



AUTO CHEMISTRY ANALYZER

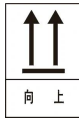
BANA-806

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1. Safety Symbol

Various safety symbols are used in this user manual and the analyzer to remind you of taking care. As shown in the following table :

Symbol	Implication	Description
	Caution	When seeing this mark, it is necessary to consult the user manual to ascertain the nature of the potential hazard and any action that must be taken. Do not open the cover or touch the parts near the warning mark when the device is running. If you do not follow the instructions in the user manual to use the device, the protective measures provided by the device may fail.
	Biological infection risk	Used for reagent&sample probes and waste drains. Indicate a risk of biological infection, and if not followed, there may be a risk of biological infection.
	Protective conductor terminal	For internal and external grounding. Please ensure that the instrument is well grounded.
	Manufacturer	On the nameplate. Indicates manufacturer information.
	Operator's manual	Identify the location where the operator's manual is stored or information that relates to the operating instructions. Indicate that the operating instructions should be considered when operating the device or control close to where the symbol is placed.
	In vitro diagnostic instrument	On the nameplate position. Indicates that the medical instrument is an in vitro diagnostic medical instrument.
	European Authorized Representative	On the nameplate. Represents the authorized representative of the European Union.
	CE mark	On the nameplate. Indicate that this medical device has been assigned to class A according to Annex II + Annex III + Article 17 of IVDR (EU) 2017/746.
	This way up	Indicate correct upright position of the transport package.
	Fragile	Contents of the transport package are fragile therefore it should be handled with care.
	Keep away from rain	Transport package should be kept away from rain.
	Do not roll	Transport package should not be rolled.

	Do not stack	Stacking of the transport package is not allowed and nothing can be placed on the transport package.
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Table 1

2. Main Introduction

Semi-auto Chemistry Analyzer is a microcomputer-based in-vitro diagnostics instrument that gathers optics, mechanics and automation control. It is used together with the related reagents for quantitative determination of biochemical items, widely applied to hospitals and research institutes, with the characteristics of high precision, excellent repeatability, with LIS software, etc.

2.1 Configuration and Structure

It mainly consists of control system, incubation system, optical and measuring system, peristaltic pump suction system, built-in thermal printer, etc.

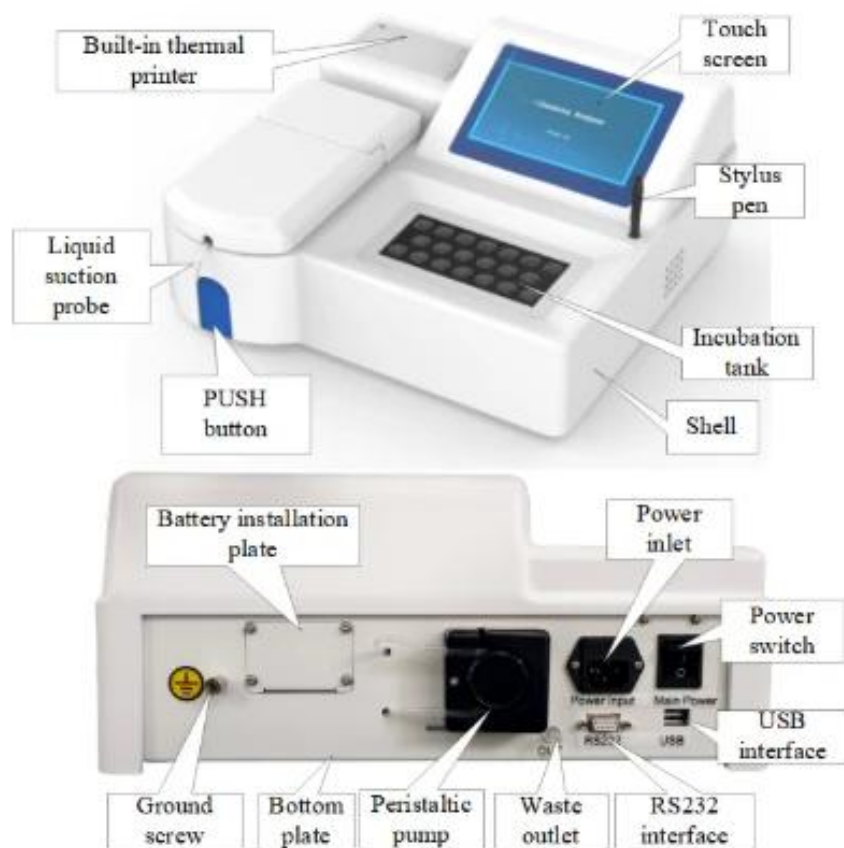


Figure 1

2.2 Main Technical Parameters

Technical parameter		Standard specifications	
Cuvette	Type of cuvette	Flow through direct-reading cuvette	
Incubator	Incubator position	20 pcs	
	Temperature control	R.T., 25.0°C, 30.0°C, 37.0°C	
	Accuracy of temp control	± 1°C	
	Temperature fluctuation	± 0.4°C	
Photometric System	Light source	6V, 10W halogen lamp	
	Wavelength of transmitted light	340/405/450/510/546/578/630nm wavelength, with two expandable positions	
	Accuracy of wavelength	±2 nm	
Measuring System	Measuring range	0~3.500 OD	
	Linear range	±2% from 0 to 2.500 OD	
	Aspiration accuracy	±0.02 OD	
	Zero drift	Less than 0.005 OD	
	Accuracy of linear aspiration	0.2~0.5 OD	±5%
		0.5~1.0 OD	±4%
		1.0~1.8 OD	±2%
	Repeatability of aspiration	Coefficient variance(CV) ≤1.0%	
	Analysis method	End point method, fixed time method (two-point method), kinetic method (rate method), etc.	
Instrument	Type of display	Touch screen	
	Type of printer	Built-in thermal printer	
	Interface	RS-232, USB	
	Machine weight	9kg	
	Gross weight	12kg	
	External size (W*D*H)	400mm*410mm*190 mm	
	Package size (W*D*H)	520mm*490mm*330 mm	
Installation and storage	Power supply	AC100-240V, 50Hz/60Hz	
	Storage and usage requirements	Storage: -10°C ~ 40°C, < 85%RH, Working: 15°C ~ 30°C, 40%RH ~ 85%RH, Altitude: Below 2000m	

Table 2

3. Installation

The installation and operation of this instrument is simple and easy to operate. In principle, no engineer is sent to install. Before leaving the factory, commissioning and calibration by professionals, after the customer receives the instrument, install it according to the requirements of this chapter.

Attention :

Violation of the installation in this chapter may cause problems or damage the instrument. Such problems or damages are not covered by the free warranty.

3.1 Requirement of Installation

Before the installation, the user and engineer must check and confirm that the lab meets the requirements of space, power supply and working environment, etc.

3.1.1 Space requirements

To ensure enough space for releasing heat, repairing, maintenance, keeping the pipeline not squeezed and ensure the fluid can flow freely, the space must meet the requirements as follows:

- Keep the analyzer at less than 100mm distance from the wall and other objects for each side (left, right and back).
- Provide enough space close to the instrument to place containers of pure water and waste.

3.1.2 Power requirements

Power supply: AC100-240V, 50Hz/60Hz.

Power socket: A well-grounded socket within one meter of the instrument.

Attention :

- The power supply socket should be within 1m from the analyzer in order to disconnect the plug timely when an accident happens.
- Check if network voltage is the same with the analyzer voltage.

3.1.3 Environmental requirements

- Working temperature: 15°C ~ 30°C
- Working humidity: 40% ~ 85%
- Working atmospheric pressure: 86.0kPa ~ 106.0kPa
- Fuse: F3AL250V(5*20mm)
- Input power: 150VA
- The environment should be in a quiet and clean room and keep away from dust, noise, big equipment (X-ray machine, CT, centrifuge, etc) and radio interference.
- Avoid direct sunlight and ultraviolet rays and keep away from hot and cool sources and outlets of air conditioning.

3.1.4 Computer configuration requirement

The semi-auto chemistry analyzer is equipped with a semi-automatic data management software, which is convenient for users to transfer data to the LIS system. Users need to contact our customer service center to obtain this semi-automatic data management software and install it on a computer that meets the following requirements.

Computer host configuration requirements:

- It must be a branded machine with a CPU frequency of $\geq 2.8\text{GHz}$ or above, a hard disk of 80G or above, a partition ≥ 2 (C, D...), a memory $\geq 2\text{GB}$, and a stable USB interface.
- Install Windows 7 and above operating system, 32-bit or 64-bit version, Microsoft.NET Framework 4.0 and semi-automatic data management software, and Microsoft Office Access software is recommended to install.

The display configuration requirements:

- 17 inches or more, the resolution is not less than 1366*768.

3.2 Unpacking

3.2.1 Unpacking steps

After the analyzer arrives, please carefully check the package to see if there is any damage, such as broken, wet or polluted. If there is, please contact our company.



Figure 2

After confirming that there is no external damage, open it by following steps:

- Open the box and according to the accessories list to check whether the object is complete, if missing, please contact our company.



Figure 3



Figure 4



Figure 5

- Carefully check the appearance of the instrument, if damaged, please contact our company timely.
- Check whether the ex-factory number or serial number is in accord with the package.
- As shown in figure below, open the operation window and pull out and adjust the suction probe.

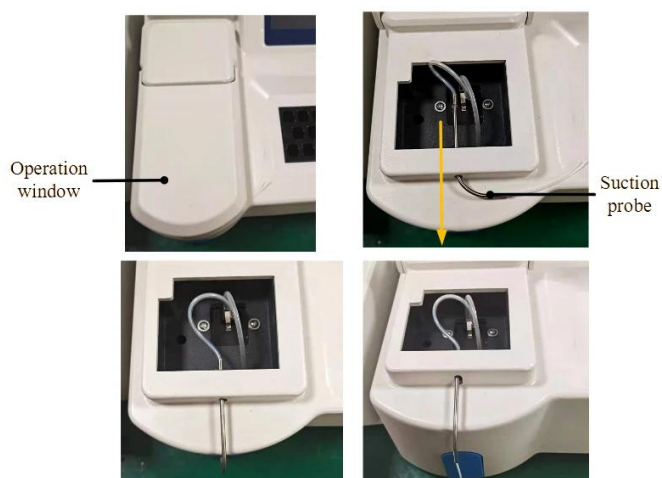


Figure 6

3.3 Installation Steps

1. Place the instrument on a stable worktable.
2. Take out the power cable and outlet pipe from the accessory box, connect the power cable to the designated power supply according to the following figure, plug one end of the outlet pipe into the out joint and plug another end into the waste container. The instrument connects to a computer with a serial cable to use the LIS function. (Contact our customer service center for details.)

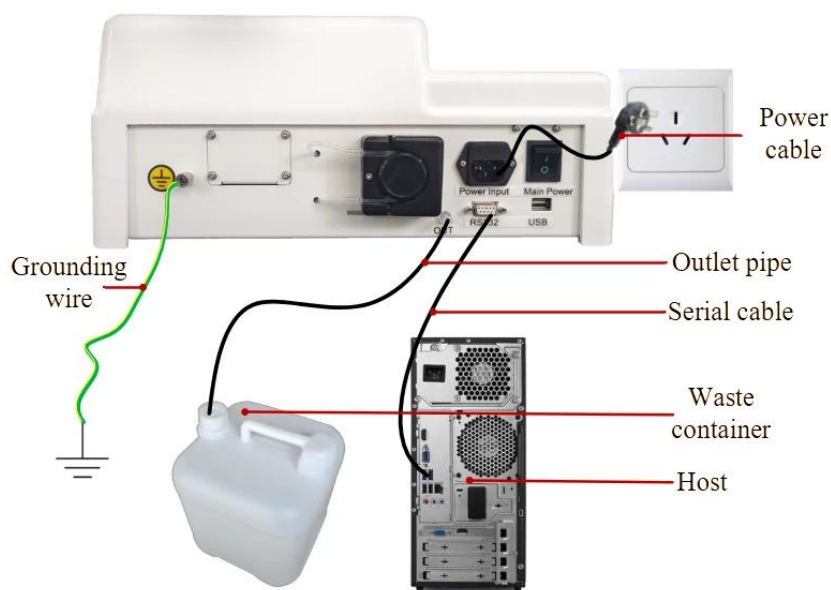


Figure 7

3. Switch on the main power before testing. ("|" means connected, "O" means disconnected.)
4. Install the thermal printing paper shown like below :



Figure 8

Open the printer cover by turning up the "Fastener" in the upper right corner of the printer.

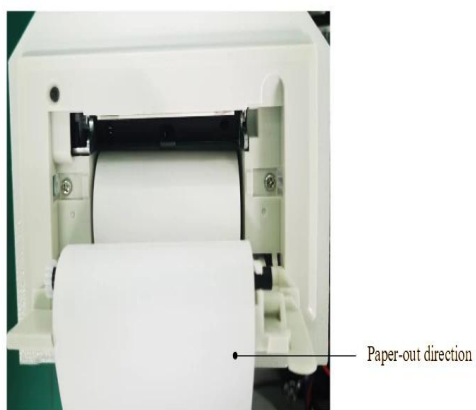


Figure 9

Load the printer paper into the paper slot and pay attention to the installation direction of the printer paper.



Figure 10

Put the paper to the feeding form and close the cover.

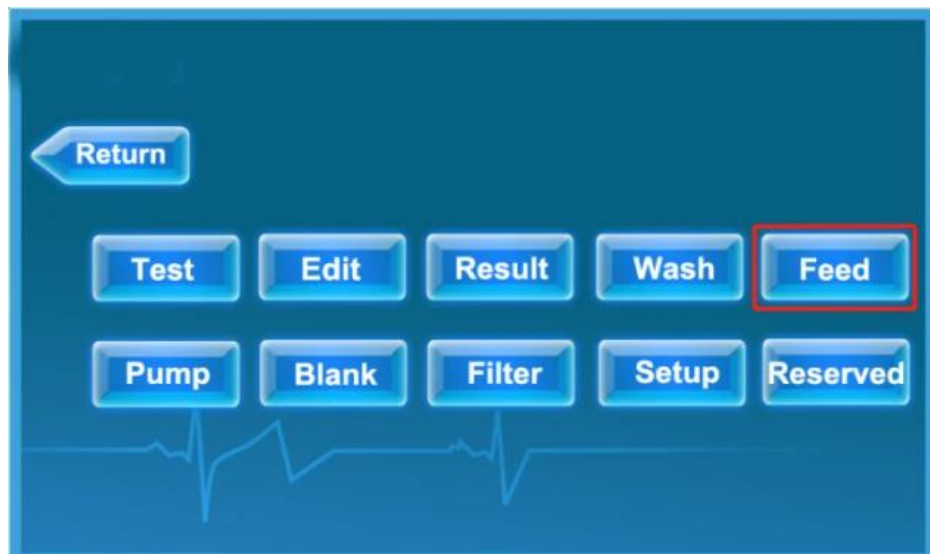


Figure 11

- Click [Feed] on the main menu, make sure the paper is running properly.



Attention :

- When installing the thermal printing paper, pay attention to the direction of the paper.
- Before installing the printing paper, do not print, or else it would result in a system crash.
- The suction probe or waste fluid joint may carry some serum, reference substance, calibrator or reagent, which is of potential biological risk. Therefore, do not touch the probe directly with your hands to avoid danger.

3.4 Installation and Use of Semi-automatic Data Management Software

Contact our customer service center to obtain [Semi-automatic data management software].

[Semi-automatic data management software] can obtain the internal data of the instrument online, can edit the sample information and bind with the test results, can view and print the test items and results of the sample.

Note:

The semi-automatic data management software must be installed before using the LIS function.

3.4.1 Installation

Contact our customer service center to get the software, and double-click "Semi Automatic.exe" to complete the installation.

3.4.2 Confirm the port number

Right-click on [My Computer]-[Computer Management]-[Device Manager] to view the COM number of the serial cable connected to the instrument (note: if the port is not found in the device manager, just plug and unplug the serial cable again).

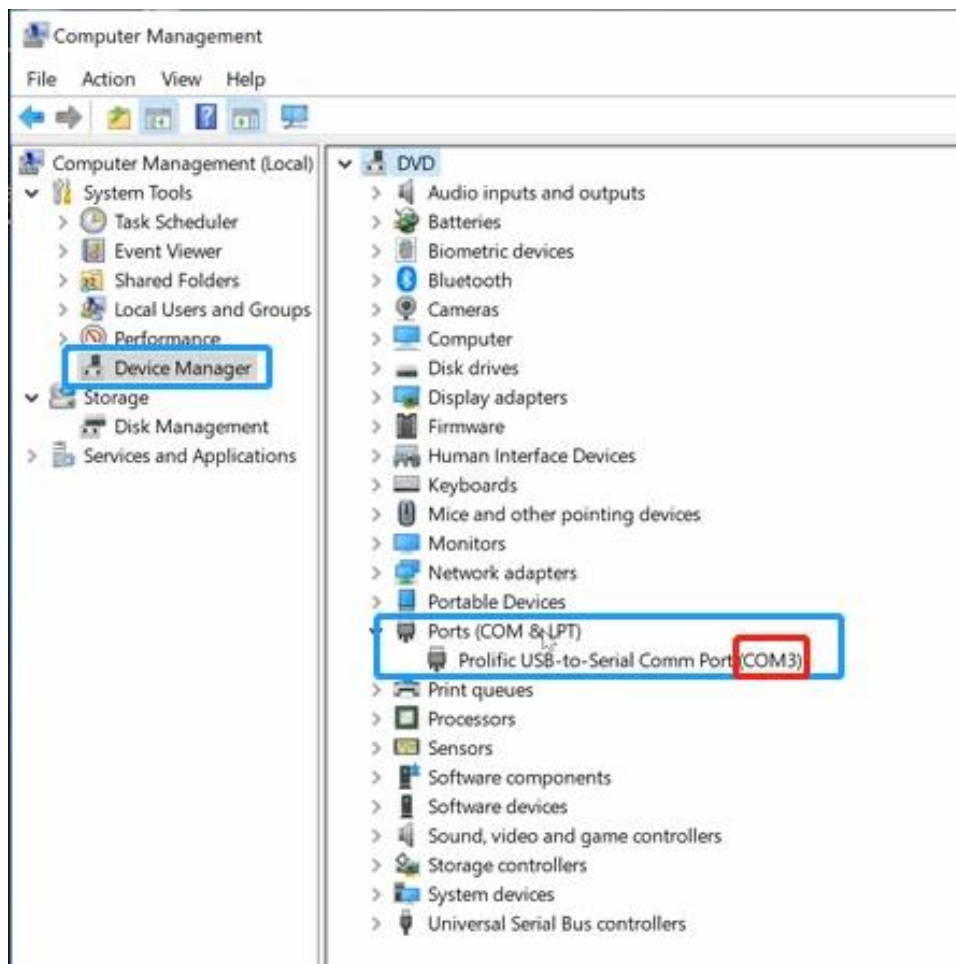


Figure 12

3.4.3 Go online and get data

After opening the LIS software, select the port number and click [Open] which then would show "Open successfully!", which means the connection is successful.

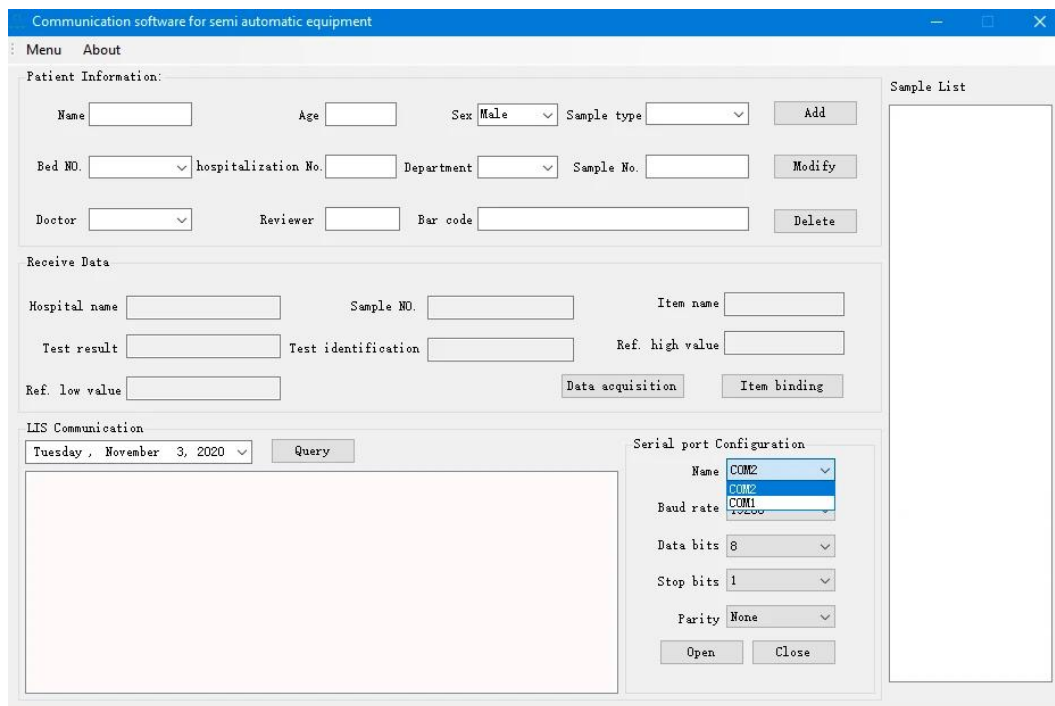


Figure 13

After the connection is successful, click [Data acquisition] to obtain the internal database of the instrument.

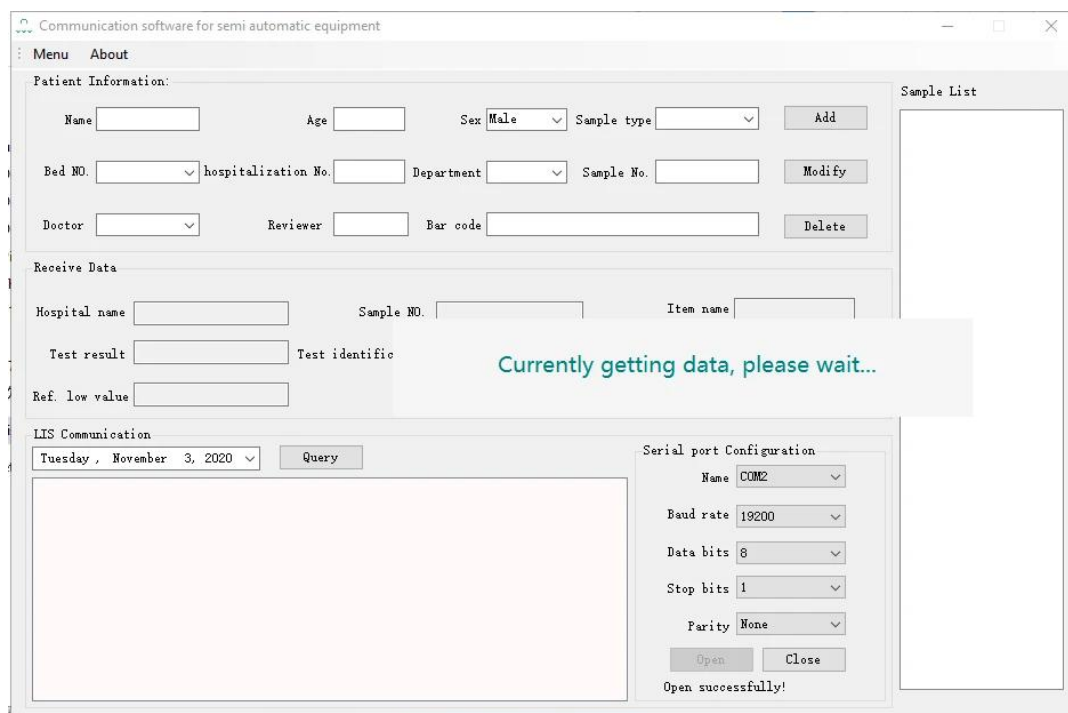


Figure 14

After selecting the test date and clicking [Query], all test results of the day would be automatically filtered out.

Communication software for semi automatic equipment

Menu About

Patient Information:

Name: Age: Sex: Sample type:

Bed NO.: Hospitalization No.: Department: Sample No.:

Doctor: Reviewer: Bar code:

Receive Data

Hospital name: Sample NO.: Item name:

Test result: Test identification: Ref. high value:

Ref. low value:

LIS Communication

Friday, September 25, 2020

September 2020						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

Today: 11/3/2020

Serial port Configuration

Name:

Baud rate:

Data bits:

Stop bits:

Parity:

Open successfully!

Sample List

1
2
3
4
5

Figure 15

Click [Add] to automatically generate a sample number, enter patient information on the left, and click [Save] to save the sample information.

Communication software for semi automatic equipment

Menu About

Patient Information:

Name: Age: Sex: Sample type:

Bed NO.: Hospitalization No.: Department: Sample No.:

Doctor: Reviewer: Bar code:

Receive Data

Hospital name: Sample NO.: Item name:

Test result: Test identification: Ref. high value:

Ref. low value:

LIS Communication

Friday, September 25, 2020

hospital1	02	2	w	0.0000	0.0000	g/dL	0.0000	0.0000	20-09-25
hospital1	02	3	GLU	0.0000	0.0000	g/dL	0.0000	0.0000	20-09-25
hospital1	02	4	GLU	0.0000	0.0000	g/dL	0.0000	0.0000	20-09-25
hospital1	02	5	GLU	0.0000	0.0000	g/dL	0.0000	0.0000	20-09-25

Serial port Configuration

Name:

Baud rate:

Data bits:

Stop bits:

Parity:

Open successfully!

Sample List

1
2
3
4
5

Figure 16

After selecting a sample, click to select the test result, and click [Item binding] to bind the test result to the sample information, as shown in the figure below, displaying "Successfully added item for sample!" which means that the test result is successfully bound.

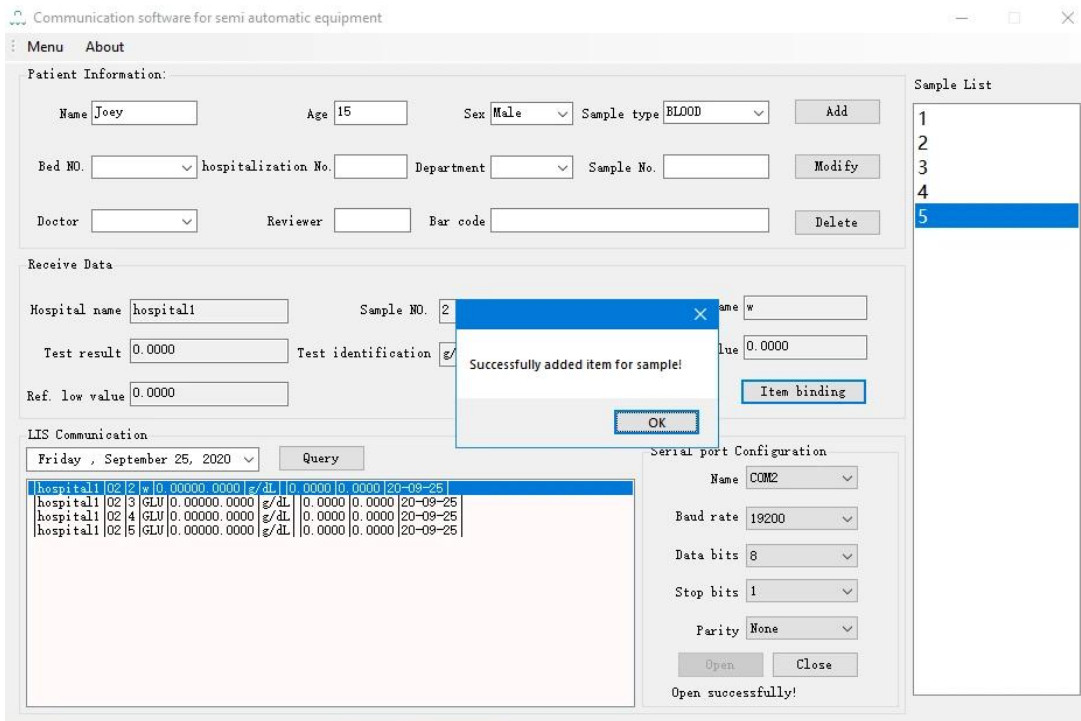


Figure 17

In the [Sample List] column, double-click a group of samples to pop up all the test items and results of the sample, click [Preview] to preview the report printing results, and click [Print] to print the report of the group of samples.

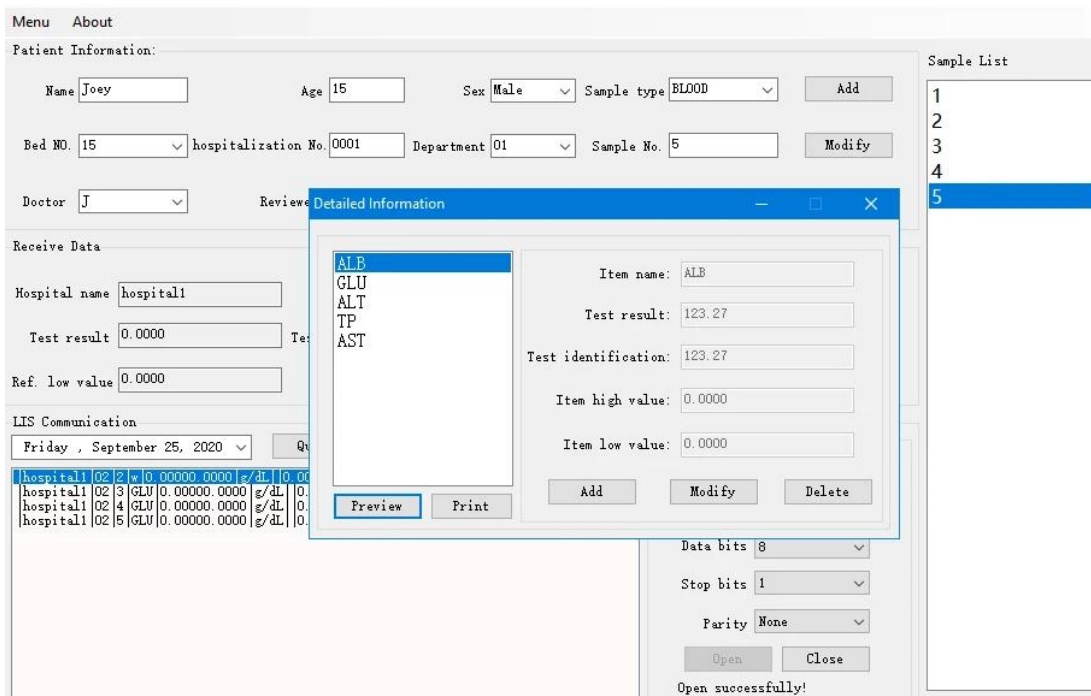


Figure 18

4. Main Menu Functions

4.1 Working Principle

The principle of analyzer is based on Lambert-Beer Law.

4.2 Introduction of Main Menu Functions

Turn on the instrument, the interface looks like the left figure. Click on the screen, it would enter function menu as shown in the right figure:

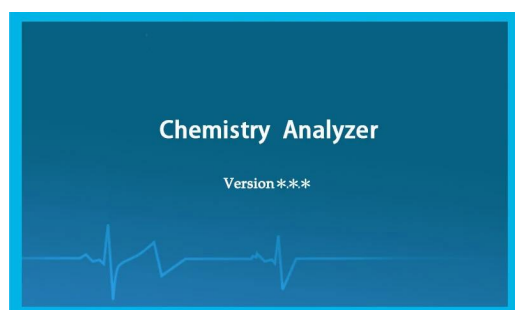


Figure 19

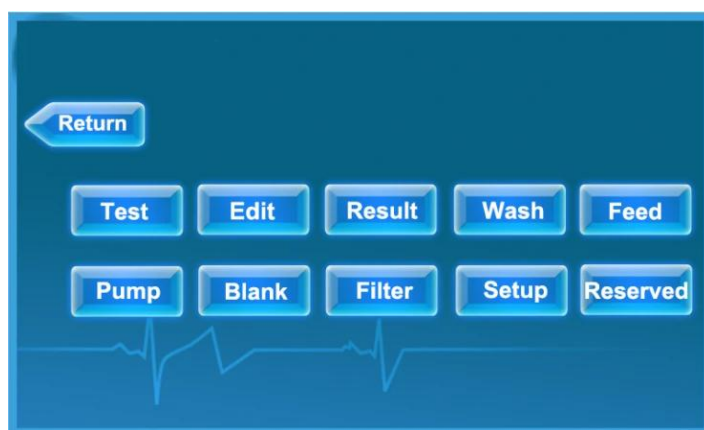


Figure 20

The menu functions are shown in the table. Touch screen to select the functions you need and enter the sub-menu.

No.	Menu name	Function	Operation
1	Test	Select the program to do sample test, after testing, the instrument would show the test results and print it automatically.	See 5.2.3
2	Edit	Add, modify, delete or print test programs.	See 5.1.6
3	Result	View, delete and print the sample and QC test results.	See 5.2.4
4	Wash	The shortcut key for cleaning, aspiration volume is 1.5ml per keystroke, used to clean cuvette.	See 5.2.2

5	Feed	The printer automatically feeds and prints a blank piece of paper.	See 6.3.2
6	Pump	Calibration for Peristaltic pump aspiration volume.	See 5.1.5
7	Blank	AD check to confirm whether the instrument is in the regular test status.	See 5.1.4
8	Filter	Measure and adjust each filter's AD value, blank value and absorbance.	See 5.1.3
9	Setup	Display temperature of cuvette and incubator, print settings, standby settings, screen brightness settings, time format and date/time settings, hospital settings, view version information, etc.	See 5.1.1
10	Reserved	Contains settings for temperature calibration, aspirate format, plate calibration, etc.	See 4.1.2

Table 3

5. Operations

5.1 Parameter Setting

Proper parameter setting is the basic step before the daily testing. Only when the parameters are correct and reasonable can the instrument get accurate results. Parameter setting is mainly used to set parameters of temperature, aspiration, filter, program and other system parameters.

5.1.1 System settings

Click [Setup] on the main menu to enter the sub-menu [System Setup].



Figure 21



Figure 22

The user can click the key shown above to enter the sub-menu for checking or setting corresponding system parameters. After changing the parameters, click [System Setup] for return, pop up the interface shows like that, click [YES] to save changes.

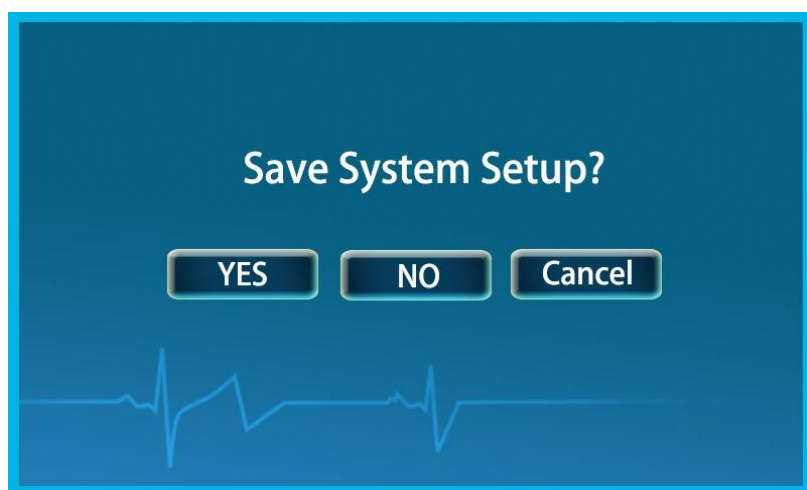


Figure 23

1. Temperature display

Click [Temp Display] on the [System Setup] menu to enter the interface as shown below. The interface displays the preset and real-time temperature of the cuvette and incubator measured by thermal sensor. The cuvette can be preset to four temperature levels. Note that when the room temperature is higher than the preset temperature, the temperature preset function would be invalid. Please adjust the room temperature first.

The interface shows a 'System Setup' menu with a 'Temp Display' section. It contains two rows of data: 'Cuvette' and 'Incubator'. Each row has two columns: 'Preset' and 'Measured'. The 'Cuvette' row shows '37.0 °C' for Preset and '37.1 °C' for Measured. The 'Incubator' row shows '37.0 °C' for both Preset and Measured.

	Preset	Measured
Cuvette	37.0 °C	37.1 °C
Incubator	37.0 °C	37.0 °C

Figure 24

A vertical list of four temperature selection buttons: 'R.T.', '25.0', '30.0', and '37.0'.

Figure 25

2. Print setup

Click [Print Setup] on the [System Setup] menu to enter the interface as shown below. The user can choose the print mode and whether to print the result or curve.

The interface shows a 'System Setup' menu with a 'Print Setup' section. It contains three rows of settings: 'Result Print' (Enable), 'Curve Print' (Enable), and 'Print Mode' (Normal). Each setting is followed by a dropdown arrow.

Result Print	Enable ▼
Curve Print	Enable ▼
Print Mode	Normal ▼

Figure 26

[Result Print]: Click ▼, choose [Enable] or [Disable] to decide whether to print the test result. If choose [Enable], printing function is turned on, and the test result would be automatically printed during the test. [Disable] indicates that the printing function is turned off. The instrument would prohibit automatic printing of test results during testing, but the test results can be manually printed in [Result] menu.

[Curve Print]: Click  , choose [Enable] or [Disable] to decide whether to print the curve result.

[Print Mode]: Click  , choose [Normal] or [Concise] to decide the print mode.

Normal mode means that during the test process, the instrument would print the test results and curves one by one. Take the end point method test as an example as shown in below:

- Printing of AD Auto Zero Test :

2020-02-18 09:42:53
Program Name: TP
Program Method: End Point
Main Filter: 546 nm
Linearity Low: 0.0000
Linearity High: 0.0000
AD Auto Zero
AD: 47265 M
AD Range: 45000-60000
Figure 27

Printing of Blank Test :

2020-02-18 09:43:39
Blank:
Program Name:TP
Blank:0.0068
Figure 28

Printing of STD Test :

2020-02-18 09:43:39
Program Name:TP
STD 1
CONC:46.1
Factor:160.692
OD:0.0195
Figure 29

Printing of QC Test :

2020-02-18 09:45:20
Program Name:TP
Control
Control value: 47.3
OD: 0.0977
Control: 240.7506

Figure 30

Printing of Sample Test :

2020-02-18 09:47:46

Nr:001

Program Name:TP

Result: 78.5371

OD: 0.1552

Normal Low: 60

Normal High: 88

Figure 31

[Concise mode] means that to print the test results one by one in line with the principle of saving paper to make it easy to count, save and consult the results. Take the end point method test as an example as shown in below:

- Printing of AD Auto Zero Test:

2020-02-18 09:55:30

Program Name: TP

Program Method: End Point

Main Filter: 546 nm

Linearity Low: 0.0000

Linearity High: 0.0000

AD Auto Zero

AD: 50196 M

AD Range: 45000-60000

Figure 32

Printing of Blank Test:

Blank:0.0068

Printing of STD Test:

CONC:46.1

Factor:160.692

OD:0.0195

Figure 33

Printing of QC Test:

Control

Control value: 47.3

OD: 0.0977

Control: 240.7506

Figure 34

Printing of Sample Test:

Result: 78.5371

OD: 0.1552

Figure 35

3. Standby setup

Click [Standby Setup] on the [System Setup] menu to enter the interface as shown below. Click the box after [Wait Time], pop up a soft keyboard for entering the wait time.

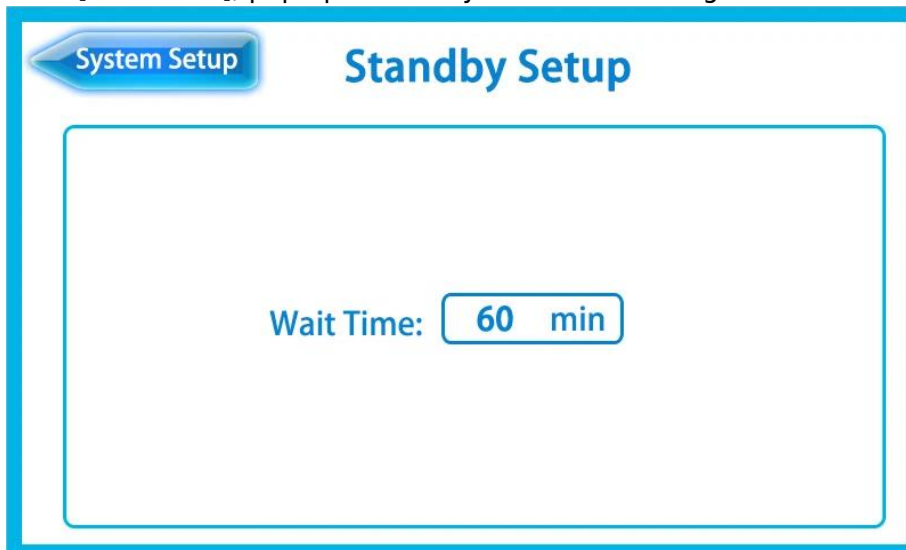


Figure 35

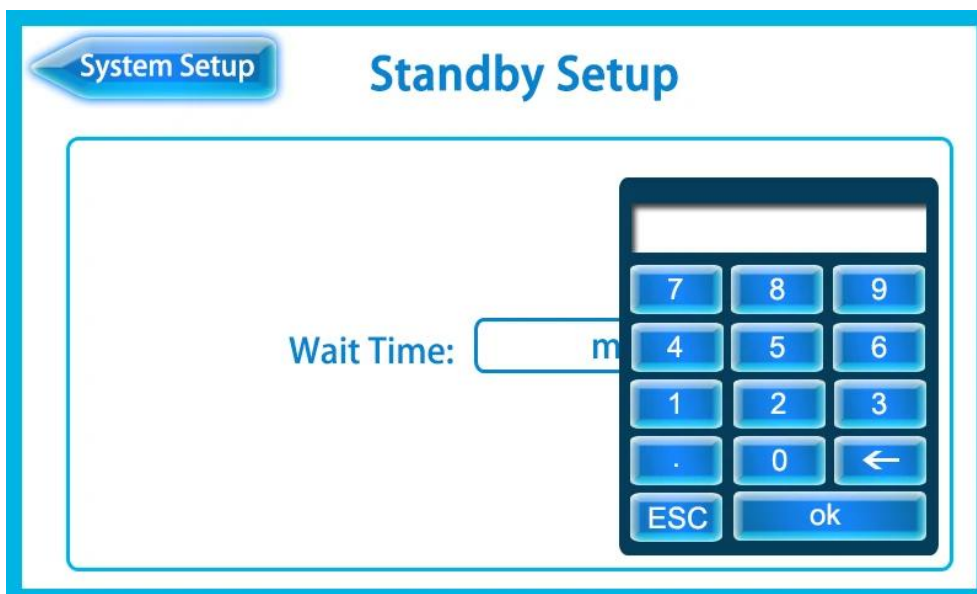


Figure 36

If the instrument has no operation in excess of wait time, it would enter the standby interface as shown below. Please touch the screen to wake up the instrument.

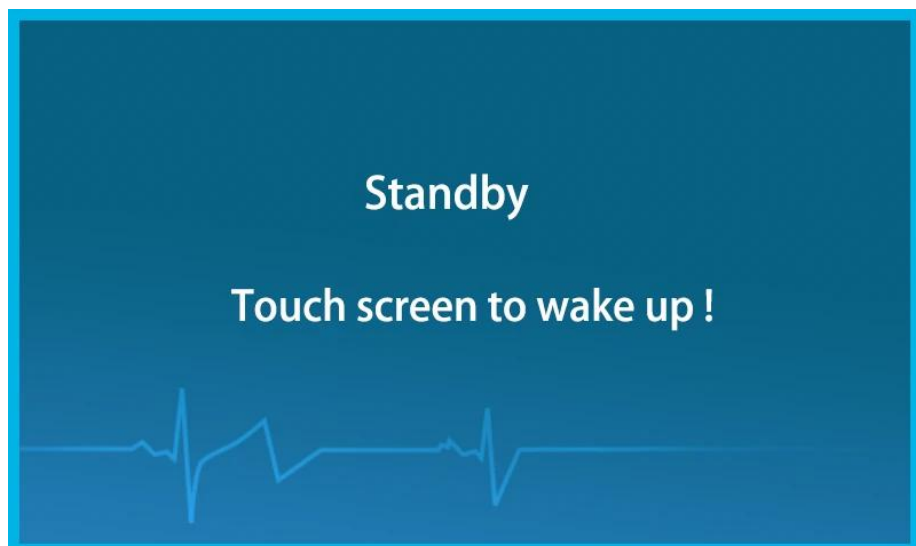


Figure 37

4. Date format

Click [Date Format] on the [System Setup] menu to enter the interface as shown below. Click , pop up a soft keyboard for changing the format of the date.

There are three date formats: YY-MM-DD, DD-MM-YY and MM-DD-YY. (YY represents year, MM represents month and DD represents day).

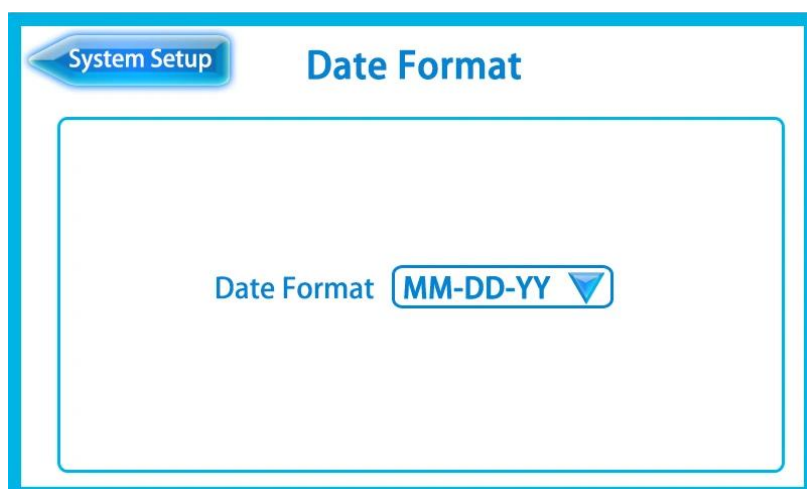


Figure 38

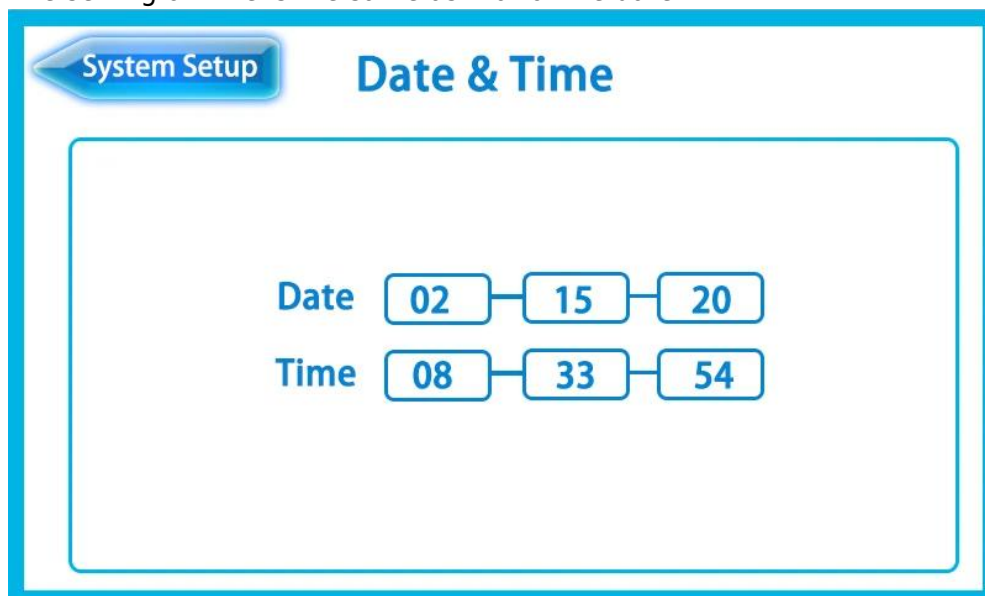


Figure 39

Figure 4-7

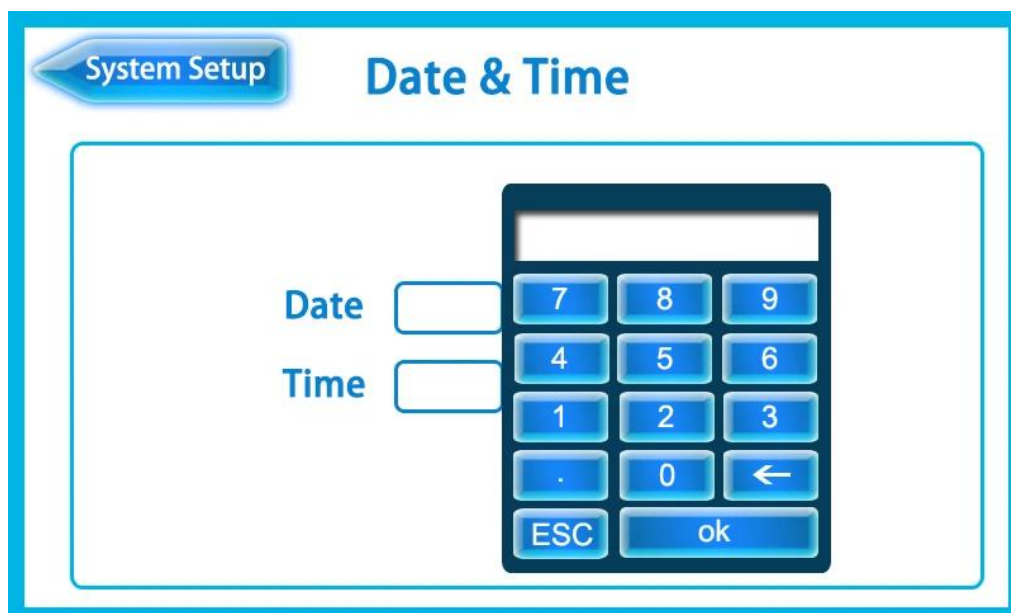
5. Date&Time

Click [Date&Time] on the [System Setup] to enter the interface as shown below.
Click the box after [Date] and pop up a soft keyboard for entering numbers. The date is entered in the order set in [Date Format].
The setting of time is the same as that of the date.



The screenshot shows the 'System Setup' menu with 'Date & Time' selected. The date is set to 02-15-20 and the time is set to 08-33-54. The date is entered in the order set in [Date Format].

Figure 40



The screenshot shows the 'System Setup' menu with 'Date & Time' selected. A soft keyboard is displayed for entering numbers. The date and time fields are empty, and the keyboard has buttons for digits 0-9, a decimal point, a back arrow, an ESC key, and an OK key.

Figure 41

6. System info

Click [System Info] on the [System Setup] to check the system version.

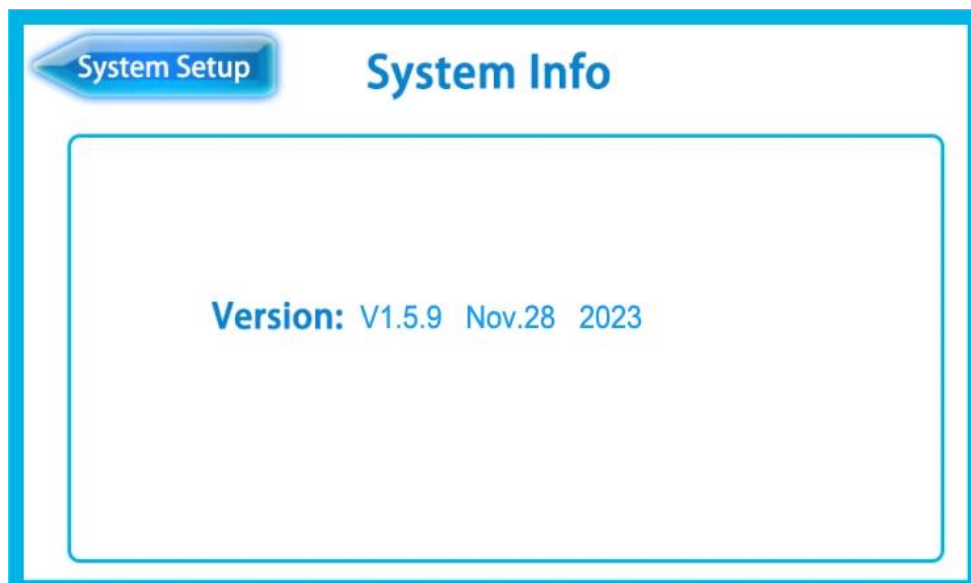


Figure 42

Figure 4-9

7. Hospital setup

Click [Hospital Setup] on the [System Setup] menu to enter the interface. Click the box, pop up a soft keyboard to input the hospital name.

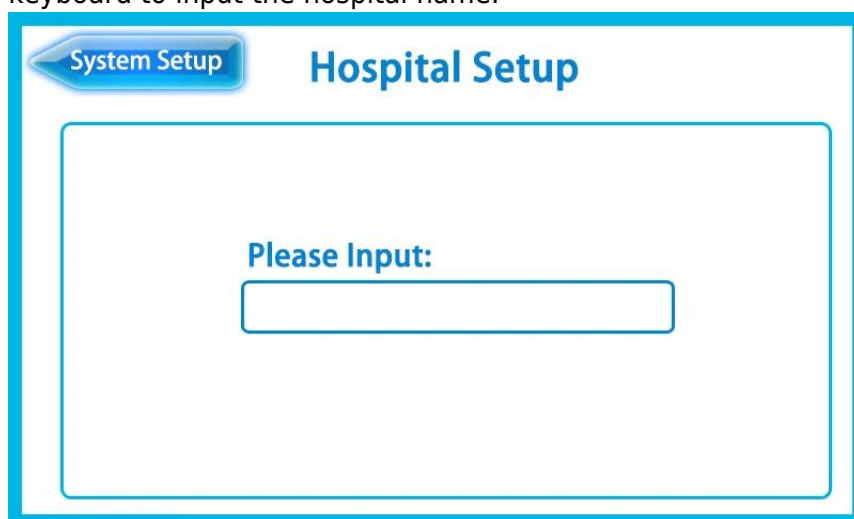


Figure 43

8. Language setup

Click [Language Setup] on the [System Setup] interface to enter the following page, the default language is English.



Figure 44



Figure 45

9. Screen setup

Click [Screen Setup] on the [System Setup] menu. Click ▼ or ▼ to adjust the screen brightness.



Figure 46

4.1.2 Reserved settings

Click [Reserved] on the main menu, pop up a soft keyboard and then input the password "666666" to enter the sub-menu [Reserved Setting].

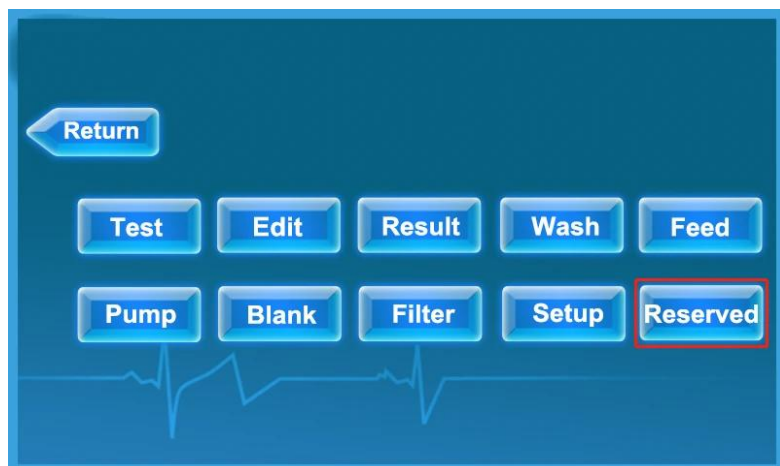


Figure 47

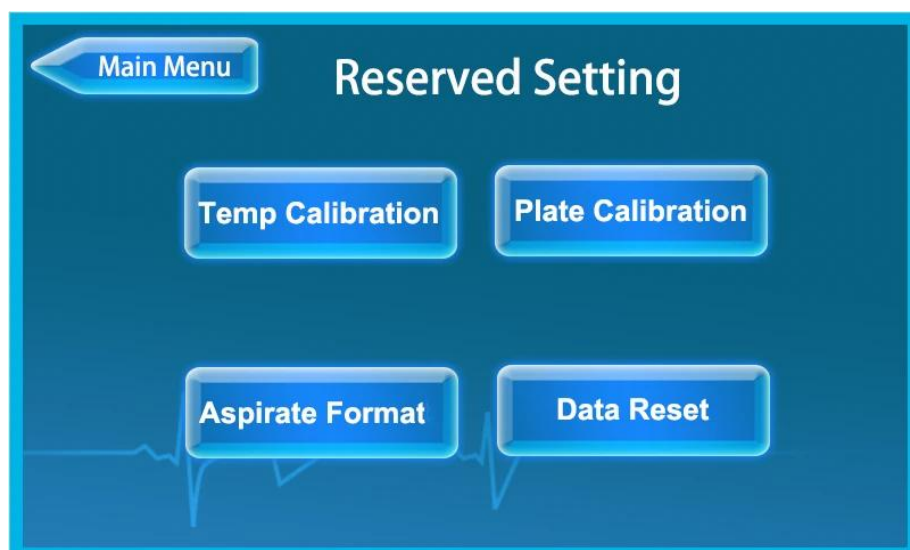


Figure 48

1. Temperature calibration

Temperature calibration includes the temperature calibration of cuvette and incubator. Click [Temp Calibration] to enter the interface as shown below.

 The image shows the 'Temp Calibration' screen. At the top left is a 'Reserved Setup' button. The title 'Temp Calibration' is centered at the top. Below the title is a table with two columns: 'Cuvette Temp Calibrate' and 'Incubator Temp Calibrate'. Each column has three rows for 'Set Temp', 'Temp', and 'Actual Temp', each with a text input field showing a temperature value. At the bottom of each column is a 'Calibrate' button.

Cuvette Temp Calibrate	Incubator Temp Calibrate
Set Temp: 37.0 °C	Set Temp: 37.0 °C
Temp: 37.0 °C	Temp: 37.1 °C
Actual Temp: 36.9 °C	Actual Temp: 37.1 °C
Calibrate	Calibrate

Figure 49

[Set Temp]: System preset temperature.

[Temp]: Display value of temperature which is measured with the temperature sensor.

[Actual Temp]: Temperature measured with the thermometer, click the box to enter the measured value.

Temp calibration of cuvette:

- Insert the temperature measuring rod into the tube containing distilled water. Note that the tip of the rod should not touch the tube wall or the bottom of the tube, as shown in the figure:



Figure 50

As shown, rotate the sheet metal, take out and place well the cuvette.



Figure 51



Figure 52

Put the tube into the incubator shows like below:

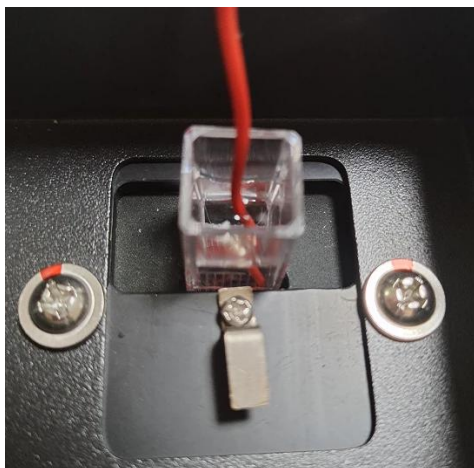


Figure 53

- When the value of the thermometer is stable, click the input box of [Actual Temp] and enter the measured value.
- Click [Calibrate], the displayed temp value would be calibrated to the measured one. If the displayed temp is lower than the set temp, the heating system would work and heat the cuvette. Otherwise, the heating system would not work and would cool down to the set temp slowly.

Temp calibration of incubator:

Put the tube into the incubator shown below, the steps of temp calibration are the same as that of cuvette.



Figure 54

Attention:

- This function can only confirm whether temperature monitoring is right or not. When testing a sample, the temperature would be changed according to the test program.
- If the displayed temp is lower than the preset temp, meanwhile the actual temp is higher than the preset temp and continues to increase, maybe there is something wrong with the temperature sensor.

2. Aspirate format

Aspirate format includes the settings of aspirate format and air gap. Click the [Aspirate Format] on the [Reserved Setting] menu, the interface shows as below.

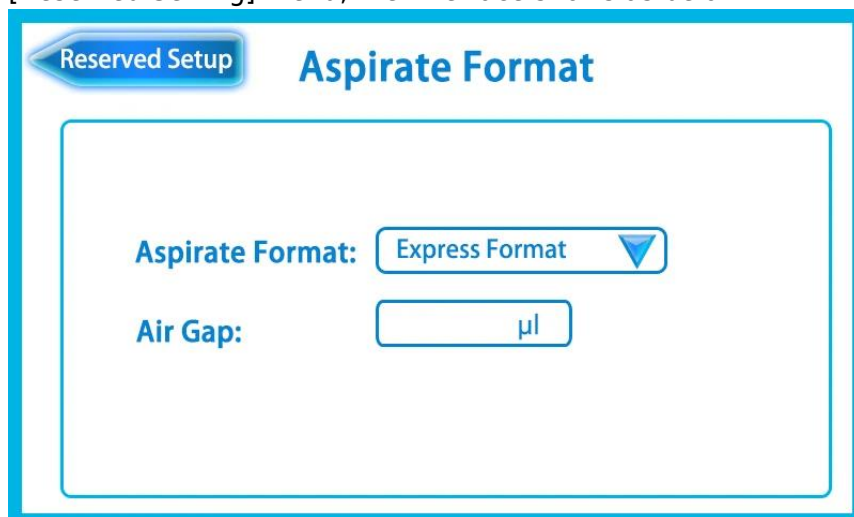


Figure 55

Click  to choose the format of aspirate:

[Normal Format]: Only aspirate samples with set volume during normal format.

[Express Format]: After the instrument has aspirated the set volume of the sample, pause and then

continue to aspirate the sample that set volume in the [Air Gap].

In order to avoid the interference of the air in the suction probe to the sample aspiration accuracy, the user can choose express aspirate format. Click the box after [Air Gap], pop up a soft keyboard to enter the compensated volume of air.

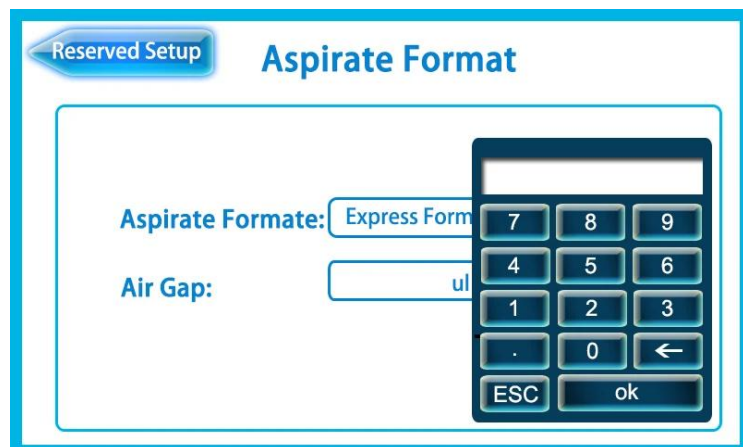


Figure 56

3. Plate calibration

Plate calibration is used to set the optimum position of the filter plate. Click the [Plate Calibration] on the [Reserved Setting] menu, the interface shows as below.

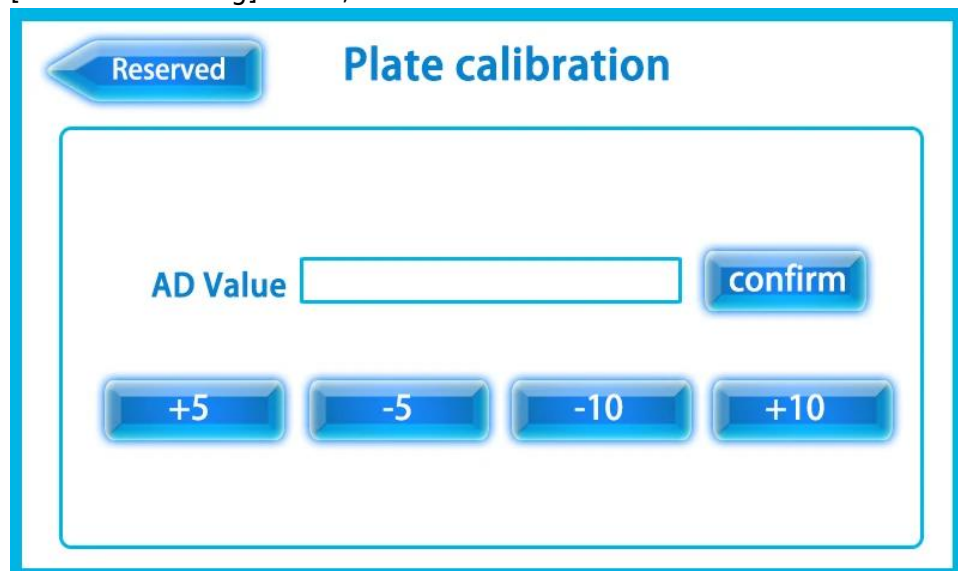


Figure 57

Activate the stepping motor through pressing [+5], [-5], [+10], [-10] to adjust the position of the filter plate. When the [AD Value] is the maximum value, click [Confirm] to save the position parameters of the filter plate.

Attention:

Click the [Data Reset] on the [Reserved Setting] menu, then all the parameter settings would be restored and all the tests and results would be deleted. Reconsider before clicking [Data Reset]. The interface shows like that:

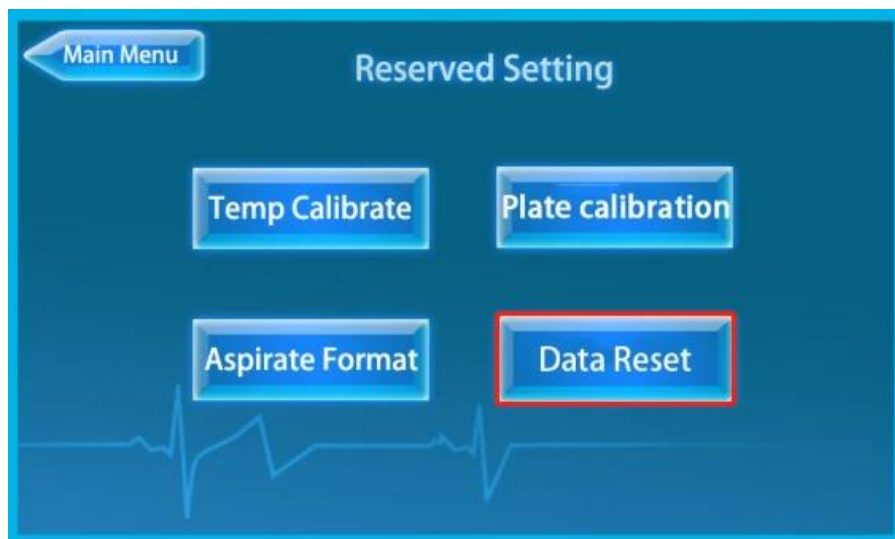


Figure 58

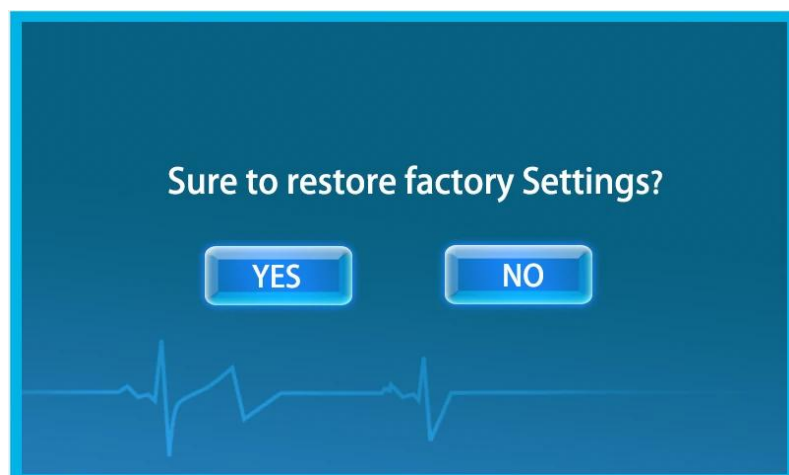


Figure 59

5.1.3 Optical paths calibration

Click [Filter] on the main menu and enter the sub-menu [Filter Test].



Figure 60

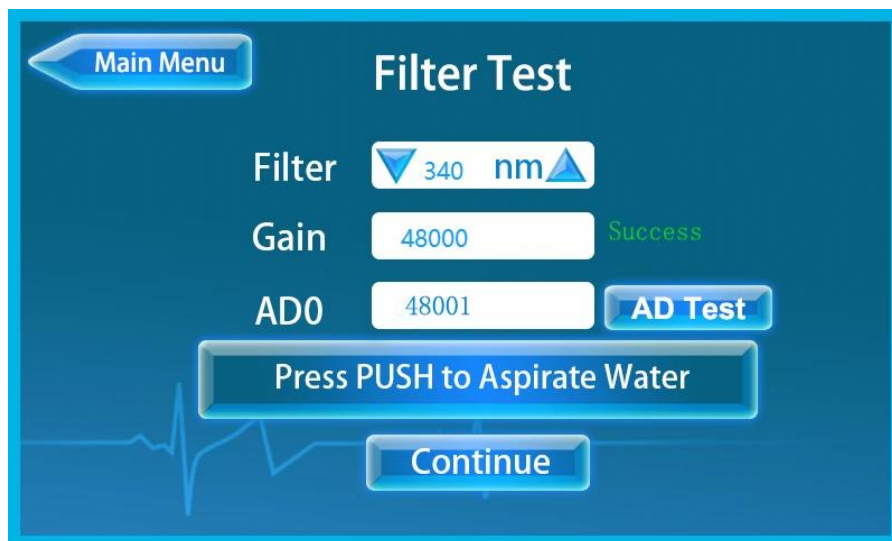


Figure 61

[Filter]: Click or to choose different optical paths for calibration, if the filter is 0, it represents the detection of background value.

[Gain]: Set the target value of optical path amplification, the instrument would automatically increase AD value. If the AD value is equal to the target value, it would display [Success]. If the target value cannot be reached, it would display [Fail].

The calibration steps are as follows:

- Choose the optical path and set target value.
- Insert the suction probe into the distilled water, press the PUSH button to aspirate water.



Figure 62

- Click [AD Test] for calibration. The difference between [Gain] and [AD0] cannot exceed 1000.
- Click [Continue] to enter the interface as shown below:

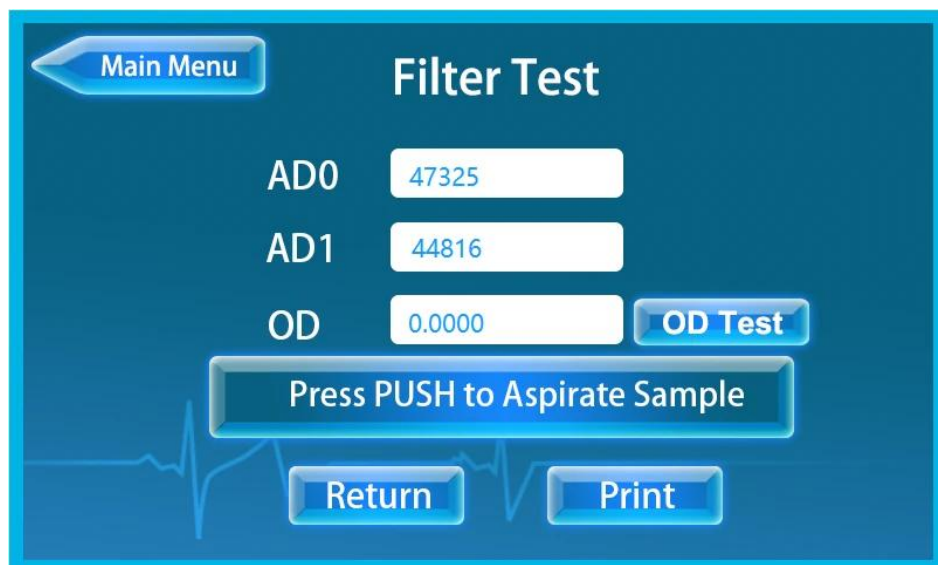


Figure 63

- Insert the suction probe into the sample, press PUSH button to aspirate sample for aspiration testing.
- Click [Print] to print the calibration result of the filter.
- Click [Return] to calibrate again.

5.1.4 AD blank check

When the user finishes the calibration of optical paths, click [Blank] on the main menu and enter the sub-menu [AD Check].



Figure 64



Figure 65

- Insert the suction probe into the distilled water, press PUSH to aspirate water.
- Click [Read] in the interface to read the AD value of all optical paths at one time. In the [State] bar, use letter H, M, L and No to judge the result is high, medium or low.
- Click [Print] can print the test result.

5.1.5 Pump calibration

When the aspiration volume of the instrument is not accurate, the user can calibrate the pumping steps as follows:

- Click [Pump] on the main menu and enter [Pump Calibration].

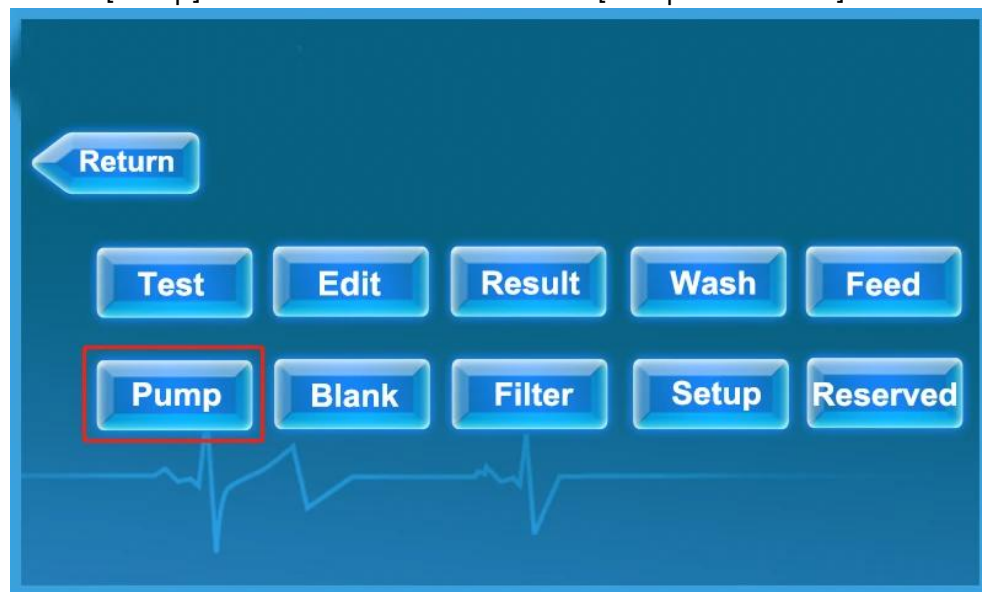


Figure 66

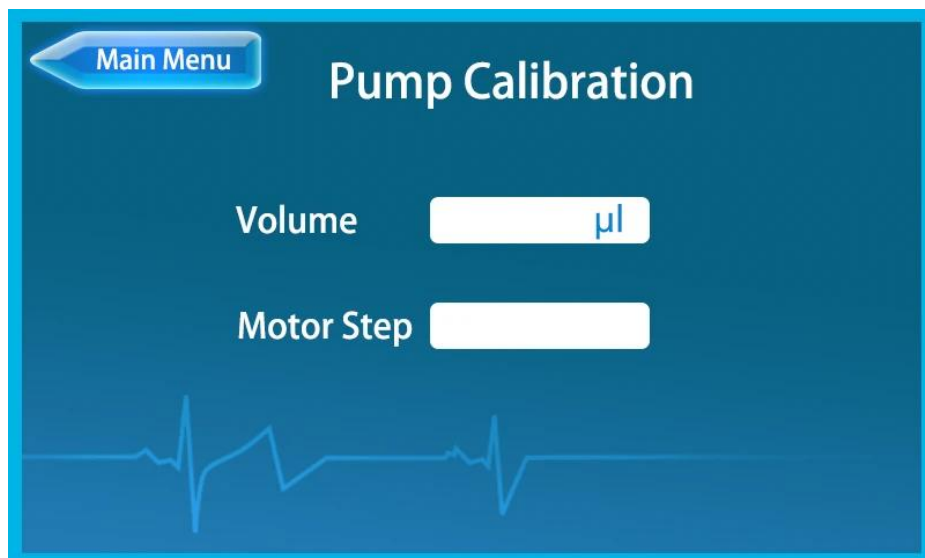


Figure 67

- Input calibration volume and take the same volume of distilled water in jug. Insert the suction probe into the bottom of the jug and then press "PUSH button" to aspirate distilled water.
- When the liquid level drops to the target height (initial volume - set volume) immediately press the "PUSH button" key, and the number of steps of the peristaltic pump motor is calibrated. (For example, when the volume is 400μl, the motor steps is about 6500 to 9000).
- Click [Main Menu] to save and return to main menu, it would pop up an interface to ask if you want to save the changes, click [YES] to save.
- If the aspirate volume is not accurate during the sample testing process, please repeat the above operations or directly modify the current motor step of the instrument through the soft keyboard.

5.1.6 Program process

Click [Edit] on the main menu and enter the sub-menu [Program Process] as shown below.



Figure 68

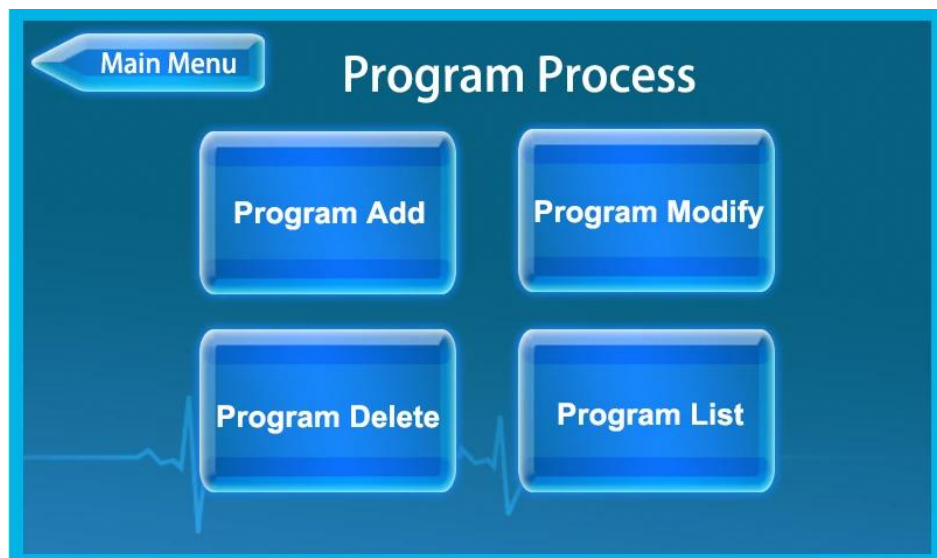


Figure 69

The user can click the keys shown above to enter the sub-menu for adding, modifying, deleting or printing programs.

1. Program add

Before adding a new program, it's necessary to set parameters according to the reagent specification. The program must choose the right analysis method. The commonly used analysis methods are kinetic method, two-point method and End point method. Usually, enzyme programs adopt kinetic methods. Creatinine and urea tests adopt the two points method, and others are used by the end point method. Take program ALB as an example, the operation steps of program parameter setting shown as below:

- Click [Program Add] to enter the interface as shown follow:

Figure 70

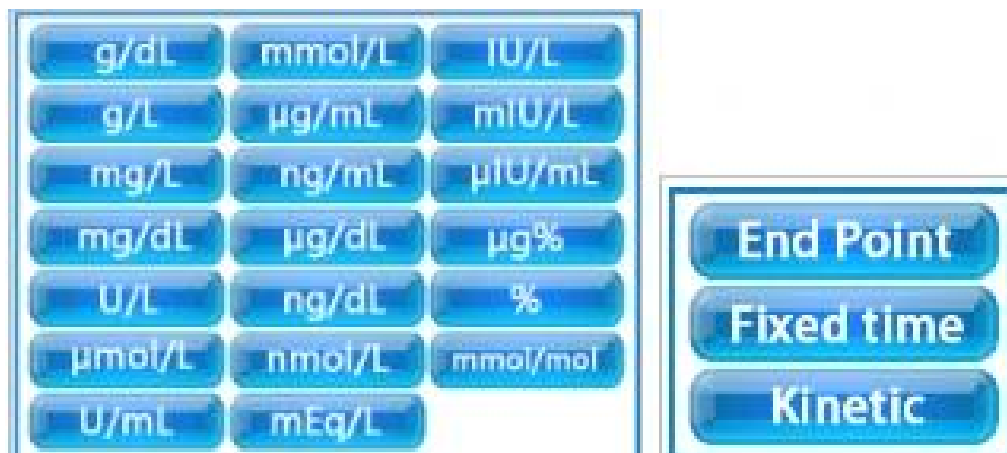


Figure 71

[Program Name]: Input the name through the soft keyboard.

[Program Method]: Click ▼ to choose an analyse method between [End Point], [Two points] and [Kinetic].

[Program Unit]: Click ▼ to choose the program unit.

[Aspirate Volume]: 100 to 1000 µl, input the volume of sample to be aspirated during the test through the soft keyboard.

[Main Filter]: Click ▼ or ▼ to choose an optical path.

[Sub Filter]: None.

[Delay Time]: Delay time before test, 1 second to 999 seconds, refer to reagent specification to enter value through soft keyboard.

[Test Time]: 1 second to 999 seconds, refer to reagent specification to enter value through soft keyboard.

- Click [Next] to enter next page:

Figure 72

[Linearity Low]: Refer to reagent specification to enter value through soft keyboard.

[Linearity High]: Refer to reagent specification to enter value through soft keyboard.

[Blank]: Click  to select the type of blank test in [Water], [Reagent] or [Serum], in order to check and correct the optical path system.

[Num of Blank]: The number of blank tests, which can be entered through the soft keyboard 0~7, the default number is 1.

[Blank Low]: Blank low value. Refer to reagent specification to enter value through soft keyboard.

[Blank High]: Blank high value. Refer to reagent specification to enter value through soft keyboard.

[Normal Low]: Normal low value. Refer to reagent specification or clinical reference value to enter value through soft keyboard.

[Normal High]: Normal high value. Refer to reagent specification or clinical reference value to enter value through soft keyboard.

- Click [Next] to enter next page:

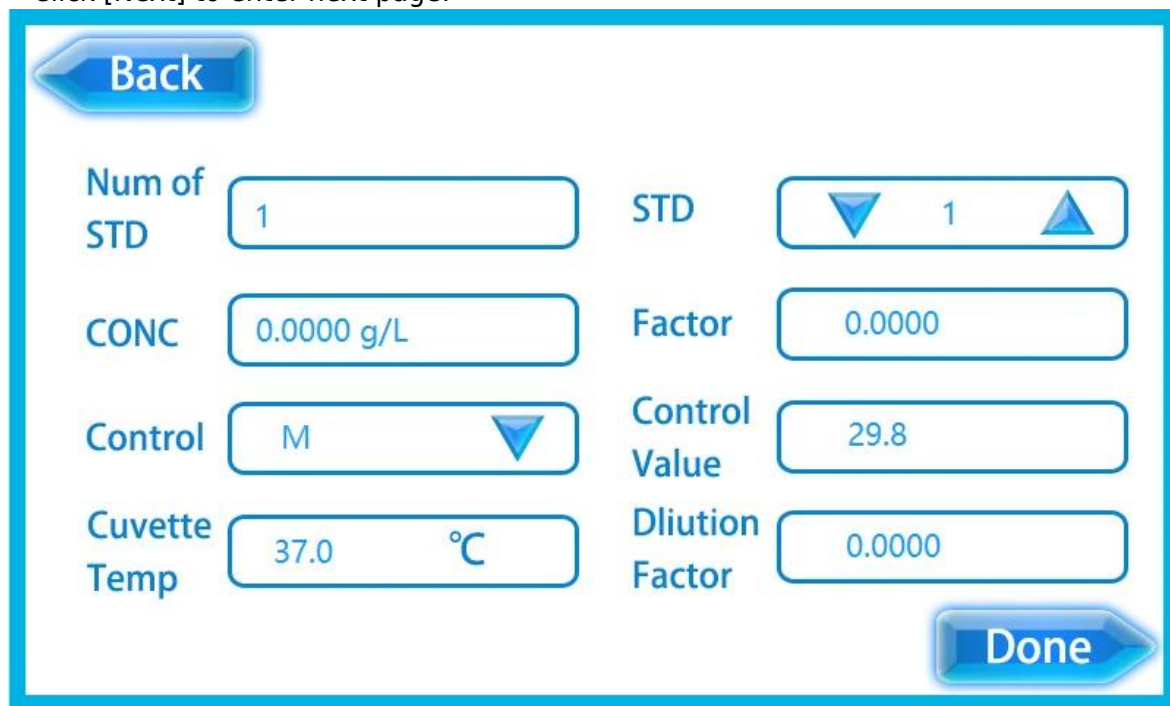


Figure 73

[Num of STD]: Quantity of standard samples, which depends on calibration method.

No. of STD	Calibration Method
1	End-point Method (Factor Method)
2	Two points Method (Fixed Time Method)
6	Kinetic Method (Rate Method)

Table 4

[STD]: Standard No., which is used in two points method and kinetic method, click ▼ or ▼ to choose.

[CONC]: Concentration, which represents the standard concentration corresponding to the STD No., entered through a soft keyboard.

[Factor]: Standard factor, which is entered through a soft keyboard according to the reagent specification. The standard factors can also be obtained by an STD test.

[Control]: Click ▼ or ▼ to choose the type of QC, such as high value QC, median value QC and low value QC.

[Control Value]: Set the target value of QC through the soft keyboard.

[Cuvette Temp]: The preset temperature of cuvette, the default value is 37°C.

[Dilution Factor]: The sample dilution factor, by default, is 0, which can be entered by soft keyboard, and the test result is multiplied by the corresponding dilution factor.

- Click [Done] to enter the interface as shown below, click [YES] to add the program, click [No] to back to the main menu interface, click [Cancel] to back to the interface of parameters edit.

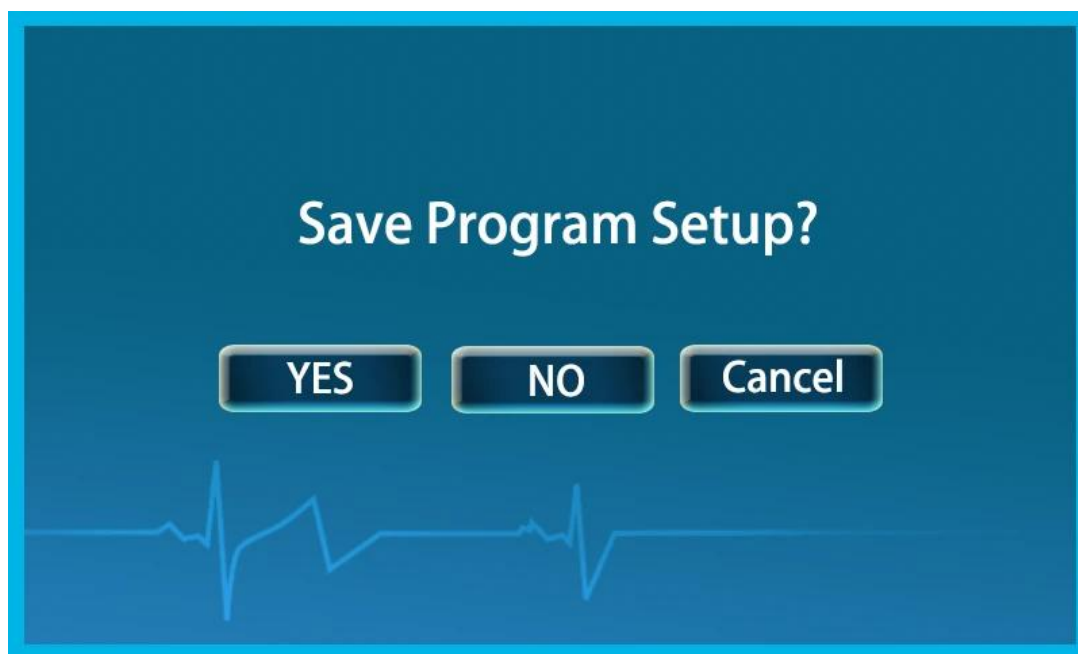


Figure 74

2.Program modify

Modify and view the parameters of the added program. When the reagent type or batch number is changed, the corresponding parameters need to be modified. The modification steps of the program are as follows:

- Click [Program Modify] to enter the interface as shown follow:

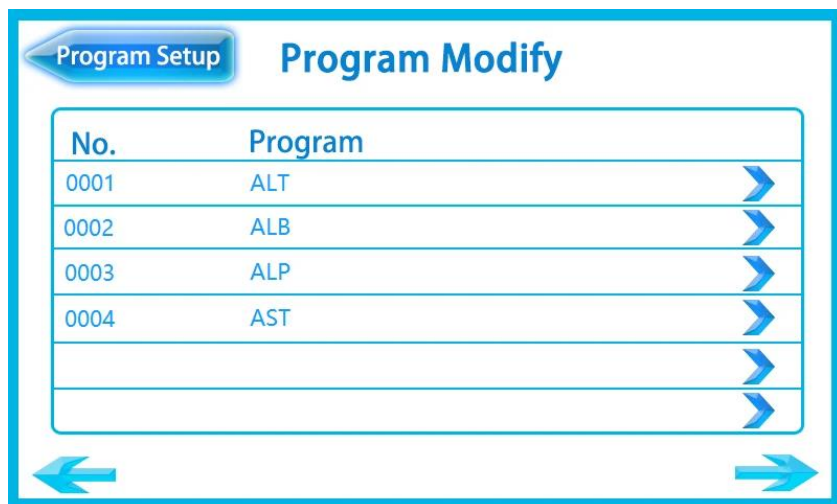


Figure 75

- Choose the program you need to modify, click to enter the interface of program parameters, and then modify the parameter that needs to be modified.
- Click [Done] to enter the saving interface, and click [YES] to save the edit of the program.

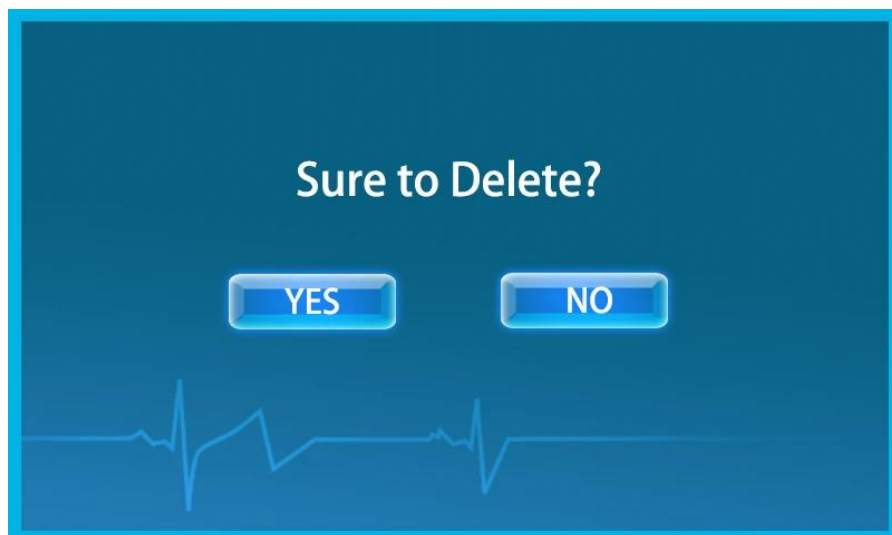
3. Program delete

- Click [Program Delete] to enter the interface as shown follow:



Figure 76

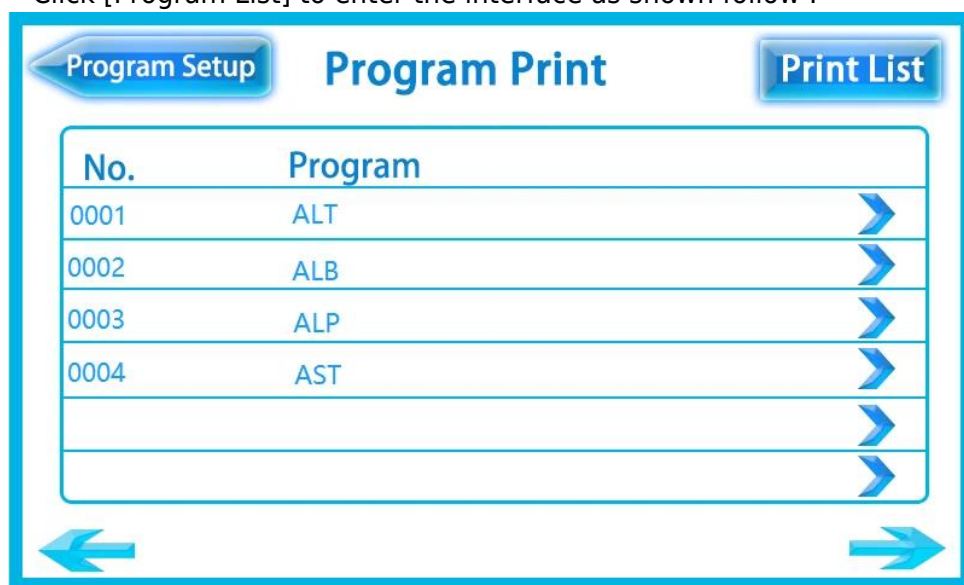
Choose the program and click ➤ , then pop up an interface:



- Click [YES] to delete the program, click [No] to back to the interface of parameters edit.

4. Program list

- Click [Program List] to enter the interface as shown follow :



- Click the  , the instrument would print the program information.
- Click [Print List], the instrument would print the program list, including the program number and name, for users to query for program numbers.

5.2 Daily Operation Process

5.2.1 Instrument preheating

Connect to the power and turn on the switch, the instrument should be preheated for 30 minutes.

5.2.2 Pipeline washing

Clean the cuvette and pipe line before testing, insert the suction probe into distilled water, and then click [Wash] on the main menu to start washing, repeat 5-10 times.

Attention:

Work in an environment that is dust proof, moisture proof, and in which installation air conditioning is better and environment temperature in 18-25 °C.

- When external power is not stable, instruments must connect regulated power supply.
- Instruments in the process of operation should not open the cover, so as not to cause damage to equipment or operator.
- With leakage and electrostatic prevention, the instrument should be in good grounding. Line power socket must have a reliable grounding line to guarantee in a steady state and security.
- After work, wash the instrument 3 times at least immediately to keep the cuvette and pipeline from waste attachment.
- After finish the testing, the used should be collected and disposed according to the requirements of the disposal of the medical waste.
- The waste pipe end should not be dipped into the waste to avoid poor drainage.
- Use qualified reagents within the period of validity.

5.2.3 Program test

Click [Test] on the main menu to enter the sub-menu [Test] as shown below:

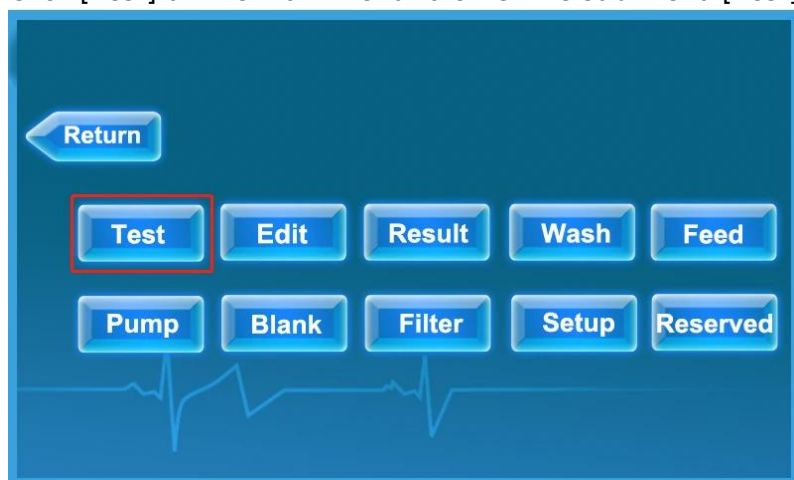


Figure 77

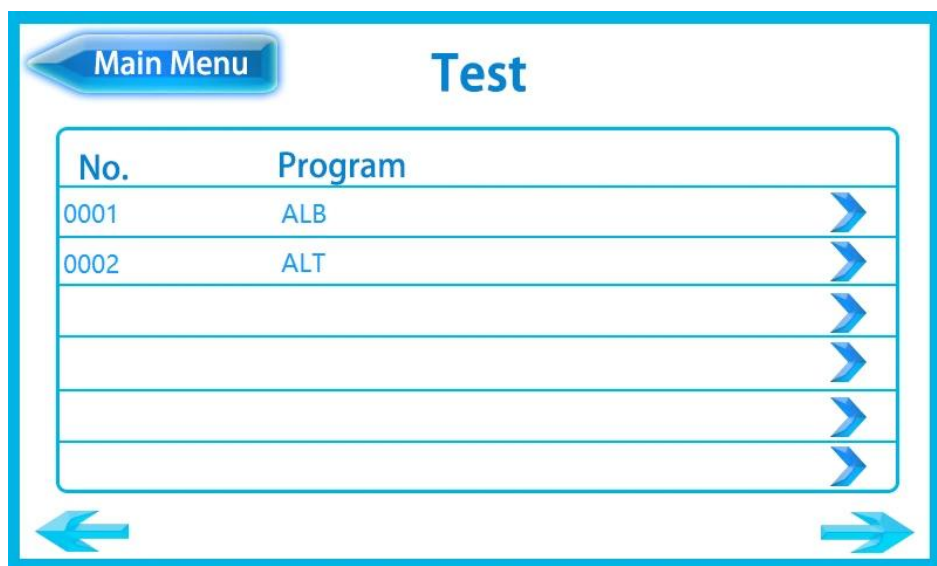


Figure 78

Take program ALB for example to show the test progress. Click to enter the interface as shown below:

1. Temperature calibration

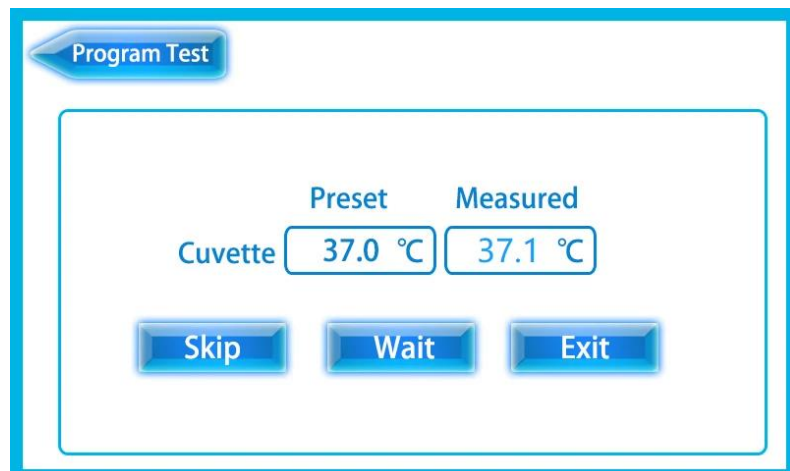


Figure 79

- [Skip]: Go to the next step.
- [Wait]: When the cuvette reaches the set temperature, it would automatically proceed to the next step.
- [Exit]: Back to the main menu.

After calibrating the temperature, click to proceed to the next step.

2. AD auto zero

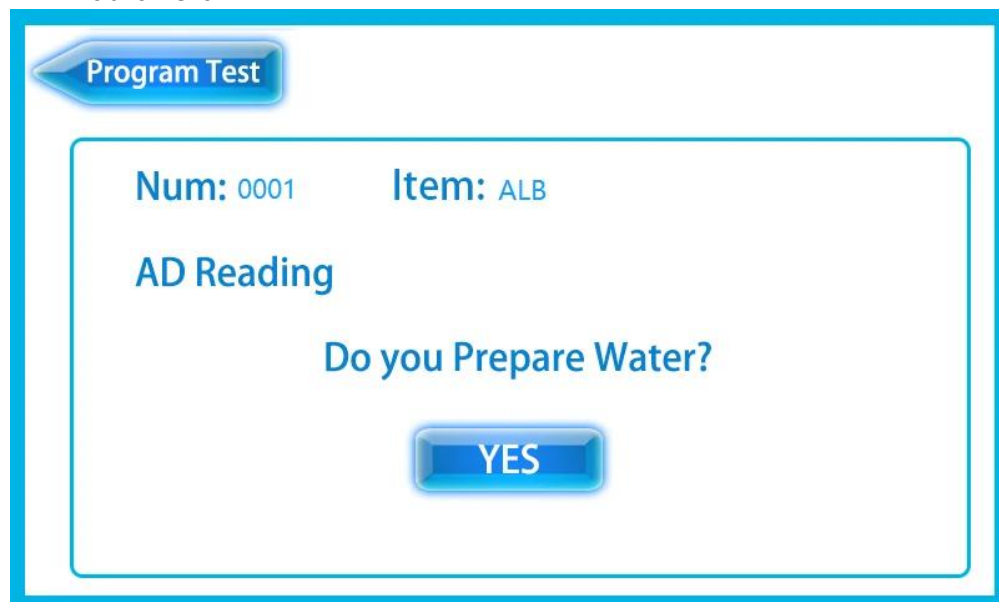


Figure 80

Confirm that the suction probe is inserted into distilled water and click [YES] to enter the interface as shown below:

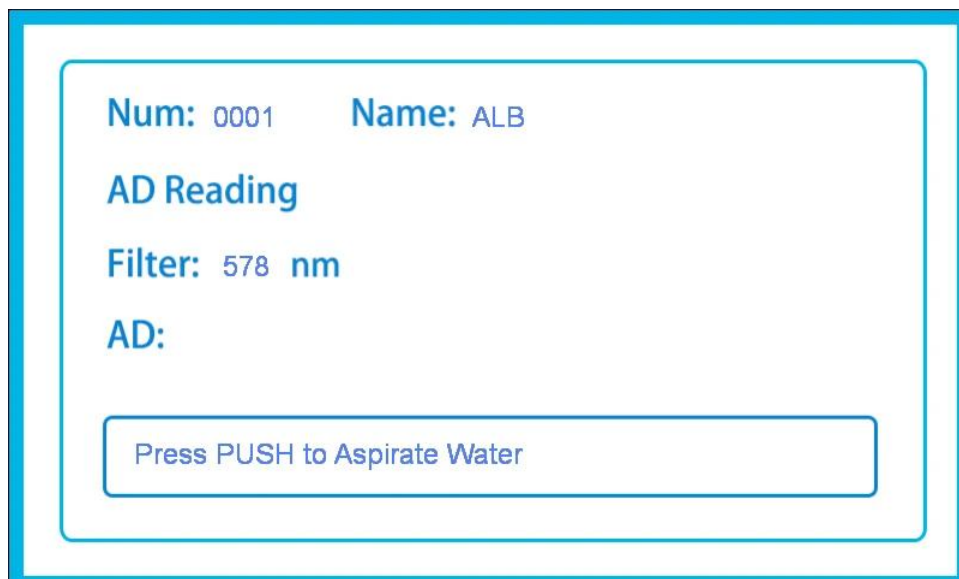


Figure 81

Press the PUSH button to aspirate distilled water, the instrument would automatically calibrate AD value and enter the interface as shown below:

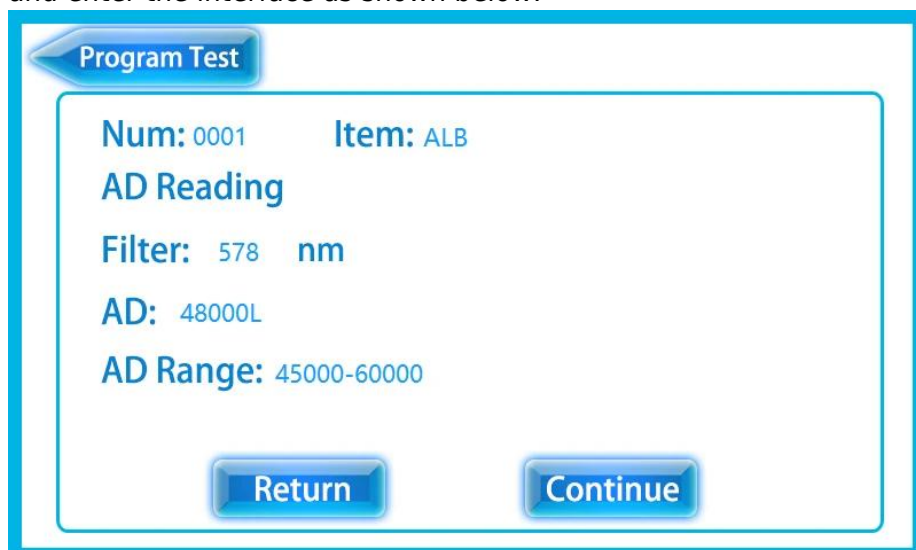


Figure 82

- [Num]: The number of program.
- [Item]: The name of program.
- [Filter]: The main filter of testing optical path.
- [AD]: AD value for water blank.
- [AD Range] Reference range of AD value.

After calibrate the AD value, click [Continue] to proceed to the next step.

3. Water blank calibration

Program Test

Num: 0001 Name: ALB

OD: 0.0000

Test Water Blank ?

Yes No

Figure 83

Water blank means the absorbance of cuvette with distilled water. Confirm that the suction probe is inserted into distilled water and click [YES] to enter the interface as shown below:

Num: 0001 Item: ALB

Test Blank

OD:

Blank Low: 0.0000 Blank High: 0.0000

Press PUSH to Aspirate Water

Figure 84

- [Blank Low]: The value is the same as the lower limit of blank value in the project parameter setting.
 - [Blank High]: The value is the same as the upper limit of blank value in the project parameter setting.
- Press the PUSH button to aspirate water, and enter the interface as shown below:

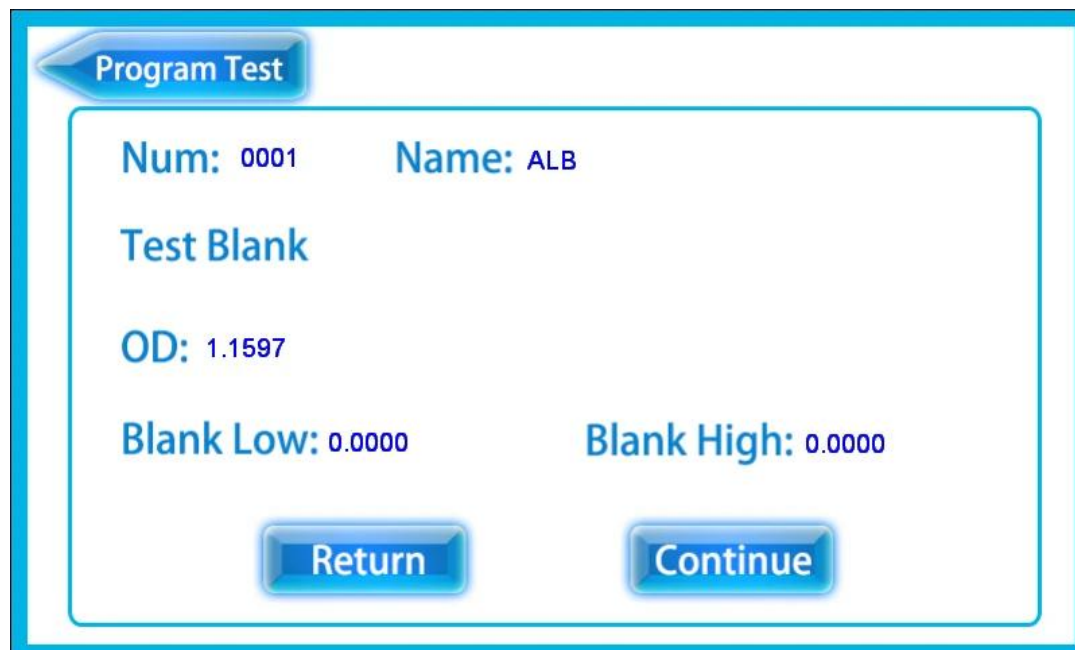


Figure 85

- [OD]: Absorbency in blank.
- [Return]: Do water blank test again.
- [Continue]: Go to the next step.

After calibrating the water blank, click [Continue] to proceed.

4. STD test

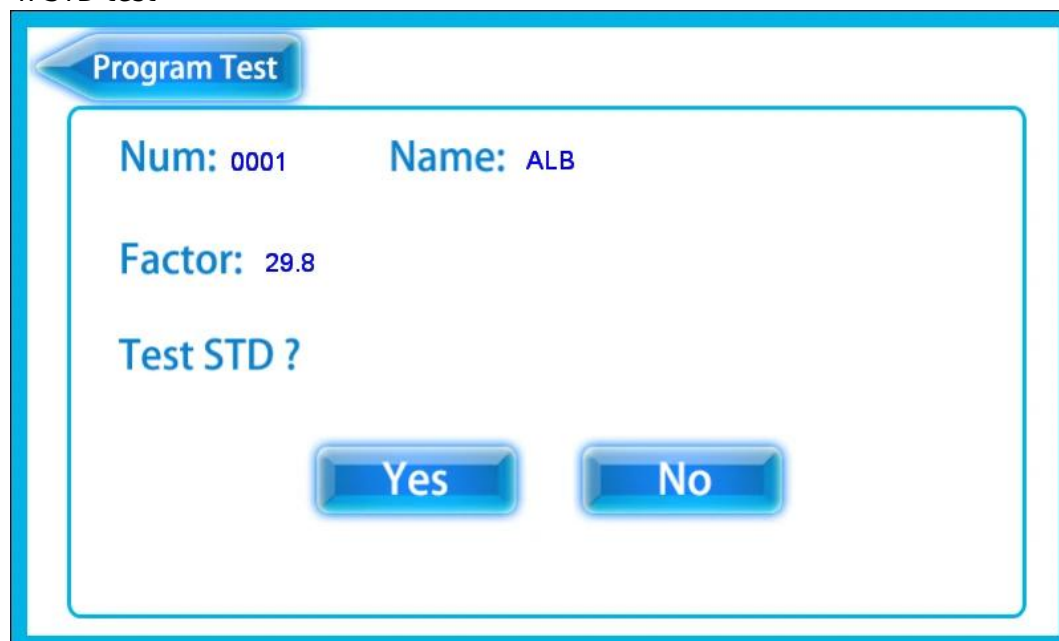


Figure 86

- [Factor]: Standard factor, which can be set in program parameter.
- [No]: Skip STD test, turn to the next step.
- [YES]: Start STD test.

Confirm that the suction probe is inserted into STD and click [YES] to enter the interface as shown below:

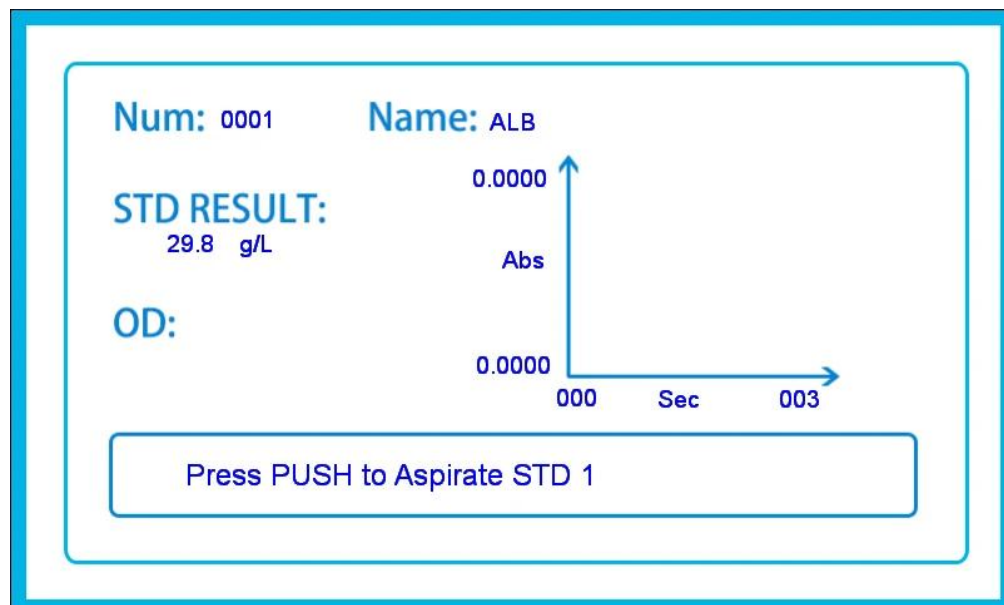


Figure 87

- [STD Result]: Concentration of the STD which can be set in program parameters. Push the PUSH button to do STD test, the test result shows like that:

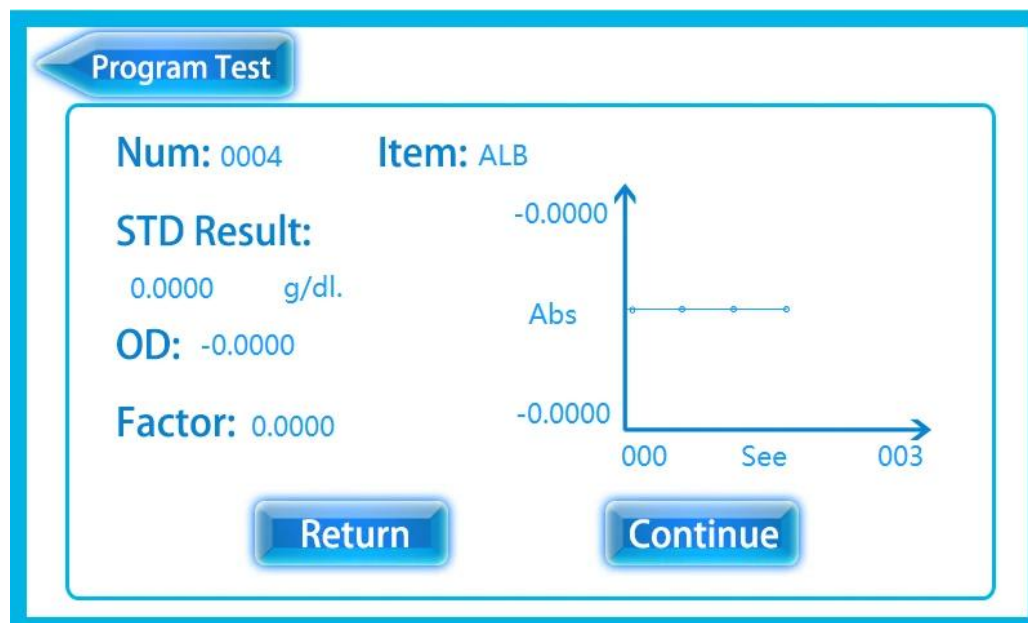


Figure 88

- [Return]: Do STD test again.
 - [Continue]: Turn to the next step.
- After finished the STD test, click [Continue] to proceed.

5. QC test

Program Test

Num: 0001 Item: ALB

Test Control ?

Yes **No**

Figure 89

Confirm that the suction probe is inserted into the QC product and click [YES] to do the QC test of QC which is the same as the STD test.

After finishing the QC test, confirm that the suction probe is inserted into sample and click [Continue] to proceed.

6. Sample test

Program Test

Num: 0001 Item: ALB

No.

Name:

Feed **Wash** **Continue**

Figure 90

- [Feed]: The same as the [Feed] in main menu.
- [Wash]: The same as the [Wash] in main menu.
- [Continue]: Test the sample.

Input the patient's name and then click [Continue] to do sample test.

Attention:

- After each sample test, click [Wash] to clean the pipeline. Avoid cross contamination to affecting the accuracy of test results.

- The STD test is used to calculate the factor, so as to participate in the calculation of sample test results. Generally, it is necessary to do the STD test when any of the following situations occurs:
 - a. Add a new item or edit the item parameters.
 - b. When the reagent, QC product and standards are still within its validity, the QC results are out of tolerance.
 - c. Replace another batch or bottle number reagent.
 - d. Replace the halogen lamp or cuvette.
- QC results as an important tool to monitor whether the instrument runs well. In order to ensure the accuracy of sample test results, it is recommended to do QC test every day.

5.2.4 Result process

The instrument can store 5600 sample test results sequentially for users to query. When the storage is full, results need to be cleared. The user can search, edit, delete, print or synchronize the sample test results and QC results through the [Result Process] menu as shown below:

Click [Result] on the main menu and enter the sub-menu [Result Process].

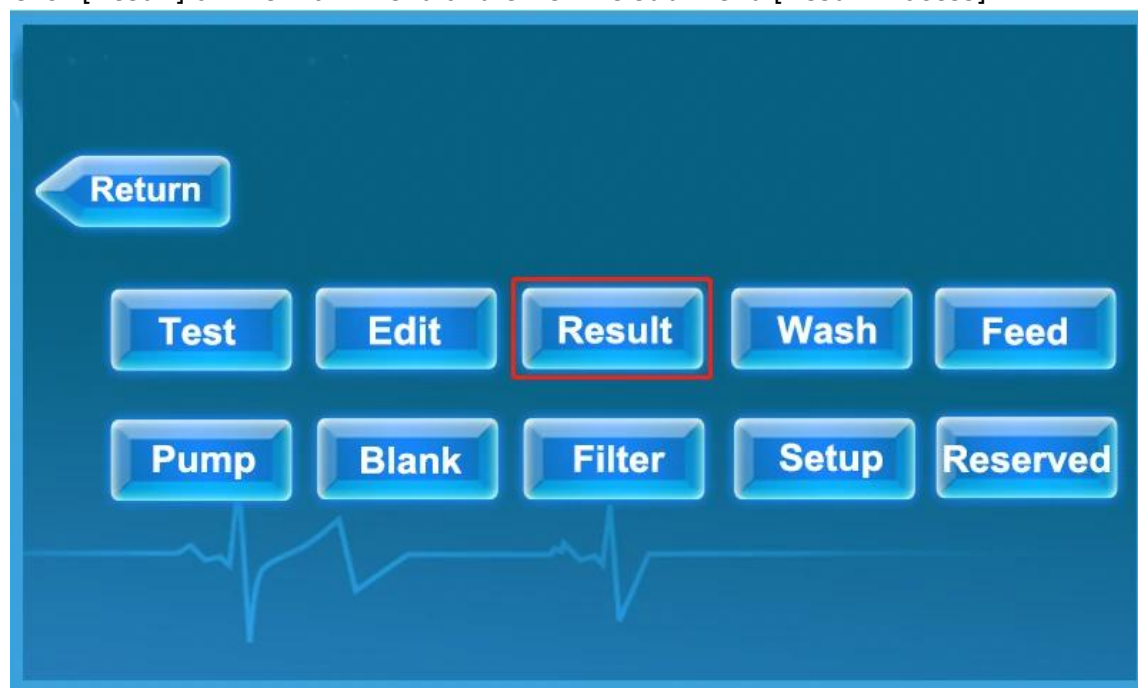


Figure 91

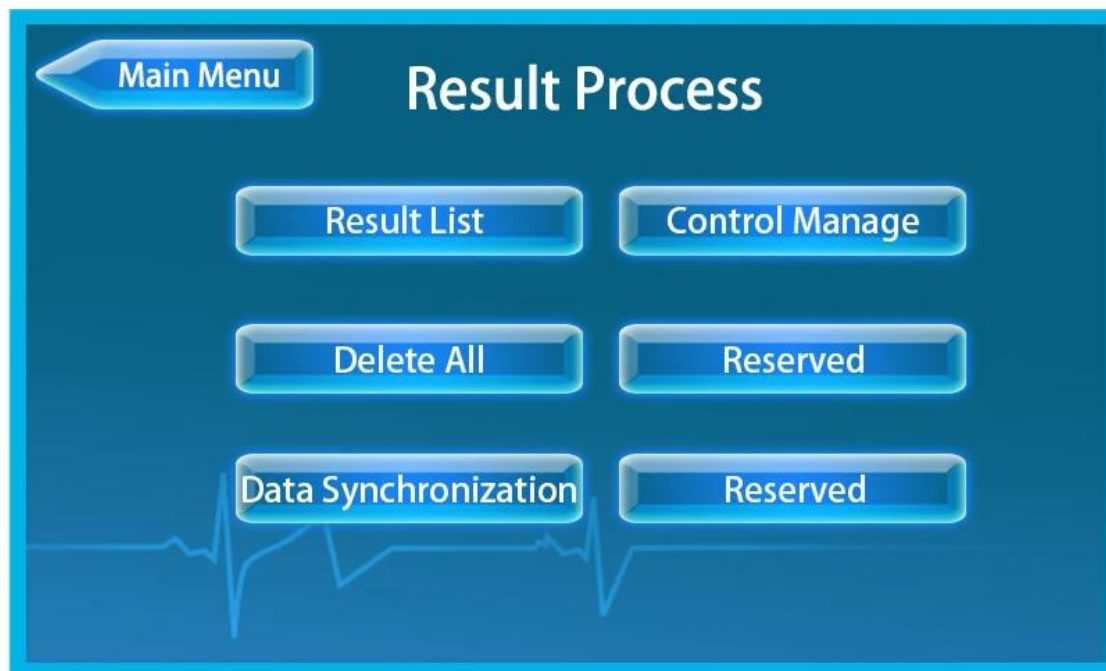


Figure 92

5.2.4.1 Sample result process

1. Result list

Click [Result List] on the [Result Process] menu, the interface shows like that:



Figure 93

[Search]: To query the test result, click to enter the interface as shown below:

Program Test

No. **Search**

Name **Search**

Date **Search**

Please Input No., Name or Date

Figure 94

- [No.]: Input program number, search for the program with that number.
- [Name]: Input patient's name, search program for all patients with the same name.
- [Date]: Input the testing date, search all the program done on that day.

The user can use the key words to searching sample testing results, the query list shows like that:

Result Process **Result List** **Search**

0001	01-18-20	09:05:20	>
0002	01-18-20	09:15:45	>
0003	N/A		>
0004	N/A		>
0005	N/A		>
0006	N/A		>
0007	N/A		>

← →

Figure 95

Choose one result in [Query List], click to enter the interface shows like that:

Result QueryList **Data Sync**

Porgram Name: AST

Nr: 0001

Ref:

Time: 00-01-28

RATE: 0.0697

CONC: 0.0000 g/dl.

Normal Low: 0.0000 Normal High: 0.0000

Edit **Print** **Delete**

Figure 96

- [Edit]: Input patient's name.
- [Print]: Print test result.
- [Delete]: Delete test result.
- [Data Sync]: Upload this test result to the database.

2. Delete all result

Click [Delete All] on the [Result Process] menu, the interface shows like that:

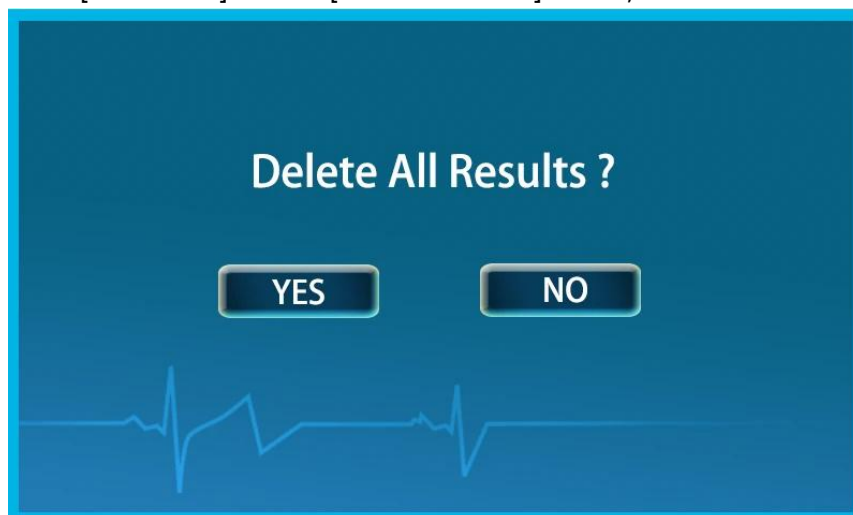


Figure 97

Click [YES] to delete all test results.

3. Data synchronization

Click [Data Synchronization] on the [Result Process] menu, the interface is as below:

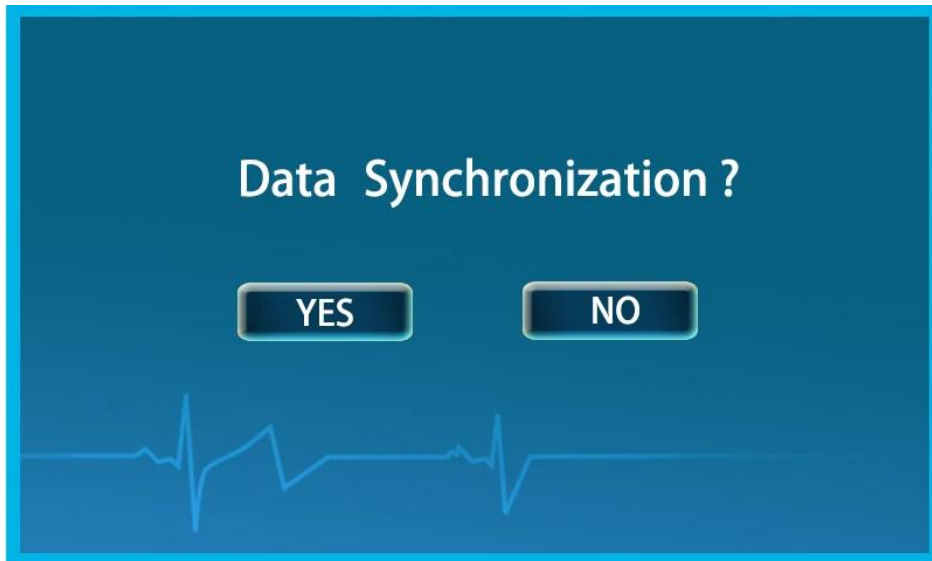


Figure 98

Click [YES] to synchronize all test results.

5.2.4.2 QC result process

Click [Control Manage] on the [Result Process] menu and enter the sub-menu [Control Manage].

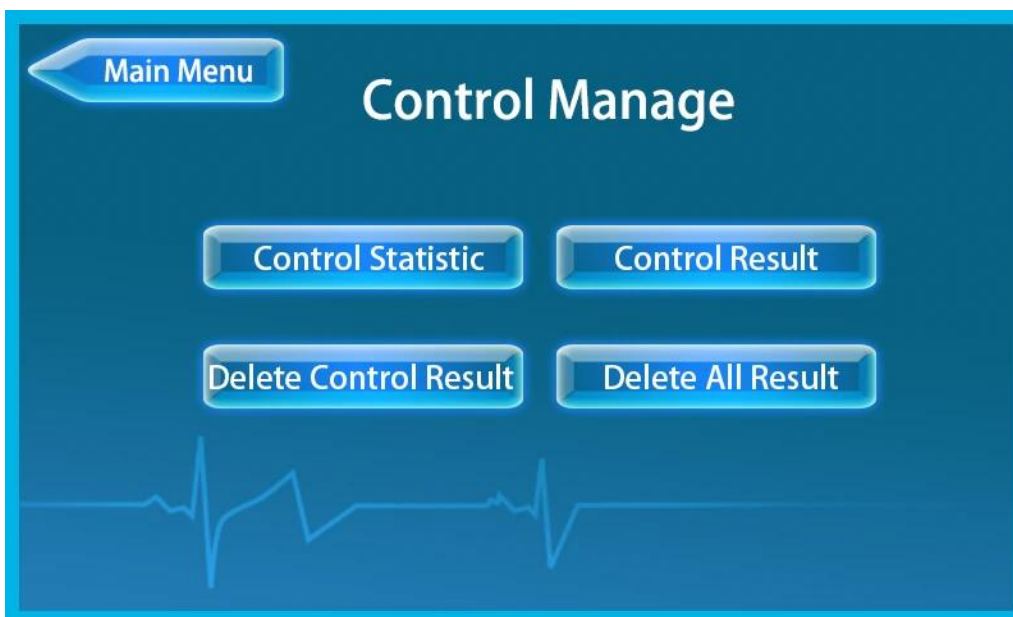


Figure 99

1. QC statistic list

Click [Control Statistic] on the [Control Manage] menu, the interface shows like below. Choose one QC program, click to choose control type like that:



Figure 100



Figure 101

Click the control type to query, the types H, M and L are the same as the control type set in program parameters.

Statistic List **Control M**

Program Name: ALB
No.: 0002
Sum: 0001
AV: 17.4444
SD: 0.0000
CV: 0.0000

Curve **Print**

Figure 102

- [Print]: Print this QC results.
- [Curve]: Analyze the QC results in a curve which can only be generated when the QC results are less .

2. QC Result

Click [Control Result] on the [Control Manage] menu, the interface shows as below:

Control Manage **Result List**

No.	Program	
0001	ALP	>
0002	AST	>
0003	ALT	>
0004	TP	>
0005	ALB	>
0006	UREA	>

← →

Figure 103

Choose one QC program, click to choose control type to query all QC results of the control type in the program, the interface shows like:

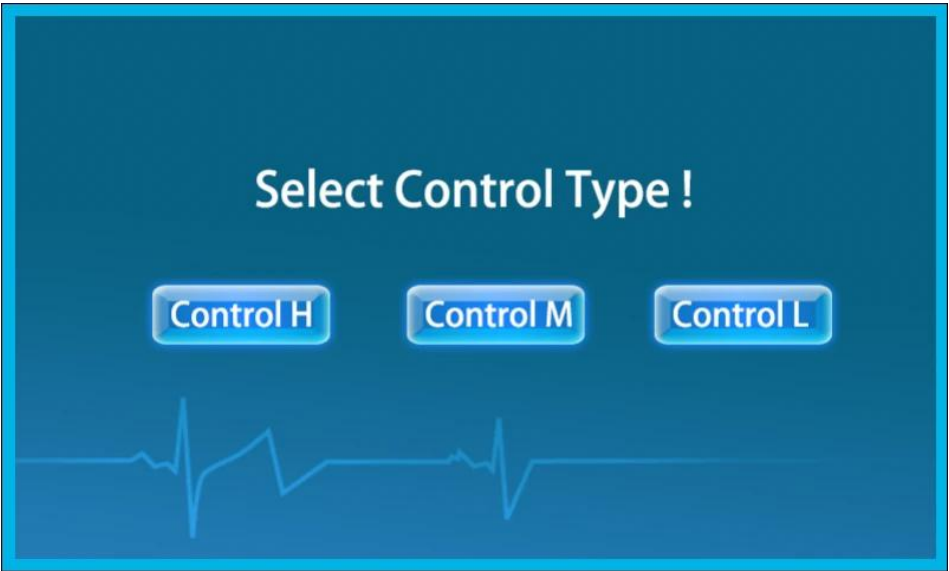


Figure 104



Figure 105

Click  to see the control result, shows as below:



Figure 106

- [Print]: Print this QC result.
- [Delete]: Delete this QC result.

3. Delete QC Result

Select a program and click ➤ to delete all QC results of this program.

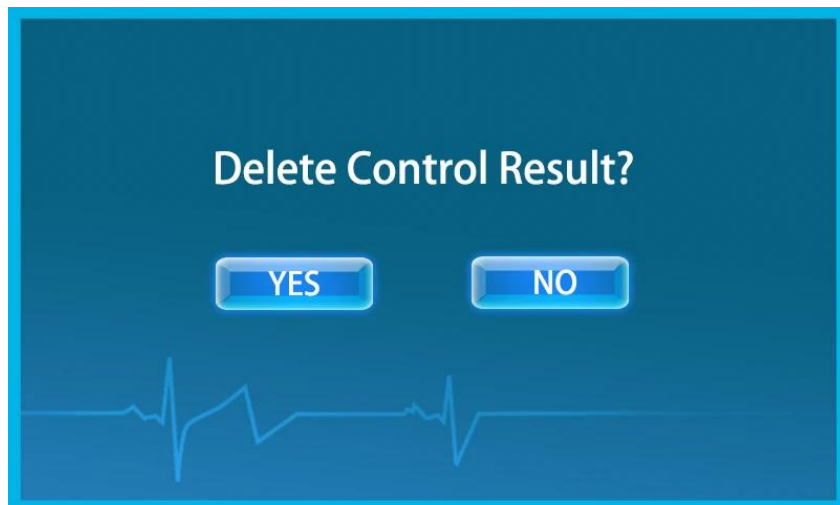


Figure 107

4. Delete All Result

Click to delete all QC results.

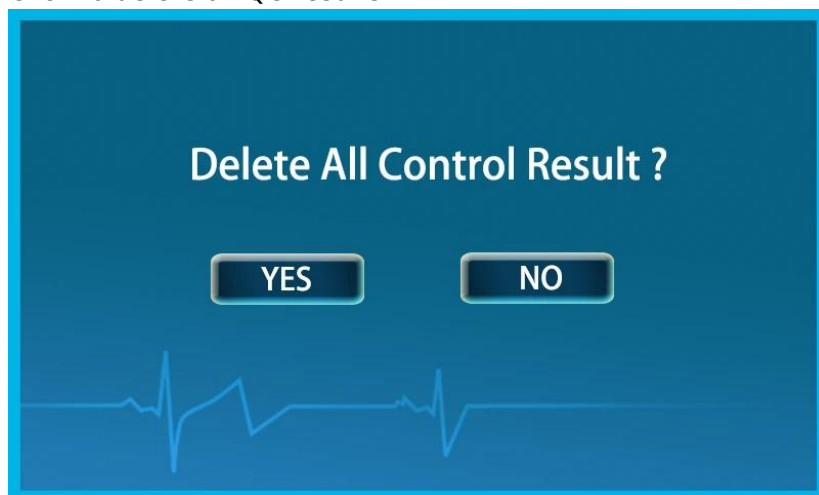


Figure 108

6. Maintenance

6.1 Overview

6.1.1 Brief introduction

In order to ensure the reliable performance, good working condition and service life of the system, the system should be operated and maintained regularly according to the requirements of this user manual. Even if you are only an operator, it is very important to understand the knowledge of maintenance and repair in this chapter. In-depth study would enable the instrument to achieve the best operating state and performance.

For unsolvable problems encountered in use and maintenance problems not covered in this chapter, please contact our company customer service center or the distributor in the area.

Warning:

- Do not perform maintenance work that is not explicitly stated in this chapter. Otherwise, it may result in system damage and personal injury.
- The user can only touch the parts that have been stated and can be use in safe in this manual.
- Unauthorized repairs to the system may result in system damage and personal injury, and the terms promised in the repair contract are no longer valid.
- After the maintenance is completed, please confirm that the system is working properly.
- Do not spill liquids such as water or reagents on the mechanical or electrical parts of the machine.



Biological infection risk:

During maintenance work, be sure to wear gloves, work clothes to prevent infection, and goggles if necessary.

6.1.2 Accessories information

To ensure personal safety and system performance, please use the accessories manufactured or recommended by our company. If you need instrument repair or replacement of accessories and consumables, please contact our customer service department or distributor in your area.

Accessory Name	Location	Note
Halogen Lamp 6V 10W	Light box	Replace parts regularly. Replace it when it has been used for more than 2000 hours or the AD value is less than 45,000. In order to ensure the accuracy and precision of the test results, it is recommended to replace the halogen lamp after 1500 hours of use.
Tube	Peristaltic pump	2mm*4mm
Fuse	Power Socket	F3AL250V(5*20mm)
Thermal Printing Paper	Thermal Printer	56mm*28mm

Table 5

6.1.3 Maintenance materials and tools

Materials & Tools	Applicable range
Clean gauze	Cleaning the surface of shell and screen, etc.
Cotton swab	Cleaning incubator.
Alcohol	Cleaning the outer surface of the instrument.
Neutral detergent	Cleaning the surface of shell and screen, etc.
Fiber-free gloves	Protecting operator in maintenance process.
Phillips screwdriver $\phi 3.3\text{mm} \times 75\text{mm}$	Removing and installing the shell.
Slotted screwdriver $\phi 3.3\text{mm} \times 75\text{mm}$	Removing and installing the power line of halogen lamp.
Allen key $\phi 3.0\text{mm} \times 60\text{mm}$	Remove and install shell, halogen lamp holder.

Table 6

6.2 Regular Maintenance

6.2.1 Daily maintenance

6.2.1.1 Cuvette washing

If there are contaminants or bubbles attached to the cuvette, it would affect the absorbance, so it is necessary to wash cuvette frequently.

Purpose

Wash the cuvette and pipelines to avoid contamination by samples or reagent residues, which may affect the test results.

Maintenance time

- Before testing, 10 times washing are necessary.
- After each test, washing 4~5 times is necessary.
- When all tests are done, please use distilled water flush.
- If there are bubbles in cuvette, you may aspirate neutral detergent to • flush, and then wash it by distilled water repeatedly.

Operation steps

- Insert the suction probe into enough distilled water to avoid bubbles due to insufficient distilled water during the aspiration process.
- Press the PUSH button to clean once, and repeat the operation several times.

Instrument status

When performing this maintenance operation, make sure the instrument is in standby.

6.2.1.2 Check waste connection

The improper connection of the waste liquid pipeline, full of the waste liquid barrel, and empty barrel not in time, which would cause the waste liquid overflow, environmental pollution and cross-infection, and even damage the instrument. Therefore, it is necessary to check the waste connection of the instrument frequently.

Purpose

Check the connection of the waste liquid pipeline and whether the waste liquid barrel is not emptied to avoid waste liquid overflow.

Maintenance time

It is recommended to perform this maintenance operation before starting the test every day.

Instrument status

When performing this maintenance operation, make sure the instrument is in standby or out of power.

Precautions



Biological infection risk:

During maintenance, be sure to wear gloves and work clothes to prevent infection and wear protective glasses if necessary.

Dispose of waste liquid, dispose of waste liquid in accordance with local regulations.

Operation steps

- Click [Wash] on the main menu to check whether the discharge system is normal, keep the waste pipeline not bent and discharge smoothly.
- Make sure that the waste pipe is not immersed in the waste water. Otherwise, the accuracy of aspiration may be affected due to poor drainage.

6.2.2 Weekly maintenance

Weekly maintenance is on washing the flowing cuvette by detergent. Keep detergent in cuvette for 5 to 10 minutes before draining. Then flush it by distilled water again and again.

Recommended detergents:

- 20% sodium hypochlorite solution
- 95% anhydrous ethanol
- Dedicated detergent for chemistry analyzer

6.2.3 Monthly maintenance

Monthly maintenance is mainly about calibrating the aspiration accuracy of the peristaltic pump.

6.3 Unscheduled Maintenance

6.3.1 Cleaning shell

Instrument shells, printer covers, touch screens and other frequently touched places are very easy to get dirty. In order to keep the working environment clean, reduce biological risk, clean them timely.

Purpose

Remove dust or other contaminants for keeping clean.

Maintenance time

Perform this maintenance when dust or other contaminants accumulate on the exposed parts.

Instrument status

When performing this maintenance operation, make sure the instrument is out of power.

Precautions

 **Warning:**

Do not spill liquid on the analyzer to prevent liquid from immersing and causing damage to the instrument.

 **Biological infection risk:**

- During maintenance work, be sure to wear gloves and work clothes to prevent infection and wear protective glasses if necessary.
- Do not discard the gauze used for wiping. Please dispose of it in accordance with relevant regulations.

Operation steps

- Confirm the analyzer is out of power.
- Gently wipe the touch screen, shell and printer cover with gauze dipped in neutral detergent.
- Wipe the PUSH button and suction probe with gauze dipped in alcohol.

6.3.2 Replacement of printing paper

Maintenance time

Perform this maintenance when the printing paper run out or jam.

Instrument status

When performing this maintenance operation, make sure the instrument is in standby.

Precautions

 **Warning:**

If the printing paper installation direction is reversed, nothing can be printed.

Operation steps

- Turn the latch on the upper right corner of the printer upward to open the printer cover and take out the old paper core (Some types of print paper may have no paper core).

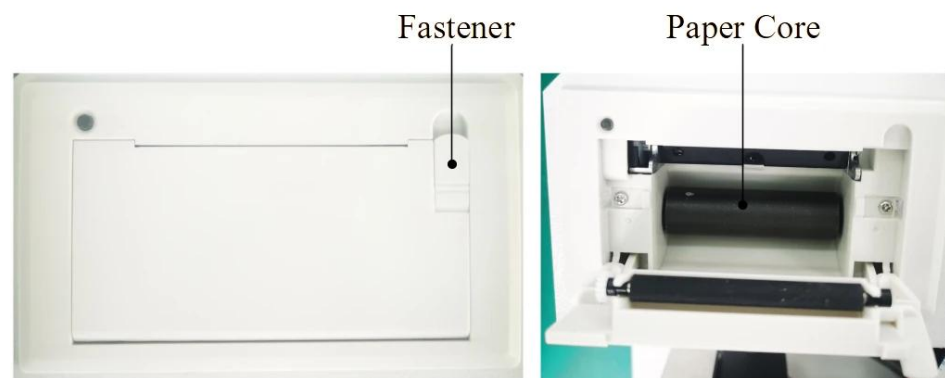


Figure 109

Load a new roll of printer paper in the slot, pay attention to the direction as shown in the figure:

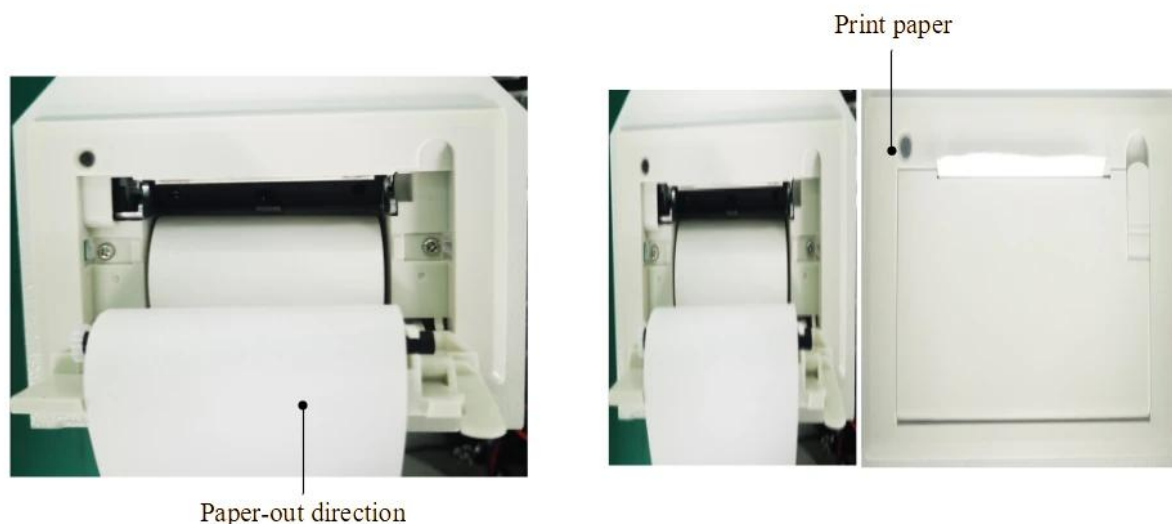


Figure 110

- Cover the printer cover, click [Feed] on the main menu of the screen, make sure the paper is running properly.

6.3.3 Replacement of fuse

Maintenance time

This maintenance can be performed when the instrument switch does not respond and is judged to have blown a fuse.

Instrument status

When performing this maintenance operation, make sure the instrument is out of power.

Precautions



Warning:

The operator must use the fuse of the specified specification.

Operation steps

- Turn off the power of analyzer and pull out the power line from the power socket.
- Take out the fuse seat and replace the fuse.



Figure 111



Figure 112

- Plug the fuse seat into original position.

6.3.4 Replacement of pump tube

Maintenance time

Replace the tube in the peristaltic pump when the aspiration accuracy gets worse due to tube broken or wear on the inner wall.

Instrument status

When performing this maintenance operation, make sure the instrument is out of power.

Precautions



Warning:

Before replacing the pipeline, click [Wash] on the main menu several times to empty the pipeline.

Operation steps

- Open the peristaltic pump shell counterclockwise as shown in the figure.



Figure 113

Take out the worn water pipe, unplug it from the joint, take out the new pipe from the accessory box, cut the appropriate length, connect it to the joint and install it into the peristaltic pump as it is.

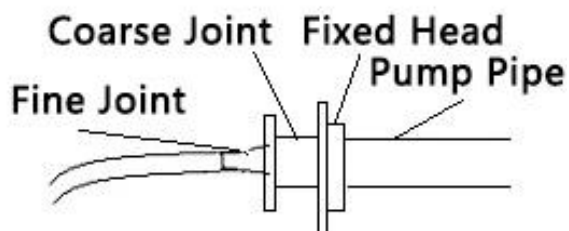


Figure 114

- Close the casing of the peristaltic pump and install it in place when you hear a click.
- Click the [Wash] function on the main menu interface of the touch screen, confirm that the suction and discharge function is good, and calibrate the suction volume according to 4.1.5.

6.3.5 Replacement of halogen lamp

If light source lamps age, light energy would deviate from the light measurement range. During the sample test, it won't test correctly because of interference.

Maintenance time

When the AD value of all optical paths is less than 45000, click [Filter] on the main menu to do gain. If the gain fails, consider replacing the halogen lamp.

Instrument status

When performing this maintenance operation, make sure the instrument is out of power.

Precautions



Warning:

Do not touch the surface of the halogen lamp, otherwise it would affect the amount of light. If the surface is found to have smudges such as fingerprints, wipe it with a gauze dampened with alcohol.

Operation steps

- Prepare a new halogen lamp.
- Turn off the power switch, wait 20 minutes for cooling down.
- Open the operation window, remove the silicone tube shown in the figure from the suction probe, then withdraw the pipette from the suction probe and remove the suction probe.



Figure 115

Unscrew 7 stainless steel hexagon cylindrical head screws M6*16 (three in one) from below the bottom plate with the hexagon wrench, hold the shell with both hands and lift it up for 15cm before turning the shell assembly to the left, as shown in the figure, open the FFC fixing seat shown in the figure, pull out the FFC, and remove the shell assembly.

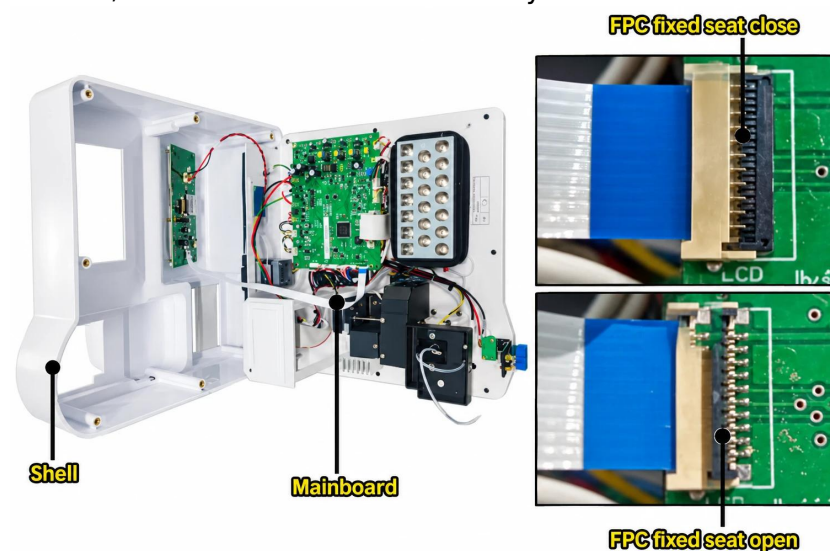


Figure 116

Use an Allen wrench to loosen (do not need to remove) the two fastening screws fixing the halogen lamp cover in the shown position, pull up the halogen lamp cover, and place it properly.

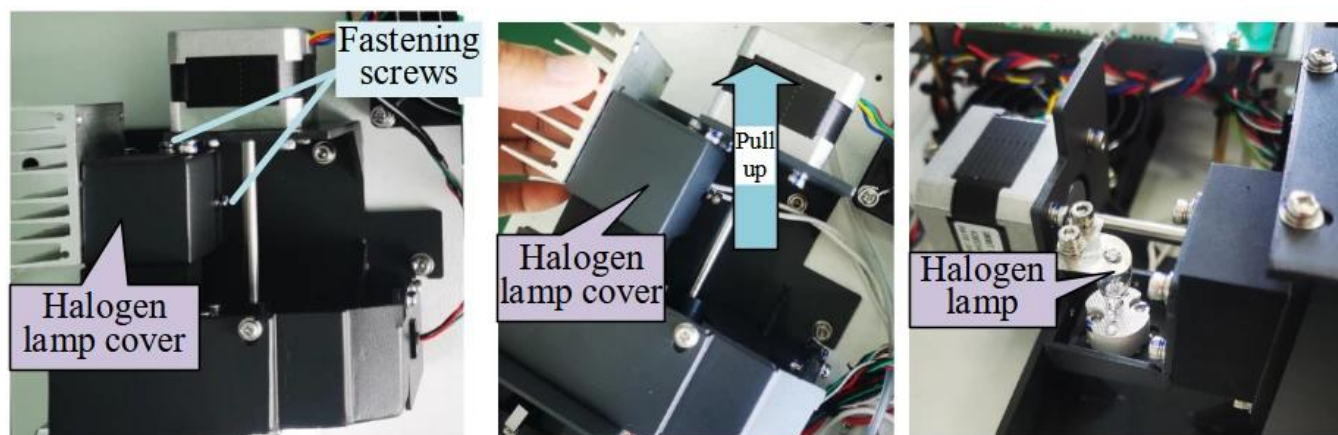


Figure 117

Use a Allen wrench to remove the screws and parts shown in the figure and place them properly for later use. Wearing rubber gloves, hold the halogen lamp with your fingers and pull the halogen lamp bulb up with slight force.

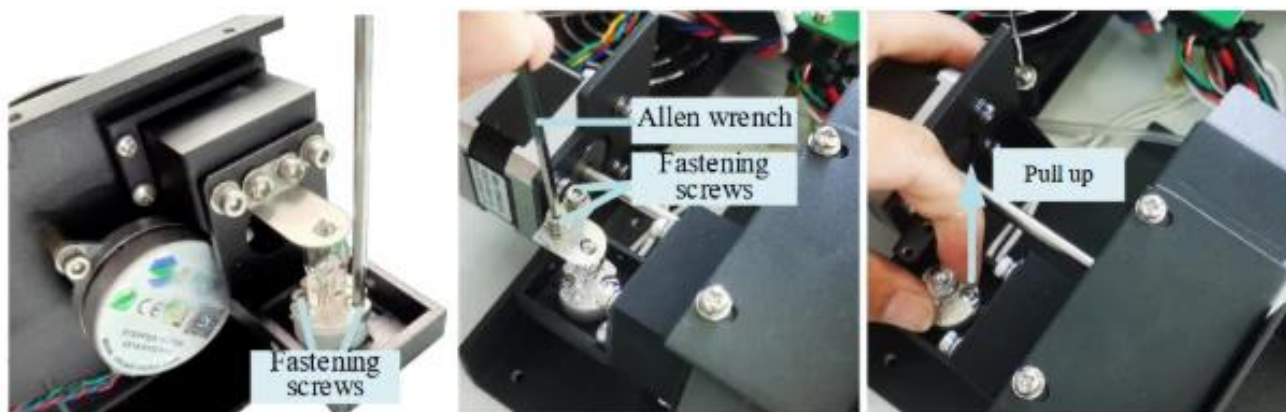


Figure 118

- Replace the halogen lamp with a new one (the surface of the lamp should not have fingerprints, dander, dirt, etc., if so, use mirror wiping paper to wipe it clean).
- Remove the two screws fixing the cover of the OCB(optical circuit board) from the front of the instrument, remove the OCB cover, remove the two screws fixing the OCB, remove the OCB, turn on the power of the instrument, choose 510 wavelength on the "Filter", install the cuvette into the incubator, fine-tune the positioning screws at both sides of the assembly, so that the light source passes through the light-transmitting hole of the cuvette.

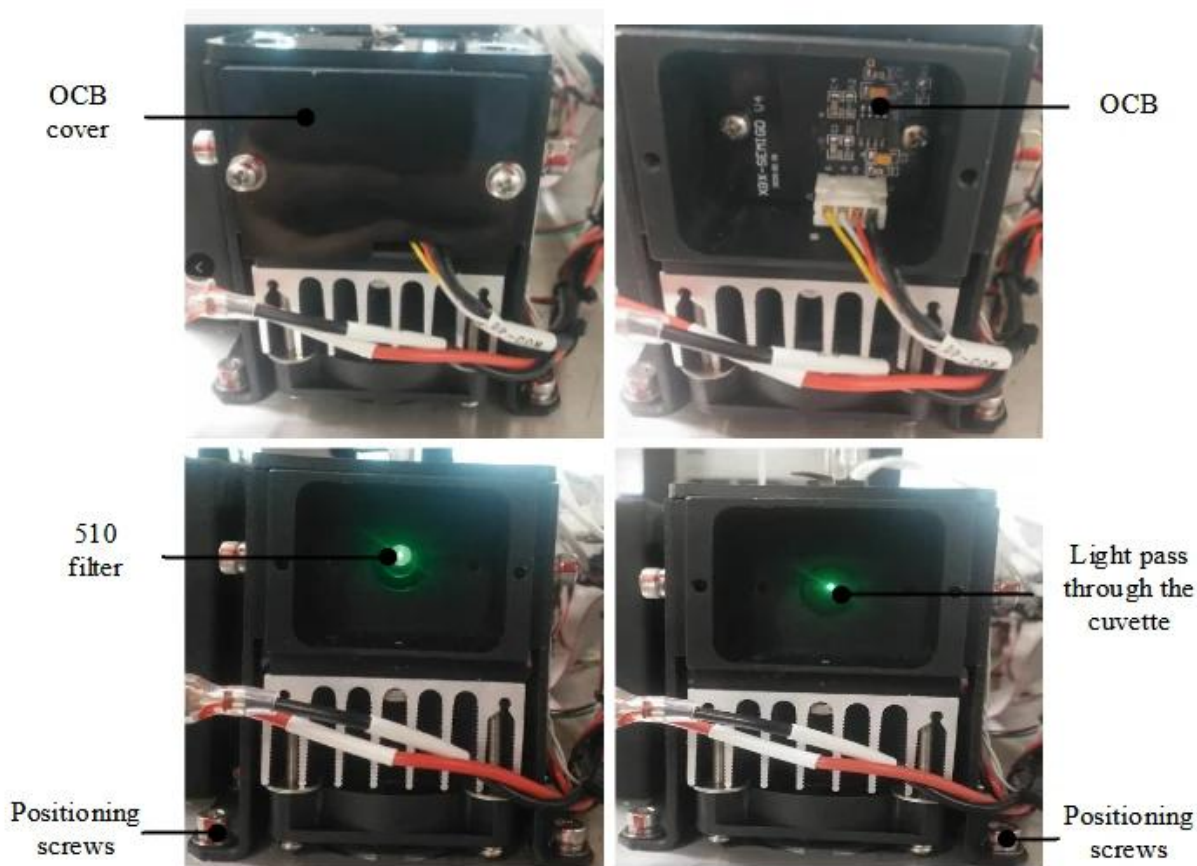


Figure 119

- Perform optical path calibration and optical path test. The test can only be performed when the AD value of each optical path is above 48000.
- Install the shell and other parts in reverse order.

6.3.6 Replacement of battery

Maintenance time

After the battery is exhausted and the screen does not work properly, the screen battery needs to be replaced.

Device condition

Make sure the device is powered off when performing this maintenance operation.

Precaution



Warning:

For a new battery, please use the specification specified by our company, which is CR2032 button battery 3V.

Operation steps

- Prepare 1 new battery(CR2032 button battery 3V).

- Close the main power switch of the device, unplug the power cable on the power socket.
- Use the cross screwdriver to unscrew the 4 stainless steel cross groove disc head screws M3*6(three in one) on the battery installation plate, and pull the battery installation plate out carefully.



Figure 120

Take out the battery installation plate slowly, turn the switch of the battery box to the "OFF" side, open the battery box up and down, replace the old battery with a new one.

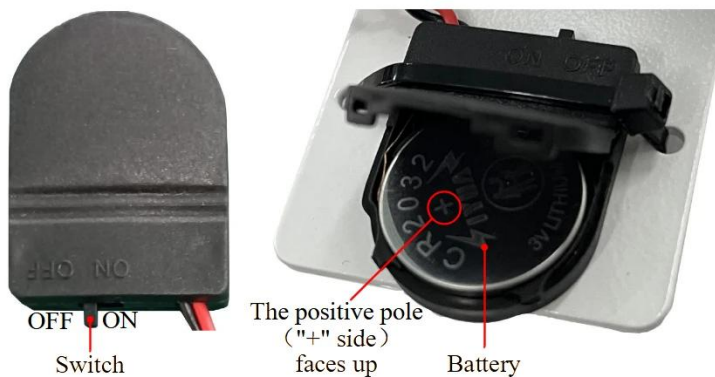


Figure 121

Precaution

 Warning:

- When replacing the new battery, the positive electrode with the "+" side of the battery should be facing up, as shown in the figure above;
- Ensure that the shrapnel and battery positive contact, otherwise not conduction;
- When replacing the battery, pull carefully to avoid damage to the line.

Close the battery box and turn the battery box switch to the "ON" side before installing back the battery installation plate, which avoids affecting the touch screen work.

7. Troubleshooting

This chapter explains all kinds of malfunctions, which often happen in routine operations. Besides, it analyzes the related reasons about malfunctions and supplies some methods against the malfunctions. Please take measures to eliminate the malfunctions which occur in use or before use according to relevant troubleshooting.

If the malfunctions still exist, please contact our company customer service center or the distributor in the area as soon as possible.



Warning:

- You must turn off the analyzer, cut off the power, and then disconnect the power plug from the socket. The repair work must be taken by our company's professional trained staff.
- The analyzer must use a suited power supply and voltage. Or else, the damage which is caused against this order is out of our responsibility.



Caution:

Analysis of samples may give incorrect test results in the case of instrument malfunction. If there is a fault detected in the sample, be sure to troubleshoot before use.



Biological infection risk:

Sample, QC product, STD, wasted liquid and so on have potential biochemistry risk. The operator must comply with the laboratory regulations about the safety operator to wear personal protective devices (like: laboratory protective clothing, gloves etc.), and in accordance with local government regulations to dispose of the waste materials generated by the instrument detection.

7.1 Instrument Faults and Handling

The failure analysis and solution for common faults are shown in the following table:

Accident details	Main reason	Solution
The instrument doesn't work	Fuse burn-out.	Replace the fuse.
	Power socket is poor connection.	Check the power interface.
Preheating time is too long	Effect of ambient temperature (Especially in winter).	Use air conditioner to keep the environment temperature to 15°C~30°C.
	The heating voltage is insufficient and could lead to a longer heating time.	Please remove the shell, use the digital multimeter to test the voltage of incubator heating rod, if there is no voltage, and replace the Peltier.
The heating system continues to heat up which is beyond the preset temp	Careless error of the temperature sensor.	Please contact us for replacement of the temperature sensor.

Insufficient suction	Pipeline leak.	Check and replace pipe, joints or suction probe.
	The waste barrel is placed too high or too low.	Place the waste barrel lower than the instrument.
	During the suction process, the suction probe exposed the liquid level and caused the air to be suction.	Insert the suction probe into the bottom of the sample tube.
Abnormal or no suction	Pump pipe worn out.	Replace pump pipe.
	Pipeline is blocked.	Check for clots in cuvette or pipelines.
	Pipeline is leaking due to joint broken or loosen.	Check the joints and pipes.
	Peristaltic pump motor is not working properly.	Please contact us for motor replacement.
There are mistakes with auto zero	There is no distilled water in cuvette.	
	Cuvette is dirty.	
	There is air bubble in cuvette.	
	Pipeline leak.	Check and replace pipe, joints or suction probe.
	Pump pipe is worn out.	Replace the pump pipe.
	Halogen lamp burned out.	Replace halogen lamp.
All or some filters have a high AD value	There is air bubble in cuvette.	Wash the cuvette.
	Halogen lamp burned out.	Replace halogen lamp.
	The filters are damaged.	Please contact us for plate replacement.
Wrong Blank result	The light source fault.	Adjust or replace halogen lamp.
	The cuvette is empty or blocked.	Check and wash cuvette.
	Too much light.	No filter or filter problem, check the filter plate.
Control value is too low	Standard factor is too high.	Check the standard factor, check whether the STD concentration is correct, check whether the STD test is correct.
	The absorbance of the reactant is out of linear range.	Use a new reagent or dilute the sample.

Poor repeatability of test results	There is air bubble in cuvette.	Wash the cuvette.
	Pipeline leak.	Check and replace pipe, joints or suction probe.
	The inaccuracy of the aspirate volume causes cross contamination in the test.	Re-calibrate aspirate volume or replace pump pipe.
	Halogen lamp burned out.	Replace halogen lamp.
	The working environment is poorly ventilated or temperature is too high.	The temperature of the laboratory working environment must meet the requirements of the analyzer.
	The reagent is unstable or may contain suspended particles.	Use a qualified reagent.
	Whether the sample is hemolytic or whether the reagent is invalid.	Check and replace the sample or reagent.
	Voltage is not stable.	Connect regulated power.
The results are uniformly low or high	The aspirate volume of STD is wrong.	Add standard accurately.
	Standard out of date.	Change the standard.
	Reagents (especially enzymatic reagents) are spoiled by contamination.	Use a qualified reagent.
	Wrong temperature.	Temperature calibration.
	The ratio of sample to reagent is incorrect.	Add samples and reagents exactly as required in the reagent specification.
Print white paper	The printing paper installation direction is reversed.	Reinstall thermal printing paper.

Table 7



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