

V2000 VIS Spectrophotometer

U2000/U2000PRO

UV-VIS Spectrophotometer

User manual V1.0

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Chapter 1 The Spectrophotometer Introduction

1. The basic working principle and purpose

1) The nature of absorption: spectrophotometer is the method set up by the use of substances to choose different wavelengths of light absorption properties. Generally utilize a prism or grating to get monochromatic light, so that monochromatic light passes through the solution continuously, and absorption of the solution was measured at each wavelength to obtain the absorption spectrum curve.

Absorption spectrum results from absorption of light from the substance, which is the material macroscopic phenomena, and the nature of the absorption is molecular internal movement and the results of light mutual interaction. When the molecules absorb certain energy or wavelength spectrum, among the transmission spectrum, some wavelengths are absorbed to form the absorption spectrum. The smaller the energy absorption is, the corresponding wavelength of light, the absorption peak is at a longer wavelength. When in the infrared region, infrared absorption spectrum formed, if greater the energy absorption is, the shorter the wavelength of the corresponding absorption peak is at a shorter wavelength. When the absorption is in the UV region, ultraviolet absorption spectrum produced.

2) Absorption Law - Lambert-Beer's law: When a bunch of parallel monochromatic light passes through a uniform solution, the solution absorbance is in direct proportion to the product of concentration and thickness.

Its mathematical formula: $A = KCL = \text{Log} I_0 / I = -\text{Log} T$

The premise of absorption Law mathematical formula: ① the incident light is monochromatic, ② in the absorption process no interaction of each substance, the absorbance of each substance has additive property, ③ the role of light and matter is limited to the absorption process, no fluorescent and photochemical scattering phenomenon, ④ the absorbent is a uniform distribution and continuous system,

3) The reasons for impact on spectrophotometer:

a, the errors caused by non-absorption of radiation and material,

b, the effect of fluorescence and photochemical reactions, in general, spectrophotometer measurement error generated by fluorescence can be ignored. The fluorescence efficiency of the color system is very small in most cases, and the fluorescence emission is isotropic, only a small portion along direction of the transmitted light goes into the detector so that the absorbance was low, resulting in a negative deviation. Fluorescence absorption effects on

measurements greatly depend on the instrument's absorption cell and detector optical design, c, reflection and scattering, absorption law applies only to the absorption system with uniform medium, the turbid solution increases the measured absorbance because of scattering, leading to deviations from Beer's Law,

d, errors caused by non-ideality of the instrument,

e, polychromatic light deviates from Beer's law, most of the photometer can only get close to monochromatic light with a narrow lumen, in fact, there is still a polychromatic nature can lead to deviations from Beer's law. Two monochromatic deviation depends on the molar absorptivity difference $\Delta \epsilon$, when $|\Delta \epsilon|$ is very small, can be approximately considered as monochromatic

light, at low concentrations, curve remains linear; but at greater concentrations, with concentration increases, A-C curve bend more seriously, so the Beer's law applies only to dilute solution.

f stray light, stray light is wavelength component which is not required, but enters the detector and is outside the to be tested spectral bandwidth range. It comes mainly from the spectrometer dispersion element prism or a grating, mirrors, scattering of lens surface, monochrome dust of inner wall and reflection and diffuse of other elements scars, etc. Stray light can cause serious measurement errors. When the instrument energy is at the minimum wavelength, stray light is usually at its maximum (e.g. deuterium lamp 220nm, tungsten lamp 340nm),

g, slit width, slit width not only affects the purity of the spectrum, but also the absorbance values. In quantitative analysis, in order to obtain sufficient measurement signal, should use a larger slit, in the qualitative analysis a small slit is used, when the exit slit width is equal to the width of the entrance slit, error caused by slit width is minimal.

h, wavelength gauge error, wavelength gauge is the wavelength accuracy of the instrument, if the error is considerably large or no error correction, the spectral measurement will cause errors that affect the accuracy of absorbance measurements (in the peak of absorption spectrum is more significant),

i, the impact of non-parallel incident light, one of the prerequisites in Beer's law is the use of a parallel incident beam, to ensure that all the beam passing through the same thickness of the absorbing medium, when incident beam has large deviation from parallel light, obviously lead to deviations from Beer law. If deviation of parallel beam is in the instrument moderate, absorbance measurement error is generally within 0.5%;

j, luminosity scale error, the accuracy of transmittance, the error size directly affects the accuracy of photometric measurements.

Purpose: discipline for physics, chemistry, medicine, biology, pharmacology, geology and other scientific research, is one of the most important quality control instruments which is widely used in chemical, pharmaceutical, biological and chemical, metallurgy, light industry, materials, environmental protection, medical tests and analysis of industry and other industries, is an essential equipment in routine laboratory.

2. Conditions of Use

The instrument should be installed away from the hot and humid environment; the instrument should be used at 16-35 °C, 45-80% of humidity. Please try to stay away from the device which emits magnetic field, electrical field and the high-frequency wave. Do not install the instrument in the place where air chlorine, hydrochloric acid gas, hydrogen sulfide gas, sulfurous acid gas and other corrosive gases are seriously overweight. The instrument table should be smooth, without vibrations; the instrument should spare enough space close to the fan to exhaust smoothly. Instrument would better use an independent power outlet; power should be ensured good grounding. Otherwise may cause the instrument does not work properly. If the local voltage is instable, instrument should be equipped with stable power supply. The instrument should avoid direct sunlight and avoid dusty environment.

Chapter 2 Product Features and Installation

1. Features

The new UV-Vis spectrophotometer adopts improved CT monochromator, it has a wider spectral range and excellent quality. Due to the strong role of the instrument concealed microprocessor system, coupled with excellent optical, electrical systems, and reasonable mechanical structure, and the use of large-screen LCD, it will provide very effective and intuitive means for the analytical testing of every laboratory .

Spectrophotometer adopts Chinese man-machine dialogue mode of operation, easy to learn. The menu on large-screen LCD selects and recognizes each corresponding steps that the function you need to complete. The light replacement of instrument change the domestic equipment cumbersome method in past, in the entire light source replacement, the user simply rotates a few screws to complete the replacement light source, without the bother of light adjusting that to ensure that the light source is in the best position .

Instrument software programming has automatic protection, and ensures the instrument still restore normal operation in time with the event of operational errors. Meanwhile, instrument supports remote upgrade feature.

As an excellent practical UV / visible spectrophotometer, UV-visible spectrophotometer with a quick and easy method of analysis can be widely applied in organic, inorganic, petroleum, pharmaceutical, environment, biochemistry, medicine, food and other economic sectors. It is one of the indispensable methods in routine quality control (QC) and quality analysis (QA).

2. The Performance Index

	V2000	U2000	U2000PRO
Optical System	Single-beam		
	1200 pcs/ mm Holographic Grating		
Wavelength Range	320nm~1020nm	195nm~1020nm	195nm~1020nm
Wavelength Accuracy	±2nm	±2nm	±2nm
Wavelength Repeatability	1nm	1nm	1nm
Spectral Bandwidth	4nm(2nm)	4nm	2nm
Stray Light	0.15%T (at 360nm)	0.15%T (at 220、360nm)	0.15%T (at 220、360nm)
Transmittance Measurement Range	0.0%T~200%T	0.0%T~200%T	0.0%T~200%T
Absorbance Measurement Range	-0.3A~3A	-0.3A~3A	-0.3A~3A
Transmittance Accuracy	±0.5%T	±0.5%T	±0.5%T
Transmittance Repeatability	±0.2%T	±0.2%T	±0.2%T
Light Current	≤0.3%T/3min	≤0.3% T /3min	≤0.3%T/3min

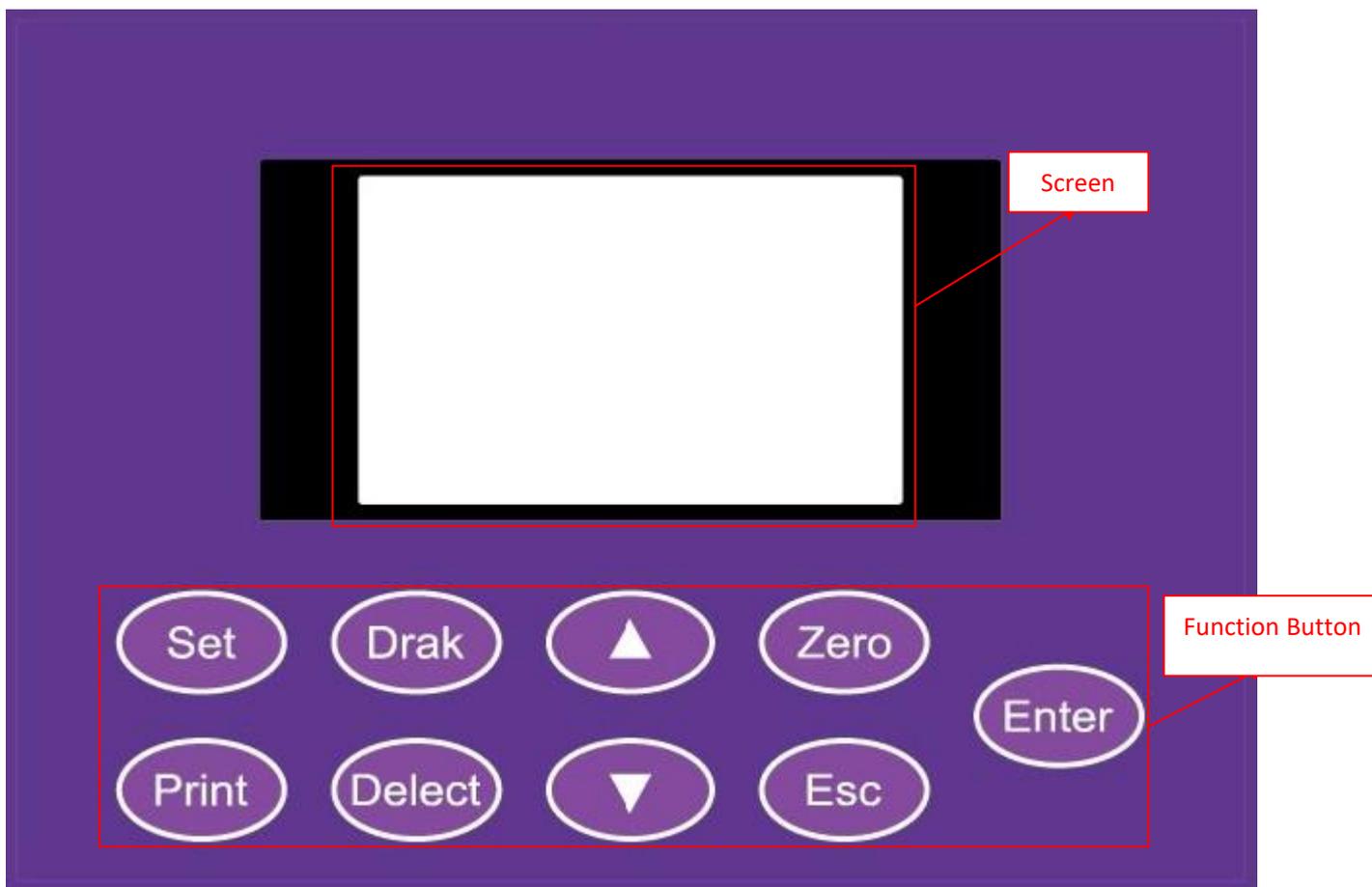
Dark Current	$\leq 0.1\%T/3\text{min}$	$\leq 0.1\%T/3\text{min}$	$\leq 0.1\%T/3\text{min}$
Receiving Element	photocell	photocell	photocell
Data Output	USB interface, serial port		
Display	128*64 dot matrix LCD		
Dimensions	(L)436mm×(B)356mm×(H)210mm		
Weight	About 8kg	About 12kg	

3. Equipment Installation

- 1) After unpacking, carefully check the packing list whether the things inside are complete and intact;
- 2) Ensure the working environment meets the above requirements, environmental temperature is $10 \sim 35 \text{ }^{\circ}\text{C}$, relative humidity is less than 85%, operating voltage $(220 \pm 22) \text{ V} / (50 \pm 1) \text{ Hz}$,
- 3) Place the instrument on a level platform, the instrument should avoid direct sunlight, be away from electromagnetic emitting devices and high-power electrical devices, there can not be dust, corrosive gas and vibration;
- 4) There must not be any obstacles to the flow of air around the instrument;
- 5) Use the company supplied power cord and make sure electrical outlets have intact ground wire;
- 6) Check the sample chamber; ensure that there is no any solution and any foreign objects. In the process of self-test ensure that the sample compartment lid is closed, don't open it halfway (This is very important. Otherwise, instrument self-test results and the normal use will be influential!!!).
- 7) Turn on the instrument power supply, so that the instrument starts self-test, it can be used normally the self-test is completely finished, in case there is an error alarm halfway refer to the chapter of instrument troubleshooting.

Chapter 3 Button Definition and Basic Operation

1. Button Panel Diagram



2. Button Function Description

<Set>: parameter setting, to set measurement parameters for each mode;

<Dark>: dark current correction;

<Print>: print key;

<Delect>: delete key;

<▲>: menu selection up key or set the value increases;

<▼>: menu selection down key or set the value decreases;

<.ero>: blank correction, for adjusting the 0.000 Abs and 100.0% T

<Esc>: exit;

<Entre>: enter key.

3. The Basic Operation

1) How to adjust blank

In any test interface, put the spectrophotometer containing reference solution into the spectrophotometer-cell, and put it into the light path, press **Zero** to bring up a blank.

2) How to set the wavelength

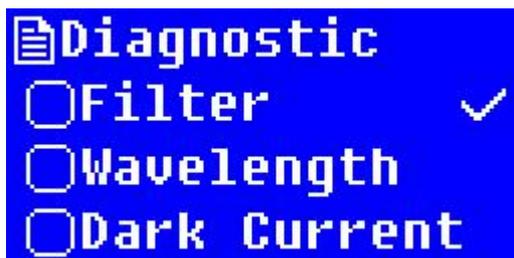
Rotate the wavelength knob, to see wavelength data the change to the position you need.

Chapter 4 Self-test

1. The system self-test

(Self-test process, ensure that the sample chamber does not have any solution and foreign matter, quadruples are framed on the fixed gear which can not stop at the general position. In the self-test process, ensure that the sample compartment lid is closed, don't open it halfway, and otherwise easily lead to self-test error)

1) Filter Self-test



2) Wavelength Calibration

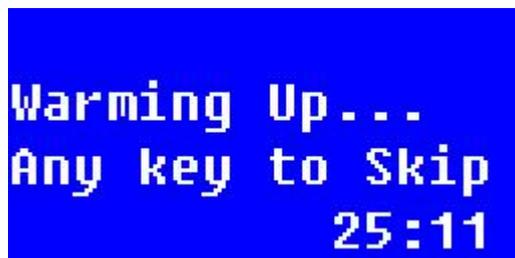


3) The Dark Current Calibration



2. System Preheating

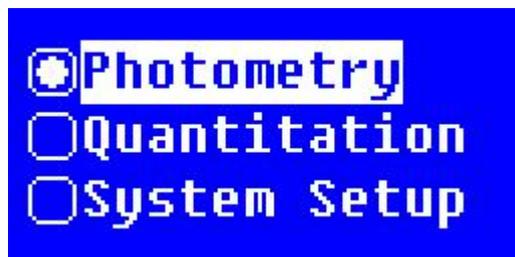
After the self-test, and enter the warm-up state, the 30 minutes warm-up time, and after the warm-up, re-detect dark current. Press any button to skip the warm-up.



Warming Up...
Any key to Skip
25:11

3. Self-test Finish

After the self-test is completed, enter into the main menu shown below.



Photometry
 Quantitation
 System Setup

Flip keys on the keyboard <▲> and <▼> to move the cursor to the appropriate options, and then press <ENTER> key to enter the selected corresponding function: Press <Esc> key to return to the previous table of Contents.

4. The Function Menu

1) **Photometry**

In this function, can be measured and printed absorbance or transmittance with fixed wavelength, can also measure energy at fixed gain.

2) **Quantitative measurement**

In this function, you can use standard samples to establish their own standard curve and use the curve to measure the unknown sample; if already know the slope of the curve, you can also test by utilization factor method.

3) **System Settings**

In this function, you can set the instrument operating parameters, such as a tungsten lamp, deuterium lamp switch, instrument operation mode selection, time setting, wavelength calibration and dark current calibration.

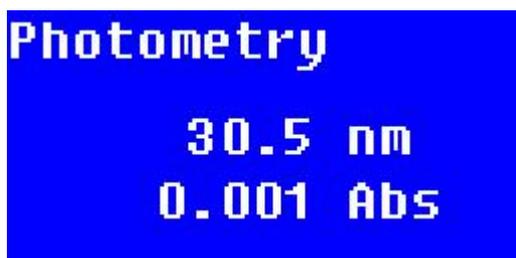
Chapter 5 Photometry

1. Function

Photometric measurements are measuring the absorbance, transmittance or energy value of the sample at a single wavelength.

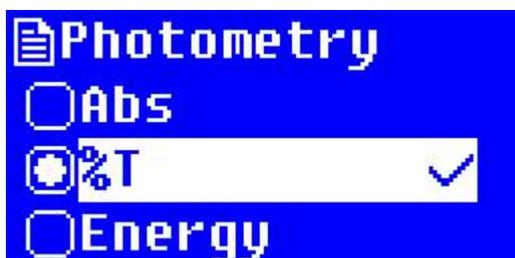
2. The Photometric Main Interface

Completed with instrument initialization, press <▲>, <▼> key to select **photometry**, and press **Enter** to enter the photometry main interface



3. Set the Measurement Mode

In photometric main screen, press **Set** to enter the measurement mode selection screen. Press <▲>, <▼>, select the desired measurement mode, then press **Enter**, then **√** moves to the appropriate mode, it means choose successfully, then press **Esc** to return to the previous interface.

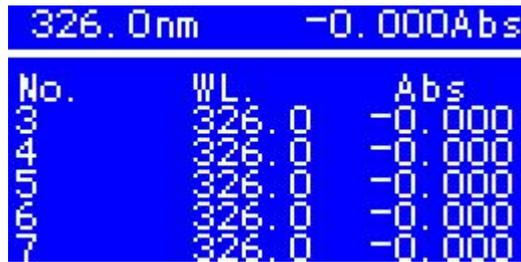


Operating tips: when energy mode is selected, you can use the <▲>, <▼> keys to manually select a different energy gain multiple to check the current energy value, as shown below

4. The 100% T / 0Abs correction

In the photometric measurement main interface, press **Zero** to adjust blank samples 0.000Abs, 100.0% T under current operating wavelength.

In the photometric measurement main interface, when zeroing is completed, pull the sample to be tested into the light path, press **Enter** to enter the measurement screen, press **Enter** key again you can measure samples in the current working wavelength. Each screen can only display five rows of data, the remaining data can be displayed by <▲> or <▼> to turn the page.



The screenshot shows a blue background with white text. At the top, it displays '326.0nm' and '-0.000Abs'. Below this is a table with three columns: 'No.', 'WL', and 'Abs'. The 'No.' column contains numbers 1 through 10. The 'WL' column contains '000000.00000000'. The 'Abs' column contains '-0.000000' for each row.

No.	WL	Abs
1	000000.00000000	-0.000000
2	000000.00000000	-0.000000
3	000000.00000000	-0.000000
4	000000.00000000	-0.000000
5	000000.00000000	-0.000000
6	000000.00000000	-0.000000
7	000000.00000000	-0.000000
8	000000.00000000	-0.000000
9	000000.00000000	-0.000000
10	000000.00000000	-0.000000

5. The Data Clear

If the data storage area is full, or you want to clear the measured data, in the measurement results display interface, press **Delect** key, select **YES**, otherwise, select **No**, and press **Enter** the system returns to the previous interface.



6. Data Printing

In the measurement result display interface, if you want to print the measured data, can directly press **Print** to screen of printing setting, if you want to print the data, press **Enter** to start printing, after the printing is finished, the system and screen data will be cleared automatically. If you do not want to print, choose **Cancel Printing** and press **Enter** to exit, you can also press **Esc** to return to measurement results display interface.



Chapter 6 Quantitative Tests

1. Function

In this function, you can take advantage of standard samples to establish their own standard curve, and use the curve to measure the unknown sample; if already know the slope and intercept, you can also test by utilization factor method.

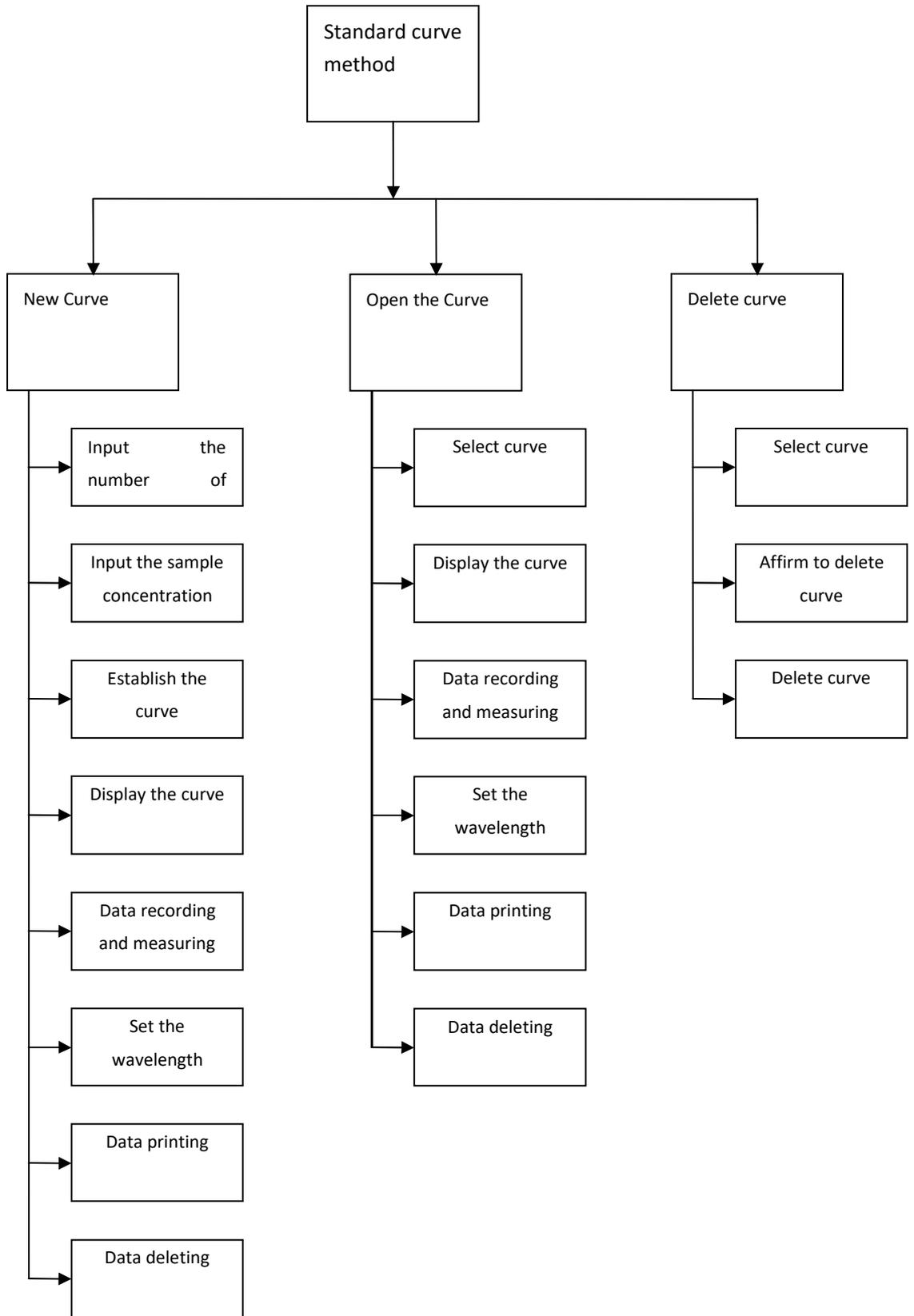
2. The Main Interface Quantitative Tests

In the main interface, via <▲> or <▼> to move the cursor to the **Quantitative Measurement**, and press **Enter** to enter quantitative measurement interface,



3. The Standard Curve Method

Standard curve method is a quantitative measurement which uses standard samples of known concentration to establish a working curve, and then use an established standard curve to measure the concentration of the unknown sample.

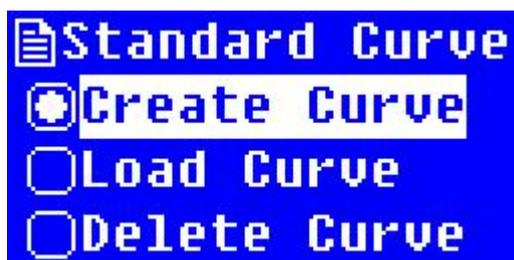


1) Into the standard curve method

In the quantitative measurement interface with use <▲> or <▼> to select **Standard curve method**, and press **Enter** to enter the standard curve method interface.

2) The new curve

Input the number of samples and sample concentration of new curves in the new curve interface, curve established according to the input parameters, display the coordinates of the curve, you can also enter data test interface, basing on the curve information just established, measure the unknown sample concentration.



3) Standard sample quantity setting

(Before the standard sample quantity setting, you should do zero operation. Zeroing method is putting blank samples into the sample Ikegami in the current optical path, and in working curve method interface press **Zero** to auto-zero.)

In the parameter setting interface with the page button to select **newcurve** press **Enter** to enter the standard sample quantity setting interface.



In the standard sample interface set the sample quantity with the numeric keys, press **Enter** to confirm the input,

Note: The standard sample quantity is set within the range: 1--9, otherwise the deemed invalid by system, after beeps three times return to parameter setting interface, you need to re-enter.

4) Standard concentration setting

After entering the quantity of samples, press **Enter** to enter the standard concentration setting interface,



In the concentration setting interface, according to prompts put the corresponding number of standard samples into, press <▲> and <▼> to input the concentration you want to set, press

Enter to confirm the input,

```

30.5 nm   -0.001Abs
-----
Put in Std. 1
Read Std. 1 Abs.
  
```

The system will record the current input concentration values and meanwhile measure the current inserted standard sample absorbance values. System enters into the next standard setting interface; put the standard samples with corresponding number in the same manner and mark standard sample concentration press **Enter** until the system automatically returns to the parameter setting interface, thus all of the standard sample concentration setting is completed.

Note: The concentration setting range is: 0 - 9999 or deemed invalid, need to re-enter.

No.	Conc.	Abs
1	0.000	-0.001 ←
2	10.00	0.263
3	20.00	0.533
4	40.00	1.180

5) Establish a working curve

After the completion of setting standard sample concentration in the step, the system will automatically establish working profile, after building curve equation successfully information will be displayed,

```

Standard Curve
Coef. K= 0.000
Coef. B= 0.000
  
```

6) Measurement and data printout

In the curve of interface, press <Esc> to return to the main interface standard curve, press **Enter** to enter the measurement results display interface,

```

Standard Curve
30.5 nm
0.000 Abs
LOWER %
  
```

In the measurement result display screen, press **Enter** again to use the standard curve just created to measure. In the data display screen, pull reference back into the optical path you can

also use **Zero** to zero operation. The test sample is sequentially pulled into the light path, each time you press **Enter**, system conducts a measurement, and the measurement results are numbered and sequentially displayed sequentially on the screen.

409.0 nm -0.001Abs		
No.	Abs	%
1	-0.000	0.873
2	0.087	3.807
3	1.306	44.83
4	1.555	53.17
5	1.706	58.26

In this interface, press **Print** to print the measurement results, after printing is completed; the system will empty the data.

If the standard curve system established can't reach measurement requirements, please check if the standard sample preparation, concentration value is entered correctly, and then re-set the standard concentration. If the system gives an error message, check carefully whether standard samples are meeting the established requirements, then set standard sample concentration.

Note:

- 1, through the display, check eligibility of curve correlation coefficient r, slope, intercept,
- 2, please do not give the error message in the system prompting for sample measurement, the system will draw the wrong results and may cause the system not working properly!

7) Delete data

In the measurement interface of standard curve method, press **Delect** to delete the measured recording, select **Yes** to delete all the data in the standard curve measurement interface, select **No** to exit delete without any action.

8) Print data

In the measurement interface of standard curve method, press **Print** to print the measured record, select **Print** to print all records in standard test interface curve, then all data will be deleted, select **No** to exit Print without any action.

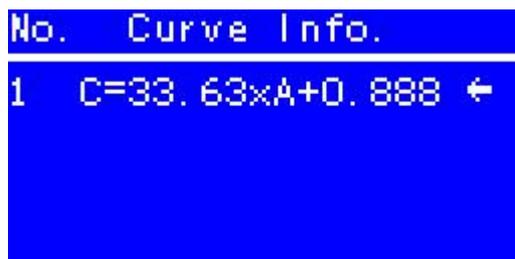
9) Auto-zeroing

In the measurement interface of standard curve method, press **Zero** under the current operating wavelength adjust blank modulation 0.000Abs, 100% T

NOTE: Load a blank sample before zeroing operation.

10) Open curve

The machine offers a memory recall function curve; user-created curve will be automatically stored in the system. When a user calls the curve, move the cursor to the **open curve**, and then press **Enter** to enter the curve to select the main interface.



```
No. Curve Info.  
1 C=33.63x A+0.888 ←
```

The latest established curve will be the presence of a final position; the system can store a total of 50 standard curves. After entering the curve main interface to select, use the keys to move the cursor or type the number front of the selected formula directly, the curve can be selected, press **Enter** to return system parameter setting interface, and then press **Esc** to return the system to work curve main interface, then press **Enter** to use the selected curve to test sample to be measured.

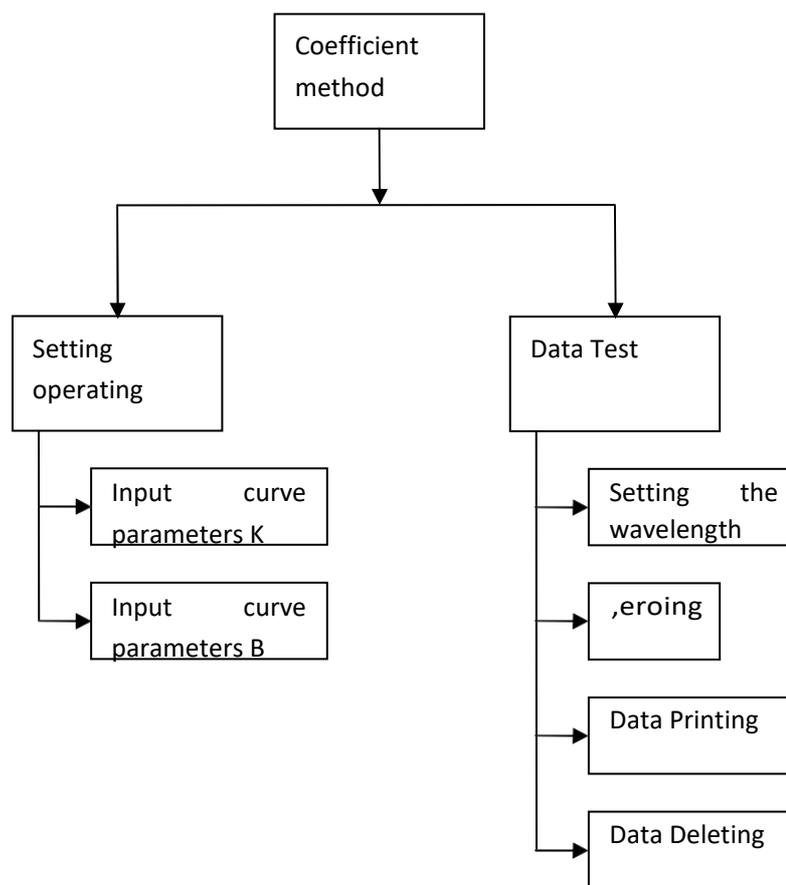
11) Delete the curve

This function is used to delete a saved profile data, to delete a curve, move the cursor to **Delete curve**, and then press **Enter** to enter the delete curve main interface select. Simply move the cursor to the curve you want to delete, and then press **Delect**.

If the confirmation message to delete this curve, move the cursor to **Yes**, and then press **Enter** to delete the curve. If you want to give up the information of removing curve, move the cursor to **No**, and then press **Enter**, or press **Return** to return to the remove curve selection screen.

4. Coefficient Method

Coefficient method is simple application of standard curve method, which is being measured the absorbance of the sample by the system, and put this value into the specified formula to get sample concentration values.



The formula coefficient law given by the system, as $C = K * A + B$, you only need to enter the curve parameters K and curve parameters B, it can be measured.

1) Enter coefficient method:

In the quantitative measurement selection screen, use \blacktriangledown or \blacktriangle to move the cursor to the **coefficient**, and press **Enter** to confirm, the system will enter the coefficient method main interface,

```

Coefficient
  30.5 nm
  0.000 Abs
  0.000 %
  
```

2) Set the curve parameter interface

Before conducting coefficient measurements you need to set some parameters. You need set curve parameters K and curve parameters B. In the coefficient main interface press **Set** to enter the interface for setting measurement parameters.



3) Set the curve parameter K

In the parameter setting interface, options with the flip key to choose **curve parameters K**, press **Enter** to enter the setting interface of curve parameter K.



In the measuring coefficient setting interface K, use \blacktriangledown or \blacktriangle to enter the value of the coefficient K which you want to set, and press **Enter** to confirm the input, the system returns the parameter setting interface.

Coefficient K is set in the range of: -9999--9999, otherwise the system will beep three times to mention the input is invalid, you will need to re-enter.

4) Set the curve parameter B

In the parameter setting interface use \blacktriangledown or \blacktriangle to select **curve parameter B**, press **Enter** to enter the setting interface of the curve parameter B,



In the measuring coefficient setting interface B, use \blacktriangledown or \blacktriangle to enter the value of the coefficient B which you want to set, and press **Enter** to confirm the input, the system returns the parameter setting interface.

Coefficient B is set in the range of: -9999--9999, otherwise to mention the input is invalid, you will need to re-enter.

After setting measurement parameters, Press **Esc** to return to the coefficient main interface.

5) Auto-zero

In the coefficient main interface, press **Zero** do absorbance zero calibration on the current operating wavelength, before the correction, we should put a blank sample.

6) Measuring and printing

Remove the blank samples for zeroing, and put the sample to be tested into, in coefficient measurement interface, then press **Star** to enter the measurement screen.

409.0nm		0.304Abs	
No.	Abs	uE/l	
20	0.3335	777	676
21	0.3335	777	555
22	0.3335	777	411
23	0.3277	777	377
24	0.321	777	07

In the coefficient measurement interface, if you want to print the measurement results, the method is the same as the standard curve method.

5. Select the Concentration Unit

In the quantitative measurement interface use <▼> or <▲> to select **concentration unit**, press **Enter** to enter the concentration unit setting screen.

1. %	5. ml/l
2. ug/l	6. mg/ml
3. mg/l	7. ug/ml
4. g/l	8. None

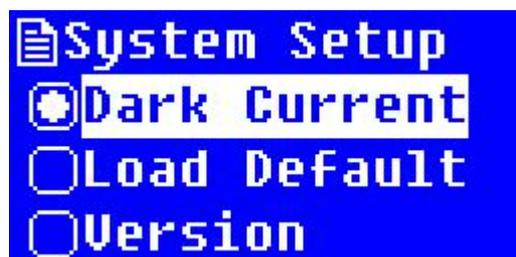
In this screen use <▲> and <▼> to move the cursor to the desired concentration units, press **Enter** to confirm the system and return to the parameter setting interface.

Chapter 7 System Setting

1. Dark Current Correction

Dark current is mainly to ensure a more accurate measurement of the sample, when the instrument operating environment changes (such as: temperature, voltage, ambient light), before measuring the dark current correction is required.

In the System Preferences menu, press <▲> and <▼> to move the cursor to the **dark current correction**, press <Enter> to do dark current correction, dark current correction needs a while, the dark current return to the system application interface after calibration is completed. Correction appears in following picture:



Dark in the relevant

Dark current correction can also be made by directly pressing measurement interface.

2. Restore Factory Settings

In the System Preferences menu, press <▲> and <▼> keys to move the cursor to the **Restore Factory Settings** and press <Enter> key to enter restore factory settings interface.

Press <▲> and <▼> to move the cursor to the appropriate option, press <Enter> key to perform the corresponding operation, select **Yes** to restore the factory settings, if you select **No**, then give up any action and directly exit, also can press the **Return** to return.

Note: **Restore Factory Settings** will clear the memory of all the data, including user testing records, user setting parameter and user established curve information, so please choose this feature carefully.

3. Check the Version Information

In the System Preferences menu, press the scroll key to move the cursor to the **version**, press **Enter** to enter the version information display interface.

In the version information display screen, press **Enter** or the **Esc** will return to the system application setting screen.

Chapter 8 Instrument Maintenance

1. Daily Caution

Any instrument is concerned, the correct use is the best maintenance for equipment maintenance, with emphasis on the use of equipment and mobile environments, in addition to the requirements for the use of previously proposed, we must also pay attention to the following issues:

- 1) The use of the environment to keep clean, when the instrument host is not in use should be covered up with cloth, to prevent dust accumulation, for prolonged storage, a constant temperature and drying room is better,
- 2) Place sample carefully in spectrophotometer-cell and not to allow the solution to splash into the sample chamber, to prevent corrosion. For some volatile samples, we recommend using the spectrophotometer cover, to prevent the impact of volatile gas on light, thus affecting the instrument measurement accuracy,
- 3) Instrument screw and nut in any light path part, is not going to loose, in order to prevent the light path deviation and affect the instrument working properly,
- 4) All The instrument mirror must not be touched by hands or oft and hard objects, once leaving traces, will produce stray light of severe punishment and reduce efficient energy, which leads to damage caused by man-made instruments,
- 5) Instrument handling should be handled with care; heavy matters can not be placed on the instrument shell, so as to avoid optical stroke affecting the stability and accuracy,
- 6) The instrument can not work in bright light to ensure the accuracy of measurements,
- 7) Every time when instrument is powered on, not necessarily always do the wavelength calibration, sometimes do. Wavelength calibration is recommended once a week, in order to improve the accuracy of the measured data,
- 8) Instrument can't be long dormant; it will reduce life expectancy, if not for some time, it's recommended powering on 1-2 times a week, each about half an hour.

2. The Instrument Maintenance

1) The sample chamber lens inspection: quartz lens periodic inspection of the sample chamber sides around the biased position to see whether there are fingerprints and other stains, if stains have serious impact on the accuracy of the measured values, find the stain and wipe decontamination in one direction with a clean cloth moistened with alcohol, it is recommended to check once a month,

2) Wavelength accuracy check: buy a calibrated holmium oxide solution, scan corresponding absorbance spectrum in the instrument wavelength scanning interface, check the calibration between the measured peak and standard values, the error is the error of instrument wavelength accuracy, it is recommended to check once a year,

3) Wavelength accuracy cursory examination: after self-test, enter any test interface, set the wavelength to 546nm, and then open the sample chamber, take a piece of white paper on the left side of the sample chamber at any one lens to see the color of light displayed in white sheet of paper, if it's light green, it indicates the wavelength is roughly correct; when the results of tests are greatly different from their past experience, it can be checked at any time.

Chapter 9 Instrument Troubleshooting

When equipment has failure, equipment can initially determine what kind of faults are. Generally, there is internal and external failure, life and sporadic failures, and the failures user can handle and not handle, to distinguish the above situation is conducive to the use and maintenance of the equipment, because they can provide correct and valid information to serviceman in a timely manner, there will be conducive to the timely resolution of problems. Within the warranty period, no sales staff telephone guidance, please do not attempt to open the housing for servicing the instrument. Once questions found, please contact after-sales service staff as soon as possible!

1. Power Failure

Symptom	Analysis	Solution
Boot no reaction	Socket no power	Check power supply
	Power cord not plugged in	Again insert Host Power
	Socket switch embedded fuse is burnt	Replace embedded fuse or purchase the 3A fuse of same size
	Instrument socket switch is broken	Please contact the manufacturer or the local dealer
	Internal power board or transformer is burnt	Please contact the manufacturer or the local dealer
Instrument display is not normal	Internal display wiring is loose	Open shell under the serviceman's guidance and reinsert tightly
	Internal + 5V power supply is not normal or cable is loose	Open shell under the serviceman's guidance and reinsert tightly
	Internal procedures collapse by the unexpectedly high frequency voltage shock	Make program writing under the serviceman's guidance
	Motherboard does not work properly,	Please contact the manufacturer or the local dealer

2. The Self-test Failure

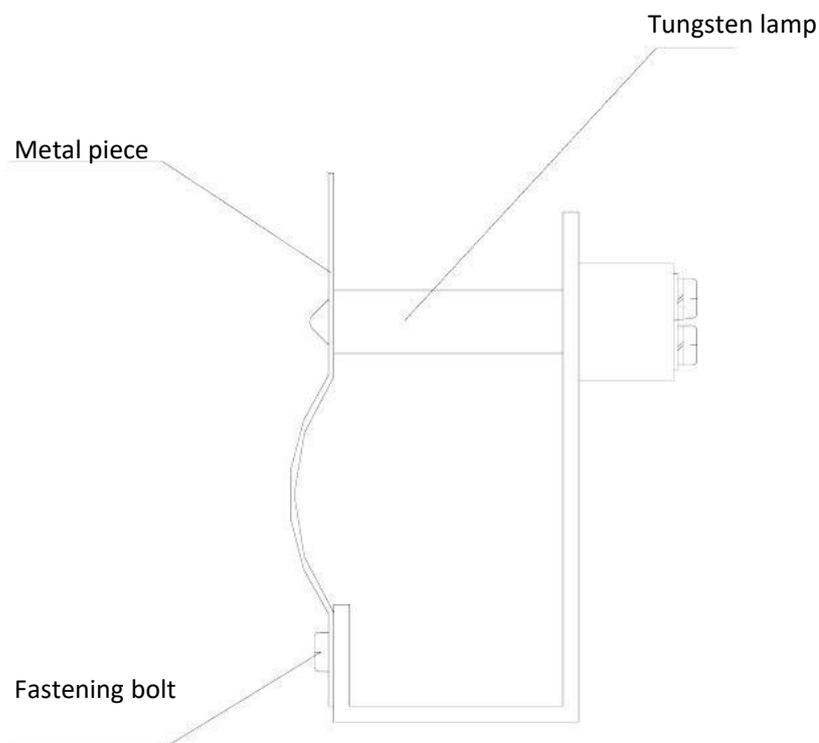
Symptom	Analysis	Solution
Filter positioning error	Filter Motor cable is loose	Open shell under the serviceman's guidance and reinsert tightly
	Filter optocoupler is loose	Open shell under the serviceman's guidance and reinsert tightly
	Power board + 12V power supply is not normal, or a loose cable	Open shell under the serviceman's guidance and reinsert tightly
	Filter optocoupler is wrong	Please contact the manufacturer or the local dealer
	Motor driver chip on the motherboard TD62083 is wrong	Please contact the manufacturer or the local dealer
Light positioning error	Switching electrical wire is loose	Open shell under the serviceman's guidance and reinsert tightly
	Switching micro switch is loose	Open shell under the serviceman's guidance and reinsert tightly
	Switching micro switch is wrong	Open shell under the serviceman's guidance and reinsert tightly
	Power board + 12V power supply is not normal, or a loose cable	Please contact the manufacturer or the local dealer
	Motor driver chip on the motherboard TD62083 is wrong	Please contact the manufacturer or the local dealer
Signal detector error	Signal board line connected to the motherboard is loose	Open shell under the serviceman's guidance and reinsert tightly
	Power Board +/- 15 power is not normal or loose cable	Open shell under the serviceman's guidance and reinsert tightly
	Signal board is wrong	Please contact the manufacturer or the local dealer
	Motherboard is wrong	Please contact the manufacturer or the local dealer
Dark current calibration error	Open the sample chamber when self-tested	Close the sample chamber and do self-test again
	Signal board is wrong	Please contact the manufacturer or the local dealer

Chapter 10 light source change

Note: In order to make the instrument normally work, please choose the original accessories.

1. change tungsten lamp

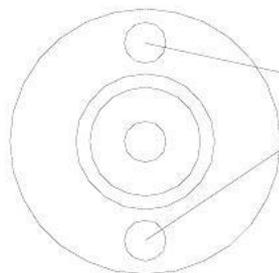
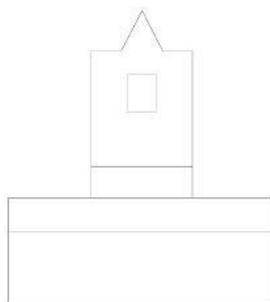
- 1) Shut off the power, unplug the power line, tear down 4 pieces of bolt fastening the shell on the left and right, take out the shell lightly and on the left side of the instrument upright.(There is link between the shell and the bottom plate, so can't pull the shell too hard after tearing down the screw fastened the shell, to prevent snapping the wiring harness.)
- 2) Tear down 3 pieces of screw fixing the lamp chamber cover. (If the instrument has been on for a while, the lamp chamber cover will be hot, please be careful!)
- 3) Find the items in the following picture, loose the bolt fastening the metal sheet, pull out the tungsten lamp outward, and insert new tungsten lamp in the form position tightly, cover the metal sheet, and tighten the fastening bolt.(Ensure the tungsten lamp upright.)



- 4) Open the instrument power and light the tungsten lamp, manually turn the light source switch mirror to the horizontal direction.
- 5) Loose the bolt fixing switch motor base, move the switch motor base to make the tungsten lamp light focused on the narrow gap minimum and in the middle.
- 6) Install the light chamber cover again(please note that don't press the line on the right) and instrument shell (don't press the display line.), and fasten the corresponding bolt.
- 7) Start up and self inspect again, when the self inspection is completed, the wave length move to 340nm, 370nm, 1000nm separately in the photometric measurement mode, let it set zero automatically. Changing the lamp is completed if it don't show the low energy, please repeat the steps if the energy is low, if still isn't available, please contact our company.

2. Change the deuterium lamp

- 1) Shut off the power, unplug the power line, tear down 4 pieces of bolt fastening the shell on the left and right, take out the shell lightly and on the left side of the instrument upright.(There is link between the shell and the bottom plate, so can't pull the shell too hard after tearing down the screw fastened the shell, to prevent snapping the wiring harness.)
- 2) Tear down 3 pieces of screw fixing the lamp chamber cover, and take out the lamp chamber cover lightly. (If the instrument has been on for a while, the lamp chamber cover will be hot, please be careful!)
- 3) Find the items in the following picture, loose the bolt as the following picture, and pull out the socket inserting in the power panel then could take out the deuterium lamp, install the new deuterium lamp in the form position, (note that the deuterium lamp light outlet toward the objective lens, and insert the plug on the power panel.



Loose the two bolts and
Connecting line of lamp
And then could remove
deuterium lamp

- 4) Open the instrument power and light the deuterium lamp, manually turn the light source switch mirror to the vertical direction.
- 5) Loose the bolt fixing switch motor base, slightly adjust objective lens base to make the deuterium lamp light focused on the narrow gap minimum and in the middle.
- 6) Manually turn the light source switch mirror to the horizontal direction.
- 7) Loose the bolt fixing switch motor base, move switch motor base to make the tungsten lamp light focused on the narrow gap minimum and in the middle.
- 8) Install the light chamber cover again(please note that don't press the line on the right) and instrument shell (don't press the display line.), and fasten the corresponding bolt.
- 9) Start up and self inspect again, when the self inspection is completed, the wave length move to 200nm, 330nm, 340nm , 370nm,1000nm separately in the photometric measurement mode, let it set zero automatically. Changing the lamp is completed if it don't show the low energy, please repeat the steps if the energy is low, if still isn't available, please contact our company.