



## **UV/VIS 6000 Ultraviolet Visible Spectrophotometer**

### **Smart Touch Screen**

### **Reference Manual**



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# 1. Summary

## 1.1 Working Principle

The working principle of spectrophotometer is mainly based on Lambert - Bill law. When a bundle of monochromatic light passes through a uniform colored solution, the absorbance of the solution is proportional to the product of the concentration of the solution and the optical path, which is the true physical meaning of Lambert Bill's law. The law is the basis of quantitative analysis of photometric analysis, and also the basic principle of UV-Vis spectrophotometer. The formula for Lambert-Bill law is expressed as follows:

$$A=k b C$$

A--The absorbance of the measured substance solution.

k-- Absorption coefficient of solution.

b-- The thickness of the liquid layer (the optical path of the cuvette or

absorption pool), cm.

C—The concentration of the measured substance solution.

☞ The premise of satisfying the Lambert Bill law is three hypotheses: First, the incident light is monochromatic light. Second, the incident light is parallel light. Third, light-absorbing particles are independent of each other, regardless of quantity and variety. In addition, the deviation of the law is affected by sample treatment, the optical path of measure, stray light, noise, the spectral bandwidth, the chemical factors and other factors. The above factors need be taken into account in the routine tests.

## 1.2 Instrument Characteristics

The characteristics of UV/VIS 6000 Spectrophotometer are the following:

- ✧ The stray light is low and resolution is high in optical system, so the stability and reproducibility are excellent and the readings are accurate.
- ✧ The design is scientific, new technologies are used to combine the light, instrument, electricity with computer to make the stability indicators of the instrument close to or reach the high-level of UV spectrophotometer.
- ✧ 7 inch TFT capacitive touch screen, the touch point is more accurate, sensitivity is more higher and stability is more better.
- ✧ High definition resolution (800 \* 480), fast running, large capacity for picture.
- ✧ Interactive and friendly user interface, and it is easy and fast to be used.
- ✧ System settings function is powerful, the measurement function of

photometric analysis, quantitative analysis, wavelength scan and kinetic analysis can be realized without online operation.

- ✧ Large data storage: 30 wavelength scan files, 20 kinetic measurement files, multiple sets of measurement data and standard curves.
- ✧ Data retrieval and atlas zooming function.
- ✧ The universal printer (inkjet or laser) can be connected with the instrument, A4 report output can be completed directly and the report is more clear and beautiful.
- ✧ USB transfer function can be achieved; data storage and reading is more flexible.

### **1.3 Application Field**

Ultraviolet visible spectrophotometer can be widely used in the fields of pharmacy, medical and health services, chemical engineering, energy, machinery, metallurgy, environmental protection, geology, food, biology, materials, agriculture, forestry, fisheries and other industries, and plays an important role in teaching and research of higher education, measurement science and research institutes, quality control in the production, raw materials and product analysis, and is commonly used in physicochemical laboratory. UV/VIS 6000 is a UV spectrophotometer with touch screen. The instrument is stable, accurate and powerful and has obvious

advantages in the fields of scientific research and quality control.

## 1.4 Technical Parameters

Type	UV/VIS 6000
Wavelength range (nm)	190-1100
Spectral bandwidth (nm)	1,8 nm
Wavelength accuracy (nm)	$\pm 0.5$
Wavelength repeatability (nm)	$\leq 0.2$
Photometric range	0-200%T、-0.3-3A、0-9999C
Photometric accuracy	$\pm 0.4 \%T$
Stray light	$\leq 0.07 \%T$
Size (mm)	460×380×180

## 1.5 Symbols and Prompt Notes



: Power supply, beware of electric shock.



: Heat source, burn carefully.



: UV light source, be careful radiation.



: Notice.



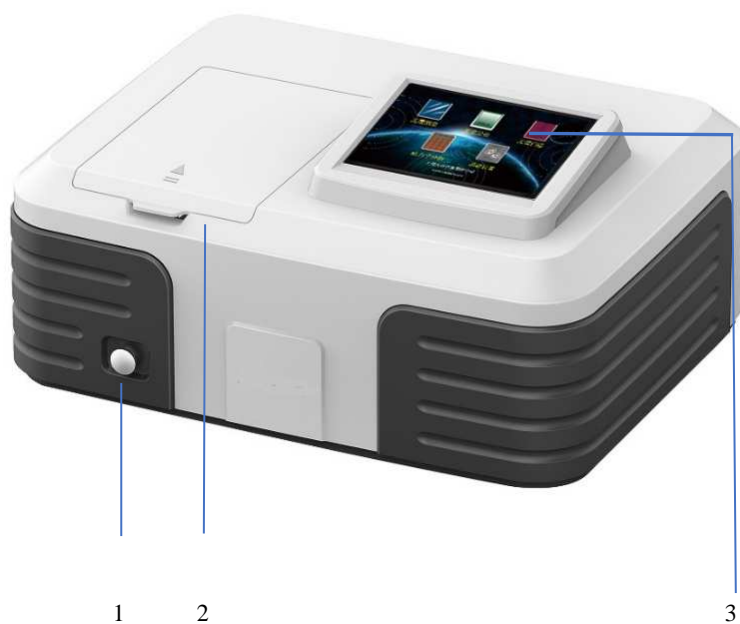
: Special note.



## 1.6 Brief Introduction of System and Structure

### 1、 The shape and structure of the instrument

The shape and structure of the instrument is shown in figure 1:



1--Hand pull rod    2--Sample room    3--Touch screen

Figure 1 The shape of UV/VIS 6000

The back of the UV/VIS 6000 instrument is shown in figure 2:



1--Power switch    2-- Power supply socket    3-- Cooling vent

4-- Printer port

Figure 2 The back of UV/VIS 6000

## 2. Installation

Please read the contents of this chapter carefully before installation.

### 2.1 Unpacking

Please check to make sure that the instrument external packing is intact and has no opened marks before unpacking. After unpacking, please inspect to make sure the instrument has no damage and the accessories is complete by referring to the packing list in the manual (page thirty-fifth of this manual). If you have any question, please consult the dealer or manufacturer. If you find any damage or loss in the package, please inform the manufacturer immediately.

### 2.2 Installation Condition

The following requirements should be met for the installation of the instrument:

- 1) The requirements of temperature and humidity:

The equipment should be placed in a dry room with temperature within the range of 15 °C to 35 °C and relative humidity less than 85%.

2) Power requirements:

The rated voltage of the instrument is 220 V + 22 V AC (or 110 V + 11 V AC), the frequency is 50 Hz (or 60 Hz), and a good grounding wire should be installed. More than 1000W electronic AC voltage stabilizer is recommended to enhance the anti-interference performance of the instrument.

3) Other working conditions:

- A position not subject to strong vibration, or any continuous (even weak) vibration.
- A position not exposed to direct sunlight and disturbed by air flow.
- A location free from exposure to corrosive gas, or dust.
- A position free from strong magnetic, electromagnetic fields and high frequency electromagnetic wave.
- Make sure that the bench or table used to support the instrument is comfortably able to withstand the load, more than 15 cm of space at the rear away from the wall for effective ventilation.

## 2.3 Instrument Installation

Installation procedures of the instrument are as follows:

- 1) Place the instrument on a stable bench after unpacking.
- 2) Connect instrument power cord. If equipped with a printer, connect wiring between the instrument and printer and printer power cord.

## 3. Operating the Instrument

Please inspect all connections, ensure the connections are correct. The power supply needs to meet the requirements and have reliable ground connection. Ensure light path is expedite (no blocking object in sample room). Ensure all other conditions are correct before the boot.

### 3.1 Power on Self-test

#### 1. Powering on

After the instrument is connected to power, start up the instrument and the welcome interface is displayed, as shown in figure 3.



Figure 3 The welcome interface

## 2. Self-check

The instrument starts self-check after displaying the welcome interface several seconds. The lamp conversion, filter, detector, deuterium lamp, tungsten lamp, wavelength calibration, battery, system parameters and dark current are detected automatically. The self-check interface of the UV/VIS 6000 Spectrophotometer is shown in figure 4.



Figure 4 The self-checking interface

🔊 If the self-checking is passed successfully, the status indicator light is green. If a self-checking error occurs, the buzzer alarm will automatically happen, the status indicator light will be red, and the next self-checking content will be carried out generally.

🔗 Please do not open the cover of sample chamber when self-checking. Please contact the manufacturer in time, or judge and remove the fault according to the "5 common faults and exclusions" when the self-checking fails.

### 3. Pre-warming

Pre-warming starts after self-check (Figure 5).

The default time of pre-warming is 20minutes, the buzzing will appear automatically and the instrument enters the main interface after pre-warming.

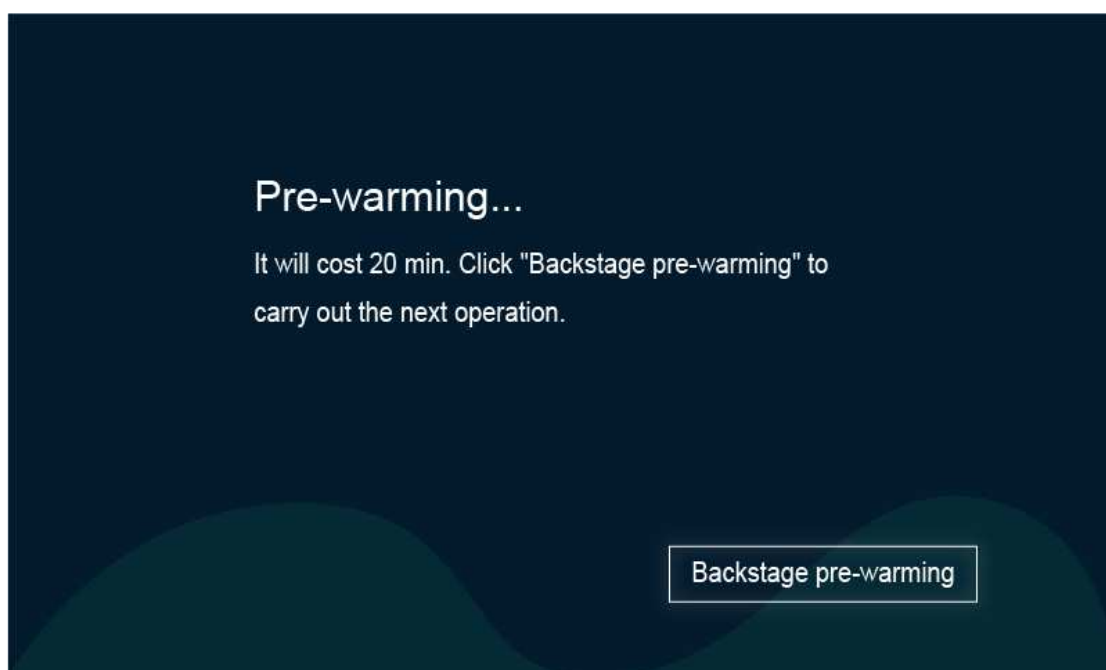


Figure 5 Pre-warming interface

🔊 The electronic components need to be preheated for a certain period of time to reach a stable state after powering on the instrument. In addition, deuterium lamp also takes some time to reach thermal equilibrium, so it is recommended that the instrument starts to test after pre-warming for 20 minutes.

#### 4. Pending operation

The main operation interface appears after pre-warming, as shown in figure 6.




Figure 6 The operation main interface

Photometric analysis, quantitative analysis, wavelength scan, kinetic analysis and system settings can be realized by the UV/VIS 6000. Click the required functional modules, you can enter the corresponding operation interface.

### 3.2 Photometric Analysis

At the interface of photometric analysis, the user can measure the absorbance, transmittance and energy at fixed wavelengths, and also print the measurement results.



Click  icon at the operation main interface to enter the interface of photometric analysis (Figure 7).

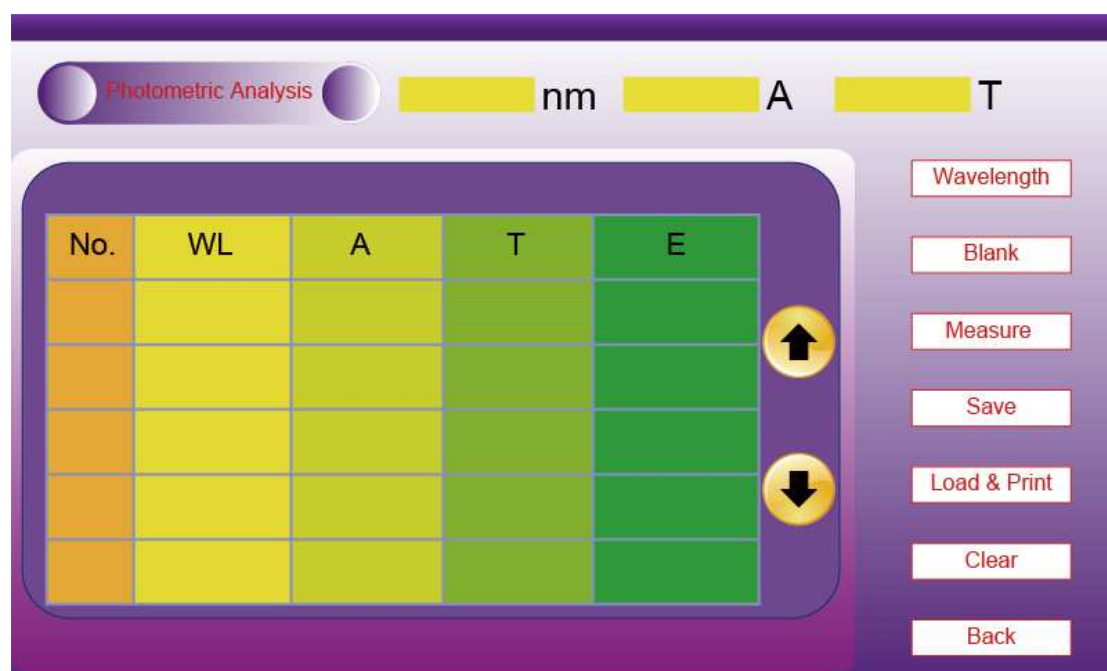
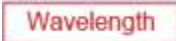



Figure 7 The interface of photometric analysis

After entering the functional interface, the real-time display column is in the upper part of the screen, the main area of the window is the data recording area, and touch button operation area is on the right side of the screen. The specifications of touch button are as follows:




: used to set wavelengths.

: used to calibrate 0 Abs and 100% T, and correct the blank.

: used to measure and record data.

: to save data.

: to load and print data.


: to clear all displayed data.

: to quit the current interface and return to the last interface.



### 3.2.1 Photometric analysis

The specific steps of photometric analysis are as follows:

#### 1) Entering photometric interface

Click  icon at the operation main interface to enter the interface of photometric analysis.

#### 2) Setting test wavelength



Click  button at the interface of photometric analysis, the digital input window appears (Figure 8). Input the wavelength value, click  to confirm the value, the indication of "wavelength shift....." appears below the screen, then the instrument reaches the specified

wavelength.





Figure 8 Digital input window

☞ The wavelength input range of the UV/VIS 6000 is 190 nm~1100 nm. If the input value is out of the range, the data is considered invalid and needs to be reentered.


🔊 If the input wavelength is found to be incorrect, click "" to clear the current data and reenter. Touch button "" has the same function in the following data input process.




### 3) Sample test



First, put the blank sample or reference solution in the optical path, click  button to set absorbance/ transmittance of the blank sample or reference solution as 0 Abs/100.0%T at the current test wavelength. Second, take out the blank sample or reference solution from the optical path, put the determined solution into the optical path, click  button, then record the measured results of sample.

## 3.2.2 Data processing

The user can save, load, print and delete the data after photometric analysis.

Save data: click  button to save data to the host, and the data is automatically saved to the USB memory if the USB memory is connected.

Load data, print: click  button to enter printing and loading data operations interface (Figure 9). When the printer is connected, click "" to print the data, click "" to open the saved data. "

Clear data: when the user needs to delete individual data, click  icon at the lower left corner of the screen to activate it (showing ) , then click the number of data needing to be deleted to delete the corresponding data.

Users can also click  button on the right of the screen to empty all data in the data table.

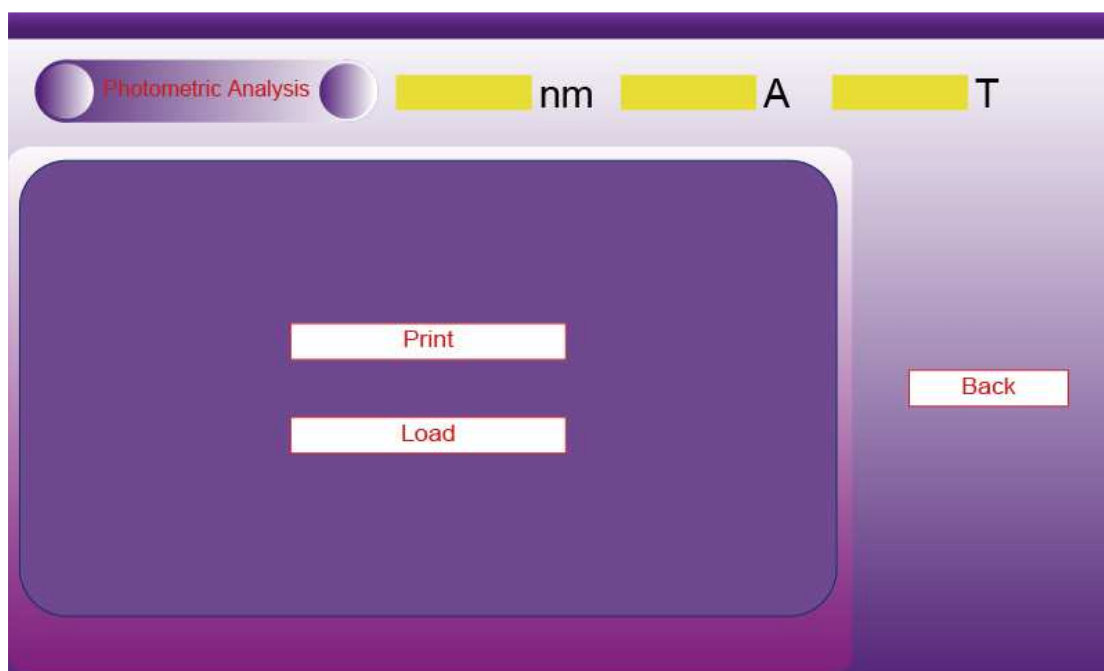





Figure 9 Photometric analysis—the operation interface of printing and loading data

☞ Once the user deletes the individual data, the clear touch button should be frozen in time (click “” to make it show “”) to avoid misoperation in subsequent operations. The delete operation is only valid for the current display, the saved data will not be lost. If the user needs to save the deleted data, click  button to overwrite the saved data.

### 3.3 Quantitative Analysis

In the functional interfaces of quantitative analysis, users can use standard curve method to determine unknown samples (The standard curves are got through several standard samples, and unknown samples are measured by comparing with standard curves). The unknown sample can also be measured by the coefficient method (The slope and intercept of the standard curve are known, and the unknown sample is measured directly by this standard curve).




Click  icon at the main operation interface of instrument operation to enter interface of quantitative analysis (Figure 10).



Figure 10 The main interface of instrument operation

### 3.3.1 Standard curve test

Standard curve method is a quantitative analysis method to measure the concentration of sample by comparing the standard curve established by standard sample with known concentration. "Standard curve", that is "the standard work curve". The concentration of standard solution is known, the absorbance of a set of standard solution whose concentration increase with certain multiple are measured, choose the absorbance as ordinate value and the concentration as abscissa value, the absorbance corresponds to the concentration, draw a straight line to pass the points as much as possible, and then get the standard work curve (Curvilinear equation:  $A=K \times C+B$ ). Among them, A is the absorbance, K is the slope, C is the concentration,

and B is the intercept). The absorbance of the sample solution with unknown concentration is measured, and then the concentration of the sample solution is obtained by comparing the standard work curve.

⚠) Different absorbance linear ranges lead to different measurement errors. The optimum linear range of absorbance is 0.2 ~ 0.8.

⚠) The curve shown by the UV/VIS 6000 instrument is that the concentration value is abscissa, and the absorbance value is ordinate, but curvilinear equation is  $C = K \times A + B$ , the form is different, the sample test and the display of final results are not affected.

## 1. Entering the standard curve method interface



Click  button at the quantitative analysis interface to enter the interface of standard curve method (Figure 11).



Figure 11 The main interface of standard curve method

## 2. Establishing standard curve

Click  button at the main interface of standard curve method to enter the interface of creating standard curves (Figure 12). Create the standard curve according to the system prompts.

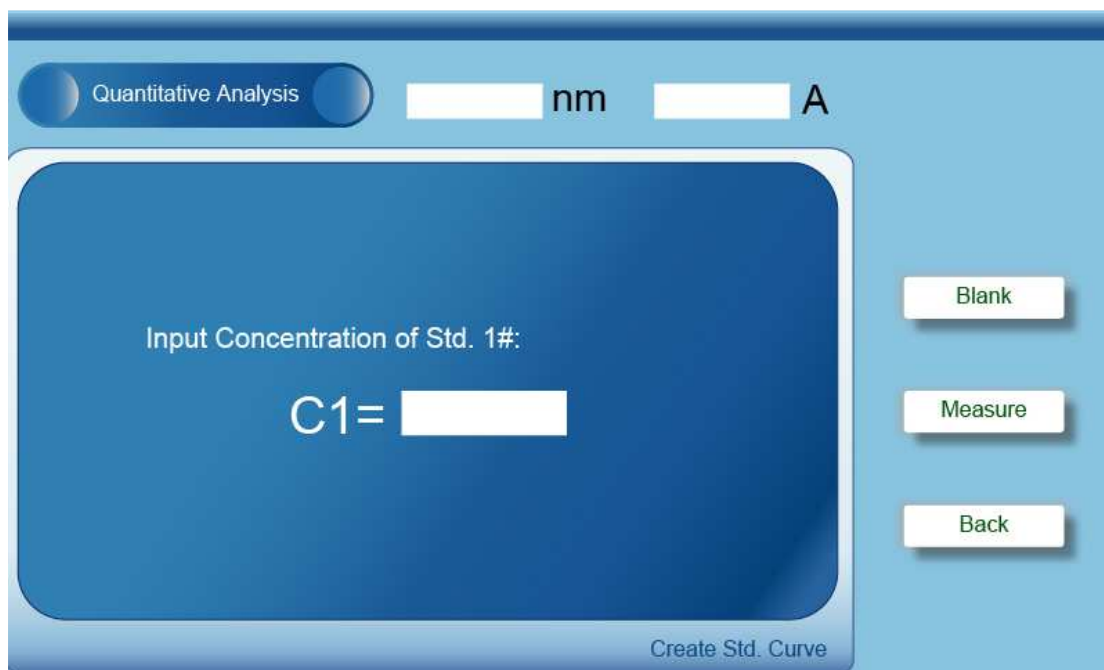









Figure 12 The interface of creating standard curve

The procedures of standard curve test are as follows:

(1) Setting wavelength

Click  button at the main interface of standard curve method and the digital input window appears (Figure 8). Input the wavelength value, click  button to confirm the value, the prompt message of "wavelength shift....." appears under the screen, then the instrument reaches the specified wavelength.

## (2) Standard sample test and drawing curve

Click  button at the main interface of standard curve method to enter the interface of creating standard curve. First, put the standard reference solution into the optical path, click  button to set 0.000 Abs. Second, according to the system prompt, put 1# standard sample into the optical path, click the concentration settings box, the digital input window appears (Figure 8), input the concentration value, click  and  buttons orderly. Last, follow the prompts to set and measure the next standard sample (up to 12 standard points). Click  button after all measurement of standard solution are finished, the system draws the standard curve directly, and gives the curve equation and the correlation coefficient (Figure 13).



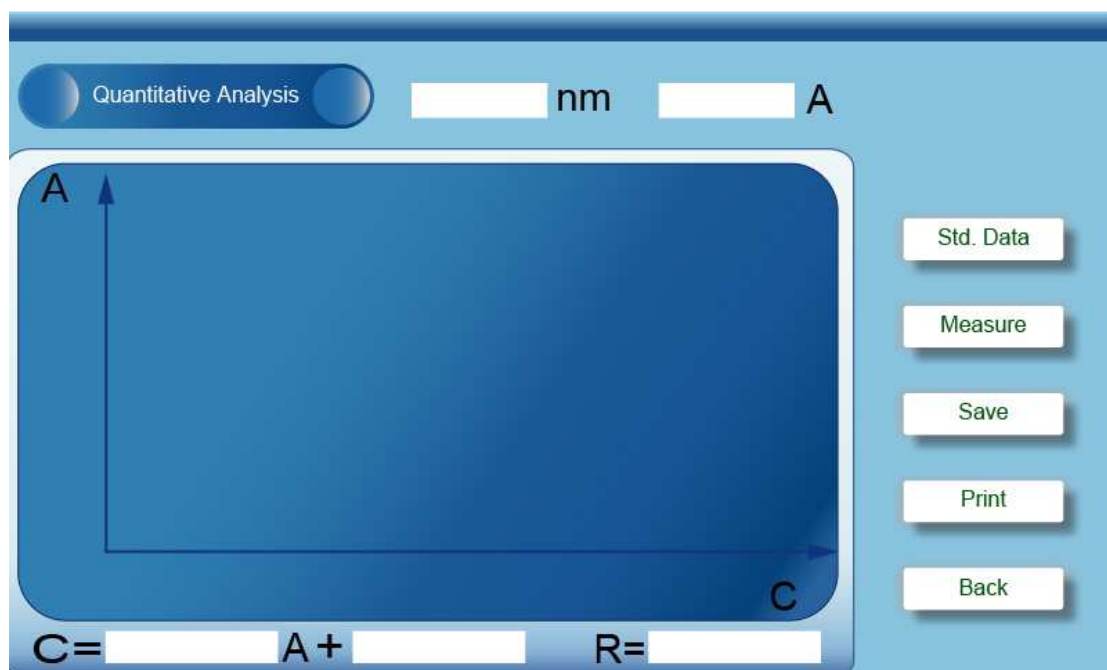


Figure 13 The display interface of standard curve

When the standard sample is tested, please ensure that the corresponding sample has been placed in the light path before inputting the sample concentration. The data records are not displayed by the current measurement interface, the user can click **Std. Data** button to view the standard sample data after drawing the curve (Figure 14).

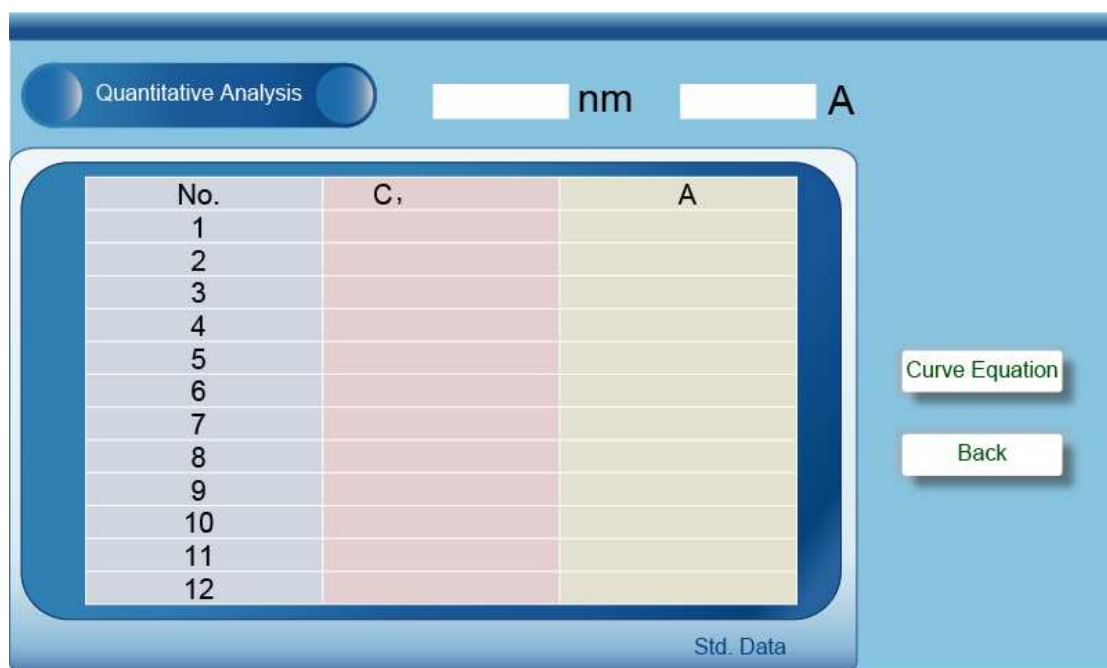


Figure 14 Standard sample data display interface

### (3) Sample test

Click  button to enter sample test interface at the display interface of standard sample (Figure 15). Put the blank solution into the light path and click  button to deduct the absorbance of the blank solution (Set 0.000Abs). Then put the sample needed to be tested in the light path and click  button to record the test result.

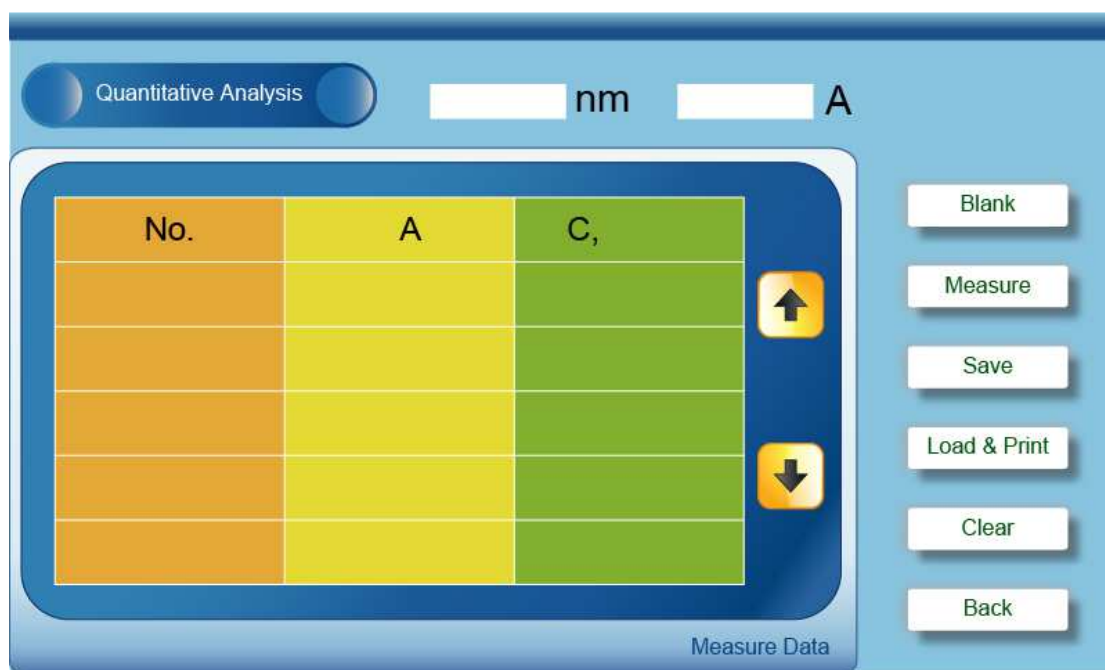


Figure 15 Sample test interface



### 3. Data processing

The standard curve and sample test data can be saved, loaded, printed and deleted after the standard curve test is completed. Multiple curves

and multiple sets of data can be stored into the instrument.

Save data: click  button to save the data to the instrument, and the data can be saved to the USB memory automatically if the USB memory is connected.

Load, print data: click  button at the sample test interface to enter the interface of loading and printing data (Figure 16). Click  button to print the data when the printer is connected. Click  button to open the saved data.

Clear data: click  icon to active it ( is shown) when individual data needs to be deleted, then click the number of the data to delete the corresponding data. Users can also click  button on the right of the screen to empty all data in the data table.

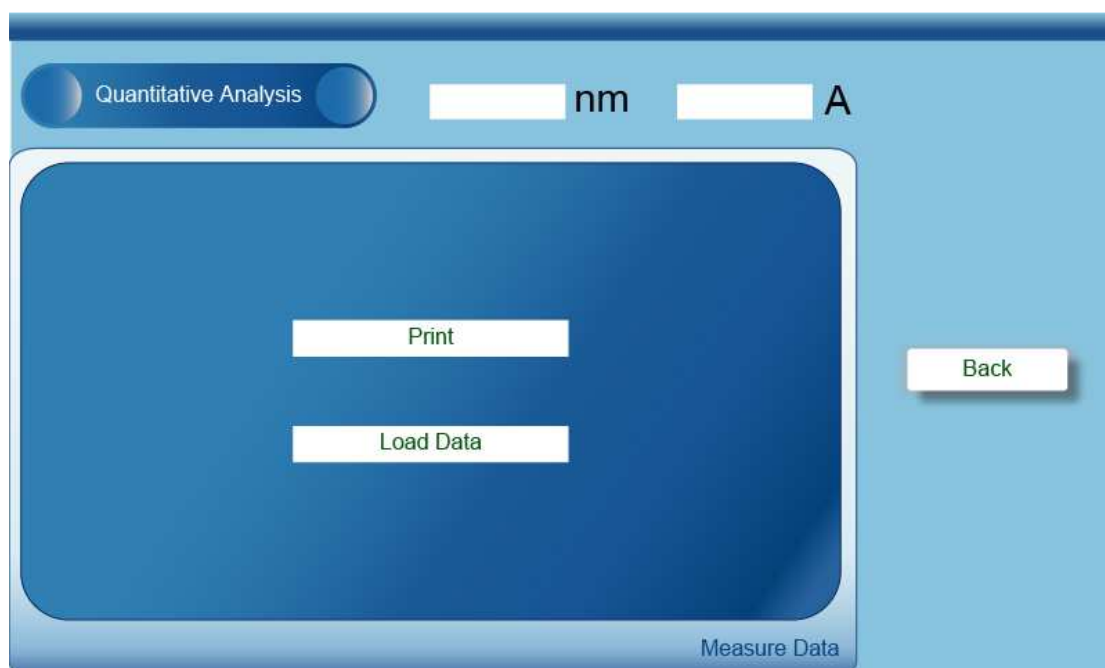








Figure 16 The interface of printing and loading data

The clear touch button should be frozen in time after the individual data deletion has been finished (click  icon to let it show as ) to avoid misoperation in subsequent operations. The clear operation is only valid for the current display and the saved data will not be lost. If the remaindered data needs to be saved, click  button to replace the saved data.

#### 4. Opening standard curve

The user can open the standard curve that has been saved to load it.

Click  button at the main interface of standard curve method to enter the loading standard curve interface (Figure 17). The user can click  icon and  icon to choose the needed equation, click the corresponding sequence number in the number bar to enter the standard curve display interface to test the samples further.

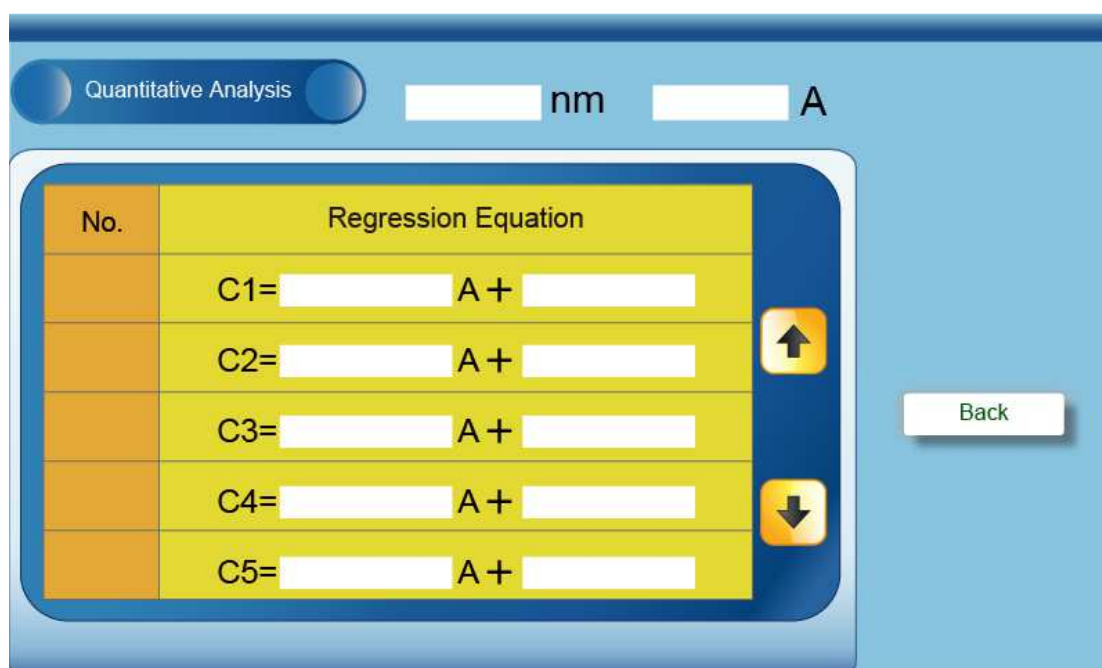


Figure 17 Loading standard curve

When the curve is saved, the sequence number increases orderly, and the new established curve is saved in the last position. The instrument can store a plurality of standard curves.

## 5. Deleting standard curve

The saved standard curve can be deleted by the user. Click

Delete Std. Curve

button at the main interface of standard curve to enter the interface of deleting standard curve (Figure 18). The user can click

↑ icon and ↓ icon to choose the needed curve to be deleted, click the corresponding sequence number in the number bar to delete the curve.

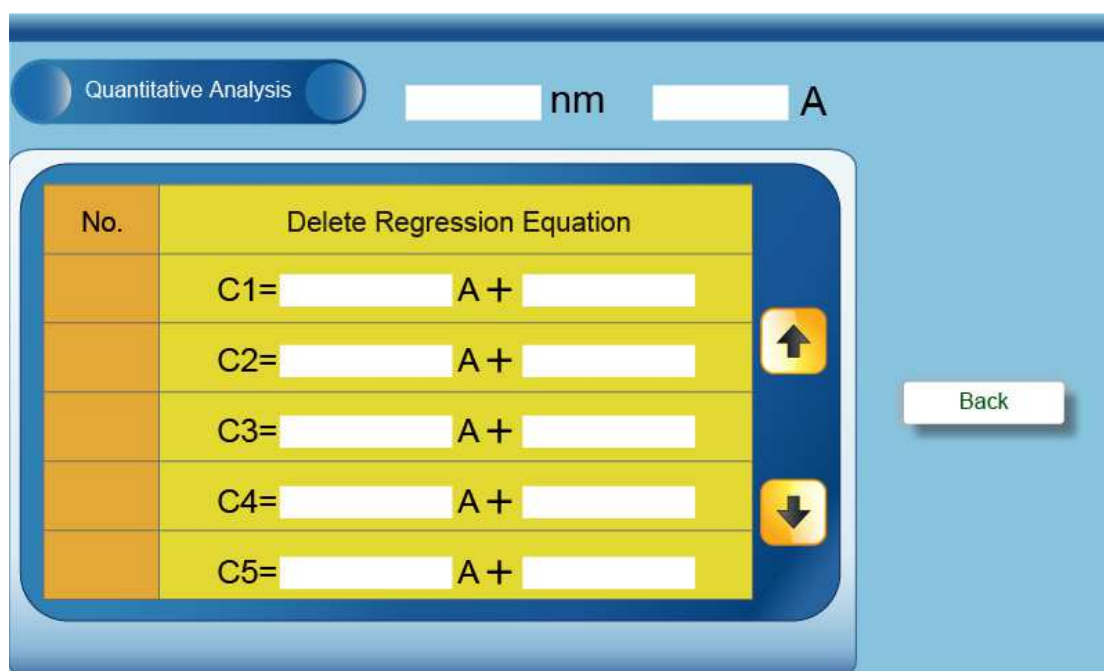


Figure 18 Deleting standard curve


### 3.3.2 Application of coefficient method

The coefficient method is a simple application of the standard curve method. Input the known curve parameters to determine curve equation, then test the unknown concentration samples.

The formula  $C=K \times A+B$  in the coefficient method is given by the system, input the curve parameters K and B to carry out the measurement.

The procedures of standard curve test are as follows:

### 1) Entering coefficient method interface

Click  button at the main interface of quantitative analysis to enter the coefficient method interface (Figure 19).

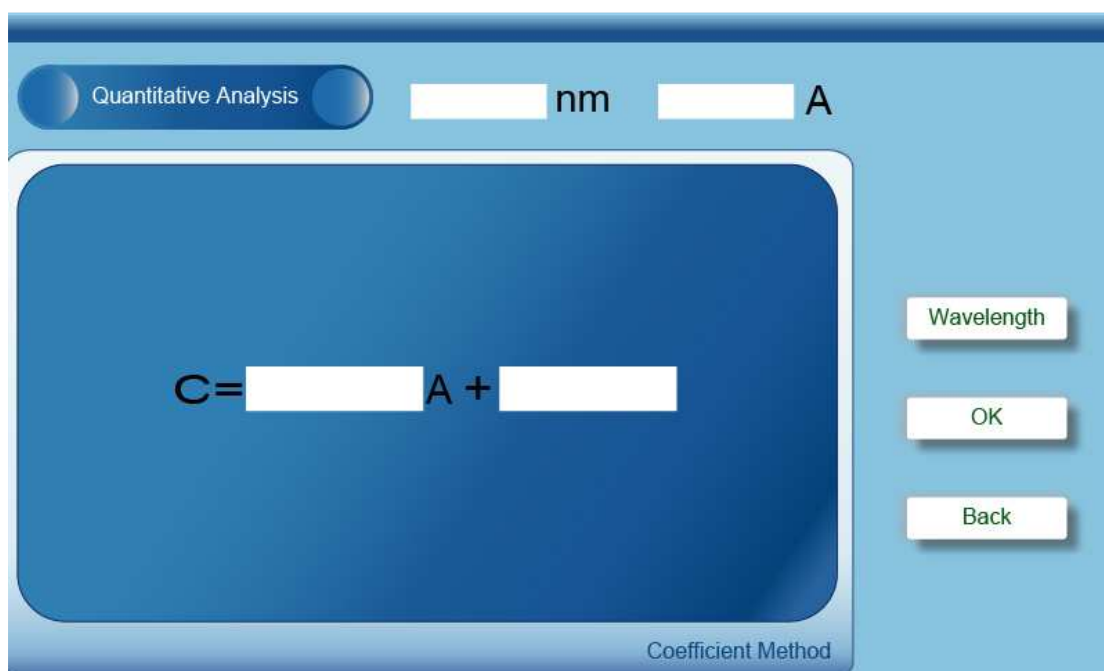






Figure 19 Coefficient method interface

### 2) Setting wavelength



Click  button at the coefficient method interface, and

the digital inputting window appears (Figure 8). Input needed wavelength, click  button, the prompt message of "wavelength shift....." appears under the screen, then the instrument reaches the specified wavelength.

### 3) Setting the curve parameters K and B

Click the parameter K settings box at the main interface of coefficient method, the digital inputting window appear (Figure 8). Input K and click  button to confirm the value. Set the B value with the same method, click  button to enter the sample test interface (Figure 15).

### 4) Sample test

Put the blank solution into the light path and click  button to deduct the absorbance of the blank solution (Set 0.000Abs). Then put the sample needed to be tested into the light path and click  button to record the test result.

The user can save, print or delete the measure data after test. No more details here.

## 3.3.3 Setting concentration unit

Set concentration unit at quantitative analysis interface before the quantitative analysis. Click  button to enter the unit selection interface (Figure 20). Six common concentration units can be available: g/L, mg/L, mg/ml,  $\mu\text{g/ml}$ , mmol/L and mol/L. Select needed unit and click  button, then click  button to return the main interface of quantitative analysis.

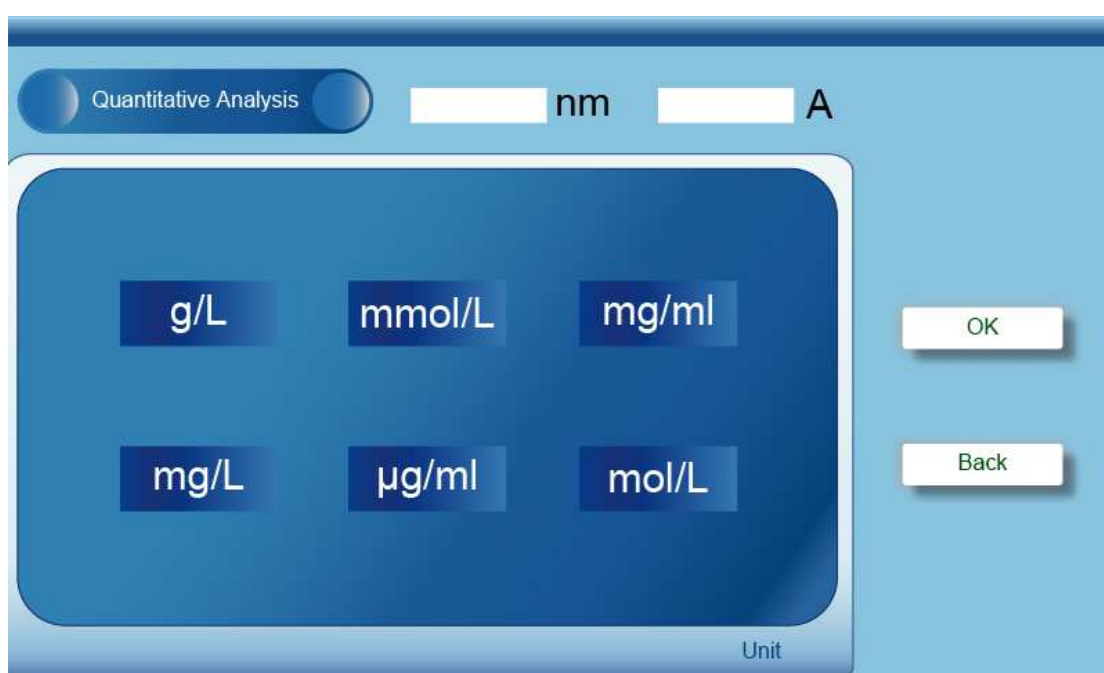



Figure 20 Selecting concentration unit

### 3.4 Spectral Scanning

The user can establish related curves between absorbance or transmittance and wavelength at the wavelength scan interface to analyze relevant content.





Click  icon at main operation interface to enter wavelength scan interface (Figure 21).

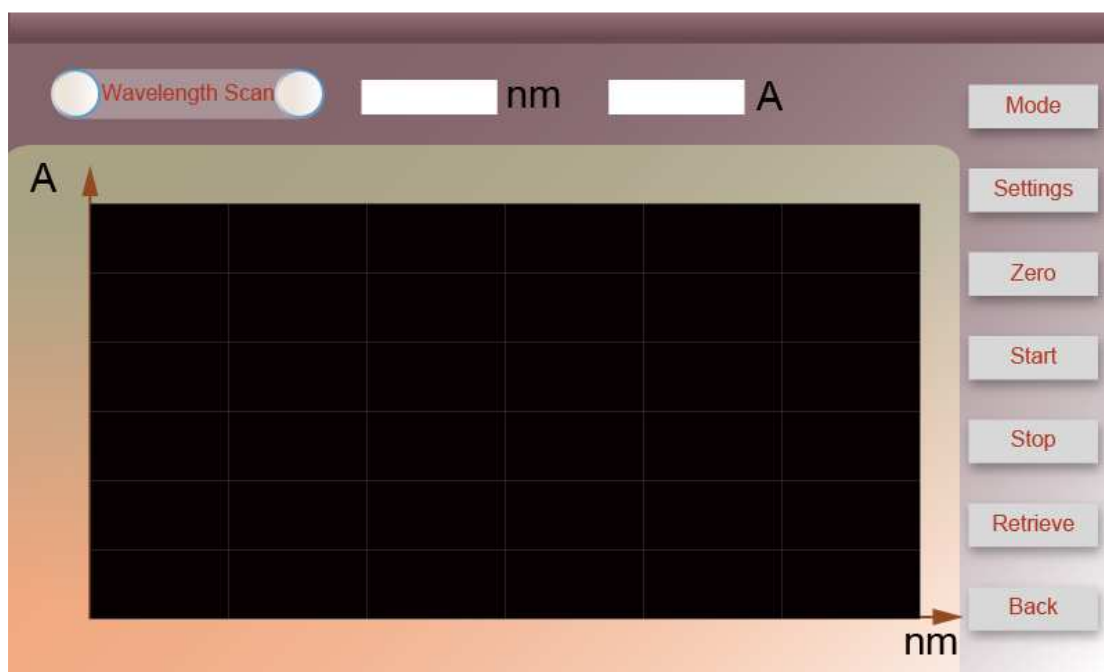


Figure 21 Wavelength scan interface


The real-time display column is in the upper part of the screen, the main area of the window is spectrum display area, the touch button operation area is on the right of the screen. The specifications of the touch button are as follows:

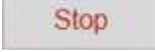
**Mode**: used to select display mode (A, T or E).

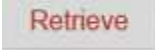
**Settings**: to set the wavelength scan parameters, for example scan wavelength range, scan interval, ordinate range.

**Zero**: to calibrate baseline and the blank value within the selected

wavelength range.

: to start wavelength scan.

: to stop wavelength scan.

: to search, save and print data by retrieval.


: to quit the current interface and return to the last interface.

### 3.4.1 Wavelength scan

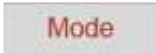
The procedures of wavelength scan are as follows:

- 1) Entering wavelength scan interface



Click  icon to enter the wavelength scan interface at the main operation interface.

- 2) Selecting display mode

Click  button to enter display mode interface (Figure 22), there are three display modes: A, T, E, click the needed mode to complete selection.

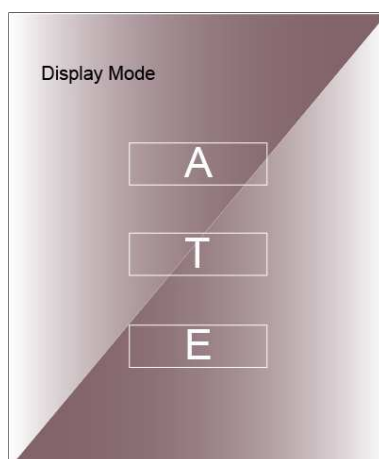


Figure 22 Display mode selection

### 3) Setting wavelength scanning parameters

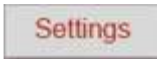

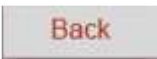

Click  button to enter scan setting interface (Figure 23), the scanning wavelength range (starting wavelength and termination wavelength), scan interval, ordinate display range (ordinate minimum and maximum) can be set. Click the settings box respectively on the right of each parameter name, and input the corresponding value into the number input window, then click  to confirm the values. Click  button to return to the wavelength scan interface after parameter settings are completed.



Figure 23 Wavelength scan settings

#### 4) Wavelength scan of sample

Wavelength scan can be started when scan settings are completed: Put the blank solution into the light path, click **Zero** button to calibrate baseline, and the prompt of “Baseline correcting.....” is shown. Baseline correction is finished and the system will prompt the message “Baseline correction is finished”. Put sample solution into the light path, click **Start** button to start to scan sample and prompt the user “Wavelength scanning.....”. The message of “Scan is finished” appears when scan is completed. When scanning the sample, the scanning graph is displayed immediately in the spectrum display area.

 Wavelength is scanned from long wave to short wave. The system alarms

and the wavelength returns to the starting point when baseline correction and sample scan are completed.

### 3.4.2 Processing data

Click **Retrieve** button to enter wavelength scan retrieval interface (Figure 23) after scan is over. And retrieval, saving, loading, deleting, printing and coordinate adaptation can be done.

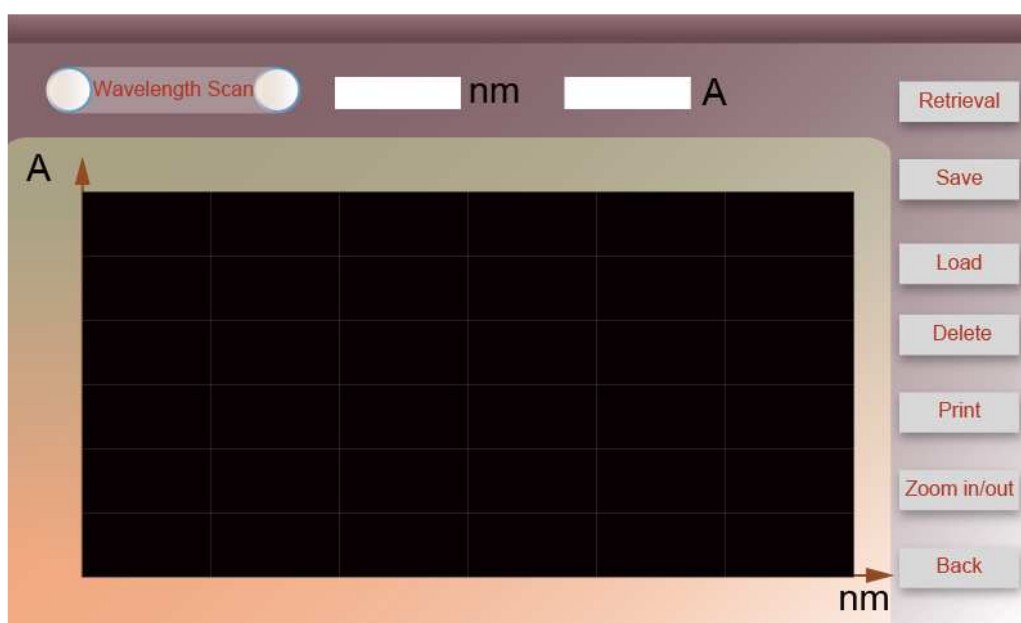






Figure 23 Retrieval interface of wavelength scan

#### 1. Data search

Click **Retrieve** button to enter retrieval interface (Figure 24).  and  can be clicked to search the peak, or  and  can be click to search data point-by-point. Also click the display bar of current wavelength and input wavelength into the digital input window, and click **ok** to confirm the value to realize accurate search. Retrieval is

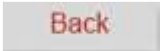


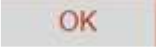
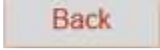
finished, click  button to return retrieval interface of wavelength scan.



Figure 24 Data search interface

## 2. Saving data


The wavelength scan data can be saved in the instrument or USB memory automatically if the memory is connected.

Click  button at the retrieval interface of wavelength scan to enter saving data interface (Figure 25). Click setting box, input the file name in the pop-up digital input window, click  to confirm the name, then click  button and prompt message “Saving data.....”, once the data is saved, click  button to return to the retrieval

interface.



Figure 25 Saving data interface

 The valid length of the saved file name is no more than 4 bits, please do not exceed the input range to avoid mistakes. In addition, due to the limited storage space, please do not repeat preservation of the same scan file to avoid mistakes.

### 3. Loading data

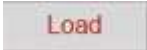

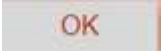

Click  button at the retrieval interface of wavelength scan to enter loading data interface (Figure 26). Click setting box, input the file name needed to be loaded in the pop-up digital input window, click  to confirm the name, then click  button to load the correspondent file.



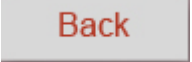


Figure 26 Loading data interface

☞ When save the file, files of A, T, E model need to save into the folder with specified storage mode, so choose the correct display mode before loading file so as to find out the loaded file in corresponding folder.

#### 4. Printing data

Click  button at the retrieval interface of wavelength scan to enter printing data interface (Figure 27).

If the printer is connected, click  button or  button to print image or text. Click  button to return the retrieval interface.



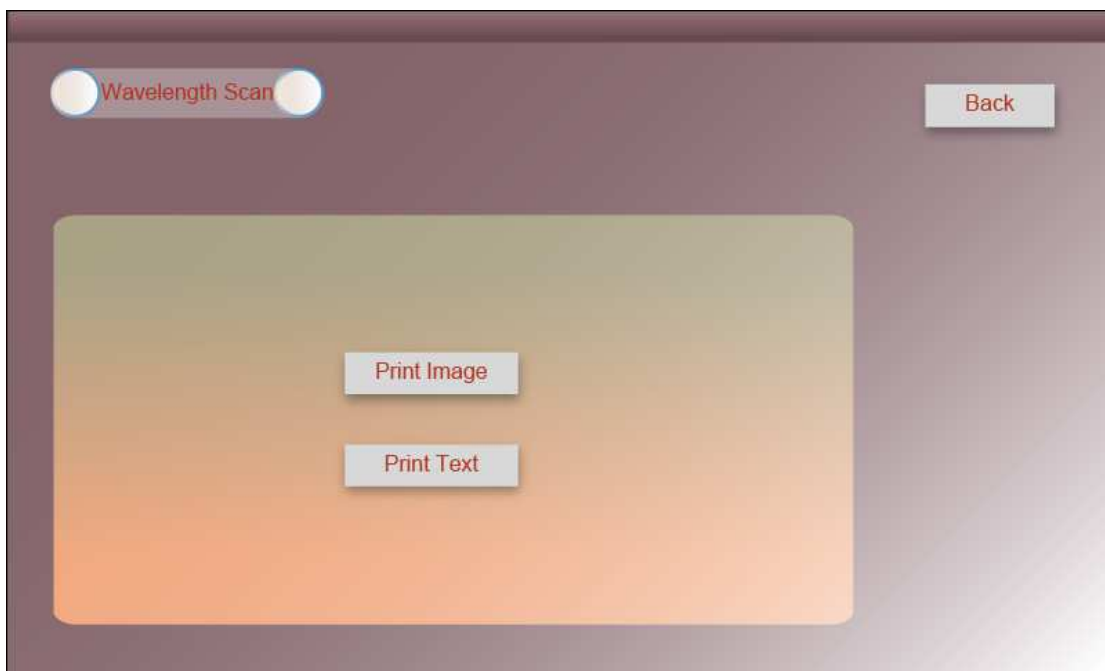
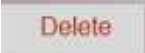


Figure 27 Printing data interface

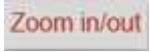
☞ Once the print is executed, the corresponding files stored in the instrument will be emptied automatically because of the limited storage space.

## 5. Deleting data

Click  button at the retrieval interface to delete the current spectrum.

☞ If the scan data is opened by loading file, the corresponding file stored in the instrument will be emptied automatically when the delete operation is performed.

## 6. Coordinate adaption

Click  button at the retrieval interface button to enter coordinate parameter adjustment interface (Figure 28). Click setting box on the right side of each coordinate parameter name respectively,


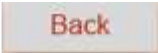
input the corresponding value in the input window, click  to confirm the value after setting, then click  button to return to the retrieval interface, at the same time the adjusted spectrum is showed.



Figure 28 Coordinate parameter adjustment interface

### 3.5 Kinetic Analysis

At the kinetic analysis interface, the curve of relationship between absorbance or transmissivity and time can be established to do relevant dynamic analysis.




Click  icon at the main operation interface to enter kinetic analysis interface (Figure 29).



Figure 29 Kinetic analysis interface

The real-time display bar is in the upper part of the screen, the main area of the window is spectrum display area, the touch button operation area is on the right of the screen. The specifications of the touch button are as follows:

**Mode**: to select display mode (A, T)

**Settings**: to set kinetic parameters, such as wavelength, scan time, scan interval and ordinate range.

**Blank**: used to set 0.000 Abs and 100% T and correct the blank.

**Start**: to start the kinetic scan.

**Stop**: to stop the kinetic scan

**Retrieve**: to search data, save data, print and other operation by retrieval.


: to quit the current interface and return to the last interface.

### 3.5.1 Kinetic analysis


The procedures of kinetic analysis are as follows:

#### 1) Entering kinetic analysis interface



Click  button at the operation interface to enter kinetic analysis interface.

#### 2) Selecting display mode

Click  button to enter display mode selection interface (Figure 30). Two modes A, T can be selected, click the needed mode to complete selection.

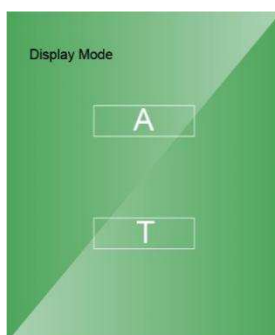



Figure 30 Kinetic analysis-display mode selection

#### 3) Setting kinetic parameters

Click  button to enter kinetic parameters setting interface (Figure 31). Wavelength, scan time (length), scan interval, ordinate





display range (minimum and maximum) can be set. Click setting box on the right of each parameter name respectively, input the corresponding value in the input window, click  to confirm the value. When settings are completed, click  button to return to the kinetic analysis interface.



Figure 31 Kinetic scan settings

#### 4) Kinetic scan

After settings, return to the kinetic analysis interface to start scan test:

Put the blank solution in the light path, click  button to correct the blank. After blank correction is finished, put sample solution in the light path, click  button to start to scan sample and the user is prompted “Kinetic analysis.....”. When scan is over, the user is prompted “Kinetic scan is completed”. When kinetic scan is performing, the scan image is real-time displayed in the spectrum

display area.

### 3.5.2 Processing data







Click  button to enter the retrieval interface of kinetic analysis (Figure 32). The user can search data, save, delete, load, print and exchange coordinate at the interface.



Figure 32 Kinetic retrieval interface

#### 1. Searching data

Click  button to enter data retrieval of kinetic analysis (Figure 33). The user can click  and  to search data point-to-point, or click the time display bar above the interface, input time into the pop-up digital input window, and click  to confirm the value to

realize accurate search. When retrieval is finished, click  button to return to retrieval interface of kinetic retrieval.

## 2. Saving data

The kinetic scan data can be saved in the instrument or USB memory automatically if the memory is connected.






Click  button at the retrieval interface of kinetic analysis to enter saving data interface (Figure 34). Click setting box, input the file name in the pop-up digital input window, click  to confirm the name, then click  button and prompt message “saving.....” appears, once the data is saved, click  button to return to the retrieval interface.






Figure 33 Retrieval interface



Figure 34 Saving data interface

 The valid length of the saved file name is no more than 4 bits, please do not exceed the input range to avoid mistakes. In addition, due to the limited storage space, please do not repeat preservation of the same scan file to avoid mistakes.

### 3. Loading data

Click  button at the retrieval interface to enter loading data interface (Figure 35). Click setting box, input the file name needed to be loaded in the pop-up digital input window, click  to confirm the name, then click  button to load the correspondent file.



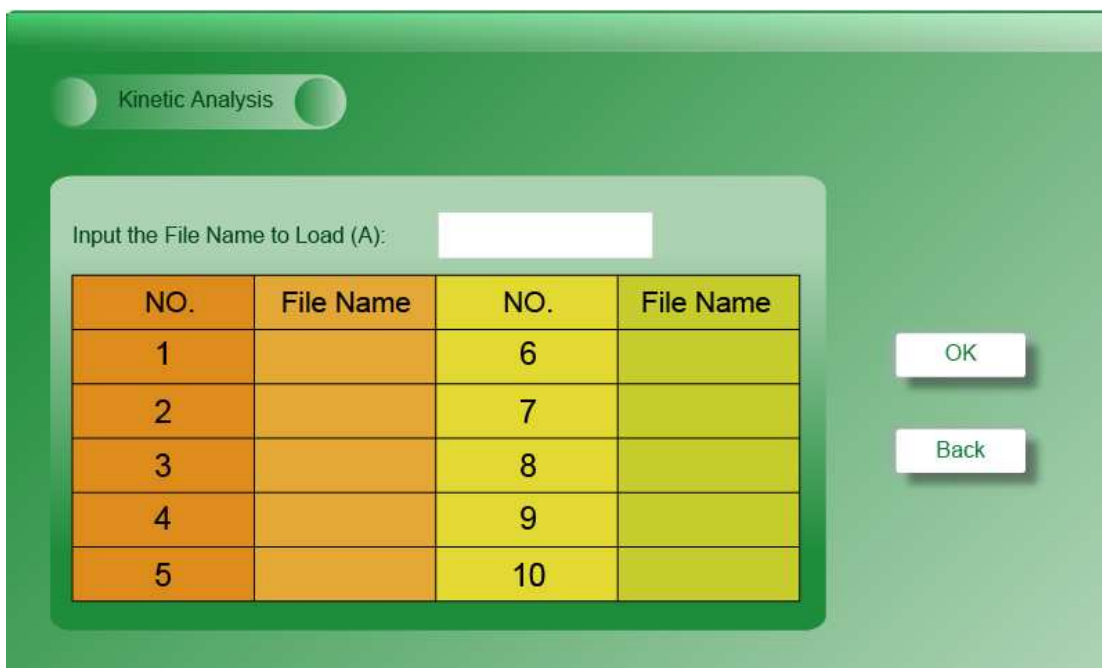





Figure 35 Loading data interface

☞ When save the file, files of A, T model need to save into the folder with specified storage mode, so choose the correct display mode before loading file so as to find out the loaded file in corresponding folder.

#### 4. Printing data

Click  button at the retrieval interface of kinetic analysis to enter printing data interface (Figure 36). If the printer is connected, click  button to print data. Click  button to return the retrieval interface.

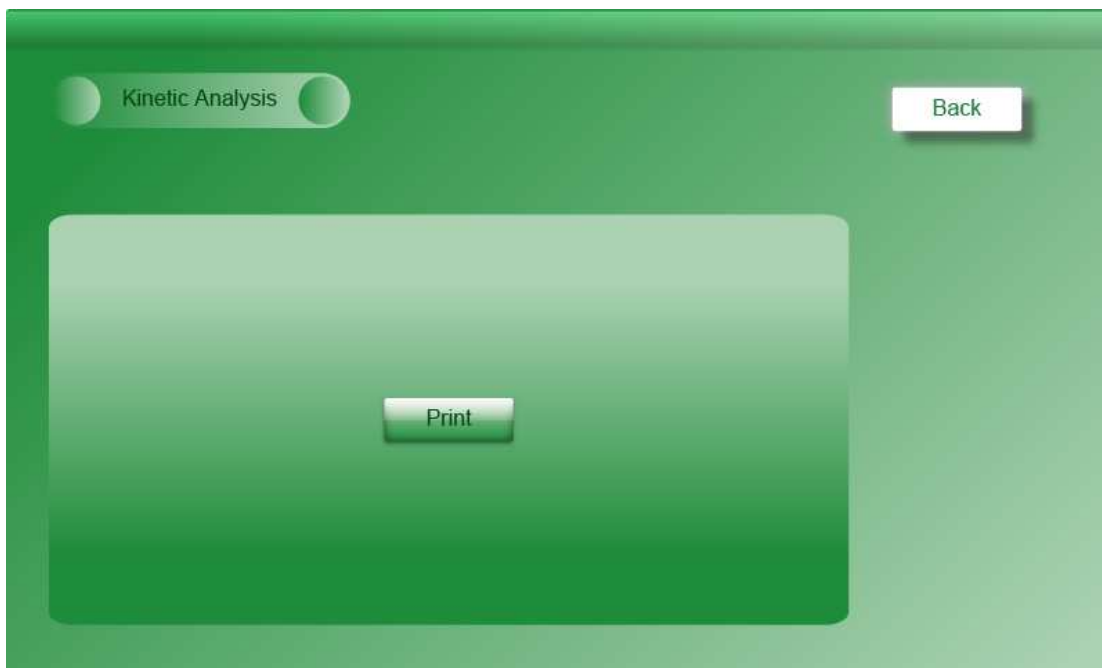



Figure 36 Printing data interface


☞ Once the print is executed, the corresponding files stored in the instrument will be emptied automatically because of the limited storage space.



## 5. Deleting data

Click  button at the retrieval interface of kinetic analysis to delete the current display spectrum.

☞ If the scan data is opened by loading file, the corresponding file stored in the instrument will be emptied automatically when the delete operation is performed.

## 6. Coordinate adaption

Click  button at the retrieval interface to enter coordinate parameter adjustment interface (Figure 37). Click setting box on the right of each coordinate parameter name respectively, input the

corresponding value in the input window, click  to confirm the value. When the settings are over, click  button to return to the retrieval interface, at the same time the adjusted spectrum is showed.

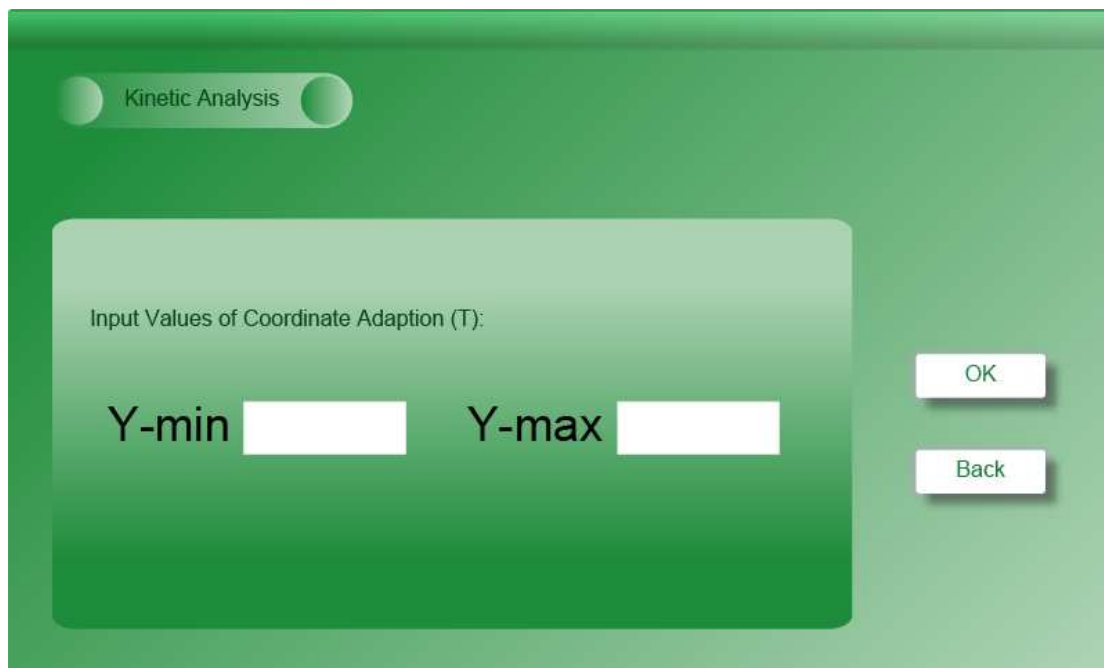


Figure 37 Adjusting coordinate parameter interface

### 3.6 System Settings

The user can manage lamps, set time, correct dark current, debug system, restore defaults at the system settings interface.




Click  icon at the main operation interface to enter system settings interface (Figure 38).



Figure 38 System setting interface

### 3.6.1 Lamps management

The user can control lamp switch and lamp conversion wavelength through


lamps management (Figure 39). Click  icon at system settings interface to enter lamps management interface.



Figure 39 Lamps management interface

### 1. Controlling lamp switch


Click  button to enter lamp switch control interface (Figure 40).



Figure 40 Lamp switch control interface

### 2. Setting lamp conversion wavelength






Click  button to enter lamp conversion wavelength interface (Figure 41).




Figure 41 Lamp conversion wavelength setting interface

Click the blank setting box, input the corresponding value in the pop-


up digital input window, click  to confirm the value. Then click  button at the lamp conversion wavelength interface to confirm the setting. Click  button to quit the current interface.

 When only the UV or visible area is used for test, it is recommended that the unused lamp should be switched off to prolong the service life of the lamp after the initialization of the instrument.

 The system default lamp conversion wavelength is 340 nm, and the valid setting range is 300 nm - 360 nm. Please do not test sample at the lamp conversion wavelength to ensure the accuracy of the measurement results. If this wavelength is needed for test, please set reasonable lamp conversion wavelength before test.

### 3.6.2 Time settings



The system display time can be set by the user. Click  icon at the system settings interface to enter time settings interface (Figure 42).

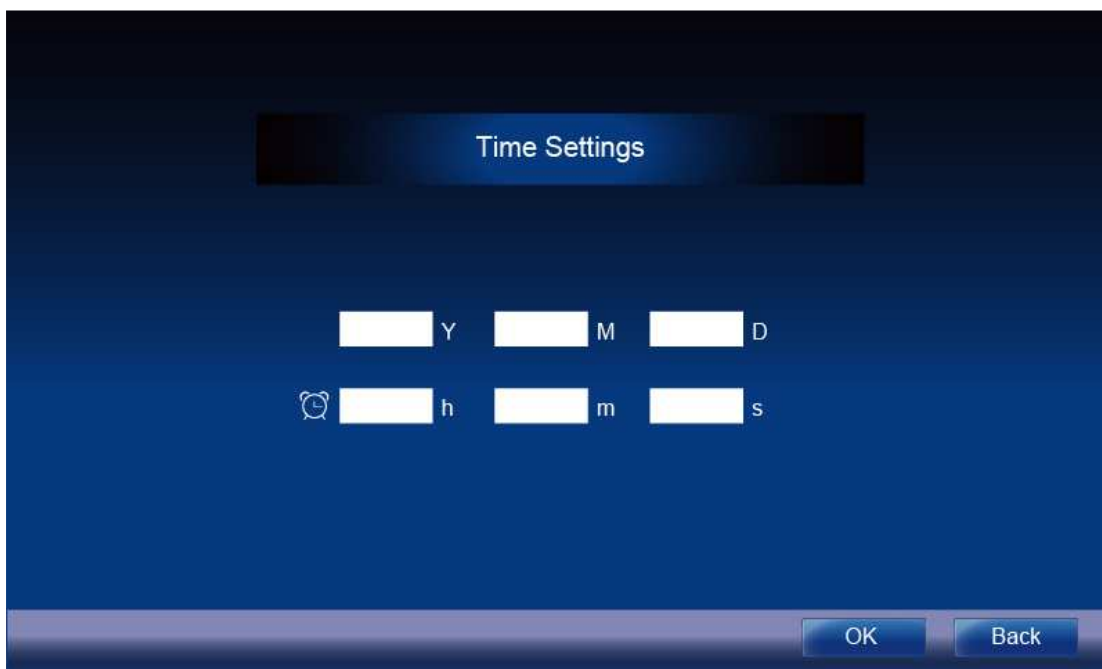

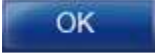
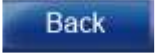




Figure 42 Time settings interface

Click the corresponding blank settings box, and then input the corresponding values in the pop-up input window, click  to confirm value to quit digital input window. After settings are completed, click  button to confirm all the values, at last click  button to quit the current interface.

### 3.6.3 Dark current calibration

When the instrument is affected by longer starting time, resetting the wavelength and other factors, dark current will change. Dark current calibration is needed before test to ensure the accuracy of the measurement results.



Click  icon at the system setting interface to enter dark current calibration interface (Figure 43). Click  button, the system will calibrate dark current automatically, and indicates "Dark current calibrating.....". After the dark current calibration is completed, the system indicates that the dark current calibration has been completed, and the blank area will display the corresponding dark current code number.

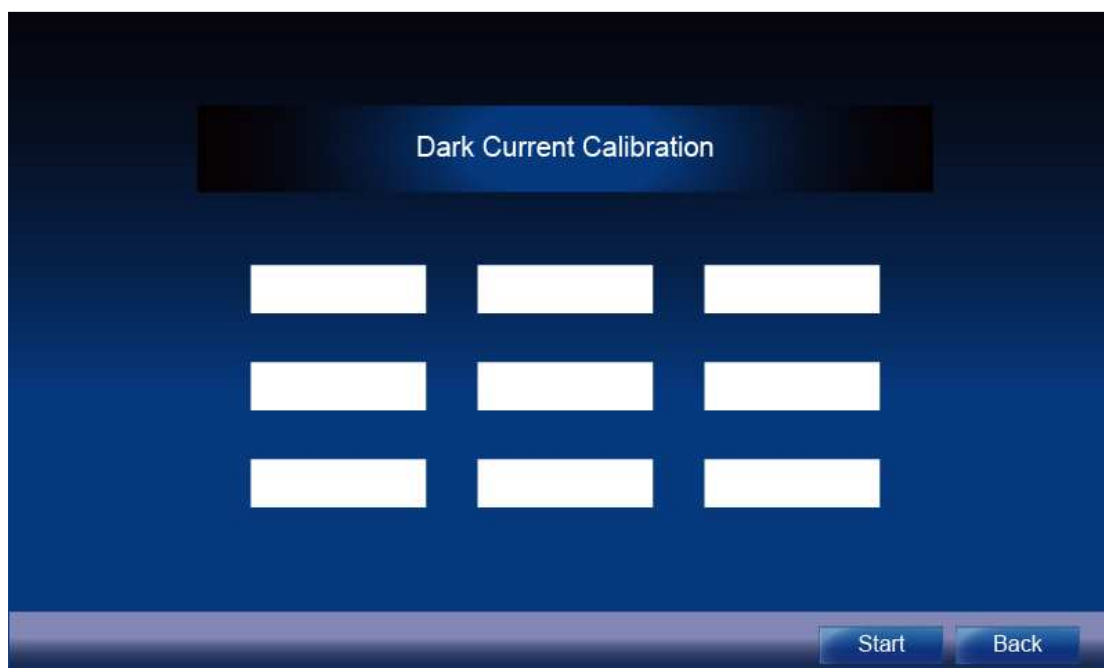


Figure 43 Dark current calibration interface



### 3.6.4 Wavelength calibration

Wavelength calibration function is needed when the wavelength has





deviation. Click  icon at the system setting interface to enter wavelength calibration interface (Figure 44). Click  button, the system will automatically calibrate the 656.1nm characteristic wavelength and indicates "wavelength calibrating.....", the process takes about 2 minutes. Wavelength calibration is completed, the system indicates "Wavelength calibration is completed", click  button to return to the system settings interface.



Figure 44 Wavelength calibration interface

### 3.6.5 System debugs



Click  icon at system setting interface to enter system debugs interface (Figure 45). The system debugs function is open mainly to the factory debugging personnel and the professional maintenance personnel, here does not make the specific explanation.

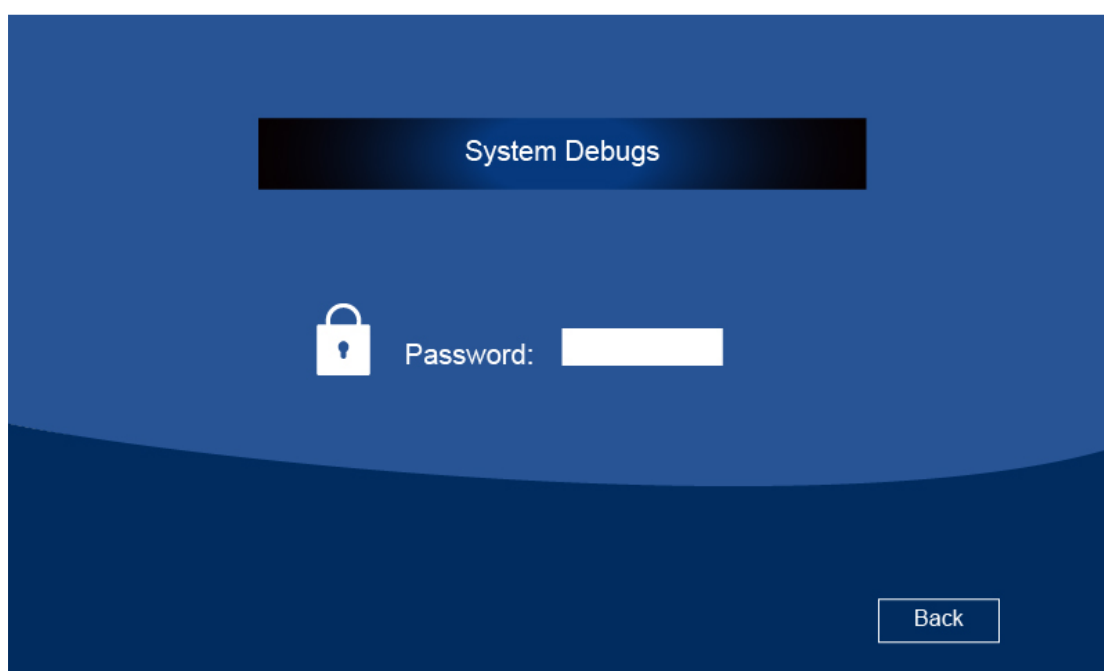




Figure 45 System debugs interface

### 3.6.6 Restoring defaults



Click  icon at system setting interface to enter restoring defaults interface (Figure 46). Click  button to perform the restoring


defaults order. Click  button to return to system setting interface.



Figure 46 Restoring factory defaults interface

☞ "Restore factory defaults" will clear all data stored by the instrument, including user test records, user set parameters, and curve information established by the user, so be careful to execute the operation.

## 4. Routine maintenance

- 1) Check the sample cell to ensure that the light path is expedite (There no objects at sample cell and the position of sample frame is correct) to avoid self-check error.
- 2) The height of the solution loaded into the cuvette is  $\frac{2}{3}$  of the cuvette height preferably. Try to avoid bubbles (The presence of bubbles affects the test results). If the solution remains on the outer surface of the cuvette, it should be cleaned promptly (First soak up the solution with the filter paper, then wipe the glaze with the lens wiping paper.) The cuvette cover is recommended for volatile samples. Try to avoid to contaminate sample holder, or the residual liquid on the sample holder should be wiped off in time.
- 3) The glaze of cuvette should not be touched when taking or putting the cuvette to avoid to affect the accuracy of the test results. Handle the cuvette gently so as not to cause damage. Clean the cuvette in time in proper way after using (Refer to the clean methods of the cuvette in Appendix A). The accuracy and stability of the test results will be affected if the cuvette is washed improperly or not cleaned.

- 4) Close the cover of sample room in time when taking or putting sample during test. Open or close the cover of sample cell gently. Remove the sample from the sample room in time after test and check to ensure the sample room is dry and no liquid (Liquid sample or residual liquid may cause assemblies to become moldy and even corrode).
- 5) Turn off the unused lamp to prolong the service life of the lamp. Please turn off the instrument and unplug the power plug when the instrument is not used to prevent damage caused by thunderstorms.
- 6) Do not disassemble the cover and parts of the instrument, especially the light path structure, do not loosen the tight screws and nuts. Do not touch the surface of all optical parts (including lamps) by hand or other objects so as not to affect the normal operation of the instrument or even cause man-made damage.
- 7) Handle the instrument gently and do not put heavy objects on the top of the instrument, so as not to cause light path shift to affect the accuracy and stability of the instrument.
- 8) Keep the instrument surface and working environment clean. Do not scrub the shell of the instrument with alcohol, gasoline, ether and other organic solutions. Cover the instrument with dust guard or clean cloth cover to avoid dust accumulation when the equipment is not used.

- 9) The instrument should not be used for a long time, it is recommended to operate on regular time to ensure proper running. Pay attention to moisture protection issues at higher temperature and humidity areas.
- 10) Special note: the self-check is only for routine items. The systematic errors may be accumulated if the instrument is transported, carried and used for a period of time. Therefore, wavelength and dark current is recommended to be calibrated in time through “system settings” function when the above circumstances occur or you feel that the test data is different from the experience value.

## 5. Troubleshooting

We make sure that strict debugging, aging and inspection have been done for every instrument left factory, the instrument usually has no problem in normal storage, handling and use. However, it still is impossible to avoid problems caused by misoperation or extreme conditions, as well as long-term use. For example, poor environment of storage and use lead to the damage of electronic and optical components, improper handling results in loose parts or the damage of vulnerable parts, service time of lamps is more than their service life, electronic components age, misoperation causes other troubles.

Please refer to the manual carefully before operating the instrument. The

reasons and remedial actions of common faults are summarized in Table 1, which makes it easy for users to make effective judgments at the first time, and also to explain the situation during maintenance.

**Table 1 Analysis and elimination of common faults**

Symptom	Possible cause	Remedial action
1、 No response after opening the instrument	1) The power is not connected.	Check the power or power cord to ensure that the external power supply is normal and the power plug is contacted.
	2) Power fuse has blown out.	Replace a new fuse.
	3) Power switch is broken.	Contact supplier or technician of manufacturer for maintenance.
2、 When the fan is working, the screen does not show or cannot show clearly.	1) Control chips or components is broken.	Contact supplier or technician of manufacturer for maintenance.
	2) Bad contact or screen is broken.	Contact supplier or technician of manufacturer for exchange of screen.
3、 Self-check cannot	Lamp conversion 1) Control motor has fault.	Contact supplier or technician of manufacturer for maintenance.

pass.	has fault		
	Optical filter has fault	1) Control motor does not work	Contact supplier or technician of manufacturer for maintenance.
		2) The optocoupler is not positioned normally.	Contact supplier or technician of manufacturer for maintenance.
	The detector has fault	1) The circuit of amplifier board has fault.	Contact supplier or technician of manufacturer for maintenance.
		2) Filter position is wrong.	Contact supplier or technician of manufacturer for maintenance.
		3) The contact signal between the amplifier board and the microcomputer board is not connected well.	Contact supplier or technician of manufacturer for maintenance.
	Wavelength calibration error	1) The cover of sample room is opened when self-check, or a sample is placed inside the sample room.	Check sample room to ensure there is no sample on sample holder, close the cover of sample room during self-check.
		2) The position of sample holder is wrong.	Make sure the sample holder is in the correct position.
		3) Deuterium lamp does not light.	Contact supplier or technician of manufacturer



			for maintenance.
		4) Mildew of optical components leads to low energy.	Contact supplier or technician of manufacturer for maintenance.
		5) Wavelength motor has fault.	Contact supplier or technician of manufacturer for maintenance.
		6) The motor of filter has fault.	Contact supplier or technician of manufacturer for maintenance.
	Dark current is wrong.	1) The lid of sample compartment is open during self-check.	Keep the lid of sample compartment closed.
		2) The amplifier board has fault.	Contact supplier or technician of manufacturer for maintenance.
4、The instrument is unstable when setting 100%T or 0.000Abs.		1) The position of sample holder is incorrect.	Inspect the sample holder to make sure the sample holder is in the correct position.
		2) Preheating time is not enough.	Make sure the instrument is preheated for 30 minutes.
		3) Tungsten lamp ages or is connected badly.	Exchange the tungsten lamp.
		4) The deuterium lamp ages.	Exchange the deuterium lamp.
		5) The wavelength is incorrect.	Select system settings to

		calibrate dark current and wavelength, and then try again.
	6) Light path or amplifier board and its supply power have faults.	Contact supplier or technician of manufacturer for maintenance.。
5、 The readings of sample are unstable.	1) The self-check is abnormal.	Make sure the instrument passes self-check properly.
	2) The preheating time is not enough.	Make sure the preheating time is enough.
	3) The supply voltage of the instrument is unstable.	Contact supplier or technician of manufacturer for maintenance.
	4) Ambient interference: external voltage is unstable, corrosive gas exists.	Configure regulated power supply, prevent corrosive gas from corroding the parts.
	5) The sample is unstable.	The sample itself is unstable and should be tested as soon as possible. The solution in the cuvette contains bubbles, remove bubbles or reload the solution. If the sample is volatile, cover cuvette for test.
	6) The cuvette is contaminated.	Ensure the cuvette is clean before using.
	7) The blank value is too large, or the sample concentration is too high, so that the absorbance exceeds the	The absorbance of the blank or reference solution

	stable reading range of the instrument.	should be controlled below 0.1. Dilute the sample properly to control the absorbance between 0.2-0.8.
	8) Tungsten lamp or deuterium lamp age, energy is low.	Replace the lamp.
6、 Sample reading is inaccurate.	1) Dark current drifts.	Calibrate dark current in system setting, then correct the blank solution and test sample.
	2) The cuvette compatibility is not good.	Check and ensure the pairing of the cuvette.
7、 The printer does not work.	1) The connection between the instrument and printer is loose.	Be sure the proper connection between the instrument and the printer.
	2) The printer model is not match with the instrument.	Select the printer model specified by the manufacturer.

## Appendix A: The answers of common problem UV-Vis spectrophotometer

### 1. How to calibrate 0%T ?

UV-6000 UV-Vis spectrophotometer is a fully automatic and high grade spectrophotometer. 0%T calibration corresponds to dark current test.

There is no need to calibrate 0%T every time during the actual test.

Dark current calibration needs to be done when the instrument is opened

for a long time, or the wavelength is reset, or the environment (such as temperature, humidity, working voltage, light intensity, and so on.) is changed. Enter dark current calibration interface through system settings to correct dark current.

2. How to realize the conversion of tungsten lamp and deuterium lamp?

The conversion of tungsten lamp and deuterium lamp needs not to be done manually for UV/VIS 6000 Spectrophotometer. Set lamp conversion wavelength after entering lamp management main interface through system setting (setting range: 300nm-360nm, the default lamp conversion wavelength is 340nm). Input the wavelength required to be set, and then confirm the value.

3. Why the phenomenon that the stray light is unqualified happens sometimes?

Every instrument is inspected carefully before leaving the factory. If the unqualified stray light happens in the user's own inspection or third party inspection, please refer to the following analysis and solutions:

(1) Because the external power supply is not stable enough or disturbed, the dark current rises. Calibrate the dark current after entering the interface of dark current calibration to eliminate the phenomenon.

(2) Store the instrument in a humid place for a long time, the optical

mirror is damp, the stray light arises. If the instrument is not used regularly, it is recommended to turn it on regularly (preferably a week) to avoid some failures.

#### 4. How to switch from 220V voltage and 110V voltage?

220V voltage or 110V voltage can be selected to adapt the different countries' voltage. A red voltage switch is set up to switch voltage from 220V to 110V. 220V is applied in our country, so our instrument has been set to the correct position before leaving factory, please do not switch again.

#### 5. How to distinguish a glass cuvette and a quartz cuvette?

The glass cuvette cannot be used for ultraviolet test, because of strong absorption for ultraviolet light. Visible region can be measured by the glass cuvette or the quartz cuvette. Ultraviolet test can only be measured by the quartz cuvette. Then how to distinguish a glass cuvette and a quartz cuvette? The material of the cuvette: the new cuvette is usually marked the capital on the upper right of the glaze, "G" means glass, "Q" means quartz. If the mark disappears or is not clear, the ultraviolet test can be applied to distinguish the glass cuvette and the quartz cuvette. For example, an empty cuvette is used to test the transmittance at 200nm, most light can pass through the quartz cuvette, the light cannot pass

through the glass cuvette at all.

#### 6. How to clean the cuvette?

After the cuvette is used, it is better to clean it immediately, the remained sample solution will be air-dried on the inside of the cuvette. The methods of dissolution, neutralization can be used to clean the cuvette, the principle is that the clean effect needs to be guaranteed, the structure and transparency of the cuvette cannot be damaged, and the test results cannot be affected. Hard cloth or brush cannot be used to clean the cuvette. Potassium dichromate lotion or ultrasonic cleaning is also generally not recommended.

The solvent for the test can be used to clean the cuvette (Both inside and outside need to be washed. Load half of the solvent, press both ends of the cuvette with fingers and shake it at least three times if the solvent is non-toxic.), then wash the cuvette with a lot of water, at last with deionized water. Put the cuvette on the clean filter paper after cleaning, if the cuvette is used urgently, rinse it with ethanol, ether and dry it with cold wind of blower. In general, weak acid solution or weak alkaline solution can be used to clean the cuvette, and the cuvette can also be rinsed with organic solvent quickly (should not be soaked for a long time).

If the cuvette is difficult to clean, the following methods can be adopted:

- (1) Soak the cuvette with sodium carbonate solution (20g/L) containing a small amount of anionic surfactant, flush it with water, then soak cuvette with the mixture of hydrogen peroxide and nitric acid (5:1) for half an hour, at last rinse the cuvette with water and deionized water orderly.
- (2) Soak the cuvette with the mixture of hydrochloric acid, water and methanol (1:3:4) in the fume cupboard for less than ten minutes, then flush the cuvette with water and deionized water orderly.
- (3) Soak the cuvette with hydrochloric acid (3mol/L) – ethanol solution (1:1) for a while, and then flush the cuvette with water and deionized water.

## Qualification

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Name: Ultraviolet and visible spectrophotometer

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Type: UV/VIS 6000

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### Inspection report

No.	Item	Result
1、	Appearance	Qualified
2、	Stability	Qualified
3、	Photometric accuracy and repeatability	Qualified
3、	Spectra band width	Qualified
5、	Transmittance accuracy and repeatability	Qualified
6、	Stray light	Qualified
7、	Transmittance changes caused by voltage change	Qualified
8、	Cuvette compatibility	Qualified



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## Packing List

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Name: Ultraviolet and visible spectrophotometer

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Type: UV/VIS 6000

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### Packing list

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No.	Type	Quantity
1、	Instrument	1
2、	10mm glass cuvette	4
3、	10mm quartz cuvette	2
4、	Manual	1
5、	Power cord	1
6、	Dust cap	1

---

## Warranty

Instrument warranty description:		
<p style="text-align: center;">Our company provides one-year free warranty of since you get the instrument. During the warranty period, please contact our company directly with the instrument warranty and the invoice if the instrument has faults.</p>		
<b>Information</b>		
Type		
Purchase unit		
Purchase data		
<b>Maintenance Record</b>		
Service data	Service Content	
Telephone:	+34 93 284 69 62	DINTER, S.A. c/ Encarnació, 123-125 / 08024-Barcelona

---

 **Contact Information:**

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DINTER, S.A.

Address : c/ Encarnació, 123-125/Barcelona

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Telephone : +34 93 284 69 62

Fax : +34 93 210 43 07

E-mail : dinter@dinko.es

Website : <http://www.dinko.es>

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Note

Disposal of Waste Electrical and Electronic Equipment by users in private households in the the European Union.

This symbol on the product or on the packing indicates that this cannot be disposed of as household waste. You must dispose of your waste equipment by handing it over to the applicable take-back scheme for the recycling of electrical and electronic equipment. For more information about recycling of this equipment please contact your city office, the shop where you purchased the equipment or your household waste disposal service. The recycling of materials will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and environment.

## Accessories

Code	Articles
6.3200.01	Cuvette holder 1x10mm path light
6.3200.02	Cuvette holder 4x10mm path light
6.3200.03	Cuvette holder 4x50mm path light
6.3200.04	Cuvette holder 4x100mm path light
6.3200.04	Cuvette holder 1x10mm path light for recirculation water
6.3200.05	Micro Cuvette holder , adjustable
6.3200.06	Transparent Film holder
6.3200.07	Tube holder , max. 20 mm Ø
6.3200.08	Peltier System 15°C to 65°C
6.3200.09	Sipper system 1 to 256s
6.3200.10	Peltier / Sipper system
6.6900.07*	Micro printer
6.3000.01	PC Software-Quantitative/Scanning/Kinetics/Multi- wavelength/AND/Protein
8.9749.00*	PC with monitor TFT 19"
6.6900.03	Halogen lamp visible, all models
6.6900.04	Deuterium lamp, ultraviolet, for UV-4000 model

Code	Articles
6.3200.11	Cuvette with lid, glass, 1.7ml, path light 5mm, 4pcs
6.6900.05	Cuvette with lid, glass, 3.5ml, path light 10mm, 4pcs
6.3200.12	Cuvette with lid, glass, 7ml, path light 20mm, 4pcs
6.3200.13	Cuvette with lid, glass, 10.5ml, path light 30mm, 4pcs
6.3200.15	Cuvette with lid, glass, 17.5ml, path light 50mm, 4pcs
6.3200.16	Cuvette with lid, glass, 34ml, path light 100mm, 4pcs



**OTHER DINKO APPARATUS**

- Colorimeters
- Extractor for mince analysis
  
- Heater Metallic Blocks
- Heater Plates
  
- Infrared Ovens
- Kits for Water Analysis
  
- Magnetic Stirrers.
  
- Muffle Furnaces to 1200°C
- Nephelometers
  
- Orbital Shakers
  
- Peristaltic Pumps
- Photometers
- Rotary Stirrers
  
- Sand Baths
  
- Spectrophotometers
  
- Stirrers
  
- Temperature Controllers
- Timers
- Trichinoscopes
- Turbidimeters
- Turn Dishes
- Vacuum Pumps