	55°	P/V	3
11	Paraffin wax	75	60°	P/V	3
12	Paraffin wax	60	60°	P/V	3
13	Paraffin wax	60	60°	P/V	3
Total Time		**14 Hrs**			

Short time process (small samples)

The **RTP™/RTPH™-300** will perform shortened processing time. The user will have to determine the best step timing based on his or her past experiences and the following:

- The use of vacuum.
- Overall quality of the reagents and how often they are maintained.
- The program time excludes fill and drain times.
- Minimum step time is 10 minutes.

- **We recommend not shortening times in the first paraffin shorter than 20 minutes**. Minimum of 1 minute for every 10 samples (thus 20 minutes for 200 samples and 30 minutes for 300).
- The first paraffin step cannot be in vacuum even when activated. This is due to the possible formation of solidified paraffin foam on top of the sample baskets.

Fast Process

The RTPH™-300 can be considered today the fastest "non-microwave" vacuum tissue processor available on the market. This instrument can be safely process up to 300 small biopsies in about 45 minutes (excluding fixation time) using conventional reagents or using alcohol and xylene substitutes available.

The increased processing speed is obtained by:

- 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.
- The heating of the reagents in the SPC up to 55°- 6 0°C.
- The reduction of the program steps used in the process down to 3-4. (only for small samples)
- The optimization of the **R**eagent **M**anagement **S**ystem.

Fast processing is only possible with the **RTPH™-300.**

Reagents warm-up by the EHE

To perform a fast process in the **RTP™-300** it is necessary to use the EHE.

To be successfully used, the EHE must be:

- Activated in the instrument SETUP->Param. Setup (if not activated the EHE will work, but the process start will be delayed for the need to pre-heat)
- Select the steps for the process program
- For the selected steps an adequate temperature (50-60℃) must be set in order to decrease the processing time due to the increased infiltration capability of warm reagents, conversely to that the steps time can be proportionally reduced.

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 (approx. 10℃ above the desired SPC temperature for that step). If EHE is at ambient temp, please allow about 20 minutes to warm it up. Refer to the sub-chapter SETUP -> EHE activation.

Examples of fast protocols (with EHE)

Step	Reagent	Time	Temp C°	P/V	Mix	RHE
Thickness <1mm (Option 1)						
7	100% ETOH	15	45°	P/V	5	YES
10	Xylene	15	55°	P/V	5	YES
14	Paraffin wax	15	60°	P/V	5	NO
Total Time		**45 Min**				
Thickness 1mm (Option 2)						
1	Formalin	0	Ambient	-	-	NO
2	Formalin	0	Ambient	-	-	YES
3	70% ETOH	0	45°	-	-	YES
4	80% ETOH	15	45°	P/V	5	YES
5	95% ETOH	0	45°	-	-	NO
6	100% ETOH	15	45°	P/V	5	YES
7	100% ETOH	0	45°	-	-	NO
8	100% ETOH	0	45°	-	-	NO
9	Xylene	15	55°	P/V	5	YES
10	Xylene	0	55°	-	-	NO
11	Paraffin wax	15	60°	P/V	5	NO
12	Paraffin wax	0	60°	-	-	NO
13	Paraffin wax	0	60°	-	-	NO
Total Time		**60 Min**				
Small BX (Option 3)						
1	Formalin	13	Ambient	P/V	5	NO
2	Formalin	13	Ambient	P/V	5	YES
3	70% ETOH	10	45°	P/V	5	YES
4	95% ETOH	10	45°	P/V	5	YES
5	95% ETOH	10	45°	P/V	5	YES
6	100% ETOH	10	45°	P/V	5	YES
7	100% ETOH	13	45°	P/V	5	YES
8	100% ETOH	13	45°	P/V	5	YES
9	Xylene	12	55°	P/V	5	YES
10	Xylene	12	55°	P/V	5	YES
11	Paraffin wax	10	60°	P/V	5	NO
12	Paraffin wax	15	60°	P/V	5	NO
13	Paraffin wax	15	60°	P/V	5	NO
Total Time		**156 Min**				

Continued…

Step	Reagent	Time	Temp C°	P/V	Mix	RHE
Thickness 3-5mm						
1	Formalin	90	Ambient	P/V	5	NO
2	Formalin	60	Ambient	P/V	5	YES
3	70% ETOH	25	45°	P/V	5	YES
4	80% ETOH	26	45°	P/V	5	YES
5	95% ETOH	26	45°	P/V	5	YES
6	100% ETOH	26	45°	P/V	5	YES
7	100% ETOH	26	45°	P/V	5	YES
8	100% ETOH	26	45°	P/V	5	YES
9	Xylene	30	55°	P/V	5	YES
10	Xylene	35	55°	P/V	5	YES
11	Paraffin wax	18	60°	P/V	5	NO
12	Paraffin wax	24	60°	P/V	5	NO
13	Paraffin wax	24	60°	P/V	5	NO
Total Time		**7 Hrs 26 Min**				
Stat BX						
1	Formalin	0	Ambient	-	-	NO
2	Formalin	0	Ambient	-	-	YES
3	70% ETOH	10	45°	P/V	5	YES
4	80% ETOH	10	45°	P/V	5	YES
5	95% ETOH	10	45°	P/V	5	YES
6	100% ETOH	10	45°	P/V	5	YES
7	100% ETOH	10	45°	P/V	5	YES
8	100% ETOH	10	45°	P/V	5	YES
9	Xylene	10	55°	P/V	5	YES
10	Xylene	10	55°	P/V	5	YES
11	Paraffin wax	10	60°	P/V	5	NO
12	Paraffin wax	15	60°	P/V	5	NO
13	Paraffin wax	15	60°	P/V	5	NO
Total Time		**120 Min**				

Fixation

Samples are normally fixed outside the tissue processors. This is due also to the need to perform different fixation type and timing in relationship to the kind and size of sample.

The following is recommended:

- Perform a complete fixation outside the tissue processor
- Wash the samples in fresh tap water before to introducing them in the tissue processor
- Set the first step as a low gradation alcohol or water

Graphs of the last 30 processes executed

At the end of the process it is advisable to look at the graph of the last executed process in order to check if it was performed correctly. To access the graph, press the <GPH> key in the START Menu, the graph shown first is always the one of the last executed process.

The graph displays the following:

- 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 or alarm the graph indicates the exact time in which the alarm occurred. It is also helpful when maintaining the processor and can be used to avoid future failures. For example: an unstable temperature fluctuation or pressure graph may indicate a degradation of the temperature control system or air pump performance. In this case, it would be recommended to call our technical service team for a preventive maintenance and avoid possible future alarms.

Section 5 | Service

Error History
The alarms historical archive is under the “SERVICE” menu and consists of a list of the last 100 alarm occurrences. Service can immediately review the problem, frequency of occurrence, the step in which the error occurred and other information useful in solving 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. Press <EXIT> to go back to “SERVICE” menu.
If a printer is available the alarm list can be printed from the “SETUP” menu.

Service Menu, the following tests can be performed:

Function	Description
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
Drain SPC	This function is used to empty the SPC in the event reagent is still present (for example a blocking alarm during a process). Before using this function it is important to repair the cause of the problem. After activating this function, the processor checks the status of the rotary valve and the “SPC last” and “SPC 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, the operator is responsible for choosing the right bottle (an empty bottle or a bottle with a 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 solidified paraffin being present in the SPC. It will be necessary to first melt the paraffin with the service function “SPC HEATING”. When melted, the draining procedure can be started but be certain to choose a rotary valve position from 11 to 13.
Vacuum test	The instrument 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 exceeds 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 instrument 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 exceeds 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 checks SPC heating elements, and melts the paraffin residuals that could remain in the SPC in case of an alarm. This is performed by heating the chamber temperature to 60°C. 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 DOWN arrow key it is possible to show the remaining alarms.
Data Backup	With this function it is possible to save on a USB memory all instrument data files, later. If necessary, the saved files can be restored into the instrument memory. The restore operation can be performed only by the service technicians. To start this function it is necessary to insert blank formatted USB drive into the USB port. 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 flag	This function has the same effect of the Reset Button on the rear panel of the instrument.
Alarms reset	This function may be used to eliminate an alarm that appeared during the instrument testing. It can also be used to reset an alarm that for any reason was not possible to reset by the normal way. (normally pressing <EXIT> key)

Periodic Maintenance

Daily Maintenance	• Wipe retort and lid with lint free wipes after completing retort clean cycle • Examine retort lid gasket, free of wax • Check retort filter screen or bottom for tissue and waxy residue • Clean Exterior of instrument with soft cloth and ParaGard™ • Inspect and, if necessary adjust paraffin levels • Inspect reagent container levels
Weekly Maintenance	• Inspect and empty condensate bottles • Examine activate Carbon Filters
Monthly Maintenance	• Check the indicator of the Charcoal filter and in case is at 100% replace the filter. • Check for the presence of residues at the bottom of reagent and paraffin 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. • Extended Clean Cycle- Hot water Flush
Quarterly Maintenance	• Replace Carbon Filter (Not to exceed 6 months) • Extended Clean Cycle with Detergent
Charcoal Filter Replacement	Based upon environmental factors and the use of the WCC. Filter replacement is required approximately every 60 to 120 processes. Regardless of usage, the charcoal filter should be changed at least once every six months. If ignored, the charcoal filter may release toxic and contaminated vapors into the air when exhausted. Exhausted filter waste is to be handled in accordance with local regulations.
SPC Lid Gasket Replacement	The processing chamber lid gasket is made of VITON® rubber. The gasket needs to be periodically greased with TEFLON grease. When replacing, use a sharp plastic tool (not a metallic one) to remove the gasket. Before inserting a new gasket carefully clean the gasket housing slot. The gasket replacement may be not easy due to the fact that the gasket is oversized. This is necessary to maintain a proper seal.

Section 6 | Troubleshooting

Alerts and Alarms

Managing alarms

There are two types of alarms:

NON BLOCKING ALERTS:

Alarms 1 through 50 are NON-BLOCKING ALERTS. NON-BLOCKING alerts are only WARNINGS and do not interrupt the program execution because it is not critical for the process completion. In this situation, a program stoppage may produce worse results than its continuation. When an ALERT occurs, the program continues and the screen displays the alert number and a brief explanation of it. Upon the process 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 General Data Service.

BLOCKING ALARMS:

Alarms 51 through 99. 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 paraffin/reagent
3. Remove the samples
4. Reset the instrument

After the reset, the instrument is again ready to run a program. The alarm could simply have been an error in closing the chamber lid or something else easily resolved. Before proceeding please do the following:

1. Remove all samples
2. Check that the SPC does not contain any reagent residuals
3. Check reagent and paraffin levels
4. Check that the bottles are correctly placed in their housing slots
5. Check that the paraffin's 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 instrument

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.

Procedure for the instrument reset

There is a red button on the rear panel of the instrument. Its purpose is to reset of the instrument software program. It must be used under the following circumstances:

- When the operator is unable to reset an alarm in the usual way
- When the operator faces unexpected situations that cannot be resolved by any other means
- To reset the instrument'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

Perform the following procedure for using the reset button:

1. Switch off the instrument (the switch is located near the main power cord)
2. Press and Hold the reset button
3. Switch on the instrument and maintain the reset button pressed until the main screen appears.

After this operation the **RTP™/RTPH™-300** 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 instrument 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 instrument and call our service department, (with the exception of the alert #1).
- Before to start the purge cycle execute the instrument check list.
- Run a purge cycle to verify that the instrument is fully operative.

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 is information that may allow to better understanding 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 indicate the exact moment of the error. Checking also the alarm archive the chances to understand why an alarm occurred are greatly increased. For example:

- If the paraffin temperature graph is unstable (more than +/- 1.0℃) or if the temperature shown is different from the pre-defined set point, it is possible to suspect a failure of the paraffin 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 unstable 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.

NON-BLOCKING ALERT CODE

1	
PROBLEM	**PW FAILURE**
DESCRIPTION	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 instrument. If the loss of power occurs during a process, the **RTP™/RTPH™-300** 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 **RTP™/RTPH™-300** 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 are NOT considered processing time.
REMEDY	If the power supply doesn't resume, check the electric network, plug and cord. If necessary, replace the instrument fuses. If the instrument 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 instrument safety and reliability, an uninterruptible power supplies (UPS) may be used to protect against power failures, fluctuations and spikes

2	
PROBLEM	**DIFFICULT DRAIN** - Insufficient reagents drain speed.
DESCRIPTION	Difficulty during the reagent drain. The instrument had to perform the drain cycle twice
REMEDY	Verify the SPC draining holes, verify the bottle contents, the presence of solid residue can slow down the draining

3	
PROBLEM	**SHORT DRAIN** - Insufficient level of reagent in the indicated bottle
DESCRIPTION	The duration of the reagent drain was too short
REMEDY	Verify reagent levels

4	
PROBLEM	**P/V TIME OUT** – Lid gasket unable to ,\maintain vacuum/pressure
DESCRIPTION	The instrument 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.
REMEDY	Check and clean the lid gasket

5	
PROBLEM	**FULL FILL P** - Excessive level of reagent in the bottle
DESCRIPTION	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.
REMEDY	Verify reagent levels

6	
PROBLEM	**ABORTED STEP** - unable to fill bottle
DESCRIPTION	It is impossible to fill the content of a bottle into the SPC. The bottle will be bypassed and the next bottle in the process list will be used, the time of the aborted step will be added to the current one. If the attempt succeeded, the process can continue. If the following bottle cannot be filled the process is interrupted and the instrument indicates alarm 53 – LINE CLOGGED
REMEDY	Check for clogged line

7	
PROBLEM	**FILE NOT FOUND**
DESCRIPTION	File not found or corrupted in the long term computer memory; the recovery system replaces the lost or incomplete file from a backup copy.
REMEDY	No intervention by the user is possible. If the problem persists, contact our technical service

8	
PROBLEM	**LONG DRAIN** - 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.
DESCRIPTION	The time required to drain the SPC was excessive
REMEDY	Check the SPC lid gasket, contact our service for other possible causes

9	
PROBLEM	**WWV TEMP LOW** - The thermo-regulation system of the paraffin chamber is out of order
DESCRIPTION	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 draining of the last reagent, the process is stopped. (see alarm 60)
REMEDY	No intervention by the user is possible. Please contact our service for assistance.

10	
PROBLEM	**PNV TIME OUT**
DESCRIPTION	The PNV (Pressure Normalize Valve) solenoid valve that is used to normalize the pressure inside the SPC (making it the same of the ambient pressure), doesn't normalize within 3 minutes from the intervention of the PNV this alert is issued
REMEDY	Check the small hole in the right wall of the SPC. A small quantity of Xylene (or xylene substitute) can be introduced into the hole with a syringe, if the clogging was due to a small drop of solidified paraffin after a few minutes the xylene may melt it, try also to heat the SPC from the Service menu, after 15 minutes or more try to execute the Pressure test from the service menu, after the creation of the pressure press ENTER to release the it, if the pressure normalizes the problem has been solved. If the problem persists, contact our service department for technical assistance

11	
PROBLEM	**M1 Rotary Valve FAILURE**
DESCRIPTION	The M1 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 instrument may continue to work by using the counter-clockwise motor (M2).
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

12	
PROBLEM	**M2 Rotary Valve FAILURE**
DESCRIPTION	The M2 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 instrument may continue to work by using the clockwise motor (M1).
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

14	
PROBLEM	**SPC TEMP LOW** - The thermo-regulation of the SPC is out of order, or step time too short to allow the reagent to be heated at the desired set-point (when the EHE is not used)
DESCRIPTION	During the process the temperature of the sample processing chamber did not reach the set-point; the process continues till the "last reagent before the paraffin". If the problem persists, before the draining of the "last reagent before the paraffin", the process is stopped. (see alarm 60)
REMEDY	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 thermoregulation system no intervention by the user is possible contact our service department for technical assistance

15	
PROBLEM	**SHORT FILL** - Malfunction of the pneumatic system, reagent level in the tank too low
DESCRIPTION	During the reagent fill the filling time was too short; the reagent level may be insufficient to cover the samples.
REMEDY	Verify the reagent level in the tank(s). If the problem persists, contact our service department for technical assistance

20	
PROBLEM	**PROC SUSP USER**- The process has been suspended for the opening of the SPC lid or by user request.
DESCRIPTION	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
REMEDY	Close the SPC lid as soon as possible. If the process has not resumed, wait for the system to automatically check the SPC lid microswitch functionality (it may take up to 3 minutes from the lid closing). If the microswitch is broken the system will automatically disable it and it will resume the process execution. (NOTE: The SPC lid must be left closed). If the SPC lid is closed but the system shows that it is open, the microswitch that controls the SPC lid status is broken or out-of- position. Waiting for service it is possible to manually disable it by the instrument SETUP menu

21	
PROBLEM	**PROC SUSP LID**- The process has been suspended indefinitely cause the opening of the SPC lid
DESCRIPTION	The suspension the process MUST be resumed within 3 minutes, after that time the suspension is considered accidental and ALERT 21 is issued. Do not confuse it with alert 20.
REMEDY	See ALERT 20.

22	
PROBLEM	**PROC SUSP UPS**- This alert is issued only in unit with the RS-232 connected UPS
DESCRIPTION	The process has been suspended because, during a power failure, the UPS batteries went below 40% charge. The process is suspended to avoid an inadvertent shut down of the instrument during a drain or fill action. This avoids the risk that the sample will remain in air. The instrument is set in a condition of power saving to increase the UPS batteries life
REMEDY	Restore the electrical power, if the power is restored before the batteries would be completely exhausted the process will be automatically restarted. 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 completely melted. 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 instrument prepare itself for the complete switching OFF (see alert 23)

23	
PROBLEM	**PRO SUSP INDEF**- The process has been indefinitely suspended due to the extended opening of SPC lid or lack of power when the instrument is equipped with the UPS and the batteries are too low (see alert 22).
DESCRIPTION	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 instruments equipped with UPS when there is a power failure and the batteries charge is not sufficient to keep the instrument alive, the process has been suspended and the instrument prepare itself to the complete power failure
REMEDY	See alerts 20, 21 and 22

30	
PROBLEM	**RMS POSPONED** - The RMS execution has been postponed by the user.
DESCRIPTION	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.
REMEDY	Execute the RMS every time is requested by the system

32	
PROBLEM	**RMS POSTPON PW** - The RMS has been postponed due to incorrect or unknown password
DESCRIPTION	See alert 30.
REMEDY	See alert 30.

34	
PROBLEM	**WRONG PASSWORD** - The password has been mistakenly typed more than three times.
DESCRIPTION	The password has been mistakenly typed more than three times. The alert is stored in memory for future consultation.
REMEDY	Type the correct password; if the password is lost please call our technical service to retrieve it.

40	
PROBLEM	**ELODEV LACK** - Hardware failure of the touch screen devices
DESCRIPTION	The drivers of the touch screen device are not responding properly
REMEDY	If the problem persists, contact our service department for technical assistance, **meanwhile it is possible to successfully and safely use the RTP™/RTPH™-300 by connecting an AT keyboard in the rear panel. All instrument functions can be controlled also by a common PC keyboard.**

BLOCKING ALARM CODES

51	
PROBLEM	**FILL NO VACUUM** - During the filling stage, a leak in the pneumatic or hydraulic circuit occurred; the air pump is not fully efficient or broken.
DESCRIPTION	The instrument was unable to produce vacuum in the process chamber while attempting to fill from a reagent or a paraffin station.
REMEDY	Check the SPC lid gasket. Please contact our service department for assistance.

52	
PROBLEM	**FILL TIME OUT** - The filling from a reagent or a paraffin bottle has not occurred in the allotted time.
DESCRIPTION	See alarm 51
REMEDY	See alarm 51

53	
PROBLEM	**LINE CLOGGED** - The pipeline for the bottle that the system is going to fill is clogged, or the previous reagent was not completely drained due to an obstruction in the pipeline or a problem in the hydraulic or pneumatic circuit.
DESCRIPTION	Before filling 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.
REMEDY	Check the specific portion of pipeline to the tank involved in this alarm (or the previous tank), there may be debris (or drops of solidified paraffin) clogging it.

54	
PROBLEM	**SPC OVERTEMP** - SPC sensor detected an over temp
DESCRIPTION	During a paraffin step the processing chamber temperature went over the allowed limit (not to be confused with **Alarm 20**).
REMEDY	No intervention by the user is possible. Please contact our service department for assistance.

55	
PROBLEM	**TS SPC OUT** - SPC temperature sensor failure
DESCRIPTION	Malfunction of the SPC temperature sensor
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

56	
PROBLEM	**SHORT FILL** - Very low quantity of reagent in a bottle
DESCRIPTION	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.
REMEDY	Check reagent bottle position and fluid levels. Reagent bottle quick connector may not be fully inserted into the female receptacle. If the problem persists, contact the our service department for technical assistance.

57	
PROBLEM	**VR OUT** - The rotary valve is out of position
DESCRIPTION	The Rotary Valve motor failed or the Rotary Valve position sensor failed
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

58	
PROBLEM	**FILE NOT FOUND** - Computer malfunction
DESCRIPTION	An essential computer file is damaged or cannot be found and the error recovery system couldn't correct the problem.
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

59	
PROBLEM	**SPC TEMP LOW** – Failure of SPC: temperature sensor, heater, safety thermostat.
DESCRIPTION	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.
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

60	
PROBLEM	**WWC TEMP LOW** - Failure of WWC: temperature sensor, heater, safety thermostat
DESCRIPTION	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.
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

61	
PROBLEM	**WWC OVERTEMP** -WWC temperature system failure
DESCRIPTION	The temperature of the paraffin chamber is well above the set point
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

62	
PROBLEM	**TS WWC OUT** - WWC temperature sensor failure
DESCRIPTION	The WWC temperature sensor is out of the correct range.
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

63	
PROBLEM	**PRESSURE NR** - The air pump or other pneumatic circuit failed
DESCRIPTION	During the ending phases of the drain, the pressure in the SPC is too low.
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

64	
PROBLEM	**DRAIN NO PRESS** - During the drain the pressure has not reached the correct value
DESCRIPTION	See Alarm 63
REMEDY	See Alarm 63

65	
PROBLEM	**DRAIN TIME OUT** - The drain has gone over the maximum time allowed
DESCRIPTION	See Alarm 63
REMEDY	See Alarm 63

66	
PROBLEM	**SPC NOT EMPTY** - The purge cycle, compulsory after a process which involved paraffin, was not performed.
DESCRIPTION	The user attempted to begin a process with the SPC either not empty or not cleaned from paraffin residue.
REMEDY	If the SPC did 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	
PROBLEM	**OVER FILL P** - Complete emptying of the previous reagent failed due to an incorrect solenoid valve opening or, in case of paraffin, temperature problems
DESCRIPTION	An over fill 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 **RTP™/RTPH™-300**, 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
REMEDY	No intervention by the user is possible. Please contact our service department for assistance

70-89	
PROBLEM	**COM Errors**
DESCRIPTION	
REMEDY	Check communication cable connections, if error persists, call service

90-93	
PROBLEM	**I/O Errors**
DESCRIPTION	Possible hardware failure
REMEDY	De-energize then energize the instrument, if error persist, call service

95	
PROBLEM	**EHE OVERTEMP -** EHE temperature system failure
DESCRIPTION	The temperature of the EHE is well above the set point
REMEDY	No intervention by the user is possible. If the problem persists, contact our service department for technical assistance

96	
PROBLEM	**EHE TS OUT -** EHE temperature sensor failure
DESCRIPTION	EHE temperature sensor failure
REMEDY	No intervention by the user is possible. If the problem persists, contact our service department for technical assistance

97	
PROBLEM	**EHE TEMP LOW -** Incorrect working of EHE: temperature sensor, heater, safety thermostat
DESCRIPTION	The temperature of the EHE is too low. The process will be halted because the fast processing cannot be guaranteed.
REMEDY	No intervention by the user is possible. If the problem persists, contact our service department for technical assistance

Appendix 1 | Accessories

Printers

The **RTP™/RTPH™-300** is equipped with 4 USB ports in the back panel. Any USB printer, keyboard or mouse can be connected to anyone of the ports; the system should promptly recognize it through plug-and-play functions. If for any reason a device is not recognized, please call our technical service, it may be necessary to manually install a software driver.

UPS (Uninterruptible Power Source)

General description

The UPS is an option. The **RTP™/RTPH™-300** can be powered by an external UPS connected or not connected to the instrument by the serial port, the difference consists in the following advantages:

- Communicate with the **RTP™/RTPH™-300** to manage the situations of power failure
- Reduces the power consumption in case of power failure
- It will avoid operations of fill and drain when the batteries charge is low
- 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
- Acts as a filter to eliminate noises that can come from the electrical power line
- Issues an alert and sounding a 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. In the event of a power interruption, the **RTP™/RTPH™-300** computer system maintains in special memory all processing information. This allows the restart of processing from exactly where it was interrupted.

Some power interruptions such as fast transients may cause system errors that are not recoverable.

Therefore 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.

Switching the UPS ON and OFF

To switch OFF instruments 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 RTP™/RTPH™-300 it is necessary to:

1. **Switch OFF the UPS**
2. **Disconnect the RTP™-360 from the UPS supply power cord**

To switch ON the RTP™/RTPH™-300 it is necessary to:

1. **Reconnect the main power cord to the UPS**
2. **switch ON the UPS**

In case it would be necessary to open the rear panels of the RTP™/RTPH™-300 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 RTP™/RTPH™-300 is not electrically powered!

To ensure that the RTP™/RTPH™-300 is not electrically powered it is necessary to switch the UPS OFF! It is also recommend to disconnect the UPS power cord from the RTP™/RTPH™-300!

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.

UPS action 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 **RTP™/RTPH™-300** 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 paraffin. 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 paraffin), 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.

Appendix 2 | Glossary of Abbreviations

EHE	**Enhanced Heat Exchanger**
WWC	**Paraffin (Wax) Warm Chamber**
SPC	**Retort - Sample Processing Chamber**
RMS	**Reagents Management System**
WCC	**Paraffin (Wax) Cleaning Cycle**
RFD	**Remote fill and drain system**
RFD	**Remote Fill and Drain**
WCC	**Wax Cleaning Cycle**
HPa	**EctoPascal = 1000 mBar – pressure unit measure**
W	**Watt – power unit measure**
A	**Ampere – electrical current unit measure**
V	**Volt – voltage unit measure**
IOB2	**Input Output Board**
TSM	**Monitor Touch Screen**
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**

More Information

PH: 844.643.1129

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ID Solutions For Healthcare
General Data

General Data Healthcare, Inc.
Headquarters: 4354 Ferguson Drive, Cincinnati, OH 45245
TBS Facility: 3014 Croasdaile Drive, Durham, NC 27705

Sales Inquiries:
PH: 844.643.1129
Email: talktous@general-data.com
Web: www.general-data.com/hc

Service:
PH: 800.245.5029
Email: customersupport@general-data.com