Labotronics

UV-Visible Spectrophotometers

LB-10UVS

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1. Safety Measures

- Read the entire user manual carefully before you unpack, set up, or operate the device.
- Wrong operations could lead to serious injury to the operator or damage to the device.
- To make sure that the protection provided by this instrument is not impaired, do not use or install this instrument in any manner other than that specified in these operating instructions.
- The source lamps are operated at high temperatures.
- To avoid the risk of electrocution, make sure the instrument is disconnected from the power source before changing the lamps.

Cautions:

- Health hazards caused by ozone.
- Hazardous levels of ozone can be generated when the UV lamp is not cooled.
- Burn hazard, allow the lamp(s) to cool down for at least 30 minutes before theyare serviced/replaced.

Warning:

- Health hazards caused by UV light.
- UV light can cause eye and skin damage.
- Protect eyes and skin from direct exposure to UV light.
- Do not look directly at an energized lamp without UV safety glasses.

Dangerous:

- Potential danger with contact with chemical/biological substances.
- Working with chemical samples, standards, and reagents can be dangerous.
- Make yourself familiar with the necessary safety procedures and the correct handling of the chemicals before use and read and follow all relevant safety datasheets.

2. Introduction

UV-Visible Spectrophotometer LB-10UVS is a light intensity measuring unit with deuterium lamp for prevention of ozone inhalation. The SiO2 coated optical mirror enables uninterrupted propagation of light and reduces contamination through external sources. Characterization of PC software expands its scope of applications.

3. Features

1. Double wavelength and triple wavelength test feature
2. Photometric detection by fixed wavelength
3. Multi-Wavelength configuration for measurement of transmittance and absorbance
4. Testing and storage capacity of 240 data in each curve
5. Efficient time course scanning and reaction rate calculations
6. Three modal standard curve

4. Specifications

Model No.	LB-10UVS
Optical system	Single beam (1200 lines/mm grating)
Wavelength range	190 nm ~ 1100 nm
Spectral bandwidth	2 nm
Wavelength accuracy	± 0.5 nm
Wavelength repeatability	≤ 0.3 nm
Photometric accuracy	± 0.002 A (0 Abs ~ 0.5 Abs)
	0.004 A (0.5 Abs ~ 1.0 Abs)
	±0.5% T (0% T ~ 100% T)
Photometric repeatability	0.001 Abs (0 Abs ~ 0.5 Abs)
	0.002 Abs (0.5 Abs ~ 1.0 Abs)
	≤ 0.2% T (0% T ~ 100 %)
Stray light	≤ 0.05% T at 360 nm, 220 nm
Stability	± 0.001 A/h at 500 nm
Baseline flatness	± 0.002 A
Noise	± 0.0005 A
Display	TFT LCD
Photometric mode	T.A.C.E
Photometric range	0% T ~ 200% T
	-0.301 Abs ~ 3.0 Abs
Detector	Silicon photodiode
Light source	Deuterium lamp; Tungsten lamp
Input	Membrane keypad
Output	USB print and data output
	PC Connection
Power	AC 110 V ±10%; 50 Hz
	AC 220 V ±10%; 60 Hz
Dimensions	620 × 500 × 370 mm
Gross weight	18 kgs

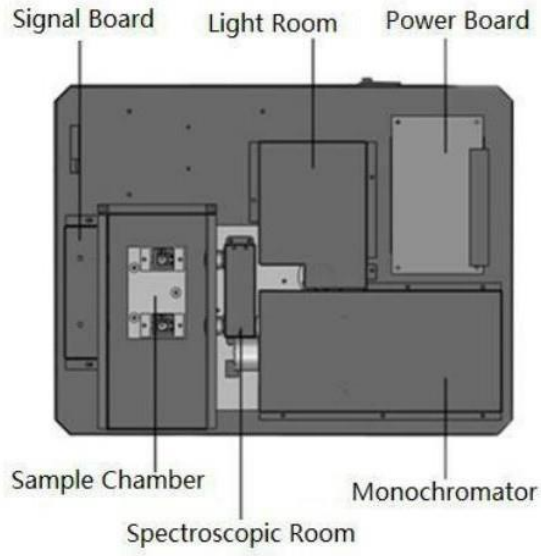
5. Applications

Used for concentration measurement, photometric analysis, impurities detection in the fields of biology, biochemical, pharmaceutical, environmental science, food, chemical, genetic, quality control, etc.

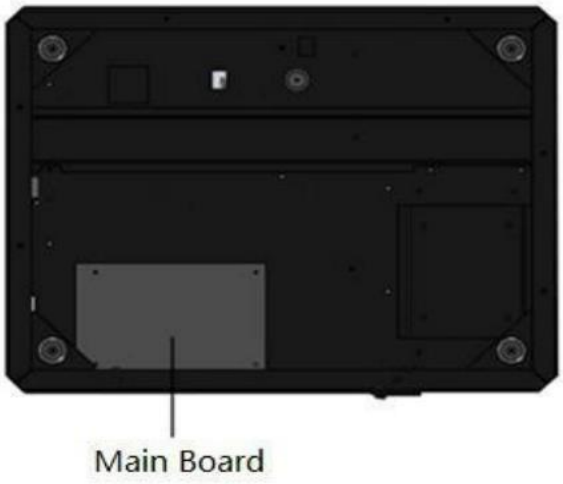
6. Instrument Introduction

Overall structure consists of three parts: an optical system, a power system, and a micro-computer system.

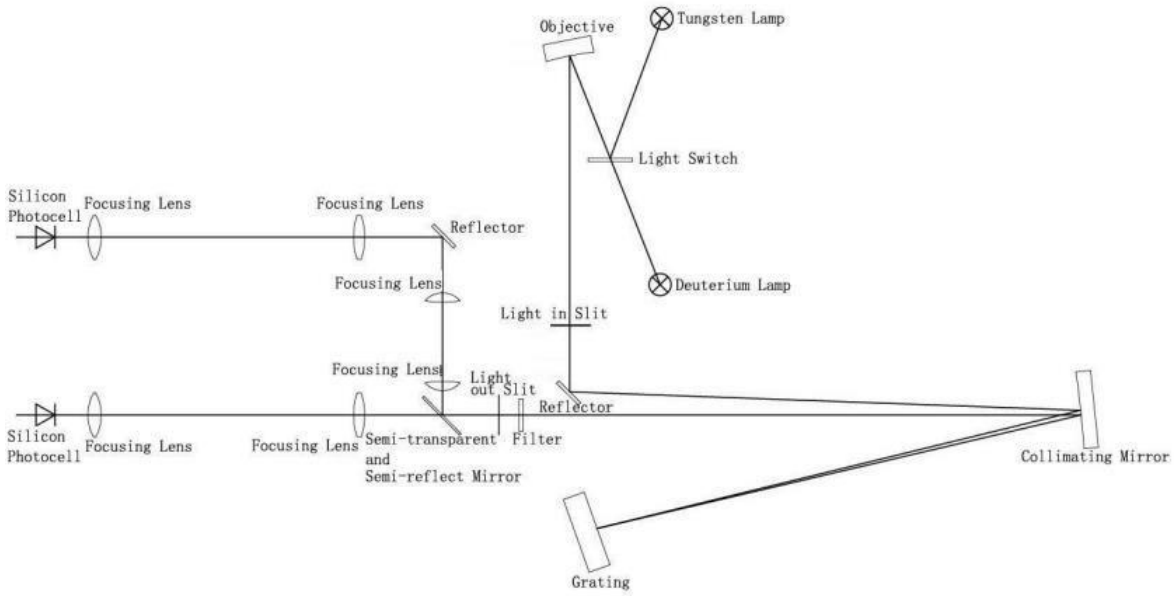
6.1 Top View of Structure



6.2 Bottom View of Structure



6.3 Light Path Diagram



6.4 Important part of the instrument

1. **Power Board:** The 110-220V/50Hz-60Hz power conversion and regulation outside access to the necessary equipment: 11.5V (tungsten lamp power), +12 V (fan power, electrical power), +5 V (computer system power), + /-15V (signal board power supply), deuterium lamp filament preheating, and lit power deuterium lamp is lit up and the power breakdown.
2. **Light Room:** There are tungsten halogen lamps and deuterium lamp source devicesto automatically switch.
3. **Tungsten Halogen:** Visible spectral region. Applicable wavelength range 340-1100nm. Because it uses the principle of the halogen cycle, it has a greater intensity of light emission and longer life. The halogen cycle requires a higher temperature. Thus, lamps commonly use quartz glass or high-temperature glass.Tungsten halogen lamps emit energy in the visible region around the operating voltage is proportional to the fourth power, therefore, to make light stable, the model has a stability of less than 0.2% of the power supply, the other imported Philips halogen socket tungsten halogen lamp replacement to ensure stable and easy to use and long life.
4. **Deuterium Lamp:** suitable wavelength range of 190-340nm. When deuterium lamp operation, maximum energy sources in the vicinity of 230nm, 486.0nm, and656.1nm and has two characteristic lines, can be used for instrument calibration wavelength accuracy in the visible region. Stability of the steady flow of less than0.02% of the models, to ensure stable deuterium lamps, seat belt deuterium lamp replacement lamps to ensure the convenience and use of the stability and long life.

5. **Monochromator:** Contains spectral components - Grating into the slit, mirror, focusing lens, and the wavelength filter drive system, the monochromaticlight emitted from the composite light can be decomposed into monochromatic may lead to any wavelength of monochromatic light from optical separation.
6. **Raster:** The dispersion of the original, the model uses 1200 / mm holographic grating to ensure high resolution and low stray light.
7. **Filter:** Due to the grating spectrum spectral overlap exists between the problem class times, so the use of filters to eliminate the spectral overlap problem.

   Action slits, the slit in the monochromator is large, and the resolution of the instrument is not only related to the dispersion of the grating and the size of the image (i.e., the slit width).
8. The slit is too large, the color band deteriorates, is not conducive to the qualitative analysis, quantitative analysis also affect the linear range of the calibration curve, the slit is too small, flux decreased, reducing the signal-to-noise ratio, affects the measurement accuracy, the slits there is two general representation of the width, the actual width of the slit of a knife-edge between the two expressed (in mm), the other to represent the bandwidth of spectral bands (in nm).
9. **Spectroscopic Room:** Contains a half-mirror, focusing lens, and reflector toachieve a beam monochromator out into two beams of light in different directions.
10. **Sample Chamber:** Fixed 2-position cuvette holder, one is for reference solution, and the other is for sample solution. The 8-position cell changer is optional.
11. **Signal Board:** Transfer to the motherboard processed signal detection light amplification.
12. **Mainboard:** Instrument micro control unit, control instruments light source switch, the motor rotates, the signal processor display, etc.

7. Installation

1) After unpacking, carefully check the packing list inside if the object is complete and intact.
2) Determine whether the work environment meets the foregoing requirements, the ambient temperature of 10 to 35 ℃relative humidity less than 85%, operating voltage of110-220V/50-60HZ.
3) The instrument is placed on a horizontal platform, the instrument should avoid direct sunlight and be away from electromagnetic launchers and high-power electrical devices,the use of the environment can't have dust, corrosive gases, and vibration.
4) Around the instrument there is no obstacle to the flow of air.
5) Check the sample chamber, ensure that there is no solution or foreign matter, and the process of self-test to ensure that the sample compartment lid is closed, you can't half-open (this is very important otherwise affects the instrument self-test results and normaluse!).
6) Turn on the instrument. Then the instrument makes a self-test. After that, the instrument can be operated normally. In case there is an error alarm halfway through, refer to the chapter on instrument troubleshooting.
7) **Note:** Use only a grounded socket for the connection of thisdevice to the power supply. If you are not sure if the sockets are grounded, have this checked by a qualified electrician. The power plug serves in addition to the power supplyto isolate the device quickly from the power source where necessary. During the disconnection from the power source, it must be made sure that the correct power plug is pulled (for example by labeling the sockets).
8) This is recommended for long-term storage and can prevent potential dangers in the event of a fault. Therefore, make sure that the socket to which the device is connected iseasy to always reach each user.

8. Working Principle

8.1 The nature of absorption

- The spectrophotometric analysis method is the use of substancesto choose a different wavelength of light absorption characteristics established.
- Typicallyusing a prism or grating to obtain monochromatic light that passes through the continuous monochromatic solution, the solution was measured, and the absorption of each wavelength, the absorption spectrum curve obtained.
- Absorption spectrum selective absorption of light from the material, which is the material of macroscopic phenomena, and the nature of the molecular absorption is the result of internal movement and light interaction.
- When molecules absorb certain wavelengths of spectral energy or by some wavelengths of the spectrum are absorbed to form the absorption spectra.
- The smaller the energy absorption, the wavelength of light corresponding to the absorption peak at a longer wavelength.
- When the infrared absorbent is formed in the infrared absorption spectrum, if the energy absorption is larger, the shorter the wavelength corresponds to the absorption peak at a shorter wavelength when generating the ultraviolet absorption spectra of absorption in the ultraviolet region.

8.2 Absorption Law - Lambert-Beer law: When a parallel beam passes through the homogeneous solution, the absorbance of monochromatic light is proportional to the product of the solution concentration and thickness.

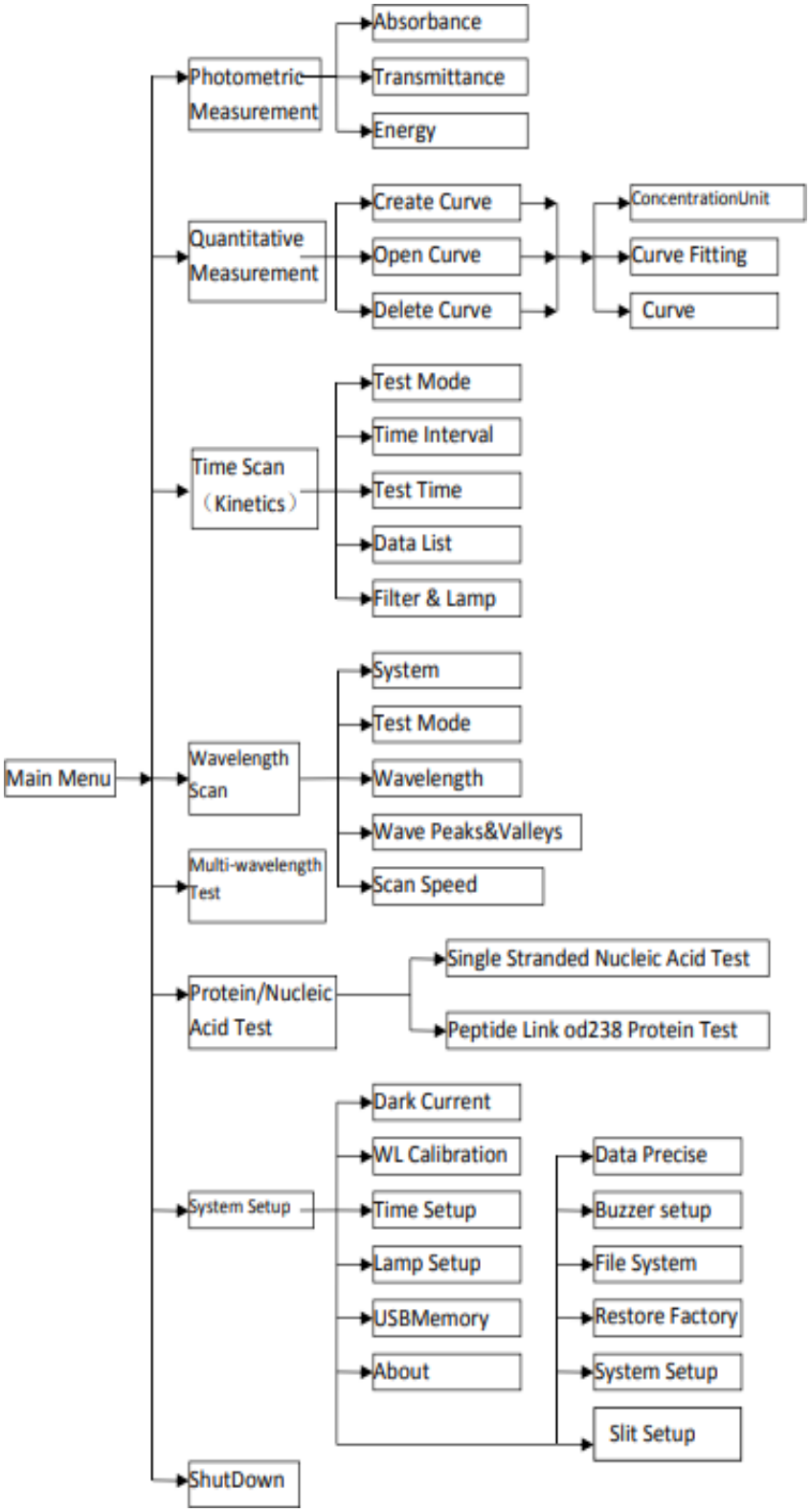
Its digital expression: A=KCL=LogI0/I=Log T.

Premise absorption laws established numeric expression:

① The incident light is monochromatic.
② The absorption process without interaction of each substance, the absorbance of each substance has additivity.
③ The role of light and matter is limited to the absorption process, with no fluorescent and photochemical scattering phenomena.
④ absorbent system is a continuous uniform distribution.

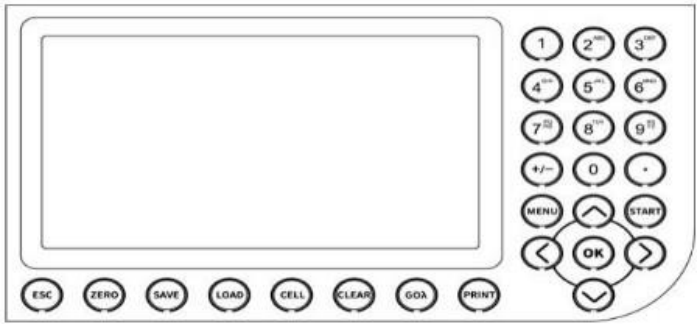
9. Operations

9.1 Main Function



9.2 Basic Functions

Panel schematic diagram



Button function descriptions

Button name	Button functional description
【MENU】	Menu key under each function
【PRINT】	Print output button
【SAVE】	File storage button
【LOAD】	File open button
【ESC】	Back, cancel button, test stop button
【CLEAR】	Clear key to delete the input data, delete files
【GOλ】	Set the wavelength
【ZERO】	Adjust 100%T and 0Abs, build user baseline key
【OK】	Confirmation button, function, menu selection button
【START】	Test beginning button
【0】 - 【9】	Number button
【.】	The decimal point
【+/-】	Plus or minus sign
【↑】, 【↓】	Up and down key
【←】, 【→】	Left and Right key
【CELL】	Automatic sample holder button

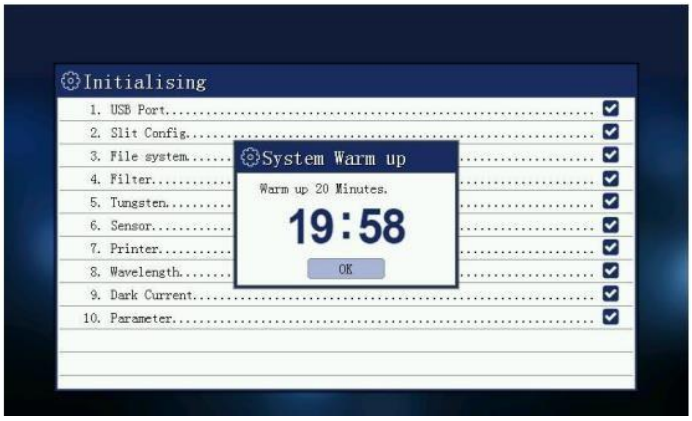
Basic Operation

1) **How to adjust the blank**
   In any test interface, put the cuvette containing the reference solution into the cuvetteslot, and pull it into the light path, press the 【Zero】 key to adjust the blank.
2) **How to set the wavelength**
   In any measurement interface press 【Go λ】 key to set the current working wavelength.
3) **Store files in text or cvs format (use Excel format for simple spreadsheet file)**

9.3 Programs

Instrument Self-test

After users switch on the instrument, it will go through self-checking process.



1) **Communication port inspection**
   Check whether the communication port of the instrument is working properly or not. The result is displayed correctly √ and an error is ×, the buzzer alarm.

2) **File system check**
   Check the instrument's built-in flash file system is correct. If the result is displayed correctly √, an error will reformat the file system.

3) **Filter positioning**
   Check the instrument's filter motor and locator are working correctly. The result is displayed correctly as √, an error as ×, the buzzer alarm.

4) **Light positioning**
   Check the instrument light switch motor and its locator is working correctly. The result is displayed correctly √, an error is displayed result is ×, the buzzer alarm.

5) Printer check

Check the printer interface device is working properly. The result is displayed correctly √, an error is displayed result is ×, the buzzer alarm.

6) Tungsten lamp examination

Open the instrument tungsten light source, and check the operating parameters of tungsten lights are working properly. If the parameter is not working properly, then re-set the operating parameters of a tungsten lamp. Change detections are always displayed correctly, the result is always √.

7) Deuterium lamp examination

Open the deuterium light source instrument operating parameters to check the deuterium lamp is working correctly. If the parameter is not working properly, then re-set the operating parameters of the deuterium lamp. Change detections are always displayed correctly, the result is always √.

8) Signal detector check

Check signal detector instrument is working correctly. The result is displayed correctly √, an error is displayed result is ×, the buzzer alarm.

9) Wavelength Calibration

The wavelength parameter checking instrument is working properly. Correct, then the pop-up boxes, please confirm whether the user input wavelength calibration if no user input within five seconds, then skip this. If the argument is the wrong wavelength, then start looking for a deuterium lamp to automatically correct the characteristic peak wavelength. The wavelength calibration result is displayed by √, when the correction is not passed, and then the result is ×, the buzzer alarm.

10) Dark current correction

Read instrument dark current of energy, checking eligibility. If the dark current in theproper range, which means that the dark current is correct, then displays the results √. If the dark current exceeds the maximum setting, the user is prompted dark current error. The results are displayed as ×, the buzzer alarm.

11) System parameters check

The instrument system baseline reading is correct. If correct, then the pop-up box that asks the user whether to re-enter the correction system baseline, baseline correctionsystem default does not automatically skip the 3 seconds. If an error does not exist orthe baseline, the baseline correction system directly. Showing results √, the correctionis not passed, then the result is ×, buzzer alarm. After self-testing and re-calibration, the darkcurrent, is into the main programs.

Note: After power on the instrument, the instrument will automatically self-test and initialization until after initialization is complete, the instrument will warm up for 20 minutes, 20 minutes warm-up time or press [ESC] to skip preheating case, the instrument being prompted preparatory work environment, which is the instrument re-calibration darkcurrent, set the working parameters, etc., and then enter the main menu.

9.4 Photometric Measurement

Function description

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

Set measuring mode

Press the set button, enter the measurement mode settings menu, select the desired test mode, and press [ENTER] to confirm. If you choose the energy model, energy window appearsand prompts you to select the amplifier gain.

Set wavelength

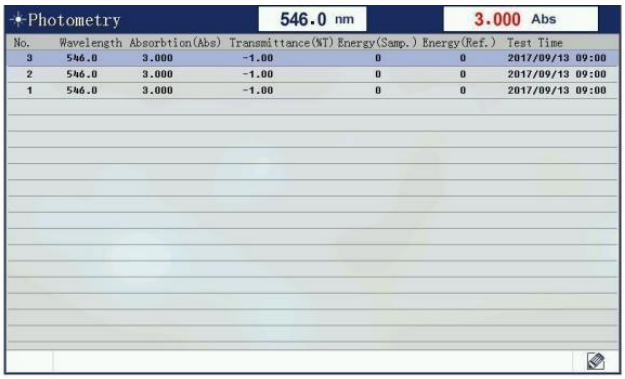
Set the current working wavelength range 190nm-1100nm, press the up and down button to open the wavelength setting window, press [0] - [9] to enter the desired wavelength, press [CLEAR] to clear the input, press [ENTER] to confirm. Input errors or exceeds the set range buzzer alarm.

Correction 100%T/0Abs

In two samples simultaneously into the two slots reference solution, and then press the [3ERO] key, the instrument will be a blank correction in the current wavelength. Display calibration is completed 100.0% T or 0.000Abs.

Measurement data

Calibrated with reference solution 100% T/0Abs, remove the rear slot reference sample solution into the sample solution, and then press the [START] button, then perform a test, thesample data are immediately added to the list.

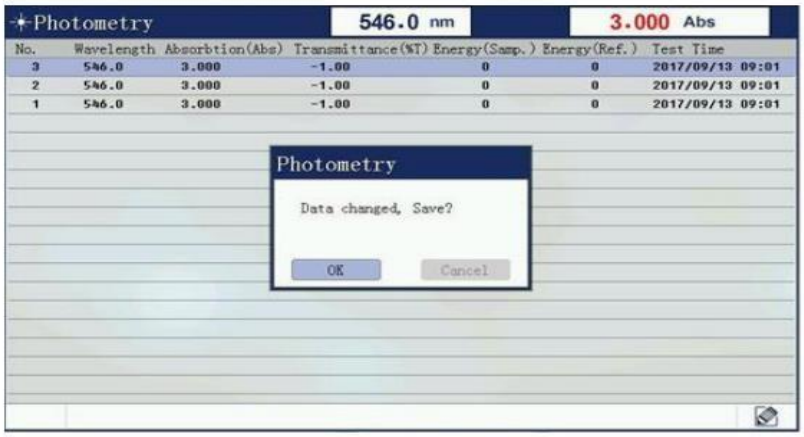


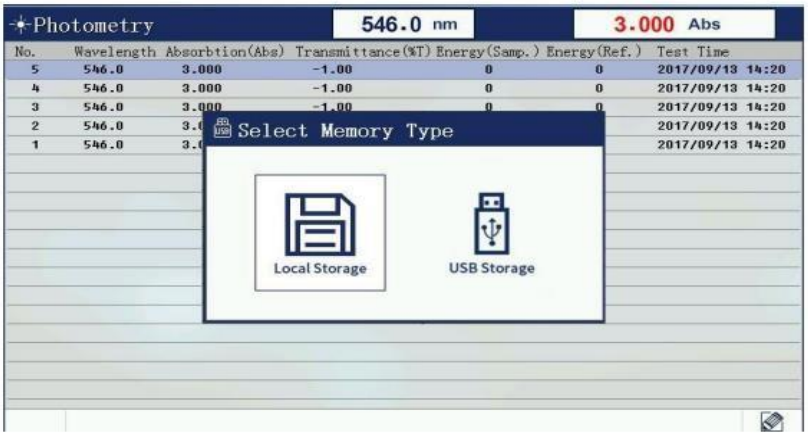
Delete data

Delete files Press the [CLEAR] button, delete files prompt box will pop up, this operation will delete all the test data currently under test. Select [Yes], the file will be deleted all the data, and select [No] will return the test window.

Save the file

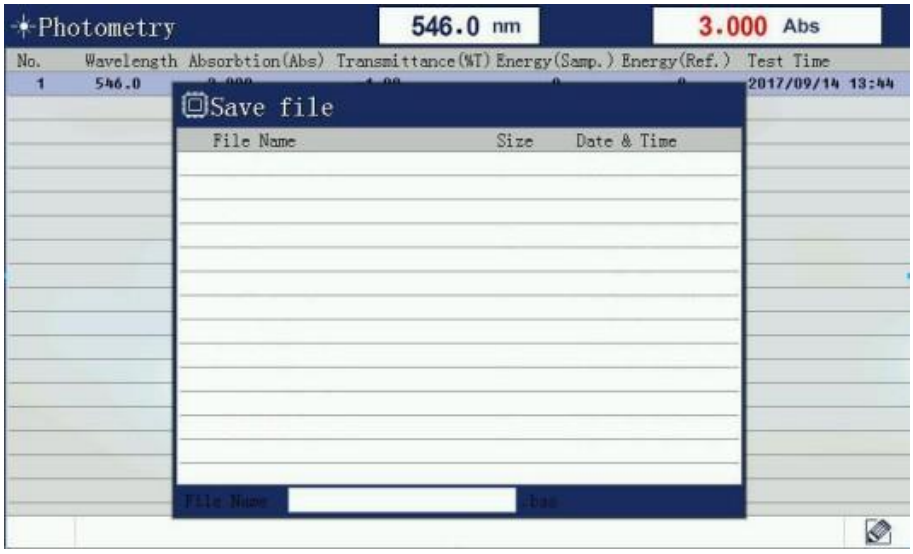
Press the Save button to save the current list of test data to a file. If this is the first time you save a file, the dialog box will pop up asking to save the file name input.





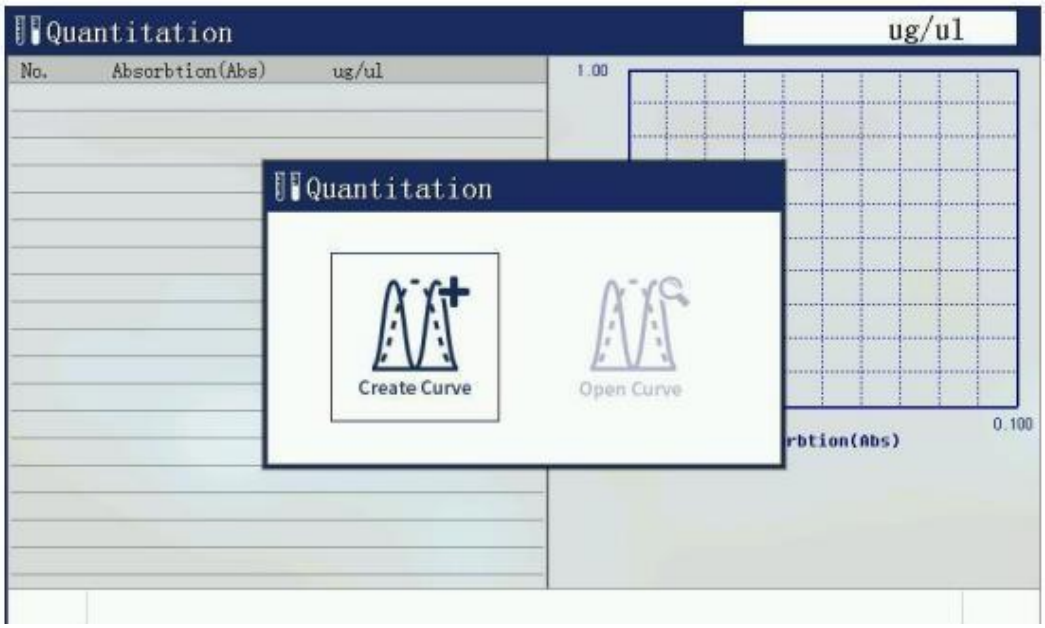
Open the file

In photometric measurement interface will be displayed by the Load button to open the window, open the window has all the photometric data file list. Select the appropriate data file and press [ENTER], the file will be read into all the test data, and then automatically enter the measurement mode.



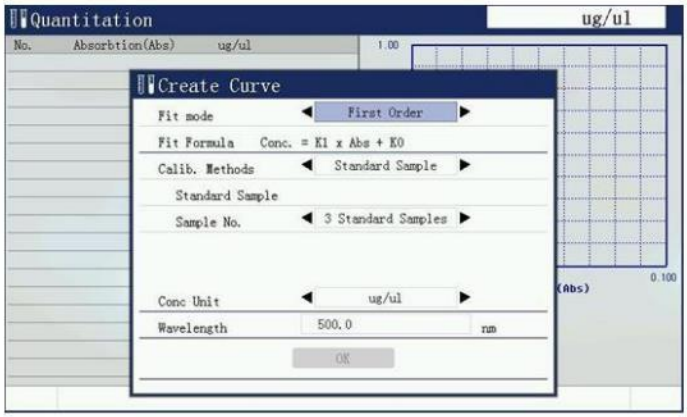
9.5 Quantitative Measurement

Select [quantitative measurement] with up and down, left and right keys, then press Enter key. there are two options: build a standard curve and open the standard curve.



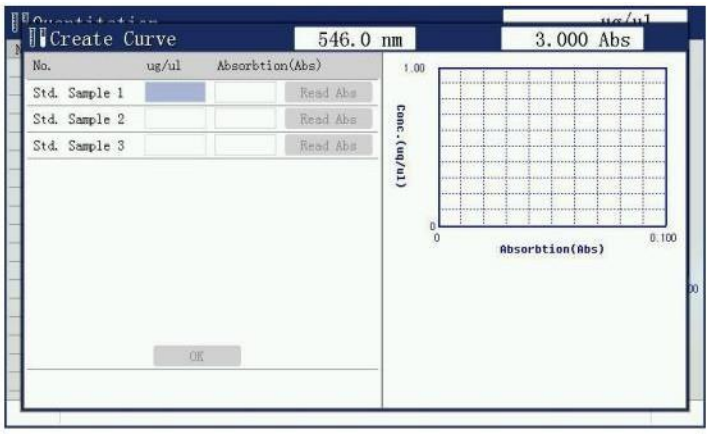
Build standard curve

Use several configured standard samples, input the concentration of sample standard, and collect the absorbance of standard sample, through the relationship between concentration and absorbance is calculated curve parameters, and use this parameter tomeasure the concentration of the sample.



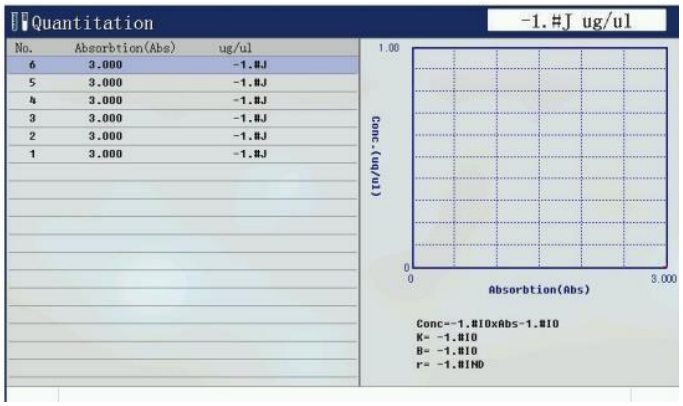
1) **Curve fitting mode:** there are first-order fitting, first-order fitting through zero, andsecond-order fitting.
2) **Curve building method:** there are standard sample methods and coefficient methods. The stand sample method is to prepare the sample first, build curve, and then testthesample. The coefficient method is to enter the known coefficient and build a standard curve, then test the sample.
3) **The number of samples:** at least 2 samples. More sample numbers, more accuratetesting data.
4) **Concentration units:** Enter the concentration value of each standard sample, because the parameters of the curve have established limits, please select the appropriate concentration units.
5) Wavelength value is required.

Standard sample measuring



Put various standard samples into a cuvette holder orderly, and enter the concentration value of each sample, then press the [enter] key, and read the absorbance ofthe sample. The input is completed, and the data of the standard sample is calculated automatically according to the parameters of the curve, displayed on the screen. If the parameter is wrong, then the buzzer alarm exits to establish the curve function.

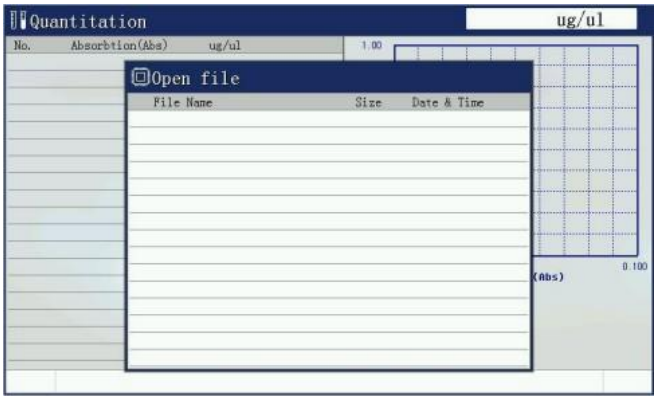
Sample test



Put the sample into the cuvette holder and press the [start] key, to get the concentration value of thecurrent sample.

Open standard curve

By opening the previously established curves for measurements. Select the appropriatequantitative test file, and press the [Enter] key to open a standard curve file.



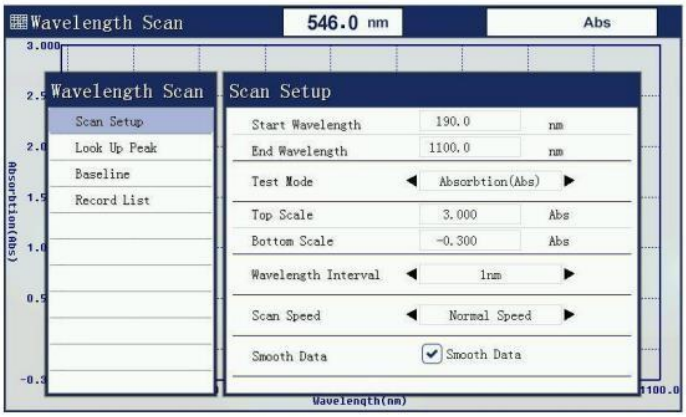
9.6 Time scan (Kinetic)

Function description

The scan time (kinetic) function is a fixed time interval to the trend in absorbance or transmittance of the test current displayed on the map. Select the time scanning (kinetic)menu option and press [ENTER].

Time scanning parameters set

Set the time to scan the scanning parameters: time interval, test time, measurementmode, the display displays the upper and lower limits.



1) Set test time

Test time is the total time of the entire test.

2) Set measurement mode

The measurement mode is absorbance, transmission, or energy. Choose a different measurement mode, you need to reset the display to display the upper and lower limits.

3) Set the upper and lower limit

The different measurement modes, upper and lower displays are not the same.

4) Set the time interval

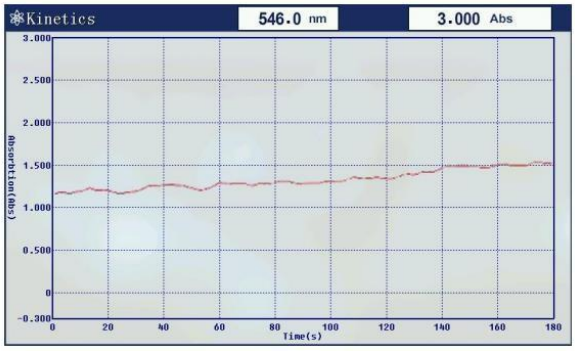
Scan scanning interval setting time, 0.5 seconds minimum, 1 minute maximum.

5) Select to make data smoothing

The function of data smoothing is to reduce the irregular fluctuation caused by the external environment during the test.

Data test

Press [START] to start measuring the current real-time map will be on the screen.

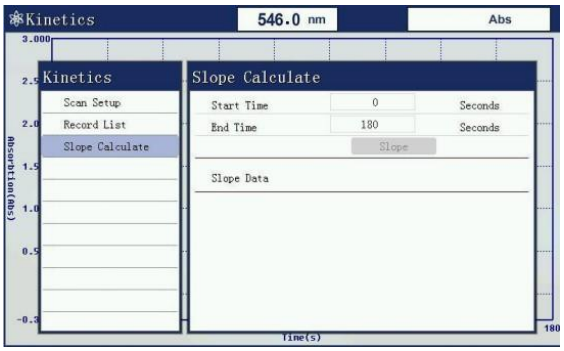


Data list

Press the [Menu] key to check the scanning data after the scanning finish.

Slope calculation

After scanning, press the [Menu] key to set the starting time and end time for slop calculation.

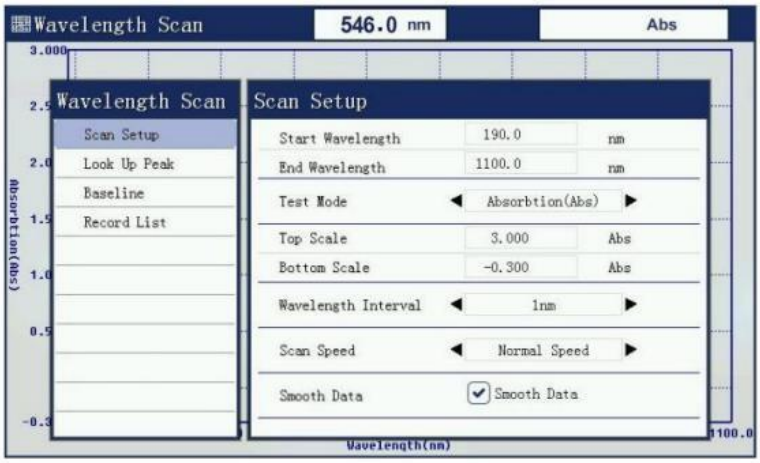


9.7 Wavelength scanning

Function description

In the set wavelength range, in a certain wavelength interval to record the absorbance of thesample and the energy transmittance value, the results are plotted in the map, which can beseen in the sample absorbance, transmittance, and the energy value trends at a different wavelength.

Set scanning parameters



1) Set start wavelength and end wavelength

The start wavelength and end wavelength mean the wavelength range used for scanning.

2) Set the measurement mode

The measurement mode is absorbance, transmission or energy. Choose different measurement mode, you need to reset the display to display the upper and lower limits.

3) Set the upper and lower limit

The different measurement modes: upper and lower display is not the same.

4) Set wavelength scan interval

Scan scanning wavelength interval from 0.1nm to 5.0nm.

5) Set scanning speed

The scanning speed determines the quantity of data collected on single point wavelength. The faster the speed, the less the collecting quantity.

6) Select to make data smoothing

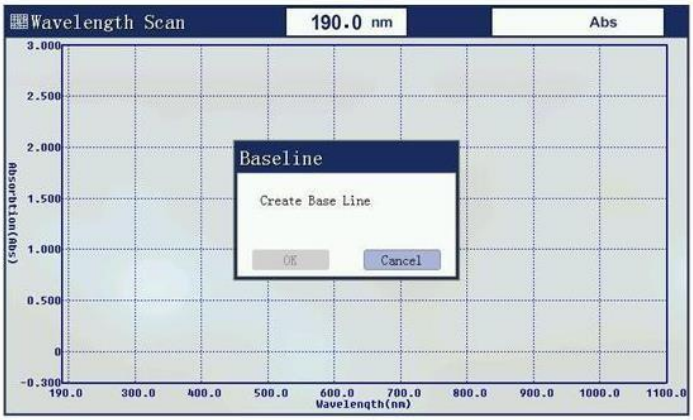
The function of data smoothing is to reduce the irregular fluctuation caused by the external environment during testing

Note:

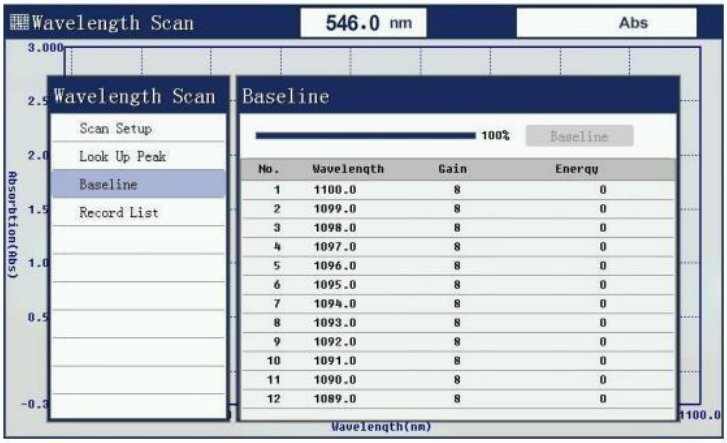
Must set the scan settings before calibration parameters blank, because the scan settings to modify the parameters, the baseline will lead to an invalid user, the user needs to re-establisha baseline.

System baseline

Before the beginning of the measurement wavelength scan, you must create a system baseline. If you have previously established a system baseline, you can skip. A long time without updating the system, re-create the system baseline.

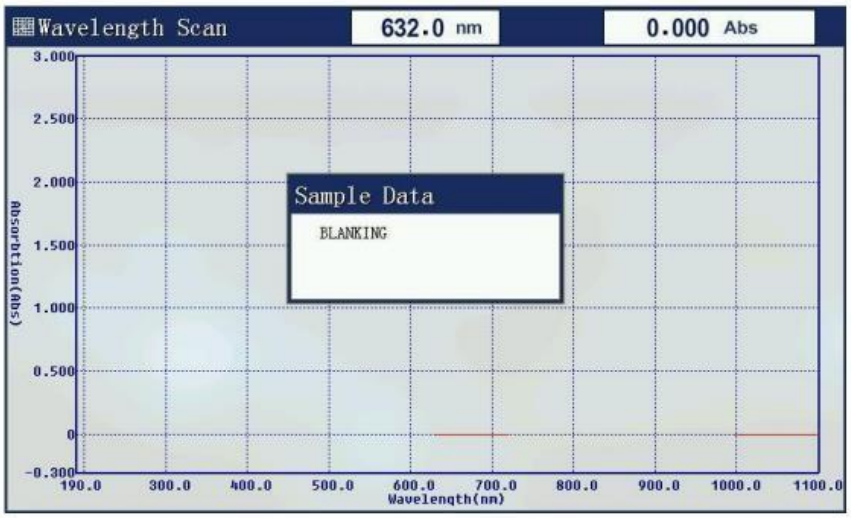


Press the [Menu] key to view the baseline data after building the system baseline.



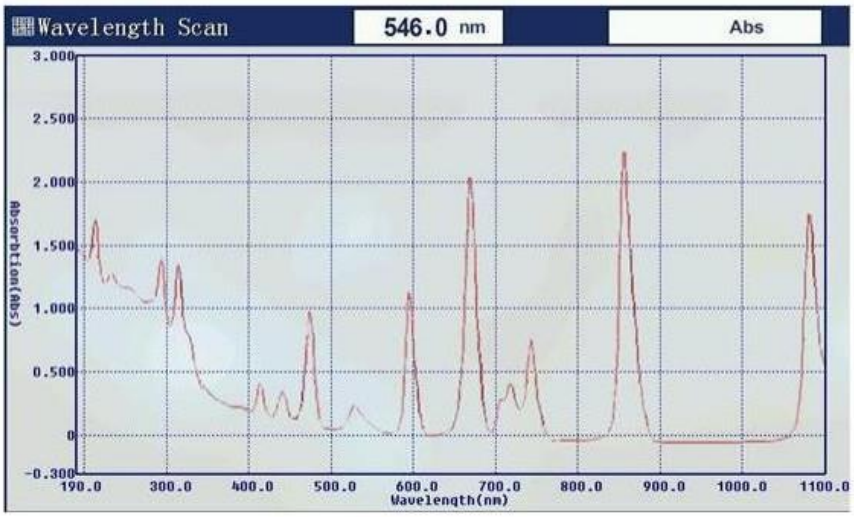
Create a user baseline (corrected blank)

Before starting the measurement, the user must establish a baseline, that is, correction of the reference sample 100% T and 0Abs.



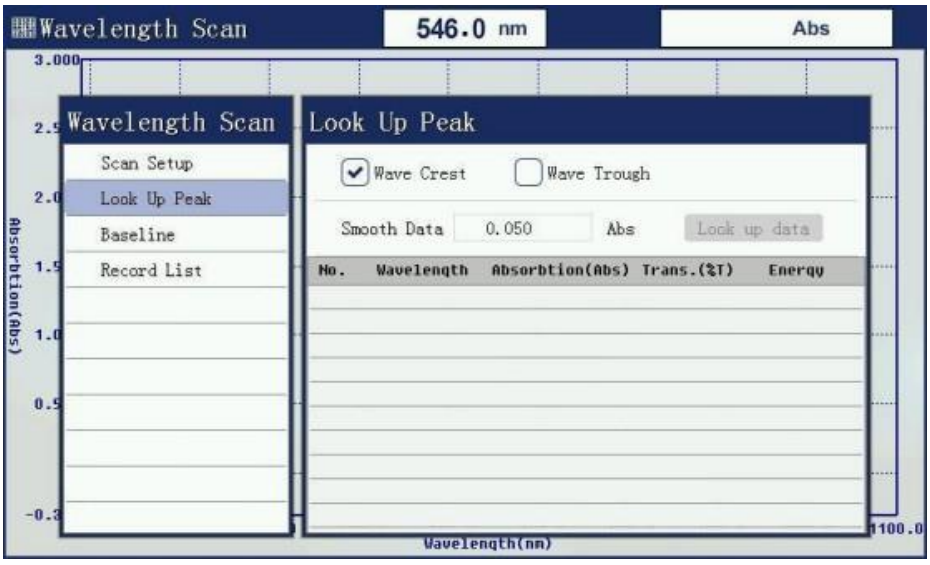
Begin testing

The tested samples were placed in the light path, press [START] to start the test.



Peaks and valleys

After the test is finished, you can choose to find peaks and valleys peaks and valleys value oftest results.



Data list

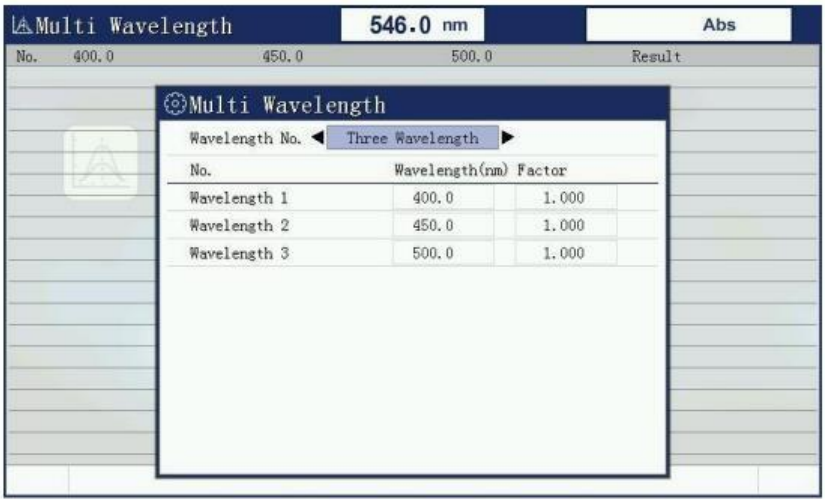
Press the [Menu] key to see the list of the test data.

9.8 Multi-wavelength test

Function description

Multi-wavelength for the user is needed to test a sample while measuring the transmittance or absorbance at a wavelength setting of several functions, the user interface can be placed in this first sample obtained values for several wavelengths simultaneously, thus simplifying user operation processes.

Set parameter



1) Set the number of wavelengths measurement

When you select a multi-wavelength test capability will be prompted to enter the number of the instrument wavelength.

2) Set test wavelength

After setting the number of wavelengths measuring wavelength will enter the setup interface, this interface inputs wavelength values of all measured using the number keys, lost a good point [ENTER] after confirming then lose the next one, until all shall be measured wavelengths losers.

Correction 100%T/0Abs

After these parameters are set, place two reference solutions for both colorimetric anti-tanks,and then press the [3ERO] key, the instrument will go to the pre-school set a good few wavelengths were blank, went after the end of the prior setting the minimum wavelength, and displays 100.0% T or 0.000Abs.

Data test

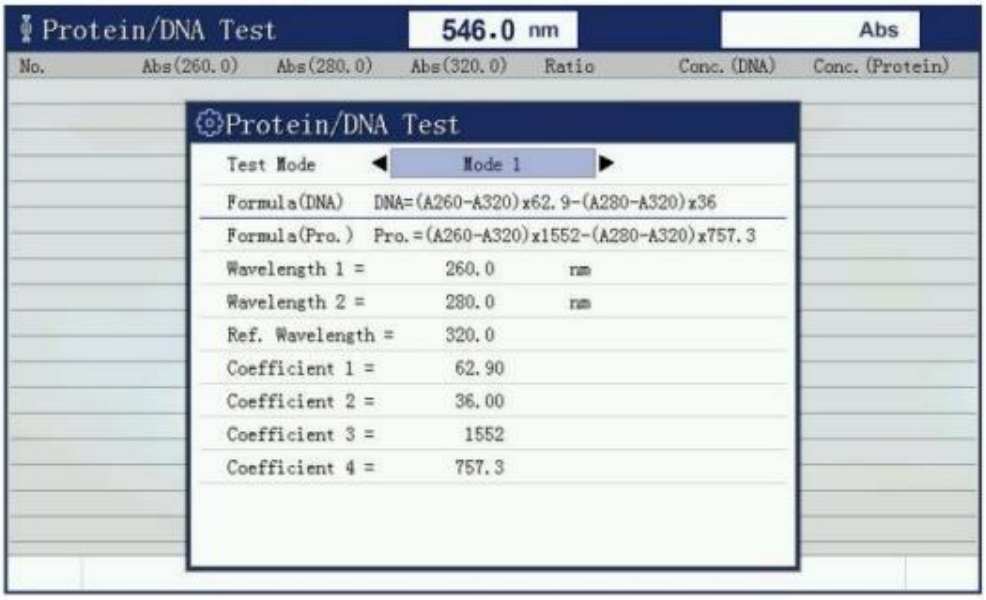
Remove the rear slot of the reference sample solution (the front does not move), and place in the sample solution is measured, and then press the [START] button will measure a set of data, if a second sample is to be measured, replace the solution after press [START], once on.

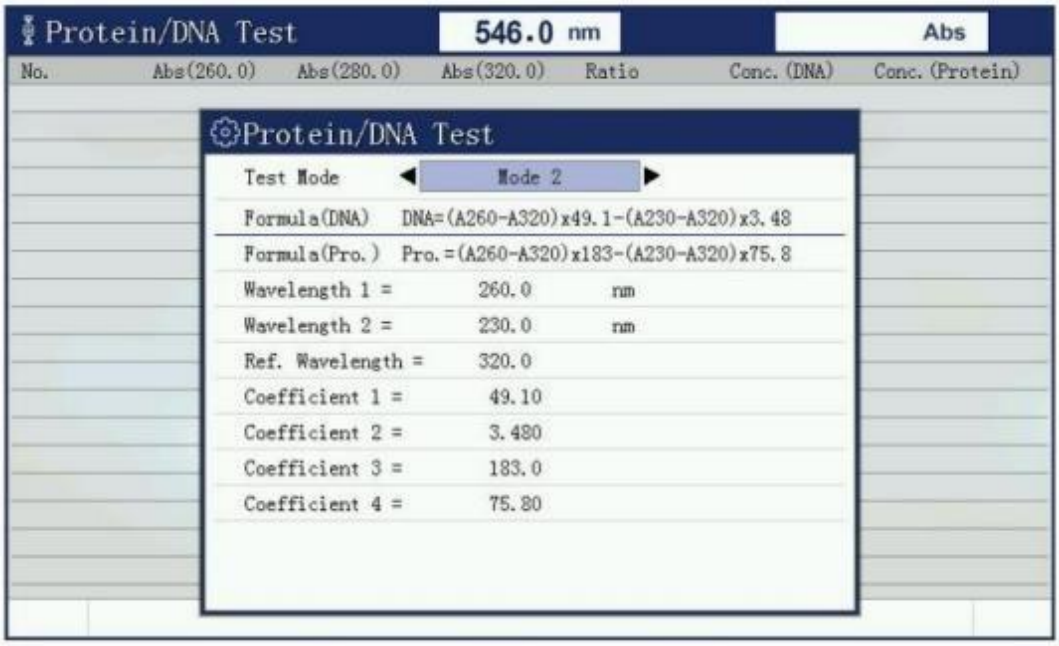
9.9 Protein/DNA measurement

Function description

Protein / nucleic acid comprises two tests: Measurement of protein and single-stranded nucleic acid testing. The curve and parameter are installed inside the instrument for the two tests and users can make tests without building the standard curve again.

Parameter selection



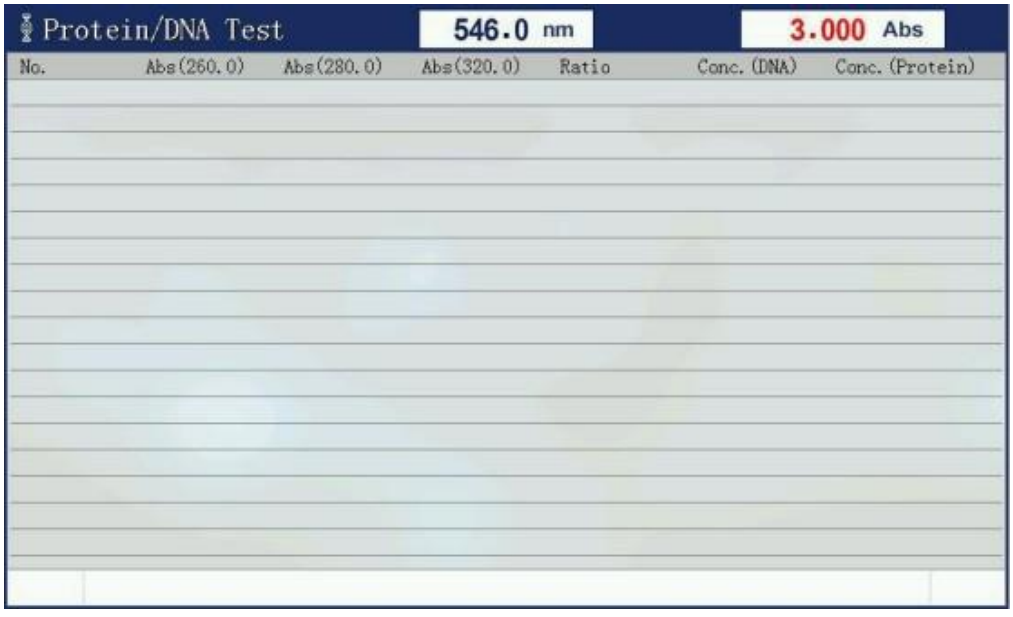


Set zero

Put reference solution into light path after selecting mode and press the [Zero] key to set zero.

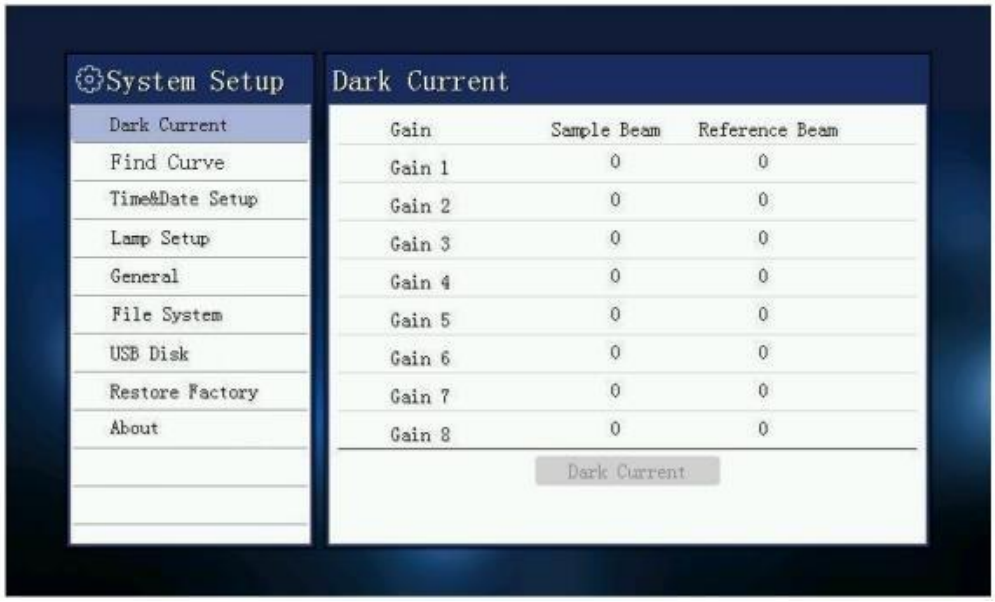
Test

Put the sample solution into the light path and press the [Start] key to measure.



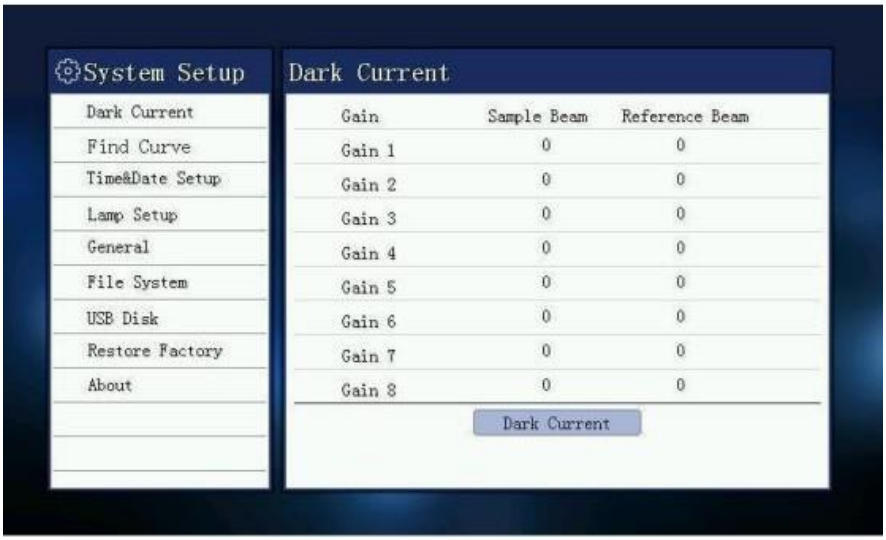
9.10 System Setup

Press the icon [System], you will enter the system setup window.



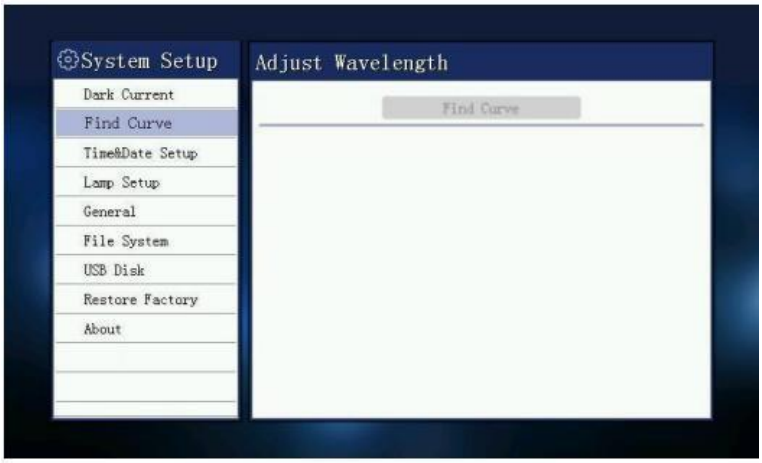
Dark current measurements

Long-time operation of the instrument probably leads to the drift of dark current. this function can correct full range of dark current. Make sure to cover the sample chamber lid when testing dark current.



Looking for a deuterium lamp curve

This function is to locate the 656.1nm wavelength characteristic curve by looking at a deuterium lamp, and wavelength calibration. If the seek fails the deuterium lamp characteristic curve, the wavelength is an invalid instrument, and the instrument will not work.



Time and date settings

Set the time and date of the instrument, set the year, month, day, hour, minute, second. By the arrow keys select the year, month, day, hour, minute, and second, through the numeric keys currently selected content. Press Enter to confirm your entry, press Esc to abandon input.

Note: Time and date will not power down after the instrument is switched off.

Light source management

Deuterium lamps and tungsten light source light switches control the display ofeach light source life. Up and down keys to select the source, press Enter to confirm the selection, the arrow keys to select the state of the light source, and press Enter to confirm the selection.

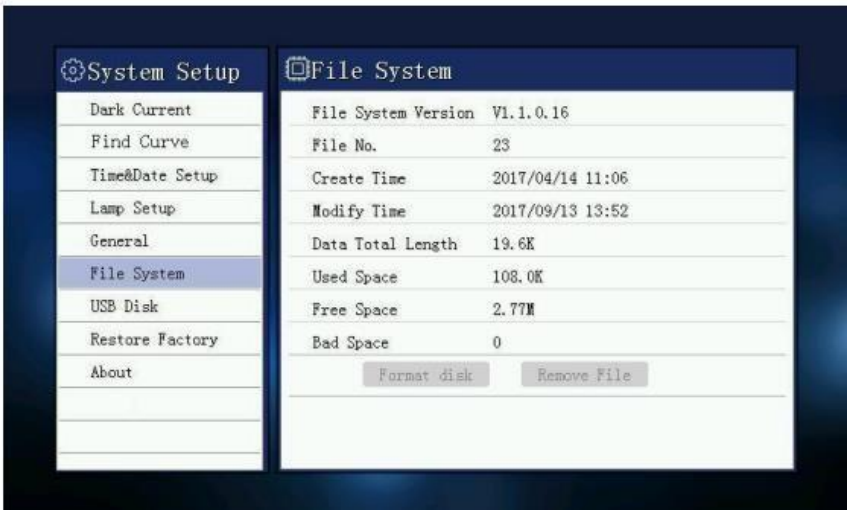
Note: Open deuterium lamp needs preheating after 15 seconds before they can open.

General

You can see the language option, data precise, beep setup, screen brightness and font setup.

File system

Here you can see file status in local storage, you can format the disk and delete all fileshere.



USB storage device

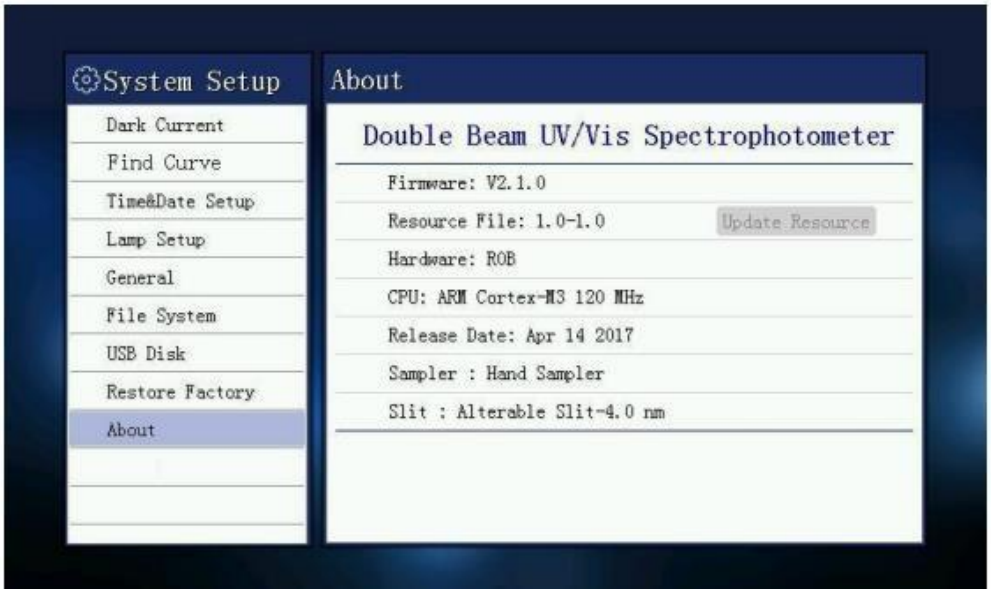
It shows the status of the external USB flash drive.

Restore factory settings

This operation will restore all system configuration information, this operation does not affect the system baseline and data files.

System information

You can view software version and hardware version information.



10. Maintenance

Cautions:

- Potential Chemical, Biological Eye and Skin Hazards.
- Only qualified personnel should conduct the tasks described in this section of the manual.

Notice:

- Remove all cells remaining in the instrument.
- Dispose of the cells or their contentsin an authorized manner.
- Correct use is the best safeguard for equipment maintenance, with emphasis on the use of the environment and mobile devices, in addition to the requirements previously proposed for use, we must also pay attention to the following issues:

1) Cleaning Requirement

Danger:

- Chemical exposure hazard.
- Gas from a chlorine compound and UV light reaction can cause death.
- Do not usechlorine compounds for cleaning.

Caution

- Potential Pinch, Eye, Burn, and Chemical Hazards.
- Before cleaning, always disconnect the instrument from the power source.

2) Spectrophotometer Cleaning

- Only clean the housing, the cell compartments, and all accessories with a soft, damp cloth.
- A mild soap solution can also be used.
- Do not get excess water in the cell compartments.
- Insert no brush and no sharp objects in the cell compartment, to avoid damage to mechanical components.
- Dry the cleaned parts carefully with a soft cotton.

3) Display Cleaning

- Do not scratch the display.
- Never touch the display with ball pens, pencils, or similar pointed objects.
- Clean the display with a soft, lint- and oil-free cotton cloth.
- Diluted window **cleaner**liquid can also be used.

4) Cuvettes/cells

CAUTION:

- Potential Chemical/ Biological Exposure Hazards.
- User correct laboratory practices if a risk of chemical exposure exists.
- After use, clean the glass cells with cleaning agents.
- Afterwards, rinse the cuvettes/sample cells several times with tap water and then thoroughly with deionized water.

Note: Glass cuvettes/sample cells that have been used for organic solvents (such as chloroform, benzene, toluene, etc.) must be rinsed with acetone before being treated with cleaning agents. In addition, another rinse with acetone is necessary as a final treatment step before the cuvettes/sample cells are dried.

5) Routine precautions

- Use the dust cover to prevent dust accumulation when the instrument is not working for a long time.
- Be careful not to spill solution into the sample chamber, to prevent corrosion, for some volatile samples, we recommend using the cuvette lid to prevent the impact of volatile gases to light, thus affecting the accuracy of the test equipment.
- Check every part of the instrument to make sure they are not lost to prevent optical path deviations and affect the instrument's working properly.
- Moving instruments should be handled with care, and no heavy items can be placed on the top of the instrument, to avoid affecting the optical path shift stability and accuracy.
- Wavelength calibration is recommended once a week to improve the accuracy of themeasured data, not necessary to do it every time.
- The instrument can't be left unused for a long time, which will shorten its life, and running 1- 2 times a week is recommended, half an hour each time.

11. Troubleshooting

Refer to the following table for common troubles.

Failures	Causes	Solutions
Boot no reaction	There is no electrical outlet.	Check the external powersupply.
	The power cord is not plugged in.	Re-seated host power.
	The socket switch inline fuse burned.	Replace the spare fuse embedded or purchase thefuse of the same size.
	The instrument socket switch is broken.	
	Internal power supply board or transformer burned.	
Display error	Internal wiring is a loose display.	Open the housing and re-seat the wire under the guidance of service personnel.
	The internal +5 V power supply is not normal or loose cable.	Open the housing and re-seat The cable is under the guidance of service personnel.
	Internal procedures by the unexpected collapse of the high-frequency voltage shock.	
	The motherboard is not working properly.	

12. Accessories

Standard Accessories

Sr. No.	Name of the accessory	Quantity
1	10 mm glass cuvette	4 units
2	10 mm quartz cuvette	2 units

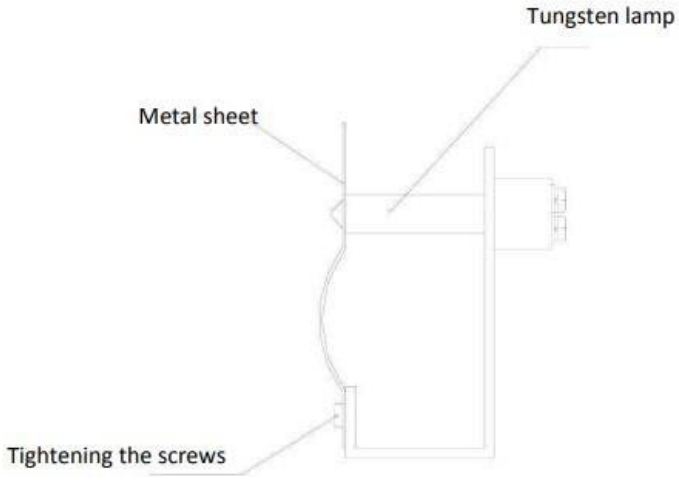
Optional Accessories

Sr. No.	Name of the accessory
1.	Single cell holder
2.	General cell holder
3.	Test tube holder
4.	Solid sample holder
5.	Deuterium lamp
6.	Halogen lamp
7.	4 place cell holder
8.	Printer
9.	Water jacketed cell holder (4 cells capacity)
10.	Reflection accessory 5°
11.	Auto 8 cell changer
12.	Micro cell holder
13.	Water jacketed cell holder (1 cell capacity)
14.	Constant temperature

13. Replacement

Tungsten lamp replacement

- Turn off the instrument and unplug the power cord and disconnect the equipment on both sides of the four screws fastening the shell and the shell gently removing the left vertical against the instrument.
  (Note: The connecting wire between the housing and the base plate, so after the fastening of the housing screws are not removed toomuch force is to pull the housing to prevent the pull-beam break).
- Remove the lamp compartment cover with three fixing screws and gently remove the lamp compartment cover.
  (Note: If the instrument has been open for some time thelamp compartment cover will be very hot).
- Find the objects shown in the following figure, loose fastening sheet metal screws, pull out a tungsten lamp, and the new tungsten lamp according to the original position seated, and put on a solid metal piece tighten the screws (to ensure tungsten light positive).



- Turn on the instrument, make a tungsten lamp light, and convert the light source switching mirror to a horizontal position manually.
- Loosen the screws seat switch motors, and seat motors to move the focus to switch intothe slit in the smallest and tungsten lights centered.
- Replace the lamp compartment cover (be careful not to press the right side of the line) and the instrument housing (do not press the display line) and tighten the corresponding screws.
- Re-POST, after the completion of the self-test mode in the wavelength photometricmeasurements were walked at 340nm, 370nm, 1000nm, and 1100 nm let automatic zero.
- If it does not display the low-energy lamp replacement is completed, if there is low energy, repeat the above steps.