Kalstein

Series YR431-1

Fully Automatic Enclosed Tissue Processor

# Instruction Manual

Thank you very much for purchasing our Fully Automatic Enclosed Tissue Processor model YR431-1.

Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a hand place for future reference.

 Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

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# Table of Contents

# 1. Introduction

## 1.1 Scope of application

- Used to Pathological section and study histology of plant, animal, or human being.

## 1.2 Helpful suggestions

- The user should read this user manual carefully before first installation and operating the machine and put this manual beside the instrument to refer it when meet problems.
- Before operation, please carefully read operation instruction first to know operation steps and process.

# 2.Safety Instructions

## 2.1 Obligation to the operator

●Only staff who are familiar with basic regulations on safety at work and accident prevention and are trained in the use and operation of this instrument should be allowed to handle this instrument.

## 2.2 Safety notes

●The instrument may only be transported or moved in an upright position always, the tilt angle should not exceed 45°C.
●After installation, the fixed feet must be adjusted off the ground before transporting or movement
●The input voltage has been preset at the factory, please check this setting complies with your local power requirement before connecting the instrument to the mains power.
●Please use the power cord provided. If changing the power cord, ensure the power cord with earth wire.
●The instrument must be installed in a ventilated environment， do not operate in rooms with explosion hazard
●The protective parts on instrument and accessories must neither be removed nor modified, to avoid injury to instrument or human body

## 3.1 Technical Specification

- Voltage And Frequency： AC220V±10%, 50Hz (Standard)
  AC110V±10%, 60Hz
- Environmental temperature 5℃～35℃
- Relative humidity: ⩽90% （25℃）
- Atmospheric pressure: 86kPa～106kPa

## 3.2 Feature

- Smart Management

  Monitoring the running status, Sensor's control, Alarm checking to keep specimens in safety.
- Accommodate specific laboratory needs

  Ability to different processing demand, flexibility to accommodate normally or rapid in 3hrs finished.
- Friendly Color Touch Screen display

  15 inches large touch screen, Easy to use, convenient operation. One-touch operation to ensure runs start quickly and operator errors are minimized
- Large Processing Capacity

  300cassettes at one time according to the demand target.
- Fast

  Ensure patients get critical results sooner.
- Safety

  Power failure protection and keep going the processing.
- Reliable

  Multi-protection to monitor the specimen in safety. Two sensors for reagent cover, Alarm and Pause function, over temp and power failure protection, Retort bath Unlock Alarm.

## 3.3 Technical Data

⊙Power supply：220 V AC/110V AC
⊙Frequency：50/60 Hz
⊙Power：＜1200W
⊙Fuse：main power 3A，heating power 5 A

⊙Safe classify：Classify Ⅰ - type B
⊙Dimensions：L：650mm ,
W：650mm,
H：1130mm,
⊙Weight (net): approx145kg

⊙Number of paraffin bath： 3pcs (No: 10、12、13)
Capacity 6L
Temperature 65℃
Temperature accuracy: ±1℃
Melting time 3h

⊙Number of Retort bath： 1pc
Capacity: max 300cassettes (3basket）
Reagent volume 6.5L
Temperature(paraffin):65℃，Temperature (processing reagents): 0-30℃
Temperature accuracy: ±1℃
Negative pressure max：0-70Kpa Positive pressure max： 30Kpa

⊙Waste reagent bottles： 1pc
Maximum bottle volume: 6L

⊙Reagent bottles： 9pcs (No：: 1、2、3、4、5、6、7、8、9）
Maximum bottle volume: 6L

⊙Cleaning bottles： 3pcs (No：: 14、15、16）
Maximum bottle volume: 6L

⊙Waste wax box： 1pc (No：: 11）
Maximum bottle volume: 6L

⊙Color LCD touch screen： 15inches
⊙Bath setting time:0～300min
⊙Reagent loading time:<5min
Reagent Drain out time: <5min
⊙Mixing time:2min
⊙Mixing interval time: 8min
⊙Operation mode: Automatic & Manual

## 4.1 Overview - Structure Description

YR431-1 vacuum Tissue Processor be worked for processing plant, animal, and human cells. This instrument adopts PLC with touch screen control system in reliable performance, complete function, and friendly operations. It be widely used in clinical pathology study and analysis of animal and plant, microorganisms' cells. It is mainly consisting of computer control system, wax cylinder, working cylinder, pneumatic system, liquid distribution system and reagent bottle.

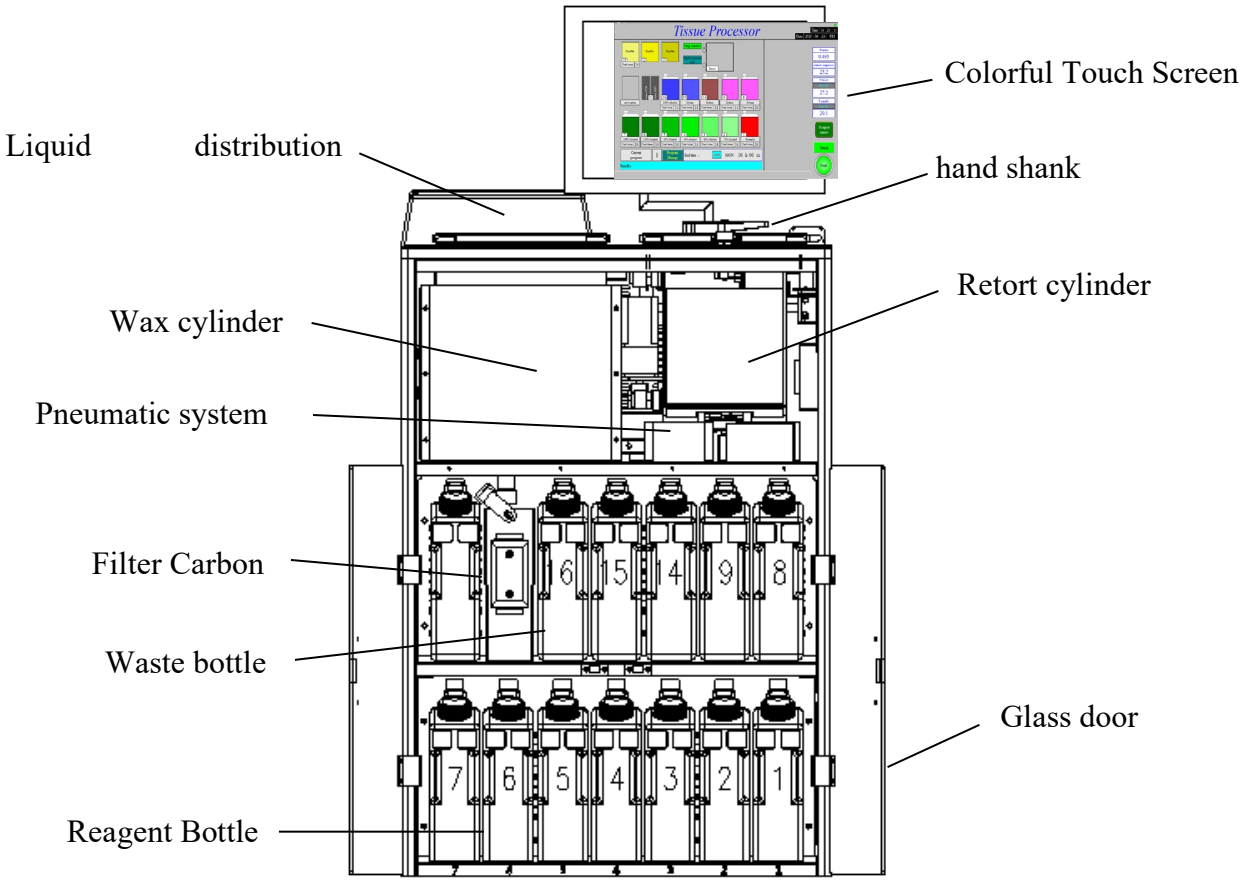
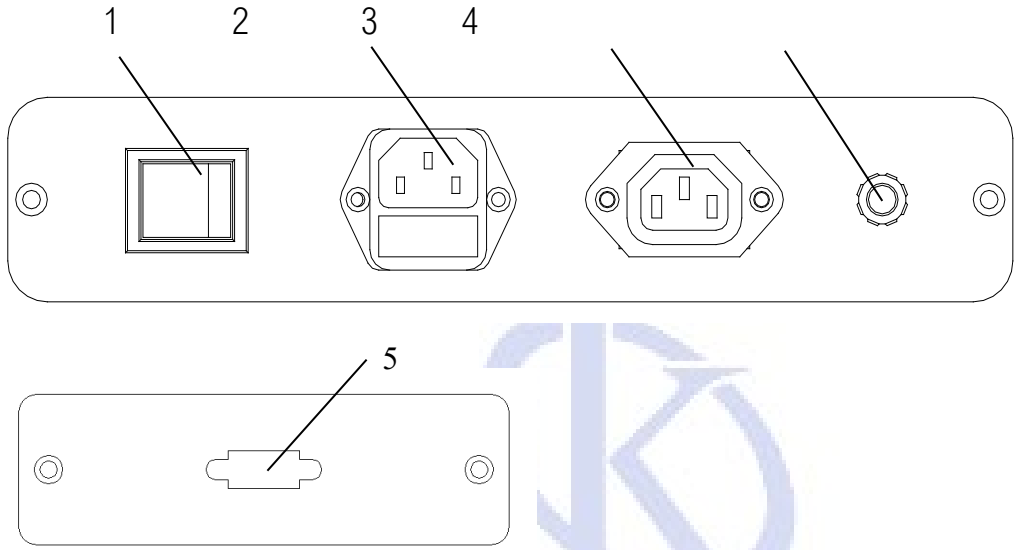



Fig 1

- 15-inch color LCD touch screen, visual graphic display, English/Chinese languages switch, automatic suggestion guidance, it can complete dehydration according to the user setting.
- Hand shank: Open or locked the Retort cylinder. The non-locked alarm function during the operation of the dehydrating program.
- Working cylinder (Retort Bath）： Put the tissue into bath and different reagent to dehydration and wax fixed. Its only start works in order while the hand shank locked well or alarm to remind.

- Liquid distribution system: It consists of distribution valve and micromotor. Through the motor and Photoelectric switch precision control that success processing the reagents medium from No.1 to No.16
- Pneumatic system: It can complete the loading and unloading of various reagent in the working cylinder.
- Carbon Filter： Used to adsorb harmful gas in the pneumatic system.
- Waste bottle: Collect the waste liquid when changing the wax or reagent.
- Wax cylinder and reagent bottle: It be used for storage of liquid medium.

## 4.2 Back panel cover plate instruction




1——Power switch: AC220V power switch
2——Power Socket: AC220Vsocket (with Fuse10A)
3——Power Socket: Power for LCD touch screen
4——Terminal: Ground wiring
5——LCD communication serial port

# 5.Preparing installation

## 5.1 Unpacking

To unpack, pry open the steel buckle fixing the wooden box by slotted screwdriver, and open the top cover of the wooden box, take out the box of LCD touch screen and bracket, the waste bottle, the spare bottles, the tray, the instruction materials, etc., and then remove the side plates around. The machine is too heavy. It needs 4 people to lift the equipment out of the wooden box, and put it on a stable ground, and gently push it to the working area.

## 5.2 Touch screen

Open the packaging box of the touch screen bracket and fix the bracket to the device as shown in Figure 2 (Fix it with M5 Socket head screw *2 pcs) and fix the power cord and serial communication cable of the screen into the bracket buckle (Note: Please pull out the buckle to open and fix it again when the wire is threaded). Then fix the touch screen on the bracket, connect, and fix the serial communication cable, and plug both ends of the screen power cord into the corresponding socket hole.

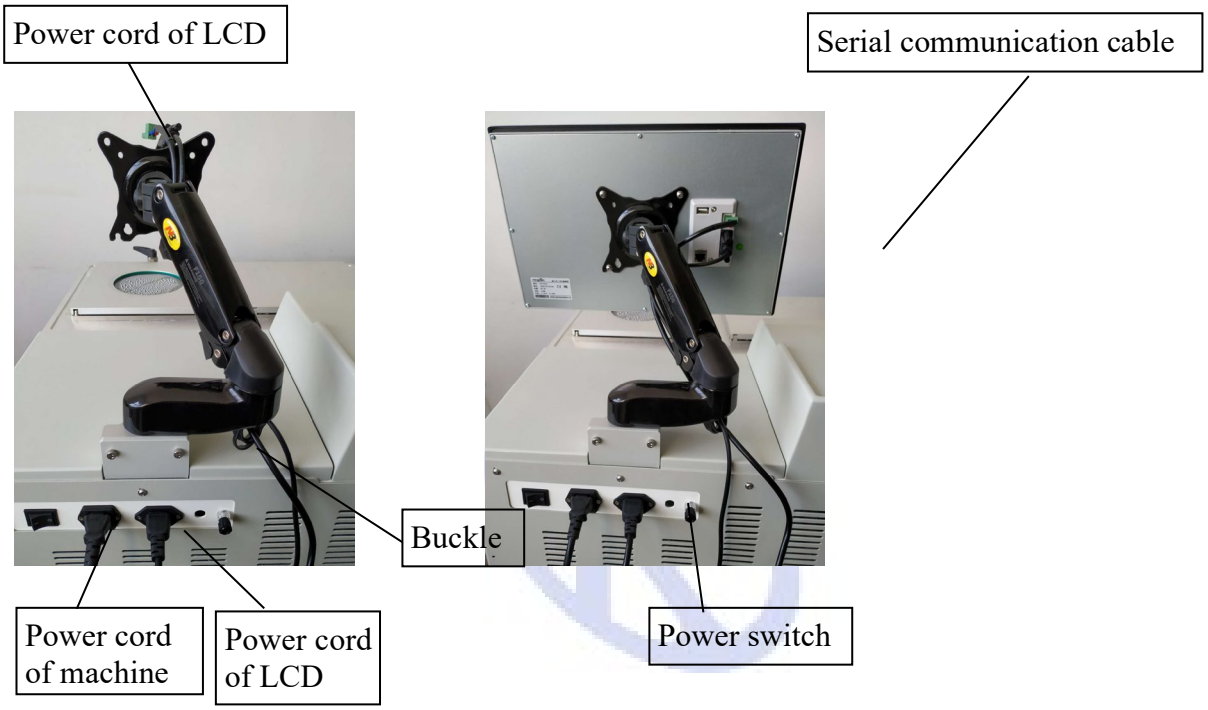



Fig2

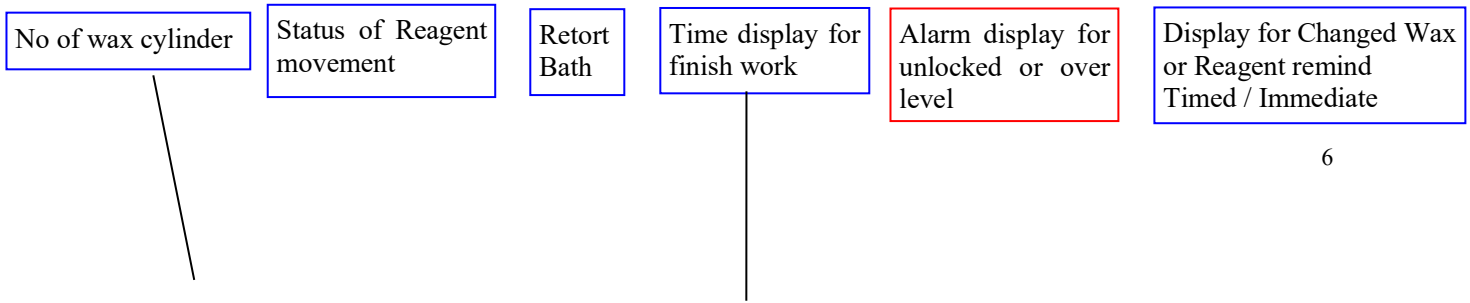
## 5.3 Power cord connection

Connect the power cord(3pcs) to machine unit and Main's power.

# 6. Operation

## 6.1Setting up of the instrument

Reliable power connection and then turn on the instrument, the LCD touch screen will be displayed the main menu after program initialization several minutes as fig showing.



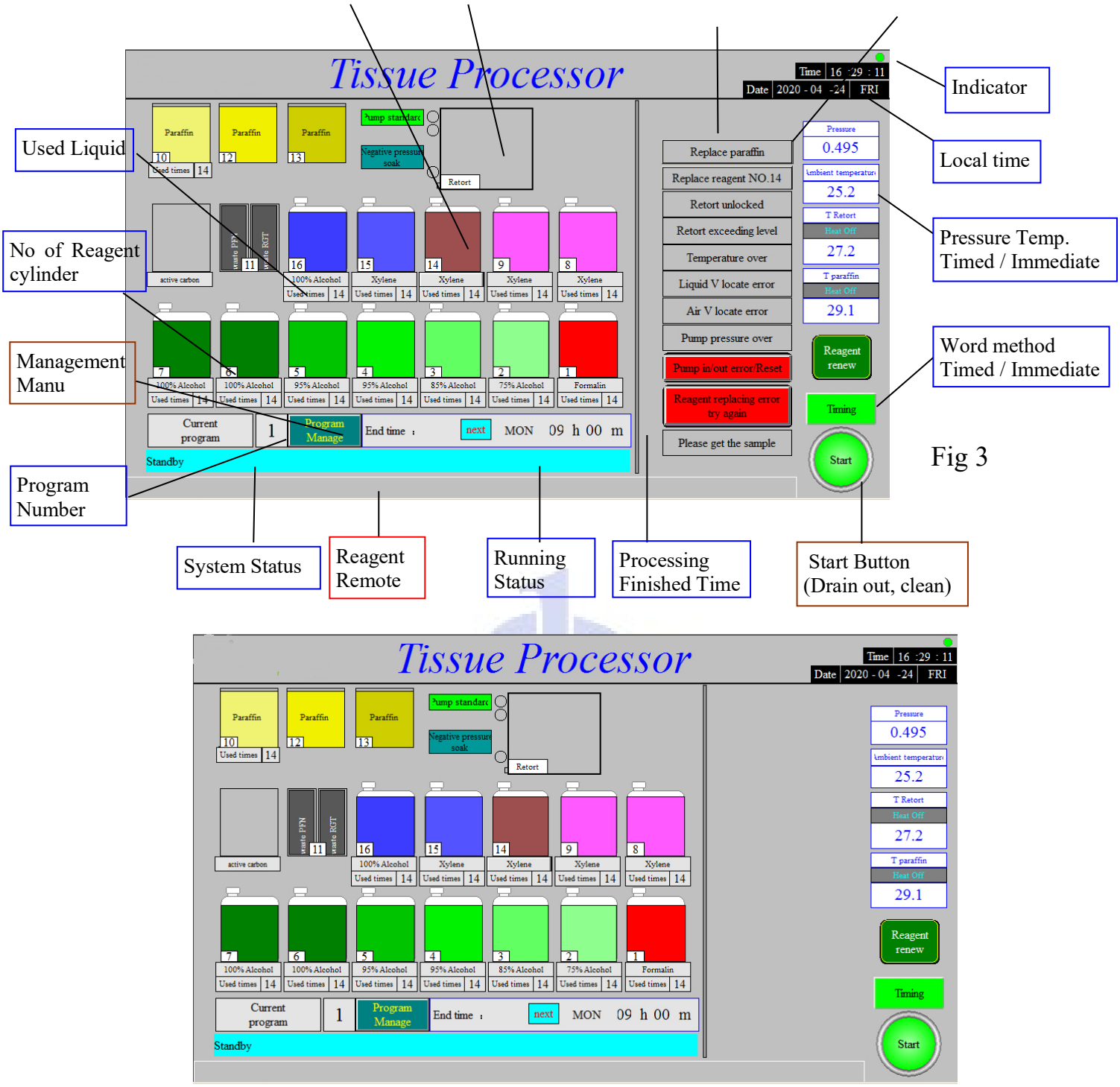



Fig 3




Notes: This is Standby Menu. Two buttons for functions: Start and Program.

If Buzzer alarm, please check the Alarm Display Area (Fig3).

Please check the Hand Shank is locked in good situation or unlocked.

## 6.2 Instruction of button

### 6.2.1、START

Program edited, Reagent filled well, Tissue is ready in Retort Bath, Press" START" in 3 seconds and go into processing starting. After the processing finished the dehydrated, dipped wax," Wax back to home «message comes, please click it, the wax back to the wax cylinder. Take out the Basket and message" Clean" remind you to clean the system. The unit will back to Standby after the system clean.

6.2.2、Management Manu

Click" Management Menu"

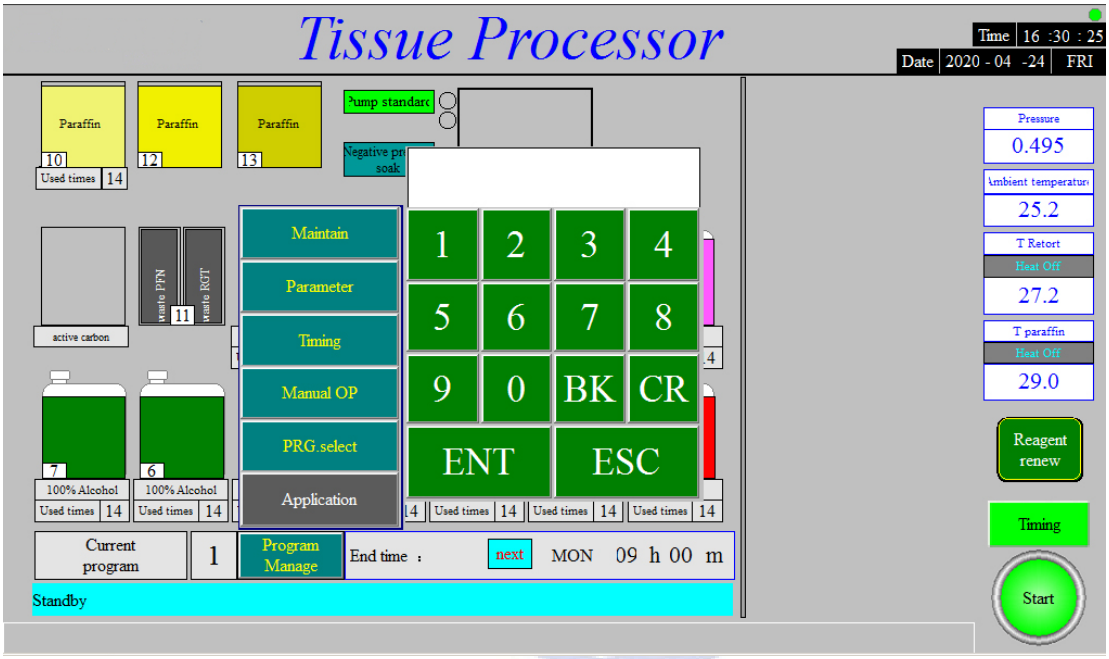



Fig 4

The system maintenance and parameters are default, the user does not need changes or maybe issue fault operations.

6.2.2.1、The system maintenance (Fig 5) mainly includes the display of the liquid and gas valve's position, the setting of the coordinate value of the liquid and gas valves, the setting of the pressure range, the adjustment of the temperature PID deviation value and other system parameters. The function of low liquid level switch and automatic liquid change can be selected as customer required.

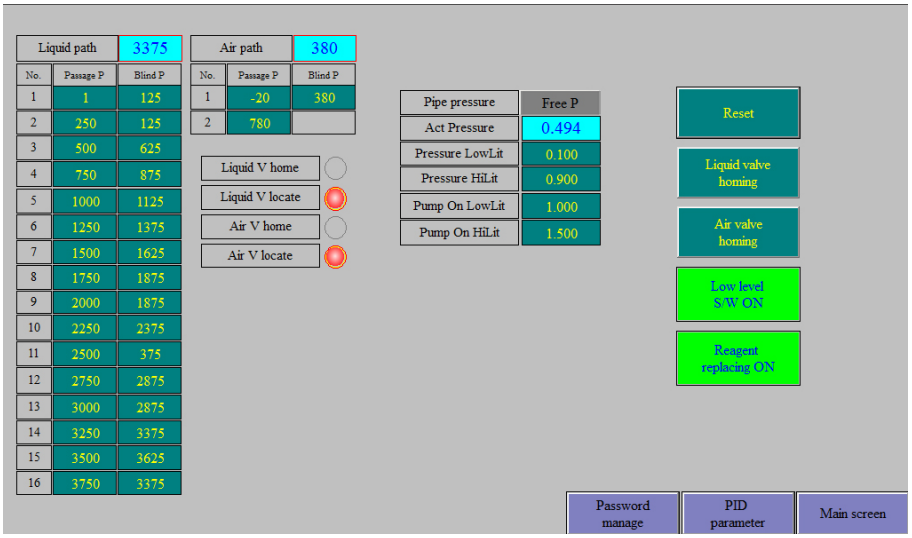
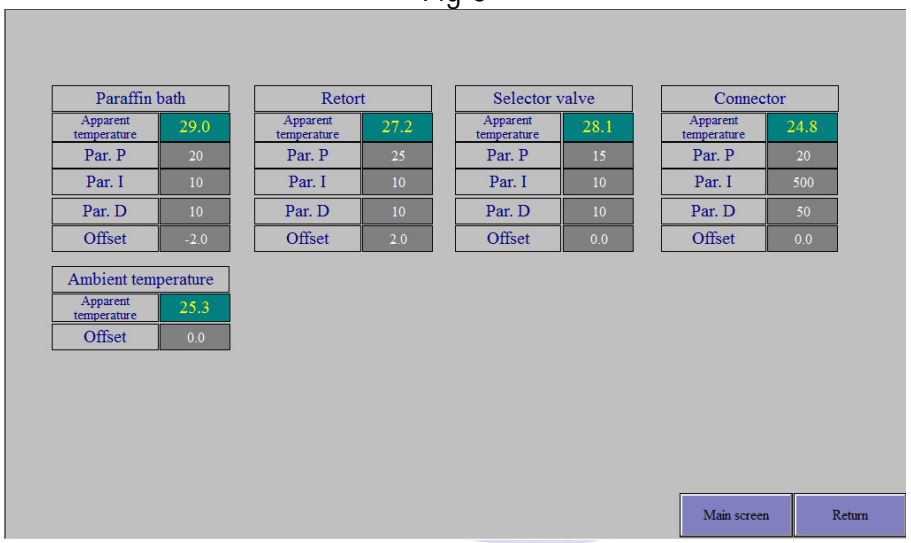



Fig 5




PID parameters

Special notes

If the alarm issued: "Liquid Valve locate error" or "Gas valve locate error», in order not to affect this dehydration, you can enter the system maintenance interface, click the zero button to force the valve control system to return to zero, the corresponding alarm information disappears, the program continues to run, and complete the current program. After then go to find the fault reason.

When the low liquid level is in the open state, when it runs automatically, it will automatically detect whether the liquid Fill in or drain out is positive. If abnormality, the user shall be reminded by flashing reagent Number text in the bottom of the main interface.

6.2.2.2、All temperature parameters.

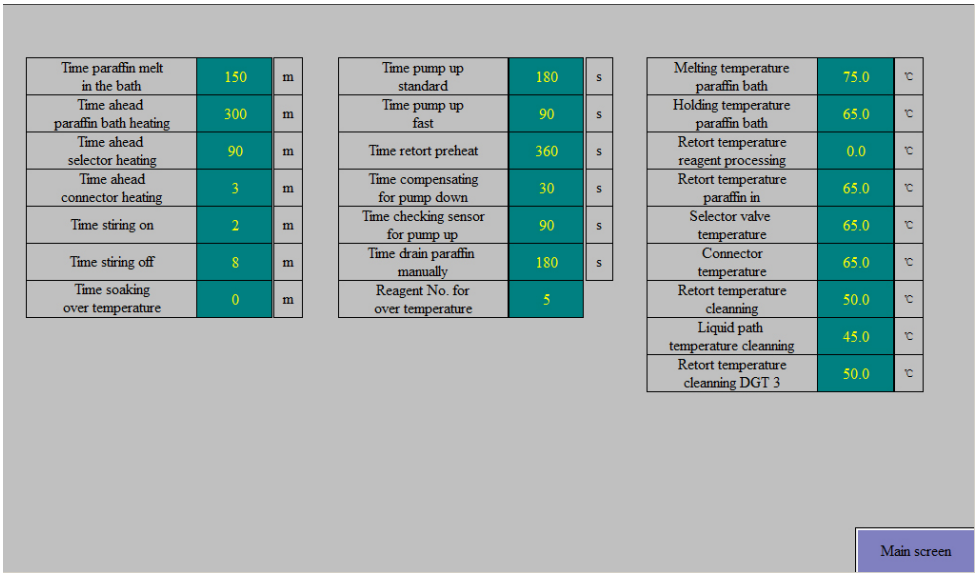
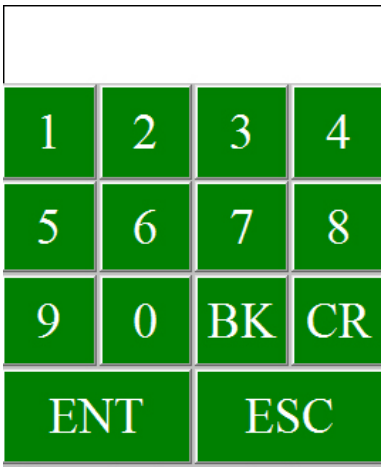



Fig 6

Password management. Click “System Maintain” “Parameter set” to set the password and go into the Set Menu.

Fig 7



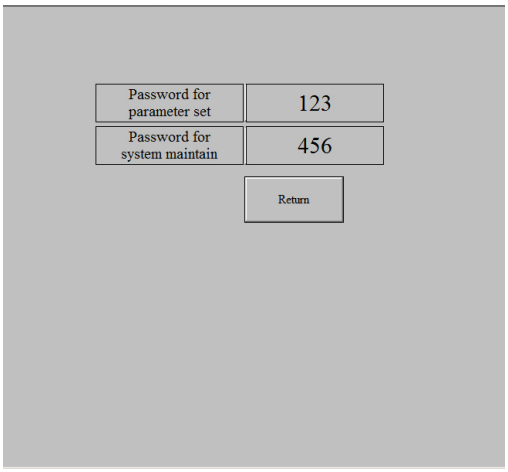




Fig 8

The password can be changed through the password management in Figure 5.
The factory default password is shown in Figure 8.

6.2.2.3 click the timing setting button to enter the timing setting interface (Figure 9). It can be set the ends time of specimen dehydration in next week, i.e., the time of specimen collection, as shown in the following figure: the dehydration of specimen ends at 09:00 a.m. from Monday to Friday and closed on Saturday and Sunday. Sunday is defined as the first day of the week.

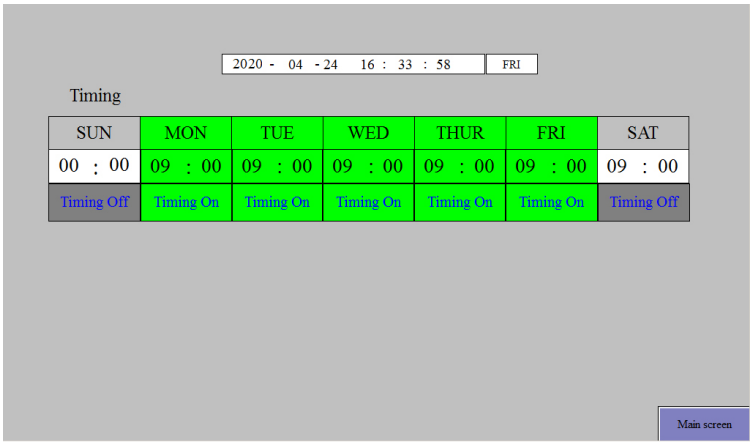



Fig 9

6.2.2.4、Manual Operation is activated on the device standby. If enter Manual operation during automatic running, it can check temperature only.

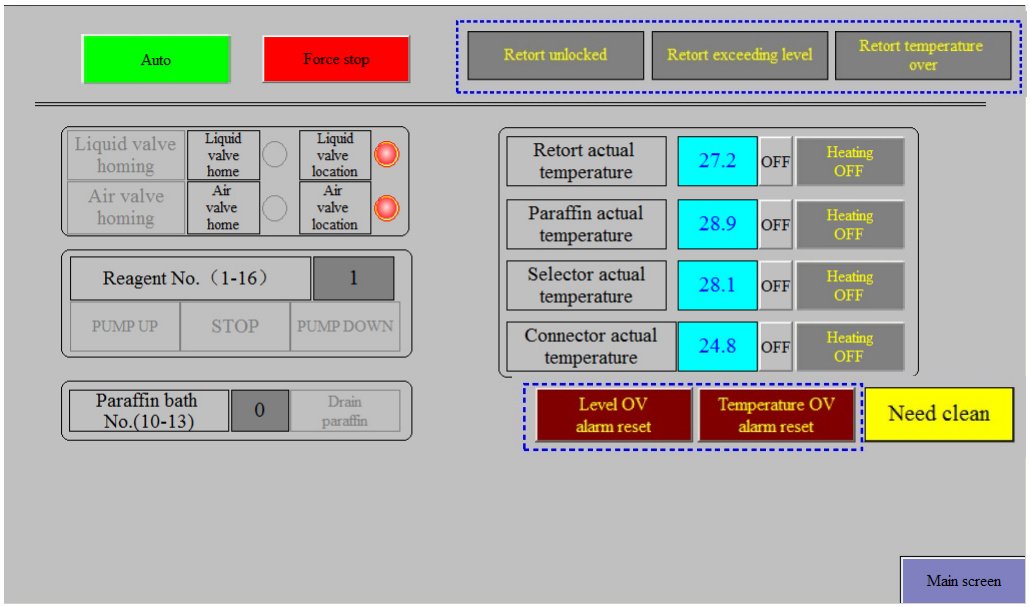



Fig 10

Note：If the problem occurred from the color marked, the alarm will remind.

"Need Clean" message to remind user cleaning.

If the device meet malfunction in Auto running, please long press" Force Stop «in 3 seconds to stop the running and the device enter into Manual mode. Fig 11

The Reagent No. Change to the current work reagent number and press" PUMP DOWN" while the reagent will return to the bottle as the edited reagent number. After the reagent return finished, press" STOP" and wait 30seconds while the "PUMP UP" performed to green, that could do other operations. Could input the reagent number again, Pump up and pump down the reagent.

Liquid valve Home、Air valve Home only for manufactory use.

Click the number button to edit the reagent bottle number and ENT to next steps. Click"

PUMP UP”,” PUMP DOWN”,” STOP”. Click” STOP «to stop all manual actions.

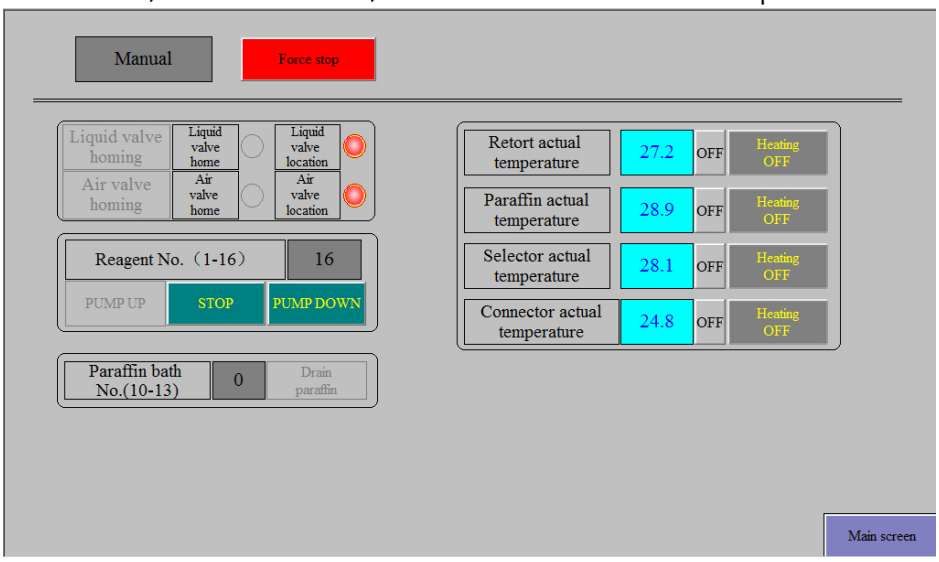
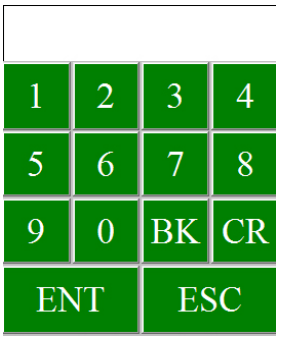



Fig 11




ig 12

Drain paraffin by manual mode：

*Click the “Paraffin bath” number and enter the wax cylinder number (no:10,12,13).

*Before start drain out, please must make sure the paraffin is melting enough, and the Temperature of valve, connector, retort bath all reaches to the set temp. If the temperature does not reach to set; the user could use manual mode to heat.

* Click Drain paraffin to return to wax cylinder as the set number

*Long press Need Clean 3 seconds to cleaning the retort bath, then go to next steps.

Friendly remind: Suggest the best way to save time

After the cylinder cleaning is completed, and the equipment returns to the standby state, start the manual heating, and timely discharge wax (because the wax is generally in the melting state at this time, which can save the preheating time of the melting wax and the retort bath).

Click Manual Heating Stop on the right side to switch between Stop and Start, and the heating status of each part can be manually controlled separately (Figure 13).

It is suggested that when the user needs to manually discharge wax, it is better to switch to the manual operation interface after the sample dehydration is completed,

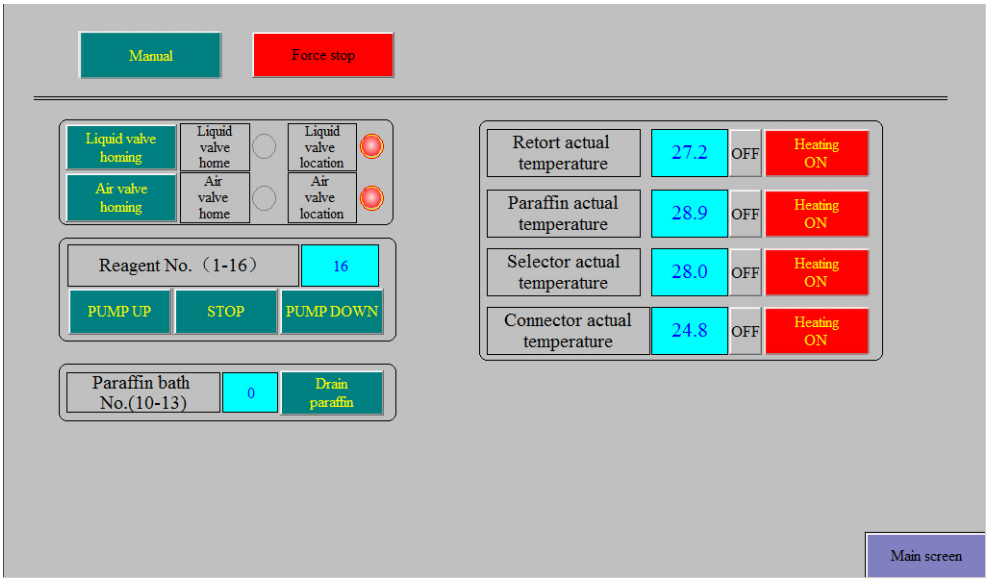



Fig 13

*If the over level alarm, the automatic running will pause and over level message remind on the main interface. Check the reagent and reagent number, retort bath, if everything is okay, that maybe alarm fault, so please enter into Manual mode to long press **Level OV alarm Reset** delete the alarm. If alarm still exists, please clean the level sensors, and press the Reset again. The program could continue to run while the Alarm disappears.

*If the reagent exceeds the limit level of retort bath, please enter into Manual interface to long press **Force Stop** for manual mode, PUMP DOWN the reagent return to the bottle and long press **Level OV alarm Reset** delete the alarm.

*If the paraffin exceeds the limit level, please manual pump down the paraffin or finished the procedure to click **Need clean.**

Click **Manual** back to Auto mode and main interface.

**Note：** When the tissue is dehydrated in order, the paraffin has entered the retort bath, while there is a long-time power failure, the paraffin has solidified in the retort bath already. After the power is on, press the **Force Stop** key to switch to the manual mode, manually start all the heating, and then after the paraffin in the wax cylinder and the retort bath has melted, manually complete the remaining wax steps, and take out the tissues, clean the bath.

6.2.2.5、Click program button and enter into the program interface (Fig 14). Click the clean reagent name to edit its name and time.

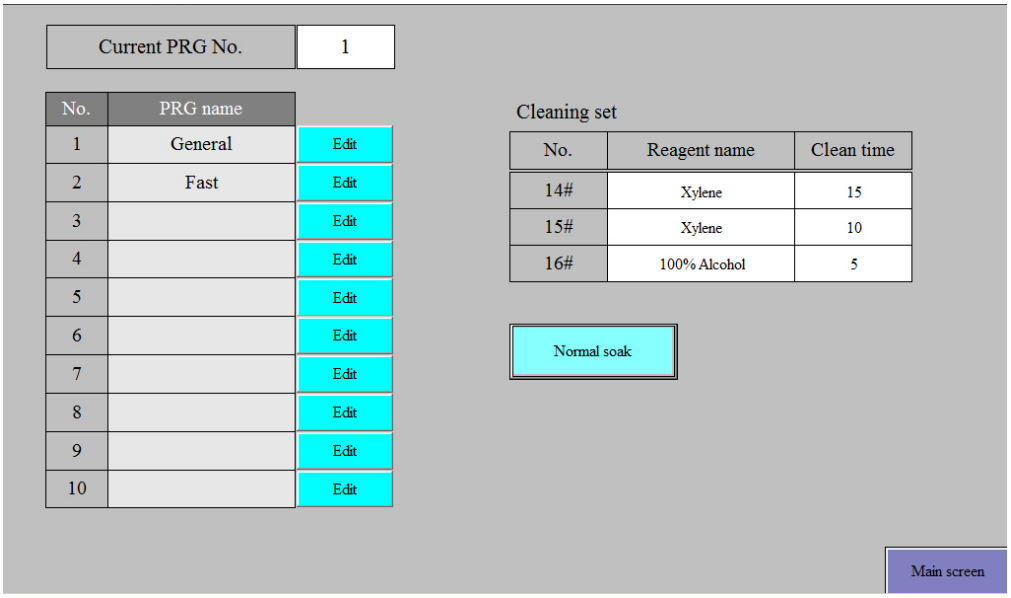
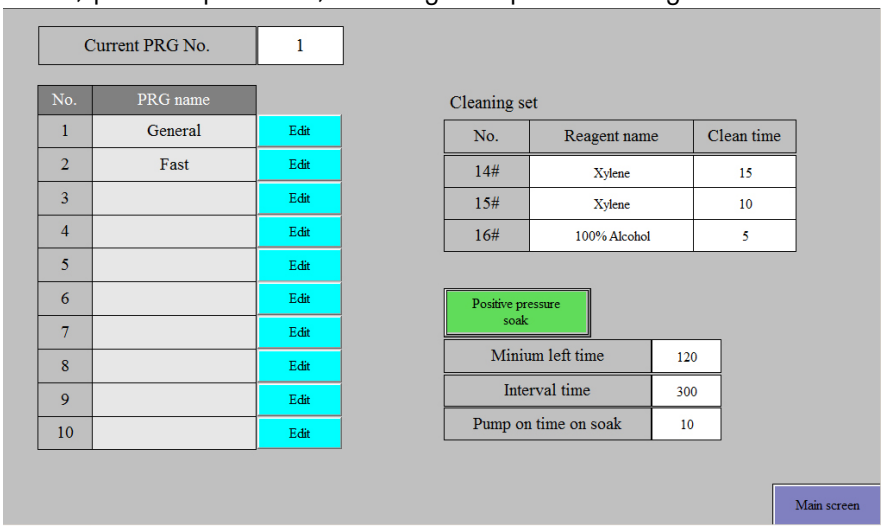



Fig 14

*Click the pressure button, and the dehydration mode can be switched between normal pressure, positive pressure, and negative pressure. Fig15



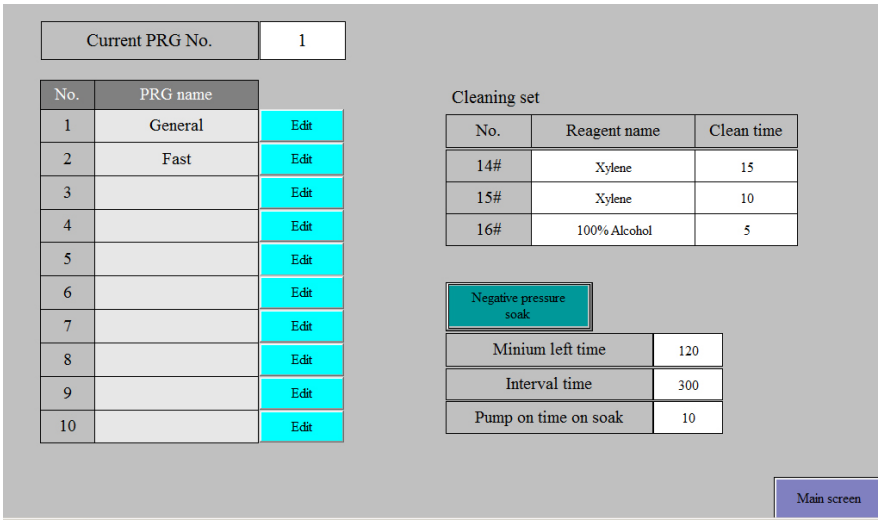
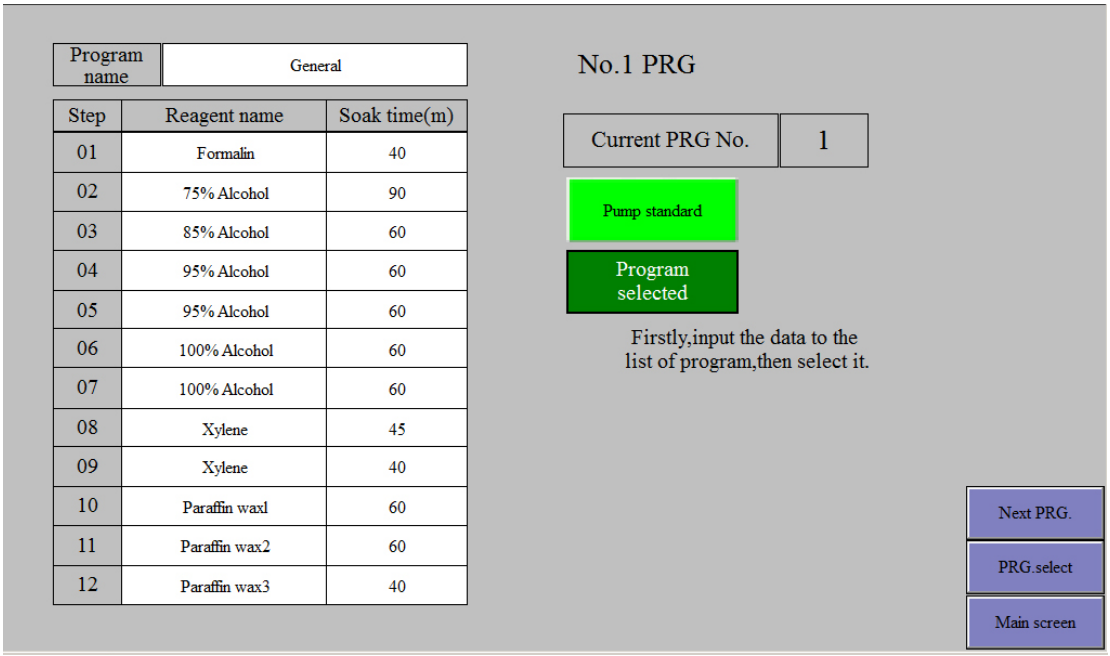




Fig 15

*Click the program edit(no:1-10) enter into the program.



| Program name | General |
|---|---|

| Step | Reagent name | Soak time(m) |
|---|---|---|
| 01 | Formalin | 40 |
| 02 | 75% Alcohol | 90 |
| 03 | 85% Alcohol | 60 |
| 04 | 95% Alcohol | 60 |
| 05 | 95% Alcohol | 60 |
| 06 | 100% Alcohol | 60 |
| 07 | 100% Alcohol | 60 |
| 08 | Xylene | 45 |
| 09 | Xylene | 40 |
| 10 | Paraffin waxl | 60 |
| 11 | Paraffin wax2 | 60 |
| 12 | Paraffin wax3 | 40 |

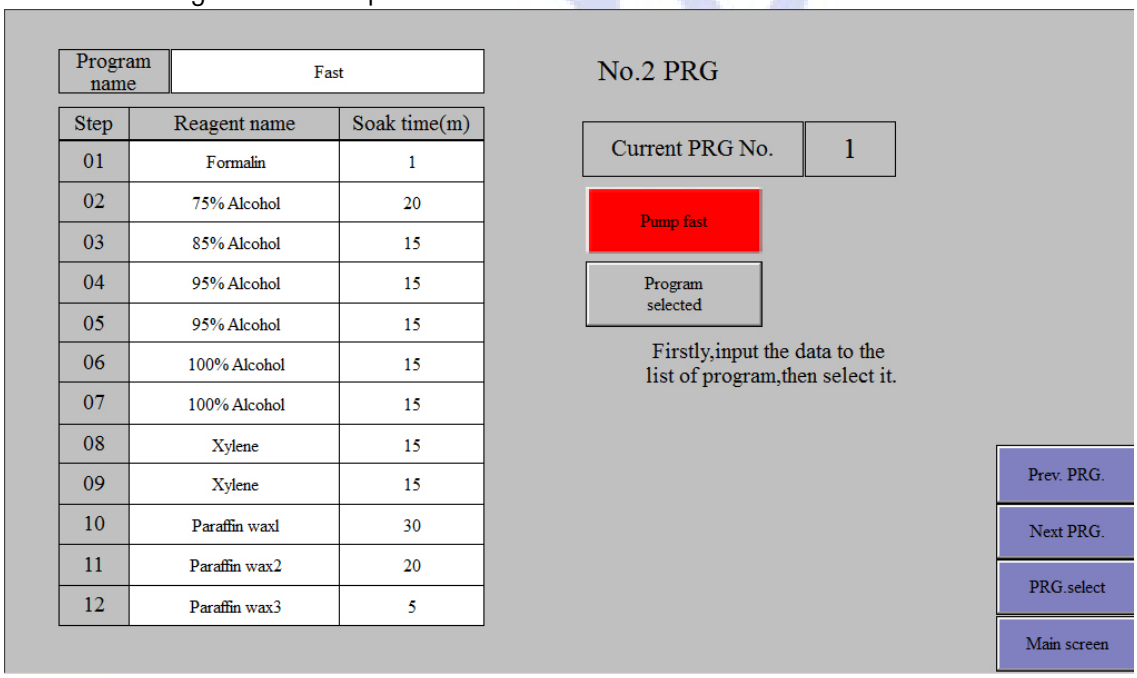


Fig 16

*Click the program name and reagent name area to change its name.

*Click the number to set the soaking time of each step, the unit is minute, range is 0-300 minutes. Figure 16 shows the reference procedure.

*Click **Standard processing** Switch to **Rapid processing**, and the specific status will be displayed in the system status area of the main interface after selection. After the program is edited, click the program selection button, and the current program will become the program selected during automatic operation.



| Program name | Fast |
|---|---|

| Step | Reagent name | Soak time(m) |
|---|---|---|
| 01 | Formalin | 1 |
| 02 | 75% Alcohol | 20 |
| 03 | 85% Alcohol | 15 |
| 04 | 95% Alcohol | 15 |
| 05 | 95% Alcohol | 15 |
| 06 | 100% Alcohol | 15 |
| 07 | 100% Alcohol | 15 |
| 08 | Xylene | 15 |
| 09 | Xylene | 15 |
| 10 | Paraffin waxl | 30 |
| 11 | Paraffin wax2 | 20 |
| 12 | Paraffin wax3 | 5 |



Fig 17

When other programs need to be run, click **Program Selection** return to the program selection interface (Figure 14), click the program editing to be run, enter the program editing interface (Figure 17), edit the program, and select the dehydration method (rapid or standard),

click **Program Selected** to set the program to be run as the current dehydration program, if only the saved program needs to be selected Order, click the next program key, find the program to run, and then click the program selection key. Figure 17 procedure is the reference procedure for rapid dehydration

6.2.2.6、Click the application setting button to enter the setting interface (Figure 18), set the user's local SMS center number (a mobile card needs to be configured) and the user's mobile number to receive the SMS. When the device fails, the fault information will be sent to the user's mobile phone in real time, to eliminate the fault in time and minimize the impact on the tissue (optional function)

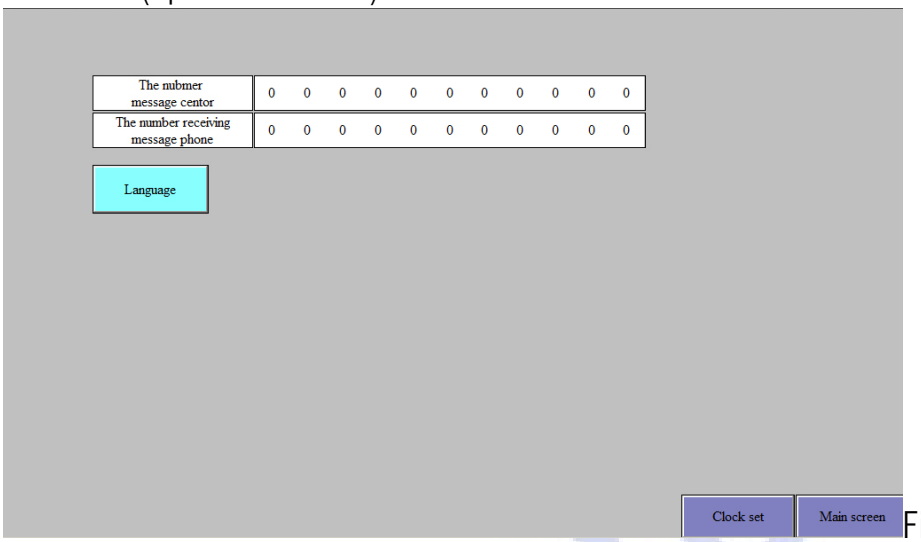



Fig 18

Click language selection in the figure to select the language version of the interface.

Click the clock setting in the figure to calibrate the system time according to the user's local time (Figure 19)

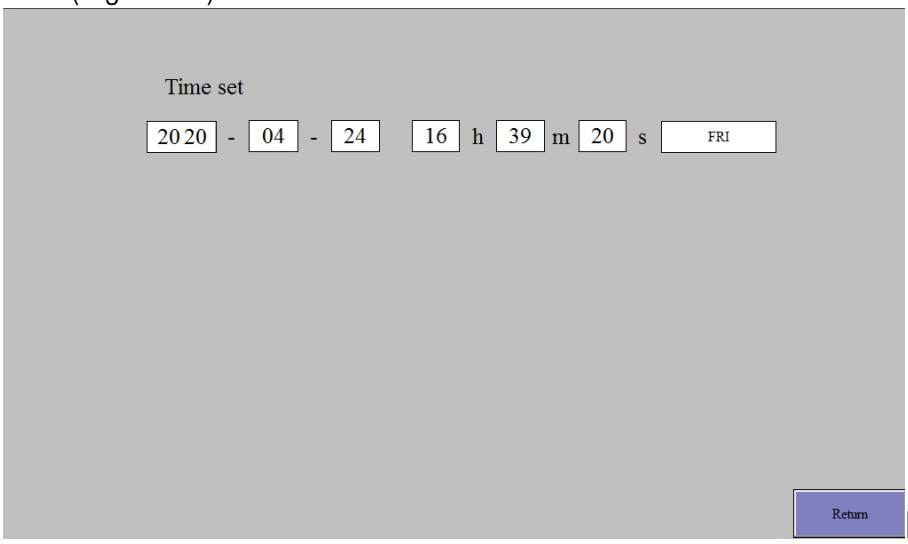



Fig 19

## 7.1 working principle

The machine has the function of selecting various solutions according to the requirements of tissue treatment. Among them, no.1-9 bottles are defined to store the solution for ordinary dehydration, No.10, No.12 and No.13 bottles are defined to store the paraffin, which is heated to the melting during operation, and no.14-16 bottles are defined to contain the cleaning solution.

During the automatic operation, according to the program set by the user, the solution is pumped into the Retort Bath according to the sequence set by the program. The tissue specimen to be dehydrated has been placed in the Retort Bath in advance, and the solution is stirred every few minutes to accelerate the dehydration of the tissue. After reaching the time set by the user, the solution in the Retort Bath is returned to the original bottle, and the machine automatically selects the next bottle of solution and pumps it up, so on Resume completion of dewatering.

After the ordinary solution of no.1-9 bottles is pumped into the cylinder, the temperature of the Retort Bath is controlled at about 30 degrees (settable); while after the paraffin solution of no.10-13 bottles is pumped into the cylinder, the temperature of the Retort Bath is heated to about 65 degrees, and the working temperature of no.14-16 cleaning solution is heated to 45 degrees left and right.

The setting time of each step is 0-300 minutes. When the time of a step is set to 0, the step is ignored during execution, and the next step is executed

## 7.2 Preparing

7.2.1、Fill in reagent and paraffin

According to the number of daily dehydrated samples, according to the reagents used in the dehydration procedure, add corresponding reagents (including paraffin) to each solvent bottle according to the number of reagents in the table below. It is recommended to add 500ml more cleaning reagent than dehydrating reagent. Do not bring things into the process of reagent filling, such as small plastic sheet for paraffin packing.

Sample quantity - reagent quantity table

| No | Loading Qty (Standard cassettes) | Basket | Reagent Volume (L) | Paraffin （Kg） | Paraffin （PCK） |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | | | | | 500g/PCK |
| 1 | 75-100 | 1 | 2.5L | 2.2 Kg | 4.5 PCK |
| 2 | 150-200 | 2 | 3.5L | 3Kg | 6 PCK |
| 3 | 225-300 | 3 | 4.5L (MAX) | 4Kg (MAX) | 8 PCK (MAX) |

**Note: it is recommended to add 500ml more cleaning reagent than dehydration reagent.**

After the reagent be filled into the solvent bottle according to the number, then put it into the corresponding bottle connector according to the number (table below). The area where the bottle is placed is divided into two layers, the lower layer is placed with 1-7 from right to left, and the upper layer is placed with 8-16 from right to left. Among them, No. 10-13 is the amount of paraffin.

: The reagent number should be as the same as that on the main interface.

| Carbon Filter | Collection Box | 16 | 15 | 14 | 9 | 8 |
|---|---|---|---|---|---|---|
| 7 | 6 | 5 | 4 | 3 | 2 | 1 |

Reagent Table

| No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Medium | Formalin-Fixed | 75% alcohol | 85% alcohol | 95% alcohol | 95% alcohol | 100% alcohol | 100% alcohol | xylene | xylene |
| No | 10 | 12 | 13 | 14 | 15 | 16 | | | |
| Medium | Paraffin | Paraffin | Paraffin | xylene | xylene | 100% alcohol | | | |

7.2.2、Reagent usage setting

In the main interface (Figure 20), click the used times to setup the input box. In the set times, you can set the maximum use times of reagent, detergent, and paraffin.

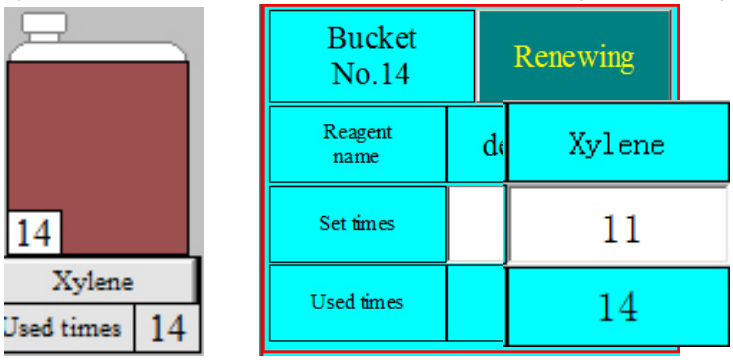



Fig 20

Reagent Bottle： When the used times exceed the set times, the used times flashes to alarm change. After the user changes to new reagent, click the **Renewing** button to clear the

used times, or operate the automatic change function to automatic change the reagent (Bottle No:2-7). After the changed, the used times will clear automatically

Cleaning： When the used times exceed the set times about clear bottle No 14, the message Replace reagent NO.14 will alarm user to renew. Please click Renewing button to clear the times number.

Attention:

* When the reagent concentration of No.14 is increased due to multiple use, the user needs to check the reagent 14 immediately and replace it in time. After renewing the reagent, press the reset button, and reagent 

14 will be loaded again until the alarm disappears, and the loading is in order before leaving.

*When the Paraffin bath exceed the used times, replace paraffin message to remind the user change the paraffin. Long press Replace paraffin in 3 seconds and wait 1 minutes, the program will automatically empty the No. 10 wax cylinder, and move the paraffin from the No. 12 wax cylinder to the No. 10 wax cylinder, the paraffin from the No. 13 wax cylinder to the No. 12 wax cylinder. The user only needs to place new wax in the No. 13 wax cylinder, and the alarm information on the main interface will be eliminated.

*The paraffin replacement function can only be carried out after the paraffin removal completely and takes out the specimen. If the user forgets to replace the paraffin in this warning, the user should wait next processing finished.

7.2.3、Confirm that the immersion time and dehydration mode, the selected dehydration procedure all be correct. And the procedure finished time is right and turn on it.

## 7.3 Processing Start

Put the basket into the retort bath, lock the handle, and click Immediate Mode or Timing Mode to set the operation mode. There are two modes of automatic operation. Immediate Mode or Timing Mode to switch.

Immediate Mode: immediately start work as selected procedure after the specimen is put in, and the actual completely time shall be displayed in the time zone.

Timing Mode: the procedure completed time be displayed in the time zone. start filling the solution from reagent no.1 and immerses the tissues to wait for the start until the waiting

end. While the running start, the solution back to reagent bottle number 1 and continue number 2 according to the procedure.

Long press the START button for 3 seconds, the program will enter the automatic operation mode (Figure 21). At the beginning, if it is found that the completion time is wrong, user can immediately enter the manual mode and press the Force Stop to interrupt the current program. After the completion of liquid back to bottle, user can switch to the automatic operation mode and reset the timing time

Attention： If the handle of the retort bath is not locked well, the main interface will send the alarm message while buzzer sound to remind the user to lock the lever.

**Notes: If the completion time set is less than the running time required for the procedure, the specimen dehydration will be completed according to the running time required, that is, the actual running time will display on the main interface.**

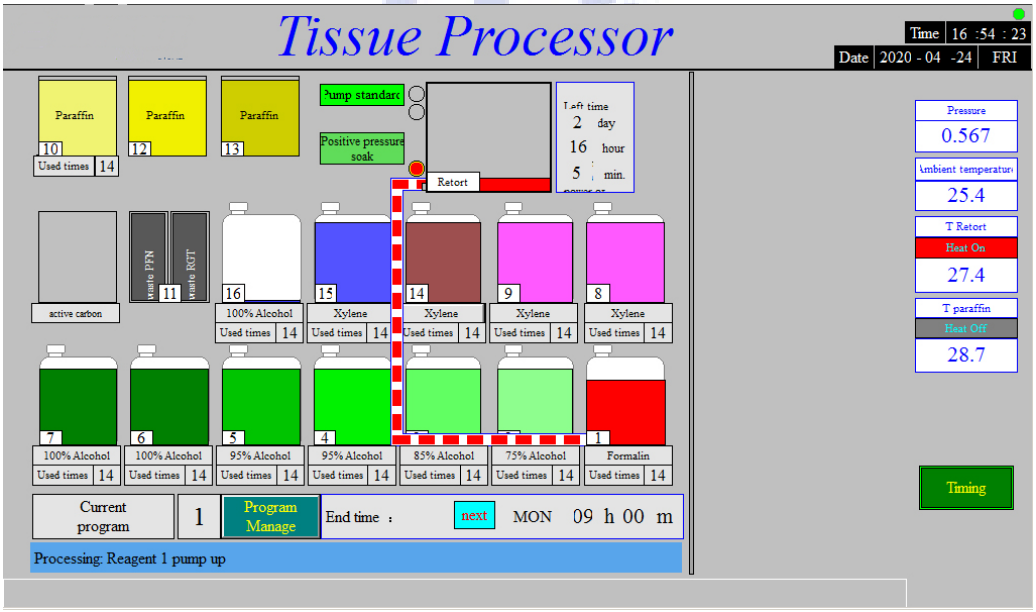



Fig 21

Automatic Running has two modes" Fast processing "and "Standard processing" for choice.

At Fig. 21, "Standard processing" and positive pressure mode are shown on the left side of the icon of the main interface studio, "Fast processing" is same issues.

The completed time shown is: AM09:00 next Monday.

After the automatic running, the system status display processing start running: The number 1 reagent is loading. Observe whether the solution on reagent 1 is worked in order. During the automatic operation, the main interface has a real-time display of the status in progress, and the user can track it at any time.

At this time, it can be observed that reagent 1 starts to fill into retort bath. The red figure in the icon indicates the moving.

When the liquid is drain back to the bottle, the indicator icon is opposite (Figure 21). The indicator light of low liquid level detection on the left side, and the real-time display on the right side of the studio icon.

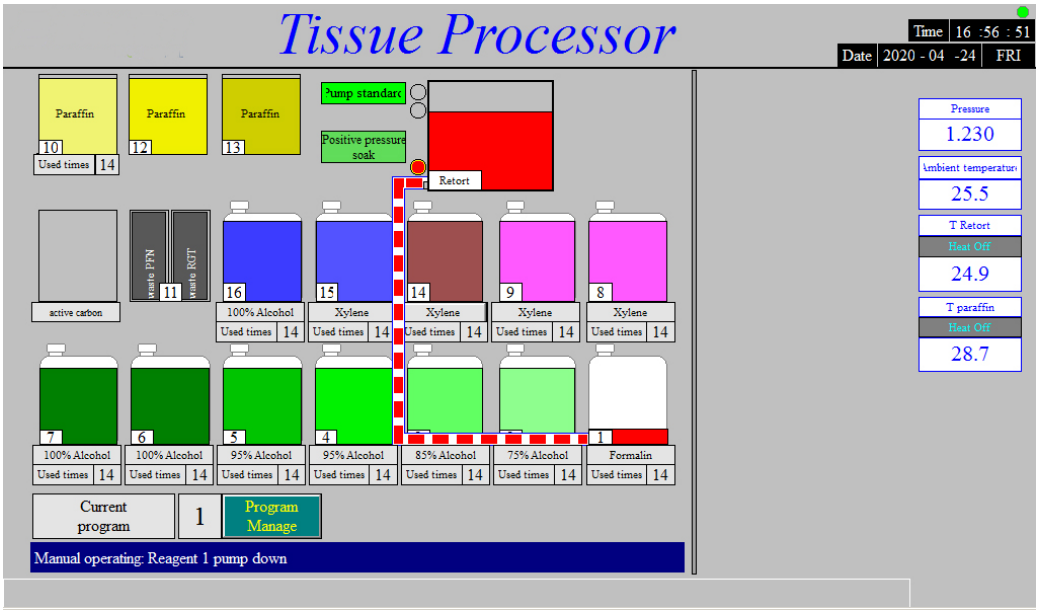



Fig 22

After the procedure finished, the message **PFN down** remind and long press **PFN down** 3s， the paraffin returns to the bath and remind to take the samples. After that, **Clean** come on and press **Clean** 3s to clean the retort bath.

After **Clean** button disappears, enter the cleaning procedure.

First, drain back the No. 3 wax again (drain the paraffin from retort bath to home). Then, clean it from No. 14, and the equipment will automatically return to the standby state after the cleaning is finished

## 7.4 Automatic liquid change (Optional)

When the used times of reagent 1-7 exceeds the set number, the automatic liquid change function can be used to save reagent and convenience the user using.

In standby status, click **Automatic liquid change / Reagent renew,** the interface shows the

setting screen of start and stop bottle number. Fig23

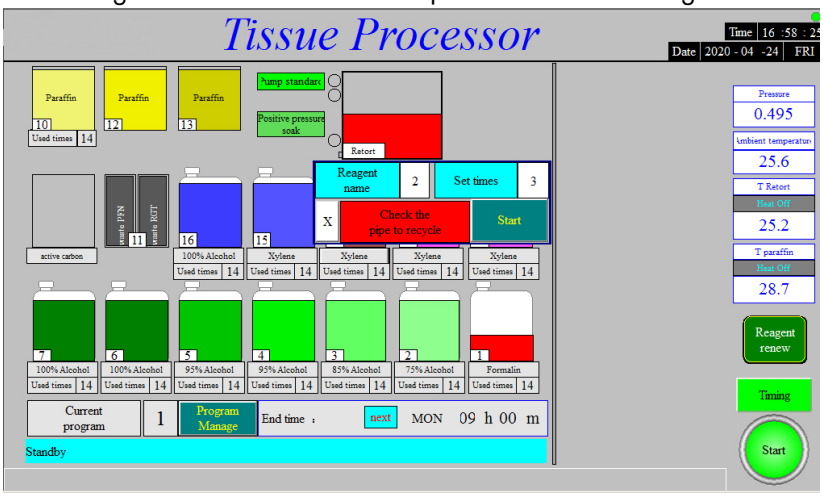
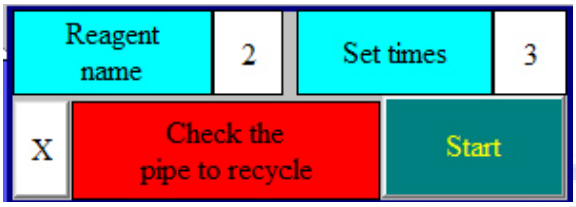



Fig 23

Click “Start” after the start number and stop number




The Steps of the automatic change：

Fill in from Reagent bottle 2（Fig 24），and drain out as Fig 25

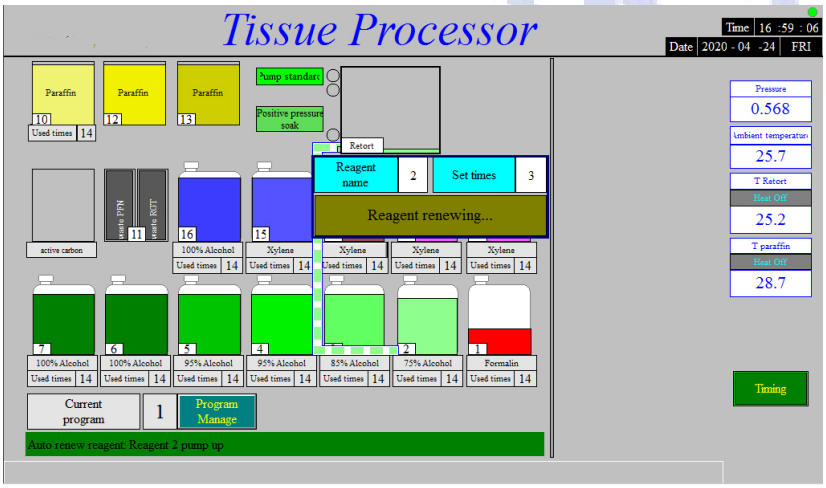



Fig 24

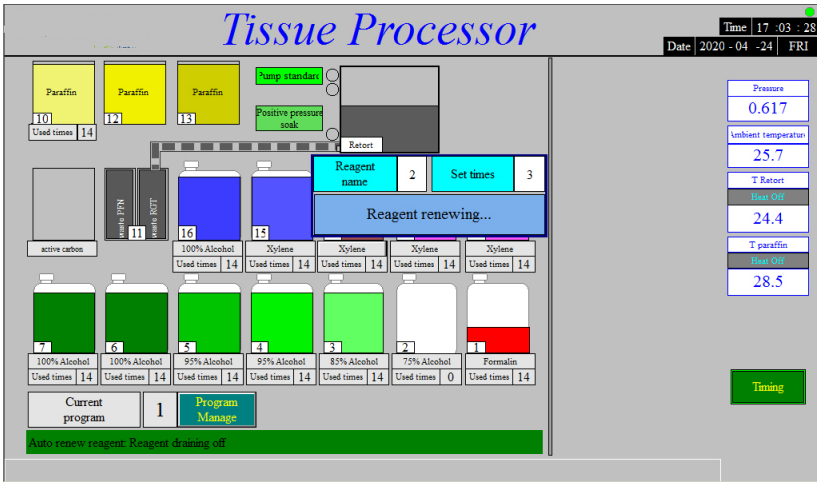



Fig 25

Fill in from reagent bottle 3, and then return the reagent to bottle 2, while reagent bottle 3 is empty, add new reagent manually in bottle 3 (Figure 26).

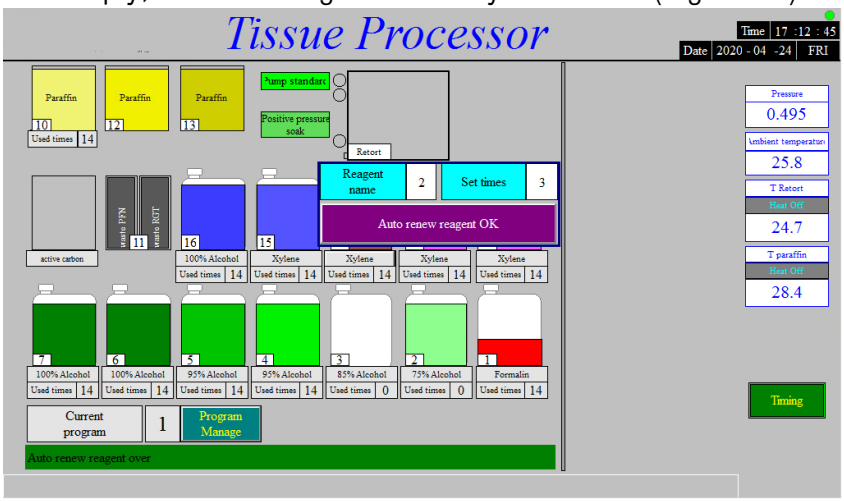



Fig 26

And so on. When the end bottle number is set to 7, the liquid change is finished. Just add new reagent into the 7 bottles.

Note: Normally, only gradient alcohol needs to be automatically rotated, set the start bottle number 2 and the end bottle number set 7.

## 7.5 Turn off operation

Turn off the power switch to the machine off, but must meet the following conditions:

7.5.1 It can be shut down safely in standby mode.

7.5.2 In the manual state, if the reagent has been loaded, you must press Pump Down to finish. The system will unload the liquid automatically and then return to standby mode. It can be safely shutdown at this time.

7.5.3 When in the automatic mode, it can be shut down only in standby mode.

## 7.6 Power off protection and accident protection

Power failure protection, the machine is equipped with good power failure and other unexpected protection measures, as follows:

7.6.1、In standby state and retort bath is cleared, if meet power failure happens, the system will be closed, but it will still in standby mode when the power on.

7.6.2、In setting state, if meet power failure, the system will not save the user program, and still enter the standby mode when the power is restored.

7.6.3、In manual state, if meet power failure, it will still in standby mode if the reagent does not load, if the reagent load already, they system still keep loading liquid state when the power on.

7.6.4、When it is automatic operation, the system will continue to work after power on.

7.6.5、Heating accident protection: The machine is equipped with 2 sets of insurance devices. One of it is PLC temperature control device,

Other one is the limiting temperature protector attached on heating area, once the PLC or control components is out of control, limiting temperature protector will do the protection control, the protecting temperature is 80 ℃.

7. 6.6、Over temperature protection function

*Running work in reagent 1-9, there is an over temperature alarm, the retort bath stops heating, the program continues to run to reagent 9, continues to soak for more than 30 minutes (the time can be set, the range is 30-300 minutes), reagent 9 returns to the bottle, and then fill the protects reagent (can be set to 3-7) and the program is pause.

After manual troubleshooting, press the alarm reset and the protect reagent return, The program starts from protecting reagent and continues to run program.

The user can press the forced stop key to directly return to the manual state.

*When it is running at No. 10, 12 and 13 wax cylinders, the retort bath stops heating, the program stops for manual troubleshooting, press the alarm reset, the program returns to the manual state, and completes heating, wax, cleaning, and other operations in the manual mode

*When its running at 14-16 cleaning reagent, the retort bath stops heating, the program continues to run until the end of cleaning. After manual troubleshooting, press alarm reset to return to standby mode.

8.1、The default set temperature of the wax cylinder and the retort bath should not be changed. If reduce the default temperature that may cause pipe blockage.

8.2、During the instrument is running processing, should observe the liquid pump in retort bath is in order before leaving.

8.3、After processing finished, please clean the retort bath in time.

8.4、It is better to wipe the remaining paraffin in the retort bath with a paper towel before cleaning.

8.5、The function of automatic paraffin replacement can only be used when automatic processing is running, the user completes wax removal and get the specimen, then press" Clean". If not clean, must wait for next processing finished.

8.6、When discharging wax manually, it is necessary to start the heating function of the retort bath, wax cylinder, distribution valve and joint manually, observe whether the temperature of each position reaches the set temperature, and wait for 10-30 minutes according to the melting of wax, then discharge wax manually, and clean the retort bath in time after the completion of discharging wax.

8.7、Before manual wax discharge or automatic paraffin replacement, please confirm that the drain box has been placed in right place. It is recommended to place a garbage bag in the drain box in advance to collection of waste wax or waste liquid.

8.8、Set the times of reagent used according to the sample quantity, and replace the reagent in time when the times of use alarm.

8.9、Change cleaning reagent frequently

8.10、Before start to work, observe whether the pressure value and temperature value on the main interface are in order.

8.11、The user shall pay attention to all red reminders in the screen, and specially remind that reagent 14 shall be replaced in time to prevent the normal use of the equipment from being affected due to the blockage of pipeline caused by unclean cleaning.

8.12、It is recommended that the user need clean and maintain the liquid system of the equipment every half a year, and use xylene to clean all reagent pipelines

8.13、When the interface appears "liquid way valve positioning fault" or "gas way valve positioning fault" due to fault in case of alarm information, to ensure the completion of

this procedure, the manufacturer can be contacted to enter the system maintenance interface and force the valve control system to return to zero. After returning to zero, the dehydration of current specimen can be generally completed, and then the cause of failure can be found.

## 9. Avoid

9.1、Open the package to check the appearance and attached accessories. Please read the operation manual carefully and operate after understanding.

9.2、In order to ensure personal and equipment safety, the machine must use 220V three wire power supply with reliable grounding device. It is forbidden to use the power supply without grounding wire or without grounding wire. When its running, do not open the unit housing at will to prevent electric shock.

9.3、When the instrument is working, the solution is inflammable. To ensure the personal and machine safety, please take necessary fire prevention measures.

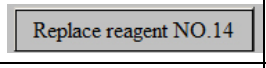
9.4、After taking out the specimen, press clean button on the main interface for automatic cleaning. During the cleaning process, it is necessary to manually operate and press the Force Stop to enter the manual state, and then manually operate and click the Need Clean button to clean the retort bath.

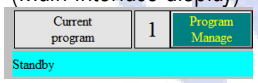
## 10. Trouble Shooting

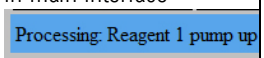
| Trouble | Reason | Solving Method |
|---|---|---|
| No display after power on | The power cord is not plugged in, or the socket is damaged after power on. | Plug in the power cord or replace the socket |
| | 10A fuse is open circuit | Replace fuse |
| | 24V switch power supply has no output | Replace switch power supply. |
| | | Open the lower rear cover plate to check whether the power module works normally and whether the main control PLC power wiring is loose. |
| Abnormal reagent up and down | Over liquid level alarm of retort bath: it means that the reagent in the previous step did not return completely, which caused too much liquid in the retort bath. | Enter the manual operation from main interface, long press the "forced stop" key, confirm the safety, press the "PUMP DOWN" key to return the liquid, after the liquid return is completed, please manually check whether the pipeline is blocked. |
| | Reagent bottle No. 1 cannot be pumped up or pump up is too slow: it means that the pipeline of reagent bottle no.1 is blocked, or the bottle is not inserted in place. | Take out the bottle, replace it with another bottle in xylene, and then manually pump up and down the reagent to clean No. 1 pipeline |
| | Reagent bottle No. 14 cannot be pumped up or pump up is too slow: The reagent in bottle No. 14 reagent (the first step cleaning solution) has been mixed with more paraffin wax after used many times, resulting in the increase reagent concentration, which has blocked the pipeline. | The reagent in the bottle must be replaced, and then the liquid can be loaded and unloaded manually |
| | Other bottles cannot be pumped up or pump up is too slow | Clean the pipeline according to the above method |
| Location fault alarm of gas-liquid distribution valve system: "Positioning fault of liquid way valve" or "positioning fault of gas way valve" | Open the protective cover of the liquid distribution valve and observe whether the indicator light of the photoelectric switch displays normally. | If one or two of the indicator lights are off when the dividing plate is rotating, it means that the photoelectric switch is broken. The photoelectric switch board needs to be replaced. |
| | | Check whether the synchronous belt and fastener of the pulley drive system are loose.<br>Please tighten the synchronous belt. |
| | Open the upper and rear cover plates and observe whether the photoelectric switch indicator light of the air distribution valve system displays normally. | If one or two of the indicator lights are off for a long time when the valve element of the air distribution valve is rotating, it means that the photoelectric switch is broken, and the photoelectric switch board needs to be replaced. |
| | | Check whether the coupling fastening screws of the motor part are loose. The rotating parts are blocked due to the increase of wear resistance |

| Trouble | Reason | Solving Method |
|---|---|---|
| All reagents cannot pump up and down | There is air leakage in the air system, or the micro air pump is broken, and the pressure value does not change significantly when the liquid is up and down. | Confirm whether the air pump can work normally. If the air inlet of the air pump is blocked or the air pump is damaged, the filter screen at the air inlet of the pump shall be replaced or a new pump shall be replaced. |
| | | If there is air leakage at the gas pipeline joint, the after-sales engineer shall check on site to see if there is air leakage at each gas pipeline joint and if the joint nut is loose. |
| | | The sealing ring of the retort bath head is aged and needs to be replaced. |
| | | Check whether there are any things at the sealing ring of the working cylinder head and clean it. |
| Good Operation but heating system does not heat | The slow melting of wax in 3 wax tanks (10, 12, 13) indicates that a heating piece of the wax tank is broken. | Need to replace the damaged heating plate |
| | Wax does not melt, no heating of the whole machine: | The bar connector of heating system is loose, or the solid-state relay is damaged. Check the connector or replace the solid-state relay. |
| | The temperature sensor is damaged, causing heating failure. | Check whether the temperature display value is normal. If temperature value is abnormal, replace the temperature sensor. |
| Abnormal sound during operation | Check the source of the abnormal sound. It is usually caused by the wear of the moving parts. | Contact the manufacturer to determine the cause of the fault. |
| Temperature value will display 0 or "XXX" | Communication interruption and ad board failure in control system | Check whether the communication cable and connector are loose or oxidized, causing abnormal communication |
| | | Replace AD board |
| There is no liquid in the retort bath, but display over liquid level alarm occurs | There is something stuck on the sensing light end of the over limit liquid level instrument. | After cleaning with alcohol, press the Liquid level alarm reset, and the alarm signal disappears. |
| | | If the alarm signal cannot disappear and the level gauge is broken, a new level gauge shall be replaced. |
| The pressure value is closed or more than 1.0 in standby mode | The pressure sensor is broken | Needs to be replaced. |

## 11. Summary of interface prompt or alarm information

| Item | Contents | Icons | Notes |
|---|---|---|---|
| Important Message | Change paraffin |   | Remind the user that the number of used times of No. 10 paraffin wax has reached the set maximum after the last wax change, and it is necessary to start the automatic wax change |
| | Replace reagent In bottle number 14 |   | Remind the user to replace No. 14 cleaning reagent in time and continue to use, which may cause blockage of reagent pipeline. |
| | The handle lever is not locked |   | Remind the user that the handle is not locked, and the program cannot continue to run when it runs automatically. After locking, the prompt message will disappear automatically. |

| | | | |
|---|---|---|---|
| | Liquid loading alarm | #Loading fault | A certain reagent is not loaded normally, the bottle may not be plugged properly, or its pipeline may be blocked. |
| | | #14 Loading fault | The solution on bottle 14 is not normal, the reagent needs to be replaced, otherwise the cleaning procedure cannot be operated. After replacing the reagent, press the reset key at the bottom right to refill. |
| | Liquid pump down alarm | #Pump down fault | A certain reagent does not return normally, and its pipeline may be blocked due to something. |
| Important alarm Message | Over level in retort bath |  | The reagent in retort bath has reached the upper limit liquid level, which may be caused by the remaining reagent in the last procedure, so it needs to be manually. There is something stuck on the front end of the liquid level instrument, which shall be wiped with alcohol. The liquid level gauge is broken. It needs to be replaced with a new one. Or false alarm. |
| | Positioning fault of liquid valve | Liquid V locate erro | Manual exclusion required |
| | Positioning fault of air valve | Air V locate error | Manual exclusion required |
| Status indication | Reagent Pump Up | | Reagent is pumping up |
| | Reagent Pump Down | | Reagent is pumping down |
| System status information | Standby | status bar<br>(Main interface display)<br>  | Display the current working status of the device |
| | Processing | | |
| | Cleaning... | | |
| | Change Paraffin... | | |
| | Wax change completed, please clean | | |
| | Manual Operation | | |
| | The liquid level exceeds the limit, needs to be reset and cleaned | | |
| | Manual cleaning required | | |

| Item | Contents | Icons | Notes |
|---|---|---|---|
| Operation status information | Reagent 1 pump up | Processing status in main interface<br>  | Display the current working status of the device |
| | Reagent 1 soaking | | |
| | Timing wait | | |
| | Reagent 1 pump down | | |
| | Reagent 2 pump up | | |
| | Reagent 2 soaking | | |
| | Reagent 2 pump down | | |
| | ..... | | |
| | Reagent 9 pump up | | |
| | Reagent 9 soaking | | |

| | | | |
|---|---|---|---|
| | Reagent 9 pump down | | |
| | Retort bath heating up | | |
| | Paraffin 1 pump up | | |
| | Paraffin 1 soaking | | |
| | Paraffin 1 pump down | | |
| | ..... | | |
| | Paraffin 3 pump up | | |
| | Paraffin 3 soaking | | |
| | Processing finished, paraffin pumping down | | |
| | Paraffin 3 pump down | | |
| | Paraffin pump down needs cleaning | | |
| | Cleaning 1 pump up | | |
| | Cleaning 1 soaking | | |
| | Cleaning 1 pump down | | |
| | ..... | | |
| | Cleaning 3 pump up | | |
| | Cleaning 3 soaking | | |
| | Cleaning 3 pump down | | |

## 12. After sale service

Our commitment: Once the products are sold out, we will provide lifelong service for the users. Once the products have equipment fault when using in the correct way, our legitimate dealers will be responsible for repairing the products. We will provide free service within one year. The maintenance of this product needs to be equipped with professional knowledge and skills, kindly remind the users do not repair the products by yourself.

## 13. Transportation and storage

（1）Transportation: Without the crash of the direct rain or snow, the products after packing can adapt to different kinds of transportation mode.

（2）Storage: The products after packing can be stored under （0～40）℃. Under the

condition of no acid, alkali and no corrosive gas, the products can be stored.

Thank you for purchasing LTF series vacuum Tissue Processor produced by our company. This instruction will help users to master the correct way of using this product. If you need any help, please contact us any time.