SINNOWA

BS-3000M

User's manual

NANJING SINNOWA MEDICAL SCIENCE&TECHNOLOGY CO.,LTD.

Add: Qilin Industrial Park Nanjing, China Z.P.: 211135

Tel： 86-25-84121523 ,84125155 Fax：86-25-84127199

http://www.sinnowa.com e-mail: service@sinnowa.com

Contents

1 Description

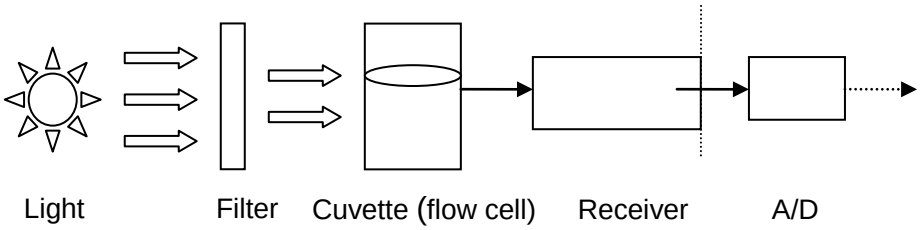
BS series of Semi-Automatic Clinical Chemistry Analyzers is used to measure biochemistry items and a part of immunity items, with characteristics of high precision, good repetition and complete function.

1.1 Principle

The analyzer is designed on the basis of Lambert-Beer Law.

When a monochromatic light beam shoots through target solute, it will be absorbed. The solute concentration could be calculated by measuring absorbance

The measuring process of the analyzer is represented as following scheme:



1.2 Working Condition

-- Power supply：AC220V±10%, 50Hz±2% or AC110V±10%, 60Hz±2%

-- Fuse：2A

-- Power：150VA

-- Temperature: 15℃—30℃

-- Humidity: 30%- 70%

-- Atmospheric pressure: 86.0kpa-106.0kpa

-- Keep away from electromagnetism field, direct sunlight and ultraviolet radiation.

-- Connect power supply to ground well.

1.3 Technical Specification

-- Methods: End point, Two points, Multi standard, Kinetic, Bichromatic and Serum blank, ect.

-- Test program: 204 items, which may be modified and deleted

-- Capacity of flow cell: 32ul

-- Temperature control: 25℃，30℃，37℃ ±0.2℃，room temperature

-- Optical system: interferential filters, 340 / 405 / 492 / 510 / 546 / 578 / 620nm and two more filters available.

-- Light source: 6V 10W halogen lamp

-- Photometric range: 0-2.5A

-- Display: LCD screen

-- Printer: built-in thermal printer

-- Serial output: RS-232 standard

-- Dimension: 39cm×37cm×18cm

2 Installations

Attention: The instrument should be installed by professionals.

2.1 Unpacking

Unpack outer package, and check:

-- If the outer package is broken during transportation.

-- If the packing contents are complete referring to packing list.

If you find any problems, please contact the local distributor or SINNOWA service department.

2.2 Installation

-- Install the instrument on a stable desk.

-- Connect power cable with the appointed power supply, before connecting check the voltage of the electricity.

-- Put waste pipe end (at the back of the instrument) into waste bottle.

-- If voltage drifts more than 10 %, please connect a stabilizer.

-- Switch on the main machine, before test. The analyzer must be warmed up for 5 minutes at least.

3 Instrument Structure and Function

3.1 Structure

Front view

Back view

3.2 Components

The main components: SCM, LCD screen, keyboard, aspirating probe, optical system, peristaltic pump and built-in printer.

Flow cell is made of quartz. The volume is 32ul. The advisable aspiration volume is 300-500ul.

3.3 Function of Keyboard and Button

“PUSH” button: used for controlling aspirating sample.

Keyboard: composed of 19 film keys, the key function is listed in Table 1.

Table 1 The key function on the film board

No	Film key	Function
1	Direction key	To choose the menus
2	Enter	To confirm the inputted data and program
3	Esc	To return to the previous menu or main menu
4	Feed	For printer to load paper, feed paper
5	Wash	Wash flow through cell(only for SA-20)
6	Number keys	To input numbers, letters ,and so on
7	Decimal point key	To input decimal

Remark: press “PUSH” button to clean pipeline and flow cell for avoiding reaction liquid remains.

Clean the pipeline in the following cases:

-- Before starting work everyday.

-- After finishing work everyday.

-- After testing high concentration sample.

-- After being unused for a long time

-- A/D value is out of range.

4 Instrument Operations

Turn on power switch, and the screen will display as Figure 4-1 , 4-2.

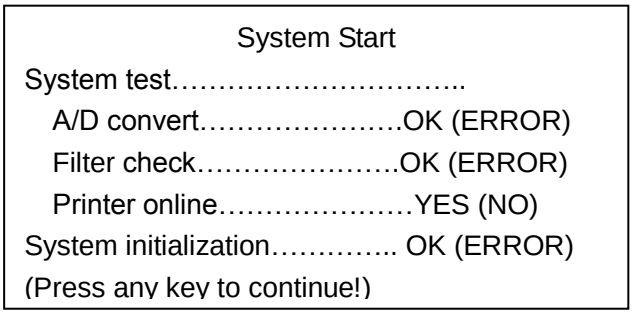


Figure4-1

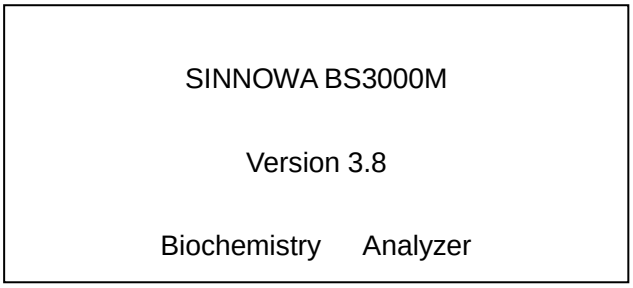


Figure4-2

Press “Enter” to enter the main menu, shown as Figure 4-3.

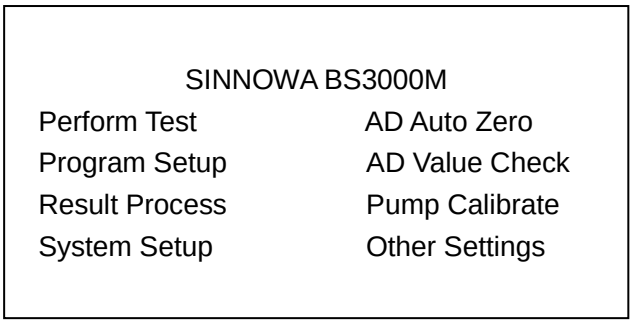


Figure 4-3

Use direction key to choose submenu from the main menu. Then press “Enter” to enter the submenu.

The menu and its individual function is listed in Table 2.

Table 2. Menu function

No	Menu	Function
1	Perform Test	Do sample test
2	Program Setup	Set up parameters of each test item
3	Result Process	Result print, review, delete and Q.C management
4	System Setup	Set up temperature, filter number, cuvette diameter, language and print model
5	AD Auto Zero	To read blank
6	AD Value Check	Inspect the signal value (AD value gain and offset) of each wavelength
7	Pump Calibrate	Calibrate pump movement steps
8	Other Settings	For headline ,time, date and OD test

4.1 Program Setup

Use direction key to choose “Program Setup” from main menu and press “Enter”, the screen will show as Figure 4-4.

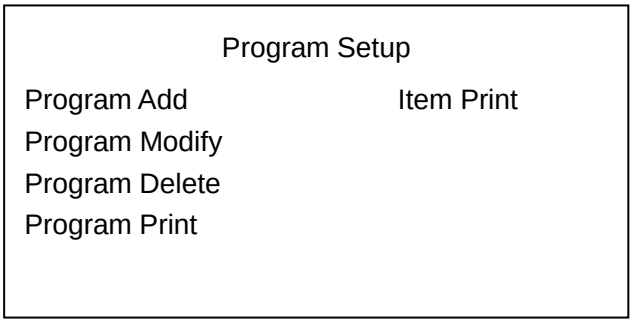


Figure 4-4

4.1.1 Program Add

"Program Add" is for adding new test programs. Use direction key to choose "Program Add" and press "Enter". All program parameters are shown as Figure 4-5 to 4-11.

Attention: Please press "Enter" key to confirm after finishing the setup.

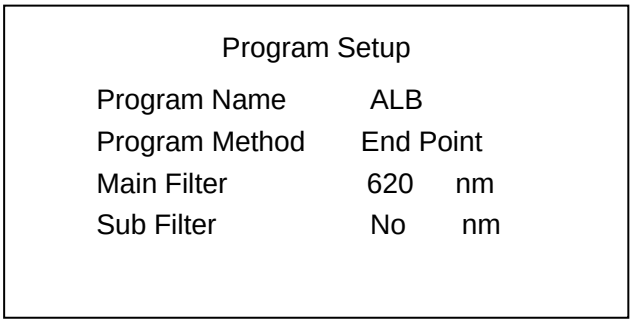


Figure 4-5

Program Name: press number key to input program name, e.g. ALB, TP …

Program Method: press "◄" "►" to choose End Point, Kinetic, Two points, and Bichromatic.

Main Filter (nm): press "◄" "►" to choose 340, 405, 492, 510, 546, 578, 620, etc.

Sub Filter (nm): Press "◄" "►" to choose sub wavelength (for Bichromatic method only).

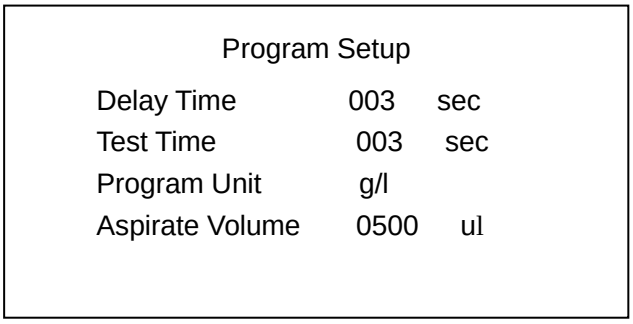


Figure 4-6

Delay Time: Press number key to input numbers (001~999).

Test Time: Press number key to input numbers (001~999),

Program Unit: Press "◄" "►" to choose g/dl, g/l, mg/dl, mg/l, mmol/l, U/L, umol/l, U/ml, ug/ml, ng/ml, and ug/dl.

Aspirate Volume: Press number key to input aspirate volume.

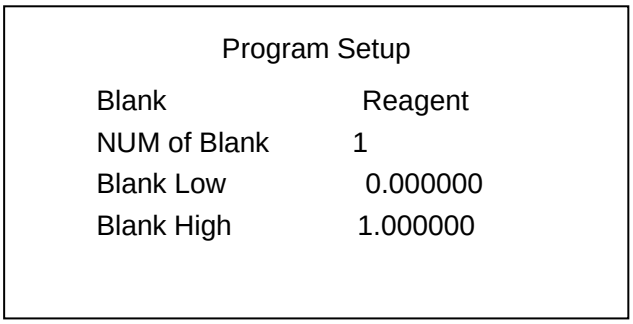


Figure 4-7

Blank: Press "◄" "►" key to choose Water (ion-free), Reagent, or Serum.

NUM of Blank: Press number key to input blank reading times.

Blank Low: Press number key to input low limit value (O.D)

Blank High: Press number key to input high limit value (O.D)

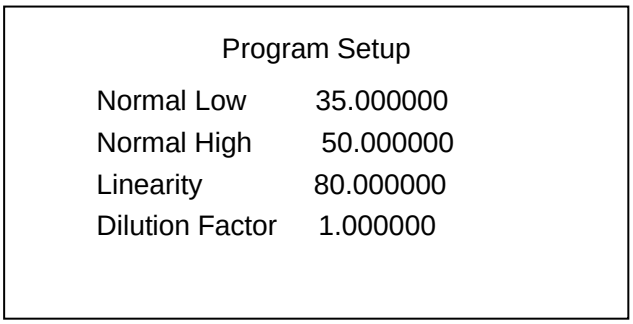


Figure 4-8

Normal Low: Press number key to input low limit value of sample test.

Normal High: Press number key to input high limit value of sample test.

Linearity: Press number key to input linearity value, referring to reagent description.

Dilution Factor: Press number key to input dilution ratio. The default is 1.

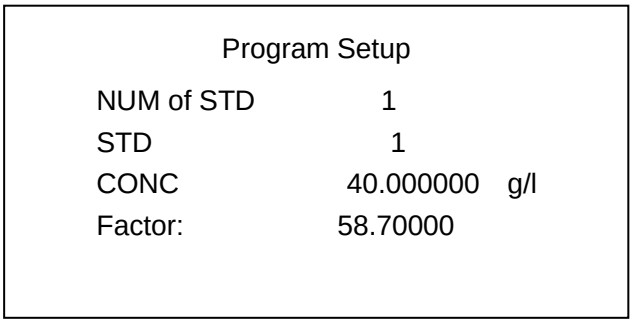


Figure 4-9

NUM of STD: Press number key to input the number of standards, only

choose 1 to 8.

STD: The sequence of standard will automatically change.

Conc.: Concentration of standard corresponding to each standard, press number key to input.

Factor: This value could be input by operator referring to reagent manual or automatically obtained by calibration.

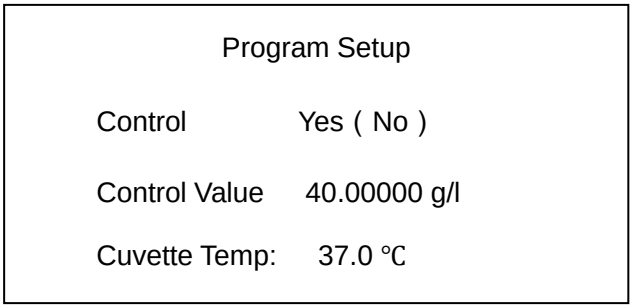


Figure 4-10

Control: Press "◄" "►" to choose "Yes" or "No" to confirm testing control or not.

Control Value: Input control value referring to control's manual.

Cuvette Temp: Press "◄" "►" to select test temperature, 37℃, 30℃, 25℃, and R.T. (room temperature) available.

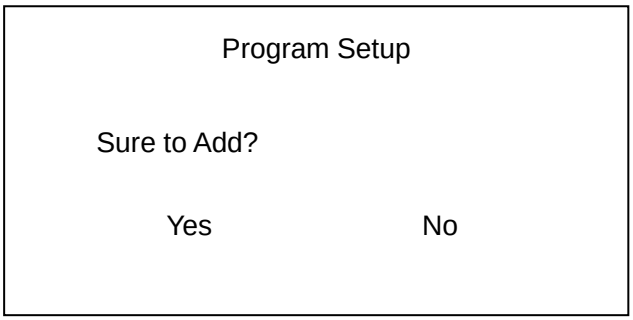


Figure 4-11

Sure to Add: Select "Yes" to save the setting program, select "No" to cancel the setting program.

4.1.2 Program Modify

"Program Modify" is for checking and modifying program parameters. Choose "Program Modify", and press "Enter", the screen will show as Figure 4-12.

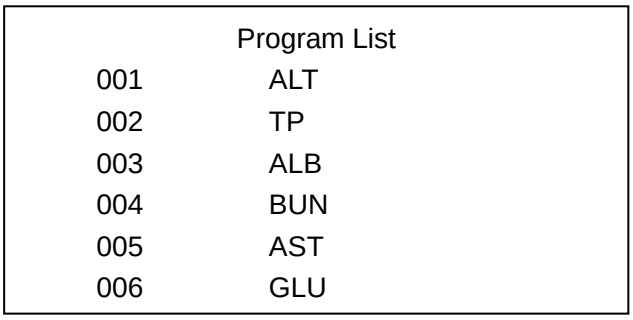


Figure 4-12

Use “▲” “▼” to select the program then press “Enter”.

4.1.3 Program Delete

“Program Delete” is for deleting program. Use direction key to choose “Program Delete”, and press “Enter”, the screen will show as Figure 4-13.

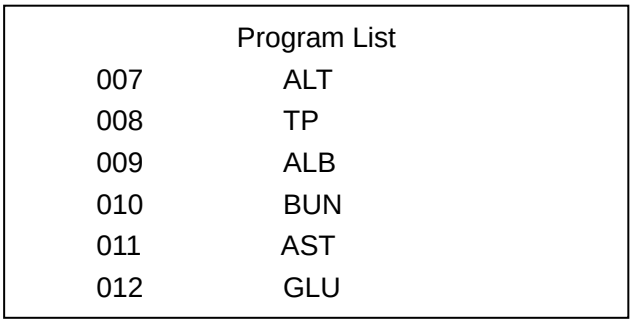


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Figure 4-13

Use “▲” ▼ to select the program, and press “Enter”, the screen will show as Figure 4-14.

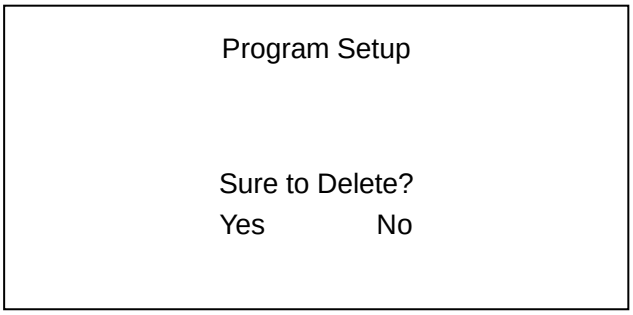

Figure 4-14

Select “Yes” to confirm deleting, select “No” to cancel deleting.

4.1.4 Program Print

“Program Print” is for printing program. Use direction key to choose “Program Print”, and then press “Enter”, the screen will show as Figure 4-15.

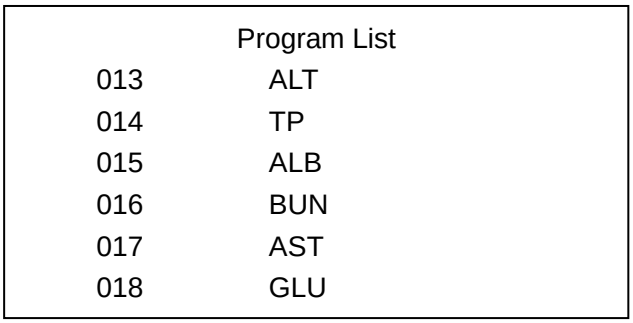

Figure 4-15

Use “▲” “▼” to select the program , and then press “Enter”, the screen will show as Figure 4-16.

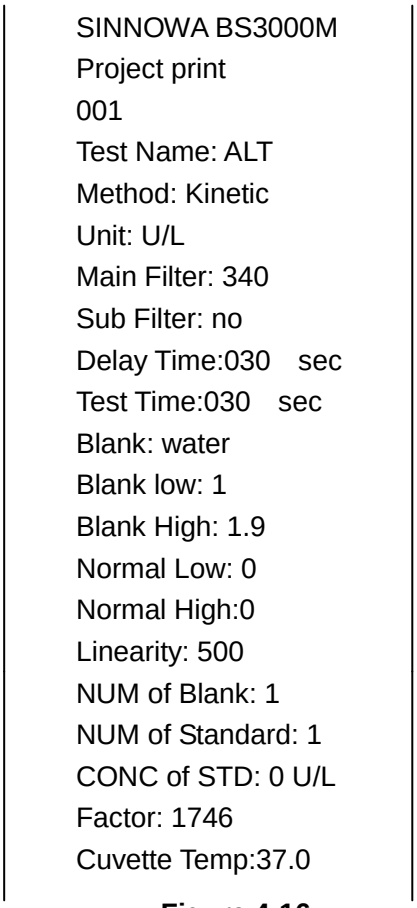

Figure 4-16

4.2 Perform Test

Use direction key to choose “Perform Test” from the main menu, and press “Enter”, the screen will show as Figure 4-17.

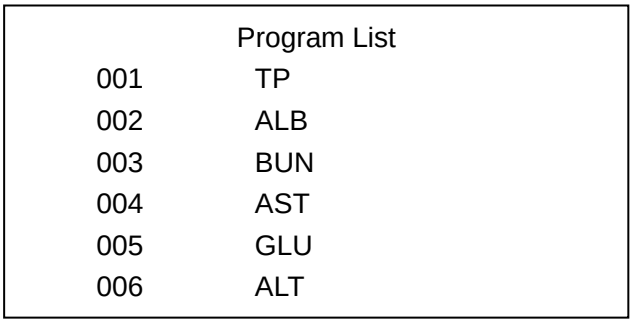

Figure 4-17

Use “▲” “▼” to select the program, and then press “Enter”.

If the temperature is up to setting value, the screen will show as Figure 4-19.

If the temperature isn’t up to setting value, the screen will show as Figure 4-18.

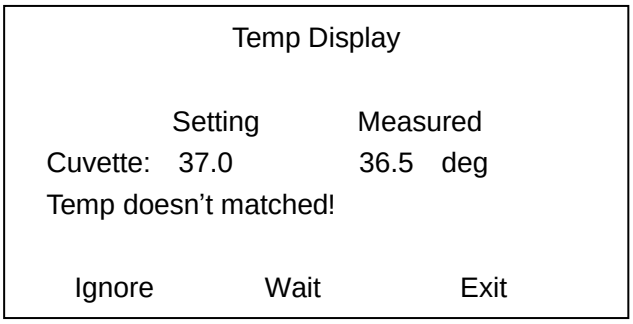

Figure 4-18

Ignore: system enters next page, start testing.

Wait: system waiting.

Exit: system back to main menu.

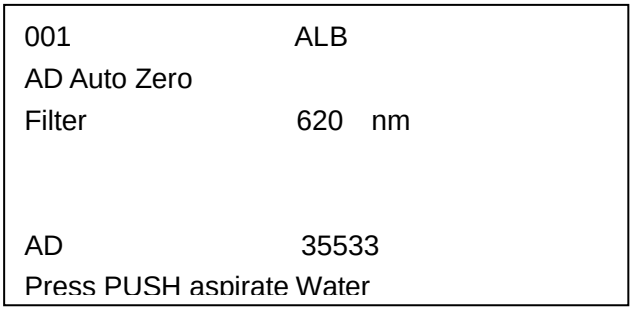

Figure 4-19

Insert pipette into distill water then press “PUSH” button to aspirate distilled water, the instrument will test AD value automatically, and then display the AD value as shown in Figure 4-19.

Enter next page when the AD value is stable, the screen will show as Figure4-20.

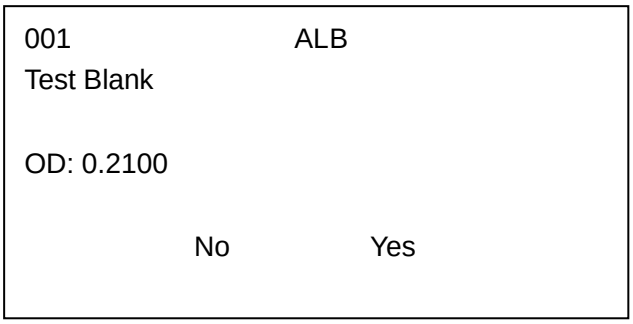

Figure 4-20

If choose “No”, the instrument will use the last blank value and do the standard test directly. The screen will show as Figure 4-23.

If choose “Yes”, the instrument will do blank test, the screen will show as Figure 4-21.

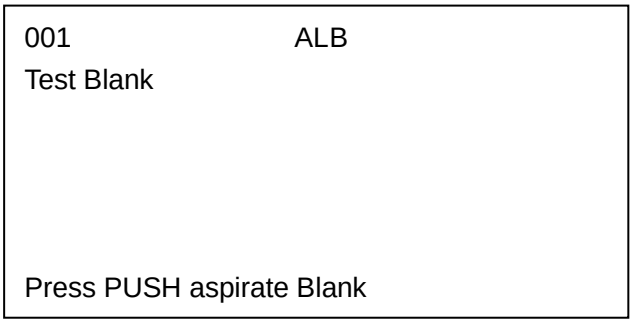

Figure 4-21

Insert pipette into blank then press “PUSH” button to aspirate blank. The instrument will test blank absorbency, then display as shown in Figure 4-22.

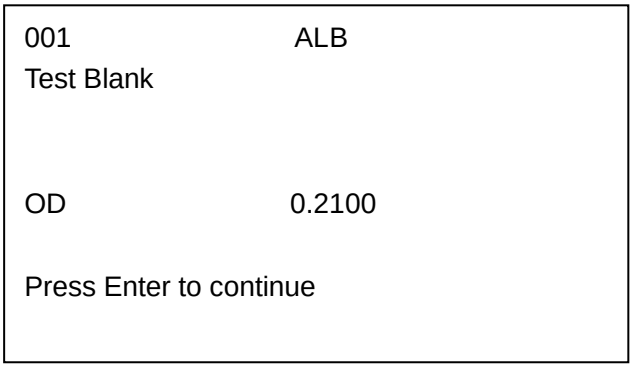

Figure 4-22

Press “Enter”, enter the next page, the screen will show as Figure4-23.

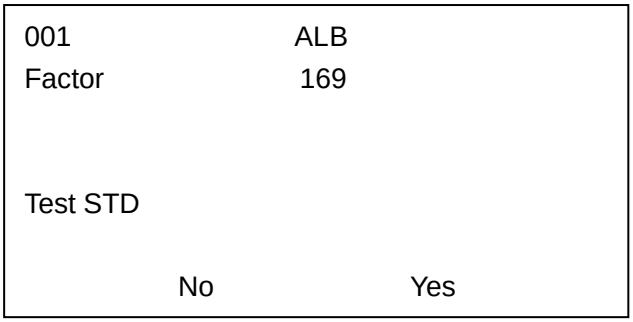

Figure 4-23

If choose “No”, the instrument will use the last factor displayed and do the sample test directly, and the screen will show as Figure 4-26.

If choose “Yes”, the instrument will do standard test, and the screen will show as Figure 4-24.

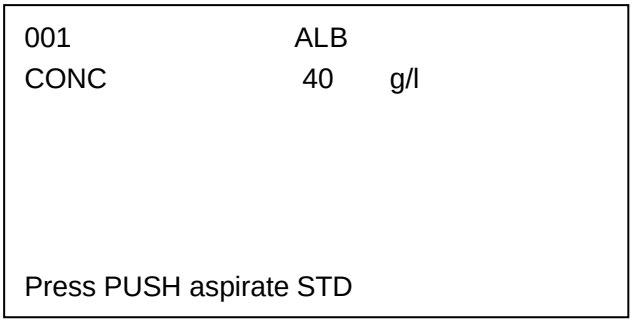

Figure 4-24

Insert pipette into standard then press “PUSH” button to aspirate standard.

The instrument will test standard absorbency and calculate factor automatically, then display as shown in Figure 4-25.

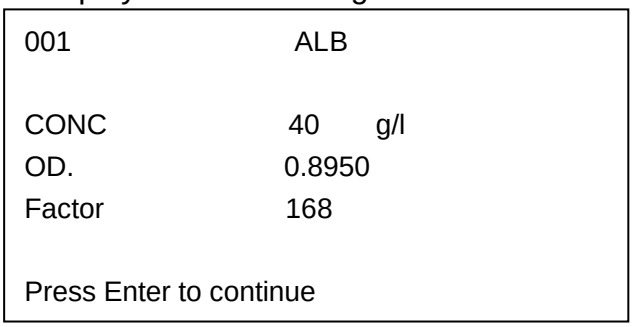

Figure 4-25

Press “Enter”, enter the next page, the screen will show as Figure4-26.

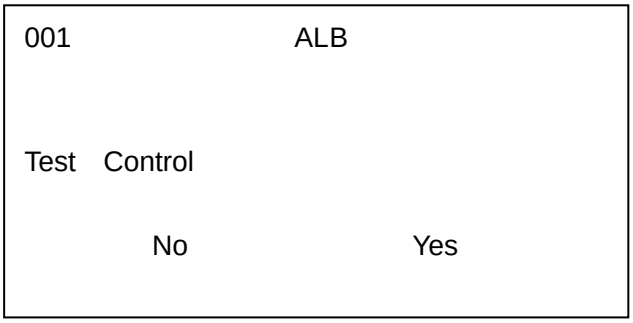

Figure 4-26

If choose “No”, the instrument will directly do the sample test, and the screen will show as Figure 4-29.

If choose “Yes”, the instrument will do control test, the screen will show as Figure 4-27.

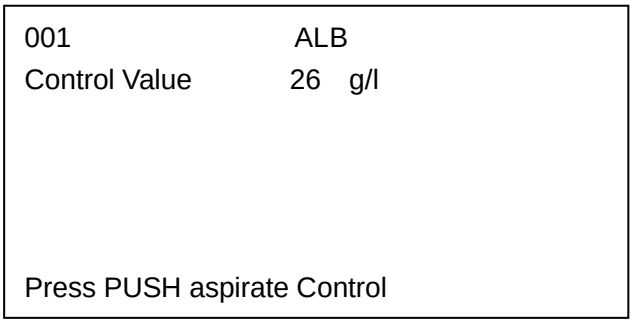

Figure 4-27

Insert pipette into control then press “PUSH” button to aspirate control. The instrument will test control, then display test result as shown in Figure 4-28.

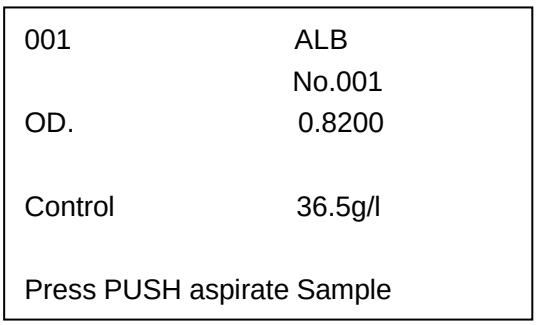

Figure 4-28

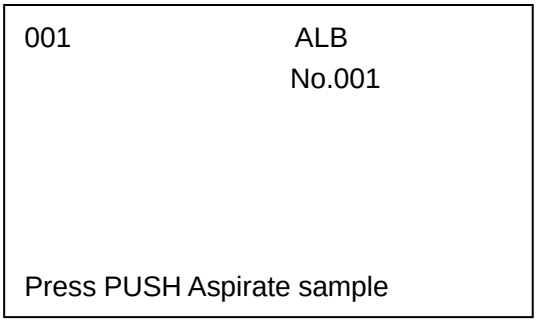

Figure 4-29

Press number key to input sample ID (the default is No.001).

Insert pipette into sample then press “PUSH” button to aspirate sample. The instrument will test sample, then display test result as shown in Figure 4-30.

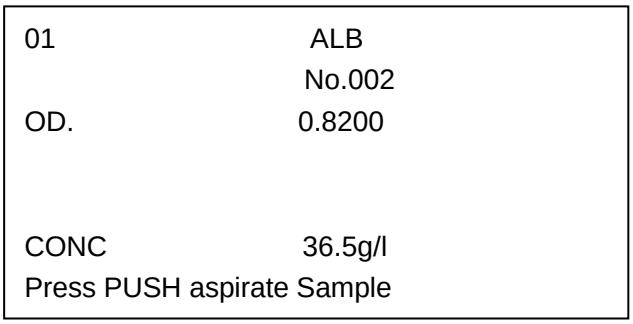

Figure 4-30

Press “Wash” to wash flow cell with distilled water, “PUSH” button to test the next sample ,”ESC” back to main menu.

Attention:

--If the “Program Method” is Kinetic, the instrument will display the sample reaction curve with test result. The screen will show as Figure 4-31.

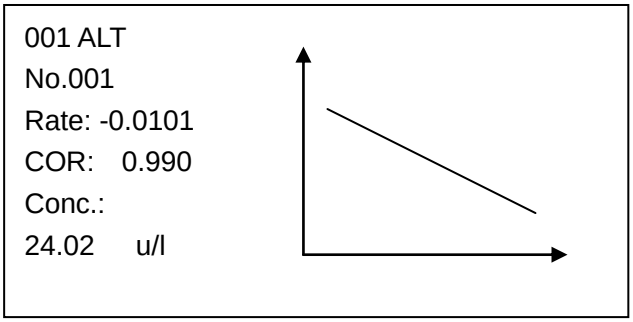

Figure 4-31

--If the program “Blank” is Serum, the sample test has 2 steps (After testing AD, blank, standard and control, and then screen will show as Figure 4-32).

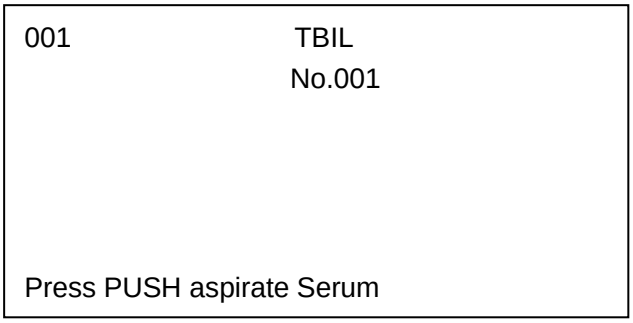

Figure 4-32

Firstly, insert pipette into serum blank then press “PUSH” button. The instrument will test OD1 (absorbency of serum blank), then display as shown in Figure 4-33.

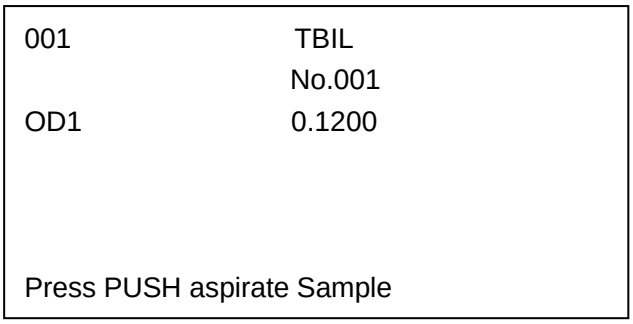

Figure 4-33

Secondly, Insert pipette into sample then press “PUSH” button. The instrument will test OD2 (absorbency of sample), calculate result, then display as shown in Figure 4-34.

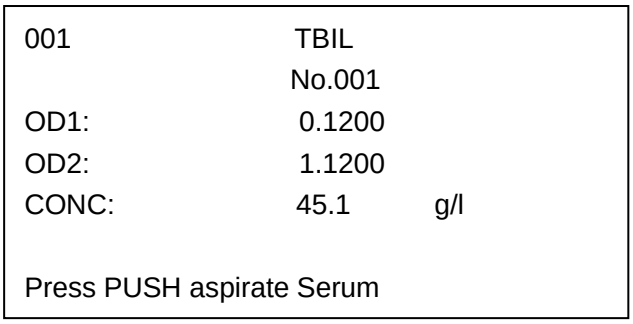

Figure 4-34

Press “ESC” to return, press “PUSH” to test next sample.

4.3 Result Process

The instrument can store 1000 test results and update with new test results automatically. Use direction key to choose “Result Process”, then press “Enter”, the screen will show as Figure 4-35.

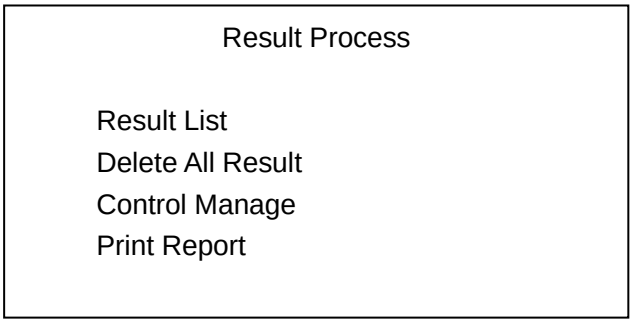

Figure 4-35

4.3.1 Result List

"Result List" is for browsing and printing test results. Use "▲" "▼" to choose "Result List", and then press "Enter", the screen will show as Figure 4-36.

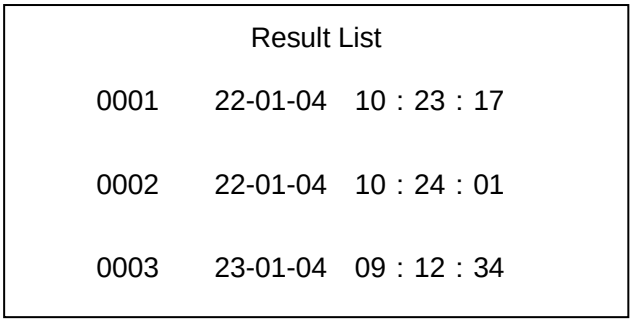

Figure 4-36

Use "▲" "▼" to choose result number, and then press "Enter", the screen will show as Figure 4-37.

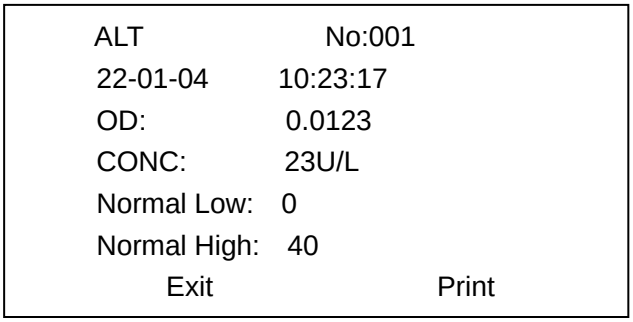

Figure 4-37

Choose "Exit" back to previous page, "Print" to print the result.

4.3.2 Delete All Result

Use "▲" "▼" to choose "Delete All Result", and then press "Enter", the screen will show as Figure 4-38.

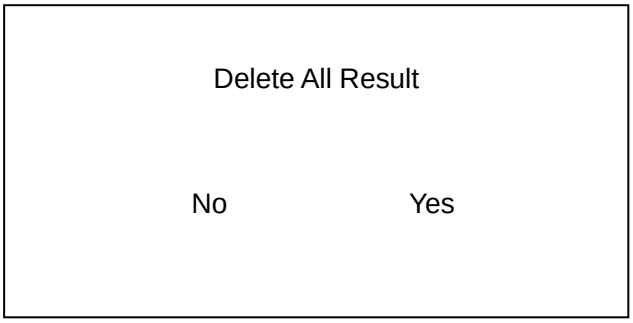

Figure 4-38

Choose "Yes" to delete all results, "No" back to previous page.

4.3.3 Control Manage

Use “▲” “▼” to choose “Control Manage”, and then press “Enter”, the screen will show as Figure 4-39.

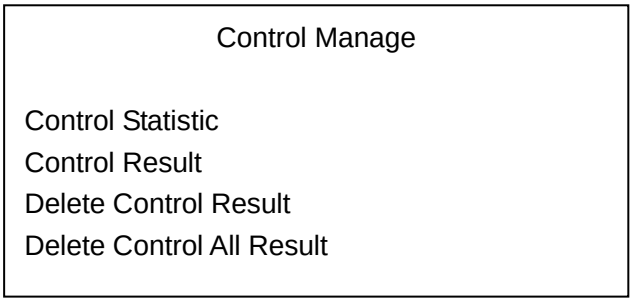

Figure 4-39

4.3.3.1 Control Statistic

Use “▲” “▼” to choose “Control Statistic”, and then press “Enter”, the screen will show as Figure 4-40.

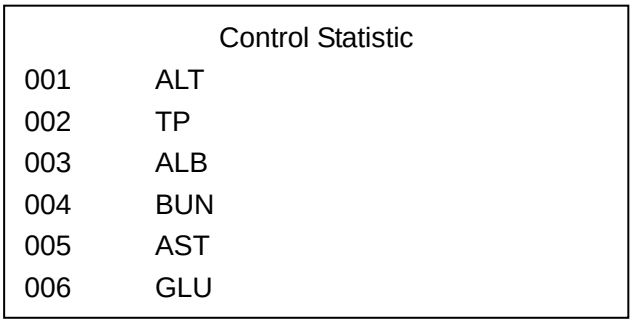

Figure 4-40

Use “▲” “▼” to choose test program, then press “Enter”, the screen will show as Figure 4-41.

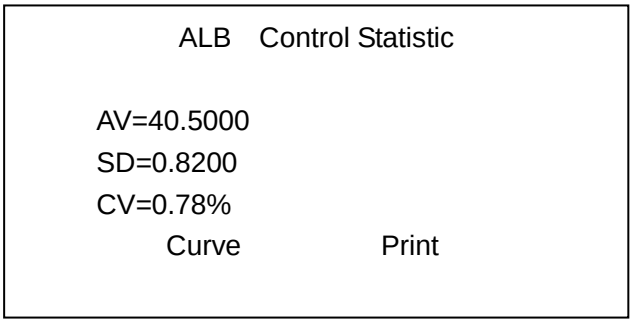

Figure4-41

AV: average value of control test
SD: standard deviation of control test
CV: control variation rate of control test
Curve: Print: to print QC curve

4.3.3.2 Control Result

Use“▲” “▼” to choose “Control Result”, and then press “Enter”, the screen will show as Figure 4-42.

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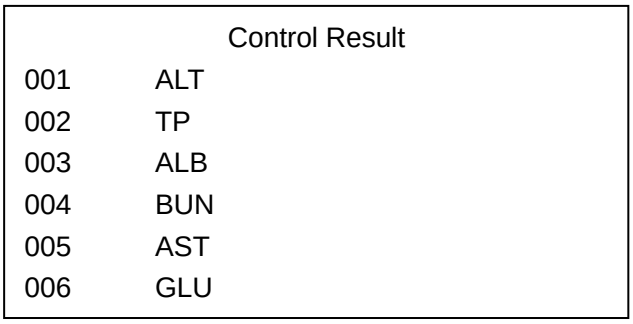

Figure 4-42

Use “▲” “▼” to choose test program, then press “Enter”, the screen will show as Figure 4-43.

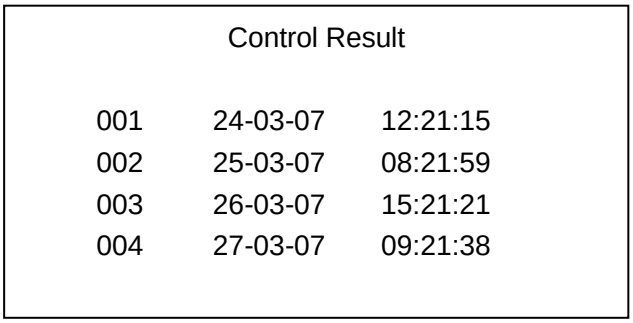

Figure 4-43

Use “▲” “▼” to choose control result, then press “Enter”, the screen will show as Figure 4-44.

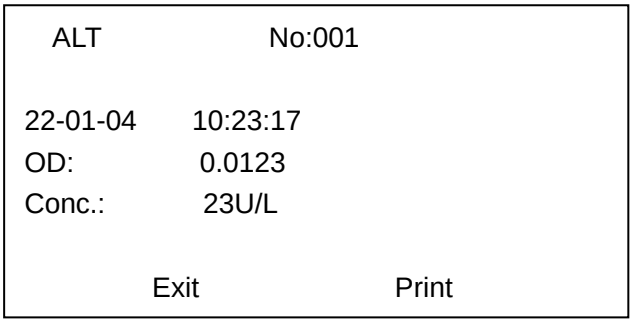

Figure 4-44

Choose “Exit” back to previous page, “Print” to print the result .

4.3.3.3 Delete Control Result

Use “▲” “▼” to choose “Delete Control Result”, the screen will show as Figure 4-45.

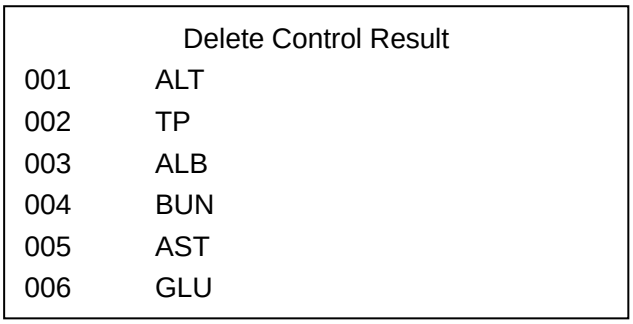

Figure 4-45

Use “▲” “▼” to choose control program, then press “Enter”, the screen will show as Figure 4-46.

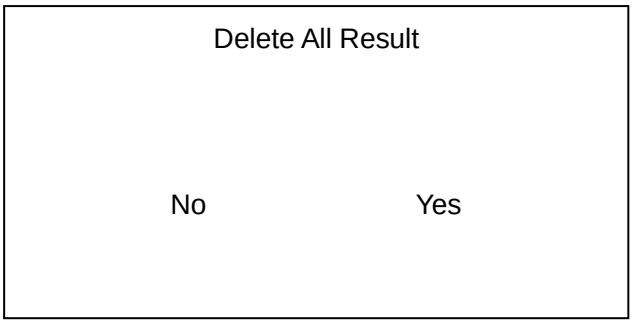

Figure 4-46

Choose “Yes” to delete control result, “No” back to previous page.

4.3.3.4 Delete Control All Result

Use “▲” “▼” to choose “Delete Control All Result”, and then press “Enter”, the screen will show as figure 4-47.

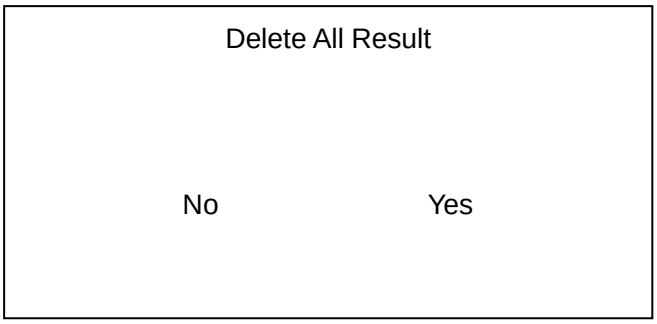

Figure 4-47

Choose “Yes” to delete control all result, “No” back to previous page.

4.3.4 Print Report

Use “▲” “▼” to choose “Print Report”, and then press “Enter”, the screen will show as Figure 4-48.

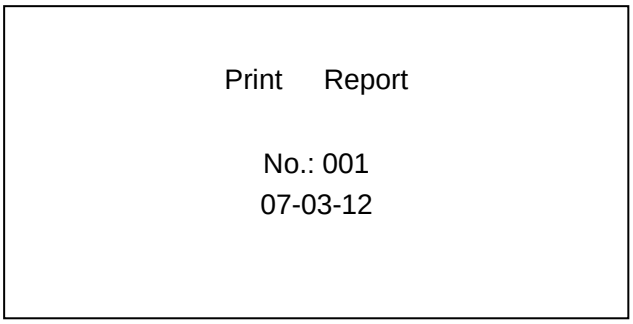

Figure 4-48

Input sample ID (the default is 001) and date, then press “Enter” to print the report.

4.4 System Setup

“System Setup” is for setting temperature, Filter number, Cuvette optical path, and printer mode. Use direction key to choose “System Setup”, then press “Enter”, the screen will show as Figure 4-49.

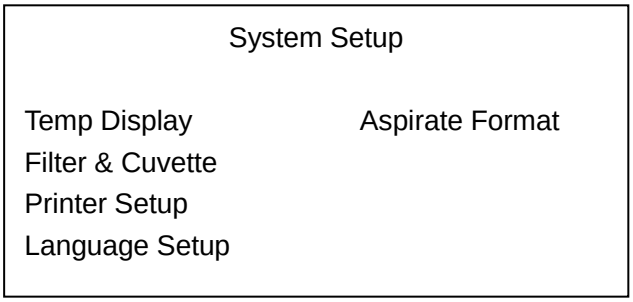

Figure 4-49

4.4.1 Temp Display

Use direction key to choose “Temp Display”, and then press “Enter”, the screen will show as Figure 4-50.

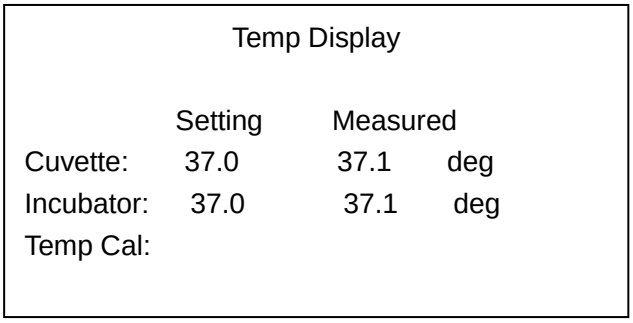

Figure 4-50

Setting: Input setting temperature (25℃, 30℃, 37℃, RT)

Measured: Display the real-time temperature.

Temp Cal: Input password, and then input calibration temperature (for professionals only).

4.4.2 Filter and Cuvette

Use direction key to choose “Filter and Cuvette”, and press “Enter”, then input password the screen will show as Figure 4-51 (for professionals only).

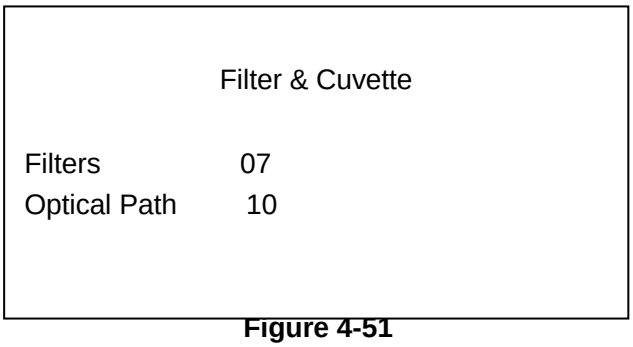

Figure 4-51

Filters: Setup filter numbers (e.g. 7 pieces of filter in total).

Optical Path: Setup light path (e.g. the light path is 10mm).

4.4.3 Printer Setup

Use direction key to choose “Printer Setup”, and then press “Enter”, the screen will show as Figure 4-52.

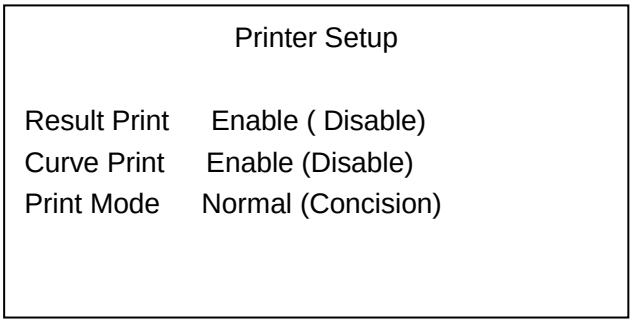

Figure 4-52

Result Print: Print result after testing automatically or not.

Curve Print: Print reaction curve after testing automatically or not. (for Kinetic only)

Print Mode: Choose print mode.

4.4.4 Language Setup

Use direction key to choose “Language Setup”, and then press “Enter”, the screen will show as Figure 4-53

.

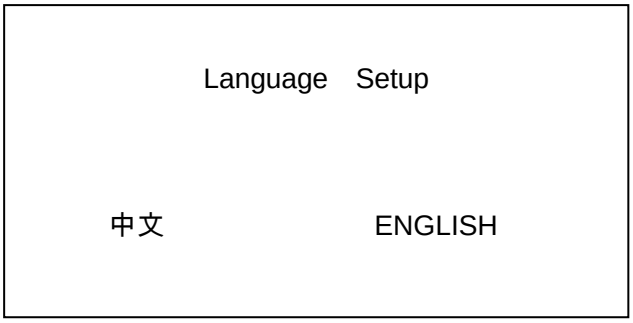

Figure 4-53

After the choice finished press ENTER to confirm and exit.

4.4.5 Aspirate Format

Use direction key to choose “Aspirate Format”, and then press “Enter”, the screen will show as Figure 4-54

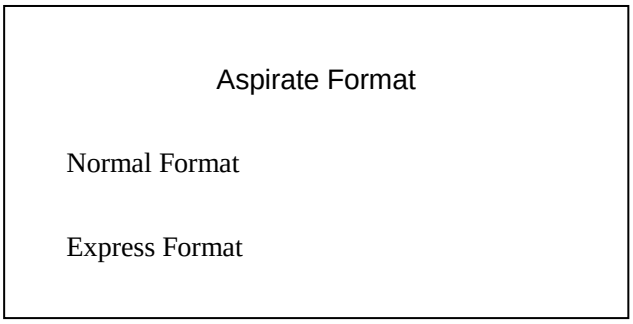

Figure 4-54

Use direction key to choose “Express Format ”, and then press “Enter”, the screen will show as Figure 4-55

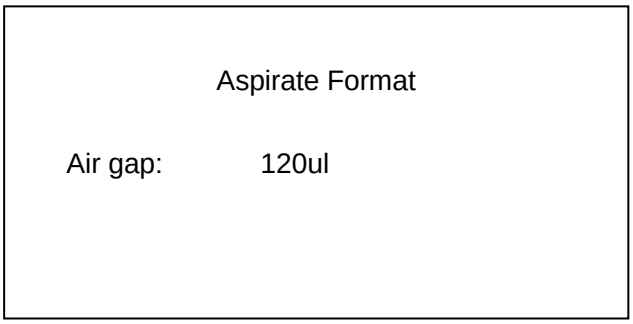

Figure 4-55

Select airgap format ,machine should work as follows when it is programmed to aspirate 500 micro litter of solution

1) when user present sample at aspiration tube and press aspirate button, machine should aspirate 500 micro litter of solution

2) machine should wait for 1 sec with no operation (this is time when user has to remove sample away from machine.)

3) after one second peristaltic pump should move to suck 120 micro liter of air .

4) after aspiration of air machine can start its normal reading operation.

5) after reading machine can throw sample out to waste.

4.5 AD Auto Zero

Use direction key to choose “AD Auto Zero”, and then press “Enter”, the screen will show as Figure 4-56

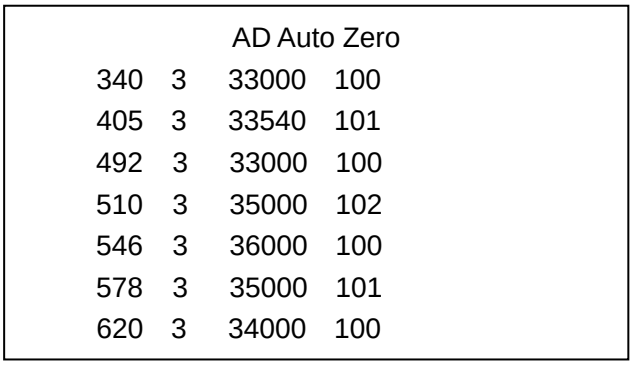

Figure 4-56

Insert pipette into distilled water, then press “PUSH” button. The instrument will adjust automatically. The first column is filter wavelength. The second column is Gain value. The third column is AD value. The fourth column is Offset value. The normal range of each value shows as table 3.

Table 3 Normal range for each value

Value	Normal range
Gain	1--6
A/D	26000--38000
Offset	1--350

If the value is out of range, check or ask engineer for service.

4.6 AD Value Check

Use direction key to choose “AD Value Check”, and then press “Enter”, the screen will show as Figure 4-57.

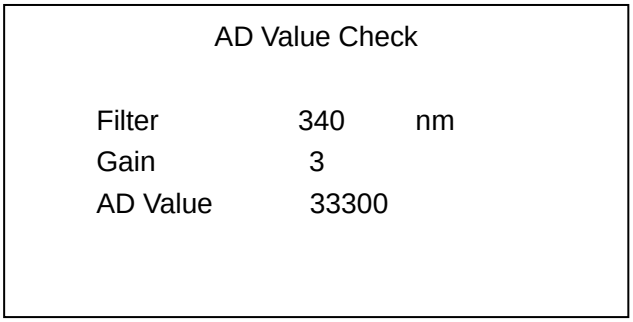

Figure 4-57

Filter: Use “◄” “►” to choose filter (“NO” means filter is dark).

Gain: Use “▲” “▼”to choose Gain value.

AD Value: Display real-time AD value.

4.7 Pump Calibrate

“Pump Calibrate” is for calibrating pump movement steps, so when aspiration is not correct, “Pump Calibrate” is necessary.

Use direction key to choose “Pump Calibrate”, and then press “Enter”, the screen will show as Figure 4-58.

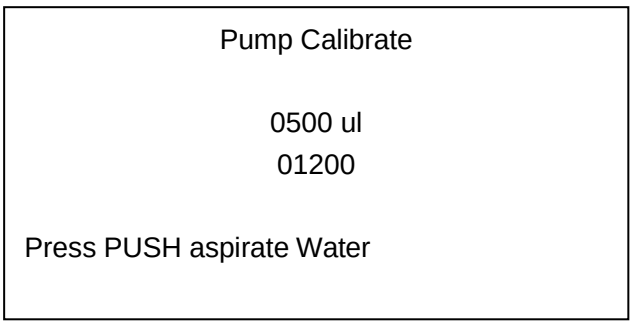

Figure 4-58

Operation steps:

-- Press number key to input aspirate volume, then press “Enter”.

-- Insert pipette into water, press “PUSH” button.

-- Loose “PUSH” button when finish aspiration. The instrument will display and save movement steps.

-- Press “Enter” back to main menu.

4.8 Other Settings

Use direction key to choose “Other Settings”, and then press “Enter”, the

screen will show as Figure 4-59.

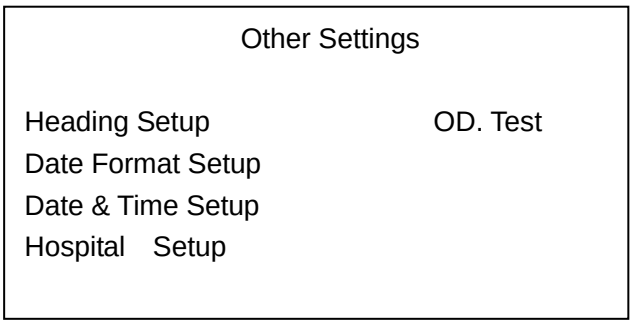

Figure 4-59

4.8.1 Heading Setup

Use “▲” “▼” to choose “Heading Setup”, and press “Enter”, then input password, the screen will show as Figure 4-60 (for professionals only).

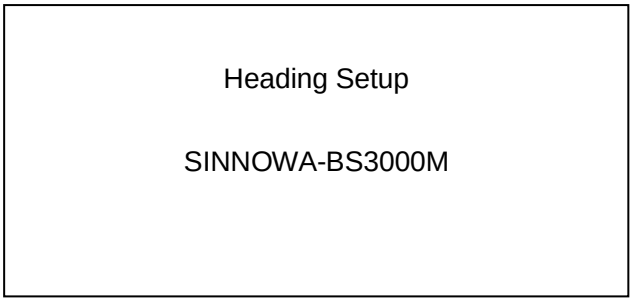

Figure 4-60

Press number key to input the heading, and then press “Enter” to save and back to previous page.

4.8.2 Date Format Setup

Use “▲” “▼” to choose “Date Format Setup”, and then press “Enter”, the screen will show as Figure 4-61.

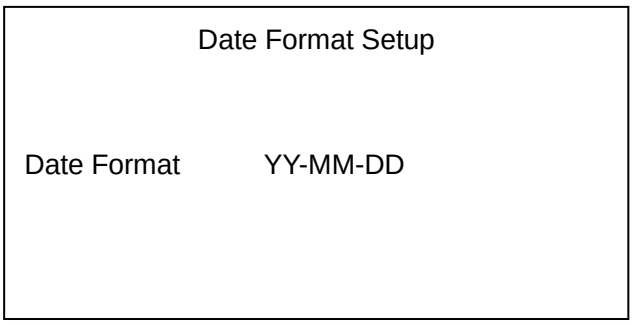

Figure 4-61

Press “◄” “►” to choose date format (YY-MM-DD, DD-MM-YY or DD-MM-YY), then press “Enter” to save and back to previous page.

4.8.3 Date & Time Setup

Use “▲” “▼” to choose “Date Format Setup”, and then press “Enter”, the screen will show as Figure 4-62.

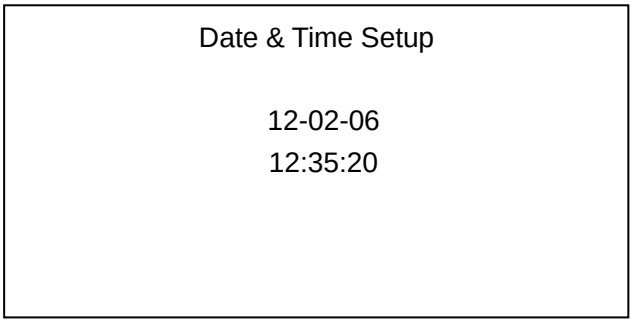

Figure 4-62

Press number key to input date and time, and then press “Enter” to save and back to previous page.

4.8.4 Hospital Setup

Use “▲” “▼” to choose “Hospital Setup”, and press “Enter”, then input password, the screen will show as Figure 4-63 (for professionals only)

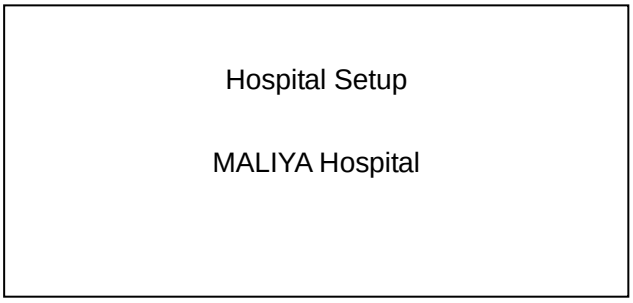

Figure 4-63

Press number key to input the heading, and then press “Enter” to save and back to previous page.

4.8.5 OD. Test

“OD. Test” is for testing real-time absorbency of sample directly. Use “▲” “▼” to choose “OD. Test” and then press “Enter”, show as Figure 4-64.

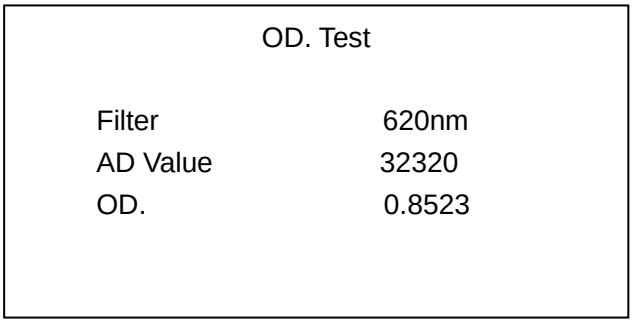

Figure 4-64

Operation steps:

-- Press “◄” “►” to choose the filter wave length, and then press “Enter” to confirm.

-- Insert pipette into distill water, and then press “PUSH” button to aspirate water. The instrument will test the water blank (AD value). Press “Enter” until the AD value is stable.

-- Insert pipette into sample, then press “PUSH”, the instrument will test and display real-time sample absorbency.

-- Press “ESC” back to previous page.

5 Instrument Maintenance

5.1 Maintenance

There are two kinds of maintenance: daily maintenance and weekly maintenance.

5.1.1 Daily Maintenance

Clean the flow cell with distilled water before and after the instrument works. Insert the pipette into distilled water, press “Wash”.

5.1.2 Weekly Maintenance

Clean the flow cell with detergent. Insert the pipette into detergent, press “Wash”.

Attention:

-- Detergent should remain in flow cell for about 5-10 minutes. The following detergents are recommended: 20% NaCLO, 95% absolute alcohol and Special detergent.

-- If the analyzer stands idle for long time, loose the peristaltic pump tube and turn on the analyzer every week.

5.2 Trouble Shooting

5.2.1 A/D value of 0

-- The lamp is damaged or the voltage is too low

-- The lamp connection is loose contact

-- Filters have loose contact

-- Filters are damaged

5.2.2 AD value out of range

-- There is no distilled water in flow cell

-- Flow cell is dirty

-- There is bubble in flow cell

-- Pipette is leaked or blocked.

-- Peristalsis pump hitch

-- Filter is aging or damaged

5.2.3 Wrong test result or bad repetition

-- There is bubble in flow cell

-- Peristalsis pump tube is not installed properly or leaked.

--Aspiration is abnormal.

-- Voltage is not stable

-- The sample is haemolytic or the reagent is invalid.

Attention: If there are some problems cannot be resolved, please contact SINNOWA distributor and engineer

5.3 Fittings Replacement

5.3.1 Power Supply Fuse

-- Turn off power supply, and unplug power supply line.

-- On the right underside of the instrument, pull out fuse under the socket.

-- Replace old fuse with a new one

5.3.2 Peristalsis Pump Tube Replacement

-- Open the cover on the instrument side face.

-- Pull out the pump tube.

-- Replace with the new pump tube

5.3.3 Printing Paper Replacement

-- Open printer cover; take away the old printing paper

-- Load the new printing paper into the paper slot

-- Put the paper to the form feed

-- Press “Feed”

Attention: If there are some problems cannot be resolved, please contact SINNOWA distributor and engineer

6 Storage

Packed instruments should be placed in the well-ventilated room, avoiding hard by poisonous, harmful and corrosive substances.

End